FUNCTIONAL DESCRIPTION

APPLICATIONS ................................................... 68P81062E59
REMOTE CONTROL .................................................. 68P81062E61

RF-CONTROL CHASSIS

RF-CONTROL CHASSIS (TLN2472B, 74B, 75B) (B VERSION) .......... 68P81070E88

REMOTE CONTROL

REMOTE CONTROL MODULES ........................................... 68P81062E63
STATION CONTROL (TRN5321A) .................................... 68P81062E14
LINE DRIVER (TRN5235A, 36A, 37A) .............................. 68P81062E13
LINE DRIVER (TRN5240A, 54A, 55A, 56A) ......................... 68P81062E16
DC TRANSFER (TRN5239A, 57A) .................................. 68P81062E17
GUARD TONE DECORDER (TLN2443A, 50A) ......................... 68P81062E18
F1 TONE CONTROL (TRN5320A, 22A, 27A, 28A) ................... 68P81062E19
F2 TONE CONTROL (TLN2444A, 49A, TRN5256A, 5325A) ......... 68P81062E21
SQUELCH GATE (TRN5324A) ....................................... 68P81062E23
TIME-OUT TIMER (TRN2442A) .................................... 68P81062E24
SINGLE-TONE DECORDER (TLN2442A) ............................. 68P81062E26
4-FREQUENCY CONTROL OPTION DECORDER (TRN5296A) ......... 68P81062E22
SQUELCH, REPEATER, AND PRIVATE-LINE CONTROL
OPTION DECORDER (TRN1249A, 50A, 51A) ....................... 68P81062E28
"WILD CARD" CONTROL (TLN2448A) .............................. 68P81062E27

AUDIO & SQUELCH

R1 AUDIO & SQUELCH MODULE (TRN9688A, 89) .................... 68P81070E57
R1 AUDIO & SQUELCH MODULE (TRN5068A, 69A) .................... 68P81062E57
R2 AUDIO & SQUELCH MODULE (TRN9690A, 91A, 92A) .......... 68P81070E58
R2 AUDIO & SQUELCH MODULE (TRN5070A, 71A, 72A) ............ 68P81062E64
TONE PRIVATE-LINE ENCODER-DECORDER MODULE TRN5073A, 74A, 75A .................. 68P81062E51
DIGITAL PRIVATE-LINE ENCODER-DECORDER MODULE (TRN5076A, 77A, 78A) ........... 68P81062E52

OPTIONAL EQUIPMENT

Spectra-TAC ENCODER OPTION (C269) ................................ 68P81112E78
Spectra-TAC 4-WIRE LINE DRIVER MODULE (TRN5294A) ........... 68P81062E41
Spectra-TAC ENCODER MODULE (TRN5293A) ........................ 68P81062E42
Spectra-TAC SQUELCH GATE MODULE (TRN5331A) .................. 68P81062E43
MSR 2000 BASE AND REPEATER STATION MULTIPLE TONE
PL OPTIONS (C158, C261, C262, C263) .............................. 68P81112E80
MULTIPLE PL MATRIX CONTROL MODULE (TRN5330A) .................. 68P81062E67
MULTIPLE PL ENCODER MODULE (TRN5292A) ........................ 68P81062E68
MULTIPLE PL ENCODER MODULE (TRN5329A) ........................ 68P81062E69

68P81061E40
1. DESCRIPTION

Five RF-Control Chassis are described in this section (refer to the detail model breakdown chart). The BASIC rf control chassis uses a smaller Backplane Interconnect Board, with a maximum capacity of nine control and audio modules, one exciter, and one receiver. The FULLY OPTIONABLE RF-Control Chassis uses a larger Backplane Interconnect Board, with a maximum capacity of fifteen control and audio modules, one exciter, and two receivers.

The RF-Control Chassis mounts plug-in modules that perform control switching functions and audio processing for station operation. Nylon guide rails in the chassis align the modules with the mating connecting pins on the Backplane Interconnect Board, on the rear of the chassis.
2. APPLICATION

2.1 TONE OR DC REMOTE CONTROL

The RF-Control Chassis, together with the associated plug-in modules, permits a station to be operated from a remote location and performs various control or operational functions for the station. Tones or dc line currents generated at a remote location(s) are carried over wire line pairs to the station’s RF-Control Chassis via the junction box, to implement the desired type of operation. The RF-Control Chassis and its modules convert the tones or dc line currents into switching functions to perform any or all of the operations listed in Tables 1, 2, and 3, depending on the modules used.

### Table 1. DC Commands

<table>
<thead>
<tr>
<th>DC Line Current (mA)</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Transmitter standby, receiver operative</td>
</tr>
<tr>
<td>-2.5</td>
<td>PL disable (receiver)</td>
</tr>
<tr>
<td>-5.5</td>
<td>Mute receiver 2 audio</td>
</tr>
<tr>
<td>+5.5</td>
<td>Turn-on transmitter F1 oscillator; Select R1 receiver</td>
</tr>
<tr>
<td>-12.5</td>
<td>Turn-on transmitter F1 oscillator without PL modulation for paging (XMIT PL Inhibit)</td>
</tr>
<tr>
<td>+12.5</td>
<td>Turn-on transmitter F2 oscillator; Repeater turn-on; Select R2 receiver oscillator</td>
</tr>
<tr>
<td>12.5 (momentary)</td>
<td>Unmute receiver 2 audio</td>
</tr>
</tbody>
</table>

### Table 2. Tone Commands

<table>
<thead>
<tr>
<th>Tone Freq. (Hz)</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2050</td>
<td>Disable receiver PL</td>
</tr>
<tr>
<td>1950</td>
<td>Transmit F1, or Select F1</td>
</tr>
<tr>
<td>1850</td>
<td>Transmit F2, or Select F2, or Transmit F1 w/o PL</td>
</tr>
<tr>
<td>1750</td>
<td>R2 Mute, or Receive F1*</td>
</tr>
<tr>
<td>1650</td>
<td>R2 Unmute or Receive F2*</td>
</tr>
<tr>
<td>1550</td>
<td>MAX Squelch, or Repeater OFF, or PL ON</td>
</tr>
<tr>
<td>1450</td>
<td>MIN Squelch, or Repeater ON, or PL OFF</td>
</tr>
<tr>
<td>1350</td>
<td>“Wild Card” ON #1, or Select F3</td>
</tr>
<tr>
<td>1250</td>
<td>“Wild Card” ON #2, or Select F4</td>
</tr>
<tr>
<td>1150</td>
<td>“Wild Card” ON #3</td>
</tr>
<tr>
<td>1050</td>
<td>“Wild Card” ON #4</td>
</tr>
</tbody>
</table>

*C2-R2 Receiver Frequency Selection

### Table 3. Guard Tone

<table>
<thead>
<tr>
<th>Tone Freq. (Hz)</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2175</td>
<td>Function Tone Enable</td>
</tr>
</tbody>
</table>

2.2 PLUG-IN MODULES

All stations are equipped with plug-in exciter and receiver boards, and an R1 audio & squelch module. Coded squelch stations have an additional PL or DPL encoder-decoder module. Two receiver stations have an
additional plug-in receiver board and an R2 audio & squelch module.

All stations are also equipped with the following basic complement of control modules.

**DC CONTROL**
- DC Transfer Module
- Station Control Module
- Line Driver Module

**TONE CONTROL**
- Guard Tone Decoder Module
- F1 Tone Control
- F2, or C2-R2, Tone Control Module (2-Frequency Stations)
- Station Control Module
- Line Driver Module

Repeater stations are also equipped with a Squelch Gate Module and Time-Out Timer Module. Repeaters without wire line control may have the modules that are associated with line control operation omitted. All base and repeater stations have additional space provided for optional accessory modules.

### 3. SERVICE AND MAINTENANCE

#### 3.1 LOCAL STATION OPERATION

**WARNING**

Always line disable this station when performing local maintenance duties. Failure to do so may result in personal injury or equipment damage. Selection of frequency by the remote control console momentarily keys this station even though the microphone push-to-talk switch has not been depressed. Upon completion of local testing, return the line disable switch to its normal position.

#### 3.2 REMOVAL AND REPLACEMENT OF MODULES

Modules may be removed by simply pulling outward on the module, and may be replaced by pushing the module back into its position by its panel. The modules are labelled and the mounting positions are marked on the inside of the module housing and on the backplane interconnect board.

**CAUTION**

Always be sure of the correct module installation position before plugging a module into the RF-Control Chassis.

Technicians who service many of these stations may wish to carry spares and replace malfunctioning modules for immediate restoration of operation. The module may then be repaired at the shop and used as the next replacement spare.

**NOTE**

For proper operation, all jumper connections must be identical on modules that are removed and modules that are inserted before swapping can be successfully used as a troubleshooting technique.

#### 3.3 INSTALLATION OF ADDITIONAL MODULES

When new functions (optional modules) are added, refer to the pertinent module section in this manual for proper jumpering information.

#### 3.4 IN-CIRCUIT MODULE SERVICING

The Model TLN5935A Service Board Kit can be used to extend a control or audio module out of the front of the RF-Control Chassis. This provides access for service and maintenance without interrupting the power and signal connections.

If the service board kit is not available, the module can be plugged on to the rear of the backplane interconnect board. (Tilt the RF-Control Chassis forward to obtain access to the rear of the backplane interconnect board.)

**CAUTION**

Care must be taken to insert the module on to the correct connector by using the legend on the backplane. Match pin 1 of the module connector with pin 1 of the proper backplane connector. An outline of the front panel's position, with respect to the backplane connector is given as part of the backplane legend to assist proper insertion.

#### 3.5 INTERCOM, OR METERING & INTERCOM

The Option C226 Series Service Intercom or Option C149 Series Metering and Intercom are optional accessories for remotely controlled MSR 2000 base or repeater stations. Both of these accessory items facilitate testing, adjustment, and maintenance of the station. There is a specific version of these options available for any MSR 2000 base or repeater station.

The speaker and test microphone may be used for two-way intercom between the station and the remote control console without keying the station transmitter. The speaker and microphone also may be used to locally op-
erate the station for “on-the-air” testing and maintenance. The NORMAL-INT switch (S1) selects the desired mode of operation; NORMAL for “on-the-air” testing and INT for intercom operation. The SPKR-OFF switch allows the speaker to be used during testing, or to be disabled when the station is unattended.

The intercom mode is operated by placing the NORMAL-INT switch (S1) in the INT position, the SPKR-OFF switch in the SPKR position, and depressing the microphone PTT button. Microphone audio is then routed, via the line driver, to the remote control console (over the control line). Microphone audio is also routed to the transmitter, however the INT PTT function does not key the transmitter. A message from the remote control console is applied to the speaker through the line driver and R1 audio & squelch modules.

When switch S1 is in the NORMAL position and the microphone PTT switch is activated, mic audio is again routed to the line driver. However, the line driver is inhibited under these conditions, which prevents line noise from being transmitted. Mic audio is applied to the exciter and the transmitter is keyed.

3.6 LOCAL OPERATING INSTRUCTIONS

3.6.1 Intercom

Step 1. Connect a test microphone to the microphone receptacle on the R1 audio & squelch module.

Step 2. Place the SPKR-OFF switch in the SPKR position.

Step 3. Place the NORMAL-INT switch in the INT position.

Step 4. The unit is now ready for intercom operation between the station and remote control point. Close the push-to-talk switch on the microphone and speak into the microphone to send a message. Release the button to listen; replies will be heard in the local speaker. The console operator at the remote point must also switch to an intercom mode to prevent keying the station during replies.

---

WARNING
Station should ALREADY be line disabled!

---

Step 5. Return the SPKR-OFF switch to the OFF position and return the NORMAL-INT switch to the INT position before leaving the station unattended.

3.6.2 “On-The-Air” Testing

Step 1. Connect a test microphone to the microphone receptacle on the R1 audio & squelch module.

Step 2. Place the SPKR-OFF switch in the SPKR position.

Step 3. Leave the NORMAL-INT switch in the NORMAL position.

Step 4. The unit is now ready for “on-the-air” testing. If the microphone push-to-talk switch is closed, the station’s transmitter will be keyed. Speak into the microphone to transmit a message. Release the push-to-talk switch to listen. Receiver audio will be heard on the local speaker.

Step 5. Return the SPKR-OFF switch to the OFF position before leaving the station unattended.

3.6.3 Monitoring

To monitor audio quality, etc., place the SPKR-OFF switch in the SPKR position. Both receiver audio and line audio from the remote control point will be heard in the local speaker.

4. SPECIAL MODIFICATIONS

To change the Function Tone Decoder frequencies from the standard value, change those parts indicated in Figure 1 and Table 4.

![Figure 1. Typical Function Tone Detector](image-url)
Table 4. Function Tone Modification Table

<table>
<thead>
<tr>
<th>To Change Function Tone Tank Freq. To</th>
<th>R1 ± 5% (Ohms)</th>
<th>R2 ± 5% (Ohms)</th>
<th>R3 ± 1% (Ohms)*</th>
<th>R4 ± 1% (Ohms)</th>
<th>C1 ± 2% (uF)</th>
<th>Capacitor Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2050 Hz</td>
<td>27k, 33k*</td>
<td>1.5k</td>
<td>2.7k**</td>
<td>221</td>
<td>.0056</td>
<td>8-84326A13</td>
</tr>
<tr>
<td>1950 Hz</td>
<td>22k, 27k*</td>
<td>1k</td>
<td>2.2k**</td>
<td>221</td>
<td>.0062</td>
<td>8-84326A14</td>
</tr>
<tr>
<td>1850 Hz</td>
<td>18k, 22k*</td>
<td>1.5k</td>
<td>2.7k**</td>
<td>221</td>
<td>.0069</td>
<td>8-84326A15</td>
</tr>
<tr>
<td>1750 Hz</td>
<td>22k</td>
<td>1k</td>
<td>2.43k</td>
<td>221</td>
<td>.0077</td>
<td>8-84326A16</td>
</tr>
<tr>
<td>1650 Hz</td>
<td>18k</td>
<td>1k</td>
<td>2.21k</td>
<td>221</td>
<td>.00865</td>
<td>8-84326A17</td>
</tr>
<tr>
<td>1550 Hz</td>
<td>15k</td>
<td>1k</td>
<td>2.21k</td>
<td>221</td>
<td>.0098</td>
<td>8-84326A18</td>
</tr>
<tr>
<td>1450 Hz</td>
<td>12k</td>
<td>1k</td>
<td>2.21k</td>
<td>221</td>
<td>.0112</td>
<td>8-84326A19</td>
</tr>
<tr>
<td>1350 Hz</td>
<td>10k</td>
<td>1k</td>
<td>2.21k</td>
<td>221</td>
<td>.0129</td>
<td>8-84326A20</td>
</tr>
<tr>
<td>1250 Hz</td>
<td>9.1k</td>
<td>1k</td>
<td>2.43k</td>
<td>221</td>
<td>.015</td>
<td>8-84326A21</td>
</tr>
<tr>
<td>1150 Hz</td>
<td>8.2k</td>
<td>1k</td>
<td>2.43k</td>
<td>221</td>
<td>.0178</td>
<td>8-84326A22</td>
</tr>
<tr>
<td>1050 Hz</td>
<td>6.8k</td>
<td>1k</td>
<td>2.43k</td>
<td>221</td>
<td>.0213</td>
<td>8-84326A23</td>
</tr>
</tbody>
</table>

* Values for “Wild Card” only.
** ± 5% is allowable.

Example: Changing “Wild Card” frequency to 1850 Hz

<table>
<thead>
<tr>
<th>Freq.</th>
<th>R1</th>
<th>R2</th>
<th>R3</th>
<th>R4</th>
<th>C1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1850 Hz</td>
<td>22k ± 5%</td>
<td>1.5k ± 2%</td>
<td>2.7k ± 5%</td>
<td>221 ± 1%</td>
<td>.0069 uF ± 2%</td>
</tr>
</tbody>
</table>
parts list

This parts list contains 5 items of the Recontrol chassis block. When other blocks are referenced to this block, the reference symbol is printed in the application

REFERENCE NUM.

REFERENCE TABLE

REFERENCE MODEL

REFERENCE ABBREVIATION

DESCRIPTION

REFERENCE

REFERENCE MODEL

REFERENCE ABBREVIATION

DESCRIPTION

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DESCRIPTION

REFERENCE
<table>
<thead>
<tr>
<th>Component</th>
<th>Board 1</th>
<th>Board 2</th>
<th>Board 3</th>
<th>Board 4</th>
<th>Board 5</th>
<th>Board 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacitor</td>
<td>C1</td>
<td>C1</td>
<td>C2</td>
<td>C2</td>
<td>C3</td>
<td>C3</td>
</tr>
<tr>
<td>Resistor</td>
<td>R1</td>
<td>R2</td>
<td>R3</td>
<td>R4</td>
<td>R5</td>
<td>R6</td>
</tr>
<tr>
<td>Transistor</td>
<td>T1</td>
<td>T2</td>
<td>T3</td>
<td>T4</td>
<td>T5</td>
<td>T6</td>
</tr>
</tbody>
</table>

*Note: The table above is a sample of the information contained in the document.*