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TECHNICAL NOTE 25T065 **DECEMBER 2005**
REV C

NSU REDUNDANT SWITCHOVER SYSTEM

SECTION 1

INTRODUCTION

1.1 GENERAL DESCRIPTION

1.1.1 PHYSICAL



Figure 1-1. Front Panel, Control Unit



Figure 1-2. Rear Panel, NSUN Control Unit

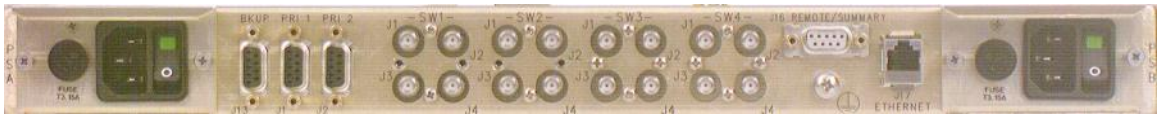


Figure 1-3. Rear Panel, NSU2 Control Unit

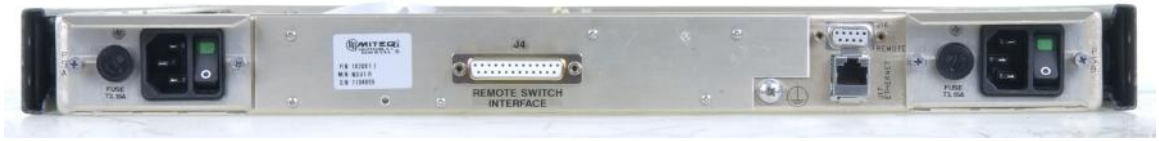


Figure 1-4. Rear Panel, NSU1-R Control Unit

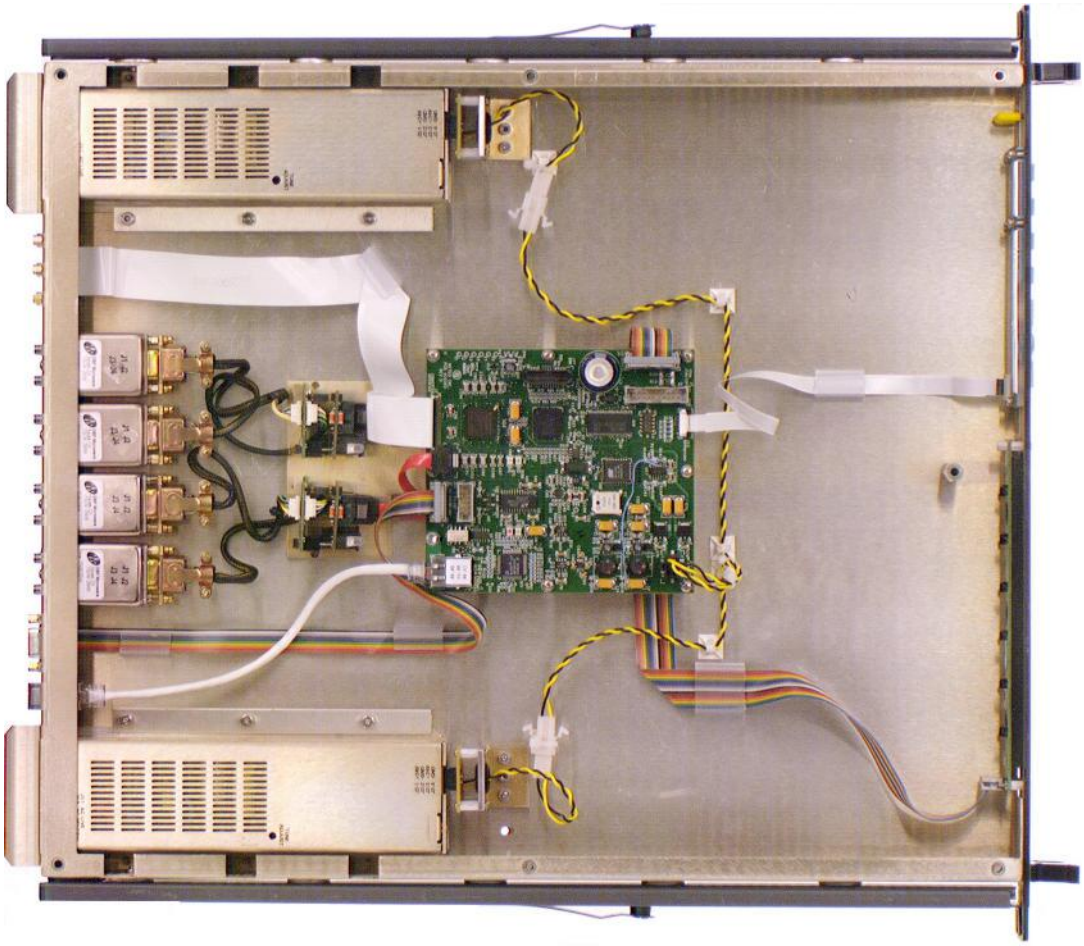


Figure 1-5. Internal View, NSU2 Control Unit

1.1.2 FUNCTIONAL

The MITEQ 1:N New Switchover Unit (NSU) is designed to provide improved reliability for advanced satellite communications systems. The NSU consists of a Control Unit, Switch Modules and frequency converters. The Control Unit monitors the status of up to twelve primary frequency converters and one backup frequency converter. When a fault is detected on a primary frequency converter, the defective converter is automatically placed into standby and the backup converter is placed on line in place of the defective converter using the Switch Modules. The frequency converters can be prioritized so that critical communication channels have access to the backup converter on a prioritized basis.

Switchover from a defective primary converter to the backup converter is achieved by connecting the converters to a switch matrix. The defective converter is replaced by physically removing its input/output signal lines and connecting them to the backup converter via the switch matrix. This ensures continuous operation while the fault is corrected, or allows for routine maintenance without disrupting signal transmission.

Converters can be added to unfilled positions in the chain and the settings will be "uploaded" from the new unit to the Control Unit automatically. Conversely, when a failed unit or switch is replaced in the redundancy chain the settings are "downloaded" to the unit position from the settings stored in the Control Unit. This simplifies the converter replacement process. The Control Unit is equipped with redundant hot swappable power supplies. In the event of a power supply failure the Control Unit can remain fully operational while the power supply is replaced.

To reduce operating costs the NSU may be placed in an unoccupied facility and be totally controlled and monitored from a remote system controller. All front panel controls and indications are available to a host monitor and control system. The Control Unit is equipped with an Ethernet interface and an RS485/RS422 Serial Port interface. As an option the RS485/RS422 Serial Port interface can be replaced with an RS232 Serial Port interface.

A strong feature set of monitor and control functions supports powerful local and remote control. In addition, any converter in the redundancy chain with a remote interface can be controlled directly from the NSU Control Unit. An event log is continuously updated with time stamped records of activity for the NSU. The resident firmware can be easily updated via the Ethernet port.

1.1.3 NSU MODEL NUMBERS

The NSU1 is a 1:1 configuration with the switch modules integrated into a 1 rack high chassis with the control unit. The NSU2 is a 1:2 configuration with the switch modules integrated into the 1 rack high chassis with the control unit. The NSUN is a 1 rack high control unit that is expandable up to a 1:12 configuration with external Redundancy Switch Modules (RSMs). The Switch Modules specified below are intended for use with the NSUN and can be ordered individually using the part numbers given. The standard 9800 and 9900 Series converters have been designed to physically accommodate the Switch Module.

Redundancy Switchover Systems (1RU Controller With Integrated Switches)	
1:1 integrated switches 1 IF 75 ohm, 1 RF 50 ohm	NSU1-B75/S50
1:1 integrated switches 1 IF 50 ohm, 1 RF 50 ohm	NSU1-B50/S50
1:1 integrated switches 1 IF 75 ohm, No RF	NSU1-B75
1:1 integrated switches 1 IF 50 ohm, No RF	NSU1-B50
1:1 integrated switches No IF, 1 RF 50 ohm	NSU1-S50
1:1 integrated switches No IF, 2 RF 50 ohm	NSU1-S50/S50
1:1 integrated switches 2 IF 50 ohm, No RF	NSU1-B50/B50
1:1 integrated switches 2 IF 75 ohm, No RF	NSU1-B75/B75
1:2 integrated switches 2 IF 75 ohm, 2 RF 50 ohm	NSU2-B75/S50
1:2 integrated switches 2 IF 50 ohm, 2 RF 50 ohm	NSU2-B50/S50
1:2 integrated switches 2 IF 75 ohm, No RF	NSU2-B75
1:2 integrated switches 2 IF 50 ohm, No RF	NSU2-B50
1:2 integrated switches No IF, 2 RF 50 ohm	NSU2-S50
1:2 integrated switches No IF, 4 RF 50 ohm	NSU2-S50/S50

1:N Redundancy Switch Controller	
1:N Controller for connection to external switches	NSUN

1:1 Redundancy Switch Controller with Redundant Plate Assembly	
1:1 Controller for connection to remote outdoor switches	NSU1-R/CXXXXX

Redundant Switch Modules	
1 IF 75 ohm, 1 RF 50 ohm	RSM-B75/S50
1 IF 50 ohm, 1 RF 50 ohm	RSM-B50/S50
1 IF 75 ohm, No RF	RSM-B75
1 IF 50 ohm, No RF	RSM-B50
No IF, 1 RF 50 ohm	RSM-S50
No IF, 2 RF 50 ohm,	RSM-B50/B50
2 IF 50 ohm, No RF	RSM-B50/B50
2 IF 75 ohm, No RF	RSM-B75/B75

NOTE:
IF(BNC female) Switches are 50-180MHz, RF Switches (SMA female) are DC-18.1 GHz

Option 17C: RS232 Remote Interface

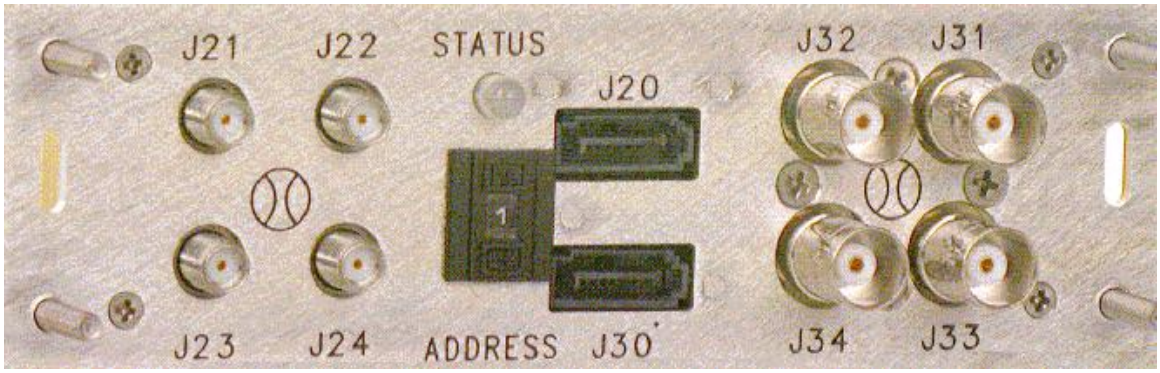


Figure 1-6. Rear Panel, Switch Module (For Use With NSUN)

1.2 EQUIPMENT CHARACTERISTICS

1.2.1 PHYSICAL

NSU Control Unit

Weight..... 12 pounds nominal
Chassis Dimensions .....19” x 20” x 1.75” panel height
Converter Control and Status connectors..... DE-9S
.....DB-25S(NSU1-R ONLY)
Remote Interface and Status connector DE-9S
Ethernet Interface connector..... RJ45 Receptacle
Switch Module Bus Connectors .....Serial ATA Receptacle

RSM Switch Modules

Weight.....1 pound nominal
Chassis Dimensions ..... 5.6” wide x 1.61” high x 1.90” deep
..... excluding connectors(see outline drawing 157773)
RF connectors.....SMA female
IF Connectors.....BNC female
Switch Module Bus Connectors .....Serial ATA Receptacle

1.2.2 Connector Wiring Information

Converter Control and Status Connectors* (J1 through J13) 9-pin D-subminiature			
Function	**Pins**	**Normal**	**Fault**
Converter Fault Inputs	1,2	Open	Closed
Converter Fault Inputs	2,3	Closed	Open
Converter Control Bus Data-	5	N/A	
Converter Control Bus Data+	9	N/A	

The Control Unit must sense both Normally Open and Normally Closed contacts. This provides the means for the Control unit to automatically recognize that a converter has been added to the chain or removed from the chain.

Table 1-1. NSUN Switch Connections

Switch Module Bus Connectors (J14 and J15 NSUN Only) Connector type Serial ATA	
Pin	**Designation**
1	Ground
2	Data +
3	+24V 'A'
4	+24V 'A' Return
5	Data-
6	+24V 'B'
7	+24V 'B' Return

Table 1-2. NSU Remote Interface Connections

Control Unit Remote Interface and Status Connector (J16) 9-Pin D-Subminiature			
RS485 and RS422		**RS232**	
Pin	**Designation**	**Pin**	**Designation**
1	Ground	2	RCV Data
3	Data Out -	3	Tx Data
5	Data In -	5	Ground
7	Data Out +	7	RTS
9	Data In +	8	CTS
2	Normally Open	1	Normally Open
4	Common	4	Common
6	Normally Closed	6	Normally Closed

Control Unit Ethernet Interface Connector (J17) RJ45		
RJ-45 Pin	**Wire Color**	**10BaseT Signal Name**
1	White/Orange	Transmit+
2	Orange	Transmit-
3	White/Green	Receive+
4	Blue	Un-used
5	White/Blue	Un-used
6	Green	Receive-
7	White/Brown	Un-used
8	Brown	Un-used

1.2.3 CONVERTER CONNECTIONS TO THE NSU

NSU Connections J1-J13	DNB/UPB Block Converter	9400/9600 Converters	9700/9800 9900 Converter	1/3rd Rack Converters
Unit Normally-Open Pin 1	J7-1	J7-1	J3-1	J7-4
Unit Status Common Pin 2	J7-2	J7-2	J3-2	J7-2
Unit Normally-Closed Pin 3	J7-3	J7-3	J3-3	J7-6
RS485 Data- Pins 3 and5	N/A	J6 orJ10 Pins –3 and 5	J6 Pins –3 and 5	J6 Pins –3 and 5
RS485 Data+ Pins 7 and 9	N/A	J6 orJ10 Pins 7 and 9	J6 Pins 7 and 9	J6 Pins 7 and 9

Table 1-3. Converter Connections to the NSU

The table above lists the MITEQ converters, their Redundant switch connections and RS485 remote connections (where available) and where to connect them to the NSU Control Unit.

NOTE: For NSU1-R mating cable assembly is provided to mate Redundant Plate assembly to the NSU controller.

The minimum requirement for any converter connected to the NSU is a Form-C set of contacts, which are used to indicate the fault status. In addition, any converter capable of remote control must have its RS485 port wired to the NSU. The RS485 connection between a Primary Converter and the NSU will enable the Primary Converter settings to be stored automatically in the NSU. In the absence of a Serial Link between the Primary Converter and the NSU, the Primary Converter settings must be manually stored in the NSU. When a Primary Converter fails, its settings are transferred to the Backup converter via the RS485 connection between the NSU and the Backup Converter. In the case where the NSU-Converter Serial Link is disabled for the Backup Converter a fault in a Primary Converter will cause the transfer switches to switch but none of the settings of the Backup Converter will be changed. Converters with an RS485 connection to the NSU should have their NSU-Converter Serial Link option enabled in the NSU. Converters without an RS485 connection to the NSU should have their associated NSU-Converter Serial Link option disabled in the NSU. The NSU-Converter Serial Link options operation is described later in this document.

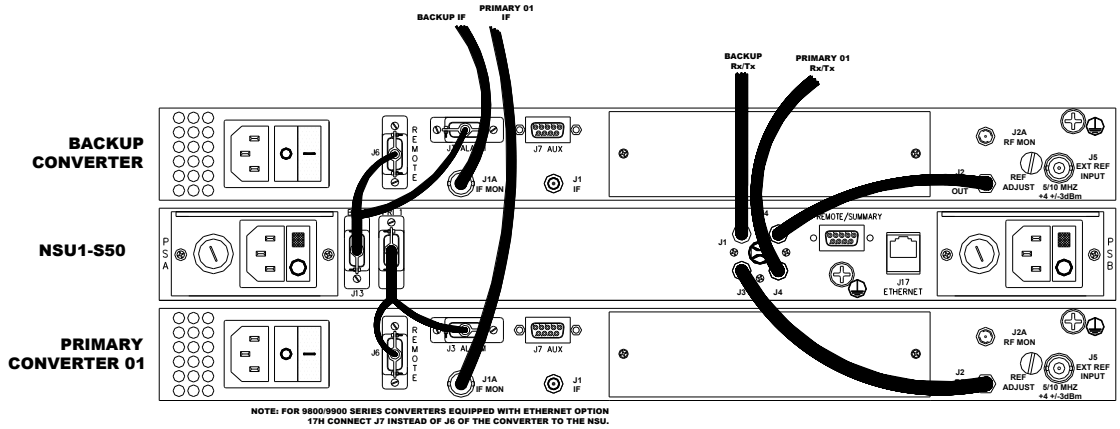


Figure 1-7. NSU1-S50 RF Connections to Converter

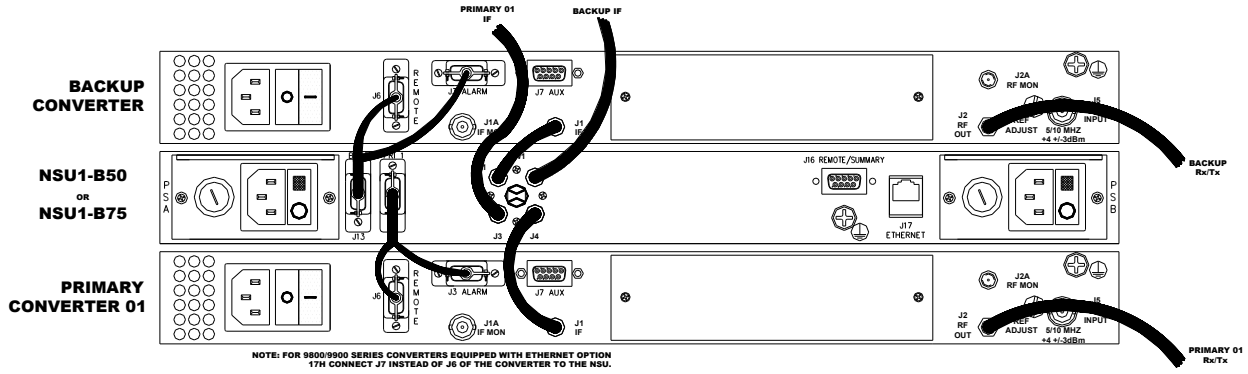


Figure 1-8. NSU1-B50 or NSU1-B75 RF Connections to Converter

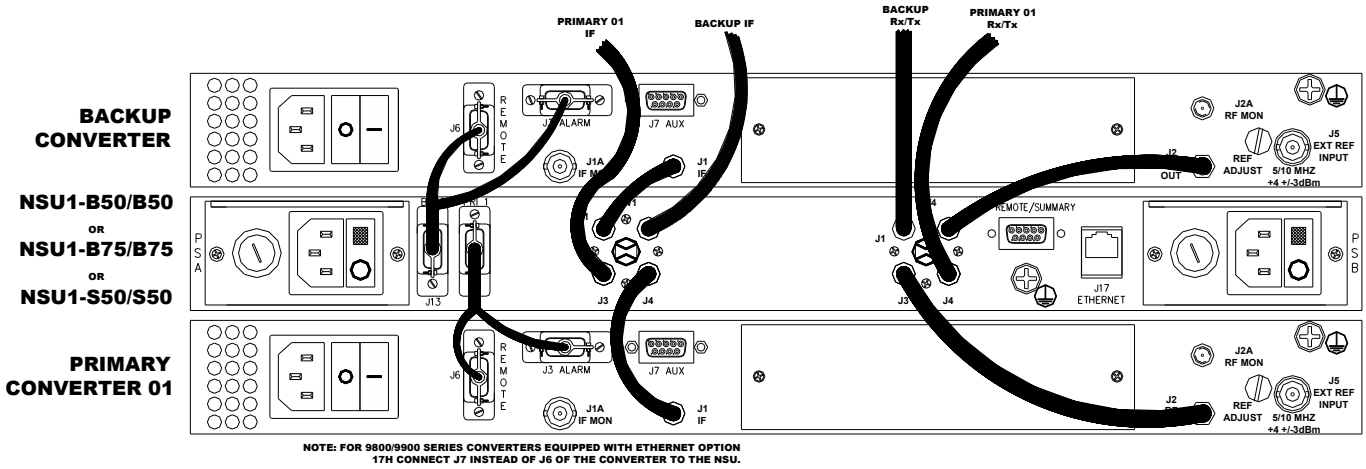


Figure 1-9. NSU1-B50/B50, NSU1-B75/B75 or NSU1-S50/S50 RF Connections

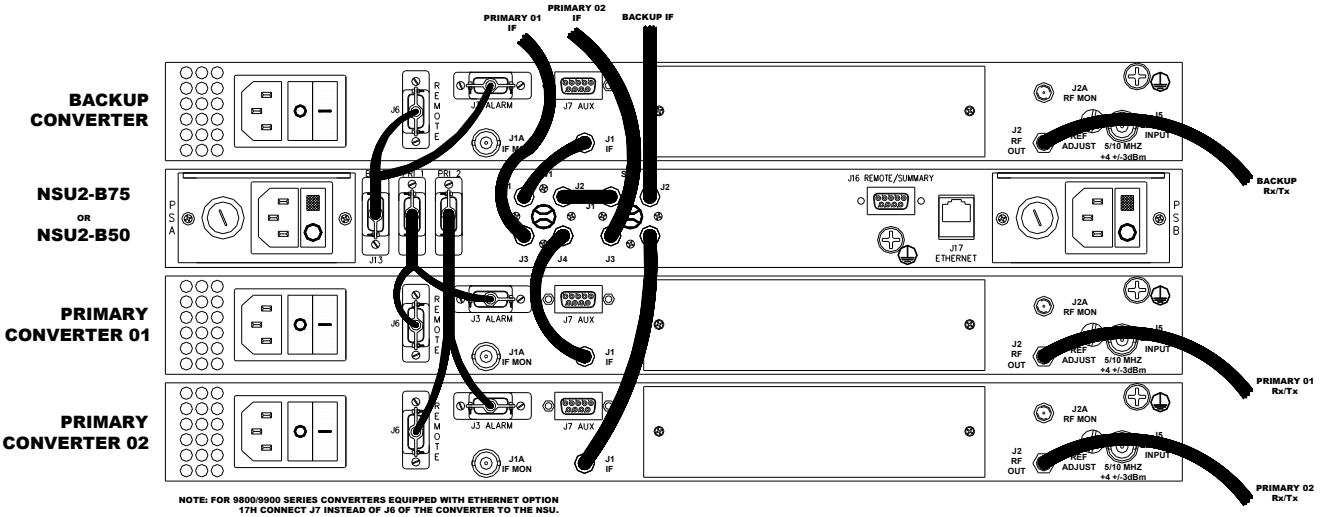


Figure 1-10. NSU2-B50 or NSU2-B75 RF Connections to Converter

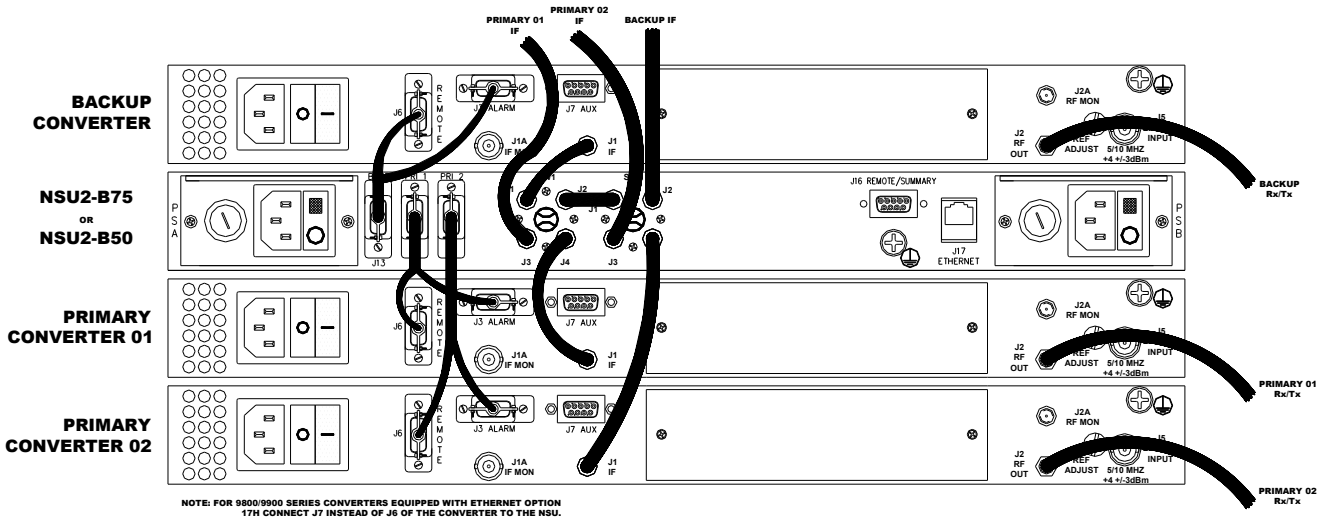


Figure 1-11. NSU2-B75 or NSU2-B50 RF Connections to Converter

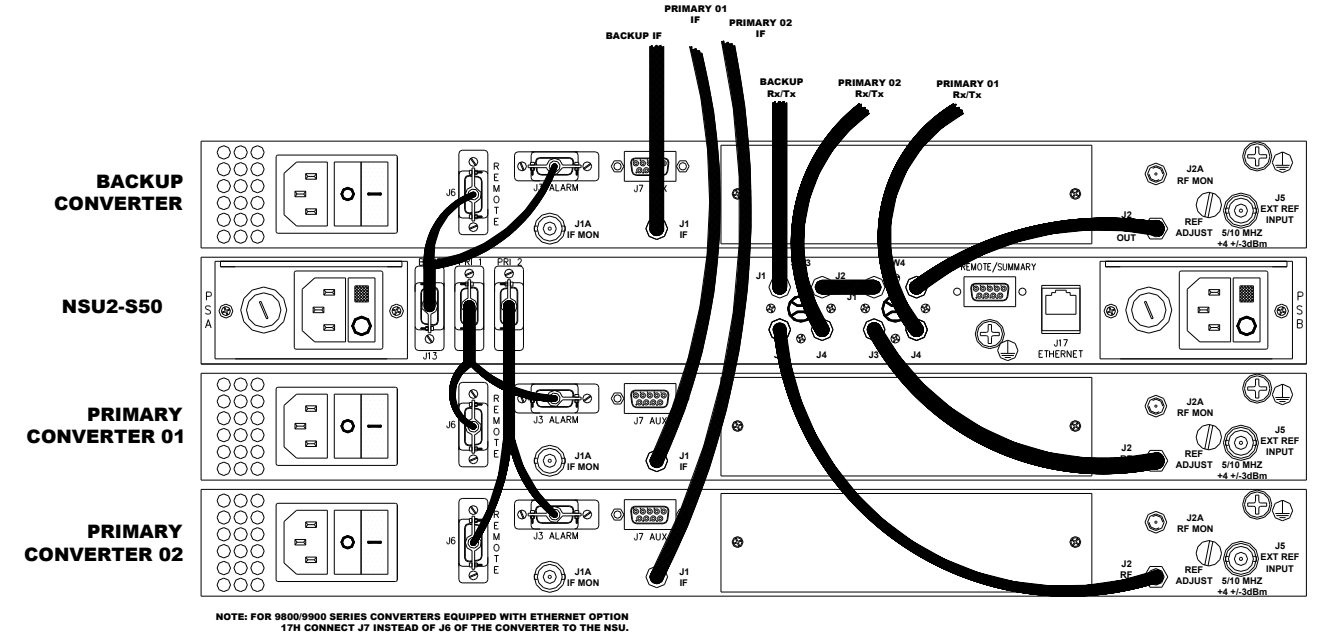


Figure 1-12. NSU2-S50 RF Connections to Converter

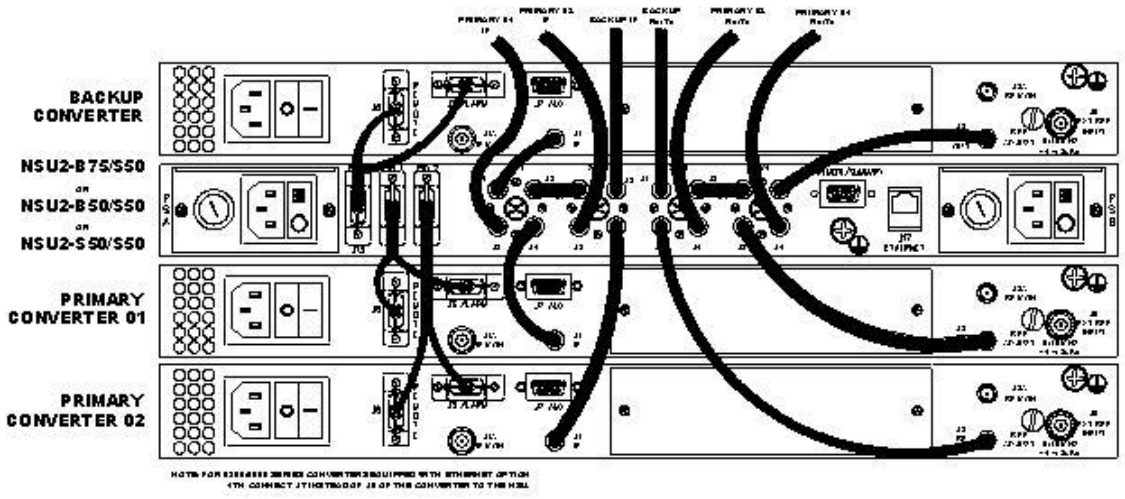


Figure 1-13. NSU2-B75/S50, NSU2-B50/S50 or NSU2-S50/S50 RF Connections

1.2.4 DEFINITIONS

Redundancy Chain

The Redundancy Chain is a series of units that have their signal paths linked together via four-port transfer switches to achieve higher overall system reliability. This is accomplished by having a Backup Unit standing by. In the event that a Primary Unit fails the Control Unit will automatically place the backup unit online in the primary path and the primary unit into the standby path by controlling the Switch Modules in the Redundancy Chain.

The Redundancy Chain includes up to twelve primary positions and one backup position. Each primary position includes one frequency converter and one Switch Module. The backup position includes one frequency converter and may contain a Switch Module for switching polarization. The NSU1 and NSU2 are fixed configurations and cannot be expanded nor can they support polarization switching.

NSU System

The NSU1 is a 1:1 configuration with the switch modules integrated into a 1 rack unit with the control unit. A polarization switch module cannot be added to the NSU1 System.

The NSU2 is a 1:2 configuration with the switch modules integrated into the 1 rack control unit chassis. A polarization switch module cannot be added to the NSU2 System.

The NSUN System is capable of being arranged in a 1:1 up to 1:12 redundancy configuration. A 1:1 system is comprised of the Control Unit, and one Switch Module. A 1:12 system is comprised of the Control Unit and twelve Switch Modules. A polarization switch module may be added to the NSUN System. The RSMs are intended for use with the NSUN and can be ordered individually using the part numbers given. The standard 9800 Series converters have been designed to physically accommodate the Switch Module.

Control Unit

The Control Unit is responsible for the monitor and control of the NSU System.

Primary Unit

A Primary Unit is a component that is in the signal path of communications traffic. The NSUN can accommodate up to twelve Primary Units. The NSU1 includes one Primary Unit. The NSU2 includes two Primary Units. Each Primary Unit occupies a unique primary position in the redundancy chain.

Backup Unit

A Backup Unit is intended to serve as a substitute for a faulty Primary Unit. The Backup Unit normally occupies the Standby Path. If a Primary Unit fails the Control Unit will switch the Backup Unit online into the Primary Path and the faulty Primary Converter into the Standby Path.

Online

A unit is considered Online if the Switch Module is directing signals through a Primary Path. This is essentially referring to transfer switch position within the associated Switch Module. The opposite transfer switch position is Standby.

Standby

A unit is considered in Standby if the Switch Module is directing signals through the standby path. This is essentially referring to transfer switch position within the associated Switch Module. The opposite transfer switch position is Online.

Redundancy Chain Position

Redundancy Chain Position refers to a unique location in the redundancy chain. There is a maximum of thirteen chain positions, one backup and up to twelve primaries. A single frequency converter and a Switch Module occupy every primary Redundancy Chain Position. The backup Redundancy Chain Position is occupied by a single frequency converter. The backup position may also include a Polarization Switch Module.

Priority

Each of the primary frequency converters can be assigned a priority. The NSU will grant communication channels access to the backup converter on a prioritized basis. A priority setting of 1 is for the most crucial communication channels. A priority setting of 12 is the least significant. In the case where the primary converters are set to the same priority the backup is available on a first-come, first serve basis. The backup converter has no priority.

Switch Module

The signal paths of the units in the Redundancy Chain are linked together by the Switch Modules. The Switch Module is fixed in a redundancy chain position with a frequency converter. The Switch Module contains an IF frequency and/or an RF frequency four-port transfer switch. The Switch Module is connected to the Control Unit via the Switch Module Bus. The Switch Module depicted below has both an RF and an IF four-port transfer switch. The push-wheel is set from zero to twelve to indicate redundancy chain position of the Switch Module (Zero is reserved for the Polarization switch). The LED will light green for online, amber for standby, and red if there is an internal fault. There are two connectors provided for daisy-chaining the Switch Module Bus.

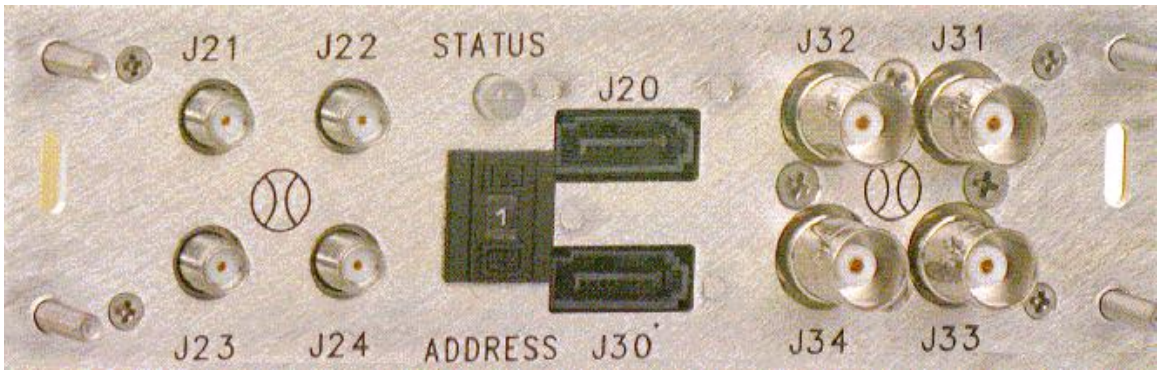


Figure 1-14. Front Panel, Switch Module (NSUN Only)

Active Fault

An Active Fault indicates the NSU is presently experiencing a failure that is impeding ideal operation of the NSU. An active fault will cause the “STATUS” button on the front panel to light red and the status contacts will indicate a fault. The Event Log will contain information about the fault condition and the time and date that the fault occurred.

The Types of Active Faults that can be reported are:

Power Supply ’A’ fault
Power Supply ’B’ fault
Converter bus fault
Converter Contact Failure fault
Switch Module fault
Switch Module Bus fault

NSU-Converter Serial Link

The NSU - Converter Serial Link refers to a dedicated RS485 bus connection between the NSU and the Backup and Primary converters in the redundancy chain. The NSU-Converter Serial Link can be enabled or disabled for each chain position independently.

With the NSU-Converter Serial Link enabled for the Backup chain position, when a Primary Converter fails, its settings are transferred from the NSU to the Backup converter via the NSU-Converter Serial Link. Once the NSU-Serial Link is enabled for particular chain positions, the NSU is continuously polling those units updating the settings stored in the NSU.

Some units in the Redundancy Chain may not be equipped with remote control. An example would be single band block converters without remote control. In the absence of an available RS485 connection between the NSU and a particular chain position, the NSU-Converter Serial Link should be disabled for that chain position.

If the Backup NSU-Serial Link is disabled, a fault in a Primary converter will cause the transfer switches to switch but none of the settings of the Backup Converter will be changed. If the Backup NSU-Serial Link is enabled and the NSU-Converter Serial Link is disabled for a Primary Converter, a fault in that Primary converter will cause the transfer switches to switch and the Backup converter would be updated with the converter settings stored in the NSU by the operator.

1.2.5 REDUNDANCY OPERATION

The equipment is capable of being connected in a prioritized redundancy arrangement. Each redundancy arrangement includes one Backup Unit, and up to twelve Primary Units. A Switch Module is associated with each Primary Unit. The NSU is capable of substituting the Backup Unit for any one of the twelve Primary Units on a prioritized basis.

Redundancy operation is achieved via four-port transfer switches that are located in the Switch Modules. A Switch Module can be set in one of two states, online or standby. During normal operation, only one unit in the chain can be in the standby position. Normally, this would be the Backup Unit. The Primary units would be online. The Control Unit monitors the Primary Units as well as the Backup Unit via the converter bus. In the event of a Primary Unit fault: the Control Unit reconfigures the Backup Unit, switches the Backup Unit online into the primary path, and the faulty Primary Unit to standby. The faulty unit can then be removed leaving the Switch Module in place without interrupting signal traffic.

1.2.5.1 REDUNDANCY MODES

There are two redundancy modes available, manual and automatic.

Manual Redundancy Mode

The Manual Redundancy Mode is provided to allow the operator direct control of the redundancy chain. With the Control Unit set to the Manual Redundancy Mode, the operator has exclusive control of the transfer switch positions. This enables off-line testing and maintenance to be performed.

Automatic Redundancy Mode

The Automatic Redundancy Mode provides the Control Unit with complete control of switching operations. The Control Unit monitors the Primary Units, the Backup Unit and the Switchover Modules. The Control Unit can back up only one Primary fault at a time. In the event of more than one failure, the Control Unit will force the faulty unit with lowest priority (highest numeric setting) back online while backing up a faulty unit of higher priority (lowest numeric setting).

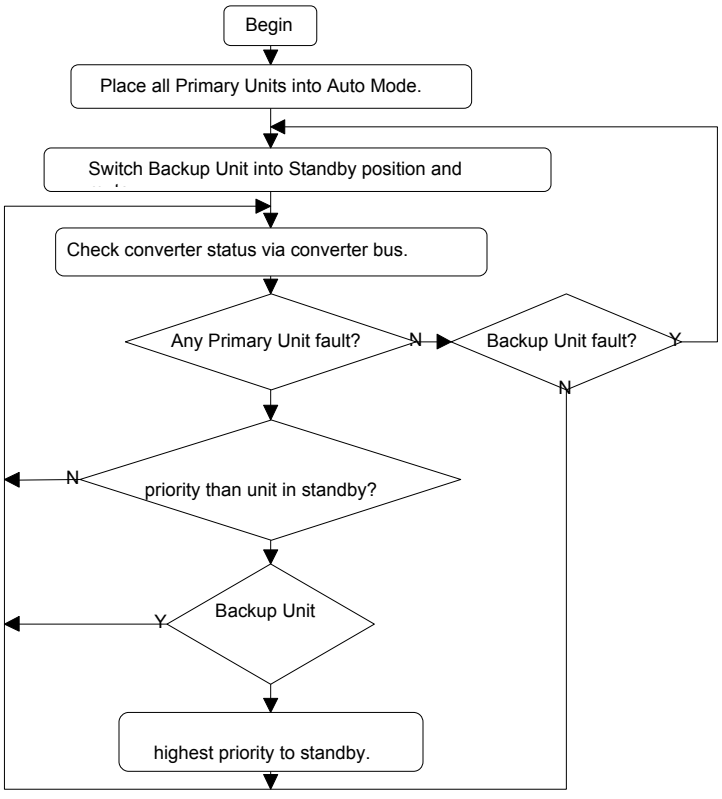
Placing the Control Unit into Automatic redundancy mode has the following consequences:

All Primary Units are switched online.
The Backup Unit is switched to standby.
The NSU Control Unit screen switches to the Redundancy Chain Status display.

If a Primary Unit fails, it is switched into standby and the Backup Unit is switched online in place of the failed Primary Unit (as long as there are no higher priority units already in standby).

a) If the fault on the Primary Unit clears, the Primary Unit is never switched back online unless another unit with higher priority (lowest numeric setting) develops an active fault. In this case the unit with the active fault is switched to standby, forcing the cleared unit back online.

The flowchart below illustrates the switching decisions performed by the Control Unit when it is placed into the Automatic mode.



SECTION 2

INSTALLATION

2.1 UNPACKING, STORAGE, RESHIPMENT

Carefully open the shipping container and remove the equipment. Inspect the equipment thoroughly and report any damage.

If the equipment is to be stored, it should be wrapped in plastic and kept in a clean, dry place.

If the equipment is to be re-shipped for any reason, wrap the unit in heavy plastic and ship in a heavy (275-lb. test) double wall carton. At least three inches of a solid packing material should be used on all sides of the unit. The carton should be marked to indicate that it contains fragile electronic equipment.

2.2 MOUNTING

THIS EQUIPMENT IS NOT FOR USE IN A DOMESTIC ENVIRONMENT.

THIS EQUIPMENT IS INTENDED FOR RACK MOUNTING.

OPERATOR INJURY MAY OCCUR IF UNIT IS NOT PROPERLY MOUNTED.

THIS EQUIPMENT MUST BE SECURELY MOUNTED.

Slides are provided for mounting the Control Unit in a standard 19" equipment rack.

Physical Arrangement of Converters in a Redundancy Chain

The converter remote interface configuration must be set to RS485, Odd Parity, and 19200 Baud with the following addresses

Backup Unit: Address 64
Primary Unit 1: Address 65
Primary Unit 2: Address 66
Primary Unit 3: Address 67
Primary Unit 4: Address 68
Primary Unit 5: Address 69
Primary Unit 6: Address 70
Primary Unit 7: Address 71
Primary Unit 8: Address 72
Primary Unit 9: Address 73
Primary Unit 10: Address 74
Primary Unit 11: Address 75
Primary Unit 12: Address 76

Mounting of Switch Modules in a Redundancy Chain

Brackets and associated hardware are provided such that a converter can be removed from the rack without disconnecting the Switch Module from the redundancy chain. See Figures 3-1 and 3-2 below for the proper arrangement for the supplied hardware. Each successive Switch Module must be no more than one rack unit (1RU, 1.75") from the unit that precedes it. If additional space is required between Switch Modules, consult the factory for an accessory package of hardware and cables to accommodate your physical arrangement.

2.3 TURN-ON PROCEDURE

After mounting, make all external connections per Tables 1-1, 1-2, 1-3 and 2-1.

Apply power to the equipment using the power On/Off switches.

System is now operational.

DESIGNATION	DESCRIPTION
Ground Lug	Connect the Ground Lug on the rear panel of the equipment to the Protective Earth connection of the building.
Power cords	Attach the power cords to the rear panel AC power inlet. Connect the other end to the power source. Refer to national wiring standards for the correct connection to the power source.
Converter Monitor and Control connectors (J1 to J13)	This connector accepts form-c contacts from Backup and Primary Units 1 through 12 and provides a means of converter control from the control unit. See Paragraph 1.2.3 for wiring information.
Switch Module Monitor and control Connectors (J14, J15 NSUN Only)	The Switch Module Bus Interface connectors are daisy-chained internally for added reliability. This is the communication link to the Switch Modules for redundancy operation. Connect J14 to the first Switch Module and J15 to the last Switch Module.
NSU Monitor and Control connector (J16)	This is an optional connection allowing the operator to monitor and control the equipment from a remote location. This connector also provides form-c contacts that indicate the active fault state of the Control Unit. See Paragraph 1.2.3 for wiring information.
Ethernet Interface Connector (J17)	The Ethernet Interface connector is an optional connection. This allows the operator to monitor and control the equipment via an Ethernet network connection. See Paragraph 1.2.2 for wiring information.

Table 2-1. External Connections

2.4 SET-UP

Description

Once all the connections from the converter to the NSU are made, the NSU detects a set of normally open or normally closed contacts connected at the connectors from J1 to J13. After detecting the contacts, the NSU polls the converter and the associated switch module in each chain position for a response. If both respond, the NSU Redundancy Chain Status display will show the switch module position (ST or ON) and the NSU then will consider the chain position active. If the NSU-Converter Serial link is disabled for a chain position, communication with the converter is unnecessary. If a unit does not respond to a poll a fault will be generated and the blinking characters will appear on the Redundancy Chain Status display in that chain position. If the NSU cannot communicate with the converter the upper numeric characters will blink, if the NSU cannot communicate with the Switch Module the lower characters will blink. In the case of the switch module, if communications has never been established with the switch module in this position the lower characters will blink ”??”. Otherwise, the last known switch position will be displayed and blink. An event will be entered into the Event Log as well. If the system configuration does not require a serial connection between the NSU and a converter, the NSU-Converter Serial Link should be disabled for that position. It is important to note that disabling the NSU-Converter serial link will prevent the NSU from becoming automatically updated with any operational changes to that unit although fault status will still be sensed. Once all the converters and switch modules have been connected to the NSU and been properly setup the NSU can be switched to the AUTO redundancy mode where it will monitor the redundancy chain.

Converter failures are determined by detecting the state of the form-c redundancy switch contacts that come from each converter. If a Primary converter faults, the NSU will back-up the failing unit and generate Event log entries related to the failure. If a problem occurs with a converter’s redundancy switch contacts, they open up or they become shorted together (states other than a normally open or normally closed fault), the NSU will treat that as a fault and back-up the affected position. If a converter stops responding to NSU polling, the NSU will retain the last known operational parameters and continue to protect the converter.

If a switch module for a given path stops responding to NSU polling or the switch indicates a fault, a fault will be reported in the NSU. The NSU will continue to operate.

2.4.1 RECOMMENDED SET-UP STEPS

The recommended steps for setting up the NSU are highlighted below:

Place NSU into Local Control mode.
Place NSU in Manual mode.
For an NSUN Set the Switch Module push wheel, located on the rear of the switch module to the proper address for the primary position it occupies.
Set the converters to the recommended remote settings.
Set NSU-Converter Serial Link enable/disable option for each chain position.
For any converter that NSU-Converter Serial Link is disabled set converter settings in NSU.
Connect all of the Switch Modules to the NSUN.
Connect all of the converters to the NSU.
On the Redundancy Chain Status screen verify that the lower line for each converter position in the chain reports “ST”, “st”, “ON”, or “on” and is not blinking.
Place all converters into Remote control mode.
Press the “AUTO” indicator button it should light green to indicate Auto mode and the Primary converters should be Online and the Backup should be in Standby.
Press the “AUTO” indicator button again. It should no longer be lit indicating the NSU is now in Manual mode.
Follow the next three steps for setting the Gain Equalization for each chain position.
- Apply an input signal to the Primary converter and measure the output signal level of the chain position.
- From the Redundancy Chain Status screen place the Primary converter into Standby and the Backup converter Online in its place.
- Apply an input signal to the Backup converter and from the Converter Settings Subscreen for that chain position adjust the Gain Equalization until output level is consistent with the measurement made on the Primary Converter.

Follow the next four steps for setting the Slope for each chain position.
- From the Redundancy Chain Status screen place the Primary converter Online.
- Apply an input signal to the Primary converter and measure the response of at the output. If the Primary converter is so equipped adjust the slope setting **on the Primary converter** to achieve the desired response at the output.
- From the Redundancy Chain Status screen place the Primary converter into Standby and the Backup converter Online in its place.
- Apply an input signal to the Backup converter and from the Converter Settings Subscreen for that chain position adjust the Slope setting **on the NSU** until output response is consistent with the measurement made on the Primary Converter.

From the Converter Settings Subscreen for each chain position set the Priority
If using a polarization switch, from the Converter Settings Subscreen for each chain position, Backup first, set the polarization of each converter.
From the Converter Settings Subscreen for each chain position verify that the settings reported by the NSU are correct and match the settings of the Primary converters.
Check the Status screen by pressing the “STATUS” indicator to be sure there are no Active Faults.
Press the “AUTO” indicator button it should light green to indicate Auto mode and the Primary converters should be Online and the Backup should be in Standby.
The system is now armed and operational.

SECTION 3

OPERATION

3.1 CONTROLS

3.1.1 POWER

AC Power

The NSU Control unit is equipped with two redundant Power supplies.
Use the rear panel power on/off switches to control AC power to the unit.

Fuses

The AC Power fuses are accessible at the rear of the power supplies.

Control Unit Power Supply Output Voltage Adjustment

Power supply voltage monitor points are located on the top of each of the removable power supply.

3.1.2 SWITCH MODULE CONTROLS

Redundancy Position Push-wheel Select Switch

Located on the front panel of the Switch Module, this select switch is set from zero to twelve to indicate redundancy chain position of the Switch Module (Zero is reserved for the Polarization Switch Module).

3.2 CONTROL UNIT FRONT PANEL OPERATIONS

A Liquid Crystal Display (LCD) and Light Emitting Diode (LED) indicator buttons have been organized such that important information is available at a glance. The keyboard is divided into functional groups to allow an operator to easily change any parameter from the front panel. See Figure 1-1 for the physical layout of the front panel. The LCD backlight is lit when power is on.

The “STATUS” indicator button will light red to indicate an active fault in the NSU System. The “STATUS” indicator button will light amber when there are no active faults but there is fault activity stored in the log that have not been cleared (either remotely or from the front panel). The “STATUS” indicator button does not reflect the fault status of the converters in the redundancy chain. Pressing the “STATUS” button will toggle between the “Status” screen and the default “Redundancy Chain Status” screen.

The “AUTO” indicator button LED will light green when the NSU is in the automatic redundancy mode. The “AUTO” indicator button LED is off when the NSU is in the manual redundancy mode. When the “AUTO” button is pressed the redundancy mode will toggle between Automatic and Manual mode and the default “Redundancy Chain Status” screen will be displayed.

The “REMOTE” indicator button will light green when the unit is under remote control. Pressing the “REMOTE” indicator button will toggle the control mode between Remote and Local. The unit can be controlled remotely from either the RS485/RS422 port or the Ethernet port. If the NSU is left in the local control mode, after thirty minutes of front panel in-activity the NSU will default to the “REMOTE” control mode.

Operating parameters can always be examined locally or remotely. Parameters can only be changed from the front panel while in local control mode. Parameters can only be changed from the remote ports while in remote control mode. The NSU will always power up in Remote control mode. If the NSU is left in the local control mode, after a thirty-minute period of no front panel keypad activity the NSU will switch back into Remote control mode.

At power-up the NSU will always set all primary converters to their online position. The backup converter will always be put in the standby position. This precaution is taken to prevent the possibility of having a converter online operating at the wrong frequency. It also removes the possibility of having more than one converter competing to be in the standby position at one time.

3.2.1 KEYPAD OPERATION

The keypad includes a “STATUS” key for immediate access to fault conditions and the event log. A full set of numeric Data Entry keys, accompanied by up, down, left and right arrows, simplifies operator entries. The “ENTER” key is provided to submit data entries. A “C” (clear) key is available to cancel a data entry. A beeper will sound to acknowledge each key press. An error tone will sound for illegal entries.

Also included is a dedicated “REMOTE” key to easily switch between Local and Remote control modes. While in the Remote control mode (“REMOTE” button illuminated), local data entry is prohibited. However, all system parameters can be examined from the front panel.

After one minute of idle time the display will default to the Redundancy Chain Status Screen.

3.2.2 SCREEN NAVIGATION

The cursor will appear as either two vertical arrows (one up arrow “≠” on the top line, and one down arrow“↓” on the bottom line) or as a single inverted, flashing right arrow “→”. This indicates the direction of navigation. While the cursor appears as two vertical arrows use the up and down arrow keys to navigate between screens. Press the left or right arrow key and the cursor will appear as a right arrow “→”. When the cursor is a right arrow “→” the data field to the right of the cursor is selected. Use the left and right arrow keys to navigate between fields within a screen Pressing the “C” key will change the cursor back to ”≠” and “↓” arrows at the left of the screen. When the ”≠” and “↓” arrows appear at the left of the screen use the up and down arrow keys to scroll through the screens listed below. This provides visibility of all pertinent data in both Local and Remote modes.

Redundancy Chain Status
Status
Serial Remote Communication parameters screen
Ethernet IP Address & Subnet Mask Screen
Ethernet Gateway and Password Screen
Utility Screen consisting of: Date/Time and Screen LCD Contrast
System Information Screen

3.2.3 DATA ENTRY

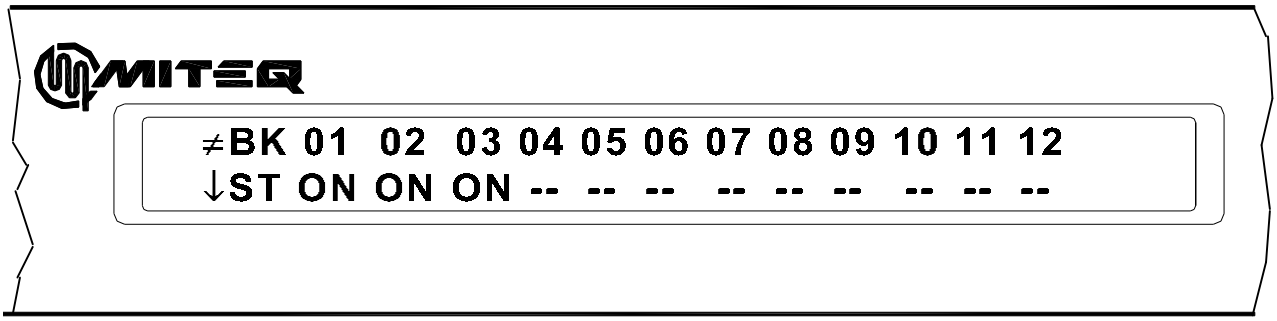
The Data Entry keys allow the operator to enter specific data into an active field. Data is entered by using the numeric keypad and pressing "ENTER", or by using the up and down arrows to scroll until the desired setting is displayed and then pressing the "ENTER" key. If using the arrow keys to change attenuation, slope or gain equalization settings, the "ENTER" key need not be pressed. If using the numeric keypad to change attenuation, slope or gain equalization the "ENTER" key must be pressed. Once a data entry has been initiated with the numeric entry keys the up and down arrows can be used to change the sign where applicable. Invalid entries will be ignored and cause an error tone to sound. Any data entry not terminated by pressing the "ENTER" key will expire after ten seconds, an error tone will sound, and the display will be restored to its prior setting.

To change a setting while in local mode:

Use the up and down arrows to navigate until the desired screen appears on the display.
Press the left or right arrow to change the cursor to a "right arrow" character "→"
If not already selected, select the desired data field by pressing the left or right arrow keys until the desired data field is to the immediate right of the cursor. Data can now be entered.
Enter the desired data using either the numeric entry keys or the up and down arrows. Note that while the cursor appears as a "→" the up and down arrow keys are used for data entry as opposed to screen navigation.
If necessary, press the "ENTER" key to accept the data entry.

3.2.4 REDUNDANCY CHAIN STATUS SCREEN

The Redundancy Chain Status screen is the default context of the display. These settings appear at power-up. After one minute of idle time the display will default to the Redundancy Chain Status screen. Repeated presses of the "STATUS" button will toggle the display between the Status screen and the Redundancy Chain Status screen.
The fields in the Redundancy Chain Status screen provide overall status of the redundancy chain including the status of the converters and switch modules in the redundancy chain. The upper row of the display indicates redundancy chain position and the state of the converters. The lower row of the display shows the transfer switch position and status of the individual Switch Modules. The individual settings and NSU-Converter Serial Link options of each converter can be accessed from this screen.



"ON" or **"on"** indicates that the transfer switch(es) associated with a particular chain position are in the online position.

"ST" or **"st"** indicates that the transfer switch(es) associated with a particular chain position are in the standby position.

Upper case letters ("ON" or "ST") indicate that NSU-Converter Serial Link has been enabled for the converter in the associated redundancy chain position.

Lower case letters ("on" or "st") indicate that NSU-Converter Serial Link has been disabled for the converter in the associated redundancy chain position.

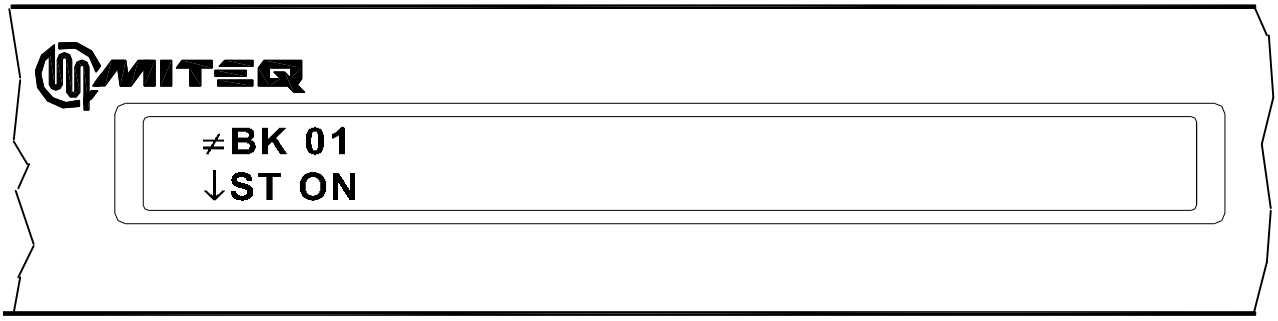
"- -" in the lower row indicates an unoccupied chain position.

Blinking characters indicate a fault. If the digits in the upper row for a particular redundancy chain position are blinking the NSU is either unable to communicate with the converter in that redundancy chain position or the converter is indicating a fault. Blinking characters in the lower row for a particular chain position indicate the NSU is either unable to communicate with the switch module in that redundancy chain position or the switch module is indicating a fault.

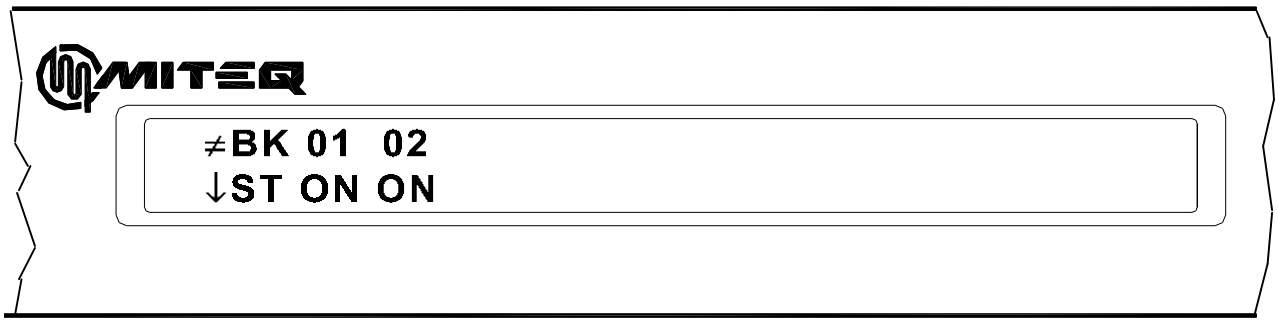
Blinking question marks "??" in the lower row indicates that the NSU recognizes the contacts of a converter however communication with the associated switch module has not yet been established.

Display	Description
- -	Position unoccupied
ST	The transfer switches in this chain position have the unit in standby and the NSU-Converter Serial Link is enabled.
ON	The transfer switches in this chain position have the unit online and the NSU-Converter Serial Link is enabled.
st	The transfer switches in this chain position have the unit in standby and the NSU-Converter Serial Link is disabled.
on	The transfer switches in this chain position have the unit online and the NSU-Converter Serial Link is disabled.

The example screen above shows an NSUN in a 1:3 redundancy configuration operating in automatic redundancy mode. The Backup Unit is in standby while all three Primary Units are online. The NSUN configuration will allow for up to twelve Primary converters to be backed up by the NSU system.



The display above shows the Redundancy Chain status screen for an NSU1 system. This system can only back up one primary converter.



The display above shows the Redundancy Chain status screen for an NSU2 system. This system can back up two Primary converters.

Both the NSU1 and the NSU2 systems have Redundant switches built into the NSU1 and NSU2 control units. The NSUN Redundant switch modules are individual assemblies that are mounted outside the NSUN control unit.

Redundancy Mode (Automatic/Manual)

Repeated presses of the “AUTO” button will toggle the redundancy mode between Automatic and Manual. The “AUTO” indicator button will light green when in Automatic redundancy mode. The “AUTO” indicator button will not be lit when in Manual redundancy mode.

Transfer Switch Position (Online/Standby/Unoccupied)

To toggle the transfer switch position associated with a chain position between online and standby the Control Unit must be in the manual redundancy mode. To change switch position:

Press the left or right arrow key until the data field directly below the desired chain position is selected. The cursor should be to the left of the data field on the bottom row of the display.

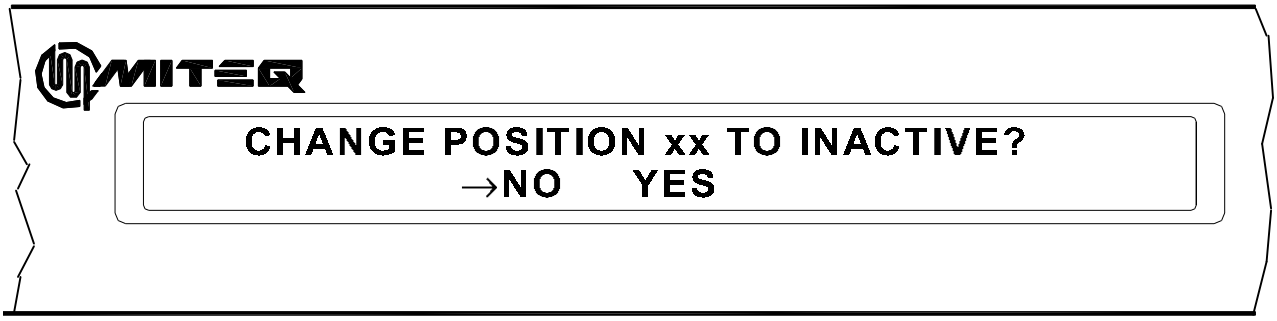
Use the up and down arrow keys to select online “ON”, standby “ST” or “- -“ (unoccupied position).

For online or standby Press “ENTER” to set the displayed status.

For Unoccupied the operator must confirm taking the converter out of the Redundancy Chain by choosing yes. If no choice is made within 10 seconds the selection times out and no change is made.

It is important to note here that normally one unit will be in the standby position, all others will be online or unoccupied. Therefore, toggling the state of a single transfer switch will always toggle the transfer switches associated with two chain positions.

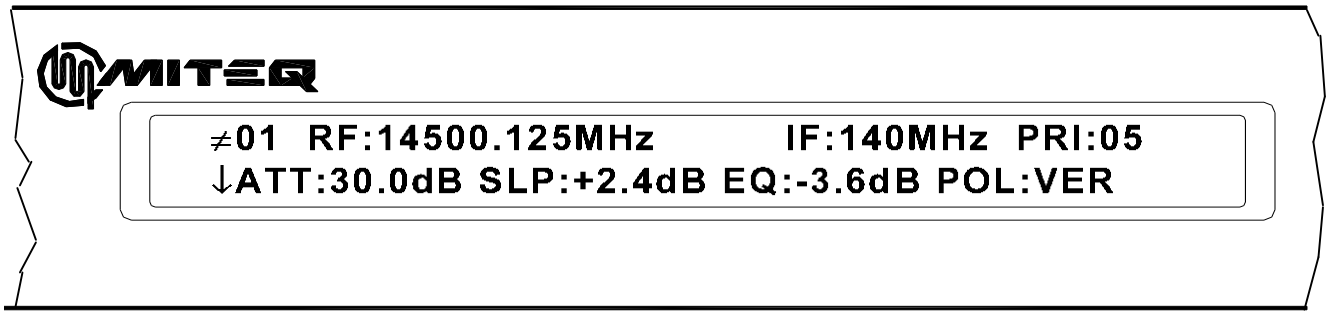
The NSU will recognize and automatically add new converters to the redundancy chain. To add a converter to the redundancy chain, the form-c contacts must be connected, the RS485 connection between the NSU and the converter must be established (or the NSU-Converter Serial Link must be disabled), and the NSU must establish communication with the switch module. Converters can only be added to the redundancy chain using the technique described above. Once a converter has been added to the redundancy chain a lapse in any of the above criteria will not eliminate the converter from the redundancy chain.



Removing converters from the redundancy chain must be done deliberately either from the front panel or by using remote commands. The control unit will not automatically change a chain position to the unoccupied state. To eliminate a redundancy chain position: place the NSU in the manual redundancy mode, change the position to unoccupied "- -" and press "Enter". A message appears "Change Position nn to Inactive? Select "Yes" to disconnect the switch and the converter. If nothing is done the default is "No" and the switch and converter will remain active in the redundancy chain.

3.2.5 CONVERTER SETTINGS SUBSCREEN

The settings for each of the converters in the redundancy chain are accessible from a subscreen of the Redundancy Chain Status screen. The polling process updates the settings stored in the NSU for converters that have their NSU-Converter Serial Link option enabled. The operator must enter settings stored in the NSU for converters that have NSU-Converter Serial Link disabled.



To access a Converter Settings Subscreen from the Redundancy Chain Status screen, press the left or right arrow key until cursor is just left of the desired chain

position in the bottom line of the display. Press “ENTER”. The display will show the Converter Settings Subscreen for that chain position as shown below.
Upon entering a Converter Settings Subscreen, up and down arrows appear at the leftmost part of the display. All Converter Settings Subscreens can be accessed by using the up and down arrows to scroll through the list.
From within a Converter Settings Subscreen press “C” once to get back to subscreen navigation. Press “C” again to exit the Converter Settings Subscreen and return to the Redundancy Chain Status screen.
The converter settings can be changed from the Converter Settings Subscreen. Any changes made to converters that are being polled will be sent to that converter from this screen. For those converters with the NSU-Converter Serial Link enabled, the polling activity will keep the NSU and the converter synchronized.
The following settings can be accessed from the Converter Settings Subscreen and are updated by polling activity: RF Frequency, IF Frequency and Attenuation. In order to make changes to the converter settings the NSU Control Unit must be in Local control mode. For changes to be accepted by a converter being polled, that converter must be in Remote control mode. If a unit with the NSU-Converter Serial Link enabled is not in Remote control mode, the operator cannot change RF Frequency, IF Frequency or Attenuation.
Polarization, Gain Equalization, Slope and Priority settings can be accessed in the Converter Settings Subscreen. These settings do not affect the primary converter and are stored in the NSU only.

RF: RF Frequency

To re-tune the RF Frequency of the selected converter:

Press the left or right arrow key to select the RF Frequency field on the display.
Use the numeric data entry keys to enter the desired frequency in MHz.
Press “ENTER” to save the RF Frequency in the NSU.
If the NSU-Converter Serial Link is enabled for the selected converter the NSU will attempt to tune the selected converter to the desired frequency. If the NSU cannot tune the converter an error tone is generated and the entry is revoked.

Note: For block converters store the translation frequency in the NSU.

IF: IF Frequency

The NSU Control Unit is intended to work with earlier equipment as well as the latest MITEQ frequency converter products. Some products are not equipped with selectable IF frequencies. For these units the IF Frequency information is for display purposes only. To select the IF Frequency of a unit that is equipped with switchable IF:

Press the left or right arrow key to select the IF Frequency field on the display.
Use the up and down arrow keys to select the IF Frequency on the display.
Press “ENTER” to save the IF Frequency in the NSU.
If the NSU-Converter Serial Link is enabled for the selected converter the NSU will attempt to set the selected converter to the desired IF frequency. If the NSU cannot set the converter to the new IF frequency an error tone is generated and the entry will be revoked.

PRI: Priority

To change the Priority of the selected converter:

Press the left or right arrow key to select the Priority field on the display.
Use the up and down arrow keys or the numeric entry keys to enter the desired Priority.
Press “ENTER” to save the Priority in the NSU. If the priority is set a value greater than 12, an error tone is generated and the entry will be revoked.

ATT: Attenuation

To change the attenuation setting of the selected converter:

Press the left or right arrow key to select the attenuation field on the display.
Use the numeric data entry keys to enter a specific attenuation value. The up and down arrow keys can be used to increment or decrement the attenuation dynamically.
If the numeric data entry keys were used, press “ENTER” to set the displayed attenuation.
If the NSU-Converter Serial Link is enabled for the selected converter the NSU will attempt to set the selected converter to the desired attenuation. If the NSU cannot set the converter to the new attenuation an error tone is generated and the entry will be revoked.

SLP: Backup Converter Slope

The Backup Converter Slope settings are only relevant when the backup converter is equipped with a programmable slope adjustment. In the case where the Backup Converter is not equipped with slope control, the slope settings are not displayed. The operator can store slope settings for each path that the backup converter may occupy. The slope setting of the Primary Converter has no bearing on the NSU operations and cannot be accessed from this screen. For example, when the backup converter is online in place of a Primary Converter the Backup Converter will be set to the Backup Converter Slope stored in the NSU for that chain position regardless of the slope setting of the Primary Converter. To adjust the Backup Converter Slope for the selected chain position:

Press the left or right arrow key to select the slope field on the display.
Use the numeric data entry keys to enter a specific slope value or use the up and down arrow keys to increment or decrement the displayed slope.
If the numeric data entry keys were used, press “ENTER” to set the displayed slope. NOTE: once an entry has been initiated using the numeric keys, the up and down arrow keys can be used to toggle the sign.
If the NSU-Converter Serial Link is enabled for the Backup Converter and the Backup Converter in online in the selected chain position the NSU will attempt to set the Backup Converter to the slope displayed. If the NSU cannot set the Backup Converter to the new slope an error tone is generated and the entry will be revoked.

EQ: Gain Equalization

In the case of a redundant switchover, the attenuation applied by the Backup Unit becomes equal to the attenuation setting of the Primary Unit added to the signed value of the Gain Equalization setting. This provides for compensation of the difference in cable losses. The calculated attenuation will be bounded by a 0.0 dB minimum and 30.0 dB maximum, moving in 0.2 dB steps.

To change the Gain Equalization setting for a redundancy chain position:

Press the left or right arrow key to select the gain equalization field on the display.
Use the numeric data entry keys to enter the desired gain equalization or the up and down arrow keys to increment or decrement the gain equalization. NOTE: once an entry has been initiated using the numeric keys, the up and down arrow keys can be used to toggle the sign.
Press “ENTER” to set the displayed equalization.
If the NSU-Converter Serial Link is enabled for the Backup Converter and the Backup Converter in online in the selected chain position the NSU will attempt to set the Backup Converter to the calculated attenuation. If the NSU cannot set the Backup Converter to the new attenuation an error tone is generated and the entry will be revoked.

Polarization (NSUN Only)

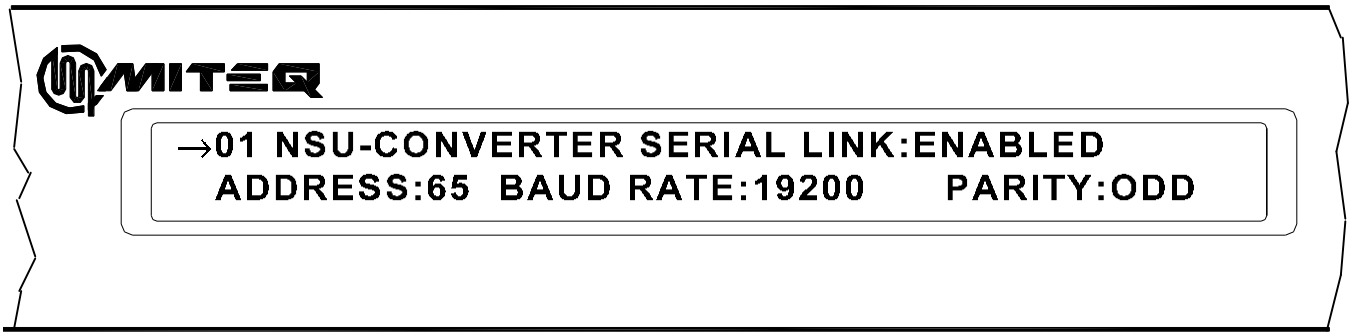
The Polarization settings are only relevant when the Redundancy Chain includes a Polarization switch. In the case where a Polarization Switch is not present, the Polarization settings are not displayed. Polarization must be set for the Backup Converter before the selection is made available for the Primary Converters.
When the Polarization switch is installed, the only Polarization selections available for the Backup Converter are “VER” for vertical and “HOR” for horizontal. When the Backup Converter detects the Polarization switch it reads the switch indicators and displays the current switch position. Once detected in the system, the Polarization switch cannot be set to “N/A” (not applicable). When there is no Polarization switch installed “N/A” for not applicable is displayed.

To select the Polarization:

Press the left or right arrow key to select the Polarization field on the display.
Use the arrow keys to toggle between the “VER” vertical or “HOR” horizontal.
Press “ENTER” to set the displayed Polarization.
When the polarization of the converter in Standby is changed, the Polarization Switch is set to the new polarization.

NSU-Converter Serial Link Subscreen

The NSU-Converter serial link for each chain position can be enabled or disabled from a subscreen of the Converter Settings Subscreen.



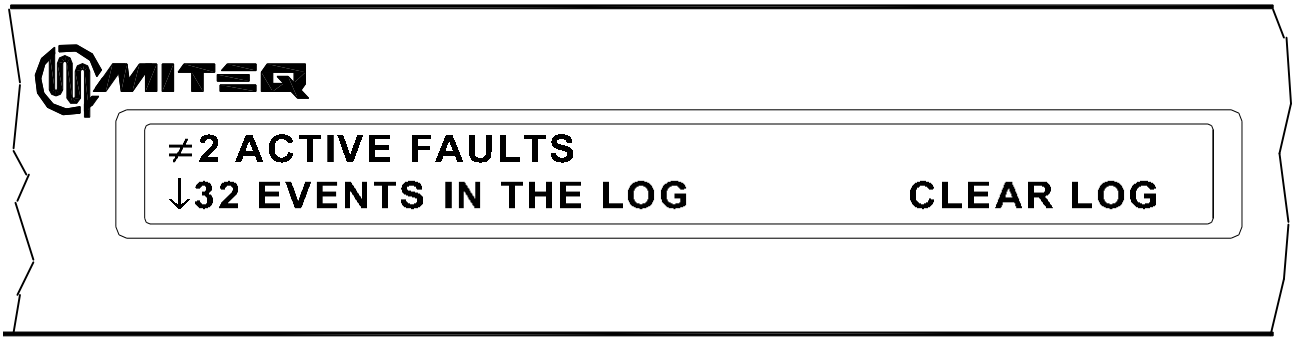
To enable or disable NSU-Converter Serial Link option of a converter:

From the Chain Redundancy Status screen, press the left or right arrow key until cursor is just left of the desired chain position in the bottom line of the display.
Press “ENTER” to access the Converter Settings Subscreen.
Press the left or right arrow once (→) and press “ENTER”. To access the NSU-Converter Serial Link Subscreen. The screen will appear as shown above. The Address, Baud Rate and Parity are fixed, not customer adjustable, and are displayed for set-up information purposes only. If the NSU-Converter Serial Link is disabled, the Address, Baud Rate and Parity will not be displayed.
Press the up or down arrow keys to toggle the Converter Remote Control between “ENABLED” and “DISABLED”.
Press “ENTER” to set the Converter Remote Control setting.

3.2.6 STATUS SCREEN

For convenience, pressing the “STATUS” indicator button can immediately access the Status Screen.

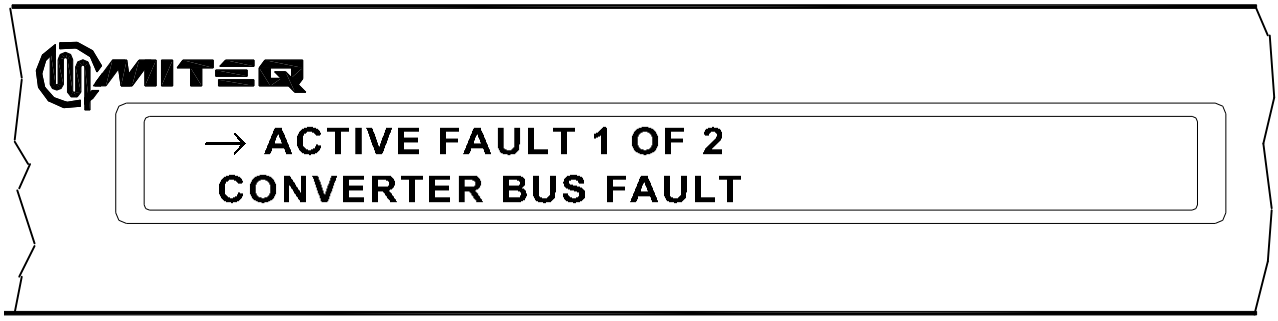
This screen provides access to the status of the NSU. This screen also allows the operator to review and clear the event log. The event log records the time and date of significant events including all fault activity. The “STATUS” indicator button will light red when there is an active fault. The “STATUS” indicator button will light amber if there are no active faults and fault activity has been stored in the event log.



Active Faults

The number of active faults is reported in the Status Screen. To view the active faults:

Press the left or right arrow key to activate the Active Faults field on the display.
Use the up and down arrow keys to scroll through all of the active faults.
Press the “C” key to return to the Status Screen.



The active faults that can be reported are:

Power Supply 'A' fault
Power Supply 'B' fault
Converter bus fault
Converter Contact Failure fault
Switch Module fault
Switch Module Bus fault

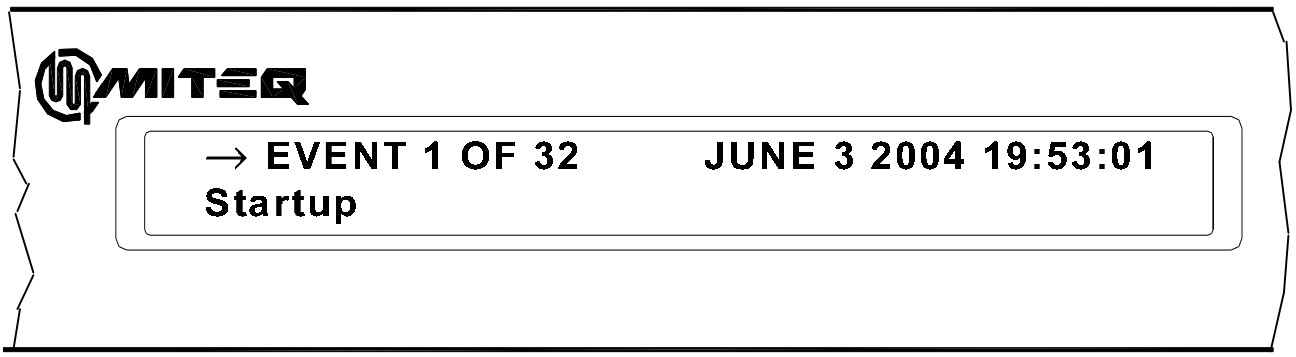
Event Log

To view the event log:

From the Status Screen press the left or right arrow key to highlight the Event Log field on the display.
Use the up and down arrow keys to scroll through all of the events stored in the Event Log. Events are displayed in reverse chronological order; most recent (highest numbered) first.
Press the "C" key to return to the Status Screen.

The events that can be reported are:

Event Log Cleared
Unit Startup
Converter Contact fault/recovery
Converter Bus fault/recovery
Switch Module fault/recovery
Switch Module Bus fault/recovery
Power Supply 'A' fault/recovery
Power Supply 'B' fault/recovery
Primary Unit fault/recovery
Backup Unit fault/recovery
Redundancy Mode changes
Redundancy Priority changes
Redundancy Chain Configuration change (add or remove positions)
Transfer Switch Position (Online/Standby) changes
Polarization Switch Position (Horizontal/Vertical) changes
NSU Control Mode changes (Remote/Local)



Clear Event Log

To clear the Event Log of its contents:

Press the left or right arrow key to highlight the Clear Log field on the display. Press the “ENTER” key. A message will appear:

“PRESS ENT TO CLEAR THE EVENT LOG.”

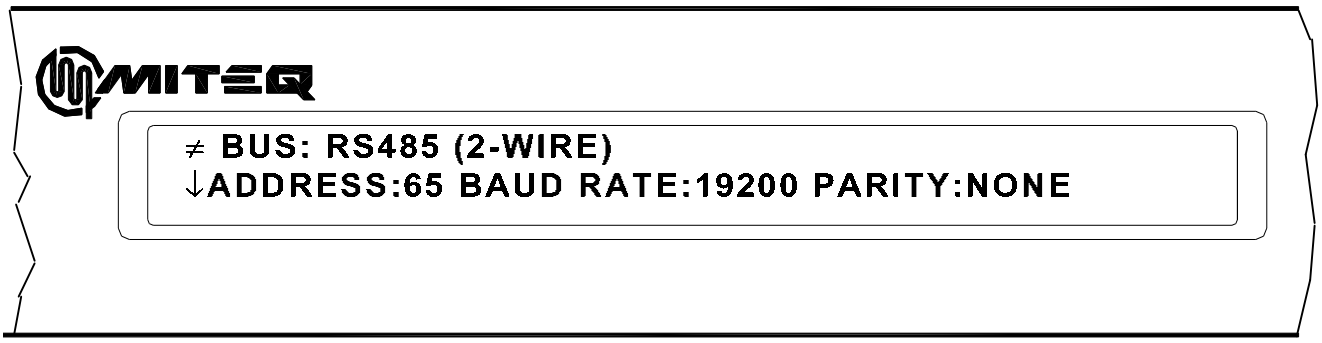
Press “ENTER” to purge the contents of the event log or press the “C” key to return to the Status Screen.

3.2.7 SERIAL PORT REMOTE OPERATION SCREEN

If not already displayed, use the Up and down arrow keys to access the Serial port remote operation screen.

The serial port remote operation screen allows the operator to configure the remote control parameters listed below.

RS485 (2-wire) or RS422 (4-wire) Bus
RS485/RS422 or RS232 Remote Address
RS485/RS422 or RS232 Baud Rate
RS485/RS422 or RS232 Parity



RS485/RS422/RS232 Parameters

BUS
Standard units are equipped with an RS485/RS422 interface. To operate in a 2-wire configuration RS485 should be selected. To operate in a 4-wire configuration RS422 should be selected. For units equipped with the RS232 option this field cannot be changed.

To switch between RS485 and RS422 on standard units:

Press the left or right arrow key to select the bus field on the display.
Use the up and down arrow keys to toggle between RS485 and RS422 operation.
Press “ENTER” to save the selection.

RS485/RS422 or RS232 Address
Units can occupy a remote address from 64 to 95 decimal. To select the remote address:

Press the left or right arrow key to select the address field on the display.
Use the numeric data entry keys to enter the desired address or the up and down arrow keys to increment or decrement the displayed address respectively.
Press “ENTER” to save the address.

RS485/RS422 or RS232 Baud Rate
To select the baud rate of the serial port:

Press the left or right arrow key to select the baud rate field on the display.
Use the up and down arrow keys to scroll through the available options until the desired setting is displayed. The baud rates available are 1200, 2400, 4800, 9600, and 19200.
Press “ENTER” to save the selection.

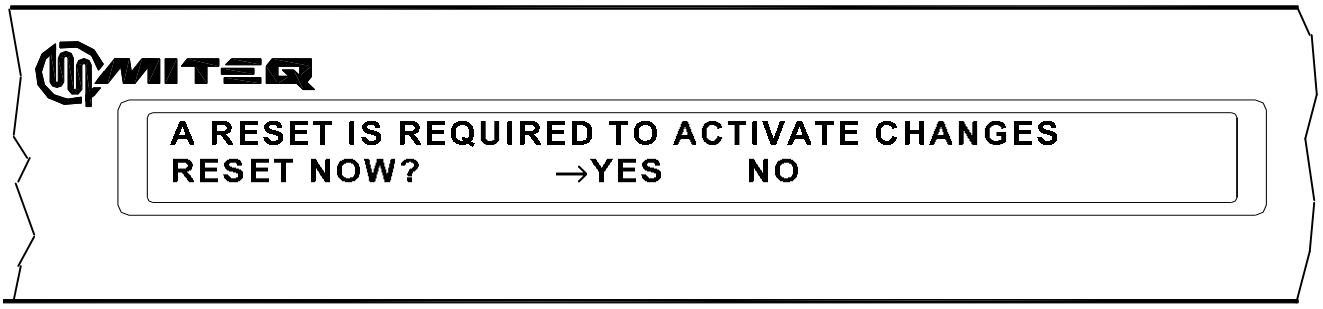
RS485/RS422 or RS232 Parity
To select the parity for remote communications:

Press the left or right arrow key to select the parity field on the display.
Use the up and down arrow keys to scroll through the available options until the desired setting is displayed. The parity can be set to ODD, EVEN, or NONE.
Press “ENTER” to set the parity selection.

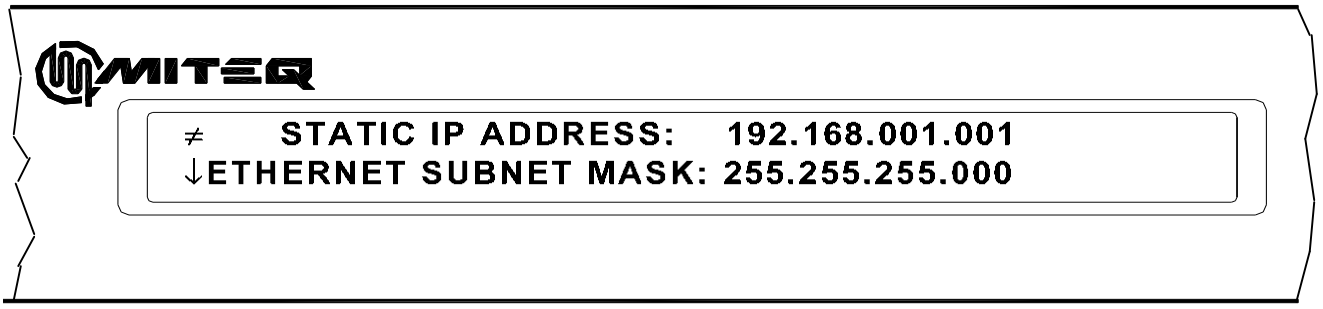
3.2.8 ETHERNET PORT REMOTE OPERATION SCREENS

If not already displayed, use the Up and down arrow keys to access the Ethernet Port remote operation screens. The Ethernet port remote operation screens allow the operator to configure the Ethernet settings listed below. These are presented in two consecutive screens.

Ethernet IP Address
Ethernet Subnet Mask
Ethernet Gateway
Ethernet Password



NOTE: With the exception of Ethernet Password, the entry of all Ethernet Parameters requires a system reset in order to invoke the changes. The screen above will appear after any change. This screen gives the operator the option to defer the reset until all Ethernet parameters have been updated. Select “YES” and Press “ENTER” to re-start the NSU. Select “NO” and press “ENTER” to dismiss the screen and enter other Ethernet parameters.



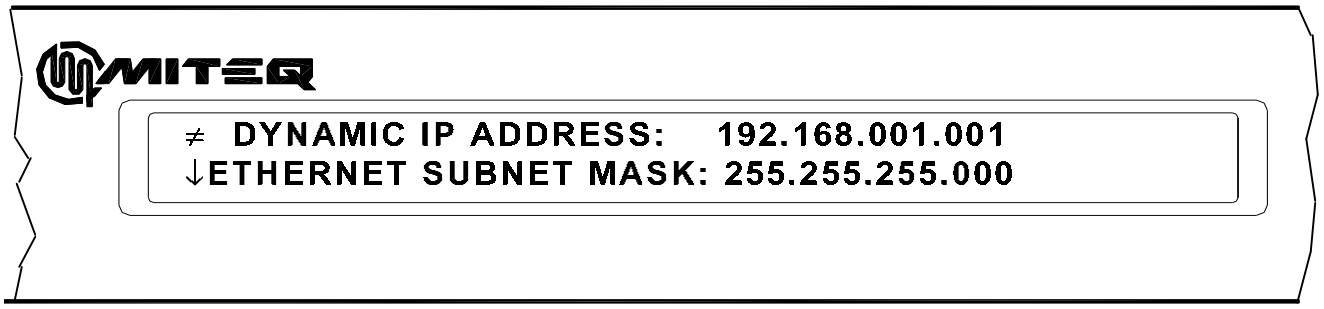
To change the Static IP Address:

Press the left or right arrow key to select the IP Address field on the display.
Use the numeric entry keys to enter each octet of the IP Address and the decimal point to advance to the next octet. If no changes are required for a particular octet simply press the decimal point to advance to the next octet.
Press “ENTER” to save the IP Address.

If using a DHCP server the IP address and Ethernet parameters can be set automatically.

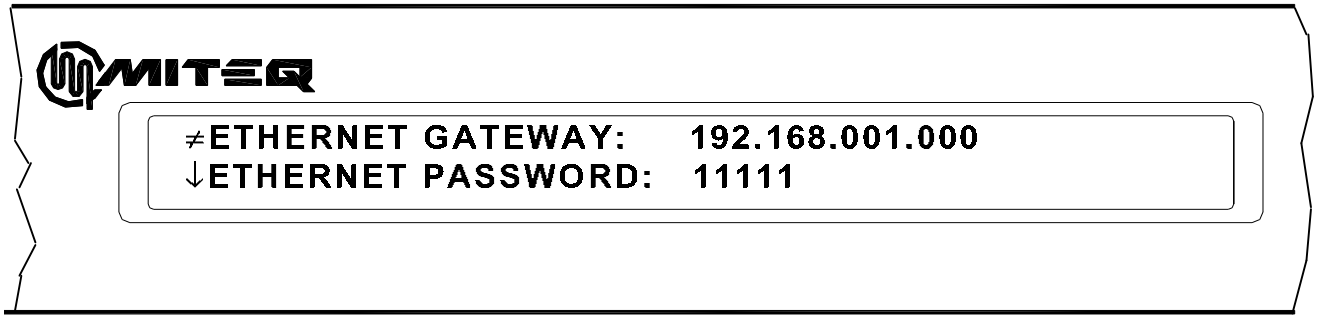
To change the Dynamic IP Address:

Press the left or right arrow key to select the IP Address field on the display.
Use the ≠↓ arrow keys to choose between Dynamic IP Address and Static IP Address. Press “ENTER”.
The RESET screen shown above will appear. Choose “YES” and the NSU will reset with a dynamically assigned IP address.



To change the Ethernet Subnet Mask:

Press the left or right arrow key to select the Ethernet Subnet Mask field on the display.
Use the numeric entry keys to enter each octet of the Subnet Mask and the decimal point to advance to the next octet. If no changes are required for a particular octet simply press the decimal point to advance to the next octet.
Press “ENTER” to save the Subnet Mask.

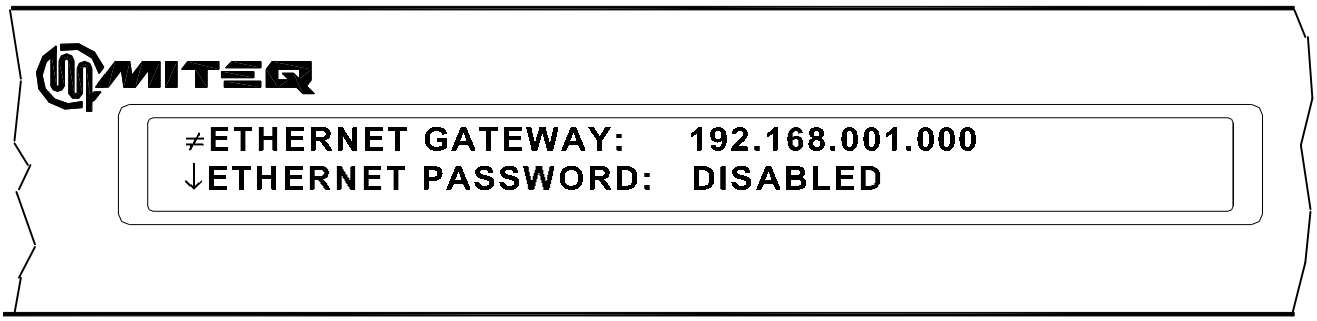


To change the Ethernet Gateway:

Press the left or right arrow key to select the Ethernet Gateway field on the display.
Use the numeric entry keys to enter each octet of the Ethernet Gateway and the decimal point to advance to the next octet. If no changes are required for a particular octet simply press the decimal point to advance to the next octet.
Press “ENTER” to save the Ethernet Gateway.

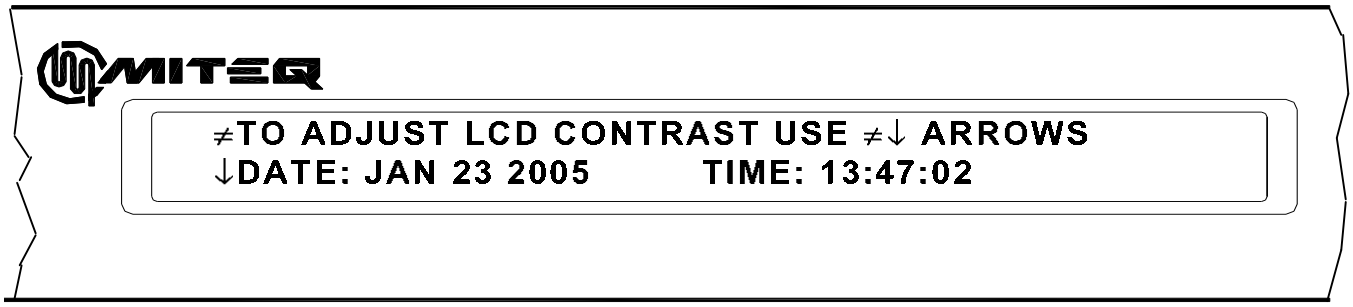
To Change the Ethernet Password:

Press the right arrow key to select the Ethernet Password field on the display.
Use the up or down arrow keys to choose between an Ethernet Password or disabling the Ethernet Password.
Use the numeric entry keys to enter a five-digit Ethernet Password.
Press “ENTER” to save the Ethernet Password.



3.2.9 UTILITY SCREEN

If not already displayed, use the Up and down arrow keys to access the Utility Screen. The utility screen allows the operator to enter the date and time as well as adjust the contrast of the LCD.



LCD Contrast

In order to adjust the LCD contrast:

Press the right arrow key to locate the cursor in the contrast field.
Use the up or down arrow keys to adjust the contrast of the display.
An Error tone will sound if the end of the adjustment range is reached.

NOTE: If the display is too light or too dark to read use the following sequence to quickly access contrast.

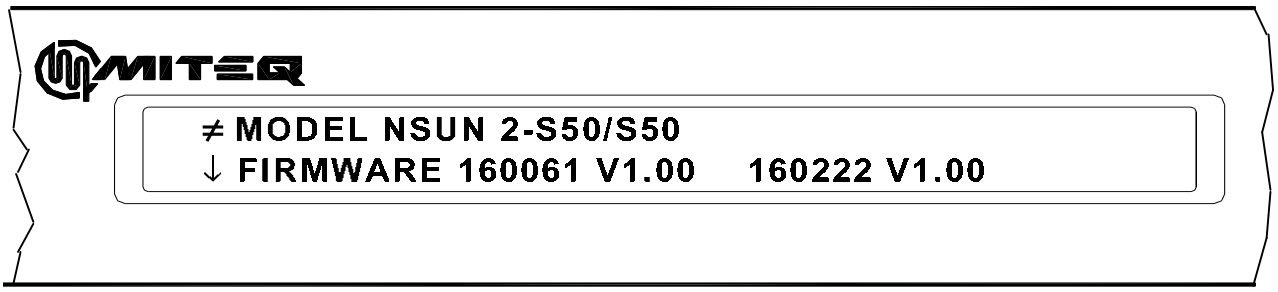
1) Press the “STATUS” indicator button
2) Press the decimal point button “.”
3) Use the up arrow to darken the display or the down arrow to lighten the display.

Date and Time
In order to adjust the date and time:

Press the left or right arrow key to select each of the fields: month, day, year, hour, minute, second.
If the selected field is correct then press the left or right arrow key to advance to the next field.
If the selected field needs adjustment use the up or down arrow keys or the numeric data entry keys to adjust the new display.
Continue to press the left or right arrow key adjusting the necessary fields until all of the fields are correct.
Press “ENTER” at any time to set the date and time to those displayed.

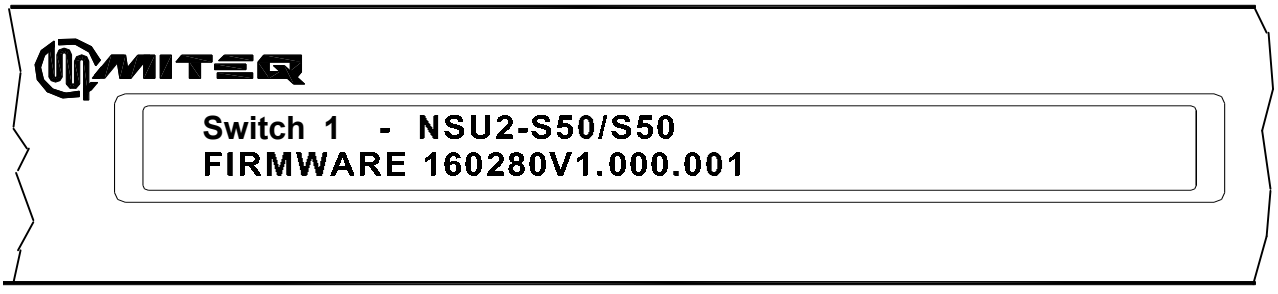
3.2.10 SYSTEM INFORMATION SCREEN

If not already displayed, use the Up and down arrow keys to access the System Information Screen.



This screen displays the model numbers and firmware versions of the NSU Control Unit and connected Switch Modules.
To view the information of a single element of the Redundancy Chain:

Press the left or right arrow key to highlight the model field.
Use the up and down arrow keys to scroll through each of the elements in the redundancy chain



SECTION 4

REMOTE OPERATIONS

The equipment is supplied with an RS485/RS422 bus interface and an Ethernet interface. As an option the unit can be supplied with RS232 instead of the RS485/RS422 interface.

4.1 SERIAL REMOTE PROTOCOL (RS485/RS422/RS232)

The command structures for the serial buses; RS485, RS422 and RS232 are identical. All transmissions are multi-byte sequences beginning with a header byte and ending with a trailer byte and checksum byte. The transmitted bytes are all ASCII printable characters in the range of 20H to 7EH.

Serial data format is a 10-bit sequence. With parity set to odd or even the data includes 1 Start bit, 7 Data bits, 1 Parity bit, and 1 Stop bit. With the parity set for none the data includes 1 Start bit, 8 Data bits and 1 Stop bit. All characters, including the checksum character, are checked for parity. If any character in a command message contains an error (parity, framing or overrun) or the checksum is incorrect, the command is ignored and no response is made. The remote parameters: Address, Baud Rate, and Parity are programmable from the front panel. The response time from command to acknowledge is 100 ms. maximum.

All messages addressed to the equipment are acknowledged with a response message. The unit continually monitors the communication bus and will accept commands, addressed to it, even in Local mode. When in Local mode, receipt of any SET commands (commands beginning with “$”) will be ignored and the unit will respond with an error code.

The response time from command to acknowledge is 100 ms. maximum. Since all bytes are ASCII printable characters, a compatible terminal may be used to control the equipment or monitor traffic on the communication bus. The serial message format described below including checksum generation must be adhered to.

4.1.1 SERIAL MESSAGE FORMAT

The serial message format is as follows:

HEADER - ADDRESS - COMMAND/ERROR CODE - PARAMETERS - TRAILER - CHECKSUM

The Header byte is 123 decimal (7BH, ASCII character "{").

The address may take on the values from 64 to 95 decimal (40H to 5FH, ASCII characters “@” to “_”).

Commands are three ASCII characters preceded by an ASCII “?” or “$.” Commands preceded by “?” are QUERY commands and those preceded by “$” are SET commands. Query commands are used to examine system parameters while SET commands are intended to modify system parameters.

Parameters are all ASCII printable characters in the range of 20H to 7EH. Numeric parameters are sent MSD first, LSD last. Values which do not adhere to the command format, or are beyond the allowable range, will be rejected and cause the unit to respond with an error code.

The Trailer byte is 125 decimal (7DH, ASCII character "}").

The checksum byte is the sum modulo 95 of all message characters beginning with the header byte up to and including the trailer byte. The value 32 is subtracted from each character value before taking the modulo 95 sum. The value 32 is added to the final sum to obtain the checksum value. All values are in decimal.

Checksum = MOD [(character value - 32), 95] + 32

Below is a program, written in the 'C' programming language that illustrates the checksum calculation.

```
/*
   return the checksum character for the message in array
   subtract 32 from each character before taking modulo 95 sum
   add 32 to the final sum
   mes_len = message length
*/
char check_sum(char *array, char mes_len)
{
char i,sum;

  for (i = 0, sum = 0; i < mes_len; i++) {
    sum += *array++ - 32;
    sum %= 95;
  }
  return(sum + 32);
}
```

4.2 COMMAND CODE SUMMARY

The following paragraphs describe each of the command codes. The NSU will also respond to the legacy command set used in the RSUN, 1-N Broadband Redundant Switching Unit. Please refer to MITEQ Technical Note 25T030 for more information on that command set.

4.2.1 COMMAND CODES

ASCII Character String	Function
ACS	Active Converter Status
ALR	System Fault Status
ATT	Converter Position Attenuation
CLK	Internal Calendar/Clock
EAD	All Ethernet Parameters
EQU	Gain Equalization
FRQ	Converter Position Frequency
IFS	Converter Position IF Frequency
LOG	Event Log
MOD	Unit model number
NAM	Unit title
POL	Polarization
PRI	Chain Priority
RED	Redundancy Mode
SER	Unit Serial number
SLP	Backup Path Slope
STA	System Status
SWP	Transfer Switch Position
SWT	Switch Module Type
VER	Firmware Title and Version
*nn	Converter Pass-Through Command

4.2.2 ERROR CODES (SERIAL PROTOCOL ONLY)

ASCII Character	Function
a	Command not recognized
b	Illegal parameter or parameter out of range
c	Unit in Local mode
d	Busy

4.2.3 ACTIVE CONVERTER STATUS = ACS

The SET command requires twenty-six parameters. The set form of this command is used to enable or disable the NSU-Converter Serial Link for each position in the redundancy chain. A chain position can be deactivated with the SET command. A chain position CANNOT be activated with a set command. To activate a chain position, the form-c contacts must be connected to the NSU, the NSU must establish communication with the switch module in the chain and then the RS485 connection between the NSU and the converter must be established unless the NSU-Converter Serial Link has been disabled.

Regardless of whether the unit is an NSU1, NSU2 or NSUN the set and query forms of the ACS command requires all 26 parameters. For an NSU1 and NSU2 if a change to a serial link or chain position outside the range of the NSU is attempted the NSU will respond with “b”: illegal parameter or parameter out of range. The acceptable range for an NSU1 is the Backup and Primary converter one positions. For an NSU2 the acceptable range is the Backup position and Primary converter positions one and two. For the NSUN changes to any of the thirteen positions are accepted.

Remote Command Sequence: $ACSsssssssssssssCccccccccccccc
Response: $ACS

ACS: Active chain position Status indicator
ssssssssssss: 13 positions of ASCII characters, the first character represents the backup position followed by primary position 1, the last character represents primary position 12.

0 = NSU-Converter Serial Link enabled
2 = NSU-Converter Serial Link disabled
* = no change to stored value in position

ccccccccccccc: 13 positions of ASCII characters, the first character represents the backup position followed by primary position 1, the last character represents primary position 12.

- = deactivate redundancy chain position
* = no change to stored value in position

The QUERY command requires no parameters. The query form of this command informs the operator of the operational condition of each NSU-Converter Serial Link and the status of the converter contacts in the redundancy chain.

Remote Command Sequence: ?ACS
Response: ? ACSsssssssssssssCccccccccccccc

ACS: Active Converter Status indicator
ssssssssssss: 13 positions of ASCII characters, the first character represents the backup position followed by primary position 1, the last character represents primary position 12.

0 = No Fault - NSU-Converter Serial Link enabled and communicating
1 = Fault - NSU-Converter Serial Link enabled and not communicating
2 = No Fault - NSU-Converter Serial Link disabled
- = No Fault - Chain position inactive

ccccccccccccc: 13 positions of ASCII characters, the first character represents the backup position followed by primary position 1, the last character represents primary position 12.

0 = No Fault – chain position active
1 = Fault –chain postion active (Fault reported normally)
2 = Fault - chain postion active both contacts open
3 = Fault - chain postion active both contacts closed
- = chain postion inactive disconnected from redundancy chain
+ = chain postion inactive connected to redundancy chain

4.2.3.1 ACTIVE CONVERTER STATUS (ACS) COMMAND EXAMPLES

The following examples are for an NSUN with seven primary converters and a backup converter connected.

Query Cmd: ?ACS

Reply: ?ACS00000000-----C00000000-----

The reply shows that there are seven Primary converters and a backup converter all with serial links enabled and no contact errors.

To de-activate serial link for primary converter 1

Cmd: $ACS*2**********C**********

Reply: $ACS

Note: The "" character must be used for any chain position in which no changes are being made otherwise an error will be generated and the command will not be accepted. This also applies to chain positions that have not yet been enabled.*

Query Cmd ?ACS

Reply ?ACS02000000-----C00000000-----

To de-activate redundancy chain position 1

Cmd $ACS**********C*-**********

Reply$ACS

Query Cmd ?ACS

Reply ?ACS0-000000-----C0+000000-----

Enable the serial link for primary converter 1

Cmd $ACS*0**********C**********

Reply $ACS

Query Cmd?ACS

Reply ?ACS0-000000-----C0+000000-----

Note: Once a chain position has been de-activated the converter contacts must be removed and the reconnected for the NSU to detect the presence of a converter again. A chain position cannot be created using any form of the $ACS command.

The following is an example of querying Active Converter Status for an NSU2 with a Backup and two Primary converters connected.

Query Cmd: ?ACS

Reply: ?ACS000----------C000----------

The reply shows that there are two Primary converters and a Backup converter all with serial links enabled and no contact errors.

Note: Although all thirteen serial links and all thirteen chain positions are shown, only converters within the first three positions of the response (Backup, Primary 1 and Primary 2) can be changed. Attempting to change the state of a serial link or chain position outside this range will generate an error response "b": illegal parameter or parameter out of range, and the action will not be implemented.

The following is an example of querying Active Converter Status for an NSU1 with a Backup and one Primary converter connected.

Query Cmd: ?ACS

Reply: ?ACS00----------C00----------

The reply shows that there is one Primary converter and a Backup converter both with serial links enabled and no contact errors.

Note: Again, although all thirteen serial links and all thirteen chain positions are shown, only converters within the first two positions of the response (Backup and Primary 1) can be changed. Attempting to change the state of a serial link or chain position outside this range will generate an error response "b": illegal parameter or parameter out of range, and the action will not be implemented.

4.2.4 SYSTEM FAULT STATUS = ALR

There is no SET command.

The QUERY command requires no parameters.

Remote Command Sequence: ?ALR
Response: ?ALRabcdefghi

?ALR: Status indicator
a-i: "0" or "1" ASCII numeric character
0 = No fault or fault
1 = Fault/Fault

a-i indicates the status of the component faults described below.

a	Power Supply 'A' Fault
b	Power Supply 'B' Fault
c	Converter Bus Fault
d	Converter Contact Fault
e	Switch Module fault
f	Switch Module Bus fault
g	Reserved for future use
h	Reserved for future use
i	Reserved for future use

4.2.5 UNIT ATTENUATION = ATT

The SET command requires two parameters. One is two digits in length representing the redundancy chain position, and the other which is three digits in length represents the attenuation in tenths of a dB. No decimal points are used. The attenuation values increment in 0.2 dB steps. For values less than 10.0 dB leading zeros must be used.

This command is used to specify the attenuation of the Primary converter in a given chain position. If the Primary converter's serial link is enabled and the unit attenuation is sent to the NSU control unit, the attenuation of the Primary converter in that chain position will be updated. It will be updated even if the attenuation value is the same as what is presently stored in the Primary converter.

If the serial link between the NSU Control unit and a Primary converter is disabled, a Backup converter with a serial link will still be able to replace that failing Primary converter at the correct output levels by using the attenuation and Gain Equalization data stored in the NSU Control unit.

Remote Command Sequence: $ATTnnTttt
Unit Response: $ATT

The QUERY command requires one parameter, two digits in length representing the redundancy chain position. The reply will consist of two parameters one two digits in length indicating the redundancy chain position and one that is three digits in length indicating attenuation in tenths of a dB. No decimal points are used. Leading zeros will be used in the response.

Remote Command Sequence: ?ATTnn

Unit Response: ?ATTnnTttt

ATT: Attenuation indicator
nn: Two digit ASCII numeric characters,
Indicating converter. “00” through “12”.

T: Attenuation parameter indicator
ttt: Three digit ASCII numeric characters,
MSD transmitted first, LSD last indicating attenuation in tenths of a dB.

4.2.6 INTERNAL CALENDAR/CLOCK = CLK

The SET command requires a twenty-character parameter that sets the date and time of the internal calendar/clock.

Remote Command Sequence: $CLKYyyyyMmmDddHhhNnnSss
Response: $CLK

The QUERY command requires no parameters.

Remote Command Sequence: ?CLK
Response: ?CLKYyyyyMmmDddHhhNnnSss

Y: Year indicator
yyyy: Year, 4-digit ASCII numeric characters, MSD transmitted first, LSD last.

M: Month indicator
mm: Month, 2-digit ASCII numeric characters

D: Day indicator
dd: Day, 2-digit ASCII numeric characters

H: Hour indicator
hh: Hour, 2-digit ASCII numeric characters

N: Minute indicator
nn: Minute, 2-digit ASCII numeric characters

S: Second indicator
ss: Second, 2-digit ASCII numeric characters

4.2.7 SET ALL ETHERNET PARMETERS = EAD

The SET command requires three 12-digit parameters indicating the Ethernet IP address, Ethernet gateway and the Ethernet subnet mask of the NSU control unit.

Remote Command Sequence: $EADIiiiiiiiiiiiGgggggggggggSsssssssssss
Unit Response: $EAD

The QUERY command requires no parameters.

Remote Command Sequence: ?EAD
Unit Response: ?EADIiiiiiiiiiiiGgggggggggggggSsssssssssss

EAD: Ethernet Address indicator. If the indicator is capitalized in the remote response, then the IP address that was set is a Static IP address. If the indicator is in lower case letters then the IP address is a Dynamic IP address and was obtained using DHCP (Dynamic Host Configuration Protocol) server to assign the IP address.

I: Ethernet IP Address parameter indicator
iiiiiiiiiii: Twelve-digit ASCII numeric characters,
* = no change to stored value in position

G: Ethernet gateway parameter indicator
ggggggggggg: Twelve-digit ASCII numeric characters,
* = no change to stored value in position

S: Ethernet Subnet mask parameter indicator
sssssssssss: Twelve-digit ASCII numeric characters,
* = no change to stored value in position

4.2.8 GAIN EQUALIZATION = EQU

The SET command requires two parameters, one which is two digits in length representing the redundancy chain position and one parameter which is a three character parameter representing the gain equalization in dB. The gain equalization moves in 0.2 dB steps regardless of the step size that the backup converter moves in.

See Section 4 of this document for an explanation of Gain Equalization.

Remote Command Sequence: $EQUnnGsgg
Response: $EQU

The QUERY command requires a two-digit parameter representing the redundancy chain position.

Remote Command Sequence: ?EQUnn
Response: ?EQUnnGsgg

EQU: Gain Equalization command indicator
nn: Two digit ASCII numeric characters,
Indicating primary converter. “01” through “12”.

G: Gain Equalization parameter indicator
s: ‘+’ or ‘-‘ indicating sign.
gg: Two-digit parameter indicating Gain Equalization in 0.2 dB steps.

4.2.9 UNIT FREQUENCY = FRQ

The SET command requires two parameters. One parameter is two digits in length representing the redundancy chain position, and the other parameter is twelve digits in length representing RF frequency in Hz. Leading zeros must be used.

Refer to Section 4 for an explanation of converter settings operation.

Remote Command Sequence: $FRQnnFfffffffffff
Unit Response: $FRQ

The QUERY command requires one parameter, two digits in length representing the redundancy chain position. The reply will consist of two parameters one two digits in length indicating the redundancy chain position and one that is twelve digits in length indicating receive frequency in Hz. Leading zeros will be used.

Remote Command Sequence: ?FRQnn
Unit Response: ?FRQnnFfffffffffff

FRQ: Frequency indicator
nn: Two digit ASCII numeric characters,
Indicating converter. “00” through “12”.

F: Frequency parameter indicator
fffffffffff: Twelve-digit ASCII numeric characters,
MSD transmitted first, LSD last indicating frequency in Hz.

4.2.10 UNIT IF SELECTION = IFS

The SET command requires two parameters, one which is two digits in length representing the redundancy chain position and one parameter which is a single-digit parameter representing the converter IF Frequency.

Refer to Section 4 for an explanation of converter settings operation.

Remote Command Sequence: $IFSnnIi
Response: $IFS

The QUERY command requires a two digit parameter representing the redundancy chain position.

Remote Command Sequence: ?IFSnn
Response: ?IFSnnIi

IFS: IF indicator
nn: Two digit ASCII numeric characters,
Indicating converter. “00” through “12”.

I: IF parameter indicator
i: "0" or "1" ASCII numeric character
0 = 70 MHz
1 = 140 MHz.

4.2.11 EVENT LOG = LOG

The only SET command clears the unit log of its contents.

Remote Command Sequence: $LOG00
Response: $LOG

The QUERY command requires a two-digit parameter indicating the log entry to be examined. If entry 00 is queried, the unit returns the number of log entries currently in the log, otherwise the unit responds with the date, time and a code indicating the event which has occurred.

Remote Command Sequence: ?LOGgg
Response: ?LOGggCyyyymmddhhnnssEeee

gg: Two digit ASCII numeric characters, MSD transmitted first, LSD last. Indicating the log entry queried.

C: Calendar/Clock indicator.

yyyy: Year, 4 digit ASCII numeric characters, MSD transmitted first, LSD last.
mm: Month, 2 digit ASCII numeric characters
dd: Day, 2 digit ASCII numeric characters
hh: Hour, 2 digit ASCII numeric characters
nn: Minute, 2 digit ASCII numeric characters
ss: Second, 2 digit ASCII numeric characters
E: Event indicator.
eee: Event Code 000 to 999 represents the following:

Event Indicator	Event
0	Event Log Cleared
1	Unit startup
2	Power Supply ‘A’ Fault
3	Power Supply ‘A’ Fault Recovery
4	Power Supply ‘B’ Fault
5	Power Supply ‘B’ Fault Recovery
6	Non-volatile memory fault
7	Redundancy Mode Changed to AUTO
8	Redundancy Mode Changed to MANUAL
9	Control Mode Changed to REMOTE
10	Control Mode Changed to LOCAL
11-29	Reserved for future use
30	Backup Converter Fault
31	Backup Converter Fault Recovery
32	Primary Converter 1 Fault
33	Primary Converter 1 Fault Recovery
34	Primary Converter 2 Fault
35	Primary Converter 2 Fault Recovery
36	Primary Converter 3 Fault
37	Primary Converter 3 Fault Recovery
38	Primary Converter 4 Fault
39	Primary Converter 4 Fault Recovery
40	Primary Converter 5 Fault
41	Primary Converter 5 Fault Recovery
42	Primary Converter 6 Fault
43	Primary Converter 6 Fault Recovery
44	Primary Converter 7 Fault
45	Primary Converter 7 Fault Recovery
46	Primary Converter 8 Fault
47	Primary Converter 8 Fault Recovery
48	Primary Converter 9 Fault
49	Primary Converter 9 Fault Recovery
50	Primary Converter 10 Fault
51	Primary Converter 10 Fault Recovery
52	Primary Converter 11 Fault
53	Primary Converter 11 Fault Recovery
54	Primary Converter 12 Fault
55	Primary Converter 12 Fault Recovery
56	Backup Converter Both Contacts Open Fault
57	Backup Converter Both Contacts Open Fault Recovery
58	Primary Converter 1 Both Contacts Open Fault
59	Primary Converter 1 Both Contacts Open Fault Recovery
60	Primary Converter 2 Both Contacts Open Fault
61	Primary Converter 2 Both Contacts Open Fault Recovery
62	Primary Converter 3 Both Contacts Open Fault
63	Primary Converter 3 Both Contacts Open Fault Recovery
64	Primary Converter 4 Both Contacts Open Fault
65	Primary Converter 4 Both Contacts Open Fault Recovery
66	Primary Converter 5 Both Contacts Open Fault
67	Primary Converter 5 Both Contacts Open Fault Recovery
68	Primary Converter 6 Both Contacts Open Fault

Event Indicator	Event
69	Primary Converter 6 Both Contacts Open Fault Recovery
70	Primary Converter 7 Both Contacts Open Fault
71	Primary Converter 7 Both Contacts Open Fault Recovery
72	Primary Converter 8 Both Contacts Open Fault
73	Primary Converter 8 Both Contacts Open Fault Recovery
74	Primary Converter 9 Both Contacts Open Fault
75	Primary Converter 9 Both Contacts Open Fault Recovery
76	Primary Converter 10 Both Contacts Open Fault
77	Primary Converter 10 Both Contacts Open Fault Recovery
78	Primary Converter 11 Both Contacts Open Fault
79	Primary Converter 11 Both Contacts Open Fault Recovery
80	Primary Converter 12 Both Contacts Open Fault
81	Primary Converter 12 Both Contacts Open Fault Recovery
82	Backup Converter Both Contacts Closed Fault
83	Backup Converter Both Contacts Closed Fault Recovery
84	Primary Converter 1 Both Contacts Closed Fault
85	Primary Converter 1 Both Contacts Closed Fault Recovery
86	Primary Converter 2 Both Contacts Closed Fault
87	Primary Converter 2 Both Contacts Closed Fault Recovery
88	Primary Converter 3 Both Contacts Closed Fault
89	Primary Converter 3 Both Contacts Closed Fault Recovery
90	Primary Converter 4 Both Contacts Closed Fault
91	Primary Converter 4 Both Contacts Closed Fault Recovery
92	Primary Converter 5 Both Contacts Closed Fault
93	Primary Converter 5 Both Contacts Closed Fault Recovery
94	Primary Converter 6 Both Contacts Closed Fault
95	Primary Converter 6 Both Contacts Closed Fault Recovery
96	Primary Converter 7 Both Contacts Closed Fault
97	Primary Converter 7 Both Contacts Closed Fault Recovery
98	Primary Converter 8 Both Contacts Closed Fault
99	Primary Converter 8 Both Contacts Closed Fault Recovery
100	Primary Converter 9 Both Contacts Closed Fault
101	Primary Converter 9 Both Contacts Closed Fault Recovery
102	Primary Converter 10 Both Contacts Closed Fault
103	Primary Converter 10 Both Contacts Closed Fault Recovery
104	Primary Converter 11 Both Contacts Closed Fault
105	Primary Converter 11 Both Contacts Closed Fault Recovery
106	Primary Converter 12 Both Contacts Closed Fault
107	Primary Converter 12 Both Contacts Closed Fault Recovery
108	Backup Converter Serial Link Fault
109	Backup Converter Serial Link Fault Recovery
110	Primary Converter 1 Serial Link Fault
111	Primary Converter 1 Serial Link Fault Recovery
112	Primary Converter 2 Serial Link Fault
113	Primary Converter 2 Serial Link Fault Recovery
114	Primary Converter 3 Serial Link Fault
115	Primary Converter 3 Serial Link Fault Recovery
116	Primary Converter 4 Serial Link Fault
117	Primary Converter 4 Serial Link Fault Recovery
118	Primary Converter 5 Serial Link Fault
119	Primary Converter 5 Serial Link Fault Recovery

Event Indicator	Event
120	Primary Converter 6 Serial Link Fault
121	Primary Converter 6 Serial Link Fault Recovery
122	Primary Converter 7 Serial Link Fault
123	Primary Converter 7 Serial Link Fault Recovery
124	Primary Converter 8 Serial Link Fault
125	Primary Converter 8 Serial Link Fault Recovery
126	Primary Converter 9 Serial Link Fault
127	Primary Converter 9 Serial Link Fault Recovery
128	Primary Converter 10 Serial Link Fault
129	Primary Converter 10 Serial Link Fault Recovery
130	Primary Converter 11 Serial Link Fault
131	Primary Converter 11 Serial Link Fault Recovery
132	Primary Converter 12 Serial Link Fault
133	Primary Converter 12 Serial Link Fault Recovery
134	Polarization Transfer Switch Module Serial Link Fault
135	Polarization Transfer Switch Module Serial Link Fault Recovery
136	Transfer Switch Module 1 Serial Link Fault
137	Transfer Switch Module 1 Serial Link Fault Recovery
138	Transfer Switch Module 2 Serial Link Fault
139	Transfer Switch Module 2 Serial Link Fault Recovery
140	Transfer Switch Module 3 Serial Link Fault
141	Transfer Switch Module 3 Serial Link Fault Recovery
142	Transfer Switch Module 4 Serial Link Fault
143	Transfer Switch Module 4 Serial Link Fault Recovery
144	Transfer Switch Module 5 Serial Link Fault
145	Transfer Switch Module 5 Serial Link Fault Recovery
146	Transfer Switch Module 6 Serial Link Fault
147	Transfer Switch Module 6 Serial Link Fault Recovery
148	Transfer Switch Module 7 Serial Link Fault
149	Transfer Switch Module Serial Link 7 Fault Recovery
150	Transfer Switch Module 8 Serial Link Fault
151	Transfer Switch Module 8 Serial Link Fault Recovery
152	Transfer Switch Module 9 Serial Link Fault
153	Transfer Switch Module 9 Serial Link Fault Recovery
154	Transfer Switch Module 10 Serial Link Fault
155	Transfer Switch Module 10 Serial Link Fault Recovery
156	Transfer Switch Module 11 Serial Link Fault
157	Transfer Switch Module 11 Serial Link Fault Recovery
158	Transfer Switch Module 12 Serial Link Fault
159	Transfer Switch Module 12 Serial Link Fault Recovery
160	Polarization Transfer Switch Module Fault
161	Polarization Transfer Switch Module Fault Recovery
162	Transfer Switch Module 1 Fault
163	Transfer Switch Module 1 Fault Recovery
164	Transfer Switch Module 2 Fault
165	Transfer Switch Module 2 Fault Recovery
166	Transfer Switch Module 3 Fault
167	Transfer Switch Module 3 Fault Recovery
168	Transfer Switch Module 4 Fault
169	Transfer Switch Module 4 Fault Recovery
170	Transfer Switch Module 5 Fault

Event Indicator	Event
171	Transfer Switch Module 5 Fault Recovery
172	Transfer Switch Module 6 Fault
173	Transfer Switch Module 6 Fault Recovery
174	Transfer Switch Module 7 Fault
175	Transfer Switch Module 7 Fault Recovery
176	Transfer Switch Module 8 Fault
177	Transfer Switch Module 8 Fault Recovery
178	Transfer Switch Module 9 Fault
179	Transfer Switch Module 9 Fault Recovery
180	Transfer Switch Module 10 Fault
181	Transfer Switch Module 10 Fault Recovery
182	Transfer Switch Module 11 Fault
183	Transfer Switch Module 11 Fault Recovery
184	Transfer Switch Module 12 Fault
185	Transfer Switch Module 12 Fault Recovery
186	Polarization Transfer Switch Online
187	Polarization Transfer Switch Standby
188	Primary Converter 1 Transfer Switch Online
189	Primary Converter 1 Transfer Switch Standby
190	Primary Converter 2 Transfer Switch Online
191	Primary Converter 2 Transfer Switch Standby
192	Primary Converter 3 Transfer Switch Online
193	Primary Converter 3 Transfer Switch Standby
194	Primary Converter 4 Transfer Switch Online
195	Primary Converter 4 Transfer Switch Standby
196	Primary Converter 5 Transfer Switch Online
197	Primary Converter 5 Transfer Switch Standby
198	Primary Converter 6 Transfer Switch Online
199	Primary Converter 6 Transfer Switch Standby
200	Primary Converter 7 Transfer Switch Online
201	Primary Converter 7 Transfer Switch Standby
202	Primary Converter 8 Transfer Switch Online
203	Primary Converter 8 Transfer Switch Standby
204	Primary Converter 9 Transfer Switch Online
205	Primary Converter 9 Transfer Switch Standby
206	Primary Converter 10 Transfer Switch Online
207	Primary Converter 10 Transfer Switch Standby
208	Primary Converter 11 Transfer Switch Online
209	Primary Converter 11 Transfer Switch Standby
210	Primary Converter 12 Transfer Switch Online
211	Primary Converter 12 Transfer Switch Standby
212-999	Reserved for future use

4.2.12 UNIT MODEL NUMBER = MOD

There is no SET command.

The QUERY command requires no parameters.

Remote Command Sequence: ?MOD
Response: ?MODmm

.

mm: ASCII string character representing model number

01 = NSUN

02 = NSU1-B75/S50
03 = NSU1-B50/S50
04 = NSU1-B75
05 = NSU1-B50
06 = NSU1-S50
07 = NSU1-S50/S50
08 = NSU1-B50/B50
09 = NSU1-B75/B75

10 = NSU2-B75/S50
11 = NSU2-B50/S50
12 = NSU2-B75
13 = NSU2-B50
14 = NSU2-S50
15 = NSU2-S50/S50
16 = NSU2-B50/B50
17 = NSU2-B75/B75

4.2.13 UNIT NAME = NAM

The SET command requires an ASCII string from one to twenty digits in length indicating the name of the unit. Allowable characters are in the range of 20H to 7AH.

Remote Command Sequence: $NAMnnnnnnnnnnnnnnnnnnn
Response: $NAM

The QUERY command requires no parameters.

Remote Command Sequence: ?NAM
Response: ?NAMnnnnnnnnnnnnnnnnnnn

nnnnnnnnnnnnnnnnnnn: Twenty-character unit name.

4.2.14 POLARIZATION = POL

The SET command requires a two-digit parameter indicating chain position and a one-digit parameter indicating Polarization selection. Polarization must be enabled for the Backup Converter before setting Primary Converters. The Polarization selections available for the Backup Converter are vertical, horizontal, or none. The selection of none is not available for the Primary Converters.

It is important to note that when the polarization of the converter in Standby is changed, the Polarization Switch is set to the new polarization. This could happen when either the Backup converter is not being used and is in Standby, or it could occur when the Backup converter is Online backing up a failed Primary converter.

Remote Command Sequence: $POLnnPp
Unit Response: $POL

The QUERY command requires a two-digit parameter indicating chain position.

Remote Command Sequence: ?POLnn
Unit Response: ?POLnnPp

POL: Polarization indicator.
nn: Two digit ASCII numeric characters indicating chain position
"00" through "12"
P: Polarization indicator. p: "0" through "2" ASCII numeric character
0 = None
1 = Horizontal
2 = Vertical

4.2.15 REDUNDANCY PRIORITY = PRI

The SET command requires a two-digit parameter indicating chain position and a two-digit parameter indicating priority.

Remote Command Sequence: $PRInnPpp
Response: $PRI

The QUERY command requires a two-digit parameter indicating chain position.

Remote Command Sequence: ?PRInn
Response: ?PRInnPpp

PRI: Redundancy chain priority indicator.
nn: Two-digit ASCII numeric characters "01" to "12" indicating chain position
P: Priority indicator.
pp: Two-digit ASCII numeric characters indicating priority,
"01" through "12", "01" is the most critical.

4.2.16 UNIT REDUNDANCY MODE = RED

The SET command requires a one-digit parameter indicating the redundancy mode selection Manual or Automatic.

Remote Command Sequence: $REDr
Response: $RED

The QUERY command requires no parameters.

Remote Command Sequence: ?RED
Response: ?REDr

RED: Redundancy mode indicator.
r: "0" through "1" ASCII numeric character
0 = Manual
1 = Automatic

4.2.17 SERIAL NUMBER = SER

The QUERY command requires no parameters.

Remote Command Sequence: ?SER
Response: ?SERnnnnnnnnnn

nnnnnnnnnn: Ten-character unit serial number.

4.2.18 SLOPE = SLP

The SET command requires two parameters, one which is two digits in length representing the redundancy chain position and one parameter which is a two-digit parameter representing the slope in dB.

Refer to Section 4 for converter settings operation.

Remote Command Sequence: $SLPnnSsgg
Response: $SLP

The QUERY command requires a two-digit parameter indicating chain position.

Remote Command Sequence: ?SLPnn
Response: ?SLPnnSsgg

SLP: Slope command indicator
nn: Two digit ASCII numeric characters,
Indicating primary converter. “01” through “12”.

S: Slope parameter indicator
s: ‘+’ or ‘-‘ indicating sign.
gg: Two-digit parameter indicating slope in 0.2 dB steps. If the response returns

?SLPnnS???, this indicates that the backup path does not have slope capability.

4.2.19 UNIT STATUS = STA

There is no SET command.

The QUERY command requires no parameters.

Remote Command Sequence: ?STA
Response: ?STALlRrSssPp?abcdefghi

L: Local/Remote mode indicator.
l: "0" or "1" ASCII numeric character
0 = Local control
1 = Remote control

R: Redundancy mode indicator.
r: "0" through "1" ASCII numeric character
0 = Manual
1 = Automatic

S: chain position in standby mode
ss: Two digit ASCII numeric characters,
Indicating chain position: “00” through “12”.
Position “00” = Backup converter, “01” = Primary converter 1
“12” = Primary converter 12

P: Polarization switch position.
p: "0" through "2" ASCII numeric character
0 = None
1 = Horizontal
2 = Vertical

?: Component Fault Status indicator
a-i: "0" or "1" ASCII numeric character
0 = No fault
1 = Fault

a-i indicates the status of the component faults described in the ?ALR command.

4.2.20 REDUNDANCY TRANSFER SWITCH POSITION = SWP

The SET command requires one parameter, which is two digits in length representing the redundancy chain position that will be switched into standby.

Remote Command Sequence: $SWPpp
Unit Response: $SWP

SWP: Switch Position indicator.
pp: Two digit ASCII numeric characters,
MSD transmitted first, LSD last.
Indicating the position that will be switched into standby

"00" through "12", valid Redundancy Chain positions
"00" is the backup chain position and is used to set all other switches back to their online positions.

"01" is redundancy chain position 1.
"12" is redundancy chain position 12.

The QUERY command requires no parameters.

Remote Command Sequence: ?SWP
Unit Response: ?SWPnnPabcdefghijklm

nn = "00" through "12" = transfer switch position in standby mode
"00" = Polarization Switch position
a – m, transfer switch module position status

0 = transfer switch Online (Vertical for Polarization switch)
1 = transfer switch Standby (Horizontal for Polarization switch)
2= transfer switch module fault
- = transfer switch inactive
? = transfer switch module communication fault

4.2.21 SWITCH TYPE = SWT

There is no SET command.

The QUERY command requires one parameter indicating redundancy chain position.

Remote Command Sequence: ?SWTpp
Response: ?SWTppTtt

SWT: Switch Type Command Indicator.

pp: ASCII numeric characters indicating redundancy chain position
(00 through 12, 00 is reserved for the Backup Unit)

T: Switch type indicator
tt: ASCII numeric character

-- = none installed
?? = unknown switch type

01 = NSU1-B75/S50
02 = NSU1-B50/S50
03 = NSU1-B75
04 = NSU1-B50
05 = NSU1-S50
06 = NSU1-S50/S50
07 = NSU1-B50/B50
08 = NSU1-B75/B75

09 = NSU2-B75/S50
10 = NSU2-B50/S50
11 = NSU2-B75
12 = NSU2-B50
13 = NSU2-S50
14 = NSU2-S50/S50

NSUN

17 = RSM-B75/S50
18 = RSM-B50/S50
19 = RSM-B75
20 = RSM-B50
21 = RSM-S50
22 = RSM-S50/S50
23 = RSM-B50/B50
24 = RSM-B75/B75

4.2.22 FIRMWARE TITLE AND VERSION = VER

There is no SET command.

The QUERY command requires one parameter, a two-digit parameter that indicates either the NSU control unit or a transfer switch module.

Remote Command Sequence: ?VER(nn)

Response: ?VERnnDddddddVv.vvv

When nn is omitted the version data returned is for the NSU Control unit

nn = 00-12 are transfer switch modules.
Position “00” is for the Polarization switch module.
D = document number identifier
dddddd = six digit firmware control drawing
V = version number identifier
v.vvv = version of firmware

4.2.23 PASS-THROUGH COMMAND

Although the NSU Control unit provides monitor and control capabilities for the converters connected to the Redundancy Chain, there may be instances where additional converter monitor and control may be required. The Pass-Through command allows either SET or QUERY commands to be passed through the NSU Control unit directly to the converter connected to a given position in the Redundancy Chain. For the NSU control unit to communicate with a converter in the Redundancy Chain the NSU-Converter Serial Link for that converter must be enabled.

Remote Command Sequence: *nnConverter_command

Response: *nnConverter_response

Where nn = “00” through “12” are the converter positions in the Redundancy Chain represented by two digit ASCII numeric characters

The converter command and converter response are listed in the applicable manual for the device being communicated with.

Example: Set the attenuation of 9700/9800/9900 style primary converter in redundancy chain position one, to 4.2 dB. When sent directly to the converter the command to set the attenuation is as follows:

Remote Command Sequence: $ATT042

Response: $ATT

When sent through the NSU Control unit to the converter in Redundancy Chain position one would be as follows:

Remote Command Sequence: *01$ATT042

Response: *01$ATT

For 9400 and 9600 style converters the following example applies. When sent directly to the converter the command to set the attenuation is as follows:

Remote Command Sequence: T042

Response: T

When sent through the NSU Control unit to the converter in Redundancy Chain position one would be as follows:

Remote Command Sequence: *01T042

Response: *01T

For other MITEQ converter types with a remote interface refer to the list of remote commands for that particular unit. The NSU will pass those commands to the unit and pass back its response to the NSU.

4.2.24 NSU REMOTE COMMUNICATION EXAMPLE

The following is an example of a properly formatted, typical command and its response showing the ASCII printable characters. The address is 41H (ASCII code 'A') for these examples.

Return the number of entries stored in the event log of the NSU. The NSU returns a response that indicates that there are 3 entries in the event log.

Remote Command Sequence: {A?LOG00}>
Response: {A?LOG03}A

4.3 ETHERNET INTERFACE

The Control Unit is equipped with an Ethernet Interface feature permitting control and monitoring via a 10 or 100 Mbps Ethernet connection. Available interface protocols are HTTP (web access), SNMP (Simple Network Management Protocol), and Telnet. In addition, a capability to remotely upgrade the system firmware is provided.

The use of standard protocols makes it possible to provide (password-protected) access to the Control Unit from any location in the world where an internet connection is available

4.3.1 CONNECTION

The NSU is shipped from the factory ready to dynamically assign an IP address. The unit can be connected to the facility Local Area Network (LAN) network via an industry-standard 10baseT RJ45 cable. The cable should be a “direct” cable, not a “crossover” cable.

If the network supports dynamically assigned IP addresses then a valid IP will be obtained when the NSU is connected to the LAN and the NSU power is cycled. If the network does not support dynamically assigned IP addresses then a valid IP address must be obtained from a network administrator and the NSU must be configured to that static IP address (see Paragraph 4.3.3).

The unit may also be connected directly to a PC without a LAN. To connect directly to the PC a “crossover” cable must be used. The unit then must be set to a Static IP address to communicate with the computer (see Paragraph 4.3.3).

Direct Cable Wiring			
End 1	**Color**	**End 2**	**Signal**
1	white/orange	1	Tx+
2	orange	2	Tx-
3	white/green	3	Rx+
4	blue	4	unused
5	white/blue	5	unused
6	green	6	Rx-
7	white/brown	7	unused
8	brown	8	unused

Crossover Cable Wiring		
End 1	**Color**	**End 2**
1	white/orange	3
2	orange.	6
3	white/green	1
4	blue	4
5	white/blue	5
6	green	2
7	white/brown	7
8	brown	8

Table 4-1. Ethernet Cable Wiring

4.3.2 SET UP

Setup of the Ethernet Interface should be attempted only after the unit is fully installed and functioning, in accordance with the Operation and Maintenance Manual. Once operating, the Ethernet Interface may be configured.

4.3.3 CONFIGURING INTERNET PROTOCOL (IP) OPERATING PARAMETERS

If an IP address cannot be dynamically assigned by the network or the unit is to be connected directly to a PC then the Internet Protocol (IP) address and associated parameters must be configured in the unit manually. Normally, an individual or organization managing the facility's LAN will assign this address.

For the direct connection to a PC any address can be chosen but the PC must also be configured correctly. In this configuration, the PC must be configured with a Static IP address. The procedure for this varies between operating system types and versions. Consult the operating manual or help files available with the computer to be used to determine the proper procedure.

Three parameters will be required on the NSU:

IP Address	(NSU example setting 192.168.1.1)
Subnet Mask	(NSU example setting 255.255.255.0)
Gateway	(NSU example setting 0.0.0.0)

The computer must be configured with the same Subnet Mask as the NSU, but a different IP address, to connect properly. For connecting with the NSU unit address in the example above, the following settings are recommended for the PC:

IP Address	(corresponding PC setting 192.168.1.2)
Subnet Mask	(corresponding PC setting 255.255.255.0)
Gateway	(corresponding PC setting 0.0.0.0)

The Ethernet address may be configured either via the serial interface (paragraph 4.3.4) or via a MITEQ supplied Windows™ application (paragraph 4.3.5).

4.3.4 CONFIGURING VIA SERIAL INTERFACE

The command listed below may be used to enter the IP parameters. The command must be transmitted with the standard MITEQ protocol, as described in Remote Interface section of this document. Note that the factory default settings of the serial port are as follows:

Baud: 9600
Parity: Odd
Address: 64 (40H or ASCII: @)

Remote Command Sequence: $EADIiiiiiiiiiiiGgggggggggggSsssssssssss
Unit Response: $EAD

EAD: Ethernet Address indicator. If the indicator is capitalized in the remote response, then the IP address that was set is a Static IP address. If the indicator is in lower case letters then the IP address is a Dynamic IP address and was obtained using DHCP (Dynamic Host Configuration Protocol) server to assign the IP address.

I: Ethernet IP Address parameter indicator
iiiiiiiiiiii: Twelve-digit ASCII numeric characters,
* = no change to stored value in position

G: Ethernet gateway parameter indicator
gggggggggggg: Twelve-digit ASCII numeric characters,
* = no change to stored value in position

S: Ethernet Subnet mask parameter indicator
ssssssssssss: Twelve-digit ASCII numeric characters,
* = no change to stored value in position

The values may be verified using the corresponding query command (?EAD)

4.3.5 CONFIGURING VIA IPSETUP APPLICATION

IPSETUP.exe is a Windows™ application, which can be obtained from MITEQ. Through an ethernet connection to the NSU, this application can re-assign the IP address of the NSU unit. For an example the NSU is connected to a PC through a crossover cable. The IP address of the PC is 192.168.001.002. The address of the NSU will be set to 192.168.001.001.

1. Make sure that the NSU is in the Remote control mode
2. Open the application IPSETUP.exe
3. The application should open and show a listing of the IP addresses of what has been found by the computer. If the NSU is unable to dynamically assign an IP address, it will show up as a unit at IP address 0.0.0.0.
4. Highlight this address from “Select a Unit”.
5. From “NDK Settings” at the “IP” line begin to enter the IP address of the NSU.
6. Press “Set→”, the NSU will reset and a few seconds later the new IP address should show up in the “Select a Unit” list at IP address 192.168.1.1.
7. If the list on the application doesn’t change press “Search Again”.



Figue 4-1. IPSETUP Application

4.3.6 VERIFYING PROPER CONNECTION AND CONFIGURATION

The connection and configuration may be verified from a PC attached to the LAN using the network "ping" command. From a command prompt, enter

"ping <assigned IP address>"

The response will indicate whether a connection was established.

4.4 ACCESSING THE SYSTEM THROUGH THE ETHERNET CONNECTION

4.4.1 ACCESS VIA THE WEB INTERFACE

All system setting may be may be queried or modified via the Web Interface. The web page designs have been optimized for the use with the Microsoft Internet Explorer (MSIE) Version 5.0 web browser, or higher. Use of Cookies must be enabled (see the TOOLS|INTERNET OPTIONS|PRIVACY setting).

Web access may function properly, or with somewhat degraded performance, using other browsers of the same vintage. Browsers of earlier vintage are not recommended.

To connect to the unit, launch the web browser on any PC connected to the same LAN, and enter the address

http://<assigned IP address>

A sign-on page requesting the password should be displayed. (See Appendix A for information on configuring for access to the unit by name instead of IP address). The default password is "11111".

The operator may navigate between the available pages by clicking on the button images located about 1/3 of the way down from the top of the screen.

To set an operating parameter, make the appropriate changes, change the (screen locked) pull-down to UNLOCKED, and press the Submit or other applicable button.

Home Page	
Function Name	Description
Converter Settings	View or set Frequency, Attenuation, Serial Link, Mute, Slope and Polarization (if available)
Redundancy Chain Settings	View or set which converter positions are online and which position is in stand-by
Communications Page	
Function Name	Description
IP Address	View or set the system IP address (changing this value will reset the system)
IP Subnet Mask	View or set the system IP Subnet Mask (changing this value will reset the system)
IP Gateway	View or set the system IP Gateway (changing this value will reset the system)
System Contact	View or set the SNMP System Contact parameter
System Name	View or set the SNMP System Name parameter
System Location	View or set the SNMP System Location parameter
Read Community	View or set the SNMP Read Community parameter (enter a long arbitrary string to make SNMP inaccessible)
Write Community	View or set the SNMP System Contact parameter (enter a long arbitrary string to make SNMP inaccessible)
Trap Destination	View or set the SNMP Trap destination address
Time Page	
Function Name	Description
Set Clock	View or set the system real-time clock functions of the NSU
Miscellaneous Page	
Function Name	Description
Enable Telnet	Permit or prevent Telnet access
Enable Re-flash	Permit or prevent firmware update
Send Test Trap	Send single SNMP Test Trap
Screen Unlock	Unlock Web screens
Alarm Re-fresh rate	View or set how frequently the alarm/fault indications will be refreshed on the Logs page
Web Timeout	View or set the time before a web user is logged off due to inactivity.
Unit Name	View or set the assigned name
Old Password New Password Confirm Password	Update the system password (1-5 digits). All three values must be entered. If the old password does not match the existing password, or the two new password entries are different, the update will not occur.
Password DISABLED	Disables password for all Ethernet connections
Event Log Page	
Function Name	Description
Clear Event Log	Clears NSU Event Log
(N/A)	Logged System Faults and Events are displayed here

Table 4-2. Web Page Functions

4.4.2 ACCESS VIA SNMP

The RSU may be accessed and monitored via the Simple Network Management Protocol (SNMP). SNMP is designed for control of network elements from a central management point.

The SNMP Management Information Base (MIB) file for the system, available from MITEQ defines the specifics of the interface. This file is read by the chosen SNMP management tool to provide an “understanding” of the interface. The MIB file is in a format that can be ready with any text editor. Do NOT modify this file.

SNMP operating parameters may be set on the COMMS web page. If SNMP operation is not desired, this feature may be rendered inaccessible by inserting a long arbitrary string in the Read Community and Write Community fields.

4.4.3 ACCESS VIA TELNET

The unit may be accessed via Telnet. There is no special protocol on the Telnet channel; the unit will expect the same commands, and offer the same replies, as via the serial port.

Telnet access must first be enabled on the COMMS web page. If not being used, it is recommended that it be left disabled for security reasons.

When a Telnet connection is established, the unit will request the password (five ASCII characters), which should be sent in the standard MITEQ wrapper (‘{‘<address byte (ignored)><password>’}’<checksum byte>). The connection will be refused if a user is already logged in via the web interface.

Once the connection is established, standard serial commands may be sent and responses will be received. Logout is automatic when the Telnet connection is broken.

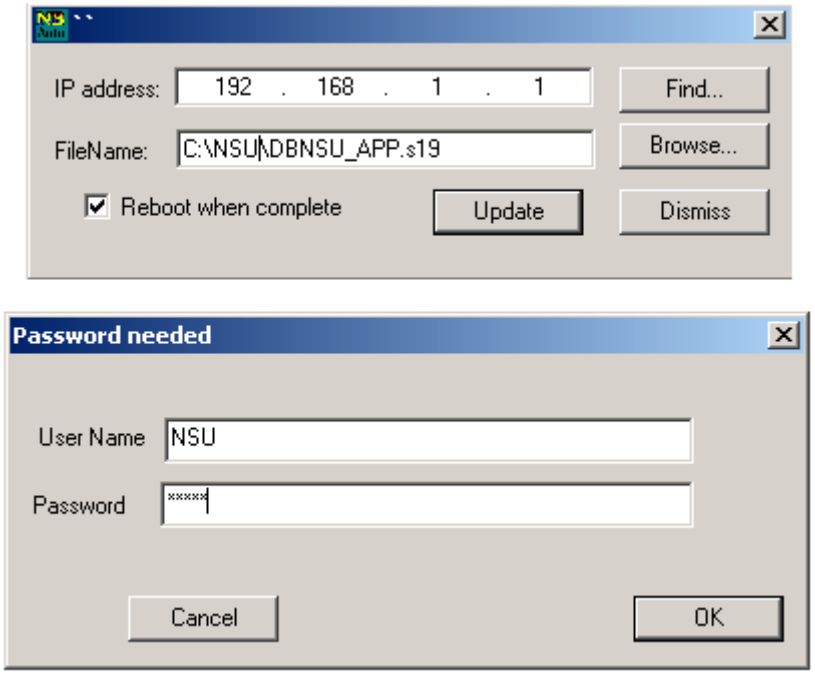
4.5 FIRMWARE UPGRADE

Should it become necessary to upgrade the firmware, the updated firmware file and the update utilities will be provided by MITEQ.

1. Make sure that the NSU is in the Remote control mode
2. Access the web page for the NSU. Note the IP Address and password of the NSU unit.
3. Go to the Misc Settings page and make sure that Enable Reflash is checked.
4. Install the update utility provided by MITEQ: AutoUpdate.exe and the DBNSU_APP.s19 firmware upgrade files on your computer. Make a note of where you save the files.
5. Start AutoUpdate.exe.
6. To set the IP address to flash: Click "Find...", it will show a list of Ethernet-based units that the application detected. Highlight the address you wish to reflash and click "OK".
7. Click “Browse…” and select the DBNSU_APP.s19 file for updating to the NSU.
8. Check the box that reads "Reboot When Complete."
9. Start the update process. Click "Update"

10. If the NSU password has not been disabled, a “Password needed box will appear. For the user name type NSU. Enter the password that you use to login to the web page.
11. A progress screen will appear. When complete a message box that reports if the process completed successfully or not. Successful programming takes approximately 10 seconds, unsuccessful programming can take as long as 2 minutes to time out.

After the upgrade, it will be necessary to log in again. The new firmware version will be visible on the login page.



Figue 4-2. Autopdate application screens

Appendix A – Reaching the Unit by NAME Instead of IP Address

If the RSU is connected to a LAN equipped with a Domain Name Server, the network manager may be able to configure the server to associate a particular text name with an IP address. If this is not the case and addressing by name is desired, machines equipped with Microsoft Windows may be configured for this capability.

Locate the "hosts" file on the PC to be configured. Some common locations for the hosts file are:

Windows XP:	C:\WINDOWS\SYSTEM32\DRIVERS\ETC
Windows 2K:	C:\WINNT\SYSTEM32\DRIVERS\ETC
Win 98\ME:	C:\WINDOWS

The hosts file is a plain-text file of the form:

<ip address> <associated name>

Add the desired address/name pair(s) to the list. Generally, it is a good idea to back up any system file before modification. An example host file is provided here:

216.239.39.99	google.com
127.0.0.1	localhost
192.168.1.1	miteqMultBB_1
192.168.1.2	miteqMultBB_2

In some cases, it may be necessary to reboot the PC before changes to the host file take effect.

Other operating systems may use a different mechanism. Consult the appropriate documentation to change host settings.

Glossary

10-baseT	Controlled-impedance cable used for Ethernet wiring
Crossover Cable	An Ethernet cable wired with the signal pairs reversed, to permit connection of two computer devices.
Direct Cable	An Ethernet cable wired with the signal pairs directly connected, to permit connection between a computer and hub or router
FTP	File Transfer Protocol, a protocol for moving files between computers via a TCP/IP connection
Gateway	An IP setting parameter that indicates how a device may connect to other devices that are not a member of the immediate subnetwork
HTTP	Hypertext Transport Protocol. The standard protocol for moving web pages between servers (e.g. the Control Unit) and clients (e.g. the web browser)
Hub	A component used to connect several Ethernet-equipped devices together.
IP Address	Internet Protocol address. A unique address used to identify and connect to a device.
LAN	Local Area Network. A means (usually, but not always Ethernet) for connecting multiple computing devices together for high-speed communications.
IP	Internet Protocol. Specifies an organization of data packets sent between computers for network communications.
MSIE	Microsoft Internet Explorer, the web browser integrated with most versions of Microsoft Windows. The unit's interface design was optimized for operation with MSIE 5.0 or higher
RJ45	The standard telephone-style connector used for terminating twisted-pair Ethernet cables.
SNMP	Simple Network Management Protocol, a system of communication between managed network elements (e.g. the Control Unit), and a network control program, e.g. HP Openview.
Subnet Mask	A numeric mask defining the size of a subnetwork. Bits cleared in the mask define IP addresses that may communicate on the subnetwork.
TCP	Transmission Control Protocol. Specifies a mechanism for establishing a virtual connection between network elements, usually via IP
Telnet	A simple mechanism for communicating between two devices via TCP. A connection is opened between the devices, and bytes may then pass freely between them, as with a serial connection.

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