

Series DCX
QEM and RES Modules
Reference Manual

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STATUTORY NOTICES



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WARNING

The DCX 860 and 870 incorporate a panel in front of the plug-in modules. This panel may only be removed by suitably qualified personnel for installation or maintenance purposes, and must be replaced afterwards. Removal under any other circumstance would invalidate any RFI (Radio Frequency Interference) and Safety Type Approvals.

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Preface

This manual provides information for DCX network supervisors to use the QEM and RES modules. It forms part of the DCX Systems Documentation, and refers to other manuals in the series. It assumes that you will already have some knowledge of the DCX system, obtained either from the System Documentation or from a Case Technology training course.

For an explanation of terms used in this manual, see the Pocket Books of Telecommunications and Computer Communications.

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The Quad Expansion Module (QEM) allows up to four remote expansion frames to be installed as part of the same node. These are used when one physical frame is insufficient to contain the number of DCX modules required.

The Remote Expansion Slave (RES) module interfaces an expansion frame to the QEM in the master frame.

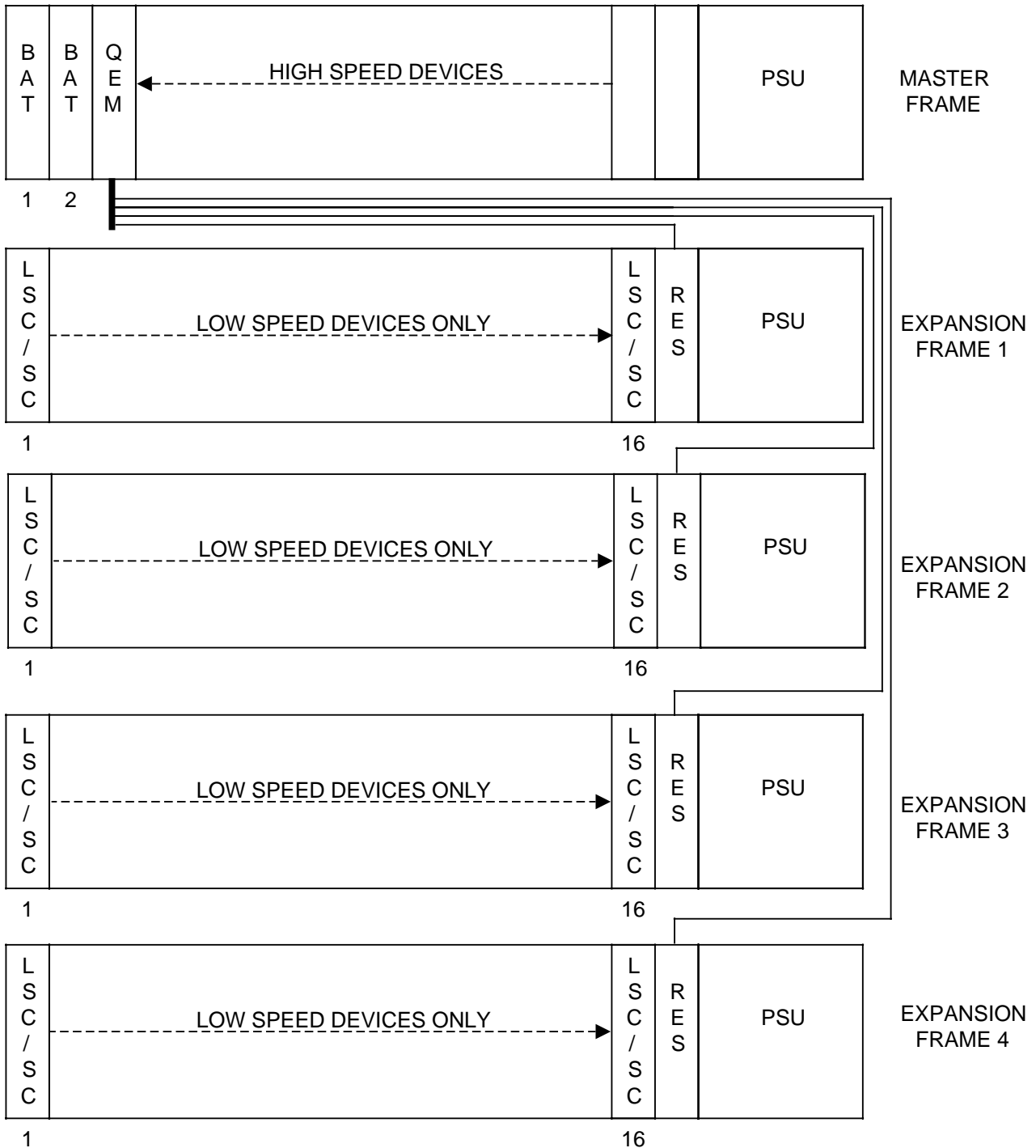
The QEM and RES modules are designed for installation with BAT modules in the DCX 840, 860 and 870 family, where the number of high and/or low speed modules in a single node, exceed the physical number of available slots in a one-frame configuration.

The QEM and RES modules have the effect of increasing the number of card frames in a single node. This is achieved by installing the QEM module in slot 3 of the master frame and connecting it to a RES module located in the last slot of an expansion (slave) frame (see Figure 2-1).

Up to a maximum of four expansion frames may be installed in any one DCX node.

The QEM and RES modules pass timing, control information, and data, between the master and expansion frames via the fibre optic link.

To enhance node distribution, expansion frames may be installed up to 1 km from the master frame. This is achieved by connecting master and expansion frames with 62.5/125 μ optical fibre cable, which does not suffer from electrical interference, and offers a greatly enhanced performance over standard copper wire connections.



- Notes:
1. RES may be installed in slot 17 or 20 depending on frame type.
 2. If SC cards are installed in the master frame, they will assume the channel numbers (1-64) of the same slot positions in the expansion frame (1-4 depending on channel distribution setting), making those cards redundant. I.e. SC1 in slot 5 of master frame equals channels 17-20, making card in slot 5 of expansion frame 1 redundant with normal distribution, but card in slot 1 of expansion frame 2 redundant with quarter frame filling (see Figures 4-1 to 4-3).

Figure 2-1 QEM and RES Slot Locations

3.1 The QEM and RES Module Front Panels

The front panels of the QEM and RES modules are shown below in Figure 3-1. The QEM has four pairs of LEDs, whilst the RES has only one pair.

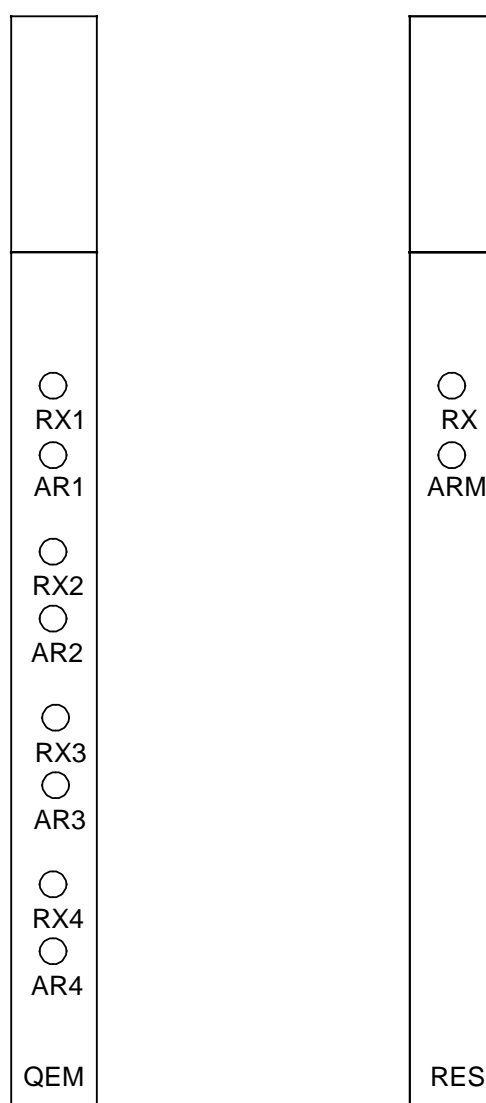


Figure 3-1 QEM and RES Front Panels

3.1.1 QEM Indicators

RX1-4 When illuminated, indicates that the QEM is receiving packets from the attached RES.

AR1-4 Indicates that the attached RES bay is armed.

3.1.2 RES Indicators

RX When illuminated, indicates that the RES is receiving packets from the QEM.

ARM Indicates that the RES bay is armed.

Note: A frame is said to be ARMED when the module pushbuttons are enabled and functional. A DISARMED frame defaults to all the module pushbuttons being released and inoperable.

4 Configuration and Installation

See Appendix A.2 for full details of the compatibility of the QEM and RES modules.

4.1 Configuration

The RES module has no switchbank settings that require configuration.

The QEM module has one configuration DIP switchbank (SW1). The purpose of this is to determine the expansion frame low speed channel distribution (see table and figures below).

| | DISTRIBUTION 0 | DISTRIBUTION 1 | DISTRIBUTION 2 |
|-------|----------------|----------------|----------------|
| SW1.1 | closed | closed | open |
| SW1.2 | closed | open | closed |

Table 4-1 QEM Switchbank Settings

The purpose of the various distribution options shown in Figures 4-1 to 4-3 is to allow users to select the required number of expansion frames and the low speed channel distribution, when choosing the double polling option with SC2 modules.

This gives the user the flexibility of spreading the available 128 channels (shown in the shaded areas) over two or four expansion frames, depending on their distributed processing requirements.

With the normal polling option selected, all 256 low speed channels are available to the user. Only their physical channel number distribution will be affected by the distribution selection setting made on the QEM module.

| SLOT | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| FRAME 1 | 1 | 5 | 9 | 13 | 17 | 21 | 25 | 29 | 33 | 37 | 41 | 45 | 49 | 53 | 57 | 61 |
| | 2 | 6 | 10 | 14 | 18 | 22 | 26 | 30 | 34 | 38 | 42 | 46 | 50 | 54 | 58 | 62 |
| | 3 | 7 | 11 | 15 | 19 | 23 | 27 | 31 | 35 | 39 | 43 | 47 | 51 | 55 | 59 | 63 |
| | 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 | 40 | 44 | 48 | 52 | 56 | 60 | 64 |
| FRAME 2 | 65 | 69 | 73 | 77 | 81 | 85 | 89 | 93 | 97 | 101 | 105 | 109 | 113 | 117 | 121 | 125 |
| | 66 | 70 | 74 | 78 | 82 | 86 | 90 | 94 | 98 | 102 | 106 | 110 | 114 | 118 | 122 | 126 |
| | 67 | 71 | 75 | 79 | 83 | 87 | 91 | 95 | 99 | 103 | 107 | 111 | 115 | 119 | 123 | 127 |
| | 68 | 72 | 76 | 80 | 84 | 88 | 92 | 96 | 100 | 104 | 108 | 112 | 116 | 120 | 124 | 128 |
| FRAME 3 | 129 | 133 | 137 | 141 | 145 | 149 | 153 | 157 | 161 | 165 | 169 | 173 | 177 | 181 | 185 | 189 |
| | 130 | 134 | 138 | 142 | 146 | 150 | 154 | 158 | 162 | 166 | 170 | 174 | 178 | 182 | 186 | 190 |
| | 131 | 135 | 139 | 143 | 147 | 151 | 155 | 159 | 163 | 167 | 171 | 175 | 179 | 183 | 187 | 191 |
| | 132 | 136 | 140 | 144 | 148 | 152 | 156 | 160 | 164 | 168 | 172 | 176 | 180 | 184 | 188 | 192 |
| FRAME 4 | 193 | 197 | 201 | 205 | 209 | 213 | 217 | 221 | 225 | 229 | 233 | 237 | 241 | 245 | 249 | 253 |
| | 194 | 198 | 202 | 206 | 210 | 214 | 218 | 222 | 226 | 230 | 234 | 238 | 242 | 246 | 250 | 254 |
| | 195 | 199 | 203 | 207 | 211 | 215 | 219 | 223 | 227 | 231 | 235 | 239 | 243 | 247 | 251 | 255 |
| | 196 | 200 | 204 | 208 | 212 | 216 | 220 | 224 | 228 | 232 | 236 | 240 | 244 | 248 | 252 | 256 |


 Denotes channels available for double polling selection on BAT.

Figure 4-1 Distribution 0: Full Frame Filling (Normal)

| SLOT | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| FRAME 1 | 1 | 5 | 9 | 13 | 17 | 21 | 25 | 29 | 129 | 133 | 137 | 141 | 145 | 149 | 153 | 157 |
| | 2 | 6 | 10 | 14 | 18 | 22 | 26 | 30 | 130 | 134 | 138 | 142 | 146 | 150 | 154 | 158 |
| | 3 | 7 | 11 | 15 | 19 | 23 | 27 | 31 | 131 | 135 | 139 | 143 | 147 | 151 | 155 | 159 |
| | 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 132 | 136 | 140 | 144 | 148 | 152 | 156 | 160 |
| FRAME 2 | 33 | 37 | 41 | 45 | 49 | 53 | 57 | 61 | 161 | 165 | 169 | 173 | 177 | 181 | 185 | 189 |
| | 34 | 38 | 42 | 46 | 50 | 54 | 58 | 62 | 162 | 166 | 170 | 174 | 178 | 182 | 186 | 190 |
| | 35 | 39 | 43 | 47 | 51 | 55 | 59 | 63 | 163 | 167 | 171 | 175 | 179 | 183 | 187 | 191 |
| | 36 | 40 | 44 | 48 | 52 | 56 | 60 | 64 | 164 | 168 | 172 | 176 | 180 | 184 | 188 | 192 |
| FRAME 3 | 65 | 69 | 73 | 77 | 81 | 85 | 89 | 93 | 193 | 197 | 201 | 205 | 209 | 213 | 217 | 221 |
| | 66 | 70 | 74 | 78 | 82 | 86 | 90 | 94 | 194 | 198 | 202 | 206 | 210 | 214 | 218 | 222 |
| | 67 | 71 | 75 | 79 | 83 | 87 | 91 | 95 | 195 | 199 | 203 | 207 | 211 | 215 | 219 | 223 |
| | 68 | 72 | 76 | 80 | 84 | 88 | 92 | 96 | 196 | 200 | 204 | 208 | 212 | 216 | 220 | 224 |
| FRAME 4 | 97 | 101 | 105 | 109 | 113 | 117 | 121 | 125 | 225 | 229 | 233 | 237 | 241 | 245 | 249 | 253 |
| | 98 | 102 | 106 | 110 | 114 | 118 | 122 | 126 | 226 | 230 | 234 | 238 | 242 | 246 | 250 | 254 |
| | 99 | 103 | 107 | 111 | 115 | 119 | 123 | 127 | 227 | 231 | 235 | 239 | 243 | 247 | 251 | 255 |
| | 100 | 104 | 108 | 112 | 116 | 120 | 124 | 128 | 228 | 232 | 236 | 240 | 244 | 248 | 252 | 256 |


 Denotes channels available for double polling selection on BAT.

Figure 4-2 Distribution 1: Half Frame Filling

| SLOT | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|------------|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| FRAME 1 | 1 | 5 | 9 | 13 | 65 | 69 | 73 | 77 | 129 | 133 | 137 | 141 | 193 | 197 | 201 | 205 |
| | 2 | 6 | 10 | 14 | 66 | 70 | 74 | 78 | 130 | 134 | 138 | 142 | 194 | 198 | 202 | 206 |
| | 3 | 7 | 11 | 15 | 67 | 71 | 75 | 79 | 131 | 135 | 139 | 143 | 195 | 199 | 203 | 207 |
| | 4 | 8 | 12 | 16 | 68 | 72 | 76 | 80 | 132 | 136 | 140 | 144 | 196 | 200 | 204 | 208 |
| FRAME 2 | 17 | 21 | 25 | 29 | 81 | 85 | 89 | 93 | 145 | 149 | 153 | 157 | 209 | 213 | 217 | 221 |
| | 18 | 22 | 26 | 30 | 82 | 86 | 90 | 94 | 146 | 150 | 154 | 158 | 210 | 214 | 218 | 222 |
| | 19 | 23 | 27 | 31 | 83 | 87 | 91 | 95 | 147 | 151 | 155 | 159 | 211 | 215 | 219 | 223 |
| | 20 | 24 | 28 | 32 | 84 | 88 | 92 | 96 | 148 | 152 | 156 | 160 | 212 | 216 | 220 | 224 |
| FRAME 3 | 33 | 37 | 41 | 45 | 97 | 101 | 105 | 109 | 161 | 165 | 169 | 173 | 225 | 229 | 233 | 237 |
| | 34 | 38 | 42 | 46 | 98 | 102 | 106 | 110 | 162 | 166 | 170 | 174 | 226 | 230 | 234 | 238 |
| | 35 | 39 | 43 | 47 | 99 | 103 | 107 | 111 | 163 | 167 | 171 | 175 | 227 | 231 | 235 | 239 |
| | 36 | 40 | 44 | 48 | 100 | 104 | 108 | 112 | 164 | 168 | 172 | 176 | 228 | 232 | 236 | 240 |
| FRAME 4 | 49 | 53 | 57 | 61 | 113 | 117 | 121 | 125 | 177 | 181 | 185 | 189 | 241 | 245 | 249 | 253 |
| | 50 | 54 | 58 | 62 | 114 | 118 | 122 | 126 | 178 | 182 | 186 | 190 | 242 | 246 | 250 | 254 |
| | 51 | 55 | 59 | 63 | 115 | 119 | 123 | 127 | 179 | 183 | 187 | 191 | 243 | 247 | 251 | 255 |
| | 52 | 56 | 60 | 64 | 116 | 120 | 124 | 128 | 180 | 184 | 188 | 192 | 244 | 248 | 252 | 256 |


 Denotes channels available for double polling selection on BAT.

Figure 4-3 Distribution 2: Quarter Frame Filling

4.2 Installation

The initial installation of the QEM and RES modules should only be undertaken by suitably qualified engineers as it involves the installation of the fibre optic PCBs on the backplane of the parent DCX. However, if the channel distribution selection is to be changed, or a card needs replacing, this may be undertaken as follows:

1. Power down the parent DCX.
2. Remove the QEM or RES card.
3. Make any QEM switch changes required.
4. Insert the QEM or RES card in the appropriate slot.
5. Power up the parent DCX.

No user action is required: the QEM and RES modules operate entirely automatically.

In normal operation the green RX and yellow AR indicators should be illuminated on the QEM for the number of expansion frames installed. The requisite RX and ARM indicators on the RES modules should also be illuminated.

Appendix A Technical Specification

A.1 QEM and RES Modules

| | |
|----------------------------|--|
| Optical Fibre Connectivity | Expansion frames may be installed up to 1 km from the master frame. |
| Fibre Specification | Standard 62.5/125 μ m duplex optical fibre cable with ST connectors. |
| Channel Capacity | Each expansion frame may contain up to 16 LSC, SC1 or SC2 modules, except when the double polling option is used with SC2 modules, where the total number of low speed channels is reduced to 128. See Figures 4-1, 4-2 and 4-3 for channel distribution options. Note: Apart from the RES module, only LSC, SC1 or SC2 may be installed in expansion frames. |

A.2 Compatibility

LSC modules are restricted to slave frame operation in conjunction with QEM and RES modules.

LSC and SC1 modules will only operate with Normal polling rate settings.

SC2 modules will operate Normal or Double polling rates. Double polling, as its name suggests, increases the effective throughput between the SC2 and the DCX bus. It should be noted however, that the double polling option reduces the maximum number of low speed channels from 256 to 128 (see Section 4.2 for channel distribution options).