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A830-2
10 W WIDE-BAND FM BROADCAST EXCITER

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1962

CEDAR RAPIDS, IOWA, U.S.A.

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COLLINS

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SECTION I
GENERAL DESCRIPTION

1.1 GENERAL.

This instruction book contains information for operation and maintenance of A830-2 10 W Wide-Band FM Broadcast Exciter. See figure 1-1. The A830-2 is manufactured by Collins Radio Company, Cedar Rapids, Iowa.

1.2 PURPOSE OF EQUIPMENT.

The A830-2 10 W Wide-Band FM Broadcast Exciter is a direct FM exciter designed specifically to meet the stringent requirements of stereophonic FM broadcasting. The A830-2 may be used in monaural broadcasting, Storecasting (SCA), or with Collins 786M-1

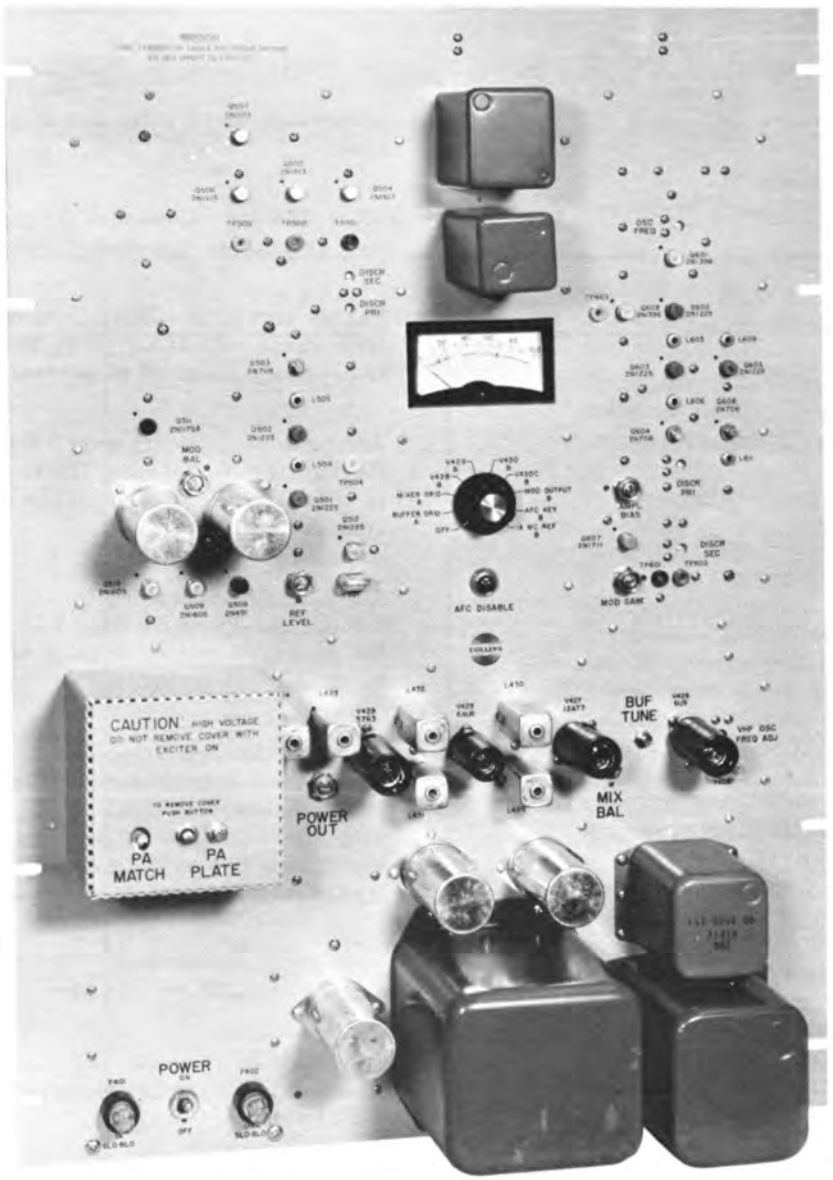


Figure 1-1. A830-2 10 W Wide-Band FM Broadcast Exciter, Over-all View

Stereo Generator (optional) for stereophonic broadcasting. The A830-2 is used to drive higher power amplifiers in the FM broadcast service.

1.3 EQUIPMENT SUPPLIED.

The A830-2 is normally supplied as a part of a Collins FM transmitter (830B-1A, 830D-1A, 830E-1A, etc.). The A830-2 mounts in the same cabinet as the first stage of amplification (250 or 1000 watts) in the transmitter. A rear view of the A830-2 is shown in figure 1-2.

1.4 EQUIPMENT REQUIRED BUT NOT SUPPLIED.

The A830-2 is supplied with all required equipment.

1.5 TECHNICAL SUMMARY.

Ambient temperature range	+10°C(+50°F) to +55°C(+131°F).
Ambient humidity range	0 to 95 percent relative.
Altitude	7500 feet, maximum.
Shock and vibration	Normal handling and transportation.
Power source	117 volts ±5 percent, 50/60 cps, single phase.
R-f power output	Adjustable to 10 watts into a 50- to 70-ohm resistive load.
Frequency range	88 to 108 mc. Customer frequency is determined by one crystal in the heterodyning oscillator circuit.
Carrier frequency stability	Varies less than ±1000 cps with an ambient temperature range of +10°C(+50°F) to +55°C(+131°F), and a line-voltage range of ±5 percent.
Harmonic and spurious radiation	Any emission appearing on a frequency removed from the carrier by between 120 kc and 240 kc, inclusive, is attenuated at least 30 db below the level of the unmodulated carrier. Any emission appearing on a frequency removed from the carrier by more than 240 kc up to and including 600 kc is attenuated at least 40 db below the level of the unmodulated carrier. Any emission appearing on a frequency removed from the carrier by more than 600 kc is attenuated at least 80 db below the level of the unmodulated carrier, with the exception of harmonics of the r-f carrier which complies with the requirements of the particular transmitter in which the A830-2 is installed.
Type of modulation	Frequency modulation. 100 percent modulation is defined as ±75-kc deviation of the main carrier.
Exciter inputs	Stereophonic channel: 600 ohms, unbalanced. Input of 0.1 volt (approximately) required for 100 percent modulation. Monophonic channel: 600 ohms, balanced. Input of 10 dbm ±2 db (approximately 2.45 volts) required for 100 percent modulation.

SCA channel: 600 ohms, balanced. Input of 0.35 volt (approximately) required for 10 percent modulation.

Frequency and phase response . . . . . The frequency and phase response of the A830-2 is such that when used with a suitable stereophonic generator such as the 786M-1, stereophonic separation between left and right stereophonic channels shall be better than 35 db at audio modulating frequencies between 30 and 15,000 cps.

Distortion . . . . . Does not exceed 0.5 percent in the 30- to 15,000-cps frequency range and 1.0 percent in the 15,000- to 75,000-cps frequency range.

Pre-emphasis . . . . . Standard 75-microsecond pre-emphasis.

FM noise level . . . . . 65 db below 100 percent modulation.

AM noise level . . . . . 55 db below 100 percent AM level.

1.6 VACUUM-TUBE, FUSE, AND SEMICONDUCTOR COMPLEMENT.

Table 1-1 lists all of the vacuum tubes, fuses, and semiconductors used in the A830-2.

TABLE 1-1. VACUUM-TUBE, FUSE, AND SEMICONDUCTOR COMPLEMENT

SYMBOL	TYPE	FUNCTION
V426	6U8A	Oscillator and buffer
V427	12AT7	Balanced mixer
V428	6AU6	Limiter-amplifier
V429	5763	Driver
V430	2E26	Power amplifier
Q501	2N1225	First afc limiter
Q502	2N1225	Second afc limiter
Q503	2N708	Afc discriminator driver
Q504	2N1613	First error signal amplifier
Q505	2N1613	Second error signal amplifier
Q506	2N1613	Third error signal amplifier
Q507	2N1613	Fourth error signal amplifier
Q508	2N491	Keying generator
Q509	2N1605	Multivibrator
Q510	2N1605	Multivibrator
Q511	2N1175A	Baseband cancellation amplifier
Q601	2N1396	Frequency modulated oscillator
Q602	2N1225	First limiter
Q603	2N1225	Second limiter
Q604	2N708	Discriminator driver
Q605	2N1225	Afc buffer
Q606	2N708	Modulator output amplifier
Q607	2N1711	First baseband amplifier
Q608	2N1396	Second baseband amplifier
CR401	1N1492	B+ rectifier
CR402	1N1492	B+ rectifier
CR403	1N1492	B+ rectifier
CR404	1N1492	B+ rectifier
CR405	1N1492	B+ rectifier

TABLE 1-1. VACUUM-TUBE, FUSE, AND SEMICONDUCTOR COMPLEMENT (Cont)

SYMBOL	TYPE	FUNCTION
CR406	1N1492	B+ rectifier
CR407	1N1492	B+ rectifier
CR408	1N1492	B+ rectifier
CR409	1N538	+20-volt rectifier
CR410	1N538	+20-volt rectifier
CR411	10M10ZB1	+20-volt regulator
CR412	1Z10V01	+10-volt regulator
CR413	1N538	-10-volt rectifier
CR414	1N538	-10-volt rectifier
CR415	1Z10V01	-10-volt regulator
CR426	1N977A	Oscillator plate voltage regulator
CR501	1N270	Gate
CR502	1N270	Gate
CR503	1N270	Afc limiter
CR504	1N270	Afc limiter
CR505	1N270	Afc limiter
CR506	1N270	Afc limiter
CR507	1N198	Afc discriminator
CR508	1N198	Afc discriminator
CR509	FA-4000	Synchronous detector
CR510	FA-4000	Synchronous detector
CR511	FA-4000	Gate
CR512	1N198	Meter rectifier
CR513	1N198	Meter rectifier
CR514	1N718	Voltage regulator
CR601	1N626	Temperature compensation
CR602	SV3173	Voltage regulator
CR603	1N270	Limiter
CR604	1N270	Limiter
CR605	1N270	Limiter
CR606	1N270	Limiter
CR607	1N198	Modulation discriminator
CR608	1N198	Modulation discriminator
CR609	1N751A	Voltage regulator
CR610	1N198	Meter rectifier
F401	1 amp	Protect T401
F402	1/4 amp	Protect T402

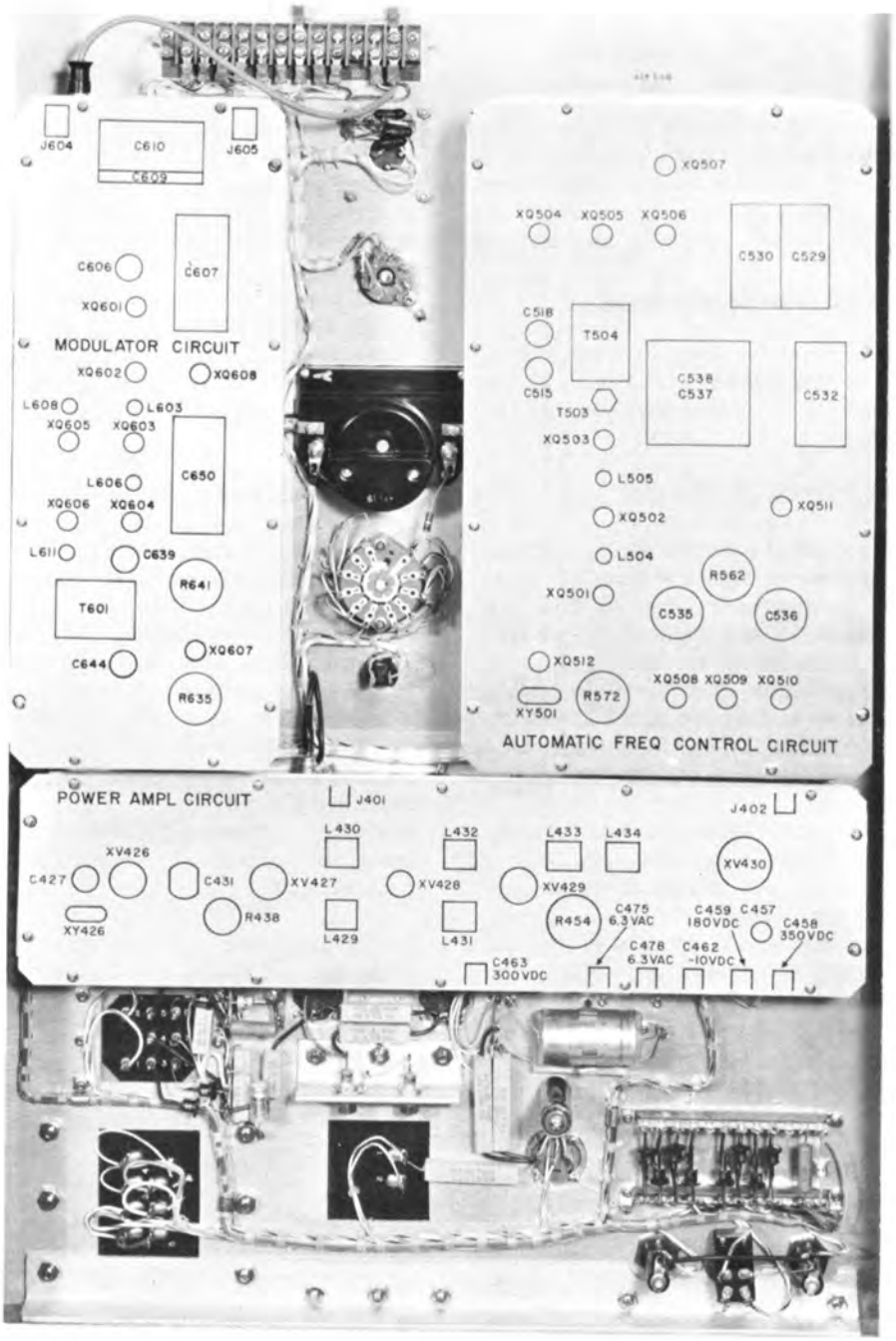


Figure 1-2. A830-2 10 W Wide-Band FM Broadcast Exciter, Rear View

SECTION II
PRINCIPLES OF OPERATION

2.1 GENERAL.

This section describes the principles of operation of A830-2 10 W Wide-Band FM Broadcast Exciter. Figure 2-2 is a block diagram of the A830-2 and figure 5-1 is the schematic diagram of the A830-2. Refer to these figures for the following discussion.

2.2 FREQUENCY MODULATION METHODS.

There are two basic methods used to generate an FM signal, direct FM and phase modulation. There are variations of each of these two methods, but the end results are the same.

2.2.1 PHASE MODULATORS.

The phase modulation method consists of phase modulating a CW (continuous wave) signal with audio tones. The audio response is shaped to drop off 6 db per octave from the lowest to the highest frequency. The resultant signal is frequency modulated although produced by a phase modulator. The modulation index of an FM signal is defined as the ratio of the change in carrier frequency (deviation) to the modulating frequency, $\frac{\nabla f}{f_m}$. The modulation index of present phase modulators is so low that modulation is usually performed at a low frequency (approximately 100 kc) and then multiplied about 800 times to obtain the output frequency with the desired ±75-kc deviation. The outstanding advantage of this system is that the 100-kc oscillator may be crystal controlled and further frequency stabilization is not required. This system has been used widely in broadcast FM transmitters in the past.

The arrival of stereophonic FM broadcasting has caused problems in the phase modulator. A composite stereo plus SCA signal (referred to hereafter as the baseband audio signal) occupies a frequency band from 50 cps to 75 kc. The audio response shaping (6 db per octave) would require that 50-cps signals be 65.5 db above signals at 75 kc. When a signal-to-noise ratio of 65 db and a dynamic range of approximately 60 db is added to this, it is obvious that baseband amplifiers cannot be built to meet these requirements.

It is possible to split the phase modulation into two steps where one phase modulator accepts only the L + R (left and right audio signals) audio spectrum and a subsequent modulator adds the L - R double-sideband suppressed carrier signal. The audio bandwidth for each phase modulator is thereby reduced and the dynamic range of the baseband amplifiers is reduced to acceptable limits. The phase and amplitude relationships must be maintained between the two signals. These requirements are ±0.3-db gain variation and ±3-degree phase variation to meet the 30-db stereo separation requirement. These requirements would be difficult to obtain without frequent on-the-air adjustment to continually meet the stereo separation requirement.

There are other methods of splitting the signal and using more than one modulator, but all have the phase and gain stability problem.

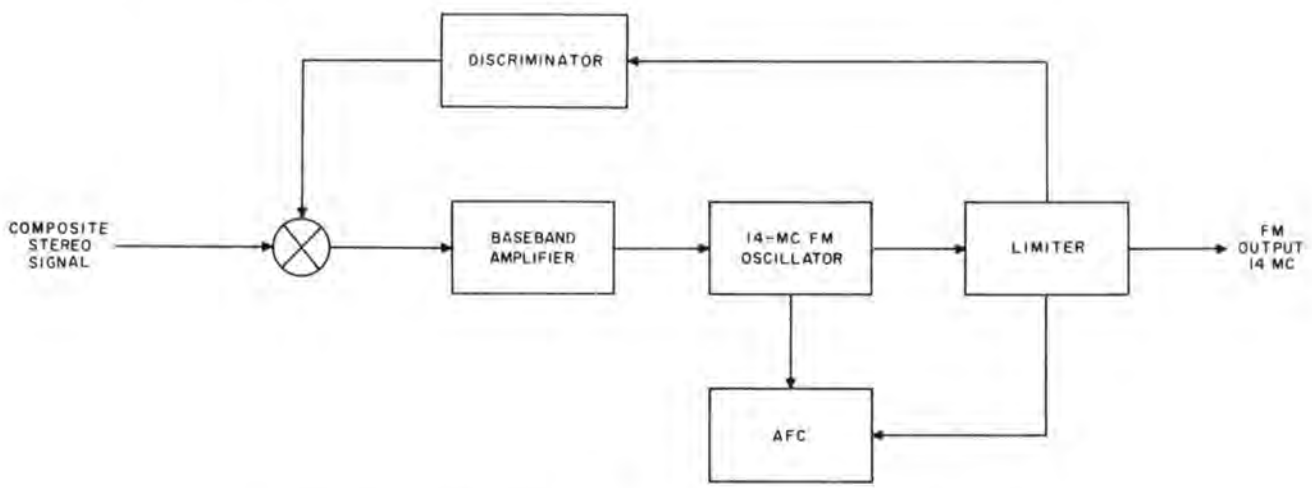


Figure 2-1. Direct FM Modulation, Simplified Block Diagram

2.2.2 DIRECT FREQUENCY MODULATION.

The direct method of generating a frequency modulated signal is shown in figure 2-1. The complete stereo signal (and SCA signal if used) is fed through a baseband amplifier to a frequency-modulated oscillator. The discriminator completes an audio feedback loop which suppresses FM oscillator distortion, incidental FM noise, transient carrier offset, and gain/phase variation in the baseband amplifier and modulator. The center frequency of the oscillator is not sufficiently stable so an automatic frequency control (afc) circuit is required to maintain frequency stability. The output of the modulator is a 14-mc FM signal with ±75-kc peak deviation. The output frequency is obtained by translating this signal with a stable vhf oscillator. The use of the direct FM system removes the requirement for double modulators, phase delay lines, and baseband amplifiers with a response which changes with frequency.

2.3 BLOCK DIAGRAM.

Refer to figure 2-2, a block diagram of the A830-2.

2.3.1 MODULATOR.

The A830-2 uses the direct FM method of generating an FM signal. The baseband input (and SCA input, if used) is connected to baseband amplifiers Q607 and Q608. The response of these amplifiers is flat.

The gain of the baseband amplifiers is adjustable with AMPL BIAS control R641. Refer to figure 5-1. The emitter voltage on Q608 is regulated to +15 volts by a silicon breakdown diode, CR609. The output of Q608 is coupled to frequency-modulated oscillator Q601. Q601 is an LC oscillator which has a center frequency of 14 mc. The tuned circuit in the base of Q601 contains a voltage-sensitive capacitor, C654. Refer to figure 5-1. The capacitance of C654 varies proportionately with the voltage across it. The change in capacity of C654 makes a corresponding change in the frequency of oscillations in Q601. Thus, the frequency deviation of the output of Q601 is directly proportional to the amplitude of the modulating signal and the peak deviation is ±75 kc.

The output of Q601 is coupled to two limiters, Q602 and Q603. The limiters remove any amplitude modulation from the FM signal. This amplitude modulation is caused by variation of the tuned circuit capacity by the baseband signal. The transistors do not do any limiting. The limiting takes place in the diodes connected to the collectors. This method provides symmetrical limiting (positive and negative) which avoids the phase modulation that occurs when unsymmetrical clipping followed by filtering is used. The limiters are set up so that as the input level is raised, the second limiter operates first; just before it becomes nonlinear, the first limiter starts limiting. The limiting range is approximately 31 db.

The output of the second limiter is coupled to discriminator driver Q604. One output of the discriminator driver is connected to modulator discriminator T601 and the other output goes to output amplifier Q606.

Modulator discriminator T601 converts the frequency-modulated 14-mc signal to an AM signal which is detected by diodes CR607 and CR608. The detected audio is mixed with the input baseband audio at the input to the baseband amplifiers. This feedback loop suppresses distortion from the FM oscillator, incidental FM noise, transient carrier offset, and gain/phase variation in the baseband amplifier and modulator.

Output amplifier Q606 provides a signal output of 1.0 volt rms for the balanced mixer in the power amplifier compartment. This output is matched to 50 ohms by an L-section impedance, L611 and C634. A low-pass filter, C632, C633, and L610, attenuates harmonics of the 14-mc signal. A portion of this output is rectified and connected to meter switch S101 for monitoring purposes.

The second output from Q606 is coupled to afc buffer amplifier Q605. This amplifier, as well as the limiters and amplifiers preceding it, reduces oscillator frequency change caused by variation of loading on the output. The output of Q605 is 0.1 volt rms across 50 ohms.

2.3.2 AUTOMATIC FREQUENCY CONTROL.

The A830-2 requires automatic frequency control to maintain the center frequency of the modulated oscillator at 14 mc. The error in frequency of this oscillator may be caused by temperature drift, carrier shift due to distortion in the modulator, etc. The afc circuits correct these errors to bring the stability of the output frequency to ±1000 cycles per second over a temperature range of +10°C(+50°F) to +55°C(+131°F) and a line voltage range of ±5 percent.

The afc correction voltage is obtained by comparing the modulator output signal with the output of a crystal-controlled reference oscillator, and deriving a d-c voltage which is proportional in magnitude and polarity to the magnitude and direction of the difference in frequency of these two signals.

The reference oscillator is a conventional crystal-controlled oscillator using a fundamental 14-mc series-resonant crystal. The temperature drift of this crystal contributes only ±70 cycles per second to the output frequency drift over temperature.

The signal from afc buffer Q605 and the output from the reference oscillator are connected to a diode switch, CR501 and CR502. The diode switch is simply two diodes which are alternately switched on and off by the 5-cps square wave. The diode switch is controlled by a signal from keying generator Q508. This

signal, a square wave with a frequency of approximately 5 cps, alternately couples the reference signal, then the modulated carrier, to the input to first limiter Q501.

The two limiters, Q501 and Q502, and discriminator driver Q503 are identical to the limiters and driver (Q602, Q603, and Q604) used in the modulator. The limiters remove any amplitude difference which might exist between the two signals. The level of the reference signal is adjustable with REF LEVEL control R572. Q503 amplifies the limited signal to a level sufficient to drive the afc discriminator. Assume that there is no modulation applied. In this case, the output from the discriminator will be a 5-cps square wave with an amplitude proportional to the frequency error in the FM oscillator.

The 5-cps error signal is amplified and applied to the synchronous detector which develops the d-c correction voltage. This d-c voltage is coupled through a low-pass filter to the voltage-sensitive capacitor in the frequency-modulated oscillator to tune the FM oscillator back on frequency.

The operation of the afc circuitry is only slightly different when modulation is applied at ±75-kc deviation. Assume now that modulation is applied and an error of 100 cps exists in the FM oscillator. The output of the afc discriminator due to the 100-cps signal would be 100 K_d where K_d is the gain of the discriminator in volts per cps. The output of the discriminator due to the modulation on the carrier would be 150,000 K_d. This means that the undesired signal is 1500 times greater than the desired signal. The undesired signal is removed by the modulation canceling circuit consisting of baseband cancel amplifier Q511 and diode switch CR511. Whenever the modulated carrier is connected to the first limiter diode switch, CR501 and CR502, the baseband audio input is connected to the discriminator output by diode switch CR511. This baseband audio is 180 degrees out of phase with the discriminator output, and when MOD BAL control R652 is properly adjusted, the output of the afc discriminator due to modulation is completely canceled. The 5-cps error signal due to the frequency error in the FM oscillator is then amplified and detected as if modulation were not applied.

Note that the afc discriminator is used as a comparator rather than as a reference. The exact center frequency of the discriminator is not important since the output voltage need only be proportional to the difference in the two frequencies rather than to the absolute value of these frequencies. Therefore, the center frequency stability of the discriminator does not effect the operation of the afc system.

The last stage of the error signal amplifiers, Q507, is a phase splitter to provide a push-pull output to the synchronous detector. The synchronous detector is keyed by the 5-cps square-wave keying signal from the keying generator.

The synchronous detector recovers the information contained in the amplitude and phase of the 5-cps error signal. The circuit used in the A830-2 is actually two synchronous detectors operating from opposite half cycles of the 5-cps square-wave keying signal so that the 5-cps square-wave keying signal is balanced out in the output. This is analogous to a double-sideband balanced modulator in which neither input signal is present in the output.

Figures 2-3 through 2-5 illustrate the operation of the two diode switches and the synchronous detector. The electronic circuit and a mechanical analog for each of the circuits is shown. The resistances marked R_f represent the forward resistance of the diodes.

The output of the synchronous detector may be disabled for test and adjustment by depressing AFC DISABLE switch S102 on the front panel.

2.3.3 POWER AMPLIFIER.

The 14-mc FM signal from the modulator is coupled to a balanced mixer, V427. The other input to V427 is the amplified output of a vhf crystal oscillator, V426A. The crystal oscillator operates with a fifth-overtone series-resonant crystal in the 74- to 94-mc frequency range. The specific frequency of the crystal is 14 mc below the station's assigned output frequency. The exact frequency is adjustable over a small range by VHF OSC FREQ ADJ control C427. This adjustment is required to compensate for the finishing tolerance and aging in crystals Y426 and Y501. The output of V426A is amplified in V426B and coupled to V427. The two input signals are balanced out of the output of V427 and the sum of the two signals is the operating frequency. The MIX BAL control compensates for unbalance between the sections of V427.

The output of V427 is coupled to limiter amplifier V428. The limiter amplifier removes any amplitude modulation resulting from mixing and couples this signal to driver stage V429. The signal is amplified by V429 to a level sufficient to drive power amplifier stage V430. The power output is adjustable with POWER OUT control R454. The tuning and loading of the output stage is accomplished with C461 and C456.

2.3.4 POWER SUPPLY.

The power supply in the A830-2 provides all operating voltages for the A830-2 and 786M-1 Stereo Generator, if used. The primary power may be 115 or 230 volts, 60 cps. The power supply is of conventional design using a bridge rectifier and a voltage divider for the high voltages. The low voltages are obtained from full-wave rectifiers. Voltage breakdown diodes are used for regulating the +20-volt, +10-volt, and -10-volt outputs to ±5 percent.

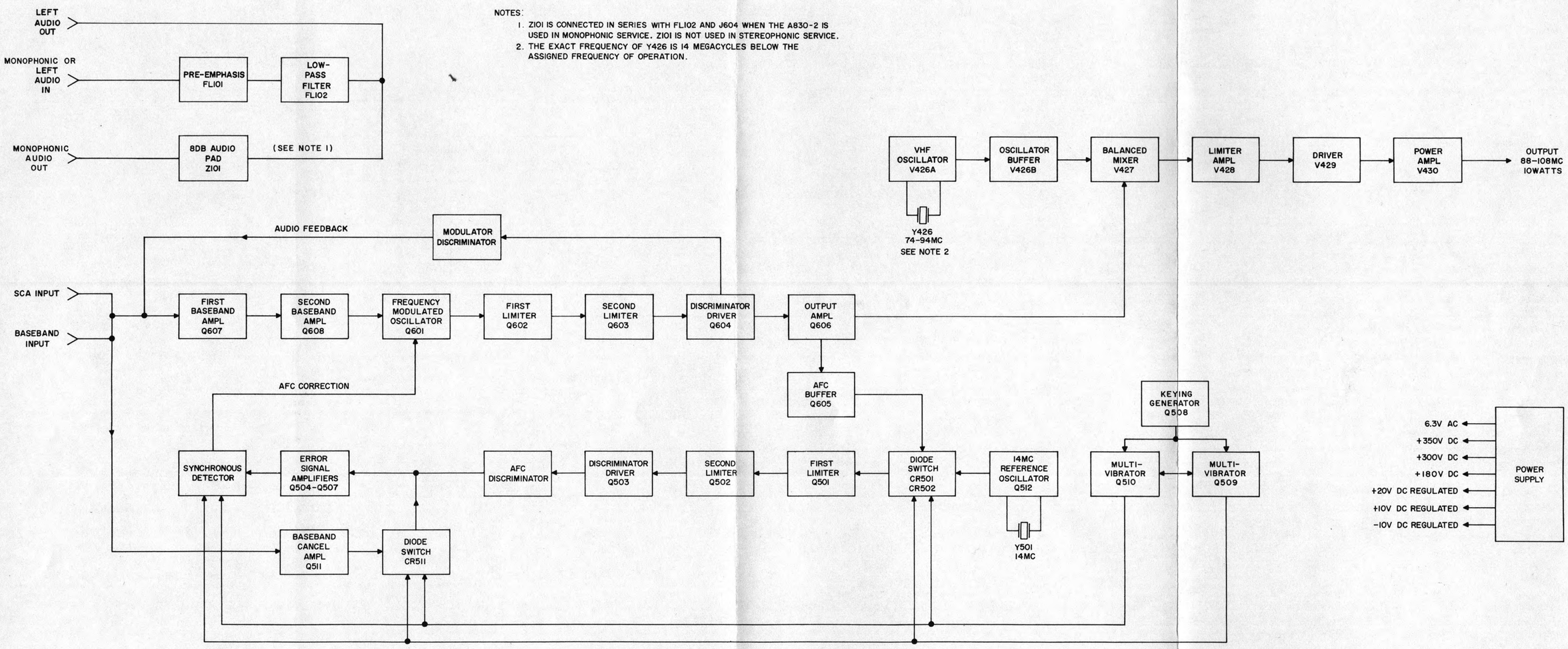


Figure 2-2. A830-2 10 W Wide-Band FM Broadcast Exciter, Block Diagram

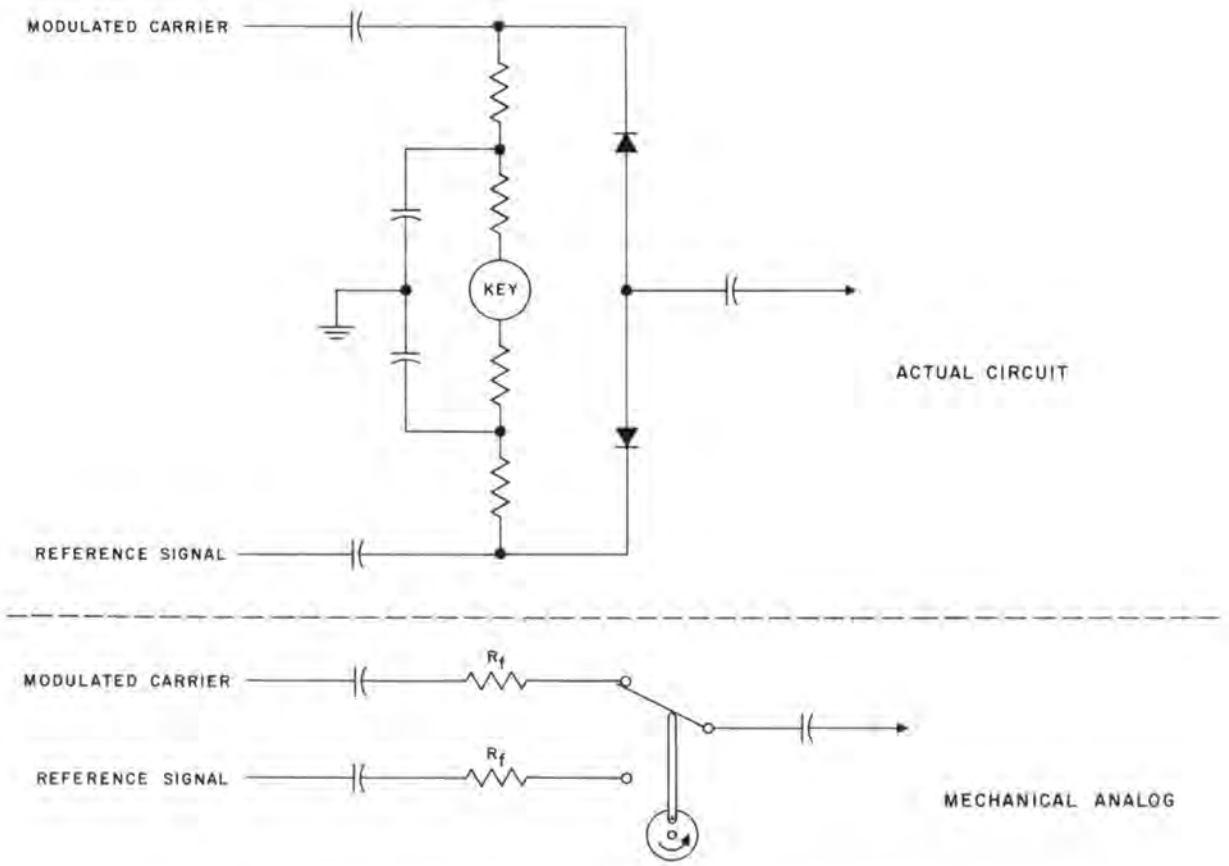


Figure 2-3. Reference Switch, Simplified Schematic and Mechanical Analog Diagram

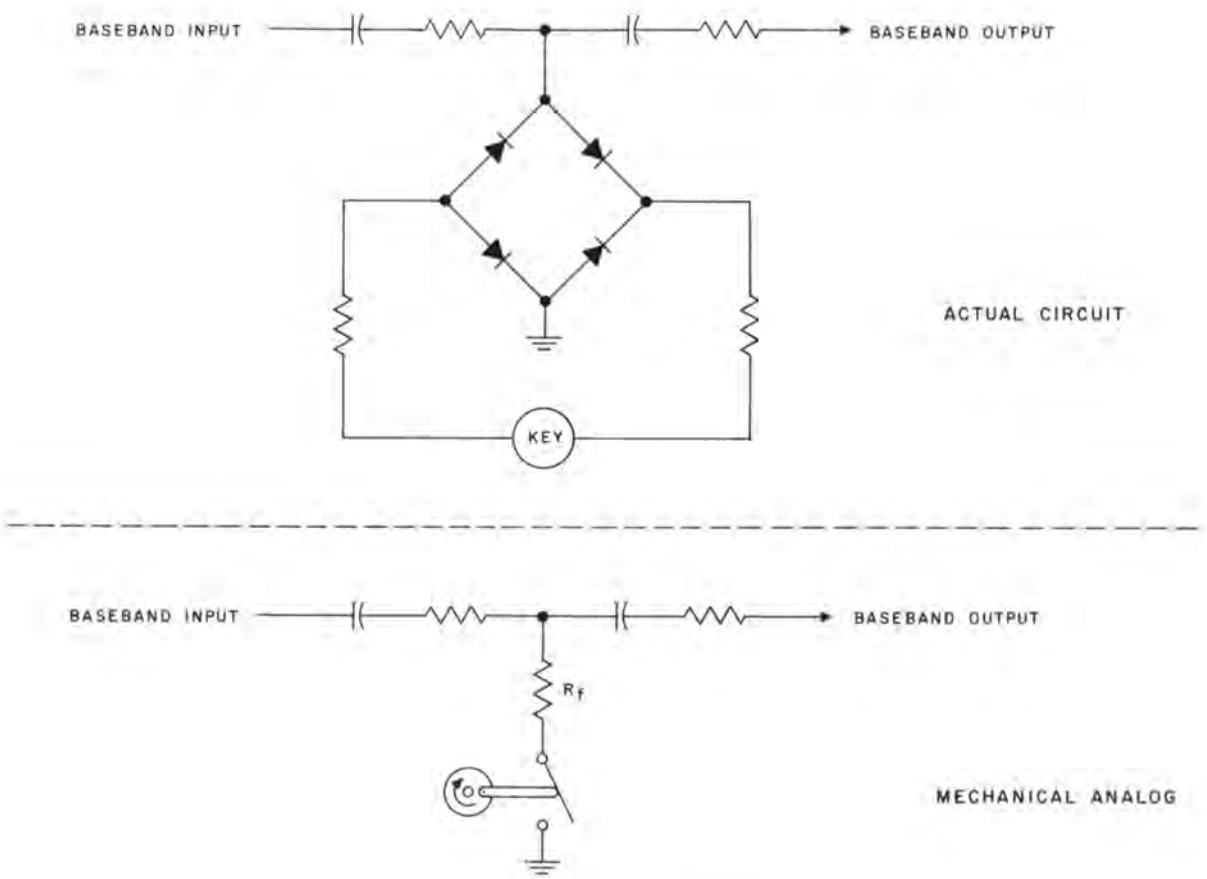


Figure 2-4. Baseband Cancel Switch, Simplified Schematic and Mechanical Analog Diagram

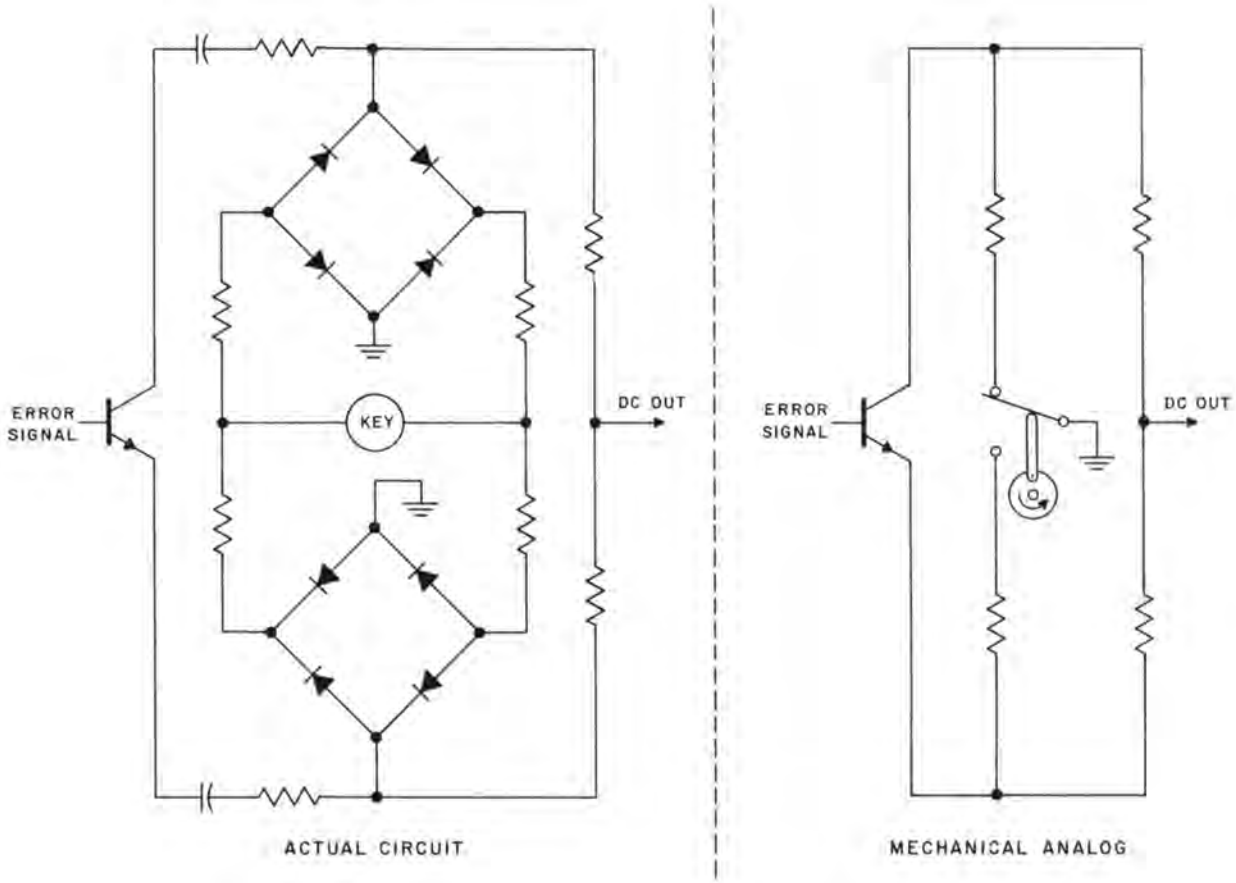


Figure 2-5. Synchronous Detector, Simplified Schematic and Mechanical Analog Diagram

SECTION III
MAINTENANCE

3.1 GENERAL.

This section contains alignment instructions, adjustment procedures, and minimum performance standards for the A830-2.

3.2 TEST EQUIPMENT REQUIRED.

The test equipment in table 3-1, or its equivalent, is required to perform the procedures given in this section.

TABLE 3-1
TEST EQUIPMENT REQUIRED

ITEM	MANUFACTURER'S DESIGNATION
Audio oscillator	Hewlett-Packard 200AB
Distortion and noise meter	Hewlett-Packard 330D
A-c vtvm	Hewlett-Packard 410B
R-f vtvm*	Bird 91C
Communications receiver	Capable of receiving 14 mc
10-db pad	Microlab AD-10N
Oscilloscope	
FM monitor	Hewlett-Packard 335B
50-ohm load	

*The 91C is not required if a Tektronix 541 oscilloscope is available. See paragraph 3.3.10.

3.3 ALIGNMENT AND ADJUSTMENT.

3.3.1 PRELIMINARY ADJUSTMENTS.

Perform the following procedure prior to performing any of the alignment procedures.

a. Set the meter switch on the A830-2 to the OFF position.
b. Short AFC DISABLE switch S102 on the A830-2 with a clip lead.
c. Connect the 50-ohm load to RF OUTPUT jack J402.
d. Operate POWER switch S401 to the ON position. Allow 10 minutes for equipment warm up.

3.3.2 MODULATOR LIMITER-DISCRIMINATOR ALIGNMENT.

a. Remove Q601 from its socket.
b. Rotate REF LEVEL control R572 fully counterclockwise.
c. Connect a 0.01-uf capacitor and clip lead between the movable arm of REF LEVEL control R572 and the emitter pin on the socket for Q601. This supplies an accurate 14-mc signal for alignment of the A830-2.
d. Connect the HP-410B to TP602 and set it to the lowest d-c scale.
e. Rotate R572 clockwise until an indication is observed on the HP-410B.

NOTE

During this adjustment, maintain the 14-mc signal at a level below limiting. Limiting causes the tuning peaks to be very broad.

f. Adjust C639, L606, and L603 for maximum indication on the HP-410B.
g. Remove the 0.01-uf capacitor and clip lead from XQ601 and R572. Replace Q601 into XQ601.
h. Connect the 91C to TP504.

NOTE

Refer to note in paragraph 3.3.10.

i. Remove Q509 from its socket.
j. Adjust R572 for an indication of 30 millivolts.
k. Replace Q509.

3.3.3 MODULATOR OUTPUT AMPLIFIER TUNING.

a. Set the meter selector switch on the front panel of the A830-2 to the MOD OUTPUT B position.
b. Tune L611 for maximum indication on the front panel meter.

3.3.4 AFC BUFFER TUNING.

a. Connect the 91C (or Tektronix oscilloscope) to TP504.
b. Remove Q510 from its socket.
c. Tune L608 for maximum indication on the 91C (or oscilloscope).
d. Replace Q510 into its socket.

3.3.5 FM OSCILLATOR ADJUSTMENT.

a. Loosely couple the communications receiver to FM oscillator Q601 and to the 14-mc reference oscillator. If the receiver has a bfo, turn it off.
b. Adjust OSC FREQ control C606 for a zero beat on the communication receiver.
c. Remove the communications receiver.

3.3.6 MODULATION DISCRIMINATOR.

a. Connect the HP-410B to TP601.
b. Adjust DISCR SEC control C644 for a zero indication on the HP-410B.
c. Check adjustment of DISCR PRI control C639. It should be set for a maximum indication, and C644 set for a minimum indication.

3.3.7 AMPLIFIER BIAS ADJUSTMENT.

a. Connect the HP-410B to TP603.
b. Adjust R641 for an indication of +7.5 volts d-c.

3.3.8 MODULATOR GAIN ADJUSTMENT.

a. Remove the 50-ohms load and connect the HP-335B to the output of the A830-2 through the 10-db pad.
b. Connect the HP-200AB to baseband input jack J604.
c. Set the output level of the HP-200AB to 0.1 volt rms at 1000 cps.
d. Adjust MOD GAIN control R635 for an indication of 100 percent modulation (±75-kc deviation) on the HP-335B.

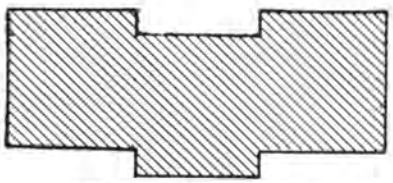
3.3.9 AFC LIMITER-DISCRIMINATOR ALIGNMENT.

a. Connect the HP-410B to TP501 and set to 10-volt scale.
b. Remove Q509 from its socket.
c. Adjust REF LEVEL control R572 fully counterclockwise.
d. Adjust L504, L505, and C515 (DISCR PRI control) for maximum indication on the HP-410B.
e. Connect the 91C to TP504.
f. Adjust R572 for an indication of 30 millivolts on the 91C.
g. Connect the HP-410B to TP502 and adjust DISCR SEC control C518 for a minimum indication on the HP-410B when set to its lowest range.
h. Replace Q509 in its socket.
i. Reset R572 as specified in paragraph 3.3.10.

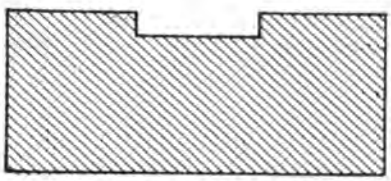
3.3.10 REFERENCE LEVEL ADJUSTMENT.

NOTE

The following procedure may be accomplished with the 91C or with a Tektronix 541 oscilloscope. Steps a through f describe the procedure for using the 91C and steps g and h describe the procedure for using the 541 oscilloscope.



IMPROPER ADJUSTMENT



PROPER ADJUSTMENT

Figure 3-1. Reference Level Adjustment, Oscilloscope Patterns

a. Connect the 91C to TP504.
b. Remove Q510 from its socket.
c. Tune L608 for maximum indication on the 91C. Record the reading on the 91C.
d. Replace Q510 and remove Q509 from its socket.
e. Adjust R572 for the same indication recorded in step c.
f. Replace Q509 in its socket.
g. Connect the Tektronix oscilloscope to TP504.
h. Adjust R572 for alignment of base lines of alternate signals. See figure 3-1.
i. Set meter switch S101 on the A830-2 front panel to the 14 MC REF B position. The meter should indicate in the B range.

3.3.11 BASEBAND CANCELING ADJUSTMENT.

a. Remove Q510 from its socket.
b. Make certain that AFC DISABLE switch S102 is still jumpered.
c. Rotate R562 to its maximum counterclockwise position.
d. Connect the oscilloscope to TP503.
e. Connect the HP-200AB to baseband input jack J604.
f. Set the HP-200AB to 50 cps.
g. Set the level of the HP-200AB to produce a 2-volt peak-to-peak waveform on the oscilloscope.
h. Adjust the oscilloscope to display the 50-cps waveform.
i. Slowly adjust R562 to cancel the signal on the oscilloscope. Gradually increase the input signal from the HP-200AB to 0.1 volt while maintaining the null by adjustment of R562. The waveform on the oscilloscope should be less than 1 volt peak-to-peak when the input signal is 0.1 volt.
j. Replace Q510.

3.3.12 AFC LOOP CHECK.

a. Remove the jumper from across AFC DISABLE SWITCH S102.
b. Observe the deviation meter on the HP-335B and depress the AFC DISABLE switch. The frequency should slowly drift off and come back quickly when the AFC DISABLE switch is released.

3.3.13 POWER AMPLIFIER ADJUSTMENT AND TUNING.

a. Set meter switch S101 on the A830-2 to the MIXER GRID A position.
b. Adjust C431 for maximum indication on front panel meter M101.
c. Adjust VHF OSC FREQ ADJ control C427 so that the HP-335B indicates on frequency.
d. Switch S101 to BUFFER GRID A and observe meter. It should indicate approximately 1 unit.
e. Switch S101 to V428 B.
f. Adjust L429, L430, and MIX BAL control R438 for maximum indication on the front panel meter.
g. Switch S101 to V429 B.
h. Adjust L431 and L432 for maximum indication on the front panel meter.
i. Remove all connections to J402 and connect the 50-ohm load to J402.
j. Connect the HP-410B across the 50-ohm load.
k. Switch S101 to V430C B.
l. Adjust PA PLATE control C461 for minimum indication on the front panel.
m. Adjust PA MATCH control C456 for a maximum indication on the HP-410B.
n. Adjust POWER OUT control R454 for an indication of 22.5 volts.

3.4 MINIMUM PERFORMANCE STANDARDS.

The A830-2 should be tested in accordance with the following procedures after alignment and adjustment. The following tests may be used to determine if the A830-2 is operating properly.

3.4.1 PRELIMINARY ADJUSTMENTS.

a. Connect the HP-200AB to J604 on the A830-2.
b. Connect the HP-335B through the 10-db pad to J402.
c. Connect the HP-330D to the modulation output of the HP-335B.

3.4.2 FREQUENCY RESPONSE.

a. Perform the preliminary procedures of paragraph 3.4.1.
b. Set the HP-200AB for an output of 0.100 volt on a frequency of 400 cps.
c. Adjust the HP-330D for an indication of 0 db.
d. Set the HP-200AB to 50 cps and reset output level to 0.100 volt. The HP-330D indication should be 0 ±0.3 db.
e. Repeat step d for a frequency setting of 15,000 cps.

3.4.3 HARMONIC DISTORTION.

a. Perform the preliminary procedures of paragraph 3.4.1.
b. Set the HP-200B frequency to 50 cps and the output level to 0.01 volt. Measure the harmonic distortion on the HP-330D. It should be 1.0 percent or less.
c. Repeat step b for frequencies of 400 and 15,000 cps.

3.4.4 RESIDUAL FM NOISE.

a. Perform the preliminary procedures of paragraph 3.4.1.
b. Set the HP-200AB to 400 cps at an output level of 0.100 volt.
c. Measure the level across terminals 1 and 2 of the HP-335B with the HP-330D. Record the reading.
d. Turn off the HP-200AB and record the indication on the HP-330D. Record this reading.
e. Compute the s+n/n ratio using the readings recorded in steps c and d. The ratio should not be less than 60 db.

3.4.5 CARRIER FREQUENCY SHIFT.

a. Perform the preliminary procedures of paragraph 3.4.1.
b. Remove the audio input from J604.
c. Connect the output of the HP-200AB to terminals 3 and 4 of TB101.
d. Adjust the output of the HP-200AB to a frequency of 1000 cps and to a level sufficient to modulate the carrier 100 percent.
e. Remove the audio connections from terminals 3 and 4.
f. Adjust the HP-335B to indicate 0 frequency deviation.
g. Touch the audio connections from the HP-200AB to terminals 3 and 4 of TB101 and note the carrier deviation on the HP-335B. It should be less than 500 cps.

3.4.6 AM NOISE MEASUREMENT.

a. Perform the preliminary procedures of paragraph 3.4.1.
b. Set the HP-335B function switch to CARRIER LEVEL and read the carrier output voltage on the modulation meter. An indication of 100 percent modulation equals 10 volts, 90 percent modulation equals 9 volts, etc.
c. Connect the 91C to J3 on the HP-335B and measure the noise output. Compute the carrier-to-AM noise ratio using the following formula:

$$\frac{\text{Carrier}}{\text{AM Noise}} = 20 \log_{10} \frac{\text{Carrier Voltage}}{\text{AM Noise Voltage}}$$

The ratio should not be less than 50 db.

SECTION IV
PARTS LIST

ITEM	DESCRIPTION	COLLINS PART NUMBER
	A830-2 10 W WIDE-BAND FM BROADCAST EXCITER	549-1588-00
	PANEL	
FL101	ATTENUATOR, FIXED: pre-emphasis network for use in FM commercial broadcast equipment; 600 ohms balanced, w/ center tap; ±1 to ±1.5 db frequency response	379-0426-00
FL102	FILTER, HIGH PASS: metal encased, hermetically sealed, input 600 ohms, output 600 ohms, 4 solder type terminals; continuous duty cycle; A. D. C. part no. D10390	673-0869-00
M101	METER, ARBITRARY SCALE: permanent magnet moving coil d-c microammeter, 500 ua, 100 ohms resistance; 2 scales, A scale, 10-90 ua, B scale, 175-500 ua; Assembly Products, Inc. part no. 361	458-0650-00
R101	RESISTOR, FIXED, COMPOSITION: 1000 ohms ±10%, 1/2 w	745-1352-00
R102	RESISTOR, FIXED, FILM: 562 ohms ±1%, 1/4 w	705-7084-00
R103	RESISTOR, FIXED, FILM: 261 ohms ±1%, 1/4 w	705-7068-00
R104	RESISTOR, FIXED, FILM: same as R103	705-7068-00
S101	SWITCH, ROTARY: 2 circuit, 2 pole, 10 position, 2 section; 2 moving, 22 fixed contacts	259-1567-00
S102	SWITCH, PUSH: spst; momentary; 125 v a-c, 0.75 amp, 250 v a-c, 0.25 amp; Cutler-Hammer part no. 8411-K6	266-6169-00
TB101	TERMINAL BOARD: barrier type w/ double row front connection of 12 screw terminals; 13/32 in. by 7/8 in. by 5-11/64 in.; Howard B. Jones, Div, Cinch Mfg. Co, part no. 12-140-D	367-0518-00
TB102	TERMINAL BOARD: Bakelite, 4 terminals, 1 grounded, 3 insulated; 21/32 in. w by 1-1/2 in. lg; Cinch Mfg. Corp. part no. 1534-A	306-2240-00
XFL101	SOCKET, ELECTRON TUBE: 8 prong octal tube socket w/ steel mtg plate; Amphenol-Borg Electronics part no. 88-8TM	220-1005-00
	POWER AMPLIFIER AND POWER SUPPLY	
C401	CAPACITOR, FIXED, CERAMIC: 1000 uuf ±20%, 500 vdcw	913-1186-00
C402 thru C408	CAPACITOR, FIXED, CERAMIC: same as C401	913-1186-00
C409 A & B	CAPACITOR, FIXED, ELECTROLYTIC: dual section, 40 uf ea section; -10% +50%, 450 vdcw; Sprague Electric part no. Y27674	183-1259-00
C410	CAPACITOR, FIXED, ELECTROLYTIC: 1000 uf -10% +100%, 50 vdcw	183-1403-00
C411	CAPACITOR, FIXED, ELECTROLYTIC: same as C410	183-1403-00
C412	CAPACITOR, FIXED, ELECTROLYTIC: 500 uf -10% +100%, 50 vdcw	183-1575-00
C413	CAPACITOR, FIXED, ELECTROLYTIC: 4 uf -10% +100%, 50 vdcw	183-1389-00
C414 thru C425	NOT USED	
C426	CAPACITOR, FIXED, MICA: 5 uuf ±5%, 500 vdcw; Electro Motive part no. DM15C050J01	912-2750-00
C427	CAPACITOR, VARIABLE, CERAMIC: 3.0 uuf min to 12.0 uuf max, 350 vdcw	917-1072-00
C428	CAPACITOR, FIXED, MICA: 470 uuf ±5%, 300 vdcw; Electro Motive part no. DM15F471J01	912-2864-00
C429	CAPACITOR, FIXED, CERAMIC: 1.5 uuf ±5%, 500 vdcw; Stackpole Carbon Co, part no. GA-1.5uufPORM5	913-2981-00
C430	CAPACITOR, FIXED, CERAMIC: 4700 uuf ±20%, 500 vdcw	913-1187-00
C431	CAPACITOR, VARIABLE, AIR: 3.0-9.8 uuf, 1250 vdcw; E. F. Johnson part no. 160-211	922-0046-00
C432	CAPACITOR, FIXED, CERAMIC: 7.5 uuf ±5%, 500 vdcw; Stackpole Carbon Co, part no. GA-7.5uufPORM5	913-2997-00
C433	CAPACITOR, FIXED, MICA: same as C426	912-2774-00
C434	CAPACITOR, FIXED, MICA: same as C426	912-2774-00
C435	CAPACITOR, FIXED, CERAMIC: same as C430	913-1187-00
C436	CAPACITOR, FIXED, MICA: 10 uuf ±5%, 500 vdcw; Electro Motive part no. DM15C100J01	912-2753-00
C437	CAPACITOR, FIXED, MICA: same as C436	912-2753-00
C438	CAPACITOR, FIXED, CERAMIC: same as C429	913-2981-00
C439 thru C444	CAPACITOR, FIXED, CERAMIC: same as C430	913-1187-00
C445	CAPACITOR, FIXED, CERAMIC: same as C429	913-2981-00
C446 thru C449	CAPACITOR, FIXED, CERAMIC: same as C430	913-1187-00
C450	CAPACITOR, FIXED, CERAMIC: 1000 uuf -20% +80%, 500 vdcw; Erie Resistor part no. 327-029X5T0102Z	913-1292-00
C451	CAPACITOR, FIXED, CERAMIC: same as C429	913-2981-00
C452	CAPACITOR, FIXED, MICA: 33 uuf ±5%, 500 vdcw; Electro Motive part no. DM15E330J01	912-2780-00
C453	CAPACITOR, FIXED, CERAMIC: same as C430	913-1187-00
C454	CAPACITOR, FIXED, CERAMIC: same as C430	913-1187-00
C455	CAPACITOR, FIXED, CERAMIC: same as C430	913-1187-00
C456	CAPACITOR, VARIABLE, CERAMIC: 4.5 uuf min to 25 uuf max, 500 vdcw	917-1026-00
C457	CAPACITOR, FIXED, CERAMIC: same as C450	913-1292-00
C458	CAPACITOR, FIXED, CERAMIC: same as C450	913-1292-00
C459	CAPACITOR, FIXED, CERAMIC: same as C450	913-1292-00
C460	CAPACITOR, FIXED, CERAMIC: same as C430	913-1187-00
C461	CAPACITOR, VARIABLE, AIR: 3.0 uuf min to 18.7 uuf max; 1250 v a-c; E. F. Johnson Co. part no. 160-110-3	922-0033-00
C462	CAPACITOR, FIXED, CERAMIC: same as C450	913-1292-00
C463	CAPACITOR, FIXED, CERAMIC: same as C450	913-1292-00
C464	CAPACITOR, FIXED, MICA: same as C428	912-2864-00
C465 thru C468	CAPACITOR, FIXED, CERAMIC: same as C430	913-1187-00
C469	NOT USED	
C470	NOT USED	
C471 thru C474	CAPACITOR, FIXED, CERAMIC: same as C430	913-1187-00
C475 thru C480	CAPACITOR, FIXED, CERAMIC: same as C450	913-1292-00
C481	CAPACITOR, FIXED, CERAMIC: 1.0 uuf ±5%, 500 vdcw; Stackpole Carbon Co, part no. GA-1.0uufPORM5	913-2977-00
C482	CAPACITOR, FIXED, MICA: same as C428	912-2864-00
C483	CAPACITOR, FIXED, MICA: same as C428	912-2864-00
C484	CAPACITOR, FIXED, MICA: same as C428	912-2864-00
C485	CAPACITOR, FIXED, CERAMIC: same as C450	913-1292-00
C486	CAPACITOR, FIXED, MICA: same as C426	912-2750-00
C487	CAPACITOR, FIXED, MICA: same as C426	912-2750-00
C488	CAPACITOR, FIXED, MICA: same as C426	912-2750-00
C489	CAPACITOR, FIXED, MICA: 150 uuf ±5%, 500 vdcw; Electro Motive part no. DM15F151J01	912-2828-00
C490	CAPACITOR, FIXED, MICA: same as C489	912-2828-00
C491	CAPACITOR, FIXED, MICA: 20 uuf ±5%, 500 vdcw; Electro Motive part no. DM15C200J01	912-2765-00
CR401	SEMICONDUCTOR DEVICE, DIODE: silicon; Motorola part no. 1N1492	353-1661-00
CR402 thru CR408	SEMICONDUCTOR DEVICE, DIODE: same as CR401	353-1661-00
CR409	SEMICONDUCTOR DEVICE, DIODE: silicon, single phase, half-wave; General Electric part no. 1N538	353-1526-00
CR410	SEMICONDUCTOR DEVICE, DIODE: same as CR409	353-1526-00
CR411 A & B	SEMICONDUCTOR DEVICE, SET: two hermetically sealed silicon voltage reference diodes; Motorola part no. 10M10ZB1	353-1238-00
CR412	SEMICONDUCTOR DEVICE, DIODE: silicon, hermetically sealed; International Rect. Corp part no. 1Z10V01	353-1208-00

ITEM	DESCRIPTION	COLLINS PART NUMBER
CR413	SEMICONDUCTOR DEVICE, DIODE: same as CR409	353-1526-00
CR414	SEMICONDUCTOR DEVICE, DIODE: same as CR409	353-1526-00
CR415	SEMICONDUCTOR DEVICE, DIODE: same as CR412	353-1208-00
CR416 thru CR425	NOT USED	
CR426	SEMICONDUCTOR DEVICE, DIODE: silicon, hermetically sealed, diffused-junction type; Motorola part no. 1N977A	353-3237-00
F401	FUSE, CARTRIDGE: 1.00 amp current rating, 250 v, glass body, ferrule terminals; Bussmann part no. MDL 1	264-4280-00
F402	FUSE, CARTRIDGE: 0.250 amp current rating, 250 v d-c, glass body, ferrule terminals	264-4240-00
J401	JACK, TELEPHONE: steel, miniature, panel mtg; Switchcraft, Inc. part no. 3501FP	360-0148-00
J402	CONNECTOR, RECEPTACLE, ELECTRICAL: single round female contact, right angle shape; Amphenol part no. 31-213	357-9258-00
L401	REACTOR: 7.2 henrys min, 0.300 amp d-c; 60 ohms; 4-37/64 in. by 5-5/16 in. overall; Stancor Elec, Inc. part no. RS-8300	668-0015-00
L402 thru L425	NOT USED	
L426	COIL, RADIO FREQUENCY: 0.68 uh ±3%, 250 mc, 0.12 ohm, 1750 ma; 3/16 in. dia by 7/16 in. lg; Delevon part no. 1840	240-1844-00
L427	COIL, RADIO FREQUENCY: 0.25 uh ±3%, 400 mc, 0.04 ohm, 2850 ma; 3/16 in. dia by 7/16 in. lg	240-1843-00
L428	COIL, RADIO FREQUENCY, NO. 1: single layer wound #14 wire, 1/2 in. ID of coil, 7/8 in. lg overall	549-1605-003
L429	COIL, RADIO FREQUENCY: variable; 88 to 108 mc, -15°C to +55°C temp range; 850 v d-c dielectric strength	278-0730-00
L430 thru L434	COIL, RADIO FREQUENCY: same as L429	278-0730-00
L435	COIL, RADIO FREQUENCY, NO. 2: single layer wound #16 wire; 3/4 in. ID of coil, 2-7/8 in. lg overall	549-1606-003
L436	COIL, RADIO FREQUENCY: single layer wound; 5.6 uh, 860 ma current, 0.95 ohm; Jeffers Electronics Div. of Speer Carbon Co. part no. 10402-34	240-0179-00
L437	COIL, RADIO FREQUENCY: same as L436	240-0179-00
L438	COIL, RADIO FREQUENCY: single layer wound, 0.47 uh nom inductance, 0.09 ohm max dc resistance, 1600 ma max current rating; Jeffers Electronics, Div. of Speer Carbon Co. part no. 10100-126	240-0060-00
L439	COIL, RADIO FREQUENCY, NO. 3: single layer wound #14 wire, 3/4 in. ID of coil, 1-3/8 in. h; approx 1-11/16 in. lg overall	549-1607-003
L440	COIL, RADIO FREQUENCY: 1.00 uh ±10%, 0.30 ohm d-c resistance; 850 ma d-c; Jeffers Electronics part no. 10100-128	240-0062-00
R401	RESISTOR, FIXED, WIREWOUND: 100 ohms ±10%, 10 w	710-9053-00
R402	RESISTOR, FIXED, WIREWOUND: 16,000 ohms ±5%, 25 w	710-0369-00
R403	NOT USED	
R404	RESISTOR, FIXED, WIREWOUND: 600 ohms ±10%, 10 w	710-9081-00
R405	RESISTOR, FIXED, WIREWOUND: 12,000 ohms ±10%, 10 w	710-9070-00
R406	RESISTOR, FIXED, WIREWOUND: 25,000 ohms ±10%, 10 w	710-9068-00
R407	RESISTOR, FIXED, WIREWOUND: 5.0 ohms ±10%, 5 w	710-9105-00
R408	RESISTOR, FIXED, WIREWOUND: 25 ohms ±10%, 7 w	710-9019-00
R409	RESISTOR, FIXED, WIREWOUND: same as R408	710-9019-00
R410	RESISTOR, FIXED, COMPOSITION: 160.0 ohms ±5%, 5 w	747-5444-00
R411	RESISTOR, FIXED, COMPOSITION: same as R407	710-9105-00
R412	RESISTOR, FIXED, COMPOSITION: same as R410	747-5444-00
R413	RESISTOR, FIXED, WIREWOUND: 100 ohms ±10%, 7 w	710-9005-00
R414 thru R425	NOT USED	

ITEM	DESCRIPTION	COLLINS PART NUMBER
R426	RESISTOR, FIXED, COMPOSITION: 10,000 ohms ±10%, 1/2 w	745-1394-00
R427	RESISTOR, FIXED, COMPOSITION: 1000 ohms ±10%, 1/2 w	745-1352-00
R428	RESISTOR, FIXED, COMPOSITION: 220 ohms ±10%, 1/2 w	745-1324-00
R429	RESISTOR, FIXED, COMPOSITION: 2700 ohms ±10%, 1/2 w	745-1370-00
R430	RESISTOR, FIXED, COMPOSITION: 47,000 ohms ±10%, 1/2 w	745-1422-00
R431	RESISTOR, FIXED, COMPOSITION: 1500 ohms ±10%, 1/2 w	745-1359-00
R432	RESISTOR, FIXED, COMPOSITION: 39,000 ohms ±10%, 1/2 w	745-1419-00
R433	RESISTOR, FIXED, COMPOSITION: 2200 ohms ±10%, 1/2 w	745-1366-00
R434	RESISTOR, FIXED, COMPOSITION: 0.10 megohm ±10%, 1/2 w	745-1436-00
R435	RESISTOR, FIXED, COMPOSITION: same as R434	745-1436-00
R436	RESISTOR, FIXED, COMPOSITION: same as R431	745-1359-00
R437	RESISTOR, FIXED, COMPOSITION: same as R433	745-1366-00
R438	RESISTOR, VARIABLE: COMPOSITION; 500 ohms ±20%, 0.2 w	376-0202-00
R439	RESISTOR, FIXED, COMPOSITION: 3300 ohms ±10%, 2 w	745-5673-00
R440	RESISTOR, FIXED, COMPOSITION: same as R439	745-5673-00
R441	RESISTOR, FIXED, COMPOSITION: same as R434	745-1436-00
R442	RESISTOR, FIXED, COMPOSITION: same as R426	745-1394-00
R443	RESISTOR, FIXED, COMPOSITION: 68 ohms ±10%, 1/2 w	745-1303-00
R444	RESISTOR, FIXED, COMPOSITION: 39,000 ohms ±10%, 1 w	745-3419-00
R445	RESISTOR, FIXED, COMPOSITION: 4700 ohms ±10%, 1 w	745-3380-00
R446	RESISTOR, FIXED, COMPOSITION: same as R434	745-1436-00
R447	RESISTOR, FIXED, COMPOSITION: same as R426	745-1394-00
R448	RESISTOR, FIXED, COMPOSTION: 270 ohms ±10%, 1 w	745-3328-00
R449	RESISTOR, FIXED, COMPOSITION: 10,000 ohms ±10%, 1 w	745-3394-00
R450	RESISTOR, FIXED, COMPOSITION: 820 ohms ±10%, 2 w	745-5649-00
R451	RESISTOR, FIXED, COMPOSITION: 10 ohms ±10%, 1/2 w	745-1268-00
R452	RESISTOR, FIXED, COMPOSITION: 3300 ohms ±10%, 1/2 w	745-1373-00
R453	RESISTOR, FIXED, COMPOSITION: same as R432	745-1419-00
R454	RESISTOR, VARIABLE, WIREWOUND: 250 ohms ±10%, 2 w	377-0621-00
R455	RESISTOR, FIXED, COMPOSITION: 180 ohms ±10%, 2 w	745-5621-00
R456	RESISTOR, FIXED, COMPOSITION: 8200 ohms ±10%, 1/2 w	745-1391-00
R457	RESISTOR, FIXED, COMPOSITION: 33 ohms ±10%, 1/2 w	745-1289-00
R458	RESISTOR, FIXED, COMPOSITION: 100 ohms ±10%, 1/2 w	745-1310-00
R459	RESISTOR, FIXED, COMPOSITION: same as R451	745-1268-00
R460	NOT USED	
R461	RESISTOR, FIXED, FILM: 51,000 ohms ±10%, 5 w	714-2973-00
R462	RESISTOR, FIXED, COMPOSITION: same as R443	745-1303-00
R463	RESISTOR, FIXED, COMPOSITION: 22,000 ohms ±10%, 1/2 w	745-1408-00
R464	RESISTOR, FIXED, COMPOSITION: same as R458	745-1310-00
R465	RESISTOR, FIXED, COMPOSITION: 27,000 ohms ±10%, 1/2 w	745-1412-00
R466	RESISTOR, FIXED, WIREWOUND: 20,000 ohms ±10%, 10 w	710-9067-00
R467	RESISTOR, FIXED, COMPOSITION: 22,000 ohms ±10%, 2 w	745-5708-00
S401	SWITCH, TOGGLE: dpst; 125 v a-c, 15 amp, 250 v a-c, 10 amp; Cutler-Hammer, Inc. part no. 7561K4	266-0099-00
T401	TRANSFORMER, POWER, STEP-UP, STEP-DOWN: pri 120 v; sec. #1, 438 v, sec. #2, 6.3 v, ct; 50/60 cps; continuous duty cycle; Stancor Electric part no. 31215	662-0046-00
T402	TRANSFORMER, POWER, STEP-DOWN: pri 120 v rms; sec. #1, 77 v, ct; sec. #2, 41.5 ct; 50/60 cps; continuous duty cycle; Stancor Electric part no. 31214	662-0048-00
T403 thru T425	NOT USED	

ITEM	DESCRIPTION	COLLINS PART NUMBER
T426	TRANSFORMER, RADIO FREQUENCY: pri 14 turns #26 wire, close wound; sec. 13 turns #26 wire, close wound	549-1590-00
TB401	TERMINAL BOARD: phenolic w/ 3 solder-lug terminals; 11/16 in. w by 1-1/8 in. lg; Cinch Mfg. Corp. part no. 1520-A	306-9033-00
TB402	TERMINAL BOARD: Baklite, 2 terminals; 21/32 in. by 3/4 in. lg; Cinch Mfg. Co. part no. 1513-A	306-2220-00
TB403	TERMINAL BOARD: laminated phenolic w/ 4 solder-lug terminals; 27/32 in. w by 1-1/2 in. lg overall; Cinch Mfg. Co. part no. 1909	306-0838-00
TB404	TERMINAL BOARD: same as TB401	306-9033-00
TB405	TERMINAL BOARD: phenolic; steel mounting base, brass lugs, 12 terminals; H. B. Jones part no. 2012	367-0905-00
TB406	TERMINAL BOARD: same as TB405	367-0905-00
TB407 thru TB425	NOT USED	
TB426	TERMINAL BOARD: phenolic, 4 brass solder-lug terminals; 1/16 in. by 3/8 in. by 1-1/2 in.; Cinch Mfg. Corp. part no. 1532-A	306-9032-00
TB427	TERMINAL BOARD: same as TB403	306-0838-00
TB428	TERMINAL BOARD: phenolic, 5 brass solder-lug terminals; 1/16 in. by 3/8 in. by 1-7/8 in.; Cinch Mfg. Corp. part no. 1542-A-FV	306-0951-00
TB429	TERMINAL BOARD: same as TB428	306-0951-00
TB430	TERMINAL BOARD: same as TB402	306-2220-00
TB431	TERMINAL BOARD: same as TB428	306-0951-00
V401 thru V425	NOT USED	
V426	ELECTRON TUBE: triode-pentode; Radio Corp. of America part no. 6U8A	255-0328-00
V427	ELECTRON TUBE: glass envelope; twin triode; Radio Corp. of America part no. 12AT7	255-0205-00
V428	ELECTRON TUBE: pentode; Radio Corp. of America part no. 6AU6	255-0202-00
V429	ELECTRON TUBE: glass envelope; vhf beam power; Radio Corp. of America part no. 5763	257-0059-00
V430	ELECTRON TUBE: glass envelope; Radio Corp. of America part no. 2E26	256-0084-00
XF401	FUSE HOLDER: extractor post type, for use w/ 3 AG fuses; 0-20 amp, 100-125 v; clear knob; neon lamp type	265-1072-00
XF402	FUSE HOLDER: same as XF401	265-1072-00
XV401 thru XV425	NOT USED	
XV426	SOCKET, ELECTRON TUBE: 9 contact miniature; copper nonmagnetic alloy contacts; phenolic insulation; Sylvania Electric Products, Inc. part no. 7490-0100	220-1244-00
XV427	SOCKET, ELECTRON TUBE: same as XV426	220-1244-00
XV428	SOCKET, ELECTRON TUBE: 7 contact miniature for uhf application; phenolic insulation; Sylvania Electric Products, Inc, part no. 7470-0125	220-1203-00
XV429	SOCKET, ELECTRON TUBE: same as XV426	220-1244-00
XV430	SOCKET, ELECTRON TUBE: 8 prong octal tube socket w/ steel mtg plate; Amphenol-Borg Electronics part no. 78-8TM	220-1005-00
	AUTOMATIC FREQUENCY CONTROL	
C501	CAPACITOR, FIXED, CERAMIC: 1000 uuf ±20%, 500 vdcw	913-1186-00
C502	CAPACITOR, FIXED, CERAMIC: same as C501	913-1186-00
C503	CAPACITOR, FIXED, CERAMIC: same as C501	913-1186-00
C504	CAPACITOR, FIXED, CERAMIC: 0.01 uf -0% +100% temp range; 100 vdcw; Erie Resistor Corp. part no. 855-502-X550-103P	913-3680-00
C505	CAPACITOR, FIXED, CERAMIC: same as C504	913-3680-00
C506	CAPACITOR, FIXED, CERAMIC: same as C504	913-3680-00
C507	CAPACITOR, FIXED, CERAMIC: same as C504	913-3680-00
C508	CAPACITOR, FIXED, MICA: 10 uuf ±5%, 500 vdcw; Electro Motive part no. DM15C100J01	912-2753-00
C509	CAPACITOR, FIXED, CERAMIC: same as C504	913-3680-00
C510	CAPACITOR, FIXED, MICA: 82 uuf ±5%, 500 vdcw; Electro Motive part no. DM15E820J01	912-2810-00
C511	CAPACITOR, FIXED, CERAMIC: 0.1 uf -20% +80%, 50 vdcw; Sprague Electric part no. 33C41	913-3886-00
C512	CAPACITOR, FIXED, CERAMIC: same as C504	913-3680-00
C513	CAPACITOR, FIXED, CERAMIC: same as C504	913-3680-00
C514	CAPACITOR, FIXED, MICA: same as C510	912-2810-00

ITEM	DESCRIPTION	COLLINS PART NUMBER
C515	CAPACITOR, VARIABLE, CERAMIC: 5.0 uuf min to 37.5 uuf max, 350 vdcw; Erie Resistor part no. 557018C0P039R	917-1073-00
C516	CAPACITOR, FIXED, MICA: 220 uuf ±5%, 500 vdcw; Electro Motive part no. DM15F221J01	912-2840-00
C517	CAPACITOR, FIXED, MICA: 30 uuf ±2%, 500 vdcw; Electro Motive part no. DM15E300G01	912-2776-00
C518	CAPACITOR, VARIABLE, CERAMIC: 3.0 uuf min to 12.0 uuf max, 350 vdcw	917-1072-00
C519	CAPACITOR, FIXED, MICA: 470 uuf ±5%, 300 vdcw; Electro Motive part no. DM15F471J01	912-2864-00
C520	CAPACITOR, FIXED, MICA: same as C519	912-2864-00
C521	CAPACITOR, FIXED, ELECTROLYTIC: 100 uf -10% +100%, 10 vdcw; Sprague Electric part no. S13691	183-2151-00
C522	CAPACITOR, FIXED, ELECTROLYTIC: 100 uf -10%, +100%, 25 vdcw; Sprague Electric part no. 30D188A1	183-1192-00
C523	CAPACITOR, FIXED, CERAMIC: 0.68 uf -20% +80%, 25 vdcw; Sprague Electric part no. 5C12A	913-3809-00
C524	CAPACITOR, FIXED, ELECTROLYTIC: same as C522	183-1192-00
C525	CAPACITOR, FIXED, CERAMIC: same as C523	913-3809-00
C526	CAPACITOR, FIXED, ELECTROLYTIC: same as C522	183-1192-00
C527	CAPACITOR, FIXED, CERAMIC: same as C523	913-3809-00
C528	CAPACITOR, FIXED, ELECTROLYTIC: same as C522	183-1192-00
C529	CAPACITOR, FIXED, PAPER: 5.0 uf ±20%, 150 vdcw; Sprague Electric part no. 121P50501R5S2	931-2585-00
C530	CAPACITOR, FIXED, PAPER: same as C529	931-2585-00
C531	CAPACITOR, FIXED, PAPER: 2.0 uf ±20%, 200 vdcw; Aerovox Corp. part no. P8292ZN14	951-0670-00
C532	CAPACITOR, FIXED, PAPER: 20 uf ±20%, 150 vdcw; Sprague Electric part no. 143P101M	951-2004-00
C533	CAPACITOR, FIXED, PAPER: same as C531	951-0670-00
C534	CAPACITOR, FIXED, ELECTROLYTIC: 250 uf -10% +100%, 30 vdcw	183-1565-00
C535	CAPACITOR, FIXED, ELECTROLYTIC: 1000 uf -10% +100%, 50 vdcw	183-1403-00
C536	CAPACITOR, FIXED, ELECTROLYTIC: same as C535	183-1403-00
C537	CAPACITOR, FIXED, PAPER: 35 uf ±20%, 150 vdcw; Sprague Electric part no. 143P4M	951-2003-00
C538	CAPACITOR, FIXED, PAPER: same as C537	951-2003-00
C539	CAPACITOR, FIXED, ELECTROLYTIC: 250 uf -10% +100%, 12 vdcw; Sprague Electric Co. part no. 30D157A1	183-1190-00
C540	CAPACITOR, FIXED, CERAMIC: same as C511	913-3886-00
C541	CAPACITOR, FIXED, MICA: 180 uuf ±5%, 500 vdcw; Electro Motive part no. DM15F181J01	912-2834-00
C542	CAPACITOR, FIXED, CERAMIC: same as C511	913-3886-00
C543	NOT USED	
C544	CAPACITOR, FIXED, MICA: 68 uuf ±5%, 500 vdcw; Electro Motive part no. DM15E680J01	912-2804-00
C545	CAPACITOR, FIXED, MICA: 510 uuf ±5%, 300 vdcw; Electro Motive part no. DM15F511J01	912-2867-00
C546	CAPACITOR, FIXED, CERAMIC: same as C501	913-1186-00
C547	CAPACITOR, FIXED, CERAMIC: same as C501	913-1186-00
C548	CAPACITOR, FIXED, CERAMIC: same as C501	913-1186-00
C549	CAPACITOR, FIXED, CERAMIC: 3300 uuf ±20%, 500 vdcw	913-1193-00
C550	CAPACITOR, FIXED, MICA: 22 uuf ±5%, 500 vdcw; Electro Motive part no. DM15C220J01	912-2768-00
C551	CAPACITOR, FIXED, ELECTROLYTIC: same as C534	183-1565-00
C552	CAPACITOR, FIXED, CERAMIC: same as C549	913-1193-00
C553	CAPACITOR, FIXED, CERAMIC: same as C501	913-1186-00
CR501	SEMICONDUCTOR DEVICE, DIODE: germanium; Transitron part no. 1N270	353-2018-00
CR502 thru CR506	SEMICONDUCTOR DEVICE, DIODE: same as CR501	353-2018-00
CR507	SEMICONDUCTOR DEVICE, DIODE: germanium; Erie Resistor part no. 1N198	353-0160-00
CR508	SEMICONDUCTOR DEVICE, DIODE: same as CR507	353-0160-00
CR509	SEMICONDUCTOR DEVICE, SET: four matched silicon diodes; encapsulated; Fairchild Semiconductor Corp. part no. FA-4000	353-3271-00
CR510	SEMICONDUCTOR DEVICE, SET: same as CR509	353-3271-00
CR511	SEMICONDUCTOR DEVICE, SET: same as CR509	353-3271-00
CR512	NOT USED	
CR513	SEMICONDUCTOR DEVICE, DIODE: same as CR507	353-0160-00

ITEM	DESCRIPTION	COLLINS PART NUMBER
CR514	SEMICONDUCTOR DEVICE, DIODE: hermetically sealed, silicon; Motorola, Inc. part no. 1N718	353-2734-00
CR515	SEMICONDUCTOR DEVICE, DIODE: quick recovery silicon junction diode; Hughes Aircraft part no. 1N626	353-2857-00
CR516	SEMICONDUCTOR DEVICE, DIODE: same as CR515	353-2857-00
J501	JACK, TIP: insulated tip u/w standard 0.080 in. test probes; brown; E. F. Johnson Co. part no. 105-208-200	360-0152-00
J502	JACK, TIP: insulated tip u/w standard 0.080 in. test probes; red; E. F. Johnson Co. part no. 105-202-200	360-0150-00
J503	JACK, TIP: insulated tip u/w standard 0.080 in. test probes; orange; E. F. Johnson Co. part no. 105-206-200	360-0154-00
J504	JACK, TIP: insulated tip u/w standard 0.080 in. test probes; yellow; E. F. Johnson Co. part no. 105-207-200	360-0156-00
L501	COIL, RADIO FREQUENCY: single layer wound, 100 uh nom inductance, 3.2 ohms d-c resistance, 530 ma current rating; Jeffers Electronics, Div. of Speer Carbon Co. part no. 10404-34	240-0193-00
L502	COIL, RADIO FREQUENCY: single layer wound, 3.30 uh nom inductance, 0.15 ohm d-c resistance, 1150 ma current rating; Jeffers Electronics, Div. of Speer Carbon Co. part no. 10102-110	240-0065-00
L503	COIL, RADIO FREQUENCY: single layer wound, 4.7 uh inductance; 0.22 ohm max d-c resistance, 950 ma current rating; Jeffers Electronics, Div. of Speer Carbon Co. part no. 10102-115	240-0145-00
L504	COIL, RADIO FREQUENCY: variable; +15°C to +55°C temp range; 100 v d-c dielectric strength	278-0733-00
L505	COIL, RADIO FREQUENCY: same as L504	278-0733-00
Q501	TRANSISTOR: germanium; RCA part no. 2N1225	352-0135-00
Q502	TRANSISTOR: same as Q501	352-0135-00
Q503	TRANSISTOR: hermetically sealed, NPN silicon; Fairchild Semi Conductor Co. part no. 2N708	352-0322-00
Q504	TRANSISTOR: hermetically sealed, NPN diffused silicon planar transistor; Fairchild Semiconductor Corp. part no. 2N1613	352-0349-00
Q505	TRANSISTOR: same as Q504	352-0349-00
Q506	TRANSISTOR: same as Q504	352-0349-00
Q507	TRANSISTOR: same as Q504	352-0349-00
Q508	TRANSISTOR: silicon; General Electric part no. 2N491	352-0116-00
Q509	TRANSISTOR: germanium; hermetically sealed; Sylvania Electric part no. 2N1605	352-0348-00
Q510	TRANSISTOR: same as Q509	352-0348-00
Q511	TRANSISTOR: hermetically sealed; PNP germanium; General Electric part no. 2N1175A	352-0315-00
Q512	TRANSISTOR: same as Q501	352-0135-00
R501	RESISTOR, FIXED, COMPOSITION: 68 ohms ±10%, 1/2 w	745-1303-00
R502	RESISTOR, FIXED, COMPOSITION: 2700 ohms ±10%, 1/2 w	745-1370-00
R503	RESISTOR, FIXED, COMPOSITION: same as R502	745-1370-00
R504	RESISTOR, FIXED, COMPOSITION: 680 ohms ±10%, 1/2 w	745-1345-00
R505	RESISTOR, FIXED, COMPOSITION: 4700 ohms ±10%, 1/2 w	745-1380-00
R506	RESISTOR, FIXED, COMPOSITION: 10,000 ohms ±10%, 1/2 w	745-1394-00
R507	RESISTOR, FIXED, COMPOSITION: same as R505	745-1380-00
R508	RESISTOR, FIXED, FILM: 42.2 ohms ±1%, 1/4 w	705-7030-00
R509	RESISTOR, FIXED, FILM: 51.1 ohms ±1%, 1/4 w	705-7034-00
R510	RESISTOR, FIXED, COMPOSITION: same as R506	745-1394-00
R511	RESISTOR, FIXED, COMPOSITION: same as R506	745-1394-00
R512	RESISTOR, FIXED, COMPOSITION: same as R505	745-1380-00
R513	RESISTOR, FIXED, FILM: 261 ohms ±1%, 1/4 w	705-7068-00
R514	RESISTOR, FIXED, COMPOSITION: 1800 ohms ±10%, 1/2 w	745-1363-00
R515	RESISTOR, FIXED, COMPOSITION: same as R514	745-1363-00
R516	RESISTOR, FIXED, COMPOSITION: 150 ohms ±10%, 1/2 w	745-1317-00
R517	RESISTOR, FIXED, FILM: 110 ohms ±1%, 1/4 w	705-7050-00
R518	RESISTOR, FIXED, FILM: 6810 ohms ±1%, 1/4 w	705-7136-00
R519	RESISTOR, FIXED, FILM: same as R518	705-7136-00
R520	RESISTOR, FIXED, FILM: same as R517	705-7050-00
R521	RESISTOR, FIXED, FILM: 34,800 ohms ±1%, 1/4 w	705-7170-00
R522	RESISTOR, FIXED, FILM: 10,000 ohms ±1%, 1/4 w	705-7144-00
R523	RESISTOR, FIXED, FILM: 178,000 ohms ±1%, 1/4 w	705-7204-00
R524	RESISTOR, FIXED, FILM: 14,700 ohms ±1%, 1/4 w	705-7152-00
R525	RESISTOR, FIXED, FILM: 7500 ohms ±1%, 1/4 w	705-7138-00
R526	RESISTOR, FIXED, FILM: 422 ohms ±1%, 1/4 w	705-7078-00
R527	RESISTOR, FIXED, FILM: 196,000 ohms ±1%, 1/4 w	705-7206-00
R528	RESISTOR, FIXED, FILM: same as R524	705-7152-00
R529	RESISTOR, FIXED, FILM: same as R525	705-7138-00
R530	RESISTOR, FIXED, FILM: same as R526	705-7078-00
R531	RESISTOR, FIXED, FILM: same as R527	705-7206-00
R532	RESISTOR, FIXED, FILM: same as R524	705-7152-00
R533	RESISTOR, FIXED, FILM: same as R525	705-7138-00
R534	RESISTOR, FIXED, FILM: same as R526	705-7078-00
R535	RESISTOR, FIXED, FILM: 38,300 ohms ±1%, 1/4 w	705-7172-00
R536	RESISTOR, FIXED, FILM: 19,600 ohms ±1%, 1/4 w	705-7158-00
R537	RESISTOR, FIXED, FILM: 1470 ohms ±1%, 1/4 w	705-7104-00
R538	RESISTOR, FIXED, FILM: same as R537	705-7104-00
R539	RESISTOR, FIXED, FILM: 2870 ohms ±1%, 1/4 w	705-7118-00
R540	RESISTOR, FIXED, FILM: same as R539	705-7118-00
R541	RESISTOR, FIXED, FILM: 100,000 ohms ±1%, 1/4 w	705-7192-00
R542	RESISTOR, FIXED, FILM: same as R541	705-7192-00
R543	RESISTOR, FIXED, COMPOSITION: 0.12 megohm ±10%, 1/2 w	745-1440-00
R544	RESISTOR, FIXED, COMPOSITION: 27,000 ohms ±10%, 1/2 w	745-1412-00
R545	RESISTOR, FIXED, COMPOSITION: 0.18 megohm ±10%, 1/2 w	745-1447-00
R546	RESISTOR, FIXED, FILM: 5620 ohms ±1%, 1/4 w	705-7132-00
R547	RESISTOR, FIXED, FILM: 9090 ohms ±1%, 1/4 w	705-7142-00
R548	RESISTOR, FIXED, FILM: same as R547	705-7142-00
R549	RESISTOR, FIXED, FILM: 8250 ohms ±1%, 1/4 w	705-7140-00
R550	RESISTOR, FIXED, FILM: 1330 ohms ±1%, 1/4 w	705-7102-00
R551	RESISTOR, FIXED, COMPOSITION: 15,000 ohms ±10%, 1/2 w	745-1401-00
R552	RESISTOR, FIXED, COMPOSITION: 3300 ohms ±10%, 1/2 w	745-1373-00
R553	RESISTOR, FIXED, COMPOSITION: 1000 ohms ±10%, 1/2 w	745-1352-00
R554	RESISTOR, FIXED, COMPOSITION: same as R551	745-1401-00
R555	RESISTOR, FIXED, FILM: 75,000 ohms ±1%, 1/4 w	705-7186-00
R556	RESISTOR, FIXED, COMPOSITION: 10 ohms ±10%, 1/2 w	745-1268-00
R557	RESISTOR, FIXED, COMPOSITION: 220 ohms ±10%, 1/2 w	745-1324-00
R558	RESISTOR, FIXED, FILM: 56,200 ohms ±1%, 1/4 w	705-7180-00
R559	RESISTOR, FIXED, FILM: 2610 ohms ±1%, 1/4 w	705-7116-00
R560	RESISTOR, FIXED, FILM: 3160 ohms ±1%, 1/4 w	705-7120-00
R561	RESISTOR, FIXED, COMPOSITION: same as R553	745-1352-00
R562	RESISTOR, VARIABLE: COMPOSITION; 1000 ohms ±20%, 1/4 w	376-4727-00
R563	RESISTOR, FIXED, COMPOSITION: same as R506	745-1394-00
R564	RESISTOR, FIXED, FILM: 3480 ohms ±1%, 1/4 w	705-7122-00
R565	RESISTOR, FIXED, FILM: 4640 ohms ±1%, 1/4 w	705-7128-00
R566	RESISTOR, FIXED, FILM: same as R521	705-7170-00
R567	RESISTOR, FIXED, FILM: same as R521	705-7170-00
R568	RESISTOR, FIXED, COMPOSITION: 100 ohms ±10%, 1/2 w	745-1310-00
R569	RESISTOR, FIXED, COMPOSITION: 6800 ohms ±10%, 1/2 w	745-1387-00
R570	RESISTOR, FIXED, COMPOSTION: 8200 ohms ±10%, 1/2 w	745-1391-00
R571	RESISTOR, FIXED, COMPOSITION: 18,000 ohms ±5%, 1/2 w	745-1404-00
R572	RESISTOR, VARIABLE: COMPOSITION; 500 ohms ±20%, 1/4 w	376-4726-00
R573	RESISTOR, FIXED, COMPOSITION: same as R502	745-1370-00
R574	RESISTOR, FIXED, COMPOSITION: same as R502	745-1370-00
R575	RESISTOR, FIXED, COMPOSITION: same as R505	745-1380-00
R576	RESISTOR, FIXED, COMPOSITION: 5600 ohms ±10%, 1/2 w	745-1384-00
R577	RESISTOR, FIXED, COMPOSITION: 39,000 ohms ±10%, 1/2 w	745-1419-00
R578	RESISTOR, FIXED, COMPOSITION: 47,000 ohms ±10%, 1/2 w	745-1422-00
R579	RESISTOR, FIXED, COMPOSITION: 2150 ohms ±1%, 1/4 w	705-7112-00
R580	RESISTOR, FIXED, COMPOSITION: 820 ohms ±10%, 1/2 w	745-1349-00
R581	RESISTOR, FIXED, COMPOSITION: same as R552	745-1373-00
T501	NOT USED	
T502	NOT USED	
T503	TRANSFORMER, RADIO FREQUENCY: 20 turns #30 AWG, close wound tapped at 10 turns; 43.5 uh inductance; ferrite core; 0.250 in. w by 0.500 in. dia	549-1589-00

ITEM	DESCRIPTION	COLLINS PART NUMBER
T504	TRANSFORMER, RADIO FREQUENCY: 5 terminals, primary ct; 5/8 in. h by 1-1/8 in. w by 1-1/2 in. lg	549-1617-003
TB501	TERMINAL BOARD: phenolic, 1-7/8 in. lg by 3/8 in. w by 1/16 in. thk; 5 brass solder-lug terminals; Cinch Mfg. Corp. part no. 1542-A-FV	306-0951-00
TB502	TERMINAL BOARD: same as TB501	306-0951-00
TB503	TERMINAL BOARD: same as TB501	306-0951-00
TB504	TERMINAL BOARD: Bakelite, 4 terminals, 1 grounded, 3 insulated; 21/32 in. w by 1-1/2 in. lg; Cinch Mfg. Corp. part no. 1534-A	306-2240-00
TB505	TERMINAL BOARD: same as TB501	306-0951-00
TB506	TERMINAL BOARD: same as TB501	306-0951-00
TB507	TERMINAL BOARD: phenolic w/ 3 solder-lug terminals; 11/16 in. w by 1-1/8 in. lg; Cinch Mfg. Corp. part no. 1520-A	306-9033-00
TB508	TERMINAL BOARD: same as TB501	306-0951-00
TB509	TERMINAL BOARD: phenolic, 1/16 in. by 3/8 in. by 1-1/2 in.; 4 brass solder-lug terminals; Cinch Mfg. Corp. part no. 1532-A	306-9032-00
TB510	TERMINAL BOARD: same as TB507	306-9033-00
TB511	TERMINAL BOARD: same as TB501	306-0951-00
TB512	TERMINAL BOARD: phenolic w/ 3 solder-lug terminals, 11/16 in. w by 1-1/8 in. lg; Cinch Mfg. Corp. part no. 1525-A	306-0001-00
TB513	TERMINAL BOARD: same as TB509	306-9032-00
TB514	TERMINAL BOARD: same as TB507	306-9033-00
TB515	TERMINAL BOARD: same as TB501	306-0951-00
TB516	TERMINAL BOARD: same as TB501	306-0951-00
TB517	TERMINAL BOARD: same as TB501	306-0951-00
TB518	TERMINAL BOARD: phenolic, 12 solder-lug terminals; Vector Mfg. Co. part no. 6H-12	306-0909-00
TB519	TERMINAL BOARD: same as TB501	306-0951-00
TB520	TERMINAL BOARD: phenolic w/ 4 solder lug terminals; 27/32 in. w by 1-1/2 in. lg; Cinch Mfg. Corp. part no, 1909	306-0838-00
TB521	TERMINAL BOARD: phenolic, 3 solder-lug terminals; 11/16 in. w by 1-1/8 in. lg	306-0587-00
Y501	CRYSTAL UNIT, QUARTZ: 14.0 mc; type HC-27/U holder	289-2743-00
	MODULATOR	
C601	CAPACITOR, FIXED, CERAMIC: 20.0 uuf ±2%, 500 vdcw	916-0362-00
C602	CAPACITOR, FIXED, CERAMIC: same as C601	916-0362-00
C603	CAPACITOR, FIXED, CERAMIC: uninsulated, 10.0 uuf ±1/2 uuf, 500 vdcw	916-0412-00
C604	CAPACITOR, FIXED, MICA: 100 uuf ±5%, 500 vdcw; Electro Motive part no. DM15F101J01	912-2816-00
C605	CAPACITOR, FIXED, CERAMIC: 0.01 uf -0% +100%, 100 vdcw; Erie Resistor Corp. part no. 855-502-X550-103P	913-3680-00
C606	CAPACITOR, VARIABLE, CERAMIC: 5.0 uuf min to 37.5 uuf max, 350 vdcw; Erie Resistor Corp. part no. 557018C0P039R	917-1073-00
C607	CAPACITOR, FIXED, PAPER: 1.0 uf -10% +20%, 200 vdcw	931-0170-00
C608	CAPACITOR, FIXED, ELECTROLYTIC: 250 uf -10% +100%, 12 vdcw; Sprague Electric Co. part no. 30D157A1	183-1190-00
C609	CAPACITOR, FIXED, PAPER: 0.5 uf -10% +20%, 200 vdcw	931-0169-00
C610	CAPACITOR, FIXED, PAPER: 20 uf ±20%, 150 vdcw; Sprague Electric part no. 143P101M	951-2004-00
C611	CAPACITOR, FIXED, MICA: same as C604	912-2816-00
C612	CAPACITOR, FIXED, MICA: same as C604	912-2816-00
C613	CAPACITOR, FIXED, CERAMIC: same as C605	913-3680-00
C614	CAPACITOR, FIXED, MICA: 330 uuf ±5%, 500 vdcw; Electro Motive part no. DM15F331J01	912-2852-00
C615	CAPACITOR, FIXED, CERAMIC: 0.1 uf -20% +80%, 50 vdcw; Sprague Electric part no. 33C41	913-3886-00
C616	CAPACITOR, FIXED, CERAMIC: same as C615	913-3886-00
C617	CAPACITOR, FIXED, CERAMIC: same as C605	913-3680-00
C618	CAPACITOR, FIXED, CERAMIC: 100 uuf ±20%, 500 vdcw	913-1186-00
C619	CAPACITOR, FIXED, MICA: 10 uuf ±5%, 500 vdcw; Electro Motive part no. DM15F100J01	912-2753-00
C620	CAPACITOR, FIXED, MICA: 82 uuf ±5%, 500 vdcw; Electro Motive part no. DM15E820J01	912-2810-00
C621	CAPACITOR, FIXED, CERAMIC: same as C615	913-3886-00
C622	CAPACITOR, FIXED, CERAMIC: same as C615	913-3886-00
C623	CAPACITOR, FIXED, CERAMIC: same as C605	913-3680-00
C624	NOT USED	
C625	CAPACITOR, FIXED, MICA: 22 uuf ±5%, 500 vdcw; Electro Motive part no. DM15C220J01	912-2768-00
C626	CAPACITOR, FIXED, CERAMIC: same as C615	913-3886-00
C627	CAPACITOR, FIXED, CERAMIC: same as C605	913-3680-00
C628	CAPACITOR, FIXED, CERAMIC: same as C605	913-3680-00
C629	CAPACITOR, FIXED, MICA: same as C625	912-2768-00
C630	CAPACITOR, FIXED, CERAMIC: same as C615	913-3886-00
C631	CAPACITOR, FIXED, CERAMIC: same as C615	913-3886-00
C632	CAPACITOR, FIXED, MICA: 150 uuf ±5%, 500 vdcw; Electro Motive part no. DM15F151J01	912-2828-00
C633	CAPACITOR, FIXED, MICA: same as C632	912-2828-00
C634	CAPACITOR, FIXED, MICA: 39 uuf ±5%, 500 vdcw; Electro Motive part no. DM15E390J01	912-2786-00
C635	CAPACITOR, FIXED, CERAMIC: same as C605	913-3680-00
C636	CAPACITOR, FIXED, CERAMIC: same as C605	913-3680-00
C637	CAPACITOR, FIXED, CERAMIC: same as C605	913-3680-00
C638	CAPACITOR, FIXED, CERAMIC: same as C605	913-3680-00
C639	CAPACITOR, VARIABLE, CERAMIC: same as C606	917-1073-00
C640	CAPACITOR, FIXED, CERAMIC: same as C618	913-1186-00
C641	CAPACITOR, FIXED, MICA: 68 uuf ±5%, 500 vdcw; Electro Motive part no. DM15E680J01	912-2804-00
C642	CAPACITOR, FIXED, MICA: 220 uuf ±5%, 500 vdcw; Electro Motive part no. DM15F221J01	912-2840-00
C643	CAPACITOR, FIXED, CERAMIC: same as C601	916-0362-00
C644	CAPACITOR, VARIABLE, CERAMIC: 3.0 uuf min to 12.0 uuf max, 350 vdcw	917-1072-00
C645	CAPACITOR, FIXED, MICA: 33 uuf ±5%, 500 vdcw; Electro Motive part no. DM15F330J01	912-2780-00
C646	CAPACITOR, FIXED, MICA: same as C645	912-2780-00
C647	CAPACITOR, FIXED, MICA: 560 uuf ±5%, 500 vdcw; Electro Motive part no. DM19F561J	912-2983-00
C648	CAPACITOR, FIXED, MICA: 1800 uuf ±5%, 500 vdcw; Electro Motive part no. DM20F182J	912-3333-00
C649	CAPACITOR, FIXED, ELECTROLYTIC: 100 uf -15% +75%, 25 vdcw; Sprague Electric part no. 109D107C7025T2	184-7802-00
C650	CAPACITOR, FIXED, PAPER: same as C607	931-0170-00
C651	CAPACITOR, FIXED, CERAMIC: same as C615	913-3886-00
C652	CAPACITOR, FIXED, CERAMIC: 10.0 uuf ±1/4 uuf, 500 vdcw	916-0203-00
C653	CAPACITOR, FIXED, MICA: 270 uuf ±5%, 500 vdcw; Electro Motive part no. DM15F271J01	912-2846-00
C654	CAPACITOR, DIODE: 35 uuf ±20%, at -4 v d-c voltage, max 130 v d-c; total capacity range 6 to 88 uuf, 130 v d-c to 0.1 v d-c	922-0002-00
CR601	SEMICONDUCTOR DEVICE, DIODE: quick recovery silicon junction diode; Hughes Aircraft part no. 1N626	353-2857-00
CR602	SEMICONDUCTOR DEVICE, DIODE: silicon, hermetically sealed; Transitron Elect. Corp. part no. SV3173	353-3304-00
CR603	SEMICONDUCTOR DEVICE, DIODE: germanium, Transitron part no. 1N270	353-2018-00
CR604	SEMICONDUCTOR DEVICE, DIODE: same as CR603	353-2018-00
CR605	SEMICONDUCTOR DEVICE, DIODE: same as CR603	353-2018-00
CR606	SEMICONDUCTOR DEVICE, DIODE: same as CR603	353-2018-00
CR607	SEMICONDUCTOR DEVICE, DIODE: germanium; Erie Resistor part no. 1N198	353-0160-00
CR608	SEMICONDUCTOR DEVICE, DIODE: same as CR607	353-0160-00
CR609	SEMICONDUCTOR DEVICE, DIODE: silicon; Texas Instruments part no. 1N751A	353-2710-00
CR610	SEMICONDUCTOR DEVICE, DIODE: same as CR607	353-0160-00
J601	JACK, TIP: insulated tip u/w standard 0.080 in. test probes; brown; E. F. Johnson Co. part no. 105-208-200	360-0152-00
J602	JACK, TIP: insulated tip u/w standard 0.080 in. test probes; red; E. F. Johnson Co. part no. 105-202-200	360-0150-00
J603	JACK, TIP: insulated tip u/w standard 0.080 in. test probes; orange; E. F. Johnson Co. part no. 105-206-200	360-0154-00
J604	JACK, TELEPHONE: steel, miniature; panel mtg; Switchcraft, Inc. part no. 3501FP	360-0148-00
J605	JACK, TELEPHONE: same as J604	360-0148-00
L601	COIL, RADIO FREQUENCY: 82 uh ±10%, 2.3 ohms max d-c resistance, 570 ma current rating; Jeffers Electronics part no. 10404-112	240-0192-00
L602	INDUCTOR, RADIO FREQUENCY: toroidal, single layer wound, approx 22 turns #28 double formvar; 2.4 uh ±2%, at 2.6 mc	240-1529-00
L603	COIL, RADIO FREQUENCY: variable; -15°C to +55°C temp range; 100 v d-c dielectric strength	278-0733-00

ITEM	DESCRIPTION	COLLINS PART NUMBER
L604	COIL, RADIO FREQUENCY: universal wound, 3 pi, 72 turns ea section, #36 AWG wire; 220 uh inductance; 100 ma current; Delevan Electric part no. BS-217	240-0198-00
L605	COIL, RADIO FREQUENCY: same as L604	240-0198-00
L606	COIL, RADIO FREQUENCY: same as L603	278-0733-00
L607	COIL, RADIO FREQUENCY: same as L604	240-0198-00
L608	COIL, RADIO FREQUENCY: same as L603	278-0733-00
L609	COIL, RADIO FREQUENCY: same as L604	240-0198-00
L610	COIL, RADIO FREQUENCY: 1.00 uh ±10%, 0.30 ohm d-c resistance; 850 ma dc; Jeffers Electronics part no. 10100-128	240-0062-00
L611	COIL, RADIO FREQUENCY: same as L603	278-0733-00
L612	COIL, RADIO FREQUENCY: same as L604	240-0198-00
L613	NOT USED	
L614	COIL, RADIO FREQUENCY: single layer wound, 56 uh inductance, 750 ma current; 1.30 ohms d-c; Jeffers Electronics Div. of Speer Carbon Co. part no. 10404-30	240-0191-00
L615	COIL, RADIO FREQUENCY: same as L601	240-0192-00
L616	COIL, RADIO FREQUENCY: same as L604	240-0198-00
P601	PLUG, TELEPHONE: brass; phenolic insulation, w/ solder-lug terminal; Switchcraft part no. 3501MC	361-0062-00
P602	NOT USED	
P603		
P604	PHONO, PLUG: w/ solder-lug terminals, phenolic insulation; Switchcraft, Inc. part no. 3501MC	361-0062-00
Q601	TRANSISTOR: germanium; hermetically sealed; Radio Corp. of America part no. 2N1396	352-0376-00
Q602	TRANSISTOR: germanium; Radio Corp. of America part no. 2N1225	352-0135-00
Q603	TRANSISTOR: same as Q602	352-0135-00
Q604	TRANSISTOR: hermetically sealed, NPN silicon; Fairchild Semiconductor Corp. part no. 2N708	352-0322-00
Q605	TRANSISTOR: same as Q602	352-0135-00
Q606	TRANSISTOR: same as Q604	352-0322-00
Q607	TRANSISTOR: silicon planar; hermetically sealed; Fairchild Semiconductor Corp. part no. S4639	352-0373-00
Q608	TRANSISTOR: same as Q601	352-0376-00
R601	RESISTOR, FIXED, FILM: 21,500 ohms ±1%, 1/4 w	705-7160-00
R602	RESISTOR, FIXED, FILM: 12,100 ohms ±1%, 1/4 w	705-7148-00
R603	RESISTOR, FIXED, COMPOSITION: 1000 ohms ±10%, 1/2 w	745-1352-00
R604	RESISTOR, FIXED, COMPOSITION: 47,000 ohms ±10%, 1/2 w	745-1422-00
*R605	RESISTOR, FIXED, FILM: 1470 ohms ±1%, 1/4 w	705-7104-00
*R605	RESISTOR, FIXED, FILM: 1960 ohms ±1%, 1/4 w	705-7110-00
*R605	RESISTOR, FIXED, FILM: 4220 ohms ±1%, 1/4 w	705-7126-00
*R605	RESISTOR, FIXED, FILM: 1000 ohms ±1%, 1/4 w	705-7096-00
R606	RESISTOR, FIXED, FILM: 19,600 ohms ±1%, 1/4 w	705-7158-00
R607	RESISTOR, FIXED, FILM: 2610 ohms ±1%, 1/4 w	705-7116-00
R608	RESISTOR, FIXED, COMPOSITION: 10,000 ohms ±10%, 1/2 w	745-1394-00
R609	RESISTOR, FIXED, COMPOSITION: 5600 ohms ±10%, 1/2 w	745-1384-00
R610	RESISTOR, FIXED, COMPOSITION: 27,000 ohms ±10%, 1/2 w	745-1412-00
R611	RESISTOR, FIXED, COMPOSITION: 1500 ohms ±10%, 1/2 w	745-1359-00
R612	RESISTOR, FIXED, COMPOSITION: 1800 ohms ±10%, 1/2 w	745-1363-00
R613	RESISTOR, FIXED, FILM: 42.2 ohms ±1%, 1/4 w	705-7030-00
R614	RESISTOR, FIXED, FILM: 51.1 ohms ±1%, 1/4 w	705-7034-00
R615	RESISTOR, FIXED, COMPOSITION: same as R608	745-1394-00
R616	RESISTOR, FIXED, COMPOSITION: same as R608	745-1394-00
R617	RESISTOR, FIXED, COMPOSITION: 4700 ohms ±10%, 1/2 w	745-1380-00
R618	RESISTOR, FIXED, FILM: 261 ohms ±1%, 1/4 w	705-7068-00
R619	RESISTOR, FIXED, COMPOSITION: same as R612	745-1363-00
R620	RESISTOR, FIXED, COMPOSITION: same as R612	745-1363-00
R621	RESISTOR, FIXED, COMPOSITION: 6800 ohms ±10%, 1/2 w	745-1387-00
R622	RESISTOR, FIXED, COMPOSITION: same as R617	745-1380-00
R623	RESISTOR, FIXED, COMPOSITION: same as R621	745-1387-00
R624	RESISTOR, FIXED, COMPOSITION: 220 ohms ±10%, 1/2 w	745-1324-00
R625	RESISTOR, FIXED, COMPOSITION: same as R612	745-1363-00
R626	RESISTOR, FIXED, COMPOSITION: 2200 ohms ±10%, 1/2 w	745-1366-00
R627	RESISTOR, FIXED, COMPOSITION: 390 ohms ±10%, 1/2 w	745-1335-00
R628	RESISTOR, FIXED, FILM: 1960 ohms ±1%, 1/4 w	705-7110-00
R629	RESISTOR, FIXED, FILM: same as R628	705-7110-00
R630	RESISTOR, FIXED, FILM: 8250 ohms ±1%, 1/4 w	705-7140-00
R631	RESISTOR, FIXED, FILM: 1100 ohms ±1%, 1/4 w	705-7098-00
R632	RESISTOR, FIXED, FILM: same as R631	705-7098-00
*R633	RESISTOR, FIXED, FILM: 3480 ohms ±1%, 1/4 w	705-7122-00
*R633	RESISTOR, FIXED, FILM: 4220 ohms ±1%, 1/4 w	705-7126-00
*R633	RESISTOR, FIXED, FILM: 5110 ohms ±1%, 1/4 w	705-7130-00
*R633	RESISTOR, FIXED, FILM: 10,000 ohms ±1%, 1/4 w	705-7144-00
R634	RESISTOR, FIXED, FILM: 348 ohms ±1%, 1/4 w	705-7074-00
R635	RESISTOR, VARIABLE: COMPOSITION; 50,000 ohms ±30%, 1/4 w	376-4737-00
R636	RESISTOR, FIXED, FILM: 1000 ohms ±1%, 1/4 w	705-7096-00
R637	RESISTOR, FIXED, FILM: 7500 ohms ±1%, 1/4 w	705-7138-00
R638	RESISTOR, FIXED, FILM: 100,000 ohms ±1%, 1/4 w	705-7192-00
R639	RESISTOR, FIXED, FILM: 316 ohms ±1%, 1/4 w	705-7072-00
R640	RESISTOR, FIXED, FILM: 5110 ohms ±1%, 1/4 w	705-7130-00
R641	RESISTOR, VARIABLE: COMPOSITION; 50,000 ohms ±30%, 1/4 w	376-4732-00
R642	RESISTOR, FIXED, FILM: 13,300 ohms ±1%, 1/4 w	705-7150-00
R643	RESISTOR, FIXED, FILM: 2870 ohms ±1%, 1/4 w	705-7118-00
R644	RESISTOR, FIXED, COMPOSITION: 0.10 megohm ±10%, 1/2 w	745-1436-00
R645	RESISTOR, FIXED, COMPOSITION: same as R644	745-1436-00
R646	RESISTOR, FIXED, COMPOSITION: same as R644	745-1436-00
R647	RESISTOR, FIXED, COMPOSITION: 150 ohms ±10%, 1/2 w	745-1317-00
R648	RESISTOR, FIXED, COMPOSITION: 680 ohms ±10%, 1/2 w	745-1345-00
R649	RESISTOR, FIXED, COMPOSITION: same as R608	745-1394-00
R650	RESISTOR, FIXED, COMPOSITION: same as R626	745-1366-00
R651	RESISTOR, FIXED, COMPOSITION: 22 ohms ±10%, 1/2 w	745-1282-00
T601	TRANSFORMER, RADIO FREQUENCY: 5 terminals primary, ct; 5/8 in. h by 1-1/8 in. w by 1-1/2 in. lg; Collins Radio Co.	549-1617-003
TB601	TERMINAL BOARD: phenolic w/ 3 solder-lug terminals; 11/16 in. w by 1-1/8 in. lg; Cinch Mfg. Corp. part no. 1520-A	306-9033-00
TB602	TERMINAL BOARD: phenolic, 1/16 in. by 3/8 in. by 1-1/2 in.; 4 brass solder lug terminals; Cinch Mfg. Corp. part no. 1532-A	306-9032-00
TB603	TERMINAL BOARD: same as TB602	306-9032-00
TB604	TERMINAL BOARD: same as TB601	306-9033-00
TB605	TERMINAL BOARD: same as TB601	306-9033-00
TB606	TERMINAL BOARD: same as TB601	306-9033-00
TB607	TERMINAL BOARD: phenolic w/ 3 solder-lug terminals; 11/16 in. w by 1-1/8 in. lg, Cinch Mfg. Corp. part no. 1525-A	306-0001-00
TB608	TERMINAL BOARD: phenolic, 1-7/8 in. by 3/8 in. by 1/16 in.; 5 brass solder-lug terminals; Cinch Mfg. Corp. part no. 1542-A-FV	306-0951-00
TB609	TERMINAL BOARD: same as TB608	306-0951-00
TB610	TERMINAL BOARD: laminated phenolic w/ 4 solder lug terminals; 27/32 in. w by 1-1/12 in. lg overall; Cinch Mfg. Corp. part no. 1909	306-0838-00
TB611	TERMINAL BOARD: same as TB610	306-0838-00
TB612	TERMINAL BOARD: same as TB601	306-9033-00
TB613	TERMINAL BOARD: same as TB601	306-9033-00
TB614	TERMINAL BOARD: phenolic, 12 solder lug terminals; Vector Mfg. Co. part no. 6H-12	306-0909-00
TB615	TERMINAL BOARD: same as TB608	306-0951-00
TB616	TERMINAL BOARD: phenolic, 3 solder-lug terminals; 11/16 in. w by 1-1/8 in. lg	306-0587-00

*Chosen per operational requirement.

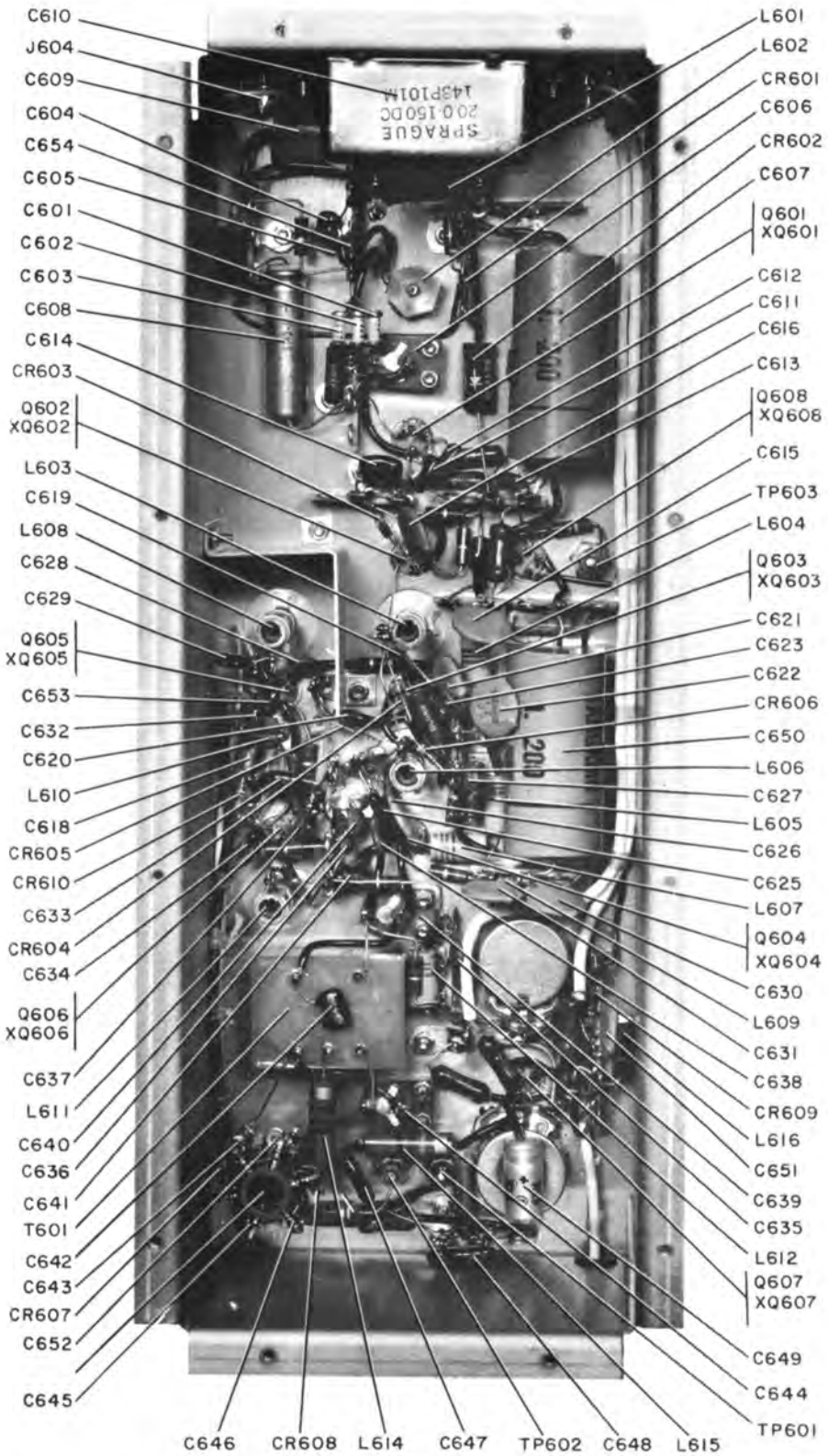


Figure 4-1. Modulator Compartment, Component (Except Resistors) Identification

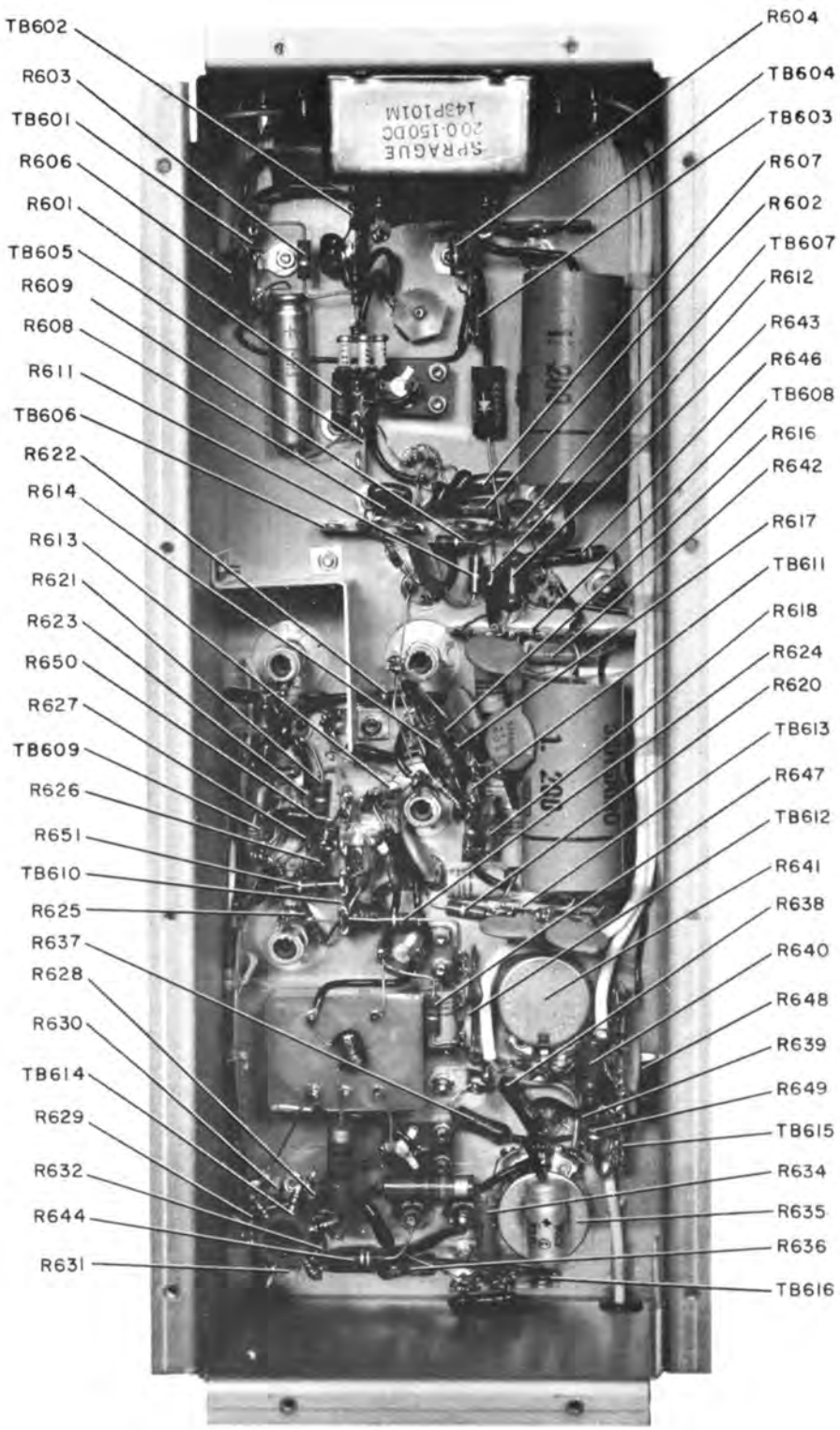


Figure 4-2. Modulator Compartment, Resistor Identification

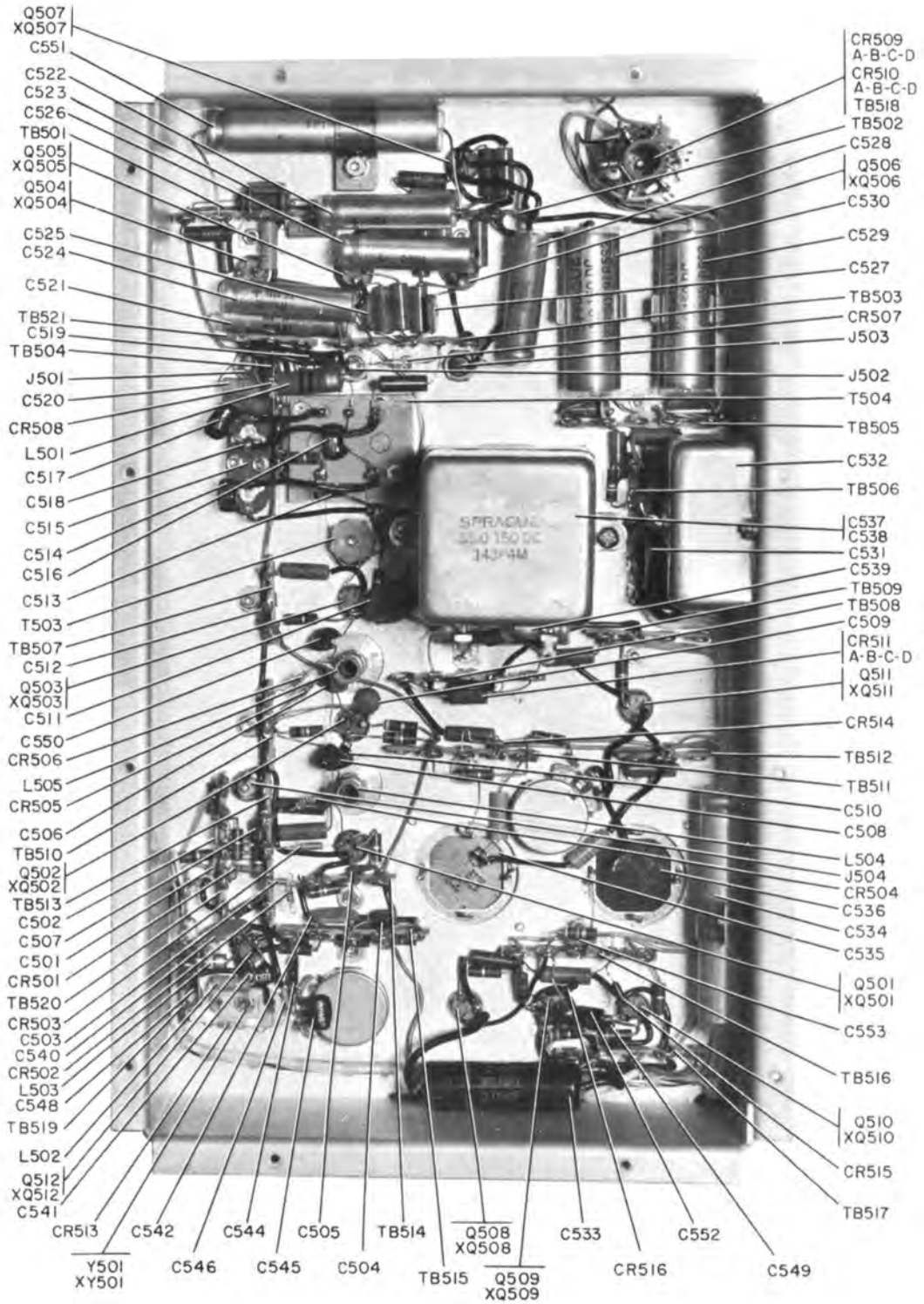


Figure 4-3. AFC Compartment, Component (Except Resistors) Identification

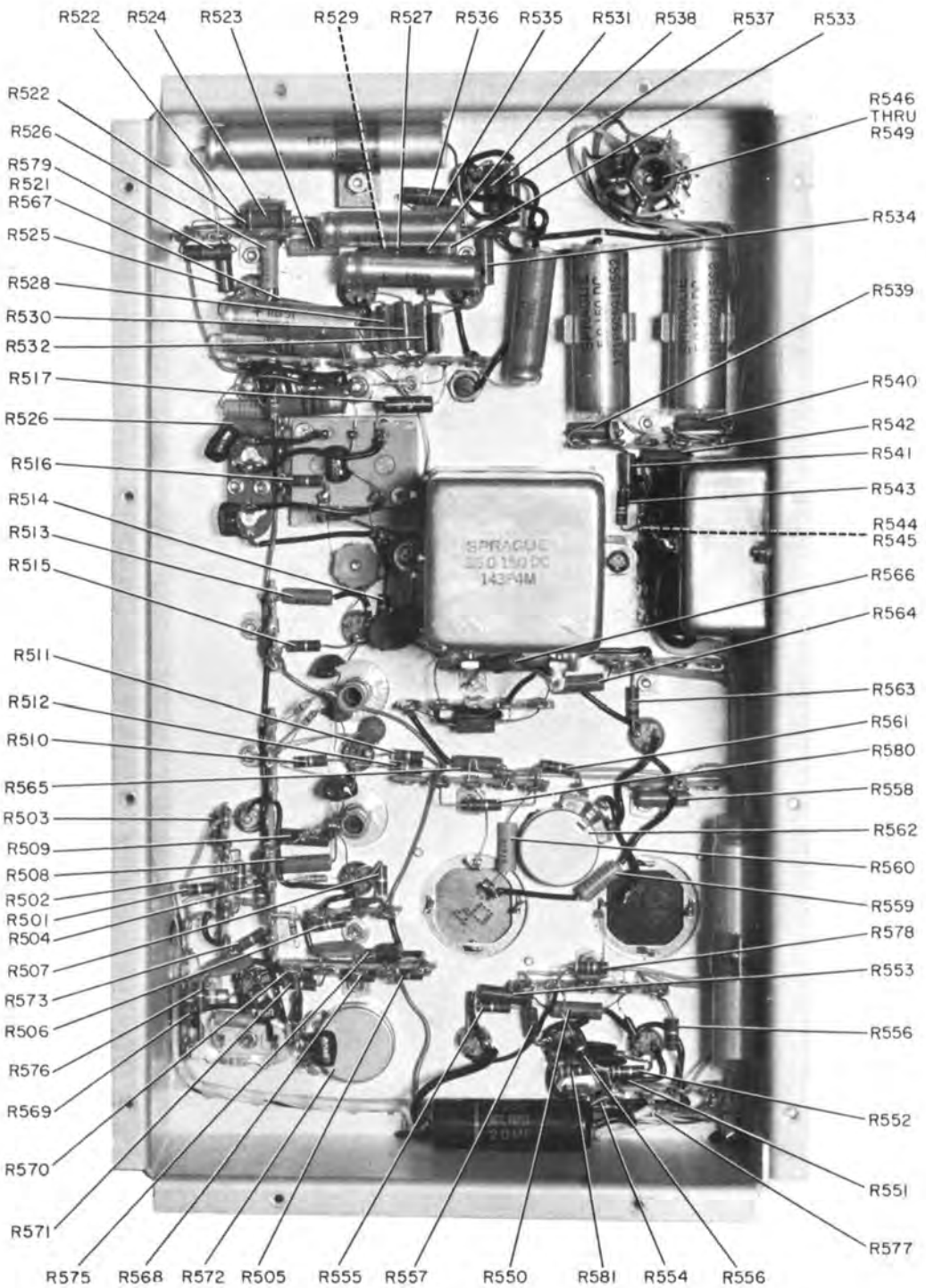


Figure 4-4. AFC Compartment, Resistor Identification

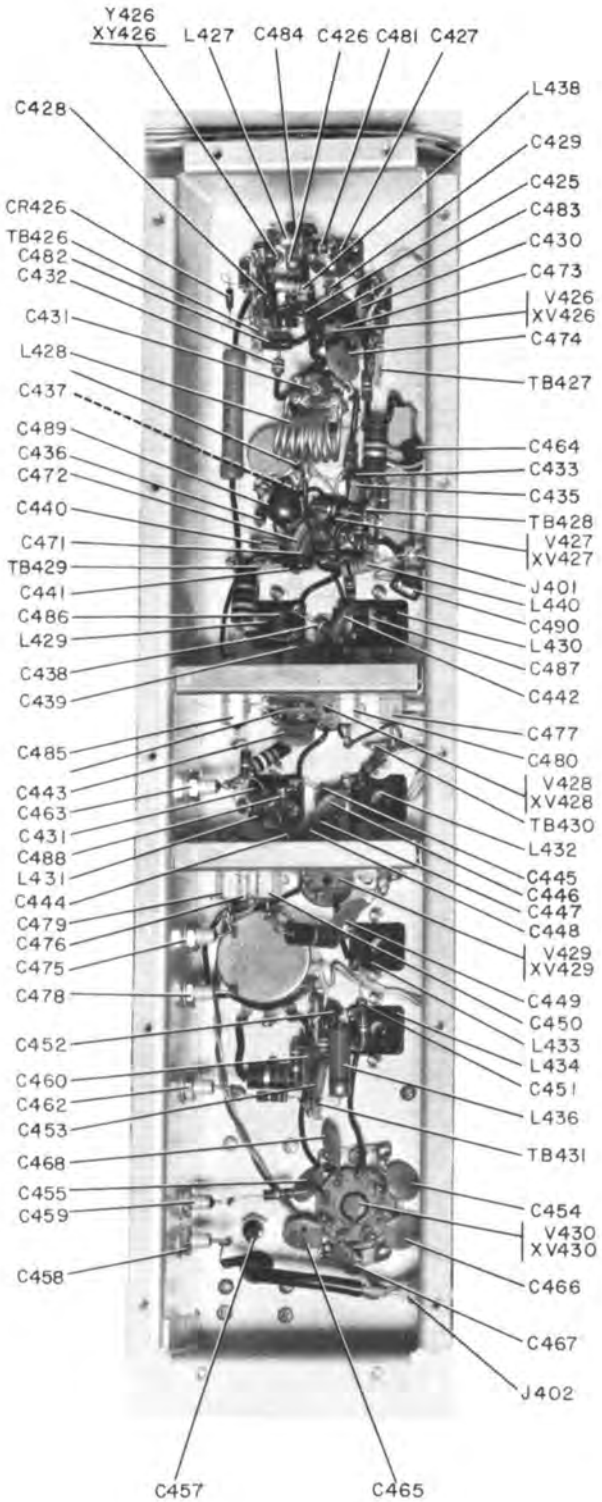


Figure 4-5. Power Amplifier Compartment, Component (Except Resistors) Identification

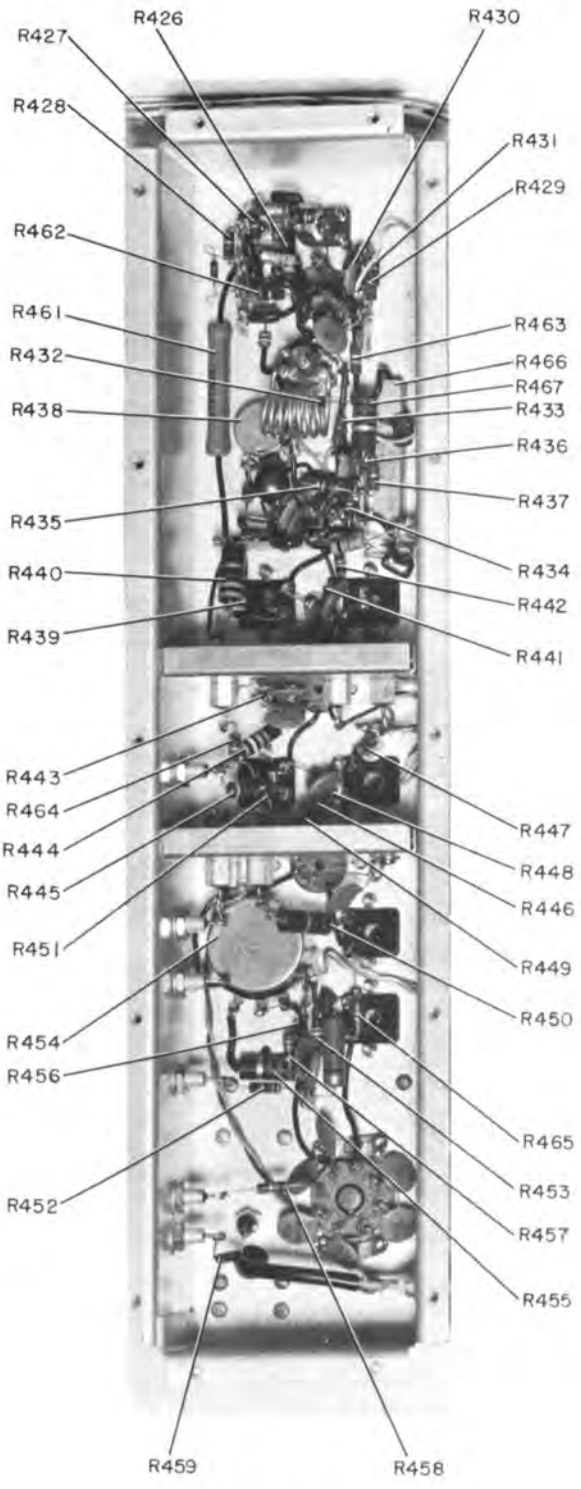


Figure 4-6. Power Amplifier Compartment, Resistor Identification

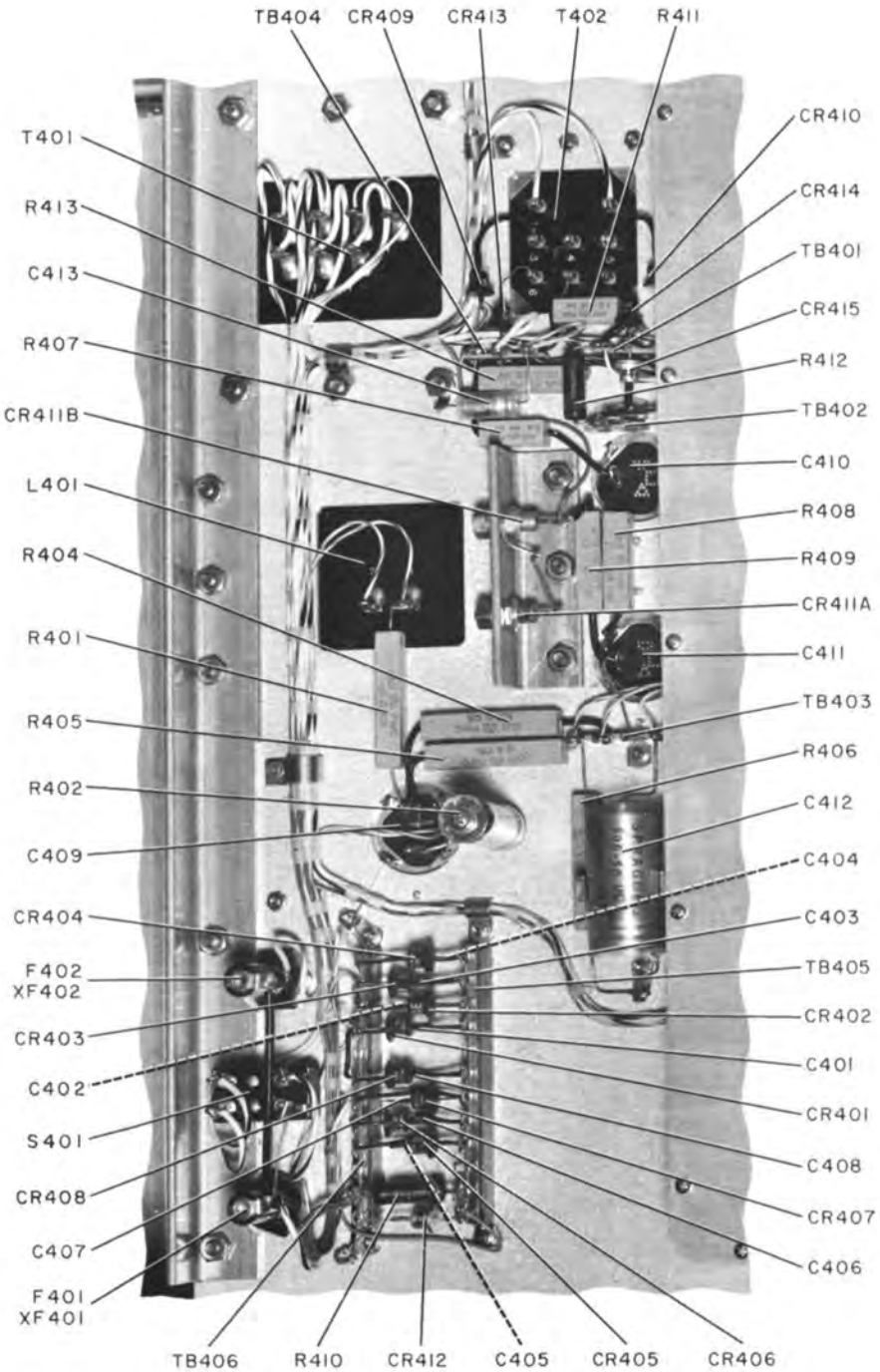


Figure 4-7. Power Supply, Component Identification

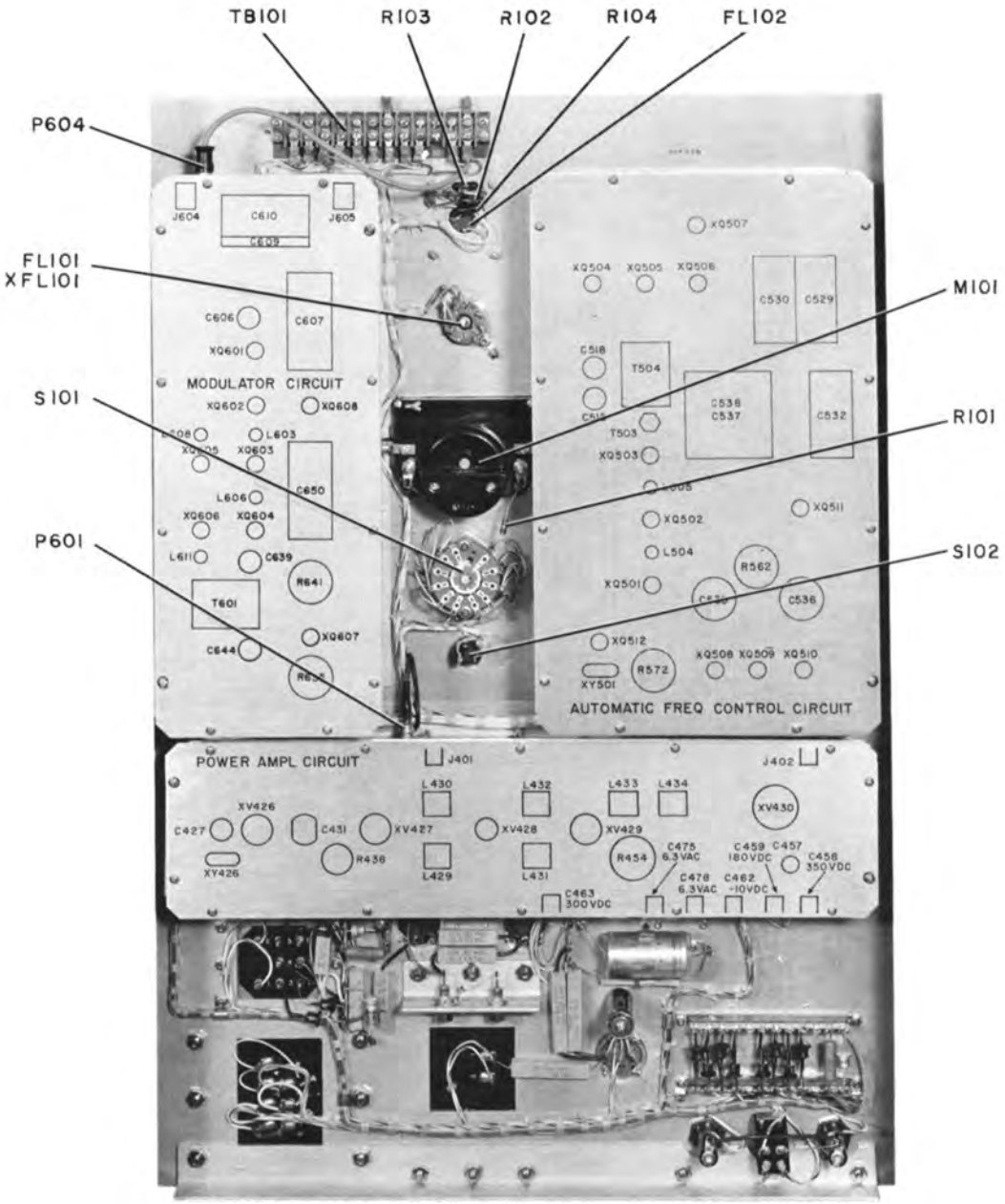


Figure 4-8. Chassis, Component Identification

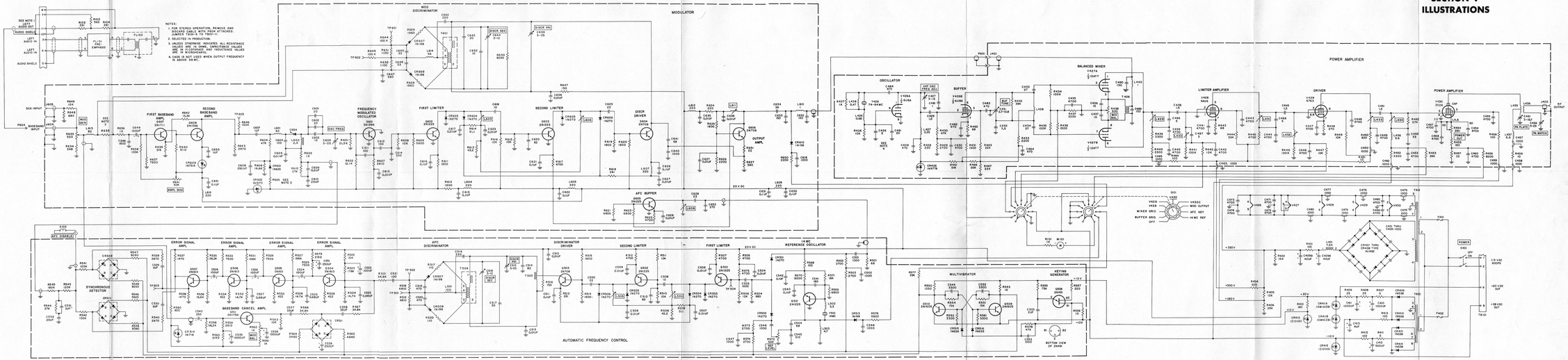


Figure 5-1. A830-2 10 W Wide-Band FM Broadcast Exciter, Schematic Diagram