

## MODEL 226 CRYSTAL CALIBRATOR

### (I) GENERAL

The TEN-TEC Model 226 crystal calibrator is an accessory which provides accurate determination of the received operating frequency. It inserts highly accurate signals every 25 kHz into the receiving antenna circuit. These signals are derived from a crystal oscillator that is factory set to zero beat with WWV. An integrated circuit divides the 3.2 MHz signal by 128 to produce the 25 kHz signal which contains harmonics that extend above 30 MHz. It is these harmonics that are received and tuned to zero beat to determine the accuracy of the VFO dial scale.

To easily identify the calibrator signal on a crowded band, the output is pulsed approximately 3 or 4 times a second. This rate can be adjusted by R1. Also, a push-on push-off switch is provided on the front panel to turn the calibrator off during transceiver operation.

### (II) INSTALLATION

- 1) Remove both top and bottom covers from ARGOSY by removing the four screws holding each cover. Carefully separate them from the chassis and set them aside.
- 2) Locate the three unused stand-off spacers on the top side of the chassis pan that are located around the area designated for Model 226. Position the calibrator assembly on the stand-offs, aligning the three mounting holes with the stand-offs.
- 3) Secure the assembly in place with the three 6 32 x 1/4" machine screws supplied. Tighten securely since the ground return path is through the spacers.
- 4) Plug one end of the coaxial cable supplied with the calibrator into the socket marked 29 on the calibrator so that the cable exits toward the center of the assembly.
- 5) Route the cable through the large grommet in the center of the chassis to the other side of the chassis. Continue routing it through the grommet in the center shield closest to the front of the unit and over to the unused socket marked 29 at the rear edge of the Oscillator/Mixer/Band Pass Filter assembly.
- 6) Attach the red cable supplied with the calibrator that has the three terminal connector to socket marked 44 on the Model 226. The wires should exit toward the edge of the PC assembly when properly inserted.
- 7) Route the other end of this wire (with the two terminal connector attached) through the same center grommet in the chassis and then forward around the PTO box toward the CAL. ON-OFF switch located on the front panel.
- 8) Observe the unused two terminal socket on the PC board that contains the three front panel switches. It is the center socket of three. Plug the Connector into this socket so that the wires exit in the same direction as those already plugged into the other two sockets.
- 9) Turn the transceiver on and check for proper operation before replacing the top and bottom covers. Check for proper switch operation (on/off) and for calibrator signals every 25 kHz.
- 10) Replace top and bottom covers.

### (III) OPERATION

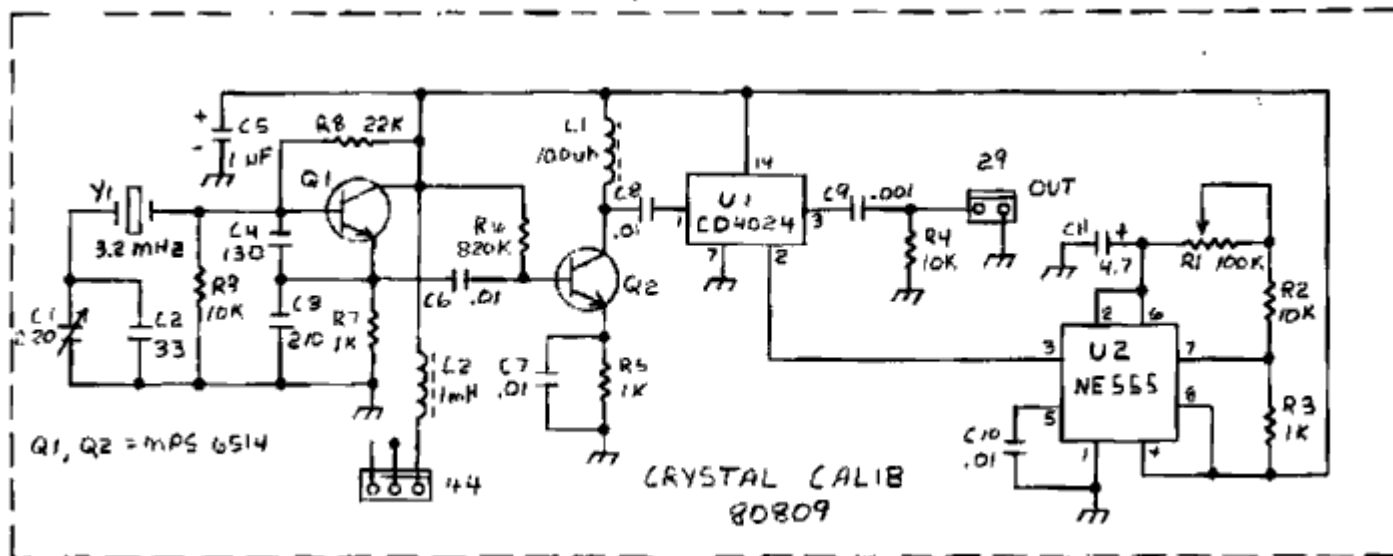
- 1) With the transceiver tuned to approximate frequency desired, tune the dial to the closest 25 kHz marker that is 0, 25, 50 or 75 on the scale. The pulsed calibrator signal should be heard at this position. (use the broadest selectivity position for calibration purposes so that the zero beat will be easily discernable.)
- 2) Tune the receiver so that the pulse signal is nulled to zero audio beat. Readjust the dial skirt while holding the main tuning knob, so that the indicated reading corresponds to the proper frequency mark that is 0, 25, 50 or 75 kHz.

3) Turn the calibrator off when operating normally.

#### (IV) THEORY OF OPERATION

Transistor Q1 is a Colpitts crystal controlled oscillator operating with the crystal at 3.2 MHz. Transistor Q2 is a buffer which drives the integrated circuit divider U1. U1 divides the 3.2 MHz signal by 128 producing an output of 25 kHz. This output is very rich in harmonics which can be heard all the way up to 30 MHz. U2 is an astable multivibrator operating at approximately 3 Hz. The output of this oscillator is used to gate the divider producing a pulsed output. The frequency of these pulses can be adjusted with thumb pot R1. The calibrator is aligned at the factory. If realignment becomes necessary, proceed as follows:

- 1) Turn the band switch to 10 MHz and the dial to 10.000 and tune in WWV. Wait until the announcement occurs and tune the voice for maximum clarity with no audible carrier beat note.
- 2) Turn the calibrator on and adjust C1 carefully to remove any trace of the pulsed audio beat note.



#### PARTS LIST

|         |       |                                  |
|---------|-------|----------------------------------|
| C1      | 23168 | CAP-VAR, 3/22PF, TRIMMER, VERT   |
| C11     | 23188 | CAP-FXD, 4.7MF, 25V, EL. VERT    |
| C2      | 23192 | CAP-FXD, 33PF, 100V, 5%, CER     |
| C3      | 23201 | CAP-FXD, 270PF, 5%, 100V         |
| C4      | 23155 | CAP-FXD, 150PF, 500V, 5%         |
| C5      | 23131 | CAP-FXD, 1MF, 50V, EL, VER       |
| C6-8,10 | 23132 | CAP-FXD, .01MF, 100V. CER        |
| C9      | 23133 | CAP-FXD, .001MF, 500V, CER, 10%  |
| L1      | 21060 | CHOKE-RF, 100 UH, 100 MA         |
| L2      | 21007 | CHOKE-RF. 1 MHY                  |
| Q1,2    | 25054 | TRANSISTOR - MPS6514             |
| R1      | 30195 | RES-VAR. 100K, LIN, PC VERT, 30% |
| U1      | 25103 | IC MC14024 BCP                   |
| U2      | 25076 | IC-NE555                         |
| Y1      | 48056 | CRYSTAL-QUARTZ, 3.2 MHZ, HC-33/U |

#### U1

| PIN | VOLTAGE |
|-----|---------|
| 1   | 1.0     |
| 2   | DNM     |
| 3   | DNM     |
| 4   | DNM     |
| 5   | DNM     |
| 6   | DNM     |
| 7   | 0       |
| 8   | 0       |
| 9   | DNM     |
| 10  | 0       |
| 11  | DNM     |
| 12  | DNM     |
| 13  | 0       |
| 14  | 7.35    |

#### U2

| PIN | VOLTAGE |
|-----|---------|
| 1   | 0       |
| 2   | DNM     |
| 3   | DNM     |
| 4   | 7.35    |
| 5   | 4.85    |
| 6   | DNM     |
| 7   | DNM     |
| 8   | 7.35    |

DNM = DO NOT MEASURE  
PULSES ARE PRESENT

| TRANSISTOR | COLLECTOR | BASE | EMITTER |
|------------|-----------|------|---------|
| Q1         | 7.35      | 2.20 | 1.50    |
| Q2         | 7.35      | 2.36 | 1.80    |