2.2 TRANSMIT TIME-OUT-TIMER PROGRAMMING

2.1 CTCSS TONE PROGRAMMING

When the TS-64WDS is activated, an internal Transmit Time-out-timer will limit transmissions to a programmed length, thus preventing accidental transmissions over the radio. At the end of the 160 ms period, the TS-64WDS will unkey the transmitter. If the TS-64WDS comes from the factory with the jumper pads all open, which is the most common configuration, it is recommended that the miniatures dip switch and jumper pads allow the radio service shop to configure the TS-64WDS for the required transmitter tone. A reverse phase burst which will mute the decoding unit at the other end of the transmission medium. When the TS-64WDS is programmed by the dip switch (setting CTCSS tone frequency) and installing 'solder bridges' across the four jumper pads, T01,T02,T03 and H/B (hang-up/busy) if needed. A low wattage soldering iron with a small tip should be used to place a small solder bridge across the various jumper pads. The TS-64WDS may be programmed before or after it is installed in the associated radio set. The TS-64WDS is designed to encode and decode CTCSS transmissions in conjunction with an associated FM radio transmitter. Upon receipt of a programmed CTCSS coded transmission, the TS-64WDS will unmute the receiver audio and allow audio to pass. While the TS-64WDS is decoding, an internal timer keeps the audio path open for approximately 350 ms during a loss of signal due to signal fade. Upon receipt of the turn-on code, the TS-64WDS will immediately mute the receiver audio thus eliminating the squelch tail that is usually heard at the end of a transmission. The microphone Hang-up Input allows the operator to override the decoder and open up the audio path for channel monitoring.

When the PTT switch is keyed on the microphone, the TS-64WDS will key the transmitter and immediately begin generating the programmed CTCSS tone for transmission. The TS-64WDS will continue to generate the CTCSS tone for as long as the PTT switch is pressed. Upon release of the PTT switch, the TS-64WDS will continue to key the transmitter for approximately 160 ms. During this time, the TS-64WDS will generate a reverse phase burst which will mute the decoding unit at the other end of the transmission medium. At the end of the 160 ms period, the TS-64WDS will unkey the transmitter. If activated, an internal Transmit Time-out-timer will limit transmissions to a programmed length, thus eliminating any potential feedback.

2.0 PROGRAMMING THE TS-64WDS

This section of the instructions describes how to program the TS-64WDS to suit the needs of your radio system. These programming features are designed to be programmed by the installing technician. The TS-64WDS may be programmed before or after it is installed in the associated radio set. The TS-64WDS is programmed by the dip switch (setting CTCSS tone frequency) and installing ‘solder bridges’ across the four jumper pads, T01,T02,T03 and H/B (hang-up/busy) if needed. A low wattage soldering iron with a small tip should be used to place a small solder bridge across the various jumper pads. When programming the unit, be careful not to damage the TS-64WDS printed circuit board. The TS-64WDS comes from the factory with the jumper pads all open, which is the most common configuration. See the Parts Layout Diagram for the location of the jumper pads.

2.1 CTCSS TONE PROGRAMMING

CTCSS tone frequency is programmed using the miniatures dip switch. A total of 64 different subaudible tones can be selected. Simply slide each of the 6 switches either ON or OFF to select the desired frequency. The table to the right shows the switch positions required to select each CTCSS tone frequency. Please note that tones marked with a ‘*’ are not EIA tones, should only be used for special applications, and may not work in harmony with adjacent EIA tones.

2.2 TRANSMIT TIME-OUT-TIMER PROGRAMMING

The Transmit time-out-timer is used to limit the duration of a continuous transmission to a maximum length as programmed by the jumper pads T01, T02, and T03. The timer can be programmed with eight different timeout intervals. These are listed in the table below. The Transmit time-out-timer is disabled when received from the factory.

<table>
<thead>
<tr>
<th>TIMEOUT INTERVAL</th>
<th>T01</th>
<th>T02</th>
<th>T03</th>
</tr>
</thead>
<tbody>
<tr>
<td>DISABLED</td>
<td>out</td>
<td>out</td>
<td>out</td>
</tr>
<tr>
<td>15 seconds</td>
<td>out</td>
<td>out</td>
<td>out</td>
</tr>
<tr>
<td>30 seconds</td>
<td>bridge</td>
<td>bridge</td>
<td>bridge</td>
</tr>
<tr>
<td>45 seconds</td>
<td>bridge</td>
<td>bridge</td>
<td>bridge</td>
</tr>
<tr>
<td>1 minute</td>
<td>out</td>
<td>bridge</td>
<td>bridge</td>
</tr>
<tr>
<td>2 minutes</td>
<td>out</td>
<td>bridge</td>
<td>bridge</td>
</tr>
<tr>
<td>3 minutes</td>
<td>out</td>
<td>bridge</td>
<td>bridge</td>
</tr>
<tr>
<td>5 minutes</td>
<td>out</td>
<td>bridge</td>
<td>bridge</td>
</tr>
</tbody>
</table>

3.0 Installation Instructions

There is a small green LED on the component side of the TS-64WDS PCB to indicate status. There are 3 jumper pads on the bottom side of the PCB that can have a “solder bridge” installed between the center pad and either or both of the other 2 pads to indicate status as follows:

Center pad to MUTE 1 LED pad=LED only on when decoding or mike is off-hook (as shipped)
Center pad to MUTE 2 LED pad=LED only when decoding or mike is on-hook

Center pad to both MUTE 1 and MUTE 2 pads=LED is on indicator only
Center pad not bridged=LED is always off

4.0 Specifications

There are 3 jumper pads on the bottom side of the PCB that can have a “solder bridge” installed between the center pad and either or both of the other 2 pads to indicate status.

Center pad to MUTE 1 LED pad=LED only on when decoding or mike is off-hook (as shipped)
Center pad to MUTE 2 LED pad=LED only when decoding or mike is on-hook

Center pad to both MUTE 1 and MUTE 2 pads=LED is on indicator only
Center pad not bridged=LED is always off

Back to Tone Signaling Equipment Page
high pass filter output (blue) (pin 11)

This wire should be connected directly to a filtered source of continuous positive DC voltage in the range of +6.0vdc to +20.0vdc. This connection should be made "downstream" from the power switch, and the power supply filter components in the radio set. If a regulated source of DC voltage is available, it may be used. Using a quiet and stable source of DC voltage inside the radio set will reduce the possibility of picking up power supply noise.

ground (black) (pin 9)

The ground wire should be connected to a location inside the radio set which will supply a DC power ground return to the TS-64WDS. To eliminate ground loops and power supply noise, the ground return to the TS-64WDS should be the same power supply ground used in the transmit or receive audio stages.

PTT input (orange / white) (pin 4)

This lead must be grounded to encode tone

PTT output (yellow / black) (pin 10)

This wire feeds the CTCSS decoder in the TS-64WDS. This connection MUST be made directly to the CTCSS output of the receiver just after the point where the TS-64WDS Discriminator Input was connected. Then install the High Pass Filter Output so that it is in series with the audio path in the receiver.

high pass filter mute (brown / black) (pin 8)

If this wire is shorted to ground, any audio flowing through the High Pass Audio Filter will be muted. Normally this is not used, however if you are using the High Pass Audio Filter, you may connect this wire to RX MUTE OUTPUT #1 to allow receive audio when the TS-64WDS is decoding the proper tone or the microphone hang-up is off hook.

microphone hang-up/busy input (violet) (pin 2)

This is a dual function input that is determined by the HB jumper pad. When the HB jumper pad has no "solder bridge" across it, this input will operate as a Microphone hang-up input, and control the "channel monitoring" function in the TS-64WDS. When the Hang-up Input is floating or above ground potential (mic is off-hook), the TS-64WDS will be in the monitor mode, and will unmute the receiver audio. If this input is grounded, such as through a mic hang-up button, the receiver audio will be muted. The audio path in the receiver will only be enabled upon receipt of the correct CTCSS code. Connect the Hang-up Input to the microphone hookswitch connection on the microphone jack.

If the HB jumper pad has a "solder bridge" across it, the Hang-up/Busy Input will operate as a Busy Input, and disable the transmit function in the TS-64WDS if the operator tries to transmit when the channel is busy. However, if the TS-64WDS is currently decoding a CTCSS tone, and the channel is busy, the transmit function will be allowed. Connect the Busy Input to a location in the receiver that will provide an indication as to the status of the channel. The usual location is the squelch switch transistor in the receiver. A busy channel is defined as a logical high, or a voltage level greater that 1.5vdc. Please note that this is the same connection point as the RX Mute Output. The Busy Input must be connected AHEAD of the RX Mute Output with a diode in series, and the cathode of the diode connected to the Busy Input. This arrangement will isolate the Busy Input from being controlled by the Receive Audio Mute Output.

alert tone output (orange / black) (pin 5)

This Output can be connected to the input of the audio amplifier stage in the receiver. The busy tone will then be heard in the speaker of the radio set.

3.1 ADJUSTMENT

The CTCSS Output Adjustment, VR-1, is the only adjustment required on the TS-64WDS. This control sets the level of the CTCSS Output. A very small slotted alignment tool should be used to make the adjustment on the TS-64WDS PCB. To adjust the CTCSS Output level to the correct deviation, key the PTT switch on the microphone, and while watching a deviation scope tuned to the transmit output frequency, carefully adjust the CTCSS Output Adjustment. The deviation level of the CTCSS Output should be set to 0.5kHz for wide-band or 0.25kHz or less for narrow-band.

A deviation scope on a service monitor is best for adjusting the CTCSS deviation. The CTCSS waveform on the scope will appear as a sine wave. If the CTCSS signal appears distorted, this indicates that the interface connection is incorrect, and must be changed to a more suitable location.

4.0 SPECIFICATIONS

Number of Tones

64

Tone Accuracy

Better than 0.05Hz

Tone Stability

Crystal controlled

Encode Output Z

2.2K ohms AC coupled

Encode Output Level

Adjustable from 0v to 3v

Discriminator Input Z

60K ohms AC coupled

Decode Input Level

5.0v minimum

Signal to Noise

Better than 4db Sinad

Decode Time

150 ms. Nominal

Fade Time

350 ms. Nominal

Squelch Tail Elimination

160 ms reverse phase burst

CTCSS Tone Programming

By 6 position dip switch

RX Mute Outputs

FET's

TX PTT Output

FET

Receive Audio Filter

3 pole 330Hz High-pass filter

Busy Tone Output

5V pk-pk at 1000Hz

Temperature Range

-30°C to + 65°C

Supply Requirements

6.0 to 20.0 VDC @ 11 Ma.

Size

0.9” x 1.8” x 0.19”