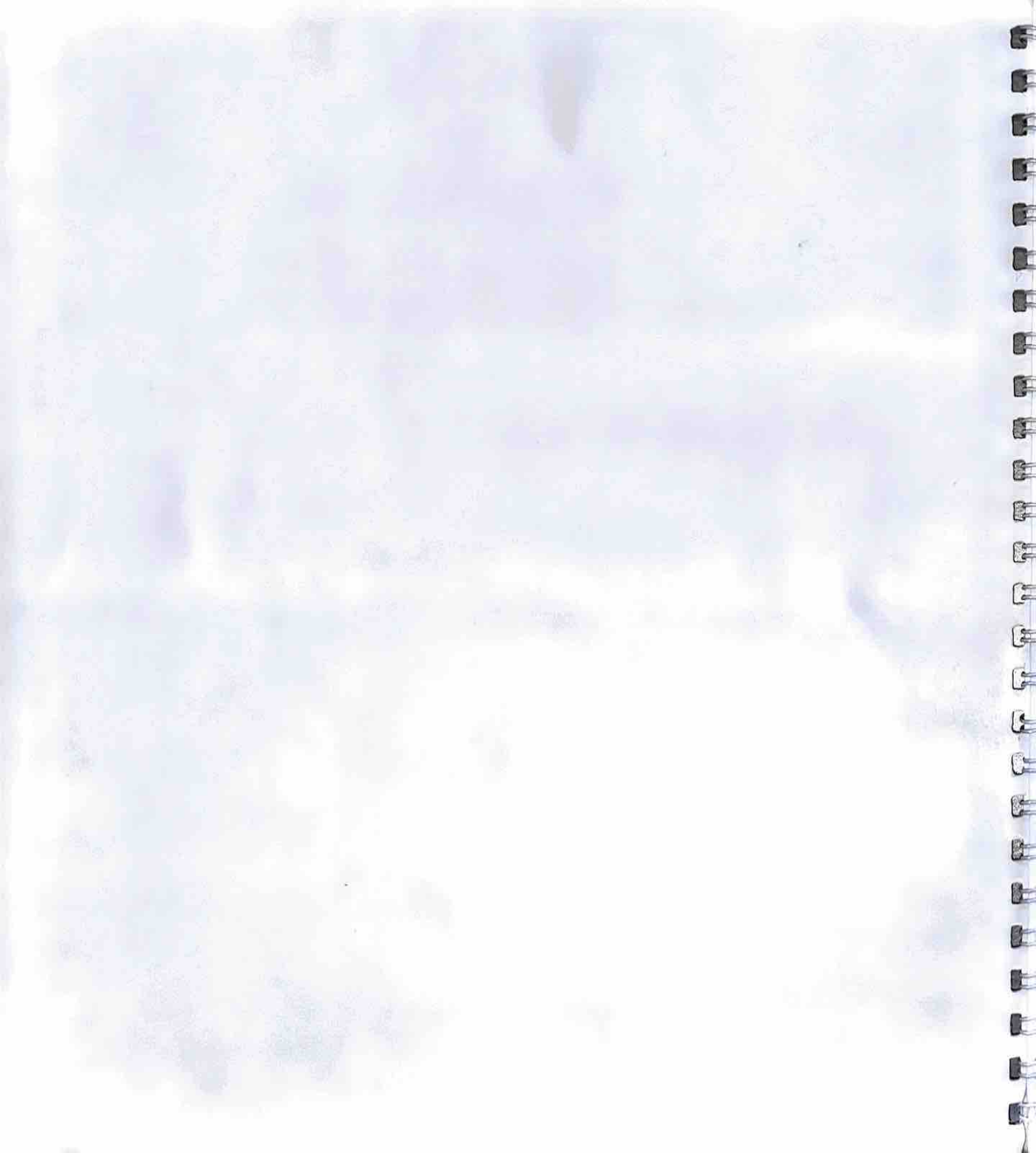


**AEROFLEX**

**NAV COMM Test Set  
IFR 4000  
Getting Started Manual**

**Issue-2**

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# GETTING STARTED MANUAL

## NAV/COMM TEST SET

### IFR 4000

PUBLISHED BY  
Aeroflex

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**Subject to Export Control, see Cover Page for details.**

GETTING STARTED MANUAL

This manual contains essential information relating to initial use of the unit.

Aeroflex recommends the operator become familiar with the Operation Manual contained on the accompanying CD-ROM.

Subject to Export Control, see Cover Page for details.

### **SAFETY FIRST: TO ALL OPERATIONS PERSONNEL**

**REFER ALL SERVICING OF UNIT TO QUALIFIED TECHNICAL PERSONNEL. THIS UNIT CONTAINS NO OPERATOR SERVICEABLE PARTS.**

**WARNING: USING THIS EQUIPMENT IN A MANNER NOT SPECIFIED BY THE ACCOMPANYING DOCUMENTATION MAY IMPAIR THE SAFETY PROTECTION PROVIDED BY THE EQUIPMENT.**

#### **CASE, COVER OR PANEL REMOVAL**

Opening the Case Assembly exposes the operator to electrical hazards that can result in electrical shock or equipment damage. Do not operate this Test Set with the Case Assembly open.

#### **SAFETY IDENTIFICATION IN TECHNICAL MANUAL**

This manual uses the following terms to draw attention to possible safety hazards, that may exist when operating or servicing this equipment.

**CAUTION: THIS TERM IDENTIFIES CONDITIONS OR ACTIVITIES THAT, IF IGNORED, CAN RESULT IN EQUIPMENT OR PROPERTY DAMAGE (E.G., FIRE).**

**WARNING: THIS TERM IDENTIFIES CONDITIONS OR ACTIVITIES THAT, IF IGNORED, CAN RESULT IN PERSONAL INJURY OR DEATH.**

#### **SAFETY SYMBOLS IN MANUALS AND ON UNITS**



**CAUTION:** Refer to accompanying documents. (This symbol refers to specific CAUTIONS represented on the unit and clarified in the text.)



**AC OR DC TERMINAL:** Terminal that may supply or be supplied with AC or DC voltage.



**DC TERMINAL:** Terminal that may supply or be supplied with DC voltage.



**AC TERMINAL:** Terminal that may supply or be supplied with AC or alternating voltage.

#### **EQUIPMENT GROUNDING PRECAUTION**

Improper grounding of equipment can result in electrical shock.

#### **USE OF PROBES**

Check the specifications for the maximum voltage, current and power ratings of any connector on the Test Set before connecting it with a probe from a terminal device. Be sure the terminal device performs within these specifications before using it for measurement, to prevent electrical shock or damage to the equipment.

#### **POWER CORDS**

Power cords must not be frayed, broken nor expose bare wiring when operating this equipment.

#### **USE RECOMMENDED FUSES ONLY**

Use only fuses specifically recommended for the equipment at the specified current and voltage ratings.



**SAFETY FIRST: TO ALL OPERATIONS PERSONNEL (cont)**

**INTERNAL BATTERY**

This unit contains a Lithium Ion Battery, serviceable only by a qualified technician.

**CAUTION:** SIGNAL GENERATORS CAN BE A SOURCE OF ELECTROMAGNETIC INTERFERENCE (EMI) TO COMMUNICATION RECEIVERS. SOME TRANSMITTED SIGNALS CAN CAUSE DISRUPTION AND INTERFERENCE TO COMMUNICATION SERVICES OUT TO A DISTANCE OF SEVERAL MILES. USERS OF THIS EQUIPMENT SHOULD SCRUTINIZE ANY OPERATION THAT RESULTS IN RADIATION OF A SIGNAL (DIRECTLY OR INDIRECTLY) AND SHOULD TAKE NECESSARY PRECAUTIONS TO AVOID POTENTIAL COMMUNICATION INTERFERENCE PROBLEMS.



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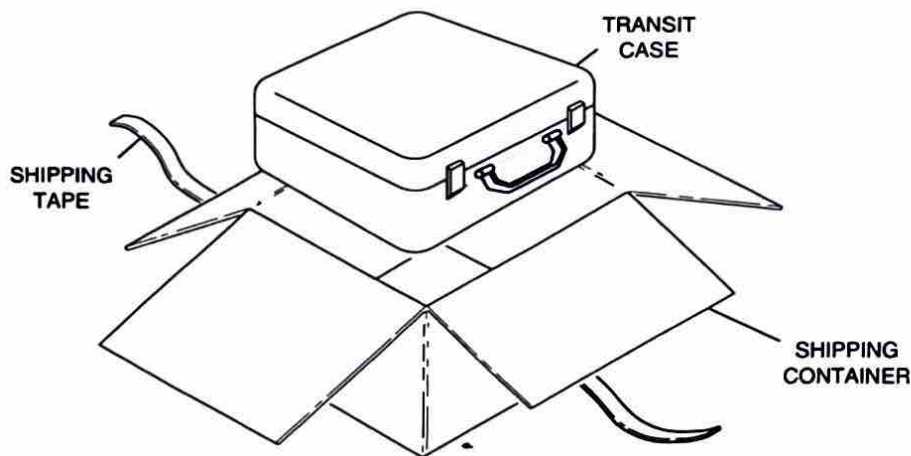
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### SERVICE UPON RECEIPT OF MATERIAL

#### UNPACKING

Special-design packing material inside this shipping carton provides maximum protection for the IFR 4000. Avoid damaging the carton and packing material during equipment unpacking. Use the following steps for unpacking the IFR 4000.

- Cut and remove the sealing tape on the carton top and open the carton.
- Grasp the IFR 4000 transit case firmly, while restraining the shipping carton, and lift the equipment and packing material vertically.
- Place the IFR 4000 transit case and end cap packing on a suitable flat, clean and dry surface.
- Remove the protective plastic bag from the IFR 4000 transit case.
- Place protective plastic bag and end cap packing material inside shipping carton.
- Store the shipping carton for future use should the IFR 4000 need to be returned.



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### SERVICE UPON RECEIPT OF MATERIAL (cont)

#### CHECKING UNPACKED EQUIPMENT

- Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage to Aeroflex.
- Check the equipment against the packing slip to see if the shipment is complete. Report all discrepancies to Aeroflex.

| DESCRIPTION                     | PART NUMBER           | STANDARD/OPTIONAL | QTY |
|---------------------------------|-----------------------|-------------------|-----|
| IFR 4000                        |                       | STANDARD          | 1   |
| AC/DC POWER SUPPLY              | 67366 (7110-5600-200) | STANDARD          | 1   |
| VHF/UHF MULTI-BAND ANTENNA      | 9140 (1201-5601-000)  | STANDARD          | 1   |
| ANTENNA                         | 9137 (1201-0909-900)  | STANDARD          | 1   |
| TNC (MALE - MALE) COAXIAL CABLE | 62398 (6041-5680-800) | STANDARD          | 1   |
| TNC SHORT                       | 24140 (2289-0001-009) | STANDARD          | 1   |
| 50 $\Omega$ LOAD                | 24141 (2289-0001-010) | STANDARD          | 1   |
| 5 A FUSE                        | 56080 (5106-0000-057) | STANDARD          | 1   |
| TRANSIT CASE                    | 10238 (1412-5653-000) | STANDARD          | 1   |
| POWER CORD (110 USE) (US ONLY)  | 62302 (6041-0001-000) | STANDARD          | 1   |
| ANTENNA INSTRUCTIONS (PAPER)    | 6085 (1002-5600-8P0)  | STANDARD          | 1   |
| PASSWORD CARD (PAPER)           | 6086 (1002-5600-9P0)  | STANDARD          | 1   |
| OPERATION MANUAL (CD-ROM)       | 6081 (1002-5600-2C0)  | STANDARD          | 1   |

|                                 |                       |          |  |
|---------------------------------|-----------------------|----------|--|
| MAINTENANCE MANUAL (CD-ROM)     | 6083 (1002-5600-4C0)  | OPTIONAL |  |
| RS-232 INTERFACE CABLE (15-PIN) | 62399 (6041-5680-900) | OPTIONAL |  |
| RS-232 INTERFACE CABLE (25-PIN) | 62400 (6041-5681-200) | OPTIONAL |  |
| BENCH STAND                     | 63656 (6500-5681-000) | OPTIONAL |  |
| POWER CORDS (220 USE)           | 64020 (7001-9903-000) | OPTIONAL |  |

#### STANDARD EQUIPMENT



#### OPTIONAL EQUIPMENT



**SPECIFICATIONS****Input Power (Test Set):**

|                    |                                                             |
|--------------------|-------------------------------------------------------------|
| Input Range:       | 11 to 32 Vdc                                                |
| Power Consumption: | 55 W Maximum<br>16 W Nominal at 18 Vdc with Charged Battery |
| Fuse Requirements: | 5 A, 32 Vdc, Type F                                         |

**Input Power (External AC to DC Converter):**

|                                   |                                            |
|-----------------------------------|--------------------------------------------|
| Input Range:                      | 100 to 250 VAC, 1.5 A Maximum, 47 to 63 Hz |
| Main Supply Voltage Fluctuations: | ≤10% of the nominal voltage                |
| Transient Overvoltages:           | According to Installation Category II      |

**Environmental (Test Set):**

|                        |                                                                                                       |
|------------------------|-------------------------------------------------------------------------------------------------------|
| Use:                   | Pollution Degree 2                                                                                    |
| Altitude:              | ≤4800 meters                                                                                          |
| Operating Temperature: | -20° to 55°C<br>(Battery Charging temperature range is 5° to 40°C,<br>controlled by internal charger) |
| Storage Temperature:   | -30° to 70°C<br>(Li Ion Battery must be removed when <-20°C and<br>>60°C)                             |
| Relative Humidity:     |                                                                                                       |
| 5°C to <10°C:          | 80%                                                                                                   |
| 10°C to <31°C:         | 95%                                                                                                   |
| 31°C to <40°C:         | 75%                                                                                                   |
| 40°C to 50°C:          | 45%                                                                                                   |

**Environmental (External AC to DC Converter):**

|              |              |
|--------------|--------------|
| Use:         | Indoors      |
| Altitude:    | ≤3000 meters |
| Temperature: | 5° to 40°C   |

### INSTALLATION

#### GENERAL

The IFR 4000 is powered by an internal Lithium Ion battery pack. The Test Set is supplied with an external DC Power Supply that enables the operator to recharge the battery when connected to AC power.

**NOTE:** The IFR 4000 can operate continuously on AC power via the DC Power Supply, for servicing and/or bench tests.

#### BATTERY OPERATION

The internal battery is equipped to power the IFR 4000 for eight hours of continuous use, after which time, the IFR 4000 battery needs recharging. Battery Operation Time Remaining (in Hours) is displayed on all screens.

The IFR 4000 contains an automatic time-out to conserve power. If a key is not pressed within a 5 to 20 minute time period, the Test Set shuts Off (only when using battery power). The Power Down Time may be set in the Setup Screen.

#### BATTERY CHARGING

The battery charger operates whenever DC power (11 to 32 Vdc) is applied to the Test Set with the supplied DC Power Supply or a suitable DC power source. When charging, the battery reaches an 100% charge in approximately four hours. The internal battery charger allows the battery to charge between a temperature range of 5° to 40°C. The IFR 4000 can operate, connected to an external DC source, outside the battery charging temperature range (5° to 40°C).

The battery should be charged every three months (minimum) or disconnected for long term inactive storage periods of more than six months. The Battery must be removed when conditions surrounding the Test Set are <-20°C and >60°C)

#### SAFETY PRECAUTIONS

The following safety precautions must be observed during installation and operation. Aeroflex assumes no liability for failure to comply with any safety precaution outlined in this manual.

##### Complying with Instructions

Installation/operating personnel should not attempt to install or operate the IFR 4000 without reading and complying with instructions contained in this manual. All procedures contained in this manual must be performed in exact sequence and manner described.

##### Grounding Power Cord

**WARNING: DO NOT USE A THREE-PRONG TO TWO-PRONG ADAPTER PLUG. DOING SO CREATES A SHOCK HAZARD BETWEEN THE CHASSIS AND ELECTRICAL GROUND.**

For AC operation, the AC Line Cable, connected to the DC Power Supply, is equipped with standard three-prong plug and must be connected to a properly grounded three-prong receptacle that is easily accessible. It is the customer's responsibility to:

- Have a qualified electrician check receptacle(s) for proper grounding.
- Replace any standard two-prong receptacle(s) with properly grounded three-prong receptacle(s).

## INSTALLATION (cont)

### Operating Safety

Due to potential for electrical shock within the Test Set, the Case Assembly must be closed when the Test Set is connected to an external power source.

Battery replacement, fuse replacement and internal adjustments must only be performed by qualified service technicians.

### AC POWER REQUIREMENTS

The DC Power Supply, supplied with the IFR 4000, operates over a voltage range of 100 to 250 VAC at 47 to 63 Hz.

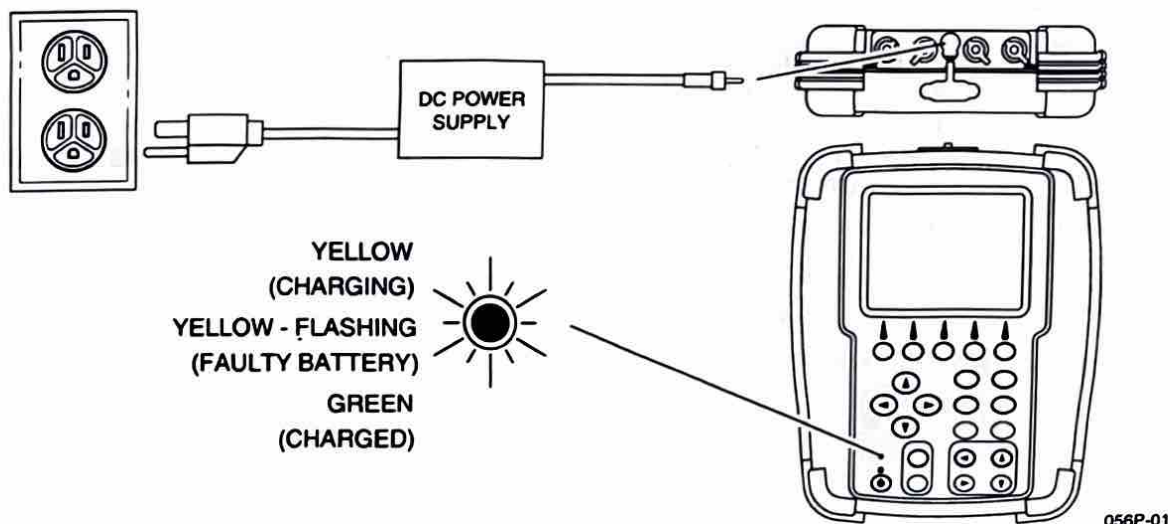
The battery charger operates whenever DC power (11 to 32 Vdc) is applied to the Test Set with the supplied DC Power Supply or a suitable DC power source. When charging, the battery reaches an 100% charge in approximately four hours. The Battery Charging temperature range is 5° to 40°C, controlled by an internal battery charger.

### BATTERY RECHARGING

| STEP | PROCEDURE |
|------|-----------|
|------|-----------|

1. Connect AC Line Cable to either:
  - AC PWR Connector on the DC Power Supply and an appropriate AC power source
  - Suitable DC power source
2. Connect the DC Power Supply to the DC POWER Connector on the IFR 4000.
3. Verify the CHARGE Indicator illuminates yellow.
4. Allow four hours for battery charge or until the CHARGE Indicator illuminates green.

**NOTE:** If the CHARGE Indicator flashes yellow and/or the battery fails to accept a charge and the IFR 4000 does not operate on battery power, the battery, serviceable only by a qualified technician, requires replacement. Refer to Battery/Voltage Instructions.



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**INSTALLATION (cont)****EXTERNAL CLEANING**

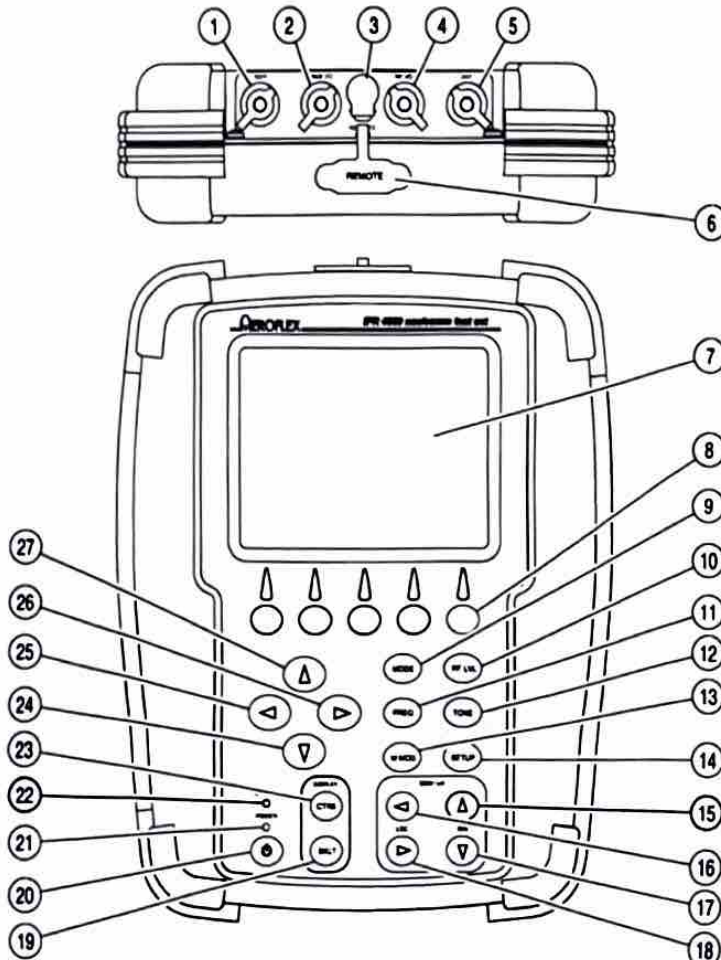
The following procedure contains routine instructions for cleaning the outside of the Test Set.

**CAUTION:** DISCONNECT POWER FROM TEST SET TO AVOID POSSIBLE DAMAGE TO ELECTRONIC CIRCUITS.

| <b>STEP</b> | <b>PROCEDURE</b> |
|-------------|------------------|
|-------------|------------------|

1. Clean front panel buttons and display face with soft lint-free cloth. If dirt is difficult to remove, dampen cloth with water and a mild liquid detergent.
2. Remove grease, fungus and ground-in dirt from surfaces with soft lint-free cloth dampened (not soaked) with isopropyl alcohol.
3. Remove dust and dirt from connectors with soft-bristled brush.
4. Cover connectors, not in use, with suitable dust cover to prevent tarnishing of connector contacts.
5. Clean cables with soft lint-free cloth.
6. Paint exposed metal surface to avoid corrosion.

## CONTROLS, CONNECTORS AND INDICATORS



1. SWR Connector
2. AUX I/O Connector
3. DC POWER Connector
4. RF I/O Connector
5. ANT Connector
6. REMOTE Connector
7. Display
8. Multi-Function Soft Keys
9. MODE Select Key
10. RF LVL Field Select Key
11. FREQ Field Select Key
12. TONE Field Select Key
13. M MOD Field Select Key
14. SETUP Key
15. G/S DDM UP Key
16. LOC DDM LEFT Key
17. G/S DDM DOWN Key
18. LOC DDM RIGHT Key
19. BACKLIGHT Key
20. POWER Key
21. POWER Indicator
22. CHARGE Indicator
23. CONTRAST Key
24. DECREMENT/SELECT Data Key
25. SELECT DATA UNIT MSB Key
26. SELECT DATA UNIT LSB Key
27. INCREMENT/SELECT Data Key

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## CONTROLS, CONNECTORS AND INDICATORS (cont)

| ITEM                               | DESCRIPTION                                                                                                                                                                                                                                                                                                                         |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. <b>SWR Connector</b>            | TNC Type Connector used for VSWR measurements on Antenna and Feeder Systems.                                                                                                                                                                                                                                                        |
| 2. <b>AUX I/O Connector</b>        | BNC Type Connector for output of baseband modulation and 10 MHz reference and for counter input.                                                                                                                                                                                                                                    |
| 3. <b>DC POWER Connector</b>       | Circular Type Connector (2.5 mm center, 5.5 mm outer diameter, center positive) used for battery charging or operation of Test Set.                                                                                                                                                                                                 |
| 4. <b>RF I/O Connector</b>         | TNC Type Connector used for direct connect to the UUT for power and frequency measurements for COMM testing, and for providing RF stimulus for VOR/ILS/GS/MB receivers.                                                                                                                                                             |
| 5. <b>ANT Connector</b>            | BNC Type Connector used for over-the-air stimulus for VOR/ILS/GS/MB receivers and for COMM testing.                                                                                                                                                                                                                                 |
| 6. <b>REMOTE Connector</b>         | DB15 or DB25 Type Connector used for remote operation and software upgrades. Contains RS-232, USB Host and USB Peripheral connections.                                                                                                                                                                                              |
| 7. <b>Display (LCD)</b>            | 38 characters by 16 lines for main screen display with Soft Key boxes at the bottom of the screen.                                                                                                                                                                                                                                  |
| 8. <b>Multi-Function Soft Keys</b> | Five Soft Keys are provided. The legends are displayed in boxes at the bottom of the Display.                                                                                                                                                                                                                                       |
| 9. <b>MODE Select Key</b>          | This Key enters the MODE Field and selects the operational mode (i.e., VOR, Localizer, etc.).                                                                                                                                                                                                                                       |
| 10. <b>RF LVL Field Select Key</b> | <p>This Key moves the edit cursor to the RF LVL (RF Level) Field.</p> <p>The INCREMENT/SELECT Data Key or the DECREMENT/SELECT Data Key may be used to slew the RF Level.</p> <p>The SELECT DATA UNITS MSB Key or the SELECT DATA UNITS LSB Key may be used to select the RF LVL units to be slewed (i.e., 0.1 dB, 1 dB, etc.).</p> |
| 11. <b>FREQ Field Select Key</b>   | <p>This Key moves the edit cursor to the FREQ (Frequency) Field.</p> <p>The INCREMENT/SELECT Data Key or the DECREMENT/SELECT Data Key may be used to slew the data.</p> <p>The SELECT DATA UNITS MSB Key or the SELECT DATA UNITS LSB Key may be used to select the FREQ units to be slewed (i.e., 25 kHz, 100 kHz, etc.).</p>     |

**CONTROLS, CONNECTORS AND INDICATORS (cont)**

| ITEM | DESCRIPTION                                                                                                                                                                                                                                                                                     |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 12.  | <p><b>TONE Field Select Key</b><br/>This Key moves the edit cursor to the MOD TONE Field.<br/>The INCREMENT/SELECT Data Key or the DECREMENT/SELECT Data Key may be used to slew the data.</p>                                                                                                  |
| 13.  | <p><b>M MOD Field Select Key</b><br/>This Key moves the edit cursor to the M MOD (Master Modulation) Field and turns the modulation OFF (0%) or ON (CAL).<br/>The INCREMENT/SELECT Data Key or the DECREMENT/SELECT Data Key may be used to slew the modulation depth.</p>                      |
| 14.  | <p><b>SETUP Key</b><br/>This Key displays the SETUP Menu.</p>                                                                                                                                                                                                                                   |
| 15.  | <p><b>G/S DDM UP Key</b><br/>This Key slews the displayed Glideslope DDM Up.<br/>Increments are either FIXED or VAR (Variable) depending on the DDM DEV STEP Field setting.</p>                                                                                                                 |
| 16.  | <p><b>LOC DDM LEFT Key</b><br/>This Key slews the displayed Localizer DDM to the Left.<br/>Increments are either FIXED or VAR (Variable) depending on the DDM DEV STEP Field setting.</p>                                                                                                       |
| 17.  | <p><b>G/S DDM DOWN Key</b><br/>This Key slews the displayed Glideslope DDM Down.<br/>Increments are either FIXED or VAR (Variable) depending on the DDM DEV STEP Field setting.</p>                                                                                                             |
| 18.  | <p><b>LOC DDM RIGHT Key</b><br/>This Key slews the displayed Localizer DDM to the Right.<br/>Increments are either FIXED or VAR (Variable) depending on the DDM DEV STEP Field setting.</p>                                                                                                     |
| 19.  | <p><b>BACKLIGHT Key</b><br/>This Key displays/exits the Backlight Adjust Field.<br/>The INCREMENT/SELECT Data Key or the DECREMENT/SELECT Data Key may be used to adjust the Backlight Intensity.<br/>The IFR 4000 powers up with the Backlight set to the setting of the previous session.</p> |
| 20.  | <p><b>POWER Key</b><br/>This Key powers the IFR 4000 up and down.</p>                                                                                                                                                                                                                           |
| 21.  | <p><b>POWER Indicator</b><br/>This Indicator is illuminated when the IFR 4000 is powered.</p>                                                                                                                                                                                                   |

**CONTROLS, CONNECTORS AND INDICATORS (cont)**

| <b>ITEM</b>                          | <b>DESCRIPTION</b>                                                                                                                                                                                                                                                          |
|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>22. CHARGE Indicator</b>          | <p>This Indicator is illuminated when external DC power is applied for Bench Operation or Battery charging.</p> <p>This Indicator is yellow when the battery is charging, flashing yellow when the battery needs replacing and Green when the battery is fully charged.</p> |
| <b>23. CONTRAST Key</b>              | <p>This Key displays/exits the Contrast Adjust Field.</p> <p>The INCREMENT/SELECT Data Key or the DECREMENT/SELECT Data Key may be used to adjust the Contrast.</p>                                                                                                         |
| <b>24. DECREMENT/SELECT Data Key</b> | <p>This Key decrements data in slewable fields, such as FREQ. This Key also selects data in fields that have fixed functions, such as MOD TONE and MODE.</p>                                                                                                                |
| <b>25. SELECT DATA UNIT MSB Key</b>  | <p>This Key moves the slew cursor toward the MSB (Most Significant Bit) of the data field.</p> <p><b>Example:</b> When a variable frequency is selected, the slew cursor can be moved from the 1 kHz unit to the 10 kHz unit.</p>                                           |
| <b>26. SELECT DATA UNIT LSB Key</b>  | <p>This Key moves the slew cursor toward the LSB (Least Significant Bit) of the data field.</p> <p><b>Example:</b> When a variable frequency is selected, the slew cursor can be moved from the 10 kHz unit to the 1 kHz unit.</p>                                          |
| <b>27. INCREMENT/SELECT Data Key</b> | <p>This Key increments data in slewable fields, such as FREQ. This Key also selects data in fields that have fixed functions, such as MOD TONE and MODE.</p>                                                                                                                |

### SCREEN HIERARCHY

The Setup Menu allows the operator to set various parameters used in testing, configuration and memory storage. The Setup Menu can be entered from any mode by pressing the SETUP Key.

|                            |                        |                          |                      |             |
|----------------------------|------------------------|--------------------------|----------------------|-------------|
| <b>SETUP</b>               |                        | <b>BAT 1.2 Hr</b>        |                      |             |
| <b>PORT: RF I/O</b>        |                        | <b>FREQ: PRESET</b>      |                      |             |
| <b>AP SWP RATE: 20 sec</b> |                        | <b>VOR BRG: FIXED</b>    |                      |             |
| <b>EXT ATTN: 0.0 dB</b>    |                        | <b>PWR DWN: 10 mins</b>  |                      |             |
| <b>ILS UNITS: DDM</b>      |                        | <b>RF LVL UNITS: dBm</b> |                      |             |
| <b>KEY CLICK: OFF</b>      |                        | <b>MORSE CODE: IFR</b>   |                      |             |
| <b>AUDIO: OFF</b>          |                        |                          |                      |             |
| <b>NEXT<br/>PARAM</b>      | <b>GUIDED<br/>TEST</b> | <b>STORE/<br/>RECALL</b> | <b>H/W<br/>TOOLS</b> | <b>INFO</b> |

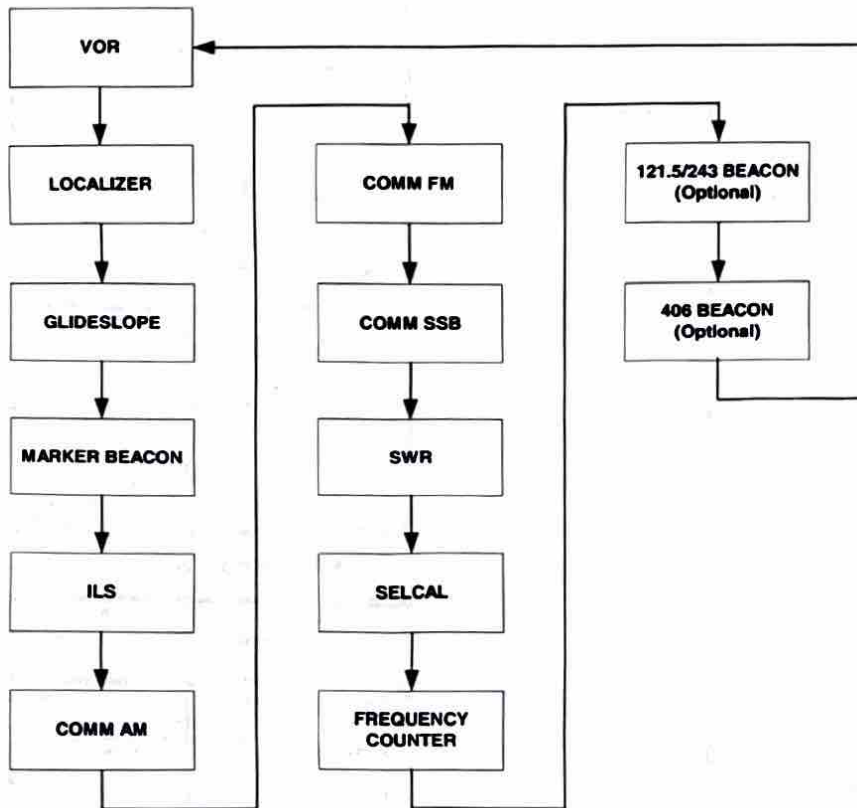
When the Setup Menu is displayed, press the "INFO" Soft Key for the unit software and firmware versions and the Options available.

This screen is a sample of the screen that appears.

|                        |             |                   |  |
|------------------------|-------------|-------------------|--|
| <b>INFO</b>            |             | <b>BAT 1.2 Hr</b> |  |
| <b>VERSION 2.13</b>    |             |                   |  |
| <b>BOOT SW VER</b>     | <b>1.02</b> |                   |  |
| <b>FPGA FW VER</b>     | <b>1.2</b>  |                   |  |
| <b>CPLD FW VER</b>     | <b>1.0</b>  |                   |  |
| <b>OPTIONS<br/>ELT</b> |             |                   |  |
| <b>RETURN</b>          |             |                   |  |

## SCREEN HIERARCHY (cont)

The operation mode screen hierarchy is as follows. The VOR Mode Screen is the opening screen. The mode screens can be changed by pressing the MODE Key.



### SCREEN HIERARCHY (cont)

#### VOR Mode Screen

| VOR                            | RF I/O                          | BAT 1.2 Hr  |
|--------------------------------|---------------------------------|-------------|
| FREQ: 108.000 MHz              | RF LVL: - 50.0 dBm              |             |
| M MOD: CAL (80%)               | MOD TONE: OFF                   |             |
| BRG: 0.0 deg<br>30 Hz MOD: 30% | TO/FROM: TO<br>9960 Hz MOD: 30% |             |
| TONE DEL: -                    |                                 |             |
| 30<br>MOD                      | 9960<br>MOD                     | TONE<br>DEL |
| BRG                            | TO/<br>FROM                     |             |

#### LOCALIZER Mode Screen

| LOCALIZER                                   | RF I/O             | BAT 1.2 Hr   |
|---------------------------------------------|--------------------|--------------|
| FREQ: 108.100 MHz                           | RF LVL: - 50.0 dBm |              |
| M MOD: CAL (40%)                            | MOD TONE: OFF      |              |
| DEV STEP: FIXED<br>LOC DDM:<br>0.000 CENTER | 90/150Hz: 0 deg    |              |
| TONE DEL: -                                 |                    |              |
| DEV<br>STEP                                 | TONE<br>DEL        | 90/<br>150Hz |

#### GLIDESLOPE Mode Screen

| GLIDE SLOPE                                | RF I/O                                | BAT 1.2 Hr   |
|--------------------------------------------|---------------------------------------|--------------|
| FREQ: 334.700 MHz<br>LOC FREQ: 108.100 MHz | RF LVL: - 50.0 dBm                    |              |
| M MOD: CAL (80%)                           |                                       |              |
| DEV STEP: FIXED                            | 90/150Hz: -<br>Q/S DDM:<br>0.001 DOWN |              |
| TONE DEL: -                                |                                       |              |
| DEV<br>STEP                                | TONE<br>DEL                           | 90/<br>150Hz |

#### MARKER BEACON Mode Screen

| MARKER BEACON    | RF I/O             | BAT 1.2 Hr |
|------------------|--------------------|------------|
| FREQ: 75.000 MHz | RF LVL: - 50.0 dBm |            |
| M MOD: CAL ( 0%) | MOD TONE: OFF      |            |

#### ILS Mode Screen

| ILS                                         | RF I/O                                       | BAT 1.2 Hr   |
|---------------------------------------------|----------------------------------------------|--------------|
| FREQ: 108.100 MHz<br>G/S FREQ: 334.700 MHz  | RF LVL: - 50.0 dBm                           |              |
| M MOD: CAL (80%)<br>AP SWP: OFF             | MOD TONE: OFF                                |              |
| DEV STEP: FIXED<br>LOC DDM:<br>0.000 CENTER | 90/150 Hz: 0 deg<br>G/S DDM:<br>0.000 CENTER |              |
| TONE DEL: -                                 |                                              |              |
| DEV<br>STEP                                 | AP<br>SWP                                    | TONE<br>DEL  |
|                                             |                                              | 90/<br>150Hz |

#### COMM AM Mode Screen

| COMM AM              | RF I/O             | BAT 1.2 Hr       |
|----------------------|--------------------|------------------|
| FREQ: 118.0000 MHz   | RF LVL: - 50.0 dBm |                  |
| M MOD: CAL (30%)     | MOD TONE: 1020 Hz  |                  |
| CHNL SP: 25 kHz      |                    |                  |
| PWR MTR: PEAK        | RECEIVING          |                  |
| TX FREQ: - TX PWR: - |                    |                  |
| TX MOD: -            |                    |                  |
| HOLD TX              |                    |                  |
| CHNL<br>SP           | HOLD<br>CLEAR      | SWITCH<br>GEN/RX |
|                      | ZERO               | POWER<br>METER   |

#### COMM FM Mode Screen

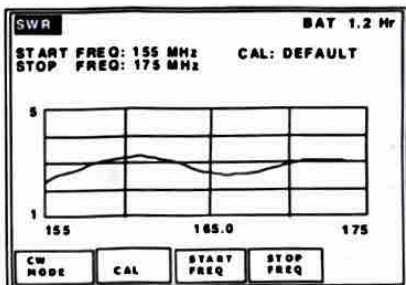
| COMM FM              | RF I/O             | BAT 1.2 Hr       |
|----------------------|--------------------|------------------|
| FREQ: 156.0000 MHz   | RF LVL: - 50.0 dBm |                  |
| M DEV: CAL (5 kHz)   | MOD TONE: 1000 Hz  |                  |
| CHNL SP: 12.5 kHz    |                    |                  |
| PWR MTR: PEAK        | RECEIVING          |                  |
| TX FREQ: - TX PWR: - |                    |                  |
| TX DEV: -            |                    |                  |
| HOLD TX              |                    |                  |
| CHNL<br>SP           | HOLD/<br>CLEAR     | SWITCH<br>GEN/RX |
|                      | ZERO               | POWER<br>METER   |

#### COMM SSB Mode Screen

| COMM SSB             | RF I/O             | BAT 1.2 Hr     |
|----------------------|--------------------|----------------|
| FREQ: 10.0000 MHz    | RF LVL: - 50.0 dBm |                |
| SIDE BAND: UPPER     | MOD TONE: 1000 Hz  |                |
| RECEIVING            |                    |                |
| TX FREQ: - TX PWR: - |                    |                |
| AUDIO FREQ: -        |                    |                |
| HOLD TX              |                    |                |
| HOLD/<br>CLEAR       | SWITCH<br>GEN/RX   | ZERO           |
|                      |                    | POWER<br>METER |

### SCREEN HIERARCHY (cont)

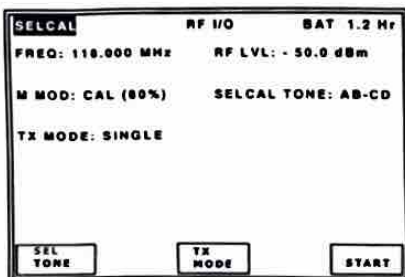
#### SWR



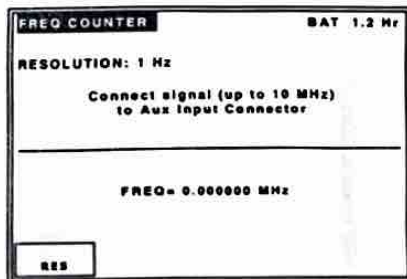
#### 406 BEACON Mode Screen



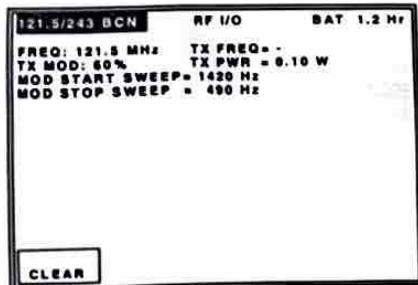
#### SELCAL Mode Screen



#### FREQUENCY COUNTER Mode Screen



#### 121.5/243 BEACON Mode Screen

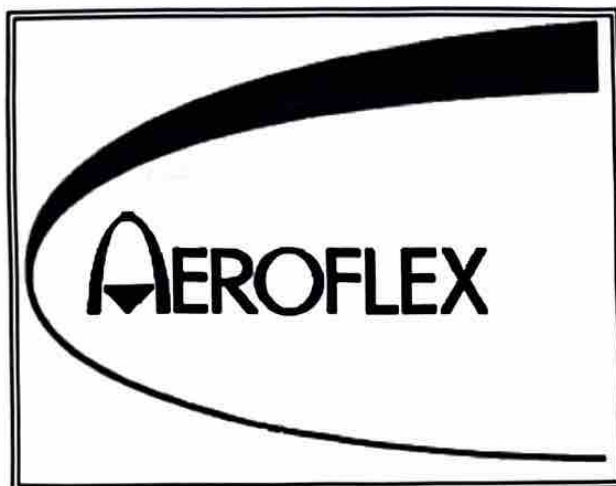


### SELF TEST

The IFR 4000 is equipped with a Self Test for quick performance evaluation. An abbreviated Self Test is run at Power-Up. The full Self Test is initiated manually.

#### POWER-UP

Press the POWER Key on the IFR 4000 to display the Startup Screen.



After several seconds, the VOR Mode Screen is displayed.

|                         |                           |                     |            |                     |
|-------------------------|---------------------------|---------------------|------------|---------------------|
| <b>VOR</b>              | <b>RF I/O</b>             | <b>BAT 1.2 Hr</b>   |            |                     |
| <b>FREQ:108.000 MHz</b> | <b>RF LVL: - 50.0 dBm</b> |                     |            |                     |
| <b>M MOD: CAL (60%)</b> | <b>MOD TONE:OFF</b>       |                     |            |                     |
| <b>BRG: 0.0 deg</b>     | <b>TO/FROM: TO</b>        |                     |            |                     |
| <b>30 Hz MOD: 30%</b>   | <b>9960 Hz MOD:30%</b>    |                     |            |                     |
|                         | <b>TONE DEL:-</b>         |                     |            |                     |
| <b>30<br/>MOD</b>       | <b>9960<br/>MOD</b>       | <b>TONE<br/>DEL</b> | <b>BRG</b> | <b>TO/<br/>FROM</b> |

### SELF TEST (cont)

#### RUN SELF TEST

| STEP | PROCEDURE |
|------|-----------|
|------|-----------|

1. Press the SETUP Key to display the Setup Menu.

|                            |                          |                          |                      |             |
|----------------------------|--------------------------|--------------------------|----------------------|-------------|
| <b>SETUP</b>               |                          | <b>BAT 1.2 Hr</b>        |                      |             |
| <b>PORT: RF I/O</b>        | <b>FREQ: PRESET</b>      |                          |                      |             |
| <b>AP SWP RATE: 20 sec</b> | <b>VOR BRG: FIXED</b>    |                          |                      |             |
| <b>EXT ATTN: 0.0 dB</b>    | <b>PWR DWN: 10 mins</b>  |                          |                      |             |
| <b>ILS UNITS: DDM</b>      | <b>RF LVL UNITS: dBm</b> |                          |                      |             |
| <b>KEY CLICK: OFF</b>      | <b>MORSE CODE: IFR</b>   |                          |                      |             |
| <b>AUDIO: OFF</b>          |                          |                          |                      |             |
| <b>NEXT<br/>PARAM</b>      | <b>GUIDED<br/>TEST</b>   | <b>STORE/<br/>RECALL</b> | <b>H/W<br/>TOOLS</b> | <b>INFO</b> |

2. Press the H/W TOOLS Soft Key to display the Hardware Tools Screen.

**NOTE:** MICRO VER is only displayed when the ELT Option Hardware is installed.

|                       |              |                   |               |
|-----------------------|--------------|-------------------|---------------|
| <b>HARDWARE TOOLS</b> |              | <b>BAT 1.2 Hr</b> |               |
| <b>S/N 999999999</b>  |              |                   |               |
| <b>MICRO VER 1.2</b>  |              |                   |               |
| <b>MICRO OPT 1</b>    |              |                   |               |
| <b>RS232</b>          | <b>DIAGS</b> | <b>CAL</b>        | <b>RETURN</b> |

### SELF TEST (cont)

STEP PROCEDURE

3. Press the DIAGS Soft Key to display the Diagnostics Screen.

|                      |   |               |      |
|----------------------|---|---------------|------|
| <b>DIAGNOSTICS</b>   |   | BAT 1.2 Hr    |      |
| AMBIENT TEMPERATURE  | = | 84 F          | 29 C |
| RF BLOCK TEMPERATURE | = | 82 F          | 28 C |
| <b>SELF TEST</b>     |   | <b>RETURN</b> |      |

4. Press the SELFTEST Soft Key to display the Self Test Screen.

|                                                          |      |               |      |
|----------------------------------------------------------|------|---------------|------|
| <b>SELF TEST</b>                                         |      | BAT 1.2 Hr    |      |
| RAM                                                      | ---- | Lock Det      | ---- |
| Flash                                                    | ---- | Lvl Det       | ---- |
| CPLD                                                     | ---- | SWR           | ---- |
| NVRAM                                                    | ---- | Freq Ctr      | ---- |
| FPGA                                                     | ---- | Localizer     | ---- |
| USB                                                      | ---- | Marker        | ---- |
| Keypad                                                   | ---- | Pwr Det       | ---- |
| Battery                                                  | ---- | Ant Prot      | ---- |
| Disconnect cables from ports<br>before running self test |      |               |      |
| <b>RUN</b>                                               |      | <b>RETURN</b> |      |

The Self Test cannot be performed until the IFR 4000 has finished the warm-up cycle. If the user attempts to initiate the Self Test before the IFR 4000 is ready, the following message is displayed:

**Instrument warming up**

**Please wait xx secs**

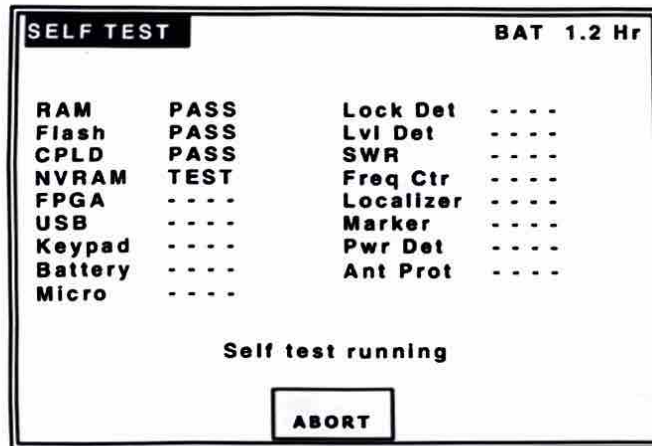
The message counts down to zero (0) then the Self Test can be initiated.

## SELF TEST (cont)

STEP PROCEDURE

---

5. Press the RUN Soft Key to initiate the Self Test.



6. Verify all the modules/assemblies pass the Self Test.
- If the battery test fails, the battery needs to be charged.
  - If any other failure occurs, refer to the IFR 4000 Operation Manual for more information.



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**FOR QUALIFIED SERVICE  
PERSONNEL ONLY**

**BATTERY/VOLTAGE INSTRUCTIONS**



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### SAFETY FIRST: TO ALL SERVICE PERSONNEL

**REFER ALL SERVICING OF UNIT TO QUALIFIED TECHNICAL PERSONNEL.**

**WARNING: USING THIS EQUIPMENT IN A MANNER NOT SPECIFIED BY THE ACCOMPANYING DOCUMENTATION MAY IMPAIR THE SAFETY PROTECTION PROVIDED BY THE EQUIPMENT.**

#### CASE, COVER OR PANEL REMOVAL

Opening the Case Assembly exposes the technician to electrical hazards that can result in electrical shock or equipment damage.

#### SAFETY IDENTIFICATION IN TECHNICAL MANUAL

This manual uses the following terms to draw attention to possible safety hazards, that may exist when operating or servicing this equipment.

**CAUTION: THIS TERM IDENTIFIES CONDITIONS OR ACTIVITIES THAT, IF IGNORED, CAN RESULT IN EQUIPMENT OR PROPERTY DAMAGE (E.G., FIRE).**

**WARNING: THIS TERM IDENTIFIES CONDITIONS OR ACTIVITIES THAT, IF IGNORED, CAN RESULT IN PERSONAL INJURY OR DEATH.**

#### SAFETY SYMBOLS IN MANUALS AND ON UNITS



**CAUTION:** Refer to accompanying documents. (This symbol refers to specific CAUTIONS represented on the unit and clarified in the text.)



**AC OR DC TERMINAL:** Terminal that may supply or be supplied with ac or dc voltage.



**DC TERMINAL:** Terminal that may supply or be supplied with dc voltage.



**AC TERMINAL:** Terminal that may supply or be supplied with ac or alternating voltage.

#### EQUIPMENT GROUNDING PRECAUTION

Improper grounding of equipment can result in electrical shock.

#### USE OF PROBES

Check specifications for the maximum voltage, current and power ratings of any connector on the Test Set before connecting it with a probe from a terminal device. Be sure the terminal device performs within these specifications before using it for measurement, to prevent electrical shock or damage to the equipment.

#### POWER CORDS

Power cords must not be frayed, broken nor expose bare wiring when operating this equipment.

#### USE RECOMMENDED FUSES ONLY

Use only fuses specifically recommended for the equipment at the specified current and voltage ratings.

## SAFETY FIRST: TO ALL SERVICE PERSONNEL (cont)

**WARNING:** THE IFR 4000 USES A LITHIUM ION BATTERY PACK. THE FOLLOWING WARNINGS CONCERNING LITHIUM ION BATTERIES MUST BE HEEDED:

- DO NOT RECHARGE OUTSIDE THE IFR 4000.
- DO NOT CRUSH, INCINERATE OR DISPOSE OF IN NORMAL WASTE.
- DO NOT SHORT CIRCUIT OR FORCE DISCHARGE AS THIS MIGHT CAUSE THE BATTERY TO VENT, OVERHEAT OR EXPLODE.

**CAUTION:** INTEGRATED CIRCUITS AND SOLID STATE DEVICES SUCH AS MOS FETS, ESPECIALLY CMOS TYPES, ARE SUSCEPTIBLE TO DAMAGE BY ELECTROSTATIC DISCHARGES RECEIVED FROM IMPROPER HANDLING, THE USE OF UNGROUNDED TOOLS AND IMPROPER STORAGE AND PACKAGING. ANY MAINTENANCE TO THIS UNIT MUST BE PERFORMED WITH THE FOLLOWING PRECAUTIONS:

- BEFORE USE IN A CIRCUIT, KEEP ALL LEADS SHORTED TOGETHER EITHER BY THE USE OF VENDOR-SUPPLIED SHORTING SPRINGS OR BY INSERTING LEADS INTO A CONDUCTIVE MATERIAL.
- WHEN REMOVING DEVICES FROM THEIR CONTAINERS, GROUND THE HAND BEING USED WITH A CONDUCTIVE WRISTBAND.
- TIPS OF SOLDERING IRONS AND/OR ANY TOOLS USED MUST BE GROUNDED.
- DEVICES MUST NEVER BE INSERTED INTO NOR REMOVED FROM CIRCUITS WITH POWER ON.
- PC BOARDS, WHEN TAKEN OUT OF THE SET, MUST BE LAID ON A GROUNDED CONDUCTIVE MAT OR STORED IN A CONDUCTIVE STORAGE BAG. REMOVE ANY BUILT-IN POWER SOURCE, SUCH AS A BATTERY, BEFORE LAYING PC BOARDS ON A CONDUCTIVE MAT OR STORING IN A CONDUCTIVE BAG.
- PC BOARDS, IF BEING SHIPPED TO THE FACTORY FOR REPAIR, MUST BE PACKAGED IN A CONDUCTIVE BAG AND PLACED IN A WELL-CUSHIONED SHIPPING CONTAINER.



**CAUTION:** SIGNAL GENERATORS CAN BE A SOURCE OF ELECTROMAGNETIC INTERFERENCE (EMI) TO COMMUNICATION RECEIVERS. SOME TRANSMITTED SIGNALS CAN CAUSE DISRUPTION AND INTERFERENCE TO COMMUNICATION SERVICES OUT TO A DISTANCE OF SEVERAL MILES. USERS OF THIS EQUIPMENT SHOULD SCRUTINIZE ANY OPERATION THAT RESULTS IN RADIATION OF A SIGNAL (DIRECTLY OR INDIRECTLY) AND ENSURE COMPLIANCE WITH INSTRUCTIONS IN FAA CIRCULAR AC 170-6C, DATED FEBRUARY 19, 1981.

## FOR QUALIFIED SERVICE PERSONNEL ONLY

### FUSE REPLACEMENT

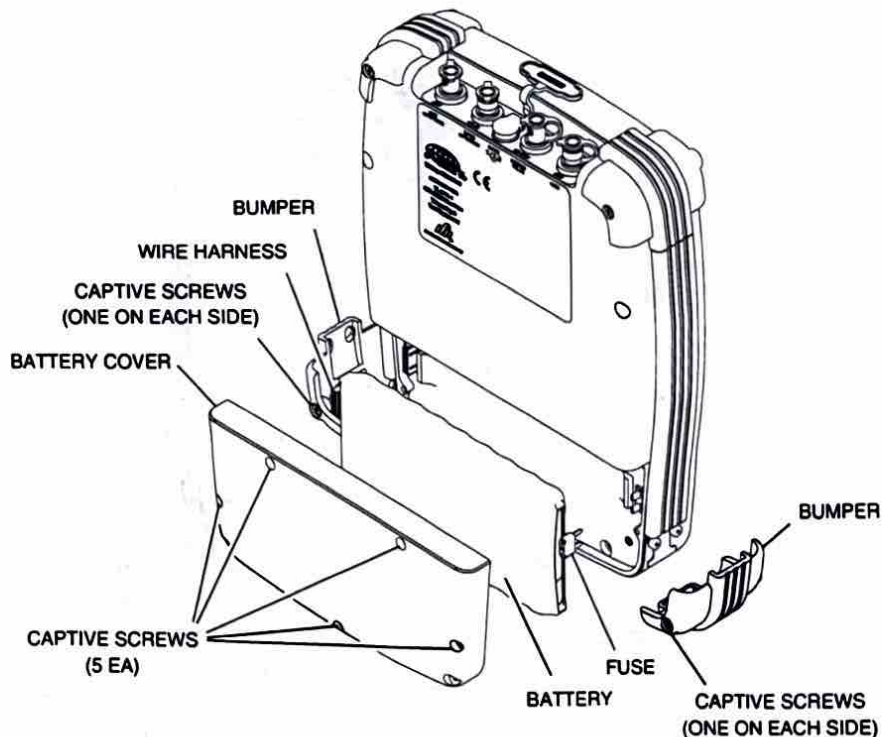
| STEP | PROCEDURE |
|------|-----------|
|------|-----------|

1. Verify the IFR 4000 is OFF and not connected to AC power.
2. Fully loosen two captive screws in the two lower bumpers and remove the bumpers.
3. Fully loosen five captive screws and lift the Battery Cover from the Case Assembly.
4. Replace fuse:

5 A, 32 Vdc, Type F  
(Mini Blade Fuse)  
(Aeroflex PN: 56080 [5106-0000-057])

**CAUTION:** FOR CONTINUOUS PROTECTION AGAINST FIRE, REPLACE ONLY WITH FUSES OF THE SPECIFIED VOLTAGE AND CURRENT RATINGS.

5. Install the Battery Cover on the Case Assembly and tighten the five captive screws (8 in/lbs.).
6. Install the two lower bumpers and tighten the two captive screws in each bumper (8 in/lbs.).



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## FOR QUALIFIED SERVICE PERSONNEL ONLY

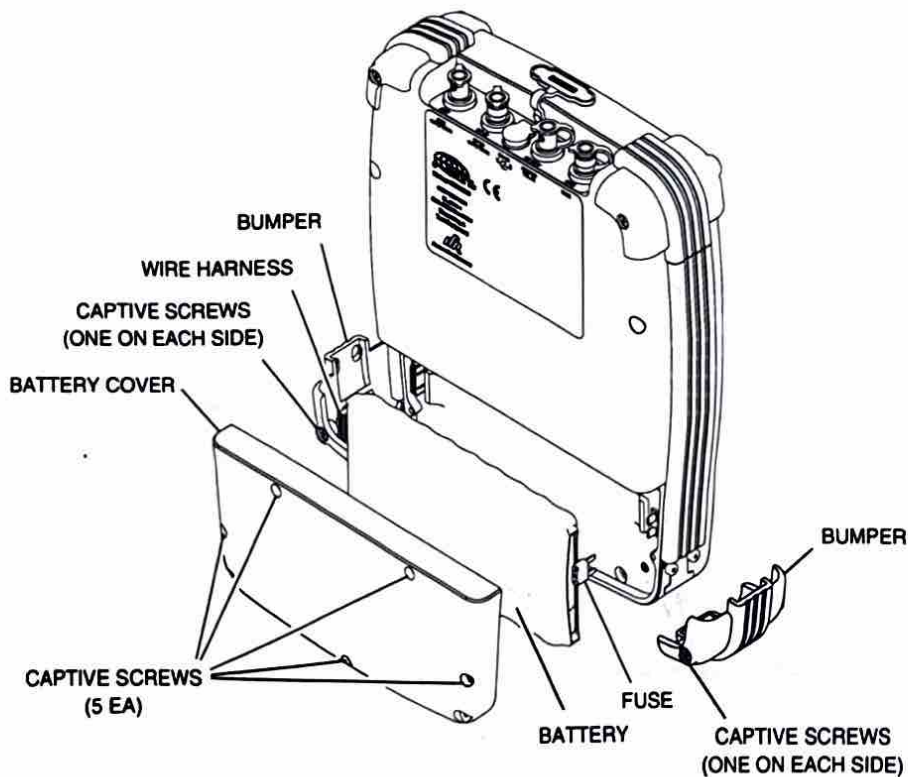
### BATTERY REPLACEMENT

| STEP | PROCEDURE |
|------|-----------|
|------|-----------|

1. Verify the IFR 4000 is OFF and not connected to AC power.
2. Fully loosen two captive screws in the two lower bumpers and remove the bumpers.
3. Fully loosen five captive screws and lift the Battery Cover from the Case Assembly.
4. Disconnect the wire harness connecting the battery to the Test Set and remove the battery.
5. Install new battery and reconnect the wire harness.
6. Install the Battery Cover on the Case Assembly and tighten the five captive screws (8 in/lbs.).
7. Install the two lower bumpers and tighten the two captive screws in each bumper (8 in/lbs.).

**WARNING: DISPOSE OF OLD BATTERY ACCORDING TO LOCAL STANDARD SAFETY PROCEDURES.**

**CAUTION:** REPLACE ONLY WITH THE BATTERY SPECIFIED BY AEROFLEX. DO NOT ATTEMPT TO INSTALL A NON-RECHARGEABLE BATTERY.



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