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# USER MANUAL

Model No. **20-740/745**

## RF Multiplexer Module


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# Section 1
# 20-740 R.F. Multiplexer Module

## 1.1 Features

- Dual 8 to 1 Multiplexer with 2000MHz Bandwidth
- Configurable as 16 to 1 Multiplexer
- Available in both 50 and 75Ω Versions
- Choice of Front Panel Mounted Connectors: BNC, SMA and Type N
- Automatic Termination of all Unselected Inputs
- Ideal Building Block for Large R.F. Switching Networks
- 75Ω Version Suitable for Telecoms and Video Switching

### 1.1.1 Description

The 20-740 series are a range of high performance dual 8 to 1 RF Bi-Directional Multiplexers with a bandwidth of 2000MHz, available in 50 or 75Ω versions. All non-selected input lines are terminated into a matched load. This module may also be configured (via DIP switches) as a 16 to 1 multiplexer but with reduced r.f. performance.

Applications include routing high frequency signals to and from oscilloscopes, analysers, signal generators and synthesizers, video/audio switching, switching high frequency logic and many other situations involving coaxial switching.

All inputs are automatically terminated into matched loads (50 or 75Ω).

Larger multiplexer/matrix switching networks may be constructed by interconnecting individual modules, see section 4 for further details.

### 1.1.2 Operation

This module is factory configured as a dual 8 to 1 multiplexer, see fig 1.2. Performance figures are given in table 1.1. However it may also be configured (using dip switches) as a 16 to 1 multiplexer. Please note that the R.F. performance for this configuration is to a slightly reduced specification (please refer to table 1.3 for further details).

**Self-Test** is performed both at power up and at any other time either manually or under program control. In the unlikely event of relay failure the front panel will indicate a fault. The diagnosis - including the position of the suspect relay - will be indicated using the DIAGNOSTIC? command.

This is a double height module and **must** be mounted into a double height (6U) case.

### 1.1.3 Front Panel

The module front panels are illustrated in Section 6, they include:

**Status Display**, 4 LED Indicators:-

**Power LED.** Connected to power system supply.

**Active LED.** On whenever one or more switches are closed. For a list of all active switches use the VIEW? command.

**Self-Test LED.** Active when self-test in progress.

**Error LED.** Indicates that error found during self-test.

**Self-Test Button**. Press to initiate a self-test. While in progress the “Self-Test” LED will be on, if a failure is detected then the “Error” LED will be set on permanently. Use the DIAGNOSTIC? command to find the exact cause of any failure, refer to section 5 for further details. NB: Self-Test button will only respond when module is inactive.

### 1.1.4 20-740 Module Model Numbers

The following table lists the standard options available with the RF multiplexer module:-

| Model Number | Configuration | Connector | Impedance |
|---|---|---|---|
| **20-740-501** | Dual 8 to 1 MUX | BNC | 50Ω |
| **20-740-511** | Dual 8 to 1 MUX | SMA | 50Ω |
| **20-740-521** | Dual 8 to 1 MUX | Type N | 50Ω |
| **20-740-701** | Dual 8 to 1 MUX | BNC | 75Ω |

Further connector types may be available (particularly 75Ω), please contact factory for further details.



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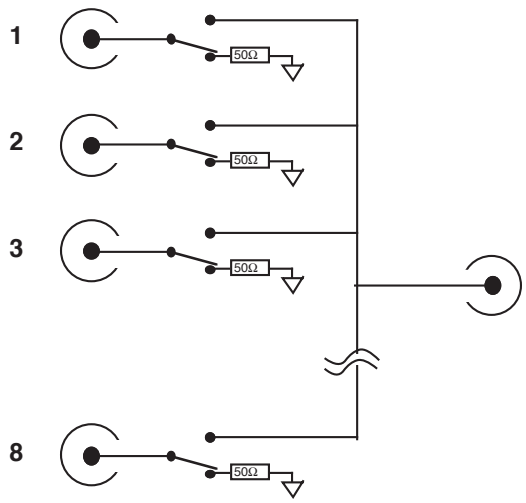



**Fig 1.1 8 to 1 Multiplexer Half of Model 20-740**

| Multiplexer Model | 20-740-501 | 20-740-511 | 20-740-521 | 20-740-701 |
|---|---|---|---|---|
| Impedance | 50Ω | 50Ω | 50Ω | 75Ω |
| Max Frequency | 1500MHz | 2000MHz | 2000MHz | 1000MHz |
| Max Insertion Loss | < 3dB | < 3dB | < 3dB | < 3dB |
| VSWR | < 1.8:1 *(1.0GHz)* | < 1.6:1 *(1.5GHz)* | < 1.6:1 *(1.5GHz)* | < 1.8:1 *(800MHz)* |
| Isolation (at 2GHz) | > 60dB | > 60dB | > 60dB | > 60dB |
| Crosstalk (at 2GHz) | > 55dB | > 55dB | > 55dB | > 55dB |
| Terminating Resistors | Yes | Yes | Yes | Yes |
| Terminating Resistor Max Power | 0.25W | 0.25W | 0.25W | 0.25W |
| Max Switch Voltage | 30V d.c. | | | |
| Max Power | 10W | | | |
| Max Carry Power | 15W | | | |
| Max Switch Current | 0.5A | | | |
| Path On Resistance | < 250mΩ (d.c.) | | | |
| Path On Resistance | > $10^8$Ω (d.c.) | | | |
| Switching Time | 20mS | | | |

**Table 1.1 General Specification**

(Dual 8 to 1 Multiplexer Mode)



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## 1.2 Dual 8 to 1 Multiplexer Mode

This is the standard configuration offering the user most flexibility, the module contains two separate 8 to 1 multiplexers, which may be operated independently of one another. These units offer the user a very flexible building block to construct large R.F. switching systems, see Section 4 for further information.

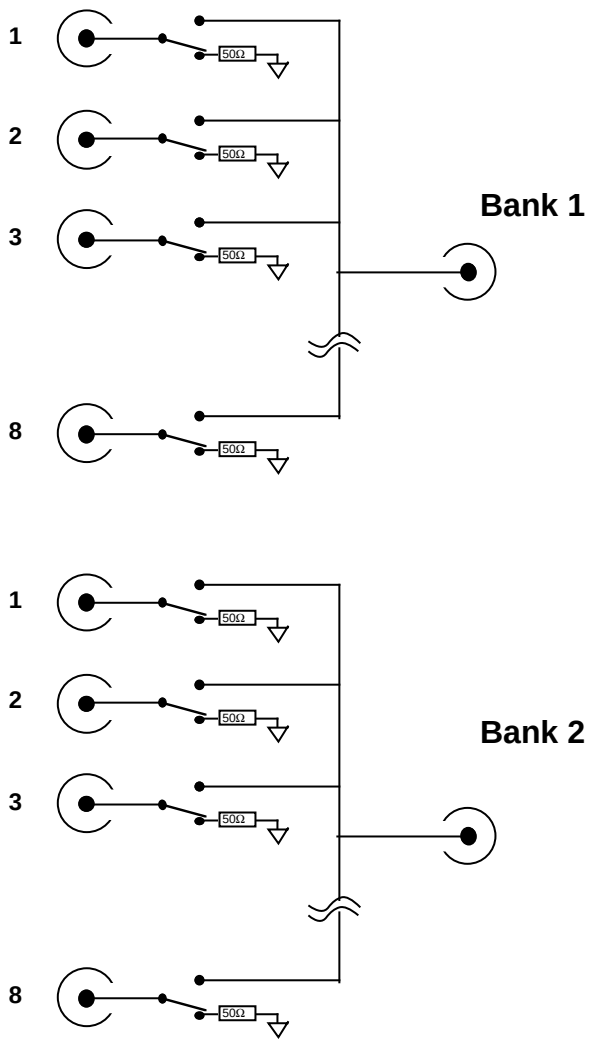



**Fig 1.2 Dual 8 to 1 Multiplexer Mode**



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Fig 1.3 Typical Insertion Loss: 50Ω Dual 8 to 1 Multiplexer Mode

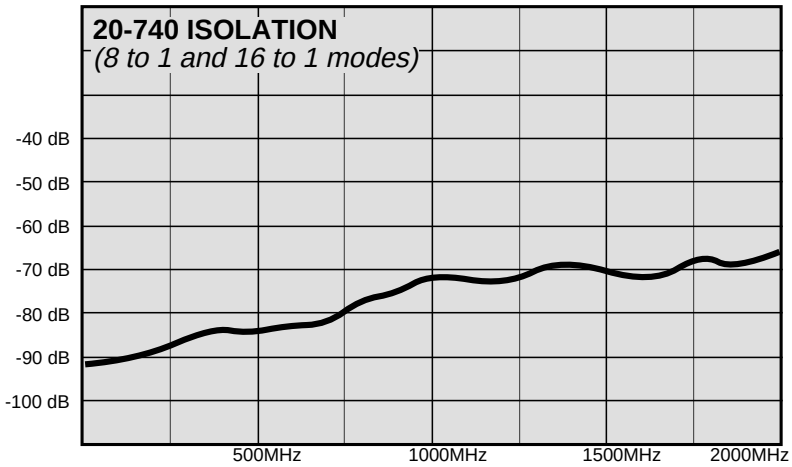



Fig 1.4 Typical Isolation: 50Ω Dual 8 to 1 Multiplexer Mode

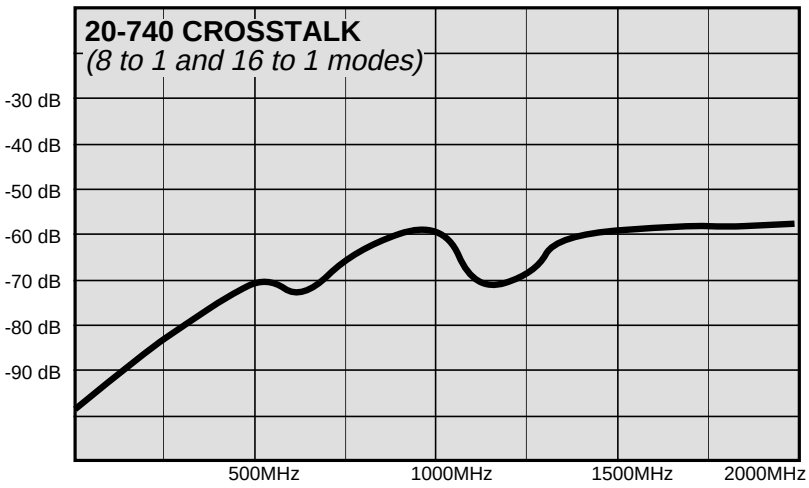



Fig 1.5 Typical Crosstalk: 50Ω Dual 8 to 1 Multiplexer Mode



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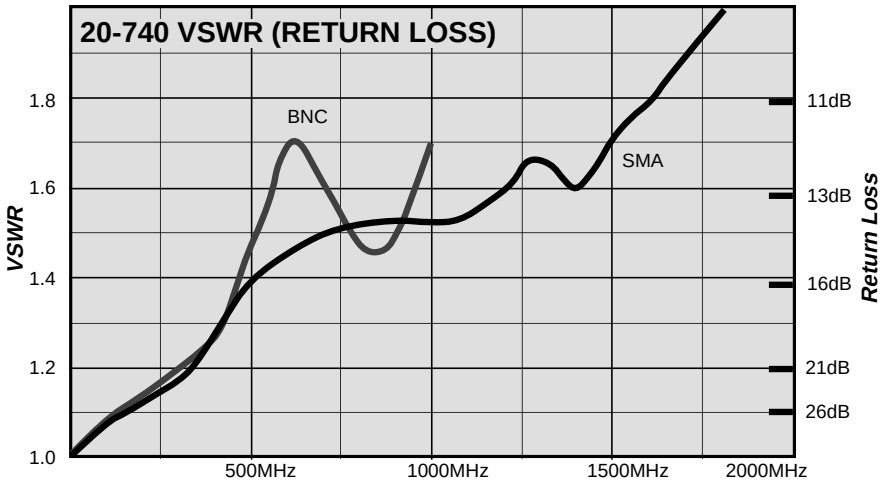



Fig 1.6 Typical VSWR: 50Ω Dual 8 to 1 Multiplexer Mode

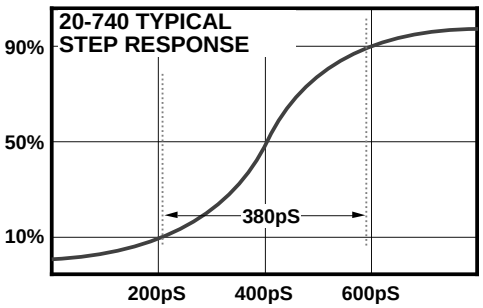



Fig 1.7 Step Response: 50Ω Dual 8 to 1 Multiplexer Mode

## 1.3 Single 16 to 1 Multiplexer Mode

This configuration provides a single 16 to 1 multiplexer, it operates in a similar manner to the 8 to 1 version. R.F. performance is slightly reduced.

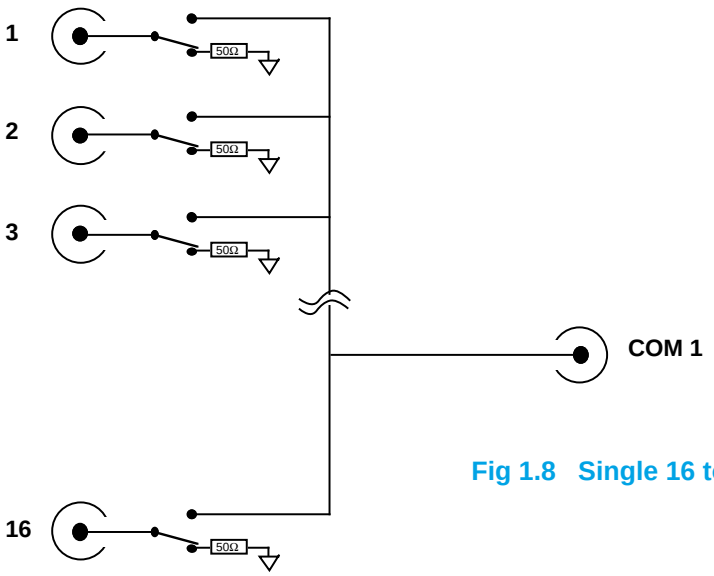



Fig 1.8 Single 16 to 1 Multiplexer Mode



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**Fig 1.8 20-740 Multiplexer Module (SMA Version)**



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# Section 2
# 20-745 R.F. Multiplexer Module

## 2.1 20-745 Multiplexer Features

- Quad 8 to 1, Dual 16 to 1 and Single 32 to 1 Multiplexer with up to 2000MHz Bandwidth
- Available in both 50 and 75Ω Versions
- Choice of Front Panel Mounted Connectors: SMB, Type 43 and MMC Connectors
- Front Panel LED Indicators
- Built-In Self Test
- Ideal Building Block for Large R.F. Switching Networks
- 75Ω Version Suitable for Telecoms and Video Switching

### 2.1.1 Description

A High Density 1500MHz Multiplexer arranged as a Quad 8 to 1 or Dual 16 to 1 or Single 32 to 1 configuration, all with excellent Insertion Loss, VSWR & Isolation, available in a choice of 50 or 75Ω versions with SMB, Type 43 or MMC Connectors.

This module is a higher density version of type 20-740 with the automatic termination function removed, the RF performance specification is similar. It is an equivalent to the 20-730-902 balanced 120Ω multiplexer.

Applications for the 20-745 include routing high frequency signals to and from oscilloscopes, analysers, signal generators and synthesizers, telecoms tributary switching, video/audio switching and switching high frequency logic signals.

Larger multiplexer/matrix switching networks may be constructed by interconnecting individual modules, see section 4 for further details.

### 2.1.2 Operation

This module is factory configured as a quad 8 to 1 multiplexer, see fig 2.4. Performance figures are given in table 2.1. However it may also be configured (using dip switches and jumper cables) as a 16 to 1 or 32 to 1 multiplexer. Please note that the R.F. performance for these configurations will be to a slightly reduced specification, please refer to table 2.1 for further details.

**Self-Test** is performed both at power up and at any other time either manually or under program control. In the unlikely event of relay failure the front panel will indicate a fault. The diagnosis - including the position of the suspect relay - will be indicated using the DIAGNOSTIC? command.

This is a double height module and **must** be mounted into a double height (6U) case.

### 2.1.3 Front Panel

The module front panels are illustrated in Section 6, they include:

**Status Display**, 4 LED Indicators:-

**Power LED.** Connected to power system supply.

**Active LED.** On whenever one or more switches are closed. For a list of all active switches use the VIEW? command.

**Self-Test LED.** Active when self-test in progress.

**Error LED.** Indicates that error found during self-test.

**Self-Test Button**. Press to initiate a self-test. While in progress the “Self-Test” LED will be on, if a failure is detected then the “Error” LED will be set on permanently. Use the DIAGNOSTIC? command to find the exact cause of any failure, refer to section 5 for further details. NB: Self-Test button will only respond when module is inactive.

**Width and Dimensions.** All modules conform to the 6U height (262mm) Eurocard standard and are 160mm deep, panel width is 1.8 Inches (45.7mm).

### 2.1.4 20-745 Module Model Numbers

The following table lists the standard options available with the RF multiplexer module:-

| Model Number | Bandwidth | Connector | Impedance |
|---|---|---|---|
| **20-745-501** | 1500MHz | SMB Version | 50Ω |
| **20-745-521** | 1000MHz | MMC Version | 50Ω |
| **20-745-701** | 1500MHz | SMB Version | 75Ω |
| **20-745-711** | 1500MHz | Type 43 Version | 75Ω |
| **20-745-721** | 1000MHz | MMC Version | 75Ω |

When ordering a configuration code should be specified, the module will then be preconfigured in Quad 8, Dual 16 or Single 32 channel mode. Other connector types are available to order.



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**Fig 2.1 20-745 Multiplexer Module (MMC Version)**



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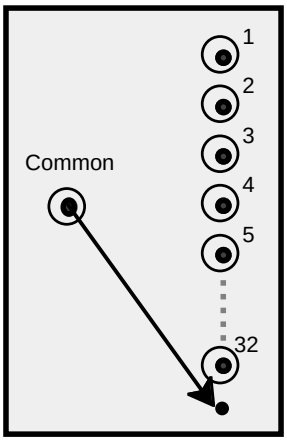



Fig 2.2 20-745 Single 32 Channel Multiplexer Configuration

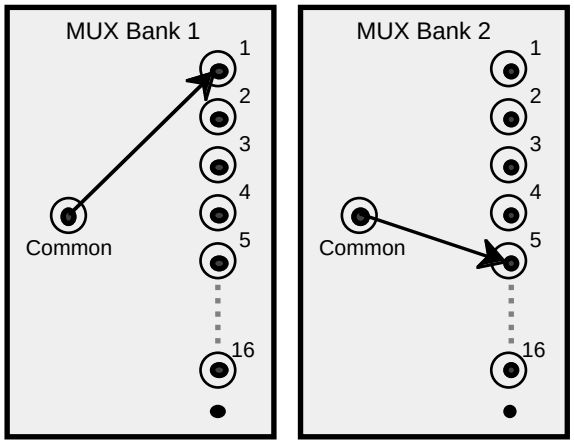



Fig 2.3 20-745 Dual 16 Channel Multiplexer Configuration

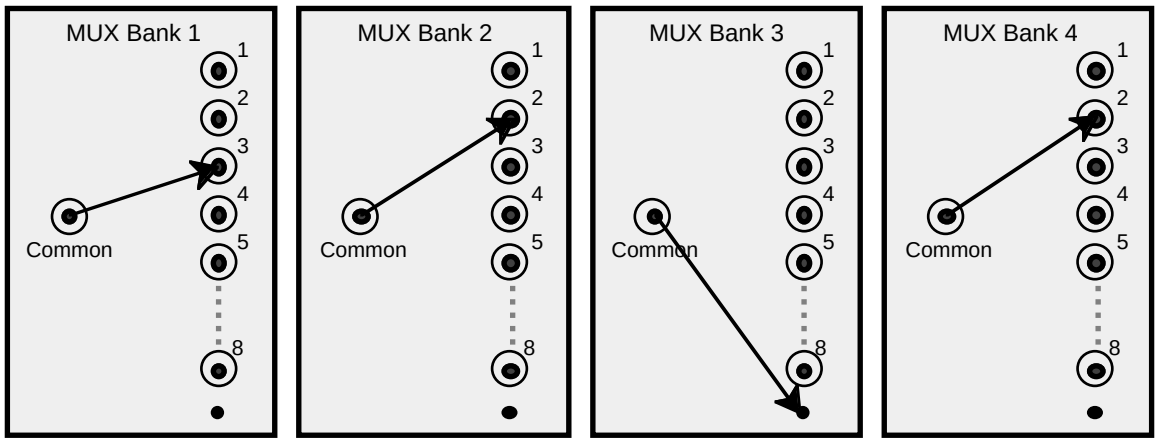



Fig 2.4 20-745 Quad 8 Channel Multiplexer Configuration



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### Specification (16 to 1 Mode)

| | |
|---|---|
| Characteristic Impedance | 50 or 75Ω |
| Maximum Frequency | 1500MHz |
| Rise Time | < 0.5nS |
| Maximum Insertion Loss | < 2dB |
| V.S.W.R. (at 1300MHz) | < 1:1.6 |
| Isolation (at 1500MHz) | > 75dB |
| Crosstalk (at 1500MHz) | > 55dB |
| Maximum Voltage | 100V d.c. |
| Maximum Power | 10W |
| Maximum Switch Current | 0.1A |
| On Path Resistance | < 250 mΩ |
| Off Path Resistance | > $10^8$ Ω |
| Differential Thermal Offset | < 20µV |
| Expected Life (Low Power) | > $2x10^7$ ops |
| Expected Life (Max Power) | > $3x10^5$ ops |
| Switching Time | 10mS |

### Additional Specification (8 to 1 Mode)

| | |
|---|---|
| Maximum Frequency | 2000MHz |

### Additional Specification (32 to 1 Mode)

| | |
|---|---|
| Maximum Frequency | 1000MHz |

**Table 2.1 Switching Specification**

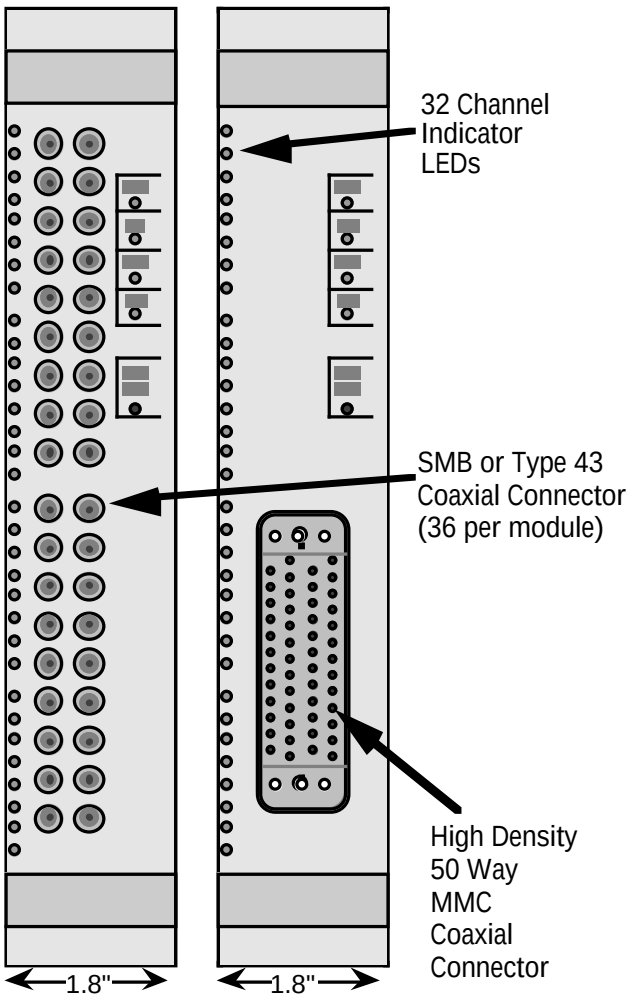



**Fig 2.5 20-745 Front Panel/Connector Options**




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Fig 2.6 Typical Insertion Loss: 50Ω Dual 16 to 1 Multiplexer Mode




Fig 2.7 Typical VSWR: 50Ω Dual 16 to 1 Multiplexer Mode

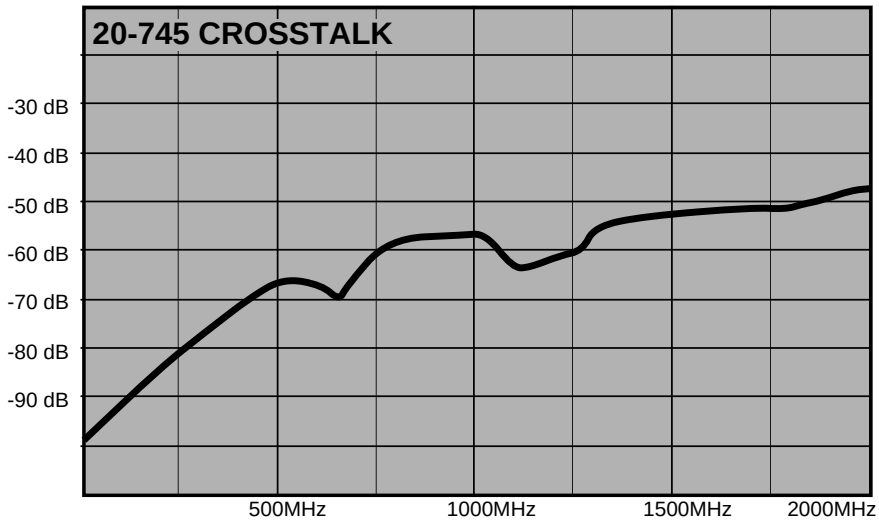



Fig 2.8 Typical Crosstalk: 50Ω Dual 16 to 1 Multiplexer Mode



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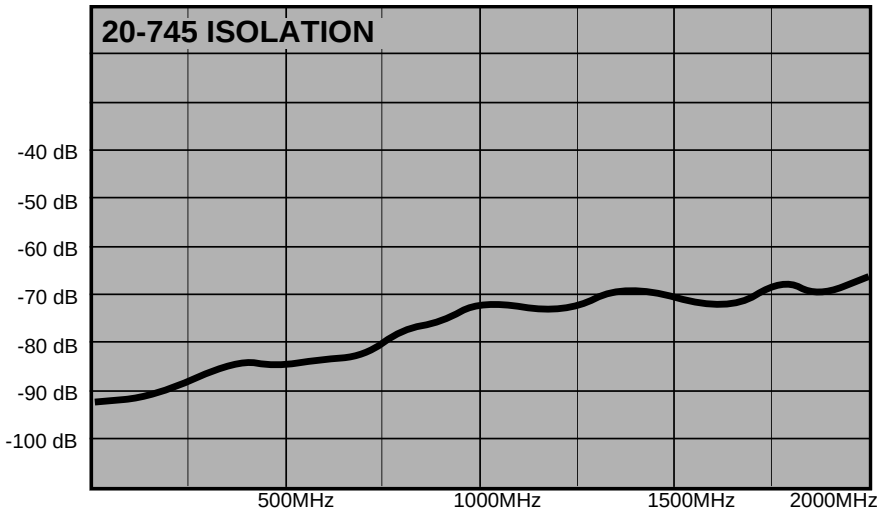



**Fig 2.9 Typical Isolation: 50Ω Dual 16 to 1 Multiplexer Mode**

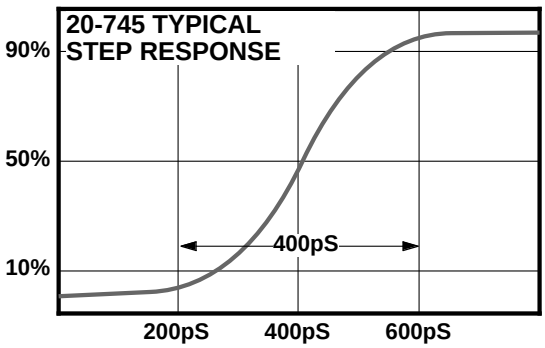



**Fig 2.10 Step Response: 50Ω Dual 16 to 1 Multiplexer Mode**



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## 3.1 Select Module Address

Choose module address (from 0 - 30) using the address select switch (SW1) on the driver card.

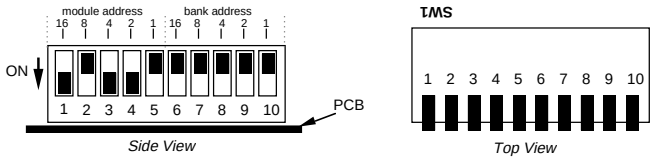



Fig 3.1 ***The module address selected in the illustration is 22 (i.e. 16 + 4 + 2 = 22).***

## 3.2 Select Module Bank (Secondary) Address

### 3.2.1 Single Multiplexer Mode

When more than one module is used to make up a multiplexer (see fig 3.2 below, where four 16 channel modules are used to make up a 64 channel multiplexer), then all multiplexer units **must** have the same primary address, the location of each module within the multiplexer is given by its bank address. Bank addresses must start at 0.

If there is a problem with any of the modules used to make up a large multiplexer then an error will be detected (use the REPORT? query to discover the cause).

If only one multiplexer model is used then bank address 0 **must** be used.

| $X_2$ | $X_1$ | $X_0$ | $Y_1$ | $Y_0$ |
|---|---|---|---|---|

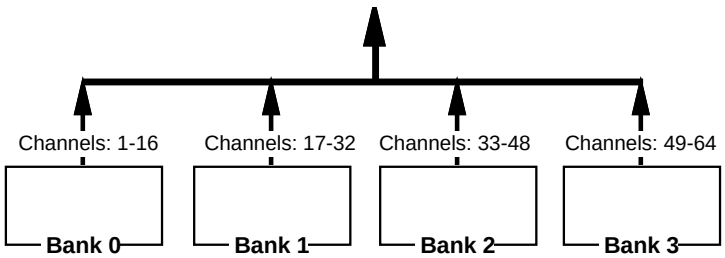



**Fig 3.2 Configuring the Multiplexer System**
(All modules must have the same primary address)

### 3.2.2 Dual/Quad Multiplexer Mode

If more than one multiplexer in the dual or quad mode is to be used to build up a large high performance multiplexer (i.e. optimised insertion loss/VSWR) then each module's primary address should have a different value, see diagram below. The Dual 8 to 1 mode yields maximised RF performance, however the selecting of the module's addresses is a little more complex. If your application does not require maximised RF performance then configure all modules in single mode, as in fig 3.2.

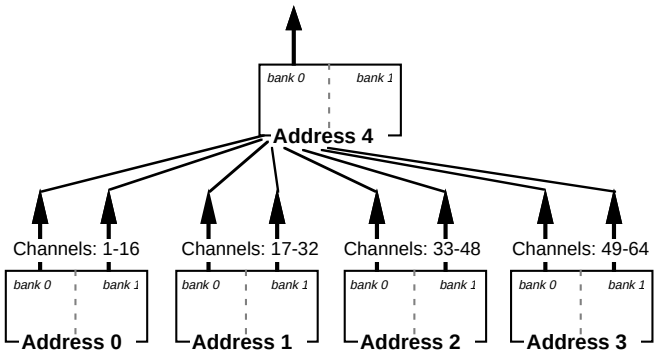



**Fig 3.3 Configuring A Large Multiplexer System**
(64 Channel using 5 x 20-740 modules)



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## 3.3 General Programming Commands

| | |
|---|---|
| ARESET a | Open all channels/crosspoints on device a |
| DELAY t | Force a minimum delay of t milliseconds between two instructions |
| RESET | Open all switches on all modules |
| VIEW? a | View status of device a |

## 3.4 Configuration Specific Programming Commands

The multiplexer/matrix module may be configured in one of the following modes:-

### 3.4.1 Quad Multiplexer Mode (20-745 only)

Each module contains four 8 to 1 multiplexers, referred to as banks 1, 2, 3 and 4.

`CHAN a,b,c` Select channel c on bank b of multiplexer a. Only one channel at a time is permitted to be on, automatic break-before-make is always enforced. b is in the range 1 to 4.

e.g. `CHAN 12,4,7` will operate the module with address 12 selecting bank 4 channel 7.

`CHAN 15,2,1` will operate the module with address 15 selecting bank 2 channel 1.

### 3.4.2 Dual Multiplexer Mode

Each module contains two 16 or 8 to 1 multiplexers, referred to as banks 1 and 2.

`CHAN a,b,c` Select channel c on bank b of multiplexer a. Only one channel at a time is permitted to be on, automatic break-before-make is always enforced. b is in the range 1 to 2.

e.g. `CHAN 3,1,7` will operate the module with address 3 selecting bank 1 channel 7.

`CHAN 15,2,1` will operate the module with address 15 selecting bank 2 channel 1.

### 3.4.3 Single Multiplexer Mode

Each module contains a single 32 or 16 to 1 multiplexer.

`CHAN a,b,c` Select channel c on bank b of multiplexer a.

## 3.5 Programming Examples

The following are simple examples of how to program the module in each of it's 3 modes of operation:-

### 3.5.1 Single Multiplexer Mode

First, to check the size of the multiplexer at address 7.

`TYPE? 7` will return "`MUX(16)`" (20-740 module).

To close channel 3 on multiplexer 7, bank 1.

`CHAN 7,1,3` (or just `CHAN 7,3`)

Now to look at status of multiplexer 7.

`VIEW? 7` will return "3"

To clear the multiplexer.

`ARESET 7`

Now to look at status.

`VIEW? 7` will return "`0`".

### 3.5.2 Dual 16 to 1 Multiplexer Mode

First, to check the size of the multiplexer at address 21.

`TYPE? 21` will return "`MUX(2[16])`" (20-745 module).

To close channel 3 (bank 1) on multiplexer 21.

`CHAN 21,1,3`

Now to look at status of multiplexer 21, bank 1.

`VIEW? 21,1` will return "3".

To clear bank 1.

`ARESET 21,1`

Or to clear both banks.

`ARESET 21`

Now to look at status.

`VIEW? 21,1` will return "`0`".

`VIEW? 21` will return the status of both multiplexer banks.



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### 3.5.3 Quad 8 to 1 Multiplexer Mode (20-745 Only)

First, to check the size of the multiplexer at address 21.

`TYPE? 9` will return "`MUX(4[8])`".

To close channel 7 (bank 4) on multiplexer 9.

`CHAN 9,4,7`

Now to look at status of multiplexer 9, bank 4.

`VIEW? 9,4` will return "`7`".

To clear bank 4.

`ARESET 9,4`

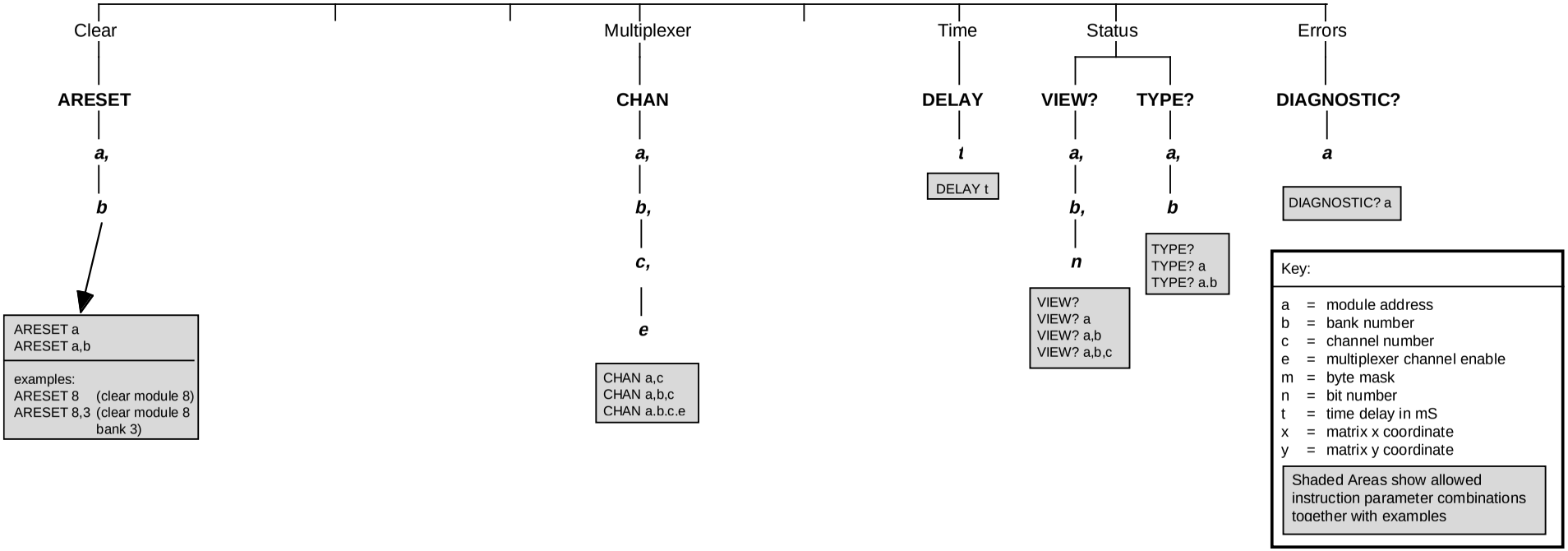
Now to look at status.

`VIEW? 9,4` will return "`0`", the status of bank 4.

`VIEW? 9` will return the status of all multiplexer banks.



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**Fig 3.4 20-740/745 Multiplexer Module Instruction Set**

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# Section 4
# Interconnecting R.F. Switching Modules

## 4.1 Large Multiplexers

Large multiplexers would normally be constructed using multiple dual 8 to 1 units, built into a tree switching network.

All module interconnections are made using direct cabling (no T-junctions) to minimise performance degradation (particularly VSWR. and insertion loss), see diagram below.

**Example:** See fig 4.1 below. Here a 64 to 1 multiplexer has been constructed using 5 x 20-740 modules. The system would be programmed using two separate multiplexers: A 64 to 1 multiplexer feeding an 8 to 1 multiplexer.

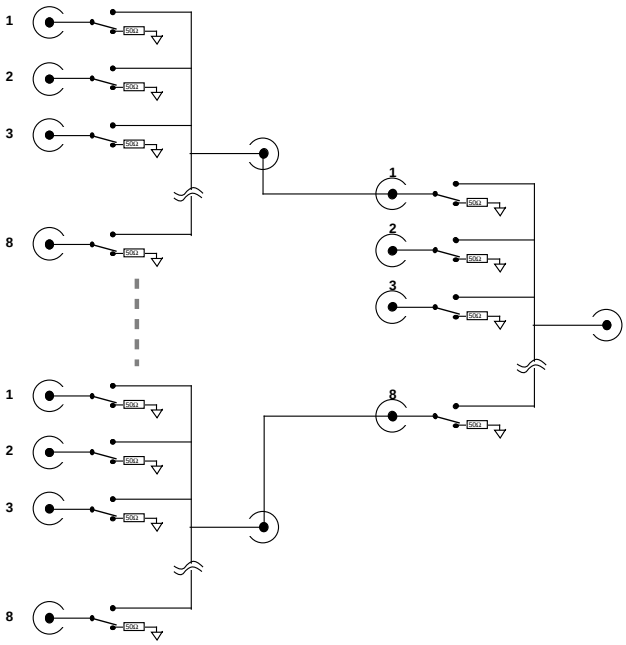



**Fig 4.1 Constructing a Large Multiplexer (64 to 1)**

Using 5 x 20-740 modules configured in dual 8 to 1 Multiplexer Mode.

## 4.2 Matrix (Single Channel)

### 4.2.1 8 x 8 Matrix (Single Channel)

This provides an 8 x 8 matrix with a single channel switch (Fig 4.2), so that only one crosspoint at a time may be selected. (This is arranged in a back-to-back multiplexer format). If you require more than one crosspoint to be operated at a time then you will require a “multi-channel” matrix, see section 4.3 for further details.

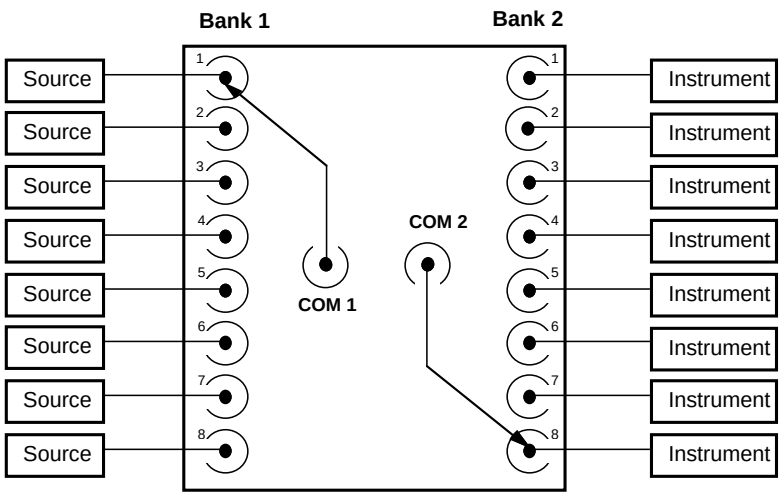



**Fig 4.2 8 x 8 Matrix (Single Channel)**

(Using A Single 20-740 Module, with Commons Interconnected Externally)




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### 4.2.1 32 x 32 Matrix (Single Channel)

A single channel 32 x 32 matrix is illustrated in Fig 4.3.

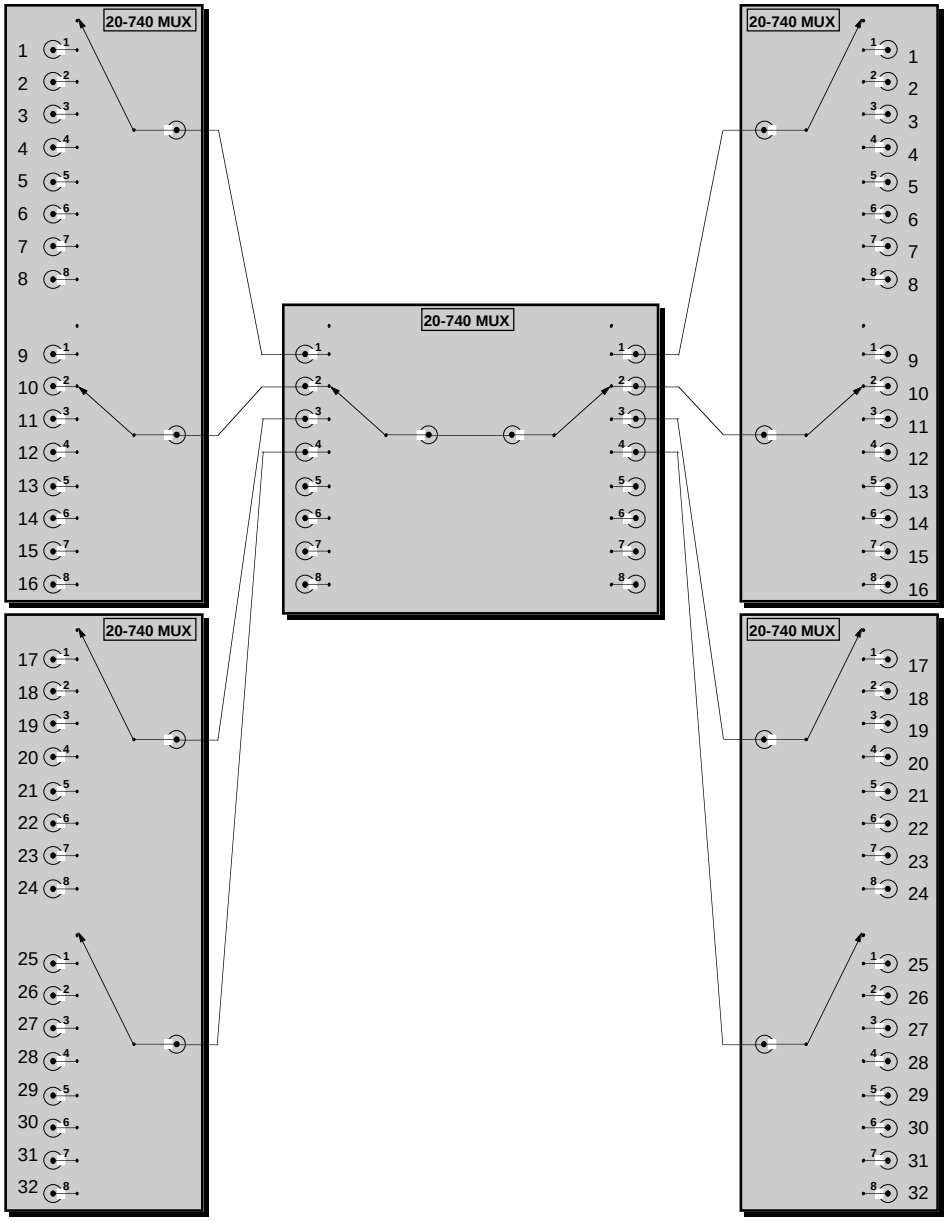



**Fig 4.3 32 x 32 Matrix (1 Channel)**

Using 5 x 20-740 modules configured in Dual 8 to 1 Multiplexer Mode




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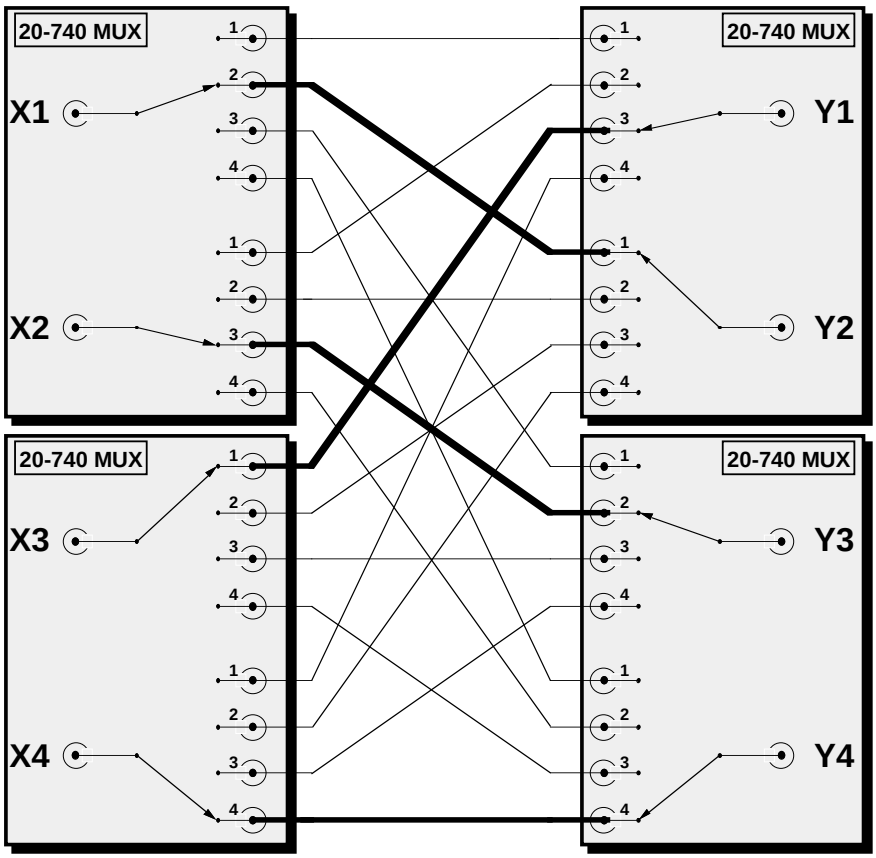
## 4.3 Large Matrix (Multiple Channel)

A matrix requiring more than one crosspoint to be set at any one time (“a multi-channel matrix”) must be constructed using individual multiplexer modules. To retain good R.F. performance all signal paths must be uninterrupted, i.e. no T-junctions. One technique is to use a multiplexer on each input signal and one demultiplexer at each output signal, this is illustrated in fig 4.4. Here a full 4 x 4 matrix has been constructed using four 20-740 modules, up to four crosspoints may be set simultaneously. Larger matrices may easily be built using the same technique. All module to module connections are via direct coax interconnection cables.

Matrices requiring more than one channel but not the maximum number (e.g. an 8x8 matrix with 2 channel capability) may be constructed using a mix of the single channel and full matrix techniques outlined here and in section 4.2. For further help please contact Pickering.

If a full crosspoint non-blocking matrix is required then look at out 20-750 range of 1GHz matrix modules.

> Pickering can design, construct and fully test complex matrix switching networks to your specifications, please contact factory for further details.




**Selected Crosspoints:**
**X1, Y2; X2, Y3; X3, Y1; X4, Y4**

**Fig 4.4 Full 4 x 4 Matrix (4 channel)**

Using 4 x 20-740 modules configured in dual 8 to 1 Multiplexer Mode (only the first 4 poles of each multiplexer are used)




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# Section 5
# Self Test

## 5.1 Self-Test Function

Self-Test is invoked at power on and may also be operated under software (*TST?) or via a recessed push button. Self-Test pass is indicated on a front panel LED with a full pass/fail description available using the DIAGNOSTIC? command.

Self-Test comprises 2 levels, see Fig 5.1:-

1. **Logic Test**: Checks all logic including on-board microprocessor, relay drivers etc.
2. **Relay Coil Test**: All reed relay coils are checked for continuity.

Note: **A spare relay** is mounted onto the relay circuit board for fast repair, additional relays are available from Pickering Interfaces.

## 5.2 Self-Test Operation

If self test is run under software control it will firstly **clear the whole multiplexer** (Manual Test will only function when the module is in a clear state).

When the selftest has finished the multiplexer will be returned to an all clear state (i.e. the previous state will not be remembered!).

## 5.3 Detailed Self Test Reporting using the DIAGNOSTIC? Query

The DIAGNOSTIC? query will give an ASCII string detailing any self test failures. These will include:-

Logic: µP, RAM, EPROM, Relay Drivers, Invalid Link Settings etc.

Relay Coils: Open Circuit Coil.

This string is not intended to be processed by the user's software, it is suitable for copying directly onto the screen of your control computer. This information will then indicate maintenance required (please contact Pickering for further help).

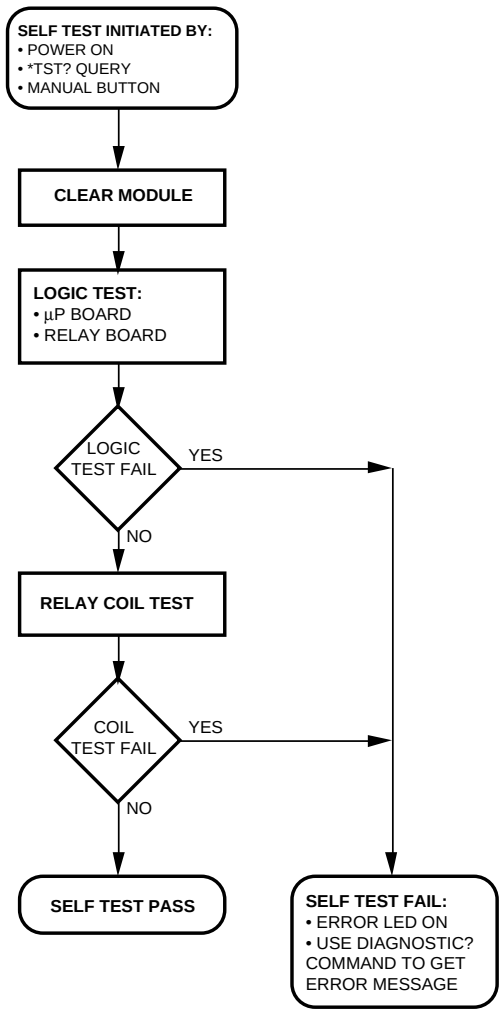



**Fig 5.1 Self-Test: Basic Flow Diagram**




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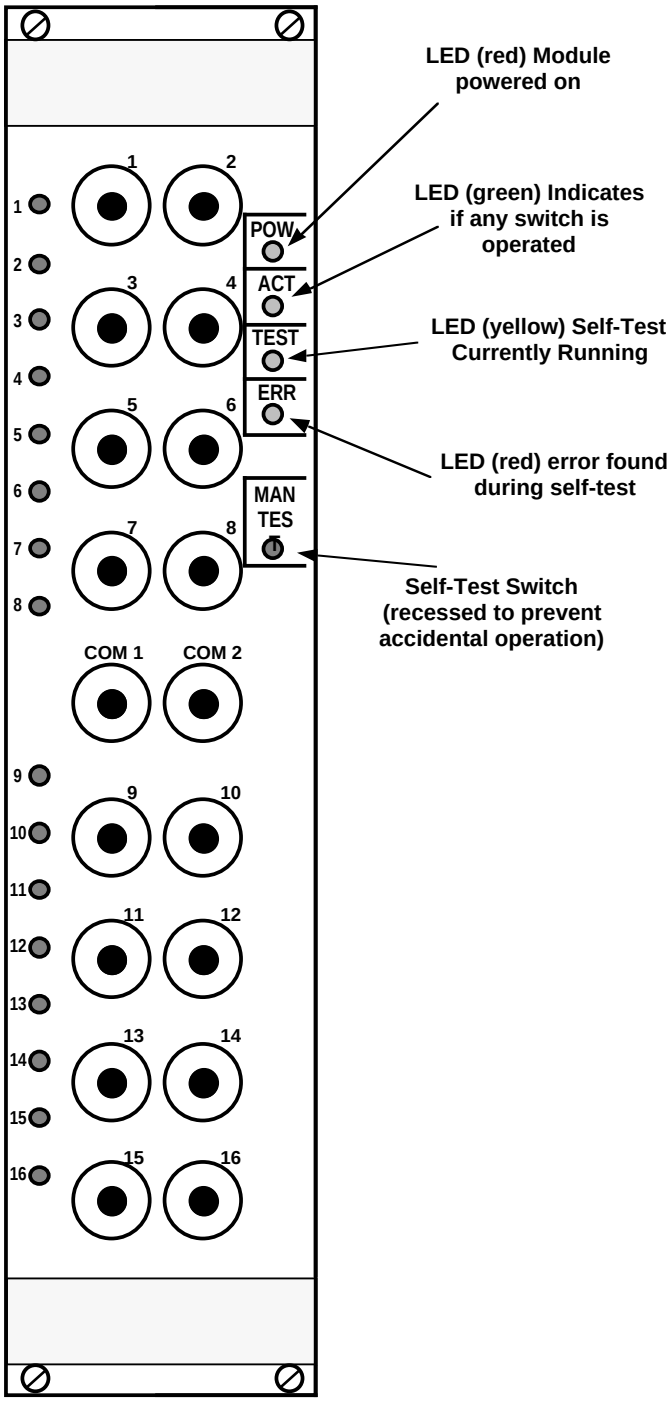



**Fig 6.1 20-740-501 Front Panel, BNC Connector Version**



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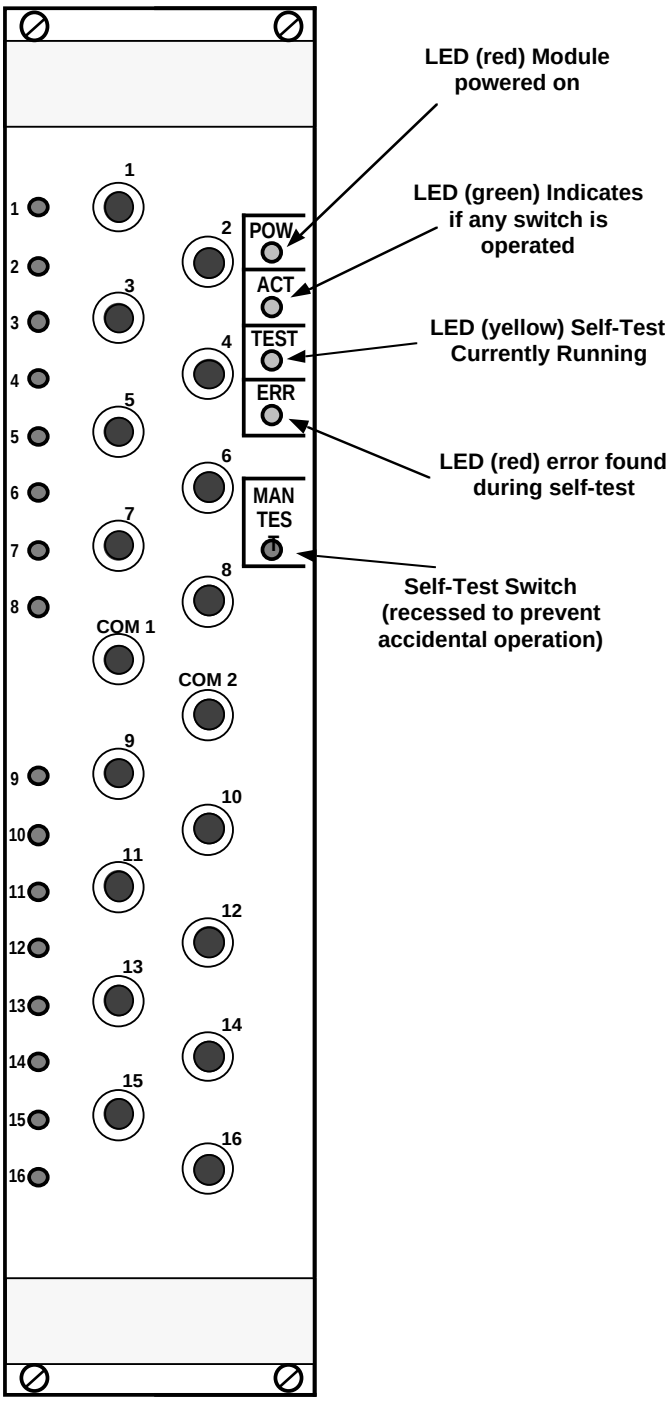



Fig 6.2 20-740-511 Front Panel, SMA Connector Version




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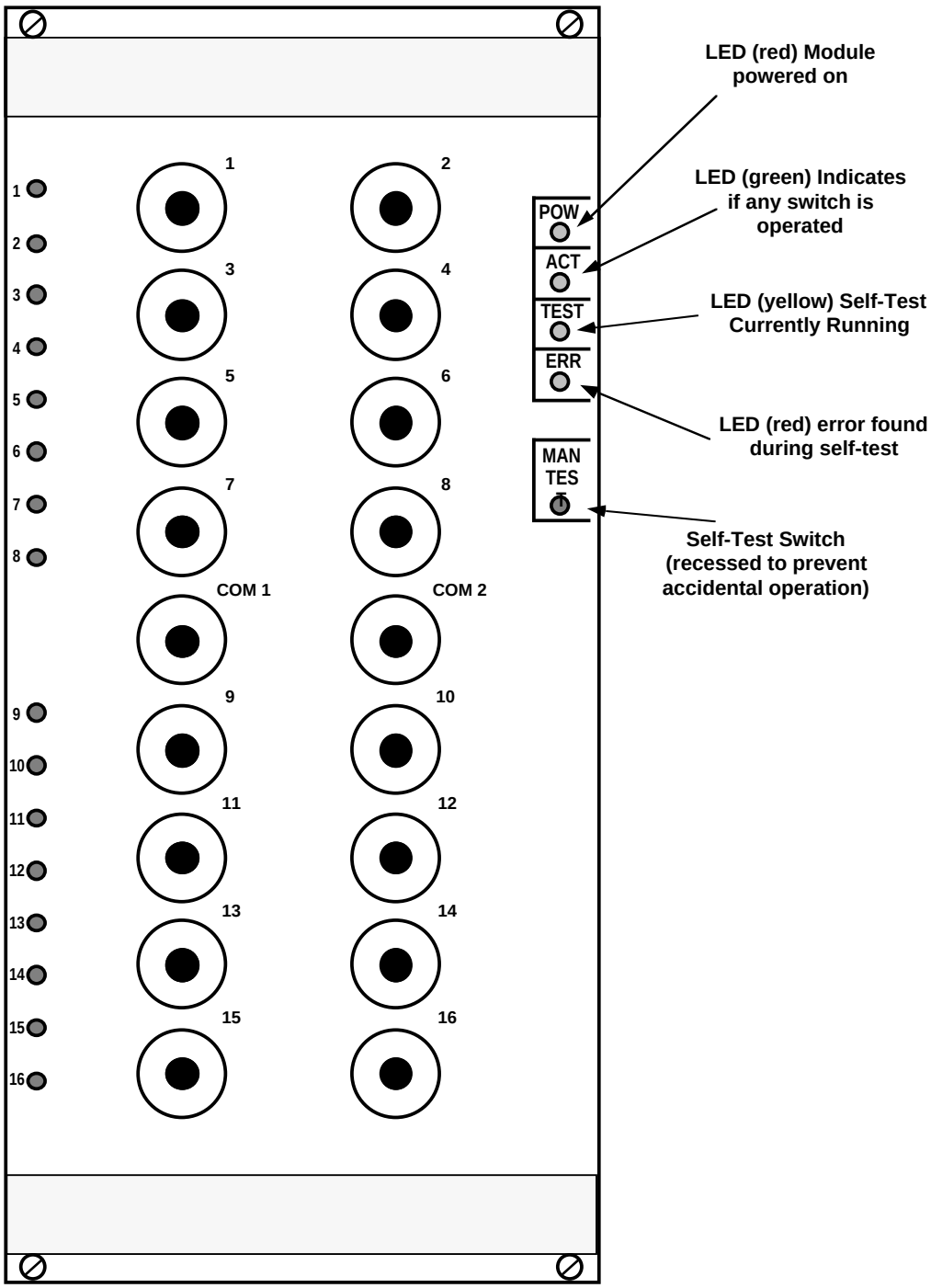



Fig 6.3 20-740-521 Front Panel, Type N Connector Version



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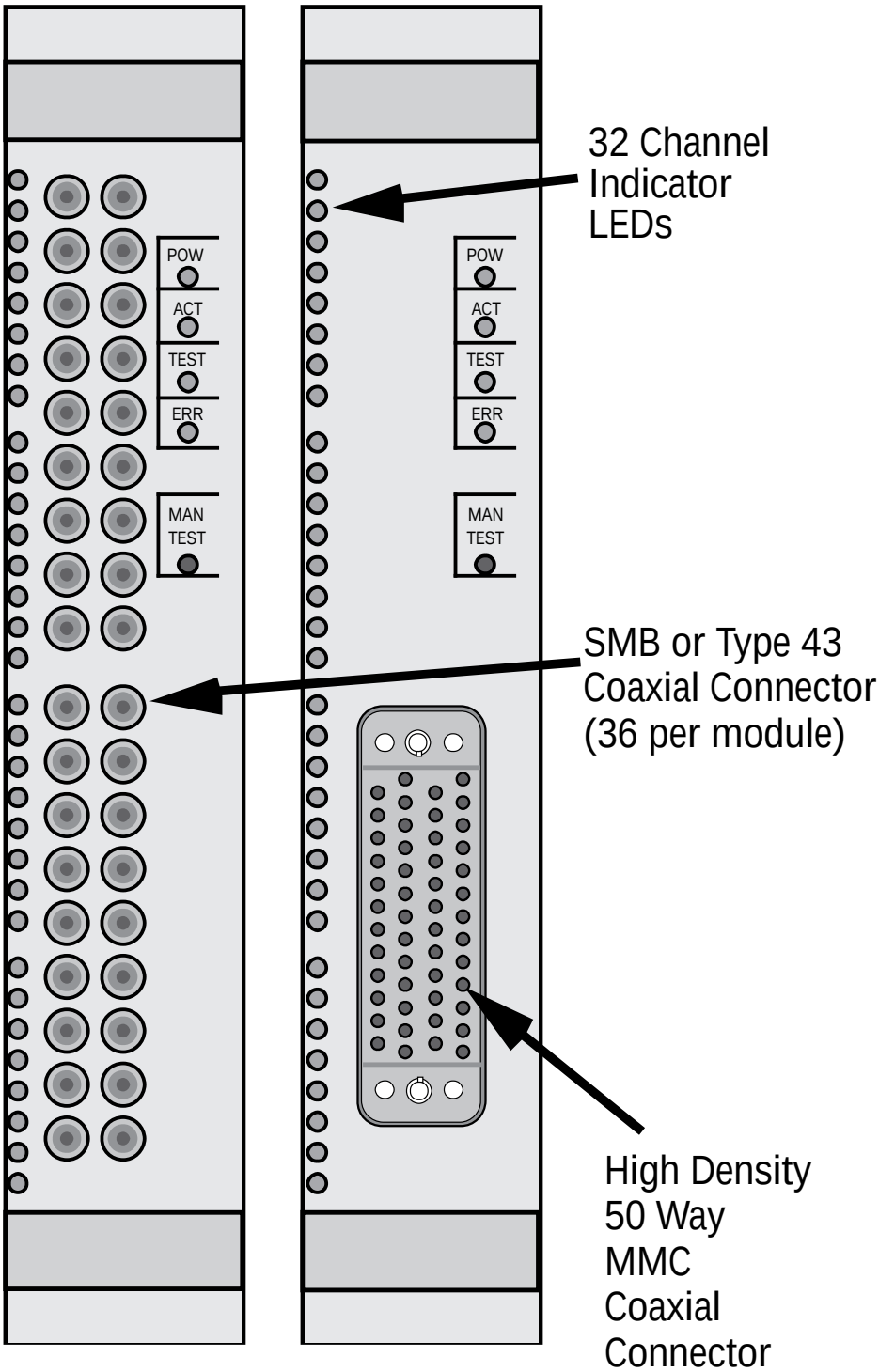



**Fig 6.4 20-745-501/521 Front Panel, Type N Connector Version**




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# Section 7
# Reconfiguring Driver Card to Your Application

Your multiplexer driver card will leave the factory preconfigured, so take **great care** if you wish to change any of the settings. If in doubt contact Pickering for further details.

## 7.1 Universal Driver Card: Configuration Links

Configuration switches are provided on the driver board at position SW2, on the top edge of the PCB, adjacent to the 10 way address selection lever switch. The five switches, see Fig 7.1, are used as follows:-

Relay Settling Time

There are four choices of relay settling time, this is to allow for different applications and relay types.

| 1 | 2 | Relay Settling Time † |
|---|---|---|
| 0 | 0 | 4.0ms - *Default Setting* |
| 0 | 1 | 1.0ms |
| 1 | 0 | 0.5ms |
| 1 | 1 | 0.0ms |

† The "Settled" line is triggered after this delay

**20-740 Configuration Links**

| 3 | 4 | 5 | Function |
|---|---|---|---|
| – | 0 | – | Dual 8 to 1 Multiplexer - *Default Setting* |
| – | 1 | – | Single 16 to 1 Multiplexer |

**20-745 Configuration Links**

| 3 | 4 | 5 | Function |
|---|---|---|---|
| – | 0 | 0 | Quad 8 to 1 Multiplexer - *Default Setting* |
| – | 0 | 1 | Dual 16 to 1 Multiplexer |
| – | 1 | 0 | Single 32 to 1 Multiplexer |

## 7.2 Repeating Self Test with Burn In - *Factory Use Only*

A burn-in test facility is built into the module, this is initiated by pressing the selftest button until the Active LED goes on (around 5 seconds). Here the module will run the usual full selftest together with some additional isolation tests followed by 15 minutes of "switch rattling", the test procedure will then be repeated. This process may only be stopped by powering off or holding the manual test button in for several seconds.

This feature is for factory use where switching modules are burned-in prior to undergoing final test.

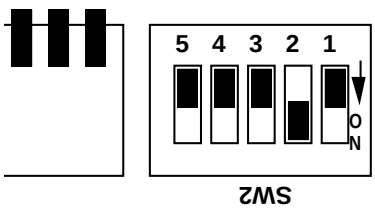



**Fig 7.1 Driver Card Configuration Links on SW2**



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# Section 8
# Circuit Diagrams

## Model 20-740 Relay PCB Assembly

PCB Layout
RF Circuit Diagram
Parts List

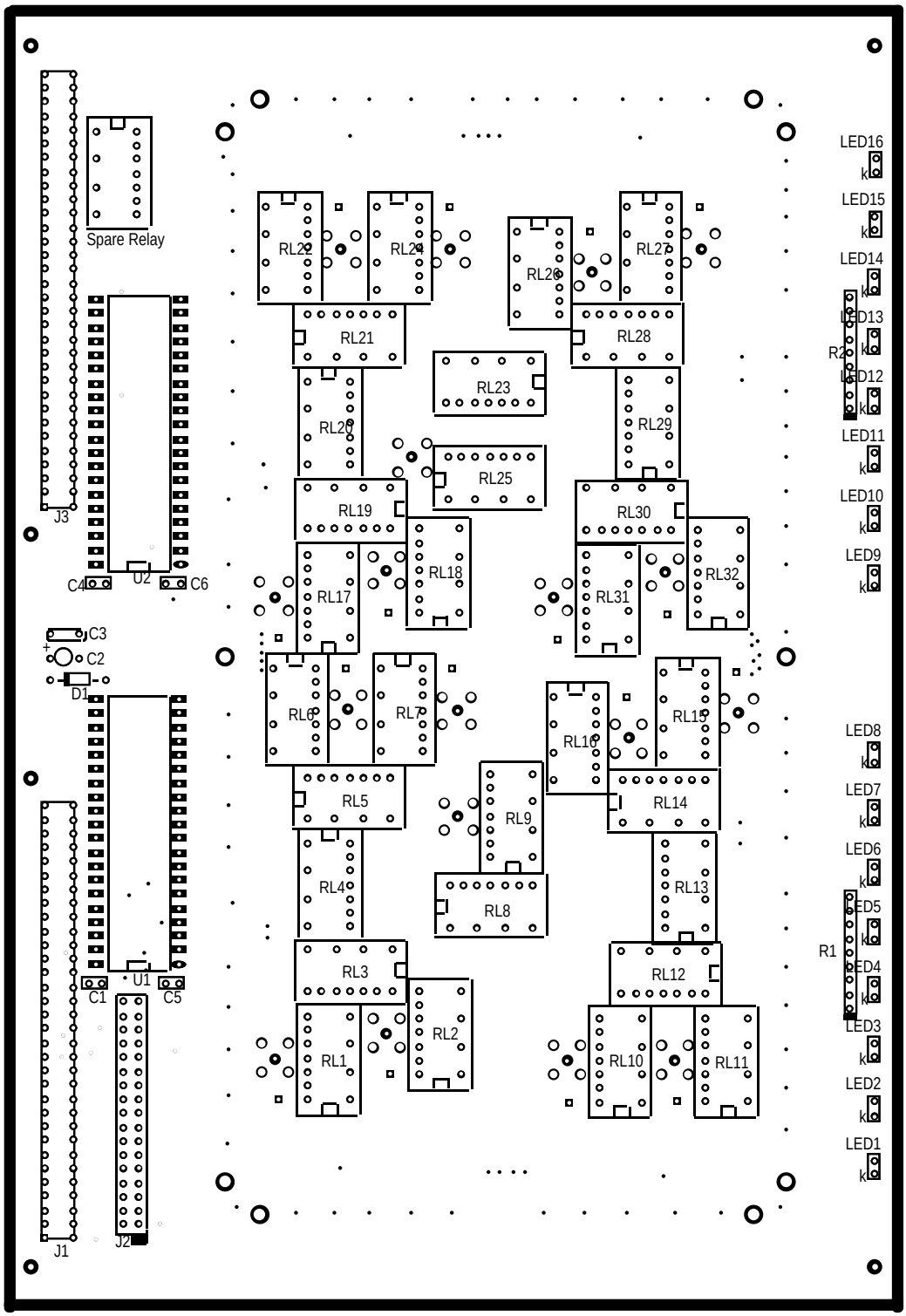



**Fig 8.1 20-745 Relay PCB Layout**




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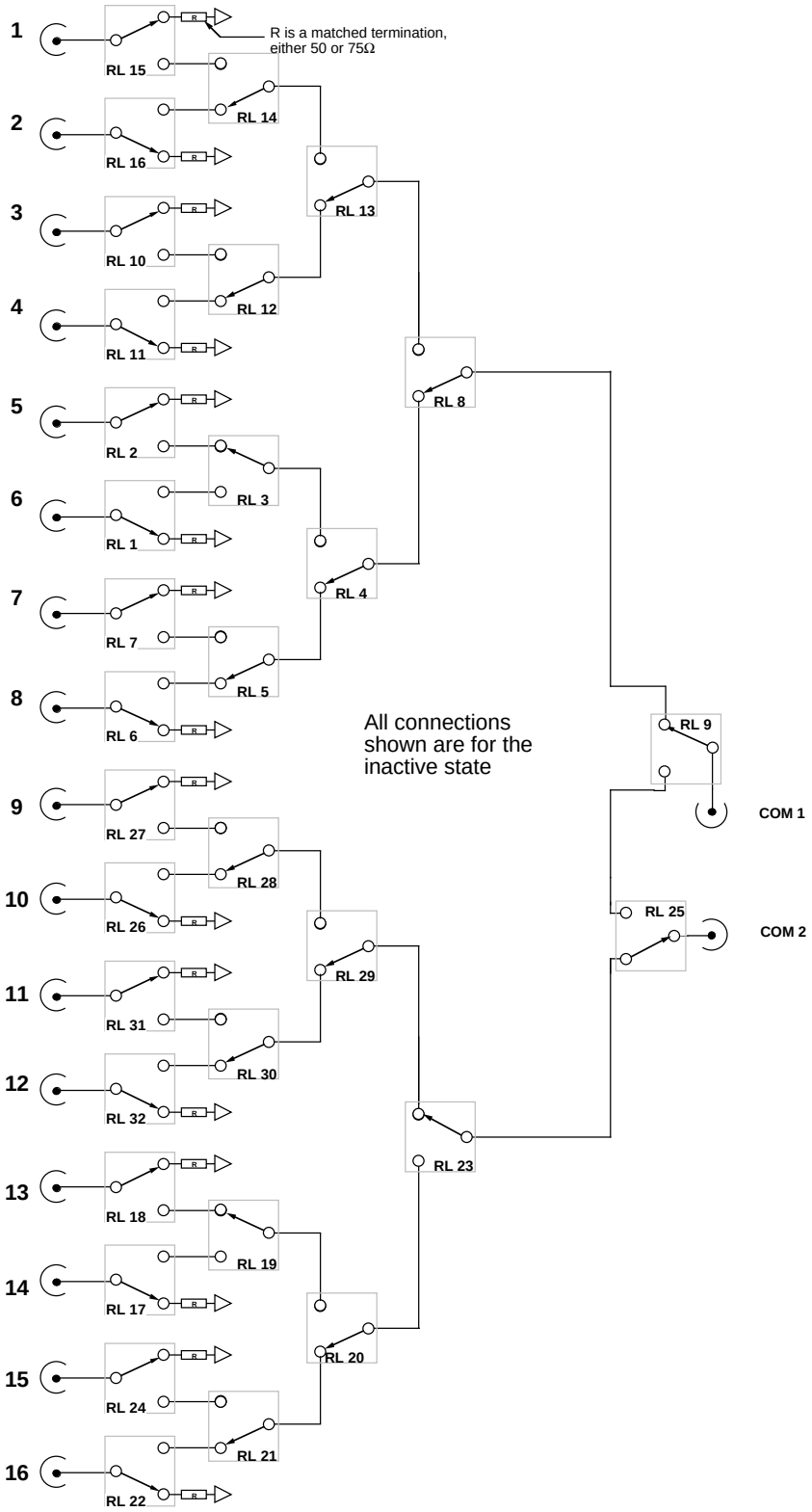



**Fig 8.2 20-740 RF Relay Circuit**




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**Parts List for GPIB79 Rev0 Relay PCB Assembly**

| PCB Location | PIL Part Number | Part Description |
|---|---|---|
| J1, J3 | C/CN/001 | Connector DIN 41612 64 Way A/C |
| J2 | C/CN/999 | Header 34 pin 2 row |
| D1 | C/SC/010 | Transorb 5V |
| LED1..LED16 | C/SC/004 | Led T1 Red high eff |
| C1, C4..C6 | C/CP/001 | Cap Cer 10nF 63V |
| C2 | C/CP/003 | Cap Tant 22uF 16V |
| C3 | C/CP/004 | Cap Cer 100nF 50V |
| R1, R2 | C/RS/028 | 1K0 Res n/w 9 |
| R3..R18 | C/RS/021 | 51ohms SMT 16 |
| RL1..RL32 | C/RL/046 | G5Y-154P RF Relay |
| Spare Relay | C/RL/046 | G5Y-154P RF Relay |
| U1..U3 | C/IC/026 | UCN-5818A 32 bit driver |
| | C/PC/079 | PCB 6U 4 Layer |



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## Model 20-745 Relay PCB Assembly

PCB Layout (Top and Bottom)
RF Circuit Diagram (Single, Dual and Quad Configurations)
Configuration Link Details
Parts List

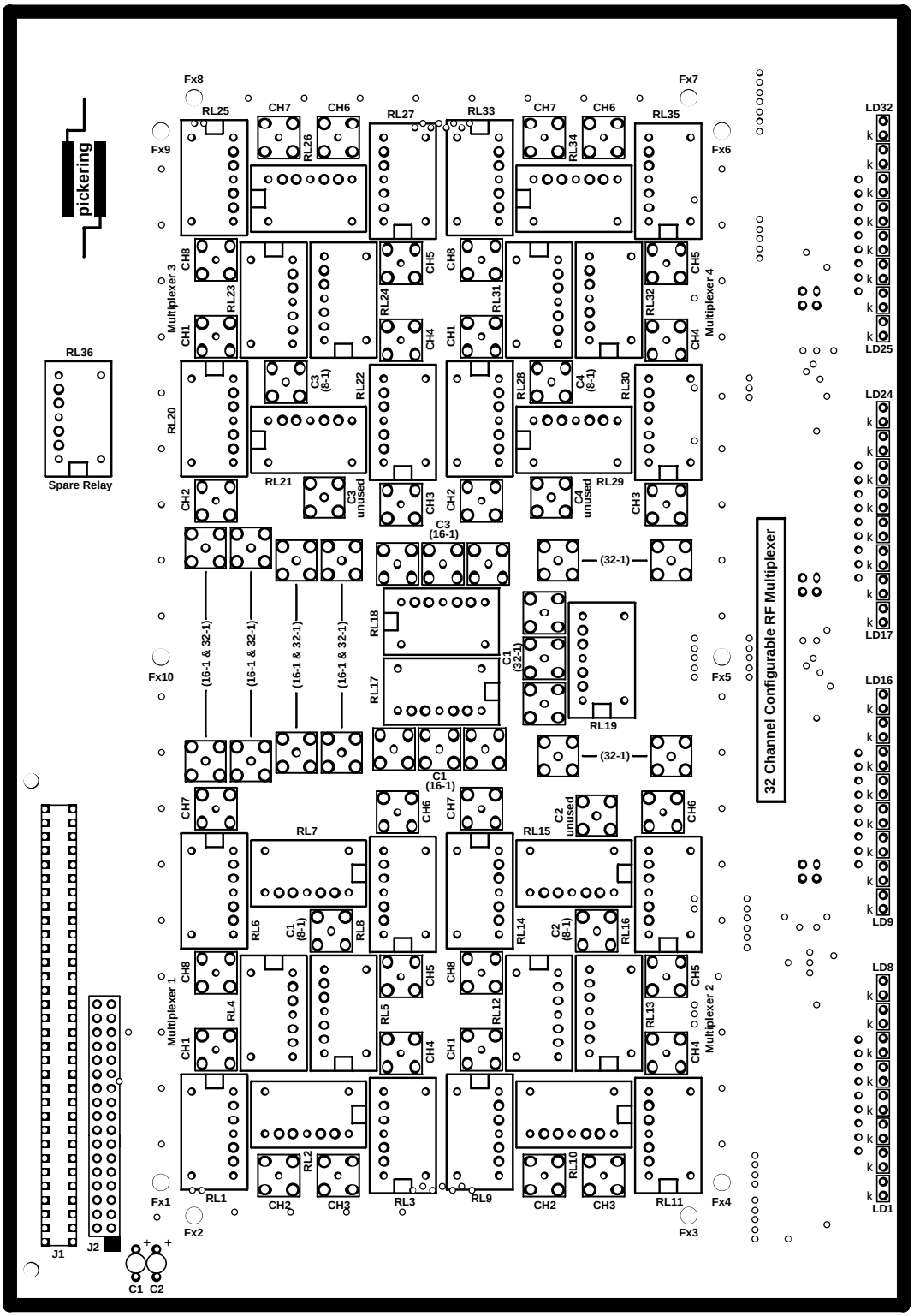



Fig 8.3 20-745 Relay PCB Layout (Top)




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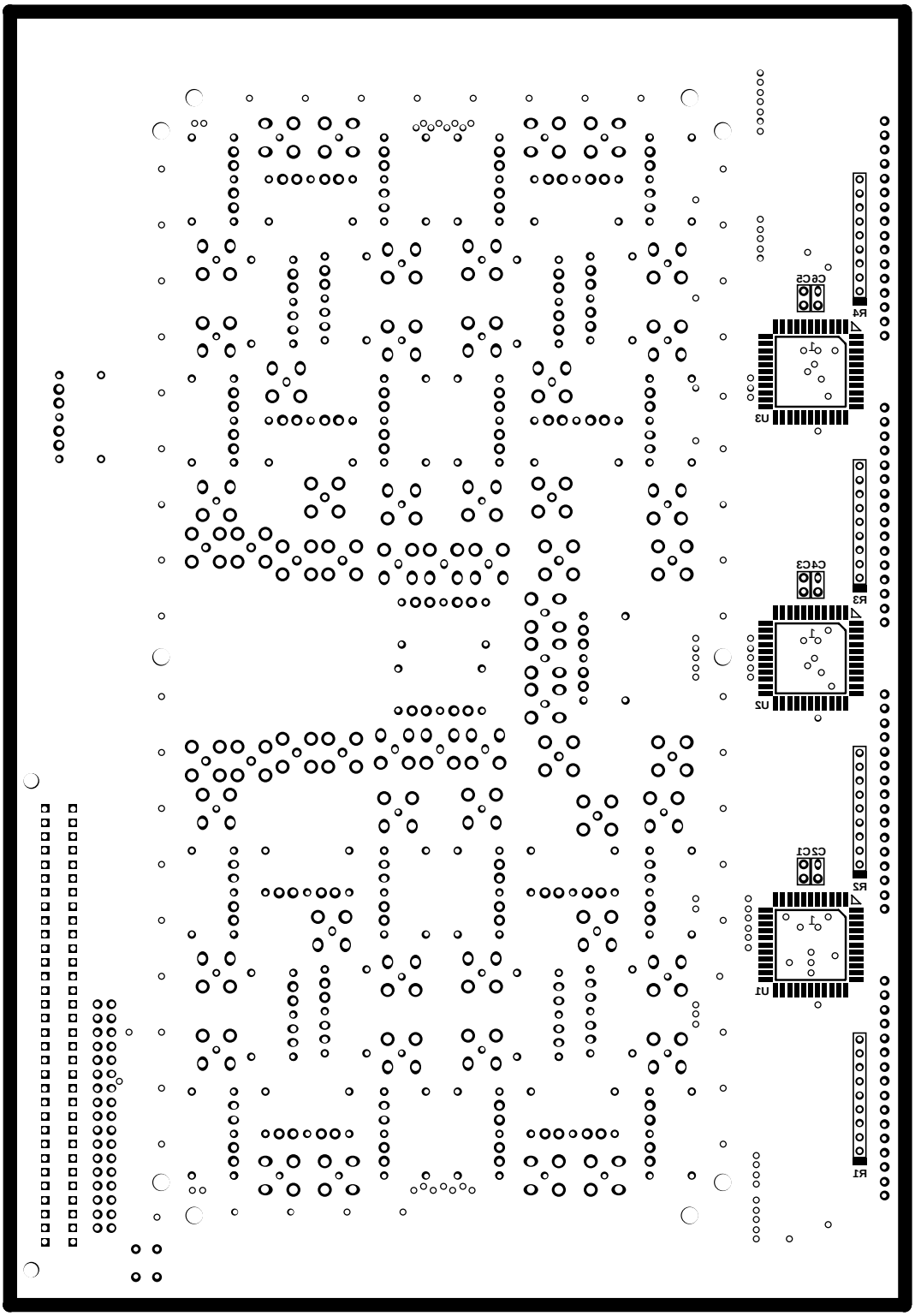


Fig 8.4 20-745 Relay PCB Layout (Bottom)



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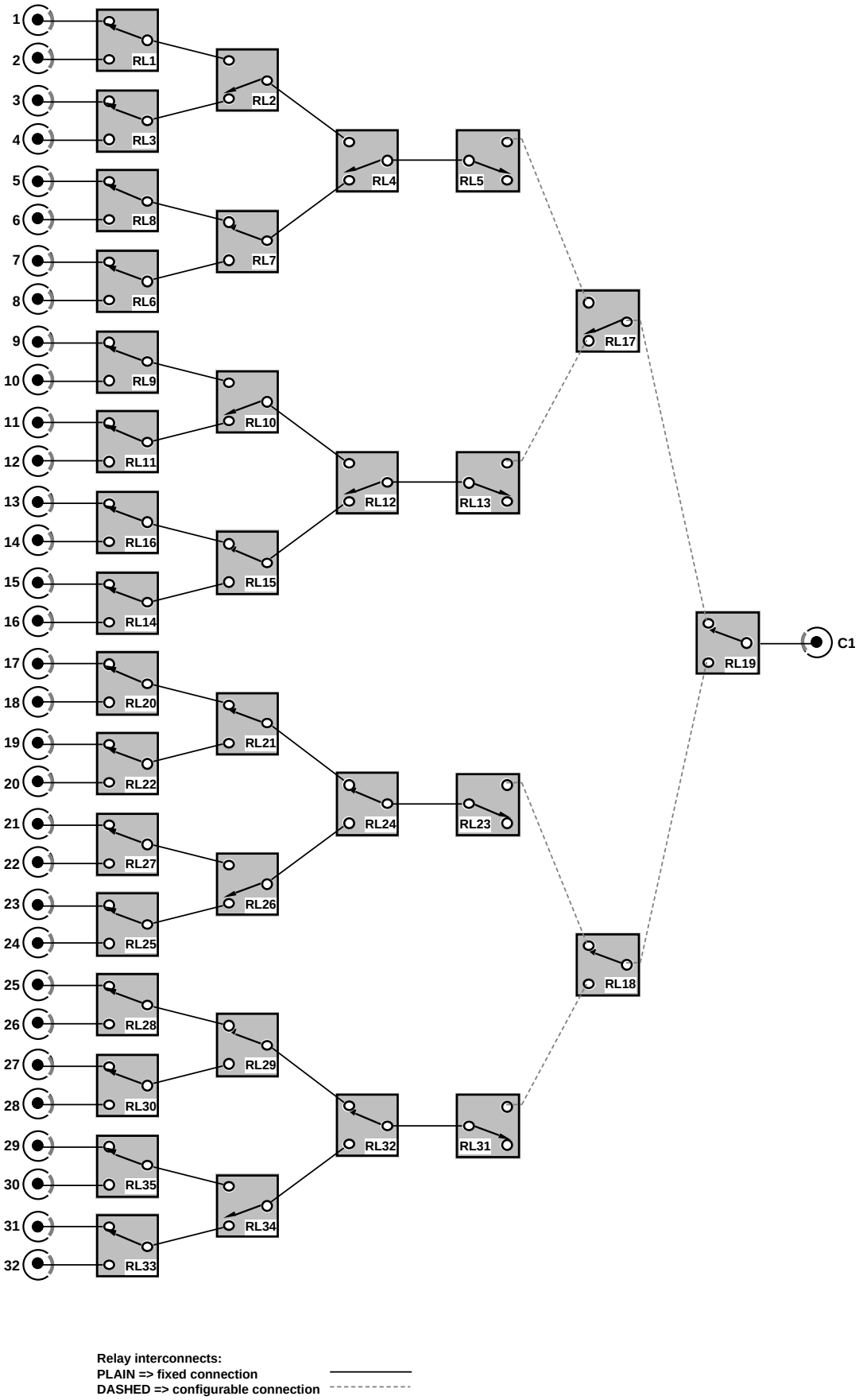



Fig 8.5 20-745 RF Relay Circuit (Single 32 Channel Configuration)




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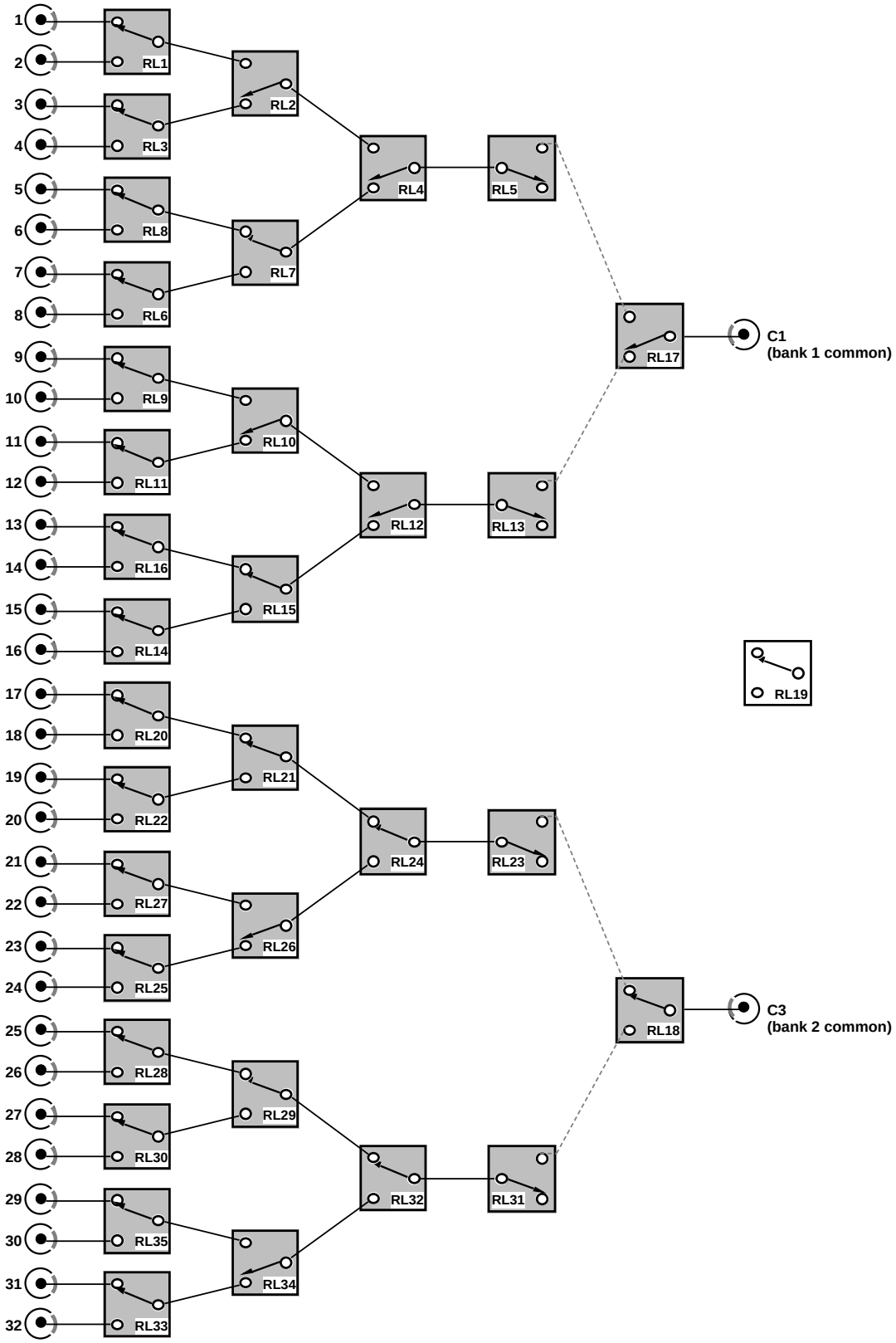
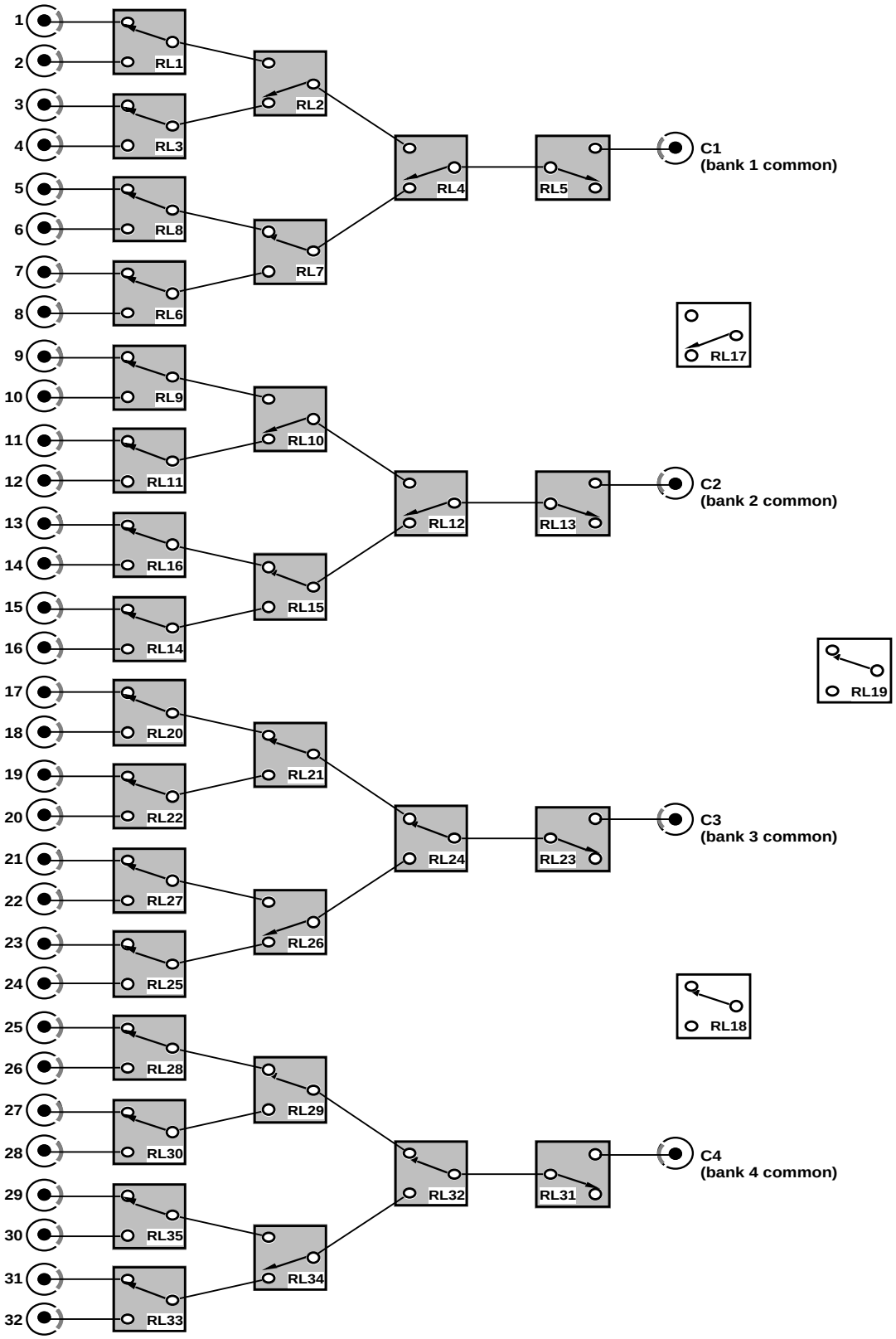



**Fig 8.6 20-745 RF Relay Circuit (Dual 16 Channel Configuration)**



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**Unused relays:**
**RL17, RL18, RL19**

**Fig 8.7 20-745 RF Relay Circuit (Quad 8 Channel Configuration)**




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Fig 8.8 20-745 RF Relay Circuit Hardware Configuration Link Positions



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**GPIB135r0 parts-list (50Ω version)**

| PCB location | PIL part number | Part description | Qty |
|---|---|---|---|
| C1 | C/CP/003 | Cap Tant 22uF 16V | 1 |
| C2 | omit | | |
| C1...C6 | C/CP/001 | Cap Cer 10nF 63V | 6 |
| J1 | C/CN/001 | DIN 41612C r/a 64 way plg | 1 |
| J2 | C/CN/124 | 34 way mini dip transition (IDC) | 1 |
| CH1...CH8 | C/CN/118 | dielectric feedthru | 38 |
| COM1...COM4 | C/CN/114 | SMB pcb receptacle | 16 |
| | C/CN/116 | SMB r/a plug | 10 |
| LD1...LD32 | C/SC/004 | LED red high efficiency | 32 |
| PCB | C/PC/135 | 32 chan config mux | 1 |
| R1...R4 | C/RS/028 | 1kΩ res n/w 9-pin SIP | 4 |
| RL1...RL36 | C/RL/046 | RK1-12V | 36 |
| U1...U3 | C/IC/035 | UCN5818EPF | 3 |
| RF cable | C/WR/041 | RG174A/U type 75Ω coax | - |

**GPIB135r0 parts-list (75Ω version)**

| PCB location | PIL part number | Part description | Qty |
|---|---|---|---|
| C1 | C/CP/003 | Cap Tant 22uF 16V | 1 |
| C2 | omit | | |
| C1...C6 | C/CP/001 | Cap Cer 10nF 63V | 6 |
| J1 | C/CN/001 | DIN 41612C r/a 64 way plg | 1 |
| J2 | C/CN/124 | 34 way mini dip transition (IDC) | 1 |
| CH1...CH8 | C/CN/118 | dielectric feedthru | 38 |
| COM1...COM4 | C/CN/243 | SMZ pcb receptacle | 16 |
| | C/CN/253 | SMZ r/a plug | 10 |
| LD1...LD32 | C/SC/004 | LED red high efficiency | 32 |
| PCB | C/PC/135 | 32 chan config mux | 1 |
| R1...R4 | C/RS/028 | 1kΩ res n/w 9-pin SIP | 4 |
| RL1...RL36 | C/RL/046 | RK1-12V | 36 |
| U1...U3 | C/IC/035 | UCN5818EPF | 3 |
| RF cable | C/WR/046 | RG179B/U type 75Ω coax | - |


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**Environmental**

Operating Temperature 0°C to 50°C.
Storage Temperature -20°C to 75°C.
Humidity 95% non condensing.

**Weight Dimensions and Power Requirements**

| | | SMB/BNC | Type N |
|---|---|---|---|
| **Approx. Weight/g** | | 800 | 1100 |
| **Dimensions/mm** † | | | |
| Front Panel Width | | 60.5 | 91 |
| Height | | 268 | 268 |
| Overall Length | | 189 | 189 |
| **Power /Current Consumption** | | | |
| **Maximum** /mA | 5V | 250 | 250 |
| | 12V | 100 | 100 |
| **Minimum** | 5V | 150 | 150 |
| | 12V | 0 | 0 |

† Approx. dimensions. Standard 160mm, 6U, Eurocard, as specified in DIN 41494.

**Voltage Supplies**

Logic Supply 5Vdc ±5%.
Relay Supply 12Vdc ±10%

**Current Firmware Revisions**

20-740: 20-740 V2.4
20-745: 20-740 V2.0



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