INSTRUCTION SHEET

IS NO.	DATE:
10515-6968	January 2019

APPLIES TO:
AN/PRC-160 Scheduled Maintenance

1. INTRODUCTION

This chapter provides information required to perform scheduled maintenance procedures on the Receiver/ Transmitter (R/T).

1.1 Preventive Maintenance Considerations

An oily substance or residue may be present on the radio surface. If this substance is the result of silicon gel coming from the radio gaskets, then it can be cleaned using a soft cloth. Do not use any solvents. Certain finishes cannot be completely cleaned and some stain will remain. The radio's performance or functionality is not affected by this residue.

CAUTION

Do not use any solvents to clean the radio. Solvents will break down the silicon gel and carry it to other places. This may interfere with the gaskets that protect the radio and may damage connectors.

1.2 Scheduled Maintenance Procedure List

Table 1 lists the scheduled maintenance procedures for the R/T. The table is divided into the following columns:

a. Column 1 - Paragraph Number, where the procedure begins

b. Column 2 - Scheduled Maintenance Procedure, describes the test to be performed

c. Column 3 - Periodicity, interval in which the procedure must be performed (daily, weekly, monthly, etc.)

Table 1. Scheduled Maintenance Procedures

Paragraph Number	Scheduled Maintenance Procedure	Periodicity
Paragraph 2.1	Receive Performance Verification Test	6 months
Paragraph 2.2	Transmit Performance Verification Test	6 months
Paragraph 2.3	Replace Hold-Up Battery (HUB)	8 months*

*NOTE: Alternatively replace prior to deployment. Time interval given is for (Harris B41-0010-004). If using (Harris B41-0010-003 or Saft LS 14250), replace HUB twice as often (every four [4] months).

2. SCHEDULED MAINTENANCE PROCEDURES

The following paragraphs contain information about tests to be performed on the R/T as part of scheduled maintenance.

2.1 Receive Performance Verification Test

The following paragraphs provide instructions for performing the receive performance verification test as part of scheduled maintenance. The receive performance verification test confirms the proper operation and alignment of all assemblies in the radio.

Prior to performing the R/T performance verification tests, ensure that fully charged, known-good batteries or an external Direct Current (DC) power supply are connected to the Unit Under Test (UUT).

NOTE

The radio must be connected to either: one known good, fully charged battery, or to a power supply via a cable that is wired as shown in Figure 5-2 of the 10515-0103-4300G. The cable used between the power source and the radio must have pin 1 jumpered to pin 3. The radio uses pin 3 to determine if it is connected to a Nickel Cadmium (Ni-Cd) or lithium battery. If pin 3 is not jumpered to pin 1, the radio will behave as if it is connected to a single lithium battery, and will only produce a maximum transmit power of 10 watts, making the transmit performance test invalid.

2.1.1 Recommended Equipment

Table 7-2 of 10515-0103-4300G lists the equipment recommended to perform the receive performance verification test.

NOTE

The specifications in this manual do not take into account the tolerance variations and/or limitations of the customer's test equipment. Allowance should be made to account for suspected variations.

2.1.2 Test Procedure

Perform the following procedure to test the receive performance of the radio:

a. Set up the UUT as shown in Figure 1. Make sure that the key/unkey switch on the Audio Breakout Box is in the unkey Receive (RX) position for this test.

CAUTION

If the test equipment is not rated for 25 watts direct input or higher, ensure that a 30 dB attenuator is properly installed to prevent damage to the test equipment in the event the radio is accidentally keyed.

b. Program the radio as listed in Table 3. Refer to the AN/PRC-160(V) Wideband HF/VHF Manpack Radio Field Reference Guide (10515-0512-4100) for detailed information on changing radio parameters.

c. Setup the test equipment using Table 2 parameters. For information on non-Harris test equipment, refer to the Other Equipment Manufacturers (OEM) documentation.

d. With the RF communications test set programmed to 1.611 MHz Upper Sideband (USB), the measured Signal + Noise + Distortion/Noise + Distortion (SINAD) should be greater than 10 dB SINAD at -113 dBm of signal. If SINAD measures out of specification, proceed to the non-Built-In Test (BIT) troubleshooting procedures in Paragraph 10.2.1.2 of AN/PRC-160(V) Wideband HF/VHF Manpack Radio Operation Manual (10515-0512-4200).

NOTE

The equivalent RF amplitude at the radio's receiver is -113 dBm with an RF communications test set output of -83 dBm, due to the 30 dB attenuator.

Always consider test cable losses when performing this test. Always use high-quality cable (such as RG-223), and use the shortest possible length of cable.

e. Repeat this measurement with the radio and the Radio Frequency (RF) communications test set configured to the USB frequencies listed in Table 4.

f. Repeat this measurement with the radio and the RF communications test set configured to the FM frequencies listed in Table 4. The measured SINAD should be greater than 10 dB SINAD at -107 dBm of signal. If SINAD measures out of specification, proceed to the non-Built-In Test (BIT) troubleshooting procedures in Paragraph 10.2.1.2 of AN/PRC-160(V) Wideband HF/VHF Manpack Radio Operation Manual (10515-0512-4200).

Table 2. RF Communications Test Set Programming Parameters

Parameter	Test Value
RF Generator Frequency	1.611 MHz
RF Amplitude	Single Sideband (SSB) -113 dBm (-83 dBm if using 30 dB attenuator) FM -107 dBm (-77 dBm if using 30 dB attenuator)

Table 2. RF Communications Test Set Programming Parameters (Continued)

Parameter	Test Value
Modulation Frequency	1 kHz (when testing FM)
Modulation	Off (when testing SSB) FM 5 kHz deviation

Table 3. Radio Test Parameters

Parameter	Value
TX FREQ	1.610 MHz
RX FREQ	1.610 MHz
MODULATION (MOD)	USB or FM (as required)
IF BANDWIDTH	2.7 kHz (for USB)
RECEIVE ONLY	NO
VOICE	CLR
SQUELCH (SQ)	OFF
TX POWER	HIGH
Radio Mode	PT
Volume	Mid scale
PT BEEPS	Disabled
FM DEVIATION	5 kHz

Table 4. Radio and Test Set Test Frequencies

Test Set Frequencies	Radio Frequencies	USB Sensitivity for 10 dB SINAD (dBm)	FM Sensitivity for 10 dB SINAD (dBm)
1.998 MHz	1.997 MHz	-113 dBm	
3.820 MHz	3.819 MHz	-113 dBm	
6.130 MHz	6.129 MHz	-113 dBm	
8.053 MHz	8.052 MHz	-113 dBm	
12.921 MHz	12.920 MHz	-113 dBm	
20.711 MHz	20.710 MHz	-113 dBm	
33.221 MHz	33.220 MHz	-113 dBm	
50.521 MHz	50.520 MHz	-113 dBm	
30.25 MHz	30.250 MHz		-107 dBm
33.975 MHz	33.975 MHz		-107 dBm
37.75 MHz	37.75 MHz		-107 dBm
40.725 MHz	40.725 MHz		-107 dBm
42.95 MHz	42.95 MHz		-107 dBm
45.225 MHz	45.225 MHz		-107 dBm
50.800 MHz	50.800 MHz		-107 dBm
54.675 MHz	54.675 MHz		-107 dBm
59.825 MHz	59.825 MHz		-107 dBm

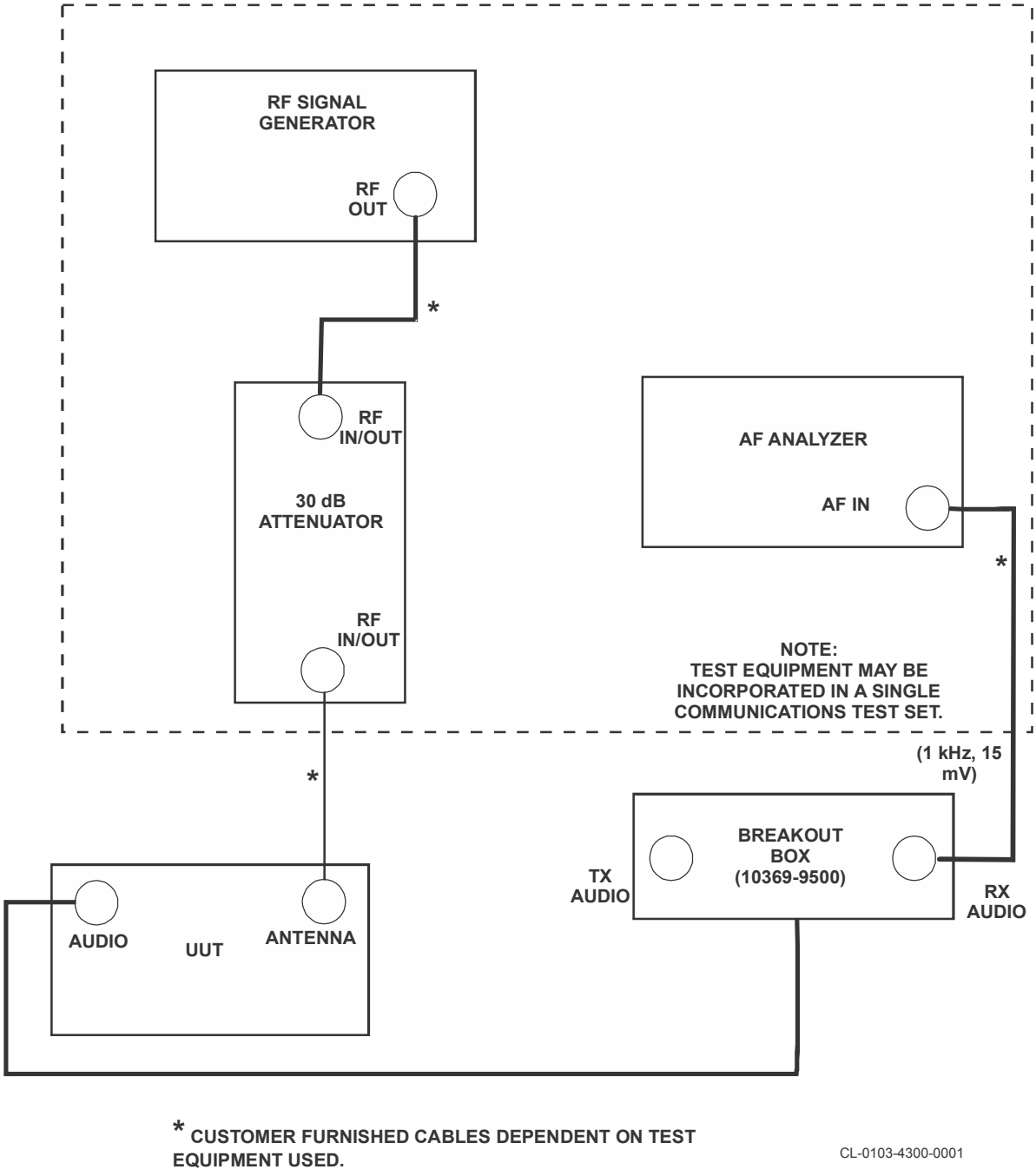

Figure 1. Receive Performance Verification Test Setup

2.2 Transmit Performance Verification Test

The following paragraphs provide instructions to verify the transmitter performance of the radio as part of scheduled maintenance. This test will measure the power output, carrier frequency of the transmitter, and FM deviation.

NOTE

Carrier frequency cannot be measured to factory specifications without using a calibrated frequency counter (often requiring an external standard). The purpose of the tests described in the following paragraphs are to verify that the radio is operational and field-ready.

NOTE

The radio must be connected to either one known good, fully charged battery, or to a power supply via a cable that is wired as shown in Figure 5-2 of 10515-0103-4300G. The cable used between the power source and the radio must have pin 1 jumpered to pin 3. The radio uses pin 3 to determine if it is connected to a Ni-Cd or lithium battery. If pin 3 is not jumpered to pin 1, the radio will behave as if it is connected to a single lithium battery, and will only produce a maximum transmit power of 10 watts, making the transmit performance test invalid.

2.2.1 Recommended Equipment

Table 7-2 of 10515-0103-4300G lists the equipment recommended to perform the transmit performance verification test.

2.2.2 Test Procedure

Perform the following procedure to verify the transmitter performance of the radio:

a. Set up the test bed radio system as shown in Figure 2.

b. Set the test equipment as listed in Table 5. Refer to test equipment operation manuals for detailed information on using the equipment.

CAUTION

If the test equipment is not rated for 25 watts direct input or higher, ensure that a 30 dB attenuator is properly installed to prevent accidental damage to the test equipment.

c. Program the radio as listed in Table 6. Refer to the N/PRC-160(V) Wideband HF/VHF Manpack Radio Field Reference Guide (10515-0512-4100) for detailed information on changing parameters.

d. Key the radio using the breakout box.

e. Verify that the Continuous Wave (CW) output level is +43 dBm -1.0 dB/+2.0 dB. If a 30 dB attenuator is installed in the test setup, the RF power meter will indicate a 20 mW or +13 dBm. If the output power measures out of specification, proceed to the non-BIT troubleshooting procedures in Paragraph 10.2.1.2 of AN/PRC-160(V) Wideband HF/VHF Manpack Radio Operation Manual (10515-0512-4200).

NOTE

If a CW Offset of 1000 Hz is programmed into the radio, the signal will be 1000 Hz higher than the test frequency. This is the default for the radio.

f. Verify CW output frequency is within ±1 parts-per-million (ppm) accuracy plus test equipment drift (usually another ±1 ppm). For example, a frequency of 30.100 MHz may be measured within ± 60.2 Hz (±2 ppm of the operating frequency). Recommended test equipment is listed in Table 7-2 of 10515-0103-4300G. Repeat test for remaining USB frequencies listed in Table 7. If the frequency accuracy measures out of specification, proceed to the non-BIT troubleshooting procedures in Paragraph 10.2.1.2 of AN/PRC-160(V) Wideband HF/VHF Manpack Radio Operation Manual (10515-0512-4200).

g. Repeat Step d through Step f for each of the CW transmit frequencies listed in Table 7.

h. To measure USB power output, change the modulation (MOD) on the radio to USB, set the radio transmit frequency to 25.35 MHz, and ensure a 1 kHz audio tone is applied to the transmit audio input of the breakout box as shown in Figure 2.

i. Key the radio using the breakout box.

j. Verify that the USB output level is +43 dBm, -1.0 dB/+2.0 dB. If a 30 dB attenuator is installed in the test setup, the RF power meter will indicate 20 mW or +13 dBm. Note that the frequency will be 1 kHz higher than the radio's programmed frequency. If the output power measures out of specification, proceed to the non-BIT troubleshooting procedures in Paragraph 10.2.1.2 of AN/PRC-160(V) Wideband HF/VHF Manpack Radio Operation Manual (10515-0512-4200).

k. To measure FM power output and deviation using a communications test set, change the modulation (MOD) on the radio to FM, set the transmit frequency to 40.65 MHz, and ensure a 1 kHz audio tone is applied to the transmit audio input of the breakout box as shown in Figure 2.

l. Key the radio using the breakout box.

m. Verify that the FM power output level is +41 dB, -1.0 dB/+2.0 dB, as measured on the RF communications test set. If a 30 dB attenuator is installed in the test setup, the RF power meter will indicate 12.5 mW or +11 dBm. If the output power measures out of specification, proceed to the non-BIT troubleshooting procedures in Paragraph 10.2.1.2 of AN/PRC-160(V) Wideband HF/VHF Manpack Radio Operation Manual (10515-0512-4200).

n. With the radio keyed, ensure that the measured FM deviation is 5 kHz +/-10%.

Table 5. RF Communications Transmit (TX) Test Set Parameters

Parameter	Test Value
TX Power	dBm
RF Frequency	MHz
Audio Frequency	1 kHz
Audio Level	15 mV

Table 6. Radio Transmit (TX) Test Parameters

Parameter	Value
TX FREQ	1.610 MHz
RX FREQ	1.610 MHz
MODULATION (MOD)	CW (FM for deviation test)
IF BANDWIDTH	2.7 kHz (for USB)
RECEIVE ONLY	NO
VOICE	CLR
SQUELCH (SQ)	OFF
TX POWER	HIGH
Radio Mode	PT
Volume	Mid scale
FM DEVIATION	5 kHz

Table 7. CW Transmit Test Frequencies

Radio Frequencies
1.610 MHz
2.100 MHz
3.100 MHz
5.100 MHz
7.500 MHz
12.100 MHz
20.000 MHz
30.100 MHz
50.000 MHz

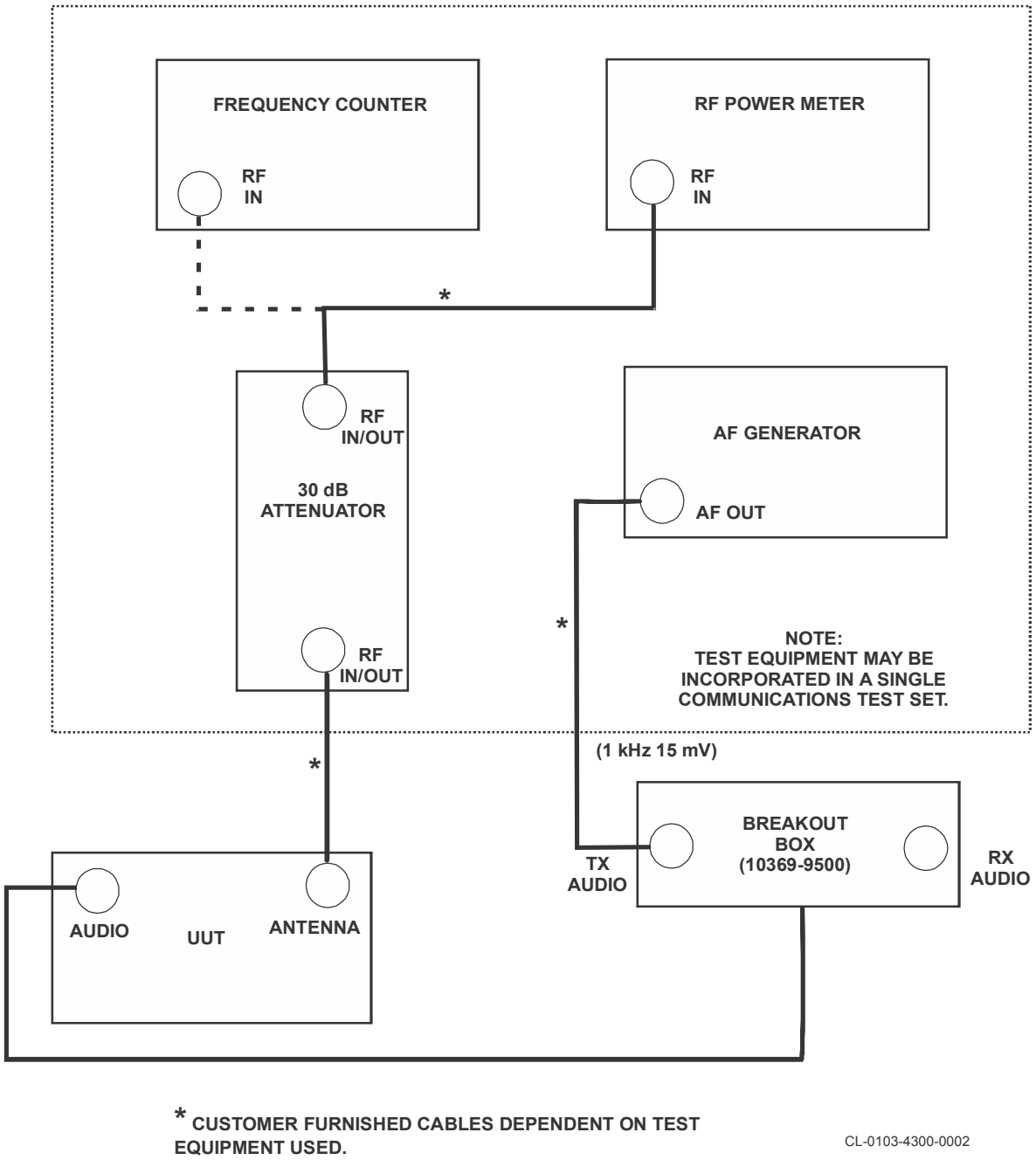

Figure 2. Transmit Performance Verification Test Setup

2.3 HUB Replacement

If the transceiver does not retain programming and configuration information after being powered off, the 3.6 V lithium HUB (B41-0010-004) must be replaced. It is recommended that this be done every eight months. See Figure 3.

WARNING

Do not charge, short circuit, incinerate, or mutilate the BA-5590/U or Hold-Up Battery (HUB). Do not expose to fire or temperatures above 130° F (54° C); otherwise battery may vent or rupture, releasing toxic material which may cause injury or death to personnel.

2.4 Memory Hold-Up Battery

See Figure 3. for location. The HUB is used to maintain power for the internal memory when the main battery is dead or removed. The HUB maintains the memory that holds the programmed parameters (black data) and the COMSEC fills (red data).

NOTE

If the HUB expires or is removed without a charged main battery connected, the radio will require Type-1 initialization (level III maintenance). A radio requiring Type-1 initialization cannot be used in CT. When the main battery is attached and charged, it provides the memory hold-up even if the HUB is dead or missing.

After changing the HUB, reset HUB by using **PGM > RADIO CONFIG > MAINTENANCE > RESET HUB CAPACITY**.

The HUB is a 3.6 VDC commercially available lithium battery (Harris # B41-0010-004; SAFT LS 14250C).

The AN/PRC-160(V) provides self testing and status monitoring of the HUB Capacity. Refer to Paragraph 3.15.8.3 of AN/PRC-160(V) Wideband HF/VHF Manpack Radio Operation Manual (10515-0512-4200) for more information about checking HUB Capacity. Harris recommends replacing the HUB annually. Some users may want to institute a plan for hub monitoring and replacement prior to mission deployment to ensure maximum HUB readiness. A dead HUB is indicated if the radio does not hold programmed parameters and fill data after removing and replacing the main battery.

1. LEAVE BATTERY ATTACHED
2. USE B41-0010-004 (SAFT LS 14250C)
3. USE COIN OR FLAT-TIP SCREWDRIVER TO REMOVE/REPLACE COVER

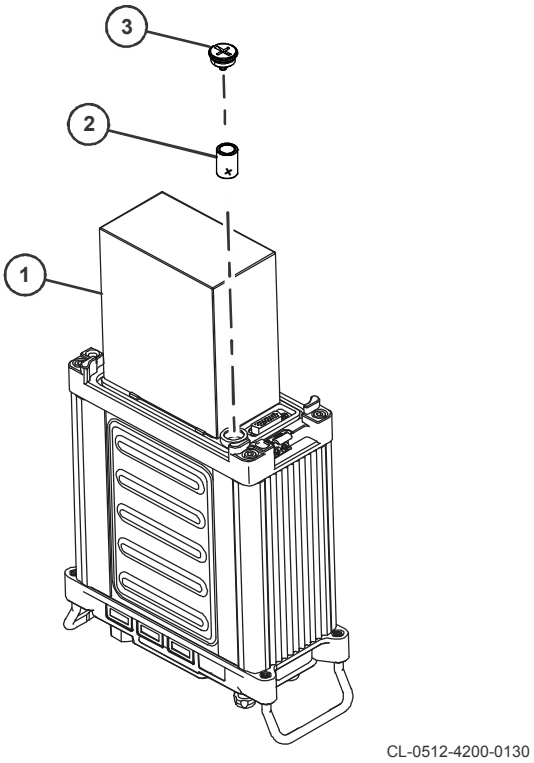

Figure 3. HUB Replacement