ARGUS

RSM 48/100 Modular Switched Mode Rectifier / Eliminator

010-522-B2

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Power

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Argus Technologies Ltd.

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RSM 48/100 MODULAR SWITCHED MODE

RECTIFIER / ELIMINATOR

#010-522-B2

Serial #_____

The following documents and drawings are included in this manual to provide the necessary information required for routine operation and fault diagnosis of the unit.

- Specifications, RSM 48/100: 010-522-B1 Rev C
- Warranty Policy: 048-507-10
- Installation and Operation Instructions: 010-522-C0 Rev D
- RSM 48/100 Outline Drawings: 010-522-06
- Connections of Multiple RSM Rectifiers, Drawing: 010-522-08
- Assembly Kit, Alarm Relay Interface Drawing/Notes: 037-002-04, 037-002-F0
- Assembly Kit Connector Drawings: 037-001-04
- Cable Assembly, RS-232 Terminal, 9-9 Pin: 877-010-04
- Cable Assembly, RS-232 Terminal Cable: 877-009-04
- Cable Assembly, RS-232 Modem Cable: 877-006-04
- Cable Assembly, AC Line Cord, 208-240VAC, RSM 48/100: 877-149-04
- Cable Assembly, AC Line Cord, 380-415VAC, RSM 48/100: 877-150-04
- Factory Service Information: 048-527-10

SPECIFICATIONS FOR ARGUS TECHNOLOGIES' SWITCH MODE RECTIFIER MODEL RSM 48/100

Output:

Voltage	42 - 62 VDC (test) 50 - 60 VDC (equalize) 48 - 57 VDC (float)
Current	100 Amps D.C. nominal
Maximum Power	6000 Watts Continuous
Regulation	+/- 25mv (0.05%) line and load (static, zero slope)
Time Stability	0.2% per year
Temp. Stability	100 ppm/degree C over the operating range
Transient Response	<1% deviation for 50 to 100% load step ≤2% deviation for 10 to 90% load step 2 msec. to 0.1% of output
Noise	Less than 22 dBrnc (Voice Band) 10mVrms 10KHz to 10MHz (Wide Band) 150mVp-p 10KHz to 100MHz
EMI	The unit meets requirements of: IC ICES 003 Class A (CISPR11) FCC Rules Docket #20780, Part 15, Class A
Breaker Rating	150 Amp, 10000 Amp interrupting capacity at 65 VDC

In Accordance with FCC requirements, we provide the following statement as specified in the FCC guidelines for conformance to Part 15, Level A:

> **WARNING: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.**

Input:

Voltage	184 VAC - 264 VAC (57 - 63 Hz) List 9: 208/220/240VAC 317 VAC - 456 VAC (47 - 63 Hz) List 10: 380/415 VAC
Current	21 Amps RMS @ 208 VAC List 9: 208/220/240 VAC 12 Amps RMS @ 380 VAC List 10: 380/415 VAC
Frequency	47-63 Hz
Power Factor	>0.90 (True) 50-100% load
T.I.F. (Current)	<200 at 100% load
Efficiency	91% minimum 50-100% load
Hold-over time	10ms from loss of 240 VAC or 380 VAC line
Source Impedance	5% inductive of resistive
Soft Start	Approximately 10% per second
Start Delay	0-256 sec. (5 second increments)
Input transient suppression	Meets IEEE/ANSI C62.41 Category B.
Breaker Rating	30 Amp, 10000 amp interrupting capacity at 415 VAC
Recommended Feeder Breaker	30 Amps or greater

Miscellaneous:

Size:	130mm H x 419mm W x 381mm D (5.15" H x 16.5" W x 15" D)
Mounting:	19" or 23" Center Mounting. 19" Flush Mounting
Weight	20.5 Kg (45 lbs)
Acoustic Noise	60 dBA at 1 meter (3 ft)

Environmental:

Temperature	0 to +60 deg C (+32 to +140 deg F) [standard operating] -40 to +60 deg C (-40 to +140 deg F) [optional operating] -40 to +65 deg C (-40 to +158 deg F) [storage]
Humidity	0 to 90% (non-condensing)
Elevation	-500 to +2800 metres (-1640 to 9180 ft.)

Recommended Wire Sizes (as per UL):

Input:

Temperature Range	Minimum Input Wire Size (AWG)
to 40 deg C (104F)	#10
to 60 deg C (140F)	#8

Output:

Temperature Range	Minimum Output Wire Size (AWG)
to 40 deg C (104F)	#2
to 60 deg C (140F)	#0

(Specifications subject to change without notice)

WARRANTY AND REPAIR INFORMATION

Warranty Policy

Argus Technologies Ltd. warrants all equipment manufactured by it to be free from defects in parts and labor, excluding third party OEM materials (example: air conditioners, batteries), for a period of two years from the date of shipment from the factory. For third party products the OEM's warranty shall apply. The liability of Argus applies solely to repairing, replacing or issuing credit (at Argus' sole discretion) for any equipment manufactured by it and returned by the customer during the warranty period. The terms of the warranty are Ex Works (EXW) from Argus' factory service location.

Argus reserves the right to void the warranty if:

(1) identification marks or serial numbers are removed or altered in any way,
(2) invoice is unpaid, or
(3) defect is the result of misuse, neglect, improper installation, environmental conditions, non-authorized repair, alteration or accident.

Argus shall not be liable to the customer or other parties for any loss of profits, loss of use, costs for removal or installation of defective equipment, damages or consequential damages based upon equipment failure during or after the warranty period. There shall be no other obligations either expressed or implied. Argus will not honor warranties for batteries and other third party products without prior written Argus authorization.

Freight Policy

Customer is responsible for all shipping and handling charges (COD and freight collect will not be accepted without prior approval from Argus Technologies).

Terms of Payment (North America)

Payment terms are net 30 days subject to prior credit approval. All other orders require payment before shipping.

Terms of Payment (International)

Payment terms are subject to prior approval and are typically through Tele-Transfer.

Return Material Policy

Our RMA policy is designed to ensure prompt, efficient and high quality factory service. A Return Material Authorization (RMA) number must be obtained before products can be accepted for servicing by the Argus factory. For returns to an authorized service center (refer to "Authorized Service Centers" for locations), please consult the individual service center for specific return policies and instructions.

To obtain a RMA number for a factory return, customers must call the appropriate location with the product serial and model number, as well as a brief description of the problem, shipment instructions and billing details.

The original packing container should be used whenever possible. Both the shipping documents and the outside of the box must have the RMA # clearly marked and the product shipped prepaid to the Argus factory service center. Argus will endeavor to repair products within five working days of receipt. Repairs to the returned product are warranted for a period of six months. A service charge may be applied if no fault is found in the returned product. Argus will not accept products without an RMA number.

Business Hours

Argus North American office hours are 7:30 am to 5:00 pm (Pacific Standard Time) Monday to Friday.

Factory Service Centers

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Argus Technologies Ltd.
ATTN: RMA Returns
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Email: returns-usa@argusdcpower.com

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048-507-10-I1 Rev S (09/2007)

CSA/NRTL — MARKS — BACKGROUND

What are the CSA and NRTL?

CSA (Canadian Standards Association also known as CSA International) was established in 1919 as an independent testing laboratory in Canada. CSA received its recognition as an NRTL (Nationally Recognized Testing Laboratory) in 1992 from OSHA (Occupational Safety and Health Administration) in the United States of America (Docket No. NRTL-2-92). This was expanded and renewed in 1997, 1999, and 2001. The specific notifications were posted on OSHA's official website as follows:

Federal Register #: 59:40602 - 40609 [08/09/1994]
Federal Register #: 64:60240 - 60241 [11/04/1999]
Federal Register #: 66:35271 - 35278 [07/03/2001]

C US NRTL/C

The product on which either of these marks appear has been certified by CSA as meeting applicable Canada/US standards.

When these marks appear with the indicator "C and US" or "NRTL/C" it means that the product is certified for both the US and Canadian markets, to the applicable US and Canadian standards. (1)

Argus rectifier and power system products, bearing the aforementioned CSA marks, are certified to CSA C22.2 No. 950 and UL 1950, or CSA/UL 60950.

As part of the reciprocal, US/Canada agreement regarding testing laboratories, the Standards Council of Canada (Canada's national accreditation body) granted Underwriters Laboratories (UL) authority to certify products for sale in Canada. (2)

c UL US

The product on which this mark appears has been certified by UL as meeting applicable Canada/US standards.

Only Underwriters Laboratories may grant a licence for the use of this mark, which indicates compliance with both Canadian and US requirements. (3)

What are NRTLs and what do they do?

NRTLs are third party organizations recognized by OSHA, US Department of Labor, under the NRTL program.

The testing and certifications are based on product safety standards developed by US based standards developing organizations and are often issued by the American National Standards Institute (ANSI). (4)

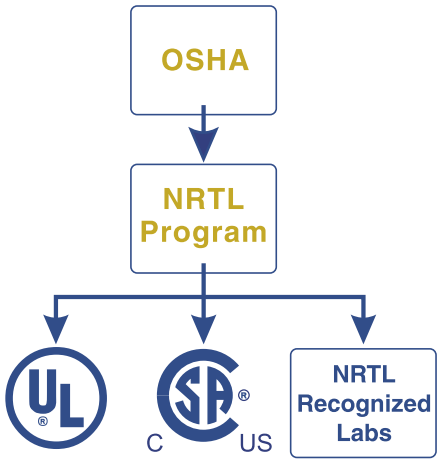
The NRTL determines that a product meets the requirements of an appropriate consensus-based product safety standard either by successfully testing the product itself, or by verifying that a contract laboratory has done so, and the NRTL certifies that the product meets the requirements of the product safety standard. (4)

When was the NRTL started and who governs it?

In 1983, in a suit brought on by an independent testing laboratory, OSHA was court ordered to remove specific references to UL (Underwriters Laboratories) and FMRC (Factory Mutual Research Corporation) from its regulations.

In 1988, OSHA revised its regulations to remove those references and the NRTL program was established.

The NRTL Program is both national and international in scope with foreign labs permitted.



References:

Information in this document has been developed from the official websites of the respective organizations.

(1) www.csa-international.org
(2) www.scc.ca
(3) www.ulc.ca
(4) www.osha.gov

Table of Contents

LIST OF FIGURES AND TABLES

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS
This manual contains important safety and operating instructions for rectifier model RSM 48/100.

1. **Please read this manual thoroughly prior to use in order to become familiar with the rectifier's numerous features and operating procedures. To obtain a maximum degree of safety, follow the prescribed sequences as outlined.**

2. **This manual provides warnings and notes to the user. Points that are vital to the proper operation or safety of the operator are indicated by the heading: WARNING.**

3. **Before using rectifier, read all instructions and cautionary markings on: (1) rectifier, (2) battery, and (3) product using battery.**

4. **CAUTION - To reduce risk of injury, charge only lead-acid type rechargeable batteries. Other types of batteries may burst causing personal injury and damage.**

5. **Do not expose rectifier to rain or snow.**

6. **CAUTION - Use of an attachment not recommended or sold by the rectifier manufacturer may result in a risk of fire, electric shock, or injury to persons.**

7. **CAUTION - Do not operate rectifier if it has received a sharp blow, been dropped, or otherwise damaged in any way — take it to a qualified service center.**

1.0 INTRODUCTION

1.1 Scope Of The Manual

This instruction manual explains the installation, interconnection and operation of Argus Technologies' RSM 48/100 switched mode rectifier. The topics covered include general description, product specifications, basic features, installation and configuration, operation and maintenance. To aid the user with installation and operation, frequent reference is made to drawings attached to the back of the manual.

1.2 ARGUS Numbering System

ARGUS technologies uses an eight digit drawing number system which is broken into three blocks. The first three digits describe the category of the product; i.e. rectifier or fuse panel. The next three digits indicate the sequence in which the product number was allocated in a particular category. The last two digits indicate the type of drawing; i.e.:

- 05 . . . . Schematic
- 06 . . . . Outline Drawing
- 20 . . . . Main Assembly

ARGUS Technologies uses an eight digit part numbering system for all components and sub assemblies. Each part is covered by its own unique number. Because of the large quantity, categories are not listed within this manual.

1.3 Notes To The User

This manual has special notes for the user. Points that are important to the performance or ease of use of the equipment are covered by a notation that is double underlined.

Items that refer to physical components or features such as indicator lights are in ***Bold Italic*** typeface. Items that refer to states, modes and generated messages such as found on the LCD panel are in **BOLD UPPERCASE** typeface.

1.4 Product Description

The RSM series of rectifiers uses a high frequency, switched mode conversion technique to provide a fully regulated and isolated DC output from the AC mains. The RSM 48/100 module provides external connections for input, output and alarm interfaces. The DC output of the RSM 48/100 rectifier is designed for a positive ground configuration only.

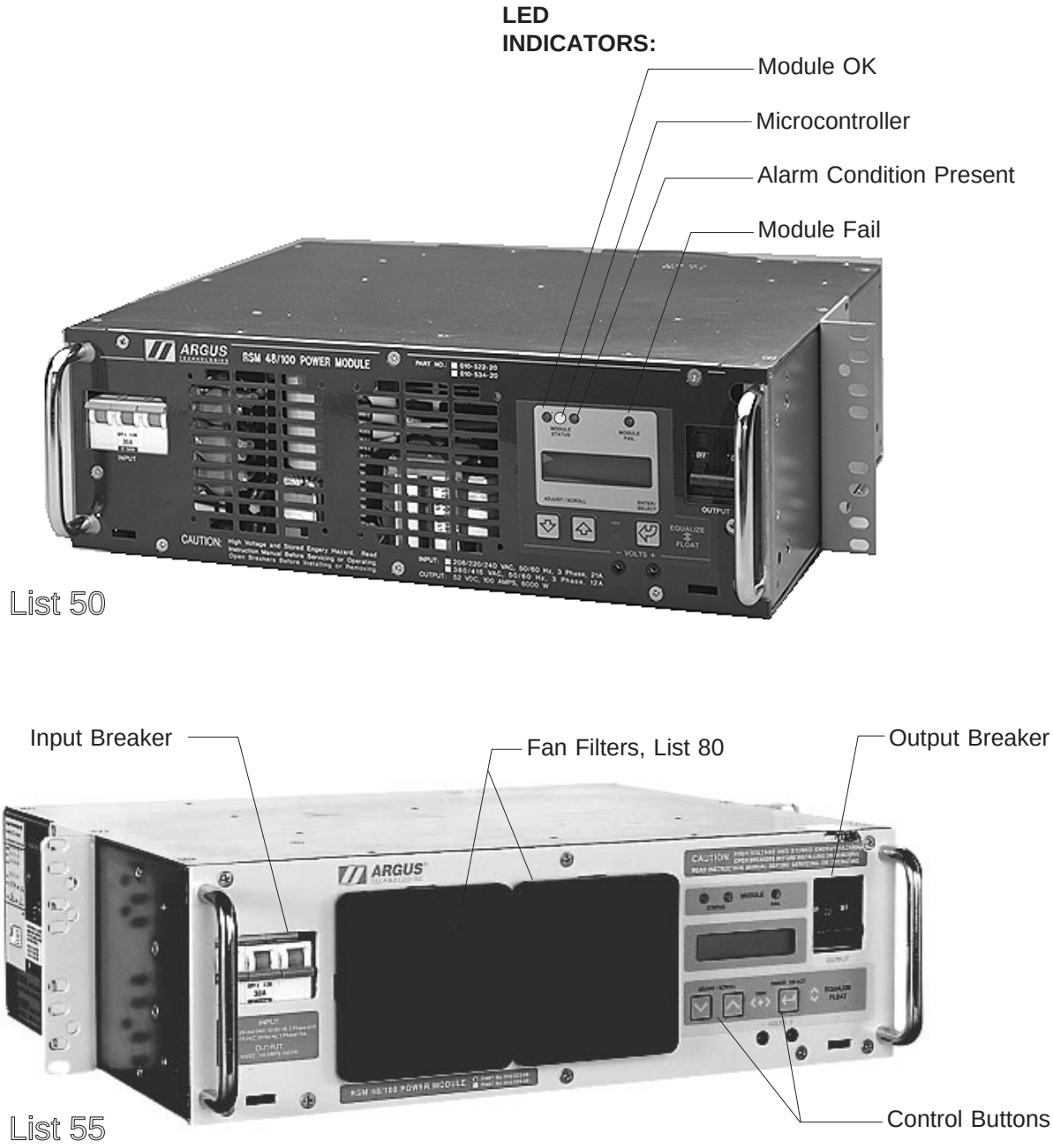


Figure 1 - Front View of RSM 48/100

The RSM 48/100 is available with the following part numbers and list options:

RSM 48/100, 208/220/240 or 380/415 VAC, 3 Phase Input 010-522-20
Basic Module.....List 0
208/220/240 VAC, 3 Phase Input .....List 9
380/415 VAC, 3 Phase Input .....List 10
19" and 23" center mount, 1-3/4" rack mounting .....List 19/23
19" flush mount, 1-3/4" rack mounting.....List 21
Standard temperature operation (0 to 60 degrees C) .....List 40
Extended temperature operation (-40 to 60 degrees C) .....List 42
Argus overlay and software (Midnight Blue).....List 50
Argus overlay and software (Gray/Gray) .....List 55
Fan filters .....List 80
AC line cord, 12 ft., 208-240 VAC .....List 81
AC line cord, 12 ft., 380-415VAC .....List 82
DC Power Cable Kit, 10 feet .....List 83
Relay Interface (shipped loose) .....List 85
RS-485, Communication Ribbon Cable, 9.0”.....List 87
DC Power Cable Kit (wire cable not included) .....List 88
380/415 VAC, 3 Phase Input, 0.92 Power Factor .....List 92

RSM 48/100, 440/460/480 VAC, 3 Phase Input.....010-546-20
Basic Module.....List 0
19" and 23" center mount, 1-3/4" rack mounting .....List 19/23
19" flush mount, 1-3/4" rack mounting.....List 21
Standard temperature operation (0 to 60 degrees C) .....List 40
Extended temperature operation (-40 to 60 degrees C) .....List 42
Argus overlay and software (Gray/Gray) .....List 55
Fan filters .....List 80
DC Power Cable Kit, 10 feet .....List 83
Relay Interface (shipped loose) .....List 85
RS-485, Communication Ribbon Cable, 9.0”.....List 87

RS-485 to RS-232 Converter Module (one per power plant may be required).....018-533-20

RS-232 Cables:
Cable assembly, SCI, RS-232, DTE-DCE, 25 pin.....877-006-10
Cable assembly, SCI, RS-232, DTE-DTE, 25 pin 877-009-20
Cable assembly, SCI, RS-232, DTE-DTE, 9 pin 877-010-20

The above information is valid at time of publication. Consult factory for up-to-date ordering information.

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2.0 INSTALLATION INSTRUCTIONS

This section is provided for qualified personnel to install and interconnect the rectifier.

2.1 Tools Required

- Philips screw driver, #2 (Tip Size 3/16")
- Philips screw driver, #3 (Tip Size 1/4")
- Slotted screw driver (Blade size 1/4")
- Slotted screw driver (Blade size 1/8")
- Slotted screw driver (Blade size .09" x .02") or tweaker
- Crimp tools; recommended: Amp #59804-1 and 90384-1
- Crimp tool for #2 to #4 AWG Cable
- 4 1/2 Digit Digital Voltmeter
- Adjustable resistive load 48 volts

WARNING: For safety reasons, ensure the tools used are properly insulated. User must avoid direct contact with any energized electrical termination.

2.2 Inspection

All Argus products are shipped in rugged, double-walled boxes and suspended via solid polyurethane foam inserts to minimize shock that may occur during transportation. Package assemblies and methods are tested to National Safe Transit Association (NSTA) standards.

Before uncrating the Module, look for signs of damage to the shipping container. Next, uncrate the module and inspect the exterior. If any damage is observed, contact the carrier immediately. Continue the inspection for internal damage. In the unlikely event of internal damage, please inform the carrier and contact Argus Technologies for advice on the impact of the damage.

Note: Save the original shipping container. In the event the module needs to be returned for service, it should be packaged in its original shipping container. If the original container is unavailable, make sure the unit is packed with at least three inches of shock-absorbing material to prevent shipping damage. Argus Technologies is not responsible for damage caused by the improper packaging of returned units.

2.3 Preparation / Mounting

The module must be mounted in a clean and dry environment. Sufficient access to an uninterrupted air source must also be allowed in front of the module. Allow at least 6 inches of free space in front and behind the module for ease of access and airflow.

The module should be mounted to the rack using four #12, 24 x 1/2" screws in each bracket. A Philips head screwdriver should be used to eliminate the possibility of slippage and scratching of the module's exterior.

The module has been designed for center mounting in a 19" or 23" EIA standard relay rack. Mounting brackets are universal for 1" or 1 3/4" spacing and reversible for 19" or 23" mounting. The RSM 48/100 modules are shipped from the factory arranged for 19” center mounting. To adapt to 23” center mounting, remove the three attaching screws, then flip the brackets so that the small flange is against the shelf chassis and then reattach with mounting screws.

Flush mounting is only available for the 19" rack or cabinet. Attach the flush mount brackets to the cabinet via the mounting holes located near the front of the cabinet. An additional rear support bracket is available for box bay applications requiring extra support.

2.4 AC Input Connections

2.4.1 Grounding Requirements

Note: Connections to the module should comply with all local codes and ordinances.

This module must be connected to a grounded, metal, permanent wiring system. An equipment grounding conductor should be run with circuit conductors in the input cable and connected to the equipment grounding terminal of the input connector. It's also recommended that a grounding conductor be connected to the ground lug provided under the input connector.

2.4.2 Feeder Protection Sizing

Each rectifier should have a dedicated protection breaker. If it's preferred to have the input breaker of the module trip before the feeder protection breaker, refer to the specifications for recommended feeder protection sizing.

2.4.3 Cabling Connections

WARNING: The feeder breaker must be in the “off” position before attempting to install the module AC Connections on the rear of the cabinet shelf.

WARNING: Ensure that the input and output breakers are in the “off” position prior to any work being performed on the AC or DC connections.

For 010-522-20, AC cabling must be wired to an AMP CP3-7 female connector (order List 81 for 208-240 VAC or List 82 for 380-415 VAC) for quick connection to male receptacle on the rear of the module. A flexible cable tie (UL type S-4 or SO-4) for the feeder cable and contacts **is** strongly recommended. See Drawing #010-522-06 for pin outs and location of AC input receptacle. The connector contacts must be crimped to the wires using a crimping tool such as Amp # 90384-1. Trim free end to desired length and terminate per local codes as required. Attach supplied connector end to the rectifier.

For 010-546-20 (480 VAC), AC cabling must be wired to the terminal block TB1 for the three line wires and TB2 for the ground wire.

2.5 DC Output Connections

WARNING: DC VOLTAGE AND SHOCK HAZARD. Only qualified personnel familiar with line and battery voltage should attempt to install the module DC Connections on the rear of the cabinet shelf. Remove rings, watches and other jewelry before performing this procedure. Keep fingers clear of live electric parts while unit is energized.

DC output wire should be UL 1015 (CSA TEW) or Class K welding cable. Wire output cabling to an Anderson SB175 Female connector (available in accessory kit: 037-001-20) for quick connection to Male receptacle on rear of module. See Drawing #010-522-06 or 010-546-06 for connector polarity and location of DC output receptacle. The output connector contacts should be crimped onto the wires using a suitable heavy duty crimping tool or soldered.

WARNING: DC power may be present across the output terminals from a connected battery or parallel module even if the output breaker is open. Confirm the operating voltage and polarity before proceeding.

WARNING: Ensure that the polarity of the output of the module and the sense lines (if used) are correct. Verify polarity using a hand held voltmeter.

Connect the output cable to the load or to the appropriate output termination bars.

Users of this equipment should be aware of the short circuit current capacity of the connected battery system in relation to the interrupting capacity of the output breaker. In applications where the battery system short circuit current may exceed the breaker's interrupting capacity, the battery cables should be protected by a high interrupting capacity fuse or breaker. The current limiting capacity of the battery system can be aided by selecting the minimal wire size without compromising the maximum loop voltage drop.

WARNING: On modules without an external power source, confirm the output polarity connection is correct to prevent damage to the load.

Display operation and Illumination of the indicator shows that the output connections are the correct polarity (when a DC source is connected in parallel; i.e. a battery or second rectifier).

WARNING: If the *Module Fail*, the yellow *Status Alarm* indicator and front panel LCD display do not illuminate and an external DC power source is present, output polarity could be reversed, resulting in damage to the module.

2.6 Alarms and Control Connection

Control and sense wires must be UL-approved Style 1015 (Canadian users: TEW type) for ease of cable manipulation.

2.6.1 Remote Sense and Current Share Connection

For remote sensing, the ***+Sense*** and ***-Sense*** lines, if used, should be connected to the desired regulating point - most likely at the battery terminals or charge bars. If multiple rectifiers are used, the sense line and current share lines can be connected from one rectifier to another.

Note: If the ***Remote Sense*** leads are not attached, the module will automatically revert to internal sensing. The internal sense point is at the output terminals of the cabinet. Prior to attachment, the sense leads should be twisted together to minimize noise pickup.

Remote Sense and ***Current Share*** terminate to the Molex 8981-4V male insulation displacement type mating connector supplied with this rectifier. See Drawing #010-522-06 or 010-546-06 (for 480 VAC) for pin out and location of P4. This connector should be installed with *# 18 AWG* multi-stranded wire using a suitable tool such as Amp #59804-1.

The ***Current Share*** line is used when multiple modules are present and forced paralleling is desired. The terminals should be connected from module to module.

2.6.2 Alarm and Remote Control Connection

The ***AC Fail***, and ***Rectifier Fail Alarm*** outputs are connected to J3, a 9 pin D-Sub miniature Female Connector. The ***General Alarm*** output is included as a pulse on the ***Rectifier Fail*** alarm output. See Drawing #010-522-06 or 010-546-06 (for 480 VAC) for pin out connections and location. Available remote control inputs are also connected to J3.

2.6.3 Relay Interface Kit (List 85)

The ***Relay Interface Kit*** accessory extends alarms, remote equalize and shutdown control pins from J3 to a terminal block. It also decodes the ***General Fail*** alarm pulses from the ***Rectifier Fail*** output. The kit consists of a PC board located on the rear of the module and to the left of the fan array. Mounting and terminal block descriptions are shown in drawing #010-522-08 or 010-546-08 (for 480 VAC). Refer also to drawing #037-002-04 for installation details.

The board provides true dry relay contacts for ***AC Fail***, ***Rectifier Fail***, and ***General Fail*** alarms via jumper selectable Form A or Form B relay contacts. The relay contacts can be individually set to normally open (NO) or normally closed (NC) by configuring jumpers P2, P3 or P4. The jumpers are located to the right of the terminal block. Jumper settings are shown in the table below. The alarm extension board requires DC power which must be brought in from the DC bus to TB1.

TABLE 1 (A) - RELAY INTERFACE KIT CONTACTS AND JUMPER SELECTIONS:

ALARM	TERMINAL NUMBER	JUMPER SETTING: NORMALLY CLOSED (NC)	JUMPER SETTING: NORMALLY OPEN (NO)	RELAY STATE: NON-ALARM CONDITION
AC FAIL	TB2 - 1 (COM) TB2 - 2 (NO/NC)	P2 (2 - 3)	P2 (1 - 2)	DE-ENERGIZED
GENERAL ALARM	TB2 - 3 (COM) TB2 - 4 (NO/NC)	P3 (2 - 3)	P3 (1 - 2)	DE-ENERGIZED
RECTIFIER FAIL	TB2 - 5 (COM) TB2 - 6 (NO/NC)	P4 (2 - 3)	P4 (1 - 2)	ENERGIZED

Note: Normally Open (NO) and Normally Closed (NC) are the contact states when the relay is de-energized. The ***Rectifier Fail*** relay is normally 'energized' and the ***General Fail*** and ***AC Fail*** relays are normally 'de-energized' when the module is powered up.

TABLE 1 (B) - MISC. RELAY LOCATIONS:

RELAY DESCRIPTION	TERMINAL NUMBER
POWER INPUT	(POSITIVE) TB1 - 1 (NEGATIVE) TB1 - 3
REMOTE EQUALIZE	TB3 - 1
REMOTE COMMON	TB3 - 2
REMOTE SHUTDOWN	TB3 - 3

2.6.4 RS-485 Connection (List 87)

Use the ribbon cable supplied with List 87 for RS-485 connection to D connector P5. See drawing 010-522-06, 010-522-08 or 010-546-08 (480 VAC).

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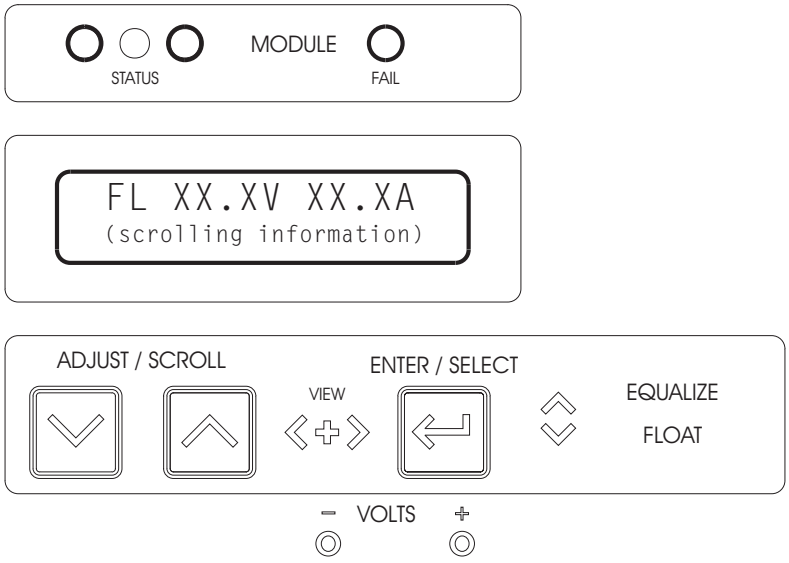

Figure 2 - LCD Panel

3.1 LCD Display and Control Keys

LCD display: Located on the front panel is a 2 x 16 character LCD. All of the module's operating parameters, status and alarms can be viewed from this display (See Figure 2). During normal operation the display indicates:

- Output current of the module
- Output voltage of the module
- Float / Equalize / Test Mode Status
- Current limit or soft start indication
- Corporate identification and Module Serial #

Float, equalize, soft start, current limit and test mode status designators flash on the LCD to differentiate them from the output voltage and current readings. The serial number is displayed in normal and alarm modes. The corporate identity is displayed only in normal mode. See Figure 3 and Table #2 for the complete list of menu parameters and display messages possible. Possible alarm messages are referenced in the alarm section. The display is updated two to three times per second. Output voltage and current are displayed on the top line under all modes of operation. Current readings are accurate to within 2% while voltage measurements are accurate to 0.2%. Sensing for voltage and current measurements is present before the output breaker of the module. Therefore, only the true output of the rectifier is displayed. Refer to Figure 4 when performing adjustments in order to see how the front panel message display changes when accepting input.

LCD back lighting and viewing angle: The display is back-lit any time a control key is depressed or when the module first starts up. The duration of back-lighting can be adjusted during setup.

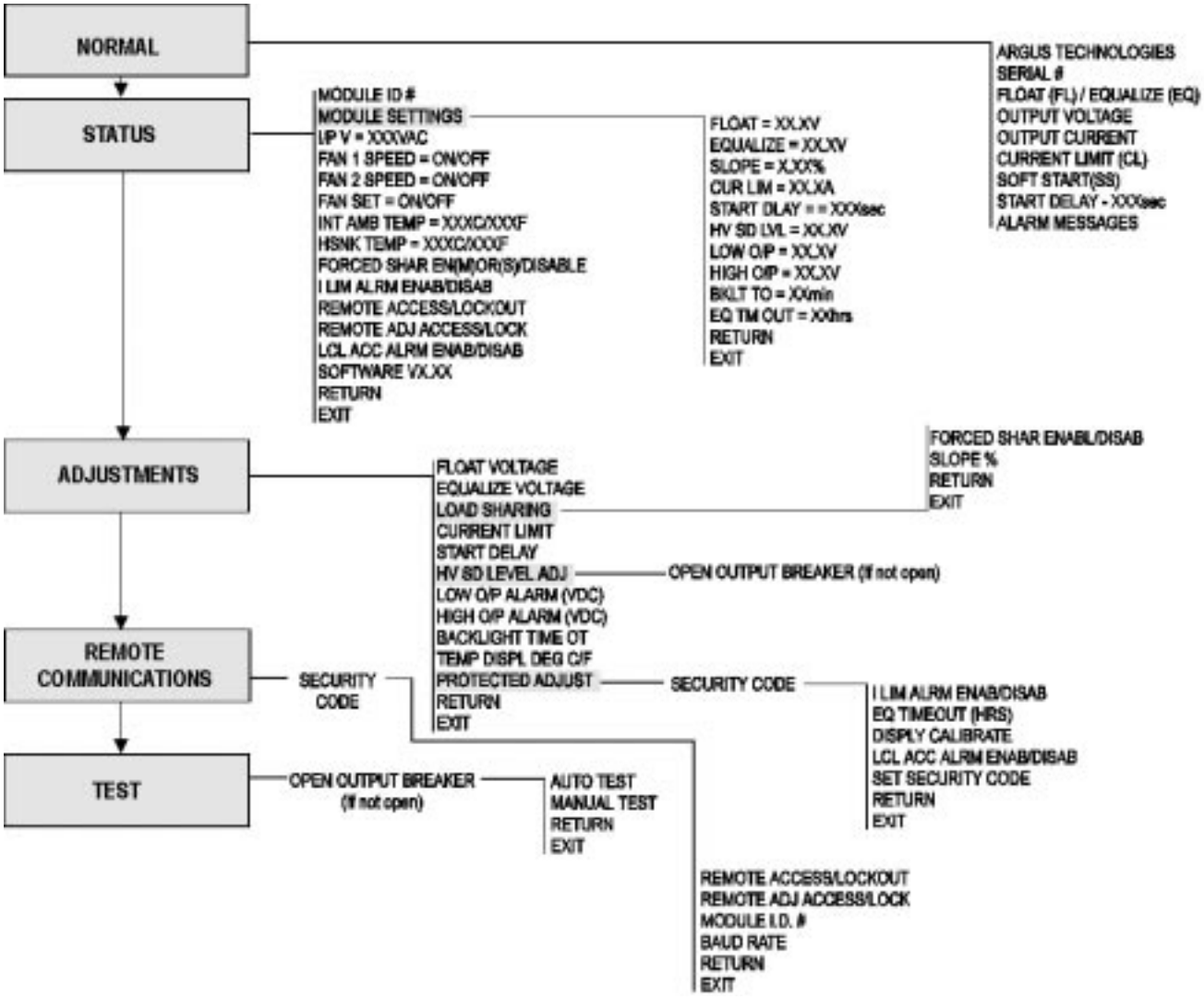

Figure 3 - RSM Display Menu

LCD viewing angle: The viewing angle is adjusted by pressing and holding the ENTER/***SELECT button***, and pressing the right SCROLL/***ADJUST button*** (labeled with an upwards arrow). If the module is in **NORMAL** mode, adjustment is made by pressing either ***SCROLL/ADJUST*** button repeatedly and then pressing the ***ENTER/SELECT*** button to return to **NORMAL** mode.

Because of the limited number of characters that can be displayed on the LCD, abbreviated messages are used. This manual uses both abbreviated and complete condition descriptions. See Table #2 for a complete list of display message abbreviations.

Microprocessor control buttons: Three control buttons are located on the front panel labeled with an up arrow, down arrow (ADJUST/**SCROLL) and a** curved arrow (ENTER/SELECT). Use the **ADJUST/SCROLL** buttons to scroll through the menu tree seen in Figure 3. Use the ***ENTER/SELECT*** button to select the displayed item. Initially, the **ADJUST/SCROLL** buttons allow the user to change the display from its normal Voltage/Current/Alarms mode (**NORMAL**) to one of **STATUS, ADJUSTMENTS, REMOTE COMMUNICATIONS,** or **TEST MODE, while the third button is used to switch between FLOAT** and **EQUALIZE** modes when the display is in the **NORMAL** mode.

Possible Menu Prompts:

ADJUSTMENTS .....enter adjustments menu
ADJ^^^^ DISPL CAL .....adjust calibration of the O/P voltage display
ADJ^^^^ EQLIZE V .....adjust equalize voltage
ADJ^^^^ FLOAT V .....adjust float voltage
ADJ^^^^ HV SHUTDN .....adjust output high voltage alarm value
ADJ^^^^ OUTPUT .....adjust output voltage
ADJ^^^^V TOO HIGH .....indicates the voltage adjustment is at the max
ADJ^^^^V TOO LOW .....indicates the voltage adjustment is at the min
AUTO TEST .....starts auto test mode
AUTO TEST ACTIVE .....indicates auto test is running
BACKLIGHT TIMEOT .....enter backlight timeout adjustment
BAUD RATE .....enter baud rate setting
BAUD RATE = 1200/2400/4800/9600 .....adjust baud rate value
BKLT TO = XXmin .....display/adjust backlight timeout
CUR LIM = XX.XA .....display/adjust current limit
CURRENT LIMIT .....enter current limit adjustment
DELAY = XXXsecs .....adjust start delay time
DISPL CALIBRATE .....adjust voltage display calibration
EQ TIMEOUT .....enter equalize timeout adjustment
EQ TMOUT = XXhrs .....display/adjust equalize timeout
EQUALIZE = XX.XV .....display equalize voltage
EQUALIZE VOLTAGE .....enter equalize voltage adjustment
ERROR: IN I LIMIT ..... indicates an invalid adjustment was attempted
ERROR: UNIT OFF..... indicates an invalid adjustment was attempted
EXIT .....return to regular display
FAN SET = OFF/ON .....display fan setting
FAN1 SPEED = OFF/ON .....display fan speed
FAN2 SPEED = OFF/ON .....display fan speed
FLOAT = XX.XV .....display float voltage
FLOAT VOLTAGE .....enter float voltage adjustment
FORCE SHAR DISAB/ENABL .....display/adjust current share setting
HI^^^^O/P CTOFF.....indicates the high voltage alarm has turned off
HI^^^^O/P TRIP ..... indicates the high voltage alarm has turned on
HIGH O/P = XX.XV .....display/adjust output high voltage alarm value
HIGH O/P ALARM.....enter output high voltage alarm value
HSNK TEMP = XXXC/XXXF .....display heatsink temperature
HV SD LVL = XX.XV .....display O/P high voltage shutdown setting
HV SD LEVEL ADJ ..... enter output high voltage shutdown setting
HV SHUTD = XX.XV..... indicates the o/p high voltage shutdown has tripped and shows level
I LIM ALRM ENAB/DISAB .....display/adjust current limit alarm setting
I/P V = XXXVAC .....display AC input voltage
INT AMB TP = XXXC/XXXF .....display internal ambient temperature
LCL ACC ALM ENAB/DISAB .....display/adjust local access alarm setting
LOAD SHARING .....enter current sharing menu
LOW O/P = XX.XV .....display/adjust output low voltage alarm value
LOW O/P ALARM .....enter output low voltage alarm setting
LOW^^^^O/P CTOFF .....indicates the low voltage alarm has turned off
LOW^^^^O/P TRIP .....indicates the low voltage alarm has turned on
MANUAL TEST .....starts manual test mode
MODULE ID .....enter module id# setting
MODULE ID = XX .....adjust module id #
MODULE SETTINGS .....enter module settings menu
OPEN O/P BREAKER .....open output breaker if not already open
PROTECTED ADJUST .....enter security controlled menu
REMOTE ACCESS/LOCKOUT .....display/adjust remote access setting
REMOTE ADJ ACCESS/LOCK .....display/adjust remote adjustment access setting
REMOTE COMMUNIC .....enter remote communications menu
RETURN .....return to previous menu
SECURITY = —- .....enter or adjust security code for access
SECURITY FAILED = ...indicates entered security code was invalid
SET SECURITY CODE .....enter security code adjustment
SLOPE .....enter slope adjustment
SLOPE = X.XX% .....display/adjust slope value
SOFTWARE V X.XX .....display software version number
START DELAY .....enter start delay time adjustment
STATUS .....enter status menu
STRT DELAY = XXXsec .....display start delay time
TEMP DISPL DEG C/F .....adjust temperature display mode
TEST MODE .....enter test mode menu

Possible Alarm & Mode Messages

AC MAINS FAIL
AC MAINS HIGH
CURRENT LIMIT
FAN FAIL
FAN SPEED ERROR
HIGH O/P VOLTAGE
I/P BREAKER OPEN
LOW O/P VOLTAGE
MODULE FAIL
NO OUTPUT POWER
O/P BREAKER OPEN
O/P HV SHUTDOWN
OVER TEMPERATURE
PHASE FAIL
PRIMARY IMBALANCE
REMOTE EQUALIZE
REMOTE SHUT DOWN
TEMP SENSE FAIL
THERMAL SHUTDOWN
VAC METER FAIL

Table 2 - Display Messages and Definitions

3.2 LED Status Indicators

The indicators provide visual indication of operational status and alarms. The conditions and associated colors are:

Module Status - OK .....Green
Module Status - Micro-Controller fail/reset .....Red
Module Status - Alarm Condition Present .....Yellow
Module Fail.....Red

Note: The red ***Module Status - Micro-Controller fail/reset*** indicator is located behind the frosted panel between the green ***Module Status - OK*** and yellow ***Module Status - Alarm Condition Present*** indicators and is normally not visible.

3.2.1 Module OK (Green Indicator)

When both circuit breakers are closed (off) and no alarm conditions are present, the ***Module OK*** indicator will light. However, the indicator will extinguish if a user enters the **ADJUSTMENTS** mode when the **LOCAL ACCESS ALARM** is enabled. Remote or local access of the module **STATUS** menu does not affect the module's status indicator.

3.2.2 Micro-Controller Fail / Reset (Red Indicator)

Located behind the face plate between the ***Module Status - OK*** and ***Alarm Condition Present*** indicators is a separate ***Micro-controller Fail/Reset*** indicator which will illuminate in the unlikely event that the micro-controller fails. This alarm triggers when the micro-controller fails to respond to a watchdog timer. The LCD will be suppressed during this mode of failure and a **GENERAL** ALARM will be extended. The indicator will continue to illuminate any time the criteria is met and an external voltage is present at the module's output.

3.2.3 Alarm Condition Present (Yellow Indicator)

Any alarm condition will cause the ***Alarm Condition Present*** indicator to illuminate. Local adjustment or entry into some of the menu modes (except **STATUS** mode) will cause the LED to illuminate. The indicator will continue to illuminate any time the alarm criteria is met and an external voltage is present at the module's output. The indicator will not function if the micro-controller fails or is reset. An ***Alarm Condition Present*** condition will also extend a **GENERAL ALARM**.

3.2.4 Module Fail (Red Indicator)

Located to the right of the status indicators is a separate ***Module Fail*** indicator. If any of the conditions defined as a module fail occur (see Table 3), the indicator will illuminate and a **RECTIFIER FAIL** alarm will be extended. The indicator will continue to illuminate any time the criteria is met and an external voltage is present at the module's output.

3.3 Alarms and Protection

Alarms are indicated via the front panel LED lights and by messages on the bottom row of the LCD. During alarm conditions, one or more of the following extensions - **AC FAIL**, **RECTIFIER FAIL** and **GENERAL ALARM** - may be activated through one of two 9-pin D sub-miniature ports on the rear of the module.

TABLE 3 - ALARM EXTENSIONS AND INDICATORS

RECTIFIER FAIL ALARM EXTENSION and *MODULE FAIL INDICATOR*	**AC FAIL ALARM EXTENSION**	**GENERAL ALARM EXTENSION and *ALARM CONDITION PRESENT INDICATOR***
AC Mains Fail/AC Mains High	AC Mains Fail/AC Mains High	Current Limit
Input Breaker Open	Phase Fail	Fan Fail
Output Breaker Open		Fan Speed Error
Output High Voltage Shutdown		Low Output Alarm
Auto. HV Shutdown Restart		Phase Fail
Module Fail		VAC Meter Fail
Over Temp. Foldback (<60A)		High Output Voltage
Thermal Shutdown		Temp. Sensor Failure
Primary Circuit Imbalance		Over Temp. Foldbk Alarm (>60A)
No Output Power		AC Inrush/Transient Suppress.
Remote Shutdown		Micro-controller Fail

A **GENERAL** alarm is transmitted via a pulsed voltage signal on the **RECTIFIER FAIL** alarm output. A **RECTIFIER FAIL** alarm will inhibit a **GENERAL** alarm extension as it has a higher priority. All alarms are “real time” and therefore do not latch. If AC power fails, indicators will not remain lit unless there is a DC power source available (i.e. a battery or another module connected in parallel).

Note: An optional alarm interface card is available to provide jumper selectable Form A and B relay contacts for the three alarm extensions.

3.3.1 AC Mains Fail / AC Mains High

The module is electronically protected from low voltages to the input by fault detection circuitry. If the input to the module falls below the lower AC input limit (see specifications), the module will shutdown. In addition, the messages **AC MAINS FAIL** and **MODULE FAIL** will be displayed on the LCD panel. If the input to the module rises above the upper AC input limit (see specifications), the module will shutdown and the **GENERAL ALARM** indicator **MODULE FAIL** indicator and relays will turn on, while the message **AC MAINS HI** and **MODULE FAIL** will be displayed on the LCD panel. The module will resume normal operation immediately upon restoration of normal line conditions. If a start delay is programmed, the module will enter delay when the input is returning from a low AC mains condition. The delay timer is inhibited if the module is returning from an AC mains high condition.

3.3.2 Input Breaker Open (off)

Every module is equipped with a three-pole, thermal-magnetic input circuit breaker. Excessive current passing through the breaker will trip it. The breaker must be reset manually to restart the module. The module turns off anytime the input breaker is opened. If there is a backup DC power source such as a battery or another rectifier connected in parallel, the message '**INPUT BREAKER' OPEN** is displayed on the module's LCD and the **MODULE FAIL** and **AC FAIL** indicators will illuminate.

3.3.3 Output Breaker Open (off)

Every module is equipped with a two-pole (paralleled) magnetic output circuit breaker. Excessive current passing through the breaker will cause it to trip. The LCD will display the message **OPEN O/P BREAKER** and the **MODULE FAIL** and **AC FAIL** indicators will illuminate. To turn the module back on, the tripped breaker must be manually reset. Each breaker allows the operator to isolate the module from either the input or output.

3.3.4 Output High Voltage Shutdown

The high voltage protection feature electronically shuts down the rectifier when a high voltage condition on the output of the rectifier is identified. Consequently, the message **O/P HIGH VOLTAGE SHUTDOWN**, and **MODULE FAIL** will be displayed on the LCD panel. The level at which the high voltage shutdown is activated is set through the sub menu **ADJUSTMENTS**. The HVS feature provides protection to the load from an over voltage condition at the rectifier's output. The high voltage shutdown feature of the RSM is selective and operates at 5% higher voltage in a less than 5% load current condition. This allows isolation and shutdown of a malfunctioning module amongst a group of modules operating in parallel. The level cannot be adjusted to a voltage less than one volt above the highest of the float or equalize voltage settings. The level is protected by fail safe circuitry in the unlikely event of micro-controller failure.

3.3.5 Automatic High Voltage Shutdown Restart

After a high voltage shutdown condition has occurred, the module will attempt to restart three times at five second intervals. The number of attempts is stored in a counter. If the condition clears for at least one minute, the counter is reset. If the module fails on the third attempt, the module will remain shutdown and require the input breaker to be turned “off” then “on” again to clear the condition. The module can be reset remotely by toggling the remote shutdown control signal.

3.3.6 Module Fail Alarm

RSM series of rectifiers have a 'true' fail alarm. This alarm provides a true indication of the module's ability to source current. When the module's current output drops below 5% of the rated output, the module fail detection circuit is activated. The circuit momentarily ramps up the output voltage to determine if the module will source current. If no increase in current is detected, the message **MODULE FAIL** and **NO OUTPUT POWER** will be displayed on the LCD panel. The module will check every 60 seconds for the condition until current is detected. The output voltage ramping is terminated upon detection of current. The ramp is inhibited during the **TEST** mode or **ADJUSTMENT** mode. A minimum 5% load is required to avoid the **MODULE FAIL** alarm

3.3.7 Over Temperature Foldback Alarm (<60A)

The message **OVER TEMPERATURE** will be displayed, if the module's output drops below a threshold of 60A during an **OVER TEMPERATURE** alarm condition (indicating that current foldback has occurred).

3.3.8 Thermal Shutdown

Unlike the over temperature foldback, which gradually reduces output current caused by a high temperature, the thermal shutdown function turns off the module as a result of high internal air temperature (above 70 degrees C). During this condition, the message **THERMAL SHUTDOWN** will be displayed on the LCD. When the temperature has cooled by approximately ten degrees, the module will resume normal operation. The fan will not operate during the shutdown condition.

3.3.9 Primary Circuit Imbalance

The **PRIMARY CIRCUIT IMBALANCE** alarm message indicates the rectifier has turned off because of a serious internal problem with the primary circuit of the module.The module should be sent to a qualified service center for repair.

3.3.10 No Output Power Alarm

This alarm is activated when the module is unable to source output current. This will be indicated on the LCD as **NO OUTPUT POWER**.

3.3.11 Remote Shutdown Alarm

When the module is shutdown via the **REMOTE SHUTDOWN** function, **REMOTE SHUTDOWN** will be displayed on the LCD.

3.3.12 Phase Fail

The module will indicate a **PHASE FAIL** if one of the input phases is imbalanced with respect to the others or the phase has failed completely. The rectifier will continue to operate if sufficient equivalent voltage is present, but will limit current to approximately 60% of the rated output current to prevent overloading of the remaining phase(s).

3.3.13 Current Limit

The current limit circuit of the RSM Module provides a primary response to output overcurrent situations. The current limit circuit is an alternative to tripping the output breaker in overload situations. The level at which the current limit engages is adjusted through the sub menu **ADJUSTMENTS**. If the output current reaches the preset level, the output voltage will decrease and subsequently limit the output current of the module. **CL** will be displayed by the output current on the LCD display. If the module is driven far into current limit, the output voltage may decrease to the point of a **LOW O/P VOLTAGE** alarm. The current limit level is protected by fail safe circuitry in the unlikely event of micro-controller failure. Below the lowest operating voltage, the current limit will be folded back to approximately 50% in a short circuit condition.

During a **MODULE FAIL** condition, the current limit indicator "***CL"*** may flash. This may indicate a high current condition inside the module. If this happens, the module should be turned off and removed from service for repair.

3.3.14 Fan Fail

The message **FAN FAIL** will appear when a fan fails. If a fan fails, the current limit of the rectifier will be decreased by an amount that is dependent on the heat sink temperature. If the temperature sensor fails at the same time as the fan, then the current limit will be set to 60% of the maximum rated current. Micro-controller failure will cause the fan to turn on. Fan operation is inhibited when internal air temperature drops below -20 degrees Celsius.

Note: During **FAN FAIL,** the current limit level should not be adjusted.

3.3.15 Fan Speed Error

Fan speed is monitored by the module's microprocessor which will detect incorrect speed or failure. **FAN SPEED ERROR** will be displayed if an error is detected.

3.3.16 Low Voltage Alarm

When the output of the Module drops to the level set in the sub menu **ADJUSTMENTS**, the message **LOW O/P VOLTAGE** will be displayed on the LCD. When the output level is raised above the alarm level, the alarm and indicator will extinguish. The alarm has a fixed hysteresis of 3V.

3.3.17 VAC Meter Fail

The micro-controller monitors several signals including the input voltage to determine if the input breaker is open or closed. If the input voltmeter fails, the module will turn off for 30 seconds. During this time the message **'INPUT BREAKER OPEN'** will be displayed. The module will then restart and the message **'VAC METER FAIL'** will be displayed and the message '**INPUT BREAKER OPEN'** will clear. Display of messages are on condition that a secondary DC power source, i.e. a battery, is connected in parallel with the rectifier.

3.3.18 High Output Voltage Alarms

When the output voltage of the module rises above the adjusted level in the sub menu '**ADJUSTMENTS,'** the message '**HIGH O/P VOLTAGE'** will be displayed on the LCD. This alarm has a fixed hysteresis of 1 volt.

3.3.19 Temperature Sensor Failure

The internal temperature sensor is constantly monitored to establish reliable operation. If an unrealistic temperature is measured, it's assumed that the sensor has failed and no shutdown occurs. The LCD will display **TEMPERATURE SENSE FAIL** during this condition.

3.3.20 Over Temperature Alarm (60A)

When the rectifier detects a temperature greater than the specified maximum on a heatsink (approx. 100 degrees C), the message **OVER TEMPERATURE** will be displayed on the LCD. The basis for this function is a hardware control circuit that gradually reduces the module's output current once an abnormally high temperature at the module's heatsink is detected.

3.3.21 AC Inrush / Transient Suppression

The module's inrush current is limited to the nominal line current to prevent surges on the AC line. Input provides lightning and transient protection in accordance with IEEE/ANSI C62.41 Category B3.

3.4 Rectifier Features

3.4.1 Start Delay

The modules are equipped with a delay timer in order to stagger start a series of modules to prevent excessive loading of standby generators upon start up. The timer delays the AC start of the module depending on the value programmed. Delay times range from 0 - 250 seconds in 5 second increments. A one second delay is introduced in the zero position to allow for charging of the capacitors. Delay is initiated upon application of AC At the end of the delay period soft start is initiated and the Module goes into **FLOAT** mode. The duration for the delay is set by the setting found in the sub menu **ADJUSTMENTS**. When active, the message **DELAY START** and the time remaining will appear on the LCD.

There is no delay when the module is returning to operation after a remote shutdown signal removal. The count can be aborted locally by depressing the Enter key (local entry of equalize is inhibited during delay start). The count can also be remotely activated by toggling the remote shutdown control signal.

3.4.2 Soft Start

To eliminate an instantaneous demand on the AC source, a soft start feature is employed. Soft start, sometimes referred to as “current walk-in,” works by gradually ramping rectifier output from zero amps to the load requirement (110% max.). This is accomplished by current limiting the output at a rate of 8 - 12% per second. **“SS”** will appear on the LCD during this condition.

3.4.3 Slope or Forced Paralleling

RSM modules use “output slope” or “forced” paralleling to accomplish load sharing. Forced sharing automatically adjusts the current sharing between modules. It is used when only RSM-type modules are in a DC system. This procedure is selected in the sub menu **ADJUSTMENTS.**

Slope Paralleling is used in systems where RSM modules are run in parallel with non-RSM rectifiers. Output slope adjustment alters the regulation of the Module. The output slope is adjusted by the setting found in the sub menu **ADJUSTMENTS** which changes the regulation of the module beyond its preset factory setting of 1%.

3.4.4 Demand Based Forced Cooling

Cooling of the module is achieved via front-to-back forced cooling. Cool air is drawn in via the front grill and is directed towards the rear of the module and over the heat sinks. Fan speed is adjusted automatically based on temperature conditions.

3.4.5 Battery Eliminator Operation

The module maintains all noise and performance specifications with or without a battery attached to the output. However, if a battery or another module operating in parallel is not present, the alarms will not function when AC power is removed.

3.4.6 Remote or Local Sensing

The rectifier will regulate at a remote point when remote sense leads are connected to the ***Remote Sense*** input. If remote leads are not connected, the rectifiers will automatically revert to internal sensing at the output terminals. Remote sense leads are recommended in applications with excessively long battery cables, because it assures proper current sharing among parallel modules.

3.4.7 Micro-controller Reset

Each RSM rectifier is equipped with a hardware reset, which will restart the micro-controller if it ceases function. Reset is activated by simultaneously holding down the ***Enter/Select*** key and turning the module's AC input breaker off and on. The micro-controller will restart at base code levels in the control software. Settings will not be altered by this operation. The AC mains must be within limits to generate a reset pulse.

3.4.8 Output Voltage Test Points

Each module is equipped with test jacks to monitor the module's output. The jacks are protected against direct short circuit condition. Voltage is measured before the module's output breaker, allowing sensing of the output voltage with the breaker open.

3.4.9 Control Fail Safe & Memory

All critical control functions utilize discrete programmable potentiometers to retain level settings. All alarm set points are stored in nonvolatile memory. This enables retention of user level programming during periods of inactivity such as transportation of the modules. Levels may also be preset at a central service area before shipment to the field.

3.5 Operation Modes

3.5.1 Float Mode

Normal operation of the module is in the **FLOAT** mode. The module will default to this mode when AC power is supplied to the module. When in the **FLOAT** mode the output voltage of the module is determined by the **FLOAT VOLTAGE** setting found in the sub menu **ADJUSTMENTS**. The ***Float/Equalize*** mode control button (labeled ***Enter/Select)*** manually returns the module to the **FLOAT** mode from a locally initiated **EQUALIZE**. **FLOAT** mode is indicated by illumination of the **FL** beside the output voltage reading on the LCD display. The level is protected by fail safe circuitry in the unlikely event of microcontroller failure.

3.5.2 Equalize Mode

When the module is required to equalize (i.e. boost charge) a battery string the **EQUALIZE** mode is generally used. This mode can be entered manually via the front panel control or by an external signal supplied via the external remote ***Equalize*** input. Holding down the ***Float/Equalize*** mode control button for three seconds places the module in the **EQUALIZE** mode. When in the **EQUALIZE** mode the output voltage of the module is determined by the **EQUALIZE VOLTAGE** setting found in the sub menu **ADJUSTMENTS**. **EQUALIZE** mode is indicated by illumination of the **EQ** beside the output voltage reading on the LCD display. The equalize level is protected by fail safe circuitry in the unlikely event of micro-controller failure.

3.5.3 Test Mode

The module is equipped with two Test modes, **MANUAL** or **AUTO** test. Either are selected under the **TEST** sub menu.

3.5.3.1 Manual Test

The output breaker must be in the ***Open*** position before this mode can be selected. The operator will be prompted by the message **OPEN O/P BREAKER** if the breaker is closed. Selection of the **TEST** mode is via sub menu **TEST**. When in the **MANUAL TEST** mode the module's alarm levels can be checked with the output breaker open without disturbing the load if powered by a battery or parallel modules. The simulated output voltage of the module is set by the **TEST** adjustment ***Up*** and ***Down*** keys on the front panel. **MANUAL TEST** mode is indicated by **MT** beside the output voltage reading on the LCD display. When the mode is exited the module returns to the previously selected output mode; i.e. **EQUALIZE**.

3.5.3.2 Auto Test

The output breaker must be in the Open position before this mode can be selected. The operator will be prompted by the message **OPEN O/P BREAKER** if the breaker is closed. Selection of the **TEST** mode can be done through the **TEST** sub menu. **AUTO TEST** automatically ramps the module's output to simulate a manual test. The auto process starts with the output voltage at the programmed equalize level. This voltage is then decreased until an under voltage alarm is generated. The output voltage and the low voltage alarm condition are displayed simultaneously. After a three second hold period the voltage ramps up until the upper level for the low voltage alarm is reached. The upper level is the lower level plus a 3V hysteresis. After another three second hold period the alarm message disappears and resumes an upward ramp until the high output alarm is activated. The message **HIGH O/P VOLTAGE** will be displayed simultaneously with the level. After a 3 second hold period, the voltage ramps down until the lower level of the high voltage alarm is reached. The lower level is the upper level minus a 1V hysteresis. After another 3 second period, the alarm message disappears and starts an upward ramp until the high voltage circuit is activated. The message **O/P HV SHUTDOWN** will be displayed simultaneously with the level. This level is held for three seconds before the module exits out to the main menu for the test mode. The HV Shutdown does not require manual reset as it will restart automatically. **AUTO TEST** is aborted if the output breaker is closed at any point during the test process. When the mode is exited, the module will return to the previous output mode (i.e. **FLOAT**).

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4.0 STARTUP AND SHUTDOWN

Factory settings or last entered settings of a module are stored in nonvolatile memory indefinitely.

4.1 AC STARTUP

Apply AC power via the feeder breaker, then place the rectifier's input breaker into the ***On*** position. The display will indicate float mode (**FL**) output voltage, zero output current and possibly soft start (**SS**). Module status indicators should indicate an alarm condition and the ***Module Fail*** indicator should be lit. The serial number and appropriate alarm messages will also be displayed. See Figure #3 for menu tree normal mode messages. If the ***Delay Start Timer*** is set to any position other than zero, the rectifier will not start until the selected delay has elapsed. The display will countdown the delay time if set.

4.2 Float / Equalize (Initial)

To ensure voltage setting accuracy to +/- 0.01 volts, use of an external digital voltmeter connected to the test jacks is recommended.

Depress the menu ***Down*** key until the **ADJUSTMENTS** sub menu is displayed on the LCD panel. Depress the ***Enter/Select*** key to enter the adjustment mode. See Figure #4 for a typical display adjustment sequence and syntax. Depress the menu ***Up/Down*** keys until the float voltage setting is displayed. If the level is to be changed, depress the ***Enter/Select*** key. The display will now read **ADJ^^^^ FLOAT V** Using the ***Up*** or ***Down*** keys, adjust the level to the desired setting. Holding a key down will cause the adjustment to increase or decrease rapidly after approximately 1 second. Single depressions of a key will cause the output voltage to change in approximately 0.005 volt increments. Because the LCD only registers 0.1 volt steps, several depressions may be required when finite adjustments are made. The float voltage cannot be set higher than the over-voltage alarm voltage setting. When the desired level is reached, depress the enter/select key to store the level in memory. The display will step to the **EQUALIZE ADJUST** menu item.

If no key activity is sensed on the panel after 10 minutes, the module will return to normal operation mode. Entries not confirmed by the enter key won't be recorded. The output voltage may be monitored via the panel meter or by connecting a D.V.M. (Digital Voltmeter), e/w miniature banana plugs (0.08" probes), to the front output sense test points.

Repeat the process for reviewing and altering the equalize level. The equalize voltage cannot be set higher than the over-voltage alarm voltage setting.

4.3 Current Limit

Prior to closing the output breaker, the output current limit setting should be set to the desired level if different from the factory setting. Check the current setting by scrolling through the adjustment menu until the current level is displayed. Use the same process described for float setting to adjust the output current limit point.

4.4 Output High Voltage Protection (Initial)

Prior to closing the output breaker, the output over voltage protection level should be adjusted to the desired level if different from the factory setting. Check the setting by scrolling through the adjustment menu until **O/P HV LEVEL ADJ** is displayed and press the ***Enter/Select*** key. Use the same process described for float setting to adjust the high output voltage shutdown level

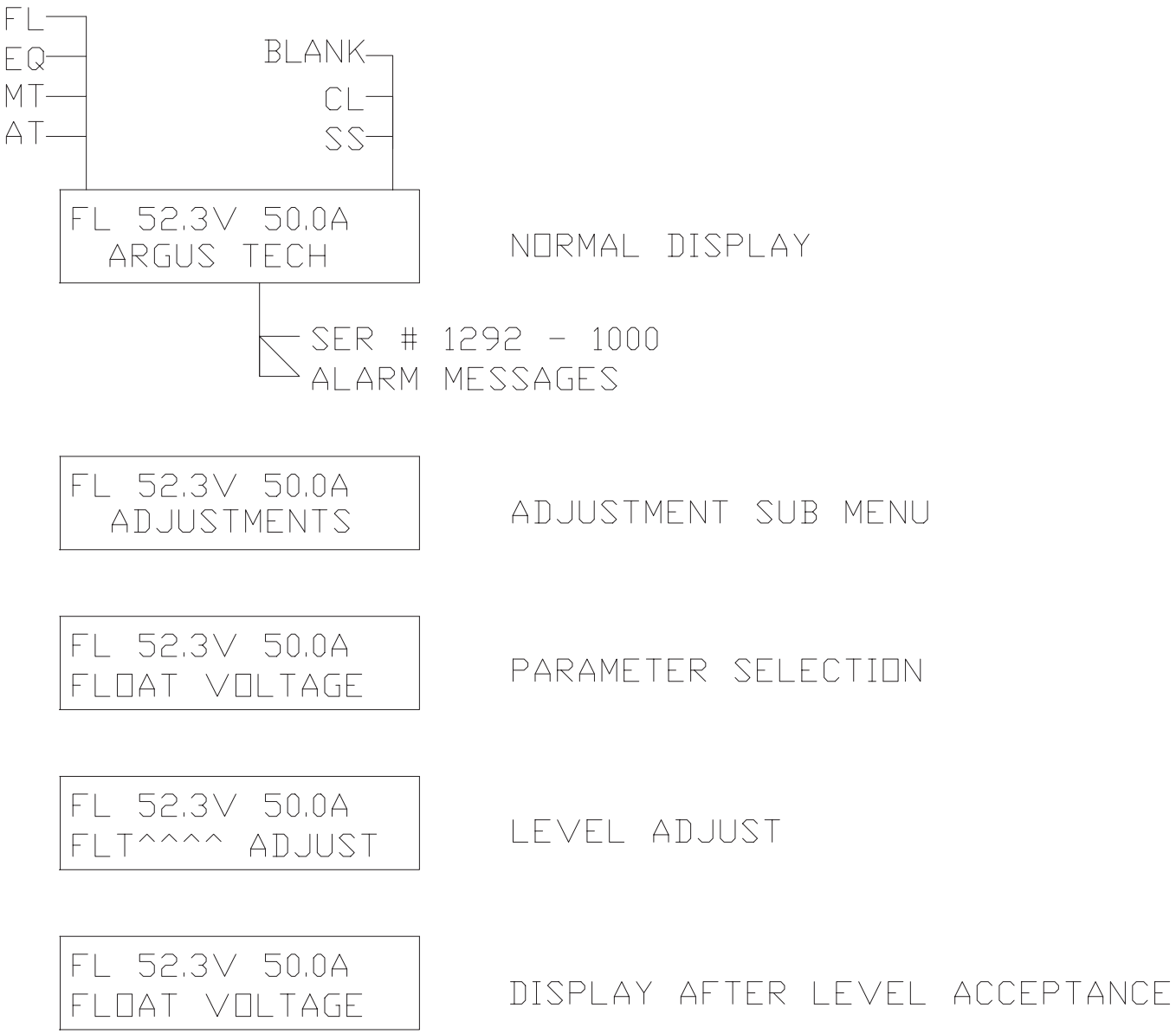

Figure 4 - Display Sequence and Syntax

When setting the output high voltage protection level, the following sequence of events occurs:

When **O/P HV LEVEL ADJ** is selected the output high voltage level is increased to 62V and the output voltage is set to the last output high voltage level.

The **O/P VOLTAGE** can then be adjusted by pressing the ***Up*** or ***Down*** keys until the output voltage of the module is set to the desired output voltage level.

Note: The **O/P VOLTAGE** changes approximately 5 mV per step. The **OUTPUT HIGH VOLTAGE LEVEL** cannot be adjusted to a level less than or equal to the equalize voltage (or float voltage) plus one volt.

When the ***Enter/Select*** key is pressed to set the **OUTPUT HIGH VOLTAGE LEVEL**, the microcontroller reduces the output high voltage level from 62V until the module trips and goes into **O/P HV SHUTDOWN**. The module then stores that level, returns to the previous mode of operation (float or equalize) and resets the **O/P HV SHUTDOWN** condition.

To confirm the setting use one of the test modes. Scroll through the menu until exit function is selected. Depressing the enter key will return the module to the normal mode.

4.5 DC STARTUP

Close the output breaker, thereby connecting the module to the load. If the high output shutdown trips, the sense lines have probably been reversed. If so, shut the module down and correct the polarity of the lines. The ***Module Fail*** and yellow ***Module Status*** indicator should extinguish as long as the module is providing current above 5% of the rated output. The display should have normal mode messages as defined in the menu tree. The green ***Module Status*** indicator for OK condition should now be on.

Before closing the output breaker of other modules, proceed to section 4.6 (i.e. Paralleling).

4.6 Paralleling: Slope or Forced Load Sharing

The user has the ability to select either forced paralleling or slope methods of load sharing. If all modules are Argus RSM series then forced paralleling should be used. If this is selected, the modules will track automatically.

These initial adjustments will provide satisfactory operation of the modules during their initial (15 minutes) warm up.

4.6.1 Negative Slope Paralleling

When the module is used in a multi-rectifier configuration with non-Argus RSM series rectifiers, then the slope method of load sharing should be used. The output slope adjustment should be given a preliminary setting so that the rectifiers will share the load. Set the slope controls of all modules to 1.00% via the slope adjustment sub menu of **LOAD SHARING** found in the **ADJUSTMENTS** menu.

4.6.2 Forced Paralleling

It is recommended that 0.5% slope be used with forced paralleling. After the slope has been adjusted, enable the forced sharing system via the forced share enable/disable menu item found under load sharing in the adjustments sub menu. Pressing the enter/select key will toggle between enable and disable. This will cause all Argus RSM series rectifiers to parallel without fine tuning the output voltage or slope. It is possible that more than one “master” (i.e. the rectifier being tracked) may exist in a multi-module system when forced paralleling is enabled. This generally occurs when two or more rectifiers have been adjusted to the same output voltage (within 0.005V). Multiple masters do not affect the overall system performance.

4.7 Shutdown

The module may be shut down by turning the AC input and DC output breaker ***Off*** in any sequence.

Note: The front panel may be operational for up to 20 seconds after all power (input and output) is cut from the module.

4.8 Status Parameters

Any alarm messages are detailed on the menu tree and under the individual alarm description. The operator also has the ability to retrieve operating data via the menu and the front panel display as well as by remote connection. These “status” parameters include:

1) Module ID #
2) Module Settings:
    - Float Voltage
    - Equalize Voltage
    - Slope %
    - Current Limit
    - Start Delay
    - High Voltage Shutdown Point
    - Low Voltage Alarm
    - High Voltage Alarm
    - Backlight Time Out
    - Equalize Time Out
    - Return
    - Exit
3) Input AC Voltage RMS (+/- 5% nominal)
4) Fan Speed
5) Fan Setting
6) Internal Ambient Temperature*
7) Heat Sink Temperature
8) Forced Share Enable/Disable Master/Slave
9) Remote Communication Access/Lockout
10) Current Limit Alarm Enable/Disable
11) Software Version #

***Note:** The internal ambient temperature reading is the internal air temperature of the module. If the fan fails to operate for some reason, the internal ambient temperature will begin to approach the heat sink temperature. If the AC input breaker in the module is open (off) and there is DC power at the output terminals (output DC breaker closed/on), then the heatsink temperature will be unavailable and will read **N/A**. However, the internal ambient temperature will still read correctly.

5.0 ADJUSTMENTS

5.1 Factory Presets / Ranges

5.1.1 Adjustments, Ranges and Default Settings

Function	Range/ modes	Factory setting
Float Voltage	48-57VDC	54.00VDC
Equalize Voltage	50-60VDC	55.00VDC
Test Voltage	42-62VDC	N/A
High Voltage Shutdown Point	54-61VDC	57.0VDC
Low Voltage Alarm	42-48VDC	44.0VDC
High Voltage Alarm	44-60VDC	55.5VDC
Current Limit	30-110 Amps	102.0 Amps
Output Slope	0-2%	1%

5.1.2 Function Default Settings

Forced Sharing	enabled/disabled	disabled
Delay Start	0-250 sec	0 seconds
Back light time-out	0-60 minutes	5 minutes
Equalize time-out	1-30 hours	30 hr.
Current limit alarm	enable/disable	disable
Remote Access	access/lockout	lockout
Remote Adjust	access/lockout	lockout
Module ID#	01-99	01
Local access alarm	enable/disable	enable
Security code	000-999	123
Baud Rate	1200-9600	2400

WARNING: No adjustments should be made to the module while the input breaker is open (off) or the AC Mains voltage is outside the range stated in the specifications. Final adjustments should be done only when the module has reached operating temperature. Warm-up of 15 minutes is sufficient.

5.2 Float Voltage

If sense lines are used, the load voltage should be measured with an external meter. Voltage setting should be done using the external meter at the remote sense point.

First set the Float voltage with the output breaker open (off). Select the **FLOAT ADJUST** mode. Entrance to this mode may be prohibited by the presence of a remote “Equalize” signal. While observing the front panel meter (or a DVM on the front panel test points), adjust the output level via the ***Up*** or ***Down Adjust/Scroll*** keys. Accuracy of this setting will be +/-100mV. Close the output breaker. If greater accuracy is required, an external meter should be used to “fine tune” the setting. The external meter should be monitoring the termination point of the sense lines. Adjust the **FLOAT** level as described in the initial setting section.

The **FLOAT** level should not be adjusted when the Module is in current limit.

FLOAT and **EQUALIZE** settings do not interact and therefore may be set at any point; however it is standard practice to adjust the equalize level higher than the float level. The float level cannot be increased while the module is in the current limit. Similarly, this level cannot be changed if the module is off.

5.3 Equalize Voltage

First, set the equalize voltage with the output breaker open (off). Select the **EQUALIZE ADJUST** mode. While observing the front panel display, adjust the output level via the ***Up*** and ***Down*** keys. Accuracy of this setting will be +/-100mV. Close the output breaker. If greater accuracy is required an external meter should be used to “fine tune” the setting. The external meter should be monitoring the termination point of the sense lines. Adjust the **EQUALIZE** level as required. The equalize level cannot be increased while the module is in the current limit. Similarly this level cannot be changed if the module is off.

The **EQUALIZE** level should not be adjusted when the Module is in current limit.

Note: Consult the battery manufacturer's equalize voltage recommendations. Do not exceed the limitations of the equipment connected to the rectifier.

5.4 Current Limit

The method of setting of the **CURRENT LIMIT** level is similar to **FLOAT** and **EQUALIZE**.

To accurately test the current limit of the Module, it's necessary to increase the output current of the module to greater than the desired current limit point. The possible methods are:

- Via a dummy load with selectable load settings.
- By turning off other modules in a multi-module arrangement to force the module under adjustment to take on a greater load.
- If a battery is used, the output current can be increased by placing the module in the **EQUALIZE** mode.

While observing the output current reading increase the output current via methods described above to the desired set point for current limit. When reached, the **CL** indication will appear beside the output current.

5.5 Test Voltage

The **TEST** modes can only be entered if the DC output breaker is in the ***Off*** position. Once in the **MANUAL TEST** mode, the output voltage of the module can be adjusted to evaluate performance of low/high voltage alarms and HVSD features. The module will not operate in **AUTO TEST** with the breaker closed. Selection of the mode is via the **TEST** sub menu . Manual tests requires the operator to vary the level via the adjustment keys. Auto tests automatically ramps the test voltage to confirm alarm levels.

5.6 Load Sharing Parallel Operation

5.6.1 Slope Control - RSM modules in parallel with variable slope modules

Assure that Forced Paralleling in turned off. Apply a DC load to the system. Adjust all the slope settings to the same value (1% is suggested). Adjust the float voltage on all rectifiers until the voltage is correct at the regulating point (i.e. when the battery and rectifiers share the current evenly). Verify that all rectifiers share the current evenly under different load conditions.

Repeat procedure for Equalize settings.

5.6.2 Slope Control - Argus modules in parallel with fixed slope modules

Follow the same procedure as 5.6.1. Unless the fixed slope of the parallel rectifiers is known, trial and error settings for the adjustable slope will be required to match the load sharing between the different types of rectifiers under high and low load conditions. If the Argus modules' output current varies less than the fixed slope modules', then the slope of the Argus modules is too high. Conversely, if the output current of the Argus modules varies more than the fixed slope modules, the slope of the Argus modules is too low. Decrease or increase the slope of the Argus modules, readjust the **FLOAT** level of the Argus modules for proper load current sharing, and re-verify the correct current sharing with other loads. Repeat until satisfactory current sharing is achieved. Fine tune the slope of the Argus modules for correct current sharing among the Argus modules if necessary.

Repeat procedure with Equalize settings.

5.6.3 Forced Paralleling - Argus RSM modules in parallel with other RSM modules

Follow same procedure as 5.6.1 and then initialize the forced sharing. Make final voltage adjustments as required. The rectifiers will automatically track each other. One rectifier will act as a “master” and all other rectifiers will “slave” off this rectifier. Master selection is automatic. To determine which rectifier is the “master,” select the **FORCED SHARE** item in the status menu. All slave modules will be denoted by an **“S”** designation beside the message **FORCED**. The master module will be designated with an **“M”.**

Note: It is possible to have several “master” rectifiers, but this will not affect system operation.

When forced paralleling is used, the adjustment range of the slave rectifiers' float and equalize voltage to follow the master is limited. The maximum change of the slaves' output voltage is +1% from the nominal settings when **FORCED** sharing is enabled. This prevents slaves from following a faulty master module into a high voltage condition.

5.7 Start Delay

Select **START DELAY** from the **ADJUSTMENTS** sub menu. Adjust the start delay to the desired setting. The actual start of the module is delayed further by the soft start control or “walk in,” which engages at the end of the selected delay sequence.

5.8 High Output Voltage Shutdown

Select **O/P HV LEVEL ADJ** from the **ADJUSTMENTS** sub menu. Adjust the level to the desired setting. Wait to confirm the setting until after set up of the low output voltage alarm level.

The High Output Voltage Shutdown level cannot be adjusted when the Module is in current limit or off.

5.9 Low Output Voltage Alarm

Select **LO O/P (VOLTS) ALARM** from the **ADJUSTMENTS** sub menu . Adjust the level to the desired setting. Confirm the low output voltage level and the high output voltage shutdown level using **MANUAL** or **AUTO TEST**.

5.10 High Output Voltage Alarm

Select **HI O/P ALARM** from the **ADJUSTMENTS** sub menu . Adjust the level to the desired setting using the up/down arrow keys. Confirm the low output voltage level, the high voltage level, and the high output voltage shutdown level using **MANUAL** or **AUTO TEST**.

5.11 Protected Adjustments

The module is equipped with the following adjustments which require a password to access:

- Current limit alarm disable/enable
- Equalize Time-out
- Display Calibration
- Local access alarm disable/enable
- Security code set

The factory default password is set to 123. Anytime a menu item that requires a password is selected, the message **SECURITY = —-** will show and the first dash will be replaced with a zero as the first digit. Use the ***Up*** and ***Down*** keys to select the first digit and press the ***Enter/Select*** key. Do the same for the second and third digits. The display will wrap around from 9 to 0 (or 0 to 9) when the ***Up*** (or ***Down***) key is pressed.

5.11.1 Current Limit Alarm

When disabled, a current limit condition will not cause the general alarm to be activated. The control toggles between an enabled and disabled condition. Use the ***Enter/Select*** key to toggle the condition.

5.11.2 Equalize Time-out

A maximum equalize time is set by this control. If the equalize mode is selected locally the maximum time the module will remain in the mode is up to 30 hours. This is a cautionary control to prevent accidental over charge of the batteries. The control is overridden by the remote equalize signal. Using the up and down adjustment keys alters the time from 1 to 30 hours.

5.11.3 Back Light Time-out

The maximum time that the LED back light is active is set in this mode. The module will deplete DC standby power when AC power is disconnected even when the display is not in use. Using the ***Up*** and ***Down*** adjustment keys alters the time-out duration.

5.11.4 Display Calibration

This control is used to calibrate the module's output voltage display to a known standard DVM reading. Connect the DVM to the module's test jacks (located on the front panel). Using the ***Up*** and ***Down*** adjustment keys, change the display until the reading on the module matches the external meter. Pressing the ***Enter/Select*** key sets the calibration of the module. The meter is accurate to +/- 0.1V (measured at the output of the module just before the output breaker).

5.11.5 Local Access Alarm

When disabled, activity of the local control keys will not cause the minor alarm to be activated in the adjustment, remote and test modes. The control toggles between an enabled and disabled condition. Use the enter/select key to set the desired condition.

5.11.6 Security Code Set

The **SECURITY CODE** is set to **123** at the factory. To set the security code, select the **SECURITY CODE SET** menu item found in the **PROTECTED ADJUST** sub menu. The code is set one digit at a time by pressing the **UP** or **DOWN** keys until the desired number is displayed and the **ENTER/SELECT** key is pressed. The display will wrap around from 9 to 0 (or 0 to 9) when the ***Up*** (or ***Down***) key is pressed.

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6.0 REMOTE ACCESS/CONTROL

6.1 Remote Control/Monitoring

The two 9 pin D-Sub miniature connectors on the rear of the RSM 48/100 rectifier offer remote control operation and monitoring of the module. See Drawing #010-522-06 or #010-546-06 (for 480 VAC) for pin outs and location of P5 and J3.

6.1.1 Remote Equalize Input

When an external positive or negative polarity (with respect to the remote common termination) DC signal is applied to the remote **EQUALIZE** input, the modules will enter the **EQUALIZE** mode. The modules will remain in the equalize mode as long as a signal is present. Upon removal of this signal, the Module will automatically go into **FLOAT** mode, even though it may have been in **TEST** mode prior to signal application. Remote equalize via this hardware method cannot be disabled locally. The message **REMOTE EQUALIZE** will be displayed on the LCD display.

6.1.2 Remote Shutdown Input

When a signal is applied to this input, the module “electronically” shuts down (breakers are not tripped). To the outside world the module appears as if the output breaker was turned off. In this condition, all the appropriate trouble alarms are extended, i.e. **MODULE FAIL**. Removal of the signal will return the rectifier to the condition prior to signal application. This feature requires the same type of input that is used for ***Remote Equalize***. ***Remote shutdown*** cannot be disabled locally. This control can also be used to reset the module after a High o/p shutdown condition. The message **'REMOTE SHUTDOWN**' will be displayed on the LCD display.

6.1.3 Alarm Monitoring (Standard)

Three alarms, **RECTIFIER FAIL, AC FAIL** and **GENERAL ALARM**, are extended from P5 located on the back of the module. The **RECTIFIER FAIL** alarm is extended via an open collector transistor output in the de-energized state. The **AC FAIL** alarm is extended via a similar output in the energized state. The **GENERAL ALARM** is encoded as narrow pulses in the **RECTIFIER FAIL** output. These outputs can sink 1mA of current and are rated at 65VDC.

6.1.4 Relay Interface Card (List 85)

Monitoring of the three alarms described above and in Section 3 as well as control of the ***Remote Equalize*** and ***Remote Shutdown*** features can be extended to a set of terminal blocks with the ***Relay Interface Kit*** (accessory). This card also decodes the general alarm pulses. Alarm contacts are jumper selectable Form A or Form B. Module Fail alarm contacts are 'fail safe' and therefore will extend an alarm without a source of DC present (i.e. a battery).

6.2 RS-485 Communications Port

Monitoring and control of the rectifier can also be achieved remotely via the RS-485 communications port located on the rear of the rectifier. Refer to Drawing #010-522-06 or #010-546-06 (for 480 VAC) to determine the location and pin outs of the communications port, P5.

See section 5.3 for communications protocol. Note that modems and ASCII terminals must be RS-485 compatible.

Alternatively, the Argus RS-485 to RS-232 SCI converter module can be used as an interface to allow communications with RS-232 protocol.

6.3 RS-485 to RS-232 Serial Communications Interface (SCI) (Optional)

6.3.1 SCI Port Description

The RS-485 to RS-232 Serial Communications Interface (SCI) will interface the RS-485 communications of up to ninety-nine RSM 48/100 rectifiers to any RS-232 standard modem or ASCII terminal meeting the protocols described below (Argus part #: 018-533-20). This module has two communication ports (RS-485 and RS-232) and one power port. The module is available in 19" or 23", 2U high rack mount. An optional wall mount unit is also available. The RS-232 port is not a true RS-232 protocol interface until after the adapter cable (see table below) is installed. **Do not use an off-the-shelf 9-pin serial cable - it will not work.**

RS-232 Interface Cable (9 pin SCI to 25 pin RS-232 or 9 pin RS-232)

Connected To	Cable Length	Argus Part Numbers
Modem - DB25 (DCE)	6/12/25 ft	877-006-10
Terminal/PC - DB25 (DTE)	6/12/25 ft	877-009-10
Terminal/PC - DB9 (DTE)	6/12/25 ft	877-010-10

The SCI Board is configured as a DTE. The SCI Board RS232 signals are:

PIN	Signal
2	TX DATA
3	RX DATA
7	SIG GND

No other pins may be connected. Connect the cable from the SCI connector labeled RS232 to your equipment. Refer to Drawings #877-006-04, 877-009-04, and 877-010-04 for cable pin outs for RS232 communications. Please note the connections made internally on the modem end of the RS-232 cable connecting DTR to DSR, and RTS,CTS to DCD.

Power requirements for the SCI module are supplied by connecting leads from the positive and negative terminals of the power ports on the SCI module to the positive and negative bus of the power system.

6.3.2 Modem Connection

6.3.2.1 Modem required:

External Hayes compatible (or one compatible with the calling modem) with a female DB-25 connector and configured as a DCE (Data Communications Equipment) is required. The DB-25 port on the modem should conform to the EIA RS-232 standard. The modem should be able to run in full duplex mode. The modem must support a fixed data link rate on the modem's serial port of 1200, 2400, 4800, or 9600 baud. 300 baud modems are not supported. The modem must hang up the phone line after a defined time period with no carrier signal. The modem must not change the link rate when answering. For example, if an intelligent 2400 baud modem is used on the rectifier and a 1200 baud modem is used to initiate a call to the 2400 baud modem, the 2400 baud modem will attempt to connect at 1200 and then set the data link rate at 1200 baud. However the rectifier will still be set at 2400 baud since it currently does not recognize the CONNECT or CONNECT 1200 string returned by the modem. If you wish to allow variable baud rates upon connect, you will have to use a modem that allows a fixed data link rate at 9600 baud (or 4800, 2400, or 1200) and a floating connect rate to match the calling modem and a buffer sufficient to store 2kB of data. The buffer is required since the SCI rectifier does not support handshaking at this time so when a status command is sent, the modem will have to be able to store the contents of the status screen while sending it at a lower speed to the calling modem. One example of a modem that supports a fixed data rate and has a 3.25kB buffer would be the US Robotics Courier V32bis modem (fixed data link rate of 9600 baud, error control enabled). Please note that these types of modems are complex in their setup and have not been tested extensively with the RSM.

6.3.2.2 Modem setup:

The baud rate of the modem is normally set to match the highest baud rate programmed in the RSM rectifier that it is capable of achieving. The SCI rectifier is currently not programmed to send initialization strings to the modem. The modem may or may not have indicator lights for transmitted data (usually SD or TD), received data (usually RD), data set ready (usually DSR or MR), data terminal ready (DTR or TR), and automatic answer (usually AA - sometimes doubles as a ring indicator). The wiring jumpers incorporated into the modem cable (P/N 877-006-10) connect DSR to DTR and RTS to CTS and DCD so it should cause the DTR indicator (if any) to come on, and it also forces the hardware handshaking to be bypassed.

A critical setting is the time period required for the modem to disconnect and hang up the line after carrier is lost (i.e. when the calling modem hangs up). A Hayes compatible modem uses the S10 register to define the time period in 0.1 second increments. A typical value would be 2 seconds (S10=20). If this is set to a value where the modem never hangs up the line after loss of carrier, then the modem will not answer more than one call.

If the modem does not power up in automatic answer mode (either set via external switches or internal nonvolatile memory) then the following steps will have to be followed:

1) If your modem has external setup switches for answer mode and baud rate:

a) Connect the modem's power input to the power source that will be used during its normal operation (necessary for step 3d below, otherwise any convenient power source).

b) Set the necessary switch such that the modem will power up in automatic answer mode.

c) Set the necessary switch such that the modem will operate at the desired baud rate.

2) If your modem has nonvolatile memory (NVRAM) for its initial power-up settings:

a) Connect the modem's power input to the power source that will be used during its normal operation (necessary for step 3d below, otherwise any convenient power source).

b) Connect the modem's serial port to a terminal or personal computer capable of sending the modem command strings.

c) Send the required initialization strings to put the modem in automatic answer mode and to set the appropriate carrier loss disconnect time (register S10 for Hayes compatible modems).

d) Send the required initialization strings to put the modem in the desired baud rate.

e) Save the current setup in the modem's NVRAM.

f) Connect the modem to the RSM cabinet with the supplied cable and power up the modem.

3) If your modem has none of the above:

a) Connect the modem's power input to the power source that will be used during its normal operation (necessary for step 3d below, otherwise any convenient power source).

b) Connect the modem's serial port to a terminal or personal computer capable of sending the modem command strings.

c) Send the required initialization strings to put the modem in automatic answer mode and to set the appropriate carrier loss disconnect time (register S10 for Hayes compatible modems).

d) Send the required initialization strings to put the modem in the desired baud rate.

e) WITHOUT DISCONNECTING POWER to the modem, connect the modem's serial port to the RSM cabinet.

At this point, the modem should be connected to the RSM cabinet, already powered up, and the automatic answer mode enabled (usually shown as an AA indicator), the hang-up on carrier loss set, and the correct baud rate set. The cable designed for the SCI rectifier should cause the DTR indicator on the modem to be enabled. The baud rate setting in the RSM rectifier and the baud rate setting in the modem's link rate should be the same.

The initialization string 'ATS0=1' (not including quotes) will set a Hayes compatible modem to answer after 1 ring.

The consequence of using a modem that does not power up in auto answer mode is that if the power to the modem is interrupted and resumed, a remote caller will not be able to call into the RSM cabinet. The baud rate settings may also be affected.

Connect the modem to the desired telephone line. Call the RSM cabinet modem from a remote modem, and verify that the modem answers correctly. After a successful CONNECT (or equivalent) message from the remote's terminal program, type '[01s]' (not including quotes, and do not press CR/ENTER after the last ']') and the RSM cabinet modem will send a status display to the remote terminal of the rectifier designated as ID #01.

To disconnect from the RSM cabinet modem, simply hang up the remote terminal's modem.

If this does not work, then debugging of the above system connection interface by a person knowledgeable in RS-232 communications is required, or call Argus Technologies for assistance.

6.3.3 Local Terminal Connection

6.3.3.1 Terminal required:

A terminal with a male DB-25 connector and configured as a DTE (Data Communications Equipment) is required. The DB-25 port on the terminal should conform to the EIA RS-232 standard. The terminal should be able to run in full duplex mode. The terminal must support 1200, 2400, 4800, or 9600 baud. 300 baud terminals are not supported. A PC with a DB-25 serial interface running a terminal emulation program (set for TTY operation) is adequate.

6.3.3.2 Terminal setup:

The baud rate of the terminal is normally set to match the highest baud rate programmed in the RSM rectifier that it is capable of achieving. Set the parameters to 8 data bits, 1 stop bits, and no parity.

6.4 Communicating with the RSM

The RSM is designed to communicate directly with a “ASCII terminal” to eliminate the need for additional software. Communication with a PC is also possible with a terminal emulation program such as PROCOMM or LYNC. LYNC, a publicly available shareware program, is available free of charge from Argus and is pre-configured to work with the SCI board. When you use other terminal programs such as PROCOMM, a few settings have to be made. The local echo (also called half duplex) setting should be set ON so the user can see what is typed on the screen. Automatic linefeed generation after a carriage return is received should be disabled.

After all hardware is set up and a communications link established, you will need to know how to talk to the RSM rectifiers. There has to be DC power present at the output for the remote communication to function. There are only four commands that the RSM rectifier will respond to.

SYNTAX	DESCRIPTION
[##S]	Request Status
[##E]	Press Enter Key
[##U]	Press Up Key
[##D]	Press Down Key

“##” is the rectifier ID number from 01 to 99.

Typing [01S] will result in rectifier #01 transmitting its complete status. This is the same as going into the STATUS sub menu. For all commands, the rectifier will send back the relevant information and/or prompt after the ']' character is received.

The commands must be entered correctly the first time. The backspace and delete and other common editing keys will NOT work. If you wish to terminate an incorrect command and re-enter it, simply enter ']' and start over. The command, if it is invalid, will be ignored.

For ease of use, macros are usually programmed in the terminal program used and assigned to the function keys (or other available keys).

The following keys have been preset in the LYNC configuration and they can be changed to suit the individual user's requirements. The default key assignments are as follows:

F1	[01
F2	[02
F3	[03
F4	[04
F5	U]
F6	S]
F7	D]
F8	E]

Note that the macros can be split between keys for flexibility. Using the above macros, the user would press F1 and then F6 to get the status of module # 01, and similarly, F2 and F6 for the status of module #02.

If you change the baud rate of the rectifier using a locally connected terminal (i.e. not via modem), then you will have to change the baud rate of the terminal to match the rectifier's new setting. Do this immediately after sending the "ENTER" command ("[##E]") to be able to continue the session. DO NOT CHANGE THE MODULE BAUD RATE IF YOU ARE CONNECTED BY MODEM UNLESS YOU ARE ABLE TO CHANGE THE MODEM PORT BAUD RATE REMOTELY AS WELL.

6.5 Access to the RSM

There are two distinct levels of communications possible with the RSM.

6.5.1 Remote Access/Lockout

When remote communications are locked out the RSM ignores all commands and responds only with **REMOTE LOCKOUT**.

When remote communications are enabled the level of communication is determined by the status of **REMOTE ADJUST**.

To change the status of **REMOTE ACCESS/LOCKOUT**, select the **REMOTE COMMUNICATIONS** menu item. You will be prompted for the security code before any adjustments can be performed.

REMOTE ACCESS/LOCKOUT is the first item inside the **REMOTE COMMUNICATIONS** menu. Pressing the ***Enter/Select*** key toggles between **REMOTE ACCESS** and **REMOTE LOCKOUT**.

6.5.2 Remote Adjust Access/Lockout

When **REMOTE ADJUST** is locked out, the RSM simply ignores the **UP**, **DOWN**, and **ENTER** commands and responds with **REMOTE LOCKOUT**. The rectifier will only provide status information through the **STATUS** command.

When **REMOTE ADJUST** is enabled it is possible to adjust the RSM remotely. The **UP, DOWN, ENTER** commands are equivalent to physically pressing the keys on the front panel of the rectifier itself.

To change the status of **REMOTE ADJUST ACCESS/LOCKOUT**, select the **REMOTE COMMUNICATIONS** menu item. You will be prompted for the security code before any adjustments can be performed.

REMOTE ADJUST ACCESS/LOCKOUT is the second item inside the **REMOTE COMMUNICATIONS** menu. Pressing the ***Enter/Select*** key toggles between **REMOTE ACCESS** and **REMOTE LOCKOUT**.

6.6 Module ID

In order for the rectifier to be identified for remote communication, each rectifier must be assigned a unique identification number. Sequentially program each rectifier in the system. Do not duplicate the ID number on separate shelves. Select the **MODULE I.D.** entry mode via the **REMOTE ACCESS** sub menu. The default address or programmed address will be displayed. Using the ***Up*** and ***Down*** keys increase or decrease the number displayed. The digits will wrap around; i.e. when the number 99 is reached, pressing the ***Up*** key will cause the number to jump to 01. Press ***Enter/Select*** to enter the desired number. The module will display **RETURN**. If two rectifiers have the same ID#, a line conflict will occur which will result in garbled communications.

6.7 Baud Rate

The module has four programmable baud rate settings for use with the Serial Communications Interface. Using the cursor controls the operator scrolls between 1200, 2400, 4800 and 9600 baud transmission rates. When the appropriate rate is chosen to match the external communications device (e.g. modem), the operator presses the ***Enter/Select*** key.

6.8 Remote Disable

Remote access via the serial communications interface can be disabled if programmed. Disabling the feature will inhibit remote interrogation of the module.

6.9 Remote Adjust Disable

Depending on factory configuration, some modules are able to receive remote adjustment of all levels similar to local operation. Consult factory for complete information on the operation of this feature.

Please see individual terminal software information and Figure #5 for a remote terminal screen format.

6.10 Remote Terminal Status Format

The following is a typical screen page layout as the RSM responds to the “status” command after selecting a rectifier (please note that the screen shown may vary for different models).

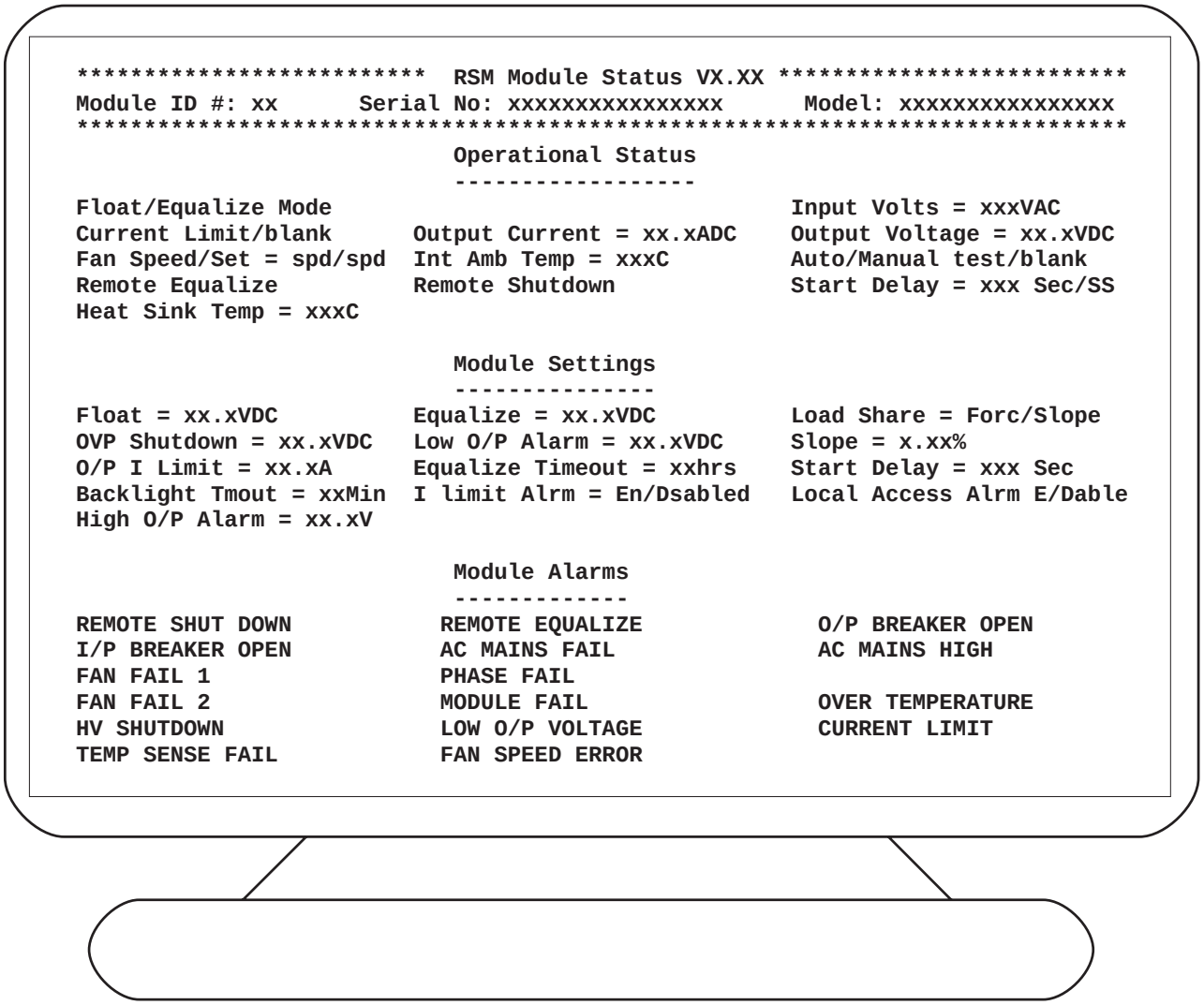
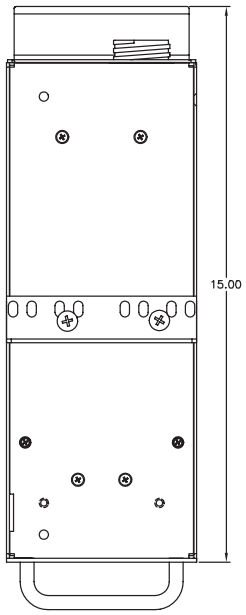
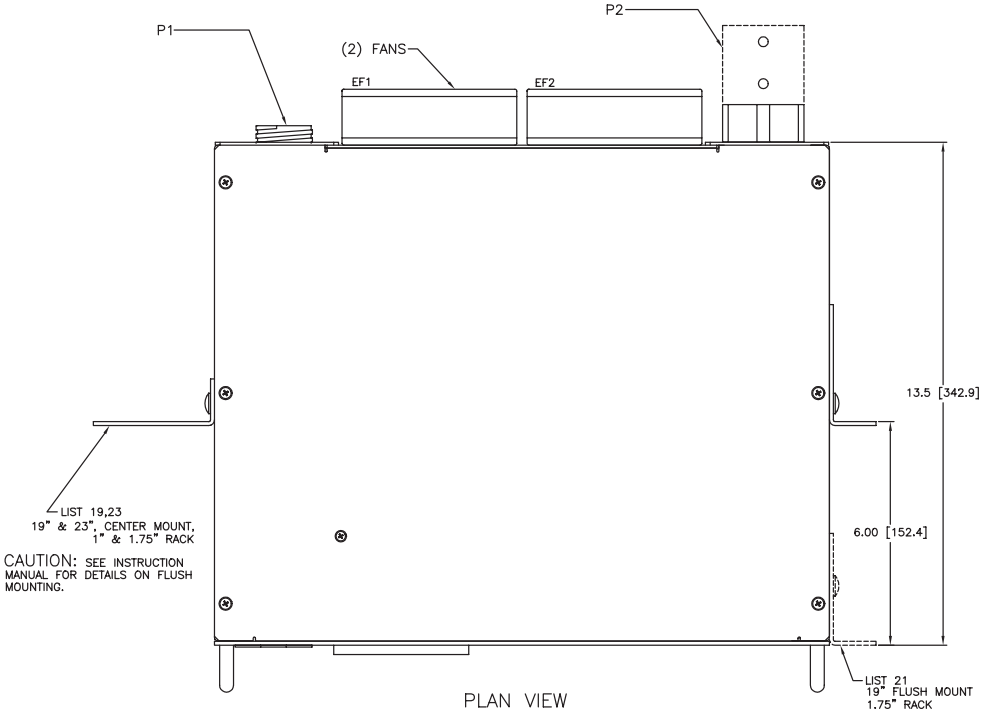


Figure 5 - Remote Screen Layout

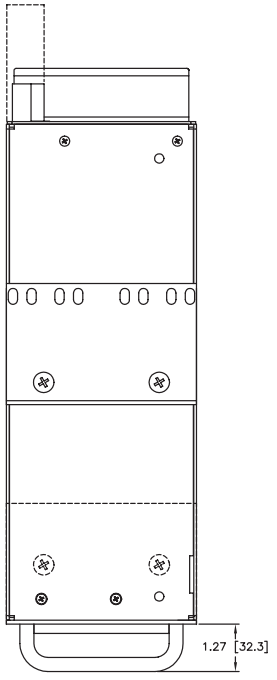
REVISIONS			
LTR	DESCRIPTION	DATE	APPD
A	PRODUCTION RELEASE	96/07	DD
B	PAGE 4 ADDED	96/10	LRD
C	LIST OPTION 92 ADDED		



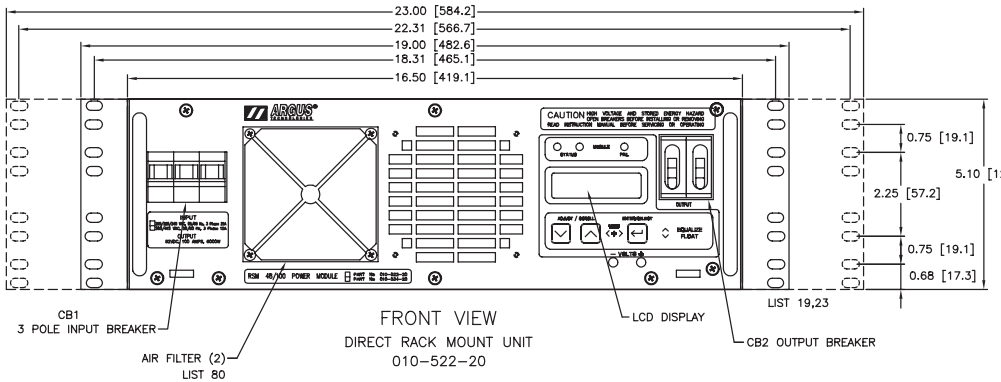
LEFT SIDE VIEW



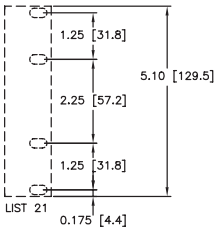
PLAN VIEW



RIGHT SIDE VIEW



FRONT VIEW
DIRECT RACK MOUNT UNIT
010–522–20



DIMENSIONS ARE IN INCHES WITH METRIC [mm] IN BRACKETS: INCHES [mm]

LTR	DESCRIPTION	QTY
	FINISHED HOLE LEGEND	

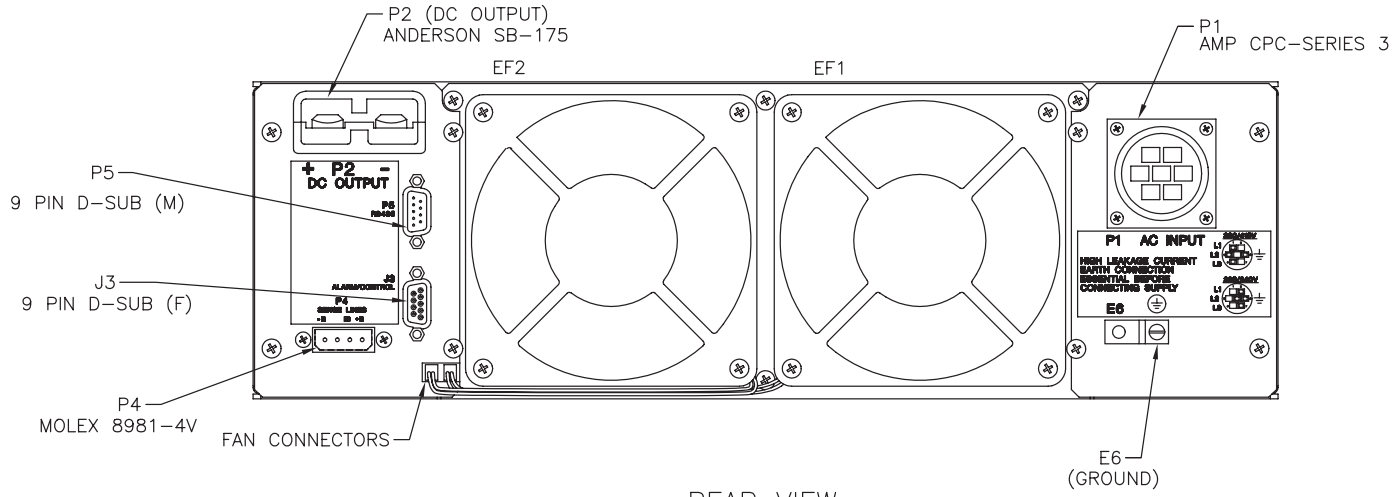
ARGUS® TECHNOLOGIES

DESIGN	D.D.	95/05	MATERIAL
DRAWN	W.Y.	95/05	
CHECKED	K.L.	96/01	FINISH PER PO
APPROVED	D.D.	96/01	
TOLERANCE ± 0.025"			SCALE N.T.S.

TITLE
OUTLINE DRAWING
RSM 48/100 POWER MODULE

ISSUE DATE		SHEET 1 OF 4	
SIZE B	DWG NO. 010 – 522 – 06	TYPE A1	REV C

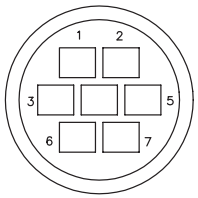
REVISIONS			
LTR	DESCRIPTION	DATE	APPD



REAR VIEW

P1 – AC INPUT, PIN NUMBERS

	LIST 9	LIST 10	LIST 92
	208–240 VAC	380–415 VAC	380–415 VAC 0.92 P/F
L1	2	1	1
L2	4	3	3
L3	7	6	6
GND	5	5	5



P1

J3–ALARM/CONTROL I/F

1	ALARM COM
2	AC FAIL
3	SPARE
4	REM EQ
5	REM COM
6	MOD FAIL
7	SPARE
8	SPARE
9	REM S.D.

J3

P5 – RS485 INTERFACE

1	485 COM
2	SCI ENABLE
3	SPARE
4	Tx/Rx +
5	Tx/Rx –
6	SPARE
7	SPARE
8	Tx/Rx +
9	Tx/Rx –

P5

P4 – SENSE LINES

1	– SENSE
2	SPARE
3	CUR SHARE
4	+ SENSE

P4

LTR	DESCRIPTION	QTY
	FINISHED HOLE LEGEND	

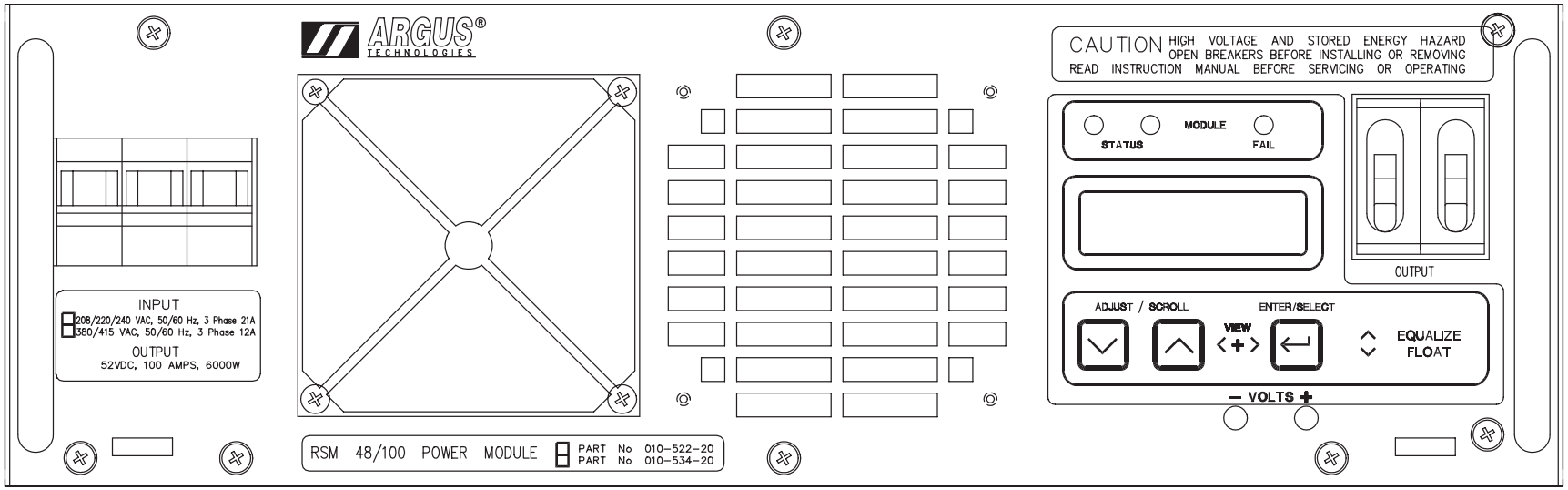
ARGUS® TECHNOLOGIES

DESIGN	D.D.	95/05	MATERIAL
DRAWN	W.Y.	95/05	
CHECKED	K.L.	96/01	FINISH
APPROVED	D.D.	96/01	
TOLERANCE ± 0.025"			SCALE N.T.S.

TITLE
OUTLINE DRAWING
RSM 48/100 POWER MODULE

ISSUE DATE	SHEET 2 OF 4	
SIZE B	DWG NO. 010 – 522 – 06	TYPE A1 / REV C

REVISIONS			
LTR	DESCRIPTION	DATE	APPD



FRONT VIEW

HORIZONTAL MOUNT POWER MODULE

010-522-20

LTR	DESCRIPTION	QTY
	FINISHED HOLE LEGEND	

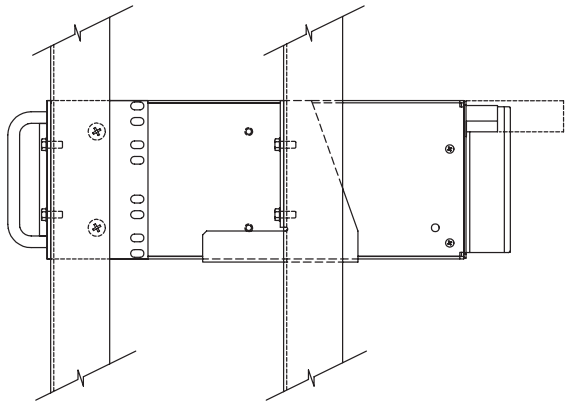
ARGUS® TECHNOLOGIES

DESIGN	D.D.	95/05	MATERIAL
DRAWN	W.Y.	95/05	
CHECKED	K.L.	96/01	FINISH
APPROVED	D.D.	96/01	
TOLERANCE ± 0.025"			SCALE N.T.S.

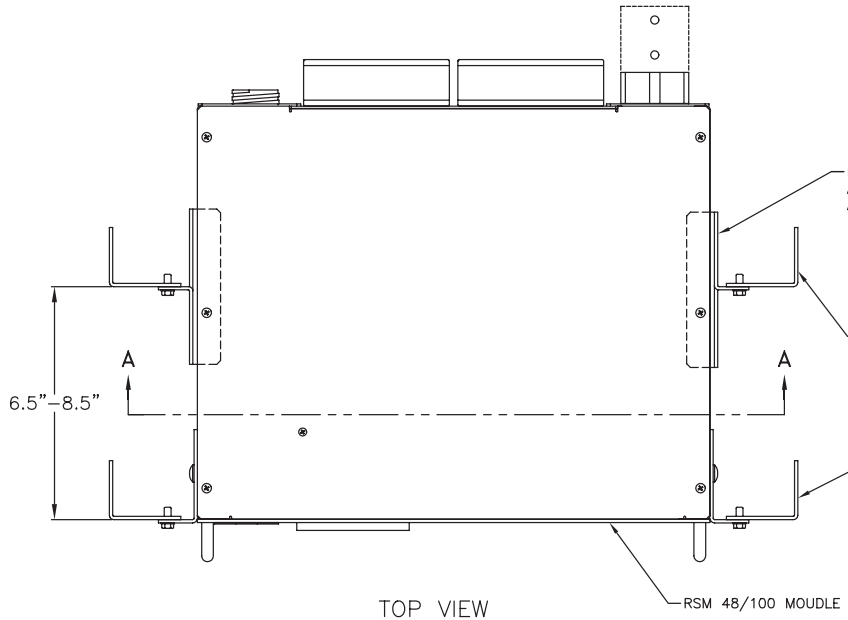
TITLE

OUTLINE DRAWING
RSM 48/100 POWER MODULE

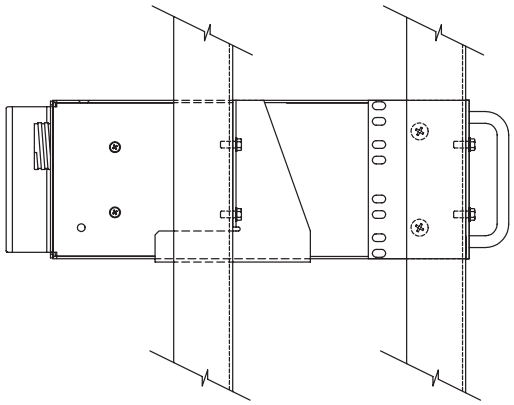
ISSUE DATE		SHEET 3 OF 4	
SIZE B	DWG NO. 010 – 522 – 06	TYPE A1	REV C



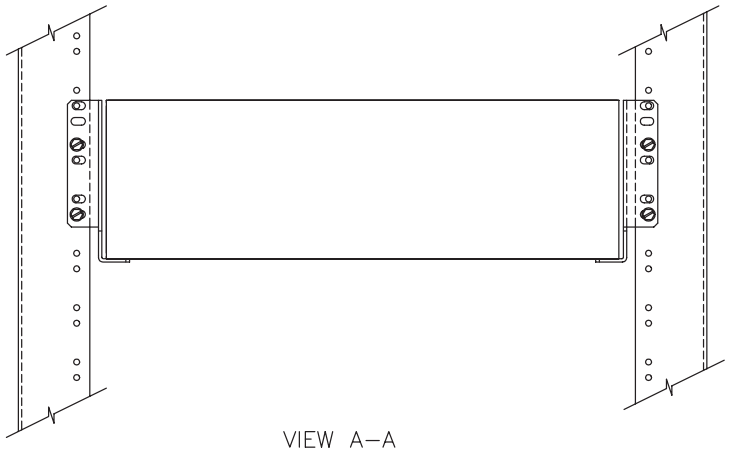
RIGHT SIDE VIEW



TOP VIEW



LEFT SIDE VIEW



VIEW A-A

REAR SUPPORT MOUNTING FOR BOX BAY

REVISIONS			
LTR	DESCRIPTION	DATE	APPD

LTR	DESCRIPTION	QTY
	FINISHED HOLE LEGEND	

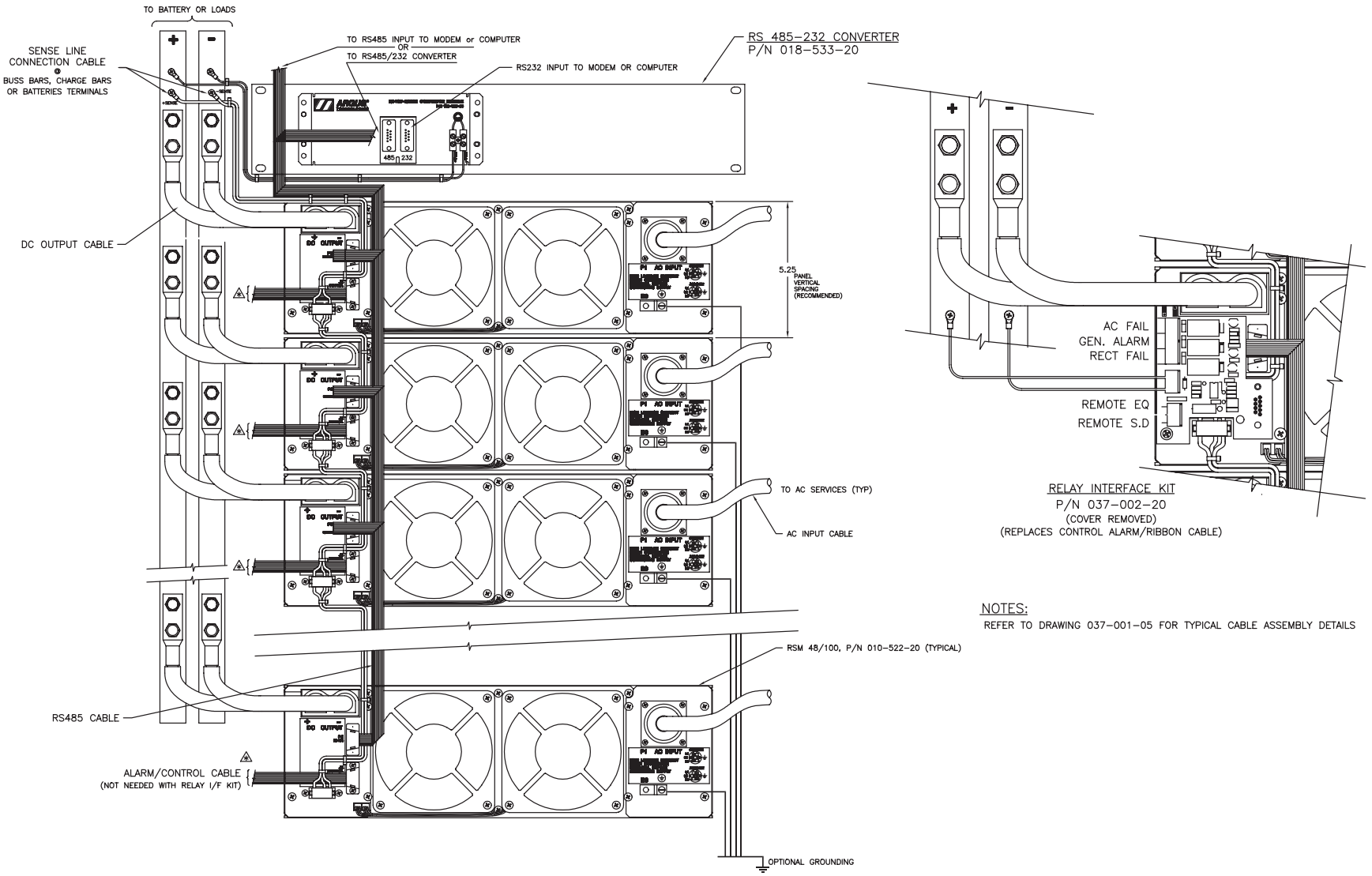
ARGUS® TECHNOLOGIES

DESIGN	D.D.	95/05	MATERIAL
DRAWN	W.Y.	95/05	
CHECKED	K.L.	96/01	FINISH
APPROVED	D.D.	96/01	
TOLERANCE ± 0.025"			SCALE N.T.S.

TITLE
OUTLINE DRAWING
RSM 48/100 POWER MODULE

ISSUE DATE		SHEET 4 OF 4	
SIZE B	DWG NO. 010 - 522 - 06	TYPE A1	REV C

REVISIONS			
LTR	DESCRIPTION	DATE	APPD
A	PRODUCTION RELEASE		



NOTES:

REFER TO DRAWING 037-001-05 FOR TYPICAL CABLE ASSEMBLY DETAILS

LTR	DESCRIPTION	QTY
	FINISHED HOLE LEGEND	

argus TECHNOLOGIES

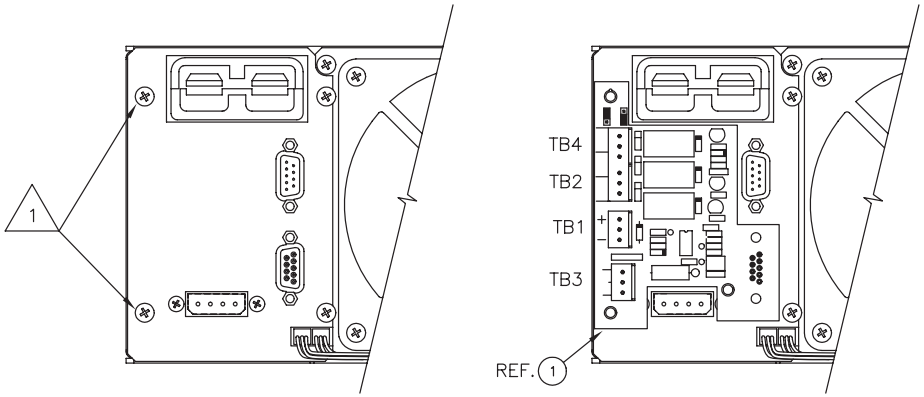
DESIGN	J.U.	96/07	MATERIAL
DRAWN	J.U.	96/07	
CHECKED			FINISH
APPROVED	D.D.	96/07	
TOLERANCES			SCALE N.T.S.

TITLE

TYPICAL CONNECTION
OF RSM48/100 RECTIFIERS

ISSUE DATE	SHEET 1 OF 1	
SIZE B	DWG NO. 010 – 522 – 08	REV A

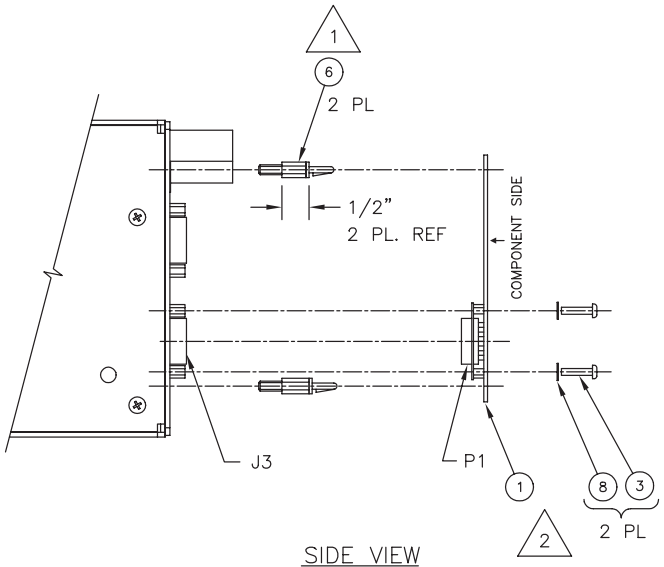
REVISIONS			
LTR	DESCRIPTION	DATE	APPD
A	PRODUCTION RELEASE	96/08	CDD
B	ASSEMBLY STEPS # CHANGED	97/01	CDD
C	CABLE DETAIL ADDED	97/02	



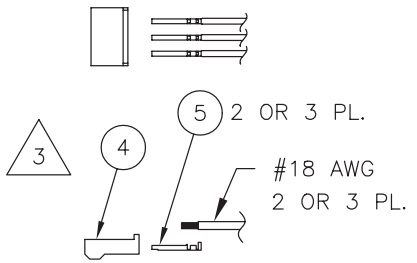
BEFORE ASSEMBLY

WITH PCB ASSEMBLED

REAR VIEWS



SIDE VIEW



CABLE DETAIL:

NOTES:

1. REPLACE 2 EXISTING #8–32 SCREWS & WASHERS WITH TWO #8 SUPPORT STANDOFFS (ITEM 6).
2. PLUG 9 PIN CONNECTOR P1 OF THE PCB (ITEM 1) TO 9 PIN CONNECTOR J3 OF THE MODULE REAR PANEL AND SECURE IT WITH TWO #4–40 SCREWS (ITEM 3) AND WASHERS (ITEM 8).
3. CRIMP WIRES (#18 AWG) TO PIN TERMINALS (ITEM 5) AND INSERT TO CRIMP TERMINAL HOUSING (ITEM 4).
   FOR TB1 USE ONLY TWO WIRES, LEAVING MIDDLE TERMINAL EMPTY.
   FOR TB2,3,4 USE ALL THREE WIRES.

PART LIST: 037–002–20

LTR	DESCRIPTION	QTY
	FINISHED HOLE LEGEND	

ARGUS® TECHNOLOGIES

DESIGN	C.D.D.	96/06	MATERIAL
DRAWN	J.U.	96/06	
CHECKED			FINISH
APPROVED	C.D.D.	96/06	
TOLERANCE			SCALE N.T.S.

TITLE
ASSY., KIT, RELAY INTERFACE
RSM 48/100

ISSUE DATE		SHEET 1 OF 1	
SIZE	DWG NO.	TYPE	REV
B	037 – 002 – 04	A1	C

ASSEMBLY SEQUENCE AND NOTES
KIT, PCB, RELAY INTERFACE
RSM 48/100

APPROVED: _____
ISSUED: _____

Assembly instructions:

1. Replace the two existing #8 screws & washers with two #8 standoffs (11) & washers (10). Save existing hardware for assembly the cover (2) in Step 5.

2. Mount the nylon spacer (7) with a #6 screw (4) and washer (9) onto the PCB (1).

3. Plug the 9 pin connector (P1) of the PCB (1) to the 9 pin connector (J3) of the module rear panel and secure it with two #4 screws (3) and washers (8).

4. Screw two #8 standoffs (6) with washers (10) to further secure the PCB (1) to the rear panel.

5. Mount the PCB cover (2) to the nylon spacer (7) and secure with two #8 screws and washers (Hardware saved in Step 1).

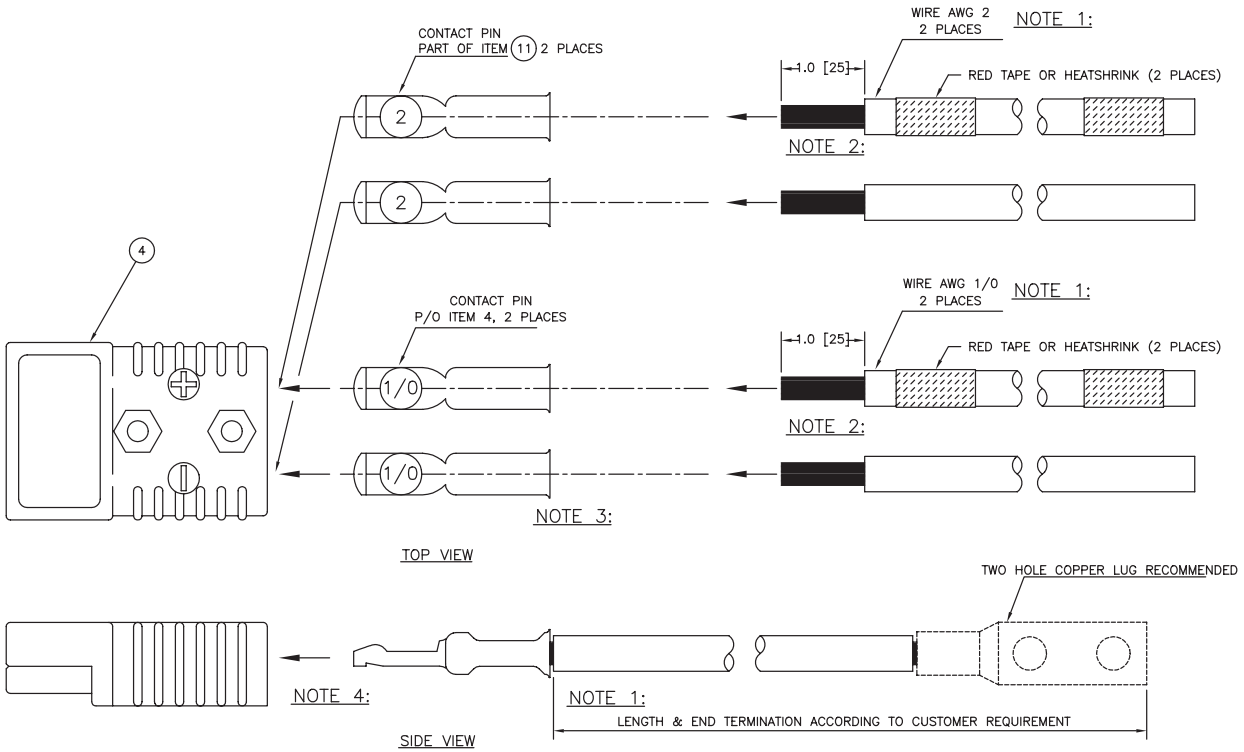
References:

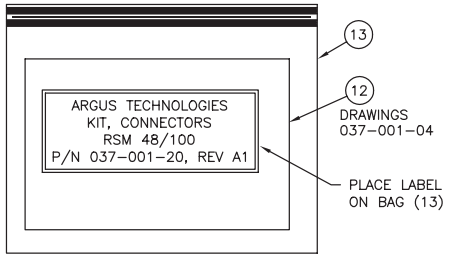
REF 037-002-04 A Dwg (B); Assembly, Kit, Relay Interface

Revisions:

P/A	96-06-05	Preliminary Release
A	96-08-19	Production Release

REVISIONS			
LTR	DESCRIPTION	DATE	APPD
A	REV P/B – REV D SEE HISTORY	98/09	JU
E	REV'D PER EO'S C1 – C2; METRIC VALUES ADDED		





KIT PACKAGING:

LIST 0

DC POWER CABLE:

B.O.M.: 037–001–20

NOTES:

1 RECOMMENDED WIRES: AWG 1/0, BELDEN, UL STYLE 3126, 200C–600V, SILICONE RUBBER INSULATION
AWG 2, BELDEN, UL STYLE 3125, 200C–600V, SILICONE RUBBER INSULATION

2 STRIP EACH WIRE (AWG 1/0 OR AWG 2) AS SHOWN.
THE WIRE GOING TO POSITIVE SIDE OF THE CONNECTOR SHOULD BE MARK
BY RED SLEEVE OR RED TAPE ON BOTH ENDS OF THE WIRE.

3 FOR CRIMPING THE WIRE (AWG 1/0 OR AWG 2) TO THE CONTACT,
USE AMP HYDRAULIC HAND TOOL CAT. No. 59973–1,
INSERT HEAD (CAT. No. 69099) WITH DIE (CAT. No.46766–2)
OR USE SIMILAR EQUIPMENT FOR CRIMPING WIRE AND CONTACT.

4 INSERT CONTACTS INTO HOUSING (4) UNTIL SNAPPING INTO POSITION SECURELY.

DIMENSIONS ARE IN INCHES WITH METRIC [mm] IN BRACKETS: INCHES [mm]

LTR	DESCRIPTION	QTY
	FINISHED HOLE LEGEND	

ARGUS TECHNOLOGIES

DESIGN	J.U.	96/07	MATERIAL: SEE B.O.M.
DRAWN	J.U.	96/07	
CHECKED	C.D.D.	96/07	
APPROVED	C.D.D.	96/07	FINISH: PER P.O. and Doc. 070–024–83

TOLERANCES (UNLESS OTHERWISE NOTED)
x.x ±0.04" [x] ±1mm
x.xx ±0.02" [x.x] ±0.5mm
x.xxx ±0.01" [x.xx] ±0.25mm

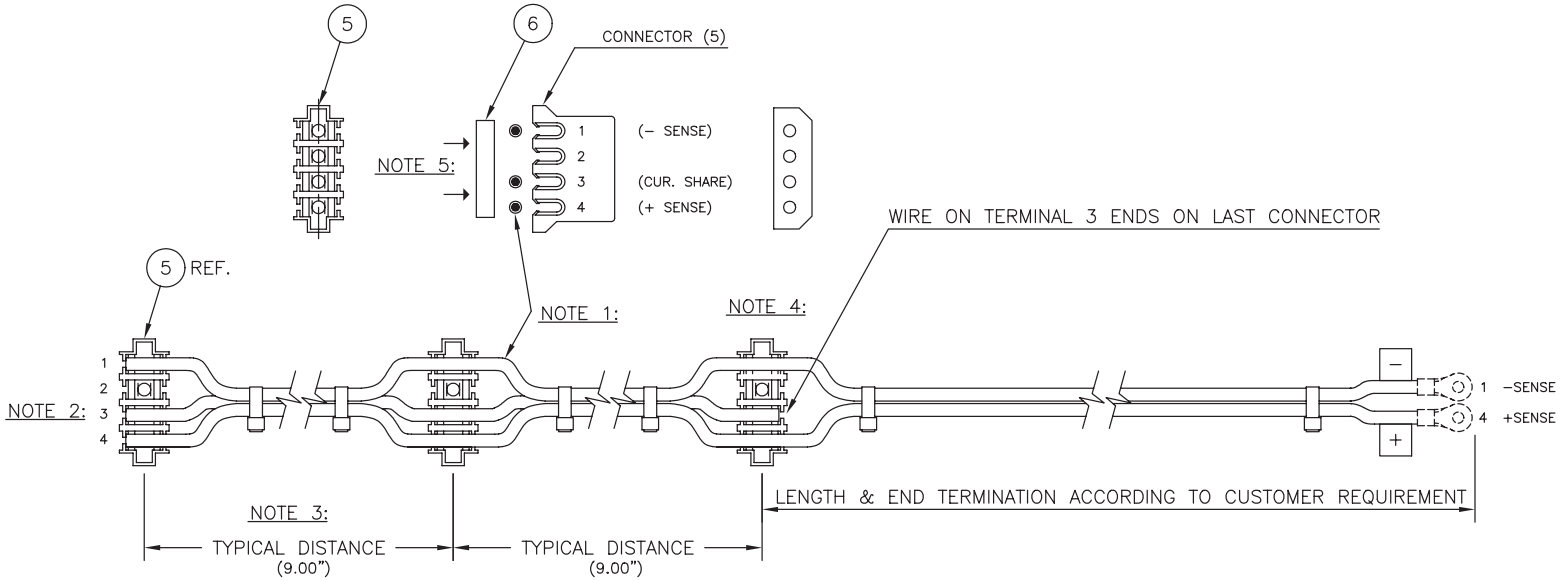
SCALE N.T.S.

TITLE: ASSEMBLY;
KIT CONNECTOR, RSM 48/100

ISSUE DATE | SHEET 1 OF 5

SIZE	TYPE	DWG NO.	REV
B	A1	037–001–04	E

REVISIONS			
LTR	DESCRIPTION	DATE	APPD



LIST 0

SENSE LINE & CURRENT SHARE CABLE:

PARTS LIST: 037–001–20

NOTES:

1. RECOMMENDED WIRE: #18 AWG, AWM 200C–600V UL STYLE No.3071, BELDEN OR EQUIVALENT.
2. PLACE WIRES OVER CONNECTOR AS SHOWN:
   – SENSE GO TO TERMINAL 1
   + SENSE GO TO TERMINAL 4
   CUR. SHARE GO TO TERMINAL 3
3. RECOMMENDED TYPICAL DISTANCE = PANEL VERTICAL SPACING + 3.75"
   (REFER TO DWG. 010–522–08)
4. NUMBER OF CONNECTORS (5) ACCORDING TO CUSTOMER REQUIREMENTS.
5. PRESS CONNECTOR, WIRES AND COVER AS SHOWN,
   USING AMP HAND TOOL HANDLE No. 58074–1 WITH HEAD No. 231894–1.

DIMENSIONS ARE IN INCHES WITH METRIC [mm] IN BRACKETS: INCHES [mm]

LTR	DESCRIPTION	QTY
	FINISHED HOLE LEGEND	

ARGUS TECHNOLOGIES

DESIGN	J.U.	96/07	MATERIAL: SEE B.O.M.
DRAWN	J.U.	96/07	
CHECKED	C.D.D.	96/07	
APPROVED	C.D.D.	96/07	FINISH: PER P.O. and Doc. 070–024–83

TOLERANCES (UNLESS OTHERWISE NOTED)
x.x ±0.04" [x] ±1mm
x.xx ±0.02" [x.x] ±0.5mm
x.xxx ±0.01" [x.xx] ±0.25mm

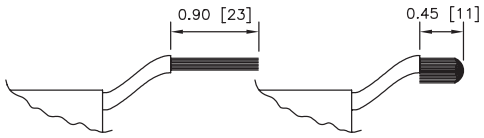
SCALE: N.T.S.

TITLE: ASSEMBLY; KIT CONNECTOR, RSM 48/100

ISSUE DATE | SHEET 2 OF 5

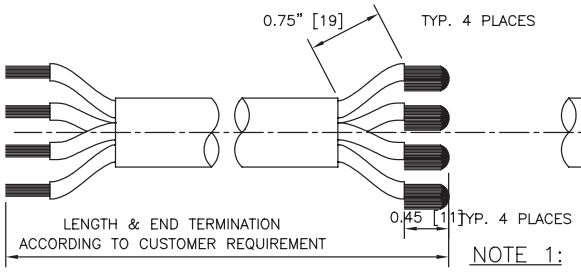
SIZE	TYPE	DWG NO.	REV
B	A1	037–001–04	E

REVISIONS			
LTR	DESCRIPTION	DATE	APPD



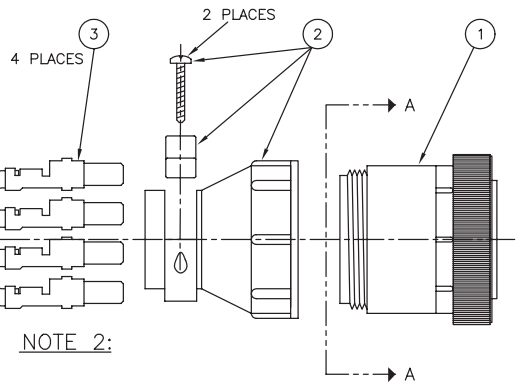
DETAL 'A' (TYP. 4 PLACES)

CABLE PREPARATION:

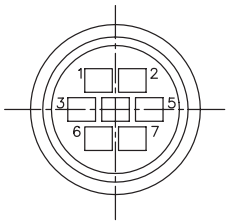


NOTE 1:

CONNECTOR DETAIL:



NOTE 2:

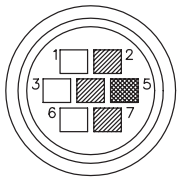


VIEW A–A
(SEE LIST OPTIONS)

LIST 9: (208–240VAC)

WIRE L1; POSITION 2
WIRE L2; POSITION 4
WIRE L3; POSITION 7

WIRE GND; POSITION 5

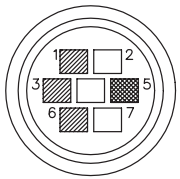


VIEW A–A

LIST 10: (380–415VAC)
LIST 92: (380–415VAC , 0.92 P/F)

WIRE L1; POSITION 1
WIRE L2; POSITION 3
WIRE L3; POSITION 6

WIRE GND; POSITION 5



VIEW A–A

NOTES:

1 STRIP CABLE AND EACH WIRE (AWG 8 & 10) AS SHOWN. FOR WIRE SIZE AWG 12 SEE DETAIL 'A'.

2 FOR TERMINATING SOCKET CONTACTS (3) TO THE WIRES USE AMP CERTI–CRIMP HAND TOOL CAT. No.69710–1, INSERT DIE CAT. No. 90140–1

3 FOR REMOVING SOCKET CONTACTS (3) FROM THE PLUG (2) USE AMP EXTRACTION TOOL CAT. No. 91019–3

LIST 80

AC POWER CABLE:

PARTS LIST: 037–001–20

LTR	DESCRIPTION	QTY
	FINISHED HOLE LEGEND	

ARGUS TECHNOLOGIES

DESIGN	J.U.	96/07	MATERIAL: SEE B.O.M.
DRAWN	J.U.	96/07	
CHECKED	C.D.D.	96/07	
APPROVED	C.D.D.	96/07	FINISH: PER P.O. and Doc. 070–024–83

TOLERANCES (UNLESS OTHERWISE NOTED): x.x ±0.04" [x] ±1mm; x.xx ±0.02" [x.x] ±0.5mm; x.xxx ±0.01" [x.xx] ±0.25mm

SCALE: N.T.S.

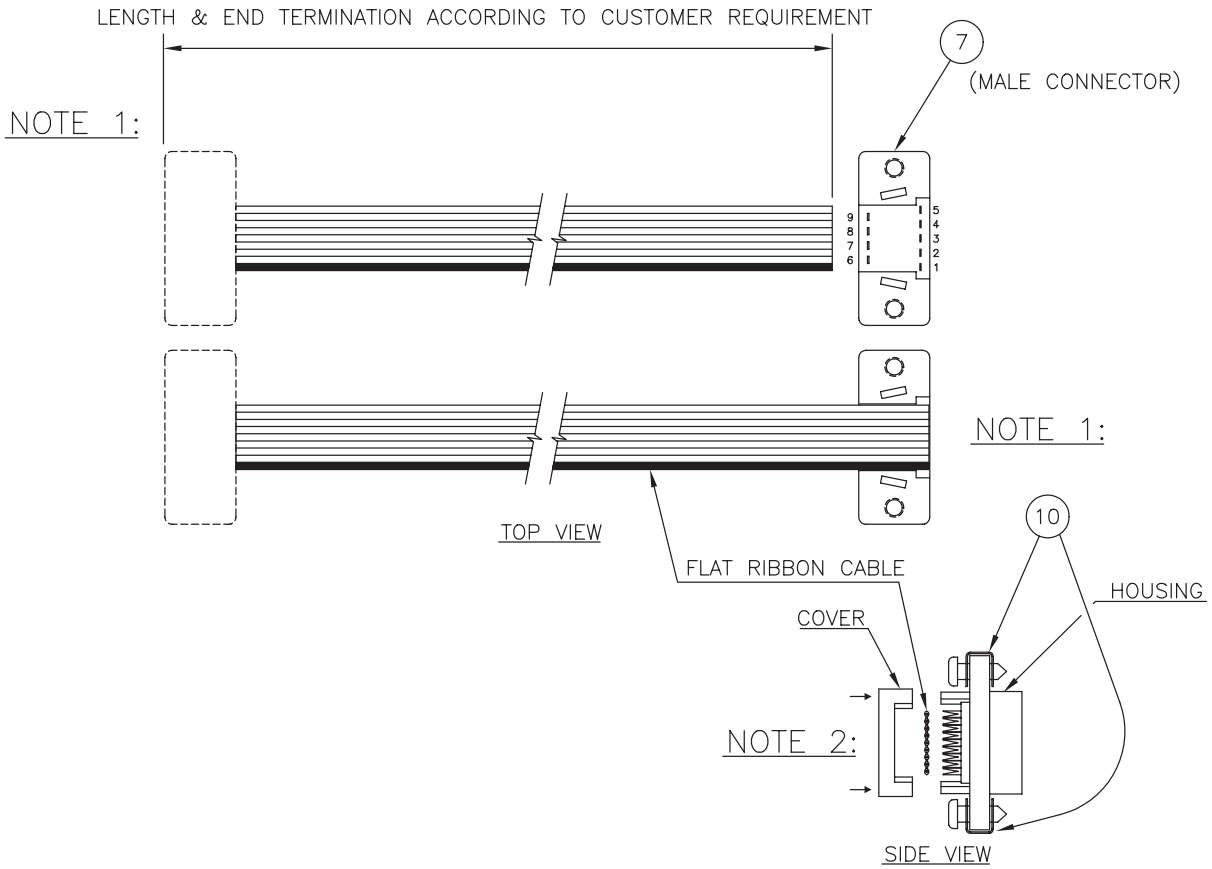
TITLE: ASSEMBLY; KIT CONNECTOR, RSM 48/100

ISSUE DATE | SHEET 3 OF 5

SIZE	TYPE	DWG NO.	REV
B	A1	037–001–04	E

DIMENSIONS ARE IN INCHES WITH METRIC [mm] IN BRACKETS: INCHES [mm]

REVISIONS			
LTR	DESCRIPTION	DATE	APPD



LIST 81

ALARM/CONTROL INTERFACE:

PARTS LIST: 037-001-20

NOTES:

1 CUT THE LENGTH OF CABLE AND PLACE OVER THE CONNECTOR (7) PINS AS SHOWN.
RECOMMENDED CABLE: AMP RIBBON 9 CONDUCTORS #28 FLAT CABLE, 0.05" [1.3mm] CENTERLINES, UL2651 OR SIMILAR.

2 FOR FINAL ASSEMBLY USE AMP MANUAL ARBOR TOOL No.91085-2 OR SIMILAR PROPER TOOLING.

DIMENSIONS ARE IN INCHES WITH METRIC [mm] IN BRACKETS: INCHES [mm]

LTR	DESCRIPTION	QTY
	FINISHED HOLE LEGEND	

ARGUS TECHNOLOGIES

DESIGN	J.U.	96/07	MATERIAL: SEE B.O.M.
DRAWN	J.U.	96/07	
CHECKED	C.D.D.	96/07	
APPROVED	C.D.D.	96/07	FINISH: PER P.O. and Doc. 070-024-83

TOLERANCES (UNLESS OTHERWISE NOTED): x.x ±0.04" [x] ±1mm; x.xx ±0.02" [x.x] ±0.5mm; x.xxx ±0.01" [x.xx] ±0.25mm

SCALE: N.T.S.

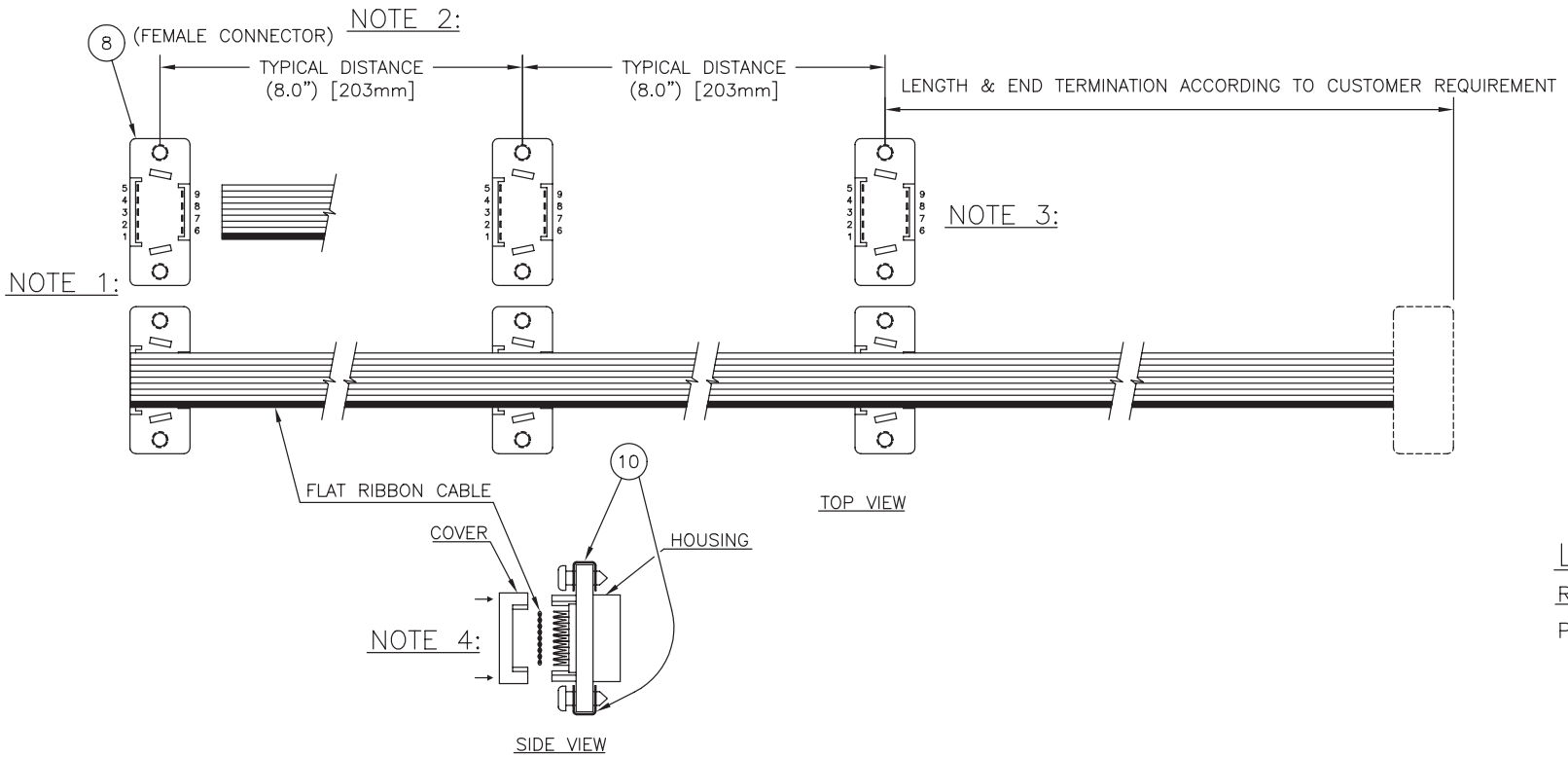
TITLE: ASSEMBLY; KIT CONNECTOR, RSM 48/100

ISSUE DATE

SHEET 4 OF 5

SIZE	TYPE	DWG NO.	REV
B	A1	037-001-04	E

REVISIONS			
LTR	DESCRIPTION	DATE	APPD



LIST 82

RS485 INTERFACE CABLE:

PARTS LIST: 037-001-20

NOTES:

1 CUT THE LENGTH OF CABLE AND PLACE OVER THE CONNECTOR (8) PINS AS SHOWN.
RECOMMENDED CABLE: AMP RIBBON 9 CONDUCTORS #28 FLAT CABLE, 0.05" CENTERLINES, UL2651 OR SIMILAR.

2 RECOMMENDED TYPICAL DISTANCE = PANEL VERTICAL SPACING + 2.75" [70mm]
(REFER TO DWG. 010-522-08).

3 NUMBER OF CONNECTORS (8) ACCORDING TO CUSTOMER REQUIREMENTS.

4 FOR FINAL ASSEMBLY USE AMP MANUAL ARBOR TOOL No.91085-2 OR SIMILAR PROPER TOOLING.

DIMENSIONS ARE IN INCHES WITH METRIC [mm] IN BRACKETS: INCHES [mm]

LTR	DESCRIPTION	QTY
	FINISHED HOLE LEGEND	

ARGUS TECHNOLOGIES

DESIGN	J.U.	96/07	MATERIAL: SEE B.O.M.
DRAWN	J.U.	96/07	
CHECKED	C.D.D.	96/07	
APPROVED	C.D.D.	96/07	FINISH: PER P.O. and Doc. 070-024-83

TOLERANCES (UNLESS OTHERWISE NOTED): x.x ±0.04" [x] ±1mm; x.xx ±0.02" [x.x] ±0.5mm; x.xxx ±0.01" [x.xx] ±0.25mm

SCALE: N.T.S.

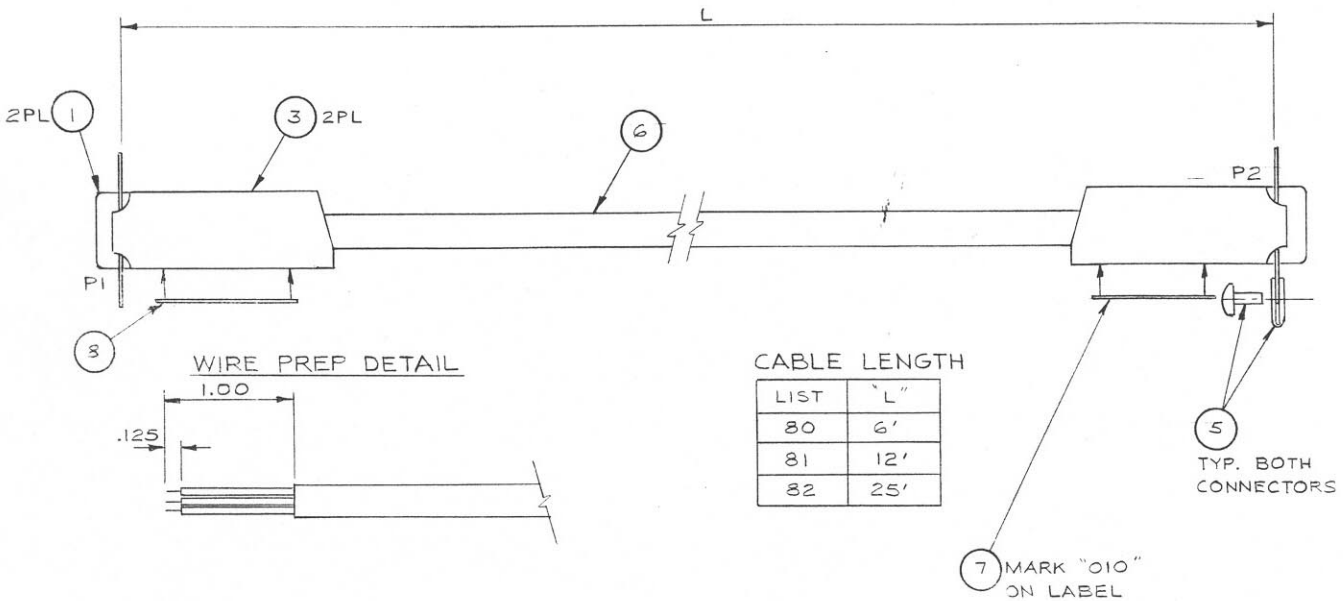
TITLE: ASSEMBLY; KIT CONNECTOR, RSM 48/100

ISSUE DATE | SHEET 5 OF 5

SIZE	TYPE	DWG NO.	REV
B	A1	037-001-04	E

REVISIONS			
LTR	DESCRIPTION	DATE	APPD
-1	PIN DESCRIPTION ADDED	96/10	

FINISHED VIEW



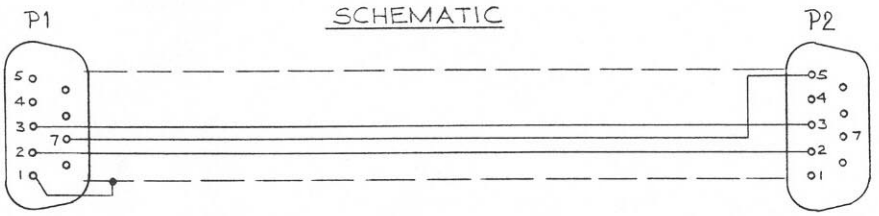
PARTS LIST: 877-010-20

WIRE PREP DETAIL

CABLE LENGTH

LIST	"L"
80	6'
81	12'
82	25'

SCHEMATIC



P2 PIN No's	SIGNAL
2	TXD
3	RXD
5	GND

LTR	DESCRIPTION	QTY
	FINISHED HOLE LEGEND	

argus TECHNOLOGIES

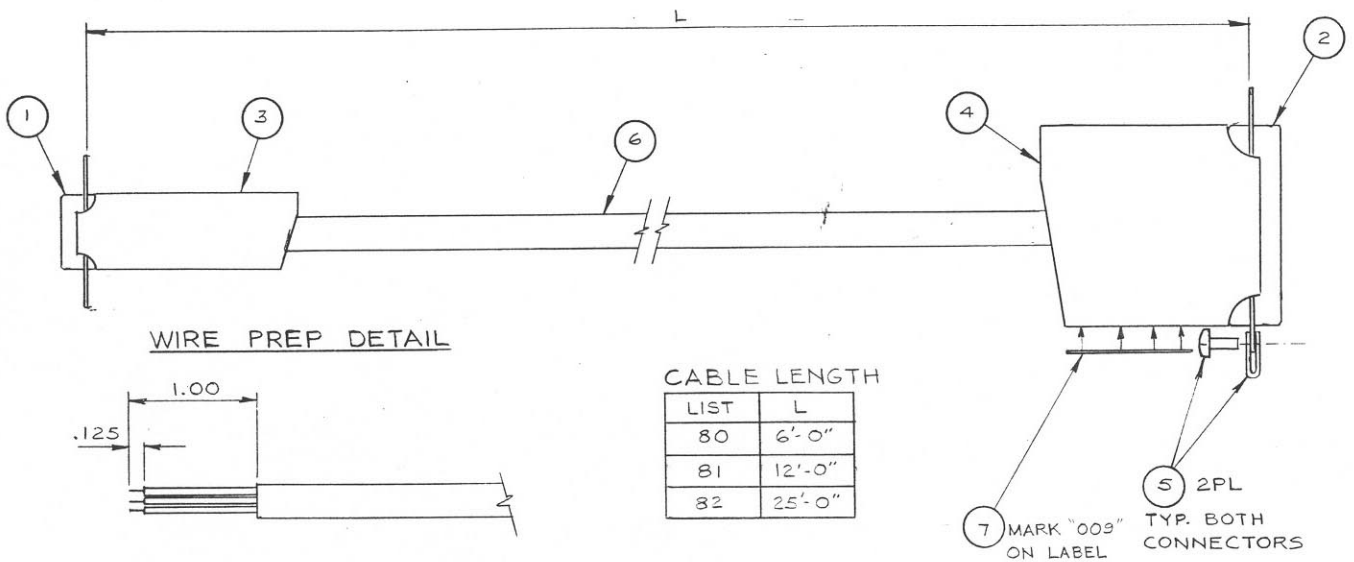
DESIGN	R.D.	92/11	MATERIAL
DRAWN	D E D	92/11	
CHECKED		92-12-01	FINISH
APPROVED		92.12.01	
TOLERANCES	+/- .032		SCALE 1 : 1

TITLE
CABLE ASSEMBLY
RS232, TERMINAL, 9-9 PIN
SCI BOARD, RSM 48/50, 24/100

ISSUE DATE	SHEET 1 OF 1	
SIZE B	DWG NO. 877-010-04	REV -1

REVISIONS			
LTR	DESCRIPTION	DATE	APPD
A	ADDED LABEL	92/11	
A1	PIN DESCRIPTION ADDED	96/10	

FINISHED VIEW



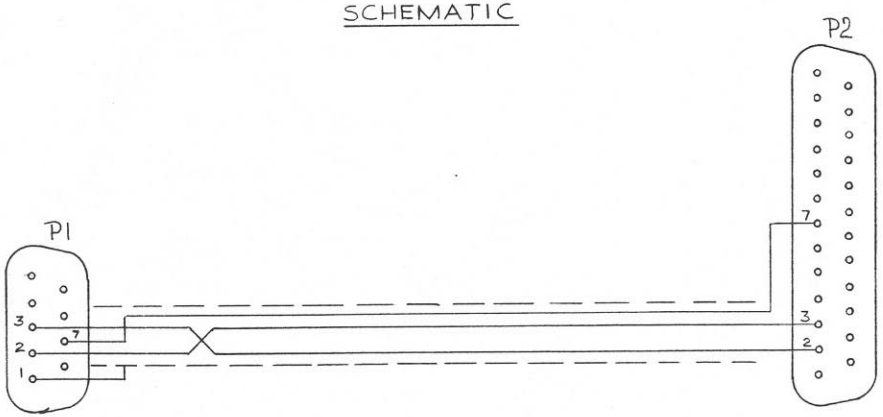
WIRE PREP DETAIL

CABLE LENGTH

LIST	L
80	6'-0"
81	12'-0"
82	25'-0"

PARTS LIST : 877-009-20

SCHEMATIC



P2 PIN No.	SIGNAL
3	TXD
2	RXD
7	GND

LTR	DESCRIPTION	QTY
	FINISHED HOLE LEGEND	

argus TECHNOLOGIES

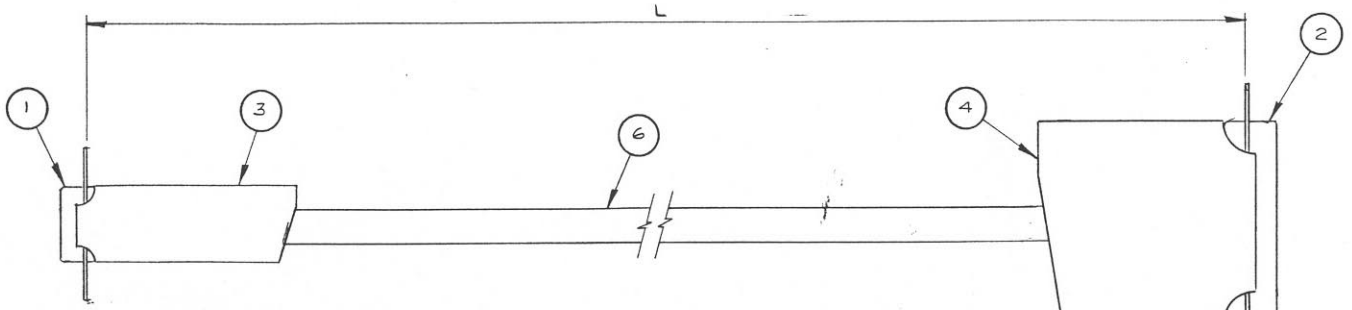
DESIGN	R.D.		MATERIAL
DRAWN	DED	92/07	
CHECKED		12-07-10	FINISH
APPROVED		91.03.07	
TOLERANCES	+/- .032		SCALE 1:1

TITLE
CABLE ASSEMBLY
RS 232, TERMINAL CABLE
SCI BOARD, RSM 48/50, 24/100

ISSUE DATE	SHEET 1 OF 1	
SIZE B	DWG NO. 877-009-04	REV A1

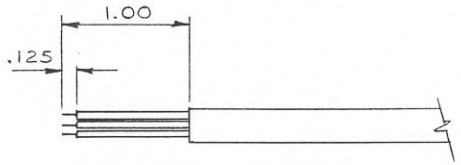
REVISIONS			
LTR	DESCRIPTION	DATE	APPD
A	ADDED LABEL & W1-3	92/11	
A1	ADDED CONNECTOR OUTLINE	96/10	

FINISHED VIEW



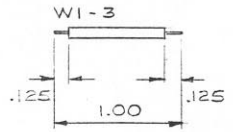
PARTS LIST : 877-006-20

WIRE PREP DETAIL



CABLE LENGTH

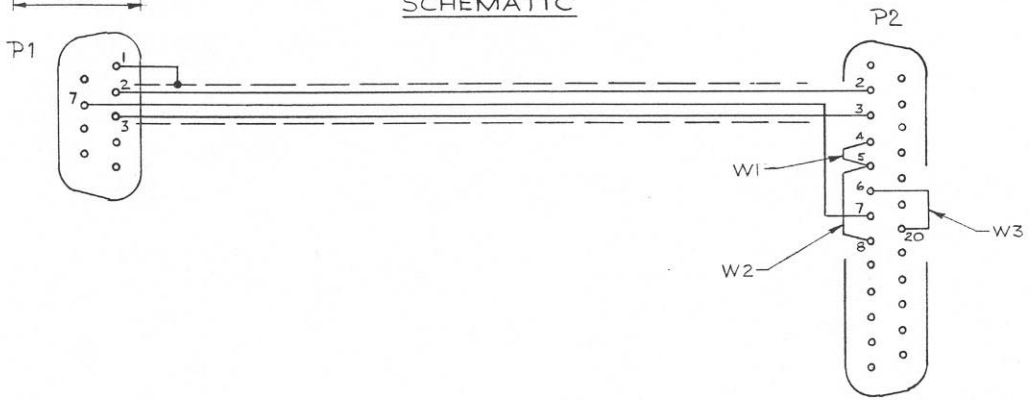
LIST	L
80	6'-0"
81	12'-0"
82	25'-0"



7 MARK "006" ON LABEL

5 2PL TYP. BOTH CONNECTORS

SCHEMATIC



P2 PIN	SIGNAL
2	TXD
3	RXD
4	RTS
5	CTS
6	DSR
7	GND
8	DCD
20	DTR

LTR	DESCRIPTION	QTY
	FINISHED HOLE LEGEND	

argus TECHNOLOGIES

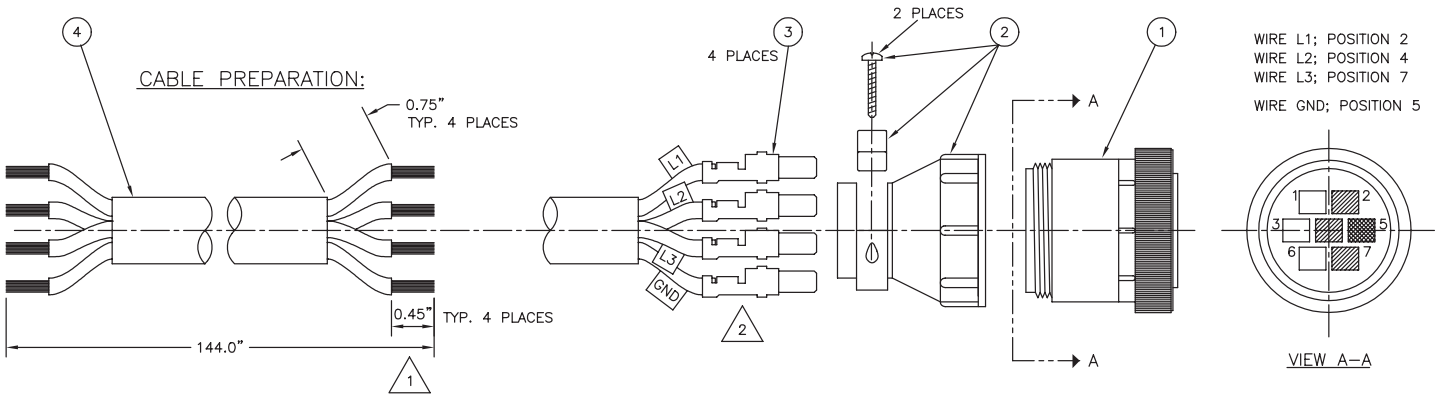
DESIGN	R.D.		MATERIAL
DRAWN	DED	92/07	
CHECKED	RD	92-07-10	FINISH
APPROVED	SD	92.08.07	IP
TOLERANCES	+/-.032		SCALE 1:1

TITLE
CABLE ASSEMBLY
RS 232, MODEM CABLE
SCI BOARD, RSM 48/50, 24/100

ISSUE DATE	SHEET 1 OF 1	
SIZE B	DWG NO. 877-006-04	REV A1

REVISIONS			
LTR	DESCRIPTION	DATE	APPD
A1	WIRE COLORS ADDED		

CONNECTOR DETAIL:



WIRE COLORS:

WIRE L1; POSITION 2	RED
WIRE L2; POSITION 4	WHITE
WIRE L3; POSITION 7	BLACK
WIRE GND; POSITION 5	GREEN or GREEN/YELLOW

VIEW A–A

NOTES:

1. STRIP CABLE AND EACH WIRE AS SHOWN.
2. FOR TERMINATING SOCKET CONTACTS (3) TO THE WIRES USE AMP CERTI–CRIMP HAND TOOL CAT. No.69710–1, INSERT DIE CAT. No. 90140–1
3. FOR REMOVING SOCKET CONTACTS (3) FROM THE PLUG (2) USE AMP EXTRACTION TOOL CAT. No. 91019–3

B O M : 877–149–20

LTR	DESCRIPTION	QTY
	FINISHED HOLE LEGEND	
A		

ARGUS® TECHNOLOGIES

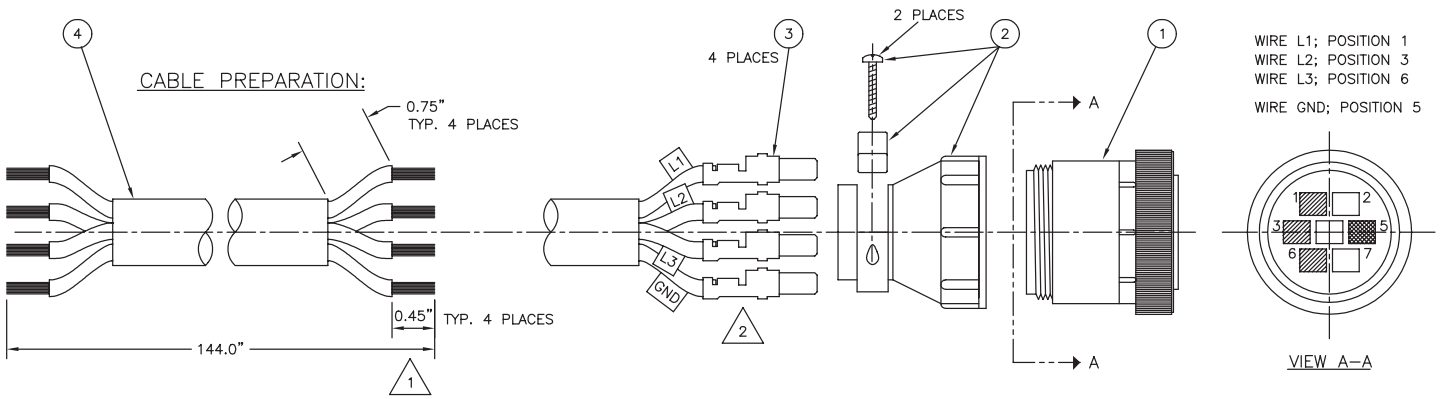
DESIGN	J.U.	96/07	MATERIAL	
DRAWN	JU/SK	97/03		
CHECKED			FINISH	PER PO
APPROVED	C.D.D.	97/03		
TOLERANCE			SCALE	N.T.S.

TITLE
ASSY., AC LINE CORD, 208–240VAC (RECTIFIER END), RSM 48/100

ISSUE DATE		SHEET 1 OF 1	
SIZE B	DWG NO. 877 – 149 – 04	TYPE A1	REV A1

REVISIONS			
LTR	DESCRIPTION	DATE	APPD
A1	WIRE COLORS ADDED	97/07	LRD
A2	PIN POSITION NO'S CORRECTED		

CONNECTOR DETAIL:



VIEW A–A

WIRE COLORS:

WIRE L1; POSITION 1	RED
WIRE L2; POSITION 3	WHITE
WIRE L3; POSITION 6	BLACK
WIRE GND; POSITION 5	GREEN or GREEN/YELLOW

NOTES:

1. STRIP CABLE AND EACH WIRE AS SHOWN.
2. FOR TERMINATING SOCKET CONTACTS (3) TO THE WIRES USE AMP CERTI–CRIMP HAND TOOL CAT. No.69710–1, INSERT DIE CAT. No. 90140–1
3. FOR REMOVING SOCKET CONTACTS (3) FROM THE PLUG (2) USE AMP EXTRACTION TOOL CAT. No. 91019–3

B O M : 877–150–20

LTR	DESCRIPTION	QTY
	FINISHED HOLE LEGEND	

ARGUS® TECHNOLOGIES

DESIGN	J.U.	96/07	MATERIAL
DRAWN	JU/SK	97/03	
CHECKED			FINISH PER PO
APPROVED	C.D.D.	97/03	
TOLERANCE			SCALE N.T.S.

TITLE
ASSY., AC LINE CORD, 380–415VAC (RECTIFIER END), RSM 48/100

ISSUE DATE		SHEET 1 OF 1	
SIZE B	DWG NO. 877 – 150 – 04	TYPE A1	REV A2

FACTORY SERVICE INFORMATION

Technical Support

Technical support staff are available for answering general questions related to installation, operation and maintenance of Argus products. In Canada and the USA, call Argus toll free 7:30 am to 5:00 pm Pacific Standard Time at:

+1-888 GO ARGUS

(+1-888-462-7487)

For emergencies, call +1-888-GO-ARGUS 24 hours a day, seven days a week.
Customers outside Canada and the USA, call +1-604-436-5547 for technical support.

Training

Argus offers various levels of product and technical training. These workshops provide a mix of theory and hands on application for qualified customers. Please consult your sales representative for course schedules, locations and costs, or visit our website at ***www.argusdcpower.com***.

Factory Repair and Servicing

All service, beyond initial adjustments, should be carried out by qualified factory service personnel. For these procedures, please contact Argus Technologies at the locations listed to the right.

Product Returns

Before returning any product for service, please obtain a Return Material Authorization (RMA) number from an Argus factory service representative. The representative will require the model and serial number, as well as a brief description of the problem prior to issuing the RMA number. All material must be pre-authorized before being returned.
See document 048-507-10 "Warranty and Repair Information" for more details.

Moving and Storage

Units must be suitably packed in the original shipping container (or equivalent) prior to re-shipping. The box should be completely enclosed and constructed of wood or double-wall, corrugated cardboard. At least 3" of foam or shock absorbing packing material must surround the unit.

Factory Service Centers

Canada and International
Argus Technologies Ltd.
ATTN: RMA Returns
7033 Antrim Avenue
Burnaby, BC, V5J 4M5 Canada
Tel: +1 604 436 5900
Fax: +1 604 436 1233
Email: returns@argusdcpower.com

USA
Argus Technologies Inc.
ATTN: RMA Returns
3116 Mercer Avenue
Bellingham, WA, 98225 USA
Tel: +1-360 756 4904
Fax: +1-360 647 0498
Email: returns-usa@argusdcpower.com

Asia-Pacific
PCM Electronics (Dong Guan) Co., Ltd.
Hongli Industrial Area, Miaobian, Liaobu Town,
Dongguan City, Guangdong Province,
523400 China
Tel: +86 755 8895 3310
Fax: +86 755 8895 3307

Authorized Service Center

Argentina
Argus Technologies de Argentina
Belen 315, Capital Federal, Buenos Aires,
1407I Argentina
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Fax: +54 (11) 4504 4698
Cell: +54 9 (11) 4993 9996
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8/376 Newbridge Rd
Moorebank, NSW, 2170 Australia
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Fax: +61 02 9822 8077

Australia/New Zealand
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Unit 3, 30 Heathcote Road
Moorebank, NSW, 2170 Australia
Tel: +61 02 9602 8331
Fax: +61 02 9602 9180

Century Yuasa
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Carole Park QLD 4300
Australian Sales & Service
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Fax: +61 07 3361 6705
New Zealand Sales & Service
Tel: +64 9 978 6689
Fax: +64 9 978 6677

Canada
Compower Systems Inc.
118 Tiffield Road
Toronto, ON, M1V 5N2 Canada
Tel: +1 416 293 3088
Fax: +1 416 293 0671

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Cartel Business Estate
Edinburgh Way
Harlow, Essex, CM20 2DU UK
Tel: +44 1279 422110
Fax: +44 1279 423355

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Col. Polanco
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Tel: +52 55 5280 6990
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