HELICOPTER ENGINES

TURBOSHAFT

ARRIEL 2
C1

MAINTENANCE MANUAL

VOLUME 1

No. X 292 N4 450 2

Original issue: Aug. 16/1998
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LETTER

This covering letter is not part of the MAINTENANCE MANUAL.
Do not keep it on the MAINTENANCE MANUAL.

Bordes, Jun. 15/2022

Dear Sir / Madam,

The *ARRIEL 2 C1 MAINTENANCE MANUAL No. X 292 N4 450 2* has been subject to normal update No. 50 on Jun. 15/2022.

A description of the update (description, pages to be removed or inserted) is provided below.

We remain at your disposal for any further information you may require. Very truly yours

Technical Publications

Task Number	Description	Pages to be removed	Pages to be inserted
TITLE PAGE - 1	Integration	ALL	1
TITLE PAGE - 2	Integration	ALL	1
TITLE PAGE - 3	Integration	ALL	1
TITLE PAGE - 4	Integration	ALL	1
LIST OF EFFECTIVE PRELIMINARY PAGES	Integration	ALL	1 - 2
STATEMENT OF APPROVAL	Integration	ALL	1 - 2
HIGHLIGHTS	Integration	ALL	1 - 2
LIST OF CHAPTERS BY CHAPTER NO.	Integration	ALL	1 - 2
LAP - 05	Integration	ALL	1 to 2
05-10-00-APP-801-A01	Integration	ALL	1 to 2
05-10-01-200-801-A01	Integration	ALL	1 to 2
05-15-00-201-801-A01	Integration	ALL	1 to 4
LAP - 71	Integration	ALL	1 to 6
TDM - 71	Integration	ALL	1 to 6
71-00-02-940-801-A01	Integration	ALL	1 to 12
71-01-00-940-803-A01	Integration	ALL	1 to 4
71-02-10-940-801-A01	Integration	ALL	1 to 6
71-02-12-280-803-A01	Integration	ALL	201 to 202

Task Number	Description	Pages to be removed	Pages to be inserted
71-05-01-280-801-A01	Integration	ALL	201 to 204
71-05-01-550-801-A01	Integration	ALL	1201 to 1210
71-05-01-551-802-A01	Integration	ALL	1201 to 1204
71-05-01-551-803-A01	Integration	ALL	1201 to 1208
71-05-01-551-804-A01	Integration	ALL	1201 to 1208
71-05-01-551-805-A01	Integration	ALL	1201 to 1214
71-05-01-551-807-A01	Integration	ALL	1201 to 1204
71-05-01-551-808-A01	Integration	ALL	1201 to 1204
LAP - 72	Integration	ALL	1 to 12
TDM - 72	Integration	ALL	1 to 10
72-00-00-950-801-A01	Integration		701 to 704
72-00-15-900-801-A01	Integration	ALL	701 to 716
72-00-43-200-806-A01	Integration	ALL	801 to 806
72-00-61-900-801-A01	Integration	ALL	701 to 720
72-43-00-950-801-A01	Integration	ALL	701 to 710
72-61-00-900-806-A01	Integration	ALL	701 to 704
72-61-00-900-811-B01	Integration	ALL	701 to 710
72-61-00-900-812-B01	Integration	ALL	701 to 708
72-61-00-200-806-A01	Integration	ALL	801 to 804

Task Number	Description	Pages to be removed	Pages to be inserted
72-61-00-750-803-A01	Integration	ALL	1301 to 1304
72-61-20-950-801-B01	Integration	ALL	701 to 714
72-61-20-950-801-B02	Integration	ALL	701 to 714
LAP - 73	Integration	ALL	1 to 6
73-23-13-950-801-B01	Integration	ALL	701 to 718
73-23-13-950-801-C01	Integration	ALL	701 to 718
LAP - 75	Integration	ALL	1 to 2
75-31-00-200-802-A01	Integration	ALL	801 to 804
LAP - 77	Integration	ALL	1 to 2
77-11-00-200-801-A01	Integration	ALL	801 to 804
77-11-00-750-801-A01	Integration	ALL	1301 to 1304
77-12-00-200-801-A01	Integration	ALL	801 to 804
77-12-00-750-801-A01	Integration	ALL	1301 to 1304

CAUTION

COMPONENTS FROM AIRCRAFT INVOLVED IN ACCIDENTS

During an aircraft accident, the engine components can be subjected to damage which alters their resistance or performance characteristics. These components must be repaired by an approved entity or discarded.
In no cases, shall these components involved in accidents must be used again as is.
The use of an accidented component can affect the engine operation in flight.

CONTINUED AIRWORTHINESS

We remind you that the continued airworthiness of engines is the responsibility of the owner, lessor and/or operator of this equipment.
As continued airworthiness manager, you must record the actions done on the engine in the engine log book.
If you do not record the actions done in the engine log book, this can (lead to inappropriate use of the engine and ultimately) affect engine operation and compromise flight safety.

RIGHTS OF USE

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CAUTION

CAUTION: USE WITH SERVICE BULLETINS

1. TABLE OF NEW TASK REFERENCES USED IN SERVICE BULLETINS

A. Task numbers have changed due to Maintenance Manual restructuring. Use enclosed table of new task references to get new task numbers

SB Reference	*TU Reference*	*Current Task Number used in SB*	*New Task Number after restructuring*
292 72 2006	TU 006	71-02-13-280-001	71-02-13-280-801
292 72 2006	TU 006	79-00-00-280-001	79-00-00-200-801
292 72 2006	TU 006	71-02-10-760-001	71-02-10-760-801
292 72 2014	TU 014	71-02-13-280-001	71-02-13-280-801
292 72 2014	TU 014	79-00-00-280-001	79-00-00-200-801
292 72 2014	TU 014	71-02-10-760-001	71-02-10-760-801
292 72 2020	TU 020	71-02-13-280-001	71-02-13-280-801
292 72 2022	TU 022	71-02-13-280-001	71-02-13-280-801
292 72 2022	TU 022	79-00-00-280-001	79-00-00-200-801
292 72 2022	TU 022	71-02-10-760-001	71-02-10-760-801
292 72 2023	TU 023	71-02-13-280-001	71-02-13-280-801
292 72 2023	TU 023	79-00-00-280-001	79-00-00-200-801
292 72 2023	TU 023	71-02-10-760-001	71-02-10-760-801
292 72 2033	TU 033	71-02-13-280-001	71-02-13-280-801
292 72 2034	TU 034	71-02-13-280-001	71-02-13-280-801
292 77 2035	TU 035	71-02-13-280-001	71-02-13-280-801
292 72 2036	TU 036	71-02-13-280-001	71-02-13-280-801
292 72 2036	TU 036	79-00-00-280-001	79-00-00-200-801
292 72 2036	TU 036	71-02-10-760-001	71-02-10-760-801
292 72 2041	TU 041	71-02-13-280-001	71-02-13-280-801
292 72 2041	TU 041	79-00-00-280-001	79-00-00-200-801
292 72 2041	TU 041	71-02-10-760-001	71-02-10-760-801
292 72 2044	TU 044	71-02-13-280-001	71-02-13-280-801
292 72 2044	TU 044	79-00-00-280-001	79-00-00-200-801
292 72 2044	TU 044	71-02-10-760-001	71-02-10-760-801

CAUTION

SB Reference	*TU Reference*	*Current Task Number used in SB*	*New Task Number after restructuring*
292 72 2046	TU 046	71-02-13-280-001	71-02-13-280-801
292 72 2047	TU 047	71-02-13-280-001	71-02-13-280-801
292 72 2047	TU 047	79-00-00-280-001	79-00-00-200-801
292 72 2047	TU 047	71-02-10-760-001	71-02-10-760-801
292 72 2051	TU 051	72-00-43-900-001	72-00-43-900-801
292 72 2051	TU 051	71-02-13-280-001	71-02-13-280-801
292 72 2051	TU 051	79-00-00-280-001	79-00-00-200-801
292 72 2051	TU 051	71-02-10-760-001	71-02-10-760-801
292 79 2052	TU 052	71-02-13-280-001	71-02-13-280-801
292 79 2052	TU 052	79-00-00-280-001	79-00-00-200-801
292 73 2056	TU 056	71-02-13-280-001	71-02-13-280-801
292 72 2057	TU 057	71-02-13-280-001	71-02-13-280-801
292 72 2057	TU 057	79-00-00-280-001	79-00-00-200-801
292 72 2057	TU 057	71-02-10-760-001	71-02-10-760-801
292 72 2058	TU 058	71-02-13-280-001	71-02-13-280-801
292 72 2058	TU 058	79-00-00-280-001	79-00-00-200-801
292 72 2058	TU 058	71-02-10-760-001	71-02-10-760-801
292 72 2059	TU 059	71-02-13-280-001	71-02-13-280-801
292 72 2059	TU 059	79-00-00-280-001	79-00-00-200-801
292 72 2059	TU 059	71-02-10-760-001	71-02-10-760-801
292 72 2061	TU 061	72-00-61-900-001	72-00-61-900-801
292 72 2061	TU 061	71-02-13-280-001	71-02-13-280-801
292 72 2061	TU 061	79-00-00-280-001	79-00-00-200-801
292 72 2061	TU 061	71-02-10-760-001	71-02-10-760-801
292 72 2063	TU 063	71-02-13-280-001	71-02-13-280-801
292 72 2063	TU 063	79-00-00-280-001	79-00-00-200-801
292 72 2063	TU 063	71-02-10-760-001	71-02-10-760-801
292 72 2068	TU 068	70-40-01-470-001	70-40-01-940-801
292 72 2068	TU 068	71-02-13-280-001	71-02-13-280-801
292 72 2069	TU 069	70-40-01-470-001	70-40-01-940-801
292 72 2069	TU 069	71-02-13-280-001	71-02-13-280-801

CAUTION

SB Reference	*TU Reference*	*Current Task Number used in SB*	*New Task Number after restructuring*
292 72 2070	TU 070	71-02-13-280-001	71-02-13-280-801
292 72 2071	TU 071	71-02-13-280-001	71-02-13-280-801
292 72 2071	TU 071	79-00-00-280-001	79-00-00-200-801
292 72 2071	TU 071	71-02-10-760-001	71-02-10-760-801
292 72 2072	TU 072	71-02-13-280-001	71-02-13-280-801
292 72 2072	TU 072	79-00-00-280-001	79-00-00-200-801
292 72 2072	TU 072	71-02-10-760-001	71-02-10-760-801
292 72 2073	TU 073	72-61-00-907-001	72-61-00-900-810
292 72 2073	TU 073	71-02-13-280-001	71-02-13-280-801
292 72 2074	TU 074	71-02-10-760-001	71-02-10-760-801
292 72 2074	TU 074	71-02-13-280-001	71-02-13-280-801
292 72 2074	TU 074	79-00-00-280-001	79-00-00-200-801
292 72 2075	TU 075	71-02-10-760-001	71-02-10-760-801
292 72 2075	TU 075	71-02-13-280-001	71-02-13-280-801
292 72 2075	TU 075	79-00-00-280-001	79-00-00-200-801
292 73 2077	TU 077	73-21-00-900-001	73-21-00-900-801
292 72 2078	TU 078	71-02-13-280-001	71-02-13-280-801
292 72 2078	TU 078	79-29-00-900-002	79-29-00-900-802
292 72 2078	TU 078	79-31-00-900-001	79-31-00-900-801
292 72 2078	TU 078	73-19-00-900-004	73-19-00-900-804
292 72 2078	TU 078	73-19-00-900-005	73-19-00-900-805
292 72 2078	TU 078	72-61-00-905-001	72-61-00-900-807
292 72 2078	TU 078	72-61-00-903-001	72-61-00-900-803
292 72 2078	TU 078	72-61-00-903-002	72-61-00-900-804
292 72 2081	TU 081	72-00-61-900-001	72-00-61-900-801
292 72 2081	TU 081	72-61-20-901-001	72-61-20-900-801
292 72 2081	TU 081	79-00-00-280-001	79-00-00-200-801
292 72 2081	TU 081	71-02-10-760-001	71-02-10-760-801
292 72 2081	TU 081	71-02-13-280-001	71-02-13-280-801
292 73 2082	TU 082	71-02-13-280-001	71-02-13-280-801
292 73 2082	TU 082	73-23-00-900-001	73-23-00-900-801

CAUTION

SB Reference	*TU Reference*	*Current Task Number used in SB*	*New Task Number after restructuring*
292 73 2083	TU 083	71-02-13-280-001	71-02-13-280-801
292 73 2083	TU 083	73-23-00-900-001	73-23-00-900-801
292 72 2084	TU 084	72-00-54-900-001	72-00-54-900-801
292 72 2084	TU 084	79-00-00-280-001	79-00-00-200-801
292 72 2084	TU 084	71-02-10-760-001	71-02-10-760-801
292 72 2084	TU 084	71-02-13-280-001	71-02-13-280-801
292 75 2085	TU 085	71-02-13-280-001	71-02-13-280-801
292 75 2085	TU 085	75-31-00-751-001	75-31-00-750-801
292 72 2087	TU 087	79-00-00-280-001	79-00-00-200-801
292 72 2087	TU 087	71-02-10-760-001	71-02-10-760-801
292 72 2087	TU 087	71-02-13-280-001	71-02-13-280-801
292 77 2089	TU 089	77-12-00-900-001	77-12-00-900-801
292 77 2089	TU 089	71-02-13-280-001	71-02-13-280-801
292 73 2092	TU 092	71-02-13-280-001	71-02-13-280-801
292 73 2096	TU 096	73-14-00-900-001	73-14-00-900-801
292 73 2096	TU 096	75-29-00-900-004	75-29-00-900-804
292 72 2100	TU 100	79-00-00-280-001	79-00-00-200-801
292 72 2100	TU 100	71-02-10-760-001	71-02-10-760-801
292 72 2100	TU 100	71-02-13-280-001	71-02-13-280-801
292 77 2101	TU 101	71-02-13-280-001	71-02-13-280-801
292 77 2101	TU 101	77-12-00-900-001	77-12-00-900-801
292 72 2103	TU 103	79-00-00-280-001	79-00-00-200-801
292 72 2103	TU 103	71-02-10-760-001	71-02-10-760-801
292 72 2103	TU 103	71-02-13-280-001	71-02-13-280-801
292 72 2104	TU 104	79-00-00-280-001	79-00-00-200-801
292 72 2104	TU 104	71-02-10-760-001	71-02-10-760-801
292 72 2104	TU 104	71-02-13-280-001	71-02-13-280-801
292 73 2105	TU 105	73-23-00-900-001	73-23-00-900-801
292 73 2105	TU 105	71-02-13-280-001	71-02-13-280-801
292 72 2107	TU 107	79-00-00-280-001	79-00-00-200-801
292 72 2107	TU 107	71-02-10-760-001	71-02-10-760-801

CAUTION

SB Reference	*TU Reference*	*Current Task Number used in SB*	*New Task Number after restructuring*
292 72 2107	TU 107	71-02-13-280-001	71-02-13-280-801
292 73 2111	TU 111	71-02-13-280-001	71-02-13-280-801
292 72 2112	TU 112	79-00-00-280-001	79-00-00-200-801
292 72 2112	TU 112	71-02-10-760-001	71-02-10-760-801
292 72 2112	TU 112	71-02-13-280-001	71-02-13-280-801
292 72 2116	TU 116	79-00-00-280-001	79-00-00-200-801
292 72 2116	TU 116	71-02-10-760-001	71-02-10-760-801
292 72 2116	TU 116	71-02-13-280-001	71-02-13-280-801
292 72 2119	TU 119	72-00-15-900-801	72-00-15-900-801
292 72 2119	TU 119	79-00-00-280-001	79-00-00-200-801
292 72 2119	TU 119	71-02-10-760-001	71-02-10-760-801
292 72 2119	TU 119	71-02-13-280-001	71-02-13-280-801
292 77 2121	TU 121	77-12-00-900-001	77-12-00-900-801
292 77 2121	TU 121	71-02-13-280-001	71-02-13-280-801
292 72 2122	TU 122	72-00-61-900-001	72-00-61-900-801
292 72 2122	TU 122	72-61-20-901-001	72-61-20-900-801
292 72 2122	TU 122	79-00-00-280-001	79-00-00-200-801
292 72 2122	TU 122	71-02-10-760-001	71-02-10-760-801
292 72 2122	TU 122	71-02-13-280-001	71-02-13-280-801
292 77 2124	TU 124	71-02-13-280-001	71-02-13-280-801
292 73 2126	TU 126	73-14-00-900-001	73-14-00-900-801
292 73 2126	TU 126	71-02-13-280-001	71-02-13-280-801
292 73 2133	TU 133	71-02-13-280-001	71-02-13-280-801
292 73 2133	TU 133	73-23-00-900-001	73-23-00-900-801
292 73 2133	TU 133	73-23-13-901-001	73-23-13-950-801
292 75 2141	TU 141	75-29-00-900-005	75-29-00-900-805
292 75 2141	TU 141	71-02-13-280-001	71-02-13-280-801
292 72 2142	TU 142	79-00-00-280-001	79-00-00-200-801
292 72 2142	TU 142	71-02-10-760-001	71-02-10-760-801
292 72 2142	TU 142	71-02-13-280-001	71-02-13-280-801
292 72 2145	TU 145	72-00-15-900-001	72-00-15-900-801

CAUTION

SB Reference	*TU Reference*	*Current Task Number used in SB*	*New Task Number after restructuring*
292 72 2145	TU 145	79-00-00-280-001	79-00-00-200-801
292 72 2145	TU 145	71-02-10-760-001	71-02-10-760-801
292 72 2145	TU 145	71-02-13-280-001	71-02-13-280-801
292 72 2146	TU 146	72-00-54-900-001	72-00-54-900-801
292 72 2146	TU 146	79-00-00-280-001	79-00-00-200-801
292 72 2146	TU 146	71-02-10-760-001	71-02-10-760-801
292 72 2146	TU 146	71-02-13-280-001	71-02-13-280-801
292 73 2147	TU 147	73-23-00-900-001	73-23-00-900-801
292 73 2147	TU 147	71-02-13-280-001	71-02-13-280-801
292 73 2148	TU 148	73-23-00-900-001	73-23-00-900-801
292 73 2148	TU 148	71-02-13-280-001	71-02-13-280-801
292 75 2151	TU 151	75-29-00-900-004	75-29-00-900-804
292 75 2151	TU 151	71-02-13-280-001	71-02-13-280-801
292 72 2152	TU 152	72-00-43-900-001	72-00-43-900-801
292 72 2152	TU 152	79-00-00-280-001	79-00-00-200-801
292 72 2152	TU 152	71-02-10-760-001	71-02-10-760-801
292 72 2152	TU 152	71-02-13-280-001	71-02-13-280-801
292 72 2153	TU 153	72-00-32-900-001	72-00-32-900-801
292 72 2153	TU 153	79-00-00-280-001	79-00-00-200-801
292 72 2153	TU 153	71-02-10-760-001	71-02-10-760-801
292 72 2153	TU 153	71-02-13-280-001	71-02-13-280-801
292 72 2154	TU 154	72-61-10-900-001	72-61-10-900-801
292 72 2154	TU 154	71-02-13-280-001	71-02-13-280-801
292 72 2156	TU 156	72-00-15-900-001	72-00-15-900-801
292 72 2156	TU 156	79-00-00-280-001	79-00-00-200-801
292 72 2156	TU 156	71-02-10-760-001	71-02-10-760-801
292 72 2156	TU 156	71-02-13-280-001	71-02-13-280-801
292 73 2157	TU 157	73-23-00-900-001	73-23-00-900-801
292 73 2157	TU 157	71-02-13-280-001	71-02-13-280-801
292 72 2162	TU 162	72-00-43-900-001	72-00-43-900-801
292 72 2162	TU 162	79-00-00-280-001	79-00-00-200-801

CAUTION

SB Reference	*TU Reference*	*Current Task Number used in SB*	*New Task Number after restructuring*
292 72 2162	TU 162	71-02-10-760-001	71-02-10-760-801
292 72 2162	TU 162	71-02-13-280-001	71-02-13-280-801
292 72 2164	TU 164	72-00-43-900-001	72-00-43-900-801
292 72 2164	TU 164	79-00-00-280-001	79-00-00-200-801
292 72 2164	TU 164	71-02-10-760-001	71-02-10-760-801
292 72 2164	TU 164	71-02-13-280-001	71-02-13-280-801
292 72 2166	TU 166	72-00-43-900-001	72-00-43-900-801
292 72 2166	TU 166	79-00-00-280-001	79-00-00-200-801
292 72 2166	TU 166	71-02-10-760-001	71-02-10-760-801
292 72 2166	TU 166	71-02-13-280-001	71-02-13-280-801
292 72 2167	TU 167	72-00-43-900-001	72-00-43-900-801
292 72 2167	TU 167	79-00-00-280-001	79-00-00-200-801
292 72 2167	TU 167	71-02-10-760-001	71-02-10-760-801
292 72 2167	TU 167	71-02-13-280-001	71-02-13-280-801
292 72 2804		79-00-00-280-001	79-00-00-200-801
292 72 2804		71-02-10-760-001	71-02-10-760-801
292 72 2804		71-02-13-280-001	71-02-13-280-801
292 75 2809		75-31-00-751-001	75-31-00-750-802
292 72 2815		72-00-15-900-001	72-00-15-900-801
292 72 2815		72-15-00-210-001	72-15-00-200-801
292 72 2815		72-00-54-900-001	72-00-54-900-801
292 72 2815		79-00-00-280-001	79-00-00-200-801
292 72 2815		71-02-10-760-001	71-02-10-760-801
292 72 2815		71-02-13-280-001	71-02-13-280-801
292 73 2822		73-23-00-900-001	73-23-00-900-801
292 73 2822		71-02-13-280-001	71-02-13-280-801
292 73 2822		70-11-00-940-801	70-11-00-940-801
292 73 2827		73-23-00-900-001	73-23-00-900-801
292 73 2827		71-02-13-280-001	71-02-13-280-801
292 72 2829		79-00-00-280-001	79-00-00-200-801
292 72 2829		70-41-00-850-001	70-41-00-940-801

CAUTION

SB Reference	*TU Reference*	*Current Task Number used in SB*	*New Task Number after restructuring*
292 72 2829		71-02-13-280-001	71-02-13-280-801
292 72 2834		72-00-54-900-001	72-00-54-900-801
292 72 2834		79-00-00-280-001	79-00-00-200-801
292 72 2834		71-02-10-760-001	71-02-10-760-801
292 72 2834		71-02-13-280-001	71-02-13-280-801

TEMPORARY UPDATE NO. APP-27

1. GENERAL

Temporary update No. APP-27 includes the following temporary update:

– No. 05-10

2. INSTRUCTIONS

CAUTION: DO NOT REMOVE THIS TEMPORARY UPDATE UNTIL INSTRUCTED TO DO SO AS PART OF:

– A NORMAL UPDATE
– A NEW TEMPORARY UPDATE SUPERSEDING THIS ONE.

ON RECEIPT OF THE NORMAL UPDATE, UPDATE THE RECORD OF TEMPORARY UPDATES.

A. MODIFICATION

Please find herewith the Tasks which have been modified by this temporary update. Insert the pages of these Tasks before the corresponding Task of the last normal update:

- LIST OF EFFECTIVE PRELIMINARY PAGES
- APPROVAL
- LIST OF TEMPORARY UPDATES
- Task 05-10-00-APP-801-A01
- Task 05-10-01-200-801-A01 : Correction of the PN of the HP turbine disc ref. 2292260690 is replaced by ref. 0292260690.

B. CREATION

Not applicable.

C. DELETED

Not applicable.

3. INCORPORATION

Temporary update No. APP-27 will be incorporated in the MAINTENANCE MANUAL as part of the next normal update.

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LIST OF EFFECTIVE PRELIMINARY PAGES

* Page modified following update No. 50

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STATEMENT OF APPROVAL - TEMPORARY UPDATE NO. APP-27

The technical content of this document is approved under the authority of the DOA (Design Organisation Approval) ref. EASA.21J.070.

NOTE: ***The Airworthiness Limitations, written in the language used for the initial Airworthiness Limitations Section approval, are subject to specific approval of the EASA (European Union Aviation Safety Agency).***

No.	Effectivity
APP-27	C1

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STATEMENT OF APPROVAL

The technical content of this document is approved under the authority of the DOA (Design Organisation Approval) ref. EASA.21J.070.

NOTE: ***The Airworthiness Limitations, written in the language used for the initial Airworthiness Limitations Section approval, are subject to specific approval of the EASA (European Union Aviation Safety Agency).***

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HIGHLIGHTS

These HIGHLIGHTS list the main changes introduced through the update of this document. This list does not replace the transmittal letter but serves as an additional document to make it easier to identify the main effects of the update on your document.

Please continue to help us improve the quality of our documents by letting us know what you think about the content of this update via the "Managing my Maintenance Document Revision Requests" field on EngineLife® Customer Portal.

DESCRIPTION	*TASK No. / SPARES CATALOG ITEM*
Add of HP turbine disc reference.	05-10-01-200-801
Update of the task for fuels, lubricants and special products.	71-00-02-940-801
Update of the water quality criterion for the engine cleaning procedures.	71-01-00-940-803
Update of the special procedure task to return to service of an engine after storage.	71-05-01-280-801
Update of the task for conditioning, packaging and storage of the engine, modules and equipment.	71-05-01-550-801
Update of the task for short-term storage of the engine and modules.	71-05-01-551-802
Update of the task for long-term storage of the engine and modules conditioned in a sealed polyethylene cover.	71-05-01-551-803
Update of the task for long-term storage of the engine and modules conditioned in a VCI cover.	71-05-01-551-804
Update of the task for long-term storage of engine in a metal or laminated container.	71-05-01-551-805
Update of the task for storage of the engine on an airframe under shelter / under closed shelter.	71-05-01-551-807
Update of the task for storage of the engine on an airframe out of a shelter.	71-05-01-551-808
Creation of a task for replacement of the equipped spacer.	72-00-00-950-801
Update of the inspection and check task for module 03 gas generator.	72-00-43-200-806
Update of the removal/installation task for module 01 accessory gearbox and transmission shaft.	72-00-61-900-801
Update of the removal/installation task for the seal of the breather cover.	72-61-00-900-811
Update of the removal/installation task for the seal of the Dynastart adapter.	72-61-00-900-812
Update of the replacement task for the magnetic seal of the drive shaft.	72-61-20-950-801
Update of the bleed valve filter inspection and check procedure.	75-31-00-200-802

Please find below the list of tasks that have been subject to modification but without revision mark:

Task Code	*Modification description*
00-00-00-APP-801-A01	-
71-00-06-816-816-A01	DELETED
71-00-06-816-817-A01	DELETED
71-00-06-816-818-A01	DELETED
71-00-06-816-820-A01	DELETED

NORMAL UPDATE INCORPORATION SHEET

The person who incorporates the update writes its No. and date, his/her name and the date of incorporation.

Up-date No.	*Date of Up-date*	*Inserted by*	*On*	*Up-date No.*	*Date of Up-date*	*Inserted by*	*On*

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TEMPORARY UPDATE INCORPORATION SHEET

The person who incorporates the update writes its No. and date, his/her name and the date of incorporation.

No.	*Date*	*Date inserted*	*Inserted by*	*Date deleted*	*Deleted by*

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LIST OF TEMPORARY UPDATES - TEMPORARY UPDATE NO. APP-27

Yellow pages of the temporary updates mentioned in the table below must systematically be removed from the manual when inserting the corresponding normal update.

No.	*Date*	*Subject*	*Inserted in the Manual as part of update No.*
73-1	April 19/1999		01 - December 30/2000
05-1	September 20/1999		01 - December 30/2000
05-2	September 20/1999		01 - December 30/2000
71-1	September 20/1999		01 - December 30/2000
71-2	September 20/1999		01 - December 30/2000
73-2	September 20/1999		01 - December 30/2000
05-3	January 21/2000		01 - December 30/2000
71-3	January 21/2000		01 - December 30/2000
72-1	January 21/2000		01 - December 30/2000
79-1	January 21/2000		01 - December 30/2000
71-4	March 28/2000		01 - December 30/2000
05-4	August 16/2000		01 - December 30/2000
71-5	December 03/2001		01 - December 30/2000
05-5	February 03/2004	Modification of Table Life limits	07 - February 27/2004
APP-1	May 15/2004	Modification of the text	09 - September 30/2004
05-6	May 15/2004	Modification of Table of the recommended maintenance tasks	09 - September 30/2004
APP-2	November 19/2004	Modification of the text	10 - April 30/2005
72-2	November 19/2004	Modification of the procedure	10 - April 30/2005
APP-3	April 29/2005	Modification of the text	10 - April 30/2005
71-6	May 20/2005	New task	10 - April 30/2005
APP-4	March 29/2006	Modification of the date of approval	13 - March 30/2006
71-7	March 29/2006	Modification of Task 71-02-07-282-001	13 - March 30/2006
75-1	March 29/2006	Modification of Task 75-41-00-750-001	13 - March 30/2006
APP-5	March 29/2006	Modification of the date of approval	13 - March 30/2006
71-8	March 29/2006	Modification of Task 71-00-02-940-001	13 - March 30/2006
APP-6	June 30/2006	Modification of the date of approval	14 - July 30/2006
71-9	June 30/2006	Modification of Task 71-02-07-282-001	14 - July 30/2006

No.	*Date*	*Subject*	*Inserted in the Manual as part of update No.*
75-2	June 30/2006	Modification of Task 75-41-00-282-001	14 - July 30/2006
APP-7	July 28/2006	Modification of the date of approval	14 - July 30/2006
73-3	July 28/2006	Modification of Task 73-23-00-900-001	14 - July 30/2006
APP-8	July 28/2006	Modification of the date of approval	14 - July 30/2006
71-10	July 28/2006	Modification of Task 71-00-06-817-859	14 - July 30/2006
73-4	July 28/2006	Modification of Task 73-14-00-750-001	14 - July 30/2006
APP-9	November 28/2006	Modification of the date of approval	15 - November 30/2006
73-5	November 28/2006	Modification of Task 73-23-13-902-001	15 - November 30/2006
APP-10	July 16/2007	Modification of the date of approval	17 - July 30/2007
72-3	July 16/2007	Modification of Task 72-00-43-280-001 Modification of Task 72-00-43-282-001	17 - July 30/2007
APP-11	July 29/2007	Modification of the date of approval	17 - July 30/2007
72-4	July 29/2007	Modification of Task 72-00-43-282-001	17 - July 30/2007
APP-12	September 14/2007	Modification of the date of approval	18 - January 30/2008
71-11	September 14/2007	Modification of Task 71-00-06-816-804	18 - January 30/2008
APP-13	January 04/2008	Modification of the date of approval	18 - January 30/2008
73-6	January 04/2008	Modification of Task 73-14-00-900-001	18 - January 30/2008
73-6	January 04/2008	Modification of Task 73-14-01-900-001	18 - January 30/2008
APP-14	January 28/2008	Modification of the date of approval	18 - January 30/2008
72-5	January 28/2008	Modification of Task 72-00-43-281-001	18 - January 30/2008
APP-15	March 29/2008	Modification of the date of approval	19 - March 30/2008

No.	*Date*	*Subject*	*Inserted in the Manual as part of update No.*
71-12	March 29/2008	Modification of Task 71-02-09-760-001 Trouble shooting - 71-00-06 Modification of Tasks : Failures observed during operation Failures observed during maintenance 71-00-06-815-801 71-00-06-815-802 71-00-06-816-814 71-00-06-816-815	19 - March 30/2008
APP-16	November 20/2008	Modification of the date of approval	21 - November 30/2008
05-7	November 20/2008	Modification of Task 05-10-00 GENERAL Modification of Task 05-10-00-200-001 Modification of Task 05-20-00-200-001	21 - November 30/2008
APP-17	November 09/2009	Modification of the date of approval	23 - November 30/2009
72–6	November 09/2009	Modification of Task 72-00-32-900-801 Modification of Task 72-00-43-900-801	23 - November 30/2009
APP-18	March 15/2011	Modification of the date of approval. This Temporary update No. APP-18 includes the temporary update No. 72-11	26 - May 30/2011
72-11	March 15/2011	Modification of Task 72-00-32-280-801 Modification of Task 72-00-32-280-801	26 - May 30/2011
APP-19	Sept. 07/2011	Modification of the date of approval. This Temporary update No. APP-19 includes the temporary update No. 73-11	27 - November 30/2011
73-11	Sept. 07/2011	Modification of Task 73-23-13-750-801 New Task 73-23-13-750-801	27 - November 30/2011
APP-20	Feb. 06/2012	Modification of the date of approval. This Temporary update No. APP-20 includes the temporary updates No. 70-1 and No. 71-17	28 - March 30/2012
70-1	Feb. 06/2012	Modification of Task 70-11-00-940-803	28 - March 30/2012

No.	*Date*	*Subject*	*Inserted in the Manual as part of update No.*
71-17	Feb. 06/2012	Modification of Task 71-02-10-760-801 New Task 71-02-10-760-801 New Task 71-02-10-940-801	28 - March 30/2012 28 - March 30/2012 28 - March 30/2012
APP-21	March 20/2013	Modification of the date of approval. This Temporary update No. APP-21 includes the temporary update No. 72-12	31 - March 30/2013
72-12	March 20/2013	Modification of Task 72-61-20-950-801 Modification of Task 72-61-20-950-801	31 - March 30/2013 31 - March 30/2013
APP-22	January 31/2014	Modification of the date of approval. This Temporary update No. APP-22 includes the temporary update No. 05-8 and No. 73-12	34 - April 30/2014
05-8	January 31/2014	Modification of Task 05-20-00-200-001	34 - April 30/2014
73-12	January 31/2014	New Task 73-21-00-280-810	34 - April 30/2014
APP-23	July 18/2014	Modification of the date of approval. This Temporary update No. APP-23 includes the temporary update No. 71-18	35 - October 30/2014
71-18	July 18/2014	Modification of Task 71-05-01-550-801 Modification of Task 71-05-01-551-801 Modification of Task 71-05-01-551-803 Modification of Task 71-05-01-551-804 Modification of Task 71-05-01-551-805	35 - October 30/2014 35 - October 30/2014 35 - October 30/2014 35 - October 30/2014 35 - October 30/2014
APP-24	Jan. 09/2015	Modification of the date of approval. This Temporary update No. APP-24 includes the temporary update No. 72-13	36 - May 30/2015
72-13	Jan. 09/2015	Modification of Task 72-43-00-900-803	36 - May 30/2015
APP-25	March 15/2016	Modification of the date of approval. This Temporary update No. APP-25 includes the temporary update No. 05-9	38 - May 30/2016
05-9	March 15/2016	Modification of Task 05-10-00-APP-801	38 - May 30/2016

No.	*Date*	*Subject*	*Inserted in the Manual as part of update No.*
		Modification of Task 05-10-01-200-801	
APP-26	August 31/2020	Modification of the date of approval. This Temporary update No. APP-26 includes the temporary update No. 71-19	47 - December 30/2020
71-19	August 31/2020	Modification of Task 71-71-00-700-801	47 - December 30/2020
APP-27	August 16/2022	Modification of the date of approval. This Temporary update No. APP-27 includes the temporary update No. 05-10	
05-10	August 16/2022	05-10-00-APP-801-A01 Modification of Task 05-10-01-200-801-A01	

NOTE: ***APP number is a sequential number. APP numbers result in a non-interrupted sequence (example: APP-03 is followed by APP-04).***
An APP number can group several Temporary Updates.
RT number includes the chapter number concerned and is a unique number.
RT numbers might result in an interrupted sequence (example: RT 72-03 can be followed by RT 72-06).

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72-1	January 21/2000		01 - December 30/2000
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75-1	March 29/2006	Modification of Task 75-41-00-750-001	13 - March 30/2006
APP-5	March 29/2006	Modification of the date of approval	13 - March 30/2006
71-8	March 29/2006	Modification of Task 71-00-02-940-001	13 - March 30/2006
APP-6	June 30/2006	Modification of the date of approval	14 - July 30/2006
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73-3	July 28/2006	Modification of Task 73-23-00-900-001	14 - July 30/2006
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72-3	July 16/2007	Modification of Task 72-00-43-280-001 Modification of Task 72-00-43-282-001	17 - July 30/2007
APP-11	July 29/2007	Modification of the date of approval	17 - July 30/2007
72-4	July 29/2007	Modification of Task 72-00-43-282-001	17 - July 30/2007
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APP-13	January 04/2008	Modification of the date of approval	18 - January 30/2008
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APP-14	January 28/2008	Modification of the date of approval	18 - January 30/2008
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72–6	November 09/2009	Modification of Task 72-00-32-900-801 Modification of Task 72-00-43-900-801	23 - November 30/2009
APP-18	March 15/2011	Modification of the date of approval. This Temporary update No. APP-18 includes the temporary update No. 72-11	26 - May 30/2011
72-11	March 15/2011	Modification of Task 72-00-32-280-801 Modification of Task 72-00-32-280-801	26 - May 30/2011
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70-1	Feb. 06/2012	Modification of Task 70-11-00-940-803	28 - March 30/2012

No.	*Date*	*Subject*	*Inserted in the Manual as part of update No.*
71-17	Feb. 06/2012	Modification of Task 71-02-10-760-801 New Task 71-02-10-760-801 New Task 71-02-10-940-801	28 - March 30/2012 28 - March 30/2012 28 - March 30/2012
APP-21	March 20/2013	Modification of the date of approval. This Temporary update No. APP-21 includes the temporary update No. 72-12	31 - March 30/2013
72-12	March 20/2013	Modification of Task 72-61-20-950-801 Modification of Task 72-61-20-950-801	31 - March 30/2013 31 - March 30/2013
APP-22	January 31/2014	Modification of the date of approval. This Temporary update No. APP-22 includes the temporary update No. 05-8 and No. 73-12	34 - April 30/2014
05-8	January 31/2014	Modification of Task 05-20-00-200-001	34 - April 30/2014
73-12	January 31/2014	New Task 73-21-00-280-810	34 - April 30/2014
APP-23	July 18/2014	Modification of the date of approval. This Temporary update No. APP-23 includes the temporary update No. 71-18	35 - October 30/2014
71-18	July 18/2014	Modification of Task 71-05-01-550-801 Modification of Task 71-05-01-551-801 Modification of Task 71-05-01-551-803 Modification of Task 71-05-01-551-804 Modification of Task 71-05-01-551-805	35 - October 30/2014 35 - October 30/2014 35 - October 30/2014 35 - October 30/2014 35 - October 30/2014
APP-24	Jan. 09/2015	Modification of the date of approval. This Temporary update No. APP-24 includes the temporary update No. 72-13	36 - May 30/2015
72-13	Jan. 09/2015	Modification of Task 72-43-00-900-803	36 - May 30/2015
APP-25	March 15/2016	Modification of the date of approval. This Temporary update No. APP-25 includes the temporary update No. 05-9	38 - May 30/2016
05-9	March 15/2016	Modification of Task 05-10-00-APP-801	38 - May 30/2016

No.	*Date*	*Subject*	*Inserted in the Manual as part of update No.*
		Modification of Task 05-10-01-200-801	
APP-26	August 31/2020	Modification of the date of approval. This Temporary update No. APP-26 includes the temporary update No. 71-19	47 - December 30/2020
71-19	August 31/2020	Modification of Task 71-71-00-700-801	47 - December 30/2020

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LIST OF CHAPTERS BY CHAPTER NO.

NOTE: ***Each chapter begins with a list of effective pages.***

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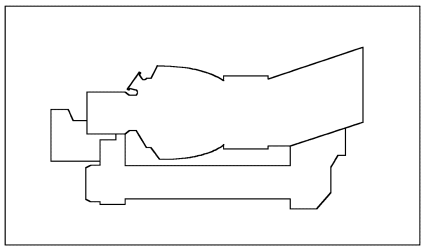
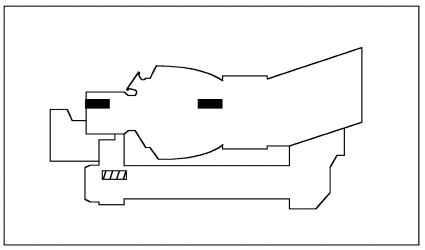
LIST OF CHAPTERS BY LOCATION

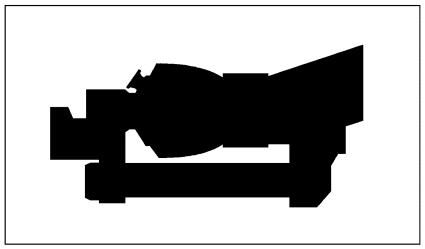
NOTE: ***Each chapter begins with a list of effective pages.***



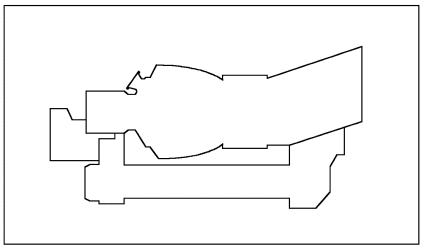
PROTECTION, FIRE 26-00-00



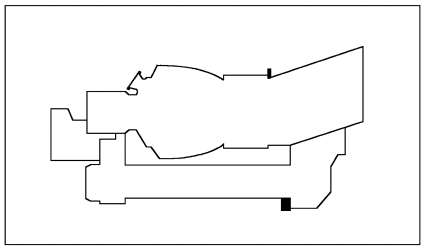
DETECTOR, FIRE 26-11-00



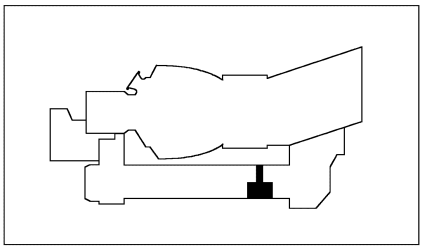
TURBOSHAFT ENGINE 71-00-00



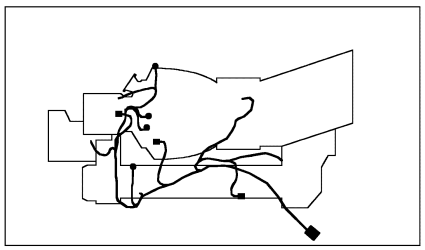
SYSTEM, GENERAL 71-01-00



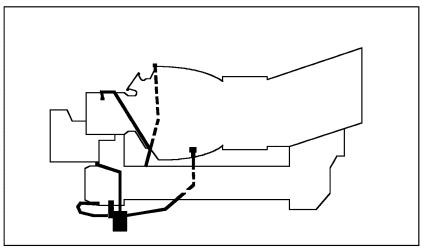
HOISTING - ATTACHING 71-21-00



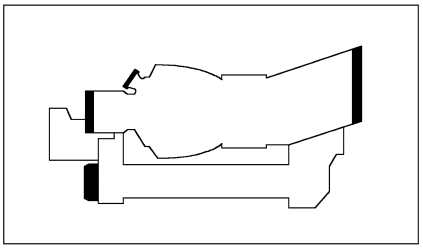
SUPPORTS 71-41-00



HARNESSES 71-51-00



DRAINING 71-71-00



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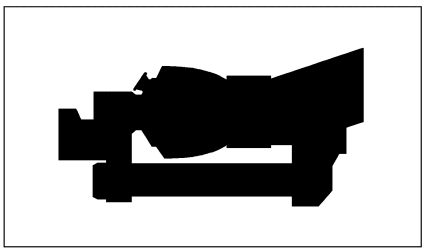
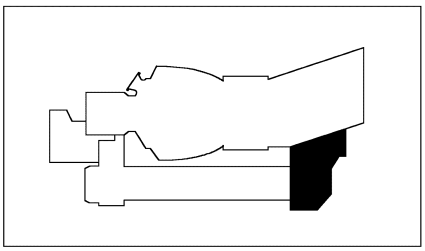


ENGINE, UNDRESSED 72-00-00



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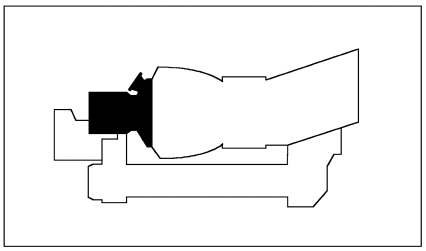
REDUCTION GEAR 72-15-00



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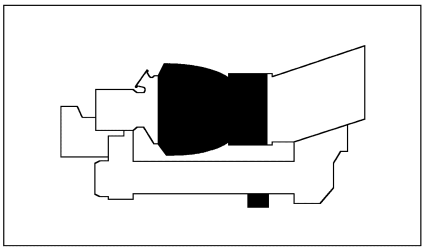

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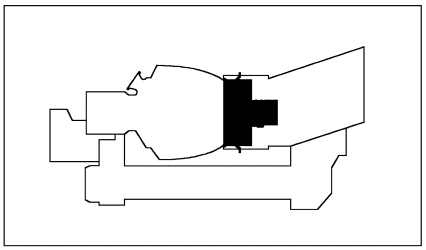
GAS GENERATOR 72-43-00



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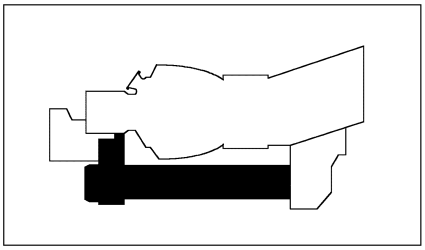

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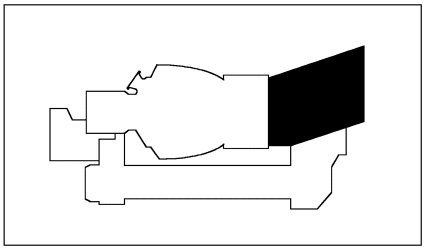

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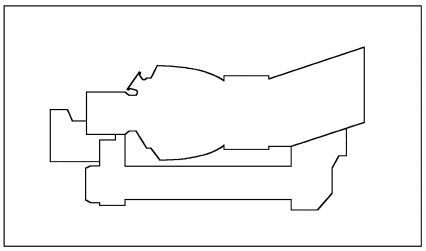
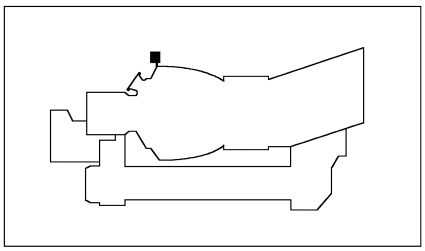
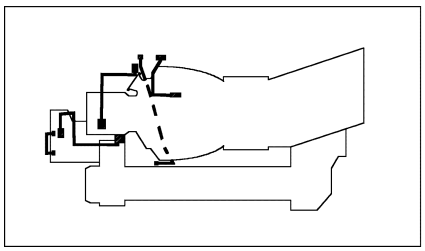


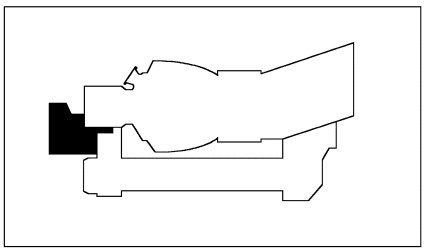
SYSTEM, FUEL 73-00-00



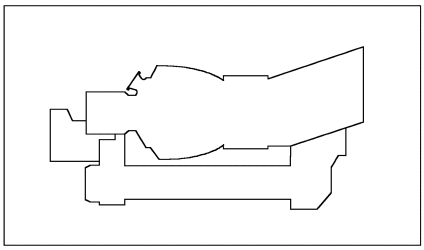
VALVE ASSY, ADJUSTED 73-14-00



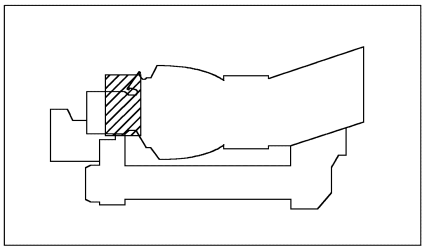
PIPES, FUEL 73-19-00



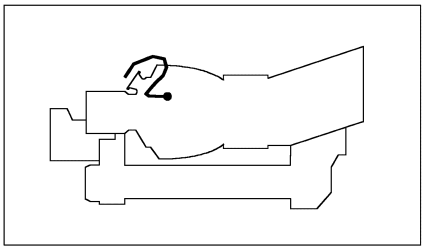
PUMP AND METER. UNIT ASSY 73-23-00



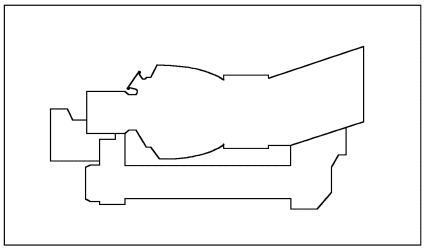
SYSTEM, IGNITION 74-00-00



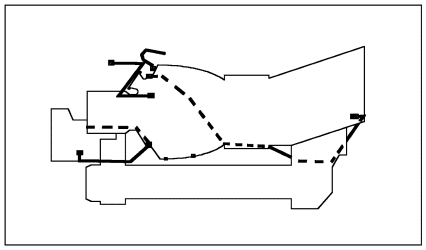
BOX, IGNITION 74-11-10



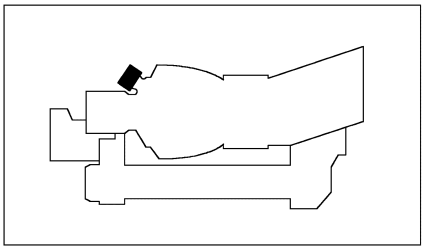
CABLES, IGNITION 73-24-10



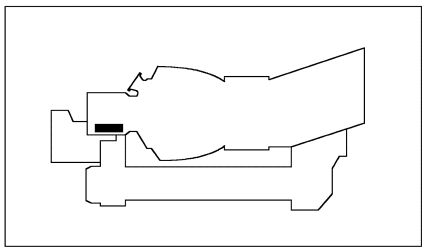
SYSTEM, AIR 75-00-00



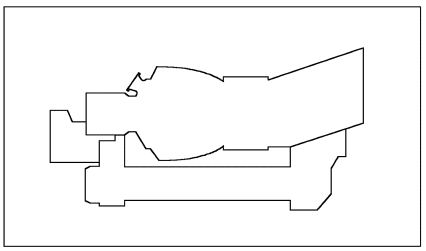
PIPES, AIR 75-29-00



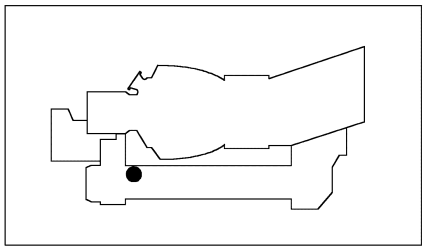
BLEED VALVE 75-31-00



TRANSMITTER P3 75-41-00



ENGINE CONTROL 77-00-00



SENSOR,
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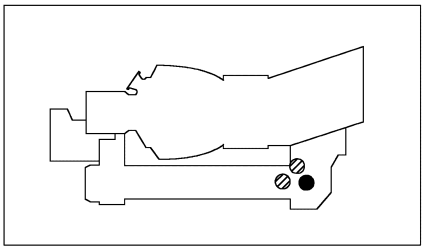

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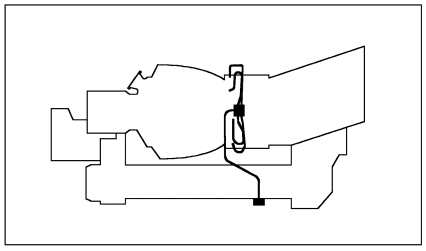
N2 SPEED 77-12-00



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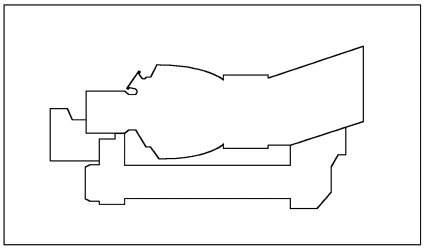
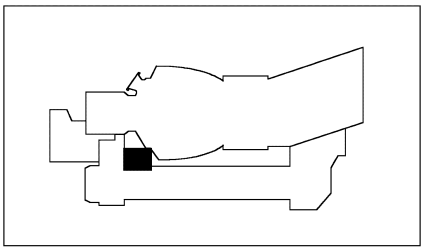


SYSTEM, OIL 79-00-00



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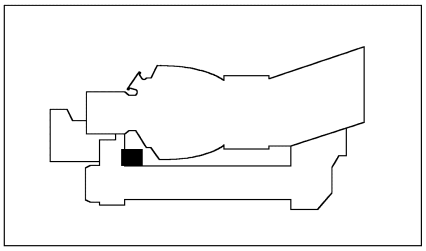
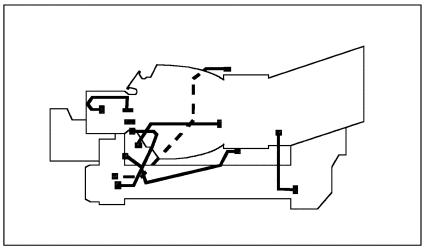
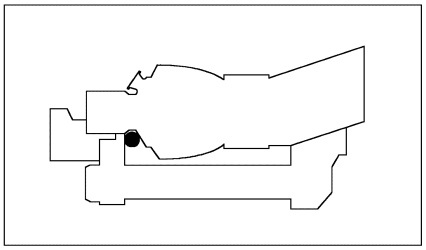


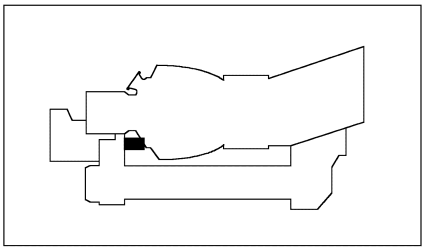
VALVE ASSY 79-25-00



PIPES, OIL 79-29-00



SWITCH,
LOW OIL PRESSURE 79-31-00



PLUGS,
MAGNETIC, ELECT. 79-38-00

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CHAPTER 00 - LIST OF EFFECTIVE PAGES

* Page modified following update No. 48

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CHAPTER 00 - TABLE OF CONTENTS

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INTRODUCTION

CAUTION: THE INFORMATION IN THIS MANUAL IS SAFRAN HELICOPTER ENGINES PROPERTY. IT SHALL NOT BE COMMUNICATED TO A THIRD PARTY, NOR SHALL IT BE USED FOR ANY OTHER PURPOSES WITHOUT SAFRAN HELICOPTER ENGINES PRIOR WRITTEN AUTHORIZATION.

1. GENERAL

The writing of this manual obeys the directives of ATA Specification No. 100.

This manual gives the necessary procedures that are required to carry out the turboshaft engine maintenance.

The manual is divided into different chapters, example:

Chapter 00	Introduction
Chapter 05	Airworthiness Limitations - Frequencies - Inspections
Chapter 26	Fire Detection System
Chapter 70	Standard Practices
Chapter 71	Power plant
Chapter 72	Turboshaft Engine
Chapter 73	Fuel System
Chapter 74	Ignition System
Chapter 75	Air System
Chapter 77	Engine monitoring
Chapter 78	Exhaust System
Chapter 79	Oil System
Chapter 80	Starting

A chapter deals with a system.

A system is an assembly of some related components, which are connected for a specified function.

The chapters are divided into sections which show the breakdown of a system into sub-systems.

A section is subdivided into subjects which are the equipment of the system or of the sub-system.

2. UPDATES

There are two types of update for the maintenance manual.

A. Normal updates

Normal updates are issued periodically.

Normal updates are printed on white paper.

A normal update incorporation sheet allows for better follow-up of these updates.

In the paper version or in PDF version, text and illustrations which have been modified are indicated by a line drawn in the left-hand margin.

In the electronic version (IETP), the text which has been modified appears on a blue-grey background. The illustrations which have been modified are indicated by a letter R that appears in front of the illustration title (left low part of the consultation screen).

B. Temporary updates

Temporary updates can be issued in advance of the next normal update.

Temporary updates are printed on yellow paper.

A List of Temporary Updates allows for better follow-up of these updates.

Updates include the number of the chapter concerned and a sequential number.

Example:

72-1 is the first temporary update of chapter 72.

Then comes temporary update No. 72-2.

A letter of instruction comes with these temporary updates to give all the necessary information about the insertion of the temporary update.

C. Temporary Revision numbering

APP number is a sequential number. APP numbers result in a non-interrupted sequence (example: APP-03 is followed by APP-04).

An APP number can group several Temporary Updates.

RT number includes the chapter number concerned and is a unique number.

RT numbers might result in an interrupted sequence (example: RT 72-03 can be followed by RT 72-06).

D. Original issue: issue dates of tasks

As the documentary fund of the Original Issue of a Manual partially results from an existing documentary fund, the issue dates of some maintenance tasks can be prior to the Original Issue date of this Manual.

MANUAL USER GUIDE

CAUTION: THE ADJUSTMENT PROCEDURES GIVEN IN THIS MANUAL MUST ONLY BE DONE BY SAFRAN HELICOPTER ENGINES STAFF OR SKILLED PERSONS THAT HAVE BEEN APPROVED.

1. USE OF THE MANUAL

The different maintenance procedures permit satisfactory operation of the engine and also prevent decrease of the engine service life. These maintenance procedures are divided into tasks which agree with the standardized numbering of the tasks.

A. Maintenance levels

(1) Level 1: Any maintenance tasks that can be performed on aircraft and engine removed from the aircraft for accessibility reasons (excluding tasks that require the removal/ installation of a module).

(2) Level 2: Any maintenance tasks that require the removal/installation of a module.

Because of their complexity and sensitivity, Safran Helicopter Engines recommends that these tasks be performed with the engine removed from the aircraft and in a maintenance center.

B. Standardized numbering of tasks

The task numbers and the sub-task numbers give:

– the identification of the equipment to which the maintenance procedure is applied,
– the description of the maintenance function carried out on the engine part(s),
– a single identification for a set of specific instructions.

The standardized numbering of the task is an extension of the three-digit A.T.A system. It includes seven groups of characters. Only six of them are used in this manual.

(1) Groups 1, 2, 3

These are the A.T.A. numbers which identify the chapter, the section and the subject. These groups give the identification of the system and the sub-system to which the maintenance procedure is applied.

They are followed by the fourth group and the fifth group which give the identification of the tasks.

(2) Group 4

The fourth group gives the type of the maintenance function.

The first two digits are the code number of the maintenance procedure. The third digit in this group specifies the maintenance procedure.

(3) Group 5

The fifth group gives a serial number to all the tasks and the sub-tasks, the first four groups of which are identical.

(4) Group 6

The sixth group identifies the configuration deviations.

– the first and the second digits are assigned to the parts configuration tracking system.
– the third digit is assigned to the configuration tracking system.

(5) Example of Task and Sub-Task Numbering

79-29-00-900-801-A01

TASK NUMBER ELEMENTS	*DEFINITION*
79-29-00 :	Assigned by the A.T.A.
900 :	Maintenance, removal/installation function code
801 :	Task Sequence Number
A01 :	Configuration Number

C. How to read a task effectivity

(1) Task effectivity

Task effectivity = Engine variant effectivity + Configuration effectivity

(2) Engine variant effectivity

(a) ALL

Means that the task applies to all variants covered by the manual.

(b) Variant or group of variants

Means that the task applies to this variant or this group of variants.

The groups of variants are established with identifications of the variants associated with a "-" (example: A-B-C).

If the task applies to different groups of variants, groups are separated with a "/" (example: A-B / C-D). Groups are constituted in order to apply to each group a different configuration.

(3) Configuration effectivity (“Empty”, or BASE, or TUXX or TUXX+TUYY)

(a) “Empty”

Means that the task is applicable, whatever the engine configuration (the configuration effectivity is not filled in).

(b) When a TUXX modification causes differences in the procedure

A version of the task affected by these differences is created. The task code evolves on the sixth group:

Procedure before TUXX modification: Task 72-43-00-900-801-**A01**

Procedure after TUXX modification: Task 72-43-00-900-801-**B01**

In this case:

- The task with task code "A01" gets the configuration effectivity “BASE”,

- The task with task code "B01" gets the configuration effectivity “TUXX”.

With respect to the task, “BASE” means that the task applies to the variants/components, the configuration effectivity of which does not include the TUXX modification.

"BASE" indicates that there is a version of the task relative to a modification (TU XX) in the manual and must induce the user to make sure of the configuration of his engine variant to use the appropriate version of the task.

With respect to the task, “TUXX” means that the task applies to the variants/components modified by TUXX.

With respect to the task, “TUXX+TUYY” means that the task applies to the variants/ components modified by TUXX and TUYY.

(4) Tool alternative

When a tool alternative causes differences in the procedure, an alternative version of the task is created. The task code evolves on the sixth group:

Procedure with tool OT XX XXXX : Task 72-43-00-900-801-A**01**.

Procedure with tool OT YY YYYY : Task 72-43-00-900-801-A**02**.

(5) Examples

Scenario of evolution for a task (engine having only the variants A and B)

(a) At the creation of the task

Task code	*Task applicable to variant A*	*Task applicable to variant B*	*Task effectivity*
72-43-00-900-801-A01	YES	YES	ALL

(b) At application of modification TU XX on both variants of the task

A version of the task A01 is created with a task code B01. The tasks effectivities evolve as follows:

Task code	*Task applicable to variant A*	*Task applicable to variant B*	*Task effectivity*
72-43-00-900-801-A01	YES	YES	ALL BASE
72-43-00-900-801-B01	YES	YES	ALL TU XX

(c) At application of modification TU XX only on variant A, this modification being already integrated into the standard of certification of variant B

A version of the task A01 is created with a task code B01. The tasks effectivities evolve as follows:

Task code	*Task applicable to variant A*	*Task applicable to variant B*	*Task effectivity*
72-43-00-900-801-A01	YES	NO	A BASE
72-43-00-900-801-B01	YES	YES into the standard of certification of variant B	A TU XX / B

D. Document breakdown and layout

This document includes the introduction pages and the so-called maintenance procedures.

(1) Introduction

The introduction includes:

– The General section which is the same for the whole engine,
– The list of the updates that have been issued,
– The List of Effective Pages and the Tables of Contents of each chapter.

(a) List of the updates that have been issued

To check and manage the updates, the list and dates of normal and temporary updates are given in the Maintenance Manual.

(b) Lists of Effective Pages and Tables of Contents

To find information easily in the Maintenance Manual and keep it up-to-date, each chapter begins with a list of effective pages and a table of contents.

The lists of effective pages give the date of issue of each page.

The tables of contents give the titles of the divisions, subdivisions or details about the relevant procedure.

(2) Maintenance procedures

Non-exhaustive list of the maintenance procedures dealt with in the manual:

Procedure types	***Function codes***
Description - Operation	Task 870
Airworthiness limitations - General	Task 150
General	Task 940
Specific procedure	Task 280
Cleaning	Task 110
Removal/Installation	Task 900
Replacement	Task 950
Inspection/Check (non-electrical)	Task 200
Inspection/Check (electrical)	Task 210
Servicing	Task 610
Storage duration	Task 550
Storage	Task 551
Protection	Task 620
Tests (non electrical)	Task 700
Tests (electrical)	Task 750
Tests (engine)	Task 760

(3) Paging (PDF version)

All the pages of the Manual include an identification block which gives:

(a) the number of the relevant task

Example: 72-11-00-870-801-A01

(b) the description of the relevant task

Example: Removal/Installation or Inspection and Check

(c) the page number in the relevant section, examples:

Procedure types	***Page blocks***
Description - Operation	1 to 99
General	1 to 99
Specific procedure	201 to 299
Cleaning	601 to 699
Removal/Installation	701 to 799
Replacement	701 to 799
Inspection/Check	801 to 899
Servicing	1101 to 1199

Procedure types	*Page blocks*
Storage duration	1201 to 1299
Storage	1201 to 1299
Protection	1201 to 1299
Tests	1301 to 1399

(d) a block giving the date

This block indicates the date of issue for a new page or the date of update for a revised page.

E. Identification of the parts

In each figure, the various parts are identified by a five-digit item number.

This number is that which appears in the Spare Parts Catalogue (SPC).

F. Identification of tools

The tools are identified with letters OT followed by 6 digits.

This identification is also used in the Maintenance Tools Catalog.

2. ABBREVIATIONS - INITIALS - SYMBOLS USED IN THE MAINTENANCE MANUAL

Refer to the list below:

A	Ampere
ACR	Amendment with change of P/N
ALT	Altitude
A.T.A.	Air Transport Association
Assy	Assembly
°C	Degree Celsius
CCW	Counter clockwise
cSt	Centistoke
CW	Clockwise
daN	Decanewton
daN.m	DecaNewton meter
D.E.C.U.	Digital Engine Control Unit
dc	Direct Current
delta P / ΔP	Difference of pressure
D.G.A.C.	Direction Générale de l'Aviation Civile
Ø	Diameter
EECU	Electronic Engine Control Unit
°F	Degree Fahrenheit
F.O.D.	Foreign Object Damage
ft	Feet
°K	Degree Kelvin
g	Load factor
g/kW.h	Gram per kilowatt per hour
gm	Gram
GSL	General Service Letter
GTM	Groupe turbomoteur (Powerplant)
H.E.	High Energy
HP	High pressure

hr	Hour
Hz	Hertz
IPC	Illustrated Parts Catalogue
kg	Kilogram
kPa	Kilo Pascal
kW	Kilowatt
l	Width
L	Length
L.A.P.	List of Effective Pages
l/hr	Litre/hour
Lb.in	Pound-inch
LEP	List of Effective Pages
LP	Low pressure
mA	Milliampere
max.	Maximum
min.	Minimum
mm	Millimeter
MM	Maintenance Manual
mn	Minute
Mod. or mod	Modification or modified
MΩ	Megohm
mΩ	Milliohm
MTC	Maintenance Tools Catalogue
mV	Millivolt
N	Rotation speed (rpm or %)
N1 or Ng	Rotation speed of the gas generator
N2 or Ntl or NP	Rotation speed of the power turbine
No.	Number
N.m	Newton meter
Ω	Ohm
OEI	One Engine Inoperative
OM	Overhaul Manual
OTC	Overhaul Tools Catalogue
P0	Pressure of the ambient air
P2.4	Air pressure at centrifugal compressor inlet
P3	Air pressure at centrifugal compressor outlet
p.p.m.	Parts per million
PSI	Pound per square inch
PT	Power turbine
rpm	Revolution per minute
s	Second
SB	Service Bulletin
SHE	Safran Helicopter Engines
S.O.A.P.	Spectrometric Oil Analysis Procedure
SL	Service Letter
SPC	Spare Parts Catalogue
t°	Temperature
T°	Absolute temperature (Kelvin)
t4.5 or TGT	Gas temperature at gas generator turbine outlet
TSB	Trouble Shooting Book
U	Voltage
V	Volt
W	Watt

NOTE: ***For the definition of the special abbreviations related to Airworthiness limitations and frequencies, refer to the general sections of Chapters 05-10 (Refer to Task 05-10-00-150-801) and 05-15 (Refer to Task 05-15-00-200-801).***

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SAFETY INSTRUCTIONS

1. GENERAL

The Maintenance Manual describes the procedures which can endanger maintenance personnel and lead to equipment being damaged if the safety recommendations are not strictly complied with.

These safety recommendations are indicated by "WARNING" and "CAUTION" instructions.

A. WARNINGS

The text of "WARNING" instructions draws the reader’s attention to the conditions required for the operation of certain equipment and for the implementation of certain processes or methods, and to the limits which must be complied with to remove any risk of injury or fatality to the personnel.

Certain maintenance procedures stipulate the use of solvents, paints and other chemicals which are available on general sale.

Users of such products must follow the safety recommendations, instructions for use and storage instructions given by the suppliers or manufacturers.

"WARNING" instructions give recommendations as to how dangerous ingredients should be used in order to protect the health of personnel.

Such “WARNING” instructions supplement, but do not replace the instructions issued by the suppliers or manufacturers.

B. CAUTIONS

The text of "CAUTION" instructions specifies the methods to be implemented and the operations to be carried out in order to prevent deterioration of the equipment.

2. LIST OF SAFETY INSTRUCTIONS

A. The list below groups together all the "WARNING" instructions used in this manual

WARNING

CLEAN THE PARTS IN A WELL-VENTILATED, WELL-LIT AREA, WHICH HAS APPROPRIATE FIRE PREVENTION AND DETECTION SYSTEMS.

WARNING

DO NOT BREATHE FUEL VAPORS. WORK IN A WELL-VENTILATED AREA. DO NOT ALLOW FUEL TO REMAIN IN CONTACT WITH THE SKIN. USE RUBBER GLOVES AND SAFETY GOGGLES OR A FACE SHIELD. FUEL CAN BE POISONOUS.

WARNING

DO NOT BREATHE OIL VAPORS. WORK IN A WELL-VENTILATED AREA. DO NOT ALLOW OIL TO REMAIN IN CONTACT WITH THE SKIN. USE RUBBER GLOVES AND SAFETY GOGGLES OR A FACE SHIELD. OIL CAN BE POISONOUS.

WARNING

DO NOT BREATHE MATERIAL FUMES. MAKE SURE THAT THE AIRFLOW IS SUFFICIENT IN THE WORK AREA. DO NOT LET MATERIAL FUMES TOUCH SKIN. USE RUBBER GLOVES AND SAFETY GOGGLES OR A FACE SHIELD. MATERIAL FUMES MATERIAL CAN BE POISONOUS.

WARNING

DO NOT BREATHE VAPORS FROM PROTECTION PRODUCTS. WORK IN A WELL-VENTILATED AREA. DO NOT ALLOW PROTECTION PRODUCTS TO REMAIN IN CONTACT WITH THE SKIN. USE RUBBER GLOVES AND SAFETY GOGGLES OR A FACE SHIELD. PROTECTION PRODUCTS CAN BE POISONOUS.

WARNING

DO NOT BREATHE VAPORS FROM PENETRATING LUBRICANTS. WORK IN A WELL-VENTILATED AREA. DO NOT ALLOW PENETRATING LUBRICANT TO REMAIN IN CONTACT WITH THE SKIN. USE RUBBER GLOVES AND SAFETY GOGGLES OR A FACE SHIELD. PENETRATING LUBRICANTS CAN BE POISONOUS.

WARNING

DO NOT BREATHE HYSO 97 VAPORS. WORK IN A WELL-VENTILATED AREA. DO NOT ALLOW HYSO 97 TO REMAIN IN CONTACT WITH THE SKIN. USE RUBBER GLOVES AND SAFETY GOGGLES OR A FACE SHIELD. HYSO 97 CAN BE POISONOUS.

WARNING

DO NOT BREATHE VAPORS FROM SOLVENTS. WORK IN A WELL-VENTILATED AREA. DO NOT ALLOW SOLVENTS TO REMAIN IN CONTACT WITH THE SKIN. USE RUBBER GLOVES AND SAFETY GOGGLES OR A FACE SHIELD. SOLVENTS CAN BE POISONOUS.

WARNING

DO NOT BREATHE LOCTITE VAPORS. WORK IN A WELL-VENTILATED AREA. DO NOT ALLOW LOCTITE TO REMAIN IN CONTACT WITH THE SKIN. USE RUBBER GLOVES AND SAFETY GOGGLES OR A FACE SHIELD. LOCTITE CAN BE POISONOUS.

WARNING

WHEN HANDLING ARDROX BATHS, WEAR PROTECTIVE CLOTHING AND A FACE SHIELD OR GOGGLES DURING IMMERSION AND REMOVAL OF THE PARTS. WORK IN A WELL-VENTILATED AREA. IN THE EVENT OF CONTACT WITH THE SKIN, RINSE UNDER RUNNING WATER AND APPLY AN OILY CREAM.

WARNING

USE GOGGLES OR A FACE SHIELD WHEN USING COMPRESSED AIR TO CLEAN OR DRY PARTS.

WARNING

WEAR HIGH INSULATION GLOVES AND PROTECTIVE CLOTHING TO AVOID BEING BURNT WHEN HANDLING VERY HOT OR VERY COLD PARTS.

WARNING

WEAR HIGH-INSULATION GLOVES AND PROTECTIVE CLOTHING TO AVOID BEING BURNT WHEN HANDLING HOT PARTS. WAIT AT LEAST 1 MINUTE BEFORE CARRYING OUT ANY INTERVENTION ON AN ENGINE WHICH WAS OPERATING JUST PRIOR TO A PROCEDURE BEING IMPLEMENTED. THE ENERGY ACCUMULATED IN THE IGNITION UNIT CAN BE FATAL.

WARNING

DISCONNECT THE IGNITION UNIT POWER SUPPLY BEFORE PERFORMING THE INSULATION CHECK.

WARNING

BE PARTICULARLY CAREFUL WHEN USING THE INSULATION CONTROLLER (VOLTAGE = 500 VOLTS).

WARNING

IF YOU FIND RESIDUES ON THE ENGINE, DO NOT MOVE OR BREATHE THESE RESIDUES. DO NOT USE COMPRESSED AIR DURING THE CLEANING PROCEDURE. CLEAN THESE RESIDUES WITH APPLICABLE AND SAFE MEANS. USE SYNTHETIC RUBBER GLOVES AND A FACE SHIELD OR SAFETY GOGGLES. THE RESIDUES CAN BE POISONOUS.

B. The list below groups all the CAUTION used in this Manual

CAUTION: DURING ASSEMBLY, MAKE SURE THAT ALL “O” MARKS ON THE DIFFERENT PARTS ARE ALIGNED WITH ONE ANOTHER.

CAUTION: NEVER STRAIGHTEN THE WIRES OF THERMOCOUPLE PROBES ONCE THEY HAVE BEEN BENT. THIS CAN DAMAGE THEIR INSULATION AND MODIFY THE CHARACTERISTICS OF THE THERMOCOUPLES.

CAUTION: USE THE RECOMMENDED RINSING PRODUCTS FROM THE LIST. THE USE OF OTHER RINSING PRODUCTS MUST BE APPROVED BY SAFRAN HELICOPTER ENGINES.

LIST OF ADDITIONAL DOCUMENTATION

MAINTENANCE MANUAL No. X 292 N4 450 2 is one document dealing with ARRIEL 2 C1 . The additional documents required for engine maintenance implementation are as follows:

Description	*References of manuals*
Spare Parts Catalogue	X 292 N4 700 2
Maintenance Tools Catalogue	X 292 N4 800 2
List of Modifications	
List of Service Bulletins	
List of Service Letters	

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CHAPTER 05 - LIST OF EFFECTIVE PAGES

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05-10-00	200-801-A01	AIRWORTHINESS LIMITATIONS - AUTHORIZED IN-SERVICE LIFE LIMITS	1 - 2	Dec. 30/2020
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05-15-01	200-801-A01	FREQUENCIES - INSPECTION FREQUENCIES	1 - 2	Oct. 30/2014
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05-20-10	201-815-A01	INSPECTION AT 30 FLIGHT HOURS	1 - 2	Oct. 30/2014
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05-20-10	201-850-A01	INSPECTION AT 600 FLIGHT HOURS	1 - 8	June 15/2021
05-20-10	201-880-A01	INSPECTION AT 3,000 FLIGHT HOURS	1 - 2	June 15/2021
05-20-10	201-940-A01	INSPECTION AT 15 YEARS	1 - 2	June 30/2018
05-50-00	200-801-A01	UNSCHEDULED INSPECTIONS	1 - 8	June 15/2021

* Page modified following update No. 50

CHAPTER 05 - TABLE OF CONTENTS

AIRWORTHINESS LIMITATIONS - TEMPORARY UPDATE NO. 05-10 - APPROVAL

APPROVAL

This Airworthiness Limitations Section is approved by the EASA (European Union Aviation Safety Agency) in accordance with PART 21A.31(a)(3) and CS-E 25(b) where applicable.
Any change to each Mandatory replacement time, inspection interval, and related procedure contained in this Airworthiness Limitations Section must also be EASA approved.
EASA Approval date : November, 26th, 2021.

The Airworthiness Limitations Section is FAA approved and specifies maintenance required under §§ 43.16 and 91.403 of Title 14 of the Code of Federal Regulations unless an alternative program has been FAA approved.

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AIRWORTHINESS LIMITATIONS - APPROVAL

APPROVAL

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Any change to each Mandatory replacement time, inspection interval, and related procedure contained in this Airworthiness Limitations Section must also be EASA approved.

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TASK 05-10-00-150-801-A01

AIRWORTHINESS LIMITATIONS - GENERAL

1. GENERAL

Chapter 05-10 specifies the mandatory replacements of life-limited components (Refer to Task 05-10-01-200-801) as well as the mandatory inspection tasks to be carried out to reach the Airworthiness objectives (Refer to Task 05-10-10-200-801).

Chapter 05-10, Airworthiness Limitations section, complies with JAR-E 25 and FAR 33.4.

The following Airworthiness Limitations are based on analyses assuming that the engine will be operated and maintained in accordance with the procedures and inspections defined in the Airworthiness instructions provided with the engine by the Type Certificate holder.

For Critical Parts and related Critical Parts, any repair, modification, maintenance or overhaul procedures not approved by Safran Helicopter Engines as well as any use of parts not supplied by Safran Helicopter Engines can materially affect these part limits.

2. REPORTING ANY ACCIDENT AND INCIDENT

The report of any occurrence that had or may have adverse effect on the engine airworthiness is a major factor for maintaining engine airworthiness and ensuring constant improvement of flight safety.

A. Reporting to Authorities

The operator must report any incident or accident to its respective Authorities, in compliance with the local regulations to which he is subjected.

B. Reporting to the manufacturer

With a view to constantly improve engine safety and reliability, it is necessary that all occurrences observed during operation be reported to Safran Helicopter Engines. This information is used to record and analyse these occurrences and implement adequate action on the in-service fleet, in compliance with the requirements of Airworthiness Authorities. General Service Letter No. 2173/02 defines the terms "incident" and "accident" along with the type of information to be sent to Safran Helicopter Engines following these occurrences.

3. PROCESSING OF MATERIALS INVOLVED IN AN ACCIDENT OR IN AN INCIDENT

A. In the event of an accident

Any engine, module or equipment installed on an aircraft that has been subject to an Accident Report has become unairworthy and unusable.

Prior to any possible return to operation, this material shall have received appropriate repair or overhaul in a Safran Helicopter Engines approved Repair Center. When returning this material, it must be expressly stated in the accompanying documents that it is an accidented material.

However, any EECU involved in an accident shall be finally declared as unairworthy and immediately withdrawn from service and scrapped.

NOTE: ***If Safran Helicopter Engines and the EECU supplier are convinced that the EECU suffered no constraints beyond its operating limits, this material could be***

declared Airworthy again and returned to operation after possible return to an approved Center to carry out a functional test.

B. In the event of an incident

Any engine, module or equipment subject to an Incident Report shall have been totally restored in compliance with the recommended procedures as specified in the Maintenance Manual for the related incident and shall be possibly returned to service (Refer to Task 05-50-00-200-801).

For all other cases, refer to Chapter 71-00-06 - Trouble shooting or contact your local Safran Helicopter Engines representative.

4. TERMS USED IN TABLES FOR LIMITS AND MANDATORY MAINTENANCE TASKS

A. DEFINITIONS

- **DESCRIPTION:** description of the component.
- **PART NUMBER:** part number of the component.
- **MAINTENANCE TASK:** description of the maintenance operation to be performed.
- **TASK NUMBER:** identification of the Maintenance Manual task.
- **PERIODICITY:** interval value of the task application.
- **TOLERANCE:**
  - **+:** higher interval tolerance value
  - **-:** lower interval tolerance value.
- **UNIT:** counter unit. Refer to paragraph 4. C.
- **REFERENCE COUNTER:** counter name to which the limit or periodicity applies. Refer to paragraph 4. B.
- **APPLICATION CONDITIONS:** description of the necessary environment for applying the maintenance operation.
- **DATE/SIGNATURE:** cell dedicated to the realization date of the maintenance operation and to visa of the authorized staff if the user wants to make a copy of the tables for performed operation recording.
- **LIMIT:** limit value.
- **NA:** not applicable.
- **COMPONENT STANDARD:** modification standard required for the application of maintenance operation:
  - **ALL:** maintenance operation applicable to all engine / component standards.
  - **ANY OTHER STANDARD:** maintenance operation applicable to any other engine / component standard different from specified minimum component standards.
- **COMPONENT MINIMUM STANDARD:** minimum modification standard required for the application of maintenance operation:
  - **PRE TU... X:** maintenance operation applicable to an engine / component not modified TU... X.
  - **PRE TU... X, PRE TU... Z:** maintenance operation applicable to an engine / component not modified TU... X and not modified TU... Z.
  - **POST TU... Y:** maintenance operation applicable to an engine / component modified TU... Y.
  - **POST TU... Y, POST TU... Z:** maintenance operation applicable to an engine / component modified TU... Y and modified TU... Z.
- **OPERATING CONDITIONS:** condition of engine operation involving the application of the maintenance operation.
- **FH** (Flight Hours): number of flight hours of a component consumed between two given times.
- **C1 or C2** (Cycles 1 or 2): number of cycles consumed between two given times.

– **CSN1 or CSN2** (Cycles Since New 1 or 2): number of cycles consumed since the component is new.
– **TSN** (Time Since New): number of flight hours consumed since the component is new.

B. ENGINE LOG BOOK COUNTERS

Usage counters of the engine log book, with correspondence of "daily" counters and "cumulation" associated counters.

"Daily" usage counter	*"Cumulation" associated counter*	*Counter unit*	*Counter definition*
DAILY_FLIGHT		FLIGHT	Counter which counts the number of flights (FLIGHT) between two given times.
FH (Flight Hours)		FH	Counter which counts the number of flight hours (FH) of a component between two given times.
	TSN (Time Since New)	FH	Counter which counts the number of flight hours (TSN) since the component is new.
C1		Cycle	Counter which records the number of gas generator cycles (C1) between two given times.
	CSN1 (Cycle Since New 1)	Cycle	Counter which records the number of cycles (CSN1) since the gas generator is new.
C2		Cycle	Counter which records the number of power turbine cycles (C2) between two given times.
	CSN2 (Cycle Since New 2)	Cycle	Counter which records the number of cycles (CSN2) since the power turbine is new.
Daily_OEI2MIN		SEC	Counter which records the day elapsed time at OEI 2 min. rating between two given times.
	OEI2MIN	SEC	Counter which records the time elapsed in operation at OEI 2 min. rating since the last overhaul or since new.
Daily_OEI30SEC		SEC	Counter which records the day elapsed time at OEI 30 sec. rating between two given times.
	OEI30SEC	SEC	Counter which records the time elapsed in operation at OEI 30 sec. rating since the last overhaul or since new.

C. UNITS

– **FH** (Flight Hour): operation time unit in hours.
– **CYCLE:** refer to Task 05-10-02-200-801.
– **DAY:** calendar day.
– **MIN:** minute.

- **SEC:** seconds.
- **%:** percentage.
- **FLIGHT:**
  - If frequency = AFTER 15 FLIGHT HOURS OR 7 DAYS: task to be performed after 15 flight hours or after 7 days, first limit reached.

TASK 05-10-00-200-801-A01

AIRWORTHINESS LIMITATIONS - AUTHORIZED IN-SERVICE LIFE LIMITS

WARNING

IT IS MANDATORY TO REMOVE A LIFE-LIMITED PART FROM SERVICE AS SOON AS IT HAS REACHED ITS AUTHORIZED IN-SERVICE LIFE LIMIT. FAILURE TO DO SO MAY COMPROMISE FLIGHT SAFETY.

1. AUTHORIZED IN-SERVICE LIFE LIMITS

A. Authorized in-service life limits - Definition

The in-service life limits of the turboshaft engine parts are expressed in reference cycles.

The in-service life limit is the number of the reference cycles that a given part can achieve, before it must be removed from service. Only the parts whose rupture can endanger the helicopter are concerned.

In service, the number of the reference cycles performed depends on the type of missions the engine is used for. To determine the number of the reference cycles performed, it is necessary to count the number of the complete and partial cycles performed.

NOTE: ***The algorithms for counting gas generator cycles (C1 cycles), based on complete and partial cycles and the algorithms for counting power turbine cycles (C2 cycles) based on complete and partial cycles are different.***

These cycles are defined as follows:

(1) Complete cycle

A complete cycle is an engine operation sequence composed of:

- A start
- A significant power increase
- A shutdown.

(2) Partial cycle

A partial cycle is an engine operation sequence corresponding to a significant in-flight power variation, without shutting down the engine.

The total number of cycles performed between a start, a flight and the related shutdown is therefore composed of a complete cycle and some partial cycles, if any.

B. Authorized in-service life limits - Initial values

Initial authorized in-service life limit values are based on calculation data, testing or on operational experience. They are approved by the Authorities when the engine Type Certificate is awarded.

C. Authorized in-service life limits - Extension

Authorized in-service life limit values may be extended if approved by the Certification Authorities.

The extension is based on:

- Tests done on new parts or parts removed from service
- Additional justification supported by experience
- A plan for managing service life
- Any other valid justification.

D. Authorized in-service life limits - Life limit values for the ARRIEL 2C1 engine

Refer to Task 05-10-01-200-801.

E. Counting / Recording of completed cycles

Refer to Task 05-10-02-200-801.

F. Authorized in-service life-limited parts - Additional actions in Repair Center

The list of actions to be applied to all life-limited parts when they are returned to a Repair Center is given in the Airworthiness Limitations section, Task 05-10-00-200-801 of the ARRIEL 2 No. X 292 R1 500 Overhaul Manual.

TASK 05-10-01-200-801-A01

VALUES OF AUTHORIZED IN-SERVICE LIFE LIMITS - AIRWORTHINESS LIMITATIONS - TEMPORARY UPDATE NO. 05-10

WARNING

IT IS MANDATORY TO REMOVE A LIFE-LIMITED PART FROM SERVICE AS SOON AS IT HAS REACHED ITS AUTHORIZED IN-SERVICE LIFE LIMIT. FAILURE TO DO SO MAY COMPROMISE FLIGHT SAFETY.

1. VALUES OF AUTHORIZED IN-SERVICE LIFE LIMITS

A. Authorized in-service life limits - General

Refer to Task 05-10-00-200-801.

B. Example of table use for authorized in-service life limits

(1) Module X

Description	*Part Number*	*Reference Counter*	*Limit*	*Unit*
Part for example	NNNNNNNNNN	CSN1	20,000	CYCLE
How to read the table: Before the ***CSN1*** counter exceeds the limit value of ***20,000 CYCLES,*** it is ***mandatory*** to remove from service the ***« Part for example »*** part number ***NNNNNNNNNN***.				

C. Table of authorized in-service life limits for the ARRIEL 2C1

(1) Module 02

Description	*Part Number*	*Reference Counter*	*Limit*	*Unit*
Axial compressor wheel	2292150170	CSN1	22,000	CYCLE
	2292152910	CSN1	22,000	CYCLE
	2292153270	CSN1	22,000	CYCLE
	729215291A	CSN1	22,000	CYCLE
	729215327A	CSN1	22,000	CYCLE

(2) Module 03

Description	*Part Number*	*Reference Counter*	*Limit*	*Unit*
Centrifugal impeller	0292260010	CSN1	22,000	CYCLE
	0292260110	CSN1	22,000	CYCLE
	0292260120	CSN1	22,000	CYCLE

Description	Part Number	Reference Counter	Limit	Unit
	0292260880	CSN1	22,000	CYCLE
Injection wheel	2292260210	CSN1	6,500	CYCLE
	2292260870	CSN1	10,000	CYCLE
HP turbine disc	2292260060	CSN1	17,000	CYCLE
	0292260690	CSN1	17,000	CYCLE

(3) Module 04

Description	Part Number	Reference Counter	Limit	Unit
Power turbine disc	2292810310	CSN2	22,000	CYCLE
	2292810610	CSN2	22,000	CYCLE
	2292810790	CSN2	22,000	CYCLE

TASK 05-10-01-200-801-A01

VALUES OF AUTHORIZED IN-SERVICE LIFE LIMITS - AIRWORTHINESS LIMITATIONS

WARNING

IT IS MANDATORY TO REMOVE A LIFE-LIMITED PART FROM SERVICE AS SOON AS IT HAS REACHED ITS AUTHORIZED IN-SERVICE LIFE LIMIT. FAILURE TO DO SO MAY COMPROMISE FLIGHT SAFETY.

1. VALUES OF AUTHORIZED IN-SERVICE LIFE LIMITS

A. Authorized in-service life limits - General

Refer to Task 05-10-00-200-801.

B. Example of table use for authorized in-service life limits

(1) Module X

Description	*Part Number*	*Reference Counter*	*Limit*	*Unit*
Part for example	NNNNNNNNNN	CSN1	20,000	CYCLE
How to read the table: Before the ***CSN1*** counter exceeds the limit value of ***20,000 CYCLES,*** it is ***mandatory*** to remove from service the ***« Part for example »*** part number ***NNNNNNNNNN***.				

C. Table of authorized in-service life limits for the ARRIEL 2C1

(1) Module 02

Description	*Part Number*	*Reference Counter*	*Limit*	*Unit*
Axial compressor wheel	2292150170	CSN1	22,000	CYCLE
	2292152910	CSN1	22,000	CYCLE
	2292153270	CSN1	22,000	CYCLE
	729215291A	CSN1	22,000	CYCLE
	729215327A	CSN1	22,000	CYCLE

(2) Module 03

Description	*Part Number*	*Reference Counter*	*Limit*	*Unit*
Centrifugal impeller	0292260010	CSN1	22,000	CYCLE
	0292260110	CSN1	22,000	CYCLE
	0292260120	CSN1	22,000	CYCLE

Description	*Part Number*	*Reference Counter*	*Limit*	*Unit*
	0292260880	CSN1	22,000	CYCLE
Injection wheel	2292260210	CSN1	6,500	CYCLE
	2292260870	CSN1	10,000	CYCLE
HP turbine disc	2292260060	CSN1	17,000	CYCLE
	2292260690	CSN1	17,000	CYCLE

(3) Module 04

Description	*Part Number*	*Reference Counter*	*Limit*	*Unit*
Power turbine disc	2292810310	CSN2	22,000	CYCLE
	2292810610	CSN2	22,000	CYCLE
	2292810790	CSN2	22,000	CYCLE

TASK 05-10-02-200-801-A01

AIRWORTHINESS LIMITATIONS - COUNTING/RECORDING OF CYCLES

WARNING

IT IS MANDATORY THAT CYCLES CONSUMED DURING OPERATION ARE COUNTED AND RECORDED IN THE ENGINE LOG BOOK. THIS PROCEDURE IS MANDATORY AND IS THE OPERATOR'S RESPONSIBILITY. ANY FAILURE TO COUNT CYCLES OR ANY ERRORS MADE WHEN COUNTING OR RECORDING MAY COMPROMISE COMPONENT RELIABILITY AND AFFECT FLIGHT SAFETY.

CAUTION: IF AN ENGINE OR MODULE IS RETURNED TO AN APPROVED REPAIR CENTER AND CYCLE COUNTS HAVE NOT BEEN CLEARLY RECORDED IN THE ENGINE/MODULE DOCUMENTATION, ALL LIFE LIMITED PARTS WILL BE SYSTEMATICALLY SCRAPPED AND REPLACED.

1. COUNTING/RECORDING OF CYCLES

A. General

Three cycle counting methods are described below:

- Automatic counting method
- Manual detailed counting method
- Manual lump counting method.

The automatic cycle counting method is the normal procedure to be used.

If, for whatever reason, the automatic counting method is not available, one of the manual counting methods must be used.

B. Automatic counting method and recording

(1) Counting

The Engine Electronic Control Unit (EECU) of the engine automatically counts the cycles.

The cycle counting algorithm in the EECU permanently counts the number of cycles of the gas generator (C1 cycles) and of the power turbine (C2 cycles). The total number of (C1) and (C2) cycles is recorded by the EECU and transmitted to a digital display.

Counters which are displayed and can be reset and counters not displayed with absolute values are also available.

TU 77C also incorporates counters which are displayed and can be reset and counters not displayed with absolute values.

NOTE: ***Only the information on cycles completed in flight, displayed by the digital display system must be taken into account by the operator for the computing of cycles indicated in the engine log book. Any other information displayed by the digital system must not be taken into account.***

NOTE: ***EECU cycle counters will automatically reset to 0 when the number of cycles reaches 999.99 (PRE TU 77C) or 99999.99 (POST TU 77C).***

WARNING

IT IS MANDATORY TO REMOVE A LIFE-LIMITED PART FROM SERVICE AS SOON AS IT HAS REACHED ITS AUTHORIZED IN-SERVICE LIFE LIMIT. FAILURE TO DO SO MAY COMPROMISE FLIGHT SAFETY.

CAUTION: (C1) AND (C2) CYCLE VALUES MUST BE RECORDED IN THE ENGINE LOG BOOK AT THE FREQUENCIES DEFINED IN THE PROCEDURE BELOW.

(2) Recording

(a) Number of gas generator (C1) cycles

Using the digital display system of the helicopter, record in the engine log book the (C1) cycle cumulated value recorded for each engine after 15 flight hours or 7 days (first limit reached) and perform the calculations defined below.

Prior to calculation, check in section C of the engine log book whether the EECU has been replaced/reset (post TU 77C) between the two readings. If so, take into account the pre and post replacement/reset values when calculating the actual number of cycles consumed.

For each engine, after 15 flight hours or 7 days (first limit reached), calculate and record in section E of the engine log book:

– The number of (C1) cycles consumed since the last recording
– The number of (C1) cycles consumed since the last availability state
– The number of (CSN1) cycles consumed since the engine was new
– The cumulated number of EECU (C1) cycles.

NOTE: ***For life-limited parts, check that the total number of authorized in-service cycles has not been reached.***

NOTE: ***When an authorized in-service life limit of a part is liable to be reached prior to 15 flight hours or 7 days (first limit reached), reduce the recording frequency accordingly.***

(b) Number of power turbine (C2) cycles

Using the digital display system of the helicopter, record in the engine log book the (C2) cycle cumulated value recorded for each engine after 15 flight hours or 7 days (first limit reached) and perform the calculations defined below.

Prior to calculation, check in section C of the engine log book whether the EECU has been replaced/reset (post TU 77C) between the two readings. If so, take into account the pre and post replacement/reset values when calculating the actual number of cycles consumed.

For each engine, after 15 flight hours or 7 days (first limit reached), calculate and record in section E of the engine log book:

– The number of (C2) cycles consumed since the last recording
– The number of (C2) cycles consumed since the last availability state
– The number of (CSN2) cycles consumed since the engine was new
– The cumulated number of EECU (C2) cycles.

NOTE: ***For life-limited parts, check that the total number of authorized in-service cycles has not been reached.***

NOTE: ***When an authorized in-service life limit of a part is liable to be reached prior to 15 flight hours or 7 days (first limit reached), reduce the recording frequency accordingly.***

C. Manual detailed counting method and recording

The manual detailed counting method must be used in the event of unavailability of the automatic cycle counting system.

(1) Counting

(a) Gas generator (C1) cycles

The number of (C1) cycles consumed between engine start and subsequent shutdown is calculated as follows:

C1 = K1 + ΣK2, with:

K1 = Coefficient corresponding to the complete cycle/reference cycle ratio as a function of the maximum Ng reached between start and shutdown. The value of the coefficient K1 is shown in the table hereafter. (Refer to table 1)

K2 = Coefficient corresponding to the value of minimum Ng reached during the partial cycle and related to all values reached less than or equal to 85%. The value of the coefficient K2 is shown in the table hereafter. (Refer to table 2)

Table 1 : Values of K1 coefficient

Ng maxi %	*K1*
102 < Ng ≤ 106	3.10
100 < Ng ≤ 102	1.30
99 < Ng ≤ 100	1.00
98 < Ng ≤ 99	0.90
97 < Ng ≤ 98	0.80
96 < Ng ≤ 97	0.70
95 < Ng ≤ 96	0.65
94 < Ng ≤ 95	0.60
93 < Ng ≤ 94	0.55
Ng ≤ 93	0.50

Table 2 : Values of K2 coefficient

Ng mini %	*K2*
Ng > 85	0
80< Ng ≤ 85	0.05
75 < Ng ≤ 80	0.10
Ng ≤ 75	0.15

(b) Power turbine (C2) cycles

Refer to Figure 1

The number of (C2) cycles consumed between engine start and subsequent shutdown is calculated as follows:

C2 = F1 + (n x F2), with:

F1: value of the complete cycle. It is a function of the N2 max. reached during the flight. The value of the complete cycle F1 is shown in the table hereafter. (Refer to table 3)

n: number of partial cycles.

F2: value of a partial cycle. It is recorded as 0.10 cycle.

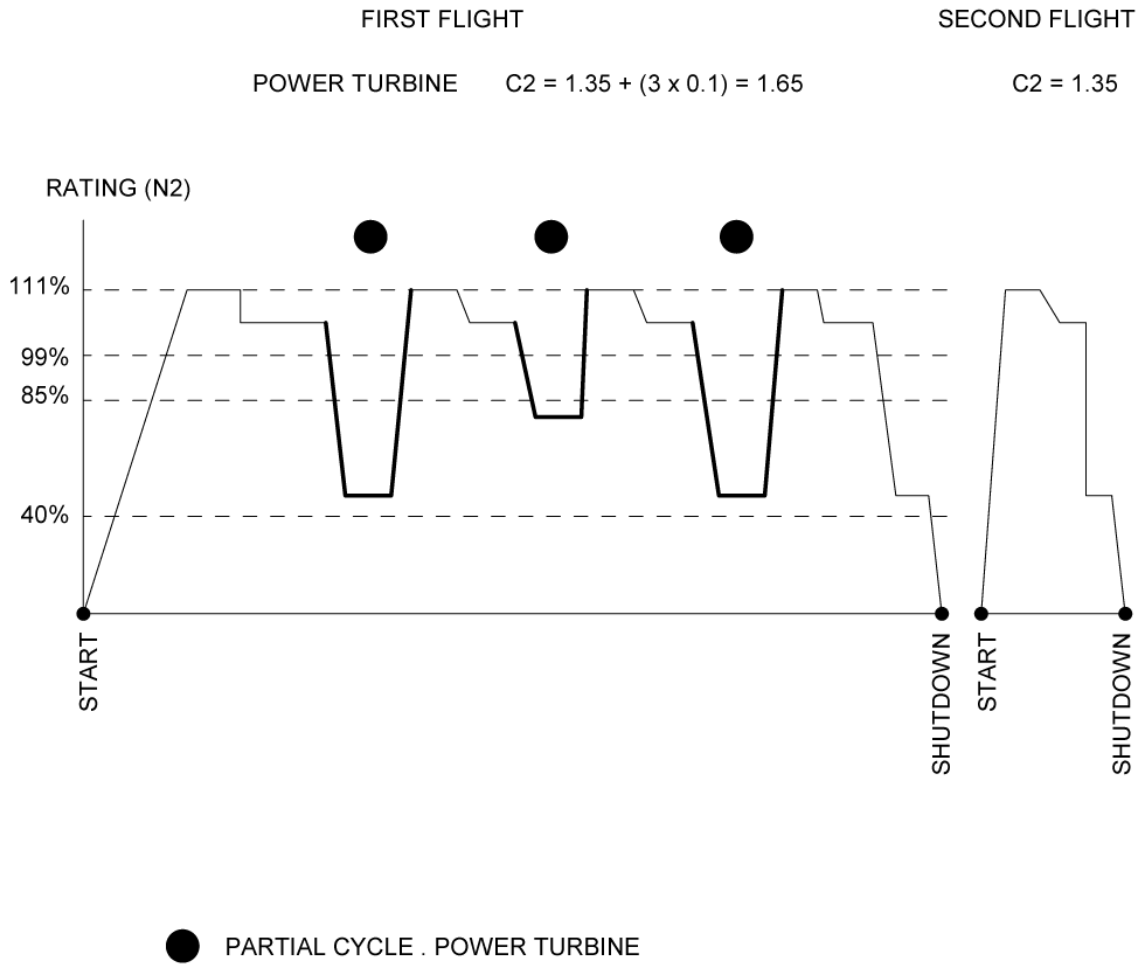
Partial cycles are calculated as follows:

– After passage beyond a min. threshold of N2 min. ≥ 99%
– When N2 decreases and reaches a value between 85% of N2 and 40% of N2
– When N2 increases and exceeds a min. threshold of N2 min. ≥ 99%.

NOTE: ***Especially, if rotor brake is used, calculate a new complete C2 cycle.***

Table 3 : Values of F1 complete cycle

N2 max %	*Value of F1 complete cycle*
112 ≤ N2 < 114	1.90
110 ≤ N2 < 112	1.35
108 ≤ N2 < 110	1.00
106 ≤ N2 < 108	0.75
104 ≤ N2 < 106	0.55
102 ≤ N2 < 104	0.40
100 ≤ N2 < 102	0.30
98 ≤ N2 < 100	0.20
96 ≤ N2 < 98	0.15
N2 < 96	0.10



Power turbine cycle counting using the manual detailed method on the ARRIEL 2C1
Figure 1

WARNING

IT IS MANDATORY TO REMOVE A LIFE-LIMITED PART FROM SERVICE AS SOON AS IT HAS REACHED ITS AUTHORIZED IN-SERVICE LIFE LIMIT. FAILURE TO DO SO MAY COMPROMISE FLIGHT SAFETY.

CAUTION: (C1) AND (C2) CYCLE VALUES MUST BE RECORDED IN THE ENGINE LOG BOOK AT THE FREQUENCIES DEFINED IN THE PROCEDURE BELOW.

(2) Recording

(a) Gas generator (C1) cycles

For each engine, after each flight, calculate and record in section E of the engine log book:

– The number of (C1) cycles consumed since the last recording
– The number of (C1) cycles since the last availability state
– The number of (CSN1) cycles since the engine was new.

NOTE: ***For life-limited parts, check that the total number of authorized in-service cycles has not been reached.***

NOTE: ***When an authorized in-service life limit of a part is liable to be reached prior to 15 flight hours or 7 days (first limit reached), reduce the recording frequency accordingly.***

(b) Power turbine (C2) cycles

For each engine, after each flight, calculate and record in section E of the engine log book:

– The number of (C2) cycles consumed since the last recording
– The number of (C2) cycles since the last availability state
– The number of (CSN2) cycles since the engine was new.

NOTE: ***For life-limited parts, check that the total number of authorized in-service cycles has not been reached.***

NOTE: ***When an authorized in-service life limit of a part is liable to be reached prior to 15 flight hours or 7 days (first limit reached), reduce the recording frequency accordingly.***

D. Manual lump counting method and recording

The manual lump method must be used if the automatic cycle counting system is not available, and as an alternative to the manual detailed cycle counting method.

(1) Counting

(a) Gas generator (C1) cycles

Refer to Figure 2

Each operating phase corresponding to one complete cycle is recorded as 1 cycle.

Each operating phase corresponding to one partial cycle is recorded as 0.15 cycle.

The number of (C1) cycles consumed between engine start and subsequent shutdown is calculated as follows:

C1 = 1 + (n x 0.15), with:

n: number of partial cycles.

Partial cycles are calculated as follows:

N1 min. becomes less than 85%.

NOTE: ***The value of the lump method coefficients may be revised by TURBOMECA depending on the mission profile, and the specific operating conditions (take-off weight, type of mission, ambient conditions, etc.).***

NOTE: ***Any operator who wishes to do so may contact TURBOMECA for a specific study.***

(b) Power turbine (C2) cycles

Refer to Figure 3

Each operating phase corresponding to one complete cycle is recorded as 1 cycle.

Each operating phase corresponding to one partial cycle is recorded as 0.15 cycle.

The number of (C2) cycles consumed between engine start and subsequent shutdown is calculated as follows:

C2 = 1 + (n x 0.15), with:

n: number of partial cycles.

Partial cycles are calculated as follows:
- After passage beyond a min. threshold of N2 min. ≥ 99%
- When N2 decreases and reaches a value between 85% of N2 and 40% of N2
- When N2 increases and exceeds a min. threshold of N2 min. ≥ 99%.

NOTE: ***Especially, if rotor brake is used, calculate a new complete C2 cycle.***

(2) Recording

Refer to Paragraph 1. C. (2)

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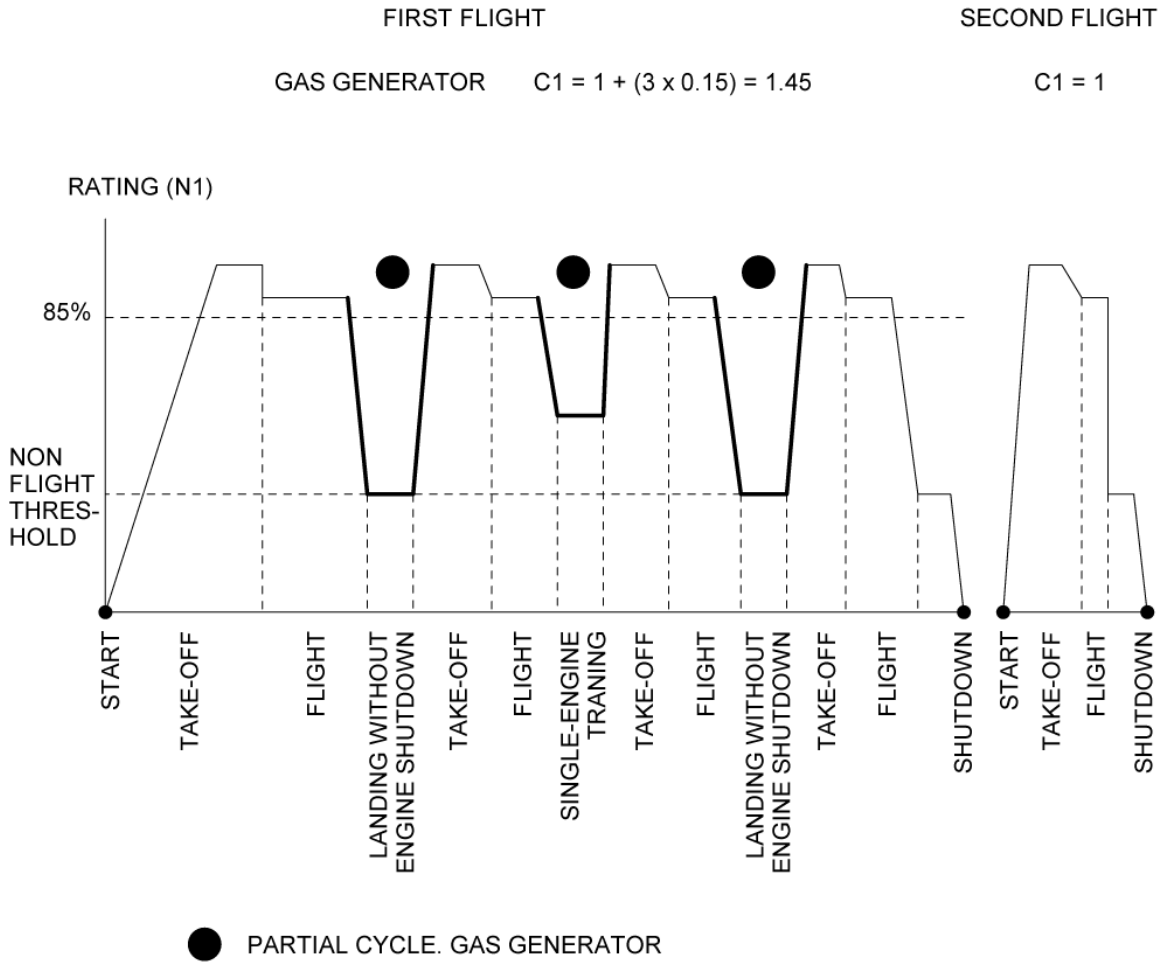

Gas generator cycle counting using the manual lump method on the ARRIEL 2C1
Figure 2

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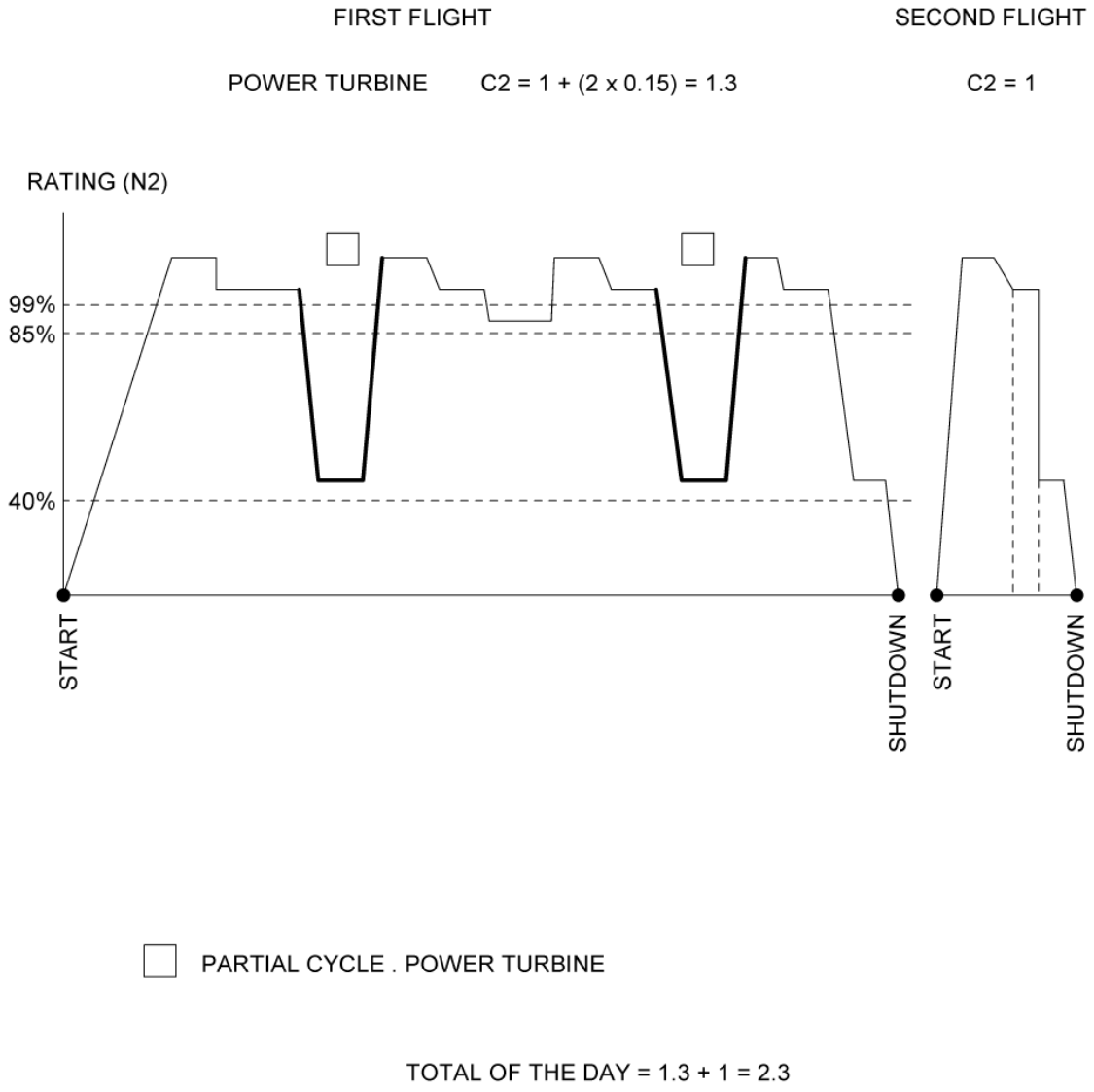

Power turbine cycle counting using the manual lump method on the ARRIEL 2C1
Figure 3

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TASK 05-10-10-200-801-A01

AIRWORTHINESS LIMITATIONS - TABLES OF MANDATORY MAINTENANCE TASKS

CAUTION: ALL INSPECTIONS MUST BE PERFORMED BY QUALIFIED PERSONNEL.

CAUTION: ALL MAINTENANCE OPERATIONS MUST BE PERFORMED BY QUALIFIED MECHANICS.

CAUTION: REGULARLY RECORD THE NUMBER OF FLIGHT HOURS IN THE ENGINE LOG BOOK.

CAUTION: RECORD THE MANDATORY MAINTENANCE TASKS PERFORMED DURING THESE INSPECTIONS IN THE ENGINE LOG BOOK.

CAUTION: USE THE FIRST LIMIT REACHED WHEN SEVERAL LIMITS APPEAR FOR THE SAME TASK.

1. TABLES OF MANDATORY MAINTENANCE TASKS

A. Mandatory maintenance tasks

(1) General

Mandatory maintenance tasks describe the actions to be performed to reach the Airworthiness regulatory objectives.

The evolution of the maintenance tasks and/or related frequency can only be approved by the E.A.S.A (European Aviation Safety Agency) and Safran Helicopter Engines.

These tasks are to be performed during servicing inspections, scheduled inspections or unscheduled inspections (Refer to Task 05-15-01-200-801).

The scheduled inspections are included in a maintenance cycle based on the flight hours which must be counted as follows: the time logged from the moment when the wheels (or the landing skids) leave the ground and the moment when the wheels (or the landing skids) touch the ground.

(2) Time intervals

In general, the time interval between scheduled inspection shall not exceed 600 flight hours, with a tolerance of 10%, as defined for each maintenance operation.

In some specified cases, another time interval between inspections may be defined.

The user may take advantage of the time periods during which the helicopter is not used to gradually perform all the maintenance tasks.

B. Use example of a scheduled mandatory maintenance tasks table

CAUTION: **IF USING A COPY OF THIS PAGE, MAKE SURE IT HAS BEEN COPIED FROM A MANUAL THAT CONTAINS ALL THE LATEST REVISIONS**

Maintenance tasks	*Task No.*	*Periodicity*	*Tolerance*	*Unit*	*Reference Counter*	*Operating condition*	*Date/Signature*
Task for example	71-00-00-ZZZ-YYY	Every 600	+50	FH	TSN	"Engine operating condition for application of task for example"	

Component standard for above task: **ALL**
Application conditions of above task: **"Application conditions of task for example"**

How to read the table: The ***"Task for example"*** No. ***71-00-00-ZZZ-YYY***, and ***whatever the component standard*** must be performed every ***600 +50 flight hours*** based on the ***TSN*** counter and obeying the indicated engine operating condition ***"Engine operating condition for application of task for example"*** and the application conditions of task ***"Application conditions of task for example"***.

C. Use example of an unscheduled mandatory maintenance tasks table

CAUTION: IF USING A COPY OF THIS PAGE, MAKE SURE IT HAS BEEN COPIED FROM A MANUAL THAT CONTAINS ALL THE LATEST REVISIONS			
Maintenance tasks	***Task No.***	***Operating condition***	***Date/Signature***
Task for example	71-00-00-ZZZ-YYY	"Engine operating condition for application of task for example"	
Component standard for above task: **ALL** *Application conditions of above task:* **"Application conditions of task for example"**			
How to read the table: The ***"Task for example"*** No. ***71-00-00-ZZZ-YYY***, and ***whatever the component standard*** must be performed obeying the indicated engine operating condition ***"Engine operating condition for application of task for example"*** and the application conditions of task ***"Application conditions of task for example"***.			

D. Scheduled inspection

CAUTION: IF USING A COPY OF THIS PAGE, MAKE SURE IT HAS BEEN COPIED FROM A MANUAL THAT CONTAINS ALL THE LATEST REVISIONS

Maintenance tasks	*Task No.*	*Periodicity*	*Tolerance*	*Unit*	*Reference Counter*	*Operating condition*	*Date/Signature*
In the engine log book, record the number of C1 and C2 cycles.	05-10-02-200-801	Before each	NA	FLIGHT	DAILY_FLIGHT	If the automatic counting is not available	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**							
In the engine log book, record the total number of C1 and C2 cycles consumed as counted by the EECU.	05-10-02-200-801	Every 15	NA	FH	TSN	ALL	
		Every 7	NA	DAY	-		
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**							
Make sure that the automatic cycle counting is correct.	73-21-00-200-801	Every 15	NA	FH	TSN	ALL	
		Every 7	NA	DAY	-		
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**							
Note: the purpose of this check is to identify: – Any inconsistency between the two engines whereas the use conditions were identical – No increment of the counter whereas the aircraft is used – Unusual increment whereas the operating conditions of the aircraft have not changed. If the consistency check of the automatic cycle counting is not correct, record in the engine logbook the same values of cycles consumed in the previous 15 hours/7 days and switch to the manuel lump counting method.							
Cycle counting - Test.	73-21-00-750-801	Every 600	+60	FH	TSN	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Ground run**							
Torque conformation box - Tests (Electrical)	72-61-00-750-801	Every 600	+60	FH	TSN	ALL	
Component minimum standard for above task: **POST TU 34, PRE TU 192** *Application conditions of above task:* **Wait at least 4 hours since the last engine shutdown before doing this test.**							

E. Unscheduled inspections

CAUTION: IF USING A COPY OF THIS PAGE, MAKE SURE IT HAS BEEN COPIED FROM A MANUAL THAT CONTAINS ALL THE LATEST REVISIONS			
Maintenance tasks	***Task No.***	***Operating condition***	***Date/Signature***
Calculate and record in section E of the engine log book the accumulated time 2 min. OEI performed during the day, the accumulated time 2 min. OEI performed since the engine was new , the accumulated time 2 min. OEI performed since the last availability state.	-	After operation at 2 min. OEI rating	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**			
Remove and send to the repair center the module 03, the module 04 and the Engine Electronic Control Unit.	71-00-01-940-801	As soon as the accumulated value of the 2 min. OEI rating is more than 10 min.	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**			
Note: do the maintenance procedure as per Task 71-00-01-940-801 (Sub-task 71-00-01-940-011-A01).			
Remove and send to the repair center the module 03 and module 04.	71-00-01-940-801	After operation at 30 sec. OEI rating	
Component minimum standard for above task: **PRE TU 6 or PRE TU 14** *Application conditions of above task:* **Engine installed on helicopter**			
Note: do the maintenance procedure as per Task 71-00-01-940-801 (Sub-task 71-00-01-940-011-A01).			
Remove and send to the repair center the Engine Electronic Control Unit.	71-00-01-940-801	After operation at 30 sec. OEI rating	
Component minimum standard for above task: **PRE TU 77C** *Application conditions of above task:* **Engine installed on helicopter**			
Note: do the maintenance procedure as per Task 71-00-01-940-801 (Sub-task 71-00-01-940-011-A01).			
Calculate and record in section E of the engine log book the accumulated time 30 sec. OEI performed during the day, the accumulated time 30 sec. OEI performed since the engine was new , the accumulated time 30 sec. OEI performed since the last availability state.	-	After operation at 30 sec. OEI rating	
Component minimum standard for above task: **POST TU 6 or POST TU 14** *Application conditions of above task:* **Engine installed on helicopter**			

CAUTION: IF USING A COPY OF THIS PAGE, MAKE SURE IT HAS BEEN COPIED FROM A MANUAL THAT CONTAINS ALL THE LATEST REVISIONS			
Maintenance tasks	***Task No.***	***Operating condition***	***Date/Signature***
Remove and send to the repair center the module 03, the module 04 and the Engine Electronic Control Unit.	71-00-01-940-801	As soon as the accumulated value of the 30 sec. OEI rating is more than 30 sec.	
Component minimum standard for above task: **POST TU 6 or POST TU 14** *Application conditions of above task:* **Engine installed on helicopter**			
Note: do the maintenance procedure as per Task 71-00-01-940-801 (Sub-task 71-00-01-940-011-A01).			

TASK 05-15-00-200-801-A01

FREQUENCIES - FREQUENCIES OF THE TURBOSHAFT ENGINE MAINTENANCE

CAUTION: REGULARLY RECORD THE NUMBER OF FLIGHT HOURS IN THE ENGINE LOG BOOK.

1. FREQUENCIES OF THE TURBOSHAFT ENGINE MAINTENANCE

A. Time Between Overhauls (TBO)

(1) Time Between Overhauls - Definition

The TBO of a material (engine, module, equipment or accessory) is the maximum authorized time before it is required to return this material to overhaul, following operation under normal use conditions.

The normal operating conditions are the conditions conforming to the criteria set down by the manufacturer and the Airworthiness Authorities for engine Certification.

TBO is expressed in flight hours.

NOTE: ***Flight hours must be counted from the time the wheels (or skids) leave the ground until they touch back down.***

Counting of flight hours begins on the day the material, installed on the airframe, performs its first flight following:

– Manufacture
– Overhaul
– Repair during which TBO values in flight hours are restored.

TBO values in flight hours are defined in Task 05-15-00-201-801.

NOTE: ***Any module returned to a Repair Center without a log card or one that does not include the operating hours and cycles will be systematically overhauled.***

(2) Initial TBO

Engines, modules, certain equipment and accessories have an initial TBO.

The initial TBO value, approved by the Authorities at the time of approval or engine type Certification is based upon:

– The experience gained in development and substantiation tests performed
– The experience gained in operation.

(3) TBO extension

The initial TBO value can be subject to extension programs.

Data recorded by operators allows reliability analyses to be performed for each type of engine. This data can be used to support TBO extension programs.

For a specific extension, application must be drawn up to Safran Helicopter Engines and shall be only effective after written consent of Safran Helicopter Engines.

(4) TBO extension/modification standard of material

When a new TBO value is declared, the manufacturer will define the modifications that must be incorporated to the material (minimum standard) to allow optimization of this new TBO.

(5) "Basic" TBO

Declared TBO values (either initial or revised TBO) must be considered as basic values, used for indication purposes only.

This "basic" TBO represents the maximum service life allowable for engines operating under normal operating and maintenance conditions. The "basic" TBO can be modified under certain operating conditions of varying severity.

(6) Publishing "basic" TBO data

"Basic" TBO values (engines, modules, equipment and accessories) are listed in Task 05-15-00-201-801.

(7) Approval by the local Airworthiness Authorities

"Basic" or specific TBO values are values recommended by Safran Helicopter Engines. It is the individual operator's responsibility to have its engine TBO approved by the local Airworthiness Authorities, and to respect this TBO.

Once these TBO values have been approved, it is the operator's responsibility to ensure and maintain the reliability of the material and not compromise flight safety.

B. Calendar limit

Calendar limit is the length of time, expressed in years, for which a material is authorized to operate under normal operating conditions.

Normal operating conditions are conditions that conform to criteria defined by the manufacturer and the Airworthiness Authorities for engine Certification.

Counting of calendar limit begins on the day the material, installed on the airframe, first enters into service following:

– Manufacture
– Overhaul
– Repair during which calendar limit values are restored.

Calendar limit values are defined in Task 05-15-00-201-801.

NOTE: ***If the equipment's accompanying documentation does not include the date of entry into service, the calendar limit date of record will be the most recently occurring date among the following:***

- ***Manufacture***
- ***Last overhaul***
- ***Last repair that included procedures to reset the calendar limit.***

(1) Management of calendar limit

Counting of calendar limit is not interrupted by intermediate removals between overhauls or by storage periods following the date of first entry into service.

For any engine sent to repair, the user must specify if he wishes that modules, which calendar availability is strictly less than 3 years, be maintained without intervention.

Failing specific operator's instructions, repair enabling calendar limit to be restored shall be performed on modules which availability is less than 3 years.

Any repaired or overhauled engine which calendar limit accessories do not require disassembly, will have its accessories reintroduced into service without intervention, if their calendar availability is 3 years as a minimum.

Accessories must be disassembled if:

– Calendar availability is less than 3 years

– The operator asks for a full calendar limit of accessories.

(2) Management of accessories calendar limit

Counting of calendar limit is not interrupted by intermediate removals between overhauls or by storage periods following the date of first entry into service.

For any accessory sent to repair, the criteria for limit restoration are as follows:

– If the accessory calendar availability is less than 3 years, the operator must specify if he wishes the accessory to be maintained without performing a repair to restore its calendar limit. Failing specific operator's instructions, repair enabling calendar limit to be restored must be performed
– If the accessory calendar availability is more than 3 years, the operator must specify if he wishes to perform a repair restoring calendar limit of the accessory. Failing specific operator's instructions, repair enabling full calendar limit to be restored is not to be performed.

C. Use-limited parts

In order to optimize the service life of certain components by keeping them in service for as long as possible aiming for the highest reliability (both prior to and following repairs), use limits, expressed in hours or cycles have been defined, based on tests and experience gained in operation. These use limits allow parts to have their service life extended rather than be replaced during overhaul.

Unlike authorized in-service life-limited parts, use-limit values are not submitted to the Airworthiness Authorities for approval (Refer to Task 05-10-00-200-801).

The list of components which have use limits is provided in Task 05-15-00-201-802.

The operating time and cycles of these components must be systematically recorded to enable reliable follow-up. Doing this enables components to be replaced as close as possible to the actual end of their use limits.

NOTE: ***The number of cycles completed by a component must be calculated and recorded according to the module it belongs to (gas generator or power turbine) in accordance with the procedure given in Task 05-10-02-200-801.***

The Repair Centers that tracks the use limits for these parts must indicate their remaining available time or cycles on the Exchangeable Supply Log Card that accompanies the module on which the part is found.

NOTE: ***Any use-limited parts of a module returned to a Repair Center without a log card or a specific card that does not include the operating hours (and operating cycles for HP and PT blades) will be systematically replaced.***

D. Practical instructions

(1) Return of a material (engine, module, equipment or accessory) for repair or overhaul

The material must be removed and returned to the manufacturer or approved Repair Center in the following cases:

(a) When a life-limited part is about to reach its authorized in-service life limit.

Refer to Task 05-10-01-200-801.

(b) When the number of flight hours corresponding to the TBO defined for that particular operator has been reached.

Refer to Task 05-15-00-201-801.

(c) When the calendar limit has been reached.

Refer to Task 05-15-00-201-801.

(d) When a use-limited part is about to reach its use limit in hours and/or cycles as defined in the Exchangeable Supply Log Cards.

Refer to Task 05-15-00-201-802.

(e) Prior to reach any of the preceding four limits, if an inspection or reconditioning of a material is proved necessary for any other reason.

NOTE: ***Some interventions can be applied by Safran Helicopter Engines approved operators for the application of the corresponding procedures.***

NOTE: ***Depending on the type of maintenance operations carried out on the material, together with its prior service and operating time, there are two possibilities for its return to service:***

- ***Either the intervention is an OVERHAUL: the material is returned to service and assigned a FULL TBO***
- ***Or the intervention is a REPAIR: the material is returned to service and assigned a REMAINING TBO.***

E. Replacement of life-limited components

Refer to Airworthiness Limitations - Life limits: Task 05-10-00-200-801.

2. TERMS USED IN TABLES FOR LIMITS AND MAINTENANCE TASKS

A. DEFINITIONS

- **ITEM:** ATA item number of component.
- **DESCRIPTION:** description of the component.
- **PART NUMBER:** part number of the component.
- **MAINTENANCE TASK:** description of the maintenance operation to be performed.
- **TASK NUMBER:** identification of the Maintenance Manual task.
- **LEVEL:** classification of the maintenance task. Refer to Task 05-15-01-200-801 (paragraph 1. A.).
- **PERIODICITY:** interval value for the task application.
- **TOLERANCE:**
  - **+:** higher interval tolerance value
  - **-:** lower interval tolerance value.
- **UNIT:** counter unit. Refer to paragraph 2. C.
- **REFERENCE COUNTER:** counter name to which the limit or periodicity applies. Refer to paragraph 2. B.
- **MAINTENANCE METHOD:** monitoring component method.
- **APPLICATION CONDITIONS:** description of the necessary environment for applying the maintenance operation.
- **DATE/SIGNATURE:** cell dedicated to the realization date of the maintenance operation and to visa of the authorized staff if the user wants to make a copy of the tables for performed operation recording.
- **LIMIT:** limit value.
- **NA:** not applicable.
- **COMPONENT STANDARD:** modification standard required for the application of maintenance operation:

  - **ALL:** maintenance operation applicable to all engine / component standards.
  - **ANY OTHER STANDARD:** maintenance operation applicable to any other engine / component standard different from specified minimum component standards.
- **COMPONENT MINIMUM STANDARD:** minimum modification standard required for the application of maintenance operation:
  - **PRE TU... X:** maintenance operation applicable to an engine / component not modified TU... X.
  - **PRE TU... X, PRE TU... Z:** maintenance operation applicable to an engine / component not modified TU... X and not modified TU... Z.
  - **PRE TU... X, POST TU... Z:** maintenance operation applicable to an engine / component not modified TU... X and modified TU... Z.
  - **POST TU... Y:** maintenance operation applicable to an engine / component modified TU... Y.
  - **POST TU... Y, POST TU... Z:** maintenance operation applicable to an engine / component modified TU... Y and modified TU... Z.
- **OPERATING CONDITIONS:** condition of engine operation involving the application of the maintenance operation.
- **FH** (Flight Hours): number of flight hours of a component consumed between two given times.
- **C1 or C2** (Cycles 1 or 2): number of cycles consumed between two given times.
- **CSN1 or CSN2** (Cycles Since New 1 or 2): number of cycles consumed since the component is new.
- **TSN** (Time Since New): number of flight hours consumed since the component is new.
- **TSO** (Time Since Overhaul): number of flight hours consumed since the component has been overhauled.

B. ENGINE LOG BOOK COUNTERS

Usage counters of the engine log book, with correspondence of "daily" counters and "cumulation" associated counters.

"Daily" usage counter	*"Cumulation" associated counter*	*Counter unit*	*Counter definition*
DAILY_FLIGHT		FLIGHT	Counter which counts the number of flights (FLIGHT) between two given times.
FH (Flight Hours)		FH	Counter which records the number of flight hours (FH) of a component between two given times.
	TSN (Time Since New)	FH	Counter which records the number of flight hours (TSN) since the component is new.
	TSO (Time Since Overhaul)	FH	Counter which records the number of flight hours (TSO) since the component has been overhauled.
C1		Cycle	Counter which records the number of gas generator cycles (C1) between two given times.
	CSN1 (Cycle Since New 1)	Cycle	Counter which records the number of cycles (CSN1) since the gas generator is new.

"Daily" usage counter	*"Cumulation" associated counter*	*Counter unit*	*Counter definition*
C2		Cycle	Counter which records the number of power turbine cycles (C2) between two given times.
	CSN2 (Cycle Since New 2)	Cycle	Counter which records the number of cycles (CSN2) since the power turbine is new.
Daily_OEI2MIN		SEC	Counter which records the day elapsed time at OEI 2 min. rating between two given times.
	OEI2MIN	SEC	Counter which records the time elapsed in operation at OEI 2 min. rating since the last overhaul or since new.
Daily_OEI30SEC		SEC	Counter which records the day elapsed time at OEI 30 sec. rating between two given times.
	OEI30SEC	SEC	Counter which records the time elapsed in operation at OEI 30 sec. rating since the last overhaul or since new.

C. UNITS

- **FH** (Flight Hour): operation time unit in hours (Refer to paragraph 1. B of Task 05-15-00-200-801).
- **CYCLE:** Refer to Task 05-10-02-200-801.
- **YEAR:** calendar year.
- **MONTH:** calendar month.
- **DAY:** calendar day.
- **MIN:** minute.
- **SEC:** seconds.
- **%:** percentage.
- **FLIGHT:**
  - If frequency = BEFORE FIRST: task to be performed before the first flight of the day
  - If frequency = BEFORE EACH: task to be performed before each flight
  - If frequency = AFTER 15 FLIGHT HOURS OR 7 DAYS: task to be performed after 15 flight hours or after 7 days.

TASK 05-15-00-201-801-A01

FREQUENCIES - TBO TABLE

CAUTION: USE THE FIRST LIMIT REACHED WHEN SEVERAL LIMITS APPEAR FOR THE SAME TASK.

1. TBO VALUES FOR ENGINES/MODULES/EQUIPMENT AND ACCESSORIES

A. TBO - General

(Refer to Task 05-15-00-200-801)

Refer to the Engine Log Book (current and single) to know the modification standard.

Module modifications:

– Recorded on the Module Log Card.

Off-Module modifications:

– Recorded on the Engine Log Book, Section "A" for the modifications applied at the time of delivery
– Recorded on the Engine Log Book, Section "E" for the modifications applied at the operator's or in a Service Center.

B. Example of a table use for engines/modules/equipment and accessories

CAUTION:	**IF USING A COPY OF THIS PAGE, MAKE SURE IT HAS BEEN COPIED FROM A MANUAL THAT CONTAINS ALL THE LATEST REVISIONS**			
Item	***Description***	***Periodicity***	***Unit***	***Reference Counter***
72-00-00-01-XXX	Module for example	Every 3,000	FH	TSO
Component standard for above task: **ALL**				
How to read the table: Before the ***TSO*** counter exceeds the TBO limit value of ***3,000 flight hours,*** it is ***required*** to remove and send for overhaul the ***« Module for example »*** item ***(72-00-00-01-XXX)*** .				

C. TBO table for engines/modules/equipment and accessories

CAUTION: YOU MUST CHECK THE STANDARD OF THE ENGINE AND ITS MODULES ANY TIME A MODULE IS REPLACED TO MAKE SURE THE STANDARD IS CONSISTENT WITH THE TBOS TAKEN INTO ACCOUNT IN THE AVAILABILITY.

CAUTION: THE MODIFICATIONS TU54 AND TU70 ARE CLASSIFIED AS MANDATORY MODIFICATIONS. THEY MUST BE APPLIED ON THE ENGINE TO ENSURE FLIGHT SAFETY.

(1) TBO table for engine and modules

CAUTION:	IF USING A COPY OF THIS PAGE, MAKE SURE IT HAS BEEN COPIED FROM A MANUAL THAT CONTAINS ALL THE LATEST REVISIONS			
Item	***Description***	***Periodicity***	***Unit***	***Reference Counter***
72-61-00-01-001	Module 01 assy - Accessory gearbox	Every 3,500	FH	TSO
Component standard for above task: **ALL**				
72-32-00-01-001	Module 02 assy - Axial compressor	Every 3,500	FH	TSO
Component minimum standard for above task: **POST TU 54 and POST TU 70**				
72-43-00-01-001	Module 03 assy - Gas generator	Every 3,500	FH	TSO
Component standard for above task: **ALL**				
72-54-00-01-001	Module 04 assy - Power turbine	Every 3,500	FH	TSO
Component minimum standard for above task: **(POST TU 6 or POST TU 14)**				
72-54-00-01-001	Module 04 assy - Power turbine	Every 3,000	FH	TSO
Component standard for above task: **Any other standard**				
72-15-00-01-001	Module 05 assy - Reduction gear	Every 3,500	FH	TSO
Component standard for above task: **ALL**				

(2) TBO table and maintenance methods for equipment and accessories

CAUTION:	IF USING A COPY OF THIS PAGE, MAKE SURE IT HAS BEEN COPIED FROM A MANUAL THAT CONTAINS ALL THE LATEST REVISIONS			
Item	***Description***	***Periodicity***	***Unit***	***Reference Counter***
71-00-00-01-003	Engine Electronic Control Unit	On condition	-	-
Component standard for above task: **ALL**				
Equipment/accessory accompanied with a log card.				
71-51-00-01-010	Control and monitoring harness	On condition	-	-
Component standard for above task: **ALL**				
71-51-00-01-020	Regulation harness	On condition	-	-
Component standard for above task: **ALL**				
72-43-00-01-010	Junction and T4.5 matching box	On condition	-	-
Component standard for above task: **ALL**				
72-43-00-01-460	Igniter	On condition	-	-
Component standard for above task: **ALL**				
72-43-00-01-550	Injector	On condition	-	-
Component standard for above task: **ALL**				
72-61-00-01-460	Visual pre-blockage indicator of the oil filter	On condition	-	-
Component standard for above task: **ALL**				
72-61-00-01-650	Alternator	On condition	-	-
Component standard for above task: **ALL**				
72-61-00-01-880	Torquemeter speed sensor	On condition	-	-
Component standard for above task: **ALL**				

CAUTION:	IF USING A COPY OF THIS PAGE, MAKE SURE IT HAS BEEN COPIED FROM A MANUAL THAT CONTAINS ALL THE LATEST REVISIONS			
Item	***Description***	***Periodicity***	***Unit***	***Reference Counter***
72-61-20-01-280	Torque conformation box	On condition	-	-
Component standard for above task: **ALL**				
72-70-00-01-200	Exhaust pipe	On condition	-	-
Component standard for above task: **ALL**				
73-14-00-01-010	Adjusted valve assy	On condition	-	-
Component standard for above task: **ALL**				
Equipment / accessory accompanied with a log card				
73-23-00-01-010	Adjusted pump and metering valve assy	Every 3,000	FH	TSO
Component standard for above task: **ALL**				
Equipment/accessory accompanied with a log card.				
73-23-13-03-220	Visual pre-blockage indicator of the fuel filter	On condition	-	-
Component standard for above task: **ALL**				
73-23-13-03-310	Low fuel pressure switch	On condition	-	-
Component standard for above task: **ALL**				
74-11-10-01-010	Ignition box	On condition	-	-
Component standard for above task: **ALL**				
75-31-00-01-050	Bleed valve	On condition	-	-
Component standard for above task: **ALL**				
75-41-00-01-010	P3 pressure transmitter	On condition	-	-
Component standard for above task: **ALL**				
77-11-00-01-010	N1 speed sensor	On condition	-	-
Component standard for above task: **ALL**				
77-12-00-01-010	N2 speed sensor	On condition	-	-
Component standard for above task: **ALL**				
77-21-00-01-010	Pyrometric harness	On condition	-	-
Component standard for above task: **ALL**				
77-21-00-01-030	Pyrometric harness	On condition	-	-
Component standard for above task: **ALL**				
79-24-00-01-010	Oil pump	On condition	-	-
Component standard for above task: **ALL**				
79-25-00-01-010	Valve assy	On condition	-	-
Component standard for above task: **ALL**				
79-31-00-01-010	Low oil pressure switch	On condition	-	-
Component standard for above task: **ALL**				
79-38-00-01-030	Electrical magnetic plug	On condition	-	-
Component standard for above task: **ALL**				

CAUTION: USE THE FIRST LIMIT REACHED WHEN SEVERAL LIMITS APPEAR FOR THE SAME TASK.

2. CALENDAR LIMITS

A. Calendar limits - General

(Refer to Task 05-15-00-200-801)

B. Example of a table for calendar limits

CAUTION:	**IF USING A COPY OF THIS PAGE, MAKE SURE IT HAS BEEN COPIED FROM A MANUAL THAT CONTAINS ALL THE LATEST REVISIONS**			
Item	***Description***	***Periodicity***	***Unit***	***Reference Counter***
72-00-00-01-XXX	Module for example	Every 15	YEAR	-
Component standard for above task: **ALL**				
How to read the table: Every time the ***CALENDAR*** counter reaches the limit value of ***15 YEARS***, it is ***required*** to remove and send to an approved repair center the ***« Module for example »*** item ***(72-00-00-01-XXX)*** .				

C. Calendar limits for engine and modules

Not applicable

D. Calendar limits of equipment and accessories

CAUTION:	**IF USING A COPY OF THIS PAGE, MAKE SURE IT HAS BEEN COPIED FROM A MANUAL THAT CONTAINS ALL THE LATEST REVISIONS**			
Item	***Description***	***Periodicity***	***Unit***	***Reference Counter***
73-23-00-01-010	Adjusted pump and metering valve assy	Every 10	YEAR	-
Component standard for above task: **ALL**				
Equipment/accessory accompanied with a log card.				

TASK 05-15-00-201-802-A01

FREQUENCIES - LIST OF USE-LIMITED PARTS

WARNING

IT IS REQUIRED TO REMOVE A USE-LIMITED PART FROM SERVICE AS SOON AS IT HAS REACHED ITS AUTHORIZED IN-SERVICE LIFE LIMIT. FAILURE TO DO SO MAY CAUSE THE OCCURRENCE OF EVENT LIABLE TO AFFECT THE ENGINE OPERATING SAFETY.

CAUTION: USE THE FIRST LIMIT REACHED WHEN SEVERAL LIMITS APPEAR FOR THE SAME TASK.

1. USE-LIMITED PARTS

A. Use-limited parts - General

(Refer to Task 05-15-00-200-801)

B. Example of table use for use-limited parts

(1) Module X

Description	*Part Number*	*Reference Counter*	*Limit*	*Unit*
Part for example	NNNNNNNNNN	CSN1	10,000	CYCLE
How to read the table: Before the ***CSN1*** counter exceeds the limit value of ***10,000 CYCLES***, it is ***required*** to remove from service the ***"Part for example"*** part number ***NNNNNNNNNN***.				

C. Tables of use-limited parts for the ARRIEL 2C1

(1) Module 03

Description	*Part Number*	*Reference Counter*	*Limit*	*Unit*
HP turbine blade	2292260070	TSN	6,000	FH
		CSN1	10,000	CYCLE
	2292260080	TSN	6,000	FH
		CSN1	10,000	CYCLE
	2292260100	TSN	6,000	FH
		CSN1	10,000	CYCLE
	2292260110	TSN	6,000	FH
		CSN1	10,000	CYCLE
	2292260760	TSN	6,000	FH
		CSN1	10,000	CYCLE

Description	Part Number	Reference Counter	Limit	Unit
	2292260770	TSN	6,000	FH
		CSN1	10,000	CYCLE
	2292260780	TSN	6,000	FH
		CSN1	10,000	CYCLE
	2292260790	TSN	6,000	FH
		CSN1	10,000	CYCLE
	229226A070	TSN	6,000	FH
		CSN1	10,000	CYCLE
	229226A0A0	TSN	6,000	FH
		CSN1	10,000	CYCLE
	229226A0B0	TSN	6,000	FH
		CSN1	10,000	CYCLE
	229226A3X0	TSN	6,000	FH
		CSN1	10,000	CYCLE
	229226A3Y0	TSN	6,000	FH
		CSN1	10,000	CYCLE
	229226A3Z0	TSN	6,000	FH
		CSN1	10,000	CYCLE
	229226A580	TSN	6,000	FH
		CSN1	10,000	CYCLE
	229226A590	TSN	6,000	FH
		CSN1	10,000	CYCLE
	729226076A	TSN	6,000	FH
		CSN1	10,000	CYCLE
	729226A07A	TSN	6,000	FH
		CSN1	10,000	CYCLE
	729226A0AA	TSN	6,000	FH
		CSN1	10,000	CYCLE
	729226A0BA	TSN	6,000	FH
		CSN1	10,000	CYCLE

(2) Module 04

Description	Part Number	Reference Counter	Limit	Unit
Power turbine blade	2292810430	TSN	7,000	FH
		CSN2	10,000	CYCLE
	2292810440	TSN	7,000	FH
		CSN2	10,000	CYCLE
	229281A010	TSN	7,000	FH

Description	*Part Number*	*Reference Counter*	*Limit*	*Unit*
		CSN2	10,000	CYCLE
Power turbine nut	0292810450	TSN	3,500	FH

(3) Module 05

Description	*Part Number*	*Reference Counter*	*Limit*	*Unit*
Sleeve assy	0292717210	TSN	3,500	FH
	0292717390	TSN	3,500	FH
	0292717600	TSN	3,500	FH
Splined nut	0292710510	TSN	3,500	FH

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TASK 05-15-01-200-801-A01

FREQUENCIES - INSPECTION FREQUENCIES

CAUTION: ALL INSPECTIONS MUST BE PERFORMED BY QUALIFIED PERSONNEL.

CAUTION: ALL MAINTENANCE OPERATIONS MUST BE PERFORMED BY QUALIFIED MECHANICS.

1. INSPECTION FREQUENCIES

A. Maintenance tasks - Definition

These tasks must be performed during servicing inspections, scheduled inspections or unscheduled inspections.

(1) Mandatory maintenance tasks

Refer to Airworthiness Limitations - Task 05-10-10-200-801.

Operations to be performed to comply with Airworthiness objectives are listed in the table of mandatory maintenance tasks.

(2) Manufacturer required maintenance tasks

Refer to Task 05-20-10-200-801 and Task 05-50-00-200-801.

The manufacturer considers that the manufacturer required maintenance tasks must be carried out at the scheduled inspection frequency. Failure to do so may cause occurrences liable to affect the engine operating safety.

The information (frequency and/or related maintenance tasks) may be adapted after approval from the manufacturer (TURBOMECA) and supervision authorities.

(3) Optional maintenance tasks

Refer to Task 05-20-10-200-801.

Optional maintenance tasks are recommended by the manufacturer as a means of improving reliability, increasing operational availability and reducing operating costs.

The information (frequency and/or related maintenance tasks) may be adapted after approval from the manufacturer (TURBOMECA) and supervision authorities.

B. Frequency

CAUTION: REGULARLY RECORD THE NUMBER OF FLIGHT HOURS IN THE ENGINE LOG BOOK.

(1) Servicing inspections

Refer to Task 05-10-10-200-801 and Task 05-20-10-200-801.

Servicing inspections are to be performed at varying intervals from the following inspections:

- Inspection before the first flight of the day
- Turn-around inspection
- Inspection after 15 flight hours or 7 days (first limit reached).

(a) Inspection before the first flight of the day

This inspection is performed to make sure that the engine is in flight condition (it may have been subjected to corrective maintenance operations following the inspection after 15 flight hours or 7 days (first limit reached).

(b) Turn-around inspection

This inspection requires a reduced number of operations.

This inspection is performed to make sure that the engine is in flight condition.

This inspection is independent of refuelling, or of any mission-specific preparation operations.

(c) Inspection after 15 flight hours or 7 days (first limit reached)

This inspection is performed so that certain checks can be carried out more frequently than just during scheduled inspections.

CAUTION: RECORD THE MAINTENANCE TASKS PERFORMED DURING THESE INSPECTIONS IN THE ENGINE LOG BOOK.

(2) Scheduled inspections

Refer to Task 05-10-10-200-801 and Task 05-20-10-200-801.

Each task to be performed is assigned a frequency.

Scheduled inspections are performed at regular intervals with an allocated tolerance.

Frequency may be expressed according to units defined in Task 05-15-00-200-801.

NOTE: When a frequency is expressed in hours, days or calendar month, the inspection must be carried out at the first limit reached.

The frequencies of manufacturer required maintenance tasks and optional maintenance tasks, prescribed for the engine and its equipment/accessories are basic and may change according to the type of operations and experience gained.

Maintenance operations must be performed within the intervals defined in the related tables.

CAUTION: RECORD THE MAINTENANCE TASKS PERFORMED DURING THESE INSPECTIONS IN THE ENGINE LOG BOOK.

(3) Unscheduled inspections

Refer to Task 05-10-10-200-801 and to Task 05-50-00-200-801.

Unscheduled inspections are linked to engine use in specific conditions.

Tasks related to unscheduled inspections must be performed prior to the next flight.

TASK 05-20-10-200-801-A01

SCHEDULED INSPECTIONS - SUMMARY TABLE OF SERVICING INSPECTIONS AND SCHEDULED INSPECTIONS

CAUTION: ALL INSPECTIONS MUST BE PERFORMED BY QUALIFIED PERSONNEL.

CAUTION: ALL MAINTENANCE OPERATIONS MUST BE PERFORMED BY QUALIFIED MECHANICS.

CAUTION: REGULARLY RECORD THE NUMBER OF FLIGHT HOURS IN THE ENGINE LOG BOOK.

CAUTION: RECORD THE MAINTENANCE TASKS PERFORMED DURING THESE INSPECTIONS IN THE ENGINE LOG BOOK.

CAUTION: SHOULD THERE BE ANY DISCREPANCY BETWEEN THE MANDATORY SCHEDULED MAINTENANCE INSPECTION TASKS LISTED IN TASK 05-10-10-200-801 AND THOSE LISTED IN TASKS 05-20-10, REFER TO TASK 05-10-10-200-801 WHICH IS THE ONLY ONE APPROVED BY THE AIRWORTHINESS AUTHORITIES.

1. SUMMARY TABLE OF SERVICING INSPECTIONS AND SCHEDULED INSPECTIONS

A. General

These tables are work reference tools for the operator. They list, in order of frequency, all mandatory, manufacturer required, and optional scheduled inspection tasks. The operator may make a copy of these tables and fill in "date" and "signature" cells, once the tasks have been performed.

Mandatory tasks are listed in Task 05-10-10-200-801 in the Airworthiness Limitations section approved by the Airworthiness authorities.

B. Conditions of application

Maintenance operations must be performed before the maximum frequency (frequency + tolerance) is reached. As long as these intervals are respected, scheduling of maintenance operations will be left at the discretion of the operator.

C. Use of the summary table

Maintenance tasks defined by their designation and number are classified in order of frequency then:

- By level (M: Mandatory, R: manufacturer Required or OP: Optional)
- By application conditions (engine installed, engine removed, ground run, in flight, engine cranking, etc.).

D. List of inspections

(1) Servicing inspections

- Inspection before the first flight of the day (Refer to Task 05-20-10-201-801)
- Turn-around inspection (between flights) (Refer to Task 05-20-10-201-803)
- Inspection after 15 flight hours or 7 days (Refer to Task 05-20-10-201-810).

(2) Scheduled inspections

- Inspection at 25 flight hours (Refer to Task 05-20-10-201-812)
- Inspection at 30 flight hours (Refer to Task 05-20-10-201-815)
- Inspection at 50 flight hours (Refer to Task 05-20-10-201-817)
- Inspection at 300 flight hours (Refer to Task 05-20-10-201-835)
- Inspection at 600 flight hours (Refer to Task 05-20-10-201-850)
- Inspection at 3,000 flight hours (Refer to Task 05-20-10-201-880)
- Inspection at 15 years (Refer to Task 05-20-10-201-940).

NOTE: ***Do the rinsing, washing, cleaning of the engine at the frequencies defined in Task 71-01-00-610-801.***

INSPECTION BEFORE THE FIRST FLIGHT OF THE DAY	**CAUTION: SHOULD THERE BE ANY DISCREPANCY BETWEEN THE MANDATORY SCHEDULED MAINTENANCE INSPECTION TASKS LISTED IN TASK 05-10-10-200-801 AND THOSE LISTED IN THIS TASK, REFER TO TASK 05-10-10-200-801 WHICH IS THE ONLY ONE APPROVED BY THE AIRWORTHINESS AUTHORITIES.**
	NOTE: Maintenance operations must be performed before the maximum frequency (frequency + tolerance) is reached. As long as these intervals are respected, scheduling of maintenance operations will be left at the discretion of the operator. Each maintenance operation can be scheduled independently.

CAUTION: USE THE FIRST LIMIT REACHED WHEN SEVERAL LIMITS APPEAR FOR THE SAME TASK.

CAUTION: IF USING A COPY OF THIS PAGE, MAKE SURE IT HAS BEEN COPIED FROM A MANUAL THAT CONTAINS ALL THE LATEST REVISIONS

M: Mandatory **R: Manufacturer required** **OP: Optional**

Maintenance tasks	*Task No.*	*Level*	*Periodicity*	*Tolerance*	*Unit*	*Reference Counter*	*Operating condition*	*Date/Signature*
Remove the blanks and make sure that there are no foreign objects: examine near the air intakes and the exhaust zone.	-	R	Before First	NA	FLIGHT	DAILY_FLIGHT	ALL	

Component standard for above task : **ALL**
Application conditions of above task: **Engine installed on helicopter**

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TURN-AROUND INSPECTION (BETWEEN FLIGHT)	**CAUTION:** **SHOULD THERE BE ANY DISCREPANCY BETWEEN THE MANDATORY SCHEDULED MAINTENANCE INSPECTION TASKS LISTED IN TASK 05-10-10-200-801 AND THOSE LISTED IN THIS TASK, REFER TO TASK 05-10-10-200-801 WHICH IS THE ONLY ONE APPROVED BY THE AIRWORTHINESS AUTHORITIES.**
	NOTE: ***Maintenance operations must be performed before the maximum frequency (frequency + tolerance) is reached. As long as these intervals are respected, scheduling of maintenance operations will be left at the discretion of the operator. Each maintenance operation can be scheduled independently.***

CAUTION: **USE THE FIRST LIMIT REACHED WHEN SEVERAL LIMITS APPEAR FOR THE SAME TASK.**

CAUTION: **IF USING A COPY OF THIS PAGE, MAKE SURE IT HAS BEEN COPIED FROM A MANUAL THAT CONTAINS ALL THE LATEST REVISIONS**

M: Mandatory **R: Manufacturer required** **OP: Optional**

Maintenance tasks	*Task No.*	*Level*	*Periodicity*	*Tolerance*	*Unit*	*Reference Counter*	*Operating condition*	*Date/Signature*
In the engine log book, record the number of C1 and C2 cycles.	05-10-02-200-801	M	Before each	NA	FLIGHT	DAILY_FLIGHT	If the automatic counting is not available	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								
Inspection of oil level in tank and top up if required	Refer to Aircraft Maintenance Manual	R	Before each	NA	FLIGHT	DAILY_FLIGHT	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								
Make sure that there are no leaks at the general drain of the support platform	-	R	Before each	NA	FLIGHT	DAILY_FLIGHT	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								

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INSPECTION AFTER 15 FLIGHT HOURS OR 7 DAYS	**CAUTION: SHOULD THERE BE ANY DISCREPANCY BETWEEN THE MANDATORY SCHEDULED MAINTENANCE INSPECTION TASKS LISTED IN TASK 05-10-10-200-801 AND THOSE LISTED IN THIS TASK, REFER TO TASK 05-10-10-200-801 WHICH IS THE ONLY ONE APPROVED BY THE AIRWORTHINESS AUTHORITIES.**
	***NOTE:* Maintenance operations must be performed before the maximum frequency (frequency + tolerance) is reached. As long as these intervals are respected, scheduling of maintenance operations will be left at the discretion of the operator. Each maintenance operation can be scheduled independently.**

CAUTION: USE THE FIRST LIMIT REACHED WHEN SEVERAL LIMITS APPEAR FOR THE SAME TASK.

CAUTION: IF USING A COPY OF THIS PAGE, MAKE SURE IT HAS BEEN COPIED FROM A MANUAL THAT CONTAINS ALL THE LATEST REVISIONS

M: Mandatory **R: Manufacturer required** **OP: Optional**

Maintenance tasks	*Task No.*	*Level*	*Periodicity*	*Tolerance*	*Unit*	*Reference Counter*	*Operating condition*	*Date/Signature*
In the engine log book, record the total number of C1 and C2 cycles consumed as counted by the EECU.	05-10-02-200-801	M	Every 15	NA	FH	TSN	ALL	
			Every 7	NA	DAY	-		
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								
Make sure that the automatic cycle counting is correct.	73-21-00-200-801	M	Every 15	NA	FH	TSN	ALL	
			Every 7	NA	DAY	-		
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								

Note: the purpose of this check is to identify:

– Any inconsistency between the two engines whereas the use conditions were identical
– No increment of the counter whereas the aircraft is used
– Unusual increment whereas the operating conditions of the aircraft have not changed.

If the consistency check of the automatic cycle counting is not correct, record in the engine logbook the same values of cycles consumed in the previous 15 hours / 7 days and switch to the manuel lump counting method.

CAUTION: IF USING A COPY OF THIS PAGE, MAKE SURE IT HAS BEEN COPIED FROM A MANUAL THAT CONTAINS ALL THE LATEST REVISIONS								
M: Mandatory			**R: Manufacturer required**				**OP: Optional**	
Maintenance tasks	***Task No.***	***Level***	***Periodicity***	***Tolerance***	***Unit***	***Reference Counter***	***Operating condition***	***Date/Signature***
Record the corrective maintenance operations performed in the engine log book, if any	-	R	Every 15	NA	FH	TSN	ALL	
			Every 7	NA	DAY	-		
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								
Note: the corrective maintenance operations stemming from the pilot's reports during the engine use and from the findings made after 15 flight hours or 7 days, must be carried out by a qualified personnel.								
In the engine log book record the total number of consumed flight hours	-	R	Every 15	NA	FH	TSN	ALL	
			Every 7	NA	DAY	-		
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								
Visually examine the engine and the engine floor for leakage	-	R	Every 15	NA	FH	TSN	ALL	
			Every 7	NA	DAY	-		
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								
Check that the HP gas generator rotates freely (no abnormal noises) and visually check that the engine is in good condition	-	R	Every 15	NA	FH	TSN	ALL	
			Every 7	NA	DAY	-		
Component standard for above task: **ALL** *Application conditions of above task:* **Manually and/or during a dry crank cycle**								
Manually check that the power turbine rotates freely (no abnormal noises)	-	R	Every 15	NA	FH	TSN	ALL	
			Every 7	NA	DAY	-		
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								

CAUTION: IF USING A COPY OF THIS PAGE, MAKE SURE IT HAS BEEN COPIED FROM A MANUAL THAT CONTAINS ALL THE LATEST REVISIONS								
M: Mandatory			**R: Manufacturer required**				**OP: Optional**	
Maintenance tasks	***Task No.***	***Level***	***Periodicity***	***Tolerance***	***Unit***	***Reference Counter***	***Operating condition***	***Date/Signature***
Visual check of the visual pre-blockage indicator of the oil filter. If the visual indicator is visible, refer to task:	71-00-06-816-813	R	Every 15	NA	FH	TSN	ALL	
			Every 7	NA	DAY	-		
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								
Visual check of the visual blockage indicator of the fuel filter. If the visual indicator is visible, refer to task:	71-00-06-816-806	R	Every 15	NA	FH	TSN	ALL	
			Every 7	NA	DAY	-		
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								
Inspection of oil level in tank and top up if required	Refer to Aircraft Maintenance Manual	R	Every 15	NA	FH	TSN	ALL	
			Every 7	NA	DAY	-		
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter. Within 15 minutes following engine shut-down.**								
Make sure that there are no foreign objects: examine near the air intakes and the exhaust zone. Install the blanks	-	R	Every 15	NA	FH	TSN	ALL	
			Every 7	NA	DAY	-		
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								

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INSPECTION AT 25 FLIGHT HOURS	**CAUTION: SHOULD THERE BE ANY DISCREPANCY BETWEEN THE MANDATORY SCHEDULED MAINTENANCE INSPECTION TASKS LISTED IN TASK 05-10-10-200-801 AND THOSE LISTED IN THIS TASK, REFER TO TASK 05-10-10-200-801 WHICH IS THE ONLY ONE APPROVED BY THE AIRWORTHINESS AUTHORITIES.**
	NOTE: Maintenance operations must be performed before the maximum frequency (frequency + tolerance) is reached. As long as these intervals are respected, scheduling of maintenance operations will be left at the discretion of the operator. Each maintenance operation can be scheduled independently.

CAUTION: USE THE FIRST LIMIT REACHED WHEN SEVERAL LIMITS APPEAR FOR THE SAME TASK.

CAUTION: IF USING A COPY OF THIS PAGE, MAKE SURE IT HAS BEEN COPIED FROM A MANUAL THAT CONTAINS ALL THE LATEST REVISIONS

M: Mandatory **R: Manufacturer required** **OP: Optional**

Maintenance tasks	*Task No.*	*Level*	*Periodicity*	*Tolerance*	*Unit*	*Reference Counter*	*Operating condition*	*Date/Signature*
Engine health inspection	Refer to Aircraft Maintenance Manual	R	Every 25	NA	FH	TSN	ALL	

Component standard for above task: **ALL**
Application conditions of above task: **Ground run or in flight**

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INSPECTION AT 30 FLIGHT HOURS	**CAUTION: SHOULD THERE BE ANY DISCREPANCY BETWEEN THE MANDATORY SCHEDULED MAINTENANCE INSPECTION TASKS LISTED IN TASK 05-10-10-200-801 AND THOSE LISTED IN THIS TASK, REFER TO TASK 05-10-10-200-801 WHICH IS THE ONLY ONE APPROVED BY THE AIRWORTHINESS AUTHORITIES.**
	NOTE: ***Maintenance operations must be performed before the maximum frequency (frequency + tolerance) is reached. As long as these intervals are respected, scheduling of maintenance operations will be left at the discretion of the operator. Each maintenance operation can be scheduled independently.***

CAUTION: **USE THE FIRST LIMIT REACHED WHEN SEVERAL LIMITS APPEAR FOR THE SAME TASK.**

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M: Mandatory **R: Manufacturer required** **OP: Optional**

Maintenance tasks	*Task No.*	*Level*	*Periodicity*	*Tolerance*	*Unit*	*Reference Counter*	*Operating condition*	*Date/Signature*
Mechanical magnetic plug of the module 05 - Check.	72-15-00-900-801	R	Every 30	NA	FH	TSN	ALL	
Component standard for above task : **ALL** *Application conditions of above task:* **Engine installed on helicopter**								
Mechanical magnetic plug of the module 01 - Check.	72-61-00-900-808	R	Every 30	NA	FH	TSN	ALL	
Component standard for above task : **ALL** *Application conditions of above task:* **Engine installed on helicopter**								

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INSPECTION AT 50 FLIGHT HOURS	**CAUTION: SHOULD THERE BE ANY DISCREPANCY BETWEEN THE MANDATORY SCHEDULED MAINTENANCE INSPECTION TASKS LISTED IN TASK 05-10-10-200-801 AND THOSE LISTED IN THIS TASK, REFER TO TASK 05-10-10-200-801 WHICH IS THE ONLY ONE APPROVED BY THE AIRWORTHINESS AUTHORITIES.**
	NOTE: ***Maintenance operations must be performed before the maximum frequency (frequency + tolerance) is reached. As long as these intervals are respected, scheduling of maintenance operations will be left at the discretion of the operator. Each maintenance operation can be scheduled independently.***

CAUTION: **USE THE FIRST LIMIT REACHED WHEN SEVERAL LIMITS APPEAR FOR THE SAME TASK.**

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M: Mandatory **R: Manufacturer required** **OP: Optional**

Maintenance tasks	*Task No.*	*Level*	*Periodicity*	*Tolerance*	*Unit*	*Reference Counter*	*Operating condition*	*Date/Signature*
P3 air bleeding automatic disabling test	Refer to Aircraft Maintenance Manual	R	Every 50	NA	FH	TSN	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Ground run**								
Spectrometric oil analysis.	71-02-08-280-801	OP	Every 50	NA	FH	TSN	ALL	
Component minimum standard for above task: **PRE TU 57 and PRE TU 145** *Application conditions of above task:* **Engine installed on helicopter**								

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INSPECTION AT 300 FLIGHT HOURS	**CAUTION: SHOULD THERE BE ANY DISCREPANCY BETWEEN THE MANDATORY SCHEDULED MAINTENANCE INSPECTION TASKS LISTED IN TASK 05-10-10-200-801 AND THOSE LISTED IN THIS TASK, REFER TO TASK 05-10-10-200-801 WHICH IS THE ONLY ONE APPROVED BY THE AIRWORTHINESS AUTHORITIES.**
	NOTE: ***Maintenance operations must be performed before the maximum frequency (frequency + tolerance) is reached. As long as these intervals are respected, scheduling of maintenance operations will be left at the discretion of the operator. Each maintenance operation can be scheduled independently.***

CAUTION: **USE THE FIRST LIMIT REACHED WHEN SEVERAL LIMITS APPEAR FOR THE SAME TASK.**

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M: Mandatory **R: Manufacturer required** **OP: Optional**

Maintenance tasks	*Task No.*	*Level*	*Periodicity*	*Tolerance*	*Unit*	*Reference Counter*	*Operating condition*	*Date/Signature*
Electrical magnetic plug - Inspection and cleaning.	79-38-00-110-801	R	Every 300	NA	FH	TSN	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								
Oil system - Draining.	79-00-00-610-801	OP	Every 300	NA	FH	TSN	Use of oil with restriction	
			Every 12	**+1**	MONTH	-		
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								

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M: Mandatory			**R: Manufacturer required**				**OP: Optional**	
Maintenance tasks	***Task No.***	***Level***	***Periodicity***	***Tolerance***	***Unit***	***Reference Counter***	***Operating condition***	***Date/Signature***
Axial compressor - Inspection of the blades.	72-00-32-200-803	OP	Every 300	+30	FH	TSN	Erosive atmosphere and airframe not fitted with an adapted sand filter (a sand filter is adapted if its demonstrated filtration efficiency is ≥ 98% per Standard ISO 5011 with ISO 12103 - A4 (ISO Coarse) test dust).	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								
Axial compressor - Inspection of the blades.	72-00-32-200-803	OP	Every 300	+30	FH	TSN	Erosive atmosphere and airframe fitted with an adapted sand filter that has a cumulated by-pass opening time ≥ 300 hrs (a sand filter is adapted if its demonstrated filtration efficiency is ≥ 98% per Standard ISO 5011 with ISO 12103 - A4 (ISO Coarse) test dust).	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								

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M: Mandatory			**R: Manufacturer required**				**OP: Optional**	
Maintenance tasks	***Task No.***	***Level***	***Periodicity***	***Tolerance***	***Unit***	***Reference Counter***	***Operating condition***	***Date/Signature***
Axial compressor - Check the blades for erosion.	72-00-32-200-801	OP	Every 300	+30	FH	TSN	Erosive atmosphere and airframe not fitted with an adapted sand filter (a sand filter is adapted if its demonstrated filtration efficiency is ≥ 98% per Standard ISO 5011 with ISO 12103 - A4 (ISO Coarse) test dust).	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								
Axial compressor - Check the blades for erosion.	72-00-32-200-801	OP	Every 300	+30	FH	TSN	Erosive atmosphere and airframe fitted with an adapted sand filter that has a cumulated by-pass opening time ≥ 300 hrs (a sand filter is adapted if its demonstrated filtration efficiency is ≥ 98% per Standard ISO 5011 with ISO 12103 - A4 (ISO Coarse) test dust).	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								

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INSPECTION AT 600 FLIGHT HOURS	**CAUTION:** SHOULD THERE BE ANY DISCREPANCY BETWEEN THE MANDATORY SCHEDULED MAINTENANCE INSPECTION TASKS LISTED IN TASK 05-10-10-200-801 AND THOSE LISTED IN THIS TASK, REFER TO TASK 05-10-10-200-801 WHICH IS THE ONLY ONE APPROVED BY THE AIRWORTHINESS AUTHORITIES.
	NOTE: *Maintenance operations must be performed before the maximum frequency (frequency + tolerance) is reached. As long as these intervals are respected, scheduling of maintenance operations will be left at the discretion of the operator. Each maintenance operation can be scheduled independently.*

CAUTION: USE THE FIRST LIMIT REACHED WHEN SEVERAL LIMITS APPEAR FOR THE SAME TASK.

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M: Mandatory **R: Manufacturer required** **OP: Optional**

Maintenance tasks	*Task No.*	*Level*	*Periodicity*	*Tolerance*	*Unit*	*Reference Counter*	*Operating condition*	*Date/Signature*
Cycle counting - Test.	73-21-00-750-801	M	Every 600	+60	FH	TSN	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Ground run**								
Torque conformation box - Tests (Electrical)	72-61-00-750-801	M	Every 600	+60	FH	TSN	ALL	
Component minimum standard for above task: **POST TU 34 and PRE TU 192** *Application conditions of above task:* **Wait at least 4 hours since the last engine shutdown before doing this test.**								
Functional test with channel B.	73-21-00-280-810	R	Every 600	+60	FH	TSN	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Ground run**								
Fuel system purge line components - Inspection.	72-00-43-200-804	R	Every 600	+60	FH	TSN	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Ground run**								
Drain cluster - Check.	71-71-00-200-802	R	Every 600	+60	FH	TSN	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Ground run**								

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M: Mandatory			**R: Manufacturer required**				**OP: Optional**	
Maintenance tasks	***Task No.***	***Level***	***Periodicity***	***Tolerance***	***Unit***	***Reference Counter***	***Operating condition***	***Date/Signature***
Electrical magnetic plug - Magnetism test.	79-38-00-700-801	R	Every 600	+60	FH	TSN	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								
Mechanical magnetic plug of the module 05 - Magnetism test.	72-15-00-700-801	R	Every 600	+60	FH	TSN	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								
Mechanical magnetic plug of the module 01 - Magnetism test.	72-61-00-700-801	R	Every 600	+60	FH	TSN	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								
Electrical magnetic plug - Test.	79-38-00-750-801	R	Every 600	+60	FH	TSN	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								
Injection wheel - Permeability inspection.	72-00-43-200-801	R	Every 600	+60	FH	TSN	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								
Pre-blockage pressure switch of the fuel filter - Test.	73-23-13-750-801	R	Every 600	+60	FH	TSN	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								
Low fuel pressure switch - Tests.	73-23-13-750-802	R	Every 600	+60	FH	TSN	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								

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M: Mandatory		**R: Manufacturer required**					**OP: Optional**	
Maintenance tasks	***Task No.***	***Level***	***Periodicity***	***Tolerance***	***Unit***	***Reference Counter***	***Operating condition***	***Date/Signature***
Combustion chamber - Inspection.	72-00-43-200-802	R	Every 600	+60	FH	TSN	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								
Gas generator turbine - Inspection of the blades.	72-00-43-200-803	R	Every 600	+60	FH	TSN	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								
Preformed packings of the rear bearing duct - Replacement.	72-43-00-900-806	R	Every 600	+60	FH	TSN	ALL	
Component minimum standard for above task: **PRE TU 181** *Application conditions of above task:* **Engine installed on helicopter**								
Pyrometric harnesses - Inspection.	77-21-00-210-801	R	Every 600	+60	FH	TSN	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								
P3 pressure transmitter - Tests.	75-41-00-750-801	R	Every 600	+60	FH	TSN	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								
EECU failure message - Tests.	73-21-00-750-802	R	Every 600	+60	FH	TSN	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								
Start system - Operational check.	72-43-00-200-806	OP	Every 600	+60	FH	TSN	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine running**								

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Maintenance tasks	***Task No.***	***Level***	***Periodicity***	***Tolerance***	***Unit***	***Reference Counter***	***Operating condition***	***Date/Signature***
Oil filtering element - Replacement.	72-61-00-900-803	OP	Every 600	+60	FH	TSN	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								
Oil dilution - Check and inspection.	70-02-00-940-801	OP	Every 600	+60	FH	TSN	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								
Oil system - Draining.	79-00-00-610-801	OP	Every 600	+60	FH	TSN	Operation in erosive or fouling atmosphere or operation with 3 cSt oil	
			Every 12	+1	MONTH	-		
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								
Oil system - Draining.	79-00-00-610-801	OP	Every 600	+60	FH	TSN	Operation with 5 cSt oil	
			Every 24	+2	MONTH	-		
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								
Fuel filtering element - Replacement.	73-23-13-900-802	OP	Every 600	+60	FH	TSN	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								
Bleed valve - Inspection of the filter.	75-31-00-200-802	OP	Every 600	+60	FH	TSN	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								

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M: Mandatory			**R: Manufacturer required**				**OP: Optional**	
Maintenance tasks	***Task No.***	***Level***	***Periodicity***	***Tolerance***	***Unit***	***Reference Counter***	***Operating condition***	***Date/Signature***
Axial compressor - Inspection of the blades.	72-00-32-200-803	OP	Every 600	+60	FH	TSN	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								
Axial compressor - Check of the erosion.	72-00-32-200-801	OP	Every 600	+60	FH	TSN	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								
Axial compressor - Inspection of the compressor casing.	72-00-32-200-802	OP	Every 600	+60	FH	TSN	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								
Exhaust pipe - Inspection.	72-70-00-200-801	OP	Every 600	+60	FH	TSN	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								
Engine front support - Inspection.	72-61-00-200-805	OP	Every 600	+60	FH	TSN	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								
Coupling sleeve between power turbine and reduction gearbox - Inspection.	72-15-00-200-801	OP	Every 600	+60	FH	TSN	Spectrometric oil analysis procedure not performed every 50 hours	
Component minimum standard for above task: **PRE TU 57** *Application conditions of above task:* **Module 05 removed**								
Tubes and unions - Inspection.	70-40-02-940-803	OP	Every 600	+60	FH	TSN	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								

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Maintenance tasks	***Task No.***	***Level***	***Periodicity***	***Tolerance***	***Unit***	***Reference Counter***	***Operating condition***	***Date/Signature***
Control harness - Inspection.	71-51-00-210-802	OP	Every 600	+60	FH	TSN	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								
Control and monitoring harness - Inspection.	71-51-00-210-801	OP	Every 600	+60	FH	TSN	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								
Igniter plugs - Inspection.	72-43-00-200-803	OP	Every 600	+60	FH	TSN	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								
Pump and metering unit assembly - Inspection.	73-23-00-200-801	OP	Every 600	+60	FH	TSN	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								
Bleed valve - Inspection.	75-31-00-200-801	OP	Every 600	+60	FH	TSN	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								
Oil pump - Inspection.	79-24-00-200-801	OP	Every 600	+60	FH	TSN	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								

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M: Mandatory			**R: Manufacturer required**				**OP: Optional**	
Maintenance tasks	***Task No.***	***Level***	***Periodicity***	***Tolerance***	***Unit***	***Reference Counter***	***Operating condition***	***Date/Signature***
Equipment supports - Tightening check of: - The torque conformation box - The T4.5 conformation box - The fuel valve assembly - The N1 speed sensors - The N2 speed sensors - The torquemeter sensor - The P3 pressure transmitter - The HE ignition unit - The low-oil pressure switch - The ignition cables.	70-11-00-940-801	OP	Every 600	+60	FH	TSN	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**								
Turbine-casing drain-valve - Tests.	71-71-00-700-801	OP	Every 600	+60	FH	TSN	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Ground run**								
Jet union - Test.	72-43-00-700-801	OP	Every 600	+60	FH	TSN	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Ground run**								
Visually examine the engine and the engine floor for leakage.	-	OP	Every 600	+60	FH	TSN	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Ground run**								

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INSPECTION AT 3,000 FLIGHT HOURS	**CAUTION: SHOULD THERE BE ANY DISCREPANCY BETWEEN THE MANDATORY SCHEDULED MAINTENANCE INSPECTION TASKS LISTED IN TASK 05-10-10-200-801 AND THOSE LISTED IN THIS TASK, REFER TO TASK 05-10-10-200-801 WHICH IS THE ONLY ONE APPROVED BY THE AIRWORTHINESS AUTHORITIES.**
	***NOTE:* Maintenance operations must be performed before the maximum frequency (frequency + tolerance) is reached. As long as these intervals are respected, scheduling of maintenance operations will be left at the discretion of the operator. Each maintenance operation can be scheduled independently.**

CAUTION: USE THE FIRST LIMIT REACHED WHEN SEVERAL LIMITS APPEAR FOR THE SAME TASK.

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M: Mandatory **R: Manufacturer required** **OP: Optional**

Maintenance tasks	*Task No.*	*Level*	*Periodicity*	*Tolerance*	*Unit*	*Reference Counter*	*Operating condition*	*Date/Signature*
Functional check in the auxiliary mode	Refer to Aircraft Maintenance Manual	R	Every 3,000	NA	FH	TSN	ALL	

Component standard for above task: **ALL**
Application conditions of above task: **Ground run**

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INSPECTION AT 15 YEARS	**CAUTION: SHOULD THERE BE ANY DISCREPANCY BETWEEN THE MANDATORY SCHEDULED MAINTENANCE INSPECTION TASKS LISTED IN TASK 05-10-10-200-801 AND THOSE LISTED IN THIS TASK, REFER TO TASK 05-10-10-200-801 WHICH IS THE ONLY ONE APPROVED BY THE AIRWORTHINESS AUTHORITIES.**
	NOTE: ***Maintenance operations must be performed before the maximum frequency (frequency + tolerance) is reached. As long as these intervals are respected, scheduling of maintenance operations will be left at the discretion of the operator. Each maintenance operation can be scheduled independently.***

CAUTION: **USE THE FIRST LIMIT REACHED WHEN SEVERAL LIMITS APPEAR FOR THE SAME TASK.**

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M: Mandatory **R: Manufacturer required** **OP: Optional**

Maintenance tasks	*Task No.*	*Level*	*Periodicity*	*Tolerance*	*Unit*	*Reference Counter*	*Operating condition*	*Date/Signature*
Remove and send the Module 03 to a certified Maintenance Center for calendar inspection.	71-02-16-280-801	R	Every 15	+1.5	YEAR	-	ALL	

Component standard for above task : **ALL**
Application conditions of above task: **Engine removed**

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TASK 05-50-00-200-801-A01

UNSCHEDULED INSPECTIONS

CAUTION: ALL INSPECTIONS MUST BE PERFORMED BY QUALIFIED PERSONNEL.

CAUTION: ALL MAINTENANCE OPERATIONS MUST BE PERFORMED BY QUALIFIED MECHANICS.

CAUTION: REGULARLY RECORD THE NUMBER OF FLIGHT HOURS IN THE ENGINE LOG BOOK.

CAUTION: RECORD THE MAINTENANCE TASKS PERFORMED DURING THESE INSPECTIONS IN THE ENGINE LOG BOOK.

CAUTION: SHOULD THERE BE ANY DISCREPANCY BETWEEN THE MANDATORY UNSCHEDULED MAINTENANCE INSPECTION TASKS LISTED IN TASK 05-10-10-200-801 AND THOSE LISTED IN THIS TASK, REFER TO TASK 05-10-10-200-801 WHICH IS THE ONLY ONE APPROVED BY THE AIRWORTHINESS AUTHORITIES.

1. UNSCHEDULED INSPECTIONS

A. Unscheduled inspections - General

Refer to Task 05-15-01-200-801.

B. List of unscheduled maintenance inspections

NOTE: If an occurrence is not listed below, contact Safran Helicopter Engines.

(1) Mandatory unscheduled maintenance task

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Maintenance tasks	***Task No.***	***Operating condition***	***Date/Signature***
Calculate and record in section E of the engine log book the accumulated time 2 min. OEI performed during the day, the accumulated time 2 min. OEI performed since the engine was new , the accumulated time 2 min. OEI performed since the last availability state.	-	After operation at 2 min. OEI rating	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**			
Remove and send to the repair center the module 03, the module 04 and the Engine Electronic Control Unit.	71-00-01-940-801	As soon as the accumulated value of the 2 min. OEI rating is more than 10 min.	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**			
Note: do the maintenance procedure as per Task 71-00-01-940-801 (Sub-task 71-00-01-940-011-A01).			

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Maintenance tasks	***Task No.***	***Operating condition***	***Date/Signature***
Remove and send to the repair center the module 03 and module 04.	71-00-01-940-801	After operation at 30 sec. OEI rating	
Component minimum standard for above task: **(PRE TU 6 or PRE TU 14)** *Application conditions of above task:* **Engine installed on helicopter**			
Note: do the maintenance procedure as per Task 71-00-01-940-801 (Sub-task 71-00-01-940-011-A01).			
Remove and send to the repair center the Engine Electronic Control Unit.	71-00-01-940-801	After operation at 30 sec. OEI rating	
Component minimum standard for above task: **PRE TU 77C** *Application conditions of above task:* **Engine installed on helicopter**			
Note: do the maintenance procedure as per Task 71-00-01-940-801 (Sub-task 71-00-01-940-011-A01).			
Calculate and record in section E of the engine log book the accumulated time 30 sec. OEI performed during the day, the accumulated time 30 sec. OEI performed since the engine was new , the accumulated time 30 sec. OEI performed since the last availability state.	-	After operation at 30 sec. OEI rating	
Component minimum standard for above task: **(POST TU 6 or POST TU 14)** *Application conditions of above task:* **Engine installed on helicopter**			
Remove and send to the repair center the module 03, the module 04 and the Engine Electronic Control Unit.	71-00-01-940-801	As soon as the accumulated value of the 30 sec. OEI rating is more than 30 sec.	
Component minimum standard for above task: **(POST TU 6 or POST TU 14)** *Application conditions of above task:* **Engine installed on helicopter**			
Note: do the maintenance procedure as per Task 71-00-01-940-801 (Sub-task 71-00-01-940-011-A01).			

(2) After operating the engine beyond limitations

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Maintenance tasks	***Task No.***	***Operating condition***	***Date/Signature***
Exceeding of T4.5 temperature.	71-00-01-940-801	At start	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**			
Note: record the excess (duration and value of T4.5) on the engine log book.			
Exceeding of T4.5 temperature.	71-00-01-940-801	During a flight	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**			
Note: record the excess (duration and value of T4.5) on the engine log book.			
Exceeding of N2 speed.	71-00-01-940-801	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**			
Note: record the excess (duration and value of N2) on the engine log book.			

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Maintenance tasks	***Task No.***	***Operating condition***	***Date/Signature***
Exceeding of N1 speed.	71-00-01-940-801	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**			
Note: record the excess (duration and value of N1) on the engine log book.			
Exceeding of engine torque.	71-00-01-940-801	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**			
Note: record the excess (duration and value of Tq) on the engine log book.			
Exceeding the max. oil temperature.	71-00-01-280-805	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**			
Low oil pressure.	71-00-01-280-806	ALL	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**			

(3) After the use of fire extinguishers

CAUTION: IF USING A COPY OF THIS PAGE, MAKE SURE IT HAS BEEN COPIED FROM A MANUAL THAT CONTAINS ALL THE LATEST REVISIONS			
Maintenance tasks	***Task No.***	***Operating condition***	***Date/Signature***
Treatment of an engine after the operation of an extinguisher.	71-02-01-280-801	After extinction of a fire or accidental release of an extinguisher on a hot turboshaft engine	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**			
Treatment of an engine after the operation of an extinguisher.	71-02-01-280-802	After accidental release of an extinguisher on a cold turboshaft engine without any extinguishing product entering the air path	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**			

(4) After an occurrence during operation

CAUTION: IF USING A COPY OF THIS PAGE, MAKE SURE IT HAS BEEN COPIED FROM A MANUAL THAT CONTAINS ALL THE LATEST REVISIONS			
Maintenance tasks	***Task No.***	***Operating condition***	***Date/Signature***
Treatment of an engine after a foreign object damage.	71-02-03-280-801	After ingestion of foreign bodies	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**			
Treatment of an engine after a lightning strike.	71-02-04-280-801	After a lightning strike	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**			
Treatment of an engine after a heavy landing.	71-02-06-280-801	After heavy landing	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine running**			
Treatment of an engine after a surge.	71-00-06-813-801	After surge	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine running**			
Parameter instability - Oil pressure.	71-00-06-814-809	Abnormal evolution of the oil pressure	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**			
Treatment of an engine after a fire.	71-02-01-280-803	After a fire	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**			
Treatment of an engine after a rotor damage.	71-02-05-280-801	After a rotor damage	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**			
Treatment of an engine after rupture of the engine/MGB link.	71-02-05-280-802	After rupture of the engine/MGB link	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**			

(5) After operating the engine in a particular atmosphere

CAUTION: IF USING A COPY OF THIS PAGE, MAKE SURE IT HAS BEEN COPIED FROM A MANUAL THAT CONTAINS ALL THE LATEST REVISIONS			
Maintenance tasks	***Task No.***	***Operating condition***	***Date/Signature***
Frequency of cleaning	71-01-00-610-801	Corrosive or erosive or fouling atmosphere.	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**			

(6) After an occurrence outside operation

CAUTION:	IF USING A COPY OF THIS PAGE, MAKE SURE IT HAS BEEN COPIED FROM A MANUAL THAT CONTAINS ALL THE LATEST REVISIONS		
Maintenance tasks	***Task No.***	***Operating condition***	***Date/Signature***
Treatment of an accidentally dropped engine	71-02-02-280-801	After accidental dropping of turboshaft engine	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine removed**			
Treatment of an engine after immersion in water.	71-02-01-280-804	After immersion in water	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine removed**			

(7) After a maintenance procedure

CAUTION:	IF USING A COPY OF THIS PAGE, MAKE SURE IT HAS BEEN COPIED FROM A MANUAL THAT CONTAINS ALL THE LATEST REVISIONS		
Maintenance tasks	***Task No.***	***Operating condition***	***Date/Signature***
Oil system rinsing	79-00-00-610-802	In case of oil system contaminated, or type of oil changed, or module used with a different type of oil installed	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**			

(8) After a microbiological contamination of the fuel

CAUTION:	IF USING A COPY OF THIS PAGE, MAKE SURE IT HAS BEEN COPIED FROM A MANUAL THAT CONTAINS ALL THE LATEST REVISIONS		
Maintenance tasks	***Task No.***	***Operating condition***	***Date/Signature***
Treatment of an engine after a microbiological contamination of the fuel	71-02-17-280-801	After a microbiological contamination of the fuel	
Component standard for above task: **ALL** *Application conditions of above task:* **Engine installed on helicopter**			

(9) Post-maintenance inspections

Refer to Figure 1

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PROCEDURES \ INSPECTIONS		Ground run 71-02-13-280-801	Vibration 71-02-10-760-801	Turbine rundown time 71-02-09-760-801	Check of oil pressure 79-00-00-200-801	Engine health inspection Refer to Flight Manual	Oil pump - unlocking of the check valve - special procedure 79-24-00-280-801 (optional (*))
- Before engine return to maintenance (level 3 or 4) (refer to Task 71-02-16-280-801)		X	X			X	
- Before module return to maintenance (level 3 or 4): (refer to Task 71-02-16-280-801)							
	Module 01	X	X		X	X	
	Module 02	X	X		X	X	
	Module 03	X	X	X	X	X	
	Module 04	X	X		X	X	
	Module 05	X	X		X		
- After engine installation		X	X	X		X	X
- After module installation:							
	Module 01	X	X		X	X	
	Module 02	X	X		X	X	
	Module 03	X	X	X	X	X	
	Module 04	X	X		X	X	
	Module 05	X	X		X		
- Removal/Installation of an accessory or a pipe:							
	Oil system	X			X		
	Air system	X					
	Fuel system	X					
	Fuel control	X					

(*) It is advised to do this task 79-24-00-280-801 that makes the opening of the oil pump check valve easier, helping the pressure increase of the oil during the first start.

Post-maintenance inspections
Figure 1

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CHAPTER 26 - LIST OF EFFECTIVE PAGES

Chapter Section Subject	Task	Title	Pages	Date
26		LIST OF EFFECTIVE PAGES	* 1 - 2	June 15/2020
26		TABLE OF CONTENTS	1 - 2	Nov. 30/2009
26-00-00	870-801-A01	FIRE DETECTION SYSTEM - DESCRIPTION AND OPERATION	1 - 4	Nov. 30/2009
26-11-00	900-801-A01	FIRE DETECTORS - REMOVAL / INSTALLATION	701 - 706	Dec. 30/2018
26-11-00	900-802-A01	FIRE DETECTORS SUPPORTS - REMOVAL / INSTALLATION	* 701 - 704	June 15/2020
26-11-00	900-803-B01	FIRE DETECTORS SUPPORTS - REMOVAL / INSTALLATION	701 - 704	Mar. 30/2013
26-11-00	900-804-A01	FIRE DETECTORS SUPPORTS - REMOVAL / INSTALLATION	* 701 - 704	June 15/2020

* Page modified following update No. 46

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CHAPTER 26 - TABLE OF CONTENTS

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TASK 26-00-00-870-801-A01

FIRE DETECTION SYSTEM DESCRIPTION AND OPERATION

1. TASKS/REFERENCE DOCUMENTATION

Not applicable.

2. DESCRIPTION OF THE FIRE DETECTION SYSTEM

A. General

Refer to Figure 1

The fire detection system is used to check an abnormal rise of temperature in the engine sensitive areas.

Three fire detectors ensure the detection at the periphery of the engine.

The control and monitoring harness ensures the interface between the engine fire detection system and the aircraft.

(1) Main components

Three fire detectors are installed on a support on the engine.

(a) On the right side

One fire detector (26-11-00-01-100) calibrated at 200°C (392°F) (+0/+40) and located on the front flange of the accessory gearbox.

(b) On the left side

One fire detector (26-11-00-01-200) calibrated at 400°C (752°F) (+0/+20) and located on the rear flange of the gas generator module.

One fire detector (26-11-00-01-010) calibrated at 200°C (392°F) (+0/+40) and located above the HP/LP pump and metering unit assembly.

NOTE: ***If the fire detectors are not correctly installed, it can cause:***

- ***An uncommanded illumination of the warning light in the cockpit***
- ***A delayed illumination of the warning light in the cockpit.***

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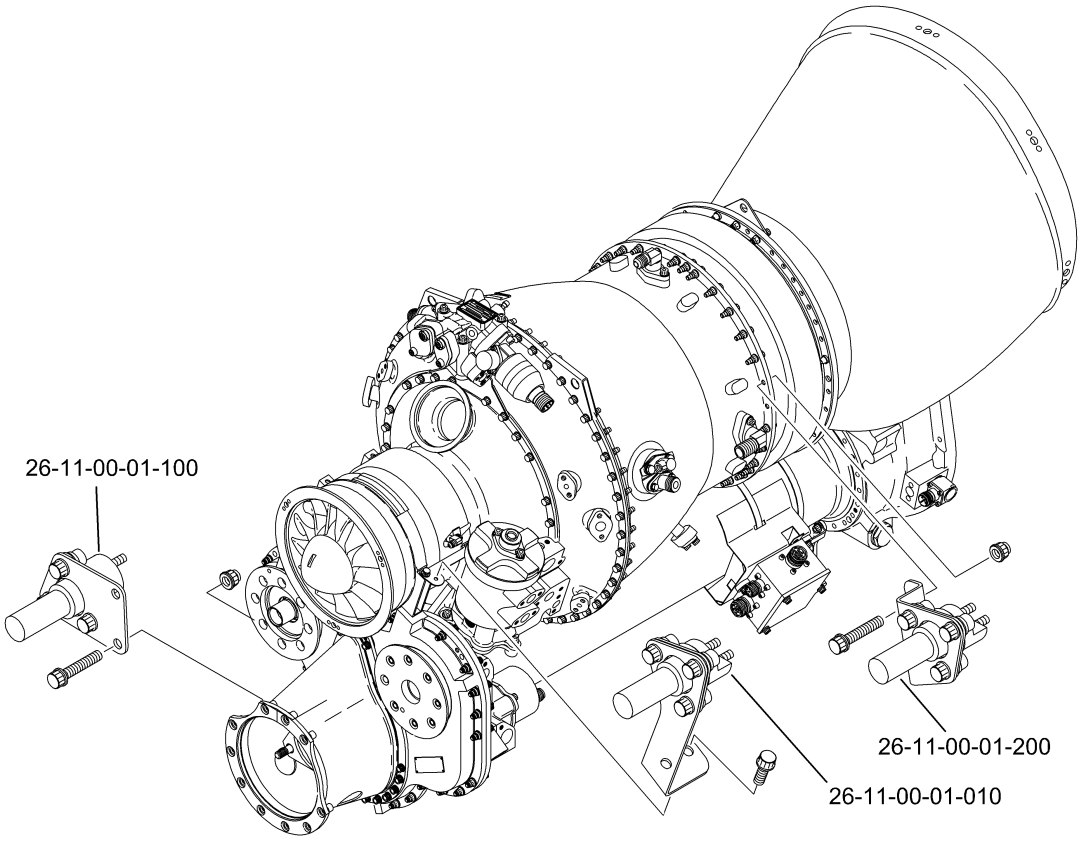

Fire detection - Description
Figure 1

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TASK 26-11-00-900-801-A01

FIRE DETECTORS REMOVAL / INSTALLATION

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Description	*Quantity*
mechanic's standard tooling	1

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Description	*Spares Catalog Item*	*Quantity*
fire detector	01-010	1
fire detector	01-100	1
fire detector	01-200	1

Consumables

Description	*Quantity*
GREY MIL-A-46146 RTV 3145 silicone	1

B. Additional provisions

Not applicable

2. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Aircraft Maintenance Manual
– Task 70-01-00-940-801 / Standard Practices - General
– Task 70-41-00-940-801 / Tightening torques - General.

WARNING

MAKE SURE THAT THE ELECTRICAL SYSTEM IS OFF.

3. PROCEDURE

Refer to Figure 701

NOTE: ***The removal/installation procedure is the same for the three fire detectors (01-010) , (01-100) and (01-200) .***

A. Preliminary operations

Not applicable

SUB-TASK 26-11-00-050-001-A01

B. Removal of the fire detector from its support

(1) Remove the silicone from the connector and MICA seal area.

(2) Remove the nuts (01) (x2) and the washers (02) (x2) from the terminals (03) (x2) of the fire detector (01-010) .

(3) Remove the electrical cables from the terminals of the fire detector (01-010) .

(4) Remove the screws (01-012) (x3) that attach the fire detector (01-010) to its support (01-050) .

(5) Remove the fire detector (01-010) from the support (01-050) .

SUB-TASK 26-11-00-200-001-A01

C. Check of the serviceability of the fire detector

Refer to Aircraft Maintenance Manual

SUB-TASK 26-11-00-450-001-A01

D. Installation of the fire detector on the support

CAUTION: OBEY THE POSITION OF THE FIRE DETECTORS. IF YOU REVERSE THE POSITION OF THE "HOT TYPE" AND "COLD TYPE" FIRE DETECTORS, IT CAN CAUSE AN UNCOMMANDED OR DELAYED ILLUMINATION OF THE WARNING LIGHT IN THE COCKPIT.

(1) Install the fire detector (01-010) on its support (01-050) .

(2) Install the screws (01-012) (x3) that attach the fire detector (01-010) to its support (01-050) .

(3) Torque to the standard torque the screws (01-012) (x3) that attach the fire detector (01-010) to its support (01-050) .

(4) Make sure that the washers (04) (x2) are installed on the fire detector terminals (03) (x2).

(5) Degrease the area to be protected.

(6) Connect the electrical cables to the fire detector terminals (03) (x2).

NOTE: ***Connect the cable marked + to the shorter terminal and connect the cable marked - to the longer terminal.***

(7) Install the washers (02) (x2) and the nuts (01) (x2) on the fire detector terminals.

(8) Torque the nuts (01) (x2) that attach the electrical cables to the fire detector terminals to 1.8 N.m.

(9) Remove the grease from the connector and MICA seal area and then apply GREY MIL-A-46146 RTV 3145 silicone on it:

- apply the layer on the full connector area (terminals / lugs / washers / nuts),
- apply a bead of approx. 1 mm in thickness all around the MICA seal.

E. Additional procedures

Not applicable

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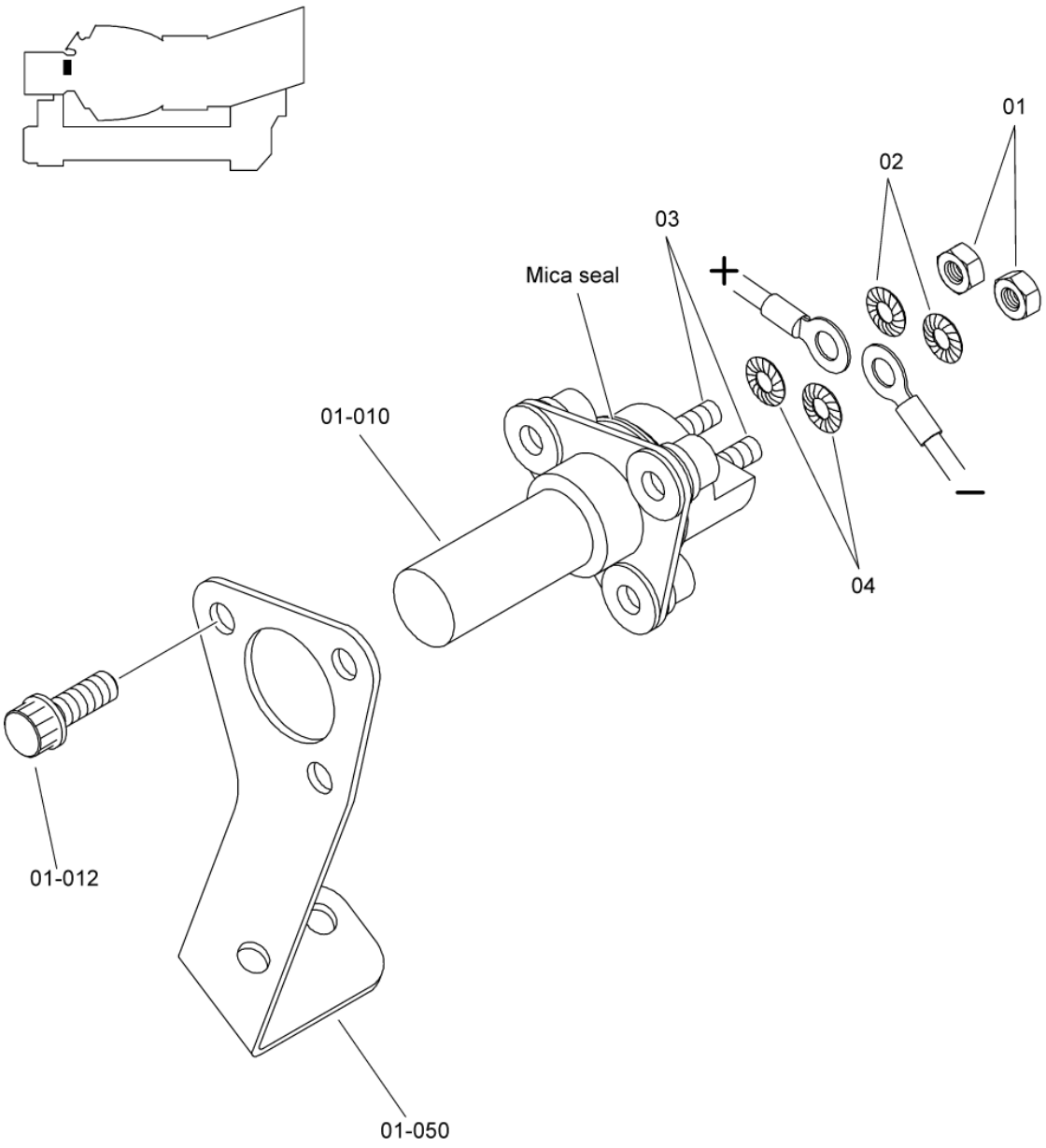


Fire detector - Removal/Installation
Figure 701

4. FINAL STEPS

Not applicable

TASK 26-11-00-900-802-A01

FIRE DETECTORS SUPPORTS REMOVAL / INSTALLATION

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Description	*Quantity*
mechanic's standard tool kit	1

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Description	*Spares Catalog Item*	*Quantity*
support	01-050	1

Consumables

Not applicable

B. Additional provisions

Task No.	*Task Title*
26-11-00-900-801	Fire detectors - Removal/Installation

2. TASKS/REFERENCE DOCUMENTATION

– Task 70-41-00-940-801 / Tightening torques.

3. PROCEDURE

Refer to Figure 701

A. Preliminary operations

(1) Remove the fire detector (01-010) . Refer to Task 26-11-00-900-801.

SUB-TASK 26-11-00-051-001-A01

B. Removal of the support (26-11-00-01-050)

(1) Remove the screws (01-052) (x2) that attach the support to the engine.

(2) Remove the support (01-050) from the engine.

SUB-TASK 26-11-00-451-001-A01

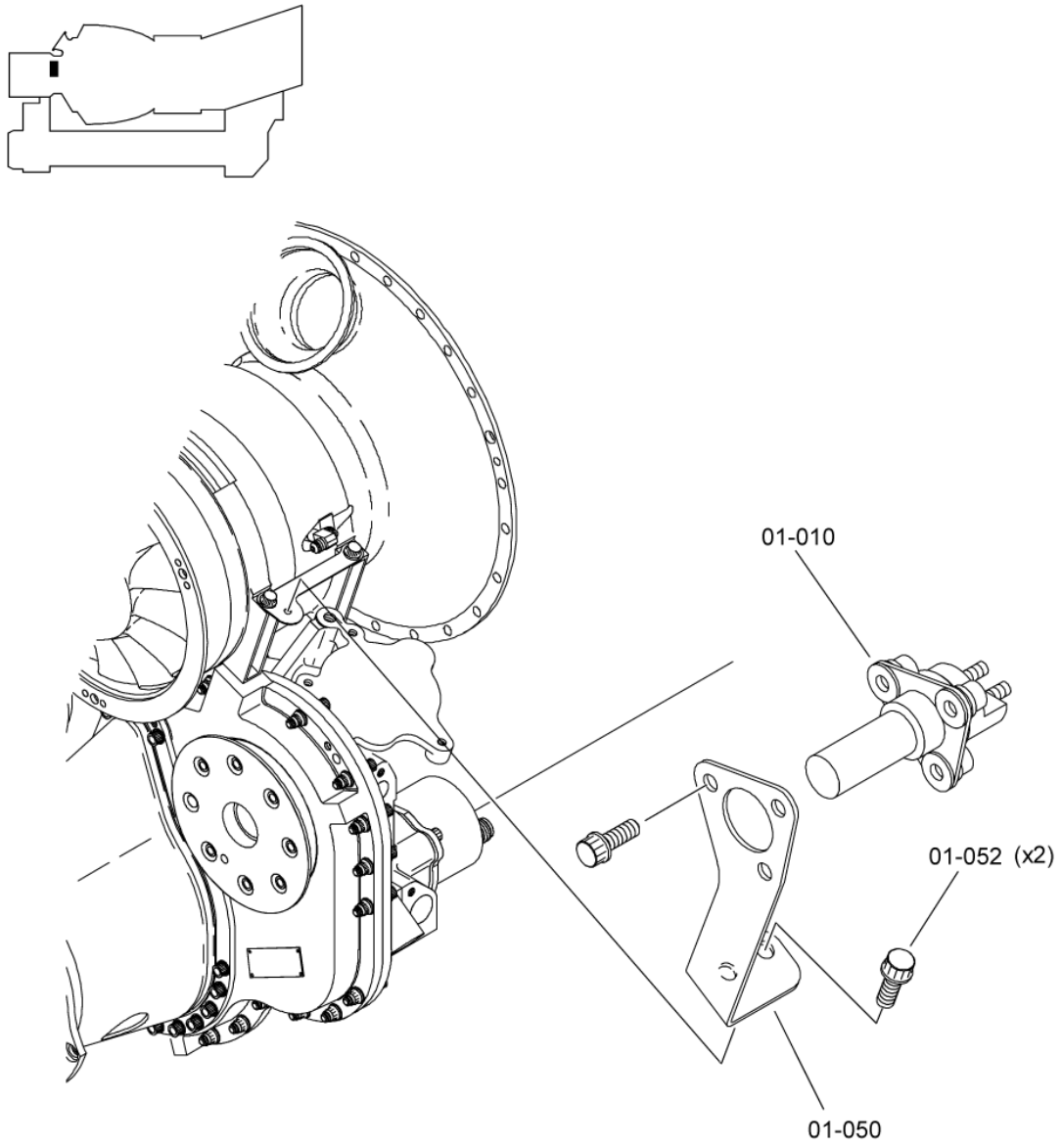
C. Installation of the support (26-11-00-01-050)

(1) Install the support (01-050) on the engine.

(2) Install and torque the securing screws (01-052) (x2) of the support to the engine.

D. Additional procedures

Install the fire detector (01-010) . Refer to Task 26-11-00-900-801.



Fire detector support - Removal/Installation
Figure 701

4. FINAL STEPS

Not applicable

TASK 26-11-00-900-803-B01

FIRE DETECTORS SUPPORTS REMOVAL / INSTALLATION

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Description	*Quantity*
extension - 50 mm	1
reversible ratchet handle - 1/4	1
ring spanner - 7 mm	1
socket with U/J, bi-hexagon - 7 mm	1
torque wrench - 3 N.m to 25 N.m (26.5 lb.in to 220 lb.in)	1

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Description	*Spares Catalog Item*	*Quantity*
support	01-250	1

Consumables

Not applicable

B. Additional provisions

Task No.	*Task Title*
26-11-00-900-801	Fire detectors - Removal/Installation

2. TASKS/REFERENCE DOCUMENTATION

– Task 70-41-00-940-801/ Tightening torques - General.

3. PROCEDURE

Refer to Figure 701

A. Preliminary operations

(1) Remove the fire detector (01-200) . Refer to Task 26-11-00-900-801.

SUB-TASK 26-11-00-052-001-A01

B. Removal of the support (26-11-00-01-250) from the fire detector (26-11-00-01-200)

(1) Remove the screws (01-252) (x2) and the nuts (01-254) (x2) from the support on the engine.

(2) Remove the support (01-250) from the engine.

SUB-TASK 26-11-00-452-001-A01

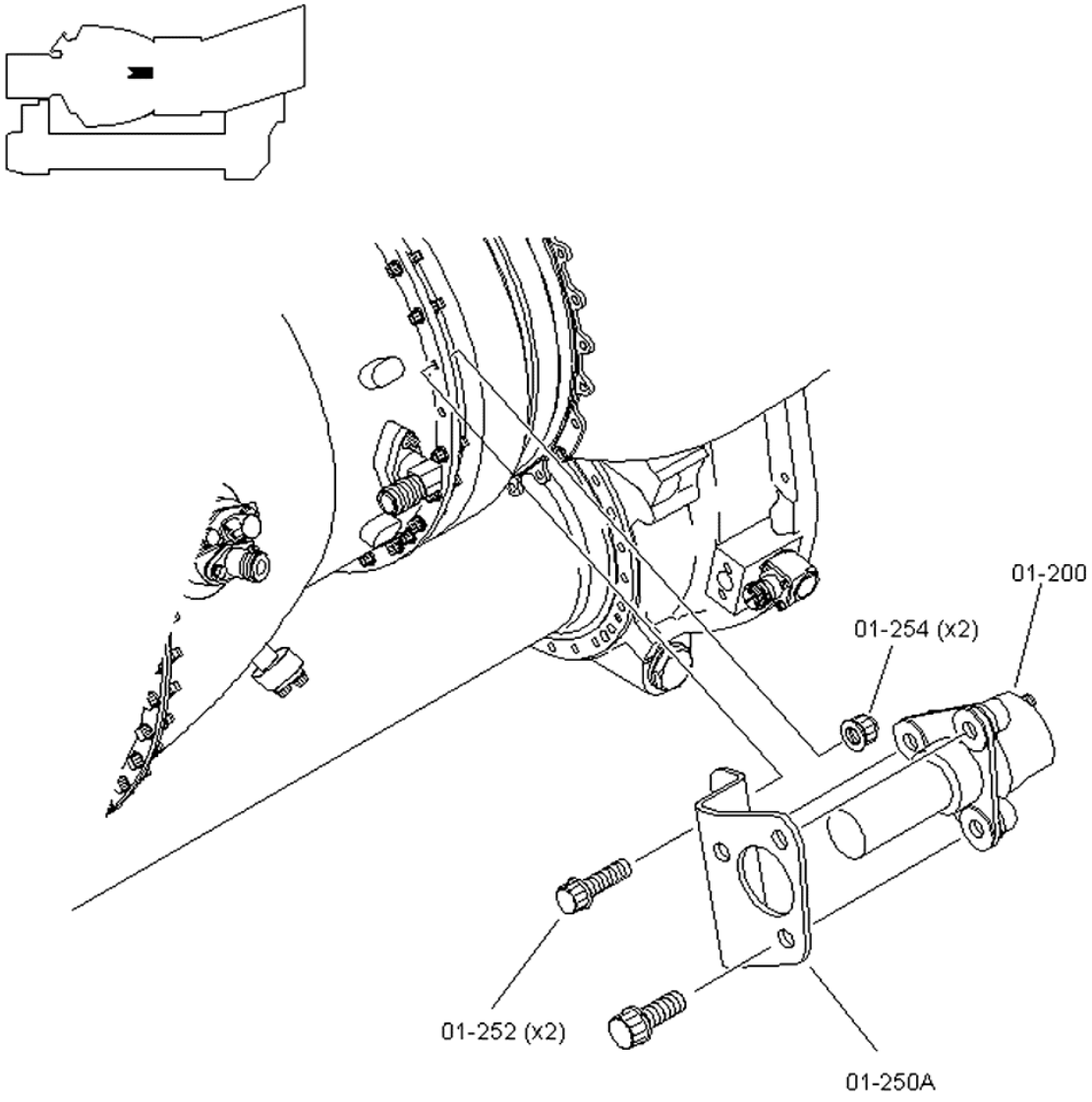
C. Installation of the support (26-11-00-01-250) on the fire detector (26-11-00-01-200)

(1) Install the support (01-250) on the engine.

(2) Install and torque the screws (01-252) (x2) and the nuts (01-254) (x2) of the support.

D. Additional procedures

(1) Install the fire detector (01-200) . Refer to Task 26-11-00-900-801.



Fire detector support - Removal/Installation
Figure 701

4. FINAL STEPS

Not applicable

TASK 26-11-00-900-804-A01

FIRE DETECTORS SUPPORTS REMOVAL / INSTALLATION

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Description	*Quantity*
mechanic's standard tool kit	1

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Description	*Spares Catalog Item*	*Quantity*
support	01-150	1

Consumables

Not applicable

B. Additional provisions

Task No.	*Task Title*
26-11-00-900-801	Fire detectors - Removal/Installation

2. TASKS/REFERENCE DOCUMENTATION

– Task 70-41-00-940-801 / Tightening torques - General.

3. PROCEDURE

Refer to Figure 701

A. Preliminary operations

(1) Remove the fire detector (01-100) .Refer to Task 26-11-00-900-801.

SUB-TASK 26-11-00-053-001-A01

B. Removal of the support (26-11-00-01-150)

(1) Remove the screws (01-152) (x2) and the nuts (01-154) (x2) that attach the support to the engine.

(2) Remove the support (01-150) from the engine.

SUB-TASK 26-11-00-453-001-A01

C. Installation of the support (26-11-00-01-150)

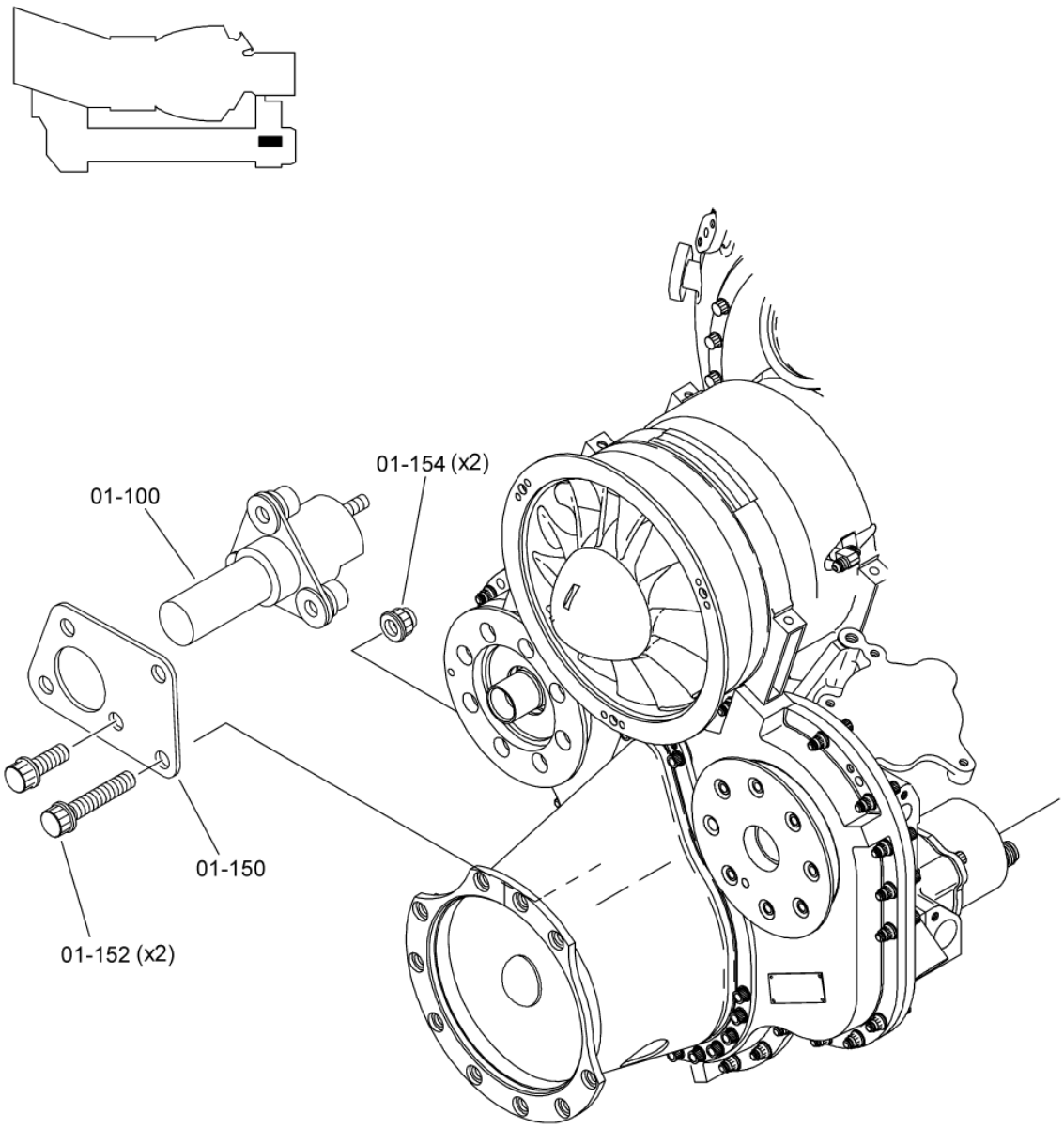
(1) Install the support (01-150) on the engine.

(2) Install and torque to the standard torque the screws (01-152) (x2) and the nuts (01-154) (x2) of the support.

D. Additional procedures

Install the fire detector (01-100) .

Refer to Task 26-11-00-900-801.



Fire detector support - Removal/Installation
Figure 701

4. FINAL STEPS

Not applicable

CHAPTER 70 - LIST OF EFFECTIVE PAGES

Chapter Section Subject	Task	Title	Pages	Date
70		LIST OF EFFECTIVE PAGES	* 1 - 2	Dec. 30/2021
70		TABLE OF CONTENTS	1 - 4	June 15/2020
70-00-00	940-801-A01	WARNING, CAUTION INSTRUCTIONS - GENERAL	1 - 4	June 15/2020
70-01-00	940-801-A01	STANDARD PRACTICES - GENERAL	* 1 - 12	Dec. 30/2021
70-02-00	940-801-A01	PRESENCE OF FUEL IN THE OIL - GENERAL	1 - 4	Dec. 30/2018
70-03-00	940-801-A01	BONDING - GENERAL	1 - 2	Nov. 30/2011
70-03-00	940-802-A01	LOCTITE PRODUCTS - GENERAL	* 1 - 6	Dec. 30/2021
70-03-00	940-803-A01	BONDING WITH RAYCHEM CONDUCTIVE GLUE - GENERAL	1 - 2	Nov. 30/2011
70-04-00	940-801-A01	APPLICATION OF SEALING MATERIALS AND LUBRICATION - GENERAL	1 - 2	Dec. 30/2018
70-04-00	940-802-A01	GRAPHITE VASELINE - GENERAL	1 - 2	Mar. 30/2012
70-04-00	940-803-A01	SEALING COMPOUND FOR SEALING FACES - GENERAL	* 1 - 2	Dec. 30/2021
70-04-00	940-804-A01	SILICONE ELASTOMERS FOR SEALING, BONDING OR POTTING PURPOSES - GENERAL	* 1 - 6	Dec. 30/2021
70-04-00	940-805-A01	TWO-COMPONENT SEALANTS - GENERAL	* 1 - 2	Dec. 30/2021
70-11-00	940-801-A01	EQUIPMENTS - GENERAL	1 - 2	Nov. 30/2011
70-11-00	940-802-A01	INSPECTION, CHECK AND REWORK - GENERAL	1 - 12	Dec. 30/2020
70-11-00	940-803-A01	RIVETING - GENERAL	1 - 20	Dec. 30/2019
70-11-00	940-804-A01	ROSAN TYPE BUSHES - GENERAL	* 1 - 16	Dec. 30/2021
70-11-00	940-805-A01	SECURING CLAMP - GENERAL	1 - 4	Nov. 30/2017
70-30-00	940-801-A01	BEARINGS - GENERAL	* 1 - 6	Dec. 30/2021
70-35-00	940-801-A01	THREAD INSERTS - GENERAL	1 - 10	Dec. 30/2020
70-38-00	940-801-A01	CHROMATING - GENERAL	1 - 2	Mar. 30/2012
70-40-01	940-801-A01	SEALS AND SEALING RINGS - GENERAL	1 - 2	Nov. 30/2011

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Chapter Section Subject	Task	Title	Pages	Date
70-40-01	940-802-A01	PREFORMED PACKINGS - GENERAL	1 - 8	Dec. 30/2020
70-40-01	940-803-A01	MAGNETIC SEALS - GENERAL	1 - 38	June 15/2021
70-40-01	940-804-A01	SEALOL SEALS - GENERAL	* 1 - 2	Dec. 30/2021
70-40-01	940-805-A01	"CROSS" TYPE SEALING SEGMENT - GENERAL	1 - 4	Nov. 30/2011
70-40-01	940-806-A01	PAULSTRA SEALING RINGS - GENERAL	* 1 - 4	Dec. 30/2021
70-40-01	940-807-A01	CORRUJOINTS - GENERAL	1 - 4	Nov. 30/2011
70-40-02	940-803-A01	PIPES AND UNIONS - GENERAL	1 - 16	Dec. 30/2020
70-40-02	200-801-A01	PIPES AND UNIONS - INSPECTION / CHECK	801 - 804	July 30/2013
70-40-03	940-801-A01	CIRCLIPS - GENERAL	1 - 4	Nov. 30/2011
70-41-00	940-801-A01	TIGHTENING TORQUES - GENERAL	1 - 10	Nov. 30/2016
70-42-00	940-801-A01	LOCKING OF ASSEMBLIES - GENERAL	1 - 2	Nov. 30/2011
70-42-00	940-802-A01	LOCKING OF ASSEMBLIES WITH SELF-LOCKING NUTS - GENERAL	1 - 4	Nov. 30/2011
70-42-00	940-803-A01	LOCKING OF ASSEMBLIES WITH LOCK-WIRE AND CABLE AND INSTALLATION OF WARRANTY SEALS - GENERAL	* 1 - 34	Dec. 30/2021
70-42-00	940-804-A01	LOCKING OF ASSEMBLIES WITH LOCK PLATE - GENERAL	* 1 - 24	Dec. 30/2021
70-42-00	940-805-A01	LOCKING OF ASSEMBLIES WITH SPLIT PIN - GENERAL	* 1 - 4	Dec. 30/2021
70-42-00	940-806-A01	LOCKING OF ASSEMBLIES WITH TAB NUTS - GENERAL	* 1 - 4	Dec. 30/2021
70-43-00	940-804-A01	ELECTRICAL CONNECTORS - GENERAL	1 - 2	July 30/2012
70-43-00	940-805-A01	BASIC ELECTRICAL TEST – ELECTRICAL DIAGRAMS READING - GENERAL	* 1 - 22	Dec. 30/2021
70-43-00	110-801-A01	ELECTRICAL CONNECTORS - CLEANING	601 - 606	June 30/2018
70-83-00	280-801-A01	TOUCH UP PAINT- REPAIR - SPECIAL PROCEDURE	201 - 204	July 30/2013

* Page modified following update No. 49

CHAPTER 70 - TABLE OF CONTENTS

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TASK 70-00-00-940-801-A01

WARNING, CAUTION INSTRUCTIONS GENERAL

1. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 70-01-00-940-801 / Standard Practices - General.

2. GENERAL

This TASK provides the necessary information for the safety instructions to be followed during maintenance.

A. OIL SYSTEM

WARNING

READ AND COMPLY WITH THE SAFETY INSTRUCTIONS BEFORE ANY OPERATION ON THE OIL SYSTEM.

WARNING

DO NOT BREATHE OIL VAPORS. WORK IN A WELL-VENTILATED AREA. DO NOT ALLOW OIL TO REMAIN IN CONTACT WITH THE SKIN. USE RUBBER GLOVES AND SAFETY GOGGLES OR A FACE SHIELD. OIL CAN BE POISONOUS.

CAUTION: USE THE RECOMMENDED LUBRICANTS GIVEN IN THE LIST. THE USE OF OTHER LUBRICANTS IS STRICTLY PROHIBITED WITHOUT SAFRAN HELICOPTER ENGINES APPROVAL.

B. FUEL SYSTEM

WARNING

READ AND COMPLY WITH THE SAFETY INSTRUCTIONS BEFORE ANY OPERATION ON THE FUEL SYSTEM.

WARNING

DO NOT BREATHE FUEL VAPORS. WORK IN A WELL-VENTILATED AREA. DO NOT ALLOW FUEL TO REMAIN IN CONTACT WITH THE SKIN. USE RUBBER GLOVES AND SAFETY GOGGLES OR A FACE SHIELD. FUEL CAN BE POISONOUS.

CAUTION: USE THE RECOMMENDED FUELS GIVEN IN THE LIST. THE USE OF OTHER FUELS IS STRICTLY PROHIBITED WITHOUT SAFRAN HELICOPTER ENGINES APPROVAL.

C. ELECTRICAL CIRCUIT

WARNING

MAKE SURE THE ELECTRICAL SYSTEM IS NOT ENERGIZED.

WARNING

WAIT AT LEAST ONE MINUTE BEFORE CARRYING OUT ANY INTERVENTION ON AN IGNITION SYSTEM WHICH WAS OPERATING JUST PRIOR TO A PROCEDURE BEING IMPLEMENTED. THE ENERGY ACCUMULATED IN THE IGNITION UNIT CAN BE FATAL.

D. OTHERS

WARNING

DO NOT BREATHE EXTINGUISHING PRODUCT VAPORS. WORK IN A WELL-VENTILATED AREA. DO NOT ALLOW EXTINGUISHING PRODUCTS TO REMAIN IN CONTACT WITH THE SKIN. USE RUBBER GLOVES AND SAFETY GOGGLES OR A FACE SHIELD. EXTINGUISHING PRODUCTS CAN BE POISONOUS.

WARNING

DO NOT BREATHE HYSO 97/1 VAPORS. WORK IN A WELL-VENTILATED AREA. DO NOT ALLOW HYSO 97/1 TO REMAIN IN CONTACT WITH THE SKIN. USE RUBBER GLOVES AND SAFETY GOGGLES OR A FACE SHIELD. HYSO 97/1 CAN BE POISONOUS.

WARNING

DO NOT BREATHE ALKALINE SOLVENT VAPORS. WORK IN A WELL-VENTILATED AREA. DO NOT ALLOW ALKALINE SOLVENTS TO REMAIN IN CONTACT WITH THE SKIN. USE RUBBER GLOVES AND SAFETY GOGGLES OR A FACE SHIELD. ALKALINE SOLVENTS CAN BE POISONOUS.

WARNING

DO NOT BREATHE SOLVENT VAPORS. WORK IN A WELL-VENTILATED AREA. DO NOT ALLOW SOLVENTS TO REMAIN IN CONTACT WITH THE SKIN. USE RUBBER GLOVES AND SAFETY GOGGLES OR A FACE SHIELD. SOLVENTS CAN BE POISONOUS.

WARNING

DO NOT BREATHE ANTI-ICER PRODUCT VAPORS. WORK IN A WELL-VENTILATED AREA. DO NOT ALLOW ANTI-ICER PRODUCTS TO REMAIN IN CONTACT WITH THE SKIN. USE RUBBER GLOVES AND SAFETY GOGGLES OR A FACE SHIELD. ANTI-ICER PRODUCTS CAN BE POISONOUS.

WARNING

DO NOT BREATHE MATERIAL FUMES. MAKE SURE THAT THE AIRFLOW IS SUFFICIENT IN THE WORK AREA. DO NOT LET MATERIAL FUMES TOUCH SKIN. USE RUBBER GLOVES AND SAFETY GOGGLES OR A FACE SHIELD. MATERIAL FUMES MATERIAL CAN BE POISONOUS.

WARNING

DO NOT BREATHE CLEANING PRODUCT VAPORS. WORK IN A WELL-VENTILATED AREA. DO NOT ALLOW CLEANING PRODUCTS TO REMAIN IN CONTACT WITH THE SKIN. USE RUBBER GLOVES AND SAFETY GOGGLES OR A FACE SHIELD. CLEANING PRODUCTS CAN BE POISONOUS.

WARNING

DO NOT BREATHE VAPORS FROM ETCHING AGENTS/SOLVENTS. WORK IN A WELL-VENTILATED AREA. DO NOT ALLOW ETCHING AGENTS/SOLVENTS TO REMAIN IN CONTACT WITH THE SKIN. USE RUBBER GLOVES AND SAFETY GOGGLES OR A FACE SHIELD. ETCHING-SOLVENT PRODUCTS CAN BE POISONOUS.

CAUTION: **USE THE RECOMMENDED CLEANING PRODUCTS GIVEN IN THE LIST. THE USE OF OTHER CLEANING PRODUCTS IS STRICTLY PROHIBITED WITHOUT SAFRAN HELICOPTER ENGINES APPROVAL.**

CAUTION: **USE THE RECOMMENDED RINSING PRODUCTS FROM THE LIST. THE USE OF OTHER RINSING PRODUCTS MUST BE APPROVED BY SAFRAN HELICOPTER ENGINES.**

CAUTION: **USE THE RECOMMENDED ANTI-ICER PRODUCTS GIVEN IN THE LIST. THE USE OF OTHER ANTI-ICER PRODUCTS IS STRICTLY PROHIBITED WITHOUT SAFRAN HELICOPTER ENGINES APPROVAL.**

CAUTION: **USE THE RECOMMENDED PROTECTION PRODUCTS GIVEN IN THE LIST. THE USE OF OTHER PROTECTION PRODUCTS IS STRICTLY PROHIBITED WITHOUT SAFRAN HELICOPTER ENGINES APPROVAL.**

CAUTION: **USE THE RECOMMENDED SOLVENTS GIVEN IN THE LIST. THE USE OF OTHER SOLVENTS IS STRICTLY PROHIBITED WITHOUT SAFRAN HELICOPTER ENGINES APPROVAL.**

CAUTION: **USE THE RECOMMENDED CLEANING PRODUCTS GIVEN IN THE LIST. THE USE OF OTHER CLEANING PRODUCTS IS STRICTLY PROHIBITED WITHOUT SAFRAN HELICOPTER ENGINES APPROVAL.**

CAUTION: **THE ADJUSTMENTS CONTAINED IN THIS MANUAL MUST BE CARRIED OUT ONLY BY SAFRAN HELICOPTER ENGINES STAFF OR BY TRAINED SPECIALISTS THAT HAVE BEEN APPROVED BY SAFRAN HELICOPTER ENGINES.**

CAUTION: **DO NOT DISTORT OR TWIST THE SEAL IN ITS RECESS DURING INSTALLATION.**

CAUTION: **SYSTEMATICALLY DISCARD ALL THE PREFORMED PACKINGS FROM A REMOVED COMPONENT.**

CAUTION: **NEVER APPLY A PREFORMED PACKING OVER A THREADED SECTION OR SHARP EDGES.**

TASK 70-01-00-940-801-A01

STANDARD PRACTICES GENERAL

1. TASKS/REFERENCE DOCUMENTS

Read carefully the information given in the tasks/documents mentioned hereafter.

- Fuel, engine lubricant, special products - General (Refer to Task 71-00-02-940-801)
- Bonding - General (Refer to Task 70-03-00-940-801)
- Application of sealing materials and lubrication - General (Refer to Task 70-04-00-940-801)
- Equipments - General (Refer to Task 70-11-00-940-801)
- Inspection, check and rework - General (Refer to Task 70-11-00-940-802)
- Bearings - General (Refer to Task 70-30-00-940-801)
- Thread inserts - General (Refer to Task 70-35-00-940-801)
- Seals and sealing rings - General (Refer to Task 70-40-01-940-801)
- Pipes and unions - General (Refer to Task 70-40-02-940-803)
- Tightening torque - General (Refer to Task 70-41-00-940-801)
- Locking of assemblies - General (Refer to Task 70-42-00-940-801)
- Electrical connectors - General (Refer to Task 70-43-00-940-804).

2. GENERAL

This task includes the precautions and standard practices to be observed during application of instructions related to the servicing and maintenance of a turboshaft engine.

CAUTION: THE ADJUSTMENTS CONTAINED IN THIS MANUAL MUST BE CARRIED OUT ONLY BY SAFRAN HELICOPTER ENGINES STAFF OR BY TRAINED SPECIALISTS THAT HAVE BEEN APPROVED BY SAFRAN HELICOPTER ENGINES.

CAUTION: REFER TO MANUAL USER GUIDE. (REFER TO TASK 00-00-11-GUI-801).

A. Precautionary measures

(1) At each phase of the servicing and maintenance procedures:

- Use the technical documentation.
- Use the appropriate tools correctly.
- Ensure complete cleanliness.
- Avoid the ingestion of foreign bodies by the turboshaft engine.
- Blank the openings and disconnected pipe unions with clean, appropriate blanks or clean plugs.

NOTE: Use clean rubber or plastic plugs if no blanks are provided.

(2) Protection shields:

- Handle protection shields with care during their removal and installation.
- Install and remove components with care to prevent damage to the protective shields.

CAUTION: VIGILANTLY APPLY THE LIMITATIONS AND SPECIFIC INSTRUCTIONS OF THE MAINTENANCE MANUAL.

B. Removal

Systematically discard parts that must not be reused such as preformed packings, gaskets, lock plates, screw of hot sections, etc….

(1) Consumable parts

(a) Re-use of the screws:

After each disassembly, carefully examine both threadings and calibrated parts.

Each examined screw, showing one of the following signs of damage shall be discarded and replaced:

- distortion due to necking down, bending or twisting,
- stripping on more than ½ thread,
- scores on the smooth, calibrated part,
- head distorted or crushed,
- wear causing dimensions to be out of tolerance,
- damaged protection,
- corrosion pittings.

(b) Re-use of the nuts:

After each disassembly, carefully examine threadings.

Each examined non self-locking nut, showing one of the following signs of damage shall be discarded and replaced:

- distortion due to necking down, bending or twisting,
- stripping on more than ½ thread,
- head distorted or crushed,
- wear causing dimensions to be out of tolerance,
- damaged protection,
- corrosion pittings.

(c) Re-use of the locks:

Regardless of lock type, they shall be systematically discarded with their removal.

(2) Identification prior to removal

Systematically identify parts at removal to make the installation procedures easier.

CAUTION: NEVER USE WEDGE SHAPE OBJECTS TO SEPARATE TWO COMPONENTS THAT ARE HARD TO UNSTICK.

(3) Separation of components

Lightly tap the edge of the component with a soft-faced mallet to separate the components.

Use appropriate extractors.

WARNING

TAKE OPERATING PRECAUTIONS: FLAMMABLE SOLVENTS, RISK OF FIRE.

WARNING

DO NOT USE TRICHLORETHYLENE.

CAUTION: USE THE RECOMMENDED CLEANING PRODUCTS FROM THE LIST. THE USE OF OTHER CLEANING PRODUCTS MUST BE APPROVED BY SAFRAN HELICOPTER ENGINES.

CAUTION: DO NOT USE CHLORINATED SOLVENT ON TITANIUM ALLOYS.

C. Cleaning

(1) Clean the components with a solvent and a lint-free cloth

The components can be cleaned by local degreasing with:

- hydrocarbon solvents of type HYSO 97/1,
- Diestone or acetone type oxygenated solvents,
- isopropyl alcohol.

(2) Dry with hot compressed air that is preferable dry.

D. Inspection

Look carefully for any damage or friction marks on components and adjacent parts prior to installation.

(1) Splines

- Comply with the component inspection instructions given in the relevant tasks
- Make sure that there are no visible signs of wear (perceptible notch), corrosion, flaking or cracks on the splines.
- Do a thorough visual inspection with X10 magnifying glass.

(2) Threaded devices:

- Comply with the component inspection instructions given in the relevant tasks.
- Examine the threaded devices (Refer to Task 70-35-00-940-801).

(3) Bearings:

- Comply with the component inspection instructions given in the relevant tasks.
- Examine the bearings (Refer to Task 70-30-00-940-801).

(4) Seals and sealing rings:

- Comply with the component inspection instructions given in the relevant tasks.
- Examine the seals and sealing rings (Refer to Task 70-40-01-940-801).

(5) Pipes and unions:

- Comply with the component inspection instructions given in the relevant tasks.
- Examine the pipes and unions (Refer to Task 70-40-02-940-803).

(6) Electrical connectors:

- Comply with the component inspection instructions given in the relevant tasks.
- Examine the electrical connectors (Refer to Task 70-43-00-940-804).

E. Repair of protective coatings

CAUTION: VIGILANTLY APPLY THE LIMITATIONS AND SPECIFIC INSTRUCTIONS OF THE MAINTENANCE MANUAL.

F. Installation

(1) Check of locking torque (Refer to Task 70-41-00-940-801).

(a) Thread inserts and self-locking nuts:

1 Re-use thread inserts and self-locking captive nuts with a diameter of 6 mm or under if the screwing resistance is sufficient.

2 Replace the damaged thread inserts (Refer to Task 70-35-00-940-801) or all inefficient locking procedures (Refer to Task 70-42-00-940-801).

NOTE: The locking torque is correct if it is impossible to manually screw the thread insert or self-locking nut.

WARNING

DO NOT BREATHE OIL VAPORS. WORK IN A WELL-VENTILATED AREA. DO NOT ALLOW OIL TO REMAIN IN CONTACT WITH THE SKIN. USE RUBBER GLOVES AND SAFETY GOGGLES OR A FACE SHIELD. OIL CAN BE POISONOUS.

(b) Lubrication of self-locking threadings:

1 Lubricate the threading and contact faces with approved engine oil.

(c) Self-locking nuts (Refer to Task 70-41-00-940-801).

1 Re-use self-locking nuts with a diameter of 6 mm or under if the screwing resistance is sufficient.

2 Measure the torque values of nuts with a diameter of greater than 6 mm with a torque wrench.

(2) Screws

It is mandatory to use screws with the same part number as those approved by the manufacturer.

Make sure that the contact faces are clean and free from foreign bodies or particles.

(a) High-temperature bolts

Systematically use high-temperature bolts on hot sections of the turboshaft engine.

1 Silver-plated, stainless steel bolts

a Use these bolts for assembly on casings. The use temperature must be between 230°C and 700°C

Punch marking or pressure marking on bolt heads. There are 2 types of marking:

– Standardized description and manufacturer’s monogram.
– Material code CM and digit 7 (temperature code 700°C).

NOTE: ***These letters CM correspond to the last two digits 25 of the Safran Helicopter Engines Standard code.***

2 Bolts of passivated cadmium-plated steel

- Use these bolts for assembly on other hot sections of the turboshaft engine. The use temperature is limited to 230°C.
- Punch marking or pressure marking on bolt heads.
- Material code BC and another letter L or F which corresponds to the supplier code.

NOTE: ***These letters BC correspond to the last two digits 14 of the Safran Helicopter Engines Standard code.***

3 Examples (Refer to Figure 1)

a Bolts with part number 9824051225

The first four digits correspond to the classification of the bolts to Safran Helicopter Engines standard:

- 9801 or 9806 hexagon head bolts
- 9820 or 9824 tooth head bolts
- 05: bolt diameter in millimeter is 5 mm
- 12: length under bolt head in millimeter is 12 mm
- 25: bolt for use up to 700°C
- Marking CM 7

b Bolts with part number 9836405016

The first five digits correspond to the classification of the bolts to Safran Helicopter Engines standard:

- 05: bolt diameter in millimeter is 5 mm
- 16: length under bolt head in millimeter is 16 mm
- Marking EN 3686 - 050016

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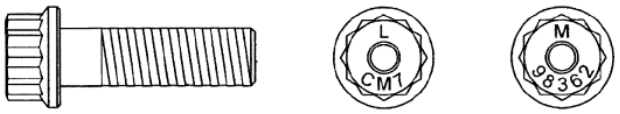


12-tooth head bolts
Figure 1

G. Anti-corrosion treatment

(1) Comply with the component storage instructions given in the relevant tasks.

NOTE: ***New or repaired equipment/accessories are delivered treated against corrosion.***

(2) Store or protect all equipment/accessories that are removed or remain in store for more than seven days against corrosion.

WARNING

DO NOT BREATHE OIL VAPORS. WORK IN A WELL-VENTILATED AREA. DO NOT ALLOW OIL TO REMAIN IN CONTACT WITH THE SKIN. USE RUBBER GLOVES AND SAFETY GOGGLES OR A FACE SHIELD. OIL CAN BE POISONOUS.

H. Splined drives

CAUTION: DRIVES MUST NEVER BE DRIED.

Lubricate component splines with approved engine oil.

I. Seals and sealing rings

Refer to Task 70-40-01-940-801.

(1) Comply with the instructions given in the relevant tasks.

J. Locking of assemblies

Refer to Task 70-42-00-940-801.

(1) Comply with the instructions given in the relevant tasks of locking.

K. Installation of flange assembly clamps

(1) Clamp installation precaution

(a) Make sure that the assembly flanges and the clamp are clean and in good condition.

(b) Make sure that the drive shaft splines do not hold the weight of the accessory during assembly.

(c) Insert the accessory centering peg in the flange milling before installing the clamp.

(d) Facilitate access to the clamp nut and spacer during installation.

(e) Make sure that there is nothing between the clamp nut and the adjacent pipes and unions.

WARNING

DO NOT BREATHE OIL VAPORS. WORK IN A WELL-VENTILATED AREA. DO NOT ALLOW OIL TO REMAIN IN CONTACT WITH THE SKIN. USE RUBBER GLOVES AND SAFETY GOGGLES OR A FACE SHIELD. OIL CAN BE POISONOUS.

(2) Installation of clamps

(a) Lubricate the equipment flanges and clamp bearing surfaces with approved engine oil.

(b) Make sure that the seal and flanges are in the correct position.

(c) Install the clamp loosely on the flanges.

(d) Bring the clamp into contact with the flange and tighten to 70% of the approved torque value.

(e) Tap lightly around the circumference of the clamp with a soft-faced mallet to distribute the tension.

(f) Tighten the nut to the recommended torque.

(g) Loosen and re-tighten the nut to the recommended torque twice without altering the position of the clamp.

L. Pipes and unions

Refer to Task 70-40-02-940-803.

(1) Dry the oil pipes with dry compressed air after rinsing to prevent contamination of the oil system.

(2) Make sure that the pipe, the unions and the flanges are clean and free from sharp edges, cracks and distortion.

M. Inspection on work completion

(1) Make sure that all components are correctly tightened.

(2) Make sure that there are no rags, tools or consumables around the turboshaft engine, especially inside the air intakes.

(3) Carry out a test run-up once the turboshaft engine is installed.

N. Visual position marker of the not locked elements

(Refer to Figure 2)

(1) Installation of the not locked elements

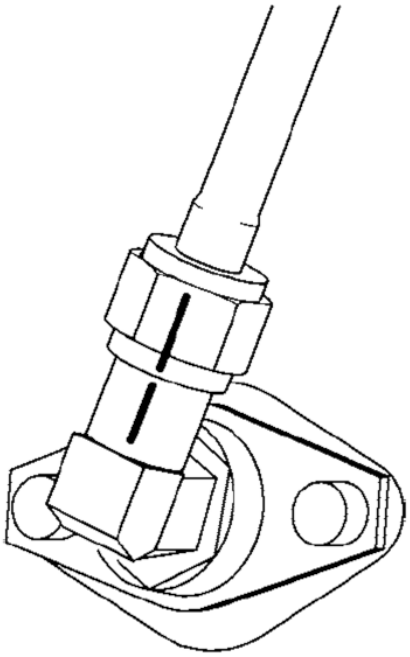
For devices without locking system, after each definitive tightening draw a longitudinal line using a retention lacquer approved by Safran Helicopter Engines (ex: BLOC LUBE RED, SL160...), between the fixed part and the mobile part. This marker makes it possible to visually notice an unwanted loosening in use.

After tightening to the torque do:

– a 1st red mark on the fixed part

– a 2nd red mark on the element to be marked.

Both marks must be aligned.



Visual position marker
Figure 2

(2) Removal of the not locked elements

Erase the red lacquer marks on the marked parts

TASK 70-02-00-940-801-A01

PRESENCE OF FUEL IN THE OIL GENERAL

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Not applicable

Special tools

Description	*Tools Catalog Item*	*Quantity*
falling ball viscosity comparator (8819252000)	OT 90 0010	1

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Description	*Quantity*
engine fuel	As required
approved engine oil	As required

2. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 70-01-00-940-801 / Standard Practices - General
– Task TSB 71-00-06-816-807 / Fuel dilution rate in oil not compliant - Toubleshooting.

3. GENERAL

A. Inspection procedure of presence of fuel in the oil

(1) Detection of fuel presence in the engine oil

(a) Inspect with each scheduled inspection the possible presence of fuel in the oil.

(b) Detect the presence of fuel in the oil by:

– Measuring the flash point (laboratory method)
– Measuring density

– Increasing the level in the oil tank
– A characteristic odour when dilution is high
– Using a viscometer.

(2) Dilution rate evaluation method

WARNING

DO NOT BREATHE OIL VAPORS. WORK IN A WELL-VENTILATED AREA. DO NOT ALLOW OIL TO REMAIN IN CONTACT WITH THE SKIN. USE RUBBER GLOVES AND SAFETY GOGGLES OR A FACE SHIELD. OIL CAN BE POISONOUS.

(a) Preparation of the falling ball viscosity comparator (Refer to Figure 1)

1 Prepare, in a clean container, 100 cm^3(6.10 cubic inch) of 10 % fuel mixture:

- 10 cm^3(0.61 cubic inch) of fuel
- 90 cm^3(5.49 cubic inch) of new oil.

2 Pick up 10 cm^3(0.61 cubic inch) of the oil to be inspected.

NOTE: ***Do the sample on cold engine.***

(b) Fill the tubes of the falling ball viscosity comparator (OT 90 0010) :

– The first tube with the 10 % fuel mixture
– The second tube with the oil to be inspected
– The third tube with new engine oil.

(c) Remove the air bubbles from the tubes

1 Fully fill the tube.

2 Insert 2 centimeters (0.787 inch) of nylon thread in the tube.

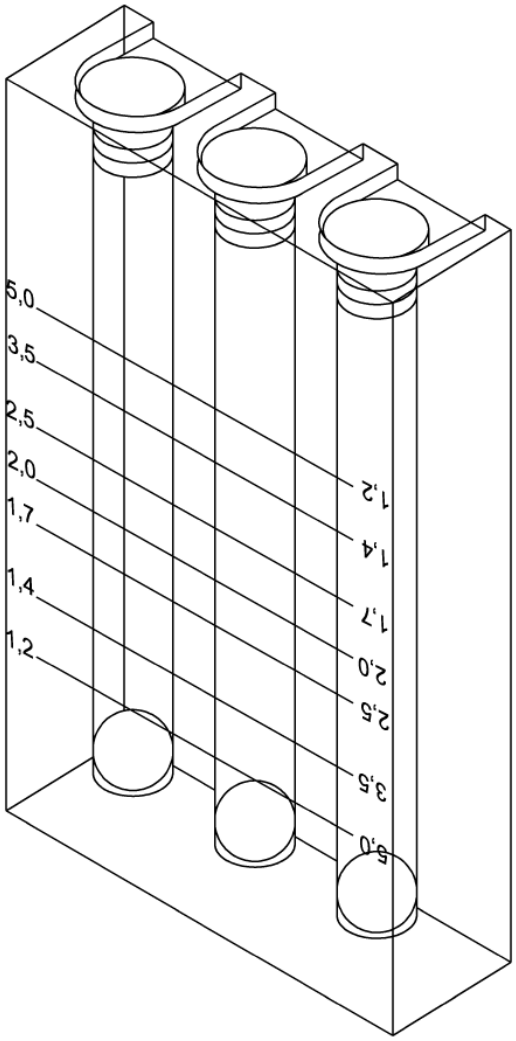
NOTE: ***The nylon thread allows air to be removed.***

3 Install the plug.

4 Hold the plug in position.

5 Remove the nylon thread.

(d) Allow the temperature to stabilize for 20 minutes.



Viscosity comparator
Figure 1

(3) Measure the dilution rate

(a) Turn the falling ball viscosity comparator (OT 90 0010) over.

(b) Compare the falling time of the balls.

NOTE: ***Falling time changes in proportion to engine oil viscosity.***

(c) Determine the dilution rate:

– Between 0 and 10 %: the ball of tube No. 2 (engine oil to be inspected) falls more slowly than the ball in tube No. 1 and faster than the ball in tube No. 3
– More than 10 %: the ball of tube No. 2 falls faster than the two other ones.

B. Additional procedures

(1) Do the inspection procedures specified in the Maintenance Manual for a dilution more than 10 %. Refer to Task TSB 71-00-06-816-807.

TASK 70-03-00-940-801-A01

BONDING
GENERAL

1. TASKS / REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 70-03-00-940-802/LOCTITE Products - General
– Task 70-03-00-940-803/Bonding with “RAYCHEM” conductive glue - General.

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TASK 70-03-00-940-802-A01

LOCTITE PRODUCTS GENERAL

1. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 70-01-00-940-801 / Standard Practices - General

2. GENERAL

This TASK provides the necessary information for LOCTITE bonding.

NOTE: ***LOCTITE products are non-toxic.***

WARNING

WORK IN A SUITABLE AND WELL-VENTILATED AREA. DO NOT ALLOW THE SOLVENTS TO REMAIN IN CONTACT WITH THE SKIN. PROTECT THE HANDS WITH A SYNTHETIC RUBBER GLOVES AND THE FACE WITH A SCREEN OR GOGGLES. IF ANY PRODUCTS IN THE BATH COME INTO CONTACT WITH THE SKIN, RINSE IMMEDIATELY WITH RUNNING WATER AND APPLY AN OILY HAND CREAM.

WARNING

ENSURE THAT THERE ARE NO FLAMES, SPARKS OR HOT PARTS IN THE IMMEDIATE VICINITY, IN ORDER TO AVOID ANY RISK OF FIRE OR EXPLOSION. THE PRODUCTS ARE FLAMMABLE.

CAUTION: NEVER POUR THE CLEANING PRODUCTS INTO THE SEWERS. CLEANING PRODUCTS ARE STRONG POLLUTANTS.

CAUTION: USE ONLY TOOLS, EQUIPMENT AND CONSUMABLE PRODUCTS THAT ARE QUALIFIED BY SAFRAN HELICOPTER ENGINES. USE OF OTHER MEANS, EQUIPMENT OR REPLACEMENT PRODUCTS MUST BE RATIFIED ACCORDING TO THE SAFRAN HELICOPTER ENGINES PROCEDURES IN FORCE.

A. LOCTITE products

(1) Definition

LOCTITE products are one-part products. They harden without the evaporation of solvent and without the addition of a catalyst.

Four series of LOCTITE products are used:

– The 200 series of the anaerobic type (hardens only in the absence of air), used for locking, has a shear strength
– The 400 series of fast-hardening cyanoacrylate type, used for bonding, has a tensile strength

– The 400 IS series a variant of the 400 series, is the cyanoacrylate type, ultra-fast hardening
– The 600 series of the anaerobic type, used for attachment, has a shear strength
– The 700 series includes the activators.

(2) Properties

(a) Hardening

The anaerobic LOCTITE products harden normally on metal surfaces in the plain assemblies or in the assemblies which have some threads.

LOCTITE IS products harden without activators by absorption of moisture and light pressure.

1 Time of hardening

The time of hardening depends on:

– The nature of metal surfaces (Refer to NOTE)
– The nature of product
– The room temperature
– The play and tolerances of assembly
The use of an activator makes it possible to restore normal conditions of polymerization on inactive materials or at too low temperatures
Resistance in this case is reduced by 15 to 20%.

NOTE: ***The structural steels and the copper alloys are very reactive surfaces.***

NOTE: ***The light alloys, the passivated stainless steels, the pig iron and cast iron and the parts treated by chromium plating, cadmium-coating, cementing or nitriding are even inactive or not very active surfaces.***

NOTE: ***The anodized light alloys and silver plated steels require oven-drying.***

(b) Chemical resistance

In the liquid state, LOCTITE products are easily dissolved in common solvents.

In the polymerized state, LOCTITE products resist the majority of the reactants and the chemicals.

Avoid contact with acids and bases.

(c) Electrical properties

LOCTITE products are electrically insulating bonding products.

(d) Temperature resistance

1 The higher limits of usage are specified for each product

2 The lower limits of usage are:

– For the anaerobic products, temperature - 55°C (- 67°F)
– For the IS series, temperature - 80°C (- 112°F).

3 LOCTITE bonds lose 90% of their resistance at temperatures of about 200°C (392°F) to 250°C (482°F).

NOTE: ***Use this property to remove the assemblies, except for the products LOCTITE 640 and adhesive 306.***

4 The bonds are irreparably destroyed at temperatures about 350°C (652°F).

5 The bonds heated at a temperature lower than 250°C (482°F) retain their normal characteristics with cooling.

(e) Storage

	Storage temperature	***Storage time***
Anaerobic products	5°C to 25°C (+ 41°F to 77°F)	1 year
IS products	4°C to 20°C (+39.2°F to 68°F)	6 months at 20°C (68°F) 9 months at 4°C (39.2°F)

NOTE: ***Avoid the contamination of the products by metal particles or rust.***

(f) Toxicity and safety of use

1 LOCTITE products are not poisonous.

2 Do not get these products on your skin.

3 Use the activators in an area which is open to the air.

4 The flash point of these products is:

100°C (212°F),

82°C (179.6°F) for the IS series.

(3) Operating procedure

(a) Assembly

CAUTION: DO NOT USE CHLORINATED SOLVENT ON TITANIUM ALLOYS.

1 Degrease carefully the two elements to be assembled using a solvent (Refer to Task 70-01-00-940-801).

2 Let it dry for 15 minutes.

3 Use an emery cloth to smooth the surfaces on which you will apply the product, unless specified differently (surface protection).

NOTE: ***Do the degreasing procedure again after light sanding.***

4 Apply the specified activator, if necessary on the surfaces to be assembled.

NOTE: ***Let it dry for 5 minutes.***

5 Lubricate the surfaces to be assembled with a film of product.

6 Make sure that the good distribution of the product on all surfaces to assemble while doing assembly and disassembly.

7 Tighten and lock with the torque value as necessary.

8 Observe the time of polymerization.

NOTE: ***Dry between 100°C (212°F) and 120°C (248°F) in the presence of less reactive surfaces and without use of activator.***

(b) Disassembly

Safran Helicopter Engines obtained good performances by using DECAPLOC 98 manufactured by HENKEL.

The uses provided by the supplier are: etching solution, solvent of anaerobic LOCTITE products, cyanoacrylate, structural,polymerized silicones.

1 Operating procedure

WARNING

AVOID CONTACT WITH THE EYES AND THE SKIN. FOR INTENSIVE USE, WEAR GLOVES AND SAFETY GOGGLES. MAKE SURE THAT THE WORK AREA IS WELL VENTILATED.

CAUTION: DO NOT USE DECAPLOC 98 ON MAGNESIUM OR TITANIUM ALLOYS.

a Immerse the parts in DECAPLOC 98 at the room temperature for 15 to 20 hours.

b Rinse the parts with demineralized water.

c Dry the parts with hot air.

(4) LOCTITE Products selected for use on Safran Helicopter Engines turboshaft engines

(a) Lock-wiring LOCTITE products (series 200)

Description	***Strong thread lock SR 270***	***Normal thread lock SR 243***	***Weak thread lock SR 222***
Safran Helicopter Engines Part Number	967.708.1477	967.708.1487	967.708.1497 (50 ml) 959.000.0200 (10 ml)
Color	Green	Blue	Violet
Brookfield Viscosity (cPo or mPA.s)	400 to 600	6000 to 18000 (thixotrope)	2500 to 7500 (thixotrope)
Unlocking torque (N.m) (steel bolt - ISO 10964)	16 to 36	15 to 25	3 to 9
Maximum operating temperature	Extensive operation = 120°C (248°F) (1) Short period = 150°C (302°F)		
Polymerization time without activator (on steel at 22°C (71.6°F) as % of final resistance).			
– Handling (10 to 15 %)	10 to 20 min	10 to 20 min	10 to 20 min
– Operation (80 %)	4 hrs	45 min	2 hrs
– Maximum (100 %)	24 hrs	3 hrs	6 hrs
Recommended radial play (mm)	0.03 to 0.06	0.03 to 0.06	0.03 to 0.06
Maximum acceptable play (mm)	0.15	0.15	0.15

Description	*Strong thread lock SR 270*	*Normal thread lock SR 243*	*Weak thread lock SR 222*
Recommended roughness Ra (microns)	0.8 to 1.6	0.8 to 1.6	0.8 to 1.6
Product life (months)	24	24	24

(1) At this temperature, the mechanical resistance is approximately 50% of the mechanical resistance at ambient temperature.

(b) Adhesive LOCTITE product (Series 400)

These adhesive products allow for very fast bonding at ambient temperature under a slight pressure.

These adhesives allow for the bonding of metals, certain elastomers and plastics.

Optimum conditions are:

– Neutral pH
– Relative humidity rate of approximately 60%
– Temperature 18°C (64.4°F).

NOTE: ***The thinner the bonded joint, the quicker the reaction***

Description	*Adhesive 496*	*Adhesive 495* (1)	*Adhesive 406* (1)
Safran Helicopter Engines Part Number	967.708.1527	967.708.1537	959.000.5191
Color	Colorless	Colorless	Colorless
Brookfield Viscosity (cPo or mPA.s)	120 to 150	25 to 60	10 to 30
Strength (MPa) on steel (hardening at ambient temperature without activator):			
– tensile/shear strength	20 to 30	12 to 26	18 to 26
– tensile strength	12 to 25	12 to 25	12 to 25
Maximum operating temperature:			
– Prolonged operation (2)	80°C (176°C)	80°C (176°C)	100°C (212°F)
– Short term	100°C (212°F)	100 to 120°C (212°F to 248°F)	120°C (248°F)
Polymerization time without activator:			
– handling	20 to 40 s	10 to 30 s	10 to 20 s
– maximum strength	24 hrs	24 hrs	24 hrs
Product life (months)	21	21	18

(1) More specifically destined for elastomer bonding.

(2) At this temperature, the mechanical resistance is approximately 50% of the mechanical resistance at ambient temperature.

(5) Activator LOCTITE product (series 700)

Description	*Safran Helicopter Engines Part Number*	*Color*	*Viscosity (cPo ou MPa. S)*	*Comments*
7471	967.700.0487	Amber	1 to 5	For products other than 330 and series 400
7452	956.000.5201	Transparent to Amber	1 to 5	For series 400 (cyanoacrylates)
7386 (1)	959.000.3837	Amber to light brown	1 to 5	For Multibond 330

(1) In the USA, the same product is identified as 7387.

TASK 70-03-00-940-803-A01

BONDING WITH RAYCHEM CONDUCTIVE GLUE GENERAL

1. TASKS / REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 70-01-00-940-801/Standard Practices - General

2. GENERAL

This TASK defines the characteristics and application conditions for RAYCHEM conductive glue.

This glue is used when it is necessary to ensure electrical continuity in an assembly.

A. Characteristics of RAYCHEM conductive glue

(1) It is an epoxy glue made up of 2 components which is made conductive by containing dispersed particles of silver.

(2) Oven-drying takes place between 20°C and 135°C.

(3) The specific resistance of the glue seal is 0.01 Ω cm.

(4) The permitted temperature range during operation is from - 55°C to + 150°C.

(5) The glue is resistant to oils and fuels.

(6) Bushes which are bonded using this glue require an untightening torque of 120 N.m.

(7) The resistance to shearing on cylindrical steel test bars is from 6 to 8 MPa.

B. Preparation of RAYCHEM conductive glue

(1) The glue is delivered in a double syringe of 20 cm^3, which guarantees the correct proportions of the 2 components.

(2) The quantity required is measured using the syringe, and then mixed carefully.

(3) The resulting mixture can be used for approximately 30 minutes at 25°C.

C. Application of RAYCHEM conductive glue

(1) Degrease the parts using chlorinated solvent (except if the parts are made of titanium) or an oil-based solvent. (Refer to Task 70-01-00-940-801).

(2) Apply the glue to the surfaces to be assembled once the solvent has completely evaporated.

NOTE: ***Bonding must take place as quickly as possible.***

(3) Once the glue has been applied to the surfaces to be assembled, one of the following oven-drying cycles must be carried out (minimum durations):

(a) 24 hours at 20°C.

(b) 1 hour at 80°C.

(c) 20 minutes at 135°C.

D. Recommendations

(1) Permissible radial play: 0.15 mm.

(2) Recommended roughness Ra = 0.8 to 1.6 microns.

(3) The expiry date for the glue is 12 months after manufacture, kept in its original packaging.

(4) Follow the instructions on the packaging.

TASK 70-04-00-940-801-A01

APPLICATION OF SEALING MATERIALS AND LUBRICATION
GENERAL

1. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned here after.

- Task 70-04-00-940-802 / Vaseline graphite - General
- Task 70-04-00-940-803 / Sealing compound for sealing faces - General
- Task 70-04-00-940-804 / Silicone elastomers for sealing, bonding or potting purposes - General
- Task 70-04-00-940-805 / Two-component sealants - General.

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TASK 70-04-00-940-802-A01

GRAPHITE VASELINE
GENERAL

1. TASKS / REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 70-01-00-940-801/Standard Practices - General.

2. GENERAL

A. Specification and composition

(1) Specification

The graphite vaseline corresponds to the following standards:

– France: AIR 4247A
– U.K.: 392 B
– U.S.A: MILT5544Andt
– NATO: S720.

(2) Composition

The graphite vaseline is composed of:

– Vaseline according to standard AIR 3565
– Graphite powder according to standard AIR 4224.

B. Domain of application

Apply graphite vaseline during assembly of all screws and bolts of the hot parts of the engine.

NOTE: ***The restrictions of usage are specified in the documentation.***

C. Conditions of application

(1) Apply the graphite vaseline with a paint brush or brush.

NOTE: ***Thickness of the layer: 0.1 mm to 0.2 mm (0.0039 inch to 0.0078 inch).***

(2) Remove excess product with a clean cloth.

D. Approved products

All the products according to the specifications are approved.

E. Storage - Service life

– Time of storage: 3 years
– Service life: 1 year.

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TASK 70-04-00-940-803-A01

SEALING COMPOUND FOR SEALING FACES GENERAL

1. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 70-01-00-940-801 / Standard Practices - General.

2. GENERAL

This TASK provides the necessary information for the application of sealing compound for sealing faces.

Safran Helicopter Engines uses three references of Hylomar compound for the assembly of its parts:

– Hylomar Advanced Formulation HV (solvent free, high viscosity),
– Hylomar Aerograde Ultra PL32A L (solvent based, light grade),
– Hylomar Aerograde Ultra PL32A M (solvent based, medium grade).

A. Surface preparation prior to the application of sealing compound for sealing faces

CAUTION: NEVER CLEAN A TITANIUM ALLOY WITH A HALOGEN SOLVENT. HALOGEN SOLVENTS DAMAGE TITANIUM ALLOYS.

(1) Remove the grease from the surfaces with a clean, dry, lint-free cloth, soaked with an approved degreasing solvent.

NOTE: ***Remove all previous compound from the sealing faces to be renewed. Repeat the solvent degreasing operation.***

CAUTION: AVOID ANY DEPOSIT OF DUST DURING THE DRYING OF SOLVENT.

(2) Allow the solvent to evaporate completely.

B. Application of the sealing compound for sealing faces

(1) Make sure that the validity (expiry date) of the HYLOMAR compound is correct.

NOTE: ***For high-quality surface finish, it is recommended that you select light-grade Hylomar compounds.***

CAUTION: DO NOT ALLOW HYLOMAR COMPOUND TO BLOCK ANY DUCTS DURING APPLICATION OF THE COMPOUND.

(2) Apply a thin and consistent coat of the HYLOMAR compound, by patting it onto both sealing faces using a clean paint brush or other suitable means.

(3) Wait for a minimum of 10 minutes before you assemble the parts.

(4) Assemble the parts and obey the tightening requirements.

(5) Wait for a minimum of 10 minutes to let the compound dry, then do a check of the tightening torques again.

TASK 70-04-00-940-804-A01

SILICONE ELASTOMERS FOR SEALING, BONDING OR POTTING PURPOSES GENERAL

1. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 70-01-00-940-801 / Standard Practices - General.

2. GENERAL

This TASK defines the characteristics and applicability of RHODORSIL CAF or RTV silicone elastomers for sealing, bonding or potting purposes.

CAFs are mainly used for sealing purposes during assembly. They can also be used to bond silicone elastomer seals.

RTVs are mostly used for potting electric or electronic components.

RHODORSIL CAFs are single-component silicone elastomers with which a thin-layer vulcanization phenomenon occurs at ambient temperature. This is induced by the air moisture which acts as a catalyst. For some elastomers, this reaction comes with a slight release of acetic acid. When these acetic acid vapors are likely to corrode steel components, it is preferable to use non-acetic CAF 730.

RTV adhesives are two-component silicone elastomers which crosslink at ambient temperature. The reaction occurs by polycondensation or polyaddition.

Tables 1 and 2 give the physical characteristics of the grades used which belong to the RHOSORSIL CAF and RTV families. CAF 1 is the most commonly used grade, recently replacing CAF 4 (code 9677680277) in all its applications since it has better oil resistance. Seals are more resistant to temperature when CAF 33 or 36 is used.

CAF and RTV elastomers are electrically insulating flexible sealing products, but as for all silicones, they are not recommended for permanent contact with oils and fuels.

WARNING

DO NOT BREATHE THE VAPORS OF THE PRODUCTS. WORK IN A WELL-VENTILATED AREA. DO NOT ALLOW THE PRODUCTS TO REMAIN IN CONTACT WITH THE SKIN. USE RUBBER GLOVES AND SAFETY GOGGLES OR A FACE SHIELD. THE PRODUCTS CAN BE POISONOUS.

WARNING

MAKE SURE THAT THERE ARE NO FLAMES, SPARKS OR HOT PARTS IN THE IMMEDIATE VICINITY, IN ORDER TO AVOID ANY RISK OF FIRE OR EXPLOSION. THE PRODUCTS ARE FLAMMABLE.

CAUTION: NEVER POUR THE CLEANING PRODUCTS INTO THE SEWERS. CLEANING PRODUCTS ARE STRONG POLLUTANTS.

CAUTION: THE APPLICATION OF CAF AND RTV PRODUCTS IS NOT AUTHORISED ON AREAS WHERE THERE IS A PERMANENT CONTACT BETWEEN OILS AND FUELS.

CAUTION: USE ONLY TOOLS, EQUIPMENT AND CONSUMABLE PRODUCTS THAT ARE QUALIFIED BY SAFRAN HELICOPTER ENGINES. USE OF OTHER MEANS, EQUIPMENT OR REPLACEMENT PRODUCTS MUST BE RATIFIED IN ACCORDANCE WITH THE SAFRAN HELICOPTER ENGINES PROCEDURES IN FORCE.

A. Surface preparation prior to application of sealing compound for the mating planes

(1) Surface preparation

(a) Check that the validity of the expiry dates of all products is correct.

(b) Apply the product to a clean surface that has been degreased with a solvent.

NOTE: ***The use of chloride solvents is not permitted on titanium alloys and organic compounds.***

(c) Degrease both surfaces of the seal. If there are any signs of oxidation or any other non-greasy contamination, sand with abrasive paper.

(d) Allow sufficient drying time for the solvent to evaporate.

B. Application of silicone elastomers for sealing and bonding

(1) Creation of a seal during assembly

CAUTION: NEVER CLEAN A TITANIUM ALLOY WITH A HALOGEN SOLVENT. HALOGEN SOLVENTS DAMAGE TITANIUM ALLOYS.

(a) Carry out degreasing on both faces of the seal with a cloth soaked with Hyso 97/1.

(b) Finish cleaning with acetone.

(c) Allow the cleaning product to evaporate completely.

(d) Select one of the RHODORSIL CAF products according to its physical properties, (Refer to table 1).

Table 1 : Characteristics of CAF elastomers

	CAF 1	***CAF 730***	***CAF 33***	***CAF 33 Noire***
Safran Helicopter Engines Code	9677680267	9677080817	96770004731	9590005941
Manufacturer	Rhodia	Rhodia	Rhodia	Rhodia
Catalyst/Colour	Red	White	White	Black
Product Category	Acetic	Oxime	Acetic	Acetic
Density at 25°C	1.15	1.05	1.05	1.05
Brookfield Viscosity (mPa.s.)	240000	Not flowing (thixo-tropic)	Not flowing (thixo-tropic)	Not flowing (thixo-tropic)

	CAF 1	*CAF 730*	*CAF 33*	*CAF 33 Noire*
Hardness (NFT 46003)	47	25	24	24
Limit operating temperatures in °C:				
Lower limit	-65	-55	-65	-65
Upper limit:	+225	+200	+200	+250
– Continuous	+300	+250	+250	+300
– Peak				
Storage duration on acceptance (between 5 and 25°C) in months, with packaging not opened	12	9	12	12

(e) Application of the RHODORSIL CAF product

CAUTION: PREVENT ANY BLOCKAGE OF INTERNAL DUCTS DURING THE APPLICATION OF THE CAF PRODUCT. ANY BLOCKING WILL CAUSE DAMAGE TO THE ENGINE OR THE ADJACENT PARTS.

CAUTION: THE SEALING FACES SHALL BE JOINED IMMEDIATELY AFTER APPLYING THE CAF PRODUCT.

1 Apply the RHODORSIL CAF product in a thin coat (0.5 mm approx.) on one face of the seal, using a clean spatula.

2 Join the sealing faces immediately after applying the CAF product.

3 Carry out vulcanisation at ambient temperature for 30 minutes approx., depending on the temperature and humidity conditions.

CAUTION: CAREFULLY CUT OFF THE EXCESS CAF PRODUCT TO AVOID DAMAGING THE SEALING FACES.

4 Eliminate the excess RHODORSIL CAF product with a sharp blade.

5 Carry out complete polymerisation of the elastomer. Leave the sealing faces at ambient temperature for 24 hours.

NOTE: Increase the polymerization speed by baking the sealing faces for 30 minutes at a temperature of 150°C.

(2) Bonding of silicone seals

(a) To bond elastomer onto elastomer:

1 Sand the surfaces to be bonded with abrasive paper.

2 Eliminate the dust with dry and filtered compressed air.

3 Select one of the RHODORSIL CAF products according to its physical properties, (Refer to table 1).

4 Apply the RHODORSIL CAF product on both the surfaces to be bonded.

5 Bond the two elastomers and then maintain the contact during vulcanisation for 30 minutes at ambient temperature.

CAUTION: CAREFULLY CUT OFF THE EXCESS CAF PRODUCT, TO AVOID DAMAGING THE SEALING FACES.

6 Eliminate the RHODORSIL CAF product with a sharp blade.

7 Carry out complete polymerisation of the elastomer. Leave the sealing faces at ambient temperature for 24 hours.

NOTE: Increase the polymerisation speed by baking the sealing faces for 30 minutes at a temperature of 150°C.

(b) To bond silicone elastomer onto metal:

1 Treat the metal surface as in the above "Creation of a seal during assembly" procedure.

2 Treat the silicone seal as in the above "To bond elastomer onto elastomer" procedure.

C. Application of silicone elastomers for potting

Select one of the RHODORSIL RTV products according to its physical properties, (Refer to table 2).

Table 2 : Characteristics of RTV elastomers

	RHODORSIL RTV 7011	***RTV 3145***	***RTV 106***
Safran Helicopter Engines Code	9677600597	95900035900/9590004357	9590006161
Manufacturer	Rhodia	Dow Corning	G.E. Silicones
Catalyst	2% catalyst C	-	-
Colour	White	Grey/Clear	Red
Product Category	Alcohol	Alcohol	Acetic
Density at 25°C	1.2	1.12	1.07
Brookfield Viscosity (mPa.s.)	16000	Not flowing (thixotropic)	Not flowing (thixotropic)
Hardness (NFT 46003)	44	50	33
Limit operating temperatures in °C:			
Lower limit	-70	-55	-60
Upper limit: – Continuous – Peak	+150 +200	+250 +300	+260 +315
Storage duration on acceptance (between 5 and 25°C) in months, with packaging not opened	6	On packaging e.g. EXP 03/08 (use before 31/03/2008)	12

Refer to subsection A for surface preparation.

Mix 2 parts of catalyst C to 100 parts RTV 70111.

Use the mixture within 20 minutes.

No air bubbles should be incorporated during the catalyst operation (proceed slowly).

The elastomer can be handled after approximately 8 hours and crosslinked after 24 hours at ambient temperature.

Protect the connectors with a coating of VP 80 strippable varnish.

Immerse the electric or electronic component in the preparation.

Carry out vulcanization at ambient temperature for 30 minutes approx., depending on the temperature and humidity conditions.

CAUTION: CAREFULLY CUT OFF THE EXCESS RTV PRODUCT, TO AVOID DAMAGING THE SEALING FACES.

Eliminate the excess RHODORSIL RTV product with a sharp blade.

Carry out complete polymerisation of the elastomer. Store the component at ambient temperature for 24 hours.

NOTE: Increase the polymerisation speed by baking the component for 30 minutes at a temperature of 150°C.

Peel the VP 80 varnish from the connectors.

D. Difficult bonding operations

In most cases, use the procedure described in subsection B (Refer to Paragraph 2. B.) without applying an adhesive primer.

For difficult operations and to ensure better bonding of CAF and RTV adhesives to the steel supports, copper and copper alloy supports, aluminum and aluminum alloy supports and to plastic materials, it is advisable to use an adhesion activator before bonding or moulding (use RHODORSIL primer MB for Rhodia products and 1204 primer for Dow Corning).

(1) Application

(a) Edge the surfaces by slight abrasion. Brush down.

(b) Degrease the surfaces.

(c) Apply a thin layer of MB primer to the surfaces to be bonded using a paint brush.

(d) Allow to dry for at least 1 hour.

(e) Apply CAF and RTV as indicated in subsection B (Refer to Paragraph 2. B.).

E. Storage

Store the elastomer products between + 5 and + 25°C.

Comply with the cure date marked on tubes or packaging.

NOTE: The cure date may be extended, but it is necessary to contact Safran Helicopter Engines FRANCE for approval and check that the product has retained its characteristics.

F. CAF and RTV removal

During repair or after wrong application, remove these products using oxygenated solvents. These products are glycol ethers (derived from propylene glycol only).

The following constraints are linked to the use of oxygenated solvents:

– Cold use with safety equipment
– Cold use in the form of pre-impregnated wipes
– At ambient temperature
– Duration of 3 to 20 minutes.

NOTE: ***The use of these products in a receptacle is not recommended.***

Qualified products:

– SOCOMOR DIESTONE A8287
– SOCOMOR DIESTONE D2
– SOCOMOR DLS
– TURCO KLEENSOLVG.

G. Health, Safety and Environment

The application of silicon-based elastomers requires the use of products that have a significant impact on the environment. The HSE manager must be informed immediately of the use of any new product or of any problems encountered regarding the application of established rules.

TASK 70-04-00-940-805-A01

TWO-COMPONENT SEALANTS GENERAL

1. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 70-01-00-940-801 / Standard Practices - General.

2. GENERAL

This TASK defines the characteristics and applicability of TYPE PR elastomer for sealing.

WARNING

DO NOT BREATHE THEVAPORSOF THE PRODUCTS. WORK IN A WELL-VENTILATED AREA. DO NOT ALLOW THE PRODUCTS TO REMAIN IN CONTACT WITH THE SKIN. USE RUBBER GLOVES AND SAFETY GOGGLES OR A FACE SHIELD. THE PRODUCTS CAN BE POISONOUS.

WARNING

MAKE SURE THAT THERE ARE NO FLAMES, SPARKS OR HOT PARTS IN THE IMMEDIATE VICINITY, IN ORDER TO AVOID ANY RISK OF FIRE OR EXPLOSION. THE PRODUCTS ARE FLAMMABLE.

CAUTION: NEVER POUR THE CLEANING PRODUCTS INTO THE SEWERS. CLEANING PRODUCTS ARE STRONG POLLUTANTS.

CAUTION: THE APPLICATION OF CAF AND RTV PRODUCTS IS NOT AUTHORISED ON AREAS WHERE THERE IS A PERMANENT CONTACT BETWEEN OILS AND FUELS.

CAUTION: USE ONLY TOOLS, EQUIPMENT AND CONSUMABLE PRODUCTS THAT ARE QUALIFIED BY SAFRAN HELICOPTER ENGINES. USE OF OTHER MEANS, EQUIPMENT OR REPLACEMENT PRODUCTS MUST BE RATIFIED IN ACCORDANCE WITH THE SAFRAN HELICOPTER ENGINES PROCEDURES IN FORCE.

A. Surface preparation prior to application of elastomer sealing compound.

(1) Surface preparation

(a) Check that the validity of the expiry dates of all products is correct.

(b) Apply the product to a clean surface that has been degreased with a solvent.

NOTE: ***The use of chloride solvents is not permitted on the titanium alloys and organic compounds.***

(c) Degrease both surfaces of the seal. If there are any signs of oxidation or any other non-greasy contamination, sand with abrasive paper.

(d) Allow sufficient drying time for the solvent to evaporate.

B. Application of two-component sealants

(1) Conditioned sealants in KITS

The KITS contain pre-measured quantities of primary product and accelerator conditioned in different containers.

The container containing the primary product is partially filled in order to allow the addition of the accelerator and the mixture of the two parts

CAUTION: ADD THE ACCELERATOR TO THE PRIMARY PRODUCT ONLY AT THE TIME OF USAGE.

(a) Agitate the accelerator with a spatula until a homogeneous consistency is obtained.

(b) With a can opener, remove the flange of the container containing the primary product and carefully mix the primary product to obtain uniform consistency before the addition of the accelerator.

(c) Pour all of the accelerator into the primary product and mix carefully for 7 to 10 minutes. Scrape the walls and the bottom of the container in order to obtain a perfectly homogeneous mixture.

(2) Conditioned sealants in SEMKIT

The primary product is placed in cartridge closed by a plug.

The accelerator is in the rod.

CAUTION: WEAR PROTECTIVE GOGGLES.

(a) Pull the rod containing accelerator to bring the propeller mixing a quarter of the cartridge.

(b) Using the push rod, gradually inject the accelerator inside the cartridge, while pulling the rod for a uniform distribution in the primary product.

(c) Mix the two components by reciprocating movement and rotation (in clockwise direction) for indicated time on the SEMKIT.

(d) When the mixture is homogeneous, unscrew the rod to remove.

(e) Screw the nozzle onto the cartridge and place it in a gun. The product is ready for application.

(3) Cleaning of the equipment

Clean the equipment with acetone or methylethylceton solvent type immediately after use and before the polymerization of the product.

TASK 70-11-00-940-801-A01

EQUIPMENTS GENERAL

1. TASKS / REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

- Task 70-01-00-940-801/Standard Practices - General
- Task 70-38-00-940-801/Chromating - General
- Task 70-43-00-940-804/Electrical connectors - General

2. GENERAL

A. Examination of the equipment

(1) Make sure that the connector of the equipment is correctly tightened.

(2) Make sure that the equipment is in good condition:

(a) Make sure that the equipment shows no signs of impact, wear or friction.

(b) Make sure that there are no surface scores with burr or distortion on the mating faces.

NOTE: ***Reduce the surface anomalies by fine grinding. Carry out chromation on the parts made of aluminum or magnesium (Refer to Task 70-38-00-940-801).***

(c) Make sure that the support does not have a crack.

(d) Make sure that the tightening torque of attachments of the equipment is correct (Refer to the installation task of the equipment).

(e) Replace the equipment if it is damaged.

(3) Make sure that the equipment does not have a fuel or oil leakage.

B. Examination of the splines of the equipment

(1) Clean the area to be examined

(a) Brush the splines, using a nonmetal manual brush to remove the deposits.

(b) Degrease the splines with an approved solvent (Refer to Task 70-01-00-940-801).

(c) Dry the area with the dry air.

(2) Do a visual inspection

(a) Make sure that there are no signs of wear or degradation (perceptible by hand).

(b) Make sure that the splines do not have a sign of corrosion.

(c) Make sure that the splines do not have flaking or pitting adjacent to the contact surface.

(d) Do a thorough visual inspection with x10 magnifying glass.

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TASK 70-11-00-940-802-A01

INSPECTION, CHECK AND REWORK GENERAL

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Not applicable

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Description	*Quantity*
ARDROX 907PB or 996P2	As required
ARDROX 9PR5 or 9PR551	As required
ARDROX 9D4E or 9D1	As required

2. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 70-01-00-940-801 / Standard Practices - General.

3. GENERAL

This TASK provides necessary information for inspection, check and rework of the parts.

CAUTION: HANDLE THE PARTS CAREFULLY IN ORDER TO AVOID IMPACTS. ANY IMPACT WILL DAMAGE THE PARTS.

CAUTION: USE ONLY TOOLS, EQUIPMENT AND CONSUMABLE PRODUCTS THAT ARE QUALIFIED BY SAFRAN HELICOPTER ENGINES. USE OF OTHER MEANS, EQUIPMENT OR REPLACEMENT PRODUCTS MUST BE RATIFIED ACCORDING TO THE SAFRAN HELICOPTER ENGINES PROCEDURES IN FORCE.

A. Checking methods

(1) Visual inspection

NOTE: ***If necessary, carry out a thorough inspection with x6 (minimum) magnifying glass.***

Damages shown with this method of inspection can be classified as:

- Fracture
- Cracks, flaking, impacts, scores
- Distortion, wear, peened
- Signs of over heating (incorrect lubrication), abnormal heating
- Corrosion, clogging, erosion.

NOTE: ***Make sure that you do not confuse between the color of burnt oil and the traces of overheating.***
In the first case, coloring is uniform sometimes accompanied by a deposit.
In the second case a range of colors is visible.

(2) Finding cracks

The preferred method for the find of cracks is dye penetrant inspection method.

Three different products are used:

NOTE: ***Refer to the instructions for use of the products to comply with their procedure of use***

- a degreasing solvent ARDROX 9PR5 or 9PR551 to remove all impurities from the part to be examined,
- A penetrant product (ARDROX 907PB or 996P2) which penetrates in the cracks and porosities
- A developer (ARDROX 9D4E or 9D1) is a white colored powder. The developer absorbs the red dye penetrant from the cracks to the surface and locates the area of the defect exactly.

NOTE: ***Refer to the instructions for use of the products to meet the service.***

CAUTION: **NEVER CLEAN A TITANIUM ALLOY WITH A HALOGEN SOLVENT. HALOGEN SOLVENTS DAMAGE TITANIUM ALLOYS. USE A HYDROCARBON SOLVENT.**

(a) Interpretation:

- A brightly colored line indicates a crack
- A dotted line indicates fatigue cracks
- Spaced points indicate a porosity of metal.

(b) After doing a check, carefully clean the part using a solvent.

B. General standard of inspection

(1) Inspections to be carried out on parts installed or removed

(a) Cast parts

Inspect surfaces surrounding the pins; no crack is allowed. Check the flanges, faces of support and mating surfaces.

(b) Gears

Make sure that the teeth of the gears are not pitted, nor scaled, and that there are no signs of irregular wear.

Inspect the polish of the gears and make sure that there are no signs of excessive friction or overheating.

(c) Welded parts

Check that there are no cracks - visual monitoring with magnifying glass or according to the dye penetrant method.

(d) Different supports, firewall and protection shields

- Inspect the external and internal condition; make sure that there are no signs of contact with the equipment of the engine
- Inspect the condition of the edges and attachments of connection
- Inspect the fasteners (bolts, screw and nuts)
- Make sure in particular that the protection shield is clean.

(2) Measuring of internal and external diameters

Refer to Figure 1

(a) Carry out measuring of internal and external diameters according to the information provided in the following tables:

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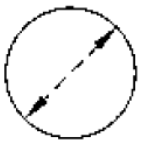
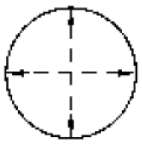
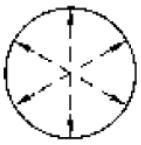
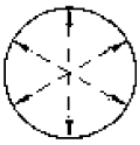
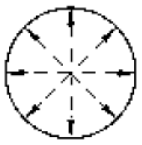
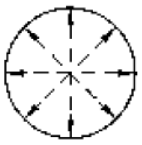
Average measurement	Specification					
	Average diameter			Circularity or fretting		
	< 8 mm	< 35 mm	> 35 mm	< 8 mm	< 35 mm	> 35 mm
Inside micrometer	1 measure	2 measures at 90°	3 measures at 60°	3 measures at 60°	4 measures at 45°	4 measures at 45°
Outside micrometer						
Vernier calliper						
3D measuring machine	measure in 4 points at 90°	measure in 6 points at 60°	measure in 8 points at 45°	measure in 6 points at 60°	measure in 8 points at 45°	measure in 12 points at 30°
	or scanning			or scanning		

NOTE 1 : In order to limit uncertainties concerning the measurements, use a 3D measuring machine with digital controls, as means of measure.

NOTE 2 : The indications given in the table are a minimum number of records carried out. The number of records could be increased according to the extent and the quality of element has to inspect, as well as the value of tolerance associated with specification.

NOTE 3 : In the case of checking of a specification on a diameter with a fretting, take at least a reading in each worn area.

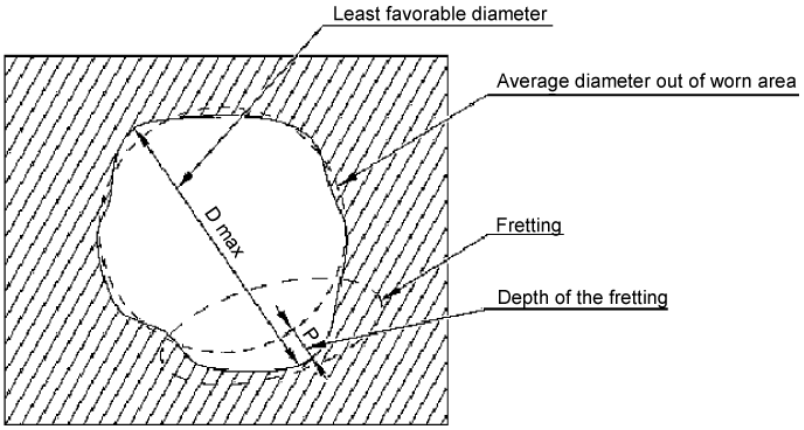
Figure 1

(b) Express the measurement result according to the specification to be inspected:

- Average diameter (without 3D measuring machine): arithmetic mean of the readings.
- Average diameter (with 3D measuring machine): diameter of the average circle of least squares.
- Circularity: difference between the maximum diameter and the minimum diameter.
- Fretting: the least favorable diameter or depth (Refer to Figure 2).

NOTE: ***If the fretting is expressed in term of diameter, the result of measurement will be the least favorable diameter defined as the minimum external diameter for a shaft, the maximum diameter for a bore (Refer to Figure 3 for the definition of these diameters from a record of 3D measuring machine).***

NOTE: ***If the fretting is expressed in term of depth, the result of measurement will be expressed like the difference between the average diameter except worn area and the least favorable diameter.***



Example of fretting on bore
Figure 2

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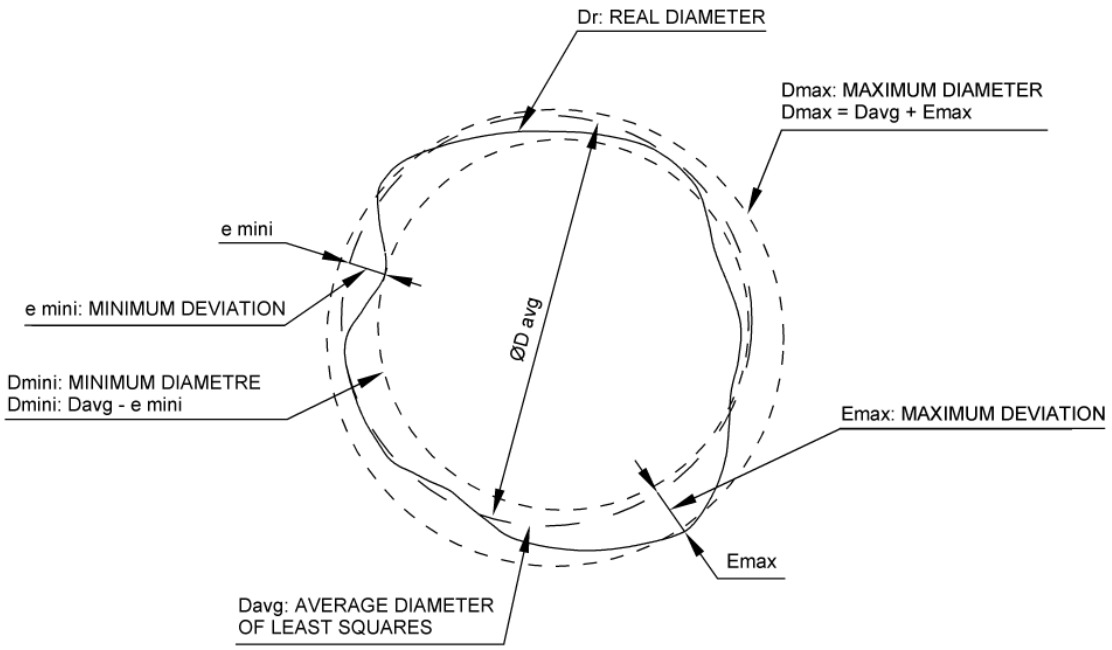

Parameters of fretting on an 3D measuring machine record
Figure 3

C. Standard minor repairs

(1) Removal of material by manual abrasions (hand fitting, trimming, polishing)

This manual operation is carried out by successive tool runs until the surface condition corresponding to the required dimensional and geometrical criteria is obtained.

The type and shape of the tool to be used must be adapted to the area of material removal by manual abrasion.

CAUTION: USE ONLY TOOLS, EQUIPMENT AND CONSUMABLE PRODUCTS THAT ARE QUALIFIED BY SAFRAN HELICOPTER ENGINES. USE OF OTHER MEANS, EQUIPMENT OR REPLACEMENT PRODUCTS MUST BE RATIFIED ACCORDING TO THE SAFRAN HELICOPTER ENGINES PROCEDURES IN FORCE.

(a) Abrasion of steels, Nickel base alloys or Cobalt base alloys

	Parameters			
Materials	***Machining type***	***Materials over-thickness recommended (mm)***	***Ra √(µm)***	***Tool type***
Steels or Nickel base alloys or Cobalt base alloys	Manual rough machining	>0.2	Not required	Cutter
		0.03 to 0.3	Not required	Grinding wheel (Grain 80 to 120)
	Manual rough machining	0 to 0.3	1.6	Grinding wheel (Grain 80 to 120)
	Manual finishing	0 to 0.1	1.6	Laminated wheel (Grain 150)
		0 to 0.07	1.2	Sheet/Strip/Roller (Grain 180)
			0.8	Sheet/Strip/Roller (Grain 240)
			0.4	Sheet/Strip/Roller (Grain 400)
		0 to 0.01	0.8	Abrasive paste
			0.4	
	Mechanical finishing	0 to 0.01	0.8	Extrude-Hone abrasive
			0.4	
		0 to 0.01	0.8	Harperizer abrasive
			0.4	

(b) Abrasion of Aluminium base alloys

	Parameters			
Materials	***Machning type***	***Materials over-thickness recommended (mm)***	***Ra √(µm)***	***Tool type***
Aluminium base alloys	Manual rough machining	>0.2	Not required	Cutter
		0.10 to 0.3	Not required	Grinding wheel
	Manual finishing	0 to 0.20	1.6	Laminated wheel (Grain 150)
		0 to 0.15	1.2	Laminated wheel (Grain 180)
		0 to 0.10	0.8	Laminated wheel (Grain 240)
		0 to 0.10	1.6	Sheet/Strip/Roller (Grain 150)
			1.2	Sheet/Strip/Roller (Grain 180)

	Parameters			
Materials	***Machning type***	***Materials over-thickness recommended (mm)***	***Ra √(µm)***	***Tool type***
		0 to 0.05	0.8	Sheet/Strip/Roller (Grain 240)
		0 to 0.03	0.4	Sheet/Strip/Roller (Grain 320)
		0 to 0.01	0.4	Abrasive paste

(c) Abrasion of Titanium base alloys

CAUTION: DO NOT USE CORUNDUM FOR TITANIUM PARTS. USE ONLY SILICON CARBIDE WITHOUT SULPHUR ADDITIVE.

	Parameters			
Materials	***Machning type***	***Materials over-thickness recommended (mm)***	***Ra √(µm)***	***Tool type***
Titanium base alloys	Manual rough machining	>0.15	Not required	Cutter
		0.02 to 0.2	Not required	Grinding wheel (Grain 80 to 120)
		0.01 to 0.1	Not required	Laminated wheel (Grain 80 to 120)
	Manual finishing	0 to 0.03	1.2	Sheet/Strip/Roller (Grain 180)
			0.8	Sheet/Strip/Roller (Grain 240)
			0.4	Sheet/Strip/Roller (Grain 320)
		0 to 0.01	0.8	Abrasive paste
			0.4	
	Mechanical finishing	0 to 0.01	0.8	Extrude-Hone abrasive
			0.4	
		0 to 0.01	0.8	Harperizer abrasive
			0.4	

D. Protection of the repaired parts

CAUTION: NEVER CLEAN A TITANIUM ALLOY WITH A HALOGEN SOLVENT. HALOGEN SOLVENTS DAMAGE TITANIUM ALLOYS. USE A HYDROCARBON SOLVENT.

(1) Clean the parts with a solvent, dry with dry compressed air.

(2) Without painting, a temporary protection can be carried out by spraying a fine layer of water-repellent fluid. Do not spray it on plastic parts.

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TASK 70-11-00-940-803-A01

RIVETING
GENERAL

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Description	*Quantity*
standard riveting pliers Ø 3.2 mm	1
standard drill	1
drill bit	1
drift punch Ø 2.9 mm	1
metal hammer	1
riveting die	As required

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Description	*Quantity*
degreasing product	As required

B. Additional provisions

Not applicable

2. TASKS/REFERENCE DOCUMENTS

Read carefully the information given in the tasks/documents mentioned hereafter.

- Standard Practices - General (Refer to Task 70-01-00-940-801).
- Fuel, engine lubricant - Special products - General (Refer to Task 71-00-02-940-801).
- Maintenance Manual.

WARNING

DO NOT BREATHE VAPORS FROM THE PRODUCTS USED. WORK IN A LOCAL ADAPTED AND WELL-VENTILATED AREA. DO NOT ALLOW PRODUCTS TO REMAIN IN CONTACT WITH THE SKIN. USE RUBBER GLOVES AND SAFETY GOGGLES OR A FACE SHIELD. THE FLOW CAN BE POISONOUS.

CAUTION: USE ONLY TOOLS, EQUIPMENT AND CONSUMABLE PRODUCTS THAT ARE QUALIFIED BY SAFRAN HELICOPTER ENGINES.

3. PROCEDURE

A. General

Riveting is an assembly process used each time when assembly cannot be performed by welding for the following reasons:

- alloy which is difficult to weld,
- sheet too thin to be fusion-welded,
- parts can be deformed by heat and/or vibrations.

NOTE: ***There are two possible forms of rivets, i.e. blind rivets and "cold-striking" type standard rivets.***

B. Riveting procedure with blind rivets

Refer to Figure 1, Figure 2, Figure 3

(1) Preliminary procedure

(a) Define the diameter, length and its size with respect to the working area.

(b) If the Maintenance Manual imposes a rivet dimension for a defined area, comply with the requirement of the Maintenance Manual.

(c) Select the drilling diameter according to the diameter of the rivet to be installed:

The drilling Ø of a hole for the installation of a rivet must be always greater than 0.1 to 0.2 mm max. with respect to the Ø of the rivet to be installed (Refer to table 1).

Table 1 : Drilling diameter

*Blind rivet Ø in mm**	*Drilling Ø in mm*	
	Min. Ø	*Max. Ø*
3.2	3.3	3.4
4	4.1	4.2
4.8	4.9	5

* *Examples of drilling Ø, the list of rivets is not exhaustive.*

(d) Drilling of the sheets to be riveted.

- The drilling must be carried out on the correctly pinned sheets to avoid misalignment of the holes between the sheets to be assembled or accumulation of the chips.

- The drilled holes must be always deburred before riveting.
- The drilling must be perpendicular to make sure that it is compliant.

CAUTION: MAKE SURE THAT THERE IS NO MISALIGNMENT OR CHIP DEPOSITS BETWEEN THE TWO SHEETS, THERE IS A RISK OF:

- **PENETRATION OF MOISTURE, THEREFORE RISK OF CORROSION.**
- **SHEAR RESULTING IN PREMATURE FATIGUE OF THE ATTACHMENTS.**

(2) Riveting procedure

(refer to paragraph B. (1))

(a) Define the dimensions of the rivet(s).

(b) Position the parts to be joined in place by tools used by the operator (pin, vice grip,etc ...).

(c) Make sure that the housing holes of the rivet are not out-of-round.

(d) Remove the burrs.

(e) Install the rivets with standard riveting pliers Ø 3.2 mm.

(f) Comply with the riveting cycles.

C. Riveting procedure with "cold-striking" type standard rivets

Refer to Figure 1, Figure 2, Figure 4, Figure 5, Figure 6, Figure 7, Figure 8

(1) Preliminary procedure

(a) Define the type of rivet with respect to the working area.

(b) If the Maintenance Manual requires a rivet dimension for a defined area, comply with the requirement of the Maintenance Manual.

(c) Select the drilling diameter according to the diameter of the rivet to be installed* (Refer to table 2)

Table 2 : Drilling diameter

Rivet Ø in mm	*Ø E (H11) in mm*	
	Min.	*Max.*
1.6	1.65	1.71
2.4	2.50	2.56
3.2	3.30	3.375
4	4.10	4.175

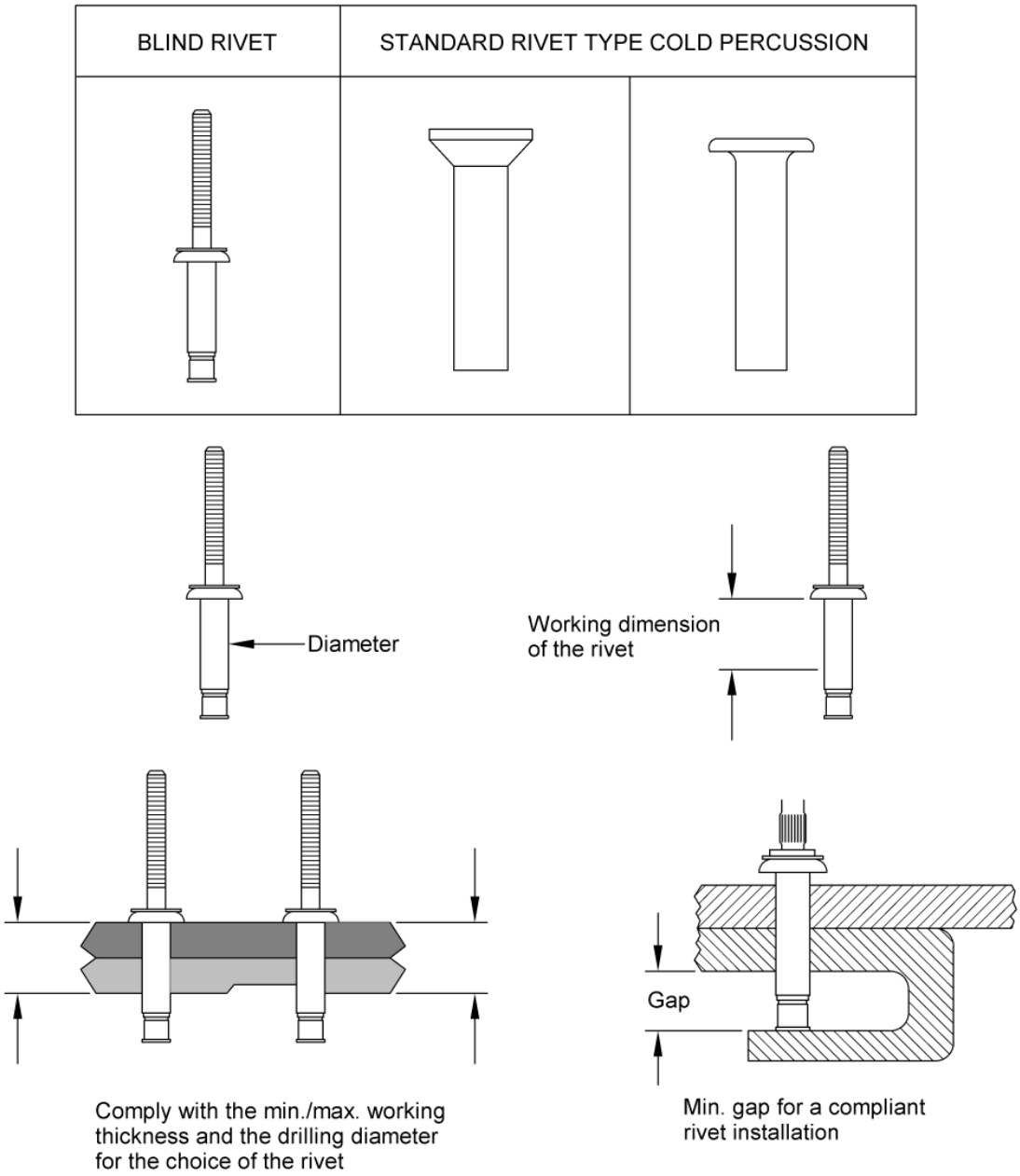
** Examples of drilling Ø, list of rivets is not exhaustive.*

(d) Drilling of the sheets to be riveted.

- The drilling must be carried out on the correctly pinned sheets to avoid misalignment of the holes between the sheets to be assembled or accumulation of the chips.
- The drilled holes must be always deburred before riveting.
- The drilling must be perpendicular to make sure it is compliant.

CAUTION: MAKE SURE THAT THERE IS NO MISALIGNMENT OR CHIP DEPOSITS BETWEEN THE TWO SHEETS, THERE IS A RISK OF:

- **PENETRATION OF MOISTURE, THEREFORE RISK OF CORROSION.**
- **SHEAR RESULTING IN PREMATURE FATIGUE OF THE ATTACHMENTS.**



Rivets
Figure 1

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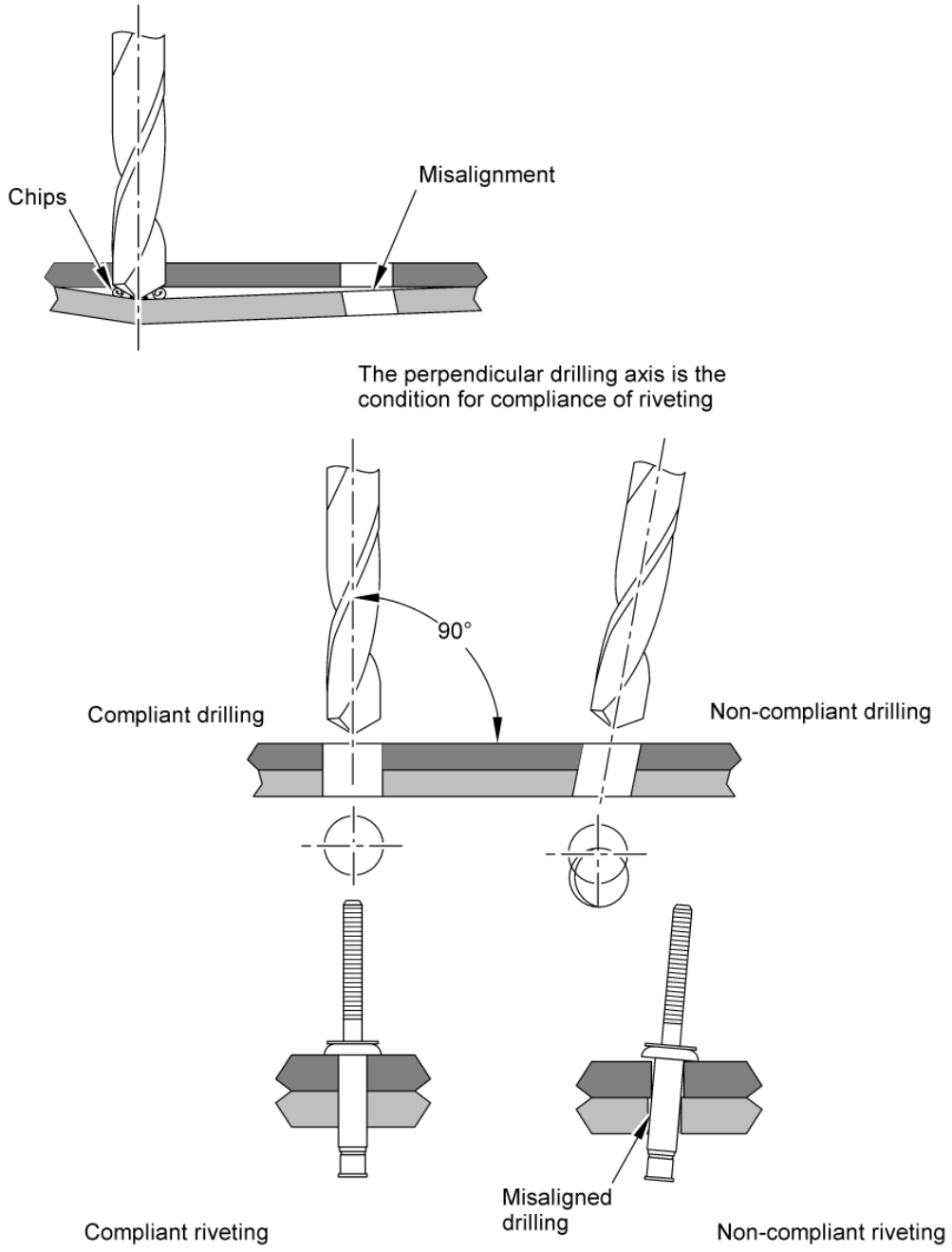

Drilling
Figure 2

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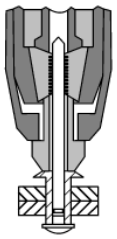
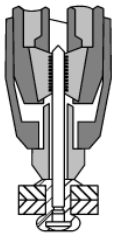
The tip of this riveting plier receives the stem, while the body of the rivet is introduced into the drilled parts. Cycle 1.



Place the rivet using the riveting plier in the drilling Ø

(1)

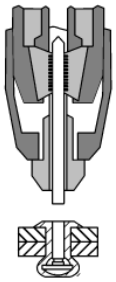
The tip is pressed against the flange, the riveting is done in two stages. An initial pressure exerted on the arms of the riveting plier pulls the stem: it deforms the body and expands the blind part at the rear side. Cycle 2.



Pull the stem of the rivet with the riveting plier

(2)

The arms are then released to push back the tip on the stem, from 4 to 5 mm. Press it again on the flange and operate the clamp again to break the stem and finish the riveting. Cycle 3.



At the end of the cycle, break the stem of the rivet with the rivet gun

(3)

The arms are spread apart to extract the remaining stem end, which comes out at the rear side.

Riveting with blind rivets
Figure 3

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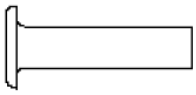
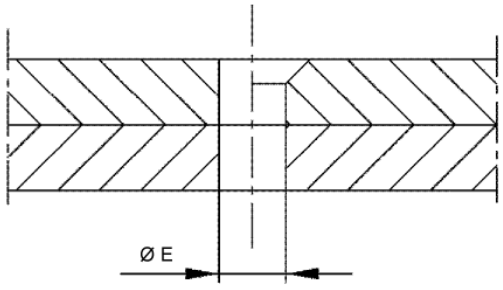
Form of rivet	Material	Shear strength	Max. operating temperature	Use
	AG5MC	Rc ⩾ 170 Mpa	150°C	Used to rivet parts made of light alloys
	Z2CN18.10	Rc ⩾ 330 Mpa	600°C	Used to rivet parts made of steel
	AG5MC	Rc ⩾ 170 Mpa	150°C	Used to rivet parts made of light alloys
	Z2CN18.10	Rc ⩾ 330 Mpa	600°C	Used to rivet parts made of steel

DIFFERENT FORMS OF RIVETS



DRILLING DIAMETER

Riveting with "cold-striking" type standard rivets
Figure 4

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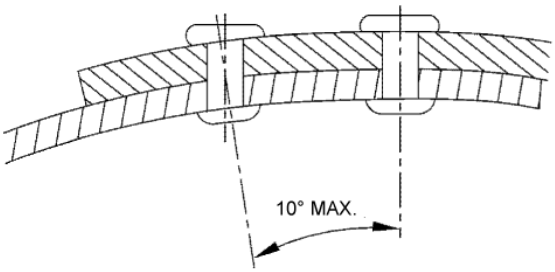
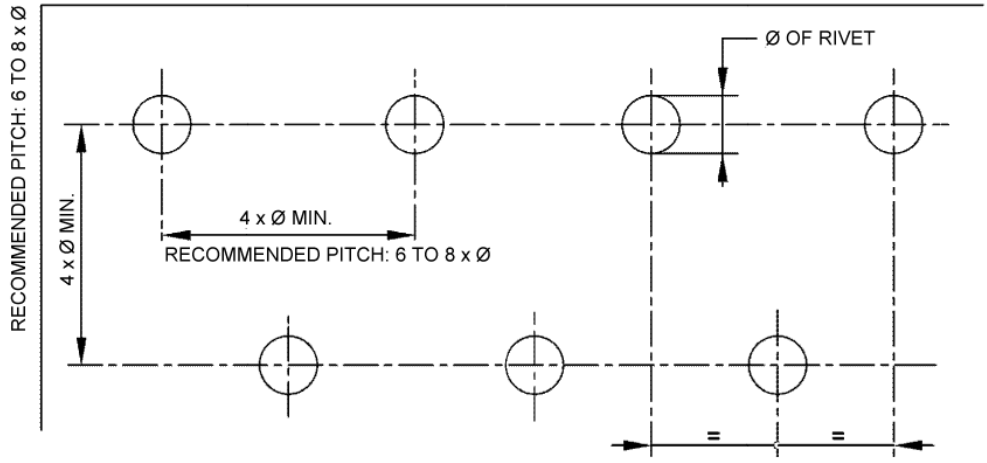
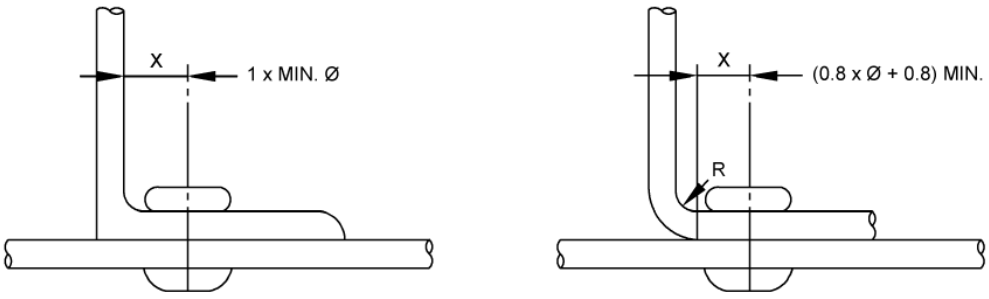


DRILLING AXIS ON SHEET WITH LARGE DIAMETER



INTER-AXIS SPACING OF TWO ROWS OF RIVETS



DISTANCE OF A RIVET AT THE EDGE OF A SHEET

Positioning of rivets
Figure 5

(2) Drilling

Refer to Figure 5

CAUTION: IF THE AXIS OF THE RIVET DOES NOT MAKE AN ANGLE GREATER THAN 10 ° WITH THE RADIUS OF THE PART, THERE IS A RISK OF FAULTY ATTACHMENT OF THE PART.

- On circular sheets with a large diameter, take into account the drilling axis.
- Take into account the spacing between the rivets.
- Take into account the distance of a rivet at the edge of a sheet.

(3) Countersinking of the sheet to be riveted

Refer to Figure 6

(a) Put the pre-formed head into the countersink and make a cylindrical post-formed head.

(b) Protrude the countersunk head in relation to the face of the sheet.

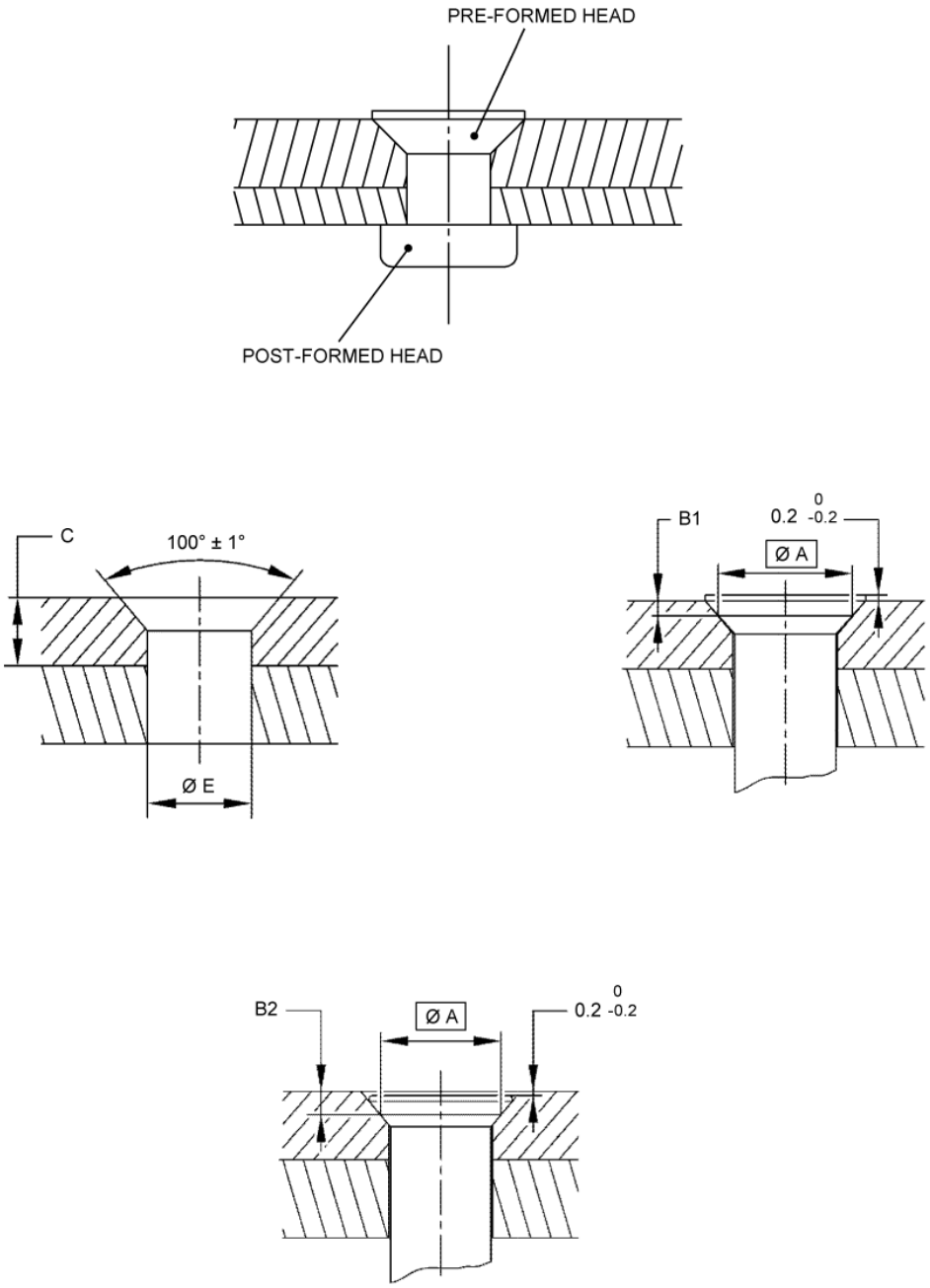
- The protrusion must be of 0 to + 0.2 mm.

NOTE: ***Protrude the countersunk head to allow the hole to be correctly filled by the body of the rivet.***

- If a part is in contact with the riveted face, the head must be - 0.2 to 0 under-flush in relation to this surface.
- For a given rivet diameter, the minimum thickness of the sheet for a correct countersink to be obtained is specified in by dimension C (Refer to table 3).
- If the head of the rivet is protruding, the depth of the countersink is determined for the diameter of measurement A, by dimension B1 (Refer to table 3).
- If the head of the rivet is under-flush, the depth of the countersink is determined for the diameter of measurement A, by dimension B2 (Refer to table 3).

Table 3 : Countersinking of the sheet to be riveted

Rivet Ø	*Meas Ø*	*B1*		*B2*		*C*
		Min.	*Max.*	*Min.*	*Max.*	*Min.*
1.6	2.45	0.05	0.15	0.25	0.35	0.8
2.4	3.85	0.15	0.25	0.35	0.45	1.2
3.2	4.9	0.20	0.30	0.40	0.55	1.4
4.0	6.15	0.30	0.40	0.50	0.65	1.7



Countersinking of the sheet to be riveted
Figure 6

(4) Dimpling of the sheet at 100°

(Refer to Figure 7)

NOTE: ***Dimple the sheet if the countersink cannot be made because of the sheet thickness.***

- ***If the sheet is dimpled, the offset will be measured in the tool contact area.***
- ***Localized distortion of the sheet around the head is admissible.***

(5) Deburr the elements to be assembled

(Refer to Figure 8)

(a) If the parts are drilled separately or disassembled before the rivets are installed, deburring must be carried out according to views A, B and C.

(b) If the parts are drilled once assembled and there is no disassembly before the rivets are installed, only the outer faces are deburred.

CAUTION: MAKE SURE THAT THE ELEMENTS ARE MATCHED PERFECTLY SO THAT THERE ARE NO CHIPS AT THE ELEMENT INTERFACES.

(6) Install the rivets

(a) Match the parts perfectly before installing the rivets.

(b) Install the rivet type cold percussion using a metal hammer with riveting die.

(c) Clean rivets which are marked by color using degreasing product.

D. Removal of damaged blind or standard rivets

(1) Drill through the rivet head with a drill bit 0.2 mm below the nominal diameter.

(2) Remove the rivet by means of drift punch Ø 2.9 mm, by placing a stack against a hit on the opposite side.

(3) Make sure that the condition of the hole is correct and put again an identical rivet, or a rivet approved in the Maintenance Manual, in position.

E. Additional procedures to be done on blind or standard rivets

Refer to Figure 2, Figure 6, Figure 7

(1) Carry out an inspection of the riveting.

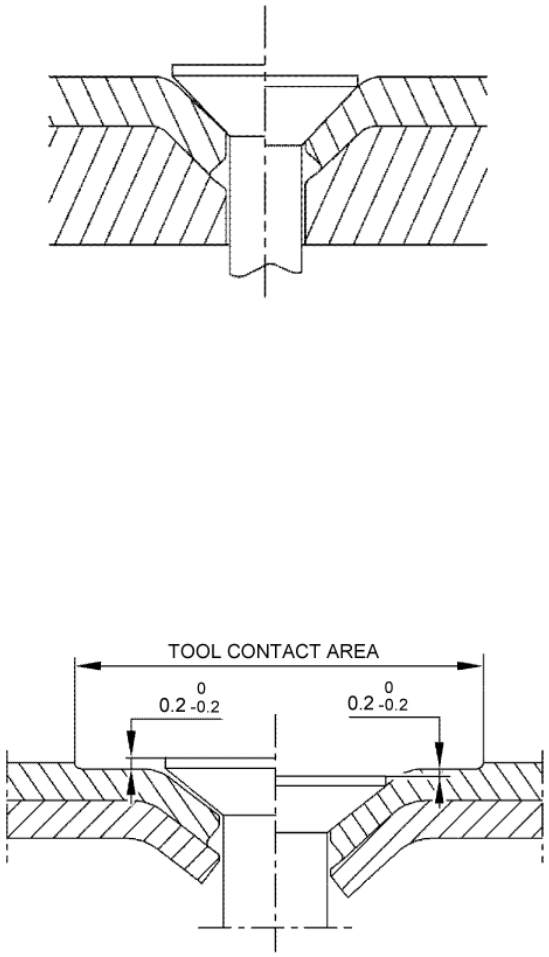
(2) Replace any damaged, loose or missing rivets on an assembly by identical rivets.

(a) Inspect the rivet hole.

- Make sure that the drilling diameter is within the admissible tolerances.
- Make sure that the out-of-roundness of the drilled hole is 0.2 mm maximum.

(b) If the rivet hole is damaged, rebore the hole to a larger diameter approved in the Maintenance Manual.

- Hold the sheets in contact using clamps to prevent any run-out between the internal faces.
- If countersinks must be enlarged, make sure that this operation is admissible taking into account the thickness of the sheet.



Dimpling of the sheet
Figure 7

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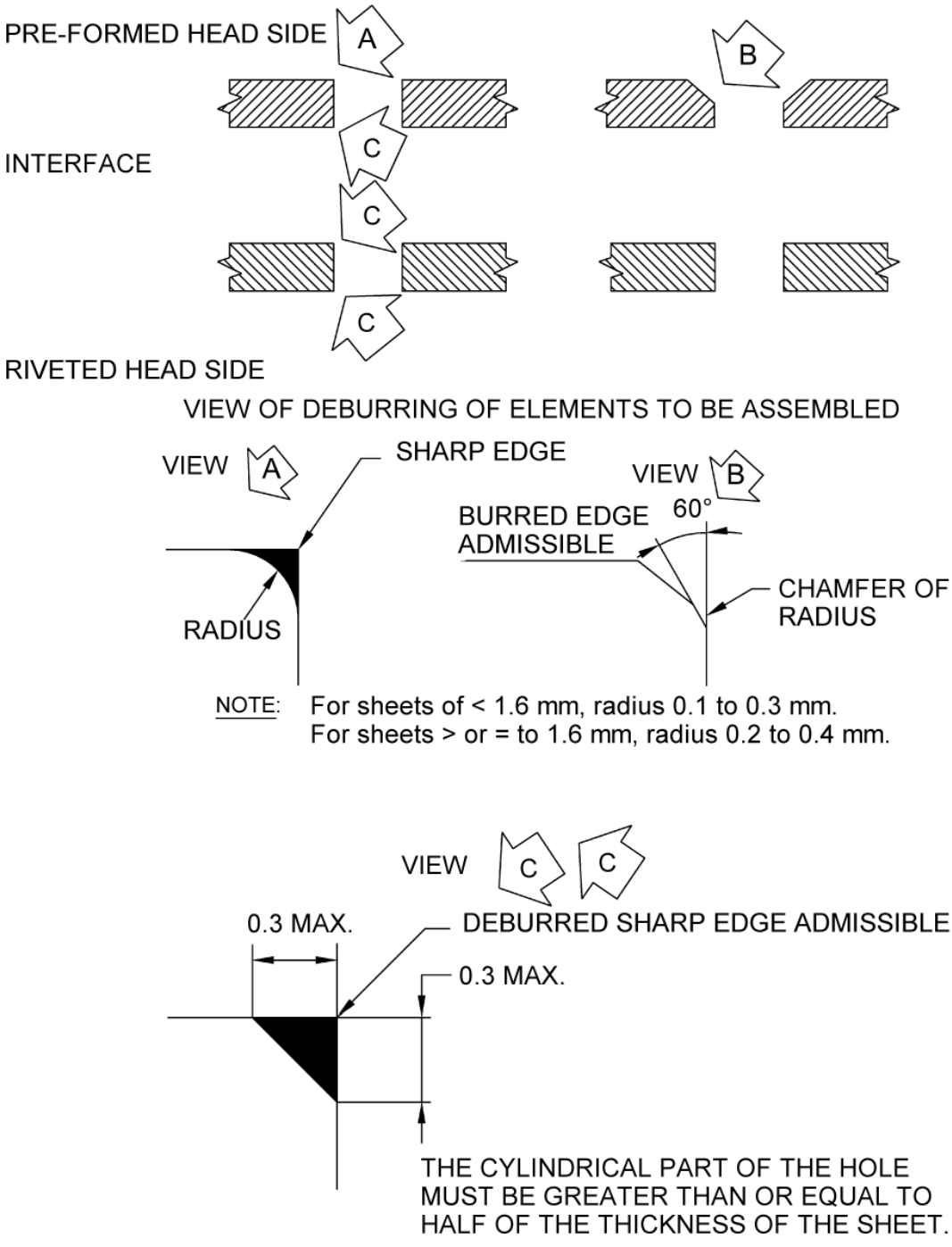

Deburr the elements to be assembled
Figure 8

4. FINAL STEPS

Not applicable

TASK 70-11-00-940-804-A01

ROSAN TYPE BUSHES GENERAL

1. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 70-01-00-940-801 / Standard Practices - General
– Task 70-41-00-940-801 / Tightening torques - General.

2. GENERAL

This TASK provides the necessary information for the removal/installation of a "ROSAN" type bush.

The installation of a "ROSAN" type bush is carried out on tapped parts with thread inserts or with stripped or damaged threads.

Safran Helicopter Engines uses three types of bush:

– Tapped bushes with a collar
– Tapped bushes without a collar
– "ROSAN" bushes.

"ROSAN" type bushes are used when it is impossible to repair with a bush that can be used to install a new thread insert.

Use the following installation principle:

– Immobilize the bush by crimping the knurled or striated end of the bush in its orifice in the casing
– Carry out the installation and crimping with specific tools
– Lock the screw by distorting the internal treading of the bush.

A. Removal of a tapped bush

(1) Use the specific extraction cutter for the bush concerned (Refer to Figure 1).

(2) Machine the crimped part of the bush.

(3) Loosen the threaded part of the bush usingthespecific tightening tool.

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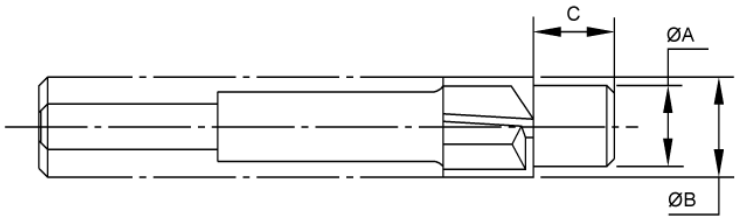
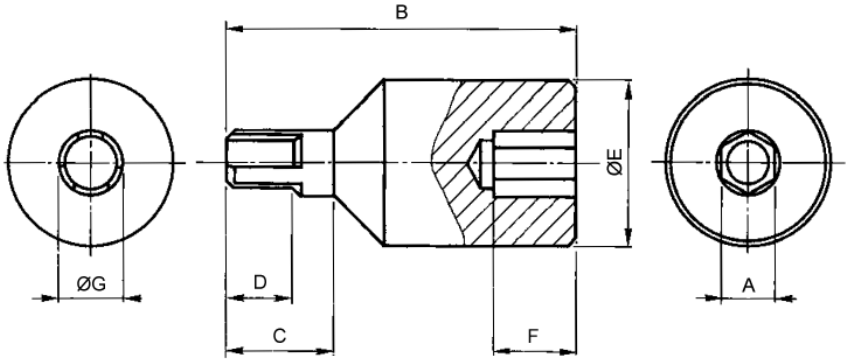


EXTRACTION CUTTER



TIGHTENING AND LOOSENING TOOL

Figure 1

B. Installation of a "ROSAN" type bush

(1) Select the specific tapped bush with thesame inside diameter, the same outside diameter, the same crimping diameter, and with the correct threading length; (Refer to table 1) and (Refer to table 2) :

Table 1 : "ROSAN" type bushes for light alloys (Z5CNU14-04)

Part Number	*Length*	*Inside diameter of bushes*	*Outside diameter of bushes*	*Diameter of crimping counterbore*
9520010875	9.10	MJ 5 x 0.80	M7 x 1.00	5.23
9520010877	10.70	MJ 6 x 1.00	M8 x 1.00	6.28
9520010879	13.20	MJ 7 x 1.00	M9 x 1.00	7.29

Table 2 : "ROSAN" type bushes for steels (EZ6NCT25)

Part Number	*Length*	*Inside diameter of bushes*	*Outside diameter of bushes*	*Diameter of crimping counterbore*
9520010874	9.10	MJ 5 x 0.80	M7 x 1.00	5.23
9520010876	10.70	MJ 6 x 1.00	M8 x 1.00	6.28
9520010878	13.20	MJ 7 x 1.00	M9 x 1.00	7.29

(2) Refer to the utilization and installation conditions for "ROSAN" type bushes; see the following table (Refer to table 3) and Refer to Figure 2.

Table 3 :

<table>
<tr><th></th><th>Materials</th><th>Light alloys (Al and Mg based) and non-ferrous materials</th><th>Titanium alloys</th><th>Steels</th></tr>
<tr><td rowspan="3">Installation orifices</td><td rowspan="2">Teeth in recesses</td><td rowspan="2">Optional for materials with
HB ≤ 187 MPa</td><td>Tooling Refer to Figure 3</td><td>Tooling Refer to Figure 2or Refer to Figure 3 on R</td></tr>
<tr><td colspan="2">Mandatory</td></tr>
<tr><td>Tappings</td><td colspan="3">Blind or open through</td></tr>
<tr><td>Provision for wall overthickness for repair purposes</td><td>Mandatory</td><td colspan="2">To be defined for each case</td></tr>
<tr><td colspan="2">Maximum operating temperature</td><td>260°C</td><td>350°C</td><td>650°C</td></tr>
<tr><td colspan="2">Maximum number of times a screw can be removed before replacement of the bush becomes necessary</td><td colspan="3">5 times max.</td></tr>
<tr><td rowspan="2">Bushes</td><td>Materials</td><td>Z5CNU14-04</td><td colspan="2">EZ6NCT25</td></tr>
<tr><td></td><td>Long</td><td colspan="2">Short</td></tr>
</table>

<u>CAUTION</u>: WHILE DRILLING OUT THE DAMAGED THREAD, BE CAREFUL NOT TO DAMAGE THE CASING. MAKE SURE THAT THE LENGTH OF THE DRILLING IS CORRECT. ANY DRILLING WHICH IS TOO SHORT WILL DAMAGE THE CASING.

(3) Drill the orifice for the bush using the specific drilling tool for the bush concerned.

NOTE: ***The drilling dimensions are specified in Refer to Figure 2, depending on the bush to be installed. The drilling and the crimping counterbore shall be carried out at the same time, using a multiple-diameter staged drill bit (Refer to Figure 3), if the length of the pilot hole allows this.***

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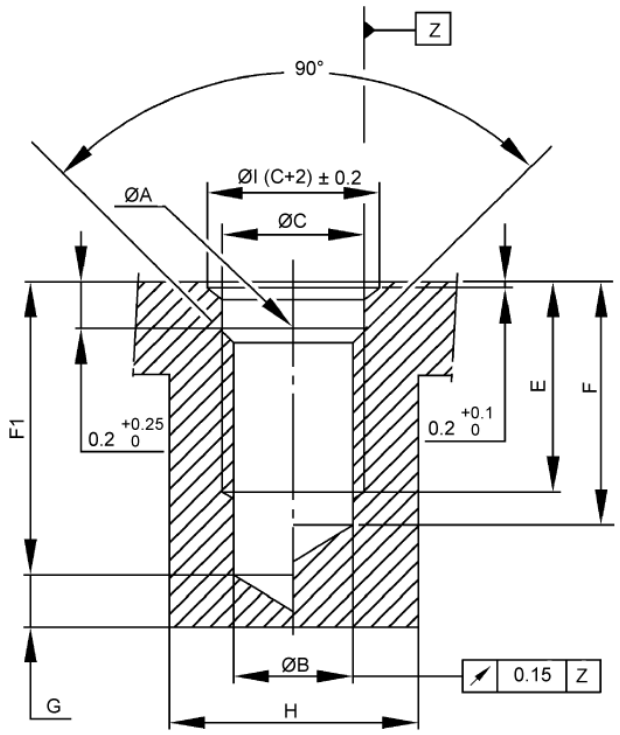


TURBOMECA Part Number	A : External Diameter x Pitch	B : Drilling Diameter Min. / Max.	C : Diameter of 1st counterbore +0.10 +0	D : Height of counterbore +0.25 +0	E : Total lenght of minithread threading	F : Min. total drilling length	F1 : Max. total drilling length	G : Min.	H : Min.	I* : Diameter 2nd counterbore +0.20
9520010874	M7 x 1.00	6.03 / 6.13	7.0	2.40	8.60	12.70	14.10	3.00	16.00	9.00
9520010875	M7 x 1.00	6.03 / 6.13	7.0	2.40	10.10	14.20	15.60	3.50	16.00	9.00
9520010876	M8 x 1.00	7.07 / 7.17	8.0	2.50	9.90	14.00	15.40	3.50	18.00	10.00
9520010877	M8 x 1.00	7.07 / 7.17	8.0	2.50	11.70	15.80	17.20	3.80	18.00	10.00
9520010878	M9 x 1.00	8.10 / 8.20	9.0	2.80	11.90	16.00	17.40	3.80	20.00	11.00
9520010879	M9 x 1.00	8.10 / 8.20	9.0	2.80	14.30	18.40	19.80	4.00	20.00	11.00

NOTE: The counterbore "I*" shall be drilled in order to prevent the swelling of the perifery of the orifice due to the crimping of the bush, its depth shall be:

$$0.2\ ^{+0.1}_{+0}$$

Dimensions of installation orifices
Figure 2

(4) Carry out the broaching of the orifice for the bush according to the failure resistance of the material

(a) For materials with R < 900 MPa, carry out the broaching using a specific broaching tool (Refer to Figure 3)

1 Loosen nut (2) so that face Y of the broach is in contact with the shoulder of body (3).

2 Engage the guide (5) in the pilot hole of the tapping.

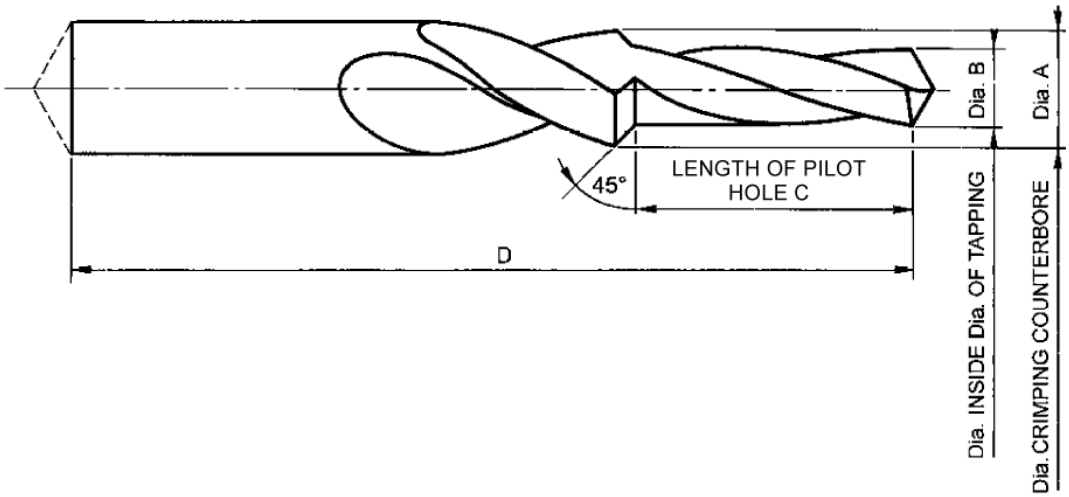
3 Maintain the body (3) against the face of the casing.

NOTE: ***The knife edges (4) shall be in contact with the face of the casing.***

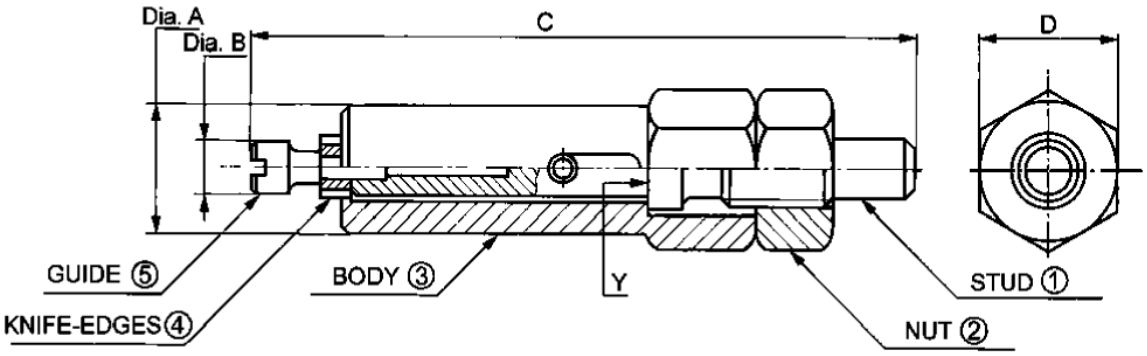
4 Apply pressure on the broach (1) until face Y is in contact with the shoulder of the body (3).

CAUTION: **HANDLE THE TOOL AND THE PART WITH CARE. DO NOT WITHDRAW THE BROACHING TOOL BY JERKING IT. THIS WOULD DAMAGE BOTH THE TOOL AND THE PART.**

5 Pull the knife edges (4) clear, by tightening the nut (2).



DRILLING TOOL



BROACHING TOOL FOR MATERIALS WITH A RESISTANCE R < 900 MPA

Figure 3

(b) For materials with R ≥ 900 MPa and for titanium alloys, carry out the broaching using the specific broaching tool (Refer to Figure 4)

1 Install the broaching tool in contact with face Y of the broaching tool.

NOTE: ***The broaching tool has a constant length, and correct installation does not pose any problem.***

2 Centre the counterbore to be broached in the axis of the machine.

3 Secure the part to be machined.

4 Drive the broaching tool at a speed of 230 rpm.

5 Bring the broaching tool into contact with the face of the part.

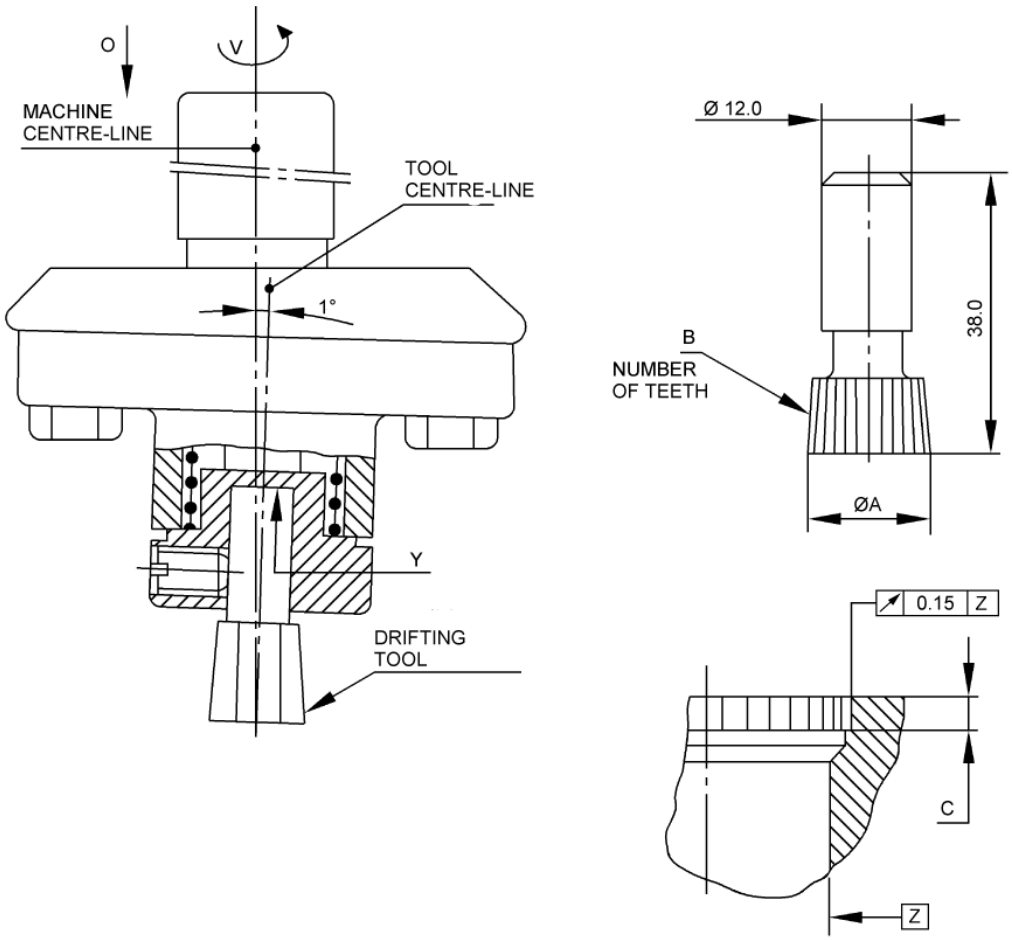
6 Lubricate the broaching tool with oil.

7 Engage the broaching tool in the counterbore to the depth specified in the figure (Refer to Figure 4), at a rate of 50 mm/min.

8 Withdraw the breaching tool.

9 Remove the components securing the part.

10 Eliminate the burrs.



Broaching tool for materials with a resistance R ≥ 900 MPa
Figure 4

(5) Tap the orifice for the bush

NOTE: ***Use standard taps for the tapping process. The first tap may mark the counterbore.***

(a) (Refer to table 4) for the tapping.

(b) Check that the taps engage correctly in the threads.

Table 4 :

Nominal diameter x Pitch		***7 x 1***	***8 x 1***	***9 x 1***
Flank diameter	Max.	6.445	7.445	9.445
	Min.	6.350	7.350	9.350
Inside diameter of drilling	Max.	6.130	7.130	9.130
	Min.	6.030	7.030	9.030

(6) Install the bush in its orifice

(a) Lubricate the bush and its orifice according to the material of the bush

1 Use engine oil to tighten the bush made of martensitic stainless steel Z5CNU14-04 into its orifice.

2 Use graphite grease to tighten the bush made of refractory steel EZ6NCT25 into its orifice.

(b) Tighten the bush into its orifice until the top of the bush is 0.40 to 0.6 mm under-flush with respect to the top of the orifice (Refer to Figure 5). Use the specific tightening tool (Refer to Figure 1).

(c) Crimp the bush by applying pressure or by striking it until the nylon stop comes into contact with the face of the casing. Use the specific crimping tool (Refer to Figure 5).

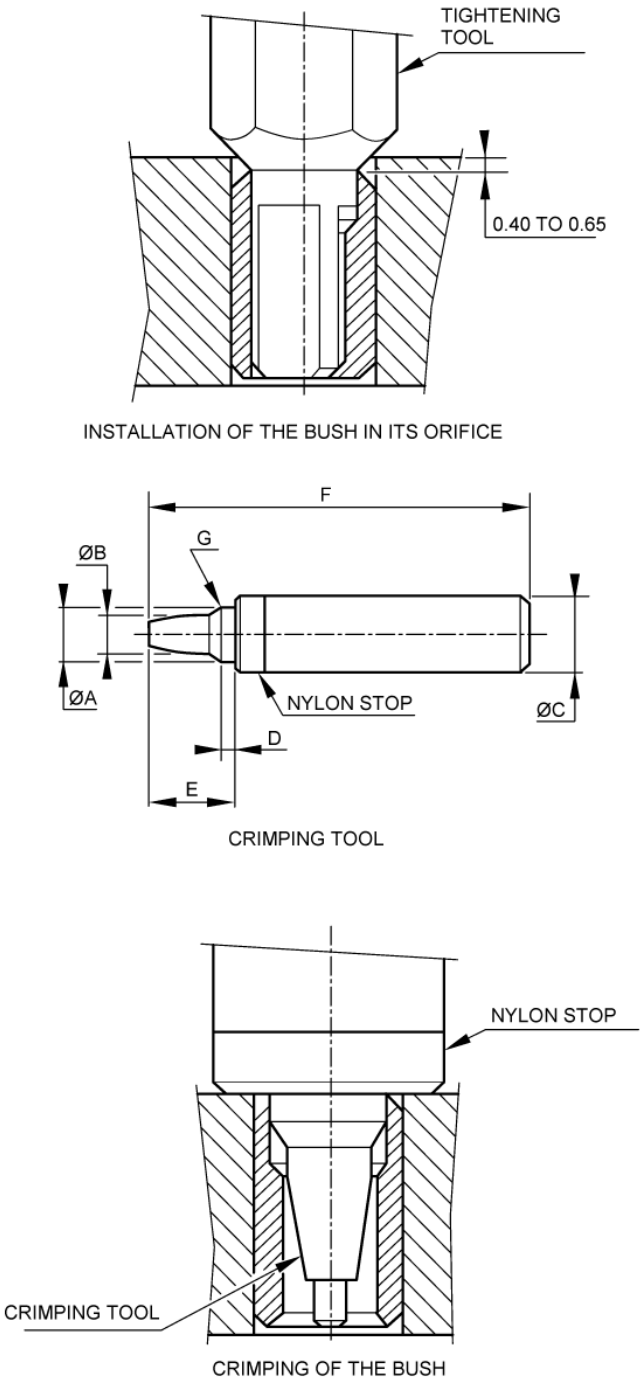

TIGHTENING TOOL
0.40 TO 0.65
INSTALLATION OF THE BUSH IN ITS ORIFICE
F
G
ØB
ØA
NYLON STOP
ØC
D
E
CRIMPING TOOL
NYLON STOP
CRIMPING TOOL
CRIMPING OF THE BUSH

Figure 5

C. Inspect the installation of the "ROSAN" type bush

(1) Carry out an inspection of the swaging

(a) Introduce the end G (GO) of the specific inspection tool inside the crimped part of the bush.

Table 5 : Inspection tool

Safran Helicopter Engines Part Number of "RO-SAN" type bushes	*Inspection tool*
9520010874	SRM-GSMD0508
9520010875	SRM-GSMD0508
9520010876	SRM-GSMD0610
9520010877	SRM-GSMD0610
9520010878	SRM-GSMD0710
9520010879	SRM-GSMD0710

(b) Make sure that the shoulder of the gauged part of the inspection tool is in contact with the face of the part (Refer to Figure 6).

(2) Inspect the position of the bush in its orifice

(a) Introduce the end N (NO GO) of the specific inspection tool inside the crimped part of the bush.

(b) Make sure that there is a clearance between the shoulder of the gauged part of the inspection tool and the face of the part (Refer to Figure 6).

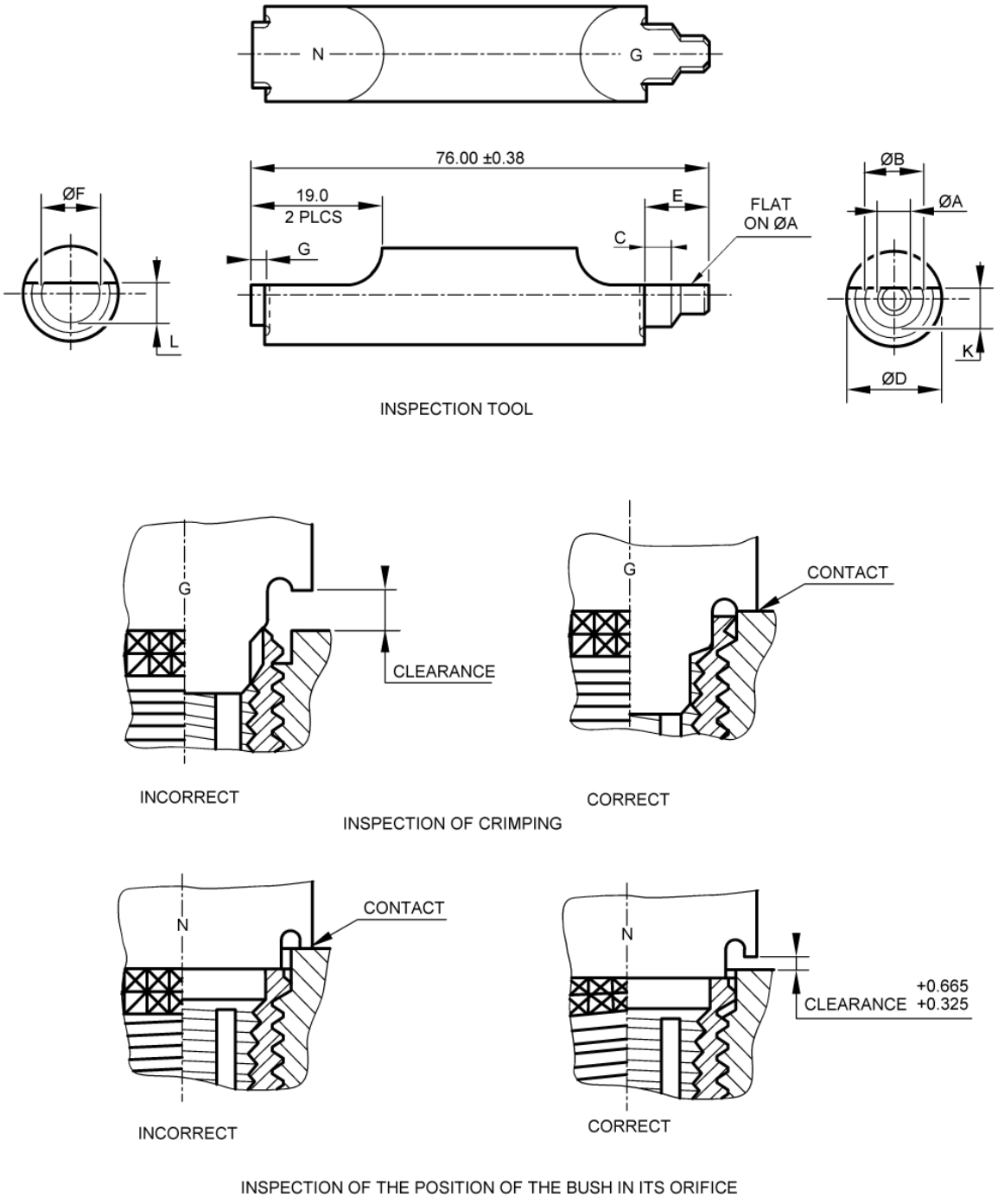

N
G
76.00 ±0.38
19.0
2 PLCS
ØF
G
L
E
C
FLAT
ON ØA
ØB
ØA
K
ØD
INSPECTION TOOL
G
CLEARANCE
INCORRECT
G
CONTACT
CORRECT
INSPECTION OF CRIMPING
N
CONTACT
INCORRECT
N
+0.665
CLEARANCE +0.325
CORRECT
INSPECTION OF THE POSITION OF THE BUSH IN ITS ORIFICE

Figure 6

(3) Carry out a visual inspection of the surface finish of the threading

(a) Make sure that there are no cracks in the threaded area of the bush.

NOTE: ***A crack, even if it is open, is acceptable on the height of the crimped section.***

TASK 70-11-00-940-805-A01

SECURING CLAMP
GENERAL

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Description	*Quantity*
shear	1

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Not applicable

2. TASKS / REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 70-01-00-940-801 / Standard practices - General.

3. PROCEDURE

Use this procedure to do the repair of the securing clamps of the equipment and accessories.

A. Dimensions of the clamps

Refer to Figure 1

Securing clamp	*Engine variants*	*Item of the clamp*	*Total length*	*Length between folding*
Pump and metering unit Starter	B-B1-C-C1-CPM-S1 B-B1-C-C1-CPM	(73-23-00-01-024) (72-61-00-01-254)	410 mm	360 mm

Securing clamp	*Engine variants*	*Item of the clamp*	*Total length*	*Length between folding*
Pump and metering unit	B-B1-B1A-C-C1-C2-C2CG-CPM-D-N-H-S1-S2	(73-23-00-01-024)	410 mm	360 mm
Starter	B-B1-B1A-C-C1-C2-C2CG-CPM-D-N-H	(72-61-00-01-254)		
Equipped clamp on the protection tube	B-B1-B1A-C-C1-C2-C2CG-CPM-S1-S2	(71-41-00-01-052)	430 mm	370 mm
	D-N-H	(71-51-00-01-250)		
	D-N-H	(71-51-00-01-300)		
Drain cluster on the protection tube	E	(71-71-00-01-420)	440 mm	380 mm
Outlet duct of the bleed valve	E	(75-31-00-01-062)	255 mm	210 mm

B. Preparation of the securing clamp

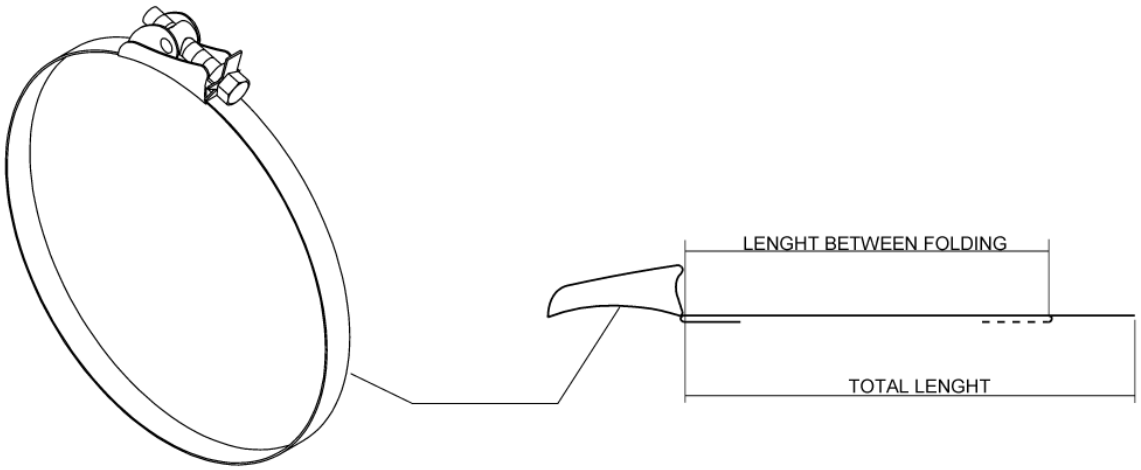
Refer to Figure 1

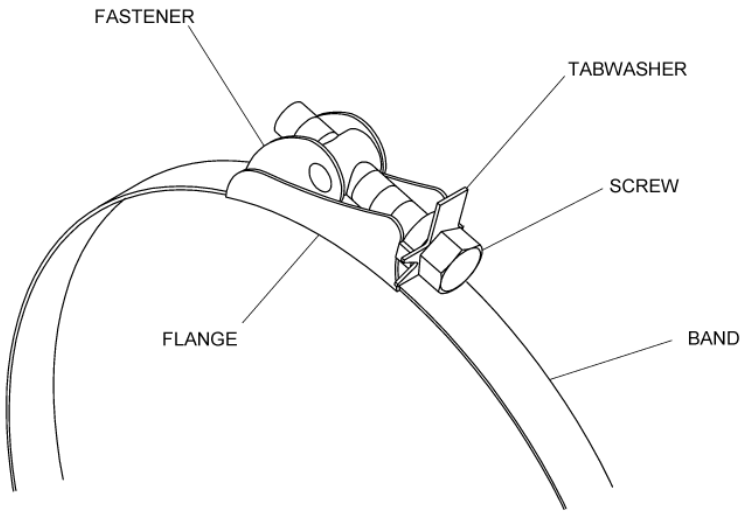
(1) Cut the clamp to the total length of the opposite fold.

(2) Remove burrs on the end of the band to remove the sharp edges.

(3) Fold the clamp back to the length between folding.

(4) Install the fastener.





Securing clamp
Figure 1

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TASK 70-30-00-940-801-A01

BEARINGS
GENERAL

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Description	*Quantity*
stylet	1
binocular magnifier (x6)	1
lint-free cloth	1

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Description	*Quantity*
synthetic oil O-147 (NATO symbol)	As required
vaseline (NATO symbol)	As required
ARDROX 5516	As required
EXXOL D 30	As required
HYSO 97/1	As required
IND 400	As required
anti-corrosion paper BRANOROST	As required

2. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned here after.

– Task 70-01-00-940-801 / Standard Practices - General.

3. GENERAL

This TASK defines theterminologyused for ball and roller bearings and also the necessary information for the inspection, removal/installation and storage of the ball and roller bearings.

CAUTION: USE ONLY THE TOOLS, EQUIPMENTS AND CONSUMMABLE PRODUCTS THAT ARE QUALIFIED BY SAFRAN HELICOPTER ENGINES. USE OF OTHER MEANS, EQUIPMENT OR REPLACEMENT PRODUCTS MUST BE RATIFIED ACCORDING TO THE SAFRAN HELICOPTER ENGINES PROCEDURES IN FORCE.

A. Terminology of ball or roller bearings

(1) General

(a) A bearing has two types of surface:

- Functional surfaces
- Non-functional surfaces.

(b) The functional surfaces include:

- Balls
- Rollers (except for the blend radii between the outer cylinder and the faces)
- Surfaces in contact with the balls or the rollers (bearing races, shoulders of rings from bearing to bearing)
- Cage centering parts
- Oil supply ducts.

(c) The non-functional surfaces include:

- All other bearing surfaces.

B. Visual inspection of ball or roller bearings

WARNING

DO NOT BREATHE OIL VAPORS. WORK IN A WELL-VENTILATED AREA. DO NOT ALLOW OIL TO REMAIN IN CONTACT WITH THE SKIN. USE RUBBER GLOVES AND SAFETY GOGGLES OR A FACE SHIELD. OIL CAN BE POISONOUS.

CAUTION: DO NOT HANDLE THE BEARINGS WITH BARE HANDS. HAND CONTACT WITH THE BEARINGS CAUSE OXIDATION ON BEARINGS. USE RUBBER GLOVES WHEN HANDLING BEARINGS.

CAUTION: HANDLE THE BEARINGS WITH CARE. AN IMPACT CAN CAUSE DAMAGE TO THE BEARING.

CAUTION: USE TOOLS, EQUIPMENT AND CONSUMABLE PRODUCTS THAT ARE APPROVED BY SAFRAN HELICOPTER ENGINES. THE USE OF OTHER MEANS AND PRODUCTS MUST BE APPROVED BY SAFRAN HELICOPTER ENGINES.

(1) Preparations for the visual inspection of ball or roller bearings

(a) Degrease the ball or roller bearing (Refer to Task 70-01-00-940-801).

CAUTION: AVOID MAGNETIZING THE BEARINGS WHEN MOVING THEM AND DURING THE INSPECTION. DURING THE OPERATION OF THE BEARING, ANY METAL PARTICLES CLINGING TO THE BEARING ARE LIABLE TO CAUSE DENTS.

CAUTION: DO NOT MIX THE COMPONENTS OF ONE BEARING WITH THOSE OF ANOTHER BEARING. THE EXCHANGE OF PARTS MAY CAUSE DAMAGE TO BEARINGS.

(b) If the bearing can be disassembled, remove each of the components of the bearing.

(2) Visual inspection of ball and roller bearings

(a) Inspect the bearing components using a binocular magnifier (x6).

(b) Replace the bearing in case of :

- Scores
- Pittings
- Flaking
- Stripping
- Wear
- Distortion
- Crack.

NOTE: ***Do a dye penetrant inspection to check the presence of cracks if there is a doubt. For application, refer to the instructions of use given by the product manufacturer.***

C. Removal/installation of the bearings

The information (tolerances, tools, consumables, etc.) in the relevant Maintenance Manual Tasks takes precedence over the information below.

(1) General information on removal

(a) The use of a press or an extractor that operates under continuous pressure distributed over the bearing races is the preferred method of removal (push-rod unsuitable exerting a differential force, etc.).

(b) The extraction force should not act on the balls or rollers of the bearing.

(c) Never press on the ring opposite the ring being extracted.

(d) Use standard extractors or tools qualified by the Safran Helicopter Engines according to the specifications required for the corresponding tasks.

(2) Precautions to be taken before installation

(a) Make sure that the warranty time period marked on the packaging has not expired. This is to be checked by the assembler before installation. All bearings with a warranty time-period expiring the following month shall be returned to the Manufacturers to be reconditioned.

(b) Before installation and so as to prevent the introduction of dust, check the cleanliness of the shaft components and bearing housings. Should one of the components be dirty, clean it with a clean, dry and lint-free cloth.

(c) Unpack the bearings just before use. Do not unpack them too early so as to avoid possible contamination. Do not clean them or degrease them after unpacking. When, for some reason, the bearing remains unpackaged for more than 24 hours, coat it with synthetic oil, O-147 (NATO symbol) or equivalent oil and protect it against dust.

(3) General information on installation

CAUTION: HANDLE THE BEARINGS WITH CARE. AN IMPACT CAN CAUSE DAMAGE TO THE BEARING.

CAUTION: USE TOOLS, EQUIPMENT AND CONSUMABLE PRODUCTS THAT ARE APPROVED BY SAFRAN HELICOPTER ENGINES. THE USE OF OTHER MEANS AND PRODUCTS MUST BE APPROVED BY SAFRAN HELICOPTER ENGINES.

(a) The bearings must be unpacked only at the time of assembly on the machine.It is essential that the information concerning the bearings is clearly marked on the protection packaging.

1 The information provided on the package must be as follows:

- Label of the manufacturer
- manufacturer P/N,
- Safran Helicopter Engines part number
- Date of packaging
- date of end of packaging warranty,
- S/N or S/N of the paired assembly.

All bearings with a warranty time-period expiring the following month shall be returned to the Manufacturers to be reconditioned.

(b) Do not use the “drift”.

(c) Shrink installation (cooling in liquid nitrogen or any other cooling method) is strictly forbidden.

(d) If possible, the bearing identification marking must remain visible and legible without having to completely disassemble the bearing.

(e) Do not identify bearings with a marking different from the original one.

(f) To hold the bearing rollers in place during installation, use Vaseline S-743 (NATO symbol). A sufficient quantity of Vaseline must be applied to hold the rollers in place in their cage, but too much Vaseline may hinder the circulation of oil.

(g) The Vaseline S-743 (NATO symbol) must be applied using a flexible spreader. Using a paintbrush is prohibited. The Vaseline S-743 (NATO symbol) must be packaged in tubes.

(h) The oil must be applied using a pipette or by spraying (spray can). Do not use a paintbrush to apply oil.

(i) Handle bearings with clean gloves.

(j) Clean the tools (fitting tool,….) before use.

(k) The ball or roller bearings must never transmit the fitting force.

(l) Never press on the ring opposite the ring being fitted.

(m) When installing the roller bearings, take roller gravity into account to fit the bearings without impact.

(n) When the shaft line roller bearings are being assembled, and if possible, the shaft will be rotated when fitting the bearings so as to avoid scoring the races and ease the operation.

(o) During the complete installation of the “separate” bearings, there may be interference between the rolling item and the ring which comes into contact with it. This installation phase may be difficult for some applications and may require the use of special tools.

(p) Installation of bearings very often requires a specific tool to control the fitting operation (progressive fitting without any shocks on the rotating parts) which may subsequently lead to deterioration of the bearings.

The installation of the bearings can be carried out:

1 Expansion installation of bearing carried out by heating the receiving part to a temperature between 80°C and 100°C. This method allows the installation of bearings without strain after loosening.

2 Expansion installation of bearing (oil bath, heating table, induction heating, oven…) at a temperature ranging between 80°C and 100°C. This method allows the installation of bearings without strain after loosening.

3 This method allows a gradual fitting of the bearing without impact on the rolling items with a bearing fitting tool and a press.

(4) Precautions after installation

(a) Check the free rotation of the bearing.

(b) Carefully remove all excess Vaseline.

(c) Apply synthetic oil O-147 (NATO symbol) or equivalent oil on the bearings.

(d) Protect bearings against contamination (dust, etc.) using protectors provided for this purpose.

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TASK 70-35-00-940-801-A01

THREAD INSERTS GENERAL

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Description	*Quantity*
thread insert extractor (type 01803)	1
thread insert installation tool (type 015001, 015002, 015004)	1
tang breaker (type 01586)	1
inspection stamp (type 01473)	1
installation tool for thread inserts with no tang	1

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Description	*Quantity*
MOLYKOTE DX paste	As required
vaseline BRISAL-OX	As required

2. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned here after.

– Task 70-01-00-940-801 / Standard Practices - General
– Task 71-00-02-940-801 / Fuel, engine lubricant, special products - General.

3. GENERAL

A. Overview

(1) There are 2 types of thread inserts:

(a) Standard thread insert

An ordinary thread insert is an helical insert made of a wire with a diamond section, that provides a standard thread, when placed in a threaded hole in an appropriate dimension.

(b) Self-locking thread insert

A self-locking thread-insert is similar to the ordinary thread insert, apart from one or more turns which have a polygonal form, to insure the locking of the screws or any other outside threaded parts.

B. Removal of a thread insert

Refer to Figure 1

(1) Thread insert replacement:

- The effective tightening torque for standard thread inserts is out of tolerance
- The indicated tightening torque or locking torque for self-locking thread inserts is out of tolerance
- A screw is stuck in the thread insert
- The thread insert is not in the correct position or overhangs the installation surface
- One or more thread insert turns are damaged.

(2) Removal procedure for thread inserts:

(a) Place the thread insert extractor (type 01803) on the turns of thread insert, lightly tap with a hammer and unscrew it counter-clockwise.

(b) Remove the thread insert.

(c) Discard all the removed thread inserts.

C. Installation of a thread insert

(1) Preparation of installation of thread inserts

CAUTION: DO NOT USE CHLORINATED SOLVENT ON TITANIUM ALLOYS.

CAUTION: MAKE SURE THAT NO CHLORINATED SOLVENT COMES INTO CONTACT WITH TITANIUM ALLOY SURFACES.

(a) Cleaning of threaded hole

1 Clean completely the threaded hole.

2 Eliminate all the grease residues in the tapped holes.

3 If no electrical continuity is required, apply the sealing compound MOLYKOTE DX paste.

(b) Preparation of thread inserts

1 If electrical continuity is required by the thread insert :

- Strip the varnish from the thread insert using asolventand degrease it
- Apply vaseline BRISAL-OX just before installing the thread inserts.

(2) Installation of thread inserts:

(a) Thread inserts with tang

Refer to Figure 2

1 Install the thread insert in the support of the thread insert installation tool (type 015001, 015002, 015004), with the tang of the thread turned towards the nose of the support.

2 Screw the thread insert in the nose of the thread insert installation tool (type 015001, 015002, 015004), taking that it does not protrudes the tool.

3 Adjust the adjustable stop of the thread insert installation tool (type 015001, 015002, 015004), for the last turn of the thread, once mounted, to be 0,5 to 1 pitch minimum below the surface of the part.

CAUTION: DO THIS OPERATION SLOWLY AND SMOOTHY UNTIL THE ADJUSTABLE STOP IS AT THE END OF TRAVEL. THIS OPERATION IS DIFFICULT, A NOT CENTERED THREAD MAY DAMAGE THE PART.

4 Center the tool on the tapping and operate the handle.

The thread insert is screwed in the tapping after it has been shrunk when going through the nose.

5 Loosen the pin of the thread insert installation tool (type 015001, 015002, 015004), with the handle.

6 Break the tang with the mechanical breaker tool made of a mandrel and a striking pin.

7 Collect the broken part with a magnet or a proper tool.

(b) Thread inserts with no tang

Refer to Figure 3

1 Insert the thread insert with no tang in the nose of the installation tool for thread inserts with no tang.

2 Tighten the thread insert with no tang fully in the installation tool for thread inserts with no tang.

3 Lock the notch of the thread insert with no tang in the installation tool for thread inserts with no tang.

4 Adjust the thread insert with no tang, installed in the installation tool for thread inserts with no tang, to the center on the applicable tapping.

5 Tighten it until the last turn of the thread, when installed, is 0.5 to 1 pitch below the upper surface of the part.

6 Loosen and remove the installation tool for thread inserts with no tang.

(3) Examination of assembled thread inserts

(a) Visually check the inside of the thread insert.

NOTE: Illuminate the bottom of the threaded hole to inspect it.

(b) Make sure that the thread insert is recessed from 0,5 to 1 pitch in relation to face.

(c) Visually make sure that you broke and collected the tang (if the thread insert had a tang).

(d) Check of locking torque:

1 Screw a screw into the thread insert.

2 Make sure that the frictional resistance stops the screw from being screwed in further by hand when it connects with the locking device.

D. Removal of hardware from the hot section assembly

Coat all the nuts and screws assembled on the hot sections with penetrating lubricant to facilitate removal.

(1) Procedure

(a) Apply the penetrant product with a brush or syringe to all the hot section assembly screws, nuts or bolts.

(b) Allow the product to penetrate for 15 to 20 minutes.

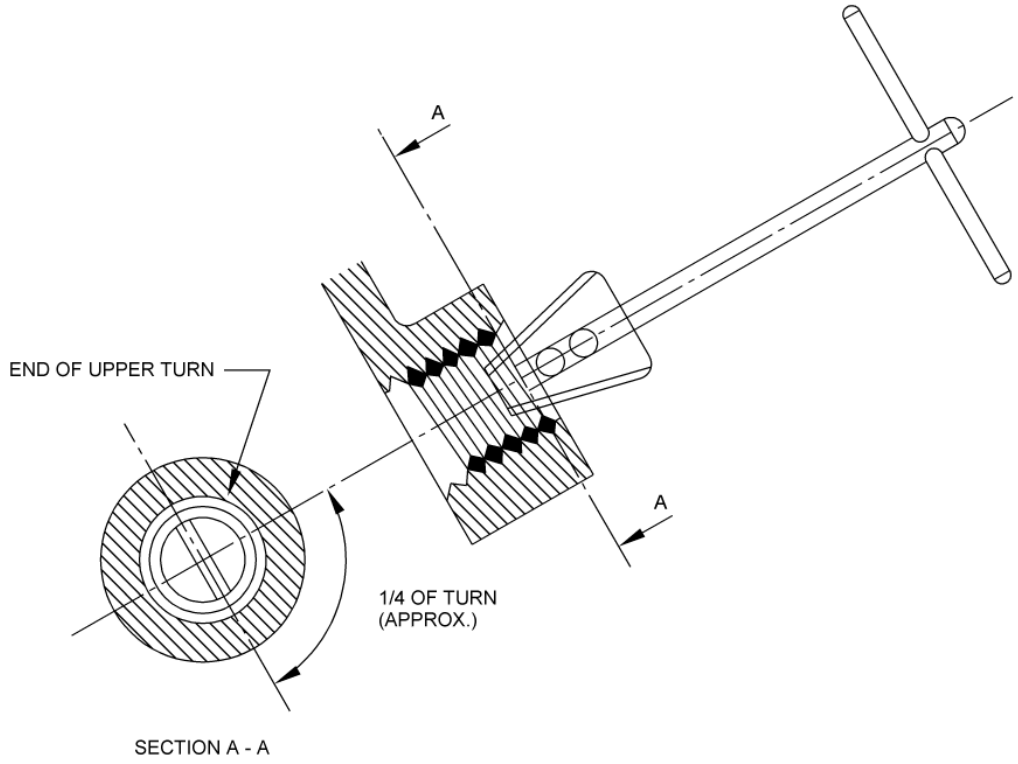
NOTE: ***Repeat the procedure if the hardware continues to resist.***

E. Re-use of nuts and screws

After each disassembly, examine the threadings and calibrated parts of bolts.

Discard all nuts and screws with one of the following anomalies:

– Distortion due to necking down, bending or twisting
– Stripping of threads
– Scores on the smooth, calibrated part
– Head distorted or crushed
– Wear causing dimensions to be out of tolerance
– Damaged protection
– Corrosion pittings.



Extraction of a thread insert
Figure 1

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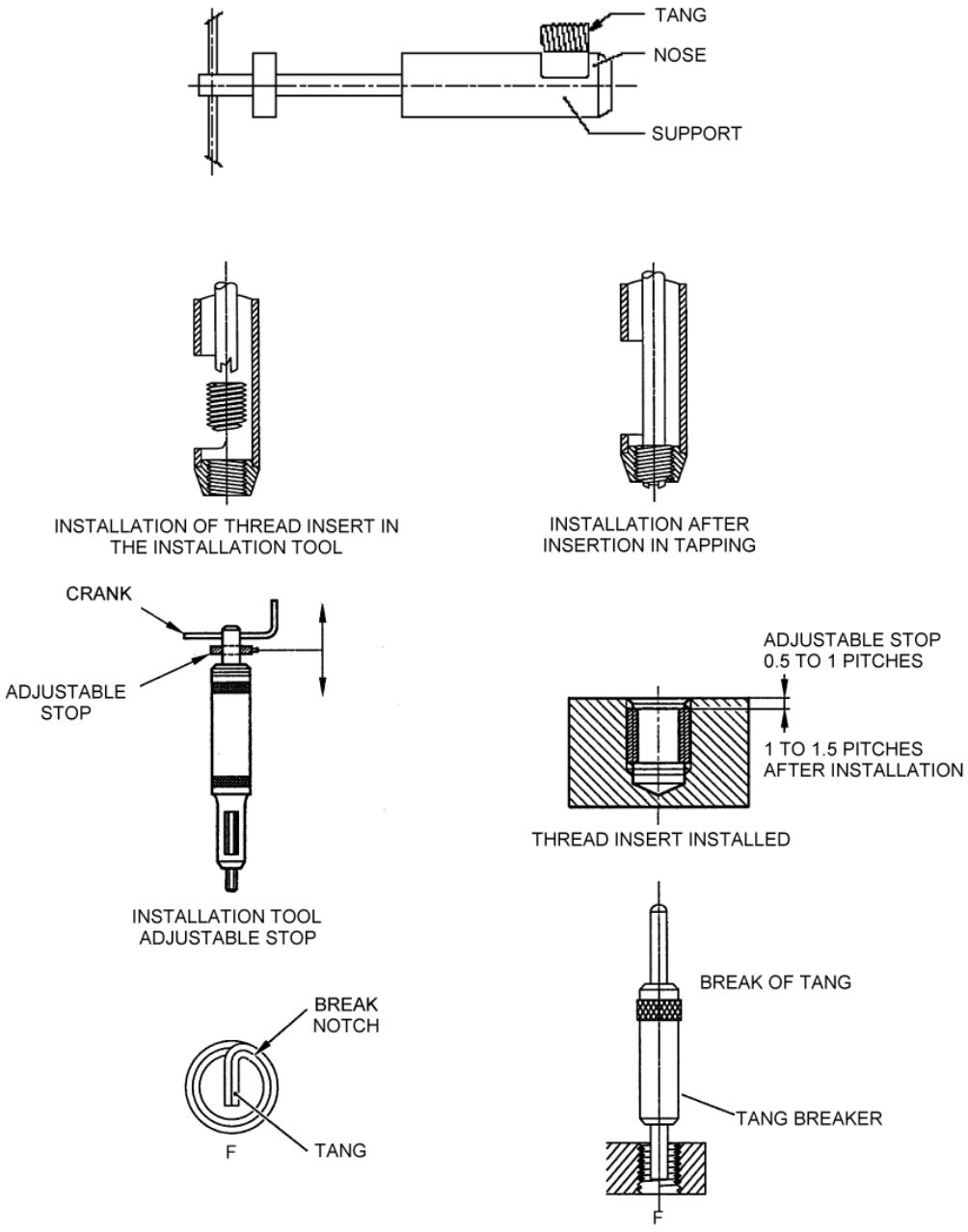

Thread inserts with tang - Installation
Figure 2

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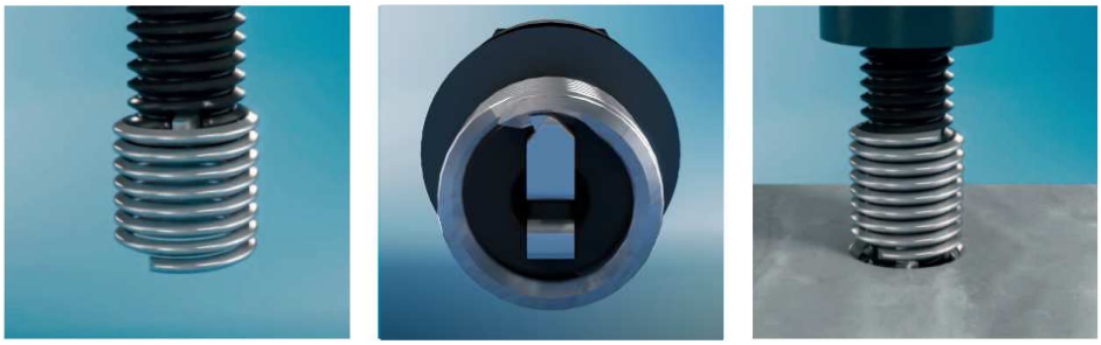
Thread insert with no tang



Insertion | Locking | Adjustment to the center

Tightening | Loosening | Recessed by 0.5 to 1 pitch

Thread inserts with no tang - Installation
Figure 3

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TASK 70-38-00-940-801-A01

CHROMATING
GENERAL

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Not applicable

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Description	*Quantity*
ALODINE 1200	As required
ALODINE 1200S	As required
ALODINE 1132	As required

2. TASKS / REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned here after.

– Task 70-01-00-940-801/Standard Practices - General.

3. GENERAL

A. Preparation for chromating

Lightly sand the damaged area.

CAUTION: TAKE ALL THE NECESSARY PRECAUTION TO PREVENT THE CONTAMINATION OF A SYSTEM OR AN ASSEMBLY IF THIS PROCEDURE IS APPLIED TO A SECTION OF AN ASSEMBLED EQUIPMENT.

B. Chromating procedure

(1) Protect the part by degreasing with a cloth soaked in solvent (Refer to Task 70-01-00-940-801).

(2) Dry the part with hot air (60°C max) (140°F).

(3) Apply:

(a) One of the following preparations using a pad or by immersion for 1 min ± 15 sec:

- ALODINE 1200S (concentration 7.5 g/l),
- ALODINE 1200 (concentration 22 g/l).

NOTE: ***The concentration of the bath must be stabilized for approximately 24 hours or warm the bath for few minutes at 50°C (122°F).***

(b) ALODINE 1132 with a felt tip.

(4) Apply continuously until an iridescent or golden yellow color shows.

(5) Rinse the protected part with cold, running water.

(6) Rinse with warm water (60°C maximum).

(7) Dry the part with hot air (60°C max) (140°F).

TASK 70-40-01-940-801-A01

SEALS AND SEALING RINGS GENERAL

1. TASKS / REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

- Task 70-40-01-940-802/Preformed packings - General
- Task 70-40-01-940-803/Magnetic seals - General
- Task 70-40-01-940-804/SEALOL seals - General
- Task 70-40-01-940-805/"CROSS" type sealing segment - General
- Task 70-40-01-940-806/PAULSTRA sealing rings - General
- Task 70-40-01-940-807/Corrujoints - General.

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TASK 70-40-01-940-802-A01

PREFORMED PACKINGS GENERAL

1. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned here after.

– Task 70-01-00-940-801 / Standard Practices - General
– Task 71-00-02-940-801 / Fuel, engine lubricant, special products - General.

2. GENERAL

This task provides the required information for the installation and storage of the preformed packings.

CAUTION: SYSTEMATICALLY DISCARD ALL PREFORMED PACKINGS FROM A REMOVED COMPONENT. REUSING A PREFORMED PACKING CAUSES THE DAMAGE OF THE PART.

CAUTION: CAREFULLY HANDLE THE PREFORMED PACKINGS TO AVOID ANY DAMAGE. ANY STRETCH OR TORSION MAY DAMAGE THE PREFORMED PACKINGS.

CAUTION: ANY PREFORMED PACKING WITH VOID LIMIT DATE OR THOSE WITH UNKNOWN CURING DATE MUST AUTOMATICALLY BE DISCARDED.

CAUTION: ONLY USE TOOLS, EQUIPMENT AND CONSUMABLE PRODUCTS QUALIFIED BY SAFRAN HELICOPTER ENGINES. THE USE OF OTHER MEANS, EQUIPMENT OR SUBSTITUTES MUST ABSOLUTELY BE APPROVED ACCORDING TO THE SAFRAN HELICOPTER ENGINES PROCEDURES IN FORCE.

A. Preparations for the installation of the preformed packing

(1) Identify the preformed packing to be installed using the marking

(a) On the storage packaging

1 Manufacturer

2 Number of preformed packings

3 Batch number, Order number, Mixture number

4 Inspection stamp

5 SAFRAN HELICOPTER ENGINES part number

Examples:

– PART: 9794080203
– P/N.: 9794410236

6 Preformed packing material (identified respectively by 2 digits, 1 letter and 1 digit)

Examples: 21A7 or 50D7 or 61D6 or 64C8, etc.,

This material identification group is either at the end of the MATERIAL line, at the start of the QUALITY line or alone on the QUALITY line.

Examples:

– MATERIAL 7DF710/64C8
– QUALITY 64C880V013A
– QUALITY 64C8

7 Curing or manufacturing date (identified by the quarter number, the letter Q for Quarter and 2 digits for the year).

Examples:

CURING DATE 2T03 (Q2 2003) or CURING DATE 1T04 (Q1 2004).

(2) Do a visual inspection of the preformed packing

Discard all the packings with anomaly.

NOTE: ***After inspection of their condition, it is possible to re-use the preformed packings of the magnetic plugs removed several times between two scheduled inspections.***

B. Installation of the preformed packing

(1) Installation of the preformed packing with the seal-press tool (Refer to Figure 1).

(a) Make sure that the housing of the preformed packing does not have a shock or a burr.

(b) Make sure that the edges of the housing are not sharp.

(c) Lubricate the preformed packing and the seal-press with pure mineral Vaseline or approved engine oil.

NOTE: ***The Turbo 10 Assembly fluid lubricant can be used instead of the mineral Vaseline AIR 3565.***

NOTE: ***The agent must be applied with syringes, brushes without bristles or with the packaging provided by the manufacturer.***

(d) Install the preformed packing on the seal-press.

CAUTION: **NEVER MAKE A PREFORMED PACKING TURN ON THREADS OR SHARP EDGES. THIS OPERATION MAY DAMAGE THE PREFORMED PACKING.**

(e) Install the seal-press tool fitted with the preformed packing on the threads and sharp edges of the part.

CAUTION: **DO NOT TWIST THE PREFORMED PACKING DURING THE ASSEMBLY. THIS OPERATION MAY DAMAGE THE PREFORMED PACKING.**

(f) Carefully slide the preformed packing on the seal-press.

(g) Install the preformed packing in its housing.

(h) Remove the seal-press.

NOTE: ***Make sure that the packing is correctly installed in its housing and that it is not twisted, broken or damaged.***

(i) Make sure that the preformed packing is correctly installed:

– The preformed packing must be correctly installed in its housing
– The preformed packing must be free of cuttings or material pick-up.

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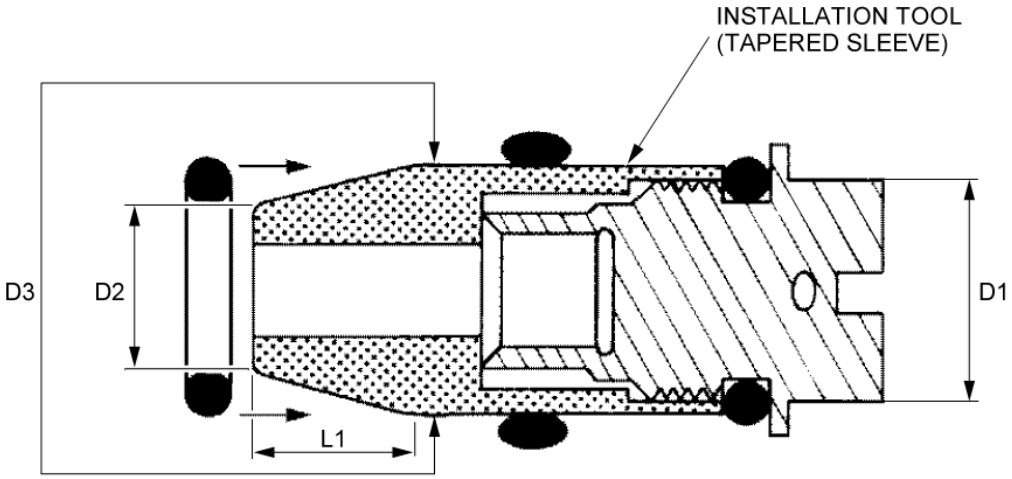
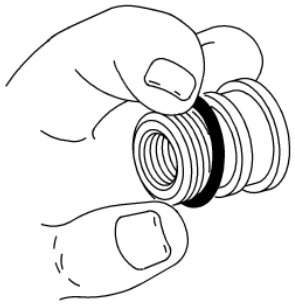


D1: DIAMETER OF PART + 1 mm
D2: DIAMETER SLIGHTLY SMALLER THAN INSIDE DIA. OF PREFORMED PACKING
D3: INSIDE DIAMETER OF PREFORMED PACKING + 2mm
L1 =D3
MATERIAL: 2017A (AU4G)



PROHIBITED INSTALLATION

Installation of preformed packing
Figure 1

(2) Installation of a preformed packing without the seal-press tool

(a) Make sure that the housing of the preformed packing does not have a shock or a burr.

(b) Make sure that the edges of the housing are not sharp.

(c) Lubricate the preformed packing and the cylindrical area over which it is to slide with pure mineral Vaseline or approved engine oil.

NOTE: ***The Turbo 10 Assembly fluid lubricant can be used instead of the mineral Vaseline AIR 3565.***

CAUTION: DO NOT TWIST THE PREFORMED PACKING DURING THE ASSEMBLY. THIS OPERATION MAY DAMAGE THE PREFORMED PACKING.

(d) Carefully let the preformed packing slide in its housing.

(e) Make sure that the preformed packing is correctly installed:

– The preformed packing must be correctly installed in its housing
– The preformed packing must be free of cuttings or material pick-up.

C. Storage of preformed packings

(1) General

(a) Put the preformed packing in its original packaging.

(b) Store it at a temperature of between 5°C and 25°C (41°F and 77°F).

(c) Keep a rate of relative hygrometry between 45% and 70%.

(d) Avoid any contact with solvents, oils and greases.

(e) Do not store the preformed packing:

– in direct sunlight or under strong artificial light,
– in a room containing ozone generating devices emitting harmful vapors.

(2) Determining storage time

The material and manufacturing date written on the packaging can be used to determine the storage expiry date.

The maximum storage time is the time, calculated from the manufacturing date, during which a material or a product stored in well defined conditions, keep its properties and is covered by the manufacturer's warranty.

Table 1 : Relation between material quality/storage time

Service life group	*Elastomer category*	*Material quality*	*Normal maximum storage time*
II	Nitrile-butadiene, Acrylic, Polyurethane	20A - 20B - 21A - 21B-23B - 24B	6 years
III	Hydrogenated nitrile, Ethylene-Propylene	26B - 26C - 31B - 32A - 41B - 42B	8 years
IV	Silicone, Fluorosilicone	50D - 51A - 52D - 53D - 54D - 61D - 63D	10 years
V	Fluorocarbon, Halogenocarbon	60C - 62A - 64C - 65C - 68B	15 years

Example: 1 QUALITY 21A preformed packing (service life group II) CURING DATE. 2T03 was manufactured in Quarter 2, 2003 and must be used before Quarter 2, 2009.

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TASK 70-40-01-940-803-A01

MAGNETIC SEALS GENERAL

1. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 70-01-00-940-801 / Standard practices - General.

2. GENERAL

This TASK defines the requirements and the optimum conditions for installing magnetic seals as used on Safran Helicopter Engines engines.

This chapter is applicable to all assemblies which comprise facial contact dynamic sealing liners, i.e. those which isolate enclosures whose interfaces comprise rotating parts and fixed parts.

The ambient environments of the enclosures to be isolated can be:

– Air + oil on one side and Air on the other (mainly drive shafts with an interface with the outside. Example: power drive),
– Fuel on one side and Air on the other (Example: sealing of NFT flyweight).

CAUTION: USE ONLY THE TOOLS, EQUIPMENTS AND CONSUMABLE PRODUCTS THAT ARE QUALIFIED BY SAFRAN HELICOPTER ENGINES. USE OF OTHER MEANS, EQUIPMENT OR REPLACEMENT PRODUCTS MUST BE RATIFIED ACCORDING TO THE SAFRAN HELICOPTER ENGINES PROCEDURES IN FORCE.

A. Terminology - Definition

(1) Sealing liner:

All the static and rotating parts which provide the sealing function.

(2) Carbon ring:

Friction ring connected either to the rotating part or to the fixed part.

(3) Friction ring:

Steel ring against which the carbon ring rubs. The friction ring is connected either to the rotating part or to the fixed part.

(4) Floating bushing:

Radial sealing comprising a complete carbon ring held in a steel strap. The carbon ring positioned around the shaft to be sealed with a clearance is free of radial movement within certain limits.

(5) Facial sealing:

Sealing provided by the contact of two surfaces perpendicular to the rotation axis. One of the faces is connected to the rotating part, and the other is connected to the fixed part.

(6) Radial sealing:

Sealing performed between two cylindrical surfaces. One of the faces is connected to the rotating part, and the other is connected to the fixed part.

(7) Leakage:

Flow rate of fluid running through the sealing liner.

(8) Qualification of a leakage:

Criteria and means implemented (qualitative and quantitative) used to identify, assess and determine the occurrence of a leak.

(9) Primary sealing surface:

Surface demarcated by the contact area between the mobile part and the fixed part of the seal. The acceptance criteria for this area are the most critical.

(10) Secondary sealing surface:

Bore, diameter, groove where a preformed packing is positioned. Also, remaining surface on either side of the primary surface.

B. Sealing surfaces of the magnetic seals

Refer to Figure 1

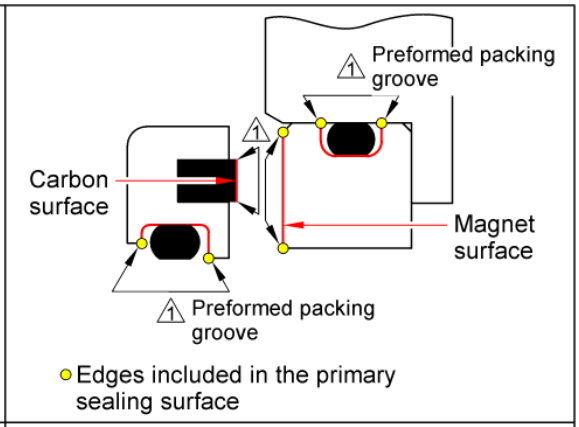
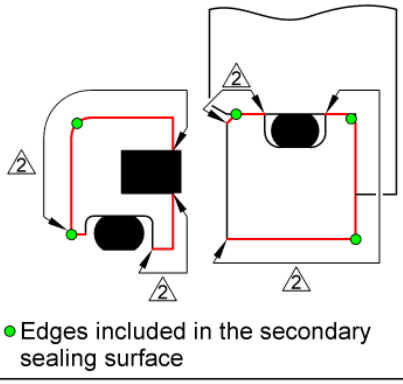
WARNING

WORK IN A SUITABLE AND WELL-VENTILATED AREA. DO NOT ALLOW ENGINE OILS TO REMAIN IN CONTACT WITH THE SKIN. PROTECT THE HANDS WITH A SYNTHETIC RUBBER GLOVES AND THE FACE WITH A SCREEN OR GOGGLES. ENGINE OILS CAN BE POISONOUS PRODUCTS.

CAUTION: MAGNETIC SEALS MUST BE UNPACKED AT THE LAST MOMENT BEFORE INSTALLATION, IN ORDER TO AVOID DUST CONTAMINATION.

CAUTION: MAGNETIC SEALS MUST BE INSTALLED IN A CLEAN ROOM. ANY DUST IN A MAGNETIC SEAL CAN DETERIORATE THE SEALING.

CAUTION: USE ONLY THE TOOLS, EQUIPMENTS AND CONSUMABLE PRODUCTS THAT ARE QUALIFIED BY SAFRAN HELICOPTER ENGINES. USE OF OTHER MEANS, EQUIPMENT OR REPLACEMENT PRODUCTS MUST BE RATIFIED ACCORDING TO THE SAFRAN HELICOPTER ENGINES PROCEDURES IN FORCE.

FUNCTIONAL FACE (PRIMARY SEALING SURFACE)	
NON-FUNCTIONAL FACE (SECONDARY SEALING SURFACE)	

Sealing surfaces of the magnetic seals
Figure 1

C. Assembly recommendations common to all types of seal

(1) General cleanness precautions

The seal must remain in its package until the time when it is installed.

Cleanness is an essential factor in the correct operation of facial contact seals. It is therefore necessary to make sure, before assembly, that there is no dust and that there are no foreign particles on the friction faces, and generally speaking on any of the visible parts of the seal.

Cleaning shall be carried out, before separating the two parts of the seal, with cellulose paper or a clean cloth, using a light SRB 13 solvent or equivalent (Refer to Task 70-01-00-940-801).

Before installing the seal, clean the recesses and make sure that the lead-in chamfers are free from all burrs.

Separate the two parts of the seal before installation, without allowing them to slip in order to prevent damage to the carbon face.

(2) Inspection of the functional faces of the magnetic seals, Refer to Figure 2 , Figure 3 , Figure 4

Type of damage	Magnetic surface	Carbon surface	Preformed packing recess
Scratches	Not permitted if perceptible with a scribe of Ø 0.635 mm (0.025 in) (1)	Not permitted if visible to the naked eye	Not permitted if perceptible with a scribe of Ø 0.635 mm (0.025 in) (1)
Chips	maximum 3: length ≤ 1 mm and height ≤ 0.5 mm	Not permitted	Not permitted
Chips on edge	maximum 3: length ≤ 1 mm and height ≤ 0.5 mm	Not permitted	maximum 3: length ≤ 1 mm and height ≤ 0.5 mm
Porosity	maximum 2 (minimum distance of 2 mm between them) if Ø < 0.3 mm		No limit if Ø < 0.3 mm
Cracks	Not permitted		
Corrosion	Not permitted		

(1) Safran Helicopter Engines recommends that you use the 55-1750 - 25 mil Moody Tools scribe.

Scribes with dimensions between 0.6 mm and 0.7 mm are also permitted.

(a) Examples of permitted damage:

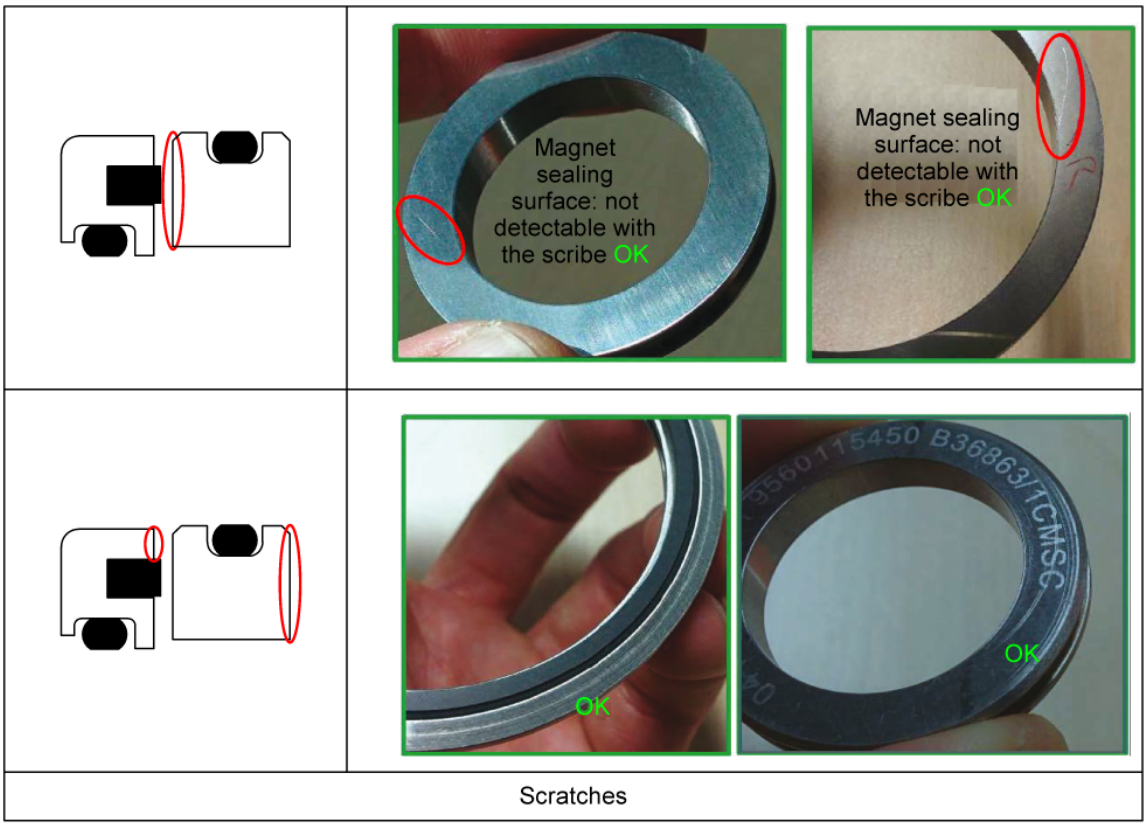
Figure 2: black mark on the rear face of the magnetic ring.

Figure 3: porosities.

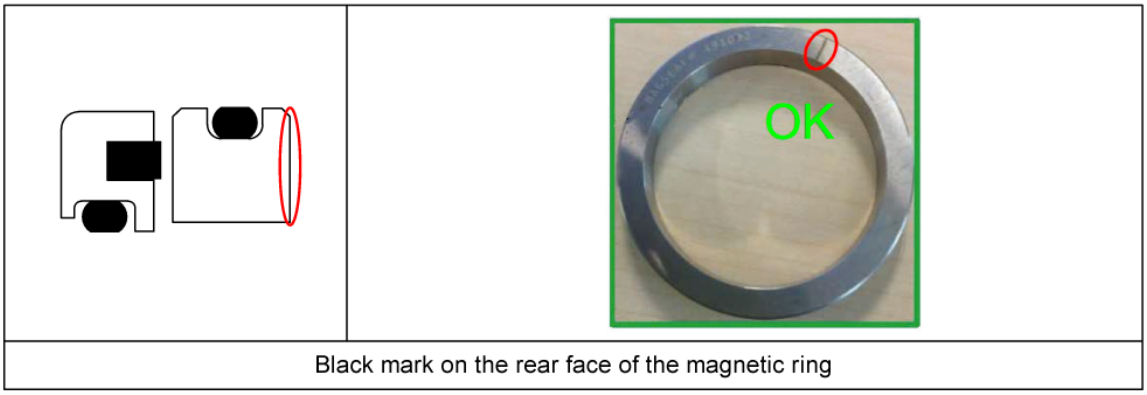
(b) Examples of NON-permitted damage:

Figure 4: scratches, chips.

Examples of permitted damage:



Scratches



Black mark on the rear face of the magnetic ring

Examples of permitted damage: black mark on the rear face of the magnetic ring
Figure 2

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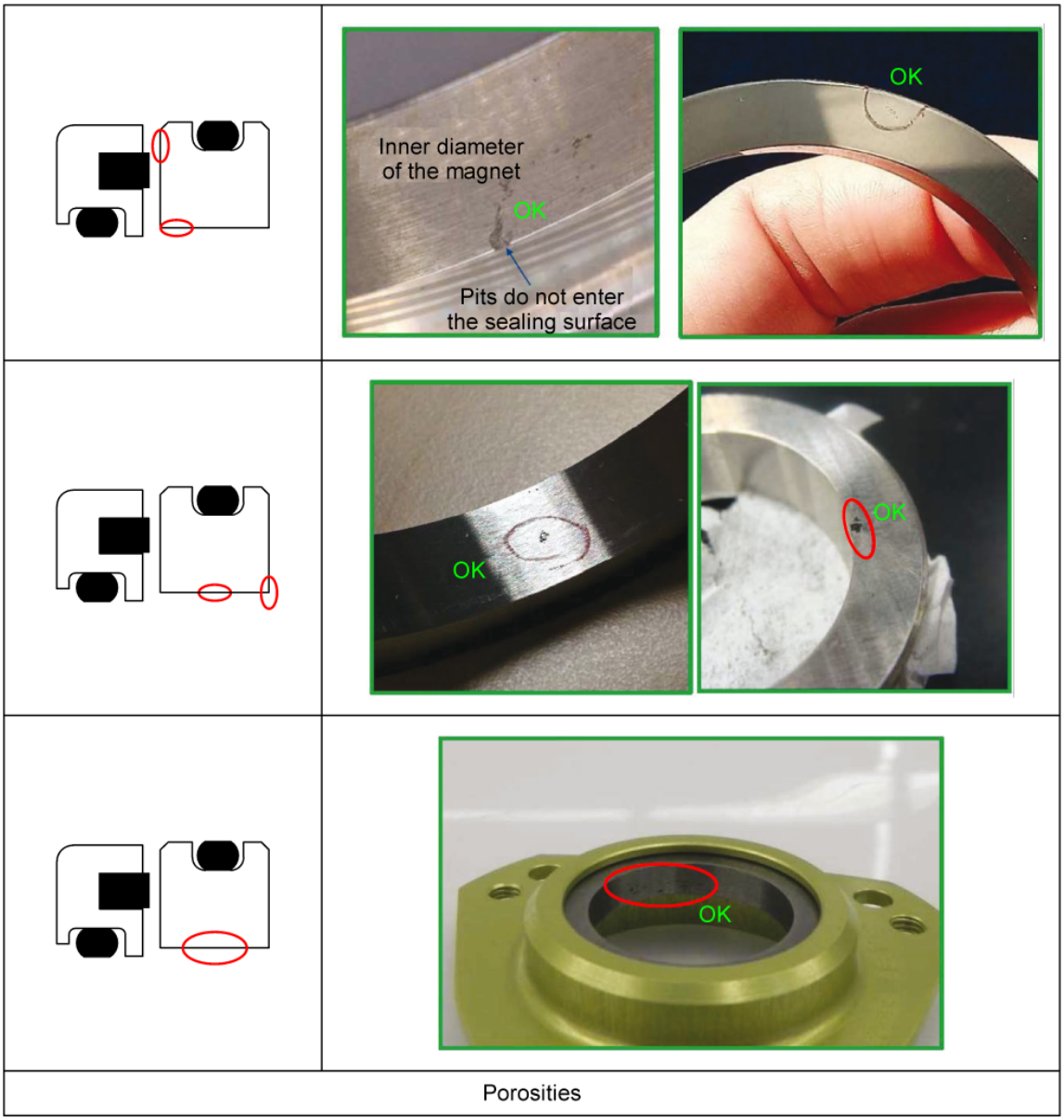
Examples of permitted damage:



Examples of permitted damage: porosities
Figure 3

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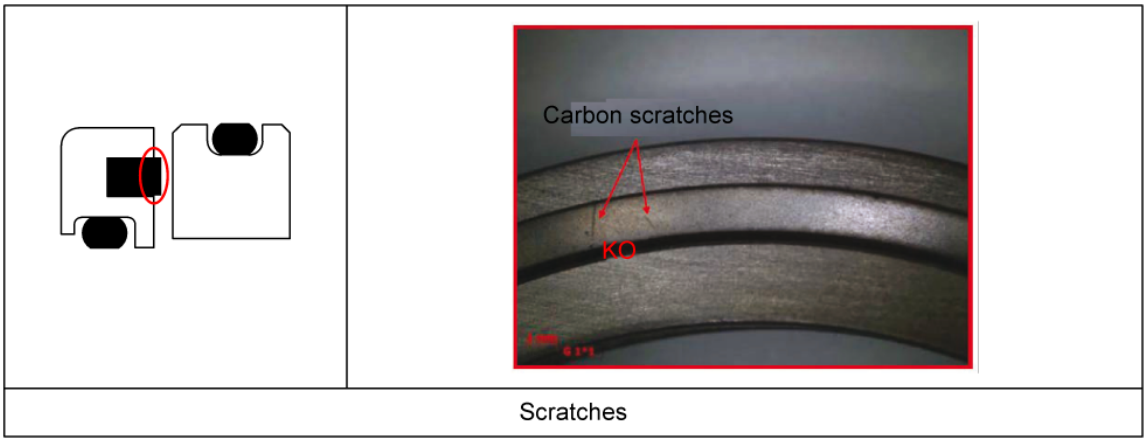
Examples of NON-permitted damage:



Examples of NON-permitted damage: scratches, chips
Figure 4

(3) Precautions to be taken with preformed packings

The preformed packing grooves must be clean and free from any foreign matter or residue. They must be free from burrs and sharp edges which could damage the preformed packing during its installation.

Using a syringe, lubricate the disassembled preformed packing and the bore for the fixed ring with NATO S-743 mineral vaseline. All precautions must be taken in order to avoid deterioration during assembly.

Before fitting, make sure the preformed packing is in contact with the rear face of the groove to prevent twisting.

Systematically discard all the preformed packings from a removed component.

(4) Lubrication of the friction faces

The final operation to be carried out, during installation of the friction faces of the friction ring and the carbon ring of the seal, is to use a syringe to smear them both with a film of engine oil or fuel, if the seal is installed in a fuel environment.

Special details for no-contact seals:

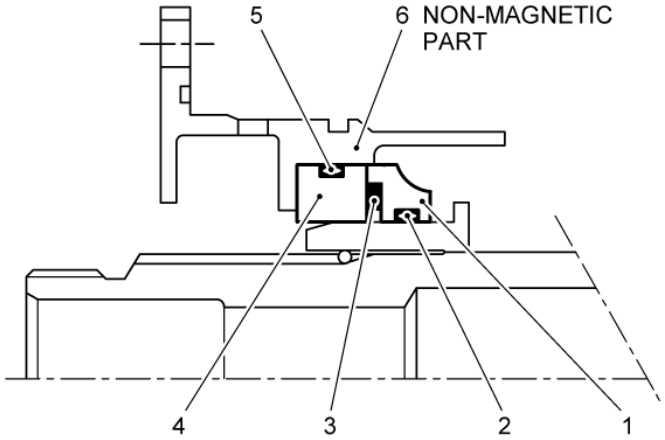
- Do not oil the friction faces of the friction ring and the carbon ring.
- Do not allow the two parts (friction ring and carbon ring) to rub against each other.

D. Installation recommendations for seals with magnetic contact force

(1) The seal consists of (Refer to Figure 5):

– a rotating ring (1) equipped with a preformed packing (2), which provides the connection and static sealing around the shaft, and a carbon sealing ring (3) which provides the dynamic sealing,
– a fixed magnetic ring (4), which fits into the non-magnetic recess (6). The static sealing and the connection between the fixed ring (4) and its recess are provided by the preformed packing (5).

The rotating ring (1) and the fixed ring (4) are maintained in contact only by the magnetic attraction force.

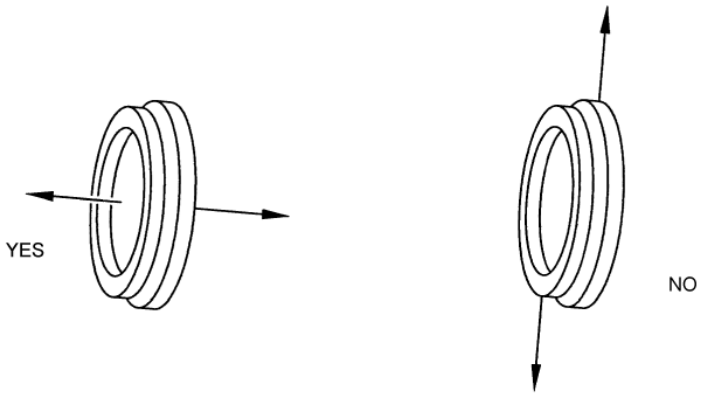


Seal with magnetic contact force
Figure 5

(2) Assembly recommendations (Refer to Figure 6, Refer to Figure 7 , Refer to Figure 8 , Refer to Figure 9 , Refer to Figure 10)

(a) Precautions

- When separating the two rings, it is essential to pull them apart axially, never slide them laterally (Refer to Figure 6).
- Do not place the fixed magnetic ring on a surface which could be contaminated by fine particles of magnetic metal. These particles immediately stick to the magnetic ring, and are liable to remain on the ring when it is installed and prevent correct sealing during operation.
- When a magnetic ring or a complete seal is removed from its recess, it is recommended that the two rings should be manually held in contact during the operation.
- This type of seal must not be stored in the presence of an external magnetic field, because a magnetic field in excess of 200 oersteds can demagnetize the magnetic ring.



Precaution
Figure 6

(b) Installation of the fixed ring

Using a syringe, lubricate the preformed packing of the fixed ring and the bore for the fixed ring with NATO S-743 mineral vaseline.

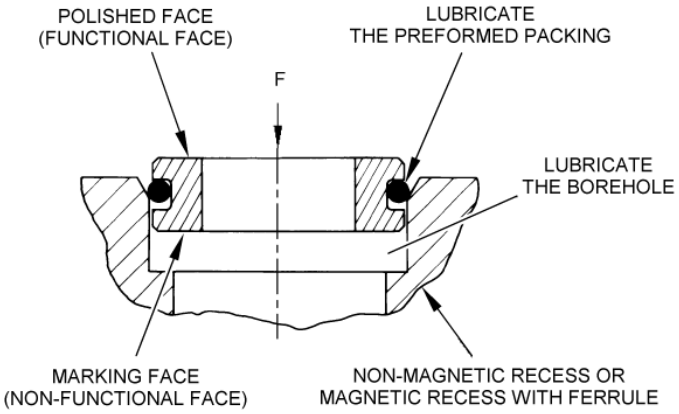
Offer the fixed ring into the lead-in of the recess, which shall first be lubricated; orient the functional face the correct way round.

– Functional face: polished face,
– Non-functional face: face with marking.

(c) Installation for cases where the recess is flush with the face (Refer to Figure 7)

Cover the functional (polished) face with a clean cloth, and press with the hand to insert the magnetic fixed ring into its recess.

Make sure that the preformed packing is correctly positioned against the rear face of the groove.

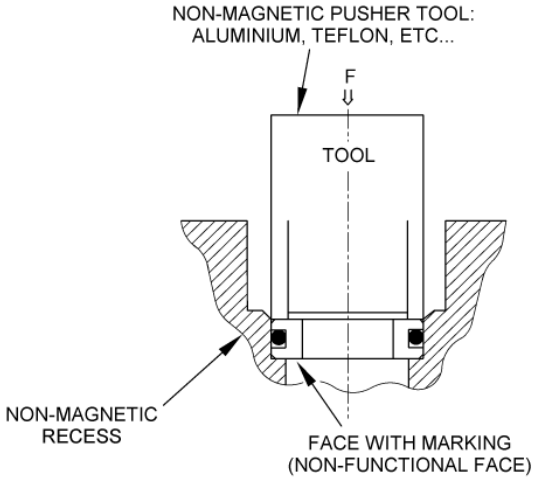


Installation for cases where the recess is flush with the face
Figure 7

(d) Installation for cases where the recess is below the surface of the face
(Refer to Figure 8)

The fixed ring can be located in the lead-in of the recess by hand, but its insertion into the recess requires a tool, whose part number is given in the Maintenance Manual. This pressing tool is designed so that it will not damage the polished face (functional face) against which it presses, thus it is made of aluminum or Teflon.

Pressure is applied on the tool by hand or using a tool and it is applied progressively. No sudden impacts (do not use a rubber mallet, for example) on the tool to press the ring home.



Installation for cases where the recess is below the surface of the face
Figure 8

(e) Untwisting of the preformed packing (Refer to Figure 9)

CAUTION: THE FIXED RINGS MUST BE ASSEMBLED AT LEAST 2 HOURS BEFORE COMPLETE INSTALLATION OF THE SEAL, IN ORDER TO ENSURE THAT THE FIXED RING (2) DOES NOT COME AWAY FROM ITS SEAT.

To complete the installation of the fixed ring, use a tool whose part number is given in the Maintenance Manual to untwist the preformed packing.

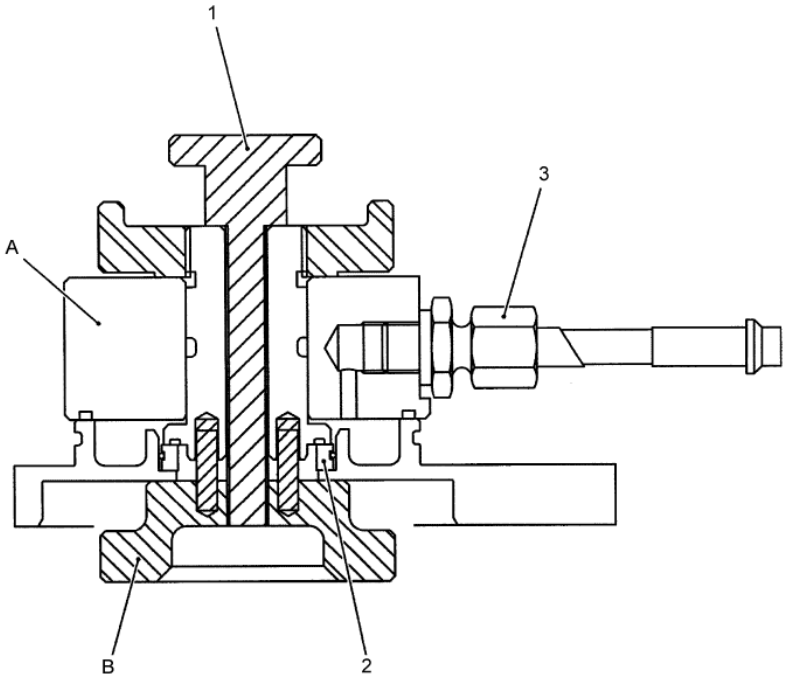
1 Apply manual pressure on the ring, to fix it lightly on the non-magnetic support.

2 Install the support + ring assembly on the body A of the special tool.

3 Install the mobile support B on the special tool.

4 Tighten the nut (1) of the special tool, until it comes into contact with the body A on the ring.

5 Maintain the pressure at (3) (400 kPa to 600 kPa) for 10 min



Untwisting of the preformed packing
Figure 9

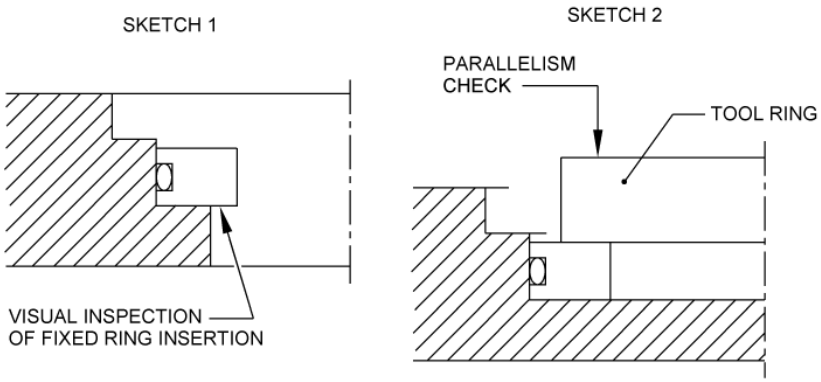
(f) Check of the position of the fixed part (Refer to Figure 10)

After assembly and before complete installation of the seal, check that the fixed part of the seal is fully in abutment in its recess. This is done by:

1 visually checking that there is no gap behind the fixed ring (Refer to Figure 10, sketch 1).

2 making sure that a shim, whose thickness is specified in the Maintenance Manual, cannot be inserted between the rear face of the magnetic ring and the shoulder of the seal-holder cage.

3 checking the parallelism, after fitting a tool ring, if there is no gap behind the fixed ring (Refer to Figure 10, sketch 2).



Check of the position of the fixed part
Figure 10

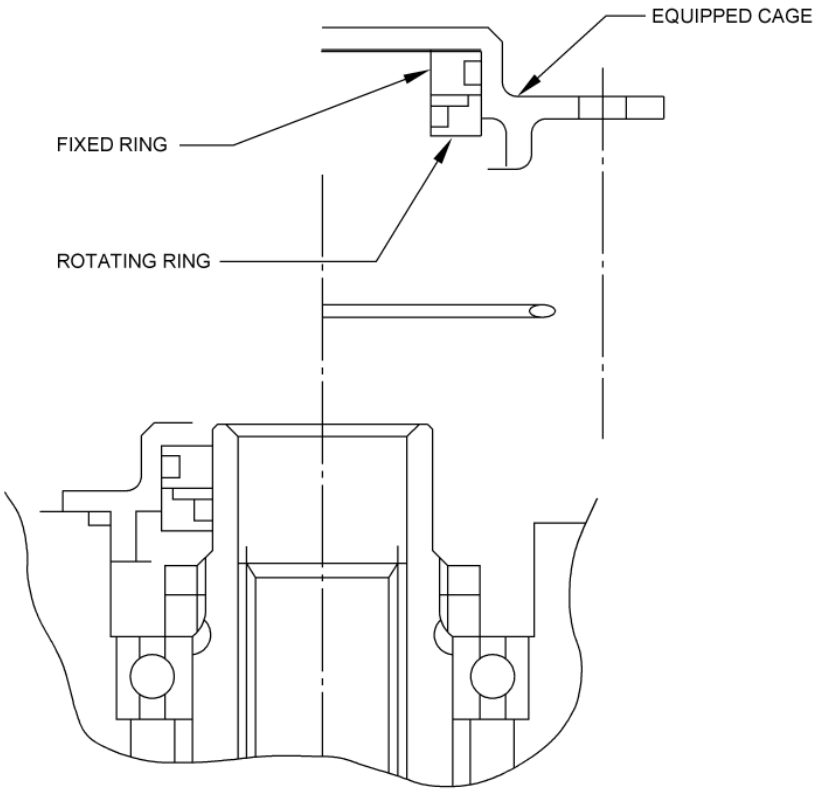
(3) Installation of the rotating ring (Refer to Figure 11 , Figure 12)

Using a syringe, lubricate the preformed packing of the rotating ring with NATO S-743 mineral vaseline and, using another syringe, lubricate the carbon face and the fixed ring with engine oil (or with fuel, depending on the environment of the seal).

(a) Assembly method A (Refer to Figure 11):

1 Installation of the rotating ring on the fixed ring. Move the rotating ring progressively towards the fixed magnetic ring and allow them to come softly into contact with each other. Do not release the rotating ring too far from the fixed ring: the magnetic attraction draws the rotating ring towards the fixed ring and the two rings snap sharply into contact with each other, which can damage the graphite ring (chipping).

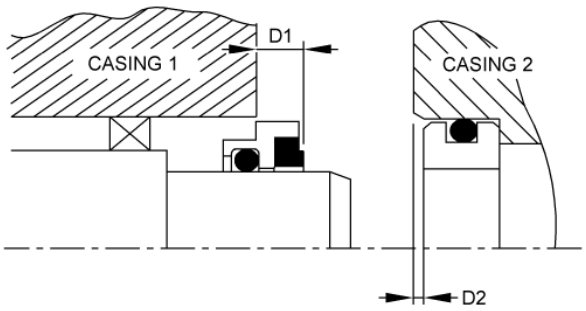
2 Installation of the equipped cage on the shaft previously lubricated with NATO S-743 mineral vaseline.



Method A
Figure 11

(b) Assembly method B (Refer to Figure 12):

1 Installation of the rotating ring on the shaft previously lubricated with NATO S-743 mineral vaseline. Locate the rotating ring on the lead-in of the shaft, so that when the fixed ring is moved axially, the two rings of the seal come into contact with each other first, before the two parts of the casing come into contact with each other.



METHOD B

Method B
Figure 12

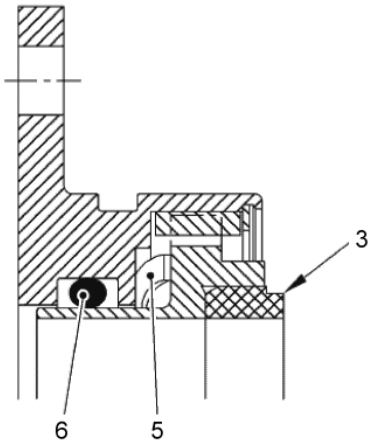
E. Installation recommendations for seals with mechanical contact force

(1) Types of technologies (Refer to Figure 13 , Figure 14)

(a) Metal spring and elastomer seal technology (Refer to Figure 13)

The carbon ring (3) receives the axial force of a wave-type metal spring (5).

The internal sealing is provided by the preformed packing (6), or by another type of seal with the same dimensions. This seal should enable the carbon ring (3) to move freely (3).

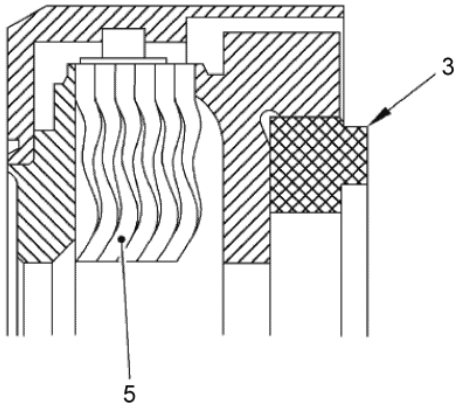


Metal spring and elastomer seal technology
Figure 13

(b) Bellows technology (Refer to Figure 14)

The carbon ring (3) receives the axial force of the metal bellows (5).

The internal sealing is provided by the metal bellows. The fact that there is no preformed packing means that the operating temperatures can be higher.



Bellows technology
Figure 14

(2) Composition of the different types of seals (Refer to Figure 15 , Figure 16 , Figure 17)

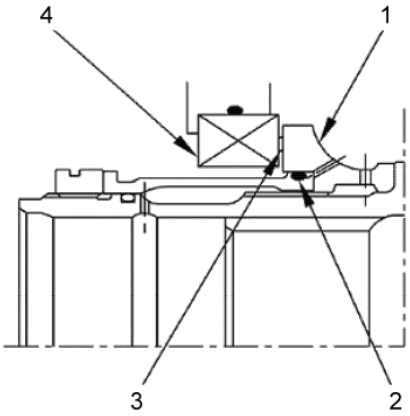
(a) The flat carbon faced seal consists of (Refer to Figure 15):

1 a rotating ring (1), equipped with a preformed packing (2) which provides the connectión and the static sealing around the shaft,

2 a fixed ring (4), equipped with a flat carbon sealing ring (3), which ensures the dynamic rotation sealing.

3 For the fixed ring (4), there are two types of technology:

- spring-type,
- bellows-type.



Flat carbon faced seal
Figure 15

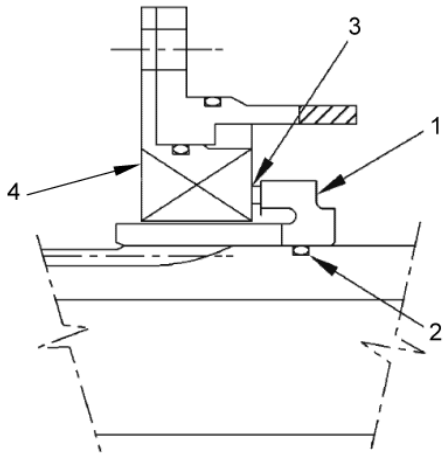
(b) The tapered carbon faced seal consists of (Refer to Figure 16):

1 a rotating ring (1), equipped with a preformed packing (2) which provides the connectión and the static sealing around the shaft,

2 a fixed ring (4), equipped with a tapered carbon sealing ring (3), which ensures the dynamic rotation sealing.

3 For the fixed ring (4), there are two types of technology:

- spring-type,
- bellows-type.



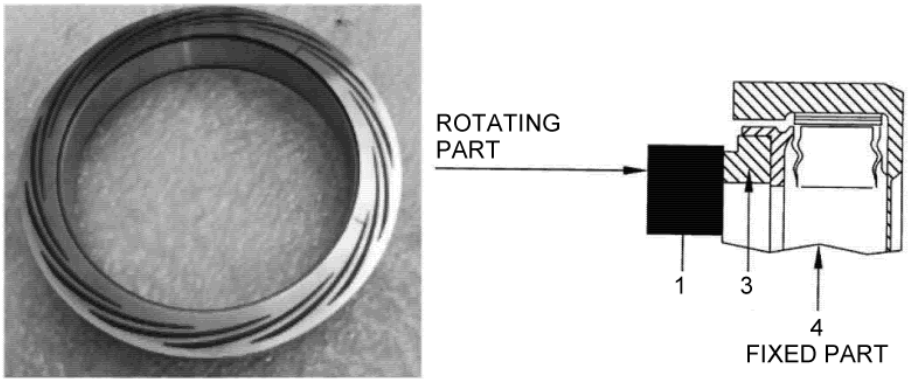
Tapered carbon faced seal
Figure 16

(c) The no-contact seal consists of (Refer to Figure 17):

1 a rotating ring (1) with helical grooves on its face in contact with the carbon ring.

During operation, the rotation of the grooves creates a pressure and a slight circulation of air. This makes it possible to obtain a no-contact seal. The no-contact effect only occurs above a certain rotation speed. Below this speed, the liner operates in the same way as a contact seal (but at low speed).

2 a fixed ring (4), equipped with a carbon ring (3), which ensures the dynamic rotation sealing.



No-contact seal
Figure 17

(3) Recommendations for installing the fixed section

(a) Make sure that the carbon seal is free to move axially, by turning the seal over against a clean cloth and by moving the cage through a distance of 0.5 to 1 mm max., using manual pressure.

(b) Make sure, after this operation, that the carbon seal returns to its original free length.

This check is to be carried out using a dial gauge, taking every precaution to avoid damaging the friction face.

CAUTION: FOR SEALS WITH METAL SPRINGS AND INTERNAL SEALING BY AN ELASTOMER SEAL:

- **IMMERSE THE CARBON SEAL CARRIER ASSEMBLY IN CLEAN ENGINE OIL AT AMBIENT TEMPERATURE FOR AT LEAST 5 MINUTES.**
- **WIPE THE CARBON SEAL CARRIER ASSEMBLY WITH A CLEAN CLOTH, PARTICULARLY THE FRICTION FACE.**

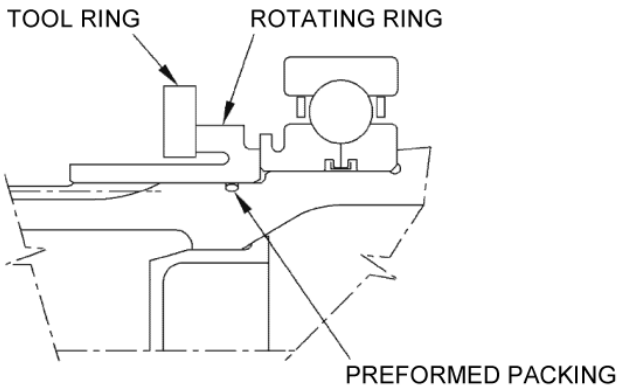
(c) Locate the fixed ring, making sure that it is pressed fully home.

(4) Recommendations for installing the rotating ring (Refer to Figure 18)

(a) Lubricate the preformed packing of the rotating ring with NATO S-743 mineral vaseline.

(b) Locate the rotating ring on the magnetic ring, making sure that it is pressed fully home.

NOTE: ***For the assembly of no-contact seals, the friction faces of the friction ring and of the carbon ring must not be lubricated. Make sure that the helical grooves do not contain any grease or dust.***



Installation of the rotating ring
Figure 18

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TASK 70-40-01-940-804-A01

SEALOL SEALS GENERAL

1. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 70-01-00-940-801 / tandard Practices - General.

2. GENERAL

This TASK provides the necessary information concerning the precautions to be taken when installing SEALOL seals.

SEALOL seals are precision components. The reliability of a SEALOL seal is absolutely essential before installation. All inspection recommendations must mandatorily be followed.

WARNING

WORK IN A SUITABLE AND WELL-VENTILATED AREA. DO NOT ALLOW ENGINE OILS TO REMAIN IN CONTACT WITH THE SKIN. USE SYNTHETIC RUBBER GLOVES AND A SCREEN OR GOGGLES. ENGINE OILS CAN BE POISONOUS.

WARNING

ENSURE THAT THERE ARE NO FLAMES, SPARKS OR HOT PARTS IN THE IMMEDIATE VICINITY, IN ORDER TO AVOID ANY RISK OF FIRE OR EXPLOSION. THE PRODUCTS ARE FLAMMABLE.

CAUTION: HANDLE THE PARTS WITH CARE IN ORDER TO AVOID IMPACTS. ANY IMPACT WILL DAMAGE THE PARTS.

CAUTION: USE ONLY TOOLS, EQUIPMENT AND CONSUMABLE PRODUCTS THAT ARE QUALIFIED BY SAFRAN HELICOPTER ENGINES. USE OF OTHER MEANS, EQUIPMENT OR REPLACEMENT PRODUCTS MUST BE RATIFIED ACCORDING TO THE SAFRAN HELICOPTER ENGINES PROCEDURES IN FORCE.

A. Installation of SEALOL seals

(1) Take the assembly precautions defined for preformed packing type 700 SEALOL seals and for metal bellow type 800 SEALOL seals

(a) Cleanness inspection on a new SEALOL seal:

1 Remove the SEALOL seal from its package just before installation.

2 Check that all visible parts of the SEALOL seal are clean.

3 Carry out basic cleaning of the SEALOL seal.

4 Inspection of the friction surface:

a Check that the friction faces show no signs of impacts, scores, marks, etc…

b The friction faces of the friction ring or of the carbon graphite must be lubricated with the specific engine oil before installing the SEALOL seal.

c Carry out a visual inspection of SEALOL seals which have operated.

(b) Take the assembly precautions for preformed packing type 700 SEALOL seals

1 Carry out a visual and dimensional inspection of the axial displacement.

CAUTION: MEASURE THE SEALOL SEAL, TAKING CARE NOT TO DAMAGE IT.

2 Measure the height of the SEALOL seal with a dial gauge or a sliding calliper gauge. Make a note of the value A.

3 Immerse the SEALOL seal in a bath of specific engine oil at ambient temperature, for at least 5 minutes.

4 Carefully wipe the SEALOL seal with a clean, lint-free cloth.

5 Turn the SEALOL seal over and lay it on a clean cloth.

6 Apply a light manual pressure to move the cage by 0.5 to 1 mm.

7 Check that the axial movement of the gland carrier is free and smooth.

8 Measure the height of the SEALOL seal with a dial gauge or a sliding calliper gauge. Check that this value is the same as the previous value A.

9 Inspect the preformed packing.

NOTE: The Preformed packing must be lubricated with the specific engine oil prior to installation of the SEALOL seal.

(c) Take the assembly precautions for metal bellows type 800 SEALOL seals

1 Handle the metal bellows with care. Protect the metal bellows to prevent any damage.

TASK 70-40-01-940-805-A01

"CROSS" TYPE SEALING SEGMENT GENERAL

1. TASKS / REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 70-01-00-940-801/Standard Practices - General
– Task 70-03-00-940-802/LOCTITE products - General.

2. GENERAL

This TASK defines the requirements and optimum conditions for the installation of "CROSS" type sealing segments with a spring effect towards the outside.

The "CROSS" type sealing segments are used to establish air tightness between parts with relative movements.

These segments are installed in pairs in a groove specifically designed for this purpose.

CAUTION: SYSTEMATICALLY REPLACE "CROSS" TYPE SEALING SEGMENTS BY NEW ONES.

CAUTION: DO NOT OPEN OR COMPRESS A "CROSS" TYPE SEALING SEGMENT MORE THAN NECESSARY WHEN INSTALLING IT.

A. Installation of "CROSS" type sealing segments.

Refer to Figure 1

(1) Make sure that the inner ring groove is clean (Refer to Task 70-01-00-940-801).

(2) Install the two segments in the inner ring groove, the openings of the two segments must be diametrically opposite.

(3) Hold and center the two segments to an installation diameter that is small enough to make the outer ring installation easier.

NOTE: ***The installation diameter must not distort the segments and put the segments at the groove bottom in contact.***

(4) Apply 4 spots of LOCTITE 496 glue to the ends of the segments.

(5) Apply 2 spots of LOCTITE 496 glue at 90° from the openings and on diametrically opposite positions.

(6) Let the glue dry for a minimum of 2 minutes.

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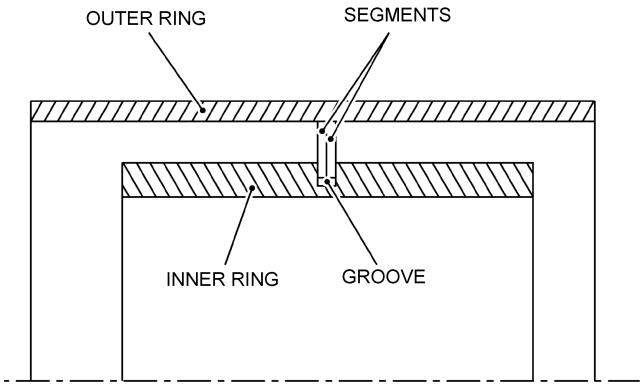

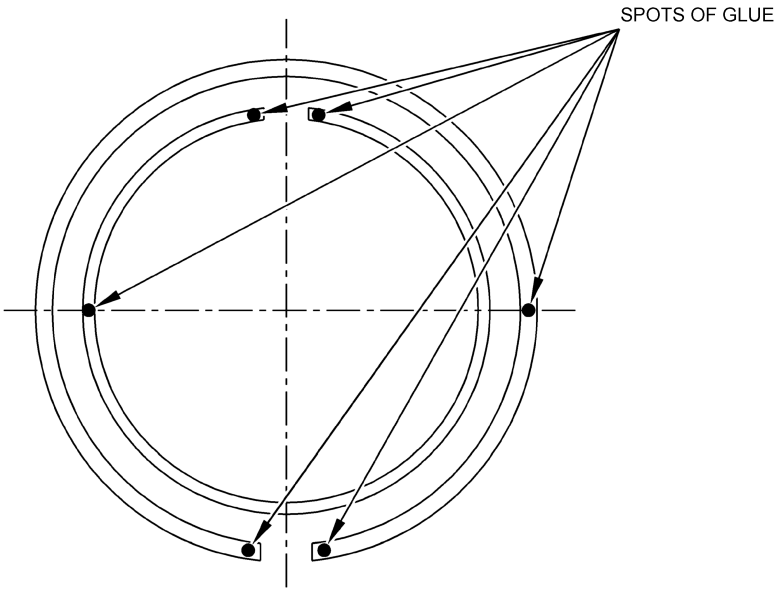

Installation of "CROSS" type sealing segments
Figure 1

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TASK 70-40-01-940-806-A01

PAULSTRA SEALING RINGS GENERAL

1. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 70-01-00-940-801 / Standard Practices - General.

2. GENERAL

This TASK provides necessary informations for the installation of PAULSTRA sealing rings.

WARNING

WORK IN A WELL-VENTILATED AREA. DO NOT ALLOW ENGINE OILS TO REMAIN IN CONTACT WITH THE SKIN. PROTECT THE HANDS WITH A SYNTHETIC RUBBER GLOVES AND THE FACE WITH A SCREEN OR GOGGLES. ENGINE OILS CAN BE POISONOUS.

CAUTION: HANDLE THE SEALING RINGS CAREFULLY TO PREVENT DETERIORATIONS. ANY STRETCHING, IMPACT OR BENDING CAN CAUSE A DAMAGE OF THE SEALING RINGS.

CAUTION: SEALING RINGS MUST BE UNPACKED AT THE LAST MOMENT BEFORE INSTALLATION, IN ORDER TO AVOID DUST CONTAMINATION. SEALING RINGS MUST BE INSTALLED IN A CLEAN ROOM. ANY DUST IN A SEALING RING CAN DAMAGE THE CORRESPONDING SEALING.

CAUTION: DURING LONG-TERM STORAGE, PREVENT ANY CONTACT WITH HEAT OR LIGHT, IN ORDER TO PRESERVE THE QUALITY OF THE RING.

CAUTION: USE ONLY THE TOOLS, EQUIPMENTS AND CONSUMABLE PRODUCTS THAT ARE QUALIFIED BY SAFRAN HELICOPTER ENGINES. USE OF OTHER MEANS, EQUIPMENT OR REPLACEMENT PRODUCTS MUST BE RATIFIED ACCORDING TO THE SAFRAN HELICOPTER ENGINES PROCEDURES IN FORCE.

A. Installation of PAULSTRA sealing rings

(1) Description (Refer to Figure 1)

(a) The sealing ring comprises two main parts:

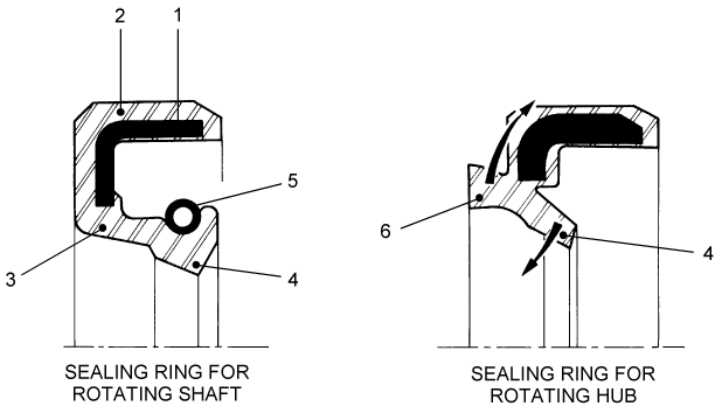
1 The metallic frame (1) comprises a ring in stamped sheet with a corner plate profile.

2 The rubber (or synthetic elastomer) comprises 3 parts: coating (2), which adheres to the frame, sleeve (3), which links the frame to the lip and ensures static tightness, lip (4), which ensures the kinetic tightness by direct contact with the shaft.

(b) Two types of sealing rings can be installed:

1 Sealing ring with spring for rotating shaft. Toroidal spiral spring (5) is slightly secured in a groove of the lip rim.

2 Balancer ring for rotating hubs does not have a spring, lip (4) extends into rim (6). The centrifugal force (F) opens lip (4). This same force (F) exerted on rim (6) closes lip by a lever arm effect.



Installation of PAULSTRA sealing rings
Figure 1

WARNING

DO NOT BREATHE THE ENGINE OIL VAPORS. WORK IN A WELL-VENTILATED AREA. DO NOT ALLOW ENGINE OIL TO REMAIN IN CONTACT WITH THE SKIN. IT CAN BE ABSORBED BY THE SKIN AND PENETRATE IN TO THE BODY. USE SYNTHETIC RUBBER GLOVES AND SAFETY GOGGLES OR A FACE SHIELD. ENGINE OIL CAN BE POISONOUS.

(2) Acceptance of PAULSTRA sealing rings

- Do not attach the rings using a wire as washers, this can damage the lip irreparably
- Sealing rings must be unpacked before installation, examine the sealing ring carefully to remove all signs of dirt, immerse the sealing ring in cold engine oil and wipe with an oily cloth.

WARNING

DO NOT BREATHE THE ENGINE OIL VAPORS. WORK IN A WELL-VENTILATED AREA. DO NOT ALLOW ENGINE OIL TO REMAIN IN CONTACT WITH THE SKIN. IT CAN BE ABSORBED BY THE SKIN AND PENETRATE IN TO THE BODY. USE SYNTHETIC RUBBER GLOVES AND SAFETY GOGGLES OR A FACE SHIELD. ENGINE OIL CAN BE POISONOUS.

(3) Installation procedure

(a) Before assembly, coat the sealing ring lip with engine oil, to avoid dry start.

(b) Install the sealing ring concentrically, perpendicular to the shaft. Orient the lip towards the fluid to be sealed.

CAUTION: TAKE ALL THE PRECAUTIONS DURING ASSEMBLY, LIP MUST NOT HAVE FOLDS, CUTS OR TEARS THAT PREVENT SEALING.

(c) Use a special tool comprising a guide and a push mandrel, defined if necessary in the concerned tasks of the Maintenance Manual.

(d) Clean the borehole before installation of the sealing ring.

(e) Install the sealing ring in the borehole using a press or a mallet and a tubular mandrel of adiameter slightly smallerthan that of the sealing ring.

TASK 70-40-01-940-807-A01

CORRUJOINTS GENERAL

1. TASKS / REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 70-01-00-940-801/Standard Practices - General
– Task 70-41-00-940-801/Tightening torques - General.

2. GENERAL

This TASK provides the necessary information for replacement of corrujoints.

A. Replacement of corrujoints

CAUTION: SYSTEMATICALLY DISCARD ALL THE REMOVED CORRUJOINTS. RE-USING AN OLD CORRUJOINT CAN CAUSE DAMAGE TO THE PARTS.

(1) Procedure of replacement

(a) Removal of corrujoint

1 Remove the element from the pipe or the blank to access the corrujoint.

2 Remove the corrujoint.

3 Discard the corrujoint.

(b) Installation of a new corrujoint (Refer to Figure 1)

CAUTION: DO NOT CLEAN A TITANIUM ALLOY WITH A HALOGEN SOLVENT. HALOGEN SOLVENTS DAMAGE TITANIUM ALLOYS.

1 Clean the seat area with solvent (Refer to Task 70-01-00-940-801).

2 Do a visual inspection on the seat area of corrujoint.

CAUTION: DO NOT DAMAGE THE PARTS WHEN REWORKING THE SEAT AREA.

a Make sure that there are no signs of impacts or scores.

NOTE: If necessary, lightly smooth the seat area.

b Make sure that the seat face is clean.

NOTE: Wipe the seat face with a clean lint-free cloth.

3 Do a visual inspection of the new corrujoint.

a Make sure that there are no signs of impacts, no grooves and no geometrical distortions (buckling, bendings, etc.).

4 Install the corrujoint on the seat area.

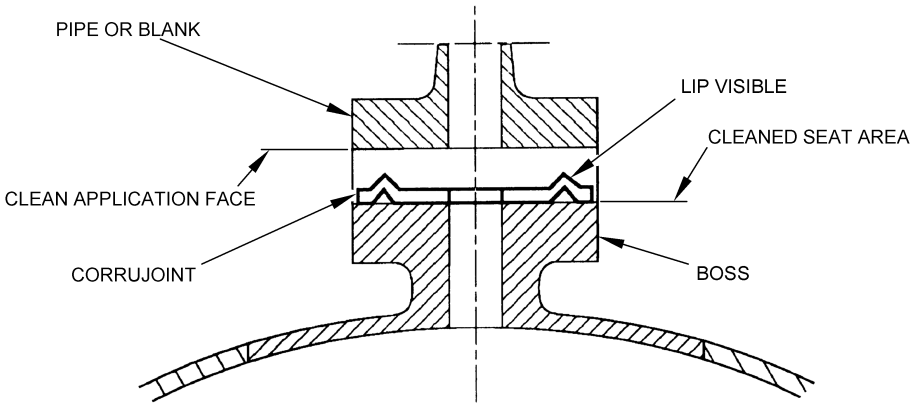
NOTE: ***Take care of the direction of corrujoint, the corrujoint lip must be visible (Refer to Figure 1).***

5 Make sure that the application face is clean.

6 Install the pipe or the blank.

7 Lubricate the threads of the attaching screws with engine oil.

8 Install and tighten the attaching screws to standard torque values (Refer to Task 70-41-00-940-801).



Replacement of a corrujoint
Figure 1

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TASK 70-40-02-940-803-A01

PIPES AND UNIONS GENERAL

1. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned here after.

- Task 70-01-00-940-801 / Standard Practices - General
- Task 70-40-01-940-802 / Preformed packings- General
- Task 70-40-02-200-801 / Pipes and unions - Inspection/check
- Task 70-41-00-940-801 / Tightening torque - General.

2. GENERAL

A. Removal of pipes and unions

(1) If necessary, unlock the unions.

(2) Loosen the unions.

NOTE: Immobilize the union fittings with an open end wrench.

(3) Disassemble the attachments.

(4) Disengage the pipe to prevent impact with other components.

NOTE: Slight elastic deformation of the pipe is permitted to make removal easier.

(5) Discard the preformed packings.

(6) Install the correct blanking plugs.

(7) Make sure that the unions and pipes are in good condition.

B. Installation of pipes and unions

(1) Installation and attachment of pipes

(a) Installation of pipes

1 Make sure that the pipes are not stressed during their installation.

2 Manually install the unions and hold the pipe in the correct direction.

3 If necessary, release the supports or components to make it easier to install the pipes.

4 Ensure a minimum clearance between pipes and between the pipes and accessories :

a 1 mm (minimum) on pipe sections close to the connection points, with a length equal to between 6 and 8 times the diameter of the pipe,

b 3 mm (minimum) on other sections of the pipe.

(b) Securing pipes

1 Tighten the union nuts or attaching screws on the pipes to the recommended torque.

NOTE: ***Hold the support elements that may rotate during locking.***

2 Install clamps on the pipes and attach them to their supports without putting pressure on the pipes.

3 Tighten the unions and accessories that were loosened during pipe installation.

4 Measure the minimum clearance between the pipe and all other engine components.

(2) Installation of unions

(a) AN union (Refer to Figure 1)

1 General

The AN union comprises a sleeve (3) and a nut (2) installed on a standard pipe (4) whose end is flared to 37°. This union is screwed and tightened on a nipple(5)attached to the component.

2 Installation of AN-type unions

a Apply vaseline grease to the nipple threading.

b Install nipple(5) equipped with a preformed packing (6) on the component.

c Tighten the nipple(5)to the indicated torque.

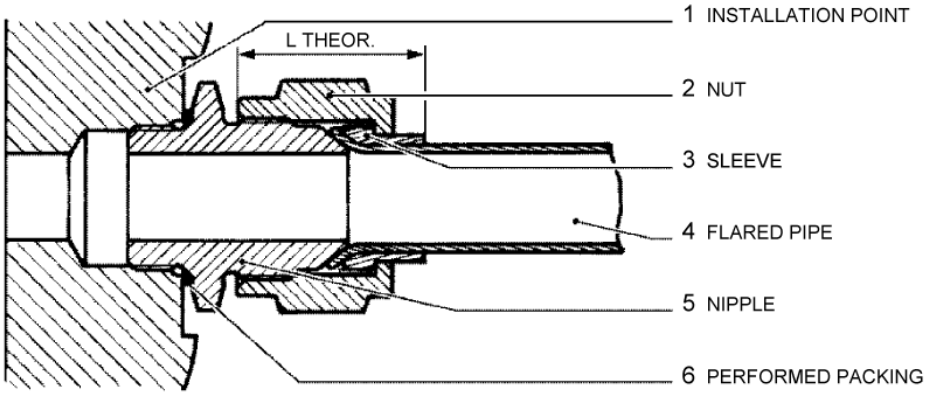
d Apply vaseline grease to the contact sections of the union and to the threadings.

e Install the pipe. Comply with the installation precautions.

f Manually screw the nut onto the nipple.

NOTE: ***Make sure that the pipe is not stressed.***

g Tighten the nut to the indicated torque.



AN-type union - Installation
Figure 1

3 Table of tightening torques

Use a torque wrench to torque tighten. The tightening torques for nipples and nuts are given in the table below.

NOTE: ***In areas that are difficult to access and, in the absence of a tool allowing use of a torque wrench, union nuts must be tightened manually, then with a standard wrench by 1/6 of a turn.***

Table 1 : Tightening torques for nipples and nuts

Pipe diameters	*Tightening torques (threading lubricated with vaseline grease)*			
	Nipple (5)		*Nut (2)*	
	daN.m	*Lbf.in*	*daN.m*	*Lbf.in*
4	1.1	97.36	0.7 to 0.9	61.95 to 79.66
6	1.8	159.31	1.3 to 1.5	115.06 to 132.76
8	1.8	159.31	1.3 to 1.5	115.06 to 132.76
10	2.5	221.27	1.9 to 2.1	168.16 to 185.86
12	3.9	315.18	3.1 to 3.3	274.37 to 292.07
14	4.7	415.98	3.9 to 4.1	345.18 to 362.88
16	5.6	495.64	4.5 to 4.7	398.28 to 415.98
20	10.5	929.32	8.5 to 8.7	752.31 to 770.01
25	12	1062.08	10.6 to 10.8	938.17 to 955.88

(b) Flange union (Refer to Figure 2)

1 General

Flange unions are unions that are welded to the end of a pipe. Flange unions can be straight or have a 90° angle.

2 Installation of flange union

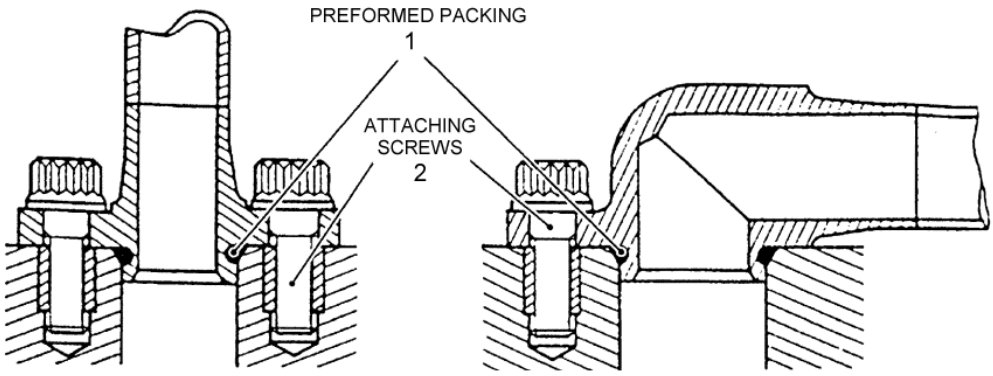
a Apply approved vaseline grease (or approved engine oil) to the preformed packing and the union recess.

b Install preformed packing (1) in its groove. Refer toTask 70-40-01-940-802.

c Install the pipe.

d Lubricate the threading of the attaching screws (2) with approved engine oil.

e Screw the attaching screws (2) and tighten them to the indicated torque. Refer toTask 70-41-00-940-801.



Flange union - Installation
Figure 2

(c) QUINSON-type union (Refer to Figure 3)

1 General

a The QUINSON union is a swivel union equipped with JET seals or metal gaskets.

b The QUINSON union comprises a nut (1), a bush (2) that pulls on a nozzle (3) integral with body (4) and two seals (5) located on either side of the ring.

c The JET seal comprises a ring (8) and rubber seal (7). Retaining ring (6) retains the seal shape.

2 Installation of QUINSON union

CAUTION: BEFORE THE INSTALLATION OF THE QUINSON-TYPE UNION, MAKE SURE THAT THE NOZZLE (3) IS INTEGRATED WITH THE BODY (4). IF THE NOZZLE (3) ROTATES, REPLACE THE COMPLETE UNION.

a Lubricate seals (5) with approved engine oil.

b Install the seal on the union.

c Make sure that the JET seal is installed if the union is equipped with this type of seal.

d Install two new seals on the union if it is equipped with metal seals.

NOTE: The seal with the largest inner diameter is installed between the nut and the body.

e Screw the union into its recess using nut (1) but do not tighten it.

f Orient the body in the required direction.

g Secure body (4) by its flats with an open end wrench.

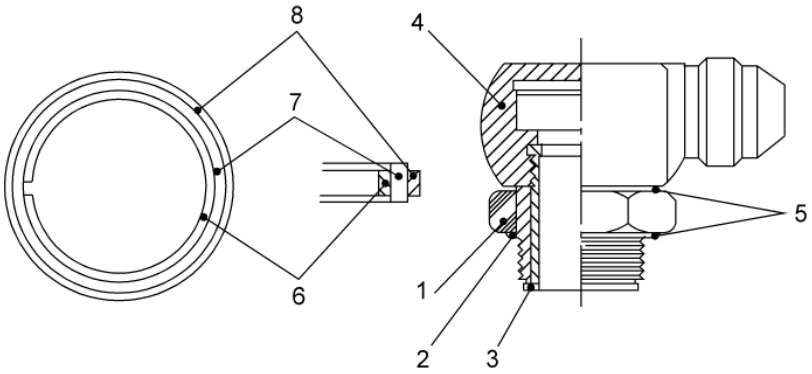
CAUTION: NEVER TRY TO UNSCREW OR ORIENT THE UNION BY ITS BODY FLATS WITHOUT FIRST LOOSENING THE NUT.

h Tighten the nut.

- In the case of unions equipped with JET seals, stop tightening when the metal parts are in contact with each other.
- In the case of unions equipped with metal seals, comply with the torque tightening value.

3 Table of tightening torques

Outer diameter of bush (2) measured on the threaded part	*Maximum tightening torque (threading lubricated with approved engine oil)*	
	daN.m	*Lbf.in*
18 mm (0.70 in)	2	177.01
12 mm (0.47 in)	1.5	132.76
10 mm (0.39 in)	1	88.51
8 mm (0.31 in)	0.8	70.81



QUINSON-type union
Figure 3

(d) T or elbow union (Refer to Figure 4)

1 General

There are 90° elbow unions and T unions. The union is sealed by a preformed packing on the branch(es).

2 Installation of elbow or T union

CAUTION: SYSTEMATICALLY REPLACE PREFORMED PACKINGS.

a Lubricate preformed packing (1), bearing surface of nut (2) and threading of union (3).

b Screw nut (2) on union (3) until level with bottom(A)of the preformed packing groove.

c Put preformed packing (1) in the groove. Refer toTask 70-40-01-940-802.

d Screw the union in the casing (or the accessory on the union) until nut (2) is in contact with the casing.

e Make sure that the preformed packing is correctly positioned in its recess.

f Hold nut (2) with an open end wrench to prevent it from rotating.

g Orient the union in relation to the pipe(s).

NOTE: Orient the union by screwing it by a maximum of 3/4 of a turn or by unscrewing it by a maximum of 1/4 of a turn.

h Connect the pipe(s).

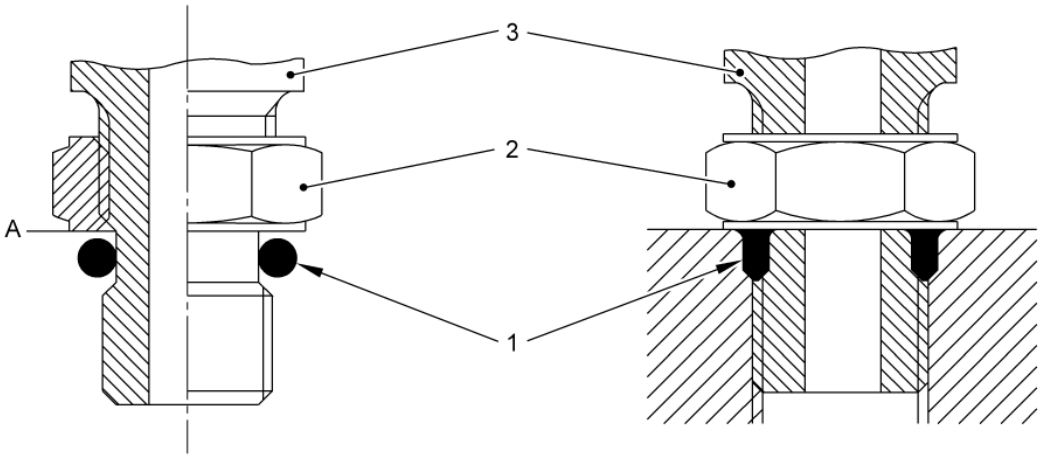
i Tighten the nut to the indicated torque.

j Immobilize the union with a lock wrench.

CAUTION: NEVER TIGHTEN THE NUT OF AN ELBOW OR T UNION TO BLOCK A LEAK. SYSTEMATICALLY REMOVE THE UNION.

3 Table of tightening torques

Recess threading diameter x pitch	***8 x 1.0***	***10 x 1.0***	***12 x 1.0***
Tightening torque (N.m)	11	18	18
Tightening torque (lbf.in)	97.35	159.3	159.3



T or elbow union
Figure 4

(e) AIRFLEX type coupling (Refer to Figure 5 , Figure 6)

1 Installation of AIRFLEX type coupling.

a Apply a thin layer of pure Vaseline on the internal bore of the female end (1).

CAUTION: WHEN REASSEMBLING SYSTEMATICALLY USE A NEW PREFORMED PACKING.

b Lubricate the preformed packing (2) with pure Vaseline.

c Install the preformed packing (2) on the male end (3).

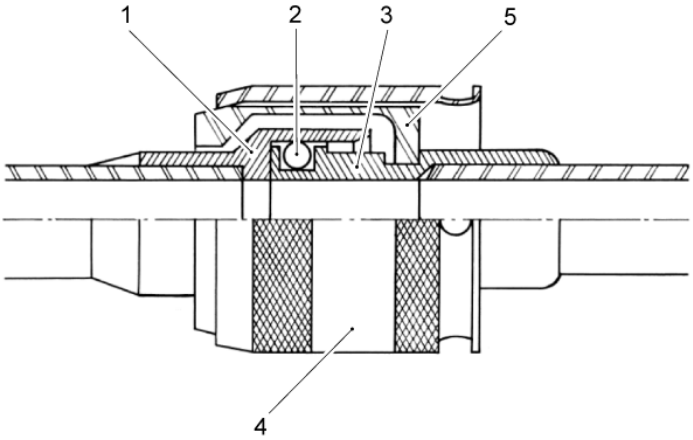
d Engage the ring (4) in the line equipped with the female end in the installation direction indicated in the Figure 5.

e Install both half-shells (5) as per Figure 5.

f Move the ring (4) on both half-shells (5).

g Lock the coupling using a thread lock in Z2CN 18-10 with a Ø 0,5 mm to Ø 0,8 mm. Use a locking pliers of type DOUGLAS KANE ASSOCIATED.

NOTE: The locking mode is given in the figure 6.



Installation of an AIRFLEX coupling
Figure 5

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Locking mode of the AIRFLEX coupling
Figure 6

(f) BANJO type universal coupling (Refer to Figure 7)

1 Installation of BANJO type universal couplings

a Apply a thin layer of pure Vaseline on the thread and on the face of contact of the internal screw or cap nut.

CAUTION: SYSTEMATICALLY INSTALL THE NEW PACKINGS DURING THE REASSEMBLY. REUSING A WORN OUT PACKING CAUSES THE DAMAGE OF THE PART.

b Successively install on the internal screw:

- A new packing
- The universal coupling
- A second new packing.

c Tighten the the internal screw or cap nut. Make sure that the packings are properly centered on the universal coupling.

CAUTION: DURING THE TIGHTENING OF THE LINKING ELEMENT, THE DUCT MUST NOT BE ON. RISK OF DAMAGE OF THE DUCT.

d Tighten the linking element of the other end of the duct to the proper tightening torque.

Outer diameter of the duct (in mm)	4	6	8	10	12
Diameter of the internal screw (in mm)	8	10	12	16	18
Tightening torques (in daN.m)	0.5 à 0.75	0.75 à 1	1 à 1.15	1.5 à 2	2 à 2.5

e Lock the internal screw or cap nut using a stainless steel threas lock.

f Perform a sealing test of the coupling.

g In the event of a leakage, tighten the internal screw or the cap nut by 1/8 turn at the maximum and do the locking of the coupling again.

h Perform a new sealing test of the coupling.

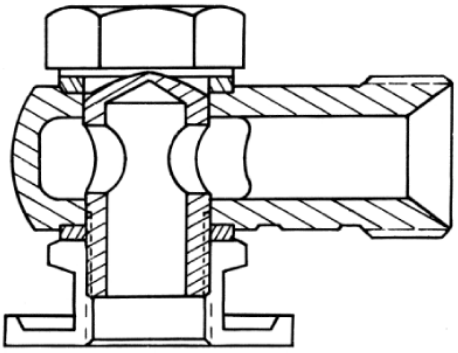
i If the leakage is still present:

j Remove the coupling.

CAUTION: SYSTEMATICALLY INSTALL THE NEW PACKINGS DURING THE REASSEMBLY. REUSING A WORN OUT PACKING CAUSES THE DAMAGE OF THE PART.

k Totally resume the installation procedure of the BANJO type coupling.

Replace the damaged parts.



Example for the installation of a BANJO universal coupling
Figure 7

C. Examination of pipes and unions

Refer to Task 70-40-02-200-801.

TASK 70-40-02-200-801-A01

PIPES AND UNIONS INSPECTION / CHECK

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Not applicable

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Not applicable

B. Additional provisions

Not applicable

2. REFERENCE TASKS/DOCUMENTS

Read carefully the information given in the tasks/documents mentioned here after.

- Task 70-01-00-940-801/ Standard Practices - General
- Task 70-40-02-940-803/ Pipes and unions - General.

3. PROCEDURE

A. Examination of the rigid pipes

CAUTION: DO THE REWORKS THAT ARE NECESSARY TO REPAIR THE PIPES ONCE ONLY.

VISUALLY MAKE SURE THAT THE AREA WITH THE DAMAGE TO BE GROUND HAS NOT ALREADY BEEN REWORKED.

CAUTION: REPLACE ANY PIPE HAVING ANOMALIES THAT ARE OUT OF THE CRITERIA BELOW.

Type of damage	*Criteria*	*Action*
Cracks	Not acceptable on all the pipe sections	Discard the pipe
Dents	Dent with a sharp edge	Discard the pipe
	If the dent is less than 10% of the pipe diameter	Accept the pipe
	If the dent is more than 10% of the pipe diameter	Discard the pipe
Scores Impacts Signs of run-out Signs of wear	If the damage is removed by polishing with emery paper (grade ≥ 240)	Accept the pipe
	If the damage is still present after polishing with emery paper (grade ≥ 240)	Discard the pipe
	NOTE: ***The polished surface must be greater than ten times the depth of the damage.***	
Corrosion	If the damage is removed by polishing with emery paper (grade ≥ 240)	Accept the pipe
	If the damage is still present after polishing with emery paper (grade ≥ 240)	Discard the pipe
	NOTE: ***The polished surface must be greater than ten times the depth of the damage.***	
Impacts within 12 mm from the union end	Not acceptable	Discard the pipe
Twisting of the pipe connection	Not acceptable	Discard the pipe
Seizing on the threading	Not acceptable	Discard the pipe
Stripping on the threading	Not acceptable	Discard the pipe
Clogging of a jet	Acceptable	Remove the deposits
Loosening of a jet	Acceptable	Bond if required Tighten the jet
Bowed curve	Pipe curve less than 15°	Straighten the pipe
	Pipe curve more than 15°	Discard the pipe
Longitudinal or circular scores on the pipe outer diameter with “LE BOZEC” -type unions		Acceptable after grinding (refer to the NOTE)
Scores Impacts	Damage (cracks excluded) on the pipe flanges (mating faces excluded)	Acceptable after grinding (refer to the NOTE)

NOTE: ***Grind the damage with emery papers (decreasing grades). Complete the grinding procedure with emery paper (grade ≥ 240). The rework length must be greater than ten times the depth of the damage.***

B. Examination of the unions

(1) Make sure that all union components are clean.

(2) Make sure that the ends have no circular scores or longitudinal scratches.

(3) Make sure that the threadings of the nipple and the nut are not burred or distorted.

(4) Install the correct blanking plugs.

4. FINAL STEPS

Not applicable

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TASK 70-40-03-940-801-A01

CIRCLIPS
GENERAL

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Description	*Quantity*
circlip plier	1

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Not applicable

2. TASKS / REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned here after.

– Task 70-01-00-940-801/Standard Practices - General.

3. GENERAL

A. Removal of a circlip

(1) Disengage the circlip from the groove using the circlip plier.

(2) Remove the circlip.

(3) Discard the circlip.

CAUTION: SYSTEMATICALLY REPLACE A CIRCLIP WITH A NEW ONE.

B. Installation of a circlip

Refer to Figure 1

(1) Check that the groove is clean and that the edge on the side opposite to the force is sharp.

CAUTION: DO NOT OPEN OR COMPRESS A CIRCLIP MORE THAN NECESSARY, WHEN INSTALLING IT ON A SHAFT OR IN A BORE.

CAUTION: AVOID EXCESSIVE CONSTRAINTS DURING INSTALLATION.

(2) Installation of circlip

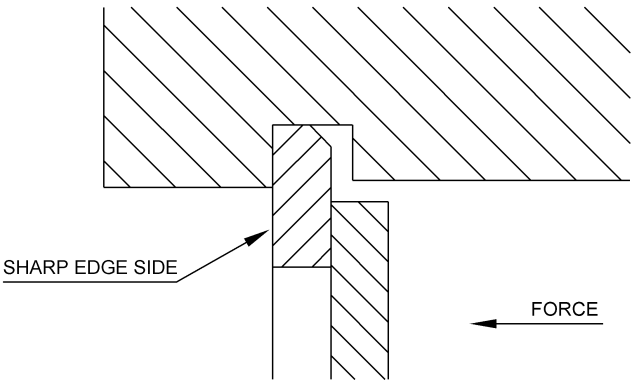
(a) Use a circlip plier equipped with an adjusting screw to limit the opening of the nose of the plier.

(b) Use an assembly cone to facilitate installation.

(c) Install the sharp edge of the circlip on the side opposite the applied force.

C. Additional procedures

(1) Do a check of the circlip installed on a shaft or in a bore.



Installation of a circlip
Figure 1

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TASK 70-41-00-940-801-A01

TIGHTENING TORQUES GENERAL

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Description	*Quantity*
torque wrench 3 N.m to 25 N.m (26.5 lb.in to 220 lb.in)	1

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Description	*Quantity*
degreaser HYSO 97/1	As required
engine oil	As required
mineral vaseline AIR 3565	As required
anti-seize vaseline	As required

2. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned here after.

– Task 71-00-02-940-801 / Fuel, engine lubricant, special products - General
– Task 70-01-00-940-801 / Standard Practices - General.

3. GENERAL

A. Tightening and locking torque

(1) Definition

(a) Effective tightening torque:

Torque required to cause a given axial force in a screw. It includes the torque due to friction on the head.

(b) Locking torque:

The torque to be applied to a nut or a screw to keep it in rotation in relation to the associated component. No axial load is applied to the assembly and the locking area is fully meshed: minimum over length of two pitches in relation to associated component including the end chamfer and no contact with the mating face.

(c) Indicated tightening torque:

Torque indicated by the torque wrench while tightening. This is the sum of locking torque and the effective tightening torque.

(2) Assembly conditions for normal attachments

(a) Screw in hardware at ambient temperature.

(b) Coat the threads and mating faces of the screws or nuts with clean engine oil (unless otherwise specified).

(c) Systematically check the minimum locking torque of all the self-locking devices during disassembly of a part or an assembly. (Refer to table 1).

Table 1 : Locking torques of self-locking devices

Nominal ø in mm		***3***	***4***	***5***	***6***	***7***	***8***	***10***	***12***	***14***	***16***
Locking torque in N.m	Maxi Mini	0.75 0.10	1.60 0.15	2.00 0.25	3.20 0.35	4.60 0.50	6.00 0.65	9.50 1.20	15.00 1.80	22.00 2.60	33.00 3.70
Locking torque in lb.in	Maxi Mini	6.63 0.885	14.16 1.33	17.70 2.21	28.32 3.1	42.48 4.42	53.10 5.75	84.07 10.62	132.75 15.93	194.7 23.01	292.05 32.74

NOTE: ***The minimum locking torque is checked when unscrewing as the bearing face of the screw or the nut does not rest on the tightening surface.***

NOTE: ***In practice, for a screw or a nut with a diameter of less than 6 mm, the locking torque will be considered correct if the screw or the nut cannot be manually unscrewed.***

(d) Assembly of attachments without self-locking devices

1 Set the effective tightening torque on the torque wrench based on the diameter of the screw or the nut (Refer to table 2).

2 Tighten the nut.

Table 2 : Effective tightening torques

Nominal ø in mm	***3***	***4***	***5***	***6***	***7***	***8***	***10***	***12***	***14***	***16***
Effective torque in N.m	0.65	1.8	3.7	6.2	11.0	17.0	31.0	56.0	92.0	135.0
Effective torque in lb.in	5.75	15.93	32.74	54.87	97.35	150.45	274.35	495.6	814.2	1194.7

NOTE: ***The given torques correspond to the use of clean engine oil as a lubricant.***

(e) Assembly of attachments equipped with self-locking devices.

CAUTION: INSERT THE SCREW INTO THE NUT OR THE THREAD INSERT BY AT LEAST 1.5 TO 2 PITCHES, INCLUDING THE CHAMFER.

CAUTION: DO NOT EXCEED THE INDICATED TIGHTENING TORQUE TO INSERT THE SCREW.

CAUTION: DO NOT MODIFY THE LOCKING TORQUE WITH LOCK GLUE OR BY MODIFICATION OF TAPPING.

1 Set the indicated tightening torque on the torque wrench based on the diameter of the screw or the nut (Refer to table 3).

2 Tighten the nut.

Table 3 : Indicated tightening torques

Nominal ø in mm	***3***	***4***	***5***	***6***	***7***	***8***	***10***	***12***	***14***	***16***
Indicated torque in N.m	1.0	2.7	4.8	8.0	13.5	20.3	36.3	64.4	104.3	153.3
Indicated torque in lb.in	8.85	23.89	42.48	70.80	119.47	179.65	321.25	570.2	923.05	1356.7

NOTE: The given tightening torques correspond to the use of clean engine oil as a lubricant.

(f) Installation of the securing clamp (Refer to Figure 1)

1 Tighten the screw of the securing clamp to an apparent torque of 1.5 N.m.

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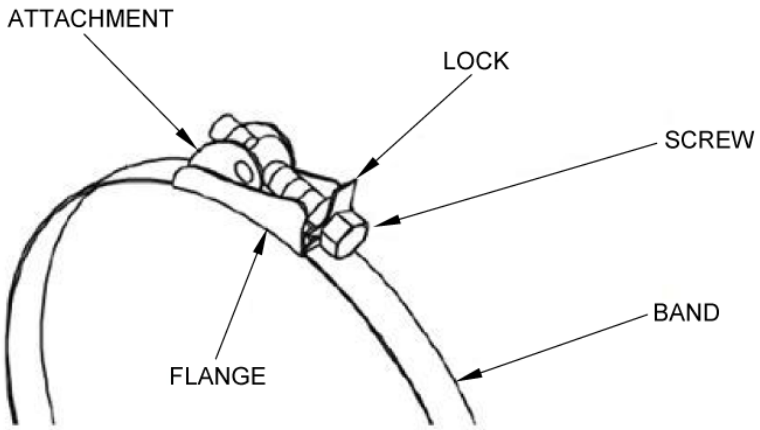


Installation of the securing clamp
Figure 1

B. Application mode for tightening torques

(1) Lubrication

– The effectiveness of the threading depends on the type of lubricant.
– The list of lubricants to be used is given in the below table.

Location	*Use*	*Lubricant Refer to Task 71-00-02-940-801*
Bearing lock nut		Pure mineral vaseline
Threaded bushes and studs	– Cast iron – Steel – Light alloys	Anti-seize vaseline
Standard hardware		Clean engine oil
Hot section hardware	– Silver-plated – Non silver-plated	Clean engine oil Anti-seize vaseline

(2) Tightening torque of 3.5 daN.m and over

Do a preliminary tightening to make sure that the threads do not lock and to bring the mating faces closer together.

(a) Lubricate the threading, the mating faces and the washers.

(b) Tighten to half the specified torque value.

(c) Loosen then re-tighten to the specified torque value.

(3) Tightening sequence (Refer to Figure 2)

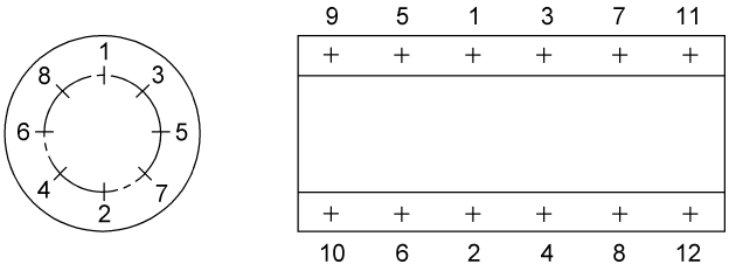
Do not tighten the nuts or the sets of the adjacent screws one after the other when the tightening force is important but tighten them according to the specified sequence.

(a) Lightly tighten a diametrically opposite pair of nuts or screws.

(b) In the same way bring the mating faces into contact.

(c) Apply the specified tightening torque in the same sequence.

NOTE: ***On the casing attachment flanges, first tighten the centre screw or nut, then progressively and alternately tighten the remaining nuts and screws always from the centre outwards.***



Application of tightening torques - Tightening sequence
Figure 2

C. Use of direct-reading torque wrench or tripping torque wrench

Refer to Figure 3

(1) Adjust the slider pointer of the tripping torque wrench to the appropriate tightening torque value.

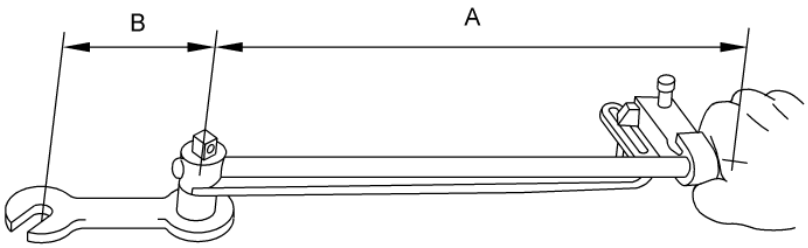
(2) Install the special end-piece and bush, which are appropriate for the nut, on the torque wrench.

(3) Install a special wrench to increase the length of the torque wrench lever arm (Refer to Figure 3).

(a) Calculate the new tightening torque to be read on the torque wrench.

Reading = C x (A/(A+B))

Where C: actual torque to be applied



Use of the tripping torque wrench
Figure 3

CAUTION: MAKE SURE THAT THERE IS NO ABNORMAL RESISTANCE WHEN TIGHTENING.

CAUTION: TIGHTEN THE NUTS WITH ONE HAND AND HOLD THE TORQUE WRENCH IN THE PRESCRIBED WAY (STABLE POSITION AND HAND CLOSED). IF THE WRENCH IS HELD INCORRECTLY, A LOWER TIGHTENING TORQUE VALUE IS GIVEN.

(4) Tighten until the appropriate torque is read or until the torque wrench trips.

TASK 70-42-00-940-801-A01

LOCKING OF ASSEMBLIES GENERAL

1. TASKS / REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

- Task 70-42-00-940-802/Locking of assemblies - Self-locking nuts
- Task 70-42-00-940-803/Locking of assemblies - Lock-wire and cable
- Task 70-42-00-940-804/Locking of assemblies - Lock plate
- Task 70-42-00-940-805/Locking of assemblies - Split pin
- (Refer to Task 70-42-00-940-806/Locking of assemblies - Tab nuts.

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TASK 70-42-00-940-802-A01

LOCKING OF ASSEMBLIES WITH SELF-LOCKING NUTS
GENERAL

1. TASKS / REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 70-01-00-940-801/Standard Practices - General
– Task 70-41-00-940-801/Tightening torques - General.

2. GENERAL

This TASK provides the necessary information for the locking of the assemblies with self-locking nuts.

A. Locking of assemblies with self-locking nuts

Refer to Figure 1

(1) Tighten the screw to appropriate tightening torque (Refer to Task 70-41-00-940-801).

NOTE: ***After tightening, the screw shall protrude beyond the nut by at least one thread, not including the chamfer.***

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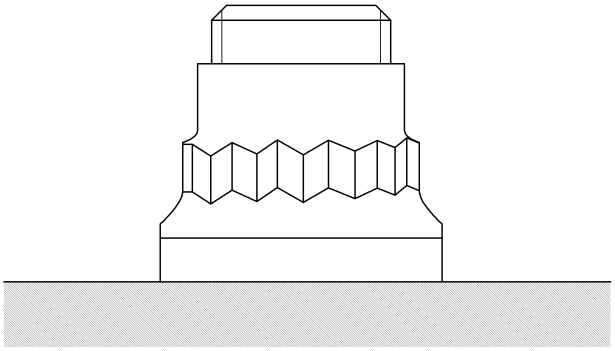

Locking with self-locking nuts principle
Figure 1

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TASK 70-42-00-940-803-A01

LOCKING OF ASSEMBLIES WITH LOCK-WIRE AND CABLE AND INSTALLATION OF WARRANTY SEALS GENERAL

1. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 70-01-00-940-801 / Standard Practices - General
– Task 70-41-00-940-801 / Tightening torques - General.

2. GENERAL

This TASK specifies:

– The purpose of the locking procedure and of the warranty seal installation
– The components, assemblies or equipment subject to a locking procedure
– The locking principles to be complied with
– The installation of the warranty seals
– The rules about the integrity of the warranty seals.

This TASK deals with the immobilization time of the threaded assemblies and the sealing of the adjusting components. It applies to the whole Safran Helicopter Engines company and to their suppliers and repair centers for new or repaired items when the definition drawing mentions it.

This TASK only applies when specifications or contracts allow for the use of lock-wire.

The purpose of the locking procedure is to prevent loosening of the threaded assemblies so that the parts held by these assemblies are immobilized.

The installation of the warranty seals ensures the integrity of the locking so that it is possible to disassemble or modify the adjustment of the sealed component only after destruction of the seal. It also ensures that this seal cannot be used again.

Terminology of lock-wire and cable locking means:

– Lock-wire: Wire preventing the loosening of an assembly by screw and nut due to vibrations
– Seal: Special character that authenticates an element and prevents an object from being unlocked or modified
– Wire: Individual and cylindrical element
– Cable: set of braided strands running clockwise, with no core
– Strand: Set of twisted wires, on the left or right, around a core.

A. Preparations for locking of assemblies with lock-wire

Cut a sufficient length of lock-wire, as required for the locking principle used.

B. Locking of assemblies with lock-wire and cable and installation of warranty seals

(1) Description of standardized design

(a) Locking with lock-wire

Lock-wire is used for locking when the elements to be locked have a hole through which the wire can be passed. The wire must be twisted using suitable locking pliers.

(b) Locking principle to be complied with

1 Make sure that the tension of the lock-wire counters the loosening tendency (Refer to Figure 1).

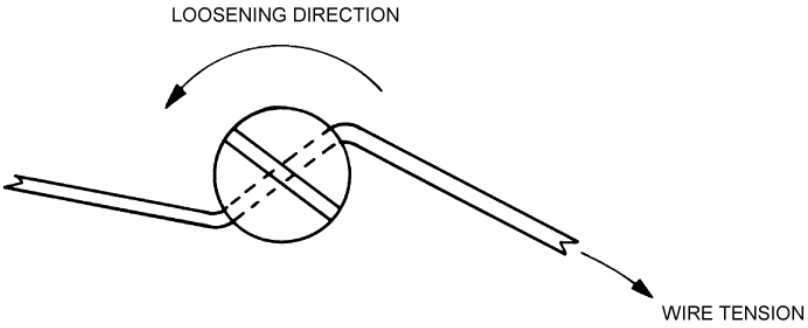
2 Pull the wire taut between the elements to be locked and the attachment points.

3 Twist the wire ends together over a length of approximately 10 mm (0.3937 inches) (Refer to Figure 2).

NOTE: ***The twisted section of the wire shall comprise at least four turns.***

4 Bend the twisted section along the part to be locked.

5 Form a loop with the end of the twisted section (Refer to Figure 3).



Lock-wire locking principle
Figure 1

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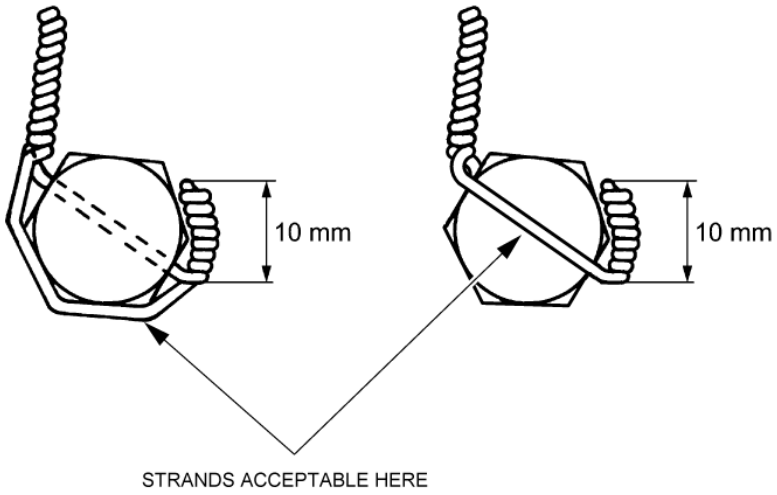

Lock-wire locking principle
Figure 2

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Lock-wire locking principle
Figure 3

(c) Double-wire locking.

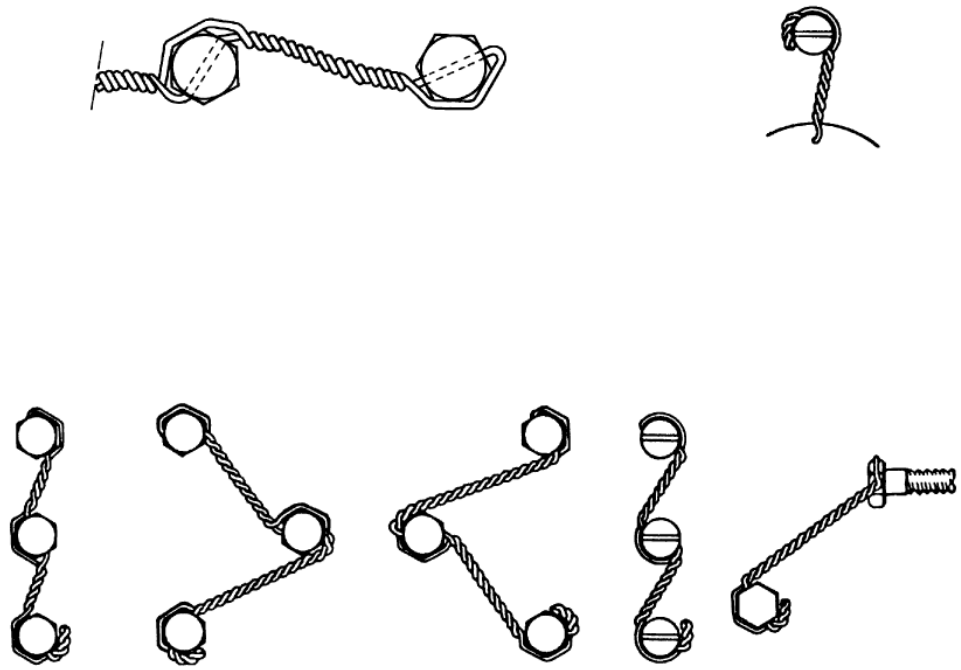
1 Carry out double-wire locking on screws (Refer to Figure 4).

2 Carry out double-wire locking on unions (Refer to Figure 5).

NOTE: ***Start the locking from the eye welded at the base of the body of the union, if the union is not easy to access. Tuck the end of the twisted section into the locking hole of the nut (Refer to Figure 6).***

3 Carry out single-wire locking on screws which are close together, or screws configured in closed geometrical shapes (Refer to Figure 7).

4 Carry out locking on protection covers over adjusting screws of accessories (Refer to Figure 8).



Double-wire locking on screws
Figure 4

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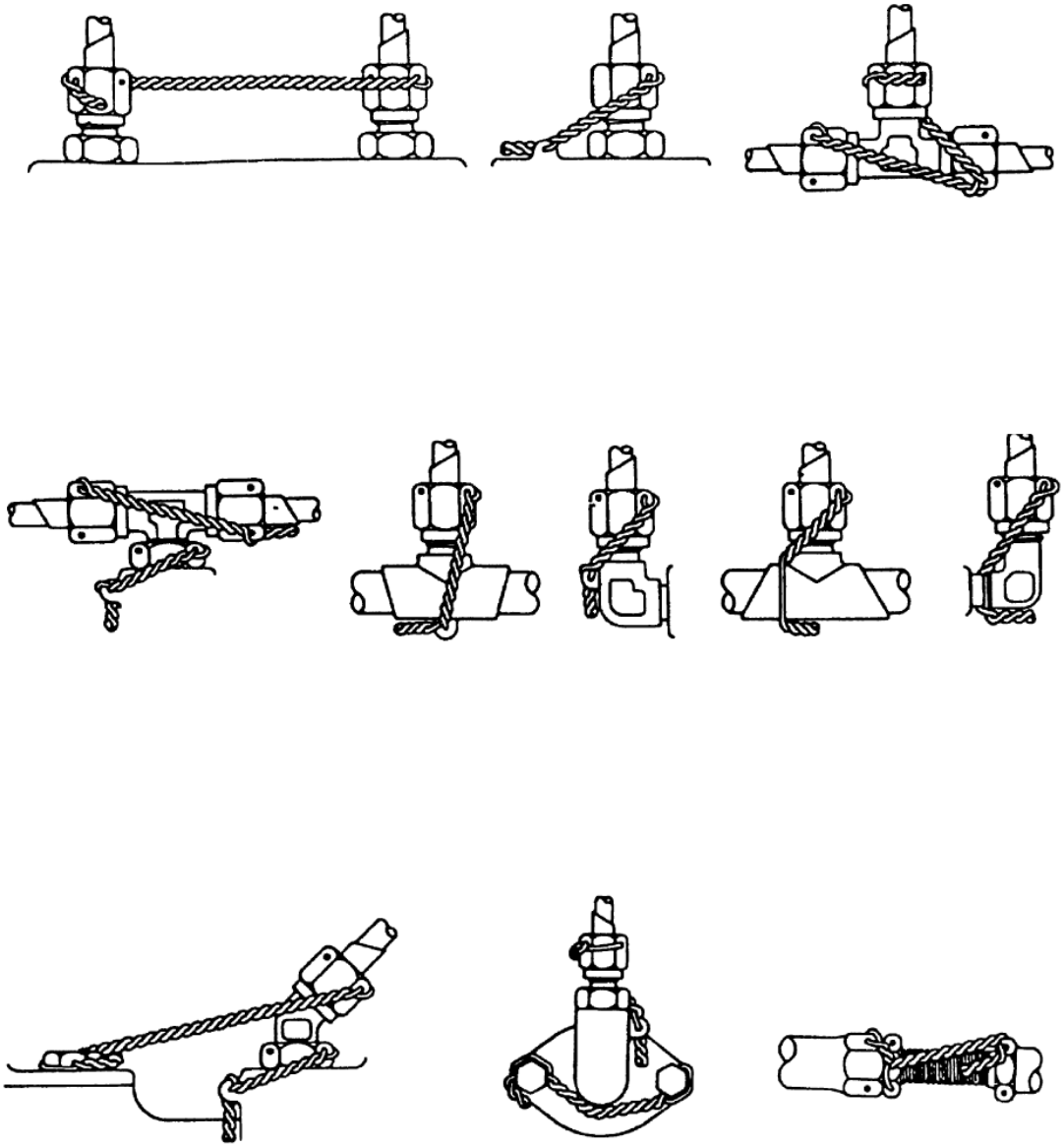

Double-wire locking on unions
Figure 5

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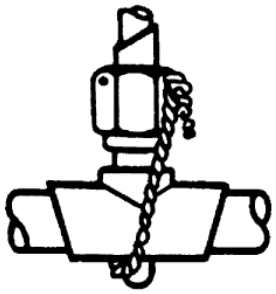

Locking on unions which are difficult to access
Figure 6

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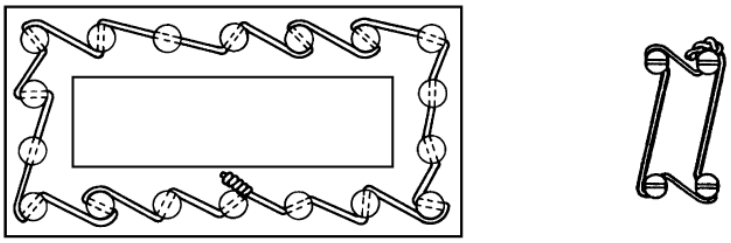

Locking of screws which are close together or screws configured in closed geometrical shapes
Figure 7

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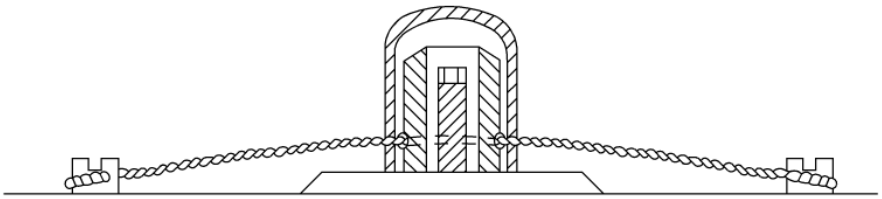
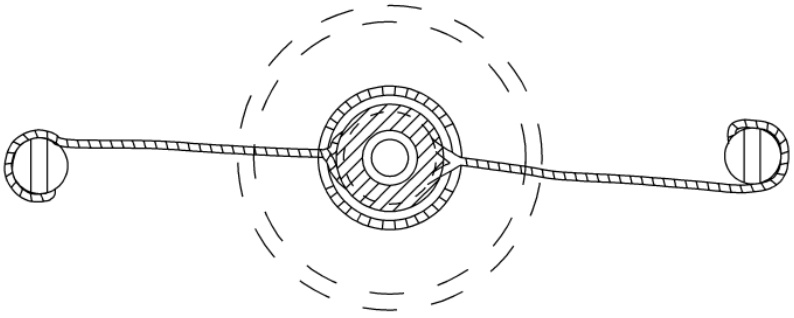


SIDE VIEW



TOP VIEW

Locking of protection covers over adjusting screws of accessories
Figure 8

(2) Locking with a crimped cable (Refer to Figure 9 , Figure 10).

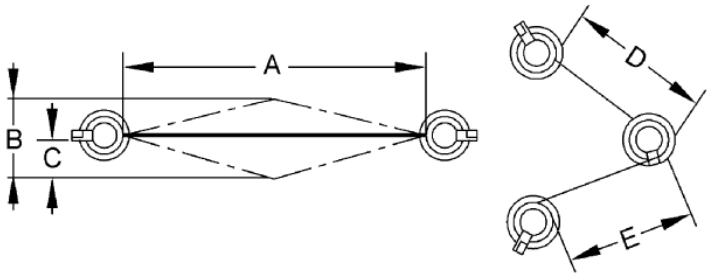
Locking with a crimped cable can be replaced by lock-wire locking if:

– The screw is used only for support and not for tightening purposes with a determined dominating force; i.e. it is authorized that the screw be untightened by a quarter of a turn
– The cable only provides for integrity of the threaded element
– There isenoughspace around the elements to be locked to introduce the crimping pliers and pull the cable properly.

The cable must betautfor efficient locking, the tension to be applied must counter the loosening tendency.

Value of cable tension measured as a function of the maximum deflection value (Refer to Figure 9)

– "A" stands for the distance between the two ending points of the assembly
– For 3 screws locked together A = D + E.



A (mm)	B (mm)	C (mm)
13	3	1.5
25	6	3
50	9	4.5
76	10	5
100	11.6	5.8
125	12.6	6.3
150	15.8	7.9

B: TOTAL CLEARANCE
C: MAXIMUM DEFLECTION

Value of cable tension measured as a function of the maximum deflection value
Figure 9

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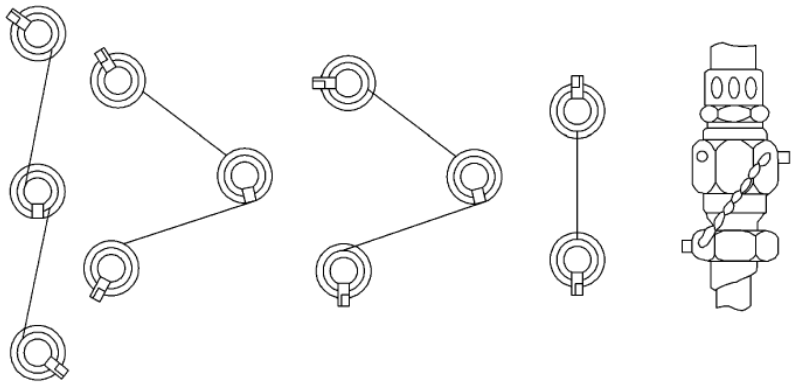


Example of cable installation
Figure 10

(3) Installation of the warranty seals

This paragraph deals with the installation of all types of warranty seals attached to the two-strand twisted lock-wire or to the crimped cable.

The rules mentioned hereafter will ensure:

– The seal integrity
– The immobilization of the seal during the operation. The stresses caused by the seal weight can lead to the rupture of the wire when elements are submitted to vibrations
– The safety of the personnel.

(a) Rules for the integrity of the warranty seals.

The warranty seal must be so attached to the wire that any disassembly or modification of the sealed element adjustment causes the destruction of the seal and prevents for re-using it.

Only aluminum-alloy seals P/N 9560146340 are authorized. Lead seals are prohibited.

"TM" must be engraved on one side of the jaws of the crimping pliers and the name of the person responsible for the sealing procedure must be engraved on the other side.

If one element to be sealed is attached with several screws, the seal installation procedure can be done on one single screw provided this screw prevents the element from being disassembled.

A single seal ensures several sealings when the same lock-wire goes through these seals.

(b) Rules for the safety of the two-strand twisted lock-wire

1 Example of application (Refer to Figure 11).

The wire section used for attaching the warranty seal must be:

– Independent from the wire section that is used for locking the element to be sealed
– As short as possible
– Attached at its ends to prevent any possible movement of the warranty seal when operating the material/equipment
– The free ends of the wire must be bent to prevent injury to the personnel.

2 Lock-wire and warranty seal on a screw (Refer to Figure 12).

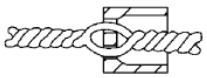
The warranty seal is installed on the lock-wire which grabs onto itself either by bypassing the screw head or by passing over the screw.

In both cases, the warranty seal is in contact with the screw head and this reduces the possibility of a seal deflection in case of vibrations.

3 Lock-wire and warranty seal on two screws (Refer to Figure 13).

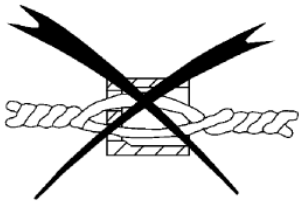
"A" Wire section that ensures locking.

"B" Wire section for the warranty seal installation.



CORRECT

DISTORTION OF SEAL TWISTED SECTION.
SEAL CANNOT BE MOVED.



INCORRECT

SEAL CAN BE MOVED IN
NON-TWISTED SECTION.

Example of application
Figure 11

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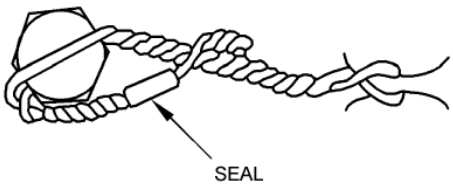

Lock-wire and warranty seal on a screw
Figure 12

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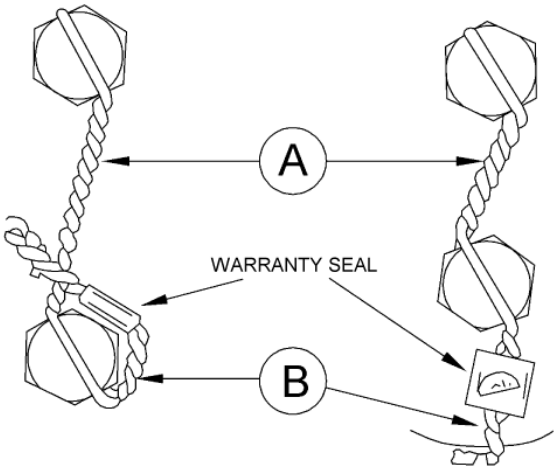


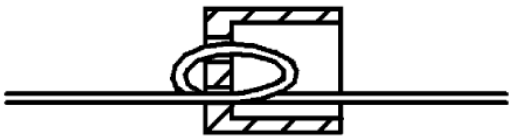
Lock-wire and warranty seal on two screws
Figure 13

(c) Rules for the safety of the crimped cable.

1 The cable must form a loop getting into the seal (Refer to Figure 14).

2 Position of the seal on the crimped cable (Refer to Figure 15).

The warranty seal must be put on the cable and be crimped before passing the cable through the last hole and before pulling and crimping the final cable grip.



The cable must form a loop getting into the seal
Figure 14

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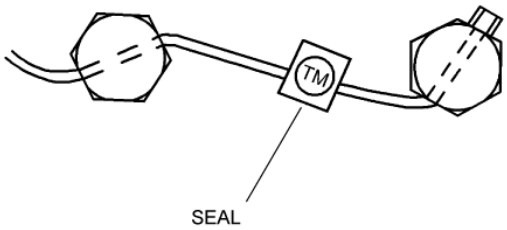


Position of the seal on the crimped cable
Figure 15

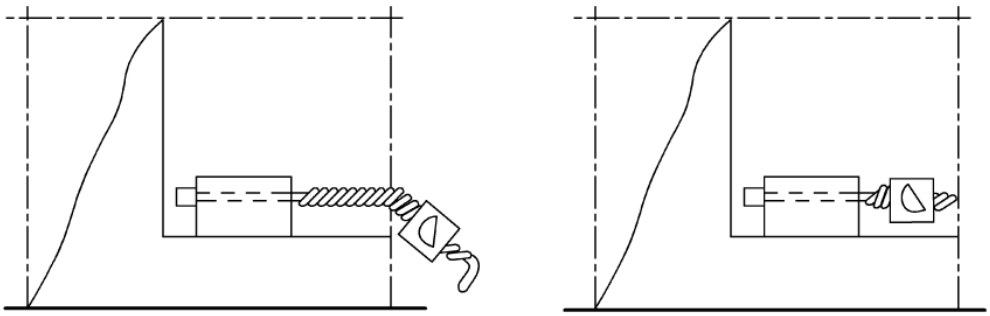
(4) Cable + wire locking combination

On a material/equipment that includes several threaded assemblies, the crimped cable locking and the lock-wire method can be used on different elements.

Leave a sufficient space (5 mm as a minimum) between the element to be locked and the surrounding parts so that the lock-wire or the crimped cableareintroduced easily during the installation.

Under no circumstancesmustthe warranty seals or the crimped cable end-fittings extend beyond the shroud of the locked element (Refer to Figure 16).

It is forbidden to disassemble the support of an adjusted and sealed element if this operation is likely to cause misadjustment of this same element (ex: flowrate adjusting screw support).



Position of the seal and the end-fitting
Figure 16

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TASK 70-42-00-940-804-A01

LOCKING OF ASSEMBLIES WITH LOCK PLATE GENERAL

1. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 70-01-00-940-801 / Standard Practices - General
– Task 70-41-00-940-801 / Tightening torques - General.

2. GENERAL

This TASK provides the necessary information for the locking of the assemblies with lock plate.

The lock plate is a piece of metal plate which replaces the washer of the screw or the nut during assembly.

CAUTION: A LOCK PLATE OF NUT IS USED ONLY ONCE. REPLACE THE LOCK PLATE AT EACH DISASSEMBLY OPERATION.

CAUTION: DO NOT PRESS THE FOLD, IN ORDER TO AVOID PRODUCING A SHARP EDGE, THUS PREVENTING ANY INCIPIENT FAILURE CRACKS.

CAUTION: USE ONLY THE TOOLS, EQUIPMENTS AND CONSUMMABLE PRODUCTS THAT ARE QUALIFIED BY SAFRAN HELICOPTER ENGINES. USE OF OTHER MEANS, EQUIPMENT OR REPLACEMENT PRODUCTS MUST BE RATIFIED ACCORDING TO THE SAFRAN HELICOPTER ENGINES PROCEDURES IN FORCE.

A. Locking of assemblies with lock plate

(1) Select the lock plate to install.

(2) Grip the lock plate with smooth and round-nosed pliers.

NOTE: ***Use a pair of smooth or round-nosed pliers. Use a locking tool or a drift if it is not possible to use pliers.***

(3) Slightly lift the two locking tabs.

(4) Install the lock plate under the screw head or under the stud.

(5) Tighten the screw or nut to the appropriate tightening torque.

(6) Bend up the first tab against the screw head or nut (Refer to Figure 1).

(7) Bend up the second tab of the lock plate with a drift (Refer to Figure 2).

(8) Press the two tabs against the nut, either on one flat (Refer to Figure 3), or on two flats (Refer to Figure 4).

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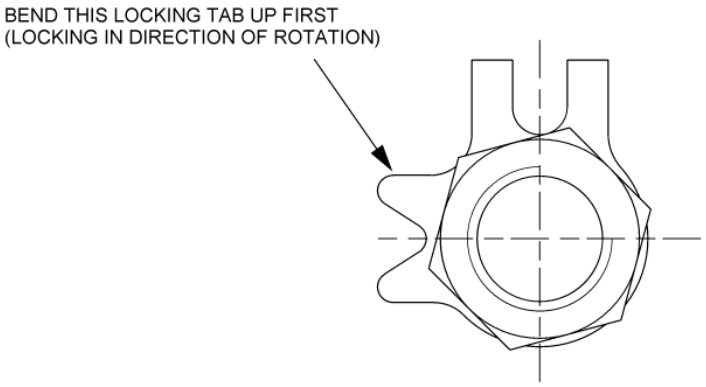

Lock plate installation principle
Figure 1

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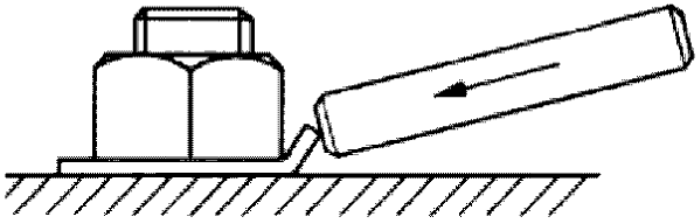

Lock plate installation principle
Figure 2

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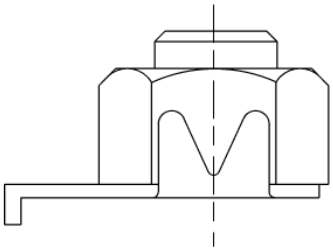

Installation of a lock plate on one flat principle
Figure 3

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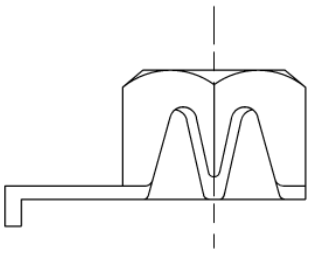


Installation of a lock plate on two flats principle
Figure 4

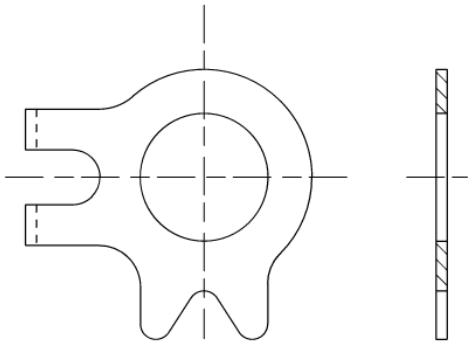
(9) Use the following lock plates with lock nuts (Refer to Figure 5)

(a) Use on a straight edge, anchoring by bending the tabs (Refer to Figure 6).

(b) Use on a curved edge, anchoring by bending the tabs (Refer to Figure 7).

(c) Use on a rib (Refer to Figure 8).

(d) Use in the presence of a locking hole (Refer to Figure 9).



For flat lock nut
Figure 5

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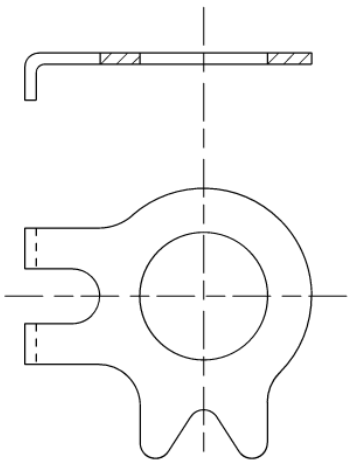

Use on a straight edge
Figure 6

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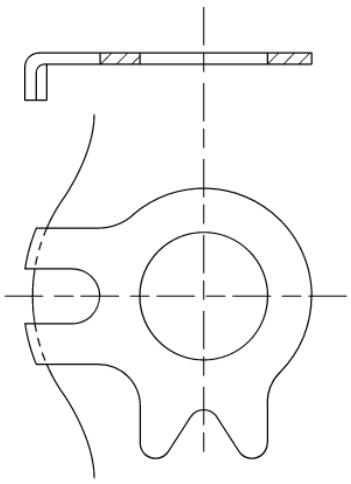

Use on a curved edge
Figure 7

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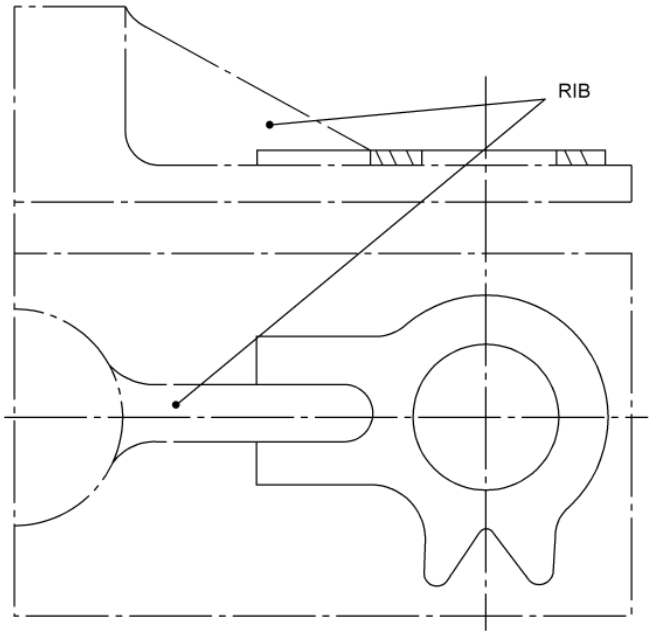

Use on a rib
Figure 8

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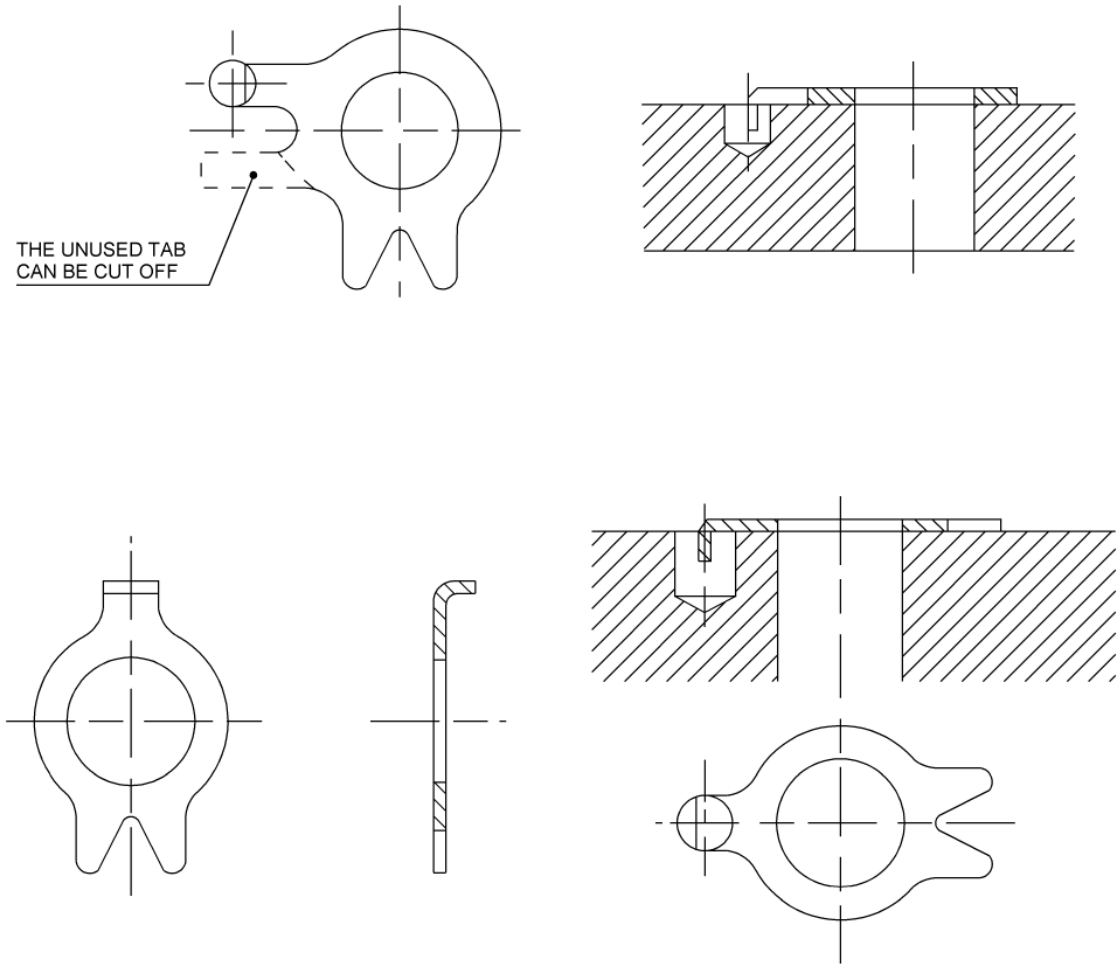


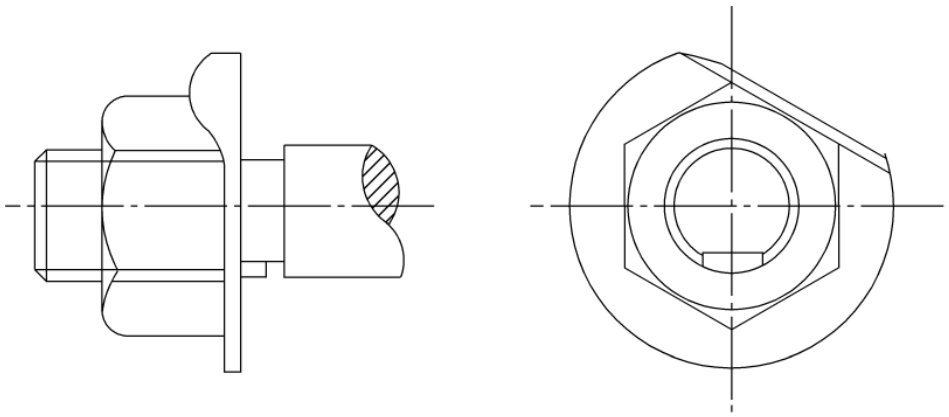
Use in the presence of a locking hole
Figure 9

(e) Circular lock plate with lugs

1 Use on a nut screwed onto a splined threaded shaft (Refer to Figure 10).

2 Rectangular lock plate

a Use on casing flange (Refer to Figure 11).



Use on a nut screwed onto a splined threaded shaft
Figure 10

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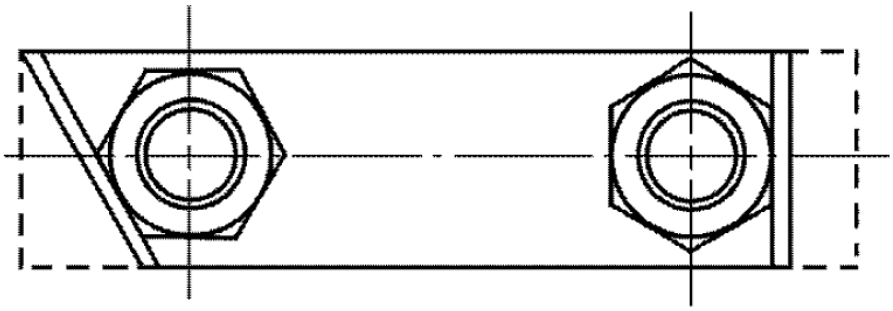

Use on casing flange
Figure 11

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TASK 70-42-00-940-805-A01

LOCKING OF ASSEMBLIES WITH SPLIT PIN GENERAL

1. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 70-01-00-940-801 / Standard Practices - General
– Task 70-41-00-940-801 / Tightening torques - General.

2. GENERAL

This TASK provides the necessary information for the locking assemblies with split pins.

The locking of assemblies by split pin is carried out on hexagonal and castellated nuts.

CAUTION: USE ONLY THE TOOLS, EQUIPMENTS AND CONSUMMABLE PRODUCTS THAT ARE QUALIFIED BY SAFRAN HELICOPTER ENGINES. USE OF OTHER MEANS, EQUIPMENT OR REPLACEMENT PRODUCTS MUST BE RATIFIED ACCORDING TO THE SAFRAN HELICOPTER ENGINES PROCEDURES IN FORCE.

A. Locking of assemblies with split pin

CAUTION: NEVER RE-USE A SPLIT PIN. SYSTEMATICALLY DISCARD ANY SPLIT PIN REMOVED.

(1) Choose the appropriate split pin for the screw diameter, refer to the following Table:

Diameter of screw		*Diameter of pin*		*Length of pin*	
4 5	0.1575 0.1969	1	0.0394	12	0.4724
6	0.2362	1.5	0.0591	15	0.5906
7 8	0.2756 0.3150	1.5	0.0591	20	0.7874
10 12	0.3937 0.4737	2	0.0787	25	0.9843
14	0.5512	3	0.1575	30	1.1811
16	0.6299	3	0.1181	35	1.3780
18 20	0.7087 0.7874	4	0.1575	40	1.5748
22	0.8661	4	0.1575	50	1.9685
24	0.9449	5	0.1969	60	2.3622
27 33	1.0630 1.2992	5	0.1969	60	2.3622
39	1.5354	6	0.2362	70	2.7559
45	1.7717	6	0.2362	75	2.9528

CAUTION: DO NOT STRIKE ON THE HEAD OF THE PIN TO DRIVE THE IT INTO ITS HOUSING.

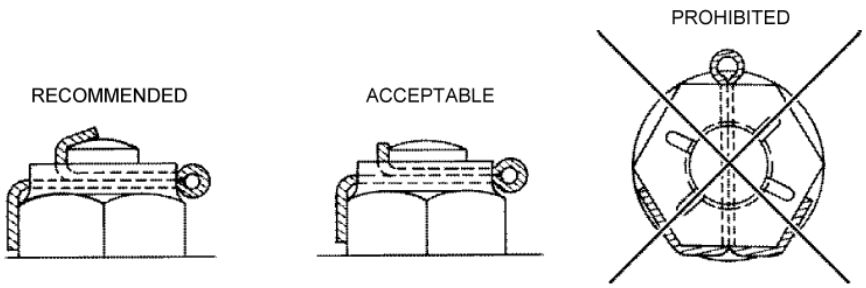
CAUTION: ALL STUDS AND SCREWS WHICH COMPRISE A CASTELLATED NUT MUST BE LOCKED WITH A SPLIT PIN AS SOON AS THE NUT IS TIGHTENED.

CAUTION: NEVER RE-USE A SPLIT PIN. SYSTEMATICALLY DISCARD ANY SPLIT PIN REMOVED.

(2) Engage the split pins in its housing with smooth and round-nosed pliers (Refer to Figure 1).

(3) Cut the ends of the split pin with pliers before bending them.

(4) Make sure that the split pin is perfectly secured in its housing.



Split pin installation principle
Figure 1

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TASK 70-42-00-940-806-A01

LOCKING OF ASSEMBLIES WITH TAB NUTS GENERAL

1. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 70-01-00-940-801 / Standard Practices - General
– Task 70-41-00-940-801 / Tightening torques - General.

2. GENERAL

This TASK provides the necessary information to lock the tab nuts.

CAUTION: USE ONLY THE TOOLS, EQUIPMENTS AND CONSUMMABLE PRODUCTS THAT ARE QUALIFIED BY SAFRAN HELICOPTER ENGINES. USE OF OTHER MEANS, EQUIPMENT OR REPLACEMENT PRODUCTS MUST BE RATIFIED ACCORDING TO THE SAFRAN HELICOPTER ENGINES PROCEDURES IN FORCE.

A. Locking of tab nuts

(1) Tighten the tab nut to the appropriate torque (Refer to Task 70-41-00-940-801).

(2) Loosen the nut and then re-tighten it to the same torque, in order to straighten the cup of the lock.

(3) Bend the edge of the cup into the castellations of the nut (Refer to Figure 1).

NOTE: Use two diametrically opposite castellations.

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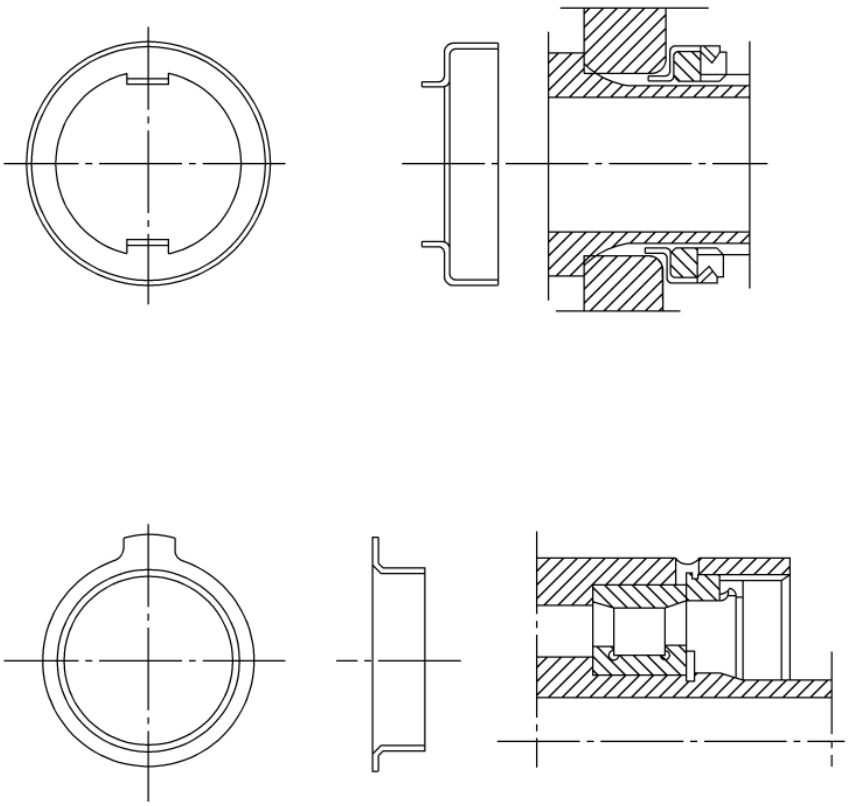

Installation of a tab nut locking principle
Figure 1

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TASK 70-43-00-940-804-A01

ELECTRICAL CONNECTORS GENERAL

1. TASKS / REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 70-01-00-940-801/Standard Practices - General
– Task 70-43-00-110-801/Electrical connectors - Cleaning.

2. GENERAL

The electrical connectors are complying with the standard EN 2997 or EN 3645. In both cases, the electrical connectors are fitted with a self-locking system.

According to these standards the tightening of the pin connector onto the receptacle connector is guaranteed when:
– The red strip on the receptacle connector is totally masked by the pin connector, for connectors complying with the standard EN 3645
– The blue strip on the receptacle connector is totally masked by the pin connector, for connectors complying with the standard EN 2997.

A. Removal procedure

CAUTION: USE CONNECTOR PLIERS IF IT IS DIFFICULT TO MANUALLY LOOSEN THE CONNECTOR.

(1) Loosen the pin connector manually.

CAUTION: DO NOT PULL THE WIRING SHEATHS, THE CONNECTOR CAST PROTECTION AND THE REAR CONNECTOR UNION.

(2) Disengage the pin connector from the receptacle connector.

NOTE: Loosen the cable attaching clamps as required.

(3) If necessary, mark the position of the connector.

(4) Blank the equipment/accessory receptacle.

(5) Blank the movable plug.

(6) Hold the cable without folding it or pulling it.

B. Check of electrical connector

(1) Make sure that the electrical connector has not seized up.

(2) Wipe all traces of oil, grease, mould or impurities with a clean lint-free cloth.

(3) Clean the pins and the insulator. Refer to Task 70-43-00-110-801.

(4) Dry the electrical connector in dry compressed air at a low pressure.

(5) Make sure that the electrical connector body is not damaged.

(6) Make sure that the pins have no clearance and that they are not damaged.

(7) Make sure that the insulator of the electrical connector has no cracks, tears or hot spots.

C. Check of harness

(1) Make sure that the harness on the side of the electrical connector is in good condition.

(2) Make sure that the sleeve of the harness is in good condition.

D. Installation of electrical connector

CAUTION: MAKE SURE THAT THE ELECTRICAL SYSTEM IS DE-ENERGISED.

(1) Install the electrical harness.

- The cable must be positioned without folding it or pulling it.
- The cable must be positioned in such a way that the cable should not interfere with other engine parts.

(2) Make sure that the pin connector has the same identification as the receptacle connector.

(3) Remove the blanks.

(4) Align and engage the pin connector in the receptacle connector.

CAUTION: NEVER USE PLIERS TO LOCK A MOVABLE CONNECTOR.

CAUTION: THE APPLICATION OF AN EXCESSIVE TIGHTENING TORQUE CAN DAMAGE A CONNECTOR: THE MAXIMUM PERMITTED TORQUE IS GIVEN FOR EACH SIZE OF CONNECTOR UNIT IN THE STANDARD EN3645.

(5) Tighten the moving ring of the pin connector manually and continuously until the colored strip that equipped the receptacle connector is completely hidden so as to obtain a mechanical stop unit between the bodies of the pin connector and the receptacle connector.

The full locking of a pin connector on a receptacle connector requires:

- A turn (360 degrees) for an assembly complying with the standard EN3645
- Four turns for an assembly complying with the standard EN2997.

NOTE: ***Connecting and disconnecting can be easily done manually. For the connectors complying with the standard EN3645 that are fitting the electronic control unit and considering the low clearance between the connectors it is admitted to use a gripping plier fitted with PTFE for the locking of the connectors. This operation is only admitted when the manual tightening is difficult.***

NOTE: ***If the tightening is getting more difficult during the connection slightly agitate the body of the union of the pin connector when trying to tighten a little more.***

(6) Make sure that the colored strip on the receptacle connector is no longer visible.

TASK 70-43-00-940-805-A01

BASIC ELECTRICAL TEST – ELECTRICAL DIAGRAMS READING GENERAL

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Description	*Quantity*
milliohmeter	1
multimeter	1
power supply	1
megaohmeter	1

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Not applicable

B. Additional provisions

Not applicable

2. TASKS/REFERENCE DOCUMENTS

Not applicable

3. GENERAL

A. SYMBOLS / DIAGRAMS

(1) Electrical components symbols

Refer to Figure 1

(2) Reading of a harness electric diagram

Refer to Figure 2

NOTE: ***The schematics of the harnesses and equipment can be found in the "Description and operation" task of the equipment concerned.***

(3) Waterproof / non-waterproof connector

Refer to Figure 3

(4) Connector structure

Refer to Figure 4

(5) Read the pin numbers

Refer to Figure 5

Wire Symbols		
	Electrical Wire	Conductor or electrical current
	Connected Wires	Connected crossing
	Not Connected Wires	Wires are not connected
Switch Symbols and Relay Symbols		
	SPST Toggle Switch	Disconnects current when open
	SPDT Toggle Switch	Selects between two connections
	Pushbutton Switch (N.O)	Momentary switch - normally open
	Pushbutton Switch (N.C)	Momentary switch - normally closed
Ground Symbols		
	Earth Ground	Used for zero potential reference and electrical shock protection.
	Chassis Ground	Connected to the chassis of the circuit
	Digital / Common Ground	
Resistor Symbols		
	Resistor (IEEE)	Resistor reduces the current flow.
	Potentiometer (IEEE)	Adjustable resistor - has 3 terminals.
Capacitor Symbols		
	Capacitor	
Inductor / Coil Symbols		
	Inductor	Coil / solenoide that generates magnetic field.
Power Supply Symbols		
	Voltage Source	Generates constant voltage
	Current Source	Generates constant current
	AC Voltage Source	AC Voltage Source
Meter Symbols		
	Voltmeter	Measures voltage. Has very high resistance. Connected in parallel.
	Ammeter	Measures electric current. Has near zero resistance. Connected serially.
	Ohmmeter	Measures resistances
Lamp / Light Bulb Symbols		
	Lamp / light bulb	Generates light when current flows through
Diode / LED Symbols		
	Diode	Diode allows current flow in one direction only (+ to -).

Electrical components symbols
Figure 1

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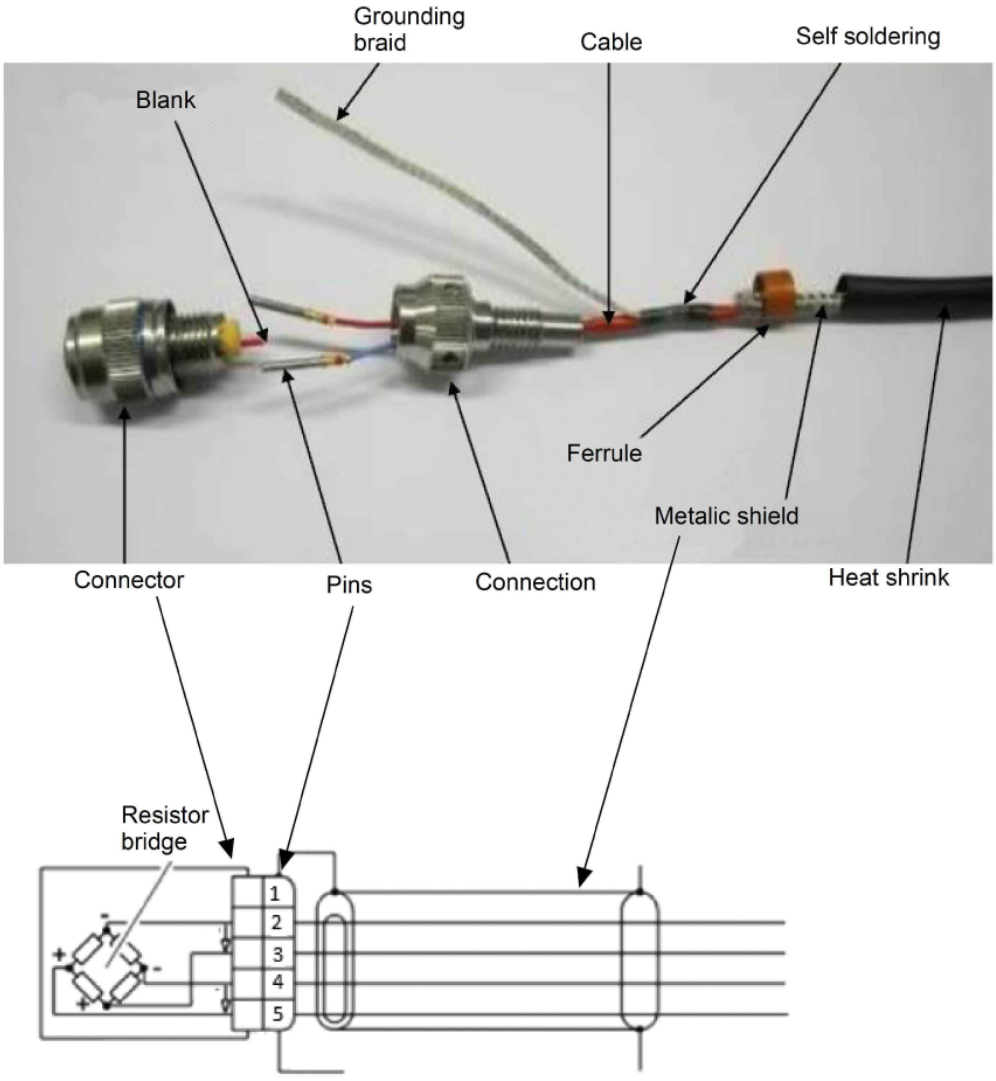

Harness electric diagram
Figure 2

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waterproof

non-waterproof

Waterproof / non-waterproof connector
Figure 3

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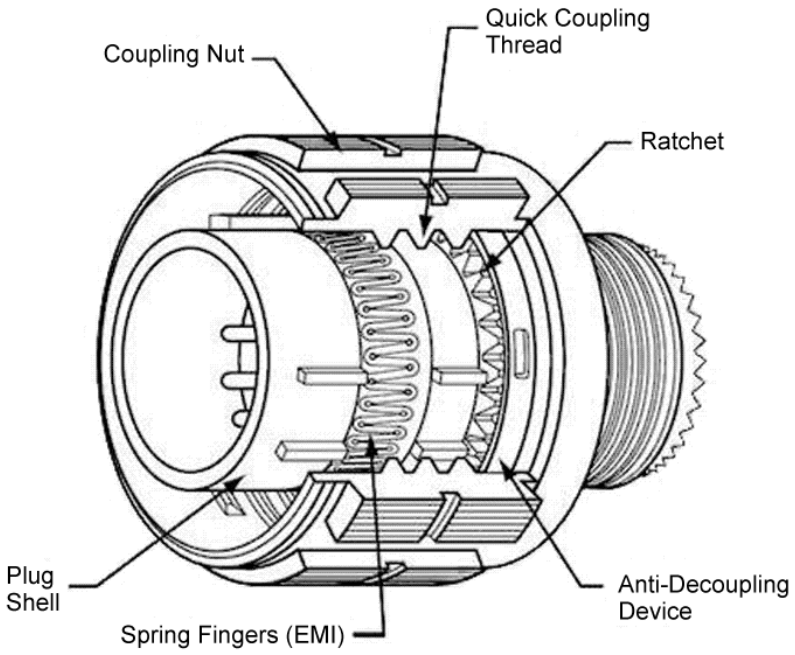

Connector structure
Figure 4

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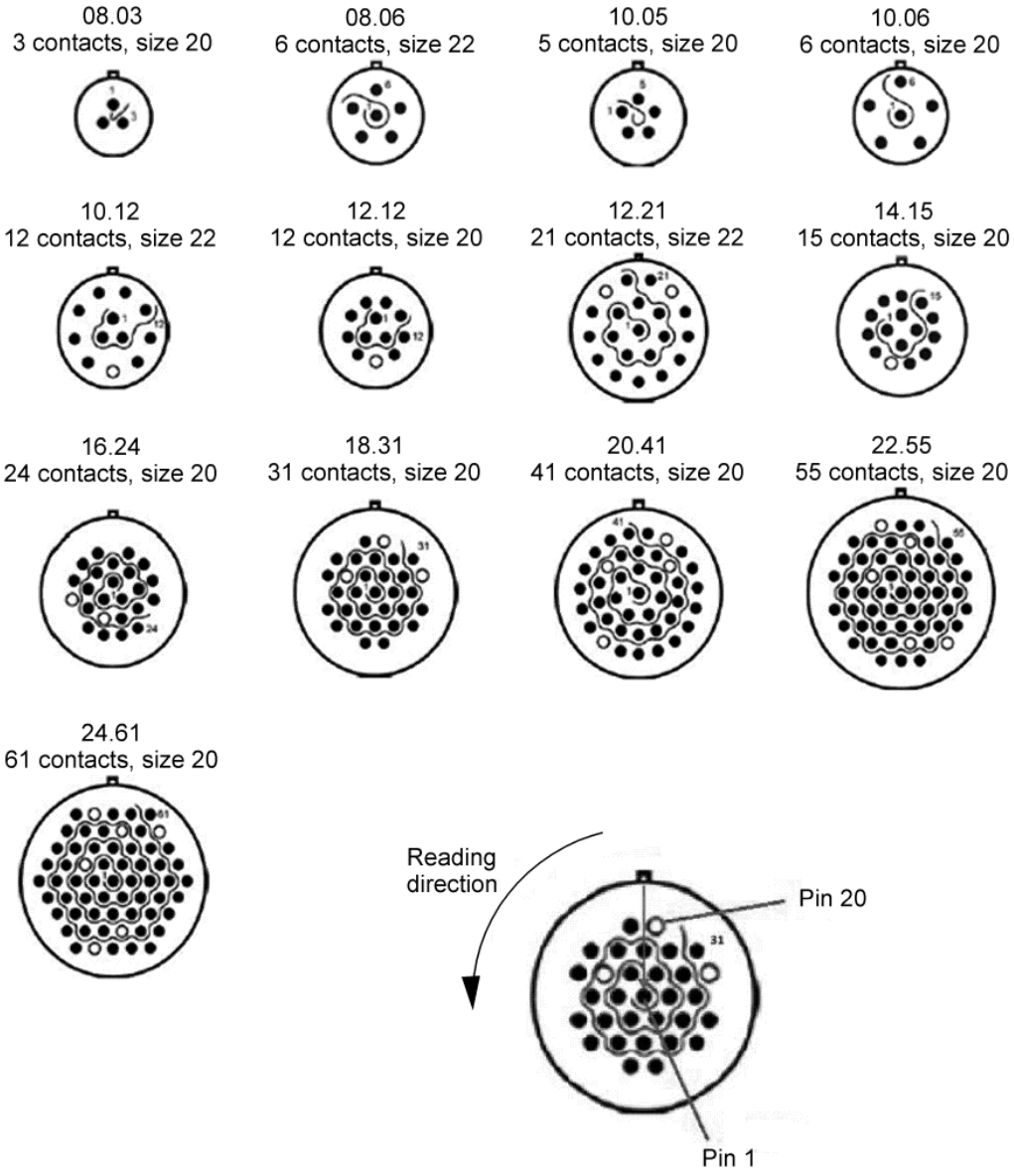


Pin numbers
Figure 5

B. DESCRIPTION TEST

(1) Insulation

(a) Description

Allow to control the insulation between the systems lines, bonding parts and shielding, to avoid degrade equipment and interfaces.

Refer to Figure 6

CAUTION: DO NOT PERFORM AN INSULATION TEST WITH 500V ALTERNATIVE. THIS CAN DAMAGE THE TESTED ACCESSORY.

(b) Procedure

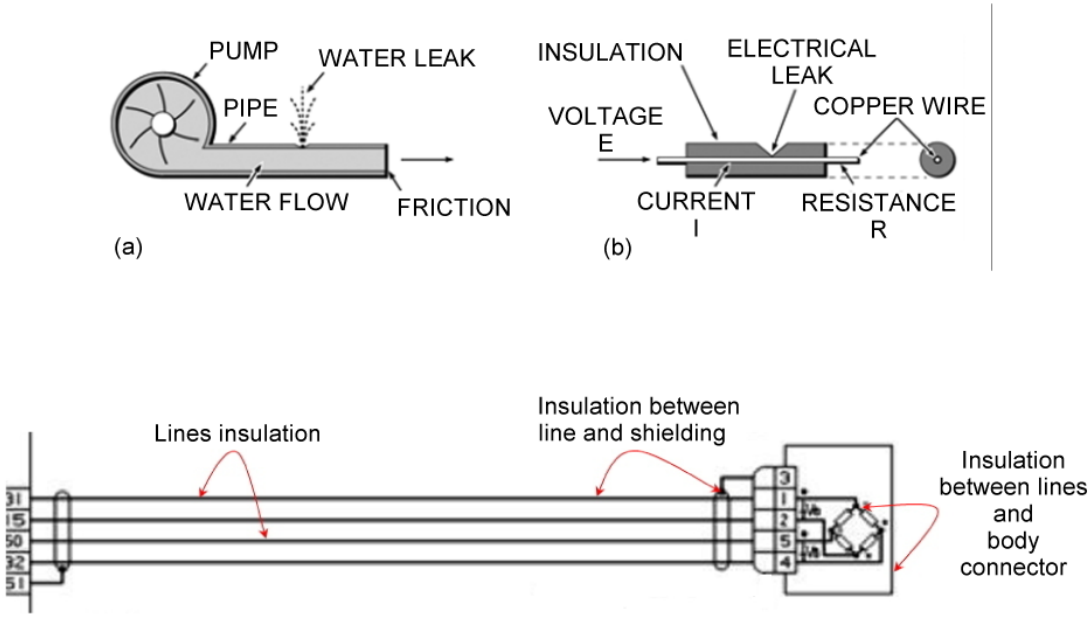
(Refer to table 1)

Use an insulation tester / megaohmeter (45 or 50V continuous).

Table 1 : Insulation test

Troubleshooting	*Best practice*	*Value*
Degraded wire / insulator Connector degradation	Test is done under 50V (1)	> 1 Megaohm

(1) This voltage is bigger than the normal utilization voltage, and will show any insulation damage (that would be invisible at normal utilization voltage range).



Insulation
Figure 6

(2) Bonding - metalization

(a) Description

Check of an electrical circuit to make sure that, in case of lightning or electromagnetic interference, the electrical current will flows to the ground instead of disrupting and/or damaging the equipment.

CAUTION: DO NOT USE THE OHMMETER TO PERFORM THIS TEST (THE "BIP" FUNCTION IS NOT TO BE USE AS WELL, NOT PRECISE ENOUGH).

(b) Procedure

(Refer to table 2)

Use a milliohmeter.

Table 2 : Bonding - metalization check

Troubleshooting	*Best practice*	*Value*
Internal resistance from control material Corrosion on interfaces Missing vaseline Brisal.	Do a test under charge (1A or 10A).	Milliohms.

NOTE: Make sure that the device is de-energized before performing a bonding test.

NOTE: Continuity is non-directional, you can switch probes and it will be the same.

(3) Continuity

(a) Description

Refer to Figure 7

Check of an electric circuit to see if it is open or close.

CAUTION: MAKE SURE THAT THE DEVICE IS DE-ENERGIZED BEFORE PERFORMING A CONTINUITY TEST.

(b) Procedure

Refer to Figure 7

Use a multimeter(Refer to table 3).

Table 3 : Continuity test

Troubleshooting	*Best practice*	*Value*
Wire cut or corrosion	Always do a test to make sure that your multimeter is working before starting the test by brushing the two tips together, and verifying you hear the "bip".	Few milliohms.

NOTE: However, during the actual test, do not use the "bip" function as it is not precise enough. The resistance should be really low.

NOTE: ***The test pin to pin on connector can't be used on normaly open components (pre-blockage switch, blockage switch and electrical magnetic plug).***

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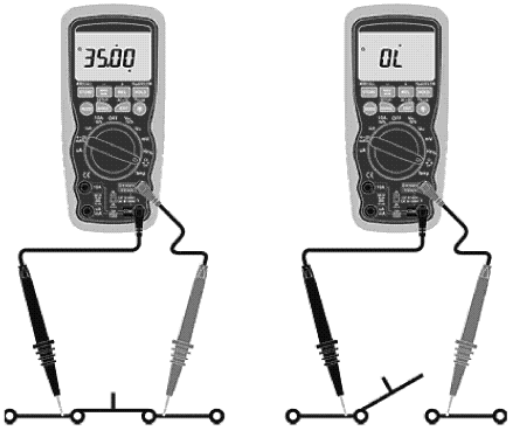
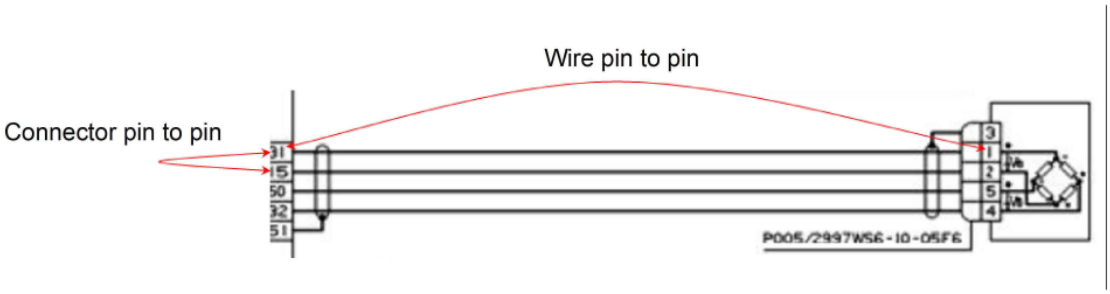




Continuity
Figure 7

(4) Voltage drop

Refer to Figure 8

(a) Description

Check the dissipation of energy in a circuit by supplying some amps and checking the voltage drop.

This test is used on fire detectors for example.

CAUTION: NOT PROPERLY CONNECT THE VARIOUS EQUIPMENT MAY INDUCE FALSE READINGS.

(b) Procedure

(Refer to table 4)

Use:

- A millivoltmeter
- A power supply,
- An ammeter
- A resistor.

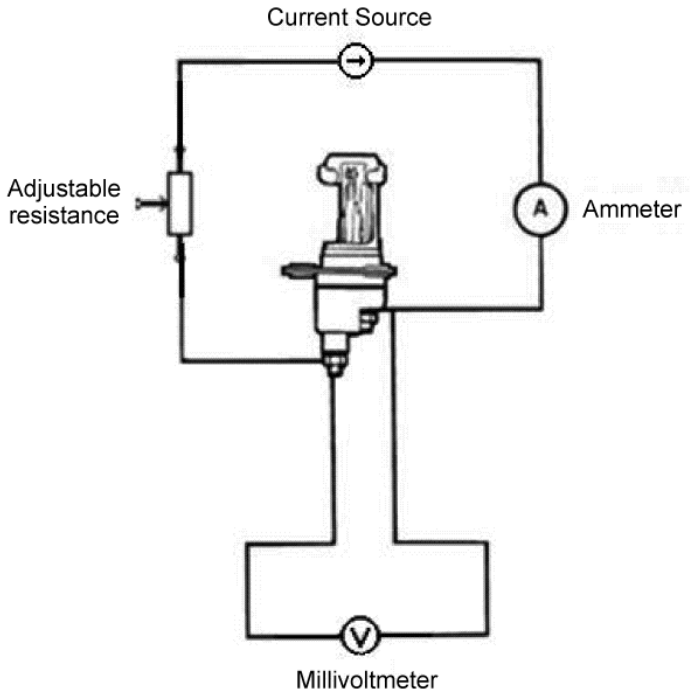
Table 4 : Voltage drop check

Troubleshooting	*Best practice*	*Value*
Bad connection - wire.	N/A	Few millivolts.

NOTE: ***The values defined in the table are used to give a scale of what we are supposed to find. The precise values are found in the Maintenance tasks of the concerned equipment.***

NOTE: ***In case of a continuity check result out of tolerance, please contact Safran Helicopter Engines representative in order to define if the equipment can be accepted under concession.***

NOTE: ***For all the tests described previously, the direction the test equipment are plugged does not matter.***



Voltage drop
Figure 8

C. Electrical test set description

This equipment is designed to control continuity, insulation and correct electrical operating condition of harnesses and their connected equipment.

Refer to Figure 9

(1) Safran Helicopter Engines tooling shared by all engine types

  (a) Test set (1)

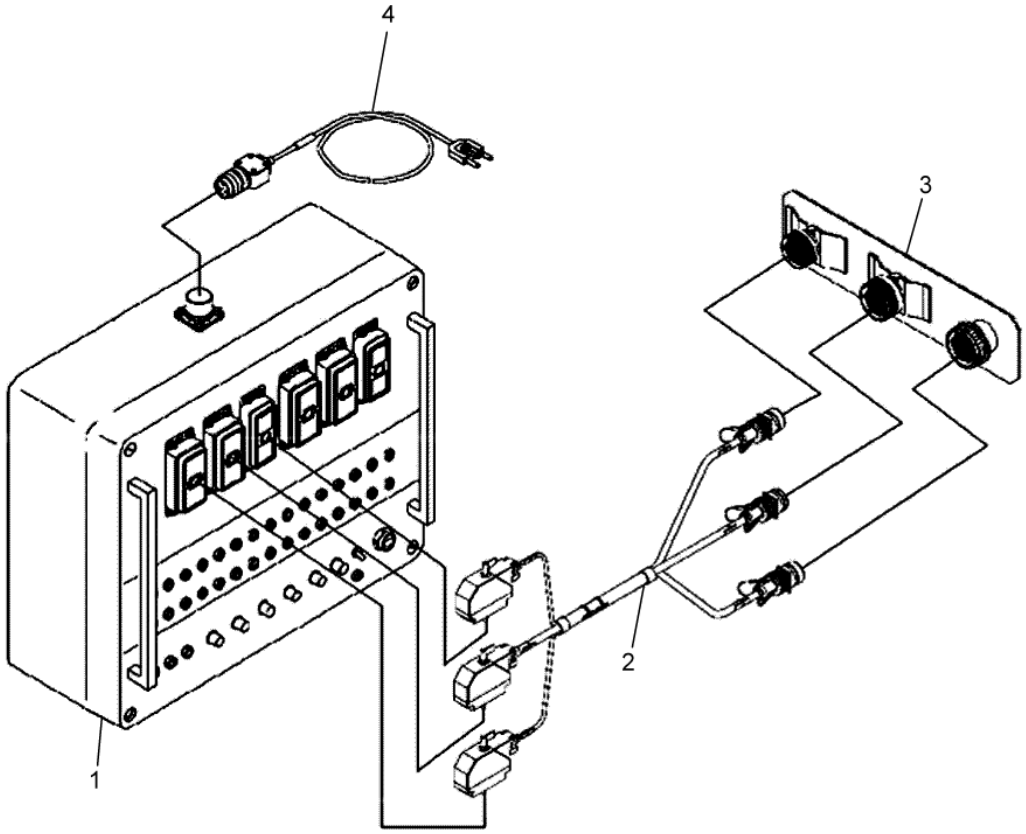
(2) Safran Helicopter Engines tooling specific to each engine type

  (a) Specific harnesses (2)

  (b) Set of self test connectors (3)

(3) Safran Helicopter Engines tooling specific to each airframe

  (a) Power supply harness (4)



Electrical test set
Figure 9

This tool are also capable of activating the following starting equipment on a removed engine:

- High energy ignition unit and ignition plugs
- Start/Stop electrovalve
- Start electrovalve.

TASK 70-43-00-110-801-A01

ELECTRICAL CONNECTORS CLEANING

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Description	*Quantity*
brush	1
brush	1
sponge	1
drain pan	1

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Description	*Quantity*
stabilant 22	As required
stabilant 22A	As required
stabilant 22E	As required
SYNCLAIR A/C	As required
ARDROX 3965 or equivalent	As required

B. Additional provisions

Not applicable

2. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 71-00-02-940-801 / Fuel, lubricants, special products - General.
– Task 70-43-00-940-804 / Electrical connectors - General.

WARNING

DO NOT BREATHE THE VAPOURS OF CLEANING PRODUCTS. WORK IN A SUITABLE AND WELL-VENTILATED AREA. DO NOT ALLOW THE CLEANING PRODUCTS TO REMAIN IN CONTACT WITH THE SKIN. PROTECT THE HANDS WITH A SYNTHETIC RUBBER GLOVES AND THE FACE WITH A SCREEN OR GOGGLES. THE CLEANING PRODUCTS MAY BE POISONOUS.

WARNING

ENSURE THAT THERE ARE NO FLAMES, SPARKS OR HOT PARTS IN THE IMMEDIATE VICINITY, IN ORDER TO AVOID ANY RISK OF FIRE OR EXPLOSION. THE PRODUCTS ARE FLAMMABLE.

WARNING

BEFORE YOU TOUCH A CADMIUM CONNECTOR, MAKE SURE THE CADMIUM CONNECTOR IS FREE FROM OXIDATION. IF THE CADMIUM CONNECTOR IS OXIDIZED, DO NOT GET THE OXIDATION ON YOUR SKIN. CADMIUM OXIDATION IS POISONOUS. IT CAN GO THROUGH YOUR SKIN AND INTO YOUR BODY. YOU MUST USE GLOVES WHEN YOU TOUCH OXIDIZED CADMIUM CONNECTORS. YOU MUST USE A RESPIRATORY PROTECTIVE MASK WHEN YOU DO WORK ON OXIDIZED CADMIUM CONNECTORS. DO NOT USE COMPRESSED AIR TO REMOVE OXIDATION ON OXIDIZED CADMIUM CONNECTORS. YOU MUST USE GLOVES WHEN YOU USE SYNCLAIR A/C SOLVENT.

CAUTION: NEVER POUR THE CLEANING PRODUCTS INTO THE SEWERS. CLEANING PRODUCTS ARE STRONG POLLUTANTS.

3. CLEANING OF ELECTRICAL CONNECTORS AND ELECTRONIC EQUIPMENT/ ACCESSORIES

A. Cleaning of cadmium-plated electrical connectors

(1) Preliminary operations

Not applicable

(2) General (Refer to Figure 601)

This cleaning process is used for all circular cadmium-plated electrical connectors that show signs of corrosion.

Signs and attacks of corrosion can be seen and found because of whitish contamination on the connectors.

(3) Cleaning procedure

(a) Disconnect the connector and pull it slowly to get access to it.

(b) Protect the connectors (male or female) with a plastic blank.

(c) Put a sponge or a drain pan under the connector.

(d) Prepare a cleaning solution with SYNCLAIR A/C diluted to 20 % (1 part of SYNCLAIR A/C for 4 parts of water).

(e) Apply SYNCLAIR A/C to the connector with a nylon brush and then lightly rub to clean it. Avoid splashing. Wait until it takes effect, for a few minutes.

(f) Collect the mixture of SYNCLAIR A/C and cadmium carefully in the drain pan or the sponge.

(g) Rinse the connector by lightly brushing it with water.

(h) Let it dry in ambient air.

(i) Do a visual inspection of the connector. Refer to the criteria in Task 70-43-00-940-804, paragraph B.

NOTE: ***It is possible that, after cleaning, the connector does not look like new again. This does not cause the electrical harness to operate incorrectly.***

NOTE: ***If there is an important damage or loss of the (olive green) cadmium-plated coating, replace the connector if it is possible. If it is not, replace the harness.***

CAUTION: DO NOT ENERGIZE THE CONNECTOR BEFORE THE PRODUCT IS FULLY EVAPORATED.

(j) When fully dry, spray ARDROX 3965 or equivalent on the cleaned connector.

(k) Connect the connector.

(4) Additional procedures

Not applicable.

B. Cleaning of electrical connectors and electronic equipment/accessories

(1) General

This task provides the information required to clean electrical connectors and electronic equipment/accessories.

This degreasing process is applicable on all metals and organic components. For the latter, contact Safran Helicopter Engines beforehand for further information.

stabilant 22 is a virtually non-toxic liquid polymer that is applied to electromagnetic contacts and that is not removed. Compared with traditional cleaner, stabilant 22 is not applied, then wiped from electrical connectors and electronic equipment/accessories. Only a small quantity of product is required, with a thickness of less than 0.0015 or 0.0020 mm generally sufficient for the treatment of electrical connectors and electronic equipment/accessories.

Compared with traditional cleaner, stabilant 22 is a non-conductive product which, when subjected to the gradient of an electric field, becomes conductive. This gradient is such that the transformation only occurs at the coupled contacts and NOT between adjacent contacts. There is thus no current leakage and the product can be used to completely cover electrical connectors and equipment/accessories in one application.

Stabilant is available in 15 ml, 50 ml, 100 ml, 250 ml and 500 ml containers in "concentrated" versions (stabilant 22), "diluted with isopropanol" (stabilant 22A) and “diluted with ethanol" (stabilant 22E).

Since the dilution ratio of stabilant 22A and stabilant 22E is 4 to 1, they generally cost a quarter of the price of the concentrated versions, even if it is the remaining concentrate that does the work once the alcohol has evaporated. Alcohol only acts here as a solvent to distribute the “concentrate” to the correct location. These versions can be applied to mounted integrated circuits without even removing them from their female connectors. The concentrate is also used to facilitate the connection of integrated circuits when mounting them on several pins due to its lubricating properties.

Electrical connectors - Cleaning
Figure 601

4. FINAL STEPS

Not applicable

TASK 70-83-00-280-801-A01

TOUCH UP PAINT- REPAIR SPECIAL PROCEDURE

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Description	*Quantity*
brush	1
paint brush	1
paint sprayer	1

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Description	*Quantity*
primer PCE215	As required
hardener PCE215 part B	As required
thinner DL151	As required
finishing LBY216 blue-gray 70740	As required
hardener LBY216 part B	As required
primer IP3–6500	As required
hardener IP3-CAT	As required
thinner IP3-Reducer	As required
finishing IP3-6005	As required

B. Additional provisions

Not applicable

2. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 70-01-00-940-801/ Standard Practices - General
– Task 71-00-02-940-801/ Fuels - lubricants - special products - General.

3. PROCEDURE

A. Preliminary operations

Not applicable

B. General

This procedure is used to do local touch-up on the areas where the protection is damaged.

This procedure gives the conditions of application of air-drying paints used for protective touch-ups of all parts that cannot be baked.

This procedure recommends the use of a paint of class D that can polymerize at ambient temperature:

– Paint primer PCE215 + paint finishing LBY216 blue-gray 70740
– or
– Paint primer IP3–6500 + paint finishing IP3-6005 .

C. Required conditions for the application of the touch-up paint:

(1) Paint BOLLORE JIVAL (PCE215 or LBY216) :

– Temperature : between 15°C and 25°C (59 at 77°F)
– Hygrometry : between 40 % and 70 %.

(2) Paint INDESTRUCTIBLE PAINT (IP3) :

– Temperature : between 15°C and 35°C (59 at 95°F)
– Hygrometry : between 35 % and 75 %.

NOTE: ***The shelf life of the different mixtures is 8 hours in tempered atmosphere at 20°C.***

D. Preparation of the surface before touch-up

(1) Remove the oxidation with a light grinding using a fine grit abrasive paper (grade 400).

(2) Do a local degreasing using a clean cloth soaked with a solvent agreed or with authorized use. Refer to Task 71-00-02-940-801.

(3) Dry the part with dry and filter compressed air.

E. Application of the primer

(1) Preparation of the primer PCE215

(a) Mix the PCE215 base gray RAL 7001 and the hardener PCE215 part B.
Add the thinner DL151, when required.

(b) The ratio in volume are as follows:

- PCE215 Base: 100 parts
- Hardener part B : 30 parts
- Thinner DL151 : 10 to 75 parts to get a fluidity of 20 to 25 seconds at the cut NF4 as per ISO 2431.

(c) Observe a curing time of 15 minutes before applying the primer.

(d) Do a check of the viscosity every 45 minute.

(2) Preparation of the primer IP3–6500

(a) Mix the IP3-6500 base light-gray RAL 7001 and the hardener IP3-CAT.

Add the thinner IP3-Reducer, when required.

(b) The ratio in volume are as follows:

- IP3-6500 base: 7 parts
- hardener IP3-CAT : 1 part
- Thinner IP3-Reducer : 10% maximum.

(c) Observe a curing time of 15 to 30 minutes before applying the primer.

(d) Do a check of the viscosity every 45 minute.

(3) Apply the mixture with a paint brush, a brush or a paint sprayer.

(4) Observe a drying time of 30 minutes at ambient air before applying the finishing paint.

F. Application of the finishing paints

(1) Finish with the BOLLORE JIVAL paint

(a) Preparation of the finishing LBY216 blue-gray 70740 (dark blue-gray and gloss color).

1 Mix the LBY216 base and the hardener LBY216 part B. At the time of the application add the thinner DL151.

2 The ratio in volume are as follows:

- LBY216 grey blue 70740 base: 100 parts
- hardener part B: 50 parts
- Thinner DL151: 10 to 50 parts to get a fluidity of 20 to 25 seconds at the cut NF4 as per ISO 2431.

(b) Observe a curing time of 15 minutes before applying the primer.

(c) Do a check of the viscosity every 45 minute.

(d) Apply the mixture with a paint brush, a brush or a paint sprayer.

(e) Observe a drying time of 3 hours at ambient air.

NOTE: The hardening is completed after 8 drying days.

(2) Finishing with INDESTRUCTIBLE PAINT paint

(a) Preparation of the finishing IP3-6005 (dark blue-gray and gloss color)

1 Mix the IP3 base and the hardener IP3-CAT.

2 The ratio in volume are as follows :

- IP3-6005 base: 3 parts.
- Hardener IP3-CAT : 1 part.
- Thinner IP3-Reducer : 10% maximum.

(b) Observe a curing time of 15 minutes before applying the primer.

(c) Apply the mixture with a paint brush, a brush or a paint sprayer.

(d) Observe a drying time of 6 hours at ambient air.

NOTE: ***The hardening is completed after 8 drying days.***

G. Additional procedures

Not applicable

4. FINAL STEPS

Not applicable

CHAPTER 71 - LIST OF EFFECTIVE PAGES

Chapter Section Subject	Task	Title	Pages	Date
71		LIST OF EFFECTIVE PAGES	* 1 - 6	June 15/2022
71		TABLE OF CONTENTS	* 1 - 6	June 15/2022
71-00-00	870-801-A01	POWER PLANT - DESCRIPTION AND OPERATION	1 - 4	Dec. 30/2018
71-00-01	940-801-A01	LIMITATIONS - GENERAL	1 - 6	June 15/2019
71-00-01	280-801-A01	TREATMENT OF AN ENGINE AFTER T4.5 OVERTEMPERATURE - SPECIAL PROCEDURE	201 - 204	Nov. 30/2016
71-00-01	280-802-A01	TREATMENT OF AN ENGINE AFTER N2 OVERSPEED - SPECIAL PROCEDURE	201 - 202	Mar. 30/2013
71-00-01	280-803-A01	TREATMENT OF AN ENGINE AFTER N1 OVERSPEED - SPECIAL PROCEDURE	201 - 202	July 30/2012
71-00-01	280-805-A01	TREATMENT OF AN ENGINE AFTER OIL OVERTEMPERATURE - SPECIAL PROCEDURE	201 - 202	July 30/2012
71-00-01	280-806-A01	TREATMENT OF AN ENGINE AFTER LOW OIL PRESSURE - SPECIAL PROCEDURE	201 - 202	Nov. 30/2013
71-00-02	940-801-A01	FUELS - LUBRICANTS - SPECIAL PRODUCTS - GENERAL	* 1 - 12	June 15/2022
71-00-06	940-801-A01	TROUBLE SHOOTING - GENERAL	1 - 6	June 30/2018
71-01-00	940-801-A01	RINSING - CHEMICAL CLEANING - PROTECTION - GENERAL	1 - 2	Dec. 30/2019
71-01-00	940-803-A01	ENGINE CLEANING PRODUCTS - GENERAL	* 1 - 4	June 15/2022
71-01-00	610-801-A01	FREQUENCY OF ENGINE CLEANING - ROUTINE MAINTENANCE	1101 - 1102	Dec. 30/2019
71-01-01	610-801-A01	RINSING - ROUTINE MAINTENANCE	1101 - 1104	Dec. 30/2020
71-01-03	610-801-A01	CHEMICAL CLEANING - ROUTINE MAINTENANCE	1101 - 1104	Dec. 30/2019
71-01-04	620-801-A01	INTERNAL PROTECTION - PROTECTION	1201 - 1204	Dec. 30/2019
71-01-05	620-801-A01	EXTERNAL PROTECTION - PROTECTION	1201 - 1202	Dec. 30/2020

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71-01-06	610-801-A01	EXTERNAL CLEANING OF DRESSED OR UNDRESSED ENGINE/MODULE - ROUTINE MAINTENANCE	1101 - 1104	Dec. 30/2018
71-02-01	940-801-A01	TREATMENT OF AN ENGINE AFTER THE USE OF EXTINGUISHANTS - GENERAL	1 - 2	Nov. 30/2009
71-02-01	280-801-A01	TREATMENT OF AN ENGINE AFTER THE OPERATION OF EXTINGUISHERS ON A HOT ENGINE (T4.5 > 150 °C) - SPECIAL PROCEDURE	201 - 204	June 15/2020
71-02-01	280-802-A01	TREATMENT OF AN ENGINE AFTER THE OPERATION OF EXTINGUISHERS ON A COLD ENGINE (T4.5 < 150 °C) - SPECIAL PROCEDURE	201 - 204	June 15/2020
71-02-01	280-803-A01	TREATMENT OF AN ENGINE AFTER A FIRE - SPECIAL PROCEDURE	201 - 202	Nov. 30/2011
71-02-01	280-804-A01	TREATMENT OF AN ENGINE AFTER AN IMMERSION IN THE WATER - SPECIAL PROCEDURE	201 - 202	Nov. 30/2011
71-02-02	280-801-A01	TREATMENT OF AN ACCIDENTALLY DROPPED ENGINE - SPECIAL PROCEDURE	201 - 202	Nov. 30/2011
71-02-03	280-801-A01	TREATMENT OF AN ENGINE AFTER A FOREIGN OBJECT DAMAGE - SPECIAL PROCEDURE	201 - 202	Dec. 30/2019
71-02-04	280-801-A01	TREATMENT OF AN ENGINE AFTER A LIGHTNING STRIKE - SPECIAL PROCEDURE	201 - 204	Nov. 30/2017
71-02-05	280-801-A01	TREATMENT OF AN ENGINE AFTER A ROTOR DAMAGE - SPECIAL PROCEDURE	201 - 204	Dec. 30/2021
71-02-05	280-802-A01	TREATMENT OF AN ENGINE AFTER A RUPTURE OF THE ENGINE LINKING SHAFT/MGB - SPECIAL PROCEDURE	201 - 202	July 30/2012
71-02-06	280-801-A01	TREATMENT OF AN ENGINE AFTER A HEAVY LANDING - SPECIAL PROCEDURE	201 - 204	May 30/2017
71-02-07	940-801-A01	PARTICLES IN THE OIL SYSTEM - GENERAL	1 - 2	Mar. 30/2013
71-02-07	280-801-A01	PARTICLES IN THE OIL SYSTEM - SAMPLING - SPECIAL PROCEDURE	201 - 212	June 15/2021
71-02-07	280-802-A01	PARTICLES IN THE OIL SYSTEM - DECISION TABLE - SPECIAL PROCEDURE	201 - 224	Dec. 30/2021

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71-02-07	280-803-A01	BURNING OF PARTICLES IN THE OIL SYSTEM - SPECIAL PROCEDURE	201 - 202	Dec. 30/2021
71-02-08	940-801-A01	SPECTROMETRIC OIL ANALYSIS - GENERAL	1 - 2	Dec. 30/2018
71-02-08	280-801-A01	SAMPLING MODE - SPECIAL PROCEDURE	201 - 202	Dec. 30/2021
71-02-08	280-802-A01	ANALYSIS METHOD AND CRITERIA - SPECIAL PROCEDURE	201 - 208	Dec. 30/2021
71-02-09	760-801-A01	ENGINE RUNDOWN TIME - TESTS (ENGINE)	1301 - 1302	Dec. 30/2018
71-02-10	940-801-A01	VIBRATION TEST PROCEDURE - GENERAL	* 1 - 6	June 15/2022
71-02-10	760-801-A01	VIBRATION TEST PROCEDURE WITH THE SIMPLIFIED SYSTEM (TYPE B&K 2513) FOR THE FIELD INSPECTION - TESTS (ENGINE)	1301 - 1310	June 30/2018
71-02-10	760-801-A02	VIBRATION TEST PROCEDURE WITH THE SEMIA SYNTHAM 2000.4 SYSTEM - TESTS (ENGINE)	1301 - 1316	June 30/2018
71-02-10	760-801-A03	VIBRATION TEST PROCEDURE WITH THE SEMIA SYNTHAM 2000.4 SYSTEM (STATIONARY SET) - TESTS (ENGINE)	1301 - 1316	June 30/2018
71-02-10	760-801-A04	VIBRATION TEST PROCEDURE WITH THE PULSE B&K 3641-A/B SYSTEM AND THE B&K 3649 -A/B SET - TESTS (ENGINE)	1301 - 1316	June 30/2018
71-02-10	760-801-A05	VIBRATION TEST PROCEDURE WITH THE PULSE B&K 3648-A/B - TESTS (ENGINE)	1301 - 1310	June 30/2018
71-02-10	760-801-A06	VIBRATION TEST WITH ACES VIPER 4040 VIBRATION ANALYSER - TESTS (ENGINE)	1301 - 1310	June 30/2018
71-02-10	760-801-A08	VIBRATION TEST PROCEDURE WITH THE M'ARMS SYSTEM ON EC 155B/B1 - TESTS (ENGINE)	1301 - 1306	June 30/2018
71-02-10	760-801-A09	VIBRATION TEST PROCEDURE WITH THE SIMPLIFIED SYSTEM (TYPE B&K 3656-A) - TESTS (ENGINE)	1301 - 1310	June 30/2018
71-02-11	280-801-A01	RETURN IN OPERATION AFTER FINDING OF FUEL IN P3 SYSTEM - SPECIAL PROCEDURE	201 - 204	Dec. 30/2021
71-02-12	280-801-A01	INSTALLATION OF THE ENGINE ON THE ENGINE MOUNT - SPECIAL PROCEDURE	201 - 208	June 15/2020

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71-02-12	280-802-A01	POWERPLANT - REMOVAL OF THE ENGINE/ MODULE FROM STORAGE IN A BOX OR CONTAINER - SPECIAL PROCEDURE	201 - 206	Dec. 30/2021
71-02-12	280-803-A01	TREATMENT OF AN ENGINE/MODULE AFTER AN INCORRECT ATTACHMENT IN THE TRANSPORT PACKAGING - SPECIAL PROCEDURE	* 201 - 202	June 15/2022
71-02-13	280-801-A01	GROUND RUN CHECK - SPECIAL PROCEDURE	201 - 202	May 30/2015
71-02-14	940-801-A01	ENGINE POWER CHECK TREND MONITORING - GENERAL	1 - 18	Dec. 30/2018
71-02-15	760-801-A01	TESTS OF ENGINE AFTER INTERVENTION IN MAINTENANCE CENTER - TESTS (ENGINE)	1301 - 1330	Dec. 30/2021
71-02-16	280-801-A01	TREATMENT OF AN ENGINE/MODULE BEFORE RETURN TO DEEP MAINTENANCE (LEVEL 03) - SPECIAL PROCEDURE	201 - 202	Dec. 30/2021
71-02-17	280-801-A01	TREATMENT OF AN ENGINE AFTER MICROBIAL CONTAMINATION OF FUEL - SPECIAL PROCEDURE	201 - 202	June 15/2021
71-05-01	280-801-A01	RETURN TO SERVICE OF AN ENGINE AFTER STORAGE - SPECIAL PROCEDURE	* 201 - 204	June 15/2022
71-05-01	280-802-A01	CONTAINERS AND BLANKS - SPECIAL PROCEDURE	201 - 230	Dec. 30/2021
71-05-01	550-801-A01	CONDITIONING, PACKAGING AND STORAGE OF THE ENGINE, MODULES AND EQUIPMENT - STORAGE TIME	* 1201 - 1210	June 15/2022
71-05-01	551-802-A01	SHORT-TERM STORAGE OF THE ENGINE AND MODULES - STORAGE	* 1201 - 1204	June 15/2022
71-05-01	551-803-A01	LONG-TERM STORAGE OF THE ENGINE AND MODULES CONDITIONED IN A SEALED POLYETHYLENE COVER - STORAGE	* 1201 - 1208	June 15/2022
71-05-01	551-804-A01	LONG-TERM STORAGE OF THE ENGINE AND MODULES CONDITIONED IN A VCI COVER - STORAGE	* 1201 - 1208	June 15/2022
71-05-01	551-805-A01	LONG-TERM STORAGE OF ENGINE IN A METAL OR LAMINATED CONTAINER - STORAGE	* 1201 - 1214	June 15/2022

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71-05-01	551-806-A01	STORAGE OF THE EQUIPMENT/ ACCESSORIES - STORAGE	1201 - 1206	Dec. 30/2021
71-05-01	551-807-A01	STORAGE OF THE ENGINE ON AN AIRFRAME UNDER SHELTER / UNDER CLOSED SHELTER - STORAGE	* 1201 - 1204	June 15/2022
71-05-01	551-808-A01	STORAGE OF THE ENGINE ON AN AIRFRAME OUT OF A SHELTER - STORAGE	* 1201 - 1204	June 15/2022
71-06-01	620-801-A01	INTERNAL AND EXTERNAL PROTECTION PROCEDURE FOR THE ENGINE AND THE EQUIPMENT - PROTECTION	1201 - 1204	Dec. 30/2019
71-41-00	870-801-A01	JUNCTION AND T4.5 CONFORMATION BOX SUPPORT - DESCRIPTION AND OPERATION	1 - 4	Nov. 30/2009
71-41-00	900-801-A01	T4.5 CONFORMATION BOX SUPPORT - REMOVAL / INSTALLATION	701 - 706	May 30/2017
71-51-00	870-801-A01	ELECTRICAL HARNESSES - DESCRIPTION AND OPERATION	1 - 8	Apr. 30/2014
71-51-00	280-801-A01	ELECTRICAL HARNESSES - PROTECTION OF THE SLEEVES WITH SPIRAL WRAPPING - SPECIAL PROCEDURE	201 - 204	Mar. 30/2012
71-51-00	280-802-A01	ELECTRICAL HARNESSES - REPAIR PROCEDURE RP1 - SPECIAL PROCEDURE	201 - 208	Mar. 30/2012
71-51-00	280-803-A01	SPLICE REPAIR METHOD WITH SILICONE TAPE (SELF-VULCANIZING TAPE) - SPECIAL PROCEDURE	201 - 210	May 30/2016
71-51-00	900-801-A01	CONTROL AND MONITORING HARNESS - REMOVAL / INSTALLATION	701 - 708	Nov. 30/2009
71-51-00	900-802-A01	CONTROL HARNESS - REMOVAL / INSTALLATION	701 - 704	Nov. 30/2011
71-51-00	900-805-A01	MAGNETIC PLUG HARNESS - REMOVAL / INSTALLATION	701 - 706	Nov. 30/2009
71-51-00	210-801-A01	CONTROL AND MONITORING HARNESS - INSPECTION / CHECK	801 - 802	May 30/2016
71-51-00	210-802-A01	CONTROL HARNESS - INSPECTION / CHECK	801 - 806	May 30/2016
71-51-00	210-805-A01	MAGNETIC PLUG HARNESS - INSPECTION / CHECK	801 - 802	Nov. 30/2009

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71-51-00	750-801-A01	CONTROL AND MONITORING HARNESS - TESTS (ELECTRICAL)	1301 - 1304	Nov. 30/2009
71-51-00	750-802-A01	CONTROL HARNESS - TESTS (ELECTRICAL)	1301 - 1306	Nov. 30/2011
71-51-00	750-805-A01	MAGNETIC PLUG HARNESS - TESTS (ELECTRICAL)	1301 - 1304	Nov. 30/2009
71-51-00	750-806-A01	ELECTRICAL HARNESSES WITH THE TEST SET - TESTS (ELECTRICAL)	1301 - 1306	Apr. 30/2014
71-71-00	870-801-A01	TURBINE CASING DRAIN VALVE ASSEMBLY - DESCRIPTION AND OPERATION	1 - 6	Dec. 30/2020
71-71-00	940-801-A01	ENGINE DRAINING - GENERAL	1 - 4	Nov. 30/2009
71-71-00	900-801-A01	DRAIN PIPE OF THE FUEL PUMP ASSEMBLY - REMOVAL / INSTALLATION	701 - 704	Oct. 30/2014
71-71-00	900-802-A01	DRAIN PIPE OF THE FUEL VALVE ASSEMBLY - REMOVAL / INSTALLATION	701 - 704	Oct. 30/2014
71-71-00	900-802-B01	DRAIN PIPE OF THE FUEL VALVE ASSEMBLY - REMOVAL / INSTALLATION	701 - 706	Oct. 30/2014
71-71-00	900-803-A01	PIPE OF THE TURBINE CASING DRAIN VALVE ASSEMBLY - REMOVAL / INSTALLATION	701 - 704	Nov. 30/2009
71-71-00	900-804-A01	DRAIN VALVE ASSEMBLY - REMOVAL / INSTALLATION	701 - 704	June 15/2019
71-71-00	900-806-A01	PURGE VALVE OUTLET PIPE OF THE PUMP AND METERING UNIT ASSEMBLY - REMOVAL / INSTALLATION	701 - 704	Oct. 30/2014
71-71-00	200-801-A01	DRAIN VALVE ASSEMBLY - INSPECTION / CHECK	801 - 804	June 15/2019
71-71-00	200-802-A01	DRAIN CLUSTER - INSPECTION / CHECK	801 - 802	June 15/2019
71-71-00	700-801-A01	DRAIN VALVE ASSEMBLY - TESTS (EXCEPT ELECTRICAL)	1301 - 1302	Dec. 30/2020
71-71-01	900-801-A01	INNER PARTS OF THE DRAIN VALVE - REMOVAL / INSTALLATION	701 - 704	June 15/2019

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TASK 71-00-00-870-801-A01

POWER PLANT
DESCRIPTION AND OPERATION

1. TASKS/REFERENCE DOCUMENTATION

Not applicable.

2. GENERAL PRESENTATION OF THE TURBOSHAFT ENGINE

Refer to Figure 1

A. General

This turboshaft-engine is a free-turbine of the 650 kW power class.

The turboshaft engine is supplied with the equipment to permit its operation on the helicopter.

B. Main characteristics

The main characteristics are:

- Type: it is a power-turbine turboshaft-engine, with a front power drive and a free wheel
- Design: Modular
- Power: Class 650 kW (871 Shp)
- Output shaft speed: 6,000 rpm at 100%
- Mass: around 130 kg (286 lbs) without the lubrication oil, and with specific equipment.

C. Main components

The main components are:

- The turboshaft engine with its equipment
- The Engine Electronic Control Unit (E.E.C.U).

This turboshaft engine is supplied without the starter and the exhaust pipe extension, but with the Engine Electronic Control Unit and its electrical harness.

D. Dimensional characteristics

Mass:

- The engine with specific equipment and without the lubrication oil: around 130 kg (286 lbs)
- The Engine Electronic Control Unit: 4.2 kg (9.24 lbs)

Dimensions of the engine:

- Length: 1,015 mm (40 inches)
- Width: 498 mm (19.6 inches)
- Height: 576 mm (22.7 inches)

Dimensions of the Engine Electronic Control Unit:

- Length: 300 mm (11.7 inches)
- Width: 200 mm (7.8 inches)
- Height: 80 mm (3 inches)

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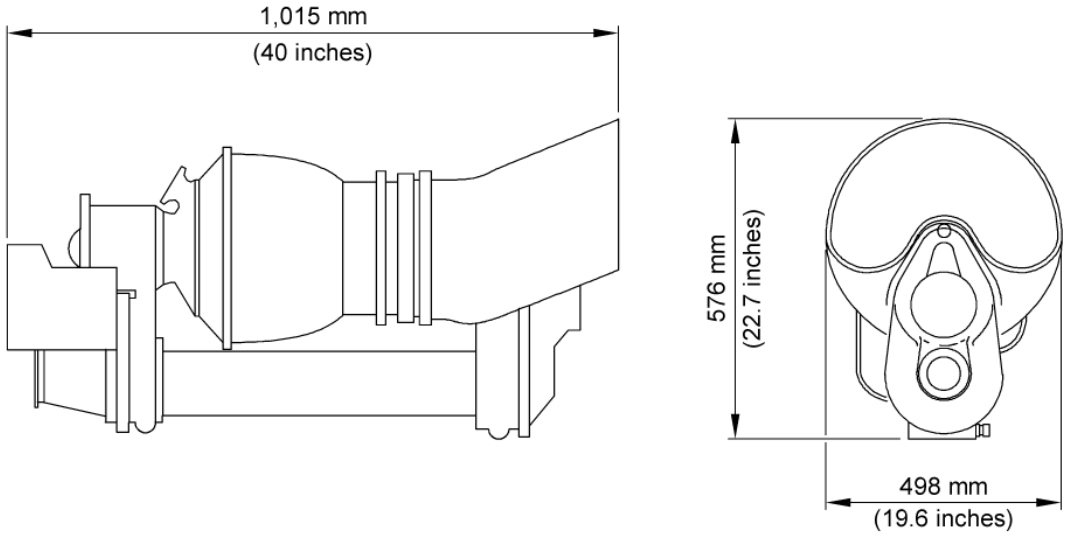

Dimensional characteristics
Figure 1

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TASK 71-00-01-940-801-A01

LIMITATIONS
GENERAL

1. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter

- Task TSB 71-00-06-812-804 / Engine parameter out of limit - T4.5 limitations exceeded - Troubleshooting
- Task TSB 71-00-06-814-806 / Engine parameter out of limit - N1 limitations exceeded - Troubleshooting
- Task TSB 71-00-06-814-807 / Engine parameter out of limit - N2 limitations exceeded - Troubleshooting
- Task TSB 71-00-06-814-809 / ENG P ON - Low oil pressure signal - Troubleshooting
- Task TSB 71-00-06-814-810 / Engine parameter out of limit - Oil overtemperature - Troubleshooting
- Task TSB 71-00-06-816-811 / Non conform oil consumption - Troubleshooting
- Task TSB 71-00-06-816-812 / Check of abnormal oil pressure - Troubleshooting
- Task 71-02-07-280-801 / Particles in the oil system - Sampling - Special procedure
- Task 71-02-08-280-801 / Sampling mode - Special procedure
- Task 71-02-09-760-801 / Engine rundown time - Tests (engine)
- Task 71-02-10-940-801 / Vibration test Procedure - General
- Task 72-00-15-900-801 / Module 05 reduction gearbox - Removal / installation
- Task 72-00-43-900-801 / Module 03 gas generator - Removal / Installation
- Task 72-00-54-900-801 / Module 04 power turbine - Removal / Installation
- Task 73-21-00-900-801 / Digital engine control unit - Removal / Installation
- Flight Manual.

2. GENERAL

SUB-TASK 71-00-01-940-011-A01

A. Use of the OEI ratings

(1) Use of the 30-second OEI rating

(a) For engine not modified TU006 (or TU014)

Remove the module 03, the module 04 and the E.E.C.U. after the operation at the 30-second OEI rating.

- The module 03 - Gas generator. Refer to Task 72-00-43-900-801
- The module 04 - Power Turbine. Refer to Task 72-00-54-900-801
- The Engine Electronic Control Unit. Refer to Task 73-21-00-900-801.

Send the removed module 03, the module 04 and the E.E.C.U. back to the Repair Center.

(b) For engine modified TU006 (or TU014)

Check the cumulated time of operation at the OEI 30 second rating by adding the time of the last event to the one recorded on the engine log book, if the new cumulated time is higher than 30 seconds, refer to paragraph (b).

If the new cumulated time is lower than 30 seconds, remove the E.E.C.U. (engine PRE-MOD TU77C), refer to Task 73-21-00-900-801 , and send it back to the Repair Center for reset.

(2) Exceeding the maximum accumulated time of operation at the OEI ratings

Exceeding the operation accumulated time at the 30-second OEI rating

NOTE: ***The reference accumulated time which makes necessary the removal of Module 03 and/or 04 is not the time displayed on the Engine Electronic Control Unit but the time recorded on the modular log cards.***

(a) When the 30-second operation is reached, remove and send to the Repair Center:

- The module 03 - Gas generator. Refer to Task 72-00-43-900-801
- The module 04 - Power Turbine. Refer to Task 72-00-54-900-801
- The Engine Electronic Control Unit. Refer to Task 73-21-00-900-801.

(a) Exceeding the operation accumulated time at the 2-minute OEI rating (maximum accumulated time of 10 min.)

An accumulated time of 10-minute operation at this rating is permitted.

NOTE: ***The reference accumulated time which makes necessary the removal of Module 03 and/or 04 is not the time displayed on the Engine Electronic Control Unit but the time recorded on the modular log cards.***

1 When the 10-minute operation is reached, remove and send to the Repair Center:

- The module 03 - Gas generator. Refer to Task 72-00-43-900-801
- The module 04 - Power Turbine. Refer to Task 72-00-54-900-801
- The Engine Electronic Control Unit. Refer to Task 73-21-00-900-801.

SUB-TASK 71-00-01-940-012-A01

B. Gas maximum temperatures (T4.5)

(1) T4.5 temperature limitations at starting

- Unlimited duration at starting: 750 °C (1,382°F)
- Above 750°C (1,382°F) and up to 865°C 865°C (1,589°F) included: duration limited to 10 seconds.
- T4.5 maximum: 900°C (1,652°F).

(2) T4.5 temperature limitations in flight:

- At "OEI 30 seconds" rating T4.5 maxi stabilized: 1000°C (1,832°F)
- At "OEI 2 minutes" rating T4.5 maxi stabilized: 941°C (1,726°F)
- At "OEI Continuous" rating T45 maxi stabilized: 912°C (1,674°F)
- At take-off: 912°C (1,674°F)
- At maxi stabilized rating: 877°C (1,611°F).

(3) Procedure to be applied when the temperature limitations are exceeded:

- Trouble shooting task. Refer to Task TSB 71-00-06-812-804.

SUB-TASK 71-00-01-940-013-A01

C. N2 overspeed

(1) N2 maximum limits:

- Min. stabilized power-off: 85 % (33,230 rpm)
- Min. stabilized power-on: 90.5 % (35,381 rpm)
- Max. stabilized: 108.5 % (42,418 rpm)
- Min. transient (t < 20s): 68 % (26,585 rpm)
- Max. transient (power-off) (t < 20s): 121 % (47,305 rpm)
- Max. transient (power-on) (t < 20s): 109 % (42,613 rpm)
- The overspeed protection controls the engine shutdown for N2 = 118.5 % (46,327 tr/mn) ± 1 %.

(2) Procedure to apply when the N2 limits are exceeded

(a) Trouble shooting procedure. Task TSB 71-00-06-814-807 of the Trouble shooting manual.

SUB-TASK 71-00-01-940-014-A01

D. N1 overspeed

(1) N1 maximum limits:

- Idle: 67 % to 68 % (34,914 to 35,435 rpm)
- Min. stabilized: 62 % (32,308 rpm)
- Max stabilized continuous: 99.09% (51,637 rpm)
- Max. stabilized take-off:: 101.27 % (52,776 rpm)
- Max. transient (for less than 20s): 102.3 % (53,312 rpm)
- Max. stabilized OEI continuous: 100.76 % (52,506 rpm)
- Max. stabilized 2" OEI: 101.95 % (53,126 rpm)
- Max. stabilized 30" OEI: 105.52 % (54,986 rpm).

(2) Procedure to apply when the N1 limits are exceeded

(a) Trouble shooting procedure. Task TSB 71-00-06-814-806 of the Trouble shooting manual.

SUB-TASK 71-00-01-940-015-A01

E. Exceeding the torque limitation

(1) Torque maximum limits:

- Max. transient overtorque (for less than 20s): 172.1 % (132.2 daN.m)
- Max. stabilized OEI rating torque: 138.6 % (123.6 daN.m)
- Max. stabilized twin engine: 120.4 % (92.5 daN.m)
- 100 % Engine: 100% (76.8 daN.m)

(2) General

This procedure gives you the inspections that you must do after the exceeding of the torque limitation.

(3) Procedure

(a) Make sure that the power turbine turns freely.

NOTE: ***Send the engine back to the factory if you find some rubbing or binding.***

(b) Make sure that the gas generator turns freely.

NOTE: ***Send the engine back to the factory if you find some rubbing or binding.***

(c) Do a visual check of the engine parts below:

- The engine attachment points
- The protection tube
- The reduction gear casing.

NOTE: ***Send the engine back to the factory if you find damage or folding on one of these parts.***

(d) Remove the module 05 - Reduction gear. Refer to Task 72-00-15-900-801.

(e) Make sure that the splined nut of the drive gear is not too tight.

1 Send the modules 04 and 05 back to the factory if the marks engraved on the front face of the nut do not align with the marks engraved on the gear shaft.

2 Keep the modules 04 and 05 serviceable if the marks engraved on the front face of the nut align with the marks engraved on the gear shaft.

3 Send the module 04 and the module 05 back to the factory if you are not sure they are serviceable.

(f) Monitor the engine performance.

1 Do a spectrometric oil analysis. Refer to Task 71-02-08-280-801.

NOTE: ***Remove two oil samples at five-hour intervals.***

NOTE: ***Apply the normal frequency for the oil sampling procedure if the result is satisfactory.***

2 Examine the oil filtering element. Refer to Task 71-02-07-280-801.

3 Examine the magnetic plugs. Refer to Task 71-02-07-280-801.

4 Do a vibration test. Refer to Task 71-02-10-940-801.

5 Monitor the engine for a change of the rundown time. Refer to Task 71-02-09-760-801.

NOTE: ***Remove the engine and send it back to the factory if there is a rub noise or a binding.***

NOTE: ***Remove the engine and send it back to the factory if you find some anomalies during the inspections.***

F. Oil pressure

(1) Limits:

- minimum oil relative pressure: 110 kPa (15.95 PSIG),
- maximum oil pressure at starting: 980 kPa (142.14 PSIG),
- normal oil relative pressure more than 85 % N1: 200 kPa to 600 kPa (29 to 87.02 PSIG).

(2) Do the procedure that follows if oil pressure is less than the limits

Troubleshooting procedure. Refer to Task TSB 71-00-06-814-809.

(3) Do the procedure that follows if oil pressure is more than the limits Troubleshooting procedure. Refer to Task TSB 71-00-06-816-812.

G. Oil temperature

(1) Limits:

– maximum oil temperature: 115 °C (241 °F).

(2) Do the procedure that follows if oil temperature is more than the limits Troubleshooting procedure. Refer to Task TSB 71-00-06-814-810.

H. Maximum oil consumption

(1) Limits:

– Maximum oil consumption: 0.2 l/h (0.05284 US gal/hr).

(2) Do the procedure that follows if oil consumption is more than the limits Troubleshooting procedure. Refer to Task TSB 71-00-06-816-811.

I. Other limitations

Refer to Flight Manual for the other limitations.

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TASK 71-00-01-280-801-A01

TREATMENT OF AN ENGINE AFTER T4.5 OVERTEMPERATURE SPECIAL PROCEDURE

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Not applicable

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Not applicable

B. Additional provisions

Task No.	*Task Title*
72-00-43-200-802	Module 03 Gas generator - Combustion chamber - Inspection / Check
72-00-43-200-803	Module 03 Gas generator - HP turbine and HP nozzle guide vane blades of the of the gas generator - Inspection / Check

2. TASKS/REFERENCE DOCUMENTATION

Not applicable

3. PROCEDURE

A. Preliminary operations

Not applicable

B. General

This procedure describes the inspections to be done following a T4.5 overtemperature

C. Procedure

(1) Exceeding the T4.5 temperature limitations during the start

Refer to Figure 201

(a) Temperature T4.5 between 750°C (1,382°F) and 865°C (1,589°F) during more than 10 seconds or temperature T4,5 between 865°C (1,589°F) and 900°C (1,652°F) according to area 3 (blue) of Figure 201.

1 Record the T4.5 temperature and the exceeding duration in the engine log book.

2 Check the engine. Refer to Task 72-00-43-200-802 and Task 72-00-43-200-803.

3 Check the free rotation of the gas generator.

NOTE: If anomalies are found, replace the Module 03.

(b) T4.5 temperature higher than 900°C (1,652°F) according to area 1 (red) of Figure 201 and whatever the duration.

1 Record the T4.5 temperature and the exceeding duration in the engine log book.

2 Contact Safran Helicopter Engines.

(2) T4.5 temperature limitations exceeded during a flight.

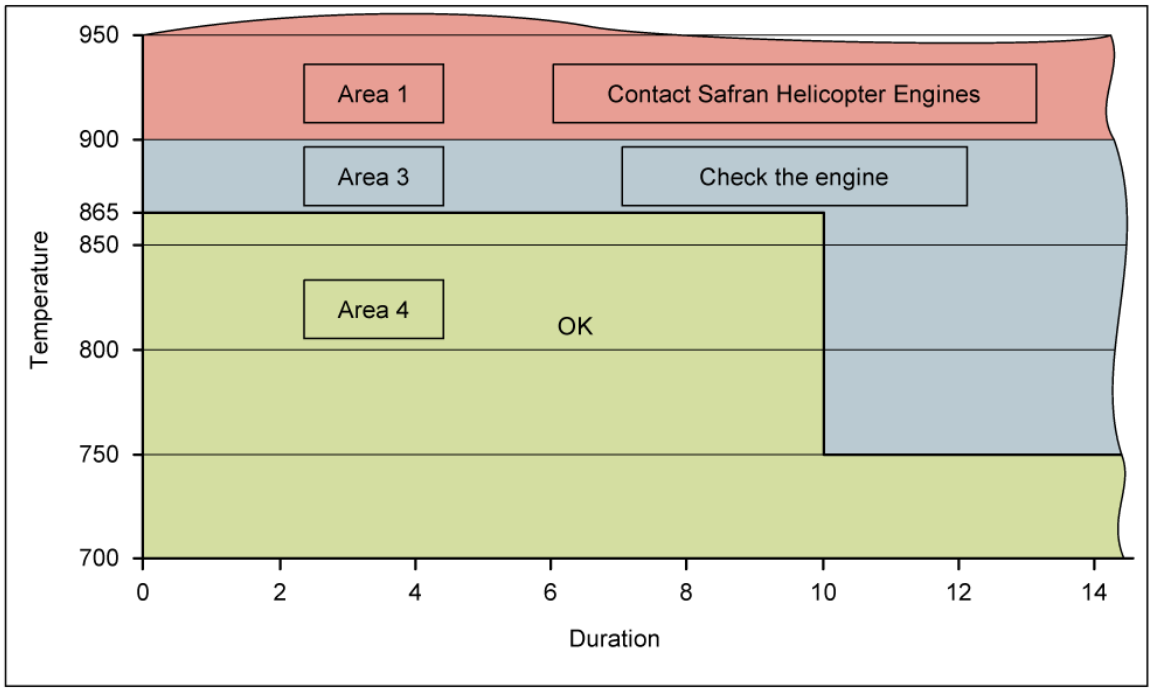
(a) Note the T4.5 temperature and the exceeding duration in the engine log book.

(b) Check the engine. Refer to Task 72-00-43-200-802 and Task 72-00-43-200-803.

(c) Check the free rotation of the gas generator and of the power turbine.

NOTE: If anomalies are found, replace the Modules 03 and/or 04.

(d) Contact Safran Helicopter Engines.



Exceeding the T4.5 temperature limitations during the start
Figure 201

D. Additional procedures

Not applicable

4. FINAL STEPS

Not applicable

TASK 71-00-01-280-802-A01

TREATMENT OF AN ENGINE AFTER N2 OVERSPEED SPECIAL PROCEDURE

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Not applicable

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Not applicable

B. Additional provisions

Task No.	*Task Title*
71-02-07-280-801	Particles in the oil system - Sampling - Special procedure
72-00-15-900-801	Module 05 Reduction gearbox - Removal/ installation
72-00-43-900-801	Module 03 Gaz generator - Removal/installation
72-00-54-900-801	Module 04 Power turbine - Removal/installation

2. TASKS/REFERENCE DOCUMENTATION

Not applicable

3. PROCEDURE

A. Preliminary operations

Not applicable

B. General

This procedure gives you the checks that you must do after N2 overspeed.

C. Procedure

(1) Maximum N2 reached between 108,5 % and 121 % during more than 20 seconds.

(a) Examine the magnetic plugs. Refer to Task 71-02-07-280-801.

(b) Make sure the gas generator turns freely.

NOTE: ***Replace the module 03 if anomalies are found. Refer to Task 72-00-43-900-801.***

(c) Make sure that the power turbine turns freely.

NOTE: ***Replace the module 04 if anomalies are found. Refer to Task 72-00-54-900-801.***

(d) Repeat this procedure after five hours of flight.

(2) N2> 121%

(a) Replace the module 04. Refer to Task 72-00-54-900-801.

(b) Replace the module 05. Refer to Task 72-00-15-900-801.

(3) Engine shutdown by the overspeed safety system

(a) Replace the module 04. Refer to Task 72-00-54-900-801.

(b) Replace the module 05. Refer to Task 72-00-15-900-801.

D. Additional procedures

Not applicable

4. FINAL STEPS

Not applicable

TASK 71-00-01-280-803-A01

TREATMENT OF AN ENGINE AFTER N1 OVERSPEED SPECIAL PROCEDURE

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Not applicable

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Not applicable

B. Additional provisions

Task No.	*Task Title*
71-02-07-280-801	Particles in the oil system - Sampling - Special procedure
71-02-08-280-801	Sampling procedure - Special procedure
71-02-09-760-801	Engine rundown time - Tests
71-02-10-760-801	Vibration test procedure with the simplified system for the field inspection - Tests
72-00-43-900-801	Module 03 Gaz generator - Removal/installation
72-61-00-900-803	Module 01 accessory gearbox equipment - Oil filtering element - Removal/installation

2. TASKS/REFERENCE DOCUMENTATION

Not applicable

3. PROCEDURE

A. Preliminary operations

Not applicable

B. General

This procedure gives you the checks that you must do after N1 overspeed.

C. Procedure

After an N1 overspeed.

(1) Examine the magnetic plugs. Refer to Task 71-02-07-280-801.

(2) Make sure the gas generator turns freely.

NOTE: ***Replace the module 03 if anomalies are found. Refer to Task 72-00-43-900-801.***

(3) Monitor the engine performance.

(a) Do a check of the vibration level before returning the engine into service. Refer to Task 71-02-10-760-801.

(b) Take two oil samples at five-hour intervals for monitoring A.S.H.. Refer to Task 71-02-08-280-801.

NOTE: ***Apply the normal frequency for the oil sampling procedure if the result is satisfactory.***

(c) Do a check of the oil filter element after the first 5 hours. Refer to Task 72-61-00-900-803.

(d) Examine the engine rundown time for a change during 25 hours, after the last flight of the day. Refer to Task 71-02-09-760-801.

NOTE: ***Remove and send the engine back to the factory if you hear a rub noise during the rotation of the rotating assembly or a seizing.***

NOTE: ***Any damage noticed during the inspections leads to the removal of the complete engine and its return in the factory***

D. Additional procedures

Not applicable

4. FINAL STEPS

Not applicable

TASK 71-00-01-280-805-A01

TREATMENT OF AN ENGINE AFTER OIL OVERTEMPERATURE SPECIAL PROCEDURE

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Not applicable

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Not applicable

B. Additional provisions

Task No.	*Task Title*
71-02-07-280-801	Particles in the oil system - Sampling - Special procedure
71-02-08-280-801	Sampling procedure - Special procedure
72-00-43-200-805	Module 03 gas generator - Rear bearing - Sealing check - Inspection check
72-61-00-900-803	Module 01 accessory gearbox equipment - Oil filtering element - Removal/installation
79-00-00-610-802	Oil system - Rinsing - Routine maintenance

2. TASKS/REFERENCE DOCUMENTATION

Not applicable

3. PROCEDURE

A. Preliminary operations

Not applicable

B. General

This procedure gives you the inspection that you must do after the exceeding of the oil maximum temperature.

C. Treatment procedure

(1) Oil temperature between 115°C and 130°C

(a) Examine the magnetic plugs. Refer to Task 71-02-07-280-801.

(b) Rinse the oil system. Refer to Task 79-00-00-610-802.

(c) Do a sealing check of the rear bearing. Refer to Task 72-00-43-200-805.

(d) Take two oil samples at five-hour intervals for monitoring A.S.H.. Refer to Task 71-02-08-280-801.

NOTE: ***Apply the normal frequency for the oil sampling procedure if the result is satisfactory.***

(e) Remove and check the oil filter element after the first 5 hours. Refer to Task 72-61-00-900-803.

(2) Oil temperature > 130°C

(a) Send back the engine to the factory.

D. Additional procedures

Not applicable

4. FINAL STEPS

Not applicable

TASK 71-00-01-280-806-A01

TREATMENT OF AN ENGINE AFTER LOW OIL PRESSURE SPECIAL PROCEDURE

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Not applicable

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Not applicable

B. Additional provisions

Not applicable

2. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 71-02-07-940-801/ Particles in the oil system - General
– Task 71-02-13-280-801/ Ground run check - Special procedure

3. PROCEDURE

A. Preliminary operations

Not applicable

B. Treatment of an engine after low oil pressure

(1) Examine the magnetic plugs. Refer to Task 71-02-07-940-801.

(2) Make sure the gas generator turns freely.

NOTE: ***If anomalies are found, replace the module 03.***

(3) Make sure the power turbine turns freely.

NOTE: ***If anomalies are found, replace the module 04.***

(4) Do a ground run check. Refer to Task 71-02-13-280-801.

(5) Examine the magnetic plugs. Refer to Task 71-02-07-940-801.

C. Additional procedures

Not applicable

4. FINAL STEPS

Not applicable

TASK 71-00-02-940-801-A01

FUELS - LUBRICANTS - SPECIAL PRODUCTS GENERAL

1. LIST OF THE PRODUCTS

A. Fuels and additives

This task gives the list of all the fuels that are approved by Safran Helicopter Engines. Nevertheless, Safran Helicopter Engines reminds that only the fuels given in the aircraft manufacturer's Flight Manual can be used for a given airframe.

WARNING

DO NOT BREATHE THE FUEL VAPORS. MAKE SURE THAT THE AREA WHERE YOU WORK IS OPEN TO THE AIR. DO NOT GET THE FUEL ON YOUR SKIN. PUT THE RUBBER GLOVES AND A FACE SHIELD OR THE SAFETY GOGGLES. THE FUEL CAN BE POISONOUS.

(1) Normal fuels

The engine operates satisfactorily in all the flight envelope with the fuels that agree with the specifications below:

TYPE OF FUEL	*NATO SYMBOL*	*U.S.A. SPEC.*	*U.K. SPEC.*	*FRANCE SPEC.*	*OTHER SPEC.*	*FUEL TEMP. MIN. °C*	*FUEL TEMP. MAX. °C*
Kerosene-50 (AVTUR-FSII) JP8	F 34	MIL-DTL-83133 issue J	DEF STAN 91-087 issue 6	DCSEA 134 issue D		-50	+50
Kerosene-50 (AVTUR) JET A1	F 35	ASTM-D-1655	DEF STAN 91-091	DCSEA 134 issue D		-20*	+50
Kerosene		ASTM-D-1655				-20*	+50
High flash point Kerosene JP 5 (AVCAT)	XF43			DCSEA 144 issue D		-20	+50
High flash point Kerosene JP 5 (AVCAT FSII)	F 44	MIL-DTL-5624 issue W	DEF STAN 91-086 issue 6	DCSEA 144 issue D		-40	+50

TYPE OF FUEL	NATO SYM-BOL	U.S.A. SPEC.	U.K. SPEC.	FRANCE SPEC.	OTHER SPEC.	FUEL TEMP. MIN. °C	FUEL TEMP. MAX. °C
Kerosene TS-1, RT					(CIS) GOST 10227-86 Ed 2008 Amdt 1, 2, 3	-20*	+43**
JET fuel PRC nation-al standard 3					CHINA GB 6537 2018	-20*	+50

* : For JET A1 (F35), Kerosene, PRC3, Kerosene TS-1, RT, the use of anti-icing additive is imperative for a fuel temperature between -20°C and -50°C (see para.(d) 1).

** : +43°C below 15,000 ft and +10°C above 15,000 ft with oil temperature < 90°C.

NOTE: ***Specifications ASTM D1655 and DEF-STAN 91-091 are at latest issue, latest valid amendment. For all other specifications, the version of the specification to use is mentioned explicitly in the table, and further evolutions shall be usable only after Safran Helicopter Engines agreement. For this type of fuel, a viscosity less than 8 cSt shall only be guaranteed for the following temperatures:***

- ***F34, F35, jet A, XF43, F44, PRC3: Tfuel > -20°C***
- ***TS.1, RT: Tfuel > -50°C***

Below these temperature thresholds and if these synthetic compound-based fuels shall be used, the starting of the engine shall not be totally guaranteed.
Viscosity conditions the spraying of the fuel in the chamber and thus the ability of the chamber to the ignition.
Restarting or re-ignition during the flight shall nevertheless be guaranteed after a successful starting.

(2) Replacement fuels

TYPE OF FUEL	NATO SYM-BOL	U.S.A. SPEC.	U.K. SPEC.	FRANCE SPEC.	ANTI-ICING ADDITIVE	FUEL TEMP. MIN. °C	FUEL TEMP. MAX. °C
Wide band JP4 (AVTAG FS II)	F 40	MIL-DTL-5624 issue W			With	-50	+43**
Wide band JET B (AV-TAG) CAN/ CGSB 3.22 ed 2012	(F 45)***	ASTM-D-6615			Without	-20*	+43**

NOTE: ***Specification ASTM D6615 is at latest issue, latest valid amendment. For all other specifications, the version of the specification to use is mentioned explicitly in the table, and further evolutions shall be usable only after Safran Helicopter Engines agreement.***

NOTE: **** = The use of anti-icing additive is imperative for a fuel temperature between -20°C and -50°C.***

NOTE: ***** = +43°C below 15,000 ft and +10°C above 15 000 ft with oil temperature < 90°C.***

NOTE: ****** = Abandoned NATO symbol.***

(3) Alternative fuels

Use the alternative fuels only if it is absolutely necessary and for a short time, in the place of the normal fuels.

Obey their restrictions of use to prevent a decrease of the engine service life.

TYPE OF FUEL	*NATO SYMBOL*	*U.S.A. SPEC.*	*U.K. SPEC.*	*FRANCE SPEC.*
Aviation gasoline AVGAS	F 18	ASTM D910	DEF STAN 91-090 issue 4	DCSEA 118 issue C

NOTE: ***Specification ASTM D910 is at latest issue, latest valid amendment. For all other specifications, the version of the specification to use is mentioned explicitly in the table, and further evolutions shall be usable only after Safran Helicopter Engines agreement.***

(a) Restrictions of use

1 Use:

a You must add 2 % of a mineral oil to these fuels (NATO: 0.135-0.138)

2 Flight envelope:

a The limits of the flight envelope are:

b ALT < or = 1,500 m (4,920 ft)

c T0 < or = + 25° C (77°F)

3 Time:

a The maximum operating time for these fuels is 3 hours.

4 Remark:

a The use of these fuels does not necessarily permit a hot engine start or a relight in flight.

(4) Approved fuel additives

(a) Anti-icing additive

The use of anti-icing additive is imperative for a fuel temperature below -20°C (-4°F).

TYPE OF ADDITIVE	*NATO SYM-BOL*	*FRANCE SPEC.*	*U.S.A. SPEC.*	*U.K. SPEC.*	*C.I.S. and RUSSIA SPEC.*	*CHINA SPEC.*	*Concentra-tion*
EGME*						SH 0369 (T 1301)	0.10 to 0.15%

TYPE OF ADDITIVE	*NATO SYM-BOL*	*FRANCE SPEC.*	*U.S.A. SPEC.*	*U.K. SPEC.*	*C.I.S. and RUSSIA SPEC.*	*CHINA SPEC.*	*Concentra-tion*
Di-EGME**	S-1745	AIR 3652/B (S174)	MIL-I-85470	DEF STAN 68252 DERD 2451 (AL–41)			0.10 to 0.15%
“I” FLUID					GOST 8313–88		0.10 to 0.30%
“I-M” FLUID					TU6-10-145 8-79		0.10 to 0.30%

* : EGME = Ethylene glycol monomethylether

** : Di-EGME = Diethylene glycol monomethylether

NOTE: ***All specifications are latest issue, latest valid amendment at issue date. Further evolutions shall be usable after Safran Helicopter Engines agreement.***

(b) Jet fuel thermal stability improver

Product	*Minimum concentration (mg/l)*	*Maximum concentration (mg/l)*
Aeroshell Performance Additive 101 (APA 101)	256	300
Betz Dearborn Spec Aid 8Q462	256	300
Turboline FS 100 (Dilute)	533	625
Turboline FS 100 C (Concentrate)	256	300

NOTE: ***Additive for F34 and F35, F34 + additive = F37***

NOTE: ***If this additive is used, water separating filter device is inoperative.***

(c) Anti-oxidizing additive

De-activation of the metals, anti-corrosion additive, which agree with the approved specifications in force.

WARNING

BIOCIDE OVERDOSE IN FUEL AT THE INLET OF THE ENGINE FUEL SYSTEM CAN CAUSE A POWER LOSS OF THE ENGINE(S).

CAUTION: **IT IS NOT PERMITTED TO MIX BIOBOR AND KATHON. THESE BIOCIDES ARE NOT COMPATIBLE.**

CAUTION: **DO NOT USE FUEL TREATED WITH BIOCIDE IF THE CONCENTRATIONS OF FUNGI/MOLDS ARE HIGH AS PER THE THRESHOLDS SPECIFIED BY THE IATA (INTERNATIONAL AIR TRANSPORT ASSOCIATION). FILTRATION IS FIRST NECESSARY, TO**

GET BACK TO MODERATE CONCENTRATIONS WHEN THE AIRCRAFT MANUFACTURER'S PROCEDURES MAKE IT POSSIBLE.

(d) Fungicide additive

1 **Maximum concentrations permitted at the inlet of the engine fuel system**

The maximum concentrations permitted, at all times, at the inlet of the engine fuel system, are:

BIOCIDE	Maximum concentrations for preventive treatment (mL/L) (1)	Maximum concentrations for curative treatment (mL/L) (1)
BIOBOR	0.100 (2)	0.199 (2)
KATHON FP1.5	0.050	0.100

(1) To convert into volumetric ppm: multiply the table values by 1,000.

(2) These concentrations are respectively equivalent to 135 and 270 ppm by weight for BIOBOR.

2 **Precautions for the use of biocides in the tanks**

If the biocide products are permitted by the aircraft manufacturer, it is the aircraft manufacturer's responsibility to supply the technical procedures that are necessary to:

- obey the procedures in force to prevent the presence and proliferation of fungi/molds in the tanks.
- specify the applicable inspections of the tanks to find the first signs of proliferation and to start a treatment as quickly as possible.
- specify the treatment necessary in relation to the recorded concentration of fungi/molds, for example in accordance with the IATA (International Air Transport Association) recommendations.
- make sure that the dosage and homogeneity of the biocide/fuel mixture at the inlet of the engine fuel system are correct.

(5) Storage time in the original packaging

Refer to manufacturer's specifications.

B. Lubricants

NOTE: ***When the engine is put into service or after draining, note in the engine log book the type of oil used.***

NOTE: ***This task gives the list of all the lubricants that are approved by Safran Helicopter Engines. Nevertheless, Safran Helicopter Engines reminds that only the lubricants given in the aircraft manufacturer's Flight Manual can be used for a given airframe.***

WARNING

DO NOT BREATHE THE OIL VAPORS. MAKE SURE THAT THE AREA WHERE YOU WORK IS OPEN TO THE AIR. DO NOT GET THE OIL ON YOUR SKIN. PUT THE RUBBER GLOVES AND A FACE SHIELD OR THE SAFETY GOGGLES. THE OIL CAN BE POISONOUS.

CAUTION: USE THE RECOMMENDED LUBRICANTS WHICH ARE GIVEN IN THE LIST. YOU CANNOT USE THE OTHER LUBRICANTS WITHOUT THE APPROVAL OF SAFRAN HELICOPTER ENGINES.

(1) Approved lubricants

The engine operates satisfactorily if you obey the restrictions of use, with the oils that agree with the specifications below and if you take into account the main characteristics of the lubrication oil system specified in this manual (see Task 79-00-00-870-801):

Oil type	*NATO symbol*	*U.S.A. SPEC.*	*U.K. SPEC.*	*FRANCE SPEC.*	*Class*	*Approved oil trademarks*
RECOMMENDED SYNTHETIC OILS						
Average synthetic 5 cSt at 98,9°C (210°F)	0 - 156	MIL-PRF-23699 or MIL-L-23699	DEF STAN 91.101		HTS (High thermal stability)	.EASTMAN TURBO OIL 2197 .MOBIL JET OIL 254
SYNTHETIC OILS - NORMAL USE						
Average synthetic 5 cSt at 98,9°C (210°F)	0 - 156	MIL-PRF-23699 or MIL-L-23699	DEF STAN 91.101		Corrosion inhibiting	.CASTROL AEROJET 5
					Standard	.CASTROL 5000 .ASTO 500 .MOBIL JET OIL 2 .TURBONYCOIL 600 .TOTAL AERO TURBINE 535 .ELF TURBOJET II .TOTAL PRESLIA SE JET
SYNTHETIC OILS - NORMAL USE WITH RESTRICTION (Drain frequency: 300 Operating hours)						
Average synthetic 5 cSt at 98,9°C (210°F)	0 - 156	MIL-PRF-23699 or MIL-L-23699	DEF STAN 91.101		Standard	.ASTO 560* .ROYCO 560* .EASTMAN TURBO OIL 2380*
OTHER OIL TYPES						

Oil type	*NATO symbol*	*U.S.A. SPEC.*	*U.K. SPEC.*	*FRANCE SPEC.*	*Class*	*Approved oil trademarks*
Synthetic oil 3 to 3,5 cSt at 98,9°C (210°F)	0 - 148	MIL-PRF-7808 or MIL-L-7808				.CASTROL 325 .CASTROL 3C .EASTMAN TURBO OIL 2389 .MOBIL OIL AVREX 256 .TURBONY-COIL 160
	0 - 150			AIR 3514		.TURBONY-COIL 13 B .ELF JET SYNTHETIC OIL 15
Synthetic oil 3,9 cSt at 98,9°C (210°F)			DEF STAN 91.94			.ASTO 390

(*)

The use of oil types ROYCO 560, ASTO 560 and EASTMAN TURBO OIL 2380 requires a drain frequency of 300 operating hours. Refer to Task 79-00-00-610-801.

Moreover, the use of oil types ROYCO 560 and ASTO 560 requires a clogging test of the rear bearing every operating 100 hours. Refer to Task 72-00-43-200-805.

The replacement of these types of oil with recommended oils requires:

– The draining of the oil system. Refer to Task 79-00-00-610-801
– The rinsing of the oil system. Refer to Task 79-00-00-610-802
– The descaling of the rear bearing (except oil EASTMAN TURBO OIL 2380). Refer to Task 72-43-10-110-801.

NOTE: ***All specifications are latest issue, latest valid amendment at issue date. Further evolutions shall be usable after Safran Helicopter Engines agreement.***

(2) Restrictions of use

In case of oil change with trademark change or NATO symbol change or class change, rinsing the oil sytem. Refer to Task 79-00-00-610-802.

Use the 5 cSt oil, NATO symbol 0-156, for a normal use at an ambient temperature between -30°C and +50°C (-22°F to +122°F).

Use the 3 cSt oil for an operation at a low temperature between -50°C and +30°C (-58°F and +86°F).

(3) Storage time in the original packaging

Refer to manufacturer's specifications.

C. Special products

WARNING

READ AND OBEY THE SAFETY INSTRUCTIONS BEFORE YOU USE THE SPECIAL PRODUCTS. THESE PRODUCTS ARE FLAMMABLE.

CAUTION: USE THE RECOMMENDED SPECIAL PRODUCTS WHICH ARE GIVEN IN THE LIST. YOU CANNOT USE THE OTHER SPECIAL PRODUCTS WITHOUT THE APPROVAL OF SAFRAN HELICOPTER ENGINES.

(1) Cleaning products for cleaning procedure done during cranking

Designations	*Suppliers*
Validated products (recommended)	
ARDROX 6367 (Turboclean 2)	CHEMETALL
ARDROX 6368 ready to use (Turboclean 2 RTU)	CHEMETALL
RMC-G21	RIVENAES (NORWAY)
TURCOJET WASH K3	TURCO
ZOK 27	AIRWORTHY Ltd G.B.
ZOK MX	AIRWORTHY Ltd G.B.
Products authorized for use (replacement)	
AL 333	WYANDOTTE
ARDROX 6375	CHEMETALL
ARDROX 6334	CHEMETALL
B & B3100	B & B TRITECH INC.
SOLVEX ICE 113	CASTROL
SINCLAIR S	SOCOMOR
TURCO 4217	TURCO
TURCO 5884	TURCO
TURCO 6783 series	TURCO
All Type-I, Type-II and Type-II RTU products qualified in agreement with the latest official version of standard MIL-PRF-85704	

(2) Cleaning products for cleaning procedure done on an engine that is in operation

Designations	*Suppliers*
Validated products (recommended)	
ARDROX 6367 (Turboclean 2)	CHEMETALL
TURCOJET WASH K3	TURCO
ZOK 27	AIRWORTHY Ltd G.B.
ZOK MX	AIRWORTHY Ltd G.B.
Products authorized for use (replacement)	
TURCO 6783-50	CHEMETALL
All Type-III and Type-III RTU products qualified in agreement with the latest official version of standard MIL-PRF-85704	

(3) Internal/external protection products

Designations	*Suppliers*
Validated products (recommended)	
ARDROX 3965	CHEMETALL
ARDROX 396/1 E28-1	CHEMETALL
ARDROX 3968	CHEMETALL
RUSTILO DW 377	CASTROL
TURCO 5442 WD EXTRA	HENKEL
WADIS 24	SOCOMORE
WADIS 24-60	SOCOMORE
WADIS 11B	SOCOMORE
TURBO PROTEC SC	LABORATOIRE ACI
Products authorized for use (replacement)	
ARDROX 396/1 E14	CHEMETALL
ARDROX 3961 (E31)	CHEMETALL
WADIS 634DM	SOCOMOR
ACF-50	LEAR CHEMICAL CORPORATION
Water-repellent product, NATO code C634	
All products qualified in agreement with the latest official version of one of these standards: – MIL-C-81309 – NF ISO 6743-8, categories RA, RBB and RCC – AIR 3634 – DEF STAN 68-10	

NOTE: ***ARDROX 3965 and ARDROX 396/1 E28-1 are the same product with two part numbers, one for supply in France and the other for international supply.***

(4) Anti-freeze products

Designations	
Validated products (recommended)	
Isopropyl alcohol	
Products authorized for use (replacement)	
Pure methanol	
Methanol/Water 44/56 or 50/50	

(5) Degreasing solvents recommended

The following cleaning solvents are used for routine cold.

Recommended products:

Degreasing solvents	*Suppliers*
Acetone	Not exclusive
Isopropyl alcohol	Not exclusive
Ethyl alcohol	Not exclusive

Degreasing solvents	*Suppliers*
ARDROX 552	CHEMETALL
DIESTONE D	SOCOMORE
DIESTONE DLS	SOCOMORE
EXXSOL D30	EXXON
HYSO 93	SOCOMORE
HYSO 97/1	SOCOMORE
Methylethylketone	Not exclusive
SOCOSOLV 95/1	SOCOMORE
SOCOSOLV 99/1	SOCOMORE
SRB 5	TECHNOUTIL
SRB 13	TECHNOUTIL
TURCO IND 79	HENKEL
Dearomatized WHITE SPIRIT	Not exclusive

CAUTION: **USE THE RECOMMENDED LUBRICANTS WHICH ARE GIVEN IN THE LIST. YOU CANNOT USE THE OTHER LUBRICANTS WITHOUT THE APPROVAL OF SAFRAN HELICOPTER ENGINES.**

(6) Cleaning of electrical connectors

Cleaning products for connectors	*Suppliers*
STABILANT 22	D.W. ELECTOCHEMICALS LTD.
SYNCLAIR A/C	SOCOMOR

WARNING

SOME OF THESE PRODUCTS CONTAIN VARIABLE AMOUNTS OF COMPONENTS HAZARDOUS FOR HEALTH. ANY CONTACT WITH THE BATH MAY CAUSE SKIN BURNS. THESE PRODUCTS ARE VERY STRONG ALKALINES. AVOID ANY CONTACT WITH THE SKIN AND TAKE EXTREME CARE WHEN HANDLING THE PRODUCT. IN ORDER TO AVOID PROJECTION ONTO THE BODY OR INGESTION BY MOUTH OR BY NOSE, WEAR APPROPRIATE GLOVES, CLOTHES, BOOTS AND MASK. IN CASE OF ACCIDENTAL CONTACT, WASH THOROUGHLY WITH WATER, AND TREAT WITH A SOLUTION OF BORIC ACID.

(7) Descaling products for hot sections

Products	*NATO symbol*	*U.S.A. SPEC.*	*U.K. SPEC.*	*FRANCE SPEC.*	*Suppliers*
MAGNUS 664D					A.O.G Air Service Zone de Fret N °3 3 rue du Remblai B.P. 10355 95706 ROISSY C.D.G.
ARDROX 185L					CHEMETAL
ARDROX 185					
HTP 1150L					ELDORADO CHEMICAL COMPANY
HDL 202					SOCOMOR/ Magchem

NOTE: ***Heating and immersion time of the elements to be descaled:***

- ***With MAGNUS 664D product: 100°C (+212°F) for 1 hour***
- ***With HTP 1150L product diluted in cold water at a concentration of 60%: 90°C (+194°F) for 15 at 30 minutes.***
- ***With ARDROX 185L product diluted in cold water at a concentration of 40%: 80°C (+176°F) for 15 at 30 minutes.***
- ***With ARDROX 185 product diluted in cold water at a concentration of 300g/l: 80°C (+176°F) for 15 at 30 minutes.***
- ***With HDL 202 product diluted in cold water at a concentration of 35%: 80°C (+176°F) for 15 at 30 minutes.***

(8) Varnish

Designation (validated product)	*Supplier*
SVP 52 permanent silicone varnish	ABCHIMIE

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TASK 71-00-06-940-801-A01

TROUBLE SHOOTING GENERAL

1. TASKS/REFERENCE DOCUMENTATION

Not applicable.

2. GENERAL

The trouble shooting procedures described in this Manual are an aid to the engine servicing personnel for finding possible faults.

In order to make the maintenance work of the personnel easier, the troubleshooting section is presented in a manual different from the Maintenance Manual.

This section 71-00-06 is integral part of the Maintenance Manual and obeys the same rules prescribed by the ATA 100 Standard concerning the normal revisions and temporary revisions.

3. INFORMATION FEEDBACK FOLLOWING TECHNICAL EVENTS

Safran Helicopter Engines has developed a system, which allows the retrieval of all information concerning the technical events affecting the operators' fleet.

The aim is to reduce:

- The time required for the analysis of the event
- The repair costs
- The time required for the repair of your equipment, engines, modules, and accessories.

To achieve this goal, Safran Helicopter Engines must have the as many details as possible about the event that caused the removal of the equipment. This will allow us to identify the elements involved and to apply the best adapted repair method.

Therefore, the operator is requested:

To send by fax to Safran Helicopter Engines a copy of the "Technical Event Report" with a description of the event as soon as the technical event occurs. (Refer to Figure 1)

NOTE: ***This report can also be supplied from and returned to the relevant Safran Helicopter Engines correspondent via the Internet.***

To return the equipment with a copy of the "inquiry about modules/accessories" form after having carefully provided all the information requested and enclosed the engine documentation: engine log book, module log card, component log card.... (Refer to Figure 2)

In the specific occurrence of engine or module removal following the illumination of the magnetic plug indicator light, it is imperative to leave the particles on the magnetic plug.

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	Technical Event Report					Operator	
Date of event	**Type of A/C**	**A /C S/N**	**Engine type**	**S/N.1**	**S/N 2**	**Hours #1**	**Hours #2**
P/N EECU #1	**P/N EECU #2**	**P/N HMU #1**	**P/N HMU #2**	**N1 #1 Cycles**		**N1 #2 Cycles**	
S/N EECU #1	***S/N EECU #2***	***S/N HMU #1***	***S/N HMU #2***	**N2 #1 Cycles**		**N2 #2 Cycles**	

Configuration at moment of event

☐ Static	☐ Rolling	☐ Cruising	☐ Descent
☐ Start-up	☐ Take-off	☐ Rundown	☐ Landing
☐ Ground idle	☐ Climb	☐ Hovering	☐ Stop

Effect on flight		**Effect on engine**
☐ Late	☐ Mission Abandoned	☐ Flame-out
☐ Cancelled	☐ No effect	☐ Loss of engine power
☐ Interrupted		☐ No effect

Failure Level	**Messages and Codes displayed**
☐ Level 3 (major event) ☐ Level 2 (degraded mode) ☐ Level 1 (minor event)	

Selector Position	**Selector Position**	**Mode**	**Neutral notch**	**Metering unit frozen**	**Booster pump**
☐ Stop	☐ Normal	☐ Auto	☐ In	☐ Yes	☐ Operating
☐ Idle	☐ Training	☐ Manual	☐ Out	☐ No	☐ Not operating
☐ Flight					

Indicator status during the event	**Indicator status when engine shut down**

Engine parameters at moment of event	**Accessories replaced for analysis and result**
N1 (#1) : N1 (#2) : N2 (#1) : N2 (#2) : T4.5 (#1) : T4.5 (#2) : TQ (#1) : TQ (#2) :	

Description of the event

Safran Helicopter Engines Request

Safran Helicopter Engines Report

Technical event report
Figure 1

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Information modules/accessoires
Inquiry about modules / accessories

1. **Utilisateur** / Operator.....
Adresse / Address .....
Pays / Country .....
Propriétaire du matériel / Owner of the equipment .....
Adresse / Address .....
(Si différent de l'utilisateur / If different from operator) **Pays** / Country .....

2. **Matériel déposé** / Removed equipment
Designation / Description.....
Référence / Part Number.....
N° de Série / Serial No.....
Date de livraison / Delivery date .....
Date de mise en service / Installation date .....
Date de l'incident / Date of incident.....

TSN		CSN	
TSO		CSO	
TSR		CSR	

Symptômes et circonstances de l'évènement / Circumstances of the Event

Déposé de / Removed from : **moteur** / engine
Type .....
N° Série / Serial No.....
Date de livraison / Delivery date .....
Date de mise en service / Installation date .....
Lieu d'utilisation / Place of use.....

☐ **En vol** / In flight ☐ **Au sol** / On ground

TSN		CSN	
TSO		CSO	
TSR		CSR	

3. **Matériel posé** / Installed equipment
Designation / Description .....
Référence / Part Number.....
N° de Série / Serial No.....
Date de pose / Installation date .....

TSN		CSN	
TSO		CSO	
TSR		CSR	

4. **Composition modulaire moteur** / Engine modular composition

	Réf. / P/N	S/N	TSN	TSO	CSN	CSO	**Avionné sur** / Fitted to
M01							Type hélic / A/C type
M02							
M03							N/S hélic / A/C S/N
M04							
M05							

5. **Documentation** / Publication
Avec un moteur .....**Le livret moteur** ☐
With an engine .....The engine log book
Avec un module, un accessoire ou un équipement.....**La fiche matricule** ☐
With a module, an accessory or an equipement .....The log card

6. **Etabli par** / Issued by ..... **Qualité** / Position.....
Société / Company ..... **Signature**.....
Date.....

Inquiry about modules/accessories
Figure 2

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TASK 71-01-00-940-801-A01

RINSING - CHEMICAL CLEANING - PROTECTION GENERAL

1. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

- Task 71-01-01-610-801 / Rinsing - Routine maintenance
- Task 71-01-03-610-801 / Chemical cleaning - Routine maintenance
- Task 71-01-04-620-801 / Internal protection - Protection
- Task 71-01-05-620-801 /External protection - Protection.

2. GENERAL

The operation of a turboshaft engine in a dirty air can cause its deterioration. The turboshaft engine must be treated to operate satisfactorily.

An atmosphere which can cause some corrosion, such as the salt-laden air near the sea level, causes:

- First, the corrosion of materials, which causes their weakening
- Then, the formation of deposits which decrease the engine performance.

The industrial contamination of the air, or the insects can cause:

- First, the formation of deposits which decrease the engine performance
- And possibly, some corrosion.

A sandy atmosphere causes:

- mainly, particles in the hot sections which decrease the engine performance.

It is important that the air path is cleaned each time it is necessary.

A delay causes irreversible deteriorations that even the recommended treatments cannot make up for. The removal of the engine is thus necessary.

A. Definitions

An engine is used in a salty environment if:

- The airframe on which it is installed is boarded on boat
- It operates above sea (or a salty water) at a height less than 1000 feet (305 meters)
- It operates inland at less than 5 km from the sea (or from salty water).

An engine is used in a polluted environment if:

- It operates around industrial dust (industrial or town environment)
- It operates around natural dust (flying over quarry, take off/landing on non asphalted grounds) or insects.

An engine is used in a sandy environment:

- At take-off, landing or stationary in ground effect (DES) on areas not prepared in sandy regions
- During operations over deserts or similar environments, whatever the height, with a high concentration of airborne sand or particles (rising sand type).

B. Recommended procedures

The procedures to prevent the engine deterioration are:

– The rinsing (during cranking or with the engine running)
– The chemical cleaning (during cranking only)
– The internal or external protection.

(1) The rinsing (Refer to Task 71-01-01-610-801) is a fast cleaning procedure which removes some of the corrosive or the salty materials from the air path after the engine operates in a corrosive or a salty air. It is also used to remove some of the mineral particles from the air path after the engine operates in a sandy atmosphere.

(2) The chemical cleaning (Refer to Task 71-01-03-610-801) procedure removes the dirt, the insects, the unwanted oil, etc., with a degreasing product.

(3) The internal (Refer to Task 71-01-04-620-801) or external protection (Refer to Task 71-01-05-620-801) protects the internal surfaces of the engine (the air path, the compressor) and the external surfaces with a mainly corrosion inhibitor and water-repellent product.

TASK 71-01-00-940-803-A01

ENGINE CLEANING PRODUCTS GENERAL

1. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 71-00-02-940-801 / Fuels - Lubricants - Special - General

2. GENERAL

WARNING

DO NOT BREATHE CLEANING PRODUCT VAPORS. WORK IN A WELL-VENTILATED AREA. DO NOT ALLOW CLEANING PRODUCTS TO REMAIN IN CONTACT WITH THE SKIN. USE RUBBER GLOVES AND SAFETY GOGGLES OR A FACE SHIELD. CLEANING PRODUCTS CAN BE POISONOUS.

It is necessary to use an adapted cleaning mixture to do the engine cleaning procedures.
The efficiency of the rinsing and chemical cleaning procedures can be improved by using a hot mixture (max. 60°C).

NOTE: ***Use hot water when you prepare the mixture, or increase the mixture temperature directly in the tool tank with an immersion heater (standard tool) or equivalent.***

It is not mandatory to use anti-icer product if the rinsing or chemical cleaning procedures are done increasing the mixture temperature (max. 60°C) and if the engine is immediately dried.
Carefully read the Safety Sheet of the products used and consult the supplier about any issues or questions regarding the products.

A. Mixture for rinsing

(1) Description

	Recommended products (Approved)	*Substitutes* (1) *(Authorized use)*
Cleaning product	Refer to Task 71-00-02-940-801	
Anti-icer product	Refer to Task 71-00-02-940-801	
Water	Distilled water Demineralized water	Minimum quality water

(1) Can be used for rinsing during cranking only.

(2) Mixture ratio

T0	*Anti-icer product* (1) *% v/v*	*Cleaning product % v/v*	*Water % v/v*
T0 ≥ 5°C (41°F)	0	0 to 6	100 to 94
5°C > T0 > -8°C (17.6°F)	18	0 to 6	82 to 76

T0	*Anti-icer product* (1) *% v/v*	*Cleaning product % v/v*	*Water % v/v*
-8°C ≥ T0 ≥ -24°C (11.2°F)	33	0 to 6	67 to 61

(1) If you use the methanol/water mixture, you must double the anti-icer product ratio.

B. Mixture for chemical cleaning

(1) Description

	Recommended products (Approved)	*Substitutes (Authorized use)*
Cleaning product	Refer to Task 71-00-02-940-801	
Anti-icer product	Refer to Task 71-00-02-940-801	
Water	Distilled water Demineralized water	Minimum quality water

(2) Mixture ratio

T0	*Anti-icer product* (1) *% v/v*	*Cleaning product % v/v*	*Water % v/v*
T0 ≥ 5°C (41°F)	0	20	80
5°C > T0 > -8°C (17.6°F)	15	20	65
-8°C ≥ T0 ≥ -24°C (11.2°F)	30	20	50

(1) If you use the methanol/water mixture, you must double the anti-icer product ratio.

NOTE: ***For the cleaning products that follow, the cleaning product ratio, by volume, to be used for the mixture preparation is:***

- ***SOLVEX ICE 113: 50%***
- ***AL 333 and ARDROX 6375: 25%***
- ***TURCO 6783-3: 10%***
- ***TURCO 4217: 5%***

Obey the anti-icer product ratio, by volume, according to the ambient temperature given in the above table. Adjust the water ratio, by volume, according to the ratios of cleaning product and anti-icer product to get 100%.

NOTE: ***Some cleaning products are Ready-To-Use (RTU) products and it is not necessary to dilute them: ZOK 27 RTU, ARDROX 6368, RMC-G21, TURCO 6783-10. Obey the anti-icer product ratio, by volume, according to the ambient temperature given in the above table.***

C. Products used for the internal and/or external protection

	Recommended products (Approved)	*Substitutes (Authorized use)*
Protecting products	Refer to Task 71-00-02-940-801	
Concentration	Pure	

D. Water quality

(1) Distilled water - Control test as per standard ISO 3696:

- Appearance: clear, limpid, colorless, without deposits or suspended materials
- Conductivity or resistivity at 25°C: maximum 5 µS/cm
- pH: 5 - 7.5
- Oxygen content: maximum 0.4 mg/L.
- Dry extract content (residue after heating at 110°C and complete evaporation): 2 ppm max.

(2) Demineralized water - Control test as per standard ISO 3696:

- Appearance: clear, limpid, colorless, without deposits or suspended materials
- Conductivity or resistivity at 25°C: maximum 10 µS/cm
- pH: 5 - 7.5
- Dry extract content (residue after heating at 110°C and complete evaporation): 10 ppm max.

(3) Minimum quality water

Should distilled or demineralized water be not used, and for the cleaning procedures during cranking only, you can use water that obeys the conditions that follow.

Minimum quality:

- Appearance: clear, limpid, colorless, without deposits or suspended materials
- Chloride content: maximum 15 ppm
- Sulphate content: maximum 10 ppm
- Sodium content: maximum 10 ppm
- Hardness: maximum 18°f

NOTE:
- ***1°f = 4 ppm of Ca2+.***
- ***1°f = 2.4 ppm of Mg2+.***
- ***1°f = 10 ppm of CaCO3.***

- Conductivity or resistivity at 25°C (optional): maximum 400 µS/cm
- pH: 6 - 8.5
- Dry extract content (residue after heating at 110°C and complete evaporation): 175 ppm max.

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TASK 71-01-00-610-801-A01

FREQUENCY OF ENGINE CLEANING ROUTINE MAINTENANCE

1. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

- Task 71-01-01-610-801 / Rinsing - Routine maintenance
- Task 71-01-03-610-801 / Chemical cleaning - Routine maintenance
- Task 71-01-05-620-801 / External protection - Protection.

2. GENERAL

The tables that follow (Refer to table 101) , (Refer to table 102) give the recommended frequencies to do the cleaning tasks for the different types of atmosphere the turboshaft engine operates in.

For use in combined atmospheres (e.g.: salty and contaminated), the recommendations are cumulative and on the basis of the most restrictive frequencies.

These frequencies are recommendations that can be adjusted to keep the engine condition as correct as possible. Thus, a special installation configuration (IBF/Vortex filters installed) or special operational constraints can justify these adjustments.

Contact a Safran Helicopter Engines representative to specify the servicing schedule that is applicable to your environment.

A. Procedures

(1) Rinsing (Refer to Task 71-01-01-610-801) .

(2) Chemical cleaning (Refer to Task 71-01-03-610-801) .

(3) External protection (Refer to Task 71-01-05-620-801) .

B. Table of frequencies

(1) After operation in special atmosphere (Refer to table 101)

Table 101 :

Type of atmosphere	*Rinsing*	*Chemical cleaning*	*External protection*
Corrosive or salty	Daily after the last flight of the day (1)	100 FH*	Weekly or 50 FH*
Contaminated	N/A (2)	50 FH*	N/A
Sandy	Daily (3)	100 FH*	N/A

(1) For operational requirements, this can be done before the first flight of the day.

(2) Rinsing can be necessary for flights in a very contaminated atmosphere.

(3) Only during cranking.

*: Flight Hours

NOTE: ***For use in combined atmospheres (e.g.: salty and contaminated), the recommendations are cumulative and on the basis of the most restrictive frequencies.***

(2) After operation out of special atmosphere (Refer to table 102)

Table 102 :

Type of atmosphere	*Rinsing*	*Chemical cleaning*	*External protection*
Not special	N/A	100 FH*	N/A

*: Flight Hours

TASK 71-01-01-610-801-A01

RINSING
ROUTINE MAINTENANCE

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Not applicable

Special tools

Description	*Tools Catalog Item*	*Quantity*
pressure generator tank (TM0188G002)	OT 20 0010	1
flow limiter assembly (8819505000)	OT 20 0020	1

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Not applicable

B. Additional provisions

Not applicable

2. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

- Aircraft Flight Manual
- Task 70-01-00-940-801 / Standard Practices - General
- Task 71-01-00-940-803 / Engine cleaning products - General
- Aircraft manufacturer's documentation.

WARNING

DO NOT BREATHE ANTI-ICER PRODUCT VAPORS. WORK IN A WELL-VENTILATED AREA. DO NOT ALLOW ANTI-ICER PRODUCTS TO REMAIN IN CONTACT WITH THE SKIN. USE RUBBER GLOVES AND SAFETY GOGGLES OR A FACE SHIELD. ANTI-ICER PRODUCTS CAN BE POISONOUS.

CAUTION: SAFRAN HELICOPTER ENGINES RECOMMENDS THE USE OF THE VENTILATION PROCEDURE, HOWEVER DUE TO OPERATIONAL CONSTRAINTS THE PROCEDURE ON RUNNING ENGINE CAN BE USED.

3. PROCEDURE

A. Preliminary operations

Not applicable

CAUTION: RINSING DURING VENTILATION IS MORE SATISFACTORY THAN RINSING ON A RUNNING ENGINE. HOWEVER, OPERATIONAL CONSTRAINTS CAN JUSTIFY THE USE OF THE RINSING PROCEDURE ON A RUNNING ENGINE.

B. Rinsing on a running engine

(1) Prepare 6 liters of rinsing mixture in the pressure generator tank (OT 20 0010). Refer to Task 71-01-00-940-803.

NOTE: Homogenize the rinsing mixture before you use it.

(2) Make sure that the aircraft air tappings are closed.

CAUTION: IF YOU DO NOT OBEY THE INJECTION FLOW RATE, THIS CAN HAVE EFFECTS ON THE INTEGRITY OF THE ENGINE ROTATING COMPONENTS.

(3) Adjust the pressure generator (OT 20 0010) to get an injection flow rate between 2 and 3 l/min or use, if necessary, the flow limiter (OT 20 0020).

NOTE: You can use a pressure generator tool other than the pressure generator (OT 20 0010) if you can connect it to the spraying device for an injection of the rinsing mixture with the specified volume and flow rate.

(4) Connect the hose of the pressure generator (OT 20 0010) to the fitting of the helicopter washing system (Refer to the aircraft manufacturer's documentation) or to the spraying device.

CAUTION: IF YOU DO NOT OBEY THE INJECTION RATING, THIS CAN HAVE EFFECTS ON THE INTEGRITY OF THE ENGINE ROTATING COMPONENTS.

(5) Start the engine (Refer to the aircraft manufacturer's documentation).

(6) Stabilize the engine at the ground idle (IDLE).

(7) Start the injection of the rinsing mixture.

During the injection, make sure that the rating does not decrease by more than 10 %.

If the rating decreases by more than 10%:

– stop the injection of the rinsing mixture,
– wait until the engine rating increases and stabilizes,
– start the injection of the rinsing mixture again with the same flow rate.

(8) Stop the injection of the rinsing mixture after the injection of all the rinsing mixture.

(9) Keep the engine in operation for a minimum of 5 minutes to dry it.

(10) Stop the engine (Refer to the aircraft manufacturer's documentation).

(11) Remove the tools.

(12) In case of twin-engine system, do the same procedure for the other engine.

C. Rinsing during ventilation

CAUTION: MAKE SURE THAT TEMPERATURE T4 IS LESS THAN 70°C.

CAUTION: THE COOLING OF THE ENGINE MUST BE SLOW. DO NOT ACCELERATE IT WITH VENTILATIONS.

(1) To plug the bleed valve:

– either install the bleed valve blank,
– or install the bleed valve blanking union on the bleed valve P2 inlet union and apply an air pressure of approximately 7 bars (101 PSI).

(2) Prepare 6 liters of rinsing mixture in the pressure generator tank (OT 20 0010). Refer to Task 71-01-00-940-803.

NOTE: Homogenize the rinsing mixture before you use it.

(3) Make sure that the aircraft air tappings are closed.

(4) Adjust the pressure generator (OT 20 0010) to get a flow between 7 and 8 l/min.

NOTE: You can use a pressure generator tool other than the pressure generator (OT 20 0010) if you can connect it to the spraying device for an injection of the rinsing mixture with the specified volume and flow rate.

(5) Connect the hose of the pressure generator (OT 20 0010) to the fitting of the helicopter washing system (Refer to the aircraft manufacturer's documentation) or to the spraying device.

CAUTION: MAKE SURE THAT THE POWER SUPPLY TIME OF THE STARTER GENERATOR COMPLIES WITH THE CRITERIA IN THE AIRCRAFT FLIGHT MANUAL.

CAUTION: OBEY THE VENTILATION PROCEDURE GIVEN IN THE AIRCRAFT FLIGHT MANUAL.

(6) Do the injection of all the rinsing mixture during one or more ventilations (Refer to the Aircraft Flight Manual).

NOTE: Start the injection when the engine is at 10 % of N1.

NOTE: Continue the injection after the starter stops until 10 % of N1.

(7) Remove the tools.

(8) Reset the bleed valve to the initial configuration:

- Remove the blank bleed valve
- Or remove the bleed valve blanking union on the bleed valve P2 inlet union.

(9) In case of twin-engine system, do the same procedure for the other engine.

(10) Start the engine, stabilize it at the ground idle (IDLE) and then keep the engine in operation for a minimum of 5 minutes to dry it.

D. Additional procedures

Not applicable

4. FINAL STEPS

Not applicable

TASK 71-01-03-610-801-A01

CHEMICAL CLEANING
ROUTINE MAINTENANCE

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Not applicable

Special tools

Description	*Tools Catalog Item*	*Quantity*
pressure generator tank (TM0188G002)	OT 20 0010	1

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Not applicable

B. Additional provisions

Task No.	*Task Title*
71-01-01-610-801	Rinsing - Routine maintenance

2. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

- Aircraft Flight Manual
- Task 70-01-00-940-801 / Standard Practices - General
- Task 71-01-00-940-803 / Engine cleaning products - General
- Aircraft manufacturer's documentation.

WARNING

DO NOT BREATHE ANTI-ICER PRODUCT VAPORS. WORK IN A WELL-VENTILATED AREA. DO NOT ALLOW ANTI-ICER PRODUCTS TO REMAIN IN CONTACT WITH THE SKIN. USE RUBBER GLOVES AND SAFETY GOGGLES OR A FACE SHIELD. ANTI-ICER PRODUCTS CAN BE POISONOUS.

WARNING

DO NOT BREATHE CLEANING PRODUCT VAPORS. WORK IN A WELL-VENTILATED AREA. DO NOT ALLOW CLEANING PRODUCTS TO REMAIN IN CONTACT WITH THE SKIN. USE RUBBER GLOVES AND SAFETY GOGGLES OR A FACE SHIELD. CLEANING PRODUCTS CAN BE POISONOUS.

CAUTION: THE COOLING OF THE ENGINE MUST BE SLOW. DO NOT ACCELERATE IT WITH VENTILATIONS.

CAUTION: MAKE SURE THAT TEMPERATURE T4 IS LESS THAN 70°C.

3. PROCEDURE

A. Preliminary operations

Not applicable

B. Chemical cleaning during ventilation

CAUTION: MAKE SURE THAT TEMPERATURE T4 IS LESS THAN 70°C.

CAUTION: THE COOLING OF THE ENGINE MUST BE SLOW. DO NOT ACCELERATE IT WITH VENTILATIONS.

(1) To plug the bleed valve:

- Either install the bleed valve blank
- Or install the bleed valve blanking union to the bleed valve P2 inlet union and apply an air pressure of approximately 7 bars (101 PSI).

(2) Prepare 4 liters of chemical cleaning mixture in the pressure generator tank (OT 20 0010). Refer to Task 71-01-00-940-803.

NOTE: Homogenize the chemical cleaning mixture before you use it.

(3) Make sure that the aircraft air tappings are closed.

(4) Adjust the pressure generator (OT 20 0010) to get an injection flow between 7 and 8 l/min.

NOTE: You can use a pressure generator tool other than the pressure generator (OT 20 0010) if you can connect it to the spraying device for an injection of the chemical cleaning mixture with the specified volume and flow rate.

(5) Connect the pipe of the pressure generator tank (OT 20 0010) to the fitting of the helicopter washing system (Refer to the aircraft manufacturer's documentation) or to the spraying device.

CAUTION: MAKE SURE THAT THE POWER SUPPLY TIME OF THE STARTER GENERATOR COMPLIES WITH THE CRITERIA IN THE AIRCRAFT FLIGHT MANUAL.

CAUTION: OBEY THE VENTILATION PROCEDURE GIVEN IN THE AIRCRAFT FLIGHT MANUAL.

(6) Do the injection of all the chemical cleaning mixture during some ventilations (Refer to the Aircraft Flight Manual).

Let the chemical cleaning mixture soak in the air path for 5 to 20 minutes between each ventilation, but make sure that you do not let the chemical cleaning mixture dry in the air path.

NOTE: The cumulated time the chemical cleaning mixture soaks in the air path is an important parameter for the chemical cleaning efficiency.

NOTE: Start the injection when the engine is at 10 % of N1.

NOTE: Continue the injection after the starter stops until 10 % of N1.

(7) Rinse the air path during ventilation. Refer to Task 71-01-01-610-801.

(8) For a twin-engine system, do the same procedure on the other engine.

C. Additional procedures

Not applicable

4. FINAL STEPS

Not applicable

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TASK 71-01-04-620-801-A01

INTERNAL PROTECTION PROTECTION

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Not applicable

Special tools

Description	*Tools Catalog Item*	*Quantity*
pressure generator tank (TM0188G002)	OT 20 0010	1

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Not applicable

B. Additional provisions

Task No.	*Task Title*
71-01-03-610-801	Chemical cleaning - Routine maintenance

2. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

- Aircraft Flight Manual
- Task 70-01-00-940-801 / Standard Practices - General
- Task 71-01-00-940-803 / Engine cleaning products - General
- Aircraft manufacturer's documentation.

WARNING

AVOID CONTACT WITH THE EYES AND THE SKIN. FOR INTENSIVE USE, WEAR GLOVES AND SAFETY GOGGLES. MAKE SURE THAT THE WORK AREA IS WELL VENTILATED.

CAUTION: THE COOLING OF THE ENGINE MUST BE SLOW. DO NOT ACCELERATE IT WITH VENTILATIONS.

CAUTION: MAKE SURE THAT TEMPERATURE T4 IS LESS THAN 70°C.

3. PROCEDURE

A. Preliminary operations

(1) Do a chemical cleaning of the air path (Refer to Task 71-01-03-610-801).

B. Internal protection

CAUTION: MAKE SURE THAT TEMPERATURE T4 IS LESS THAN 70°C.

CAUTION: THE COOLING OF THE ENGINE MUST BE SLOW. DO NOT ACCELERATE IT WITH VENTILATIONS.

(1) To plug the bleed valve:

- either install the bleed valve blank,
- or install the bleed valve blanking union on the bleed valve P2 inlet union and apply an air pressure of approximately 7 bars (101 PSI).

(2) Prepare 1 liter of internal protection product in the pressure generator tank (OT 20 0010). Refer to Task 71-01-00-940-803.

(3) Make sure that the aircraft air tappings are closed.

(4) Adjust the pressure generator (OT 20 0010) to get an injection flow between 7 and 8 l/min.

NOTE: You can use a pressure generator tool other than the pressure generator (OT 20 0010) if you can connect it to the spraying device for an injection of the internal protection product with the specified volume and flow rate.

(5) Connect the pipe of the pressure generator tank (OT 20 0010) to the fitting of the helicopter washing system ((Refer to the aircraft manufacturer's documentation) or to the spraying device.

CAUTION: MAKE SURE THAT THE POWER SUPPLY TIME OF THE STARTER GENERATOR COMPLIES WITH THE CRITERIA IN THE AIRCRAFT FLIGHT MANUAL.

CAUTION: OBEY THE VENTILATION PROCEDURE GIVEN IN THE AIRCRAFT FLIGHT MANUAL.

(6) Do the injection of all the internal protection product during some ventilations (Refer to the Aircraft Flight Manual).

NOTE: Start the injection when the engine is at 10 % of N1.

NOTE: Continue the injection after the starter stops until 10 % of N1.

(7) Remove the tools.

(8) Reset the bleed valve to the initial configuration:

– Remove the blank bleed valve
– Or remove the bleed valve blanking union on the bleed valve P2 inlet union.

(9) In case of twin-engine system, do the same procedure for the other engine.

C. Additional procedures

Not applicable

4. FINAL STEPS

Before you return the engine to service: do a chemical cleaning of the air path. Refer to Task 71-01-03-610-801.

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TASK 71-01-05-620-801-A01

EXTERNAL PROTECTION PROTECTION

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Description	*Quantity*
low-pressure sprayer	1
paint brush	1

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Description	*Quantity*
protection products	As required

B. Additional provisions

Task No.	*Task Title*
71-01-06-610-801	External cleaning of dressed or undressed engine/ module - Routine maintenance

2. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 71-00-02-940-801 / Fuels - Lubricants - Special products - General.

WARNING

AVOID CONTACT WITH THE EYES AND THE SKIN. FOR INTENSIVE USE, WEAR GLOVES AND SAFETY GOGGLES. MAKE SURE THAT THE WORK AREA IS WELL VENTILATED.

3. PROCEDURE

A. Preliminary operations

(1) Do an external cleaning of the engine/module. Refer to Task 71-01-06-610-801.

B. External protection

CAUTION: DO NOT USE A HIGH PRESSURE SPRAYING DEVICE.

CAUTION: INSTALL THE BLANKS ON ALL THE ORIFICES OF THE TURBOSHAFT ENGINE.

(1) Spray a thin layer of protection product on the full external surface of the engine and equipment items with a low-pressure sprayer. Refer to Task 71-00-02-940-801.

(2) Apply a thin layer of protection product, with a paint brush, on the non-sprayed areas.

(3) Remove the unwanted protection product from the lower points and the retention areas.

NOTE: Prevent any deposit of this product on the plastic parts.

C. Additional procedures

Not applicable

4. FINAL STEPS

Not applicable

TASK 71-01-06-610-801-A01

EXTERNAL CLEANING OF DRESSED OR UNDRESSED ENGINE/MODULE ROUTINE MAINTENANCE

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Description	*Quantity*
low-pressure sprayer	1
paint brush	1
abrasive hand pad (type Scotch-Brite™)	1

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Description	*Quantity*
demineralized water	As necessary
degreasing solvent	As necessary

B. Additional provisions

Not applicable

2. TASKS/REFERENCE DOCUMENTATION

– Task 70-01-00-940-801 / Standard practices - General
– Task 71-00-02-940-801 / Fuel, Lubricant, Special Products used - General.

3. PROCEDURE

WARNING

DO NOT BREATHE CLEANING PRODUCT VAPORS. WORK IN A WELL-VENTILATED AREA. DO NOT ALLOW CLEANING PRODUCTS TO REMAIN IN CONTACT WITH THE SKIN. USE RUBBER GLOVES AND SAFETY GOGGLES OR A FACE SHIELD. CLEANING PRODUCTS CAN BE POISONOUS.

WARNING

DO NOT BREATHE SOLVENT VAPORS. WORK IN A WELL-VENTILATED AREA. DO NOT ALLOW SOLVENTS TO REMAIN IN CONTACT WITH THE SKIN. USE RUBBER GLOVES AND SAFETY GOGGLES OR A FACE SHIELD. SOLVENTS CAN BE POISONOUS.

WARNING

THE INGREDIENTS/CONSUMABLES RECOMMENDED BY THE MANUFACTURER MUST BE USED IN COMPLIANCE WITH THE COMPANY'S SAFETY REGULATIONS IN FORCE.

CAUTION: USE THE RECOMMENDED CLEANING PRODUCTS FROM THE LIST. THE USE OF OTHER CLEANING PRODUCTS MUST BE APPROVED BY SAFRAN HELICOPTER ENGINES.

CAUTION: ALL THE ORIFICES OF THE PIPES, ACCESSORIES AND MODULES MUST BE FITTED WITH BLANKS TO PREVENT CONTAMINATION.

CAUTION: BEFORE THE TREATMENT, MAKE SURE THAT THE TEMPERATURE OF THE ENGINE/MODULES HOT SECTIONS ARE LOWER THAN THE FLASH POINT OF THE PRODUCTS (GENERALLY < 60°C).

A. Preliminary operations

Not applicable

B. Preparation - Blanking of the systems

CAUTION: THESE BLANKS ARE NOT SEALED. DO NOT FILL UP THE AIR DUCT AND/OR THE CAVITIES WITH CLEANING PRODUCTS OR WATER.

(1) Systems is blanked with blanks and standard or special plugs from the tool catalogue

(2) In the event of an engine assembly, blank the air inlet and the gas outlet.

(3) In the event of module(s), install storage blanks.

(4) Blank the unions/drains of the fuel system.

(5) Blank the unions/breathers/air vent of the oil system.

(6) Blank the free orifices of the air system (scavenge valve, pressurizations, etc. according to the engines/modules specifications.

(7) Blank the power drives (power, rear transmission, Freon unit, etc.).

(8) Blank the interfaces of the accessories and equipment items not installed.

(9) Blank the free electrical connectors.

(10) Install a scavenge tank below the engine/module support mount.

C. External cleaning of the dressed or undressed Engine/Module

CAUTION: FOR THE OPERATORS' SAFETY AND THE ENVIRONMENTAL PROTECTION, IT IS MANDATORY TO SPRAY THE PRODUCTS IN AN ADAPTED ROOM AND TO OBEY THE STANDARDS SPECIFIED BY THE LOCAL AUTHORITIES (AIR COOLING, AIR EXTRACTORS).

CAUTION: THEREFORE, THE UTILIZATION (OR NON-UTILIZATION) OF LOW PRESSURE SPRAYER REMAINS THE WORKSHOP SUPERVISOR'S DECISION.

CAUTION: RESIDUES MUST BE COLLECTED AND TREATED IN CONFORMITY WITH THE REGULATION IN FORCE.

NOTE: To do the procedure satisfactorily, it is recommended to do it on an engine that is sufficiently cold (surface temperature < 50°C).

(1) Rinse the engine/module.

NOTE: Do the procedure on a series of areas with a small surface because the demineralized water must not dry too quickly between spraying and rubbing.

(a) Spray demineralized water on the engine/module external sections with a low-pressure sprayer.

(b) Rub the areas where there are collected particles with a paint brush or a abrasive hand pad (type Scotch-Brite™).

(c) Do the above steps again for all of the engine/module.

(2) Remove the grease from the engine/module.

NOTE: Do the procedure on a series of areas with a small surface because the solvent must not dry too quickly between spraying and rubbing.

(a) Spray degreasing solvent on the engine/module external sections with a low-pressure sprayer. Refer to Task 71-00-02-940-801.

(b) Rub the areas where there are collected particles with a paint brush or a abrasive hand pad (type Scotch-Brite™).

(c) Do the above steps again for all of the engine/module.

(3) Dry the engine/module and the equipment items with compressed air.

NOTE: Correctly dry the liquid retention areas (e.g.: connecting flanges of engine/ equipment interface, spot facings, dents, etc.).

D. Additional procedures

Not applicable

4. FINAL STEPS

Not applicable

TASK 71-02-01-940-801-A01

TREATMENT OF AN ENGINE AFTER THE USE OF EXTINGUISHANTS GENERAL

1. PURPOSE

The purpose of this maintenance procedure is to decrease as much as possible the corrosion.

This procedure is applicable to an engine or an equipment which is in a correct condition or repairable.

Use this procedure:

- After an engine fire or of its environment which occurs during a flight or a ground run and which is rapidly overcome (the extinguishant can touch the engine)
- After accidental operation of the extinguishers on a cold engine, and when the extinguishant is not in the air path.

2. EFFECTS ON THE ENGINE

A. After the use of the carbon dioxide

The carbon dioxide is an inert and a non-corrosive gas which does not make deposits:

- On the external and the internal surfaces of a cold engine or on the external cold surfaces of an engine (the compressor casing, the equipment, etc.) just after its operation, the expansion of the carbon dioxide normally does not cause damage
- On the internal components of the engine air path (the compressor, the turbines etc.), just after the operation of the engine or on the hot external parts of an engine (the turbine casing, the exhaust diffuser, the exhaust pipe, etc.) just after its operation, the expansion of the carbon dioxide can cause some cracks which are the result of a thermal shock.

B. After the use of the foam

The foam can be:

- A chemical foam: it results from the reaction of an acid or of an acid salt dissolved in the water on a bicarbonate or a carbonate, with a foaming agent
- A physical foam: it results from a mechanical procedure with some pressurized water, a foaming liquid (made from some fluorine wetting agents) and the ambient air.
  The water and the foams used can cause some corrosion. They can make some deposits and cause the seizing of the rotating parts.

C. After the use of a dry powder

The powder is generally made from the sodium hydrogen bicarbonate or the potassium.

It can cause some corrosion, some clogging and make some glassy deposits on the engine hot parts.

D. After the use of a halon

A halon is a volatile liquid or a colorless and an odorless gas, generally made from a halogenated hydrocarbon (with the fluorine, the chlorine, the bromine).

Examples:

– The tribromofluorine (TBF)
– The bromotrifluoromethane (halon 1301)
– The bromochlorodifluoromethane (BCF - halon 1211).

The halon can cause some corrosion: thus, you must protect all the engine parts because of the volatility of the product, even if the fire occurred on the external parts of the engine or in its environment.

NOTE: ***If a TBF product is used, which reacts very quickly, the treatment must be applied immediately.***

TASK 71-02-01-280-801-A01

TREATMENT OF AN ENGINE AFTER THE OPERATION OF EXTINGUISHERS ON A HOT ENGINE (T4.5 > 150 °C) SPECIAL PROCEDURE

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Description	*Quantity*
vacuum-cleaner	1
fan	1

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Not applicable

B. Additional provisions

Task No.	*Task Title*
71-01-03-610-801	Chemical cleaning - Routine maintenance

2. TASKS/REFERENCE DOCUMENTATION

- Task 71-01-06-610-801/External cleaning of dressed or undressed engine/module - Routine maintenance
- Task 71-02-13-280-801/Ground run check - Special procedure
- Chapter 05-20/Scheduled inspections
- Flight Manual

WARNING

DO NOT BREATHE EXTINGUISHING PRODUCT VAPORS. WORK IN A WELL-VENTILATED AREA. DO NOT ALLOW EXTINGUISHING PRODUCTS TO REMAIN IN CONTACT WITH THE SKIN. USE RUBBER GLOVES AND SAFETY GOGGLES OR A FACE SHIELD. EXTINGUISHING PRODUCTS CAN BE POISONOUS.

CAUTION: CLEAN THE ENGINE AS QUICKLY AS POSSIBLE AFTER YOU USE THE EXTINGUISHANTS. THESE MATERIALS CAN CAUSE SOME CORROSION WHEN THEY TOUCH THE HOT PARTS. THEY CAN MAKE DEPOSITS THAT CAUSE SOME CLOGGINGS.

3. PROCEDURE

A. Preliminary operations

Not applicable

B. After the use of carbon dioxide fire extinguishers

(1) If the engine can be used again and brought back into operation

(a) If the extinguishant did not go into the air path

1 Do an external cleaning of the engine if necessary (Refer to Task 71-01-06-610-801).

2 Do a servicing inspection "Inspection after 15 flight hours or 7 days” (Refer to Chapter 05-20).

3 Do a ground run check (Refer to Task 71-02-13-280-801).

4 Return the engine to service.

(b) If the extinguishant went into the air path

1 Remove the engine.

2 Send the engine back to a Repair Center.

(2) If the engine cannot be brought back into operation

(a) Remove the engine.

(b) Send the engine back to a Repair Center.

C. After the use of water / additive water / foam fire extinguishers

(1) If the engine can be used again and brought back into operation

(a) If the extinguishant did not go into the air path

1 Do an external cleaning of the engine (Refer to Task 71-01-06-610-801).

2 Do a chemical cleaning of the air path (Refer to Task 71-01-03-610-801).

3 Do a servicing inspection "Inspection after 15 flight hours or 7 days” (Refer to Chapter 05-20).

4 Do a ground run check (Refer to Task 71-02-13-280-801).

5 Return the engine to service.

(b) If the extinguishant went into the air path

1 Do an external cleaning of the engine (Refer to Task 71-01-06-610-801).

2 Do a chemical cleaning of the air path (Refer to Task 71-01-03-610-801).

3 Remove the engine.

4 Send the engine back to a Repair Center.

(2) If the engine cannot be brought back into operation

(a) Remove the engine.

(b) Do an external cleaning of the engine (Refer to Task 71-01-06-610-801).

(c) Send the engine back to a Repair Center.

D. After the use of dry powder fire extinguishers

(1) If the engine can be brought back into operation

(a) If the extinguishant did not go into the air path

1 Remove all the powder to which you can get access with a vacuum-cleaner.

2 Do an external cleaning of the engine (Refer to Task 71-01-06-610-801).

3 Do a chemical cleaning of the air path (Refer to Task 71-01-03-610-801).

4 Do a servicing inspection "Inspection after 15 flight hours or 7 days” (Refer to Chapter 05-20).

5 Do a ground run check (Refer to Task 71-02-13-280-801).

6 Return the engine to service.

(b) If the extinguishant went into the air path

1 Remove all the powder to which you can get access with a vacuum-cleaner.

2 Do an external cleaning of the engine (Refer to Task 71-01-06-610-801).

3 Do a chemical cleaning of the air path (Refer to Task 71-01-03-610-801).

4 Remove the engine.

5 Send the engine back to a Repair Center.

(2) If the engine cannot be brought back into operation

(a) Remove the engine.

(b) Remove all the powder to which you can get access with a vacuum-cleaner.

(c) Do an external cleaning of the engine (Refer to Task 71-01-06-610-801).

(d) Send the engine back to a Repair Center.

E. After the use of HALON 1301 or HALON 1301-inert gas mixture fire extinguishers

CAUTION: FOR ANY EXPOSURE TO ANOTHER TYPE OF HALON (E.G.: 1211), THE RESPONSE TIME OF 24 HOURS GOES DOWN TO 1 HOUR.

(1) If the engine can be brought back into operation

(a) If the extinguishant did not go into the air path

1 Blow air in the engine compartment within 24 hours.

2 Do a servicing inspection "Inspection after 15 flight hours or 7 days" (Refer to Chapter 05-20).

3 Do a ground run check (Refer to Task 71-02-13-280-801).

4 Return the engine to service.

(b) If the extinguishant went into the air path

1 Ventilate the engine compartment within 24 hours.

2 Do 3 dry ventilations of the engine for 20 seconds, within 24 hours (Refer to the Flight Manual).

3 Remove the engine.

4 Send the engine back to a Repair Center.

(2) If the engine cannot be brought back into operation

(a) Remove the engine.

(b) Do a forced ventilation of the air path for 15 minutes with a fan, within 24 hours.

(c) Send the engine back to a Repair Center.

F. ADDITIONAL PROCEDURES

Not applicable

4. FINAL STEPS

Not applicable

TASK 71-02-01-280-802-A01

TREATMENT OF AN ENGINE AFTER THE OPERATION OF EXTINGUISHERS ON A COLD ENGINE (T4.5 < 150 °C) SPECIAL PROCEDURE

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Description	*Quantity*
vacuum-cleaner	1
fan	1

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Not applicable

B. Additional provisions

Task No.	*Task Title*
71-01-03-610-801	Chemical cleaning - Routine maintenance

2. TASKS/REFERENCE DOCUMENTATION

– Task 71-01-06-610-801/External cleaning of dressed or undressed engine/module - Routine maintenance
– Task 71-02-13-280-801/Ground run check - Special procedure
– Flight Manual

WARNING

DO NOT BREATHE EXTINGUISHING PRODUCT VAPORS. WORK IN A WELL-VENTILATED AREA. DO NOT ALLOW EXTINGUISHING PRODUCTS TO REMAIN IN CONTACT WITH THE SKIN. USE RUBBER GLOVES AND SAFETY GOGGLES OR A FACE SHIELD. EXTINGUISHING PRODUCTS CAN BE POISONOUS.

CAUTION: CLEAN THE ENGINE AS QUICKLY AS POSSIBLE AFTER YOU USE THE EXTINGUISHANTS. THESE MATERIALS CAN CAUSE SOME CORROSION WHEN THEY TOUCH THE HOT PARTS. THEY CAN MAKE DEPOSITS THAT CAUSE SOME CLOGGINGS.

3. PROCEDURE

A. Preliminary operations

Not applicable

B. After the use of carbon dioxide fire extinguishers

(1) Keep the engine in service.

C. After the use of water / additive water / foam fire extinguishers

(1) Do an external cleaning of the engine (Refer to Task 71-01-06-610-801).

(2) Do a chemical cleaning of the air path (Refer to Task 71-01-03-610-801).

(3) Do a servicing inspection "Inspection after 15 flight hours or 7 days" (Refer to Chapter 05-20).

(4) Do a ground run check (Refer to Task 71-02-13-280-801).

(5) Return the engine to service.

D. After the use of dry powder fire extinguishers

(1) Remove all the powder to which you can get access with a vacuum-cleaner.

(2) Do an external cleaning of the engine (Refer to Task 71-01-06-610-801).

(3) Do a chemical cleaning of the air path (Refer to Task 71-01-03-610-801).

(4) Do a servicing inspection "Inspection after 15 flight hours or 7 days" (Refer to Chapter 05-20).

(5) Do a ground run check (Refer to Task 71-02-13-280-801).

(6) Return the engine to service.

E. After the use of HALON 1301 or HALON 1301-inert gas mixture fire extinguishers

CAUTION: FOR ANY EXPOSURE TO ANOTHER TYPE OF HALON (E.G.: 1211), THE RESPONSE TIME OF 24 HOURS GOES DOWN TO 1 HOUR.

(1) Blow air in the engine compartment within 24 hours.

(2) Do 3 dry ventilations of the engine for 20 seconds (Refer to the Flight Manual) or a forced ventilation of the air path for 15 minutes with a fan, within 24 hours.

(3) Do a servicing inspection "Inspection after 15 flight hours or 7 days" (Refer to Chapter 05-20).

(4) Do a ground run check (Refer to Task 71-02-13-280-801).

(5) Return the engine to service.

F. Additional procedures

Not applicable

4. FINAL STEPS

Not applicable

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TASK 71-02-01-280-803-A01

TREATMENT OF AN ENGINE AFTER A FIRE SPECIAL PROCEDURE

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Not applicable

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Not applicable

B. Additional provisions

Not applicable

2. TASKS/REFERENCE DOCUMENTATION

Not applicable

3. PROCEDURE

A. Preliminary operations

Not applicable

B. Treatment procedure of an engine after a fire

(1) Fill in the "incident report" (GLS 2173) and attach it to the equipment sent back.

(2) Send the complete engine and the EECU back to the factory.

C. Additional procedures

Not applicable

4. FINAL STEPS

Not applicable

TASK 71-02-01-280-804-A01

TREATMENT OF AN ENGINE AFTER AN IMMERSION IN THE WATER SPECIAL PROCEDURE

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Not applicable

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Not applicable

B. Additional provisions

Not applicable

2. TASKS/REFERENCE DOCUMENTATION

Not applicable

3. PROCEDURE

A. Preliminary operations

Not applicable

B. Treatment procedure of an engine after an immersion in the water

(1) Fill in the "incident report" (GLS 2173) and attach it to the equipment sent back.

(2) Send the complete engine and the EECU back to the factory.

C. Additional procedures

Not applicable

4. FINAL STEPS

Not applicable

TASK 71-02-02-280-801-A01

TREATMENT OF AN ACCIDENTALLY DROPPED ENGINE
SPECIAL PROCEDURE

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Not applicable

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Not applicable

B. Additional provisions

Not applicable

2. TASKS/REFERENCE DOCUMENTATION

Not applicable

3. PROCEDURE

A. Preliminary operations

Not applicable

B. Treatment of an accidentally dropped engine

(1) Fill in the "incident report" (GLS 2173) and attach it to the equipment sent back.

(2) Send the complete engine and the EECU back to the factory.

C. Additional procedures

Not applicable

4. FINAL STEPS

Not applicable

TASK 71-02-03-280-801-A01

TREATMENT OF AN ENGINE AFTER A FOREIGN OBJECT DAMAGE SPECIAL PROCEDURE

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Description	*Quantity*
torch	1

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Not applicable

B. Additional provisions

Task No.	*Task Title*
72-00-32-900-801	Module 02 compressor - Removal/Installation
72-00-32-200-803	Module 02 compressor - Axial compressor blades - Inspection/Check
72-00-43-200-806	Module 03 gas generator - Inspection/Check
71-01-03-610-801	Chemical cleaning - Routine maintenance
71-02-10-940-801	Vibration test procedure - General
75-31-00-200-802	Bleed valve filter - Inspection/Check

2. TASKS/REFERENCE DOCUMENTATION

– Flight Manual.

3. PROCEDURE

A. Preliminary operations

Not applicable

B. Procedure

(1) Examine the components that you can see through the air inlet and the exhaust pipe.

(a) Examine the axial compressor blades. Refer to Task 72-00-32-200-803.

(2) Do a borescopic inspection of the centrifugal compressor blades. Refer to Task 72-00-43-200-806.

(3) Examine all the tubes of the air system, more specially the jets installed on the flange unions.

(4) Examine the filter of the bleed valve. Refer to Task 75-31-00-200-802.

(5) Examine the customer air bleeds.

(6) Do a chemical cleaning of the air path. Refer to Task 71-01-03-610-801.

(7) Do a ground run check (Refer to the Flight Manual).

(8) Do a vibration test. Refer to Task 71-02-10-940-801.

NOTE: ***If an anomaly is found. Contact a Safran Helicopter Engines representative to help you.***

C. Additional procedures

Not applicable

4. FINAL STEPS

Not applicable

TASK 71-02-04-280-801-A01

TREATMENT OF AN ENGINE AFTER A LIGHTNING STRIKE
SPECIAL PROCEDURE

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Not applicable

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Not applicable

B. Additional provisions

Task No.	*Task Title*
72-00-15-900-801	Module 05 reduction gearbox - Removal/ Installation

2. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 71-02-07-280-802 / Particles in the oil system (Table of Decisions) - Procedure
– Task 71-02-09-760-801 / Engine rundown time - Check
– Task 71-02-13-280-801 / Ground run check - Check.

3. PROCEDURE

A. Preliminary operations

Not applicable

B. General

The lightning strikes cause two types of phenomena:

- The thermal phenomena
- The electrical phenomena.

(1) Thermal phenomena

The thermal phenomena can cause:

– The fusion of some components
– A short temperature increase on a limited area which is sufficient to cause a damage to the heat treatment of a component

(2) Electrical phenomena

The electrical phenomena can cause:

– Some overcurrent phenomena in some parts of the electrical circuits

C. Procedure

(1) Do a servicing inspection "Inspection after 15 flight hours or 7 days" or "Inspection after the last flight of the day" according to variant. Refer to chapter 05-20.

– Manually examine the power turbine for free rotation (absence of noise).
– Examine the gas generator rotating assembly for free rotation on ventilation (absence of noise).

NOTE: Send the engine to the factory in case of friction or blockage noises.

(2) Examine the components and casings for indications of burning.

NOTE: Send the engine to the factory in case of indications of burning on the casings.

NOTE: Replace the related components in case of burning.

(3) Examine the components that follow for traces of burning:

– The fuel and oil draining system
– The electrical harnesses
– The torque and temperature conformation box
– The ignition and starting cable
– The bonding braids.

NOTE: Replace the related components in case of burning.

(4) Examine the Module 02 - Inlet cone for indications of burning.

(5) Remove the Module 05. Refer to Task 72-00-15-900-801.

(6) Examine the components that follow for traces of burning:

– The splines of the coupling sleeve
– The tightening nut of the power turbine shaft
– The driving gear of the reduction gearbox.

NOTE: Send back the engine to the factory in case of indications of burning.

(7) Install the Module 05. Refer to Task 72-00-15-900-801.

(8) Examine the filtering element of the front oil filter before and after a ground run check. Refer to Task 71-02-07-280-802.

(9) Do a check of the magnetic plugs before and after a ground run check. Refer to Task 71-02-07-280-802.

(10) Do a ground run check. Refer to Task 71-02-13-280-801.

NOTE: ***Electronic Engine Control Unit: If no failure is reported at the end of the autotests done at power on of the Electronic Engine Control Unit and after an engine ground run, then no further action is required on the Electronic Engine Control Unit.***

(11) Find out abnormal noises.

NOTE: ***Send the engine to the factory in case of abnormal noises.***

(12) Do a check of the rundown time. Refer to Task 71-02-09-760-801.

(13) Record the lightning strike in the engine log book.

(14) Do a SOA procedure every 25 hours during the next 100 engine operating hours.

NOTE: ***After a lightning strike, you can find deposits from the bearings. These deposits can come into view during the magnetic plugs inspection.***

D. Additional procedures

Not applicable

4. FINAL STEPS

Not applicable

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TASK 71-02-05-280-801-A01

TREATMENT OF AN ENGINE AFTER A ROTOR DAMAGE
SPECIAL PROCEDURE

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Not applicable

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Not applicable

B. Additional provisions

Task No.	*Task Title*
71-02-08-280-801	Sampling procedure - Special procedure
71-02-09-760-801	Engine rundown time - Tests
71-02-10-940-801	Vibration test procedure - General
72-00-15-900-801	Module 05 reduction gearbox - Removal/ Installation
72-15-00-900-801	Module 05 reduction gearbox - Mechanical magnetic plug - Magnetic head - Removal/ Installation
72-61-00-900-803	Module 01 accessory gearbox equipment - Oil filtering element - Removal / Installation
72-61-00-900-808	Module 01 accessory gearbox equipment - Mechanical magnetic plug - Magnetic head - Removal / Installation

Task No.	*Task Title*
79-38-00-900-801	Electrical magnetic plug - Magnetic head - Removal/Installation

2. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

- Aircraft Maintenance Manual
- Task 70-40-02-940-803 / Tubes and unions - Inspection
- Task 71-02-13-280-801 / Ground run check - Check.

CAUTION: THIS PROCEDURE IS APPLICABLE AFTER AN OPERATION INCIDENT WHICH CAUSED A ROTOR DAMAGE: ROTOR OVERSPEED, IMPACT ON THE MAIN BLADES OR ON THE TAIL ROTOR BLADES, ETC …

CAUTION: IN CASE OF A RETURN IN A REPAIR CENTER:

- **FILL IN THE "INCIDENT REPORT" (GLS 2173) AND ATTACH IT TO THE EQUIPMENT SENT BACK**
- **SEND THE COMPLETE ENGINE AND THE EECU BACK TO AN APPROVED REPAIR CENTER.**

3. PROCEDURE

A. Preliminary operations

Not applicable

B. Treatment of an engine after a rotor impact without blade damage (distortion, rupture...)

(1) Check manually the rotation of the gas generator and the power turbine.

NOTE: ***Send the complete engine back to an approved repair center if you find a friction noise, or a friction point on one of the rotors.***

(2) Make a ventilation. Refer to the Aircraft Maintenance Manual.

NOTE: ***If you hear a friction noise during the rotation or seizing, thus remove the engine and send it back to an approved repair center.***

(3) Do a ground run check. Refer to Task 71-02-13-280-801.

(4) Monitor the engine performance

(a) Do a check of the vibration level before to return the engine in service. Refer to Task 71-02-10-940-801.

(b) Remove two oil samples with 5 hours between each sample for a better SOA monitoring. Refer to Task 71-02-08-280-801.

NOTE: ***Go back at the normal frequency if the result is correct.***

(c) Examine the oil filtering element after the 5 first hours. Refer to Task 72-61-00-900-803.

(d) Examine the mechanical magnetic plugs after the last flight of the day. Refer to Task 72-61-00-900-808 and Task 72-15-00-900-801.

(e) Examine the electrical magnetic plugs after the last flight of the day. Refer to Task 79-38-00-900-801.

(f) Examine the engine rundown time for a change during 25 hours after the last flight of the day. Refer to Task 71-02-09-760-801.

NOTE: ***Remove and send back the engine to an approved repair center if you hear a friction noise during the rotation of the rotating assembly or a seizing.***

NOTE: ***If you find an anomaly during the inspections, remove the engine and send it back to an approved repair center.***

C. Treatment of an engine after a rotor impact with blade damage (distortion, rupture...)

(1) Examine the support platform of the engine on the airframe. Refer to the Aircraft Maintenance Manual.

(2) Check manually the rotation of the gas generator and the power turbine.

NOTE: ***Send the complete engine back to an approved repair center if you find a rough feeling, or a friction point on one of the rotors.***

(3) Do a visual check of:

- The engine attachment points
- The protection tube
- The reduction gearbox casing
- The compressor casing
- The turbine casing

NOTE: ***Send the complete engine back to an approved repair center if you find a folding or a damage on one of these parts.***

- The exhaust pipe.

NOTE: ***A small dent is permitted.***

(4) Examine the tubes. Refer to Task 70-40-02-940-803.

NOTE: ***Replace all the tubes which have anomalies (the bent, the worn or the blocked tubes).***

(5) Make a ventilation. Refer to the Aircraft Maintenance Manual.

NOTE: ***If you hear a friction noise during the rotation or seizing, thus remove the engine and send it back to an approved repair center.***

(6) Remove the Module 05. Refer to Task 72-00-15-900-801.

(7) Twin-engine variants

Inspect the deviation of the engraved marks between the front face of the nut and the drive gear shaft.

(a) If the marks engraved are misaligned higher than 0.50 mm, send back to an approved repair center:

- the Module 05 - Reduction gearbox.
- the Module 04 - Power turbine.
- the Module 01 - Accessory gearbox.

(b) If the marks engraved are aligned or in case of a misalignment lower than 0.50 mm, keep serviceable:

- the Module 05 - Reduction gearbox.
- the Module 04 - Power turbine.
- the Module 01 - Accessory gearbox.

(c) Doubt regarding the misalignment of the engraved marks, send back to an approved repair center:

- the Module 05 - Reduction gearbox.
- the Module 04 - Power turbine.
- the Module 01 - Accessory gearbox.

(8) Do a ground run check. Refer to Task 71-02-13-280-801.

(9) Monitor the engine performance

(a) Do a check of the vibration level before to return the engine in service. Refer to Task 71-02-10-940-801.

(b) Remove two oil samples with 5 hours between each sample for a better SOA monitoring. Refer to Task 71-02-08-280-801.

NOTE: ***Go back at the normal frequency if the result is correct.***

(c) Examine the oil filtering element after the 5 first hours. Refer to Task 72-61-00-900-803.

(d) Examine the mechanical magnetic plugs after the last flight of the day. Refer to Task 72-61-00-900-808 and Task 72-15-00-900-801.

(e) Examine the electrical magnetic plugs after the last flight of the day. Refer to Task 79-38-00-900-801.

(f) Examine the engine rundown time for a change during 25 hours after the last flight of the day. Refer to Task 71-02-09-760-801.

NOTE: ***Remove and send back the engine to an approved repair center if you hear a friction noise during the rotation of the rotating assembly or a seizing.***

NOTE: ***If you find an anomaly during the inspections, remove the engine and send it back to an approved repair center.***

D. Additional procedures

Not applicable

4. FINAL STEPS

Not applicable

TASK 71-02-05-280-802-A01

TREATMENT OF AN ENGINE AFTER A RUPTURE OF THE ENGINE LINKING SHAFT / MGB SPECIAL PROCEDURE

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Not applicable

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Not applicable

B. Additional provisions

Task No.	*Task Title*
71-00-01-940-801	Limitations – General

2. TASKS/REFERENCE DOCUMENTATION

Not applicable

CAUTION: IN CASE OF A RETURN IN A REPAIR CENTER :

- **FILL IN THE "INCIDENT REPORT" (GLS 2173) AND ATTACH IT TO THE EQUIPMENT SENT BACK,**
- **SEND THE COMPLETE ENGINE AND THE EECU BACK TO AN APPROVED REPAIR CENTER.**

3. PROCEDURE

A. Preliminary operations

Not applicable

B. Treatment procedure of an engine after a rupture of the engine linking shaft / MGB

(1) Apply the procedure "N2 overspeed". Refer to Task 71-00-01-940-801.

C. Additional procedures

Not applicable

4. FINAL STEPS

Not applicable

TASK 71-02-06-280-801-A01

TREATMENT OF AN ENGINE AFTER A HEAVY LANDING
SPECIAL PROCEDURE

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Not applicable

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Not applicable

B. Additional provisions

Task No.	*Task Title*
71-02-08-280-801	Sampling procedure - Special procedure
71-02-09-760-801	Engine rundown time - Tests
71-02-10-940-801	Vibration test procedure - General
72-00-32-200-803	Module 02 compressor - Axial compressor blades - Inspection/Check
72-00-43-200-803	Module 03 gas generator - turbine blades of the gas generator - Inspection / Check
72-15-00-900-801	Module 05 reduction gearbox - Mechanical magnetic plug - Magnetic head - Removal/ Installation
72-61-00-900-803	Module 01 accessory gearbox equipment - Oil filtering element - Removal / Installation

Task No.	*Task Title*
72-61-00-900-808	Module 01 accessory gearbox equipment - Mechanical magnetic plugs - Magnetic head - Removal / Installation
73-23-00-900-801	Pump and metering unit assembly - Tool TM1991G001 - Removal/Installation
79-38-00-900-801	Electrical magnetic plug - Magnetic head - Removal/Installation

2. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

- Aircraft Maintenance Manual
- Task 70-40-02-940-803 / Pipes and unions - General
- Task 71-02-13-280-801 / Ground run check - Special procedure.

CAUTION: IN CASE OF A RETURN IN A REPAIR CENTER:

- **FILL IN THE "INCIDENT REPORT" (GLS 2173) AND ATTACH IT TO THE EQUIPMENT SENT BACK**
- **SEND THE COMPLETE ENGINE AND THE EECU BACK TO AN APPROVED REPAIR CENTER.**

3. PROCEDURE

A. Preliminary operations

Not applicable

B. Treatment of the engine after a heavy landing, engine running

(1) Examine the support platform of the engine in the airframe. (Refer to the Aircraft Maintenance Manual).

(2) Examine manually the rotation of the gas generator and the power turbine.

NOTE: ***Send the complete engine back to the factory if you find a rub, a friction point on one of the rotors.***

(3) Do a visual check of:

- The engine attachment points
- The protection tube
- The reduction gearbox casing
- The compressor casing
- The turbine casing

NOTE: ***Send the complete engine back to the factory if you find a folding or a damage on one of these parts.***

- The exhaust pipe.

NOTE: ***A small dent is permitted.***

(4) Examine the tubes. Refer to Task 70-40-02-940-803.

NOTE: ***Replace all the damaged tubes (the bent, the worn or the blocked tubes).***

(5) Remove the pump and metering unit assembly. Refer to Task 73-23-00-900-801.

(6) Remove the starter-generator. Refer to the Aircraft Maintenance Manual.

(7) To ensure the correct state of the mounting flanges.

NOTE: ***All damage noticed (fold, creek...) imply the removal of the engine and the send it back to the factory.***

(8) Check the following parts:

– Axial compressor. Refer to Task 72-00-32-200-803
– Gas generator turbine. Refer to Task 72-00-43-200-803.

NOTE: ***If anomalies are found during the inspection, contact Safran Helicopter Engines.***

(9) Install the pump and metering unit assembly. Refer to Task 73-23-00-900-801.

(10) Install the starter-generator. Refer to the Aircraft Maintenance Manual.

(11) Make a ventilation. Refer to the Aircraft Maintenance Manual.

NOTE: ***If you hear a rub noise during the rotation or seizing, thus remove the engine and send it back to the factory.***

(12) Do a ground run check. Refer to Task 71-02-13-280-801.

(13) Monitor the engine performance

(a) Do a check of the vibration level before to return the engine in service. Refer to Task 71-02-10-940-801.

(b) Remove two oil samples with 5 hours between each sample for a better SOA monitoring. Refer to Task 71-02-08-280-801.

NOTE: ***Go back at the normal frequency if the result is correct.***

(c) Examine the oil filtering element after the 5 first hours. Refer to Task 72-61-00-900-803.

(d) Examine the mechanical magnetic plugs for the next 25 hours after the last flight of the day. Refer to Task 72-61-00-900-808 and Task 72-15-00-900-801.

(e) Examine the electrical magnetic plugs for the next 25 hours after the last flight of the day. Refer to Task 79-38-00-900-801.

(f) Examine the engine rundown time for the next 25 hours after the last flight of the day. Refer to Task 71-02-09-760-801.

NOTE: ***Remove and send back the engine to the factory if you hear a rub noise during the rotation of the rotaring assembly or a seizing.***

NOTE: ***If you find an anomaly during the inspections, remove the engine and send it back to the factory.***

C. Treatment of the engine after a heavy landing, engine not running

(1) Fill in the "incident report" (GLS 2173) and attach it to the equipment sent back.

(2) Send the complete engine and the EECU back to the factory.

D. Additional procedures

Not applicable

4. FINAL STEPS

Not applicable

TASK 71-02-07-940-801-A01

PARTICLES IN THE OIL SYSTEM GENERAL

1. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

- Task 71-02-07-280-801/ Particles in the oil system - Special procedure
- Task 71-02-07-280-802/ Particles in the oil system - Table of Decisions - Special procedure.

2. PARTICLES IN THE OIL SYSTEM - GENERAL

A. General

There are different types of contamination of the engine oil system (the dilution, the particles...).

If there are some unwanted particles in the oil, you can find them and collect them at four different locations:

- On the magnetic plugs
- On the oil filtering element
- On the strainers.

Refer to Task 71-02-07-280-801 for the sampling procedure.

You must use a corrective maintenance procedure in relation to the type and the shape of the particles. Refer to Task 71-02-07-280-802.

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TASK 71-02-07-280-801-A01

PARTICLES IN THE OIL SYSTEM - SAMPLING SPECIAL PROCEDURE

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Description	*Quantity*
filter paper	1
magnet	1
magnifying glass x6	1
white adhesive tape (Scotch Temflex 1500 white)	As required
transparent support sheet (80-micron polyester film)	1
sealed zip bag	As required

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Not applicable

B. Additional provisions

Task No.	*Task Title*
72-15-00-900-801	Module 05 reduction gearbox - Mechanical Magnetic plug - Magnetic head - Removal / Installation
72-61-00-900-803	Module 01 accessory gearbox equipment - Oil filtering element - Removal / Installation
72-61-00-900-806	Module 01 accessory gearbox equipment - Strainers - Removal / Installation

Task No.	*Task Title*
72-61-00-900-808	Module 01 accessory gearbox equipment - Machanical Magnetic plug - Magnetic head - Removal / Installation
79-25-01-900-801	Strainer - Removal / Installation
79-38-00-900-801	Electrical magnetic plug - magnetic head - Removal / Installation

2. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 71-00-02-940-801 / Fuel, lubricants, special products - General
– Task 71-02-07-280-802 / Particles in the oil system - Table of Decisions - Special procedure
– Task 71-02-07-280-803 / Burning of particles in the oil system - Special procedure.

WARNING

READ AND OBEY THE SAFETY INSTRUCTIONS BEFORE YOU START THE PROCEDURE ON THE OIL SYSTEM.

3. PROCEDURE

A. Preliminary operations

Not applicable

WARNING

DO NOT BREATHE THE OIL VAPORS. MAKE SURE THAT THE AREA WHERE YOU WORK IS OPEN TO THE AIR. DO NOT GET THE OIL ON YOUR SKIN. PUT THE RUBBER GLOVES AND A FACE SHIELD OR THE SAFETY GOGGLES. THE OIL CAN BE POISONOUS.

WARNING

DO NOT BREATHE THE SOLVENT VAPORS. MAKE SURE THAT THE AREA WHERE YOU WORK IS OPEN TO THE AIR. DO NOT GET THE SOLVENT ON YOUR SKIN. PUT THE RUBBER GLOVES AND A FACE SHIELD OR THE SAFETY GOGGLES. THE SOLVENT CAN BE POISONOUS.

CAUTION: NOT OBEYING THE FOLLOWING TAKING INSTRUCTIONS CAN LEAD TO ISSUES AT THE TIME OF THE ANALYSIS BY THE APPROVED LABORATORY:

- **AVOID TRACES OF FINGERS ON THE PARTICLES OR ON THE ADHESIVE TAPE**
- **DO NOT TRAP THE PARTICLES IN THE ADHESIVE TAPE**

– **ONLY BOND THE PARTICLES ON A TRANSPARENT SUPPORT SHEET (80-MICRON POLYESTER FILM).**

B. Method for sampling particles on Mechanical Magnetic Plugs (MMP) and Electrical Magnetic Plugs (EMP)

(1) Remove the magnetic plugs. Refer to Task 72-61-00-900-808, Task 72-15-00-900-801 and Task 79-38-00-900-801.

CAUTION: THE GREASE REMOVAL IS AN IMPORTANT STEP, IT MUST BE DONE CAREFULLY TO HELP THE TRANSFER OF PARTICLES ON THE TACKY FACE OF THE WHITE ADHESIVE TAPE (SCOTCH TEMFLEX 1500 WHITE) AND THUS, TO GET A BETTER VIEW OF THE PARTICLES DURING THE OBSERVATION. ANY OIL TRACE ON THE COLLECTED PARTICLES WILL IMPACT THE RESULTS OF THE ANALYSIS. THE CONTAINER MUST BE CLEAN AND FREE FROM METALLIC PARTICLES.

(2) Remove the grease from the particles with a solvent. Refer to Task 71-00-02-940-801.

Refer to Figure 201

– Soak the magnetic plug in a container filled with the solvent
– Remove the magnetic plug from the container
– Let the solvent dry.

(3) Examine the particles on the magnetic plug with a magnifying glass x6.

(4) Do a first diagnostis with the table of decisions. Refer to Task 71-02-07-280-802.

CAUTION: DO NOT COMPRESS THE PARTICLES ON THE WHITE ADHESIVE TAPE (SCOTCH TEMFLEX 1500 WHITE) NOT TO DROWN THE PARTICLES IN THE ADHESIVE AND NOT TO CAUSE DAMAGE TO THE TAPE.

(5) Transfer the particles with a magnet or by buffering:

– Either on the sticky face of a white adhesive tape. Refer to Figure 202,
– Or in a sealed zip bag.

(6) Examine again the particles with the magnifying glass x6 to confirm the first diagnostis and analyze the particles geometry. Refer to Task 71-02-07-280-802.

(7) On one transparent support sheet (80-micron polyester film): Refer to Figure 203

1. Bond the adhesive tape to trap the particles between the adhesive tape and the transparent support sheet. Turn a corner of the adhesive tape to help its separation during the material analysis,

2. Or staple the sealed zip bag.

NOTE: The transparent support sheet (80-micron polyester film) can be provided by Safran Helicopter Engines.

(8) Send the transparent support sheet (80-micron polyester film) to an approved laboratory.

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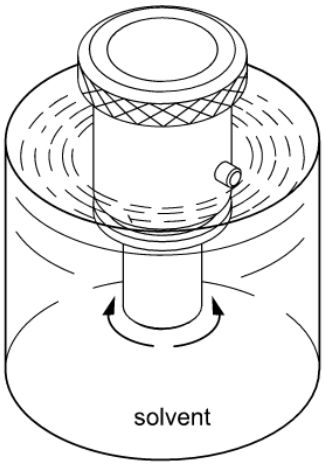

Magnetic plug in the solvent
Figure 201

WARNING

DO NOT BREATHE THE OIL VAPORS. MAKE SURE THAT THE AREA WHERE YOU WORK IS OPEN TO THE AIR. DO NOT GET THE OIL ON YOUR SKIN. PUT THE RUBBER GLOVES AND A FACE SHIELD OR THE SAFETY GOGGLES. THE OIL CAN BE POISONOUS.

WARNING

DO NOT BREATHE THE SOLVENT VAPORS. MAKE SURE THAT THE AREA WHERE YOU WORK IS OPEN TO THE AIR. DO NOT GET THE SOLVENT ON YOUR SKIN. PUT THE RUBBER GLOVES AND A FACE SHIELD OR THE SAFETY GOGGLES. THE SOLVENT CAN BE POISONOUS.

CAUTION: NOT OBEYING THE FOLLOWING TAKING INSTRUCTIONS CAN LEAD TO ISSUES AT THE TIME OF THE ANALYSIS BY THE APPROVED LABORATORY:

- **AVOID TRACES OF FINGERS ON THE PARTICLES OR ON THE ADHESIVE TAPE**
- **DO NOT TRAP THE PARTICLES IN THE ADHESIVE TAPE**
- **ONLY BOND THE PARTICLES ON A TRANSPARENT SUPPORT SHEET (80-MICRON POLYESTER FILM).**

C. Method for sampling particles on the oil filter element and/or the strainers

(1) Clean the filter and/or the strainers with solvent. Refer to Task 71-00-02-940-801.

(2) Filter the solvent collected during the cleaning of the filter, the bell or the strainers through a filter paper.

(3) Wash the collected metallic particles or deposits with a solvent.

(4) Collect the deposits and separate the magnetic metallic particles with a magnet.

(5) Examine the collected particles with the magnifying glass x6.

NOTE: ***In a 20-micron granulometry filtering medium, because of the traditional cleaning method for the 50-micron filters and strainer, the quantity of particles collected does not necessarily mean that the filter is contaminated.***

(6) Do a first diagnostic with the table of decisions. Refer to Task 71-02-07-280-802.

CAUTION: DO NOT COMPRESS THE PARTICLES ON THE ADHESIVE TAPE NOT TO DROWN THE PARTICLES IN THE ADHESIVE AND NOT TO CAUSE DAMAGE TO THE TAPE.

(7) Transfer the mechanical magnetic particles with a magnet:

- Either on the sticky face of a white adhesive tape (Scotch Temflex 1500 white). Refer to Figure 202,
- Or in a sealed zip bag.

(8) Examine again the particles with the magnifying glass x6 to confirm the first diagnostic and analyze the particles geometry. Refer to Task 71-02-07-280-802.

(9) On one transparent support sheet (80-micron polyester film): Refer to Figure 203

1. Bond the adhesive tape to trap the particles between the adhesive tape and the transparent support sheet. Turn a corner of the adhesive tape to help its separation during the material analysis,

2. Or staple the sealed zip bag.

NOTE: ***The transparent support sheet (80-micron polyester film) can be provided by Safran Helicopter Engines.***

(10) Send the transparent support sheet (80-micron polyester film) to an approved laboratory.

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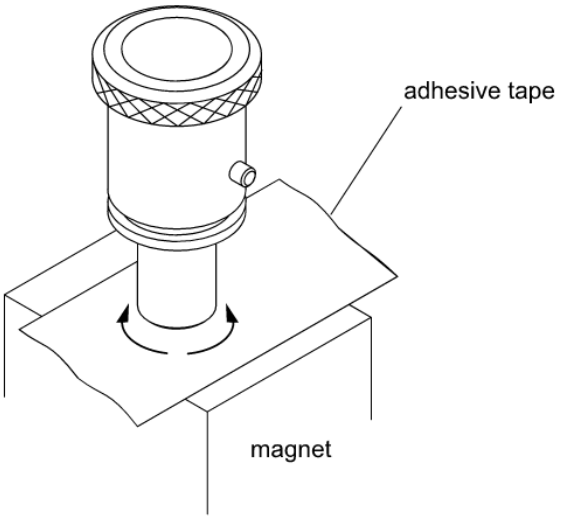

Magnetic plug on adhesive tape
Figure 202

CAUTION: OBEY THE CONDITIONS FOR PARTICLES SENDING TO THE APPROVED LABORATORY, TO PRESERVE THE ANALYSIS QUALITY AND THE RESULTS VALUE.

D. Procedure for sending the support sheet

(1) Mandatory supply the data that follows with the transparent support sheet:

Sampling date

Sampling places (number of the magnetic plug): Give in minute details the different sampling point(s) or zone(s) on the transparent support sheet (80-micron polyester film). For each sampling you must specify the number of the magnetic plug.

Engine:

- Type
- Variant
- Version
- Serial number
- Total number of hours
- Number of hours since the last overhaul.

Module:

- Serial number
- Total number of hours
- Number of hours since the last overhaul (O/H).

Sender:

- Surname
- First name
- Company or department
- Address
- Phone
- Fax
- E-mail
- Client's name (if different from the originator).

(2) Further information:

Any information likely to be interesting for the diagnosis.

(3) Send the request for analysis and the transparent support sheet (80-micron polyester film) to a Safran Helicopter Engines approved laboratory.

(a) SAFRAN HELICOPTER ENGINES analysis laboratory:

DT/ MPE/PS - BP 56

64511 Bordes Cedex - France

(b) Laboratory approved by Safran Helicopter Engines:

Refer to the “List of the approved laboratories” on EngineLife® Customer Portal.

NOTE: ***To inform of the arrival of a sample, data can be sent by email to the following address: “oilsystem-analysis.fr.she@safrangroup.com”.***

SAFRAN

HELICOPTER ENGINES

PARTICLES SAMPLING SHEET

TEEXMA REQUEST NUMBER:	
ENGINE: Type: S/N: Hours: Sampling date:	**CALLER:** Surname - First name: Phone: OTP: **CUSTOMER:**

SAMPLES:

1)	2)	3)
4)	5)	6)

COMMENTS:

Particles sampling sheet
Figure 203

E. Additional procedures

Not applicable

4. FINAL STEPS

Not applicable

TASK 71-02-07-280-802-A01

PARTICLES IN THE OIL SYSTEM - DECISION TABLE SPECIAL PROCEDURE

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Description	*Quantity*
magnifying glass x6	1

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Not applicable

B. Additional provisions

Task No.	*Task Title*
72-15-00-900-801	Module 05 reduction gearbox - Mechanical magnetic plug - Magnetic head - Removal / installation
72-43-10-110-801	Module 03 Gas Generator - Rear bearing (Descaling) - Cleaning
72-43-10-900-801	Module 03 Gas Generator - Rear bearing - Removal / Installation
72-61-00-900-806	Module 01 accessory gearbox equipment - Strainers - Removal / Installation
72-61-00-900-808	Module 01 accessory gearbox equipment - Mechanical magnetic plug - Magnetic head - Removal / Installation
79-00-00-610-801	Oil system - Draining - Routine maintenance
79-00-00-610-802	Oil system - Rinsing - Routine maintenance

Task No.	*Task Title*
79-25-01-900-801	Strainer - Removal / Installation
79-38-00-900-802	Electrical magnetic plug - Receptacle - Removal / Installation

2. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 71-00-02-940-801 / Fuel, Lubricants, Special products - General
– Task 71-02-07-280-801 / Particles in the oil system - Sampling - Special procedure
– Task 71-02-08-940-801 / Spectrometric oil analysis - General

3. PROCEDURE

A. Preliminary procedures

Not applicable

CAUTION: YOU MAY FIND SOME CHIPS FROM MACHINING DURING THE FIRST 20 OPERATING HOURS OF THE TURBOSHAFT ENGINE.

CAUTION: SEND THE PARTICLES FOR ANALYSIS TO A LABORATORY APPROVED BY SAFRAN HELICOPTER ENGINES ONLY, TO GET AN ACCURATE DIAGNOSIS.

B. Visual inspection and decision table

Visual inspection of the particles collected on the mechanical (MMP) and electrical (EMP) magnetic plugs and/or on the filtering element and/or on the strainers. Refer to Figure 204.

The decision-making parameters are:

– The quantity of particles: less than, equal to or more than 5 units.
– The type of particles: there are five different families of particles.

(1) Type of particles:

Refer to Figure 201 , Figure 202 , Figure 203

– **Wires**: long and thin strands of hair-type.
– **Machining chips**: pieces of material removed by a cutting tool.
– **Dust**: very thin particles, in the form of powder. You can see these particles to the naked eye (granulometry of particles more than 50 µm).
– **Coked oil particles**: carbon-based particles. Carbon is a non-metallic element. Here the carbon, associated or not associated with silver, was generally caused by oil coking.
– **Flakes, splinters**
  – **Flakes**: thin lugs which separate from a part surface.
  – **Splinters**: fragments separated from a hard body.
– **Fragments of the bearing separating cage**: pieces of material 2 mm long and 1 mm wide.
– **Non-magnetic particles**: Hylomar or silver particles, or other antimagnetic particles.

For each pair (quantity/type), there is a related maintenance level, with related maintenance procedures, as per the decision table.

There are three different maintenance levels:

- **Level A**: Minor.
- **Level B**: Light.
- **Level C**: Heavy.

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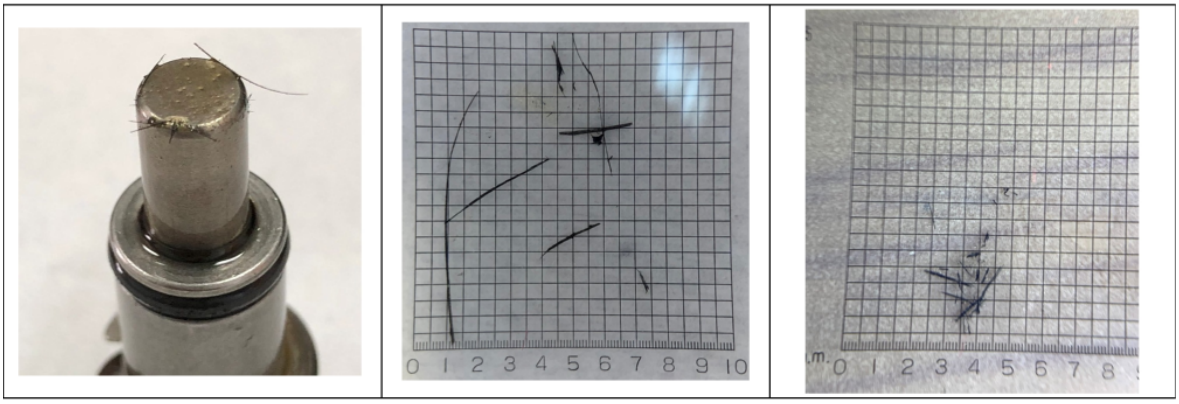
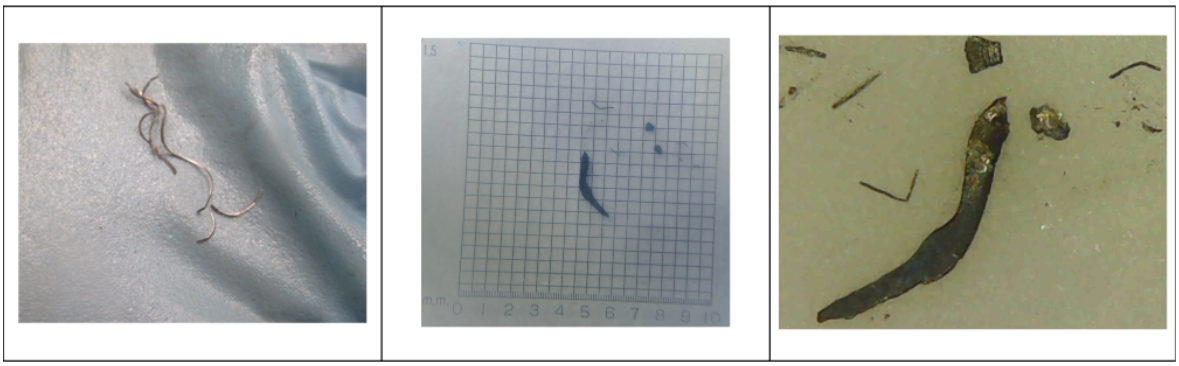
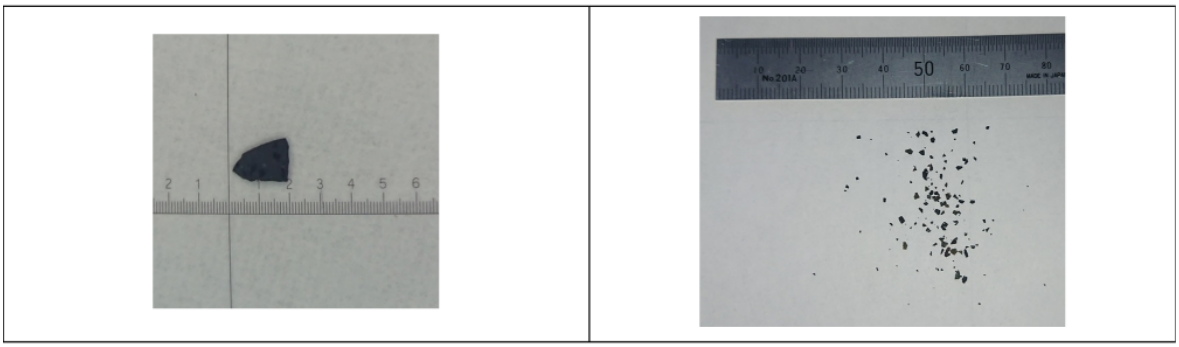
- Wires (filaments)



- Machining chips



- Coked oil particles



Type of particles - Sheet 1
Figure 201

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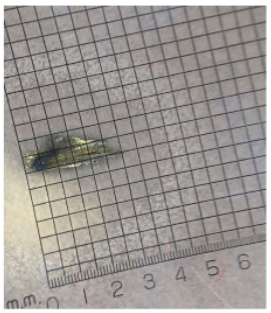
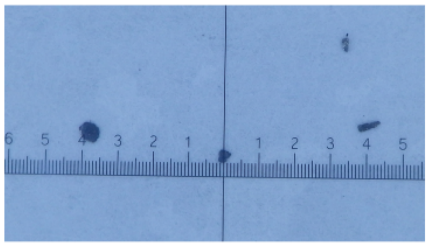
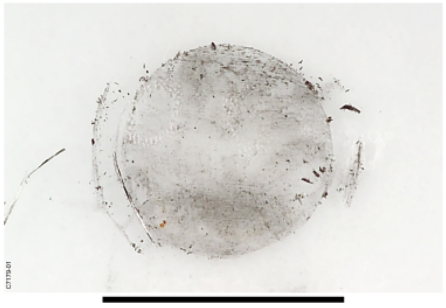
- Flakes, splinters





- Dust

Reference image for the maximum accepted quantity of dust-type particles



6 mm (Diameter of the magetic plug head)

Image obtained during the transfer of particles on the adhesive tape.

Type of particles - Sheet 2
Figure 202

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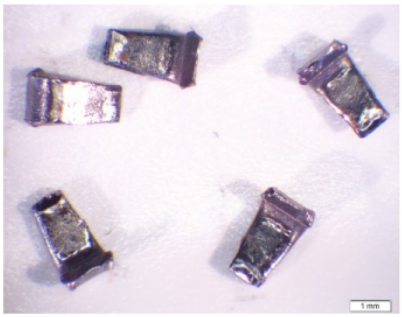
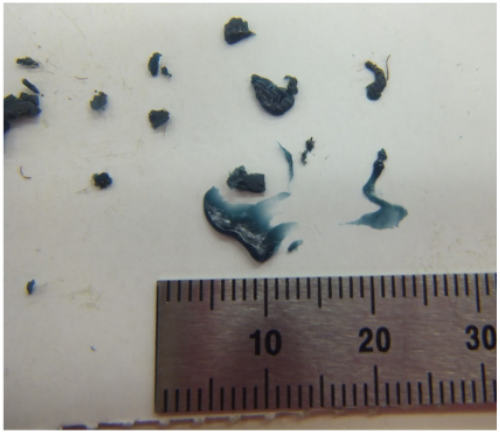
- Fragments of the bearing separating cage



Fragment of the bearing separating cage on an electrical magnetic plug

- Non-magnetic particles



Hylomar particles

Silver particles

Type of particles - Sheet 3
Figure 203

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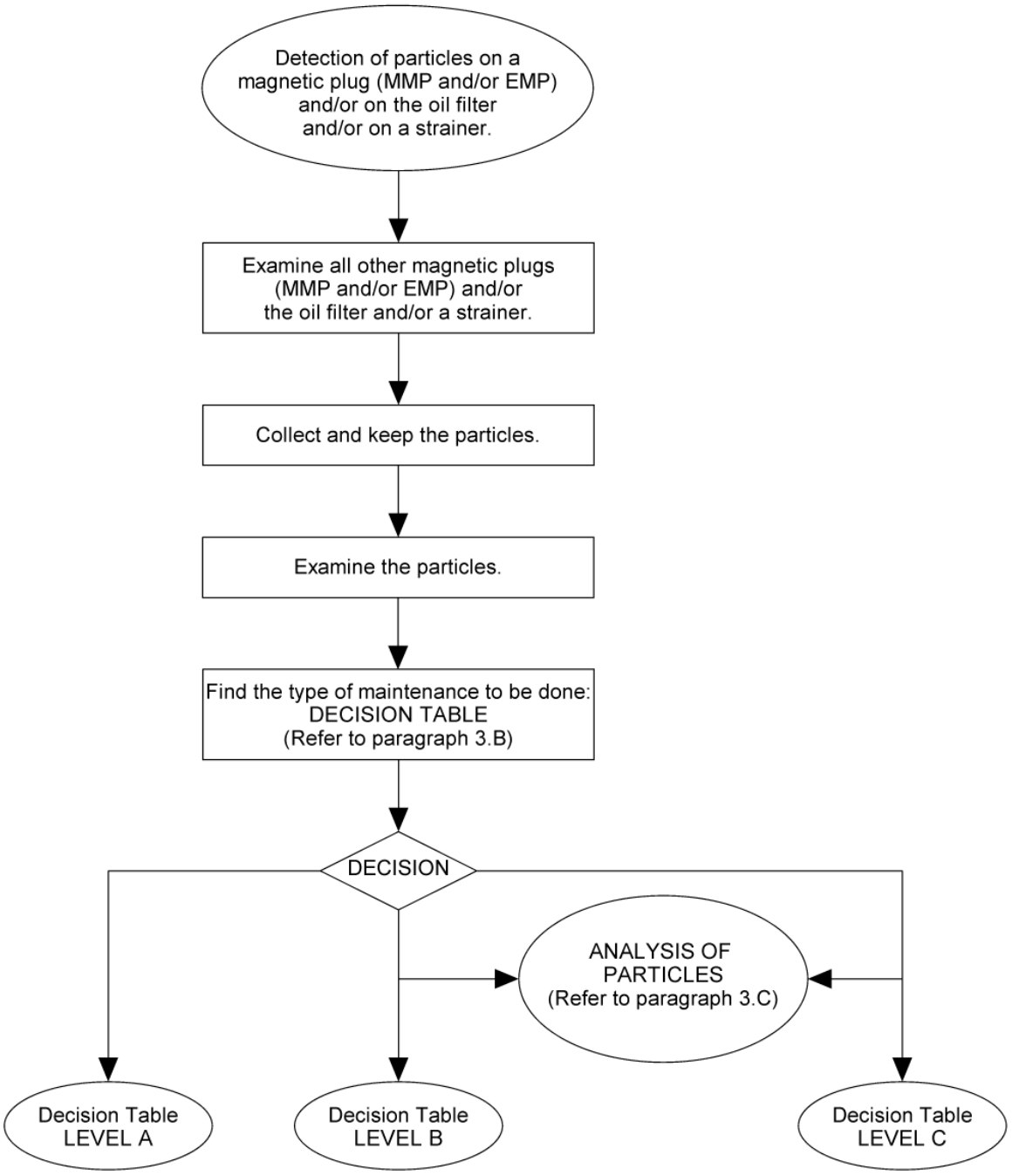

Particle sampling
Figure 204

(2) Decision table:

Type of particles		*Maintenance level*			
Wires		Q < 5	Level A Refer to Figure 206	Q ≥ 5	Level B + Particle analysis Refer to Figure 207 , Figure 209
Machining chips		Q < 5	Level A Refer to Figure 206	Q ≥ 5	Level B + Particle analysis Refer to Figure 207 , Figure 209
Coked oil		Q < 5	Level A Refer to Figure 206	Q ≥ 5	Level B + Particle analysis Refer to Figure 207 , Figure 209
Flakes, Splinters		Q < 2	Level B + Particle analysis Refer to Figure 207 , Figure 209	Q ≥ 2	Level C + Particle analysis Refer to Figure 208 , Figure 209
Dust (visible to the naked eye)		Q < reference image (1)	Level A Refer to Figure 206	Q ≥ reference image (1)	Level B + Particle analysis Refer to Figure 207 , Figure 209
Fragments of the bearing separating cage		Level C Refer to Figure 208 Particle analysis is not necessary.			
Non-magnetic particles	Rubber, paint, organic deposit	Level A Refer to Figure 206			
	Silver particles	Level B + Particle analysis Refer to Figure 207 , Figure 209			

(1) The reference image is given on sheet 2. (Refer to Figure 202) which shows the different types of particles.

Q: Quantity of particles observed with the magnifying glass x6.

(3) Return to service under monitoring

Refer to Figure 205

(a) Particles found on the oil filtering element and/or the strainers:

– Examine the oil filtering element and the strainers after 25 operating hours.

CAUTION: THE FUZZ BURNER MUST NOT BE USED DURING THE 25-HOUR MONITORING TIME.

(b) Particles found on the magnetic plugs:

1 Engines with electrical magnetic plugs only:

– make sure that the detection system correctly operates and then,
– make sure that no detection occurs again during the next 25 hours.

2 Engines with mechanical magnetic plugs and electrical magnetic plugs:

– examine the magnetic plugs after the next flight and then,
– examine the magnetic plugs 3 times within the next 25 operating hours with a minimum of 5 flight hours between each inspection.

3 Engines with mechanical magnetic plugs only:

– examine the magnetic plugs after the next flight and then,
– examine the magnetic plugs after the next flight of the day, or within the next 5 flight hours, during the next 25 operating hours.

(c) If new particles are found during the return to service under monitoring:

– go back to the general block diagram,
– two applications (Level A or B) are permitted during the return to service under monitoring,
– if more, directly go to Level C.

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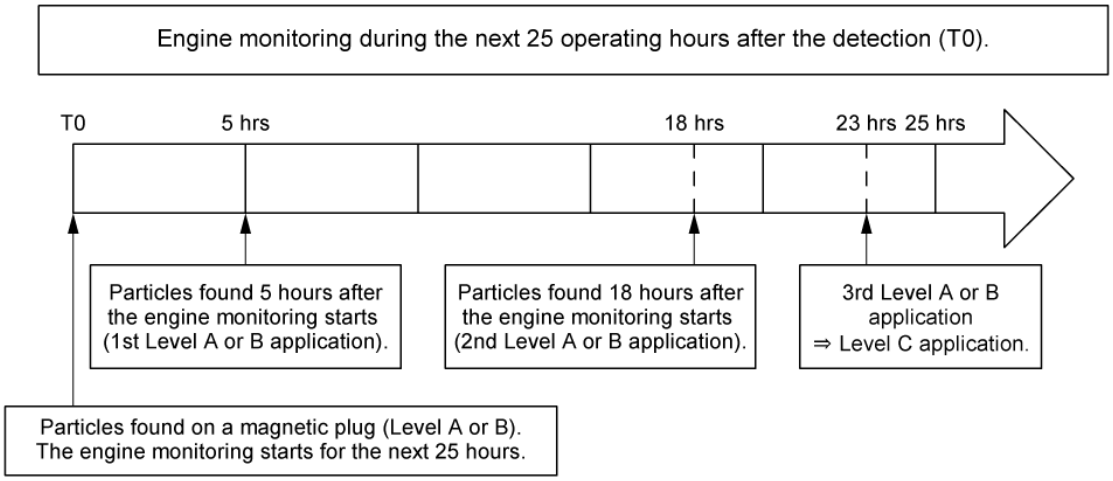

Return to service under monitoring
Figure 205

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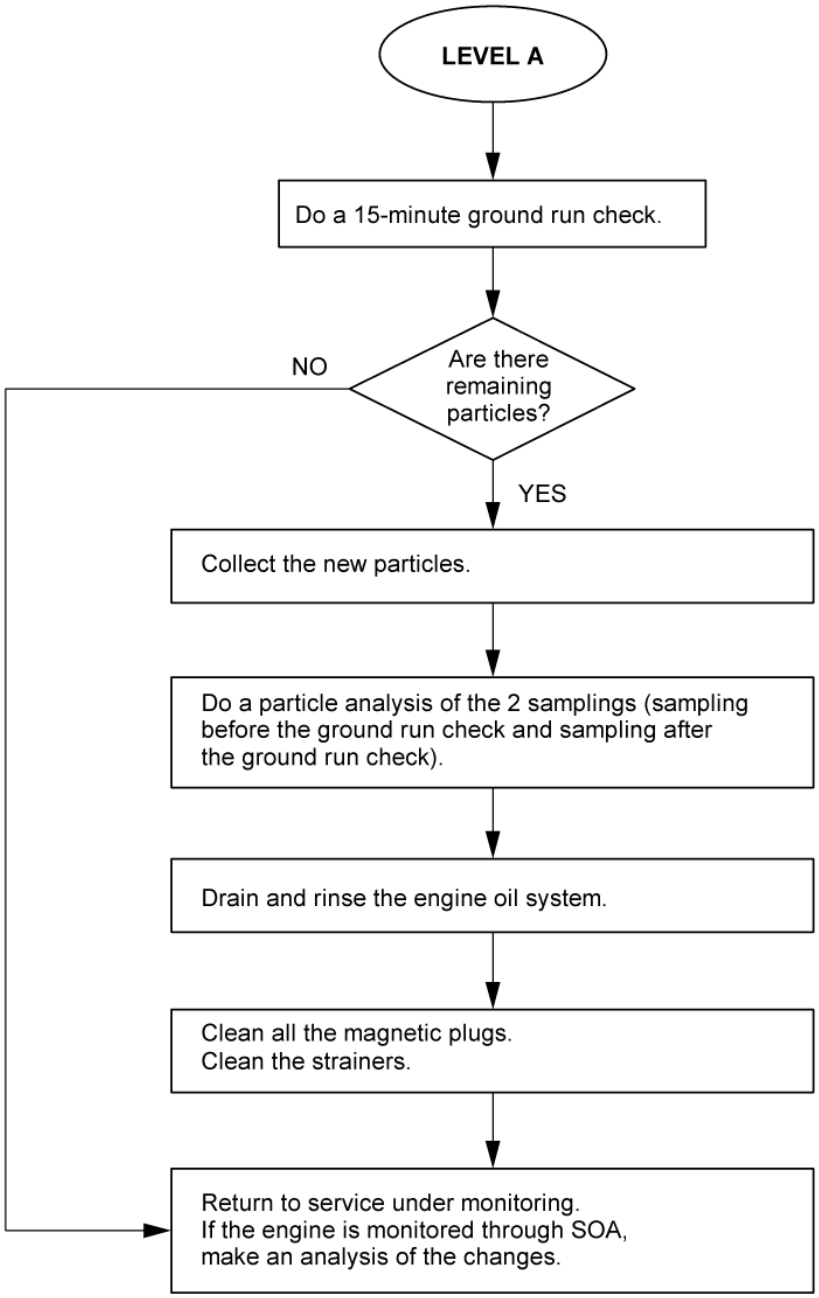

Decision table - Level A
Figure 206

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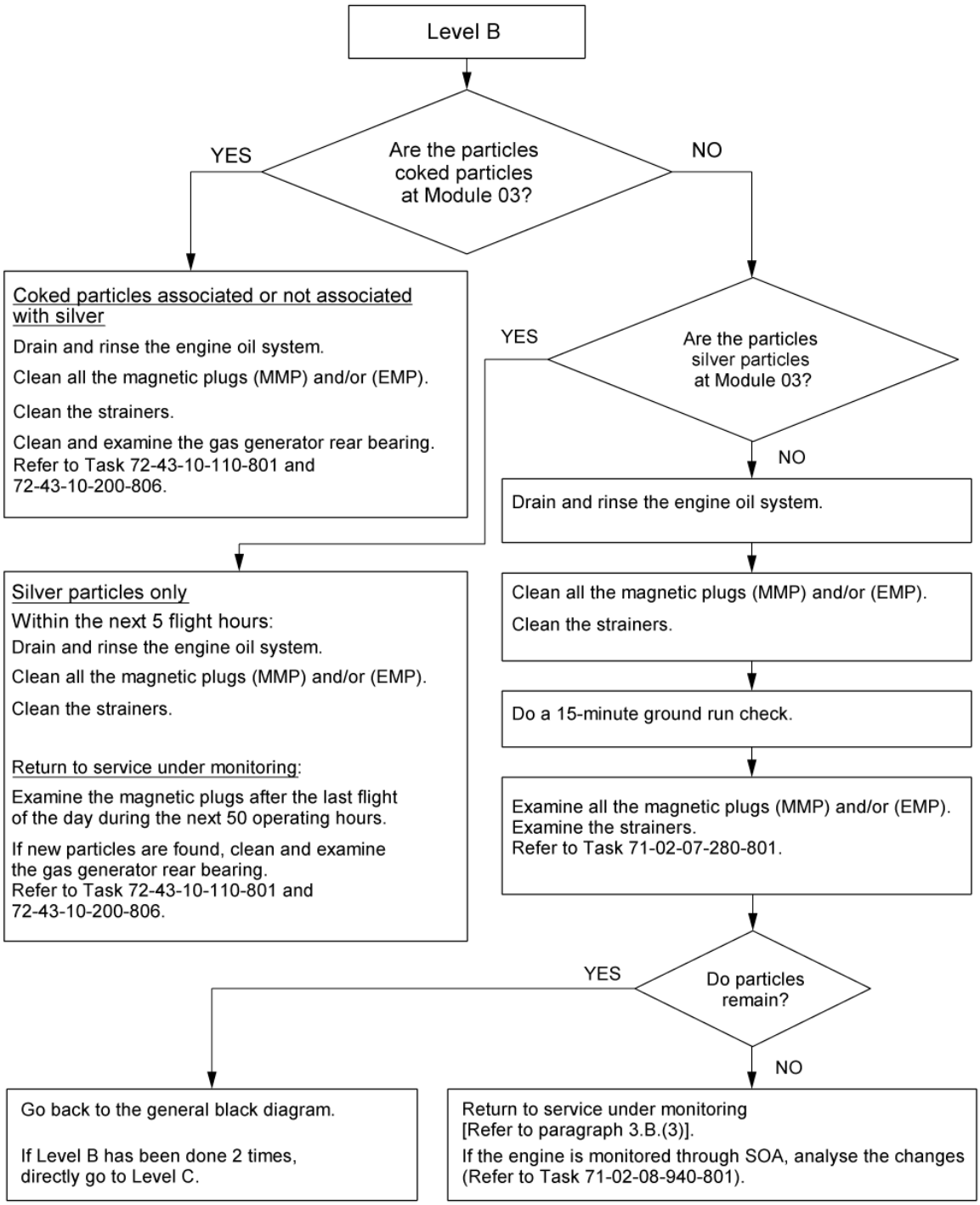

Decision table - Level B
Figure 207

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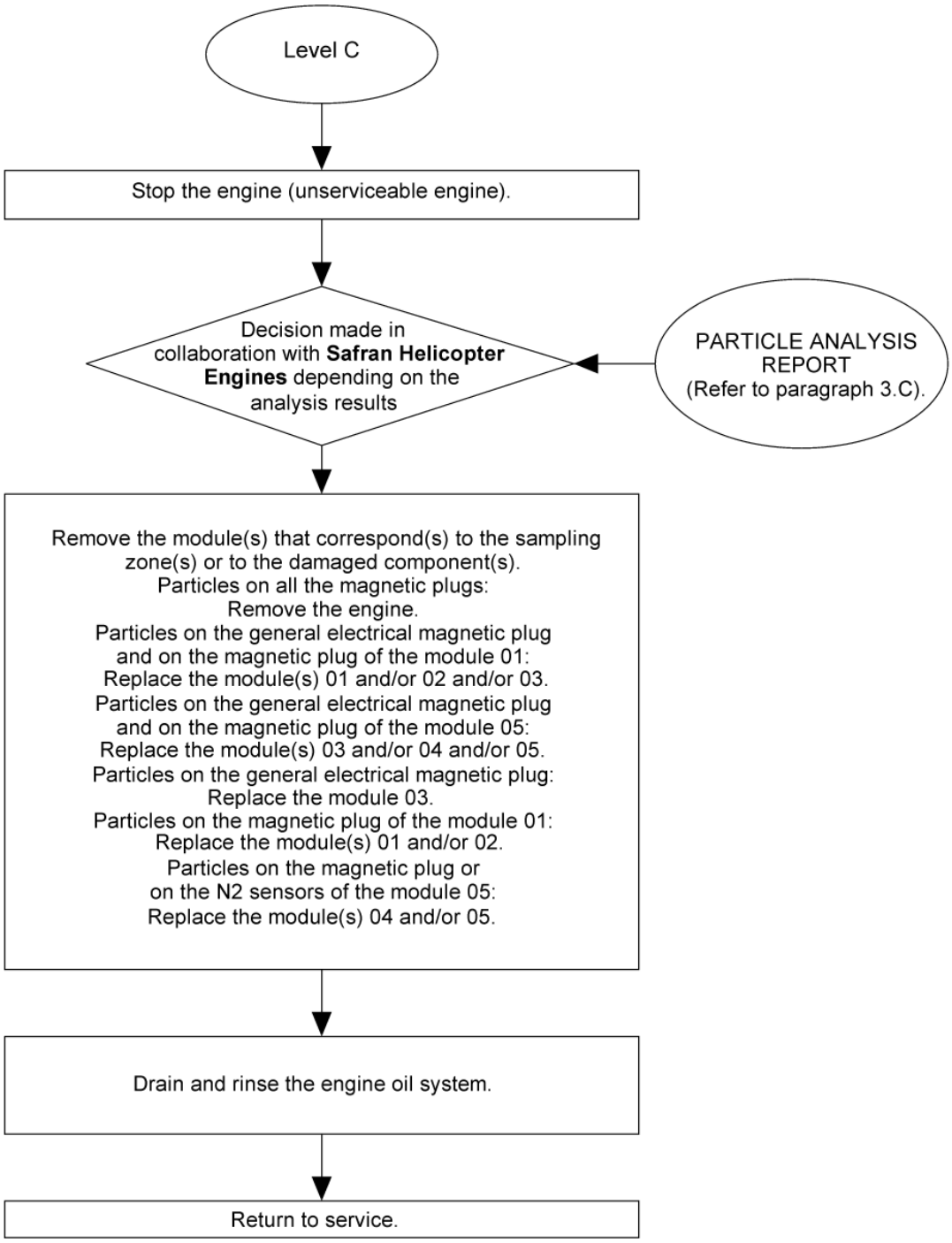


Decision table - Level C
Figure 208

C. Material analysis

Refer to Figure 209 - Particle analysis

The material analysis is done using a Scanning Electron Microscope (SEM) and Micro-analysis is done by Energy Dispersive X-ray Spectroscopy (EDS). This analysis enables the material of the damaged part(s) to be identified on the basis of the chemical composition of the particles.

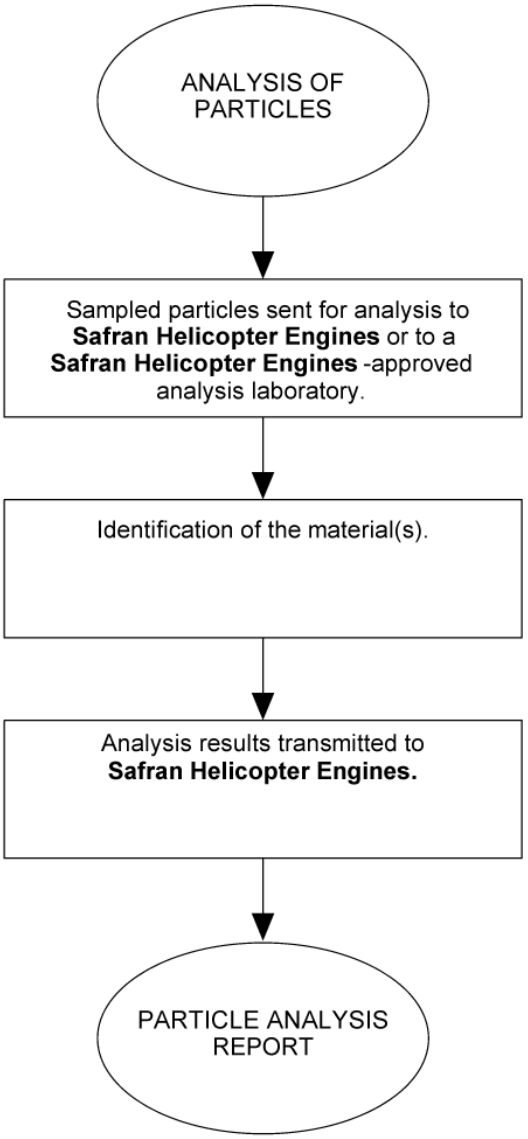
It is done by the Safran Helicopter Engines laboratory or by a Safran Helicopter Engines-qualified laboratory (refer to the “List of approved laboratories” on EngineLife® Customer Portal).

The material analysis must be done systematically whenever the decision table points to Level B or C maintenance. This analysis is not a maintenance procedure: it is complementary to the latter two maintenance levels. It orients the maintenance diagnosis (Level B) and the disassembly during repair (Level C).

When sending particles for analysis, you must send all samples taken.

By identifying the material of the particle and because the original location of the sample is known, Safran Helicopter Engines can find which part(s) is/are damaged. The result is a report that gives the procedures to be followed:

– Return to service
– Return to service under supervision
– Level A maintenance
– Level B maintenance
– Level C maintenance



Particle analysis
Figure 209

D. Additional procedures

Not applicable

4. FINAL STEPS

Not applicable

TASK 71-02-07-280-803-A01

BURNING OF PARTICLES IN THE OIL SYSTEM SPECIAL PROCEDURE

1. BURNING OF PARTICLES

A. Procedure

(1) Within a 100 flight hours period the particle burner can be used a maximum of 4 different flights per engine, using the particle burners a maximum of twice per flight per engine.

(2) Flights, in which the fuzz burner is used, must be recorded in the engine log book.

(3) After the use of the fuzz burner, the magnetic plugs must be checked. If particles are found on either of the magnetic plugs refer to Task 71-02-07-280-802 in order to do a particle analysis on the debris in the oil system. If no particles are found during the magnetic plug check, then no further maintenance actions are required.

(4) In the event that the fuzz burners are used four times in flight within the 100 flight hours limit contact your Safran Helicopter Engines Representative.

(5) The number of fuzz burner uses can be set to zero in the log book after either:

- a general overhaul of the engine
- replacement of the affected module or modules
- following a specific directive from Safran Helicopter Engines.

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TASK 71-02-08-940-801-A01

SPECTROMETRIC OIL ANALYSIS GENERAL

1. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 70-01-00-940-801 / Standard Practices - General.

2. PURPOSE

To give the processes related to the predictive maintenance of any Safran Helicopter Engines engine by lubricant analyses:

– Spectrometric Oil Analysis (SOA).
– Lubricant quality analysis through the check for quantity of residual antioxidants by using the cyclic voltammetry (RULER™ method: Remaining Useful Life Evaluation Routine).

3. COVERAGE

A. Spectrometric Oil Analysis (SOA)

The Spectrometric Oil Analysis (SOA) is used to follow up an engine as a complement to the examination of the filters and magnetic plugs.

The Spectrometric Oil Analysis (SOA) is used to prevent faults due to wear.

The Spectrometric Oil Analysis (SOA) can also give an early indication of an engine deterioration.

NOTE: ***The analysis must be done in a qualified laboratory (Safran Helicopter Engines or a company listed in the "List of approved laboratories" on EngineLife® Customer Portal).***

B. Oil quality RULER™

The RULER™ test can be used to check the lubricant quality and thus to guarantee an optimum lubrication, to overcome oil aggressiveness to the engine components and coking problems, and to optimize the drain cycles.

NOTE: ***The laboratories having the equipment are listed in the "List of approved laboratories" on EngineLife ® Customer Portal.***

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TASK 71-02-08-280-801-A01

SAMPLING MODE
SPECIAL PROCEDURE

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Description	*Quantity*
sampling flask	1
sampling pipette	1

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Not applicable

B. Additional provisions

Not applicable

2. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 70-01-00-940-801 / Standard Practices - General.

3. SAMPLING MODE

A. Procedure

The efficiency of the SOA method is a function of the following:
– Rigor in obeying the procedures (sampling frequency and methods)
– Decrease of the time for sending the samples to the laboratories
– Speed of interpreting and transmitting the analysis results
– Quality of the analysis

– Any tool used for sampling must be clean and dry.

B. Sampling method

Siphon approx. 30 cm^3(0.008 US Gallons) of oil from the tank.

NOTE: ***Use the same sample to do the SOA and the RULER™.***

Recommendations

To get the maximum accuracy for the analysis results, it is important to obey the following conditions:
– Sample the oil when the oil/particles mix is still homogeneous. To do so, you must take the sample within max. fifteen minutes after the engine shut-down and before any replenishment
– Take the sample with the flask provided for this purpose
– Measure the oil consumptions as accurately as possible
– Calculate the total number of replenishments between two samples.

C. Labeling

Mention the following information on the sample label and on the analysis request sheet:
– Date of sampling
– Oil specification
– Engine type
– Engine No.
– Number of hours since the last installation
– Number of operating hours since the last oil draining
– Quantity of oil required to complete oil level since the last sample has been taken and number of replenishments
– Reason for taking sample
– Required analysis type(s) (SOA - RULER™ or the two).

D. Sending

Send the sample to a laboratory approved by Safran Helicopter Engines.

(1) Safran Helicopter Engines analysis laboratory.
DT/MPE/PS - BP 56
64511 Bordes Cedex - France

(2) Laboratory qualified by Safran Helicopter Engines:
Refer to the "List of the approved laboratories" on the EngineLife® Customer Portal.

E. Additional procedures

– If the analysis result is equal to the alert value, take a second sample for confirmation.

4. FINAL STEPS

Not applicable

TASK 71-02-08-280-802-A01

ANALYSIS METHOD AND CRITERIA SPECIAL PROCEDURE

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Description	*Quantity*
ICP spectrometer	1
RULER™	1

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Not applicable

B. Additional provisions

Not applicable

2. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 70-01-00-940-801 / Standard Practices - General.

3. DEFINITION OF TERMS USED IN SOA

A. Oil operating hours

Engine operating time since the last oil change.

B. Measured concentration "C"

Gross result of an analysis; it shows the quantity of metal element contained in an oil sample. After application of the correlation coefficient of the qualified laboratory.

It is expressed in parts per million (ppm). One ppm means that there is one milligram of element in 1,000 g of oil.

It is measured by the spectrometer for each metal looked for.

C. Corrected concentration "CT"

Concentration calculated with the oil leaks and the subsequent addition of oil.

D. Alert criteria

There are two alert criteria:
- Concentration alert criterion: concentration value (ppm) from which the engine must be monitored and must undergo frequent samples
- Contamination rate alert criterion: contamination rate value from which the engine must be monitored and must undergo frequent samples.

E. Removal criteria

There are two removal criteria:
- Concentration removal criterion: concentration value (ppm) from which the engine must undergo a maintenance procedure
- Contamination rate removal criterion: contamination rate value from which the engine must undergo a maintenance procedure.

F. Contamination rate "m"

This is the metal mass flow rate injected into the system oil by the wearing parts. It is calculated over an operating time between two consecutive samples.

G. Check-sample

Oil sample taken at the Analysis laboratory's request to confirm a result.

H. Frequent sample

Procedure applied when an engine is put under monitoring.

4. TOOLS

A. Spectrometric analysis

You must do the SOAs with spectrometers that have been qualified by Safran Helicopter Engines.

NOTE: ***For each tool, a correlation coefficient is set during the qualification by Safran Helicopter Engines. It is used to get measured concentrations "C" and to compare them with the criteria specified for each engine.***

B. RULER™

The tool used to measure the rate of antioxidants is the RULER™ marketed by the FLUITEC Company.

5. ANALYSIS PROCEDURE

A. Spectrometric Oil Analysis

During the spectrometric analysis, you can look for elements according to the engine. Refer to the paragraph 6. CRITERIA.

B. Calculation of the concentrations and contamination rates

(1) Calculation of a corrected concentration "CT"

(a) If oil has not been added since the last sample or if the consumption is less than 0.01 l/hr, use the following formula:

CT = C

CT: Corrected concentration → in ppm
C: Concentration measured in the sample (after application of the correlation coefficient if necessary) → in ppm.

(b) If oil has been added once or several times before sampling and if the consumption is more than 0.01 l/hr, use the following formula:

CTb = CTa + Cb + Ca[(Vb/V) - 1]

Where you assume that sample A is prior to sample B.

CTa: Corrected concentration of sample A → in ppm
CTb: Corrected concentration of sample B → in ppm
Cb: Concentration measured in sample B (after application of the correlation coefficient if necessary) → in ppm
Ca: Concentration measured in sample A (after application of the correlation coefficient if necessary) → in ppm
V: Total oil volume in the tank → in liters
Vb: Volume added between sample B and sample A → in liters.

(2) Calculation of a contamination rate

(a) If oil has not been added since the last sample or if the consumption is less than 0.01 l/hr, use the following formula:

m = [(Cb - Ca)/T]

Where you assume that sample A is prior to sample B.

m: Contamination rate → in ppm/hr
Cb: Concentration measured in sample B (after application of the correlation coefficient if necessary) → in ppm
Ca: Concentration measured in sample A (after application of the correlation coefficient if necessary) → in ppm
T: Engine operating time between analysis B and analysis A → in hr.

NOTE: ***This formula is also applicable for units of volume in US Gallons.***

(b) If oil has been added once or several times before sampling and if the consumption is more than 0.01 l/hr, Refer to Figure 201:

Where you assume that sample A is prior to sample B.

m: Contamination rate → in ppm/hr
q: Leakage rate (hourly oil consumption) → in l/hr
Vo: Oil system capacity → in liters
Cb: Concentration measured in sample B (after n replenishments) → in mg/l
Ca: Concentration measured in sample A (previous concentration) → in mg/l
n: Number of oil replenishments between analysis B and analysis A → no dimension
T: Engine operating time between analysis B and analysis A → in hr.

NOTE: ***This formula is also applicable for units of volume in US Gallons.***

$$m = \frac{q\left(Cb\left(1+\frac{qT}{2Vo}\times\frac{n-1}{n}\right)-Ca\left(1-\frac{qT}{2Vo}\times\frac{n+1}{n}\right)\right)}{\log_{n}\frac{1}{1-\frac{qT}{nVo}}}$$

Figure 201

C. RULER™

The operating procedure for measurement is given in the user guide of the device.

The 200 µl test sample is carried out with a positive-displacement piston micropipette in order to provide a maximum repeatability considering the oil viscosity.

The solvent used is the "red" solvent marketed by FLUITEC; it is specifically designed to adjust the quantity of oil additives for turbo-machines.

Systematically use, as a reference, a sample of new oil with the same trade description which corresponds to the calibration high point (100% of additives).

6. CRITERIA

A. RULER™

A decrease in the rate of antioxidants shows the start of a lubricant degradation, an increase of the acidity, and a decomposition of the lubricant which will cause coking phenomena.

The min. rate of antioxidants is set to 70%.

Below this value, it is **strongly recommended** to change the oil.

B. SOA

The criteria given in the table below have been set with the ICP (Inductive Coupled Plasma) plasma emission spectrometer used by Safran Helicopter Engines.

NOTE: ***The concentrations are corrected concentrations "CT".***

NOTE: ***For any tool, use the results corrected by the correlation coefficient calculated during its approval by Safran Helicopter Engines.***

(1) Table of alert and removal criteria

The values specified in the following table are to be taken into account if the total number of operating hours for the oil is more than 5 hours.

Do not make any decision if the number of oil operating hours is less than 5 hours.

Table 201 :

	Fe	*Cu*	*Cr*	*Ni*	*Frequency*	*Notes*
Concentration CT (ppm)	Fe < 3	Cu < 2			Refer to Chapter 05-20-10, if there is a frequency.	None
Alert concentration CT (ppm)	3 ≤ Fe < 5 and m < 0.08	2 ≤ Cu < 3			25 hours	1, 3, 4
Alert concentration CT (ppm)	5 ≤ Fe < 7 and m < 0.25	3 ≤ Cu < 4			5 hours or at the last flight of the day	1, 3, 4, 5
Removal concentration CT (ppm)	Fe ≥ 7	Cu ≥ 4	0.7 (if Fe >6)	0.8 (if Fe >6)		2.6

	Fe	*Cu*	*Cr*	*Ni*	*Frequency*	*Notes*
Removal rate m (ppm/hr)	m ≥ 0,25					1.6

NOTE:

1. ***Removal rate m is only calculated from the concentration corresponding to the alert threshold.***

2. ***The elements CR and Ni are interpreted in relation with Fe. The removal rates of these elements must be taken into account when the warning concentration in Fe is exceeded.***

3. ***The reduced frequency of oil analysis is defined on the alert concentration value of a second test confirming the results.***

4. ***If after three SOA procedures, concentration CT (corrected concentration) decreases or does not change: drain the engine and apply the normal frequency.***

5. ***If, after three SOA procedures, concentration CT (corrected concentration) increases and if the results of the analysis are below the removal thresholds, drain the engine, rinse the lubrication system and apply the normal frequency.***

6. ***Contact Safran Helicopter Engines.***

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TASK 71-02-09-760-801-A01

ENGINE RUNDOWN TIME TESTS (ENGINE)

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Not applicable

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Not applicable

B. Additional provisions

Not applicable

2. TASKS/REFERENCE DOCUMENTATION

– Task TSB 71-00-06-815-802 /Trouble shooting - rundown time out of limit
– Flight Manual

3. PROCEDURE

A. Preliminary operations

(1) Start the engine. Refer to the Flight Manual

B. Check procedure

(1) Operate the engine at the ground idle speed.

(2) Stop the engine.

(3) Make sure that the engine rundown time between the idle speed and the real shutdown of the gas generator is more than 25 seconds.

NOTE: ***Do a troubleshooting procedure if the engine rundown time is less than 25 seconds. Refer to Task TSB 71-00-06-815-802.***

C. Additional procedures

Not applicable

4. FINAL STEPS

Not applicable

TASK 71-02-10-940-801-A01

VIBRATION TEST PROCEDURE GENERAL

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

2. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 05-50-00-200-801 / Unscheduled inspections

3. GENERAL

CAUTION: YOU MUST DO THE VIBRATION TEST IN SINGLE ENGINE CONFIGURATION.

A. Vibration measurement

Do an engine vibration test in these conditions:

(1) Scheduled

Not applicable.

(2) Unscheduled

Refer to Task 05-50-00-200-801.

(3) Recommended

– After the engine installation on the airframe,
– Before the engine removal from the airframe,
– After a module replacement,
– If you are not sure about the engine vibration level,
– After all vibrations or all noises reported by the crew,
– After all occurrences caused by a high vibration level:
  – if there is a pipe rupture (if possibly caused by vibrations),
  – after the repetitive replacement of the same accessory (if possibly caused by vibrations),
  – if a crack is found on an accessory or its attaching parts (if possibly caused by vibrations).

B. Check point

Refer to Figure 1

There is a check point on the engine:

– the vibration sensor support is located on Module 02 near the high-energy unit,
– the vibration sensor is attached to its support with three screws.

C. Acceptance criteria

(1) With a tool that processes the global level only

Gas generator rating	Permitted global vibration level
0 rpm - 52,110 rpm (100%)	< 20 mm/s rms

NOTE: ***This limit is applicable alone, with the vibration test tools that follow:***

- ***simplified system (type B&K 2513) for the field inspection,***
- ***simplified system (type B&K 3656-A).***

(2) With a tool that processes the filtered and global levels

(a) Order 1 (O1) limits of the gas generator

Gas generator rating	Permitted vibration level
0 rpm - 17,000 rpm (33%)	< 7 mm/s rms
17,000 rpm (33%) - 52,110 rpm (100%)	< 15 mm/s rms

(b) Order 1 (O1) limits of the power turbine

Power turbine rating	Permitted vibration level
0 rpm - 39,095 rpm (100%)	< 8 mm/s rms

(c) Limit in global level

Gas generator rating	Permitted vibration level
0 rpm - 52,110 rpm (100%)	< 20 mm/s rms

D. Special tools

Refer to Task 71-02-10-760-801 to do the check procedure with the following tools.

(1) Check equipment currently recommended by Safran Helicopter Engines

The signals from the vibration sensor can be processed by the equipment that follows:

- simplified system (type B&K 2513) for the field inspection,
- SEMIA (type SYNTHAM 2000.4) equipment,
- SEMIA (type SYNTHAM 2000.4) equipment (stationary set),
- PULSE B&K 3641-A/B equipment and B&K 3649-A/B set,
- PULSE B&K 3648-A/B equipment,
- ACES VIPER 4040 vibration analyser,
- M'ARMS system,
- simplified system (type B&K 3656-A).

(2) Simplified system (type B&K 2513) for the field inspection

This tool, which is adapted to use in the field, is used:

- to process the signal in global level, in a frequency band (80 - 1,000 Hz),
- to show the vibration level in mm/s rms.

This system:

- gives a real-time indication of the vibrations during the test,
- or stores the maximum vibration peak measured during the test.

If the vibration level is more than the maximum permitted limit, do a vibration test with a filtered-type system, which identifies the cause of the vibrations more accurately.

NOTE: ***This tool is not sold by BRÜEL&KJAER SOUND & VIBRATION and Safran Helicopter Engines at this time.***

(3) SEMIA (type SYNTHAM 2000.4) equipment

This vibration measurement assembly characterizes the vibration behavior of the rotating assemblies (gas generator and power turbine), during a start and power increase to the nominal rating, with a tracking filter controlled by the tachometer signal related to the rotating assembly, in a frequency band (80 - 1,000 Hz).

It shows the vibration level curve, which is available in real time on a PC screen and can be transferred on paper, in mm/s rms. A "bargraph" of electro-luminescent diodes shows the global vibration level in real time.

During the check of the rotating assemblies, this assembly also measures the global level of the signal that can be shown upon request on the PC screen.

NOTE: ***This tool is mainly available from SEMIA and possibly from Safran Helicopter Engines upon customer request.***

NOTE: ***Make sure that the tool is to the latest standard (tell the SEMIA Company if necessary).***

(4) SEMIA (type SYNTHAM 2000.4) equipment (stationary set)

This vibration measurement assembly characterizes the vibration behavior of the rotating assemblies (gas generator and power turbine), during a start and power increase to the nominal rating, with a tracking filter controlled by the tachometer signal related to the rotating assembly, in a frequency band (80 - 1,000 Hz).

It shows the vibration level curve, which is available in real time on a PC screen and can be transferred on paper, in mm/s rms. A "bargraph" of electro-luminescent diodes shows the global vibration level in real time.

During the check of the rotating assemblies, this assembly also measures the global level of the signal that can be shown upon request on the PC screen.

For some customers, AIRBUS HELICOPTERS has an installation called “stationary set”. The installation includes permanent wiring of engine harness and accelerometer low-noise cables, with a double charge amplifier.

NOTE: ***This tool is mainly available from SEMIA and possibly from Safran Helicopter Engines upon customer request.***

NOTE: ***Make sure that the tool is to the latest standard (tell the SEMIA Company if necessary).***

(5) PULSE B&K 3641-A/B equipment and B&K 3649-A/B set

These tools, which are adapted to use in the field, are used:

– for filtered processing of the signal with a tracking filter controlled by the NG or NPT ratings,
– for global processing in a frequency band (80 - 1,000 Hz).

They process the vibration sensor signal relative to the NG and NPT orders 1, and show the evolution of the NG and NPT ratings over time.

The results are shown in real time and can be downloaded as an automatic report (vibration curves and time graphs of the engine ratings) in Word format.

They are used to save the vibration and tachometric signals during the engine starting, for a more accurate analysis of the measured vibrations.

NOTE: ***These tools are available at BRÜEL&KJAER SOUND & VIBRATION.***

(6) PULSE B&K 3648-A/B equipment

This tool, which is adapted to use in the field, is used:

– for filtered processing of the signal with a tracking filter controlled by the NG or NPT ratings,
– for global processing in a frequency band (80 - 1,000 Hz).

It processes the vibration sensor signal relative to the NG and NPT orders 1, and shows the evolution of the NG and NPT ratings over time.

The results are shown in real time and can be downloaded as an automatic report (vibration curves and time graphs of the engine ratings) in Word format.

It is used to save the vibration and tachometric signals during the engine starting, for a more accurate analysis of the measured vibrations.

NOTE: ***This tool is no more sold by HBK (HOTTINGER, BRÜEL & KJAER).***

(7) ACES VIPER 4040 vibration analyser

This tool, which is adapted to use in the field, is used for filtered processing of the vibration signal controlled by the NG or NPT ratings, in a frequency band (80 - 1,000 Hz).

It processes the vibration sensor signal relative to the NG and NPT orders 1, and the global level.

NOTE: ***This tool is available at ACES SYSTEMS.***

(8) M'ARMS system

This system, which is installed on the helicopters, is used for filtered processing of the vibration signal controlled by the NG or NPT ratings, in a frequency band (80 - 1,000 Hz).

During the engine starting phase, it processes the NG and NPT orders 1 and the global level at the same time. Data are recorded in a PCMCIA card and can be transferred after the flight to a microcomputer (PC).

NOTE: ***This tool is available at AIRBUS HELICOPTERS.***

(9) Simplified system (type B&K 3656-A)

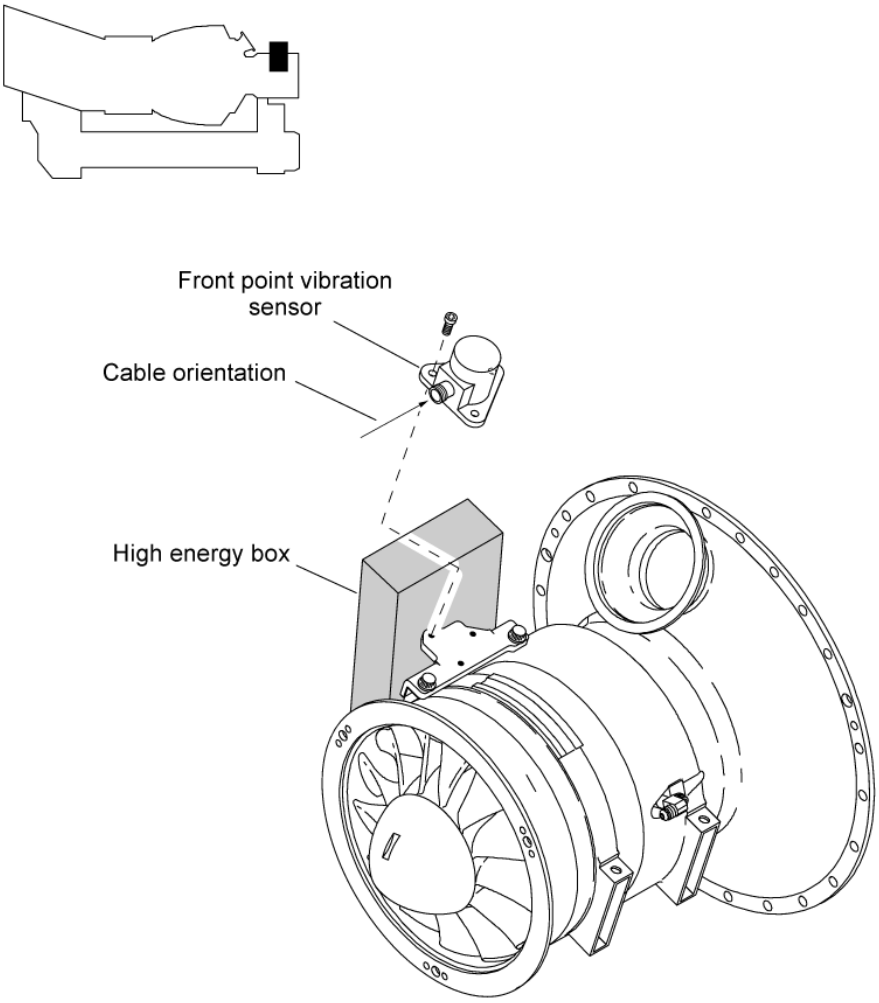
This tool, which is adapted to use in the field, is used to process the signal in global level, in a frequency band (80 - 1,000 Hz). Results are expressed in mm/s rms.

This system shows at the same time:

– a real-time indication of the vibrations during the test,
– the maximum vibration value measured during the test,
– the result of the vibration test.

It is used to save the vibration data during the engine starting. If the vibration level is more than the maximum permitted limit, these vibration data can be unloaded and sent to the Safran Helicopter Engines Support Department for analysis.

NOTE: ***This tool is available at Safran Helicopter Engines and at BRÜEL&KJAER SOUND & VIBRATION.***



Location of the vibration check point
Figure 1

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TASK 71-02-10-760-801-A01

VIBRATION TEST PROCEDURE WITH THE SIMPLIFIED SYSTEM (TYPE B&K 2513) FOR THE FIELD INSPECTION TESTS (ENGINE)

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Description	*Quantity*
mechanic's standard tool kit	1

Special tools

Description	*Tools Catalog Item*	*Quantity*
vibration measuring kit (8816694000)	OT 40 0020	1
high-temperature accelerometer - type B&K 8324 (9610017700)	OT 40 0140	1

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Description	*Quantity*
adhesive tape, “aluminium” type	As necessary
plastic clamps, "TY-RAP" type	As necessary

B. Additional provisions

Not applicable

2. REFERENCE TASKS/DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 70-01-00-940-801 / Standard practices - General
– Task 71-02-10-940-801 / Vibration test procedure - General.

CAUTION: MAKE SURE THAT THE BANDWITH OF THE TOOL USED IS MODIFIED.

- **THE LABEL ON WHICH IS ENGRAVED THE MODIFICATION NUMBER IS BONDED ON THE FRONT FACE OF THE MEASURING DEVICE, ON THE LOWER RIGHT CORNER BELOW THE "TYPE 2513" WRITING.**
- **THE LABEL ON WHICH IS ENGRAVED THE NEW BANDWITH "80 HZ - 10 KHZ" IS BONDED ON THE FRONT FACE OF THE MEASURING DEVICE, ON THE TOP BELOW THE SWITCH "H/A - SEV - LIN".**
- **IF THE BANDWITH OF THE TOOL USED IS NOT MODIFIED, TELL SAFRAN HELICOPTER ENGINES.**

3. PROCEDURE

A. Preliminary operations

Not applicable

B. Preparation

Refer to Figure 1301

(1) Install the accelerometer (OT 40 0140) on the accelerometer support with the three HSHC screws M4X12 (OT 40 0020) (C). Make sure that you correctly point the accelerometer. Refer to Task 71-02-10-940-801.

CAUTION: MAKE SURE THAT THE TIGHTENING TORQUE OF THE SCREWS IS CORRECT TO PREVENT DAMAGE TO THE ACCELEROMETER (TIGHTEN WITH YOUR HAND IF NECESSARY).

(2) Torque the three HSHC screws M4X12 (OT 40 0020) (C) to a value from 0.7 to 1.1 N.m.

(3) Connect the accelerometer (OT 40 0140) to the vibration meter (OT 40 0020) (A) with the B&K WLO748 cable (OT 40 0020) (F).

(4) Lightly tighten the connector of the B&K WLO748 cable (OT 40 0020) (F) to the accelerometer (OT 40 0140) with combination pliers.

CAUTION: MAKE SURE THAT THERE IS NO INTERFERENCE BETWEEN THE CABLE AND THE HELICOPTER CONTROLS.

(5) Do the routing of the B&K WLO748 cable (OT 40 0020) (F) up to the cabin (but not on the hot parts of the engine). Attach the cable in different locations with adhesive tape, “aluminium” type and plastic clamps, "TY-RAP" type.

C. Vibration measurement

Refer to Figure 1301, Figure 1302

(1) Enter the metadata.

(2) Start the engine and increase up to ground idle. Stay at a stabilized rating until you get an oil temperature higher than 50°C (122°F).

(3) Stop the engine.

(4) Set the vibration meter (OT 40 0020) (A) to on as follows:

(a) Set the vibration meter (OT 40 0020) (A) to position 1 (with record of the maximum peak).

(b) Push the "On/Off" button to energize the vibration meter (OT 40 0020) (A).

(c) Push the "Reset" button.

CAUTION: DO NOT MEASURE THE VIBRATIONS BETWEEN 3 AND 20 MINUTES AFTER THE ENGINE SHUTDOWN. THIS IS TO PREVENT A THERMAL UNBALANCE THAT CAN MAKE THE VIBRATION MEASUREMENT INCORRECT.

(5) Start the engine and increase up to flight idle.

NOTE: The N1/NG value that you get changes with the outdoor conditions (T0, P0).

(6) Record the maximum value recorded by the vibration meter (OT 40 0020) (A) during the acceleration from start to flight idle.

(7) Stop the engine.

(8) Push the "Reset" button of the vibration meter (OT 40 0020) (A).

NOTE: The vibration meter operates for approx. two minutes as you push the RESET pushbutton. Then it stops automatically. To start it again, press the "On-Off" pushbutton. This function is cancelled when you connect a JACK plug to the side connector of the vibration meter.

(9) Interpretation of the vibration test.

The acceptance criteria are given in Task 71-02-10-940-801 / Vibration test procedure - General.

NOTE: These criteria can change after statistical studies of the signatures of the new or repaired engines.

(a) If the maximum vibration level of the engine (displayed on the tool screen) is less than the tolerance:

– keep the engine in service.

(b) If the maximum vibration level of the engine (displayed on the tool screen) is more than or equal to the tolerance:

– do a confirmation measurement.

(10) Confirmation measurement.

This measurement is used to confirm the out-of-limit level recorded during the first test.

NOTE: You must do this second test immediately after the first one, on a hot engine.

(a) Make sure that:

1 The HSHC screws M4X12 (OT 40 0020) (C) of the accelerometer (OT 40 0140) are not loose.

2 The connector of the B&K WLO748 cable (OT 40 0020) (F), on the accelerometer (OT 40 0140) side, is not loose.

(b) Set the vibration meter (OT 40 0020) (A) to on as follows:

1 Set the vibration meter (OT 40 0020) (A) to position 2 (instant reading).

2 Push the "On/Off" button to energize the vibration meter (OT 40 0020) (A), if the tool is in stand-by mode.

3 Push the "Reset" button.

(c) Start the engine and increase up to flight idle.

NOTE: ***The N1/NG value that you get changes with the outdoor conditions (T0, P0).***

(d) Record the maximum instantaneous value recorded by the vibration meter (OT 40 0020) (A) and the related N1/NG value (in %) in the confirmation recording table.

Refer to Figure 1302

(e) Stop the engine.

(f) Push the "Reset" button of the vibration meter (OT 40 0020) (A).

(11) Interpretation of the confirmation measurement.

The acceptance criteria are given in Task 71-02-10-940-801 / Vibration test procedure - General.

NOTE: ***These criteria can change after statistical studies of the signatures of the new or repaired engines.***

(a) If the maximum vibration level of the engine (displayed on the tool screen) is less than the tolerance:

– keep the engine in service.

(b) If the maximum vibration level of the engine (displayed on the tool screen) is more than or equal to the tolerance:

– send the vibration data to the Safran Helicopter Engines support department.
– do the maintenance procedure (Refer to Figure 1303).

(12) Final steps.

(a) Push the "On/Off" button of the vibration meter (OT 40 0020) (A) to de-energize it.

(b) Disconnect and remove the B&K WLO748 cable (OT 40 0020) (F) from the vibration meter (OT 40 0020) (A).

(c) Remove and discard the adhesive tape, “aluminium” type and the plastic clamps, "TY-RAP" type that hold the B&K WLO748 cable (OT 40 0020) (F) on the aircraft airframe.

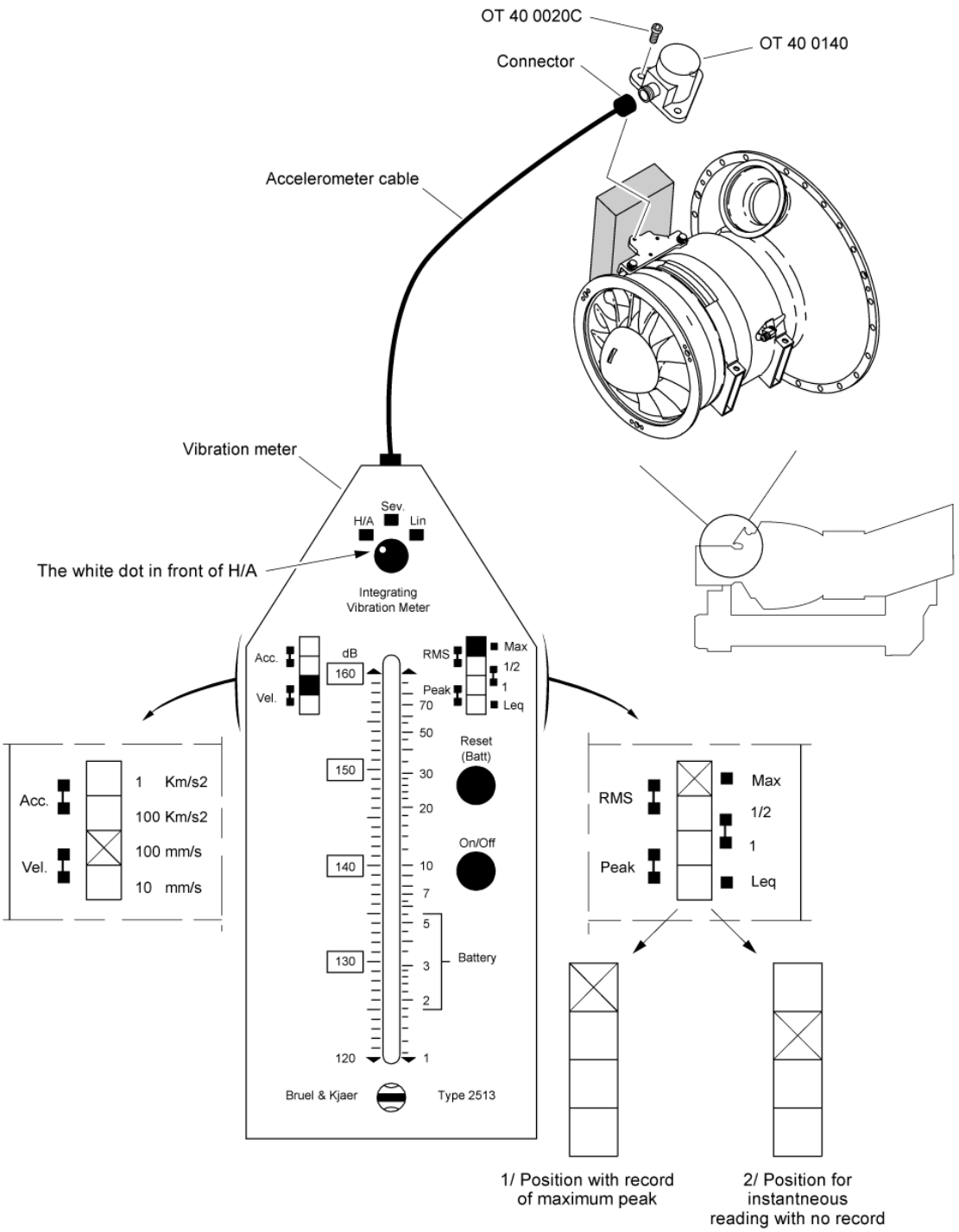
(d) Disconnect and remove the B&K WLO748 cable (OT 40 0020) (F) from the accelerometer (OT 40 0140).

(e) Remove the three HSHC screws M4X12 (OT 40 0020) (C), and then remove the accelerometer (OT 40 0140) from the accelerometer support.

(f) Put the removed equipment items in their packages.

D. Additional procedures

Not applicable



Engine vibration test - B&K 2513 vibration meter
Figure 1301

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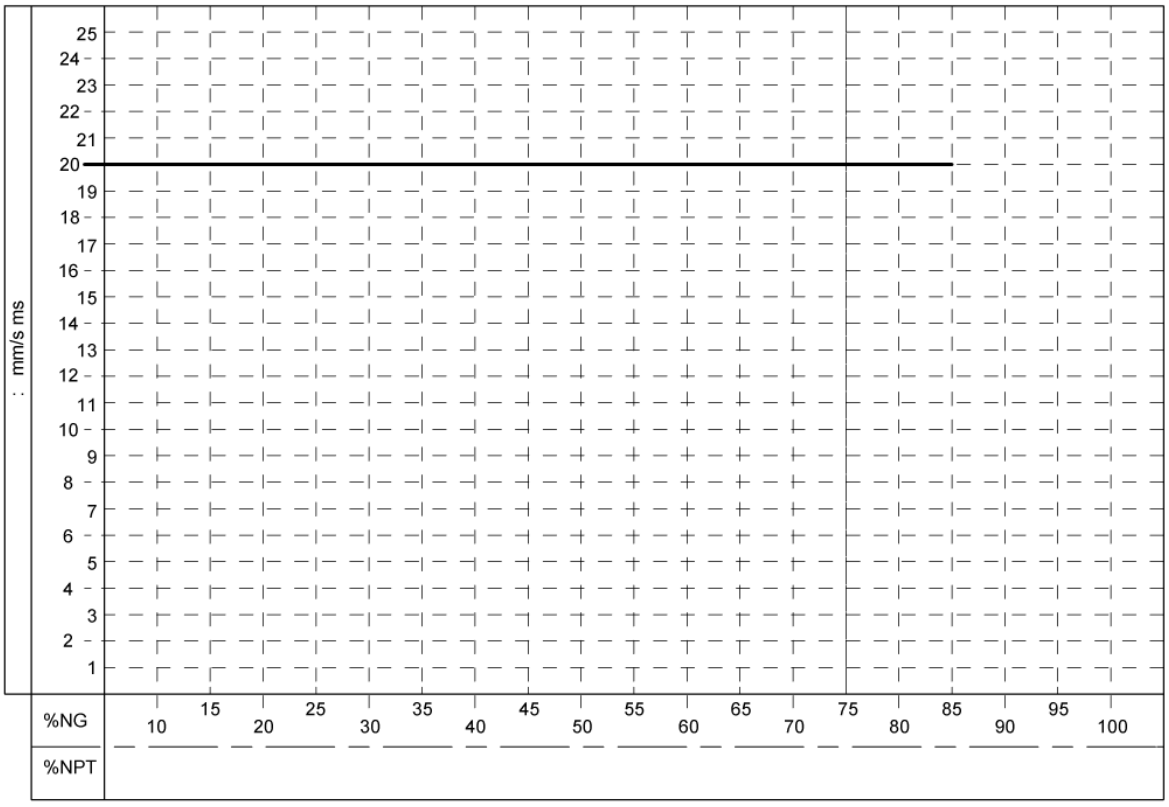
Date of the vibration record:	Customer:	Place: .....
Technician's name:	Function:	Approval: .....
Engine type:	Serial No.:	Position : .....
Aircraft type:	Serial No.:	Registration No.: .....
Reason for the Vibration Test:		

Metadata

Maximum vibration value	➡	.....	mm/s ms
Engine rating	➡	.....	%NG

Vibration measurement (Max. amplitude - Position 1)



Confirmation measurement (Instant reading - Position 2)

Engine vibration test - Readings
Figure 1302

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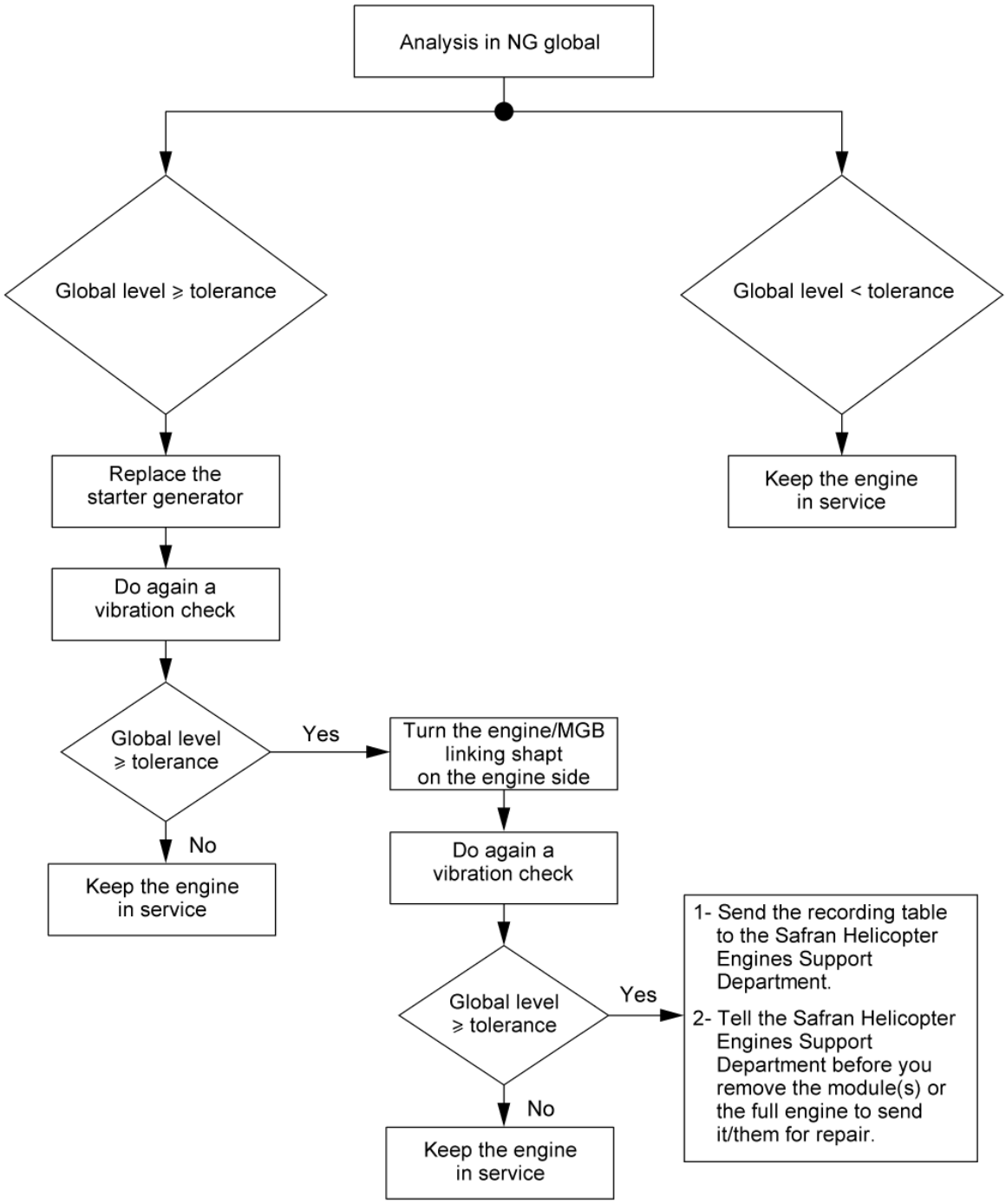


Engine vibration test - Maintenance tasks
Figure 1303

4. FINAL STEPS

Not applicable

TASK 71-02-10-760-801-A02

VIBRATION TEST PROCEDURE WITH THE SEMIA SYNTHAM 2000.4 SYSTEM TESTS (ENGINE)

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Description	*Quantity*
mechanic's standard tool kit	1
SYNTESTER (9610064970)	1

Special tools

Description	*Tools Catalog Item*	*Quantity*
SYNTHAM unit + PC (TM0104G012)	OT 40 0180	1
vibration test set assembly (TM1388G010)	OT 40 0160	1
helicopter power supply cable (SMA2-03-10) (9610064500)	OT 40 0150	1

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Description	*Quantity*
"aluminum"-type adhesive tape	As necessary
"TY-RAP"-type plastic clamps	As necessary

B. Additional provisions

Not applicable

2. REFERENCE TASKS/DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 70-01-00-940-801 / Standard practices - General

– Task 71-02-10-940-801 / Vibration test procedure - General.

3. PROCEDURE

CAUTION: MAKE SURE THAT THE SYNTHAM 2000.4 BASIC UNIT USED HAS AN INDEX MORE THAN OR EQUAL TO 2 (V2). FOR A SYNTHAM 2000.4/V1 BASIC UNIT, TELL THE SEMIA COMPANY.

A. Preliminary procedures

Not applicable

B. Procedure

(1) Installation of the accelerometer (Refer to Figure 1301)

(a) Install the accelerometer (OT 40 0160) (B1) on the accelerometer support of the tested engine with the three screws (OT 40 0160) (B3). Make sure that you correctly point the accelerometer. Refer to Task 71-02-10-940-801.

CAUTION: MAKE SURE THAT THE TIGHTENING TORQUE OF THE SCREWS IS CORRECT TO PREVENT DAMAGE TO THE ACCELEROMETER (TIGHTEN WITH YOUR HAND IF NECESSARY).

(b) Torque the three screws (OT 40 0160) (B3) to a value from 0.7 to 1.1 N.m.

(c) Connect the accelerometer cord (OT 40 0180) (A4) to the accelerometer (OT 40 0160) (B1).

(d) Tighten the connector of the accelerometer cord (OT 40 0180) (A4) moderately to the accelerometer (OT 40 0160) (B1) with combination pliers.

CAUTION: MAKE SURE THAT THERE IS NO INTERFERENCE BETWEEN THE CABLE AND THE HELICOPTER CONTROLS.

(e) Do the routing of the accelerometer cord (OT 40 0180) (A4) up to the cabin (but not on the hot parts of the engine). Attach the cord in different locations with "aluminum"-type adhesive tape and "TY-RAP"-type plastic clamps.

(2) Connection to the helicopter airframe (Refer to Figure 1301)

(a) Disconnect the P100 engine harness connector (55 pins) from the J100 connector of the aircraft support platform.

(b) Connect the tachometer cable (OT 40 0160) (A1) to the P100 engine harness connector (55 pins) and to the J100 connector of the aircraft support platform.

CAUTION: MAKE SURE THAT THERE IS NO INTERFERENCE BETWEEN THE CABLE AND THE HELICOPTER CONTROLS.

(c) Do the routing of the tachometer cable (OT 40 0160) (A1) up to the cabin (but not on the hot parts of the engine). Attach the cable in different locations with "aluminum"-type adhesive tape and "TY-RAP"-type plastic clamps.

(3) Connection of the SYNTHAM 2000.4 unit (Refer to Figure 1301)

(a) Connect the connector of the accelerometer cord (OT 40 0180) (A4) to the ACC input of the box assembly (OT 40 0180) (A2).

(b) Connect the connector of the tachometer cable (OT 40 0160) (A1) to the SYNCHRO input of the box assembly (OT 40 0180) (A2).

(c) Connect the PC cord (OT 40 0180) (A3) between the PC connector of the box assembly (OT 40 0180) (A2) and the serial port connector (COM 1) of the portable PC (OT 40 0180) (B) (connector at the rear of the PC).

NOTE: ***Make sure that the PC battery is sufficiently charged to make the measurements. If the battery is not sufficiently charged, connect the PC to a 220V power supply.***

(4) Power supply of the SYNTHAM 2000.4 unit (Refer to Figure 1301)

(a) To supply power to the box assembly (OT 40 0180) (A2) (two possible procedures), do as follows:

1. Use of the aircraft electrical power system.

2. Connect the helicopter power supply cable (OT 40 0150) to the + 28 V connector of the box assembly (OT 40 0180) (A2) and to the 28 V power receptacle of the aircraft electrical power system.

NOTE: ***If the SYNTHAM 2000.4 unit is energized and if the aircraft electrical power system correctly supplies power to the SYNTHAM 2000.4 unit, the "POWER ON" indicator light of the SYNTHAM 2000.4 unit must come on in green.***

(b) Use of the batteries of the SYNTHAM 2000.4 unit

If the aircraft electrical power system is not available, use the batteries of the box assembly (OT 40 0180) (A2).

– Energize the box assembly (OT 40 0180) (A2) and make sure that the charge of the batteries is as follows:
  – if the "BATTERY LOW" indicator light is off, the batteries of the box assembly (OT 40 0180) (A2) are sufficiently charged.
  – if the "BATTERY LOW" indicator light is on, the batteries of the box assembly (OT 40 0180) (A2) are not sufficiently charged. Charge the batteries of the box assembly (OT 40 0180) (A2).

NOTE: ***If the SYNTHAM 2000.4 unit is energized and used on the batteries, the "POWER ON" indicator light must come on in red.***

(c) Energize the box assembly (OT 40 0180) (A2). Make sure that the "NO SYNCHRO" indicator light is on.

NOTE: ***The "NO SYNCHRO" indicator light goes off when the SYNTHAM 2000.4 unit receives a tachometer signal.***

(d) Energize the portable PC (OT 40 0180) (B) and wait for the complete initialization of the PC.

(e) Start the BAIE SEMIA 2000 program (BS2000).

(5) Measurement of the gas generator vibrations

(a) Prepare the box assembly (OT 40 0180) (A2) for the acquisition. Refer to the SEMIA operation manual.

(b) Start the engine and increase up to ground idle. Stay at a stabilized rating until you get an oil temperature higher than 50°C (122°F).

(c) Stop the engine.

CAUTION: DO NOT MEASURE THE VIBRATIONS BETWEEN 3 AND 20 MINUTES AFTER THE ENGINE SHUTDOWN. THIS IS TO PREVENT A THERMAL UNBALANCE THAT CAN MAKE THE VIBRATION MEASUREMENT INCORRECT.

CAUTION: DURING THE INCREASE OF RATING ON A HOT ENGINE, MAKE SURE THAT THE VIBRATION LEVEL (GLOBAL MEASUREMENT) DOES NOT STAY EQUAL TO 50 MM/S FOR SOME SECONDS ON THE FRONT FACE OF THE SYNTHAM 2000.4 UNIT. IF IT DOES, STOP THE START (AN INSTANTANEOUS PEAK IS PERMITTED AND DOES NOT STOP THE PROCEDURE).

CAUTION: MAKE SURE THAT THE CONNECTIONS ARE CORRECT (SPECIALLY AT THE ACCELEROMETER) AND MAKE THE MEASUREMENT AGAIN. IF THE VIBRATIONS LEVEL IS AT 50 MM/S AGAIN, STOP THE MEASUREMENT AND TELL SAFRAN HELICOPTER ENGINES. IF THE VIBRATION LEVEL IS LESS THAN 50 MM/S, CONTINUE THE OPERATIONS.

(d) Start the engine and increase up to flight idle. Record these vibration levels:

- the order 1 vibration level of the gas generator (N1/NG O1) versus the gas generator speed (N1/NG).
- the global vibration level versus the gas generator speed (N1/NG).

NOTE: Acquisition automatically starts when the SYNTHAM 2000.4 unit receives a tachometer signal.

NOTE: The N1/NG value that you get changes with the outdoor conditions (T0, P0).

(e) Save the acquisition.

(f) Stop the engine.

(g) If the vibration level curve is almost the same as the curve in Figure 1302, do as follows:

1. Make sure that the connections of the accelerometer cord (OT 40 0180) (A4) and of the tachometer cable (OT 40 0160) (A1) are correct.

2. Do the check of the vibration measuring system with the SYNTESTER (9610064970) test device .

3. Start one more acquisition, Refer to Paragraph 3. B. (5) Measurement of the gas generator vibrations.

4. If the vibration level curve is almost the same as the curve in Figure 1302, tell SEMIA or Safran Helicopter Engines.

NOTE: ***A damaged accelerometer or harness can change the result of the vibration measurements. In Figure 1302, the specified scales and the template curve shown in this graph are not reflective of this engine variant. You can see large and sudden variations in the amplitude of the signals, and the chopped appearance on all the curve length.***

(6) Interpretation

The acceptance criteria are given in Task 71-02-10-940-801 / Vibration test procedure - General.

There are two possible results:

NOTE: ***These criteria can change after statistical studies of the signatures of the new or repaired engines.***

(a) The vibration levels are less than the limits:

– measure the vibrations of the power turbine.

(b) The vibration levels are more than or equal to the limits:

– make sure that there is no problem on the vibration measuring system.
– do a confirmation measurement, Refer to Paragraph 3. B. (7) Confirmation measurement.
– measure the vibrations of the power turbine.

(7) Confirmation measurement

This measurement is used to confirm the out-of-limit level recorded during the first test.

NOTE: ***You must do this second test immediately after the first one, on a hot engine.***

(a) Make sure that:

1. The screws (OT 40 0160) (B3) that attach the accelerometer (OT 40 0160) (B1) are not loose.

2. The connector of the accelerometer cord (OT 40 0180) (A4), on the accelerometer(OT 40 0160) (B1) side, is not loose.

CAUTION: **DO NOT MEASURE THE VIBRATIONS BETWEEN 3 AND 20 MINUTES AFTER THE ENGINE SHUTDOWN. THIS IS TO PREVENT A THERMAL UNBALANCE THAT CAN MAKE THE VIBRATION MEASUREMENT INCORRECT.**

CAUTION: **DURING THE INCREASE OF RATING ON A HOT ENGINE, MAKE SURE THAT THE VIBRATION LEVEL (GLOBAL MEASUREMENT) DOES NOT STAY EQUAL TO 50 MM/S FOR SOME SECONDS ON THE FRONT FACE OF THE SYNTHAM 2000.4 UNIT. IF IT DOES, STOP THE START (AN INSTANTANEOUS PEAK IS PERMITTED AND DOES NOT STOP THE PROCEDURE).**

CAUTION: MAKE SURE THAT THE CONNECTIONS ARE CORRECT (SPECIALLY AT THE ACCELEROMETER) AND MAKE THE MEASUREMENT AGAIN. IF THE VIBRATIONS LEVEL IS AT 50 MM/S AGAIN, STOP THE MEASUREMENT AND TELL SAFRAN HELICOPTER ENGINES. IF THE VIBRATION LEVEL IS LESS THAN 50 MM/S, CONTINUE THE OPERATIONS.

(b) Start the engine and increase up to flight idle. Record these vibration levels:

- the order 1 vibration level of the gas generator (N1/NG O1) versus the gas generator speed (N1/NG).
- the global vibration level versus the gas generator speed (N1/NG).

NOTE: ***Acquisition automatically starts when the SYNTHAM 2000.4 unit receives a tachometer signal.***

NOTE: ***The N1/NG value that you get changes with the outdoor conditions (T0, P0).***

(c) Save the acquisition.

(d) Stop the engine.

(8) Interpretation of the confirmation measurement

The acceptance criteria are given in Task 71-02-10-940-801 / Vibration test procedure - General.

NOTE: ***These criteria can change after statistical studies of the signatures of the new or repaired engines.***

(a) If the out-of-limit vibration level is not confirmed:

- measure the vibrations of the power turbine.

(b) If the out-of-limit vibration level is confirmed:

- measure the vibrations of the power turbine.
- Refer to Paragraph 3. B. (12) Interpretation of the vibration measurements.

(9) Measurement of the power turbine vibrations

Prepare the box assembly (OT 40 0180) (A2) for the acquisition. Refer to the SEMIA operation manual.

CAUTION: DO NOT MEASURE THE VIBRATIONS BETWEEN 3 AND 20 MINUTES AFTER THE ENGINE SHUTDOWN. THIS IS TO PREVENT A THERMAL UNBALANCE THAT CAN MAKE THE VIBRATION MEASUREMENT INCORRECT.

CAUTION: DURING THE INCREASE OF RATING ON A HOT ENGINE, MAKE SURE THAT THE VIBRATION LEVEL (GLOBAL MEASUREMENT) DOES NOT STAY EQUAL TO 50 MM/S FOR SOME SECONDS ON THE FRONT FACE OF THE SYNTHAM 2000.4 UNIT. IF IT DOES, STOP THE START (AN INSTANTANEOUS PEAK IS PERMITTED AND DOES NOT STOP THE PROCEDURE).

CAUTION: MAKE SURE THAT THE CONNECTIONS ARE CORRECT (SPECIALLY AT THE ACCELEROMETER) AND MAKE THE MEASUREMENT AGAIN. IF THE VIBRATIONS LEVEL IS AT 50 MM/S AGAIN, STOP THE MEASUREMENT AND TELL SAFRAN HELICOPTER ENGINES. IF THE VIBRATION LEVEL IS LESS THAN 50 MM/S, CONTINUE THE OPERATIONS.

(a) Start the engine and increase up to flight idle. Record this vibration level:

– the order 1 vibration level of the power turbine (N2/NPT O1) versus the power turbine speed (N2/NPT).

NOTE: ***Acquisition automatically starts when the SYNTHAM 2000.4 unit receives a tachometer signal.***

NOTE: ***The N1/NG value that you get changes with the outdoor conditions (T0, P0).***

(b) Save the acquisition.

(c) Stop the engine.

(d) If the vibration level curve is almost the same as the curve in Figure 1302, do as follows:

1. Make sure that the connections of the accelerometer cord (OT 40 0180) (A4) and of the tachometer cable (OT 40 0160) (A1) are correct.

2. Do the check of the vibration measuring system with the SYNTESTER (9610064970) test device.

3. Start one more acquisition, Refer to Paragraph 3. B. (9) Measurement of the power turbine vibrations.

4. If the vibration level curve is almost the same as the curve in Figure 1302, tell SEMIA or Safran Helicopter Engines.

NOTE: ***A damaged accelerometer or harness can change the result of the vibration measurements. In Figure 1302, the specified scales and the template curve shown in this graph are not reflective of this engine variant. You can see large and sudden variations in the amplitude of the signals, and the chopped appearance on all the curve length.***

(10) Interpretation

The acceptance criteria are given in Task 71-02-10-940-801 / Vibration test procedure - General.

There are two possible results:

NOTE: ***These criteria can change after statistical studies of the signatures of the new or repaired engines.***

(a) The vibration level is less than the vibration limit:

– Refer to Paragraph 3. B. (12) Interpretation of the vibration measurements.

(b) The vibration level is more than or equal to the vibration limit:

– make sure that there is no problem on the vibration measuring system.
– do a confirmation measurement.

(11) Confirmation measurement

This measurement is used to confirm the out-of-limit level recorded during the first test.

NOTE: ***You must do this second test immediately after the first one, on a hot engine.***

(a) Make sure that:

1. The screws (OT 40 0160) (B3) that attach the accelerometer (OT 40 0160) (B1) are not loose.

2. The connector of the accelerometer cord (OT 40 0180) (A4), on the accelerometer(OT 40 0160) (B1) side, is not loose.

CAUTION: **DO NOT MEASURE THE VIBRATIONS BETWEEN 3 AND 20 MINUTES AFTER THE ENGINE SHUTDOWN. THIS IS TO PREVENT A THERMAL UNBALANCE THAT CAN MAKE THE VIBRATION MEASUREMENT INCORRECT.**

CAUTION: **DURING THE INCREASE OF RATING ON A HOT ENGINE, MAKE SURE THAT THE VIBRATION LEVEL (GLOBAL MEASUREMENT) DOES NOT STAY EQUAL TO 50 MM/S FOR SOME SECONDS ON THE FRONT FACE OF THE SYNTHAM 2000.4 UNIT. IF IT DOES, STOP THE START (AN INSTANTANEOUS PEAK IS PERMITTED AND DOES NOT STOP THE PROCEDURE).**

CAUTION: **MAKE SURE THAT THE CONNECTIONS ARE CORRECT (SPECIALLY AT THE ACCELEROMETER) AND MAKE THE MEASUREMENT AGAIN. IF THE VIBRATIONS LEVEL IS AT 50 MM/S AGAIN, STOP THE MEASUREMENT AND TELL SAFRAN HELICOPTER ENGINES. IF THE VIBRATION LEVEL IS LESS THAN 50 MM/S, CONTINUE THE OPERATIONS.**

(b) Start the engine and increase up to flight idle. Record this vibration level:

– the order 1 vibration level of the power turbine (N2/NPT O1) versus the power turbine speed (N2/NPT).

NOTE: ***Acquisition automatically starts when the SYNTHAM 2000.4 unit receives a tachometer signal.***

NOTE: ***The N1/NG value that you get changes with the outdoor conditions (T0, P0).***

(c) Save the acquisition.

(d) Stop the engine.

(12) Interpretation of the vibration measurements

The acceptance criterion is given in Task 71-02-10-940-801 / Vibration test procedure - General.

NOTE: ***This criterion can change after statistical studies of the signatures of the new or repaired engines.***

(a) If the out-of-limit vibration level is not confirmed:

- Keep the engine in service.

(b) If the out-of-limit vibration level is confirmed for:

- The global vibration level versus the gas generator speed (N1/NG):
  - send the vibration data and the engine / airframe information to the Safran Helicopter Engines support department.
  - do the maintenance procedure (Refer to Figure 1303).
- The order 1 vibration level of the gas generator (N1/NG O1) versus the gas generator speed (N1/NG):
  - send the vibration data and the engine / airframe information to the Safran Helicopter Engines support department.
  - do the maintenance procedure (Refer to Figure 1303).
- The order 1 vibration level of the power turbine (N2/NPT O1) versus the power turbine speed (N2/NPT):
  - send the vibration data and the engine / airframe information to the Safran Helicopter Engines support department.
  - do the maintenance procedure (Refer to Figure 1303).

(13) Final steps (Refer to Figure 1301)

(a) Close the BAIE SEMIA 2000 program (BS 2000) and de-energize the portable PC (OT 40 0180) (B).

(b) De-energize the box assembly (OT 40 0180) (A2).

(c) Disconnect the box assembly (OT 40 0180) (A2) as follows:

1. If you used the aircraft electrical power system, disconnect and remove the helicopter power supply cable (OT 40 0150) from the + 28 V connector of the box assembly (OT 40 0180) (A2) and from the 28 V power receptacle of the aircraft electrical power system.

2. Disconnect and remove the PC cord (OT 40 0180) (A3) from the PC connector of the box assembly (OT 40 0180) (A2) and from the portable PC (OT 40 0180) (B).

3. Disconnect the tachometer cable (OT 40 0160) (A1) from the SYNCHRO input of the box assembly (OT 40 0180) (A2).

4. Disconnect the accelerometer cord (OT 40 0180) (A4) from the ACC input of the box assembly (OT 40 0180) (A2).

(d) Remove and discard the "aluminum"-type adhesive tape and the "TY-RAP"-type plastic clamps that hold the tachometer cable (OT 40 0160) (A1) and the accelerometer cord (OT 40 0180) (A4) on the aircraft airframe.

(e) Removal of the tachometer cable

1. Disconnect the tachometer cable (OT 40 0160) (A1) from the P100 engine harness connector (55 pins) and from the J100 connector of the aircraft support platform.

2. Connect the P100 engine harness connector (55 pins) to the J100 connector of the aircraft support platform.

(f) Removal of the accelerometer

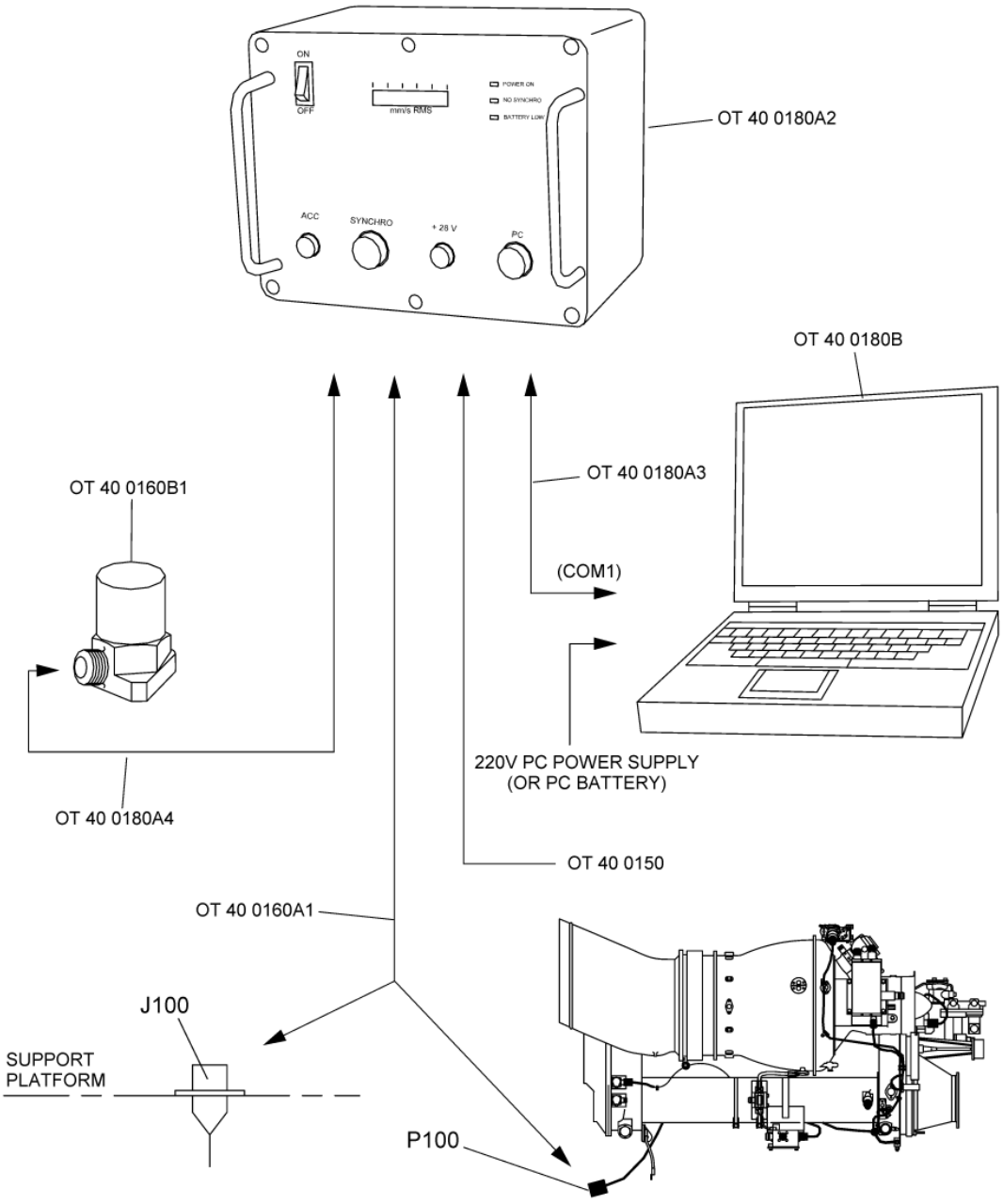
1. Disconnect and remove the accelerometer cord (OT 40 0180) (A4) from the accelerometer (OT 40 0160) (B1).

2. Remove the three screws (OT 40 0160) (B3), and then remove the accelerometer (OT 40 0160) (B1) from the accelerometer support.

(g) Put the removed equipment items in their packages.

C. Additional procedures

Not applicable



Engine vibration test - SEMIA SYNTHAM 2000-4 system
Figure 1301

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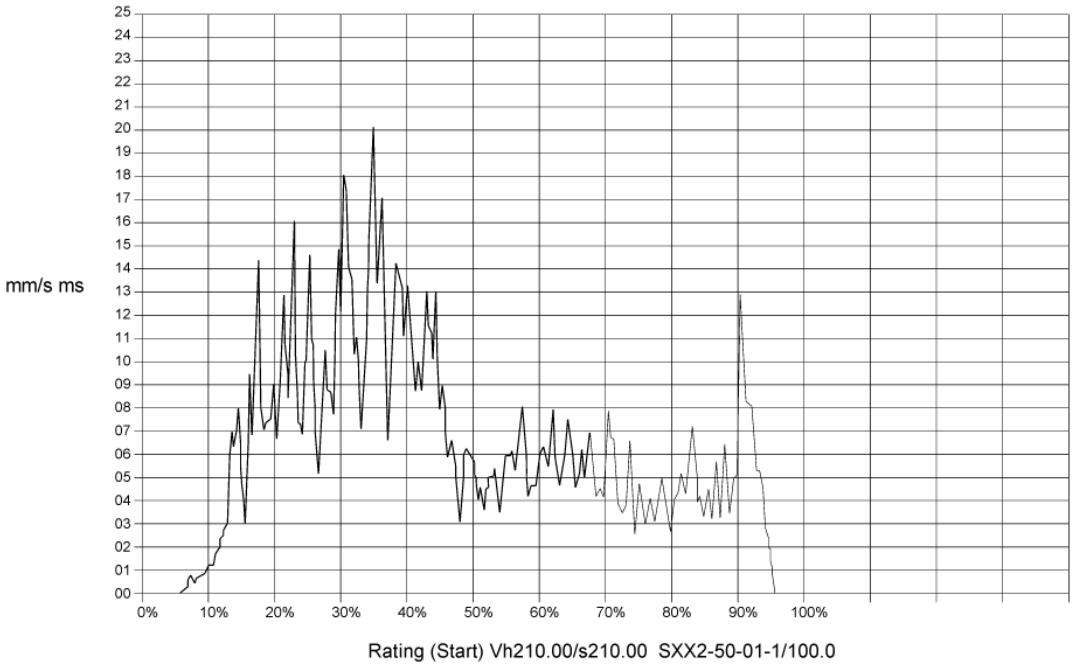

Engine vibration test - Signal from a test with damaged accelerometer or harness
Figure 1302

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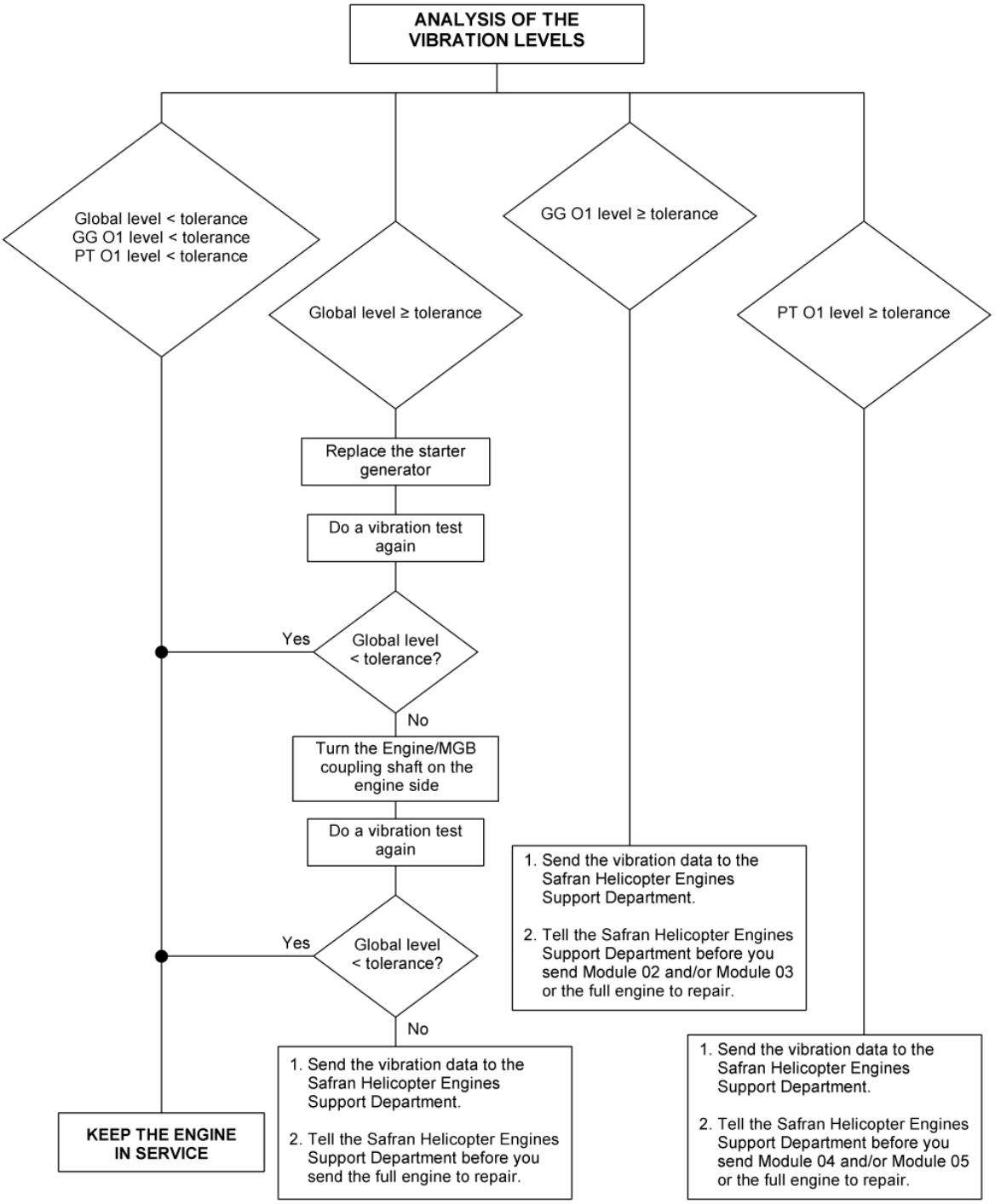


Engine vibration test - Maintenance tasks
Figure 1303

4. FINAL STEPS

Not applicable

TASK 71-02-10-760-801-A03

VIBRATION TEST PROCEDURE WITH THE SEMIA SYNTHAM 2000.4 SYSTEM (STATIONARY SET) TESTS (ENGINE)

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Description	*Quantity*
mechanic's standard tool kit	1
SYNTESTER (9610064970)	1

Special tools

Description	*Tools Catalog Item*	*Quantity*
SYNTHAM unit + PC (TM0104G012)	OT 40 0180	1
vibration test set assembly (TM1388G010)	OT 40 0160	1
helicopter power supply cable (SMA2-03-10) (9610064500)	OT 40 0150	1

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Description	*Quantity*
"aluminum"-type adhesive tape	As necessary
"TY-RAP"-type plastic clamps	As necessary

B. Additional provisions

Not applicable

2. REFERENCE TASKS/DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 70-01-00-940-801 / Standard practices - General

– Task 71-02-10-940-801 / Vibration test procedure - General.

3. PROCEDURE

CAUTION: MAKE SURE THAT THE SYNTHAM 2000.4 BASIC UNIT USED HAS AN INDEX MORE THAN OR EQUAL TO 2 (V2). FOR A SYNTHAM 2000.4/V1 BASIC UNIT, TELL THE SEMIA COMPANY.

A. Preliminary procedures

Not applicable

B. Procedure

(1) Installation of the accelerometer (Refer to Figure 1301)

(a) Disconnect the accelerometer cord from the dummy accelerometer of the tested engine.

(b) Remove the dummy accelerometer from the accelerometer support. Keep the three stainless-steel HSHC screws M4X10 (OT 40 0160) (B3).

(c) Install the accelerometer (OT 40 0160) (B1) on the accelerometer support with the three stainless-steel HSHC screws M4X10 (OT 40 0160) (B3). Make sure that you correctly point the accelerometer. Refer to Task 71-02-10-940-801.

CAUTION: MAKE SURE THAT THE TIGHTENING TORQUE OF THE SCREWS IS CORRECT TO PREVENT DAMAGE TO THE ACCELEROMETER (TIGHTEN WITH YOUR HAND IF NECESSARY).

(d) Torque the three stainless-steel HSHC screws M4X10 (OT 40 0160) (B3) to a value from 0.7 to 1.1 N.m.

(e) Connect the accelerometer cord to the accelerometer (OT 40 0160) (B1).

(f) Tighten the connector of the accelerometer cord moderately to the accelerometer (OT 40 0160) (B1) with combination pliers.

(2) Connection to the helicopter airframe (Refer to Figure 1301)

(a) Connect the tachometer cable (OT 40 0160) (A1) in the cockpit, at the front between the two pilots, as follows:

– engine installed in T1: “ENGINE 1” connector (upper),
– engine installed in T2: “ENGINE 2” connector (lower).

(3) Connection of the SYNTHAM 2000.4 unit (Refer to Figure 1301)

(a) Connect the connector of the tachometer cable (OT 40 0160) (A1) to the SYNCHRO input of the box assembly (OT 40 0180) (A2).

(b) Connect the PC cord (OT 40 0180) (A3) between the PC connector of the box assembly (OT 40 0180) (A2) and the serial port connector (COM 1) of the portable PC (OT 40 0180) (B) (connector at the rear of the PC).

NOTE: ***Make sure that the PC battery is sufficiently charged to make the measurements. If the battery is not sufficiently charged, connect the PC to a 220V power supply.***

(4) Power supply of the SYNTHAM 2000.4 unit (Refer to Figure 1301)

To supply power to the box assembly (OT 40 0180) (A2) (two possible procedures), do as follows:

(a) Use of the aircraft electrical power system

1. Connect the helicopter power supply cable (OT 40 0150) to the + 28 V connector of the box assembly (OT 40 0180) (A2) and to the 28 V power receptacle of the aircraft electrical power system.

NOTE: ***If the SYNTHAM 2000.4 unit is energized and if the aircraft electrical power system correctly supplies power to the SYNTHAM 2000.4 unit, the "POWER ON" indicator light of the SYNTHAM 2000.4 unit must come on in green.***

(b) Use of the batteries of the SYNTHAM 2000.4 unit

If the aircraft electrical power system is not available, use the batteries of the box assembly (OT 40 0180) (A2).

– Energize the box assembly (OT 40 0180) (A2) and make sure that the charge of the batteries is as follows:
  – if the "BATTERY LOW" indicator light is off, the batteries of the box assembly (OT 40 0180) (A2) are sufficiently charged.
  – if the "BATTERY LOW" indicator light is on, the batteries of the box assembly (OT 40 0180) (A2) are not sufficiently charged. Charge the batteries of the box assembly (OT 40 0180) (A2).

NOTE: ***If the SYNTHAM 2000.4 unit is energized and used on the batteries, the "POWER ON" indicator light must come on in red.***

(c) Energize the box assembly (OT 40 0180) (A2). Make sure that the "NO SYNCHRO" indicator light is on.

NOTE: ***The "NO SYNCHRO" indicator light goes off when the SYNTHAM 2000.4 unit receives a tachometer signal.***

(d) Energize the portable PC (OT 40 0180) (B) and wait for the complete initialization of the PC.

(e) Start the BAIE SEMIA 2000 program (BS2000).

(5) Measurement of the gas generator vibrations

Prepare the box assembly (OT 40 0180) (A2) for the acquisition. Refer to the SEMIA operation manual.

(a) Start the engine and increase up to ground idle. Stay at a stabilized rating until you get an oil temperature higher than 50°C (122°F).

(b) Stop the engine.

CAUTION: **DO NOT MEASURE THE VIBRATIONS BETWEEN 3 AND 20 MINUTES AFTER THE ENGINE SHUTDOWN. THIS IS TO PREVENT A THERMAL**

UNBALANCE THAT CAN MAKE THE VIBRATION MEASUREMENT INCORRECT.

CAUTION: DURING THE INCREASE OF RATING ON A HOT ENGINE, MAKE SURE THAT THE VIBRATION LEVEL (GLOBAL MEASUREMENT) DOES NOT STAY EQUAL TO 50 MM/S FOR SOME SECONDS ON THE FRONT FACE OF THE SYNTHAM 2000.4 UNIT. IF IT DOES, STOP THE START (AN INSTANTANEOUS PEAK IS PERMITTED AND DOES NOT STOP THE PROCEDURE).

CAUTION: MAKE SURE THAT THE CONNECTIONS ARE CORRECT (SPECIALLY AT THE ACCELEROMETER) AND MAKE THE MEASUREMENT AGAIN. IF THE VIBRATIONS LEVEL IS AT 50 MM/S AGAIN, STOP THE MEASUREMENT AND TELL SAFRAN HELICOPTER ENGINES. IF THE VIBRATION LEVEL IS LESS THAN 50 MM/S, CONTINUE THE OPERATIONS.

(c) Start the engine and increase up to flight idle. Record these vibration levels:

- the order 1 vibration level of the gas generator (N1/NG O1) versus the gas generator speed (N1/NG).
- the global vibration level versus the gas generator speed (N1/NG).

NOTE: ***Acquisition automatically starts when the SYNTHAM 2000.4 unit receives a tachometer signal.***

NOTE: ***The N1/NG value that you get changes with the outdoor conditions (T0, P0).***

(d) Save the acquisition.

(e) Stop the engine.

(f) If the vibration level curve is almost the same as the curve in Figure 1302, do as follows:

1. Make sure that the connections of the accelerometer cord (OT 40 0180) (A4) and of the tachometer cable (OT 40 0160) (A1) are correct.

2. Do the check of the vibration measuring system with the SYNTESTER (9610064970) test device.

3. Start one more acquisition, Refer to Paragraph 3. B. (5) Measurement of the gas generator vibrations.

4. If the vibration level curve is almost the same as the curve in Figure 1302, tell SEMIA or Safran Helicopter Engines.

NOTE: ***A damaged accelerometer or harness can change the result of the vibration measurements. In Figure 1302, the specified scales and the template curve shown in this graph are not reflective of this engine variant. You can see large and sudden variations in the amplitude of the signals, and the chopped appearance on all the curve length.***

(6) Interpretation

The acceptance criteria are given in Task 71-02-10-940-801 / Vibration test procedure - General.

NOTE: ***These criteria can change after statistical studies of the signatures of the new or repaired engines.***

There are two possible results:

(a) The vibration levels are less than the limits:

– measure the vibrations of the power turbine.

(b) The vibration levels are more than or equal to the limits:

– make sure that there is no problem on the vibration measuring system.
– do a confirmation measurement, Refer to Paragraph 3. B. (7) Confirmation measurement.
– measure the vibrations of the power turbine.

(7) Confirmation measurement

This measurement is used to confirm the out-of-limit level recorded during the first test.

NOTE: ***You must do this second test immediately after the first one, on a hot engine.***

(a) Make sure that:

1. The stainless-steel HSHC screws M4X10 (OT 40 0160) (B3) that attach the accelerometer (OT 40 0160) (B1) are not loose.

2. The connector of the accelerometer cord (OT 40 0160) (A4), on the accelerometer(OT 40 0160) (B1) side, is not loose.

CAUTION: **DO NOT MEASURE THE VIBRATIONS BETWEEN 3 AND 20 MINUTES AFTER THE ENGINE SHUTDOWN. THIS IS TO PREVENT A THERMAL UNBALANCE THAT CAN MAKE THE VIBRATION MEASUREMENT INCORRECT.**

CAUTION: **DURING THE INCREASE OF RATING ON A HOT ENGINE, MAKE SURE THAT THE VIBRATION LEVEL (GLOBAL MEASUREMENT) DOES NOT STAY EQUAL TO 50 MM/S FOR SOME SECONDS ON THE FRONT FACE OF THE SYNTHAM 2000.4 UNIT. IF IT DOES, STOP THE START (AN INSTANTANEOUS PEAK IS PERMITTED AND DOES NOT STOP THE PROCEDURE).**

CAUTION: **MAKE SURE THAT THE CONNECTIONS ARE CORRECT (SPECIALLY AT THE ACCELEROMETER) AND MAKE THE MEASUREMENT AGAIN. IF THE VIBRATIONS LEVEL IS AT 50 MM/S AGAIN, STOP THE MEASUREMENT AND TELL SAFRAN HELICOPTER ENGINES. IF THE VIBRATION LEVEL IS LESS THAN 50 MM/S, CONTINUE THE OPERATIONS.**

(b) Start the engine and increase up to flight idle. Record these vibration levels:

– the order 1 vibration level of the gas generator (N1/NG O1) versus the gas generator speed (N1/NG).

– the global vibration level versus the gas generator speed (N1/NG).

NOTE: ***Acquisition automatically starts when the SYNTHAM 2000.4 unit receives a tachometer signal.***

NOTE: ***The N1/NG value that you get changes with the outdoor conditions (T0, P0).***

(c) Save the acquisition.

(d) Stop the engine.

(8) Interpretation of the confirmation measurement

The acceptance criteria are given in Task 71-02-10-940-801 / Vibration test procedure - General.

NOTE: ***These criteria can change after statistical studies of the signatures of the new or repaired engines.***

(a) If the out-of-limit vibration level is not confirmed:

– measure the vibrations of the power turbine.

(b) If the out-of-limit vibration level is confirmed:

– measure the vibrations of the power turbine.
– Refer to Paragraph 3. B. (12) Interpretation of the vibration measurements.

(9) Measurement of the power turbine vibrations

Prepare the box assembly (OT 40 0180) (A2) for the acquisition. Refer to the SEMIA operation manual.

CAUTION: **DO NOT MEASURE THE VIBRATIONS BETWEEN 3 AND 20 MINUTES AFTER THE ENGINE SHUTDOWN. THIS IS TO PREVENT A THERMAL UNBALANCE THAT CAN MAKE THE VIBRATION MEASUREMENT INCORRECT.**

CAUTION: **DURING THE INCREASE OF RATING ON A HOT ENGINE, MAKE SURE THAT THE VIBRATION LEVEL (GLOBAL MEASUREMENT) DOES NOT STAY EQUAL TO 50 MM/S FOR SOME SECONDS ON THE FRONT FACE OF THE SYNTHAM 2000.4 UNIT. IF IT DOES, STOP THE START (AN INSTANTANEOUS PEAK IS PERMITTED AND DOES NOT STOP THE PROCEDURE).**

CAUTION: **MAKE SURE THAT THE CONNECTIONS ARE CORRECT (SPECIALLY AT THE ACCELEROMETER) AND MAKE THE MEASUREMENT AGAIN. IF THE VIBRATIONS LEVEL IS AT 50 MM/S AGAIN, STOP THE MEASUREMENT AND TELL SAFRAN HELICOPTER ENGINES. IF THE VIBRATION LEVEL IS LESS THAN 50 MM/S, CONTINUE THE OPERATIONS.**

(a) Start the engine and increase up to flight idle. Record this vibration level:

– the order 1 vibration level of the power turbine (N2/NPT O1) versus the power turbine speed (N2/NPT).

NOTE: ***Acquisition automatically starts when the SYNTHAM 2000.4 unit receives a tachometer signal.***

NOTE: ***The N1/NG value that you get changes with the outdoor conditions (T0, P0).***

(b) Save the acquisition.

(c) Stop the engine.

(d) If the vibration level curve is almost the same as the curve in Figure 1302, do as follows:

1. Make sure that the connections of the accelerometer cord (OT 40 0180) (A4) and of the tachometer cable (OT 40 0160) (A1) are correct.

2. Do the check of the vibration measuring system with the SYNTESTER (9610064970) test device .

3. Start one more acquisition, Refer to Paragraph 3. B. (9) Measurement of the power turbine vibrations.

4. If the vibration level curve is almost the same as the curve in Figure 1302, tell SEMIA or Safran Helicopter Engines.

NOTE: ***A damaged accelerometer or harness can change the result of the vibration measurements. In Figure 1302, the specified scales and the template curve shown in this graph are not reflective of this engine variant. You can see large and sudden variations in the amplitude of the signals, and the chopped appearance on all the curve length.***

(10) Interpretation

The acceptance criteria are given in Task 71-02-10-940-801 / Vibration test procedure - General.

NOTE: ***These criteria can change after statistical studies of the signatures of the new or repaired engines.***

There are two possible results:

(a) The vibration level is less than the vibration limit:

– Refer to Paragraph 3. B. (12) Interpretation of the vibration measurements.

(b) The vibration level is more than or equal to the vibration limit:

– make sure that there is no problem on the vibration measuring system.
– do a confirmation measurement.

(11) Confirmation measurement

This measurement is used to confirm the out-of-limit level recorded during the first test.

NOTE: ***You must do this second test immediately after the first one, on a hot engine.***

(a) Make sure that:

1. The stainless-steel HSHC screws M4X10 (OT 40 0160) (B3) that attach the accelerometer (OT 40 0160) (B1) are not loose.

2. The connector of the accelerometer cord (OT 40 0180) (A4), on the accelerometer(OT 40 0160) (B1) side, is not loose.

CAUTION: DO NOT MEASURE THE VIBRATIONS BETWEEN 3 AND 20 MINUTES AFTER THE ENGINE SHUTDOWN. THIS IS TO PREVENT A THERMAL UNBALANCE THAT CAN MAKE THE VIBRATION MEASUREMENT INCORRECT.

CAUTION: DURING THE INCREASE OF RATING ON A HOT ENGINE, MAKE SURE THAT THE VIBRATION LEVEL (GLOBAL MEASUREMENT) DOES NOT STAY EQUAL TO 50 MM/S FOR SOME SECONDS ON THE FRONT FACE OF THE SYNTHAM 2000.4 UNIT. IF IT DOES, STOP THE START (AN INSTANTANEOUS PEAK IS PERMITTED AND DOES NOT STOP THE PROCEDURE).

CAUTION: MAKE SURE THAT THE CONNECTIONS ARE CORRECT (SPECIALLY AT THE ACCELEROMETER) AND MAKE THE MEASUREMENT AGAIN. IF THE VIBRATIONS LEVEL IS AT 50 MM/S AGAIN, STOP THE MEASUREMENT AND TELL SAFRAN HELICOPTER ENGINES. IF THE VIBRATION LEVEL IS LESS THAN 50 MM/S, CONTINUE THE OPERATIONS.

(b) Start the engine and increase up to flight idle. Record this vibration level:

– the order 1 vibration level of the power turbine (N2/NPT O1) versus the power turbine speed (N2/NPT).

NOTE: ***Acquisition automatically starts when the SYNTHAM 2000.4 unit receives a tachometer signal.***

NOTE: ***The N1/NG value that you get changes with the outdoor conditions (T0, P0).***

(c) Save the acquisition.

(d) Stop the engine.

(12) Interpretation of the vibration measurements

The acceptance criterion is given in Task 71-02-10-940-801 / Vibration test procedure - General.

NOTE: ***This criterion can change after statistical studies of the signatures of the new or repaired engines.***

(a) If the out-of-limit vibration level is not confirmed:

- Keep the engine in service.

(b) If the out-of-limit vibration level is confirmed for:

- The global vibration level versus the gas generator speed (N1/NG):

- send the vibration data and the engine / airframe information to the Safran Helicopter Engines support department.
- do the maintenance procedure (Refer to Figure 1303).

- The order 1 vibration level of the gas generator (N1/NG O1) versus the gas generator speed (N1/NG):
  - send the vibration data and the engine / airframe information to the Safran Helicopter Engines support department.
  - do the maintenance procedure (Refer to Figure 1303).
- The order 1 vibration level of the power turbine (N2/NPT O1) versus the power turbine speed (N2/NPT):
  - send the vibration data and the engine / airframe information to the Safran Helicopter Engines support department.
  - do the maintenance procedure (Refer to Figure 1303).

(13) Final steps (Refer to Figure 1301)

(a) Close the BAIE SEMIA 2000 program (BS 2000) and de-energize the portable PC (OT 40 0180) (B).

(b) De-energize the box assembly (OT 40 0180) (A2).

(c) Disconnect the box assembly (OT 40 0180) (A2) as follows:

1. If you used the aircraft electrical power system, disconnect and remove the helicopter power supply cable (OT 40 0150) from the + 28 V connector of the box assembly (OT 40 0180) (A2) and from the 28 V power receptacle of the aircraft electrical power system.

2. Disconnect and remove the PC cord (OT 40 0180) (A3) from the PC connector of the box assembly (OT 40 0180) (A2) and from the portable PC (OT 40 0180) (B).

3. Disconnect the tachometer cable (OT 40 0160) (A1) from the SYNCHRO input of the box assembly (OT 40 0180) (A2).

(d) Removal of the tachometer cable

- Engine installed in T1:
  - disconnect the tachometer cable (OT 40 0160) (A1) from the “ENGINE 1” connector of the cockpit.
- Engine installed in T2:
  - disconnect the tachometer cable (OT 40 0160) (A1) from the “ENGINE 2” connector of the cockpit.

(e) Removal of the accelerometer

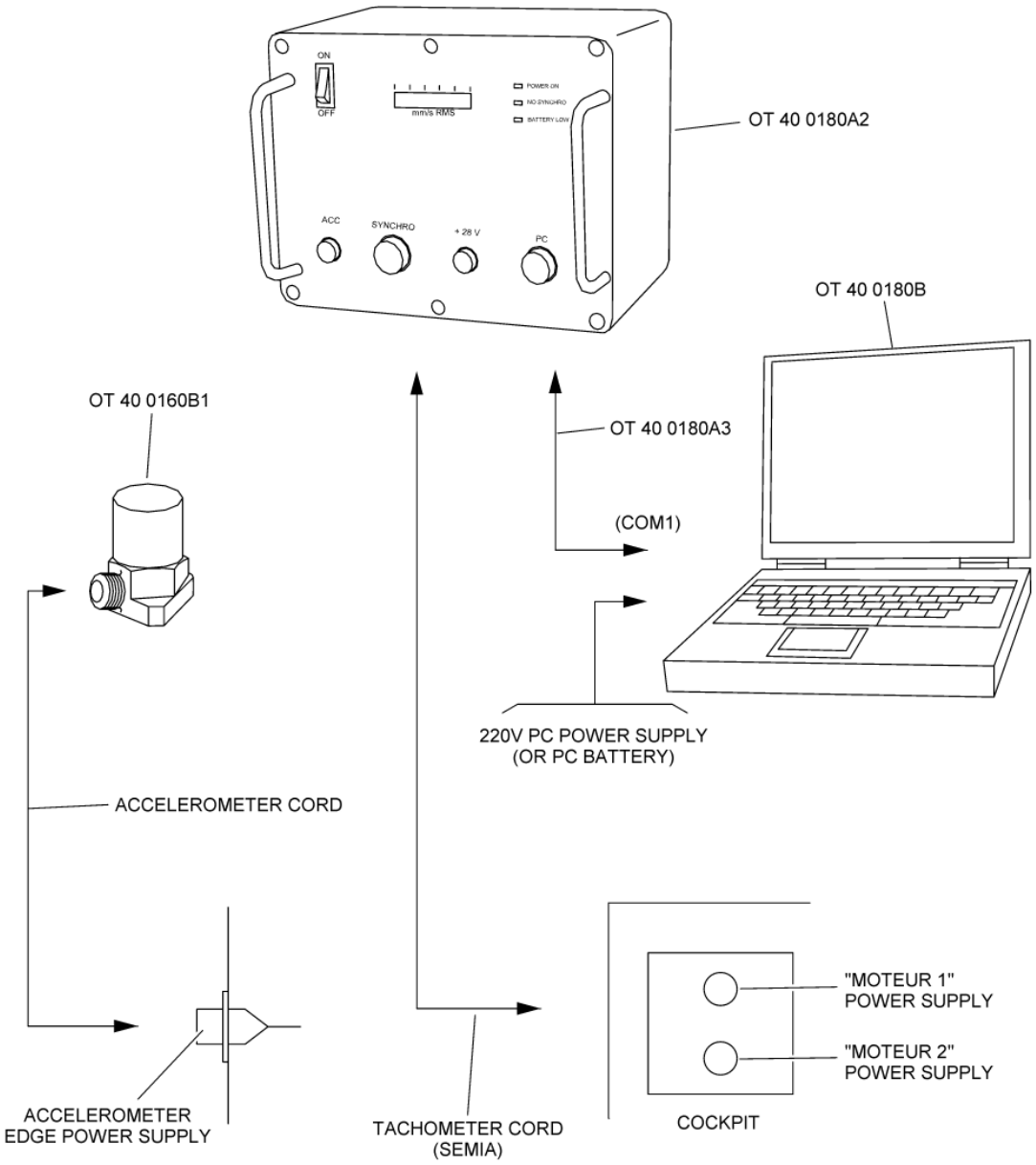
1. Disconnect the accelerometer cord from the accelerometer (OT 40 0160) (B1).

2. Remove the three stainless-steel HSHC screws M4X10 (OT 40 0160) (B3), and then remove the accelerometer (OT 40 0160) (B1) from the accelerometer support.

3. Install the dummy accelerometer on the accelerometer support with the three screws that you kept. Make sure that you correctly point the dummy accelerometer. Refer to Task 71-02-10-940-801.

4. Connect the tachometer cable to the dummy accelerometer.

(f) Put the removed equipment items in their packages.



Engine vibration test – SEMIA SYNTHAM 2000.4 system (stationary set)
Figure 1301

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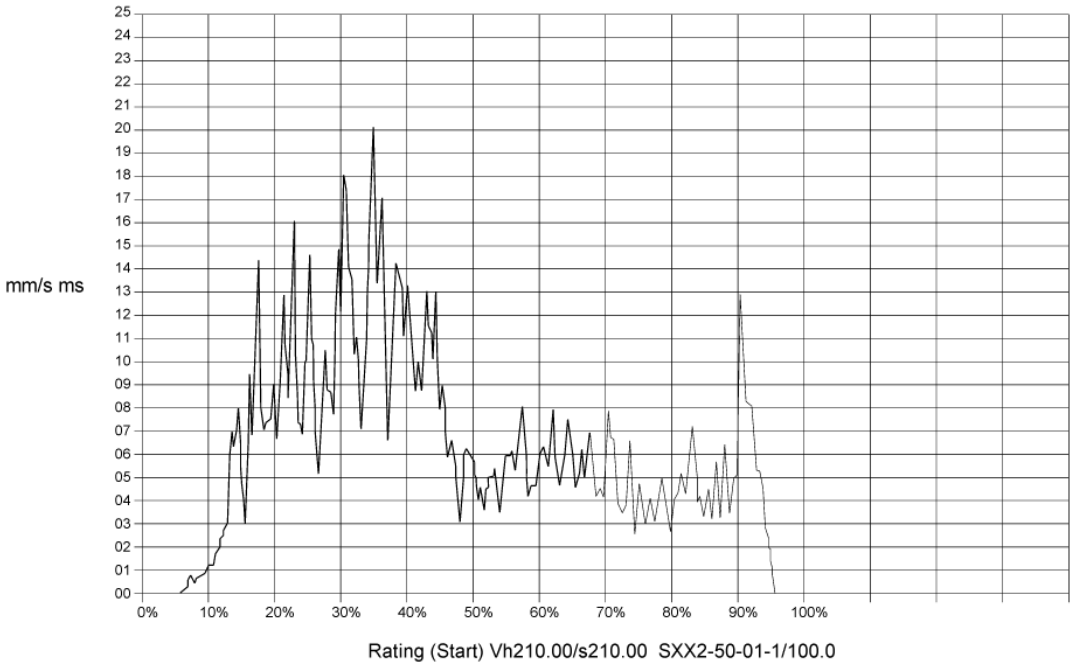

Engine vibration test – Signal from a test with damaged accelerometer or harness
Figure 1302

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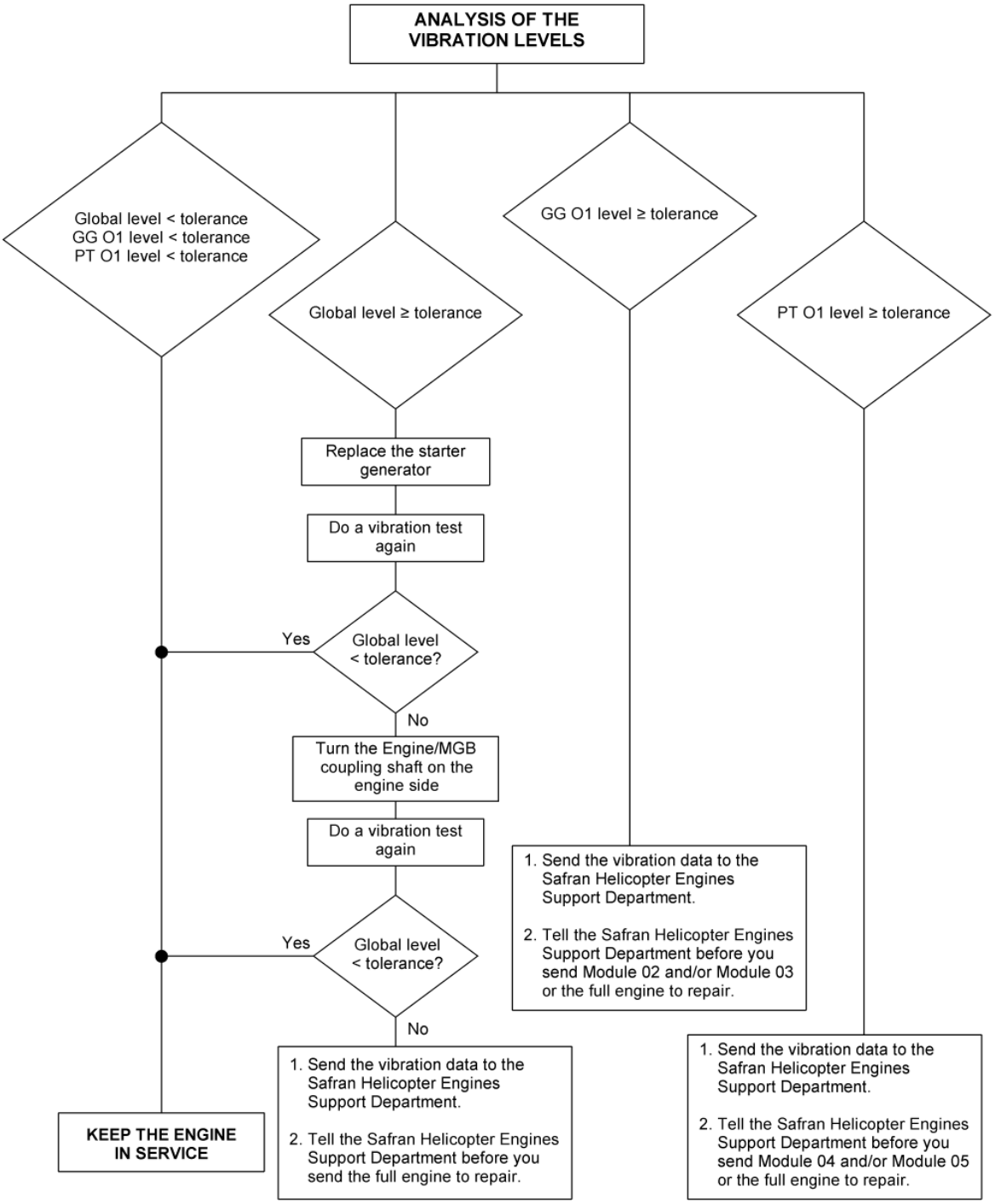

Engine vibration test – Maintenance tasks
Figure 1303

C. Additional procedures

Not applicable

4. FINAL STEPS

Not applicable

TASK 71-02-10-760-801-A04

VIBRATION TEST PROCEDURE WITH THE PULSE B&K 3641-A/B SYSTEM AND THE B&K 3649 -A/B SET
TESTS (ENGINE)

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Description	*Quantity*
mechanic's standard tool kit	1
Brüel & Kjaer 3641-A/B test case or Brüel & Kjaer 3649-A/B vibration test set	1
B&K UA-1678-A-009 engine special set	1
laptop	1

NOTE: ***The B&K 3641-B and B&K 3649-B sets are the same as the B&K 3641-A and B&K 3649-A sets without accelerometer.***

NOTE: ***The Brüel & Kjaer 3649-A vibration test set is supplied with:***

- ***B&K 3560-B or B&K LAN-XI acquisition module,***
- ***B&K WB-3487 galvanic insulator (Dual Channel Tacho-coupler),***
- ***accelerometer cable and B&K 2647-D-003 charge amplifier,***
- ***B&K YS-8406 HSHC screws M4x12 (x3),***
- ***BNC / BNC cable (60 cm long) (x2).***

NOTE: ***The B&K UA-1678-A-009 engine special set is supplied with:***

- ***B&K AO-1479-A-009 tachometer cable,***
- ***software and technical data,***
- ***bag for cables.***

Special tools

Description	*Tools Catalog Item*	*Quantity*
B&K 8324 high-temperature accelerometer (9610017700)	OT 40 0140	1

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Description	*Quantity*
"aluminum"-type adhesive tape	As necessary
"TY-RAP"-type plastic clamps	As necessary

B. Additional provisions

Not applicable

2. REFERENCE TASKS/DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 70-01-00-940-801 / Standard practices - General
– Task 71-02-10-940-801 / Vibration test procedure - General
– B&K operation manual.

3. PROCEDURE

A. Preliminary procedures

Not applicable

B. Procedure

(1) Installation of the accelerometer and of the accelerometer cable / charge amplifier assembly. (Refer to Figure 1301 , Figure 1302 , Figure 1303).

(a) Install the B&K 8324 high-temperature accelerometer (OT 40 0140) on the accelerometer support with the three B&K YS-8406 screws. Make sure that you correctly point the accelerometer. Refer to Task 71-02-10-940-801.

CAUTION: OBEY THE TIGHTENING TORQUE OF THE SCREWS TO PREVENT DAMAGE TO THE ACCELEROMETER (POSSIBLY TIGHTEN WITH YOUR HAND).

(b) Torque the three B&K YS-8406 screws to a value from 0.7 to 1.1 N.m.

(c) Connect the B&K 8324 high-temperature accelerometer (OT 40 0140) to the accelerometer cable/ B&K 2647-D-003 charge amplifier assembly.

(d) Tighten the connector of the accelerometer cable / B&K 2647-D-003 charge amplifier assembly moderately to the B&K 8324 high-temperature accelerometer (OT 40 0140) with combination pliers.

CAUTION: MAKE SURE THAT THERE IS NO INTERFERENCE BETWEEN THE CABLE AND THE HELICOPTER CONTROLS.

(e) Do the routing of the accelerometer cable / B&K 2647-D-003 charge amplifier assembly up to the cabin (but not on the hot parts of the engine). Attach the cable in different locations with "aluminum"-type adhesive tape and "TY-RAP"-type plastic clamps.

(2) Installation of the tachometer cable (Refer to Figure 1301 , Figure 1302 , Figure 1303).

(a) Disconnect the P100 engine harness connector (55 pins) from the J100 connector of the aircraft support platform.

(b) Connect the B&K AO-1479-A-009 tachometer cable to the P100 engine harness connector (55 pins) and to the J100 connector of the aircraft support platform.

CAUTION: MAKE SURE THAT THERE IS NO INTERFERENCE BETWEEN THE CABLE AND THE HELICOPTER CONTROLS.

(c) Do the routing of the B&K AO-1479-A-009 tachometer cable up to the cabin (but not on the hot parts of the engine). Attach the cable in different locations with "aluminum"-type adhesive tape and "TY-RAP"-type plastic clamps.

(3) Use of the Brüel & Kjaer 3641-A/B test case (Refer to Figure 1301).

(a) Connect the N1/NG and N2/NPT signal outputs of the B&K AO-1479-A-009 tachometer cable related to the tested engine to the B&K 3641-A/B box as follows:

– Ch1 terminal for the N1/NG signal,
– Ch2 terminal for the N2/NPT signal.

(b) Connect the accelerometer cable / B&K 2647-D-003 charge amplifier assembly to the B&K 3641-A/B box as follows:

– Ch3 terminal for the accelerometer signal.

(c) Energize the laptop and wait for the complete initialization.

(d) Start the PULSE program (Engine Vibration Check).

(e) Prepare the acquisition. Refer to the B&K operation manual.

(4) Use of the B&K 3649-A/B test set with the B&K 3560-B acquisition module (Refer to Figure 1302).

CAUTION: CHARGE THE BATTERIES OF THE ACQUISITION MODULE FOR MIN. 5 HOURS TO PREVENT BATTERY CHARGE PROBLEMS DURING THE ENGINE TEST.

(a) Energize and do the check of the charge status of the B&K 3560-B acquisition module batteries.

(b) Connect the B&K 3560-B acquisition module to the laptop with the LAN cable.

(c) Connect the N1/NG and N2/NPT signal outputs of the B&K AO-1479-A-009 tachometer cable related to the tested engine to the INPUT inputs of the B&K WB-3487 Dual Channel Tacho-coupler.

(d) Connect the OUTPUT outputs of the B&K WB-3487 Dual Channel Tacho-coupler to the B&K 3560-B acquisition module with the BNC / BNC cables as follows:

– Ch1 terminal for the N1/NG signal,
– Ch2 terminal for the N2/NPT signal.

(e) Connect the accelerometer cable / B&K 2647-D-003 charge amplifier assembly to the B&K 3560-B acquisition module as follows:

– Ch3 terminal for the accelerometer signal.

(f) Energize the laptop and wait for the complete initialization.

(g) Start the PULSE program (Engine Vibration Check).

(h) Prepare the acquisition. Refer to the B&K operation manual.

(5) Use of the B&K 3649-A/B test set with the B&K LAN-XI acquisition module (Refer to Figure 1303).

CAUTION: CHARGE THE BATTERIES OF THE ACQUISITION MODULE FOR MIN. 5 HOURS TO PREVENT BATTERY CHARGE PROBLEMS DURING THE ENGINE TEST.

(a) Make sure that the charge status of the B&K 2831 battery is correct.

(b) Assemble the B&K 2831 battery module and the B&K 3050-A-060 acquisition module with the four captive screws.

(c) Connect the B&K WB-1497 link module to the rear of the B&K 2831 battery and of the B&K 3050-A-060 acquisition module.

(d) Connect the B&K 3050-A-060 acquisition module to the laptop with the LAN cable.

(e) Connect the N1/NG and N2/NPT signal outputs of the B&K AO-1479-A-009 tachometer cable related to the tested engine to the INPUT inputs of the B&K WB-3487 Dual Channel Tacho-coupler.

(f) Connect the OUTPUT outputs of the B&K WB-3487 Dual Channel Tacho-coupler to the B&K 3050-A-060 acquisition module with the BNC / BNC cables as follows:

– Ch1 terminal for the N1/NG signal,
– Ch2 terminal for the N2/NPT signal.

(g) Connect the accelerometer cable / B&K 2647-D-003 charge amplifier assembly to the B&K 3050-A-060 acquisition module as follows:

– Ch3 terminal for the accelerometer signal.

(h) Energize the B&K 2831 battery.

(i) Energize the laptop and wait for the complete initialization.

(j) Start the PULSE program (Engine Vibration Check).

(k) Prepare the acquisition. Refer to the B&K operation manual.

(6) Vibration measurement

(a) Start the engine and increase up to ground idle. Stay at a stabilized rating until you get an oil temperature higher than 50°C (122°F).

(b) Stop the engine.

CAUTION: DO NOT MEASURE THE VIBRATIONS BETWEEN 3 AND 20 MINUTES AFTER THE ENGINE SHUTDOWN. THIS IS TO PREVENT A THERMAL UNBALANCE THAT CAN MAKE THE VIBRATION MEASUREMENT INCORRECT.

(c) Start the engine and start the acquisition.

(d) Increase up to flight idle. Record the values that follow:

- the global vibration level versus the gas generator speed (N1/NG),
- the order 1 vibration level of the gas generator (N1/NG O1) versus the gas generator speed (N1/NG),
- the order 1 vibration level of the power turbine (N2/NPT O1) versus the power turbine speed (N2/NPT).

NOTE: ***The N1/NG value that you get changes with the outdoor conditions (T0, P0).***

(e) Stop the acquisition.

(f) Stop the engine.

(7) Interpretation of the vibration test

The acceptance criteria are given in Task 71-02-10-940-801 / Vibration test procedure - General.

NOTE: ***These criteria can change after statistical studies of the signatures of the new or repaired engines.***

There are two possible results:

(a) The maximum vibration level is less than the vibration limits:

- keep the engine in service.

(b) The maximum vibration level is more than or equal to the vibration limits:

1 Make sure that the conditioning and measuring set is not damaged and that there is no loose component.

2 Do a confirmation measurement in the same conditions as in paragraph "3. B. (6) Vibration measurement".

NOTE: ***This measurement is used to confirm the out-of-limit vibration level recorded during the first test. You must take this measurement immediately after the first one, on a hot engine.***

(8) Interpretation of the confirmation measurement

The acceptance criteria are given in Task 71-02-10-940-801 / Vibration test procedure - General.

NOTE: ***These criteria can change after statistical studies of the signatures of the new or repaired engines.***

(a) If the out-of-limit vibration level is not confirmed:

- keep the engine in service.

(b) If the out-of-limit vibration level is confirmed for:

1 The global vibration level versus the gas generator speed (N1/NG):

- send the vibration data and the engine / airframe information to the Safran Helicopter Engines support department,

– do the maintenance procedure (Refer to Figure 1304).

2 The order 1 vibration level of the gas generator (N1/NG O1) versus the gas generator speed (N1/NG):

– send the vibration data and the engine / airframe information to the Safran Helicopter Engines support department,
– do the maintenance procedure (Refer to Figure 1304).

3 The order 1 vibration level of the power turbine (N2/NPT O1) versus the power turbine speed (N2/NPT):

– send the vibration data and the engine / airframe information to the Safran Helicopter Engines support department,
– do the maintenance procedure (Refer to Figure 1304).

(9) Final steps (Refer to Figure 1301 , Figure 1302 , Figure 1303)

(a) De-energize the acquisition module used (B&K 3641-A/B or B&K 3560-B or B&K LAN-XI).

(b) Close the PULSE program (Engine Vibration Check) and de-energize the laptop.

(c) For the B&K 3560-B or B&K LAN-XI acquisition modules, do as follows:

1 Disconnect and remove the LAN cable that connects the acquisition module to the laptop.

2 Disconnect and remove the BNC / BNC cables that connect the acquisition module to the OUTPUT outputs of the B&K WB-3487 Dual Channel Tacho-Coupler.

3 Disconnect the BNC plugs of the N1/NG and N2/NPT outputs of the B&K AO-1479-A-009 tachometer cable from the INPUT inputs of the B&K WB-3487 Dual Channel Tacho-coupler.

(d) Disconnect the accelerometer cable / B&K 2647-D-003 charge amplifier assembly from the acquisition module.

(e) For the B&K LAN-XI acquisition module, do as follows:

1 Disconnect and remove the B&K WB-1497 link module from the rear of the B&K 2831 battery and of the B&K 3050-A-060 acquisition module.

2 Loosen the four captive screws and then remove the B&K 2831 battery module and the B&K 3050-A-060 acquisition module.

(f) Remove the "aluminum"-type adhesive tape and the "TY-RAP"-type plastic clamps that hold the B&K AO-1479-A-009 tachometer cable and the accelerometer cable / B&K 2647-D-003 charge amplifier assembly on the aircraft airframe.

(g) Removal of the tachometer cable

1 Disconnect and remove the B&K AO1479-A-009 tachometer cable from the P100 engine harness connector (55 pins) and from the J100 connector of the aircraft support platform.

2 Connect the P100 engine harness connector (55 pins) to the J100 connector of the aircraft support platform.

(h) Removal of the accelerometer

1 Disconnect and remove the accelerometer cable / B&K 2647-D-003 charge amplifier assembly from the B&K 8324 high-temperature accelerometer (OT 40 0140).

2 Remove the three B&K YS-8406 screws and then remove the B&K 8324 high-temperature accelerometer (OT 40 0140) from the accelerometer support.

(i) Put the removed equipment items in their packages.

C. Additional procedures

Not applicable

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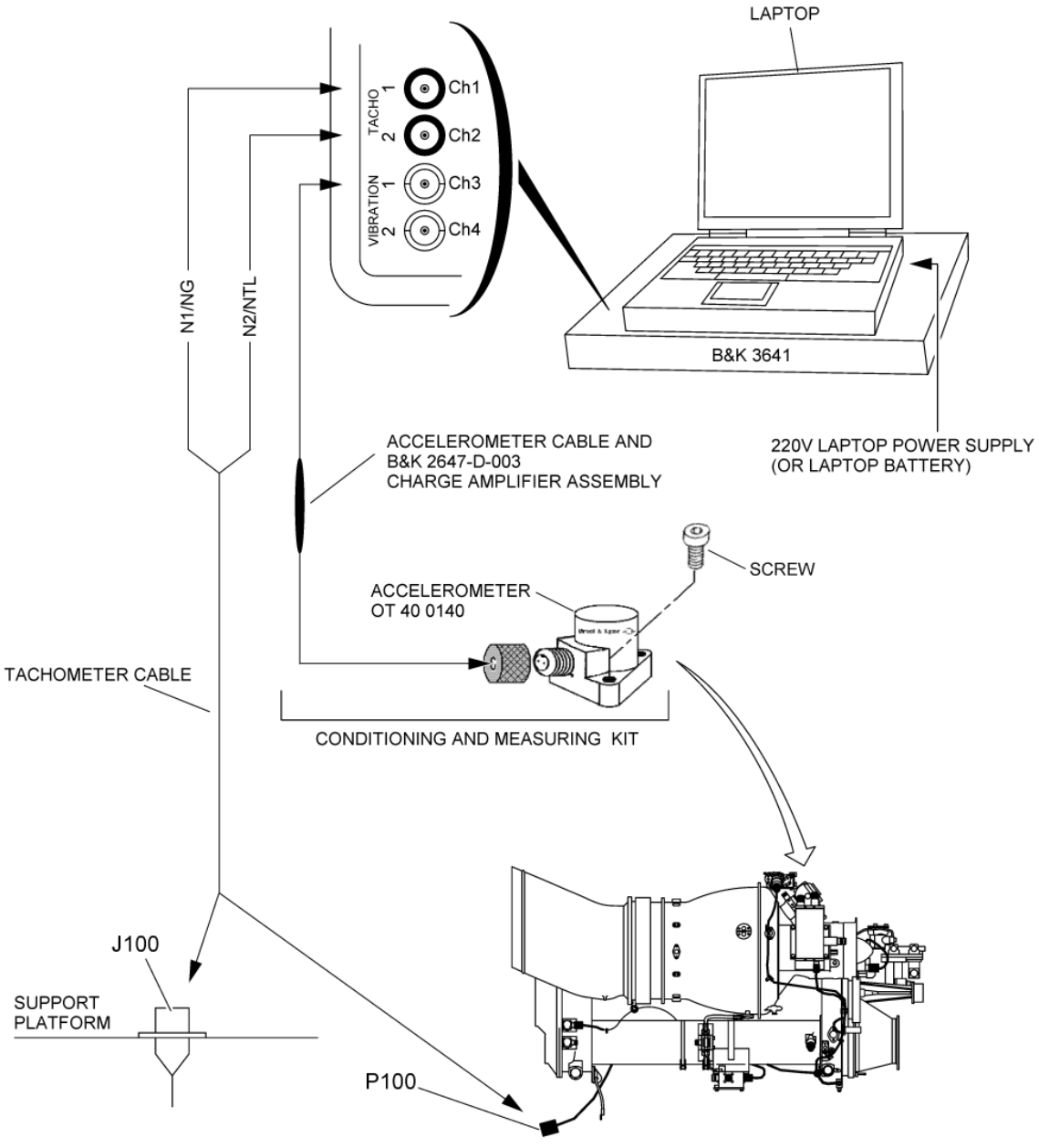

Engine vibration test - Use of the B&K 3641-A/B system
Figure 1301

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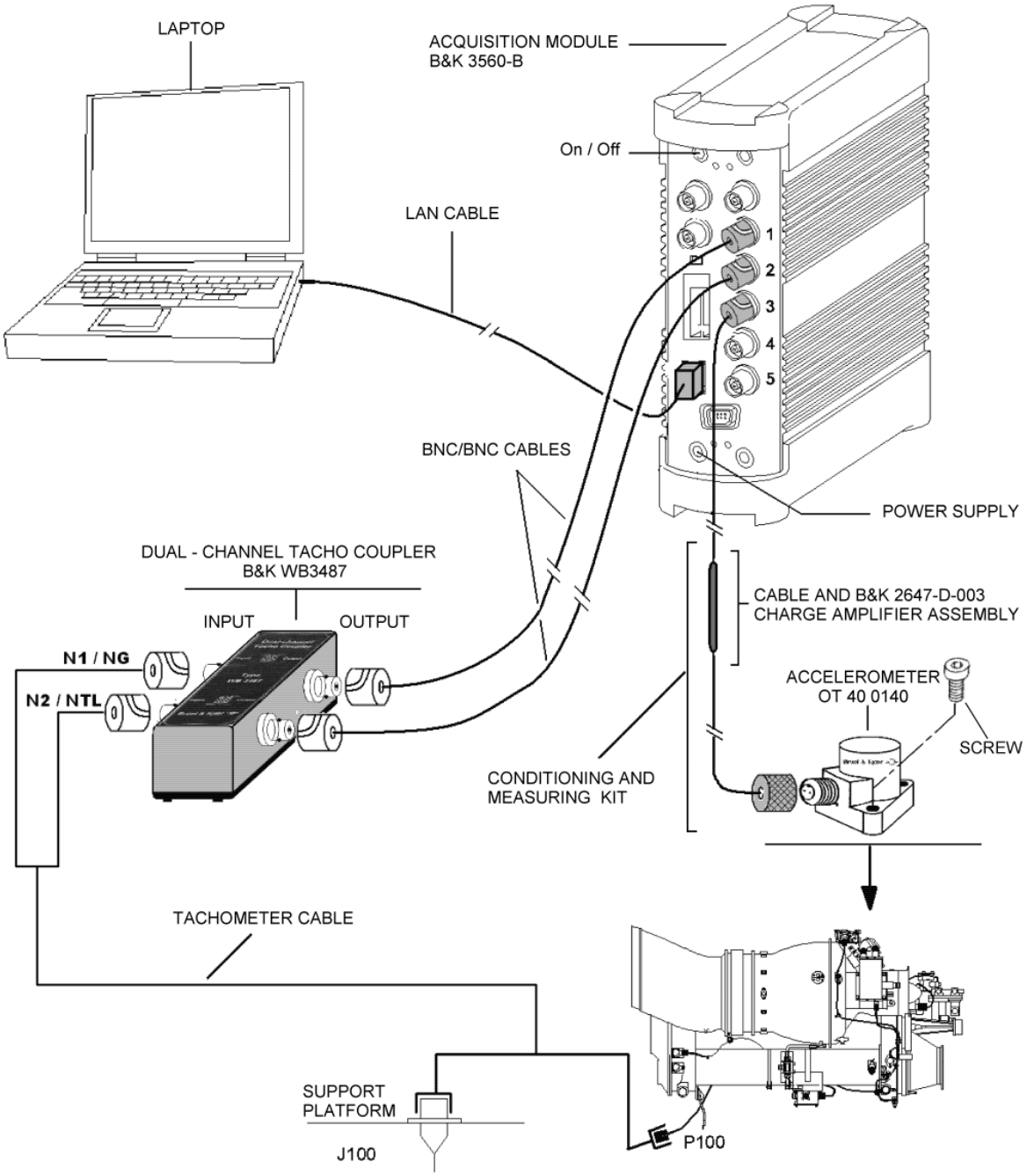

Engine vibration test - Use of the B&K 3649-A/B test set with the B&K 3560-B acquisition module
Figure 1302

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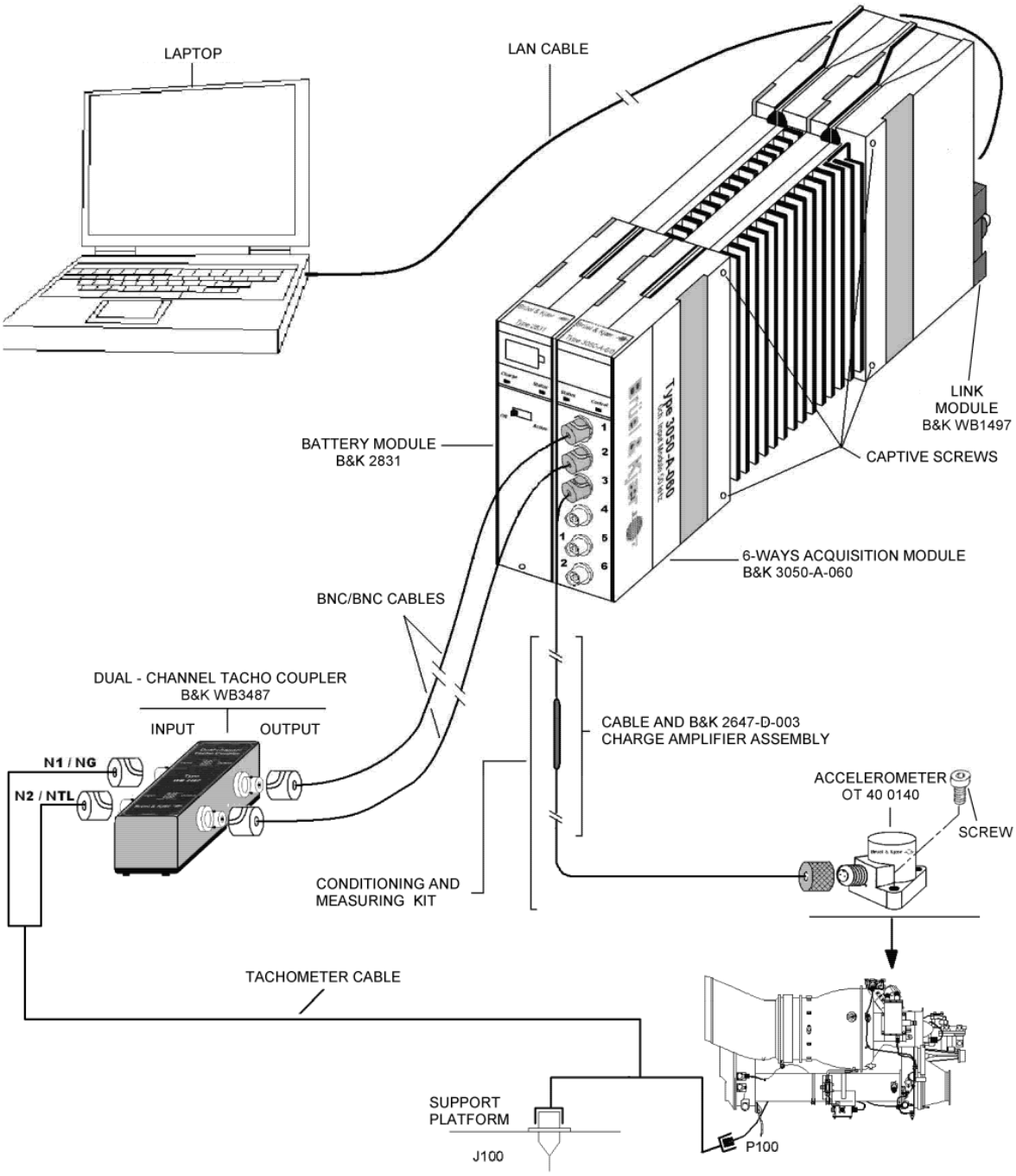

Engine vibration test - Use of the B&K 3649-A/B test set with the B&K LAN-XI acquisition module
Figure 1303

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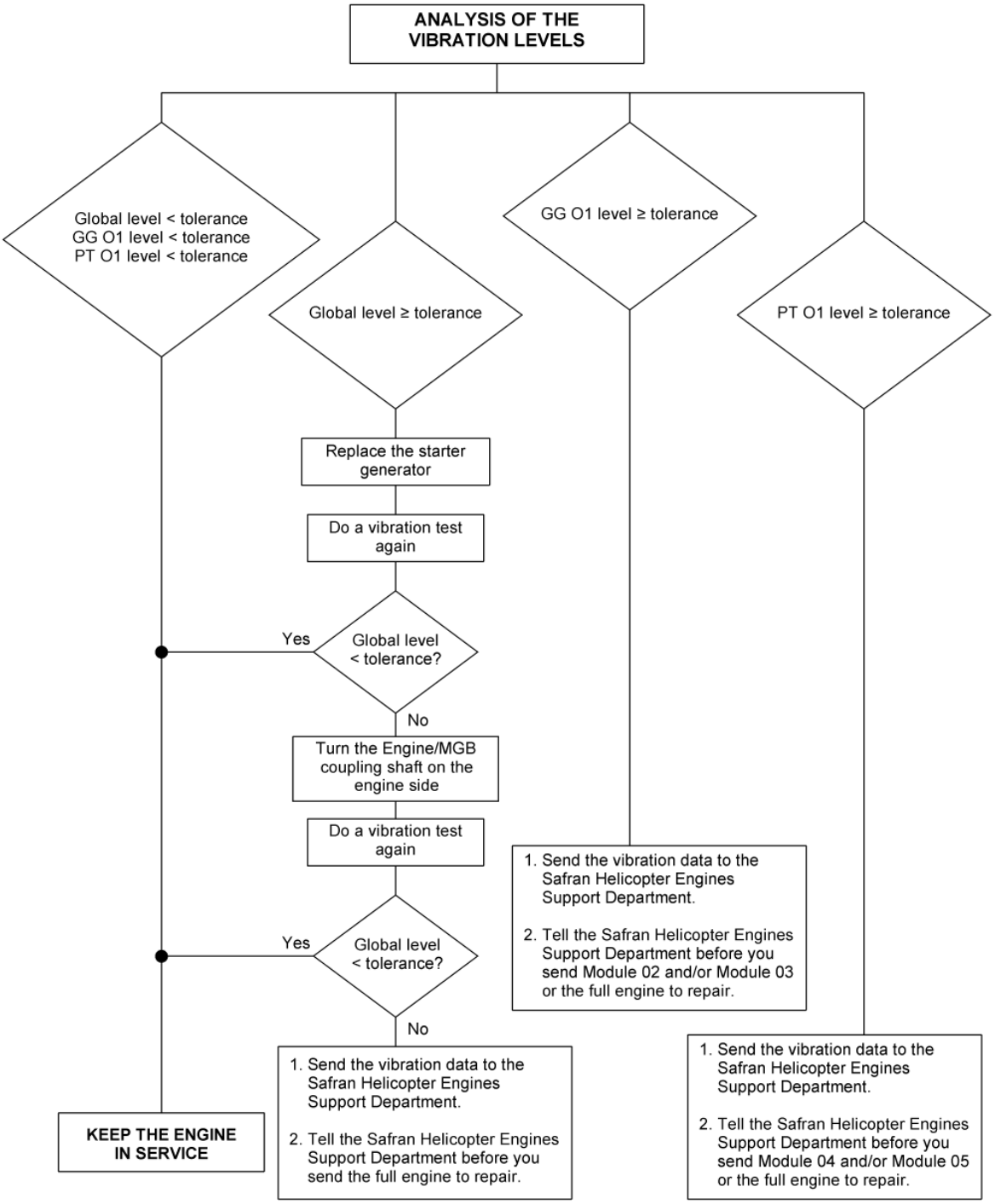


Engine vibration test - Maintenance tasks
Figure 1304

4. FINAL STEPS

Not applicable

TASK 71-02-10-760-801-A05

VIBRATION TEST PROCEDURE WITH THE PULSE B&K 3648-A/B TESTS (ENGINE)

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Description	*Quantity*
mechanic's standard tool kit	1
B&K 3648-A/B vibration test set	1
B&K UA-1678-A-009 engine special set	1
laptop	1

NOTE: ***The B&K 3648-B set is the same as the B&K 3648-A set without accelerometer.***

NOTE: ***The B&K 3648-A vibration test set is supplied with:***

- ***B&K 3560-L acquisition module,***
- ***B&K WB-3487 galvanic insulator (Dual Channel Tacho-coupler),***
- ***accelerometer cable and B&K 2647-D-003 charge amplifier,***
- ***B&K YS-8406 HSHC screws M4x12 (x3),***
- ***BNC / BNC cable (60 cm long) (x2).***

NOTE: ***The B&K UA-1678-A-009 engine special set is supplied with:***

- ***B&K AO-1479-A-009 tachometer cable,***
- ***software and technical data,***
- ***bag for cables.***

Special tools

Description	*Tools Catalog Item*	*Quantity*
B&K 8324 high-temperature accelerometer (9610017700)	OT 40 0140	1

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Description	*Quantity*
"aluminum"-type adhesive tape	As necessary
"TY-RAP"-type plastic clamps	As necessary

B. Additional provisions

Not applicable

2. REFERENCE TASKS/DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 70-01-00-940-801 / Standard practices - General
– Task 71-02-10-940-801 / Vibration test procedure - General
– B&K operation manual.

3. PROCEDURE

A. Preliminary procedures

Not applicable

B. Procedure

(1) Installation of the accelerometer and of the accelerometer cable / charge amplifier assembly. (Refer to Figure 1301).

(a) Install the B&K 8324 high-temperature accelerometer (OT 40 0140) on the accelerometer support with the three B&K YS-8406 screws. Make sure that you correctly point the accelerometer. Refer to Task 71-02-10-940-801.

CAUTION: OBEY THE TIGHTENING TORQUE OF THE SCREWS TO PREVENT DAMAGE TO THE ACCELEROMETER (POSSIBLY TIGHTEN WITH YOUR HAND).

(b) Torque the three B&K YS-8406 screws to a value from 0.7 to 1.1 N.m.

(c) Connect the B&K 8324 high-temperature accelerometer (OT 40 0140) to the accelerometer cable / B&K 2647-D-003 charge amplifier assembly.

(d) Tighten the connector of the accelerometer cable / B&K 2647-D-003 charge amplifier assembly moderately to the B&K 8324 high-temperature accelerometer (OT 40 0140) with combination pliers.

CAUTION: MAKE SURE THAT THERE IS NO INTERFERENCE BETWEEN THE CABLE AND THE HELICOPTER CONTROLS.

(e) Do the routing of the accelerometer cable / B&K 2647-D-003 charge amplifier assembly up to the cabin (but not on the hot parts of the engine). Attach the cable in different locations with "aluminum"-type adhesive tape and "TY-RAP"-type plastic clamps.

(2) Installation of the tachometer cable (Refer to Figure 1301)

(a) Disconnect the P100 engine harness connector (55 pins) from the J100 connector of the aircraft support platform.

(b) Connect the B&K AO-1479-A-009 tachometer cable to the P100 engine harness connector (55 pins) and to the J100 connector of the aircraft support platform.

CAUTION: MAKE SURE THAT THERE IS NO INTERFERENCE BETWEEN THE CABLE AND THE HELICOPTER CONTROLS.

(c) Do the routing of the B&K AO-1479-A-009 tachometer cable up to the cabin (but not on the hot parts of the engine). Attach the cable in different locations with "aluminum"-type adhesive tape and "TY-RAP"-type plastic clamps.

(3) Preparation of the B&K 3648-A/B vibration test set with the B&K 3560-L acquisition module. (Refer to Figure 1301).

(a) Install the PCMCIA card on the dedicated port of the laptop.

(b) Energize the B&K 3560-L acquisition module.

(c) Connect the N1/NG and N2/NPT signal outputs of the B&K AO-1479-A-009 tachometer cable related to the tested engine to the INPUT inputs of the B&K WB-3487 Dual Channel Tacho-coupler.

(d) Connect the OUTPUT outputs of the B&K WB-3487 Dual Channel Tacho-coupler to the B&K 3560-L acquisition module with the BNC / BNC cables as follows:

– Tacho1 terminal for the N1/NG signal,
– Tacho2 terminal for the N2/NPT signal.

(e) Connect the accelerometer cable / B&K 2647-D-003 charge amplifier assembly to the B&K 3560-L acquisition module as follows:

– Ch1 terminal for the accelerometer signal.

(f) Energize the laptop and wait for the complete initialization.

(g) Start the PULSE program (Engine Vibration Check).

(h) Push the INPUT MODE button of the B&K 3560-L acquisition module.

(i) Prepare the acquisition. Refer to the B&K operation manual.

(4) Vibration measurement

(a) Start the engine and increase up to ground idle. Stay at a stabilized rating until you get an oil temperature higher than 50°C (122°F).

(b) Stop the engine.

CAUTION: DO NOT MEASURE THE VIBRATIONS BETWEEN 3 AND 20 MINUTES AFTER THE ENGINE SHUTDOWN. THIS IS TO PREVENT A THERMAL UNBALANCE THAT CAN MAKE THE VIBRATION MEASUREMENT INCORRECT.

(c) Start the engine and start the acquisition.

(d) Increase up to flight idle. Record the values that follow:

– the global vibration level versus the gas generator speed (N1/NG),

– the order 1 vibration level of the gas generator (N1/NG O1) versus the gas generator speed (N1/NG),
– the order 1 vibration level of the power turbine (N2/NPT O1) versus the power turbine speed (N2/NPT),

NOTE: ***The N1/NG value that you get changes with the outdoor conditions (T0, P0).***

(e) Stop the acquisition.

(f) Stop the engine.

(5) Interpretation of the vibration test

The acceptance criteria are given in Task 71-02-10-940-801 / Vibration test procedure - General.

NOTE: ***These criteria can change after statistical studies of the signatures of the new or repaired engines.***

There are two possible results:

(a) The maximum vibration level is less than the limits:

– keep the engine in service.

(b) The maximum vibration level is more than or equal to the limits:

1 Make sure that the conditioning and measuring set is not damaged and that there is no loose component.

2 Do a confirmation measurement in the same conditions as in paragraph "3. B. (4) Vibration measurement".

NOTE: ***This measurement is used to confirm the out-of-limit vibration level recorded during the first test. You must take this measurement immediately after the first one, on a hot engine.***

(6) Interpretation of the confirmation measurement

The acceptance criteria are given in Task 71-02-10-940-801 / Vibration test procedure - General.

NOTE: ***These criteria can change after statistical studies of the signatures of the new or repaired engines.***

(a) If the out-of-limit vibration level is not confirmed:

– keep the engine in service.

(b) If the out-of-limit vibration level is confirmed for:

1 The global vibration level versus the gas generator speed (N1/NG):

– send the vibration data and the engine / airframe information to the Safran Helicopter Engines support department,
– do the maintenance procedure (Refer to Figure 1302).

2 The order 1 vibration level of the gas generator (N1/NG O1) versus the gas generator speed (N1/NG):

– send the vibration data and the engine / airframe information to the Safran Helicopter Engines support department,
– do the maintenance procedure (Refer to Figure 1302).

3 The order 1 vibration level of the power turbine (N2/NPT O1) versus the power turbine speed (N2/NPT):

– send the vibration data and the engine / airframe information to the Safran Helicopter Engines support department,
– do the maintenance procedure (Refer to Figure 1302).

(7) Final steps (Refer to Figure 1301)

(a) De-energize the B&K 3560-L acquisition module.

(b) Close the PULSE program (Engine Vibration Check) and de-energize the laptop.

(c) Disconnect the B&K 3560-L acquisition module and the B&K WB 3487 Dual Channel Tacho-Coupler as follows:

1 disconnect the PCMCIA card of the B&K 3560-L acquisition module from the laptop,

2 disconnect and remove the BNC / BNC cables that connect the acquisition module to the OUTPUT outputs of the B&K WB-3487 Dual Channel Tacho-Coupler,

3 disconnect the BNC plugs of the N1/NG and N2/NPT/NR outputs of the tachometer cable from the INPUT inputs of the B&K WB-3487 Dual Channel Tacho-coupler,

4 disconnect the accelerometer cable / B&K 2647-D-003 charge amplifier assembly from the acquisition module,

5 remove the "aluminum"-type adhesive tape and the "TY-RAP"-type plastic clamps that hold the B&K AO-1479-A-009 tachometer cable and the accelerometer cable / B&K 2647-D-003 charge amplifier assembly on the aircraft airframe.

(d) Removal of the tachometer cable

1 Disconnect and remove the B&K AO-1479-A-009 tachometer cable from the P100 engine harness connector (55 pins) and from the J100 connector of the aircraft support platform.

2 Connect the P100 engine harness connector (55 pins) to the J100 connector of the aircraft support platform.

(e) Removal of the accelerometer

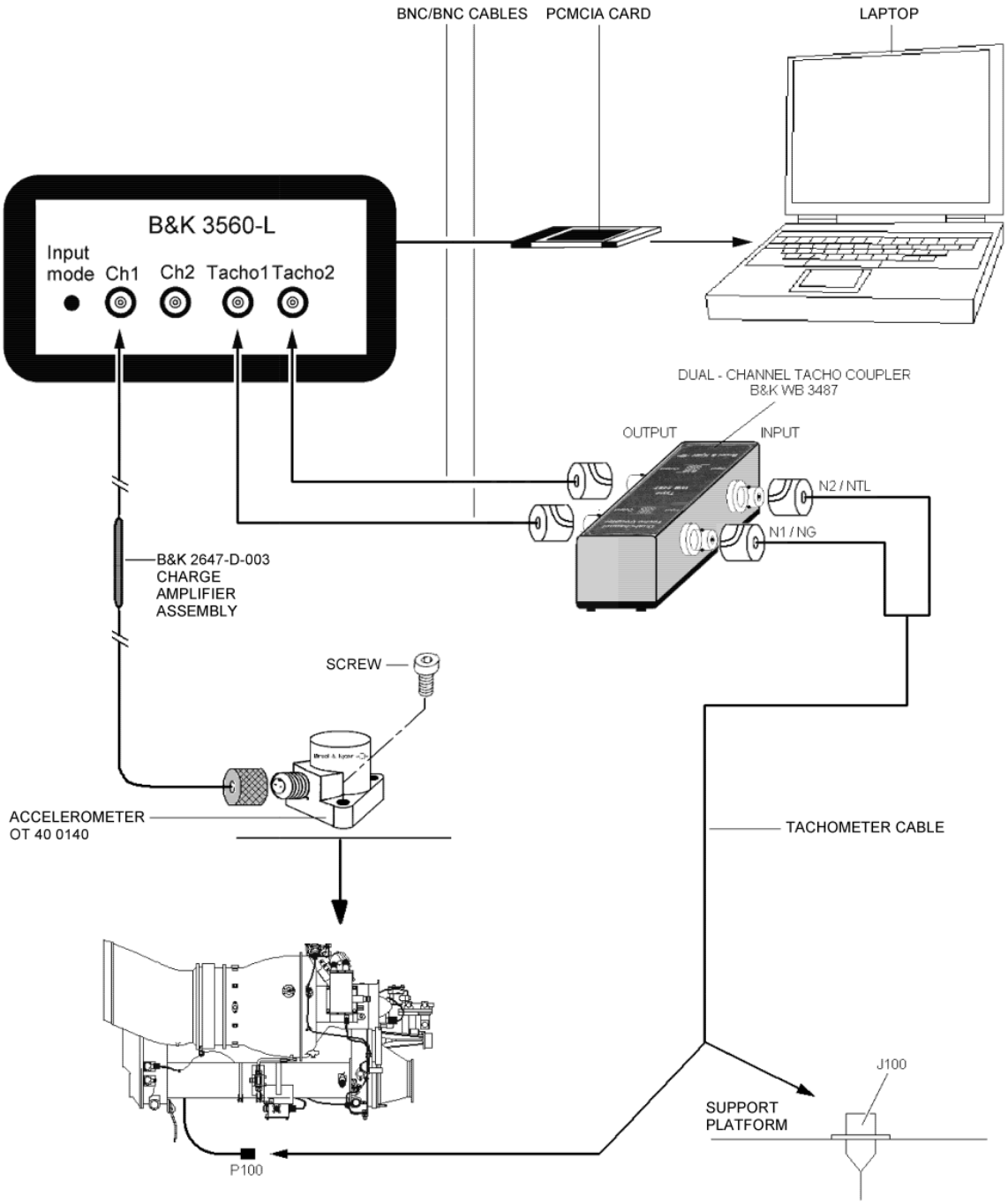
1 Disconnect and remove the accelerometer cable / B&K 2647-D-003 charge amplifier assembly from the B&K 8324 high-temperature accelerometer (OT 40 0140).

2 Remove the three B&K YS-8406 screws and then remove the B&K 8324 high-temperature accelerometer (OT 40 0140) from the accelerometer support.

(f) Put the removed equipment items in their packages.

C. Additional procedures

Not applicable



Engine vibration test - Use of the B&K 3648-A/B test set with the B&K 3560L system acquisition module
Figure 1301

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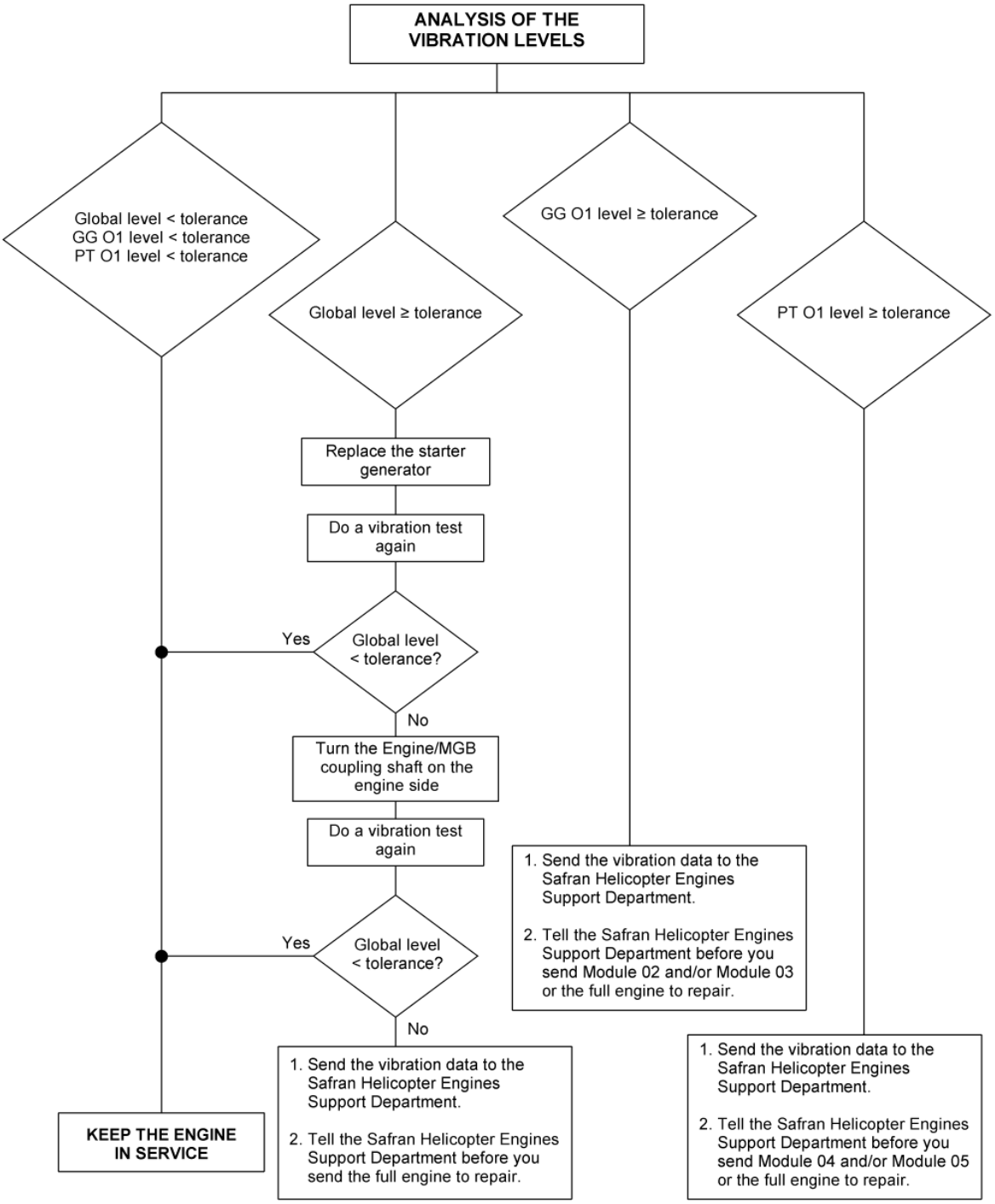

Engine vibration test - Maintenance tasks
Figure 1302

4. FINAL STEPS

Not applicable

TASK 71-02-10-760-801-A06

VIBRATION TEST WITH ACES VIPER 4040 VIBRATION ANALYSER TESTS (ENGINE)

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Description	*Quantity*
mechanic's standard tool kit	1
ACES VIPER 4040 vibration analyser	1
ENDEVCO 6222S-20A accelerometer	1
991V accelerometer cable	1
high-temperature accelerometer cable	1
ACES 538 charge converter	1
HSHC screws M4X10	3
ACES 10-320-0326 tachometer cable	1

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Description	*Quantity*
"aluminum"-type adhesive tape	As necessary
"TY-RAP"-type plastic clamps	As necessary

B. Additional provisions

Not applicable

2. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 70-01-00-940-801 / Standard practices - General
– Task 71-02-10-940-801 / Vibration test procedure - General
– ACES SYSTEMS Application Note ref. "E–TM–ARRIEL–4040–TV"

3. PROCEDURE

A. Preliminary operations

Not applicable

B. Procedure

(1) Installation of the accelerometer (Refer to Figure 1301)

(a) Install the ENDEVCO 6222S-20A accelerometer on the accelerometer support of the tested engine with the three HSHC screws M4X10. Make sure that you correctly point the accelerometer. Refer to Task 71-02-10-940-801.

CAUTION: MAKE SURE THAT THE TIGHTENING TORQUE OF THE SCREWS IS CORRECT TO PREVENT DAMAGE TO THE ACCELEROMETER (TIGHTEN WITH YOUR HAND IF NECESSARY).

(b) Torque the three HSHC screws M4X10 to a value from 0.7 to 1.1 N.m.

(c) Connect the high-temperature accelerometer cable to the ENDEVCO 6222S-20A accelerometer.

(d) Tighten the connector of the high-temperature accelerometer cable moderately to the ENDEVCO 6222S-20A accelerometer with combination pliers.

CAUTION: MAKE SURE THAT THERE IS NO INTERFERENCE BETWEEN THE CABLE AND THE HELICOPTER CONTROLS.

(e) Do the routing of the high-temperature accelerometer cable up to the cabin (but not on the hot parts of the engine). Attach the cable in different locations with "aluminum"-type adhesive tape and "TY-RAP"-type plastic clamps.

(2) Installation of the tachometer cable (Refer to Figure 1301)

(a) Disconnect the P100 engine harness connector (55 pins) from the J100 connector of the aircraft support platform.

(b) Connect the ACES 10-320-0326 tachometer cable to the P100 engine harness connector (55 pins) and to the J100 connector of the aircraft support platform.

CAUTION: MAKE SURE THAT THERE IS NO INTERFERENCE BETWEEN THE CABLE AND THE HELICOPTER CONTROLS.

(c) Do the routing of the ACES 10-320-0326 tachometer cable up to the cabin (but not on the hot parts of the engine). Attach the cable in different locations with "aluminum"-type adhesive tape and "TY-RAP"-type plastic clamps.

(3) Installation of the ACES VIPER 4040 vibration analyser (Refer to Figure 1301)

(a) Connect the high-temperature accelerometer cable to the ACES 538 charge converter.

(b) Connect the 991V accelerometer cable between the ACES 538 charge converter and the CHANNEL A connector of the VIPER 4040 unit.

(c) Connect the ACES 10-320-0326 tachometer cable to the VIPER 4040 unit as follows:

- TACH 1 connector for the N1/NG signal,
- TACH 4 connector for the N2/NPT signal.

(4) Vibration measurement

(a) Set the ACES VIPER 4040 unit to on as follows:

- Push the ON/OFF button of the ACES VIPER 4040 unit.

NOTE: ***Make sure that the battery of the ACES VIPER 4040 unit is sufficiently charged to make the measurements. If the battery of the ACES VIPER 4040 unit is not sufficiently charged, connect the ACES VIPER 4040 unit to a 220 V power supply.***

- Open the main menu. Refer to the ACES SYSTEMS Application Note ref.: "E-TM-ARRIEL-4040-TV".

(b) Start the engine and increase up to ground idle. Stay at a stabilized rating until you get an oil temperature higher than 50°C (122°F).

(c) Stop the engine.

CAUTION: **DO NOT MEASURE THE VIBRATIONS BETWEEN 3 AND 20 MINUTES AFTER THE ENGINE SHUTDOWN. THIS IS TO PREVENT A THERMAL UNBALANCE THAT CAN MAKE THE VIBRATION MEASUREMENT INCORRECT.**

(d) Start the engine and start the acquisition.

(e) Increase up to flight idle. Record the values that follow:

- the global vibration level versus the gas generator speed (N1/NG),
- the order 1 vibration level of the gas generator (N1/NG O1) versus the gas generator speed (N1/NG),
- the order 1 vibration level of the power turbine (N2/NPT O1) versus the power turbine speed (N2/NPT).

NOTE: ***The N1/NG value that you get changes with the outdoor conditions (T0, P0).***

(f) Stop and save the acquisition.

(g) Stop the engine.

(5) Interpretation of the vibration test

The acceptance criteria are given in Task 71-02-10-940-801 / Vibration test procedure - General.

NOTE: ***These criteria can change after statistical studies of the signatures of the new or repaired engines.***

There are two possible results:

(a) The maximum vibration level is less than the limits:

– keep the engine in service.

(b) The maximum vibration level is more than or equal to the limits:

1. Make sure that the conditioning and measuring set is not damaged and that there is no loose component.

2. Do a confirmation measurement in the same conditions as in paragraph "3. B. (4) Vibration measurement".

NOTE: ***This measurement is used to confirm the out-of-limit value recorded during the first test. You must take this measurement immediately after the first one, on a hot engine.***

(6) Interpretation of the confirmation measurement

The acceptance criteria are given in Task 71-02-10-940-801 / Vibration test procedure - General.

NOTE: ***These criteria can change after statistical studies of the signatures of the new or repaired engines.***

(a) If the out-of-limit vibration level is not confirmed:

• Keep the engine in service.

(b) If the out-of-limit vibration level is confirmed for:

• The global vibration level versus the gas generator speed (N1/NG):
  – send the vibration data and the engine / airframe information to the Safran Helicopter Engines support department.
  – do the maintenance procedure (Refer to Figure 1302).
• The order 1 vibration level of the gas generator (N1/NG O1) versus the gas generator speed (N1/NG):
  – send the vibration data and the engine / airframe information to the Safran Helicopter Engines support department.
  – do the maintenance procedure (Refer to Figure 1302).
• The order 1 vibration level of the power turbine (N2/NPT O1) versus the power turbine speed (N2/NPT):
  – send the vibration data and the engine / airframe information to the Safran Helicopter Engines support department.
  – do the maintenance procedure (Refer to Figure 1302).

(7) Final steps (Refer to Figure 1301)

(a) Removal of the ACES VIPER 4040 vibration analyser

1. Push the ON/OFF button to de-energize the VIPER 4040 unit.

2. Disconnect the N1/NG and N2/NPT connectors of the ACES 10-320-0326 tachometer cable from the VIPER 4040 unit.

3. Disconnect the 991V accelerometer cable from the CHANNEL A connector the VIPER 4040 unit.

(b) Remove the "aluminum"-type adhesive tape and the "TY-RAP"-type plastic clamps that hold the ACES 10-320-0326 tachometer cable and the high-temperature accelerometer cable on the aircraft airframe.

(c) Removal of the tachometer cable

1. Disconnect and remove the ACES 10-320-0326 tachometer cable from the P100 engine harness connector (55 pins) and from the J100 connector of the aircraft support platform.

2. Connect the P100 engine harness connector (55 pins) to the J100 connector of the aircraft support platform.

(d) Removal of the accelerometer

1. Disconnect the accelerometer cable from the ACES 538 charge converter.

2. Disconnect and remove the high-temperature accelerometer cable from the ENDEVCO 6222S-20A accelerometer.

3. Remove the three HSHC screws M4X10 and then remove the ENDEVCO 6222S-20A accelerometer from the accelerometer support.

(e) Put the removed equipment items in their packages.

C. Additional procedures

Not applicable

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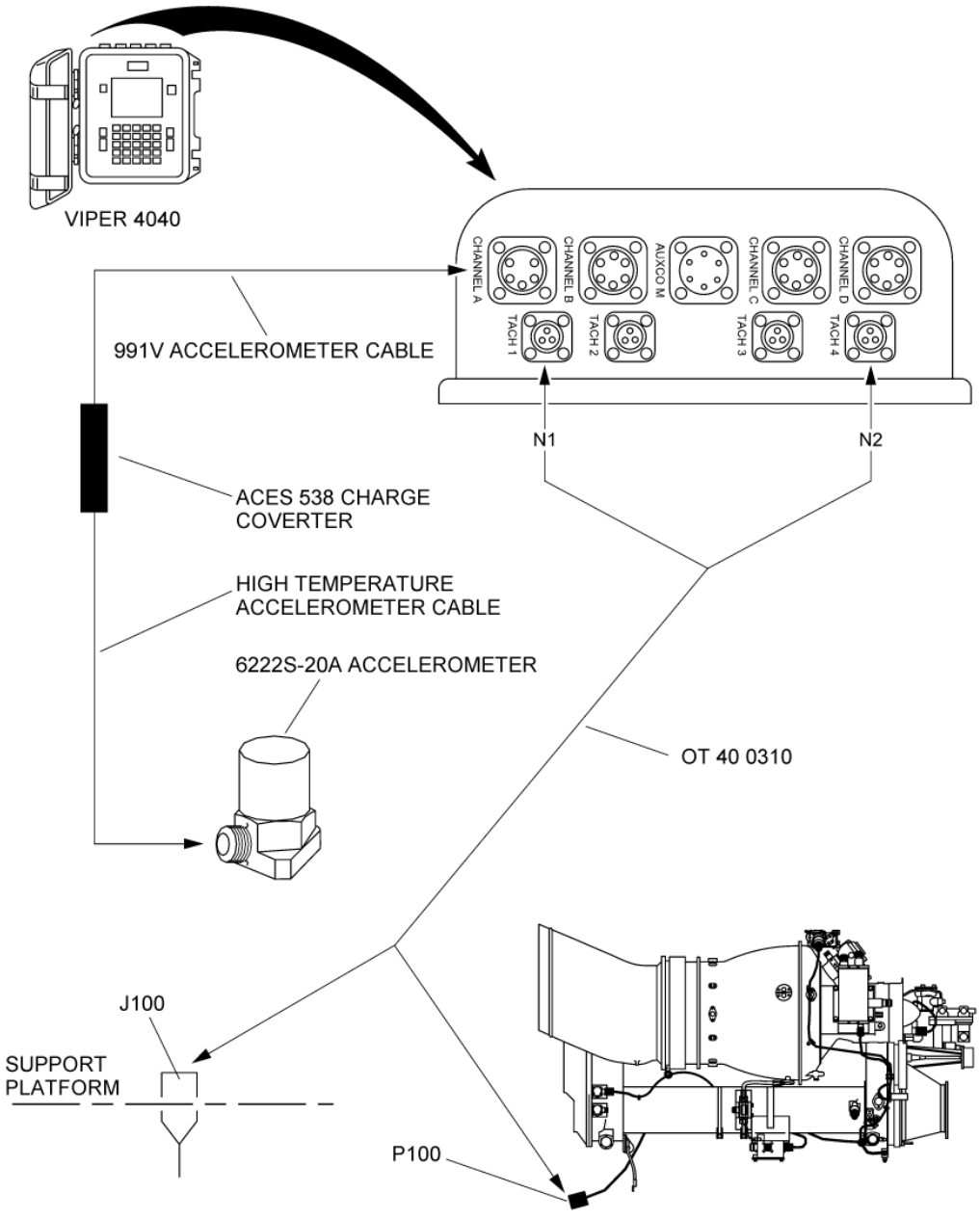

Engine vibration test – ACES VIPER 4040 vibration analyser
Figure 1301

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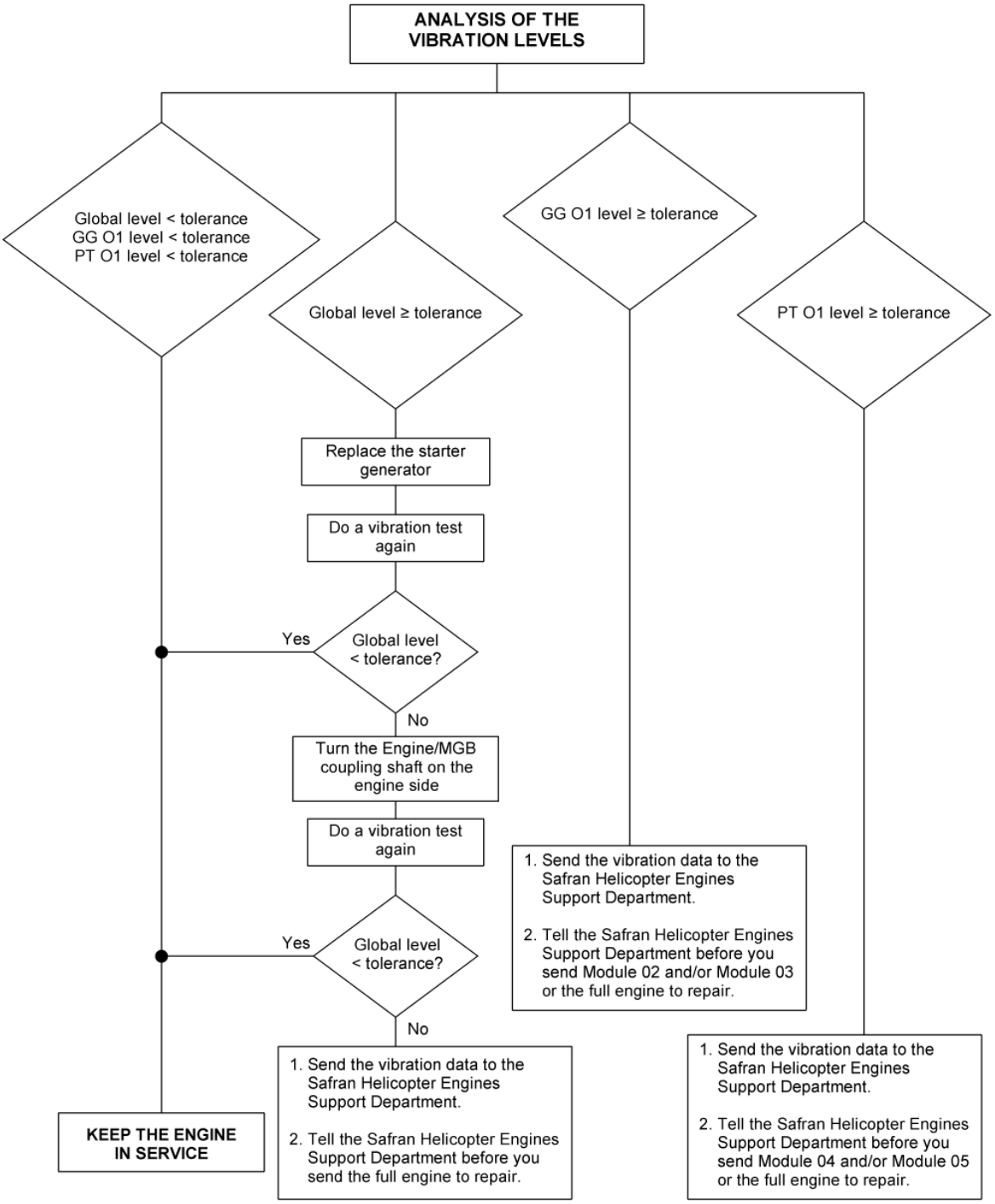


Engine vibration test – Maintenance tasks
Figure 1302

4. FINAL STEPS

Not applicable

TASK 71-02-10-760-801-A08

VIBRATION TEST PROCEDURE WITH THE M'ARMS SYSTEM ON EC 155B/B1 TESTS (ENGINE)

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Description	*Quantity*
M'ARMS system for EC 155B/B1	1

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Not applicable

B. Additional provisions

Not applicable

2. REFERENCE TASKS/DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 70-01-00-940-801 / Standard practices - General
– Task 71-02-10-940-801 / Vibration test procedure - General.
– Aircraft documentation.

3. PROCEDURE

A. Preliminary procedures

Not applicable

B. Procedure

(1) Preparation

(a) Insert a PCMCIA card, with a sufficient storage capacity, in the DTU card drive of the M'ARMS system.

(b) Set the aircraft electrical system to on and wait for one minute to make sure that the self-tests of the M'ARMS system are completed.

(2) Vibration measurement

(a) Warm-up ground run

1 Start the tested engine and increase up to ground idle. Stay at a stabilized rating until you get an oil temperature higher than 50°C (122°F).

2 Stop the engine.

CAUTION: DO NOT MEASURE THE VIBRATIONS BETWEEN 3 AND 20 MINUTES AFTER THE ENGINE SHUTDOWN. THIS IS TO PREVENT A THERMAL UNBALANCE THAT CAN MAKE THE VIBRATION MEASUREMENT INCORRECT.

(b) Acquisition

1 Start the engine.

NOTE: The system systematically does the acquisition of the first started engine.

2 Increase up to flight idle. The system saves the vibration levels that follow:

– the global vibration level versus the gas generator speed (N1/NG),
– the order 1 vibration level of the gas generator (N1/NG O1) versus the gas generator speed (N1/NG),
– the order 1 vibration level of the power turbine (N2/NPT O1) versus the power turbine speed (N2/NPT).

NOTE: The N1/NG value that you get changes with the outdoor conditions (T0, P0).

3 Stay at a stabilized rating for three minutes until the M'ARMS system processes the vibration data.

4 Stop the engine.

5 Make sure that the data transfer is completed when the "TRANSFER DONE" display is on the CDU screen.

6 Remove the PCMCIA card from the DTU drive / recorder.

(c) Data unloading

1 Unload and analyze the session saved at the Ground Station. Refer to the general procedure for M'ARMS data unloading given in the aircraft documentation.

2 Make sure that there are no warning messages in the Ground Station, showing an anomaly in the engine vibration acquisition system. If there are, do the

maintenance task recommended to do the check and the repair of the engine vibration acquisition system (Refer to the aircraft documentation).

CAUTION: MAKE SURE THAT THE VIBRATION LIMITS DISPLAYED IN THE GROUND STATION ARE UP-TO-DATE (REFER TO TASK 71-02-10-940-801 / VIBRATION TEST PROCEDURE – GENERAL). IF THE VIBRATION LIMITS ARE NOT UP-TO-DATE IN THE GROUND STATION, TELL THE AIRBUS HELICOPTER SUPPORT DEPARTMENT.

3 At the Ground Station, make the display show the vibration records made during the engine start. To do so, select the "Engine Vibration Monitoring Power-up" tab from the "HEALTH" function. Correctly select the helicopter and the number of the engine that undergoes the vibration test.

NOTE: The Ground Station screen shows the levels filtered in "Order 1"of the gas generator (N1/NG O1) and power turbine (N2/NPT O1), and the global vibration level during all its rating increase.

NOTE: The engine oil temperature measured at the beginning of the acquisition is shown between the two graphs (it must be higher than 50°C for a valid engine vibration test).

(3) Interpretation of the vibration test

The acceptance criteria are given in Task 71-02-10-940-801 / Vibration test procedure - General.

NOTE: These criteria can change after statistical studies of the signatures of the new or repaired engines.

There are two possible results:

(a) The maximum vibration level is less than the limits:

– keep the engine in service.

(b) The maximum vibration level is more than or equal to the limits:

– do a confirmation measurement in the same conditions as in paragraph "3. B. (2) Vibration measurement".

NOTE: This measurement is used to confirm the out-of-limit value recorded during the first test. You must take this measurement on a hot engine.

(4) Interpretation of the confirmation measurement

The acceptance criteria are given in Task 71-02-10-940-801 / Vibration test procedure - General.

NOTE: These criteria can change after statistical studies of the signatures of the new or repaired engines.

(a) If the out-of-limit vibration level is not confirmed:

– keep the engine in service.

(b) If the out-of-limit vibration level is confirmed for:

1 the global vibration level versus the gas generator speed (N1/NG):

– send the vibration data and the engine / airframe information to the Safran Helicopter Engines support department,
– do the maintenance procedure (Refer to Figure 1301).

2 the order 1 vibration level of the gas generator (N1/NG O1) versus the gas generator speed (N1/NG):

– send the vibration data and the engine / airframe information to the Safran Helicopter Engines support department,
– do the maintenance procedure (Refer to Figure 1301).

3 the order 1 vibration level of the power turbine (N2/NPT O1) versus the power turbine speed (N2/NPT):

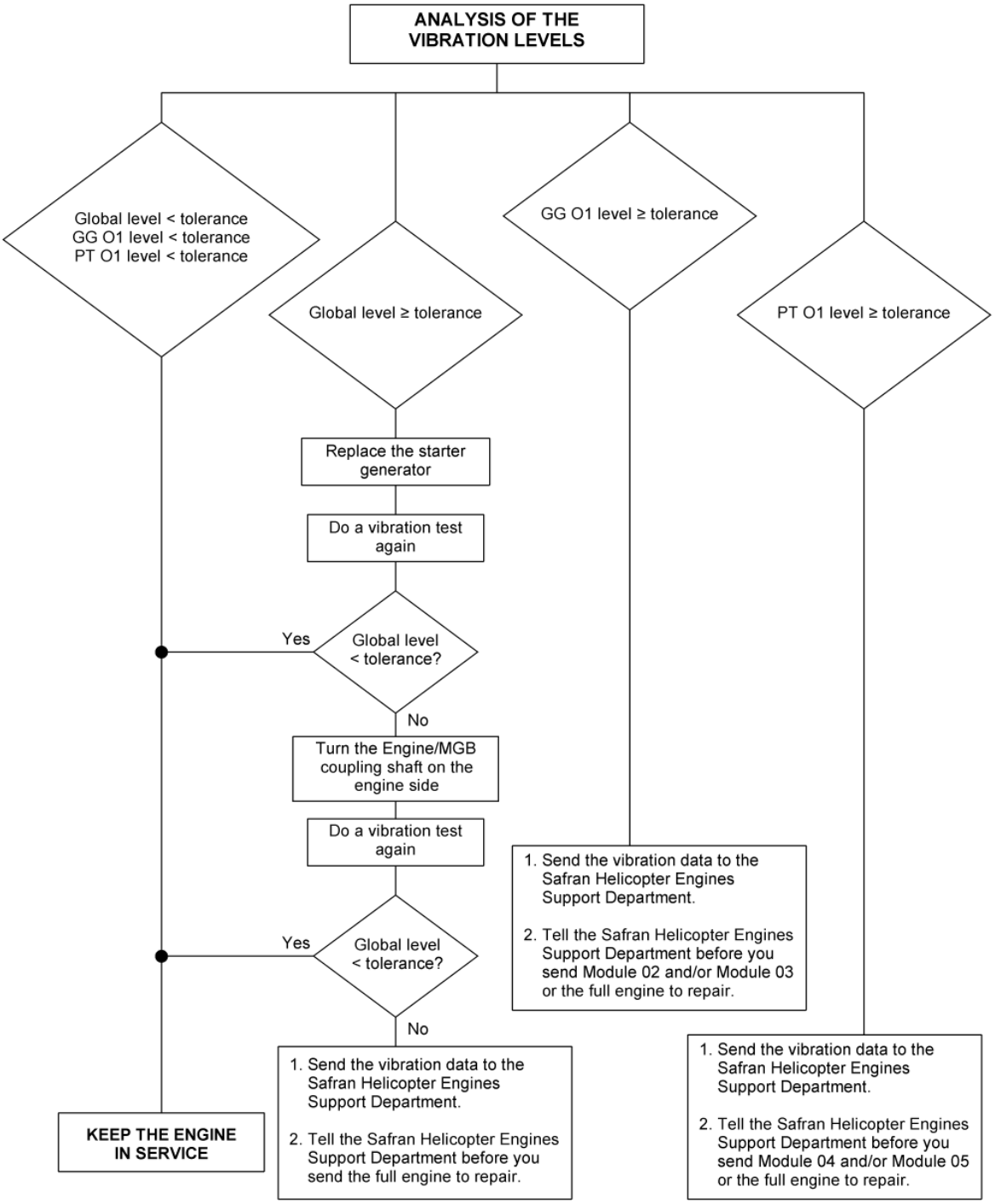
– send the vibration data and the engine / airframe information to the Safran Helicopter Engines support department,
– do the maintenance procedure (Refer to Figure 1301).

(5) Final steps

(a) Put the removed equipment items in their packages.

C. Additional procedures

Not applicable



Engine vibration test – Maintenance tasks
Figure 1301

4. FINAL STEPS

Not applicable

TASK 71-02-10-760-801-A09

VIBRATION TEST PROCEDURE WITH THE SIMPLIFIED SYSTEM (TYPE B&K 3656-A) TESTS (ENGINE)

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Description	*Quantity*
mechanic's standard tool kit	1

Special tools

Description	*Tools Catalog Item*	*Quantity*
vibration check kit (type B&K 3656-A) (TM4865G001)	OT 40 0530	1
B&K 8324 high-temperature accelerometer (9610017700)	OT 40 0140	1

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Description	*Quantity*
"aluminum"-type adhesive tape	As necessary
"TY-RAP"-type plastic clamps	As necessary

B. Additional provisions

Not applicable

2. REFERENCE TASKS/DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 70-01-00-940-801 / Standard practices - General
– Task 71-02-10-940-801 / Vibration test procedure - General.

3. PROCEDURE

A. Preliminary procedures

Not applicable

B. Preparation

Refer to Figure 1301

(1) Preparation

(a) Install the B&K 8324-type high-temperature accelerometer (OT 40 0140) on the accelerometer support with the three B&K YS-8407 HSHC screws M4X10 (OT 40 0530) (B2). Make sure that you correctly point the accelerometer. Refer to Task 71-02-10-940-801.

CAUTION: OBEY THE TIGHTENING TORQUE OF THE SCREWS TO PREVENT DAMAGE TO THE ACCELEROMETER (POSSIBLY TIGHTEN WITH YOUR HAND).

(b) Torque the three B&K YS-8407 HSHC screws M4X10 (OT 40 0530) (B2) to a value from 0.7 to 1.1 N.m.

(c) Connect the B&K 8324-type high-temperature accelerometer (OT 40 0140) to the B&K 2250-H-001 vibration meter (OT 40 0530) (A2) with the accelerometer cable / B&K 2647-D-004 charge amplifier assembly (OT 40 0530) (B1).

(d) Tighten the connector of the accelerometer cable / B&K 2647-D-004 charge amplifier assembly (OT 40 0530) (B1) moderately to the B&K 8324-type high-temperature accelerometer (OT 40 0140) with combination pliers.

CAUTION: MAKE SURE THAT THERE IS NO INTERFERENCE BETWEEN THE CABLE AND THE HELICOPTER CONTROLS.

(e) Do the routing of the accelerometer cable / B&K 2647-D-004 charge amplifier assembly (OT 40 0530) (B1) up to the cabin (but not on the hot parts of the engine). Attach the cable in different locations with "aluminum"-type adhesive tape and "TY-RAP"-type plastic clamps.

(2) Vibration measurement

(a) Set the B&K 2250-H-001 vibration meter (OT 40 0530) (A2) to on as follows:

1. Push the ON/OFF button (1).
2. Identify the related work card in the menu.
3. Enter the metadata.

(b) Start the engine and increase up to ground idle. Stay at a stabilized rating until you get an oil temperature higher than 50°C (122°F).

(c) Stop the engine.

CAUTION: DO NOT MEASURE THE VIBRATIONS BETWEEN 3 AND 20 MINUTES AFTER THE ENGINE SHUTDOWN. THIS IS TO PREVENT A THERMAL

UNBALANCE THAT CAN MAKE THE VIBRATION MEASUREMENT INCORRECT.

(d) Push the push-button (3) of the B&K 2250-H-001 vibration meter (OT 40 0530) (A2) to start the acquisition.

(e) Start the engine and increase up to flight idle.

NOTE: ***The N1/NG value that you get changes with the outdoor conditions (T0, P0).***

(f) Push the push-button (3) of the B&K 2250-H-001 vibration meter (OT 40 0530) (A2) to stop the acquisition.

(g) Push the push-button (4) of the B&K 2250-H-001 vibration meter (OT 40 0530) (A2) to save the acquisition.

(h) Push the RESET button (2) of the B&K 2250-H-001 vibration meter (OT 40 0530) (A2).

NOTE: ***The vibration meter operates for approx. five minutes as you push the RESET button. Then it automatically goes to stand-by mode. To start it again, press the ON/OFF button.***

(i) Stop the engine.

(3) Interpretation of the vibration test

The acceptance criterion is given in Task 71-02-10-940-801 / Vibration test procedure - General.

NOTE: ***This criterion can change after statistical studies of the signatures of the new or repaired engines.***

(a) If the maximum vibration level of the engine (shown on the tool screen) is less than the tolerance:

– keep the engine in service.

(b) If the maximum vibration level of the engine (shown on the tool screen) is more than or equal to the tolerance:

– do a confirmation measurement.

(4) Confirmation measurement

This measurement is used to confirm the out-of-limit level recorded during the first test.

NOTE: ***You must do this second test immediately after the first one, on a hot engine.***

(a) Make sure that:

1 The screws (OT 40 0530) (B2) that attach the B&K 8324-type high-temperature accelerometer (OT 40 0140) are not loose.

2 The connector of the accelerometer cable / B&K 2647-D-004 charge amplifier assembly (OT 40 0530) (B1), on the accelerometer (OT 40 0140) side, is not loose.

(b) Set the B&K 2250-H-001 vibration meter (OT 40 0530) (A2) to on as follows:

1 Push the ON/OFF button (1), if the tool is in stand-by mode.

2 Complete the metadata, if necessary ("comments" tab).

(c) Push the push-button (3) of the B&K 2250-H-001 vibration meter (OT 40 0530) (A2) to start the acquisition.

(d) Start the engine and increase up to flight idle.

NOTE: ***The N1/NG value that you get changes with the outdoor conditions (T0, P0).***

(e) Push the push-button (3) of the B&K 2250-H-001 vibration meter (OT 40 0530) (A2) to stop the acquisition.

(f) Push the push-button (4) of the B&K 2250-H-001 vibration meter (OT 40 0530) (A2) to save the acquisition.

(g) Push the RESET button (2) of the B&K 2250-H-001 vibration meter (OT 40 0530) (A2).

(h) Stop the engine.

(5) Interpretation of the confirmation measurement

The acceptance criterion is given in Task 71-02-10-940-801 / Vibration test procedure - General.

NOTE: ***This criterion can change after statistical studies of the signatures of the new or repaired engines.***

(a) If the maximum vibration level of the engine (shown on the tool screen) is less than the tolerance:

– keep the engine in service.

(b) If the maximum vibration level of the engine (shown on the tool screen) is more than or equal to the tolerance:

– send the vibration data to the Safran Helicopter Engines support department.
– do the maintenance procedure (Refer to Figure 1302).

(6) Final steps

(a) Push the button (1) of the B&K 2250-H-001 vibration meter (OT 40 0530) (A2) to set it to off.

(b) Disconnect and remove the accelerometer cable / B&K 2647-D-004 charge amplifier assembly (OT 40 0530) (B1) from the B&K 2250-H-001 vibration meter (OT 40 0530) (A2).

(c) Remove and discard the "aluminum"-type adhesive tape and the "TY-RAP"-type plastic clamps that hold the accelerometer cable / B&K 2647-D-004 charge amplifier assembly (OT 40 0530) (B1) on the aircraft airframe.

(d) Disconnect and remove the accelerometer cable / B&K 2647-D-004 charge amplifier assembly (OT 40 0530) (B1) from the B&K 8324 high-temperature accelerometer (OT 40 0140).

(e) Remove the three B&K YS-8407 HSHC screws M4X10 (OT 40 0530) (B2) and then remove the B&K 8324 high-temperature accelerometer (OT 40 0140) from the accelerometer support.

(f) Put the removed equipment items in their packages.

C. Additional procedures

Not applicable

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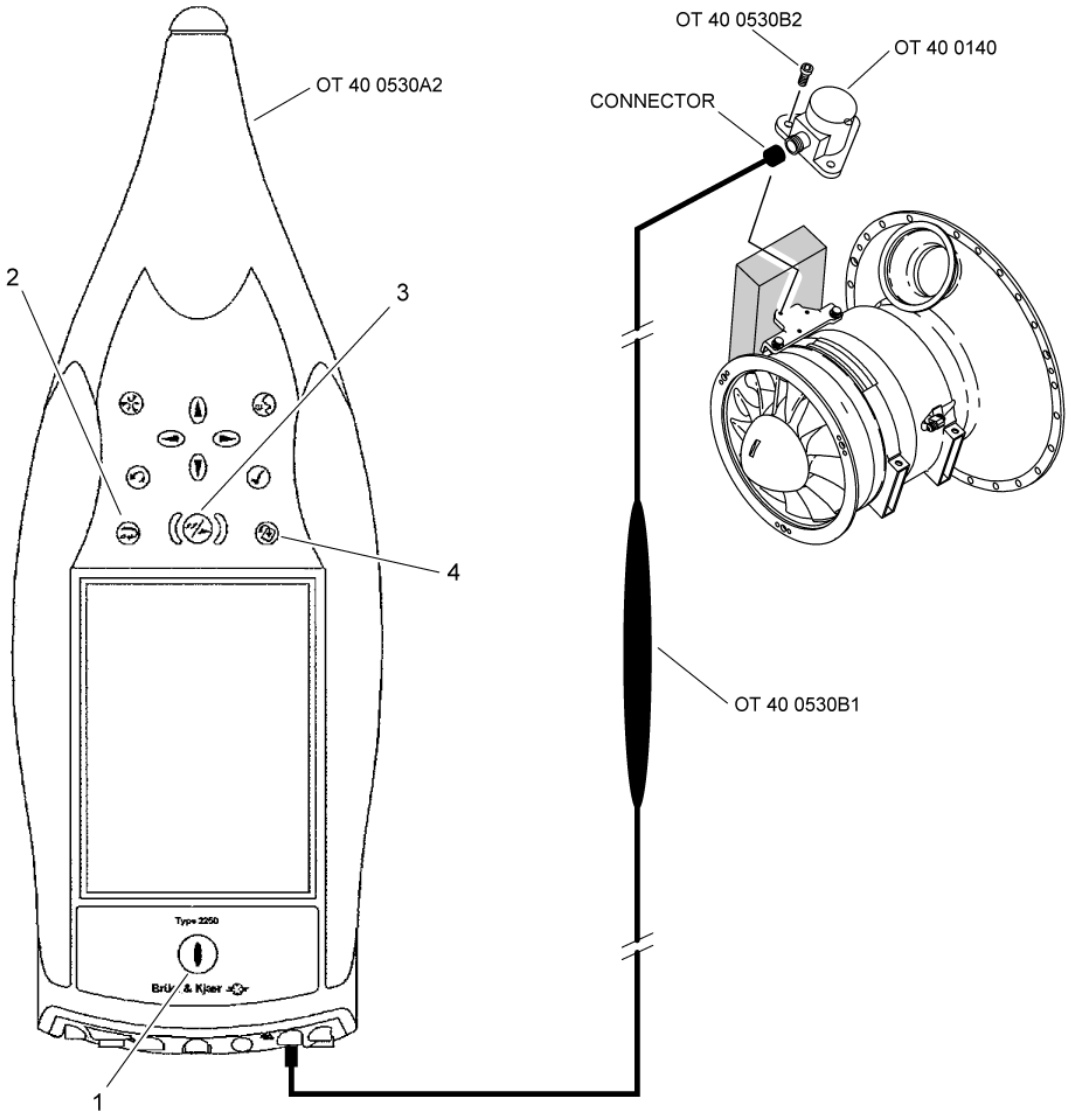

Engine vibration test - B&K 3656-A vibration check kit
Figure 1301

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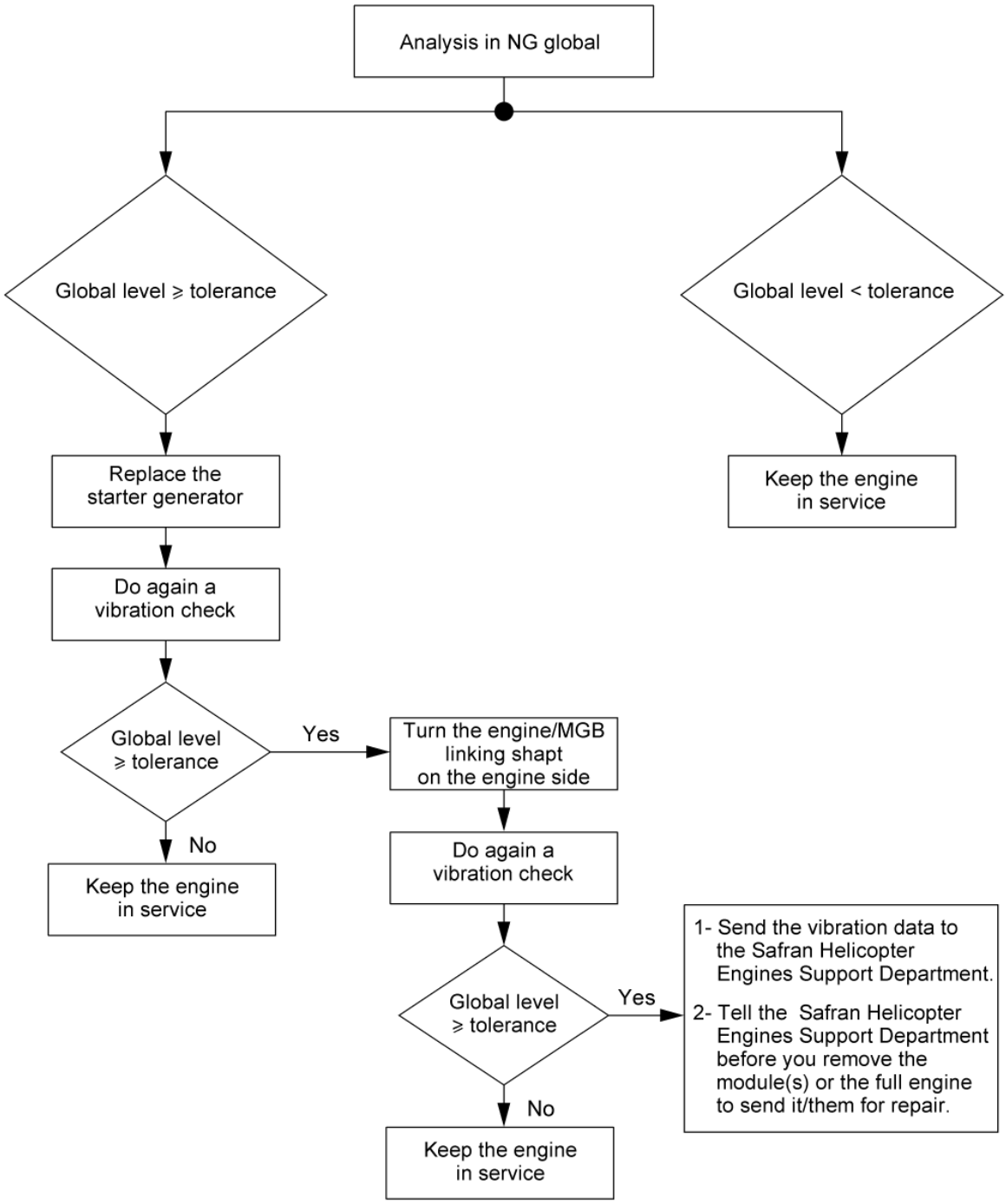

Engine vibration test - Maintenance tasks
Figure 1302

4. FINAL STEPS

Not applicable

TASK 71-02-11-280-801-A01

RETURN IN OPERATION AFTER FINDING OF FUEL IN P3 SYSTEM SPECIAL PROCEDURE

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Not applicable

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Not applicable

B. Additional provisions

Task No.	*Task Title*
73-14-01-700-801	Start electro-valve - Sealing - Tests (except electrical)
75-29-00-900-801	P3 pipe of bleed valve - Removal / Installation
75-29-00-900-803	Pipe of P3 air pressure transmitter - Removal / Installation
75-29-00-900-804	P3 pipe of the fuel valve assembly - Removal / Installation
75-29-00-900-805	P3 pipe of power turbine labyrinth pressurization - Removal / Installation
75-31-00-200-802	Bleed valve filter - Inspection / Check
75-31-00-750-802	Opening and closing thresholds of the bleed valve - Tests (electrical)
75-41-00-200-801	P3 air pressure transmitter - Inspection / Check

Task No.	*Task Title*
75-41-00-750-801	P3 air pressure transmitter - Tests (electrical)
75-41-00-900-801	P3 air pressure transmitter - Removal / Installation

2. TASKS/REFERENCE DOCUMENTS

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 70-40-02-940-803 / Pipes and unions - General.

3. PROCEDURE

A. Preliminary procedures

After the tightness of the start electro-valve has been checked following the Task 73-14-01-700-801

B. Inspections

(1) Inspection of the Turbine casing:

(a) If a blue coloration is found at the front of the turbine casing, send the module 03 back to repair center.

(2) Check the P3 pipe of the fuel valve assembly:

(a) Remove the P3 pipe of the fuel valve assembly. Refer to Task 75-29-00-900-804.

(b) Check the P3 pipe of the fuel valve assembly. Refer to Task 70-40-02-940-803.

(c) If a contamination is found in the P3 pipe of the fuel valve assembly: send the pipe back to a repair center approved by Safran Helicopter Engines for cleaning

(d) Install a new P3 pipe of the fuel valve assembly. Refer to Task 75-29-00-900-804

(3) Check the P3 pipe of bleed valve:

(a) Remove the P3 pipe of bleed valve. Refer to Task 75-29-00-900-801.

(b) Check the P3 pipe of bleed valve. Refer to Task 70-40-02-940-803.

(c) If a contamination is found in the P3 pipe of bleed valve: send the pipe back to a repair center approved by Safran Helicopter Engines for cleaning.

(d) Install a new P3 pipe of bleed valve. Refer to Task 75-29-00-900-801.

(e) Check the filter of the bleed valve. Refer to Task 75-31-00-200-802.

(f) Check the Opening and closing thresholds of the bleed valve. Refer to Task 75-31-00-750-802.

(4) Check the P3 air pressure transmitter pipe:

(a) Remove the P3 air pressure transmitter pipe. Refer to Task 75-29-00-900-803.

(b) Check the P3 air pressure transmitter pipe. Refer to Task 70-40-02-940-803.

(c) If a contamination is found in the P3 air pressure transmitter pipe: send the pipe back to a repair center approved by Safran Helicopter Engines for cleaning.

(d) Visually check the condition of the P3 air pressure transmitter. Refer to Task 75-41-00-200-801.

(e) If coking traces are found on the P3 air pressure transmitter, replace the P3 air pressure transmitter. Refer to Task 75-41-00-900-801.

(f) If the outer condition of the P3 air pressure transmitter is satisfactory, make sure that the P3 air pressure transmitter operates properly. Refer to Task 75-41-00-750-801.

(g) Install a new P3 air pressure transmitter pipe. Refer to Task 75-29-00-900-803.

(5) Check the P3 pipe of power turbine:

(a) Remove the P3 pipe of power turbine. Refer to Task 75-29-00-900-805.

(b) Check the P3 pipe of power turbine. Refer to Task 70-40-02-940-803.

(c) If a contamination is found in the P3 pipe of power turbine: send the pipe back to a repair center approved by Safran Helicopter Engines for cleaning.

(d) Install a new P3 pipe of power turbine. Refer to Task 75-29-00-900-805.

(e) Contact Safran Helicopter Engines for the module M04 to be monitored.

C. Additional procedures

Not applicable

4. FINAL STEPS

Not applicable

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TASK 71-02-12-280-801-A01

INSTALLATION OF THE ENGINE ON THE ENGINE MOUNT
SPECIAL PROCEDURE

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Not applicable

Special tools

Description	*Tools Catalog Item*	*Quantity*
handling device (TM4334G003)	OT 80 7260	1
modular support assembly (TM0038G003)	OT 80 0060	1
engine support mount (8819114000)	OT 80 0030	1

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Description	*Quantity*
thread lock	As required

B. Additional provisions

Not applicable

2. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Aircraft Maintenance Manual
– Task 70-01-00-940-801 / Standard practices - General
– Task 70-40-01-940-801 / Seals and sealing rings - General
– Task 70-41-00-940-801 / Tightening torque - General.

3. PROCEDURE

A. Preliminary operations

(1) Remove the engine. Refer to the Aircraft Maintenance Manual.

B. Installation of the engine on the modular assembly support

Refer to Figure 201

(1) Install the handling device (A) (OT 80 7260) on the engine.

(2) Lower the engine with the handling device (A) (OT 80 7260) on the modular support assembly (B).

(3) Install the engine on the modular support assembly (OT 80 0060) (B) .

(a) Install the engine junction tube on the rear support (4) of the modular support assembly (OT 80 0060) (B).

(4) Secure the engine on the modular support assembly (OT 80 0060).

(a) Install the engine front support on the front support (1) of the modular support assembly (OT 80 0060).

(b) Tighten the screw (x3) of the engine front support on the front support (1) of the modular support assembly (OT 80 0060).

NOTE: ***If the Module 05 is to be removed, remove the bolts (72-00-00-01-310) (x12) and the bolts (72-00-00-01-300) (x8).***

(c) Tighten the clamp (3) that safeties the engine junction tube on the rear support (4) of the modular support assembly (OT 80 0060).

(5) Remove the handling device (A) (OT 80 7260).

CAUTION: WHEN THE ENGINE IS IN THE VERTICAL POSITION, DO NOT REMOVE THE CLAMP (3) FROM THE SUPPORT (4). THIS MAY CAUSE THE ENGINE TO FALL.

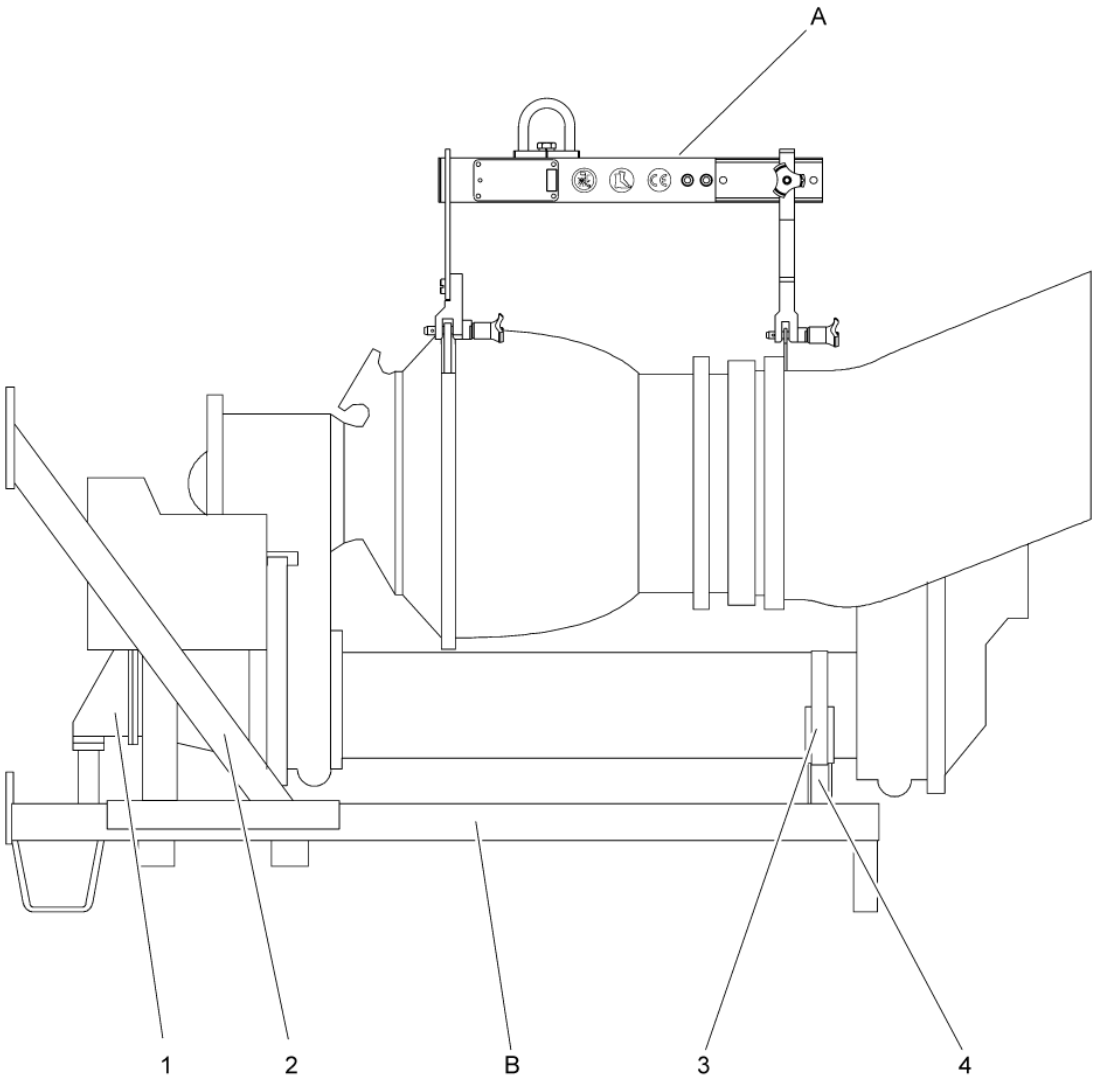
(6) Install the modular assembly support/engine assembly in the vertical position, if necessary.

NOTE: ***For some maintenance procedures, it is necessary to install the engine in the vertical position.***

(a) Attach the two struts (2) to the two sides of the modular assembly support (OT 80 0060).

(a) Lift the rear of the modular assembly support/engine assembly to install it on the stands.

NOTE: ***The stands of the modular assembly support have some holes for the attachment to the ground, if necessary.***



Installation of the engine on the modular assembly support
Figure 201

C. Installation of the engine on the engine mount

Refer to Figure 202 , Figure 203

(1) Preparation of the engine mount (OT 80 0030).

(a) Make sure that the screws (4) that attach the front flange (3) are correctly torqued (3 daN.m) and locked with thread lock on the engine mount (1) (OT 80 0030).

(b) Remove the screws (5), the nuts (6) and the washers (7) from the front flange (3).

(c) Remove the pin (10) from the rear flange (2) of the engine mount (OT 80 0030) (1).

(d) Make sure the locking pin (9) is installed.

(e) Loosen the screws (11) that attach the rear flange (2) to the engine mount (1) (OT 80 0030).

(2) Installation of the engine on the engine mount (OT 80 0030)

(a) Install the handling device (A) (OT 80 7260) on the engine.

(b) Remove the air intake blanks and the exhaust pipe.

(c) Lift, then offer the engine on the engine mount (OT 80 0030).

(d) Attach the engine rear support on the rear flange (2) of the engine mount (OT 80 0030) (1) with the pin (10).

(e) Lock the pin (10) with the pin (9).

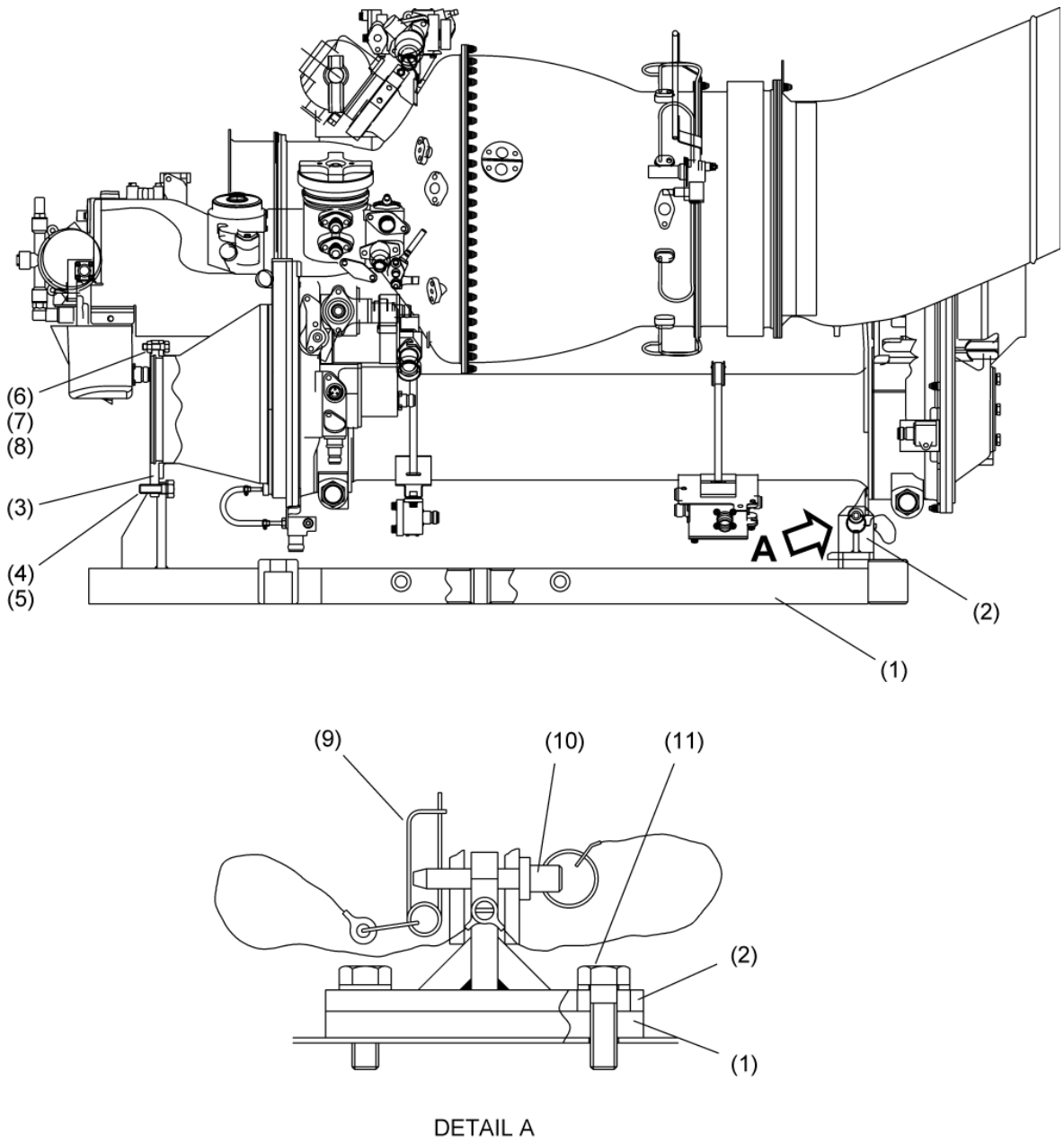
(f) Install the engine front support on the front flange (3) of the engine mount (1) (OT 80 0030).

(g) Install the screws (6) (x3) and the washers (8) (x3) that attach the engine front support in the 3 spotfaced holes of the front flange of the engine mount (1) (OT 80 0030). Refer to Figure 203.

(h) Tighten the screws (11) that attach the rear flange (2) to the engine mount (OT 80 0030) (1).

(i) Tighten the screws (6) and the nuts (7) that attach the front engine support to the front flange of the engine mount (OT 80 0030) (1).

(j) Install the nuts (7) on the threaded rod M7 located on the front of the engine mount.



Installation of the engine on the engine mount
Figure 202

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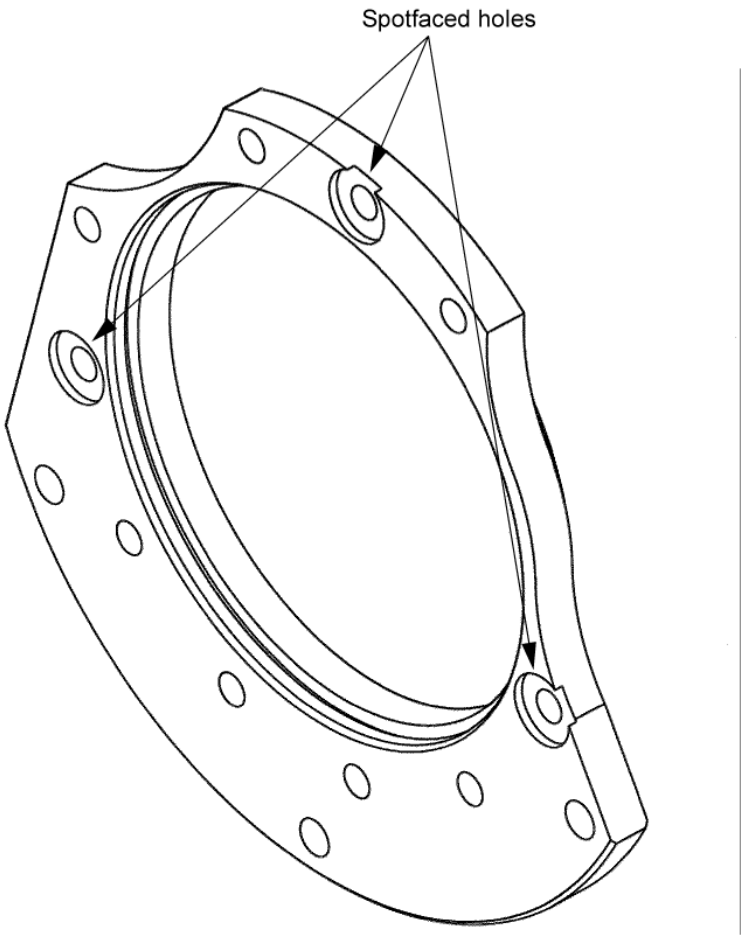


Installation of the screws, nuts and washers in the spotfaced holes of the front flange of the engine mount (1) (OT 80 0030)
Figure 203

D. Additional procedures

Not applicable

4. FINAL STEPS

Not applicable

TASK 71-02-12-280-802-A01

POWERPLANT - REMOVAL OF THE ENGINE/ MODULE FROM STORAGE IN A BOX OR CONTAINER SPECIAL PROCEDURE

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Not applicable

Special tools

Description	*Tools Catalog Item*	*Quantity*
handling device (TM4334G003)	OT 80 7260	1

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Not applicable

B. Additional provisions

Not applicable

2. REFERENCE TASKS/DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 71-02-12-280-803 / Treatment of an engine/module after an incorrect attachment in the transport packaging - Special procedure.

3. PROCEDURE

A. Preliminary procedures

Not applicable

B. Procedure to remove an engine from storage in a box or a non-sealed container

Refer to Figure 201

"Shuttle" box or outside laminated-wood container (Class O and A)

(1) Open the box or the container.

(a) Open the box or the container and remove the cover.

(b) Keep the engine documents.

(c) Carefully cut the upper section of the cover.

(d) Conditioning in a polyethylene cover: collect the desiccant bags.

(2) Inspection

(a) Make sure that there are no signs of corrosion on the engine.

(b) Make sure that the engine is correctly attached to the mount. If it is not, refer to Task 71-02-12-280-803.

(3) Remove the engine from the box or from the container.

(a) Install the handling device (OT 80 7260) on the engine.

(b) Remove the nuts (2) (x4) and the washers (3) (x4) from the shock absorber studs (4) (x4).

(c) Remove the engine with the engine mount from the container.

(d) Install the engine mount/engine assembly on a transport trolley or on a work surface.

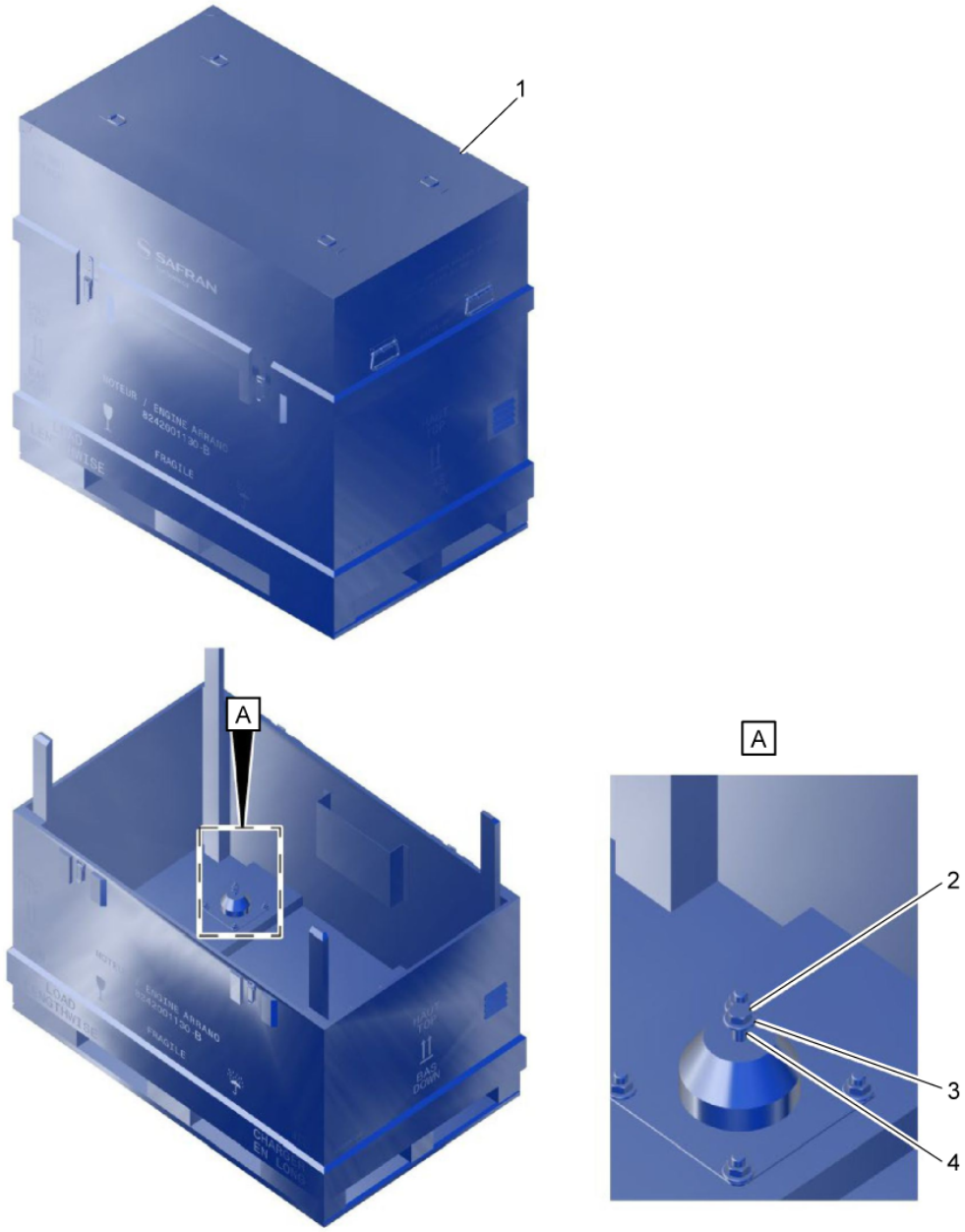
(e) Remove the handling device (OT 80 7260).

(4) Get the box or the container in condition.

(a) Clean and examine the box or the container.

(b) Install the washers (3) (x4) and the nuts (2) (x4) on the shock absorber studs (4) (x4).

(c) Install the cover (orientation marks) and close the box or the container.



Removal of an engine from storage supplied in a box or a non-sealed container
Figure 201

C. Procedure to remove an engine from storage in a pressurized metal container

Refer to Figure 202

(1) Open the pressurized metal container.

(a) Open the outer box (1) of the container.

(b) Keep the engine documents.

(c) Do the check of the humidity indicator (2).

(d) If necessary, deflate the container through the valve (3).

CAUTION: USE THE PRESSURE GAUGE (4) TO MAKE SURE THAT THE PRESSURE IS SET TO ZERO BEFORE YOU OPEN THE CONTAINER.

(e) Remove the screws, washers and nuts (5) that attach the cover of the container.

CAUTION: DO NOT CAUSE DAMAGE TO THE SEAL.

(f) Lift the cover (6) with a pulley block and put it on the ground on a cardboard or thick-plastic protection to keep the mating surface as it is.

(g) Keep the engine documents and all the components and accessories packaged in the container.

(h) Collect the desiccant bags.

(2) Inspection

(a) Make sure that there are no signs of corrosion on the engine.

(b) Make sure that the engine is correctly attached to the mount. If it is not, refer to Task 71-02-12-280-803.

(3) Remove the engine from the metal container.

(a) Install the handling device (OT 80 7260) on the engine.

(b) Remove the nuts (9) (x4) and the washers (10) (x4) from the shock absorber studs (11) (x4).

(c) Remove the engine with the engine mount from the metal container.

(d) Install the engine mount/engine assembly on a transport trolley or on a work surface.

(e) Remove the handling device (OT 80 7260).

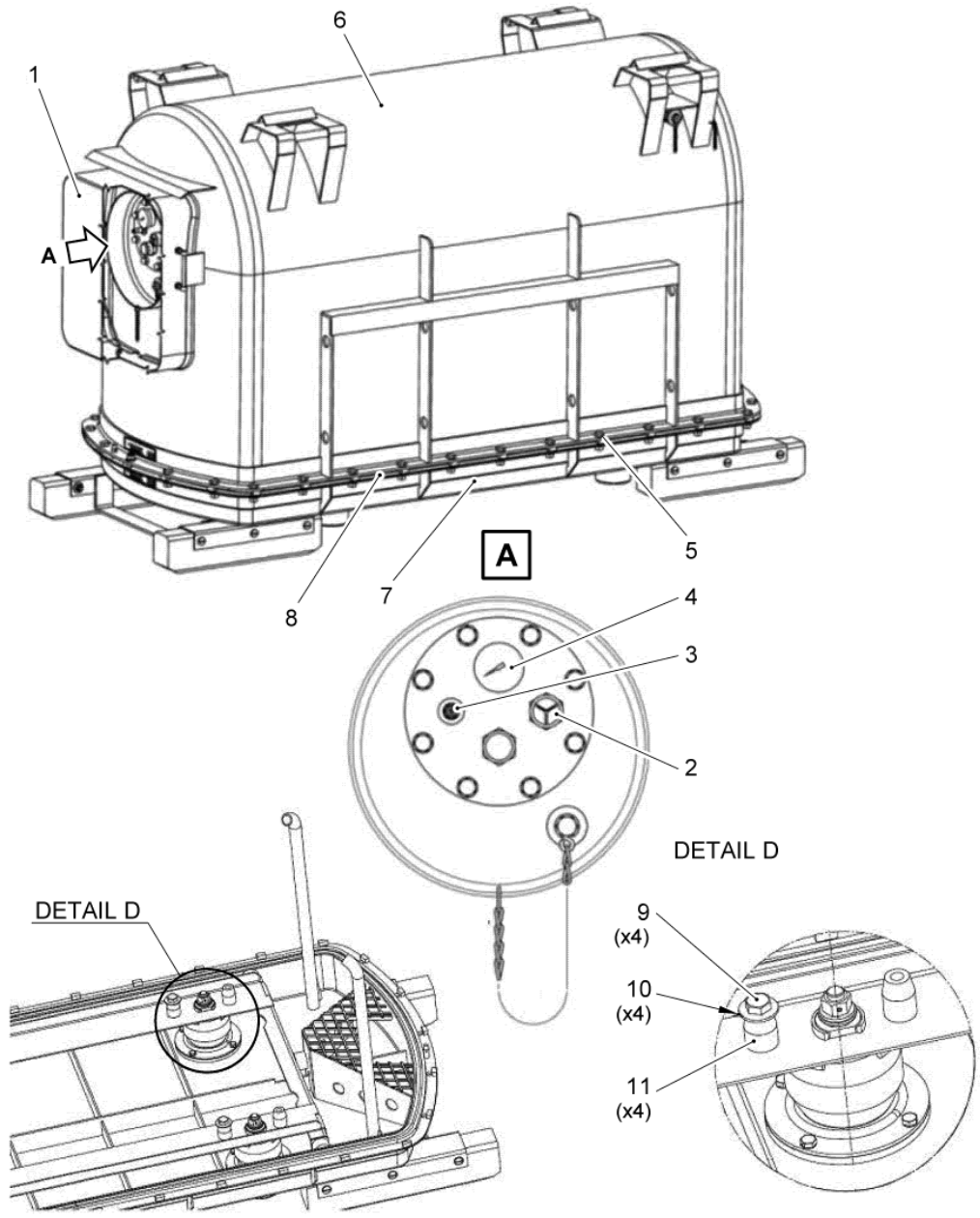
(4) Get the metal container in condition.

(a) Clean the inner walls and the mating surface.

(b) Clean the internal surface of the base (7).

(c) Install the washers (10) (x4) and the nuts (9) (x4) on the shock absorber studs (11) (x4).

(d) Install the cover (orientation marks) and close the container.



Removal of an engine from storage supplied in a pressurized metal container
Figure 202

D. Procedure to remove a module from storage in a box or a non-sealed container

"Shuttle" box or outside laminated-wood container (Class O and A).

(1) Open the box or the container.

(2) Keep the documents.

(3) Carefully cut the upper section of the cover.

(4) Conditioning in a polyethylene cover: collect the desiccant bags.

(5) Make sure that there are no signs of corrosion on the module.

(6) Make sure that the module is correctly attached in its packaging. If it is not, refer to Task 71-02-12-280-803.

(7) Remove the module from the box or from the container.

(8) Clean and examine the box or the container.

(9) Install the cover, then close the box or the container.

E. Procedure to remove a module from storage in a sealed container

Non-pressurized laminated container.

(1) Open the container.

(2) Keep the documents.

(3) Collect the desiccant bags.

(4) Make sure that there are no signs of corrosion on the module.

(5) Make sure that the module is correctly attached in its packaging. If it is not, refer to Task 71-02-12-280-803.

(6) Remove the module from the container.

(7) Clean and examine the container.

(8) Install the cover, then close the container.

F. Additional procedures

Not applicable

4. FINAL STEPS

Not applicable

TASK 71-02-12-280-803-A01

TREATMENT OF AN ENGINE/MODULE AFTER AN INCORRECT ATTACHMENT IN THE TRANSPORT PACKAGING SPECIAL PROCEDURE

1. PROVISIONING

The provisions for this task are given in paragraph A. and in the tasks of paragraph B.

A. Provisions mentioned in the procedure

Standard tools

Not applicable

Special tools

Not applicable

Systematic spares

Not applicable

Spares

Not applicable

Consumables

Not applicable

B. Additional provisions

Not applicable

2. TASKS/REFERENCE DOCUMENTATION

Read carefully the information given in the tasks/documents mentioned hereafter.

– Task 71-02-06-280-801 / Treatment of an engine after a heavy landing - Special procedure.

3. PROCEDURE

A. Preliminary operations

Not applicable

B. Procedure

(1) Stand with one or more shock absorbers missings:
Send the engine/module to an approved Repair Center.

(2) Stand with all shock absorbers. Foam or safetying item damaged or missing:

CRITERIA	*ACTION*
If the missing securing item does not cause a possible movement between the engine/module and the other securing items: E.g.: 1 out of 5 bolts that attach the same bracket to the mount link is missing	No action is necessary.
If all the securing items are missing or damaged (distortion, "fresh" fretting):	Send the engine/module to an approved Repair Center
If the missing item can cause a possible movement between the engine and the other securing items:	
– If no damage can be seen on the engine (distortion, "fresh" fretting…) between the securing items that can move:	Do the inspection after a heavy landing with engine running. Refer to Task 71-02-06-280-801.
– If damage can be seen on the engine (distortion, "fresh" fretting…) between the securing items that can move:	Send the engine to an approved Repair Center.
If the missing item can cause a possible movement between the module and the other securing items.	Send the module to an approved Repair Center.

C. Additional procedures

Not applicable

4. FINAL STEPS

Not applicable