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DEPARTMENT OF THE ARMY TECHNICAL MANUAL

RADIO TEST SET

AN/ARM-5

OPERATING INSTRUCTIONS

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Radio Test Set AN/ARM-5
Operating Instructions

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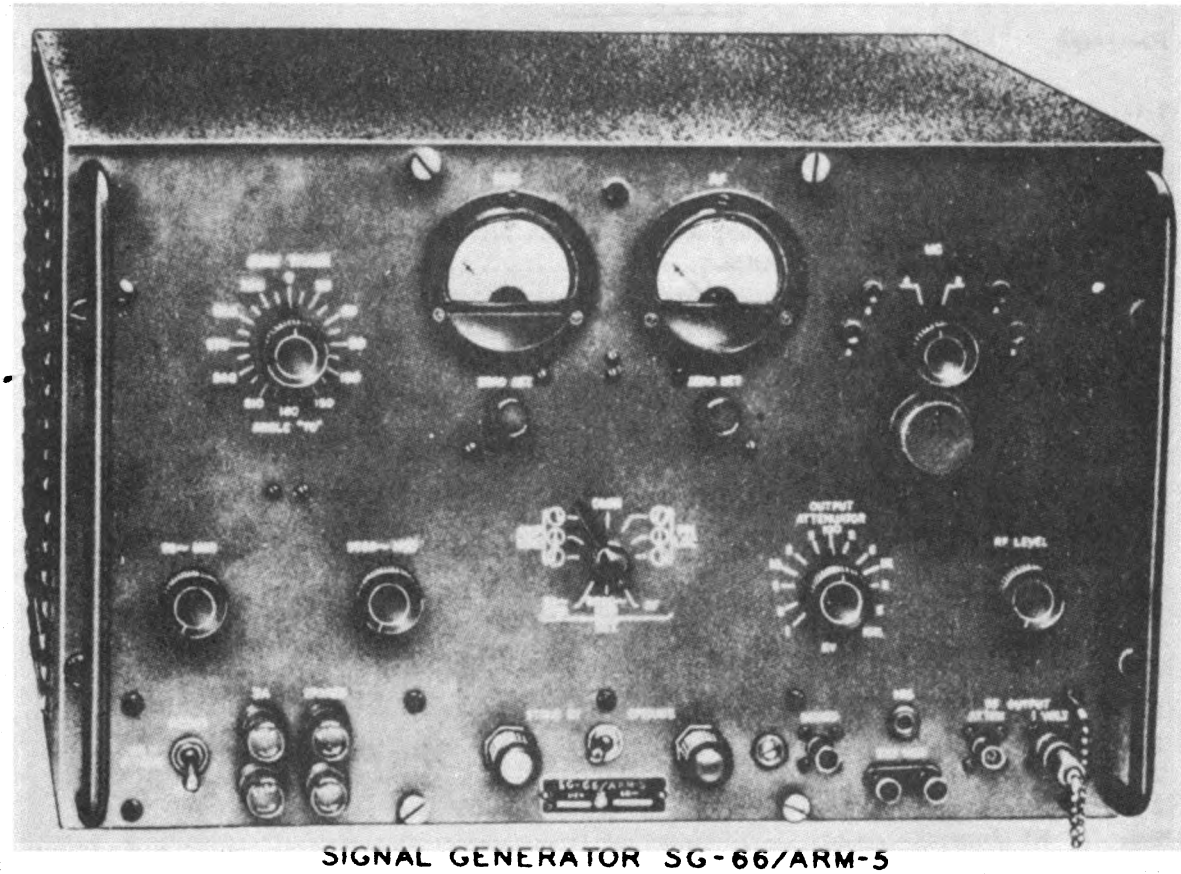
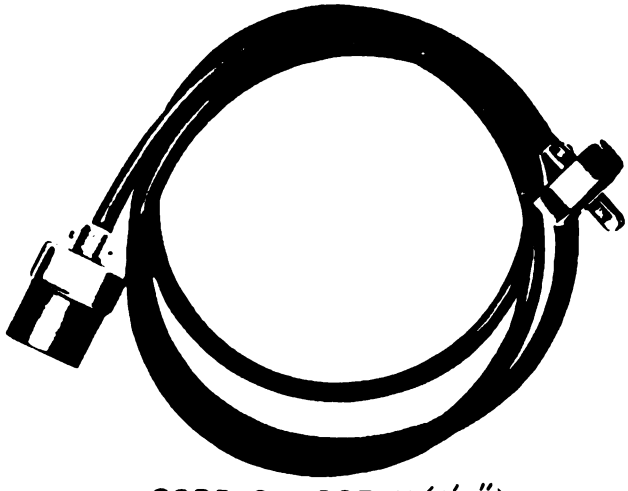
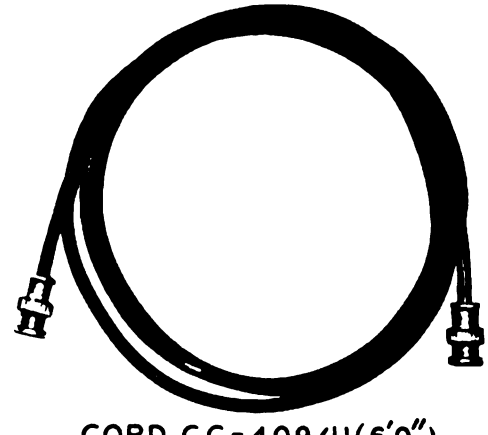


SIGNAL GENERATOR SG-66/ARM-5



CORD CX-337/U (6'0")



CORD CG-409/U(6'0")

Figure 1-1. Radio Test Set AN/ARM-5

SECTION I

GENERAL DESCRIPTION

1-1. PURPOSE OF HANDBOOK.

1-2. This handbook provides instructions for the operation of Radio Test Set AN/ARM-5.

1-3. PURPOSE OF EQUIPMENT.

1-4. Radio Test Set AN/ARM-5 is designed to provide simulated omnidirectional (VOR), phase localizer (PH LOC), and 90/150 cps amplitude localizer (AMP LOC) signals for testing VHF navigational receiving equipment operating in the frequency range of 108-132 megacycles.

1-5. EQUIPMENT SUPPLIED.

1-6. The major component and accessories supplied as part of the equipment are shown in figure 1-1 and listed in table I.

TABLE I. EQUIPMENT SUPPLIED

Quantity	*Short Form Name*	*Type Designation*
MAJOR COMPONENT		
1	Signal Generator	SG-66/ARM-5
ACCESSORIES		
1	Cord	CX-337/U (6' 0")
1	Cord	CG-409/U (6' 0")

1-7. EQUIPMENT REQUIRED BUT NOT SUPPLIED.

1-8. Auxiliary equipment components and items required for operation of AN/ARM-5 are listed in table II.

TABLE II. EQUIPMENT REQUIRED BUT NOT SUPPLIED

Quantity	*Short Form Name*	*Type Designation*
1	Antenna	ARC Type A-13B (or equivalent)
1	Microphone	RS38-A (or equivalent)
Variable	Cable	RG-58/U

1-9. DESCRIPTION OF EQUIPMENT SUPPLIED.

1-10. SIGNAL GENERATOR SG-66/ARM-5. (*See figure 1-1.*) Signal Generator SG-66/ARM-5 is a test instrument which may be installed either on a test bench or, by use of special mounting brackets (not supplied), in a standard 19-inch rack. All component items, except those installed on the front panel, are mounted on a common chassis which is enclosed in a louvered instrument case. Primary a-c power is connected to a suitable connector located at the rear of the component. All operating controls and indicating devices are located on the front panel. Two vertically positioned handles, which also act as guard rails, are located at the extreme ends of the front panel. Small vent holes, located in the bottom of the instrument case permit drainage of any accumulated moisture. A white-lens light assembly when lighted indicates that the SG-66/ARM-5 is on standby position with only filament voltage applied. A red-lens light assembly when lighted indicates that the component is on operating position with plate voltage and all other required operating potentials applied. Four fuses, two of which are spares, are installed in extractor-type, finger-cap, fuse holders located near the lower-left corner of the front panel. The front panel is finished a flat gray color, while the instrument case is a wrinkle gray. The unit is secured to the instrument case by ten captive screws, eight of which are installed on the front panel, the remaining two on the rear of the instrument case.

1-11. CORD CX-337/U (6' 0"). (*See figure 1-1.*) Cord CX-337/U (6' 0") is a two-conductor plastic covered cable used for connecting primary a-c power to Signal Generator SG-66/ARM-5. It is fitted at one end with a two-contact female Hubbell 7057 connector, and at the other end with a two-contact male Hubbell 7084 connector. Its over-all length is 6 feet.

1-12. CORD CG-409/U (6' 0"). (*See figure 1-1.*) Cord CG-409/U (6' 0") is a single-conductor shielded cable assembly used for connecting the output signal of the SG-66/ARM-5 to the input of the equipment under test. It is fabricated from a length of RG-58/U cable which is fitted at each end with a UG-88/U connector. Its over-all length is 6 feet.

1-13. GENERAL PRINCIPLES OF OPERATION.

1-14. OVER-ALL FUNCTIONAL DESCRIPTION. Signal Generator SG-66/ARM-5 generates crystal-controlled r-f signals amplitude modulated in any one

of three different ways to correspond to simulated omni, phase localizer, or amplitude localizer (tone localizer) signals, in each of which the modulation has two components. For omni or phase localizer signals, one component consists of a 9960-cycle subcarrier, frequency modulated at 30 cycles; the other component is a simple 30-cycle signal. For omni signals, the phase angle between the 30-cycle signal and the 30-cycle frequency modulation on the 9960-cycle subcarrier depends on the "track angle." For phase localizer signals, the 30-cycle signal is in phase with the 30-cycle frequency modulation, corresponding to the simulation of "off course, needle right" signals; or is opposite in phase, corresponding to "off course, needle left" signals; or is zero amplitude, corresponding to "on course, needle center" signals. For amplitude localizer or visual-aural range signals, one of the modulation components is 90 cycles; the other is 150 cycles. An "on course" signal corresponds to equality of these components. "Off course" signals indicate inequality, with the 150-cycle component predominating for "needle left" and the 90-cycle predominating for "needle right."

1-15. Modulation frequencies in the SG-66/ARM-5 are derived from two tone wheels, mounted on a common shaft, and driven by a 60-cycle, 1800-rpm synchronous motor. Each of these tone wheels has teeth so cut as to generate a frequency-modulated signal with a 9960-cycle center frequency. On one wheel (E116) the frequency modulation is 30 cycles, that is, one cycle per revolution of the wheel. At the periphery of this wheel are placed four magnetic pick-up coils, at relative angles of 0, 30, 120, and 180 degrees, and voltages generated in selected pairs of these coils are used to form the signals for omni or phase localizer modulations. The other wheel (E115) is frequency-modulated by equal components of 90 cycles and 150 cycles, one component having 3 cycles per revolution, the other having 5 cycles per revolution. An additional pick-up coil is used with this wheel for the generation of amplitude localizer modulation. The 9960-cycle signals, frequency-modulated at 30 cycles, are taken from E116, amplified, and then applied to the modulator tube V107 as the "reference" modulation component for omni or phase localizer signals. The 30-cycle modulation (or 90-cycle and 150-cycle modulation for amplitude localizer signals) is obtained by discriminating and filtering the frequency-modulated output of the appropriate tone wheel.

1-16. A ten-position switch, known as the "FUNCTION switch" determines the type of emission: omni, phase localizer, or amplitude localizer. The phase localizer and amplitude localizer functions each have three positions on this switch corresponding to "off course, needle right," "off course, needle left," and "on course" signal emissions; the omni function has a single position. In the block diagram, figure 1-2, the relationship of the various functional circuits of the signal generator is shown for each of the three possible types of emission. Though not shown in figure 1-2, the FUNCTION switch also has three SET positions: one for setting the RF level with no modulation applied, and the other two for adjusting the modulation levels of the high-frequency component (9960-cycle) and low-frequency components (30-cycle or 90-cycle plus 150-cycle) of modulation. Built-in and factory-adjusted attenuators are so circuited that when the 30-cycle component is properly adjusted to 30 per cent modulation, as indicated by the LEVEL SET line of the MOD meter with the FUNCTION switch at the 30 ~ SET position, the modulation percentage of the 90-cycle and 150-cycle components of the amplitude localizer signal will each be 20 per cent when the FUNCTION switch is set to the AMP LOC ⊕ (needle center) position.

1-17. The RF unit Z103 (see figure 4-1) is completely shielded and contains circuits for generating an amplitude-modulated, crystal-controlled, radio-frequency signal, and for detection of that signal. The r-f signal is modulated as desired by a voltage supplied by the modulator tube V107. The detector or "demodulator" provides an audio output that is the same in wave form and phase as the modulation envelope of the r-f output. Two independently tuned sets of r-f circuits and two crystal sockets are built into Z103. A switch is provided to permit the choice of either of two crystals and associated r-f circuits. The output frequencies of these crystals may be located anywhere between 108 and 132 mc. Crystals normally supplied with Signal Generator SG-66/ARM-5 are for output frequencies of 110.9 and 114.9 mc; other crystals (not supplied) are available if desired. The replaceable metal tabs at the MC switch, points A and B, are engraved to show the output frequency corresponding to the crystal socket positions A and B. The r-f output can be taken at a 1-volt level from J104 or at a controllable calibrated level between 1 and 10,000 microvolts from J106.

1-18. OMNI SIGNAL CIRCUIT. As shown in section A of figure 1-2, the four 30-cycle tone wheel coils (L101, L102, L104, and L105) are connected to the OMNI TRACK switch S103. These coils are disposed about the tone wheel E116 at precise angular spacings of 0, 30, 120, and 180 degrees. The OMNI TRACK switch selects these coils in pairs in various combinations, and connects one to the input of the reference channel amplifier V101A and the other to the variable channel amplifier V104A. The output of the reference amplifier is clipped symmetrically by the twin-diode limiter V102 and applied to the modulator tube V107 as the reference-phase component of modulation. The output of V104A is clipped by a similar limiter V105, then discriminated. The resulting 30-cycle signal is passed through a 30-cycle filter for the elimination of harmonics and high-frequency components. It is then amplified by V103A and applied to the modulator as the variable-phase component of modulation. The discriminator connections are such that the 30-cycle output voltage is maximum when the frequency of the frequency-modulated input signal is minimum. By definition this corresponds to

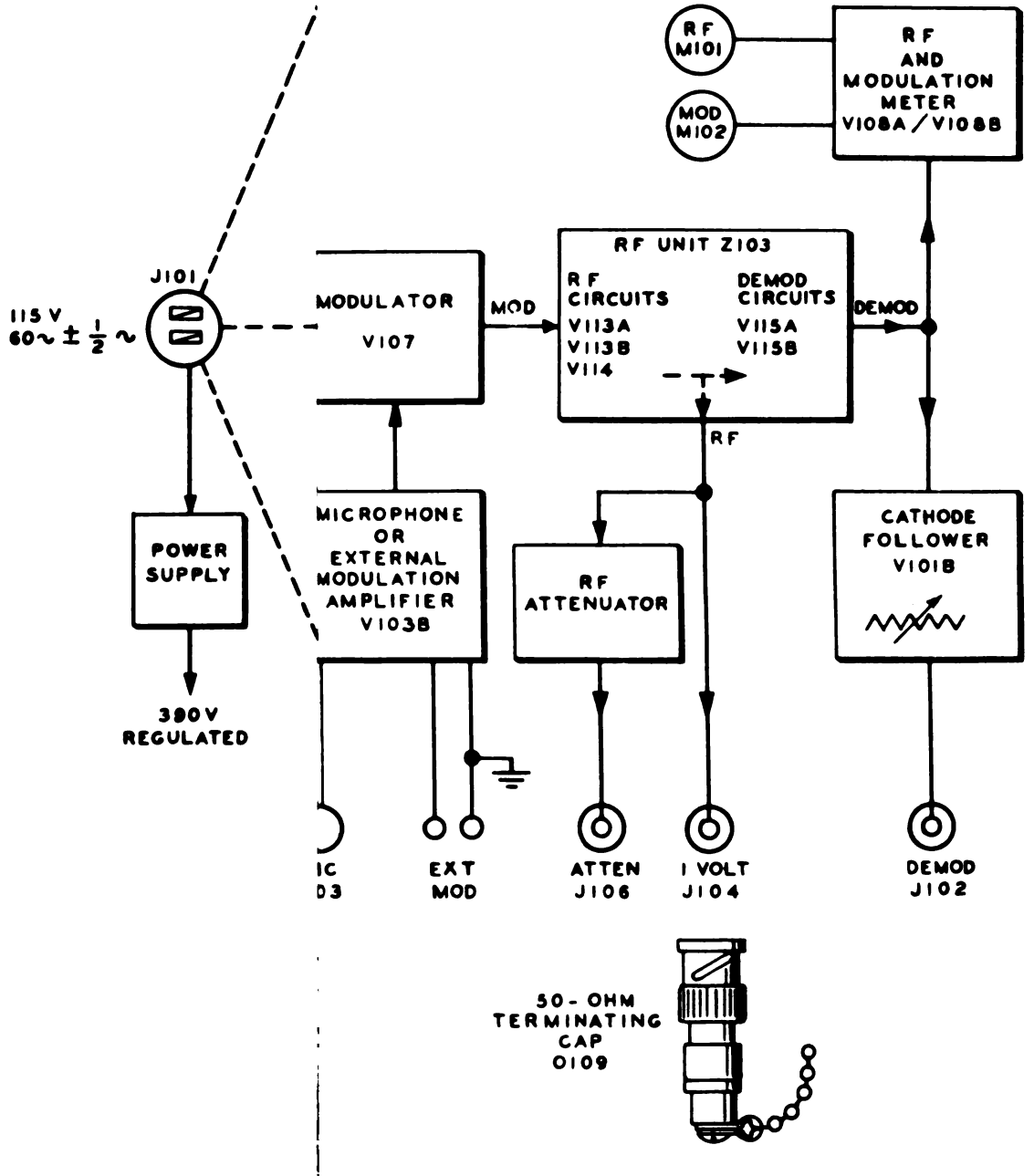


Figure 1-2. Signal Generator SG-66/ARM-5, Block Diagram

a 180-degree phase difference between the reference and variable channel signals. Therefore, when the reference and variable channels are fed from the same pick-up coil, the reference and variable channels are 180 degrees out of phase corresponding to a track angle of 0 degrees. The phase relationship between the 30-cycle frequency modulation on the reference-phase component of modulation and the 30-cycle variable-phase component of modulation is determined by the particular pair of tone wheel coils selected by the OMNI TRACK switch. By selecting these coils in proper combination, the OMNI TRACK switch is capable of shifting the "track angle" through 360 degrees in twelve 30-degree steps. At intermediate (odd 15-degree) positions of the track switch an additional phase shift is introduced by the connection of an RC phase shifting circuit between the 30-cycle filter and the amplifier V103A. The OMNI TRACK switch is calibrated in ANGLE TO degrees, to simulate an omni transmitter. At a zero degree setting of the track switch, the phases of the reference and variable channel components are opposite, and the emitted signal is the same as that which would be received by an aircraft due south of an omni transmitter. A 90-degree setting provides modulation corresponding to the signal received due west of the omni station, and so forth. The modulation percentage of each of the modulation components is adjusted to the proper 30 per cent value by means of two potentiometers, one in each channel, immediately following the two limiter tubes V102 and V105. These panel controls are marked 30 ~ MOD and 9960 ~ MOD. Adjustments must be made with the FUNCTION switch set in the correspondingly marked SET positions (not shown in figure 1-2; see figure 2-1) which provide for separately connecting, each of the modulation components to the modulator.

1-19. PHASE LOCALIZER CIRCUIT. Phase localizer signals are the same in character as omni signals with the following exceptions: For an "on-course" indication, the 30-cycle component is zero; for "off course, needle right," the 30-cycle component is in phase with the reference modulation on the 9960-cycle subcarrier; and for "off course, needle left," the 30-cycle component is shifted 180 degrees from the reference modulation phase. As shown in section B of figure 1-2, the input for the reference phase of the simulated phase localizer signal is always taken from one coil (L101) associated with the tone wheel E116. For a simulated "needle center" (on course) signal, the input of the variable phase channel is grounded. The input of this variable phase channel is connected to the reference coil L101 for "needle left" signals, and to the diametrically opposite tone wheel coil L105 for "needle right" signals. In addition, in all PH LOC positions of the FUNCTION switch, a resistive attenuating network is switched into the variable phase channel to reduce the 30-cycle component of modulation from the normal omni value of 30 per cent to 7.5 per cent for off-course phase localizer test signals.

1-20. AMPLITUDE LOCALIZER CIRCUIT. The amplitude localizer tone wheel E115 is cut so as to provide a 9960-cycle signal frequency-modulated simultaneously at 90 cycles and 150 cycles. When the FUNCTION switch is set to any of the three AMP LOC positions, the input to the reference phase channel is disconnected from the tone generator and grounded, and L103, the amplitude localizer pick-up coil, is connected to the variable phase channel. (See figure 1-2.) Also, a 150-cycle low-pass filter is switched into the circuit in place of the 30-cycle filter in order to pass the 90-cycle and 150-cycle voltages produced by the discriminator, and to remove the higher-frequency components. The filter is followed by a ratio network, the function of which is to set the relative levels of the 90-cycle and 150-cycle components as required. When the FUNCTION switch is in the AMP LOC ⓒ (needle center) position these voltages are equal and each provides 20 per cent modulation of the carrier. For the AMP LOC ⓛ (needle left) and AMP LOC ⓡ (needle right) switch positions, the voltages are unbalanced to such an extent as to produce "3 dot" deflection, left or right, in a standardized localizer receiver. This corresponds to an increase of 2 db in one component and a decrease of 2 db in the other component.

1-21. METER CIRCUITS. The RF meter M101 is in a linear detector circuit, fed by the r-f output tank coil, for measuring carrier level. The sensitivity of the meter is such that a red line (LEVEL SET) indication corresponds to a one-volt output across 50 ohms at J104. At this level, providing J104 is terminated in 50 ohms, the proper input is fed to the r-f attenuator Z101. Such a 50-ohm termination is provided in the cap normally used to close J104.

1-22. The MOD meter M102 is a linear voltmeter which measures the audio voltage derived from the carrier by the demodulator tube. When the r-f carrier is set at the standard level (the red line indication on the RF meter) the MOD meter is calibrated to indicate per cent modulation. Its sensitivity is such that with the FUNCTION switch in either the 9960 ~ SET or the 30 ~ SET position, the red-line indication (LEVEL SET) corresponds to 30 per cent modulation. When the FUNCTION switch is set to RF, a resistance is connected across the meter to reduce its sensitivity so that a full-scale reading corresponds approximately to 100 per cent modulation, as supplied from an external source. In the PH LOC, OMNI, and AMP LOC positions of the FUNCTION switch, providing the proper SET adjustments have been made, other shunt resistors are connected, with values chosen to produce essentially LEVEL SET indications for each of the various modulations corresponding to these switch positions.

1-23. MICROPHONE AND EXTERNAL MODULATION CIRCUIT. In all positions of the FUNCTION switch, voice modulation may be superimposed on the internal test modulations to permit simultaneous voice and signal transmission. The voice modulation is connected through an amplifier stage V103B to the modulator tube V107. V103B also functions as

the amplifier for any other external modulation source which may be connected to the two binding posts on the front panel. These binding posts are automatically short-circuited when the push-to-talk button of a microphone plugged into the MIC jack J103 is operated.

1-24. POWER REQUIREMENTS.

CAUTION

The frequency of the primary power supply must be 60 cycles, ± ½ cycle, and stable. Refer to note of paragraph 1-25.

1-25. Radio Test Set AN/ARM-5 requires an a-c primary power source of 115 volts, 60 cps. Its power consumption is 160 watts. The AN/ARM-5 can be operated only on 60-cps a-c power because of the synchronous motor of the tone generator, the speed of which determines the frequency of the generated modulation voltages.

Note

Omni receivers show course errors, in varying degrees depending on the receiver design, when the modulation frequencies deviate from 30 cycles. Consequently, since the 30-cycle frequency generated by the SG-66/ARM-5 is directly proportional to the primary power frequency, it is necessary that the primary power frequency be 60 cycles and stable. Errors in measurement resulting from primary power frequency variations will depend upon the characteristics of the receiver under test. Frequency variations of less than 0.5 per cent are not likely to cause serious errors.

SECTION II

OPERATING PROCEDURES

2-1. DESCRIPTION OF OPERATING CONTROLS.

(*See figure 2-1.*)

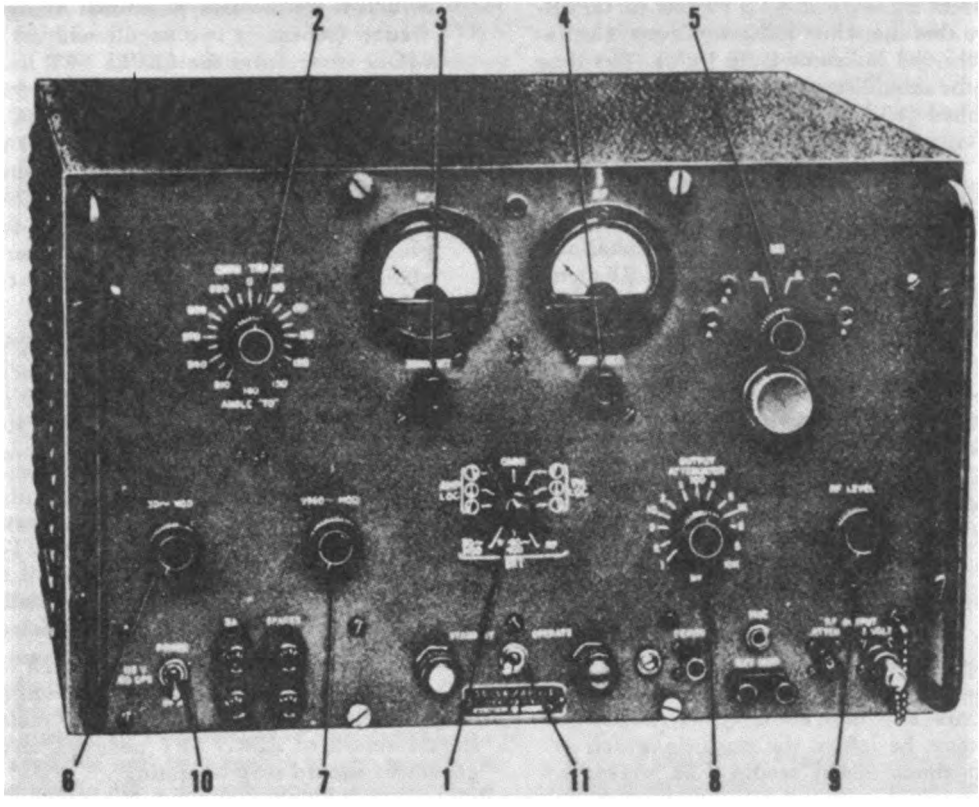
2-2. Table III lists the controls, and their functions, provided for operation of Radio Test Set AN/ARM-5.

TABLE III. OPERATING CONTROLS

Panel Marking	*Function of Control*
AMP LOC-OMNI-PH LOC-SET Note In the text this switch is referred to as the "FUNCTION" switch	Selector switch with ten operating positions as follows: AMP LOC ◐: needle-left test for amplitude localizer AMP LOC ●: needle-center test for amplitude localizer AMP LOC ◑: needle-right test for amplitude localizer OMNI : omni track tests for omnidirectional signals PH LOC ◐ : needle-left test for phase localizer PH LOC ● : needle-center test for phase localizer PH LOC ◑ : needle-right test for phase localizer RF : for RF carrier level setting 9960 ~ MOD: for 9960-cycle modulation adjustment 30 ~ MOD: for 30-cycle modulation adjustment

TABLE III. OPERATING CONTROLS (Cont.)

Panel Marking	*Function of Control*
OMNI TRACK	Selects different pair of tone wheel pick-up coils for reference phase and variable phase modulation. Also inserts a 15-degree phase shift at alternate (odd 15-degree) OMNI TRACK switch positions. With FUNCTION switch in OMNI position provides for 24 ANGLE TO omni-track test positions
ZERO SET (under MOD meter)	For zero-setting MOD meter
ZERO SET (under RF meter)	For zero-setting RF meter
MC	Two-position crystal selector switch for switching r-f output frequency
30 ~ MOD	Sets level of 30-cycle component of omni modulation to proper value as indicated by MOD meter. When this adjustment is correctly made, the AMP LOC modulation levels and the level of the 30-cycle component of the PH LOC modulation are automatically established at the proper values
9960 ~ MOD	Sets level of 9960-cycle component of omni modulation to proper value as indicated by MOD meter



1. AMP'LOC—OMNI—PH LOC—SET (Function Switch)
2. OMNI TRACK
3. ZERO SET
4. ZERO SET
5. MC
6. 30~ MOD
7. 9960~ MOD
8. OUTPUT ATTENUATOR
9. RF LEVEL
10. POWER—OFF
11. STAND BY—OPERATE

Figure 2-1. Signal Generator SG-66/ARM-5, Operating Controls

TABLE III. OPERATING CONTROLS (Cont.)

Panel Marking	*Function of Control*
OUTPUT ATTENUATOR	Adjusts attenuator output level
RF LEVEL	Adjusts level of r-f carrier as indicated by the RF meter
POWER-OFF	In POWER position applies 115-volt 60-cps a-c primary power to equipment. In OFF position disconnects primary a-c power
STAND BY—OPERATE	In STAND BY position (providing POWER-OFF switch is in POWER position) illuminates white indicator lamp (at left) indicating application of filament voltage only. In OPERATE position applies primary a-c power to plate transformer, extinguishes white indicator lamp, illuminates red indicator lamp (at right) indicating application of plate voltage and other operating potentials, and starts tone generator motor

2-3. OPERATING PROCEDURES.

2-4. BEFORE USE. Prepare the SG-66/ARM-5 for operation as follows:

a. Check that the primary power frequency is 115 volts, 60 cycles, and stable. (Refer to paragraph 1-25.)

b. Remove the crystal cover cap located below the MC switch. Check the frequency rating of the crystals installed in the A and B sockets. Replace the crystals if other frequencies are desired. Make sure that the panel frequency tabs agree with the crystal frequencies installed. The upper crystal corresponds to the "A" position; the lower to "B".

c. If ATTEN output is to be used for testing, connect 50-ohm termination cap, which is chain-attached alongside, to RF OUTPUT 1 VOLT connector.

d. Set STAND BY—OPERATE switch to STAND BY and POWER-OFF switch to POWER. White indicator lamp should light.

e. Set STAND BY—OPERATE switch to OPERATE. Observe that the white indicator lamp is extinguished and the red indicator lamp lights. The tone generator motor should start, resulting in a characteristic high-pitched (10 kc) whine.

f. Press in ZERO SET knob below MOD meter and rotate knob left or right, aligning needle of MOD meter with ZERO SET line of meter scale.

g. Press in ZERO SET knob below RF meter and rotate knob left or right, aligning needle of RF meter with ZERO SET line of meter scale.

h. Set FUNCTION switch to RF and MC switch to A. Set the RF LEVEL control at about the middle of its range. Insert an insulated screw driver into the A hole at the left of the MC switch and adjust the trimming screw for maximum RF meter indication. Then insert the screw driver into the A hole, at the right of the MC switch, and again adjust for maximum RF meter indication.

Note

Readings on the RF meter may not be obtained immediately. It may be necessary to alternately adjust both A trimmers several times before any indication appears. Each trimmer must be left in the position which gives a maximum meter reading. *To prevent damage or possible false readings, do not press screw driver harder than is necessary to engage slots in heads of trimmer screws.*

i. Set MC switch to B. Adjust the B trimmers at the left and right of the MC switch in the same manner as described in step g.

j. Adjust the RF LEVEL control until the RF meter needle is aligned with the LEVEL SET line on meter scale.

k. Set FUNCTION switch to 9960 ~ MOD position. Adjust the 9960 ~ MOD control until the MOD meter needle is aligned with the LEVEL SET line on the meter scale.

l. Set FUNCTION switch to 30 ~ MOD position. Adjust the 30 ~ MOD control until the MOD meter needle is aligned with the LEVEL SET line on the meter scale.

m. Set FUNCTION switch successively to AMP LOC ②, AMP LOC ①, AMP LOC ⑤, OMNI, PH LOC ②, PH LOC ①, and PH LOC ⑤. In each of these positions, note that the level settings of the MOD and RF meters remain essentially constant at the LEVEL SET line on the meter scales.

Note

The settings of the 9960 ~ MOD and 30 ~ MOD controls described in steps k. and l. must not be changed when the FUNCTION switch is set to other positions. A slight deviation (of one or two needle widths) of the MOD meter from the LEVEL SET line may be expected at positions other than 9960 ~ MOD or 30 ~ MOD of the FUNCTION switch, due to slight inaccuracies in meter-shunting resistors. (Refer to paragraphs 1-21 and 1-22.) If the 30 ~ MOD and 9960 ~ MOD controls have been properly set, the phase localizer and amplitude localizer modulation percentages are adjusted to the correct values automatically.

n. Plug a single-button carbon microphone, such as Microphone Type RS38-A, into MIC jack. Depress microphone button, and observing MOD meter, talk and check that slight fluctuations of the MOD meter needle take place. The reading of the RF meter should not change.

o. Connect an adjustable audio frequency source to the EXT. MOD binding posts. Set FUNCTION switch to RF. The MOD meter should read full scale indicating approximately 100 per cent modulation with approximately 1.5 volts of external modulation input.

p. Set STAND BY—OPERATE switch to STAND BY. Red indicator lamp should go out, white indicator lamp should light, the RF and MOD meter needles should return to ZERO SET position, and the tone generator should stop operating.

2-5. DURING USE. Operation of Signal Generator SG-66/ARM-5 will be governed by the requirements of the tests to be performed and the type of equipment under test. The preliminary operating procedure described in paragraph 2-4 will be required before actual testing takes place. Once this procedure has been performed, actual operation may begin with the setting of the STAND BY—OPERATE switch to OPERATE. The type of output signal required from the SG-66/ARM-5 will determine the setting and use of the controls listed in table III. The different output signals available for testing are described in paragraphs 2-6 through 2-9.

2-6. RF OUTPUT. The radio frequency output (RF OUTPUT) of the SG-66/ARM-5 is terminated at two connectors marked ATTEN and 1 VOLT. A variable output from 1 to 10,000 microvolts is available at the ATTEN output. This output is adjustable continuously by means of the OUTPUT ATTENUATOR control. It has a source impedance of 50 ohms. Normally, the ATTEN OUTPUT is used for receiver testing, and under such circumstances the 1 VOLT output connector is capped with the 50-ohm termination cap chained alongside. Use of the 50-ohm termination cap is necessary since the OUTPUT ATTENUATOR scale is calibrated to indicate microvolts appearing across an external 50-ohm load when the 1 VOLT connector J104 is properly terminated. The load is connected to the SG-66/ARM-5 by a short length of

RG-58/U cable which has a nominal impedance of 50 ohms. If the receiver under test has an impedance other than 50 ohms, a correction factor must be used to determine the microvolts appearing at its input. A fixed output of 1 volt is available at the 1 VOLT connector J104 for connection to a 50-ohm antenna for test radiation to adjacent aircraft. If this connector is connected to an antenna or other load having an impedance other than 50 ohms, the impedance mismatch will cause a change in the reading of the RF meter. The RF meter should be restored to the LEVEL SET indication by means of the RF LEVEL control.

Note

A sufficiently bad impedance mismatch at J104 will make it impossible to modulate the carrier properly. To test for this, switch between the OMNI and RF SET positions of the FUNCTION switch. If the modulation is proper, there should be no change in the reading of the RF meter between these switch positions. A change in meter reading indicates a need for better matching at J104.

2-7. DEMODULATED OUTPUT. The DEMOD output is provided to permit use of the available SG-66/-ARM-5 modulation voltages for bench tests. This output is derived from the r-f carrier and the demodulating circuits are so designed that if the DEMOD output is connected to a resistive load, the demodulated voltage available will be a replica of the modulation envelope, except that a d-c component is also present. If the load is reactive, a phase shift will result which must be taken into account when checking omni equipment. The demodulated output voltage may be adjusted by means of a screw driver adjustment at the left of the DEMOD output connector. The output voltage of a modulation component which modulates the carrier at 30 per cent is adjustable between 0.5 and 4.5 volts. For other modulation percentages, the output voltage will be linearly related to the per cent modulation. A d-c voltage also appears at this output connector; this d-c voltage will vary with the carrier level and the setting of the DEMOD screw driver control. It may be as great as 40 volts at the maximum DEMOD output.

2-8. EXTERNAL MODULATION. If external modulation is required, connect to the EXT MOD binding posts an audio-frequency source capable of supplying approximately 1.5 volts rms across 10,000 ohms, and set the FUNCTION switch to RF. Under these conditions a full scale reading of the MOD meter corresponds to approximately 100 per cent modulation.

2-9. MICROPHONE INPUT. If it is desired to transmit simultaneous voice and test signals, plug a single-button carbon-type microphone into the MIC input jack. When the microphone circuit is closed, any other external modulation which may be connected to the SG-66/ARM-5 is removed.

2-10. DURING STANDBY. During standby periods set the STAND BY—OPERATE switch to STAND BY. Only the filament voltage will remain on.

2-11. SECURING THE EQUIPMENT. To shut down the SG-66/ARM-5 following use, set the POWER-OFF switch to OFF.

SECTION III

OPERATING CHECKS AND ADJUSTMENTS

3-1. OPERATING CHECKS AND ADJUSTMENTS BEFORE USE.

3-2. Before using the Signal Generator SG-66/ARM-5 for test purposes, make the following checks:

a. Check that the primary power source frequency is 60 cycles and stable. (Refer to paragraph 1-25.)

b. Remove the crystal cover cap located below the MC switch and check that crystals of desired frequencies are installed in the A and B sockets. Also check that the front panel frequency tabs agree with the crystal frequencies installed. The upper crystal corresponds to "A," the lower to "B."

c. If ATTEN output is to be used for testing, check that the 50-ohm termination cap is connected to the RF OUTPUT 1 VOLT connector.

d. With the setting of the STAND BY—OPERATE switch at STAND BY and POWER-OFF switch at POWER, check that white indicator lamp at the left of the STAND BY—OPERATE switch lights.

e. With the setting of the STAND BY—OPERATE switch at OPERATE (POWER-OFF switch in POWER position), check that the white indicator lamp goes out, the red indicator lamp at the right of the STAND BY—OPERATE switch lights, and the tone-generator motor starts.

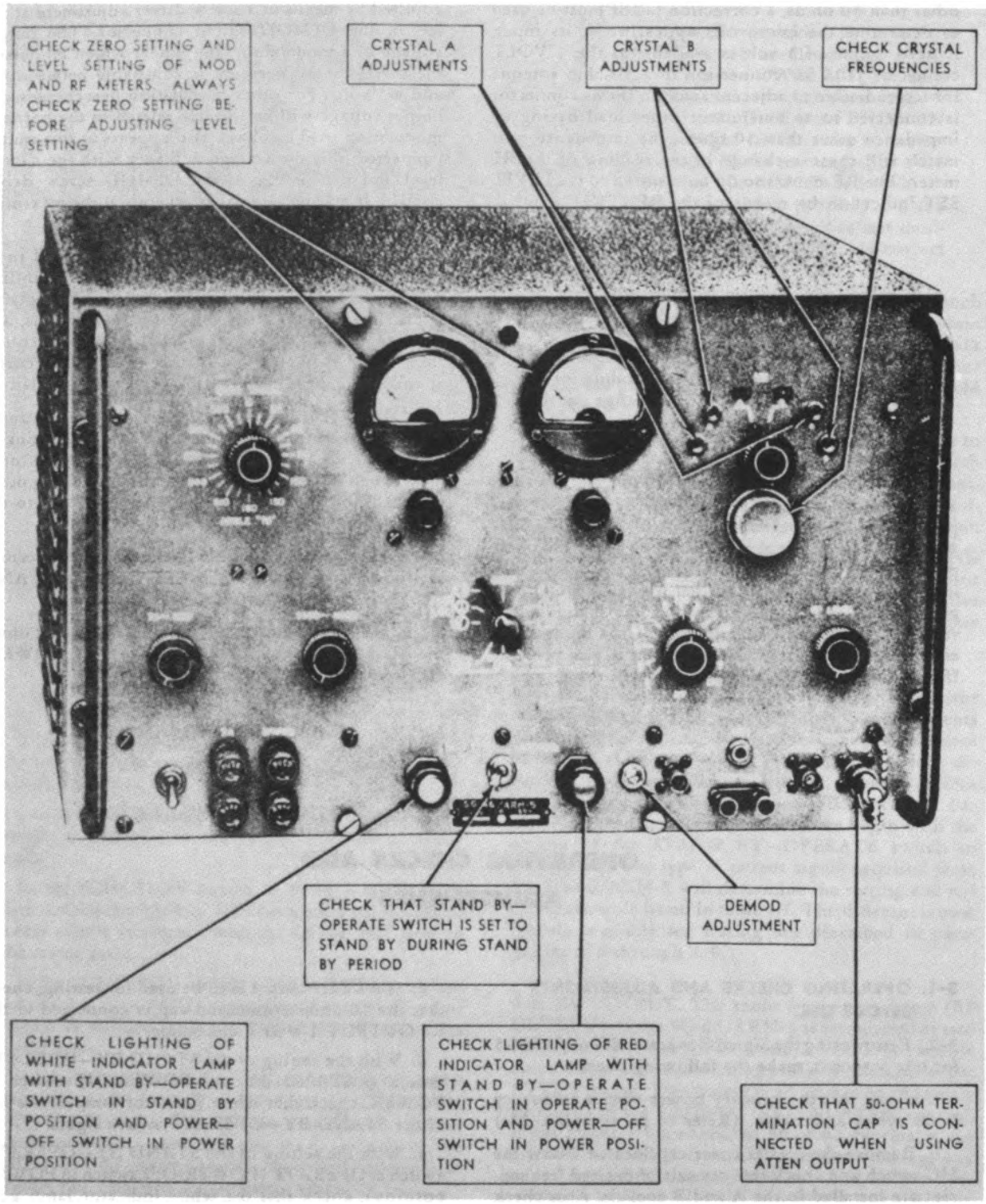


Figure 3-1. Signal Generator SG-66/ARM-5, Operating Checks and Adjustments

3-3. Adjustments required before use of the SG-66/ARM-5 are noted in the operating procedure of paragraph 2-4.

3-4. OPERATING CHECKS AND ADJUSTMENTS DURING USE.

3-5. To insure proper operation of the SG-66/ARM-5 during test procedures, make the following checks and adjustments:

a. Check the zero setting of the MOD and RF meters by depressing the applicable ZERO SET knob. If readjustment is necessary, refer to paragraph 2-4, steps f. and g.

b. Check the level settings of the RF and MOD meters by setting the FUNCTION switch to the RF position, observing the RF meter, and then to the 30 ~ MOD and 9960 ~ MOD positions, observing the MOD meter. These meter indications should also remain essentially constant (refer to note of step m., paragraph 2-4) with the FUNCTION switch set to any of the AMP LOC, OMNI, or PH LOC positions. If readjustment is necessary always adjust in the applicable SET position of the FUNCTION switch. Refer to paragraph 2-4, steps j., k., and l. Always check the meters' zero settings (refer to step a., this paragraph) before adjusting the level setting.

c. If ATTEN output is in use, make sure the 50-ohm termination cap is connected to the 1 VOLT RF OUTPUT connector.

d. Check the impedance of the load if connected to the ATTEN OUTPUT. If the impedance of the load is other than 50 ohms resistive, the OUTPUT ATTENUATOR microvolts reading must be corrected accordingly.

e. To avoid unnecessary warm-up periods and frequent operating control adjustments, check that the STAND BY—OPERATE switch is in STAND BY position and the POWER-OFF switch is in POWER position during standby periods.

SECTION IV

EMERGENCY OPERATION AND REPAIR

4-1. EMERGENCY OPERATION.

4-2. There are no substitute methods of operation for Radio Test Set AN/ARM-5. However, since failure may be due to minor faults, such as defective cable connections, crystals, vacuum tubes, or fuses, which may be replaced or repaired by the operator, this possibility should be investigated before undertaking major repair.

4-3. EMERGENCY REPAIR.

4-4. REMOVING CHASSIS FROM INSTRUMENT CASE. To remove the signal generator chassis from its instrument case, loosen the two captive screws on the rear of the instrument case, stand the unit on its back, loosen the eight captive screws on the front panel, grasp the two handles, and pull the chassis out of the case.

4-5. REPLACING CHASSIS IN INSTRUMENT CASE. To replace the signal generator chassis in its instrument case, stand the instrument case on its back, lift the chassis by the two handles on the front panel and lower the chassis into the case. Start the captive screws on the front panel; then erect the instrument case and start the two captive screws at the rear of the case. Tighten all screws, especially the two rear screws, to provide heat conductivity from the chassis to the instrument case.

4-6. REPLACING VACUUM TUBES. All vacuum tubes are accessible with the removal of the chassis from its instrument case. (See figure 4-1.) To replace a tube, remove the chassis from its instrument case (refer to paragraph 4-4), pull out the defective tube, and insert a new tube of the proper type. Replace the chassis in its instrument case (refer to paragraph 4-5).

4-7. REPLACING CRYSTALS. Signal Generator SG-66/ARM-5 contains two type CR-23/U crystals installed behind a screw-on protective cap. (See figure 4-2.) To replace a crystal, remove the crystal cover cap, grasp the crystal case between thumb and forefinger, and work the crystal out of its socket.

CAUTION

Do not use pliers or similar metal-jawed tool to remove crystals.

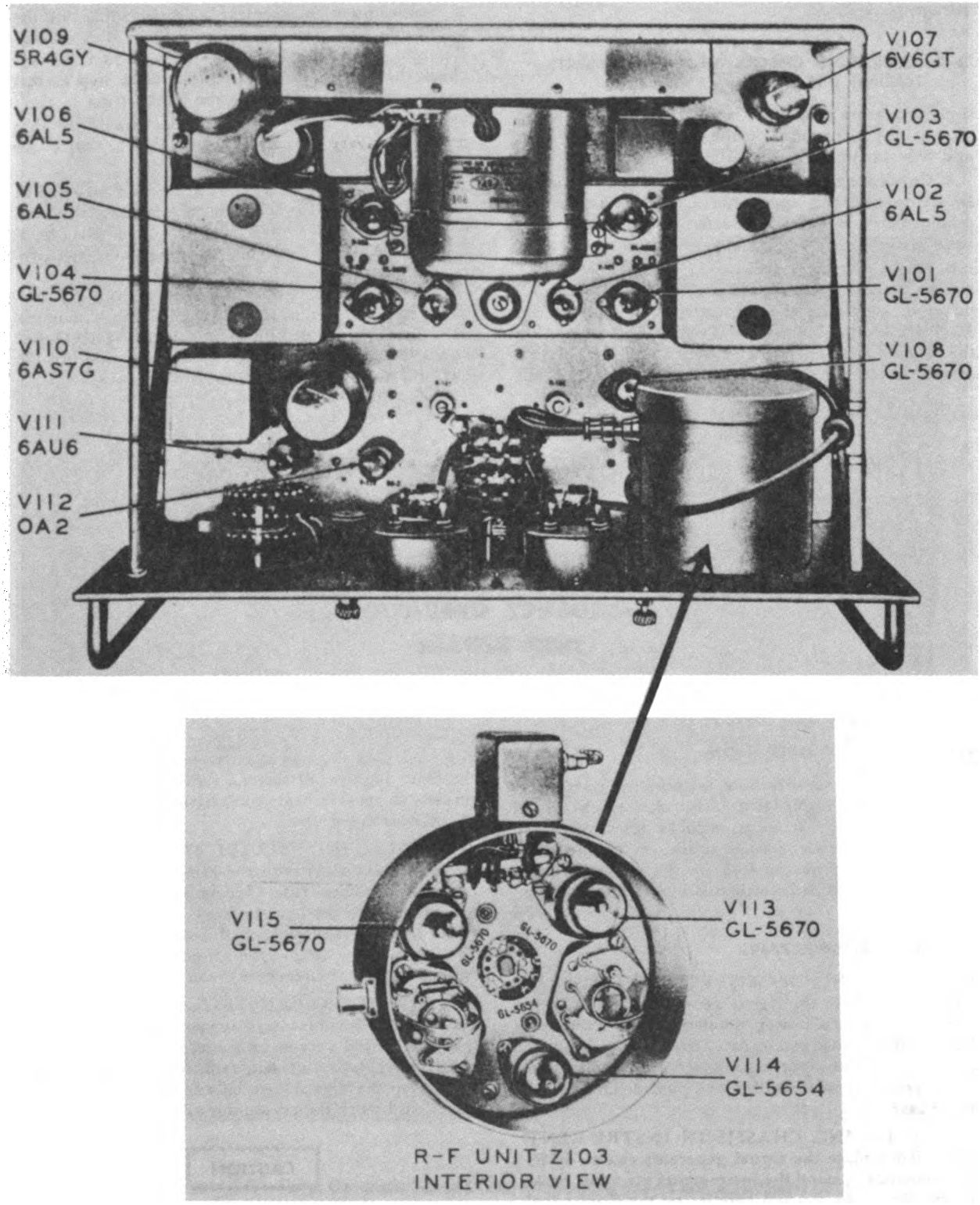


Figure 4-1. Signal Generator SG-66/ARM-5, Location of Vacuum Tubes

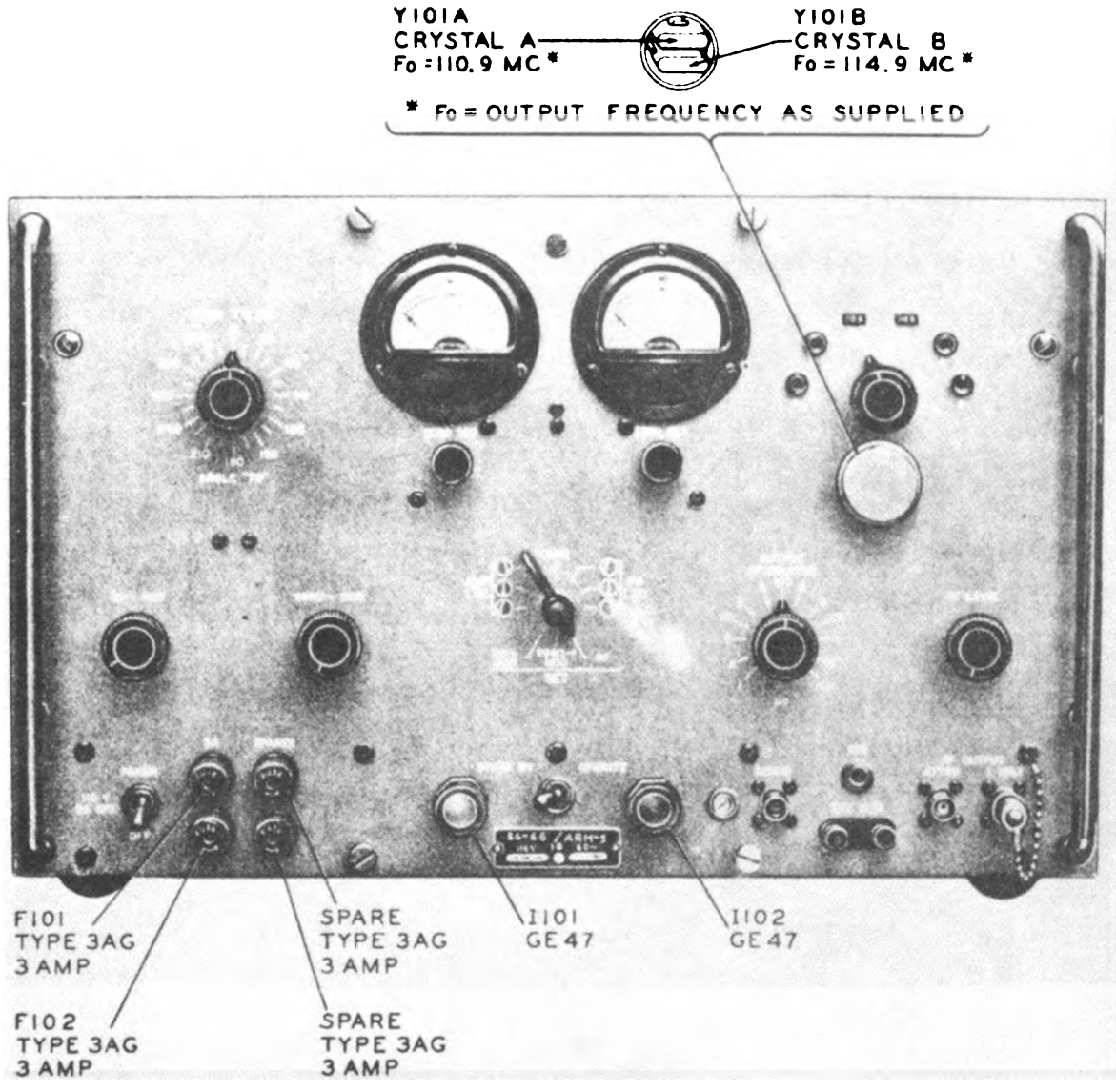


Figure 4-2. Signal Generator SG-66/ARM-5, Location of Crystals, Fuses, and Panel Lamps

If the new crystal being installed is for a frequency different from that shown by the corresponding front panel tab at A or B, replace the tab with one showing the new crystal frequency.

4-8. REPLACING FUSES. Signal Generator SG-66/ARM-5 contains two active and two spare 3-ampere, type 3AG fuses installed in extractor-type, finger-cap fuse holders located in the lower left portion of the front panel. (See figure 4-2.) To replace a fuse, turn the fuse-holder cap counterclockwise, remove the cap, and pull out the defective fuse, install a new fuse of the proper rating, and replace the cap, securing it with a clockwise turn.

4-9. REPLACING PANEL LAMPS. Radio Test Set AN/ARM-5 contains two GE #47 bayonet-type panel lamps located in the white-lens and red-lens lamp assemblies on either side of the STAND BY—OPERATE switch. (See figure 4-2.) To replace either one of these lamps, unscrew the lens-cap and remove the defective lamp by pressing in and turning counterclockwise. Insert a new lamp and secure by pressing in and turning clockwise. Screw the lens-cap back in place, making sure that the white lens is at the left of the STAND BY—OPERATE switch, while the red lens is at the right.

By order of the Secretary of the Army:

M. B. RIDGWAY,
General, United States Army,
Chief of Staff.

Official:
JOHN A. KLEIN,
Major General, United States Army,
The Adjutant General.

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