

## GENERAL

The Model ST-32 Line Termination Panel is a miniature circuit board designed to interface most dc remotes to the base station radio. It is small enough to be mounted inside most base stations. The ST-32 is shipped with a modular phone jack, line cord, #42A wall mount terminal block, double-sided pressure-sensitive tape for mounting and 18" flying leads for radio connections. Controls are included for setting transmit and receive line levels.

When installed, the ST-32 interfaces the base station radio to a single pair of "metallic" wires. It is then possible to transmit (two frequencies), receive (one frequency) and disable the receiver tone protection (MONITOR) by passing known dc currents through the ST-32 via the control wires. The same pair of wires is also used to pass transmit and receive audio between the radio equipment and the remote control equipment. Current detection is provided by optical isolators while outputs are Form "C" relay contacts.

Because of our comprehensive warranty policy you should probably not have to consider any field repair; however, if repair is unavoidable, all parts are clearly labeled on the diagrams and should be available through major component distributors.

SmarTrunk's Application Engineering staff is available to assist you if any questions arise regarding product capability or interfacing for your application. We maintain an extensive library of technical literature for radio communications equipment manufactured world wide.

## INSTALLATION

Application requirements vary considerably for remotely controlled radio systems. The ST-32 has been designed to permit considerable flexibility on the part of the system installer. Actual connection to the ST-32 is by a 15-pin MOLEX connector with 18" flying leads. Connections that are common to most applications are factory installed on the female connector. Application dependent leads are marked with an \* and supplied for field connection.

## PIN CONNECTIONS

**P1-1 (GREEN):** ..... Connect to the radio speaker high or any squelch controlled audio source in the radio.

**CAUTION:** *If the volume control affects the level at this point, provision should be made to restrict adjustment since it will affect the line level.*

**P1-2\* (BLK/GRN):** ..... Secondary (-) supply connection to speaker low.

**P1-3\* (YELLOW):** ..... Connect to PTT.

**P1-4 (WHT/BLU):** ..... Connect to MIC high (R23, R24 and R25 are supplied on the PCB to bridge the microphone circuit with minimum loading).

**P1-5 (BLACK):** ..... Connect to Negative (-) Supply.

**P1-6 (RED):** ..... Connect to Positive (+) Supply.

The remaining pins are the Form "C" relay outputs of the indicated control relay.

**K2:** ..... This relay is activated if there is -5 mA or greater on the control loop. Operation may be modified to -2.5 mA by clipping R11 from the circuit.

**P1-7\* (BLK/BRN):** ..... N.C.

**P1-8\* (WHT/BRN):** ..... N.O.

**P1-9\* (BROWN):** ..... Monitor Common.

**K3:** ..... This relay is activated if there is +12.5 mA or greater on the control loop. If your application does not have an F2 transmit requirement, these connections are not used.

**P1-10\* (ORANGE):** .... Frequency Select Common.

**P1-11\* (BLK/ORG):** .... N.O.

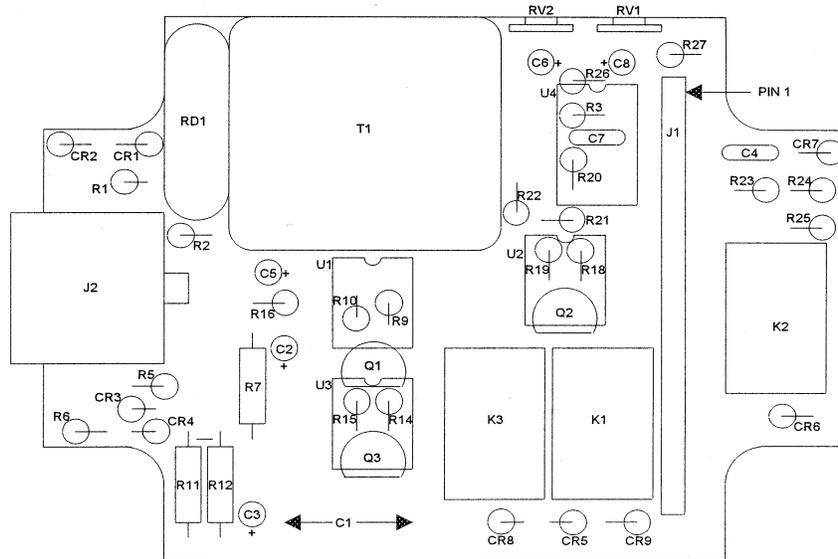
**P1-12\* (WHT/ORG):** ... N.C.

**K1:** ..... This relay is activated if there is +5 mA or greater on the control loop.

**P1-13\* (VIOLET):** ..... Transmit Common.

**P1-14\* (BLK/VIO):** ..... N.O.

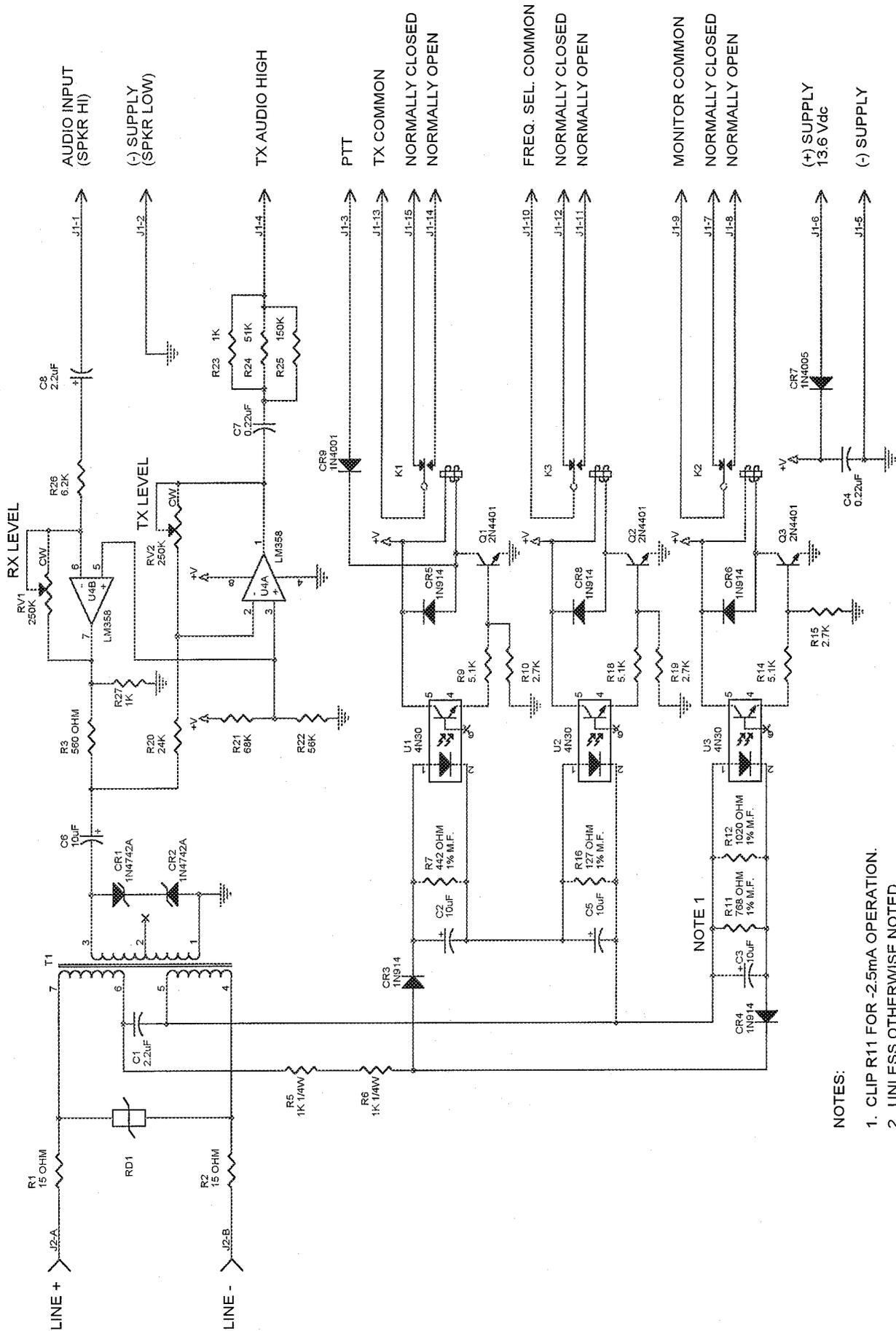
**P1-15\* (WHT/VIO):** ..... N.C.



NOTES  
 1. THE TOP LEAD OF ALL DIODES IS THE CATHODE.  
 2. PIN 6 OF U1, U2 AND U3 MUST BE CUT OFF.

### SERVICEABLE ITEMS PARTS LIST

COMP.	PART #	DESCRIPTION	COMP.	PART #	DESCRIPTION
<b>C1</b>	036-0000	Capacitor 2.2 UF Mylar 250V 20%	<b>R13</b>		Not Used
<b>C2-3</b>	034-0000	Capacitor 10 UF Tantalum 16V 20%	<b>R14</b>	146-5101	Resistor 5.1K 1/8W 5% CF
<b>C4</b>	028-2203	Capacitor 0.22 UF Z5U 50V 20%	<b>R15</b>	146-2701	Resistor 2.7K 1/8W 5% CF
<b>C5-6</b>	034-0000	Capacitor 10 UF Tantalum 16V 20%	<b>R16</b>	147-1270	Resistor 127 Ohm RN55 1% MF
<b>C7</b>	028-2203	Capacitor 0.22 UF Z5U 50V 20%	<b>R17</b>		Not Used
<b>C8</b>	034-0001	Capacitor 2.2 UF Tantalum 16V 20%	<b>R18</b>	146-5101	Resistor 5.1K 1/8W 5% CF
<b>CR1-2</b>	067-0004	Diode 1N4742 Zener 12V 1W	<b>R19</b>	146-2701	Resistor 2.7K 1/8W 5% CF
<b>CR3-6</b>	066-0000	Diode 1N914	<b>R20</b>	146-1002	Resistor 10K 1/8W 5% CF
<b>CR7</b>	066-0002	Diode 1N4005	<b>R21</b>	146-6802	Resistor 68K 1/8W 5% CF
<b>CR8</b>	066-0000	Diode 1N914	<b>R22</b>	146-5602	Resistor 56K 1/8W 5% CF
<b>CR9</b>	066-0001	Diode 1N4001	<b>R23</b>	146-1001	Resistor 1K 1/8W 5% CF
<b>J1</b>	056-0011	Connector 15 Pin Male	<b>R24</b>	146-5102	Resistor 51K 1/8W 5% CF
<b>J2</b>	074-0000	Jack Phone Mod PC Mount	<b>R25</b>	146-1503	Resistor 150K 1/8W 5% CF
<b>K1-3</b>	123-0002	Relay SPDT Sealed ITT	<b>R26</b>	146-2401	Resistor 2.4K 1/8W 5% CF
<b>Q1-3</b>	210-0000	Transistor 2N4401	<b>R27</b>	146-1001	Resistor 1K 1/8W 5% CF
<b>R1-2</b>	146-0150	Resistor 15 Ohm 1/8W 5% CF	<b>RD1</b>	086-0007	Surge Protector 130Vrms
<b>R3</b>	146-5600	Resistor 560 Ohm 1/8W 5% CF	<b>RV1-2</b>	111-0021	Potentiometer 250K 1-Turn
<b>R4</b>		Not Used	<b>T1</b>	200-0001	Transformer 600:600 Ohm
<b>R5-6</b>	141-1001	Resistor 1K 1/4W 5% CF	<b>U1-3</b>	083-0000	IC 4N30 Opto-Coupler
<b>R7</b>	147-4402	Resistor 442 Ohm RN55 1% MF	<b>U4</b>	085-0003	IC LM358 Dual Op Amp
<b>R8</b>		Not Used	<b>W1</b>	011-0002	Phone Cord 7 ft
<b>R9</b>	146-5101	Resistor 5.1K 1/8W 5% CF		501-4035	Cable Assembly
<b>R10</b>	146-2701	Resistor 2.7K 1/8W 5% CF		190-0006	Terminal Block Wall Mount
<b>R11</b>	147-7680	Resistor 768 Ohm RN55 1% MF		501-4075	ST-32 Operating Manual
<b>R12</b>	147-1021	Resistor 1.02K RN55 1% MF			



NOTE 1

NOTES:

1. CLIP R11 FOR -2.5mA OPERATION.
2. UNLESS OTHERWISE NOTED, ALL RESISTORS ARE 1/8W.

# CIRCUIT SCHEMATIC

## MECHANICAL INSTALLATION

Use of double-sided adhesive tape eliminates the need for mounting hardware. The tape may be used to mount the ST-32 board. Mount on a clean dry surface oriented to allow adjustment of the level controls by the service technician. Press firmly after mounting to ensure good contact of the adhesive. Do not touch the adhesive or attempt to reposition the unit after mounting.

## SETUP PROCEDURE

Only two adjustments are required on the ST-32. They are RECEIVE LEVEL and TRANSMIT LEVEL. While receiving a 1000 Hz tone modulating at 2/3 system deviation, adjust RV1 (farthest from the transformer) for the desired line level (level turn-on point for the ST-30). Place the transmitter keying control current on the control loop and the desired transmit audio line level on the line, then adjust RV2 (nearest the transformer) for the desired system deviation.

**NOTE:** The transmitter manufacturer's procedure for deviation adjustment should be followed prior to any transmit audio adjustments.

## WARRANTY POLICY

All Selectone products are guaranteed to meet or exceed published performance specifications and are warranted against defects in material and workmanship for a period of two (2) years from date of purchase. Third party equipment such as radios, power supplies, antennas, etc., carry the factory warranty of their respective manufacturers.

All warranty repairs must be performed at the SmarTrunk factory in Hayward, California, or other factory authorized repair depot. Any unauthorized repair attempted by the customer, alteration or modification of the equipment, damage by external sources, or removal or alteration of the serial number label or date code, will void the warranty. Specifically excluded from this warranty are batteries, fuses, lamps, and damage caused by lightning, power surges, or mechanical abuse.

Equipment for repair may be returned to the factory without prior written authorization; however, a note must be sent with the packing list briefly describing the nature of the defect. Repairs must be shipped freight prepaid and will be returned freight prepaid. Shipments should be directed to the address below, attention *Repair Department*.

## OPERATING SPECIFICATIONS

### GENERAL

Supply Voltage: ..... 13.6Vdc $\pm$ 20%  
Supply Current: ..... Less than 60mAdc  
Operating Temperature: ..... 0°C to +70°C ambient  
Signaling Format: ..... Loop current sense  
Dimensions: ..... 1.9"W X 2.6"L X 1.0 "H  
(4.83 cm X 6.60 cm X 2.54 cm)

### OUTPUTS

PTT: ..... Open collector, 100mAdc @ 24Vdc and single Form-C relay contacts  
Monitor: ..... Single Form-C relay contacts  
Transmit F1/F2: ..... Single Form-C relay contacts

### AUDIO: RECEIVER TO CONTROL LINE

Input Z: ..... Greater than 2K Ohms as seen from the receiver output  
Line Output Z: ..... 600 Ohms nominal at 1000 Hz  
Frequency Response: .....  $\pm$  3dB, 300 to 3000 Hz (1000 Hz ref.)  
Line Output: ..... Adjustable; minimum of 40mVrms receive audio required to produce 0dBm (600 Ohms)

### AUDIO: CONTROL LINE TO TRANSMITTER

Line Input Z: ..... 600 Ohms nominal at 1000 Hz  
2500 Ohms dc resistance  
Frequency Response: .....  $\pm$  3dB, 300 to 3000 Hz (1000 Hz ref.)  
Transmit Output: ..... -20dBm (600 Ohms) on control line required to produce 0.77mVrms (open circuit) to transmitter audio input (TX HI)  
Output Z: ..... Less than 2000 Ohms (build-out resistors supplied for HI-Z mic. input circuits)

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