MOTOROLA

RA/RT CONFIGURATION (TRC CONTROL)

For *Quantar* and *Quantro* Stations

1 OVERVIEW

The RA/RT (TRC control) configuration allows a *Quantar/Quantro* station to be TRC controlled by a remote console using either a radio link or a microwave link in place of the usual wireline link. This configuration is typically used in cases where the station is located in a relatively inaccessible location (such as a mountain top) where running phone lines is either impractical or impossible.

As shown in Figure 1A, a pair of stations (called station 1 and station 2) is used to substitute for the normal wireline connections between the repeater station and the console. Figure 1B shows a microwave RA/RT link.
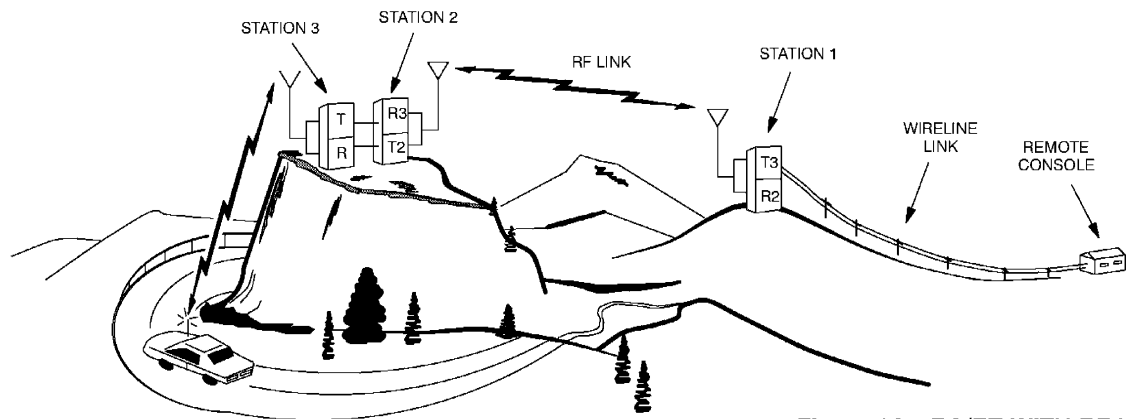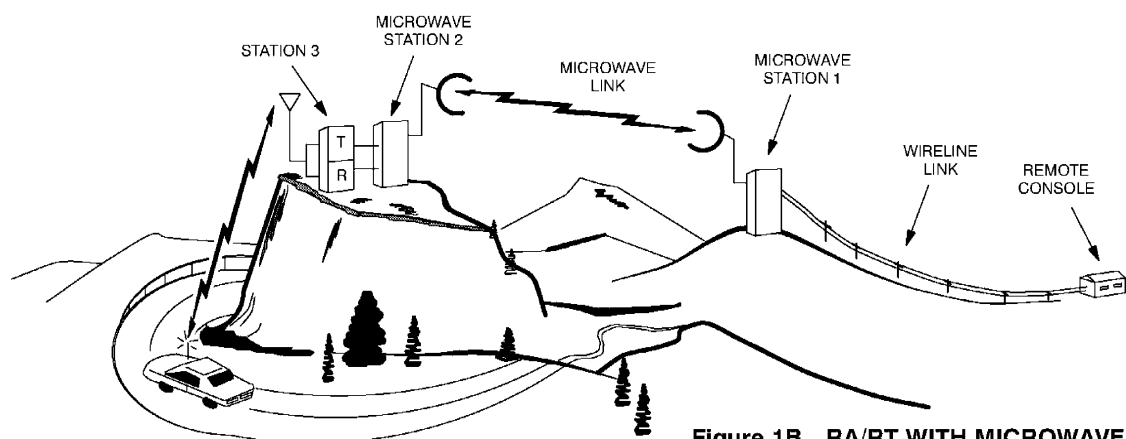
Figure 1A   RA/RT WITH RF LINK

Figure 1B   RA/RT WITH MICROWAVE LINK

Figure 1.   Typical RA/RT Systems (TRC Control)

68P81090E98−A
9/1/00−UP

2 ELECTRICAL CONNECTIONS (RF LINK)

Install stations 1, 2, and 3 as described in the appropriate functional base station manual. Figure 2 shows the connections between the stations necessary to allow RA/RT (TRC control) operation. Perform the following procedures to make the wiring connections between the console and Station 1 and between Stations 2 and 3.
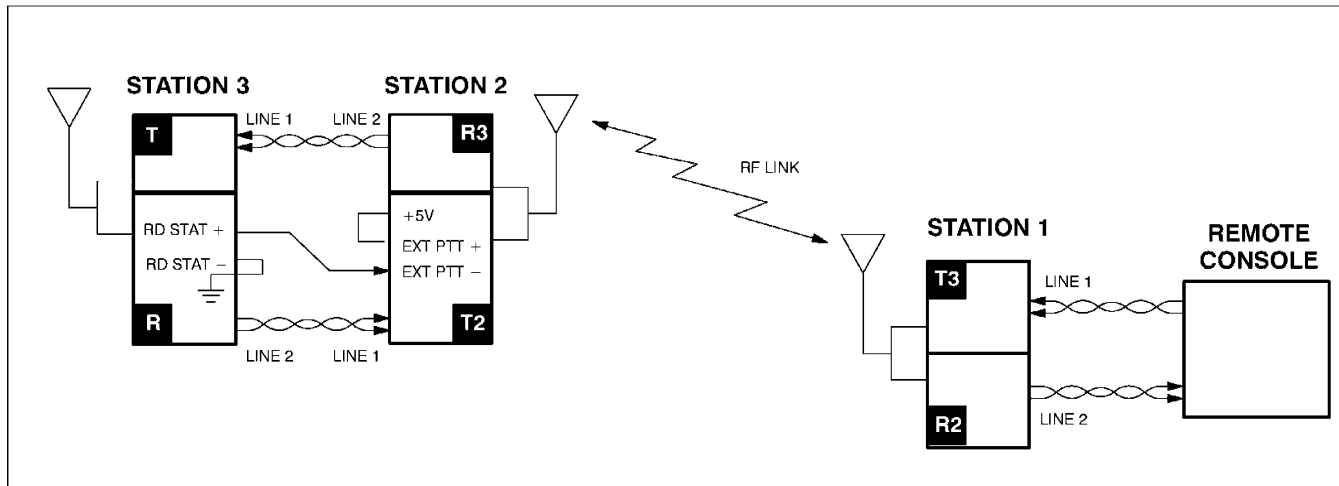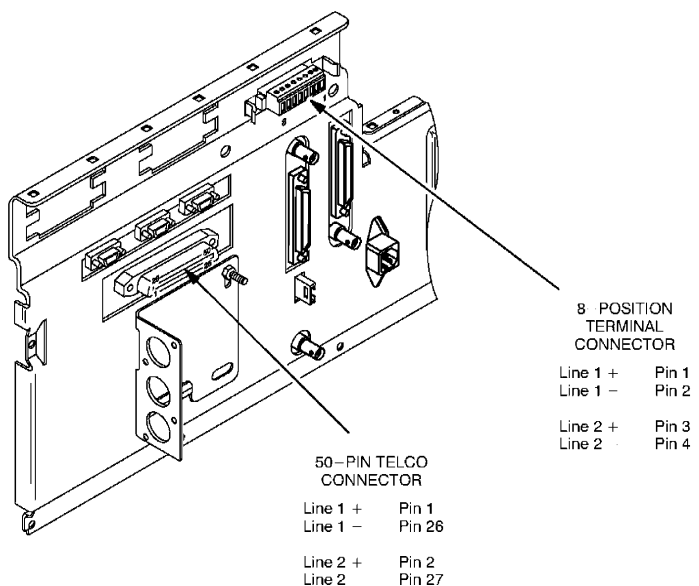

Figure 2. RA/RT (TRC Control) Wiring Connections (RF Link)

Console to Station 1 Wiring Connections

Step 1. Connect the landline−to−station audio (from the console) to the Line 1 connections on the backplane of Station 1 as shown below.

Step 2. Connect the station−to−landline audio (to the console) to the Line 2 connections on the backplane of Station 1, as shown below.

Note *Phone line connections may be made at either the 50-pin Telco connector or the 8-position terminal connector. Refer to the* **Installation** *section of the appropriate station functional manual for more details on phone line connections.*

8 POSITION
TERMINAL
CONNECTOR

Line 1 +	Pin 1
Line 1 −	Pin 2
Line 2 +	Pin 3
Line 2	Pin 4

50−PIN TELCO
CONNECTOR

Line 1 +	Pin 1
Line 1 −	Pin 26
Line 2 +	Pin 2
Line 2	Pin 27

Station 2 to Station 3 Wiring Connections

Wireline Connections

Step 1. Connect the Line 1 audio from Station 2 to the Line 2 connections on Station 3 as shown below.

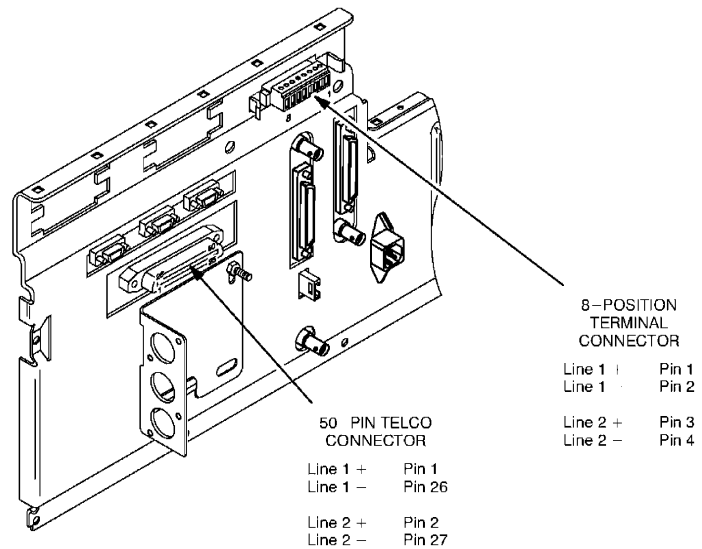**Step 2.** Connect the Line 2 audio from Station 2 to the Line 1 connections on Station 3 as shown below.

Note *Phone line connections may be made at either the 50-pin Telco connector or the 8-position terminal connector. Refer to the* **Installation** *section of the appropriate station functional manual for more details on phone line connections.*
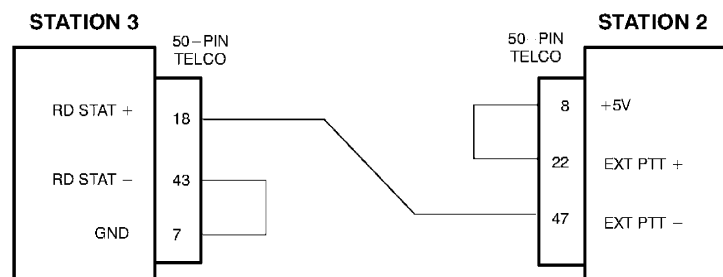

8-POSITION
TERMINAL
CONNECTOR

Line 1	Pin 1
Line 1	Pin 2
Line 2 +	Pin 3
Line 2 −	Pin 4

50 PIN TELCO
CONNECTOR

Line 1 +	Pin 1
Line 1 −	Pin 26
Line 2 +	Pin 2
Line 2 −	Pin 27

RDSTAT to EXT PTT Connection

Step 1. Connect the RD STAT + and − signals from Station 3 to the EXT PTT + and − signals on Station 2 as shown below. An equivalent schematic circuit for the RD STAT and EXT PTT signals is also shown.

Note *RDSTAT INT signal goes high when Station 3 detects receive signal (according to RX Activation parameter setting via RSS). This energizes relay, turns on LED in optocoupler, and pulls* **EXT PTT INT** *low. This causes Station 2 transmitter to key up and routes Line 1 audio to the transmitter.*

3 ELECTRICAL CONNECTIONS (MICROWAVE LINK)

Install the station as described in the appropriate functional base station manual. Figure 2 shows the connections between the station, microwave equipment, and console necessary to allow RA/RT (TRC control) operation. Perform the following procedures to make the wiring connections between the console and the Microwave Station 1 and between Microwave Station 2 and Station 3.

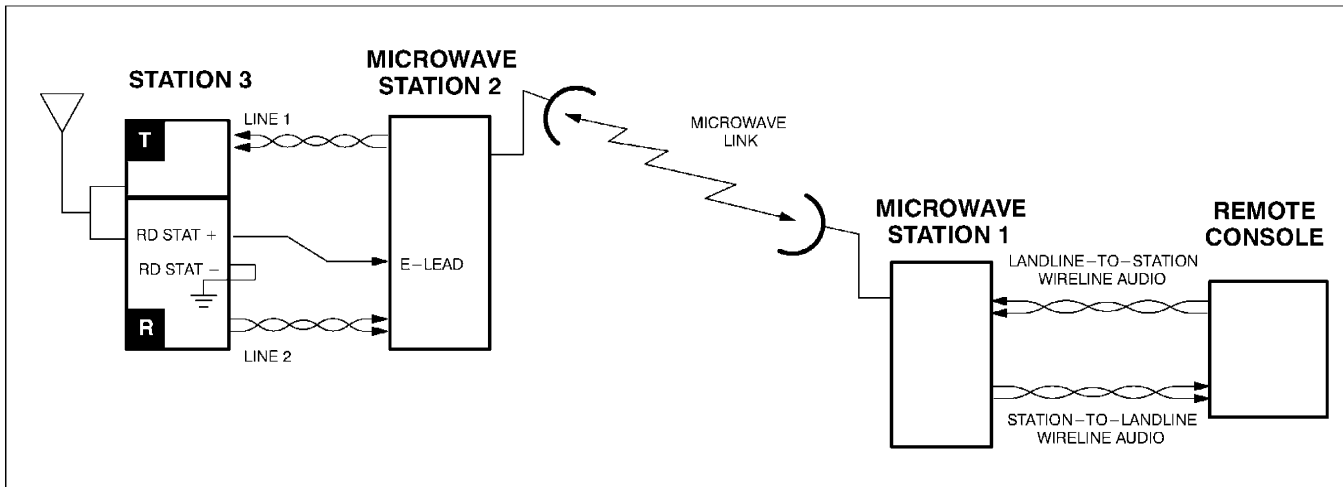**Figure 3.** RA/RT (TRC Control) Wiring Connections (Microwave Link)

Console to Microwave Station 1 Wiring Connections

Note *Refer to the Microwave Station manual for details of making wireline connections.*

Step 1. Connect the landline–to–station audio (from the console) to Microwave Station 1.

Step 2. Connect the station–to–landline audio (to the console) to the Microwave Station.

Microwave Station 2 to Station 3 Wiring Connections

Note *Refer to the Microwave Station manual for details of making wireline connections.*

Note *Phone line connections may be made at either the 50-pin Telco connector or the 8-position terminal connector. Refer to the **Installation** section of the appropriate station functional manual for more details on phone line connections.*

Wireline Connections

Step 1. Connect the station−to−landline audio from Microwave Station 2 to the Line 1 connections on Station 3 as shown below.

Step 2. Connect the landline−to−station audio to Microwave Station 2 to the Line 2 connections on Station 3 as shown below.

8−POSITION
TERMINAL
CONNECTOR

Line 1 +   Pin 1
Line 1 −   Pin 2

Line 2 +   Pin 3
Line 2   Pin 4

50−PIN TELCO
CONNECTOR

Line 1 +   Pin 1
Line 1   Pin 26

Line 2 +   Pin 2
Line 2 −   Pin 27

RDSTAT to E−Lead Connection

Step 1. Connect the RD STAT + and − signals from Station 3 to the E−Lead signal on Microwave Station 2 as shown below. An equivalent schematic circuit for the RD STAT and E LEAD signals is also shown.

STATION 3

50−PIN
TELCO

RD STAT I   18

RD STAT −   43

GND   7

MICROWAVE
STATION 2

E−LEAD

STATION 3   +5V

3.9K

RDSTAT
INT

MICROWAVE STATION 2

E−LEAD

Note *RDSTAT INT signal goes high when Station 3 detects receive signal (according to RX Activation parameter setting via RSS). This energizes relay and provides ground signal to E LEAD input on Microwave Station 2.*

4 RSS PROGRAMMING

Using the *Quantar/Quantro* Radio Service Software (RSS) program, make the following codeplug data changes to allow proper RA/RT operation. (Refer to the *RSS User's Guide 68P81085E35* for details on making codeplug programming changes.)

Table 1. Codeplug Data Changes for RA/RT Operation (RF Link Configuration)

Equipment	Codeplug Data Parameter	RSS User's Guide Location
Station 1	Change command for Guard Tone from (typically) MORE to **KEY.** Leave all other commands empty.	Programming the TRC Commands Data (p/o Chapter 4)
	Disable TX Notch Filter	Programming the Wireline Configuration Data (p/o Chapter 4)
Station 3	**Enable** TX Notch Filter	Programming the Wireline Configuration Data (p/o Chapter 4)

Note — Make sure console is programmed for 240 msec HLGT. On SECURENET systems, increase to 360 msec.

Table 2. Codeplug Data Changes for RA/RT Operation (Microwave Link Configuration)

Equipment	Codeplug Data Parameter	RSS User's Guide Location
Station 3	**Enable** TX Notch Filter	Programming the Wireline Configuration Data (p/o Chapter 4)

Note — Make sure console is programmed for 240 msec HLGT. On SECURENET systems, increase to 360 msec.

5 TX WIRELINE ALIGNMENT

You may align the TX Wireline levels as described in the *RSS User's Guide 68P81085E35* (which requires the use of an external signal generator), or you may use the station to generate the alignment tone. This method is described as follows.

Note — *Make sure the Automatic Line Control parameter is disabled for Stations 1, 2, and 3.*

Station 1 TX Wireline Alignment

Perform standard TX Wireline alignment procedure located in *RSS User's Guide 68P81085E35*.

Station 2 TX Wireline Alignment

Step 1. Connect the RSS to Station 3 and access the RX Wireline Alignment screen.

Step 2. Set the RX wireline level and **Save** it. (Note that the wireline level is typically set to −6 dBm.)

Step 3. Press **F2** to turn on the 1 kHz tone. **Do not** exit this screen.

Step 4. With the RSS program still running, disconnect the RSS cable from Station 3 and connect it to Station 2. Now exit the RX Alignment screen.

Step 5. Access the TX Wireline Alignment screen and press **F8** to save the alignment value. (Station 3 is providing the 1 kHz alignment tone.)

Step 6. Exit the TX Wireline Alignment screen.

Step 7. With the RSS program still running, disconnect the RSS cable from Station 2 and connect it to Station 3.

Step 8. Access the RX Wireline Alignment screen and turn off the 1 kHz tone.

Station 3 TX Wireline Alignment

Step 1. Connect the RSS to Station 2 and access the RX Wireline Alignment screen.

Step 2. Set the RX wireline level and **Save** it. (Note that the wireline level is typically set to −6 dBm.)

Step 3. Press **F2** to turn on the 1 kHz tone. **Do not** exit this screen.

Step 4. With the RSS program still running, disconnect the RSS cable from Station 2 and connect it to Station 3. Now exit the RX Alignment screen.

Step 5. Access the TX Wireline Alignment screen and press **F8** to save the alignment value. (Station 2 is providing the 1 kHz alignment tone.)

Step 6. Exit the TX Wireline Alignment screen.

Step 7. With the RSS program still running, disconnect the RSS cable from Station 3 and connect it to Station 2.

Step 8. Access the RX Wireline Alignment screen and turn off the 1 kHz tone.

![Motorola logo] ***MOTOROLA***

RA/RT CONFIGURATION (E & M KEYING)

For *Quantar* and *Quantro* Stations

1 OVERVIEW

The RA/RT (E & M keying) configuration allows a *Quantar/Quantro* station to be controlled by a remote console using either a radio link or a microwave link in place of the usual wireline link. This configuration is typically used in cases where the station is located in a relatively inaccessible location (such as a mountain top) where running phone lines is either impractical or impossible.

As shown in Figure 1A, a pair of stations (called station 1 and station 2) is used to substitute for the normal wireline connections between the repeater station and the console. Figure 1B shows a microwave RA/RT link.

Figure 1A   RA/RT WITH RF LINK

Figure 1B   RA/RT WITH MICROWAVE LINK

Figure 1. Typical RA/RT Systems (E & M Keying)

2 ELECTRICAL CONNECTIONS (RF LINK)

Install stations 1, 2, and 3 as described in the appropriate functional base station manual. Figure 2 shows the connections between the stations necessary to allow RA/RT (E & M keying) operation. Perform the following procedures to make the wiring connections between the console and Station 1 and between Stations 2 and 3.

Figure 2. RA/RT (E & M Keying) Wiring Connections (RF Link)

Console to Station 1 Wiring Connections

Step 1. Connect the landline–to–station audio (from the console) to the Line 1 connections on the backplane of Station 1 as shown below.

Step 2. Connect the station–to–landline audio (to the console) to the Line 2 connections on the backplane of Station 1, as shown below.

Note *Phone line connections may be made at either the 50-pin Telco connector or the 8-position terminal connector. Refer to the* **Installation** *section of the appropriate station functional manual for more details on phone line connections.*

8 POSITION
TERMINAL
CONNECTOR

Line 1 +   Pin 1
Line 1 −   Pin 2

Line 2 +   Pin 3
Line 2   Pin 4

50–PIN TELCO
CONNECTOR

Line 1 +   Pin 1
Line 1 −   Pin 26

Line 2 +   Pin 2
Line 2   Pin 27

Station 2 to Station 3
Wiring Connections

Wireline Connections

Step 1. Connect the Line 1 audio from Station 2 to the Line 2 connections on Station 3 as shown below.

Step 2. Connect the Line 2 audio from Station 2 to the Line 1 connections on Station 3 as shown below.

*Note Phone line connections may be made at either the 50-pin Telco connector or the 8-position terminal connector. Refer to the **Installation** section of the appropriate station functional manual for more details on phone line connections.*

8−POSITION
TERMINAL
CONNECTOR

Line 1	Pin 1
Line 1	Pin 2
Line 2 +	Pin 3
Line 2 −	Pin 4

50 PIN TELCO
CONNECTOR

Line 1 +	Pin 1
Line 1 −	Pin 26
Line 2 +	Pin 2
Line 2 −	Pin 27

RDSTAT to EXT PTT Connection (Station 3 to Station 2)

Step 1. Connect the RD STAT + and − signals from Station 3 to the EXT PTT + and − signals on Station 2 as shown below. An equivalent schematic circuit for the RD STAT and EXT PTT signals is also shown.

STATION 3

50−PIN TELCO

RD STAT +	18
RD STAT −	43
GND	7

50 PIN TELCO

8	+5V
22	EXT PTT +
47	EXT PTT −

STATION 2

*Note   **RDSTAT INT** signal goes high when Station 3 detects receive signal (according to RX Activation parameter setting via RSS). This energizes relay, turns on LED in optocoupler, and pulls **EXT PTT INT** low. This causes Station 2 transmitter to key up and routes Line 1 audio to the transmitter.*

STATION 3

+5V

RDSTAT
INT

3.9K

STATION 2

+5V

+5V

100K

3.9K   3.9K

220PF

220PF

0.1UF

EXT PTT
INT

Station 2 to Station 3 Wiring Connections (Cont'd)

RDSTAT to EXT PTT Connection (Station 2 to Station 3)

Step 1. Connect the RD STAT + and − signals from Station 2 to the EXT PTT + and − signals on Station 3 as shown below. An equivalent schematic circuit for the RD STAT and EXT PTT signals is also shown.

Note *RDSTAT INT signal goes high when Station 2 detects receive signal (according to RX Activation parameter setting via RSS). This energizes relay, turns on LED in opto-coupler, and pulls **EXT PTT INT** low. This causes Station 3 transmitter to key up and routes Line 1 audio to the transmitter.*
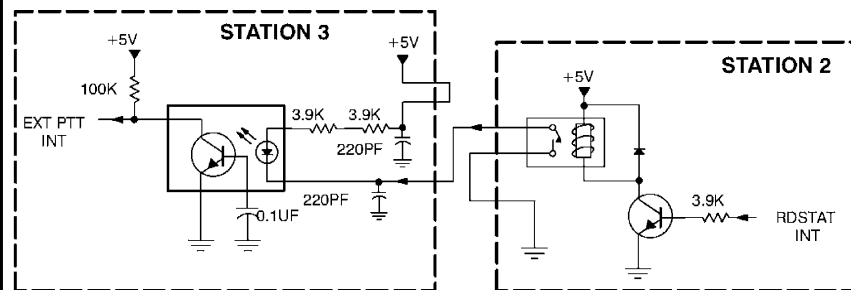
3 ELECTRICAL CONNECTIONS (MICROWAVE LINK)

Install the station as described in the appropriate functional base station manual. Figure 2 shows the connections between the station, microwave equipment, and console necessary to allow RA/RT (E & M keying) operation. Perform the following procedures to make the wiring connections between the console and the Microwave Station 1 and between Microwave Station 2 and Station 3.
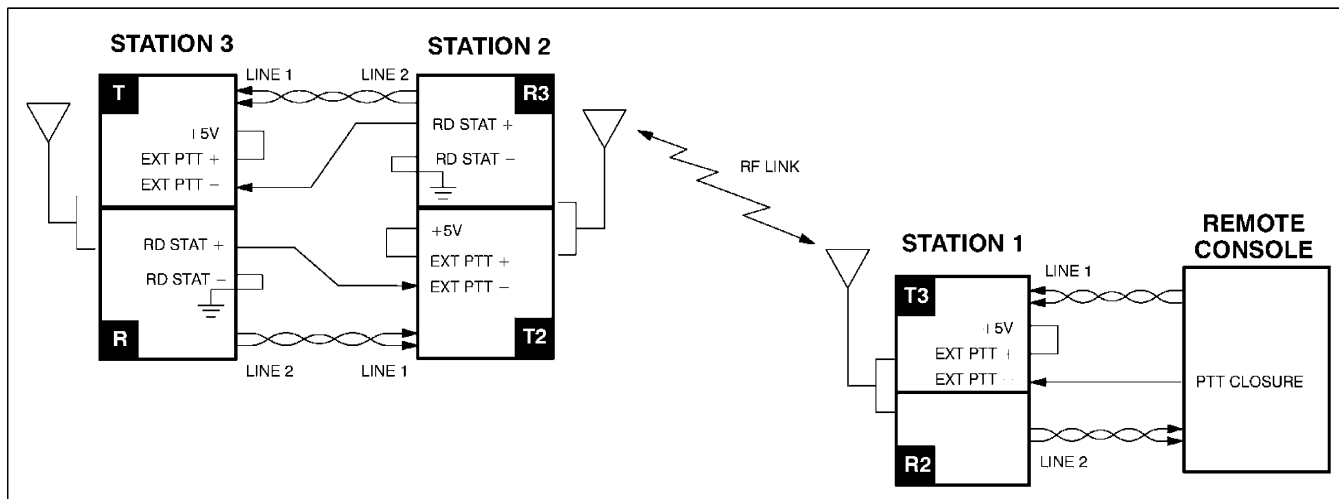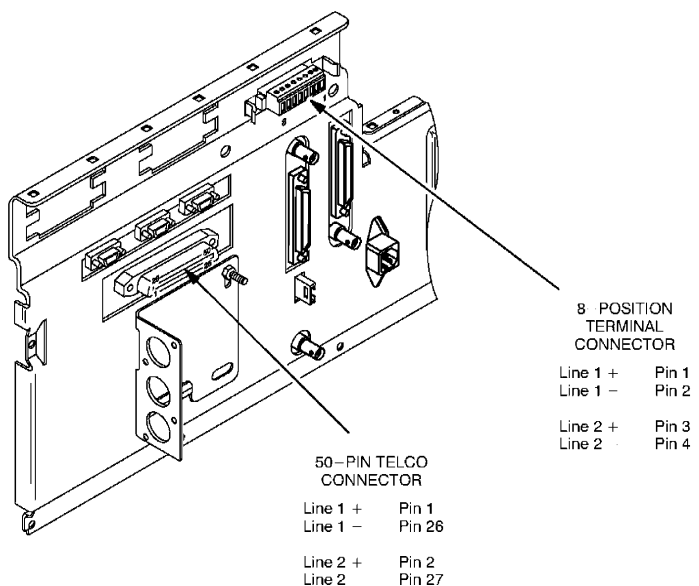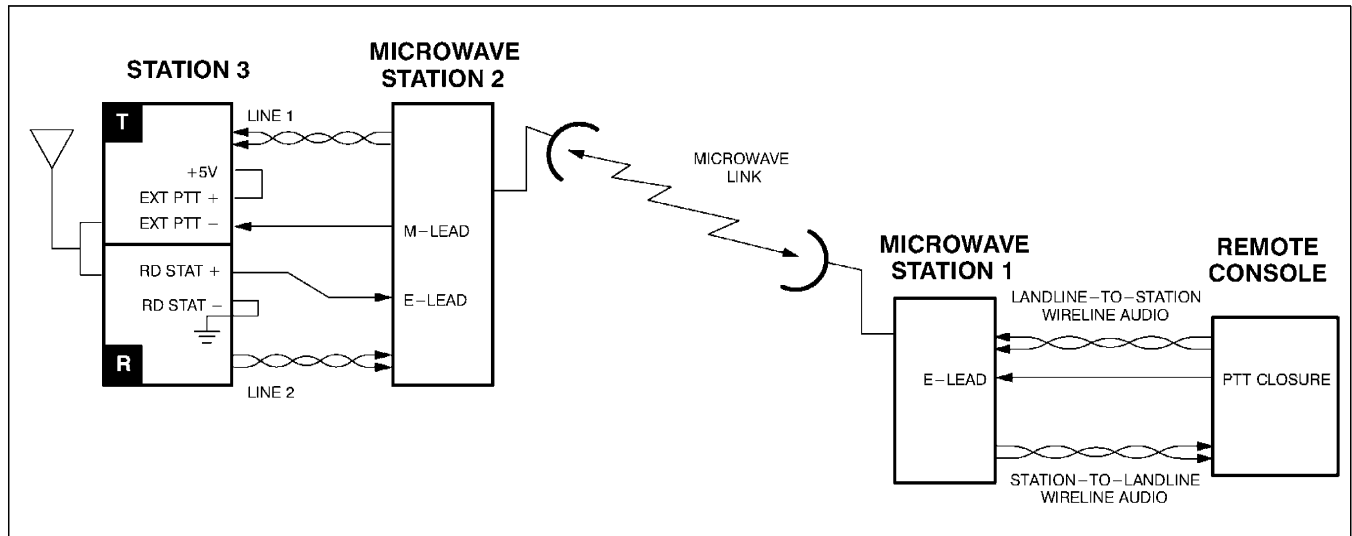

Figure 3. RA/RT (E & M Keying) Wiring Connections (Microwave Link)

Console to Microwave Station 1 Wiring Connections

Note *Refer to the Microwave Station manual for details of making wireline connections.*

Step 1. Connect the landline−to−station audio (from the console) to Microwave Station 1.

Step 2. Connect the station−to−landline audio (to the console) to the Microwave Station.

Microwave Station 2 to Station 3 Wiring Connections
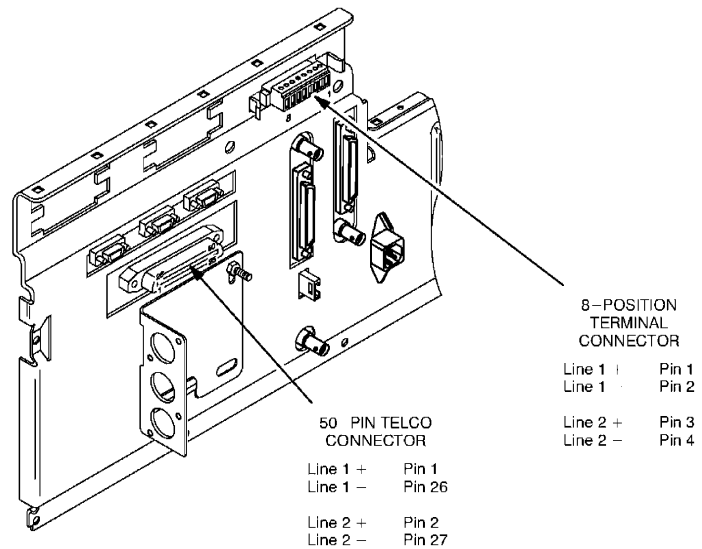
Note *Refer to the Microwave Station manual for details of making wireline connections.*

Note *Phone line connections may be made at either the 50-pin Telco connector or the 8-position terminal connector. Refer to the **Installation** section of the appropriate station functional manual for more details on phone line connections.*
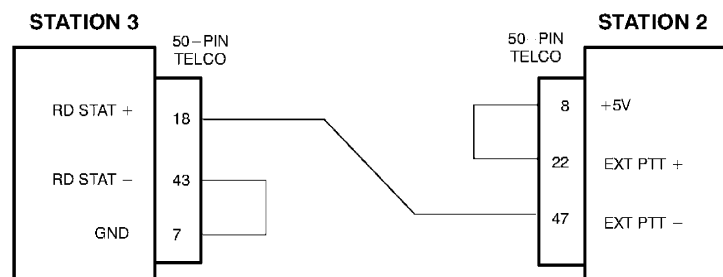
Wireline Connections

Step 1. Connect the station−to−landline audio from Microwave Station 2 to the Line 1 connections on Station 3 as shown below.

Step 2. Connect the landline−to−station audio to Microwave Station 2 to the Line 2 connections on Station 3 as shown below.

8−POSITION
TERMINAL
CONNECTOR

Line 1 +   Pin 1
Line 1 −   Pin 2

Line 2 +   Pin 3
Line 2 −   Pin 4

50−PIN TELCO
CONNECTOR

Line 1 +   Pin 1
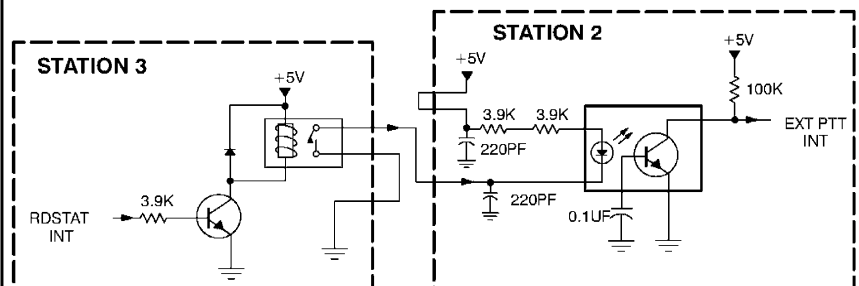Line 1   Pin 26

Line 2 +   Pin 2
Line 2 −   Pin 27

RDSTAT to E−Lead Connection (Station 3 to Station 2)

Step 1. Connect the RD STAT + and − signals from Station 3 to the E−Lead signal on Microwave Station 2 as shown below. An equivalent schematic circuit for the RD STAT and E LEAD signals is also shown.

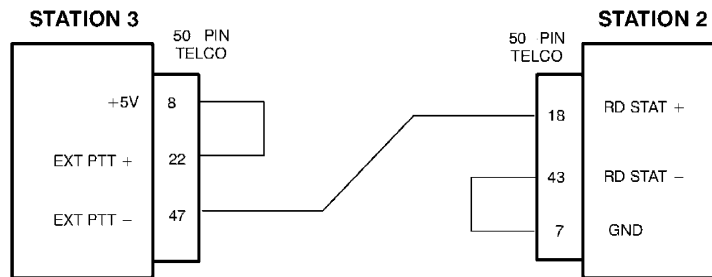**Note** **RDSTAT INT** *signal goes high when Station 3 detects receive signal (according to RX Activation parameter setting via RSS). This energizes relay and provides ground signal to **E LEAD** input on Microwave Station 2.*

Microwave Station 2 to Station 3 Wiring Connections (Cont'd)

M–Lead to EXT PTT Connection (Station 2 to Station 3)

Step 1. Connect the M–Lead on the Microwave Station 2 to the EXT PTT + signal on Station 3 as shown below. An equivalent schematic circuit for the EXT PTT and M LEAD signals is also shown.

Note *MLEAD output from Microwave Station 2 goes low when transmitting signal on wireline. This causes **EXT PTT** to activate and key Station 3 transmitter.*
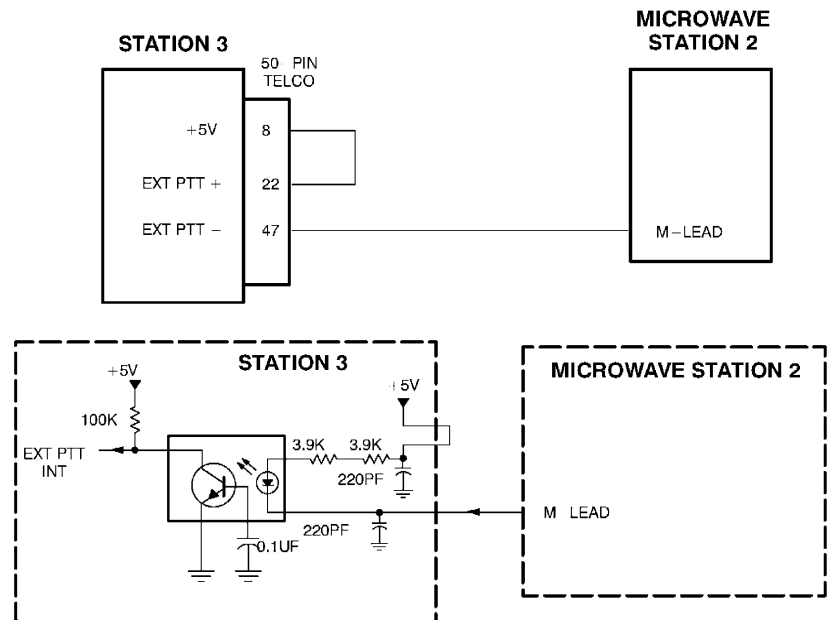
4 RSS PROGRAMMING

Using the *Quantar/Quantro* Radio Service Software (RSS) program, make the following codeplug data changes to allow proper RA/RT operation. (Refer to the *RSS User's Guide 68P81085E35* for details on making codeplug programming changes.)

Table 1. Codeplug Data Changes for RA/RT Operation (RF Link Configuration)

Equipment	Codeplug Data Parameter	RSS User's Guide Location
Station 1	**Disable** TX Notch Filter	Programming the Wireline Configuration Data (p/o Chapter 4)
Station 3	**Disable** TX Notch Filter	Programming the Wireline Configuration Data (p/o Chapter 4)

Table 2. Codeplug Data Changes for RA/RT Operation (Microwave Link Configuration)

Equipment	Codeplug Data Parameter	RSS User's Guide Location
Station 3	**Disable** TX Notch Filter	Programming the Wireline Configuration Data (p/o Chapter 4)

5 TX WIRELINE ALIGNMENT

You may align the TX Wireline levels as described in the *RSS User's Guide 68P81085E35* (which requires the use of an external signal generator), or you may use the station to generate the alignment tone. This method is described as follows.

Note — *Make sure the Automatic Line Control parameter is disabled for Stations 1,2, and 3.*

Station 1 TX Wireline Alignment

Perform standard TX Wireline alignment procedure located in *RSS User's Guide 68P81085E35*.

Station 2 TX Wireline Alignment

Step 1. Connect the RSS to Station 3 and access the RX Wireline Alignment screen.

Step 2. Set the RX wireline level and **Save** it. (Note that the wireline level is typically set to −6 dBm.)

Step 3. Press **F2** to turn on the 1 kHz tone. **Do not** exit this screen.

Step 4. With the RSS program still running, disconnect the RSS cable from Station 3 and connect it to Station 2. Now exit the RX Alignment screen.

Step 5. Access the TX Wireline Alignment screen and press **F8** to save the alignment value. (Station 3 is providing the 1 kHz alignment tone.)

Step 6. Exit the TX Wireline Alignment screen.

Step 7. With the RSS program still running, disconnect the RSS cable from Station 2 and connect it to Station 3.

Step 8. Access the RX Wireline Alignment screen and turn off the 1 kHz tone.

Station 3 TX Wireline Alignment

Step 1. Connect the RSS to Station 2 and access the RX Wireline Alignment screen.

Step 2. Set the RX wireline level and **Save** it. (Note that the wireline level is typically set to −6 dBm.)

Step 3. Press **F2** to turn on the 1 kHz tone. **Do not** exit this screen.

Step 4. With the RSS program still running, disconnect the RSS cable from Station 2 and connect it to Station 3. Now exit the RX Alignment screen.

Step 5. Access the TX Wireline Alignment screen and press **F8** to save the alignment value. (Station 2 is providing the 1 kHz alignment tone.)

Step 6. Exit the TX Wireline Alignment screen.

Step 7. With the RSS program still running, disconnect the RSS cable from Station 3 and connect it to Station 2.

Step 8. Access the RX Wireline Alignment screen and turn off the 1 kHz tone.

MOTOROLA

FALL BACK IN-CABINET REPEAT FEATURE

For *Quantar* and *Quantro* Stations

1 OVERVIEW

Feature Description

The Fall Back In-Cabinet Repeat (FBICR) feature provides limited backup communications capabilities in Simulcast (Option U764) and Non-Simulcast Voting (Option X269) systems in which the link to the Comparator has been lost (phone line disruption, cable disconnection, etc.). Figure 1 and Figure 2 illustrate typical scenarios in which the FBICR mode is activated. (Note that in these examples automatic FBICR mode is assumed; refer to *Automatic and External Modes* below for details.)

Note *The FBICR feature is supported only for Station/RSS Release R10.03.00 and later.*

Automatic and External Modes

The FBICR feature may be configured for either automatic or external modes (depending on system types, as explained later). Automatic mode is configured by programming certain station parameters using the Radio Service Software (RSS). External mode requires (in addition to RSS settings) that electrical connections be made to certain pins on the System Connector (Connector #17) located on the station backplane; external equipment (customer-provided) is used to ground one or more of these lines to force the station into FBICR mode.

The FBICR feature can be configured for the following system types in Automatic or External Modes:

Automatic Mode
- Conventional Analog (both Simulcast and Non-Simulcast Voting Systems)
- Conventional *ASTRO* (CAI) (both Simulcast and Non-Simulcast Voting Systems)
- Trunked *ASTRO* (SMARTZONE or SMARTNET) (CAI, VSELP) (Simulcast only)

External Mode
- Conventional Analog (both Simulcast and Non-Simulcast Voting Systems)
- Conventional *ASTRO* (CAI) (both Simulcast and Non-Simulcast Voting Systems)
- Trunked Analog (SMARTZONE or SMARTNET) (both Simulcast and Non-Simulcast Voting Systems)
- Trunked *ASTRO* (SMARTZONE or SMARTNET) (CAI, VSELP) (Simulcast only)

Commercial Government and Industrial Solutions Sector
1301 E. Algonquin Road, Schaumburg, IL 60196

If either/both of these links fail
(for any coverage area), station
will revert to FBICR mode.

Coverage Area A

Coverage Area B

Coverage Area C

STATION

STATION

STATION

OVERLAP

OVERLAP

TO
COVERAGE
AREA B
STATION TX

TO
COVERAGE
AREA C
STATION TX

COMPARATOR

FROM
COVERAGE
AREA
B

FROM
COVERAGE
AREA
C
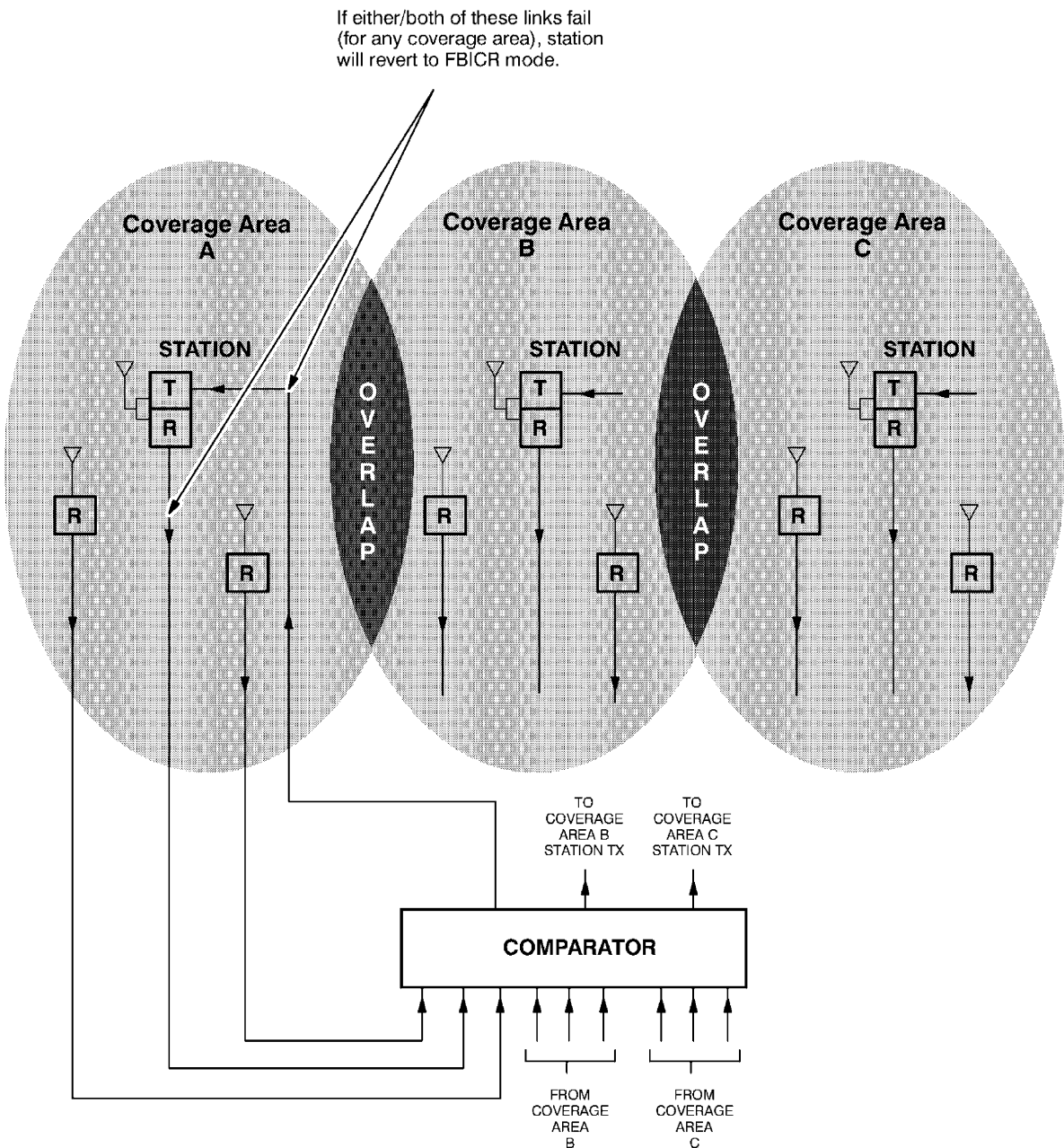
Figure 1. FBICR Feature in Simulcast Voting System (Automatic FBICR Mode Shown)

In either/both of these links fail, station will revert to FBICR mode

STATION

T

R

RECEIVER

RECEIVER

R

R

COMPARATOR
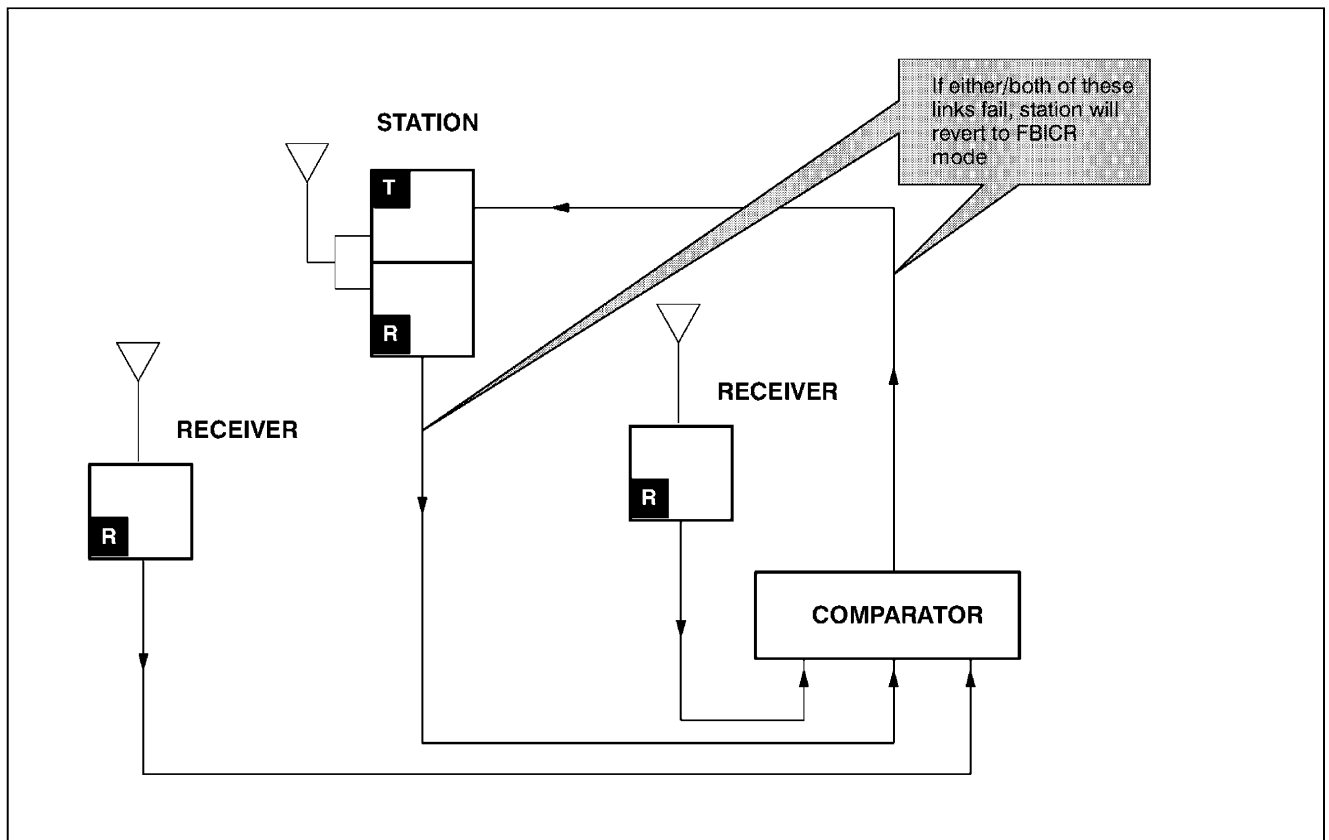
Figure 2. FBICR Feature in Non-Simulcast Voting System (Automatic FBICR Mode Shown)

Link Failure Detection Requirements

Before automatically enabling FBICR mode, a link failure detection must occur, defined as follows:

For Digital Systems

- Protocol Failure
- Carrier Detect Loss

Note *In a V.24 Hybrid Configuration, the loss of the analog link **will not** cause the station to enter FBICR mode. Only the failure of the digital link will cause the station to enter FBICR mode.*

For Analog Systems

- Loss of External PTT (Simulcast)
- No TRC Keyup (Voting)

Other Things to Know

- It is important to note that a station operating in FBICR mode is independent of other stations/receivers in the particular system. This is especially important in a Simulcast system, because simulcast transmission timing will be lost for the overlap coverage area between an active Simulcast station and a FBICR station. In a typical Simulcast scenario, the station responsible for the major coverage area is set for FBICR, and any adjacent stations are subsequently disabled.
- Automatic and External modes are mutually exclusive (i.e., a station may not be configured for both modes).

2 CONFIGURING THE FBICR FEATURE

Depending on the system type and whether you wish to configure for automatic or external operation, the FBICR feature must be configured by using the RSS only, or a combination of RSS programming and external wiring connections. Each configuration scenario is described on the following pages.

Automatic Mode

Conventional Analog or Conventional ASTRO (CAI) (Simulcast or Non-Simulcast Voting Systems)

Step 1. Access the *Wireline Configuration Screen*.

Step 2. Set the *Fall Back In-Cabinet Repeat* field to **ENABLED**.

Step 3. Enter the desired delay time (in msecs) in the *Fall Back Timer* field.

```
MOTOROLA RADIO SERVICE SOFTWARE          Use Up/Down Arrow Keys to Select
BASE STATION PRODUCTS                     Wireline Operation
Page 1 of 2          VER:XX.XX.XX
:CHANGE/VIEW:WIRELINE CONFIGURATION

Wireline Operation              4 WIRE FULL DUPLEX
Console Priority                DISABLED              OPTION
Remote Control Type             ASTRO
   TRC Input                    Line 1
Outbound Analog Link Timer      120 sec
Comparator                      NONE                  OPTION
   Fall Back In-Cabinet Repeat  ENABLED
   Fall Back Timer              xxx   msec

Status Tone                     ENABLED
   Status Tone Frequency        2175  kHz
Wireline Squelch                DISABLED



Rx Securenet/ASTRO To Wireline  ENABLED
Equalization                    DISABLED


F1      F2      F3      F4      F5      F6      F7      F8      F9      F10
HELP                                                                   EXIT
```

◆ **End of Procedure** ◆

Automatic Mode (continued)

Note While in FBICR mode, the station will transmit Failsoft beeps and the subscriber will give the Fail- soft indication.

Trunked (SMARTZONE or SMARTNET) ASTRO (CAI, VSELP) (Simulcast Systems Only)

Step 1. Access the *Wireline Configuration Screen*.

Step 2. Set the *Fall Back In-Cabinet Repeat* field to **ENABLED**. (No *Fall Back Timer* setting is required.)

```
MOTOROLA RADIO SERVICE SOFTWARE          Use Up/Down Arrow Keys to Select
BASE STATION PRODUCTS                    Wireline Operation
Page 1 of 2           VER:XX.XX.XX
:CHANGE/VIEW:WIRELINE CONFIGURATION


Wireline Operation            4 WIRE FULL DUPLEX
Console Priority              DISABLED                OPTION
Remote Control Type           ASTRO
   TRC Input                  Line 1
Outbound Analog Link Timer    120 sec
Comparator                    NONE                    OPTION
   Fall Back In-Cabinet Repeat    ENABLED


Status Tone                   ENABLED
   Status Tone Frequency      2175  kHz
Wireline Squelch              DISABLED



Rx Securenet/ASTRO To Wireline    ENABLED
Equalization                      DISABLED


F1    F2     F3     F4     F5     F6     F7     F8     F9     F10
HELP                                                          EXIT
```

Step 3. Access the *6809 Trunking Interface Screen*.

Step 4. Make sure the *Failsoft* field is set to **ENABLED**, and set the *Modulation Type* to **ASTRO** or **ANALOG**.

```
MOTOROLA RADIO SERVICE SOFTWARE          Use Up/Dn Arrow Keys To Select
BASE STATION PRODUCTS                    RSTAT Mode
         VER:XX.XX.XX
:CHANGE/VIEW:6809 TRUNKING


      RSTAT Mode                      Normal

      Failsoft                        ENABLED
         Line TRC Encode              DISABLED
         Failsoft Carrier Squelch     DISABLED
         Dual CT Failsoft Only        DISABLED
         Modulation Type              ASTRO

      Trunking Tickle Source          TX DATA LINE
      Trunking Tickle Source TOT      1       sec
      CSC Logical Channel Number      1
      Rx Discriminator Type           QUANTAR/MICOR


F1    F2     F3     F4     F5     F6     F7     F8     F9     F10
HELP                                                          EXIT
```

◆ **End of Procedure** ◆

External Mode

Conventional Analog or Conventional ASTRO (CAI)
(Simulcast or Non-Simulcast Voting Systems)

Step 1.   Access the *Wireline Configuration Screen*.

Step 2.   Set the *Fall Back In-Cabinet Repeat* field to **DISABLED**.

```
┌──────────────────────────────────────────────┬─────────────────────────────┐
│ MOTOROLA RADIO SERVICE SOFTWARE              │ Use Up/Down Arrow Keys to Select │
│ BASE STATION PRODUCTS                        │ Wireline Operation          │
│ Page 1 of 2          VER:XX.XX.XX            │                             │
│ :CHANGE/VIEW:WIRELINE CONFIGURATION          │                             │
├──────────────────────────────────────────────┴─────────────────────────────┤
│                                                                             │
│ Wireline Operation          4 WIRE FULL DUPLEX                              │
│ Console Priority            DISABLED                    OPTION              │
│ Remote Control Type         ASTRO                                          │
│    TRC Input                Line 1                                         │
│ Outbound Analog Link Timer  120  sec                                      │
│ Comparator                  NONE                       OPTION              │
│ ▓Fall Back In-Cabinet Repeat  DISABLED▓                                    │
│    Fall Back Timer          0    msec                                     │
│                                                                             │
│ Status Tone                 ENABLED                                        │
│    Status Tone Frequency    2175  kHz                                      │
│ Wireline Squelch            DISABLED                                       │
│                                                                             │
│                                                                             │
│ Rx Securenet/ASTRO To Wireline  ENABLED                                    │
│ Equalization                DISABLED                                       │
├─────────────────────────────────────────────────────────────────────────────┤
│ F1      F2      F3      F4      F5      F6      F7      F8      F9      F10  │
│ HELP                                                                  EXIT │
└─────────────────────────────────────────────────────────────────────────────┘
```

Step 3.   Connect a wire to pin 16 of System Connector #17 (located on the station backplane). To activate FBICR mode, an external circuit (customer-provided) must ground this pin.

CONNECTOR #17

◆ **End of Procedure** ◆

External Mode (continued)

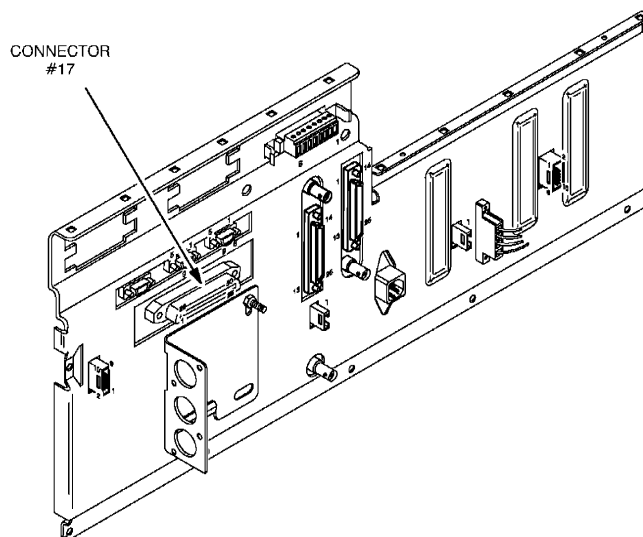### Trunked (SMARTZONE or SMARTNET) Analog (Simulcast or Non-Simulcast Voting Systems)

Step 1. Access the *Wireline Configuration Screen*.

Step 2. Set the *Fall Back In-Cabinet Repeat* field to **ENABLED**.
Set the *Fall Back In-Cabinet Repeat* field to **0 msec**.

```
┌─────────────────────────────────────────────────┬──────────────────────────────┐
│ MOTOROLA RADIO SERVICE SOFTWARE                  │ Use Up/Down Arrow Keys to    │
│ BASE STATION PRODUCTS                            │ Select                       │
│ Page 1 of 2           VER:XX.XX.XX               │ Wireline Operation           │
│ :CHANGE/VIEW:WIRELINE CONFIGURATION              │                              │
├─────────────────────────────────────────────────┴──────────────────────────────┤
│                                                                                 │
│  Wireline Operation              4 WIRE FULL DUPLEX                             │
│  Console Priority                DISABLED                    OPTION             │
│  Remote Control Type             ASTRO                                          │
│     TRC Input                    Line 1                                         │
│  Outbound Analog Link Timer      120  sec                                       │
│  Comparator                      NONE                        OPTION             │
│  Fall Back In-Cabinet Repeat     ENABLED                                        │
│     Fall Back Timer              0    msec                                      │
│                                                                                 │
│  Status Tone                     ENABLED                                        │
│     Status Tone Frequency        2175  kHz                                      │
│  Wireline Squelch                DISABLED                                       │
│                                                                                 │
│                                                                                 │
│  Rx Securenet/ASTRO To Wireline  ENABLED                                        │
│  Equalization                    DISABLED                                       │
└─────────────────────────────────────────────────────────────────────────────────┘
 F1    F2    F3    F4    F5    F6    F7    F8    F9    F10
 HELP                                                EXIT
```

Step 3. Access the *6809 Trunking Interface Screen*.

Step 4. Set the *Modulation Type* to **ANALOG**.

```
┌─────────────────────────────────────────────────┬──────────────────────────────┐
│ MOTOROLA RADIO SERVICE SOFTWARE                  │ Use Up/Dn Arrow Keys To      │
│ BASE STATION PRODUCTS                            │ Select                       │
│           VER:XX.XX.XX                            │ RSTAT Mode                   │
│ :CHANGE/VIEW:6809 TRUNKING                        │                              │
├─────────────────────────────────────────────────┴──────────────────────────────┤
│                                                                                 │
│     RSTAT Mode                   Normal                                         │
│                                                                                 │
│     Failsoft                     DISABLED                                       │
│        Line TRC Encode           DISABLED                                       │
│        Failsoft Carrier Squelch  DISABLED                                       │
│        Dual CT Failsoft Only     DISABLED                                       │
│        Modulation Type           ANALOG                                         │
│                                                                                 │
│     Trunking Tickle Source       TX DATA LINE                                   │
│     Trunking Tickle Source TOT   1      sec                                     │
│     CSC Logical Channel Number   1                                             │
│     Rx Discriminator Type        QUANTAR/MICOR                                  │
└─────────────────────────────────────────────────────────────────────────────────┘
 F1    F2    F3    F4    F5    F6    F7    F8    F9    F10
 HELP                                                EXIT
```

External Mode
(continued)

Trunked (SMARTZONE or SMARTNET) Analog (continued)

Step 5. Connect a wire to pin 11 and pin 16 of System Connector #17 (located on the station backplane). To activate FBICR mode, an external circuit (customer-provided) must ground these pins.

Note *When pins 11 and 16 are grounded, the station will enter FBICR operation. The station will ignore any wireline transmit activity, ignore the EXT PTT line, and assert the TSTAT line. While in FBICR mode, the station will transmit Failsoft beeps and the subscriber will give the Failsoft indication.*

CONNECTOR #17

◆ **End of Procedure** ◆

External Mode (continued)

Trunked (SMARTZONE or SMARTNET) ASTRO (CAI, VSELP) (Simulcast Systems Only)

Step 1. Access the *Wireline Configuration Screen*.

Step 2. Set the *Fall Back In-Cabinet Repeat* field to **DISABLED**. (No *Fall Back Timer* setting is required.)

```
MOTOROLA RADIO SERVICE SOFTWARE          Use Up/Down Arrow Keys to Select
BASE STATION PRODUCTS                    Wireline Operation
Page 1 of 2          VER:XX.XX.XX
:CHANGE/VIEW:WIRELINE CONFIGURATION
```

Wireline Operation	4 WIRE FULL DUPLEX	
Console Priority	DISABLED	OPTION
Remote Control Type	ASTRO	
TRC Input	Line 1	
Outbound Analog Link Timer	120 sec	
Comparator	NONE	OPTION
Fall Back In-Cabinet Repeat	DISABLED	
Status Tone	ENABLED	
Status Tone Frequency	2175 kHz	
Wireline Squelch	DISABLED	
Rx Securenet/ASTRO To Wireline	ENABLED	
Equalization	DISABLED	

F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
HELP									EXIT

Step 3. Access the *6809 Trunking Interface Screen*.

Step 4. Set the *Modulation Type* to **ASTRO** or **ANALOG**.

```
MOTOROLA RADIO SERVICE SOFTWARE          Use Up/Dn Arrow Keys To Select
BASE STATION PRODUCTS                    RSTAT Mode
          VER:XX.XX.XX
:CHANGE/VIEW:6809 TRUNKING
```

RSTAT Mode	Normal
Failsoft	DISABLED
Line TRC Encode	DISABLED
Failsoft Carrier Squelch	DISABLED
Dual CT Failsoft Only	DISABLED
Modulation Type	ASTRO
Trunking Tickle Source	TX DATA LINE
Trunking Tickle Source TOT	1 sec
CSC Logical Channel Number	1
Rx Discriminator Type	QUANTAR/MICOR

F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
HELP									EXIT

External Mode
(continued)

Trunked (SMARTZONE or SMARTNET) ASTRO (CAI, VSELP) (continued)

Step 5. Connect a wire to pin 11 and pin 16 of System Connector #17 (located on the station backplane). To activate FBICR mode, an external circuit (customer-provided) must ground these pins.

Note *When pins 11 and 16 are grounded, the station will enter FBICR operation. The station will ignore any wireline transmit activity, ignore the EXT PTT line, and assert the TSTAT line. While in FBICR mode, the station will transmit Failsoft beeps and the subscriber will give the Failsoft indication.*

CONNECTOR
#17

◆ **End of Procedure** ◆

MOTOROLA
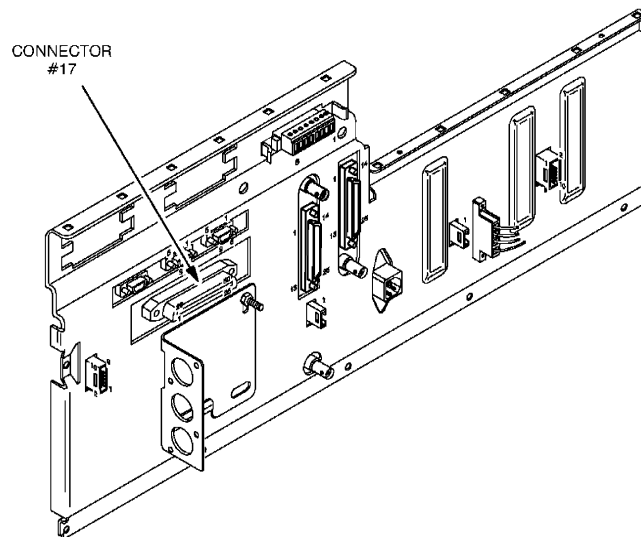
MAIN/STANDBY CONFIGURATION
For *Quantar* and *Quantro* Stations

1 OVERVIEW

The Main/Standby configuration allows two *Quantar/Quantro* stations to operate as a redundant pair. If the Main station should fail (due to hardware or software malfunction), the Standby station will immediately take over and provide service. Each station's operating mode (Main or Standby) is determined by a setting made using the Radio Service Software (RSS).

Please note the following requirements/restrictions that are applicable to the Main/Standby feature:
- Main/Standby feature is compatible with stations in **Conventional** systems only
- Main/Standby feature **is not** compatible with *ASTRO* signaling
- The station must be equipped with an 8−wire Wireline Interface Module and the Enhanced Wildcard Option

68P81095E89−O
2/15/99−UP

2 ELECTRICAL CONNECTIONS

Install both stations (designating one as A and the other as B) as described in the appropriate functional base station manual. Make the wiring connections as shown in Figure 2 to allow Main/Standby operation.

Hint *Wiring connections between the two stations and with external equipment will be facilitated by using a standard telephone punch block. Figure 1 shows how to connect the stations and punch block.*

STATION A

STATION B

PUNCH BLOCK

CONNECTOR #17
50-PIN
TELCO

CONNECTOR #17
50-PIN
TELCO
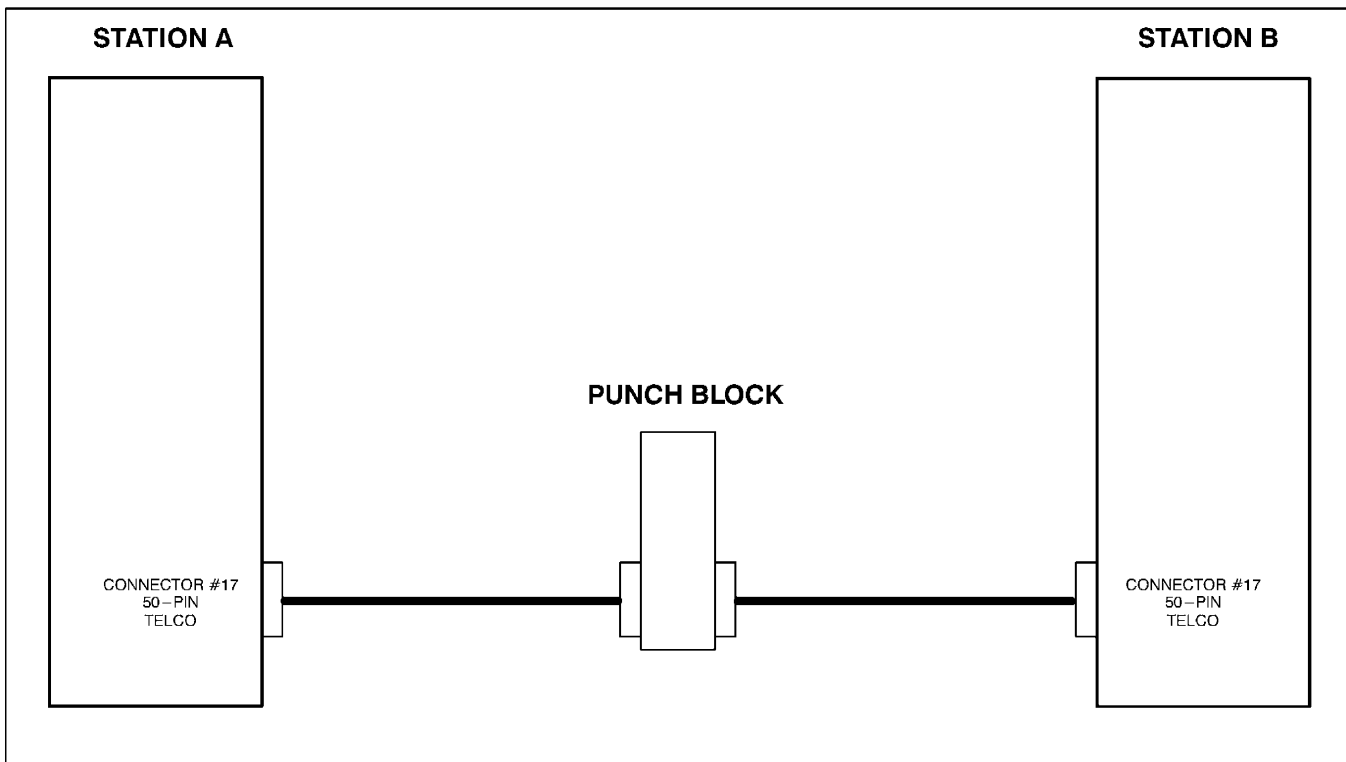
Figure 1. Using Punch Block to Facilitate Wiring Connections
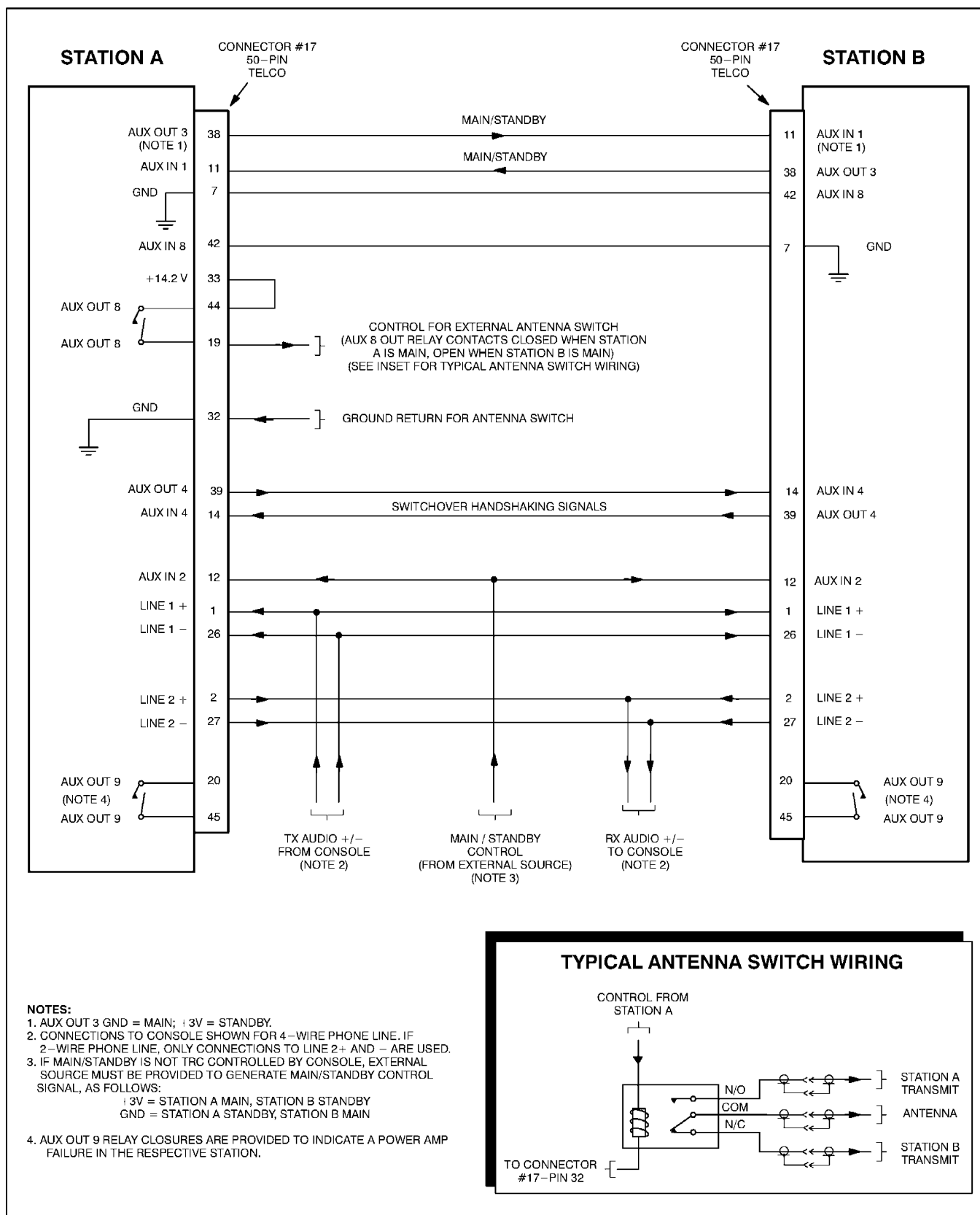
Figure 2. Wiring Connections for Main/Standby Configuration

NOTES:
1. AUX OUT 3 GND = MAIN; +3V = STANDBY.
2. CONNECTIONS TO CONSOLE SHOWN FOR 4-WIRE PHONE LINE. IF
   2-WIRE PHONE LINE, ONLY CONNECTIONS TO LINE 2+ AND - ARE USED.
3. IF MAIN/STANDBY IS NOT TRC CONTROLLED BY CONSOLE, EXTERNAL
   SOURCE MUST BE PROVIDED TO GENERATE MAIN/STANDBY CONTROL
   SIGNAL, AS FOLLOWS:
       +3V = STATION A MAIN, STATION B STANDBY
       GND = STATION A STANDBY, STATION B MAIN
4. AUX OUT 9 RELAY CLOSURES ARE PROVIDED TO INDICATE A POWER AMP
   FAILURE IN THE RESPECTIVE STATION.

3 SETTING WIRELINE IMPEDANCE JUMPERS

Set the impedance jumpers on the Wireline Interface Modules in Stations A and B as described in Table 1. Figure 3 shows the location of the jumpers.

Table 1. Wireline Impedance Jumpering for Main/Standby Operation

STATION A		STATION B	
2−Wire Connection to Console	4−Wire Connection to Console	2−Wire Connection to Console	4−Wire Connection to Console
Jumpers in position 1 on T1001	Jumpers in position 1 on T1000 and T1001	All jumpers removed (high impedance) on T1001	All jumpers removed (high impedance) on T1000 and T1001
Jumper JU1010 in 2-wire position	Jumper JU1010 in 4-wire position	Jumper JU1010 in 2-wire position	Jumper JU1010 in 4-wire position
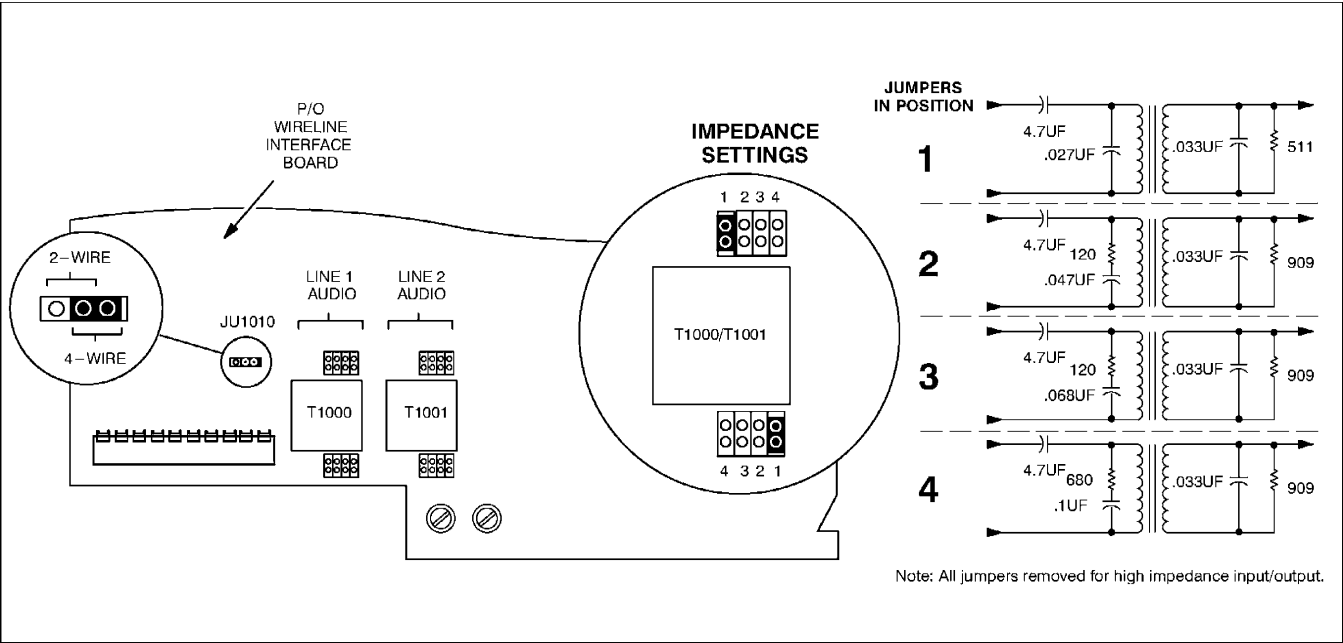
Figure 3. Wiring Connections for Main/Standby Configuration

4 RSS PROGRAMMING

In order to enable the Main/Standby Feature, the following two tasks must be performed using the *Quantar/Quantro* Radio Service Software (RSS) program. (Refer to the *RSS User's Guide 68P81085E35* for details on performing the following tasks.)

Step 1. Connect a PC running the RSS program to one of the two stations and read the station codeplug.

Step 2. Access the *Hardware Configuration* screen and set the Main/Standby field for **MAIN** (for station designated as Main) or **STANDBY** (for station designated as standby) as shown in Figure 4.

Step 3. Perform all other RSS programming tasks to configure the station (as described in the *RSS User's Guide 68P81085E35*).

```
┌────────────────────────────────────────────────────────────────────────────────┐
│  ┌──────────────────────────────────────┐  ┌───────────────────────────────┐    │
│  │ MOTOROLA RADIO SERVICE SOFTWARE      │  │ Please Enter The Serial Number│    │
│  │ BASE STATION PRODUCTS                │  │ Type Alphanumeric/Punctuation │    │
│  │              VER:XX.XX.XX            │  │ Chars.                        │    │
│  │ MAIN:SERVICE:HARDWARE CONFIGURATION │  │                               │    │
│  └──────────────────────────────────────┘  └───────────────────────────────┘    │
│  ┌────────────────────────────────────────────────────────────────────────┐     │
│  │   Serial Number:                     Station Name:                       │     │
│  │   Hardware Platform: QUANTAR                                             │     │
│  │                                                                          │     │
│  │   System Type: CONVENTIONAL          Station Type: ANALOG ONLY           │     │
│  │   Rx Freq Band 1: UHF_R2  438-470 MHz  Tx Freq Band: UHF_R2 438-470 MHz  │     │
│  │   Rx Freq Band 2:  NONE              IR Freq Band: NONE                   │     │
│  │                                                                          │     │
│  │   PA Power Rating: 25  Watts            Output limited to xxx Watts       │     │
│  │   Power Supply:  AC LOW              Battery Type:  NONE                  │     │
│  │                                                                          │     │
│  │   OPTIONS:                                                               │     │
│  │   Wireline:  8-WIRE                  WildCard:  ENHANCED                  │     │
│  │   Freq Ref:  INTERNAL - STD          Simulcast Operation:  DISABLED       │     │
│  │   Multi-Coded Squelch: DISABLED      MRTI Interface:  DISABLED            │     │
│  │   Scanning Receiver                  Site Number:   1                     │     │
│  │                                      Main/Standby: MAIN                   │     │
│  └────────────────────────────────────────────────────────────────────────┘     │
│  ██████████████████████████████████████████████████████████████████████████     │
│  █ F1    F2     F3     F4     F5     F6     F7     F8     F9     F10         █     │
│  █ HELP                                           VALIDATE            EXIT  █     │
│  █                                                CONFIG                    █     │
│  ██████████████████████████████████████████████████████████████████████████     │
└────────────────────────────────────────────────────────────────────────────────┘
```

Set to MAIN (for Main Station)
Set to STANDBY (for Standby Station)

Figure 4. Making Main/Standby RSS Setting

Step 4. Access the *Wildcard Configuration* menu screen and select *State/Action Configuration*. Press **F4** to set the WildCard Tables to their default values. This ensures that the tables for the Main/Standby Feature are programmed with the factory values. Note that any WildCard Tables that have been custom created by the customer will be deleted, and that any customization of the default tables will be returned to the factory default values. Re-enter these if the functions are still required for this installation.

Step 5. Save the codeplug to the station.

Step 6. Repeat Steps 1 thru 4 for the other station.

5 MAIN/STANDBY OPERATION

Three Modes of Main/Standby Operation

The Main/Standby Feature offers three modes of switching from MAIN to STANDBY and from STANDBY to MAIN:

- **Automatic (or "Hot") Switchover** — Whenever one of the modules fails in the MAIN station, the MAIN station will automatically set itself to STANDBY and will signal its companion station to set itself to MAIN. The MAIN station will not automatically switch to STANDBY unless it is connected to its companion station and the companion station has not indicated a failure mode. (To disable automatic switchover mode, refer to page 8.)

- **Tone Remote Control Switchover** — Sending function tone 4 to the stations will force the MAIN station to STANDBY mode and the STANDBY station to MAIN mode. Sending function tone 5 to the stations will force the MAIN station back to MAIN mode and the STANDBY station back to STANDBY mode. If either station has detected a module failure, neither switchover will occur. (To change the particular function tones that trigger these events, refer to 9.)

- **External Control Switchover** — An external control device may be connected to Input 2 on Connector #17 (located on backplane of both stations) to initiate a Main-to-Standby or a Standby-to-Main switchover to occur. Grounding this signal causes the MAIN station to go to STANDBY mode and the STANDBY station to go to MAIN mode. Pulling this signal high causes the STANDBY station to go to MAIN mode and the MAIN station to go to STANDBY mode.

Additional Functions Provided by the Main/Standby Feature

- **Antenna Relay Control** – When the MAIN station is operating in MAIN mode, the relay driven output 8 is energized. The use of this closure is left up to the user. Typically a user will use this closure to drive an external relay which connects the antenna to whichever station is operating in MAIN mode.

- **Status Request** – Utilizing TRC function tone 14, the console operator can request which station is in MAIN mode. One beep will be returned if the MAIN station is in MAIN mode and two beeps if the STANDBY station is in MAIN mode.

- **Reset** – Utilizing TRC function tone 15, both stations will reset.

6 CUSTOMIZING MAIN/STANDBY OPERATION

Default Operation

The Main/Standby Feature is implemented using the Radio Service Software (RSS) WildCard Feature. As shipped from the factory, the RSS contains 21 WildCard Tables for the Main station and 20 WildCard Tables for the Standby station. These tables contain default settings that define the basic operation of the Main/Standby Feature (i.e., control of Main and Standby status of two interconnected stations via pre-defined Tone Remote Control function tones to provide backup redundancy in the event of a station failure).

Customizing Main/Standby Operation

Although all of the Main/Standby WildCard Tables are user configurable (via the RSS), it is recommended that only the following functions be customized by the user. Follow the instructions in Chapter 11 of the *RSS User's Guide 68P81085E35* for details on modifying the WildCard Tables.

● **Disable Automatic (Hot) Switchover** — Delete WildCard Table 8 in both stations

```
                                TABLE 8 OF 20
      STATE CONDITION
                   Description:    MAIN/STANDBY 8
      State                Cond    State              Cond    State
      EVENT FLAG 6         AND     INPUT 8
      --------------------------------------------------------------
          ACTION:                          INACTION:
          -        STANDBY                  - NULL
          -        MRTI DISABLE             -
          -        RX WL MUTE               -
          -        WAIT         30          -
          -        CLR OUTPUT   3           -
          -        CLR OUTPUT   8           -
          -                                 -
          -                                 -
```

- **Select Alternate Function Tones to Activate Main/Standby Switchover (default is FT4 to switch, FT5 to switch back)** — To modify the Function Tone that initiates the initial switch from Main to Standby, modify the TRC TONE entry in WildCard Table 19 in the MAIN station and WildCard Table 17 in the STANDBY station.

  To modify the Function Tone that initiates the switch back from Standby to Main, modify the TRC TONE entry in WildCard Table 18 in the MAIN station and WildCard Table 18 in the STANDBY station.

Main

```
                                    TABLE 19 OF 31
        STATE CONDITION
                    Description:   MAIN/STANDBY 19
        State              Cond    State                Cond    State
        TRC TONE       4   AND NOT EVENT FLAG 12

            ACTION:                             INACTION:
        -   STANDBY                          -  NULL
        -   MRTI DISABLE                     -
        -   RX WL MUTE                       -
        -   WAIT             30              -
        -   CLR OUTPUT       3               -
        -   CLR OUTPUT       8               -
        -                                    -
```

Modify TRC Tone field to change Main-to-Standby Switchover

Standby

```
                                    TABLE 17 OF 30
        STATE CONDITION
                    Description:   MAIN/STANDBY 17
        State              Cond    State                Cond    State
        TRC TONE       4   AND NOT EVENT FLAG 12

            ACTION:                             INACTION:
        -   SET OUTPUT       3               -  NULL
        -   SET OUTPUT       8               -
        -   WAIT             30              -
        -   RX WL ENABLE                     -
        -   MRTI ENABLE                      -
        -   MAIN                             -
        -                                    -
```

Main

```
                                    TABLE 18 OF 31
        STATE CONDITION
                    Description:   MAIN/STANDBY 18
        State              Cond    State                Cond    State
        TRC TONE       5   AND NOT EVENT FLAG 12

            ACTION:                             INACTION:
        -   SET OUTPUT       3               -  NULL
        -   SET OUTPUT       8               -
        -   WAIT             30              -
        -   RX WL ENABLE                     -
        -   MRTI ENABLE                      -
        -   MAIN                             -
        -   SET EVENT FLAG   8               -
        -                                    -
```

Modify TRC Tone field to change Standby-to-Main Switchover

Standby

```
                                    TABLE 18 OF 30
        STATE CONDITION
                    Description:   MAIN/STANDBY 18
        State              Cond    State                Cond    State
        TRC TONE       5   AND NOT EVENT FLAG 12

            ACTION:                             INACTION:
        -   STANDBY                          -  NULL
        -   MRTI DISABLE                     -
        -   RX WL MUTE                       -
        -   WAIT             30              -
        -   CLR OUTPUT       3               -
        -   CLR OUTPUT       8               -
        -                                    -
```

- **Select Alternate Function Tone to Initiate a Status Request (default is FT14)**

```
                                TABLE 12 OF 31
        STATE CONDITION
                   Description:    MAIN/STANDBY 12
        State              Cond    State              Cond    State
        TRC TONE      14   AND NOT STN KEYED          AND NOTRX QUAL MET


                  ACTION:                             INACTION:
                  -       ABORT TIMER 1               - NULL
                  -       SET EVENT FLAG   8          -
                  -                                   -
                  -                                   -
                  -                                   -
                  -                                   -
                  -                                   -
```

Main

Modify TRC Tone field to change which function tone initiates a Status Request

```
                                TABLE 11 OF 30
        STATE CONDITION
                   Description:    MAIN/STANDBY 11
        State              Cond    State              Cond    State
        TRC TONE      14   AND NOT STN KEYED          AND NOTRX QUAL MET


                  ACTION:                             INACTION:
                  -       ABORT TIMER 1               - NULL
                  -       SET EVENT FLAG   7          -
                  -                                   -
                  -                                   -
                  -                                   -
                  -                                   -
                  -                                   -
```

Standby

- ● **Select Alternate Function Tone to Initiate a Reset to Both Stations (default is FT15)**

Main

Modify TRC Tone field to change which function tone initiates a Status Reset

Standby

MOTOROLA

FAST KEYUP FEATURE

For *Quantar* and *Quantro* Stations

1 OVERVIEW

The Fast Keyup Feature allows *Quantar* and *Quantro* stations to be keyed up by an external device (such as a Data Controller) in approximately 12 milliseconds (*Quantar* VHF and *Quantro* UHF) or 10 milliseconds (all other stations). Note that normal keyup time using the station's PTT input is approximately 50 msecs.

In order to implement this feature, three signals (TX Audio, RX Audio, and PTT) must be connected between the station and the external device. Also, an RSS parameter setting must be made to properly configure the feature's operation. This manual provides step-by-step instructions for performing these tasks.

Note — *The Fast Keyup Feature applies only to non-Simulcast, Analog Conventional stations.*

2 ELECTRICAL CONNECTIONS

As shown in Figure 1, the following signals must be connected properly between the station and the external device:

- PTT
- TX Audio
- RX Audio

Additionally, there are two possible connection configurations — **Direct Connection** and **Splatter Filter Connection**. The Direct Connection configuration is chosen when the external device provides the required splatter filtering of the TX Audio signal. The Splatter Filter Connection configuration is chosen when the station's internal splatter filter is to be utilized (no splatter filtering provided by the external device).

The following procedures describe how to make the signal connections for each type of connection configuration.
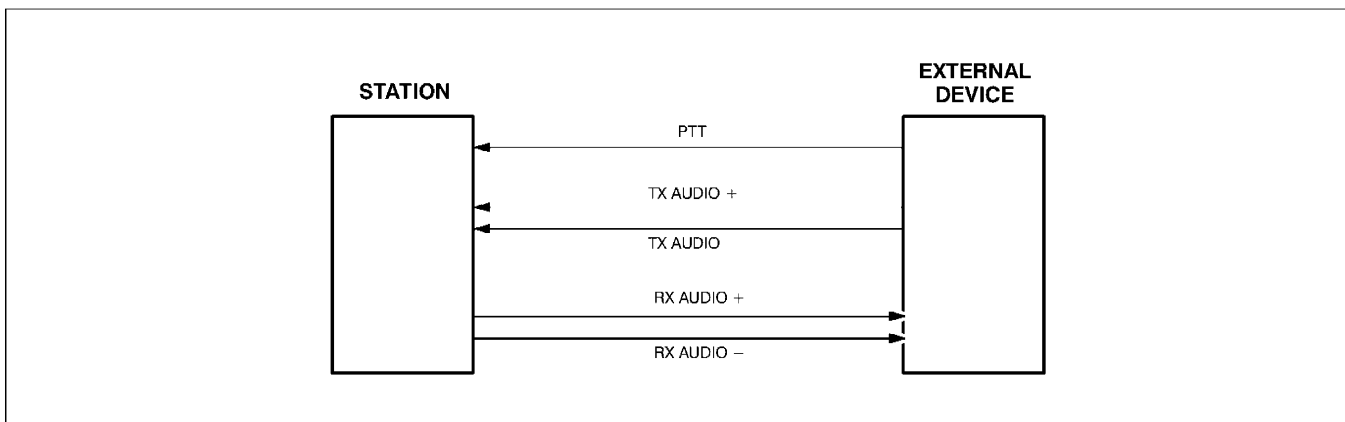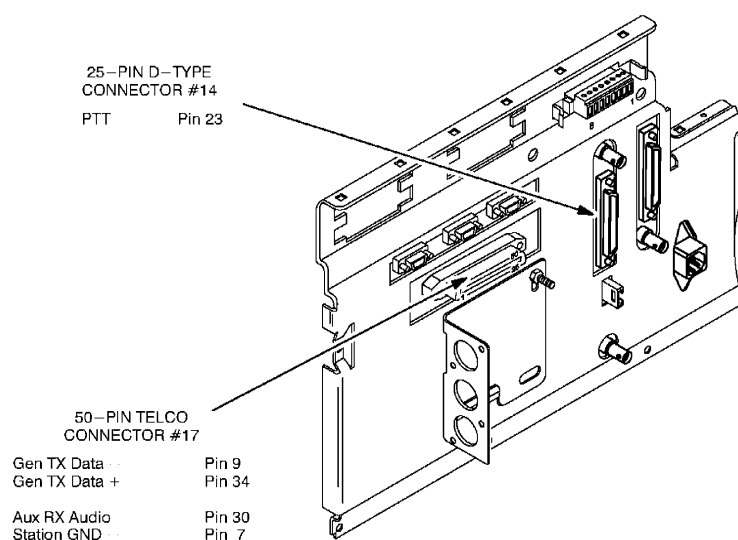

STATION

EXTERNAL DEVICE

PTT

TX AUDIO +

TX AUDIO

RX AUDIO +

RX AUDIO −

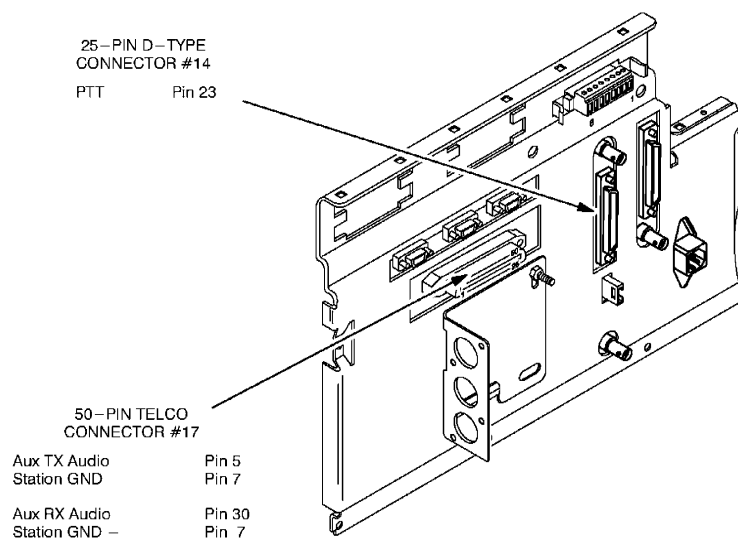***Figure 1.*** Fast Keyup Feature Wiring Diagram

Wiring Details for Direct Connection and Splatter Filter Configurations

Step 1. Connect the PTT signal from the external device to Connector #14 on the station backplane as shown below.

Step 2. Connect TX Audio (+) and (−) from the external device to Connector #17 on the station backplane as shown below.

Step 3. Connect Aux RX Audio and GND from the station backplane Connector #17 to the external device as shown below.

Direct Connection Configuration

25-PIN D-TYPE
CONNECTOR #14

PTT   Pin 23

50-PIN TELCO
CONNECTOR #17

Gen TX Data −   Pin 9
Gen TX Data +   Pin 34

Aux RX Audio   Pin 30
Station GND −   Pin 7

Splatter Filter Connection Configuration

25-PIN D-TYPE
CONNECTOR #14

PTT   Pin 23

50-PIN TELCO
CONNECTOR #17

Aux TX Audio   Pin 5
Station GND   Pin 7

Aux RX Audio   Pin 30
Station GND −   Pin 7

3 | RSS PROGRAMMING

Using the *Quantar/Quantro* Radio Service Software (RSS) program (Version R09.05.00 or higher), make the following codeplug data changes to allow proper Fast Keyup operation. (Refer to the *RSS User's Guide 68P81085E35* for details on making codeplug programming changes.)

Table 1. Codeplug Data Changes for Fast Keyup Operation

Codeplug Data Parameter	RSS User's Guide Location
Set the **Fast Key–Up** parameter to *WIDEBAND* for Direct Connection configurations, or to *AUX TX* for Splatter Filter Connection configurations. **Note** *AUX TX selection is not compatible with MRTI.*	Programming the RF Configuration Data (p/o Chapter 4)

4 FAST KEYUP PERFORMANCE CHARACTERISTICS

Figure 2 shows the performance characteristics of the station after implementing the Fast Keyup Feature.

Aux RX Audio Amplitude Response

2dB/DIV

X: 5275 Hz

START: 0 Hz   STOP: 10 000 Hz
X: 5275 Hz

Aux RX Audio Phase Response

40
DEG

10 DEG/DIV

X: 7000 Hz
Y: 17.80 DEG

−40

START: 0 Hz   STOP: 10 000 Hz
X: 7000 Hz

Aux TX Magnitude Response

1dB/DIV

START: 0 Hz   STOP: 10 000 Hz

Aux TX Audio Phase Response

40
DEG

10 DEG/DIV

−40

START: 0 Hz   STOP: 10 000 Hz
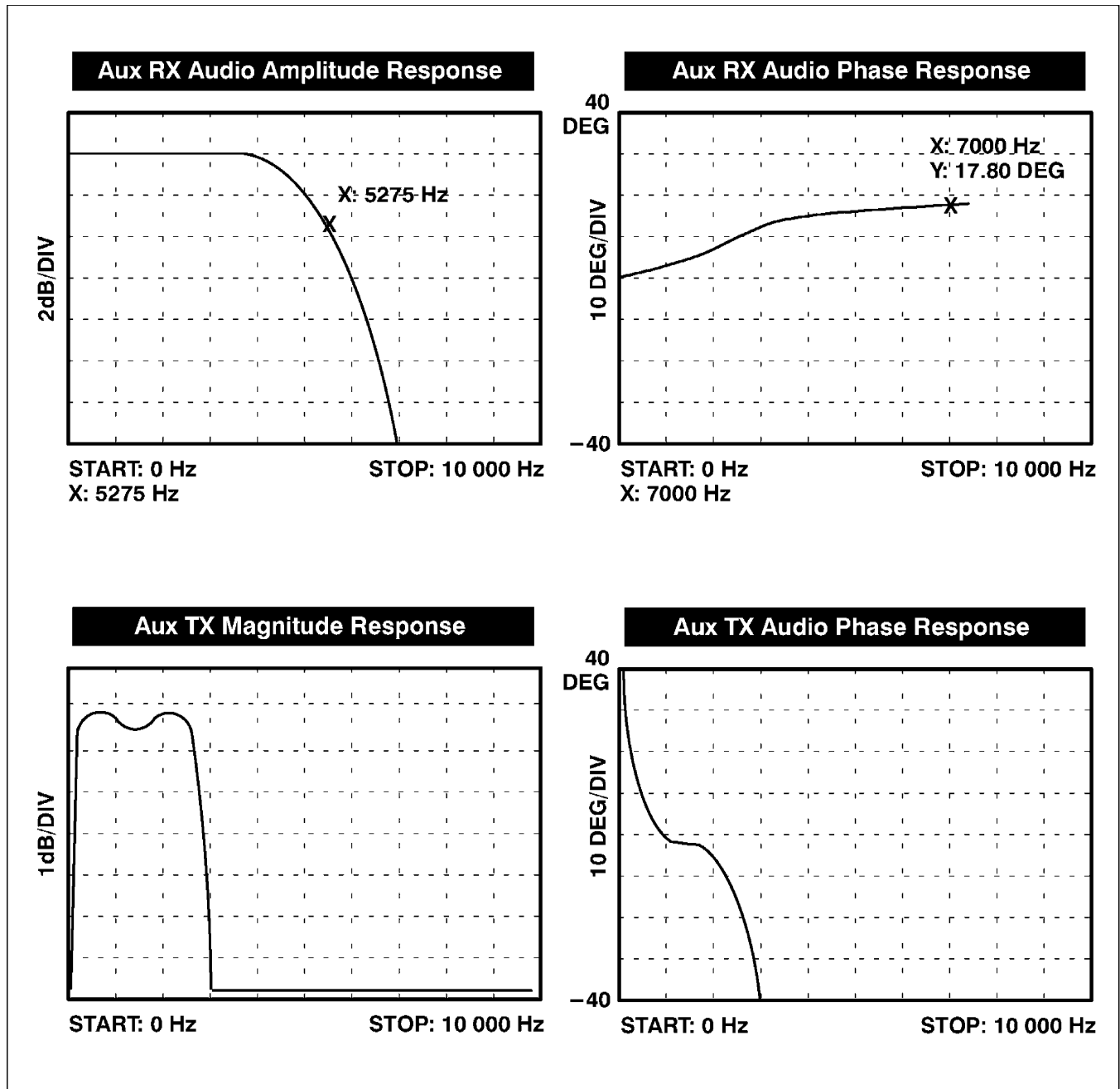
Figure 2. Fast Keyup Performance Characteristics

MOTOROLA

DUAL CONTROL
OF GATED ACCESS
VIA TRC AND SAM

**For *Quantar* and *Quantro* Stations
Servicing MCS Users**

1 OVERVIEW

This section describes how to program the station (*Quantar* or *Quantro*) and the Station Access Module (SAM) to allow two functions (repeater setup/knockdown and "gated access" to be controlled (toggled on and off) by both of the following methods:

- Console Operator using TRC tones
- Subscriber Unit using DTMF or MDC 1200 signaling transmitted over the air

By utilizing the MCS Feature and controlling the repeater setup/knockdown and "gated access" functions, an effective "Mutual Aid" talk group configuration can be created. In this configuration, subscribers within a specific coverage area (local subscribers) are assigned a "primary" PL and have their MCS User Access field set to ENABLED. These subscribers will repeat as normal (assuming station is toggled to "repeater setup" mode). Should emergency conditions require other subscribers outside of the local area to enter the communications area, these subscribers will be able to communicate with each other (as well as local users) via the same local repeater if they have been assigned with a "secondary" PL and have their MCS User Access set to GATED. Additionally, the repeat mode (setup or knocked down) and gated access mode (enabled or disabled) may be controlled by both a console operator or a subscriber unit. (Note that Gated User Access is disabled upon station reset. Gated Access must be enabled via over-the-air transmissions to the SAM module, or via TRC tones from the console.)

The following table shows how the repeater access and "gated access" functions may be controlled to provide access to local and visiting subscribers. Refer also to Figure 1 (showing a typical repeater access call flow chart *before* Gated Access is employed), and Figure 2 (showing a repeater access call flow chart *after* Gated Access is incorporated).

Gated Access	Repeater Up/Down	Subscriber Operation
Enabled	Up	• Local subscribers (primary PL) will repeat. • Emergency subscribers (secondary PL and MCS User Access set to GATED) will repeat.
Enabled	Down	• No subscribers will repeat.
Disabled	Up	• Only local subscribers (primary PL) will repeat.
Disabled	Down	• No subscribers will repeat.

In order to perform the procedures in this section, you must program certain parameters in the *Quantar* or *Quantro* station and the Station Access Module (SAM). In order to do this, you will need the following software programs:

- RVN5002 *Quantar/Quantro* Radio Service Software (RSS) Version R09.05.00 or higher)
- RVN4110 Station Access Module (SAM) Radio Service Software (RSS) Version R01.01 or higher)

Call Flow Prerequisites

- MCS User Access is Enabled (but not Gated)
- Analog Rptr Activation RSS Parameter set to SC
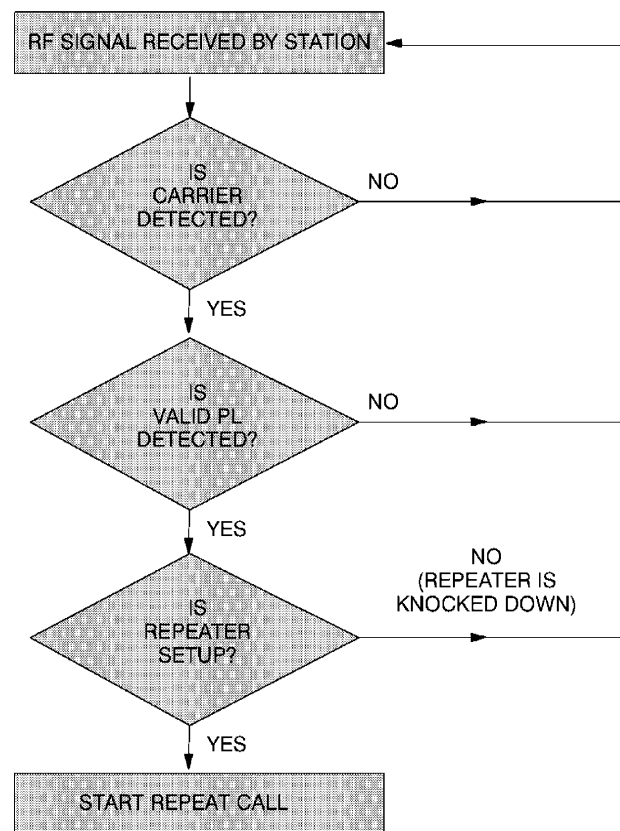- Local Subscribers are using "Primary" PL

Figure 1. Typical Call Flow Chart Without Gated Access Incorporated

Call Flow Prerequisites

- MCS User Access is set to "Gated"
- Analog Rptr Activation RSS Parameter set to SC
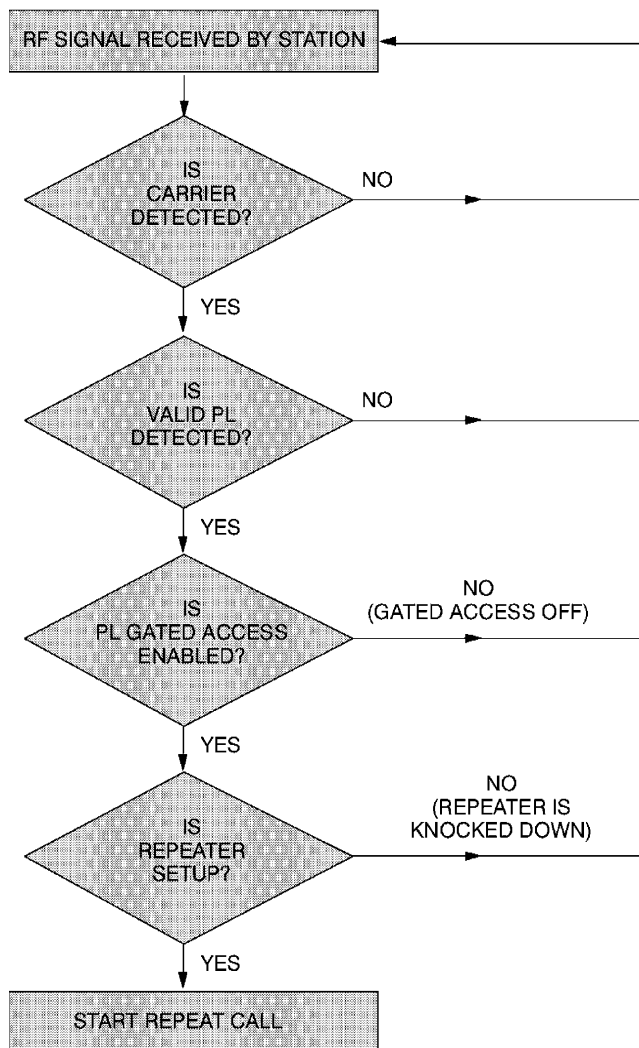- Emergency conditions exist, in which non-Local Subscribers are using "Secondary" PL

```
            ┌─────────────────────────────┐
            │ RF SIGNAL RECEIVED BY STATION │◄──────────┐
            └─────────────────────────────┘            │
                          │                             │
                          ▼                             │
                    ╱─────────╲                         │
                   ╱    IS     ╲      NO                 │
                  ╱   CARRIER    ╲──────────►            │
                   ╲  DETECTED?  ╱                       │
                    ╲─────────╱                          │
                          │                             │
                         YES                            │
                          │                             │
                          ▼                             │
                    ╱─────────╲                         │
                   ╱    IS     ╲      NO                 │
                  ╱  VALID PL    ╲──────────►            │
                   ╲  DETECTED?  ╱                       │
                    ╲─────────╱                          │
                          │                             │
                         YES                            │
                          │                             │
                          ▼                             │
                    ╱──────────╲      NO                 │
                   ╱    IS      ╲  (GATED ACCESS OFF)    │
                  ╱ PL GATED ACCESS╲─────────►           │
                   ╲  ENABLED?   ╱                       │
                    ╲──────────╱                         │
                          │                             │
                         YES                            │
                          │                             │
                          ▼                             │
                    ╱─────────╲       NO                 │
                   ╱    IS     ╲   (REPEATER IS          │
                  ╱  REPEATER    ╲  KNOCKED DOWN)        │
                   ╲   SETUP?    ╱─────────────────────┘
                    ╲─────────╱
                          │
                         YES
                          │
                          ▼
            ┌─────────────────────────────┐
            │      START REPEAT CALL       │
            └─────────────────────────────┘
```

Figure 2. Typical Call Flow Chart With Gated Access Incorporated

2 | STATION RSS PROGRAMMING

In order to support dual control of gated access by TRC and SAM, certain station parameters must be programmed using the *Quantar/Quantro* Radio Service Software (RSS) program (Version R09.05.00 or higher). (Refer to the *RSS User's Guide 68P81085E35* for details on making these settings.)

Step 1. Connect a PC running the Station RSS program to one of the two stations and read the station codeplug.

Step 2. Access the *Hardware Configuration* screen and set the *Multi-Coded Squelch* field to **MULTI-PL ONLY** to enable the Multi-Coded Squelch feature (as shown in Figure 3).

```
MOTOROLA RADIO SERVICE SOFTWARE          Please Enter The Serial Number
BASE STATION PRODUCTS                     Type Alphanumeric/Punctuation Chars.
            VER:XX.XX.XX
MAIN:SERVICE:HARDWARE CONFIGURATION

   Serial Number:                         Station Name:
   Hardware Platform: QUANTAR

   System Type: CONVENTIONAL              Station Type: ANALOG ONLY
   Rx Freq Band 1: UHF_R2 438-470 MHz     Tx Freq Band: UHF_R2 438-470 MHz
   Rx Freq Band 2: NONE                   IR Freq Band: NONE

   PA Power Rating: 25  Watts             Output limited to xxx Watts      Set to MULTI-PL ONLY
   Power Supply: AC LOW                   Battery Type: NONE

   OPTIONS:
   Wireline: 8-WIRE                       WildCard: ENHANCED
   Freq Ref:  INTERNAL - STD              Simulcast Operation: DISABLED
   Multi-Coded Squelch: MULTI-PL ONLY     MRTI Interface: DISABLED
   Scanning Receiver                      Site Number:   1
                                          Main/Standby: MAIN

F1      F2      F3      F4      F5      F6      F7      F8      F9      F10
HELP                                                    VALIDATE         EXIT
                                                        CONFIG
```

Figure 3. Making *Multi-Coded Squelch* RSS Setting

Step 3. Access Page 1 of the *Channel Information* screen and set the *Analog Rptr Access* field to **MDC/TONE** (as shown in Figure 4) to enable the Station Access Module (SAM).

```
MOTOROLA RADIO SERVICE SOFTWARE          Please Enter A Channel Number.
BASE STATION PRODUCTS                     Valid Range Is 1 to 1
Page 1 of 2          VER:XX.XX.XX
MAIN:CHANGE/VIEW:CHANNEL INFORMATION

    Channel Number                    1              CHANNEL# 1 OF 1

    Rx1 Frequency      0.000000 MHz   Tx Frequency 0.000000 MHz
    Rx2 Frequency      0.000000 MHz   Tx Idle Frequency 0.000000 MHz

    Modulation Type                   ANALOG
    Tx Rated Deviation                5.00       kHz
    Receive Channel BW                WIDE       25−30 kHz Channel Spacing      Set to MDC/TONE

    Call Sign
      Call Sign Over Wireline         DISABLED
    Access Code Table                 1
    Analog Rx Activation              OFF
    Analog Rptr Activation            OFF
    Analog Rptr Hold−In               OFF
    Analog Rptr Access                MDC/TONE

 F1      F2      F3      F4      F5      F6      F7      F8      F9      F10
 HELP            ADD             PREV    NEXT            DELETE          EXIT
                 CHN             CHN     CHN             CHN
```

Figure 4. Making *Analog Rptr Access* RSS Setting

Step 4. Access the *RF Configuration Data* screen and set the *Repeater Operation* field for **REPEATER** (as shown in Figure 5).

```
MOTOROLA RADIO SERVICE SOFTWARE          Use Up/Dn Arrow Keys To Select
BASE STATION PRODUCTS                     Repeater Operation
          VER:XX.XX.XX
:CHANGE/VIEW:RF CONFIGURATION

    Repeater Operation                REPEATER    Fast Key−Up  DISABLED
    Max Deviation                     92 %
    Low Speed Deviation               17.0 %
    Antenna Relay                     ENABLED
    Antenna Relay Delay               30 msec
    Call Sign Interval                15  min
    Startup On Last Active Channel    DISABLED
    Startup Channel                   1                                Set to REPEATER
    ASTRO Fade Tolerance              3 FRAMES
    ASTRO RDLAP: Repeat               DISABLED
                 Wireline Drop Out Delay   0  sec
    ASTRO TX Filter                   WIDE PULSE
    ANALOG Simulcast Reverse Burst    INTERNAL
    Securenet: Rx Code Detect Fade Timer    80  msec
                 Fade EOM Timer       80  msec

 F1      F2      F3      F4      F5      F6      F7      F8      F9      F10
 HELP                                                                   EXIT
```

Figure 5. Making *Repeater Operation* RSS Setting

Step 5. Access the *Multi-Coded Squelch* screen, enter the desired number of users, then set the "secondary" PL's *User Access* field to **GATED** (as shown in Figure 6). Refer to the *RSS User's Guide 68P81085E35* for details on setting up users in the *Multi-Coded Squelch* screen.
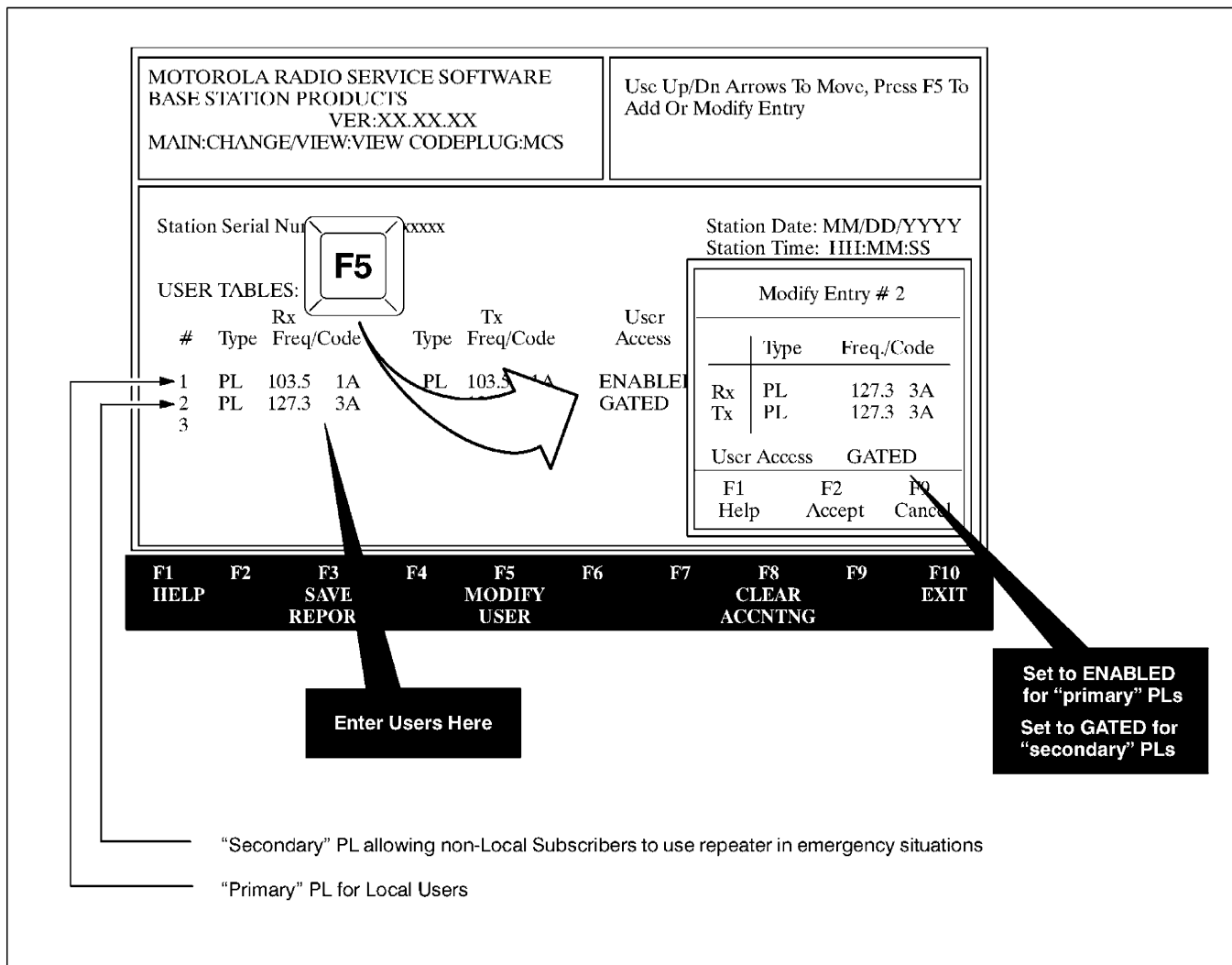

Figure 6. Entering Users and Setting to *Gated*

Step 6. Access the *TRC Commands* screen and program tones FT3 – FT6 (as shown in Figure 7). Refer to the *RSS User's Guide 68P81085E35* for details on programming the tones.

```
MOTOROLA RADIO SERVICE SOFTWARE          Enter Command or Use Tab/Shift Tab
BASE STATION PRODUCTS                     and Enter To Move Between Fields
Page 1 of 3              VER:XX.XX.XX
MAIN:CHANGE/VIEW:TRC COMMANDS


    Guard Tone      MORE
    2175 Hz

    FT1 — 2050 Hz   MONITOR

    FT2 — 1950 Hz   CHN 001  KEY

    FT3 — 1850 Hz   RPT ON

    FT4 — 1750 Hz   RPT OFF

    FT5 — 1650 Hz   GATEACC ON


F1      F2      F3      F4      F5      F6      F7      F8      F9      F10
HELP                                                                    EXIT
```

```
MOTOROLA RADIO SERVICE SOFTWARE          Enter Command or Use Tab/Shift Tab
BASE STATION PRODUCTS                     and Enter To Move Between Fields
Page 2 of 3              VER:XX.XX.XX
MAIN:CHANGE/VIEW:TRC COMMANDS


    FT6 — 1550 Hz   GATEACC OFF

    FT7 — 1450 Hz

    FT8 — 1350 Hz

    FT9 — 1250 Hz

    FT10 — 1150 Hz


F1      F2      F3      F4      F5      F6      F7      F8      F9      F10
HELP                                                                    EXIT
```

Figure 7. Programming TRC Tones FT3 – FT6

◆ **End of This Procedure** ◆

3 SAM RSS PROGRAMMING

In order to support dual control of repeater access by TRC and SAM, certain SAM parameters must be programmed using the Station Access Module (SAM) Radio Service Software (RSS) program. (Refer to the *SAM RSS User's Guide 68P80309E35* for details on performing the following tasks.)

Step 1. Connect a PC running the RSS program to the RSS port on the front panel of the SAM module and read the SAM codeplug.

Step 2. **For DTMF operation**, access *Page 03* of the *SAM Decoder Selection* screen and program the *TARGET* and *ACT TBL* settings as shown in Figure 1. These settings establish the keypad sequences and corresponding Action Tables for Repeater Setup, Repeater Knockdown, Gated Access Enable and Gated Access Disable. Note that if there is default data already entered when opening the screen, overwrite the data with the data shown below.

```
┌─────────────────────────────────────┬──────────────────────────────────┐
│ MOTOROLA RADIO SERVICE SOFTWARE      │ Enter DTMF Target, Valid input is:│
│ SAM with QUANTAR/QUANTRO             │ 0-9, A-D, #, *, or X              │
│ Page = 03 of 03                      │                                   │
│ SAM DECODER SELECTION                │ ─ ─ ─ ─ ─ ─ ─                    │
└─────────────────────────────────────┴──────────────────────────────────┘
                                              Set to ENABLED..

   DTMF DECODER          ENABLED           SAM MODE# 00 of 01
   DTMF INPUT            RECEIVER 1


   DTMF DECODER TARGET#      TARGET          ACT TBL
              01 . . . . . . . . . 123*        03
              02 . . . . . . . . . 456#        04
              03 . . . . . . . . . 147*        06
              04 . . . . . . . . . 369#        07
              05 . . . . . . . . .
              06 . . . . . . . . .
              07 . . . . . . . . .
              08 . . . . . . . . .
              09 . . . . . . . . .
              10 . . . . . . . . .
              11 . . . . . . . . .

  F1    F2    F3    F4    F5     F6     F7    F8      F9    F10
  HELP                    PRINT  ADD   DELETE ACTION        EXIT
                         PAGE   MODE   MODE   EDIT
```

Enter Action Table numbers to correspond to keypad sequences 01 thru 04. Use 03, 04, 06, and 07 as shown. (Note that if a table does not exist, the RSS will prompt you to create one.)

Enter desired keypad sequences for: Gated Access Enable – 123* Gated Access Disable – 456# Repeater Setup – 147* Repeater Knockdown – 369# (Keypad sequences are shown here as examples. You may choose other sequences as desired.)

Figure 1. Making DTMF *SAM Decoder Selection* RSS Settings

For MDC 1200 operation, access *Page 02* of the *SAM Decoder Selection* screen and program the *OPCODE*, *ID*, and *ACT TBL* settings as shown in Figure 2. These settings establish the IDs and corresponding Action Tables for Repeater Setup, Repeater Knockdown, Gated Access Enable and Gated Access Disable. Note that if there is default data already entered when opening the screen, overwrite the data with the data shown below.


```
MOTOROLA RADIO SERVICE SOFTWARE          Use UP/DOWN Arrows to Change Fields
SAM with QUANTAR/QUANTRO
Page = 02 of 03                                                          Set to ENABLED..
SAM DECODER SELECTION


    BINARY DECODER           MDC1200          SAM MODE# 00 of 01
    BINARY INPUT             RECEIVER 1


    BINARY DECODER TARGET#   OPCODE       ID        ACT TBL
                        01 ........... REPEAT ACC   0001        03
                        02 ........... REPEAT ACC   0002        04
                        03 ........... REPEAT ACC   0003        06
                        04 ........... REPEAT ACC   0004        07
                        05 ...........
                        06 ...........
                        07 ...........
                        08 ...........
                        09 ...........
                        10 ...........
                        11 ...........

 F1      F2      F3      F4      F5      F6      F7      F8      F9      F10
 HELP                            PRINT   ADD     DELETE  ACTION          EXIT
                                 PAGE    MODE    MODE    EDIT
```

Enter Action Table numbers to correspond to IDs 0001 thru 0004. Use 03, 04, 06, and 07 as shown.

The ID column reflects the MDC 1200 ID transmitted by the subscriber unit. IDs 0001 thru 0004 are shown here as examples. You may choose other IDs as desired.

Select REPEAT ACC for IDs 01 thru 04. (You MUST select REPEAT ACC. Do not use the Repeater Setup or Repeater Knockdown selections.)

Figure 2. Making MDC 1200 *SAM Decoder Selection* RSS Settings

continued on next page ☞

Step 3. Access the *SAM Action Tables* screen and program Tables 03 and 04 as shown in Figure 3. These Action Tables control the Gated Access functions (enabled and disabled). Note that if there is default data already entered when opening the tables, overwrite the data with the data shown on the facing page.

Setting Action Table 03 (Enable Gated Access)

MOTOROLA RADIO SERVICE SOFTWARE
SAM with QUANTAR/QUANTRO
Page = 01 of 04
ACTION TABLES

Use UP/DOWN Arrows to Change Fields

— — — — — — — —

Use arrow keys to toggle to 03.

ACTION TABLE   03   ACTION TABLE# 03 of xx

#	ACTION	ADDRESS	TARG BIT	POLARITY
01	MANIBIT	004C	1	DISABLED

#	ACTION	WAIT TIME		
02	WAIT	100		

— —

Program Actions 01–03 as shown.

#	ACTION	ADDRESS	TARG BIT	POLARITY
03	MANIBIT	004C	1	ENABLED

ACTION
04

ACTION
04

F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
HELP				PRINT PAGE		CLEAR TABLE			EXIT

Setting Action Table 04 (Disable Gated Access)

MOTOROLA RADIO SERVICE SOFTWARE
SAM with QUANTAR/QUANTRO
Page = 01 of 04
ACTION TABLES

Use UP/DOWN Arrows to Change Fields

— — — — — — — —

Use arrow keys to toggle to 04.

ACTION TABLE   04   ACTION TABLE# 04 of xx

#	ACTION	ADDRESS	TARG BIT	POLARITY
01	MANIBIT	004C	1	ENABLED
02	MANIBIT	004C	0	DISABLED

— —

Program Actions 01–04 as shown.

#	ACTION	WAIT TIME		
03	WAIT	100		

#	ACTION	ADDRESS	TARG BIT	POLARITY
04	MANIBIT	004C	1	DISABLED

ACTION
05

F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
HELP				PRINT PAGE		CLEAR TABLE			EXIT

Figure 3.   Programming the Action Tables for Gated Access Enable/Disable

Step 4. Access the *SAM Action Tables* screen and program Tables 06 and 07 as shown in Figure 4. These Action Tables control the Repeater Setup and Knockdown functions. Note that if there is default data already entered when opening the tables, overwrite the data with the data shown on the facing page.

◆ **End of This Procedure** ◆

Setting Action Table 06 (Repeater Setup)

MOTOROLA RADIO SERVICE SOFTWARE
SAM with QUANTAR/QUANTRO
Page = 01 of 04
ACTION TABLES

Use UP/DOWN Arrows to Change Fields

Use arrow keys to toggle to 06.

ACTION TABLE	06		ACTION TABLE# 06 of xx
# ACTION	ADDRESS	TARG BIT	POLARITY
01 MANIBIT	004C	3	ENABLED
# ACTION	WAIT TIME		
02 WAIT	100		
# ACTION	ADDRESS	TARG BIT	POLARITY
03 MANIBIT	004C	3	DISABLED

Program Actions 01–03 as shown.

ACTION
04

ACTION
04

F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
HELP				PRINT PAGE		CLEAR TABLE			EXIT

Setting Action Table 07 (Repeater Knockdown)

MOTOROLA RADIO SERVICE SOFTWARE
SAM with QUANTAR/QUANTRO
Page = 01 of 04
ACTION TABLES

Use UP/DOWN Arrows to Change Fields

Use arrow keys to toggle to 07.

ACTION TABLE	07		ACTION TABLE# 07 of xx
# ACTION	ADDRESS	TARG BIT	POLARITY
01 MANIBIT	004C	3	DISABLED
# ACTION	WAIT TIME		
02 WAIT	100		
# ACTION	ADDRESS	TARG BIT	POLARITY
03 MANIBIT	004C	3	ENABLED

Program Actions 01–03 as shown.

ACTION
04

ACTION
04

F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
HELP				PRINT PAGE		CLEAR TABLE			EXIT

Figure 4. Programming the Action Tables for Repeater Setup/Knockdown