AutoMax[®] Power Supply Modules and Racks

M/N 57C493 Power Supply Module M/N 57C494 Power Supply Module M/N 57C331 16-Slot Rack M/N 57C332 10-Slot Rack M/N 57C334 6-Slot Rack

Instruction Manual J2-3008-4

Rockwell Automation

Reliance Electric

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DANGER

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DANGER

THE USER IS RESPONSIBLE FOR CONFORMING WITH ALL APPLICABLE LOCAL. NATIONAL, AND INTERNATIONAL CODES. WIRING PRACTICES, GROUNDING, DISCONNECTS, AND OVER-CURRENT PROTECTION ARE OF PARTICULAR IMPORTANCE. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.

WARNING

INSERTING OR REMOVING THE POWER SUPPLY MODULE OR ITS CONNECTING CABLES MAY RESULT IN UNEXPECTED MACHINE MOTION. POWER TO THE MODULE SHOULD BE TURNED OFF BEFORE INSERTING OR REMOVING THE MODULE OR ITS CONNECTING CABLES. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN BODILY INJURY.

WARNING

THE USER MUST PROVIDE AN EXTERNAL, HARDWIRED EMERGENCY STOP CIRCUIT OUTSIDE THE PROGRAMMABLE CONTROLLER CIRCUITRY THIS CIRCUIT MUST DISABLE THE SYSTEM IN CASE OF IMPROPER OPERATION. UNCONTROLLED MACHINE OPERATION MAY RESULT IF THIS PROCEDURE IS NOT FOLLOWED. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN BODILY INJURY.

CAUTION: The power supply module and racks contain static-sensitive components. Caroloss handling can cause severe damage. Do not touch the connectors of the back of the power supply module or the racks. When not in use, the power supply module, should be stored in an arti-static bag. The plastic cover should not be removed. Failure to observe this precaution could result in carriage to or destruction of equipment.

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Table of Contents

1.0	ntroduction	1-1
	1 Additional information	11
	2 Related Hardware and Soltware	1-2
2.0	Mechanical:Electrical Description	2-1
	2.1 Power Supply Module Mechanical Description	2.1
	2.1.1 Fover Supply Module LED indicators	.24
	2.1.2 Prover Supply Module Terminal Black	2.4
	2.1.3 Power Supply Module Battery Connection (M/N 57C/E3 only)	22
	2.1.4 Priver Supply Module Keywith 1	2.2
	2 Power Supply Module Electrical Description	2-5
	23 Back Mechanical Description	2.5
	2 Rack Electrical Description	2-6
3.0	nstallation	3-1
	1 Willing	3-1
	1.2 Initial Installation	3-1
	3 Power Supply Mobule Replacement	3-5
	1.4 Rack Replacement	3-6
4.0	Diagnostics and Troubleshooting	4-1
	11 The POWER LED & Off	1-1
	12 The FAULT LED is On	42

Appendices

Appendix A Technical Specificational	011		.Ar-1
Appendix B External Connections	12.2		B-1
Appendix C Beck Backplans			C-1
Appendix D Back Mounting Fattern	85	-	D-1
Appendix E Power Requirements of AutoMax Modules	44		51

List of Figures

Figure 2.1 - 376W Power Supply Module (M/N 57C493)	1.10	2.2
Figure 2.2 - 147W Power Supply Module (M/N 57C494)	1.1	2-3
Figure 2.3 - 8-Sici Rack	64.1	2.6
Figure 2.4 - 10-Sloi Rack		2-6
Figure 2.5 - 16-Slot Rack	1.1	2-7
Figure 2.6 - Rack Stot Limits. Iona	54	2-7
Figure 2.7 - Typical Input Power Connections	14	2-8

1.0 INTRODUCTION

The products described in this instruction manual are manufactured by Reliance Electric Industrial Company.

The Power Supply module (M/N 57C190 or M/N 57C194) converts 115 VAC input power into the DC vollages necessary to operate the other modules contained in the Back. The Back provides the mechanical means of mounting 6 (M/N 57C334), 10 (M/N 57C332) or 16 (M/N 57C331) DCS 5000 or AutoMax modules issivel as the Power Supply module. The Multibus T backplane in the Back provides two sats of bas lines for local communication among the DCS 5000 and AutoMax modules.

The M/N 570395 Power Supply module can provide a maximum continuous output of \$76 watta to power modules in the AutoMax rack. The M/N 570391 Power Supply module can provide a maximum continuous output of 147 watta to power modules in the AutoMax rack. When using the M/N 570494 Power Supply module in a 10 cm 6-stol rack, make certain that the power requirements of the modules in the rack coincil exceed the capacity of the Power Supply modules and their power requirements.

I his instruction manual describes the functions and specifications of the Power Supply modules are the Back, it also includes a obtailed overview of installation and activiting procedures.

1.1 Additional Information

You about be familiar with the instruction manusis which describe your system configuration. This may include, but is not limited to the following:

- J-3698 COMMON MEMORY MODULE INSTRUCTION MANUAL.
- J-3849 AutoMsx CONFIGURATION TASK MANUAL.
- J-3630 Resource AutoMax PROCINALMING EXECUTIVE INSTRUCTION MANUAL VERSION 1.6
- J-3650 AutoMsx PROCESSOR MODULE INSTRUCTION MANUAL
- J-366a DCS 5000 POCKET REFERENCE.
- J 3669 AutoMax FOCKET REFERENCE
- J-367a AuroMax ENHANCED BASIC LANGUAGE INSTRUCTION MANUAL
- J.3676 AutoMax CONTROL BLOCK LANGUAGE INSTRUCTION MANUAL
- J.3677 AutoMax LADDER LOGIC LANGUAGE INSTRUCTION MANUAL
- IEEE ST8 BUIDE FOR THE INSTALLATION OF ELECTRICAL EQUIPMENT TO MINIMIZE ELECTRICAL NOISE INPUTS TO CONTROLLERS
- TEEE 796 STANDARD MICROCOMPUTER SYSTEM BUS.
- Your ReSource AutoMax PROGRAMMING FXEQUILINE INSTRUCTION MANUAL

- Other instruction manuals applicable to your hardware configuration
- Your personal computer and DOS operating system manual(s).

1.2 Related Hardware and Software

The Power Supply modules and Backs are sold individually. M/N 57C499 contains one 376 wait Fower Supply module and two keyswitch keys. M/N 57C494 contains one 147 wait Power Supply module and two keyswitch keys. M/N 57C331 contains one 16 slot Back. M/N 57C332 contains one 10-slot Back. M/N 57C334 contains one 6 slot Back. One Fower Supply module and one Back are used with various input, output, and special purcose modules, as well as the following hardware and software, which can be purchased separately:

- AutoMax or DCS 5000 Processor modules. The following Processor modules can be used only with the M/N 57C493 Power Supply module:M/N 57C430 AutoMax Processor(s) or M/N 57C407 DCS (x00) Processor(s). Note that all Processors in a single Back must be of the some type, i.e., AutoMax and DCS 5000 Processors cannot be mixed in one Back.
 - M/N 57G430 AutoMax Processor.
 - M/N 570/107 DOS 5000 Processor

Note that all Processors in a single rack must be of the same type, i.e., AutoMax and DGS 5000 Processors cannot be mixed in the same rack.

The following AutoMax Processors can be used with the M/N 57G493 or M/N 57G494 Power Supply module. These processor modules can be mixed in the same rack:

- M/N 57C/I30A
- M/N 570451
- M/N 570435
- ReSource AutoMax Programming Executive software or ReSource DCB 5000 Programming Executive software
- M/N 570127 RS-2320 ReSource Interface Oable. This cable is used to connect the personal computer to the Processor module.
- 4 M/N sVC413 (or later) or M/N 5/C423 (or later) Common Memory module. This module is used when there is more than one Processor in the Rack. Note that only M/N s/C413B (and later) or M/N s/C423 (and later) Common Memory module can be used with the M/N s/C494 Fower Supply.
- 5 M/N 67C492 Battery Back-Up. This unit is used when there is a Common Memory module (M/N 57C413 or M/N 57C413A only), a M/N 57C407 or M/N 57C430 Processor, or both in the Rack. The Battery Back Lo unit can be used only with the M/N 57C493 Power Supply.
- M/N o7C384 Battery Back Up cable. This cable is used with the Battery Back-Up unit.

2.0 MECHANICAL/ELECTRICAL DESCRIPTION

The following is a description of the mechanical and electrical componenta, as well as the characteristics of the input connections, for the Power Supply module and Racks Unless noted otherwise, the descriptions that follow describe only M/N 570493 and M/N 570494. Power Supply modules.

2.1 Power Supply Module Mechanical Description

The M/N 570494 Power Supply module is a printed orbit theard assembly that plugs into the leftmost position of the 6-, 10-, or 16-Stot Heck. When it is instelled in a 10- or 18-Stot Heck, there will be a one-stot-wide space to the right of the Power Supply. If dealed, this apply each be covered, with a clark tablecter (M/N 610,550)

The M/N 57C493 Power Supply module is a printee circuit board assembly that plugs into the followed power of either the 10 for 16.6 at Back, it cannot be used with the 6.6 at Back, Both modules are one case in protective steel housings with integral heatsink. Through the connection to the Multibus backplane of the Back, the Power Supply module provides the BG voltages necessary to power the logic discuity of modules in the Back. On the faceplate of the M/N 57C493 Power Supply module are two LED indicators, a form tal block connector, a keyswitch, a fuse, and a battery back-up connector. See figure 2.1.

On the laceptate of the M/N s7C494 Power Supply module are two LED indicators: a terminal block connector, a keyswitch, and a fuse. See figure 2.2.



Figure 2.1 376W Power Supply Mocule (M/N 57C496)



Figure 2.2 147W Power Supply Mocule (M/N 57C494)

2.1.1 Power Supply Module LED Indicators

The Power Supply module faceplate contains 2 LEDs. The green LED labeled "POWER" is lit to indicate when incoming AC power is within the specified ranges. The red LED labeled "FAULT" is normally off. When it is on it indicates the output voltages are not all above the low voltage alern thresholds on the watchdog OK signal is high.

2.1.2 Power Supply Module Terminal Block

The terminal clock on the Power Supply faceprate provides the means to connect the 11's WAC power and a ground wire from the rack to the module. Note that terminals 1–5 (reading top to bottom) are not functional.

The green ground wire from the Rack connects to the "CND" terminal on the tspeciale of the Power Supply. Terminal "L2" is the connection for the AC neutral input time from the Rack. Terminal "L1" is the connection for the AC hot input line from the Rack. See section 3.2 for more information.

2.1.3 Power Supply Module Battery Connection (M/N 57C493 only)

The laceplate connection laceled "BATTERY BACK UP " provides the means to connect the Battery Back Up (M/K 57C492) to the Power Supply module. Note that the Battery Back-Up unit is redured only when there is a DCS 5000 Processor module (M/N 57C407) or a Common Memory module (M/K 57C413 or 57C413A only) in the Pack. The Battery Back Up unit can save the contents of the Common Memory and DCS 5000 Processor RAM in the event of a power failure.

The keyswitch is used to rese. The 'OK' signal on the Battery Back-Up. It is necessary to reset this signal if the battery fails or if the cacle is removed. See 2.1.4 and 2.2 for more information.

Note that the M/N 57C494 Power Supply module does not contain a Battery Back-up connection. Therefolds, the above memoraal Processon and Colmmon Viemery modules cannot be used with the M/N 57C494 Power Supply.

2.1.4 Power Supply Module Keyswitch

The keyswitch on the faceplate mutes TTL signals strough the Multibus backplane to the Processor meau e(s) to allow lockout of programming functions for system security. The three positions of the keyswitch are PROGRAM, MEMORY PROTECT, and SET L.R. The position of the keyswitch indicates the security level of the tack, i.e., the kind of ON-LINE Menu operations that can be beformed through a personal computer communicating with the processors in the tack. The MEMORY PROTECT posted allows only monitoring of variables and saving of tasks from the tack. SETLP allows the operator to monitorial variables, modify functionallows the operator to perform allows the operator toperform allows the operator toperform

2.2 Power Supply Module Electrical Description

When the Power Supply module powers up, it executes a "soft start," gradually increasing its output until it reaches the voltage necessary for logic operations. At this time, the module generates an initialize signal

Should the AC input tail below the lower line voltage limit, the module will generate a power tail interrup, signal at least three mill seconds before loss of the regulated DC power to at ow for orderly system shutdown. The holdover time on loss of AC input is 20 milliseconds.

In the event of s power fall Interrupt signs 15 Volt output power a supplied by the Bathary Book-Up (it Installed, W/N 57C493 only) for installating the volatile memory of DCS 5000 Processor modules and the Common Mathary module. When the regulated output power of the Power Supply module is restored to 4.55 Volts or greater, power will be supplied by the Power Supply module. Note that AutoMax Processors have on-board pattery bed-4 up and do not require Battery Book-Up unless there is a Common Memory module (M/N 57C415 or 57CF13A only) in the rack.

If Battery Back-Up Voltage over drops below 3.0 Volta, or the cable between the Battery Back Up and M/N 57C493 Power Supply module is disconnected with the power off, memory will be lost anothe Processor modules with not function until the Prover Supply is manually reset by turning the keyswitch on the front panel from MEMORY PROTECT to the PROSEAM position.

2.3 Rack Mechanical Description

The 8-, 10- and 18-Sidt Backs provide the mechanical meshs for mounting the indicated number of DCS 5000 and AutoMaximodules as well as the Power Supply module. All Backs are designed for panel mounting and indiude bull-in high capacity cooling fana, an AG line filter, a surge protector and a cable management tray. See figures 2.3, 2.4, and 2.5.



Figure 2.4-10-Slot Rack



Figure 2.5 - 16-Slot Back

Dedicated signal lines on the Multipus backalane require Limitations on slot placement for some types of DCS 5000/AutoMax modules. See ligure 2.6

6460-0100 PD							Mo	du	le S	Slot	Pos	ition				
Module	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
6-Slot Rack: Common Memory	•		Ĵ.		28 18		522 335		243 243						Ĵ	
Processor		٠	٠		•											
DOS DO Drive ¹				F	F	T				F						
Al Other	٠		٠		•									1 3		
10-Slot Rack: Common Memory					Γ											
Processor				*										1.6	1.8	
DOS DO Driver				Γ	Г		•	٠		•						
Al Other		٠				٠		٠		•						
16-Slot Rack: Common Memory	•		Ĵ,		- 27				100							
Processor																
DOS DO Drive?	1		1	T	Г			٠		F						٠
Al Other																

¹ Carmo, be used in a 6-Slot Rack. ² Must be prouped logether.

Figure 2.6- Rack Slot Limitations

2.4 Rack Electrical Description

The Multious backplane of the Rack supports two sets of bus lines that serve as the electrical connection for all slots in the Hack. The P1 bus, the larger of the two electrical connectors, conforms to the IEEE Microcomputer System Bus Standard for the 7796 bus, compliance level D16M20116. This bus is used for communication and control signals among the different modules in the Rack. The P2 bus, the analter of the two backplane electrical connectors, follows s ReLance pin assignment as permitted by the IEEE P763 standard. The P2 bus is used for functions such as determining the stort number of the module. See Appendix C for a cestriction of the pine on the Rack backplane. See J-3519, J-3750, or J2-3015 for guidelines on using non-Reliance modules in the Rack.

The AC line filter on the Heck filters the incoming power algosi before it is transmitted to the Power Supply module. The surge protoctor provides power supply protection from power surges. No other connections to the AC line are permitted between the line filter and the Power Supply module. See figure 2.7 for a typical input power signal.



Figure 2.7- Typical Input Power Connections

3.0 INSTALLATION

This section describes how to install and replace the Power Supplymodule and Back.

DANGER

THE USER IS RESPONSIBLE FOR CONFORMING WITH ALL APPLICABLE LOCAL, NATIONAL, AND INTERNATIONAL CODES. WIRING PRACTICES, GROUNDING, DISCONNECTS, AND OVER-CURRENT PROTECTION ARE OF PARTICULAR IMPORTANCE. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.

CAUTION: This equipment must be connected to a power source for which it was designed. Verify that the available power is 119 voits. Failure to observe this precaution could result in camage to equipment.

3.1 Wiring

To motice the possibility of electrical toba irrefering with the properoperation of the control system, exercise care when installing the withig between the system and the external devices. For detailed recommendations refer to IEEE 515.

The external wining to the modules in the Rack must be carefully routed to minimize electrical noise and crosscalk between input and output wiring. Group and buncle wire types by similar electrical signals, doing especially careful to separate low- and high level control signals and AC and DC wring.

If the 115 VAC input signal is subject to severe harmonic diatortion install a constant voltage transformer on the line.

3.2 Initial Installation

CAUTION: The cabinet or panel on which the rack is mountee must be located in enance, away from or shielded from sources of EML such as radar beams and transmission towers. Failure to observe this presention could result in damage to or destruction of the sourcement.

CAUTION: Air flow around the rack must be sufficient to dissipate the heat generated by sill of the nertward in suc structure the rack. Allower lises two inches of descence on each side of the rack. Avoid practing large, heat generating equipment underneath the rack fans. Additional user-supplied fan cooling or air conditioning is required if the amb ent temperature exceeds 60° C. Failure to observe this precention dould result in damage to pricestruction of the equipment. **CAUTION:** The rack must be located in splean environment. Do not expose the rack to dripping water or conceive atmospheres containing carbon dust, motal particles, or other contaminants. Failure to observe this precaution courd result in damage to or destruction of the equipment.

Use the following proceed is in install the Back and Prover Supply module. Before you begin, make contain that you have provided enough space for the Back, witing, and form tails tips or other devices that must be mounted near the Back. Make contain that the panel is shurey enough to support the Back and all modules that it will hold including connectors affected to module isoop atest a fully-conce 6-Sict Back weighs approximately 40 lbs. A fully-loaded 10-s of Back weighs between 70 and 30 lbs. A fully-loaded 16-Sict Back weighs between 105-115 lbs.

- Step 1. Mount the Rack on a panel or cobinet made of heavy gauge staal sturcy enough ic hold the Rack, all of the hardware modules that will go into the Rack, and the terminal strig/toornector assemblies for UD modules. The connector and of each terminal at p/connector assembly is attached to the appropriate module faceplate. The terminal strip one of each assembly can be mounted on the care isself or on lashing bars attached to the panel. Befor to the instruction menual for each individual module in your installation for more specific information. Follow the procedure below to install the Rack.
 - a) Drift four holes in the panel using the appropriate mounting pattern in Appendix D.
 - b) In each hole, screw is one 1,1/4° 20-thread, lap title 1 bolt, leaving approximately 1/8° to 1/4° of the thread excessed.
 - c) Remove the large nameptate preciset (labeled Aux/Mac') from the rack by removing the three screws resar the base holding it to the cable guide area.
 - d) Position the Rack against the panel st a slight angle so that the bottom is a lew increas away from the panel. Nace the too of the Rack against the panel so that the upper two botts are visible through the larger part of the bott holes at the top of the Rack.

Carefully slide the Back down as that the bolts are wedged in the top (smaller) area of the holt holes, while at the same time moving the lower portion of the Back toware the objinet or panel onto the dworthota. The lower oots should be firmly wedged against the upper edge of the lower bolt holes on the Back. The ther all the bolts.

- Step 2. Mount the Power Supply module in the Back following the steps below.
 - a) Take the Power Supply module out of its shipping container and anti-static bag, being careful not to buch the connectors on the back of the module.
 - b) Bemove the two keyswitch keys which are taped to the mont of the module. Insert the module into the leftmost and widest storing the Back. Use a screwdriver to attach.

the module to the Rack. Store the keyswitch keys in a secure area.

- c) Connect the Battery Back-Up unit, it used. Flug one end of the Bettery Back-Up cable into the Power Supply include taceplate connector labeled "BALLERY BACK UP". Flug the other end of the cable into the Battery Back-Up unit. Rotate the keyswitch on the front pane from Memory Protect to the Program position.
- Step 3 Mount the terminal strip one of the terminal strip/connector associations for 1/0 modules on the panel or on lashing bars. The terminal strips should be mounted to per nit easy access to the screw terminals. Make so that the onnecting cables will reach between terminal strips and the modules. Most cables are approximately tw' long.
- Step 4 Fasten wining for the external hardware to the terminal strips. Make certain that all field wires are securely attached. Label all terminal strips and field wires to allow easy reconnection at a later date.

For 70 modules, note carefully that bit numbers and whe numbers (located on wires detween the tacep ate connector and terminal stript are not the same. Refer to the installation section of the instruction manuals describing the VO modules for more information.

- Step 5 Take the Processor module(s) and other modules out of their shipping containers and insert them into the desired stats. See Figure 2.6 for slot restrictions for contain modules. Use a acrowpriver to stach the modules to the Back.
- Step 6. Attach the connector ends of the terminal strip/connector assemblies to their mating halves on the appropriate modules. Use a scieworiver to attach the connectors to the modules. Use the cable guides at the base of the rack to keep cables separate.

Note that in most osses both the connectors and their mating halves are equipped with movsble tkeys i. These keys should be used to prevent the wrong connector from being plugged into a module in the event that the connector needs to be removed and then re-altached later.

At the time of installation, rotate the keys on the connectanend the mating half on the module to mirmr image positions so that they can be connected together securely. For all modules equipped with keys, the key on each successive module in the Back should be rotated and position to the right of the key on the preceding module.

Stap 7 Wire the Rack following the instructions below:

CAUTION: Do not connect incoming AC power cirectly to the power supply module faceplate. ConnectAC power to the correction minals on the rack only. Failure to observe this precaution could result in carriage to or cestruction of the equipment.

- a) Ground the cabine, or panel on which the Rack will be mounted. Make cartain that there is an unbroken bath from the cabine, to the plant ground (earth).
- b) Ground the risck with a ground wire connected to one of the protective ground terminals provided on each side of the rack. The ground wire optor and size must be in accordance with appropriate international and institutal standards and codea.
- c) Connect incoming AC power to the Back as follows:

Rack Terminal Label	Input
109	120 VAC
168	120 VAC + (hol)

Cover the incoming wire ends with a -costen " connector and attach them securely to the sporopriate terminals using a acrewordver.

 d) Connect the power and ground wires from the Back to the Power Supply module as follows:

Wire Color	Wire Label	Power Supply Faceplate Connector
black	L2	12
orange	LI	U
green		GND

The wires labeled L2 and L1 should remain twisted together as much as possible between the Rack and the Power Supply module.

- Step 8. Using a acrowdriver, re-stisch the hameplate brocket to the case of the rack.
- Step 9. Turn on power to the system.

DANGER

THE POWER SUPPLY MODULE OPERATES USING AC INPUT VOLTAGE CAPABLE OF PRODUCING SEVERE SHOCK. MAKE CERTAIN THAT THE EXTERNAL AC SUPPLY CIRCUIT IS TURNED OFF BEFORE INSERTING OR REMOVING THE MODULE OR ANY CONNECTING CABLES. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.

> Step 10. Verify the installation by connecting the personal computer to the port labeled "PROGRAMMER/FORT B" on the leftmost Processor in the Back and running the BeSource programming software. Try to read from or write to the registers on each of the modules in the Back.

WARNING

BE CAREFUL TO INSURE THAT NO UNEXPECTED MACHINE MOTION WILL. RESULT WHEN WRITING TO OUTPUTS. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN BODILY INJURY.

Refer to the instruction manuals describing other hardware in the installation for more information.

3.3 Power Supply Module Replacement

Use the following procedure to replace the Power Supply module:

Step 1 Turn off power to the Rack and all connections.

DANGER

THE POWER SUPPLY MODULE OPERATES USING AC INPUT VOLTAGE CAPABLE OF PRODUCING SEVERE SHOCK. MAKE CERTAIN THAT THE EXTERNAL AC SUPPLY CIRCUIT IS TURNED OFF BEFORE INSERTING OR REMOVING THE MODULE OF ANY CONNECTING CABLES. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.

> Step 2 Use a acrewidiver to disconnect the terminal ship from the Power Supply module. Do not remove the wires from the terminal ship. Disconnect the Battery Back-Up cable if used.

> > Remove the nameplate bracket from the rack by removing the three screws near the base holding. If to the cable guide area

- Stap 3 Use a screwdriver to loosan the screws holding the Power Supply module in the Rack and remove the module, being careful not to scuch the connectors on the back. Store the module in the anti-state bag it came in
- Step 4 Mount the rediscement Power Supply module in the Back following the ateps below:
 - a) Take the inclosement Power Supply module cut of its shipping container and anti-static bag, being careful not to four 1 the connectors on the back of the module.
 - b) Remove the two keys to the keyswitch which are taped to the front of the module. Store the keyswitch keys in a secure area. Use a screwdriver to disconnect the terminal ship from the replacement Power Supply module.
 - Insert the module into the leftmost and widest alot in the Rack. Use a screwdriver to attach the module to the Rack.
 - d) Use a screwdriver to attach the terminal strip from the old Power Supply module to the replacement Power Supply module. Make certain that the connector is alteched correctly by varilying that the whing and the terminal lacels on the faceplate match as follows:

Wire Color	Wire Label	Power Supply Faceplate Connector
niack	12	12
prange	Lī	Li
green	S 😸 🔅	GND

- e) If you are using the Battery Bsok-Up unit, plug one end of the Battery Back-Up capte into the Power Supply module Isoeplate connector labeled ' BATTERY BACK UP ', Plug the other end into the Battery Back-Up unit. Rotate the keyswitch on the 'ront panel from Memory Protect to the Program position.
- Using a screwdriver, re-effsch the nameplate cracket to the base of the rack.
- Step 5. Turn on power to the system.
- Step 5. Verily the installation by connecting the personal computer to the port labeled "PROGRAMMER/PORT B" on the leftmost Processor in the Rack and running the ReSource programming software. Try to read from or write to the registers on each of the modules in the Rack.

WARNING

BE CAREFUL TO INSURE THAT NO UNEXPECTED MACHINE MOTION WILL RESULT WHEN WRITING TO OUTPUTS. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN BODILY INJURY OR DAMAGE TO EQUIPMENT.

Refer to the instruction manuals beaching the specific hardware in the installation for more information.

3.4 Rack Replacement

Use the following processure to replace the Back-

Step 1. Turn off power to the Rack and all connections.

DANGER

THE POWER SUPPLY MODULE OPERATES USING AC INPUT VOLTAGE CAPABLE OF PRODUCING SEVERE SHOCK. MAKE CERTAIN THAT THE EXTERNAL AC SUPPLY CIRCUIT IS TURNED OFF BEFORE INSERTING OR REMOVING THE MODULE OR ANY CONNECTING WIRES. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.

- Step 2. Using a acrewiditiver, remove the nameplate pracket from the rack by removing the three sprewa hear the base holding it to the caple guide area. Loosen slittle sprewa holding connectors to the mocules in the Rack. Remove the connectors. Disconnect the wires attached to the terminal strip on the Power Supply module
- Step 3. Use a scrowdriver to rosen the screws holding all modules, including the Power Supply module. In the Back.

Take all of the modules out of the flack, being careful not to touch the connectors on the back.

- Step 4. Loosen the holts that hold the rack to care, approximately 1781, 1445. Uit the Back alightly while holding it sgainal the panel until ooth top polits are positioned in the larger colt holes and the lower two colts have cleared the amailer holes. Put the Rack away from the panel and set aside.
- Step 5 Fosition the replacement Back against the panel at a slight angle so that the bottom is a few inches away from the panel. Place the Back against the panel so that the upper two bots are visible through the larger part of the bolt boles at the top of the Back.

Carefully alice the Rack down so that the bolts are wedged in the top (smaller) area of the polit holes, while at the same time moving the lower portion of the Rack toward the cabinet or panel onto the lower bolts. The lower bolts should be firmly wedged significant the upper edge of the lower bolt holes on the Rack. Tighten all the holts.

- Step 5 Insert the Power Supply module into the effmost and wideat slot in the Back. Use a screworiver to attach the module to the Back.
- Step 7. If you are using the Battery Back-Up unit plug one one of the Battery Back Up cable into the Power Supply module faceplate connector labeled "BATTERY BACK UP". Plug the other end into the Battery Back Up unit. Rotate the keyswitch on the front panel from Memory Protect to the Program position.
- Step 8 Insert the Processor module(s) and other modules. Use a screwdriver to attach the modules to the Rack.
- Step 9 Use a screwdriver to attach the connectors to their meting halves on the appropriate modules.
- Step 10. Connect 11s WAC power to the Rack following the instructions below.

CAUTION: Do not connect incoming AC power cirectly to the cover supply module faceplate. Connect power to the normative minals on the wak only Failure to observe this precaution could result in damage to or dee ruction of the equipment.

- Make certain that there is an unbroken path 'rom the cabines to the plant ground
- b) Connect incoming AC power to the Back as follows:

Rack Terminal Label	Input
1821	120 V4C
160	120 VAC + (hot)

Cover the incoming wire ends with a Fasion[®] connector and at ach them securely to the appropriate terminals using a screworiver.

 c) Connect the power and ground wires from the Hack to the Power Supply module as follows;

Wire Color	Wire Label	Power Supply Faceplate Connector
black	12	1.2
orenge	1.1	11
graen	S =	GND

The wirea labeled L2 and L1 should remain twisted together as much as possible between the Rack and the Power Supply module.

- Step 11. Using a screwdriver, re-stiach the hamep ate brockst to the base of the rack.
- Step 12. Turn on power to the system.
- Step 13. Verify the installation by connecting the personal computer to the port labeled "PROGRAMMER/PORT B" on the leftmost, Processor in the Rack and running the ReSource programming software. Try to read from or write to the registers on each of the modules in the Rack.

WARNING

WHEN WRITING TO OUTPUTS, BE CAREFUL TO INSURE THAT NO UNEXPECTED MACHINE MOTION WILL RESULT. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN BODILY INJURY OR DAMAGE TO EQUIPMENT.

Refer to the instruction misnuals deportion; the apeolitic hardware in the installation for more information.

4.0 DIAGNOSTICS AND TROUBLESHOOTING

This section explains how to troubleshoot the Power Supply module and Reck. Any problems with either the Power Supply module or the Reck can usually be isolated by observing the condition of the LEDs on the Power Supply module (sceptate, Problems with the Rack backclane (bus) will result in error ocdes on the LEDs of Processor modules in the Rack. See U-3650 for more information on troubleshooting the Auto Max Processor module.

DANGER

THE POWER SUPPLY MODULE OPERATES USING AC INPUT VOLTAGE CAPABLE OF PRODUCING SEVERE SHOCK. MAKE CERTAIN THAT THE EXTERNAL AC SUPPLY CIRCUIT IS TURNED OFF BEFORE INSERTING OR REMOVING THE MODULE OR ANY CONNECTING WIRES. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.

If the problem cannot be determined using the troubleshooting instructions below the hardware is not user-serviceable.

DANGER

SOME OF THESE STEPS ARE MADE WITH POWER ON. EXERCISE EXTREME CARE BECAUSE HAZARDOUS VOLTAGE EXISTS. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.

4.1 The POWER LED is Off

Problem: the POWER LED on the Power Supply module is off. This LED should always be on when input adwar is on and the input fuse is in close and functioning correctly. If the LED is off, the module is not receiving 120 VAC power. Use the following procedure to isolate the problem.

- Step 1. Using a so tincter, verily that the Back is receiving 120 W/C power.
- Step 2 Turn off power to the Rack. Wait until all of the LEDe on the tabeplate of the Power Supply module have gone out. Verily that the connectione at the Rack and the L1 and L2 connections at the Power Supply module are tight.
- Step 3. Bemove the fuse cap and fuse and, using an Ohm mate; we ify that the fuse is not blown. If the fuse is good, re-insert it and continue with step 4.

If the fuse is blown, verily that, for M/N s7C493, it is a taA MDA time delay type luse. M/N 57C494 should contain a bA MDA time delay type fuse. A blown luse indicates that the Power Supply should be replaced.

Step 4 Turn on power to the Back. If the crockern is not corrected, replace the Power Supply.

4.2 The FAULT LED is On

Problem: the FAULT LED on the Power Supply module is ON. This LED should always be of when input power is on, the Power Supply output voltage is within proper limits, and the watchdog alarm coming from the backplane is not active. The rack must also contain at least one AutoMax Processor module (or, for a remote rack is Renote I/O module). Note that the FAULT LED will be ON if there is no Processor for Renote I/O module) in the rack.

Use the following procedure to determine whether the problem is caused by a malfunctioning Power Supply or by a wate idog alarm.

- Step 1. Verify that the Power Supply is accurally seated in the rack. The FAULT LED will come ON if there is not a good connection to the rack backplane.
- Step 2. If you have more than one Processor in the rack, s wstahdog timeout will not be indicated by the Power Supply FAULT LED. If the Power Supply FAULT LED is ON, the Power Supply must be recladed.

If the rack contains a single AutoMax Processor or is a remote rack, check the OK LED on the Processor module or Remote FO module. If the OK LED is OFF, it may indicate a watchdoo timeout.

- Step 3. Turn oll power to the rack. Replace the Processor or Remote I/O module. Turn on power to the rack.
- Step 4. In the Power Supply FAULT LED turns ON, the Power Supply is mailunctioning. Replace the Power Supply

Appendix A

Technical Specifications Power Supply Module (M/N 57C493)

Amblent Conditions

- Storage temperature: 40°C 85°C
- Operating temperature: 0°C 60°C
- Humidity: 5 90% non-condensing
- Altitude. operation from sea level at 60°C to 10,000 leet (3048 meters) with incer dersting of 1°C per 1000 feet above 5000 feet.

Dimensions

- Height: 29.6 cm 11⁸/₄ inches
 Wiefn: 10.2 cm 4 inches
 Depth. 19.7 cm 7⁹/₄ inches
- Weight 3.8 kg 8½ lbs

System Power Requirements

- nput voltage: nominal 100/120 VAC, 65-132 VAC acceptable range
- Current. 6 Amp at 120 VAC
- Frequency: nominal 90/60 Hz, 47-63 Hz acceptable range.
- Protection: 15 Amp 250 VAC MDA time de ay fuee
- Fault current limit: 10 000 Amps
- Maximum source rating: 50KVA

DC Output

- +5 VDC et 50 emp3
- +7-12 VDC at 4 amps
- 17 15 VDC at 1 smp.
- Maximum continuous output power. 376 Walls
- Holdup time: 20 msec immimum after loss of AC input.

Regulation

- Nominal +5 VDC. -2.5% to -3% regulation
- Nominal +/+ 12 VDC: +/-10% regulation
- Nominal 17 15 VDC: 17 19; regulation.

Efficiency

75% minimum at nominal line voltage and full load.

Isolation

- 1500 VDC for 1 see input to output and input to chaesis.
- 700 VDC for 1 sec output to chase a

Protection

Overvoltage:	+6V	5.6V+/-0.16V
1.272200-00100-001-001-001-001-001-001-001-0	+/~12V	14 × V +/-0.6V
	+/-15V	18.5V +/-0.5V

Technical Specifications Power Supply Module (M/N 57C494)

Ambient Conditions

- Storage temperature: -40°C 85°C
- Operating temperature: 0' G 60' C
- Humidity. 5–90% non-condensing
- Altitude: poperation from son love at 00PC to 10,000 less (3048) motors), with linear densing of 14C per 1000 lest above 5000 lest.

Dimensions

÷	Height	29.8	om	11.4.	inches .
٠	Wiche	6.1	GIN	215/16	inches
	Decth:	111.7	cm	781	inches

Weight 2.8 kg 3³/₂ lbs.

System Power Requirements

- mput voltage: nominal 100/120 VAC, 86-132 VAC acceptable range
- Current: 2.6 Amplat 190 VAC
- Frequency: nominal 50/80 Hz, 47-55 Hz acceptable range
- Protection: a Anip 2s0 VAC MDA time delay luse
- Fault current limit: 10.000 Amps.
- Maximum source rating: 50-KVA

DC Output

- 15 VBC at 20 amps.
- 17 12 VDC at 1 smp
- +2+1a VDC at 0.75 amp
- Maximum continuous output powers 147 Watts.
- +5 VDC output holdup time. 3 msec, in himum alter loss of AC input á. full lose and minimum input line voltage
- input fine loss: capable of a 1 cycle 60 Hz line loss at nominal input ine voltage

Regulation

- Nominal 15 VDC: 2.5% to 3% regulation
- Nominal +/+ 12 VDC: +/+10% regulation
- Nominal +/+ 15 VDC: +/+ 1% regulation

Efficiency

65% minimum at nominal line voltage and full load.

Isolation

- 1500 VDC input to output.
- 700 VDC output to chassis

Protection

 Overvoltsge: 	157	5.6V / 0.15V
20/20/10/11/07/2007/07/201	47-129	117V 17-0.6V
	17, 159	16.5V 17 0.5V

Technical Specifications 16-Slot, 10-Slot and 6-Slot Rack

Ambient Conditions

- Operating temperature: 0°C 60°C
- Humidity: 5-80% non-condensing

Rack Dimensions

M/N 57C331 16-Slot Rack

٠	Height:	18.6	cm	191/8	inchee
	Wiath:	62.4	cm	249:16	inches
	Depth.	31.1	an	121/4	inches
	Approximate Weight:	50 kg	fully loaded	1.10 lbs	

M/N 57C332 10-Slot Rack

	Height:	48.6	CTII	19%	inches.
	Wight:	13.3	an	171/16	inches
٠	Depth:	31.1	cro	121:4	inches
	Approximate Weight:	34 kg	fully cadeo	75 Iba	

M/N 57C334 6-Slot Rack

	Height	18.8	an	19%,	inches
	Wioth:	27.5	cm	TUR'IE	inches.
٠	Decth:	31.1	cm	121/4	Inches
	Approximate Weight:	1a kg	fully cases:	39.5 b	5

Bus Specifications

- Type: Intel Multibus 1
- P1 bus connector: EEE standard P796 bus
- P2 bus connector: EEE standard P706 modified bus

AC Line Filter:

- 10 Amp (M/N 570331 sinc M/N 570332)
- 6 Amp (M/N a/C334)
- ♦ 120/250 VAG
- SO/60 Hz

Fans

- Two (2) per Back (M/N 57G331 and M/N 57G332).
- One (1) per Bsok (M/N 57G334)
- Nominal power dissipation: 14 Watts each

Appendix B

External Connections

Input Power to Rack (M/N 57C331, 57C332, and 57C334)

Terminal Label	Input
189	AG neutral
136	AC hot
GND	Rack/earth ground

Rack (M/N 57C331 and 57C332) to Power Supply Module (M/N 57C493)

Wire Color	Wire Label	Power Supply Faceplate Connector
black	1.2	L2
orançe	11	
6.660		GND

Rack (M/N 57C331, 57C332, and 57C334) to Power Supply Module (M/N 57C494)

Wire Color	Wire Label	Power Supply Faceplate Connector
black	12	12
crançe	L1	LT
ginan	859710	GND

Appendix C

Rack Backplane

P1 Bus

	Component 5lde				
	Pin ¹	Mnemania	Description		
Power Supplies	1 5 5 7 9 NG 11	GND 1-5V 1-5V 1-12V 5V GND	Signal Ground 15 VDC 15 VDC 112 VDC 5 VDC Signal Ground		
Bus Controls	13 15 17 10 21 24	BCLK BPRN; HUSW MRDC; IGBC/ XACK/	Bus Clock Bus Priolity In Bus Rusy Moncory Read Command VG Rose Command Transfer Acknowledge		
Bus Controls and Addresses	25 27 29 31 33 NC	LOCK/ D IEN/ CBRQ: CCLK/ INTA	Look Byte Hi Enable Common Bus Request Common Clock Interrupt Acknowledge		
Parallel Internupts Requests	36 MOD 37 NC 30 41	INT6/ INT4/ INT2/ INT0/	CPU Communication Interlupt General Purpose interlupt General Purpose interlupt General Purpose interlupt		
Address	43 46 17 19 51 53 56 57	ADRC/ ADRC/ ADRA/ ADRC/ ADRC/ ADRC/ ADRC/ ADRC/ ADRC/	Augroen Jun		
Data	99 67 68 68 67 69 71 73	DATE/ DATC/ DATC/ DATE/ DATE/ DATE/ DATE/ DAT2/ DAT2/ DATC/	Dota Bus		
Power Supplies	75 77 NC 79 81 83 80	GND - 12V 1-5V + 6V GND	Signal Ground Bese voo –1 av 15 VDC 15 VDC Signal Ground		

NC: No connection MOD: Modified definition of Multibus specification NU: No usage it system: driven per Multipus specification

Rack Backplane (Cont.)

P1 Bus (Cont.)

	Solder Side		
	Pin ¹	Minemonic	Description
Power Suppliea	2 1 6 10 NC 12	GND -5V -3V -12V -5V OND	Signal Ground +5 VDC +5 VDC +12 VDC -5 VDC Signal Cround
Bus Controls	14 16 18 20 22 24 MOD	INIT/ BPBO/ BREQ/ MWTO/ IOWC/ PR W	nitistice Bus Priority Out Bus Request Memory Write Committeed UC Write Command Privilece
Bus Controls and Addresses	28 MOD 28 30 32 34	MMUMAP AD10; AD11; AD12; AD12; AD13;	MMU Mac Select Acdress Sus Acdress Sus Acdress Sus Acdress Sus Acdress Sus
Parallel Interrupts Requests	38 MOD 38 NC 10 12	INT// INT5/ INT3/ INT1/	System WDOG Interrupt General Purpose interrupt General Purpose interrupt General Purpose interrupt
Address	44 46 48 32 23 53 39	ADBH/ ADBD/ ADBB/ ADB9/ ADB9/ ADB7/ ADB7/ ADB3/ ADB3/	Aodress Sus
Data	80 82 84 86 88 70 72 74	DATF/ DATD/ DATS/ DATS/ DATS/ DATS/ DATS/ DATS/ DATI/	Deta 3us
Power Suppliee	76 78 NC 50 62 54 56	OND 12V -5V -5V GND	Signal Ground Reserved - 2V + 5 VDC + 5 VDC Signal Ground

NC: No connection

MOD: Modified definition of Multipus specification NU: No usage in system; driven per Multipus specification

Rack Backplane (Cont.)

P2 Bus

	Com	ponent Side
Pin	Mnemonic	Description
1	AG ND	Analog Ground
3	SVB	+5V Ballery
5	IDAQ/	Accress D #0
7	DB	Decicated High Speed Bus
9	IDAL:	Accress (D #)
11	DB	Decicated High Speed Bus
13	DB	Decicated High Sceed Bus
15	DB	Decicated High Sceed Bus
17	PESN/	Power Fall Sense
19	PEIN/	Power Fail Interrupt
21	AGND	Analog Ground
23	A +15V	Analog – 5 VOC
25	A =16V	Analog – 5 VDC
27	DB OPRO;	Data Parity 0
28	DB APRO;	ADDR Parity 0
31	DB APRo/	ADDR Parity 2
33	DB	Decidated High Second Bus
35	KEY0/	Key Lock Position 0
37	REY1/	Key Lock Restition 1
58	WOCK/	Watchdog OK
41	MPOSO	Decloated High Sceod Bus
43	MPOS2/	Decicated High Sceed Pus
45	MPOS4/	Decicated High Sceed Pus
47	MPOS6/	Decicated High Sceed Pus
49 51 53 57 58	MPOS8/ MPOSA/ MPOSC/ MPOSE/ MDFLT/ MVAGND	Decidated Tigh Speed Bus Decidated High Speed Bus

Rack Backplane (Cont.)

P2 Bus (Cont.)

	So	lder Side
Pin	Mnemonic	Description
2	AG ND	Analog Ground
4	SVB	+5V Battery
6	DBR	Decidated Tigh Speed Bus
6	DBR	Desicated High Speed Bus
10	IDA2/	Accress 10 #2
12	DD	Desicuted High Speed Bus
14	IDA3/	Accress 0.43
16	DBR	Decicated High Speed Bus
18	DBR	Decicated High Speed Bus
20	MPRO/	Memory Protect
22	AGND	Analog Ground
24	A +15V	Analog – 15 VDC
23	A = 16V	Analog – 15 VDC
28	DPR17	Data Parity 1
30	APR17	ADOR Parity 1
32	PREN/	Parity Enable
34	DIAG/	Diagnostic Loop
36	BD RST/	Board Reset
38	DB	Decleated High Speed Bus
40	DB	Decleated High Speed Bus
42	MPOS ⁻	Decleated High Speed Bus
44	MPOSS/	Decidated High Sceed Pus
46	MPOSS/	Decidated High Sceed Pus
48	MPOS7/	Decidated High Sceed Pus
50	MPOS9/	Decidated Tigh Speed Bus
52	MPOSB/	Decidated High Speed Bus
55	MPOSD/	Decidated High Speed Bus
58	MPOSF/	Decidated High Speed Bus
58	MVAREF	Decidated High Speed Bus
60	MVAREF	Decidated High Speed Bus

Appendix D

Rack Mounting Pattern



Appendix E

Power Requirements of AutoMax Modules

Nota: Values are in amps

Module	Description	+54	+12V	-129	+15V	-159
MON 57C400	115VAC/DC Input	0.425	a	0	U.	D
B/M 57401-1	Drive Digital VO	0.370	0.1	0.015	0	0
M/N 570402	24-115VAC/DC Output	0.525	0.045	0.0/5	0	0
M/N 6/C428	115V High Output	1.2	0	0	0	0
M/N 570404	Network Communication	2.5	0.063	5.0075	0	0
B/M 57405	Drive Analog 10	1.2	0.1	0.1	0.15	0.1a
M/N 57C/ICE	Ansizg Incut	3.05	0	5	0	0
M/N 57CA10	Anslog Culput	2.75	0.065	0.005	0	0
M/N 57C411	Resolver lopur	1.7	0.085	0.045	U.	D
M/N 6/C413	Common Memory	1.00	0	2	0	0
M/N 57C/114	Moobus intertace	2.5	0.063	0.0075	0	
M/N 57C415	24VAC/BC Input	0.625	đ	0	0	D
M/N o7C416	Remote (/C Communications	2.5	0.053	0.0075	0	
M/N 57C/117	AutoMate Inter'ace	2.5	0.063	0.0075	0	
M/N 57C418	A+B interlace	2.5	5c0.0	5.0075	0	
M/N a7C419	a-24VDC Input	0.7	0	D	0	0
M/N 57C/120	5-24VDC Outcut	0.05	0	5	0	0
M/N 57CA21	Pulaetsch Input	0.9	0	D	0	0
M/N 67C422	2-Axis Servit	3.6	0	0	U.	D
M/N 6/0423	Common Memory	1.05	0	2	0	0
M/N 57C/128	Toleco Scale Interface	2.1	0.063	5.008	0	0
M/N 6/C429	AutoMax R+Net Processor	2.5	0.0G	5	0	0
M/N 07C430	AutoMax Processor	3.0	d.1	0.1	0	D
M/N 67C431	AutoMax Processor	3.C	0.1	0.1	0	0
M/N 57C/135	AutoMax Trocessor	3.0	0.1	0.1	0	0
M/N 57C440	Etherner Imeneoa	5.0	0.5	0.1	0	0

Power Requirements of AutoMax Modules (Cont.)

Note: Volues are in amps-

Module	Description	+5V	+12V	-127	+15¥	-15V
M/N 570441	Modbus Plus Interlace	0.E	0	9	D	D
M/N 570442	Osta Highway Nus Interlace	0.65	0	0	0	0
B/M 57552	Universal Drive Controller	1.7	0	ā.	D.1	0.071
M/N 6112500	115VAC input	342	a	5	D	0
M/N 610515	249AC/DG Input	1.7	a	đ	D	Ð
M/N 61C510	Current Input	1.5	0.03	0	0	2
M/N 61C542	Voltage hput	*.5	0.03	G	0	3
M/N 61C344	RID	2.5	6.03	0	0	0
M/N 61C805	8-Ch. Thermoccupte input	181	a	d.	D	0
M/N 61061S	15-Channel Analog Input	1.25	0	a	0	0

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d2-3008-4

September, 1996