McDowell Research
AN ULTRALIFE COMPANY

MRC-82A
Interoperable Power Adapter and Charger (IPAC)

Operation Manual

Copyright

Revision History

Version	Description of Change	Effective Date
REV: C	Previous revision.	JAN 00 2008
REV: D	This manual has been updated to reflect the new template design.	MAY 01 2008

Disclaimer of Liability

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1 ABOUT THIS MANUAL

This manual has been prepared by McDowell Research, an Ultralife Company, for the purpose of providing the information necessary to operate and maintain the MRC-82A Interoperable Power Adapter and Charger (IPAC).

1.1 Symbols Used

The symbols shown in this section appear throughout this manual, the first one shown being the *NOTE* symbol, below, which is self-explanatory.

NOTE: *Note statements contain important information that may affect how you use this product.*

The other symbols represent *important safety advice*, and they appear throughout this manual in the form of *WARNINGS* and *CAUTIONS* against possible hazards to people or equipment, respectively. These safety *WARNINGS* and *CAUTIONS* must be followed at all times. They are flagged by use of a triangular alert icon shown just to the left of the cautionary advice given, as shown below:

WARNING: *Warning statements mean danger. They identify practices, procedures or conditions such as high voltage that could result in injury or loss of life and which, therefore, require extreme care before proceeding.*

CAUTION: *Caution statements denote a hazard. They identify practices, procedures or conditions that could result in damage to or destruction of this product or other equipment or property.*

McDowell Research assumes no liability for the customer's failure to comply with these *WARNINGS* and *CAUTIONS*.

1.2 General Safety Instructions

WARNING: *This manual contains important safety and operating instructions for the MRC-82A. Before using the MRC-82A, read all instructions in this manual and cautionary markings, if any, on the device. Specifically:*

- *Do not operate the MRC-82A if it has received a sharp blow, been dropped, or otherwise damaged in any way; take it to a qualified repair technician for servicing.*
- *Do not disassemble the MRC-82A; take it to a qualified repair technician when service or repair is required. Incorrect reassembly may result in a risk of electric shock or fire.*
- *To reduce risk of electric shock, unplug the MRC-82A from its power source before attempting any maintenance or cleaning. Turning off controls will not eliminate this risk.*
- *If there are any questions regarding maintenance or safety-of-use issues pertaining to the MRC-82A , please contact our service department at:*

Service Department
McDowell Research, an Ultralife Company
(PHONE) (315) 332-7100 (FAX) (315) 331-7800
(Email) service@mcdowellresearch.com

2 PRODUCT DESCRIPTION

The MRC-82A IPAC (Figures 1 and 2) provides 26.5 VDC (nominal) of uninterruptible power under varying input/output conditions. Operation from either an AC or DC input, the versatility of the MRC-82A IPAC makes it suitable for a variety of applications and systems, including the AN/PSC-5 (EMUT), AN/PRC-113, AN/PRC-138 and the AN/URC-200 Transceivers.

WARNING: *Only a MRC-2590 or BB2590 lithium ion rechargeable battery may be used. Under no circumstances should a BB-590/U or metal hydride (BB-390/U) battery be substituted for this unit.*

Figure 1 MRC-82A Interoperable Power Adapter and Charger

Figure 2 MRC-82A attached to AN/PRC-117F with MRC-67A Speaker, Cables, Handset and Antenna

2.1 Required/Supplied Equipment

Provided with the MRC-82A, Interoperable Power Adapter and Charger, is an AC and DC power cable and this technical manual, as shown in the table below. The DC portion of this cable is intended for temporary use only. For permanent installations, MRC recommends an input power cable be fabricated keeping all AC and DC leads as short as possible. Connect ground leads to a known ground to prevent any spurious RF/EMI from affecting the operation of the transceivers.

Equipment	Quantity
MRC-82A IPAC	1
PCP35-00-01 AC Input Power Cable	1
PCP65-00-01 DC Input Power Cable	1
Operator Manual	1

The AC and DC power cables, necessary to properly operate the MRC-82A, are shown in Figures 3 and 4, respectively. MRC offers two optional DC Input Power Cables (not shown) for operational requirements requiring longer DC cables operating directly from vehicle or other DC Power Systems.

WARNING: *Extreme care must be exercised if power cables are fabricated since dangerous and potentially lethal voltages are present within the unit.*

Also, under no circumstances should any other battery be substituted for the MRC-2590 or the BB2590 battery provided with this unit.

CAUTION: *The MRC-82A must be connected to an external power source at least every 90 days for 12 hours to ensure the internal battery is maintained.*

CAUTION: *It is recommended that a MRC-2590 or a BB2590 lithium ion rechargeable battery be installed in the MRC-82A prior to operating the unit.*

CAUTION: *When using the MRC-82A with an AN/PSC-5 transceiver, the MRC-82A battery must be disarmed at the end of operations. The AN/PSC-5 will deplete the internal battery in the MRC-82A, although the AN/PSC-5 is turned off, unless the MRC-82A is connected to a reliable power source.*

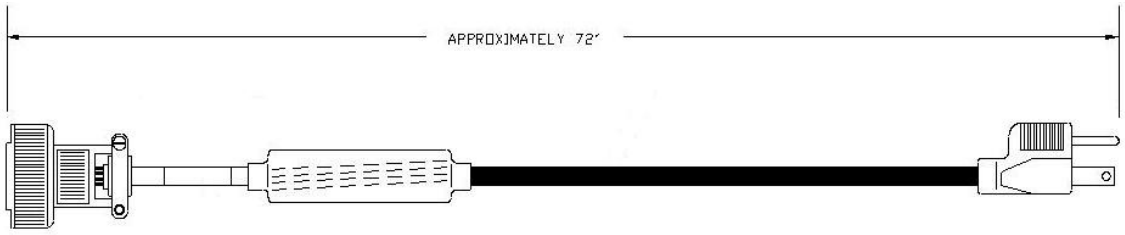

Figure 3 PCP35-00-01 AC Input Power Cable

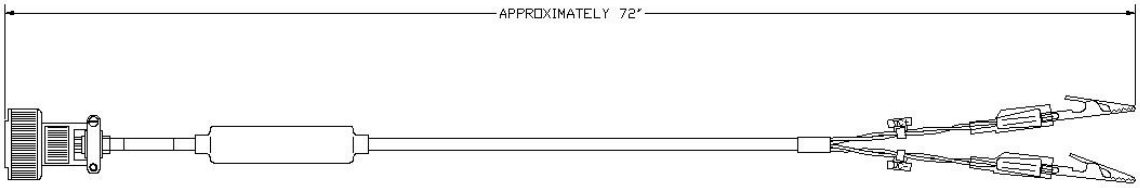

Figure 4 PCP65-00-01 DC Input Cable (Battery Terminal Adapter)

2.2 Features

The MRC-82A has the following features:

- Provides uninterruptible 26.5 VDC (nominal) output under varying external load conditions.
- The integrated, internal battery system can be recharged while the equipment is operating. Battery backup operations can be "Armed" or "Disarmed" with an external switch located on the side of the MRC-82A, near the output connector.
- Allows operation of 26.5 VDC equipment from DC Voltage source ranging from 9 VDC to 36 VDC -OR- for operation from an AC Voltage power source between 95 VAC and 265 VAC at frequencies of 47 Hz to 440 Hz. This encompasses most aircraft, ship, and other DC or AC generating systems, both domestic and foreign.
- All input and output circuits are EMI filtered.
- Provides regulated DC output power and charges battery simultaneously from almost any input power source, including solar panels and wind generators.

- No shipping or handling restrictions. (Battery has the same shipping and handling classification as an ordinary flashlight battery.)

2.3 Physical Description

The MRC-82A IPAC (Figure 5) is a self contained unit measuring 6.250 inches long, 2.875 inches wide, and 9.201 inches deep. The Radio Power Output Connectors are located on the top of the MRC-82A. The AC/DC Input Power Connector and the Auxiliary Power Connector are located on one side of the MRC-82A. The Vent Valve and Heat Sink are located on the front side. Three (3) Lenses for LEDs are located on the same side as the Power Connectors. Located on each side is an over-center latch to attach the MRC-82A to the applicable Transceiver.

Internally, the MRC-82A contains the following: **Control Board** - Located on this PCB are the output circuit breakers and all control circuits. **Filter Board -** Located on this PCB are input power circuit breakers, battery charge circuit and input power line filters. **DC Module** - Potted module used for transforming input DC voltage to regulated 26.5 VDC (nominal) output. **AC Module** - Potted module used for transforming input AC voltage to regulated 26.5 VDC output. **Battery** – MRC-2590 and BB2590 rechargeable Lithium Ion batteries.

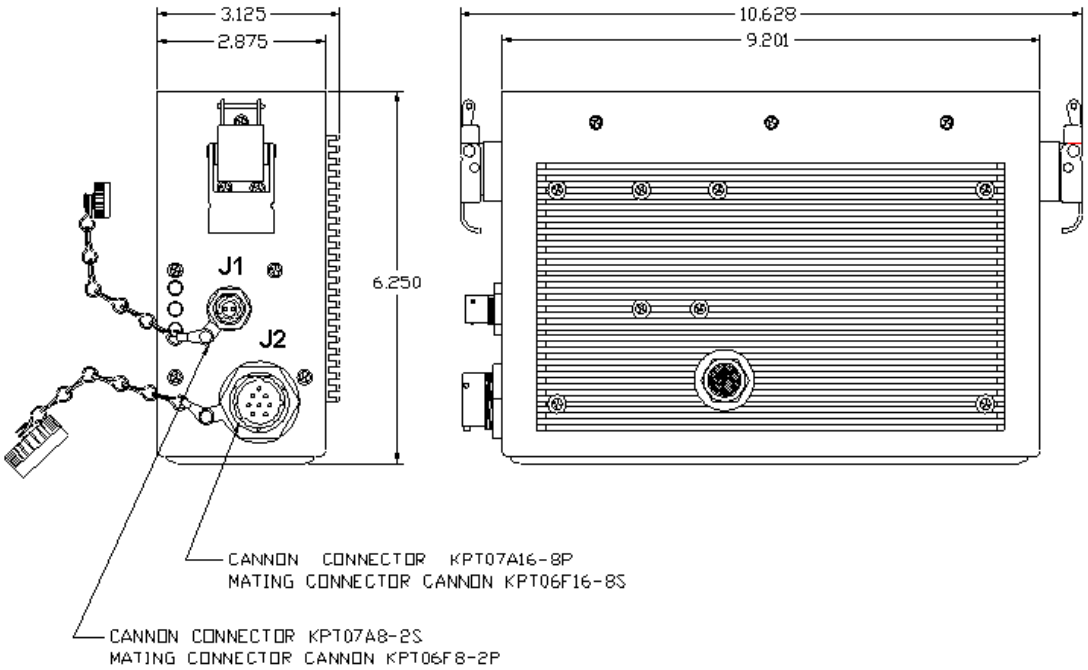

Figure 5 MRC-82A Layout and Dimensions

2.4 Functional Description

Input power (AC or DC) is provided through Input Power Connector J1 (large eight pin male connector). Output power to the radio is provided through Radio Power Connector – J6 (battery connector on inside top panel). Auxiliary power out of 26.5 VDC at 1 Amp is provided through Auxiliary Power Connector J3 (small two socket female connector). This power is intended for use by a TSEC/KY-57, TSEC/KY-99 or equivalent Encryption Unit and MRC-67A Amplified Speaker.

The MRC-82A is connected directly to the Transceiver in the same manner as a typical battery box would be connected, and is secured with the two over-center latches. Circuits for power conversion, status monitoring, and battery charging, are contained inside the MRC-82A.

- **Control PCB** - Contains the output power circuit breakers and the LED indicator circuits.
- **DC Module -** Contains the circuitry for transforming the 9 to 36 VDC input to a regulated 26.5 VDC (nominal) output.
- **AC Module -** Contains the circuitry to transform the 95 to 265 VAC, 47 TO 440 Hz input power to a regulated 26.5 VDC (nominal) output.
- **Filter Board Assembly -** The filter board serves as the main interconnection for the AC module, DC module, input power and internal battery. It contains input power line circuit breakers, steering diode logic circuits for DC voltages into and out of the Power Modules, and differential and common mode filter circuits.
- **MRC-2590 AND BB2590 Rechargeable Lithium Ion Batteries -** Provides back-up power when AC or DC input power is lost or not available.
- **LED Indicators -** There are three (3) light emitting diodes (LEDs) located on the Control Board inside the unit with (3) three lenses on the side of the MRC-82A, providing the operator with MRC-82A status information.

3 OPERATION

This section provides a basic operational description of the MRC-82A Interoperable Power Adapter and Charger (IPAC) and its assemblies/major components.

The MRC-82A IPAC provides output of 26.5 VDC (nominal) to power the AN/PSC-5 (EMUT), AN/PRC-113, AN/PRC-138, AN/PRC-117F and AN/URC-200 series Transceivers and ancillary equipment from either 9 to 36 VDC or 95 to 265 VAC input.

The MRC-82A can be connected to external AC and DC power sources as well as allowing the Transceiver to operate from the internal battery without an external power source connected. The MRC-82A can be connected to both AC and DC sources at the same time without damage to the unit. The MRC-82A automatically prioritizes the input power such that the unit will select the AC input power whenever it is available. If the AC external power is lost or interrupted, the MRC-82A will automatically revert to the DC power. If DC power is lost or interrupted, the MRC-82A will operate from the internal battery. If AC power is available the DC power module is shut off to prevent the DC power module from drawing power.

NOTE: *It is highly recommended that a MRC-2590 or BB2590 lithium ion rechargeable battery be installed in the unit prior to operating the MRC-82A. The AC and DC modules are designed to operate the transceiver in any mode; however, if external power is lost, codes could be lost unless a battery is installed.*

3.1 Controls and Indicators

There are three (3) light emitting diodes (LEDs) located on the Control Board inside the unit with three (3) lenses on the side of the MRC-82A providing the operator with status information. The top LED lens is illuminated (green) when the battery is supplying power. The middle LED lens is illuminated (amber) when the DC module is supplying power. The bottom LED lens is illuminated (green) when the AC module is supplying power.

3.2 Power Sources

The MRC-82A IPAC operates from one of the following power sources:

- AC input voltage between 95 and 265 volts, single phase, 47 Hz to 440 Hz.
- DC input voltage between 11 and 36 volts - This may be from a DC power supply, external batteries, solar panels or wind generators.
- MRC-2590 or BB2590 Lithium Ion Rechargeable Batteries

3.3 Power Installation

1. Install a MRC-2590 or BB2590 Lithium Ion Rechargeable Battery prior to connecting the MRC-82A to a Transceiver.

    A. Place the battery pull strap in position so that when the battery is inserted, the strap slides in and wraps around the battery.
    B. Install the battery with the connector up.

    C. Connect the battery cable to the battery.

    D. Place the battery cover over the battery, padded side down, and install screws to secure cover.

2. Orient the MRC-82A so that the Radio Power Connector on the MRC-82A and the Power Input Connector on the radio match.

3. Mate the two connectors and latch with the over-center latches mounted on the sides of the MRC-82A.

4. Input power will be provided by connecting the Input Power Cable to the Input Power Connector J1 (large 8 pin male connector). The other end of the cable will then be connected to the appropriate power source.

3.4 Input Circuits

Input power is protected with self-resetting circuit breakers which will automatically reset in two (2) to three (3) minutes after the fault is removed. The DC input additionally has a transient voltage suppression device to protect the MRC-82A up to a 100 VDC surge. This device works in conjunction with the input circuit breaker.

3.5 AC Module

The AC Module accepts input voltages of 95 to 265 VAC, 47 to 440 Hz, and outputs regulated 26.5 VDC (nominal).

3.6 DC Modules

The DC Module accepts input voltages of 9 to 36 VDC and provides a regulated 26.5 VDC (nominal) output.

3.7 Battery

The MRC-2590 or BB2590 Lithium Ion Rechargeable battery is used in the 26.5 VDC mode. The MRC-82A provides a continuous recharge of the battery whenever the MRC-82A is connected to an external power source. The battery can be recharged while the Transceiver is being operated. No operator action or special maintenance is required.

If the MRC-82A is not used for more than a ninety (90) day period, it is recommended the MRC-82A be connected to an external power source for twelve (12) hours to top off the battery to assure maximum battery performance. When using the MRC-82A with the AN/PSC-5 Transceiver it is recommended that the MRC-82A be "Disarmed" at the end of operations. Although the PSC-5 is switched "OFF" it will continue to draw the MRC-2590 or BB2590 down to an 18 VDC level, at which time the battery will be disconnected.

To "Disarm" the battery, push and hold the "DISARM" switch for three (3) to five (5) seconds. After releasing the switch, the green LED indicator should be off. This action removes the battery power to the Transceiver.

3.8 Switch Circuit

The internal MRC-2590 or BB2590 Lithium Ion Rechargeable battery is activated in one of two methods. The first method is with the loss of external power connected to the MRC-82A. Upon the loss of an appropriate AC or DC power source (reference Chapter 6, Specifications), battery power will automatically be switched to the Transceiver.

The second method is if an operator wishes to operate the Transceiver from the internal battery without first connecting to an external power source. The operator must push and momentarily hold the "ARM" switch, then release. This action of pushing the switch "Arms" the battery allowing the battery to power the Transceiver.

4 MAINTENANCE

Maintenance for the MRC-82A is described in the following sections.

4.1 Cleaning

Cleaning of the MRC-82A is described in the following sections.

4.1.1 Dirt and Dust

All external components to the MRC-82A can be cleaned with a water dampened non-abrasive cloth and allowed to air dry or wipe dry with a clean dry non-abrasive cloth.

4.1.2 Oils and Grease

All external components of the MRC-82A can be cleaned with a mild soap/water solution dampened non-abrasive cloth. Rinse with water dampened non-abrasive cloth and allowed to air dry or wipe dry with a clean dry non-abrasive cloth.

4.2 Corrective Maintenance

The MRC-82A has NO user serviceable parts. Units requiring corrective maintenance should be sent to McDowell Research for repair. Contact information is provided in the next chapter.

5 CUSTOMER ASSISTANCE

5.1 Warranty Information

Warranty Statement

4 years for equipment shipped after May 1, 2004.

3 years for equipment shipped prior to May 1, 2004.

McDowell Research warrants to its customers that the products it manufactures and sells will be free from defects in materials and workmanship for a period of four (4) years for equipment shipped after May 1, 2004.

This warranty shall not apply to any defect, failure or damage caused by improper use or inadequate maintenance and care. McDowell shall not be obligated to provide service under this warranty to repair, service, or modify these products.

In order to obtain service under this warranty, customers must return a failed unit to McDowell with a description of the failure, contact information (in case questions arise and to speed up processing of guarantee claims) and finally a return shipping address. McDowell will return any failed unit at McDowell's cost.

NOTE: *This warranty does not apply to batteries supplied by McDowell Research. All batteries supplied by McDowell Research are warranted for 90 days from date of shipment.*

5.2 Contact/Return Information

Please call (315) 332-7100 to obtain an RMA number prior to returning any failed unit(s) to:

McDowell Research, an Ultralife Company
2000 Technology Parkway
Dock "X"
Newark, New York 14513
Phone: (315) 332-7100
Fax: (315) 331-7800

Online RMA requests can be located and submitted at:
http://www.mcdowellresearch.com/rma_form.php or
service@mcdowellresearch.com

6 SPECIFICATIONS

Table 1: Physical Characteristics

Dimension	Measurement
Width	2.875 inches
Length	6.250 inches
Depth	9.201 inches
Weight with Battery	7.20 lbs.
Weight without Battery	3.75 lbs.

Table 2: Environmental Characteristics

Dimension	Measurement
Storage Temperature	-50° C to +65° C
Operating Temperature	-30° C to +60° C
Relative Humidity	95%
Storage Altitude	55,000 ft.
Operating Altitude	27,000 ft.
Immersion	10 ft. (if the Transceiver has a bottom gasket seal)

Table 3: Electrical Characteristics

Dimension	Measurement
DC Input Range	9-36 VDC MIL-STD-1275
AC Input Range	95-265 VAC, 47-440 HZ
DC Output	26.5 VDC @ 5.5 Amps 26.5 VDC @ 7 Amps Peak