TM 11-4054
T. O. 16-40 BC 779-6
C 1

TECHNICAL MANUAL

RADIO RECEIVERS BC-779-A AND B, BC-794-A AND B, BC-1004-A, B, C, AND D, AND R-129/U, REPAIR INSTRUCTIONS

CHANGES No. 1

DEPARTMENT OF THE ARMY
WASHINGTON 25, D. C., 17 MAY 1948

TM 11-4054, 29 July 1946, is changed as follows:

Note. For a list of repair and supply parts for Radio Receiver 129/U refer to SIG 10-R-129-U. The fact that an item appears in this technical manual is not sufficient basis for requisitioning it. Requisitions must cite an authorized basis, such as T/O & E, TE, TA, T/BA, SIG 7 & 8, SIG 7-8-10, SIG 10, list of allowances of expendable material, or other authorized basis.

1. General

* * * * *

d. An external power * * * and testing purposes. The following power supplies, **which are described in TM 11-866,** are designed for use with the subject receivers.

* * * * *

5. Design Differences, Radio Receivers BC-1004-D and R-129/U, and Basic Receivers

* * * * *

b. RADIO RECEIVER R-129/U. (Superseded.) The basic receiver for this model is the BC-1004-C. In the R-129/U, 300- to 540-kc coil assemblies are used in place of the 10- to 20-mc coil assemblies of the BC-1004-C. In addition, the band spread has been removed from this low-frequency band and the series padding capacitor (C79) has been changed in value to 190 mmf. An 11-mmf capacitor has been added to coil assemblies L6, L11, and L16 for this band, and a 50-mmf capacitor has been added to the h-f oscillator coil assembly L21.

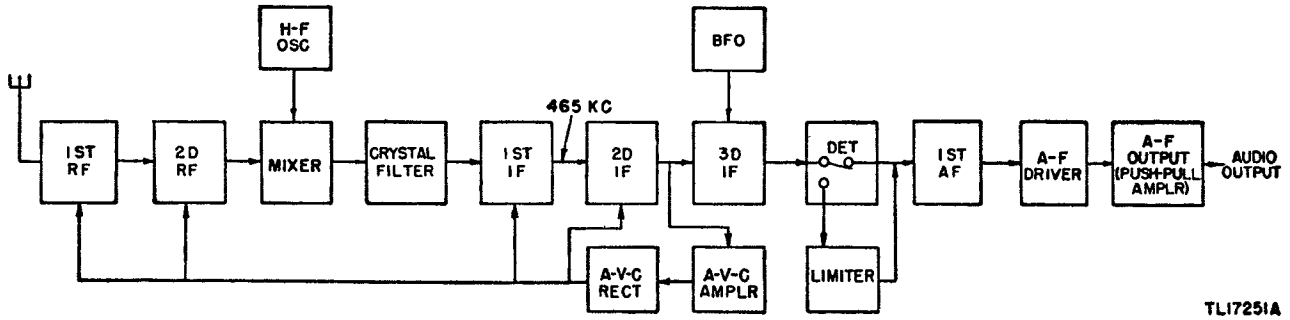

Figure 3. (Superseded.) Radio Receiver BC-779-B, block diagram.

3. Operational Differences

* * * * *

b. RADIO RECEIVERS BC-794-A AND B.

Band	*Calibration*
* * * * *	
20 mc-40 mc	500 kc per division
* * * * *	

d. RADIO RECEIVER R-129/U.

Band	*Calibration*
* * * * *	
540 kc-1,160 kc	10 kc per division
* * * * *	

8. Tools, Test, and Cleaning Equipment

The equipment listed * * * perfect working order.

Item	*Description*
* * * * *	
3. Crystal calibrator.	This equipment is * * * 10-20 mc. **Frequency Meter Set SCR-211-( )may be used.**

* * * * *

10. Cleaning

* * * * *

b. To remove the dust cover from the unit, turn the knurled thumbnuts that retain the cover in a counterclockwise direction to loosen, and lift the dust cover from the unit.

* * * * *

12. Lubricating (Superseded)

Note. A Department of the Army Lubrication Order is not issued on the radio sets.

a. Recommended Lubricants and Cleaner.

Symbols	Standard nomenclature
PL–SPECIAL	Oil, Lubricating, Preservative, Special.
GL	Grease, Lubricating, Special.
SD	Solvent, Dry Cleaning.

b. Detailed Lubrication Instructions. (1) The location of the points on the receivers requiring lubrication and the type of lubricant to be used are illustrated in figure 8.1. Lubrication is not required at any point not included in the illustration. The recommended lubricants are suitable for all temperatures at which these receivers are operated.

(2) Lubricate the equipment before storing it. Inspect and lubricate it, if it appears to be necessary, before putting it into operation after a period of storage. During a period of normal operation, lubricate the receivers at 3-month intervals. This time interval is based upon a normal usage of approximately 8 hours daily. Lengthen or shorten the interval according to actual operating conditions.

(3) When lubrication is to be applied, thoroughly clean the point to be lubricated, and all other parts affected, with solvent (SD) and dry with a lint-free cloth.

(4) Apply all lubricants very sparingly to these receivers. Use only 1 drop at each lubricating point when oil (PL–SPECIAL) is specified. Apply a thin coat of lubricating grease (GL) at points where GL is specified.

(5) After the lubricant has been applied, rotate each affected control shaft through at least 2 complete rotations to evenly distribute the lubricant.

(6) Remove excess lubricants.

Figure 9. Change resistance value for pin 8 of V10 to read 73,000 for CW.

14. Preparing Receiver for Operating and Testing

* * * * *

b. Resistance Measurements. To minimize the * * * resistance measurements are:

* * * * *

(2) (Superseded.) Power supply unit connected to receiver but with receiver ON-OFF switch at OFF.

* * * * *

c. Incorrect Resistance Measurements. If a measurement * * * and correct it. The circuit diagram for the receiver being tested (figs. 58, 59, **60, or 61)** will prove helpful in tracing circuits from stage to stage. For detailed information * * * 42 through 57.

* * * * *

e. Connection of External Power Unit. Connect the receiver * * * terminal strip E4.

(1) With the power * * * of the chassis. See that all 10 screws on each strip are unscrewed at least three turns, then attach one end of the connector cable to each terminal strip *exactly* as shown in figure 12 and tighten all the screws securely. Make certain that * * * a-c power line.

* * * * *

Figure 13. Correct as follows: V11 pin 8 should be +240; V6 pin 8 should be +250; V14 pin 5 should be −20; V9 pin 8 should be −.2; V9 pin 1 should be 0.

15. Operating Procedure

Set controls as * * * in figure 13. **Readings to within ±10 percent may be considered normal.**

17. Alignment with Signal Generator and Output Meter (figs. 15 and 16)

a. General. Throw the OFF-ON switch to ON and let the receiver **and signal generator** warm up thoroughly, an hour if practicable, before alignment. Connect the output * * * their operating frequencies.

* * * * *

c. A-v-c Alignment Check. Leave all other * * * SENSITIVITY to 10. Increase AUDIO GAIN to restore half-scale reading on the output meter and adjust the single trimmer capacitor in

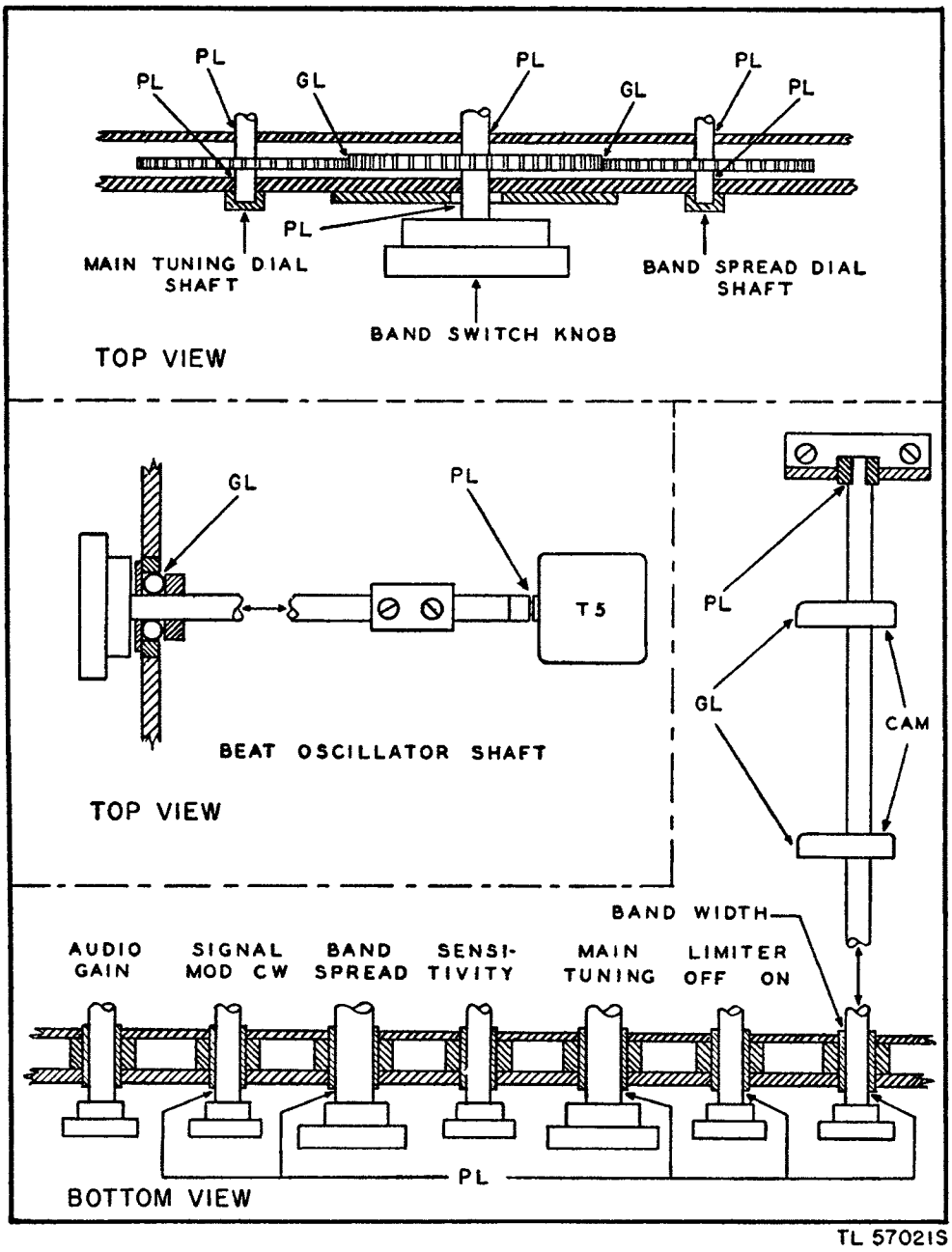

Figure 8.1 (Added.) Receiver lubrication diagram.

T6 for **minimum** output meter reading. The S meter * * * meter reading dips.

d. Beat-Frequency Oscillator Alignment Check. Keep all controls * * * a suitable loudspeaker. **Remove the modulation from the signal generator.** Throw the SIGNAL * * * considered operating perfectly.

e. High-Frequency Oscillator Calibration Check.

Note (Added). A signal generator is not necessarily an accurate frequency source. However, it can be made accurate for h-f oscillator alignment by calibration against a secondary frequency standard or other crystal controlled h-f source such as the Frequency Meter BC-221-( ), part of Frequency Meter Set SCR-211-( ). Calibration of the signal generator may be accomplished as follows: Place the signal generator and the frequency meter near each other. Turn on both equipments and allow them to warm up for at least 15 minutes. Attach a piece of wire to the signal generator output connection and place the wire near the frequency meter antenna. Calibrate the frequency meter according to instructions furnished with the meter. Set the frequency meter to the exact frequency at which the signal generator is to be used. While listening to the headset, which is connected to the frequency meter, tune the signal generator to the approximate frequency until a zero beat is obtained.

When zero beat is obtained, as indicated by a rising pitch tone in the headset on either side of silence, the signal generator is set to the same frequency as that of the frequency meter. Be careful to use only the smallest required amount of signal generator output during this calibration procedure. The precise signal generator reading for this particular frequency should be noted by recording both its main dial and vernier settings. This will be found useful since the frequency recorded must be referred to at least three times during each band calibration. In a similar manner, the signal generator must be calibrated for all remaining calibration frequencies to be used. A chart may be appended to the signal generator for future reference. Where the signal generator range is exceeded by the frequency range of the receiver, second harmonic calibration as described below may be used, with the same accuracy. After the signal generator is calibrated, turn off the frequency meter so that it cannot affect the receiver which is to be aligned.

The accuracy of the MAIN TUNING dial calibration depends solely on the h-f oscillator frequency which, on all bands of the basic receivers except the 20- to 40-megacycle (mc) band of Receiver BC–794–B, is 465 kc (the i-f) higher than the signal frequency. In the BC–794–B * * * to 40-mc band. To check calibration, tune in signals of known frequency on each band and note the MAIN TUNING dial reading **with the BAND SPREAD dial set at 100.** If it does * * * calibration is off. To correct dial calibration, see figures 17, 18, 19, **and 19.1** for location of h-f oscillator adjustments as well as the signal frequencies at which adjustments should be made. The signal generator may be set for the lower end of the band, **accurately calibrated by the frequency meter,** and its second harmonic, if strong enough, may be used at the upper end. The output of * * * too great amplification.

f. R-F AND FIRST DETECTOR ALIGNMENT. Accurate calibration and * * * which it operates. This tuning check is extremely important at the high end of the 10- to **20 and 20- to 40-mc** bands where there is some slight interaction between the first detector and h-f oscillator circuits. After checking the three trimmers at the high end of this band, turn the main dial to 2.5 megacycles and retune the signal generator to suit. Check the three inductance adjuster settings marked 2.5 megacycles in the same row. Since adjustments at one end of the band also affect the other end of the band, it will be necessary to repeat the procedure until no further improvement can be secured. The rest of the gangs can be checked in the same manner. For greatest efficiency with a particular antenna arrangement, the r-f circuits may be adjusted without being disconnected. This can be done by loosely coupling the output of the signal generator to the antenna system, instead of directly to the antenna terminals through a 100-ohm resistor. The signal from the signal generator must reach the receiver by way of the antenna,

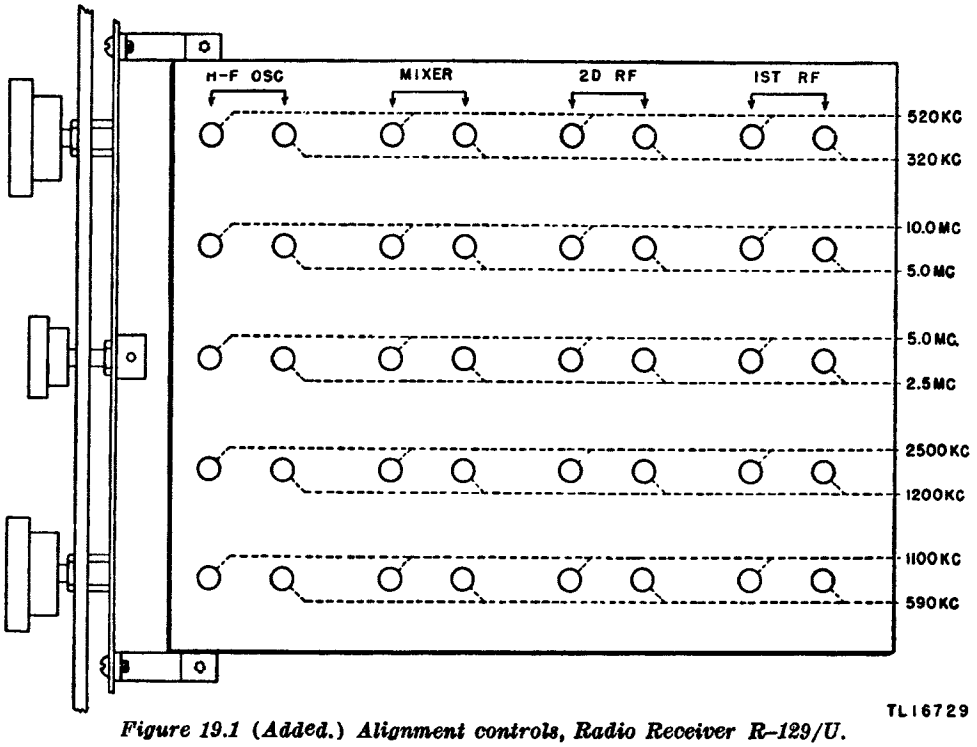

Figure 19.1 (Added.) Alignment controls, Radio Receiver R–129/U.

not by some form of indirect coupling. Headphones or a speaker should be used on all tests to monitor the signal to avoid false adjustments due to overloading and freakish or superior signal responses.

18. Alignment of *Grid Coil L27* with Frequency-Modulated Signal Generator and Oscillograph (fig. 20)

Note (Added). The following method of visually aligning grid coil L27 requires an f-m signal generator with a 465-kc output and an oscillograph (also called an oscilloscope). Any f-m signal generator to be used for visual alignment should be checked for the presence of strong amplitude modulation in the output. This may be accomplished by using the lowest r-f frequency of the f-m signal generator, modulated at 400 cps, by connecting the r-f output cable to the vertical plates of the oscillograph, and by stabilizing the pattern by choosing the correct horizontal sweep frequency. The top and bottom of the oscillograph pattern should be level. Any waveform observed above and below the average carrier level observed represents amplitude modulation which will result in erroneous visual alignment patterns. The f-m signal generator deviation should be reduced until a level pattern is observed. In no case should the deviation be less than 5 kc. If amplitude modulation cannot be eliminated from the f-m signal generator output, do not perform visual alignment.

Connect the input * * * to the chassis. **Connect the input of the horizontal plates of the oscillograph to the f-m signal generator sync frequency output.** Set the frequency-modulated * * * secure closest adjustment. **If an f-m signal generator with a 465-kc output is not available, an f-m signal generator with an output to which the receiver can be tuned, such as Signal Generator I-208, may be used. The output of the signal generator is connected to the AA (antenna) terminals of the receiver. Except for the signal frequency and connection of the signal generator, the method of alignment is the same as above.**

Figure 20. Change designation TO HORIZONTAL PLATE to read: TO HORIZONTAL PLATES. Change designation TO VERTICAL PLATE to read: TO VERTICAL PLATES. Change designation PHONES to read: PHONO.

21. Audio Circuit Check

* * * * *

Control	Setting
* * *	* *
CRYSTAL SELECTIVITY	OFF
* * *	* *
* * *	* *

22. Signal Tracing Analysis and Chart (fig. 21)

* * * * *

Control	Setting
* * *	* *
CRYSTAL SELECTIVITY	OFF
* * *	* *
* * *	* *

27. Test Conditions

* * * * *

Control	Setting
* * *	* *
AUDIO GAIN	AS REQUIRED
* * *	* *
* * *	* *

30. Sensitivity, Modulated Signal

a. Apply a 30-percent * * * a dummy antenna. **Adjust the AUDIO GAIN control as required.**

* * * * *

31. Signal-Plus-Noise to Noise Ratio

* * * * *

b. After each portion of each band is tested in accordance with paragraph 30, turn off the modulation of the signal generator and **observe the out-**

put meter readings. The readings shown below are the maximum allowable; smaller readings are desirable. Do not readjust the AUDIO GAIN control.

* * * * *

Figure 23. Sensitivity chart. **(Rescinded.)**

38. Power Output With Modulation (to Speaker)

a. CONDITIONS. Same as paragraph 27, with the exception of the following settings:

AVC–MANUAL on MAN.
SENSITIVITY on **0**
AUDIO GAIN on maximum

b. TEST. Apply a 1,000-microvolt, 2.5-mc r-f signal, modulated **30 percent** at 400 cps, through the 100-ohm dummy antenna to the receiver **and tune the receiver to resonance. Advance the SENSITIVITY control from 0 for maximum output.** The voltage output should not be less than 77 volts **(10 watts).**

39. Power Output, C-w Operation (to Speaker)

* * * * *

b. TEST. (1) Apply a 1,000-microvolt, 2.5-mc **unmodulated** r-f signal, through the 100-ohm dummy antenna to the receiver and tune the receiver to resonance.

* * * * *

43. First R-f Stage V1 (figs. 25, 26, and 27)

* * * * *

b. CIRCUIT DIFFERENCES. (1) The B positive plate supply is series fed to the plates of V1 in Radio Receivers BC–779–( ), BC–1004–( ), **and R–129/U.**

* * * * *

Figures 25, 26, and 27. V1 pin 8 should be 0 ohms. Indicate as a variable inductance coils L10, L9, L8, L7, and L6 in figure 25; coils L52, L8, L48, L7, and L6 in figure 26; and coils L40, L39, L8, L7, and L6.

Add the following note after figure 27:

Note. The schematic diagram of the first r-f stage for Radio Receiver R–129/U is the same as figure 27 except add one 11-mmf capacitor C201 in parallel with C59 and remove band-spread capacitor C–2–A from this circuit (fig. 61).

44. Second R-f Stage V2 (figs. 28, 29, and 30)

* * * * *

b. SERIES DAMPING RESISTOR. A series damping resistor (R57) is inserted in the secondary coil (L42) of the 540- to 1,160-kc band in Radio Receiver BC–1004–C **and in Radio Receiver R–129/U.** This resistor reduces * * * BC–779–B and BC–794–B.

* * * * *

Figures 28, 29, and 30. V2 pin 8 should be 0 ohms. Indicate as a variable inductance the secondary of coils L15, L14, L13, L12, and L11 in figure 28; the secondary of coils L53, L13, L49, L12, and L11 in figure 29; and the secondary of coils L42, L41, L13, L12, and L11 in figure 30.

Add the following note after figure 30:

Note. The schematic diagram of the second r-f stage of Radio Receiver R–129/U is the same as figure 30 except add one 11-mmf capacitor C202 in parallel with C64 and remove band-spread capacitor C–2–B from this circuit (fig. 61).

45. First Detector Stage V3 (figs. 31, 32, and 33)

* * * * *

b. CIRCUIT DIFFERENCES. (1) A plate decoupling filter consisting of resistor R8 and capacitor C10 is present in Radio Receivers BC–779–B, BC–1004–C, **and R–129/U,** but is not included in the BC–794–B.

(2) A series damping resistor R58 is inserted in the secondary coil (L44) of the 540- to 1,160-kc band in Radio Receiver BC–1004–C **and in Radio Receiver R–129/U.** This resistor reduces * * * BC–779–B and BC–794–B.

* * * * *

Figures 31, 32, and 33. V3 pin 8 should be 0 ohms. Indicate as a variable inductance the secondary of coils L20, L19, L18, L17, and L16 in figure 31; the secondary of coils L54, L18, L50, L17, and L16 in figure 32; the secondary of coils L44, L43, L18, L17, and L16 in figure 33.

Add the following note after figure 33:

Note: The schematic diagram of the first detector stage of Radio Receiver R–129/U is the same as figure 33 except add one 11-mmf capacitor C203 in parallel with C69 and remove band-spread capacitor C–2–C from this circuit (fig. 61).

46. High-Frequency Oscillator Stage V4 (figs. 34, 35, and 36)

* * * * *

b. CIRCUIT DIFFERENCES. (1) No fixed series * * * Radio Receiver BC–794–B. A fixed series padder is used on all other bands and on all bands of Radio Receivers BC–779–B, BC–1004–C, **and** R–129/U.

* * * * *

Figures 34, 35, and 36. Indicate as variable inductance coils L23, L22, and L21 in figure 34; coils L55, L23, L51, L22, and L21 in figure 35; and coils L46, L45, L23, L22, and L21 in figure 36.

Add the following note after figure 36:

Note. The schematic diagram of the high-frequency oscillator stage of Radio Receiver R–129/U is the same as figure 36 except add one 50-mmf capacitor C204 in parallel with C74, change the value of C79 to 190 mmf, and remove band-spread capacitor C–2–D from this circuit (fig. 61).

47. First I-f Stage V5 (fig. 37)

a. CIRCUIT FEATURES. The quartz crystal * * * first amplifier (V5). When the CRYSTAL SELECTIVITY switch (**SW7**) is set at the OFF position, the crystal (Y1) is short-circuited and signal voltages present in the secondary of the first i-f coil (L26) are imposed directly upon the control grid of the first i-f amplifier tube. At any other setting of switch SW7, the quartz crytal is in the circuit. It acts as * * * or supercontrol type.

* * * * *

Figure 37. Radio Receivers BC–779–B, BC–794–B, BC–1004–C, and R–129/U, schematic diagram of first i-f stage.

Figure 37. V5 pins 5 and 8 should be 0 ohms. For grid cap resistance values add 670,000 after SW–4 AT AVC. Connect junction of C35 and C23 to ungrounded stator section of C32.

Figure 38. Radio Receivers BC–779–B, BC–794–B, BC–1004–C, and R–129/U, schematic diagram of second i-f stage.

Figure 38. V6 pins 3 and 5 should be 0 ohms.

Figure 39. Radio Receivers BC–779–B, BC–794–B, BC–1004–C, and R–129/U, schematic diagram of third i-f stage.

Figure 39. V7 pins 3 and 5 should be 0 ohms.

Figure 40. Radio Receivers BC–779–B, BC–794–B, BC–1004–C, and R–129/U, schematic diagram of second detector stage.

Figure 41. Radio Receivers BC–779–B, BC–794–B, BC–1004–C, and R–129/U, schematic diagram of noise limiter stage.

Figure 41. V9 pin 8 should read:

SW5 AT ON	117,000 OHMS
SW5 AT OFF	∞ OHMS
SW5 AT ON	0.2 VOLTS

Figure 42. Radio Receivers BC–779–B, BC–794–B, BC–1004–C, and R–129/U, schematic diagram of beat-frequency oscillator stage V10.

53. A-v-c Circuit, V11 and V12, Including Bias Supply and Sensitivity Meter Circuit (figs. 43 and 44)

* * * * *

b. CIRCUIT DIFFERENCES. The a-v-c, bias supply, and S meter circuits are identical in Radio Receivers BC–779–B, BC–794–B, BC–1004–C, **and R–129/U except that capacitor C30 is included only in Radio Receiver BC–779–B.** Radio Receiver BC–1004–D * * * as the BC–1004–C.

* * * * *

Figure 43. Radio Receivers BC–794–B, BC–1004–C, and R–129/U, schematic diagram of a-v-c, bias supply, and sensitivity meter circuit.

Figure 43. V11 pins 3 and 5 should be 0 ohms.

Figure 44. V11 pins 3 and 5 should be 0 ohms. V11 pin 8 should be +240 volts.

Figure 45. Radio Receivers BC–779–B, BC–794–B, BC–1004–C, and R–129/U, schematic diagram of first a-f stage.

Figure 45. V13 pin 5 should be —3.2 volts. V13 pin 6 not measured.

Figure 46. Radio Receivers BC–779–B, BC–794–B, BC–1004–C, and R–129/U, schematic diagram of a-f driver stage.

Figure 46. V14 pin 8 should be 0 ohms. V14 pin 5 should be −20 volts. V14 pin 6 not measured.

Figure 47. Radio Receivers BC–779–B, BC–794–B, BC–1004–C, and R–129/U, schematic diagram of a-f output stage.

Figure 48. Radio Receivers BC–779–B, BC–794–B, BC–1004–C, and R–129/U, diagrams of miscellaneous parts.

57.1 (Added) Power Supply Units

Refer to TM 11–866 for information on Power Supply Units RA–74–B, –C, RA–84–A, –B, and RA–94–A.

Figure 50. Change C88 to C82. Change C89 to C83.

Figure 52. Change C81 to C101. Change C88 to C81. Change C89 to C88.

Figure 53. Radio Receivers BC–1004–C and R–129/U, location of parts.

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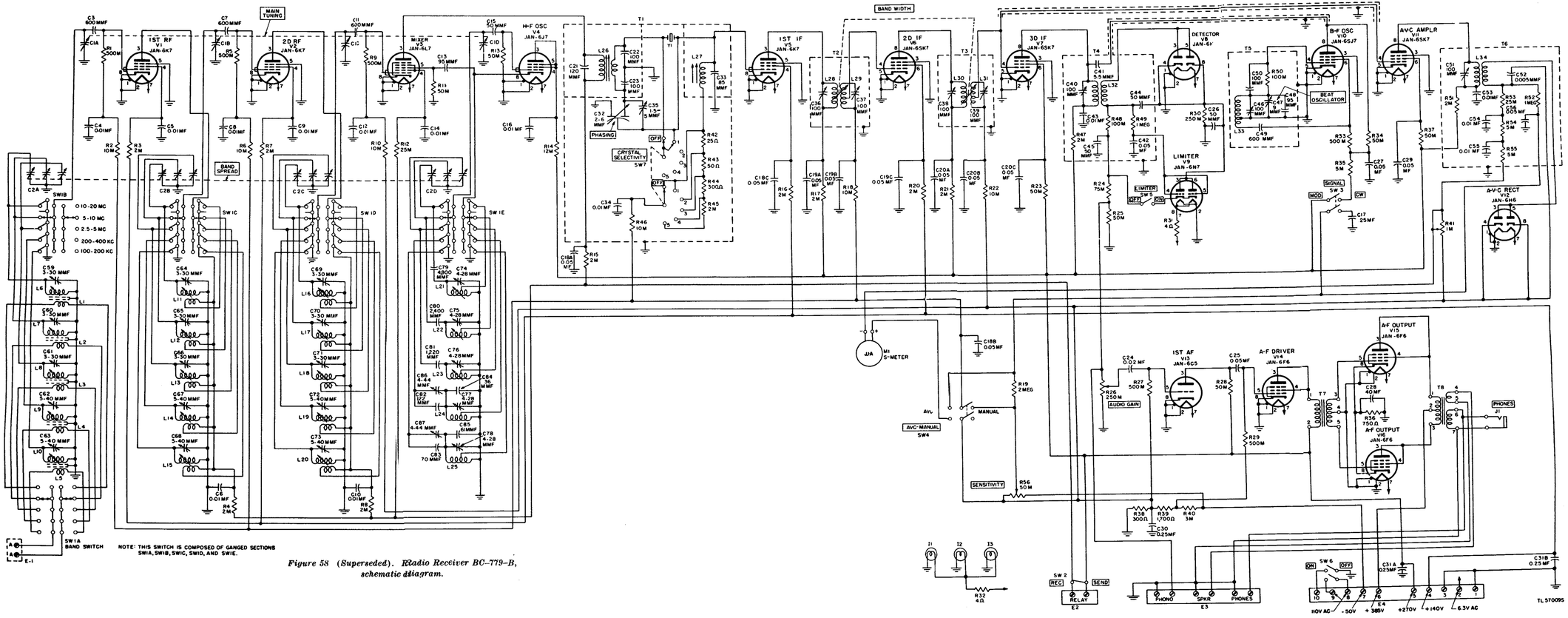

Figure 58 (Superseded). Radio Receiver BC-779-B, schematic diagram.

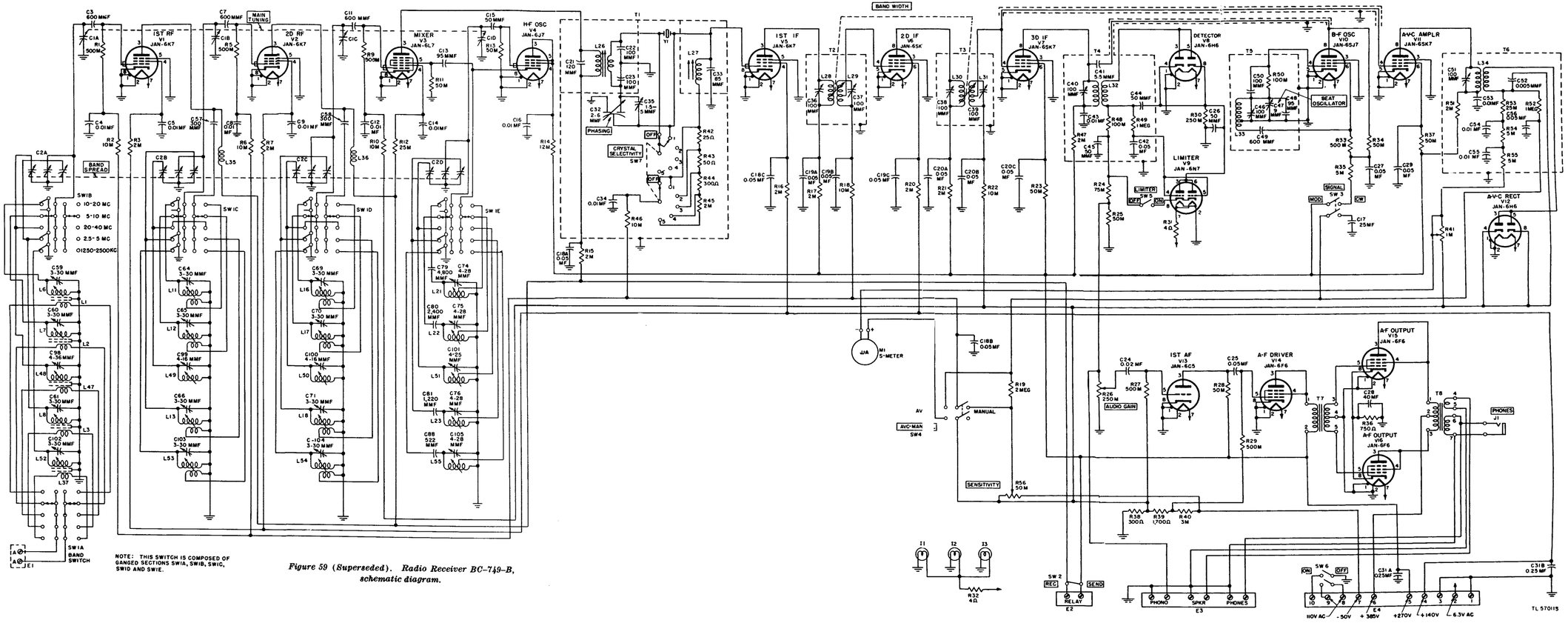

Figure 59 (Superseded). Radio Receiver BC-749-B, schematic diagram.

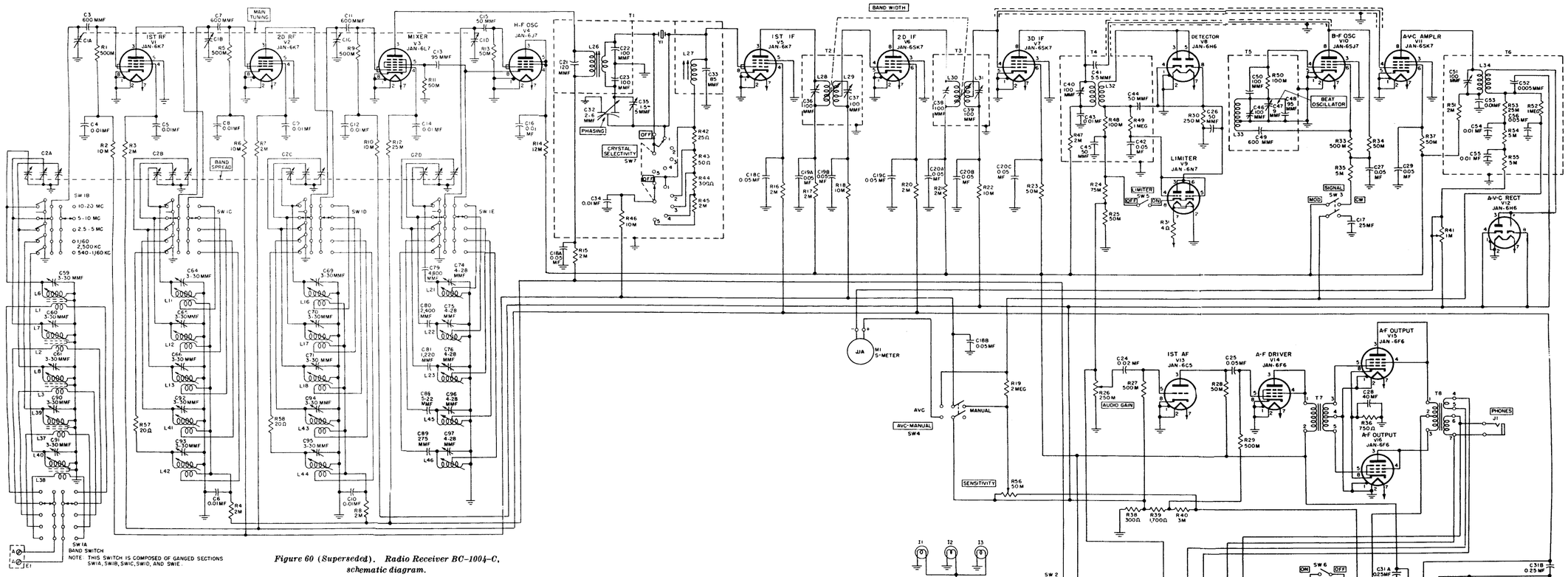

Figure 60 (Superseded). Radio Receiver BC-1004-C, schematic diagram.

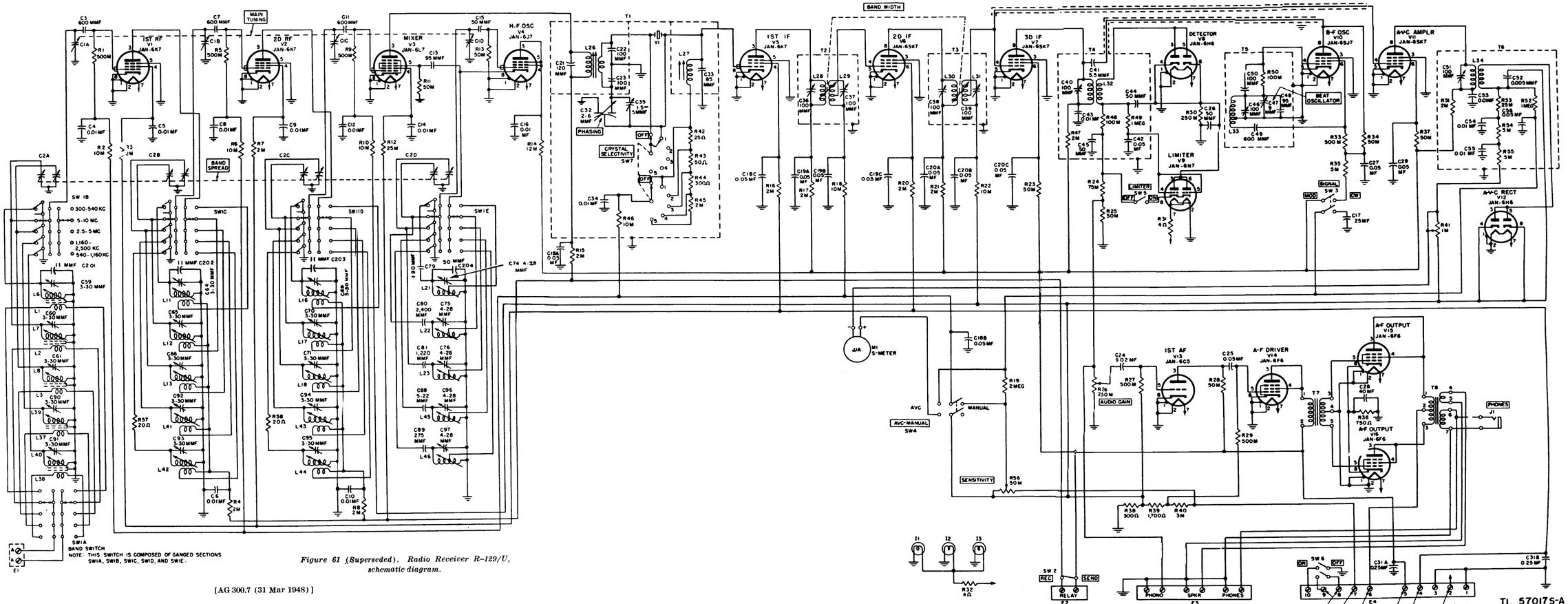

Figure 61 (Superseded). Radio Receiver R-129/U, schematic diagram.