

## SERVICE INSTRUCTIONS

## Communication Receiver Model SX104

## Mark 1

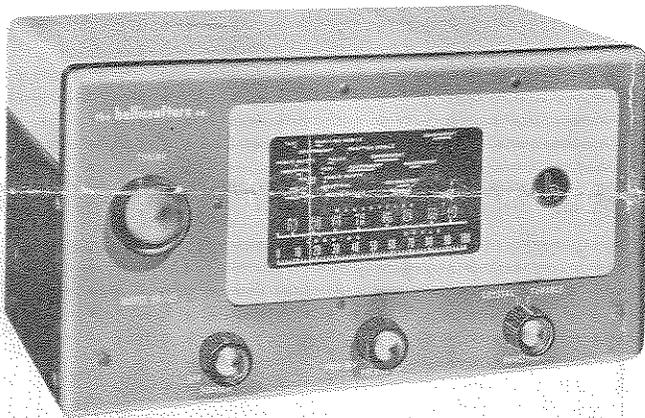


Fig. 1. Model SX104

## SPECIFICATIONS

|                            |   |
|----------------------------|---|
| Tubes and Rectifiers       | 8 tubes and 1 selenium rectifier        |
| Speaker                    | 5 inch PM                               |
| Voice Coil Impedance       | 3.2 ohms                                |
| Headphone Output Impedance | 50-5000 ohms                            |
| Antenna Input Impedance    | 300 ohms                                |
| Antenna                    | Vertically polarized whip or doublet    |
| Intermediate Frequency     | 10.7 MC                                 |
| Power Supply               | 105-125 volts 60 cycle AC               |
| Frequency Coverage         | 30 to 50 MC                             |
| Dimensions (overall)       | 7-1/2" High x 13" Wide x<br>8-3/4" Deep |
| Net Weight                 | 11-1/2 Lb.                              |
| Shipping Weight            | 13-1/2 Lb.                              |

## SQUELCH RANGE CONTROL ADJUSTMENT

The Squelch Range control (Figure 3) adjusts the operating point of the output section of the 12AU7 squelch tube (V-8). This control has been carefully adjusted at the factory for proper operation and will normally not

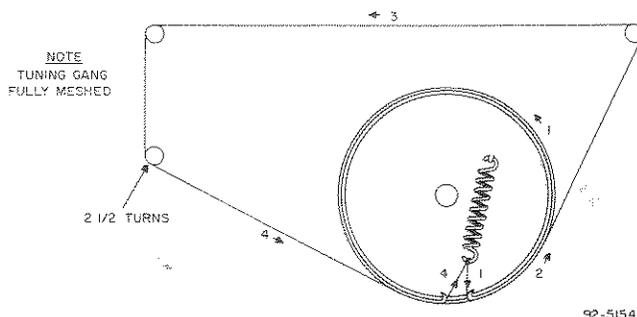


Fig. 2. Dial Cord Stringing Diagram

require readjustment unless the squelch tube, relay, or components in the squelch circuit have been replaced. If adjustment is necessary, proceed as follows:

1. Connect a DC milliammeter (0-15 ma) in series with the squelch relay, RY-1, in the plate circuit of the squelch tube, V-8.
2. Set the Volume control at maximum, the Squelch Range control fully clockwise (minimum resistance) and the Squelch control on the front panel fully counterclockwise (maximum resistance) but not at "Off".
3. Tune the receiver to noisy part of the band where no signal is present.
4. With no signal tuned in, slowly rotate the Squelch Range control counterclockwise until the noise is just squelched (disappears). At this point the relay contacts are closed and the grid of the audio output tube is shorted to ground. Note the plate current reading of the squelch tube (should be anywhere from 6.5 to 10.25 ma), and then continue to advance the Squelch Range control until the plate current drops 2 ma from that obtained at the point of squelch. This is the proper setting of the Squelch Range control.

If a milliammeter is not available, the Squelch Range control can be "roughly" set by adjusting the Squelch Range control to the point of squelch as outlined above and then advancing the control 65° farther counterclockwise.

## CRYSTAL OPERATION

The Hallicrafters Model SX104 is designed for crystal use, although crystals are not supplied with the receiver. It is advantageous to use this feature if considerable use of some particular frequency is expected. By selecting the proper crystal to cover the desired frequency, more stable reception of this frequency will be attained. Select the crystal you want, according to the formulas which follow, and insert it in the crystal socket located on the chassis base, just to the left of the auto-former near the front panel. Set the operation switch to the crystal position and tune in the frequency desired. The following formulas should be used for selecting the proper crystal:

$$\text{SX104 Crystal Frequency} = \text{Signal frequency desired (MC)} + 10.7 \text{ MC}$$

$$\text{3rd Mode Crystal - Low End } 29 \text{ MC - High End } 51 \text{ MC}$$

$$\text{Range of Crystal} = 39.7 \text{ MC to } 61.7 \text{ MC}$$

**ALARM CONNECTIONS**

On the back of your receiver are two terminals marked ALARM. Connecting a bell on light alarm circuit to these terminals will permit visual or audible notification when a signal is on the air. Whatever alarm circuit

is used must be self-powered as the receiver provides only the necessary switching to actuate the alarm. The alarm circuit should be of low voltage (24 volts or less).

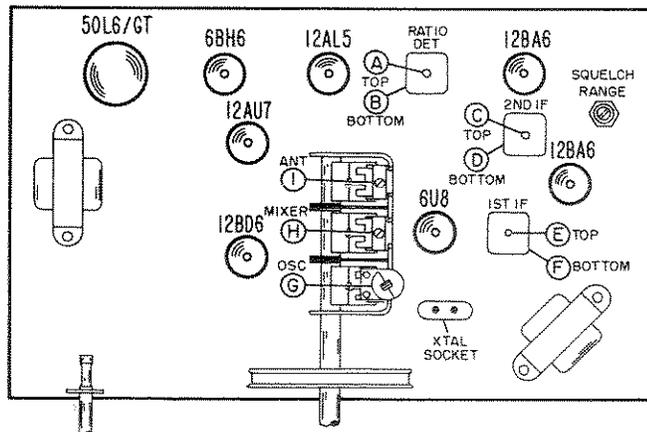
To turn the receiver off, rotate the Volume control fully counterclockwise, until a click is heard.

**IF ALIGNMENT**

- Use a 10.7 MC signal generator, either amplitude modulated or unmodulated.
  - Connect high side of generator through a .01 mfd. capacitor to pin 7 of V-2; connect low side to chassis.
  - Set function switch to tunable position
  - Adjust generator output to maintain a one volt reading on VTVM.
  - Set Volume control at maximum and Squelch control at "Off".
  - See Figure 3 for location of alignment adjustments.
1. Connect DC probe of VTVM to pin 2 of V-5; common lead to chassis. Adjust B, C, D, E, and F for maximum output.
  2. Connect two 470,000 ohm resistors in series between pin 2 of V-5 and the chassis. Connect DC probe of VTVM to junction of R-10 and C-16; common lead to center tap of the two 470,000 ohm resistors. Adjust A for zero reading between a positive and negative peak. The two peaks should have approximately the same amplitude. If not, readjust B slightly and then touch up A.

**RF ALIGNMENT**

- Use a signal generator either amplitude modulated or unmodulated which covers 33 MC and 49 MC.
  - Connect high side of generator through a 270 ohm resistor to terminal "A" on antenna terminal strip on rear of chassis; low side to terminal "G".
  - Use a non-metallic alignment tool.
  - Set function switch to tunable position.
  - Connect DC probe of VTVM to pin 2 of V-5; common lead to chassis.
  - Adjust generator output to maintain a one volt reading on VTVM.
  - Set Volume control at maximum and Squelch control at "Off".
  - See Figure 3 for location of alignment adjustments.
1. Set generator and receiver dial to 49 MC and adjust G, then H, and then I for maximum output. When adjusting I, "rock" tuning capacitor slightly.
  2. Check calibration at low end of receiver by setting generator and receiver dial to 33 MC. A calibration adjustment is usually not necessary and should not be made unless the oscillator coil on the top front of the tuning gang has been replaced. If adjustment is required, the oscillator coil lead connected to the chassis should be unsoldered and its length varied until maximum output is obtained at 33 mc.



92-5155

Fig. 3. Tube Location and Alignment Adjustments



## SERVICE PARTS LIST

| Schematic Symbol  | Description            | Part Number   | Schematic Symbol              | Description                  | Part Number | Schematic Symbol            | Description                 | Part Number             |         |
|-------------------|------------------------|---------------|-------------------------------|------------------------------|-------------|-----------------------------|-----------------------------|-------------------------|---------|
| <b>CAPACITORS</b> |                        |               | <b>RESISTORS (cont)</b>       |                              |             | <b>MISCELLANEOUS (cont)</b> |                             |                         |         |
| C-1, 2, ...       | 330 mmf. 10% N750...   | 47CA25331K/D  | R-21....                      | 12K ohm 10% 1/2w, ...        | 23X20X123K  |                             | Cover, cabinet.....         | 66A1489                 |         |
| 12, 19,           | 500V, fixed ceramic,   |               |                               | fixed comp                   |             |                             | Dial glass & .....          | 22-543                  |         |
| 21                | Durez dip              |               | R-22....                      | Variable, squelch ....       | 25B1114     |                             | calibration                 |                         |         |
| C-3A, ...         | M. in Tuning Gang .... | 48D391        |                               | control                      |             |                             | Escutcheon .....            | 7A657                   |         |
| B, C              |                        |               | R-23....                      | 1200 ohm 10% 1/2w, ..        | 23X20X122K  |                             | Foot, rubber.....           | 16A007                  |         |
| C-4, 5, ...       | .001 mfd. GMV .....    | 47B230        |                               | fixed comp                   |             |                             | Gasket, dial .....          | 12A042                  |         |
| 17                | fixed ceramic disc     |               | R-25....                      | 470 ohm 10% 1/2w, ...        | 23X20X471K  |                             | Gasket, cover.....          | 12A044                  |         |
| C-6, 25..         | 51 mmf. 10% N750, ...  | 47X20UK510K/D |                               | fixed comp                   |             |                             | Grommet, nylon plasti.      | 2B2432                  |         |
|                   | fixed ceramic          |               | R-26....                      | Variable, Squelchadj.        | 25A1113     |                             | (spacer, cabinet)           |                         |         |
| C-7.....          | 33 mmf. 5% 500V, ...   | 47X25CG330J   | R-27....                      | 10K ohm 10% 2w.....          | 23X42X103K  |                             | Grommet, nylon plasti.      | 2B2462                  |         |
|                   | fixed ceramic          |               |                               | fixed comp                   |             |                             | (spacer, front panel)       |                         |         |
| C-8, 9, ...       | .005 mfd. 20% .....    | 47A168        | R-28....                      | 15 ohm 10% 1w.....           | 23X30X150K  |                             | Grommet, nylon plasti.      | 2B2464                  |         |
| 11, 13,           | fixed ceramic disc     |               |                               | fixed comp                   |             |                             | (spacer, dial plate)        |                         |         |
| 15, 24,           |                        |               | R-29....                      | 220 ohm 10% 2w, .....        | 23X42X221K  |                             | Instruction book .....      | 94X1669                 |         |
| 29, 32,           |                        |               |                               | fixed comp                   |             |                             | Insulator, switch.....      | 8A1206                  |         |
| 33, 34            |                        |               | R-30....                      | 470 ohm 10% 1w, .....        | 23X30X471K  |                             | Insulator strip .....       | 8C1628                  |         |
| C-10, 18,         | .01 mfd. GMV, .....    | 47A224        |                               | fixed comp                   |             |                             | (chassis rear)              |                         |         |
| 20, 22,           | fixed ceramic disc     |               | R-31....                      | 270 ohm 10% 1w, .....        | 24BW271E    |                             | Insulator, mounting...      | 8A3692                  |         |
| 27                |                        |               |                               | fixed wirewound              |             |                             | board (squelch control)     |                         |         |
| C-14....          | 2 mfd. 50VDC, .....    | 45B192        | <b>TRANSFORMERS AND COILS</b> |                              |             |                             | Insulator, mounting...      | 8A3693                  |         |
|                   | electrolytic           |               | L-1.....                      | Coil, antenna .....          | 51B2232     |                             | board (volume control)      |                         |         |
| C-16....          | 220 mmf. 5% N750....   | 47X32UK221J   | L-2.....                      | Coil, R.F. ....              | 51B2233     |                             | Insulator feet .....        | 8A3710                  |         |
|                   | fixed ceramic          |               | L-3.....                      | Coil, oscillator .....       | 51B2212     |                             | Insulator, dial plate ..    | 8B3718                  |         |
| C-23A, .          | 60-40-40 mfd. @ .....  | 45B091        | T-1.....                      | Transformer, 1st I.F. 50C519 |             |                             | back                        |                         |         |
| B, C,             | 150V, 20 mfd. @ .....  |               | T-2.....                      | Transformer, 2nd I.F. 50C517 |             |                             | Insulator, cabinet....      | 8C3720                  |         |
| D                 | 25V, electrolytic      |               | T-3.....                      | Transformer, Ratio ..        | 50C518      |                             | back                        |                         |         |
| C-26....          | 5 mmf. N750 ±120 ..... | 47-681        |                               | det.                         |             |                             | Knob, main tuning....       | 15B802                  |         |
|                   | PPM, fixed ceramic     |               | T-4.....                      | Transformer, output..        | 55A127      |                             | Knob, control, volume       | 15B816                  |         |
| C-28....          | 330 mmf. 5% 300V, ...  | 47X20C331J    | T-5.....                      | Autoformer.....              | 52C481      |                             | squelch, crystal/<br>manual |                         |         |
|                   | fixed silver mica      |               |                               |                              |             |                             | Line cord.....              | 87B4948                 |         |
| C-30....          | 4-20 mmf., variable..  | 44A115        | <b>TUBES AND RECTIFIERS</b>   |                              |             |                             | Lock, Line Cord .....       | 76A397-1                |         |
|                   | ceramic trimmer        |               | SR-1....                      | Rectifier, Selenium...       | 27A158      |                             | (male)                      |                         |         |
| C-31....          | .047 mfd. 600V, .....  | 46BR473L6     |                               | 150 MA                       |             |                             | Lock, Line Cord .....       | 76A397-2                |         |
|                   | fixed tubular plastic  |               | PL-1, 2 .                     | Lamp, pilot.....             | 39A003      |                             | (female)                    |                         |         |
|                   |                        |               | V-1.....                      | Tube, Electron, .....        | 90X12BD6    |                             | Medallion, "h" .....        | 7A669                   |         |
|                   |                        |               |                               | type 12BD6r                  |             |                             | trademark                   |                         |         |
|                   |                        |               | V-2.....                      | Tube, Electron, .....        | 90X6U8      |                             | Panel, front .....          | 68A546                  |         |
|                   |                        |               |                               | type 6U8                     |             |                             | Plate, dial.....            | 63A2341                 |         |
|                   |                        |               | V-3, 4...                     | Tube, Electron, .....        | 90X12BA6    |                             | Pointer, indicator....      | 82B321                  |         |
|                   |                        |               |                               | type 12BA6                   |             |                             | Pulley.....                 | 28A052-7                |         |
|                   |                        |               | V-5.....                      | Tube, Electron, .....        | 90X12AL5    |                             | Receptacle AC line ...      | 10A975                  |         |
|                   |                        |               |                               | type 12AL5                   |             |                             | Relay, D.C. (squelch).      | 21B302                  |         |
|                   |                        |               | V-6.....                      | Tube, Electron, .....        | 90X6BH6     |                             | Ring, retaining.....        | 76A1052                 |         |
|                   |                        |               |                               | Type 6BH6                    |             |                             | Shaft, extension .....      | 74A1288                 |         |
|                   |                        |               | V-7.....                      | Tube, Electron, .....        | 90X50L6/GT  |                             | Shaft, tuning .....         | 74A1254                 |         |
|                   |                        |               |                               | type 50L6/GT                 |             |                             | Shield, tube.....           | 69A232                  |         |
|                   |                        |               | V-8.....                      | Tube, Electron, .....        | 90X12AU7    |                             | Shield, plate .....         | 69B611                  |         |
|                   |                        |               |                               | type 12AU7                   |             |                             | Shield, audio stage ...     | 69B694                  |         |
|                   |                        |               | <b>MISCELLANEOUS</b>          |                              |             |                             | Socket, pilot lamp....      | 86B299                  |         |
|                   |                        |               |                               | Baffle, Speaker .....        | 31B974      |                             | Socket, 9 pin, wafer..      | 6A401                   |         |
|                   |                        |               |                               | Bracket, Dial plate ...      | 67A4205     |                             | Socket, 7 pin, wafer..      | 6B402                   |         |
|                   |                        |               |                               | Bracket, switch.....         | 67A4368     |                             | Socket, crystal.....        | 6A417                   |         |
|                   |                        |               |                               | mounting                     |             |                             | Socket, octal.....          | 6A296                   |         |
|                   |                        |               |                               | Bushing, tuning shaft .      | 77A1338     |                             | Spacer, dial clip .....     | 16A126                  |         |
|                   |                        |               |                               | Cabinet .....                | 66A1490     |                             | Spring, dial cord....       | 75A012                  |         |
|                   |                        |               |                               | Clip, dial glass .....       | 76A390      |                             | Strip, sponge rubber..      | 16A047-1                |         |
|                   |                        |               |                               | Clip, pilot lamp.....        | 76A660      |                             | (adhesive)                  |                         |         |
|                   |                        |               |                               | Coupling, shaft.....         | 29A264      |                             | TS-1....                    | Strip, antenna .....    | 88A809  |
|                   |                        |               |                               |                              |             |                             | TS-3....                    | Strip, alarm.....       | 88A809  |
|                   |                        |               |                               |                              |             |                             | TS-2....                    | Strip, phone terminal.  | 88A510  |
|                   |                        |               |                               |                              |             |                             | S-1....                     | Switch, slide (SPDT)..  | 60A243  |
|                   |                        |               |                               |                              |             |                             | S-2....                     | Part of R-22 squelch..  | -----   |
|                   |                        |               |                               |                              |             |                             | S-3....                     | Part of R-13 volume..   | -----   |
|                   |                        |               |                               |                              |             |                             | S-4....                     | Switch, crystal/.....   | 60A823  |
|                   |                        |               |                               |                              |             |                             |                             | manual tuning           |         |
|                   |                        |               |                               |                              |             |                             | LS-1....                    | Speaker 5" PM.....      | 85-196  |
|                   |                        |               |                               |                              |             |                             |                             | Plate, cabinet back.... | 63-2616 |