MRX Matrixer
OPERATION GUIDE

1 The *MRX* **3**
1.1 *MRX* Features 4
1.2 About this Operation Guide 5

2 Operation **6**

3 Sample Applications **8**
3.1 Auto-Patch Bay 8
3.2 Zone Routing 8
3.3 Security Video 9
3.4 AC Switching 9
3.5 Amplifier Output Monitoring (Non-Crown Amplifiers) 9

Printed on recycled paper.

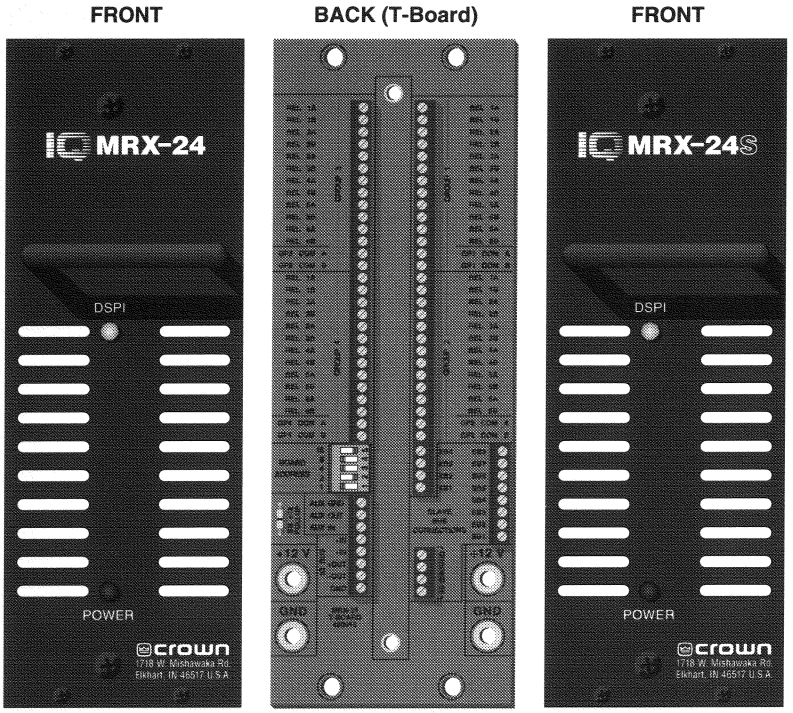
IQ-MSD

8/93

1 The *MRX*

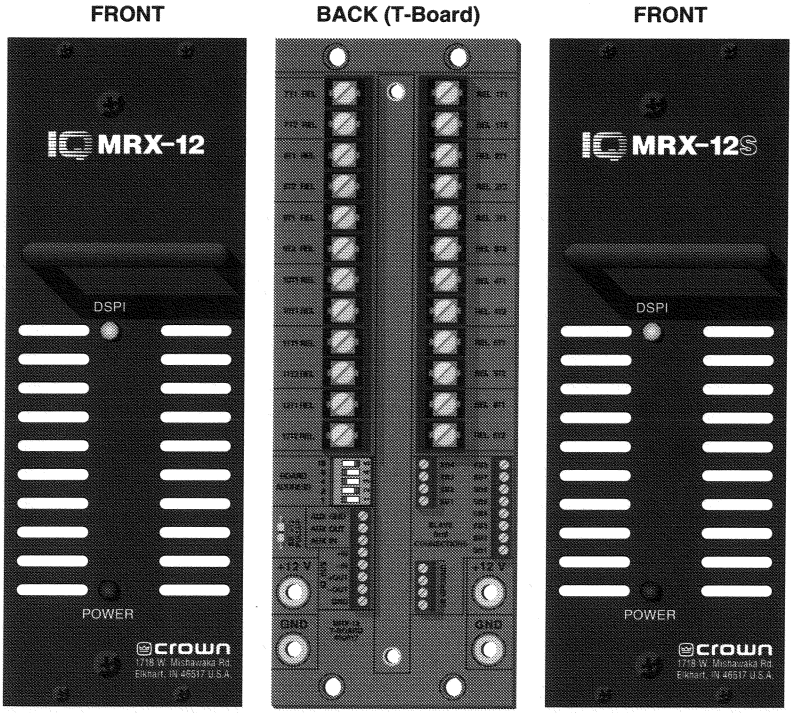
An *MRX* is an IQ matrixer. Under host computer control, it can route signals with its high-quality general-purpose relays. You can think of an *MRX* as a computer controlled patch bay. And because various matrix configurations can be saved in *dataframes* it is easy to preconfigure a series of setups which can be implemented easily and rapidly. There are four different models available: the *MRX-24*, *MRX-24S*, *MRX-12* and *MRX-12S.*

The ***MRX-24*** contains 24 pairs of low-current relay contacts which can be used to switch microphone, audio line-level, digital and DC control signals. They can be used for any purpose which does not exceed their contact or bandwidth rating. Each relay has a double-pole, single-throw (DPST) contact configuration, making it possible to switch balanced audio sources. The first relay contact (or pole) is labelled "A" and the second is labelled "B". Both relay contacts are actuated at the same time. The relays are divided into 4 groups (called ranks) with 6 relays each. Each contact of each relay connects to a common bus for its group. You can think of them as four 6x1 matrices which can used in either direction and wired in any configuration. For example, the matrices could be wired for 6x4, 4x6, 12x2, 2x12, 24x1 or 1x24 operation simply by jumpering the terminals on the unit's "T-board". Much larger matrices can be created by adding one or more slaves *(MRX-24S and/or MRX-12S).* See the *IQ Matrixer Hardware Installation Manual* for more details.



The ***MRX-24S*** is a "slave" version of the *MRX-24.* Up to 31 slaves can be connected to one *MRX-24 (or MRX-12)*, reducing the cost of larger matrices. The slave needs a master matrixer since it does not have its own microprocessor or Crown Bus port.

The ***MRX-12*** contains 12 single high-current relay contacts which can be used to switch loudspeaker lines, motors, lighting, power supplies and any other purpose which does not exceed the rating of the relay contacts or the unit's edge connector. Unlike the *MRX-24*, the *MRX-12* relays are not grouped, allowing them to be configured in any fashion by jumpering the unit's "T-board". Larger matrices can be created by adding one or more slaves *(MRX-12S and/or MRX-24S)*. See the *IQ Matrixer Hardware Installation Manual* for more details.



The ***MRX-12S*** is a "slave" version of the *MRX-12*. Up to 31 slaves can be connected to one *MRX-12 (or MRX-24)*, reducing the cost of larger matrices. The slave needs a master matrixer since it does not have its own microprocessor or Crown Bus port.

Because matrixers are controlled by computer software, they can be located in out-of-the-way places. The computer software is designed for use by audio people—not computer hacks.

1.1 *MRX* Features

MRX-24 Master:

The matrix is configured with the "T-board" at the back of the IQ-CAG.

- ❑ 24 low-current DPST relays (48 contacts) for balanced signal switching.
- ❑ Can switch microphone, audio line-level, broadcast video, digital and DC control signals.
- ❑ Gold-plated edge connector for reliable connection to "T-board".
- ❑ Handles up to 0.5 amps of switching current (1.0 amps of carry current).
- ❑ Handles up to 100 peak volts AC or 100 volts DC.
- ❑ Includes Crown Bus ports and an AUX port like other IQ components.
- ❑ Can serve as a master for up to 31 slave units *(MRX-24S or MRX-12S)*.

***MRX-24S* Slave:**
The matrix is configured with the "T-board" at the back of the IQ-CAG.

- ❑ Contains the same relays and signal routing capabilities as an *MRX-24*.
- ❑ Use the processor and battery backup features of the master.
- ❑ Up to 31 slave units can be connected to one master *(MRX-24 or MRX-12)*.

***MRX-12* Master:**
The matrix is configured with the "T-board" at the back of the IQ-CAG.

- ❑ 12 single high-current SPST relays for signal switching.
- ❑ Can switch loudspeaker lines, motors, lighting and power supplies.
- ❑ Gold-plated edge connector for reliable connection to "T-board".
- ❑ Eight relays handle up to 6 amps of current (1–4, 7–10). Four relays handle up to 9 amps (5, 6, 11, 12).
- ❑ Handles up to 120 volts AC or 28 volts DC.
- ❑ Includes Crown Bus ports and an AUX port like other IQ components.
- ❑ Can serve as a master for up to 31 slave units *(MRX-12S or MRX-24S)*.

***MRX-12S* Slave:**
The matrix is configured with the "T-board" at the back of the IQ-CAG.

- ❑ Contains the same relays and signal routing capabilities as an *MRX-12*.
- ❑ Use the processor and battery backup features of the master.
- ❑ Up to 31 slave units can be connected to one master *(MRX-12 or MRX-24)*.

Protection features:

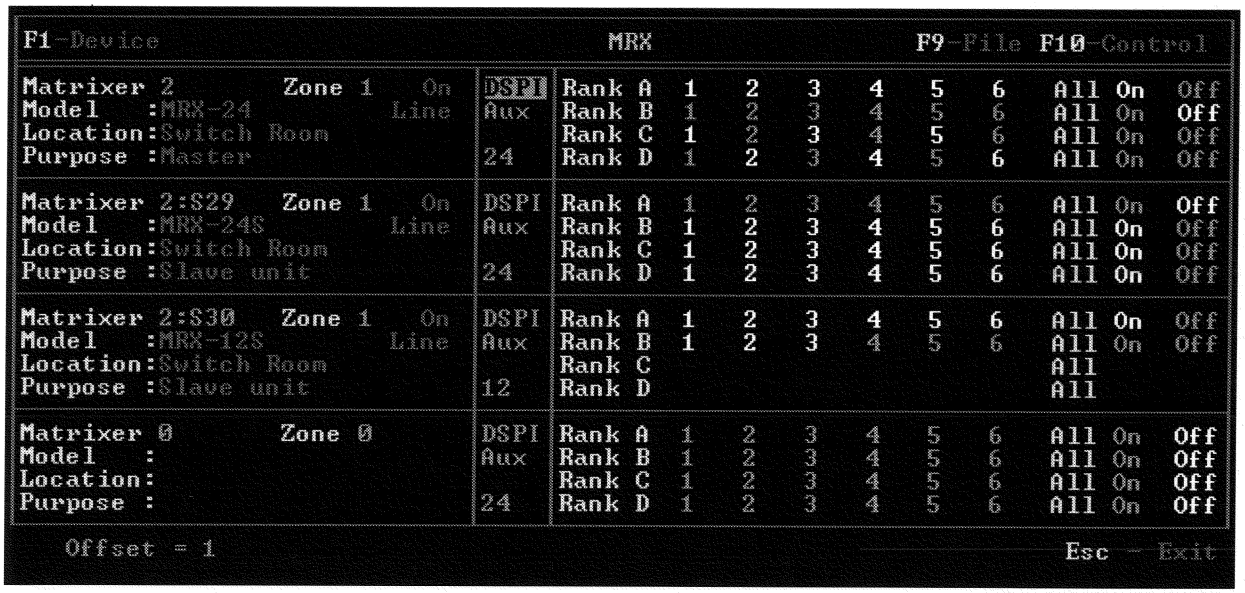
- ❑ Automatic microprocessor reset if noise spikes, power dropouts or other disturbances are encountered.
- ❑ DSPI (Data Signal Presence Indicator) helps to quickly locate wiring problems, improper IQ addresses and disconnected or off-line IQ components.
- ❑ NiCad battery and built-in charger maintain all settings. When fully charged, the unit can be disconnected from power for 60+ days. *Note: The slave units do not have batteries because the master units maintain all slave settings.*

1.2 About this Operation Guide...

This *Operation Guide* describes how to use IQ software to control an IQ matrixer. This *Operation Guide* does not discuss the hardware installation or hardware controls. Please refer to the *IQ Matrixer Hardware Installation Manual* for those details. Nor does this *Operation Guide* discuss the general features of the IQ software. Please refer to the *User's Manual* for your IQ software for that information.

2 Operation

The *MRX* is controlled with the control block screen of the IQ software. To switch to the *MRX* control block screen, press [F1] to access the Device menu then press [R]. [↑] [↓] can also be used to select the *MRX* control block screen from the Device menu followed by [Enter↵] to execute the selection. A mouse (🖱) can also be used. The *MRX* control block screen is shown below:



Please refer to the IQ software *User's Manual* for general instruction on how to navigate around a control block screen and how to select and change a control.

A description of each control in an *MRX* control block follows:

Information Area:
Each control block contains an information area. When a roll call is run, a control block will be automatically created for all components. In it the roll call will enter the **IQ address** and **zone** number for each component. The IQ address and zone can also be manually entered or changed by selecting either number and entering a new one. The IQ address is limited to 1–250. The zone is limited to 1–8. *Note: Slave units will have two numbers listed in the IQ address space. The first number is the IQ address of the master unit followed by ":S" and the slave address number. Each slave must have a unique number.*

Under the IQ address and zone number is a line for the **Model**, **Location**, and **Purpose**. These lines are provided for you to enter information which will help you identify the *MRX* controlled by the control block.

The phrase "On Line" will be displayed with green letters in the upper right corner of the information area of all *MRXs* which are found by the IQ software. This makes it easy to tell which control blocks are controlling active units and which are not.

DSPI:
The DSPI or Data Signal Presence Indicator is an LED on the front panel of all matrixers. Its function varies, depending whether the unit is a master or slave.

The DSPI on master *MRXs* functions like other IQ components—it flashes whenever a data signal, addressed to it, is received. It can be forced to stay on as an aid to troubleshooting by turning the DSPI control on. If the DSPI is forced on by the IQ software and the indicator does not light on the unit, it signifies that there is a break in communication before it.

Slave *MRXs* have a specialized DSPI which flashes to shown that it is in communication with its master *(MRX-24 or MRX-12).* It cannot be forced on the way other DSPI LEDs can be. When the DSPI control of a slave is turned on in the control block, it simply forces the DSPI of its master to stay on. This can be helpful when you need to rapidly identify which master a slave is connected to.

Tip: Use the DSPI light to verify that all units in the system are responding to IQ commands. For example, turn all DSPI lights on before a show to verify that all equipment is operating properly.

Tip: When there is more than one *MRX* unit in a system, use the DSPI light to quickly identify a particular one. For example, turn the DSPI light on to help a technician quickly locate a particular unit in a large equipment rack.

Aux:
IMPORTANT: Slave *MRXs* use the same "T-board" as their master but only masters have a functioning AUX port. Please ignore the AUX connector on the "T-board" slave units. Also ignore the "Aux" control in the control blocks of slave units.

The AUX port of the *MRX* is turned on and off with the Aux control. When turned on, the AUX port supplies +10 VDC across the pins of the AUX connector located on the "T-board". This can be used to signal non-IQ devices or it can be used to turn non-IQ components on and off (with the use of a solid state relay). For example, an auxiliary rack cooling system can be manually turned on with the Aux feature.

The AUX port also has the ability to sense the presence of an external signal. When a logic "high" is detected at the AUX connector, an **asterisk** will appear beside it.

24/12:
The 24/12 control is used to identify whether an *MRX-24* (and *MRX-24S*) or an *MRX-12* (and *MRX-12S*) is being controlled by a control block. It must be manually set by pressing [Spacebar] to toggle it to the correct setting. Notice in the previous illustration that the *MRX-12/MRX-12S* control block has only 12 relays controls.

Relay On/Off Controls:
Each individual relay can be turned on and off from the control block by highlighting its number and toggling it with [Spacebar]. The same control block layout is used for all matrixer models. Four groups, called ranks, with six relays each are shown. This corresponds to the grouping of relays on an *MRX-24* or *MRX-24S* where the relays of each group connect to a common bus for that group.

Note: "Rank" can be ignored when controlling MRX-12 and MRX-12S matrixers because they are not grouped into ranks.

All On/Off:
Global "All" on/off controls are provided to turn each *MRX-24* or *MRX-24S* rank of 6 relays on and off as a unit. This provides a convenient way to turn on or off each rank's audio bus. However, *MRX-12* and *MRX-12S* matrixers do not have ranks so these controls can be viewed as arbitrary groupings.

3 Sample Applications

IQ *MRX* matrixers offer powerful solutions wherever signal or power routing is needed. The *IQ System* host computer makes it easy to create any number of *dataframes* that can be recalled to engage a new matrix setup at any time.

The low-power *MRX-24* and *MRX-24S* matrixers serve a wide variety of needs. Each provides four 6x1 groups of double-pole, single-throw (DPST) switches. These units are called "low-power" to distinguish them from the "high-power" *MRX-12* and *MRX-12S* matrixers. The high-power matrixers can route high voltage AC sources such as amplifier outputs. Refer to the *IQ Matrixer Hardware Installation Manual* for more details on unit specifications.

The following samples show some of the varied matrixer applications.

3.1 Auto-Patch Bay

A matrixer auto-patch bay can be designed and installed almost anywhere a traditional patch bay can. The low-power *MRX-24* and *MRX-24S* matrixers are typically used for routing medium-level (line-level) and low-level (mic-level) audio signals. Each low-power matrix has four 6x1 or 1x6 switching groups that can be ganged together to accommodate almost any patch bay dimension.

Having preset configurations is one of the biggest advantages of a computer-controlled patch bay. Inexperienced operators can repatch an entire system as fast as an experienced pro by simply loading a new *dataframe*. An extremely large patch bay can be reconfigured in seconds instead of minutes. Once a *dataframe* is created, you never have to retrace your steps to figure out how something was patched. And a matrixer auto-patch bay is very convenient because you don't hassle with patch cables.

3.2 Zone Routing

A large sound system installation with central paging might need to be able to route pages to different areas or zones. This can be accomplished in two different ways with matrixers.

One way is to control the sound distribution by routing the line-level signals. This can be done by using an *MPX-6* as a distribution amplifier. With an *MPX-6* mixer feeding an *MRX-24* (and/or slaves), the *MPX-6* can control the signal level into the matrix. Preset *dataframes* can be created for each zone and activated swiftly. When a zone is selected, the matrix can route the signal to the appropriate zone and the *MPX-6* can automatically set the signal level as needed.

Another way is to control the sound distribution by routing the high-level (loudspeaker-level) signals. This has the added benefit of decreasing the number of power amplifiers required in the system. By directing its output to each zone as needed, a single amplifier could be used for the entire system. The high-power *MRX-12* would be ideal for this type of application. If more than 12 zones are required, one or more *MRX-12S* slave matrixers could be added.

WARNING: RISK OF ELECTRIC SHOCK! INSTALLATION OF THE *MRX-12*, *MRX-12S* AND HIGH-POWER WIRING SHOULD ONLY BE ATTEMPTED BY A QUALIFIED TECHNICIAN. CROWN IS NOT RESPONSIBLE FOR COMPLIANCE WITH LOCAL ELECTRICAL CODES AND REGULATIONS, OR DAMAGE CAUSED BY IMPROPER INSTALLATION.

3.3 Security Video

Like line-level audio, video signals are medium-level signals that can be routed effectively using *MRX-24* and *MRX-24S* matrixers. Security video is a good example. Several observation posts or recording feeds can be switched from one camera to the next with the matrixers.

Because the matrixers use simple relay contacts, proper video termination depends on your connection to the matrix output. This means the matrixers can also be used for some broadcast video applications. However, the matrixers have no provision for vertical interval switching, making them inappropriate for on-air broadcast switching. But they can be used to control off-air routing to a buffered video switcher or time base corrector (TBC).

3.4 AC Switching

The high-power *MRX-12* and *MRX-12S* are quite powerful when used in applications that require central control over AC switching. A touring theatre might use a matrixer to switch special lighting effects, a fog machine or any number of other special effects. At the appropriate time, presets can be activated for the most complex combination of equipment. Computer-controlled AC switching is also useful when powering racked audio gear. Any AC device that has power requirements that fall within the specifications can be switched using the *MRX-12* and *MRX-12S* matrixers.

WARNING: RISK OF ELECTRIC SHOCK! INSTALLATION OF THE *MRX-12* AND *MRX-12S* SHOULD ONLY BE ATTEMPTED BY A QUALIFIED TECHNICIAN. CROWN IS NOT RESPONSIBLE FOR COMPLIANCE WITH LOCAL ELECTRICAL CODES AND REGULATIONS, OR DAMAGE CAUSED BY IMPROPER INSTALLATION.

3.5 Amplifier Output Monitoring (Non-Crown Amplifiers)

A common practice in large installation of non-Crown amplifiers is to route each amplifier output to a central monitor location so each one can be audibly checked for distortion-free operation. (This is not required for Crown amplifiers because their *IOC*® indicators provide this function.)

The simplest way to do this is to connect the amplifier output to the matrixer with a line in parallel with the amplifier's load. This may not be possible if the impedance of the monitor loudspeaker is too low because it will reduce the available power. Another solution is to connect a voltage divider to each amplifier's output which would provide a high-impedance (10 K ohm) low-power feed to an *MRX-24*. The matrixer would then feed a monitor amplifier and loudspeaker. Please refer to the *IQ Matrixer Hardware Installation Manual* for more details about using a voltage divider.

Note: Don't automatically assume that a high-power MRX-12 matrixer will be needed when switching amplifier outputs. If the current and voltage of the amplifier output circuit are within the MRX-24's specifications for current and voltage, you should be able to use it to do the job. Please refer to the IQ Matrixer Hardware Installation Manual for current and voltage specifications.