HELICOPTER ENGINES

TURBOSHAFT

ARRIUS 2
F

MAINTENANCE MANUAL

TROUBLE SHOOTING

No. X 319 L6 301 2

Original issue: Jan. 22/1997
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SAFRAN

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LETTER

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

Bordes, Oct. 15/2022

Dear Sir / Madam,

The *ARRIUS 2 F MAINTENANCE MANUAL No. X 319 L6 301 2* has been subject to normal update No. 47 on Oct. 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	Integration	ALL	1
LAP - 71	Integration	ALL	1 to 4
TDM - 71	Integration	ALL	1 to 4
71-00-06 - FAILURES FOUND DURING OPERATION	Integration	ALL	101 to 102
71-00-06 - FAILURES FOUND DURING MAINTENANCE	Integration	ALL	101 to 102
71-00-06-811-801-A01	Integration	ALL	101 to 102
71-00-06-811-802-A01	Integration	ALL	101 to 102
71-00-06-811-803-A01	Integration	ALL	101 to 102
71-00-06-811-811-A01	Integration	ALL	101 to 104
71-00-06-811-812-A01	Integration	ALL	101 to 104
71-00-06-812-805-A01	Integration	ALL	101 to 108
71-00-06-812-813-A01	Suppression	ALL	
71-00-06-813-804-A01	Integration	ALL	101 to 102
71-00-06-813-805-A01	Integration	ALL	101 to 104
71-00-06-813-806-A01	Integration	ALL	101 to 104
71-00-06-814-802-A01	Integration	ALL	101 to 104
71-00-06-814-814-A01	Integration	ALL	101 to 102
71-00-06-814-823-A01	Integration	ALL	101 to 104

Task Number	Description	Pages to be removed	Pages to be inserted
71-00-06-814-829-A01	Integration	ALL	101 to 104
71-00-06-816-827-A01	Integration		101 to 102

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CHAPTER 71 - LIST OF EFFECTIVE PAGES

Chapter Section Subject	Task	Title	Pages	Date
71		LIST OF EFFECTIVE PAGES	* 1 - 4	Oct. 15/2022
71		TABLE OF CONTENTS	* 1 - 4	Oct. 15/2022
71-00-06	INT-801-A01	TROUBLESHOOTING - INTRODUCTION	1 - 2	Aug. 30/2014
71-00-06	RPU-801-A01	FAILURES FOUND DURING OPERATION - LIST OF FAILURES OBSERVED DURING ENGINE OPERATION	* 101 - 102	Oct. 15/2022
71-00-06	RPM-801-A01	FAILURES FOUND DURING MAINTENANCE - LIST OF FAILURES OBSERVED DURING MAINTENANCE	* 101 - 102	Oct. 15/2022
71-00-06	811-801-A01	"FUEL P" (LOW FUEL PRESSURE) NOT DISPLAYED AT POWER UP - TROUBLESHOOTING	* 101 - 102	Oct. 15/2022
71-00-06	811-802-A01	"FUEL FLT" (FUEL FILTER PRE-BLOCKAGE) DISPLAYED AT POWER UP - TROUBLESHOOTING	* 101 - 102	Oct. 15/2022
71-00-06	811-803-A01	"ENG P" (LOW OIL PRESSURE) NOT DISPLAYED AT POWER UP - TROUBLESHOOTING	* 101 - 102	Oct. 15/2022
71-00-06	811-806-A01	UNJUSTIFIED FIRE SIGNAL - TROUBLESHOOTING	101 - 102	Aug. 30/2011
71-00-06	811-807-A01	ABORTED START - FLAMES AT THE EXHAUST - TROUBLESHOOTING	101 - 104	Apr. 15/2022
71-00-06	811-808-A01	ABORTED START - SLOW START OR STAGNATION - TROUBLESHOOTING	101 - 110	Apr. 15/2022
71-00-06	811-810-A01	ABORTED START - ENGINE FLAME-OUT AFTER IGNITION - TROUBLESHOOTING	101 - 104	Oct. 15/2021
71-00-06	811-811-A01	NO EXTINGUISHING OF THE LOW FUEL PRESSURE "FUEL P" DURING THE STARTING PHASE - TROUBLESHOOTING	* 101 - 104	Oct. 15/2022
71-00-06	811-812-A01	NO EXTINGUISHING OF THE LOW OIL PRESSURE "ENG P" DURING THE STARTING PHASE - TROUBLESHOOTING	* 101 - 104	Oct. 15/2022
71-00-06	812-801-A01	ABORTED START - GAS GENERATOR NOT DRIVEN - TROUBLESHOOTING	101 - 104	Apr. 15/2020

* Page modified following update No. 47

Chapter Section Subject	Task	Title	Pages	Date
71-00-06	812-805-A01	ABORTED START - T4.5 OVERTEMPERATURE - TROUBLESHOOTING	* 101 - 108	Oct. 15/2022
71-00-06	812-816-A01	ABORTED START - NO IGNITION - TROUBLESHOOTING	101 - 108	Apr. 15/2022
71-00-06	813-801-A01	MTOP RATING (MAXIMUM TAKE-OFF POWER) NOT REACHED - TROUBLESHOOTING	101 - 102	Apr. 15/2018
71-00-06	813-802-A01	FLUCTUATION OF N1 AND T4.5 - TROUBLESHOOTING	101 - 102	Aug. 30/2011
71-00-06	813-803-A01	NO TORQUE INDICATION - TROUBLESHOOTING	101 - 102	Oct. 15/2021
71-00-06	813-804-A01	OIL TEMPERATURE TOO LOW ON THE DIAGRAM VALUES DISPLAY - TROUBLESHOOTING	* 101 - 102	Oct. 15/2022
71-00-06	813-805-A01	OIL PRESSURE TOO LOW ON THE DIAGRAM VALUES DISPLAY - TROUBLESHOOTING	* 101 - 104	Oct. 15/2022
71-00-06	813-806-A01	"ENG P" MESSAGE (LOW OIL PRESSURE) DURING ENGINE RUNNING - TROUBLESHOOTING	* 101 - 104	Oct. 15/2022
71-00-06	813-807-A01	CONTROLLED ENGINE SHUTDOWN NOT POSSIBLE - TROUBLESHOOTING	101 - 102	Aug. 30/2011
71-00-06	813-808-A01	NR DRIFT - TROUBLESHOOTING	101 - 106	Oct. 15/2019
71-00-06	813-810-A01	POWER ASSURANCE CHECK - INCORRECT MARGIN - TROUBLESHOOTING	101 - 108	Apr. 15/2022
71-00-06	813-811-A01	UNJUSTIFIED FIRE SIGNAL - TROUBLESHOOTING	101 - 102	Aug. 30/2011
71-00-06	813-812-A01	ENGINE PARAMETER OSCILLATIONS: TORQUE, NG, NR - TROUBLESHOOTING	101 - 104	Oct. 15/2019
71-00-06	813-813-A01	NONCOMPLIANT TEMPERATURE MARGIN - TROUBLESHOOTING	101 - 108	Apr. 15/2019
71-00-06	814-802-A01	ABNORMAL NOISES - TROUBLESHOOTING	* 101 - 104	Oct. 15/2022
71-00-06	814-804-A01	VIBRATIONS - TROUBLESHOOTING	101 - 102	Apr. 15/2018
71-00-06	814-806-A01	SURGE - TROUBLESHOOTING	101 - 104	Apr. 15/2018
71-00-06	814-807-A01	SMELLS IN THE CABIN - TROUBLESHOOTING	101 - 108	Oct. 30/2018

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Chapter Section Subject	Task	Title	Pages	Date
71-00-06	814-808-A01	N1 OVERSPEED - TROUBLESHOOTING	101 - 102	Feb. 28/2013
71-00-06	814-809-A01	N2 OVERSPEED (FROM 104 % TO 110 %) - TROUBLESHOOTING	101 - 104	Feb. 28/2014
71-00-06	814-811-A01	TORQUE LIMITATIONS EXCEEDED - TROUBLESHOOTING	101 - 104	Feb. 28/2013
71-00-06	814-812-A01	T4.5 OVERTEMPERATURE - TROUBLESHOOTING	101 - 104	Apr. 15/2021
71-00-06	814-813-A01	“FUEL PRESS” MESSAGE (LOW FUEL PRESSURE) - TROUBLESHOOTING	101 - 104	Mar. 30/2017
71-00-06	814-814-A01	“FUEL FILT” MESSAGE (PRE-BLOCKAGE OF THE FUEL FILTERING ELEMENT) - TROUBLESHOOTING	* 101 - 102	Oct. 15/2022
71-00-06	814-816-A01	NO N1 SPEED INDICATION - TROUBLESHOOTING	101 - 102	Feb. 28/2013
71-00-06	814-817-A01	NO N2 SPEED INDICATION - TROUBLESHOOTING	101 - 102	Feb. 28/2013
71-00-06	814-818-A01	NO T4.5 INDICATION - TROUBLESHOOTING	101 - 102	Feb. 28/2013
71-00-06	814-819-A01	T4.5 INDICATION ERRONEOUS - TROUBLESHOOTING	101 - 102	Feb. 28/2013
71-00-06	814-820-A01	TORQUE INDICATION ERRONEOUS - TROUBLESHOOTING	101 - 104	Oct. 15/2021
71-00-06	814-823-A01	OIL OVERTEMPERATURE ON THE DIAGRAM VALUES DISPLAY - TROUBLESHOOTING	* 101 - 104	Oct. 15/2022
71-00-06	814-826-A01	FLUCTUATING OIL PRESSURE - TROUBLESHOOTING	101 - 104	Aug. 30/2011
71-00-06	814-828-A01	OIL PRESSURE TOO HIGH - TROUBLESHOOTING	101 - 102	Apr. 15/2018
71-00-06	814-829-A01	"ENG CHIP" MESSAGE (MAGNETIC PARTICLES) - TROUBLESHOOTING	* 101 - 104	Oct. 15/2022
71-00-06	814-837-A01	N2 OVERSPEED (OVER 110 %) - TROUBLESHOOTING	101 - 102	Feb. 28/2014
71-00-06	814-842-A01	FIRE ALARM OR NO FIRE ALARM - TROUBLESHOOTING	101 - 104	Apr. 15/2020
71-00-06	815-804-A01	TESTING OF THE NOT COMPLIANT PREFERENCE INJECTOR - TROUBLESHOOTING	101 - 102	Aug. 30/2011

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Chapter Section Subject	Task	Title	Pages	Date
71-00-06	816-801-A01	DEFECTIVE AUTOMATIC CYCLE COUNTING - TROUBLESHOOTING	101 - 104	Feb. 28/2013
71-00-06	816-802-A01	EXHAUST FUMES AFTER ENGINE SHUTDOWN - TROUBLESHOOTING	101 - 106	Feb. 28/2012
71-00-06	816-805-A01	POPPING OUT OF THE VISUAL BLOCKAGE INDICATOR OF THE FUEL FILTERING ELEMENT - TROUBLESHOOTING	101 - 104	Mar. 30/2017
71-00-06	816-806-A01	LEAKAGE AT THE POWER-DRIVE DRAIN - TROUBLESHOOTING	101 - 104	Apr. 15/2020
71-00-06	816-806-B01	LEAKAGE AT THE POWER-DRIVE DRAIN - TROUBLESHOOTING	101 - 102	Apr. 15/2020
71-00-06	816-807-A01	POPPING OUT OF THE VISUAL BLOCKAGE INDICATOR OF THE OIL FILTERING ELEMENT - TROUBLESHOOTING	101 - 104	Aug. 30/2011
71-00-06	816-808-A01	OIL LEAKAGE AT THE STARTER POWER DRIVE - TROUBLESHOOTING	101 - 102	Oct. 15/2019
71-00-06	816-811-A01	OIL TRACES IN THE AIR INTAKE CASING - TROUBLESHOOTING	101 - 104	Apr. 15/2019
71-00-06	816-815-A01	OIL CONSUMPTION MORE THAN 0.3 L/HR - TROUBLESHOOTING	101 - 102	Aug. 30/2011
71-00-06	816-816-A01	EXTERNAL LEAKS AT ADJUSTED FUEL CONTROL UNIT ASSEMBLY - TROUBLESHOOTING	101 - 102	Aug. 30/2011
71-00-06	816-826-A01	ABNORMAL VIBRATION, ABNORMAL NOISE OR ACCESSORY DAMAGE - TROUBLESHOOTING	101 - 102	Apr. 15/2022
71-00-06	816-827-A01	INJECTION PROTECTION TEST NOT CONFORM - TROUBLESHOOTING	* 101 - 102	Oct. 15/2022

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CHAPTER 71 - TABLE OF CONTENTS

TROUBLESHOOTING - INTRODUCTION

.

A. General

This document contains some data extracted from the ARRIUS, chapter 71-00-06 - Trouble Shooting.

It is devoted to the engine maintenance personnel for finding the failures.

To ease its use, this document is divided up into 6 sections:

– Section 1: list of effective pages and contents of the manual
– Section 2: introduction, this section gives the manual lay-out and the general
– Section 3: list of failures observed during use
– Section 4: list of failures observed during maintenance
– Section 5: list of CDS and CPDS failure codes
– Section 6: maintenance tasks from the above lists.

These lists are non-exhaustive and the trouble shootings will be corrected and completed as experience is gained all along the engine life.

CAUTION: BEFORE THE REMOVAL OF THE ENGINE FROM THE AIRFRAME, REFER TO TASK "TREATMENT OF AN ENGINE/MODULE BEFORE RETURN TO A MAINTENANCE CENTER". (REFER TO TASK 71-02-01-940-802)

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FAILURES FOUND DURING OPERATION

1. GENERAL

A. At power up

DESIGNATION	*TASK No.*
"ENG P" (low oil pressure) not displayed at power up	71-00-06-811-803
"FUEL P" (low fuel pressure) not displayed at power up	71-00-06-811-801
"FUEL FLT" (fuel filter pre-blockage) displayed at power up	71-00-06-811-802
Unjustified ″FIRE″ signal.	71-00-06-811-806

B. Starting

DESIGNATION	*TASK No.*
Aborted start - Gas generator not driven.	71-00-06-812-801
Aborted start - Flames at the exhaust pipe.	71-00-06-811-807
Aborted start - No ignition.	71-00-06-812-816
Aborted start - Slow start or stagnation.	71-00-06-811-808
Aborted start - Engine flame-out after ignition.	71-00-06-811-810
Aborted start - T4.5 overtemperature.	71-00-06-812-805
No extinguishing of the low fuel pressure "FUEL P" during the starting phase	71-00-06-811-811
No extinguishing of the low oil pressure "ENG P" during the starting phase	71-00-06-811-812

C. Engine running

DESIGNATION	*TASK No.*
No N1 speed indication.	71-00-06-814-816
No N2 speed indication.	71-00-06-814-817
N1 overspeed.	71-00-06-814-808
N2 overspeed.	71-00-06-814-809
N2 overspeed.	71-00-06-814-837
No max. N1 achieved.	71-00-06-813-801
Fluctuation of N1 and T4.5.	71-00-06-813-802
No torque indication.	71-00-06-813-803
Torque indication erroneous.	71-00-06-814-820
Torque limitations exceeded.	71-00-06-814-811
No T4.5 indication.	71-00-06-814-818
T4.5 indication erroneous.	71-00-06-814-819
T4.5 overtemperature.	71-00-06-814-812
Oil overtemperature on the diagram values display.	71-00-06-814-823
Oil temperature too low on the diagram values display.	71-00-06-813-804

DESIGNATION	*TASK No.*
Oil pressure too low on the diagram values display.	71-00-06-813-805
Oil pressure too high.	71-00-06-814-828
Fluctuating oil pressure.	71-00-06-814-826
"ENG P" message (Low oil pressure) during engine running.	71-00-06-813-806
Oil smell in the helicopter air conditioning.	71-00-06-814-807
"ENG CHIP" message (magnetic particles).	71-00-06-814-829
"FUEL FILT" message (Pre-blockage of the fuel filtering element).	71-00-06-814-814
"FUEL PRESS" message (Low fuel pressure).	71-00-06-814-813
Surge.	71-00-06-814-806
Vibrations.	71-00-06-814-804
Controlled engine shutdown not possible.	71-00-06-813-807
NR drift.	71-00-06-813-808
Power assurance check - Incorrect margin	71-00-06-813-810
Unjustified ″FIRE″ signal.	71-00-06-813-811

D. Shutdown

DESIGNATION	*TASK No.*
Abnormal noises.	71-00-06-814-802

FAILURES FOUND DURING MAINTENANCE

1. GENERAL

A. Failures observed during maintenance

DESIGNATION	*TASK No.*
Exhaust fumes after engine shutdown.	71-00-06-816-802
Oil traces in the air intake casing.	71-00-06-816-811
Oil consumption more than 0.3 l/hr.	71-00-06-816-815
Popping out of the visual blockage indicator of the oil filtering element.	71-00-06-816-807
Popping out of the visual blockage indicator of the fuel filtering element.	71-00-06-816-805
Leakage at the power-drive drain.	71-00-06-816-806
Oil leakage at the starter power drive.	71-00-06-816-808
Defective automatic cycle counting.	71-00-06-816-801
Abnormal vibration, abnormal noise or accessory damage	71-00-06-816-826
Injection protection test not conform	71-00-06-816-827

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TASK 71-00-06-811-801-A01

"FUEL P" (LOW FUEL PRESSURE) NOT DISPLAYED AT POWER UP TROUBLESHOOTING

1. GENERAL

A. PHASE

At power up

B. GENERAL DESCRIPTION

The low fuel pressure switch is located at the fuel filter inlet.

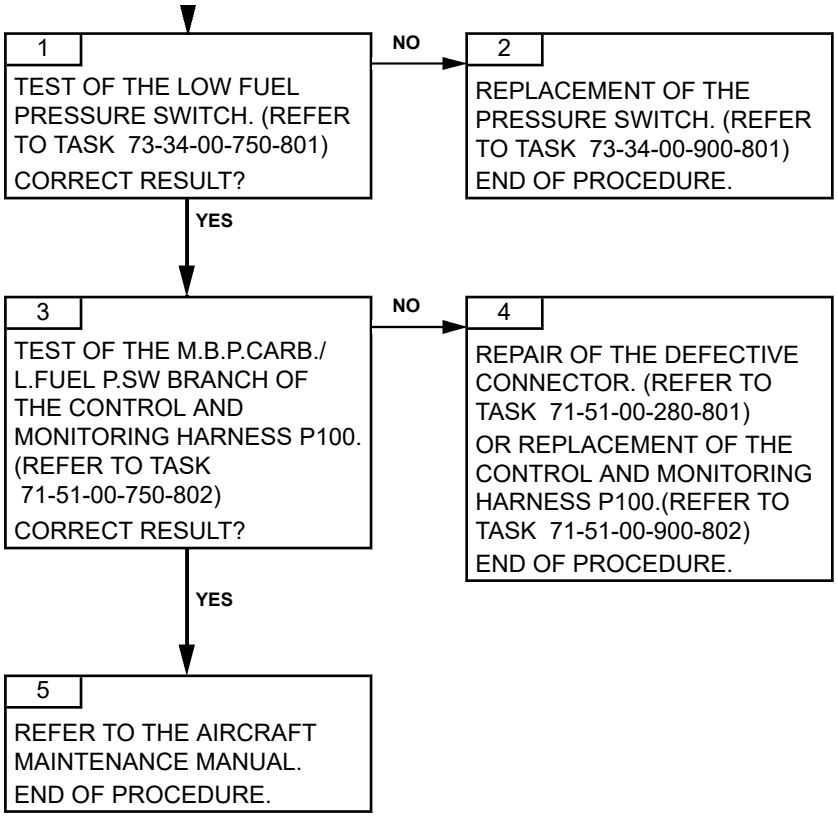
The low fuel pressure switch is connected to the aircraft.

The "FUEL-P" light must be ON during the power-up.

C. POSSIBLE CAUSES

- Low fuel pressure switch
- Control and monitoring harness P100
- Aircraft

2. PROCEDURE



TASK 71-00-06-811-802-A01

"FUEL FLT" (FUEL FILTER PRE-BLOCKAGE) DISPLAYED AT POWER UP TROUBLESHOOTING

1. GENERAL

A. PHASE

At power up

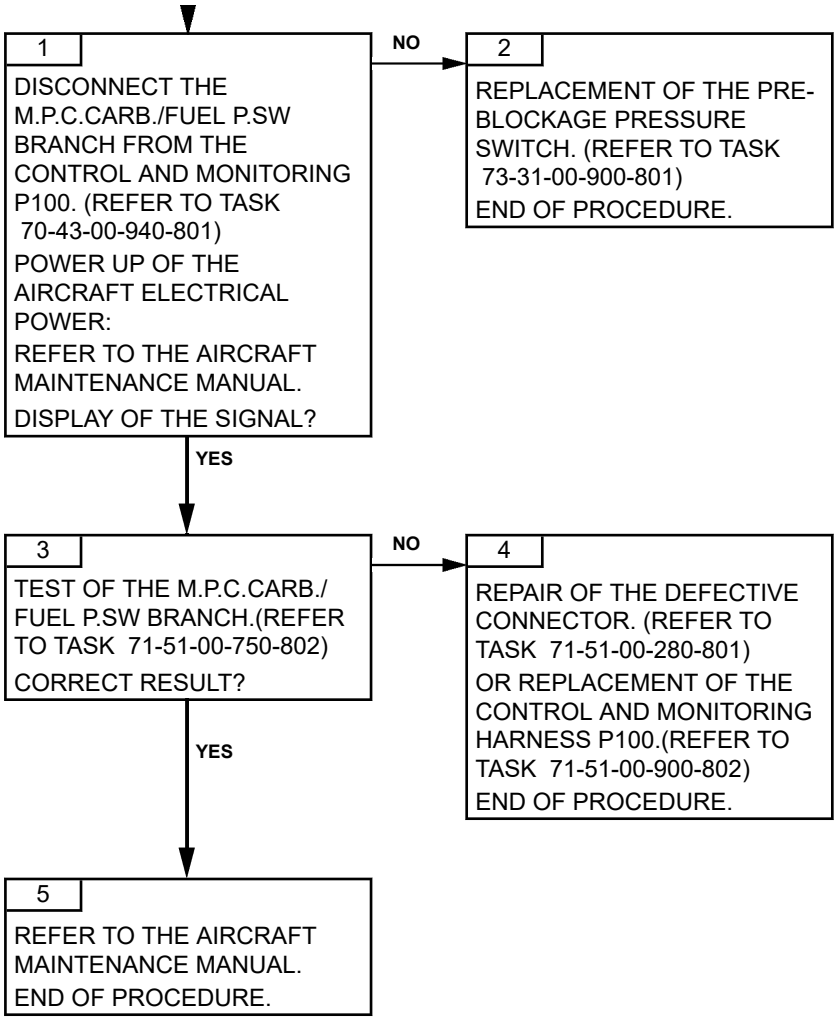
B. GENERAL DESCRIPTION

The engine is equipped of a pre-blockage fuel filter switch.
The pre-blockage fuel filter switch is connected to the aircraft.
The message "FUEL FLT" is displayed when the fuel filter is preclogging.
This message must not be displayed at power up.

C. POSSIBLE CAUSES

- Pre-blockage pressure switch
- Control and monitoring harness P100
- Aircraft

2. PROCEDURE



TASK 71-00-06-811-803-A01

"ENG P" (LOW OIL PRESSURE) NOT DISPLAYED AT POWER UP TROUBLESHOOTING

1. GENERAL

A. PHASE

At power up

B. GENERAL DESCRIPTION

The low oil pressure switch is located at the oil filter outlet.

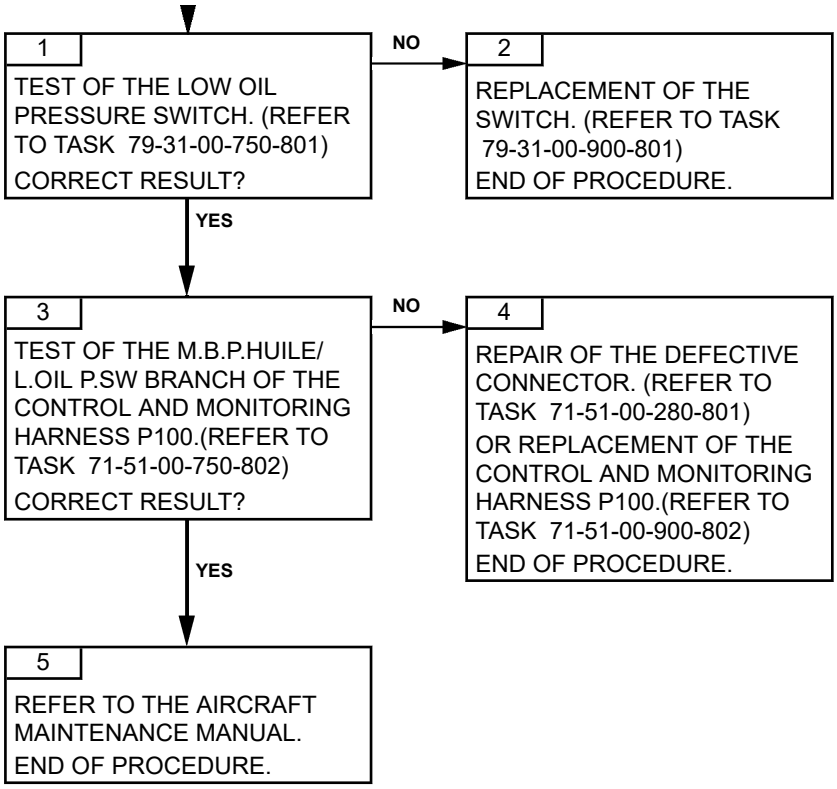
The low oil pressure switch is connected to the aircraft.

The "ENG-P" light must be ON during the power-up.

C. POSSIBLE CAUSES

- Low oil pressure switch
- Control and monitoring harness P100
- Aircraft

2. PROCEDURE



TASK 71-00-06-811-806-A01

UNJUSTIFIED FIRE SIGNAL TROUBLESHOOTING

1. GENERAL

A. PHASE

At power up

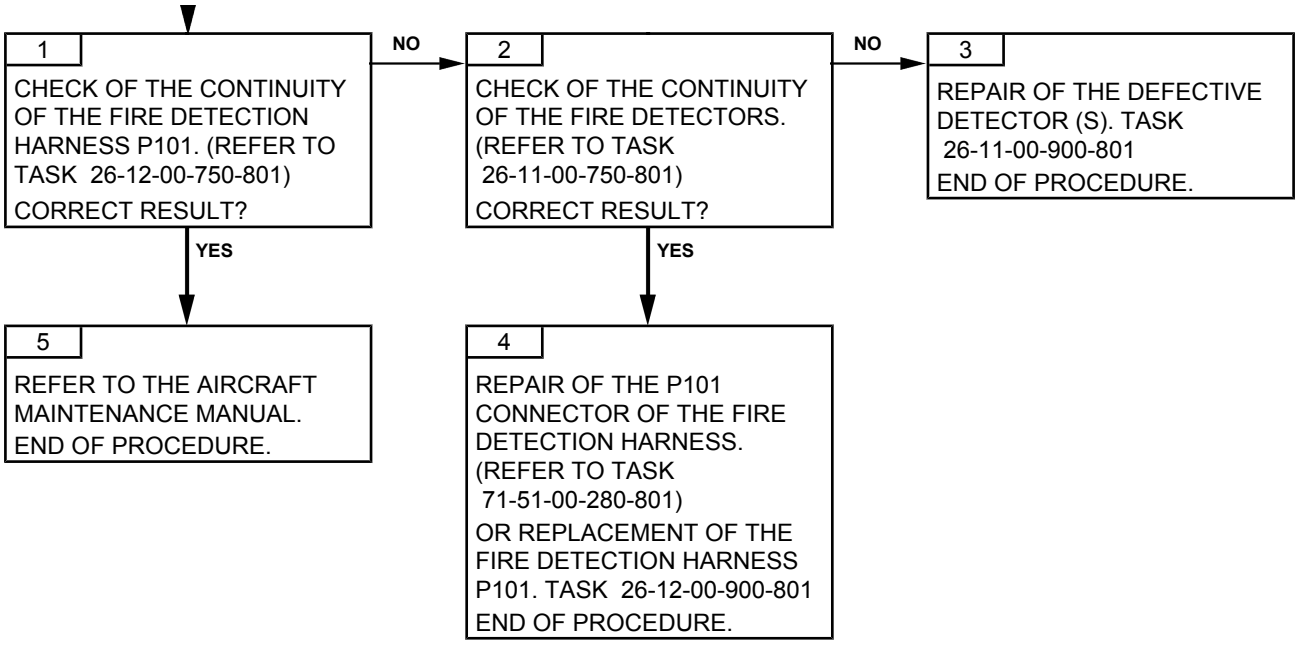
B. REMINDER OF THE NORMAL OPERATING CONDITION

The signal must not be displayed.

C. POSSIBLE CAUSES

– Fire detector
– Fire detection harness P101
– Aircraft

2. PROCEDURE



TASK 71-00-06-811-807-A01

ABORTED START - FLAMES AT THE EXHAUST TROUBLESHOOTING

1. GENERAL

A. PHASE

During starting.

B. REMINDER OF THE NORMAL OPERATING CONDITION

The normal operating condition is that the starter generator drives correctly the gas generator. The T4 increases from about 18 % N1. N1 and N2 grow up to either N2 idle or flight rate.

In troubleshooting book, there are different troubleshooting tasks concerning aborted start.

Titles are:

- **“Aborted start: gas generator not driven”**: Do this troubleshooting task if the gas generator is not driven at all (N1 = 0%) at the engine start selection or during cranking.
- **“Aborted start: no ignition”**: The pilot turns the principal selector STOP/IDLE/FLIGHT to IDLE or FLIGHT, then the gas generator is driven but no ignition of the combustion chamber (T4 not increase).
- **“Aborted start: slow start or stagnation”**: Do this troubleshooting task when the ignition in the combustion chamber is observed, but the N1 speed increases slower than usually, or the N1 speed stops to increase during start (and the pilot has to abort manually the starting sequence).
- **“Aborted start: flames at the exhaust pipe”**: Do this troubleshooting task when the starting sequence generates abnormal flames at the exhaust pipe.
- **“Aborted start: flame-out”**: Do this troubleshooting task when the ignition is observed but the combustion chamber flames out.
- **“T4.5 limitations exceeded”**: Do this troubleshooting task when there is a T4.5 overtemperature observed during engine running or during starting sequence.

C. POSSIBLE CAUSES

- Start injectors
- Drain purge valve.

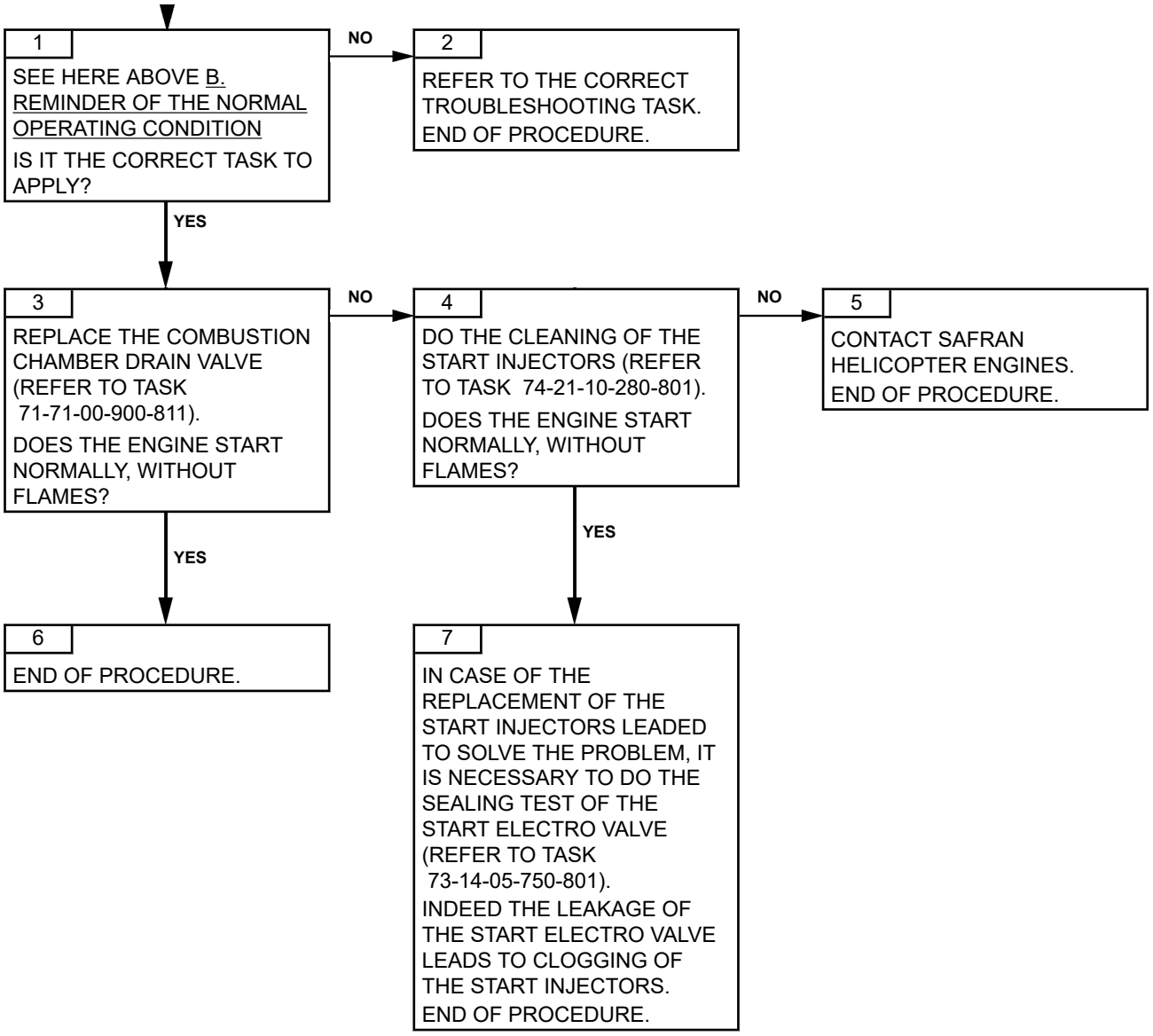
2. PROCEDURE

NOTE: ***In case of a recent maintenance operation performed on this engine or on the aircraft starting system (starter, battery, fuse, selector, harness...), check firstly the sub assembly concerned by this maintenance operation. In particular the plug and connectors.***

NOTE: ***It is possible to interchange equipment with the other engine.***

- ***If the engine start normally, both the equipment shall be reinstall in their original location in order to confirm the fault. If the fault is confirmed, then the faulty equipment has to be replaced***

– ***If the engine doesn't start normally, both the equipment shall be reinstall in their original location and you have to carry on the next step of the troubleshooting tree.***



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TASK 71-00-06-811-808-A01

ABORTED START - SLOW START OR STAGNATION TROUBLESHOOTING

1. GENERAL

A. PHASE

During starting.

B. REMINDER OF THE NORMAL OPERATING CONDITION

The normal operating condition is that the starter generator drives correctly the gas generator. The T4 increases from about 18 % N1. N1 and N2 grow up to either N2 idle or flight rate.

In troubleshooting book, there are different troubleshooting tasks concerning aborted start.

Titles are:

- **“Aborted start: gas generator not driven”**: Do this troubleshooting task if the gas generator is not driven at all (N1 = 0%) at the engine start selection or during cranking.
- **“Aborted start: no ignition”**: The pilot turns the principal selector STOP/IDLE/FLIGHT to IDLE or FLIGHT, then the gas generator is driven but no ignition of the combustion chamber (T4 not increase).
- **“Aborted start: slow start or stagnation”**: Do this troubleshooting task when the ignition in the combustion chamber is observed, but the N1 speed increases slower than usually, or the N1 speed stops to increase during start (and the pilot has to abort manually the starting sequence).
- **“Aborted start: flames at the exhaust pipe”**: Do this troubleshooting task when the starting sequence generates abnormal flames at the exhaust pipe.
- **“Aborted start: flame-out”**: Do this troubleshooting task when the ignition is observed but the combustion chamber flames out.
- **“T4.5 limitations exceeded”**: Do this troubleshooting task when there is a T4.5 overtemperature observed during engine running or during starting sequence.

C. POSSIBLE CAUSES

- Adjusted fuel valve assembly
- Adjusted fuel control unit
- Astatic valve
- Lubrication unit
- P3 air pipe
- Pyrometric harness
- T4.5 conformation box
- Control and monitoring harness
- Low battery
- Aircraft.

2. PROCEDURE

NOTE: ***In case of a recent maintenance operation performed on this engine or on the aircraft starting system (starter, battery, fuse, selector, harness...), check firstly the sub assembly concerned by this maintenance operation. In particular the plug and connectors.***

NOTE: ***It is possible to interchange equipment with the other engine.***

- ***If the engine start normally, both the equipment shall be reinstall in their original location in order to confirm the fault. If the fault is confirmed, then the faulty equipment has to be replaced***
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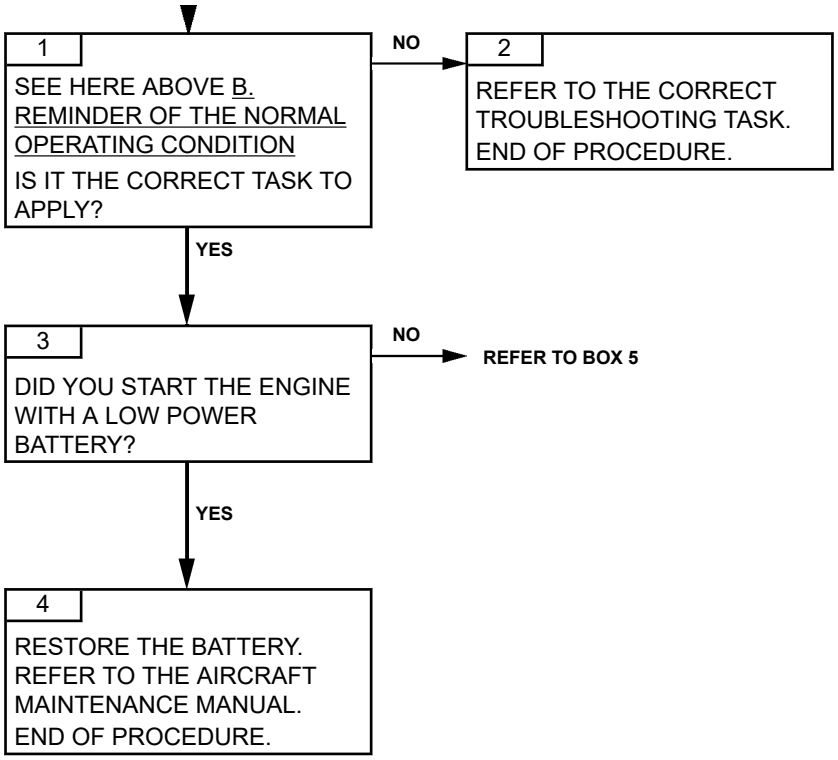

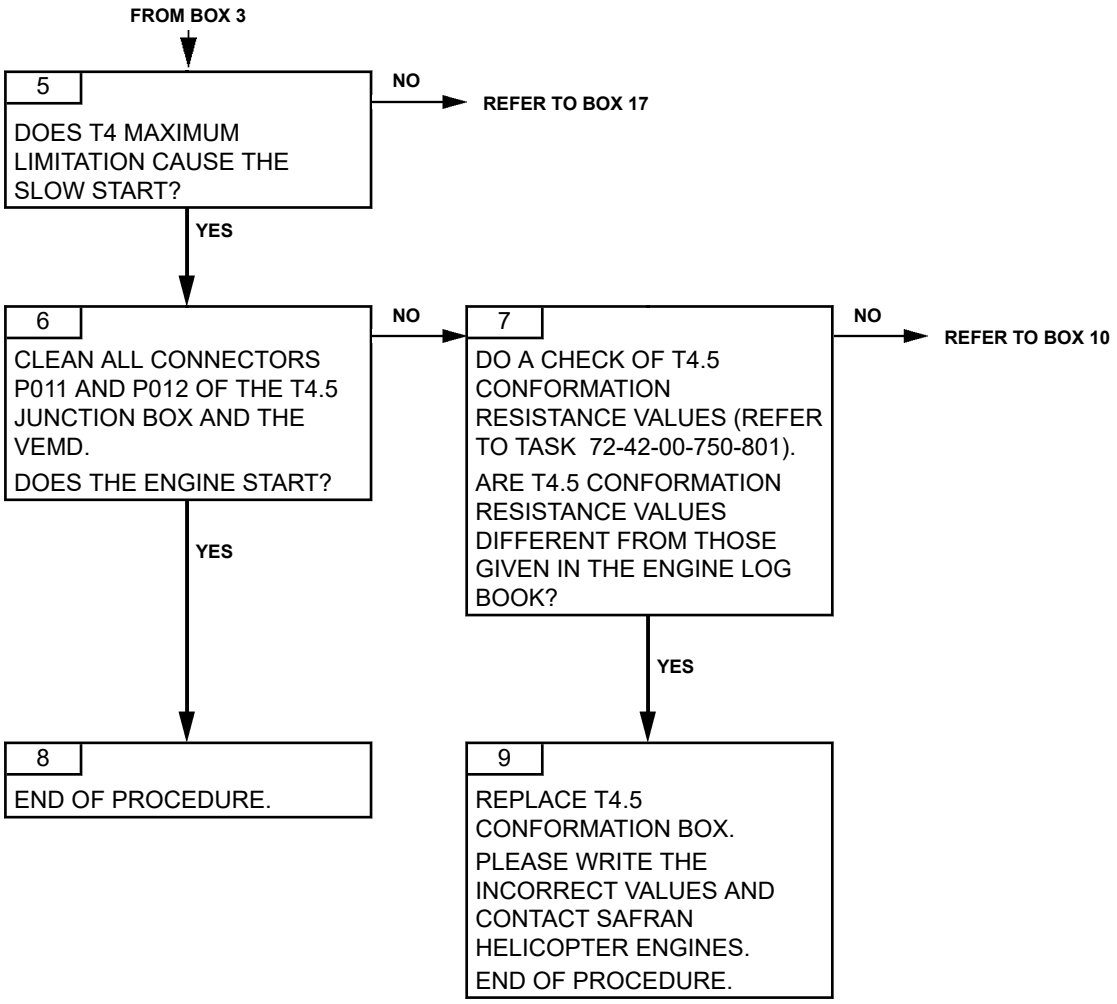

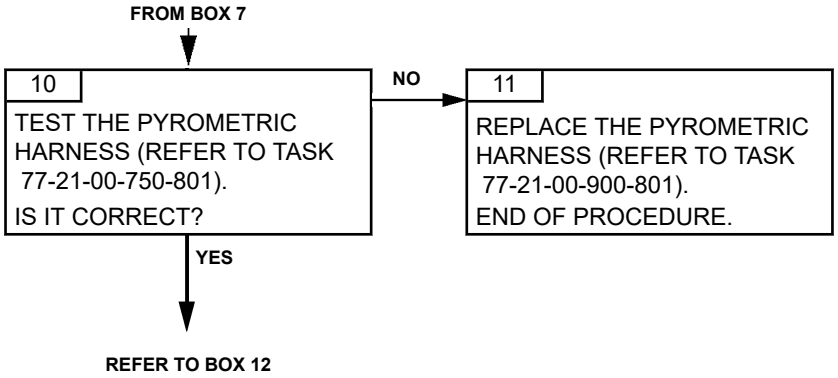

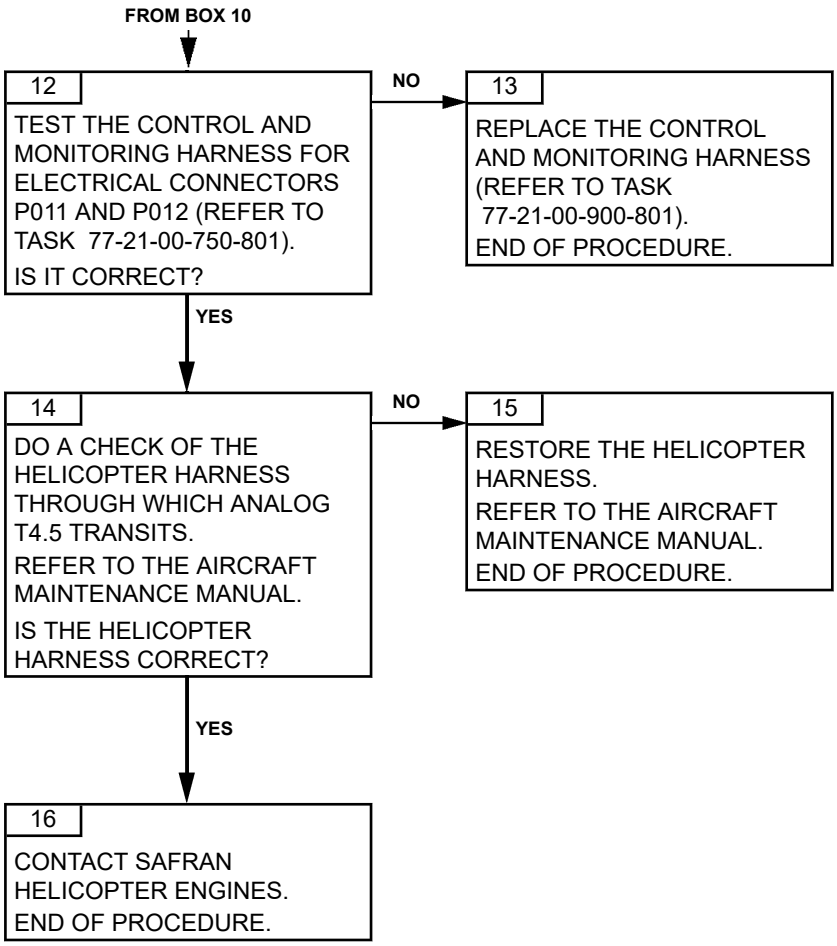

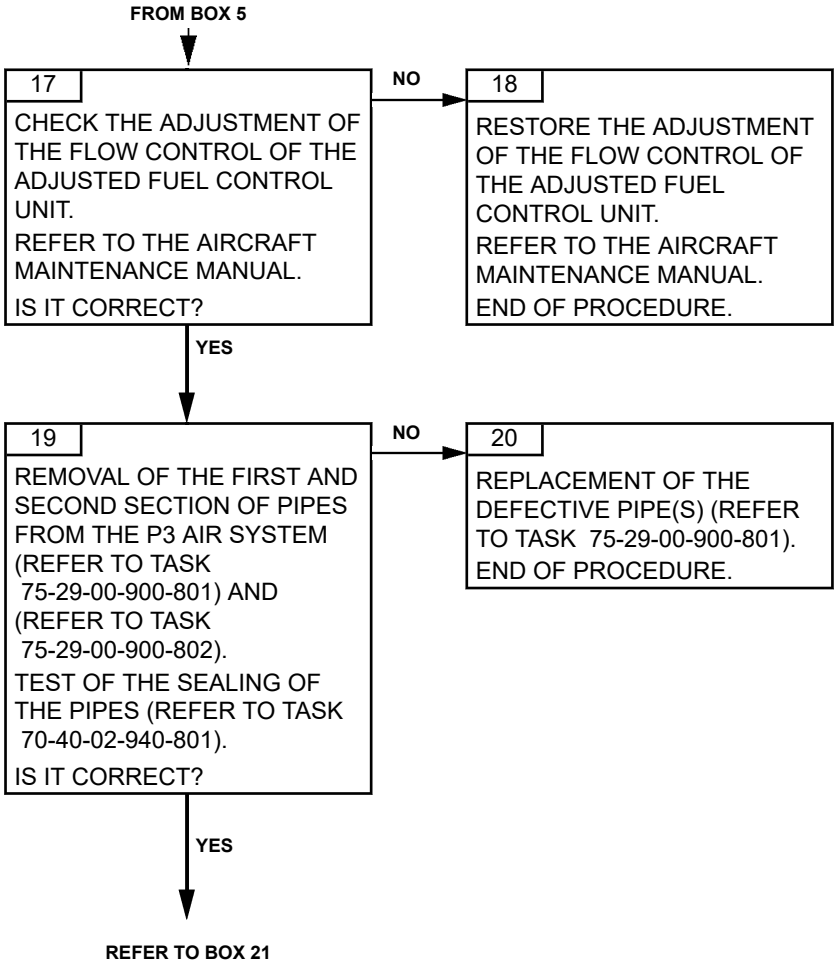

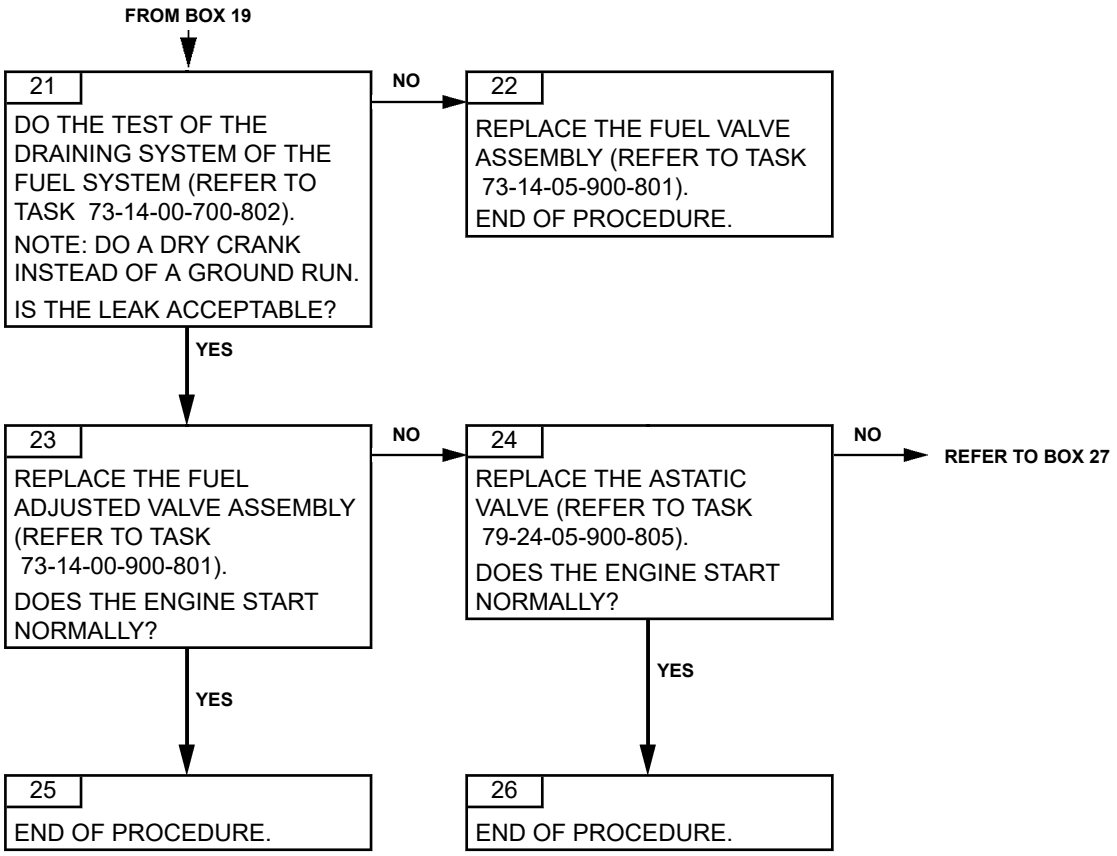

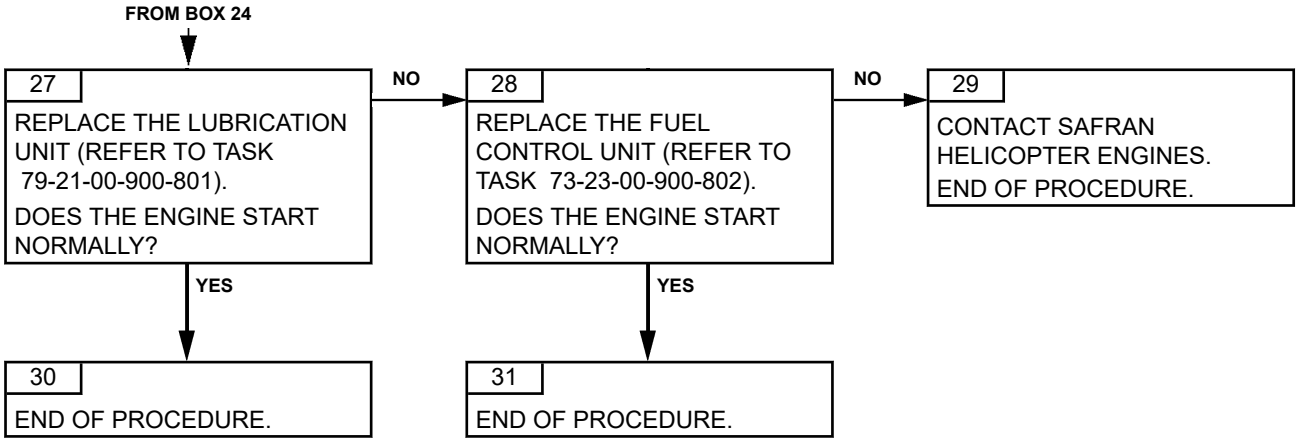

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TASK 71-00-06-811-810-A01

ABORTED START - ENGINE FLAME-OUT AFTER IGNITION TROUBLESHOOTING

1. GENERAL

A. PHASE

During the start phase

B. REMINDER OF THE NORMAL OPERATING CONDITION

The low fuel pressure signal is off.

The fuel is in accordance with the standards.

During the start phase, the plugs make sparks, the start electro-valve opens and the fuel is ignited at the start injectors. The pressure of the fuel pump increases and supplies the preference injector and the main injectors.

In troubleshooting book, there are different troubleshooting tasks concerning aborted start.

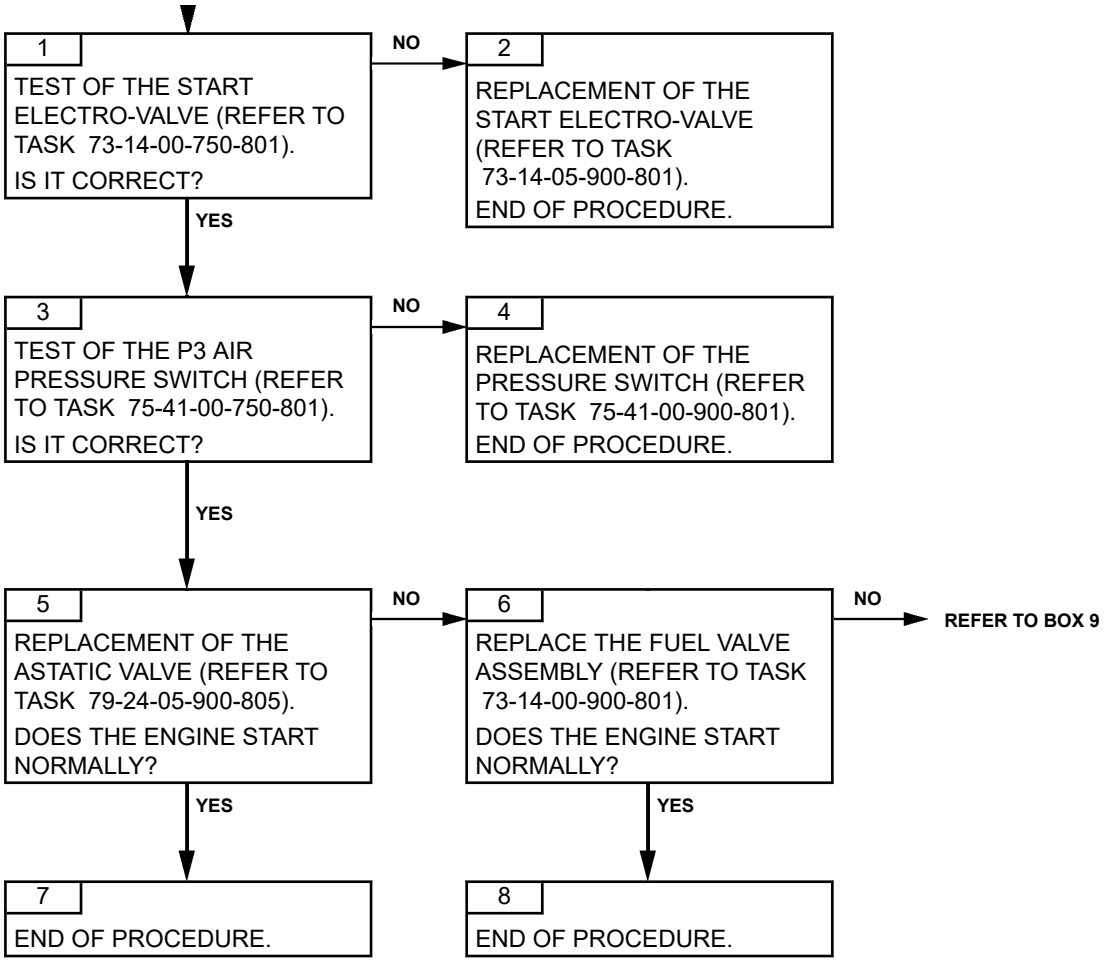
Titles are:

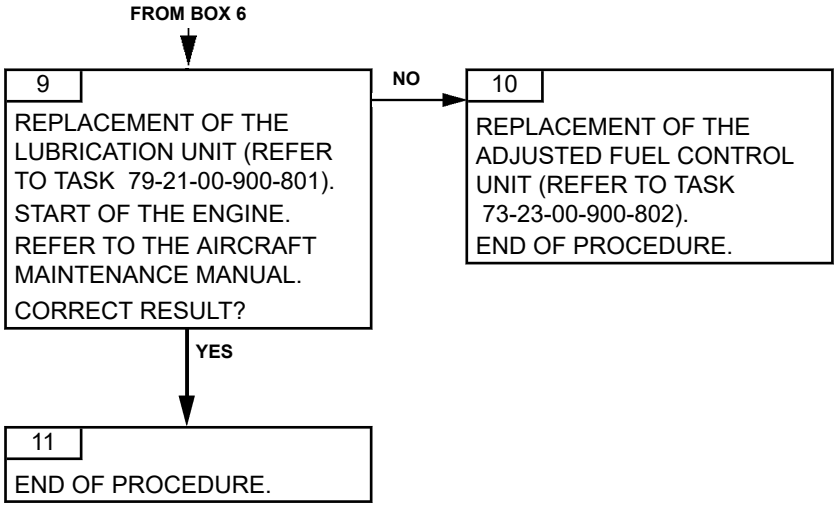
- **“Aborted start: gas generator not driven”**: Do this troubleshooting task if the gas generator is not driven at all (N1 = 0%) at the engine start selection or during cranking.
- **“Aborted start: no ignition”**: The pilot turns the principal selector STOP/IDLE/FLIGHT to IDLE or FLIGHT, then the gas generator is driven but no ignition of the combustion chamber (T4 not increase).
- **“Aborted start: slow start or stagnation”**: Do this troubleshooting task when the ignition in the combustion chamber is observed, but the N1 speed increases slower than usually, or the N1 speed stops to increase during start (and the pilot has to abort manually the starting sequence).
- **“Aborted start: flames at the exhaust pipe”**: Do this troubleshooting task when the starting sequence generates abnormal flames at the exhaust pipe.
- **“Aborted start: flame-out”**: Do this troubleshooting task when the ignition is observed but the combustion chamber flames out.
- **“T4.5 limitations exceeded”**: Do this troubleshooting task when there is a T4.5 overtemperature observed during engine running or during starting sequence.

C. POSSIBLE CAUSES

- Start electro-valve
- P3 air pressure switch
- Astatic valve
- Lubrication unit
- Adjusted fuel control unit.

2. PROCEDURE





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TASK 71-00-06-811-811-A01

NO EXTINGUISHING OF THE LOW FUEL PRESSURE "FUEL P" DURING THE STARTING PHASE TROUBLESHOOTING

1. GENERAL

A. PHASE

During the start phase.

B. GENERAL DESCRIPTION

The low fuel pressure switch is located at the fuel filter inlet.

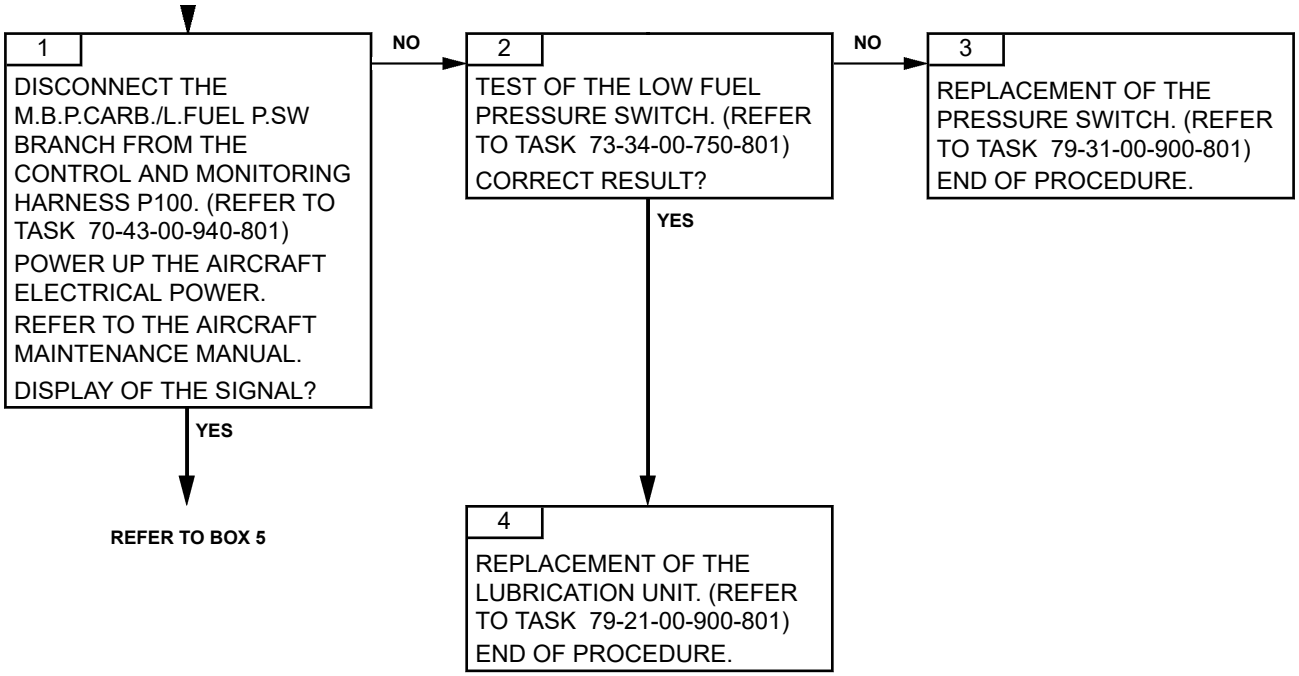
The low fuel pressure switch is connected to the aircraft.

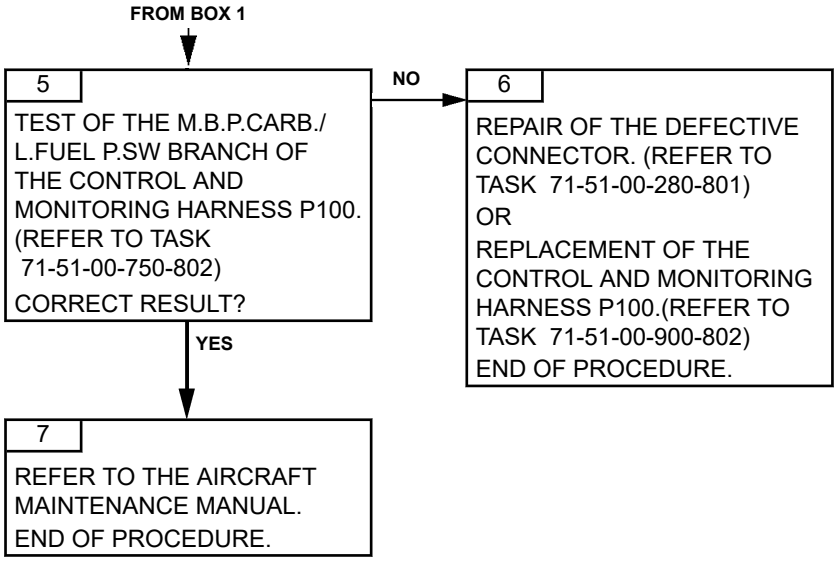
The low pressure fuel signal must be OFF when the booster pump operates.

C. POSSIBLE CAUSES

- Low fuel pressure switch
- Lubrication unit (ejector)
- Control and monitoring harness P100
- Aircraft

2. PROCEDURE





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TASK 71-00-06-811-812-A01

NO EXTINGUISHING OF THE LOW OIL PRESSURE "ENG P" DURING THE STARTING PHASE TROUBLESHOOTING

1. GENERAL

A. PHASE

During the start phase.

B. GENERAL DESCRIPTION

The tolerance criteria for oil pressure limitation are defined: (Refer to Task 71-00-02-940-801).

The low oil pressure switch is located at the oil filter outlet.

The low oil pressure switch is connected to the aircraft.

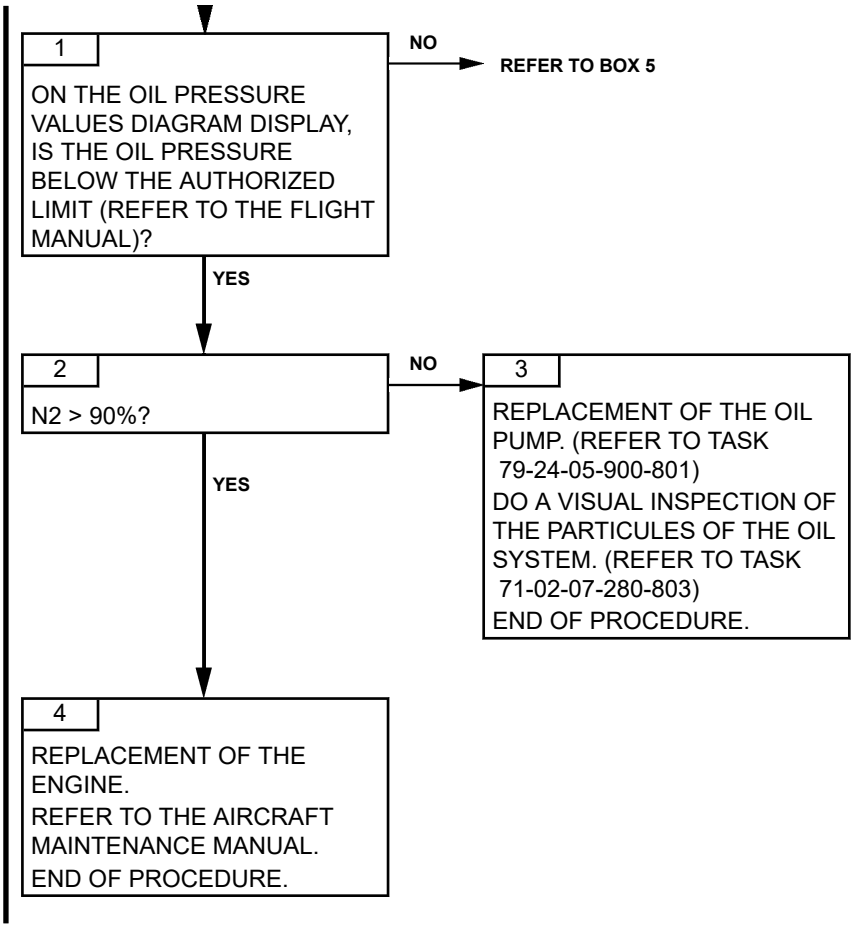
The "ENG-P" light is ON until the N1 speed reaches the extinction threshold.

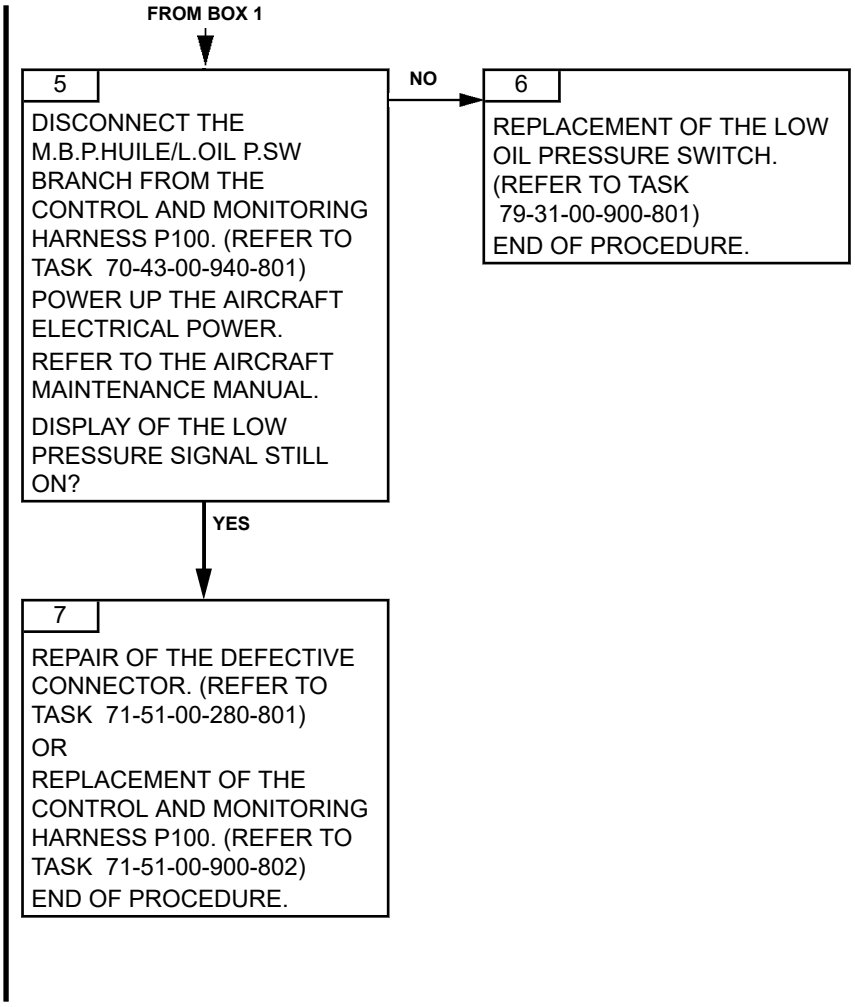
Apply the troubleshooting task if the "ENG P" light remains ON during the starting phase.

C. POSSIBLE CAUSES

- Low oil pressure switch
- Oil pump
- Control and monitoring harness P100

2. PROCEDURE





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TASK 71-00-06-812-801-A01

ABORTED START - GAS GENERATOR NOT DRIVEN TROUBLESHOOTING

1. GENERAL

A. PHASE

During starting.

B. REMINDER OF THE NORMAL OPERATING CONDITION

The starter drives the gas-generator rotating assembly through the accessory drive train.

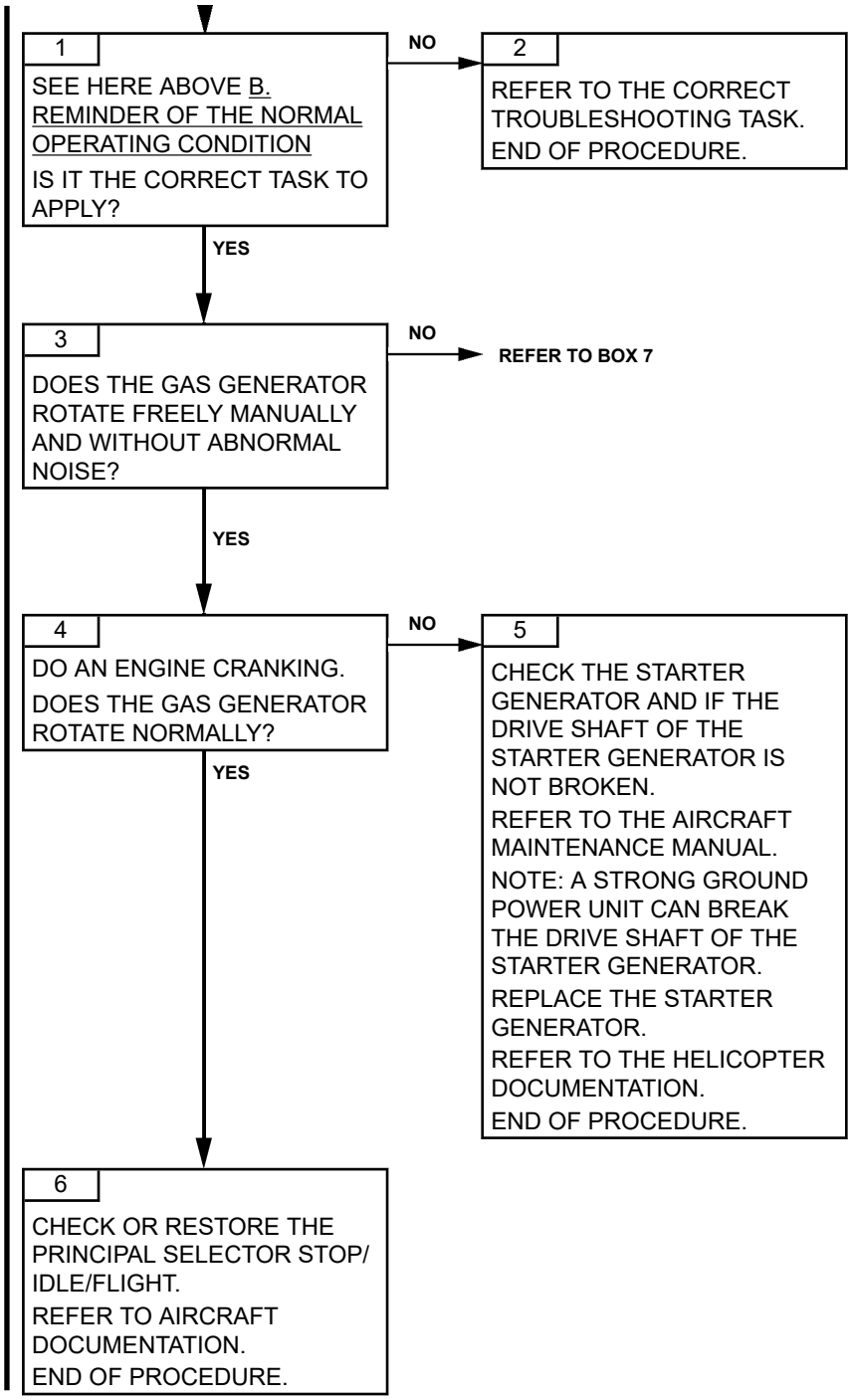
Titles are:

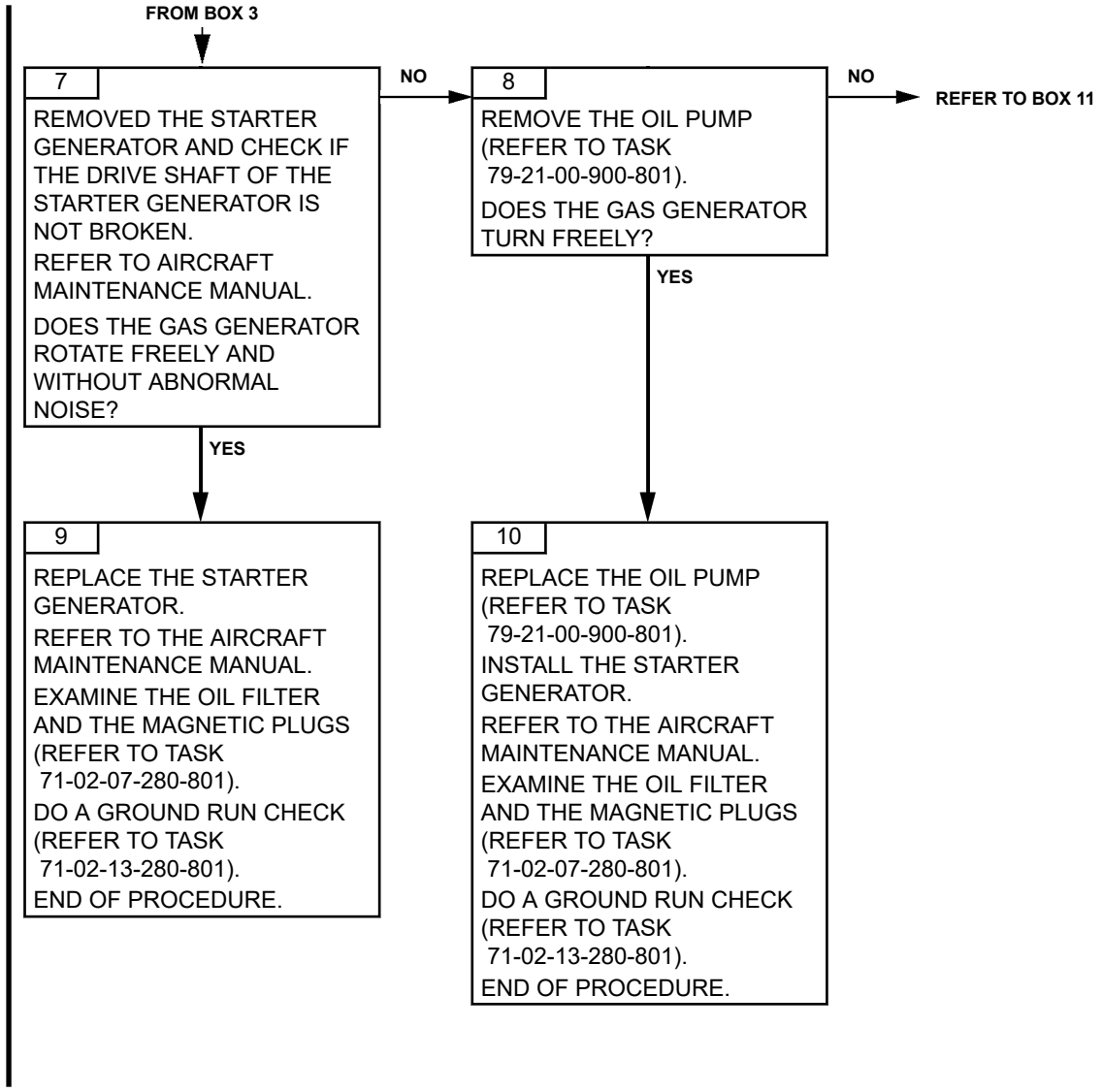
- **“Aborted start: gas generator not driven”**: Do this troubleshooting task if the gas generator is not driven at all (N1 = 0%) at the engine start selection or during cranking.
- **“Aborted start: no ignition”**: The pilot turns the principal selector STOP/IDLE/FLIGHT to IDLE or FLIGHT, then the gas generator is driven but no ignition of the combustion chamber (T4 not increase).
- **“Aborted start: slow start or stagnation”**: Do this troubleshooting task when the ignition in the combustion chamber is observed, but the N1 speed increases slower than usually, or the N1 speed stops to increase during start (and the pilot has to abort manually the starting sequence).
- **“Aborted start: flame-out”**: Do this troubleshooting task when the ignition is observed but the combustion chamber flames out.
- **“Aborted start: flames at the exhaust pipe”**: Do this troubleshooting task when the starting sequence generates abnormal flames at the exhaust pipe.
- **“T4.5 limitations exceeded”**: Do this troubleshooting task when there is a T4.5 overtemperature observed during engine running or during starting sequence.

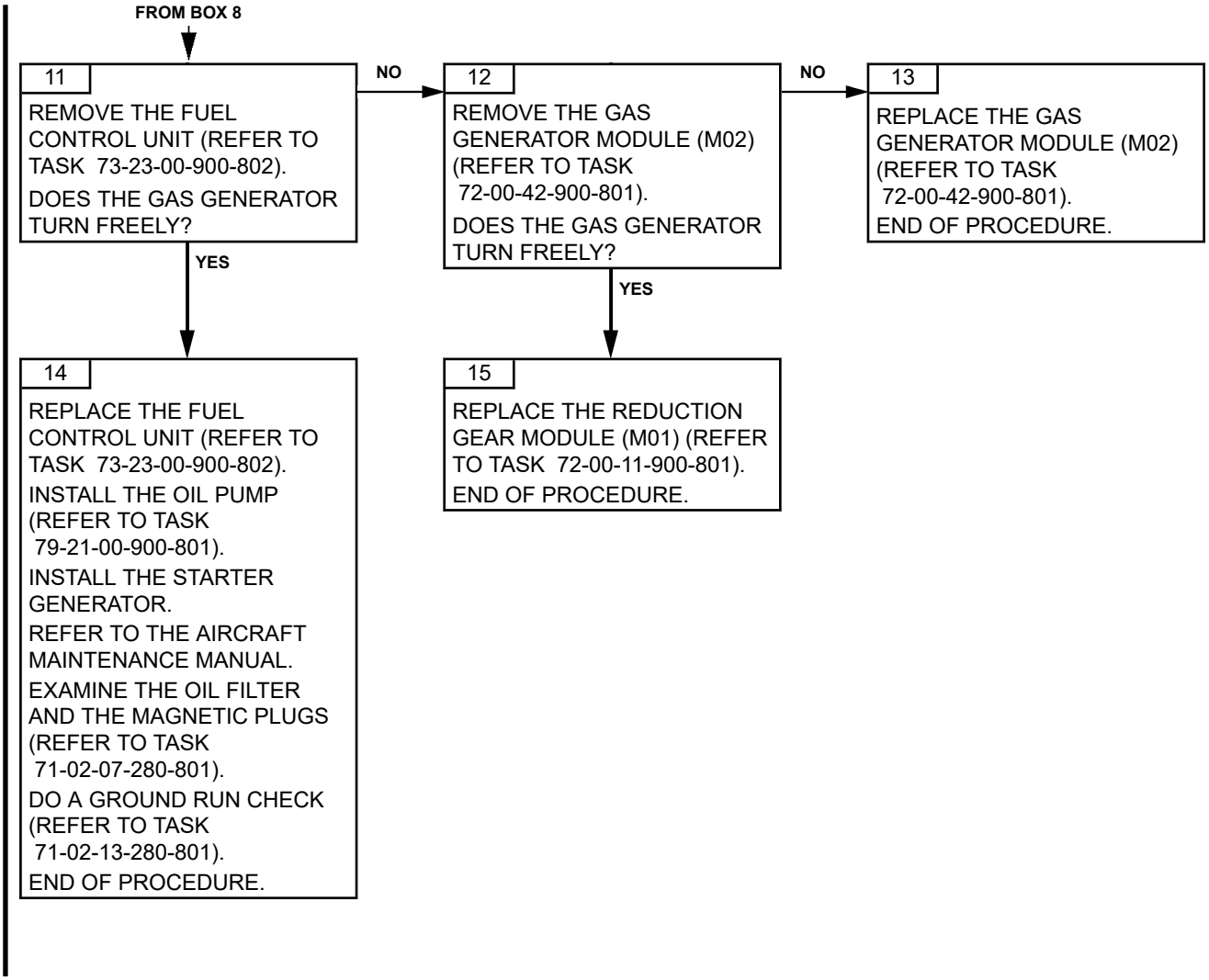
C. POSSIBLE CAUSES

- Starter generator
- Reduction gear module (M01)
- Gas generator module (M02)
- Oil pump
- Fuel Control Unit
- Aircraft.

2. PROCEDURE







TASK 71-00-06-812-805-A01

ABORTED START - T4.5 OVERTEMPERATURE TROUBLESHOOTING

1. GENERAL

A. PHASE

During the start phase

B. GENERAL DESCRIPTION

ENGINE LIMITATIONS (Refer to Task 71-00-01-940-801).

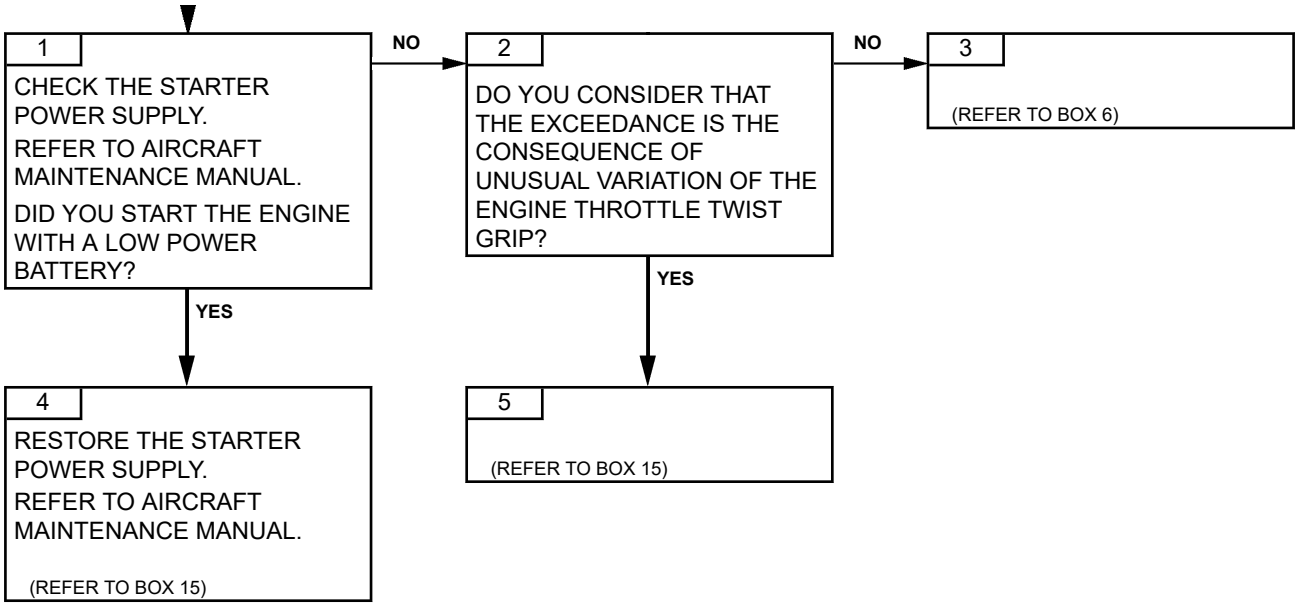
C. POSSIBLE CAUSES

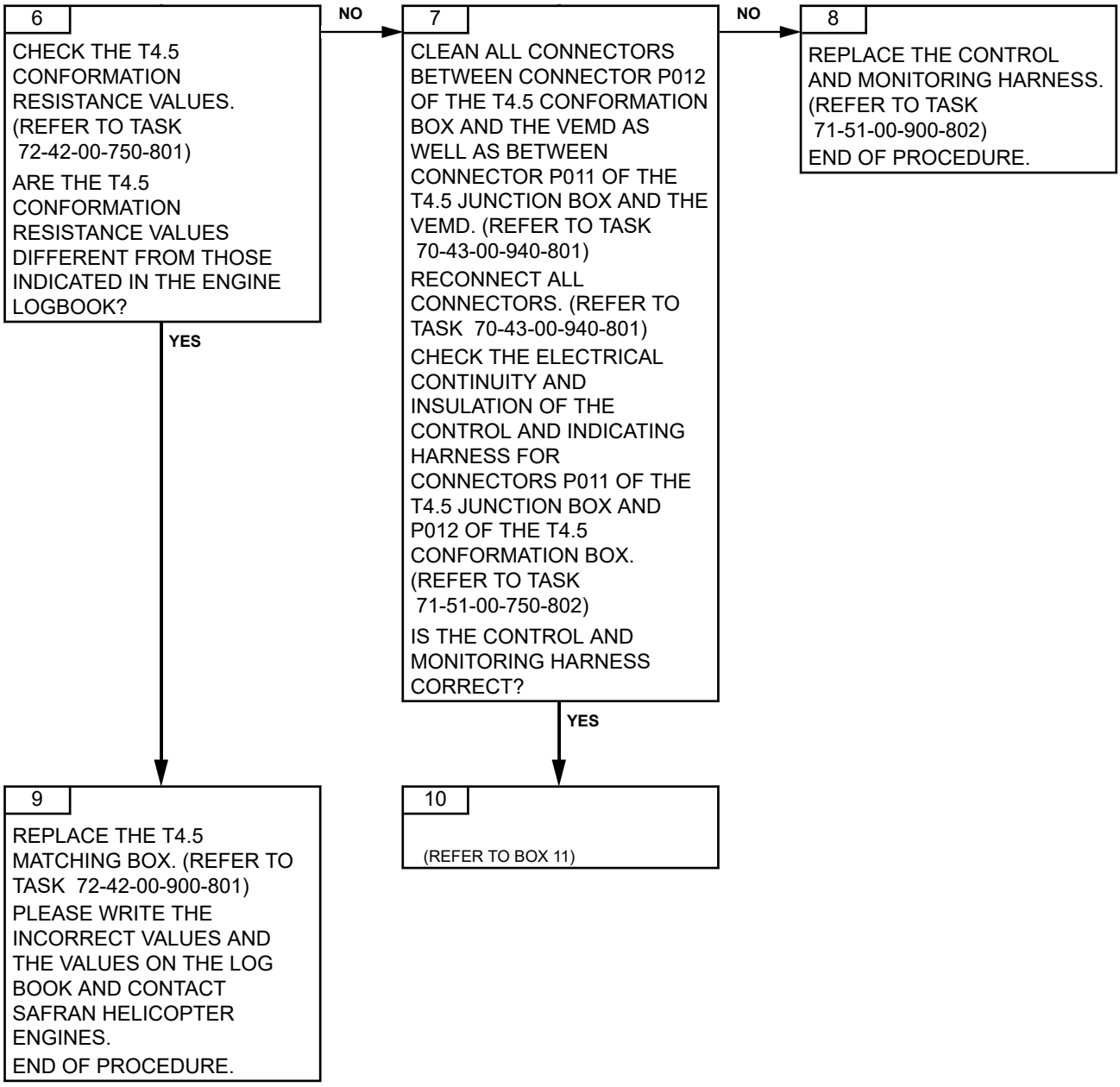
- Unusual variation of the engine throttle twist grip
- Pyrometric harness
- T4.5 matching box
- Control and monitoring harness P100
- Aircraft (indication harness, battery, starter)

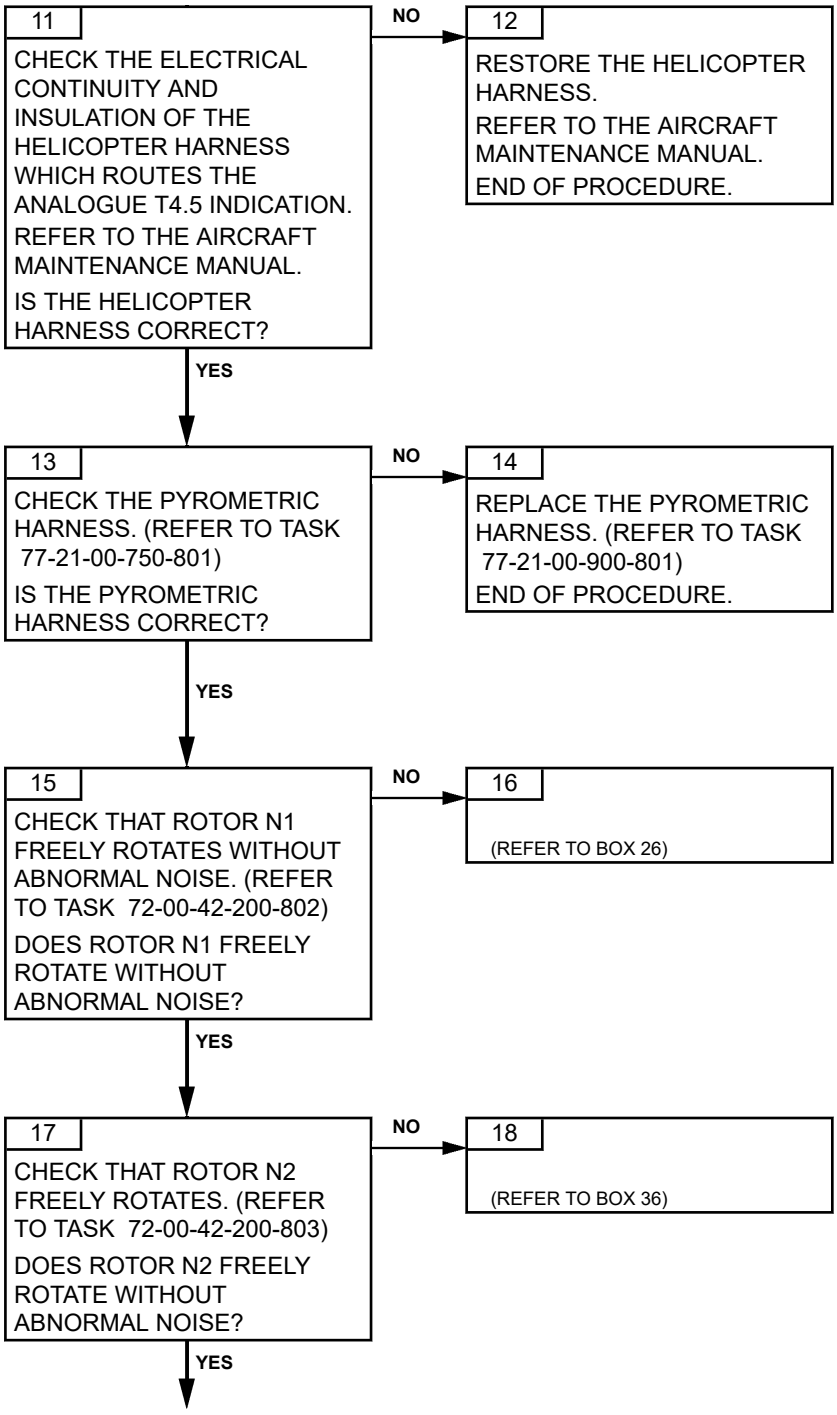
2. PROCEDURE

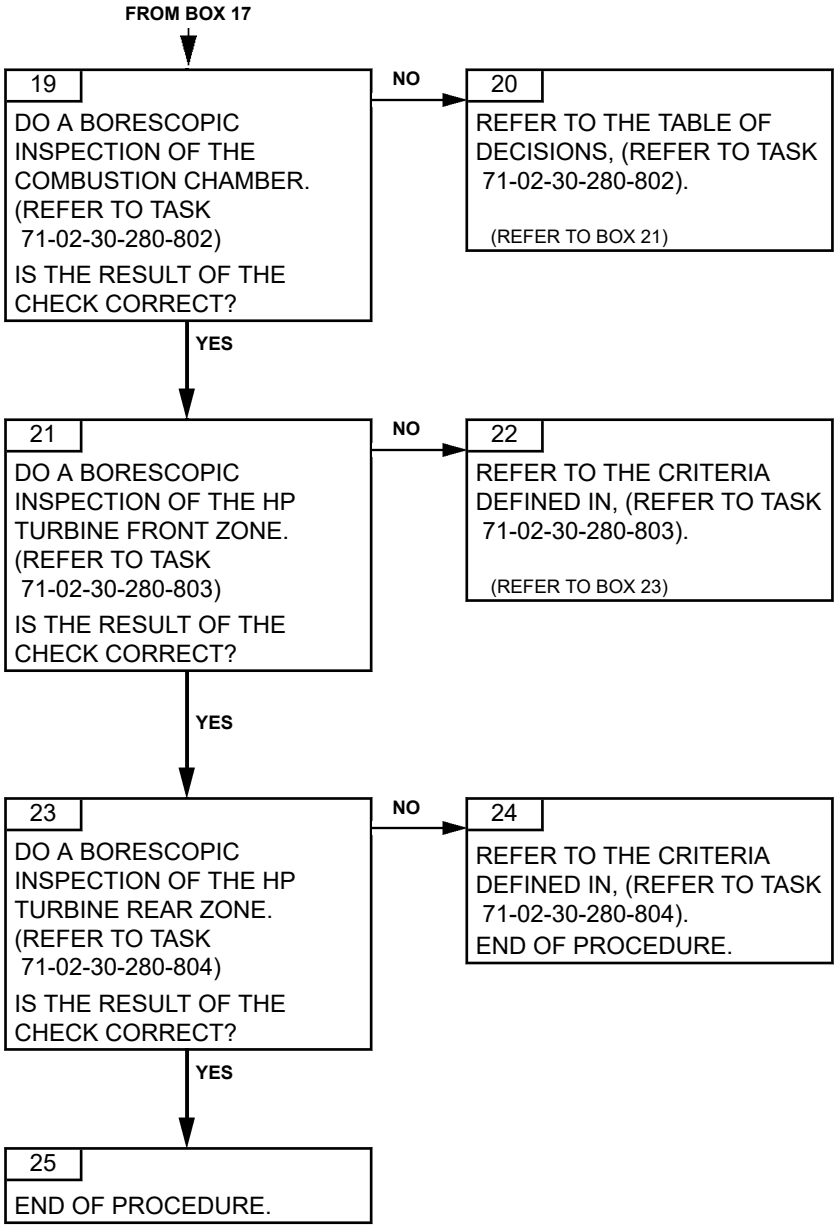
NOTE: ***Note the overtemperature (T4.5 and time) on the engine log book (section E).***

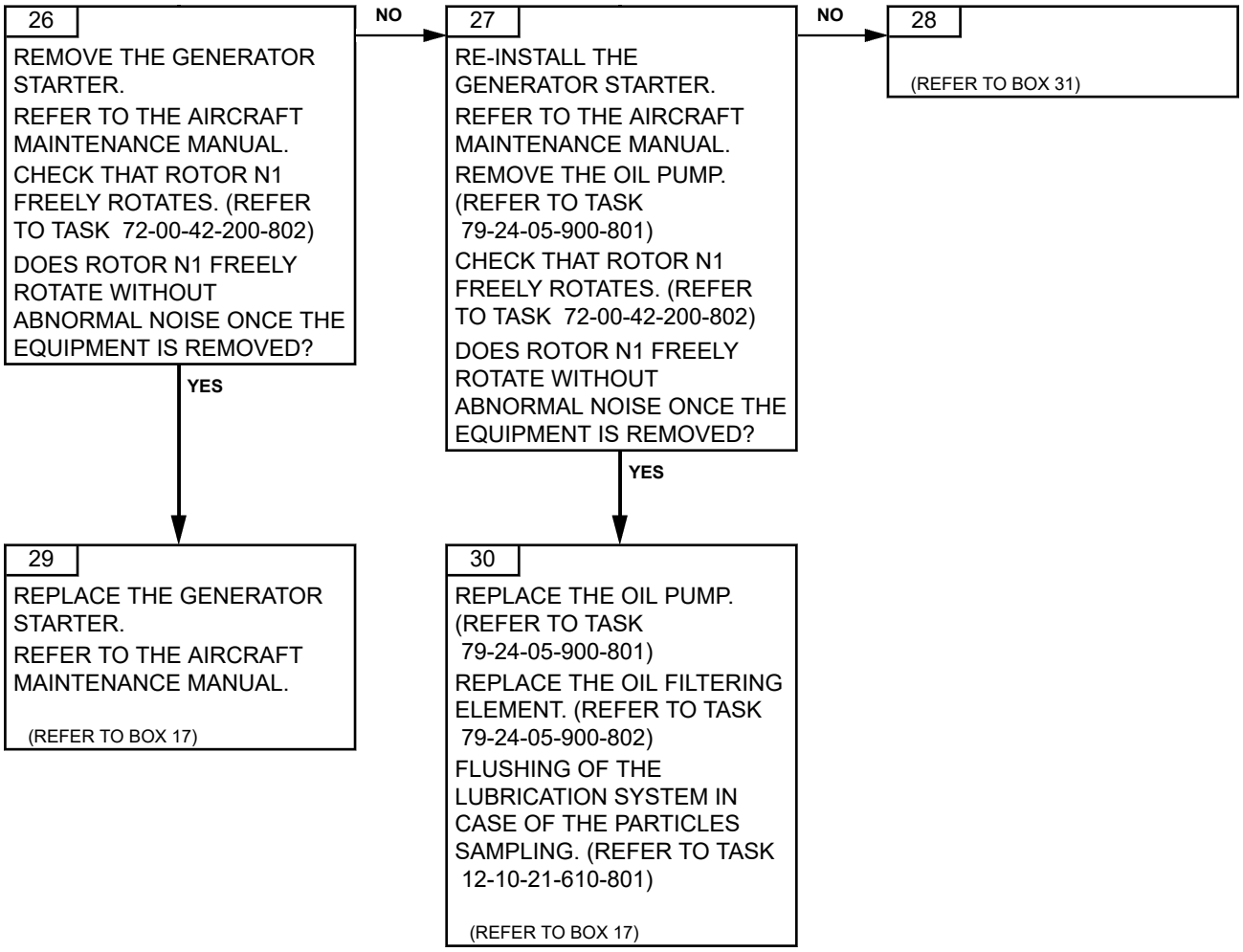
NOTE: ***First, the fault isolation procedure helps you to find the root cause and to repair the engine part related to that root cause. After that, the troubleshooting procedure gives the checks and repairs of the event consequences on the engine.***

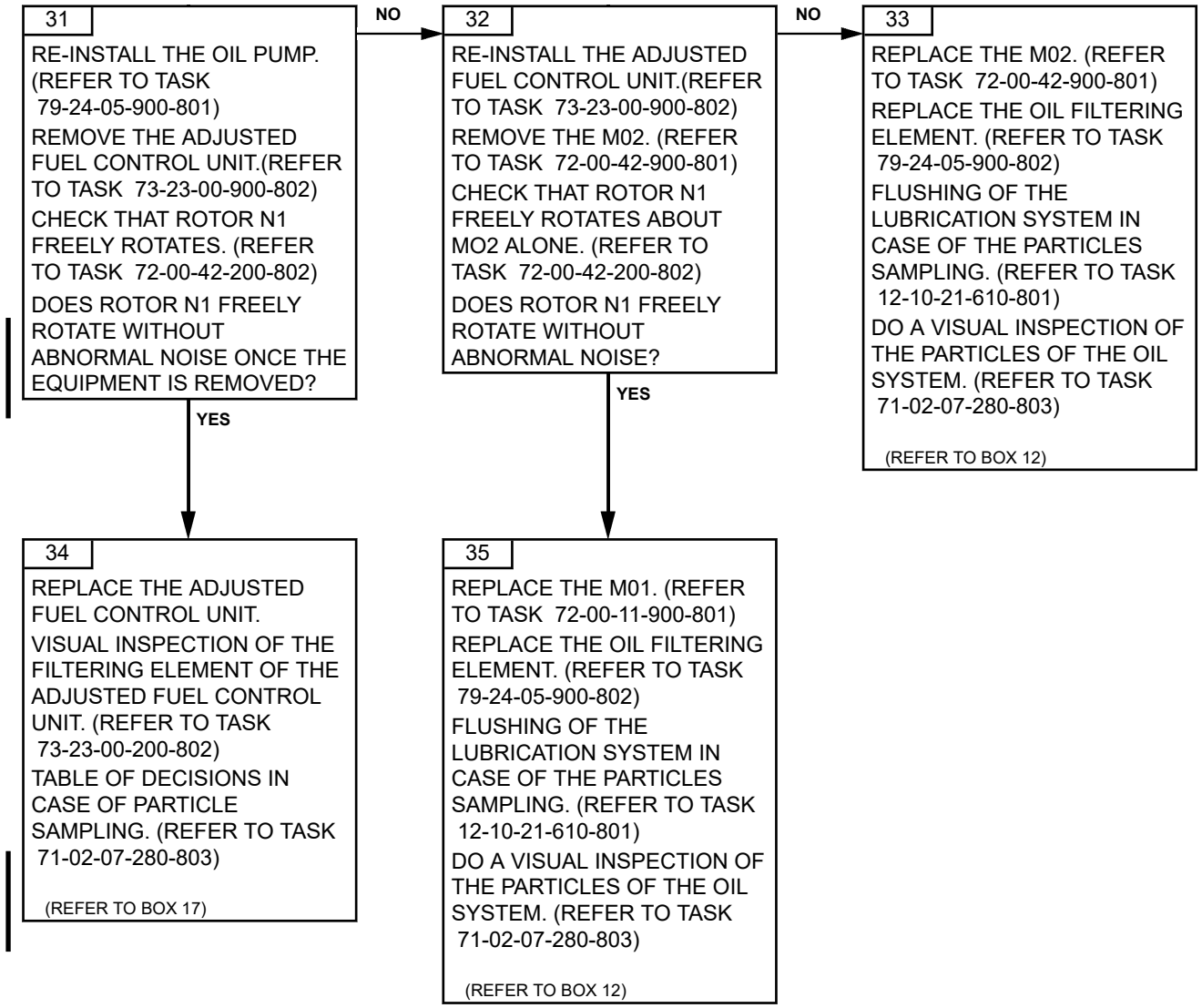


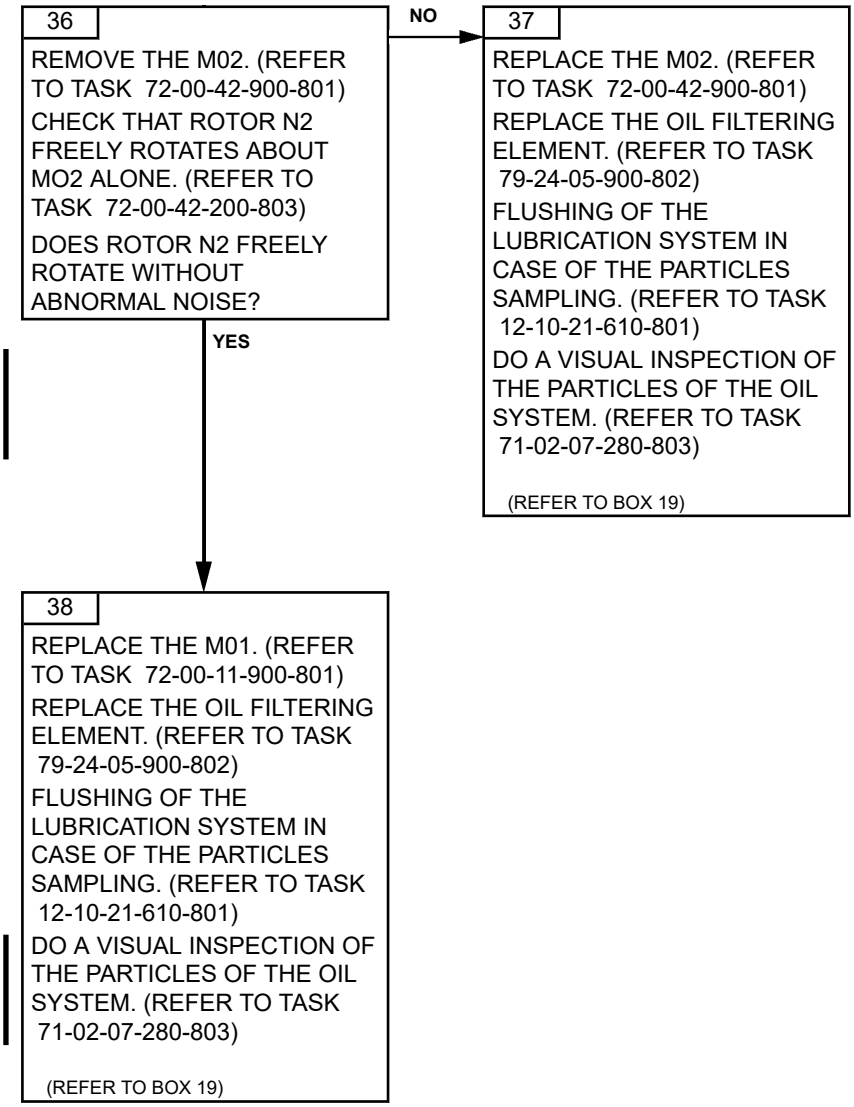












TASK 71-00-06-812-816-A01

ABORTED START - NO IGNITION TROUBLESHOOTING

1. GENERAL

A. PHASE

During starting

B. REMINDER OF THE NORMAL OPERATING CONDITION

The normal operating condition is that the starter drives correctly the gas generator.

When the engine reaches the self-sustaining speed, the start electro-valve of the adjusted valve assembly closes. The start injectors are then ventilated. The main injectors and the preference injector assembly are supplied with fuel.

In troubleshooting book, there are different troubleshooting tasks concerning aborted start.

Titles are:

- **“Aborted start: gas generator not driven”**: Do this troubleshooting task if the gas generator is not driven at all (N1 = 0%) at the engine start selection or during cranking.
- **“Aborted start: no ignition”**: The pilot turns the principal selector STOP/IDLE/FLIGHT to IDLE or FLIGHT, then the gas generator is driven but no ignition of the combustion chamber (T4 not increase).
- **“Aborted start: slow start or stagnation”**: Do this troubleshooting task when the ignition in the combustion chamber is observed, but the N1 speed increases slower than usually, or the N1 speed stops to increase during start (and the pilot has to abort manually the starting sequence).
- **“Aborted start: flames at the exhaust pipe”**: Do this troubleshooting task when the starting sequence generates abnormal flames at the exhaust pipe.
- **“Aborted start: flame-out”**: Do this troubleshooting task when the ignition is observed but the combustion chamber flames out.
- **“T4.5 limitations exceeded”**: Do this troubleshooting task when there is a T4.5 overtemperature observed during engine running or during starting sequence.

C. POSSIBLE CAUSES

- Igniters plugs
- Ignition unit
- Ignition cable
- Fuel valve assembly
- Start injectors
- Control and monitoring harness
- Fuel control unit
- External condition (tail wind)
- Aircraft.

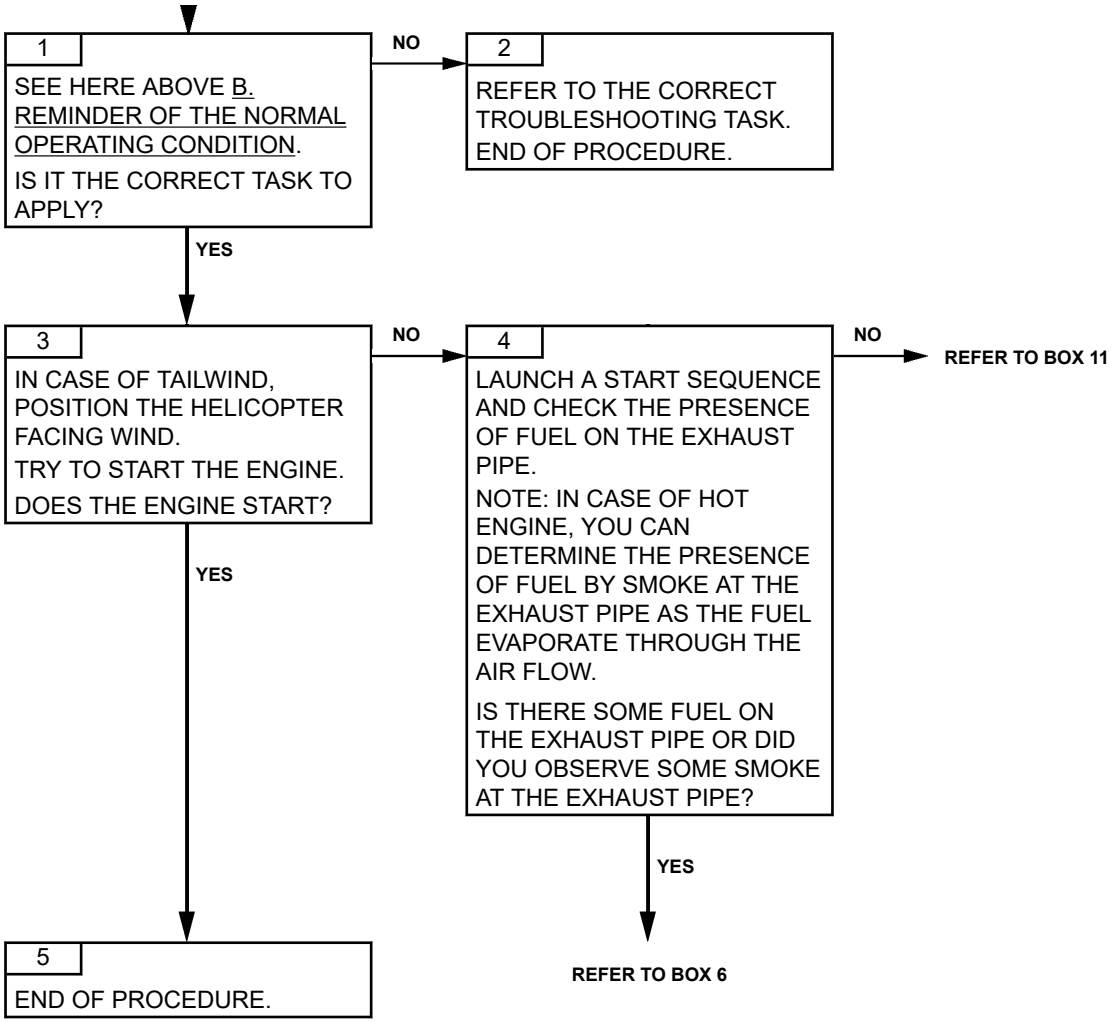
2. PROCEDURE

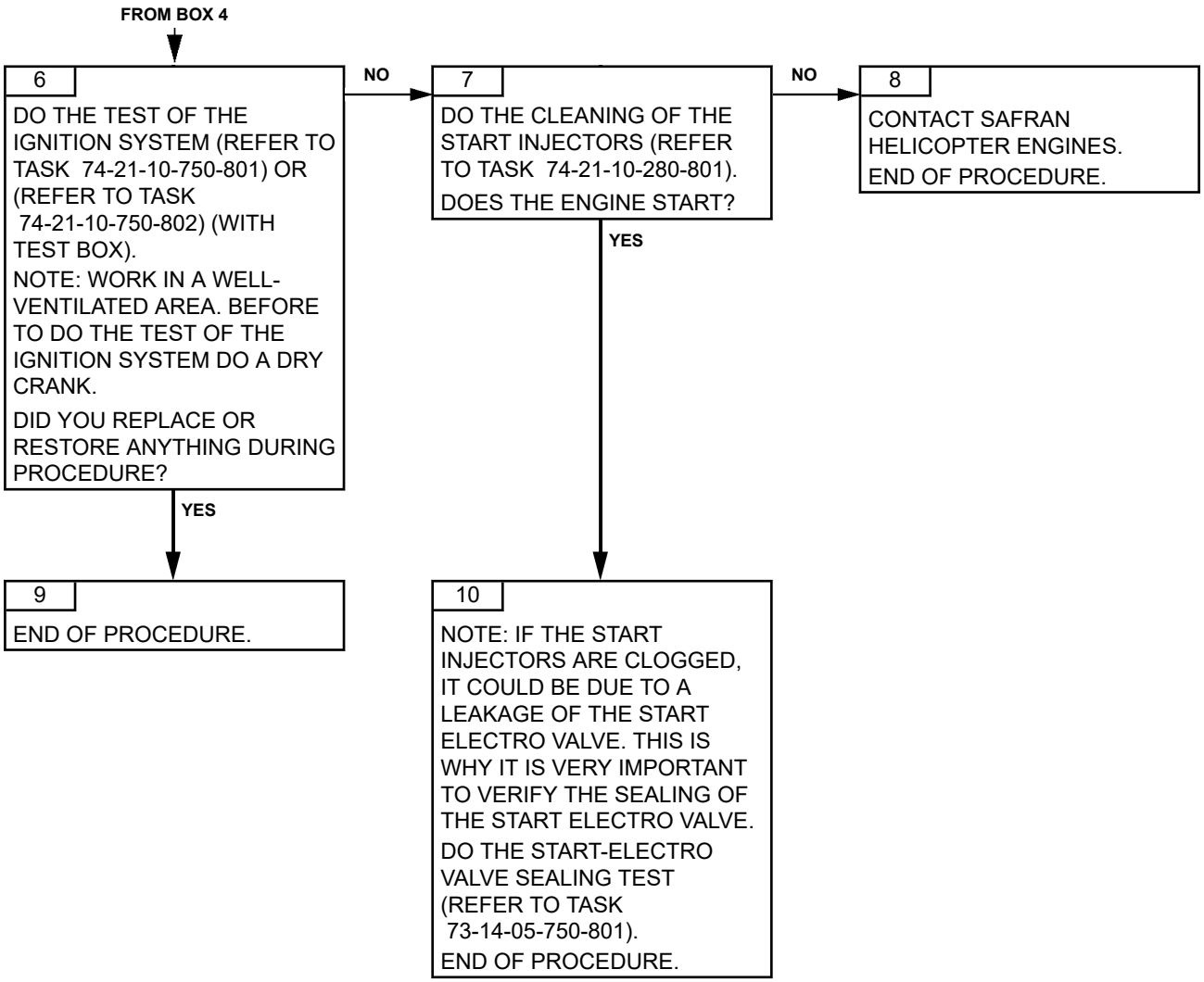
NOTE: ***In case of a recent maintenance operation performed on this engine or on the aircraft starting system (starter, battery, fuse, selector, harness...), check firstly the sub***

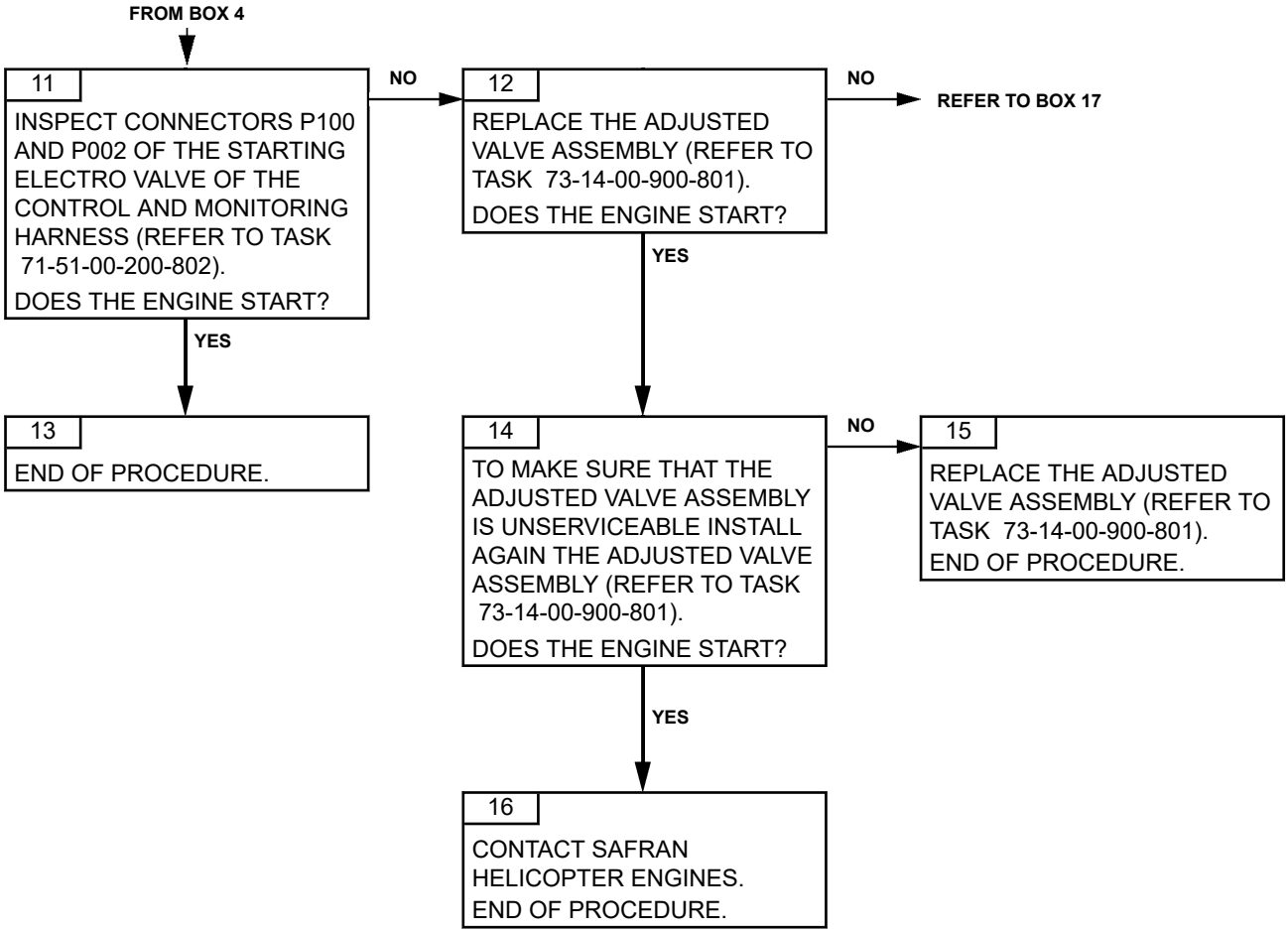
assembly concerned by this maintenance operation. In particular the plug and connectors.

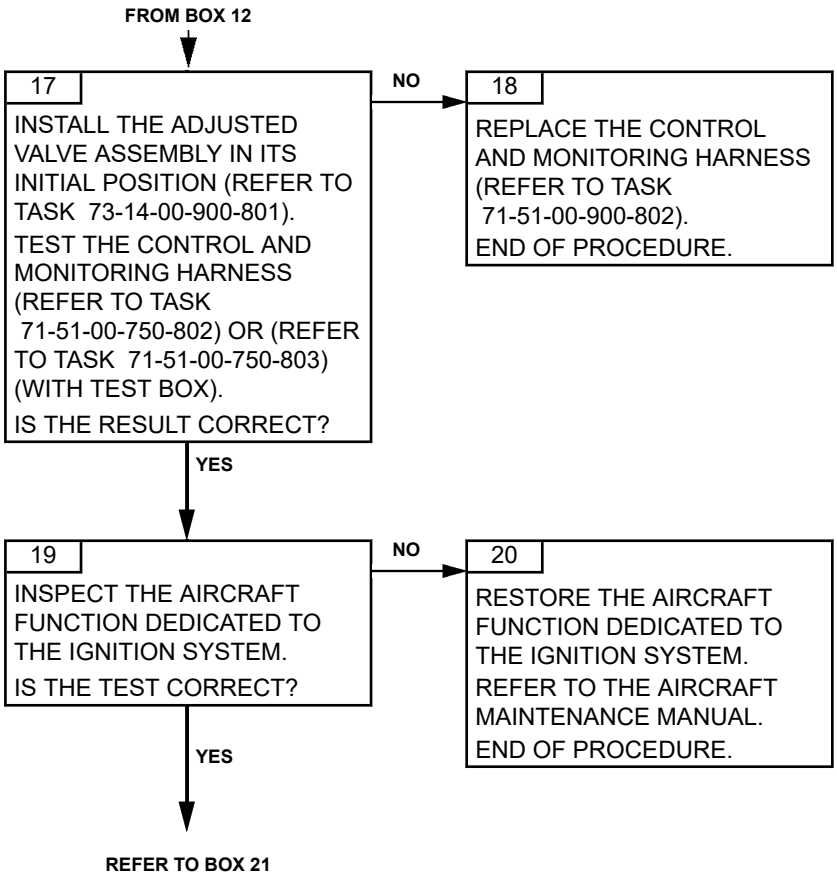
NOTE: ***It is possible to interchange equipment with the other engine.***

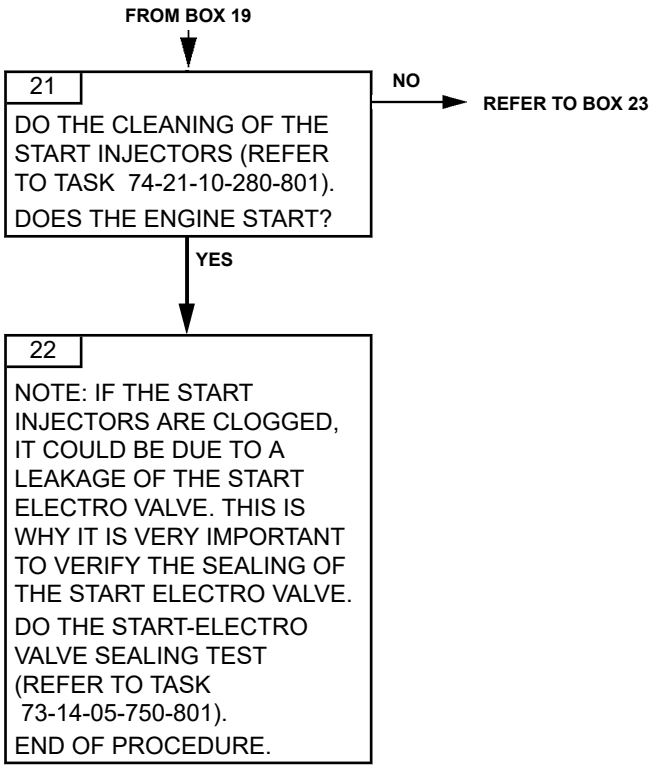
- ***If the engine start normally, both the equipment shall be reinstall in their original location in order to confirm the fault. If the fault is confirmed, then the faulty equipment has to be replaced***
- ***If the engine doesn't start normally, both the equipment shall be reinstall in their original location and you have to carry on the next step of the troubleshooting tree.***

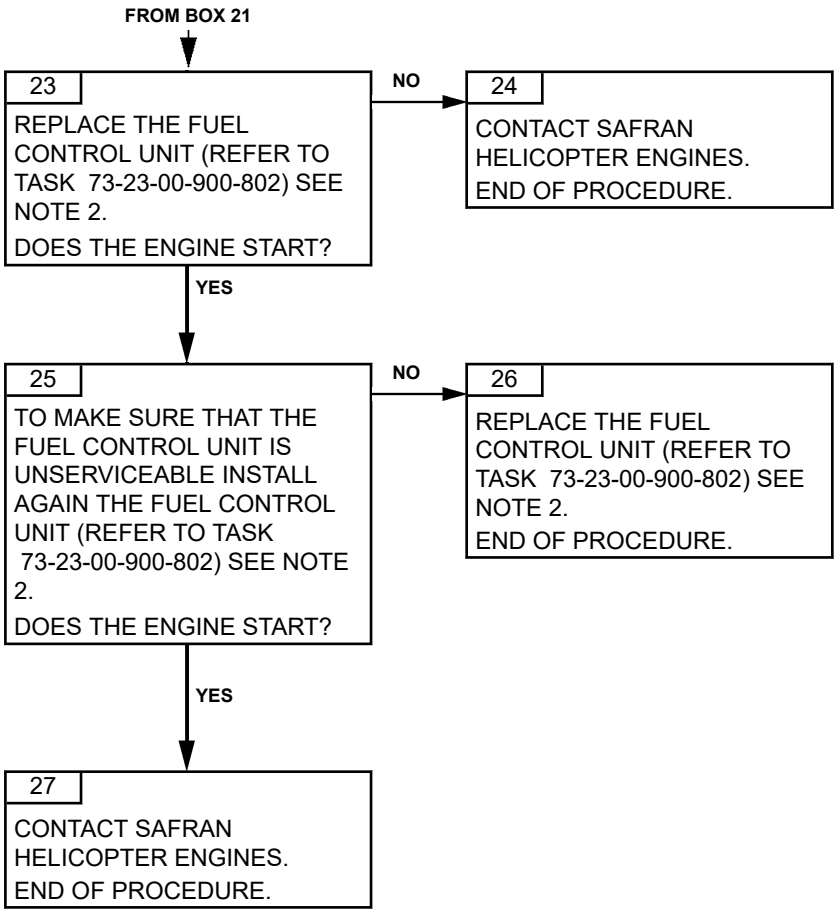












TASK 71-00-06-813-801-A01

MTOP RATING (MAXIMUM TAKE-OFF POWER) NOT REACHED TROUBLESHOOTING

1. GENERAL

A. PHASE

During operation or during the scheduled inspection of the MTOP (Max. Take-Off power).

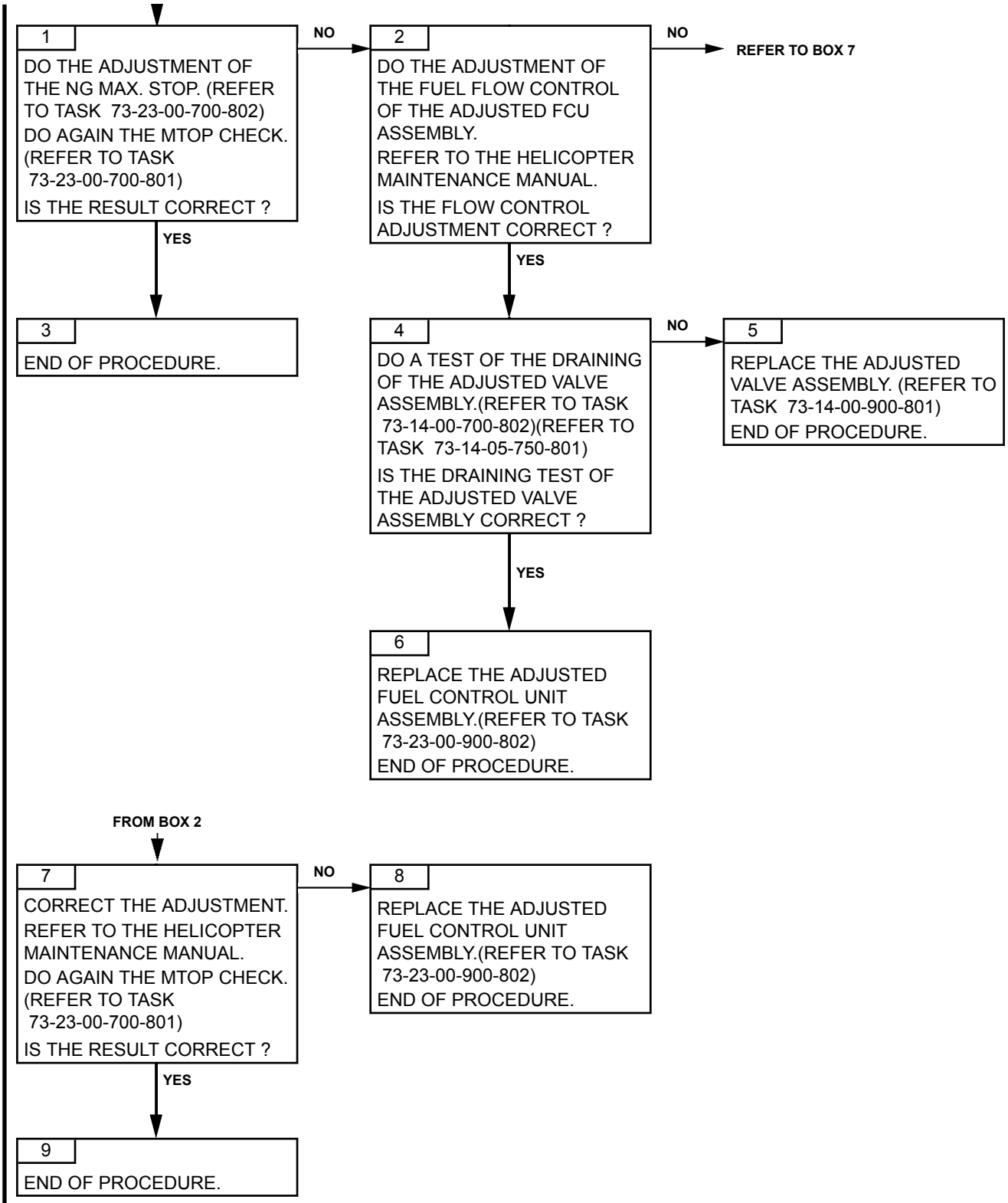
B. REMINDER OF THE NORMAL OPERATING CONDITION

Refer to the Limitations task (Refer to Task 71-00-01-940-801).

C. POSSIBLE CAUSES

ADJUSTED FUEL CONTROL UNIT ASSEMBLY
ADJUSTED VALVE ASSEMBLY
FUEL CONTROL
NG MAX. STOP

2. PROCEDURE



TASK 71-00-06-813-802-A01

FLUCTUATION OF N1 AND T4.5 TROUBLESHOOTING

1. GENERAL

A. PHASE

During operation

B. REMINDER OF THE NORMAL OPERATING CONDITION

No air bleed at the fuel supply system of the engine.
During a stabilized flight, the engine parameters must be constant.

C. POSSIBLE CAUSES

– Adjusted fuel control unit

2. PROCEDURE

1

REPLACEMENT OF THE ADJUSTED FUEL CONTROL UNIT. (REFER TO TASK 73-23-00-900-802)
END OF PROCEDURE.

TASK 71-00-06-813-803-A01

NO TORQUE INDICATION TROUBLESHOOTING

1. GENERAL

A. PHASE

During operation

B. REMINDER OF THE NORMAL OPERATING CONDITION

N2 >0%.

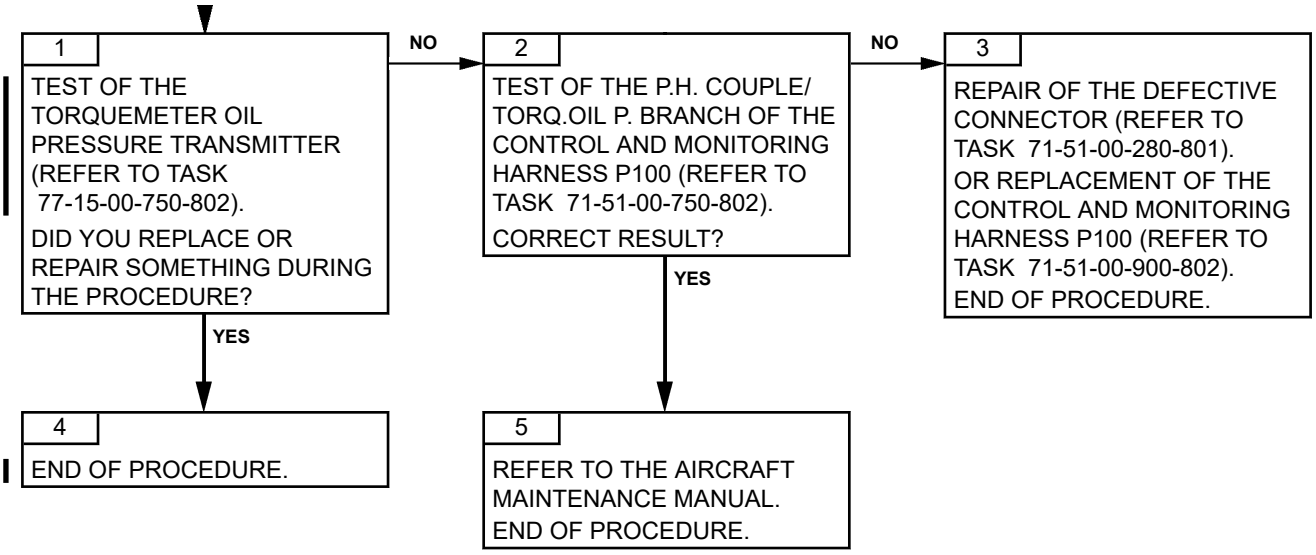
The oil pressure is correct at the oil pressure and temperature visual indicator.

When N2 is more than 0% steady display of the torque visual indicator.

C. POSSIBLE CAUSES

- Torquemeter oil pressure transmitter
- Control and monitoring harness P100
- Aircraft

2. PROCEDURE



TASK 71-00-06-813-804-A01

OIL TEMPERATURE TOO LOW ON THE DIAGRAM VALUES DISPLAY TROUBLESHOOTING

1. GENERAL

A. PHASE

During operation

B. GENERAL DESCRIPTION

The tolerance criteria for oil temperature limitation are defined:
(Refer to Task 71-00-02-940-801).

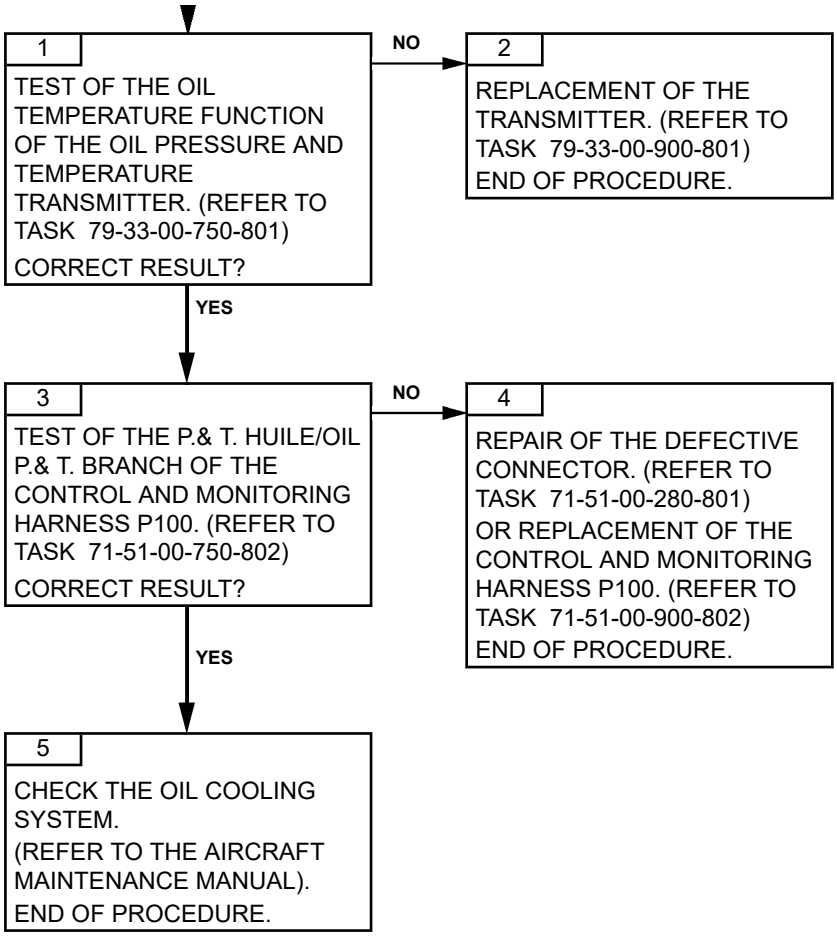
The oil temperature is monitored by the oil pressure and temperature transmitter, connected to the aircraft.

The oil pressure and temperature transmitter is located at the oil filter outlet.

C. POSSIBLE CAUSES

- Oil pressure and temperature transmitter
- Control and monitoring harness P100
- Aircraft

2. PROCEDURE



TASK 71-00-06-813-805-A01

OIL PRESSURE TOO LOW ON THE DIAGRAM VALUES DISPLAY TROUBLESHOOTING

1. GENERAL

A. PHASE

During operation

B. GENERAL DESCRIPTION

The tolerance criteria for oil temperature limitation are defined:
(Refer to Task 71-00-02-940-801).

The oil level must be correct and the pre-blockage visual indicator of the oil filtering element not popped out.

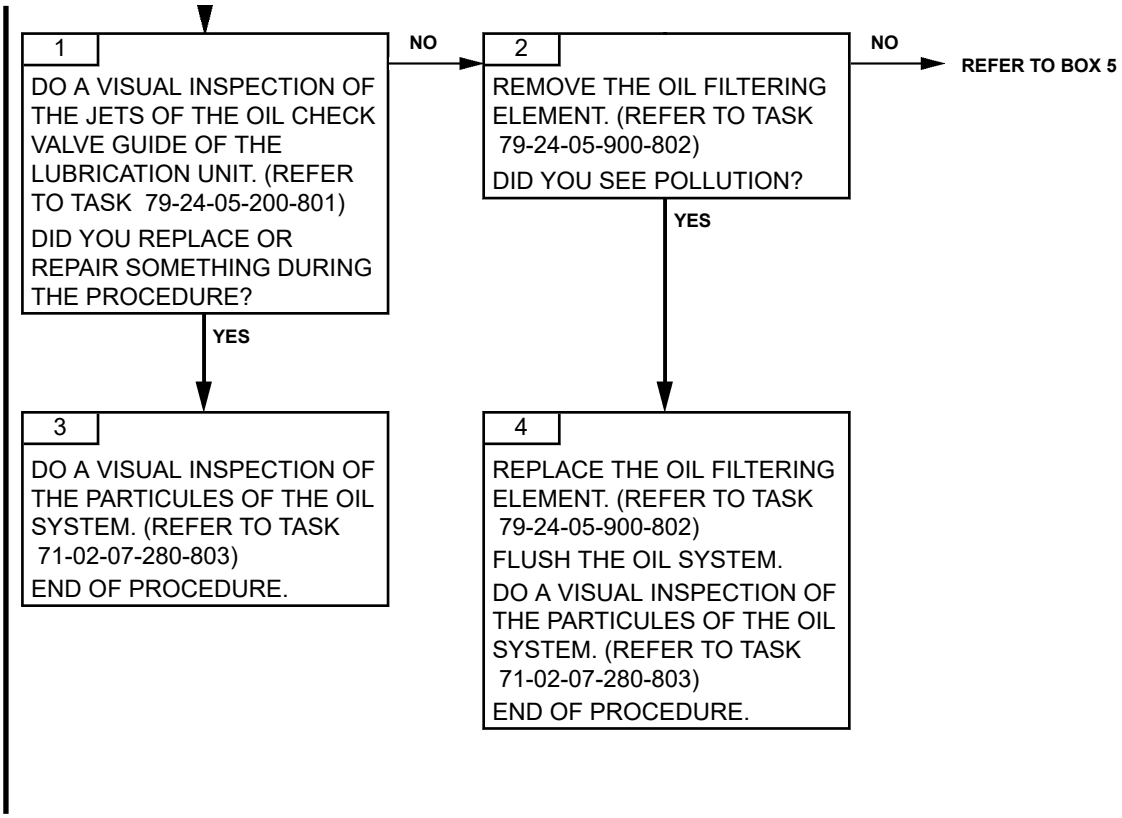
The oil pressure is monitored by the oil pressure and temperature transmitter, connected to the aircraft.

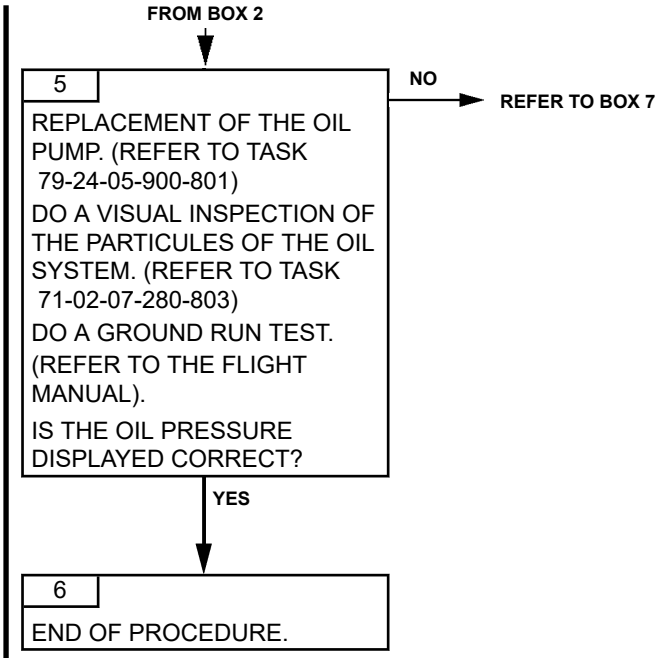
The oil pressure and temperature transmitter is located at the oil filter outlet.

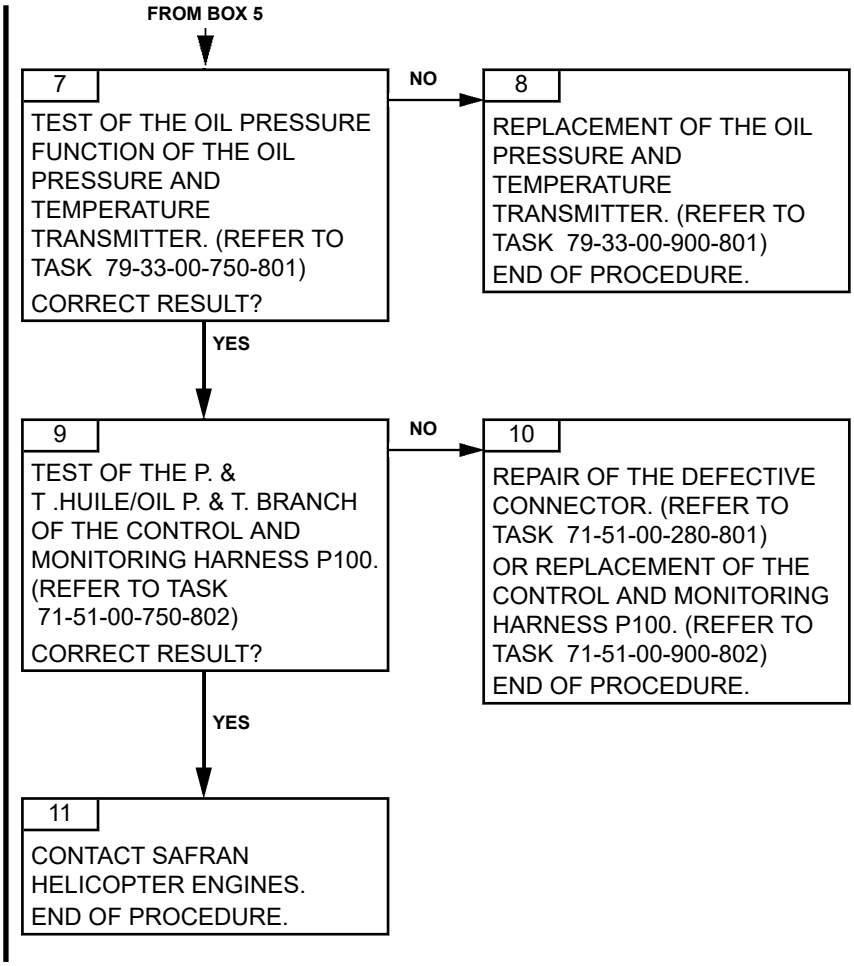
C. POSSIBLE CAUSES

- Oil pressure and temperature transmitter
- Oil pump
- Oil system contamination
- Control and monitoring harness P100

2. PROCEDURE




FROM BOX 2
5
REPLACEMENT OF THE OIL PUMP. (REFER TO TASK 79-24-05-900-801)
DO A VISUAL INSPECTION OF THE PARTICULES OF THE OIL SYSTEM. (REFER TO TASK 71-02-07-280-803)
DO A GROUND RUN TEST. (REFER TO THE FLIGHT MANUAL).
IS THE OIL PRESSURE DISPLAYED CORRECT?
NO
REFER TO BOX 7
YES
6
END OF PROCEDURE.



TASK 71-00-06-813-806-A01

"ENG P" MESSAGE (LOW OIL PRESSURE) DURING ENGINE RUNNING TROUBLESHOOTING

1. GENERAL

A. PHASE

During operation

B. GENERAL DESCRIPTION

The tolerance criteria for oil pressure limitation are defined: (Refer to Task 71-00-02-940-801).

The low oil pressure switch is located at the oil filter outlet.

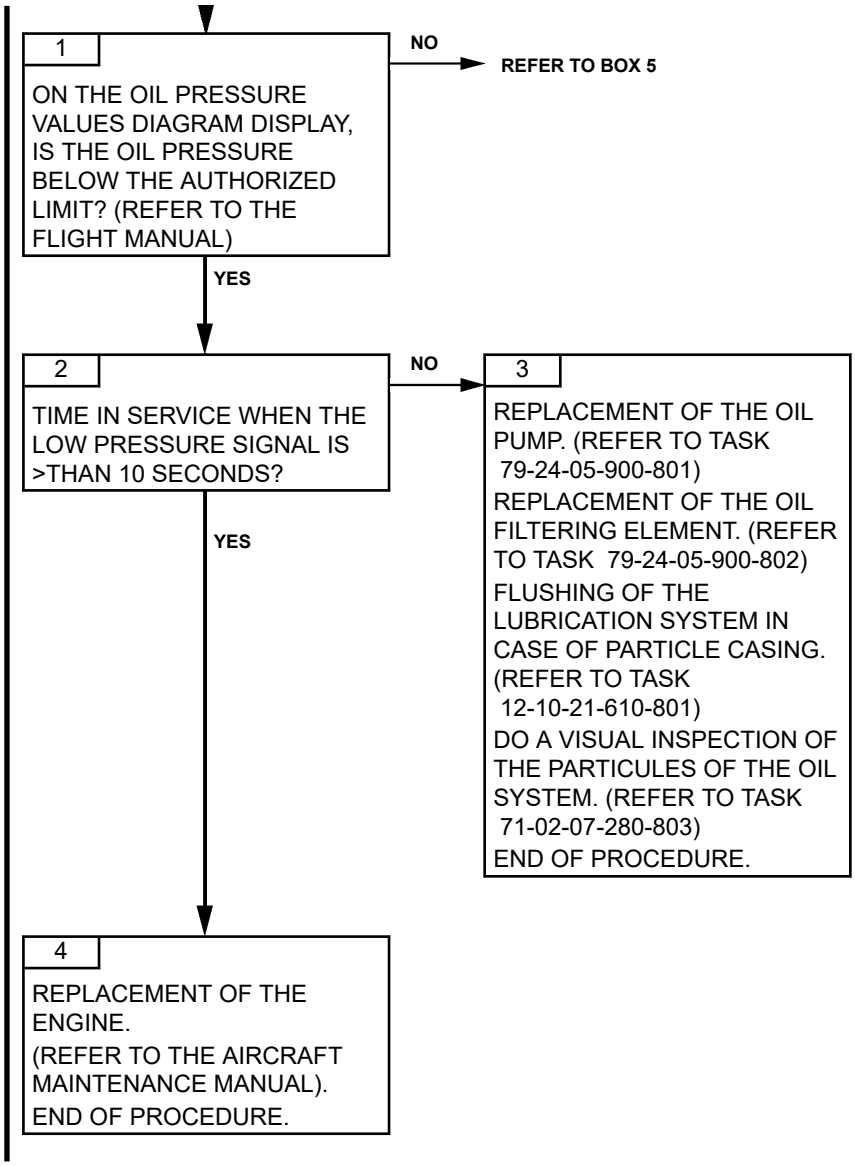
The low oil pressure switch is connected to the aircraft.

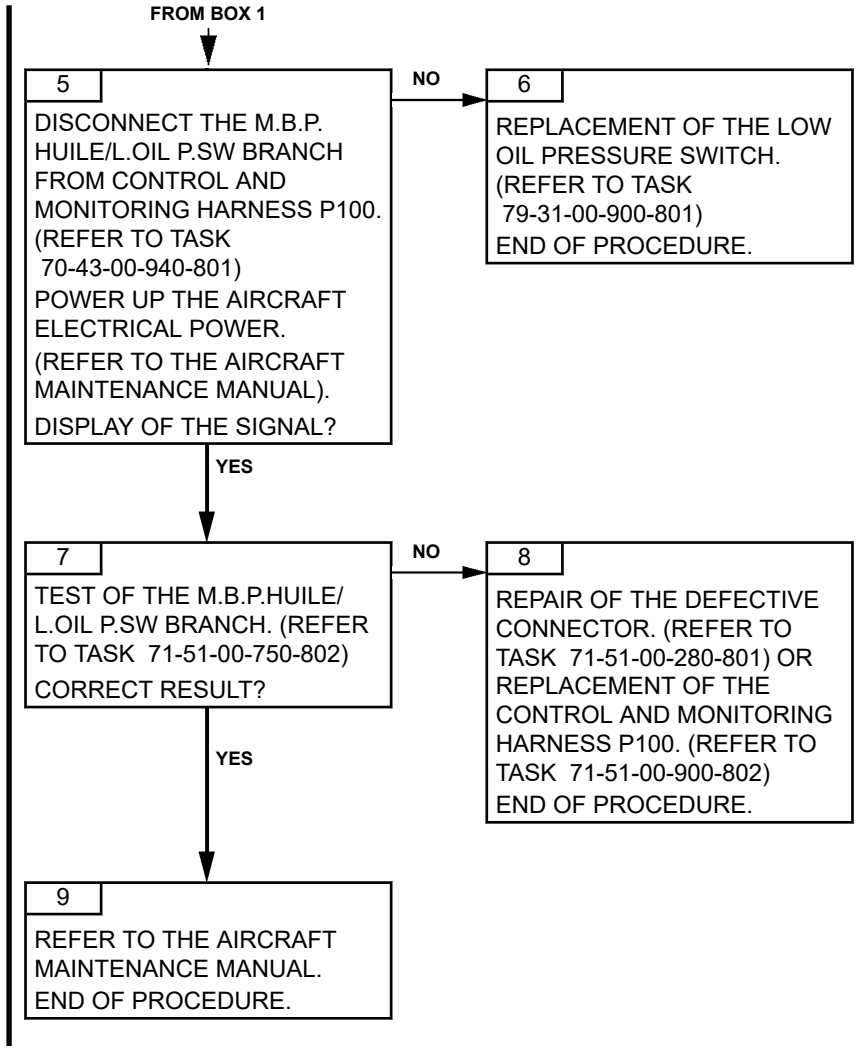
The "ENG-P" light must be OFF during the engine running.

C. POSSIBLE CAUSES

- Low oil pressure switch
- Oil pump
- Control and monitoring harness P100
- Aircraft

2. PROCEDURE





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TASK 71-00-06-813-807-A01

CONTROLLED ENGINE SHUTDOWN NOT POSSIBLE TROUBLESHOOTING

1. GENERAL

A. PHASE

During operation

B. REMINDER OF THE NORMAL OPERATING CONDITION

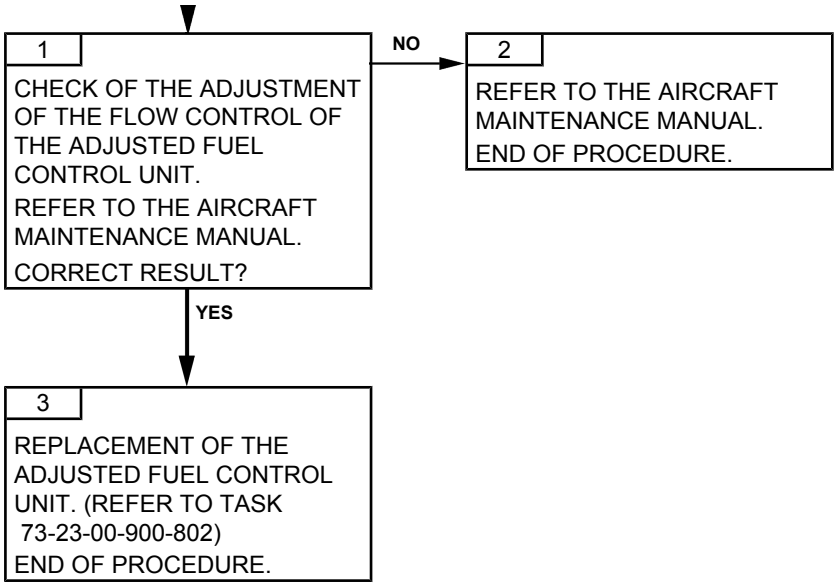
Display of the twist boom visual indicator on "stop".

The twist boom is used to turn off the flow valve of the adjusted fuel control unit. The fuel supply of the engine is stopped.

C. POSSIBLE CAUSES

– Adjusted fuel control unit
– Aircraft

2. PROCEDURE



TASK 71-00-06-813-808-A01

NR DRIFT TROUBLESHOOTING

1. GENERAL

NOTE: ***To do a satisfactory analysis of the occurrence, please fill in the EC120 B - ARRIUS 2F "Investigation Form" and send it to your nearest Safran Helicopter Engines representative (Refer to Figure 101)***

A. PHASE

During operation or during level flight at maximum continuous power.

B. REMINDER OF THE NORMAL OPERATING CONDITION

The nominal speeds and maximum continuous power ratings are defined in the flight manual.

C. POSSIBLE CAUSES

- P3 pipe
- Anticipator - Refer to the aircraft manufacturer documentation
- Aircraft fuel system (engine inlet strainer)
- FCU filtering element
- Fuel control unit
- Adjusted valve assembly

NOTE: ***Do a check of the NR measurement system for correct operation. Refer to the Aircraft Maintenance Manual.***

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EC120 B - ARRIUS 2 F

"Investigation Form"

External parameters:

Where is the helicopter parked before flight? ☐ Inside ☐ Outside

Atmospheric pressure and temperature when helicopter is parked:

P0:

T0:

Equipment:

FCU P/N:

FCU S/N:

FCU TSN:

Engine S/N:

Engine TSN:

Fuel type:

Engine parameters prior to incident (if available):

N1:

N2:

T45:

Engine oil pressure:

Torque:

Engine parameters reached during incident:

N1:

N2:

T45:

Engine oil pressure:

Torque:

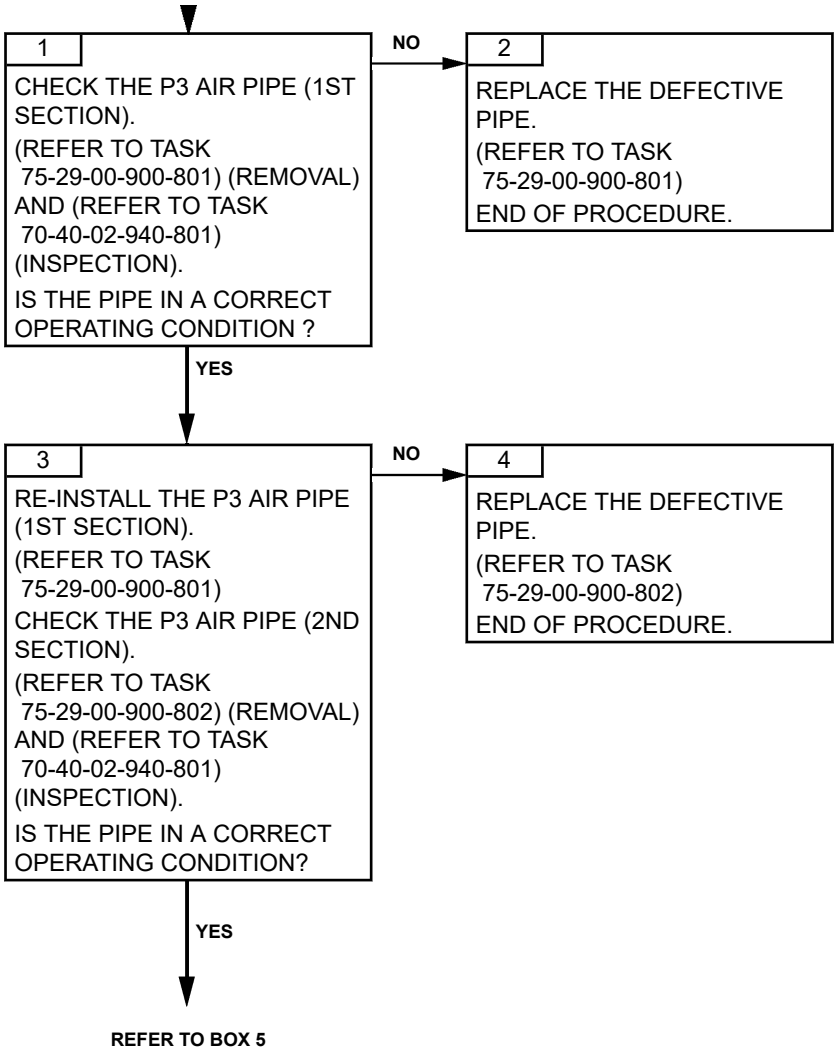
Flight conditions:

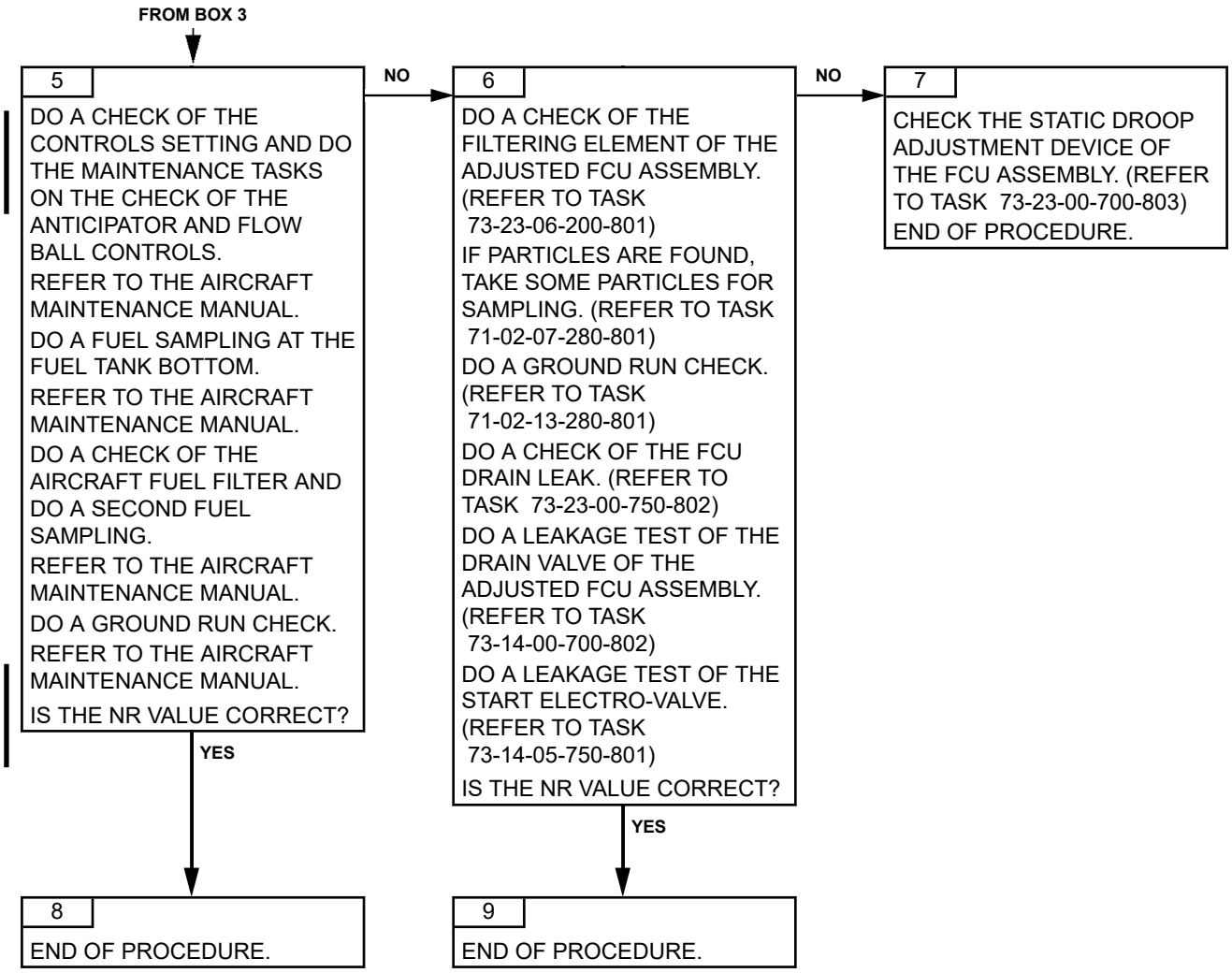
☐ Cruising flight ☐ Hovering flight

☐ During a power increase ☐ During a power decrease

Investigation Form
Figure 101

2. PROCEDURE


1
CHECK THE P3 AIR PIPE (1ST SECTION).
(REFER TO TASK 75-29-00-900-801) (REMOVAL) AND (REFER TO TASK 70-40-02-940-801) (INSPECTION).
IS THE PIPE IN A CORRECT OPERATING CONDITION ?
NO
2
REPLACE THE DEFECTIVE PIPE.
(REFER TO TASK 75-29-00-900-801)
END OF PROCEDURE.
YES
3
RE-INSTALL THE P3 AIR PIPE (1ST SECTION).
(REFER TO TASK 75-29-00-900-801)
CHECK THE P3 AIR PIPE (2ND SECTION).
(REFER TO TASK 75-29-00-900-802) (REMOVAL) AND (REFER TO TASK 70-40-02-940-801) (INSPECTION).
IS THE PIPE IN A CORRECT OPERATING CONDITION?
NO
4
REPLACE THE DEFECTIVE PIPE.
(REFER TO TASK 75-29-00-900-802)
END OF PROCEDURE.
YES
REFER TO BOX 5



TASK 71-00-06-813-810-A01

POWER ASSURANCE CHECK - INCORRECT MARGIN TROUBLESHOOTING

1. GENERAL

A. GENERAL DESCRIPTION

For the PAC (Power Assurance Check) to be acceptable:

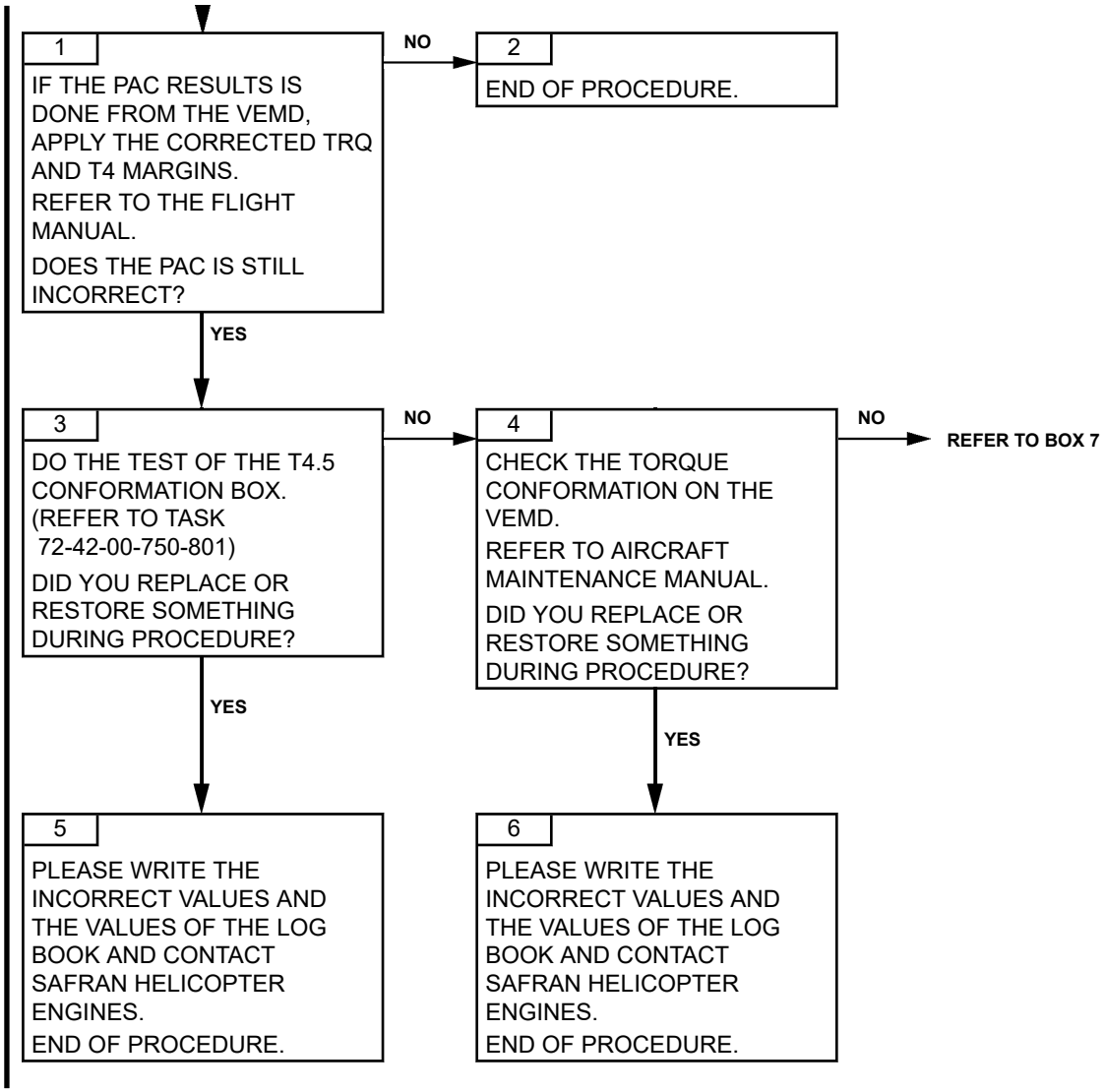
- The value "TRQ MARGIN" must be positive corresponding on VEMD display to "GOOD"
- The value "T4 MARGIN" must be negative corresponding on VEMD display to "GOOD".

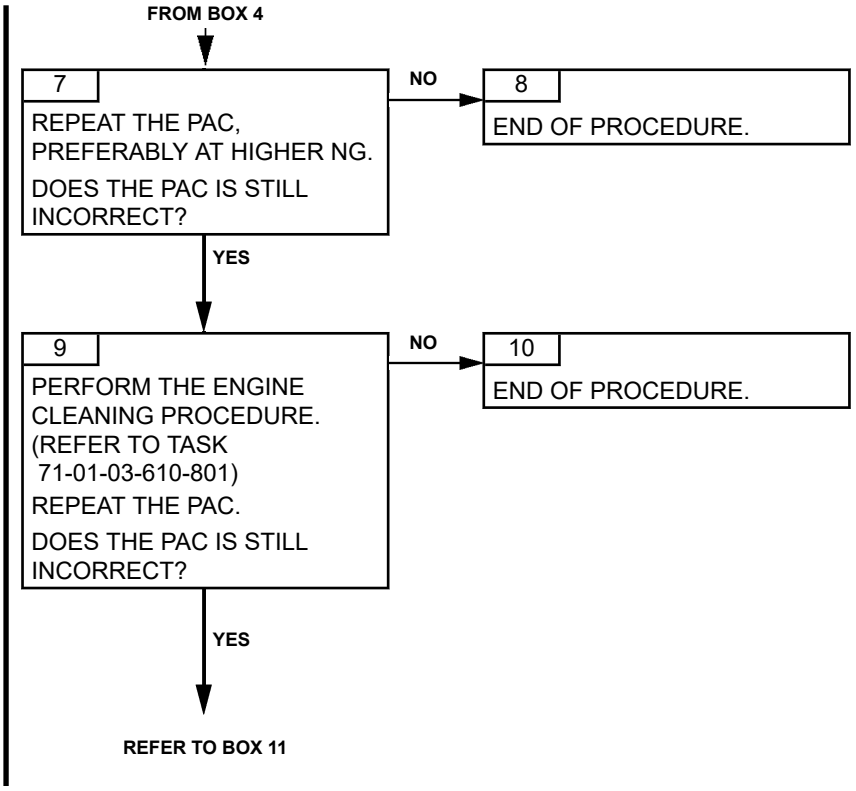
The PAC procedure is defined in the Flight Manual, Section 5.3.

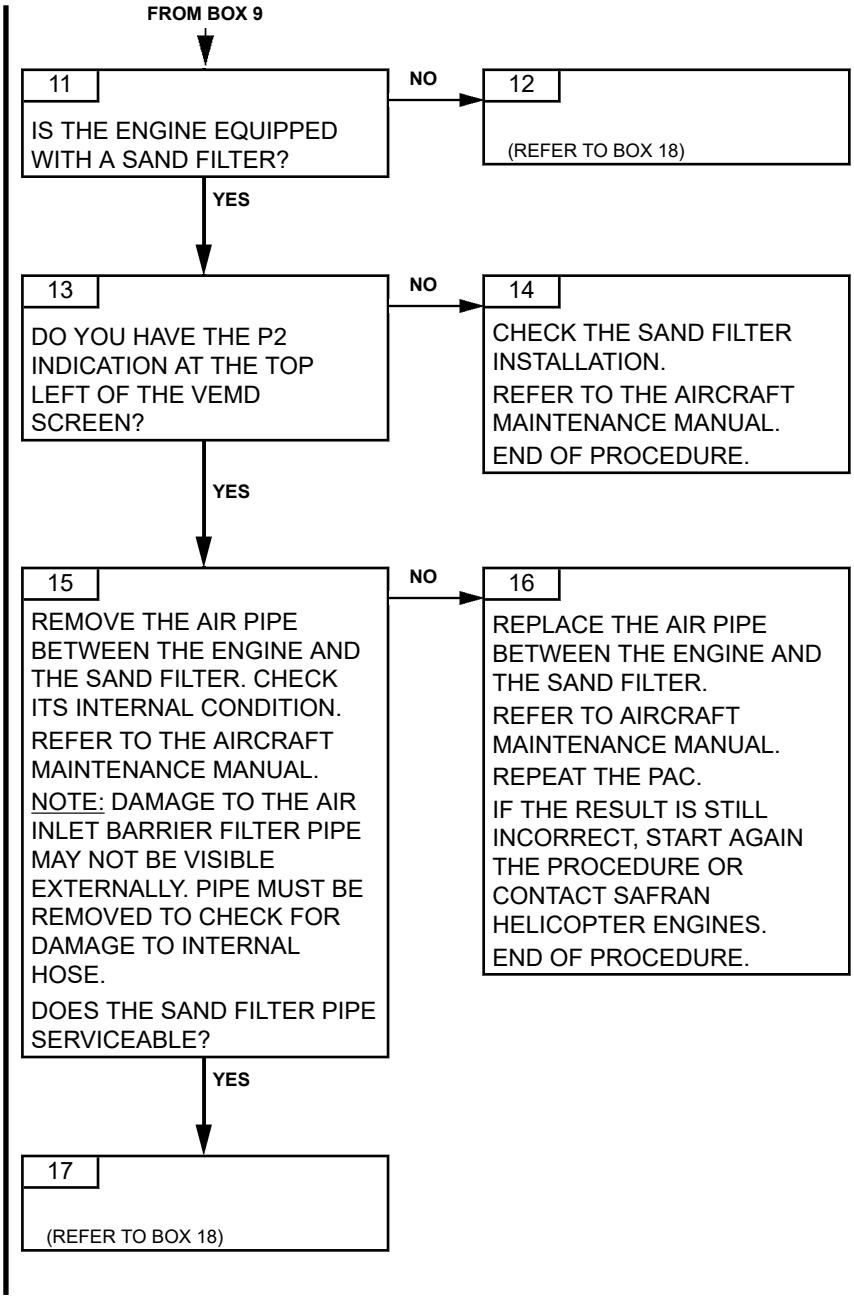
B. POSSIBLE CAUSES

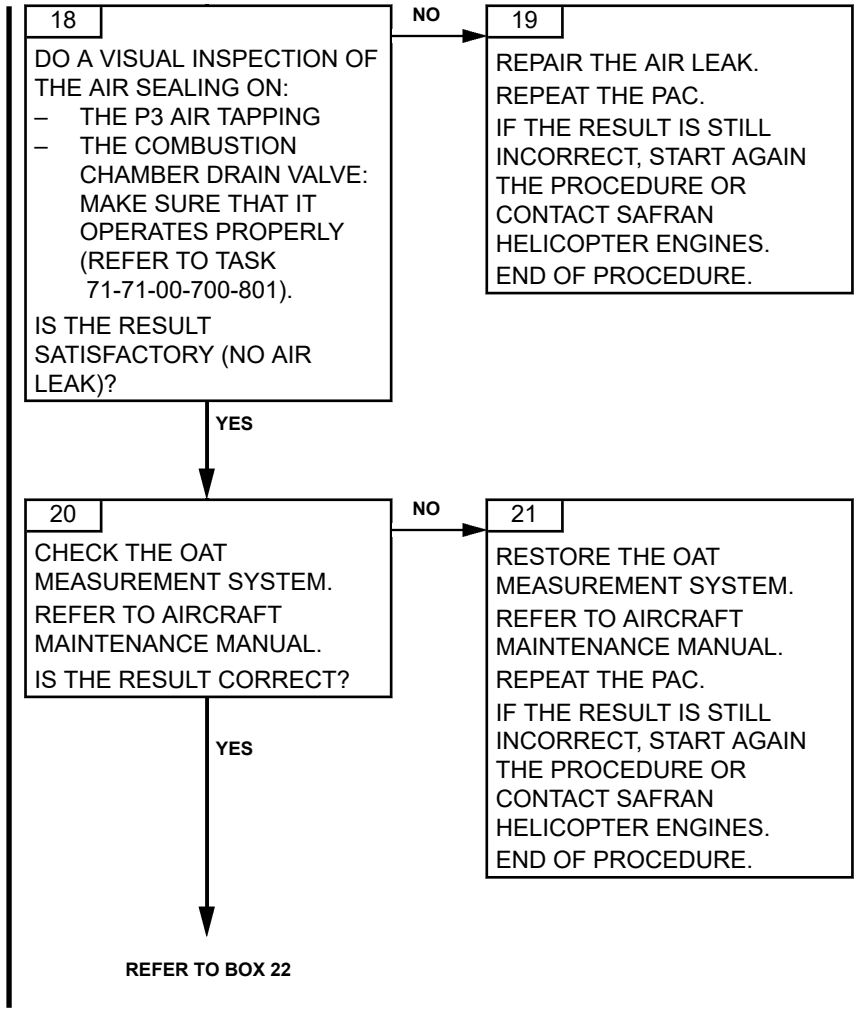
- T4.5 conformation
- TORQUE conformation
- Air path contamination
- Air leaks
- Torquemeter pressure transmitter
- Torquemeter piston seal
- Module 2
- OAT sensor (Aircraft)
- Sand filter air pipe (Aircraft)
- Sand filter installation system (Aircraft).

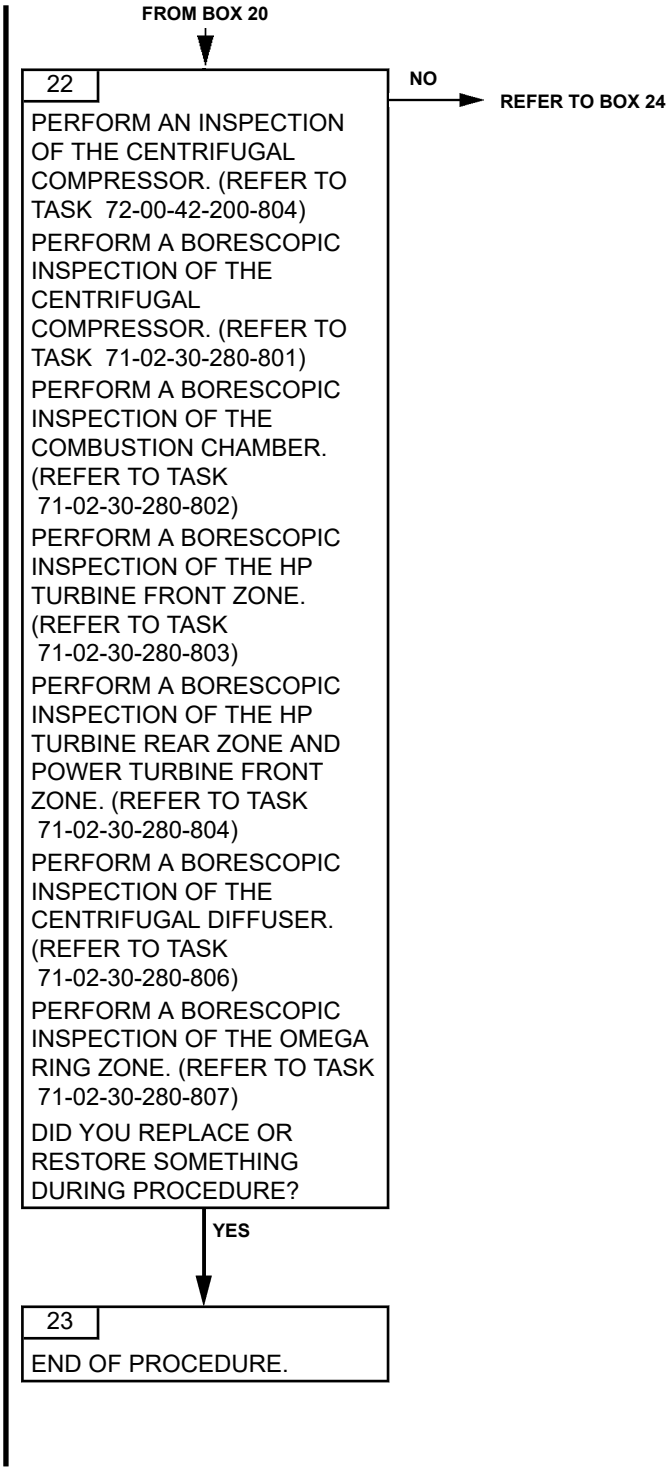
2. PROCEDURE

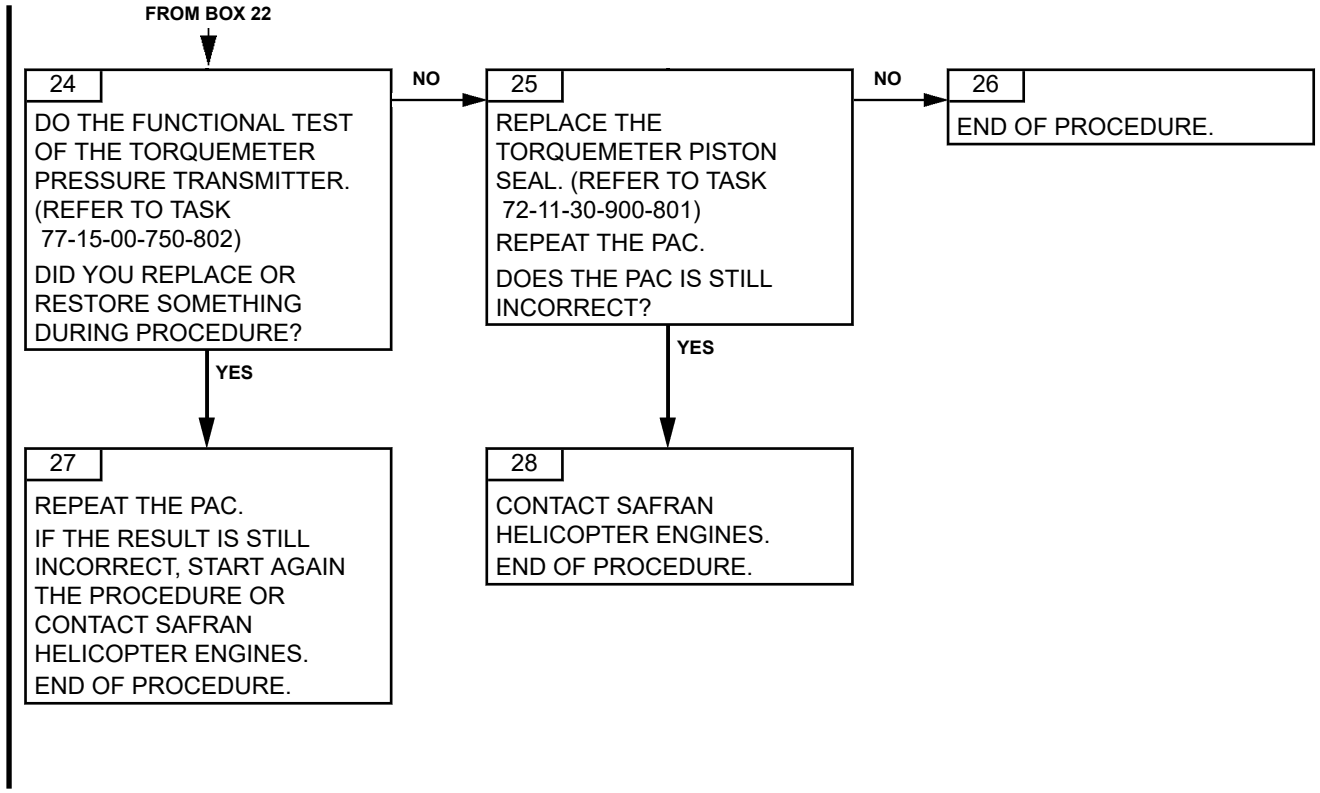







18
DO A VISUAL INSPECTION OF THE AIR SEALING ON:
– THE P3 AIR TAPPING
– THE COMBUSTION CHAMBER DRAIN VALVE: MAKE SURE THAT IT OPERATES PROPERLY (REFER TO TASK 71-71-00-700-801).
IS THE RESULT SATISFACTORY (NO AIR LEAK)?
NO
19
REPAIR THE AIR LEAK.
REPEAT THE PAC.
IF THE RESULT IS STILL INCORRECT, START AGAIN THE PROCEDURE OR CONTACT SAFRAN HELICOPTER ENGINES.
END OF PROCEDURE.
YES
20
CHECK THE OAT MEASUREMENT SYSTEM.
REFER TO AIRCRAFT MAINTENANCE MANUAL.
IS THE RESULT CORRECT?
NO
21
RESTORE THE OAT MEASUREMENT SYSTEM.
REFER TO AIRCRAFT MAINTENANCE MANUAL.
REPEAT THE PAC.
IF THE RESULT IS STILL INCORRECT, START AGAIN THE PROCEDURE OR CONTACT SAFRAN HELICOPTER ENGINES.
END OF PROCEDURE.
YES
REFER TO BOX 22





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TASK 71-00-06-813-811-A01

UNJUSTIFIED FIRE SIGNAL TROUBLESHOOTING

1. GENERAL

A. PHASE

During operation

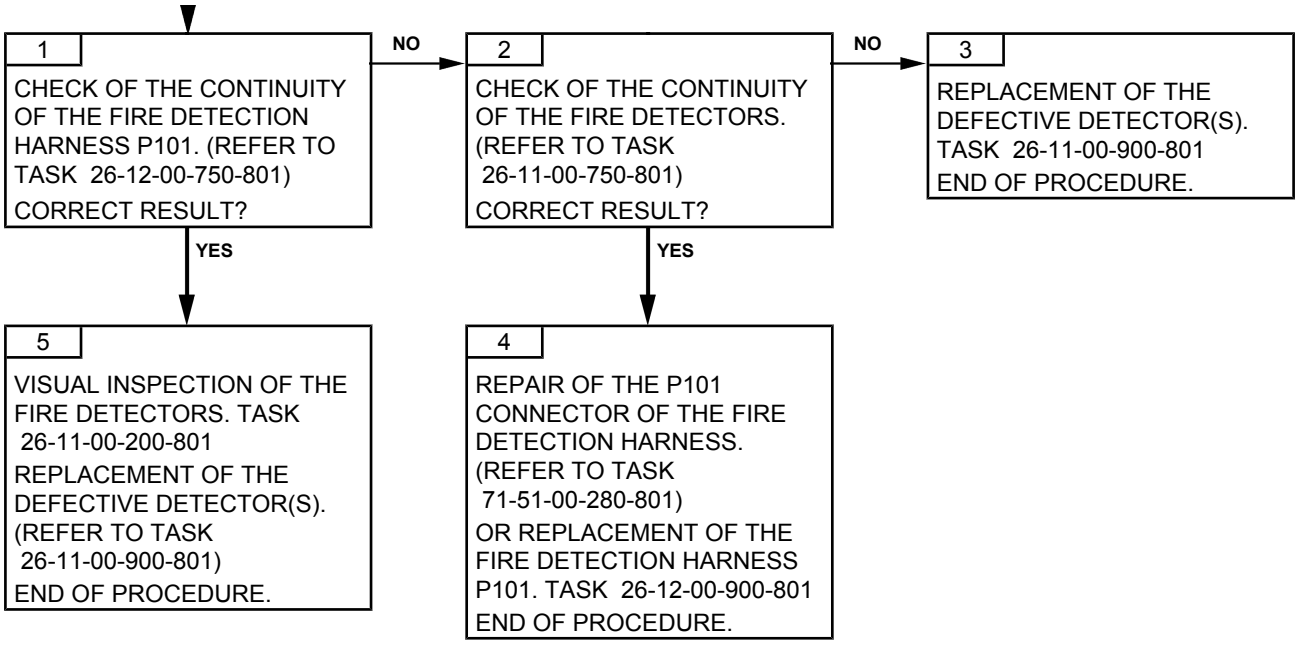
B. REMINDER OF THE NORMAL OPERATING CONDITION

The fire visual indicator system of the aircraft is correct.
No display of the signal.

C. POSSIBLE CAUSES

– Fire detector
– Fire detection harness P101

2. PROCEDURE



TASK 71-00-06-813-812-A01

ENGINE PARAMETER OSCILLATIONS: TORQUE, NG, NR
TROUBLESHOOTING

1. GENERAL

A. PHASE

Toutes

B. REMINDER OF THE NORMAL OPERATING CONDITION

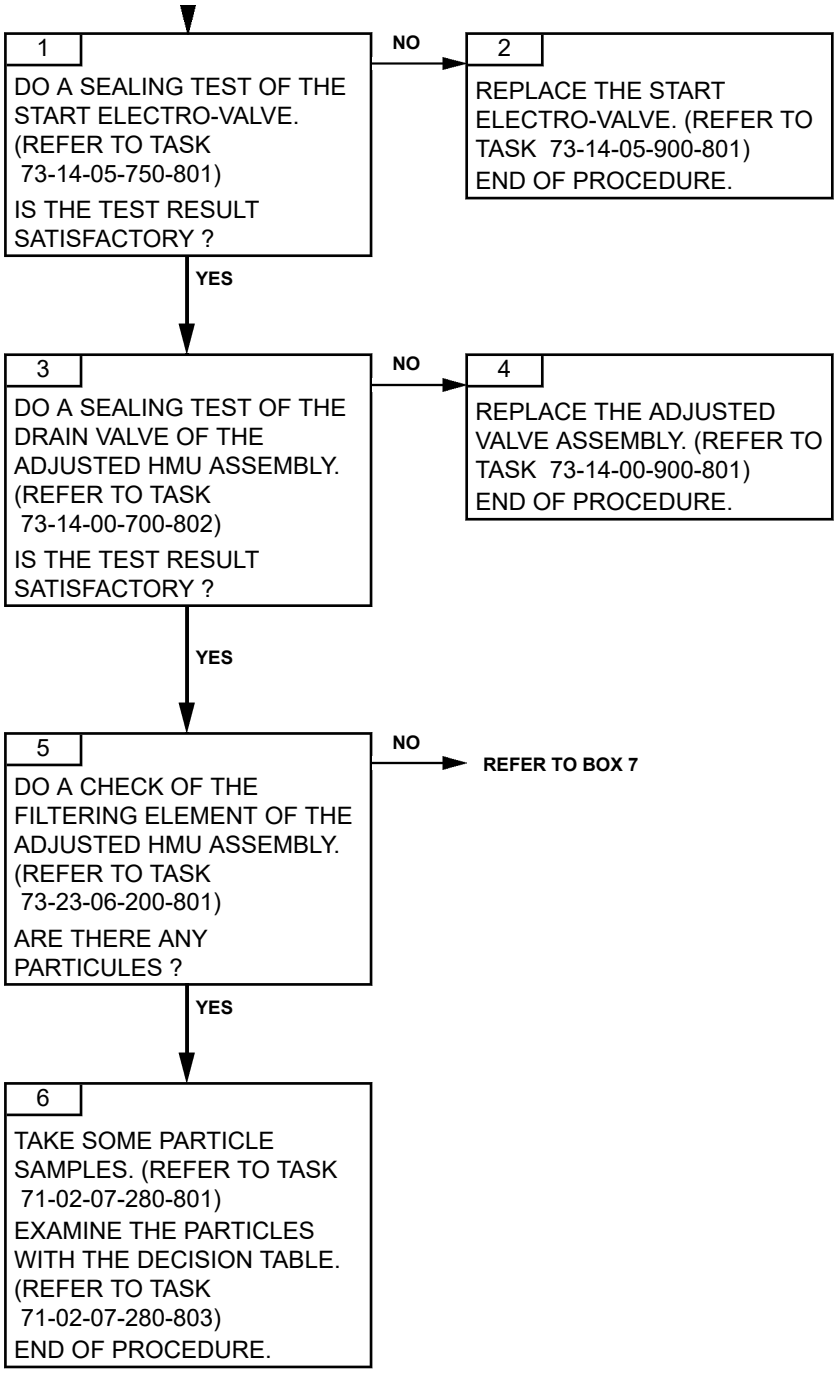
The engine parameter oscillations must remain in compliance with the criteria.
(Refer to Task 71-00-01-940-801)

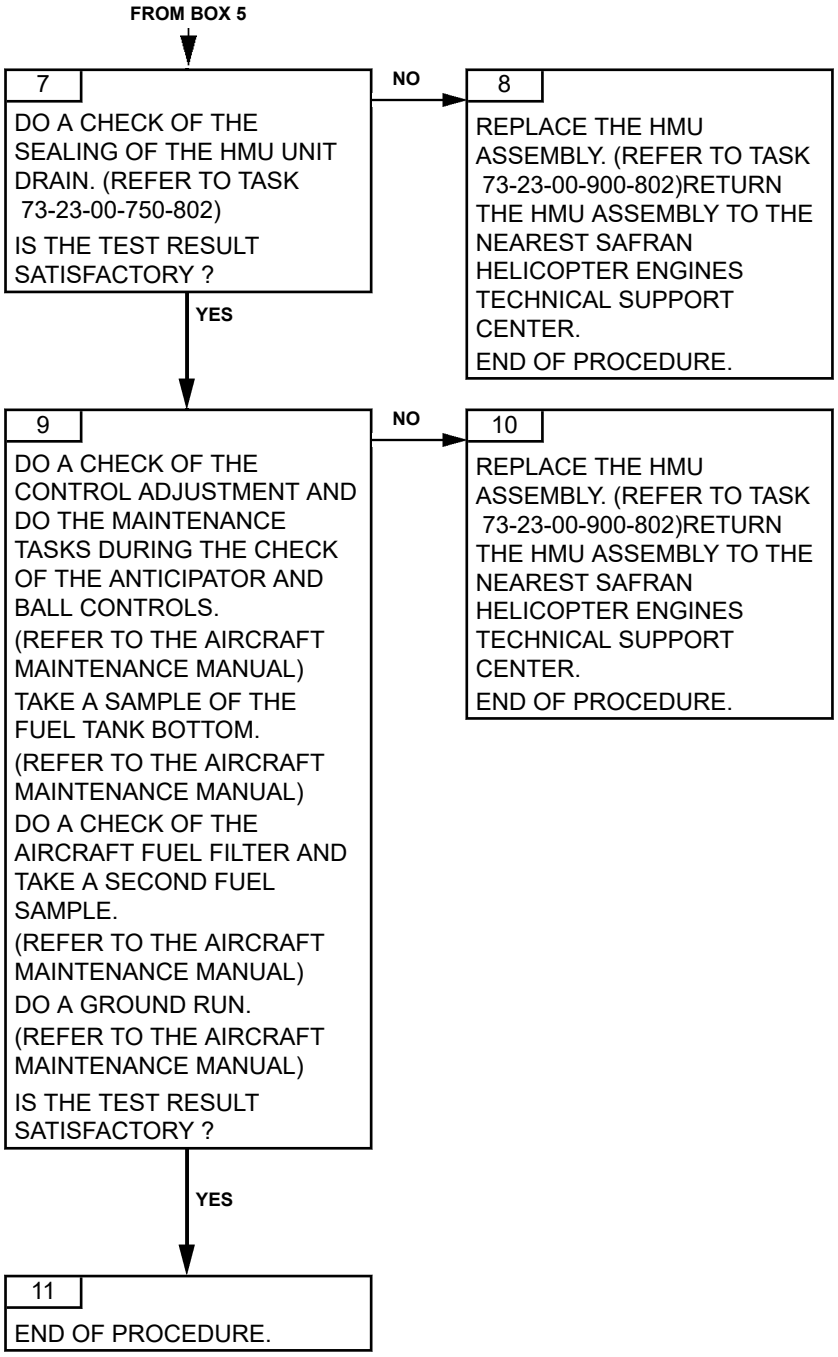
C. POSSIBLE CAUSES

- Start electro-valve
- Adjusted valve assembly
- Fuel contamination
- HMU assembly
- Anticipator control

2. PROCEDURE

NOTE: ***To do a correct analysis of the event, please complete the EC120 B - ARRIUS 2F "Investigation Form" and send it to the nearest Safran Helicopter Engines representative.***





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TASK 71-00-06-813-813-A01

NONCOMPLIANT TEMPERATURE MARGIN TROUBLESHOOTING

1. GENERAL

A. PHASE

CAUTION: IF A MAINTENANCE OPERATION HAS BEEN RECENTLY PERFORMED ON ONE OF THE ABOVE LISTED FUNCTIONS, GIVE PRIORITY FIRST TO THE CHECK OF THE FUNCTION CONCERNED BY THIS OPERATION.

CAUTION: IN THE CASE OF A NEW HELICOPTER AND/OR NEW ENGINE, GIVE PRIORITY TO THE CHECK OF THE MEASUREMENT SYSTEMS.

CAUTION: IF POSSIBLE, CHECK THE CONSISTENCY OF THE OAT MEASUREMENT SYSTEM DISPLAYED ON VEMD WITH AN EXTERNAL REFERENCE. IN CASE OF INCONSISTENCY, GIVE PRIORITY TO THE CHECK OF THIS MEASUREMENT SYSTEM.

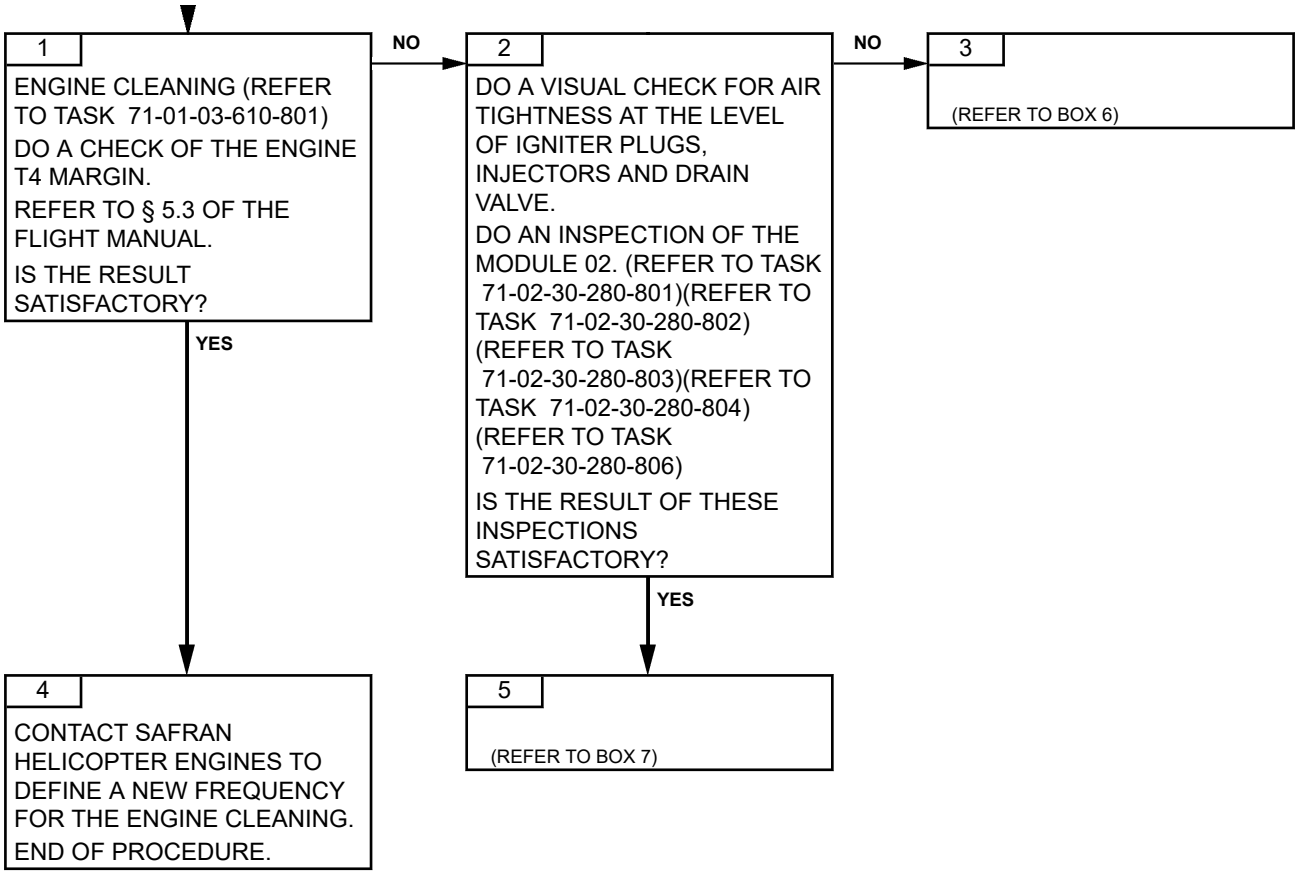
During operation

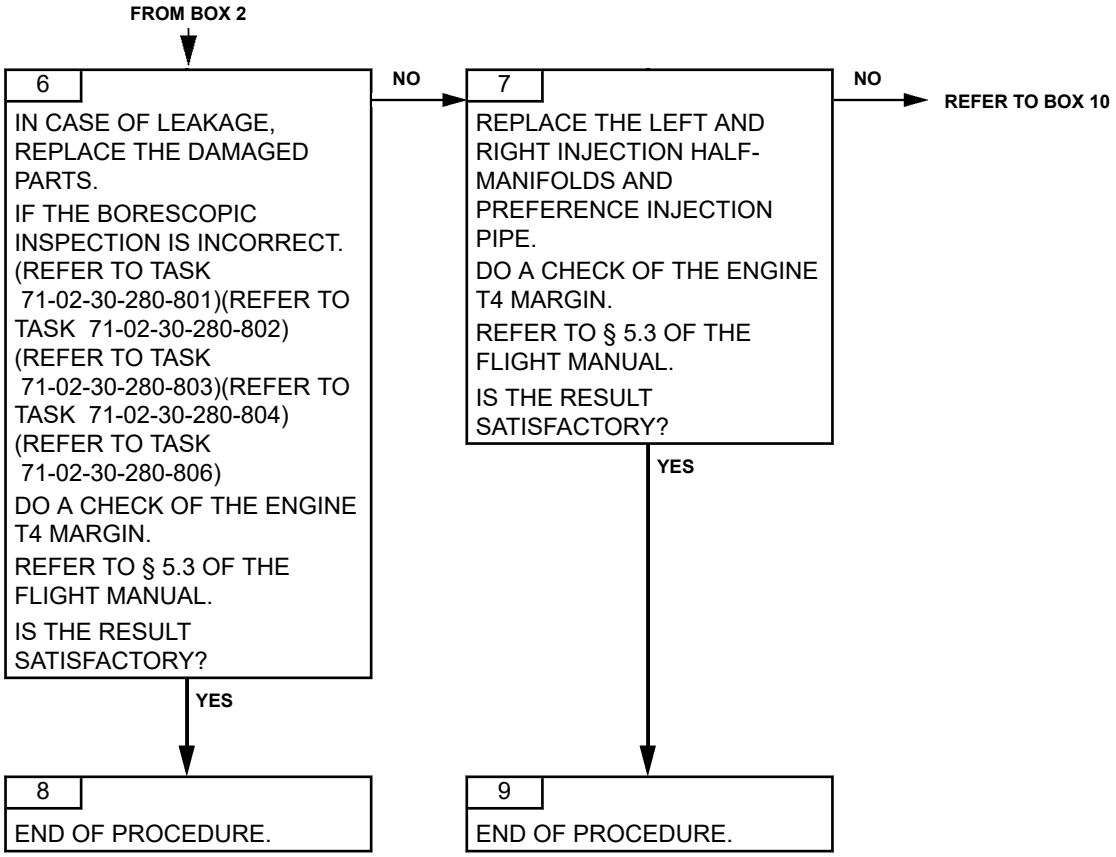
Findings made following the application of the procedure for checking the engine in flight.

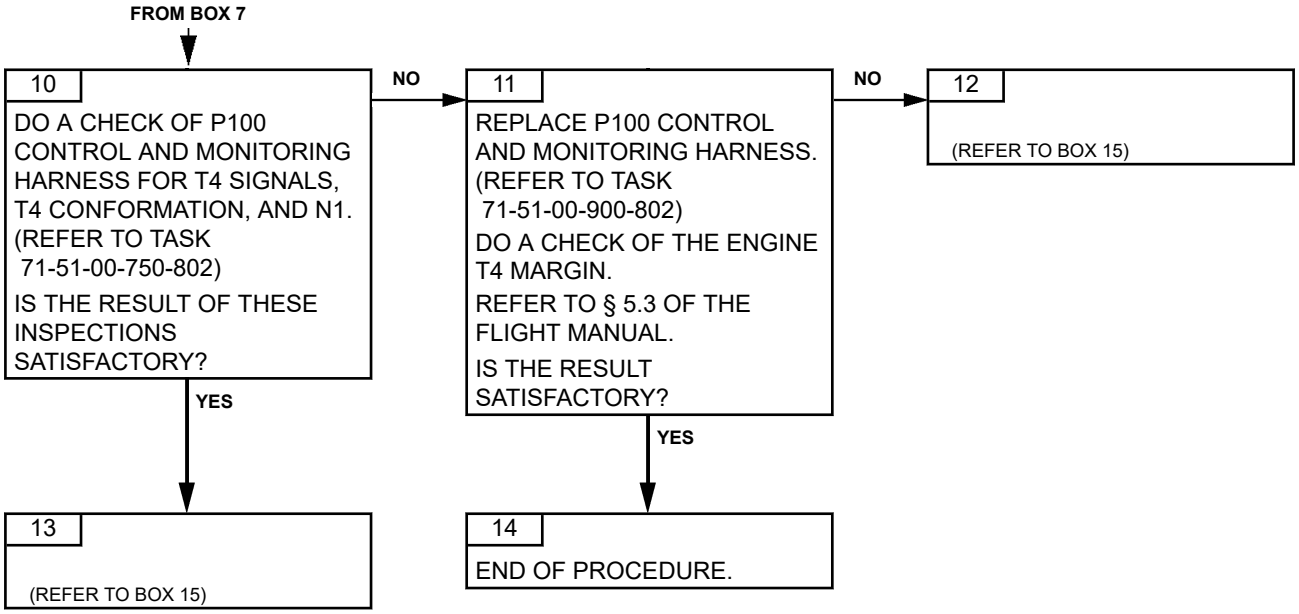
B. POSSIBLE CAUSES

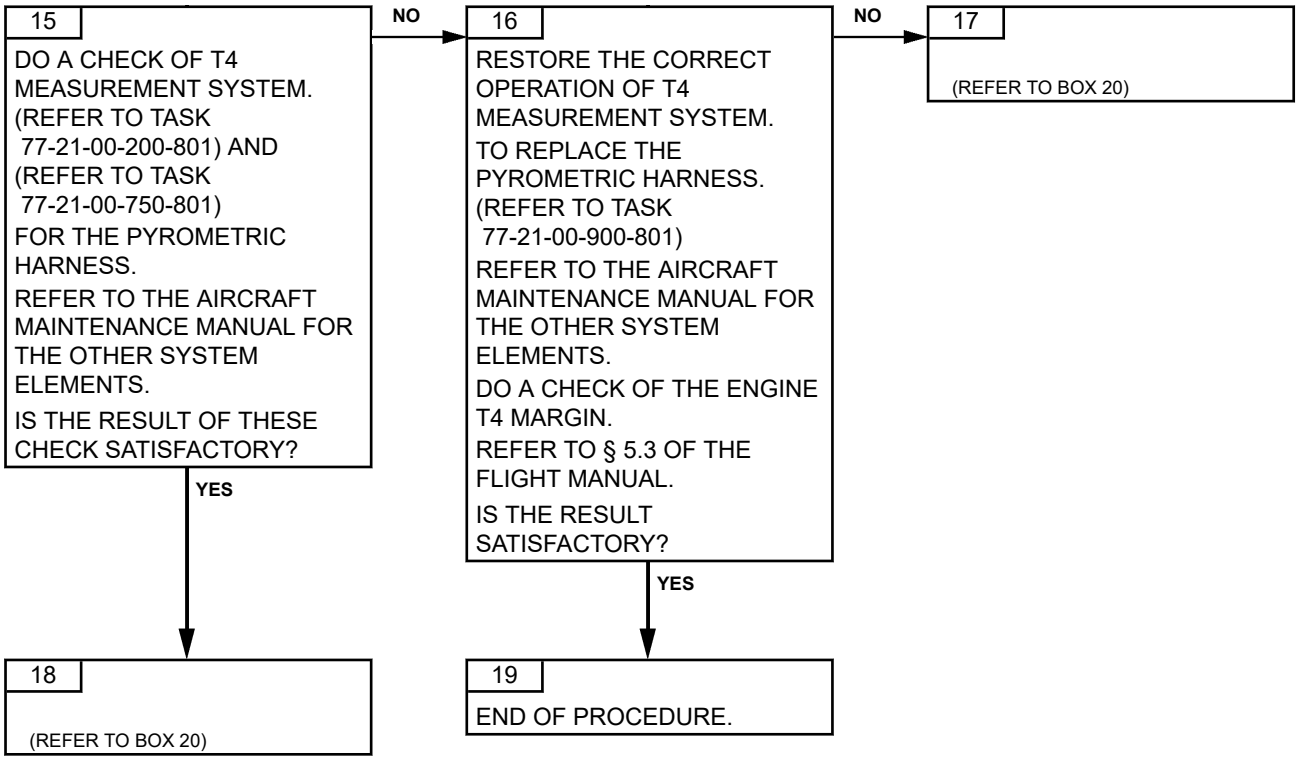
- Air path (cleaning)
- Module 02
- Injectors (air leakage and blockage)
- Igniter plugs (air leakage)
- Drain valve (air leakage)
- Air tapping (air leakage)
- Control and monitoring harness
- T4 measurement system
- OAT measurement system
- Zp measurement system

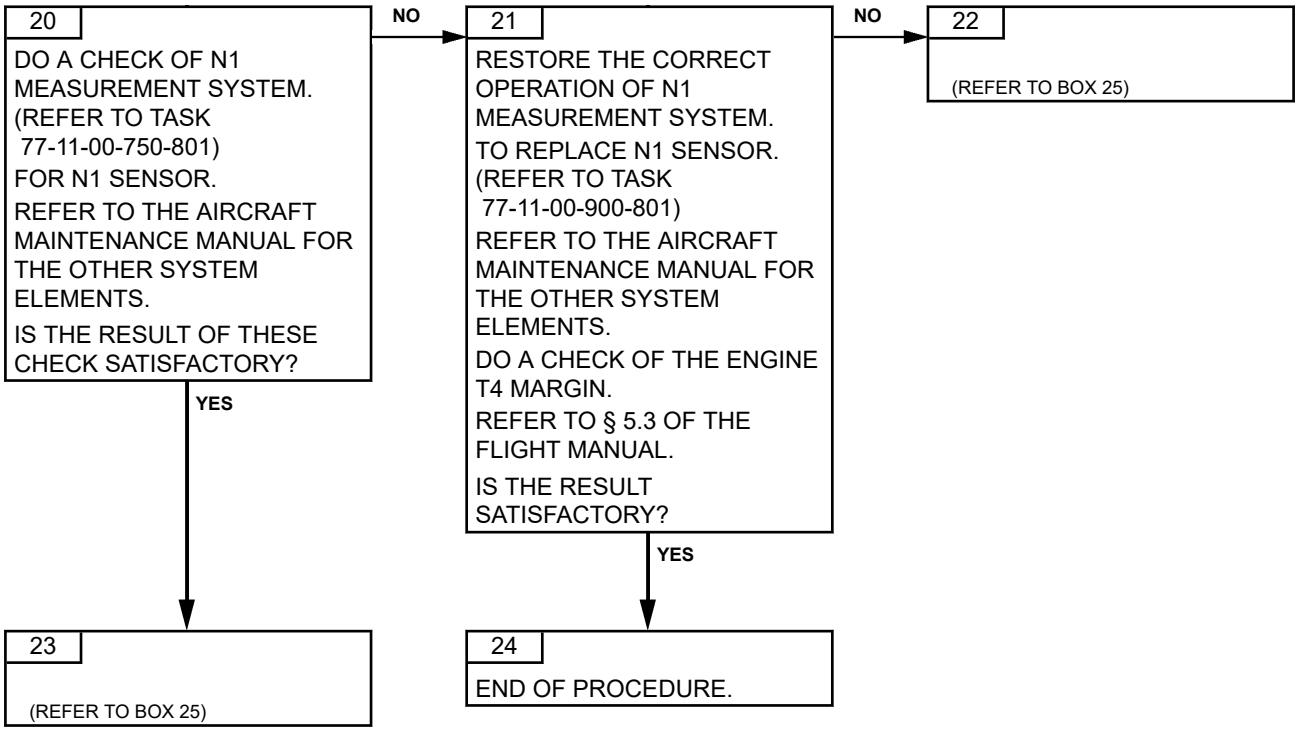
2. PROCEDURE

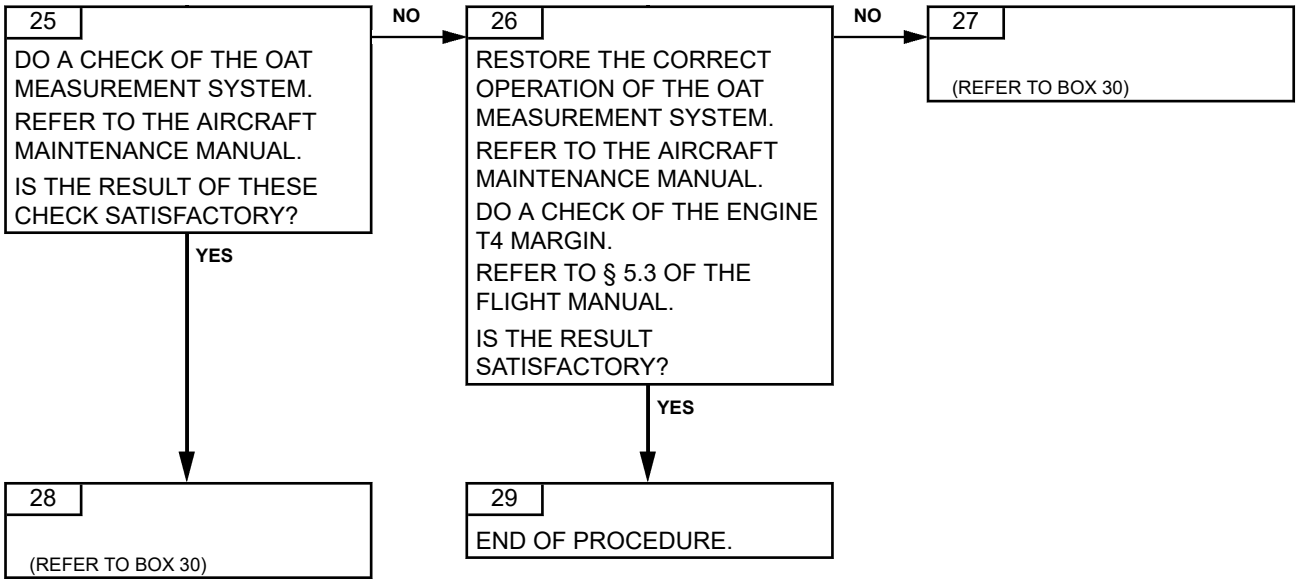


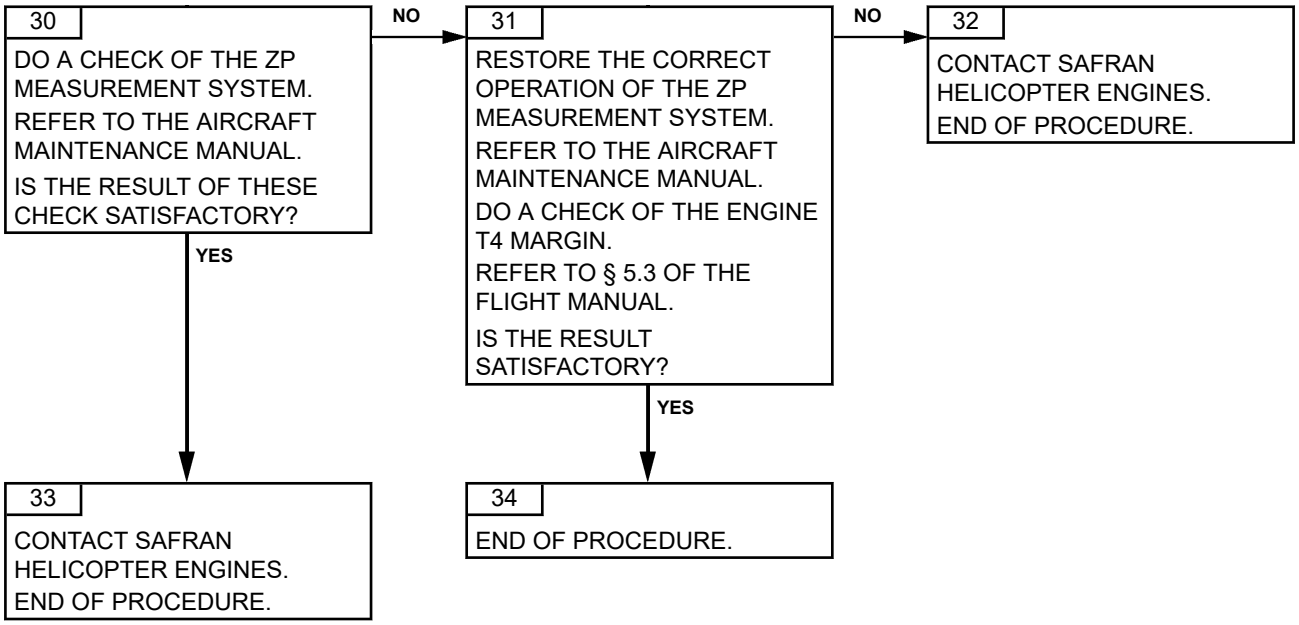












TASK 71-00-06-814-802-A01

ABNORMAL NOISES TROUBLESHOOTING

1. GENERAL

A. PHASE

Stop phase

B. REMINDER OF THE NORMAL OPERATING CONDITION

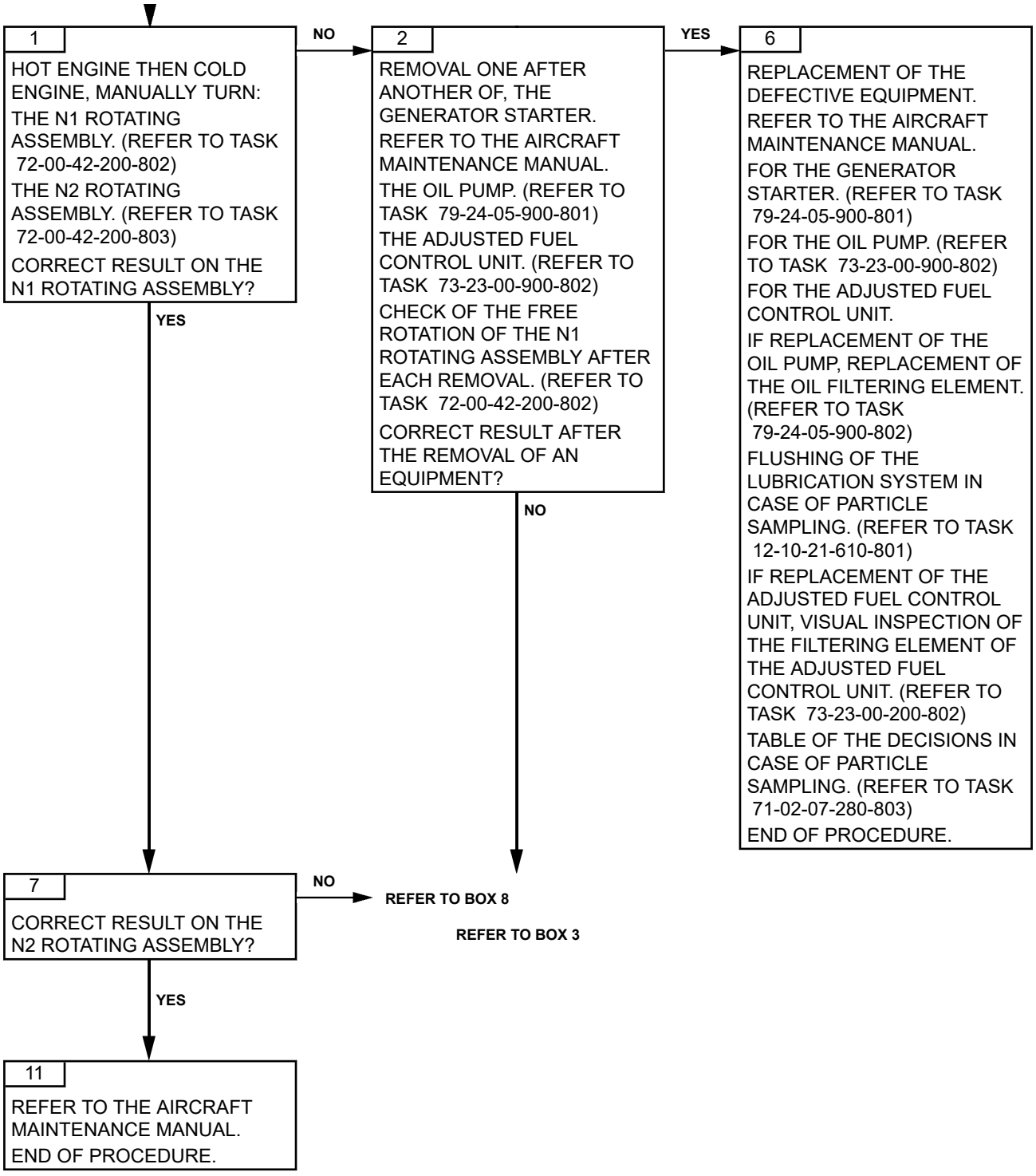
No defects during operation.

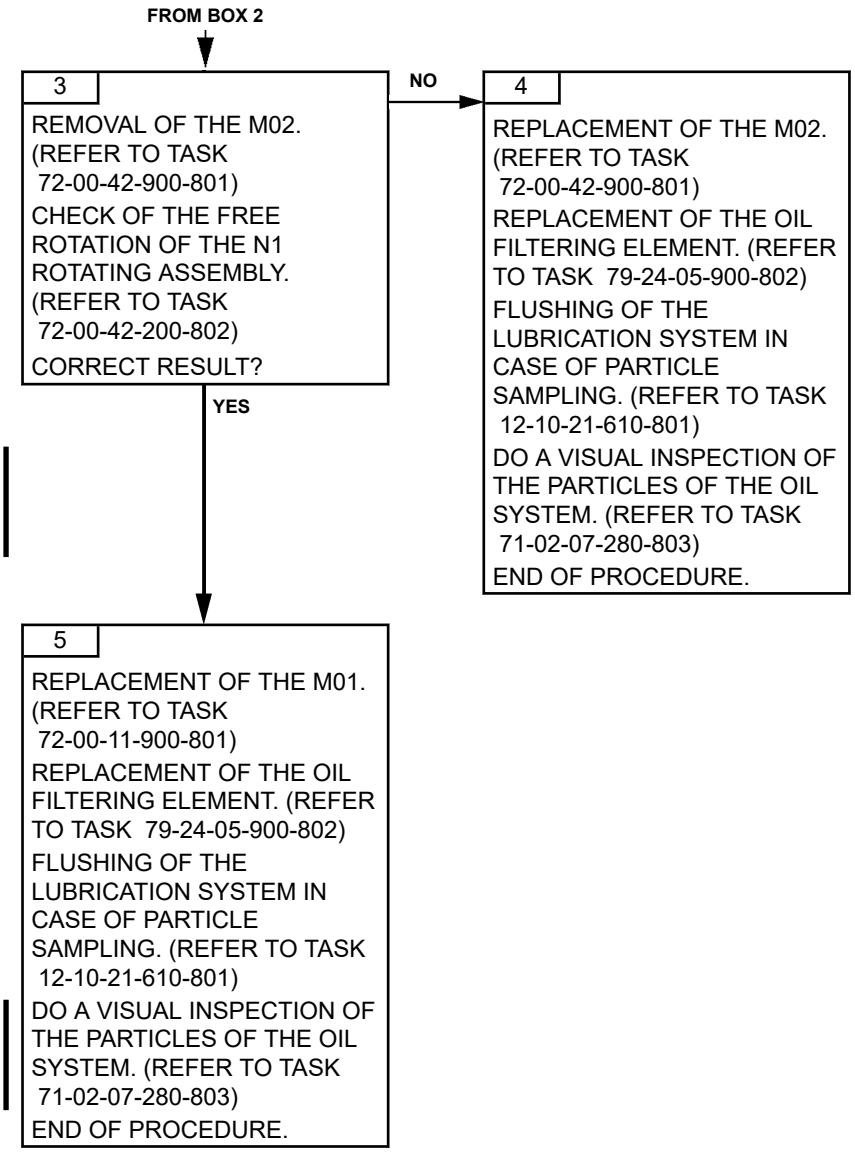
Only the rattle of the blade roots of the free turbine in the housing of the wheel is normal.

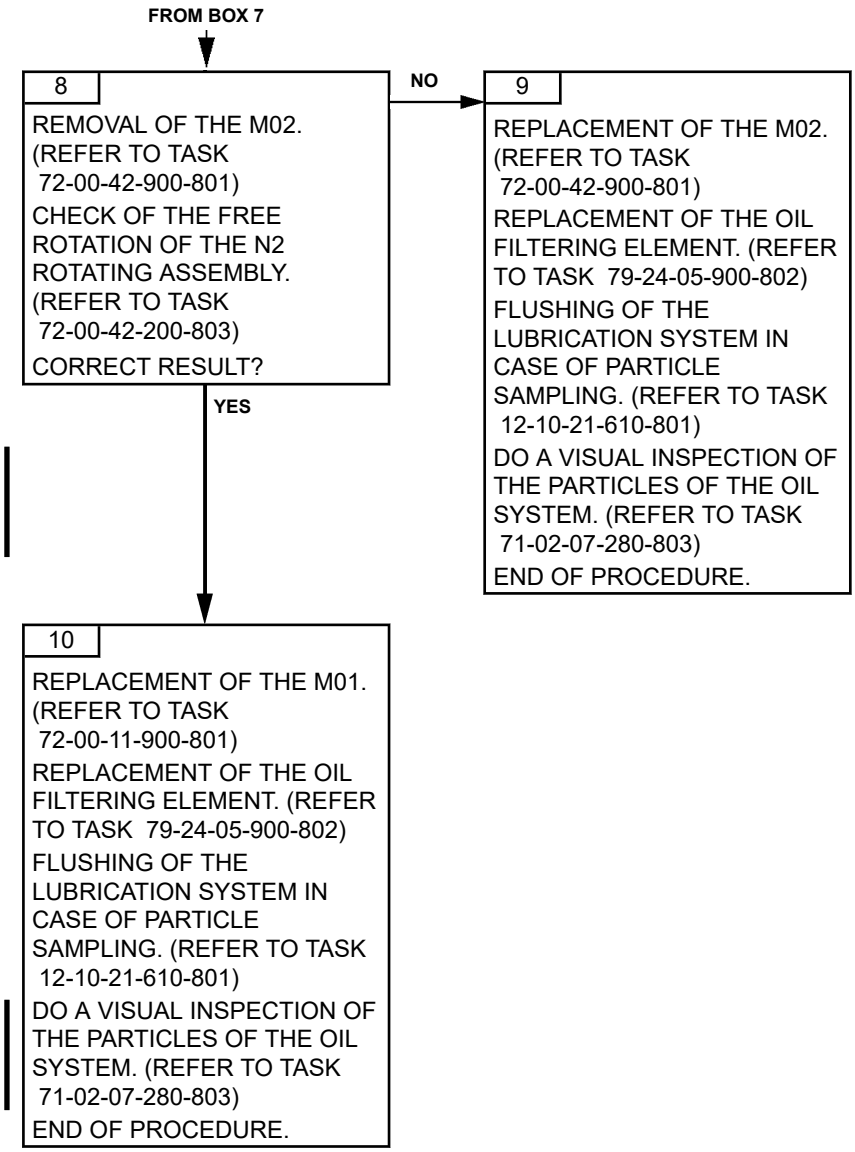
C. POSSIBLE CAUSES

- Module 1 or 2 (M01 or M02)
- Oil pump
- Adjusted fuel control unit
- Generator starter
- Aircraft

2. PROCEDURE







TASK 71-00-06-814-804-A01

VIBRATIONS TROUBLESHOOTING

1. GENERAL

A. PHASE

During operation

B. REMINDER OF THE NORMAL OPERATING CONDITION

N1 < 15 efficient mm/s between 0 and 45,000 rpm.

N1 < 10 efficient mm/s between 45,000 and 56,000 rpm.

N2 < 15 efficient mm/s between 0 and 44,000 rpm.

or

The overall vibration level (N1 + N2) is> 20 efficient mm/s.

It is measured during a start phase after a stop ≤ 3 mn.

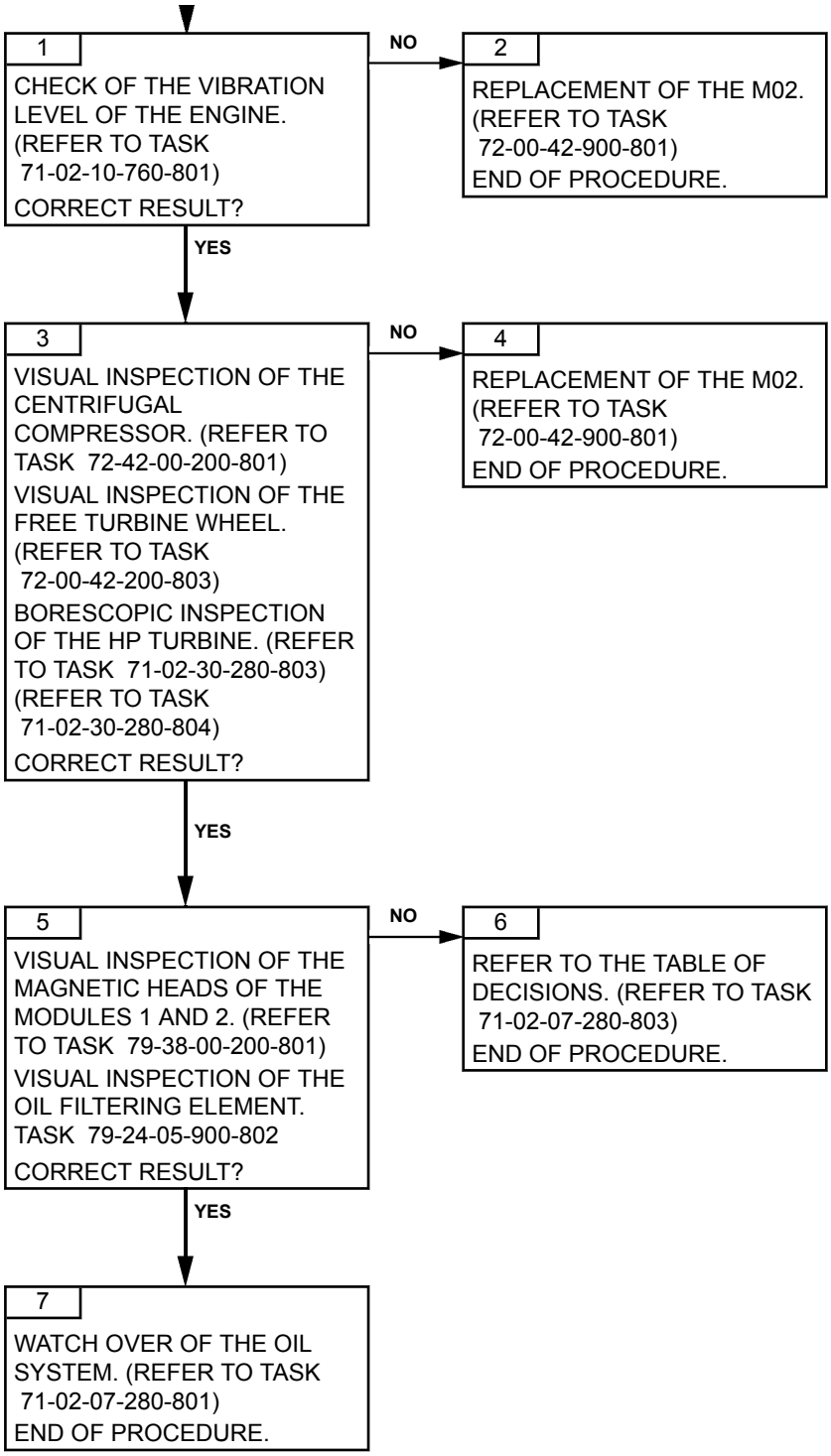
The generator starter, the engine attachments, the coupling and the engine alignment/M.G.B of the aircraft are correct.

Abnormal noises or/and repetitive cracks show that the vibration level is incorrect.

C. POSSIBLE CAUSES

– Module 2 (M02)

2. PROCEDURE



TASK 71-00-06-814-806-A01

SURGE TROUBLESHOOTING

1. GENERAL

A. PHASE

During operation

B. REMINDER OF THE NORMAL OPERATING CONDITION

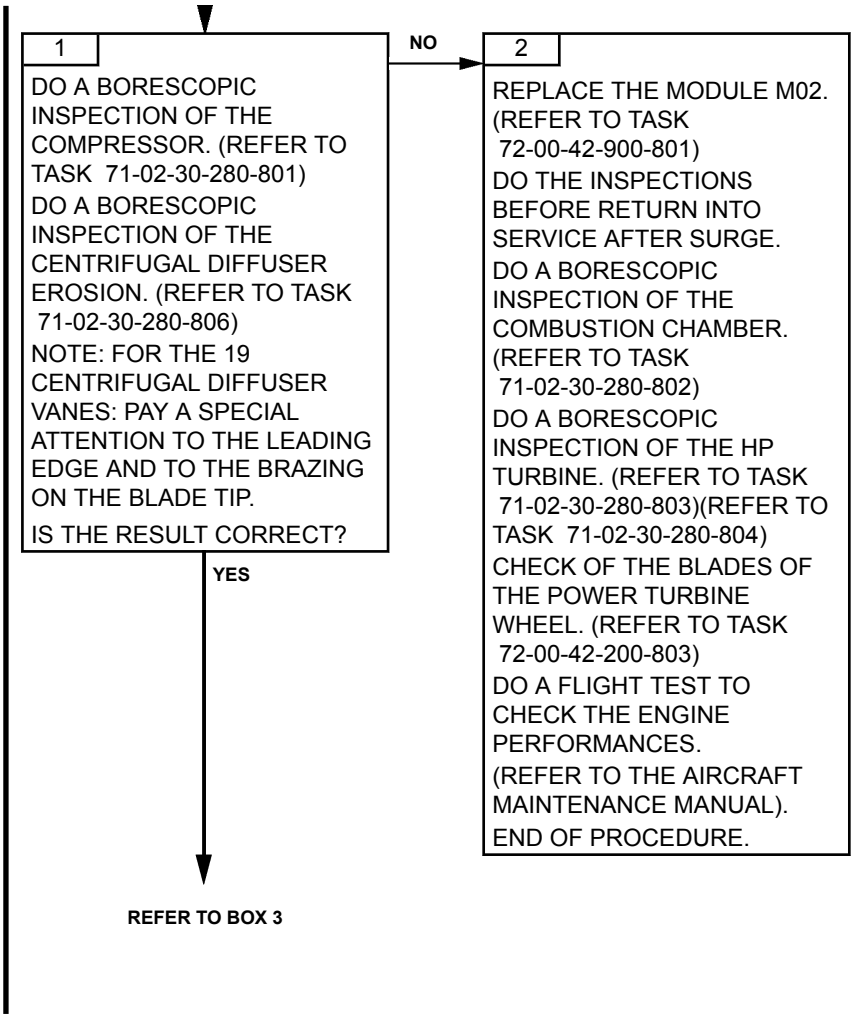
The surge phenomenon is reflected by:

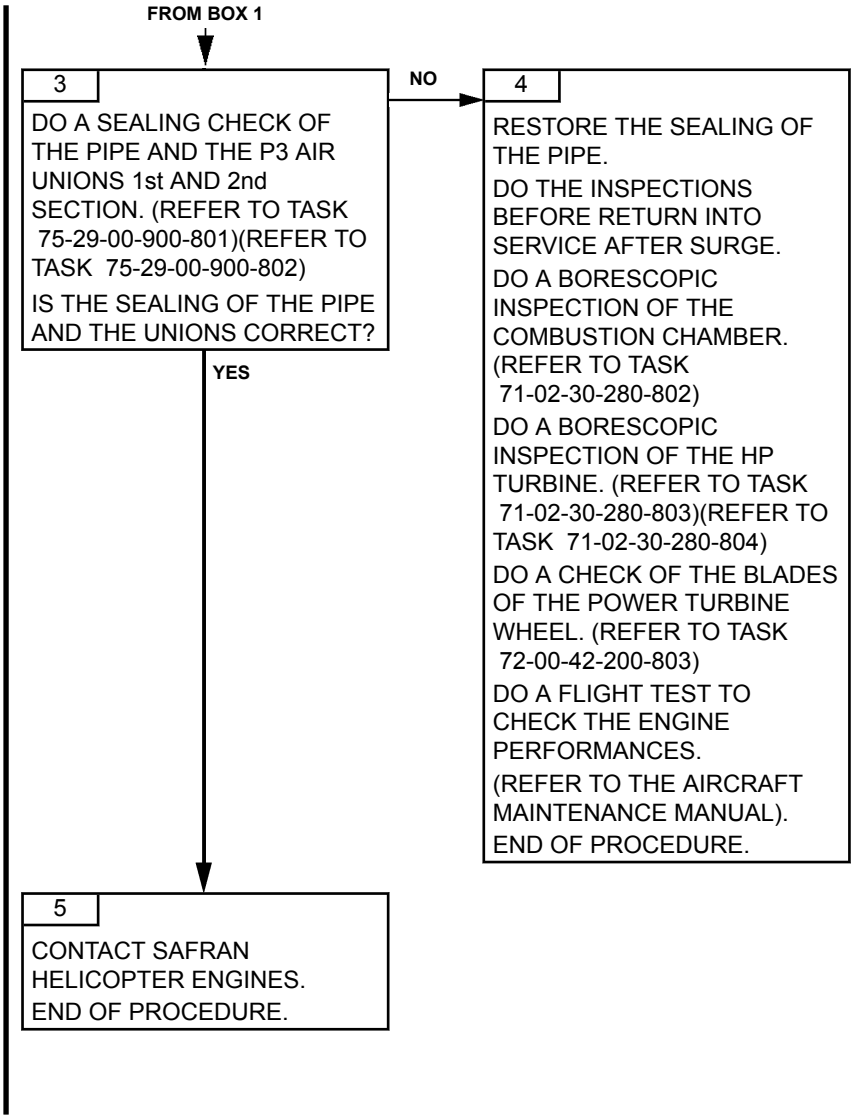
- Violent noise(s) and jerk(s)
- Fish tailing
- Vibrations
- Potentially loss of power

C. POSSIBLE CAUSES

- Module 2 (M02)
- Air P3 acceleration controller

2. PROCEDURE





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TASK 71-00-06-814-807-A01

SMELLS IN THE CABIN TROUBLESHOOTING

1. GENERAL

A. PHASE

During operation

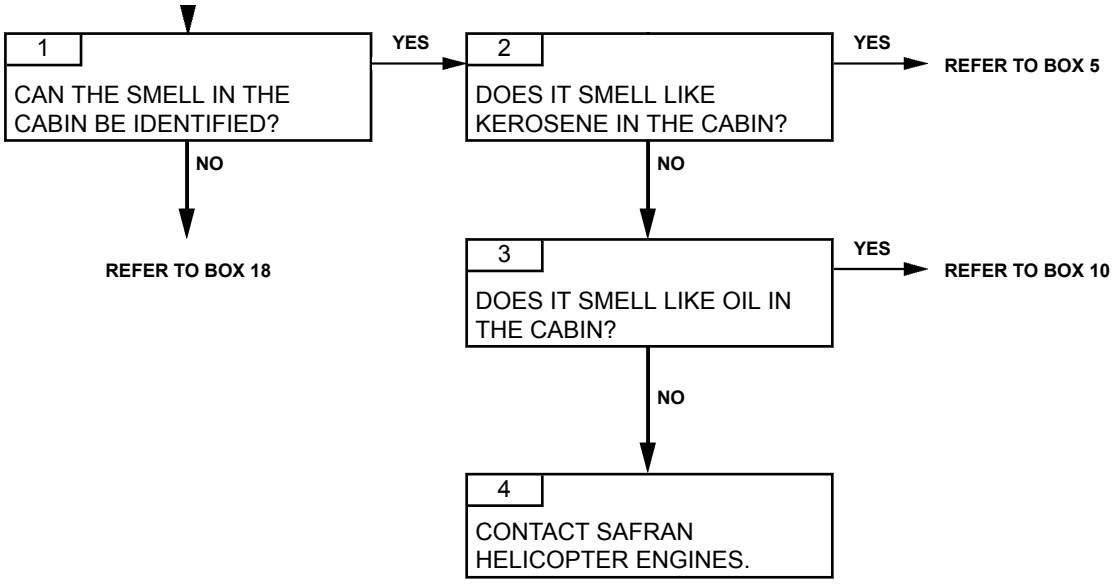
B. REMINDER OF THE NORMAL OPERATING CONDITION

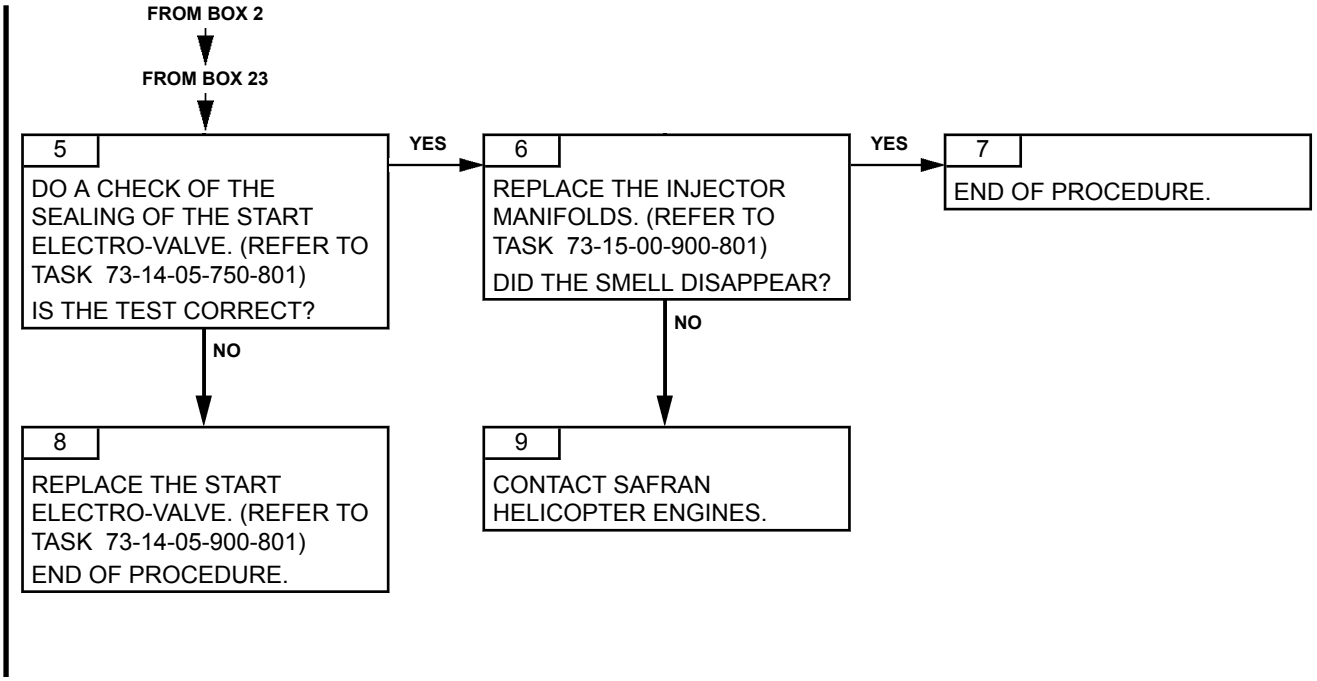
No smell in the cabin.

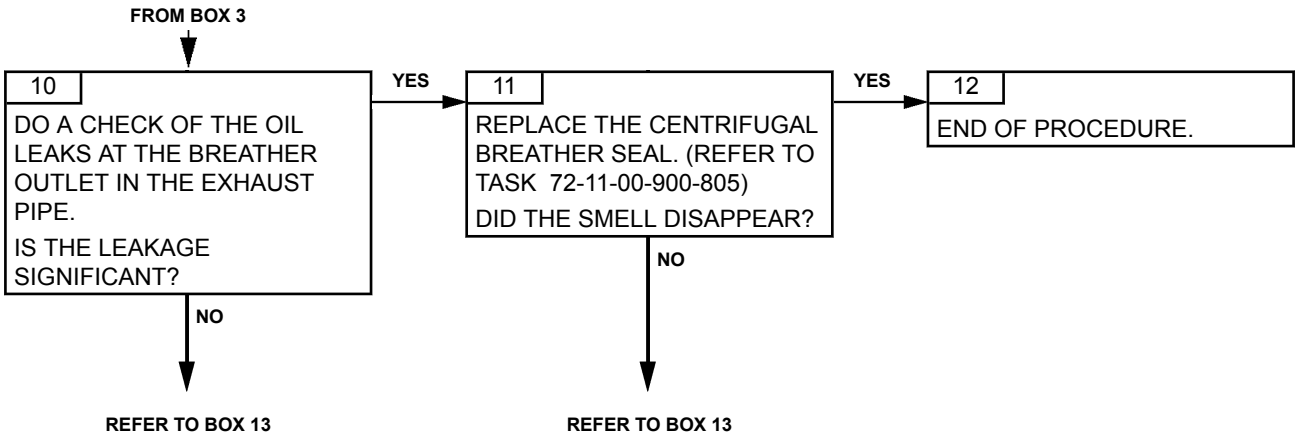
C. POSSIBLE CAUSES

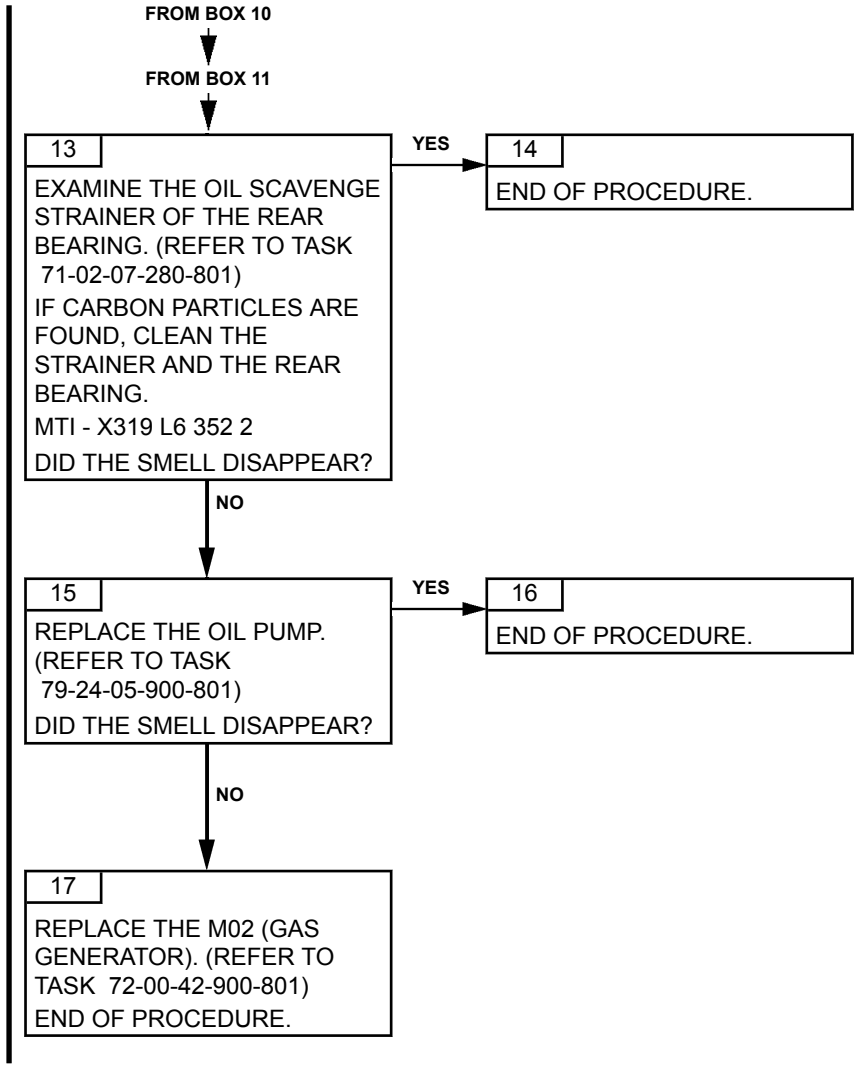
- Start electrovalve
- Injector manifolds
- M02 (Gas generator)
- Breather sealing
- Oil scavenge pipe of the rear bearing
- Oil pump

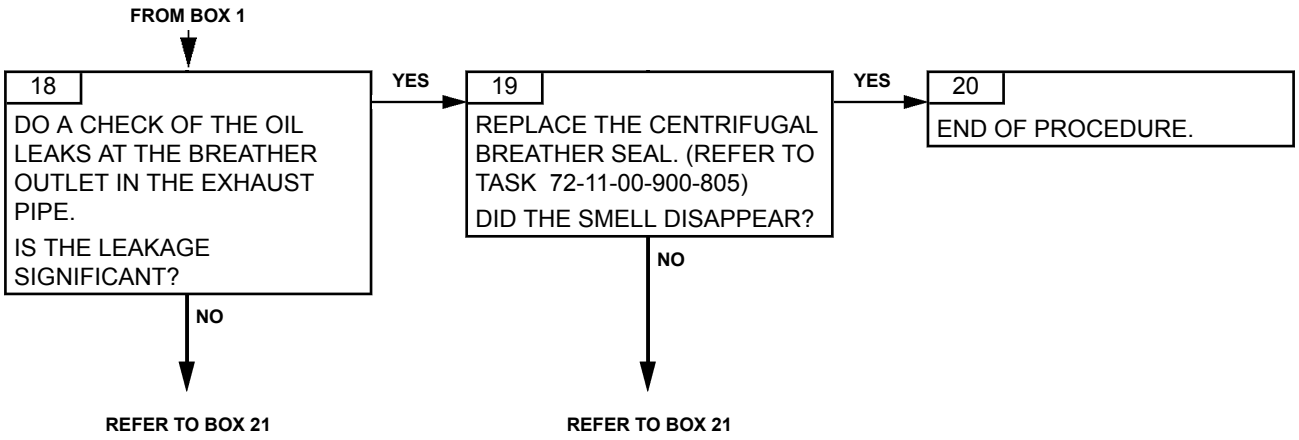
2. PROCEDURE

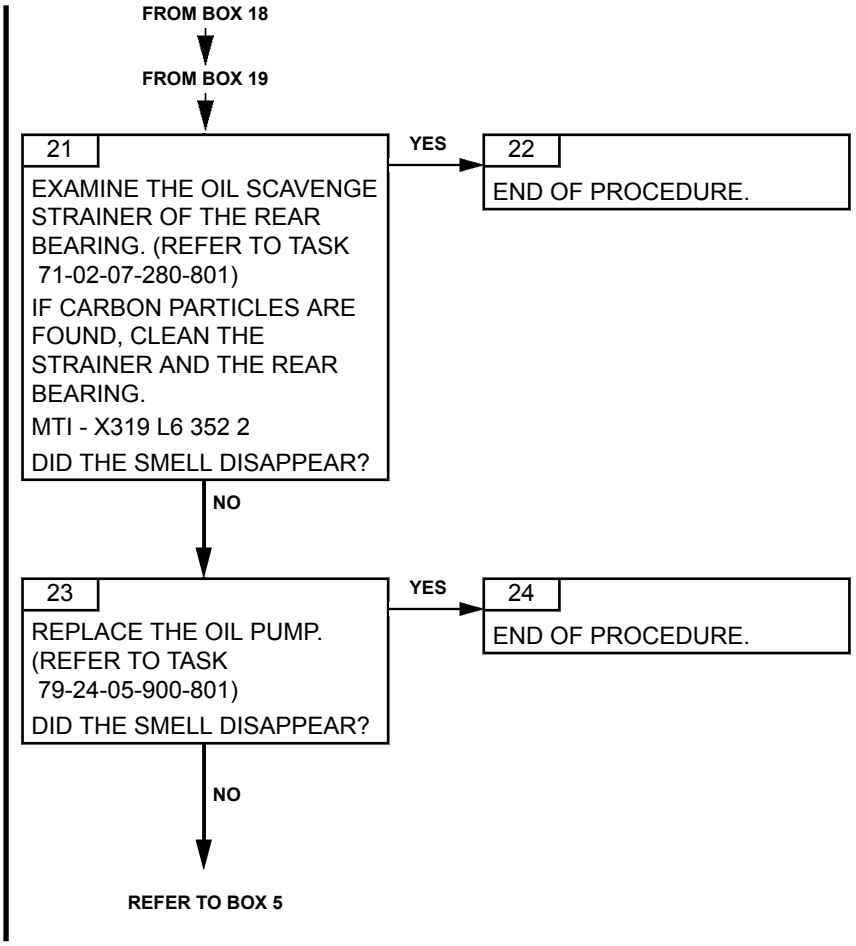












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TASK 71-00-06-814-808-A01

N1 OVERSPEED TROUBLESHOOTING

1. GENERAL

A. PHASE

During operation

B. REMINDER OF THE NORMAL OPERATING CONDITION

ENGINE LIMITATIONS. (Refer to Task 71-00-01-940-801).

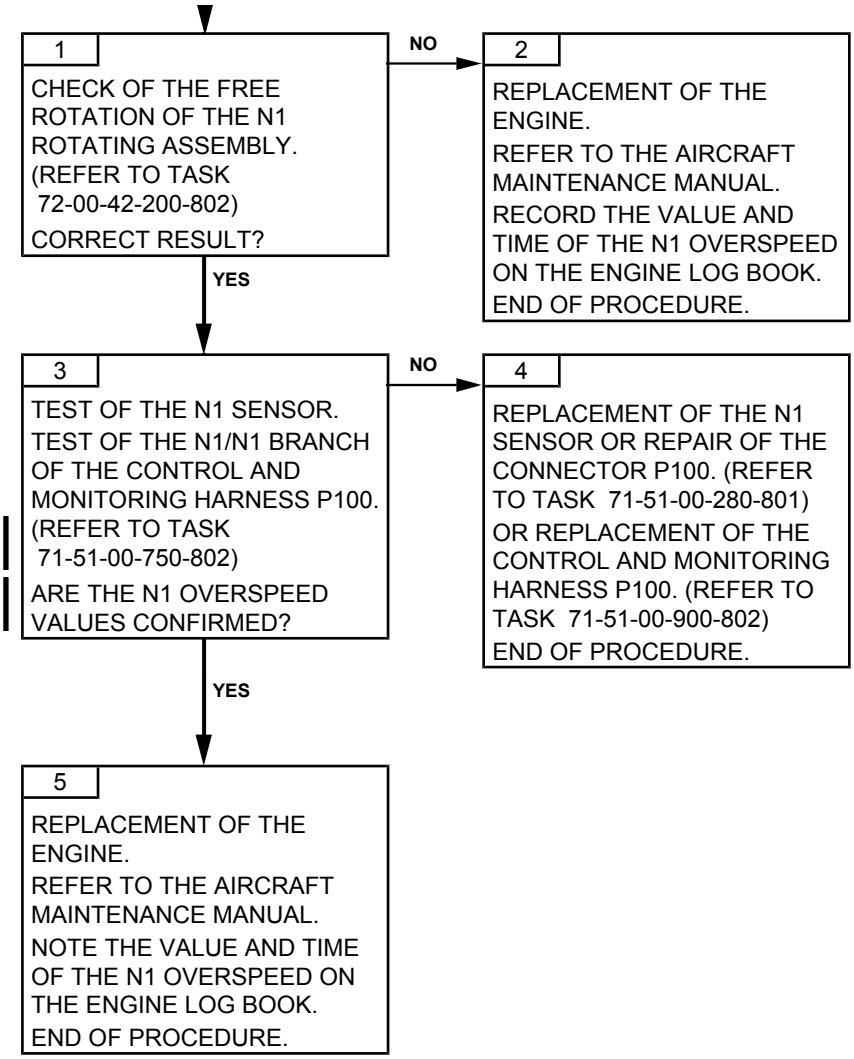
The V.E.M.D is correct.

The N1 speed is checked by the adjusted fuel control unit. The speed must respect the limitations (Refer to Task 71-00-01-940-801).

C. POSSIBLE CAUSES

- Adjusted fuel control unit
- Control and monitoring harness P100

2. PROCEDURE



TASK 71-00-06-814-809-A01

N2 OVERSPEED (FROM 104 % TO 110 %) TROUBLESHOOTING

1. GENERAL

A. PHASE

During operation

B. REMINDER OF THE NORMAL OPERATING CONDITION

ENGINE LIMITATIONS. (Refer to Task 71-00-01-940-801).

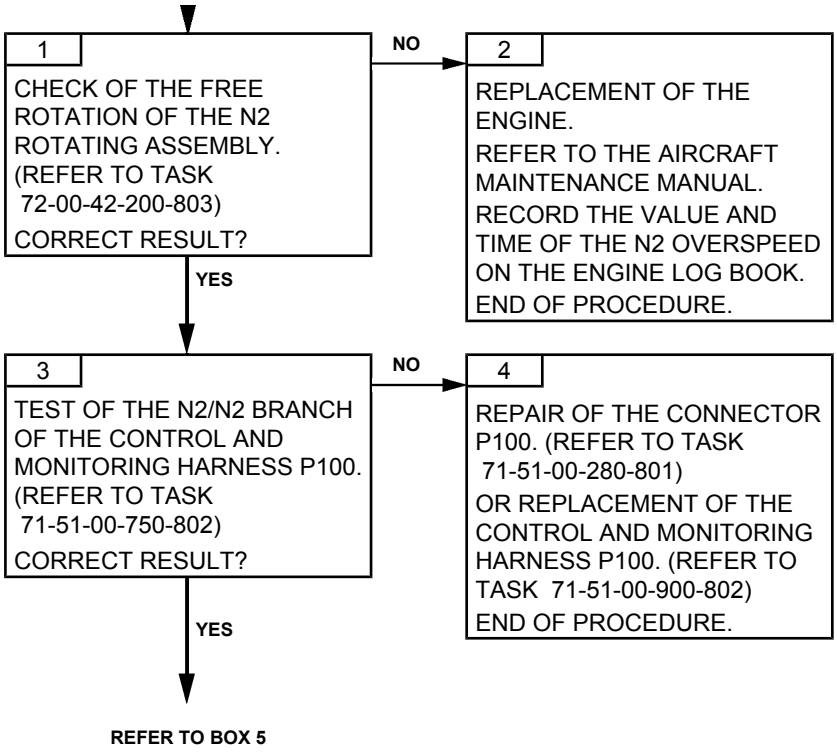
The V.E.M.D is correct.

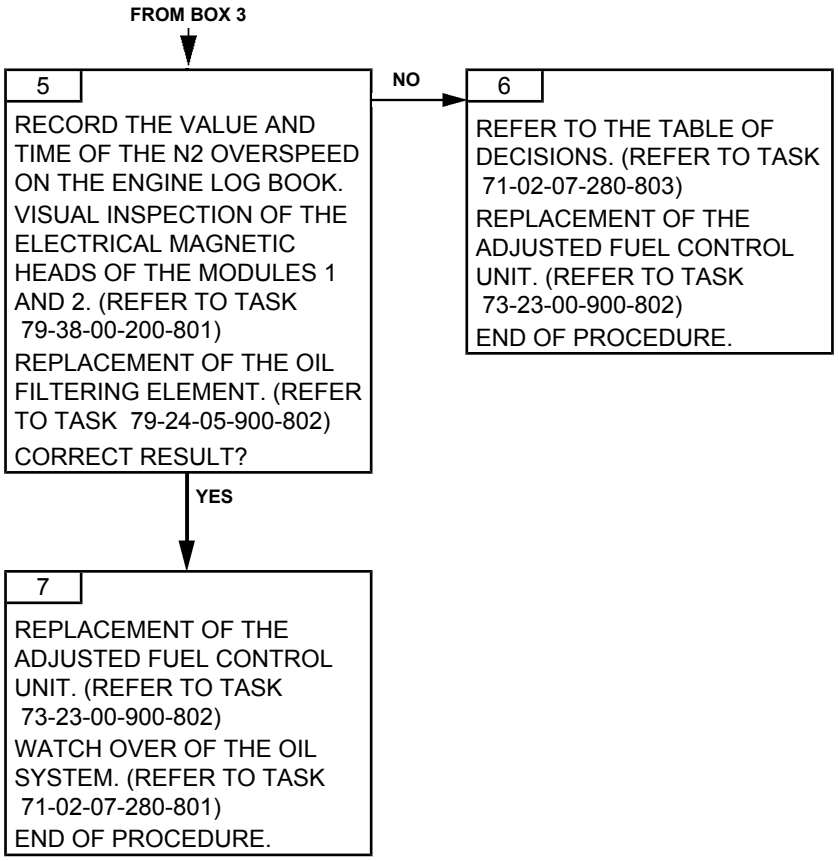
The N2 speed is checked by the adjusted fuel control unit. The speed must respect the limitations (Refer to Task 71-00-01-940-801).

C. POSSIBLE CAUSES

- Adjusted fuel control unit
- Control and monitoring harness P100

2. PROCEDURE





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TASK 71-00-06-814-811-A01

TORQUE LIMITATIONS EXCEEDED TROUBLESHOOTING

1. GENERAL

A. PHASE

During operation

B. REMINDER OF THE NORMAL OPERATING CONDITION

ENGINE LIMITATIONS. (Refer to Task 71-00-01-940-801).

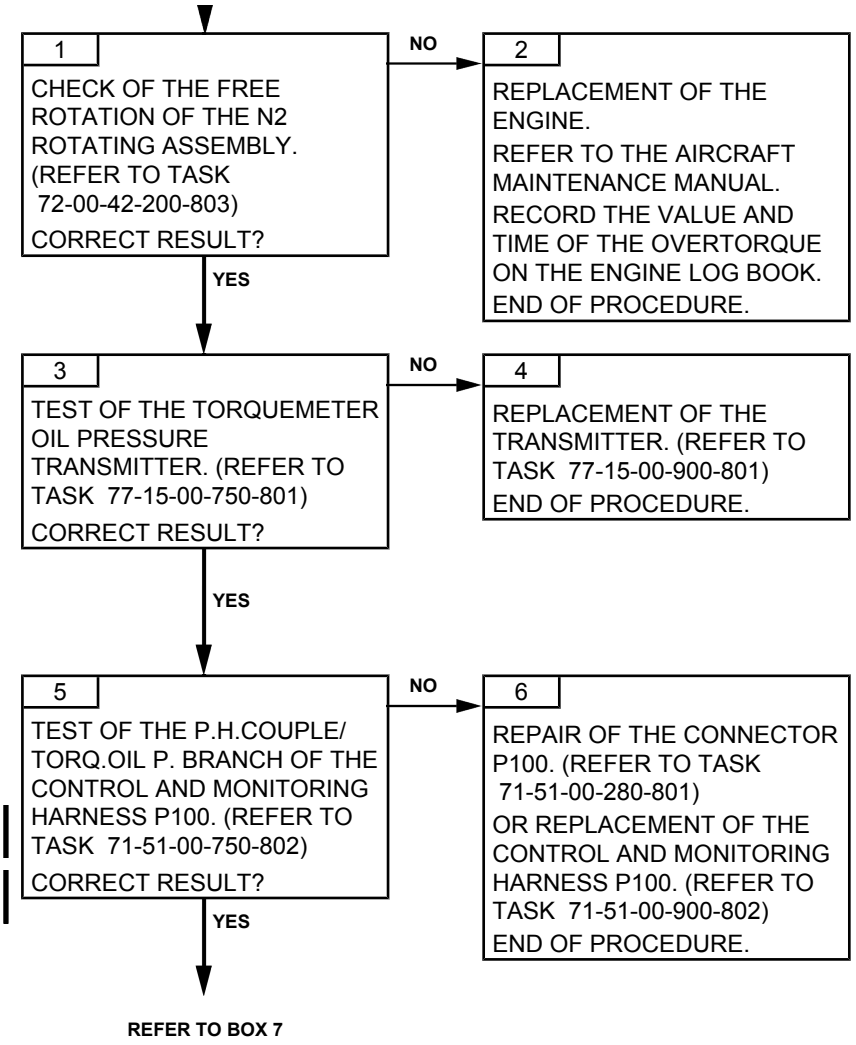
The matching value of the torque of the module 1 (M01) recorded on the V.E.M.D and the measurement system of the torque of the aircraft are correct.

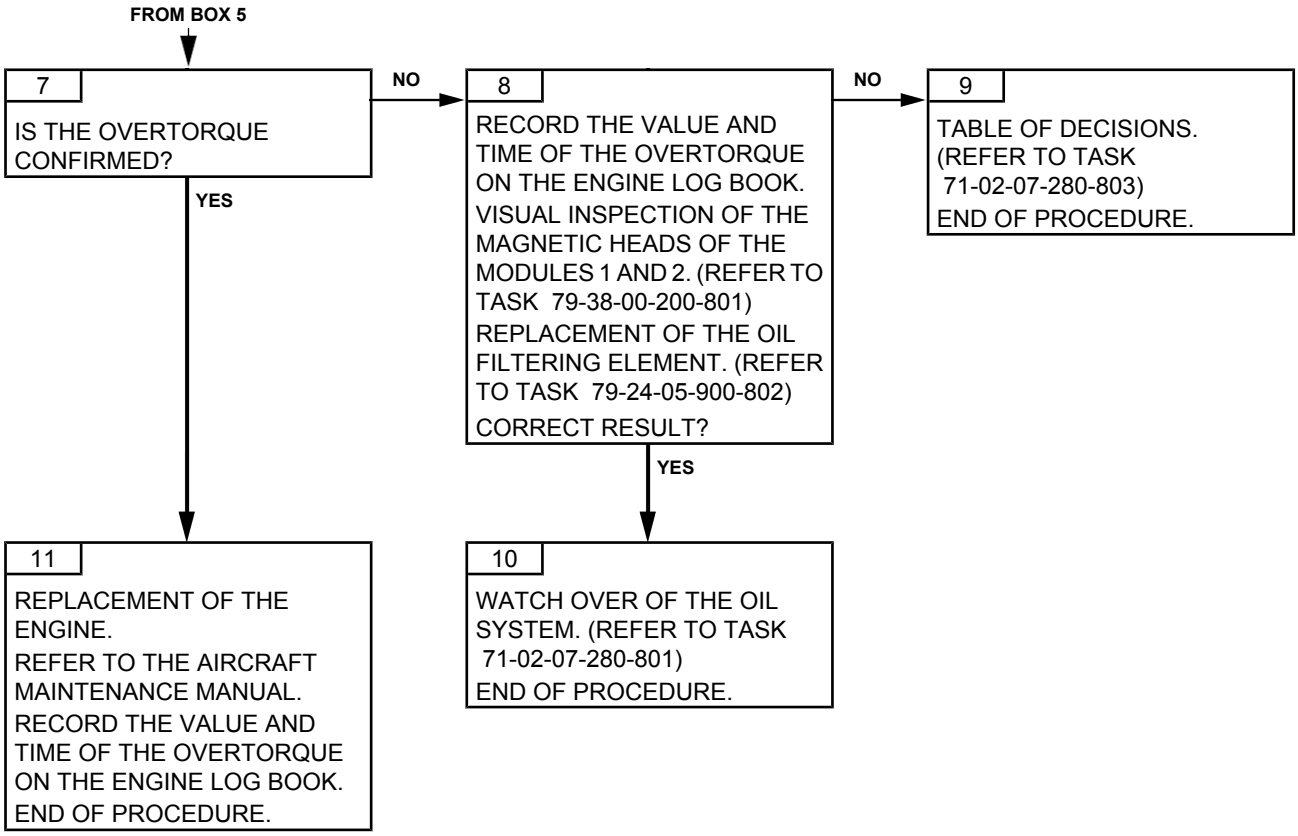
The torquemeter must respect the limitations of the relevant flight envelope (Refer to Task 71-00-01-940-801).

C. POSSIBLE CAUSES

- Torquemeter oil pressure transmitter
- Control and monitoring harness P100
- M01 (hydraulic torquemeter)

2. PROCEDURE





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TASK 71-00-06-814-812-A01

T4.5 OVERTEMPERATURE TROUBLESHOOTING

1. GENERAL

A. PHASE

During operation

B. REMINDER OF THE NORMAL OPERATING CONDITION

ENGINE LIMITATIONS. (Refer to Task 71-00-01-940-801).

No compressor surge.

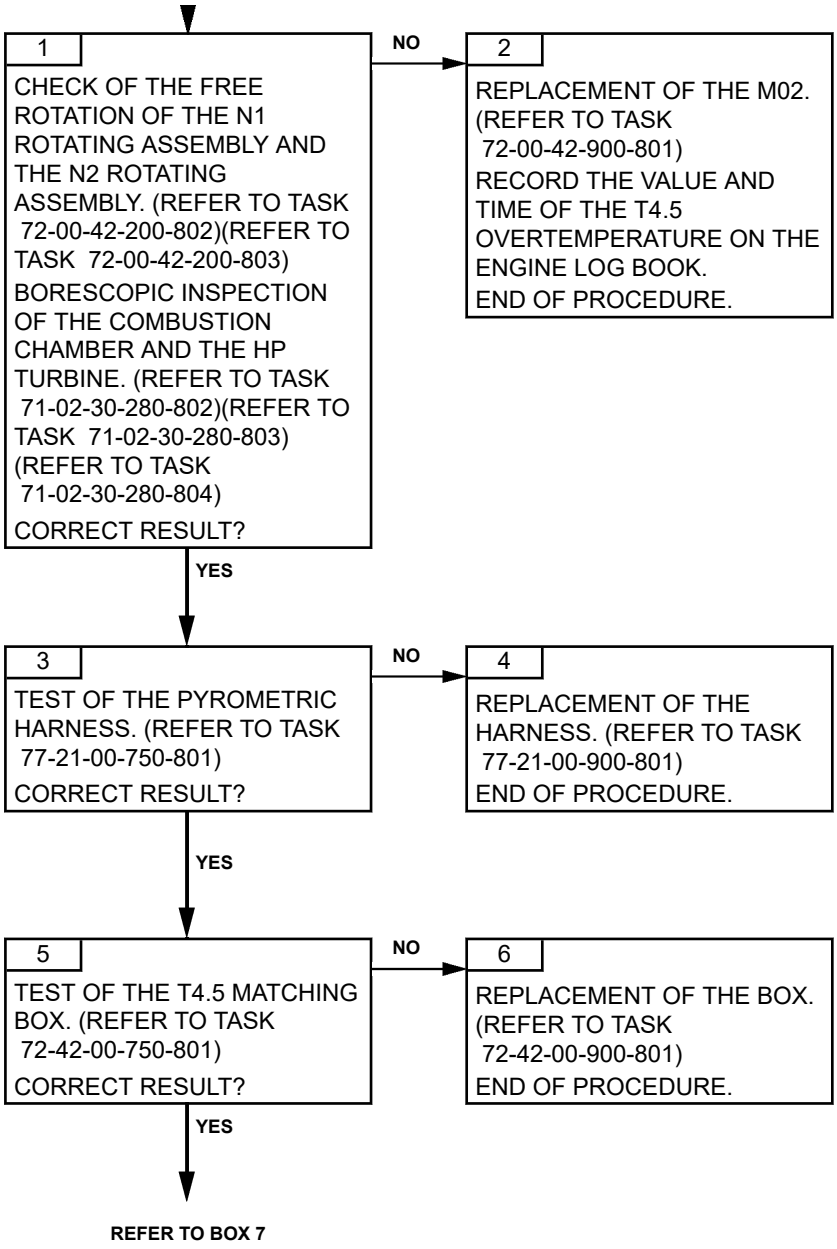
The T4.5 measure systems and the aircraft torque are correct.

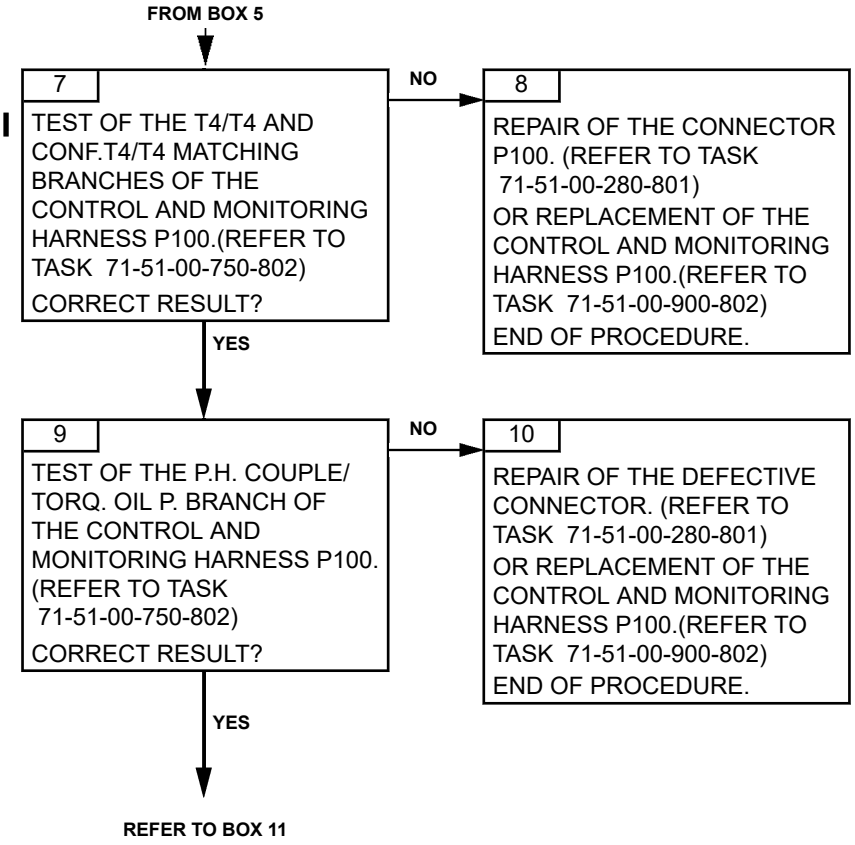
The T4.5 is defined by an air/fuel report that can be damaged by the condition of the air path, the HP turbine, and the cleanliness of the centrifugal compressor.

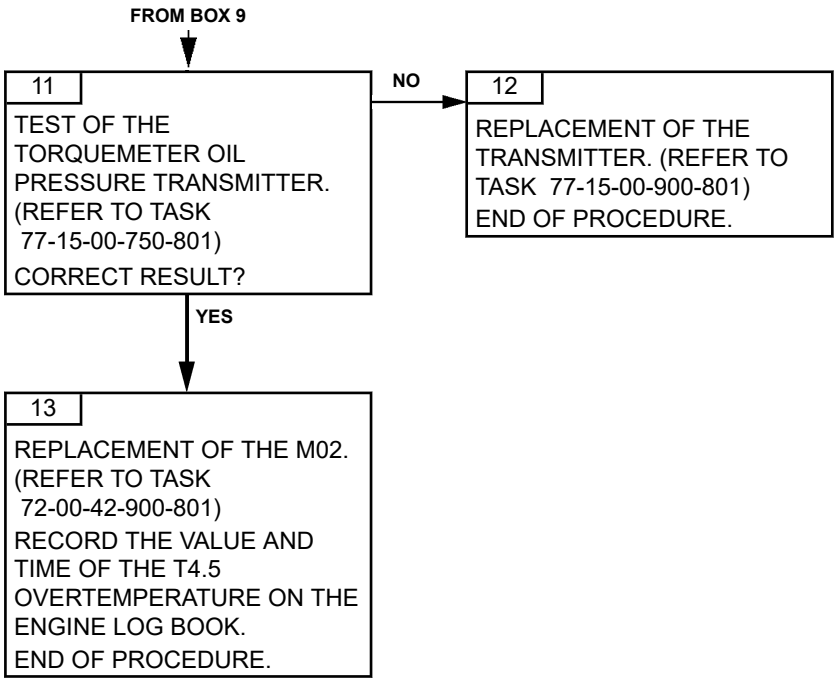
C. POSSIBLE CAUSES

- Module 2 (M02)
- Pyrometric harness
- T4.5 matching box
- Control and monitoring harness P100
- Torquemeter oil pressure transmitter

2. PROCEDURE






FROM BOX 9
11
TEST OF THE TORQUEMETER OIL PRESSURE TRANSMITTER. (REFER TO TASK 77-15-00-750-801)
CORRECT RESULT?
NO
12
REPLACEMENT OF THE TRANSMITTER. (REFER TO TASK 77-15-00-900-801)
END OF PROCEDURE.
YES
13
REPLACEMENT OF THE M02. (REFER TO TASK 72-00-42-900-801)
RECORD THE VALUE AND TIME OF THE T4.5 OVERTEMPERATURE ON THE ENGINE LOG BOOK.
END OF PROCEDURE.

TASK 71-00-06-814-813-A01

"FUEL PRESS" MESSAGE (LOW FUEL PRESSURE) TROUBLESHOOTING

1. GENERAL

A. PHASE

During operation

B. REMINDER OF THE NORMAL OPERATING CONDITION

The booster pump visual indicator was on "stop".

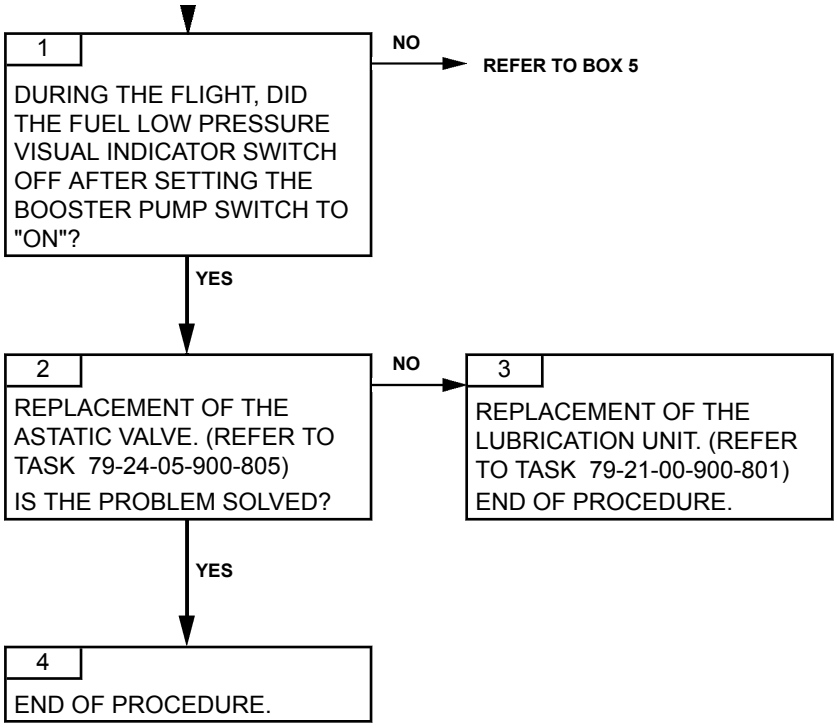
The visual indication system of the low fuel pressure and the fuel system of the aircraft are correct.

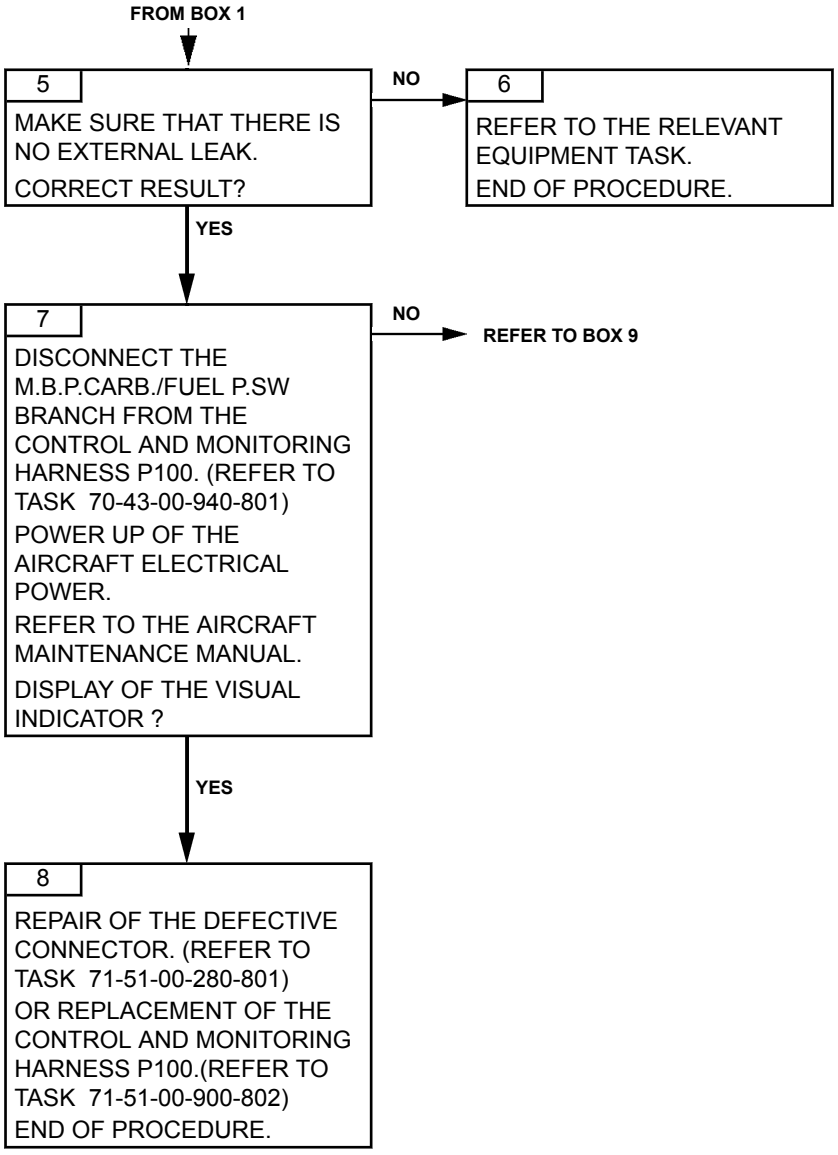
No display of the signal during the engine operation.

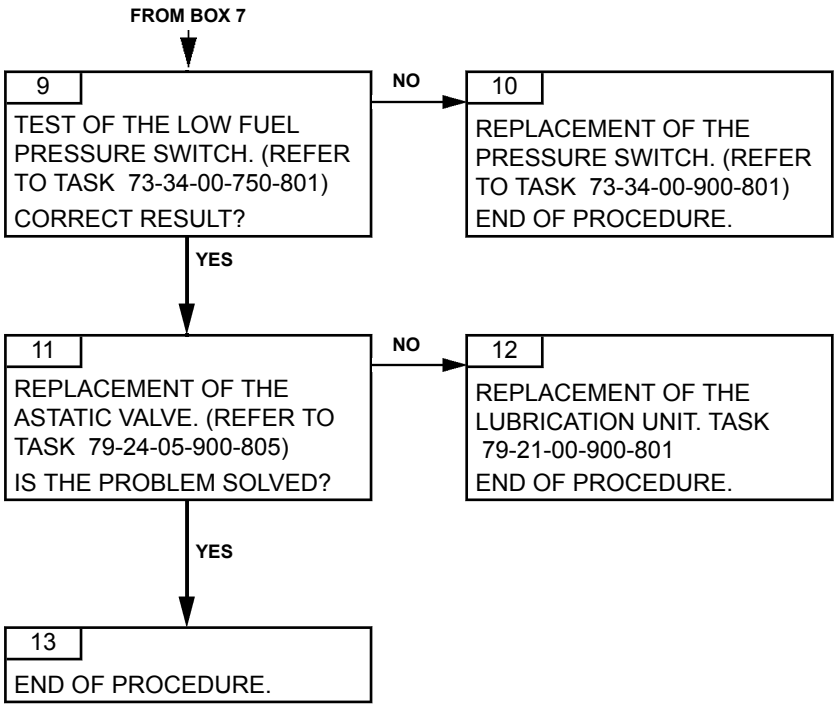
C. POSSIBLE CAUSES

- Low fuel pressure switch
- External leak
- Lubrication unit (astatic valve or/and ejector)
- Control and monitoring harness P100

2. PROCEDURE







TASK 71-00-06-814-814-A01

"FUEL FILT" MESSAGE (PRE-BLOCKAGE OF THE FUEL FILTERING ELEMENT) TROUBLESHOOTING

1. GENERAL

A. PHASE AND FAILURE DETECTION

During operation

B. GENERAL DESCRIPTION

The engine is equipped of two fuel filters:

- The first located on the adjusted fuel control unit (FCU)
- The second located on the lubrication device.

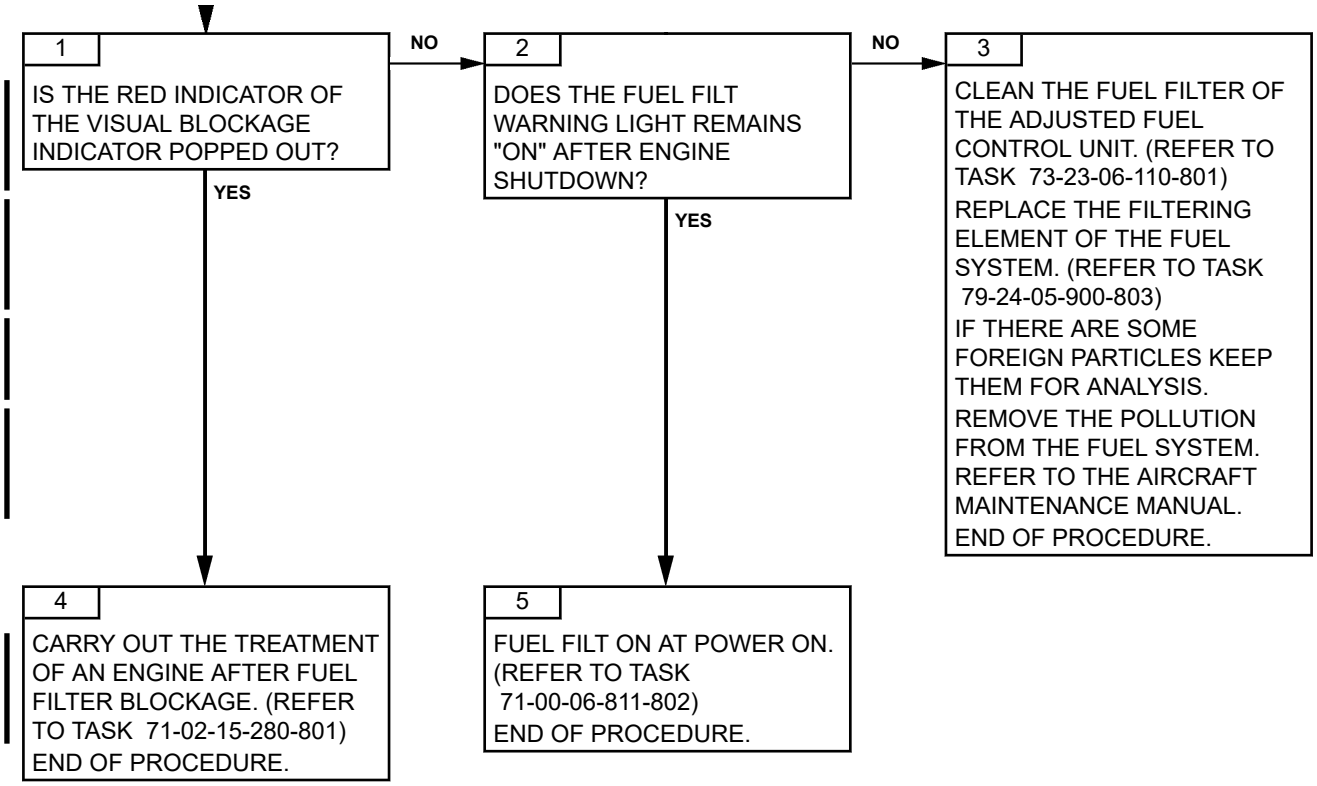
The fuel filter of the adjusted fuel control unit is not monitored by the aircraft. The fuel filtering element located on the lubrication device, has a pre blockage pressure switch connected to the aircraft.

This message "FUEL FLT" is displayed when the aircraft detects a pre blockage of the fuel filtering element located on the lubrication device.

C. POSSIBLE CAUSES

- Pre blockage pressure switch
- Control and monitoring harness P100
- Fuel pollution
- Aircraft

2. PROCEDURE



TASK 71-00-06-814-816-A01

NO N1 SPEED INDICATION TROUBLESHOOTING

1. GENERAL

A. PHASE

During operation

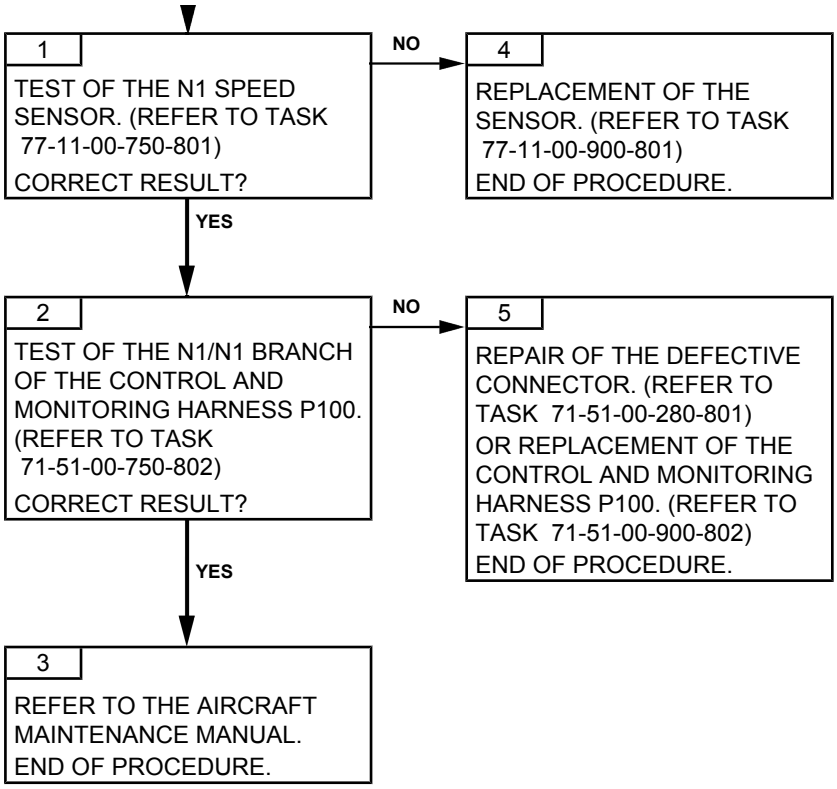
B. REMINDER OF THE NORMAL OPERATING CONDITION

Steady display of the N1 speed visual indicator when the N1 rotating assembly is driven.

C. POSSIBLE CAUSES

– N1 speed sensor
– Control and monitoring harness P100
– Aircraft

2. PROCEDURE



TASK 71-00-06-814-817-A01

NO N2 SPEED INDICATION TROUBLESHOOTING

1. GENERAL

A. PHASE

During operation

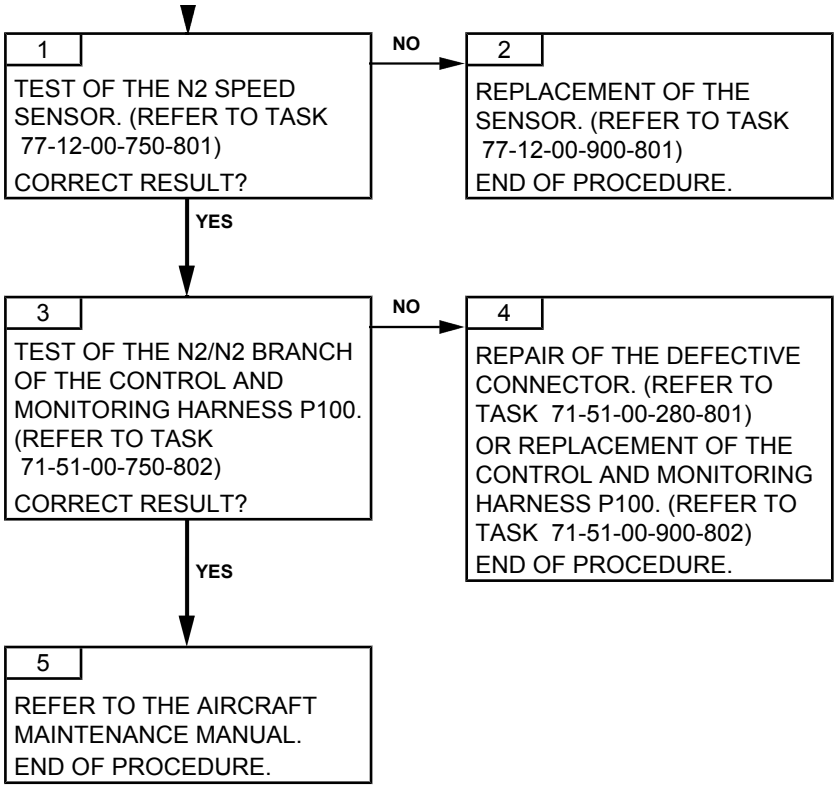
B. REMINDER OF THE NORMAL OPERATING CONDITION

Steady display of the N2 speed visual indicator when the rotor is driven by the engine.

C. POSSIBLE CAUSES

– N2 speed sensor
– Control and monitoring harness P100
– Aircraft

2. PROCEDURE



TASK 71-00-06-814-818-A01

NO T4.5 INDICATION TROUBLESHOOTING

1. GENERAL

A. PHASE

During operation

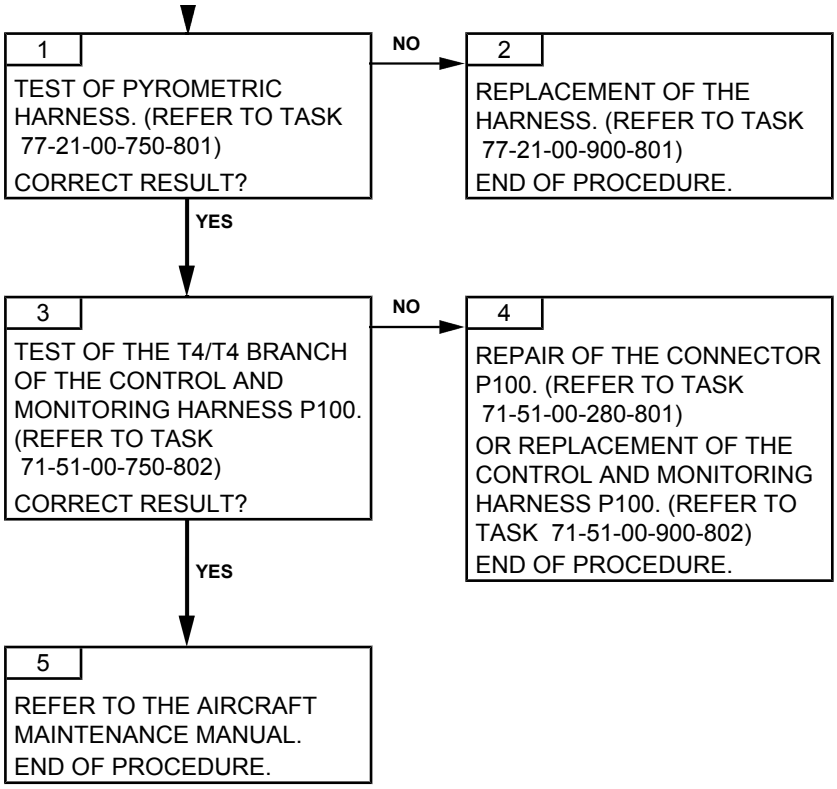
B. REMINDER OF THE NORMAL OPERATING CONDITION

Steady display of the visual indicator of the T4.5.

C. POSSIBLE CAUSES

– Pyrometric harness
– Control and monitoring harness P100
– Aircraft

2. PROCEDURE



TASK 71-00-06-814-819-A01

T4.5 INDICATION ERRONEOUS TROUBLESHOOTING

1. GENERAL

A. PHASE

During operation

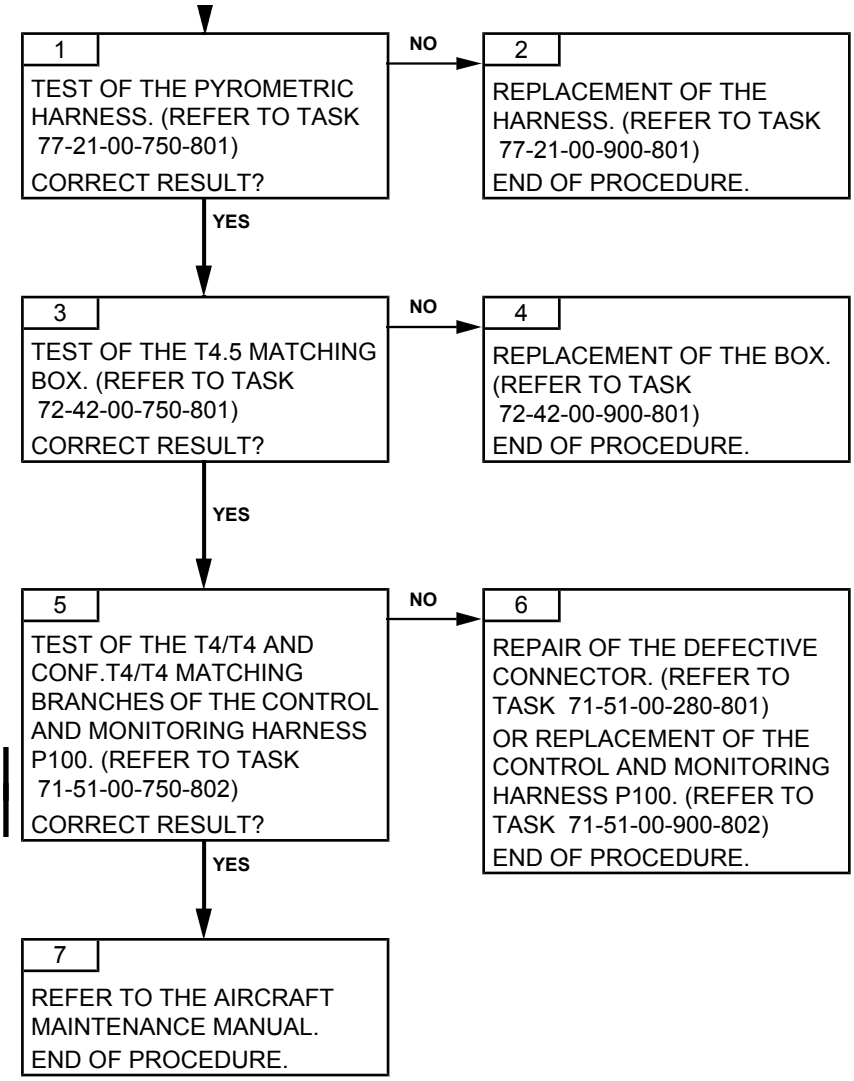
B. REMINDER OF THE NORMAL OPERATING CONDITION

The T4-5 must be in accordance with the operation rating of the engine.

C. POSSIBLE CAUSES

- Pyrometric harness
- T4.5 matching box
- Control and monitoring harness P100
- Aircraft

2. PROCEDURE



TASK 71-00-06-814-820-A01

TORQUE INDICATION ERRONEOUS TROUBLESHOOTING

1. GENERAL

A. PHASE

During operation

B. REMINDER OF THE NORMAL OPERATING CONDITION

The conformation value of the torque of the M01 is correct on the V.E.M.D.

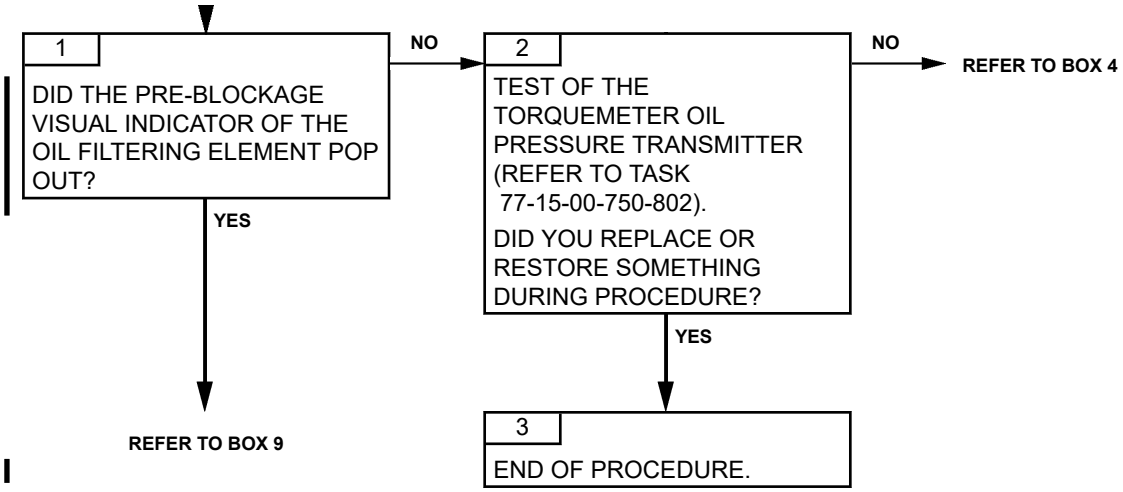
The measurement assembly of the aircraft torque is correct.

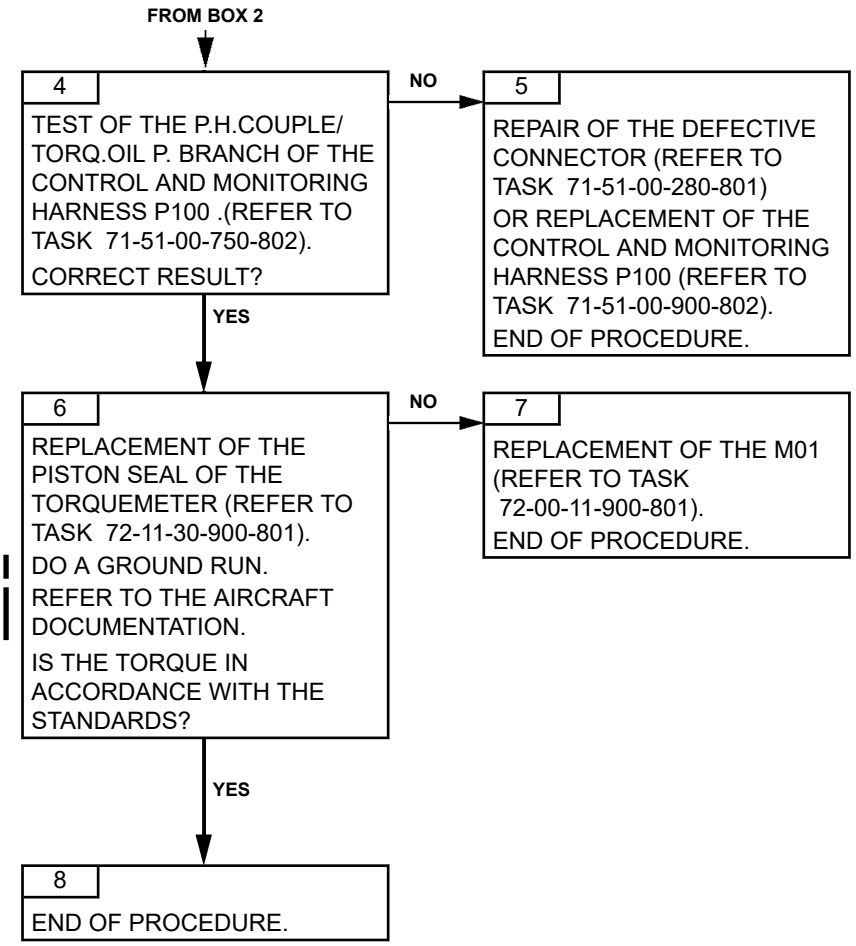
The torque must be in accordance with the relevant diagram in the flight manual.

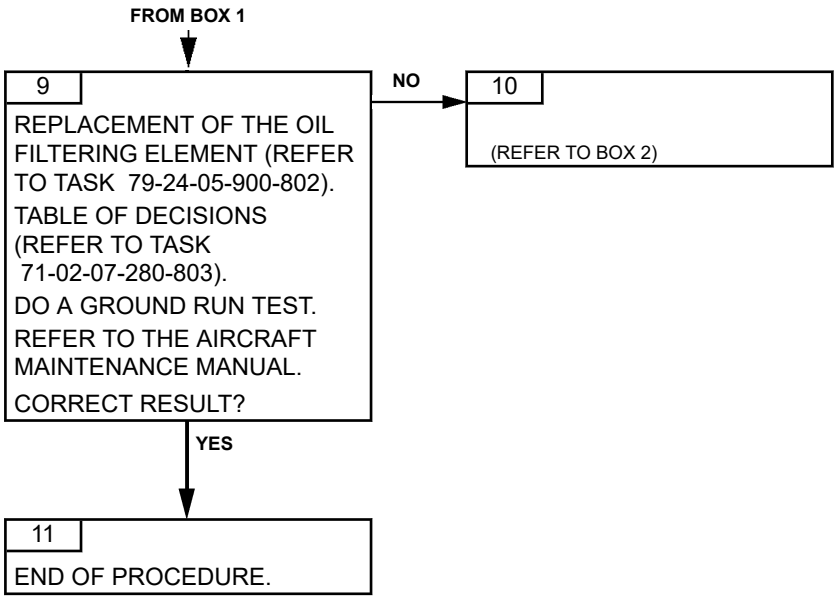
C. POSSIBLE CAUSES

- Torquemeter oil pressure transmitter
- Control and monitoring harness P100
- Piston seal of the torquemeter
- Oil system contamination
- Module 1 (M01)

2. PROCEDURE







TASK 71-00-06-814-823-A01

OIL OVERTEMPERATURE ON THE DIAGRAM VALUES DISPLAY TROUBLESHOOTING

1. GENERAL

A. PHASE

During operation

B. GENERAL DESCRIPTION

The tolerance criteria for oil temperature limitation are defined:
(Refer to Task 71-00-02-940-801).

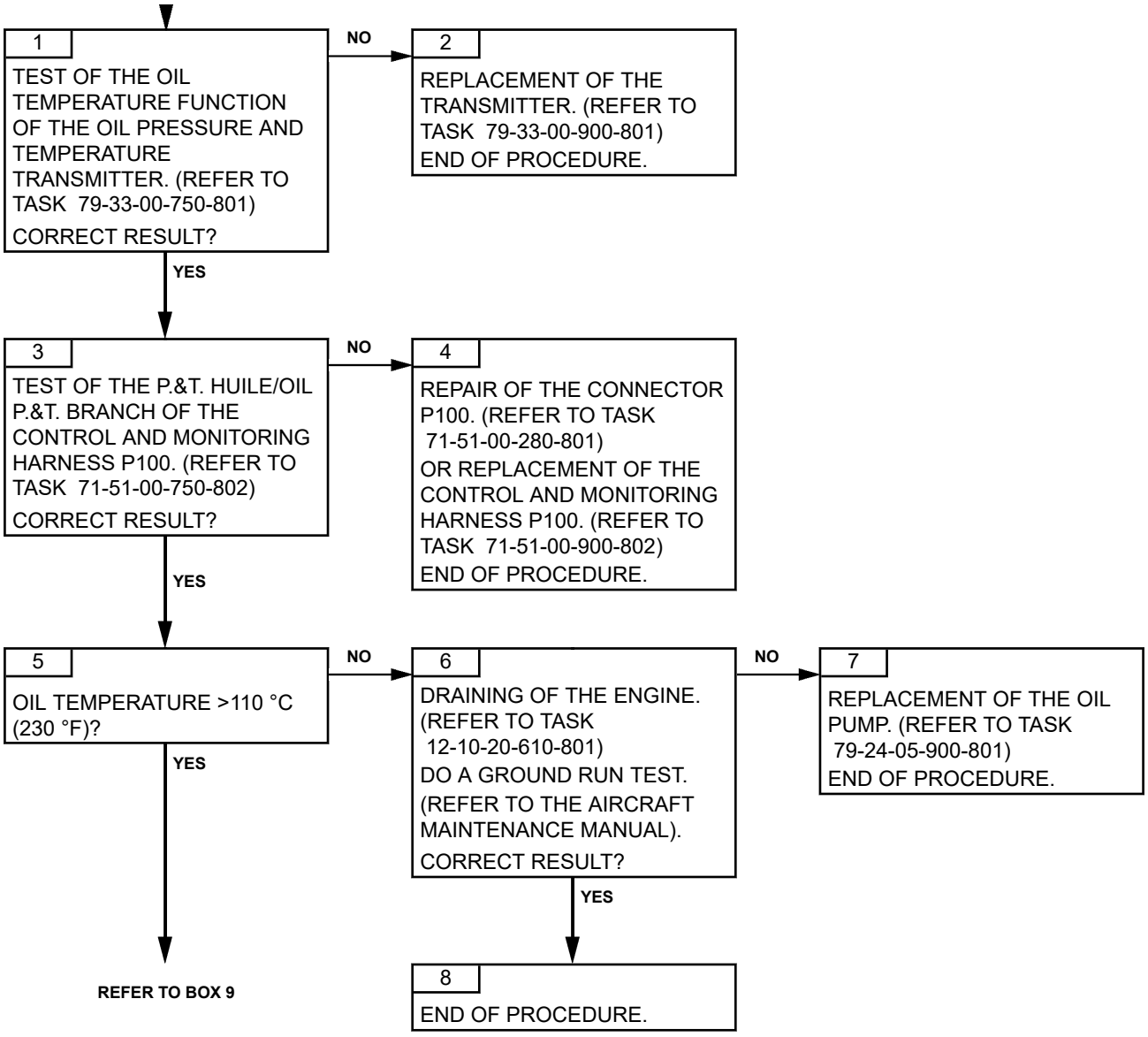
The oil temperature is monitored by the oil pressure and temperature transmitter, connected to the aircraft.

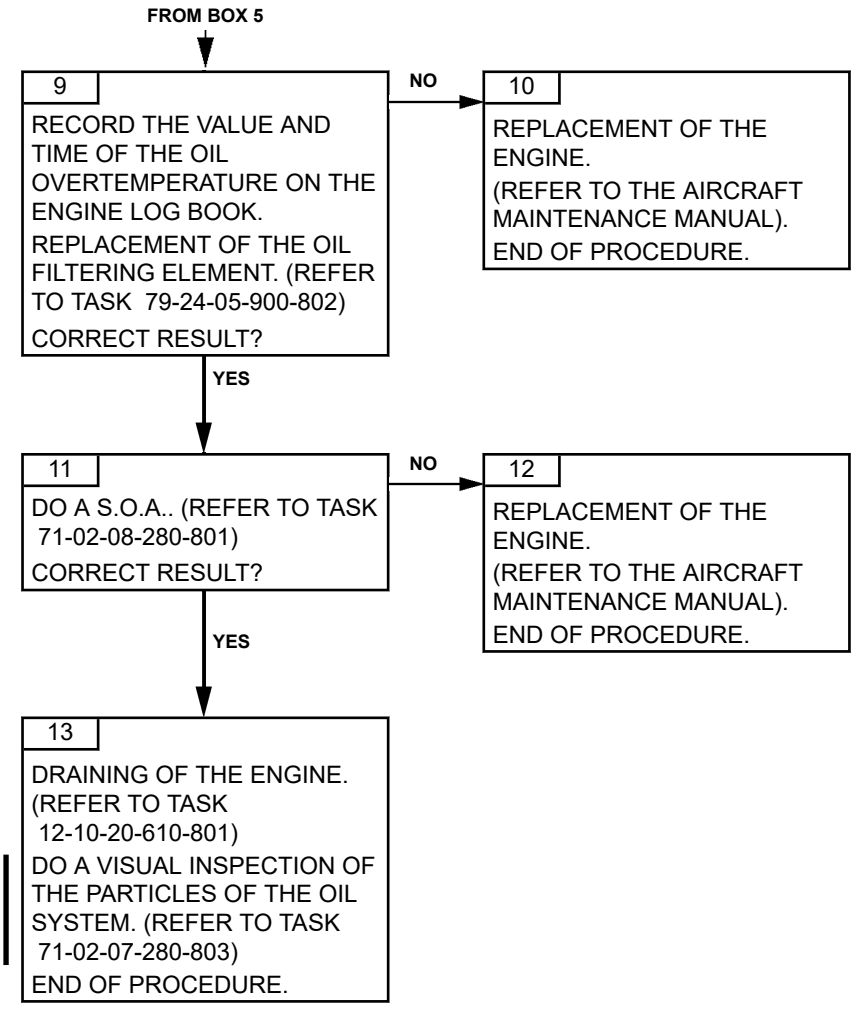
The oil pressure and temperature transmitter is located at the oil filter outlet.

C. POSSIBLE CAUSES

- Oil pressure and temperature transmitter
- Control and monitoring harness P100
- Oil pump
- Oil characteristics

2. PROCEDURE





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TASK 71-00-06-814-826-A01

FLUCTUATING OIL PRESSURE TROUBLESHOOTING

1. GENERAL

A. PHASE

During operation

B. REMINDER OF THE NORMAL OPERATING CONDITION

The oil is in accordance with the standards.

The oil level is correct.

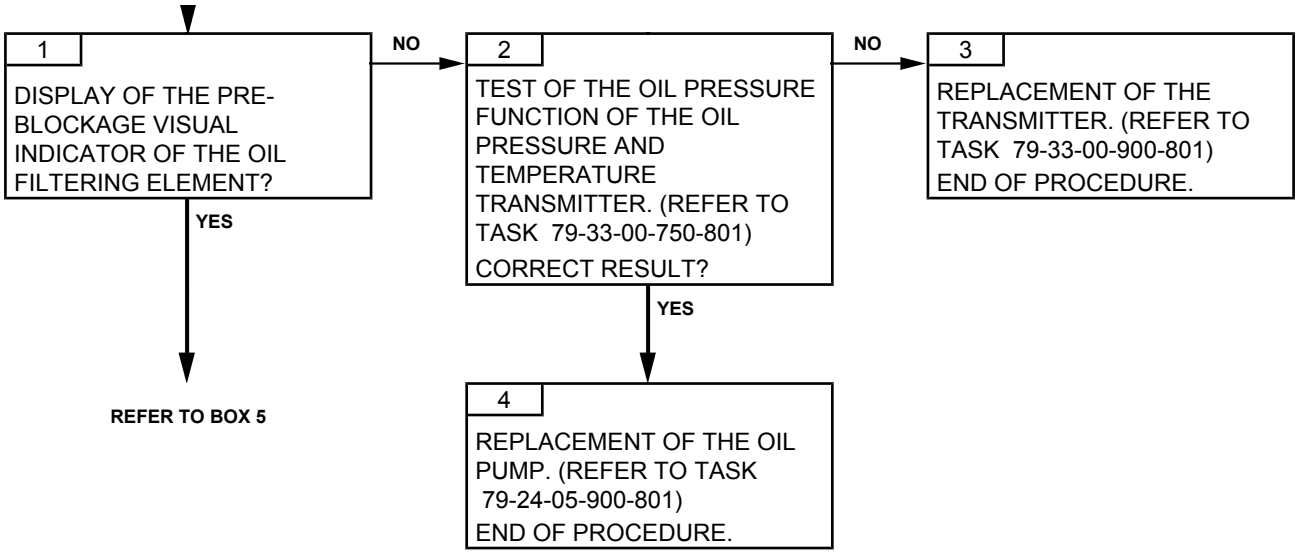
No oil leak (air bleed).

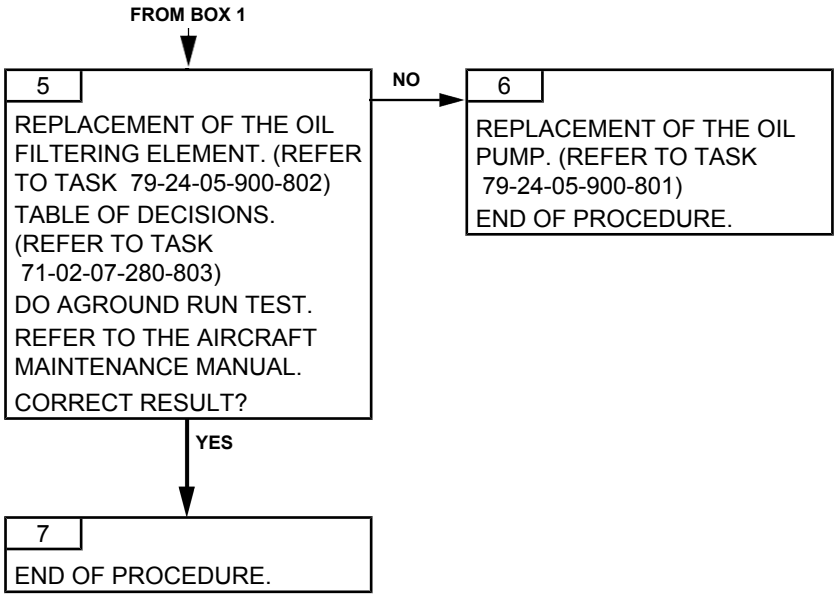
At a constant N1, the oil pressure must remain constant.

C. POSSIBLE CAUSES

- Oil pressure and temperature transmitter
- Oil pump
- Oil system contamination

2. PROCEDURE





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TASK 71-00-06-814-828-A01

OIL PRESSURE TOO HIGH TROUBLESHOOTING

1. GENERAL

A. PHASE

During operation

B. REMINDER OF THE NORMAL OPERATING CONDITION

The oil pressure is less than the values on the diagram or/and more than 1000 kPa.

No oil traces in the air intake casing, no smokes at the engine shutdown.

The visual indicator of the torque is correct.

The oil is in accordance with the standards.

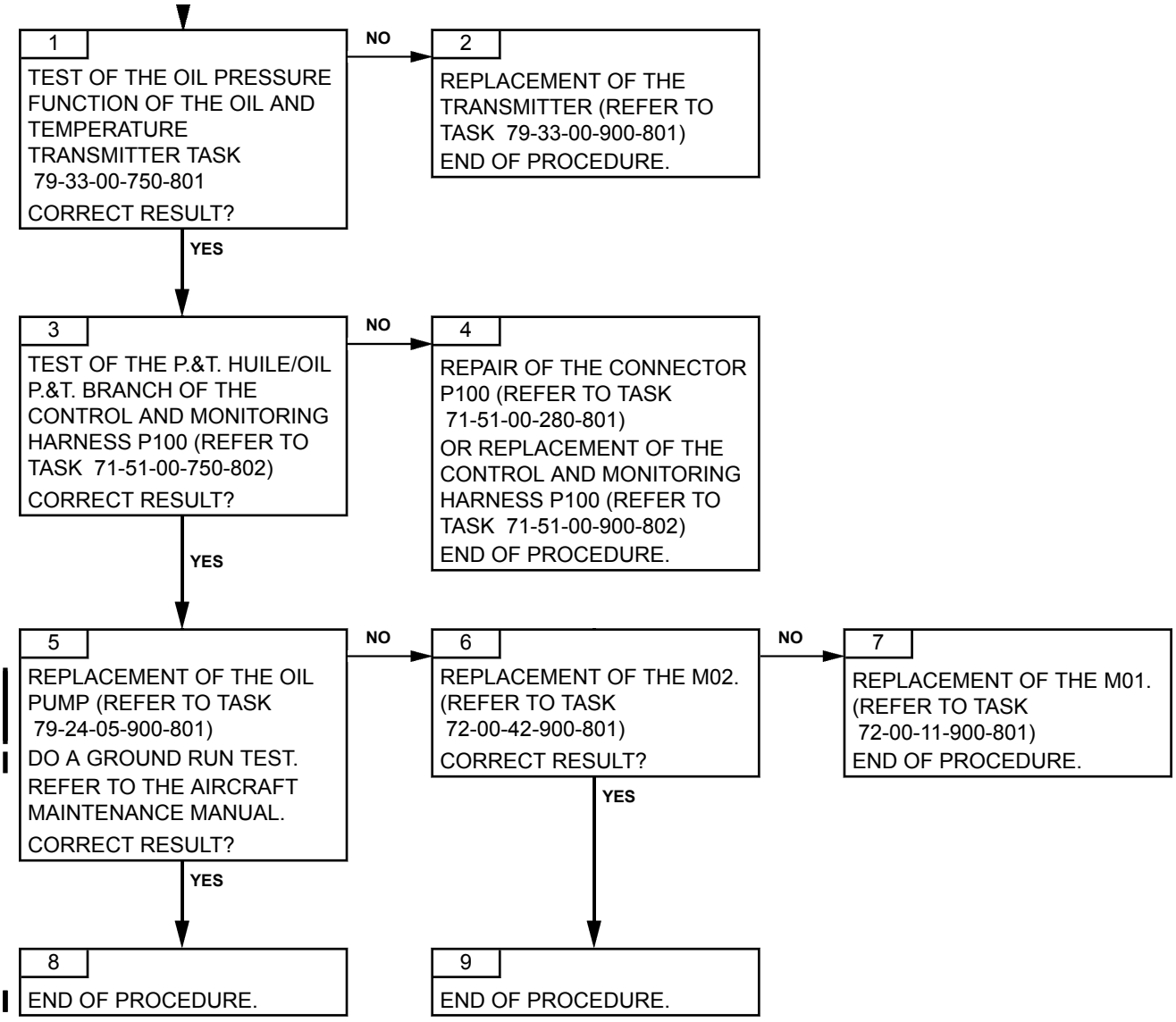
The visual indicator system of the oil pressure of the aircraft is correct.

The oil pressure must correspond to the values given in the task.
(Refer to Task 71-00-02-940-801).

C. POSSIBLE CAUSES

- Oil pressure and temperature transmitter
- Control and monitoring harness P100
- Oil pump
- Module 1 (M01)
- Module 2 (M02)

2. PROCEDURE



TASK 71-00-06-814-829-A01

"ENG CHIP" MESSAGE (MAGNETIC PARTICLES) TROUBLESHOOTING

1. GENERAL

A. PHASE

During operation

B. GENERAL DESCRIPTION

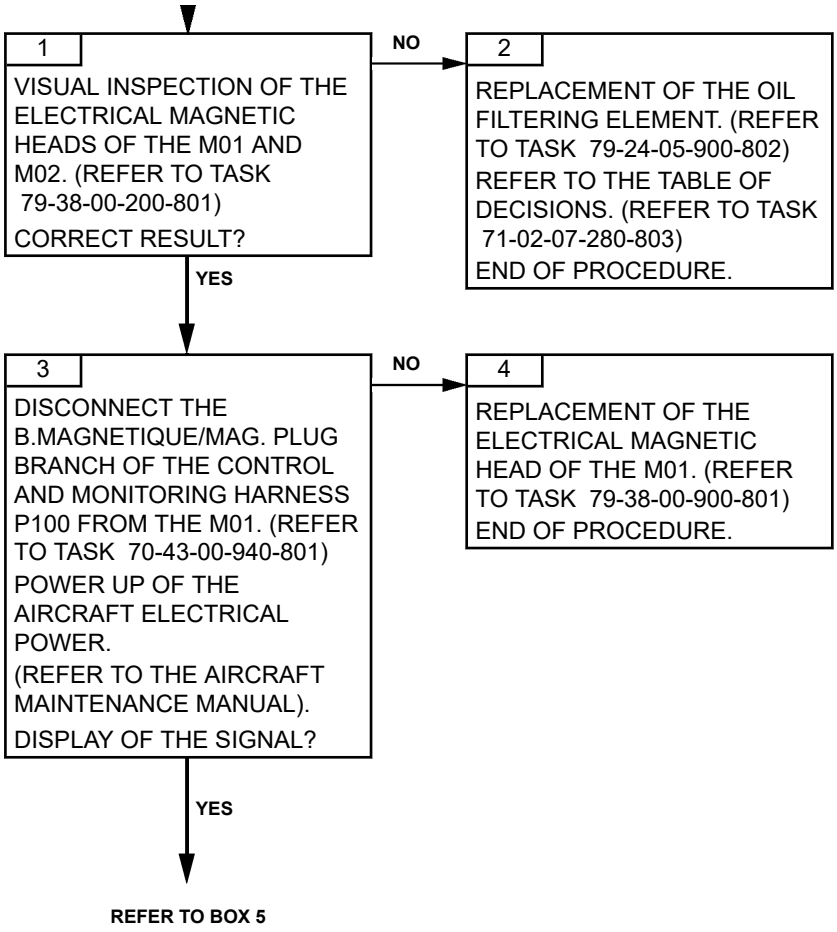
The engine is equipped of two electrical magnetic plugs located at the front and at the rear.

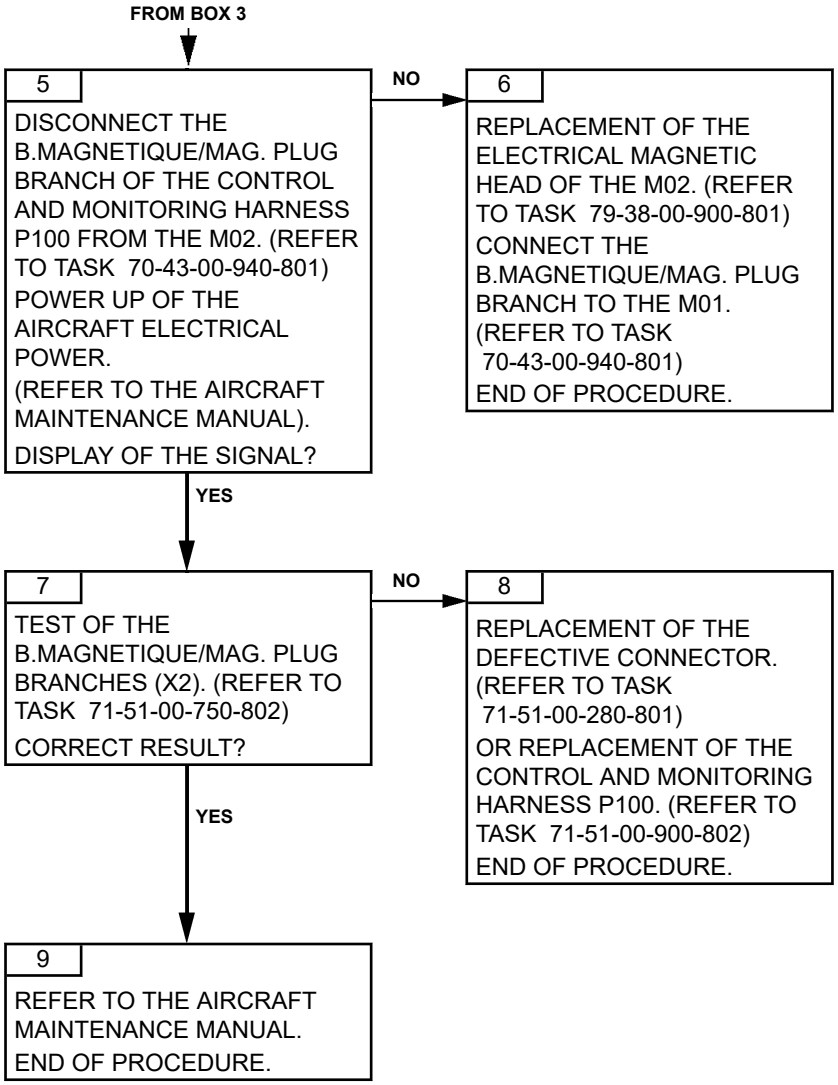
The electrical magnetic plugs are connected to the aircraft.

C. POSSIBLE CAUSES

- Module 1 (M01) or/and module 2 (M02)
- Electrical magnetic head of the module (M01) or (M02)
- Control and monitoring harness P100
- Aircraft

2. PROCEDURE





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TASK 71-00-06-814-837-A01

N2 OVERSPEED (OVER 110 %) TROUBLESHOOTING

1. GENERAL

A. PHASE

During operation

B. REMINDER OF THE NORMAL OPERATING CONDITION

ENGINE LIMITATIONS. (Refer to Task 71-00-01-940-801).

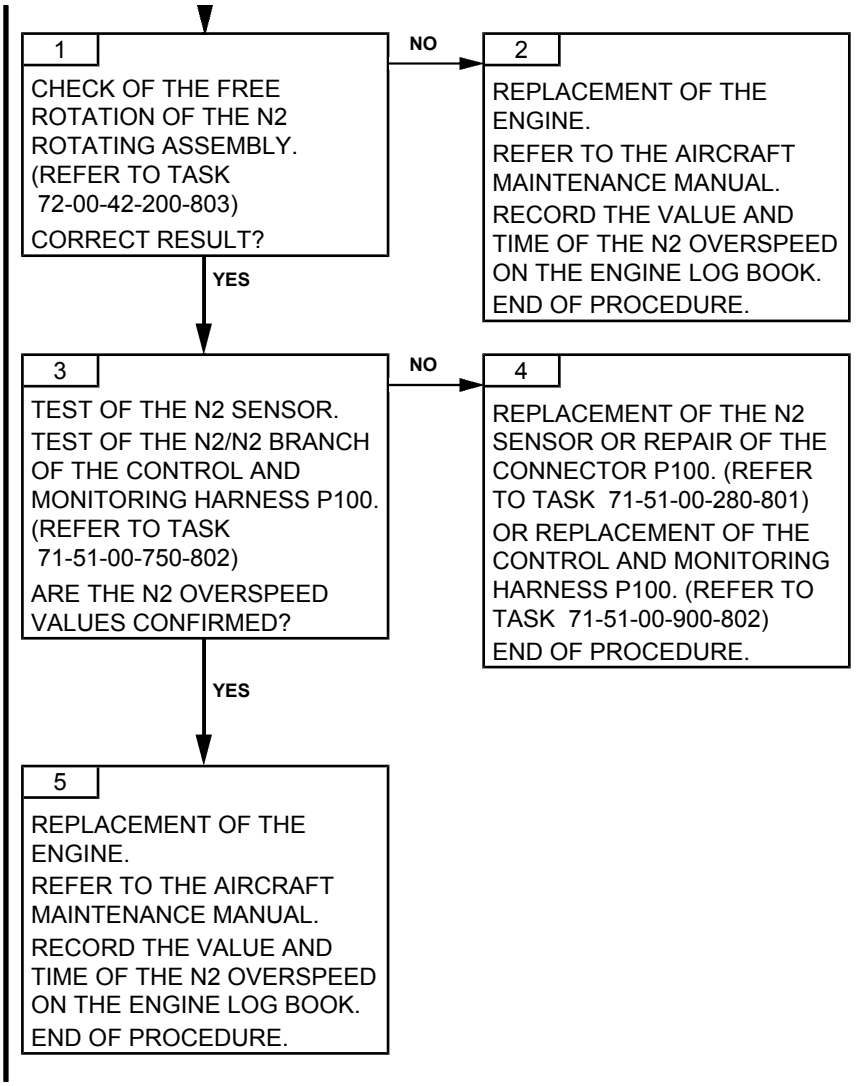
The V.E.M.D is correct.

The N2 speed is checked by the adjusted fuel control unit. The speed must respect the limitations (Refer to Task 71-00-01-940-801).

C. POSSIBLE CAUSES

- Adjusted fuel control unit
- Control and monitoring harness P100

2. PROCEDURE



TASK 71-00-06-814-842-A01

FIRE ALARM OR NO FIRE ALARM TROUBLESHOOTING

1. GENERAL

A. PHASE AND FAILURE DETECTION

PHASE	*INDICATION*	
	CDS CAUTION MESSAGE	*ALARM INDICATOR LIGHTS*
IN OPERATION		The “FIRE” indicator light is on

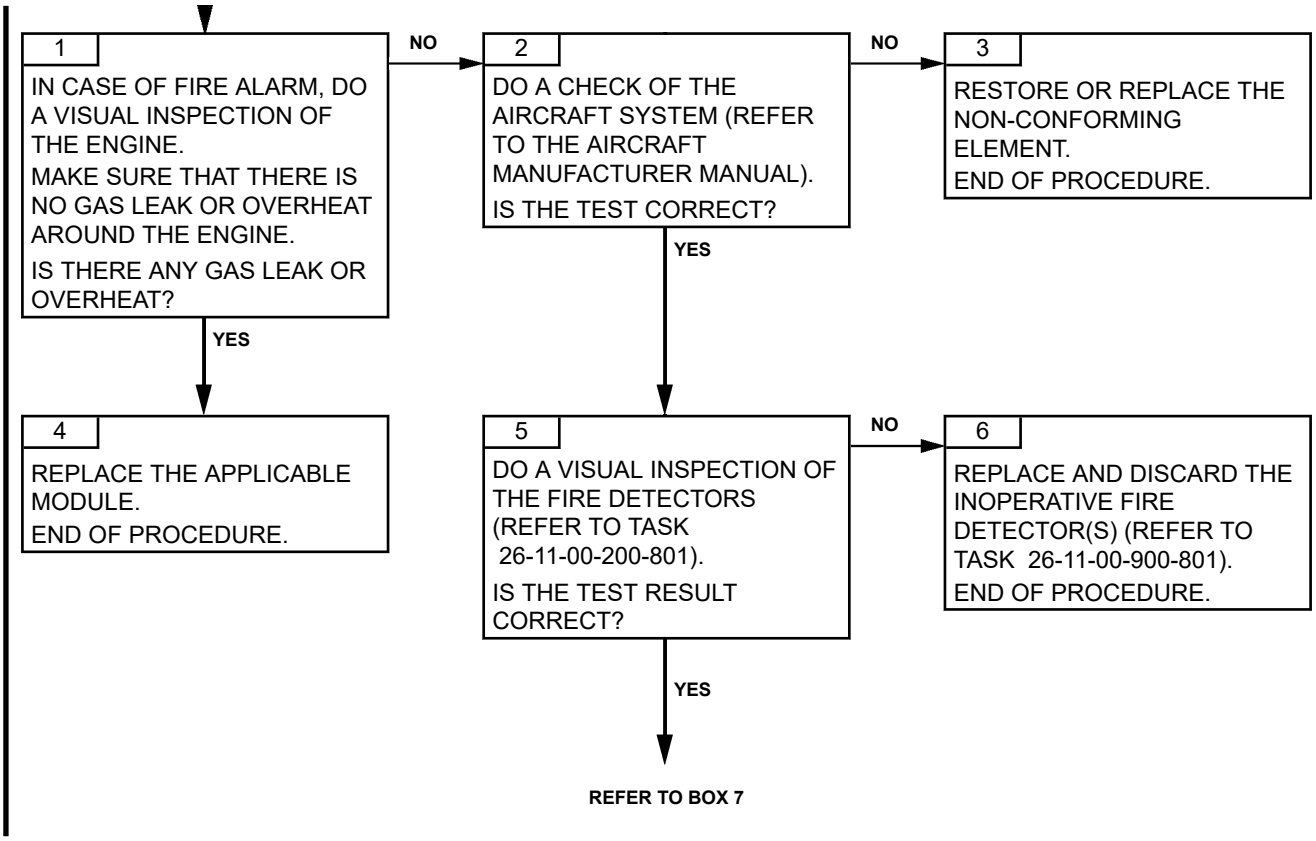
B. REMINDER OF THE NORMAL OPERATING CONDITION

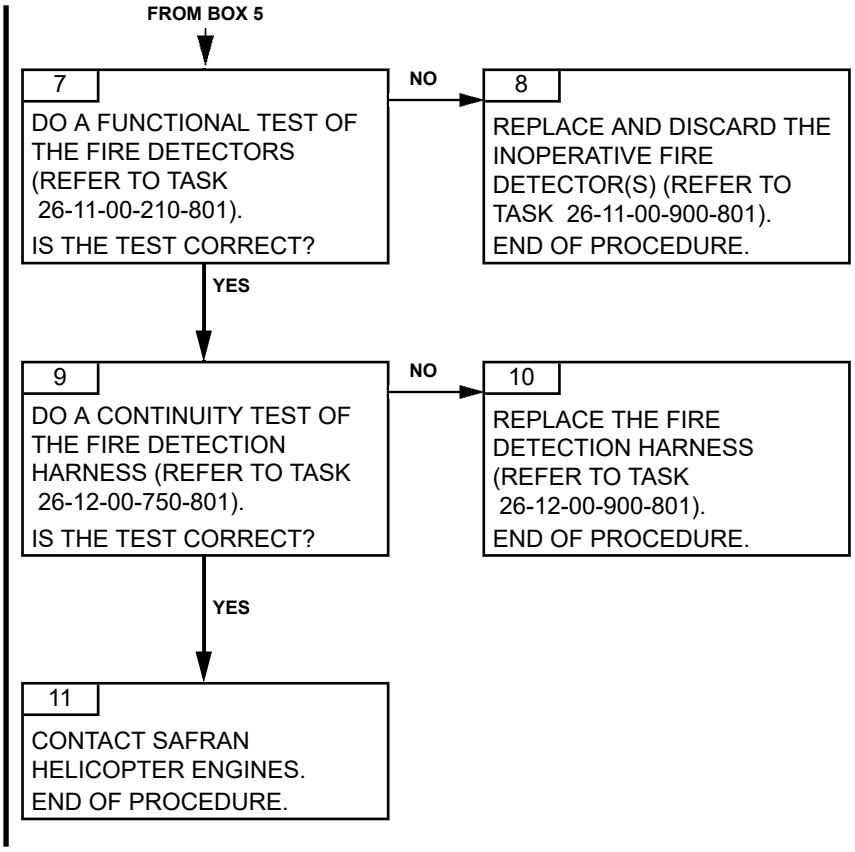
In operation, there is no fire alarm.

C. POSSIBLE CAUSES

– Fire detection harness
– Fire detectors
– Aircraft.

2. PROCEDURE





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TASK 71-00-06-815-804-A01

TESTING OF THE NOT COMPLIANT PREFERENCE INJECTOR TROUBLESHOOTING

1. GENERAL

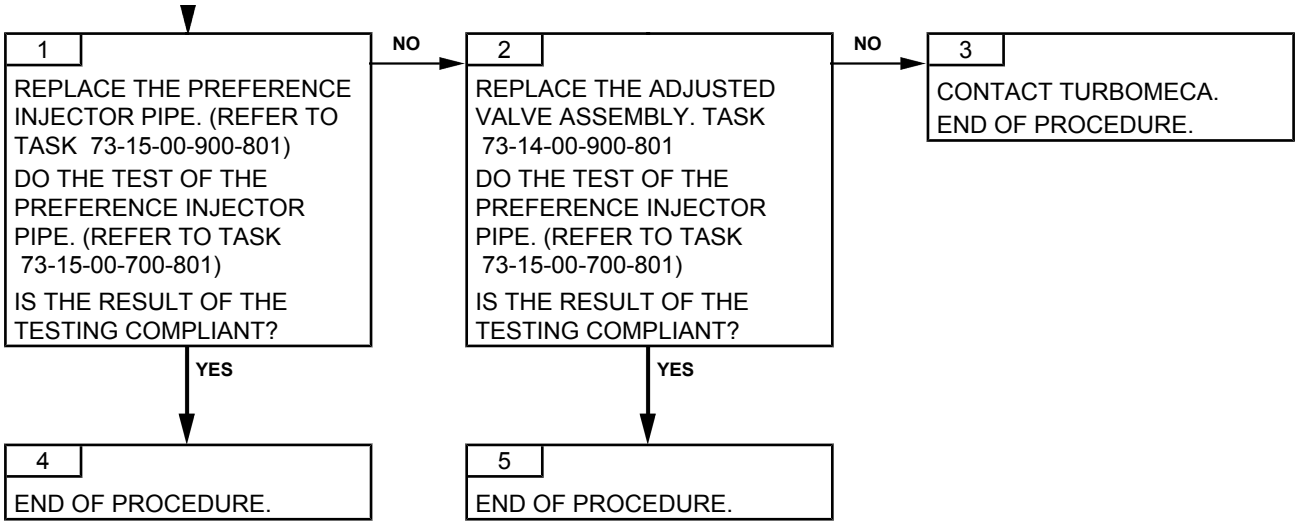
A. REMINDER OF THE NORMAL OPERATING CONDITION

The testing of the preference injector must be compliant with the criteria defined in the testing task Task 73-15-00-700-801.

B. POSSIBLE CAUSES

- Adjusted valve assembly
- Preference injector pipe

2. PROCEDURE



TASK 71-00-06-816-801-A01

DEFECTIVE AUTOMATIC CYCLE COUNTING TROUBLESHOOTING

1. GENERAL

A. PHASE

Check and inspection

B. REMINDER OF THE NORMAL OPERATING CONDITION

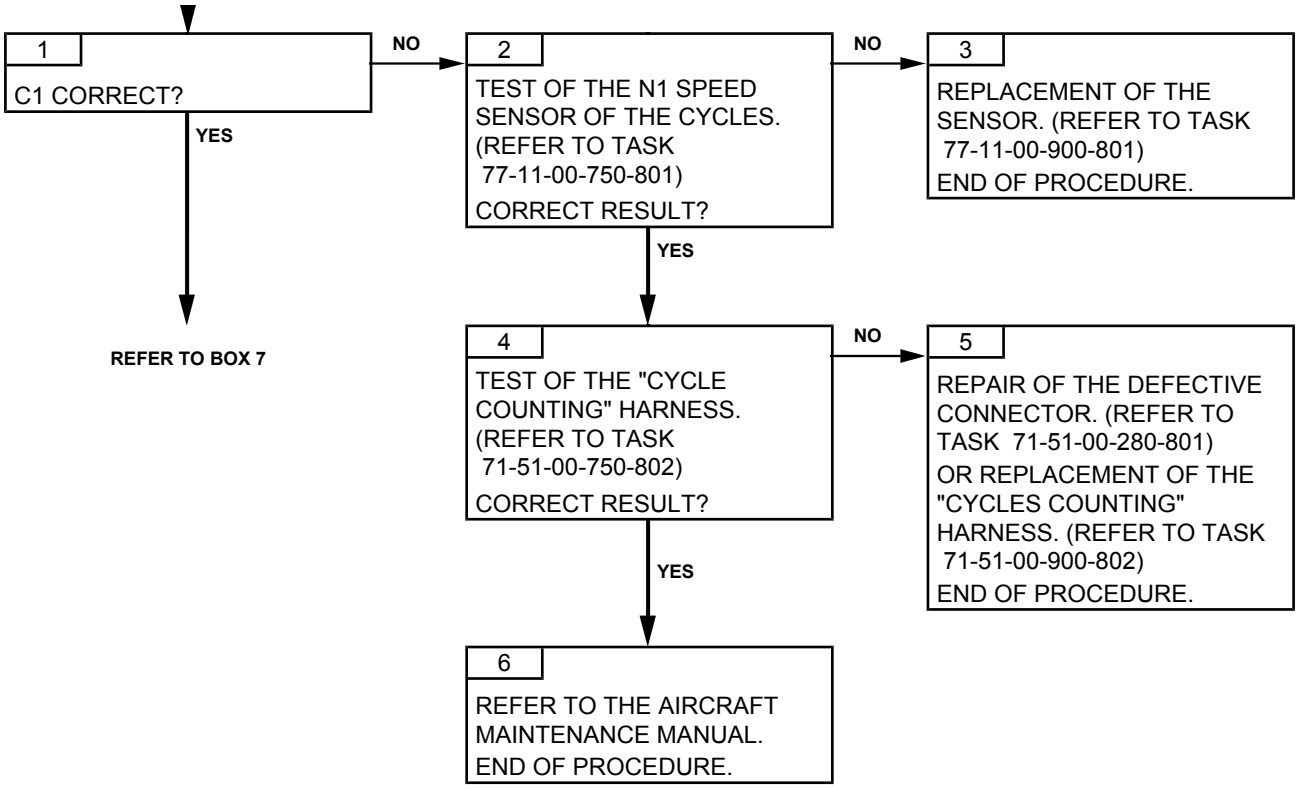
The V.E.M.D is correct.

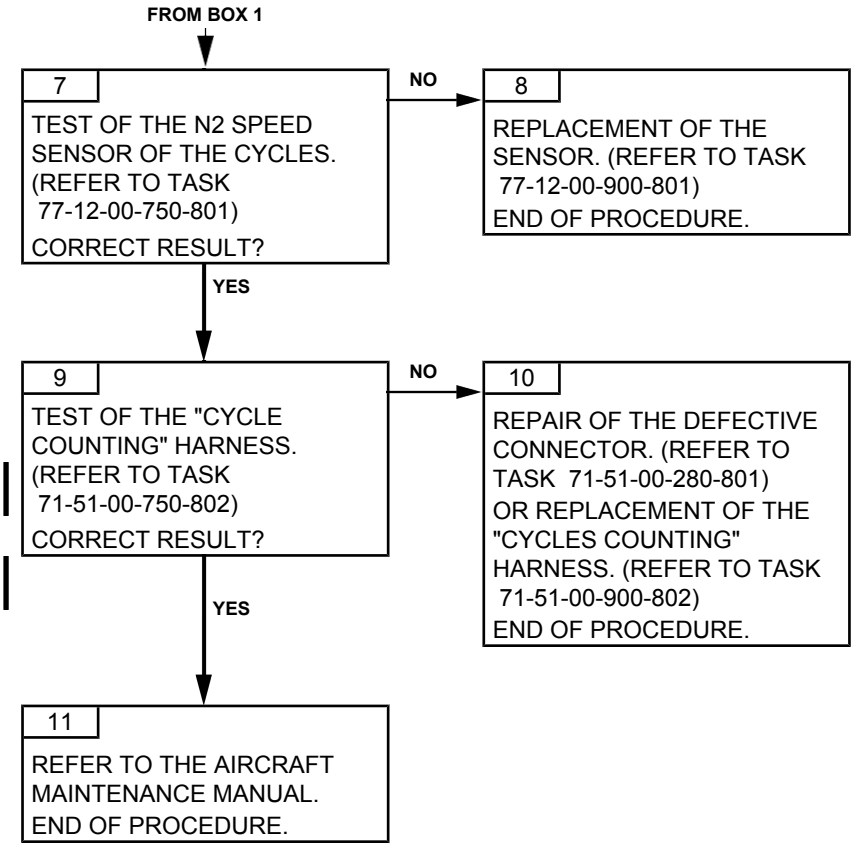
The values displayed on the V.E.M.D must be identical to the values counted manually.

C. POSSIBLE CAUSES

- N1 speed sensor of the cycles
- N2 speed sensor of the cycles
- "Cycle counting" harness
- Aircraft

2. PROCEDURE





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TASK 71-00-06-816-802-A01

EXHAUST FUMES AFTER ENGINE SHUTDOWN TROUBLESHOOTING

1. GENERAL

A. PHASE

Engine running and/or engine stop

B. REMINDER OF THE NORMAL OPERATING CONDITION

In operating condition, no smoke at the exhaust pipe outlet.

Some very faint smoke (like cigarette smoke) is allowed after engine shut down.

Indeed, remaining fuel may drip from the main injectors inside the combustion chamber.

C. POSSIBLE CAUSES

The smoke may be generated either by oil or fuel:

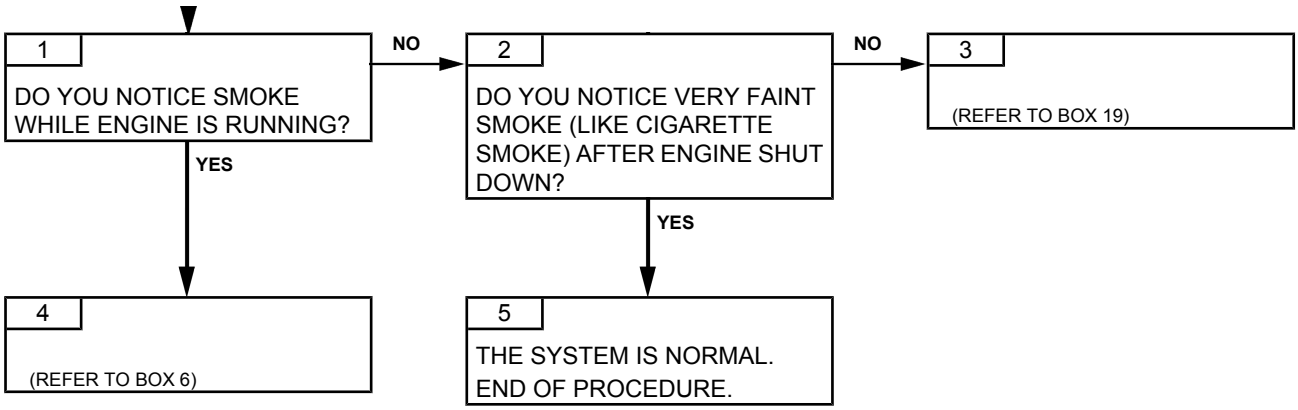
In case of oil smoke:

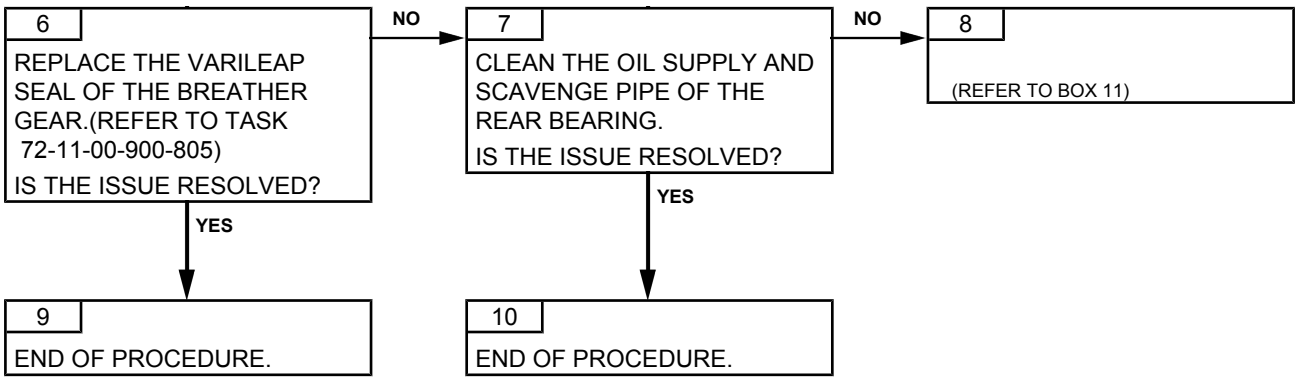
- Lip seal of the breather
- Oil pump
- Module 1 (M01)
- Module 2 (M02)
- Oil Pipes
- Oil check valve of the lubrication unit

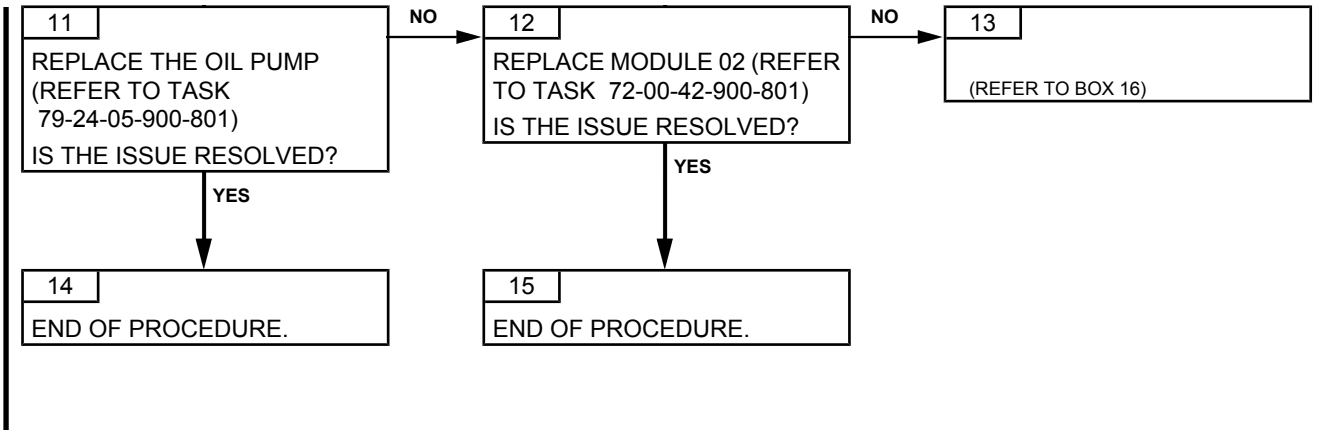
In case of fuel smoke:

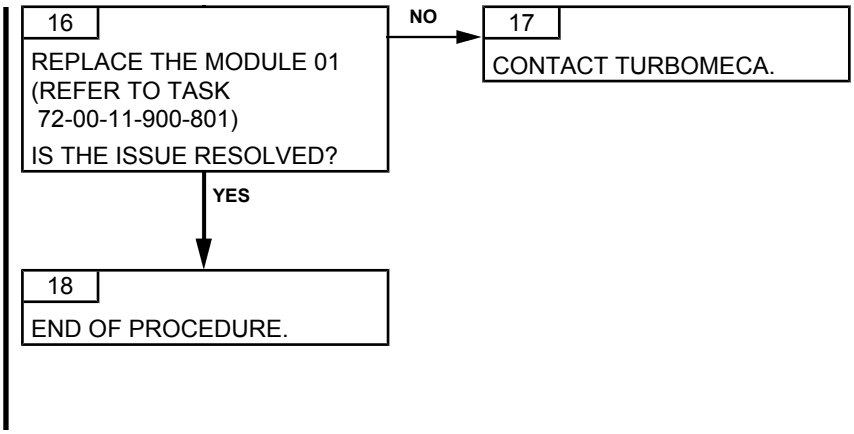
- Adjusted fuel valve assembly

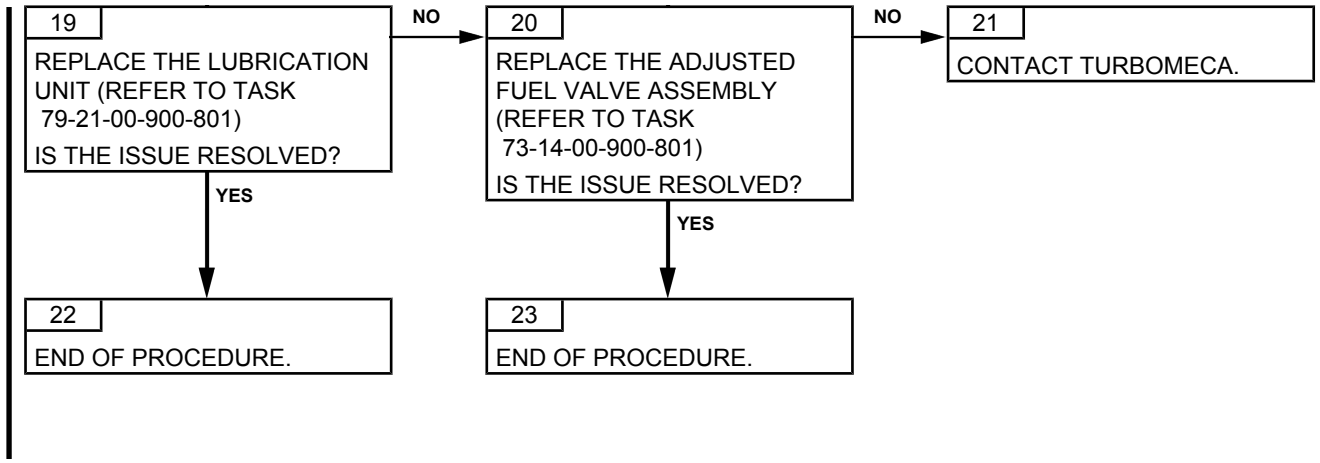
2. PROCEDURE











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TASK 71-00-06-816-805-A01

POPPING OUT OF THE VISUAL BLOCKAGE INDICATOR OF THE FUEL FILTERING ELEMENT TROUBLESHOOTING

1. GENERAL

A. PHASE AND FAILURE DETECTION

Maintenance

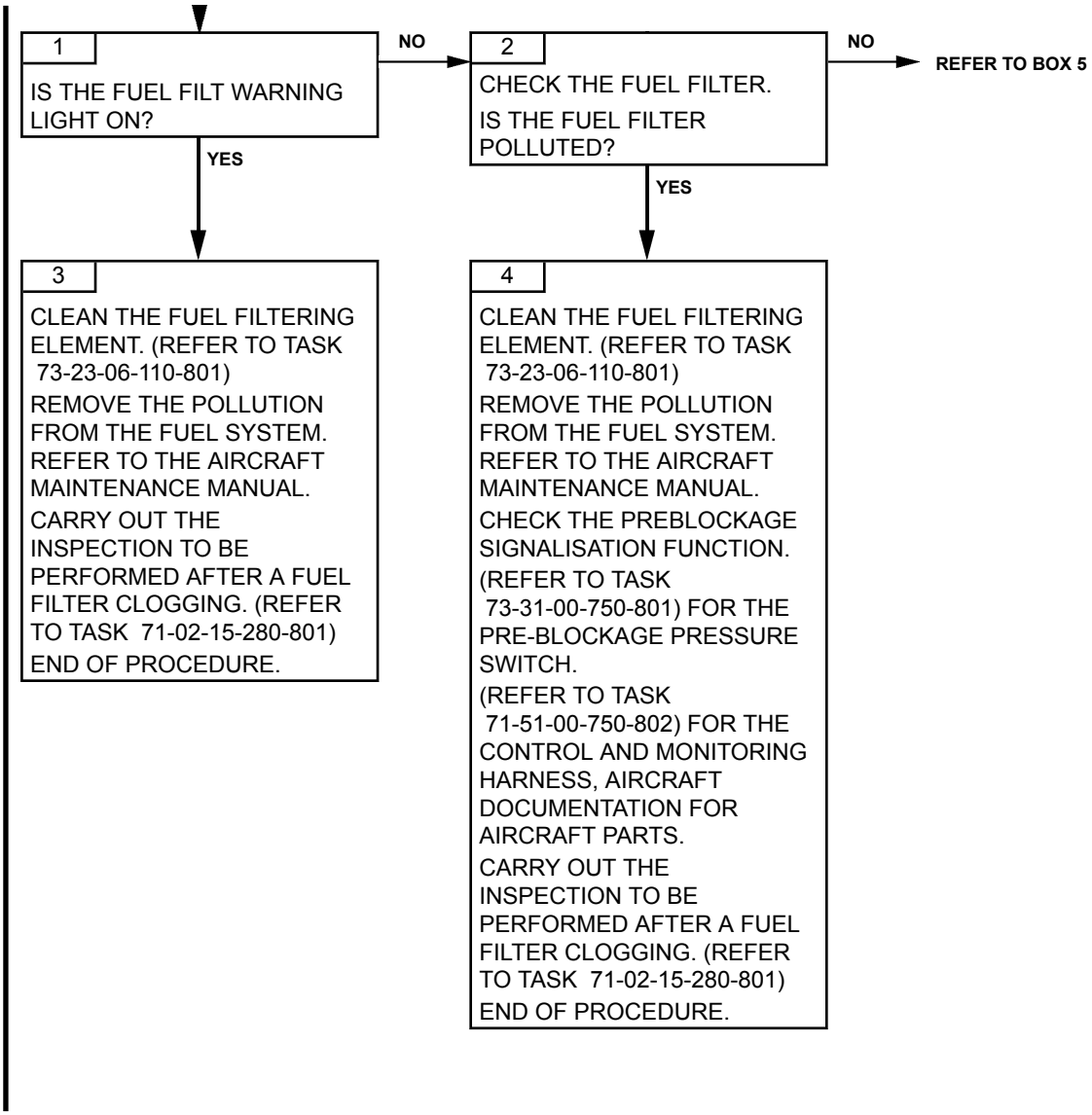
B. REMINDER OF THE NORMAL OPERATING CONDITION OR FAILURE DETECTION CONDITION

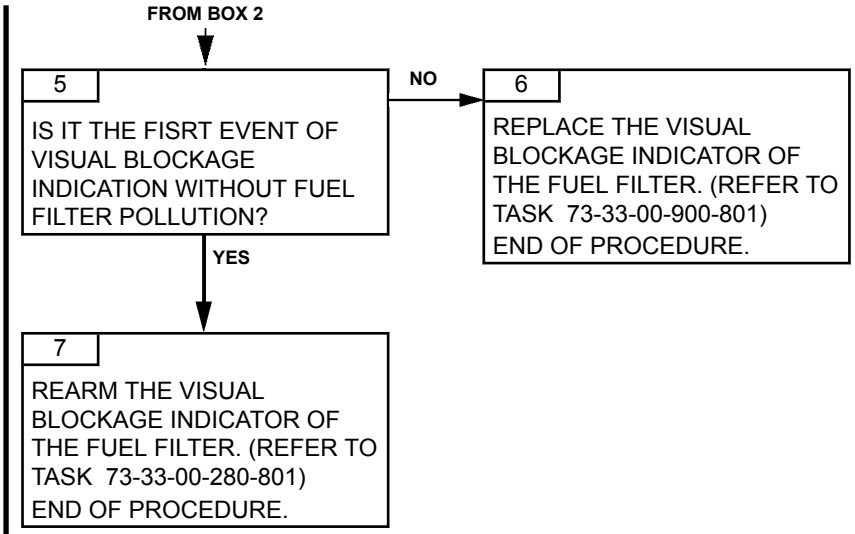
The visual indicator must not be displayed.

C. POSSIBLE CAUSES

– Visual blockage indicator
– Fuel pollution

2. PROCEDURE





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TASK 71-00-06-816-806-A01

LEAKAGE AT THE POWER-DRIVE DRAIN TROUBLESHOOTING

1. GENERAL

A. PHASE

Check and inspection

B. REMINDER OF THE NORMAL OPERATING CONDITION

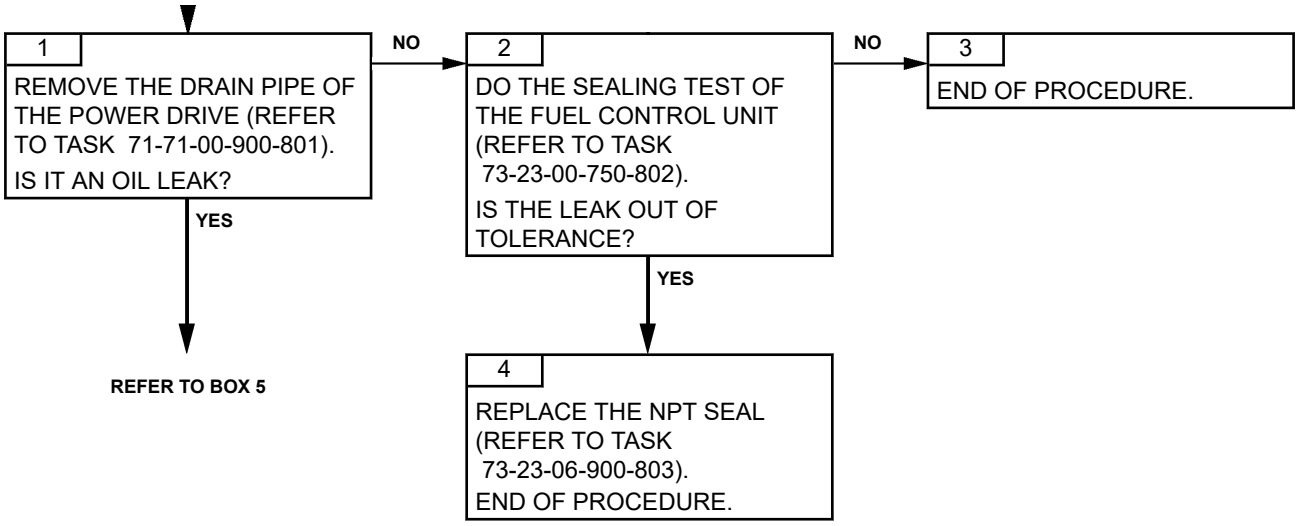
The tolerance criteria for a fuel leakage are defined (Refer to Task 73-23-00-750-802).

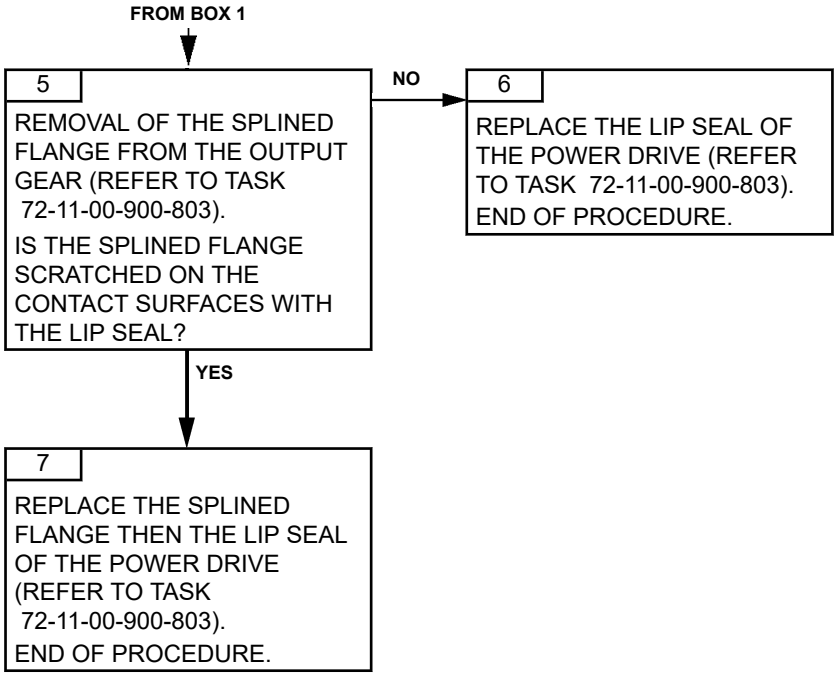
The tolerance criteria for a oil leakage are defined (Refer to Task 72-11-00-900-803).

C. POSSIBLE CAUSES

- Adjusted fuel control unit (pump shaft seal or control unit shaft of the free turbine)
- Seal of the fuel control unit shaft of the free turbine
- Lip seal of the power drive
- Splined flange of the output gear

2. PROCEDURE


1
REMOVE THE DRAIN PIPE OF THE POWER DRIVE (REFER TO TASK 71-71-00-900-801).
IS IT AN OIL LEAK?
NO
2
DO THE SEALING TEST OF THE FUEL CONTROL UNIT (REFER TO TASK 73-23-00-750-802).
IS THE LEAK OUT OF TOLERANCE?
NO
3
END OF PROCEDURE.
YES
REFER TO BOX 5
YES
4
REPLACE THE NPT SEAL (REFER TO TASK 73-23-06-900-803).
END OF PROCEDURE.


FROM BOX 1
5
REMOVAL OF THE SPLINED FLANGE FROM THE OUTPUT GEAR (REFER TO TASK 72-11-00-900-803).
IS THE SPLINED FLANGE SCRATCHED ON THE CONTACT SURFACES WITH THE LIP SEAL?
NO
6
REPLACE THE LIP SEAL OF THE POWER DRIVE (REFER TO TASK 72-11-00-900-803).
END OF PROCEDURE.
YES
7
REPLACE THE SPLINED FLANGE THEN THE LIP SEAL OF THE POWER DRIVE (REFER TO TASK 72-11-00-900-803).
END OF PROCEDURE.

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TASK 71-00-06-816-806-B01

LEAKAGE AT THE POWER-DRIVE DRAIN TROUBLESHOOTING

1. GENERAL

A. PHASE

Check and inspection

B. REMINDER OF THE NORMAL OPERATING CONDITION

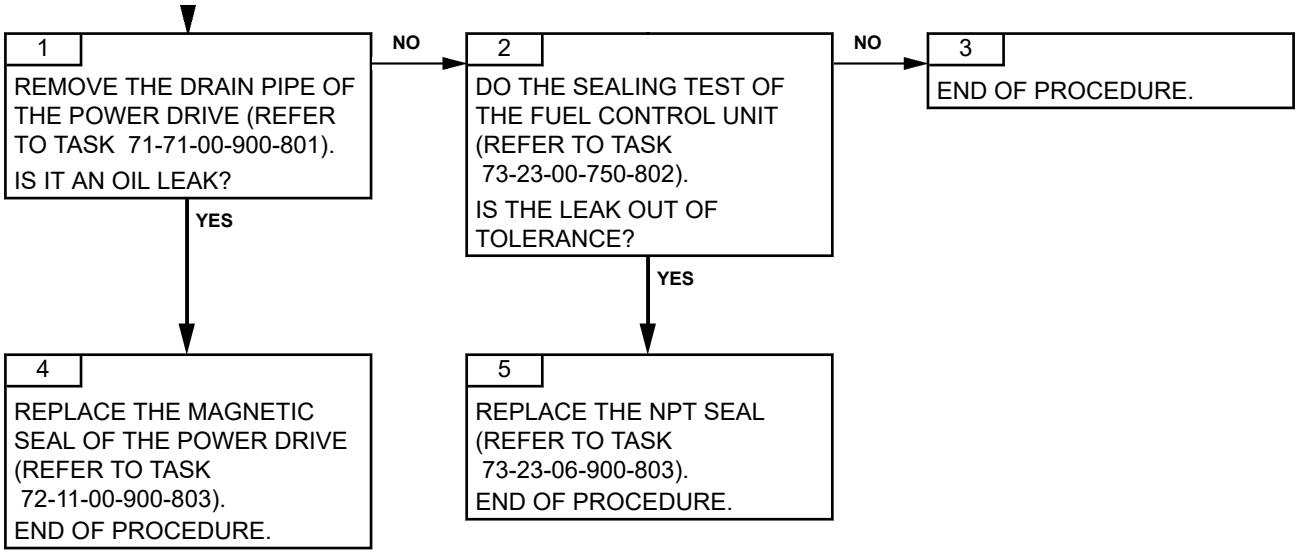
The tolerance criteria for a fuel leakage are defined (Refer to Task 73-23-00-750-802).

The tolerance criteria for a oil leakage are defined (Refer to Task 72-11-00-900-803).

C. POSSIBLE CAUSES

- Adjusted fuel control unit (pump shaft seal or control unit shaft of the free turbine)
- Seal of the fuel control unit shaft of the free turbine
- Lip seal of the power drive

2. PROCEDURE



TASK 71-00-06-816-807-A01

POPPING OUT OF THE VISUAL BLOCKAGE INDICATOR OF THE OIL FILTERING ELEMENT TROUBLESHOOTING

1. GENERAL

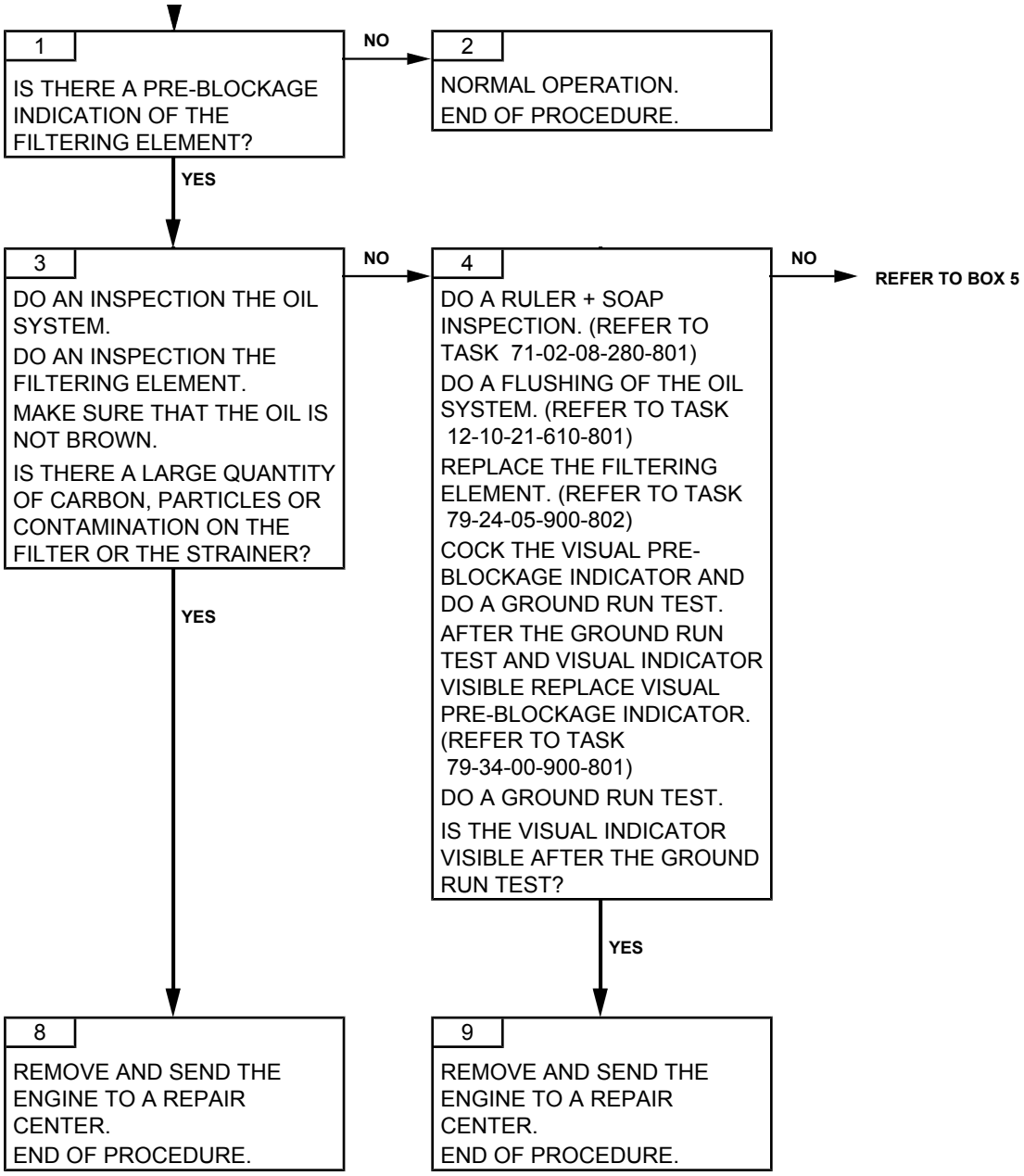
A. REMINDER OF THE NORMAL OPERATING CONDITION

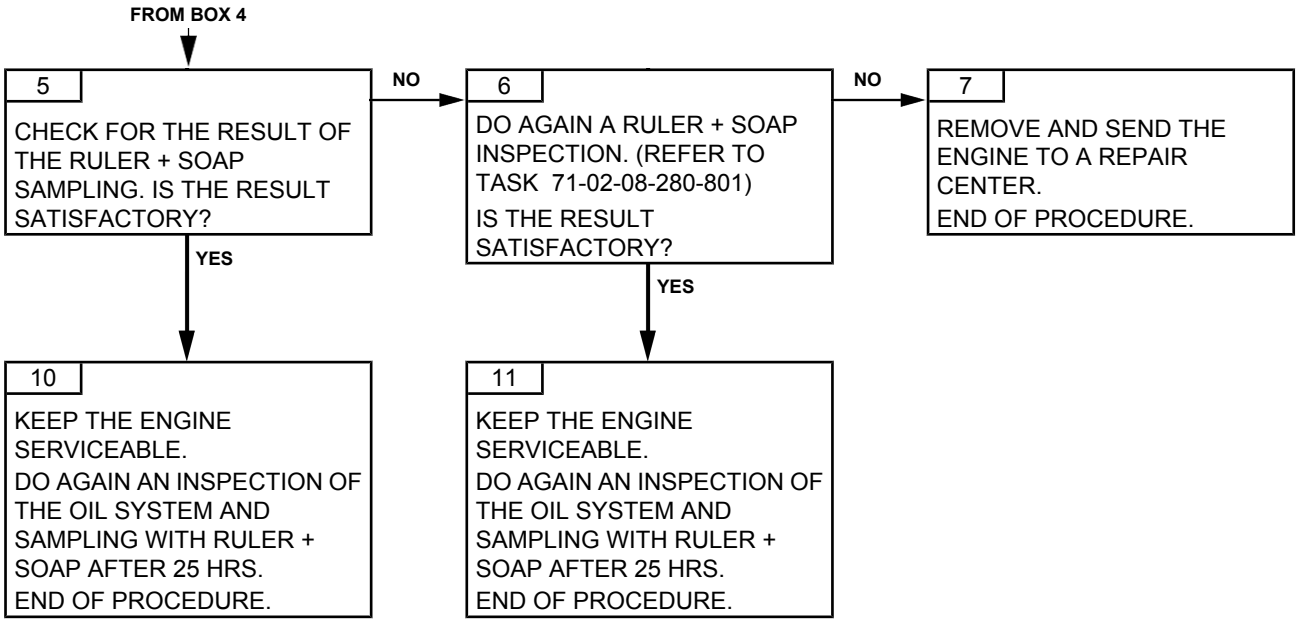
The visual pre-blockage indicator of the oil filtering element must always be armed (not visible).

B. POSSIBLE CAUSES

- Contamination of the oil system
- Oil filtering element
- Visual pre-blockage element of the oil filtering element

2. PROCEDURE





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TASK 71-00-06-816-808-A01

OIL LEAKAGE AT THE STARTER POWER DRIVE TROUBLESHOOTING

1. GENERAL

A. PHASE

Check and inspection

B. REMINDER OF THE NORMAL OPERATING CONDITION

The oil leakage tolerance criteria are defined. Refer to Task 79-00-00-280-801.

C. POSSIBLE CAUSES

– Lip seal or magnetic seal of the starter power drive

2. PROCEDURE

1

REPLACEMENT OF THE LIP SEAL OR THE MAGNETIC SEAL OF THE STARTER POWER DRIVE. (REFER TO TASK 72-11-00-900-804)

DO A GROUND RUN TEST.

REFER TO THE AIRCRAFT MAINTENANCE MANUAL.

END OF PROCEDURE.

TASK 71-00-06-816-811-A01

OIL TRACES IN THE AIR INTAKE CASING TROUBLESHOOTING

1. GENERAL

A. PHASE

Check and inspection

B. REMINDER OF THE NORMAL OPERATING CONDITION

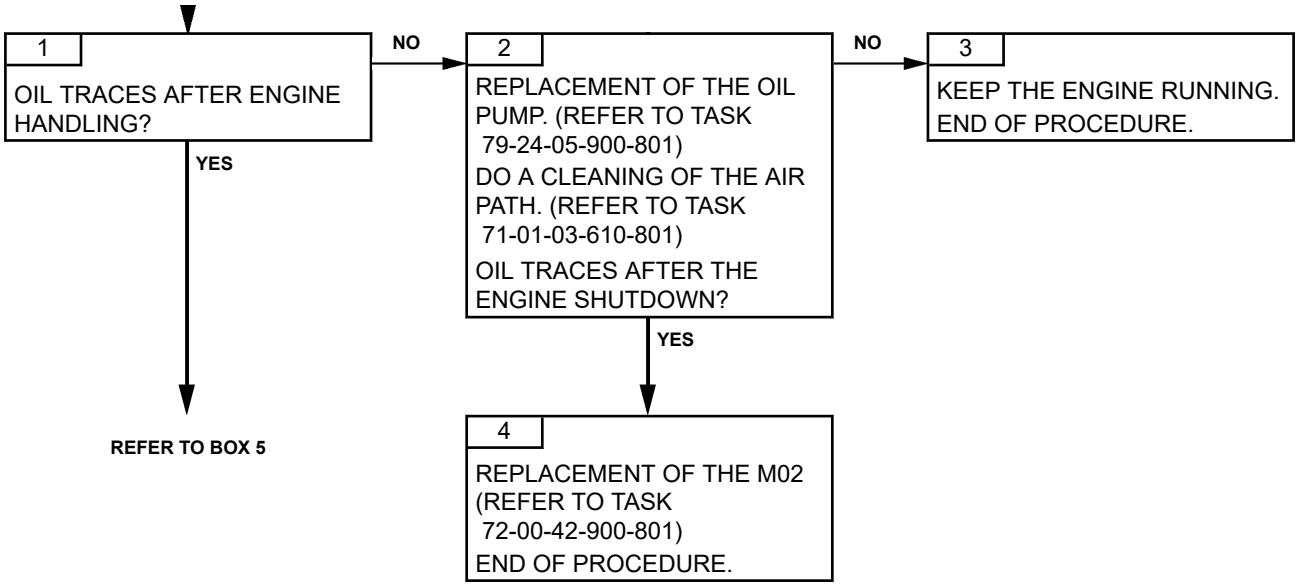
No external leak except in the air intake casing.

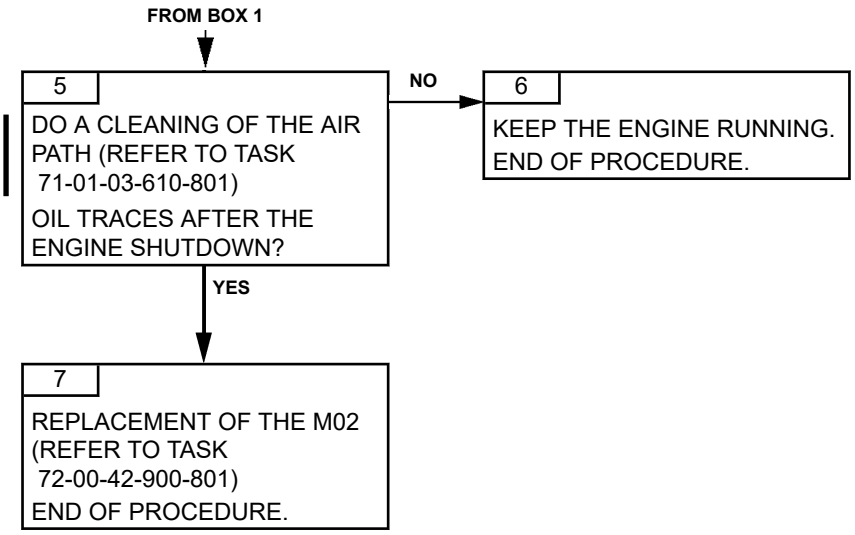
The lubrication of the front casing of the gas generator is ensured by internal pipes of the air intake casing and the sealing is ensured by a double labyrinth seal.

C. POSSIBLE CAUSES

- Engine position during handling
- Oil pump
- Module 2 (M02)

2. PROCEDURE


1
OIL TRACES AFTER ENGINE HANDLING?
NO
2
REPLACEMENT OF THE OIL PUMP. (REFER TO TASK 79-24-05-900-801)
DO A CLEANING OF THE AIR PATH. (REFER TO TASK 71-01-03-610-801)
OIL TRACES AFTER THE ENGINE SHUTDOWN?
NO
3
KEEP THE ENGINE RUNNING.
END OF PROCEDURE.
YES
REFER TO BOX 5
YES
4
REPLACEMENT OF THE M02 (REFER TO TASK 72-00-42-900-801)
END OF PROCEDURE.



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TASK 71-00-06-816-815-A01

OIL CONSUMPTION MORE THAN 0.3 L/HR TROUBLESHOOTING

1. GENERAL

A. PHASE

Check and inspection

B. REMINDER OF THE NORMAL OPERATING CONDITION

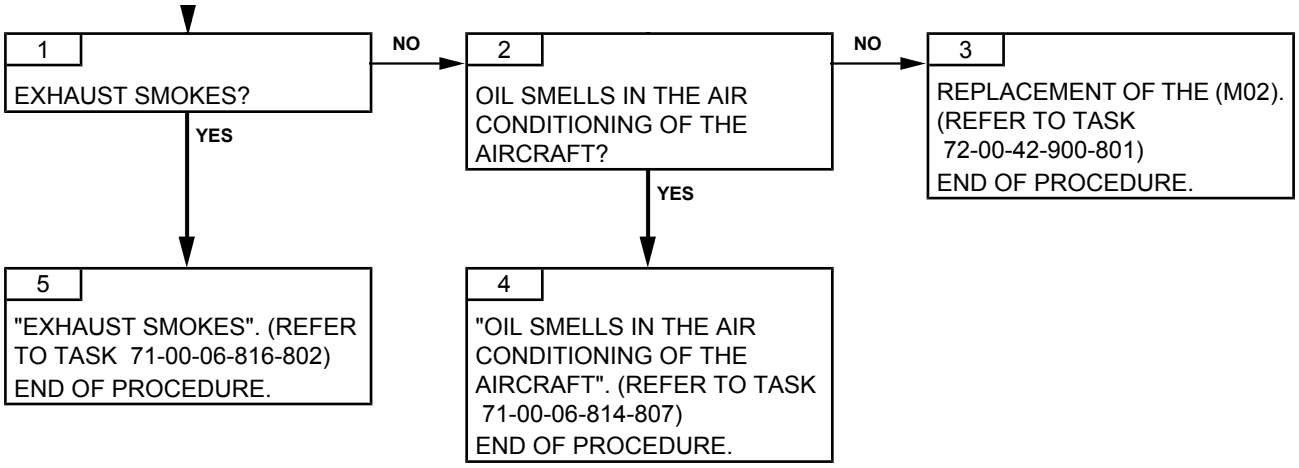
No external oil leak and no oil traces in the air intake casing.

The frequent recompletions show the consumption. The number of recompletions enables to quantify the consumption.

C. POSSIBLE CAUSES

– Module 2 (M02)

2. PROCEDURE



TASK 71-00-06-816-816-A01

EXTERNAL LEAKS AT ADJUSTED FUEL CONTROL UNIT ASSEMBLY TROUBLESHOOTING

1. GENERAL

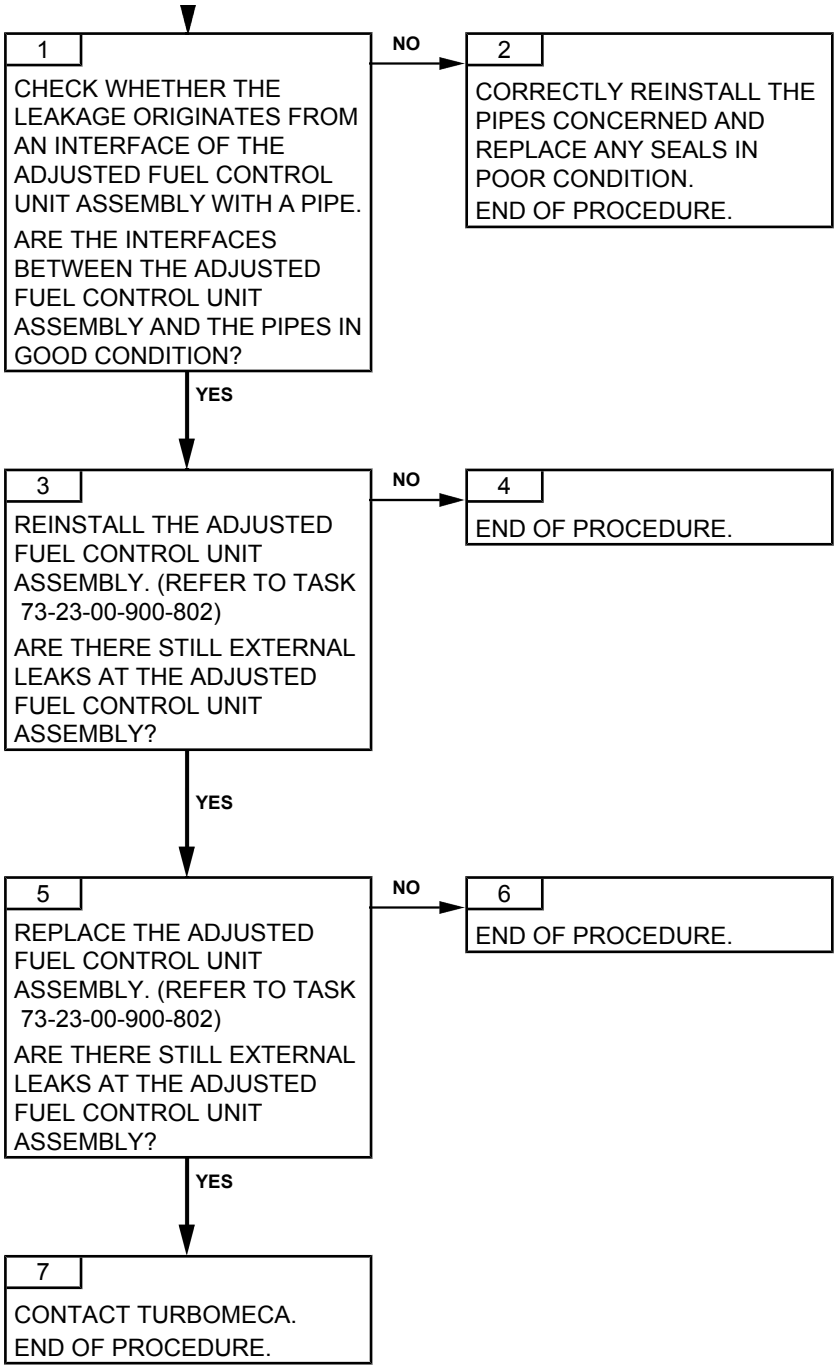
A. REMINDER OF THE OPERATING NORMAL CONDITION

No external leaks should be observed on the adjusted fuel control unit assembly.

B. POSSIBLE CAUSES

– Incorrect installation of the pipes
– Incorrect installation of the adjusted fuel control unit assembly
– Adjusted fuel control unit assembly

2. PROCEDURE



TASK 71-00-06-816-826-A01

ABNORMAL VIBRATION, ABNORMAL NOISE OR ACCESSORY DAMAGE TROUBLESHOOTING

1. GENERAL

A. GENERAL DESCRIPTION

Safran Helicopter Engines recommends to do this troubleshooting procedure:

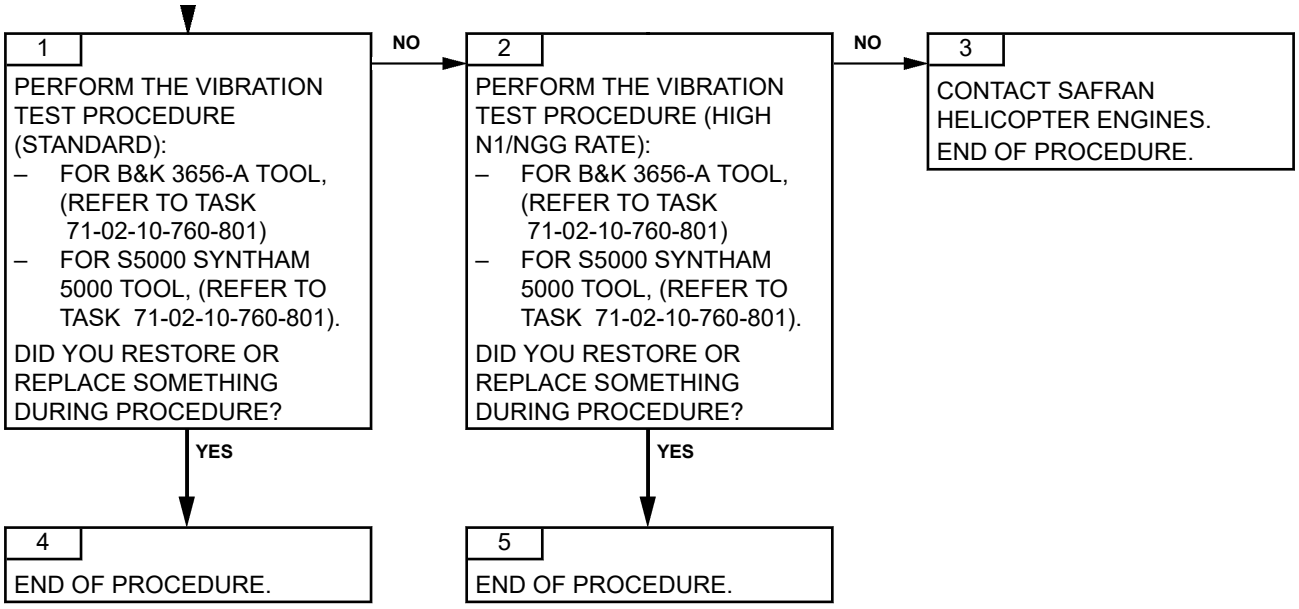
- If you are not sure of the engine vibration level
- After abnormal vibration or abnormal noise reported by the crew
- After a damage possibly caused by an abnormal vibration level:
  - Breaking of pipe or repetitive crack of pipe
  - Repetitive replacement of a same accessory
  - Crack found on a accessory.

The vibration criteria are defined in the tasks (Refer to Task 71-02-10-940-801).

B. POSSIBLE CAUSES

- Module(s)
- Engine

2. PROCEDURE


1
PERFORM THE VIBRATION TEST PROCEDURE (STANDARD):
– FOR B&K 3656-A TOOL, (REFER TO TASK 71-02-10-760-801)
– FOR S5000 SYNTHAM 5000 TOOL, (REFER TO TASK 71-02-10-760-801).
DID YOU RESTORE OR REPLACE SOMETHING DURING PROCEDURE?
NO
2
PERFORM THE VIBRATION TEST PROCEDURE (HIGH N1/NGG RATE):
– FOR B&K 3656-A TOOL, (REFER TO TASK 71-02-10-760-801)
– FOR S5000 SYNTHAM 5000 TOOL, (REFER TO TASK 71-02-10-760-801).
DID YOU RESTORE OR REPLACE SOMETHING DURING PROCEDURE?
NO
3
CONTACT SAFRAN HELICOPTER ENGINES.
END OF PROCEDURE.
YES
4
END OF PROCEDURE.
YES
5
END OF PROCEDURE.

TASK 71-00-06-816-827-A01

INJECTION PROTECTION TEST NOT CONFORM TROUBLESHOOTING

1. GENERAL

A. PHASE

During a ground run.

B. GENERAL DESCRIPTION

The injection protection test is a pilot procedure.

The injection protection test should not lead to a flame-out of the engine.

This troubleshooting procedure has to be done if the injection protection test procedure has lead to a flame-out of the engine.

If the flameout of the engine occurred outside of the injection protection test, please contact Safran Helicopter Engines: do not do this procedure.

C. POSSIBLE CAUSES

– P3 air pressure switch

2. PROCEDURE

1

REPLACE THE P3 AIR PRESSURE SWITCH. (REFER TO TASK 75-41-00-900-801)
END OF PROCEDURE.