



GRAYWACKE
Engineering, Inc.

User/Technical Manual

GEI24-RPA-T

24 volt Radio Power Adaptor





GEI24-RPA-T Contents list:

- ✓ **RPA-24 4 shelf tower – 1 ea**
- ✓ **8 ft. AC input power cord - 1 ea**
- ✓ **25 ft. 6 awg DC mini NATO cable harness - 1 ea**
- ✓ **Neoprene rubber radio adaptor gaskets – 4 ea**
- ✓ **Battery Box extension ring - 8 ea**
- ✓ **Knurled 10-24 x 1/2" shelf knob – 8 ea**
- ✓ **Shelf “L” securing bracket – 8 ea**
- ✓ **User/Technical Manual - 1 ea**
- ✓ **User/Technical Manual CD - 1 ea**
- ✓ **Trouble Shoot Guide - 1 ea**



General Information

The GEI -24 RPA produces power for the following 12 and 24 VDC radio equipment applications:

- ✓ AN119
- ✓ PRC113
- ✓ PRC104
- ✓ PRC150
- ✓ PRC117 (117G Included)
- ✓ PSC-5
- ✓ 12V SINGGARS

without the use of communication batteries. Instead it powers the radios using 110v – 240 VAC (shore power or generator) and/or 24v DC. While GEI 24-RPA-t will provide power to Harris Radios using either power source independently, it is most effective when both AC and 24v DC are used together because that provides you with an uninterrupted power supply for your radios. GEI 24-RPA-t is designed to lie on its side, back, or stand upright.

Operational Features

Main power rocker switch
Individual accessory shelf power switch
Main power lamp - green
Individual accessory shelf lamp - green
AC input resettable circuit protection - 15 amps
DC input resettable circuit protection - 40 amps
DC input battery style quick disconnect
AC input cable - 8'
DC mini NATO style 6 ga. cable harness - 20'
Color - Tan
Flexible, low profile, nylon carrying handles
5590, 2590 style battery adaptor connectors

Capabilities & Power Requirements

When the GEI24-RPA-t is used with both 120/240v AC and 24DC it provides unmatched reliability. In the event of a loss of AC power, GEI24-RPA-t will continue to power the radios using the 24v DC source. To ensure the 24v battery is up to the task, the GEI24-RPA-t charges the battery as long as the AC is providing power but it will not over charge the battery. When AC alone is used to power GEI24-RPA-t, it provides a clean DC output voltage. It must be kept in mind that if AC is lost (generator failure for example) then power to the radios is lost until AC is restored. Losing power like this will not harm the GEI24-RPA-t although communications will be lost. When 24v DC is used, the GEI24-RPA-t will continue to supply power as long as the battery is capable. The battery can be installed in a vehicle or free standing. The length of time the radios can be run on a battery without recharging is dependent on several factors:

- Condition of the battery
- State of charge of the battery
- Reserve Capacity (RC) of the battery
- The amount of use of the nets each radio represents.

CAUTION: If the 24v DC battery the GEI 24-RPA-t is connected to is unserviceable, the e GEI 24-RPA-t external circuit breaker on the front of the GEI 24-RPA-t will pop out/disconnect when the AC is plugged in

GENERAL SPECIFICATIONS

Efficiency	85% typical
Isolation Voltage (input to output)	1500VDC min
Isolation Voltage (input to case & output to case)	750VDC
Isolation Resistance (input to output)	>100 M Ohms
Switching Frequency (Fixed)	400 kHz \pm 10%
Minimum Load	none required
Weight (Tower with accessory cables)	57.6 lbs
Dimensions	23.50 L x 14.00 W x 16 D
Working Temperature Range	0 - 51C
Storage Temperature	-20 to 80C

12/24 VDC Accessory Outputs:

Pin Configuration:	pin 1(-), pin 2(+) - 12 VDC Pin 4(-), pin 3(+) - 12 VDC
---------------------------	--

INPUT SPECIFICATIONS

Input AC Voltage Range	90 VAC - 132 VAC, 216 VAC - 240 VAC
Input DC Voltage Range	18-36 VDC
Nominal DC Input	24 VDC
Input Voltage Lockout	<16 >38VDC
Input Filter	Pi input filter
Input Reflected Ripple	20mA p-p

OUTPUT SPECIFICATIONS

Output Current	pin 1(-), pin 2(+) - 4 amp Pin 4(-), pin 3(+) - 4 amp
Output Voltage Tolerance	\pm 1% max
External Output Trim	\pm 10%
Line Regulation	\pm 0.1%
Load Regulation	\pm 0.1%
Short Circuit Protection	Continuous
Over Voltage Protection	approx. 120% V out, self-resetting
Ripple/Noise (20MHz BW)	1.5% V out
Current Limiting Inception	approx. 125%
Thermal Overload	+110°C base plate, self-resetting

24 VDC BATTERY CHARGER SPECIFICATIONS:

(Note: Specifications represent usage exclusively for the purpose of charging)

DC Output Voltage (No Load)	approx 27.2 V (DC)
Output Voltage Tolerance (No Load)	+ or - .5%
Output Amperage, Max Continuous	40 Amps
Output Voltage (Full Load) approx	>27.0 V (DC)
Maximum Power Output, Continuous	1100 Watts
Typical Efficiency	>80%
Max Inrush Current, Single Cycle	50 Amps
Short Circuit Protection	Yes
Overload Protection	>100%
Load Regulation	<1%
Fan Control	PROPORTIONAL
Thermal Protection	YES



Connecting the Radios

WARNING: Ensure switches that supply power to the individual radio power cords are set to the “OFF” position before installing the radios.

1. Battery box should be installed on the back of the radio prior to installation.



Fig. A

2. (See Fig. A) Open the clamshell door that normally houses the BA-5590. Plug one of the connectors from RPA-T into the battery connector. The connector will slide on easily when the connector key is properly aligned.



Fig. B



Fig. C

3. (See Fig. B & C) Place the supplied rubber gasket in between the battery box doors with the cutout aligned with the top of the radio on the side of the battery box that has the binder posts on it. Place the power cord through the cutout and close the box.



Fig. D



Fig. E

4. (See Fig. D & E) Fasten the twist style retainer on the side opposite the binder post using the supplied extension clip. The clip will allow you to use the retainers in the normal fashion while compensating for the additional thickness of the gasket. On the binder post side of the battery box, the retaining clip that prevents the two pieces of the clamshell from separating from one another will compensate for the thickness of the gasket. On this side you do not fasten the retainer at all. The connector on the side opposite the binder posts holds everything in place.

5. If Harris remotes are to be used, run the slash wire through the hole in the side of the GEI24-RPA-t, then connect them to the binder posts in accordance with the Harris Technical Manual.

6. (See Fig. E-a) Slide the Harris into the GEI24-RPA-t and secure it with the supplied thumb screw and retaining brackets.

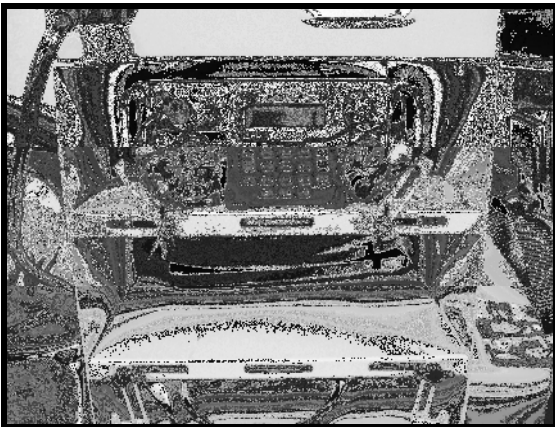


Fig. E-a

7. Repeat 1-6 for each radio to be installed.



Carrying the GEI24-RPA-t



Fig. F

(See Fig. F) This illustrates how the GEI24-RPA-t unit can be lifted by the web handles. The web handles can also be moved to accommodate individual unit preferences.

Connecting Power to the GEI24-RPA-t

Input Connections:

AC input - Be sure main power switch is in the “off” position prior to connecting power cord. Allow 1-2 seconds for power up after main power switch has been turned On. Green indicator lamp will illuminate when powered up.

NOTICE: Prior to powering On the tower, be sure all output loads are off or disconnected.

DC input - Connect mini NATO style connector cable harness to unit via quick connection on side of the tower. Green indicator lamp will illuminate when powered up.

NOTICE: Prior to powering On the tower, be sure all output loads are off or disconnected. When connecting to DC input only; The RPA tower will power on regardless of position of main power switch.

Charging via NATO cable - The RPA tower when used exclusively as a charging device will provide charging capabilities to a 24 VDC battery bank. Connect the AC power plug to the AC source. Connect the NATO style connector cable to the vehicle you want to charge. Depending on state of charge of the battery bank, the green light will illuminate when connected. Turn the main power switch to the on position.



GRAYWACKE
Engineering, Inc.

NOTICE: To prevent unnecessary power surge to connected equipment, be sure all accessory shelf switches are in the off position prior to powering “on” the tower. Connecting to 120/240v AC: Plug GEI24-RPA-t into any standard 3 prong grounded 110v AC outlet. It will operate using military generator or shore power. If the 120/240v power switch is in the on position when GEI24-RPA-t is plugged in, the lamp will illuminate and the radio cooling fan will activate. At this time GEI24-RPA-t will power up to 4 Harris radios through the individual power cords.

WARNING: Whenever GEI24-RPA-t is plugged into AC and turned on, the 6-gauge battery cables are carrying 24+ volts of DC current. Care must be used to ensure the red (positive) and black (negative) cable leads do not touch one another or an electrical short and arcing can occur. Allowing both the red and black leads to touch any conductive (metal) surface can also cause shorts and/or arcing. The leads should always be treated as if they are "hot" and carrying current.

- Connecting to 24V DC: The GEI24-RPA-t can be used with any 24V DC vehicle with an installed NATO style slave connection with a direct 24v DC hookup.

Connecting the GEI24-RPA-t to a 24V battery installed in a 24V vehicle: Use the supplied 6 gage cable with the NATO style slave connector. Connect the grey Anderson style connector located on the side of the GEI24-RPA-t with the mating end of the 6 gage NATO connector harness. Note: THE RPA is equipped with a safety (Anderson style) disconnect to prevent improper battery connection.

Simply plug the NATO style plug into any vehicle with the mating connector. Notice: while operating on 24v DC input alone, the GEI24-RPA-t main power switch will be bypassed and all power to the radios will be controlled via the individual shelf switches. If no output is detected, check connections to battery inside vehicle.

CAUTION: If the 24v DC battery the GEI 24-RPA-t is connected to is unserviceable, the e GEI 24-RPA-t external circuit breaker on the front of the GEI 24-RPA-t will pop out/disconnect when the AC is plugged in.

WARNING: Connecting the GEI24-RPA-24 to a vehicle installed battery incorrectly can result in damage to the GEI24-RPA-t and the radios.

- GEI24-RPA-t is now prepared for use. Turn on the radio and operate.

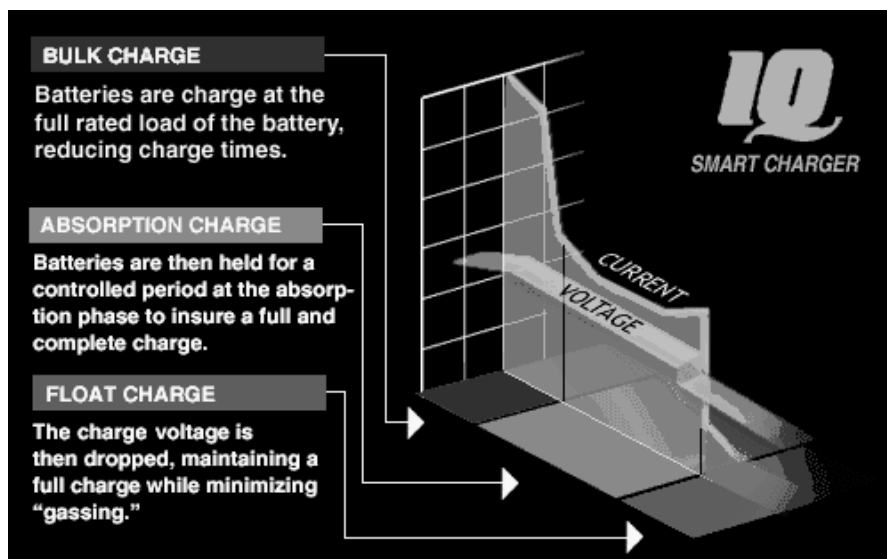
.GEI 24.RPA-T IQ Smart Charge Capabilities

The IQ Smart Controller offers automatic charging control for the RPA-T, providing longer and safer use of your system's battery.



GRAYWACKE
Engineering, Inc.

The IQ Controller allows the RPA-T to operate as an automatic 3-stage "smart charger." This gives the customer the benefit of Bulk, Absorption, and Float stage charging, increasing the charging capacity of the power supply and decreasing charge times, insuring proper and safe battery charging and minimizing over-charging. This "smart" technology monitors the battery at all times. If the RPA-T voltage remains in the long term stage for more than seven days, the IQ will automatically deliver a boost charge for a predetermined time, and then automatically return to the normal float stage.



Reduced Charge Times

The Bulk Stage allows the batteries to be charged from the full rated load of the battery. During this stage the batteries are recharged quickly to reduce charge times

Increased Battery Capacity

After the Bulk Stage, the batteries are held in the Absorption Stage for a controlled period, insuring a full and complete charge

Reduced Battery Stress

During the Float Stage, the RPA-T charge voltage is reduced. This minimizes gassing while maintaining a full charge at the nominal rate of the battery.

Weekly Equalization for Longer Battery Life

If the batteries have not received a "smart charge" during a seven-day period, the IQ Controller will switch the RPA-T charger into a pre-programmed equalization stage to top off the batteries, dissolving any sulfate layer on the battery's internal plates and avoiding stratification.

Charging Voltages

The charging voltages used to charge the battery during the three stages differ depending on the voltage of the battery being charged.

Charging Phase	Voltage Charge per Cell
Bulk Charge	2.46
Absorption Charge	2.36
Float Charge	2.26



SERVICE AGREEMENT

What Does This Service Agreement Cover? This Service Agreement means that Graywacke Engineering, Inc. will provide the repair service described below to the product end user on the GEI24-RPA-t product at Graywacke Engineering at 201 East 5th Street, Suite 310, Mansfield, OH 44902.

How Long Does The Service Agreement Last? This Service Agreement will remain in effect for five (5) years from the date of delivery of the GEI24-RPA-t product.

What Will Graywacke Do? Graywacke will, at its option, replace or repair any electrical components in the GEI24-RPA-t with new or rebuilt GEI24-RPA-t electrical components at its then current hourly charge plus the cost of replacement parts. If repair of the RPA electrical components will require estimated charges (including the cost of replacement parts) in excess of \$400.00, Graywacke will contact the GEI24-RPA-t end user to discuss alternatives. The repaired GEI24-RPA-t and an invoice for such repair work will be shipped from Graywacke within three Business Days of the date of receipt of the returned GEI24-RPA-t from end user with a written description of the problem unless further information is needed from the end user. "Business Days" mean Monday, Tuesday, Wednesday, Thursday or Friday (each a "Weekday") unless such date falls on a holiday observed by Graywacke, in which case the next Weekday will apply. All replaced GEI24-RPA-t's or parts will remain the property of Graywacke. By accepting this Service Warranty, the end user agrees to pay such invoice within thirty (30) days of the date of such invoice. Graywacke shall not be obligated under this Service Agreement to any end user for additional repair work if any invoice for prior repair work performed by Graywacke remains unpaid after the due date.

What This Service Agreement Does Not Cover? This Service Agreement does not cover non-electrical components of the RPA product. IN NO EVENT SHALL GRAYWACKE BE LIABLE FOR ANY DIRECT, SPECIAL, INDIRECT, CONSEQUENTIAL, INCIDENTAL, PUNITIVE OR EXEMPLARY DAMAGES, EXPENSES, LOST SAVINGS OR LOST PROFITS OR ANY OTHER DAMAGES OF ANY KIND.

How do I get Service? Call the Engineering Dept. at Graywacke at 419-525-3888 prior to shipping. Send the GEI24-RPA-T and a written description of the problem to Graywacke Engineering, 201 East 5th Street, Suite 310, Mansfield, OH 44902. Graywacke will return the repaired or replaced GEI24-RPA-t at Graywacke's expense by the same delivery method used to send the GEI24-RPA-t to Graywacke. THERE ARE NO WARRANTIES EXPRESS OR IMPLIED WITH RESPECT TO REPAIR WORK COMPLETED UNDER THIS SERVICE AGREEMENT, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.



LIMITED WARRANTY

What does this Warranty Cover? This warranty covers any defects in workmanship or materials of the GEI24-RPA-t under normal use and service.

How Long Does the Coverage Last? This warranty runs for one (1.5) years from the date of delivery.

What Will Graywacke Do? Graywacke will, at its option, replace or repair any GEI24-RPA-t product found by Graywacke to be defective at no charge. The repaired or replaced GEI24-RPA-t product will be shipped from Graywacke within 10 Business Days of receipt of the returned GEI24-RPA-t product. A written description of the problem must be included with the returned product from the end user. "Business Days" mean Monday, Tuesday, Wednesday, Thursday or Friday (each a "Weekday") unless such date falls on a holiday observed by Graywacke, in which case the next Weekday will apply. All replaced GEI24-RPA-t or parts will remain the property of Graywacke.

What Does This Warranty Not Cover? Graywacke will not be responsible under this warranty if Graywacke determines that (1) upon examination that the GEI24-RPA-t failure was (A) caused by misuse, neglect, accident, abnormal condition of operation or handling (including the failure to use the GEI24-RPA-t in accordance with Graywacke instructions and observe the warnings on the GEI24-RPA-t and the instruction manual), alteration to the GEI24-RPA-t (other than the movement of the carrying straps or an alteration which Graywacke determines does not affect electrical components or function), or other conditions beyond the control of Graywacke or (B) damaged in transit to Graywacke. IN NO EVENT SHALL GRAYWACKE BE LIABLE FOR ANY DIRECT, SPECIAL, INDIRECT, CONSEQUENTIAL, INCIDENTAL PUNITIVE OR EXEMPLARY DAMAGES, EXPENSES, LOST SAVINGS OR LOST PROFITS OR ANY OTHER DAMAGES OF ANY KIND.

How to Get Warranty Service? Call the Engineering Dept. at Graywacke at 419-525-3888 prior to shipping. Send the GEI24-RPA-t and a written description of the problem to Graywacke Engineering, 201 East 5th Street, Suite 310, Mansfield, OH 44902. Graywacke will return the repaired or replaced GEI24-RPA-t at Graywacke's expense by the same delivery method used to send the GEI24-RPA-t to Graywacke. THIS WARRANTY IS THE SOLE AND EXCLUSIVE REMEDY AND IS IN LIEU OF ALL OTHER WARRANTIES EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.



GEI 24-RPA-T Trouble Shooting Procedures:

Problem:
RPA Unit does not power on when plugged into AC outlet.

Check:
If power cord is not damaged, and is connected to a 15 amp rated outlet.

Check:
If 15 amp AC circuit breaker on side panel of RPA unit is tripped, push to reset.

Check:
If AC source is providing voltages in the following AC ranges:
90 V - 132 V, 216 V - 240 V

Problem:
RPA Unit does not power on when connected to DC input

Check:
If DC cable harness is not damaged and is connected to 24 VDC source only.

Check:
If 40 amp DC input circuit breaker is not tripped.

Check:
If DC input voltage falls within the following range: 18-36 VDC

Problem:
Individual shelf lights are flashing intermittently

Check:
All input power connections are secure, including radio cord

Check:
If plugged into AC and DC source and DC source is below 18v, switch off all loads and allow DC source to charge above 18v

Check:
Be sure RPA unit is in a well ventilated area, and vent holes are not obstructed. Shut off unit and allow to cool



GEI 24-RPA-T Trouble Shooting Procedures (Cont.):

Problem:
Main power indicator light is on but shelf switches do not power on. No shelf indicator light.

Check:
If RPA unit is plugged into AC and/or DC power, and the cables are not damaged or AC and/or DC circuit breakers are tripped.

Check:
.If radio connector cable is plugged into the Radio device properly.

Check:
If connected to DC input only, that DC input voltage falls within the following range: 18-36 V

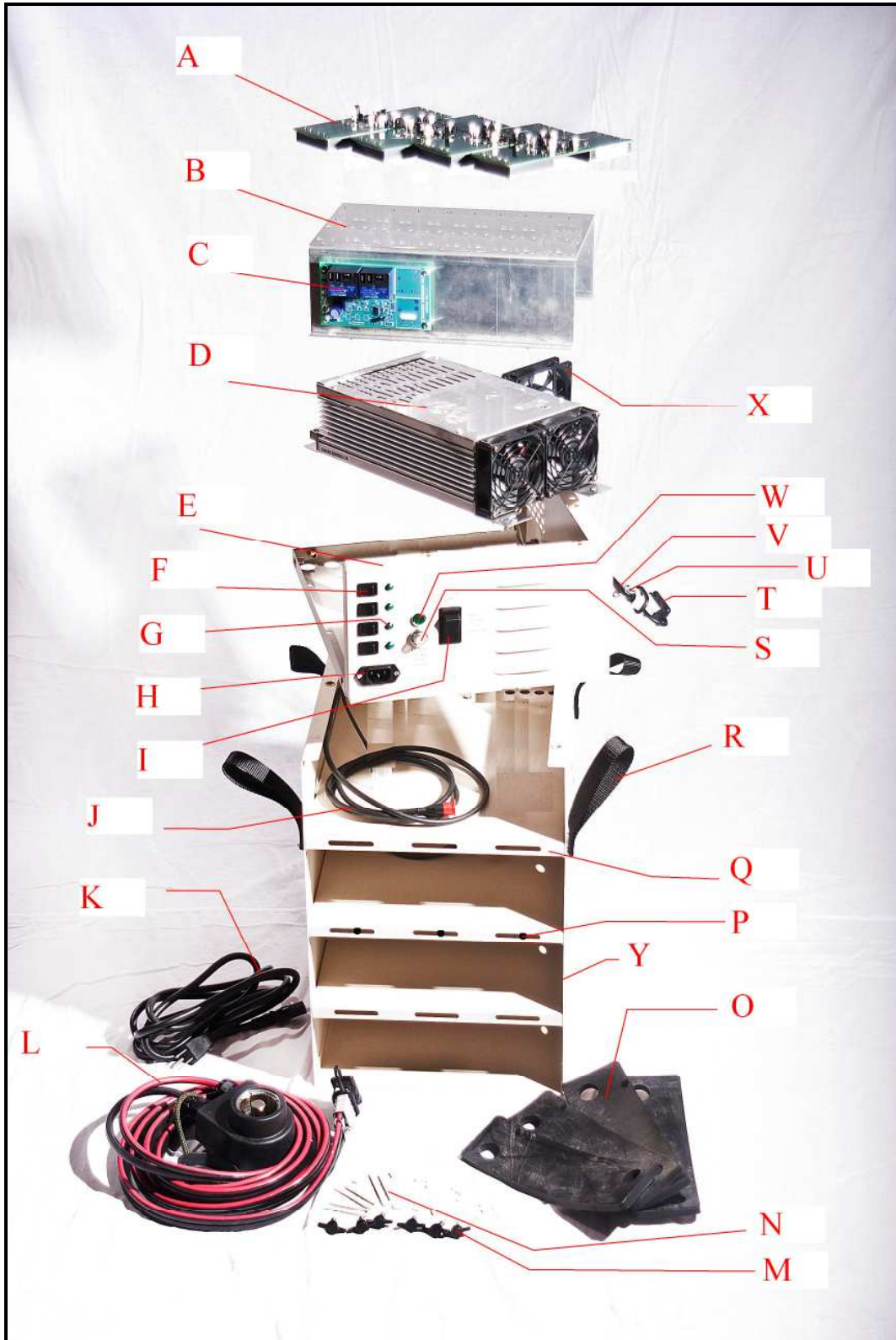
Problem:
RPA unit shuts down during operation:

Check:
If RPA unit is in a well ventilated area, and vent holes are not blocked. Shut off unit and allow to cool.

Check:
If powered by DC alone: Be sure DC input voltage is above 18v; switch off all loads and allow DC source to charge above 18v

Check:
If the RPA is plugged into a good quality surge protector and is providing power within: 90 VAC – 132 VAC,

GEI 24-RPA-T Parts List



GEI 24-RPA-T Parts List

	ITEM #	DESCRIPTION	CAGE	NSN
Y	RPA-CHS	RPA 4 Shelf Metal Chassis, Tan	3A2R7	
Q	RPA-SHLF	RPA METAL SHELF REPLACEMENT TAN	3A2R7	
E	RPA-TOP	RPA METAL VENT TOP REPLACEMENT TAN	3A2R7	
Z	RPA-LID	RPA METAL LID REPLACEMENT TAN	3A2R7	
M	RPA-SLFKT	RPA SHELF HARDWARE KIT (TKNOB, T-NUT, L-BRACKET)	3A2R7	
O	RPA-GSKT	RPA RADIO GASKET KIT (GASKET, RETENTION RING)	3A2R7	
R	RPA-HND	RPA NYLON HANDLE SET (4EA)	3A2R7	
F	RPA-MNS	RPA INDIV. SHELF MINI SWITCH	3A2R7	
I	RPA-MS	RPA MAIN POWER ROCKER SWITCH	3A2R7	
S-15	RPA-CBK-15	15 AMP CIRCUIT BREAKER	3A2R7	
S-40	RPA-CBK-40	40 AMP CIRCUIT BREAKER	3A2R7	
H	RPA-PWRIEC	MAIN AC POWER INPUT CONNECTOR	3A2R7	
U	RPA-24VINPT-50	24VDC 50AMP INPUT CABLE SET INCLUDES HARDWARE	3A2R7	
T	RPA-DSTJKT	ANDERSON STYLE DUST JACKET	3A2R7	
W	RPA-LED24	MAIN POWER INDICATOR LIGHT, GREEN	3A2R7	
V	RPA-STRNRLF	1/2" LIQUID TIGHT STRAIN RELIEF	3A2R7	
X	RPA-24VDCFN	24VDC EXHAUST FAN	3A2R7	
D	RPA-27VDC-CVRTR	27.2 VDC POWER SUPPLY WITH IQ4	3A2R7	
N	RPA-SLF-LBKT	RADIO STABILIZING BRACKET	3A2R7	
P	RPA-CGNT	SHELF CAGE NUT	3A2R7	
J	RPA-4CSC	RADIO INPUT CORD 4C14AWG	3A2R7	
C	RPA-SNFBRD-SNG	110/220 VOLTAGE CONTROL BOARD SINGLE CHANNEL	3A2R7	
L	RPA-SLV-20	SLAVE CABLE 2C6AWG 25 FT. WITH 50 AMP HOUSING	3A2R7	
K	RPA-ACCST	AC POWER CORD	3A2R7	
A	RPA-CONVBD	RPA CONVERTER CONTROL BOARD	3A2R7	
B	RPA-CVTR-MTBKT	CONVERTER CONTROL BOARD MOUNTING BRACKET	3A2R7	
	RPA-MANUAL	USER MANUAL	3A2R7	
G	RPA-LED12	SHELF INDICATOR LIGHT, GREEN	3A2R7	

GEI 24-RPA-T Wiring Diagram

