CT7-2E1 SERVICE BULLETIN - 74-0004 R00

Revised: 03/03/2021
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SB 74-0004 R00 ELECTRICAL SYSTEM - GENERAL (74-00-00) - CT7-2E1/AW-189 ELECTRONIC ENGINE CONTROL UNIT SOFTWARE VERSION 6.00

GE Designated: -CONFIDENTIAL-

1. PLANNING INFORMATION

A. Effectivity

* * * CT7-2E1

This Service Bulletin is applicable to these CT7-2E1 engines:

*CT7-2E1 engines, serial numbers 780333 and below.

This Service Bulletin has been introduced in production to these CT7-2E1 engines:

*CT7-2E1 engines, serial numbers 780334 and above.

These serial numbers are the best available data.

The control unit software P/N 5176T39P03 is affected by this Service Bulletin.

B. Description

This Service Bulletin releases new control unit software V6.00 P/N 5176T39P04. The electronic engine control unit (EECU) hardware remains unchanged.

C. Compliance

Category 7

GE recommends that you do this Service Bulletin at customer option.

NOTE: This Service Bulletin can be accomplished on wing and/or in shop.

Impact E

This recommendation is to improve the cost of ownership, reduce maintenance requirements, or is a product improvement.

D. Concurrent Requirements

Electronic Engine Control Unit Software V6.00 is compatible with Leonardo Helicopters AW189 Avionic Flight Software Phase 7 or above. Thus, EECU V6.00 must be installed concurrently with Avionic Flight Software Phase 7 or above.

E. Reason

(1) Objective:

To introduce a new control unit software V6.00 for the CT7-2E1 engines.

(2) Condition:

The new control unit software V6.00 introduces several functional improvements and is required concurrent to AW189 Avionic Flight Software Phase 7 or above from Leonardo Helicopters.

(3) Cause:

Not applicable.

(4) Improvement:
The new control unit software V6.00 includes updates:
*Increased T4.5 limits
*Updated PAC logic to reduce pilot workload
*Added logic to calculate time limited dispatch (TLD)
*Updated VG reversionary mode to reduce torque spikes
*Fault annunciation improvements.

(5) Substantiation:
Substantiation is provided by test, analysis, and comparative analysis.

F. Approval

The data contained in this Service Bulletin has been reviewed by the FAA or authorized entity representing the FAA and the repair(s) and modification(s) herein comply with the applicable Aviation Regulations and are APPROVED for installation in the model(s) listed in this Service Bulletin.

G. Manpower

The time required to accomplish this Service Bulletin is approximately 1.0 hours for each EECU.

NOTE: The activities associated with reprogramming the EECU can only be performed by personnel authorized by a GE representative. Authorized personnel are personnel working under the guidance of a trained GE representative, or personnel that have been trained by a GE representative.

H. Weight and Balance

Weight and balance are not changed.

I. References (Use the latest version of these documents)

CT7 Turboshaft Engine Service Record

GEK 112027, CT7 Turboshaft Engine, Electronic Engine Control Unit, Component Maintenance Manual, 73-21-95

GEK 115715 CT7-2E1, Illustrated Parts Catalog (IPC)

NOTE: The reference documents listed below are for the engine manufacturer's internal use only:
CID: 524798
GE Report Number R2016AE469, CT7-2E1 V6.00 Software Accomplishment Summary

J. Publications Affected

GEK 115715, CT7-2E1 Turboshaft Engine Illustrated Parts Catalog (IPC)

K. Interchangeability

One-way interchangeable. The new control unit software V6.00 (P/N 5176T39P04) may be only loaded onto the EECU to replace the old control unit software V5.00 (P/N 5176T39P03). The old control unit software V5.00 or below may not be loaded onto the EECU to replace the new control unit software V6.00.

EECUs loaded with new control unit software V6.00 are only interchangeable as a set at the aircraft level with Phase 7 Avionics or above. Both engines must have the same EECU part number installed with the same software control unit part number. V6.00 engine software is only compatible with AW189 Phase 7 Avionics or above, and no prior Avionics configurations.

L. Software Accomplishment Summary

NOTE: The reference document listed below is for engine manufacturer's internal use only:
The software has been developed in accordance with RTCA/DO-178B guidelines for software in the EECU P/N 5158T32P03 with control unit software V6.00 P/N 5176T39P04 and is documented in the FAA approved report titled "CT7-2E1 Software Accomplishment Summary", GE Report Number R2016AE469.

2. MATERIAL INFORMATION

A. Material - Price and Availability

(1) Parts necessary to do this Service Bulletin:

Part Number	Qty/ Eng	Part Name	Unit ($) Price	Pkg Qty	Lead Time Days
5176T39P04	(1)	Software, Control Unit	NP	--	--

NOTE: Prices are provided for planning purposes and are subject to change.

NOTE: Software is installed in the EECU and not provisioned as a separate part.

NOTE: The EECU master software V6.00 CD is available from GE Aviation. Contact your Customer Support Manager.

(2) Other Spare Parts:
None.

(3) Consumables:

Code Number	Description
--	Ballpoint Pen (as required) (commercially available)
--	Tie-on or Wire-on Tag (as required)

(commercially available)

B. Industry Support Information

Contact your Customer Support Manager.

C. Configuration Chart

New Part Number	Qty/ Eng	Part Name	Old Part Number/ IPC Location	Qty/ Eng	Op Code	Chg/ Sprt Code
5130T67G01	(X)	Engine Assembly, CT7-2E1	5130T67G01	(X)	RM	-/-
. 5176T39P04	(1)	Software, Control Unit	. 5176T39P03 01-040B,74-00-00	(1)	RE	1/A

Operation Codes

RE=Replace

RM=Remains

Change Codes

1=One-way interchangeable.

Support Codes

A=Old parts will no longer be supplied.

D. Parts Disposition

None.

E. Tooling - Price and Availability

(1) The EECU master software V6.00 CD is available from GE Aviation. Contact your Customer Support Manager.

(2) A Portable Maintenance Access Terminal (PMAT) 2000 will be provided by GE Aviation for use at no cost to the customer.

(3) PMAT 2000 FADEC load cables (P/N 2C90013G01 for aircraft load, P/N 2C90015G01 for bench load), or equivalent, will be provided by GE Aviation for use at no cost to the customer.

3. ACCOMPLISHMENT INSTRUCTIONS

A. Procedure for Reprogramming the EECU Using a PMAT.

CAUTION: BEFORE BEGINNING THE ACCOMPLISHMENT INSTRUCTIONS, VERIFY THAT THE CURRENTLY INSTALLED AW189 AMS SOFTWARE IS PHASE 7.0 OR ABOVE, OTHERWISE, DO NOT COMPLETE THE ACCOMPLISHMENT INSTRUCTIONS OF THIS SERVICE BULLETIN.

(1) Loading Software to PMAT.

(a) PMAT must be powered on.

(b) Connect the CD drive USB plug to a USB port on the back of the PMAT.

(c) Load the V6.00 disk (P/N 5176T39P04) into the CD drive.

(d) Starting at the PMAT 2000 Main Menu, click the ARCHIVED DATA button (Figure 1).

(e) Click the GE ECU FADEC PART NUMBER MAINTENANCE button (Figure 2).

(f) In the large Transfer block on the bottom of the screen, click the CDROM P/N TO HARD DRIVE radio button (Figure 3). To the right, click the TRANSFER button.

(g) When software has been loaded, the TRANSFER COMPLETE window will appear. In the upper block, there will be a new line: T700_CT7_AS6_00B_OS1_10A, for V6.00 software. In the TRANSFER COMPLETE window, the RUN AUTOMATIC VERIFY box should be checked. Click OK (Figure 4).

(h) When verification is complete, a window displaying "VERIFY OF TRANSFER PASSED FOR PART NUMBER T700_CT7_AS6_00B_OS1_10A" will appear. Software has been successfully loaded into the PMAT. Click OK (Figure 5). Click the GO BACK button in the lower right corner two times.

(i) Remove the CD from the drive. Disconnect the CD drive from the PMAT.

NOTE: As long as the line T700_CT7_AS6_00B_OS1_10A is shown in the FADEC PART NUMBER MAINTENANCE window, the software does not need to be loaded from the disk (unless there is reason to suspect it is the cause of a failed EECU load).

(2) Connect the PMAT to the EECU and Establish Communication.

NOTE: This Service Bulletin applies to CT7-2E1 FADEC unit P/N 5158T32P03 that is installed on AW189 A/C utilizing AMS V7.0 software or above. This Service Bulletin also applies to all uninstalled spare FADEC units P/N 5158T32P03.

NOTE: The activities associated with reprogramming the FADEC can only be performed by personnel authorized by a GE representative. Authorized personnel are personnel working under the guidance of a trained GE representative, or personnel that have been trained by a qualified GE representative.

(a) For engines installed in an aircraft, do as follows:

NOTE: Only one engine's EECU must be powered at a time during the loading procedure. Also, the aircraft battery power will only give a single channel power so, it is necessary to use external power to give 28 volts DC to both EECU channels, as both channels are loaded concurrently.

1 Using cable 2C90013G01 (one switch on connection box), place the BOOT switch in the OFF position (white OFF lettering, on the switch itself, must be showing (Figure 6)).

2 Connect the smaller cable connector (labeled SIL/GSE) to the aircraft EECU connector (J353 for engine 1, J355 for engine 2) and connect the larger cable

connector (labeled PMAT) to the PMAT. (Connectors are keyed to assure proper assembly.)

3 If not done already, power up the PMAT. The PMAT 2000 Main Menu should be displayed.

4 On the cable switch box, slide the BOOT switch to the ON position (white ON lettering, on the switch itself, must be showing).

5 If currently OFF, turn ON the power to the EECU via the aircraft breaker panel. If ON, cycle the EECU power OFF, then back ON.

(b) For engines not installed in aircraft (or EECU's not installed on engines), do as follows:

1 Using cable 2C90015G01 (two switches on connection box), place the two switches in the OFF position (white OFF lettering, on the switch itself, must be showing (Figure 7)).

2 Connect the E1 and E2 connectors to the EECU and connect the PMAT connector to the PMAT.

3 If not done already, power up the PMAT. The PMAT 2000 Main Menu should be displayed.

4 Connect the switch box power supply to the box and the outside power. On the cable switch box, slide the BOOT switch to the ON position (white ON lettering, on the switch itself, must be showing). Slide the 28 VDC switch to the ON position.

(3) Upload of the New Software to the EECU.

(a) PMAT must be powered on and at the PMAT 2000 Main Menu. Paragraph 3.A.(2) must be completed to establish communication between the PMAT and the EECU.

(b) Click the ECU TERMINAL LOADER button (Figure 8).

(c) In the upper SELECT ENGINE TYPE window (Figure 9), click CT7-2E1 FADEC. Verify that CT7-2E1 FADEC is displayed in the lower SELECT ENGINE INFORMATION window. Click NEXT. If you advance to the "Load Information" screen (Figure 10), the PMAT and EECU have established communication.

(d) Enter the load specific data in the four LOAD INFORMATION blocks at the top of the next screen. For a bench load, enter "n/a" in the TAIL NUMBER field and, if the EECU is not installed on an engine, the ENGINE SERIAL NUMBER field. In the OPERATOR NAME field, enter the name of the person doing the load. The current date and time, separated by 2-3 spaces, may also be entered in this field. (In Figure 10, dummy data is shown.) Click NEXT.

(e) Highlight T700_CT7_AS6_00B_OS1_10A in the PART NUMBER window on the lower half of the screen (Figure 11). Click NEXT.

(f) Confirm the entry of the load specific data at the top of the screen. Confirm the following 5 FILES TO BE LOADED on the bottom of the screen are as follows (Figure 12):

T700_OS_V1_10.SREC
CT7_2E1_AS_V6_00B.SREC
CT7_2E1_ADJ_TBL_V6_00B.SREC
CT7_2E1_ADJ_V6_00B.SREC
CT7_2E1_NVM_NFL_V6_00B.SREC

(g) Click START. Both Channels will now load concurrently, with progress displayed on the PMAT. Load time is about 15 minutes. When load is complete, the Load Results screen is displayed (Figure 13). Verify five green checkmarks under each channel, one for each file loaded. The Expected, FADEC and Memory check sums should match for a given file.

(h) Click View Receipt (Figure 14 and Figure 15). If connected to a printer via USB, click FILE and PRINT from the pull-down menu to get a hard copy.

(i) Edit upload date and time, if required, and sign.

(j) On the cable connection box (for either cable), slide all switches to the OFF position (white OFF lettering, on the switch itself, must be showing) prior to disconnecting either end of the cable.

(k) Load receipts are automatically stored on the PMAT and are accessed from the PMAT MAIN MENU by clicking the ARCHIVED DATA button, then the FADEC LOGS button. Each load produces two files. Click on the one with RECEIPT in the name. You can VIEW FILE, TRANSFER TO REMOVABLE MEDIA, DELETE or PRINT using the buttons on the bottom of the screen.

(l) Once printed and signed off, place the Load Receipt in the appropriate Service Record Logbook.

(4) Tag the EECU (Uninstalled EECU's Only).

If the EECU is not installed on an engine, use a ballpoint pen to mark a tie-on or wire-on tag with the software version and attach the tag to the EECU.

B. Procedure for Reprogramming at EECU Service Shop (Alternate to Paragraph 3.A.).

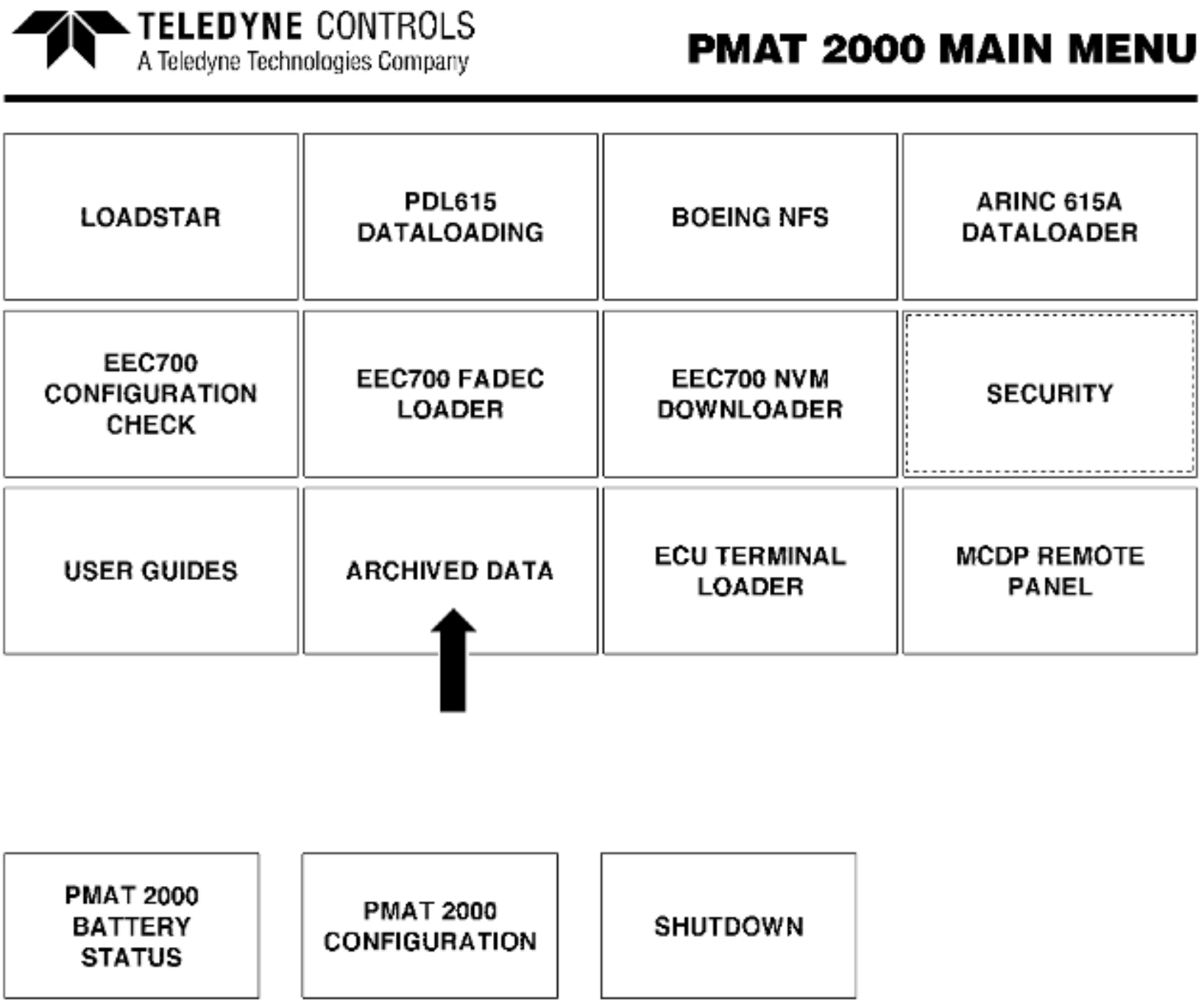
(1) Reprogram the EECU. Use automated test equipment, defined in GEK 112027, CT7 Turboshaft Engine, Electronic Engine Control Unit, Component Maintenance Manual, 73-21-95, to load files from programming disk P/N 89954-364A5189P3 (GEAE P/N 5176T39P04).

(2) Perform Checksum validation using automated test equipment. Refer to GEK 112027, CT7 Turboshaft Engine, Electronic Engine Control Unit, Component Maintenance Manual, 73-21-95.

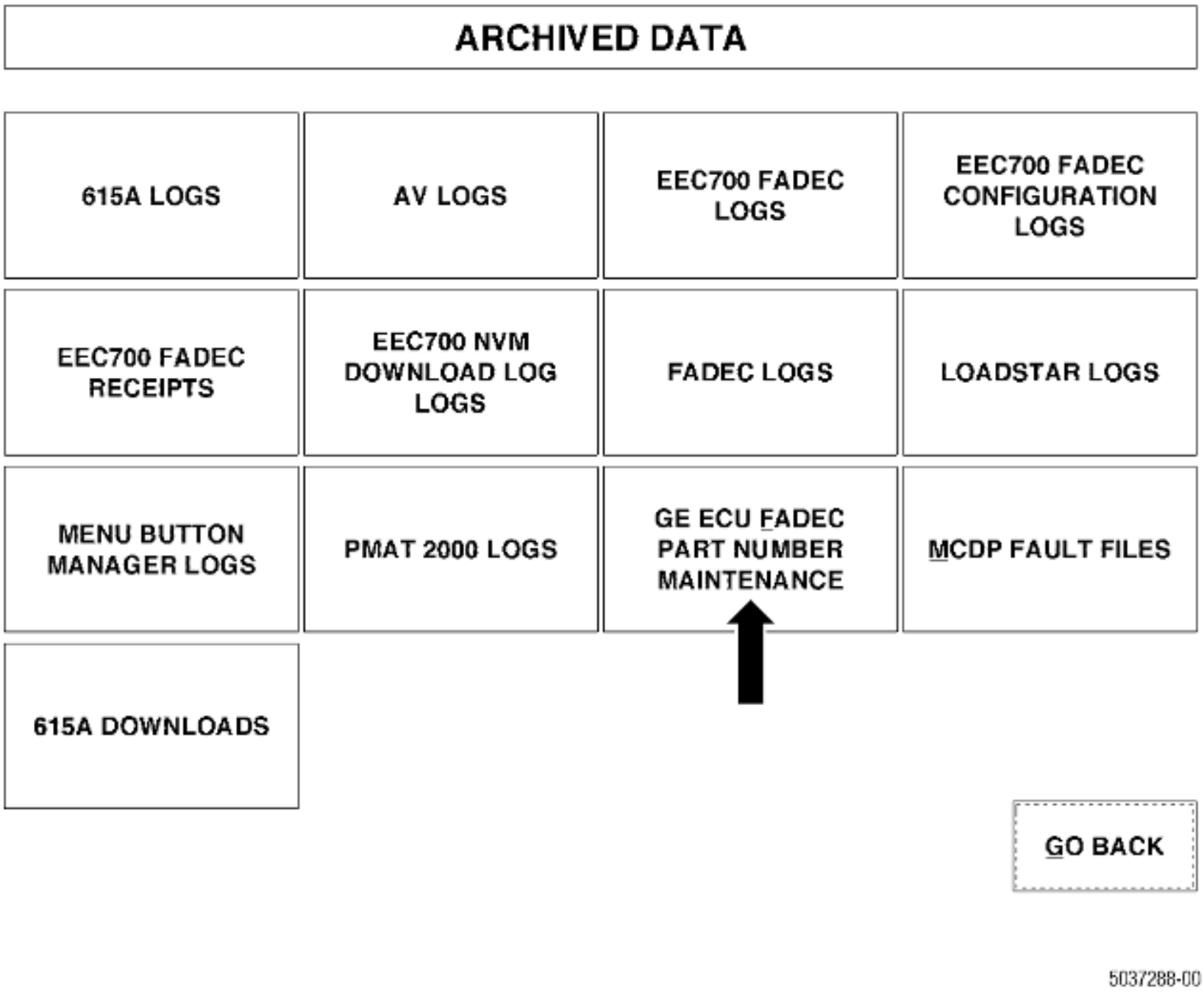
(3) Prepare new software identification tag and attach to EECU. Refer to GEK 112027, CT7 Turboshaft Engine, Electronic Engine Control Unit, Component Maintenance Manual, 73-21-95.

C. Service Record Entry

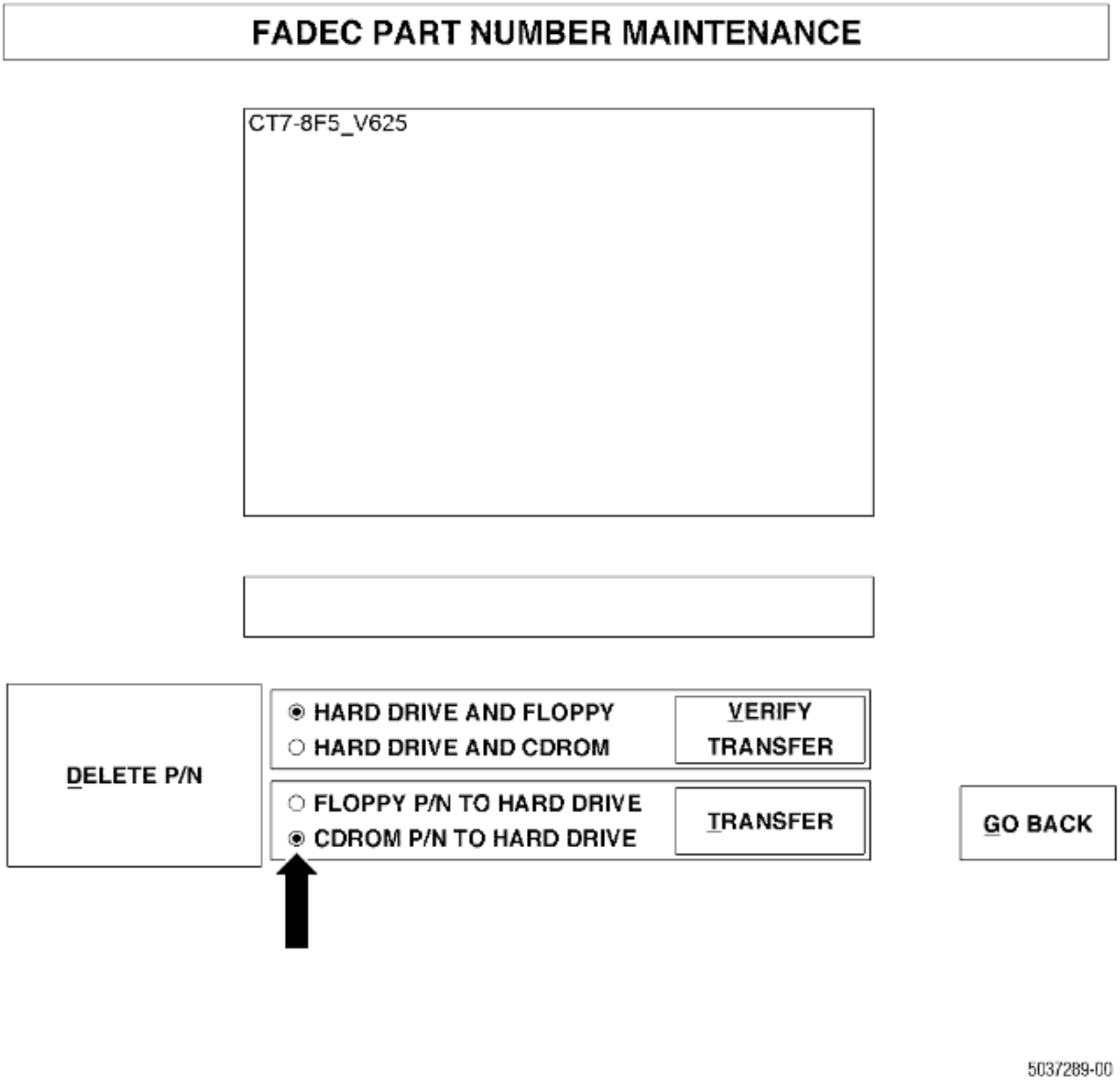
Record compliance with this Service Bulletin in the appropriate CT7 Turboshaft Engine Service Record.



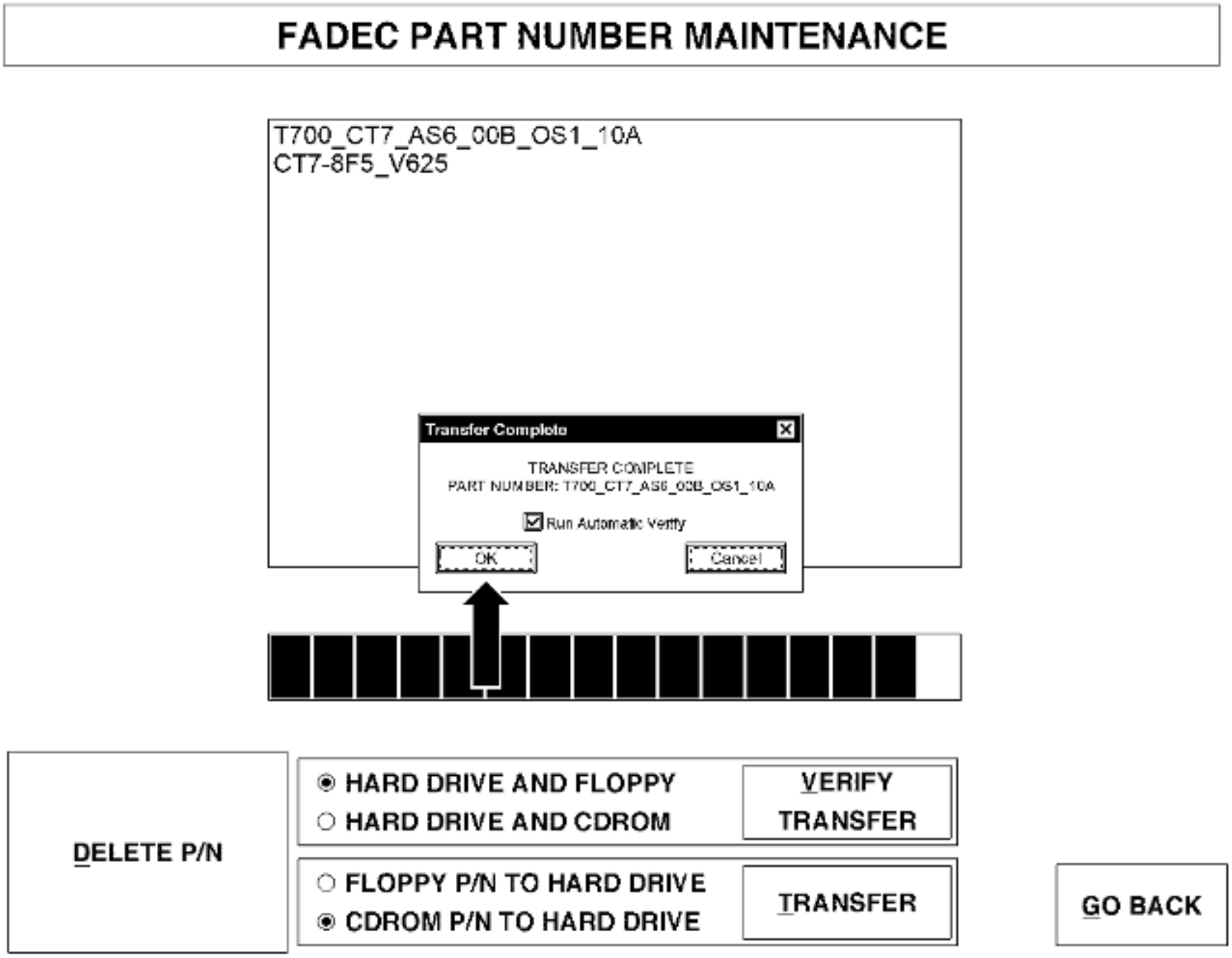
Archived Data Button
Figure 1



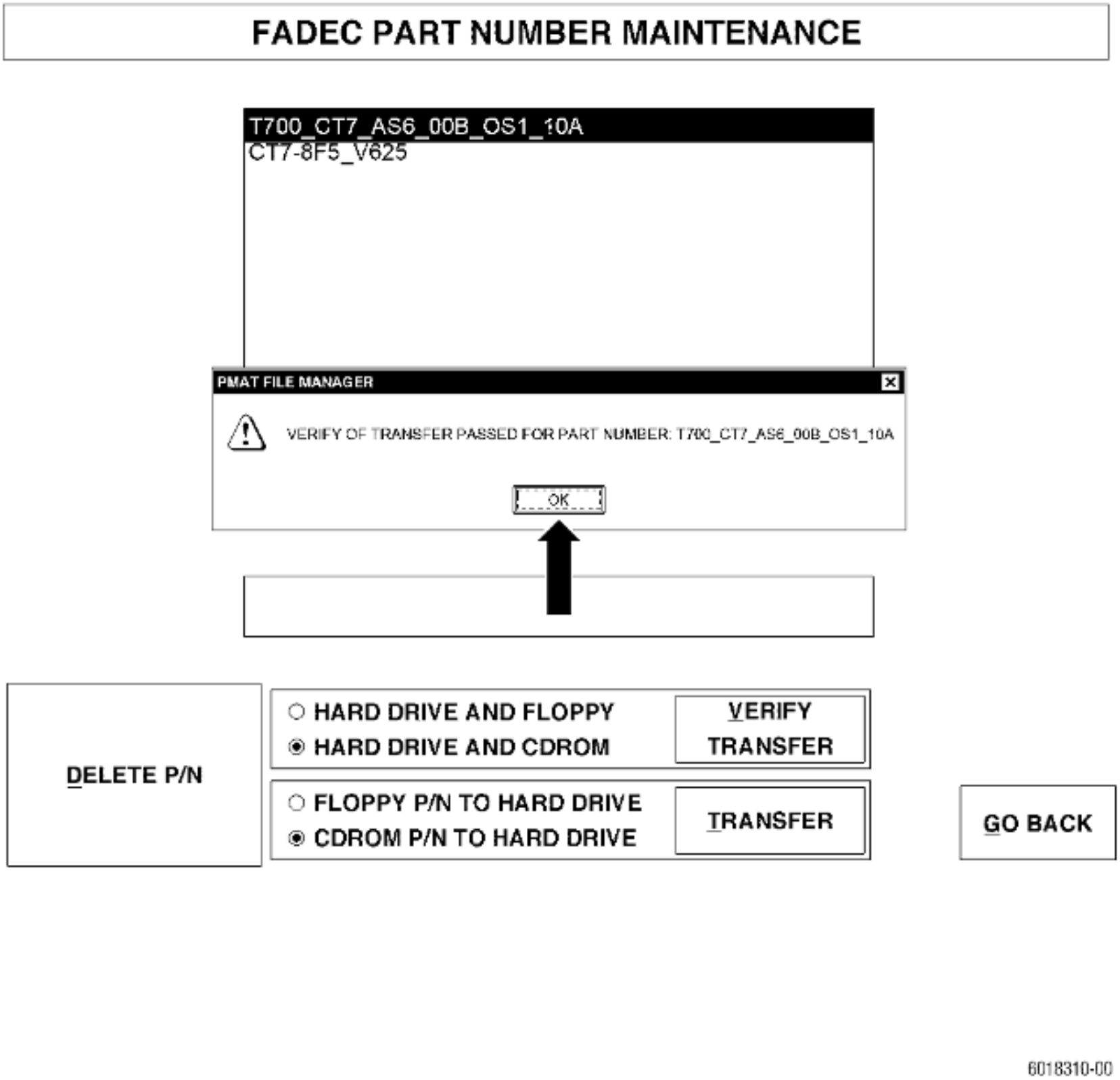
Part Number Maintenance Button
Figure 2



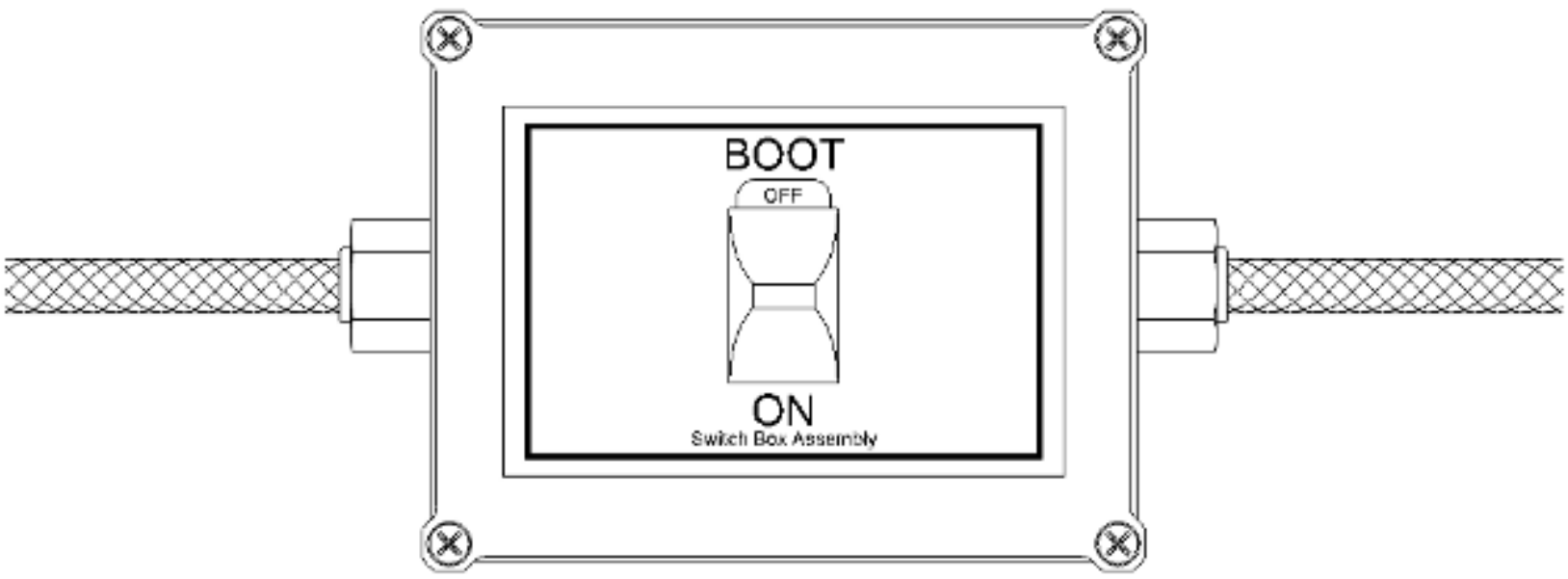
CDROM P/N to Hard Drive
Figure 3



Transfer Complete Window
Figure 4

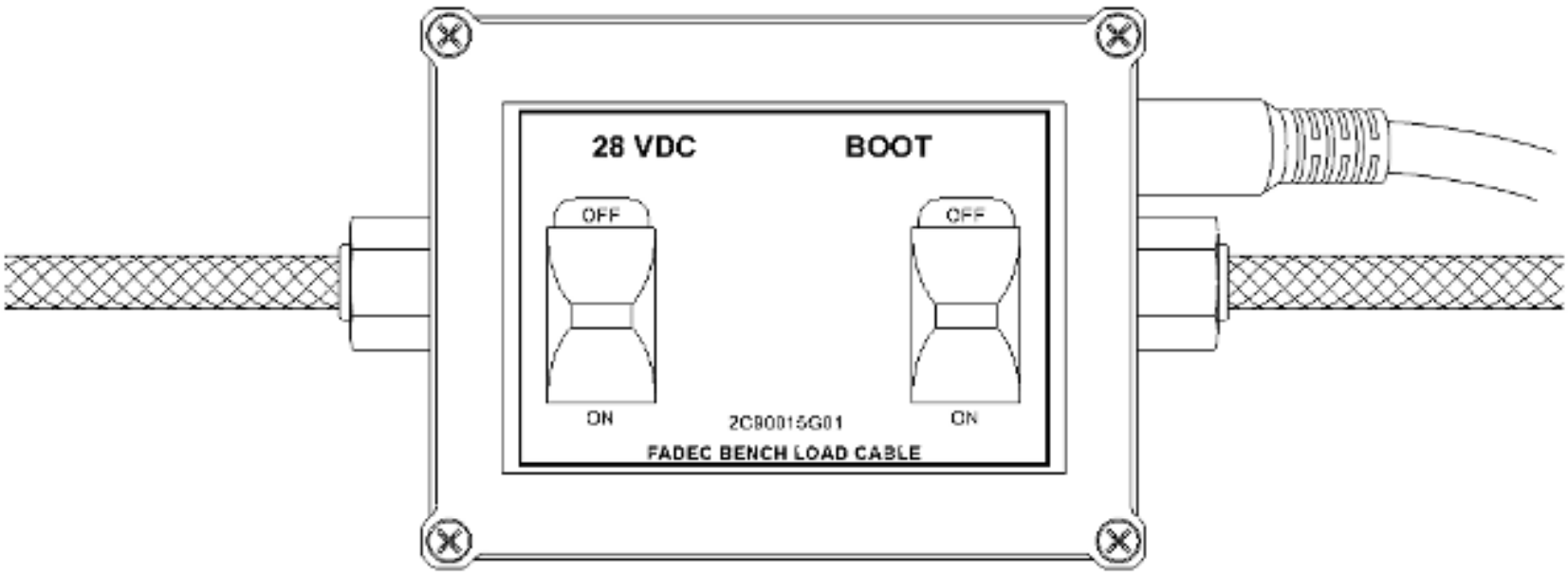


Verification of Successful Software Load to PMAT
Figure 5



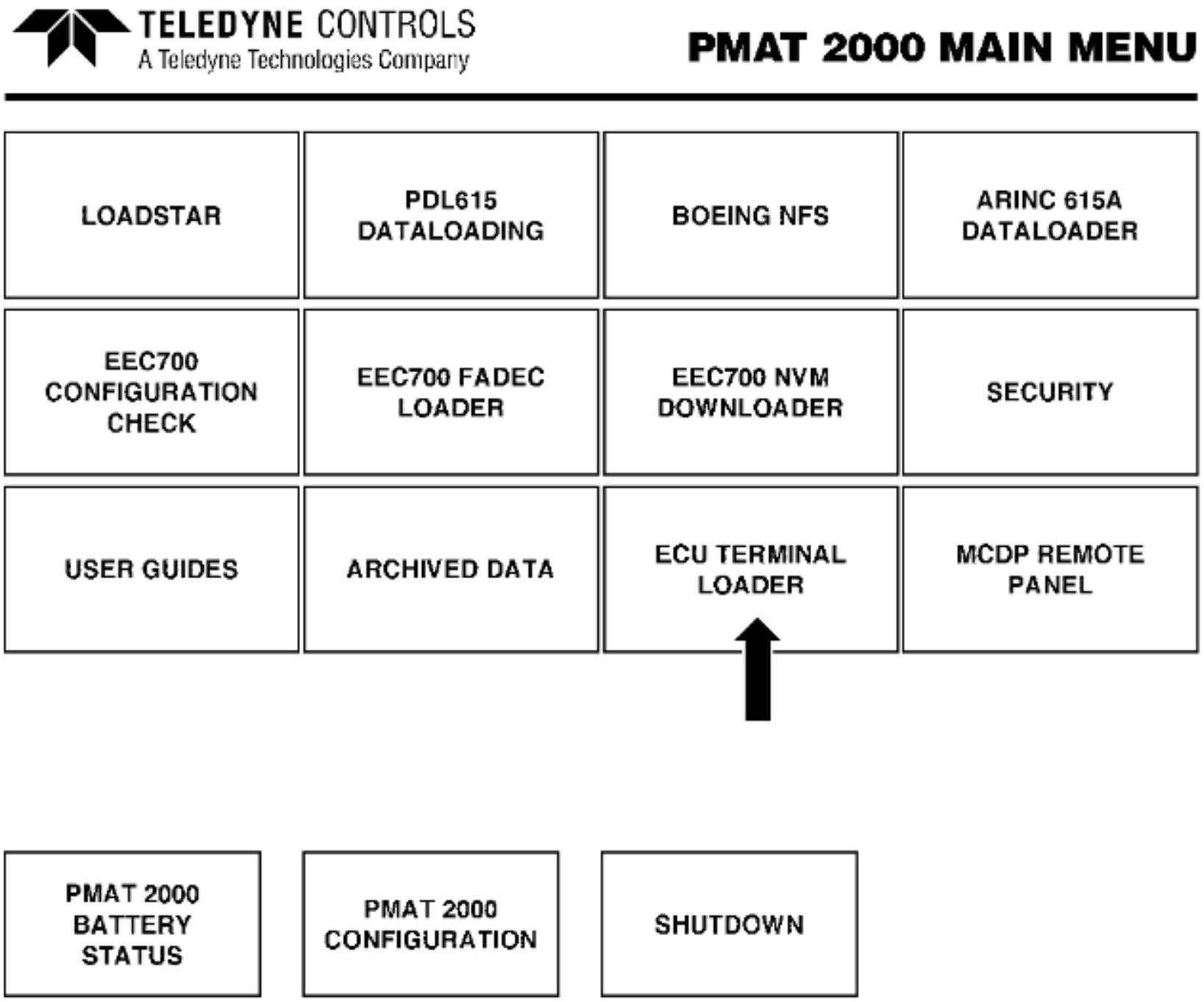
5037295-00

Aircraft Cable with Boot Switch in OFF Position
Figure 6

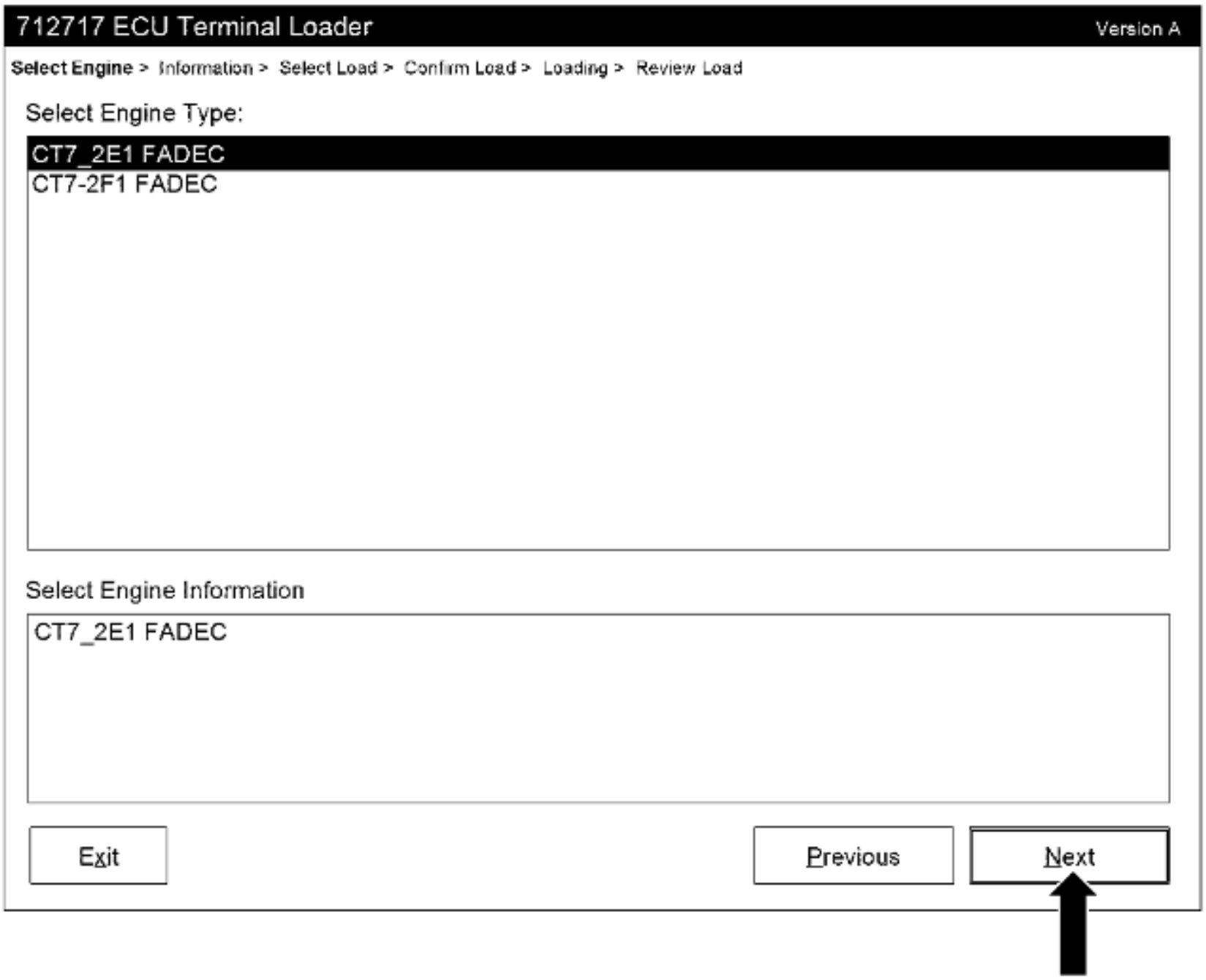


5037316-00

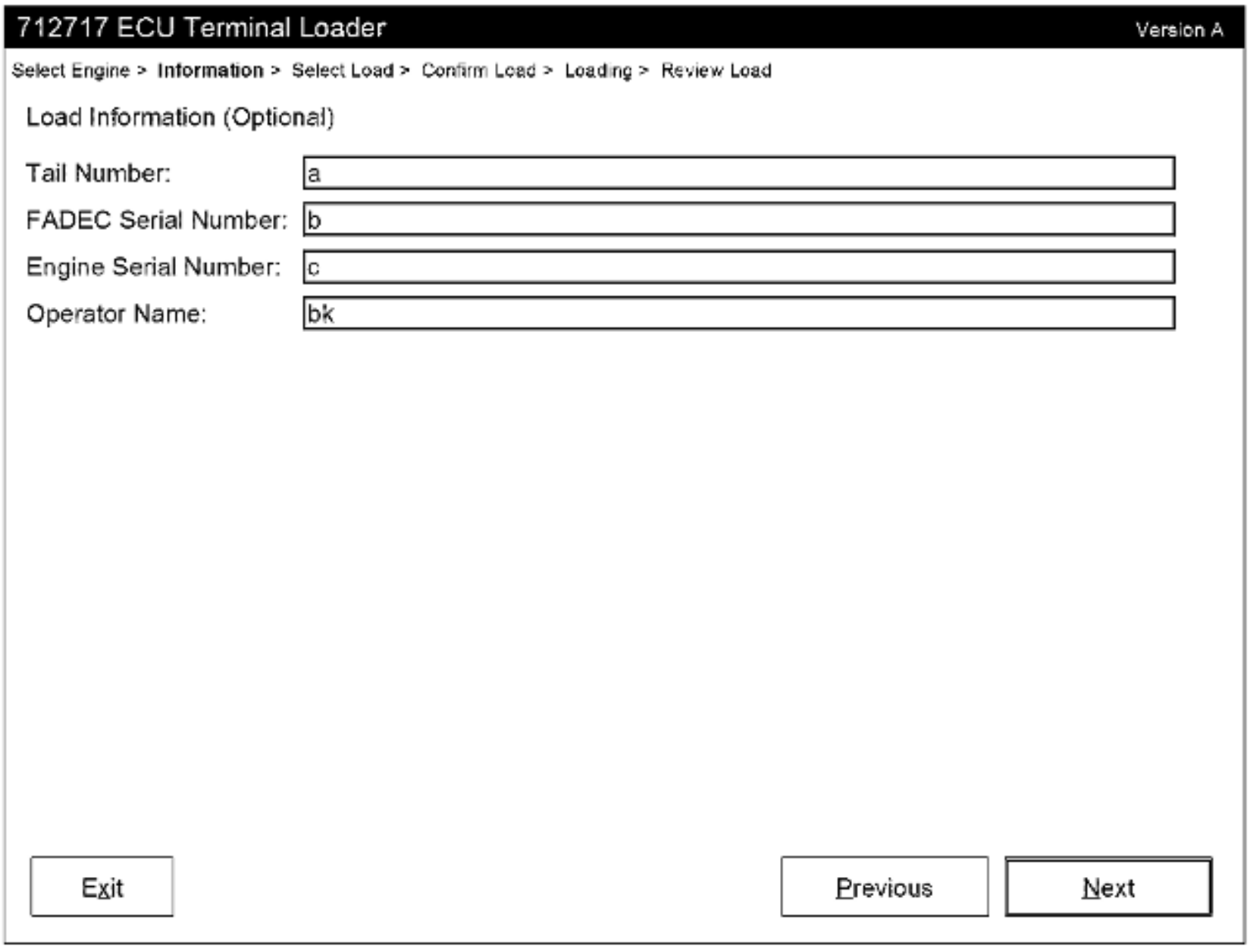
Bench Load Cable with Switches in OFF Position
Figure 7



ECU Terminal Loader Button
Figure 8

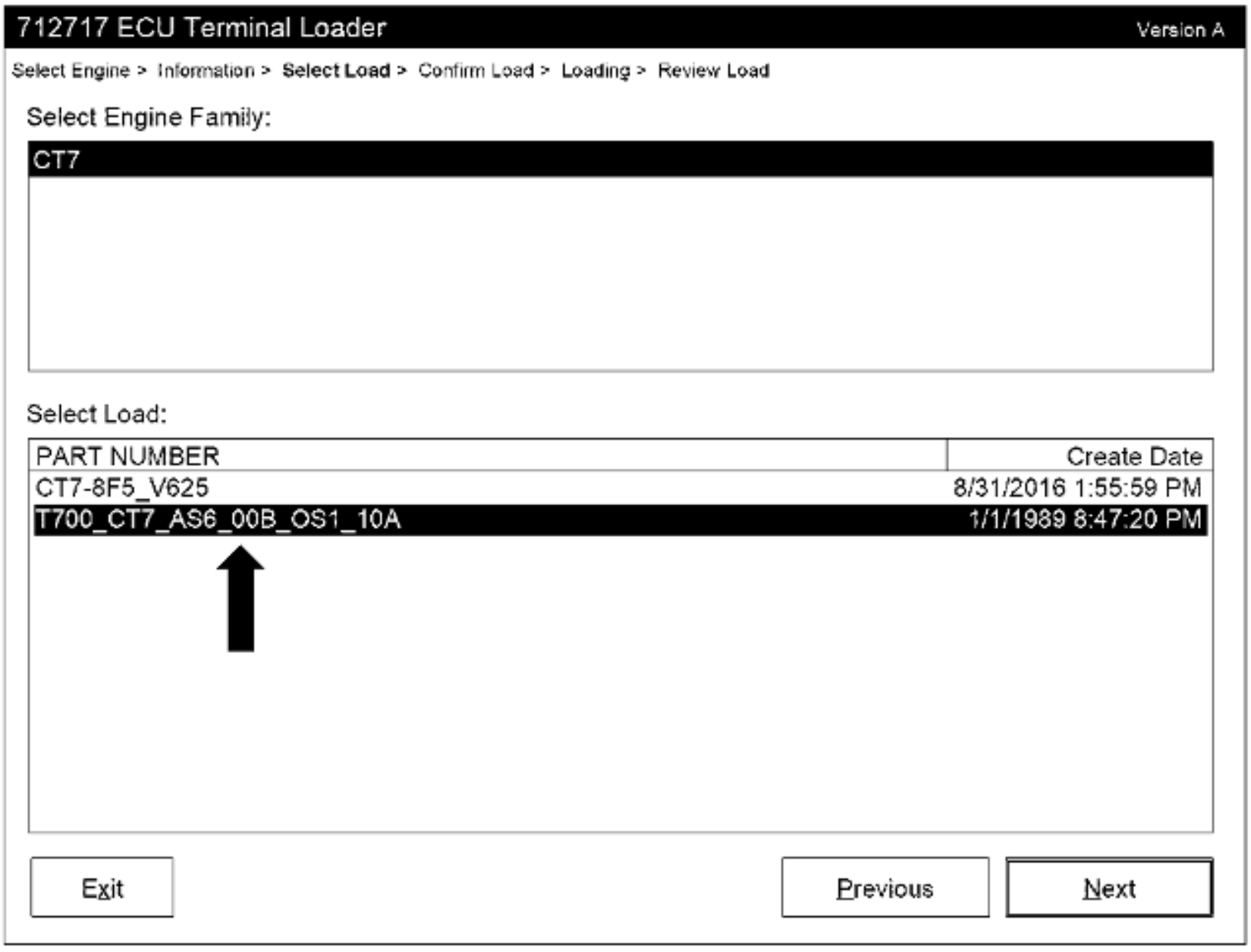


Select Engine Type
Figure 9



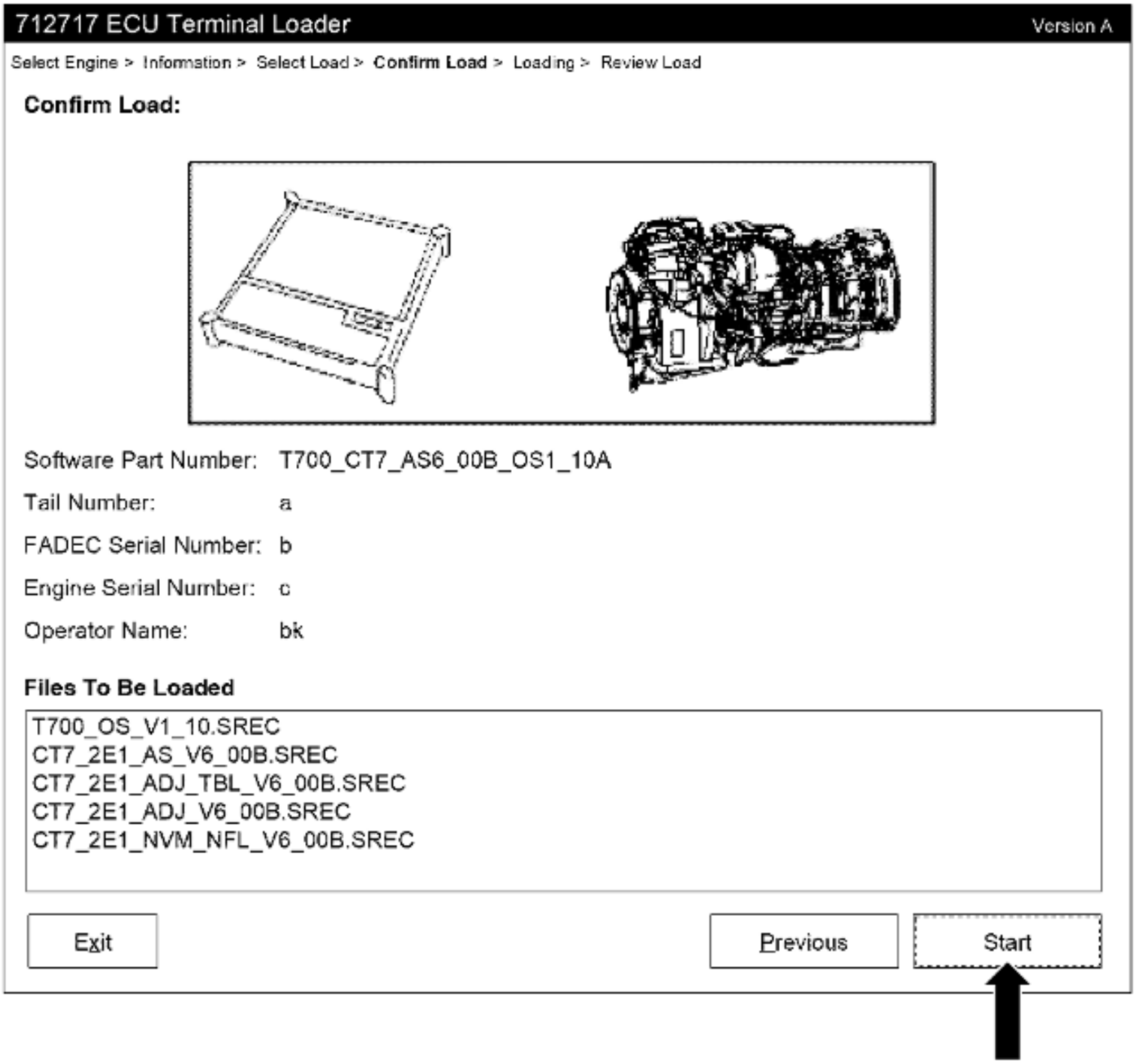
5037299-00

Load Specific Data Input Screen
Figure 10



6018309-00

Select Software to Load
Figure 11



Confirm Load Detail Data
Figure 12

6018307-00

Successful Load Result
Figure 13

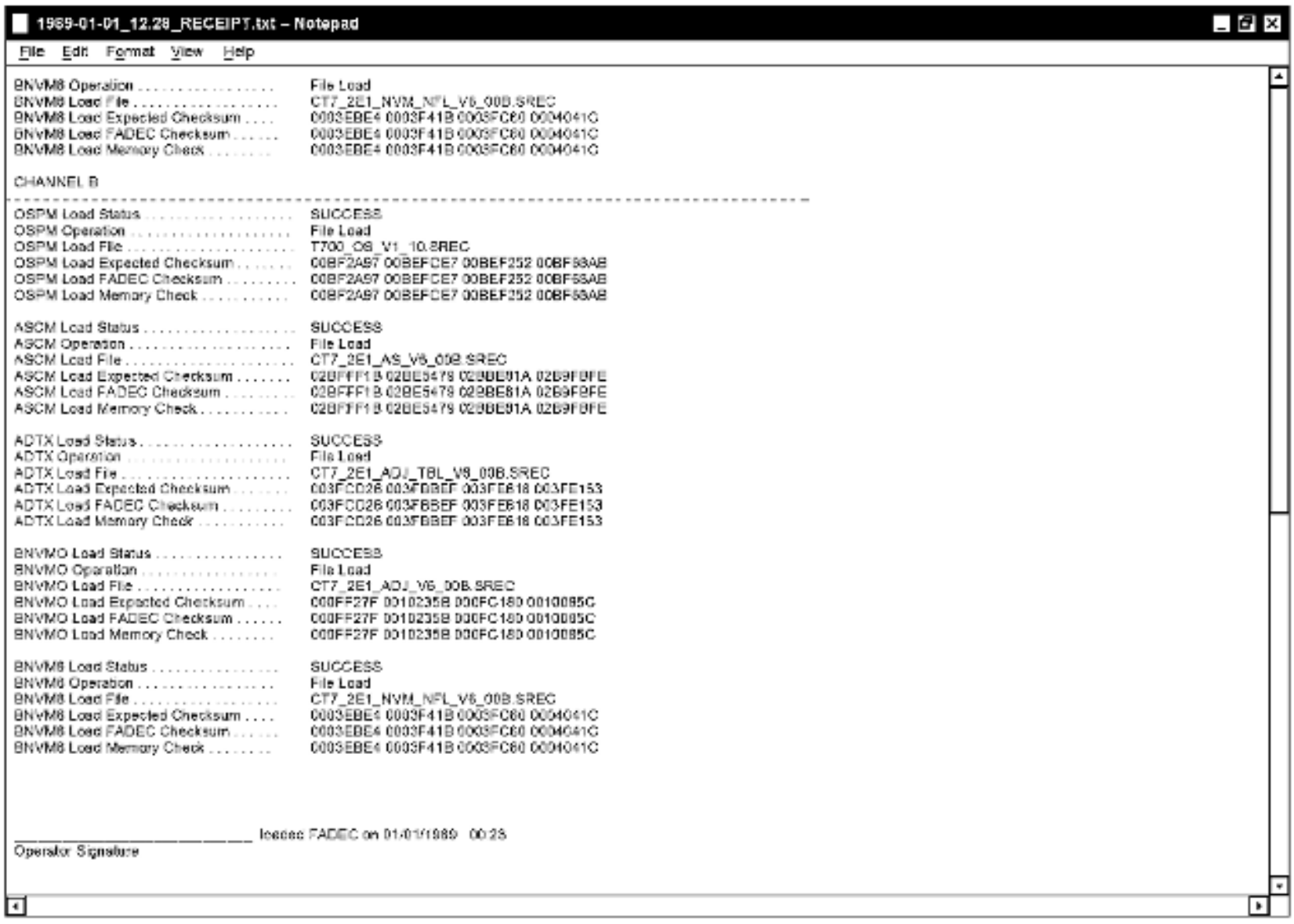
1969-01-01_12.28_RECEIPT.txt – Notepad

File Edit Format View Help

```
ECU Terminal Loader
LOAD RECEIPT
C:\DataFiles\Logs\FADEC\1969-01-01_12.28_RECEIPT.txt
--------------------------------------------------------------------------------
Engine Name:            CT7-2E1 FADEC
Software Part Number:   T700_CT7_AS6_00B_OS1_10A
Tail Number:            a
Engine Serial Number:   c
FADEC Serial Number:    0
Operator Name:          bk
Channel A
--------------------------------------------------------------------------------
OSPM Load Status . . . . . .    SUCCESS
OSPM Operation . . . . . .      File Load
OSPM Load File . . . . . .      T700_OS_V1_10.SREC
OSPM Load Expected Checksum . . . . .   00BF2A97 00BEFCE7 00BEF252 00BF88AB
OSPM Load FADEC Checksum . . . . . .    00BF2A97 00BEFCE7 00BEF252 00BF88AB
OSPM Load Memory Check . . . . . .      00BF2A97 00BEFCE7 00BEF252 00BF88AB

ASCM Load Status . . . . . .    SUCCESS
ASCM Operation . . . . . .      File Load
ASCM Load File . . . . . .      CT7_2E1_AS_V6_006.SREC
ASCM Load Expected Checksum . . . . .   02BFFF1B 02BE5479 02BBE81A 02B8FBFE
ASCM Load FADEC Checksum . . . . . .    02BFFF1B 02BE5479 02BBE81A 02B8FBFE
ASCM Load Memory Check . . . . . .      02BFFF1B 02BE5479 02BBE81A 02B8FBFE

ADTX Load Status . . . . . .    SUCCESS
ADTX Operation . . . . . .      File Load
ADTX Load File . . . . . .      CT7_2E1_ADJ_TBL_V6_00B.SREC
ADTX Load Expected Checksum . . . . .   003FCD25 003FBBEF 003FE618 003FE183
ADTX Load FADEC Checksum . . . . . .    003FCD25 003FBBEF 003FE618 003FE183
ADTX Load Memory Check . . . . . .      003FCD25 003FBBEF 003FE618 003FE183

BNVMO Load Status . . . . . .   SUCCESS
BNVMO Operation . . . . . .     File Load
BNVMO Load File . . . . . .     CT7_2E1_ADJ_V6_00B.SREC
BNVMO Load Expected Checksum . . . .    000FF27F 00102358 000FC180 0010085C
BNVMO Load FADEC Checksum . . . . . .   000FF27F 00102358 000FC180 0010085C
BNVMO Load Memory Check . . . . . .     000FF27F 00102358 000FC180 0010085C

BNVM8 Load Status . . . . . .   SUCCESS
BNVM8 Operation . . . . . .     File Load
BNVM8 Load File . . . . . .     CT7_2E1_NVM_NFL_V6_00B.SREC
BNVM8 Load Expected Checksum . . . .    0003EBE4 0003F41B 0003FC60 0004041C
BNVM8 Load FADEC Checksum . . . . . .   0003EBE4 0003F41B 0003FC60 0004041C
BNVM8 Load Memory Check . . . . . .     0003EBE4 0003F41B 0003FC60 0004041C

CHANNEL B
```

6018306-00

Load Receipt (Top Half)
Figure 14



6018299-00

Load Receipt (Bottom Half)
Figure 15

GE Designated: - CONFIDENTIAL Subject to the restrictions on the media