

CHAPTER 96

ELECTRICAL SYSTEM

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CHAPTER 96

ELECTRICAL SYSTEM

96-00 Description**CAUTION**

The installation of electrical devices can affect the accuracy and reliability of the electronic tachometer.

A 28-volt DC electrical system is standard. Primary system components are a sealed lead-acid battery, a starter-generator, and a generator control unit. The battery is located beneath the left front seat or in a compartment in the left side of the baggage compartment.

The circuit breaker panel is on the ledge just forward of the left front seat. Breakers are marked to indicate function and amperage and are of the push-to-reset type.

The battery switch controls the battery relay which connects the battery to the electrical system. A wire protected by a fuse near the battery bypasses the battery relay to allow the tachometers and clock to receive battery power with the battery switch OFF.

The avionics switch controls power to avionics. This allows avionics to be switched OFF via a single switch. Having sensitive electrical equipment off when the generator is switched ON protects against voltage spikes.

An ammeter indicates total generator output. A digital voltmeter which reads main bus voltage at the circuit breaker panel is incorporated as part of the OAT indicator. Normal indication is 27.3 to 28.7 volts with the generator ON.

A generator control unit (GCU) controls starter-generator function. Below 58 percent N_1 RPM, the GCU is in start mode regardless of generator switch position. Above 58 percent, the GCU automatically switches to generate mode. The generator switch should normally be off for starting to prevent applying generator load to the engine before reaching idle RPM.

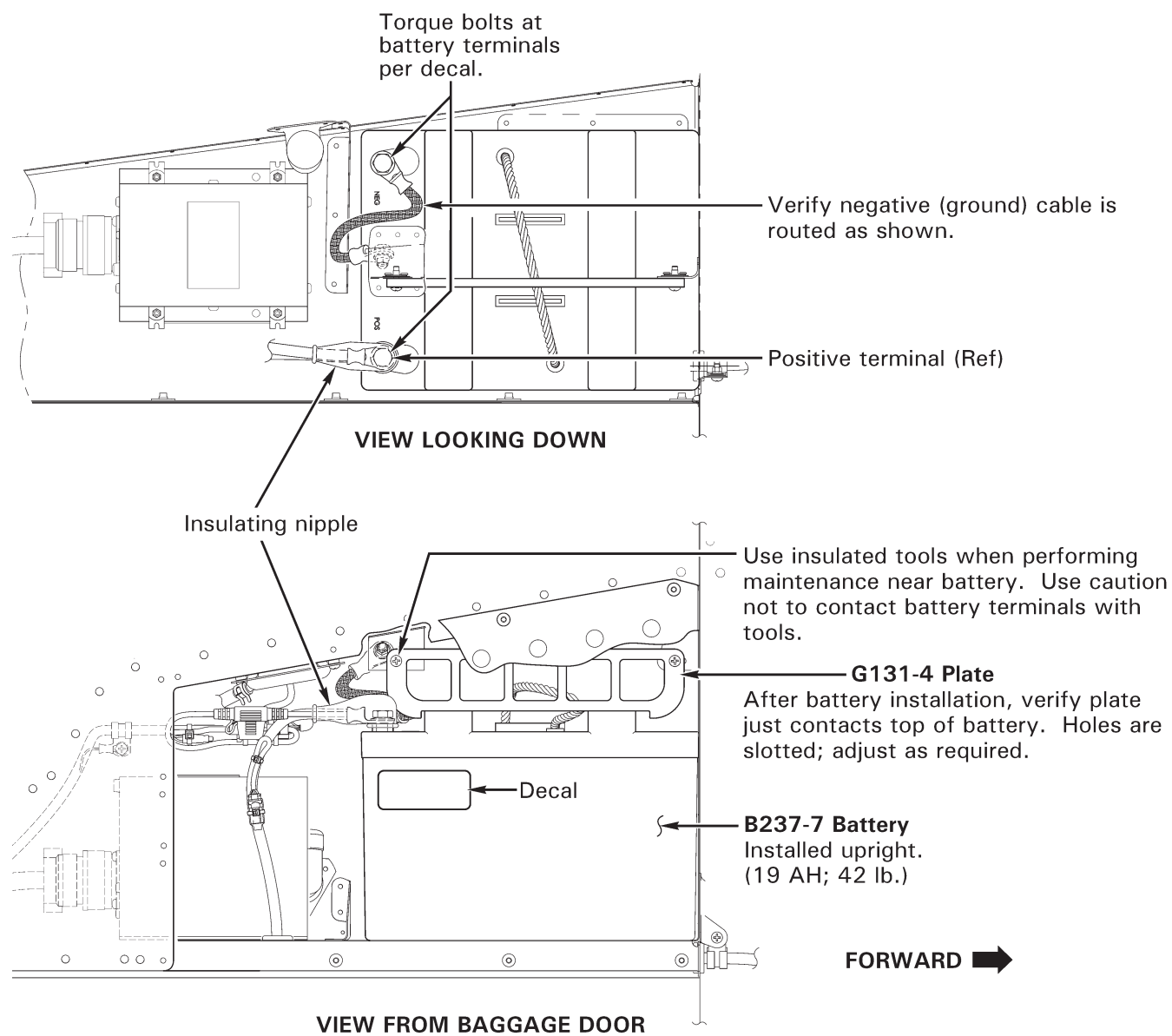


FIGURE 96-1A B237-7 (LEAD-ACID) BATTERY INSTALLATION

96-10 Battery

96-11 Lead-Acid Battery Installations

NOTE

Refer to Concorde Battery Corporation's Owner/Operator's Manual, and Instruction for Continued Airworthiness for battery maintenance procedures.

CAUTION

B237-7 battery (19 AH) weighs 42 lb and B237-8 battery (25 AH) weighs 52 lb including electrolyte. Carefully remove/install battery using handle provided to prevent injury.

CAUTION

Use insulated tools when performing maintenance near battery. When removing or installing G131-2 and G131-4 plate, use caution not to contact battery terminals with tools.

CAUTION

To minimize risk of electrical discharge: When disconnecting battery, disconnect negative (ground) cable from battery first, then the positive cable. When connecting battery, connect positive cable to battery first, then the negative (ground) cable.

A. Disconnecting and Removing Battery

1. Turn battery switch off. Open baggage compartment door. Remove auxiliary fuel tank per § 28-51, if installed.
2. Refer to Figure 96-1A & 96-1B. Remove G248-8 cover assembly.
3. Remove hardware securing negative (ground) cable to battery negative terminal (B237-7 battery) or G131-5 terminal assembly (B237-8 battery).
4. Remove hardware securing positive cable to battery positive terminal. Carefully remove battery. Remove G131-5 terminal assembly (B237-8 battery), as required.

B. Installing and Connecting Battery

1. Turn battery switch off. Open baggage compartment door. Refer to Figure 96-1A & 96-1B.
 - a. If B237-7 battery was removed and B237-8 battery is being installed: Remove G131-4 plate and install G131-2 plate as shown; verify security. If not previously installed, verify battery terminal is clean and install G131-5 terminal assembly; special torque bolt per battery decal. Carefully install B237-8 battery.

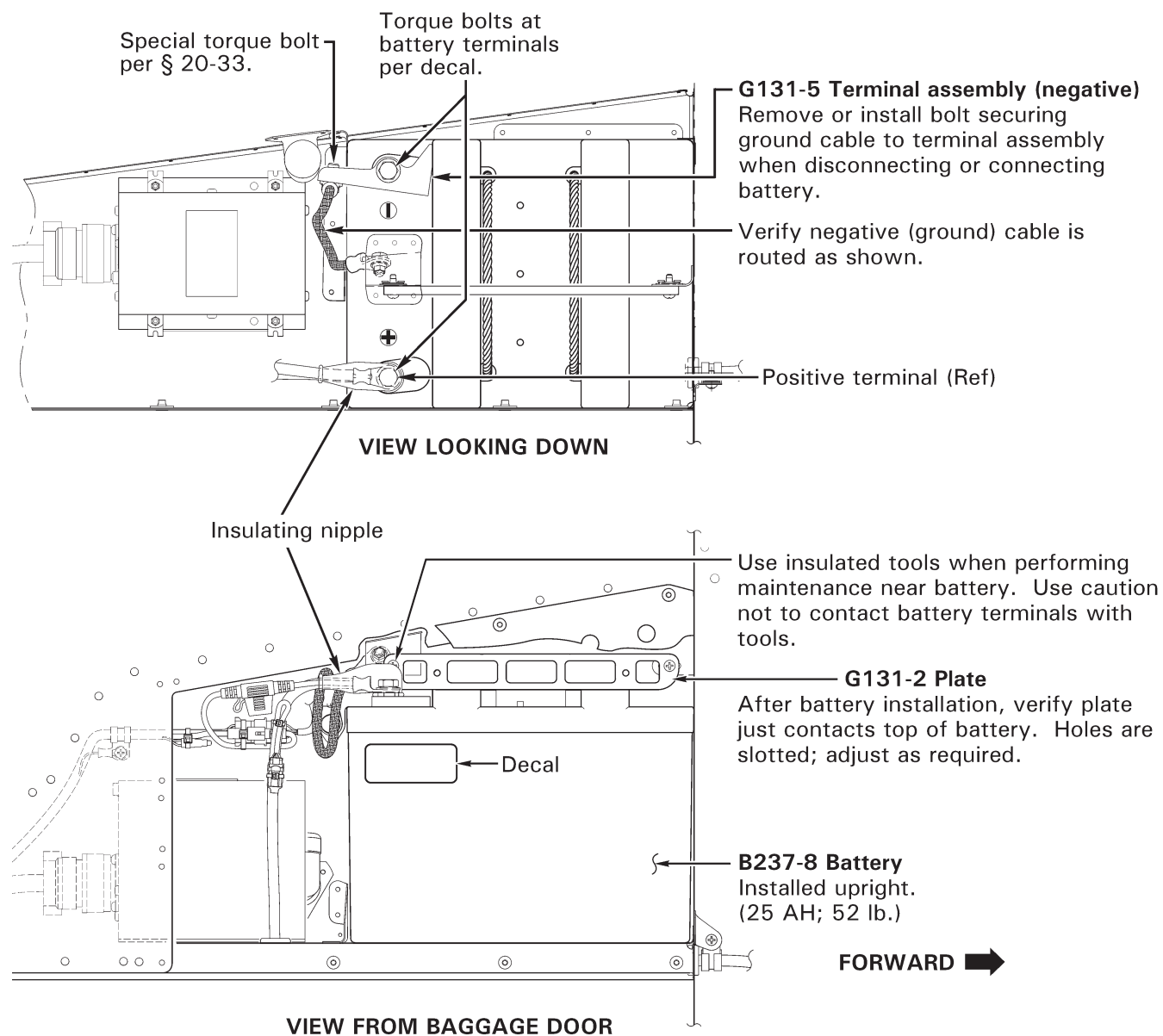


FIGURE 96-1B B237-8 (LEAD-ACID) BATTERY INSTALLATION

96-11 Lead-Acid Battery Installations (continued)

B. Installing and Connecting Battery (continued)

1. b. If B237-8 battery was removed and B237-7 battery is being installed: Remove G131-2 plate and install G131-4 plate as shown; verify security. Carefully install B237-7 battery.
- c. If battery being installed is same part number as battery removed: Verify installation and security of parts. Carefully install battery.
2. Verify G131-2 or G131-4 plate just contacts top of battery (holes are slotted). Adjust as required; verify security.
3. Verify negative (ground) cable is attached to airframe and routed as shown. Adjust as required.
4. Verify battery terminal is clean and install positive cable on battery positive terminal. Special torque bolt per battery decal and torque stripe per Figure 5-1. Slide insulating nipple over attached terminal.
5. Verify battery terminal is clean and install negative (ground) cable on battery negative terminal (B237-7 battery) or G131-5 terminal assembly (B237-8 battery), routing negative (ground) cable as shown. Special torque bolt per battery decal and torque stripe per Figure 5-1.
6. Install G248-8 cover assembly; verify security. Install auxiliary fuel tank per § 28-51, as required. Close baggage compartment door.
7. a. If B237-7 battery was removed and B237-8 battery was installed: Revise Weight and Balance Record in R66 Pilot's Operating Handbook (POH) Section 6 to incorporate the following data:

Subtract:

Item	Weight	Long. Arm	Long. Moment	Lat. Arm	Lat. Moment
B237-7 Battery	42.00 lb	96.88 in.	4068.96 in.-lb	-20.87 in.	-876.54 in.-lb

Add:

Item	Weight	Long. Arm	Long. Moment	Lat. Arm	Lat. Moment
B237-8 Battery	52.00 lb	96.88 in.	5037.76 in.-lb	-21.73 in.	-1129.96 in.-lb

- b. If B237-8 battery was removed and B237-7 battery was installed: Revise Weight and Balance Record in R66 Pilot's Operating Handbook (POH) Section 6 to incorporate the following data:

Subtract:

Item	Weight	Long. Arm	Long. Moment	Lat. Arm	Lat. Moment
B237-8 Battery	52.00 lb	96.88 in.	5037.76 in.-lb	-21.73 in.	-1129.96 in.-lb

Add:

Item	Weight	Long. Arm	Long. Moment	Lat. Arm	Lat. Moment
B237-7 Battery	42.00 lb	96.88 in.	4068.96 in.-lb	-20.87 in.	-876.54 in.-lb

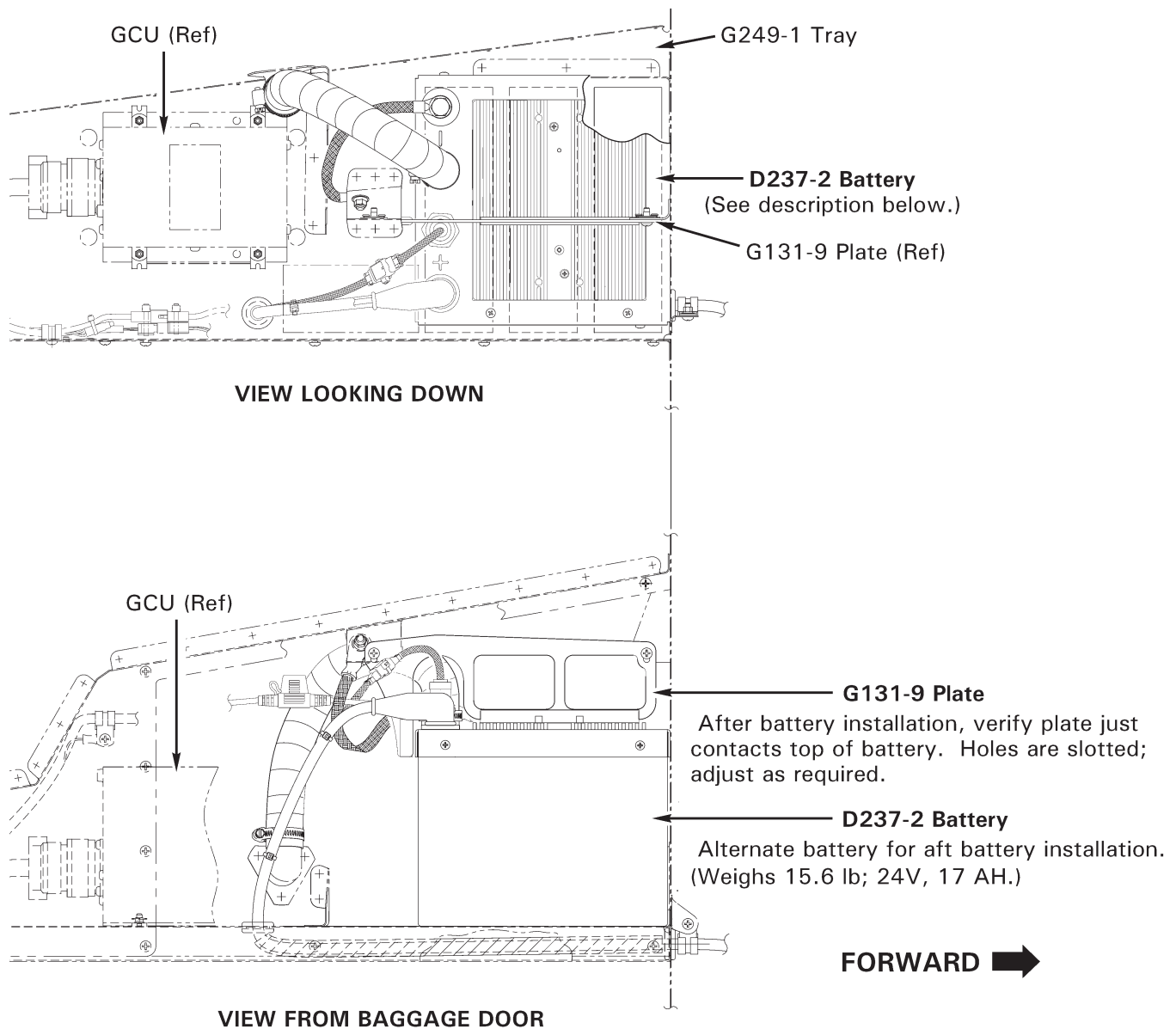


FIGURE 96-2 LITHIUM-ION BATTERY INSTALLATION

96-12 Lithium-Ion Battery Installation**A. Description**

An optional 17 amp-hour lithium-ion battery replaces the lead-acid main battery. The battery includes built-in circuitry that monitors temperature, voltage, and current draw and manages battery charge and discharge. The circuitry automatically disables charge and/or discharge if any electrical or thermal problems are detected. The battery uses lithium-iron-phosphate chemistry which is less susceptible to thermal runaway than some other lithium battery chemistries.

The metal battery case is designed to contain any heat or gases generated within the battery and is vented overboard on the left side of the aircraft. No venting should occur during normal operation.

Two annunciator panel segments, BATT FAULT and BATT HEATER, indicate battery status. Earlier aircraft have two indicator lights located to the left of the annunciator panel.

BATT FAULT illuminates if the battery has an over- or under-voltage condition, an over-temperature condition, or if current draw exceeds limits. A flashing light indicates a recoverable fault. The light may go out if the fault corrects itself (e.g. temperature decrease) or may go out as a result of a power cycle at the next landing. A steady light indicates battery maintenance or replacement may be required. The emergency procedure for a fault light (flashing or steady) is to land as soon as practical. The generator will continue to supply electrical power during the landing.

The battery incorporates an internal heater for cold weather operation. The heater attempts to maintain a battery temperature of at least 50°F (10°C). When the battery is switched ON, BATT HEATER illuminates while the heater is warming the battery and extinguishes when the battery is warm enough to attempt an engine start. On very cold days, the heating cycle may take 10 minutes or more. The heater light is disabled while the engine is running but the heater will continue to function as long as the battery switch is ON.

If a start is attempted with insufficient charge, the battery's safety monitors may interrupt power. In the event of a power interruption, a small backup power supply will allow the MGT and N₁ gages as well as the Engine Monitoring Unit to continue functioning. The backup power supply also provides power to the map light. The backup power supply consists of two 9-volt batteries installed in the compartment under the left front seat. The 9-volt batteries are non-rechargeable and should be replaced every 12 months.

NOTE

Backup batteries will discharge if battery switch is ON and main battery is discharged or disconnected. Backup batteries should be replaced if battery switch was left ON without main battery power.

96-12 Lithium-Ion Battery Installation (continued)**A. Description (continued)****NOTE**

Refer to True Blue Power Installation Manual and Operating Instructions for battery maintenance procedures.

CAUTION

To minimize risk of electrical discharge: When disconnecting battery, disconnect negative (ground) cable from battery first, then the positive cable. When connecting battery, connect positive cable to battery first, then the negative (ground) cable.

B. Disconnecting and Removing Battery

1. Remove auxiliary fuel tank per § 28-51, if installed.
2. Turn battery switch off. Open baggage compartment door.
3. Remove hardware securing G248-8 cover assembly and remove cover.
4. Loosen clamp securing vent hose to battery and pull hose off of battery.
5. Disconnect airframe wiring plug from battery's comm connector.
6. Remove hardware securing negative (ground) cable to battery negative terminal.
7. Slide nipple away from battery positive terminal and remove hardware securing positive cable to battery positive terminal. Carefully remove battery.

96-12 Lithium-Ion Battery Installation (continued)**C. Installing and Connecting Battery**

1. Remove auxiliary fuel tank per § 28-51, if installed.
2. Perform pre-installation inspection and completely charge battery per True Blue Power Installation Manual and Operating Instructions. If battery is new, also perform visual inspection, charging, capacity check, and return to service per True Blue Power Installation Manual and Operating Instructions.
3. Turn battery switch off. Open baggage compartment door.
4. Refer to Figure 96-2. Verify security, proper orientation, and installation of G131-9 plate. Carefully install battery.
5. Verify G131-9 plate just contacts top of battery (holes are slotted). Adjust as required.
6. Verify battery terminal surfaces are clean to ensure electrical conductivity. Install positive cable on battery positive terminal and install battery hardware. Special torque terminal bolt as noted on battery label, and torque stripe per Figure 5-1. Slide nipple over terminal.
7. Install negative (ground) cable to battery negative terminal and install battery hardware. Special torque terminal bolt as noted on battery label, and torque stripe per Figure 5-1.
8. Install G248-8 cover assembly and install hardware. Verify security. Close and latch baggage compartment door.

D. Scheduled Maintenance and Inspections

Every 6 Months: If battery is unused for more than 6 months, either installed in helicopter or in storage, completely charge battery per True Blue Power Installation Manual and Operating Instructions.

Every 12 months: Replace two, non-rechargeable, 9-volt batteries mounted under | the co-pilot's seat every annual inspection.

Every 24 Months: Perform visual inspection, charging, capacity check, and return to service per True Blue Power Installation Manual and Operating Instructions every 24 months from date of aircraft delivery or subsequent new battery installation.

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96-12 Lithium-Ion Battery Installation (continued)**E. Special Maintenance and Inspections**

No other battery maintenance other than routine maintenance specified by True Blue Power is permitted.

Operators are encouraged to review important safety information regarding handling, shipping, storage instructions, estimated unit life, and disposal instructions provided in True Blue Power Installation Manual and Operating Instructions.

Note: In accordance with industry and regulatory standards, the TB17 Lithium-ion battery will be shipped with a state of charge (SOC) not to exceed 30% of rated capacity.

96-20 External Power

A 28-volt MS3506-compatible external power receptacle is located inside the right engine cowl door. When the battery is switched ON, the external power relay and the battery relay both close, connecting external power to the aircraft electrical system and battery. The external power relay will not close if reverse polarity is provided to the receptacle.

A separate wire from the external power receptacle to the battery bypasses the external power and battery relays. This wire allows battery charging via the external receptacle with the battery switch OFF. A 10-amp circuit breaker at the receptacle opens if current exceeds normal charging levels, and a diode provides polarity protection.

96-30 Starter and Ignition System

A single starter-generator is used for engine starting and electrical power generation. A generator control unit (GCU) controls starter-generator function. During a start, the GCU latches the starter on until N_1 reaches 58 percent RPM. Therefore, the pilot is not required to hold the start button down throughout the start sequence. Above 58 percent N_1 RPM, the GCU automatically switches out of start mode, but the generator switch should not be switched ON until idle RPM stabilizes to prevent the generator load from bringing the RPM down.

When the igniter key switch is in the enable position, depressing the start button causes a normal start sequence with the starter latching on and the igniter firing. Above 58 percent N_1 RPM, the igniter will fire while the start button is depressed.

When the igniter switch is OFF, the engine can be motored by the starter by depressing the start button without the starter latching or the igniter firing. This is useful for performing a compressor wash or rinse. If the igniter is switched OFF during a start, the starter will disengage. If the igniter is switched OFF while the engine is running, the engine will continue to run; however, this is not recommended.

NOTE

Start button is active when battery switch is ON, even if igniter switch is OFF. Rotor brake may be left engaged after shutdown to disable start button.

96-40 Lighting System

A red anti-collision light is installed on the tailcone and is controlled by the strobe switch on the instrument console. Position lights are installed on each side of the cabin and in the tail and are controlled by the nav lights switch. A light at the top of the windshield and post lights illuminate the instrument panel. Panel lighting is active when the nav lights switch is ON and lighting is dimmed via the knob above the nav lights switch. An overhead map light mounted on a swivel is controlled by an adjacent switch with high and low settings. The map light may be used for emergency lighting of the instrument panel. An additional cabin light with an adjacent switch is located just aft of the map light. The map and cabin lights are not connected to the dimmer circuit.

Two long-life, high intensity discharge (HID) landing lights are installed in the nose. One wide-angle and one narrow-beam light are used to increase lighted area. The landing light switch is located on the cyclic center post.

NOTE

Continuous operation of landing and position lights in flight is recommended to promote collision avoidance.

An optional flashing light may be mounted on the tailcone in addition to the standard anti-collision light. The optional light is controlled by an additional position on the strobe switch and may be turned on or off anytime at pilot discretion.

96-50 Annunciator Panel

The annunciator panel consists of illuminated segments located at the top of the main instrument panel. If a caution or warning condition occurs, the appropriate segment(s) illuminate indicating the nature of the problem.

The CHIP segments are illuminated by magnetic chip devices in each gearbox which collect metallic particles in order to complete an electric circuit. The engine gearbox has two magnetic chip detectors, either of which can illuminate the ENGINE CHIP segment.

The MR TEMP/PRESS segment is illuminated by either the temperature switch or oil pressure switch at the main gearbox. The ENGINE FIRE segment is illuminated by a temperature switch in the engine compartment. The ENGINE OIL segment is activated by a pressure switch which is independent of the oil pressure sender. The ANTI-ICE segment illuminates via a pressure switch in the engine anti-ice air line. The GEN segment illuminates when the generator is disconnected from the main electrical bus.

The LOW FUEL segment is illuminated by a float switch in the tank which is independent of the fuel quantity sender. The FUEL FILTER segment illuminates when a pressure switch detects excessive pressure drop across the fuel filter. The LOW RPM segment is illuminated by a sensor measuring driveline speed at the aft end of the main gearbox. A horn sounds simultaneously with illumination of the LOW RPM segment when rotor speed is below 95% RPM. The horn is disabled when the collective is fully down.

96-50 Annunciator Panel (continued)**A. Description**

The COWL DOOR segment is illuminated when the fuel filler cowl door, the right engine cowl door (which accesses the external power receptacle), or the baggage door is not closed. The AIR FILTER segment illuminates when pressure drop across the filter opens bypass doors, allowing unfiltered air to the engine. The EMU (Engine Monitoring Unit) segment indicates the EMU status with either steady, flashing, or no illumination. The EMU segment will illuminate only when the test button is depressed.

A push-to-test button on the instrument panel should cause all segments on the annunciator panel, as well as the ROTOR BRAKE light, to illuminate when depressed. The LOW FUEL segment takes approximately two seconds before it illuminates due to a time delay in the circuit (time delay prevents sloshing fuel from giving a false indication.) The EMU segment takes approximately ten seconds to perform a self-test after the battery is switched ON before it will illuminate. The test button may be used on the ground or in flight to verify all circuits are functioning.

B. Troubleshooting

1. Turn battery switch off. Access EMU behind right, aft seatback assembly.
2. Disconnect EMU from airframe electrical harness.
3. Using an insulated jumper, connect airframe wire -2044 (pin 13 on airframe connector to EMU) to a convenient airframe ground.
4. Turn battery switch on. Depress push-to-test switch adjacent to annunciator panel and observe EMU annunciator segment response:
 - a. If EMU annunciator segment illuminates: Turn battery switch off and disconnect jumper. Replace EMU per § 71-43.
 - b. If EMU annunciator segment remains extinguished: Turn battery switch off and disconnect jumper. Proceed to step 5.
5. Turn battery switch on. Depress push-to-test switch and verify system voltage at wire -2044 (pin 13 on EMU airframe connector). Turn battery switch off. If there is no system voltage at wire -2044, disconnect F695-4 tester assembly from airframe electrical harness. Using an insulated jumper, connect airframe wire -2062 (pin 38 on airframe connector to F695-4/F694-1 circuit board) to a convenient airframe ground.
6. Turn battery switch on. Depress push-to-test switch adjacent to annunciator panel and observe EMU annunciator segment response:
 - a. If EMU annunciator segment illuminates: Turn battery switch off and disconnect jumper. Replace F695-4 tester.
 - b. If EMU annunciator segment remains extinguished: Turn battery switch off and disconnect jumper. Proceed to step 7.

96-50 Annunciator Panel (continued)**B. Troubleshooting (continued)**

7. Either an open circuit exists along wire -2062 between F695-1 tester and G198-1 annunciator, or G198-1 annunciator panel is faulty. Troubleshoot beginning with Console Connector 1 ("C1"), pin 34 and verifying security of pins on both halves of connector. If no fault is found in connector, verify continuity of wire -2062 at all connections. If no fault is detected in wire -2062 circuit, replace G198-1 annunciator panel.

96-60 Low Rotor RPM Warning Unit Adjustment

The low rotor RPM warning unit is located inside the upper console, mounted to the left vertical panel. Two magnets attached to the main gearbox tail rotor driveline output yoke provide an RPM signal for the warning unit's gearbox-mounted Hall-effect senders. When the collective is at least 0.2 to 0.4 inch (measured at grip) above the full down position and rotor RPM is 95% or less, the warning unit illuminates the Low RPM annunciator segment and sounds two warning horns. Fully lowering the collective will silence both horns, but will not extinguish the annunciator segment. The Low RPM annunciator segment and both horns must remain off above 95% rotor RPM.

To make an adjustment, remove the plastic plug (from a 3/8-inch diameter hole) in the left-vertical panel exterior. Adjust screw on back of warning unit (2 turns equals approximately 1% change).

96-70 Audio System

A five-place audio system is standard. An audio control panel allows control of communication radios, intercom, and stereo-capable auxiliary audio (e.g. music) input.

The system has four modes of operation. In normal mode, all occupants hear incoming and outgoing radio communications, intercom, and auxiliary audio. The pilot and copilot can both transmit on the selected radio.

In crew mode, the pilot and copilot are isolated from rear seat occupants. The crew does not hear rear seat intercom or auxiliary audio and rear seat occupants do not hear crew intercom or radio communications.

In pilot isolate mode, the pilot is isolated from all other occupants. The copilot is grouped with the rear seat occupants for intercom and auxiliary audio.

In emergency mode, the pilot transmits and receives on the number one radio only (regardless of audio panel switch position). All other audio is disabled.

The first three modes are selectable via the audio control panel. Emergency mode occurs if power to the panel is lost. In addition to the mode control, the audio panel has controls for squelch, volume, and selection of transmit and receive radios. A detail description of these controls can be found in the audio system operation manual.

96-70 Audio System (continued)

Headset jacks are located in the ceiling near each seat. Pilot and copilot intercom and transmit are controlled via trigger switches on the cyclic grips. The trigger has two detents; the first detent activates the intercom and the second detent transmits. Additional intercom buttons are located on the forward side of the rear seats and on the left forward floor. Intercom may also be set to be voice activated. Auxiliary audio may be plugged in to a jack on the forward face of the circuit breaker panel. In normal mode, auxiliary audio is automatically muted during radio communication.

96-80 Engine Monitoring Unit (EMU)

Refer to Section 71-43 for EMU maintenance procedures.

The Engine Monitoring Unit (EMU) is a digital recording device mounted behind the right rear seatback panel. The EMU continuously monitors N_1 , N_2 , engine torque, and MGT. EMU status is indicated by the EMU segment on the annunciator panel. The EMU segment will only illuminate while the annunciator panel test button is depressed. The EMU requires approximately ten seconds to initialize after the aircraft battery is switched ON. Once initialization is complete, steady illumination of the annunciator means normal EMU operation. A slowly flashing indication (once every two seconds) is given if the EMU detects a fault in its senders or circuitry. A fast flashing indication (four times per second) is given if the EMU has detected an exceedance. A fault or exceedance indication should be investigated and reset by a qualified mechanic prior to further flight.

The EMU records exceedances of Rolls-Royce engine limits, not airframe operating limits as given in Section 2. The EMU will record an exceedance if any of the following are exceeded:

MGT during start:	999°C, or 927°C for 1 second, or 810°C for 10 seconds.
MGT engine running:	843°C, or 782°C for 6 seconds, or 706°C for 5 minutes.
N_1 :	106%, or 105% for 15 seconds.
N_2 :	110%, or 105% for 15 seconds. 78% to 88% for 60 seconds over 38% torque.
Torque:	122% for 15 seconds, or 104% for 5 minutes.

The EMU also records a start cycle when N_1 exceeds 30% and MGT is at least 343°C.

The EMU is intended to be used only as a maintenance aid. It is the pilot's responsibility to report any observed exceedances and the operator's responsibility to maintain a record of engine starts and time in service.

96-90 Emergency Locator Transmitter (ELT)

Refer to Section 25-61 for ELT programming instructions and maintenance procedures.

The Emergency Locator Transmitter (ELT) installation consists of a transmitter with internal battery pack, an external antenna, and a remote switch/annunciator. The transmitter is mounted to the upper steel tube frame and is accessible through the spring loaded air intake door in the right-side cowl. The remote switch/annunciator is located left of the cyclic stick.

The ELT is operated by a switch on the transmitter and by the remote switch. The transmitter switch has been set in the ARM position at installation and should always be in this position for flight. The remote switch/annunciator is a three position switch with indicator light. This switch should be in the ARMED position for flight. With both switches set to armed, the ELT will begin transmitting when subjected to a high "G" load. When the unit is transmitting, the red indicator light illuminates.

Moving the remote switch to ON activates the transmitter. Use the ON position if an emergency landing is imminent and time permits.

If the ELT is inadvertently activated, use the momentary RESET & TEST position of the remote switch to stop transmission and reset the unit. The red indicator will extinguish when unit is reset.

For more detailed instructions on ELT operation, maintenance, and required tests, refer to manufacturer's instructions supplied with the unit.

96-100 Electrical Load Analysis

COMPONENT	QTY	CONTINUOUS AMPS EACH	INTERMITTENT AMPS EACH	CONTINUOUS TOTAL	INTERMITTENT TOTAL
MAIN BUS					
WARNING LT PANEL	1	0.006	0.320	0.006	0.320
ROTOR BRAKE LT	1	---	0.044	0.000	0.044
MAPLIGHT	1	0.020	0.020	0.020	0.020
INTERIOR DOME LT	1	0.020	0.020	0.020	0.020
OAT GAGE	1	0.150	0.150	0.150	0.150
ENGINE TORQUEMETER	1	0.050	0.050	0.050	0.050
INSTRUMENT CLUSTER	1	0.375	0.375	0.375	0.375
MOP SENDER	1	0.025	0.025	0.025	0.025
TORQ SENDER	1	0.025	0.025	0.025	0.025
LOW RPM UNIT W/HORN	1	0.045	0.160	0.045	0.160
AA12S-600 AUDIO PANEL	1	1.000	1.000	1.000	1.000
N ₂ GOVERNOR SYSTEM	1	0.000	0.087 ¹	0.000	0.087 ¹
N ₂ GOV ACTUATOR @ 12V	1	---	0.150		
N ₂ GOV RELAY @ 12V	1	---	0.010		
ANTI-ICE SOLENOID	1	0.670	0.670	0.670	0.670
HEATED PITOT	1	4.000	4.000	4.000	4.000
ENGINE HOUR METER	2	0.015	0.015	0.030	0.030
HYD CONTROL SOLENOID	1	---	0.800	0.000	0.800
ENGINE MONITORING UNIT	1	0.180	0.180	0.180	0.180
AVIONICS RELAY	1	---	0.060	0.000	0.060
LOW FUEL RELAY	1	---	0.010	0.000	0.010
WARNING LIGHT TEST CB	1	---	0.020	0.000	0.020
TACH PWR TEST RELAY	1	---	0.060	0.000	0.060
BOSE HEADSET	5	0.025	0.500	0.125	2.500
AUX POWER PLUG	1	2.000	2.000	2.000	2.000
SUBTOTAL (MAIN BUS)				8.721	12.606

96-100 Electrical Load Analysis (continued)

COMPONENT	QTY	CONTINUOUS AMPS EACH	INTERMITTENT AMPS EACH	CONTINUOUS TOTAL	INTERMITTENT TOTAL
LIGHTS BUS					
LANDING LT BALLAST	2	1.600 ³	5.250 ³	3.200	10.500
LANDING LT RELAY	1	0.060	0.060	0.060	0.060
CIRCUIT BREAKER LTS	1	0.001 ³	0.001 ³	0.001	0.001
INSTRUMENT LT	1	0.500 ⁵	0.500 ⁵	0.500 ⁵	0.500 ⁵
POST LTS	2	0.040 ¹	0.040 ¹	0.080	0.080
INTERNAL AVIONICS LTS	6	0.100 ¹	0.100 ¹	0.600	0.600
VERT CARD COMPASS LT	1	0.050 ³	0.050 ³	0.050	0.050
POSITION LT RH (GREEN)	1	0.250	0.250	0.250	0.250
POSITION LT LH (RED)	1	0.250	0.250	0.250	0.250
POSITION LT TAIL (WHT)	1	0.300	0.300	0.300	0.300
STROBE LIGHT	1	0.670	3.000	0.670	3.000
SUBTOTAL (LIGHTS BUS)				5.961	15.591
COMPONENT	QTY	CONTINUOUS AMPS EACH	INTERMITTENT AMPS EACH	CONTINUOUS TOTAL	INTERMITTENT TOTAL
AVIONICS BUS					
KY196A COM	1	1.000	5.000	1.000	5.000 ²
GNC 420W GPS/COM	1	1.215	4.200	1.215	1.215 ²
GNS 530AW GPS/COM/NAV	1	1.415	4.400	1.415	1.415 ²
GTX 330 XPDR	1	1.640	9.090	1.640	9.090
BLIND ENCODER	1	0.600	0.600	0.600	0.600
AM/FM/CD RCVR	1	1.500	1.500	1.500	1.500
KR87 ADF RCVR	1	0.429	0.429	0.429	0.429
KR22 MARKER BEACON	1	0.040	0.500	0.040	0.500
AVIONIC BLOWER	1	0.180	0.180	0.180	0.180
PILOT AV BLOWER	1	0.100	0.100	0.100	0.100
ELT ⁴	1	---	---	---	---
HSI (PICT NAV SYSTEM)	1	1.730	1.730	1.730	1.730
ATTITUDE HORIZON	1	0.270	0.700	0.270	0.700
TURN COORDINATOR	1	0.350	0.350	0.350	0.350
RADAR ALTIMETER	1	0.727	0.727	0.727	0.727
SUBTOTAL (AVIONICS BUS)				11.196	23.536

96-100 Electrical Load Analysis (continued)

COMPONENT	QTY	CONTINUOUS AMPS EACH	INTERMITTENT AMPS EACH	CONTINUOUS TOTAL	INTERMITTENT TOTAL
TACH BUS					
N ₂ TACH (INCL REG)	1	0.022 ¹	0.022 ¹	0.022 ¹	0.022 ¹
N ₂ TACH @ 13.75V	1	0.035	0.035		
ROTOR TACH (INCL REG)	1	0.022 ¹	0.022 ¹	0.022 ¹	0.022 ¹
ROTOR TACH @13.75V	1	0.035	0.035		
SUBTOTAL (TACH BUS)				0.044	0.044
COMPONENT	QTY	CONTINUOUS AMPS EACH	INTERMITTENT AMPS EACH	CONTINUOUS TOTAL	INTERMITTENT TOTAL
OTHER EQUIPMENT					
TACH RELAY	1	0.060	0.060	0.060	0.060
CLOCK (DIGITAL)	1	0.003	0.003	0.003	0.003
BATTERY RELAY	1	0.250	6.000	0.250	6.000
START/GEN RELAY	1	0.250	6.000	0.250	6.000
GEN LT RELAY	1	0.010	0.010	0.010	0.010
GEN CONTROL UNIT	1	0.200 ⁴	2.000 ⁵	0.200	2.000
IGNITION EXCITER	1	---	1.500	0.000	1.500
EXTERNAL PWR RELAY ²	1	0.250	6.000	---	---
BAGGAGE COMPARTMENT LT ²	1	0.020	0.020	---	---
SIGHT GLASS LED ²	2	0.020	0.020	---	---
LATCHING START RELAY ³	1	0.060	0.060	---	---
STARTER-GENERATOR ³	1	---	231.06	---	---
SUBTOTAL (OTHER)				0.773	15.573
TOTAL (MAIN + LIGHTS + AVIONICS + TACH + OTHER)				26.70	67.357
STARTER-GENERATOR MARGIN (160-AMP MAX)				+ 133.30	+ 92.657

96-110 Audio Alerts

All R66 helicopters have a low-RPM horn which sounds when rotor RPM is below 95%. The horn is muted when the collective is fully down. On aircraft S/N 1006 and prior, the horn is provided by speakers in the side of the instrument console. On aircraft S/N 1007 and subsequent, a tone generator in the audio system provides the horn through crew headsets.

Aircraft S/N 1007 and subsequent also have audio alerts in the headsets for high rotor RPM and high engine torque/MGT. For high RPM, a warble tone (high/low tone) indicates rotor RPM is approaching 106%. For high engine torque/MGT, a beeping tone indicates torque above 100% or MGT above 782°C (5-minute limits). High torque is indicated by four beeps per second, increasing to 12 beeps per second if torque exceeds 108%. High MGT is indicated by 12 beeps per second. The beep tone will also come on during start if MGT exceeds 860°C, indicating an abnormally hot start.

Test buttons on the instrument panel permit pre-flight or in-flight tests of the high RPM and high torque/MGT tones. For high torque/MGT, depressing the test button give four beeps per second for two seconds followed by 12 beeps per second.

Additional audio alerts may be provided in the headsets depending on optional equipment installed (such as pressure fueling, terrain warnings, traffic warnings, autopilot modes, etc.)

96-120 Cockpit Camera

An optional video camera may be installed in the cabin ceiling. The camera records 4K video, intercom/comm audio, and GPS position both internally and to a removable flash drive inserted in the front of the camera housing. The internal memory retains only recent video and is not user accessible. Recording starts automatically when the helicopter battery is switched on and stops when it is switched off.

Recording to the flash drive can be stopped or audio muted using the record and audio switches on the front of the camera housing. Do not remove the flash drive while a recording is in progress as this will corrupt the video file. To remove a flash drive when the helicopter battery switch is on, first stop the recording using the record switch and wait for the blue light to stop flashing.

A blue flashing light on the camera housing indicates video is being recorded to the flash drive. A green steady light indicates the camera is powered and operating normally. The green light will change to an amber flashing light if an internal camera fault is detected, in which case video may not be recorded.

Video recorded on the flash drive can be viewed on a Windows PC or Mac computer. Video is recorded in sequential 4 GB files with each file approximately 25 minutes in length. Video files are labeled HELICAM_xxxx.MP4, where xxxx is a sequential number. GPS position and altitude are optionally displayed in the video and are also recorded separately to files labeled HELICAM_xxxx.GPX. A 128 GB flash drive (as supplied with helicopter) will record approximately 10 hours of video. When full, the earliest video file is overwritten with the last recording.

96-120 Cockpit Camera (continued)

NOTE

Flash drives used with the camera must meet the criteria described in the Cockpit Camera User Guide in order to function reliably.

Complete instructions are provided in the Cockpit Camera User Guide on the Robinson website <https://robinsonheli.com>. The guide also provides camera lens cleaning instructions, additional playback suggestions, instructions for visualizing GPS data, setting user preferences, updating camera software, and video post-processing and troubleshooting tips. User options include on screen display of time & date and/or GPS position, time zone and daylight saving time status, and units for on screen display of GPS altitude.

A. Removal

1. Turn battery & camera switches off.
2. **Remove F039-2 camera assembly per the following:**
 - a. Remove (3) screws securing camera assembly to cabin.
 - b. Cut & discard ty-raps securing wiring. Disconnect wiring at connectors. Disconnect F714-2 antenna assembly from camera assembly and remove camera assembly from helicopter.
3. **Remove F039-3 camera assembly per the following:**
 - a. Remove MS27039C0807 screw securing G796-2 duct assembly and slide duct forward to release from cabin. Cut & discard ty-raps as required and disconnect electrical wiring at connectors. Remove duct from helicopter.
 - b. Remove A701-1 tape securing F714-3 antenna assembly wire to duct assembly. Temporarily mark antenna location using felt-tip marker. Using a plastic razor blade, detach antenna from duct assembly.
 - c. Disconnect RV-BATT-LIPO500 battery from RV-10251C extension harness.
 - d. Remove (4) screws and associated hardware securing camera assembly to duct assembly and remove camera assembly.

B. Installation

1. **Install F039-2 camera assembly per the following:**
 - a. Connect camera assembly wiring at connectors and lock connectors using MS3367-4-9 ty-rap. Cinch ty-rap until snug without over-tightening and trim tip flush with head. Connect F714-2 antenna assembly to camera assembly.
 - b. Position camera assembly and install (3) screws securing camera to cabin.
2. **Install F039-3 camera assembly per the following:**
 - a. Install (4) screws and associated hardware securing camera assembly to G796-2 duct assembly.

96-120 Cockpit Camera (continued)**B. Installation (continued)**

2. b. Clean mating surfaces of duct assembly and F714-3 antenna assembly using alcohol wipe. Secure antenna to duct assembly using A701-7 tape where marked during removal. Install strip of A701-1 tape securing antenna wire.
 - c. Connect RV-BATT-LIPO500 battery to RV-10251C extension harness or install new battery per Part C.
 - d. Position duct assembly in helicopter and connect electrical wiring at connectors. Lock connectors and secure wiring using MS3367-4-9 ty-raps, as required. Cinch ty-raps until snug without over-tightening and trim tips flush with heads. Align duct assembly, slide aft, and secure using MS27039C0807 screw.
3. Refer to cockpit camera user guide online at <https://robinsonheli.com>. Verify camera functions and video image is approximately level.
 4. To adjust video image loosen (2) NAS1352-04-4 screws securing lens. Rotate lens clockwise to rotate video image counterclockwise or rotate lens counterclockwise to rotate video image clockwise. Tighten screws. Repeat steps 3 and 4 as required.

C. Battery Replacement

1. Remove camera assembly per Part A.

NOTE

Batteries secured to G796-2 duct assembly may be replaced without removing F039-3 camera assembly from duct assembly.

2. Gently separate RV-BATT-LIPO500 battery connector from circuit board or disconnect at RV-10251C extension harness.

NOTE

Do not remove circuit board to access battery. If battery is internally installed in F039-3 camera assembly, gently unplug battery connector at circuit board and stow wire. Also order RV-10251C extension harness to relocate new battery.

3. Pull tab on 1024A38 tape to release battery. If battery is secured using A701-7 tape, use a plastic razor blade to separate battery from F039-2 camera assembly housing or G796-2 duct assembly. Remove old tape and clean mating surfaces using an alcohol wipe.
4. Install new battery using 1024A38 tape and carefully connect camera battery to circuit board or RV-10251C extension harness.
5. Install camera assembly per Part B.