2 x 8 Remote Antenna Smart Two Radio Switch System

DXE-RRMX2X8

DXE-RRMX2X8-INS Revision 0a
Introduction

The 2 x 8 Remote Antenna Smart Two Radio Switch System DXE-RRMX2X8 uses a DXE-RR2X8 remote switch, DXE-MX2X8 interface unit and two DXE-CC-8A control consoles.

The two DXE-CC-8A control consoles supply the BCD switching signals to the DXE-MX2X8 interface unit which then sends the appropriate signals to the DXE-RR2X8 remote switch to select one of the eight output ports for each DXE-CC-8A control console.

The dual star arrangement of 24 internal relays provide greatly improved power handling, port-to-port isolation and SWR over conventional switches and allow connection of the eight antenna output ports to either the master or slave input ports.

The system offers virtually no loss at HF and excellent low-loss performance (less than 0.16 dB loss) on six meters.

Each control console (A and B) can select one of 7 or 8 positions available. When one operator has a particular position selected, the other operator is locked out of that position - first come, first served.

Features

Enclosed relays provide exceptional performance and are moisture resistant. The DXE-RRMX2X8 system can be used to simultaneously select multiple output ports as well as conventional one-of-eight antenna switching. This allows the DXE-RR2X8B to be used in complex antenna systems as well as traditional switching arrangements. Ports that are not selected are grounded.

The DXE-RRMX2X8 system also uses removable screw terminal plugs for the control cables. The removable plugs greatly simplify installation by eliminating the need for soldering. Disassembly is not required for control wiring access.

The DXE-RRMX2X8B also offers the following features:
- RF Shielded Weatherproof Housings - unique protection
- Excellent Port-to-Port Isolation; greater than 70 dB at 30 MHz, worst case.
- Ports not selected are grounded
- High-RF tolerant UHF connectors
- Enclosed 16 ampere RF relays
- Safe 12 volt DC relay operation
- MOVs for surge protection on control lines
- RF bypass capacitors
- Includes two DXE-SSVC-2P Stainless Steel V-Clamps for mounting
- The DXE-MX2X8 interface unit interfaces between the DXE-RR2X8 and the two DXE-CC-8A control consoles for seamless operation
- The two DXE-CC-8A control consoles have LED indicators and provide the BCD outputs to the DXE-MX2X8 interface unit
Overall Wiring Diagram

This diagram shows the overall wiring scheme. Once familiar with this set up, making the actual cables will be easier.

**DXE-CW9S** is a shielded control cable that has 10-conductors and works very well for running control signals for the **DXE-RR2X8** and **DXE-MX2X8**.

**Note:** Do not seal the connectors! The connectors are recessed inside a drip edge that prevents water from getting into connectors. The cover-to-connector plate junction is not sealed so the unit can "breathe" and eliminate condensation.
MIL and SIL Safety Mode

One DXE-CC-8A Control Console is located next to each radio. Each operator can select their desired antenna port using the knob on the DXE-CC-8A. A Green LED on the DXE-CC-8A will light up showing which position is selected.

There are two internal jumpers in the DXE-MX2X8 interface unit called MIL and SIL. These jumpers are in place as a factory default.

When one antenna port is selected by operator “A” and the operator “B” tries to select it, not only does that operator “B” not connect to the same port operator “A” is on, the operator “B” is sent to port number 8 (usually connected to a dummy load) to avoid having operator “B” accidently transmit into an open.

This same safety feature is used when ever one operator tries to select an antenna port that the other operator is currently connected to.

Caution: If the jumpers are removed, then the Safety mode is no longer in operation and all 8 ports are used for antennas. If operator “A” selects the same port that operator “B” has selected, operator “A” will not hear anything (no port selected). Care is then needed so operator “A” does not transmit into an open.

The two signals MIL and SIL can be monitored (see terminals 9 & 10 on page 7). When the loser (operator trying to connect to an antenna that the other operator is already connected to) - that signal will go high (+12 VDC).

MIL A = Master Radio “A”. Will go to +12 VDC if it is the ‘loser’.
SIL B = Slave Radio “B”. Will go to +12 VDC if it is the ‘loser’.

One optional suggestion for a visual feedback for the MIL and SIL signals is to connect LEDs’ with the appropriate sized current limiting resistors so the LEDs will light up when there is a “loser” conflict.

NOTE: If MIL and SIL are used, it is suggested that port #8 be connected to an adequate size dummy load.

If MIL and SIL are not used, port #8 can be connected to an 8th antenna.

Caution: Never switch antennas while transmitting. Hot switching with power will create a sustained arc that damages relay contacts. When switching ports, allow 15 ms before transmitting to avoid damaging the switch. This type of damage is NOT covered under warranty.
Wiring the Connections

1. Connections for the wire are made on the green headers. Loosen each terminal screw until it is near flush with the top of the connector block.

2. Strip approximately 1/4” insulation from the wire end and connect each wire to a terminal by sliding the wire completely into the wire connection hole. Using a small flat blade screwdriver, tighten the associated screw until the wire is firmly gripped in place as shown. (Your control wire color sequence may vary).

Take caution to ensure just the wire is clamped in place, not the wire's insulation which would cause an open or intermittent connection. Do not over tighten the screw so much that the wire is cut instead of being firmly gripped.

The green connectors are in two parts and the top part (plug) can be removed by pulling it straight off. This will allow easier wire replacement or servicing as needed. When pushing a connector back in place, ensure you press straight inward and the plug is fully seated.

Using two ten-wire cables, connect the **DXE-RR2X8** to the **DXE-MX2X8**. Master to Master, Slave to Slave. Wiring is G to G, 1 to 1, 2 to 2, 3 to 3, etc.

Two longer 5-wire cables connect from the **DXE-MX2X8** to the two **DXE-CC-8A** Control Consoles using the BCD connectors. The BCD switching signals, Ground, +12 VDC and the MIL and SIL signals are on these cables. The two **DXE-CC-8A** control units are located near their associated radio.

**DXE-CW9S** is a shielded control cable that has 10-conductors and works very well for running control signals for the **DXE-RR2X8**, **DXE-MX2X8** and **DXE-CC-8A** units.
When connecting the short cables from the **DXE-RR2X8** to the **DXE-MX2X8** ensure the ten-wire cables are wired the same way at both ends to avoid unnecessary troubleshooting. Use the chart below to record which color wire is connected to each terminal connection of each cable.

<table>
<thead>
<tr>
<th>DXE-RR2X8 Master Connector</th>
<th>Control Wire Color</th>
<th>DXE-MX2X8 Master Connector</th>
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<tbody>
<tr>
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<table>
<thead>
<tr>
<th>Slave Connector</th>
<th>Control Wire Color</th>
<th>Slave Connector</th>
</tr>
</thead>
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<td>G</td>
</tr>
</tbody>
</table>

M = Master
S = Slave
The **DXE-MX2X8** is connected to the two **DXE-CC-8A** control consoles. One is marked as “Radio A” the second is marked as “Radio B”. Two control wire cables are used (one for each **DXE-CC-8A**) to avoid having another break-out cable in the radio room.

The control signals are BCD logic. Along with these BCD signals there are four additional wires used. One for Ground, one for +12 VDC, one for MIL and one for SIL (more on MIL and SIL later).

The ten-pin green connector located on the **DXE-MX2X8** is used to for two BCD control cables to the two **DXE-CC-8A** BCD input Green Connectors (5-pin).

<table>
<thead>
<tr>
<th>MX2X8</th>
<th>Signal Name</th>
<th>Wire Color</th>
<th>CC-8A “A”</th>
<th>CC-8A “B”</th>
<th>External</th>
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<tbody>
<tr>
<td>1</td>
<td>GND</td>
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<td>G</td>
<td>Ground</td>
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<td>+12 VDC</td>
<td></td>
<td></td>
<td></td>
<td>+12 VDC</td>
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<tr>
<td>3</td>
<td>Master A</td>
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<tr>
<td>4</td>
<td>Master B</td>
<td>B</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>5</td>
<td>Master C</td>
<td>C</td>
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<tr>
<td>8</td>
<td>Slave C</td>
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<td>9</td>
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<tr>
<td>10</td>
<td>SIL</td>
<td></td>
<td></td>
<td>SIL</td>
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</tr>
</tbody>
</table>

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**Master Radio "A"**

- **GND**
- +12 VDC

**Slave Radio "B"**

- **GND**
- **MIL**
- **SIL**
DXE-CW9S is a shielded control cable that has 10-conductors and works very well for running control signals for the DXE-RR2X8 remote switch, DXE-MX2X8 interface unit and the two DXE-CC-8A control consoles.

**Note:** Do not seal the connectors! The connectors are recessed inside a drip edge that prevents water from getting into connectors. The cover-to-connector plate junction is not sealed so the unit can "breathe" and eliminate condensation.

**Power, Ground, MIL, SIL Connections**

Referring to the previous wiring diagrams there are five wires shown not connected (GND, +12 VDC, MIL, SIL, GND).

+12 VDC is the line that needs station power (usually +13.8 VDC nominal) connected to it. This line supplies the voltage needed to operate the relays.

The two GND (Ground) wires shown need to be connected to the ground side of the station power.

As in the diagram shown, you will have to supply a ground wire from (in this example) from Slave Radio “B” GND to the same ground that Master Radio “A” is connected to. This connects each controller to the common ground.

Additionally, each DXE-CC-8A control console unit has its own power connection (not shown in the diagram for clarity) that would be connected to the same +13.8 VDC (nominal) station power supply.

The MIL and SIL wires are explained earlier in this manual and their use is optional.
DXE-RR2X8 and DXE-MX2X8 Installation

1. Secure the DXE-RR2X8B switching unit using the included DXE-SSVC-2P stainless steel V-Saddle Clamp.

Mount the DXE-MX2X8 close to the DXE-RR2X8B to keep the interface cable lengths between these units to a minimum using the included DXE-SSVC-2P stainless steel V-Clamp.

The two pictures on this page show just two versions of mounting the units. Your set up may vary.

The connectors must face downward to avoid moisture.

Use Never-Seez®, Anti-Seize or Jet Lube SS-30 on all stainless steel hardware to prevent galling.

2. Fasten all cables to the mounting mast or tower to relieve strain, and gently droop the cables to form a drip loop (do not use tight bends with coaxial cable). Install both of the units with the connectors facing down and use gradual bends or loops in heavy wires. If the system is mounted to a wooden pole or building, a wide copper flashing or heavy wire or strap should be connected from the mounting bracket to a good ground.

Note: Do not seal the connectors! The connectors are recessed inside a drip edge that prevents water from getting into connectors. The cover-to-connector plate junction is not sealed so the unit can “breathe” and eliminate condensation.
Very Simplified Control Logic

When selecting the various switch positions, the first control console that selects a particular position has precedence. This means if Radio “A” selects output port #3, then Radio “B” cannot use port #3 at the same time. Radio “B” will not connect to port #3. The operator will know that there is no antenna selected since there will be no audio from any signals coming into Radio “B”.

A very simplified schematic is shown:

Master Radio “A” and Slave Radio “B” can never use the same output port at the same time. (Ports not selected are grounded)

Caution: Never switch antennas while transmitting. Hot switching with power will create a sustained arc that damages relay contacts. When switching ports, allow 15 ms before transmitting to avoid damaging the switch. This type of damage is NOT covered under warranty.
Specifications

- **Power Rating:** 6 kW ICAS all modes, under 2:1 SWR, 4 kW CCS all modes, under 2:1 SWR
- **Control Voltage:** 10-14 Vdc at 100 mA per port
- **Port-to-Port Isolation:** >70 dB below 30 MHz, >60 dB below 60 MHz
- **Ports Not Selected:** Are Grounded
- **Loss:** <0.3 dBm below at 52 MHz
- **Impedance:** 50 ohms

Manual Updates

Every effort is made to supply the latest manual revision with each product. Occasionally a manual will be updated between the time your DX Engineering product is shipped and when you receive it. Please check the DX Engineering web site ([www.dxengineering.com](http://www.dxengineering.com)) for the latest revision manual.

Notes:
Technical Support

If you have questions about this product, or if you experience difficulties during the installation, contact DX Engineering at (330) 572-3200. You can also e-mail us at:

DXEngineering@DXEngineering.com

For best service, please take a few minutes to review this manual before you call.

Warranty

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