TELEDYNE PARADISE DATACOM
A Teledyne Technologies Company

Q-NET™ PDQS
Redundancy Switch
Installation and Operating Handbook

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Chapter 1 Welcome

This installation and operating handbook covers the **Q-NET™ PDQS redundancy switch**. The backup modem, which may be a **Q-Flex™** or **Q-MultiFlex™** modem, also acts as the Switch controller and is physically separate from the redundancy switch.

Figure 1-1 shows the redundancy switch, consisting of a 3U, 19-inch chassis.

Figure 1-1 Q-NET™ PDQS Redundancy Switch

Figure 1-2 shows the backup modem fitted underneath. The backup modem reports the status of the Switch and is used to control the Switch.

Figure 1-2 PDQS Redundancy Switch (with backup modem)

A rear view of the Switch is shown in **Figure 1-3**. The rear houses up to four modules each of which supports up to four traffic modems. The Switch has an ‘umbilical cable’ (situated in the centre, bottom) that links it to the backup modem.

Figure 1-3 Redundancy Switch, Rear View (1:4 System)

Figure 1-4 shows how the umbilical cable connects between the Switch and backup modem.

Figure 1-4 Redundancy Switch (showing connection to Backup Modem)

As well as front-panel control, the Switch can be controlled from a web browser or through SNMP (all via the backup modem).

Chapter 2 About This Handbook

2.1 Conventions

This warning symbol is intended to alert the user to the presence of a hazard that may cause death or serious injury.

This information symbol is intended to alert the user to the presence of important operating instructions critical to correct system function.

2.2 Trademarks

All trademarks used in this handbook are acknowledged to be the property of their respective owners.

2.3 Disclaimer

Although every effort is made to ensure the accuracy and completeness of the information in this handbook, this cannot be guaranteed and the information contained herein does not constitute a product warranty. A separate product warranty statement is available. Teledyne Paradise Datacom maintains a programme of continuous product improvement and reserves the right to change specifications without prior notice.

Chapter 3 Safety and Compliance Information

PLEASE READ THE FOLLOWING INFORMATION BEFORE INSTALLATION AND USE.

3.1 Safety Compliance

To ensure operator safety, this Redundancy Switch conforms to the provisions of EMC Low Voltage Directive 2006/95/EC and complies with the following standard:

- EN 60950-1:2006 'Safety of Information Technology Equipment, Including Electrical Business Equipment'.

Prior to installation and at all points during operation the following points must be observed.

- ***This Redundancy Switch must be operated with its cover on at all times in order to provide protection from potentially lethal internal voltages. Never operate the unit with the cover removed.***
- ***This Redundancy Switch must be directly connected to a protective earth ground at all times using the chassis ground stud situated on the rear of the unit.***
- ***The power system to which this Redundancy Switch is connected must provide separate ground, neutral and line conductors. The power system must have a direct ground connection.***
- ***This Redundancy Switch has double pole/neutral fusing. To ensure operator safety, fuses should always be replaced with identical type and rating.***
- ***To allow rapid disconnection from the mains in an emergency, the equipment should be installed near the mains socket outlet, which should be easily accessible.***

3.2 Environmental Compliance

All Teledyne Paradise Datacom Redundancy Switch products are compliant with the following EC environmental directives:

- The Reduction of Hazardous Substances (RoHS) Directive 2011/65/EU.
- The Waste Electrical and Electronic Equipment (WEEE) Directive 2012/19/EU.

The equipment is designed to operate in a static 19-inch rack system conforming to IEC 297-2.

The equipment should not be directly connected to the Public Telecommunications Network.

Operation of the equipment in an environment other than that stated will invalidate the safety standards.

The equipment must not be operated in an environment in which it is exposed to:

- ***Unpressurised altitudes greater than 3000 metres.***
- ***Extreme temperatures outside the stated operating range.***
- ***Excessive dust.***
- ***Moisture or humid atmosphere above 95% relative humidity.***
- ***Excessive vibration.***
- ***Flammable gases.***
- ***Corrosive or explosive atmosphere.***

3.3 Electromagnetic Compatibility (EMC) Compliance

This Redundancy Switch conforms to the provisions of EMC Directive 2004/108/EC and complies with the following EC and FCC standards:

- Emissions: EN 55022:2010 Class B – 'Information Technology Equipment – Radio Disturbance Characteristics – Limits and Methods of Measurement'.

- Immunity: EN 55024:2010 (incorporating EN61000-4-2:2009; EN61000-4-3:2006, A1, A2; EN61000-4-4:2012; EN61000-4-6:2009) – 'Information Technology Equipment – Immunity Characteristics – Limits and Methods of Measurement '.

- Federal Communications Commission (FCC) Federal Code of Regulation Part 15, Subpart B.

All D-type connectors must have grounding fingers on the plug shell to guarantee continuous shielding. The back-shells must comply with the requirements of VDE 0871 and FCC 20708, providing at least 40dB of attenuation from 30MHz to 1GHz. A good quality cable with a continuous outer shield, correctly grounded, must be used.

Connections to transmit and receive IF interfaces must be made with double-screened coaxial cable (for example, RG223/U).

The modem Ethernet ports should not be connected directly to outdoor Ethernet cables that may be subject to transient over voltages due to atmospheric discharges and faults in the power distribution network. Instead, the modem should be connected via an Ethernet switch or router to provide isolation from over voltages as recommended in clause 6 of EN 60950-1.

Chapter 4 Installation

4.1 Unpacking

Prior to unpacking, inspect the exterior of the shipping container for any sign of damage during transit. If damage is evident, contact the carrier immediately and submit a damage report.

Carefully unpack all items, taking care not to discard any packing materials. Should the unit need to be returned to Teledyne Paradise Datacom then you should use the original packing carton as it is designed to provide the necessary level of protection during shipment.

Once unpacked, visually inspect the contents to ensure all parts are present and that there is no visible damage. Other than the unit itself, the shipping container should contain a power cord and a Quick Start Guide.

4.2 Line Supply

This Redundancy Switch is classified by the EN 60950-1 safety standard as a 'pluggable equipment Class A'. The mains operating range is 90V to 250V. A 48V DC input option is available. Power consumption ranges from 40W to a maximum of 300W (when a BUC PSU is fitted).

A power cord suitable for use in the country of operation is provided.

The installation of the Redundancy Switch and the connection to the line supply must be made in compliance with local and national wiring regulations for a Category II 'impulse over-voltage' installation. The Redundancy Switch should be positioned to allow a convenient means of disconnection from the line supply.

4.3 Rack Mounting

If the unit is being installed in a rack, then adequate ventilation and cooling should be provided. There must be adequate clearance around the ventilation holes on the sides and the fans on the back panel.

For rack mounting, there are screw positions on the unit's front panel for attaching it to the rack, which prevent the unit from moving. These must always be used in conjunction with full-length L-brackets fitted on both sides of the unit (or a tray underneath the unit) to support its weight.

A 1U gap between units in the rack is not necessary but if extra space is available then any gap will help to minimise the temperature inside each unit, which may contribute to improving long-term reliability (due to the well-known general relationship between the temperature and reliability of electronic components).

4.4 Getting Started

Connect the appropriate cables to the transmit and receive IF or L-band connectors at the rear of the unit, along with the cable(s) for the traffic interface.

Connect all of the traffic modems to the Switch via 1:N cables. The 1:N connector provides both the switchover logic and serial RS485 communications between the modems in the redundancy group, enabling the Switch to monitor the status of the traffic modems.

Fit the backup modem below the Switch, either with one U of clear space or directly underneath if a 1:16 system is being used. Connect the umbilical cable (part number M3482) to the Switch and the backup modem. The umbilical cable provides a channel for control of the Switch from the backup modem, as well as the channel for the satellite traffic at the point when the backup modem replaces a failed online modem. Connect the appropriate terrestrial data interface cables from the traffic modems to the backup slots on the rear interface panels of the Switch. When Ethernet is being used as the traffic interface, the IP Traffic RJ45 on the backup modem should be connected to the rightmost lower RJ45 on the Switch’s IP interface panel (as the Ethernet traffic does not go through the umbilical cable).

Connect all of the traffic modems and the Switch together via the 1:N redundancy cables.

The two mains inputs to the Switch should ideally be connected to different power supply sources for improved reliability.

Power the Switch and wait for it to complete its initialization when it will display summary status information. The Switch should be powered up prior to powering up the associated backup modem. One working, the Switch can be powered down at any point, if required, without interfering with network operation. If the backup modem is not backing up a failed traffic modem, then it can also be powered down at any time without affecting network operation.

The Switch can be controlled via front-panel menus on the backup modem or remotely via a web browser. To set up the unit from a web browser, please follow the instructions in the relevant satellite modem installation and operating handbook (this requires an Ethernet cable to be plugged into the Remote M&C RJ45 on the backup modem).

This handbook should be read in conjunction with the installation and operating handbook pertinent to the type of modems being used.

Chapter 5 Introduction

5.1 Overview

The redundancy switch protects the associated satellite services against failure of any one traffic modem by automatically switching the affected service to the backup modem.

The Switch system supports the following terrestrial interface types:

- Ethernet
- G.703
- RS422 (DCE)
- V.35 (DCE)
- X.21 (DCE and DTE)

Other legacy serial interfaces are also supported. If a satellite overhead channel is used for remote control then this can also be backed up.

Reliability is enhanced by the following features of the Switch system:

- Modem traffic paths are maintained, error free, even if power to the Switch is removed or the Switch itself is removed from the system.

- The Switch has dual redundant power supplies.

- The 1:N technology is a direct extension of proven 1:1 redundancy technology first pioneered in the satellite industry by Paradise Datacom.

- Modems can be easily switched off-line and removed without affecting the rest of the redundancy system.

- The backup modem can be replaced without removing the Switch itself.

The backup modem automatically detects and stores configuration data for all of the installed traffic modems within the redundancy group. In the event of a failure, the backup modem will automatically match the configuration of the failed unit, thus maintaining traffic integrity.

The Switch communicates with the traffic modems using a serial RS485 interface. In the event of a modem failure, fast switchovers are ensured by the use of dedicated hardware signals that the Switch monitors at all times.

The Switch can be configured to switch out a failed modem in the event of either a unit fault (such as a hardware failure) or a traffic fault, or both. L-band services such as BUC and LNB power and 10MHz reference can optionally be switched over to the backup modem or left under the control of the failed modem.

The backup modem incorporates an event log, which records each significant system event with a time stamp as it occurs. Current and latched alarms can also be viewed.

The Switch has been designed to operate in a fail safe manner in the event of a failure of the Switch itself, ensuring that traffic modem data is not affected.

The Switch can control up to two P525 Transponder Switches (supporting up to 1:16 redundancy) when multiple upconverter and/or downconverter chains are used.

All modems within the redundancy group should be maintained at the same software revision.

5.2 Interface Options

Up to four interface panels may be fitted to a Switch. Each interface panel supports a particular type of terrestrial data interface and can be used to connect up to four modems. The interface panels are supplied with all of the necessary interconnect cables. The Switch is scalable up to 1:16 when protecting traffic only, and up to 1:8 when protecting both traffic and overhead.

The following hardware configurations are supported (see **Figures 5-1** through to **5-4**):

1. A single interface panel in slot A giving up to 1:4 redundancy.

2. Two interface panels in slots A and B giving up to 1:8 redundancy.

3. Three interface panels in slots A, B and C giving up to 1:12 redundancy.

4. Four interface panels in slots A, B, C and D giving up to 1:16 redundancy.

5. A single interface panel in slot A and an IDR interface panel in slot C giving up to 1:4 redundancy including overhead.

6. Two interface panels in slots A and B and an IDR interface panel in slot C giving up to 1:8 redundancy, including overhead for up to four of the eight modems.

7. Two interface panels in slots A and B and two IDR interface panels in slots C and D giving up to 1:8 redundancy including overhead.

8. Three interface panels in slots A, B and D and an IDR interface panel in slot C giving up to 1:12 redundancy, including overhead for up to four of the twelve modems.

No other combinations of interface panels are valid.

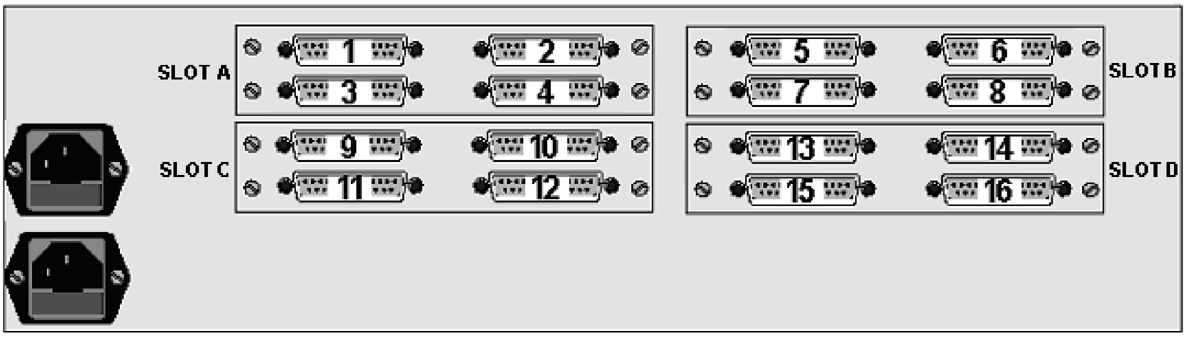


Figure 5-1 Switch Rear Panel Modem Numbering (non-IDR)

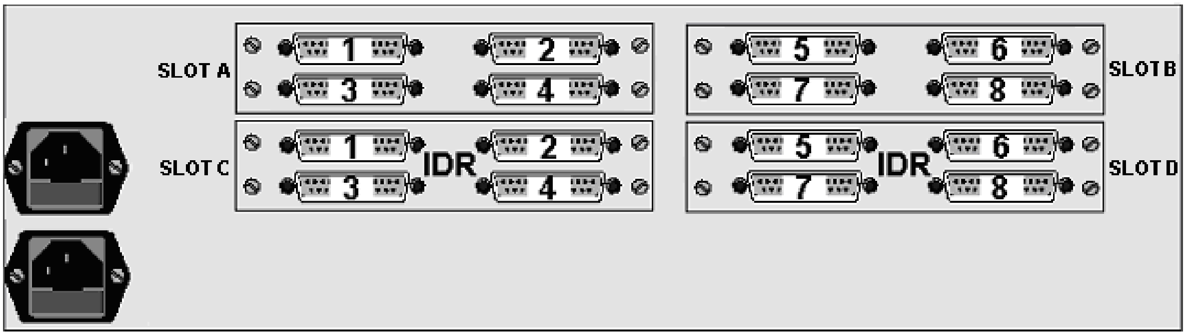


Figure 5-2 Switch Rear Panel Modem Numbering (IDR 1:8)

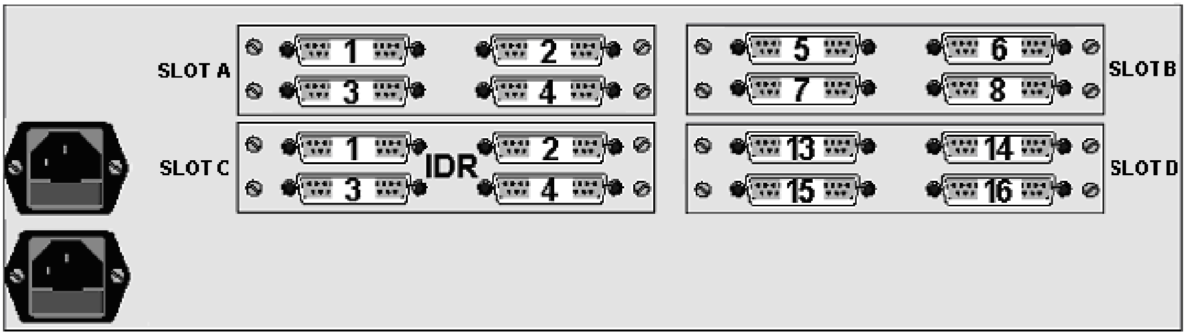


Figure 5-3 Switch Rear Panel Modem Numbering (Mixed IDR 1:12)

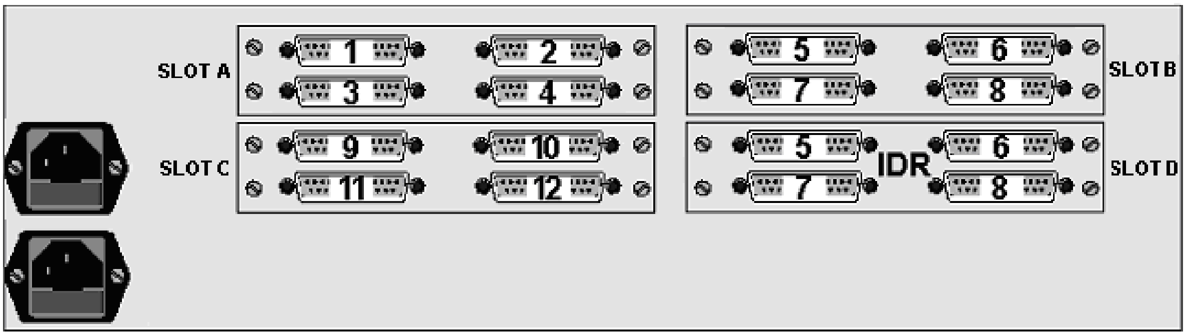


Figure 5-4 Switch Rear Panel Alternative Modem Numbering (Mixed IDR 1:12)

Note that **Figures 5-1** through to **5-4** do not show the 1:N and Transponder switch connectors for reasons of clarity.

Hardware options for the backup modem, including L-band BUC and LNB services, are listed within the relevant satellite modem installation and operating handbook.

5.3 Software Options

Software options for the backup modem are listed within the relevant satellite modem installation and operating handbook. These can be ordered at the time of the original purchase or can be activated in the field.

In order to provide a full backup capability, the backup modem must be configured with a superset of all of the features of all traffic modems within the redundancy group.

5.4 1:N Switching Logic

The logic in the 1:N Switch is an extension of Paradise Datacom's original 1:1 redundancy technology. In a 1:1 system, two modems may operate as a 1:1 redundant pair, with no other equipment required other than a 1:1 cable (used for flagging modem failures and controlling switchovers), RF splitters and combiners, and data cables to connect both modem's terrestrial interfaces to the terrestrial traffic equipment.

The 1:N Switch uses the same philosophy as the 1:1 redundancy system. Each traffic modem is connected to the Switch by a 1:N cable. Similarly, the online modems and backup modem share access to the RF and terrestrial interfaces. To enable parallel interface operation, the Switch provides no terminating load and therefore correctly maintains line impedance in all circumstances. When the backup modem is in Standby, the Switch uses relay switches to isolate the backup modem completely in order to ensure that no interference with the traffic modems can occur. Standby mode is indicated by the Tx Carrier LED on the backup modem being amber.

The Switch will automatically protect traffic in the event of a single modem failure, such as a unit fault or a traffic fault, with the backup modem being automatically reconfigured to replace the failed online modem. At this point the Tx Carrier LED will change to green indicating that the backup modem is providing a carrier. The failed modem's Tx Carrier LED will now be amber.

Following a failure, when putting a repaired or replacement modem back into service, it is necessary to manually switch the modem back into service and put the backup modem back into Standby.

5.5 Alarms

On the backup modem, the **Alarms and AGC Connector** is a 15-pin D-type male connector that provides access to four ‘Form C' relay contacts that can be used to indicate alarm conditions to external equipment.

In a 1:N system, the backup modem alarm relays are redefined from standard traffic modem usage as follows:

- **Unit Fault**: This indicates that a unit fault exists, i.e. a failure of the Switch or backup modem.
- **Tx Traffic Prompt**: This indicates a failure in either the Tx or Rx traffic paths on the backup modem.
- **Rx Traffic Prompt**: This indicates a **Group Traffic Fault** covering the entire modem redundancy group. An alarm is raised if any traffic modem within the group experiences a traffic fault.
- **Deferred Alarm**: This indicates a **Group Deferred Alarm** covering the entire modem redundancy group. An alarm is raised if the backup modem is online, when one of the following conditions exists within any modem:
    - The receive BER is greater than the user-defined threshold.
    - The receive Eb/No is lower than the user-defined threshold.
    - Buffer slips are more frequent than the user-defined threshold.
    - A backward alarm is being received from the satellite or terrestrial path.

Chapter 6 Configuration

6.1 Setting Up a 1:N System

To implement 1:N redundancy, the following steps need to be performed:

1. While performing the initial cable installation you may wish to prevent spurious switchovers when powering up the Switch. To do this, select *Disable* from the *Edit->Redundancy->1:N* menu.

2. Check that all modems are fitted with the same software version (this can be viewed on the *View->Unit* menu).

3. Position the Switch and traffic modems in the rack. The cables provided with the Switch allow a maximum distance of any traffic modem from the Switch of 8U. For 1:16 redundancy, eight traffic modems should be positioned above the Switch and eight below. 1:16 Switches and the backup modem require 9U below the Switch. The backup modem must be closest to the Switch.

4. Connect the supplied 1:N cables between the Switch interface panels and the traffic modems, taking care to connect them in accordance with the fixed modem numbering defined in **Figure 5-1**.

5. Connect the supplied terrestrial interface cables between the Switch interface panels and the relevant traffic modems (refer to Chapter 9 for cabling information).

6. Connect the transmit and receive IF/L-band interfaces of all traffic modems to the backup modem using suitable splitters and combiners of the correct impedance (50Ω or 75Ω). The splitters and combiners can be used to directly connect the traffic modems and backup modems, or, a patch panel, Transponder Switch or Polarisation Switch can be used as a convenient intermediary. Refer to Chapter 10 for details of transponder switching and Chapter 11 for the polarisation switch.

7. Connect the 1:N umbilical cable between the backup modem and the Switch.

8. Power up the traffic modems and configure them for the required service.

9. For each traffic modem, set its 1:N RS485 address (via the *Main->Edit->Redundancy->1:N* menu) in accordance with the numbering shown in **Figure 5-1**. The traffic modem in Slot A position 1 requires an RS485 bus address of 1, the traffic modem in slot A position 2, requires an RS485 bus address of 2, etc. The correct addresses must be used otherwise the Switch will not operate correctly.

10. Power up the Switch and configure the priority of each traffic modem (High, Medium or Low) indicating their relative traffic priorities. In the event of multiple modem failures, the highest priority modem will be backed up in preference to any other modem. The Switch will pre-configure the backup modem to match the configuration of the highest priority traffic modem, thus enabling a faster switchover in the event of a failure. If there are multiple modems with the highest priority then the configuration for the modem with the lowest RS485 bus address will be preloaded onto the backup modem.

11. The Switch will automatically detect the presence of the traffic modems and will learn and store their current configurations on a regular basis (once an hour by default). A manual *Learn* (via the *Status->Switch* menu) is available that causes the current configurations to be fetched immediately, should this be required.

12. Set the Switch to its active *Enable* state via the *Edit->Redundancy->1:N* menu.

Once a switchover to the backup modem has occurred the learn process is suspended. Traffic Modem configuration changes will only be learnt when the Switch returns to standby.

6.2 Replacing a Redundancy Switch

Should the standalone backup modem or Switch fail and need to be replaced then the following procedure should be used.

1. Prior to removal from the system, the backup modem (if still functioning) needs to be prevented from backing up any of the traffic modems. To do this, select *Disable* from the *Edit->Redundancy->1:N* menu.

2. Prior to cabling the replacement Switch/backup modem into the system, power it up and prevent it from being able to back up the traffic modems. To do this, select *Disable* from the *Edit->Redundancy->1:N* menu. Set an IP address via the *Edit->Unit->M&C->IP Address* menu option.

3. Power down both the original and replacement Switches/backup modems.

4. Disconnect all of the 1:N cables from the Switch, remembering to identify each cable to facilitate easy reconnection to the replacement Switch.

5. At the Switch interface panels, disconnect the traffic cables between the Switch and traffic modems, remembering to identify each cable that is removed.

6. Remove the IF/L-band cables from the backup modem.

7. Remove the Switch/backup modem from the rack.

8. If interface panels are going to be moved between the Switches, then loosen the screws that secure the interface panels to the Switch chassis and remove each interface panel in turn. Push the cards firmly into the corresponding interface slot on the replacement Switch. Tighten the interface panel screws.

9. Fit the new Switch/backup modem into the rack and follow the set up procedure described in Section 6.1 from paragraph 3.

6.3 Changing Traffic Modem Configuration

To prevent the backup modem from inadvertently backing up a traffic modem that is being reconfigured (which may cause a temporary alarm, for example, if the carrier is removed), the following procedure should be used:

1. Via the backup modem's *Edit->Redundancy->1:N Maintenance* menu option, force the modem that is to be reconfigured into *Maintenance* mode.

2. Change the traffic modem's configuration as required.

3. Via the backup modem's *Edit->Redundancy->1:N In Service* menu option, set the traffic modem to *In Service*.

4. Via the backup modem's *Status->Switch Learn* menu option, force the traffic modem's changed configuration to be fetched and stored.

If this procedure has not been followed and the Switch is now muting the traffic modem's carrier after the configuration change, then do the following:

1. Configure the Switch to set the traffic modem into *Maintenance* mode as described above.

2. On the traffic modem, ensure the *Tx* and *Rx Fail Switchover* is set to *Off* via the *Edit->Redundancy->1:1* menu options.

3. Clear the traffic modem alarms in order to allow traffic to be restored (via the modem's *Edit->Redundancy Clear 1:1 Alarm* menu option).

4. On the Switch, set the modem to *In Service* as described above.

5. Ensure the changed configuration is learnt by the Switch as described above.

6.4 Cabling Connection Examples

6.4.1 Wiring for 1:2 EIA-530 Redundancy System

Figure 6-1 shows the cabling connections for an EIA-530 redundant system but is typical of the wiring required for other interface types including LVDS, HSSI and G.703. Similarly, although only a 1:2 redundancy system has been shown for clarity, the general concepts can be applied with any value up to 1:16 with either type of Switch.

Points to note are:

1. A 'Y' cable for terrestrial data is required between each traffic modem and the relevant interface panel.
2. A 1:N cable is required between each traffic modem and the relevant interface panel.

3. An umbilical cable is required between the Standalone Switch and its backup modem.
4. RF cabling requirements are covered separately in Chapter 9.

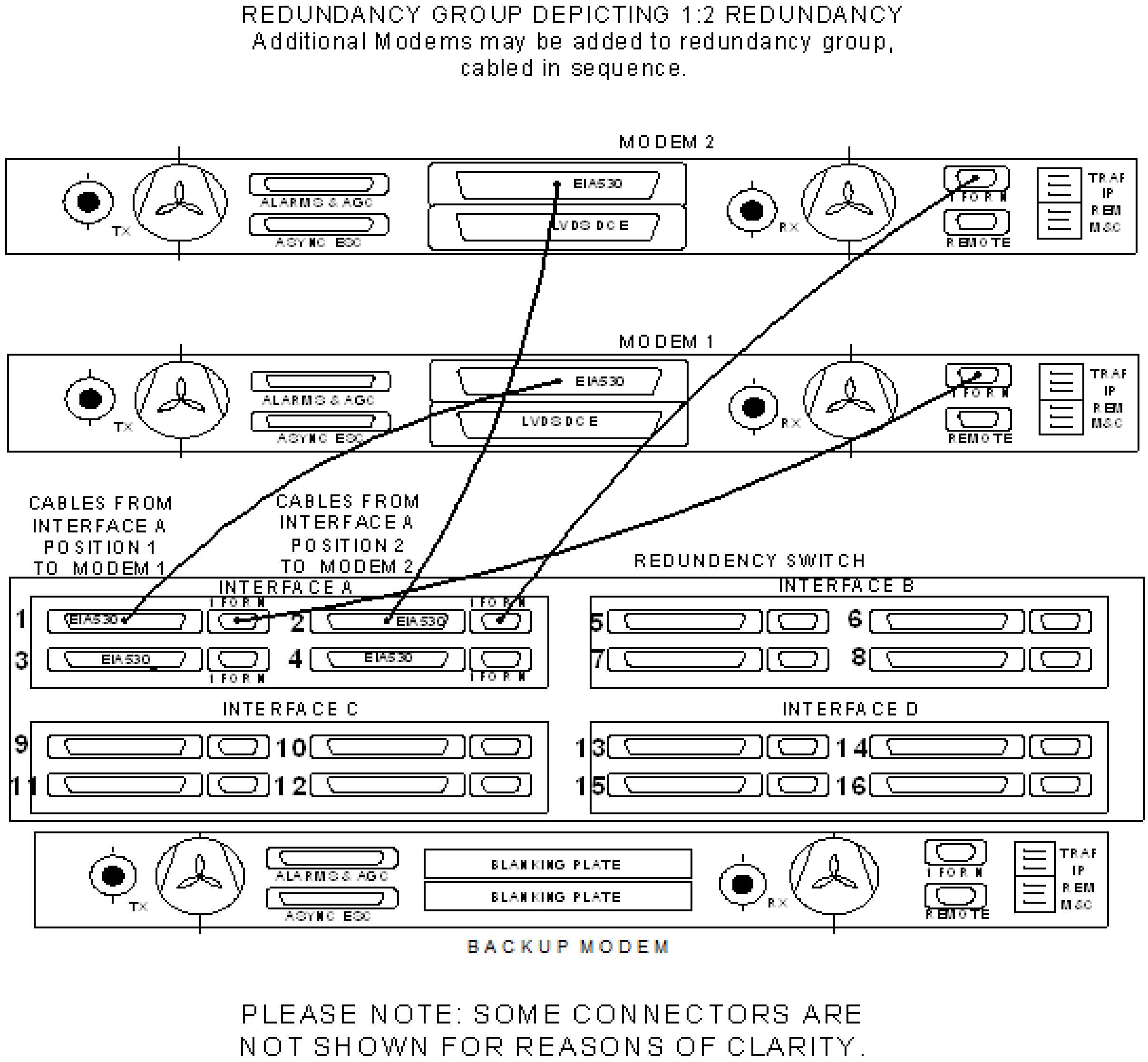


Figure 6-1 Wiring for 1:2 EIA-530 Redundancy System

6.4.2 General 1:4 Redundancy System

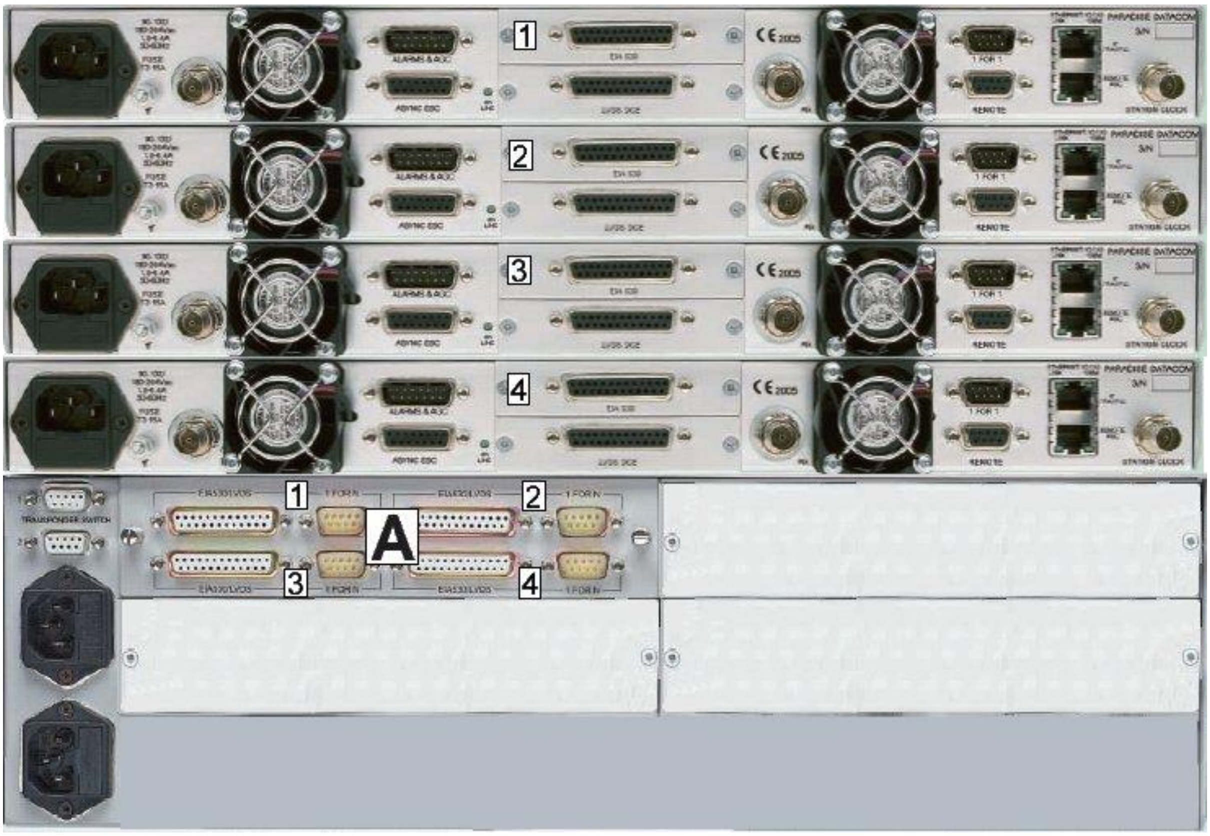


Figure 6-2 General 1:4 Redundancy System (backup modem not shown)

6.4.3 1:4 IP Redundancy System

Figure 6-3 shows a 1:4 IP redundancy system.

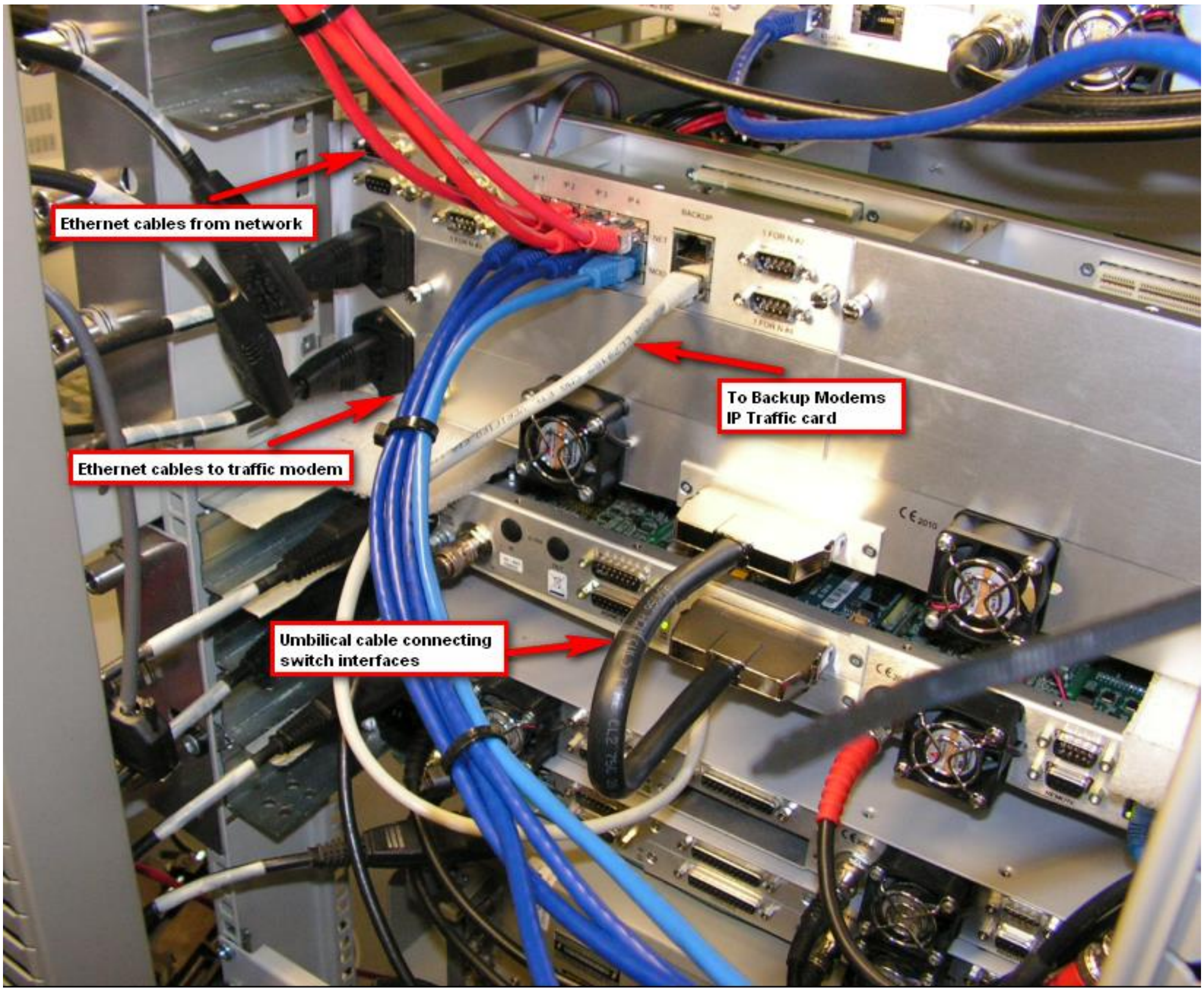


Figure 6-3 1:4 IP Redundancy System

6.4.4 1:8 IP Redundancy System

Figure 6-4 shows a 1:8 IP redundancy system.

The following points should be noted regarding cabling:

1. Routing of IP traffic is an exception in that routing of the traffic is not done via the umbilical cable but instead requires an external Ethernet connection from the Switch interface panel to the backup modem as explained below.
2. On the Switch IP interface panel, the top RJ45 in each pair is used to connect to the terrestrial network (typically via switches or routers). Separate cable connections are required for each traffic modem from the RJ45 ports on the interface panel back to the network. The PDQS switch module ports support 10/100bT operation, hence the 'IP traffic Ethernet speed/duplex' setting may need to be set to '100M full duplex' on any modems that are connected to the PDQS interfaces.
3. The lower RJ45 in each pair on the Switch IP interface panel is connected to the relevant traffic modem's IP Traffic port. Note that the upper and lower RJ45 pairs on the interface panel are connected via a relay, thereby under normal operating conditions connecting the network to each modem through the relay.

4. On the IP interface panel, there are two RJ45 connectors set apart from the rest that are labeled *NET* and *MOD*. These terms refer to the direction the attached cables head towards, with *NET* referring to the network and *MOD* to the modem. In Interface Panel A, the *NET* connector is not normally used, while the *MOD* connector is connected to the *NET* connector of the next interface panel (B). In a 1:8 system, the *MOD* connector of Interface Panel B should be connected to the IP Traffic RJ45 of the backup modem.

   In redundancy systems with more than eight modems the *NET* and *MOD* connections are propagated in a similar way to the next interface panel in turn. The *MOD* connector on the final interface panel in the sequence must be connected to the IP Traffic RJ45 of the backup modem. As with the other pairs of RJ45 connectors, the *NET* and *MOD* ports are connected via a relay. The daisy-chained *NET/MOD* links carry no traffic until a switchover occurs. At this point, on the relevant interface panel, the network RJ45 of the failed link is connected through to the *MOD* connector on that panel and then on to the backup modem.
5. A 1:N cable must be connected between each traffic modem and the relevant 1:N connector on the interface panel.
6. RF cabling requirements are covered separately in Chapter 9.

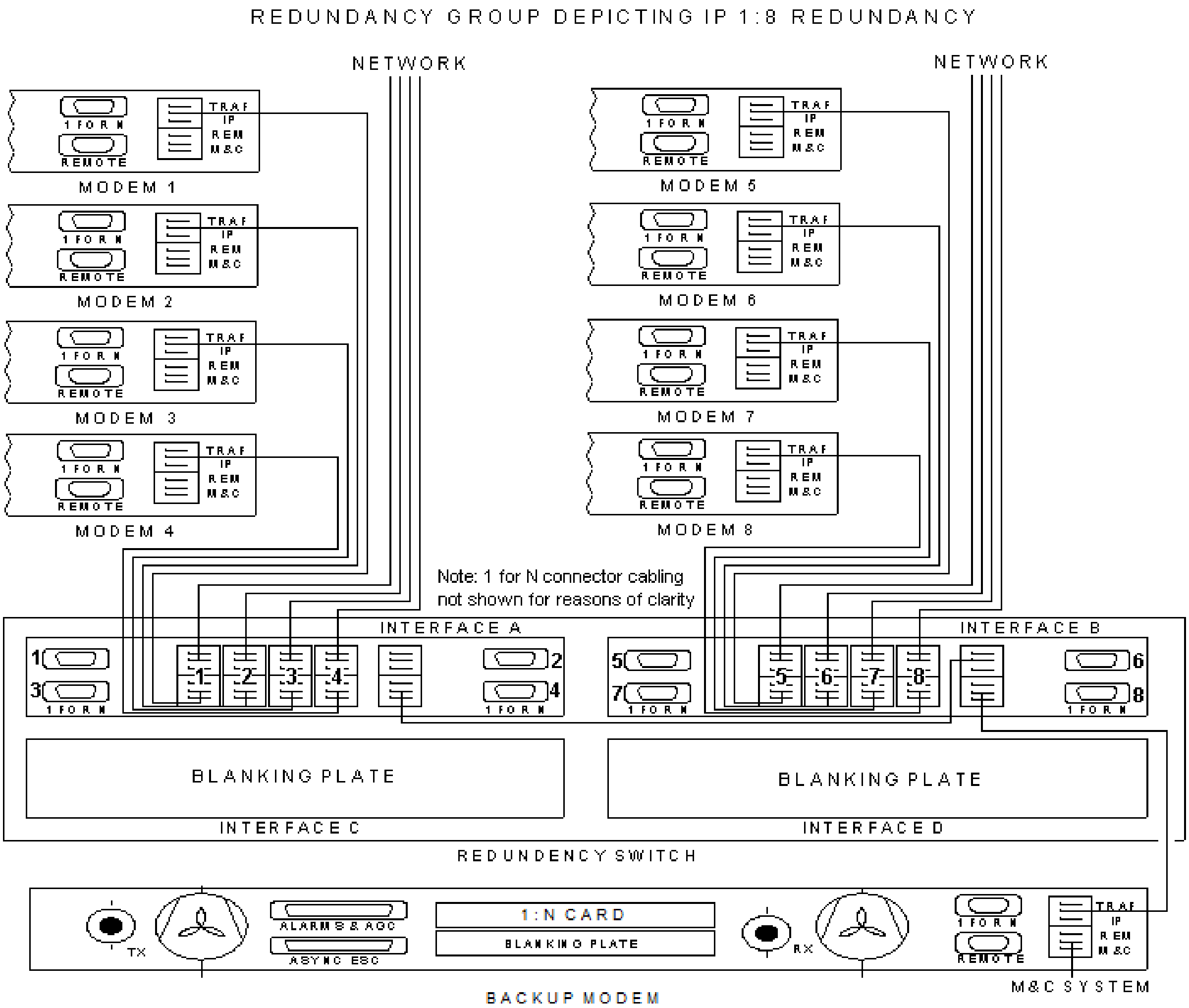


Figure 6-4 1:8 IP Redundancy System

6.5 Redundancy Switch Menus

General modem configuration is described within the relevant installation and operating handbook. The following menus pertain to either the Switch control function within the backup modem, or, to a traffic modem when used in a 1:N redundancy system. The web user interface menus are described here; similar options are available via the front-panel user interface.

6.5.1 Traffic Modem Edit->Redundancy->1:1 Menu

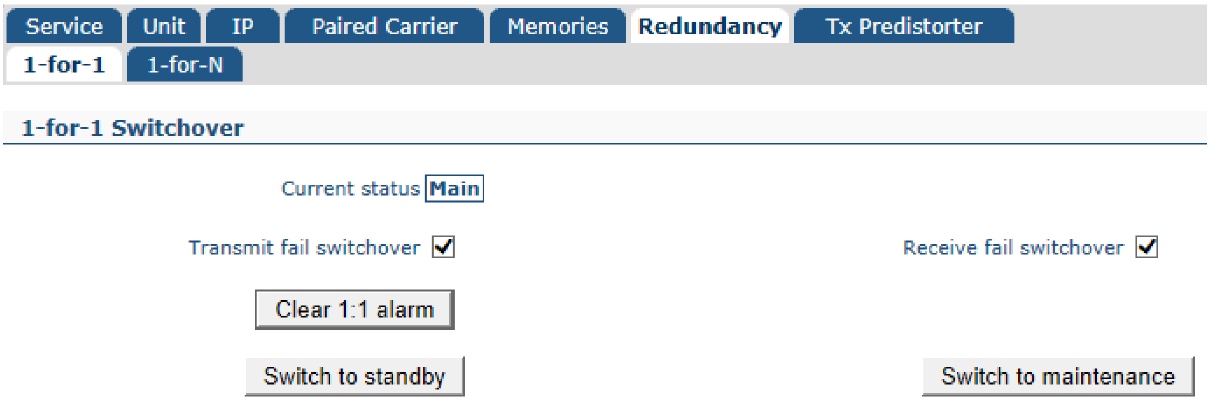


Figure 6-5 Traffic Modem Redundancy 1:N Menu

Figure 6-6 shows the traffic modem *Edit->Redundancy 1:1* menu. All of the options on this menu are relevant for both 1:1 and 1:N operation.

The *Current status* shows the service status of the modem. This will be shown as *Main* when the modem is online, *Maintenance* when the modem has been taken out of service, and *Standby* when the modem is offline, ready to switch over on a fault occurring on the online modem. The *Standby* state applies only to modems that are in a 1:1 pair.

Transmit fail switchover controls whether a switchover occurs on a transmit alarm. Likewise *Receive fail switchover* controls whether a switchover occurs on a receive alarm. Ticking a checkbox activates the switchover logic, putting it in a state where the modem will switch over when a relevant transmit or receive alarm occurs.

If both transmit and receive fail switchovers are set to off then the 1:1 redundancy system will only switch over on unit faults and all transmit or receive traffic faults will be ignored.

Traffic warnings will never cause a switchover regardless of how the fail switchover settings are configured.

The *Clear 1:1 alarm* button is used to temporarily suppress a fault condition (that has caused a switchover of the service to the backup modem), allowing the traffic modem to be returned to in-service. In addition, it is necessary to set the traffic modem back to in-service via the backup modem's *Status->Switch, Switch to online* menu option. This is useful when the traffic modem and the backup modem are both showing faults but the traffic modem is exhibiting a less severe failure than the current online modem, thereby allowing the best possible satellite service to be maintained in the circumstances.

In a 1:1 pair, the *Switch to standby* button forces the modem that is online into *Standby* mode. This is done by momentarily creating a fault condition that forces a switchover to occur.

The *Switch to maintenance* button prevents the modem from being switched online. This facilitates the modem being removed, for example, to be repaired. Traffic modems can also be switched to maintenance mode through the *Status->Switch* screen of the backup modem.

Once the modem is in *Maintenance* mode, the *Switch to maintenance* button is replaced with a *Switch to service* button, which can be used to reverse the process by making the modem available to come online.

6.5.2 Traffic Modem Edit->Redundancy->1:N Menu

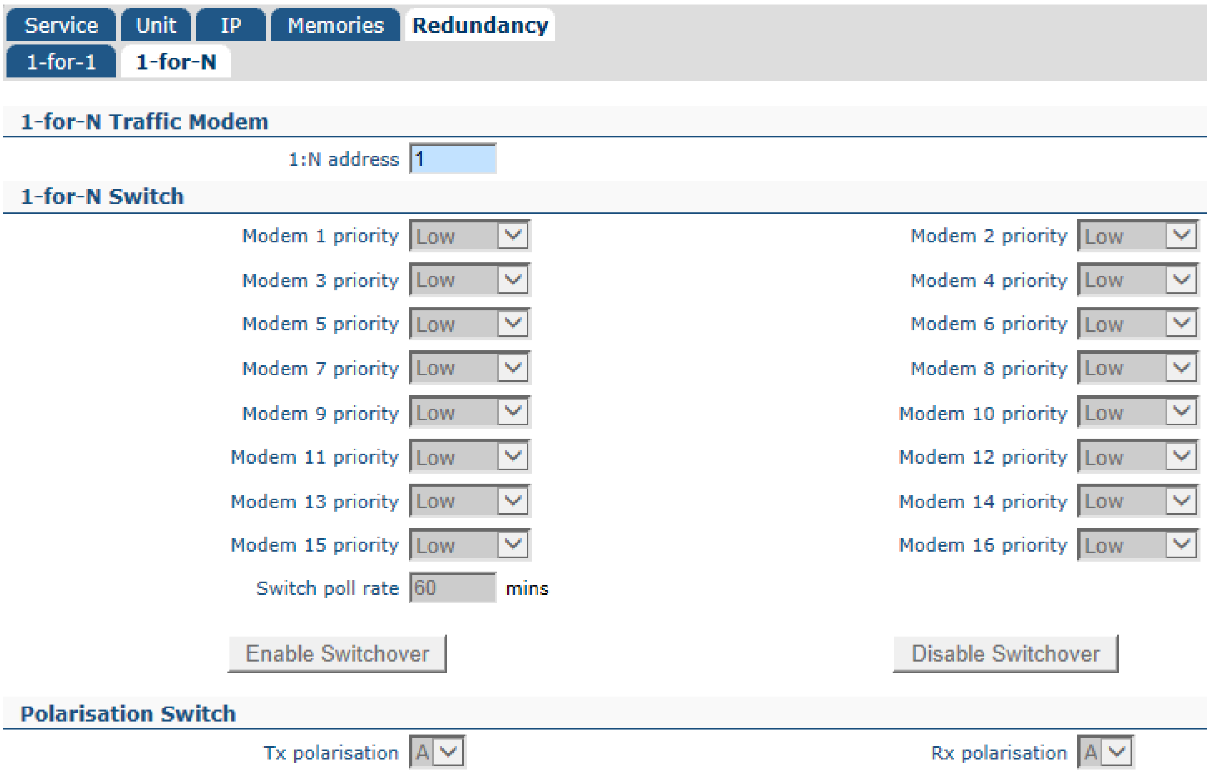


Figure 6-6 Traffic Modem Redundancy 1:N Menu

6.5.2.1 Traffic Modem 1:N Address

On a traffic modem, the *1:N address* option of the *Edit->Redundancy 1:N* menu (**Figure 6-6**) allows a unique RS485 address to be assigned to each modem. (On a backup modem this menu option is disabled since it is not relevant.)

The RS485 bus address must be in the range 1 to 16. It sets the modem's RS485 bus address for Switch communications.

Each traffic modem must have an RS485 bus address that corresponds to its position on the Switch interface panel (as shown in Figure 5-1) in order to allow the Switch to correlate physical interfaces with actual traffic modems.

6.5.2.2 Traffic Modem Polarisation Switch Control

Figure 6-6 (*Edit->Redundancy 1:N*) also shows the traffic modem polarisation switch configuration menu options. These allow the user to set the required Tx and Rx transponder polarisation for the service being provided by the specific traffic modem. The polarisation can be set to either 'A' or 'B'. This ensures the backup modem uses the same polarisation as the original traffic modem when backing up a service. The traffic modem does not need to know the precise type of polarisation being used (e.g. vertical, horizontal, etc.) as this is handled automatically in the RF chain.

6.5.3 Backup Modem Edit->Redundancy->1:N Menu

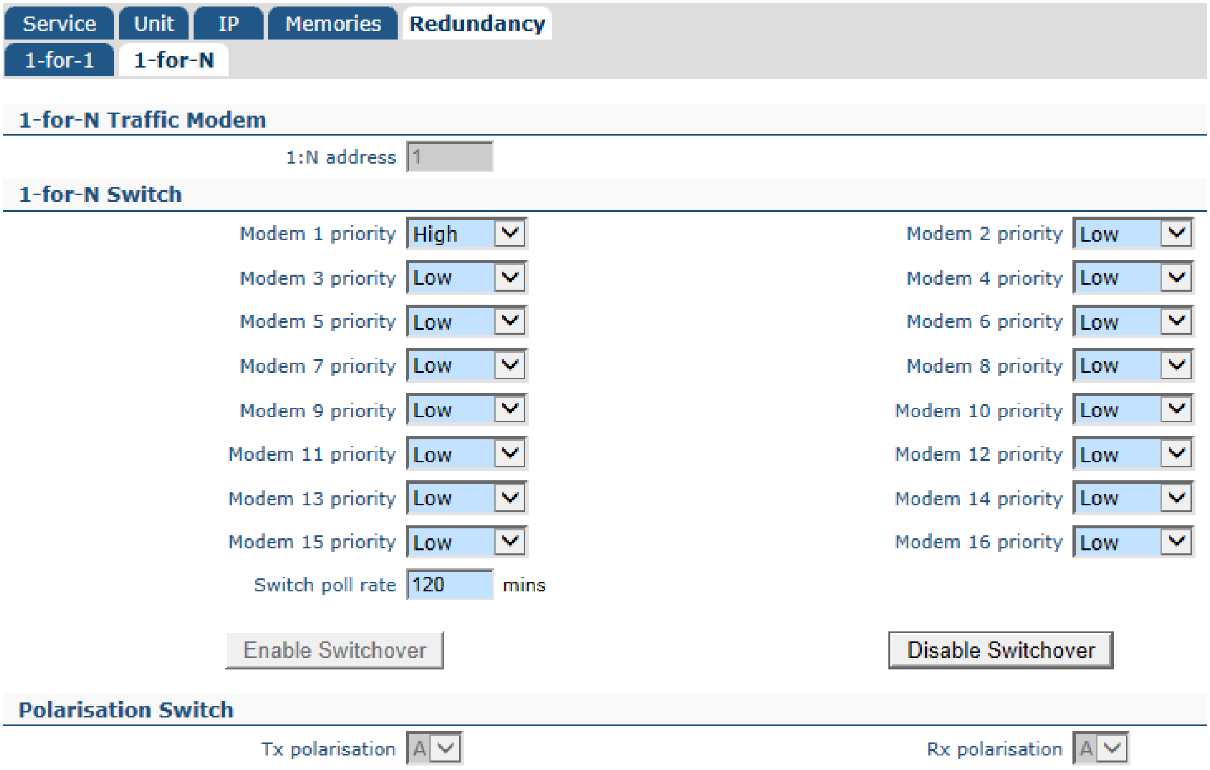


Figure 6-7 Backup Modem Redundancy 1:N Menu

The *Edit->Redundancy 1:N* menu on the backup modem (**Figure 6-7**) allows the priority of each traffic modem to be set and also allows control of polarisation switches (if used).

- The modem's priority determines which traffic modem is backed up in the event of multiple failures. The highest priority modem will be backed up in the event that more than one modem is in a failed state at the point at which a switchover occurs.

  Backup pre-emption is automatic. If a higher priority modem were to fail while the backup modem is already actively backing up a failed traffic modem then the backup modem switches to backing up the higher priority modem.

  Note that the Switch will not revert back to Standby mode except under user control, regardless of whether failures are intermittent or clear for some reason.

- The *Switch poll rate* controls the frequency at which automatic learning of traffic modem configurations occurs. When the configuration of a traffic modem is changed then the Switch will have an incorrect configuration until the next scheduled learn operation unless a manual learning operation is initiated. The default setting is 60 minutes.

- Control of the polarisation switch, which applies only to traffic modems, is described in Section 6.5.2.2.

6.5.4 Backup Modem Polarisation Switch Status Screen

Figure 6-8 (under *Status->Polarisation)* shows the *Polarisation Switch Status Screen.* This shows the polarisation settings for each traffic modem for transmit and receive services.

Switch | Summary | Ethernet | Demod 1 to 16 | **Polarization**

Channel	Tx	Rx
1	A	A
2	A	A

Figure 6-8 Polarisation Switch Status Screen

6.5.5 Backup Modem Status->Switch Screen

Switch | Summary | Ethernet | Demod 1 to 16 | Polarization

Channel	Modem Id	Status		Backup	Service mode
1	Traffic Modem 1	OK		Force backup	Go to maint.
2	Traffic Modem 2	OK		Force backup	Go to maint.
3	Traffic Modem 3	OK		Force backup	Go to maint.
4	Traffic Modem 4	OK		Force backup	Go to maint.
5	Traffic Modem 5	OK		Force backup	Go to maint.
6	Traffic Modem 6	OK		Force backup	Go to maint.
7	Traffic Modem 7	OK		Force backup	Go to maint.
8	Traffic Modem 8	OK		Force backup	Go to maint.
Backup		Standby			Learn configs

Figure 6-9 Backup Modem Status Switch Screen

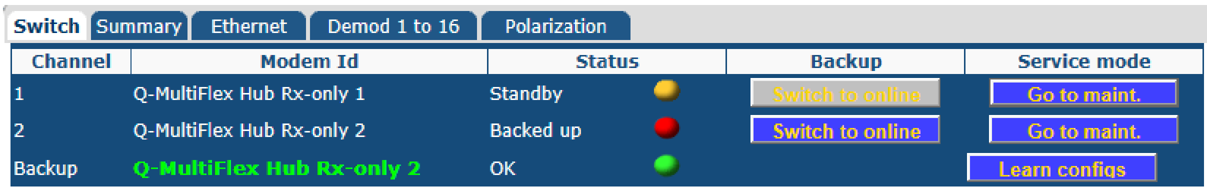
The *Backup Modem Status Switch* screen (**Figure 6-9**) contains the following:

- **A list of all of the traffic modems being protected via the Switch.** These are identified using their RS485 addresses and by their Modem IDs. The backup modem itself is also included in the list.
- **The status of each modem.** (This is also visually represented using LEDs. The LED will be green when it is not reporting any fault and red when it is. An amber LED indicates that the modem is being backed up but does not currently have any fault. A grey LED indicates that the traffic modem is in *Maintenance* mode.)
    - *OK.* This indicates that the traffic modem (numbered one to 16, from left to right, top to bottom) is functioning correctly.

    - *Backup.* This indicates the Switch is actively backing up the relevant traffic modem.
    - *Maintenance.* This indicates that the relevant traffic modem is in *Maintenance* mode. This means that the Switch will not backup the modem should it fail.
    - *Ready.* This indicates that the relevant traffic modem is masked from the redundancy group but is not showing any faults.
    - *Fail.* This indicates that the relevant traffic modem has failed but is not being backed up because of a higher-priority service taking precedence.
    - *Comms.* This indicates a communications failure with the relevant traffic modem.
    - *Standby.* This applies to the backup modem and indicates that it is ready to switchover should a traffic modem fail.
    - *Blank*. This indicates that no modem is fitted to this position within the redundancy group.

- *Force backup*. This button can be used to force a particular traffic modem to be backed up by the backup modem. This might be done, for example, as a deployment test or if there is a concern about the quality of the traffic modem service.
- *Go to maintenance*. This removes the traffic modem from the group of modems that are actively being protected against failure. This allows the modem to be powered down and removed without causing a switchover.
- *Learn configs.* This causes the Switch to learn all of the traffic modem current configurations, which are then stored for later use. Even without using the Learn function, the Switch will automatically detect, fetch and store all traffic modem current configurations once per hour (or at the rate set by the user). Note that the learn process is suspended when the Switch is actively backing up a traffic modem.

Figure 6-10 shows the *Switch Status* screen when a traffic modem is being actively backed up. In this case the modem being backed up continues to show a fault present (indicated by the red LED). In **Figure 6-11**, the modem being backed up shows an amber LED and therefore the *Switch to online* button could be used to return the service back to the original modem, allowing the backup modem to be available in case of a further failure in the system.


Switch | Summary | Ethernet | Demod 1 to 16 | Polarization

Channel	Modem Id	Status	Backup	Service mode
1	Q-MultiFlex Hub Rx-only 1	Standby	Switch to online	Go to maint.
2	Q-MultiFlex Hub Rx-only 2	Backed up	Switch to online	Go to maint.
Backup	Q-MultiFlex Hub Rx-only 2	OK		Learn configs

Figure 6-10 Switch Status (when actively backing up traffic modem)

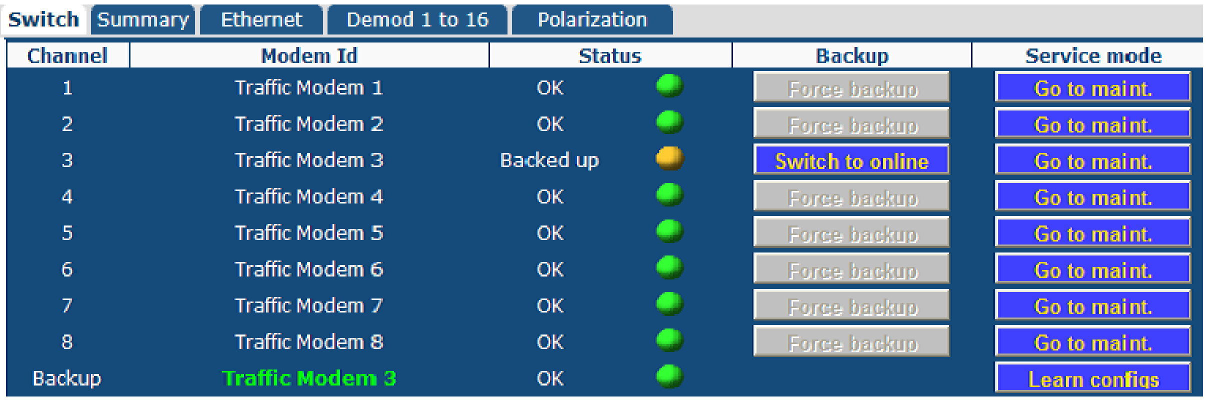


Figure 6-11 Switch Status (showing service could be returned to original failed modem)

If the message 'Not fitted' is displayed on the backup modem status, the 1:N serial port on the QMultiFlex-400, QFlex-400 or Q-Lite Modem may be in the wrong mode:

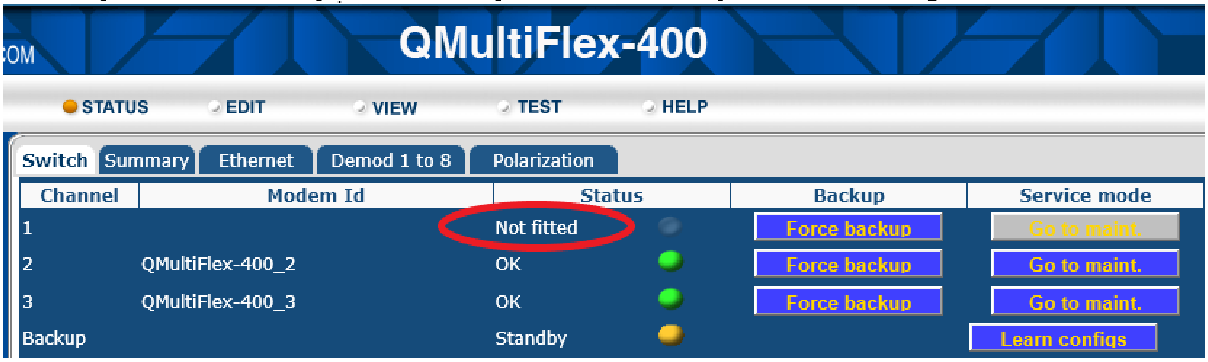


Figure 6-12 Not fitted error message

To resolve, go to the Factory/Miscellaneous menus and tick the box for 'Enable 1:N port', then reboot the modem to enforce the change. (Enter the M&C IP address/factory to bring up this menu, for example: http://10.0.70.1/factory)

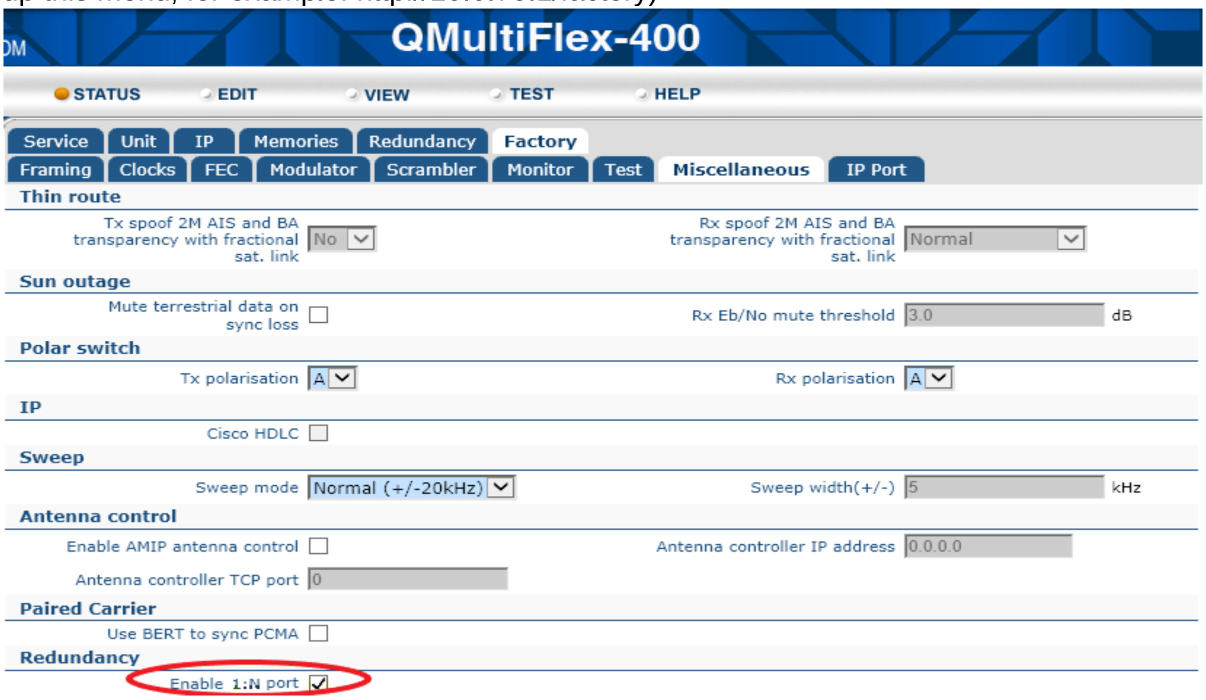


Figure 6-13 Enable 1:N Port

Chapter 7 Interfaces

7.1 Switch Interface Panel Options

Each of the Switch interface panels provides four terrestrial interface connectors and four 1:N connectors. **Table 7-1** shows the Switch interface panel options.

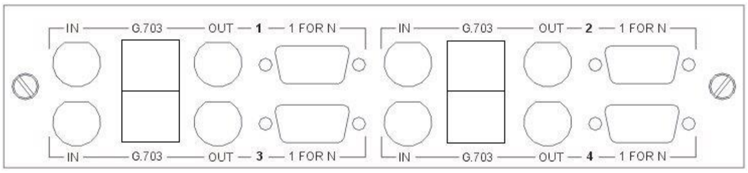
Part No.	**Description**
P3418	Four IP interfaces
P3414	Four G.703 interfaces providing: • E1 (balanced or unbalanced) • T1 (balanced) • E2 (unbalanced) • T2 (unbalanced)
P3415	Four HSSI interfaces
P3417	Four EIA-530/LVDS providing: • RS232 • RS422 • V.35 • LVDS

Table 7-1 Switch Interface Panel Options

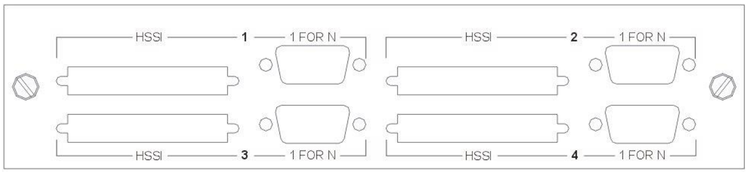
An IDR interface panel (part number P3411) provides backup of the service's overhead (ESC) channel.

Connector layouts for the different interface panels are shown in **Figure 7-1**.

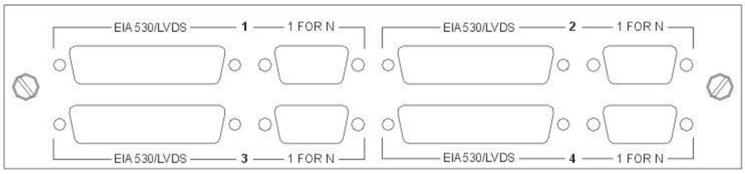
P3414



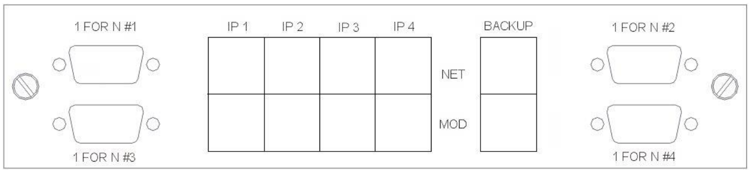
P3415



P3417



P3418



P3411

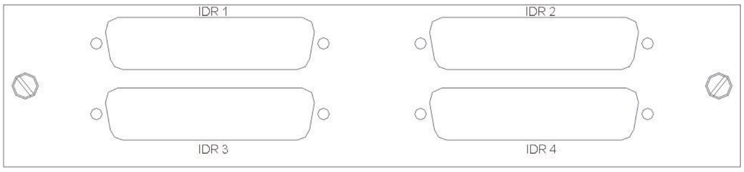


Figure 7-1 Switch Interface Panels

7.2 Cabling Options

Each modem must be connected to the Switch via a data cable and a 1:N cable (M3471). In all cases other than IP, data between the Switch and the backup modem is transferred through the 1:N umbilical cable. In the case of IP separate cables are used between the traffic modem and the Switch and from the Switch to the backup modem. The available data cables are shown in **Table 7-2**.

Part No.	Description
M3471	Cableform, 1:N, 9-way
M3472	Cableform, EIA530 ‘Y’ Data Cable, 25-way
M3473	Cableform, IDR ‘Y’ Cable, 50-way
M3474	Cableform, HSSI ‘Y’ Data Cable, 50-way
M3475	Cableform, BNC, 50 Ohm, IF
M3476	Cableform, BNC, 75 Ohm, G.703
M3477	Cableform, IP, CAT5
M3478	Cableform, LVDS ‘Y’ Data Cable, 25-way
M3481	Cableform, RJ45 ‘Y’ Cable, G.703 (Balanced)
M3482	Cableform, umbilical (PDQS only)

Table 7-2 Switch Interface Panel Cable Options

M3471

This cable has a 9-way D-type female connector at each end of the cable and connects the traffic modem 1:N port to the Switch interface panel 1:N port.

M3472

This ‘Y’ cable has two 25-way D-type male connectors and one 25-way D-type female connector. The female connector joins directly to the terrestrial equipment. The male connectors require the shorter cable to go to the traffic modem’s EIA-530 interface and the longer cable to go to the Switch’s interface panel.

M3473

This ‘Y’ cable has two 50-way D-type male connectors and one 50-way D-type female connector. The female connector joins directly to the terrestrial equipment. The male connectors require the shorter cable to go to the traffic modem’s IDR interface and the longer cable to go to the Switch’s interface panel.

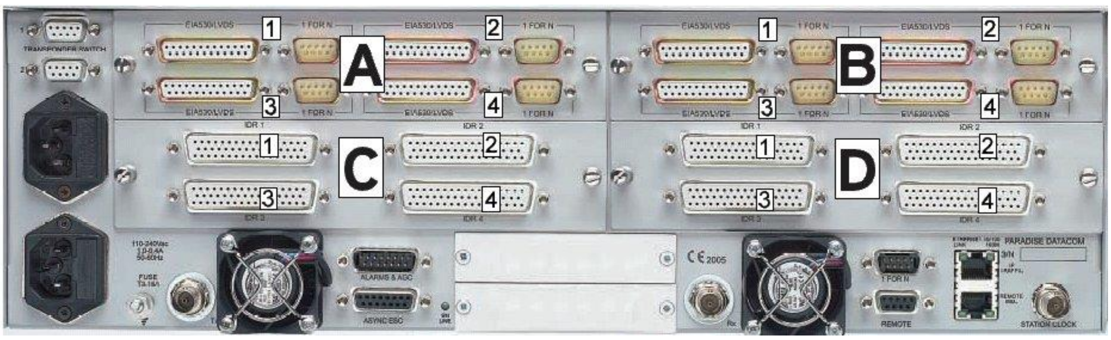


Figure 7-2 Switch Interface Panel Slot Positions and Connector Numbering

Please note with reference to **Figure 7-2**:

- IDR interface panels are fitted only in the bottom slots.
- IDR positions C1 through to C4 are associated with interface positions A1 through to A4.
- IDR positions D1 through to D4 are associated with interface positions B1 through to B4.

M3474

This ‘Y’ cable has two 50-way SCSI male connectors and one 50-way SCSI female connector. The female connector joins directly to the terrestrial equipment. The male connectors require the shorter cable to go to the traffic modem’s HSSI interface and the longer cable to connect to the Switch’s interface panel.

M3476

This cable form comprises two BNC cables with a central T-piece. The T-piece provides the connection to the terrestrial interface equipment. The other connectors join to the traffic modem and the Switch’s interface panel. Two cable forms are required, one per G.703 interface.

M3477

This cable form is a standard Cat5 Ethernet cable. The traffic modem’s IP Traffic interface is connected to the appropriate Ethernet interface (labeled ‘MOD IP1’ through to ‘MOD IP4’) on the Switch’s interface panel. The Ethernet interfaces labeled ‘NET IP1’ through to ‘NET IP4’ on the Switch’s interface panel need to be connected to the network, ensuring the position correctly matches the traffic modem. The connector labeled ‘MOD (Backup)’ needs to be connected to the IP Traffic connector on the Switch’s backup modem. When multiple interface panels are being used, the connector labeled ‘NET (Backup)’ needs to be connected to the ‘MOD (Backup)’ interface of the next interface panel. The IP interface panel is shown in **Figure 7-3.**
Note: The PDQS switch module ports support 10/100bT operation, hence the ‘IP traffic Ethernet speed/duplex’ setting may need to be set to ‘100M full duplex’ on any modems that are connected to the PDQS interfaces.

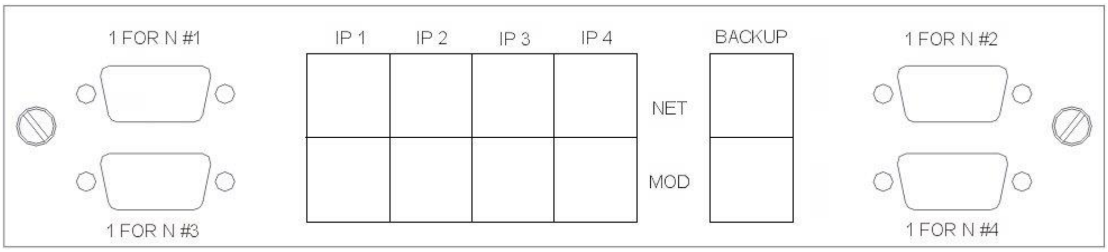


Figure 7-3 Switch IP Interface Panel

M3478

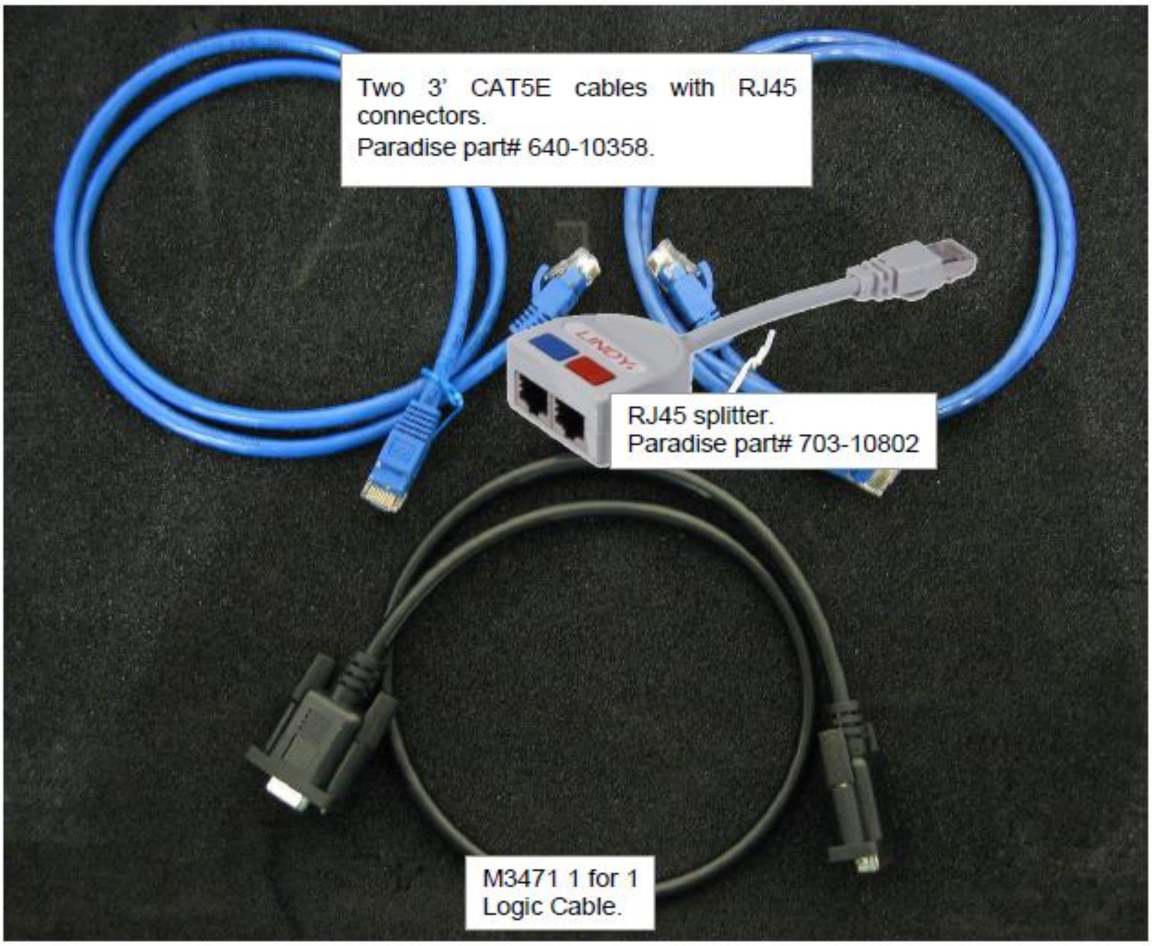
This ‘Y’ cable has two 25-way D-type male connectors and one 25-way D-type female connector. The female connector joins directly to the terrestrial equipment. The male connectors require the shorter cable to go to the traffic modem's LVDS interface and the longer cable to go to the Switch's interface panel.

M3481

This cable kit consists of 2 short Ethernet cables, a Lindy RJ45 splitter and a 1:N logic control cable. The splitters male connector joins directly to the terrestrial equipment. The remaining two RJ45 connectors require cabling to the traffic Modem and PDQS Switch balanced RJ45 ports using the two CAT5E cables supplied. The 1:N logic cable connects between the PDQS interface plate associated with that particular Modem and the traffic Modems 1:N / 1:1 port.

the Lindy RJ45 splitter (703-10802) is compatible with the QFlex and QFlex-400 Modems P3722 G703 card that uses an RJ45 socket for Balanced operation.

M3481 - 1:N Data Cable Kit



M3482 and P3717 1:N Interface Card

This umbilical cable connects the Switch to the backup modem as shown in **Figure 7-4**.

Figure 7-4 M3482 Umbilical Cable Connecting Switch to Backup Modem

The P3717 1:N Interface Card, which the umbilical cable connects to, must be fitted to both the Switch and the backup modem in the case of the Standalone Switch. **Figure 7-5** shows the P3717 1:N Interface Card.

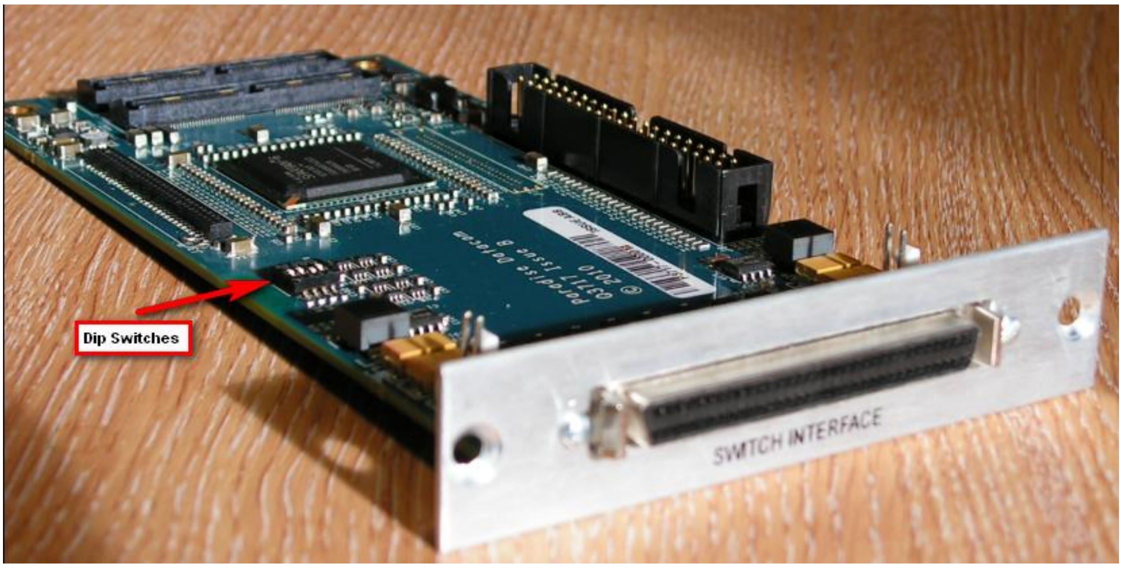


Figure 7-5 P3717 1:N Interface Card

The P3717 1:N Interface Card contains a bank of DIP switches which are factory set. The settings of these switches differs depending on their position within the system, as follows:

Card fitted to backup modem		Card fitted to Switch	
SW1 – 1	Off	SW1 – 1	On
SW1 – 2	On	SW1 – 2	On
SW1 – 3	On	SW1 – 3	Off
SW1 – 4	Off	SW1 – 4	On

Chapter 8 Quick-Start Guide

This section gives a quick-start guide to cabling and configuring a redundancy switch system. It assumes the use of G.703 but other types of electrical interfaces can be configured in the same manner.

8.1 Configuration

1) Configure the modems for normal operation. Power up the backup modem without any cables attached. Temporarily disable the backup Modem's switching capability to prevent the Switch attempting to backup one of the traffic Modems, whilst configuring the system. You can do this by selecting *Disable* from the *Edit->Redundancy->1:N* menu.
2) Power down the Backup Modem. If the Switch is powered up, please also remove mains power whilst the cables are connected. Connect the G.703 'Y' cables (i.e. from the terrestrial equipment to the traffic modem and via a T-piece to the relevant port on the Switch's interface panel.)
3) Ensure the 1:N control cables are disconnected at the modem end. It is okay for these to be cabled to the Switch.
4) Connect the umbilical cable (part number M3482) between the Switch and backup modem.
5) Power up the Switch and backup modem. Set the backup modem IP address via the *Edit->Unit->M&C->IP Address* option.
6) Perform the following for all traffic modems:

    a) Set the 1:N RS485 address of each modem via the *Edit->Redundancy->1:N* menu. The 1:N address must match the position of the modem within the redundancy group.
    b) Set the *Transmit and Receive fail switchover* to *Off* via the *Edit->Redundancy->1:1* menu.

7) Connect all of the 1:N control cables at the traffic modem end. The Switch will learn the traffic modem's configurations automatically as it detects each modem. This can be force via the *Edit->Redundancy->1:N Learn* menu option. The Tx Carrier LED will flash amber while the Switch is learning the modem configurations. Progress can be viewed via the *Status->Switch* screen on the backup modem. This will update as the configurations are fetched from each modem.
8) Set the priority of each traffic modem using the *Edit->Redundancy->1:N* menu, as required. Typically, one modem is set to be the highest priority. Modem priority can be selected between *High*, *Medium* and *Low*. In the event of multiple modem failures, the highest-priority modem will be backed up. The Switch will preconfigure the backup modem to match the configuration of the highest priority traffic modem, thus enabling a faster switchover in the event of a failure.
9) Ensure that the traffic modems' data paths are functioning correctly (i.e. that there is no loss of traffic). Check that the Tx Carrier LED is amber on the backup modem.
10) Enable the Switch via the *Edit->Redundancy->1:N* menu.

The Switch configuration is now complete.

8.2 Testing

The Switch can be tested via the *Status->Switch* screen of the backup modem as follows. Note that this will disrupt traffic briefly when the backup modem is switched online and offline.

- Display the *Status->Switch* screen.
- Force the backup of each traffic modem in turn ensuring that the switch assumes the configuration of the traffic modem and data is passed successfully via the backup modem. Ensure that the traffic modem Tx Carrier LED is amber while it is being backed up.

Other tests that can be carried out are as follows. Note that these will cause the loss of traffic for a short period during the test.

- Remove the mains power cable from a low-priority modem. The Switch will automatically backup the traffic modem. Check that traffic is being passed successfully via the backup modem.
- Then remove the mains lead from the high-priority modem. The Switch will detect this higher-priority failure and reconfigure the backup modem accordingly, leaving the low-priority service without backup.
- Re-apply power to both traffic modems and restore the services. Ensure that the Tx Carrier LED is amber on the backup modem, meaning that it is in the Standby mode.

Chapter 9 Transponder Switch

In a straightforward configuration, all of the modems in the redundant system are fed by the same passively split IF signal, originating from a downconverter. This split can be achieved using a 16:1 hybrid splitter, assuming the Switch is being used to maximum capacity. The transmit IF outputs from all 16 modems should be fed into an identical 16:1 hybrid combiner. Each modem incorporates RF carrier on/off control and, in the off state, correctly terminates the output. Thus, no complex RF switching is required and IF cabling is kept to a minimum.

Where the IF inputs and outputs are connected to more than one up/downconverter, the P525 Transponder Switch can be used. It will route IF inputs and outputs to up to eight different converters (sixteen when two are used in series). The Transponder Switch is controlled via the redundancy switch backup modem. The P525 is a 3U high rack-mount unit, approximately 40mm deep and is available in 50Ω or 75Ω versions.

Note that a transponder switch is not required for L-band systems because L-band up/down converters are naturally wideband and can address the whole of the required band, unlike for IF.

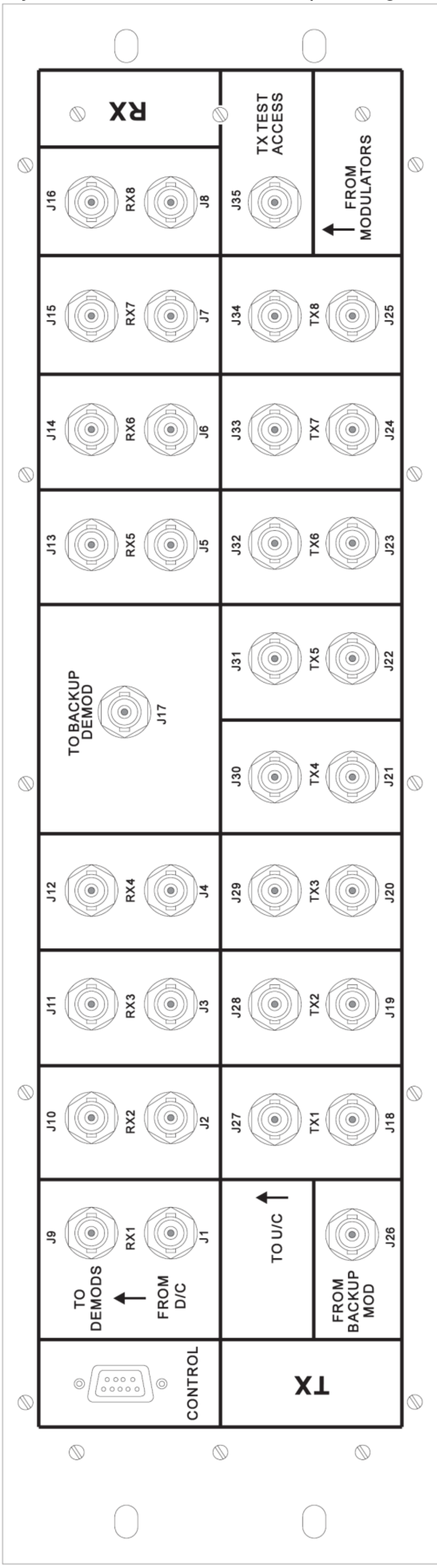
The Transponder Switch front panel is shown overleaf. It has 35 BNC connectors, split into an RX group and a TX Group. On the receive side, there are eight inputs and nine outputs. The ninth output feeds the backup modem and bridges the IF input of the modem selected by the 3-bit address fed from the Switch. On the transmit side, there are nine inputs and nine outputs. Under normal conditions, the signals from the modulators are switched directly through to their corresponding outputs. If the backup is then switched into service its output replaces that of the selected modem.

If there are more than eight modems within the redundancy group then a second transponder panel will need to be added. On the receive side this is done by passively combining the two ports labeled `TO BACKUP DEMOD` and the combined IF is routed to the RX IF input on the Switch backup modem. You may need to adjust the receive levels to compensate for the addition of the combiner/splitter. The transmit path for the second transponder switch is routed from the `TX TEST ACCESS` port of the first transponder switch to the `FROM BACKUP MOD` port of the second transponder switch.

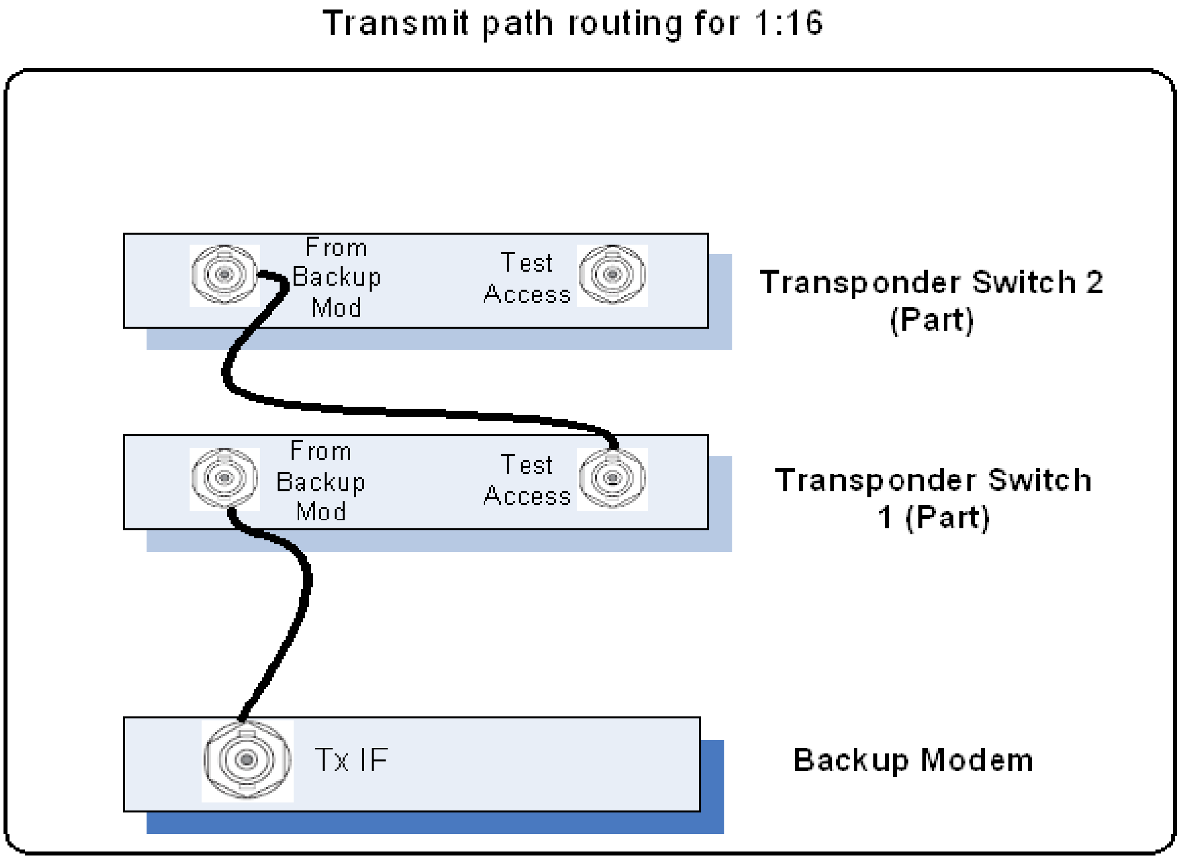
The pinout for the control connector is as follows (two individual connectors for 16 traffic modems):

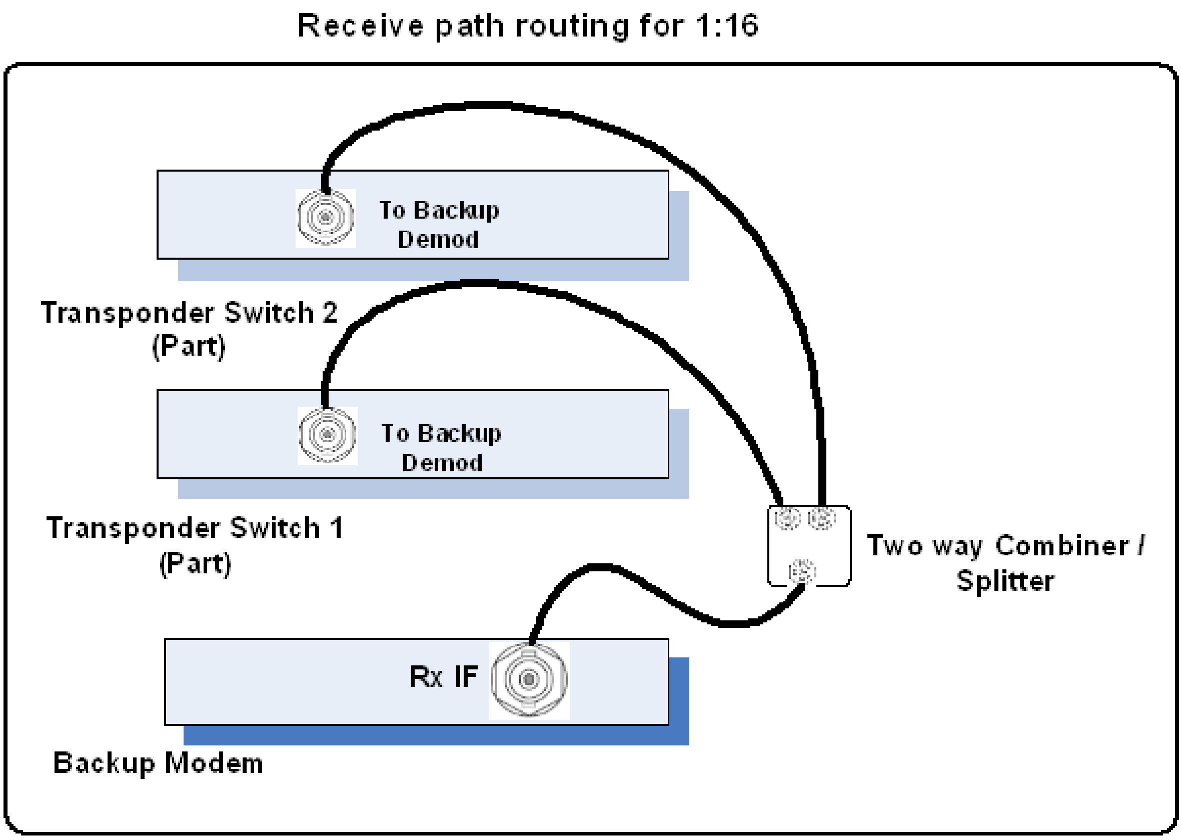
Transponder Switch Control - 9 pin Female 'D' type

Signal description	***Pin No.***	***Comment***
Ground	3,7	
5 volt	2,6	
Modem Address 0	8	Requires TTL low, or contact closure to Gnd
Modem Address 1	5	Requires TTL low, or contact closure to Gnd
Modem Address 2	9	Requires TTL low, or contact closure to Gnd
Backup/*Bridge	4	Requires TTL low, or contact closure to Gnd



P525 TRANSPONDER SWITCH – FRONT PANEL


Transmit path routing for 1:16
From Backup Mod
Test Access
Transponder Switch 2 (Part)
From Backup Mod
Test Access
Transponder Switch 1 (Part)
Tx IF
Backup Modem


Receive path routing for 1:16
To Backup Demod
Transponder Switch 2 (Part)
To Backup Demod
Transponder Switch 1 (Part)
Two way Combiner / Splitter
Rx IF
Backup Modem

Chapter 10 Polarisation Switch

L-band modems in a redundancy system potentially operate over a wide frequency range and may be associated with more than one satellite transponder. The inputs and outputs of the modems in the system are split and combined to provide an aggregated signal, which is sent to a BUC or received from an LNB.

This basic architecture relies on all the wanted signals within the aggregate L-band signal operating on the same transponder polarity. If the modems in the redundancy system need to operate on two polarities, then a further selection system is required to direct the backup modem to the correct polarity combiner or splitter. Note that this is not an issue when operating at IF frequencies since the choice of polarity is inherent in the up/down conversion process.

The P3402 Polarisation Switch provides this facility. A simplified diagram of a redundancy system operating with the polarisation switch is shown in the block diagram on the following pages. The polarisation switch switches the RF path for the backup modem between one of two input/outputs that represent either transponder linear (vertical, horizontal) or circular (clockwise, counterclockwise) polarisation paths. The redundancy switch works in conjunction with the polarisation switch to ensure that when a modem switchover occurs, the polarisation is also switched to be the same as the online modem that has failed.

The P3402 Polarisation Switch unit is a standard 1U, 19” rack mount fitting, with dual mains power supplies. The redundancy switch communicates with the polarisation switch via a private bus. Communication to the polarisation switch is via a standard serial port, or a network port. Configuration is via a web browser. The front-panel display shows the current status of the unit. The rear panel uses D-type connectors for signal connections and N-type connectors for RF, which are specified for use up to 3GHz. The internal RF switches are latching types ensuring the currently selected RF paths are maintained in the absence of power to the unit.

Figure 10-1 Front View of Polarisation Switch (top)

The Polarisation Switch front-panel LEDs indicate Tx and Rx polarisation position and the power supply status.

Figure 10-2 Rear View of Polarisation Switch (top)

10.1 Input/Output Specification

Frequency range:	950 to 2150MHz
Connector type:	N type
Port return loss:	18dB
Typical signal levels:	-20 to -70dBm

10.2 PSU/Environmental Specification

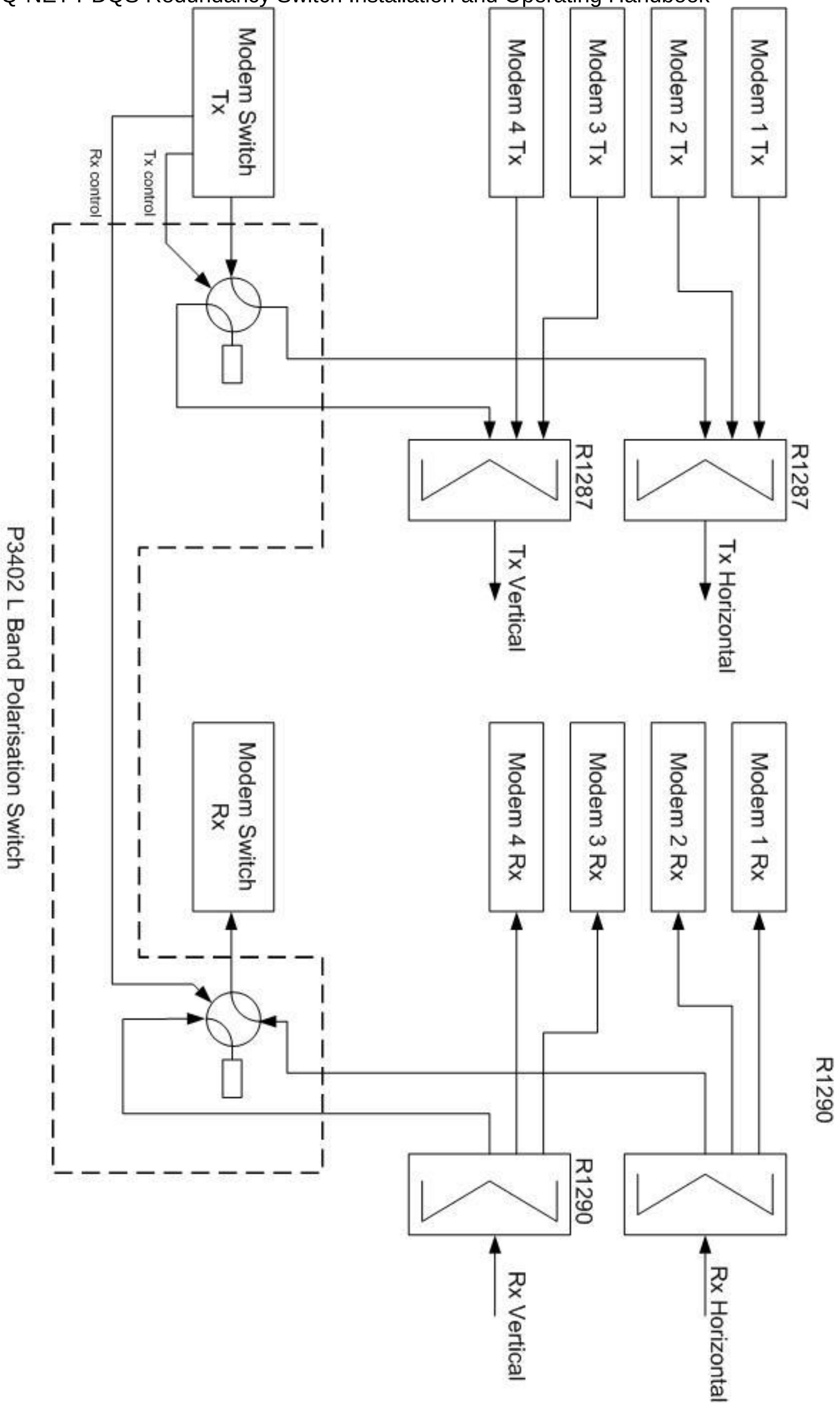
Power supply:	Auto-ranging from 85 to 260V AC 50/60 Hz
Safety earth stud:	4mm, allows the unit to be connected to rack earthing systems
Operational temperature:	0 to 50C
Storage temperature:	-20 to 80C

10.3 Transfer Specification

Loss DC to 3GHz:	1.0dB
Gain frequency 950 to 2150MHz:	1.5dB full band, ±0.05dB across any 40MHz
Port-to-port isolation:	80dB

10.4 System Block Diagram

The P3402 Polarisation Switch will operate in conjunction with the L-band modem redundancy switch and suitable L-band splitter combiner shelves such as the R1287 and R1290. The system block diagram is shown over the page.


Modem 1 Tx
Modem 2 Tx
Modem 3 Tx
Modem 4 Tx
Modem Switch Tx
Tx control
Rx control
R1287
R1287
Tx Horizontal
Tx Vertical
Modem 1 Rx
Modem 2 Rx
Modem 3 Rx
Modem 4 Rx
Modem Switch Rx
R1290
R1290
R1290
Rx Horizontal
Rx Vertical
P3402 L Band Polarisation Switch

10.5 Polarisation Switch Configuration

Remote Control Cable

PL1 Connects to the Redundancy Switch.
PL2 Connects to the Polarisation Switch.
DO NOT CONNECT THIS CABLE THE OTHER WAY AROUND AS YOU WILL SHORT CIRCUIT THE POWER SUPPLY!

The redundancy switch automatically detects the presence of the polarisation switch when the remote control cable is connected between the two units. Please ensure this cable is connected the correct way around as failure to do so will result in the power supply being short circuited. The correct polarisation for the traffic modems must also be selected from the modem menus, as described in Section 6.5.2.2. Once this is done, the redundancy switch should be forced to learn the new modem configurations. The modem with the highest priority will dictate the polarisation switch standby settings (or Modem 1 if no priorities are set).

10.5.1 Polarisation Switch Cabling

Control of the polarisation switch is via the transponder switch port (either port 1 or 2 as both are connected in parallel) on the redundancy switch.

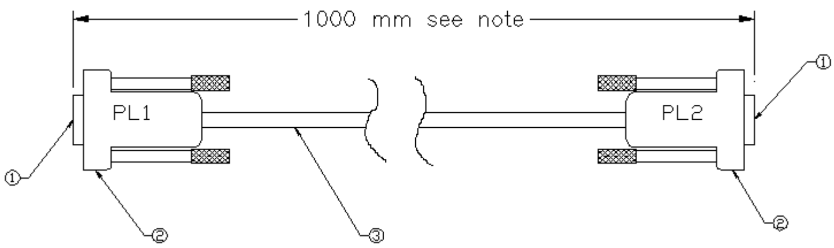
Remote Control Connector

PL1 Connects to the Redundancy Switch.
PL2 Connects to the Polarisation Switch.
DO NOT CONNECT THIS CABLE THE OTHER WAY AROUND AS YOU WILL SHORT CIRCUIT THE POWER SUPPLY!

This cable connects between the transponder switch control port and polarisation remote control port.

Control cable pinout:

PL1	PL2
8	1
4	2
9	3
5	4
3	6,7
7	8,9
SCREEN	SCREEN



NOTES

1) PL2 links 6 to 7 and 8 to 9 use Item 4

2) Cable length specified for P3402 to be 5 rack units above or below P3400

3) PL1 is Redundancy switch end, PL2 is Polarisation switch end. It is possible to fit cable to wrong equipment. DO NOT DO THIS as this will result in power supply shorting out.

ITEM	QTY	DESCRIPTION	REF DESIGNATOR	COMMENT
1	2	9 WAY D TYPE PLUG, SOLDER BUCKET FORMED CONTACT, SHELL WITH DIMPLE	PL1/PL2	FEC 109-9046
2	2	9 WAY METAL BACKSHELL		FEC 463-012
3	1	CABLE, 8 WAY PLUS SCREEN, 7/0.2mm		FEC 715-463
4		CABLE, GREEN, 7/0.2		FEC 121-9329

Summary Alarm Connector

Summary alarms connector type: 9-way D-type male.

The polarisation switch has a summary alarm connector that presents two pairs of changeover relay contacts (from the same relay). The following table shows the states of these contacts in the de-energised (alarm) state. Under normal circumstances the summary alarm relay is energised. The relay becomes de-energised if one (or both) of the mains power supplies fails or if a programmed alarm condition is detected.

Connection details:

PIN	FUNCTION
1	Summary alarm 1 common
6	Summary alarm 1 N/O
2	Summary alarm 1 N/C
7	No connection
3	No connection
8	Summary alarm 2 N/O
4	Summary alarm 2 N/C
9	Summary alarm 2 common

Serial Port Connector

Serial port connector type: 9-way D-type male.

This port supports RS-232, RS422 or an RS485 multi-drop connection. The required interface is selected via the web browser (baud rate, data bits and parity are also selected via the web browser).

Connection details:

PIN	FUNCTION
1	No connection
6	RS232 transmit data RS422/485 - transmit data
2	no connection
7	no connection
3	Receive data +
8	No connection
4	Transmit data +
9	RS232 transmit data RS422/485 + transmit data
5	Signal ground

Polarisation Switch Status (Alarms) Connector

Alarms connector type: 15-way D-type male.

There are four switch status outputs, each of which is a volt-free ‘Form C’ contact rated 30V dc, 100mA. When the unit is powered down, all relays are turned off, and the paths appear as inactive. In normal operation one relay is active for each of the transmit and receive paths.

Connection details:

FUNCTION	PIN NUMBERS		
	ACTIVE	COMMON	INACTIVE
Tx port A selected	1	9	2
Tx port B selected	10	3	11
Rx port A selected	4	12	5
Rx port B selected	13	6	14

Network Port

The polarisation switch includes a standard 10/100 BaseT network port using an RJ45 connector. This supports a variety of functions.

Units shipped from the factory will be set to a fixed IP address of 192.168.1.175.

DHCP is also available. Please refer to the full polarisation switch manual available either from Teledyne Paradise Datacom or from:

Double D Electronics Ltd
Unit 6
Robins Wharf
Grove Road
Northfleet
Kent, DA11 9AX
United Kingdom
Tel: 01474 333456
Fax: 01474 333414

If SNMP control or M&C protocol is required, refer to the main user manual.