ARGUS

RSM 24/50
Modular Switched Mode Rectifier

010-510-B2

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Power

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Argus Technologies Ltd.

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RSM 24/50
Modular Switched Mode Rectifier

010-510-B2

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 24/50:** 010-510-B1 Rev A
- **Warranty Policy:** 048-507-10
- **Installation and Operation Instructions:** 010-030-C0 Rev E
- **Factory Service Information:** 048-527-10

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SPECIFICATIONS FOR ARGUS TECHNOLOGIES SWITCH MODE RECTIFIER MODEL RSM 24/50

Output:

Voltage	21 - 31 VDC (test) 25 - 30 VDC (equalize) 24 - 28.5 VDC (float)
Current	50 Amps D.C. nominal
Power	1500 Watts Continuous
Regulation	+/- 0.02% Line and load (static, zero slope) =1% deviation for 50% to 100% load step (dynamic)
Time Stability	0.2% per year
Temp. Stability	100 ppm/degree C over the operating range
Response Time	2 msec. to 0.1% of output for 50% to 100% load step
Noise	Less than 22 dBrnc (Voice Band) 10mVrms to 10MHz (Wide Band) 150mVp-p to 100MHz
EMI	The unit meets requirements of FCC Rules Part 15 Subpart J Level A.
Breaker Rating	60 Amp, 5000 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 Subpart J, Level A:

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

Input:

Voltage	184 VAC - 264 VAC (57 Hz - 63 Hz)
Current	14 Amps (240 VAC Nominal) 1800 Watts
Power Factor	0.90 Lagging (Displacement) 0-100% load Unity (Optional)
T.I.F.	Less than 200 at 100% load (current) Less than 60 at 100% load (current) with unity PF option.
Efficiency	88% minimum 50%-100% load
Hold-over time	15ms from loss of 240 VAC line
Source Impedance	5% inductive of resistive
Soft Start	approximately 10% per second
Start Delay	0-250 sec. (5 second increments)
Input transient suppresion	Meets IEEE/ANSI C62.41 Category B.
Recommended Feeder Breaker Amps / 1.73 nected of groups	1 phase systems: N x 20 Amps or next greater size (240 VAC) where N is the number of modules con- to the same breaker. Example: 3 modules - use 60A. 3 phase systems connected to N x 3 modules: N x 20 or next greater size (240 VAC) where N is the number of 3 modules. Example: 3 modules - use 35A.
Breaker Rating	20 Amp, 10,000 amp interrupting capacity at 250 VAC

Miscellaneous:

Size:	3 Module Shelf: 7.0" H x 17.0" W x 12" D (17.8cm H x 43.2cm W x 30.5cm D) 4 Module Shelf: 7.0" H x 21.3" W x 12" D (17.8cm H x 54.6cm W x 30.5cm D) Module: 6.8" H x 5.1" W x 11.2" D (17.3cm H x 13.0cm W x 28.4cm D)
Mounting:	Flush, 5" or 6" offset, 3 Module Shelf for 19" or 23" rack mounting, 4 Module Shelf for 23" rack mounting only.

Weight:	3 Module Shelf: 20 lbs (9 kg) 4 Module Shelf: 24 lbs (11 kg) Module: 17 lbs (8 kg)
Acoustic Noise	60 dBA at three feet
Control Input/Output Ratings	60VDC 0.5A

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 +70 deg C / -40 to +158 deg F (storage)
Humidity	0 to 90% (non condensing)
Elevation	-500 to +2800 metres

Recommended Wire Sizes (as per UL) (Applies to RSM-48/30 and RSM-24/50)

Single Phase Operation:

# of shelf slots connected to main input.	Minimum main input wire size (AWG)	Minimum module input wire size (AWG)
1	12	12
2	10	12
3	8	12
4	6	12

Three Phase Operation:

# of shelf slots connected to main input	Minimum main input wire size (AWG)	Minimum module input wire size (AWG)
1	10	12
2	10	12
3	10	12
4	6 (N/R)*	12 (N/R*)

For example, to connect 4 modules in one shelf to a single phase input requires two #10 AWG main inputs or one #6AWG main input.

* N/R - Not recommended. Connecting 4 equivalent loads to a three phase source in delta configuration will create an unbalanced load. It is usually more feasible to run a separate #10 AWG line directly to the 4th module.

(Specifications subject to change without notice)

Unit Description:
Applies to Manual P/N and Rev:

RSTs	010-016-B0 Rev A	**SDs**	018-007-B0 Rev D
	010-019-B0 Rev A		018-008-B0 Rev C
	010-020-B0 Rev A		018-011-B0 Rev C
	010-007-B0 Rev A		018-016-B0 Rev C
	010-013-B0 Rev B		
	010-015-B0 Rev A	**RCS**	030-527-B2 Rev P/A
	010-006-B0 Rev A		
	010-002-B0 Rev B		
	010-023-B0 Rev A		
	010-008-B0 and B2 Rev A		
RSMs	010-510-B2 Rev C		010-030-B2 Rev B
	010-525-B2 Rev P/A		010-505-B2 Rev C
	010-511-B2 Rev P/A		010-024-B2 Rev C
	010-528-B2 Rev A		010-036-B2 Rev C
	010-529-B2 Rev A		010-028-B2 Rev B
	010-522-B2 Rev B		010-034-B2 Rev B
	010-512-B2 Rev A		010-037-B2 Rev A
	010-503-B2 Rev A		010-035-B2 Rev A
	010-510-B2 Rev B		010-038-B2 Rev A
	010-029-B2 Rev B		010-039-B2 Rev A

NOTE: THIS ADDENDUM SHEET IS TO BE INSERTED IN ALL OF THE ABOVE LISTED PRODUCT MANUALS. THIS ADDENDUM REPLACES THE ADDENDUM "ADDNEW.DOC" INCLUDED WITH DOCUMENT 022-000-C1.

EXPLANATION:

The market shift from vented or "wet cell" to valve regulated lead acid (VLRA) batteries has prompted Argus to update its factory default settings to accomodate the requirements of these batteries.

The changes listed below are being implemented immediately as new factory default settings in all Argus power products. However, as always, customer requested settings will take precedent over factory defaults.

This addendum is to accompany all new Argus user manuals. Questions about the new factory default settings should be directed to our toll free ***1-888-GO ARGUS Technical Support line.***

TABLE 1-1: RSM/RST/RCS SYSTEMS (excluding RSM 48/7.5 and 24/15)

Function	12 volt systems (nom)	24 volt systems (nom)	48 volt systems (nom)
Float	13.5	27	54
Equalize	13.8	27.5	55
OVP	14.5	29	57
LVA	11	22	44
HVA	14	28	55.5

TABLE 1-2: RSM 48/7.5 and 24/15 (module) @ 25°C (77°F)

Function	24 volt systems (nom)	48 volt systems (nom)
Float	27	54

TABLE 1-3: RSM 48/7.5 and 24/15 SUPERVISORY/CONTROL MODULE

Function	24 volt systems (nom)	48 volt systems (nom)
LVD	21	42

TABLE 1-4: SUPERVISORY/CONTROL SYSTEMS (SD-02,03,04,05)

Function	12 volt systems (nom)	24 volt systems (nom)	48 volt systems (nom)
Load Out	10.5	21	42
Load In	12.5	25	50
LVA	12	24	48
HVA	14	28	55.5
HVSD	n/a	29.5	58

NOTE: THIS ADDENDUM SHEET IS TO BE INSERTED IN ALL OF THE ABOVE LISTED PRODUCT MANUALS. THIS ADDENDUM REPLACES THE ADDENDUM “ADDNEW.DOC” INCLUDED WITH DOCUMENT 022-000-C1.

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS - This manual contains important safety and operating instructions for battery charger models RSM 48/50, RSM 48/30, RSM 24/100, RSM 24/50.

1. **Caution - Do not install or remove any modules with the input breaker or output breaker in the closed position.**

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

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

4. **Do not expose charger to rain or snow.**

5. **Use of an attachment not recommended or sold by the battery charger manufacturer may result in a risk of fire, electric shock, or injury to persons.**

6. **Do not operate charger if it has received a sharp blow, been dropped, or otherwise damaged in any way; take it to a qualified service center.**

7. **Do not disassemble charger; take it to a qualified service center when service or repair is required. Incorrect reassembling may result in a risk of electrical shock or fire.**

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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.

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2.0 Documentation - Part number information

2.1 Introduction

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

This manual incorporates 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**. 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 will be in ***Bold Italic*** typeface. Items that refer to states or modes and generated messages such as found on the LCD display panel will be in **BOLD UPPERCASE** typeface.

2.2 ARGUS Numbering system

ARGUS technologies uses a eight digit drawing number system which is broken into three blocks. The first three digits describe the category of the product ie. 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 ie:

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

ARGUS Technologies uses a eight digit part numbering system for all components and sub assemblies. Each part is covered by its own unique number. Due to the quantity categories will not be listed within this manual.

3.0 General

3.1 Scope

This instruction manual covers the installation, and operation of Argus Technologies' RSM 48/100 switched mode rectifier.

3.2 Introduction

The RSM series of rectifiers employs a high frequency switched mode conversion technique to provide a fully regulated and isolated DC output from the A.C. mains. The unit provides external connections for input, output and alarm interfaces. The 48 volt rectifiers are used in a positive ground configuration only. The units are fully functional battery eliminators and therefore do not require an external battery to meet the performance requirements as outlined in the specification section of this manual.

3.3 Features

The following sections (3.3.01 through 3.3.32) will cover the various features available on the RSM 48/100 Rectifier.

3.3.01 LCD Display and Control Keys

Located on the front panel of the unit is a 2 row by 16 character LCD display. All of the unit's operating parameters, status and alarms can be viewed with this display See Figure #1 for a detail of a normal display. Normally, 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, Module Serial #

NOTE: The front panel may be powered up for up to 20 seconds after all power (input and output) is removed from the unit.

Float, equalize, soft start, current limit and test mode status designators pulsate to differentiate them from the output voltage and current readings. The serial number is displayed with normal mode, & alarm mode messages. The corporate identity is displayed only during normal operation. Please see **Figure #3** and Table #1 for the complete menu tree and display messages possible. Possible alarm messages are referenced in the minor 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 #14** when performing adjustments in order to see how the front panel message display changes when accepting input.

There are three control buttons on the front panel and are labelled with an up arrow, down arrow, and a curved arrow. The first two (***ADJUST/SCROLL***) are used to scroll thru a list of items in forward and reverse order, and the last button (***ENTER/SELECT***) is used 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** and the third button is used to switch between **FLOAT** and **EQUALIZE** modes when the display is in the **NORMAL** mode.

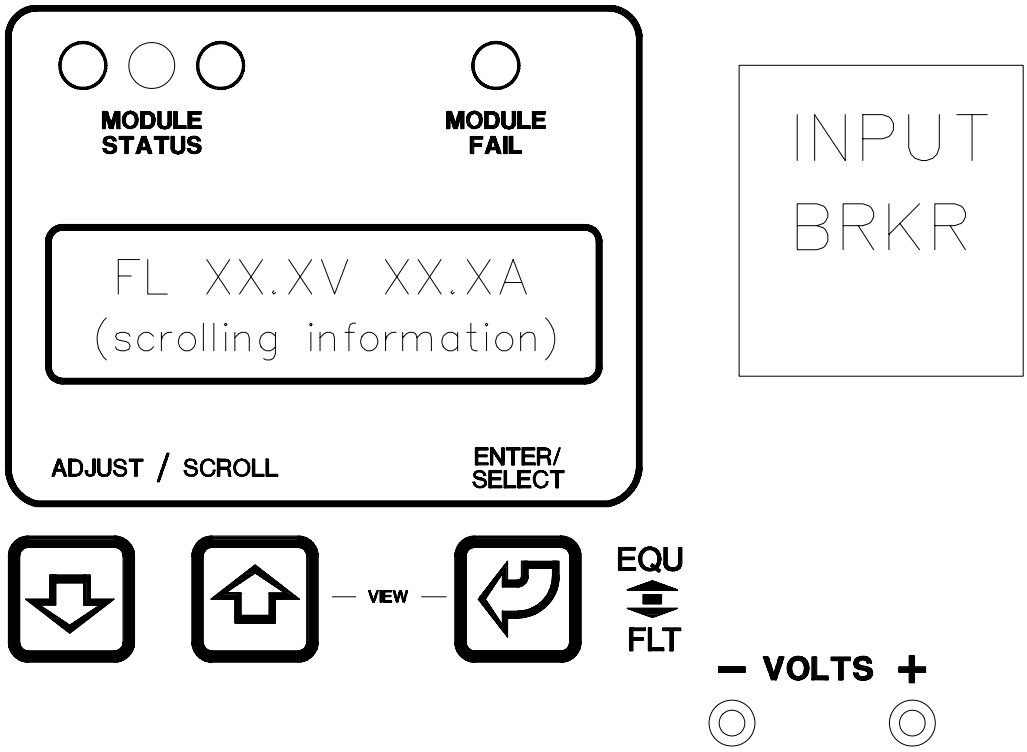

Figure 1 - Front Panel (RSM-48/30, RSM-24/50)

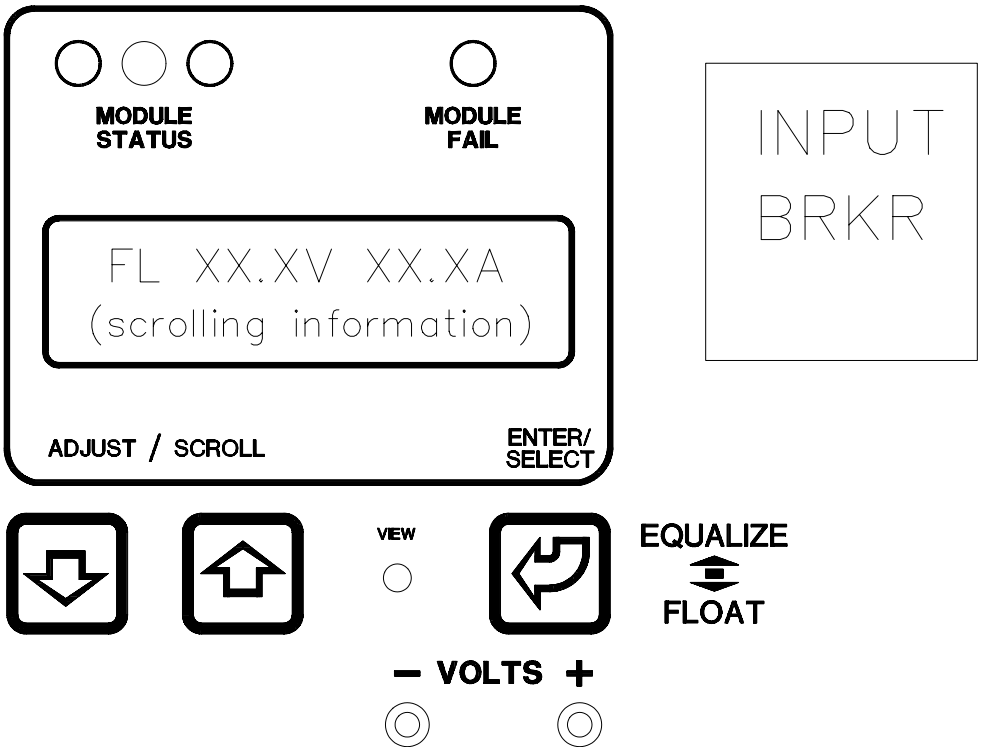

Figure 2 - Front Panel (RSM-48/50, RSM-24/100)

(NOTE: View hole may or may not be present)

RSM DISPLAY - MENU

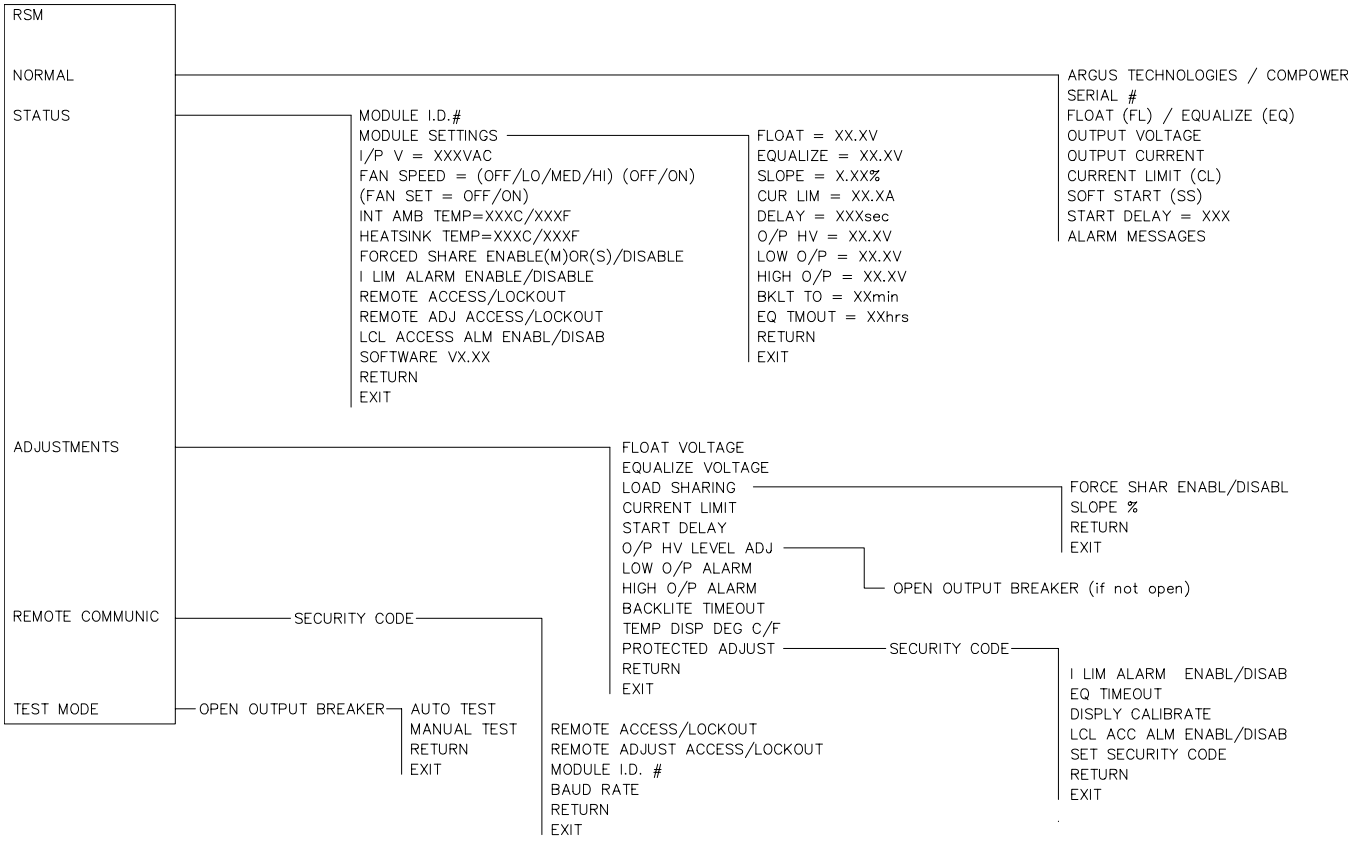

Figure 3 - Menu Tree

(NOTE: Features in parentheses may not be present on specific units)

The display is back-lit any time a control key is depressed or when the unit first starts up. The duration of back-lighting is programmed during setup. The viewing angle of the display is changed by one of two methods. If there is a small hole below the **VIEW** label, then a small screwdriver or tweaker is used to adjust the viewing angle. If there is no hole, then the viewing angle is adjusted by pressing and holding the ***ENTER/SELECT*** button, and pressing the right ***SCROLL/ADJUST*** button (labelled with an upwards arrow). The viewing angle can then be adjust by pressing either ***SCROLL/ADJUST*** button repeatedly and then pressing the ***ENTER/SELECT*** button to return to **NORMAL** mode.

Due the limited number of characters that can be displayed, abbreviated messages are used. The manual uses both abbreviated and complete condition descriptions. See Table #1 for display message abbreviations.

Possible Menu Prompts:

ADJUSTMENTS .....enter adjustments menu
ADJ^^^^ EQLIZE V .....adjust equalize voltage
ADJ^^^^ FLOAT V .....adjust float voltage
ADJ^^^^ HV SHUTDN .....adjust output high voltage alarm value
AUTO TEST .....starts auto test mode
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
EXIT .....return to regular display
*FAN SET = OFF/LOW/MED/HIGH .....display fan setting
**FAN SET = OFF/ON .....display fan setting
*FAN SPEED = OFF/LOW/MED/HIGH .....display fan speed
**FAN 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
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 LEVEL ADJ.....enter output high voltage shutdown level
***HV SD = XX.XV.....display output high voltage shutdown 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
MANUAL TEST .....starts manual test mode
MODULE ID .....enter module id# setting
MODULE ID = XX .....adjust module id #
MODULE SETTINGS .....enter module settings menu
O/P HV = XX.XV .....display output high voltage shutdown level
O/P HV LEVEL ADJ .....enter output high voltage shutdown setting
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 COMMUNIC .....enter remote communications menu
RETURN .....return to previous menu
SECURITY = —- .....enter security code for access
SECURITY CODE = —- .....adjust security code
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
REMOTE EQUALIZE
REMOTE SHUT DOWN
START DELAY = XXX
TEMP SENSE FAIL
THERMAL SHUTDOWN
***UPF TEMP

* - RSM 48/50 and RSM 24/100
** - RSM 48/30 and RSM 24/50
*** - RSM 48/50 UPF and
RSM 24/100 UPF

Table 1 - Display Messages

3.3.02 Status Mode 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 that 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.

3.3.03 Status Indicator - Module OK

When both circuit breakers are closed and no alarm conditions are present the ***Module Ok*** indicator will light. The indicator will not illuminate if a local operator is adjusting or interrogating the unit. Remote or local access of module status does not affect module status. Remote adjustments will affect the indicator.

3.3.04 Status Indicator - Alarm Condition Present

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 criteria is meet and an external voltage is present at the modules output. The indicator will not function if the micro-controller fails or is in reset. Associated with the indicator is a minor alarm contact on the equipment shelf. A minor alarm condition on any module in a shelf will cause the relay to energize.

3.3.05 Status Indicator - Micro-Controller Fail / Reset

Located in between the ***Module Status - Ok and Alarm Condition Present*** indicators is a separate ***Microcontroller Fail/Reset*** indicator to illuminate in the unlikely event that the micro-controller fails. Failure of the micro-controller to respond to a watch-dog timer triggers the alarm. The LCD will be suppressed during this mode of failure. The minor alarm contact at the shelf level will energize in the event of a micro-controller failure on one of the modules. The indicator will continue to illuminate any time the criteria is met and an external voltage is present at the module's output.

3.3.06 Module Fail Indicator

Located to the right of the status indicators is a separate ***Module Fail*** indicator. If any of the conditions defined as a module failure (see True Module Fail Alarm) occur the indicator will illuminate. The module fail relay is de-energized while the indicator is on. The indicator will continue to illuminate any time the criteria is met and an external voltage is present at the module's output.

3.3.07 Float Mode

Normal operation of the module is in the **FLOAT** mode. The module will default to this mode when A.C. power is supplied to the unit. When in the **FLOAT** mode the output voltage of the module is determined by the **FLOAT VOLTAGE** setting found in the submenu **ADJUSTMENTS**. The ***Float/Equalize*** mode control button (labelled ***Enter/Select***) manually returns the unit 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 micro-controller failure.

3.3.08 Equalize Mode

When the unit is required to equalize 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 ***Equalize*** input. Holding down the ***Float/Equalize*** mode control button for three seconds places the unit 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 submenu **ADJUSTMENTS**. **EQUALIZE** mode is indicated by illumination of the **EQ** beside the output voltage reading on the LCD display. The level is protected by fail safe circuitry in the unlikely event of micro-controller failure.

3.3.09 Test Mode

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

3.3.09.1 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 unit's alarm levels can be checked with the output breaker open without disturbing the load if powered by a battery or paralleled modules. The simulated output voltage of the unit 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 ie. **EQUALIZE**.

3.3.09.2 Auto test - units without High Output Alarm feature:

AUTO TEST automatically ramps the unit'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 hysterisis voltage (3 volts for a 48 volt system and 1.5 volts for a 24 volt system). After another 3 second hold period the alarm message disappears and resumes an upward ramp up until the high voltage shutdown circuit is activated. The message **O/P H.V. SHUTDOWN** will be displayed simultaneously with the level. This level is held for three seconds before the unit exits out to the main menu for the test mode. The H.V. shutdown does not require manual reset as it will restart automatically. **AUTO TEST** is aborted if the output breaker is closed during the process. When the mode is exited the module will return to the previous output mode ie. **FLOAT**.

3.3.09.3 Auto test - units with High Output Alarm feature:

AUTO TEST automatically ramps the unit'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 hysterisis voltage (3 volts for a 48 volt system and 1.5 volts for a 24 volt system). After another 3 second hold period the alarm message disappears and resumes an upward ramp up 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 for the high voltage alarm is reached. The lower level is the upper level minus a hysteresis voltage (1.0V for 48V systems and 0.5V for 24V systems). After another 3 second period, the alarm message disappears and starts an upward ramp until the high voltage shutdown circuit is activated. The message **O/P H.V. SHUTDOWN** will be displayed simultaneously with the level. This level is held for three seconds before the unit exits out to the main menu for the test mode. The H.V. shutdown does not require manual reset as it will restart automatically. **AUTO TEST** is aborted if the output breaker is closed during the process. When the mode is exited the module will return to the previous output mode ie. **FLOAT.**

3.3.10 Alarms

System alarms work on several levels. Specific to the shelf only is the group A.C. fail alarm. If A.C. is removed from one of the modules at the terminal block the contact will energize. Extended from each module is an individual module fail contact which is extended whenever a module enters a fail condition. The following conditions will generate a Module fail alarm:

Output High Voltage Shutdown
A.C. Mains Failure
A.C. Mains High
Input Circuit Breaker Open
Output Circuit Breaker Open
Remote Shutdown
Start Delay On
Over Temperature Shutdown
Micro-Controller Fail & Output Current 5%
Fan Fail, Thermal Foldback + O/P Current 50%
No Output Power

A minor alarm from any of the modules de-energizes (since the normal state is energized) the shelf's minor alarm contact. Visual indication of the alarms is active during all modes of operation and is displayed on the front panel LCD. A minor alarm on a module will be inhibited if there is a simultaneous module fail condition. If one module is in general fail and the other is in module, fail the alarm will be extended. The following conditions will generate a minor alarm:

Low Output Voltage
High Output Voltage
Over Temperature
Fan Fail
Test Mode
Adjust Mode
Remote Mode
Temperature Sensor Failure
UPF High Temperature

The condition will also be generated if any menu other than normal & status mode is selected. **MODULE FAIL**, **AC MAINS FAIL**, **AC MAINS HI**, **OVER TEMPERATURE**, **UPF HI TEMP, FAN FAIL** alarm discrimination circuitry is factory set. All alarms are 'real time' and therefore do not latch. The Module fail alarms are “fail safe” and therefore will extend an alarm without a source of D.C. present (ie. a battery), however, the indicators will not remain illuminated unless there is D.C. power available (ie. a battery or a second operational unit in parallel).

3.3.11 True 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 five percent of the rated output, the Module fail detection circuit is activated. The circuit momentarily ramps up the output voltage by >3 volts to determine if the Module will source current. If no increase in current is detected the Module fail alarm indicator & relay will turn on, the message **MODULE FAIL** will be displayed on the LCD panel. Newer versions of software will also display the message **NO OUTPUT POWER**. The Module will test 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.

3.3.12 Low Voltage Alarm

When the output of the Module drops to the level set by the setting found in the submenu **ADJUSTMENTS**. The minor alarm indicator & relay will turn on and the message **LOW O/P VOLTAGE** will be displayed on the LCD panel. When the output level is raised above the alarm level, the alarm and indicator will extinguish. The alarm has a fixed hysterisis of 3V for a 48V system and 1.5V for a 24V system.

3.3.13 High Voltage Alarm

When the output of the Module rises to the level set by the setting found in the submenu **ADJUSTMENTS**, the minor alarm indicator & relay will turn on and the message **HIGH O/P VOLTAGE** will be displayed on the LCD panel. When the output level is lowered below the alarm level, the alarm and indicator will extinguish. The alarm has a fixed hysterisis of 1V for 48V systems and 0.5V for 24V systems.

3.3.14 Current Limit

The current limit circuit of the RSM Module provides a primary response to output overcurrent situations. Rather than tripping the output breaker, the current limit circuit will protect the unit from overload situations. The level at which the current limit engages is set by the setting found in the submenu **ADJUSTMENTS**. When the output current reaches the preset level the output voltage will decrease thereby, limiting the output current of the unit. **CL** will be displayed by the output current on the LCD display. If the unit is driven far into current limit the output voltage may decrease to the point of a **LOW O/P VOLTAGE** alarm. The minor alarm indicator & the cabinet's relay will turn on, if the function has not been disabled under the protected adjustments sub menu. The 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 Fan Fail, the current limit level should not be adjusted. The current limit level can not be adjusted upwards from its previous setting and can not be increased above the level set by the module during a fan fail. The module will automatically return to the last current limit setting after the fan failure has been corrected. If the current limit level is adjusted during a fan failure, the unit will reset to the new setting after the fan failure has been corrected. This feature is implemented on all RSM-48/50, RSM-24/100, RSM-48/30, and RSM-24/50 modules with software version 2.30 or later.

3.3.15 Over Voltage Shutdown

The over voltage protection feature electronically shuts down the Module when a high voltage condition on the output of the Module is identified. The minor alarm indicator Module fail indicator, & relays will turn on, the message **O/P HIGH VOLTAGE SHUTDOWN**, & **MODULE FAIL** will be displayed on the LCD panel. The level of the high voltage shutdown condition is set by the setting found in the submenu **ADJUSTMENTS**. This feature provides protection to the load from a over voltage condition from the power source. The over voltage shutdown feature of the RSM is selective and operates at 5% higher voltage in a less than 5% load condition. This provides the ability to isolate and shutdown a malfunctioning unit amongst a group of units operating in parallel. The level cannot be adjusted to a voltage less than 0 volts to 0.5 volts above the highest of the float or equalize voltage settings. The level is protected by fail safe circuitry in the unlikely event of microcontroller failure.

3.3.16 Remote Equalize

When the external positive or negative polarity (with respect to the remote common termination) D.C. signal is applied to the remote **EQUALIZE** input of the shelf all modules will enter the **EQUALIZE** mode. The response to the external signal will be the same as if the front panel ***Float/Equalize*** mode selection button was depressed. 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.

3.3.17 Remote Shutdown

When a signal is applied, the unit “electronically” shuts down (breakers are not tripped). To the outside world the units appears as if the output breaker was turned off. All the appropriate trouble alarms would be extended, such as Module fail. Removal of the signal will return the Module to the condition prior to signal application. The feature requires the same type of input that is used for remote **EQUALIZE**. Remote shutdown via this hardware method cannot be disabled locally. The control can be used to reset the unit after a High o/p shutdown condition. The message **REMOTE SHUTDOWN** will be displayed on the LCD display.

3.3.18 Automatic High Voltage Shutdown Restart

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

3.3.19 Start Delay

The units are equipped with a delay timer in order to stagger start a series of modules to prevent excessive loading of the standby generators in remote sites upon start up. The timer delays the A.C. start of the Module depending on the values programmed for start delay. Delay times from 0 - 250 seconds (in 5 second increments) are available. Even in the zero position a one second delay is introduced to allow for charging of the capacitors prior to initiation of the soft start. Delay will be initiated upon application of A.C.. 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 submenu **ADJUSTMENTS**. When active the message **DELAY START** and the time remaining will be displayed on the LCD panel.

There is no delay when the unit 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 by toggling the remote shutdown control signal.

3.3.20 Soft Start

To eliminate an instantaneous demand on the a supply upon application of A.C. power, the units employ a soft start feature. This feature is sometimes referred to a “current walk-in”. The output of the Module is gradually ramped up from zero amps to the load requirement (110% max). This ramping is accomplished by current limiting the output . The circuit ramps at a rate of 8 - 12% per second. **SS** will be displayed by the output current on the LCD display during the condition.

3.3.21 Slope or Forced Paralleling

RSM Modules use “output slope” or “forced” paralleling to accomplish load sharing. Forced sharing is selected in the submenu **ADJUSTMENTS**. Forced sharing automatically parallels modules in a shelf via a voting scheme between the modules.

When the Modules are run in parallel with a non RSM unit, slope paralleling is best suited. In slope adjust method it is necessary to adjust the units to track to each other or share the load over the output current range of the units. Output slope adjustment alters the regulation curve of the Module. The output slope is set by the setting found in the submenu **ADJUSTMENTS** which adjusts the regulation of the Module beyond its preset factory setting of 0.1% The level is protected by fail safe circuitry in the unlikely event of micro-controller failure.

3.3.22 Input / Output Circuit Breakers

Every unit is equipped with thermal-magnetic input circuit breaker and a magnetic output circuit breaker. Excessive current passing through the breaker will result in the breaker releasing to the tripped (reset) position. The breakers must be manually reset to turn the unit back on. Both breakers allow the operator to isolate the unit from either the input or output.

3.3.23 A.C. High / Low Voltage Shutdown

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

3.3.24 Demand Based Forced Cooling

Cooling of the unit is achieved via front to back forced cooling. Cool air is drawn in via the grill in the front of the unit. The airflow is directed towards the rear of the unit and over the heat sinks. The fan speed is based on the internal ambient temperature and the output load of the unit. The speed control decision is made every five seconds to minimize oscillations of the fan speed.

In the event that the fan fails, the current limit setting 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 50% of maximum rated current.

Micro-controller failure will cause the fan to go to high speed in the RSM-48/50 and RSM-24/100, and to turn on in the RSM-48/30 and RSM-24/50. Fan operation is inhibited below -20 degrees Celsius.

3.3.25 Battery Eliminator Operation

The unit maintains all specifications with or without a battery attached to the output. However if a battery or another unit operating in parallel is not present the alarms will not be illuminated if the A.C. power is removed. A minimum 5% load is required to avoid the rectifier fail alarm.

3.3.26 Remote or Local Sensing

The Module will regulate to a remote point when remote sense leads are connected to the “remote sense” input. If the remote sense leads are not attached the units will automatically revert to internal sensing. The internal sense point is at the output terminals.

3.3.27 Micro-controller Reset

In the unlikely event of a software glitch and the unit will not respond to local or remote action, the unit is equipped with a hardware reset. A reset signal will be sent to the micro-controller by simultaneously holding down the ***Enter/Select*** key and turning the unit's A.C. 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 A.C. mains must be within limits to generate a reset pulse.

For the RSM 48/50 UPF and RSM 24/100 UPF series, one must reset the micro-controller by opening the AC input circuit breaker, waiting 20 seconds, and then pressing the ***Enter/Select*** key and turning the input breaker back on.

3.3.28 Output Voltage Test Points

Each module is equipped with test jacks to monitor the unit's output. The jacks are protected against direct short circuit condition. Voltage is measured before the unit's output breaker.

3.3.29 Remote monitoring

All local controls and parameters are accessible via the Serial Communications Interface (optional). Operators may monitor all of the units settings, alarm conditions and status via a modem. Please see the Remote Access section for the terminal screens and technical parameters.

3.3.30 A.C. Inrush / Transient Suppression

The units' inrush current is limited to the nominal line current to prevent surges on the a line. Every modules' input provides lightning and transient protection in accordance to IEEE standard 587 Class B.

3.3.31 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 approach enables retention of user level programming during periods of inactivity such as transportion of the modules. Levels may also be preset at a central service area before shipment to the field.

3.3.32 Over Temperature Alarm

An over temperature alarm is generated when the unit is driven into current limit by a non-load related condition. The basis for this function is the hardware control circuit that limits the unit's output current based on abnormally high temperature at the unit's heatsink. The units go into current limit due to this condition. This occurs when the heatsink temperature reaches 100 degrees Celsius.

3.3.33 Over Temperature Shutdown

Unlike the over temperature alarm which gradually reduces output current due to a high temperature, this function shuts down the module due to a high internal ambient temperature. Abnormally high ambient temperatures (above 70 degrees Celsius) can reduce the life of or damage the unit. This control is equipped with hysteresis. When the ambient temperature has cooled by approximately ten degrees the unit will resume normal operation. The fan will not operate during the shutdown condition.

The temperature sensor is constantly monitored to establish reliable operation. If an unrealistic temperature is measured it is assumed that the sensor has failed. Sensor failure is indicated by the alarm message on the front panel display. The fan is set to the high speed setting.

3.3.34 UPF Heatsink Over Temperature Alarm

In the RSM 48/50 UPF and RSM 24/100 UPF series, the unity power factor circuit is protected from thermal runaway by a hardware circuit that folds back the output current about 50% in very abnormal circumstances. The front panel will display the message **UPF HI TEMP** to indicate this abnormal condition.

4.0 INSTALLATION INSTRUCTIONS

4.1 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
- 4 1/2 Digit Digital Voltmeter
- Adjustable resistive load 24/48 volts

4.2 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 transportion. Packaging assemblies and methods are tested to National Safe Transit Association standards.

Prior to uncrating of the Module or shelf, (individual Module or part of power plant) note any damage to the shipping container. Uncrate the unit and inspect the exterior. If any damage is observed, contact the carrier immediately.

Continue the inspection for any internal damage. In the unlikely event of internal damage please inform the carrier and contact Argus Technologies for advice on the impact of any damage.

4.3 Preparation/Mounting

The unit must be mounted in a clean and dry environment. Sufficient access to an uninterrupted air source must also be allowed for in front of the unit. Allow at least 4 inches of free space behind the unit if two shelves are stacked directly on top of each other or 6 inches if three shelves are stacked directly on top of each other for ease of access and airflow.

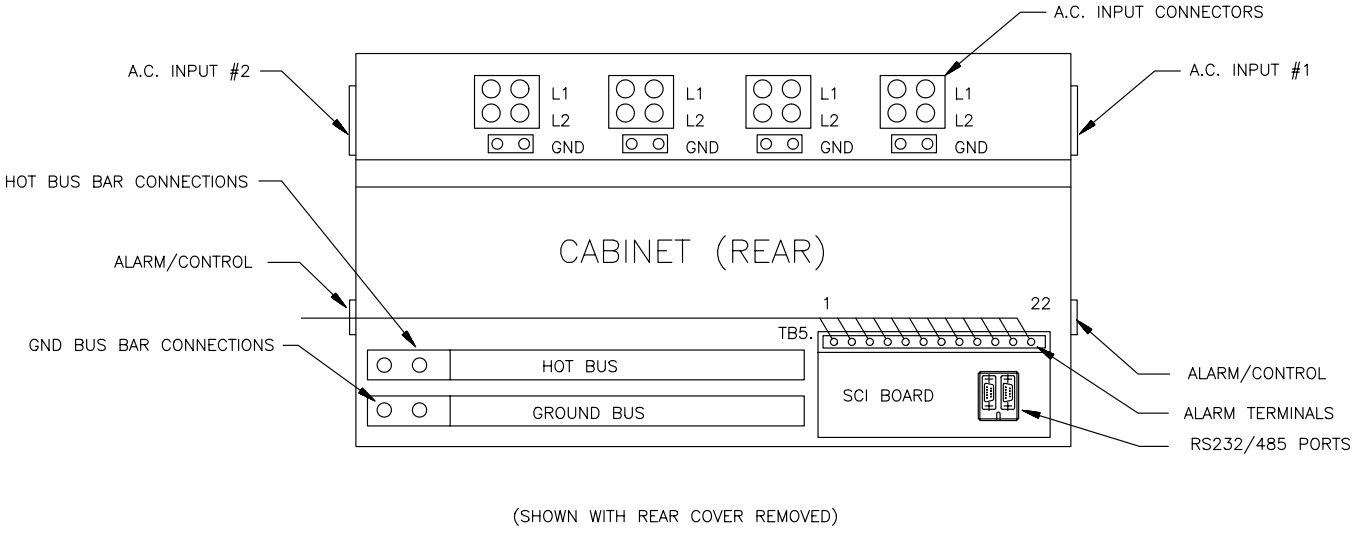

Figure 4 - Outline (4 Module Shelf, RSM 48/50 & 24/100)

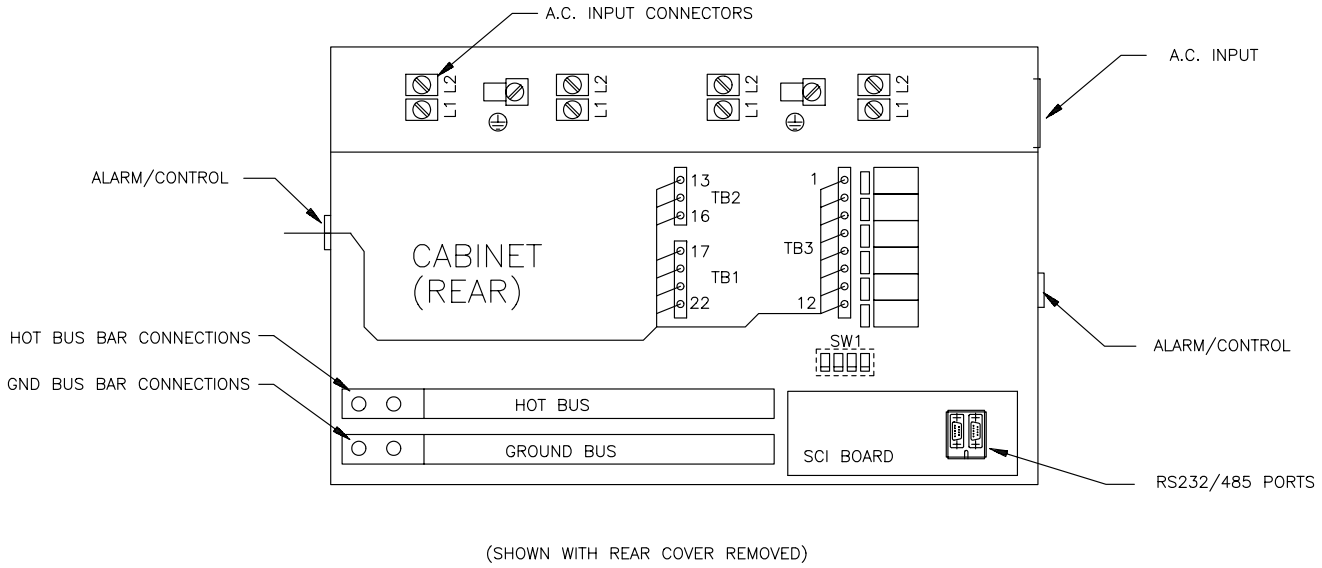

Figure 5 - Outline (4 Module Shelf, RSM 48/30 & 24/50)

RSM-48/50 and RSM-24/100 Cabinets: The unit should be mounted to the rack using four #12 -24 x 1/2" screws in each bracket. RSM-48/30 and RSM-24/50 Cabinets: The unit should be mounted to the rack using two #12 - 24 X 1/2" screws in each bracket. A captive type of drive such as Philips head is preferred to eliminate the possibility of slippage and scratching of the units exterior.

4.3.1 3 Module Shelf

The 3 Module shelves have been designed for mounting in a 19" or 23" EIA standard relay rack. Mounting brackets are universal on this shelf for 1" or 1-3/4" spacing plus reversible for 19" or 23" mounting configurations. These shelves are shipped from the factory arranged for 19" centre mounting. To adapt to 23" mounting, remove the three attaching screws, then flip the brackets so that the large flange is against the shelf chassis, re-attach with mounting screws. For flush mounting attach the brackets to the cabinet via the mounting holes located near the front of the cabinet.

4.3.2 4 Module Shelf

The 4 Module RSM-48/50 and RSM-24/100 shelves are not adjustable and must be ordered for centre or flush mounting from the factory. The 4 Module RSM-48/30 and RSM-24/50 shelves can be configured for flush mount or center mount (5" or 6" offset).

4.4 Input Connections

Grounding Instructions: This Module should be connected to a grounded, metal, permanent wiring system; an equipment grounding conductor should be run with circuit conductors and connected to equipment grounding terminal(s) of the shelf. Connections to the shelf should comply with all local codes and ordinances.

4.4.1 Feeder Protection / Sizing

Each module should have a dedicated protection breaker if possible. If it is preferred that the input breaker of the Module trips before the feeder protection breaker, the feeder breaker should have the next highest rating from the Module's A.C. input breaker. The size of the feeder breaker will be dependent on whether it is a single phase or three phase source. See specifications for recommended feeder protection.

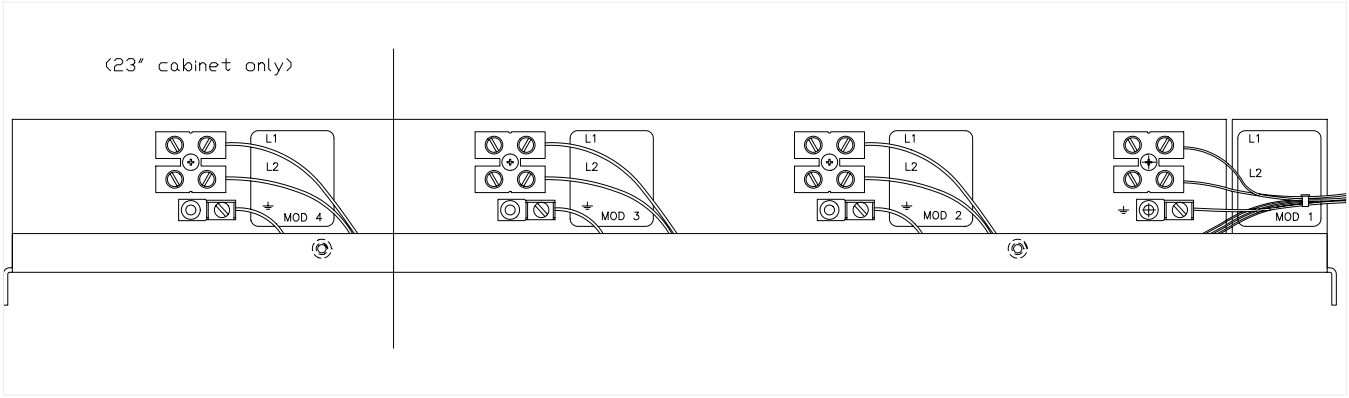

Figure 6 - Shelf Connections (RSM-48/50 & 24/100 Shelf)

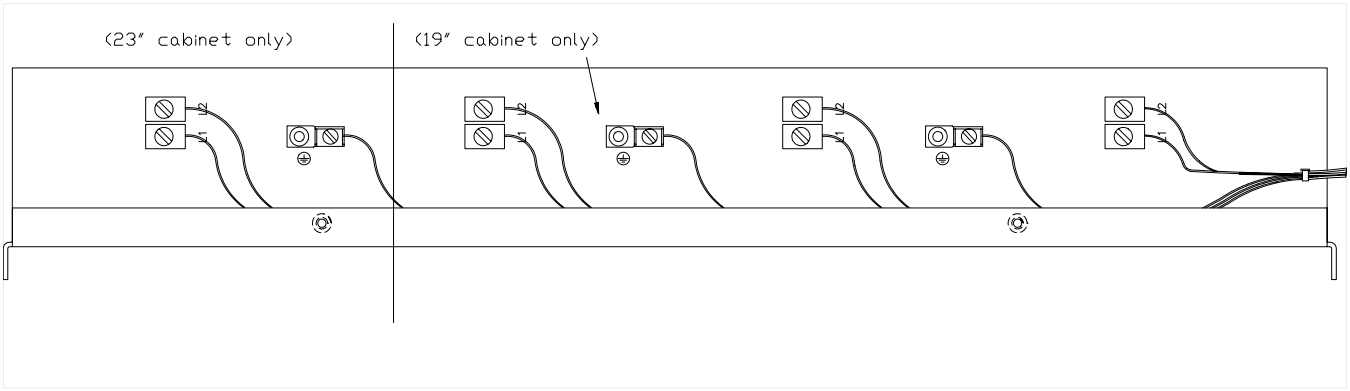

Figure 7 - Shelf Connections (RSM-48/30 & 24/50 Shelf)

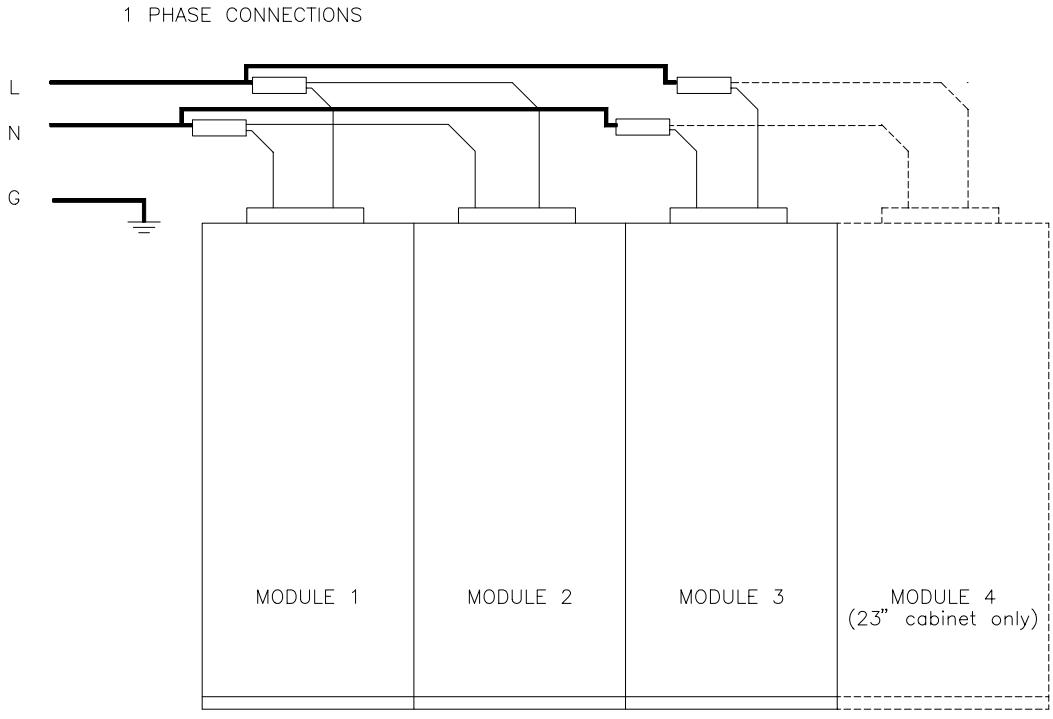

Figure 8 - 1 Phase Hookup

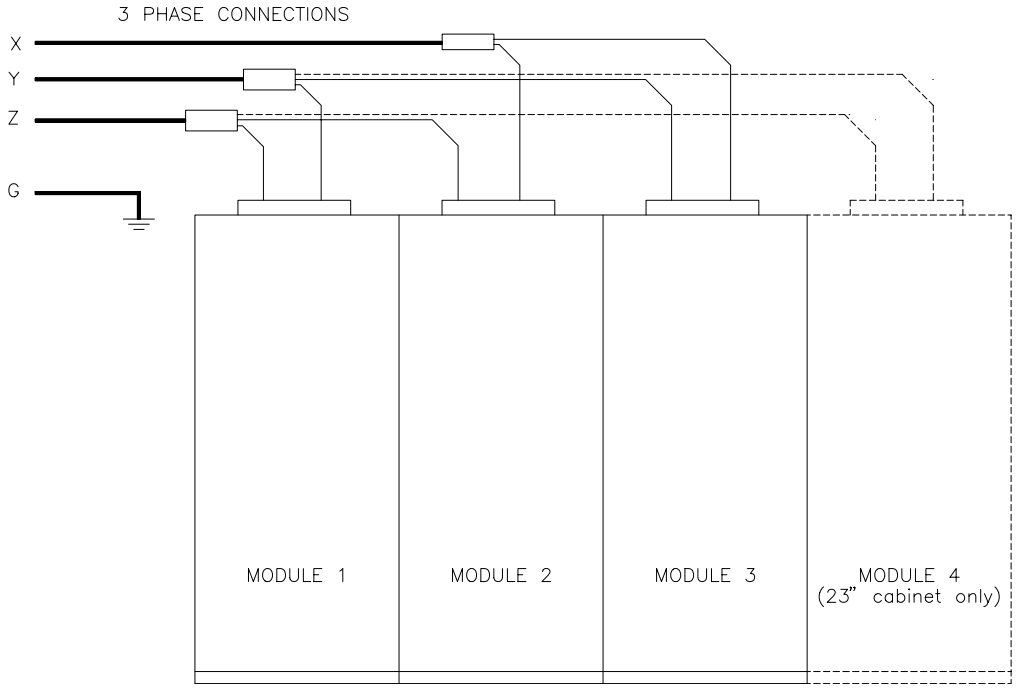

Figure 9 - 3 Phase Hookup

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

4.4.2 A.C. Connections

Confirm the operating voltage before proceeding.

WARNING: Ensure that the input and output breakers are in the "off" position prior to any work being performed on the A.C. or D.C. connections. :WARNING

Remove the rear cover via the two captive slotted fasteners. Note the connection legend affixed to the bus bar insulating cover. Input wires can be routed through the access holes located on either side of the shelf.

Refer to the connection drawing in Figure #6 or Figure #7 to determine the location of the AC input connections.

Standard AC cable knock outs for the 3 Module and 4 Module RSM 48/30 & 24/50 shelves are:
- Left Side - 1" conduit
- Right Side - no provision for AC cable

Standard AC cable knock outs for the 3 Module RSM 48/50 & 24/100 shelves are:
- Left Side - no standard conduit size (must order appropriate accessory)
- Right Side - Blank Plate

Standard AC cable knock outs for the 4 Module RSM 48/50 & 24/100 shelves are:
- Left Side - 1-1/2" knock out
- Right Side - Blank Plate

Accessories for alternate conduit sizes are available for each cabinet.

3 Module RSM 48/50 & 24/100 shelf accesories:
- 3 x 1/2" knock out plate
- 1 x 3/4" knock out plate
- 1 x 1" knock out plate

4 Module RSM 48/50 & 24/100 shelf accesories:
- 1 x 1" knock out plate
- 1 x 1-1/4" knock out plate
- 7 x 1/2" knock out Junction Box

3 or 4 Module RSM 48/30 & 24/50 shelf accesories:
- 1 x 1/2" knock out plate

We recommend completely wiring all module positions at this time. Modules can be connected to individual feeders or with a single feed (3 phase or 1 phase) which is than branched to each module terminal block using an appropriate in-line wire connector such as a split bolt or swage splice. If the modules are to be connected to a 1 phase feeder they should be connected as shown in Figure #8 . If the modules are to be connected to a 3 phase feeder they should be connected in a DELTA configuration as shown in Figure #9 . When using a 3 phase feeder, 3 connected modules are recommended to give a balanced load; a 4th module can be added but it will cause a load imbalance depending on the current drawn. It is recommended to use individual feeds and feeder breakers if possible for optimum reliability. The 3 x 1/2" knock out plate and the 7 x 1/2" knock out junction box facilitates the installation of individual feeds. Use of a flexible conduit for the feeder wires is recommended.

If a cable knock out plate is used, re-attach it to the shelf chassis using the two Philips head screws provided.

WARNING: D.C. power may be present across the output terminals from a connected battery or parallel unit even if the output breaker is open. :WARNING

4.5 Output Connections

4.5.1 Alarm And Control Connections

See Figure #10 or Figure #11 for the location of the output terminals and interface board terminals.

WARNING: Observe the correct polarity of output cable and sense lines connections when terminating. :WARNING

WARNING: Do not install modules until all external connections are made. :WARNING

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.

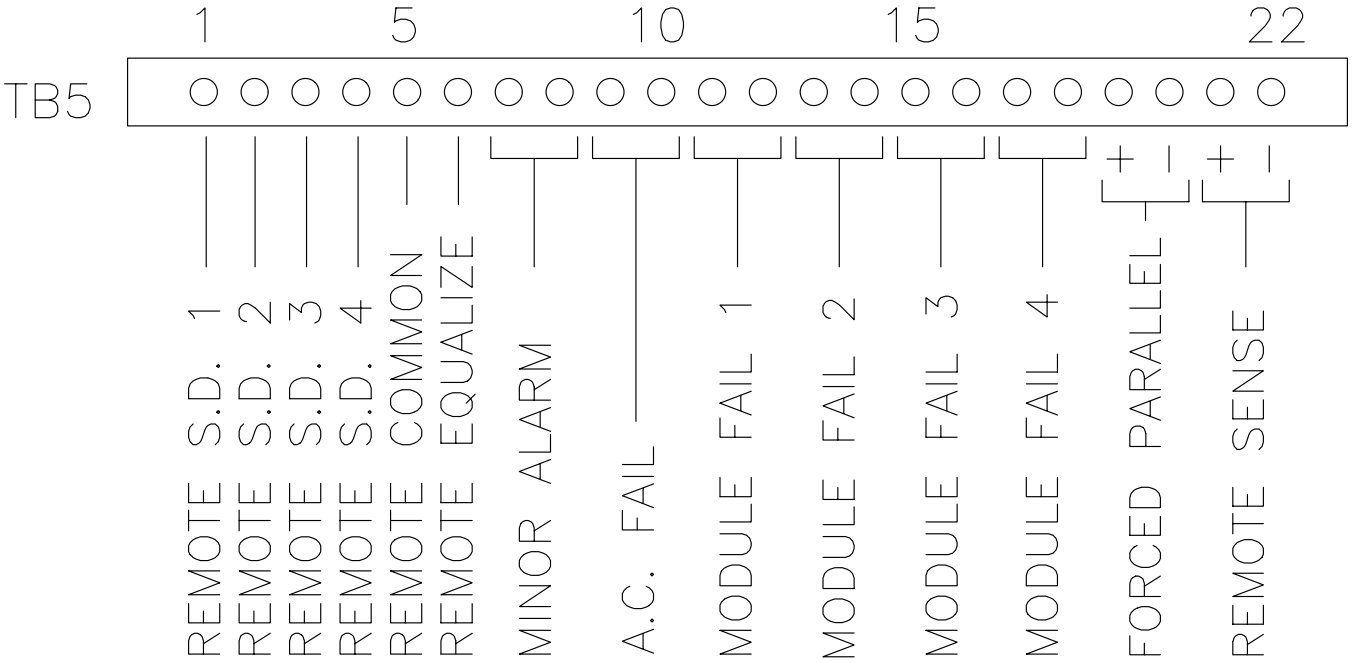

Figure 10 - Alarm/Control Connections (RSM 48/50 & 24/100)

Alarm	Terminal #	Type	Jumper Setting
Minor Alarm	TB5-7	COM	
	TB5-8	NO	P26 (2-3)
	TB5-8	NC	P26 (1-2)
A.C. Fail	TB5-9	COM	
	TB5-10	NO	P25 (2-3)
	TB5-10	NC	P25 (1-2)
Module Fail 1	TB5-11	COM	
	TB5-12	NO	P21 (2-3)
	TB5-12	NC	P21 (1-2)
Module Fail 2	TB5-13	COM	
	TB5-14	NO	P22 (2-3)
	TB5-14	NC	P22 (1-2)
Module Fail 3	TB5-15	COM	
	TB5-16	NO	P23 (2-3)
	TB5-16	NC	P23 (1-2)
Module Fail 4	TB5-17	COM	
	TB5-18	NO	P24 (2-3)
	TB5-18	NC	P24 (1-2)

Table 2 - TB5 Connections & Jumpers (RSM 48/50 & 24/100)

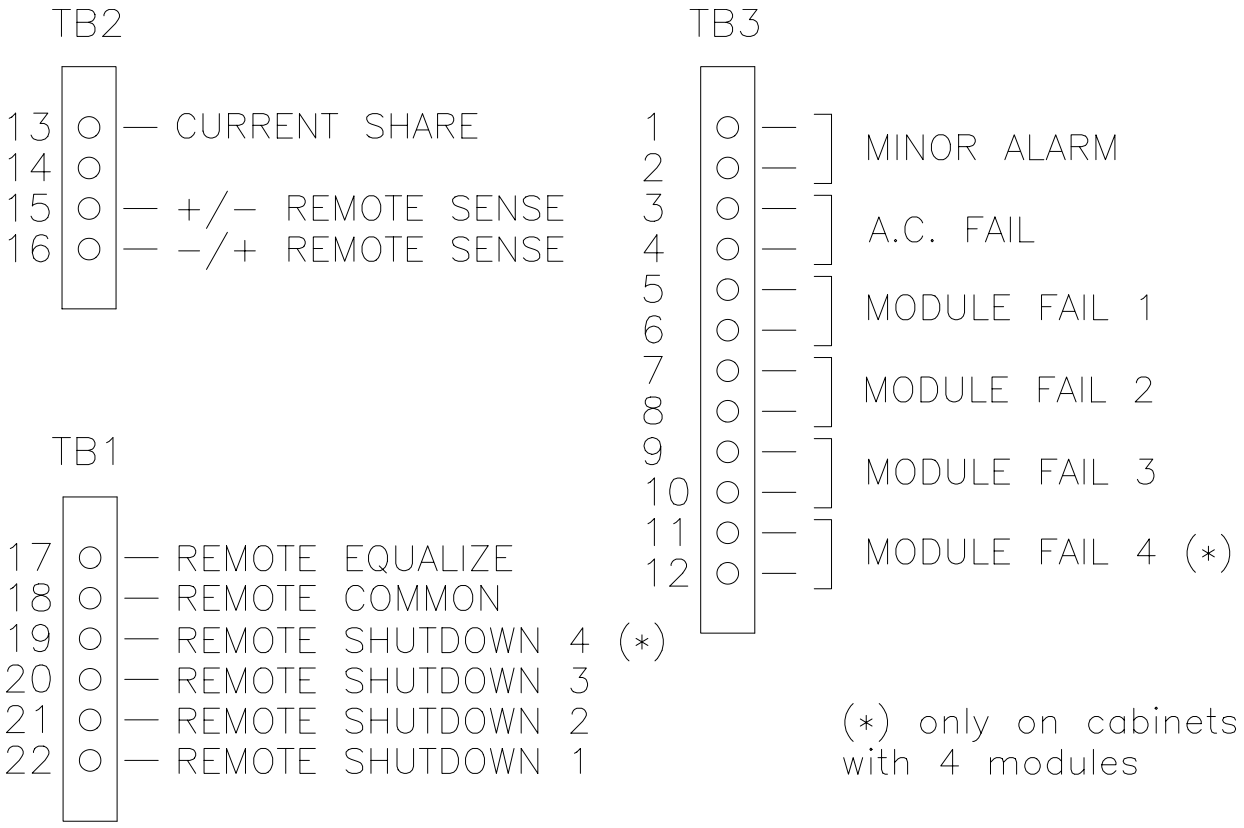

Figure 11 - Alarm/Control Connections (RSM 48/30 & 24/50)

Alarm	Terminal #	Type	Jumper Setting
Minor Alarm	TB3-1	COM	
	TB3-2	NO	P21 (1-2)
	TB3-2	NC	P21 (2-3)
A.C. Fail	TB3-3	COM	
	TB3-4	NO	P22 (1-2)
	TB3-4	NC	P22 (2-3)
Module Fail 1	TB3-5	COM	
	TB3-6	NO	P23 (1-2)
	TB3-6	NC	P23 (2-3)
Module Fail 2	TB3-7	COM	
	TB3-8	NO	P24 (1-2)
	TB3-8	NC	P24 (2-3)
Module Fail 3	TB3-9	COM	
	TB3-10	NO	P25 (1-2)
	TB3-10	NC	P25 (2-3)
Module Fail 4	TB3-11	COM	
(only on cabinets	TB3-12	NO	P26 (1-2)
with 4 modules)	TB3-12	NC	P26 (2-3)

Table 3 - TB1, TB2, TB3 Connections & Jumpers (5KW & 7KW)

If the remote sense leads are not attached the unit will automatically revert to internal sensing. The internal sense point is at the output terminals of the cabinet. The sense leads should be twisted together prior to minimize noise pickup.

Control & alarm wires should be bundled and routed through the clips provided.

Secure the control, sense and alarm cables in the cable clips. Insert each wire into the appropriate terminal on the termination block and tighten. See Figure #10 or Figure #11 . The control and alarm connections may exit either side of the cabinet.

The ***AC Fail***, ***Minor Alarm***, and ***Module Fail 1-4*** terminals are connected to relay contacts on the interface board. The relay contacts can be individually set to be normally open (NO) or normally closed by configuring jumpers P21 through P26. The jumpers are located directly beneath terminal block TB5 on the RSM 48/50 & 24/100 and beside terminal block TB3 on the RSM 48/30 & 24/50. Refer to Table #2 or Table #3 for the required settings. Please note that the Module Fail relays are normally 'energized' and the Minor Alarm & AC Fail relays are normally 'de-energized' when the unit is powered up. This means that the contact states will be complementary to the 'normal' states when the unit is not powered up.

The ***Remote Common*** terminal on the interface board is connected to the hot bus at the factory. Thus if any of the four ***Remote Shut Down*** lines are connected to the ground bus (such as the chassis) then the corresponding module will be shut down. This connection to the hot bus should be removed if an external remote common is desired to activate remote functions. Assure that the wire is completely removed.

The ***Remote Equalize*** should be connected between cabinets. When ***Remote Equalize*** is connected to the ground bus, it will put all units into Equalize mode.

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 cabinets are used, the sense lines should be connected from EACH cabinet to the sense point.

The ***+Forced Parallel*** and ***-Forced Parallel*** lines on the RSM 48/50 & 24/100 are used when multiple cabinets are present and and forced paralleling is desired and should be connected in parallel between the cabinets. The RSM 48/30 & 24/50 have a single ***CURRENT SHARE*** line which works the same way.

4.5.2 D.C. Output Connections

D.C. output wire must be UL approved File # B64801, XHHW or RHH/RHW (Canadian users; RW90 Type). Control and sense wires must be UL approved Style 1015 (Canadian users; TEW type). For ease of cable manipulation, the output cover plate can be removed until the end of this sequence. Feed the cable assembly through the notch in the cabinet.

The output terminals are 3/8" studs with nuts and washers on 1" centers.

Crimp on the appropriate lugs to the two output cables. Secure the output cables to the output post of the same polarity. Install the washers and nuts on top of the lugs in the same order in which they were shipped from the factory. Refer to Figure #12 .

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

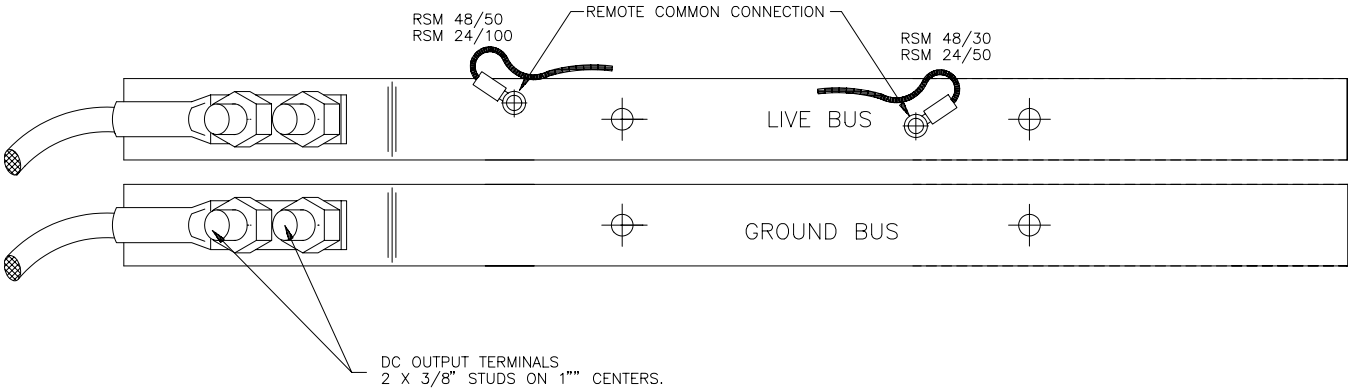

Figure 12 - DC Output Connections

WARNING: Over tightening of the post nuts may result in damage to the unit. :WARNING

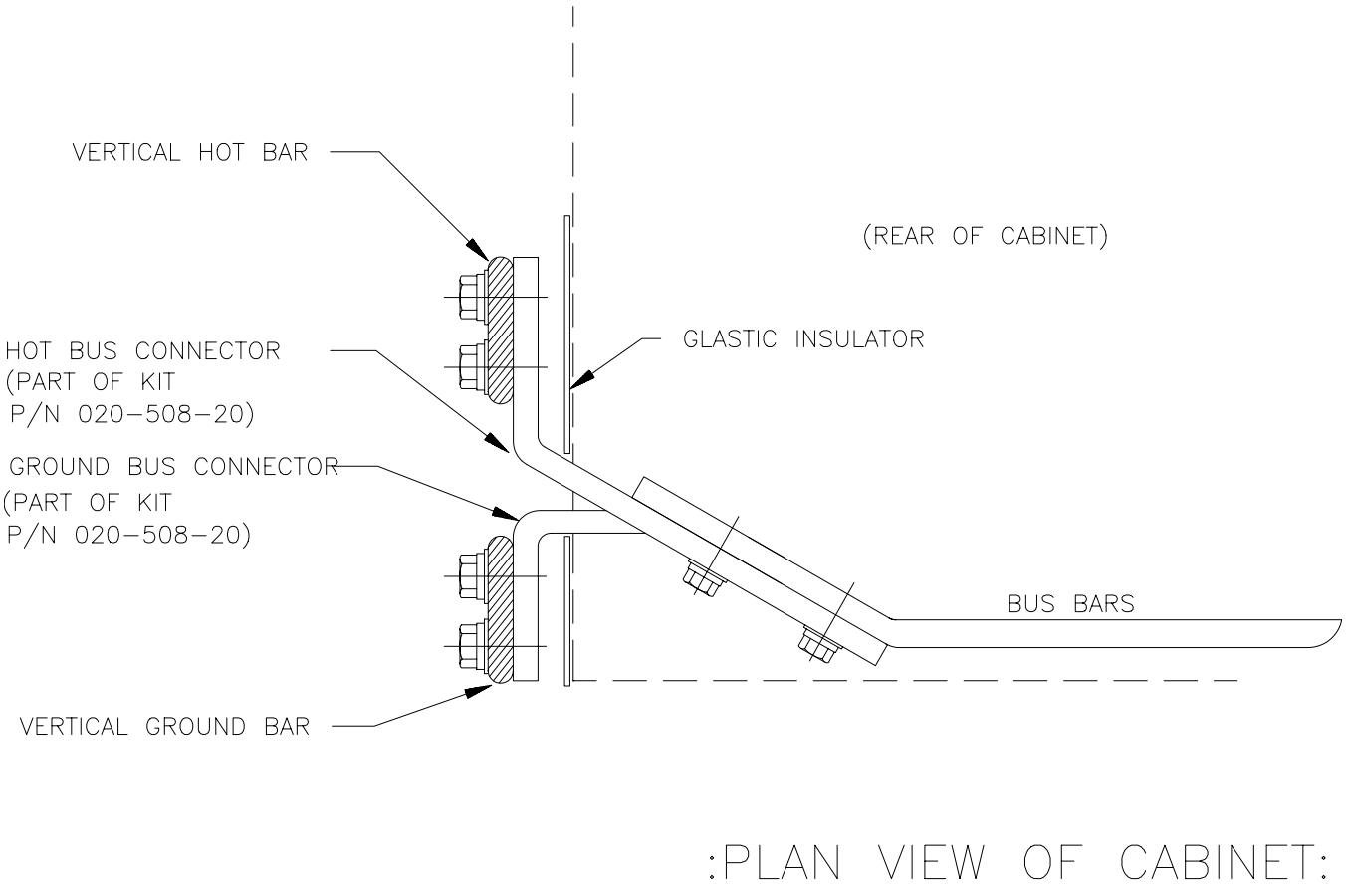

Figure 13 - Vertical Bus Bar Adaptor (RSM 48/50 & 24/100)

4.5.3 Output Bus Bars

For high current applications (above 200 Amps) the output can be connected directly to 1/4" x 2" vertical charge bus bars with a bus bar adaptor kit (Argus P/N 020-508-20). Install the bus bar adaptors per Figure #13 .

WARNING: Use the bolts and washers supplied with the adaptors to secure them to the vertical charge bus bars. The bolts must not protrude past the back of the adaptors such that they are pressing against the cabinet surface. :WARNING

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

Close and secure the rear panel in preparation for normal operation.

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

4.5.4 Module Installation

WARNING: Ensure both input and output circuit breakers are open before inserting the module into the cabinet. :WARNING

Insert the module by sliding the module into the appropriate position insuring that the guide pins align in the frame. Press the module into place until the connectors seat. Secure the module to the frame by tightening the two front panel screws. If the output is connected to a battery or to parallel operating Module(s), the ***Module Fail*** indicator, yellow ***Status Alarm*** and front panel LCD display will illuminate.

WARNING: Do not force the module into the cabinet if it doesn't slide in easily. :WARNING

WARNING: If the *Module Fail*, yellow *Status Alarm* indicator and front panel LCD display do not illuminate and the external D.C. power source is present, refer to trouble shooting section immediately before proceeding to the next section. Output polarity could be reversed, resulting in damage to the unit. :WARNING

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

Display operation and Illumination of the indicator shows that the output connections are the correct polarity.

5KW and 7KW Cabinets: For each module slot that is not occupied by a power module, set the corresponding DIP slide switch on SW1 (on the lower right side of the backplane board as viewed from the rear) by turning **ON** the DIP switch that corresponds to module slot. For example, if slots 3 and 4 were not occupied, SW1-1, SW1-2 would be **OFF** and SW1-3, SW1-4 would be **ON**.

9KW and 12KW Cabinets: For each module slot that is not occupied by a power module, plug in a Module Fail Defeat Plug (included with List 90 - Blank Front Panel - when a RSM system is ordered) in the lower socket where the power module would normally plug in.

4.6 Initial Start-up

Repeat this procedure for each module.

Factory settings or last entered settings of a module are stored in non-volatile memory indefinitely. To adjust the viewing angle a small pocket screw driver or tweaker is recommended.

4.6.1 A.C. Start-up

Apply A.C. power via the feeder breaker, then place the Module's input breaker in 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 all 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 Module will not start until the selected delay has elapsed. The display will countdown the delay time if set.

4.6.2 Float / Equalize (Initial)

Due to the accuracy of the LCD display the use of an external digital voltmeter connected to the test jacks is recommend for all voltage settings.

Depress the menu ***Down*** key until the **ADJUSTMENTS** submenu is displayed on the LCD panel. Depress the ***Enter/Select*** key to enter the adjustment mode. See Figure #14 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 approx 0.005 volt increments. Since the LCD display only registers 0.1 volt steps several depressions may be required when fine adjustments are made. The float voltage can not 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 for 10 minutes the module will return to normal operation mode. Entries not confirmed by the enter key will not 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 can not be set higher than the over-voltage alarm voltage setting.

4.6.3 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.

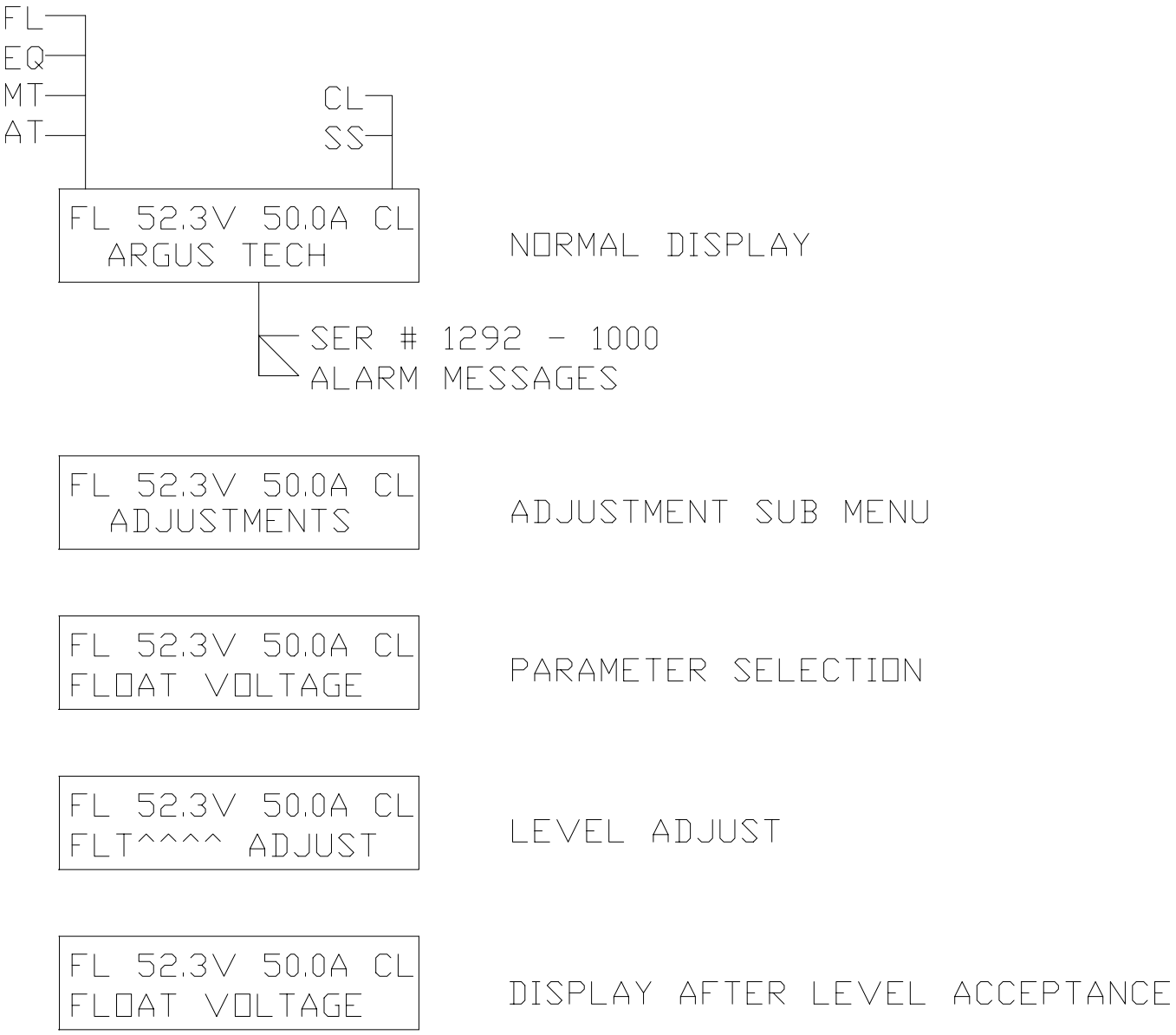

Figure 14 - Display Adjustment Sequence and Syntax

4.6.4 Output High Voltage Protection (Initial)

Prior to closing the output breaker the output over voltage protection level should be set 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

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 (for 48V units) or 31V (for 24V units) 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 (RSM 48/50), 2.5mV (RSM 24/100), 10mV (RSM 48/30), or 5 mV (RSM 24/50) for each key press from 54 to 61 Volts for 48V units and 27 to 30 Volts for 24V units. The **OUTPUT HIGH VOLTAGE LEVEL** cannot be adjusted to a level less than or equal to the equalize voltage (or float voltage) plus 0.5 volts (for 48V units) or 1.0 volt (24V units).

When the ***Enter/Select*** key is pressed to set the **OUTPUT HIGH VOLTAGE LEVEL**, the microcontroller reduces the output high voltage level from 62V (48V units) or 31V (24V units) until the unit trips and goes into **O/P HV SHUTDOWN**. The unit 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 unit to the normal mode.

4.6.5 D.C. Start-up

Close the output breaker, thereby connecting the unit to the load. If the high output shutdown trips, the sense lines have probably been reversed. If so, shut the unit down and correct the polarity of the lines. The ***Module Fail*** and yellow ***Module Status*** indicator should extinguish when the unit is providing current above 5% of the rated output or when connected to a battery. 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. If not refer to the trouble shooting section of this manual.

Before closing the output breaker of other units, proceed to section 4.6.6 (paralleling).

4.6.6 Paralleling: Slope or Forced

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

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

4.6.6.1 Negative Slope Paralleling

When the unit is used in a multi-Module configuration with non Argus RSM series units then the slope method should be used. The output slope adjustment should be given a preliminary adjustment so that the Modules will share the load. Set the slope controls of all units to 1.00% via the slope adjustment submenu of **LOAD SHARING** found in the **ADJUSTMENTS** menu.

4.6.6.2 Forced Paralleling

After the slope has been adjusted, enable the forced sharing system via the forced share enable/disable menu item of load sharing found in the adjustments submenu. 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. All units should be set to 0.5% slope. It is possible that more than one master 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.

5.0 Operation

5.1 Shutdown

The unit may be shut down by turning the A.C. input and D.C. output breaker ***Off*** in any sequence.

NOTE: For the RSM 48/50 and RSM 24/100 Unity Power Factor (UPF) models, the front panel may be powered up for up to 20 seconds after all power (input and output) is removed from the unit.

5.2 Start-up

To start the unit after a repair or for the first time the procedure as outlined in the initial start-up section of this manual should be followed. Routine start-up is accomplished by first turning the A.C. input breaker ***On*** and then turning the D.C. output breaker ***On***. This sequence is not critical but it allows a more controlled charging of the D.C. output filter capacitors.

5.3 Normal Mode

Normal operation of the Module will be in the **FLOAT** mode. The ***Module Status*** OK (green) indicator will be illuminated and, normal mode messages will be displayed (see Figure #1 or Figure #2).

5.4 Float/Equalize/Test

When the A.C. power is applied the unit may be operated in the **FLOAT**, **EQUALIZE** or **TEST** modes. Mode status is indicated by the corresponding message on the LCD display. **FLOAT** is the default mode from start up. **TEST** mode must be manually selected whereas **EQUALIZE** may be selected remotely. In the **TEST** mode voltage steps are approximately 5 mV/step (50mV in test mode) when adjusting levels. The receipt of a remote equalize signal will put the unit in into equalize and the message **REMOTE EQUALIZE** will be displayed on the front panel display. Upon removal of the signal, the unit will return to the **FLOAT** mode.

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 #

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

7.0 Adjustments

7.1 Factory Settings / Ranges

7.1.1 48 volt units

Function	Range/ modes	Factory setting
Float Voltage	48-57VDC	52.25VDC
Equalize Voltage	50-60VDC	54.25VDC
Test Voltage	42-62VDC	N/A
HIgh Voltage Shutdown Point	54-61VDC	56.0VDC
Low Voltage Alarm	42-48VDC	44.0VDC
High Voltage Alarm	44-60VDC	55.4VDC
Current Limit (30A unit)	9-33 Amps	31.0 Amps
Current Limit (50A unit)	15-55 Amps	51.0 Amps
Output Slope (30A unit)	0-2%	0.09%
Output Slope (50A unit)	0-2%	0.1%

7.1.2 24 volt units

Function	Range	Factory setting
Float Voltage	24-28.5VDC	26.1VDC
Equalize Voltage	25-30.5VDC	27.1VDC
Test Voltage	21-31VDC	24.0VDC
High Voltage Shutdown Point	27-30VDC	28.0VDC
Low Voltage Alarm	21-24VDC	22.0VDC
High Voltage Alarm	22-30VDC	27.7VDC
Current Limit (50A unit)	15-55 Amps	51 Amps
Current Limit (100A unit)	30-110 Amps	102 Amps
Output Slope (50A unit)	0-2%	0.09%
Output Slope (100A unit)	0-2%	0.1%

7.1.3 Common to 24 volt and 48 volt units

Forced Sharing disabled	enabled/disabled	
Delay Start	0-500 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

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

7.2 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. Open the output breaker and 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 required 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.

7.3 Equalize Voltage

First set the equalize voltage with the output breaker open. Open the output breaker and 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 should not be adjusted when the Module is in current limit.

7.4 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 is necessary to increase the output current of the unit 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 unit 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.

7.5 Test Voltage

The **TEST** modes can only be entered if the D.C. output breaker is in the ***Off*** position. Once in the **MANUAL TEST** mode the output breaker can be closed and the unit operated under control of the **MANUAL TEST** adjustment. The unit will not operate in **AUTO TEST** with the breaker closed. Selection of the mode is via the **TEST** submenu . Manual tests requires the operator to vary the level via the adjustment keys. Auto tests automatically ramps the test voltage to confirm alarm levels.

7.6 Load Sharing Parallel Operation

7.6.1 Slope Control - RSM units in parallel with variable slope units

Adjust all the slope settings to 0.1% and monitor the point where the outputs are paralleled or where the sense lines are connected with a 4-1/2 digit DVM. Assure that all units are in float mode and adjust the ***Float Voltage*** control of each module for the desired no load voltage and equal (as close as possible) current. If sense lines are used equal current may not be obtained so adjust the ***Float*** controls carefully until the output currents change state and the correct load voltage is obtained. Select **EQUALIZE** on all units, wait until the load current stabilizes and similarly adjust the ***Equalize*** controls for current sharing and desired equalize voltage.

Select **FLOAT** on all Units and adjust the slope controls for the desired voltage drop, 1% at full load is recommended which is a good compromise between sufficient slope to allow good current sharing and sufficient load regulation. Iteratively adjust the amount of slope on the Units until current sharing is achieved. To verify the current sharing over any load condition it is necessary to vary the load. This can be done by using a variable resistive load or with battery plant loads by turning off the A.C. power for awhile or by going into **EQUALIZE** and then back into **FLOAT**.

7.6.2 Slope Control - Argus units in parallel with fixed slope units

Set the slope to 1% on the Argus units and adjust the ***Float*** level for the desired loaded output voltage and proper current sharing of all the units.

In order to see if the Argus units are set at a slope that matches the fixed slope units, it is necessary to vary the load by using a variable resistive load (for non-battery type loads) or by turning off the A. C. for awhile and re-applying it to get a high load condition or by selecting **EQUALIZE** for a while and re-selecting **FLOAT** to get a low load condition (the latter two methods for battery plant loads). If the Argus units output current varies less than the fixed slope units then the slope of the Argus units is too high. Conversely if the output current of the Argus units varies more than the fixed slope units the slope of the Argus units is too low. Decrease or increase the slope of the Argus units, readjust the **FLOAT** level of the Argus units 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 amount of slope of the Argus units for correct current sharing among the Argus units if necessary.

Finally, select ***EQUALIZE*** on all units, wait until the load current settles down and adjust the ***Equalize*** level of the modules for correct load current sharing and loaded output voltage; do not touch the slope controls. Re-select **FLOAT** if desired.

7.6.3 Forced Paralleling - Argus RSM units in parallel with other RSM units

The slope control should be reduced to 0.50% when forced paralleling is enabled. Enable **FORCED** sharing in the load sharing submenu. Repeat the procedure for each module. The modules will all automatically track each other. One module will act as a “master” and all other modules will “slave” off this module except if adjusted to the same voltage. Master selection is automatic. To determine which module is the “master” select the **FORCED SHARE** item in the status menu. All slave units will be denoted by a **S** designation beside the message **FORCED**. The master unit will be designated with a **M**.

The adjustment range that the slave modules' float and equalize voltage can change to follow the master is limited when forced paralleling is selected. 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 master unit entering a high voltage condition.

7.7 Start Delay

Select **START DELAY** from the **ADJUSTMENTS** submenu. Adjust the start delay to the desired setting. The actual start of the unit is delayed further by the soft start control or “walk in” that is engaged at the end of the delay sequence selected.

7.8 High Output Voltage Shutdown

Select **O/P HV LEVEL ADJ** from the **ADJUSTMENTS** submenu . 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 should not be adjusted when the Module is in current limit.

7.9 Low Output Voltage Alarm

Select **LO O/P (VOLTS) ALARM** from the **ADJUSTMENTS** submenu . 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**.

7.10 High Output Voltage Alarm (not on all models)

Select **HI O/P ALARM** from the **ADJUSTMENTS** submenu . 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**.

7.11 Protected Adjustments

The unit 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.

7.11.1 Current Limit Alarm

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

7.11.2 Equalize Time-out

A maximum equalize time is set by this control. If the equalize mode is selected locally the maximum time the unit 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.

7.11.3 Back Light Time-out

The maximum time that the LED back light is active is set in this mode. Although the unit uses long life LED back lighting the total DC standby current consumption of a unit with no AC connected is reduced. Using the ***Up*** and ***Down*** adjustment keys alters the time.

7.11.4 Display Calibration

This control is used to calibrate the modules output voltage display to a known standard DVM reading. Connect the DVM to the modules 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).

7.11.5 (Section Deleted)

7.11.6 Local Access Alarm

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

7.11.7 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** submenu. 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.

8.1 Serial Communications Interface (SCI) Board Connections

8.1.1 Multiple Shelf Connections (RS485)

Cabinets are daisy chained together via the RS485 interface of the SCI Board. Refer to the outline drawing in Figure #4 or Figure #5 to determine the location of the SCI Board and connectors. The interconnect cable is a 9 PIN to 9 PIN straight through cable although only pins 1,2,4 and 5 need be connected. Argus part #877-012-10 is recommended for interconnecting the cabinets. Connect the cable from 1 connector labeled RS485 to another connector labeled RS485 on the next shelf. See Figure #15 .

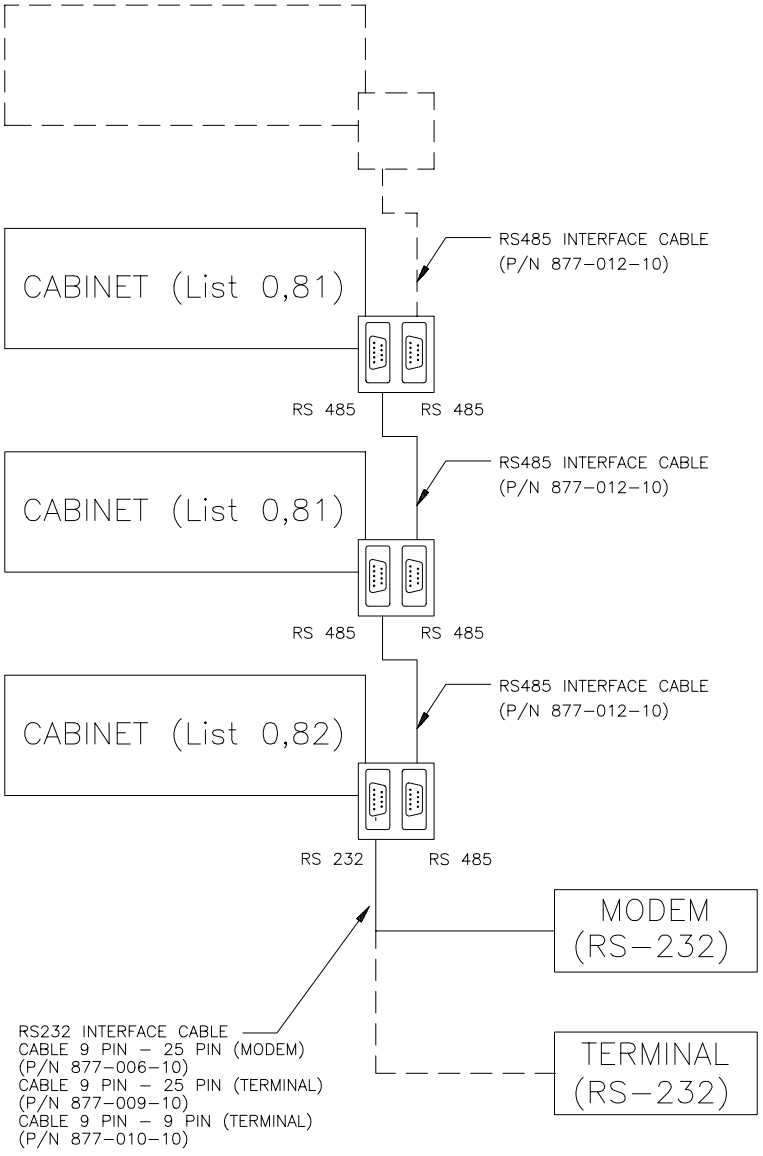

Figure 15 - Communications Connections

8.1.2 RS232 Interface

An optional RS485 to RS232 converter is available on the SCI Board. The left connector on the SCI Board can be configured for RS485 or RS232 protocol. **As a result the RS232 port is not a true RS232 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.**

RS232 Interface Cable (9 pin SCI to 25 pin RS232 or 9 pin RS232)

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 because they would interfere with the RS485 interface. Connect the cable from the SCI Board connector labeled RS232 to your equipment. Refer to Figure #16 for the pin outs of the 9 pin and 25 D connectors on the SCI board and the cables. Please note the connections made internally on the modem end of the RS-232 cable connecting DTR to DSR, and RTS,CTS to DCD.

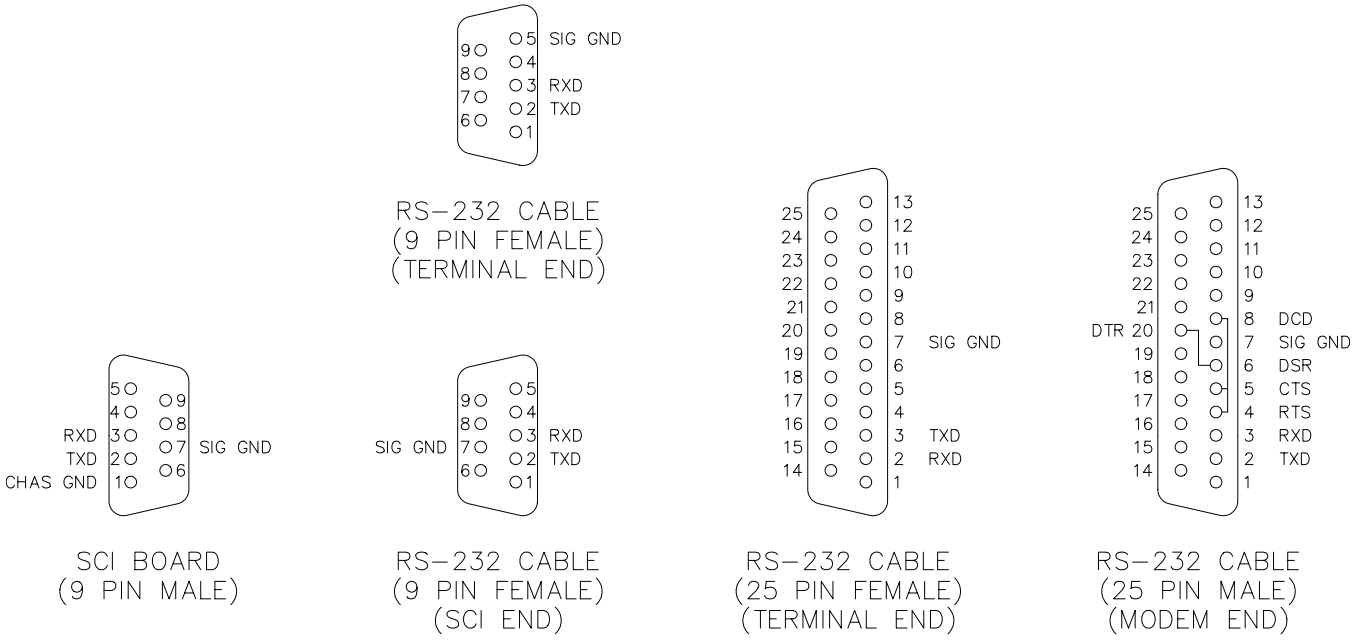

Figure 16 - D-Shell connector pinouts

8.1.3 Modem Connection

8.1.3.1 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 module 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 module 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 module 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 thier setup and have not been tested extensively with the RSM.

8.1.3.2 Modem setup:

The baud rate of the modem is normally set to match the highest baud rate programmed in the RSM module that it is capable of achieving. The SCI module 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 (ie 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 non-volatile 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 (see section 8.1.3.2)

2) If your modem has non-volatile 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 (see section 8.1.3.2)

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 (see section 8.1.3.2).

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 the SCI module should cause the DTR indicator on the modem to be enabled. The baud rate setting in the RSM module 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 module 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.

8.1.4 Local Terminal Connection

8.1.4.1 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) will work fine - see section 8.1.5.

8.1.4.2 Terminal setup:

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

8.1.5 Communicating with the RSM

The RSM is designed to communicate directly with a “dumb 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 modules. There has to be DC power present at the output for the remote communication to function. There are only four commands that the RSM module will respond to.

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

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

Typing [01S] will result in module #01 transmitting its complete status. This is the same as going into the STATUS submenu. For all commands, the module 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 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 unit # 01, and similiarly, F2 and F6 for the status of unit #02.

If you change the baud rate of the module using a locally connected terminal (ie not via modem), then you will have to change the baud rate of the terminal to match the module'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.

8.1.6 Access to the RSM

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

8.1.6.1 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**.

8.1.6.2 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 module 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 module 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**.

8.2 Module ID

In order for the module to be identified for remote communication each module must be assigned an unique identification number. Sequentially program each module 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 ie. 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 unit will display **RETURN**. If two modules have the same ID# a line conflict will occur which will result in garbled communications.

8.3 Baud Rate

The unit 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 (ie modem.) the operator presses the ***Enter/Select*** key.

8.4 Remote Disable

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

8.5 Remote Adjust Disable

Depending on factory programming some units 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 #17 for a remote terminal screen format.

9.1 Remote Terminal Status Format

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

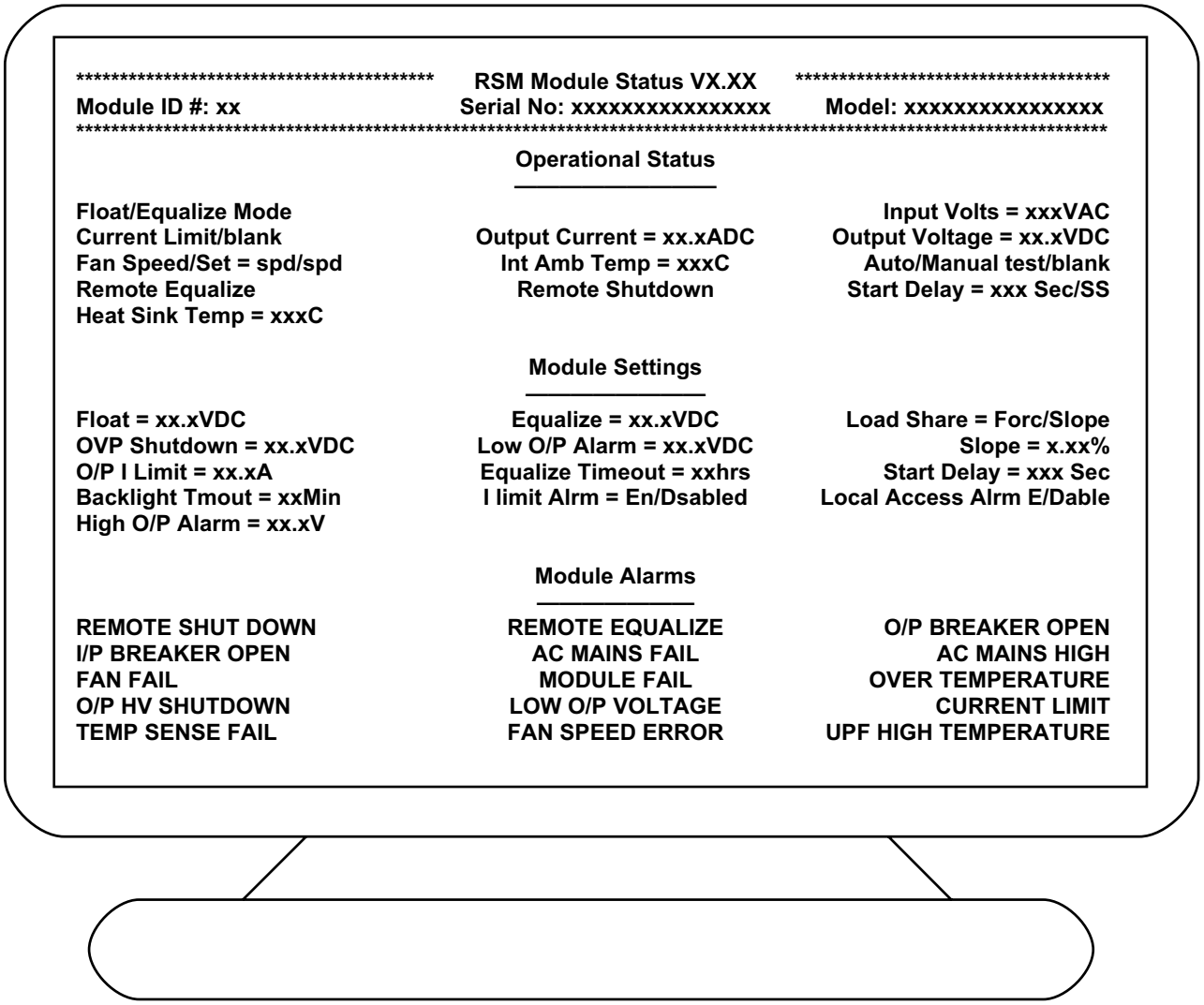

Figure 17 - Remote Screen Layout

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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
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048-527-10-I1 Rev L (09/2007)