



A Textron Company

TECHNICAL BULLETIN

407-14-111

3 July 2014

MODEL AFFECTED: 407

SUBJECT: ENGINE FADEC SOFTWARE V5.400,
INTRODUCTION OF

HELICOPTERS AFFECTED: Serial numbers 53000 through 53900, 53911
through 54175, and 54300 through 54570.

[Serial numbers 54176 through 54299 and 54571
and subsequent will have the intent of this bulletin
accomplished prior to delivery.]

COMPLIANCE: At customer's option.

DESCRIPTION:

This Technical Bulletin provides the instructions to introduce the software Version 5.400 to the engine FADEC system of the Model 407 (standard and 407GX). Bell Helicopter Textron has been coordinating closely with Rolls-Royce Corporation (RRC) to implement this software upgrade to resolve the FADEC faults associated with the introduction of the overspeed adapter per the ASB 407-14-102, as well as some other known Reversionary Governor faults that have been identified in the RRC Commercial Service Letter (CSL) 6125. The software upgrade will also be a terminating action to **Part III** of the ASB 407-14-102 that requires a 50-hour recurring functional check of the overspeed protection system and will be introduced as a revision to the subject ASB. Compliance with **Part I** of the ASB 407-14-102 (Rolls-Royce Corporation ALERT CEB A-73-6059) must be accomplished prior to or concurrently with this Technical Bulletin. This installs the engine adapter P/N M250-10684 to the helicopter FADEC harness. Applicability of this bulletin to any spare part shall be determined prior to its installation on an affected helicopter.

APPROVAL:

The engineering design aspects of this bulletin are Transport Canada Civil Aviation (TCCA) approved.

CONTACT INFO:

For any questions regarding this bulletin, please contact:

Bell Helicopter Product Support Engineering - Light Helicopters
Tel: 450-437-2862 / 1-800-363-8023 / pselight@bh.com

MANPOWER:

Approximately 2.0 man-hours are required to complete this bulletin. This estimate is based on hands-on time, and may vary with personnel and facilities available.

WARRANTY:

There is no warranty credit applicable for parts or labor associated with this bulletin.

MATERIAL:

Required Material:

The following material is required for the accomplishment of this bulletin and may be obtained through your Bell Helicopter Textron Supply Center.

<u>Part Number</u>	<u>Nomenclature</u>	<u>Qty</u>	<u>Notes</u>
407-075-011-115	DECAL 5.400 DRM	1	(Note 1 and 3)
407-075-206-133	DECAL 5.400 DRM	1	(Note 2 and 4)
113417-1	ECU IDENTIFICATION PLATE	1	(Note 5)
MS51861-1C	SCREW, SELF-TAPPING	4	(Note 5)

Notes:

1. Decal required for the standard 407 (S/N 53000 through 54299).
2. Decal required for the 407GX (S/N 54300 through 54570).
3. The decal may be locally manufactured using lettering of white color No. 17875 on a black background color No. 17038 per FED STD595. Characters to be 12 points Helvetica Regular. Text for the decal is detailed in Figure 1.
4. The decal may be locally manufactured using lettering of white color No. 17875 on a black background color No. 17038 per FED STD595. Characters to be 10 points Spartan Black. Text for the decal is detailed in Figure 1.
5. The required material will be supplied by Triumph Engine Control Systems (TECS) as part of the software upgrade campaign.

Consumable Material:

The following material is required to accomplish this bulletin, but may not require ordering, depending on the operator's consumable material stock levels. This material may be obtained through your Bell Helicopter Textron Supply Center.

<u>Part Number</u>	<u>Nomenclature</u>	<u>Qty</u>	<u>Reference</u> *
2110-00010-00	NAPTHA-MB1041 - TT-N- 95,TYII 1GAL	As required	C-305
2010-06640-00	COMPOUND-SEALER - 3950 SCOTCHCAL	As required	C-349

* C-XXX numbers refer to the consumables list in BHT-ALL-SPM Standard Practices Manual

SPECIAL TOOLS:

Refer to the required Tooling section per the Triumph Engine Control Systems (TECS) Service Bulletin 73-10. This will be supplied as part of the software upgrade program.

WEIGHT AND BALANCE:

Not affected.

ELECTRICAL LOAD DATA:

Not affected.

REFERENCES:

BHT-407-IPB Illustrated Parts Breakdown, Chapters 11, 76, 95, and 96
BHT-407-MM Maintenance Manual, Chapters 11, 71, 76, 95, and 96
Bell Helicopter Alert Service Bulletin (ASB) 407-14-102
BHT-407-FM-1 Flight Manual, Temporary Revision 14
BHT-407-FM-2 Flight Manual, Temporary Revision 4
Rolls-Royce Corporation ALERT Commercial Engine Bulletin (CEB) A-73-6059
Rolls-Royce Corporation Commercial Engine Bulletin (CEB) 73-6060
Rolls-Royce Corporation Commercial Service Letter (CSL) 6125
Triumph Engine Control Systems (TECS) Service Bulletin (SB) 73-10

PUBLICATIONS AFFECTED:

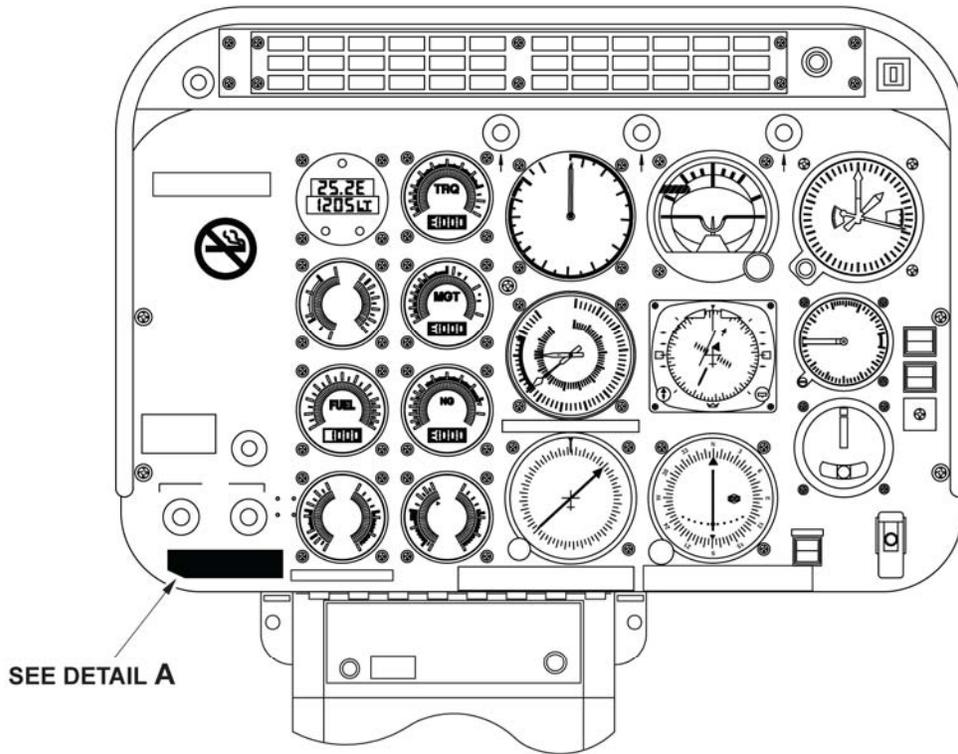
BHT-407-IPB Illustrated Parts Breakdown, Chapters 11, 76, 95, and 96
BHT-407-MM Maintenance Manual, Chapters 11, 71, 76, 95, and 96
BHT-407-FM-1 Flight Manual
BHT-407-FM-2 Flight Manual
BHT-407-MD-1 Manufacturer's Data
BHT-407-MD-2 Manufacturer's Data

ACCOMPLISHMENT INSTRUCTIONS:

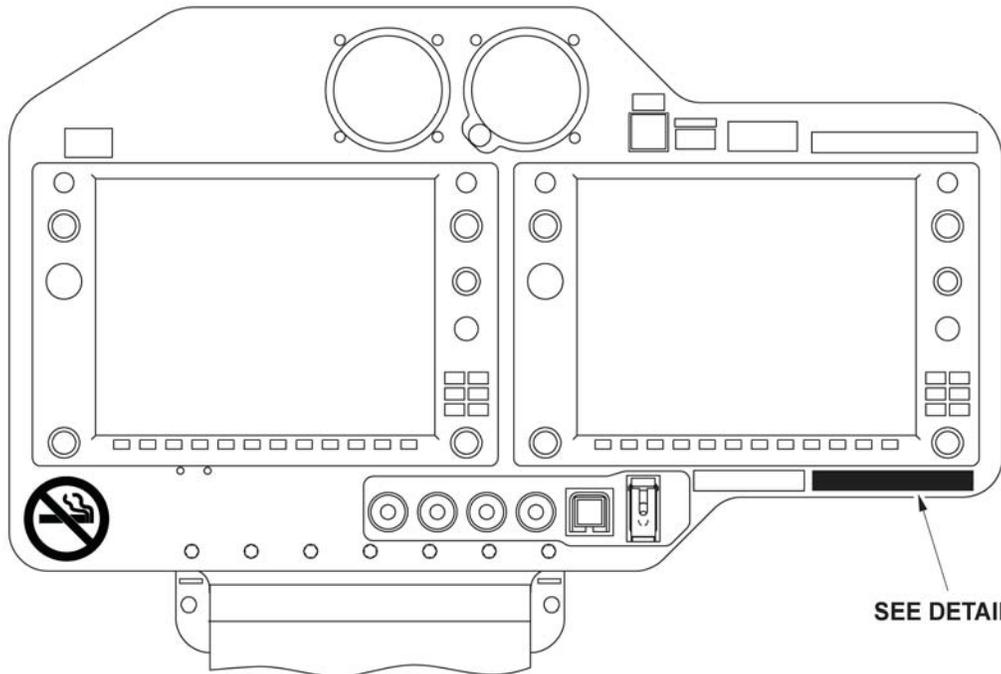
-NOTE-

Compliance with **Part I** of the ASB 407-14-102 (Rolls-Royce Corporation CEB A-73-6059) shall be accomplished prior to or concurrently with this Technical Bulletin. This installs the engine adapter P/N M250-10684 to the helicopter FADEC harness.

1. Refer to the Rolls-Royce Corporation (RRC) Commercial Engine Bulletin (CEB) 73-6060 to verify applicability of this bulletin to the ECU part number installed on the helicopter.
 - a. If the ECU is affected, do step 2.
 - b. If the ECU is not affected, do step 8.
2. Prepare the helicopter for maintenance.
3. Perform the Accomplishment Instructions of the Rolls-Royce CEB 73-6060 and the Triumph Engine Control Systems (TECS) Service Bulletin 73-10.
4. With a plastic scraper, remove and discard the existing FADEC software version decal located on the instrument panel. Wipe the surface clean with a clean damp cloth, moistened with aliphatic naphtha (C-305) (Figure 1).
5. Install applicable decal on the instrument panel in the location identified.
6. Seal the edges of the decal with edge sealer (C-349).
7. Insert temporary revisions into the appropriate Rotorcraft Flight Manual (RFM).
 - a. Insert Temporary Revision 14 into the BHT-407-FM-1, Flight Manual (407).
 - b. Insert Temporary Revision 4 into the BHT-407-FM-2, Flight Manual (407GX).
8. Make an entry in the helicopter logbook and historical service records indicating compliance with this Technical Bulletin.



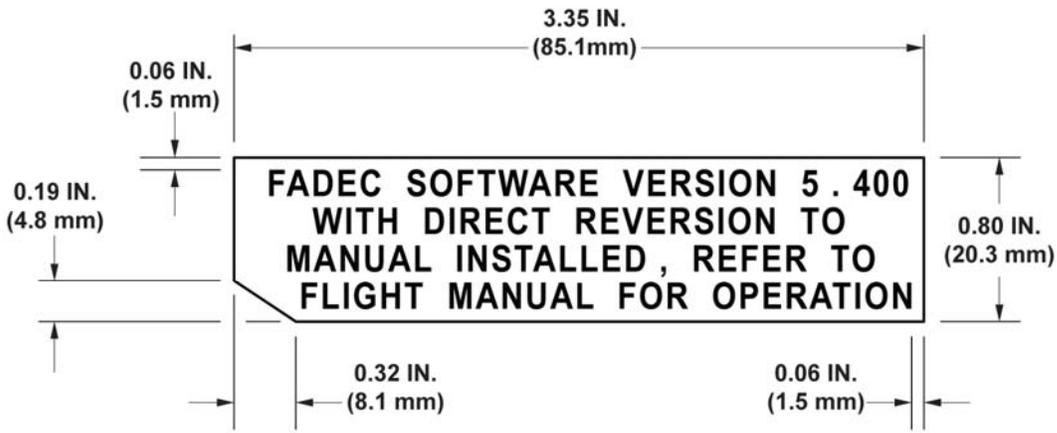
(FOR S/N 53000 THROUGH 54299)



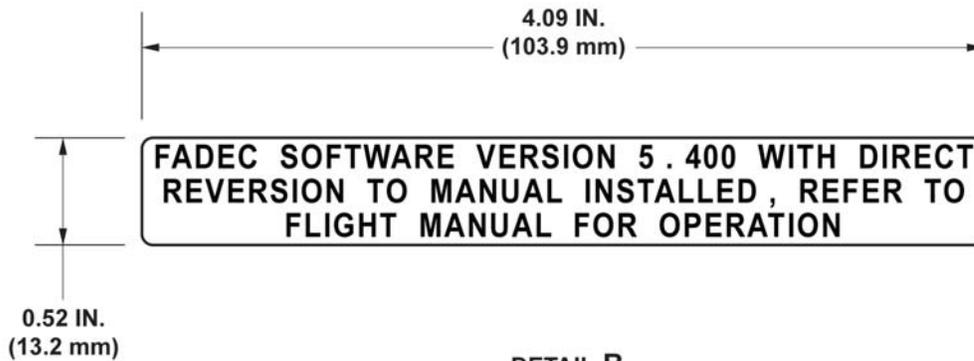
(FOR S/N 54300 AND SUBSEQUENT)

14531_001a

Figure 1 – Markings Installation (Sheet 1 of 2)



DETAIL A
 DECAL P/N 407-075-011-115
 (FOR S/N 53000 THROUGH 54299)



DETAIL B
 DECAL P/N 407-075-206-133
 (FOR 407GX S/N 54300 AND SUBSEQUENT)

Figure 1 – Markings Installation (Sheet 2 of 2)

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ENGINE, FUEL AND CONTROL - NEW ECU SOFTWARE

1. PLANNING INFORMATION

A. Effectivity

(1) Engines

All Rolls-Royce M250-C47B series engines with the following ECUs installed:

C47B

23080490
23088484
23088856

(2) Spares - Not affected

B. Reason

The new software addresses the “power-up faults” and “overspeed shutdown test disable” which were introduced with the adapter installed via CEB-A-73-6059.

C. Description

Installation of the false overspeed trip (FOST) adapter (M250-10684) generates power-up faults. It also makes the “overspeed test function” inoperable. With this software update, the engine operation will be restored to normal operation prior to the adapter install. The new software will also provide confirmation that the adapter is installed. It will generate a fault if the adapter is NOT installed.

The following software changes are incorporated into this software version:

- (1) Change the overspeed protection logic to accommodate the FOST adapter, (M250-10684). The software will now check for the presence of the adapter and declare faults (OSCnfigFlt and OSFlt) if adapter is not detected. The overspeed shutdown test will now function with the adapter installed.
- (2) Improvement in the NG Fault detection including eliminating nuisance faults on shutdown.
- (3) Added fault detection on starter circuit to check for a stuck “on” condition.
- (4) Improvement in Incident recorder detection logic.
- (5) Improvement in the igniter circuit fault detection logic.
- (6) Elimination of nuisance Watch Dog Timer faults in the reversionary governor.
- (7) Improvement in the primary to reversionary governor hand-off logic.

For C47M operators, new software is planned to make the above changes. This bulletin will be revised at that time to include the C47M part numbers and compliance information.

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D. Approval

Technical aspects are FAA approved.

E. Compliance

Compliance Code 7. To be complied with per customer option.

F. Interchangeability – See Prerequisites

G. Material Availability

NEW P/N	NAME	QTY/ENG
M250-10695	Engine Control Unit	1
M250-10696	Engine Control Unit	1

H. Tooling – See attached Triumph bulletin.

I. Weight and Balance – Not affected

J. Electrical Load Data – Not affected

K. References

(1) Advance Engineering Memorandum (AEM), CW500020268050.

NOTE: The document above is referenced for the internal use of Rolls-Royce only.

(2) CSP 21001 Operation and Maintenance Manual, Turboshaft Model M250-C47B (OMM).

(3) CSP 23001 Illustrated Parts Catalog, Turboshaft Models M250-C40B, -C47B, -C47M (IPC).

L. Other Publications Affected

M. Prerequisites

(1) Compliance with CEB-A-73-6059 – Paragraph 2.A., Installation of the FOST adapter Part Number M250-10684.

2. ACCOMPLISHMENT INSTRUCTIONS

A. See attached Triumph Service Bulletin EMC35R 73.10. Once you receive your software kit from Triumph, verify part number and serial number information on the new data plate. If there are discrepancies, contact Rolls-Royce and Triumph immediately.

Rolls-Royce: helicoptercustsupp@rolls-royce.com

Triumph: TECSWH-Support@triumphgroup.com

B. Record compliance with this CEB in the engine log book, white pages, and the component accessory card for the ECU.

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3. MATERIAL INFORMATION

A. Configuration Chart

NEW P/N	QTY/ ENG	NAME	OLD P/N	QTY/ ENG	INSTRUCTIONS/ DISPOSITION
M250-10695	1	Engine Control Unit	23080490 (See Note 1)	1	1
M250-10695	1	Engine Control Unit	23088484 (See Note 1)	1	1
M250-10696	1	Engine Control Unit	23088856 (See Note 2)	1	1

NOTE: (1) ECUs 23080490 and 23088484 are pre CEB 73-6052.

NOTE: (2) ECU 23088856 has complied with CEB 73-6052.

INSTRUCTIONS/DISPOSITION NOTES

1. Software updated.

B. Consumable Materials - None

C. Expendable Parts - None

CUSTOMER SUPPORT
ROLLS-ROYCE



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EMC-35R ECU
73-10

Triumph Engine Control Systems Model EMC-35R
Electronic Control Unit Assembly
Software Upgrade for Rolls-Royce 250-C47B Engine

1. Planning Information

A. Effectivity

Applicable to the Triumph Engine Control Systems (Triumph) model EMC-35R Electronic Control Unit Assembly (ECU) part numbers 115220-1A5-20, 115220-1A5-23 and 115220-2A5-23 (Rolls-Royce Part Numbers 23080490, 23088484, and 23088856, respectively) as components of the Rolls-Royce 250-C47B engine.

B. Reason

To upgrade part number 115220-1A5-20, 115220-1A5-23, or 115220-2A5-23 (Rolls-Royce Part Number 23080490, 23088484, or 23088856, respectively) to part number 115220-1A5-24 or 115220-2A5-24 (Rolls-Royce part numbers M250-10695 and M250-10696, respectively) by changing the embedded software for the Primary governor from version 257-5356 (-20) or 257-5358 (-23) to 257-5400, and the embedded software for the Reversionary governor from version 681-9026 (-20) or 681-9029 (-23) to 681-9100. The primary objective of the new software is to make the power-up and shutdown overspeed tests compatible with the overspeed adapter (Rolls-Royce P/N M250-10684) that is installed between the engine harness and firewall connector (refer to Rolls-Royce CEB-A-73-6059).

C. Description

This service bulletin provides instructions for changing the embedded software for the Primary governor from version 257-5356 or 257-5358 to 257-5400, and the embedded software for the Reversionary governor from version 681-9026 or 681-9029 to 681-9100 using the on-line loader functionality of the ECU. The task is accomplished using an IBM compatible personal computer (PC) with Windows XP, 7, or 8 operating system and the following Triumph supplied hardware/software:

- (1) Programming interface cable
- (2) Programming interface box
- (3) On-Line Loader interface software
- (4) Maintenance Terminal software
- (5) Bell 407 Maintenance Terminal data files
- (6) Embedded software files for versions 257-5400 and 681-9100

The on-line loader (OLL) function which is run on the personal computer, will completely erase the existing embedded Primary governor and Reversionary software and upload the new software version to replace it. The on-line loader function automatically verifies successful erasure of the existing software and automatically verifies the integrity of the new

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software version by a supplemental identification (a.k.a CRC) check. The operator is required to verify and document that the software version and supplemental identifier number are correct. The operator is also required to verify and document that the engine history data displayed after software upload are identical to those displayed before upload.

It is not possible to end up with a 'dead' ECU due to a unsuccessful upload, regardless of the cause. The boot loader code is resident in the ECU flash memory and cannot be corrupted by a terminated upload. Once power is cycled with the programming switch in the active state, the boot loader restarts execution and is again ready to receive programming instructions and data from the PC.

Configuration control is maintained by removing the identification plate prior to the software change and by changing the unit part number onto a new identification plate and on applicable documents after the ECU is programmed with the new software.

D. Compliance

At customer discretion but only in conjunction with or after the installation of the overspeed adapter (Rolls-Royce P/N M250-10684) per Rolls-Royce CEB-A-73-6059.

E. Approval

Technical aspects are FAA approved.

F. Manpower

All work is to be performed by FAA authorized personnel only. Approximately 1.0 man hour is required to accomplish this upgrade.

G. Material - Price and Availability

Item	Nomenclature	Part Number	Quantity
1	ECU Identification Plate	113417-1*	1
2	Screw, Self-Tapping	MS51861-1C*	4

* Contact Triumph account manager for availability



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H. Tooling

Item	Part Number	Nomenclature	Quantity
1	118737-1*	EMC-35R ECU Programming Kit for C47B, consisting of items 2 through 9, below.	1
2	CD118743-1	CD: Bell 407 250-C47B FOSSA	1
3	T-11527-4	Programming Interface Cable	1
4	T-11527-5	Programming Interface Box	1
5	N/A	RS232 Extension Cable, 6 foot (or 2M); D-sub 9-pin male to 9-pin female	1
6	USA-19HS	Keyspan USB-to-Serial Converter	1
7	N/A	Universal 24 VDC Power Supply Module (100 - 240VAC 50/60 Hz input, 2.1 amps minimum output)	1
8	N/A	AC Power Cord (Nema 5-15P/IEC60320-C13; 18 AWG min., 3 conductor, 6 foot minimum length, 240 VAC min.)	1
9	N/A	International AC Plug Adapter	1
10	CD118794-1*	CD: Maintenance Terminal 2013	1
11	CD118758-1*	CD: Bell 407 250-C47B Maintenance Terminal Data Files	1
12	113972-3*	Maintenance Terminal Interface Cable	1
13	C-1912 Rev - *	Maintenance Terminal User's Manual	1
14	N/A	Personal Computer (PC) with Windows XP/7/8 Operating System, CDROM Drive, and 9-Pin RS232 Serial Port or USB Port	1
15	N/A	Small Phillips Head Screwdriver	1

* Contact Triumph Account Manager for availability

This document is subject to the controls and restrictions as stated on the title page.



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I. Weight and Balance

None.

J. Electrical Load Data

Not Changed.

K. Software Accomplishment Summary

The software accomplishment summary for software versions 257-5400 and 681-9100 is Triumph document C-1105-24, latest revision.

L. References

None.

M. Other Publications Affected

Not Applicable.



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2. Accomplishment Instructions

Precautions

- (1) To ensure software integrity, the Triumph-supplied CDs are write protected. If there is any damage to the CDs or any question of CD integrity, consult Triumph for replacement CDs before attempting accomplishment instructions.
- (2) The operator should verify that the PC is free of virus infection using a commercially available anti-virus program with recently updated virus detection files. The protocol and automated checks of the on-line loader function prevent the possibility of infecting software in the ECU. However it is possible for virus infection to cause operating problems with the PC which could inhibit completion of the accomplishment instructions.
- (3) Powering the ECU without normal airframe connections will cause numerous faults to be logged in RAM (volatile) memory due to loss of external signals. Observed faults should be disregarded except as specifically addressed in these instructions.
- (4) Steps **2.A** through **2.E** can be completed in advance while away from the aircraft. Steps **2.F** through **2.L** will require access to the aircraft and are required to be completed in consecutive order, as written.
- (5) It is recommended that programming of the ECU be completed with a PC that is running off AC power rather than battery power, to ensure that the PC does not shut down in the middle of the reprogramming process.
- (6) It is recommended that if a PC that has been historically used to run the Maintenance Terminal software is available, it also be used to support reprogramming of the ECU since the serial communications port has already been set up and demonstrated to be functional.
- (7) If a PC with Maintenance Terminal version 2.00 or 2.01 is not available, complete the registration of the CD for Maintenance Terminal 2013 (version 2.3) in order to receive an installation password. A registration form and instructions can be found in the Maintenance Terminal User's Manual.
- (8) If programming of the Primary governor or Reversionary governor is unsuccessful for any reason, it is recommended that the PC be re-booted, the ECU be de-powered, and the programming process be restarted from the first step of the applicable paragraph; **2.H** for the Primary governor, **2.I** for the Reversionary governor.
- (9) Ensure that a replacement ECU identification plate is available before proceeding past step **2.F** of this bulletin.

A. Install Maintenance Terminal Software

NOTES: It is not necessary to re-install the Maintenance Terminal software from the CD each time this service bulletin is accomplished. It is also not necessary to install the Maintenance Terminal 2013 software (version 2.3) if an earlier version (v2.0, v2.01) has been previously installed onto the PC. Refer to Maintenance Terminal User's Manual if any difficulties with the installation are encountered. The user must have administrator rights on the PC in order to install the software.

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- (1) Insert the Maintenance Terminal 2013 CD (CD118794-1) into CDROM drive.
- (2) From the Windows toolbar, click on **Start > Run**.
- (3) Click on **Browse** and navigate to the CDROM drive containing the CD.
- (4) Select **Setup.exe** and click on **Open**.
- (5) Click on **OK**.
- (6) A window titled **Setup for Maintenance Terminal Version 2.3** will be displayed. As directed, close all other programs that are running. Click on **Next**.
- (7) A window identifying the default destination folder for Maintenance Terminal will be displayed. Click on **Next..**
- (8) A window identifying the default destination folder for the Maintenance Terminal icon will be displayed. Click on **Next**.
- (9) A window indicating that the installation is completed will be displayed. Click on **Finish**.
- (10) Remove the Maintenance Terminal Program CD from the CDROM drive.

B. Install Maintenance Terminal Data Files for the Bell 407

NOTE: It is not necessary to re-install the Maintenance Terminal data files from the CD for the Bell 407 software each time this service bulletin is accomplished. The user must have administrator rights on the PC in order to install the software.

- (1) Insert the Bell 407 250-C47B Maintenance Terminal Data Files CD (CD118758-1) into the CDROM drive.
- (2) From the Windows toolbar, click on **Start > Run**.
- (3) Click on **Browse** and navigate to the CDROM drive containing the CD.
- (4) Select **Setup.exe** and click on **Open**.
- (5) Click on **OK**.
- (6) A setup wizard for version 4.1 of the C47B Maintenance Terminal data files will open. As directed, close all other programs that are running. Click on **Next**.
- (7) A window identifying the default destination folder for the data files will be displayed. Click on **Next..**
- (8) A window indicating that the data files are ready to install will be displayed. Click on **Install**.
- (9) A window indicating that the installation is completed will be displayed. Click on **Finish**.
- (10) Remove the Maintenance Terminal Data file CD for the Bell 407 from the CDROM drive.



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C. Install On-Line Loader Software and Embedded ECU Software Files

NOTE: It is not necessary to re-install the On-Line Loader software and embedded ECU software files each time this service bulletin is accomplished.

- (1) Create a **C:\temp** folder on the PC if it does not already exist.
- (2) Insert Bell 407 250-C47B FOSSA CD (CD118743-1) into the CDROM drive.
- (3) Browse to the CDROM drive.
- (4) Browse to **IMAGE_CD118743-1_REV-**
- (5) Right click on **EMC35_TTOLLI** folder and click **Copy**
- (6) Browse to **C:**, right click on the **temp** folder, and click on **Paste**.
- (7) Browse again to **IMAGE_CD118743-1_REV-** on the CDROM drive.
- (8) Right click on **Bell 407 EMC-35 Program Files** folder and click **Copy**.
- (9) Browse again to **C:**, right click on the **temp** folder, and click on **Paste**.
- (10) Remove the Bell 407 250-C47B FOSSA CD from the CDROM drive.

D. Install USB-to-Serial Adapter and Software

NOTE: The USB-to-Serial adapter driver files only need to be installed if the PC does not have a 9-pin serial port or if another USB-to-Serial converter has not been installed previously. Also, it is not necessary to re-install the driver files each time this service bulletin is accomplished.

- (1) Insert the Bell 407 250-C47B FOSSA CD (CD118743-1) into the CDROM drive.
- (2) Browse to the CDROM drive.
- (3) Browse to folder **IMAGE_CD118743-1_REV- \ Keyspan USB Files**.
- (4) Depending upon the PC operating system, double-click on the appropriate setup file as defined below:
 - (a) **USA-19HS Windows (98, ME)_v3.4.exe**
 - (b) **USA-19HS Windows (2000, XP, 2003 Server, Vista)_v3.75.exe**
 - (c) **USA-19S Windows 7v4.exe** (also use for Windows 8)
- (5) Follow setup screens to complete installation of necessary files for the USB-to-serial adapter (Keyspan manuals are on the CD if needed).
- (6) Plug the USB-to-Serial adapter into a USB port on the PC. The driver file will be installed automatically.
- (7) Remove the Bell 407 250-C47B FOSSA CD from the CDROM drive.

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E. Determine Serial COM Port Assignment

NOTE: The serial COM port assignment only has to be determined if the PC did not have Maintenance Terminal software installed prior to initiating this service bulletin.

- (1) From the Windows toolbar menu click on **Start > Control Panel > System > Device Manager > Ports (COM & LPT)**.
- (2) If PC has a 9-pin serial port connector, note the COM port assignment (typically COM1).
- (3) If USB-to-serial adapter is being used, note the COM port assignment for the adapter.

NOTE: The Maintenance Terminal software only supports COM port assignment up to and including COM9. If the COM port assignment is higher than COM9, refer to the Keyspan manual on the Bell 407 250-C47B FOSSA CD (CD118743-1) for instructions on how to change the COM port assignment.

F. Record Software Version, Serial Number and Engine History Data Prior to Re-programming ECU

NOTE: If it is not possible to provide AC power at the aircraft location, the ECU may be removed from the aircraft for reprogramming.

- (1) If ECU is to be programmed on aircraft, complete steps (2) through (5) below. Otherwise, begin at step (6) below.
- (2) Remove dust cap from FADEC ECU communications port on left side of pedestal.
- (3) Connect one end of the Maintenance Terminal interface cable to FADEC ECU communications port and the other end to the 9-pin COM port on PC (or USB-to-serial adapter).
- (4) Apply airframe power to the ECU.
- (5) Go to step (17) below.
- (6) Plug the circular plug on the programming interface cable into the J2 connector on ECU.
- (7) Plug the 15-pin 'D' connector on the programming interface cable labeled as 'P104' into the 'J104' connector on the programming interface box.
- (8) Set the programming switch on the programming interface box to center 'OFF/ECUIC' position.
- (9) Set the power switch position on the programming interface box to 'OFF'.
- (10) Connect AC power cord to power supply module.
- (11) Connect power supply module output plug to receptacle labeled as 'J101' on the programming interface box.
- (12) If PC does not have 9-pin serial port, install USB-to-serial converter to one of the USB ports (if not already installed).



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- (13) Connect one end of the 9-pin RS232 cable to the 9-pin serial port on the PC (or USB-to-serial converter).
- (14) Connect the other end of the 9-pin RS232 cable to the receptacle labeled as 'J102' on the interface box.
- (15) Plug the AC power cord into a 110 - 240VAC 50/60 Hz outlet.
- (16) Set the power switch on the programming box to 'PWR ON'.
- (17) From the Windows toolbar, click on **Start > Programs > Maintenance Terminal**. If running Maintenance Terminal version 2.00 or 2.01 click on **Maintenance Terminal**. If running Maintenance Terminal 2013 (version 2.3), right click on **Maintenance Terminal** and select **Run as administrator**. This is only necessary for the first time the Maintenance Terminal version 2.3 is used.
- (18) If prompted for a password, enter the existing password (or password supplied during registration of Maintenance Terminal version 2.3) and click **OK**.
- (19) From the MTerm main menu, click on **File > Select COM port**.
- (20) Note the active COM port. The active COM port number will be required as part of the ECU programming steps. Click **OK**.
- (21) Initiate MTerm communications with the ECU by clicking on the 'connect' icon at top left of MTerm window.
- (22) Verify the following information from the Component Serial Numbers screen. Record compliance on record data sheet, Appendix A, paragraph 1.A.:
 - (a) ECU Software Version **257-5356** and Supplemental ID **6058**, OR
 - (b) ECU Software Version **257-5358** and Supplemental ID **211A**
- (23) Record the following serial number information from the screen on the record data sheet, Appendix A, paragraph 1.C:
 - (a) ECU S/N:
 - (b) Engine S/N:
 - (c) Compressor S/N:
 - (d) HMU S/N:
 - (e) Aircraft ID:
 - (f) Turbine S/N:
 - (g) Eng Gearbox S/N:
- (24) Click on **OK**.
- (25) On MTerm main menu, click on **Engine History > View**.

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- (26) Record the displayed values for the following engine history data on the record data sheet , Appendix A, paragraph 1.D:
 - (a) ECURnTm
 - (b) NpRLmPk
 - (c) NpRLmTm
 - (d) NumStrt
 - (e) OSCyc
 - (f) SgCtr
 - (g) EngRunCtr
 - (h) NpLmPk
 - (i) NpLmTm
 - (j) OSCtr
 - (k) NpLmEvts (does not apply to ECU software version 257-5356)
 - (l) NpRLmEvts (does not apply to ECU software version 257-5356)
 - (m) NpMLmEvts (does not apply to ECU software version 257-5356)
 - (n) NpExclnd (does not apply to ECU software version 257-5356)
- (27) Disconnect the MTerm from the ECU by clicking on the 'disconnect' icon at the top left of the window.
- (28) Exit the MTerm by clicking on **File > Exit**.
- (29) If previous steps were performed with ECU on aircraft, complete steps (30) through (32). Otherwise, set the power switch position on the programming interface box to OFF'.
- (30) Remove aircraft power from ECU.
- (31) Disconnect Maintenance Terminal cable from the FADEC ECU communications port and from the 9-pin COM port on PC (or USB-to-serial adapter).
- (32) Replace dust cap on the FADEC ECU communications port.

G. Connect Programming Equipment

- (1) Using a small Phillips screwdriver, remove the four screws securing the identification plate to the ECU housing. Retain screws and identification plate for transfer of information onto new identification plate in accordance with step 2.L.
- (2) Complete steps (3) through (15) only if programming equipment was not previously connected in paragraph 2.F.
- (3) Ensure aircraft power is removed from ECU.

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- (4) Remove cable clamp closest to ECU J2 connector.
- (5) Disconnect airframe harness from ECU J2 connector.
- (6) Plug the circular plug on the programming interface cable into the J2 connector on ECU.
- (7) Plug the 15-pin 'D' connector on the programming interface cable labeled as 'P104' into the 'J104' connector on the programming interface box.
- (8) Set the programming switch on the programming interface box to center 'OFF/ECUIC' position.
- (9) Set the power switch position on the programming interface box to 'OFF'.
- (10) Connect AC power cord to power supply module.
- (11) Connect power supply module output plug to receptacle labeled as 'J101' on the programming interface box.
- (12) If PC does not have a 9-pin serial port, install USB-to-serial converter to one of the USB ports (if not already installed).
- (13) Connect one end of the 9-pin RS232 cable to the 9-pin serial port on the PC (or USB-to-serial converter).
- (14) Connect the other end of the 9-pin RS232 cable to the receptacle labeled as 'J102' on the interface box.
- (15) Plug the AC power cord into a 110 - 240VAC 50/60 Hz outlet.

H. Re-program the Primary Governor

NOTE: It is recommended that this paragraph (H) and subsequently paragraph (I) be performed without interruption. Plan for a minimum of 20 minutes to complete both paragraphs.

- (1) Connect equipment as described in paragraph **2.G** above.
- (2) Set the switch on the programming box to 'PRIMARY PROGRAM' (full down position)
- (3) Set the power switch on the programming box to 'PWR ON'.
- (4) Browse to **C:\temp\EMC35_TTOLLI** and click on the **Start** shortcut.
- (5) The following dialogue box will appear:

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- (6) Click on **Yes**. The following dialogue box will appear and prompt for the COM port number.



- (7) Enter the serial communications port number which was determined in step **2.E** or **2.F(20)**. Click on **OK**.
- (8) If the port is already in use, the following message will be displayed:



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- (9) If this error occurs, it must be determined which applications are already using the communications port and close those applications and then restart the TTOLLI application and try to connect again.

NOTE: An aborted TTOLLI application can in some cases leave the serial port locked. Consult the TTOLLI users manual (C-1913-001) on CD118743-1 for directions on unlocking the serial port.

- (10) Upon a successful connection with the serial port, the following menu dialogue box is displayed:



- (11) Click on **Program Primary** and click on **OK**.
- (12) The TTOLLI will then display the current Primary governor software version as shown below (may be C-00257-5356 or C-00257-5358):



- (13) Click **OK**. The following status box will be displayed:

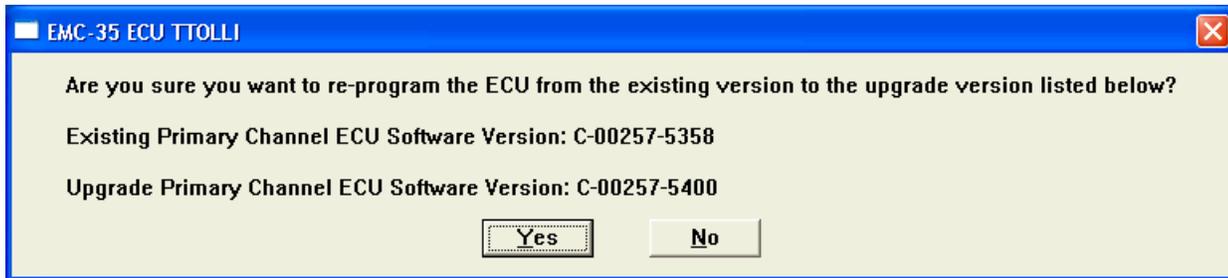


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- (14) An explorer window will open. Browse to **C:\temp\Bell 407 EMC-35 Program Files** and click on **257-5400.oil** and then click on **Open**.
- (15) A message box will be displayed to confirm the software version to be loaded into the Primary governor (existing version may be C-00257-5356 or C-00257-5358):



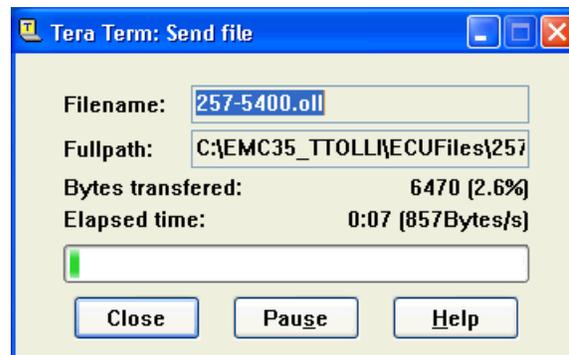
- (16) Click on **Yes**. The TTOLLI will begin erasing the Primary governor flash memory as shown below:



- (17) Once the Primary governor flash memory is erased, the TTOLLI will begin to program the flash memory with version 257-5400 as shown below:



- (18) A file transfer status box will then be displayed showing the progress of the software file transfer from the PC to the ECU as shown below:





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WARNING: DO NOT CLICK ON **CLOSE**, **PAUSE**, OR **HELP** DURING THE PROGRAMMING PROCESS OR THE UPLOAD WILL TERMINATE.

NOTE: It will take approximately 6 minutes to program the Primary governor. It is recommended to move the mouse every 2 - 3 minutes to prevent the PC from going to sleep during the programming process, which could terminate the upload and lock up the serial port.

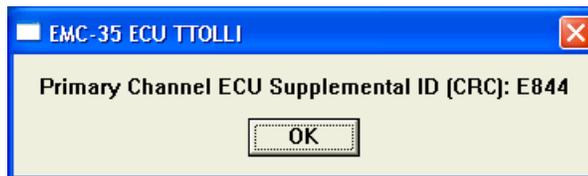
(19) When programming the Primary governor is complete, the transfer status box will close and a message box will be displayed as shown below:



(20) Click on **OK**. The TTOLLI will then read back the uploaded version of software from the ECU and display it as shown below. Record confirmation of the Primary governor software version the on record data sheet, Appendix A, paragraph 1.E.(1).



(21) Click on **OK**. The TTOLLI will then read the supplemental identifier from the ECU and display it as shown below. Record confirmation of the Primary governor supplemental identifier on the record data sheet, Appendix A, paragraph 1.E.(2).



(22) Click on **OK**. A status box will be displayed indicating that programming of the Primary governor is complete



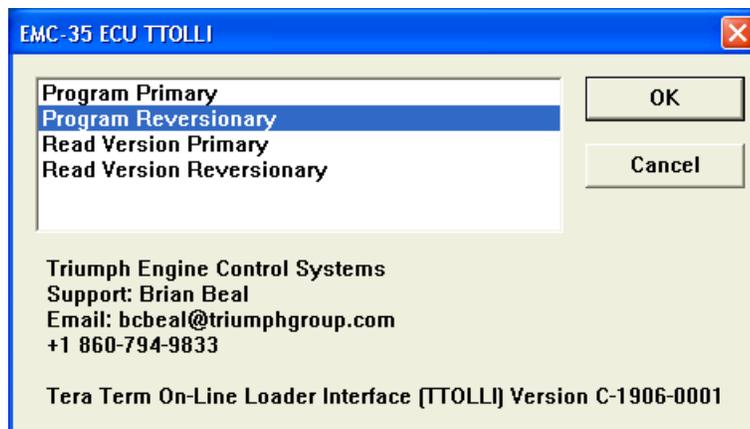
(23) Set the power switch on the programming box to 'OFF'.

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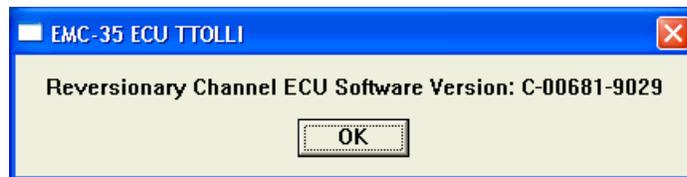
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I. Re-Program the Reversionary Governor

- (1) Move the 9-pin RS232 cable from the 'J102' receptacle on the programming interface box to the 'J103' receptacle.
- (2) Set the switch on the programming box to 'REVER PROGRAM' (full up position).
- (3) Set the power switch on the programming box to 'PWR ON'.
- (4) At the TTOLLI main menu dialogue box, click on **Program Reversionary** and click **OK**.



- (5) The TTOLLI will then display the current Reversionary governor software version as shown below (may be C-00681-9026 or C-00681-9029)



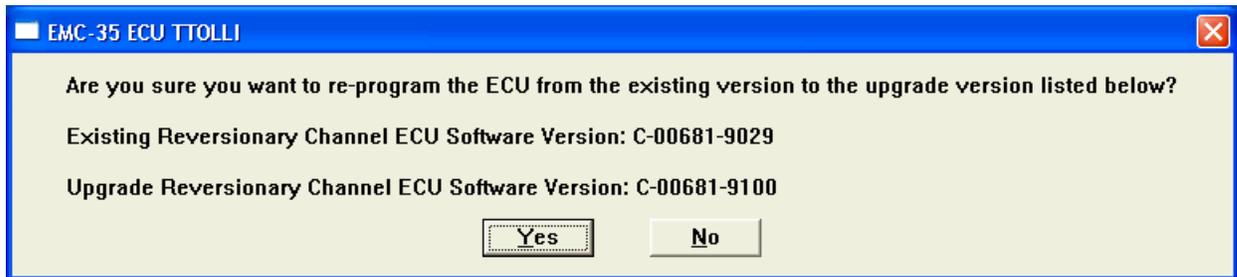
- (6) Click **OK**. The following status box will be displayed.



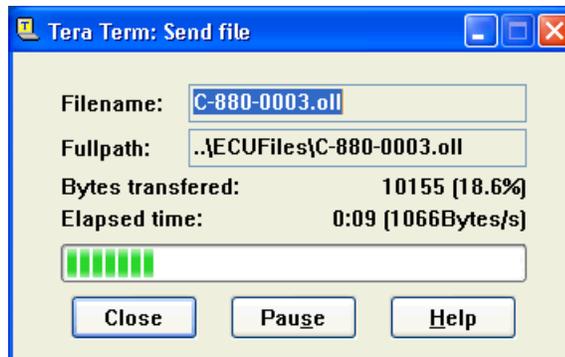
- (7) An explorer window will open. Browse to **C:\temp\Bell 407 EMC-35 Program Files** and click on **681-9100.oil** and then click on **Open**.

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- (8) A message box will be displayed to confirm the software version to be loaded into the Reversionary governor (existing version may be C-00681-9026 or C-00681-9029).

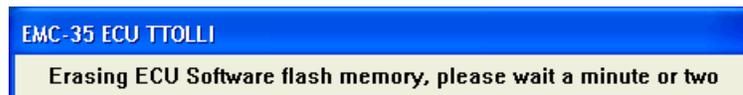


- (9) Click on **Yes**. The TTOLLI will upload a flash kernel to Reversionary governor RAM memory as shown below:



WARNING: DO NOT CLICK ON CLOSE, PAUSE, OR HELP DURING THE PROGRAMMING PROCESS OR THE UPLOAD WILL TERMINATE.

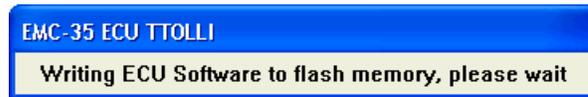
- (10) It will take approximately 1 minute to upload the flash kernel to the Reversionary governor. Once the flash kernel is uploaded, it will start execution and erase the flash memory.



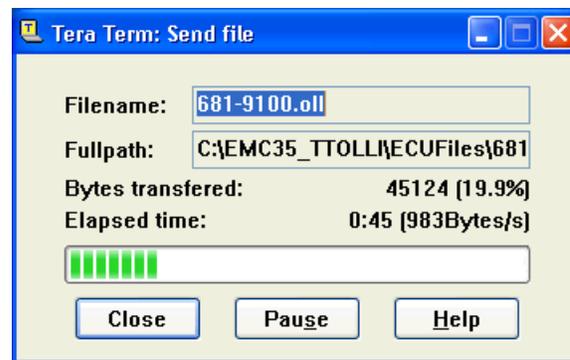
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- (11) After the Reversionary governor flash memory is erased, the TTOLLI will begin to program the flash memory with version 681-9100.



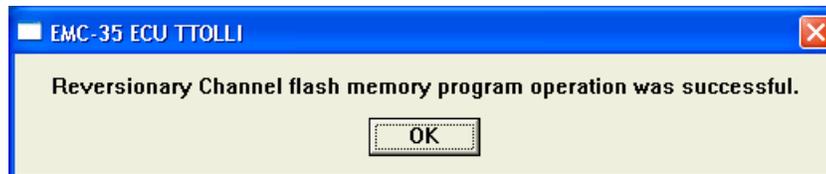
- (12) A file transfer status box will then be displayed showing the progress of the software file transfer from the PC to the Reversionary governor flash memory as shown below:



WARNING: DO NOT CLICK ON CLOSE, PAUSE, OR HELP DURING THE PROGRAMMING PROCESS OR THE UPLOAD WILL TERMINATE.

NOTE: It will take approximately 5 minutes to program the Reversionary governor. It is recommended to move the mouse every 2 - 3 minutes to prevent the PC from going to sleep during the programming process, which could terminate the upload and lock up the serial port.

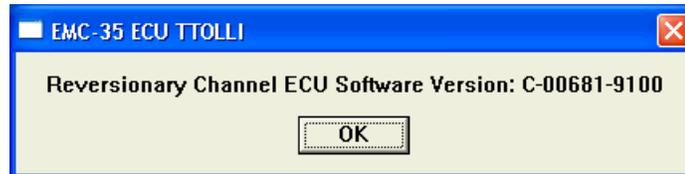
- (13) When programming the Reversionary governor is complete, the transfer status box will close and a message box will be displayed as shown below:



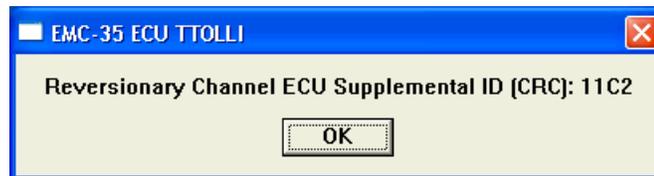


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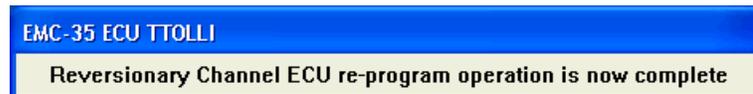
- (14) Click on **OK**. The TTOLLI will then read back the uploaded version of software from the ECU and display it as shown below. Record confirmation of the Reversionary governor software version on the record data sheet, Appendix A, paragraph 1.F.(1).



- (15) Click on **OK**. The TTOLLI will then read the supplemental identifier from the ECU and display it as shown below. Record confirmation of the supplemental identifier on the record data sheet, Appendix A, paragraph 1.F.(2).



- (16) Click on **OK**. A status box will be displayed indicating that programming of the Reversionary governor is complete.



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(17) At the TTOLLI main menu dialogue box, click on Cancel to exit the program.



(18) Set the power switch on the programming box to OFF.

J. Verify Software Version, Serial Numbers and Engine History Data After Reprogramming ECU

- (1) Move the 9-pin RS232 cable from the 'J103' receptacle on the programming interface box back to the 'J102' receptacle.
- (2) Set the programming switch to the center 'OFF/ECUIC' position.
- (3) Set the power switch position on the programming interface box to 'PWR ON'
- (4) From the Windows toolbar, click on **Start > Programs > Maintenance Terminal > Maintenance Terminal**.
- (5) If prompted for a password, enter the supplied password and click **OK**.
- (6) Initiate Maintenance Terminal communications with the ECU by clicking on the 'connect' icon at top left of MTerm window.
- (7) Verify the following information from the Component Serial Numbers screen. Record compliance on record data sheet, Appendix A, paragraph 1.B.
 - (a) ECU Software Version **257-5400** and Supplemental ID **E844**.
- (8) Verify that the component serial numbers are identical to those recorded in step **2.F(23)** prior to reprogramming the Primary governor software. If identical, place a check mark in the brackets to the right of the associated component serial number on the record data sheet, Appendix A, paragraph 1.C.
- (9) Click on **OK**
- (10) On toolbar at top of the MTerm window, click on **Engine History > View**. A **Parameter Edit** window will be displayed.

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- (11) Verify that the values for the displayed engine history data are identical to those recorded in step **2.F(26)** prior to reprogramming the Primary governor software. If identical, place a check mark in the brackets to the right of the associated parameter on the record data sheet, Appendix A, paragraph 1.D.
- (12) **Complete steps 13 through 19 below for original ECU configuration 115220-1A5-20 only.**
- (13) Record values for the Np strike data values on the record data sheet, Appendix A, paragraphs 1.D.(11) through (14).
- (14) Verify the following Np strike data values in the engine history data:
 - (a) NpLmEvts = 0
 - (b) NpRLmEvts = 0
 - (c) NpMLmEvts = 0
 - (d) NpExclnd = FALSE
- (15) If the engine log card contains Np strike data (or if the Np exceedance data recorded by the ECU meets criteria for recording strike data), the Np strike data in the ECU memory should be edited to reflect actual strike status. Refer to the 250-C47B engine O & M manual for determining strike status from Np exceedance information. Update the recorded value on the record data sheet, Appendix A, paragraph 1.D.(11).
- (16) To edit the Np strike data in the ECU memory, from the MTerm main menu, click on **Engine History > Edit**. A **Parameter Edit** window will be displayed.
- (17) Click on **NpLmEvts** and Click on **Edit**.
- (18) Edit the value for the parameter and click on **OK**. The data will be written to the ECU.
- (19) When prompted, cycle the power switch on the interface box to 'OFF' for a couple of seconds, then back to 'PWR ON'. Click **OK**.
- (20) Disconnect the MTerm from the ECU by clicking on the 'disconnect' icon at the top left of the window.
- (21) Exit the MTerm by clicking on **File > Exit** on toolbar at top of Mterm window.
- (22) Set the power switch position on the programming interface box to 'OFF'

K. Disconnect Equipment and Re-connect ECU to Aircraft

- (1) Ensure the power switch on the interface box to the 'OFF' position
- (2) Disconnect the circular plug on the interface cable from the J2 connector on ECU.
- (3) Connect airframe harness to J2 connector on ECU.
- (4) Re-install cable clamp closest to ECU J2 connector.

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L. Re-identify the ECU

- (1) Replace the identification plate previously removed in step **2.G(1)** with a new identification plate (5, Figure 1) using four new screws (10, Figure 1) showing the appropriate Triumph part number (see Table below). Record compliance after new identification plate is installed on record data sheet, Appendix A, paragraph G.(1).

Existing Part Number		New Part Number	
Triumph	Rolls-Royce	Triumph	Rolls-Royce
115220-1A5-20	23080490	115220-1A5-24	M250-10695
115220-1A5-23	23088484	115220-1A5-24	M250-10695
115220-2A5-23	23088856	115220-2A5-24	M250-10696

Verify that the ECU serial number on the identification plate matches the ECU serial number recorded on the record data sheet, Appendix A, paragraph C.(1). Record compliance on the record data sheet, Appendix A, paragraph G.(2).

All other identification plate information remains unchanged. If necessary, other service bulletin information shall be transferred from the old identification plate to the new identification plate prior to installation using a marking method such as hand scribing, vibro-etching or metal stamping.

M. Record Compliance with Service Bulletin

After the new identification plate has been installed, record compliance information as specified on Service Bulletin Compliance Data Sheet (Appendix B). Remit to Triumph Engine Control Systems via mail, fax, or email as specified on the form.



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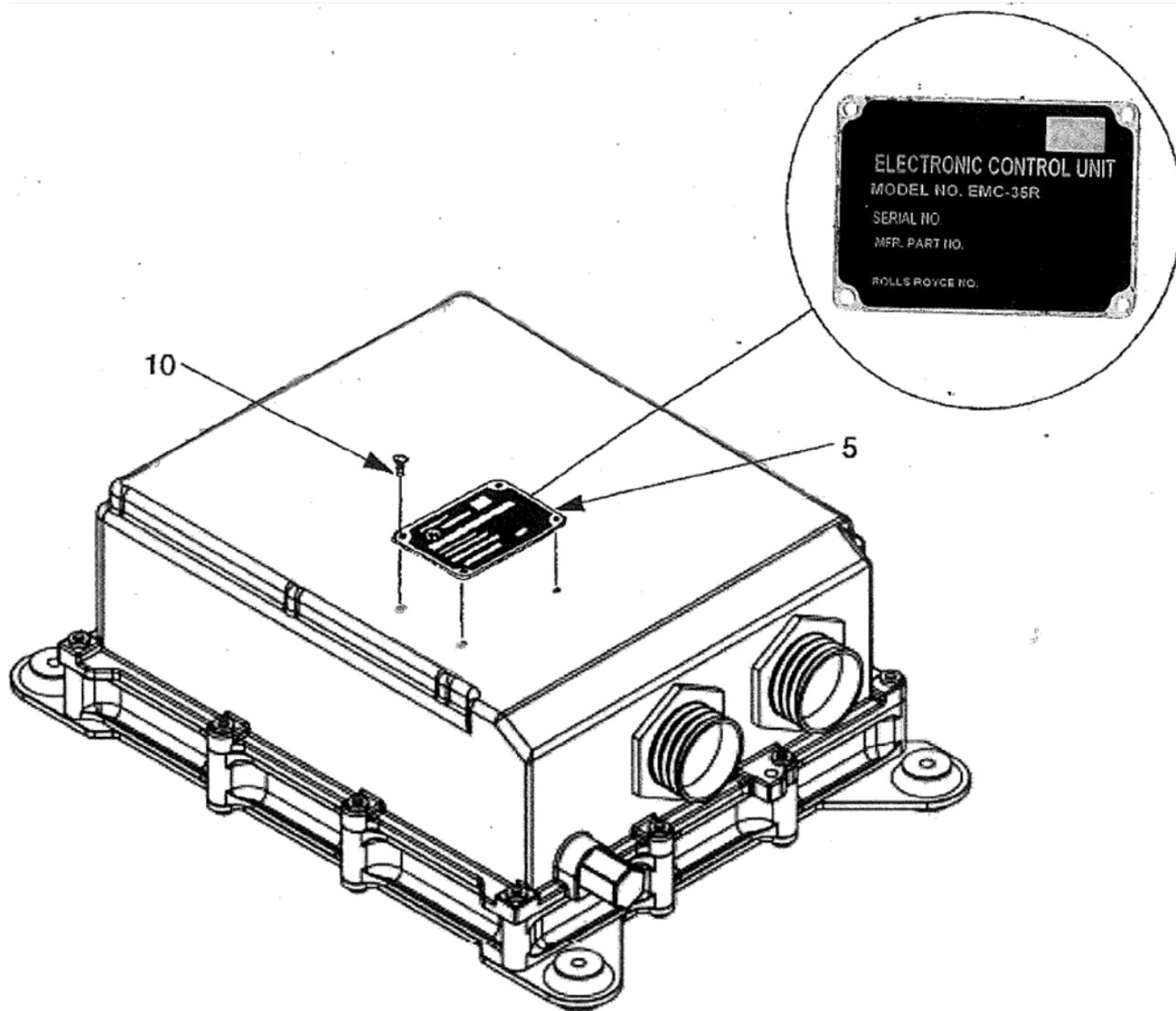


Figure 1. ECU Identification Plate Replacement

Item Number	Quantity	Nomenclature	Part Number
5	1	Plate, Identification	113417-1
10	4	Screw, Self Tapping	MS51861-1C

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3. Material Information

The basis for the following is per the Electronic Control Unit assembly.

New Part Number	Quantity	Nomenclature	Old Part Number	Instructions / Disposition
113417-1	1	Plate, Identification, ECU	113417-1	Destroy and Scrap
MS51861-1C	4	Screw, Self-tapping	MS51861-1C	Scrap
115220-1A5-24 (M250-10695)	1	Electronic Control Unit	115220-1A5-20 (23080490)	Re-identify
115220-1A5-24 (M250-10695)	1	Electronic Control Unit	115220-1A5-23 (23088484)	Re-identify
115220-2A5-24 (M250-10696)	1	Electronic Control Unit	115220-2A5-23 (23088856)	Re-identify

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APPENDIX A

SERVICE BULLETIN RECORD SHEET

1. Record and Verify Data Extracted from ECU

A. As instructed in step **2.F(22)**, place check mark in brackets after verifying the following information from the prior to reprogramming the ECU:

- (1) ECU Software Version: **257-5356** with supp ID **6058** [] OR
- (2) ECU Software Version: **257-5358** with supp ID **211A** []

B. As instructed in step **2.J(7)**, place check mark in brackets after verifying the following information from the after reprogramming the ECU:

- (1) ECU Software Version: **257-5400** with supp ID **E844** []

C. As instructed in step **2.F(23)**, record the following S/N information below prior to reprogramming the Primary governor. Place check mark in brackets after verifying S/N data is identical after reprogramming the ECU as instructed in step **2.J(8)**.

- (1) ECU S/N: _____ []
- (2) Engine S/N: _____ []
- (3) Compressor S/N: _____ []
- (4) HMU S/N: _____ []
- (5) Aircraft ID: _____ []
- (6) Turbine S/N: _____ []
- (7) Eng Gearbox S/N: _____ []

D. As instructed in step **2.F(26)** record the following engine history data below prior to reprogramming the Primary governor. Place check mark in brackets after verifying engine history data is identical after reprogramming the ECU as instructed in step **2.J(11)**. For original ECU configuration 115220-1A5-20, record values for items k through n (Items 11 - 14 below) after reprogramming the ECU as instructed in step **2.J(13)**.

- (1) ECURnTm _____ Hours []
- (2) NpRLmPk _____ %Np []
- (3) NpRLmTm _____ Seconds []
- (4) NumStrt _____ Starts []
- (5) OSCyc _____ Boolean []
- (6) SgCtr _____ Surges []
- (7) EngRunCtr _____ Seconds []

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(8) NpLmPk	_____	%Np	[]
(9) NpLmTm	_____	Seconds	[]
(10) OSCtr	_____	Events	[]
(11) NpLmEvts	_____	Counts	[]
(12) NpRLmEvts	_____	Counts	[]
(13) NpMLmEvts	_____	Counts	[]
(14) NpExclnd	_____	Boolean	[]

E. As instructed in steps **2.H(20)** and **2.H(21)**, place a check mark in the brackets after verifying the following information from the after reprogramming of the Primary governor.

- (1) ECU Software Version: **257-5400** []
- (2) ECU Supplemental ID: **E844** []

F. As instructed in step **2.I(14)** and **2.I(15)**, place a check mark in the brackets after verifying the following information from the after reprogramming of the Reversionary Governor.

- (1) ECU Software Version: **681-9100** []
- (2) ECU Supplemental ID: **11C2** []

G. As instructed in step **2.L(1)**, place a check mark in the brackets after verifying that the identification plate has been changed to reflect the new ECU part number and that the ECU serial number on the identification plate matches the serial number recorded in step C.(1) above.

- (1) Identification Plate changed []
- (2) ECU serial number on identification plate matches serial number recorded in C.(1) []



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APPENDIX B

SERVICE BULLETIN COMPLIANCE DATA SHEET

ECU Serial Number: _____

ECU Identification Plate Before EMC-35A ECU Service Bulletin 73-10

Triumph P/N _____ Rolls-Royce P/ N _____

ECU Identification Plate After EMC-35A ECU Service Bulletin 73-10

Triumph P/N _____ Rolls-Royce P/ N _____

The above ECU is in compliance with EMC-35R ECU Service Bulletin 73-10, Latest Revision.

Facility/Company: _____

Address: _____

Date of Compliance: _____

Contact name: _____

Contact phone: _____

Engine serial number: _____

Aircraft serial number: _____

Submit the completed Service Bulletin Compliance Data Sheet (this page) to Triumph Engine Control Systems via one of the following methods:

Regular mail

Mail to: Triumph Engine Control Systems
Attn: Brian Beal
1 Charter Oak Boulevard
P.O. Box 330651
West Hartford, CT 06133-0651

Fax

Fax to (860) 231-2706

E-mail

Scan and e-mail to TECSWH-Support@triumphgroup.com

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