1260 VXI SWITCHING CARD

1260-145 MULTIPLEXER PLUG-IN

PUBLICATION NO. 980824-145

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1. Product serial number
2. Product model number
3. Your company and contact information

You may contact your customer service advisor by:

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RETURN of PRODUCT

Authorization is required from Racal Instruments before you send us your product for service or calibration. Call your nearest Racal Instruments support facility. A list is located on the last page of this manual. If you are unsure where to call, contact Racal Instruments, Inc. Customer Support Department in Irvine, California, USA at 1-800-722-3262 or 1-949-859-8999 or via fax at 1-949-859-7139. We can be reached at: helpdesk@racalinstruments.com.

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FOR YOUR SAFETY

Before undertaking any troubleshooting, maintenance or exploratory procedure, read carefully the **WARNINGS** and **CAUTION** notices.

This equipment contains voltage hazardous to human life and safety, and is capable of inflicting personal injury.

If this instrument is to be powered from the AC line (mains) through an autotransformer, ensure the common connector is connected to the neutral (earth pole) of the power supply.

Before operating the unit, ensure the conductor (green wire) is connected to the ground (earth) conductor of the power outlet. Do not use a two-conductor extension cord or a three-prong/two-prong adapter. This will defeat the protective feature of the third conductor in the power cord.

Maintenance and calibration procedures sometimes call for operation of the unit with power applied and protective covers removed. Read the procedures and heed warnings to avoid “live” circuit points.

Before operating this instrument:

1. Ensure the instrument is configured to operate on the voltage at the power source. See Installation Section.

2. Ensure the proper fuse is in place for the power source to operate.

3. Ensure all other devices connected to or in proximity to this instrument are properly grounded or connected to the protective third-wire earth ground.

If the instrument:

- fails to operate satisfactorily
- shows visible damage
- has been stored under unfavorable conditions
- has sustained stress

Do not operate until performance is checked by qualified personnel.

Racal Instruments

EC Declaration of Conformity

We

Racal Instruments Inc.
4 Goodyear Street
Irvine, CA 92718

declare under sole responsibility that the

1260-145A thru 1260-145G Multi-Configurable Matrix Switch
407643-001 thru 407643-007

conform to the following Product Specifications:

Safety: EN 61010-1

EMC: EN50081-1
CISPR 11:1990/EN 55011 (1991): Group 1 Class A
IEC 801-2:1991/EN 50082-1 (1992): 4 kV CD, 8 kV AD
IEC 801-3:1984/EN 50082-1 (1992): 3 V/m, 27-500 MHz
IEC 801-4:1988/EN 50082-1 (1992): 1 kV

Supplementary Information:

The above specifications are met when the product is installed in a Racal Instruments Adapt-a-Switch Carrier with faceplates installed over all unused slots, as applicable. The carrier is installed in a certified mainframe.

The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC.

Irvine, CA, August 17, 1999

Quality Manager

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Chapter 1

SPECIFICATIONS

Introduction – 1260-145A (9 – 4x4's)

The 1260-145A is a plug-in matrix switch module developed for the Racal Instruments 1260-100 Adapt-a-Switch Carrier. This switch provides nine independent 4x4 matrices with a maximum switching voltage of 125VAC @ 0.3A or 30 VDC @ 1A.

The 1260-145A includes the following features:

- Standard Adapt-a-Switch™ plug-in design, providing for ease of replacement

- Data-Driven embedded descriptor, allowing immediate use with any Option-01T switch controller, regardless of firmware revision level.

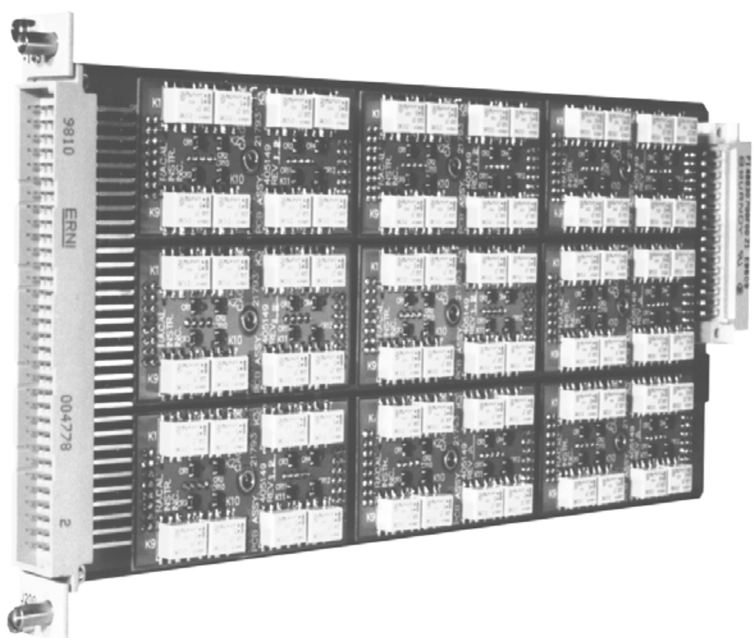

Figure 1-1, The 1260-145 Series

Electrical Specifications – 1260-145A

Chan. Input Voltage	60 VDC / 125 VAC maximum
Chan. Output Current	1 A maximum
Chan. Output Power	30 W / 37.5 VA maximum
Path Resistance	< 1.8 Ohms (HI + LOW path)
Contact Bounce Time	3 ms maximum
Contact Thermal EMF	4 μV maximum
Switch Contact Lifetime	50 Million Cycles (low-level) 100,000 Cycles (maximum rating)
Available I/O Channels	144 (dual wire)
Capacitance	
A (HI) to B (LOW)	120 pF maximum
Chan. to Chassis	415 pF maximum
Bandwidth (Worst Path Performance; Typical Unit)	42 MHz (-3 dB) minimum
Insertion Loss (Worst Path Performance; Typical Unit)	1.0 dB @ 10 MHz maximum 0.2 dB @ 1 MHz maximum 0.1 dB @ 300 kHz maximum
Isolation (Worst Path Performance; Typical Unit)	15 dB @ 42 MHz minimum 43 dB @ 10 MHz minimum 62 dB @ 1 MHz minimum 76 dB @ 300 kHz minimum
Crosstalk (Worst Path Performance; Typical Unit)	-9 dB @ 42 MHz maximum -49 dB @ 10 MHz maximum -69 dB @ 1 MHz maximum -81 dB @ 300 kHz maximum
Power Requirements	+5 VDC
quiescent	0.1 A maximum
each relay closure	0.02 A maximum
Mean Time Between Failures (MTBF)	33,784 Hours (MIL-HDBK-217FN2) 50,714 Hours (Telcordia / Bellcore 6)
Mean Time to Repair	< 5 minutes (MTTR)

Mechanical Specifications – 1260-145A

Shock	30g, 11 ms, ½ sine wave
Vibration	0.013 in. P-P, 5-55 Hz
Bench Handling	4 in., 45°
Cooling	See 1260-100 cooling data
Temperature	
Operating	0°C to +55°C
Non-operating	-40°C to +75°C
Relative Humidity	85% + 5% non-condensing at < 30°C
Altitude	
Operating	10,000 feet
Non-operating	15,000 feet
Weight	9 oz. (0.32 kg.)

Power Dissipation – 1260-145A

The cooling of the Adapt-a-Switch carrier is dependent upon the chassis into which it is installed. The carrier can nominally dissipate approximately 100W. Even with all channels driven to maximum outputs, up to six 1260-145A plug-ins may be used together in a 1260-100 without exceeding the maximum allowable power dissipation of the carrier.

If the 1260-145A will be used in conjunction with other cards, the dissipation should be computed and summed with the total worst-case dissipation of the remaining modules.

For example, a 1260-145A module would dissipate the following energy:

Quiescent power dissipation = 0.5W maximum

Channel dissipation =
[(# channels energized) * (relay coil dissipation)]

Total Power Dissipation = Quiescent + Channel

Assuming all relays on the card are enabled (worse-case situation) the channel path resistances will be in parallel and therefore insignificant as a source of heat. The largest contributor of thermal energy will therefore derive from the relay coils.

Total power dissipation = [(144) * (0.100)] + [0.5] = 15W

This is acceptable power dissipation for an individual plug-in module. If five additional modules are likewise loaded, then the overall carrier dissipation is approximately 90W, which is within the cooling available in most commercial VXIbus chassis. Apart from the thermal issues, however, it is important to remember that a fully enabled 1260-145A card would draw over 3A of current from the +5V supply. If this is multiplied by six for the remaining slots, a load of 18A would burden the +5V supply, exceeding the specifications for the 1260-100 carrier. In reality, the worse-case situation is not likely, since the 1260-145A is a matrix switch where typically only one relay is engaged at a time and the power dissipation falls considerably below that calculated in the example above. For practical purposes, as the calculations can illustrate for normal operation, the 1260-145A contributes a negligible amount of thermal load on a chassis.

Introduction – 1260-145B (3 – 4x12's)

The 1260-145B is a plug-in matrix switch module developed for the Racal Instruments 1260-100 Adapt-a-Switch Carrier. This switch provides three independent 4x12 matrices with a maximum switching voltage of 125VAC @ 0.3A or 30 VDC @ 1A.

The 1260-145B includes the following features:

- Standard Adapt-a-Switch™ plug-in design, providing for ease of replacement
- Data-Driven embedded descriptor, allowing immediate use with any Option-01T switch controller, regardless of firmware revision level.

Electrical Specifications – 1260-145B

Chan. Input Voltage	60 VDC / 125 VAC maximum
Chan. Output Current	1 A maximum
Chan. Output Power	30 W / 37.5 VA maximum
Path Resistance	< 1.4 Ohms (HI + LOW path)
Contact Bounce Time	3 ms maximum
Contact Thermal EMF	4 μV maximum
Switch Contact Lifetime	50 Million Cycles (low-level) 100,000 Cycles (maximum rating)
Available I/O Channels	144 (dual wire)
Capacitance A (HI) to B (LOW) Chan. to Chassis	 135 pF maximum 500 pF maximum
Bandwidth (Worst Path Performance; Typical Unit)	31 MHz (-3 dB) minimum
Insertion Loss (Worst Path Performance; Typical Unit)	0.5 dB @ 10 MHz maximum 0.1 dB @ 1 MHz maximum 0.1 dB @ 300 kHz maximum
Isolation (Worst Path Performance; Typical Unit)	22 dB @ 31 MHz minimum 52 dB @ 10 MHz minimum 68 dB @ 1 MHz minimum 75 dB @ 300 kHz minimum
Crosstalk (Worst Path Performance; Typical Unit)	-16 dB @ 31 MHz maximum -49 dB @ 10 MHz maximum -70 dB @ 1 MHz maximum -72 dB @ 300 kHz maximum
Power Requirements quiescent each relay closure	+5 VDC 0.1 A maximum 0.02 A maximum
Mean Time Between Failures (MTBF)	33,773 Hours (MIL-HDBK-217FN2) 50,687 Hours (Telcordia / Bellcore 6)
Mean Time to Repair	< 5 minutes (MTTR)

Mechanical Specifications – 1260-145B

Shock	30g, 11 ms, ½ sine wave
Vibration	0.013 in. P-P, 5-55 Hz
Bench Handling	4 in., 45°
Cooling	See 1260-100 cooling data
Temperature	
Operating	0°C to +55°C
Non-operating	-40°C to +75°C
Relative Humidity	85% + 5% non-condensing at < 30°C
Altitude	
Operating	10,000 feet
Non-operating	15,000 feet
Weight	9 oz. (0.32 kg.)

Power Dissipation – 1260-145B

The cooling of the Adapt-a-Switch carrier is dependent upon the chassis into which it is installed. The carrier can nominally dissipate approximately 100W. Even with all channels driven to maximum outputs, up to six 1260-145B plug-ins may be used together in a 1260-100 without exceeding the maximum allowable power dissipation of the carrier.

If the 1260-145B will be used in conjunction with other cards, the dissipation should be computed and summed with the total worst-case dissipation of the remaining modules.

For example, a 1260-145B module would dissipate the following energy:

Quiescent power dissipation = 0.5W maximum

Channel dissipation =
[(# channels energized) * (relay coil dissipation)]

Total Power Dissipation = Quiescent + Channel

Assuming all relays on the card are enabled (worse-case situation) the channel path resistances will be in parallel and therefore insignificant as a source of heat. The largest contributor of thermal energy will therefore derive from the relay coils.

Total power dissipation = [(144) * (0.100)] + [0.5] = 15W

This is acceptable power dissipation for an individual plug-in

module. If five additional modules are likewise loaded, then the overall carrier dissipation is approximately 90W, which is within the cooling available in most commercial VXIbus chassis. Apart from the thermal issues, however, it is important to remember that a fully enabled 1260-145B card would draw over 3A of current from the +5V supply. If this is multiplied by six for the remaining slots, a load of 18A would burden the +5V supply, exceeding the specifications for the 1260-100 carrier. In reality, the worse-case situation is not likely, since the 1260-145B is a matrix switch where typically only one relay is engaged at a time and the power dissipation falls considerably below that calculated in the example above. For practical purposes, as the calculations can illustrate for normal operation, the 1260-145B contributes a negligible amount of thermal load on a chassis.

Introduction – 1260-145C (2 – 4x16's)

The 1260-145C is a plug-in matrix switch module developed for the Racal Instruments 1260-100 Adapt-a-Switch Carrier. This switch provides two independent 4x16 matrices with a maximum switching voltage of 125VAC @ 0.3A or 30 VDC @ 1A.

The 1260-145C includes the following features:

- Standard Adapt-a-Switch™ plug-in design, providing for ease of replacement

- Data-Driven embedded descriptor, allowing immediate use with any Option-01T switch controller, regardless of firmware revision level.

Electrical Specifications – 1260-145C

Chan. Input Voltage	60 VDC / 125 VAC maximum
Chan. Output Current	1 A maximum
Chan. Output Power	30 W / 37.5 VA maximum
Path Resistance	< 1.6 Ohms (HI + LOW path)
Contact Bounce Time	3 ms maximum
Contact Thermal EMF	4 μV maximum
Switch Contact Lifetime	50 Million Cycles (low-level) 100,000 Cycles (maximum rating)
Available I/O Channels	128 (dual wire)
Capacitance A (HI) to B (LOW) Chan. to Chassis	 175 pF maximum 640 pF maximum
Bandwidth (Worst Path Performance; Typical Unit)	24 MHz (-3 dB) minimum
Insertion Loss (Worst Path Performance; Typical Unit)	0.8 dB @ 10 MHz maximum 0.1 dB @ 1 MHz maximum 0.1 dB @ 300 kHz maximum
Isolation (Worst Path Performance; Typical Unit)	37 dB @ 24 MHz minimum 48 dB @ 10 MHz minimum 67 dB @ 1 MHz minimum 77 dB @ 300 kHz minimum
Crosstalk (Worst Path Performance; Typical Unit)	-19 dB @ 24 MHz maximum -46 dB @ 10 MHz maximum -59 dB @ 1 MHz maximum -63 dB @ 300 kHz maximum
Power Requirements quiescent each relay closure	+5 VDC 0.1 A maximum 0.02 A maximum
Mean Time Between Failures (MTBF)	37,908 Hours (MIL-HDBK-217FN2) 56,705 Hours (Telcordia / Bellcore 6)
Mean Time to Repair	< 5 minutes (MTTR)

Mechanical Specifications – 1260-145C

Shock	30g, 11 ms, ½ sine wave
Vibration	0.013 in. P-P, 5-55 Hz
Bench Handling	4 in., 45°
Cooling	See 1260-100 cooling data
Temperature	
Operating	0°C to +55°C
Non-operating	-40°C to +75°C
Relative Humidity	85% + 5% non-condensing at < 30°C
Altitude	
Operating	10,000 feet
Non-operating	15,000 feet
Weight	9 oz. (0.32 kg.)

Power Dissipation – 1260-145C

The cooling of the Adapt-a-Switch carrier is dependent upon the chassis into which it is installed. The carrier can nominally dissipate approximately 100W. Even with all channels driven to maximum outputs, up to six 1260-145C plug-ins may be used together in a 1260-100 without exceeding the maximum allowable power dissipation of the carrier.

If the 1260-145C will be used in conjunction with other cards, the dissipation should be computed and summed with the total worst-case dissipation of the remaining modules.

For example, a 1260-145C module would dissipate the following energy:

Quiescent power dissipation = 0.5W maximum

Channel dissipation =
[(# channels energized) * (relay coil dissipation)]

Total Power Dissipation = Quiescent + Channel

Assuming all relays on the card are enabled (worse-case situation) the channel path resistances will be in parallel and therefore insignificant as a source of heat. The largest contributor of thermal energy will therefore derive from the relay coils.

Total power dissipation = [(128) * (0.100)] + [0.5] = 13.3W

This is acceptable power dissipation for an individual plug-in

module. If five additional modules are likewise loaded, then the overall carrier dissipation is approximately 80W, which is within the cooling available in most commercial VXIbus chassis. Apart from the thermal issues, however, it is important to remember that a fully enabled 1260-145C card would draw over 2.7A of current from the +5V supply. If this is multiplied by six for the remaining slots, a load of 16A would burden the +5V supply, exceeding the specifications for the 1260-100 carrier. In reality, the worse-case situation is not likely, since the 1260-145C is a matrix switch where typically only one relay is engaged at a time and the power dissipation falls considerably below that calculated in the example above. For practical purposes, as the calculations can illustrate for normal operation, the 1260-145C contributes a negligible amount of thermal load on a chassis.

Introduction – 1260-145D (1 – 4x36)

The 1260-145D is a plug-in matrix switch module developed for the Racal Instruments 1260-100 Adapt-a-Switch Carrier. This switch provides a 4x36 matrix with a maximum switching voltage of 125VAC @ 0.3A or 30 VDC @ 1A.

The 1260-145D includes the following features:

- Standard Adapt-a-Switch™ plug-in design, providing for ease of replacement
- Data-Driven embedded descriptor, allowing immediate use with any Option-01T switch controller, regardless of firmware revision level.

Electrical Specifications – 1260-145D

Chan. Input Voltage	60 VDC / 125 VAC maximum
Chan. Output Current	1 A maximum
Chan. Output Power	30 W / 37.5 VA maximum
Path Resistance	< 1.6 Ohms (HI + LOW path)
Contact Bounce Time	3 ms maximum
Contact Thermal EMF	4 μV maximum
Switch Contact Lifetime	50 Million Cycles (low-level) 100,000 Cycles (maximum rating)
Available I/O Channels	144 (dual wire)
Capacitance A (HI) to B (LOW) Chan. to Chassis	 310 pF maximum 1485 pF maximum
Bandwidth (Worst Path Performance; Typical Unit)	13 MHz (-3 dB) minimum
Insertion Loss (Worst Path Performance; Typical Unit)	2.0 dB @ 10 MHz maximum 0.1 dB @ 1 MHz maximum 0.1 dB @ 300 kHz maximum
Isolation (Worst Path Performance; Typical Unit)	37 dB @ 13 MHz minimum 44 dB @ 10 MHz minimum 67 dB @ 1 MHz minimum 75 dB @ 300 kHz minimum
Crosstalk (Worst Path Performance; Typical Unit)	-38 dB @ 13 MHz maximum -42 dB @ 10 MHz maximum -68 dB @ 1 MHz maximum -75 dB @ 300 kHz maximum
Power Requirements quiescent each relay closure	+5 VDC 0.1 A maximum 0.02 A maximum
Mean Time Between Failures (MTBF)	33,768 Hours (MIL-HDBK-217FN2) 50,673 Hours (Telcordia / Bellcore 6)
Mean Time to Repair	< 5 minutes (MTTR)

Mechanical Specifications – 1260-145D

Shock	30g, 11 ms, ½ sine wave
Vibration	0.013 in. P-P, 5-55 Hz
Bench Handling	4 in., 45°
Cooling	See 1260-100 cooling data
Temperature	
Operating	0°C to +55°C
Non-operating	-40°C to +75°C
Relative Humidity	85% + 5% non-condensing at < 30°C
Altitude	
Operating	10,000 feet
Non-operating	15,000 feet
Weight	9 oz. (0.32 kg.)

Power Dissipation – 1260-145D

The cooling of the Adapt-a-Switch carrier is dependent upon the chassis into which it is installed. The carrier can nominally dissipate approximately 100W. Even with all channels driven to maximum outputs, up to six 1260-145D plug-ins may be used together in a 1260-100 without exceeding the maximum allowable power dissipation of the carrier.

If the 1260-145D will be used in conjunction with other cards, the dissipation should be computed and summed with the total worst-case dissipation of the remaining modules.

For example, a 1260-145D module would dissipate the following energy:

Quiescent power dissipation = 0.5W maximum

Channel dissipation =
[(# channels energized) * (relay coil dissipation)]

Total Power Dissipation = Quiescent + Channel

Assuming all relays on the card are enabled (worse-case situation) the channel path resistances will be in parallel and therefore insignificant as a source of heat. The largest contributor of thermal energy will therefore derive from the relay coils.

Total power dissipation = [(144) * (0.100)] + [0.5] = 15W

This is acceptable power dissipation for an individual plug-in

module. If five additional modules are likewise loaded, then the overall carrier dissipation is approximately 90W, which is within the cooling available in most commercial VXIbus chassis. Apart from the thermal issues, however, it is important to remember that a fully enabled 1260-145D card would draw over 3A of current from the +5V supply. If this is multiplied by six for the remaining slots, a load of 18A would burden the +5V supply, exceeding the specifications for the 1260-100 carrier. In reality, the worse-case situation is not likely, since the 1260-145D is a matrix switch where typically only one relay is engaged at a time and the power dissipation falls considerably below that calculated in the example above. For practical purposes, as the calculations can illustrate for normal operation, the 1260-145D contributes a negligible amount of thermal load on a chassis.

Introduction – 1260-145E (2 – 8x8's)

The 1260-145E is a plug-in matrix switch module developed for the Racal Instruments 1260-100 Adapt-a-Switch Carrier. This switch provides two independent 8x8 matrices with a maximum switching voltage of 125VAC @ 0.3A or 30 VDC @ 1A.

The 1260-145E includes the following features:

- Standard Adapt-a-Switch™ plug-in design, providing for ease of replacement

- Data-Driven embedded descriptor, allowing immediate use with any Option-01T switch controller, regardless of firmware revision level.

Electrical Specifications – 1260-145E

Chan. Input Voltage	60 VDC / 125 VAC maximum
Chan. Output Current	1 A maximum
Chan. Output Power	30 W / 37.5 VA maximum
Path Resistance	< 2 Ohms (HI + LOW path)
Contact Bounce Time	3 ms maximum
Contact Thermal EMF	4 μV maximum
Switch Contact Lifetime	50 Million Cycles (low-level) 100,000 Cycles (maximum rating)
Available I/O Channels	128 (dual wire)
Capacitance A (HI) to B (LOW) Chan. to Chassis	 175 pF maximum 640 pF maximum
Bandwidth (Worst Path Performance; Typical Unit)	27 MHz (-3 dB) minimum
Insertion Loss (Worst Path Performance; Typical Unit)	0.7 dB @ 10 MHz maximum 0.2 dB @ 1 MHz maximum 0.1 dB @ 300 kHz maximum
Isolation (Worst Path Performance; Typical Unit)	29 dB @ 27 MHz minimum 43 dB @ 10 MHz minimum 61 dB @ 1 MHz minimum 74 dB @ 300 kHz minimum
Crosstalk (Worst Path Performance; Typical Unit)	-15 dB @ 27 MHz maximum -46 dB @ 10 MHz maximum -64 dB @ 1 MHz maximum -72 dB @ 300 kHz maximum
Power Requirements quiescent each relay closure	+5 VDC 0.1 A maximum 0.02 A maximum
Mean Time Between Failures (MTBF)	37,904 Hours (MIL-HDBK-217FN2) 56,694 Hours (Telcordia / Bellcore 6)
Mean Time to Repair	< 5 minutes (MTTR)

Mechanical Specifications – 1260-145E

Shock	30g, 11 ms, ½ sine wave
Vibration	0.013 in. P-P, 5-55 Hz
Bench Handling	4 in., 45°
Cooling	See 1260-100 cooling data
Temperature	
Operating	0°C to +55°C
Non-operating	-40°C to +75°C
Relative Humidity	85% + 5% non-condensing at < 30°C
Altitude	
Operating	10,000 feet
Non-operating	15,000 feet
Weight	9 oz. (0.32 kg.)

Power Dissipation – 1260-145E

The cooling of the Adapt-a-Switch carrier is dependent upon the chassis into which it is installed. The carrier can nominally dissipate approximately 100W. Even with all channels driven to maximum outputs, up to six 1260-145E plug-ins may be used together in a 1260-100 without exceeding the maximum allowable power dissipation of the carrier.

If the 1260-145E will be used in conjunction with other cards, the dissipation should be computed and summed with the total worst-case dissipation of the remaining modules.

For example, a 1260-145E module would dissipate the following energy:

Quiescent power dissipation = 0.5W maximum

Channel dissipation =
[(# channels energized) * (relay coil dissipation)]

Total Power Dissipation = Quiescent + Channel

Assuming all relays on the card are enabled (worse-case situation) the channel path resistances will be in parallel and therefore insignificant as a source of heat. The largest contributor of thermal energy will therefore derive from the relay coils.

Total power dissipation = [(128) * (0.100)] + [0.5] = 13.3W

This is acceptable power dissipation for an individual plug-in

module. If five additional modules are likewise loaded, then the overall carrier dissipation is approximately 80W, which is within the cooling available in most commercial VXIbus chassis. Apart from the thermal issues, however, it is important to remember that a fully enabled 1260-145E card would draw over 2.7A of current from the +5V supply. If this is multiplied by six for the remaining slots, a load of 16A would burden the +5V supply, exceeding the specifications for the 1260-100 carrier. In reality, the worse-case situation is not likely, since the 1260-145E is a matrix switch where typically only one relay is engaged at a time and the power dissipation falls considerably below that calculated in the example above. For practical purposes, as the calculations can illustrate for normal operation, the 1260-145E contributes a negligible amount of thermal load on a chassis.

Introduction – 1260-145F (1 – 8x16)

The 1260-145F is a plug-in matrix switch module developed for the Racal Instruments 1260-100 Adapt-a-Switch Carrier. This switch provides a 8x16 matrix with a maximum switching voltage of 125VAC @ 0.3A or 30 VDC @ 1A.

The 1260-145F includes the following features:

- Standard Adapt-a-Switch™ plug-in design, providing for ease of replacement
- Data-Driven embedded descriptor, allowing immediate use with any Option-01T switch controller, regardless of firmware revision level.

Electrical Specifications – 1260-145F

Chan. Input Voltage	60 VDC / 125 VAC maximum
Chan. Output Current	1 A maximum
Chan. Output Power	30 W / 37.5 VA maximum
Path Resistance	< 1.8 Ohms (HI + LOW path)
Contact Bounce Time	3 ms maximum
Contact Thermal EMF	4 μV maximum
Switch Contact Lifetime	50 Million Cycles (low-level) 100,000 Cycles (maximum rating)
Available I/O Channels	128 (dual wire)
Capacitance A (HI) to B (LOW) Chan. to Chassis	 225 pF maximum 840 pF maximum
Bandwidth (Worst Path Performance; Typical Unit)	20 MHz (-3 dB) minimum
Insertion Loss (Worst Path Performance; Typical Unit)	1.2 dB @ 10 MHz maximum 0.2 dB @ 1 MHz maximum 0.1 dB @ 300 kHz maximum
Isolation (Worst Path Performance; Typical Unit)	30 dB @ 20 MHz minimum 53 dB @ 10 MHz minimum 66 dB @ 1 MHz minimum 79 dB @ 300 kHz minimum
Crosstalk (Worst Path Performance; Typical Unit)	-30 dB @ 20 MHz maximum -44 dB @ 10 MHz maximum -62 dB @ 1 MHz maximum -77 dB @ 300 kHz maximum
Power Requirements quiescent each relay closure	+5 VDC 0.1 A maximum 0.02 A maximum
Mean Time Between Failures (MTBF)	37,899 Hours (MIL-HDBK-217FN2) 56,682 Hours (Telcordia / Bellcore 6)
Mean Time to Repair	< 5 minutes (MTTR)

Mechanical Specifications – 1260-145F

Shock	30g, 11 ms, ½ sine wave
Vibration	0.013 in. P-P, 5-55 Hz
Bench Handling	4 in., 45°
Cooling	See 1260-100 cooling data
Temperature	
Operating	0°C to +55°C
Non-operating	-40°C to +75°C
Relative Humidity	85% + 5% non-condensing at < 30°C
Altitude	
Operating	10,000 feet
Non-operating	15,000 feet
Weight	9 oz. (0.32 kg.)

Power Dissipation – 1260-145F

The cooling of the Adapt-a-Switch carrier is dependent upon the chassis into which it is installed. The carrier can nominally dissipate approximately 100W. Even with all channels driven to maximum outputs, up to six 1260-145F plug-ins may be used together in a 1260-100 without exceeding the maximum allowable power dissipation of the carrier.

If the 1260-145F will be used in conjunction with other cards, the dissipation should be computed and summed with the total worst-case dissipation of the remaining modules.

For example, a 1260-145F module would dissipate the following energy:

Quiescent power dissipation = 0.5W maximum

Channel dissipation =
[(# channels energized) * (relay coil dissipation)]

Total Power Dissipation = Quiescent + Channel

Assuming all relays on the card are enabled (worse-case situation) the channel path resistances will be in parallel and therefore insignificant as a source of heat. The largest contributor of thermal energy will therefore derive from the relay coils.

Total power dissipation = [(128) * (0.100)] + [0.5] = 13.3W

This is acceptable power dissipation for an individual plug-in

module. If five additional modules are likewise loaded, then the overall carrier dissipation is approximately 80W, which is within the cooling available in most commercial VXIbus chassis. Apart from the thermal issues, however, it is important to remember that a fully enabled 1260-145F card would draw over 2.7A of current from the +5V supply. If this is multiplied by six for the remaining slots, a load of 16A would burden the +5V supply, exceeding the specifications for the 1260-100 carrier. In reality, the worse-case situation is not likely, since the 1260-145F is a matrix switch where typically only one relay is engaged at a time and the power dissipation falls considerably below that calculated in the example above. For practical purposes, as the calculations can illustrate for normal operation, the 1260-145F contributes a negligible amount of thermal load on a chassis.

Introduction – 1260-145G (1 – 12x12)

The 1260-145G is a plug-in matrix switch module developed for the Racal Instruments 1260-100 Adapt-a-Switch Carrier. This switch provides a 12x12 matrix with a maximum switching voltage of 125VAC @ 0.3A or 30 VDC @ 1A.

The 1260-145G includes the following features:

- Standard Adapt-a-Switch™ plug-in design, providing for ease of replacement
- Data-Driven embedded descriptor, allowing immediate use with any Option-01T switch controller, regardless of firmware revision level.

Electrical Specifications – 1260-145G

Chan. Input Voltage	60 VDC / 125 VAC maximum
Chan. Output Current	1 A maximum
Chan. Output Power	30 W / 37.5 VA maximum
Path Resistance	< 1.5 Ohms (HI + LOW path)
Contact Bounce Time	3 ms maximum
Contact Thermal EMF	4 μV maximum
Switch Contact Lifetime	50 Million Cycles (low-level) 100,000 Cycles (maximum rating)
Available I/O Channels	144 (dual wire)
Capacitance A (HI) to B (LOW) Chan. to Chassis	 175 pF maximum 625 pF maximum
Bandwidth (Worst Path Performance; Typical Unit)	27 MHz (-3 dB) minimum
Insertion Loss (Worst Path Performance; Typical Unit)	0.7 dB @ 10 MHz maximum 0.1 dB @ 1 MHz maximum 0.1 dB @ 300 kHz maximum
Isolation (Worst Path Performance; Typical Unit)	24 dB @ 27 MHz minimum 52 dB @ 10 MHz minimum 67 dB @ 1 MHz minimum 74 dB @ 300 kHz minimum
Crosstalk (Worst Path Performance; Typical Unit)	-28 dB @ 27 MHz maximum -44 dB @ 10 MHz maximum -65 dB @ 1 MHz maximum -70 dB @ 300 kHz maximum
Power Requirements quiescent each relay closure	+5 VDC 0.1 A maximum 0.02 A maximum
Mean Time Between Failures (MTBF)	33,763 Hours (MIL-HDBK-217FN2) 50,660 Hours (Telcordia / Bellcore 6)
Mean Time to Repair	< 5 minutes (MTTR)

Mechanical Specifications – 1260-145G

Shock	30g, 11 ms, ½ sine wave
Vibration	0.013 in. P-P, 5-55 Hz
Bench Handling	4 in., 45°
Cooling	See 1260-100 cooling data
Temperature	
Operating	0°C to +55°C
Non-operating	-40°C to +75°C
Relative Humidity	85% + 5% non-condensing at < 30°C
Altitude	
Operating	10,000 feet
Non-operating	15,000 feet
Weight	9 oz. (0.32 kg.)

Power Dissipation – 1260-145G

The cooling of the Adapt-a-Switch carrier is dependent upon the chassis into which it is installed. The carrier can nominally dissipate approximately 100W. Even with all channels driven to maximum outputs, up to six 1260-145G plug-ins may be used together in a 1260-100 without exceeding the maximum allowable power dissipation of the carrier.

If the 1260-145G will be used in conjunction with other cards, the dissipation should be computed and summed with the total worst-case dissipation of the remaining modules.

For example, a 1260-145G module would dissipate the following energy:

Quiescent power dissipation = 0.5W maximum

Channel dissipation =
[(# channels energized) * (relay coil dissipation)]

Total Power Dissipation = Quiescent + Channel

Assuming all relays on the card are enabled (worse-case situation) the channel path resistances will be in parallel and therefore insignificant as a source of heat. The largest contributor of thermal energy will therefore derive from the relay coils.

Total power dissipation = [(144) * (0.100)] + [0.5] = 15W

This is acceptable power dissipation for an individual plug-in

module. If five additional modules are likewise loaded, then the overall carrier dissipation is approximately 90W, which is within the cooling available in most commercial VXIbus chassis. Apart from the thermal issues, however, it is important to remember that a fully enabled 1260-145G card would draw over 3A of current from the +5V supply. If this is multiplied by six for the remaining slots, a load of 18A would burden the +5V supply, exceeding the specifications for the 1260-100 carrier. In reality, the worse-case situation is not likely, since the 1260-145G is a matrix switch where typically only one relay is engaged at a time and the power dissipation falls considerably below that calculated in the example above. For practical purposes, as the calculations can illustrate for normal operation, the 1260-145G contributes a negligible amount of thermal load on a chassis.

About MTBF

The 1260-145 MTBF is calculated in accordance with MIL-HDBK-217FN2 and Telcordia (Bellcore) 6 procedures. Refer to the specifications for each card for calculated MTBF values.

Ordering Information

Listed below are part numbers for both the 1260-145 switch module and available mating connector accessories. Each 1260-145 uses a single mating connector.

ITEM	DESCRIPTION	PART #
1260-145A Switch Module	1260-145A, 9 4x4 Matrix Switch Consists of: P/N 405139-001 PCB Assy P/N 980824-145 Manual	407643-001
1260-145B Switch Module	1260-145B, 3 4x12 Matrix Switch Consists of: P/N 405139-002 PCB Assy P/N 980824-145 Manual	407643-002
1260-145C Switch Module	1260-145C, 2 4x16 Matrix Switch Consists of: P/N 405139-003 PCB Assy P/N 980824-145 Manual	407643-003
1260-145D Switch Module	1260-145D, 1 4x36 Matrix Switch Consists of: P/N 405139-004 PCB Assy P/N 980824-145 Manual	407643-004
1260-145E Switch Module	1260-145E, 2 8x8 Matrix Switch Consists of: P/N 405139-005 PCB Assy P/N 980824-145 Manual	407643-005
1260-145F Switch Module	1260-145F, 1 8x16 Matrix Switch Consists of: P/N 405139-006 PCB Assy P/N 980824-145 Manual	407643-006
1260-145G Switch Module	1260-145G, 3 4x12 Matrix Switch Consists of: P/N 405139-007 PCB Assy P/N 980824-145 Manual	407643-007
160-pin Mating Connector	160 Pin Conn. Kit with pins	407664
Cable Assy. 6ft, Sleeved	160 Pin Cable Assy, 6 Ft, 24 AWG	407408-001
Connector Bracket	Bracket, Strain Relief	456673
Additional Manual		980824-145

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Chapter 2

INSTALLATION INSTRUCTIONS

Unpacking and Inspection

1. Before unpacking the switching module, check the exterior of the shipping carton for any signs of damage. All irregularities should be noted on the shipping bill and reported.

CAUTION

ESD sensitive devices, open the instrument at an ESD safe work station.

2. Remove the instrument from its carton, preserving the factory packaging as much as possible.
3. Inspect the switching module for any defects or damage. Immediately notify the carrier if any damage is apparent.
4. Have a qualified person check the instrument for safety before use.

Reshipment Instructions

1. Use the original packing material when returning the switching module to Racal Instruments for servicing. The original shipping carton and the instrument's plastic foam will provide the necessary support for safe reshipment.
2. If the original packing material is unavailable, wrap the switching module in an ESD Shielding bag and use plastic spray foam to surround and protect the instrument.
3. Reship in either the original or a new shipping carton.

Installation

Installation of the 1260-145 Switching Module into a 1260-100 Carrier assembly is described in the Installation section of the 1260-100 Adapt-a-Switch Carrier Manual.

Module Configuration

The 1260-145 module is available in seven different configurations providing a wide variety of matrix sizes. Refer to Chapter 1 for more information about specific configurations.

Front Panel Connectors

The 1260-145 has one 160-pin front-panel connector, labeled J200. It is a 160-pin, DIN "E" style, with 0.040" rectangular posts as pins. See **Figure 2-1** for pin numbering. Refer to Chapter 3 for channel to pin mapping. For a block diagram of the 1260-145 see **Figure 2-2.**

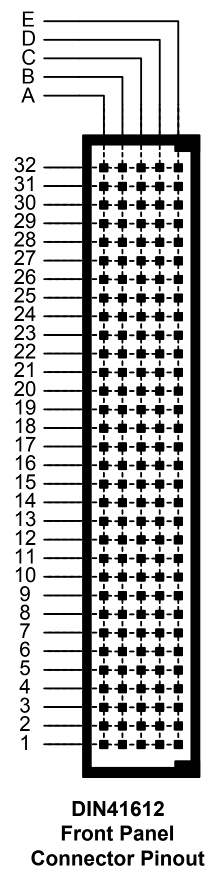

Figure 2-1, Front-Panel Connector Pin Numbering

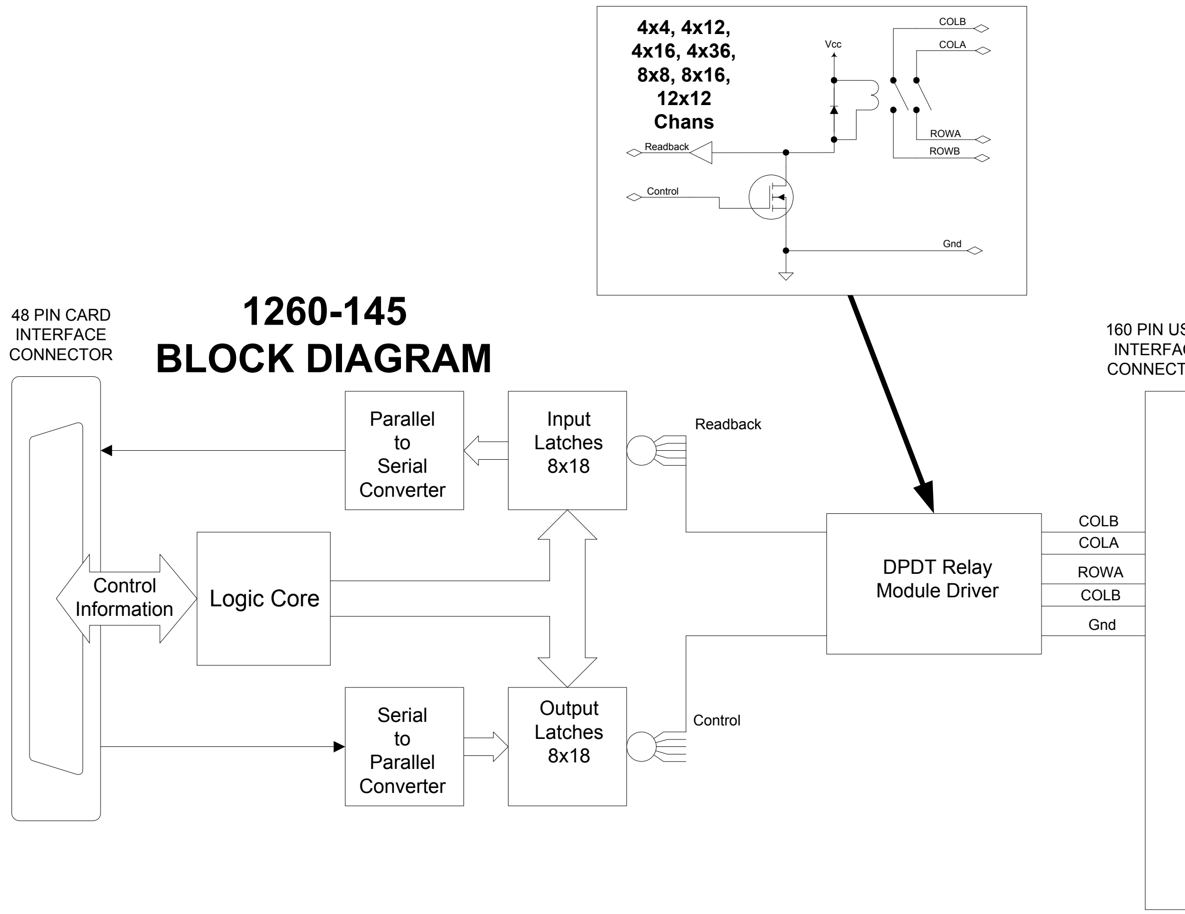

Figure 2-2, 1260-145 Block Diagram

Mating Connectors

Mating connector accessories are available:

160-Pin Connector Kit with backshell and pins,
P/N 407664

160-Pin Cable Assembly, 6 Ft., 24 AWG,
P/N 407408-001

The 160-Pin Connector Kit consists of a connector housing, and 170 crimp pins. After wire attachment, the pin is inserted into the housing and will snap into place, providing positive retention.

The suggested crimp tool for the crimp pins is P/N 990897. The corresponding pin insertion tool is P/N 990898 and the removal tool is P/N 990899.

The 160-Pin Cable Assembly uses 24 AWG cable with crimp pins to mate with the 1260-145. The other cable end is un-terminated. Refer to **Chapter 3** for channel-to-pin mapping information.

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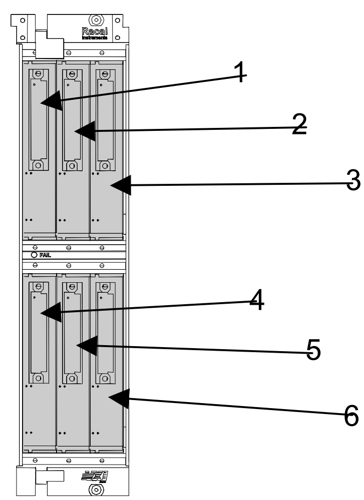
Chapter 3
MODULE OPERATION

Setting the Module Address

The Option-01T switch controller identifies each Adapt-a-Switch plug-in or conventional 1260-Series module by a *module address* that is unique to that module. The module address is a number from 1 through 12, inclusive.

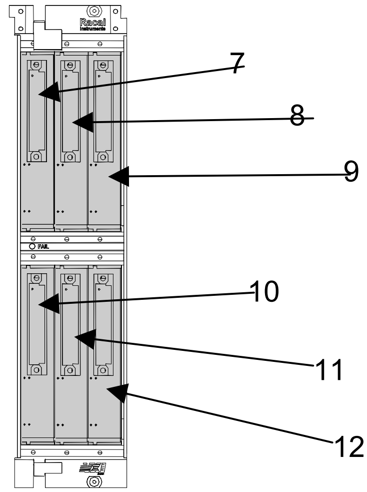
The module address assigned to the 1260-145 depends on the carrier slot into which the 1260-145 is inserted, and on the position of the logical address DIP switch on the carrier side panel. The switch has two settings:

- 1-6 (closed): When the switch is set to this position, the module addresses of the plug-ins in the 1260-100 Carrier are from 1 through 6. The module with address 1 is in the left slot of the top row. The plug-ins are addressed in the following pattern:



Front View – Module Addresses for 1 through 6

- 7 - 12 (open): When the switch is set to this position, the module addresses of the plug-ins in the 1260-100 Carrier are from 7 through 12, in the following pattern:



Front View – Module Addresses for 7 through 12

When setting module addresses for Adapt-a-Switch Carriers and conventional 1260-Series modules, be sure that no address is used by more than one plug-in or 1260-Series module.

For instructions on setting module addresses for a conventional 1260-Series module, see the label on the side panel of the module.

Operating Modes

The 1260-145 may be operated either in *message-based* mode or in *register-based* mode.

In the *message-based* mode, the 1260-01T switch controller interprets commands sent by the slot 0 controller, and determines the appropriate data to send to the control registers of the 1260-145 module.

If the A24 VXI base address for the 1260-100 Adapt-A-Switch carrier is assumed to be at 0x804000A for example purposes and the 1260-145 occupies the module 0 slot, **Figure 3-1** below provides a conceptual view of the message-based mode of operation for a read operation on port 1.

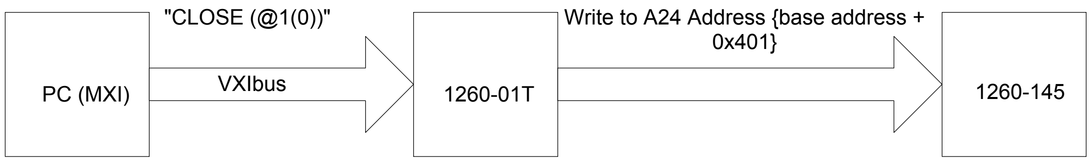


Figure 3-1, Message-Based Mode of Operation

In the *register-based* mode, the user writes directly to the port registers on the 1260-145 module. The 1260-01T command module does not monitor these operations, and does not keep track of the port states on the 1260-145 module in this mode.

A conceptual view of the register-based mode is shown in **Figure 3-2** below.

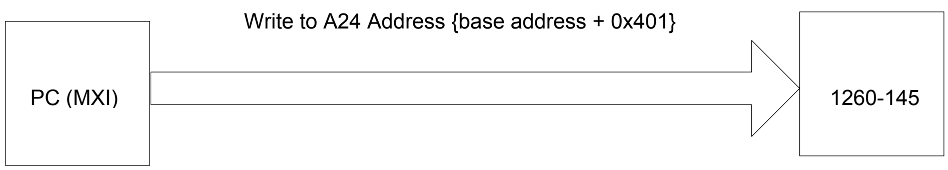


Figure 3-2, Register-Based Mode of Operation

Since the 1260-01T switch controller does not keep track of port and control register states during the register-based mode, it is advisable to use **either** the message-based or the register-based mode consistently, and use the chosen mode exclusively throughout the application program.

In general, the message-based mode of operation is easier to use with utility software such as the National Instruments VXI Interactive Control (VIC) program. The message-based mode allows the user to send ASCII text commands to the 1260-01T and to read replies from the 1260-01T. In addition, some features, such as scan lists, are available only in the message-based mode.

The register-based mode provides faster and more direct control of the 1260-145. In this mode, direct port and control register operations are processed in less than 9 microseconds, not counting software overhead inherent in I/O libraries such as VISA.

For further information about message-based vs. register-based comparisons, consult the 1260-01T User's Manual for further details.

Operating In Message-Based Mode

Channel Descriptors For The 1260-145

The standard 1260-01T commands are used to operate the 1260-145 module. These commands are described in the 1260-01T User's Manual.

Each 1260-01T port command uses a *channel descriptor* to select the channel(s) of interest. The syntax for a channel descriptor is the same for all 1260 series modules. In general, the following syntax is used to select a single channel:

```
@ <module address> ( <channel> ) )
```

Where:

- <module address> is the address of the 1260-145 module. This is a number is in the range from 1 through 12, inclusive.

- <channel> is the 1260-145 relay to operate. This number can be obtained for a given card and a given relay by referring to **Figure 3-3** and one of the applicable card types illustrated in **Figures 3-5** through **3-11**. These figures provide a message-based channel descriptor (***MBC***) for each unique relay on any 1260-145 card.

Multiple individual channels may be specified using the following channel descriptor syntax:

```
@ <module address> ( <channel1> , <channel2>
, . . ., <channelN> ))[,data]
```

A range of channels may be specified using the following channel descriptor syntax:

```
@ <module address> ( <first channel> :
<last channel> ))
```

The following examples illustrate the use of the channel descriptors for the 1260-145:

`CLOSE (@8(0))`	Closes relay 0 at module address 8
`OPEN (@3(1000))`	Opens relay 1000 at module address 3

The message-based descriptors (***MBC***) provided in **Figures 3-5** through **3-11** serve a secondary purpose. In addition to specifying an exact relay (i.e. relay 1000), the syntax of the message-based descriptor indicates which matrix the relay belongs to, and the column and row numbers which intersect the relay position. **Figure 3-4** identifies for each 1260-145 variant how to interpret the message-based descriptor to determine these parameters.

Reply To The MOD:LIST? Command

The 1260-01T returns a reply to the MOD:LIST? Command. This reply is unique for each different 1260 series switch module. The syntax for the reply is:

<module address> : <module-specific identification string>

The <module-specific identification string> for the 1260-145 depends on the version. For the standard versions 1260-145A through 1260-145G these are:

```
1260-145A 9-4X4 MATRIX MODULE

1260-145B 3-4X12 MATRIX MODULE

1260-145C 2-4X16 MATRIX MODULE

1260-145D 4X36 MATRIX MODULE

1260-145E 2-8X8 MATRIX MODULE

1260-145F 8X16 MATRIX MODULE

1260-145G 12X12 MATRIX MODULE
```

So, for a 1260-145C whose <module address> is set to 8, the reply to this query would be:

```
8 : 1260-145C 2-4X16 MATRIX MODULE
```

Operating The 1260-145 in Register-Based Mode

In register-based mode, the 1260-145 is operated by directly writing and reading to/from ports controlling eight relays each. To access the various registers the following details must be assembled to generate an absolute address that can be wrote or read from:

The control registers are located in the VXIbus A24 Address Space. The A24 address for a control register depends on:

1. The A24 Address Offset assigned to the 1260-01T module by the Resource Manager program. The Resource Manager program is provided by the VXIbus slot-0 controller vendor. The A24 Address Offset is placed into the “Offset Register” of the 1260-01T by the Resource Manager.

2. The <module address> of the 1260-145 module. This is a value in the range from 1 and 12 inclusive.

3. The 1260-145 control register to be written to or read from. Each register on the 1260-145 has a unique offset from the base address.

The base A24 address for the 1260-145 module may be calculated by:

(A24 Offset of the 1260-01T) + (1024 x Module Address of 1260-145).

The A24 address offset is usually expressed in hexadecimal. A typical value of 204000_{16} is used in the examples that follow.

A 1260-145 with a module address of 7 would have the base A24 address computed as follows:

Base A24 Address of 1260-145 = $204000_{16} + (400_{16} \times 7_{10})$
= $205C00_{16}$

The control registers for Adapt-a-Switch plug-ins and conventional 1260-Series modules are always on odd-numbered A24 addresses. This number can be obtained for a given card and a given relay by referring to **Figure 3-3** and one of the applicable card types illustrated in **Figures 3-5** through **3-11**. These figures provide a register-based address offset and bit position (***Off-bit***) for each unique relay on any 1260-145 card. Once this offset is known, the absolute address where data is to be written or read from is simply assembled by adding the base address to the offset:

(Base A24 1260-145 Address) + offset = absolute address

If slot 7 is assumed to be occupied by a 1260-145A card for illustration purposes, from our example base A24 address computed earlier, the following absolute addresses would apply for the operations indicated:

205C01	Read or write to register controlling relays 0-3 and 100-103
205C0D	Read or write to register controlling relays 3000-3003 and 3100-3103

Writing to a control register location is a straightforward process. Setting a bit high in a control register causes the appropriate relay to close and setting the same bit low causes the relay to open. Because of the hardware architecture used in the 1260-145, a control register written to with a value will be ***inverted*** (one's complement) when read back.

It is especially important to realize that a single write operation to a control register will affect eight relays simultaneously. Therefore if only a single bit change is desired, the following process must be observed.

1. Read the register first, inverting the bit pattern if necessary
2. Mask the appropriate bit with an 'AND' operation and a byte mask with all undesired bits set to a '1' and the desired bit set to a '0' or '1' depending on whether the bit is to be set or cleared in the desired register
3. Write the masked data back into the register

As simple as this may seem, a number of products reported as faulty and sent back for repair are nothing more than the result of inappropriate register accesses.

The message-based descriptors (***MBC***) provided in **Figures 3-5** through **3-11** are not directly relative to register-based operation. They do, however, serve a secondary purpose in register-based operation. In addition to specifying an exact relay (i.e. relay 1000), the syntax of the message-based descriptor indicates which matrix the relay belongs to, and the column and row numbers which intersect the relay position. **Figure 3-4** identifies for each 1260-145 variant how to interpret the message-based descriptor to determine these parameters.

The VISA I/O library may be used to control the module. The VISA function viOut8() is used to write a single 8-bit byte to a control register, while viIn8() is used to read a single 8-bit byte from the control register. The following code example shows the use of viOut8() to update the 1260-145 module.

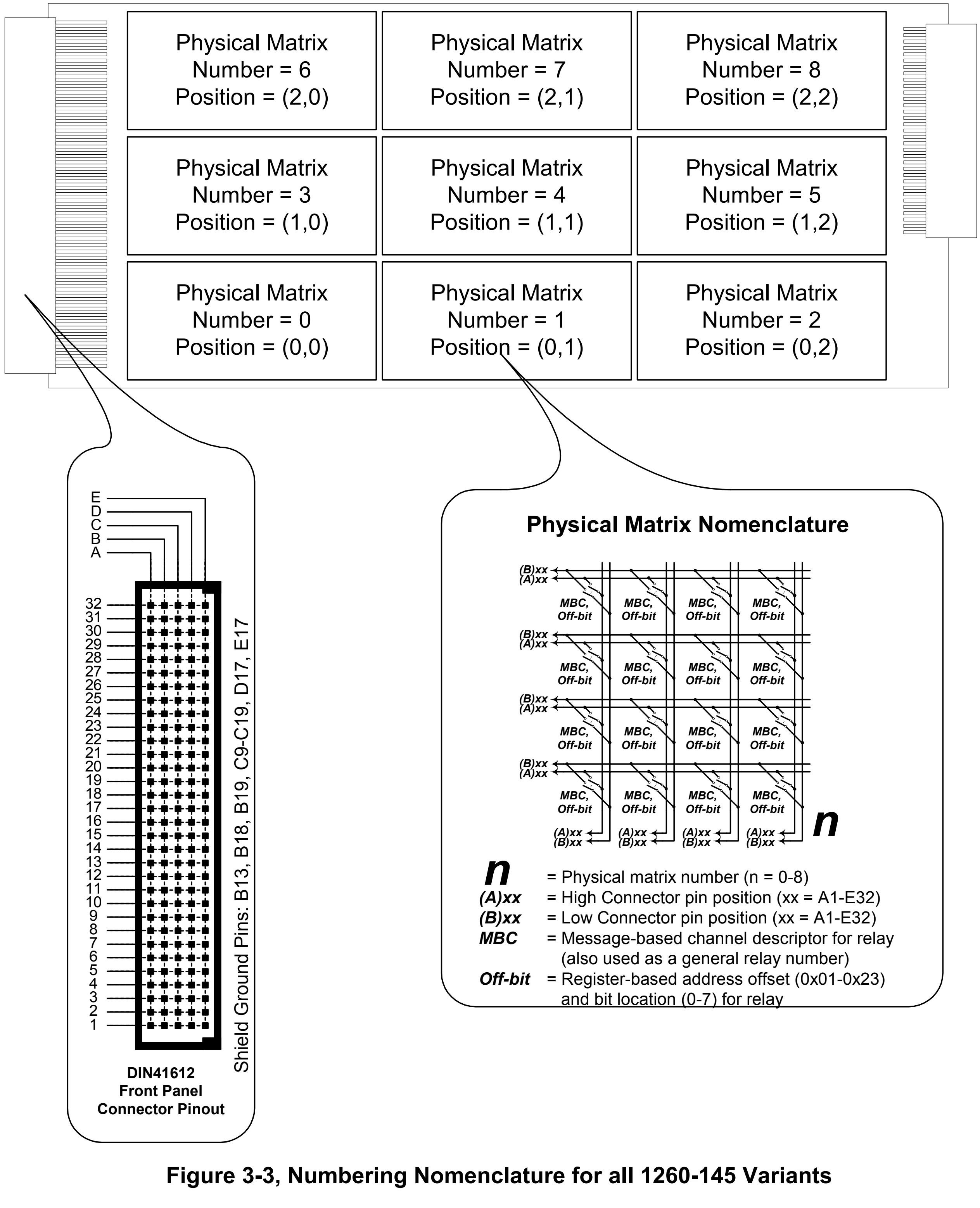


Figure 3-3, Numbering Nomenclature for all 1260-145 Variants

1260-145A Message Based Descriptor	MRCC	M	= Matrix Number (0-8)
		R	= Row Number (0-3)
		CC	= Column Number (00-03)
1260-145B Message Based Descriptor	MRRCC	M	= Matrix Number (0-2)
		RR	= Row Number (00-03)
		CC	= Column Number (00-11)
1260-145C Message Based Descriptor	MRRCC	M	= Matrix Number (0-1)
		RR	= Row Number (00-15)
		CC	= Column Number (00-03)
1260-145D Message Based Descriptor	RRCC	RR	= Row Number (00-35)
		CC	= Column Number (00-03)
1260-145E Message Based Descriptor	MRRCC	M	= Matrix Number (0-1)
		RR	= Row Number (00-07)
		CC	= Column Number (00-07)
1260-145F Message Based Descriptor	RRCC	RR	= Row Number (00-15)
		CC	= Column Number (00-07)
1260-145G Message Based Descriptor	RRCC	RR	= Row Number (00-11)
		CC	= Column Number (00-11)

Figure 3-4, Message-Based Channel Descriptor to Physical Switch Orientation

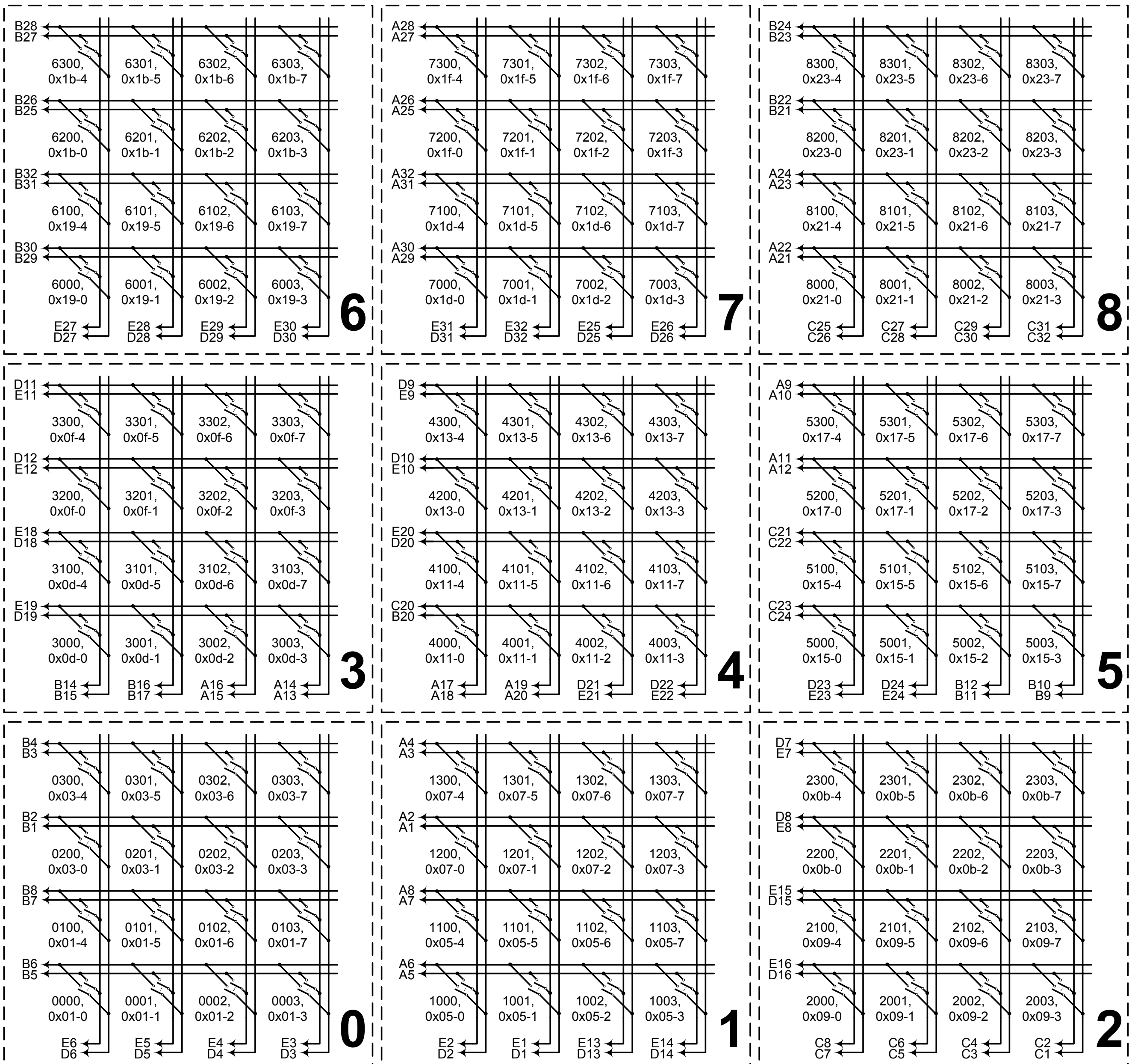


Figure 3-5, 1260-145A Connector/Channel Organization

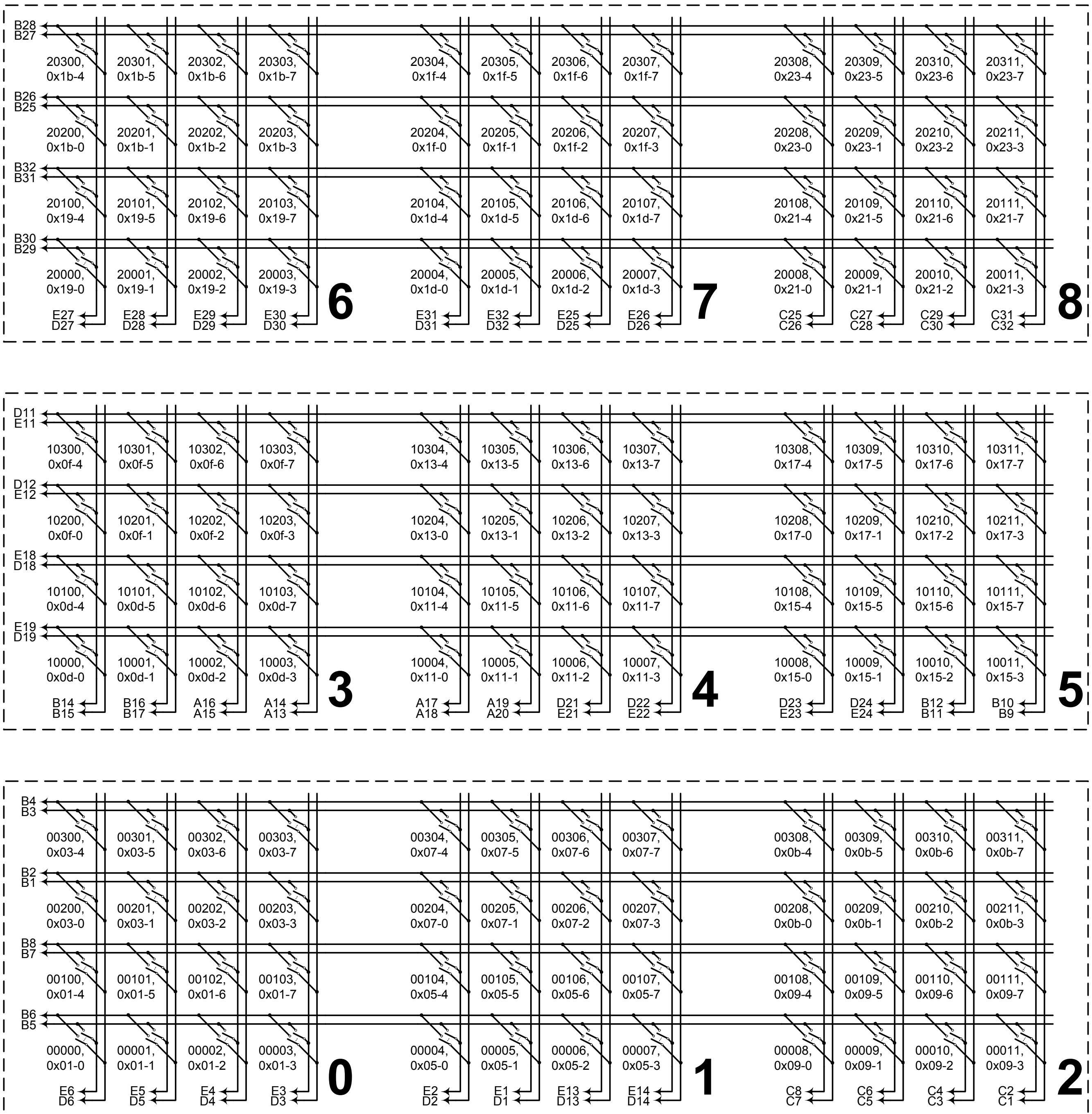


Figure 3-6, 1260-145B Connector/Channel Organization

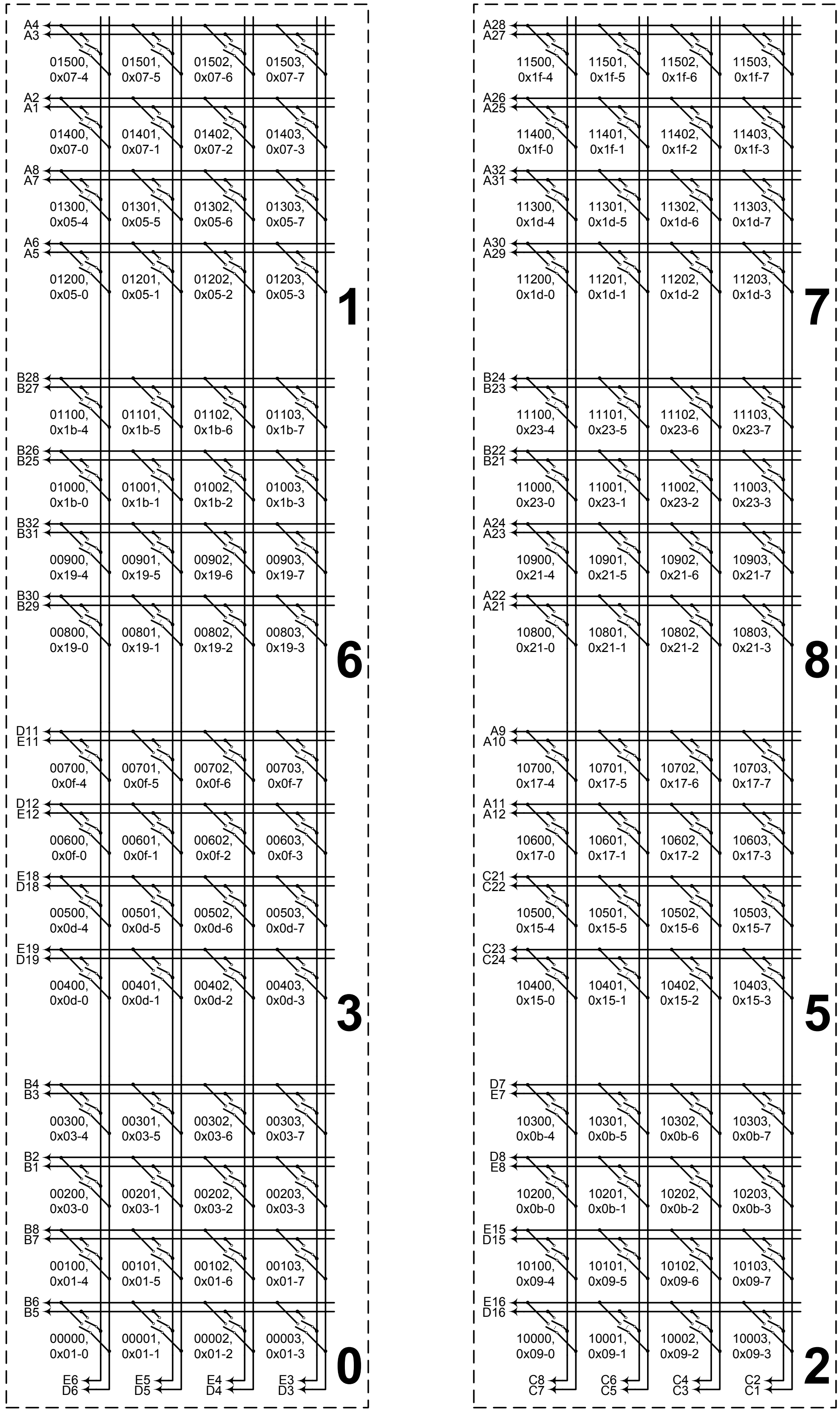


Figure 3-7, 1260-145C Connector/Channel Organization

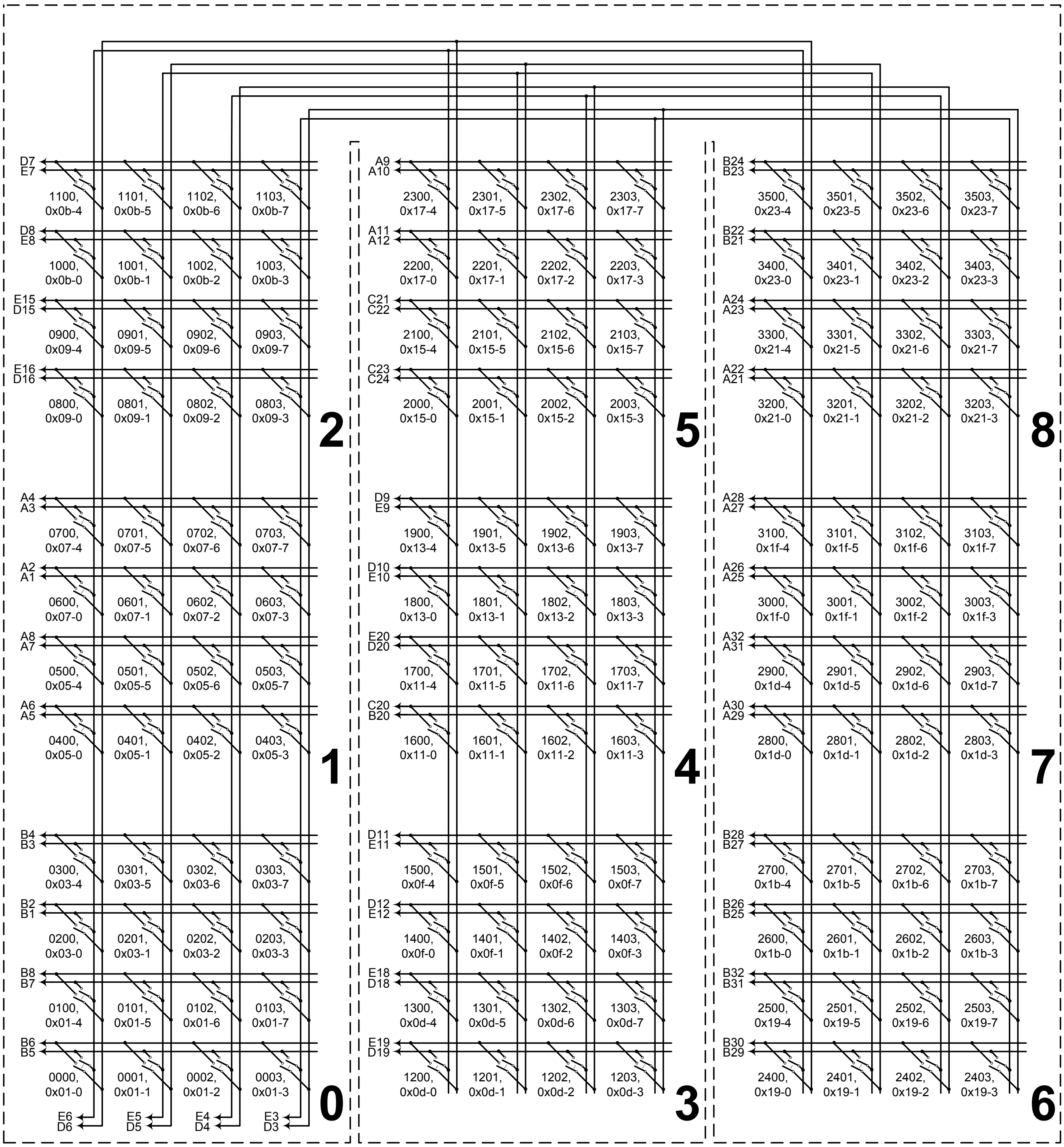


Figure 3-8, 1260-145D Connector/Channel Organization

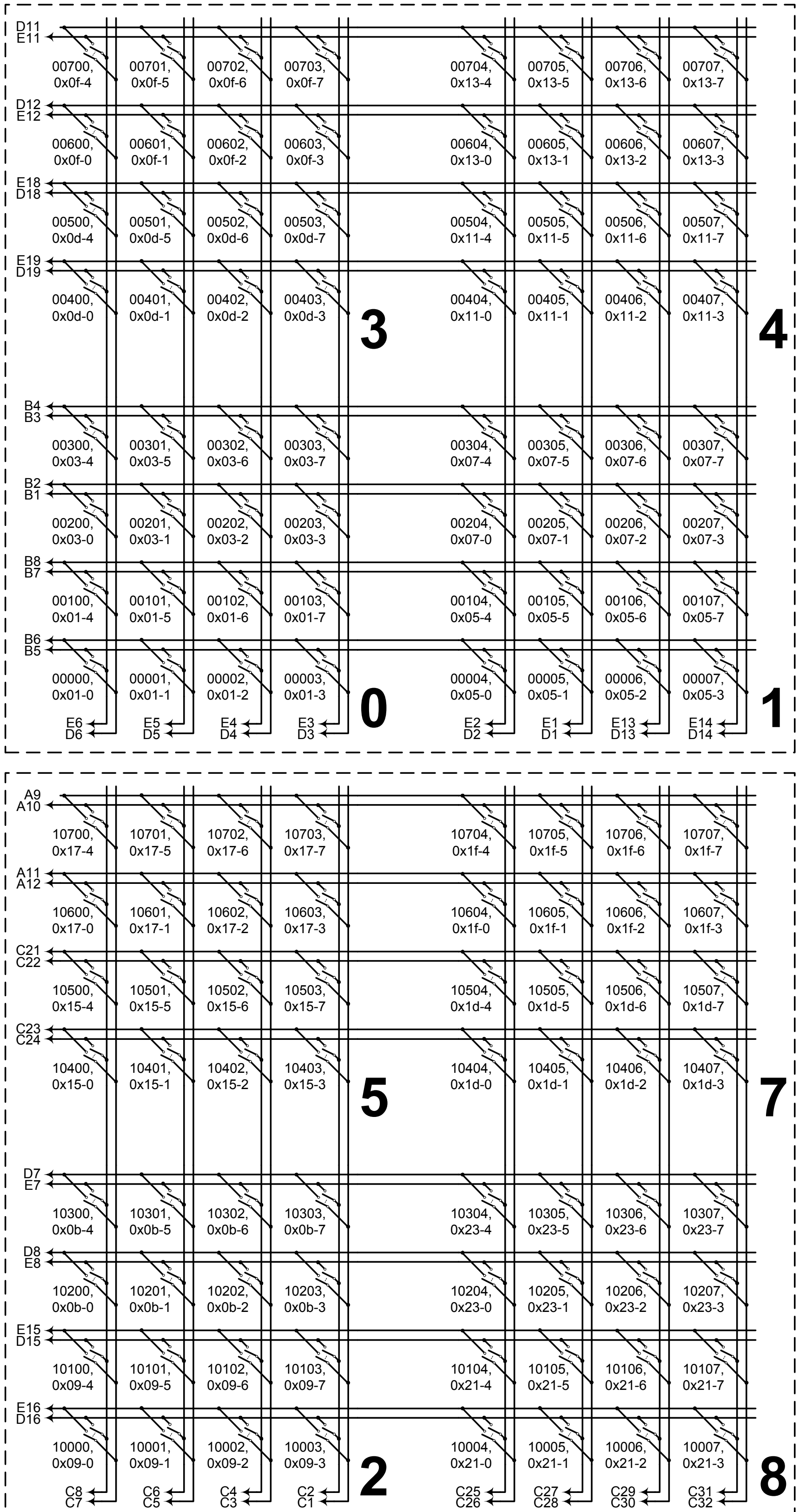


Figure 3-9, 1260-145E Connector/Channel Organization

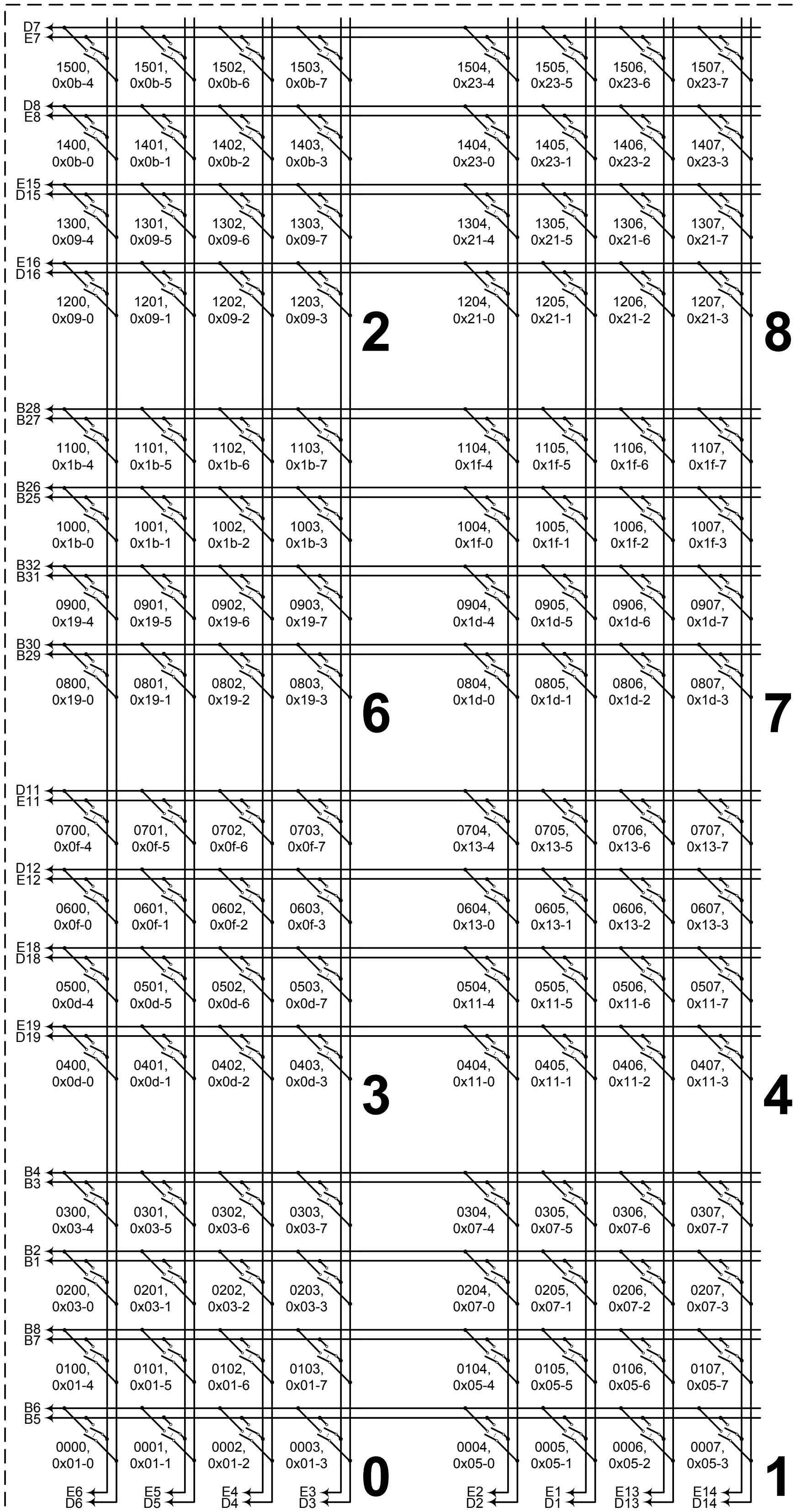


Figure 3-10, 1260-145F Connector/Channel Organization

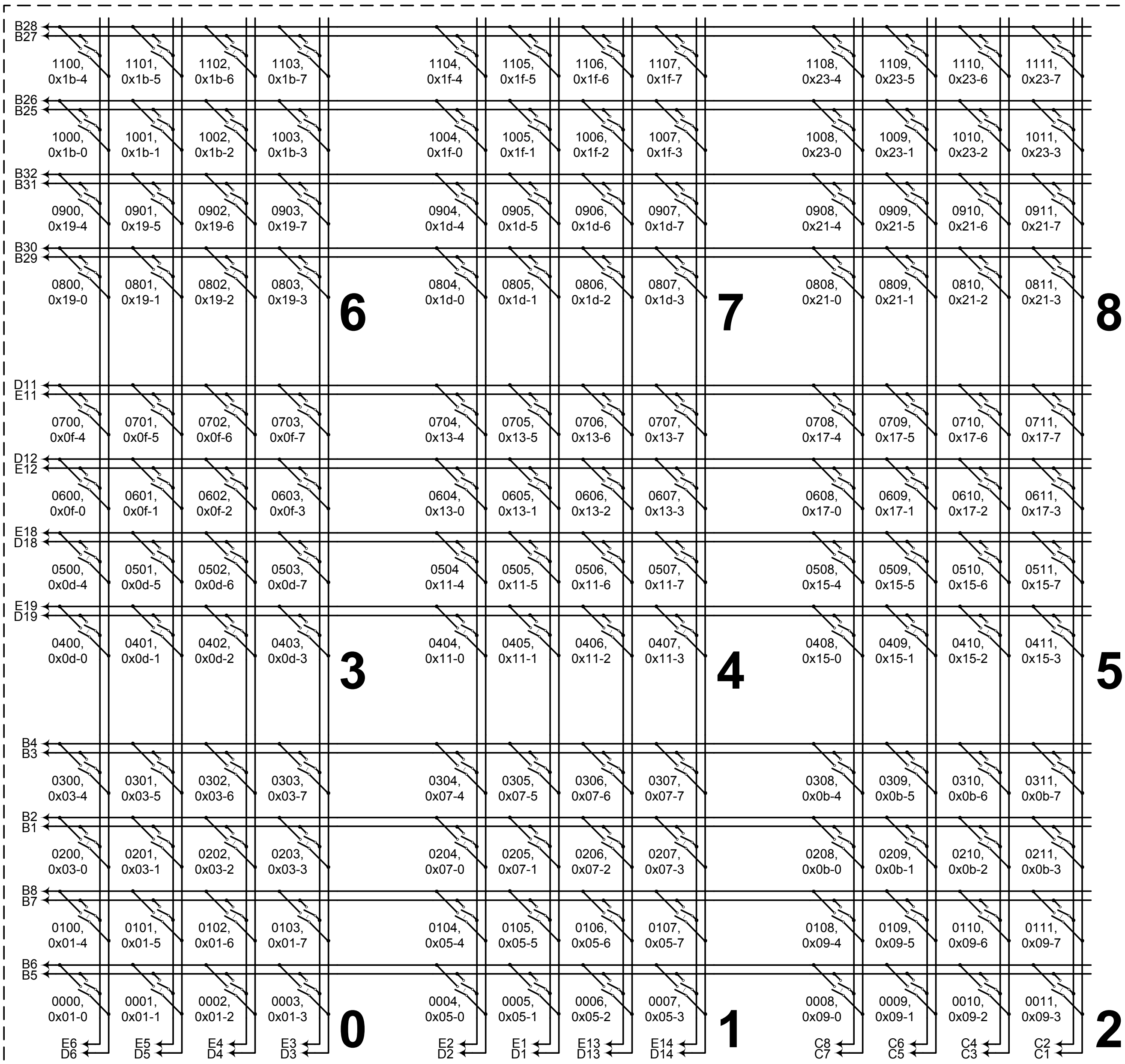


Figure 3-11, 1260-145G Connector/Channel Organization

1260-145 Example Code

```
#include <visa.h>

/* This example shows a 1260-01T at logical address 16 and a VXI/MXI */
/* interface */
#define RI1260_01_DESC     "VXI::16"

/* For a GPIB-VXI interface, and a logical address of 77 */
/* the descriptor would be:  "GPIB-VXI::77" */


/* this example shows a 1260-145 with module address 7, control register
1, and write data of 0xAA */
#define MOD_ADDR_145  7
#define CONTROL_REGISTER   1
#define DATA_ITEM     0xAA


void example_operate_1260_145(void)
{
     ViUInt8 creg_val;
     ViBusAddress chan1_addr, offset;
     ViSession hdl1260;    /* VISA handle to the 1260-01T */
     ViSession hdlRM;      /* VISA handle to the resource manager */
     ViStatus error;       /* VISA error code */

     /* open the resource manager */
     /* this must be done once in application program */
     error = viOpenDefaultRM (&hdlRM);

     if (error < 0) {
          /* error handling code goes here */
     }

     /* get a handle for the 1260-01T */
     error = viOpen (hdlRM, RI1260_01_DESC, VI_NULL,VI_NULL, &hdl1260);
     if (error < 0) {
          /* error handling code goes here */
     }


     /* form the offset for control register 0 */
     /* note that the base A24 Address for the 1260-01T */
     /* is already accounted for by VISA calls viIn8() and */
```

```
    /* viOut8() */

       /* module address shifted 10 places = module address x 1024 */
    chan1_addr = (MOD_ADDR_145 << 10) + 1;

    offset = chan1_addr + (PORT_NUMBER << 1);

    error = viOut8 (vi, VI_A24_SPACE, offset, DATA_ITEM);

   if (error < 0)

       return( error );

    /* close the VISA session */
    error = viClose( hdl1260 );
    if (error < 0) {
          /* error handling code goes here */
    }
}
```

Chapter 4
OPTIONAL ASSEMBLIES

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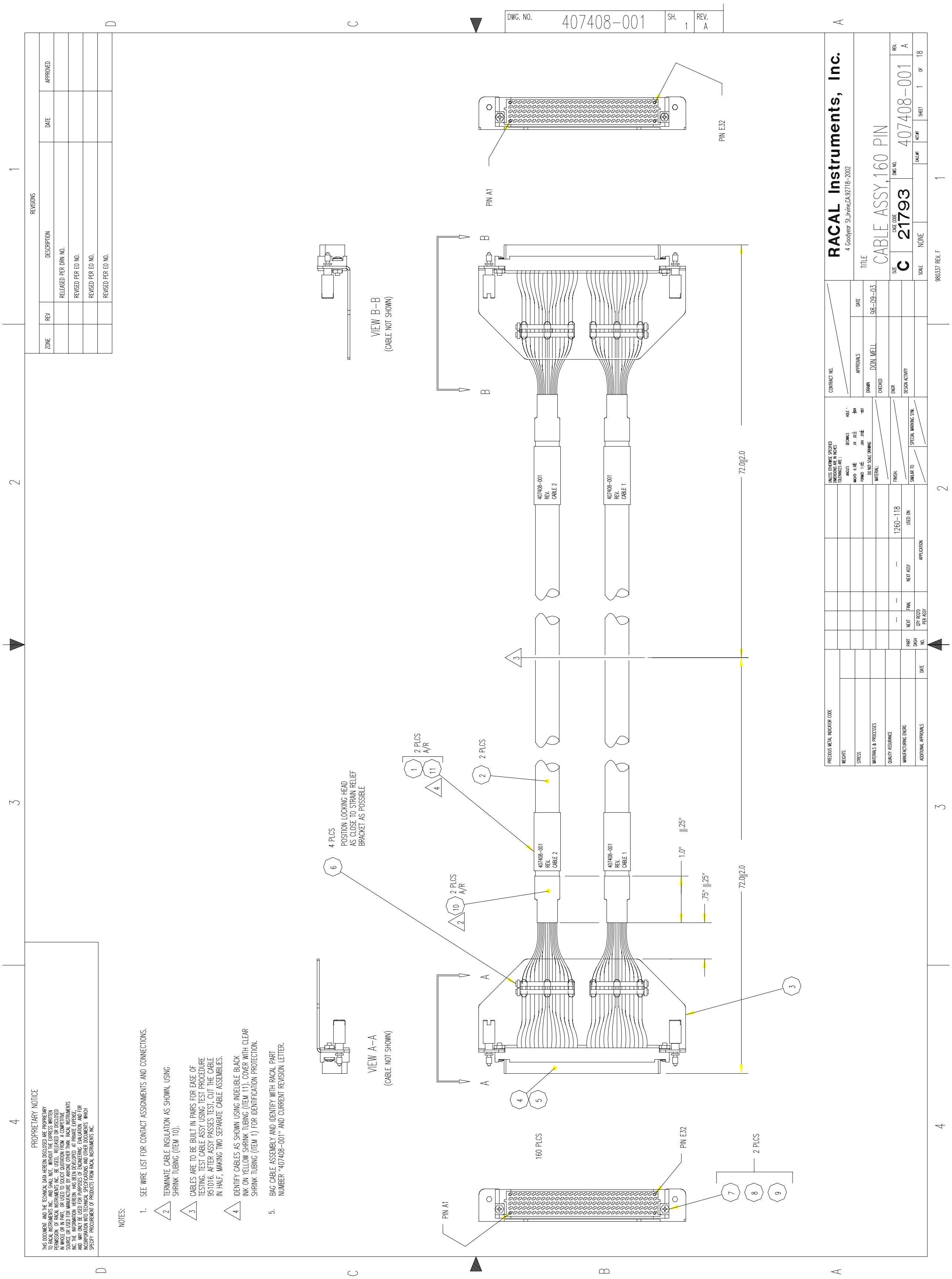
RACAL INSTRUMENTS, INC.

Assembly 407664
Connector kit, 160 Pin, CrimpRev Date 7/30/98 Revision A

#	Component	Description	U/M	Qty Reqd.	REF
1	602258-116	CON-CAB-RCP160C,100S	-E EA	1.000	
2	602258-900	TRMCRP-SNP-U-F26-20G	-E EA	170.000	


PROPRIETARY NOTICE
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REVISIONS
ZONE | REV | DESCRIPTION | DATE | APPROVED
RELEASED PER DRN NO.
REVISED PER EO NO.
REVISED PER EO NO.
REVISED PER EO NO.
NOTES:
1. SEE WIRE LIST FOR CONTACT ASSIGNMENTS AND CONNECTIONS.
2 TERMINATE CABLE INSULATION AS SHOWN, USING SHRINK TUBING (ITEM 10).
3 CABLES ARE TO BE BUILT IN PAIRS FOR EASE OF TESTING. TEST CABLE ASSY USING TEST PROCEDURE 951016. AFTER ASSY PASSES TEST, CUT THE CABLE IN HALF, MAKING TWO SEPARATE CABLE ASSEMBLIES.
4 IDENTIFY CABLES AS SHOWN USING INDELIBLE BLACK INK ON YELLOW SHRINK TUBING (ITEM 11). COVER WITH CLEAR SHRINK TUBING (ITEM 1) FOR IDENTIFICATION PROTECTION.
5. BAG CABLE ASSEMBLY AND IDENTIFY WITH RACAL PART NUMBER "407408-001" AND CURRENT REVISION LETTER.
VIEW A-A
(CABLE NOT SHOWN)
VIEW B-B
(CABLE NOT SHOWN)
4 PLCS
POSITION LOCKING HEAD AS CLOSE TO STRAIN RELIEF BRACKET AS POSSIBLE
2 PLCS A/R
2 PLCS
160 PLCS
PIN A1
PIN E32
407408-001 REV. CABLE 2
407408-001 REV. CABLE 1
1.0"
.25"
.75"
72.0±2.0
DWG. NO. 407408-001 SH. 1 REV. A
RACAL Instruments, Inc.
4 Goodyear St.,Irvine,CA.92718-2002
TITLE
CABLE ASSY,160 PIN
SIZE C
CAGE CODE 21793
DWG NO. 407408-001
REV. A
SCALE NONE
SHEET 1 OF 18
DRAWN DON MELL 98-09-03
CHECKED
ENGR
DESIGN ACTIVITY
1260-118
USED ON
NEXT ASSY
APPLICATION
PRECIOUS METAL INDICATOR CODE
WEIGHTS
STRESS
MATERIALS & PROCESSES
QUALITY ASSURANCE
MANUFACTURING ENGRG
ADDITIONAL APPROVALS
980337 REV. F

Chapter 5

PRODUCT SUPPORT

Product Support

Racal Instruments has a complete Service and Parts Department. If you need technical assistance or should it be necessary to return your product for repair or calibration, call 1-800-722-3262. If parts are required to repair the product at your facility, call 1-949-859-8999 and ask for the Parts Department.

When sending your instrument in for repair, complete the form in the back of this manual.

For worldwide support and the office closes to your facility, refer to the Support Offices section on the following page.

Reshipment Instructions

Use the original packing material when returning the 1260-145 to Racal Instruments for calibration or servicing. The original shipping crate and associated packaging material will provide the necessary protection for safe reshipment.

If the original packing material is unavailable, contact Racal Instruments Customer Service for information.

Support Offices

RACAL INSTRUMENTS

United States

(Corporate Headquarters and Service Center)
4 Goodyear Street, Irvine, CA 92618
Tel: (800) 722-2528, (949) 859-8999; Fax: (949) 859-7139

5730 Northwest Parkway Suite 700, San Antonio, TX 78249
Tel: (210) 699-6799; Fax: (210) 699-8857

Europe

(European Headquarters and Service Center)
18 Avenue Dutartre, 78150 LeChesnay, France
Tel: +33 (0)1 39 23 22 22; Fax: +33 (0)1 39 23 22 25

29-31 Cobham Road, Wimborne, Dorset BH21 7PF, United Kingdom
Tel: +44 (0) 1202 872800; Fax: +44 (0) 1202 870810

Via Milazzo 25, 20092 Cinisello B, Milan, Italy
Tel: +39 (0)2 6123 901; Fax: +39 (0)2 6129 3606

Technologie Park, Friedrich Ebert Strasse, 51429 Bergisch Gladbach, Germany
Tel: +49 (0) 2204 844200; Fax: +49 (0) 2204 844219

Repair and Calibration Request Form

To allow us to better understand your repair requests, we suggest you use the following outline when calling and include a copy with your instrument to be sent to the Racal Repair Facility.

Model____________________Serial No.______________________Date____________________

Company Name______________________________Purchase Order #______________________

Billing Address____
City

____
State/Province Zip/Postal Code Country

Shipping Address____
City

____
State/Province Zip/Postal Code Country

Technical Contact______________________Phone Number ( )__________________________
Purchasing Contact ___________________Phone Number ( )__________________________

1. Describe, in detail, the problem and symptoms you are having. Please include all set up details, such as input/output levels, frequencies, waveform details, etc.

____
____
____
____

2. If problem is occurring when unit is in remote, please list the program strings used and the controller type.

____
____
____

3. Please give any additional information you feel would be beneficial in facilitating a faster repair time (i.e., modifications, etc.)

____
____
____

4. Is calibration data required? Yes No (please circle one)

Call before shipping
Note: We do not accept "collect" shipments.

Ship instruments to nearest support office.