

## GENERAL

The ST-138 is a DIP switch programmable CTCSS Encoder/Decoder. It is fully compatible with all major CTCSS systems, including Motorola "Private Line", General Electric "Channel Guard", and E.F. Johnson "Call Guard".

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 our diagram and most should be generally available through component distributors.

Application notes are available for over 200 different radio models. These notes provide mounting details, connection points, and radio modifications required (if any). Because the ST-138 is plug compatible with our model ST-104, all ST-104 application notes and cable assemblies are usable. Call us if you would like applications details for a specific radio. Together, we may be able to save you some time and money.

## WIRING INTERFACE

The following (5) leads are supplied connected to the Molex plug, and will generally be used for all applications.

**[15] Negative (-) Supply (BLACK):** Connect to system negative (-) Supply (Ground).

**[12] Tone Output (WHT/GRN):** Connection should be similar to Figure A or B. RA is to avoid modulator loading. Clip R14 or R15 from the circuit to make RA larger.

**[10] Tone Input (GREEN):** Jumpered to Hi-Pass Filter Input by JU1. Connect directly to FM receiver detector audio output. Breaking the audio path at this point will allow insertion of the Hi-Pass Filter. If it is not practical to break the audio path at this point, refer to **Hi-Pass Filter Input (BLUE)**.

**[8] Hi-Pass Filter Output (WHT/BLU):** Connect to place Hi-Pass Filter in series with receiver audio path.

**[2] Monitor (BROWN):** Primary control of Encoder/Decoder functions. Connect to (-) Supply (Ground) through monitor/hookswitch to mute the radio. Open from (-) Supply (Ground) to monitor the channel. If your monitor switch closes to ground to monitor, connect Monitor (BROWN) directly to (-) Supply (Ground) and refer to **Monitor(BLK/BRN)** for switch hook-up.

The remaining leads must be added to the ST-138 connector to fill specific applications. Insert Molex pins in the appropriate position according to your application.

**[14] Positive (+) Supply (RED):** Connect to Positive (+) Supply (5.6Vdc to 26Vdc)

**[9] Hi Pass Filter Input (BLUE):** Use only when **Tone Input (GREEN)** cannot be used for Hi-Pass Filter input. Cut JU1. For applications where breaking the audio path at the FM receiver detector is not practical. Hi-Pass Filter input audio should be taken at the most convenient point.

**NOTE:** Will not work in Hi-Level audio stages (speaker leads).

**[7] Decode (-) (WHT/ORG):** For applications where the radio mute point must be held at (-). Supply (Ground) until decode or monitor.

**[5] Decode (+) (BLK/ORG):** For applications where the radio mute point must be held (+) until decode or monitor.

**[6] Hi-Pass Filter Mute (WHT/ORG Jumper):** If neither of the above Decode conditions apply, connect the short WHT/ORG jumper wire provided with the cable to Decode (-).

**[1] Monitor (BLK/BRN):** If your monitor switch closes to (-) supply (ground) to monitor, use this lead for monitor, and connect **Monitor (BROWN)** to ground.

**[3] Encode Enable (BLK/YEL):** Connect to PTT with close to (-) supply (ground) for transmit.

**[4] Encode Enable (YELLOW):** For applications where a keyed (+) is available during transmit.

# ADJUSTMENTS

## Tone Output Level:

Adjust the sub-audible deviation to  $\pm 750$  Hz peak deviation with R13.

## MOUNTING

Use of a double-sided adhesive pad eliminates hardware requirements. Mount the ST-138 on a clean, dry surface, oriented to allow future adjustments should they be necessary. Press firmly after mounting to ensure good adhesive contact. Do not touch the adhesive surface or attempt to re-position the unit after mounting.

The ST-138 has been designed for maximum immunity to RF interference. However, an effort should be made to locate the unit as far as possible from the radio's RF power stages. To further minimize RF problems, twist the power leads together and maintain all leads at minimum length.

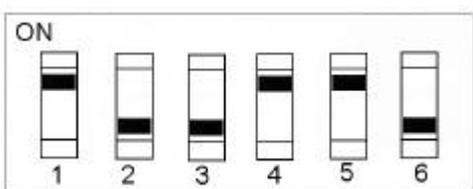
- Operating Current: = Less than 7mA
- Frequency Range: = 67Hz to 250.3Hz (37 EIA CTCSS frequencies plus 97.4Hz)
- Oper. Temp. Range: = Exceeds EIA RS-220A (-30°C to +60°C)
- Frequency Stability: = Exceeds EIA specifications
- Encoder Output Level: = Adjustable 0 to 700mVrms
- Sine Wave Distortion: = Less than 5% THD
- Decoder Input Level: = 30mVrms to 1.5Vrms
- Decoder Input Z: = Greater than 50K ohms
- Hi-Pass Filter: = May be muted by decode output
- Decoder Activate: = Field Selectable, (+) or (-) logic
- Decoder Output: = Open-collector sink 40mA to (-) supply or source(+) voltage
- Interface: = 18" flying leads terminated in a Molex connector for connection to the ST-138. Available for specific applications, or as a universal cable assembly
- Mounting: = Double-sided pressure-sensitive tape
- Dimensions: = 1.6"L x 1.05"W x 0.43"H to top of components (0.6" to top of plug)

## Frequency Programming

Frequency Programming is done by setting DIP switch positions according to the following Programming Chart.

(0 = SWITCH ON; 1 = SWITCH OFF)

PROGRAMMING CHART													
FREQ	JUMPER SECTION						FREQ	JUMPER SECTION					
IN Hz	1	2	3	4	5	6	IN Hz	1	2	3	4	5	6
67.0	1	1	1	1	1	1	131.8	0	0	1	0	0	1
71.9	0	1	1	1	1	1	136.5	0	1	1	0	0	0
74.4	1	1	1	1	1	0	141.3	0	0	1	0	0	0
77.0	0	0	1	1	1	1	146.2	0	1	0	1	1	1
79.7	1	1	1	1	0	1	151.4	0	0	0	1	1	1
82.5	0	1	1	1	1	0	156.7	0	1	0	1	1	0
85.4	1	1	1	1	0	0	162.2	0	0	0	1	1	0
88.5	0	0	1	1	1	0	167.9	0	1	0	1	0	1
91.5	1	1	1	0	1	1	173.8	0	0	0	1	0	1
94.8	0	1	1	1	0	1	179.9	0	1	0	1	0	0
97.4	1	1	1	0	1	0	186.2	0	0	0	1	0	0
100.0	0	0	1	1	0	1	192.8	0	1	0	0	1	1
103.5	0	1	1	1	0	0	203.5	0	0	0	0	1	1
107.2	0	0	1	1	0	0	210.7	0	1	0	0	1	0
110.9	0	1	1	0	1	1	218.1	0	0	0	0	1	0
114.8	0	0	1	0	1	1	225.7	0	1	0	0	0	1
118.8	0	1	1	0	1	0	233.6	0	0	0	0	0	1
123.0	0	0	1	0	1	0	241.8	0	1	0	0	0	0
127.3	0	1	1	0	0	1	250.3	0	0	0	0	0	0



Example of Switch Setting Programmed for 127.3 Hz.

## OPERATING SPECIFICATIONS

Operating Voltage: = +5.6 to 26Vdc

## WARRANTY POLICY

All standard Selectone products are guaranteed to meet or exceed published performance specifications and are warranted against defects in material and workmanship for a period of five years from the date of purchase. Special configurations and non-standard systems are warranted for a period of one year.

If any standard Selectone product fails to operate within the first 90 days from the date of purchase, Selectone will immediately send out a replacement unit and will issue full credit, including freight, upon the return of the defective unit(s). All prepay/C.O.D. customers must return the defective equipment prior to exchange, otherwise the customer will be required to prepay for the new unit(s) with credit issued only on the return of the defective equipment.

After 90 days, this warranty is specifically limited to correction of the defects by factory or replacement of faulty equipment or parts.

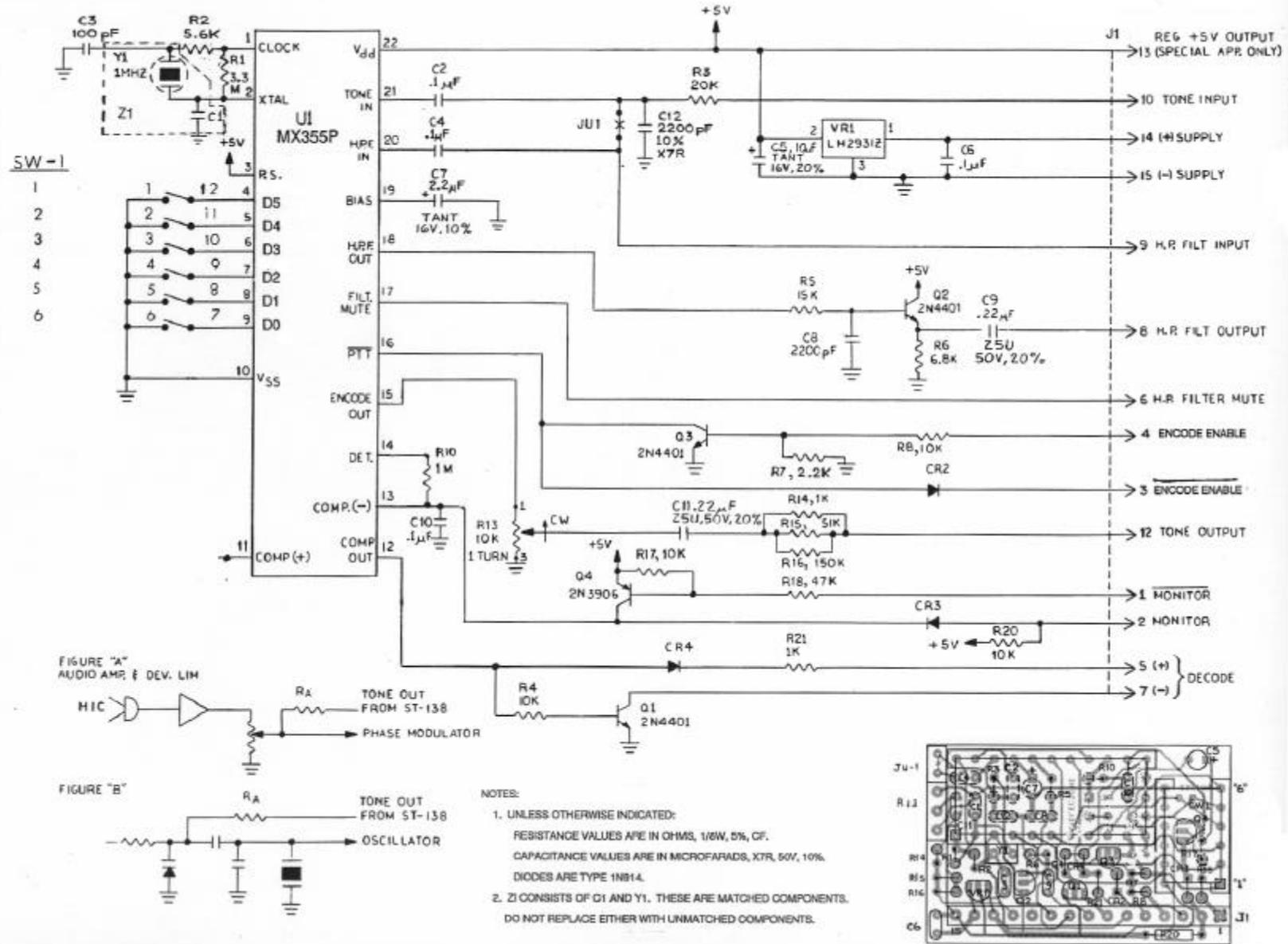
All warranty repairs must be performed at the Selectone factory in Hayward, California. No credit will be given for unauthorized repair work attempted by the customer. Any unauthorized alterations or modification of the equipment, damage caused by external sources, or removal or alteration of the serial 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.

For equipment to be returned to the factory for repair, you must first call and get an RMA# from Customer Service. The RMA# must be written on the outside of the package, otherwise receiving will reject the shipment. In addition, a note must be sent with the packing list briefly describing the nature of the defect.

For special warranty replacement service, contact Selectone Customer Service Department at (800) 227-0376, fax (510) 781-5454 or E-Mail us at techsupport@selectone.com.

All repairs and returns are to be sent to:

Selectone, Inc.  
 3501 Breakwater Ave.  
 Hayward, Ca. 94545-3610  
 ATTN: Warranty Repair



**ST-138 SCHEMATIC DIAGRAM**