

3609-04 Power Supply Unit-Redundant (PSU-R)

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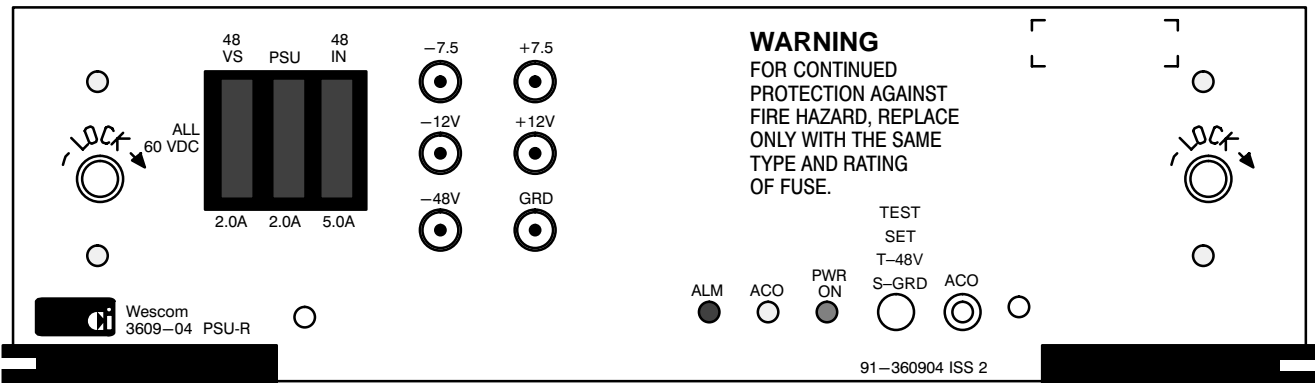


Figure 1. 3609-04 Redundant Power Supply Unit

1. GENERAL

1.1 Document Purpose

This document provides information for the Charles Industries 3609–04 Power Supply Unit-Redundant (PSU-R), shown in Figure 1.

1.2 Document Status

This document is reprinted to include a general editorial update.

1.3 Equipment Function

The 3609–04 PSU-R is part of the common equipment for the 360–22 D4 Digital Carrier Terminal. One PSU-R derives all the necessary DC voltages, including talk battery, to operate an entire 360–22 digital carrier terminal from a –48VDC input. The 3609–04 PSU-R is also designed to provide redundant operation. When used in a redundant configuration, two PSU-Rs are required, which work together in a power-sharing configuration. If one PSU-R fails, power will be completely and solely supplied by the second PSU-R.

1.4 Equipment Location/Mounting

1.5 Equipment Features

The 3609–04 PSU includes the following features:

- Soft-start circuit
- Input reverse-voltage protection
- Output over-voltage sensing/clamping
- Primary current limiting and overload shutdown
- Fault isolation of all outputs
- LEDs to signify power-on and system alarm conditions
- Alarm Cut Off (ACO) switch and ACO LED
- System alarm contacts
- Pin-jack test points to monitor –48VDC input, ± 12 VDC and ± 7.5 VDC outputs
- Bantam jack –48VDC output for powering external test equipment

2. INSPECTION

2.1 Inspect for Damages

Inspect the equipment thoroughly upon delivery. If the equipment has been damaged in transit, immediately report the extent of damage to the transportation company.

2.2 Equipment Identification

Charles Industries' equipment is identified by a model and issue number imprinted on the front panel or located elsewhere on the equipment. Each time a major engineering design change is made on the equipment, the issue number is advanced by 1 and imprinted on subsequent units manufactured. Therefore, be sure to include both the model number and its issue number when making inquiries about the equipment.

2.3 Static Concerns

Each module is shipped in static-protective packaging to prevent electrostatic charges from damaging static-sensitive devices. Use approved static-preventive measures, such as static-conductive wrist straps and a static-dissi-

protective mat, when handling modules outside of their protective packaging. A module intended for future use should be tested as soon as possible and returned to its original protective packaging for storage.



STATIC-SENSITIVE



This equipment contains static-sensitive electronic devices. To prevent electrostatic charges from damaging static-sensitive units:

- **Use approved static preventive measures (such as a static-conductive wrist strap and a static-dissipative mat) at all times whenever touching units outside of their original, shipped static-protective packaging.**
- **Do not ship or store units near strong electrostatic, electromagnetic, or magnetic fields.**
- **Use static-protective packaging for shipping or storage.**

3. APPLICATION GUIDELINES

The 3609–04 PSU-R can only be used with the 3603–02 (LIU–3E) and the 3608–04 (DIU-R) as a common equipment set for the 360–22 D4 Digital Carrier Terminal (channel bank).

The 3609–04 PSU-R is configured for a specific application via a set of PCB-mounted screw switches as described in Part 6.

4. CIRCUIT DESCRIPTION

The 3609–04 PSU-R utilizes an 80kHz switching regulator to generate regulated output voltages of $\pm 7.5\text{VDC}$ and $\pm 12\text{VDC}$. Refer to Figure 2, the 3609–04 PSU-R block diagram, as needed, while reading the following circuit description.

4.1 Features

The 3609–04 contains the circuit features described in the paragraphs below.

4.1.1. *Soft Start*

Limits the inrush current into the card-edge connector when the PSU is first plugged in.

4.1.2. *Input Reverse-Voltage Protection*

Protects the PSU against input voltages of reversed polarity.

4.1.3. *Output Over-Voltage Sensing and Clamping*

Protects the 360–22 system against excessive output voltage.

4.1.4. *Overload Shutdown with Automatic Recovery*

Protects the PSU-R against output short circuits.

4.1.5. *Fault Isolation of All Outputs*

Prevents a faulty power supply output from damaging or inhibiting a second (redundant) power supply if a power supply fault occurred.

4.2 Front Panel Items

The 3609–04 contains the following features found on the front panel.

4.2.1. *48VS Fuse*

The 48VS fuse (2.0 AMP), supplies unfiltered (signal grade) battery voltage (-48VDC) to the digital carrier terminal. Should the fuse blow, the front panel ALM LED (red) illuminates, and a power alarm signal is sent to the digital carrier terminal common equipment DIU-R unit.

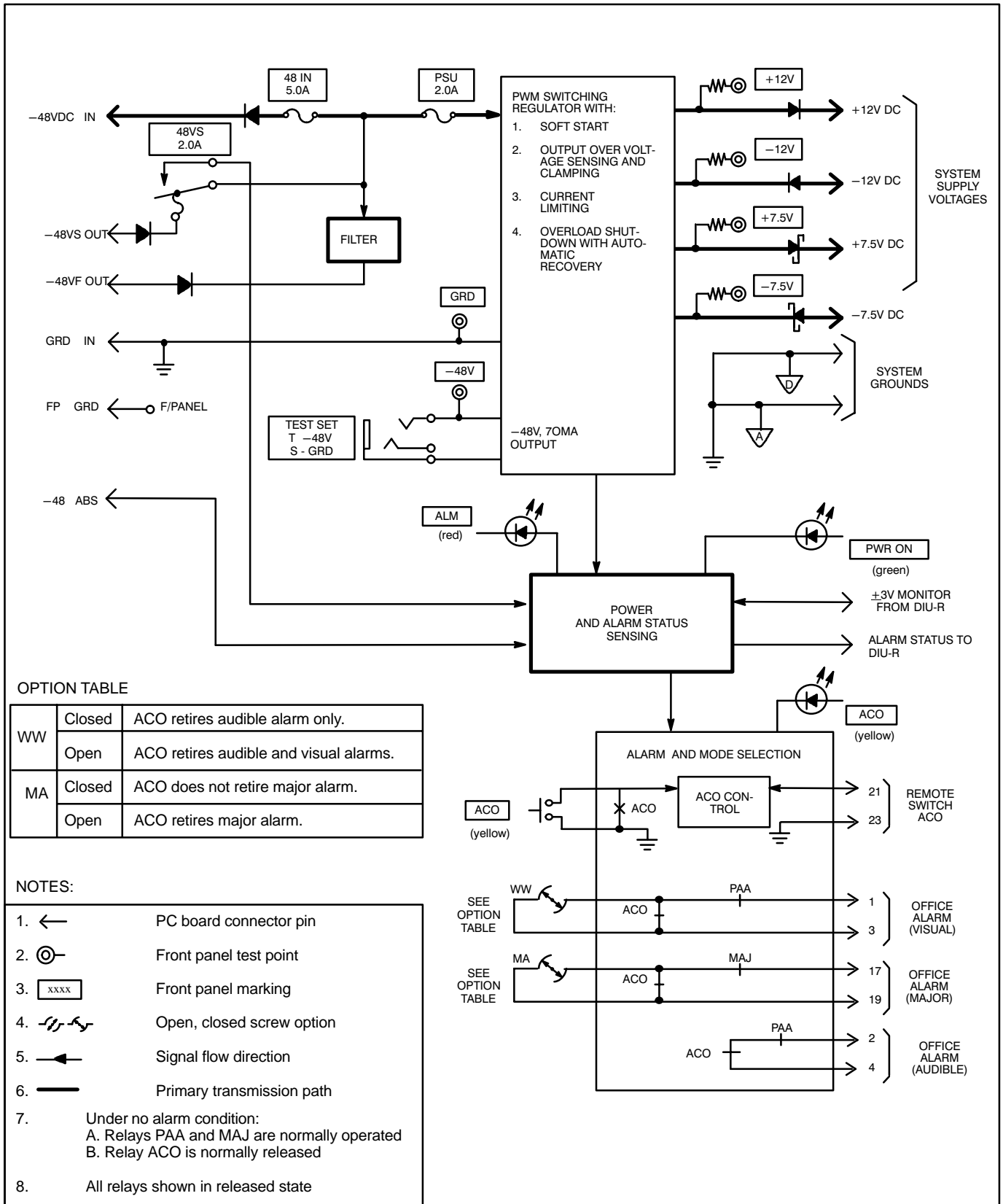


Figure 2. 3609-04 PSU-R Block Diagram

4.2.2. PSU Fuse

The PSU fuse (2.0 AMP) provides a fused input to the SWITCHING REGULATOR. A blown PSU fuse results in the regulated output voltages going to zero, the PWR ON LED extinguishes, the ALM LED illuminates, and a power alarm is sent to the DIU-R.

4.2.3. 48 IN Fuse

The 48 IN fuse (5.0 AMP) provides primary fusing for the PSU fuse, the –48VS fuse, and the –48VF filtered output lines. A blown 48 IN fuse causes regulated output voltages of zero, the PWR ON LED to extinguish, the ALM LED to illuminate, and a power alarm to be sent to the DIU-R. A blown 48 IN fuse is caused by one of the following:

- A shorted –48VF output line.
- A defective PSU.

4.2.4. ALM LED (Red)

An illuminated ALM LED is caused by one of the following:

- $\pm 7.5\text{VDC}$ or $\pm 12\text{VDC}$ regulated output voltages low.
- Blown 48 IN fuse, 48VS fuse, or PSU fuse.
- $\pm 3\text{V}$ system voltage low or respective DIU-R not installed.
- Output over-current and over-voltage conditions.

4.2.5. PWR ON LED (Green)

An illuminated PWR ON LED indicates that the regulated output voltages are within their tolerances.

4.2.6. ACO LED (Yellow)

An illuminated ACO LED during a system red or yellow alarm condition is caused by either the front-panel-mounted ACO switch being depressed or a contact closure, from a remote ACO switch, across pins 21 and 23 of the PSU connector.

4.2.7. ACO Switch

During a system alarm condition, the ACO switch can be depressed to disable the audible alarm contacts and optionally can disable the visual and major alarms, depending on the settings of screw options WW and MA.

4.2.8. TEST SET T –48V S-GRD Jack

This bantam jack provides a –48VDC, 70mA output for powering external test equipment.

4.2.9. Test Points

Pin-jack test points are provided for the –48V input, and the +12V, –12V, +7.5V, and –7.5V outputs. A GRD (ground) pin-jack test point is also provided.

4.3 Alarm Relays

The following describes the operation of the alarm relays. The block diagram shows all relay contacts in the non-operated state.

4.3.1. PAA Relay

The PAA relay is normally operated in the non-alarm state and will release under red or yellow alarm conditions. The PAA relay alarms the entire digital carrier terminal.

4.3.2. MAJ Relay

The MAJ relay is normally operated in the non-alarm state and will release in the alarm state. The MAJ relay is placed in the alarm state when a service affecting alarm condition has been detected.

4.3.3. ACO Relay

The ACO relay is normally released and will operate to disable office audible (and optional visual and major alarms). Operation is accomplished either by depressing the front-panel-mounted ACO switch or by a contact closure, from a remote ACO switch, across pins 21 and 23. When all alarm conditions in both common equipment sets are cleared, the ACO relay is automatically released.

5. MOUNTING

The 3609–04 PSU-R mounts in dedicated common equipment slots of a 360–22 D4 Digital Carrier Terminal (channel bank) as shown in Figure 3.

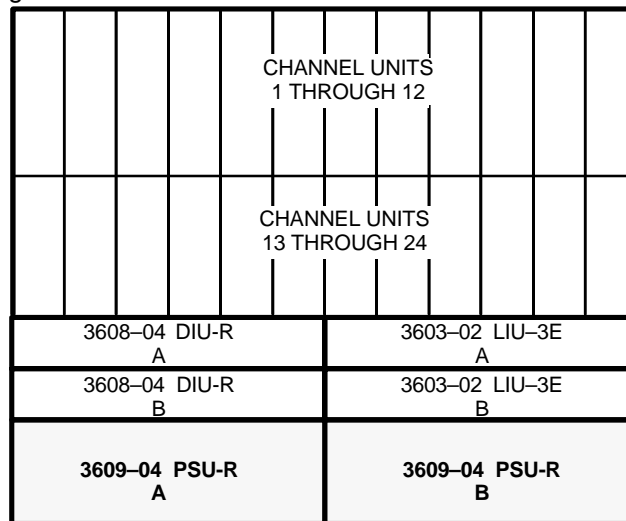


Figure 3. 360–22 DIU-R Equipment Locations, Front View

CAUTION

Installation and removal of modules should be done with care. Do not force a module into place. If excessive resistance is encountered while installing a module, remove the module and check the card guides and connector to verify proper alignment and the absence of foreign material.

6. OPTIONS

The 3609–04 PSU-R is equipped with screw options WW and MA to condition the module for the desired application. Refer to Figure 4 for location of these options.

6.1 Screw Option WW

Open screw option WW to allow the alarm cut off (ACO) button on the PSU, or the remote ACO, to disable both the office audible and visual alarms. Close screw option WW to allow the Alarm Cut Off (ACO) button on the PSU, or the remote ACO, to disable only the office audible alarm.

6.2 Screw Option MA

Open screw option MA to allow the alarm cut off (ACO) button on the PSU, or the remote ACO, to disable the major alarm. Close screw option MA to prevent the major alarm from being deactivated when the ACO is activated.

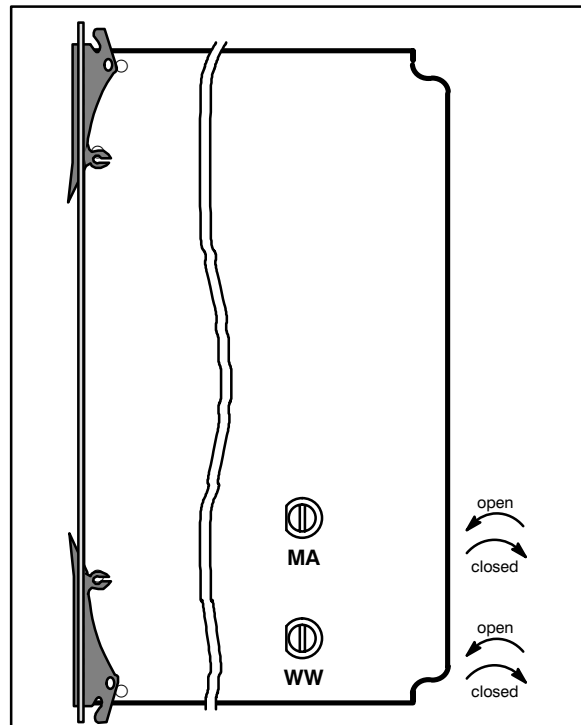


Figure 4. 3609–04 PSU-R Option Locations

Note: When opening a screw option, rotate the screw counterclockwise two full turns to ensure that the connection is open. When closing a screw option, rotate the screw clockwise until it seats.

Table 1. 3609–04 Option Settings

Option	Position	Function
WW	OPEN	ACO retires audible and visual alarms
	CLOSED	ACO retires audible alarm only
MA	OPEN	ACO retires major alarm
	CLOSED	ACO does not retire major alarm

7. TESTING

Refer to section number 360–022–600 for turn-up and acceptance test procedures for common equipment and section number 360–022–700 for troubleshooting information.

8. TECHNICAL ASSISTANCE

If technical assistance is required, contact Charles Industries' Technical Services Center at:

847–806–8500

847–806–8556 (FAX)

800–607–8500

techserv@charlesindustries.com (e-mail)

9. WARRANTY & CUSTOMER SERVICE

9.1 Warranty

Charles Industries, Ltd. offers an industry-leading, 5-year warranty on products manufactured by Charles Industries. Contact your local Sales Representative at the address or telephone numbers below for warranty details. The warranty provisions are subject to change without notice. The terms and conditions applicable to any specific sale of product shall be defined in the resulting sales contract.

Charles Industries, Ltd.
5600 Apollo Drive
Rolling Meadows, Illinois 60008–4049
847–806–6300 (Main Office)
847–806–6231 (FAX)

9.2 Field Repairs (In-Warranty Units)

Field repairs involving the replacement of components within a unit are not recommended and may void the warranty and compatibility with any applicable regulatory or agency requirements. If a unit needs repair, contact Charles Industries, Ltd. for replacement or repair instructions, or follow the *Repair Service Procedure* below.

9.3 Advanced Replacement Service (In-Warranty Units)

Charles Industries, Ltd. offers an “advanced replacement” service if a replacement unit is required as soon as possible. With this service, the unit will be shipped in the fastest manner consistent with the urgency of the situation. In most cases, there are no charges for in-warranty repairs, except for the transportation charges of the unit and for a testing and handling charge for units returned with no trouble found. Upon receipt of the advanced replacement unit, return the out-of-service unit in the carton in which the replacement was shipped, using the pre-addressed shipping label provided. Call your customer service representative at the telephone number above for more details.

9.4 Standard Repair and Replacement Service (Both In-Warranty and Out-Of-Warranty Units)

Charles Industries, Ltd. offers a standard repair or exchange service for units either in- or out-of-warranty. With this service, units may be shipped to Charles Industries for either repair and quality testing or exchanged for a replacement unit, as determined by Charles Industries. Follow the *Repair Service Procedure* below to return units and to secure a repair or replacement. A handling charge applies for equipment returned with no trouble found. To obtain more details of this service and a schedule of prices, contact the CI Service Center at 217–932–5288 (FAX 217–932–2943).

Repair Service Procedure

1. Prepare, complete, and enclose a purchase order in the box with the equipment to be returned.
2. Include the following information:
 - Company name and address
 - Contact name and phone number
 - Inventory of equipment being shipped
 - Particulars as to the nature of the failure
 - Return shipping address
3. Ship the equipment, purchase order, and above-listed information, transportation prepaid, to the service center address shown below.

CI Service Center
503 N.E. 15th St., P.O. Box 339
Casey, IL 62420–2054
4. Most repaired or replaced units will be returned within 30 or 45 days, depending on the product type and availability of repair parts. Repaired units are warranted for either 90 days from the date of repair or for the remaining unexpired portion of the original warranty, whichever is longer.

10. SPECIFICATIONS

10.1 Electrical

Electrical Characteristics of the 3609–04 Redundant Power Supply Unit are as follows:

- (a) OPERATING VOLTAGE RANGE: –42 to –56VDC.
- (b) POWER DISSIPATION WITHIN 3609–04 AT –48VDC INPUT: 20 watts.

10.2 Physical

See Table 2 below for the physical characteristics of the 609–04 Redundant Power Supply Unit.

Table 2. Physical Specifications

Feature	U.S.	Metric
Height	2.4 inches	6.1 centimeters
Width	8.5 inches	21.6 centimeters
Depth	10.6 inches	27 centimeters
Weight	2 pounds, 8 ounces	1.2 kilograms
Temperature	32 to 122° F	0 to 50° C
Humidity	To 95% (no condensation)	

11. REFERENCES

Refer to the following practices for additional information:

Document Number	Document Title
360–022–501	360–22 D4 Digital Carrier Terminal General Description, Application and Installation Procedures
360–022–600	360–22 D4 Digital Carrier Terminal Turn-Up and Acceptance Test Procedure for Common Equipment and Channel Units
360–022–700	360–22 D4 Digital Carrier Terminal Troubleshooting Procedures
360–302–202	3603–02 And 3603–32 Line Interface Units (Mode 3 ESF (LIU–3E))
360–804–201	3608–04 Digroup Interface Unit-Redundant (DIU-R)

