tyco /Services / **Fire & Safety**

NETWORK LED DISPLAY UNIT

USERS MANUAL

LT0188

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The NLDU is manufactured for

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AMENDMENTS

ISSUE	DATE	AMENDMENT	ECO
1.0	01/08/96	Original	
2.0	09/10/97	RS485 Board and Controller Boards changed.	
2.10	21/09/98	Corresponds to software V2.00/V2.10. Adds "Bridge/Network 2" function plus improved network event printing.	2876 ECS 538
2.11	01/12/98	AS3548 Class A note added (Page iii)	2897
2.12	11/06/99	New parameters for zone to LED mapping, Section 3.4.6.2. Corresponds to software V2.02.	2975
2.13	29/04/03	New parameters for lamp test. Link settings added for 1931-111 Issue B controller board. Chapter 5 Product History added.	3362

AS3548 NOTICE

WARNING: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

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1.   INTRODUCTION

The Network LED Display Unit/Panel-link Network Bridge (NLDU/PLB) has multiple functions as follows.

i.   It can operate as a bridge between an F4000 panel-link network and a remote F4000 panel connected to the NLDU via modems and a 4-wire leased circuit.

ii.   It displays the status of network zones on LED display boards.

iii.   It can perform network system event printing.

iv.   It provides an "F4000 RZDU protocol" serial output on which it transmits the status of its LEDs or a logical combination of zone states.

A single NLDU device may perform some or all of these functions simultaneously. The NLDU has two "network" connections. Network 1 is used to connect to an F4000 network using an RS485 board. Network 2 is used to connect to a single remote F4000 panel using modems. The NLDU may display on LEDs the status of zones which are from any of the network 1 panels or the network 2 F4000 panel. Similarly, it may print events from any of these panels.

If the NLDU is programmed to perform a bridge function, then it will pass selected messages from the network 1 F4000 panels to the network 2 F4000 and vice versa.

The NLDU must be programmed with a variety of information including its own network address (SID number). The SID numbers of all the F4000 panels on network 1 and network 2 and the NLDU itself must be unique.

If the NLDU is displaying the status of zones on LEDs then it must be programmed with the mapping of zones to LEDs. Each zone may be mapped to only one LED, but an LED may have more than one zone mapped to it. The RZDU output has the same zone mapping as programmed for the LEDs, but can have different prioritisation for the zone status.

A lamp test input is provided for testing of the LEDs on the display boards (if any), and also tests the LEDs on the processor board. The lamp test input is also used to cancel the buzzer which is turned on if a fault occurs.

A 9 pin connector is provided for connection to a serial port on a PC or printer. If you require a 25 pin connector you could use a 9 to 25 pin adapter or you could order -

LM0042 LOOM,1888-62,FP4000 PROG PORT to 25 PIN SERIAL

The NLDU requires 24Vdc (20-28.5V) for power. A block diagram of the NLDU is shown in Fig 1.1.

INTRODUCTION (CONTINUED)

The part numbers for the NLDU are: FP0695, Board set only
                                        FP0696, Packaged in a case

Special configurations involving power supplies and cabinets can be arranged.
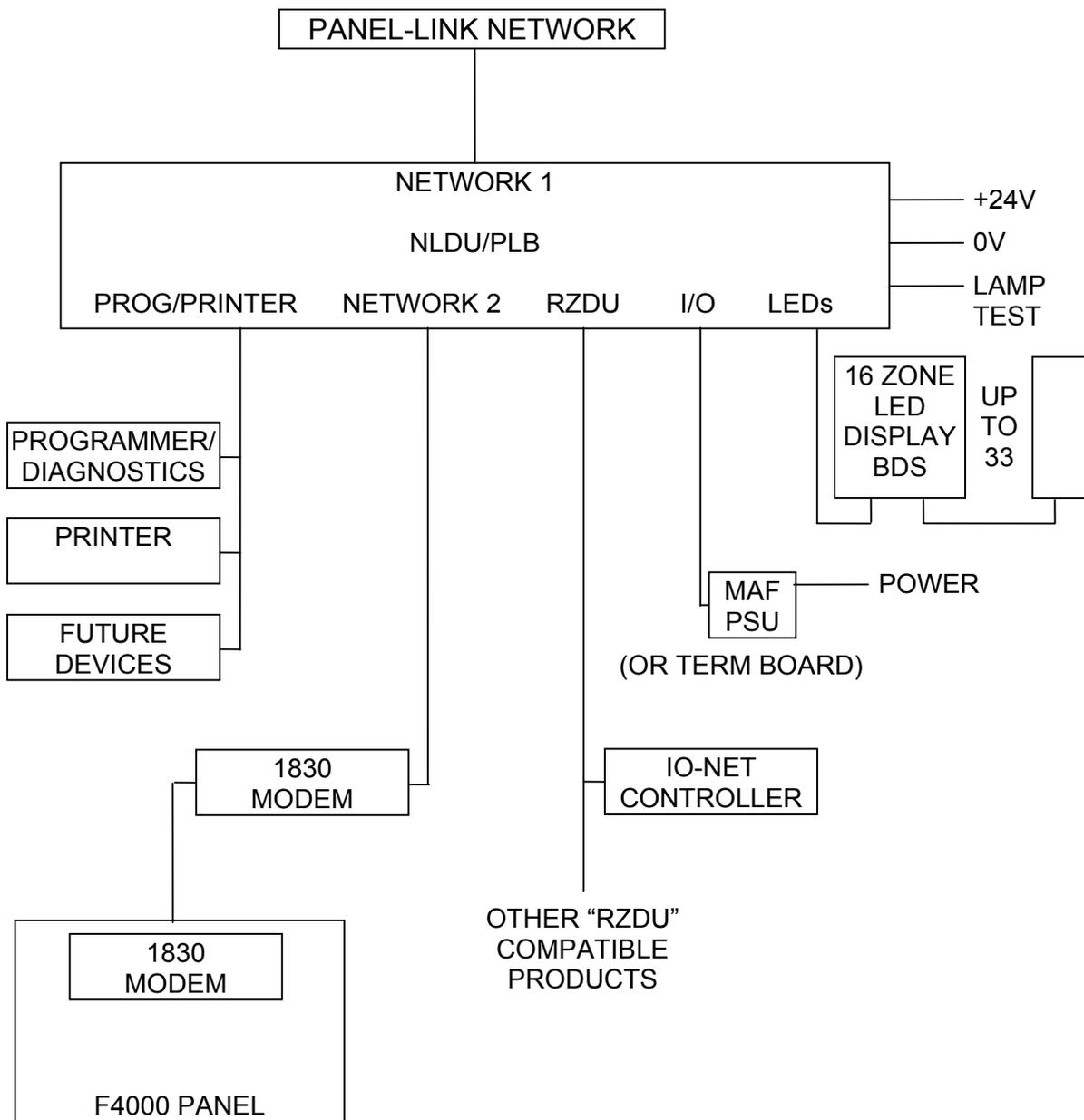
FIGURE 1.1
NLDU/PLB BLOCK DIAGRAM

2.   INSTALLATION & CONFIGURATION

Figure 2.1 shows a general wiring diagram of the NLDU/PLB. Specific detail is covered in each of the following sections.
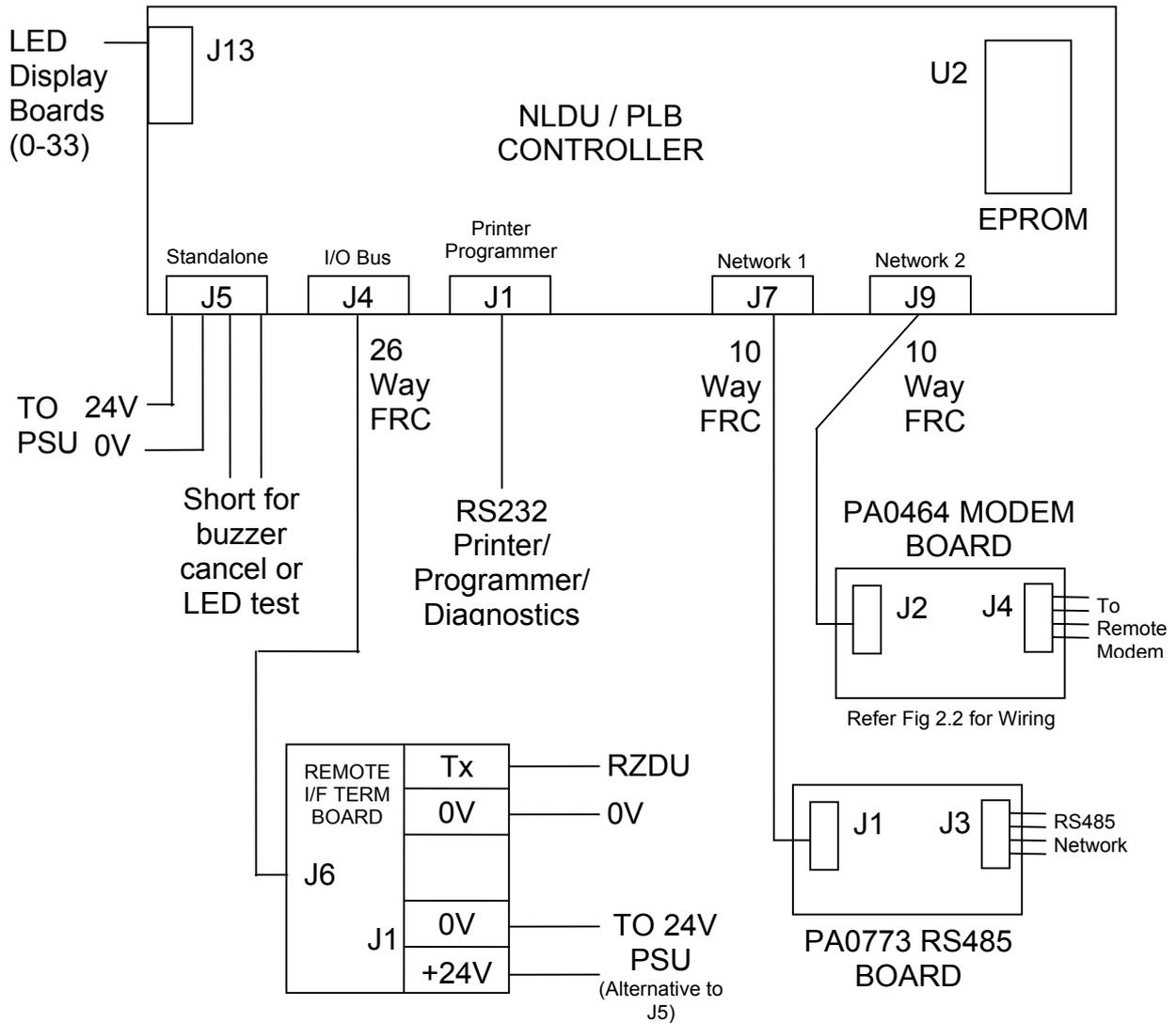
Figure 2.1
Wiring of NLDU/PLB

2.1 DISMANTLING

Remove the top cover by removing 2 screws on each side and two on top. Check that NLDU/PLB software is fitted to the Controller.

2.2 CONNECTION TO POWER

The NLDU can be powered directly via J5, or via the Remote Termination Board 1931-27 if one is fitted. Power must be 24 volts from an external power supply and is wired to the screw terminals labelled +24V and 0V. On the Remote Termination Board there are actually two terminals labelled 0V, and the correct 0V to connect to the power supply is the one adjacent to the +24V terminal. The Remote Termination Board is connected to socket J4 (IO BUS OUT) on the NLDU processor board with a 26 way FRC.

Do not accidentally connect the Remote Termination Board to socket J13 on the NLDU or you will damage the NLDU.

If you power the NLDU from the Fire Panel, and you connect the NLDU to a mains powered printer, then you will have grounded the Fire Panel's 0V. This could produce problems and susceptibility to earth faults.

2.3 RS485 CONNECTIONS & DIP SWITCH SETTINGS

Wire the connections on the removable connector (J3 of the RS485 Comms board) to the RS485 network cable(s)....

>   Pin 1 - Line A +
>   Pin 2 - Line A -
>   Pin 3 - Line B +
>   Pin 4 - Line B -
>   Pin 5 - Ground (shield for both lines A and B)
>   Pin 6 - Earth (not used)

Please also see the document "LT0143 F4000 Network Upgrade" for more information on shielding. If only one line is used for the network, connect pins 1 and 3 in parallel, and pins 2 and 4 in parallel.

Cable tie the cable(s) to the base of the case and take out the left rear opening. Ensure that on the RS485 board, DIP switch 1, 3 and 4 are ON and 2 is OFF.

2.4 CONNECTION FOR PROGRAMMING MODE / DIAGNOSTICS

Connect a PC or laptop serial port to J1 Printer/Programmer port using the supplied lead (LM0041). A DB9 to DB25 converter may be required.

Run a communications program on the PC (e.g. PROCOMM, CROSSTALK) and set it for the serial port you are using, 9600 baud, 8 data bits, no parity, and 1 stop bit. Tell the program to "connect" directly (without dialling etc).

Section 3 describes programming the NLDU and using the NLDU's diagnostics.

2.5 CONNECTION TO PRINTER

The printer connects to J1 Printer/Programmer port on the NLDU.

If an FP0546 printer is being used then loom LM0102 should be used instead of the lead supplied with the NLDU. If some other type of printer is being used, then an adaptor may be needed to convert the 9 pin connector on the supplied lead to a 25 pin connector. For some printers it may even be necessary to re-wire the connector to the printer (consult the printer manual). The printer should be set for 8 data bits, no parity, 1 stop bit and programmed baud rate. The printer should be set up to use XON/XOFF flow control.

2.6 LED DISPLAY BOARD CONNECTION

LED Display boards are connected with a 26 way to 34 way FRC (LM0092) to socket J13 on the NLDU processor board. The display board at the end of the chain furthest away from the processor board corresponds to LED numbers 1 to 16. The board at the end of the chain should have link LK1 fitted and all other display boards should have link LK1 removed. In program mode, option 9 from the zone to LED mapping menu will show the number of display boards that are physically connected. It is necessary to program the NLDU with the number of display boards that are supposed to be present.

The NLDU provides a set of programming commands for mapping network zones to LEDs. (Refer Section 3.4.6). A network zone is specified by panel number/zone number where panel number is the SID number 1-254 and zone numbers are in the range 0-528. The NLDU may have a maximum of 33 display boards (528 LEDs) with LED numbers 1-528. A maximum of 64 different panels may be accessed. Each network zone may map to only one LED, but each LED may have more than one zone mapped to it. A maximum of 4096 zone to LED "mappings" may be programmed where each "mapping" consists of a panel/zone number and an LED number.

There is a set of seven global programmable parameters which determine how a zone state is mapped to an LED and these are described in Section 3.4.6.2 (Local LEDs show true alarm, etc).

2.7 RZDU PROTOCOL CONNECTION

The NLDU transmits RZDU protocol type data out the RZDU Tx terminal 1. The connection for this is on the remote termination board where the screw terminal labelled "TX" is the transmit data output and should be connected to the receive input at whatever is receiving the RZDU data. The 0V terminal on the remote termination board should also be connected to zero volts at the receiver. The format of the data transmitted is F4000 LCD RZDU protocol. The NLDU transmits one message every 2 seconds, which will be either a refresh message consisting of one display board worth of data, or a change of state message consisting of up to 15 triplets (5 half display boards) of data.

Note that the LCD version of the protocol is used rather than the NON-LCD version.

The data transmitted is not necessarily an exact copy of the information shown on the local LEDs (if any). Refer to Section 3.4.6.2.

2.8 LAMP TEST / BUZZER CANCEL INPUT

The lamp test / buzzer cancel switch connects to pins 3 and 4 of connector J5 (IN+, IN-) on the NLDU processor board. The switch is closed to activate either the lamp test or to cancel the buzzer. If the buzzer is currently turned on then closing the switch will cancel the buzzer and not initiate a lamp test. If the buzzer is not currently turned on then closing the switch will initiate a lamp test of the LED display boards and the LEDs on the NLDU processor board.

V2.02 software lamp test

With V2.02 software, the lamp test switch is closed to start the test and must remain closed while the lamp test is in progress or the test will terminate.

V2.03 software lamp test

With V2.03 or later software, the lamp test operates as follows. When the switch is closed, the lamp test starts (if the buzzer is not currently sounding). The switch can then be opened and the lamp test will continue. The LEDs on the controller board are tested first for approximately 2 to 3 seconds after which the LED display boards are tested. The LED display boards are tested in groups. The number of display boards in a group is set by the programmable parameter "max LED boards to test simultaneously" - a maximum of 8 is recommended for this. Each group is tested for the length of time specified by the "LED test hold time" parameter. The lamp test can be stepped to the next group manually by closing the lamp test switch again. The lamp test can be terminated at any time by closing the lamp test switch continuously for 3 seconds or longer. If the buzzer sounds (due to a fault) during the lamp test, it can be silenced by momentarily closing the lamp test switch without affecting the lamp test. Refer to section 3.4.6.1 for the programming of the parameters affecting lamp test.

2.9 WIRING OF 1200 BAUD MODEMS

If the NLDU/PLB is being used to connect a remote F4000 onto a Panel-link network then a Tyco Safety Products Christchurch 1200 baud Modem (part number PA0464) is required at the NLDU/PLB and one at the remote F4000.

The modem at the NLDU/PLB should be wired as per Figure 2.2.
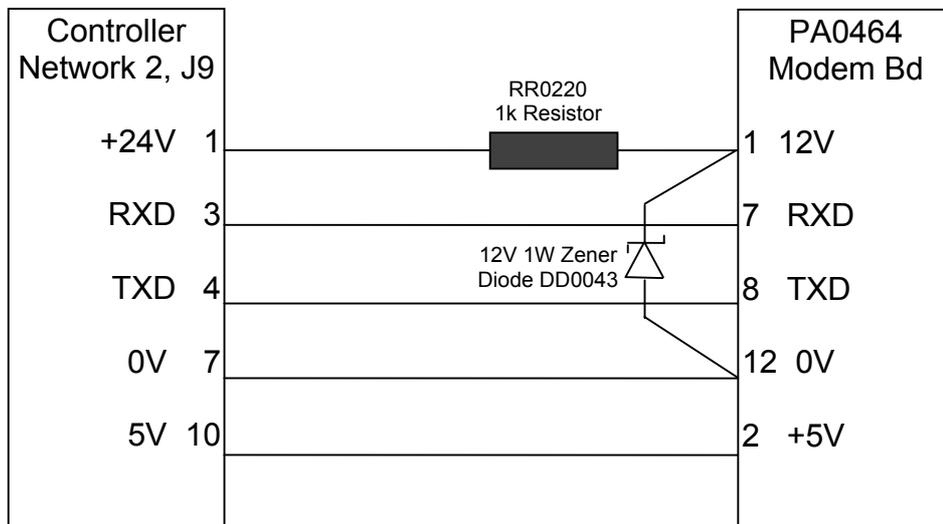
Figure 2.2
Wiring of NLDU/PLB Controller to 1200 Baud Modem

The modem at the F4000 should be plugged onto the Vicnet connector J2 on the F4000 Main Board (instead of the RS485 Network Board).

The Modem boards need to have links Lk1, Lk2, Lk3 fitted to select 1200 baud, link Lk7 set to 0DB position and link Lk8 removed.

The two modems are connected with four wires with the Tx pair of wires on one board going to the Rx pair of wires on the other modem board and vice versa as shown in Figure 2.3.

Further details for the 1200 baud modem can be found in LT0127, 1830 1200 Baud Modem Manual.
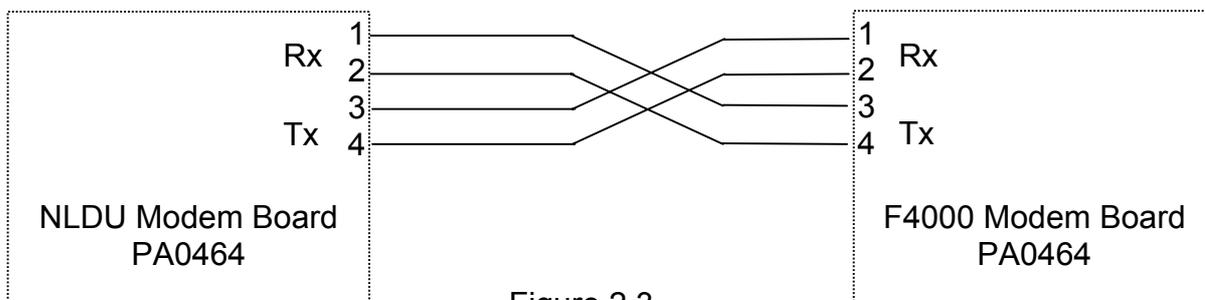
Figure 2.3
Wiring Between Modems

2.10 RE-ASSEMBLY

Check that the green earth wire is fitted between the earth terminal J3-6 on the RS485 board and the earth stud on the NLDU PCB. Tie all cabling to the side of the NLDU case using cable ties. Cable lengths inside the NLDU should be kept as short as possible. On no account run cabling across any part of the NLDU PCB.

Reassemble the top cover to the case.

For the FP0695 board set, mount the NLDU using the supplied standoffs inside the display cabinet. Make sure the earth lead and the mounting positions on the NLDU Controller are all bonded to the cabinet earth.


2.11 LINK SETTINGS

The links on the NLDU Controller are set during manufacturing and should not be altered in the field, except for Link Lk7 which must be set to WRITE ENABLED during programming. Controller board 1931-111 Issue B or later has additional links shown and does not have LK3 or LK6.

Link Name & Function	Link Position
LK1 Memory Configuration	1-2
LK2 Service Mode	Remove for Service Mode
LK3 Memory Configuration	Not Fitted
LK4 Memory Configuration	1-2
LK5 Memory Configuration	Not Fitted
LK6 Memory Configuration	2-3
LK7 Data Base Write Protect	"Write Protect" in normal operation
LK8 Memory decoding	2-3
LK9 Serial Port 0 CTS (asserted/external)	Hard Wired
LK10 Serial Port 0 DCD (asserted/external)	Hard Wired
LK11 LED Display to +ve, fit for standalone	Fit (S)
LK12 +22V to +ve	Fit (S)
LK13 Memory Configuration	1-2
LK14 RZDU Master	M
Link "SW1"	Not Fitted

The following apply to 1931-111 Issue B or later	
LK21 U2 Memory configuration	2-3
LK22 U2 Memory configuration	1-2
LK23 U3 Memory configuration	1-2
LK24 U4 Memory configuration	1-2
LK15 RZDU Master	M
LK16	DC
LK17 Battery very low threshold	AUS
LK20 U2 Memory protect	PROTECT

3.   NLDU PROGRAMMING & DIAGNOSTICS

3.1 ENTERING & EXITING PROGRAMMING MODE

Serial port zero on the NLDU is used for both diagnostics and programming, and also for event printing. Program mode is entered by first entering diagnostics mode and then using the CTRL P command from the main diagnostics menu.

To enter diagnostics mode, disconnect the printer (if any) and connect your terminal or PC. The terminal must initially be set to the same baud rate as has been programmed into the NLDU for the printer port or to 9600 baud if none is programmed. Press the ENTER key on the terminal and type the password "FIRES" followed by the ENTER key. If the baud rate that is programmed for the printer port is not 9600 baud then the NLDU will immediately switch the baud rate to 9600 baud and you should now also set the baud rate of your terminal to 9600 baud. Alternatively, set your terminal to 9600 baud, power the NLDU up and press the ENTER key within 10 seconds of power up.

When diagnostics mode has been successfully entered a menu will appear as follows.

```
          ***     NLDU/PLB Diagnostics V2.10     ***
          Q=quit, E=events on/off, ^P = Program
          1=Rxbyte net1, 2=Rxbyte net2, 3=Rxmsg net1, 9=Q discards
          4=Txmsg net1,  5=Rxmsg net2,  6=Txmsg net2, 7=all off
          L=Link integ fails, C=Comms counters
```

ENTERING PROGRAM MODE
To enter program mode the CTRL P command from the diagnostics menu is used. Set the database write protect link LK7 to WRITE. Type CTRL P on the diagnostic terminal (hold down the CTRL key and press P). Enter a password of PROG followed by the ENTER key. The NLDU should reboot itself into program mode. Once in program mode the main programming mode menu should appear as described in section 3.3. This allows the programming of the NLDU. **NOTE :-** if the NLDU is powered up with database write protect link in the WRITE position then it will immediately enter program mode, however this is not the recommended method of entering program mode.

When in programming mode, the NLDU is off line and does not communicate on either network 1 or network 2.

EXITING PROGRAM MODE
Use the X command from the main programming menu. After the database has been saved to EEPROM the database write protect link LK7 should be set to the WRITE PROTECT position.

NOTE: The NLDU database write protect link LK7 should always be in the "WRITE PROTECT " position when powering the NLDU up or down.

3.2 NLDU DIAGNOSTICS

3.2.1 Diagnostic Commands

Entering diagnostics mode is described in Section 3.1. While in diagnostics mode, events which are normally output to the printer will not be output and will be queued in the NLDU until diagnostics mode is exited (using the Q command). Event output can be temporarily enabled (or disabled) using the "E" command so that events appear on the diagnostic terminal while in diagnostics mode.

The NLDU should not be left in diagnostic mode permanently. To exit diagnostic mode use the Q (quit) command and type "Y" when prompted. The message "diagnostic session finishing" should appear. The printer (if any) should then be reconnected and after 20 seconds, event output will be resumed.

The main diagnostic menu (shown above) provides some commands for monitoring the transmission and reception of messages on network 1 and network 2. "Net 1" refers to the RS485 network and "Net 2" refers to the second network port. Numeric keys 1 to 6 allow the monitoring of characters or messages sent or received.

Numeric key 1 - shows characters received on network 1.
Numeric key 2 - shows characters received on network 2.
Numeric key 3 - shows complete valid messages received on network 1.
Numeric key 4 - shows messages transmitted by the NLDU onto network 1.
Numeric key 5 - shows complete valid messages received on network 2.
Numeric key 6 - shows messages transmitted by the NLDU on network 2.

The "C" command will show some diagnostics information on the number of unacknowledged or discarded messages on network 1 or network 2 which can be used to determine if the network connections are working ok or not.

The "L" command is used to show the SID numbers of any panels for which the NLDU has detected a link integrity fault.

3.2.2 Diagnostic LEDs

The LEDs on the NLDU processor board show diagnostic information. The alarm LED LD1 flashes when data is received on the network 2 modem port. The isolate LED LD2 flashes when data is transmitted on the network 2 modem port. The fault LED LD3 flashes at approximately 2hz continually indicating normal operation. The system fault LED LD5 turns on steady when there is a fault.

The ancil iso LED flashes when data is transmitted or received on serial port zero (printer/programmer port).

The Charger/Battery Fail LED will be on if the NLDU detects that the checksum of the database in EEPROM is incorrect when it powers up.

3.3 PROGRAMMING MAIN MENU

A menu with the following options appears at the start of program mode.

Set Time & Date (T), Configure (C), Zone LED mapping (Z), Print config (P), Set to Defaults (D), Write database to EEPROM (W), Load database (L), Save database (S), Exit (X).

The "T" command is used to set the NLDU time and date. The time and date are used for locally generated events such as power-up and link integrity faults. The NLDU time and date will be retained for only a few minutes when the NLDU is powered down.

The "Z" command is used to enter zone to LED mapping programming mode. (Refer Section 3.4.6).

The "C" (configure) command is used to program the general parameters described in section 3.4.

The "P" command prints the full list of general parameters but does not print the zone to LED mapping data.

The "X" command is used to save the database to EEPROM and exit program mode. The "W" command is used to save the database to EEPROM but to remain in program mode (this might be useful if programming a large amount of zone to LED mapping data). The "W" command must also be used to save the database to EEPROM before using the "S" command to save the database to a PC.

The "L" and "S" commands are used to load and save the database to a PC in an encoded binary format (Motorola S2/S8). NOTE: before saving the database to a PC it is essential to save it to EEPROM first using the "W" command from the main menu. At completion of saving the database to a PC it is necessary to press a key to redisplay the main menu.

3.4 GENERAL NLDU PARAMETERS

The parameters are described in this section in the order in which they appear when being programmed. The exact text which appears to the operator is shown plus the default value which is assigned when either the main menu "D" command is used or when the NLDU powers up and finds an invalid database in EEPROM. If event printing is disabled then some of the programming options may not appear.

The default parameter settings have Network 1/Network 2 Passon operation disabled, Network 2 Rx Scan Timeout set to zero and Network 2 SID number set to 255, which are the settings for when there is no device on Network 2. If there is a device on Network 2 then the parameters will need to be modified from the defaults.

If Network 2 is not being used then the parameter "Network 2 Rx Scan timeout" must be set to zero or the NLDU will generate a fault.

3.4.1 "Global" Parameters

NLDU/PLB SID number (1..254) DEFAULT 241 :
The NLDU's address (SID number) may be set to any value from 1 to 254. The SID numbers of all the F4000 panels on network 1 and network 2 and the NLDU itself must be unique. The F4000 on network 2 and some or all of the devices on network 1 should be programmed to expect to receive link integrity messages from the NLDU.

Enable Network 1 <> Network 2 Bridge/Passon Operation Y/N DEFAULT N:
This should be enabled if the NLDU/PLB is to pass messages from network 1 to network 2 or network 2 to network 1.

It is possible that the NLDU could have a device connected to network 2 and one or more devices on network 1 but not actually pass any messages from one network to the other. For example the NLDU could be displaying the status of zones or printing events for some or all of the network 1 and network 2 devices but not actually passing any messages between the two networks.

If this parameter is enabled then messages which are passed from network 1 to network 2 are as follows:
1.   Any message that is addressed specifically to the SID number of the network 2 device.
2.   Any broadcast message from a particular SID for which the NLDU has been programmed to pass on that type of message. (Refer Section 3.4.5).

Messages which will be passed from network 2 to network 1 are as follows:
1.   All messages are passed on except for link integrity messages and any messages that are addressed specifically to the NLDU itself.

Enable local event printing (Y / N) DEFAULT N :
If this parameter is disabled then the NLDU will not print any events at all. If enabled then the NLDU will print certain types of events according to further programmed options. In diagnostics mode, event printing can be enabled onto the diagnostic terminal with the "E" command even if this parameter is disabled.

Printer port baud rate DEFAULT 9600 :
The baud rate for the printer port (serial port zero).

Enable buzzer activation for local faults (Y / N) DEFAULT Y :
If enabled, the NLDU will turn its buzzer on if it detects a link integrity fault or scan fail of the device on network 2 or if a fault occurs with any connected LED display boards.

3.4.2 Network 1 Parameters

Most of the network 1 parameters should not need changing by the user. It is not appropriate for this document to describe the meaning of all of these parameters but the full list is given here showing the default values. Except for the last three items for which a description is given these parameters should not be changed from the default values without specific instructions from Tyco Safety Products Christchurch.

Network 1 baud rate DEFAULT 9600 :
Rx Timeout * 3.3msec DEFAULT 2 :
Tx delay * 3.3msec DEFAULT 1 :
Ack Time * 220msec DEFAULT 5 :
Dup Periods * 220msec DEFAULT 7 :
Leading FF DEFAULT 1 :
Trailing FF DEFAULT 1 :
Number of retries DEFAULT 4 :
Link Integrity Rx interval * 1sec DEFAULT 50 :

NLDU/PLB to Network 1 Link Integ Tx interval * 1sec (0 = disabled) DEFAULT 6 :
The NLDU may optionally transmit "link integrity" using its own SID number onto network 1 which can be monitored by other devices and allow them to generate a fault if the NLDU goes "off line". This parameter sets the number of seconds between transmission of link integrity messages on Network 1, and if set to 0 disables the transmission. The NLDU may also be programmed to transmit link integrity onto network 1 using the SID number that has been programmed for the remote device connected to network 2. This is described in the network 2 parameter list.

Expect Network 1 broadcast acks (Y / N) DEFAULT N :
This allows the NLDU to retry sending the broadcast if it does not receive an acknowledge and gives greater confidence in the broadcasts sent by NLDU being received correctly by other devices on network 1. This is desirable because the broadcast messages transmitted by the NLDU may include all of the broadcast type messages which it has received from the remote device on network 2.

Acknowledge Broadcasts to Network 1 (Y / N) DEFAULT N :
The NLDU may be programmed to acknowledge broadcasts for network 1. If this is enabled then the NLDU should be programmed to not "expect network 1 broadcast acks". i.e. the parameter above "Expect Network 1 broadcast acks" should be disabled (set to N). There can be only one device on network 1 which is programmed to acknowledge broadcasts.

3.4.3 Network 2 Parameters

The default values for the network 2 parameters are the values required for a baud rate of 1200. 1200 baud is several times slower than the 9600 baud rate of network 1. The NLDU currently provides for only a single remote device connected to network 2 and works only in full duplex mode with a dedicated non-multidropped data line.

It is essential that the NLDU is programmed with the correct SID number of the remote device connected to network 2 for several reasons including the fact that it allows the NLDU to pass on messages from network 1 to network 2 that are for the network 2 SID. The NLDU will send an acknowledge to the network 2 SID for all messages that it receives from it, including broadcast messages so the network 2 device should be programmed to expect acknowledgements to broadcasts. (Refer Section 4.1.1 Network 2 F4000 Programming). The NLDU expects to receive an acknowledge to every application type message that it sends to the network 2 SID, including broadcasts, so the network 2 SID must be programmed to acknowledge broadcasts as well as to expect acks to broadcasts.

Network 2 remote device SID number (1..255) DEFAULT 255 :
If there is no device connected to network 2 then this parameter should be set to 255, otherwise set it to the SID number that is programmed into the remote network 2 device. Devices on network 1 use this SID number to send and receive messages specifically for the remote network 2 device.

Network 2 baud rate DEFAULT 1200 :
This may be set to one of 300, 600, 1200, 2400, 4800 or 9600. The default values for the parameters listed here are specifically for 1200 baud and in particular, the "ack wait time" and "dup detect time" may need adjusting for different baud rates.

Network 2 port RTS permanently on (Y / N) DEFAULT Y :
The NLDU allows the choice of whether the RTS output for the network 2 serial port is either permanently on or whether it is turned on only for the duration of each transmission by the NLDU on network 2. If RTS is permanently on then the number of "leading FFs" should be set to one, otherwise if a modem is being used on network 2 then the number of leading FFs should be set to 3 (the extra leading FFs are needed with modem operation to allow the modem to start up).

Network 2 Leading FF DEFAULT 1 :
If RTS is permanently on then the number of "leading FFs" should be set to one. If RTS is turned on only while transmitting and a modem is being used on network 2 then the number of leading FFs should be set to 3 (the extra leading FFs are needed with modem operation to allow the modem to start up).

Network 2 Trailing FF DEFAULT 1 :
This should always be set to at least one.

Network 2 Parameters (Continued)

Network 2 Ack Wait Time * 220msec DEFAULT 6 :
This parameter sets the length of time that the NLDU will wait for an acknowledge to a message it has sent to the network 2 SID. A value of 6 sets a time of approximately 1.3 seconds. This value may be decreased for faster baud rates. A value of 6 is suitable for 1200 baud.

Network 2 Dup Periods * 220msec DEFAULT 11 :
The NLDU performs "duplicate detection" on messages that it receives from the network 2 SID and discards repeated transmissions of the same message. A value of 11 sets a time of approximately 2.4 seconds.

Network 2 Rx Scan Timeout (0=none) (seconds) DEFAULT 0 :
If there is no device connected to network 2 then this parameter should be set to zero. If there is a device on network 2 then the recommended value for this parameter is 50. If the NLDU receives no messages at all from the network 2 SID for the period of time set by this parameter then it will generate a local "link integrity fault" event. This may be useful for diagnostic purposes and is also necessary if the NLDU is displaying zone data from the network 2 SID on its LEDs because it allows the NLDU to request a "full update" when the remote device comes back on line.

This parameter does not affect the transmission of link integrity onto network 1 by the NLDU for the network 2 SID.

Network 2 number of retries DEFAULT 4 :
This parameter sets the number of times the NLDU will resend the same message before discarding the message if it does not receive an acknowledge from the network 2 SID.

Link integrity Tx interval (seconds) for NLDU/PLB to Network 2 (0 = disabled) DEFAULT 0 :
If this parameter is set to a non zero value then the NLDU will transmit link integrity for its own SID number onto network 2. The network 2 device can be programmed to expect to receive link integrity from the NLDU SID which allows the device to detect a loss of communication with the NLDU. It may not be necessary to have this option enabled because if the network 2 SID is continually sending messages to the NLDU (e.g. MAF status every 20 seconds) then it will generate a fault if it does not receive an acknowledge to its transmission and hence will detect a loss of communication.

If this parameter is enabled, i.e. set to a non zero value, then the recommended value is 10.

Network 2 Parameters (Continued)

Link integrity Tx interval (seconds) for network 2 SID onto Network 1
(0 = disabled) DEFAULT 0 :
If there is no device connected to network 2 then this parameter should be set to zero.
If this parameter is set to a non zero value (the recommended value is 5) then the
NLDU will transmit link integrity type messages onto network 1 with the SID number of
the network 2 device as if the network 2 device had directly transmitted them onto
network 1. These can then be monitored by other devices on network 1. If the NLDU
is currently receiving any kind of messages (i.e. not just link integrity) from the network
2 SID (except for acks to broadcasts) then it will generate link integrity transmissions
onto network 1. Hence it is not necessary for the network 2 SID to be programmed to
transmit link integrity to the NLDU if it is continually sending other messages such as
MAF status or "Status Transfer Data". This parameter sets the minimum time between
transmission of the link integrity messages onto network 1.

3.4.4 Event Printing Parameters
The NLDU can be programmed to print events. These may include events from any
device on network 1 or the single device on network 2.

Printer lines per page (0=none) DEFAULT 60 :
If this parameter is set to non zero then the NLDU will print page headings. If set to
zero then the NLDU will not print any page headings.

Print date with each event (Y / N) DEFAULT N :
This option allows the date to be printed with every event. If this is disabled then the
date will be printed on a line by itself only when it changes.

Print events for all SIDs regardless of SID number (still obeys group) (Y/ N)
DEFAULT Y :
If this option is enabled then events for all SIDs will be printed regardless of the SID
number or the programming of the SID list below. The events to print will still be
selected using the group programming. If this option is disabled then the SID list
programming can be used to select which SIDs to print events for.

The following options select which type of events are to be printed.

Print zone events (Y / N) DEFAULT Y :
Print system events (Y / N) DEFAULT Y :
Print system operating events (Y / N) DEFAULT Y :
Print circuit events (Y / N) DEFAULT Y :
Print point events (Y / N) DEFAULT Y :
Print relay events (Y / N) DEFAULT Y :

Event Printing Parameters (Continued)

Enable/disable groups 1-8 for event printing selection :
Group 1 enabled (Y / N) DEFAULT Y :
Group 2 enabled (Y / N) DEFAULT Y :
Group 3 enabled (Y / N) DEFAULT Y :
Group 4 enabled (Y / N) DEFAULT Y :
Group 5 enabled (Y / N) DEFAULT Y :
Group 6 enabled (Y / N) DEFAULT Y :
Group 7 enabled (Y / N) DEFAULT Y :
Group 8 enabled (Y / N) DEFAULT Y :

3.4.5 SID List Programming

The SID list programming allows the setting of some options for individual SIDs. There are six "pass on" options which select whether the NLDU passes on certain types of information that it receives from network 1 to the remote device on network 2. If network 2 is running at a much slower baud rate than network 1 then it is necessary to minimise the amount of data which is transmitted by the NLDU onto network 2. Hence only essential options should be enabled. Refer to Section 4.1.4 for further information. All of the "pass on" options affect broadcast message types only. Any messages that the NLDU receives from network 1 that are specifically for the remote SID on network 2 will always be passed on - these include zone status recalls and zone commands. Broadcast messages which are not one of the six "pass on" types listed below, are not passed on to network 2.

The SID number for the device on network 2 may be entered into the SID list but the only option which has any effect is the "Print Events" option which should be set to "Y" if it is desired to print events for the network 2 SID.

Options per SID are as follows:

Linkl Monitor=Y/N
If enabled then the NLDU will monitor link integrity messages from network 1 and generate a local link integrity fault event if they fail. This may be useful for diagnostic purposes and is also necessary if the NLDU is displaying zone data from the SID on its LEDs because it allows the NLDU to request a "full update" when the device comes back on line.

Print events=Y/N
If enabled then events received from this particular SID will be printed depending on the group programming. If the global option to "print events for all SIDs" is enabled, then this option has no effect.

SID List Programming (Continued)

Passon LinkI=Y/N
If enabled, the NLDU will pass on any link integrity messages that it receives from this device on network 1 onto network 2. This allows the remote SID on network 2 to monitor the link integrity of a specific SID on network 1 however the effect on the amount of data that has to be transmitted on network 2 must be considered.

Passon MAF data=Y/N
If enabled, the MAF status and totals for this SID will be passed from network 1 to network 2.

Passon Netvars=Y/N
If enabled, the "netvar data" (network logic variables) for this SID will be passed from network 1 to network 2.

Passon FFCIF=Y/N
If enabled, broadcast FFCIF alarm information for this SID will be passed from network 1 to network 2.

Passon Status transfer data=Y/N
If enabled, the "status transfer data" for this SID will be passed from network 1 to network 2. Status transfer data is used by a "PMB" device.

Passon Events=Y/N
If enabled, event messages for this SID will be passed from network 1 to network 2.

3.4.6 Mapping Zones to LEDs

The NLDU provides a set of programming commands for mapping network zones to LEDs. A network zone is specified by panel number/zone number where panel number is the SID number 1-254 and zone numbers are in the range 0-528. The NLDU may have a maximum of 33 display boards (528 LEDs) with LED numbers 1-528. A maximum of 64 different panels may be accessed. Each network zone may map to only one LED, but each LED may have more than one zone mapped to it. A maximum of 4096 zone to LED "mappings" may be programmed where each "mapping" consists of a panel/zone number and an LED number.

For an alarm type zone, the alarm, isolate and fault states map to the corresponding LEDs. For an ACZ (F4000 Ancillary Control Zone), the operate/activate state maps to the "alarm" LED i.e. the alarm state and operate state are treated identically by the NLDU.

There is also a set of seven global programmable parameters which determine how the status of the zones are prioritised when multiple zones map to the same LED. Refer to Section 3.4.6.2.

3.4.6.1 Programming Zone to LED Mapping

Selecting the "Z" command from the main programming menu will display the following sub menu:

  1 Modify/display zone
  2 Map range of zones to one LED
  3 Map range of zones to range of LEDs
  4 Display LED mapping for one LED
  5 Display zone mapping for range of zones
  6 Display zone mapping for all zones
  7 Delete LED mapping for range of zones
  8 Delete ALL LED mapping for ALL zones
  9 Select Menu 2.

Menu 2 has the following two options:

  1.   Assign number led display bds & type
  2.   Set local LED and RZDU output modes

A zone may be mapped to any LED regardless of whether the display board for that LED is physically present. The number of "display boards worth of LED data" that is to be transmitted out of the "RZDU protocol" port is assigned using option 9 from the menu above and this may be a different value to the number of display boards physically present. For example if the number of boards for RZDU transmit is set to three then the status of the first 48 LEDs is transmitted out the RZDU port regardless of how many LED display boards are physically connected to the NLDU.

Menu 2, Option 2 is described in Section 3.4.6.2.

Menu 2, Option 1 allows the assignment of the following:

1. The number of display boards connected. This may be from 0 to 33 and must match the number of boards physically connected or the buzzer will be turned on to indicate a fault. The buzzer may be turned off by using the lamp test input.

2. The number of display boards worth of LED data to transmit out the RZDU port (0-33).

3. The maximum number of LEDs on the display boards which may be on simultaneously before phasing of LED display boards occurs. When phasing occurs, only six boards at a time show the correct state of their LEDs and the other boards are all off and every 2 seconds the "window" moves by one position. Hence a minimum of seven boards must be present for any phasing to occur. Any boards which are programmed as "relay type" will always show their true state. Phasing does not affect the LED data transmitted out the RZDU port.

4. For V2.03 or later software - the maximum number of LED boards to test simultaneously during a lamp test. The maximum value that this should be set to is 8. Testing more than 8 LED display boards simultaneously may overload the power supply. A value less than 8 may be required, depending on how the NLDU is being powered. Refer to section 2.8 for lamp test operation.

5. For V2.03 or later software - the LED lamp test hold time. This parameter selects how long (in seconds 1 - 250) each group of LED display boards is tested for before the test steps to the next group.

6. Each LED display board may be programmed as "relay type" or non relay type according to whether there are any relay type outputs connected to that board. A board programmed as relay type will not be tested by the lamp test process and will not be turned off by the phasing process described above.

Programming Zone to LED Mapping (Continued)

Options 1 to 8 from the zone LED mapping menu above allow the assignment, deletion or displaying of zone to LED mapping assignment. Options 1,2,3,5,7 require the entry of a panel number which is the network SID number (1-254) of the panel of interest. Valid zone numbers are in the range 0 to 528 and valid LED numbers are 1 to 528. A maximum of 4096 zone to LED mappings may be programmed over a maximum of 64 different panels.

The range commands 2 and 3 in the zone to LED mapping menu allow the mapping of a group of consecutive zones on the same panel to either a group of consecutive LEDs or all to the same LED. If any zones in the specified range are already mapped to an LED then they will be unchanged. If necessary they can be deleted first using the range delete command (option 7).

Zone zero (0), corresponds to Ancillary Control Zone zero on the F4000 panel.

It is desirable that link integrity monitoring be enabled for all panels that have one or more zones mapped to LEDs. This is done with the SID list programming described in Section 3.4.5.

W A R N I N G

Option 1 (Modify / display zone) from the zone LED mapping menu will prompt you for the panel number and zone number and then immediately prompt you for an LED number if the zone is not already mapped. At this point, if you just press RETURN it will map the zone to an LED using the LED number that was shown in parenthesis. If you do not wish to map the zone to an LED you should press **ESCAPE** when prompted for an LED number. Whenever you are prompted for an LED number or a zone number a "default" value will be shown in parenthesis, which is the value that will be used if you just press RETURN. This value will automatically increment between successive commands.

3.4.6.2 Mapping of Zone States to LEDs and RZDU Output

From NLDU software V2.02 onwards, option 2 "Set Local LED and RZDU output modes" from menu 2 listed in Section 3.4.6.1 allows the programming of global parameters which determine how the zone states are prioritised to LED or "RZDU output" states when multiple zones map to the LEDs.

The global parameters are as follows:
1. Local alarm LEDs show: 1: any alarm, 2: non isolated alarms
2. Local fault LEDs show: 1: any fault, 2: non-isolated faults
3. Local isolate LEDs show: 1: any isolate, 2: all isolate
4. Local isolate LED flashes for partial isolate: 1: Yes, 2: No
5. RZDU alarm 'LEDs' show: 1: any alarm, 2: non-isolated alarms
6. RZDU fault 'LEDs' show: 1: any fault, 2: non-isolated faults
7. RZDU isolate 'LEDs' show: 1: any isolate, 2: all isolate

Mapping of Zone States to LEDs and RZDU Output (Continued)

The data transmitted on the RZDU port consists of 16 up to 528 "LED states" where each LED has an alarm, fault and isolate state.

There is a one to one correspondence between the 528 "RZDU LEDs" and the 528 LEDs on the local display boards connected to the NLDU. However, depending on the seven global parameters listed above, an LED on a local display board may not have the same state as the corresponding "RZDU LED" state sent on the RZDU port.

The following example is used to explain how the seven global parameters work.

Suppose Panel 1 Zones 1, 2, 3 are all mapped to LED number 1.
The first 4 of the parameters affect the local LEDs on the display boards connected to the NLDU and the last 3 parameters affect the LED states sent on the RZDU port.

Parameter 1. Local Alarm LEDs show: 1: any alarm, 2: non-isolated alarms
    When set to "any alarm", local alarm LED number 1 is ON when any of zones 1, 2, 3 are in alarm regardless of whether the zone is isolated.
    When set to "non-isolated alarms", local alarm LED number 1 is ON when any of zones 1, 2, 3 are in alarm and not isolated.

Parameter 2. Local Fault LEDs show: 1: any fault, 2: non-isolated faults
    When set to "any fault", local fault LED number 1 is ON when any of zones 1, 2, 3 are in fault regardless of whether the zone is isolated.
    When set to "non-isolated faults", local fault LED number 1 is ON when any of zones 1, 2, 3 are in fault and not isolated.

Parameter 3. Local Isolate LEDs show: 1: any isolate, 2: all isolate
    When set to "any isolate", local isolate LED number 1 is ON when any of zones 1, 2, 3 are isolated.
    When set to "all isolate", local isolate LED number 1 is ON only when zones 1, 2, 3 are all isolated.

Parameter 4. Local Isolate LEDs flash for partial isolate: 1: Yes, 2: No
    This parameter is meaningful only when parameter 3 is set to "all isolate". When parameter 3 is set to "all isolate", then isolate LED number 1 is on steady when all of zones 1, 2 and 3 are isolated.
    When some but not all of zones 1, 2 and 3 are isolated, then isolate LED number 1 will flash at 2Hz if parameter 4 is set to yes.

Parameter 5. RZDU Alarm LEDs show: 1: any alarm, 2: non-isolated alarms
    When set to "any alarm", RZDU alarm LED number 1 is ON when any of zones 1, 2, 3 are in alarm regardless of whether the zone is isolated.
    When set to "non-isolated alarms", RZDU alarm LED number 1 is ON when any of zones 1, 2, 3 are in alarm and not isolated.

Mapping of Zone States to LEDs and RZDU Output (Continued)

Parameter 6. RZDU Fault LEDs show: 1: any fault, 2: non-isolated faults
When set to "any fault", RZDU fault LED number 1 is ON when any of zones 1, 2, 3 are in fault regardless of whether the zone is isolated.
When set to "non-isolated faults", RZDU fault LED number 1 is ON when any of zones 1, 2, 3 are in fault and not isolated.

Parameter 7. RZDU Isolate LEDs show: 1: any isolate, 2: all isolate
When set to "any isolate", RZDU isolate LED number 1 is ON when any of zones 1, 2, 3 are isolated.
When set to "all isolate", RZDU isolate LED number 1 is ON only when zones 1, 2, 3 are all isolated.

Local LED Display Board Parameters (1,2,3,4)

The default settings for these parameters are:
Local Alarm LEDs show: any alarm
Local Fault LEDs show: any fault
Local Isolate LEDs show: any isolate
Local Isolate LEDs flash for partial isolate: No

RZDU Output Parameters (5,6,7).

The normal (and default) settings of parameters 5,6,7 for the RZDU output is:

RZDU Alarm LEDs show: non-isolated alarms
RZDU Fault LEDs show: non-isolated faults
RZDU Isolate LEDs show: all isolate

This means that when more than one zone is mapped to the same LED, if one is non-isolated alarm and another is isolated, then the state of the LED data sent out the RZDU port is non-isolated alarm. This allows the receiving device to detect when there are any non-isolated alarms, even when another mapped zone is isolated.

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4.	**APPLICATION CONFIGURATION**

The NLDU/PLB may be used in several different configurations and must be programmed accordingly. Currently only a single device is allowed on network 2 and the connection between the NLDU/PLB and the network 2 device must be full duplex. This section provides information on how to set up specific configurations.

4.1 CONFIG 1 - NETWORK 1 9600 BAUD, NETWORK 2 1200 BAUD

There are several types of devices that may be connected to network 2. This section describes a configuration where the network 2 device is a panel such as an F4000 and where there are a number of devices on network 1 which may include F4000 panels, PMBs, PTMs, and NLDUs.

At 1200 baud there is a significant limit on the amount of data which can be sent on network 2. The average rate of messages which can be sent by the NLDU onto network 2 is approximately 2 messages per second. It is necessary to restrict this to the minimum possible information being sent on network 2. The most likely things which might need to be sent include FFCIF alarms, MAF status data and netvar data for particular SIDs. It is necessary to calculate the rate of each type of message that is being sent and ensure that the average rate is 2 messages per second or less. (Refer to Section 4.1.4). The NLDU will always pass on to network 2 any messages that it receives from network 1 that are specifically for the device on network 2. The NLDU will selectively pass on broadcast messages of a particular type that have been specifically enabled per SID.

Because of the slow network 2 data rate it is probably not desirable to pass on link integrity from devices on network 1 onto network 2 but it can be done if the data rate is not too high. To allow the device on network 2 to monitor the connection to the NLDU the NLDU can be programmed to transmit link integrity onto network 2 - the device on network 2 should be programmed to expect to receive link integrity from the NLDU SID.

Sections 4.1.1, 4.1.2 and 4.1.3 describe how to program an F4000 panel being used as the device on network 2. Section 4.1.5 describes the programming of devices and panels on network 1 for this configuration.

4.1.1 Network 2 F4000 Main Menu Option 1 : Panel Link

1.   SID number - may be any unique SID number - the NLDU must also be programmed to know that this is the SID number of the remote SID.

2.   Mode - set to "Point to Point"

3.   NIC - set to "yes" so that the remote panel knows to expect an acknowledge to broadcasts. The ack to its broadcasts comes directly from the NLDU and does not come from any device on network 1.

4.   Rx timeout - leave at default value of 2.

5.   Tx delay - leave at default value of 1.

6.   Ack time - set to 250.

7.   Dup periods - set to 80.

8.   Leading FFs - set to 1.

9.   Trailing FFs - set to 1.

A.   Link txrs - set to a value of two (2) to allow the F4000 to monitor the link integrity sent by the NLDU. The NLDU SID number must be the first SID number to appear in the SID list in this F4000. The NLDU should be programmed to not pass on any link integrity messages from network 1 SIDs.

B.   LinkI Rx - set to 50 seconds.

C.   Tx LinkI - set to yes.

D.   LinkI Tx - set to 8.

E.   Groups - set as required for any panel-link panel.

F   Ack BRDCSTS - set to yes.

G.   Rx filter - set to no.

H.   MAX MSG TXS - set to 4.

4.1.2 Network Config Main Menu Option 2 : NET APP SIDs

This should be programmed the same as any panel-link F4000 panel - i.e. with the list of SID numbers that this panel wants to use the MAF status, totals and netvars of (if any). This list of SID numbers is also used to select which SIDs this panel monitors the link integrity transmissions of - the first "N" SIDs in this list will be monitored where "N" is a value set by Panel Link Menu Option A:"Link txrs". If this panel is programmed to transmit link integrity (which it should be), then the value of "N" is actually one less than the value programmed for "Link txrs". If this panel is not programmed to transmit link integrity then the value of "N" is the same as the value programmed for "Link txrs".

The SID list in the F4000 panel is also used to select which panels the F4000 will "search" when a zone "off normal" recall command is done. If desired, the SID list in the network 2 F4000 can be programmed with the SID number of every panel on network 1 plus the SID number of the NLDU, PROVIDING that the SID number of the NLDU is the first number in the list - this allows the F4000 to do link integrity monitoring for the NLDU SID.

The order of the SID numbers in this SID list is important if only some of them are being monitored for link integrity transmissions. The SIDs that are to be monitored for link integrity must be the first "N" SIDs that appear in the list when the list is displayed on the F4000 programming terminal.

The network 2 F4000 may use the MAF status, totals or netvars of any network 1 SID (within the limit of the network 2 data rate), and any such SID must be programmed into the SID list of the network 2 F4000. The NLDU/PLB must also be programmed to pass on the required information (i.e. MAF status, totals or netvars) for each particular network 1 SID.

4.1.3 Network 2 F4000 Other Network Programming Items

The items in the remaining F4000 network programming menus (i.e. 3:ffcif app, 4:netvar app ... 8:net status app) can be set as desired except that any values which set a "transmit rate" of any kind should not be set to less than the default values.

4.1.4 Calculating the Data Rate on Network 2

For a baud rate of 1200 on network 2 it is recommended that the average rate of broadcast type refresh messages that the NLDU/PLB passes on from network 1 to network 2 is limited to 2 messages per second.

The types of broadcast messages which are passed on are selected by the SID list programming described in Section 3.4.5. There are 6 "pass on" options per SID - Linkl, MAF data, Netvars and Status Transfer Data have default refresh rates which can be programmed into each network 1 SID. "FFCIF" and "Events" type messages do not have any continual refresh data.

Calculating the Data Rate on Network 2 (Continued)

For MAF data and Status Transfer data there are actually 2 messages sent each refresh time. In an F4000 panel the default refresh rates for MAF data, Netvar data and Status Transfer data is 20 seconds, hence if all of these are enabled and being passed to network 2, this produces an average rate of 5 messages every 20 seconds being passed to network 2 for that SID.

Hence the total average rate of broadcast refresh messages that the NLDU passes from network 1 to network 2 can be calculated and should be limited to 2 per second for a network 2 baud rate of 1200.

The diagnostics mode on the NLDU can be used to monitor the messages that the NLDU is transmitting or receiving on either network 1 or network 2, and this could be used to verify the approximate rate of messages the NLDU is transmitting on network 2.

4.1.5 Programming of Devices & Panels on Network 1 For a Configuration of a Single Remote Panel on Network 2 at 1200 Baud

The network parameters for any of the devices on network 1 (including the NLDU itself) can be set as for any panel-link network and the default values in the NLDU and any other device should not need to be changed with the exception of the "Linkl Rx" time which should be set to 50 seconds for all devices on network 1 and the "Linkl Tx" time should be set to 15 seconds for all devices on network 1. If the NLDU is programmed to transmit link integrity onto network 1 for either itself or for the remote network 2 SID then this can be monitored by any device on network one.

4.2 CONFIG 2 - NETWORK 1 9600 BAUD, NETWORK 2 9600 BAUD

If network 1 and network 2 are running at the same baud rate, then the constraints on the system are less than in configuration 1 where the baud rates were different. However, it is still highly desirable to minimise the amount of data being passed through the NLDU either from network 1 to network 2 or network 2 to network 1. This is because it is still possible for the NLDU to receive data from one network faster than it can send it on to the other network.

5.   PRODUCT HISTORY

NLDU V1.00 software   First release August 1996.

NLDU V2.00 software   October 1998. Added "Network 2" operation and event printing.

NLDU V2.01 software   November 1998. Minor change to default parameter settings.

NLDU V2.02 software   June 1999. Added parameters for better control of RZDU output and local LED states to ensure that a device receiving RZDU output data can detect all non-isolated alarms and faults. Refer section 3.4.6.2

NLDU V2.03 software   April 2003. Added parameters for lamp test hold time and number of boards to test simultaneously. The operation of lamp test was changed - refer section 2.8

When upgrading from V1.00 to a later version of software, the database, including LED mapping, has to be reprogrammed. When upgrading any V2.XX software to a later version, the database will not need reprogramming, but the new parameters referred to above will need checking and assigning.

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