NAVWEPS 16-30 USM 144-1

TECHNICAL MANUAL
OPERATION AND SERVICE INSTRUCTIONS
WITH ILLUSTRATED PARTS BREAKDOWN

FREQUENCY COMPARATOR SET AN/USM-144

CENTRONIX, Inc.

DEPARTMENT OF THE NAVY
BUREAU OF NAVAL WEAPONS

15 July 1961

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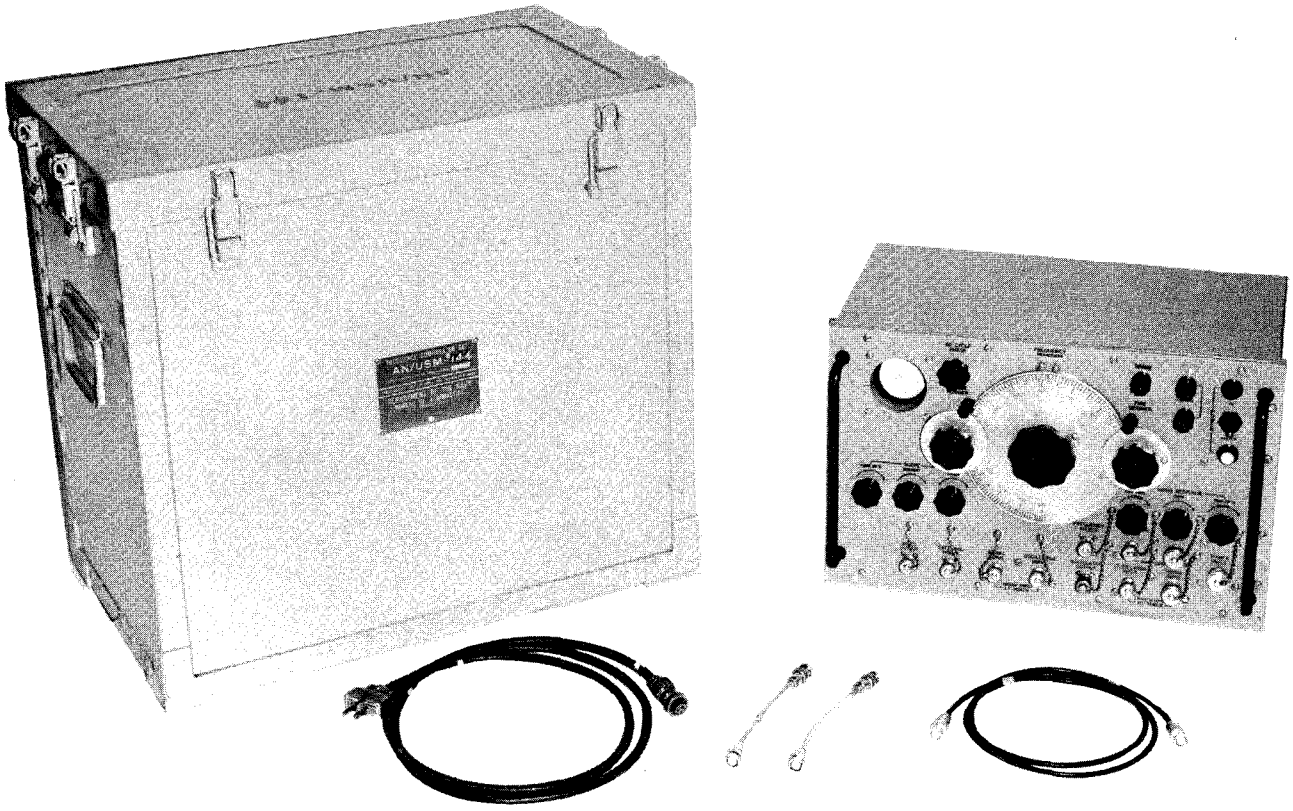


Figure 1-1. Frequency Comparator Set AN/USM-144

SECTION I
INTRODUCTION AND DESCRIPTION

1-1. GENERAL. This publication is issued as the basic Handbook of Operation and Service Instructions with Illustrated Parts Breakdown for Frequency Comparator Set AN/USM-144, manufactured by Centronix, Incorporated, Philadelphia, Pennsylvania.

1-2. PURPOSE AND USE

1-3. Frequency Comparator Set AN/USM-144, (figure 1-1), is a precision frequency measuring device, used with electronic counters to provide measurements of frequencies from 10mc to 12.4 kmc. Frequencies higher than 12.4kmc can be measured by using external waveguide mixers, or by amplifying the output of the internal mixer with a traveling wave tube amplifier and feeding a suitable harmonic generator-mixer setup. If the signal to be measured is sufficiently stable, the frequency may be measured with counter accuracy.

1-4. Types of RF signals that can be measured include continuous wave (CW), frequency modulated (FM), pulse modulated (PM) types, and signals containing troublesome amounts of noise. The residual frequency modulation in CW signals, the limits of incidental frequency, deviation in amplitude modulated signals, and the limits of frequency deviation in frequency modulated signals can also be measured.

1-5. The Frequency Comparator Set can also be used without a frequency counter to measure frequencies to about 2000 megacycles with 0.5 percent accuracy, and to higher frequencies when the frequeney of the input signal is known approximately.

1-6. DESCRIPTION

1-7. The AN/USM-144 set is housed, along with its accessory cables, in a three ply transit case measuring approximately 19¼ inches by 13¼ inches by 13 13/16 inches. The transit case serves as a carrying and storage case for the equipment.

1-8. The Frequency Comparator itself is housed in an aluminum instrument case measuring approximately 16¼ inches long by 9½ inches high by 10⅛ inches deep. The instrument case serves as a protective covering for the Frequency Comparator.

1-9. All operating controls, connecting jacks, measurement indicating controls, and the cathode ray tube are mounted on the front panel.

1-10. Two carrying handles are provided on the front panel for ease in handling and moving the Frequency Comparator.

1-11. EQUIPMENT SUPPLIED

TABLE 1-1. EQUIPMENT SUPPLIED

Quantity Per Unit	Nomenclature
1	Comparator, Frequency, CM-212/USM-144
1	Case, Frequency Comparator, CY-3157/USM-144
1	Cable Assembly, Power, Electrical, CX-7077/U(7′9″)
1	Cord, CG-409E/U(4′7″)
2	Cable Assembly, RF,CG-546/U(0′8″)

1-12. EQUIPMENT CAPABILITIES

1-13. The AN/USM-144 set is so constructed that frequencies can be measured to the accuracy of the counters used, although in actual practice very few signals are stable enough to be measured with such accuracy. In most cases, the instability of the signal to be measured will be the greatest accuracy limiting factor. With extremely stable, noise-free CW signals, accuracies of the order of one part per million may be expected. When measuring pulsed RF signals, accuracy will depend to some extent on pulse length. Typical accuracies obtainable with a stable, pulsed carrier of 1000mc are approximately 3 parts per million for a 10 microsecond pulse, and 10 parts per million for a 2.5 microsecond pulse.

1-14. PRINCIPLES OF OPERATION

1-15. GENERAL. To determine the frequency of an unknown signal, the Frequency Comparator Set AN/USM-144 beats the unknown signal against a harmonic of a very accurately known fundamental frequency. The number of the harmonic is then determined, and the fundamental frequency is multiplied by the harmonic number to give the exact frequency of the input signal. Reference to the block diagram of the equipment (figure 1-2), will indicate how this system meas-

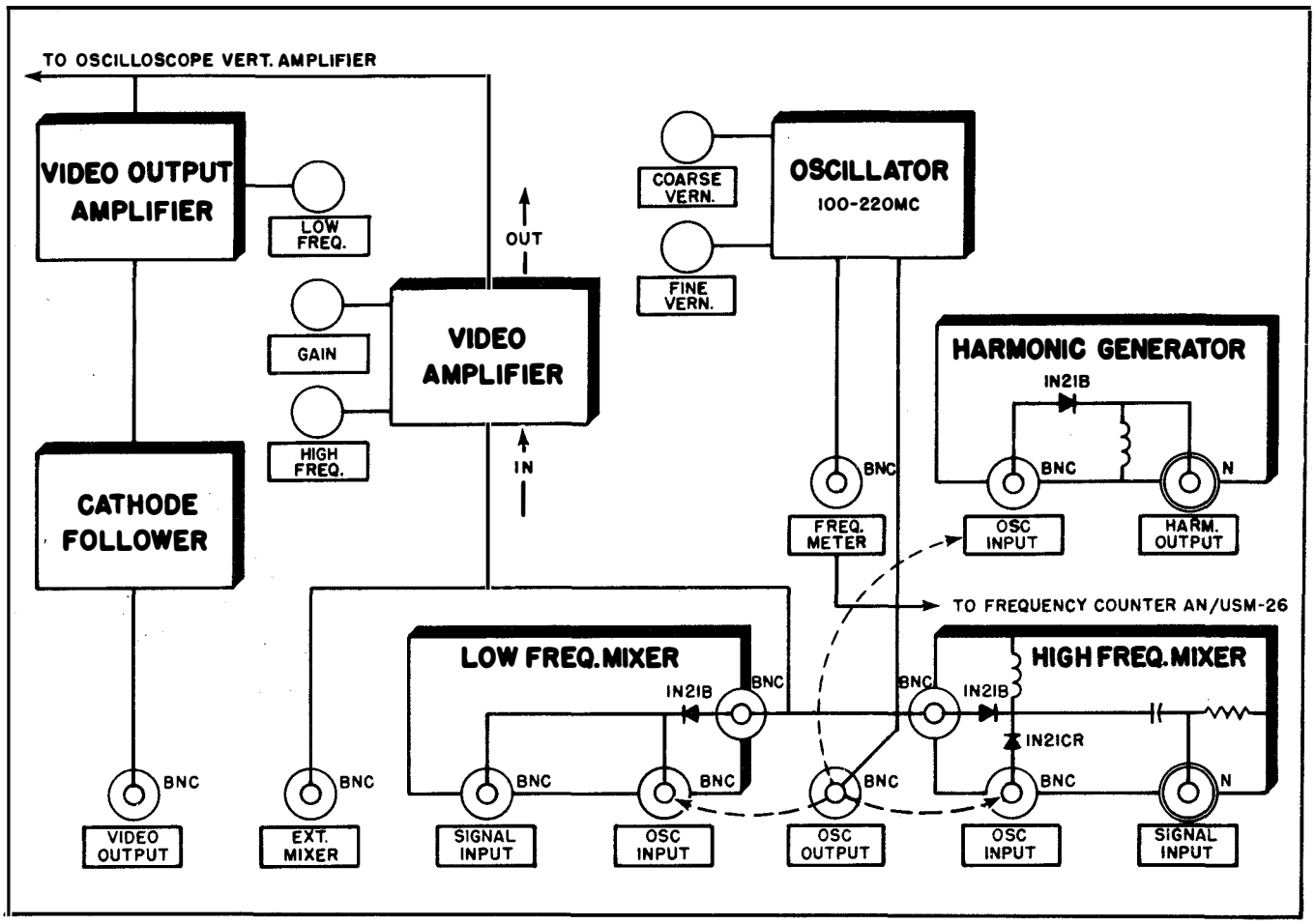


Figure 1-2. Block Diagram

ures frequency. The Frequency Comparator generates a stable signal, adjustable in frequency from 100 to 220 mc, which is continuously monitored by the external frequency counter. Harmonics of the oscillator are then compared in a mixer with the frequency to be measured, using the oscilloscope contained in the Frequency Comparator Set to observe the difference frequency.

1-16. By adjusting the oscillator frequency, a zero beat can be obtained between an oscillator harmonic and any unknown frequency applied to the input. When the zero beat is obtained, the unknown frequency is determined by multiplying the reading on the frequency counter by the proper harmonic number.

1-17. OSCILLATOR (100 to 220mc). The fundamental frequency in the Frequency Comparator Set is generated by an extremely stable push-pull oscillator, and is brought out of the front panel at the OSCILLATOR OUTPUT jack. The signal is then normally coupled through a coaxial jumper to the OSCILLATOR INPUT jack of one of the mixers.

1-18. The oscillator is a push-pull Hartley circuit constructed to obtain extremely good short time stability. The housing for the oscillator, the tuned circuit components, and all mountings are very rigid and stable. The operating voltages applied to the oscillator circuit are well regulated. Although long time stability of the oscillator circuit is not of prime importance, it is sufficient to provide 0.5 percent or better accuracy of the main dial calibration (figure 1-3).

1-19. MIXERS. The Frequency Comparator has two built-in mixers, one with a frequency range of 10-2000mc, and the other with a range of 2-12.4 kmc. These mixers serve both as mixers and as harmonic generators for the fundamental frequency from the oscillator. When an input signal is applied, mixing action occurs with all harmonics generated. If the difference between the input signal and one of the harmonics is less than the bandwidth of the following amplifier, a response will be seen on the cathode ray tube.

1-20. VIDEO AMPLIFIER. The video amplifier consists of the five resistance coupled stages V3,

V4A, V4B, V5A, and V5B, two of which are cathode followers. The bandwidth of the amplifier is approximately two megacycles with the controls set to maximum, and the gain is approximately 40db with the gain control at maximum. The first two stages provide most of the amplification for both the VIDEO OUTPUT jack and the oscilloscope vertical amplifier. The high frequency cutoff of the video amplifier is continuously adjustable from a maximum of two megacycles to a minimum of one kilocycle. The low frequency cutoff may be switched from 100 cycles to 10kc, and is then continuously adjustable from 10kc to 400kc.

1-21. OSCILLOSCOPE VERTICAL AMPLIFIER. The oscilloscope vertical amplifier provides approximately 100 volts peak-to-peak, or 40db gain, with approximately a 200kc bandwidth without compensation. This stage drives the upper vertical plate in the cathode ray tube.

1-22. HORIZONTAL AMPLIFIER AND SWEEP CIRCUIT. The oscilloscope sweep circuit consists of a line frequency voltage source, an adjustable phase shifting network and a push-pull amplifier phase inverter. The amplifier and sweep circuits drive the horizontal plates of the cathode ray tube.

1-23. POWER SUPPLY. The power supply consists of an electronically regulated +225 volt supply for operation of the majority of the circuits, an unregulated +330 volt supply for amplifiers V6 and V8 (horizontal and vertical oscilloscope amplifiers), an unregulated —730 volt supply for the cathode ray tube V7, and a special regulated heater supply for the oscillator tube heaters, which provides 6.2 volts d-c, regulated to ±0.5 percent (figure 1-4).

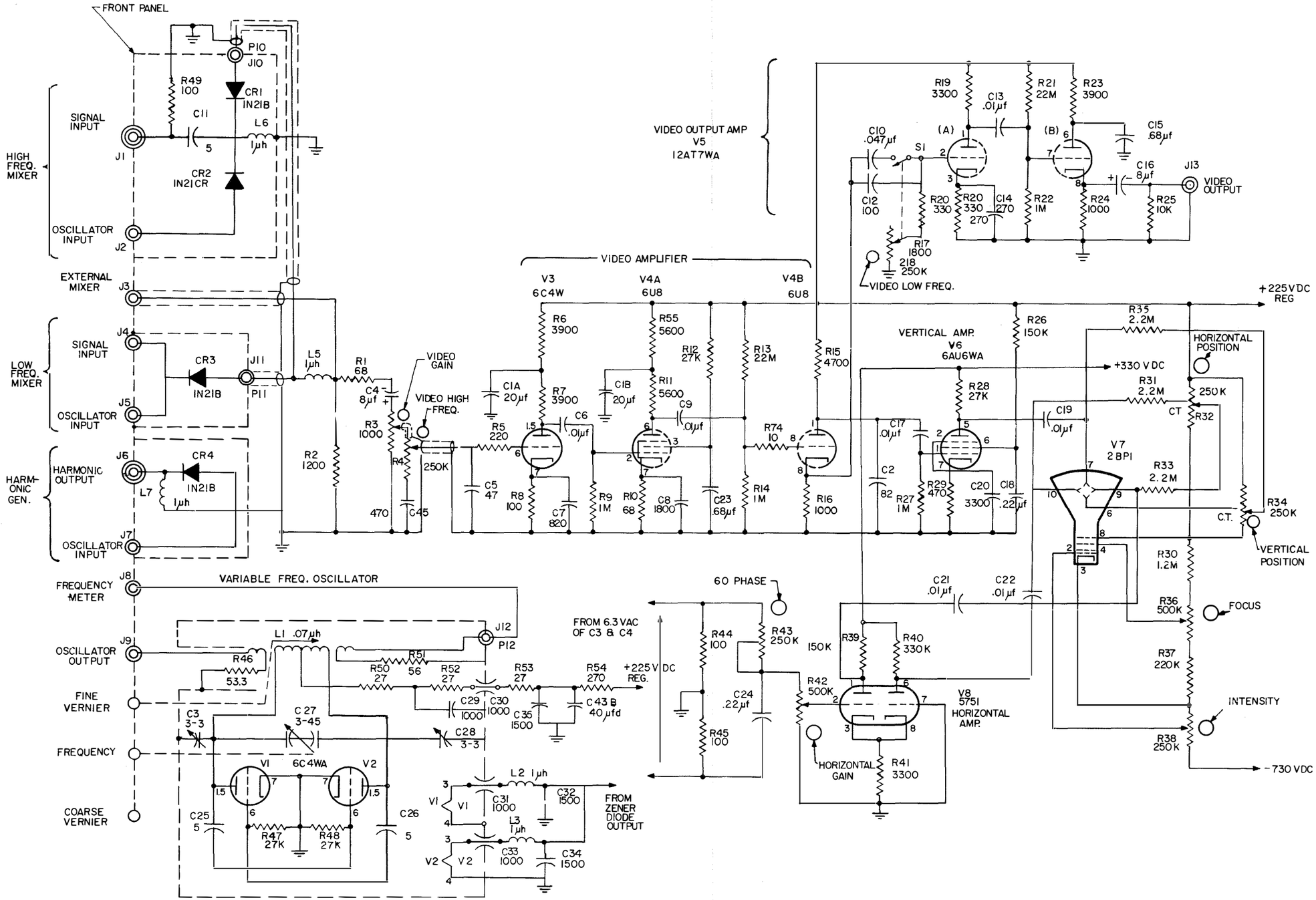


Figure 1-3. Schematic Diagram of Frequency Comparator Set AN/USM-144

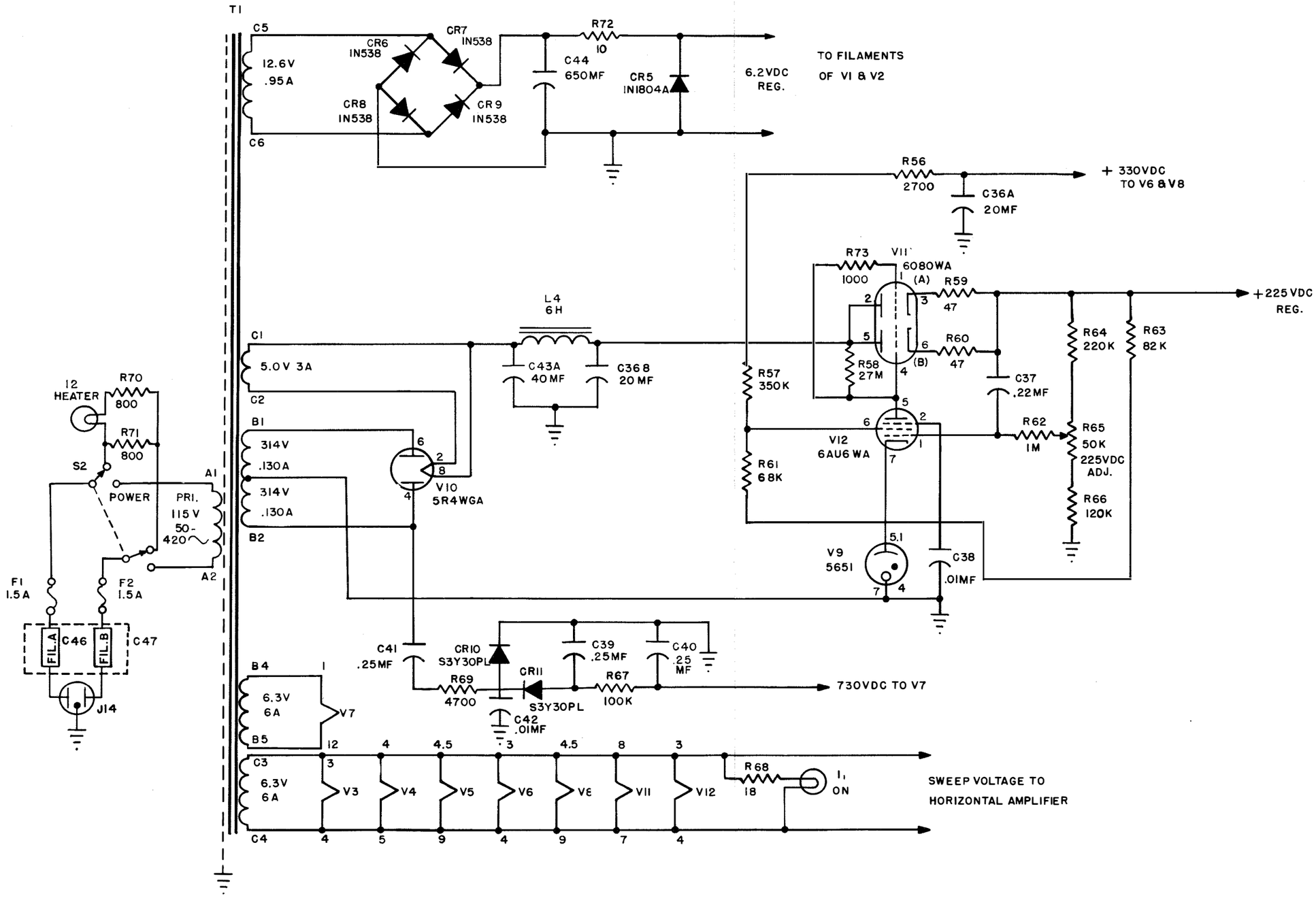


Figure 1-4. Schematic Diagram of Power Supply

SECTION II
SPECIAL SERVICE TOOLS

2-1. GENERAL. No special tools or fixtures are required for operation or maintenance of the equipment. For the convenience of operators and technicians, three Allen wrenches are provided for alignment, adjustment of dial drive components, and tightening or loosening of control knobs. One each of sizes No. 4, No. 6, and No. 1 Allen wrenches are supplied, located in special mounting clips on the inside of the left hand end plate.

SECTION III
PREPARATION FOR USE, STORAGE, OR SHIPMENT

3-1. UNPACKING

3-2. Unpack the Frequency Comparator Set in accordance with good general practice. Use care in handling tools so as not to damage the equipment. After carefully removing the equipment from its packing case, make a thorough visual inspection to make certain no damage has been incurred in transit.

3-3. PREPARATION FOR USE

3-4. No preliminary adjustment or alignment is necessary.

3-5. INPUT POWER REQUIREMENTS

3-6. Operation of the AN/USM-144 Frequency Comparator Set requires a power source capable of supplying 115 volts at 50 to 420 cycles and 1.0 ampere. Power required is 115 volts a-c (approximate). The equipment will operate satisfactorily with a line voltage variation of ± 10 percent.

3-7. PREPARATION FOR STORAGE OR SHIPMENT

3-8. Remove all jumper cables and the power cable, packing these items separately from the major unit. Secure the cable package to a side of the Frequency Comparator Set with tape.

3-9. Store the equipment in an area free from excessive humidity or extreme temperature changes. In locations where corrosion or mildew may develop, take precautionary measures before storing the equipment, and perform periodic inspections.

3-10. Crate the equipment for shipment in accordance with current electronic equipment crating procedures. Provide all necessary safeguards to assure that the equipment will not be subjected to excessive strain or shock.

SECTION IV
OPERATING INSTRUCTIONS

4-1. GENERAL. Before making measurements, allow the equipment to warm up for at least 15 minutes. There are no other preliminary adjustments or alignments necessary.

4-2. Connect the equipment to be measured by means of a 52 ohm impedance coaxial cable, terminated at one end with a type BNC coaxial connector or a type N coaxial connector (depending on what mixer is to be used), and terminated at the other end with a suitable connector for the output of the equipment to be measured. Keep the coaxial cable as short as possible while permitting convenient location of the equipment.

4-3. OPERATION

4-4. The operating controls and connections are listed in tables 4-1 and 4-2, and figures 4-1 and 4-2.

TABLE 4-1. FRONT PANEL OPERATING CONTROLS AND CONNECTORS

CONTROL/CONNECTOR NAME	FUNCTION
Power Switch	Turns equipment on and off
Low frequency cutoff switch (S1) (Located at extreme CCW position of R18)	Switches low frequency cutoff from 100 cycles to 10kc
Video Gain Control (R3)	Controls amplitude of video signal
Video High Frequency control (R4)	Adjusts high frequency cutoff of video amplifier
Video Low Frequency Control (R18)	Adjusts low frequency cutoff of video amplifier
60 Cycle Phase Control (R43)	Controls phasing of 60 cycle sweep
Horizontal Gain Control (R42)	Controls gain of horizontal signal on oscilloscope
Focus (R36)	Adjusts focus of cathode ray tube beam
Intensity (R38)	Adjusts intensity of trace on oscilloscope
Frequency, Megacycles (C27)	Adjusts frequency of variable frequency oscillator
Coarse Vernier	Mechanically adjusts variable frequency oscillator at a ratio of 8:1 with main frequency dial
Fine Vernier	Adjusts frequency of variable frequency oscillator ±125 parts per million
High Frequency Mixer Signal Input (J1) High Frequency Mixer Oscillator Input (J2)	
External Mixer (J3)	
Low Frequency Mixer Signal Input (J4) Low Frequency Mixer Oscillator Input (J5)	
Harmonic Generator Harmonic Output (J6) Harmonic Generator Oscillator Input (J7)	
Frequency Meter (J8)	
Oscillator Output (J9) Video Output (J13)	
Cable Assembly, RF, CG-546/U(0'8")	Connects oscillator output to either of the three oscillator input jacks
Cord Assembly, CG-409E/U(4'7")	Connects frequency meter jack to counter to permit monitoring of oscillator frequency
Power Cable Assembly, CX-7077/U(7'9")	Connects equipment to power source receptacle

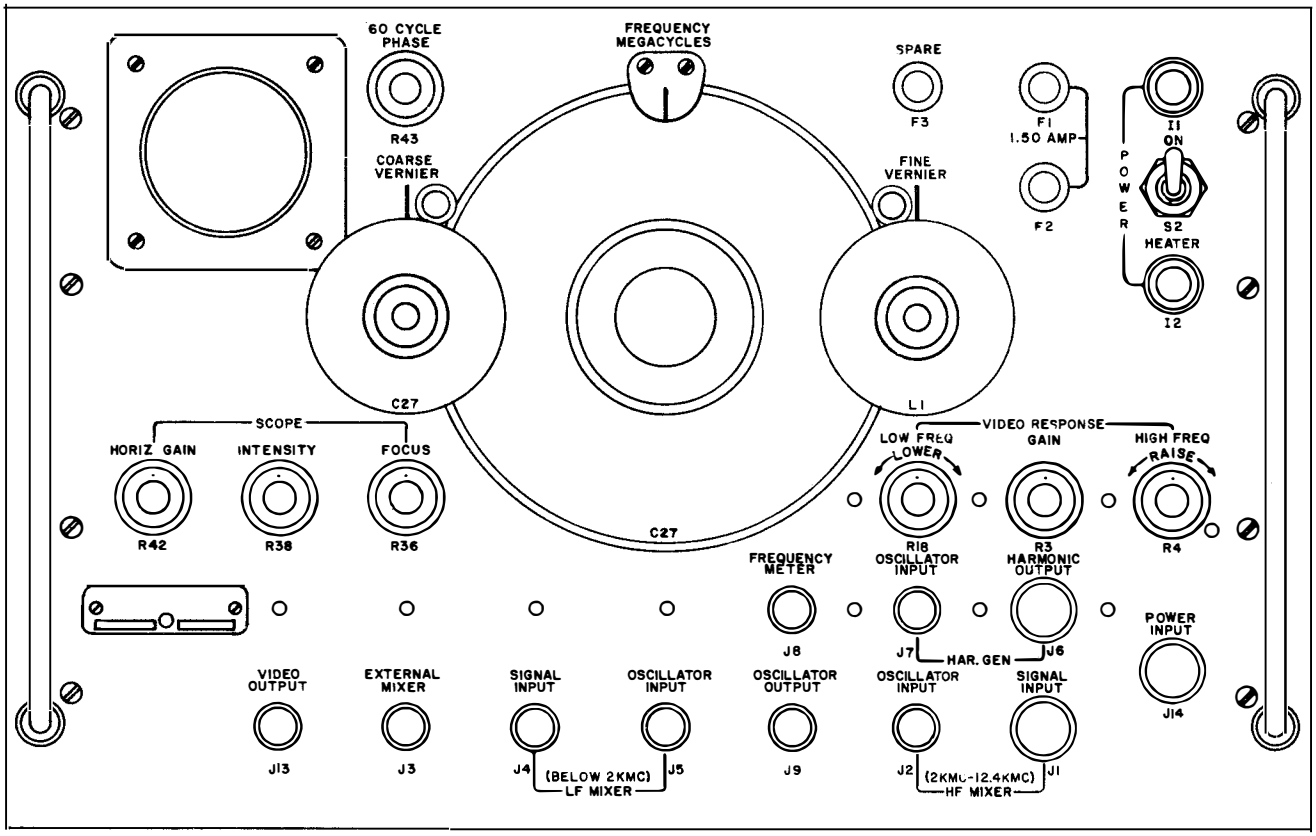


Figure 4-1. Front Panel Controls and Connectors

TABLE 4-2. INSIDE CONTROLS

CONTROL NAME	FUNCTION
Horizontal position (R32)	Adjusts positioning of horizontal trace
Vertical position (R34)	Adjusts positioning of vertical trace
225 volt d-c Adjust (R65)	Adjusts level of 225 volt d-c regulated supply

4-5. GENERAL FREQUENCY MEASUREMENTS. The following paragraphs contain step-by-step operating instructions for measuring frequency with the Frequency Comparator Set AN/USM-144. These instructions are general and apply to all frequency measurements. Refer to succeeding paragraphs for specific instructions concerning each type of signal.

CAUTION

Limit the peak power input to approximately 100 milliwatts to prevent damage to the crystal diodes. If the signal to be measured is of a higher level, insert an attenuator suitable for the frequency in the system ahead of the signal INPUT jack.

The mixer sensitivity curves (figure 4-3) indicate the minimum power required to make measurements at various frequencies.

a. Turn the power ON, and allow a few minutes time for warm-up.

b. Determine the fundamental frequency required.

(1) To determine fundamental frequency when input frequency is known approximately, divide the input frequency by a convenient integral number which provides a fundamental frequency within the range of the Frequency Comparator.

(2) To determine the fundamental frequency when the input frequency is unknown, locate two ADJACENT fundamental frequencies which pro-

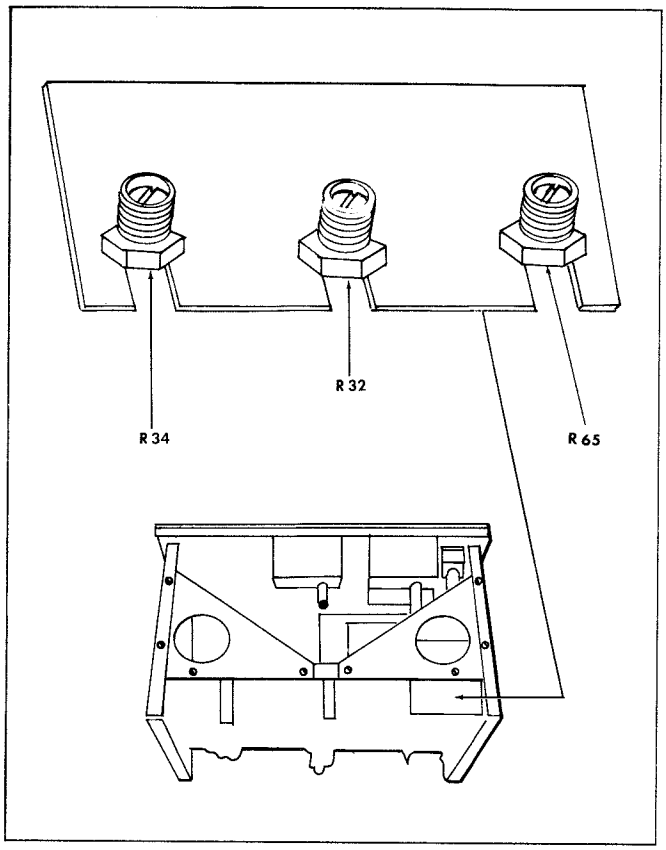


Figure 4-2. Inside Controls

vide a beat-frequency indication on the oscilloscope. From the two fundamental frequencies thus determined, the harmonic that creates the beats and the exact frequency of the unknown can be determined.

(3) The equations for calculating the unknown frequency and the harmonics are as follows:

$$\text{Frequency of Input Signals} = \frac{P}{D}$$

$$\text{Harmonic Number of Higher Fundamental Frequency} = \frac{L}{D}$$

$$\text{Harmonic Number of Lower Fundamental Frequency} = \frac{H}{D}$$

Where P = Product of two adjacent fundamental frequencies; L = Lower fundamental frequency; H = Higher fundamental frequency; and D = Difference between same two fundamental frequencies.

(4) To obtain accurate answers with these equations, the fundamental frequencies must be read to 0.01 percent or better. The division or multiplication can then be carried out on a slide rule, if this degree of accuracy is acceptable. To

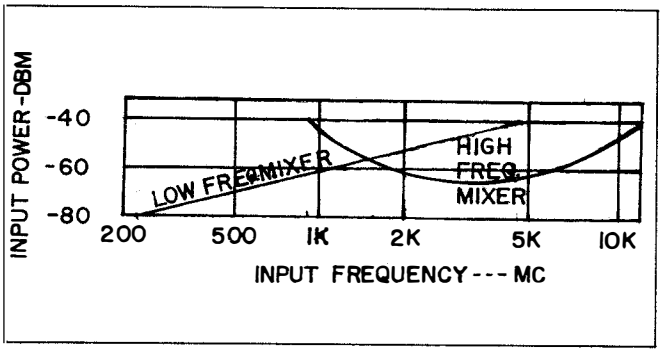


Figure 4-3. Typical Mixer Input Sensitivity

check the accuracy of a calculated answer, select the next higher or lower adjacent fundamental frequency that results in a beat frequency, and recalculate with one of the previously taken fundamental frequencies.

c. Set the COARSE VERNIER dial as close as possible to the fundamental frequency as determined by the above equations, so that a zero beat indication appears on the oscilloscope.

d. Adjust the FINE VERNIER dial for exact zero beat.

e. The FREQUENCY dial now indicates the fundamental frequency producing a harmonic which zero beats with the unknown input signal.

f. If the input signal frequency is known approximately, merely multiply the dial reading by the appropriate harmonic, as selected in paragraph 4-5.b.(1). The answer is the exact frequency of the input signal.

g. If the input signal frequency is completely unknown, adjust the COARSE AND FINE VERNIER dials for another zero beat at the next adjacent fundamental frequency.

h. With the two fundamental frequencies now determined, utilize the equations above to determine the frequency of the input signal.

i. Figures 4-4 and 4-5 are nomographs with which an input frequency between 400 and 5000 mc can be determined from two adjacent fundamental frequencies which result in zero beat indication. In the nomograph, f is the unknown frequency, f_1 is the higher of two adjacent frequencies whose harmonics produce zero beat indications, and f_2 is the lower such frequency. To use the nomograph, locate two adjacent fundamental frequencies which zero beat with the unknown input signal. Find the higher of these two frequencies in the left hand column, the lower frequency in the center column. Place a straightedge across these two points. The point where the straightedge intersects the right column is the number of the harmonic which beats with f_x when the Frequency Comparator is tuned to f_1. Multiply

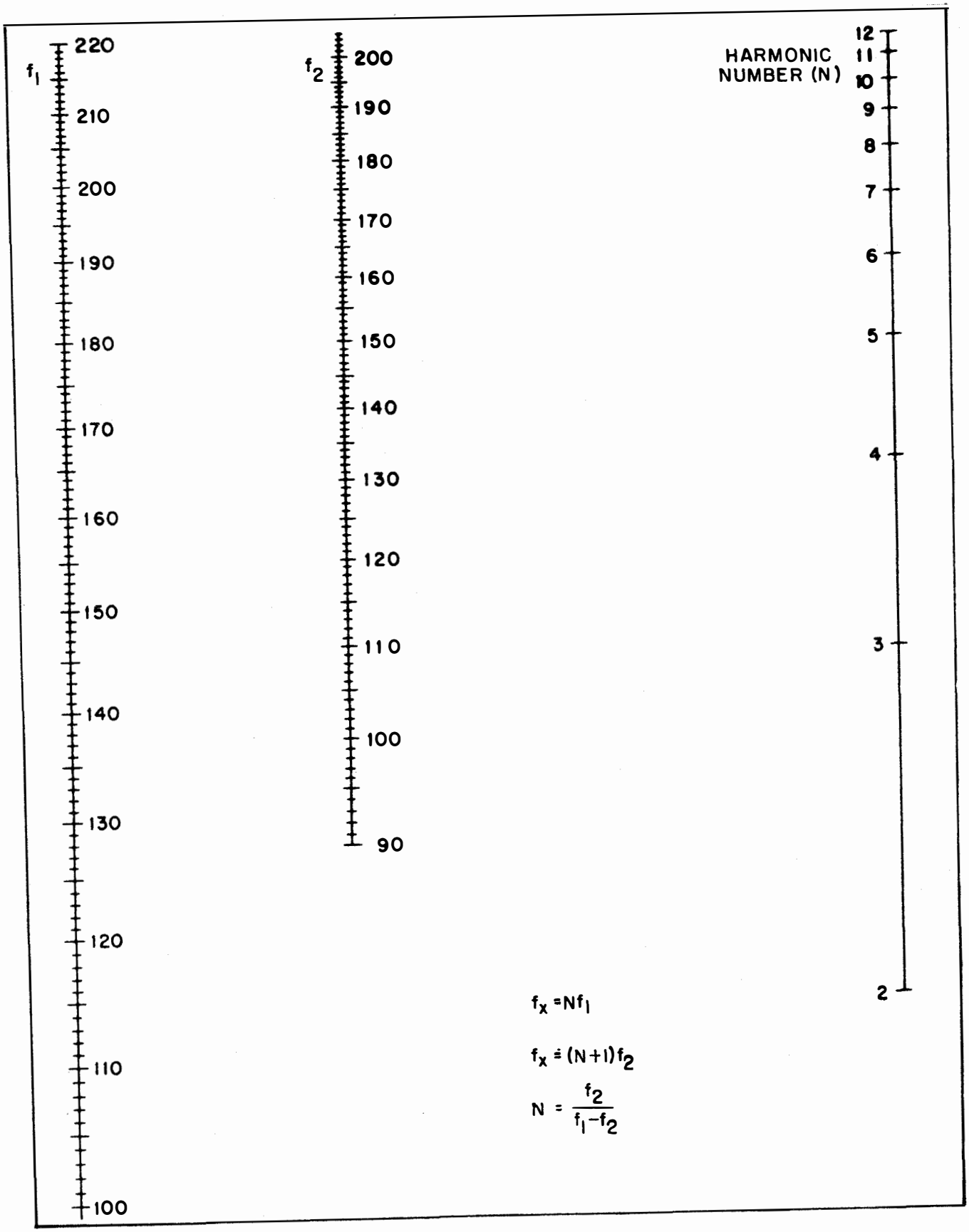


Figure 4-4. Input Signal Frequency Nomograph

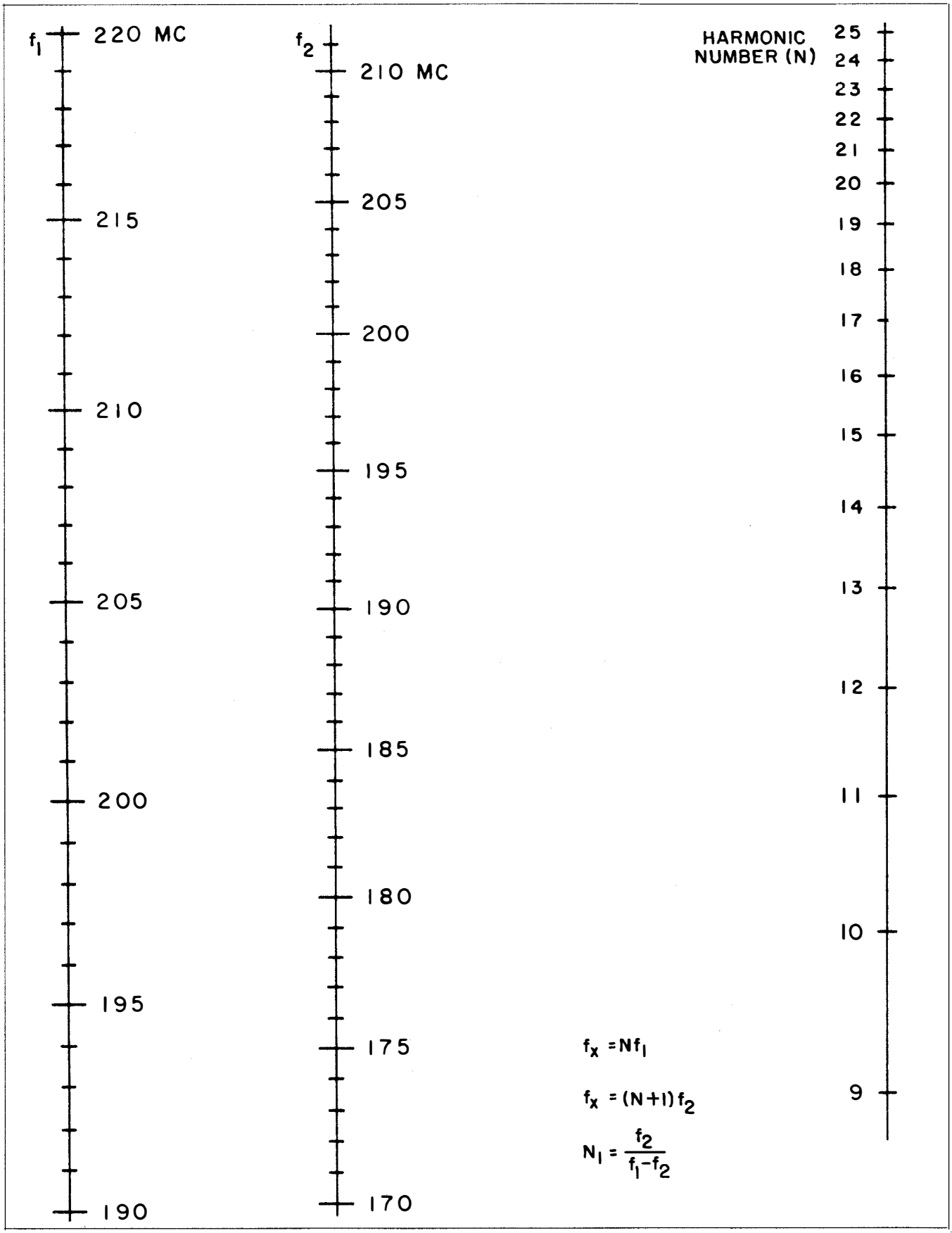
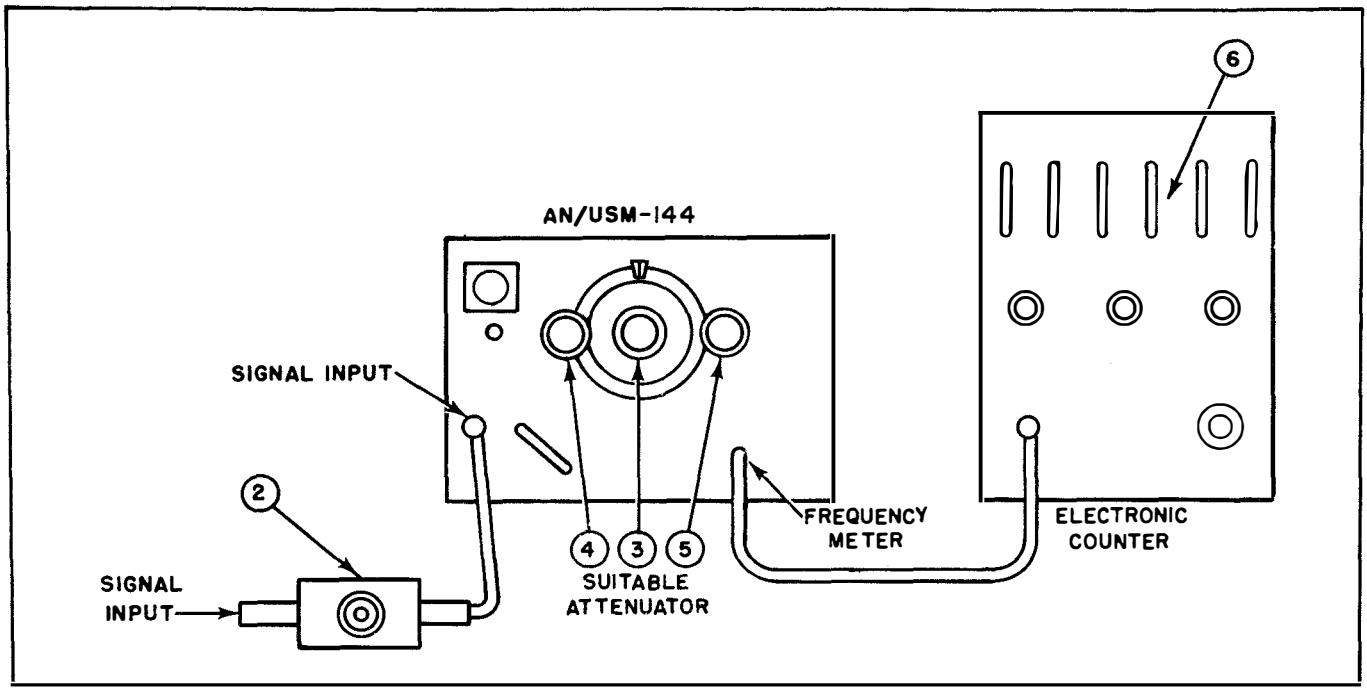


Figure 4-5. Input Signal Frequency Nomograph



1. Connect equipment as shown
2. Adjust signal to less than 100mw with attenuator
3. Set FREQUENCY control to approximate fundamental frequency
4. Adjust COARSE VERNIER for a pattern on the oscilloscope
5. Adjust FINE VERNIER to obtain a stable pattern
6. Read fundamental frequency on electronic counter
7. Multiply fundamental frequency by harmonic number. Result is frequency being measured
8. Refer to paragraph 4-6 for further specific information

Figure 4-6. Measurement Of CW And FM Frequencies

f_1 by the harmonic number to obtain the frequency of the input signal (f_X).

4-6. MEASURING SPECIFIC TYPES OF SIGNALS

4-7. In all the following operation procedures, an electronic counter is used to measure the fundamental frequency of the Frequency Comparator. This frequency can be read from the tuning dial on the Comparator to an accuracy of ± 0.5 percent or better, and can be used in the equations given above to find unknown frequencies below approximately 2000mc. Above 2000mc, use the electronic counter to read the fundamental frequency to obtain sufficient accuracy for the equations. However, unknown frequencies above 2000mc can be measured to 0.5 percent accuracy by reading the fundamental frequency directly from the tuning dial, if the number of the harmonic which produces the beat frequency has been determined.

4-8. MEASUREMENT OF CW SIGNALS. To measure the frequency of continuous wave signals, refer to figure 4-6.

4-9. The GATE and DISPLAY TIME controls on the electronic counter can be set in two ways:

a. Use a short gate time (0.01 second) and minimum display time. This allows continuous indication while adjusting the fundamental frequency of the Frequency Comparator.

b. Use a medium gate time (0.1 second) and an infinite display time. Press and release the RESET button at the instant of optimum Frequency Comparator tuning and read the fundamental frequency on the counter. This allows the reading to be made at a precise moment, and the frequency will be displayed until a new reading is to be made.

4-10. After setting the GATE and DISPLAY TIME controls, proceed as follows:

a. If the frequency of the signal to be measured is known approximately, select a sub-harmonic of this frequency which lies between 100mc and 220mc. For example, if the unknown signal lies between 1.0kmc and 1.2kmc, the tenth harmonic of a fundamental frequency between 100mc and 120mc will produce a zero beat. In the same manner, use the sixth harmonic of a frequency between 162mc and 200mc.

b. Using the COARSE VERNIER tuning control, tune the Frequency Comparator to the fundamental frequency (determined in step a.) and adjust the control very carefully until a response is seen on the oscilloscope screen. Any response seen indicates that some harmonic of the Frequency Comparator fundamental frequency is sufficiently close to the frequency of the unknown

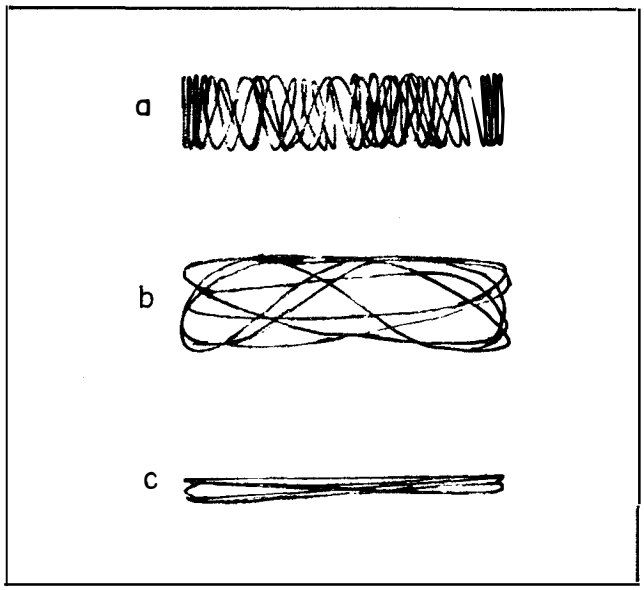


Figure 4-7. Typical Sequence Patterns

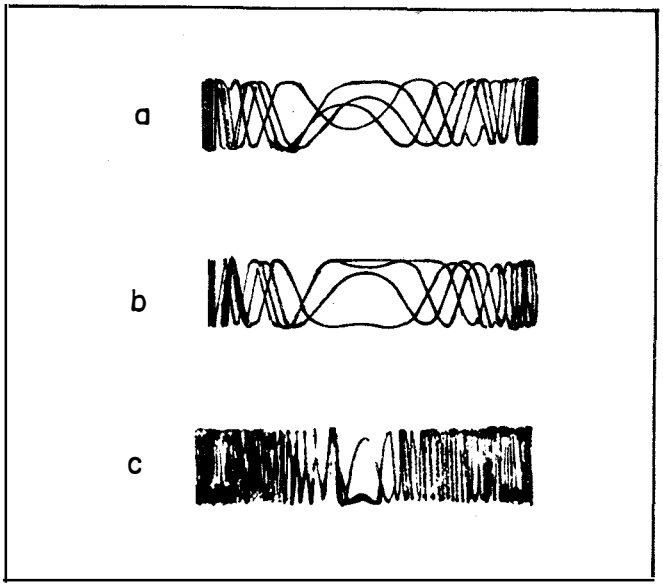


Figure 4-8. Typical Oscilloscope Patterns

signal (or harmonic of it) to permit their difference frequency to fall within the bandwidth of the oscilloscope amplifier. Tune as close to zero beat as is possible with the COARSE VERNIER control.

c. Using the FINE VERNIER control, reduce the difference frequency response on the oscilloscope to as close to zero beat as the stability of the measured signal will allow (refer to step f.). Absolute zero beat will be obtained when the oscilloscope trace collapses into the horizontal line. Various looped patterns will be obtained as the Frequency Comparator is tuned away from the measured frequency. Patterns such as those illustrated in figure 4-7 are sufficiently close to zero beat for most measurements, and are more practical to use than the absolute zero beat.

d. Read the number displayed on the electronic counter and multiply this number by the number of the harmonic which beats with the input signal being measured.

e. If a very stable CW signal is being measured, adjust the frequency of the Frequency Comparator until a beat frequency presentation similar to that shown in figure 4-7a is obtained, where a low but significant difference frequency is displayed. As the tuning continues, the oscilloscope pattern changes as shown in figure 4-7b, and then collapses to a straight horizontal line as shown in figure 4-7c, when the true zero beat is obtained.

f. In practice, few signals are sufficiently stable that the simple zero beat shown in figure 4-7c can be obtained. Rather, the signal usually measured has enough instability (residual frequency modulation) that beat frequency patterns like those shown in figure 4-8a are obtained. If the frequency of the unknown signal varies (has some residual frequency modulation), the difference frequency viewed on the oscilloscope will also vary, and the exact zero beat will be in the center of a band of difference frequencies all shown simultaneously on the oscilloscope screen. Such a pattern is shown in various degrees in figure 4-8.

g. Figures 4-8a and 4-8b show two typical beat frequency responses of signals containing very minor amounts of residual frequency deviation. Figure 4-8c shows a larger amount of frequency deviation. When such responses are obtained while tuning the Frequency Comparator, it will be noticed that first, a low beat frequency is approached; then, the exact zero beat point begins to appear somewhere on the screen. It moves about on the screen and then disappears. If the frequency modulation occurs at the 60 or 120 cycle rate, the PHASE control can be adjusted so that the zero beat first appears on one side and then disappears on the other side. The center frequency will then be measured by setting the zero beat point to the center of the pattern.

h. The exact zero beat point is where the lines in the patterns become expanded horizontally and then reverse their slope before reaching full amplitude. Note that the zero beat appears twice. This is because the line frequency applied to the oscilloscope sweeps it in both directions, crossing the zero beat twice per cycle, once in one direction and once in the other. Either zero beat can be used.

i. If the residual frequency modulation is accompanied by amplitude modulation, the amplitude of the overall pattern on the oscilloscope will be altered without affecting readability or resolution. Amplitude modulation is indicated by a difference in amplitude of the pattern at the forward and backward traces on the oscilloscope. If the

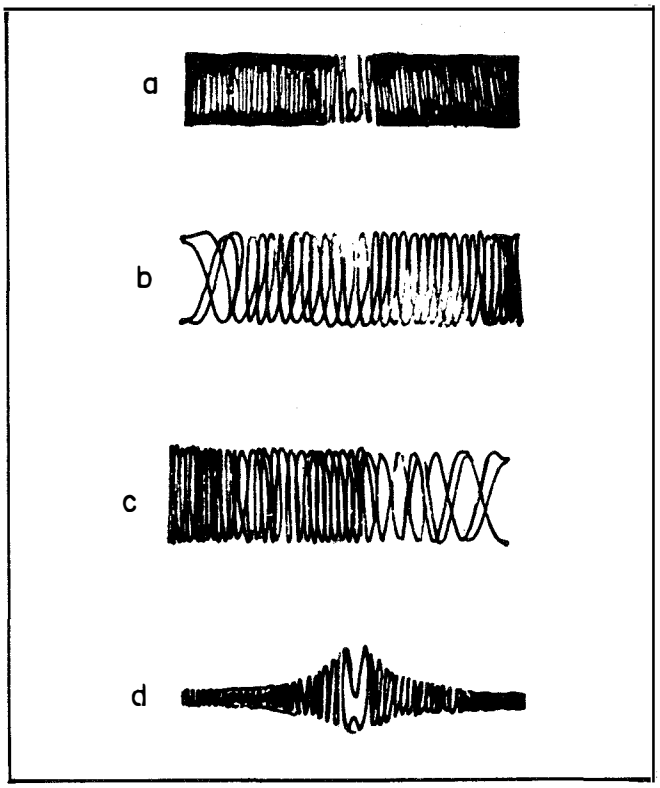


Figure 4-9. Typical Oscilloscope Patterns

amplitude modulation occurs at the 60 cycle power line frequency, the phase control can be adjusted to superimpose the two traces and produce the familiar trapezoid associated with amplitude modulation.

4-11. MEASUREMENT OF FREQUENCYMODULATED RF SIGNALS. Frequency modulated RF signals are measured in exactly the same way as CW signals, and the procedure in paragraph 4-10 is used for both types of signals. Step e. of paragraph 4-10 describes in detail the effect that residual frequency modulation has upon the beat frequency presentation of a CW signal. The presentation obtained when measuring a frequency modulated carrier is the same, but the deviation is usually much greater and the zero beat point is much smaller, in relation to the entire frequency swing. Compare figure 4-8 with figure 4-9a.

4-12. To measure the center frequency and the limits of deviation of a frequency modulated carrier, proceed as follows:

a. Follow all instructions given in paragraph 4-10 for measuring the frequency of CW signals, giving special attention to step e.

b. Since the beat frequency will be varying at the rate of the frequency modulation, it is not possible to reduce the beat frequency to a simple zero. Instead, the carrier frequency sweeps through a zero beat with the Frequency Comparator twice during each cycle of modulation, first in one direction, then in the other. Consequently, two zero beat points will be obtained simultaneously on the oscilloscope sweep. With the PHASE control, superimpose the two zero beats or separate them so that they do not interfere. Figures 4-7a and 4-7d show the beat superimposed while the Frequency Comparator is tuned to the approximate center frequency of the carrier. Figures 4-9b and 4-9c show the same pattern as it would appear first with the Frequency Comparator tuned to one limit of frequency deviation, then to the opposite limit of deviation.

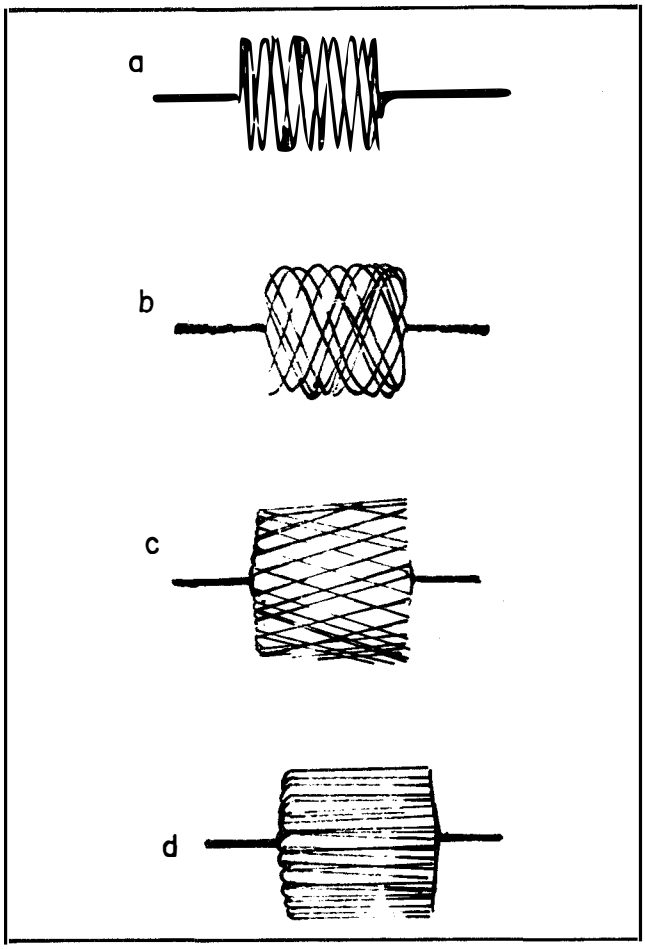
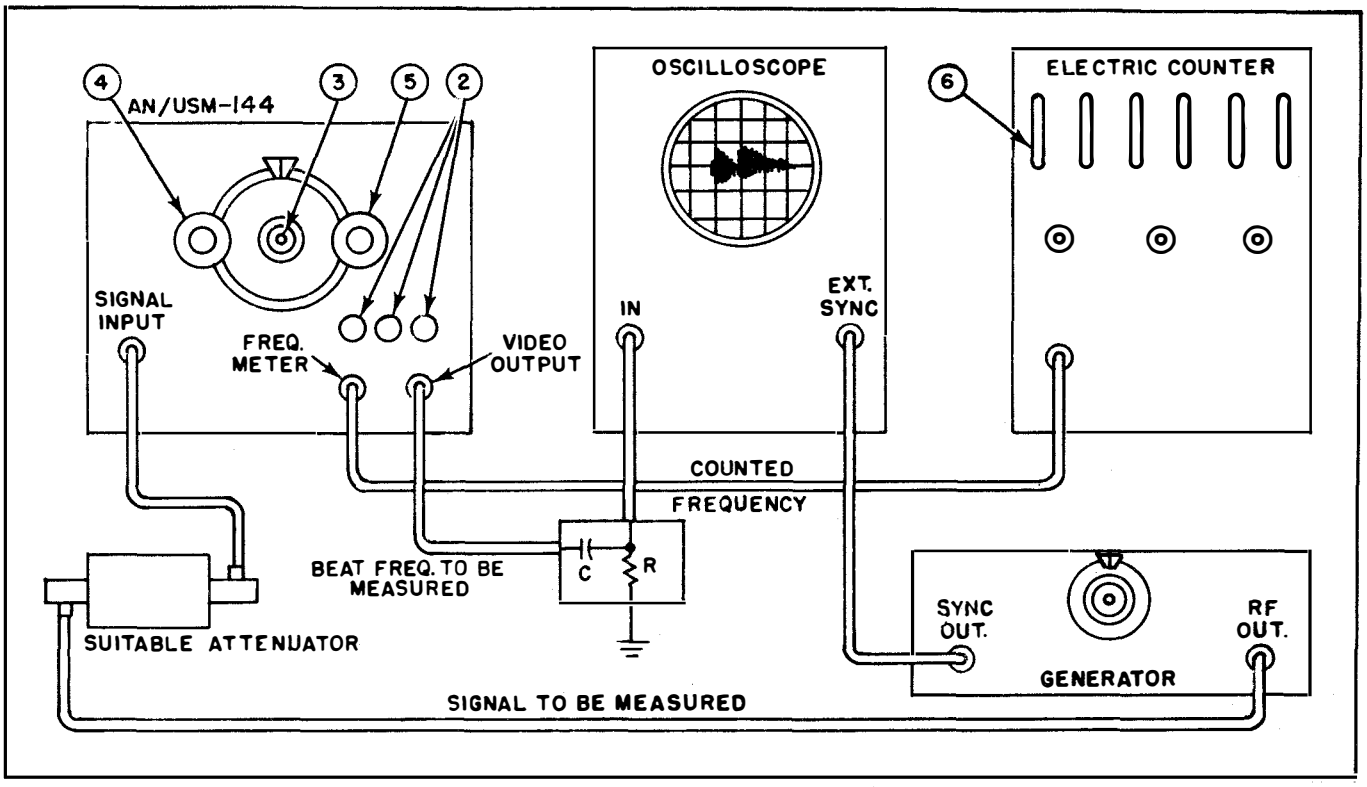


Figure 4-10. Typical Oscilloscope Patterns

4-13. MEASUREMENT OF PULSED RF SIGNALS. The carrier frequency of pulsed RF signals is measured by observing the actual carrier beat which occurs during one pulse of RF energy. In order to observe a single pulse of RF energy, the synchroscope sweep must be synchronized by the pulse. The oscillator is adjusted to display one pulse of RF energy over a large portion of the screen. The pattern within the pulse envelope will then indicate when the beat frequency is tuned toward zero. Figure 4-10a shows a typical pattern



1. *Connect equipment as shown*
2. *Set VIDEO RESPONSE and GAIN to maximum (clockwise)*
3. *Adjust FREQUENCY control to approximate fundamental frequency*
4. *Adjust COARSE VERNIER for a pattern on oscilloscope*
5. *Adjust FINE VERNIER for best pattern*
6. *Read fundamental frequency on counter*
7. *Multiply fundamental frequency by harmonic number. Result is frequency being measured*
8. *Refer to paragraph 4-9 for further specific information*

Figure 4-11. Frequency Measurement Test Setup

obtained when the pulsed carrier is close to zero beat, and figure 4-10d shows a typical pattern at zero beat. The lines within the pulse will be exactly parallel only at zero beat.

4-14. Carriers pulsed at intervals as short as one microsecond are easily indicated by the method described in paragraph 4-13. For pulses shorter than one microsecond, take the heterodyne signal from the MIXER OUTPUT jack on the Frequency Comparator, amplify it with an external broadband amplifier having the necessary gain and bandwidth to accommodate the pulse to be measured, and observe the output on an external synchroscope.

4-15. To measure the frequency of a pulsed RF carrier, refer to figure 4-11 and proceed as follows:

a. Connect the frequency to be measured to the proper SIGNAL INPUT jack on the Frequency Comparator.

b. Connect the VIDEO OUTPUT jack on the Frequency Comparator to the vertical amplifier of the synchroscope. Synchronize the synchroscope with the source of pulsed RF energy.

c. Set all VIDEO RESPONSE, GAIN AND INPUT ATTENUATION controls to positions for maximum gain and minimum attenuation, and set the FINE VERNIER control to the center of its range.

d. Adjust the frequency of the Frequency Comparator as described in steps a. through d. of paragraph 4-10 for CW signals. Since f_x consists of RF pulses, the mixer output will appear as the difference frequency signal, with a duration equal to the length of the pulse.

e. Adjust the Frequency Comparator to reduce the difference frequency until it is within the bandwidth of the video amplifier (approximately two megacycles). When the oscillator is tuned for a zero beat with a pulsed RF carrier applied to the system, a scope presentation much like that shown in figure 4-10 will be seen. Note that about five cycles of the difference frequency are seen within the pulse envelope. This would correspond to a 5mc difference frequency for a pulse of one microsecond duration.

Note

Use only enough input RF power to obtain an easily discernible zero beat on the oscilloscope. Excess input power may cause the detected video pulse to obliterate the desired beat frequency indication.

f. Adjust the Frequency Comparator toward zero beat. Referring to figure 4-10a, b, c, and d., notice that as zero beat is approached, the number of difference frequency cycles within the pulse envelope decreases. When the beat frequency is much less than one cycle (approaching actual zero beat), the pattern shown in figure 4-10d. will appear. Each of the horizontal lines shown is now a portion of a sine wave, and actual beat frequency has been obtained when the pattern appears as a family of traces all having exactly the same shape (figure 4-10d.). In figure 4-10d., the beat frequency would be about one-hundredth of a cycle per pulse width.

4-16. ALTERNATE PRESENTATION OF RF SIGNAL AS A SAWTOOTH. The technique of presentation described in paragraph 4-15 will prove successful for pulse repetition rates from 50 cycles to five kilocycles. Above five kilocycles, excessive crowding of the displayed pulse is evidenced and may produce a slight loss in accuracy. Therefore, a technique of presentation must be used which does not require the resolution of an individual trace. Such a presentation is illustrated in figure 4-10a, b, and c.

4-17. The presentation shown in figure 4-12 was obtained by inserting an R-C differentiating network ahead of the VERTICAL INPUT terminal on the oscilloscope (See figure 4-11). The time constant of the R-C network should be of the order of one-tenth of the pulse width. Zero beat will now be indicated by the first exponential envelope decaying to a sharp point. Figures 4-12a and 4-12c illustrate the response with time constants of one and one-hundredth of the pulse width. Figure 4-10b shows the response with the correct time constant of one-tenth the pulse width.

4-18. MEASUREMENT PRECAUTIONS. The following precautions should be observed whenever

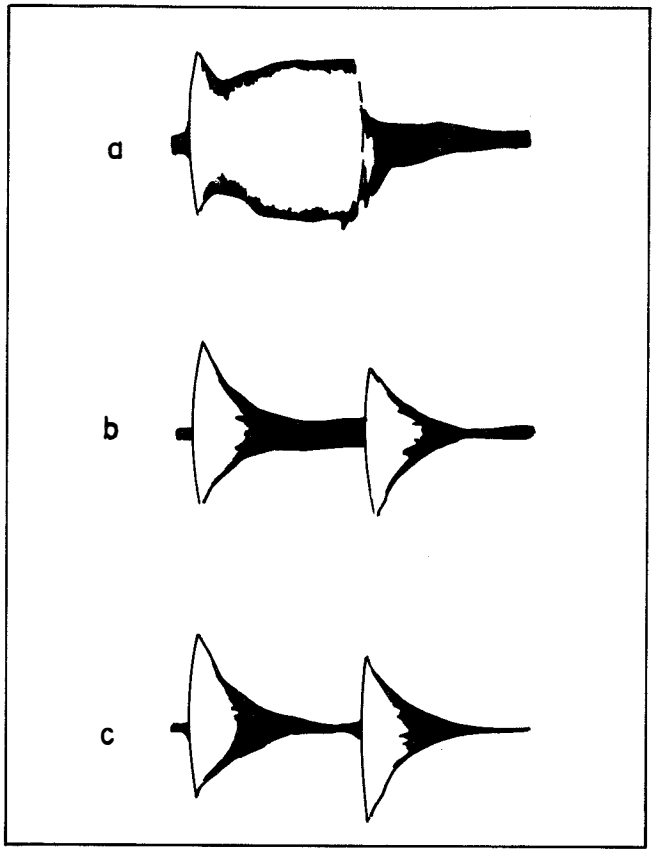


Figure 4-12. Typical Sequence of Patterns

any measurements are made with the AN/USM-144 Frequency Comparator Set.

a. Provide an input signal level at least as great as that indicated in the graph of figure 4-1.

CAUTION

Do not exceed 100mw peak power.

b. If the output power of the signal source is greater than 100mw peak, insert an attenuator between the source and the Frequency Comparator which will reduce the input to the required power level at the frequency to be measured.

c. If desired, an adjustable coupling loop or a probe can be used to provide the necessary attenuation.

SECTION V
PERIODIC INSPECTION, MAINTENANCE, AND LUBRICATION

5-1. GENERAL

5-2. This section contains maintenance and inspection procedures for Frequency Comparator Set AN/USM-144.

5-3. LUBRICATION

5-4. No lubrication of Frequency Comparator Set AN/USM-144 is required.

5-5. PREVENTIVE MAINTENANCE

5-6. Preventive maintenance is vital to the proper operation and use of this equipment. It consists principally of making repairs and correcting errors found during routine inspection. Conduct these inspections at least once each month throughout the life of the equipment.

5-7. To accomplish even the simplest inspection, it will be necessary to remove the chassis from the cabinet. To accomplish this, proceed as follows:

a. Rest the Frequency Comparator Set on its back.

b. Loosen the two large slotted set screws which are located on the bottom near the front panel.

c. Withdraw these screws about one quarter inch.

d. Lift off the front panel and the chassis, leaving the back plate attached to the chassis.

e. Remove the four slotted screws located on the rear of the back plate and remove the plate.

5-8. The various circuits of the Frequency Comparator Set AN/USM-144 are not adversely affected by normal variations in tube characteristics. Any tube may be replaced by a new one without the need of special selection. The locations of the tubes are shown in figure 5-1. See Table 7-1 for the calibration required after tube replacement.

5-9. INSPECTION

5-10. Perform the following inspections at least once each month:

a. Inspect the interconnecting cables, components, and circuit wiring for loose connections.

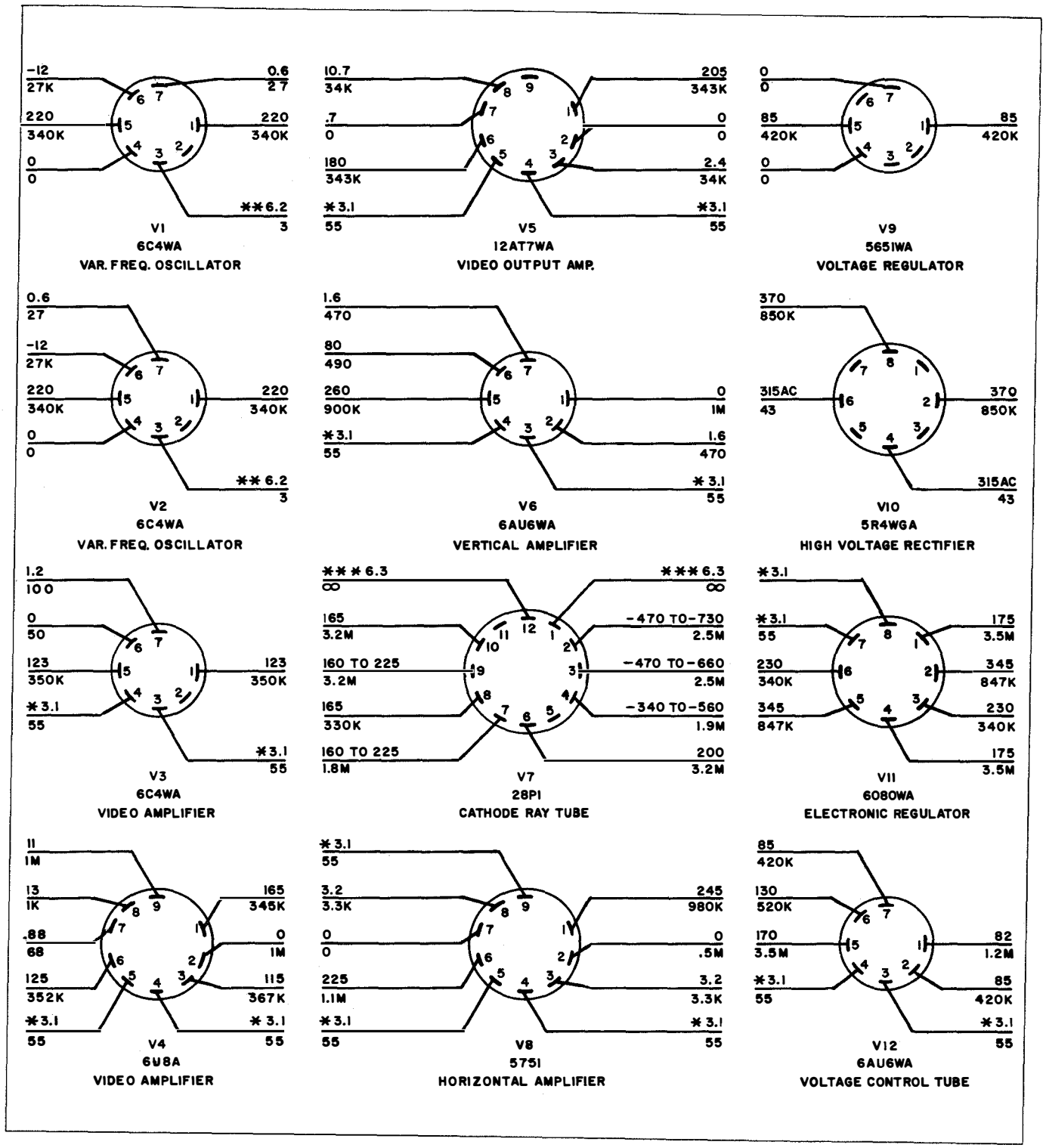
b. Check the resistors and capacitors for signs of overheating.

c. Inspect the front panel and case for chipped paint, dents, or damage of any kind.

d. Examine all recesses for dust, dirt, mildew, or corrosion.

e. Check all parts, connections, and joints for presence of corrosion, mildew, fungus, and other foreign matter.

f. Clean all dust, dirt, and lint from electronic parts with a soft brush or cloth. This process may reveal otherwise hidden minor defect or damage.



1. *All voltages measured to ground with VTVM having 11 megohm input resistance, except as noted*
2. *All voltages positive d-c values unless otherwise noted*
3. **6.3 volt a-c heater supply*
4. ***6.2 volt d-c regulated heater supply*
5. ****6.3 volt a-c isolated heater supply. Measure from pin 1 to pin 12 of V7*
6. *Resistances measured to ground with 20,000 ohms per volt multimeter. Polarity must be observed: + leads to B+ circuits, — leads to ground. Circuit capacity must be charged to obtain high R readings. Resistance in ohms: K=10^3 and M=10^6*
7. *Voltage is above line; resistance is below line*

Figure 5-1. Tube Socket Voltages and Resistances

SECTION VI
TROUBLESHOOTING

6-1. GENERAL

6-2. This section contains the service and adjustment instructions for Frequency Comparator Set AN/USM-144. Troubleshooting procedure will be greatly simplified, and the number of hours the set is out of operation will be reduced, if these instructions are carefully observed.

6-3. If the instrument is completely inoperative, first check the fuse; then check the line cord and the tubes. Refer to Table 7-1 for adjustments which may be required after changing tubes.

6-4. Follow these steps in the event that the items referenced in the preceding paragraph proved to be in working order:

a. Note the symptom.
b. Localize the fault to a single stage.
c. Localize the faulty component within that stage.
d. Make the proper repair.

6-5. Trouble in the Frequency Comparator Set AN/USM-144 will be indicated by the following major symptoms:

a. Total loss of operation.
b. Loss of sensitivity.
c. Instability.
d. Noise.

6-6. To check the operation of the oscillator, connect a 50 ohm resistive load to the OSCILLATOR OUTPUT jack. Measure the RF output voltage. The voltage must be 1.5 volts at 100mc to 2.0 volts at 200mc. The frequency must remain within 0.5 percent of the tuning dial calibration.

6-7. To check the video amplifier, connect a 20 cycle to two megacycle, 0.005 volt signal to the MIXER OUTPUT jack. The voltage measured at this jack shall be at least 0.5 volts over the full frequency range and shall provide at least one inch deflection on the oscilloscope.

6-8. The following table will aid in establishing an orderly, systematic method of troubleshooting. Check the items in the order shown in the table.

TABLE 6-1. TROUBLESHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
LOSS OF OPERATION		
Pilot lamp does not light. No input power.	Input fuse blown. Tube V10 defective. Power cord defective. Switch S2 defective. C46 or C47 open.	Locate source of overvoltage; then change fuse. Replace Tube V10. Repair or replace cord. Repair or replace switch. Replace C46 or C47.
Oscillator tube filaments (V1, V2) do not light.	Tubes V1 or V2 defective. Defective component in 6.2 volt d-c power supply circuit.	Replace V1 or V2. Locate and replace faulty component.
No +330 volt d-c, +225 volt d-c, or —730 volt d-c from power supply.	V10 defective. T1 high voltage secondary defective.	Replace V10. Replace T1.
No +225 volt d-c; all other high voltages correct.	V11, V12, or V9 defective. Defective component in circuits associated with V11, V12, or V9. +225 volt d-c ADUST control improperly adjusted.	Replace defective tube. Replace defective component. Readjust R65 for +225 volts d-c at 115 volts a-c input.
No +330 volt d-c; all other high voltages correct. No —730 volt d-c; all other high voltages correct.	R56 or C36A defective. CR10 or CR11 defective. C41, R69, or R67 open. C39, C40, or C42 shorted.	Locate and replace defective component. Replace defective rectifier. Replace defective component. Replace defective component.

TROUBLE	PROBABLE CAUSE	REMEDY
LOSS OF SENSITIVITY		
Low oscillator output.	Tubes V1 or V2 weak.	Replace V1 or V2 and recalibrate main tuning dial. See paragraph 7-14.
	Oscillator trimmer capacitors not properly tuned.	Retune C3 and C28. See paragraph 7-14.
Weak crystal diode mixer.	Defective component in oscillator circuit.	Replace faulty component.
	Crystal failing to produce strong harmonics over required range.	Replace weak crystal 1N21B. See paragraph 7-17.
Low amplifier gain.	See paragraph 6-7. Weak tubes: V3, V4, or V5.	Replace tubes V3, V4, V5.
Instability.	Shifting oscillator frequency generally caused by unstable supply voltages.	Check power supply voltages applied to V1 and V2 oscillator stage as described in this table. See LOSS OF OPERATION.
	Oscillator tubes V1 or V2 unstable.	Replace tubes.
Noise.	Crystal diode mixer noisy.	Replace diode.
	Microphonic electron tube defective.	Replace defective tube.
	Loose or poorly soldered connection.	Tighten or resolder as required.

SECTION VII
CALIBRATION

7-1. GENERAL

7-2. Calibration of the AN/USM-144 is a critical procedure and must be attempted only by experienced personnel.

7-3. CALIBRATION AFTER TUBE REPLACEMENT

7-4. Normal variations in tube characteristics will not seriously affect the Frequency Comparator Set, although certain minor calibrations may be required after changing electron tubes. The following chart indicates the necessary calibration required after tube replacement:

TABLE 7-1. CALIBRATION AFTER TUBE REPLACEMENT

REF. NO.	TUBE NO.	TYPE	USE	ADJUSTMENT
V1	6C4	Triode	½ RF oscillator	Adjust frequency dial. See paragraph 7-13.
V2	6C4	Triode	½ RF oscillator	Adjust frequency dial. See paragraph 7-13.
V3	6C4	Triode	First video amp.	None
V4	6U8A	Triode-Pentode	Second and third video amplifier	None
V5	12AT7WA	Twin triode	Video output amp.	None
V6	6AU6WA	Pentode	Vertical amplifier	None
V7	2BP1	C. R. T.	Oscilloscope	Adjust vertical and horizontal positioning. See paragraph 7-11.
V8	5751	Twin triode	Horizontal amplifier,	None
V9	5651	Gas regulator	Reference tube	Adjust +225 volt d-c. See paragraph 7-8.
V10	5R4WGA	Rectifier	Full wave rectifier	None
V11	6080WA	Dual triode	Series voltage regulator	Adjust +225 volt d-c. See paragraph 7-8.
V12	6AU6WA	Pentode	Voltage control	Adjust +225 volt d-c. See paragraph 7-8.

7-5. ADJUSTMENT OF THE POWER SUPPLY

7-6. Five separate voltages are available from the power supply, all of which are referenced to chassis ground. These voltages are a+330 volt d-c, a —730 volt d-c, and a 6.3 volt a-c, none of these being regulated or adjustable. In addition, there are a regulated +6.2 volt supply, and a regulated +225 volt d-c supply, adjustable by potentiometer R65.

7-7. Adjust the +225 volt d-c by means of the screwdriver control located on the rear of the chassis. Proceed as follows:

a. Connect a d-c voltmeter, accurate within plus or minus two percent, between ground and the junction point between R59 and R60, which are located on the center terminal board. At an input voltage of 115 volts a-c, a reading of +225 volts d-c must be obtained.

b. If the reading is not correct, adjust potentiometer R65 to correct it.

c. If the voltage is too low and adjustment of R65 will not correct this condition, replace V10 and V11 and check the load current at pins 3 and 6 of V11. If the voltage is too high, replace V12. If the voltage is erratic, replace V9.

d. To check the operation of the regulated supply, connect the Frequency Comparator Set to a variable transformer. Vary the input voltage slowly from 103 to 127 volts a-c. If the +225 volt d-c supply varies more than plus or minus two percent (4.5 volts), one or more tubes will require replacement. It the +225 volt d-c supply rises at an input of 103 volts a-c, V12 is probably weak. If the +225 volt d-c supply drops, replace V9 or V11. If regulation is poor at an input voltage of 127 volts a-c, V11 or V12 is probably at fault.

7-8. The +330 volt d-c and the —730 volt d-c outputs vary with line voltage fluctuation, but must show a nominal reading of +330 and —730 at an input of 115 volts a-c. If the +330 volt d-c supply is too low, replace V10, C43a, or C43b; then check the total load current to obtain a reading of 106ma (3.5ma to the +330 volt line and 102ma to the regulator).

7-9. If the —730 volt d-c supply is too low, check the selenium rectifiers CR10 and CR11. Using an ohmeter with a high open circuit voltage, disconnect one end of each rectifier and check the forward and back resistances of these units. An ohmeter with a 30 volt internal battery will show a reading of less than 200,000 ohms for forward resistance and approximately three megohms for back resistance in a good unit. An ohmeter with a 100 volt internal battery will provide even better indications, approaching the true forward and back resistances of the rectifiers.

7-10. ADJUSTMENT OF OSCILLOSCOPE VERTICAL AND HORIZONTAL POSITIONING

7-11. Vertical and horizontal positioning of the oscilloscope trace are accomplished by adjusting R32 (horizontal) and R34 (vertical) which are located at the rear of the chassis (figure 4-2).

7-12. CALIBRATING THE MAIN TUNING DIAL

7-13. After replacement of the variable frequency oscillator tubes V1 and V2, recalibrate the main tuning dial as necessary to bring it back into calibration. The oscillator may also need a slight adjustment of C3 and C28 to restore capacitive balance to the circuit. To calibrate the main tuning dial and balance the oscillator circuit, proceed as follows:

a. Measure the voltage at the MIXER OUTPUT jack. This voltage shall be approximately 1.75 volts d-c at 100mc, increasing to 2.2 volts d-c at 200mc. If this voltage is too low, adjust trimmer capacitors C3 and C28 to peak the voltage. Be sure front panel jumper cables are in place during this measurement.

b. Measure the frequency of the Frequency Comparator Set with an electronic counter by connecting the FREQ. METER jack to the counter. The total frequency range of the Frequency Comparator Set shall be 100 to 220mc.

c. Set the main tuning dial to 200 and read the counter. Adjust C3 and C28 as needed to bring the frequency to 200mc. Be sure to maintain the balance of the two capacitors so that the d-c voltmeter is peaked at any particular frequency.

d. Repeat steps a. through c. for optimum overall accuracy.

7-14. CRYSTAL DIODE MIXER

7-15. There are no tuning adjustments necessary in the crystal diode mixer stages. Decreased measurement sensitivity may be caused by a 1N21B crystal failing to produce strong harmonics over the desired frequency range. When such a condition is noted, replace the 1N21B crystal. To check the sensitivity of a mixer stage, proceed as follows:

a. Set all video response controls fully clockwise.

b. Connect the OSCILLATOR OUTPUT jack to the OSCILLATOR INPUT jack of the mixer in question.

c. Connect a reference voltmeter to the VIDEO OUTPUT jack and measure noise.

d. Connect the signal generator to the SIGNAL INPUT jack of the mixer in question, and adjust the output of the signal generator until the reading on the reference voltmeter is twice the value noted in step c.

e. This figure represents the sensitivity of the mixer in question at that particular frequency. Typical mixer sensitivity is shown in the curves of Figure 4-1. Note that these are idealized curves and the actual sensitivity may vary from the curves by as much as 10db.

f. Repeat the above procedure for several frequencies to determine the response over the entire band.

7-16. REPLACING CRYSTAL DIODES

7-17. In general, change crystal diodes only when they will not perform their specific function. The crystals supplied with the Frequency Comparator Set are selected for good wideband performance

with an absence of holes. If a crystal is replaced to achieve higher gain at a given frequency, retain the replaced crystal for general use.

7-18. Two crystals (a 1N21B and a 1N21CR) are used in the high frequency mixer. To correct for noise or low output, change the 1N21CR. To correct for holes, change the 1N21B.

CAUTION

When changing crystals, do not touch the crystal body or terminals with the fingers. Remove the two screws holding the polystyrene block to the housing; then remove the screw holding the clip over the crystal body. Pull the crystal from its mounting clip with padded, long nose pliers, being careful not to crack the body.

7-19. TEST EQUIPMENT

7-20. The following meters and instruments (or their equivalents) are needed for the calibration of the AN/USM-144 Frequency Comparator Set:

a. Hewlett-Packard 650A Signal Generator; 10cps to 10mc — To check the video amplifier.

b. Hewlett-Packard 410B Voltmeter; 0cps to 400mc — To check the oscillator output.

c. Hewlett-Packard 524B Counter; 10cps to 220mc — To check the oscillator frequency.

d. Tektronix 310 Oscilloscope — To check the video amplifier.

e. Measurements Model 80 Signal Generator; 2cps to 400mc — To check mixer operation.

SECTION VIII
ILLUSTRATED PARTS BREAKDOWN

8-1. GENERAL

a. The Illustrated Parts Breakdown lists and describes all of the procurable assemblies, subassemblies, and component parts of the AN/USM-144 Frequency Comparator Set as manufactured by Centronix, Inc. of Philadelphia, Pennsylvania. It is divided into four principal sections as shown in the Table of Contents.

b. This breakdown is intended only for use in identifying, stocking, and requisitioning parts, and is not to be considered authority for assembly or disassembly sequence. For operation, service, maintenance, or overhaul instructions, see preceding sections of this Handbook.

8-2. GROUP ASSEMBLY PARTS LIST. The Group Assembly Parts List (Section IX) divides the Frequency Comparator Set into its basic subassemblies and lists under each of these the subordinate parts of the assembly and any attaching parts. The parts are index numbered to match the numbers in the various views of the equipment.

8-3. FIGURE AND INDEX NUMBER COLUMN. This column lists the figure and index number of each part illustrated in the corresponding view. Each part is identified by a combined figure and index number with the exception of subassemblies which are not illustrated separately. In these cases, the subassembly is listed but is not indexed. The component parts of the subassembly are both listed and indexed.

8-4. PART NUMBER COLUMN. This column lists the contractor's part numbers, except where government standards or manufacturers' part numbers are used. The source of manufacturers' code symbols is the Federal Supply Code for Manufacturers, Cataloging Handbook H 4-1.

CODE	VENDOR'S NAME AND ADDRESS
00328	Sterling Precision Corp., Port Washington, N. Y.
01121	Allen-Bradley Co., Milwaukee, Wisconsin
02660	Amphenol Electronics Corp., Chicago, Illinois
04183	U.S. Engineering Co., Long Island City, N. Y.
06540	Amatom Electronics Hardware Co., Inc., New Rochelle, N. Y.
09922	Burndy Corp., New York, N. Y.
11706	Chatham Mfg. Co., Inc., Elkin, N. C.
14655	Cornell Dubilier Electric Corp., South Plainfield, N. J.
14674	Corning Glass Works, Corning, N. Y.
24454	General Electric Co., Electronics Components Div., Syracuse, N. Y.
24455	General Electric Co., Lamp Div., Nela Park, Ohio
44655	Ohmite Mfg. Co., Chicago, Illinois
46384	Penn Engineering & Mfg. Corp., Doylestown, Penna.
49671	Radio Corp. of America, New York, N.Y.
54753	F. W. Sickles Co., Chicopee, Mass.
61755	Union Switch and Signal Co., Pittsburgh, Penna.
70331	Alpha Wire Corp., New York, N. Y.
70485	Atlantic India Rubber Works, Inc., Chicago, Illinois
70892	Bead Chain Mfg. Co., Bridgewater, Conn.
71002	Birnbach Radio Co., New York, N. Y.
71400	Bussman Mfg. Co., St. Louis, Mo.
71785	Cinch Mfg. Corp., Chicago, Illinois
72619	Dialight Corp., Brooklyn, N. Y.
72699	General Instrument Corp., Newark, N..J
72962	Elastic Stop Nut Corp. of America Union, N. J.
73559	Carling Electric Co., Inc., Hartford, Conn.
77147	Patton MacGuyer Co., Providence, R. I.
77900	Shakeproof Lockwasher Co., Chicago, Illinois
78553	Tinnerman Products, Inc., Cleveland, Ohio
79136	Waldes Kohinoor, Inc., Long Island City, N. Y.
79963	Zierick Mfg. Corp., New Rochelle, N. Y.
80130	Times Facsimile Corp., New York, N. Y.
80583	Hammarlund Co., Inc., New York, N. Y.
82219	Sylvania Electric Products, Inc. Emporium, Penna.
82376	Astron Company, East Newark, N. J.
91418	Radio Materials Co., Chicago, Illinois
91577	Cannon Electric Co., East Haven, Conn.
91662	Elco Corp., Philadelphia, Penna.
94144	Raytheon Mfg. Co., Quincy, Mass.

8-5. DESCRIPTION COLUMN. Descriptions of all items appearing in this column are in accordance with the contractor's drawing titles plus modifiers to include electrical characteristics necessary to identify a particular item. The indentations are numbered 1 through 7 and show the relationship of parts and subassemblies to assemblies. Abbreviations used are in accordance with Standard MIL-STD-12.

8-6. ATTACHING PARTS. These are items used to attach parts or assemblies to each other and follow immediately after the part to be attached. The attaching parts have the same indentation as the parts attached and are headed "ATTACHING PARTS." The symbol .....*..... is used to denote the end of attaching parts and the continuation of the listing.

8-7. UNITS PER ASSEMBLY COLUMN. The quantity listed in this column is the total quantity of the part required in its particular assembly.

8-8. NUMERICAL INDEX

a. The Numerical Index (Section X) is compiled in accordance with the numerical part number filing system described below:

(1) Part number numerical arrangement starts on the left column and continues from left to right, one column at a time, until part number numerical arrangement is determined.

(2) The order of precedence in part number numerical arrangement is as follows:

(a) Space (blank column)
(b) Dash (—)
(c) Letters A through Z
(d) Numerals 0 through 9

b. Government standards (AN or JAN) and contractor standard parts show only the first usage in the Numerical Index but indicate the total quantity used with the complete equipment.

8-9. REFERENCE DESIGNATION INDEX. The Reference Designation Index (Section XI) lists the reference designations used in the schematic diagrams and instruction book pertaining to the Frequency Comparator Set, AN/USM-144. The designations are listed in alpha-numerical order. Opposite each designation are listed the figure and index number and the part number used for this item in the Group Assembly Parts List.

8-10. USABLE ON CODE. The "Usable on Code" column has been left blank since only one model of Frequency Comparator is covered in this handbook.

SECTION IX
GROUP ASSEMBLY PARTS LIST

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY.	USABLE ON CODE
1-	E50123	FREQUENCY COMPARATOR SET, AN/USM-144	1	
-1	D50182	. CASE. Frequency comparator set	1	
	MS-2549	. CABLE ASSEMBLY, Power, electrical	1	
-2	AN3057-4	. . CLAMP, Cable	1	
-3	CO-03MGF(3/18) 0330	. . CABLE (mfd by 70331)	1	
-4	AN3106A-10SL-3S	. . CONNECTOR, Cable (mfd by 91577)	1	
-5	UP-121M	. . CONNECTOR, Cable (mfd. by 91577)	1	
	B50216	. CORD ASSEMBLY	1	
-6	RG-58C/U	. . CABLE (mfd. by 02660)	AR	
-7	UG-88C/U	. . CONNECTOR, Cable (mfd. by 31577)	2	
	B50215	. CABLE ASSEMBLY, RF	2	
-8	RG-55/U	. . CABLE (mfd. by 02660)	AR	
-9	UG-88C/U	. . CONNECTOR, Cable (mfd. by 91577)	2	
-10	J50204	. FREQUENCY COMPARATOR ASSEMBLY	1	
-11	F50183	. . INSTRUMENT CASE ASSEMBLY	1	
-12	B20589	. . . SCREW, Captive	4	
-13	X5133-18	. . . . RING, Retaining (mfd. by 79136)	1	

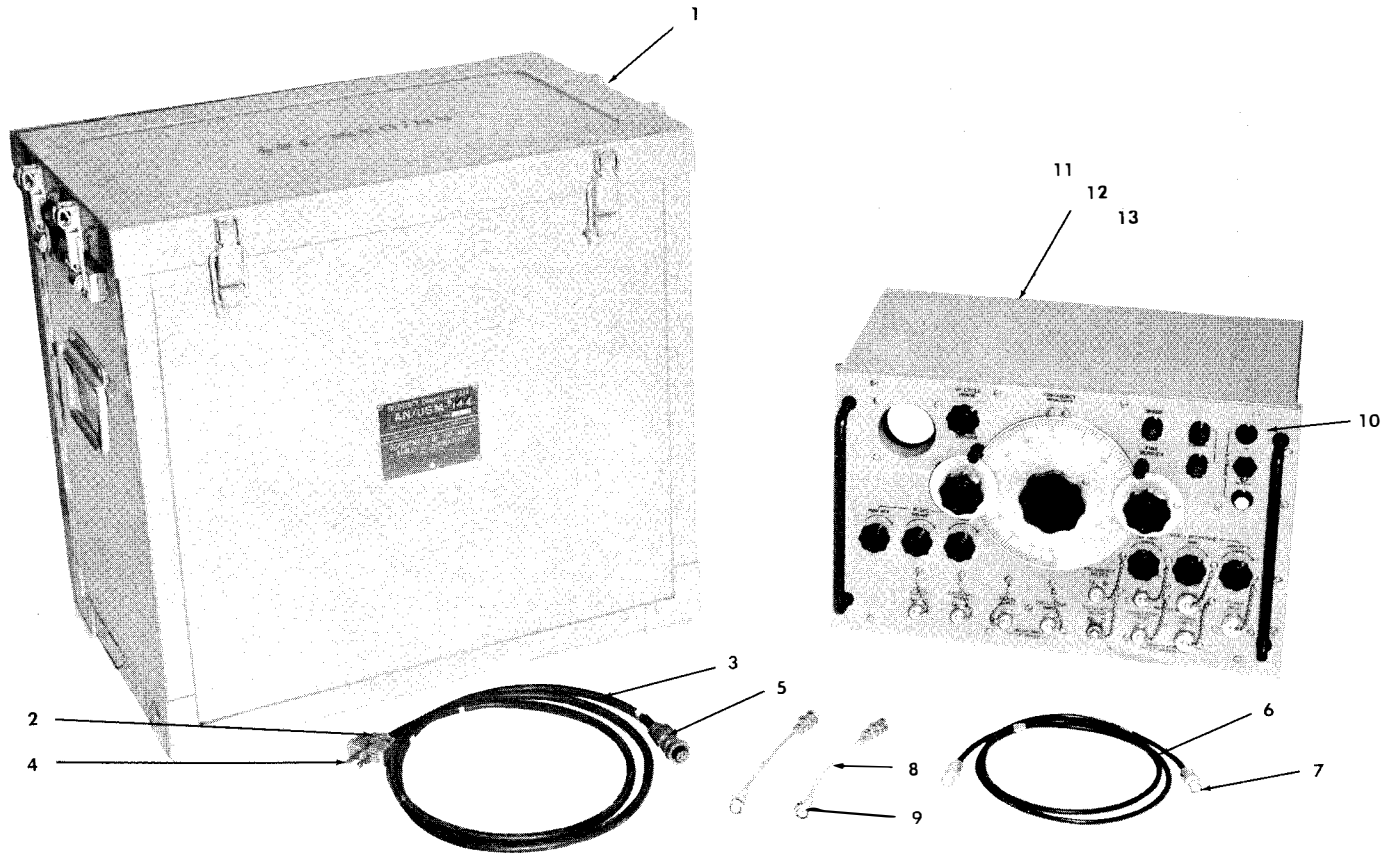


Figure 1. Frequency Comparator Set AN/USM-144

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY.	USABLE ON CODE
2-	J50205	. . FRONT PANEL ASSEMBLY	1	
-1	D20664	. . . FRONT PANEL	1	
-2	1018-14	. . . HANDLE ((mfd. by 91121)	2	
-3	900-14	. . . FERRULE (mfd. by 91121)	4	
		(ATTACHING PARTS)		
	B00160P48	. . . SCREW, Machine, flat hd, cres. No. 10-32x¾	4	
	B00155P4	. . . LOCKWASHER, Countersunk, cres. no. 10	4	
-4	A00170P	. . . PIN, Drive (mfd. by 07712)	2	
-6	FHN20G	. . . FUSEHOLDER, per MIL-F-19207 (mfg. by 71400)	3	
-7	MS90078-25-1	. . . FUSE (mfd. by 71400)	3	
-8	LH62BR2	. . . LAMPHOLDER, per MIL-L-3661 (mfd. by 72619)	1	
-9	LH62PW2	. . . LAMPHOLDER, per MIL-L-3661 (mfd. by 72619)....	1	
-10	47	. . . LAMP (mfd. by 24455)	2	
-11	ST22N	. . . SWITCH, Toggle, DPDT, per JAN-S-23A (mfd. by 73559)	1	
-12	1272	. . . . SWITCH, Boot (mfd. by 06540)	1	
		(ATTACHING PARTS)		
	B00172P140	. . . SCREW, Machine, round hd, cres. 3-56 x ½	16	
	B0020P22	. . . LOCKWASHER, Int., cres. no. 4	16	
		---*---		

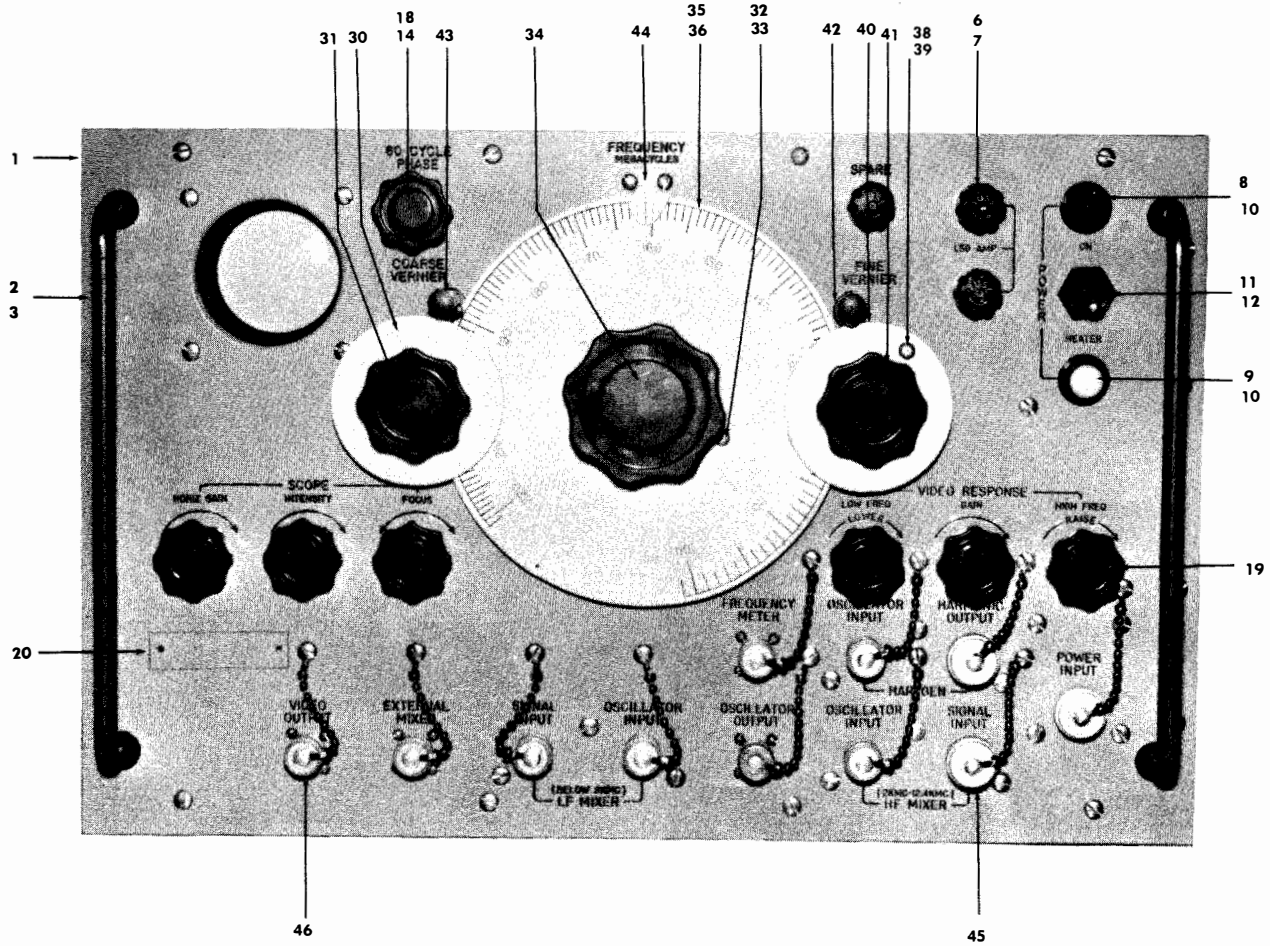


Figure 2. Front Panel Assembly (sheet 1 of 3)

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY.	USABLE ON CODE
2-13	RV4NAYSD504B	. . . RESISTOR, Variable: comp, 1 sec. 500,000ohms, ±20%; 2w nom. pwr. rating; Std. A taper. MIL-R-94B ..	2	
-14	RV4NAYSD254B	. . . RESISTOR, Variable: Comp., 1 sec. 250,000ohms, ±20%; 2w, nom. pwr. rating; std. A taper; MIL-R-94B ..	2	
-15	RV4NAYSD254E	. . . RESISTOR, Variable: Comp., 1 sec. 250,000ohms, ±10%; 2w nom. pwr. rating; std. A taper; MIL-R-94B ..	1	
-16	RV4NAYSD102A	. . . RESISTOR, Variable: Comp., 1 sec. 1,000ohms, ±10%; 2w nom. pwr. rating; std. A taper; MIL-R-94B ..	1	
	B50276	. . . RESISTOR ASSEMBLY, Low frequency	1	
-17	B20836	. . . . RESISTOR, Variable: Comp., 1 sec. 250,000ohms, ±10%; 2w nom. pwr. rating; std. A taper, with spst switch, ½A, 125VDC., normally open at CCW pos. of shft., operates at end of rotation, 2 terminals, solder lug type	1	
-17A	RC20GF182K	. . . . RESISTOR, Fixed, comp: 1,800ohms, ±10%; ..... ½w at 70°C, characteristic F.	1	
-18	A20832-1	. . . KNOB	1	
-19	A20832-2	. . . KNOB	6	
-20	A20694	. . . NAMEPLATE	1	
		(ATTACHING PARTS)		
	B00161P11	. . . SCREW. Machine binding hd., cres. 4-40x3/16	2	
	B00020P22	. . . LOCKWASHER, Int., cres. no. 4	2	
		---*---		
-21	A20640	. . . BLOCK, Bearing	1	
		(ATTACHING PARTS)		
	B00161P29A	. . . SCREW, Machine binding hd. cres. 6-32, 9/16	2	
	B00020P23	. . . LOCKWASHER, Int. cres. no. 6	2	
		---*---		
-22	A20348-4	. . . SHAFT	1	
-23	5133-25	. . . . RING, Retaining (mfd. by 79136)	1	
-24	G78-3	. . . . SHIM, .007 thk, cres. (mfd. by 00328)	1	
-25	A20930	. . . . GEAR, Spur	1	
-26	A20348-2	. . . SHAFT	1	
-27	5133-25	. . . . RING, Retaining (mfd. by 79136)	1	
-28	G78-3	. . . . . SHIM .007 thk. cres. (mfd. by 00328)	1	
-29	A20835	. . . . GEAR, Anti-backlash	1	
	A20838	. . . . PINCH DRIVE ASSEMBLY	1	
		(ATTACHING PARTS)		
	1220-08	. . . . LOCKWASHER, Int. cres. ⅜ (mfd. by 78189)	1	
		---*---		
	B50217	. . . DIAL ASSEMBLY, Coarse vernier	1	
-30	A20833	. . . . KNOB	1	
		(ATTACHING PARTS)		
	B00167P19	. . . . SCREW, Machine, flat hd. cres. 6-32 x ⅜	3	
		---*---		
-31	A20347-2	. . . . DIAL	1	
	B50213	. . . DIAL ASSEMBLY, Main	1	
-32	AN450C8AD9	. . . . RIVET	1	
-33	A20407-5	. . . . SPACER	1	
-34	A20834	. . . . Knob (mfd. by 88299) (25-066)	1	
		(ATTACHING PARTS)		
	B00161P28	. . . . SCREW, Machine, binding hd. cres. 6-32 x ½	3	
	B00023P22	. . . . LOCKWASHER, Ext. cres. no. 6	3	
		---*---		
-35	B20658	. . . . DISC, Pinch drive	1	
-36	C20346	. . . . DIAL	1	
-37	550A	. . . BEARING, Panel (mfd. by 71002)	1	
-37A	B00020P29	. . . . LOCKWASHER, Int. cres. ⅜ in.	2	
-38	B50212	. . . DIAL ASSEMBLY, Fine vernier	1	
-38	AN450C8AD12	. . . . RIVET	1	
-39	A20407-6	. . . . SPACER	1	
-40	A20833	. . . . KNOB (mfd. by 88299)	1	
		(ATTACHING PARTS)		
	B00167P19	. . . . SCREW, Machine, flat hd. cres., 6-32 x ⅜	3	
		---*---		
-41	A20347-1	. . . . DIAL	1	

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY.	USABLE ON CODE
2-42	1800-14	. . . LOCK, Dial (mfd. by 14183)	1	
-43	A20692	. . . LOCK, Dial (mfd. by 82185)	1	
		(ATTACHING PARTS)		
	A20407-2	. . . SPACER	1	
	A20407-3	. . . SPACER	1	
	B00020P255	. . . LOCKWASHER, Int. cres., no. 10	4	
	B00154P29	. . . NUT, Hex. cres., 10-32	2	
		---*---		
-44	A20689	. . . INDEX, Dial	1	
		(ATTACHING PARTS)		
	A20407-4	. . . SPACER	2	
	B00161P17A	. . . SCREW, Machine, binding hd., cres. 4-40 x 9/16	2	
	B00023P21	. . . LOCKWASHER, Ext. cres. no. 4	2	
	B00021P24	. . . NUT, Hex. cres. 4-40	2	
		---*---		
-45	MX913/U	. . . CAP (mfd. by 91577)	3	
-46	CW123A/U	. . . CAP (mfd. by 91577)	8	
		(ATTACHING PARTS)		
	B00161P23	. . . SCREW, Machine, binding hd, cres. 6-32 x 3/16	11	
	B00020P23	. . . LOCKWASHER, Int. cres. no. 6	11	
		---*---		
	C50218	. . . MIXER ASSEMBLY, High frequency	1	
		(ATTACHING PARTS)		
	B00161P26	. . . SCREW, Machine, binding hd. cres. 6-32 x ⅜	3	
	B00020P23	. . . LOCKWASHER, Int. cres. no. 6	3	
		---*---		
-47	C20641-11	. . . . HOUSING	1	
-48	B20656-1	. . . . COVER	1	
		(ATTACHING PARTS)		
	B00161P13	. . . . SCREW, Machine, binding hd. cres. 4-40 x 5/16	2	
	B00023P21	. . . . LOCKWASHER, Ext. cres. no. 4	2	
	B00167P9	. . . . SCREW, Machine, flat hd. cres. 4-40 x 5/16	2	
		---*---		
-49	A20654	. . . . INSULATOR	1	
		(ATTACHING PARTS)		
	B00161P16	. . . . SCREW, Machine, binding hd. cres. 4-40 x ½	4	
	B00023P21	. . . . LOCKWASHER, Ext. cres. no. 4	4	
		---*---		
-50	A20650	. . . . CLAMP, Diode	2	
	B00161P13	. . . . . SCREW, Machine, binding hd. cres. 4-40 x 5/16	2	
	B00023P21	. . . . . LOCKWASHER, Ext. cres. no. 4	2	
		(ATTACHING PARTS)		
	B00161P14	. . . . SCREW, Machine, binding hd. cres. 4-40 x ⅜.....	4	
	B00023P21	. . . . LOCKWASHER, Ext. cres. no. 4	4	
		---*---		
-51	4	. . . . LUG, Solder, .375i.d. (mfd. by 71002)	1	
	B50222	. . . . POST ASSEMBLY	1	
-52	A20651	. . . . . POST, Double Diode	1	
-53	A20652	. . . . . SOCKET, Diode	2	
		(ATTACHING PARTS)		
	B00161P14	. . . . SCREW, Machine binding hd. cres. 4-40 x ⅜	1	
	B00023P21	. . . . LOCKWASHER, Ext. cres. no. 4	1	
-54	1N21B	. . . . DIODE, Crystal, microwave: per MIL--E-1D	1	
-55	1N21CR	. . . . DIODE, Crystal, Microwave: reversed Polarity	1	
		per MIL-STD-200D		
-56	UG-680/U	. . . . CONNECTOR, Receptacle electrical: low loss	1	
		plastic dielectric, type N (mfd. by 91577)		
-57	UG-657/U	. . . . CONNECTOR, Receptacle electrical: low loss	1	
		plastic dielectric, type BNC (mfd. by 91577)		
-58	UG-1094/U	. . . . CONNECTOR, Receptacle electrical: low loss	1	
		plastic dielectric, type BNC (mfd. by 91577)		
-59	LT7K130	. . . . CHOKE, Radio frequency: 1μh, 610%, 1A, ...	1	
		.30ohms D.C. resistance, minimum Q of 45,		
		per MIL-C-15305, MS16224-6		
-60	CC21CH050D	. . . . CAPACITOR, Fixed, ceramic, 5$\mu\mu$f, $\pm$10%, ...	1	
		500v d-c, MIL-C-20B (mfd. by 91418)		

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY.	USABLE ON CODE
2-61	RC20GF101K	. . . . RESISTOR, Fixed, comp: 100ohms, ±10%, ½w at 70°C; characteristic F. MIL-R-11C	1	
-62	A20793	. . . . PLUG	2	
	C50208	. . . MIXER ASSEMBLY, Low frequency	1	
		(ATTACHING PARTS)		
	B00161P26	. . . SCREW, Machine, binding hd. cres. 6-32 x ⅜	3	
	B00020P23	. . . LOCKWASHER, Int. cres. no. 6	3	
		---*---		
-63	C20641-3	. . . . HOUSING	1	
-64	B20656-2	. . . . COVER	1	
		(ATTACHING PARTS)		
	B00161P13	. . . . SCREW, Machine, binding hd. cres. 4-40 x 5/16	2	
	B00023P21	. . . . LOCKWASHER, Ext. cres. no. 4	2	
	B00167P9	. . . . SCREW, Machine, flat hd. cres. 4-40 x 5/16	2	
		---*---		

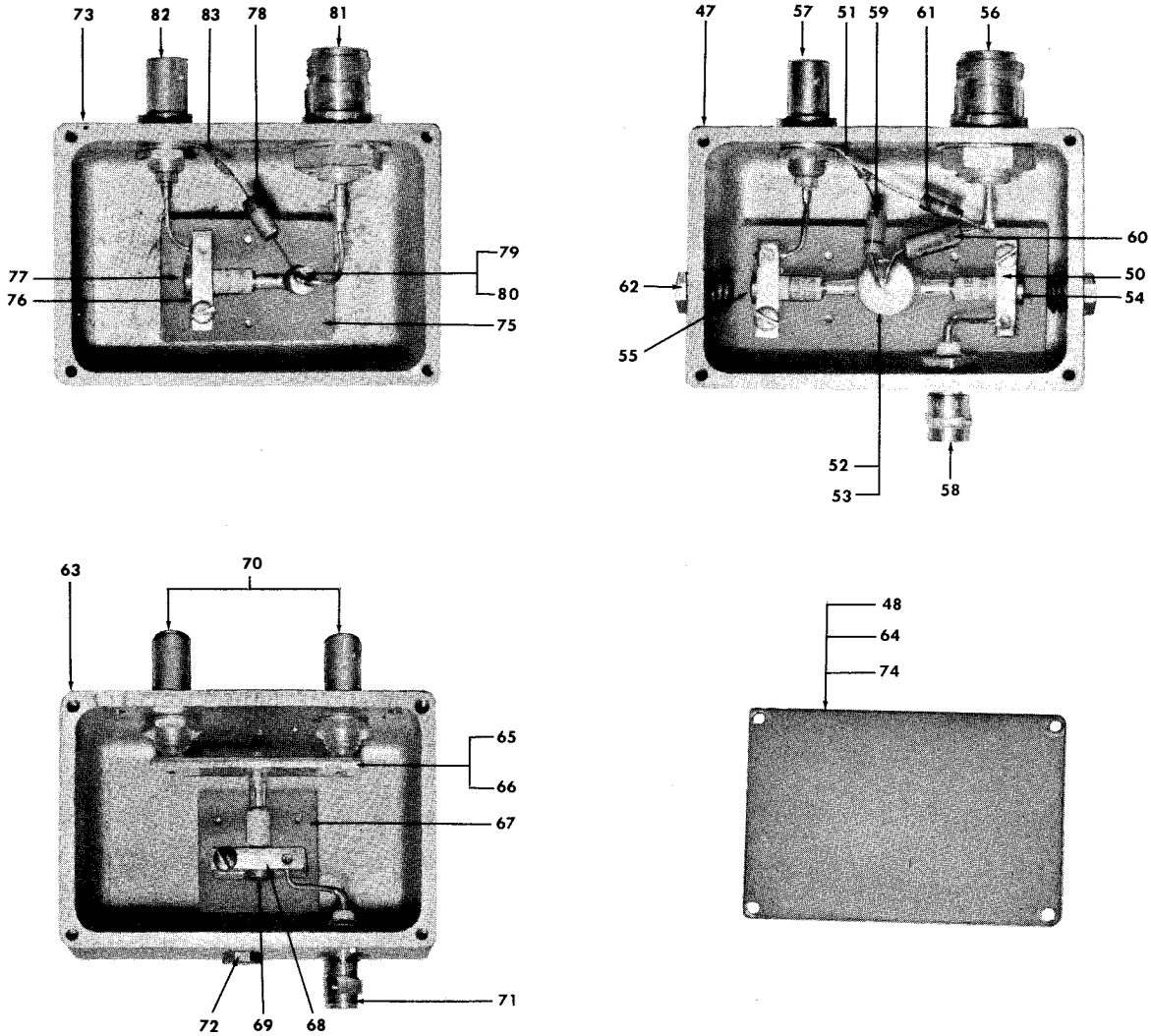


Figure 2. Front Panel Assembly (sheet 2 of 3)

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY.	USABLE ON CODE
2-	B50224	. . . . CONTACT BAR ASSEMBLY	1	
-65	A20320	. . . . . BAR, Contact	1	
-66	A20652	. . . . . SOCKET, Diode	1	
-67	A20684	. . . . INSULATOR	1	
		(ATTACHING PARTS)		
	B00161P16	. . . . SCREW, Machine, binding hd. cres. 4-40 x ½	2	
	B00023P21	. . . . LOCKWASHER, Ext. cres. no. 4	2	
		---*---		
-68	A20650	. . . . CLAMP, Diode	1	
	B00161P13	. . . . . SCREW, Machine, binding hd. cres. 4-40 x 5/16	1	
	B00023P21	. . . . . LOCKWASHER, Ext. cres. no. 4	1	
		(ATTACHING PARTS)		
	B00161P14	. . . . SCREW, Machine, binding hd. cres. 4-40 x ⅜	2	
	B00023P21	. . . . LOCKWASHER, Ext. cres. no. 4	2	
		---*---		
-69	1N21B	. . . . DIODE, Crystal, microwave: MIL-E-1D	1	
		(mfd. by 82219)		
-70	UG-657/U	. . . . CONNECTOR, Receptacle, electrical: low loss	2	
		plastic dielectric type BNC		
-71	UG-1094/U	. . . . CONNECTOR, Receptacle, electrical: low loss	1	
		plastic dielectric, type BNC		
-72	A20793	. . . . PLUG	1	
	C50219	. . . HARMONIC GENERATOR ASSEMBLY	1	
		(ATTACHING PARTS)		
	B00161P26	. . . SCREW, Machine, binding hd. cres. 6-32 x ⅜	3	
	B00020P23	. . . LOCKWASHER, Int. cres. no. 6	3	
		---*---		
-73	C20641-2	. . . . HOUSING	1	
-74	B20656-3	. . . . COVER	1	
		(ATTACHING PARTS)		
	B00161P13	. . . . SCREW, Machine, binding hd. cres. 4-40 x 5/16	4	
	B00023P21	. . . . LOCKWASHER, Ext. cres. no. 4	4	
		---*---		
-75	A20655	. . . . INSULATOR	1	
		(ATTACHING PARTS)		
	B00161P16	. . . . SCREW, Machine, binding hd. cres. 4-40 x ½	2	
	B00023P21	. . . . LOCKWASHER, Ext. cres. no. 4	2	
		---*---		
-76	A20650	. . . . CLAMP, Diode	1	
	B00161P13	. . . . . SCREW, Machine binding hd. cres. 4-40 x 5/16	1	
	B00023P21	. . . . . LOCKWASHER, Ext. cres. no. 4	1	
		(ATTACHING PARTS)		
	B00161P14	. . . . SCREW, Machine binding hd. cres. 4-40 x ⅜	2	
	B00023P21	. . . . LOCKWASHER, Ext. cres. no. 4	2	
		---*---		
-77	IN21B	. . . . DIODE, Crystal, microwave: per MIL-E-1D	1	
		(mfd. by 82219)		
-78	LT7K130	. . . . COIL, Radio freq. 1μh, ±10%, 1A, 0.30ohms d-c....	1	
		resistance, minimum Q of 45, per MIL-C-15305		
		(mfd. by 54753)		
	B50223	. . . . POST ASSEMBLY	1	
-79	A20653	. . . . . POST, Single diode	1	
-80	A20652	. . . . . SOCKET, Diode	1	
		(ATTACHING PARTS)		
	B00161P14	. . . . SCREW, Machine, binding hd. cres. 4-40 x ⅜	1	
	B00023P21	. . . . LOCKWASHER, Ext. cres. no. 4	1	
		---*---		
-81	UG-680/U	. . . . CONNECTOR, Receptacle, electrical: low loss	1	
		plastic dielectric, type N (mfd. by 91577)		
-82	UG-657/U	. . . . CONNECTOR, Receptacle electrical: low loss	1	
		plastic dielectric, type BNC (mfd. by 91577)		
-83	4	. . . . LUG, Solder (mfg. by 71002)	1	
	B50210	. . . POWER INPUT ASSEMBLY	1	
		(ATTACHING PARTS)		
	B00161P29	. . . SCREW, Machine, binding hd. cres. 6-32 x ⅝	4	
	B00020P23	. . . LOCKWASHER, Int. cres. no. 6	4	
		---*---		

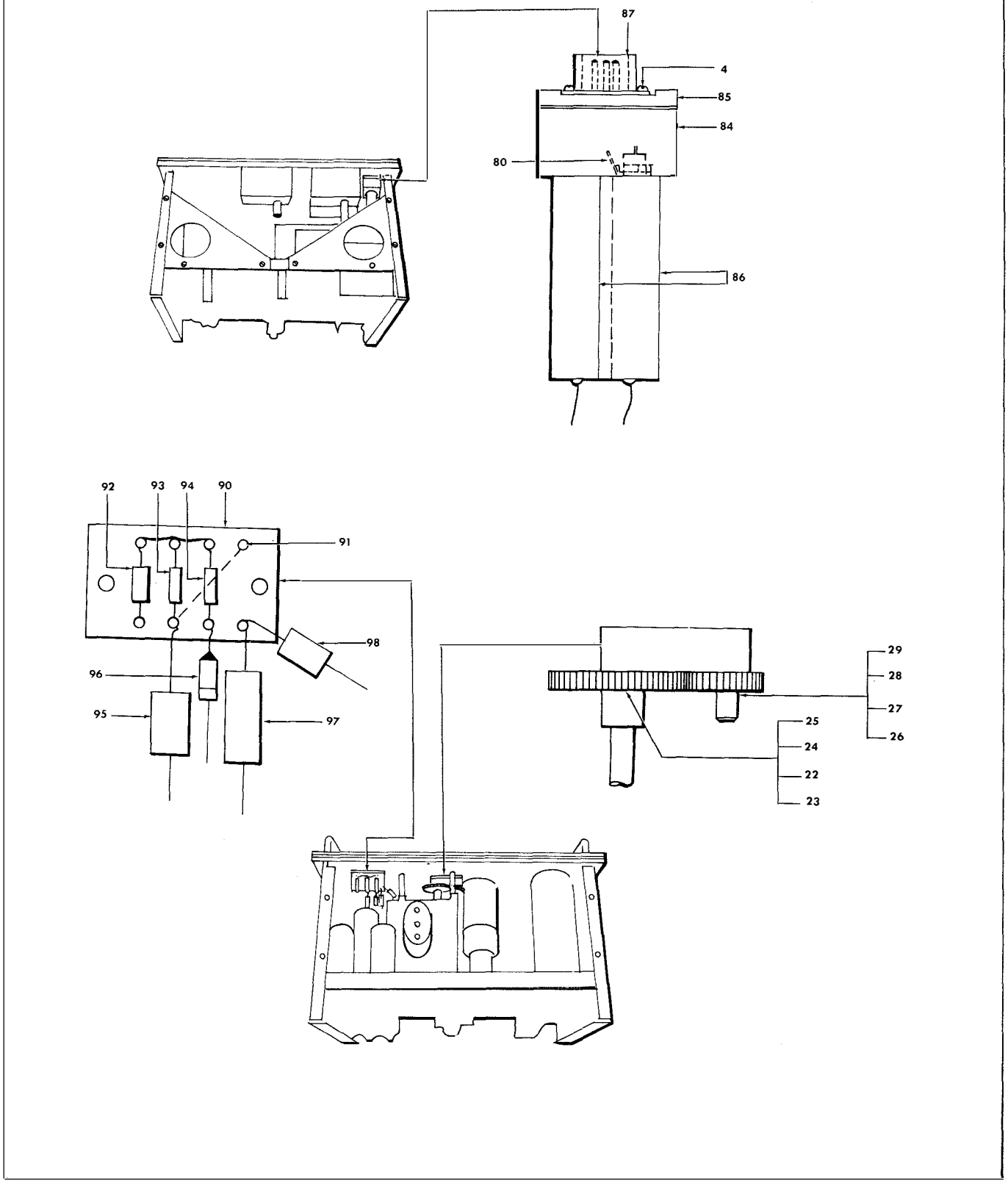


Figure 2. Front Panel Assembly (sheet 3 of 3)

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY.	USABLE ON CODE
2-84	B20643	. . . . BLOCK, Power input	1	
-85	A20649	. . . . COVER	1	
		(ATTACHING PARTS)		
	B00161P11	. . . . SCREW, Machine, binding hd. cres. 4-40 x 3/16	4	
		---*---		
-86	CZ24B2WC105A	. . . . CAPACITOR, Fixed, paper, radio interference type: ..	2	
		1μfd, 200v d-c per MIL-C-11693A (mfd. by 14655)		
-87	MS3102A10SL-3P	. . . . CONNECTOR, Receptacle, power: per MIL-C-5015 ..	1	
		(mfd. by 91577)		
-88	80	. . . . LUG, Terminal, 0.315i.d. (mfd. by 79963)	1	
	B50275	. . . COMPONENT BOARD ASSEMBLY	1	
		(ATTACHING PARTS)		
	B00021P24	. . . NUT, Hex, cres. 4-40	2	
	B00020P22	. . . LOCKWASHER, Int. cres. no. 4	2	
-89	A20407-6	. . . SPACER	2	
	B00161P17	. . . SCREW, Machine, binding hd. cres. 4-40 x 5/8	2	
		---*---		
	A50211	. . . . TERMINAL BOARD ASSEMBLY	1	
-90	A50211-1	. . . . BOARD, Terminal	1	
-91	A20871	. . . . . TERMINAL (mfd. by 70892) (T 100-9)	8	
-92	LT7K130	. . . . CHOKE, RF: 1μh, ±10%, 1A, 0.30ohms d-c	1	
		resistance, minimum Q of 45, per MIL-C-15305		
		(mfd. by 54753)		
-93	RC20GF122K	. . . . RESISTOR, Fixed comp: 1,200ohms, ±10%;.....	1	
		½w at 70°C; characteristic F; MIL-R-11C		
		(mfd. by 01121)		
-94	RC20GF680K	. . . . RESISTOR, Fixed comp: 68ohms, ±10%; ½w at....	1	
		70°C; characteristic F; MIL-R-11C (mfd. by 01121)		
-95	CM20D471K	. . . . CAPACITOR, Fixed, mica: 470μμfd, ±10%, ...	1	
		500VDC per MIL-C-5A (mfd. by 91418)		
-96	CL44BH080SP	. . . . CAPACITOR, Tant. electrolytic: 8μfd, 30 v d-c.	1	
		MIL-C-3965B (mfd. by 82376)		
-97	CP05A1EC473K	. . . . CAPACITOR, Fixed, paper: 0.047μfd, ±10%, ...	1	
		200v d-c; MIL-C25A (mfd. by 82376)		
-98	CM15C101K	. . . . CAPACITOR, Fixed, mica: 100μμfd, ±10%, ...	1	
		300v d-c. MIL-C-5A (mfd. by 91418)		

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY.	USABLE ON CODE
3-	B50206	R F SECTION ASSEMBLY	1	
		(ATTACHING PARTS)		
	B00161P52	SCREW, Machine, binding hd. cres 8-32 x 2.....	2	
	B00161P52A	SCREW, Machine, binding hd. cres. 8-32 x 2-⅛	1	
	B00163P40A	SCREW, Machine, socket hd. cres. 8-32 x 2-⅛.....	1	
	B00020P24	LOCKWASHER, Int. cres. no. 8.....	4	
	A20407-1	SPACER.....	4	
		---*---		
	C50063	. COVER PLATE ASSEMBLY.....	1	

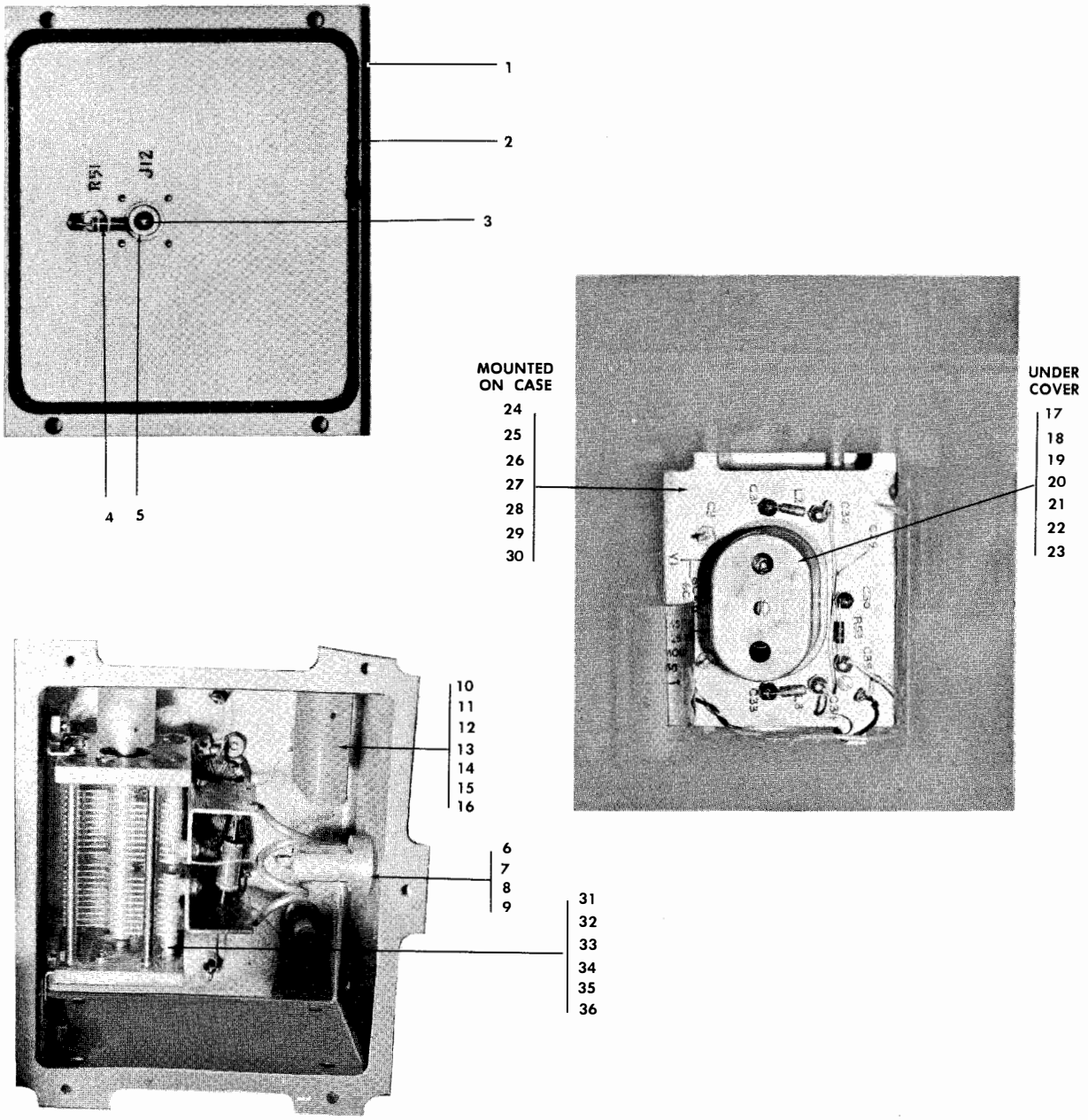


Figure 3. Front Panel Assembly (Subassemblies)

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY.	USABLE ON CODE
3-1	B20296	. . PLATE, Cover	1	
		(ATTACHING PARTS)		
	B00161P26	. . SCREW, Machine, binding hd. cres. 6-32 x ⅜	4	
	B00023P22	. . LOCKWASHER, Ext. cres. no. 6	4	
		---*---		
-2	A20685	. . SHIELD, Radio int	1	
-3	4007	. . LUG, Solder, 0.115dia (mfd. by 77147)	1	
		(ATTACHING PARTS)		
	B00161P15	. . SCREW, Machine, binding hd. cres. 4-40 x 7/16	1	
	B00023P21	. . LOCKWASHER, Ext. cres. no. 4	2	
	B00021P24	. . NUT, Hex. cres. 4-40	1	
		---*---		
-4	RC20GF560K	. . RESISTOR, Fixed comp: 56ohms., ±10%; ½w at 70°C;	1	
		characteristic F; MIL-R-11C(mfd. by 01121)		
-5	UG-185/U	. . CONNECTOR, Receptacle, electrical: low loss plastic	1	
		dielectric, type BNC (mfd. by 91577)		
		(ATTACHING PARTS)		
	B00161P12	. . SCREW, Machine binding hd. cres. 4-40 x ¼	4	
	B00023P21	. . LOCKWASHER, Ext. cres. no. 4	4	
		---*---		
	C50220	. HOUSING ASSEMBLY, R F	1	
	C50145	. . PROBE ASSEMBLY	1	
		(ATTACHING PARTS)		
	A00114P5	. . SCREW, Set, soc. cup pt. cres. 6-32 x ¼	1	
		---*---		
-6	B20518	. . . PROBE	1	
-7	UG-291/U	. . . CONNECTOR, Receptacle, electrical: low loss plastic	1	
		dielectric, type BNC(mfd. by 91577)		
-8	RG-55/U	. . . CABLE, Coaxial (mfd. by 02660)	AR	
-9	RN20X53R3F	. . . RESISTOR, Fixed film: 53.3ohms, ±10%; ½w at 70°C;	1	
		MIL-R-10509B (mfd. by 46384)		
		(ATTACHING PART)		
	A0014P4	. . . SCREW, Set, soc. 4-40 x ⅛ cres	1	
		---*---		
	B50214	. . FINE VERNIER ASSEMBLY	1	
-10	5133-25	. . . RING, Retaining (mfd. by 79136)	1	
-11	C00010P26	. . . WASHER	1	
-12	3502-14-09	. . . WASHER, Spring, cres. (mfd. by 77900)	1	
-13	012-062-0625-79	. . . PIN, Roll, 0.062dia x ⅝, cres. (mfd. by 72962)	1	
-14	A20348-1	. . . SHAFT	1	
-15	A20318	. . PLATE, Tuning	1	
		(ATTACHING PART)		
	B00161P11	. . SCREW, Machine, binding hd. cres. 4-40 x 3/16	1	
		---*---		
-16	A20319	. . INSULATOR, Plate	1	
-17	TS102P03	. . SOCKET, Tube, electron: 7 pin miniature, MIL-S-12883/10,	2	
		without center shield. (mfd. by 91662)		
-18	A20918	. . CLAMP, Tube	2	
-19	B20769	. . BASE, Clamp, tube	2	
		(ATTACHING PARTS)		
	B00161P13	. . SCREW, Machine, binding hd. cres. 4-40 x 5/16	2	
	B00023P21	. . LOCKWASHER, Ext. cres. no. 4	2	
	B00021P24	. . NUT, Hex. cres. 4-40	2	
		---*---		
-20	6C4WA	. . TUBE, Electron: single triode, MIL-STD-200D	2	
		(mfd. by 24454)		
-21	A20690	. . POST, Shield	1	
		(ATTACHING PARTS)		
	B00161P25	. . SCREW, Machine, binding hd. cres. 6-32 x 5/16	1	
	B00023P22	. . LOCKWASHER, Ext. cres. no. 6	2	
		---*---		
-22	CK70A102M	. . CAPACITOR, Fixed, ceramic, feedthru: 1000μμfd,	4	
		±20%, 500v d-c; per MIL-C-19321 (mfd. by 91418)		

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY.	USABLE ON CODE
3-23	B20307	. . SHIELD, R. F.	1	
		(ATTACHING PARTS)		
	B00161P25	. . SCREW, Machine, binding hd. cres. 6-32 x 5/16.....	1	
	B00023P22	. . LOCKWASHER, Ext. cres. no. 6.....	1	
		---*---		
-24	CK80A152M	. . CAPACITOR, Fixed, ceramic, stand-off: 1500$\mu\mu$fd, $\pm$20%,..	3	
		500v d-c, per MIL-C-19321 (mfd. by 91418)		
-25	680073	. . CAPACITOR, Variable, piston: 0.3-3 $\mu\mu$fd, 500v d-c;	2	
		(mfd. by 14674)		
-26	LT7K130	. . CHOKE, R F: 1μh, $\pm$10%, 1A, 0.30ohms d-c resistance,....	2	
		minimum Q or 45, per MIL-C-15305 (mfd. by 54753)		
-27	RC20GF270K	. . RESISTOR, Fixed comp: 27ohms, $\pm$10%; ½w at 70°C;....	3	
		characteristic F; MIL-R-11C (mfd. by 01121)		
-28	4007	. . LUG, Solder (mfd. by 77147).....	1	
		(ATTACHING PARTS)		
	B00161P24	. . SCREW, Machine, binding hd. cres. 6-32 x ¼.....	1	
	B00023P22	. . LOCKWASHER, Ext. cres. no. 6.....	1	
		---*---		
-29	CC21CH050D	. . CAPACITOR, Fixed, ceramic: 5$\mu\mu$fd, $\pm$10%, 500v d-c;	2	
		MIL-C-20B (mfd. by 91418)		
-30	RC20GF273K	. . RESISTOR, Fixed comp: 27000ohms, $\pm$10%, ½w at 70°C;	2	
		characteristic F; MIL-R-11C (mfd. by 01121)		
	B50221	. TUNING CAPACITOR ASSEMBLY.....	1	
		(ATTACHING PARTS)		
	B00021P26	. NUT, Hex. cres. 6-32.....	2	
	B00023P22	. LOCKWASHER, Ext. cres. no. 6.....	2	
	B00161P28	. SCREW, Machine, binding hd. cres. 6-32 x ½.....	2	
		---*---		
-31	A20308B	. BRACKET, Coil.....	1	
-32	A20308A	. BRACKET, Coil.....	1	
-33	A20645	. COIL, R F, 2 turns of #11 copper wire silver plated 0.07 μh..	1	
-34	B20312	. CAPACITOR, Variable, air: 3 to 45$\mu\mu$fd, 700VDC, ...	1	
		(mfd. by 80583) (VU-45)		
-35	A20317	. SHAFT, Coupling.....	1	
-36	012-062-0625-79	. . PIN, Roll, 0.062 dia x ⅝ cres. (mfd. by 72962).....	1	

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY.	USABLE ON CODE
4-	H50207	CHASSIS ASSEMBLY	1	
-1	B20686	. SHIELD, Strip, radio int.	1	
-2	B20249	. SHIELD, Strip, radio int.	1	
-3	B20586	. ANGLE	2	
		(ATTACHING PARTS)		
	B00161P43	. SCREW, Machine binding hd. cres. 8-32 x ½	8	
	B00020P24	. LOCKWASHER, Int. cres. no. 8	8	
		---*---		
-4	B20587	. GUIDE STRIP	2	
		(ATTACHING PARTS)		
	B00161P28	. SCREW, Machine, binding hd. cres. 6-32 x ½	8	
	B00020P23	. LOCKWASHER, Int. cres. no. 6	8	
		---*---		
-5	B20588	. GUIDE STRIP, End	2	
		(ATTACHING PARTS)		
	B00161P43	. SCREW, Machine, binding hd. cres. 8-32 x ½	4	
	B00023P23	. LOCKWASHER, Ext. cres. no. 8	4	
	C00010P30	. FLATWASHER, No. 8	4	
		---*---		
-6	C50232	. SHIELD, Cathode ray	1	
		(ATTACHING PARTS)		
	B00021P26	. NUT, Hex. cres. 6-32	4	
	B00161P28	. SCREW, Machine, binding hd. cres. 6-32 x ½	4	
	B00020P23	. LOCKWASHER, Int. cres. no. 6	4	
		---*---		

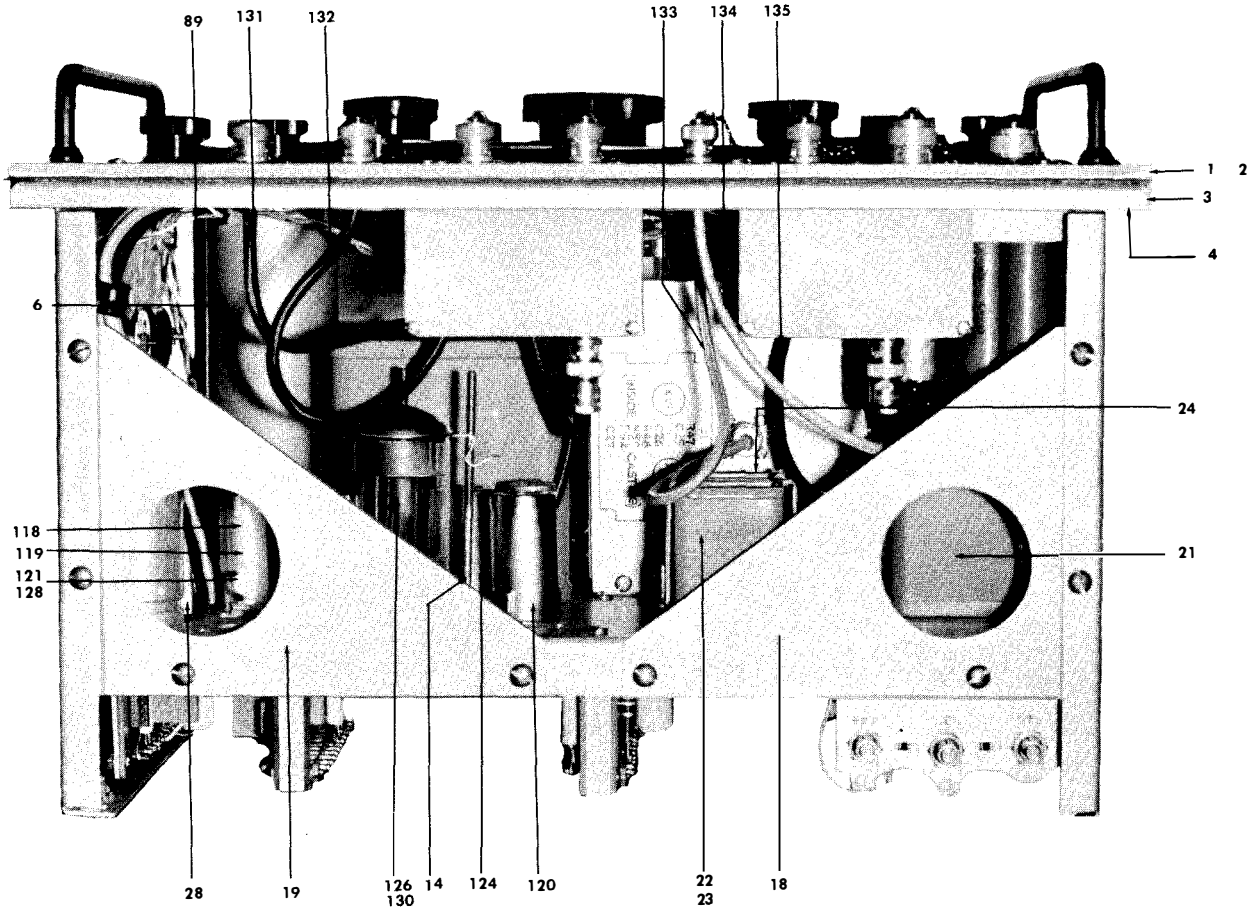


Figure 4. Chassis Assembly (sheet 1 of 3)

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY.	USABLE ON CODE
4-7	2214	. GROMMET (mfd. by 70485)	1	
-8	1862	. GROMMET (mfd. by 70485)	1	
-9	2901-A	. GROMMET (mfd. by 70485)	5	
-10	C7956-1428-3B7	. NUT, Retainer (mfd. by 78553)	4	
		(ATTACHING PART)		
	AN426AD3-4	. RIVET (mfd. by 96375)	4	
		---*---		
-11	HP-6N	. CLAMP, Cable (mfd. by 09922)	2	
-12	HP-3N	. CLAMP, Cable (mfd. by 09922)	2	
		(ATTACHING PARTS)		
	B00021P26	. NUT, Hex. cres. 6-32	4	
	B00161P26	. SCREW, Machine binding hd. cres. 6-32 x ⅜	4	
	B00023P22	. LOCKWASHER, Ext. cres. no. 6	4	
	C-00010J29	. FLATWASHER, cres. no. 6	4	
-13	42	. RETAINER, Post (mfd. by 80130)	2	
-14	52	. RETAINER, Post (mfd. by 80130)	1	
		(ATTACHING PARTS)		
	B00021P27	. NUT, Hex. cres. 8-32	6	
	B00023P23	. LOCKWASHER, Ext. cres. no. 8	6	
		---*---		
-15	D50146	. CHASSIS	1	
-16	D50154A	. PLATE, Side, left	1	
-17	D50154B	. PLATE, Side, right	1	
		(ATTACHING PARTS)		
	B00061P41	. SCREW, Machine, binding hd. cres. 8-32 x ⅜	8	
	B00023P23	. LOCKWASHER, Ext. cres. no. 8	8	
		---*---		
-18	B50147A	. GUSSET, Left	1	
-19	B50147B	. GUSSET, Right	1	
		(ATTACHING PARTS)		
	B00171P41	. SCREW, Machine, truss hd. cres. 8-32 x ⅜	8	
	B00023P23	. LOCKWASHER, Ext. cres. no. 8	4	
		---*---		
-19A	146	. HOLDER, Clip (mfd. by 79963)	3	
		(ATTACHING PARTS)		
	B00021P26	. NUT, Hex. cres. 6-32	3	
	B00161P24	. SCREW, Machine, binding hd. cres. 6-32 x ¼	3	
	B00023P22	. LOCKWASHER, Ext. cres. no. 6	3	
		---*---		
-20	C20240	. TRANSFORMER, per MIL-T-27A	1	
		(ATTACHING PARTS)		
	B00023P24	. LOCKWASHER, Ext. cres. no. 10	4	
	B00154P29	. NUT, Hex. cres. 10-32	4	
		---*---		
-21	C20239	. INDUCTOR, 1 coil, 6h, 0.130A, 600v d-c W max.,	1	
		240ohms d-c resistance per MIL-T-27A		
		(ATTACHING PARTS)		
	B00023P23	. LOCKWASHER, Ext. cres. no. 8	4	
	B00021P27	. NUT, Hex, cres. 8-32	4	
		---*---		
-22	CP70E1FH254K	. CAPACITOR, Fixed paper: 0.25μfd, ±10% 1500v d-c,	2	
		per MIL-C-25A (mfd. by 82376)		
-23	CP07SA2	. BRACKET (mfd. by 82376)	4	
		(ATTACHING PARTS)		
	B00023P24	. LOCKWASHER, Ext. cres. no. 10	4	
	B00154P29	. NUT, Hex. cres. 10-32	4	
		---*---		
-24	CP55B1EG254K	. CAPACITOR, Fixed, paper: 0.25μfd, ±10%, 1000v d-c,	1	
		per MIL-C-25A (mfd. by 82376)		
		(ATTACHING PARTS)		
	B00161P41	. SCREW, Machine, binding hd. cres. 8-32 x ⅜	2	
	B00023P23	. LOCKWASHER, Ext. cres. no. 8	2	
	B00021P27	. NUT, Hex, cres. 8-32	2	
		---*---		
-25	CE42F200R	. CAPACITOR, Fixed, electrolytic: 20-20μfd, ±10% 450v d-c,	2	
		per MIL-C-62A (mfd. by 82376)		

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY.	USABLE ON CODE
4-26	CE42F400R	. CAPACITOR, Fixed, electrolytic: 40-40μfd, ±10%, 450v d-c, .. per MIL-C-62A (mfd. by 82376)	1	
-27	CE41C651F	. CAPACITOR, Fixed, electrolytic: 650μfd, ±10%, 25v d-c,.... per MIL-C-62A (mfd. by 82376)	1	
-28	CP11A3EE684M	. CAPACITOR, Fixed, paper: 0.68μfd, ±20%, 400v d-c,..... per MIL-C-25A (mfd. by 82376)	2	
-29	TS101P02	. SOCKET, Tube, Octal type, per MIL-S-12883/1..... (mfd. by 91662)	2	
		(ATTACHING PARTS)		
	B00161P25	. SCREW, Machine, binding hd. cres. 6-32 x 5/16.....	2	
	B00023P22	. LOCKWASHER, Ext. cres. no. 6	2	
		---*---		
-30	TS103P01	. SOCKET, Tube: 9 pin miniature, MIL-S-12883/3 without .. center shield (mfd. by 91662)	3	
		(ATTACHING PARTS)		
	B00021P24	. NUT, Hex. cres. 4-40.....	2	
	B00161P14	. SCREW, Machine, binding hd. cres. 4-40 x 3/8.....	2	
	B00023P21	. LOCKWASHER, Ext. cres. no. 4.....	2	
		---*---		
-31	9470-12	. SOCKET, Tube: cathode ray type, 12 pin, ... Navy No. CMG-492005 (mfd. by 71785)	1	

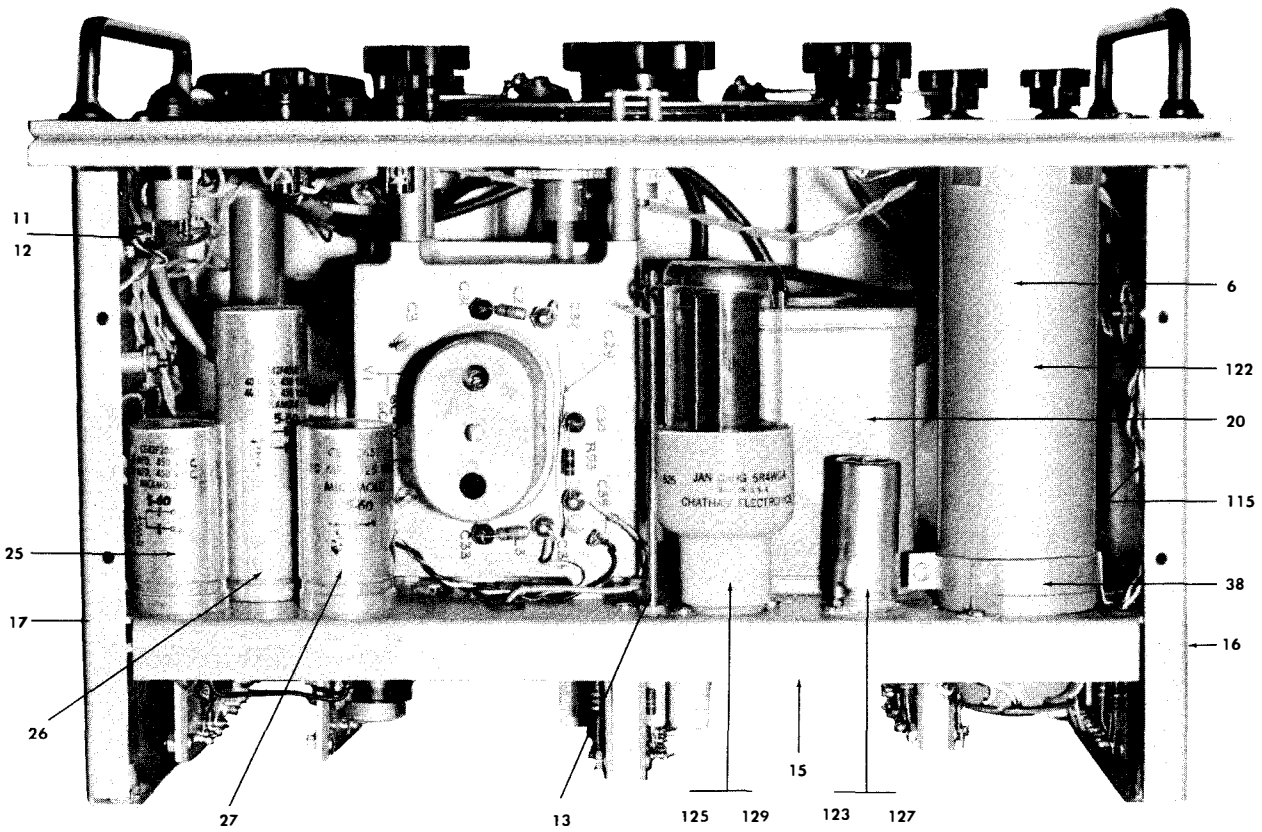


Figure 4. Chassis Assembly (sheet 2 of 3)

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY.	USABLE ON CODE
4-32	TS102P01	. SOCKET, Tube: 7 pin miniature, MIL-S-12883/2 without .. center shield (mfd. by 91662)	4	
		(ATTACHING PARTS)		
	B00021P24	. NUT, Hex, cres. 4-40	2	
	B00161P14	. SCREW, Machine, binding hd., cres. 4-40 x 3/8	2	
	B00023P21	. LOCKWASHER, Ext. cres. no. 4	2	
		---*---		
-33	194	. LUG, Ground (mfd. by 79963)	1	
-34	RW21G100	. RESISTOR, Fixed, wirewound: 10ohms, ±5%, 22w, per .. MIL-R-26C (mfd. by 44655)	1	
		(ATTACHING PARTS)		
	B00021P26	. NUT, Hex, cres. 6-32	2	
	B00161P30	. SCREW, Machine, binding hd. cres. 6-32 x 3/4	2	
	B00023P22	. LOCKWASHER, Ext. cres. no. 6	2	
		---*---		
-35	1N1804A	. DIODE, ZENER, 6. 2v at 1a, 10w, ±5% voltage ..... tolerance; 1 ohm maximum dynamic resistance (mfd. by 72699)	1	
-36	4	. LUG, Ground (mfd. by 71002)	2	
-37	B50148	. BRACKET, Potentiometer	1	
		(ATTACHING PARTS)		
	B00161P26	. SCREW, Machine, binding hd. cres. 6-32 x 3/8	2	
	B00023P22	. LOCKWASHER, Ext. cres. no. 6	2	
		---*---		
-38	B20591	. CLAMP, Ring	1	
		(ATTACHING PARTS)		
	B00021P26	. NUT, Hex, cres. 6-32	4	
	B00161P26	. SCREW, Machine, binding hd. cres. 6-32 x 3/8	4	
	B00023P22	. LOCKWASHER, Ext. cres. no. 6	4	
		---*---		
	C50201	. COMPONENT BOARD ASSEMBLY	1	
		(ATTACHING PARTS)		
	B00161P26	. SCREW, Machine, binding hd. cres. 6-32 x 3/8	2	
	B00023P22	. LOCKWASHER, Ext, cres. no. 6	2	
		---*---		
	B50191	. . TERMINAL BOARD ASSEMBLY	1	
	B50197	. . TERMINAL BOARD ASSEMBLY	1	
-39	B50191-1	. . . TERMINAL BOARD	2	
-40	A20871	. . . . TTRMINAL (mfd. by 70892) (T100-9)	48	
-41	A20248	. . POST	2	
		(ATTACHING PARTS)		
	B00021P26	. . NUT, Hex, cres. 6-32	4	
	B00161P30	. . SCREW, Machine, binding hd. cres. 6-32 x 3/4	4	
	B00023P22	. . LOCKWASHER, Ext. cres. no. 6	4	
		---*---		
-42	CM15C470K	. . CAPACITOR, Fixed, mica: 47μμfd ±10% 300v d-c, per ... MIL-C-5A (mfd. by 91418)	1	
-43	CP05A1EE103K	. . CAPACITOR, Fixed, paper: 0.01μfd ±10%, 400v d-c, per .. MIL-C-25A (mfd. by 82376)	2	
-44	CM30D821K	. . CAPACITOR, Fixed, mica: 820μμfd, ±10%, 500v d-c, ... per MIL-C-5A (mfd. by 91418)	1	
-45	CM30D182K	. . CAPACITOR, Fixed, mica: 1800μμfd, ±10%, 500v d-c, .. per MIL-C-5A (mfd. by 91418)	1	
-46	RC20GF680K	. . RESISTOR, Fixed, comp: 68 ohms, ±10%, ½w at 70°C; .. characteristic F, per MIL-R-11C (mfd. by 01121)	1	
-47	RC20GF221K	. . RESISTOR, Fixed, comp: 220 ohms, ±10%, ½w at 70°C; .. characteristic F, per MIL-R-11C (mfd. by 01121)	1	
-48	RC32GF392K	. . RESISTOR, Fixed, comp: 3900 ohms, ±10%, 1w at 70°C; .. characteristic F, per MIL-R-11C (mfd. by 01121)	2	
-49	RC20GF101K	. . RESISTOR, Fixed, comp: 100 ohms, ±10%, ½w at 70°C; .. characteristic F, per MIL-R-11C (mfd. by 01121)	1	
-50	RC20GF105K	. . RESISTOR, Fixed, comp: 1.0 megohm, ±10%; ½w at.... 70°C; characteristic F, per MIL-R-11C (mfd. by 01121)	2	
-51	RC32GF562K	. . RESISTOR, Fixed, comp: 5600 ohms, ±10%, 1w at .... 70°C; characteristic F, per MIL-R-11C (mfd. by 01121)	2	

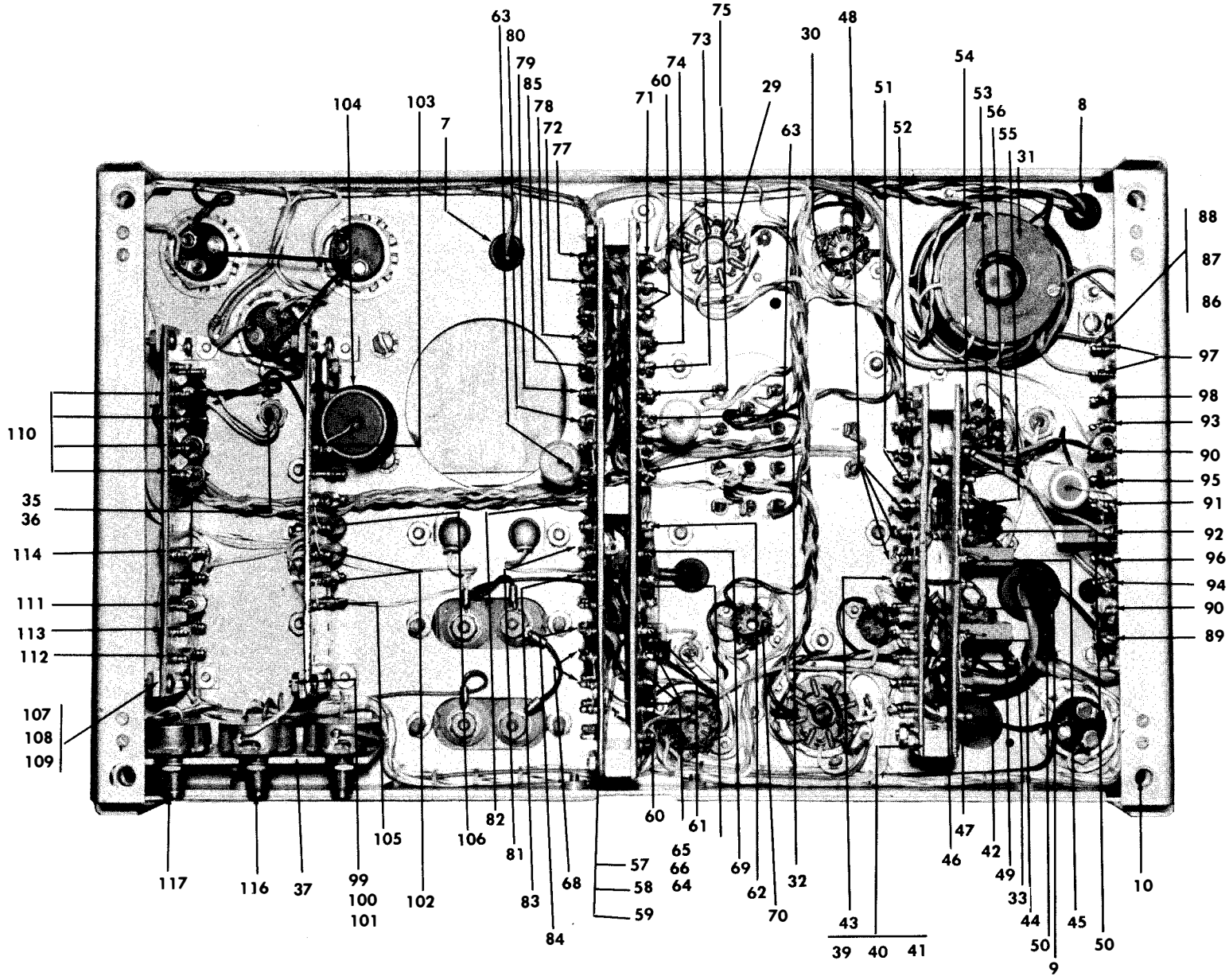


Figure 4. Chassis Assembly (sheet 3 of 3)

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY.	USABLE ON CODE
4-52	RC32GF273K	. . RESISTOR, Fixed, comp: 27,000 ohms, ±10%, 1w at 70°C; characteristic F, per MIL-R-11C (mfd. by 01121)	1	
-53	RC32GF226K	. . RESISTOR, Fixed, comp: 22 megohms, ±10%, 1w at 70°C; characteristic F, per MIL-R-11C (mfd. by 01121)	1	
-54	RC32GF472K	. . RESISTOR, Fixed, comp: 4700 ohms, ±10%, 1w at 70°C; characteristic F, per MIL-R-11C (mfd. by 01121)	1	
-55	RC32GF102K	. . RESISTOR, Fixed, comp: 1000 ohms, ±10%, 1w at 70°C; characteristic F, per MIL-R-11C (mfd. by 01121)	1	
-56	RC20GF100K	. . RESISTOR, Fixed, comp: 10 ohms, ±10%, ½w at 70°C; characteristic F, per MIL-R-11C (mfd. by 01121)	1	
	C50202	. COMPONENT BOARD ASSEMBLY (ATTACHING PARTS)	1	
	B00161P26	. SCREW, Machine, binding hd. cres. 6-32 x ⅜	3	
	B00023P22	. LOCKWASHER, Ext. cres. no. 6 ---*---	3	
	B50193	. . TERMINAL BOARD ASSEMBLY	1	
	B50192	. . TERMINAL BOARD ASSEMBLY	1	
-57	B50192-1	. . . TERMINAL BOARD	2	
-58	A20871	. . . TERMINAL (mfd. by 70892) (T100-9)	72	
-59	A20248	. . POST (ATTACHING PARTS)	3	
	B00021P26	. . NUT, Hex, cres. 6-32	6	
	B00161P30	. . SCREW, Machine, binding hd. cres. 6-32 x ¾	6	
	B00023P22	. . LOCKWASHER, Ext. cres. no. 6 ---*---	6	
-60	CP05A1EE103K	. . CAPACITOR, Fixed, paper: 0.01μfd, ±10%, 400v d-c, per MIL-C-25A (mfd. by 82376)	3	
-61	CM15D681K	. . CAPACITOR, Fixed, mica: 680 μμfd, ±10%, 300v d-c, per MIL-C-5A (mfd. by 91418)	1	
-62	CL44BH080SP	. . CAPACITOR, Tant., electrolytic: 8μfd, 30v d-c, per MIL-C-3965B (mfd. by 82376)	1	
-63	CP05A1EE224M	. . CAPACITOR, Fixed, paper: 0.22μfd, ±20%, 400v d-c, per MIL-C-25A (mfd. by 82376)	2	
-64	RC32GF332K	. . RESISTOR, Fixed, comp: 3300 ohms, ±10%, 1w at 70°C; characteristic F, per MIL-R-11C (mfd. by 01121)	1	
-65	RC20GF331K	. . RESISTOR, Fixed, comp: 330 ohms, ±10%, ½w at 70°C; characteristic F, per MIL-R-11C (mfd. by 01121)	1	
-66	RC32GF226K	. . RESISTOR, Fixed comp: 22 megohms, ±10%, 1w at 70°C; characteristic F, per MIL-R-11C (mfd. by 01121)	1	
-67	RC20GF105K	. . RESISTOR, Fixed, comp: 1.0 megohm, ±10%, ½w at 70° C; characteristic F, per MIL-R-11C (mfd. by 01121)	1	
-68	RC32GF392K	. . RESISTOR, Fixed, comp: 3900 ohms, ±10%, 1w at 70° C; characteristic F, per MIL-R-11C (mfd. by 01121)	1	
-69	RC32GF102K	. . RESISTOR, Fixed, comp: 1000 ohms, ±10%, 1w at 70° C; characteristic F, per MIL-R-11C (mfd. by 01121)	1	
-70	RC20GF103K	. . RESISTOR, Fixed, comp: 10000 ohms, ±10%, 1w at 70° C; characteristic F, per MIL-R-11C (mfd. by 01121)	1	
-71	RC20GF225K	. . RESISTOR, Fixed, comp: 2.2 megohm, ±10%, ½w at 70° C; characteristic F, per MIL-R-11C (mfd. by 01121)	1	
-72	RC20GF225K	. . RESISTOR, Fixed, comp: 2.2 megohm, ±10%, 1w at 70° C; characteristic F, per MIL-R-11C (mfd. by 01121)	1	
-73	RC20GF154K	. . RESISTOR, Fixed, comp: 150000 ohms, ±10%, ½w at 70° C; characteristic F, per MIL-R-11C (mfd. by 01121)	1	
-74	RC20GF334K	. . RESISTOR, Fixed, comp: 330000 ohms, ±10%, ½w at 70° C; characteristic F, per MIL-R-11C (mfd. by 01121)	1	

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY.	USABLE ON CODE
4-75	RC20GF332K	. . RESISTOR, Fixed, comp: 3300 ohms, ±10%, ½w at .... 70° C; characteristic F, per MIL-R-11C (mfd. by 01121)	1	
-76	RC32GF101K	. . RESISTOR, Fixed, comp: 100 ohms, ±10%, 1w at .... 70°C; characteristic F, per MIL-R-11C (mfd. by 01121)	2	
-77	RC20GF271K	. . RESISTOR, Fixed comp: 270 ohms, ±10%, ½w at .... 70°C; characteristic F; MIL-R-11C (mfd. by 01121)	1	
-78	RC32GF272K	. . RESISTOR, Fixed comp: 2700 ohms, ±10%, 1w at .... 70°C; characteristic F, MIL-R-11C	1	
-79	RC20GF275K	. . RESISTOR, Fixed comp: 2.7 megohm, ±10%, ½w at .... 70°C; characteristic F, MIL-R-11C	1	
-80	RC32GF470K	. . RESISTOR, Fixed comp: 47ohms, ±10%, 1w at ..... 70°C; characteristic F, MIL-R-11C (mfd. by 01121)	2	
-81	RC32GF823K	. . RESISTOR, Fixed comp: 82000 ohms, ±10%, 1w at .... 70°C; characteristic F, MIL-R-11C (mfd. by 01121)	1	
-82	RC32GF224K	. . RESISTOR, Fixed comp: 220000 ohms, ±10%, 1w at .... 70°C; characteristic F, MIL-R-11C (mfd. by 01121)	1	
-83	RC32GF124K	. . RESISTOR, Fixed comp: 120000 ohms, ±10%, 1w at .... 70°C; characteristic F, MIL-R-11C (mfd. by 01121)	1	
-84	RC32GF180K	. . RESISTOR, Fixed comp: 18 ohms, ±10%; 1w at .... 70°C; characteristic F, MIL-R-11C (mfd. by 01121)	1	
-85	RC20GF102K	. . RESISTOR, Fixed comp: 1000 ohms, ±10%, ½w at .... 70°C; characteristic F, MIL-R-11C (mfd. by 01121)	1	
	C50199	. COMPONENT BOARD ASSEMBLY..... (ATTACHING PARTS)	1	
	B00161P26	. SCREW, Machine, binding hd. cres. 6-32 x ⅜.....	2	
	B00023P22	. LOCKWASHER, Ext. cres. no. 6..... ---*---	2	
	B50194	. . . TERMINAL BOARD ASSEMBLY.....	1	
-86	B50191-1	. . . TERMINAL BOARD.....	1	
-87	A20871	. . . TERMINAL (mfd. by 70892) (T100-9)	24	
-88	A20839	. . BRACKET, Terminal board..... (ATTACHING PARTS)	2	
	B00120P6	. . RIVET..... ---*---	4	
-89	CM15C820K	. . CAPACITOR, Fixed, mica: 82μμfd, ±10%, 300v d-c, ... MIL-C-5A (mfd. by 91418)	1	
-90	CP05A1EE103K	. . CAPACITOR, Fixed, paper: 0.01μfd, ±10%, 400v d-c, ... MIL-C-25A (mfd. by 82376)	2	
-91	CP05A1EE224M	. . CAPACITOR, Fixed, paper: 0.22μfd, ±20%, 400v d-c, ... MIL-C-25A (mfd. by 82376)	1	
-92	CM30D332K	. . CAPACITOR, Fixed, mica: 3300μfd, ±10%, 500v d-c, ... MIL-C-5A (mfd. by 91418)	1	
-93	RC32GF154K	. . RESISTOR, Fixed comp: 150000 ohms, ±10%, 1w at .... 70°C; characteristic F, MIL-R-11C (mfd. by 01121)	1	
-94	RC20GF105K	. . RESISTOR, Fixed comp: 1.0 megohm, ±10%; ½w at .... 70°C; characteristic F; MIL-R-11C (mfd. by 01121)	1	
-95	RC32GF273K	. . RESISTOR, Fixed comp: 27000 ohms, ±10%; 1w at .... 70°C; characteristic F; MIL-R-11C (mfd. by 01121)	1	
-96	RC20GF471K	. . RESISTOR, Fixed comp: 470 ohms, ±10%; ½w at .... 70°C; characteristic F; MIL-R-11C (mfd. by 01121)	1	
-97	RC20GF125K	. . RESISTOR, Fixed comp: 1.2 megohm, ±10%; ½w at .... 70°C; characteristic F; MIL-R-11C (mfd. by 01121)	2	
-98	RC32GF224K	. . RESISTOR, Fixed comp: 220000 ohms, ±10%; 1w at .... 70°C; characteristic F; MIL-R-11C (mfd. by 01121)	1	
	C50200	. COMPONENT BOARD ASSEMBLY ..... (ATTACHING PARTS)	1	
	B00161P26	. SCREW, Machine, binding hd. cres. 6-32 x ⅜	2	
	B00023P22	. LOCKWASHER, Ext. cres. no. 6 ..... ---*---	2	
	B50195	. . TERMINAL BOARD ASSEMBLY	1	
-99	B50191-1	. . . TERMINAL Board	1	
-100	A20871	. . . TERMINAL (mfd. by 70892) (T100-9)	24	

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY.	USABLE ON CODE
4-101	A20839	. . BRACKET, Terminal board ..... (ATTACHING PART)	2	
	B00120P6	. . RIVET ..... ---*---	4	
-102	S3Y30PL	. . RECTIFIER, Silicon: 1000v d-c rating; low current .... (mfd. by 61775)	2	
-103	CP25A3EH103M	. . CAPACITOR, Fixed paper: 0.01μfd, ±20%; 1500v d-c; ... MIL-C-25A (mfd. by 82376)	1	
-104	HP-14N	. . CLAMP, Cable (mfd. by 09922) ..... (ATTACHING PARTS)	1	
	B00021P26	. . NUT, Hex. cres. 6-32	1	
	B00023P22	. . LOCKWASHER, Ext. cres. no. 6	1	
	B00161P27	. . SCREW, Machine binding hd. cres. 6-32 x 7/16	1	
	C00010P29	. . FLATWASHER ..... ---*---	1	
-105	RC32GF104K	. . RESISTOR, Fixed comp: 100,000 ohms, ±10%; 1w at .... 70°C; characteristic F; MIL-R-11C (mfd. by 01121)	1	
-106	RC32GF472K	. . RESISTOR, Fixed comp: 4700 ohms, ±10%; 1w at 70°C; .. characteristic F; MIL-R-11C (mfd. by 01121)	1	
	C50198	. COMPONENT BOARD ASSEMBLY ..... (ATTACHING PARTS)	1	
	B00161P26	. SCREW, Machine, binding hd. cres. 6-32 x ⅜	2	
	B00023P22	. LOCKWASHER, Ext. cres. no. 6 ..... ---*---	2	
	B50196	. . TERMINAL BOARD ASSEMBLY	1	
-107	B50191-1	. . . TERMINAL Board	1	
-108	A20871	. . . TERMINAL (mfd. by 70892) (T100-9)	24	
-109	A20839	. . BRACKET, Terminal board ..... (ATTACHING PART)	2	
	B00120P6	. . RIVET ..... ---*---	4	
-110	1N538	. . RECTIFIER, Silicon: MIL-STD-200D (mfd. by 72699) ..	4	
-111	CP05A1EE103K	. . CAPACITOR, Fixed, paper: 0.01μfd, ±10%, 400v d-c; .. MIL-C-25A (mfd. by 82376)	1	
-112	RC20GF334K	. . RESISTOR, Fixed Comp: 330,000 ohms, ±10%; ½w at .... 70°C; characteristic F; MIL-R-11C (mfd. by 01121)	1	
-113	RC20GF683K	. . RESISTOR, Fixed comp: 68000 ohms, ±10%; ½w at .... 70°C; characteristic F; MIL-R-11C (mfd. by 01121)	1	
-114	RC20GF105K	. . RESISTOR, Fixed comp: 1.0 megohm, ±10%; ½w at .... 70°C; characteristic F; MIL-R-11C (mfd. by 01121)	1	
-115	RW21G801	. RESISTOR, Fixed, wirewound: 800 ohms, ±5%; 22w, ... MIL-R-26C (mfd. by 44655) (ATTACHING PARTS)	2	
	B00021P26	. NUT, Hex. cres. 6-32	4	
	B00161P30	. SCREW, Machine binding hd. cres. 6-32 x ¾	4	
	B00023P22	. LOCKWASHER, Ext. cres. no. 6 ..... ---*---	4	
-116	B20837	. RESISTOR, Variable, comp., 1 section: 250K, ±20%; 2w .... nom. pwr rtng; std A taper; with center tap position at 25K from end	2	
-117	RV4LAYSA503B	. RESISTOR, Variable: comp., 1 section: 50000 ohms, ... ±20%; 2w nom. pwr rtng. std A taper; MIL-R-94B (mfd. by 01121)	1	
-118	6C4WA	. TUBE, Electron: Single triode, MIL-STD-200D ..... (mfd. by 24454)	1	
-119	6U8A	. TUBE, Electron: triode-pentode, amplifier (mfd. by 82219) ..	1	
-120	12AT7WA	. TUBE, Electron: twin triodes, MIL-STD-200D ..... (mfd. by 49671)	1	
-121	6AU6WA	. TUBE, Electron: pentode, sharp cutoff, MIL-STD-200D .. (mfd. by 24454)	2	
-122	2BP1	. TUBE, Electron: cathode ray, MIL-STD-200D (mfd. by 49671)	1	
-123	5751	. TUBE, Electron: twin triodes, MIL-STD-200D ..... (mfd. by 24454)	1	
-124	5651WA	. TUBE, Electron: voltage regulator, MIL-STD-200D ..... (mfd. by 94144)	1	
-125	5R4WGA	. TUBE, Electron: rectifier, MIL-STD-200D (mfd. by 11706) ..	1	

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY.	USABLE ON CODE
4-126	6080WA	. TUBE, Electron: twin power triode, MIL-STD-200D (mfd. by 49671)	1	
-127	TS103U02	. SHIELD, Tube (mfd. by 91662)	3	
-128	TS102U02	. SHIELD, Tube (mfd. by 91662)	4	
-129	5T	. RETAINER, Tube (mfd. by 78755)	1	
-130	3Y	. RETAINER, Tube (mfd. by 78755)	1	
-131	B50209	. CABLE ASSEMBLY No. 1	1	
	RG-55/U	. . CABLE (mfd. by 02660)	AR	
	UG-88C/U	. . CONNECTOR, Plug, electrical: 1 contact, 1 connector mating end; MIL-C-3608 (mfd. by 91577)	1	
	UG-291/U	. . CONNECTOR, Receptacle electrical: low loss plastic dielectric, type BNC (mfd. by 91577)	1	
-132	B50203	. CABLE ASSEMBLY NO. 2	1	
	RG-58C/U	. . CABLE (mfd. by 02660)	AR	
	Y1C124	. . RING, Inner (mfd. by 09922)	2	
	Y0C128	. . RING, Outer (mfd. by 09922)	2	
-133	B20938	. CABLE ASSEMBLY NO. 3	1	
-134	B50225	. CABLE ASSEMBLY NO. 4	1	
	RG-58C/U	. . CABLE (mfd. by 02660)	AR	
	UG-291/U	. . CONNECTOR, Receptacle, electrical: low loss plastic dielectric, type BNC (mfd. by 91577)	1	
	Y1C124	. . RING, Inner (mfd. by 09922)	1	
	Y0C128	. . RING, Outer (mfd. by 09922)	1	
-135	B50274	. CABLE ASSEMBLY NO. 5	1	
	RG-58C/U	. . CABLE (mfd. by 02660)	AR	
	UG-88C/U	. . CONNECTOR, Plug, electrical: 1 contact, 1 connector mating end. MIL-C-3608 (mfd. by 91577)	2	
	UG-291/U	. . CONNECTOR, Receptacle, electrical: low loss plastic dielectric, type BNC (mfd. by 91577)	1	
	Y1C124	. . RING, Inner (mfd. by 09922)	3	
	Y0C128	. . RING, Outer (mfd. by 09922)	3	

SECTION X
NUMERICAL INDEX

Class Code or Stock Number	Part Number	Source Code	Figure & Index	Quantity per Article	Microfilm Index
	AN3057-4		1-2	1	
	AN3106A-10SL-3S		1-4	1	
	AN426AD3-4		4-	4	
	AN450C8AD12		2-38	1	
	AN450C8AD9		2-32	1	
	A00114P4			1	
	A00114P5			1	
	A00170P		2-4	2	
	A20248		4-41	5	
			4-59	Ref	
	A20308A		3-32	1	
	A20308B		3-31	1	
	A20317		3-35	1	
	A20318		3-15	1	
	A20319		3-16	1	
	A20320		2-65	1	
	A20347-1		2-41	1	
	A20347-2		2-31	1	
	A20348-1		3-14	1	
	A20348-2		2-26	1	
	A20348-4		2-22	1	
	A20407-1		3-	4	
	A20407-2		2-	1	
	A20407-3		2-	1	
	A20407-4		2-	2	
	A20407-5		2-33	1	
	A20407-6		2-39	3	
			2-89	Ref	
	A20640		2-21	1	
	A20645		3-33	1	
	A20649		2-85	1	
	A20650		2-50	4	
			2-68	Ref	
			2-76	Ref	
	A20651		2-52	1	
	A20652		2-53	4	
			2-66	Ref	
			2-80	Ref	
	A20653		2-79	1	
	A20654		2-49	1	
	A20655		2-75	1	
	A20684		2-67	1	
	A20685		3-2	1	
	A20689		2-44	1	
	A20690		3-21	1	
	A20692		2-43	1	
	A20694		2-20	1	
	A20793		2-62	3	
			2-72	Ref	
	A20832-1		2-18	1	
	A20832-2		2-19	6	
	A20833		2-30	2	
			2-40	Ref	
	A20834		2-34	1	
	A20835		2-29	1	
	A20838		2-	1	
	A20839		4-88	6	
			4-101	Ref	
			4-109	Ref	
	A20871		2-91	200	
			4-40	Ref	
			4-58	Ref	
			4-87	Ref	
			4-100	Ref	
			4-108	Ref	
	A20918		3-18	2	
	A20930		2-25	1	
	A50211			1	
	A50211-1		2-90	1	
	B00020P22			20	
	B00020P23			38	
	B00020P24			12	
	B00020P25			4	
	B00020P29		2-37A	2	
	B00021P24			23	
	B00021P26			34	
	B00021P27			12	
	B00023P21			56	
	B00023P22			56	
	B00023P23			28	
	B00023P24			8	
	B00120P6			12	
	B00154P29			6	
	B00155P4			4	
	B00160P48			4	
	B00161P11			7	
	B00161P12			4	
	B00161P13			16	
	B00161P14			24	
	B00161P15			1	
	B00161P16			6	
	B00161P17			2	
	B00161P17A			2	
	B00161P23			11	

Class Code or Stock Number	Part Number	Source Code	Figure & Index	Quantity per Article	Microfilm Index
	B00161P24			4	
	B00161P25			6	
	B00161P26			37	
	B00161P27			1	
	B00161P28			17	
	B00161P29			4	
	B00161P29A			2	
	B00161P30			16	
	B00161P41			10	
	B00161P43			12	
	B00161P52			2	
	B00161P52A			1	
	B00163P40A			1	
	B00167P19			6	
	B00167P9			4	
	B00171P41			8	
	B00172P140			16	
	B20249		4-2	1	
	B20296		3-1	1	
	B20307		3-23	1	
	B20312		3-34	1	
	B20518		3-6	1	
	B20586		4-3	2	
	B20587		4-4	2	
	B20588		4-5	2	
	B20589		1-12	4	
	B20591		4-38	1	
	B20643		2-84	1	
	B20656-1		2-48	1	
	B20656-2		2-64	1	
	B20656-3		2-74	1	
	B20658		2-35	1	
	B20686		4-1	1	
	B20769		3-19	2	
	B20836		2-17	1	
	B20837		4-116	2	
	B20938		4-133	1	
	B50147A		4-18	1	
	B50147B		4-19	1	
	B50148		4-37	1	
	B50191		4-	1	
	B50191-1		4-39	5	
			4-86	Ref	
			4-99	Ref	
			4-107	Ref	
	B50192		4-	1	
	B50192-1		4-57	2	
	B50193		4-	1	
	B50194		4-	1	
	B50195		4-	1	
	B50196		4-	1	
	B50197		4-	1	
	B50203		4-132	1	
	B50206		3-	1	
	B50209		4-131	1	
	B50210		2-	1	
	B50212			1	
	B50213		2-	1	
	B50214		3-	1	
	B50215		1-	2	
	B50216		1-	1	
	B50217		2-	1	
	B50221		3-	1	
	B50222		2-	1	
	B50223		2-	1	
	B50224		2-	1	
	B50225		4-134	1	
	B50274		4-135	1	
	B50275		2-	1	
	B50276		2-	1	
N5910-161-4506	CC21CH050D		2-60	3	
			3-29	Ref	
N5910-666-7734	CE41C651F		4-27	1	
N5910-126-9597	CE42F200R		4-25	2	
N5910-120-0701	CE42F400R		4-26	1	
	CK70A102M		3-22	4	
	CK80A152M		3-24	3	
	CL44BH080SP		2-96	2	
			4-62	Ref	
	CM15C101K		2-98	1	
	CM15C470K		4-42	1	
	CM15C820K		4-89	1	
	CM15D681K		4-61	1	
N5910-101-4890	CM20D471K		2-95	1	
N5910-112-8188	CM30D182K		4-45	1	
N5910-160-1155	CM30D332K		4-92	1	
N5910-160-1808	CM30D821K		4-44	1	
	CP05A1EC473K		2-97	1	
N5910-666-8835	CP05A1EE103K		4-43	8	
			4-60	Ref	
			4-90	Ref	
			4-111	Ref	
N5910-642-6272	CP05A1EE224M		4-63	3	
			4-91	Ref	

Class Code or Stock Number	Part Number	Source Code	Index No.	Quantity per Article	Microfilm Index
	CP07SA2		4-23	4	
N5910-643-8680	CP11A3EE684M		4-28	2	
	CP25A3EH103M		4-103	1	
N5910-197-8860	CP55B1EG254K		4-24	1	
N5910-197-8871	CP70E1FH254K		4-22	2	
	CW123A/U		2-46	8	
	CZ24B2WC105A		2-86	2	
	C00010P26		3-11	2	
	C00010P29			5	
	C00010P30			4	
	CO-03MGF(3/18)0330		1-3	1	
	C20239		4-21	1	
	C20240		4-20	1	
	C20346		2-36	1	
	C20641-1		2-47	1	
	C20641-2		2-73	1	
	C20641-3		2-63	1	
	G50063		3-	1	
	C50145		3-	1	
	C50198		4-	1	
	C50199		4-	1	
	C50200		4-	1	
	C50201		4-	1	
	C50202			1	
	C50208		2-	1	
	C50218		2-	1	
	C50219		2-	1	
	C50220		3-	1	
	C50232		4-6	1	
	C7956-1428-3B7		4-10	4	
	D20664		2-1	1	
	D50146		4-15	1	
	D50154A		4-16	1	
	D50154B		4-17	1	
	D50182		1-1	1	
	E50123		1-	1	
N5920-556-0144	FHN20G		2-6	3	
	F50183		1-11	1	
	G78-3		2-24	2	
			2-28	Ref	
	HP-14N		4-104	1	
	HP-3N		4-12	2	
	HP-6N		4-11	2	
	H50207		4-	1	
	J50204		1-10	1	
	J50205		2-	1	
	LH62BR2		2-8	1	
	LH62PW2		2-9	1	
	LT7K130		2-59	5	
			2-78	Ref	
			2-92	Ref	
			3-26	Ref	
	MS2549		1-	1	
	MS3102A10SL-3P		2-87	1	
N5920-280-5020	MS90078-25-1		2-7	3	
	MX913/U		2-45	3	
	RC20GF100K		4-56	1	
N5905-190-8889	RC20GF101K		2-61	2	
			4-49	Ref	
N5905-195-6806	RC20GF102K		2-17A	2	
			4-85	Ref	
N5905-185-8510	RC20GF103K		4-70	1	
N5905-192-0390	RC20GF105K		4-50	5	
			4-67	Ref	
			4-94	Ref	
			4-114	Ref	
N5905-190-8880	RC20GF122K		2-93	1	
N5905-279-1697	RC20GF125K		4-72	1	
N5905-195-9483	RC20GF154K		4-73	1	
	RC20GF221K		4-47	1	
N5905-190-8885	RC20GF225K		4-71	3	
			4-97	Ref	
	RC20GF270K		3-27	3	
N5905-171-2006	RC20GF271K		4-77	1	
N5905-195-9482	RC20GF273K		3-30	2	
N5905-279-1881	RC20GF275K		4-79	1	
N5905-192-0390	RC20GF331K		4-65	1	
N5905-195-9457	RC20GF332K		4-75	1	
N5905-192-0379	RC20GF334K		4-74	2	
			4-112	Ref	
N5905-192-3973	RC20GF471K		4-96	1	
	RC20GF560K		3-4	1	
N5905-195-5571	RC20GF680K		2-94	2	
			4-46	Ref	
N5905-249-3661	RC20GF683K		4-113	1	
N5905-171-2006	RC32GF101K		4-76	2	
N5905-299-2048	RC32GF102K		4-55	2	
			4-69	Ref	
	RC32GF104K		4-105	1	
N5905-299-2001	RC32GF124K		4-83	1	
N5905-299-1999	RC32GF154K		4-93	1	
N5905-279-1740	RC32GF180K		4-84	1	
N5905-299-2000	RC32GF224K		4-82	2	
			4-98	Ref	
N5905-549-8986	RC32GF226K		4-53	2	
			4-66	Ref	
	RC32GF272K		4-78	1	
N5905-299-2020	RC32GF273K		4-52	2	
			4-95	Ref	
N5905-229-2059	RC32GF332K		4-64	1	

Class Code or Stock Number	Part Number	Source Code	Figure & Index	Quantity per Article	Microfilm Index
N5905-279-1721	RC32GF392K		4-48	3	
			4-68	Ref	
N5905-279-2637	RC32GF470K		4-80	2	
N5905-643-9816	RC32GF472K		4-54	2	
			4-106	Ref	
N5905-279-2650	RC32GF562K		4-51	2	
N5905-299-2005	RC32GF823K		4-81	1	
	RG-55/U		1-8	AR	
			3-8	Ref	
			4-131	Ref	
	RG-58C/U		1-6	AR	
			4-132	Ref	
			4-134	Ref	
			4-135	Ref	
N5905-201-9098	RN20X53R3F		3-9	1	
	RV4LAYSA503B		4-117	1	
	RV4NAYSD102A		2-16	1	
	RV4NAYSD254B		2-14	2	
	RV4NAYSD254E		2-15	1	
	RV4NAYSD504B		2-13	2	
N5905-270-6536	RW21G100		4-34	1	
N5905-270-6544	RW21G801		4-115	2	
	ST22N		2-11	1	
	S3Y30PL		4-102	2	
N5935-224-0986	TS101P02		4-29	2	
N5935-270-6536	TS102P01		4-32	4	
N5935-501-5458	TS102P03		3-17	2	
	TS102U02		4-128	4	
N5935-106-1355	TS103P01		4-30	3	
	TS103U02		4-127	3	
	UG-1094/U		2-58	2	
			2-71	Ref	
	UG-185/U		3-5	1	
	UG-291/U		3-7	4	
			4-131	Ref	
			4-134	Ref	
			4-135	Ref	
	UG-657/U		2-57	4	
			2-70	Ref	
			2-82	Ref	
	UG-680/U		2-56	2	
			2-81	Ref	
	UG-88C/U		1-7	7	
			1-9	Ref	
			4-131	Ref	
			4-135	Ref	
	UP-121M		1-5	1	
	X5133-18		1-13	4	
	YIC124		4-132	6	
			4-134	Ref	
			4-135	Ref	
	Y0C1028		4-132	6	
			4-134	Ref	
			4-135	Ref	
	012-062-0625-79		3-13	2	
			3-36	Ref	
	1N1804A		4-35	1	
	1N21B		2-54	3	
			2-69	Ref	
			2-77	Ref	
	1N21CR		2-55	1	
N5960-510-6977	1N538		4-110	4	
	1018-14		2-2	2	
N5960-521-7511	12AT7WA		4-120	1	
	1272		2-12	1	
	146		4-19A	3	
	1800-14		2-42	1	
	1862		4-8	1	
	194		4-33	1	
	2BP1		4-122	1	
	2214		4-7	1	
	2901-A		4-9	5	
	3Y		4-130	1	
	334			1	
	3502-14-09		3-12	1	
	4		2-51	4	
			2-83	Ref	
			4-36	Ref	
	4007		3-3	2	
			3-28	Ref	
	42		4-13	2	
G6240-179-1814	47		2-10	2	
N5960-284-5823	5R4WGA		4-125	1	
	5T		4-129	1	
	5133-25		2-23	3	
			2-27	Ref	
			3-10	Ref	
	52		4-14	1	
	550A		2-37	1	
	5651WA		4-124	1	
N5960-521-7231	5751		4-123	1	
N5960-521-7510	6AU6WA		4-121	2	
	6C4WA		3-20	3	
			4-118	Ref	
N5960-543-0966	6U8A		4-119	1	
N5960-521-7358	6080WA		4-126	1	
	680073		3-25	2	
	80		2-88	1	
	900-14		2-3	4	
	9470-12		4-31	1	

SECTION XI
REFERENCE DESIGNATION INDEX

Reference Designation	Figure & Index Number	Class Code or Stock Number	Part Number
C1	3-25	N5910-126-9597	CE42F200R
C2	4-89		CM15C820K
C3	3-25		680073
C4	2-95		CL44BH080SP
C5	4-42		CM15C470K
C6	4-43	N5910-666-8835	CP05A1EE103K
C7	4-44	N5910-160-1808	CM30D821K
C8	4-45	N5910-160-1155	CM30D182K
C9	4-43	N5910-666-8835	CP05A1EE103K
C10	2-96		CP05A1EC473K
C11	2-60	N5910-161-4506	CC21CH050D
C12	2-97		CM15C101K
C13	4-60	N5910-666-8835	CP05A1EE103K
C14	4-61		CM15D681K
C15	3-28	N5910-643-8680	CP11A3EE684M
C16	4-62		CL44BH080SP
C17	4-90	N5910-666-8835	CP05A1EE103K
C18	4-91	N5910-642-6272	CP05A1EE224M
C19	4-90	N5910-666-8835	CP05A1EE103K
C20	4-92	N5910-160-1155	CM30D332K
C21	4-60	N5910-666-8835	CP05A1EE103K
C22	4-60	N5910-666-8835	CP05A1EE103K
C23	3-23	N5910-643-8680	CP11A3EE684M
C24	4-63	N5910-642-6272	CP05A1EE224M
C25	3-29	N5910-161-4506	CC21CH050D
C26	3-29	N5910-161-4506	CC21CH050D
C27	3-34		B20312
C28	3-25		680073
C29	3-22		CK70A102M
C30	3-22		CK70A102M
C31	3-22		CK70A102M
C32	3-24		CK80A152M
C33	3-22		CK70A102M
C34	3-24		CK80A152M
C35	3-24		CK80A152M
C36	3-25	N5910-126-9597	CE42F200R
C37	4-63	N5910-642-6272	CP05A1EE224M
C38	4-111	N5910-666-8835	CP05A1EE103K
C39	3-22	N5910-197-8871	CP70E1FH254K
C40	3-22	N5910-197-8871	CP70E1FH254K
C41	3-24	N5910-197-8860	CP55B1EG254K
C42	4-103		CP25A3EH103M
C43	3-26	N5910-120-0701	CE42F400R
C44	3-27	N5910-666-7734	CE41C651F
C45	2-94	N5910-101-4890	CM20D471K
C46	2-86		CZ24B2WC105A
C47	2-86		CZ24B2WC105A
CR1	2-54		1N21B
CR2	2-55		1N21CR
CR3	2-69		1N21B
CR4	2-77		1N21B
CR5	4-35		1N1804A
CR6	4-110	N5960-510-6977	1N538
CR7	4-110	N5960-510-6977	1N538
CR8	4-110	N5960-510-6977	1N538
CR9	4-110	N5960-510-6977	1N538
CR10	4-102		S3Y30PL
CR11	4-102		S3Y30PL
F1	2-7	N5920-280-5020	MS90078-25-1
F2	2-7	N5920-280-5020	MS90078-25-1
F3	2-7	N5920-280-5020	MS90078-25-1
I1	2-10	G6240-179-1814	47
I2	2-10	G6240-179-1814	47

Reference Designation	Figure & Index Number	Class Code or Stock Number	Part Number
J1	2-56		UG-680/U
J2	2-57		UG-657/U
J3	4-135		UG-291/U
J4	2-70		UG-657/U
J5	2-70		UG-657/U
J6	2-81		UG-680/U
J7	2-82		UG-657/U
J8	4-131		UG-291/U
J9	3-7		UG-291/U
J10	2-58		UG-1094/U
J11	2-71		UG-1094/U
J12	3-5		UG-185/U
J13	4-134		UG-291/U
J14	2-87		MS3102A10SL-3P
L1	3-33		A20645
L2	3-26		LT7K130
L3	3-26		LT7K130
L4	3-21		C20239
L5	2-91		LT7K130
L6	2-59		LT7K130
L7	2-78		LT7K130
P10	4-135		UG-88C/U
P11	4-135		UG-88C/U
P12	4-131		UG-88C/U
R1	2-93	N5905-195-5571	RC20GF680K
R2	2-92	N5905-190-8880	RC20GF122K
R3	2-16		RV4NAYSD102A
R4	2-15		RV4NAYSD254E
R5	4-47		RC20GF221K
R6	4-48	N5905-279-1721	RC32GF392K
R7	4-48	N5905-278-1721	RC32GF392K
R8	4-49	N5905-190-8889	RC20GF101K
R9	4-50	N5905-192-0390	RC20GF105K
R10	4-46	N5905-195-5571	RC20GF680K
R11	4-51	N5905-279-2650	RC32GF562K
R12	4-52	N5905-299-2020	RC32GF273K
R13	4-53	N5905-549-8986	RC32GF226K
R14	4-50	N5905-192-0390	RC20GF105K
R15	4-54	N5905-643-9816	RC32GF472K
R16	4-55	N5905-299-2048	RC32GF102K
R17	2-17A	N5905-195-6806	RC20GF102K
R18	2-17		B20836
R19	4-64	N5905-229-2059	RC32GF332K
R20	4-65	N5905-192-0390	RC20GF331K
R21	4-66	N5905-549-8986	RC32GF226K
R22	4-67	N5905-192-0390	RC20GF105K
R23	4-68	N5905-279-1721	RC32GF392K
R24	4-69	N5905-299-2048	RC32GF102K
R25	4-70	N5905-185-8510	RC20GF103K
R26	4-93	N5905-299-1999	RC32GF154K
R27	4-94	N5905-192-0390	RC20GF105K
R28	4-95	N5905-299-2020	RC32GF273K
R29	4-96	N5905-192-3973	RC20GF471K
R30	4-72	N5905-279-1697	RC20GF125K
R31	4-71	N5905-190-8885	RC20GF225K
R32	4-116		B20837
R33	4-97	N5905-190-8885	RC20GF225K
R34	4-116		B20837
R35	4-97	N5905-190-8885	RC20GF225K
R36	2-13		RV4NAYSD504B
R37	4-98	N5905-299-2000	RC32GF224K
R38	2-14		RV4NAYSD254B
R39	4-73	N5905-195-9483	RC20GF154K

Reference Designation	Figure & Index Number	Class Code or Stock Number	Part Number
R40	4-74	N5905-192-0379	RC20GF334K
R41	4-75	N5905-195-9457	RC20GF332K
R42	2-13		RV4NAYSD504B
R43	2-14		RV4NAYSD254B
R44	4-76	N5905-171-2006	RC32GF101K
R45	4-76	N5905-171-2006	RC32GF101K
R46	3-9	N5905-201-9098	RN20X53R3F
R47	3-30	N5905-195-9482	RC20GF273K
R48	3-30	N5905-195-9482	RC20GF273K
R49	2-61	N5905-190-8889	RC20GF101K
R50	3-27		RC20GF270K
R51	3-4		RC20GF560K
R52	3-27		RC20GF270K
R53	3-27		RC20GF270K
R54	4-77	N5905-171-2006	RC20GF271K
R55	4-51	N5905-299-2020	RC32GF562K
R56	4-78		RC32GF272K
R57	4-112	N5905-192-0379	RC20GF334K
R58	4-79	N5905-279-1881	RC20GF275K
R59	4-80	N5905-279-2637	RC32GF470K
R60	4-80	N5905-279-2637	RC32GF470K
R61	4-113	N5905-249-3661	RC20GF683K
R62	4-114	N5905-192-0390	RC20GF105K
R63	4-81	N5905-299-2005	RC32GF823K
R64	4-82	N5905-299-2000	RC32GF224K
R65	4-17		RV4LAYSA503B
R66	4-83	N5905-299-2001	RC32GF124K
R67	4-105		RC32GF104K
R68	4-84	N5905-279-1740	RC32GF180K
R69	4-106	N5905-643-9816	RC32GF472K

Reference Designation	Figure & Index Number	Class Code or Stock Number	Part Number
R70	4-115	N5905-270-6544	RW21G801
R71	4-115	N5905-270-6544	RW21G801
R72	4-34	N5905-270-6536	RW21G100
R73	4-85	N5905-195-6806	RC20GF102K
R74	4-56		RC20GF100K
T1	4-20		C20240
V1	3-20		6C4WA
V2	4-118		6C4WA
V3	4-118		6C4WA
V4	4-119	N5960-543-0966	6U8A
V5	4-120	N5960-521-7511	12AT7WA
V6	4-121	N5960-521-7510	6AU6WA
V7	4-122		2BP1
V8	4-123	N5960-521-7231	5751
V9	4-124		5651WA
V10	4-125	N5960-284-5823	5RHWGA
V11	4-126	N5960-521-7358	6080WA
V12	4-121	N5960-521-7510	6AU6WA
XV1	3-17	N5935-501-5458	TS102P03
XV2	3-17	N5935-501-5458	TS102P03
XV3	4-32	N5935-270-6536	TS102P01
XV4	4-30	N5935-106-1355	TS103P01
XV5	4-30	N5935-106-1355	TS103P01
XV6	4-32	N5935-270-6536	TS102P01
XV7	4-31		9470-12
XV8	4-30	N5935-106-1355	TS103P01
XV9	4-32	N5935-270-6536	TS102P01
XV10	3-29	N5935-224-0986	TS101P02
XV11	3-29	N5935-224-0986	TS101P02
XV12	4-32	N5935-270-6536	TS102P01