EXHIBIT # 3

FCC Requirements CRF 47 Part 2.1033,c (3)

Installation and Operating Instructions

3.0 XP4 Installation

3.1 General

Installation Task List:

Section	Task Description
3.1	General
3.2	Equipment and Tools Required
3.3	Equipment Inventory
3.4	Cable Installation
3.5	ODU Installation
3.5.1	Co-located ODU Installation
3.5.2	Remote or Separated ODU Installation
3.6	IDU Installation

This Section assumes that pre-planning of the link has occurred; i.e. path budgeting and survey to ensure good line-of-sight between the two link ends and cable run estimations.

3.2 Required Installation Equipment

3.2.1 Tools

The only tools needed to install the radio are:
- Basic electricians toolkit (incl. voltmeter)
- Adjustable wrench (5-20mm)
- Torque wrench (capable of 66 N-m or 50 ft-lb) with a ¾ inch socket
- Crimp tool suitable for attaching N-type connectors to IDU-ODU cable

3.2.2 Equipment

Assuming the installer has the necessary radio equipment and antenna, the only other items needed are:
- RG-223/U or Belden 9913 cable of length to suit installation. See Section 3.4 for advice on which cable to use.
- At least two crimpable N-type connectors suitable for termination of the RG-223/U or Belden 9913 cable.
- Suitable waveguide to connect remote mounted ODU to antenna if Remote Mount option is used.
- To ground the ODU, sufficient earthing cable (at least 25mm^2 conductor recommended) and suitable crimp lugs are also required (the ODU grounding lugs are M6 and ¼-20).
- To ground the IDU, a suitable length of green PVC insulated 14-gauge wire (1.5 mm^2 conductor) minimum is required, plus a suitable crimp lug to attach wire to the IDU ground post (4 mm / 0.064 in. diameter).
- To power the IDU, suitable lengths of different colored PVC insulated 14-gauge wire (1.5mm^2 conductor) are required. Recommend the use of red for 0 V power connection and black for negative power connection.
- To connect alarm relay outputs and external input sensor from IDU to other co-located equipment; a suitable length of 8-pair tin-plated PVC insulated twisted pair copper cable (24 gauge), a male DB15 connector and cover.
- Enough cable ties to secure all cable runs.

3.3 XP4 Radio Equipment Inventory Check

Verify inventory of radio components before beginning installation. Ensure the part description detailed on the outside of each box corresponds to the components required for the installation; i.e. correct ODU frequency band, T-R spacing, capacity, and IDU configuration.

The radio configuration is determined by the Customer Specific Data Sheet (CSDS) that has been agreed upon by the customer. See Appendix 2 for an example showing the factory default settings.

The basic components required are contained in two boxes:

1. **ODU Box:**
   1   ODU
   1   ODU Installation Kit (refer to Table 3-1)

2. **IDU Box:**
   1   IDU
   1   IDU Installation Kit (refer to Table 3-2a)

3. **MSU Box (for 16E1):**
   1   MSU
   1   MSU Installation Kit (refer to Table 3-2b)

A remote mounted ODU requires an additional box:
4. **ODU Remote Mount Box:**
   1   Remote ODU mount
   1   Remote mount installation kit (refer to Table 3-3)

Additional items that are available through Digital Microwave Corporation:
   1   Antenna waveguide adapter for antennas using XP-type interface
   1   Flex waveguide (includes 4-40 screws and allen wrench)

Item	Quantity	Description
1	1	Weatherproof sleeve or tape and instruction set for use on cable connection at ODU (includes 200mm tie wrap for securing)

Table 3-1. ODU Installation Kit Parts List

Item	Quantity	Description
1	1	DC Power Connector for IDU; Weidmuller 3-pin
2	5	Phillips dome-head screw for mounting IDU in rack; No. 12 (12-24)
3	5	3.15A, slow-blow, 20mm spare fuse for IDU
4	1	100mm tie wrap for securing power cables to item 1
5	1	N-type 90° adapter for use with IDU in reduced front access clearance environments
6	1	Installation Guide

Table 3-2a. IDU Installation Kit Parts List

Item	Quantity	Description
1	2	DE-9 male-to-male cables, 7.5" (only 1 cable required for 1+0 16E1)
2	4	BNC to BNC cables
3	5	No.12 Phillips dome-head screws
4	5	Washers
5	1	Installation Guide

Table 3-2b. MSU Installation Kit Parts List

Item	Quantity	Description
1	2	Galvanized custom V-bolt
2	5	½-13 hex nut for attaching item 1 to antenna mounting assembly (incl. 1 spare)
3	5	½" flat washer for item 2 (incl. 1 spare)

Table 3-3. Remote Mount Installation Kit Parts List

3.4 Cable Installation

Only one cable is required to connect the XP4 IDU to the ODU. Both ends of the cable must be terminated with N-type male connectors. The N-type connectors are not supplied with the radio equipment unless requested by the customer as the type required depends upon cable type used for each installation.

Cable length limitations are dependent upon cable type used and power supply voltage as follows:

Cable Type	Nominal* Power Supply Voltage	Cable Length Limitation
RG-223/U	24 Vdc	≤ 50 m (150 ft)
RG-223/U	48 or 60 Vdc	≤ 100 m (300 ft)
Belden 9913	24 Vdc	≤ 150 m (500 ft)
Belden 9913	48 or 60 Vdc	≤ 300 m (1000 ft)

Table 3-4. Cable Length Limitations

* Nominal voltage range definitions:
- 24 Vdc = 21.6 to 28.0 Vdc
- 48 Vdc = 43.0 to 57.6 Vdc
- 60 Vdc = 54.0 to 72.0 Vdc

General notes regarding cable installation:
- When installing the cable between IDU and ODU, avoid excessive bending. Run the cable where it is reasonably well protected and will not rub against sharp edges or overly abrasive surfaces. Recommend use of cable ties at least every 1 meter.
- Use the crimp tool and die specifically designed for the connectors and cable being used. Use of generic crimp tools may result in sub-standard physical and therefore electrical connections.
- Leave a "U-bend" in the cable where it attaches to the ODU. This prevents water from running down the cable onto the ODU connection point and allows slack for antenna re-positioning should it be necessary.
- When connecting the terminated indoor/outdoor cable to the ODU and IDU, the N-type connectors should be tightened by hand. Using a tool such as pliers to tighten the N-type connectors could result in damage to the connectors, the equipment or both.
- The cable connection to the ODU should be weatherproofed using the cable-connector weatherproof sleeve or tape provided in the ODU Installation Kit. Roll the sleeve (or wind tape) onto the cable first, then connect the cable to the ODU. Roll the sleeve (or wind tape) over the connector until it contacts the ODU housing. If

necessary, secure the sleeve/tape with a tie wrap to prevent it from rolling back. Detailed instructions on how to fit the sleeve or tape are included in its packing.

Caution:
Power for the ODU is carried on the coaxial cable connecting the IDU and ODU. Ensure that power to the IDU is turned off before connecting or removing the cable from the ODU.

3.5 ODU Installation

The XP4 ODU may be used with a standard antenna that has a customized waveguide interface to accommodate DMC's proprietary circular ODU interface. The ODU generally attaches directly to the antenna. A remote ODU mounting kit is available, if required. A remotely mounted ODU does not require a DMC interface on the antenna. Both installation procedures are described in this section.

3.5.1 Co-located ODU Installation

The ODU mounts directly to the antenna with latches and spring loaded retention clips, as shown in Figure 3-1. The polarization of the transmitted signal is indicated by the polarization indicator on the faceplate of the ODU, as shown in Figure 3-2. The ODU has four mounting clips so that it may be fixed to the antenna according to the desired polarization.
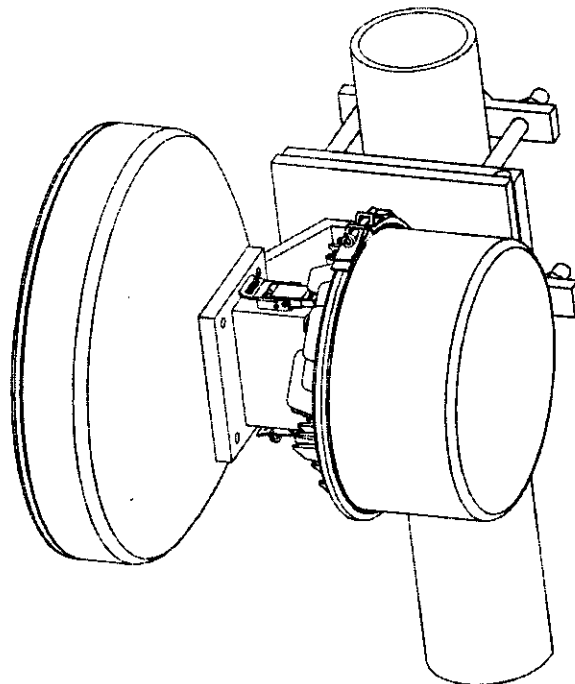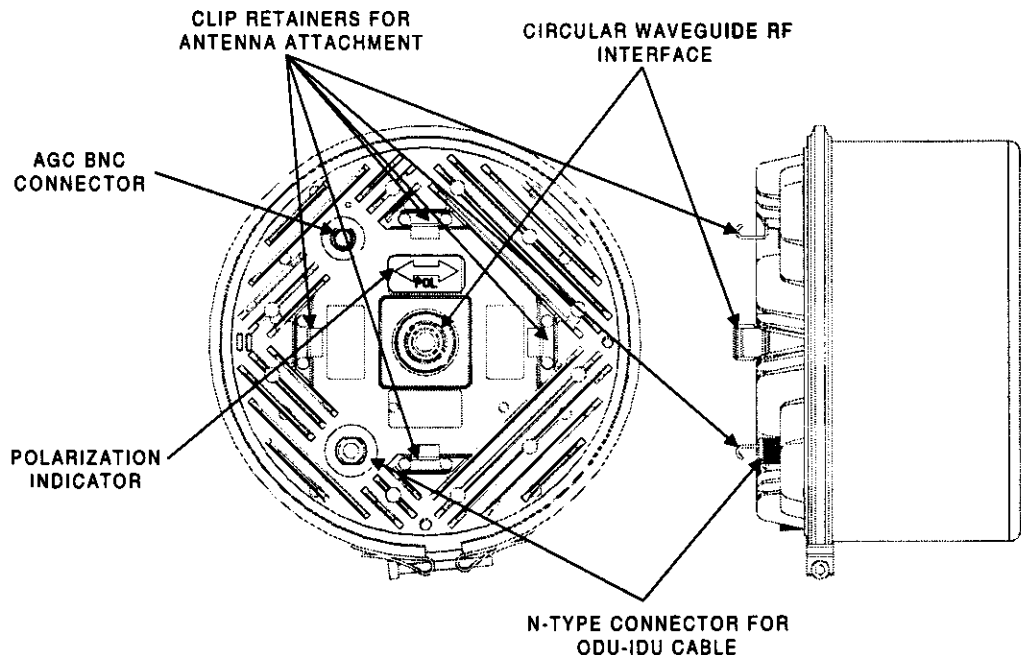

Figure 3-1. Co-located ODU with Antenna

CLIP RETAINERS FOR
ANTENNA ATTACHMENT

CIRCULAR WAVEGUIDE RF
INTERFACE

AGC BNC
CONNECTOR

POLARIZATION
INDICATOR

N-TYPE CONNECTOR FOR
ODU-IDU CABLE

Figure 3-2. ODU in Horizontal Polarization

3.5.1.1 Procedure for Installing ODU

Step 1.   Install antenna according to manufacturer's instructions.

Step 2.   Attach ODU to antenna using captive spring clips on antenna, ensuring polarization is correct.
            Note: For horizontal polarization, mount the ODU to the antenna so that the arrow is horizontal.
            For vertical polarization, mount the ODU to the antenna so that the arrow is vertical.

Step3.   Move ODU/antenna assembly to desired installation location on pole, being careful not to impact
            either ODU or antenna.

Step4.   Attach assembly to pole.
            Note: The location and orientation chosen for the assembly should have adequate clearance behind
            the ODU to allow the installer to be positioned behind it, so both installer and antenna are facing
            the remote radio terminal.

Step 5.   Secure the assembly to the pole.

Step 6.   Route, secure with cable ties and terminate ground between ODU and a nearby local ground point.
            Use jam and lock nuts provided on grounding post to secure ground connection. Tighten nuts using a
            small adjustable wrench.

Step 7.   Locate an attachment point for the ground terminal.

Step 8.   Remove any oxidation, zinc coating paint and dirt from a surface over a 13 mm (1/2 in.) area
            surrounding the ground hole.

Step 9.   Apply a coating of conductive grease to the area surrounding the area surrounding the grounding hole.

Step 10.   Connect the ground wire to the attachment point with the appropriate hardware.

Step 11.   Tighten the bolt. *Note: After tightening the connection remove any excess conductive grease.*

Step 12.   Apply a coat of zinc-rich paint.

3.5.2 Remote or Separated ODU

For remote radios or systems that require mounting the ODU separate from the antenna, a length of flex waveguide is used to connect the antenna to the ODU. The remote mount contains a circular-to-rectangular waveguide transition, providing a rectangular waveguide interface with tapped holes. A waveguide adapter is available to mount rectangular waveguide to an antenna with the DMC interface.

The ODU remote mount, shown in Figure 3-3, secures the ODU with latches and spring-loaded retention clips. The mount is designed for attachment to a pole of diameter between 48 mm and 115 mm (1.9 and 4.5 inches) using a V-bolt. The ODU is always attached to the remote mount in vertical polarization mode, i.e. with ODU polarization indicator positioned to point up and down.
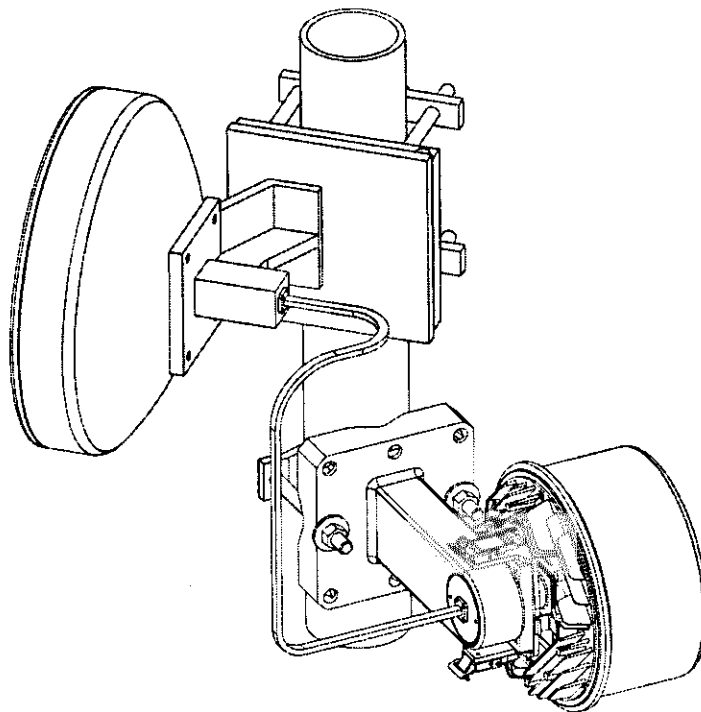

Figure 3-3. Remote Mounted ODU with Antenna

3.5.2.1 Procedure for Installing Remote Mounted ODU

Step 1.   Install antenna according to manufacturer's instructions.
Step 2.   Remove remote ODU mounting assembly and installation kit from the transport box.
Step 3.   Loosely assemble the V-bolt to the remote ODU mount plate using 2-each of the ½-13 hex nuts and ½" flat washers supplied in the Remote Mount installation kit (items 2 and 3). See Figure 3-3 for reference.
Step 4.   Attach ODU to remote mount using captive spring clips on plate, ensuring polarization is vertical, i.e. with ODU polarization indicator positioned to point up and down. See Figure 3-2 for reference.

Step 5.   If flex waveguide is used between the ODU and antenna, attach one end of the flex waveguide to the Remote Mount ODU waveguide flange using the 4-40 Allen bolts, No.4 lock washers and 3/32 Allen key provided in the installation kit.

Note: The waveguide section should be terminated on one side with a PBR type flange (square, 4-hole, with gasket groove) to be compatible with the UBR flange (square, 4-hole, without gasket groove) on the coupler. The other side of the flex waveguide section should be terminated with either a PBR or UBR flange depending on the antenna flange. All waveguide junctions require a PBR to UBR (gasket to cover) interface.

Ensure the gasket is installed in the flex waveguide PBR flange prior to assembly. Cover the open end of flex waveguide or coupler to prevent entry of foreign matter. Stow flex waveguide for transportation to its point of installation.

Step 6.   Move ODU assembly to the desired installation location on the pole, being careful not to impact the ODU or flex waveguide.

Step 7.   Attach assembly to pole using V-bolt.

Note: The location and orientation chosen should have enough clearance behind the antenna assembly to allow the installer to be positioned behind it, so both installer and antenna are facing the remote radio terminal.

Step 8.   Secure the assembly to the pole.

Step 9.   Lay-in, secure with cable ties and terminate ground between ODU and a nearby local earth point. Use jam and lock nuts provided on grounding post to secure ground connection. Tighten nuts using a small adjustable wrench.

3.6 Indoor Unit Installation

The IDU requires only 1RU of vertical rack space and 250 mm rack depth. No space above or below the IDU is required for ventilation purposes. IDUs may be stacked adjacently in racks. For 16E1, 2RU of vertical rack space is required for the IDU and MSU.

3.6.1 IDU Installation Procedure

Step 1.   Position the IDU as required in the equipment rack and secure using 4 No.12 Phillips dome-head screws provided in the installation kit.

Step 2.   a.) Lay in, secure with cable ties and terminate ground cable (at least 14 gauge wire recommended {1.5mm^2 conductor}) between IDU ground post and a nearby local grounding point. Refer to Figures 3-4, 3-5 and 3-8 for IDU ground post location.
            b.) Use nut and captive lock washer provided on grounding post to secure ground connection.
            c.) Tighten nut using a small adjustable wrench.

Step 3.   Attach 90° N-type adapter to ODU port on IDU front panel if required.

Step 4.   Pull terminated IDU/ODU cable into rack, securing with cable ties as necessary and leaving 0.5m service loop at the IDU connection point. Connect cable to 90° N-type adapter (if installed) or ODU port of IDU.

Step 5.   Install tributary data signal cables on the IDU "TRIB" connectors. Use 75Ω BNC male connectors for 2x/4x, E3, and DS3 unbalanced systems, RJ-45 plugs for 2x/4x balanced systems, and DB25 connectors for 4x/8x and 16E1 systems. Refer to the Table 3-5 and Figure 3-6 for RJ-45 wiring details and Table 3-6 for DB25 wiring details:

Step 6.   If required, install alarm relay wiring to female DB15 connector on IDU front panel. Refer to the Table 3-7 and Figure 3-7 for wiring details. Recommend use of 8-pair, tin-plated, PVC insulated, twisted pair, copper cable (24 gauge).

Step 7.   The XP4 requires DC power (±21.6 to 72 Vdc) via a 3-pin connector. Ensure that the plug provided in the installation kit is wired as detailed in Figure 3-8. Recommend use of 14 gauge wire (1.5mm^2

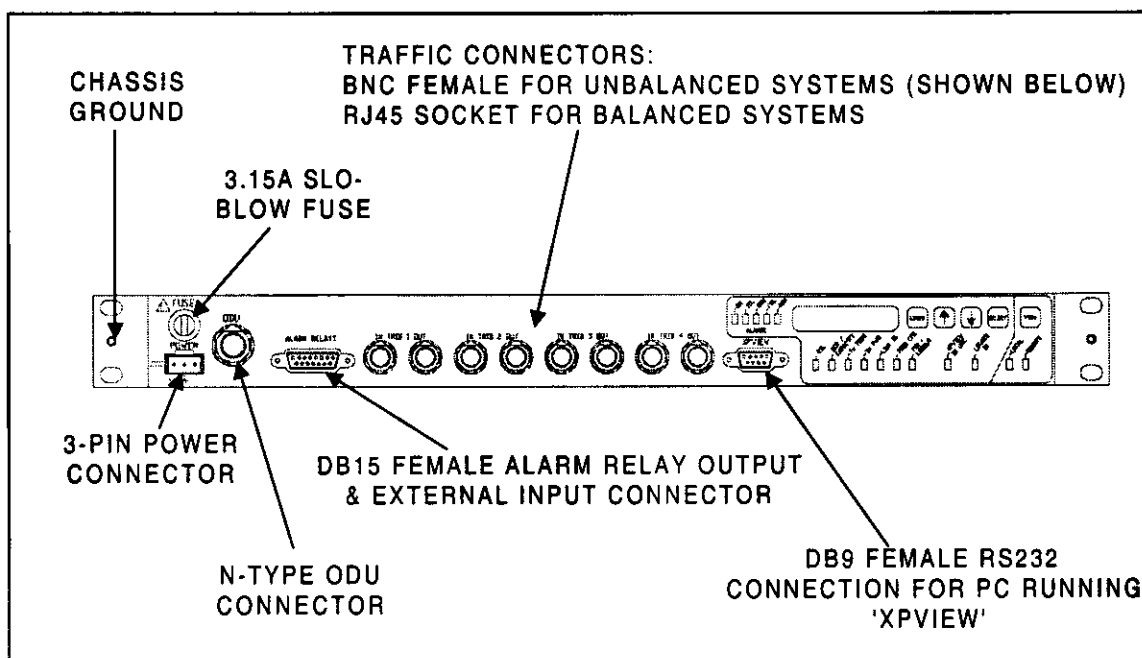conductor), ends stripped back by 3mm and secured in 3-pin Weidmuller connector using a small flat-blade screwdriver.
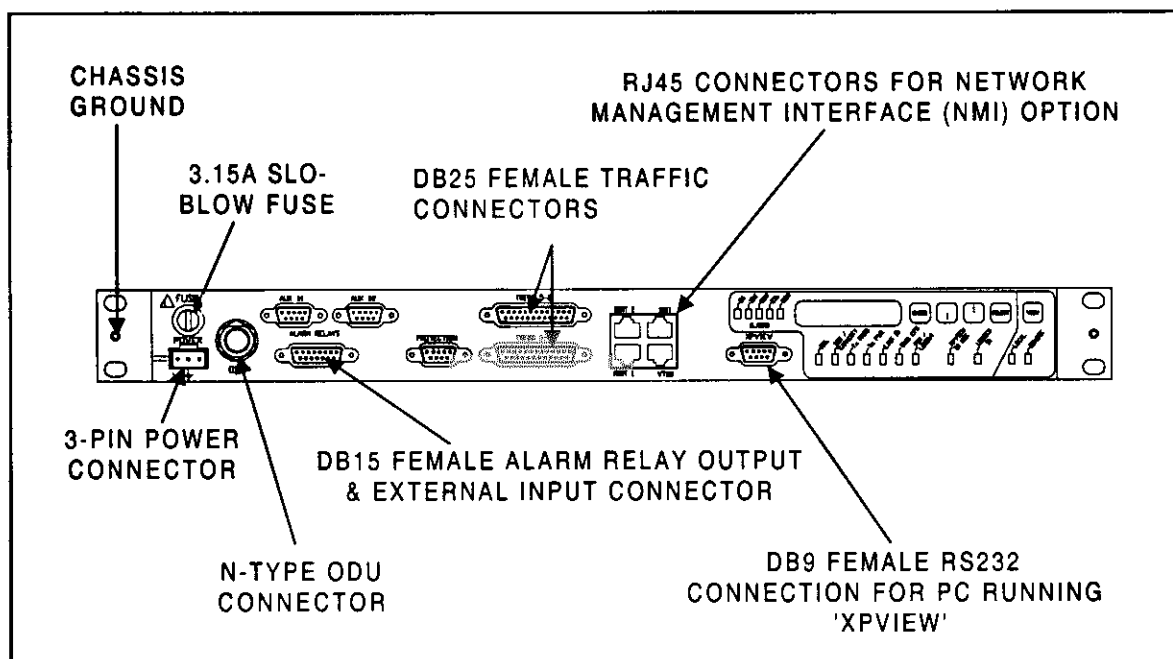

Figure 3-4. XP4 2x/4x IDU Connectors

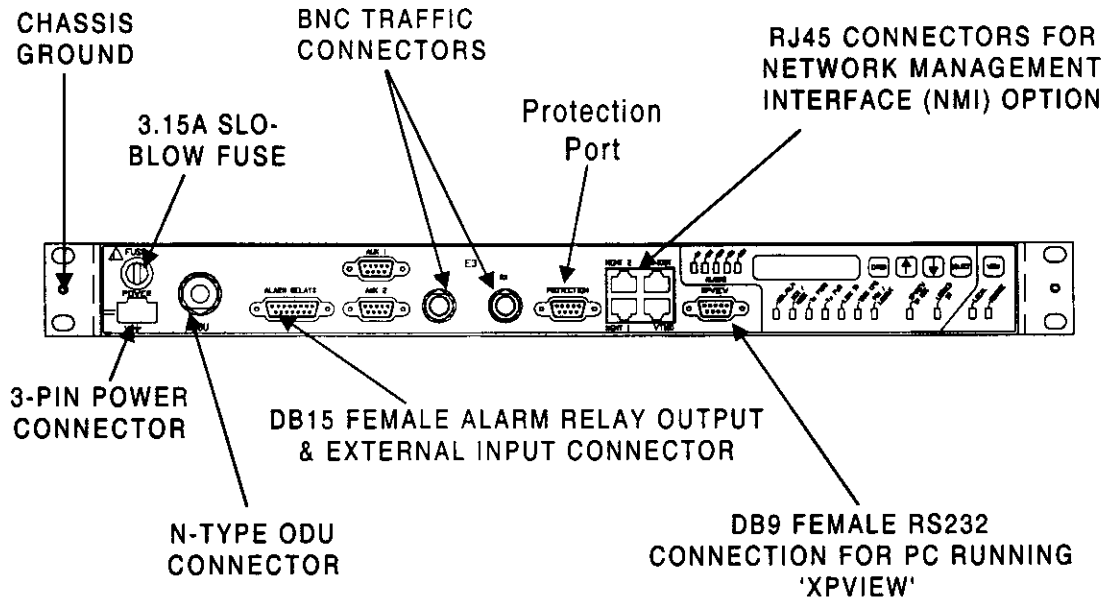*Figure 3-5a. XP4 4x/8x and Front Access 2x/4x IDU Connectors*

CHASSIS
GROUND

BNC TRAFFIC
CONNECTORS

RJ45 CONNECTORS FOR
NETWORK MANAGEMENT
INTERFACE (NMI) OPTION

3.15A SLO-
BLOW FUSE

Protection
Port

3-PIN POWER
CONNECTOR

DB15 FEMALE ALARM RELAY OUTPUT
& EXTERNAL INPUT CONNECTOR

N-TYPE ODU
CONNECTOR

DB9 FEMALE RS232
CONNECTION FOR PC RUNNING
'XPVIEW'

Figure 3-5b. XP4 E3 and DS3 IDU Connectors

3.6.2 MSU Installation Procedure (16E1 only)

Step 1.   Position the MSU either directly below or above the E3 IDU in the equipment rack and secure using 4 No.12 Phillips dome-head screws provided in the installation kit.

Step 2.   Connect the BNC cables from the MSU to the IDU – Tx A to Tx A, Rx A to Rx A.

Step 3.   Connect the DB-9 cable from the MSU to the IDU.

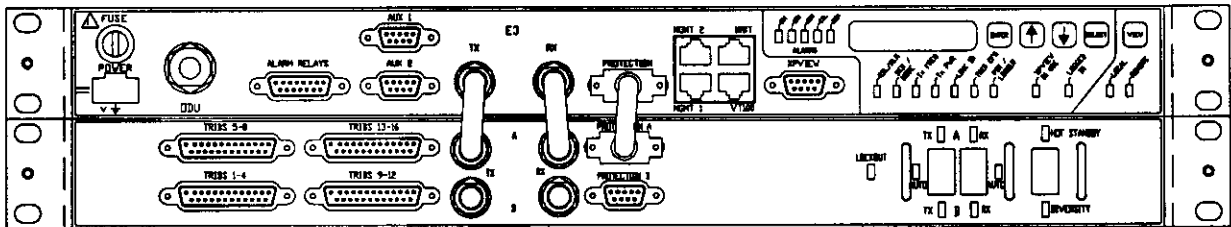**Caution: Verify that IDU is powered OFF before connecting or disconnecting IDU to MSU DB-9 'Protection' cable.**

Figure 3-5c. XP4 16E1 Connections

RJ-45 Socket Pin#	Signal Name	Signal Description
1	RXD -	Receive Balanced Data Signal (-)
2	RXD +	Receive Balanced Data Signal (+)
3	RX GND	Receive Shield Connection
4	TXD -	Transmit Balanced Data Signal (-)
5	TXD +	Transmit Balanced Data Signal (+)
6	N/C	Not Connected
7	N/C	Not Connected
8	TX GND	Transmit Shield Connection

Table 3-5. RJ-45 Tributary Socket Pinout
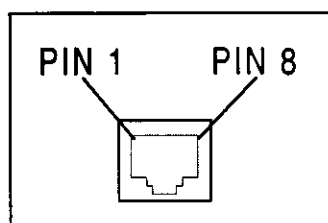
Figure 3-6. RJ-45 Tributary Socket Pin Numbering

DB25 Connector Pin #	Trib	Unbalanced	Balanced
1	N/A	Overall Shield	Overall Shield
2	1/5 In	Shield	Shield
3	1/5 Out	Center	Tip
4	1/5 Out	Shield	Ring
5	2/6 In	Shield	Shield
6	2/6 Out	Center	Tip
7	2/6 Out	Shield	Ring
8	3/7 In	Shield	Shield
9	3/7 Out	Center	Tip
10	3/7 Out	Shield	Ring
11	4/8 In	Shield	Shield
12	4/8 Out	Center	Tip
13	4/8 Out	Shield	Ring
14	1/5 In	Center	Tip
15	1/5 In	Shield	Ring
16	1/5 Out	Shield	Shield
17	2/6 In	Center	Tip
18	2/6 In	Shield	Ring
19	2/6 Out	Shield	Shield
20	3/7 In	Center	Tip
21	3/7 In	Shield	Ring
22	3/7 Out	Shield	Shield
23	4/8 In	Center	Tip
24	4/8 In	Shield	Ring
25	4/8 Out	Shield	Shield

Table 3-6. IDU Tributary DB25 Pinout

IDU "ALARM RELAYS" DB15 Pin No.	Signal Name	Signal Description (Radio is Powered on)
1	Relay #1 NO	Relay #1 normally open output
2	Relay #1 NC	Relay #1 normally closed output
3	Relay #2 NO	Relay #2 normally open output
4	Relay #2 NC	Relay #2 normally closed output
5	Relay #3 NO	Relay #3 normally open output
6	Relay #3 NC	Relay #3 normally closed output
7	Relay #4 NO	Relay #4 normally open output
8	Relay #4 NC	Relay #4 normally closed output
9	Relay #5 NO	Relay #5 normally open output
10	Relay #5 NC	Relay #5 normally closed output
11	Common	Common connection to all relays
12	GND	Station ground output (0V)
13	N/C	Not connected
14	GND	Station ground output (0V)
15	Ext I/P	External alarm input sense (alarm condition = station ground)

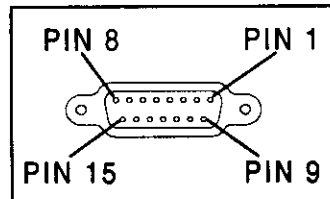*Table 3-7. IDU "ALARM RELAYS" DB15 Pinout*

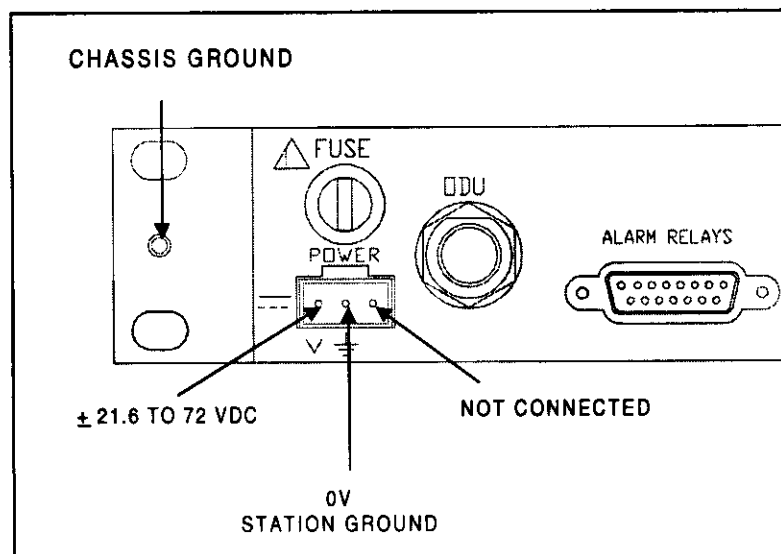*Figure 3-7. "ALARM RELAYS" DB15 Pin Numbering*

Figure 3-8. IDU Power Connector Detail

The XP4 terminal is now installed. Proceed to Section 4, Commissioning.

5.   Post-Installation XP4 Configuration

5.1 General Use of the Keypad

The keypad and display of the XP4 IDU enable the operator to configure the terminal and diagnose terminal faults by displaying unambiguous alarms and clear real-time system status.
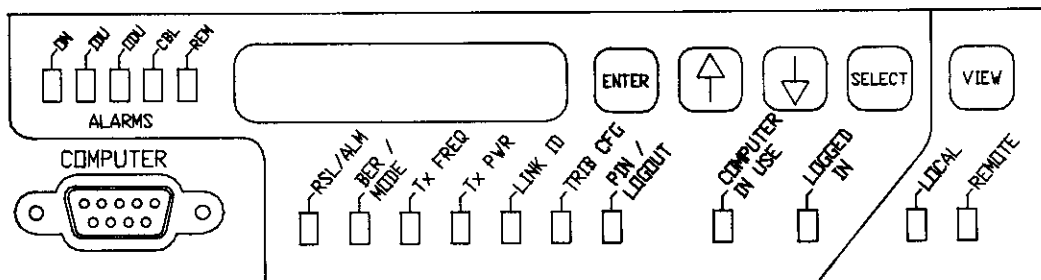

Figure 5-1. XP4 Speedkeys and LEDs

Alarms

The five **Alarm** LEDs, designated as ON, IDU, ODU, CBL and REM, give detailed current system alarms.
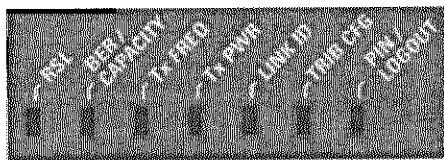
The status of the LED gives an indication as to the type of alarm:

- Green = OK
- Flashing Green/Red = Possible configuration error or minor alarm
- Red = Major alarm

Seven digit, 7-segment (7x7) LED display

This 7x7 display gives information requested by the operator about the XP4 system.

Green LEDs: RSL, BER/CAPACITY, Tx PWR, Tx FREQ, LINK ID, TRIB CFG, PIN/LOGOUT

These LEDs indicate the type of data displayed on the 7x7 display.

ENTER key

This key executes a choice selected via the keypad, shown on the 7x7 display.

↑ and ↓ keys

These keys permit scrolling through various options that are pertinent to the type of data shown on the 7x7 display.

SELECT key

This key is used to select the type of data shown on the 7x7 display.

Orange "XPVIEW IN USE" LED

When lit, this LED indicates that a PC running the XPVIEW software is connected to the XPView port of the IDU.
Note: Keypad operations at both ends of the link are limited to viewing terminal configuration only when this LED is lit.

Orange "LOGGED IN" LED

When lit, this LED indicates that the operator is logged in to the XP4 keypad.
Note: Operators may not be simultaneously logged in to both ends of the link.

VIEW key

This key allows the user to toggle between local and remote terminal information display.

Green "LOCAL" LED

When lit, this LED indicates that the information displayed on the IDU front panel is related to the local XP4.

Orange "REMOTE" LED

When lit, this LED indicates that the information displayed on the IDU front panel is related to the remote XP4.

5.1.1 Diagnostic Features

The diagnostic features below may be viewed without logging into the XP4 keypad (if the keypad has not been previously "locked out" using XPView).

The feature to be viewed is selected using the **SELECT** key.

5.1.1.1 RSL/ALARM

When the green RSL LED is lit, the 7x7 display gives a real-time indication of receive signal level in dBm. Current alarm conditions are available by pressing the arrow keys and scrolling through the alarms. If not alarms are present, 'noAl' will be displayed.

Remote XP4 RSL and alarms may be displayed by pressing the **VIEW** key so that the orange **REMOTE** LED is lit.

5.1.1.2 BER/CAPACITY

When the green **BER/CAPACITY** LED is lit, the 7x7 display gives a real-time indication of received BER and the current capacity setting and channel plan being used (alternate or normal). E3, 16E1, and DS3 systems provide **BER/MODE**, shown as 'E3', '16', or 'DS3' for 1+0 systems and 'E3p', '16p', and 'DSp' for 1+1 systems.

BER is displayed on the left side in the format "*0err*" if the BER is less than 1×10^{-7}. If the BER rises above 1×10^{-7}, the current BER is displayed in the format "*nE-n*" indicating a BER of n errors in 10^n bits is being received. For example, if a BER of 4 errors in 10^{-6} bits are being received, the display will read "4E-6".

Capacity and current channel plan are displayed on the right side in the format "*n2*", where 2 is the capacity (i.e., 2 x 2.048 Mbit/s for 2E1 configuration) and "n" is the "normal" channel plan. Capacity may be displayed as 2, 4 or 8; meaning 2x, 4x or 8x. The channel plan may be "n" or "A"; meaning "normal" or "alternate". Capacity is not selectable on E3, 16E1, and DS3 systems.

Valid configurations are:
- For a 2x/4x XP4 Series: n2, A2, n4 (2x not available for DS-1 configurations)
- For a 4x/8x XP4 Series: n4, A4, n8

An "alternate" channel plan is used when operating at the lower of the two applicable capacities. The "alternate" channel plan allows the operator to assign a frequency on the channel plan normally associated with the next higher capacity. By assigning channels in this way, there is no need for the operator to obtain new frequencies from their regulatory authority, or change channel when upgrading link capacity.

Assignment of normal and alternate channel plans are pre-programmed defaults in the factory. They may be altered or deleted by the operator if required using the XPView software.

5.1.1.3 Tx FREQ

When the green **Tx FREQ** LED is lit, the 7x7 display gives transmitter frequency currently in use.

Depending on whether the customer order was for the XP4 to display the transmit frequency in MHz or as a channel number, the display shows the transmit frequency in MHz (to 2 decimal places) or a channel number, which may be up to four digits in length.
The for transmit frequency display will be shown on the Default Software Configuration Sheet that accompanied the IDU in it's factory delivered packing (see Section 7.4 for an example).

Remote XP4 transmitter frequency may be displayed by pressing the **VIEW** key so that the orange **REMOTE** LED is lit.

5.1.1.4 Tx PWR

When the green **Tx PWR** LED is lit, the 7x7 display gives transmitter output power currently in use.

XP4 transmitter power is displayed in dBm.
If "*OFF*" is displayed, this indicates the transmitter is muted.

Remote XP4 transmit power may be displayed by pressing the **VIEW** key so that the orange **REMOTE** LED is lit.

5.1.1.5 LINK ID

Unique link codes for each installed link are required to help prevent interference.
When the green **LINK ID** LED is lit, the 7x7 display gives the Link ID currently in use.

Link ID may be set to any value between 1 and 255.

5.1.1.6 TRIB CFG

When the green **TRIB CFG** LED is lit, the 7x7 display gives tributary configuration information.
This feature allows the operator to view the LOS (loss-of-signal) detect function for each tributary.
The display may read one of two ways depending on the XP4 setup:

- "*trib 1 n*" which means: *tributary #1 is set to "normal" mode, i.e. LOS alarm will occur upon a lack of input signal.* This is the configuration used on traffic carrying tributaries.
- "*trib 1 I*" which means: *tributary #1 is set to "invert" mode, i.e. the LOS alarm that would be normally generated due to lack of input signal is inverted to defeat LOS alarms on unused tributaries.*

Each Trib Config. setting may be viewed in turn using the **ENTER** key.

Remote XP4 Trib Configs may be displayed by pressing the **VIEW** key so that the orange **REMOTE** LED is lit.

NOTE: Tributary configuration is set to '*normal*' for E3 and DS3 systems.

5.1.2 Control Features

The control features are accessed by inputting a PIN to the keypad. The PIN is detailed on the Customer Specific Data Sheet. The PIN, which can be up to six numeric digits, may be changed using XPView.

PIN input procedure:
- The **SELECT** key is pressed until the **LOG IN LED** is lit. A dot will be displayed on the left side of the 7x7 display.
  If the 7x7 displays "locd", either another operator is logged in to the remote terminal keypad or a PC running XPView is connected to the XPView port at the local or remote terminal. It will not be possible to log in to the local keypad until the other operator logs out.
- The first digit of the PIN is selected using the ↑ or ↓ keys.
- Input the digit using the **ENTER** key.
- The second digit of the PIN is selected using the ↑ or ↓ keys.
- Input the digit using the **ENTER** key.
- Enter the remaining digits in the same manner
- The **ENTER** key is pressed once more after the last PIN digit is accepted into the XP4. If the PIN is correct, the IDU will beep and light up the orange **LOGGED IN LED**.

The operator may now proceed to setup any or all of the control features detailed below, using the **SELECT** key to select the desired option.

After the operator has finished configuring the XP4, they may logout manually or just leave the keypad for inactive for 5 minutes, when the XP4 will automatically log out.

Manual logout procedure:
- The **SELECT** key is pressed until the **PIN/LOGOUT LED** is lit.
- Press the **ENTER** key to log out of the XP4. The IDU will beep and the orange **LOGGED IN LED** will extinguish.

5.1.2.1 BER/CAPACITY

When the green **BER/CAPACITY** LED is lit and the operator is logged in to the keypad (orange **LOGGED IN LED** is lit), the 7x7 display gives a real-time indication of received BER, the current capacity setting and channel plan being used. E3, 16E1, and DS3 systems provide **BER/MODE**, shown as 'E3', '16', or 'DS3' for 1+0 systems and 'E3p', '16p', and 'DSp' for 1+1 systems.

Capacity and current channel plan are displayed on the right side of the 7x7 display in the format "*n2*", where 2 is the capacity (2 x 2.048 Mbit/s for 2E1 configuration) and "n" is the "normal" channel plan. Capacity may be displayed as 2, 4 or 8; meaning 2x, 4x or 8x. The channel plan may be "n" or "A"; meaning "normal" or "alternate". Capacity is not selectable for E3, 16E1, and DS3 systems.

Valid configurations are:
- For a 2x/4x XP4: n2, A2, n4 (2x not available for DS-1 configurations)
- For a 4x/8x XP4: n4, A4, n8

An "alternate" channel plan is used when the XP4 is operating at the lower of its two capacities. The "alternate" channel plan allows the operator to assign a frequency on the channel plan normally associated with the next higher capacity. By assigning channels in this way, there is no need for the operator to obtain new frequencies from their regulatory authority, or change channels when upgrading link capacity.

Assignment of normal and alternate channel plans are pre-programmed defaults in the factory. They may be altered or deleted by the operator if required using the XPView software.

When the operator is logged in to the XP4 terminal keypad, the capacity and channel plan may be altered using the ↑ or ↓ keys. The choice of capacity and channel plan is accepted/executed by pressing **ENTER** and is implemented simultaneously at both terminals in a working link.

<u>Capacity Change Warning</u>
When upgrading traffic capacity between either "*A2*" to "*n4*" or visa versa, the channel number and
frequency is not affected and the link remains operating at the new capacity. This is the only type of
capacity change recommended after a link has been installed.
If the capacity is changed between either the "*n2*" to the "*n4*" or visa versa, the new channel number and
frequency will not match and therefore both transmitters will be muted. They will also tune automatically
to the center channel of the ODU band. In this case the link will not be operating and will need to be re-
installed following the initial installation procedure in Section 4.5, unless the operator wishes to un-mute
the transmitters on the center frequency of the ODU tuning band. Re-tuning without un-muting the
transmitters may require intervention by an operator at both ends of the link.

Note: Changing capacity or channel plan setting <u>WILL</u> cause momentary traffic disruption.

5.1.2.2 Tx FREQ

When the green **Tx FREQ** LED is lit, the 7x7 display gives transmitter frequency currently in use.
Depending on whether the customer order was for the XP4 to display the transmit frequency in MHz or
as a channel number, the display shows the transmit frequency in MHz (to 2 decimal places) or just a
channel number (up to four digits in length).
The customers choice for transmit frequency display is detailed on the Customer Specific Data Sheet.

If the operator is logged in to the XP4 terminal keypad, the frequency/channel setting may be altered
using the ↑ or ↓ keys. The change is accepted/executed by pressing **ENTER** and is implemented
simultaneously at both terminals in a working link.

The XP4 will not let the operator tune to a frequency outside the ordered/purchased tunable range.

Note: Changing frequency/channel setting <u>WILL</u> cause momentary traffic disruption.

5.1.2.3 Tx PWR

When the green **Tx PWR** LED is lit, the 7x7 display gives transmitter output power currently in use.

XP4 transmitter power is variable in steps of 0.5 dB from the terminal's maximum output power down to
50 dB below the maximum. See Appendix 1, Specifications, for maximum output requirements.

The transmitter can be turned off or muted by selecting the "*OFF*" option on the 7x7 display.

If the operator is logged in to the XP4 terminal keypad, the transmitter power setting may be altered using
the ↑ or ↓ keys. The change in level is accepted/executed by pressing **ENTER.**

The XP4 will not let the operator select a value outside of the calibrated range of operation.

Remote XP4 transmit power may be displayed and altered by pressing the **VIEW** key so that the orange
REMOTE LED is lit.

Note: Changing transmit power setting may cause momentary traffic disruption.

5.1.2.4 LINK ID

When the green **LINK ID** LED is lit, the 7x7 display gives the Link ID currently in use.

Link ID may be set to any value between 1 and 255.

If the operator is logged in to the XP4 terminal keypad, the Link ID setting may be altered using the ↑ or ↓ keys. The change is accepted/executed by pressing **ENTER** and is implemented simultaneously at both terminals in a working link.

Note: Changing Link ID WILL cause momentary traffic disruption.

5.1.2.5 TRIB CFG

When the green **TRIB CFG** LED is lit, the 7x7 display gives current tributary configurations.
This feature allows the operator to view and configure the LOS (loss-of-signal) detect function for each tributary.
The display may read one of two ways depending on XP4 setup:

- *"trib 1 I"* which means: *tributary #1 is set to "invert" mode, i.e. the LOS alarm that would be normally generated due to lack of input signal is inverted to defeat LOS alarms on unused tributaries.*
- *"trib 1 n"* which means: *tributary #1 is set to "normal" mode, i.e. LOS alarm will occur upon a lack of input signal.* This is the configuration used on traffic carrying tributaries.

If the operator is logged in to the XP4 terminal keypad, each Trib Config. setting may be altered using the ↑ key. The arrow key toggles the trib between "inverted" and "normal" modes. The change is accepted/executed by pressing **ENTER**, upon doing so the 7x7 display shows the next tributary's configuration for editing.

Remote XP4 Trib Configs may be displayed and altered by pressing the **VIEW** key so that the orange **REMOTE** LED is lit.

Note: Changing Trib Config. will not disrupt traffic.

Tributary configuration is set to *'normal'* for E3 and DS3 systems.

5.2 Specific Post-Installation XP4 Configuration Procedures

This section provides procedures that use the keypad to configure a working link without the need of a PC or other external control device connected to the IDU.

5.2.1 Traffic Capacity Upgrade

Terminals are capable of either 2x/4x or 4x/8x operation depending upon the original customer order.
This upgrade is achieved entirely in software and may be executed from the IDU keypad.
As an example, the process below details how to upgrade a link operating in 2x mode to operate in 4x mode.

1. Log in to the IDU keypad (see Section 5.1.2)
2. Press **SELECT** key until green **BER/CAPACITY** LED is lit
3. LED will display *"0Err n2"* indicating that the link BER is $<1 \times 10^{-7}$ and the channel plan is use is the "normal" 2x channel plan

Caution:
***Do not attempt this procedure if the link is running with a BER indicated on the display.
If this is the case, fix the BER problem before attempting to upgrade capacity.***

4. Use the ↑ key to select *"n4"*. This is 4x mode
5. Press the **ENTER** key to accept the configuration change. Both local and remote terminals now switch to working in a 4x mode
6. Press **SELECT** key until green **Tx PWR** LED is lit. Notice that the transmitter was muted (shown as *"off"* on the 7x7 display) when the XP4 link changed from *"n2"* to *"n4"* mode to prevent unwanted emissions
7. Use the ↑ key to select the required transmitter power
8. Press the **ENTER** key to accept the transmitter power. *This action will unmute the transmitters simultaneously at both ends of the XP4 link*

9. Connect traffic to tributaries #3 and #4
10. Check for alarms and configure tributaries #3 and #4 (Section 5.2.5)
11. When finished, press **SELECT** key until green **PIN/LOGOUT** LED is lit and press **ENTER** to logout

If the radio was working in "*A2*" mode before the capacity upgrade to "*n4*" was initiated, there is no need to un-mute the transmitters as the channel plans used in both modes are the same (see Section 5.1.2.1 for further detail).

5.2.2 Transmit Frequency Change

When a XP4 terminal's transmitter frequency is changed in a working link, the remote terminal will track the frequency change.
If the new frequency selected is subject to interference, both XP4 terminals will fall back to their original transmitter frequencies.
To change frequency:
1. Log in to the IDU keypad (see Section 5.1.2)
2. Press **SELECT** key until green **Tx FREQ** LED is lit
3. Use the ↑ and ↓ keys to select the desired frequency
4. Press the **ENTER** key to accept the change
5. The IDU will beep and display the new transmitter frequency
6. When finished, press **SELECT** key until green **PIN/LOGOUT** LED is lit and press **ENTER** to logout

For further details, refer to Section 5.1.2.2.

5.2.3 Transmit Power Change

Either local or remote XP4 transmitter power may be adjusted in a working link from the keypad:
1. Log in to the IDU keypad (see Section 5.1.2)
2. Press **SELECT** key until green **Tx PWR** LED is lit
3. Press **VIEW** key to display either local or remote transmit power setting
4. Use the ↑ and ↓ keys to select the desired transmit power
5. Press the **ENTER** key to accept the change
6. The IDU will beep and display the new transmitter power
7. When finished, press **SELECT** key until green **PIN/LOGOUT** LED is lit and press **ENTER** to logout

For further details, refer to Section 5.1.2.3.

5.2.4 Link ID Code Change

The entire Link ID Code may be changed from either XP4 terminal in a working link from the keypad:
1. Log in to the IDU keypad (see Section 5.1.2)
2. Press **SELECT** key until green **LINK ID** LED is lit
3. Use the ↑ and ↓ keys to select the desired Link ID Code (1-255)
4. Press the **ENTER** key to accept the change
5. The IDU will beep and display the new Link ID Code setting
6. When finished, press **SELECT** key until green **PIN/LOGOUT** LED is lit and press **ENTER** to logout

For further details, refer to Section 5.1.2.4.