TECHNICAL MANUAL

GS AND DEPOT MAINTENANCE MANUAL

PULSE GENERATOR SG-3366A/U

This copy is a reprint which includes current pages from Change 1.

HEADQUARTERS, DEPARTMENT OF THE ARMY
JUNE 1971

5 SAFETY STEPS TO FOLLOW IF SOMEONE IS THE VICTIM OF ELECTRICAL SHOCK

1 DO NOT TRY TO PULL OR GRAB THE INDIVIDUAL

2 IF POSSIBLE , TURN OFF THE ELECTRICAL POWER

3 IF YOU CANNOT TURN OFF THE ELECTRICAL POWER, PULL, PUSH, OR LIFT THE PERSON TO SAFETY USING A WOODEN POLE OR A ROPE OR SOME OTHER INSULATING MATERIAL

4 SEND FOR HELP AS SOON AS POSSIBLE

5 AFTER THE INJURED PERSON IS FREE OF CONTACT WITH THE SOURCE OF ELECTRICAL SHOCK, MOVE THE PERSON A SHORT DISTANCE AWAY AND IMMEDIATELY START ARTIFICIAL RESUSCITATION

CHANGE No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, *1 Sep 1983*

General Support and Depot Maintenance Manual

GENERATOR, PULSE SG-366A/U

(NSN 6625-00-168-0471)

TM 11-6625-435-45-1, 25 June 1971, is changed as follows:

1. Title of the manual is changed as shown above.
2. New or revised material is indicated by a vertical bar in the margin. When an entire chapter or section is added or revised, the vertical bar is placed opposite the title. Added or revised illustrations are indicated by a vertical bar opposite the figure caption.
3. Remove old pages and insert new pages as follows:

Remove pages	*Insert pages*
i and ii	i through iii
1-1 through 1-11	1-1 through 1-14
2-1 through 2-4	2-1 through 2-4.1
2-7 through 2-12	2-7 through 2-17
3-1 through 3-7	3-1 through 3-8
4-1 through 4-10	4-1 through 4-10
Al	A-1/(A-2 blank)
Figure 5-2 (foldout)	Figures 5-2 and 5-3 (foldouts)

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GS AND DEPOT MAINTENANCE MANUAL

GENERATOR, PULSE SG-366A/U

(NSN 6625-00-168-0471)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms) direct to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: DRSEL-ME-MP, Fort Monmouth, New Jersey 07703. In either case, a reply will be furnished direct to you.

			Paragraph	*Page*
CHAPTER	1.	FUNCTIONING		
Section	I.	General		
		Scope	1-1	1-1
		Consolidated Index of Army Publications and Blank Forms	1-2	1-1
		Maintenance Forms, Records and Reports	1-2.1	1-1
		Reporting Equipment Improvement Recommendations (EIR)	1-2.2	1-1
		Administrative Storage	1-2.3	1-1
		Destruction of Army Electronics Materiel	1-2.4	1-1
		Block Diagram	1-3	1-1
	II.	Circuit functioning		
		Astable multibrator	1-4	1-4
		Pulse shaping amplifier	1-5	1-5
		Differentiator	1-6	1-4
		Sync amplifier	1-7	1-4
		Pulse width multivibrator	1-8	1-4
		Pulse amplifiers	1-9	1-5
		Carrier oscillator	1-10	1-5
		Isolation emitter followers	1-11	1-5
		Agc detector and amplifier section (version A)	1-12	1-6
		Agc detector and amplifier section (version B)	1-12.1	1-6
		Diode switch and driver	1-13	1-7
		Output amplifiers	1-14	1-9
		Rf attenuator network	1-15	1-12
		Power supply circuits (version A)	1-16	1-12
		Power supply circuits (version B)	1-17	1-13
CHAPTER	2.	TROUBLESHOOTING		
Section	I.	General troubleshooting techniques		
		General instrutions	2-1	2-1
		Toubleshooting procedures	2-2	2-1
		Test equipment required	2-3	2-1
	II.	Troubleshooting pulse generator SC-366A/U		
		Test setup	2-4	2-2
		Localizing troubles	2-5	2-2
		Isolating trouble within a stage	2-6	2-4
		Dc resistances of transformer and coils	2-7	2-4
		Checking waveforms	2-8	2-4

		Paragraph	Page
	Transistor-testing techiques	2-9	2-4
	Resistance measurements	2-10	2-4.1
CHAPTER 3.	REPAIRS		
	General precautions	3-1	3-1
	Removal and replacement of cabinet, cover plate, and cover screen	3-2	3-1
	Repair of rf oscillator switch assembly S4	3-3	3-4
CHAPTER 4.	GENERAL SUPPORT TESTING PROCEDURES		
	General	4-1	4-1
	Test equipment required	4-2	4-1
	Modification work orders	4-3	4-1
	Physical tests and inspections	4-4	4-1
	Pulse repetition rate test	4-5	4-2
	Pulse width and pulse amplitude tests	4-6	4-3
	Continuous wave oscillator frequency test	4-7	4-3
	Continuous wave amplitude test	4-8	4-5
	Video pulse and pulsed rf rise and decay tests	4-9	4-6
	External oscillator test	4-10	4-7
	External modular test	4-11	4-8
	External trigger test	4-12	4-9
CHAPTER 5.	DEPOT OVERHAUL STANDARDS		
	Applicability of depot overhaul standards	5-1	5-1
	Applicable references	5-2	5-1
	Test facilities required	5-3	5-1
	Testing of signal generator SG-366A/U	5-4	5-1
APPENDIX	REFERENCES		A-1

LIST OF ILLUSTRATIONS

Figure	Title	Page
1-1	Pulse Generator SG-366A/U, version A, block diagram	1-2
1-1.1	Pulse Generator SG-366A/U, version B, block diagram	1-2.2
1-2	Agc detector and amplifier section, version A, schematic diagram	1-6
1-2.1	Agc detector and amplifier section, version B, schematic diagram	1-6.1
1-3	Diode switch and driver, schematic diagram	1-8
1-4	Output amplifier section, version A, schematic diagram	1-10
1-4.1	Output amplifier section, version B, schematic diagram	1-11
1-6	Power supply circuits, version A, schematic diagram	1-13
1-7	Power supply circuits, version B, schematic diagram	1-14
2-1	Pulse generator chassis, version A, top view	2-4.1
2-1.1	Pulse generator chassis, version B, top view	2-4.2
2-2	Rf oscillator switch assembly, top view with cover removal	2-5
2-3	Rf oscillator plate, bottom view	2-5
2-4	Pulse generator assembly, top view	2-6
2-5	Pulse generator assembly, bottom view, resistive components	2-7
2-6	Pulse generator assembly, bottom view, nonresistive components	2-7
2-7	Pulse generator chassis, version A, bottom view, resistive components	2-8
2-8	Pulse generator chassis, version A, bottom view, nonresistive components	2-9
2-8.1	Pulse generator chassis, version B, bottom view	2-10
2-8.2	Power supply assembly, top view	2-11
2-8.3	Printed circuit board, component side	2-11
2-9	Rf attenuator network assembly, bottom view	2-12
2-10 (1)	Pulse generator assembly waveforms (part 1 of 2)	2-13
2-10 (2)	Pulse generator assembly waveforms (part 2 of 2)	2-14
3-1	Pulse generator, cover plate and cover screen removal and replacement	3-3
3-2	Rf oscillator switch assembly, removal and replacement	3-5
3-3	Rf oscillator switch assembly, disassembly and reassembly	3-6
4-1	Pulse repetition rate test setup	4-2
4-2	Pulse width and pulse amplitude tests, equipment setup	4-3
4-3	Continuous wave oscillator frequency test, equipment setup	4-5
4-4	Continuous wave amplitude test, equipment setup	4-6

LIST OF ILLUSTRATIONS—Continued

Figure	*Title*	*Page*
4-5	Viedo pulse and pulsed rf rise and decay tests, equipment setup	4-7
4-6	External oscillator test, equipment setup	4-8
4-7	External modulator test, equipment setup	4-9
4-8	External trigger test, equipment setup	4-10
5-1	MIL-STD resistor and capacitor color code	Located in back of manual
5-2	Pulse Generator SG-366A/U, version A, schematic diagram	
5-3	Pulse Generator SG-366A/U, version B, schematic diagram	

CHAPTER 1

FUNCTIONING

Section I. GENERAL

1-1. Scope

a. This manual covers general support and depot maintenance for Pulse Generator SG-366 A/U (pulse generator). It includes instructions appropriate to general support and depot maintenance categories for troubleshooting, testing, and repairing specified maintenance parts. It also lists tools, materials, and test equipment for general support and depot maintenance. Detailed functioning of the equipment is covered in paragraphs 1-3 through 1-17.

NOTE

There are no maintenance functions assigned to direct support maintenance.

b. The complete technical manual for this equipment includes TM 11-6625-435-12-1.

c. The SG–366A/U's procured on Contract No. DAAB07-82-C-H201 (Serial No. 46-1 through 46-20 and 47-1 through 47-15) differ from the SG-366A/U's previously procured. Unless otherwise indicated, information contained herein is applicable to all SG-366A/U's. Differences are described when the information is not applicable to all SG-366A/U's.

(1) Information applicable only to early models (procured on other contracts) is identified as applicable to Version A (illustrations and equipment).

(2) Information applicable only to model procured on Contract No. DAAB07–82–C–H201 is identified' as applicable to Version B (illustrations and equipment).

1-2. Consolidated Index of Army Publications and Blank Forms

Refer to the latest issue of DA Pam 310-1 to determine whether there are new editions, changes or additional publications pertaining to the equipment.

1-2.1. Maintenance Forms, Records, and Reports

a. Reports of Maintenance and Unsatisfactory Equipment. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by TM 38-750, The Army Maintenance Management System.

b. Report of Packaging and Handling Deficiencies. Fill out and forward SF 364 (Report of Discrepancy (ROD)) as prescribed in AR-735-11-2/DLAR 4140.55/NAVMATINST 4355.73 A/AFR 400.54/ MCO 4430.3F.

c. Discrepancy in Shipment Report (DISREP) (SF 361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33C/AFR 75-18/MCO P4610.19D/DLAR 4500.15.

1-2.2. Reporting Equipment Improvement Recommendations (EIR)

If your Generator, Pulse SG-366A/U needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Put it on an SF 368 (Quality Deficiency Report). Mail it to Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: DRSEL-ME-MP, For Monmouth, New Jersey 07703. We'll send you a reply.

1-2.3. Administrative Storage

Administrative storage of equipment issued to and used by Army activities will have preventive maintenance performed in accordance with TM 740-90-1.

1-2.4. Destruction of Army Electronics Materiel

Destruction of Army electronics materiel to prevent enemy use shall be in accordance with TM 750-224-2.

1-3. Block Diagram
(fig. 1-1 or 1-1.1)

Pulse Generator SG-366A/U is a fully transistorized pulsed carrier generator which provides continuous wave (cw), pulsed carrier, or video pulse output signals. It is used in conjunction with an oscilloscope to test the steady state and transient response of radiofrequency (rf), intermediate frequency (if.), and video amplifiers in radar, television, and other equipment. Signal paths are shown in the block diagram and are described in *a* through *n* below. Figure 1-1 is the block diagram of version A and figure 1-1,1 is the block diagram of version B. For complete circuit details, refer to section II of this chapter and the applicable overall schematic diagram. Figure 5-2 is the overall schematic diagram for version A and figure 5-3 is the overall schematic diagram of version B.

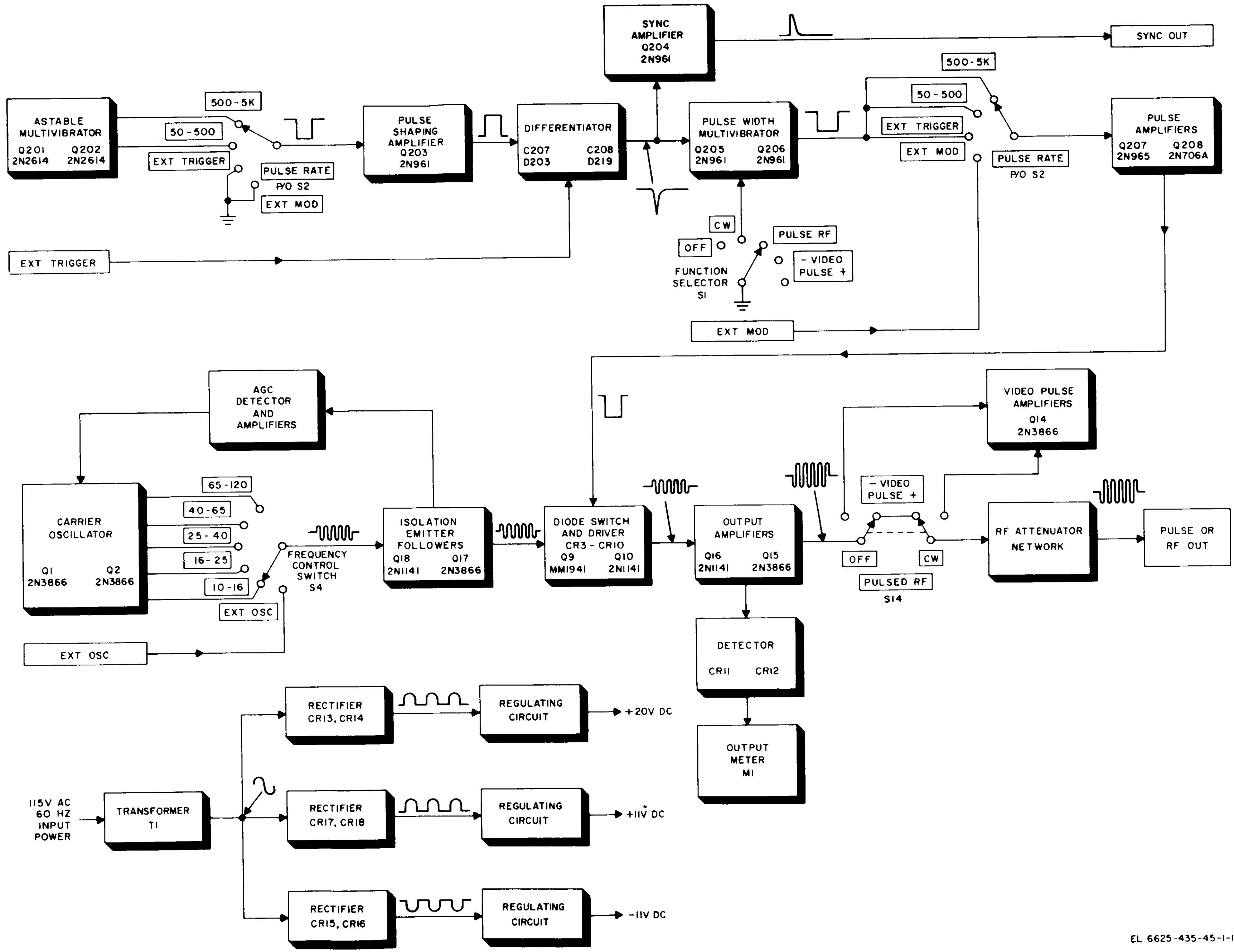


Figure 1-1. Pulse Generator SG-366A/U, Version A, Block Diagram.

a. Astable Multivibrator Q201 and Q202. Astable multivibrator Q201 and Q202 is a freerunning multivibrator. It develops rectangular output pulses which are used to trigger the circuits that produce video output pulses or pulsed rf output pulses. The output repetition rate of these rectangular pulses can be varied from 50 to 5,000 pulses per second. The output pulses of the multivibrator are applied to pulse shaping amplifier Q203.

b. Pulse Shaping Amplifier Q203. Pulse shaping amplifier Q203 sharpens the risetime and falltime of the input pulses and acts as a buffer. It also amplifies and inverts these pulses before applying them to the differentiator.

c. Differentiator C207, D203 and C208, D219. Differentiator C207, D203, receives the rectangular pulses from the pulse shaping amplifier and produces a differentiated signal from which the negative peak is selected. If external trigger is selected, the differentiator uses C208, D219 to perform the same operation on the external trigger signal from EXT TRIGGER input jack J3. The output negative spikes from the differentiator are applied to sync amplifier Q204 and pulse width multivibrator Q205 and Q206.

d. Sync Amplifier Q204. Sync amplifier Q204 receives the negative spikes from the differentiator, amplifies, inverts, and applies them to SYNC OUT jack J1. The resulting positive pulse

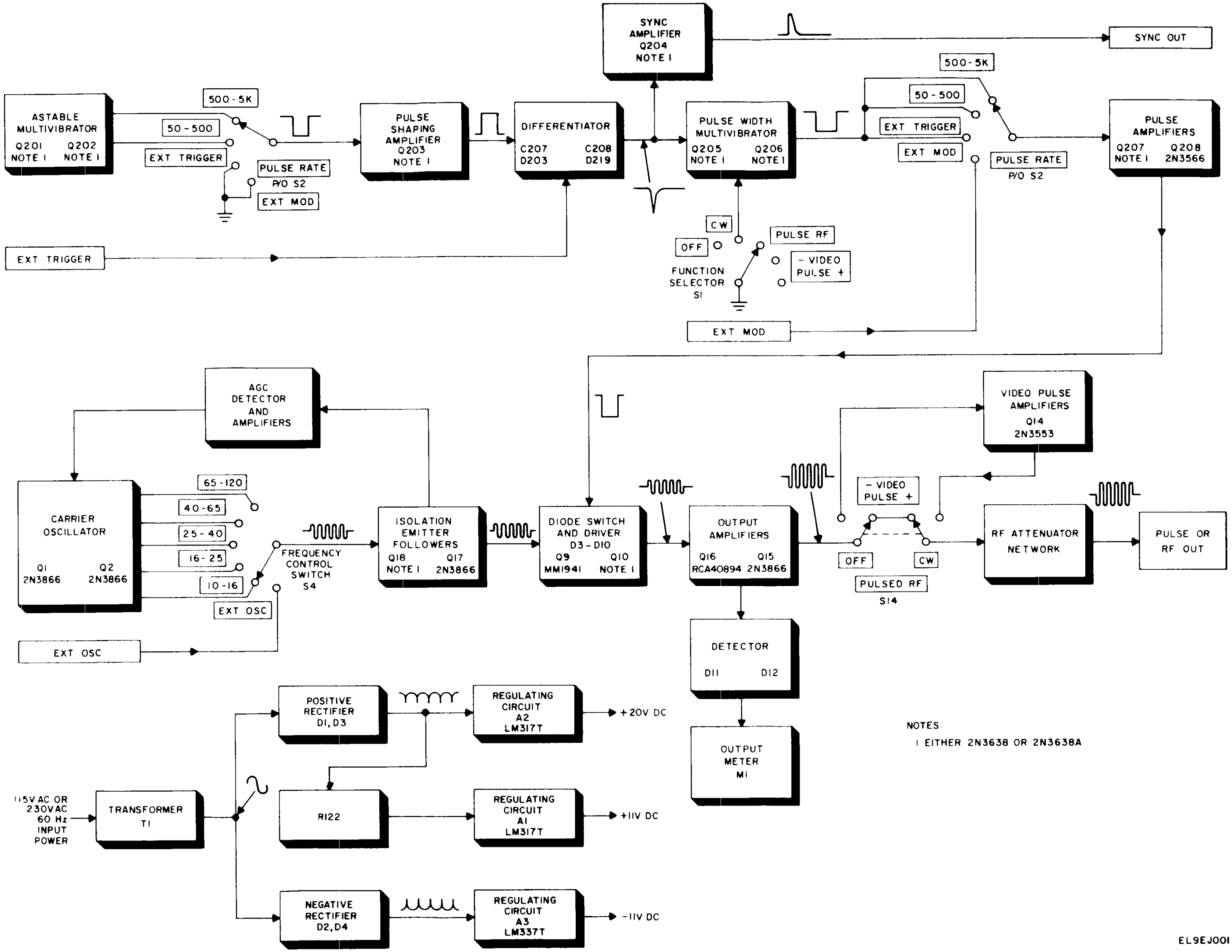


Figure 1-1.1. Pulse Generator SG-366A/U, Version B, Block Diagram.

from J8 are for use as a synchronizing signal for the oscilloscope or other external test equipment.

e. Pulse Width Multivibrator Q205 and Q206. Pulse width multivibrator Q205 and Q206 is a monostable multivibrator with quasi-stable states or output pulse widths variable from 100 nanoseconds (ns) to 100 microseconds (μ see). The pulse width multivibrator receives negative input spikes from the differentiator, either internally determined by astable multivibrator Q201 and Q202 or externally determined by an external trigger input through J3. The pulse width multivibrator applies negative output pulses to pulse amplifiers Q207 and Q208.

f. Pulse Amplifiers Q207 and Q208. Pulse amplifiers Q207 and Q208 are series-connected pulse amplifiers which amplify and invert the input pulses from the pulse width multivibrator. A front panel switch allows an external modulated signal to be applied to pulse amplifies Q207 and Q208 through EXT MOD jack J8 instead of one developed within the SG-366A/U. The output signal from the pulse amplifiers is applied to the diode switch and driver CR3 through CR10, Q9, and Q10.

g. Carrier Oscillator Q1 and Q2. Carrier oscillator Q1 and Q2 is an rf oscillator with the output frequency of the carrier signal variable from 10 to 120 megahertz (MHz). The rf signal from the carrier oscillater is used to produce the continuous wave and pulsed rf output from the SG-366A/U. The rf output signal from the carrier oscillator is applied to isolation emitter followers Q18 and Q17.

h. Isolution Emitter Follows Q18 and Q17. Isolation emitter followers Q18 and Q17 act as isolation amplifiers and emitter followers. They receive the rf signal from the carrier oscillator except during the external oscillator mode. When EXT OSC is selected by a front panel switch, a signal can be fed through EXT OSC jack J4 into isolation emitter followers Q18 and Q17. The output from the isolation emitter followers is applied to an automatic gain control (age) detector and amplifier circuit and to a diode switch and driver, CR3 through CR10, Q9, and Q10.

i. Agc Detector and Amplifier Section. The agc detector and amplifier section is a feedback path to stabilize the frequency and reduce the distortion of the carrier oscillator rf output signal. This rf signal is detected by diodes, amplified through high gain direct-current (de) amplifiers, and then used to control the oscillator level by varying the bias voltages to the oscillator.

j. Diode Switch and Driver CR3 through CR10, Q9 and Q10. The diode switch and driver receives an rf signal from isolation emitter followers Q18 and Q17 and a video pulsing signal from pulse amplifiers Q207 and Q208. Diode switch CR3 through CR10 is switched on and off by transistor drivers Q9 and Q10; this action produces a pulsed rf signal during a PULSED RF selection. In the CW selection, the rf carrier signal is continuously fed through the diode switch and driver. In the ± VIDEO PULSE selection, the pulsing signal from pulse amplifiers Q207 and Q208 is also fed through the diode switch and driver. The output signal from the diode switch and driver is applied to output amplifiers Q16 and Q15.

k. Output Amplifiers Q16 and Q15. Output amplifiers Q16 and Q15 supply the necessary power and voltage gain to the signal from the diode switch and driver. During CW selection, the signal from output amplifier Q15 is detected by CR11 and CR12 and applied to meter M1 for voltage indication. During CW or PULSED RF selection, the output signal from the output amplifiers is applied through resistance-capacitance (rc) coupling to the rf attenuator network. During ± VIDEO PULSE selection, the output signal is applied to video pulse amplifier Q14.

l. Video Pulse Amplifier Q14. Video pulse amplifier Q14 receives video pulses during& VIDEO PULSE selection and supplies the additional amplification necessary for video pulse operation. The output from the video pulse amplifier is applied to the rf attenuator network.

m. Rf Attenuator Network. The rf attenuator network is a resistive attenuating network with fixed-resistive attenuator sections. These sections are switched into the output circuit in different combinations to provide attenuation of the output signal from zero to 101 decibels (dB) in 1-dB steps. The output signal from the rf attenuator network is applied to PULSE OR RF OUT jack, J2 for use in external equipment under test.

n. Power Supply Circuits. The power supply circuits provide 6.3 volts alternating current (at) for lamp 11, regulated +20 volts dc, regulated+ 11 volts dc, and regulated –11 volts dc for operation of the transistorized circuits in the SG-366A/U. Input power is applied to transformer T1, induced to the secondary of T1, rectified by three separate sets o diode rectifiers, in version A (fig. 1-1) and by one positive rectifier and one negative rectifier in version B (fig. 1-1.1), and regulated by three separate regulator circuits to produce the three regulated dc output voltages.

SECTION II. CIRCUIT FUNCTIONING

1-4. Astable Multivibrator
(fig. 5-2 or 5-3)

Figure 5-2 is the schematic diagram of version A and figure 5-3 is the schematic diagram of version B.

a. The astable multivibrator is a free-running, collector-coupled multivibrator consisting of transistors Q201, Q202, and associated circuit components. When power is applied (–11 volts cd and +11 volts dc to transistor stages), the multivibrator produces rectangular shaped pulses which are applied to pulse shaping amplifier Q203.

b. The repetition rate (pulses per second (pps)) of these pulses can be controlled by PULSE RATE switch S2 from either the 50- to 500-pps range or the 500- to 5,000-pps range. When 50 to 500 is selected by S2, C59 and C60 become the timing capacitors for the multivibrator, and when 500 to 5,000 is selected by S2, C58 and C61 become the timing capacitors. The repetition rate of the output pulses can be continuously adjusted within these ranges by RATE AJD R85 on the front panel; or by RATE RANGE adjust R203 inside the unit, when front panel controls do not provide sufficient adjustment.

c. When PULSE RATE switch S2, is set to EXT TRIGGER or EXT MOD, the output of the astable multivibrator is grounded to allow for an external trigger signal to enter through EXT TRIGGER jack J3, or an external modulated signal to enter through EXIT MOD jack J8, without internal signal interference. Also, when function selector switch S1 is set to CW, the bases of Q201 and Q202 in the astable multivibrator are grounded to allow for a continuous wave signal to be generated without pulse interference.

1-5. Pulse Shaping Amplifier
(fig. 5-2 or 5-3)

a. The pulse shaping amplifier takes the rectangular shaped pulses from the astable multivibrator, amplifies, inverts, and shapes them to strong, positive, and sharp rectangular pulses. The components of pulse shaping amplifier Q203, C206, R208, R209, and R211 use +11 volts dc to perform these operations and then pass the output pulses to a diode differentiator.

b. Voltage divider network R208 and R209 makes the negative-going input pulses, decoupled through C206, more positive with respect to ground. Because of the quick risetime and fall-time capabilities of a transistor, Q203 shapes the output pulses, felt at collector resistor R211, to sharp cornered pulses.

1-6. Differentiator
(fig. 5-2 or 5-3)

a. During normal operation, the differentiator consists of capacitor C207 and steering diodes D202 and D203. When an external trigger is applied, the differentiator consists of capacitor C208 and steering diodes D201 and D219.

b. Capacitor C207 and diode D203 make up the rc circuit which differentiates the positive rectangular pulses and clamps them to ground and D202 selects only the negative-going peak of the differentiated signal. The negative differentiated peak is then used to drive the sync amplifier and the pulse width multivibrator.

1-7. Sync Amplifier
(fig. 5-2. or 5-3)

a. The sync amplifier is a pulse amplifier which inverts and amplifies the negative pulses which come from the differentiator or the external triggering pulses, which also come from the differentiator. The sync amplifier consists of transistor Q204 and associated circuit components.

b. The output pulses from the sync amplifier are positive 2.5 volt spikes with 20 ns risetime and they can be obtained for external equipment use at SYNC OUT (POS) jack J1. The sync out pulses precede the pulse or rf output pulses by about 40 ns.

c. The input pulses to the sync amplifier are rc-coupled from the differentiator through R213 and C210 in version A (fig. 5-2) and from Q203 through R234 and C210 in version B (fig. 5-3). The output pulses from the sync amplifier are rc-couple through R215 and C213.

1-8. Pulse Width Multivibrator
(fig. 5-2 or 5-3)

a. The pulse width multivibrator is a collector-coupled monostable or one-shot multivibrator consisting of transistors Q205, Q206, and associated circuit components. The input pulses to the pulse width multivibrator are negative pulses from the differentiator or negative external triggering pulses from the external trigger differentiator. The output pulses of the pulse width multivibrator are negative rectangular pulses (one pulse out for one pulse in).

b. The width of these output pulses is variable from 100 ns to 100 μ see, in these separate ranges: 100 ns to 1 μ sec, 1 μ sec to 10 μ sec, and 10 μ sec to 1000 μ sec. PULSE WIDTH switch S3 independently selects these ranges and, by each selection, places different timing capacitors into the pulse width multivibrator circuit. When .1 to 1 μ sec is selected by the PULSE WIDTH switch, capacitors C53 and C54 are used as the timing capacitors in the multivibrator. In this range, C53 also serves as a trimmer capacitor which can be adjusted for range accuracy. When 1 to 10 μ sec is selected by the PULSE WIDTH switch, capacitors C56 and C57 are used as the timing capacitors, and when 10 to 100 μ sec is selected by the PULSE WIDTH switch, capacitor C55 is used as the timing capacitor. Continuous fine adjustment of the output width is possible within these ranges by adjusting WIDTH ADJ R77.

c. The negative rectangular output pulses from the pulse width multivibrator are then applied to two stages of pulse amplifiers.

1-9. Pulse Amplifiers

(fig. 5-2 or 5-3)

a. General. Pulse amplifiers, Q207 with its associated components and Q208 with its associated components, invert, amplify, and shape their respective input pulses.

b. First Pulse Amplifier. First pulse amplifier Q207 with its associated components has negative rectangular input pulses coming from the pulse with multivibrator. It inverts these pulses, amplifies them, and sharpens the risetime and falltime of the pulses to produce positive rectangular pulses which are applied to the second pulse amplifier or to an open circuit if EXT MOD is selected by the PULSE Rate switch.

c. Second Pulse Amplifier. Second pulse amplifier Q208 with its associated components has positive rectangular input pulses coming from the first pulse amplifier or an external signal coming from EXT MOD jack J8 if EXT MOD is selected by the PULSE RATE switch and a signal is fed into J8. The second pulse amplifier amplifies, inverts, and shapes up the input pulses to produce more powerful, negative–going, sharp rectangular pulses.

d. Q208 Emitter Bias Adjust. The emitter bias of Q208 in version A (fig. 5-2) is adjustable. By setting S1 to VIDEO PULSE + or VIDEO PULSE –, the emitter bias to second pulse amplifier Q208 can be adjusted by VIDEO PULSE ON LEVEL ADJ R87 inside the unit. By setting S1 to PULSES RF or CW, the emitter bias to the second pulse amplifier can be adjusted by PULSED RF ON LEVEL ADJ R86 inside the unit.

1-10. Carrier Oscillator

(fig. 5-2 or 5-3)

a. The carrier oscillator is a push-pull oscillator which produces a large, stable, continuous waveform with low distortion. The carrier oscillator consists of transistors Q1 and Q2, coils L1 through L6, tuning capacitors C7 and C8, and associate components.

NOTE

The panel markings on the band indicators on version A are in MC and on version B are in MHz.

b. The frequency of the carrier oscillator is variable from 10 MH to 120 MH in five separate overlap ping ranges selected by BAND SELECTOR switch S4. The five different ranges are from 10 to 16 MH, from 16 to 25 MH, from 25 to 40 MH, from 40 to 65 MH, and from 65 to 120 MH. A sixth selection (EXT OSC) on S4 allows an external signal to be fed into the generator through EXT OSC jack J4 instead of using a signal from the carrier oscillator.

c. The six selections of S4 allow different components to be used in the carrier oscillator circuitry. When the following selections are made, the following components are used in the carrier oscillator: 10-16 MC selection causes L6 to be used, 16-25 MC selection causes L1 to be used, 25-40 MC selection causes L2 to be used, 40-65 MC selection causes L3 to be used, 65-120 MC selection causes L4 to be used, and EXT OSC selection causes R5 to be used to carry the external signal S4. (The carrier oscillator is not used in the EXT OSC selection.)

d. Within each of the five frequency bands of the carrier oscillator, the frequency can be continuously adjusted by turning the frequency selector adjust. Turning the frequency selector adjust simultaneously adjusts tuning capacitors C7 and C8, located in the carrier oscillator, from 3.5 to 31.5 picofarads.

e. The inputs to the carrier oscillator are +20 volts dc, +11 volts dc, and –11 volts dc, depending on the position of switch S1 (VIDEO PULSE +, VIDEO PULSE –, PULSED RF, or CW). The age amplifier signal is also an input to the carrier oscillator and this aids in stabilizing the rf and in reducing distortion.

f. The output sinusoidal waveform from the carrier oscillator is applied to emitter followers Q18 and Q17.

1-11. Isolation Emitter Followers

(fig. 5-2 or 5-3)

a Two emitter followers, Q18 with its associated components and Q17 with its associated components, receive rf signals from the carrier oscillator and they isolate the oscillator from the rest of the circuitry so that the frequency will remain stable and the output level constant.

b. At the input to emitter follower Q18, the amplitude of the signal can be adjusted by +VPAMP ADJ R84 (fig. 5-2) or R21 (fig. 5-3) in VIDEO PULSE +; –VPAMP ADJ R82 (fig. 5-2) or R23 (fig. 5-3) in VIDEO PULSE –; and BIAS ADJ R79 (fig. 5-2) or R26 (fig. 5-3) in CW or PULSED RF. The continuous wave output from emitter follower Q18 is applied to second emitter follower Q17 and to agc diode detector network CR1 and CR2.

c. The output of emitter follower Q17 is a .7–volt, peak-to-peak continuous wave and it is applied to a diode switching modulator to produce a pulsed rf output.

1-12. Age Detector and Amplifier Section (Version A)

(fig. 1-2)

a. The agc diode detector network is a diode doubler consisting of CR1 and CR2. This detector passes only the positive portion of its continuous wave input to apply a dc level of +.55 volt dc to the agc amplifier section.

b. The agc amplifier section consists of emitter followers Q11 and Q19 with their associated components, and differential amplifiers Q12 and Q13 with their associated components. The agc amplifier section receives +20 volts dc, – 11 volts dc, and the dc level from the agc diode detector as inputs. Emitter follows Q11 and Q19 act also as power amplifiers.

c. After the signal leaves the emitter follower Q19, it is applied to differential amplifierQ13 for high gain amplification and then compared with a reference level from differential amplifier Q12. This reference level is established by voltage divider network R96 through R99, R100, and Q12. Agc adjust R97 is adjusted for a 1.5-volt peak-to-peak waveform at RF OUT while S1 is at CW.

d. The resulting difference output from Q13 is then applied to emitter follower Q11, which amplifies and impedance matches the signal for input to the carrier oscillator. The agc detector and amplifier section controls the bias for the carrier oscillator and also aids in holding the frequency steady and reducing the distortion of the carrier oscillator output.

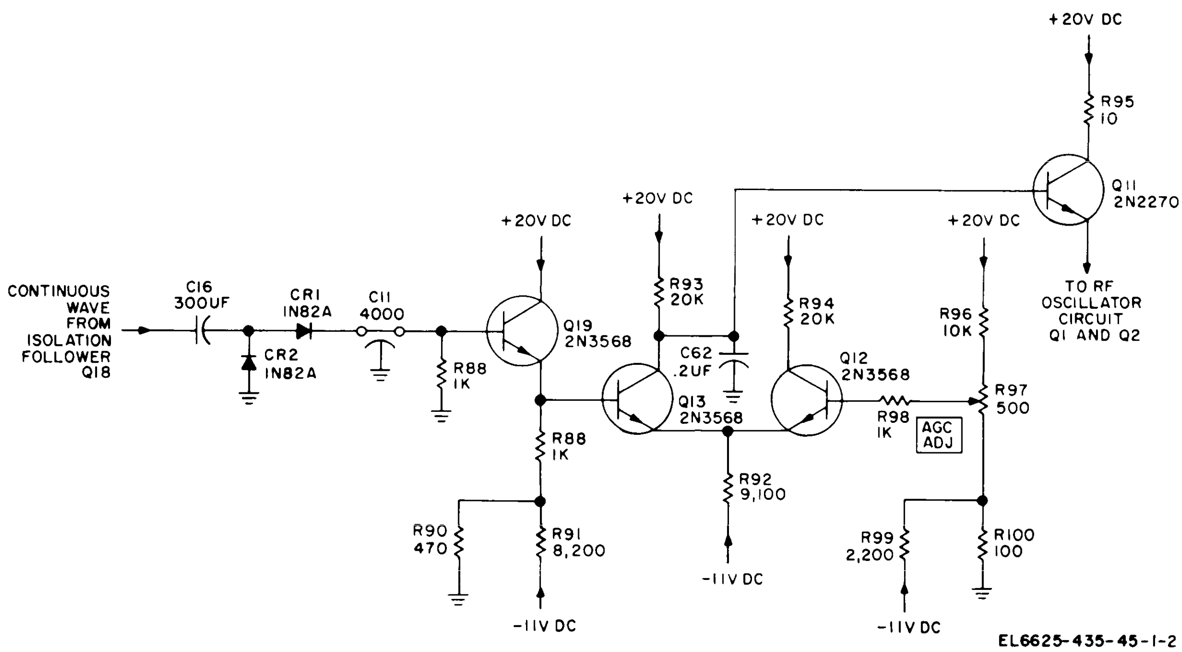


Figure 1-2. Age Detector and Amplifier Section, Version A, Schematic Diagram.

1-12.1. Agc Detector and Amplifier Section (Version B)

(fig. 1-2.1)

a. Agc detector D1 and D2 is a diode doubler that monitors the amplitude of the output of the rf oscillator. The detector passes only the positive portion of the cw output of emitter follower Q18 to apply a dc voltage to the input (pin 2) of high gain dc amplifier A1.

b. When function selector switch S1 is in either the CW or PULSED RF position, + 20V are applied to pin 8 enabling A1. The dc input is amplified by A1 and applied through emitter follower Q1 as bias to carrier oscillator Q1 and Q2 in the band switch assembly.

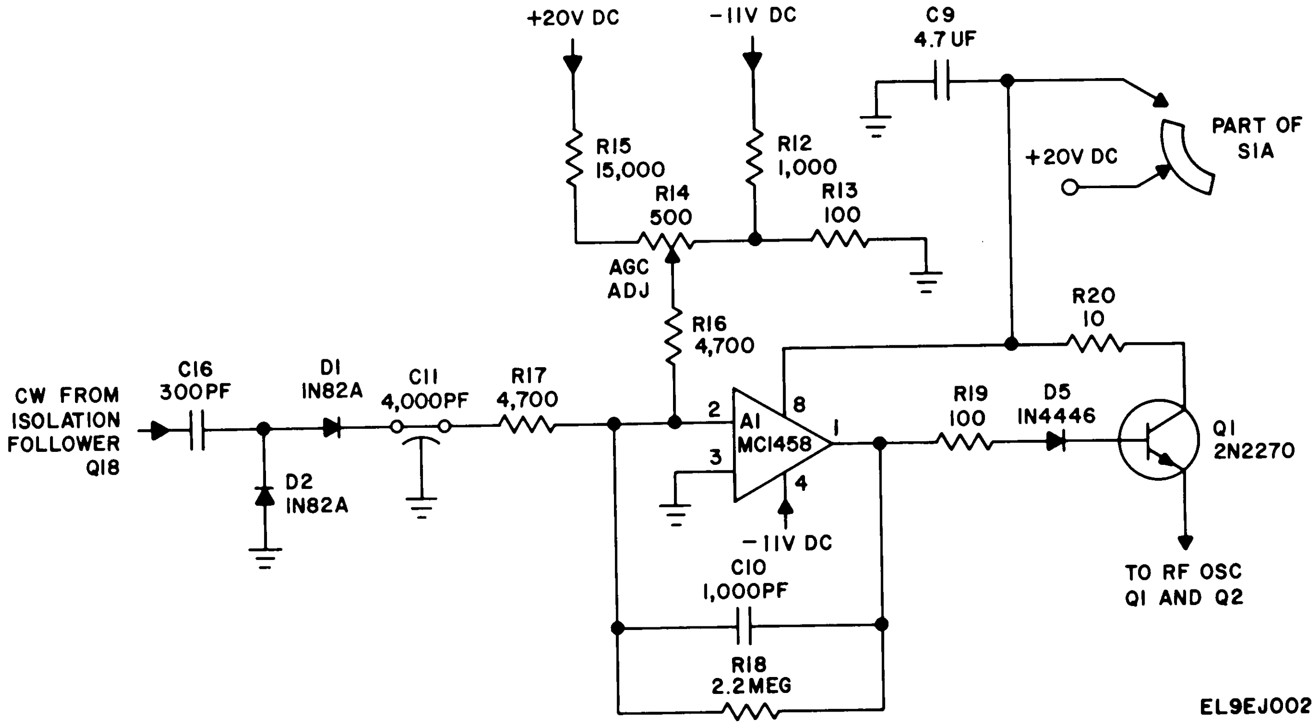


Figure 1-2.1 Agc Detector and Amplifier Section, Version B, Schematic Diagram.

1-13. Diode Switch and Driver
(fig. 1-3)

a. The diode switch and driver consists of diode switch CR3 through CR10 (D1 through D10, fig. 1-3, note 3), transistor drivers Q9 and Q10, and associated circuit components. The input to the diode switch and driver is a continuous carrier wave signal from emitter follower Q17 applied to the diode switch.

b. The diode switch is a balanced diode modulator consisting of two sets of diode networks, CR3 through CR6 and CR7 through CR10, so that the pulsed rf output will be of equal amplitude above and below ground level. Because of established reference voltage between each set of diodes, the positive half of the signal passes through CR3 through CR6 and the negative half of the signal passes through CR7 through CR10. The diode switch is gated on and by the transistor driver circuit.

c. The transistor driver circuit, consisting of transistors Q9, Q10, and associated components, receives negative-going pulses as its input from second pulse amplifier Q208 in the pulse generator section. Tuning capacitor C52 (C221, fig. 1-3, note 5) in the input circuitry is adjustable to minimize the risetime and falltime of the pulses. When the input pulse reaches ground level at the base of Q9, Q10 conducts and this allows a burst of continuous rf carrier wave to pass through the diode switch until the pulse again rises to the +10-volt dc level. Base bias resistor of Q9, BALANCE ADJ R34 maybe adjusted to minimize spikes on the output waveform. Networks L7, R29, C20 and L8, R40, C27 are filter networks which filter out undesirable low frequencies.

d. The output pulsed rf signal, or continuous wave signal when CW is selected by function switch S1, is then applied to RF OR PULSE LEVEL adjust R47 in the output amplifier section.

NOTE	VERSION A	VERSION B
1	Q10 IS TYPE 2N1141	Q10 IS EITHER TYPE 2N3638 OR 2N3638A
2	CR3 THROUGH CR10	D1 THROUGH D10
3	R74	R240
4	R75	R241
5	C52, 7-45PF	C221, 10-40PF

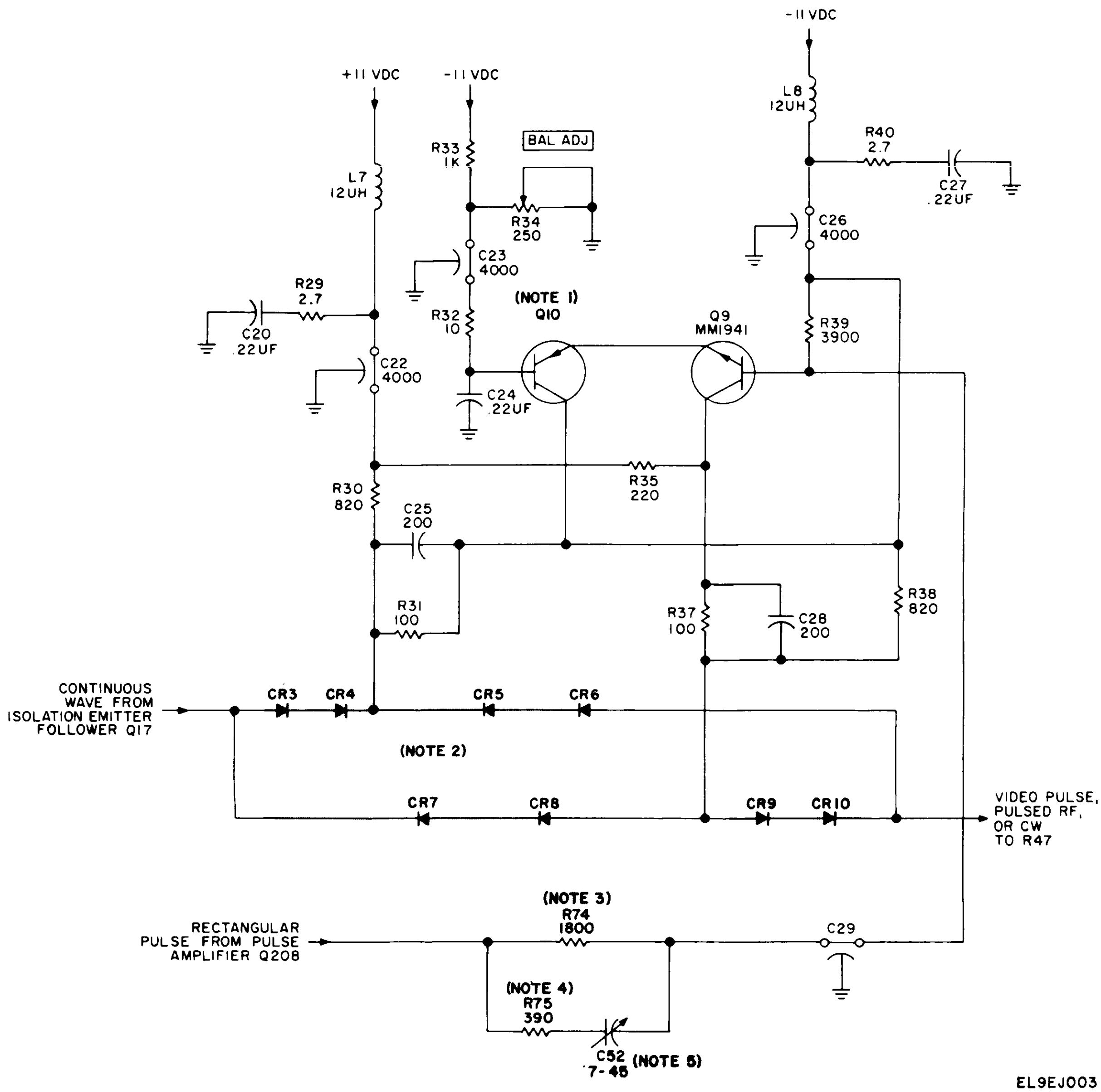


Figure 1-3. Diode Switch and Driver, Schematic Diagram.

1-14. Output Amplifiers
(fig. 1-4) or 1-4.1)

a. Band Amplifier. The wide-band amplifier, consisting of Q16 and its associated components, is the first of the rf output amplifiers and it provides emitter and collector peaking for wide-band operation in the 10- to 120-MH range. A symmetrical continuous wave or pulsed rf signal which comes from the diode switch and driver network is applied to RF OR PULSE LEVEL adjust R47 where the amplitude of the signal can be varied continuously over a 6-dB range. The signal then feeds into the wide-band amplifier which amplifies the voltage by 10 dB. Shunt. resistor R44 is selected at the factory to compensate for the high frequency end of the response. Trimmer capacitor C33 and coil L9 can be adjusted to obtain maximum flatness within the selected dB range. The output of the first rf amplifier feeds into power amplifier for further amplification.

b. Power Amplifier. An emitter follower consisting of Q15 with its associated components, receives the CW or pulsed rf signal from the first rf output amplifier and provides the necessary power gain. Trimmer capacitor C75 may be adjusted to compensate for any larger deviation at higher frequencies. For CW or PULSED RF operation, the output signal from the power amplifier feeds through rc coupling into the rf attenuator. For VIDEO PULSE (+ or –) operation, the output signal from the power amplifier is switched to a pulse output amplifier to provide the necessary power out and then feeds through the rf attenuator. The output from the power amplifier also feeds into double-diode detector D11 and D12 to be detected and fed to a front panel meter for display. The signal from the power amplifier feeds through this path only during CW or PULSED RF selection on function selector switch S1, because during VIDEO PULSE (+ or –) selection, S1 breaks that circuit path.

(1) Double-diode detector D11 and D12 detects the CW signal to establish a dc level display on front panel meter M1.

(2) Front panel meter M1 indicates maximum of .5 volt root mean square (rms) with up to 3dB of attenuation. The meter is only used when function selector switch is at CW, because the pulsed rf signal lacks sufficient power to drive the meter circuitry.

c. Video Pulse Amplifier. The video pulse amplifier, consisting of Q14 and associated components, is a final pulse output amplifier switched into use only during VIDEO PULSE + or VIDEO PULSE – selection by function selector switch S1. The components, L10, R60, and C44, are used to filter out undesirable low frequencies, and components L11 and C47 are used to filter undesirable high frequencies. Components C46 and R67 are specially selected during assembly of the SG-366A/U for sharpening the sides of the video pulse. They keep the risetime and falltime less than 20 nsec to prevent overshoot. The resulting output video signal is applied to the rf attenuator.

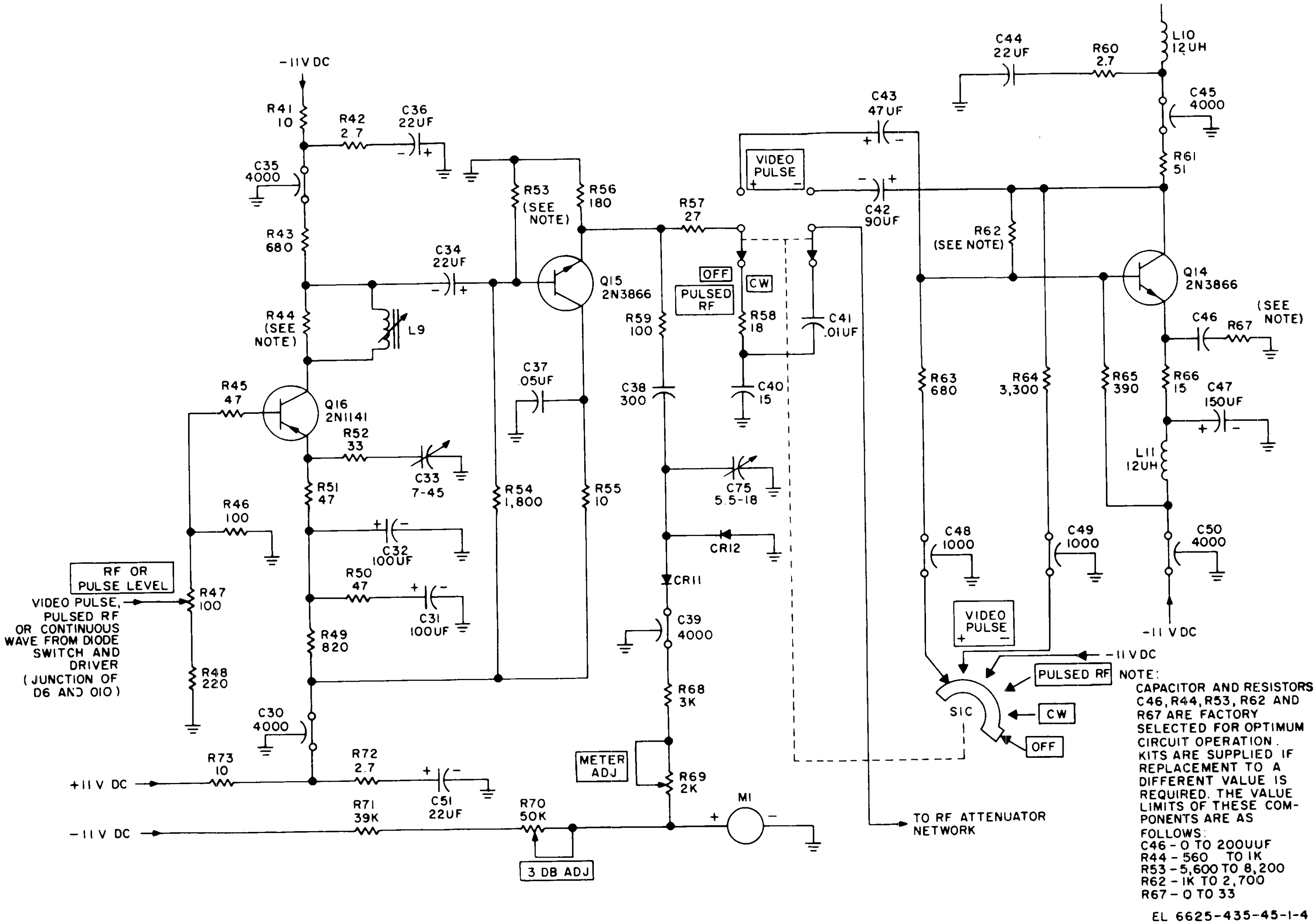


Figure 1-4. Output Amplifier Section, Version A, Schematic Diagram.

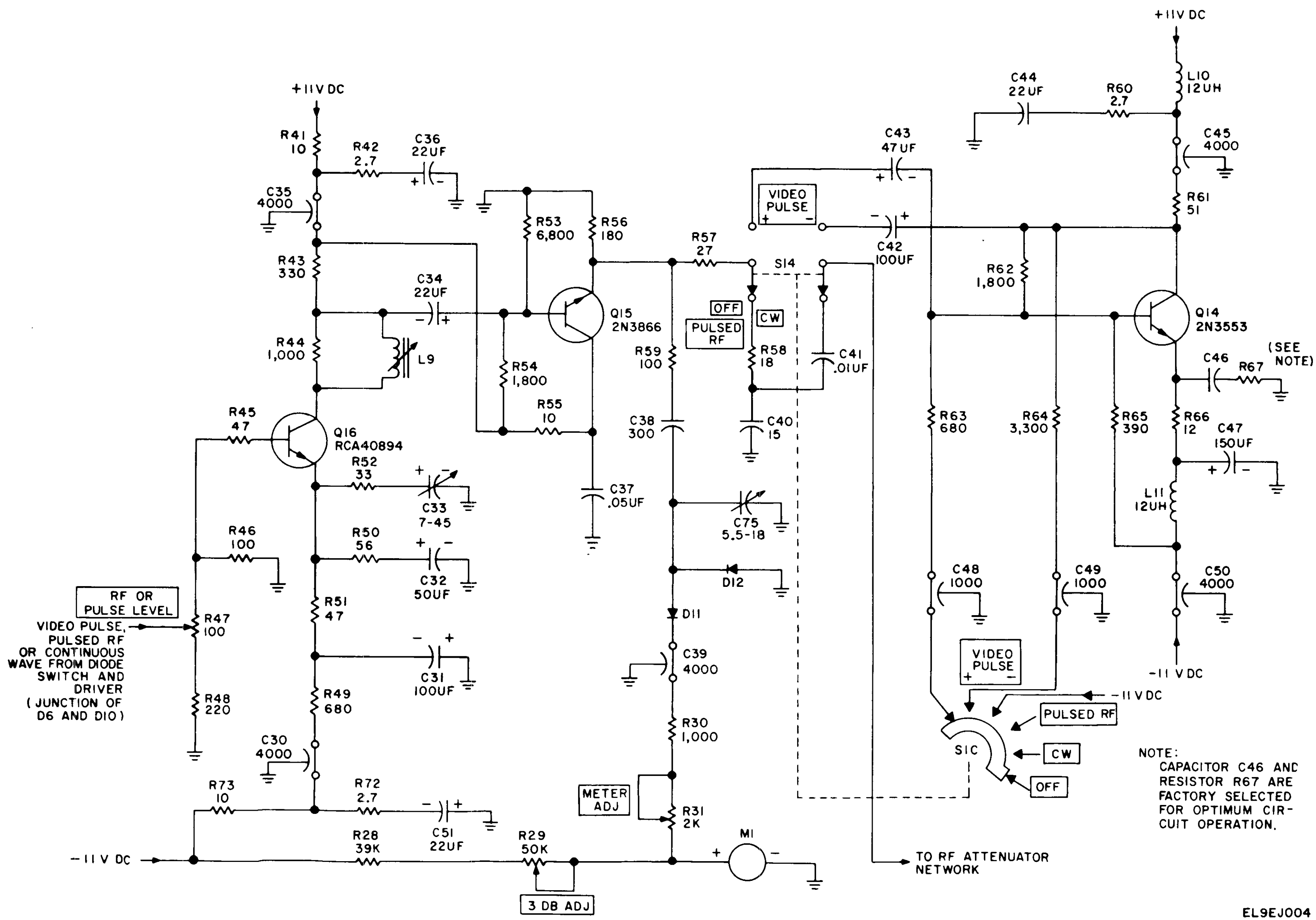


Figure 1-4.1. Output Amplifier Section, Version B, Schematic Diagram.

1-15. Rf Attenuator Network

(fig. 1-5)

a. The rf attenuator network accepts a + or — video pulse signal from video amplifier Q14 of a continuous wave or pulsed rf signal from amplifier Q15. Power attenuation of this signal is performed by selecting different combinations of toggle switches S5 through S13 on the front panel. These toggle switches insert resistor networks into the output circuit to provide amplitude reductions on output voltage in 1-decibel steps from 1 to 101 decibels. The output can also be continuously varied over a 6–decibel range by RF OR PULSE LEVEL adjustment R47.

Figure 1-5. Rf attenuator network, schematic diagram.
(Located in back of manual)

b. The output of the rf attenuator or network is applied to PULSED OR RF OUT jack J2 for use in equipment under test. During VIDEO + or VIDEO – operation, this output signal can be varied from a maximum of ± 3 volts dc with 0-decibel attenuation and a minimum of ± 3 microvolt dc with 101-decibel attenuation. During CW or PULSED RF operation, this signal can be varied from a maximum of .5 volt rms with 0-decibel attenuation to a minimum of .5 microvolt rms with 101-decibel attenuation.

1-16. Power Supply Circuits (Version A)

(fig. 1-6)

a. The power supply circuits provide regulated output voltages of +20 volts dc, +11 volts dc, and –11 volts dc for use throughout the circuits in the SG-366A/U. The power supply circuits also provide 6.3 volts rms for indicator lamp 11 behind the band selector switch window.

b. An input of 115-volt 60-hertz(Hz) ac line voltage is applied to the primary winding of transformer T1 through line plug P1, 3-ampere fuse F1, and function selector switch S1. The ac input is induced across the center-tapped secondary winding of T1 and applied to a diode bridge rectifier consisting of diodes D13 through D16 and to double-diode rectifier D17 and D18.

c. The positive dc voltage from the center of D17 and D 18 is filtered and applied to 12-volt zener diode D19. This regulated +12 volts dc is then applied to emitter follower Q21 to produce a final regulated output of +11 volts dc.

d. The negative dc voltage from the center of D15 and D 16 is filtered and applied to reversed 12-volt zener diode D24. This regulated – 12 volts dc is then applied to emitter follower Q22 to produce a final regulated output of –11 volts dc.

e. The positive dc voltage from the center of D13 and D14 is filtered, further rectified by diode D20, and applied to emitter follower Q7, which provides current limiting of the regulated output of +20 volts dc. The +20-volt dc output is also controlled by darlington emitter followers Q20 and Q5, +20 V ADJ R113, inside the SG-366A/U, voltage sensor Q8 and associated circuit components, and 6–8-volt zener diode D21.

(1) Darlington emitter followers Q20 and Q5 act as series regulators to keep the output current within limits. The darlington emitter followers can be controlled by emitter follower Q7, voltages sensor Q8, and zener diode D21.

(2) The +20-volt adjust, R113, is part of a sampling network which drives a transistor comparator circuit comprised of voltage sensor Q8 and +9-volt reference zener diode D22.

(3) Voltage sensor Q8 and associated circuit components secure the voltage from R113 and control the current through the darlington emitter followers by the amount of conduction.

(4) Zener diode D21 acts as a clamping diode which turns off the darlington emitter followers when current exceeds the upper limits.

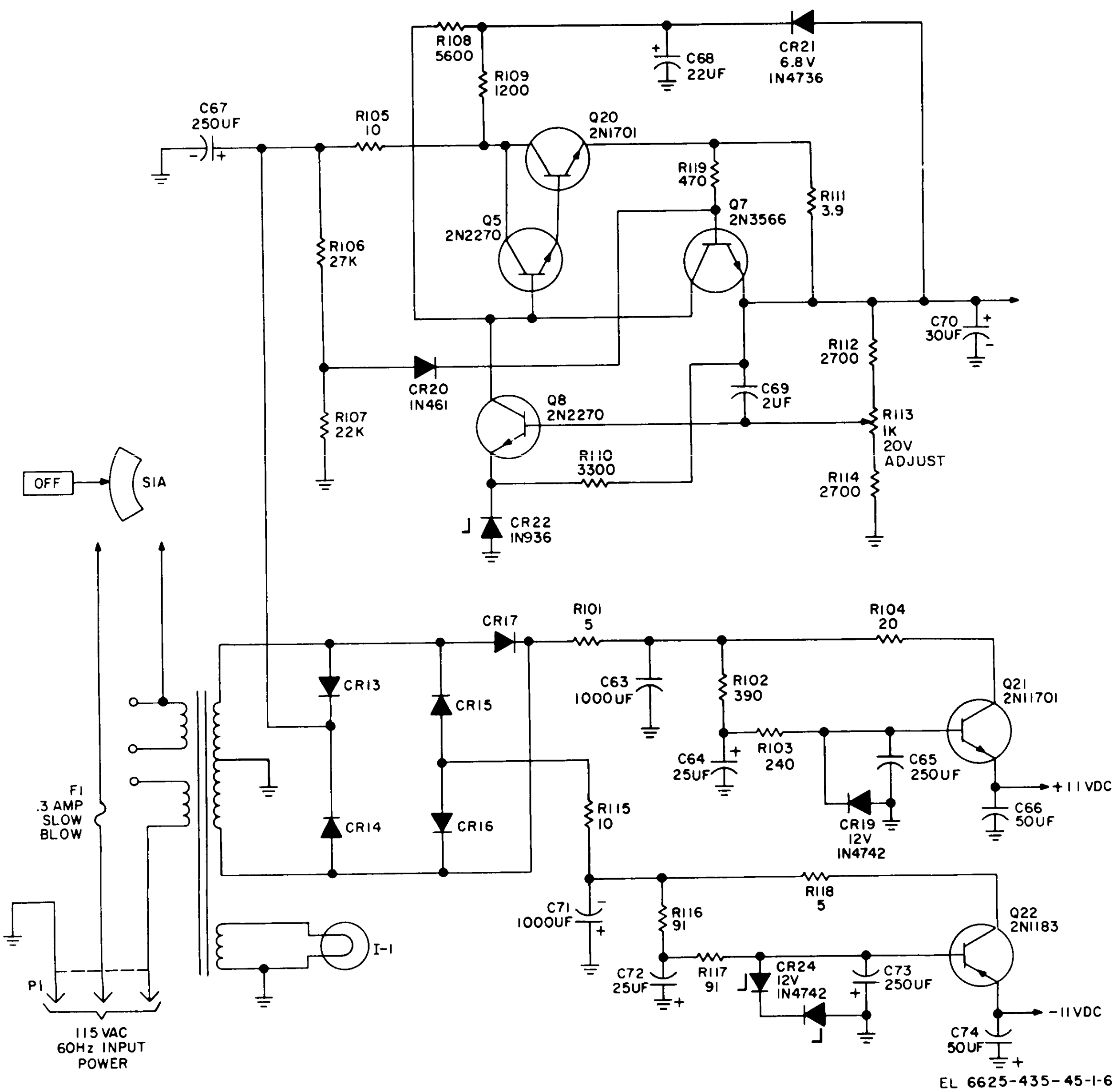


Figure 1-6. Power Supply Circuits, Version A, Schematic Diagram.

1-17. Power Supply Circuits (Version B)
(fig. 1-7)

a. The power supply circuits supply regulated output voltages of +20 volts, +11 volts and –11 volts for use throughout the pulse generator. The power supply circuits also supply 6.3 vac for indicator lamp I1.

b. An input of either 115 or 230 vac is applied through fuse F1, function switch S1A in all positions except OFF, and AC INPUT 115V/230V switch S5 to the primary of power transformer T1, Fuse F1 is a slow blow, 1/2 ampere for 115 vac input power and ¼ ampere for 230 vac output power. The ac input is induced across the center-tapped secondary winding of T1 and applied to full wave positive rectifier D1 and D3 and to full wave negative rectifier D2 and D4.

c. The positive output at the junction of D1 and D3 is applied through filter R2 and C2 to positive regulator A2 and through dropping resistor R122 to positive regulator A1. The positive 11-volt output of A1 which is available at TP2 is adjusted by R3 and is filtered by C3 and C6. The positive 20-volt output of A2, which is available at TP1, is adjusted by R9 and filtered by C7 and C8.

d. The negative output at the junction of D2 and D4 is applied through filter R1 and C1 to negative regulator A3. The negative 11-volt output of A3 which is available at TP3 is adjusted by R6 and filtered by C4 and C5.

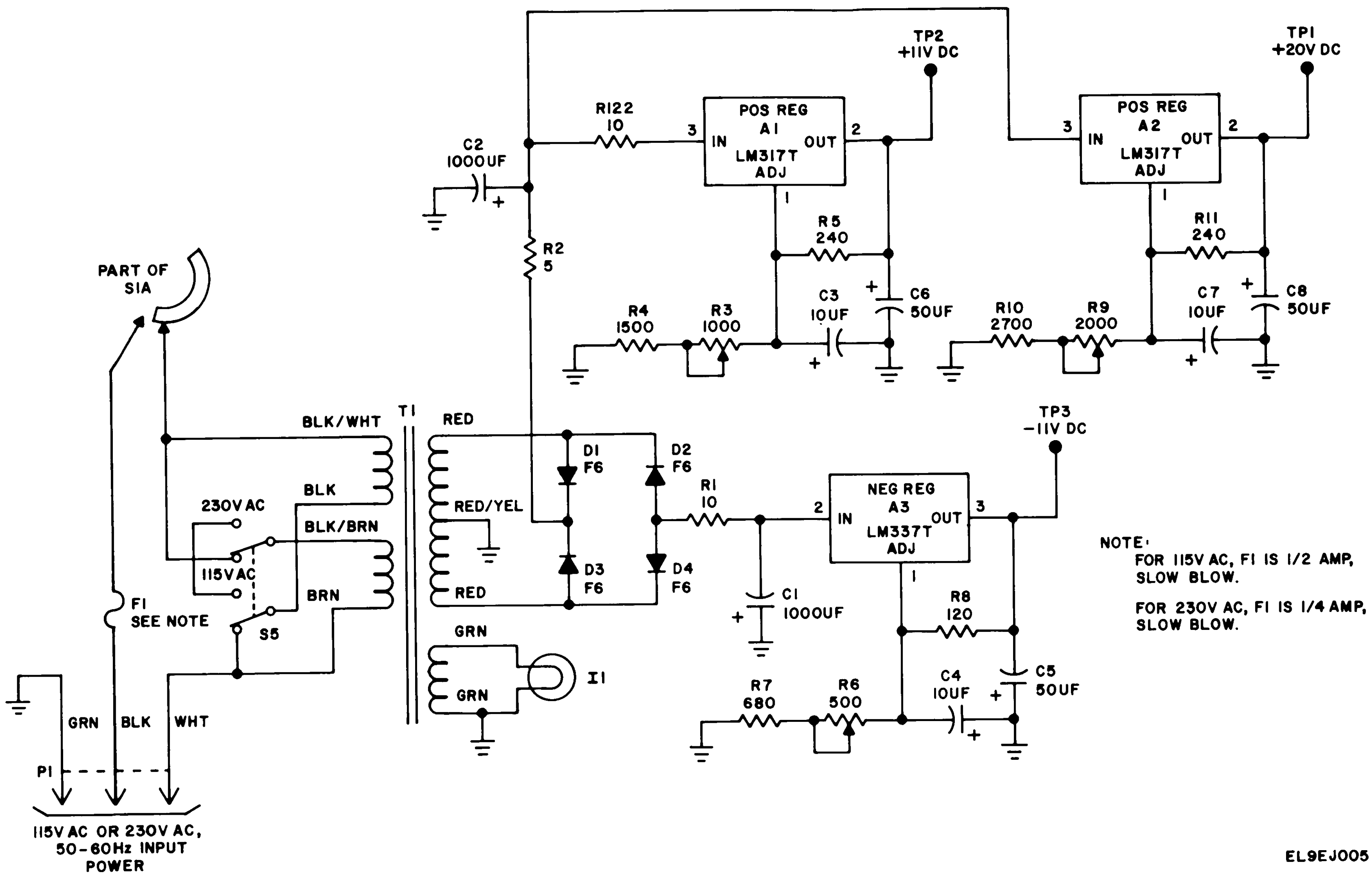


Figure 1-7. Power Supply Circuits, Version B, Schematic Diagram.

CHAPTER 2

TROUBLESHOOTING

Section I. GENERAL TROUBLESHOOTING TECHNIQUES

WARNING

When servicing the pulse generator, be careful when working on the positive and negative dc power supply circuits or on the 115-volt ac line circuits.

2-1. General Instructions

Troubleshooting at general support and depot maintenance categories includes all the techniques outlined for organizational maintenance and any special or additional techniques required to isolate a defective part. The general support and depot maintenance procedures are not complete in themselves but supplement the procedures described in TM 11-6625-435-12-1. The systematic troubleshooting procedures must be completed by means of sectionalizing, localizing, and isolating techniques.

2-2. Troubleshooting Procedures

a. General. The first step in servicing a defective pulse generator is to sectionalize the fault, which means tracing the fault to a major assembly or circuit responsible for abnormal operation. The second step is to localize the fault, which means tracing the fault to a defective part responsible for the abnormal indication. Some faults, such as burned–out resistors, and arcing and shorted transformers can often be located by sight, smell, and hearing. The majority of faults, however, must be localized by checking voltages and resistances.

b. Sectionalization. The first step in tracing trouble is to locate the major assembly or circuit at fault by the following methods:

(1) *Visual inspection.* The purpose of visual inspection is to locate faults without testing or measuring circuits. All indications, particularly on the external oscilloscope used with the pulse generator, should be observed, and an attempt made to sectionalize the fault to a major circuit.

(2) *Operational tests.* Operational tests frequently indicate the general location of trouble. In many instances, the tests will help in determining the exact nature of the fault. The equipment performance checklist (TM 11-6625-435-12-1) is a good operational test.

c. *Locationization.* The tests listed below will aid in isolating the trouble. First, localize the trouble to a single stage or circuit, and then isolate the trouble within that circuit by voltage, resistance, and continuity.

(1) *Signal tracing.* Signal tracing (para 2-8) will help in isolating a trouble to the specific circuit at fault.

(2) *Voltage and resistance measurements.* These measurements will help locate the individual component part at fault. Use resistor and capacitor color codes (fig. 5-1) to find the values of the components. Use transistor resistance charts (para 2-10) to find normal readings and compare them with readings taken.

(3) *Troubleshooting chart.* The trouble symptoms listed in the chart (para 2-5) will aid in localizing trouble to a component part.

(4) *Intermittent troubles.* In all these tests, the possibility of intermittent troubles should not be overlooked. If present, this type of trouble can be made to appear by tapping or jarring the equipment. Check the wiring and connections to the parts of the pulse generator.

2-3. Test Equipment Required

The following chart lists test equipment required for troubleshooting the pulse generator. Also listed are the associated technical manuals and the assigned common names.

Test equipment	*Technical manual*	*Common name*
Multimeter TS-352B/U	TM 11-6625-366-15	Multimeter.
Oscilloscope AN/USM-281A.	TM 11-6625-1703-15	Oscilloscope.
Test Set, Transistor TS-1836A/U.	....	Transistor tester.

Section II. TROUBLESHOOTING PULSE GENERATOR SG-366A/IJ

2-4. Test Setup

For dynamic bench tests of the pulse generator, remove the unit from its case and connect the line cord to a source of 115-volt, 50- to 60-Hz ac. Version B (fig. 2-8.1) can also be connected to a 230-volt, 50- to 60-Hz ac source selected by AC INPUT 115V/230V switch S5 on the rear of the chassis. Use the oscilloscope to check signal output voltages and for internal signal tracing.

NOTE

Fuse F1 at the rear of the chassis is 0.3 ampere, slow blow in version A. Fuse F1 in version B is 0.5 ampere, slow blow for 115-volt input power and 0.25 ampere, slow blow for 230–volt input power.

2-5. Localizing Troubles

a. General. In the troubleshooting chart *(d* below), procedures are outlined for sectionalizing the troubles to the internal power supply circuits or to the signal generating circuits, and for localizing troubles to a stage within the pulse generator. Parts locations are indicated in figures 2-1 through 2-9. Voltage and resistance measurements are given in paragraph 2-10 and waveforms are shown in figure 2-10. Depending on the nature of the operational symptoms, one or more of the localizing procedures will be necessary. When trouble has been localized to a particular stage, use voltage and resistance measurements to isolate the trouble to a particular part.

b. Use of Chart. The troubleshooting chart is designed to supplement operational checks. If no operational symptoms are known, begin with item 1 of the equipment performance checklist (TM 11-6625-435-12-1) and proceed until a symptom of trouble appears.

c. *Conditions for Tests.* All checks outlined in the chart are to be conducted with the pulse generator connected to an ac source.

d. Troubleshooting Chart.

	Symptom	*Probable trouble*	*Correction*
1.	Indicator lamp I1 does not light when the function selector switch is set to any active position. No output is available from the pulse generator.	No ac power is applied to pulse generator.	Check the power cable. Check the ac source voltage.
		Open fuse F1.	Replace the fuse. On version A, 0.3 ampere, slow blow. On version B, 0.5 ampere, slow blow for 115 vac input, 0.25 ampere, slow blow for 230 vac input.
		Defective function switch section S1.	Check the switch section. Replace the function switch if necessary.
		Defective transformer T1	Check output voltages and the dc resistance (para 2-7) of the transformer windings. Replace the transformer if necessary.
2.	Indicator lamp I1 does not light, but all outputs of the pulse generator are normal.	Indicator lamp I1 or indicator lamp socket is defective.	Replace indicator lamp I1 or indicator lamp socket.
		Faulty connector or wiring	Check connection at T1 and associated wiring. Repair if necessary.
3.	Indicator lamp I1 lights, but no output, or low output, is obtained at the SYNC OUT, RF, and PULSE connectors.	Faulty power supply circuits	On version A: Check resistance of transistors Q20, Q21, Q22, Q5, Q7, and Q8 in accordance with paragraph 2-10 *a* and *b*. On version B: Check for + 11 V at TP2. If not present, check A1 resistance measurements (para 2-10 *c* (2) and 2-1 10 *d* (2)). Check for –11 V at TP3. If not present, check A3 resistance measurements (para 2- 10 *c* (2) and 2-10 *d* (2)). Check for +20 Vat TP1. If not present, check A2 resistance measurements (para 2- 10 *c* (2) and 2-10 *d* (2)).
4.	No output, or low output, is obtained at the rf connector on all frequency bands with function switch set to CW or PULSED RF. All other outputs are normal.	Misadjusted SET RF OUTPUT control	Reset SET RF OUTPUT control.
		Faulty rf attenuator circuit	Set the function switch to CW, and check the indication on the OUTPUT meter. If the meter indication is normal, check continuity through the rf attenuator circuit (fig. 2-9).

Symptom	Probable trouble	Correction
	Faulty rf oscillator circuit	Check transistors Q1 and Q2 in accordance with paragraph 2-10.
	Faulty rf oscillator.	Check transistors Q15 and Q16 in accordance with paragraph 2-10.
5. No output is available at the rf connector on one frequency band (function switch is set to CW or PULSED RF).	Faulty rf oscillator circuit	Check transistors Q1 and Q2 in accordance with paragraph 2-10 with the frequency selector switch set to the affected band.
6. No output is available at the rf connector with the function switch set to PULSED RF. All other outputs are normal.	Faulty rf gate circuit	Check transistors Q15 and Q16 in accordance with paragraph 2-10 with the function switch set to PULSED RF.
7. Output at the rf connector is normal for CW operation, but the OUTPUT meter indication is low.	Faulty metercircuit	On version A: Check diodes CR11 and CR12 and associated circuit parts (fig. 2-6). Replace these parts if necessary. On version B: Check diodes D11 and D12 and associate circuit parts (fig. 2-6). Replace parts a necessary.
8. All pulse outputs are abnormal with PULSE RATE switch set to INT. All outputs are normal when an external trigger is used.	Faulty multivibrator circuit	Check transistors Q201 and Q202 in accordance with paragraph 2-10.
	Faulty pulse rate switch	Check circuit continuity through PULSE RATE switch S2 in the 50, 500, and 5KC positions.
9. No output, or low output, is obtained at the PULSE connector. All other outputs are normal.	Faulty video amplifier circuit	Check transistors Q14 in accordance with paragraph 2-10.
10. No pulse or pulsed rf outputs are available regardless of the PULSE RATE switch setting. CW operation is normal.	Faulty sync amplifier circuit	Check for the presence of positive pulses at the SYNC OUT (POS) connector. If no pulses are obtained, check transistor Q204 in accordance with paragraph 2-10.
	Faulty pulse forming circuits.	Check transistors Q207 and Q208 in accordance with paragraph 2-10.
11. Minimum pulse width of 0.20 microsecond cannot be obtained.	Faulty transistor Q208	Check transistor Q208 in accordance with paragraph 2-10.
	Misadjusted potentiometer R85A and B.	Readjust potentiometer R85A and B.
12. Output pulses have a triangular shape at low pulse widths, and rectangular shape at low pulse widths.	Defective capacitors C218 and C219	Check capacitors C218 and C219 (fig. 5-2). If capacitor is open or capacitance has changed, replace parts.
13. Output pulses have a triangular shape; width cannot be controlled.	Defective transistor Q208	Check transistor Q208 in accordance with paragraph 2-10.
14. Output pulses are erratic	Faulty power supply circuits	On version A: Check output voltages of the power supply (fig. 1-6). If the voltages are abnormal, check transistors Q20, Q21, Q22, Q5, Q7, and Q8 in accordance with paragraph 2-10. On version B: Check output voltages of the power supply (fig. 1-7). If the voltages are abnormal check associated rectifier D1 and D3 (positive), D2 and D4 (negative) and regulator A1 (+11 V), A2 (+20 V) and A3 (–11 V) resistance measurements (para 2-10 *c* (2) and 2-10 *d* (2)).

2-6. Isolating Trouble Within a Stage

When trouble has been localized to a stage, use the following techniques to isolate the defective part:

a. Test the transistors involved (para 2–9) either in a transistor tester, or by substituting a similar type of transistor which is known to be operating normally.

b. Take resistance readings in accordance with paragraph 2-10 and voltage measurements at other points related to the stage in question (fig. 5-2 or 5-3).

c. If voltage readings are abnormal, take resistance to isolate open and short circuits.

2-7. Dc Resistances of Transformer and Coils

The dc resistances of the transformer windings and coils in the pulse generator are listed below.

a. Version A.

Transformer or coil	*Terminals*	*Ohms*
T-1	Primary (white/black, black, brown/black, and brown leads).	Less than 1
	Secondary (red leads)	Less than 1
	Secondary (green leads)	Less than 1
L1 through L6		
L7		
L8		
L9		
L10		
L11		

b. Version B.

Transformer or coil	*Terminals*	*Ohms*
T1 (AC INPUT 115V/230V switch in 115 position)	Primary:	
	White/black and black	11
	Brown/black and brown	11
	Secondary:	
	Red	2
	Green	Less than 1
L1 through L4		Less than 1
L5 (R5)		100
L6 through L11		Less than 1

2-8. Checking Waveforms

Certain troubles that do not permit rapid localization to a stage through operational tests can be localized by checking waveforms. Use an oscilloscope, and compare the waveforms at the various points indicated with those shown in figure 2-10. If a difference is noted, make voltage and resistance measurements at that point to isolate the defective part.

2-9. Transistor-Testing Techniques

When trouble occurs, check all cabling and connections before removing any transistors. Try to isolate the trouble to a stage. If transistor failure is suspected, use the applicable procedure below to check the transistors.

CAUTION

Do not rock or rotate a transistor when removing it from a socket; pull it straight out.

a. Use of Transistor Tester. Remove and test one transistor at a time. Discard a transistor only if its defect is obvious or if the transistor tester shows it to be defective. Do not discard a transistor that tests at or near its minimum test limit on the transistor tester. Put back the original transistor, or insert a new transistor if required, before testing the next one.

b. Transistor Substitution Method. Replace a suspected transistor with a new transistor. If the equipment still does not work, remove the new transistor and put back the original transistor. Repeat this procedure with each suspected transistor until the defective transistor is located.

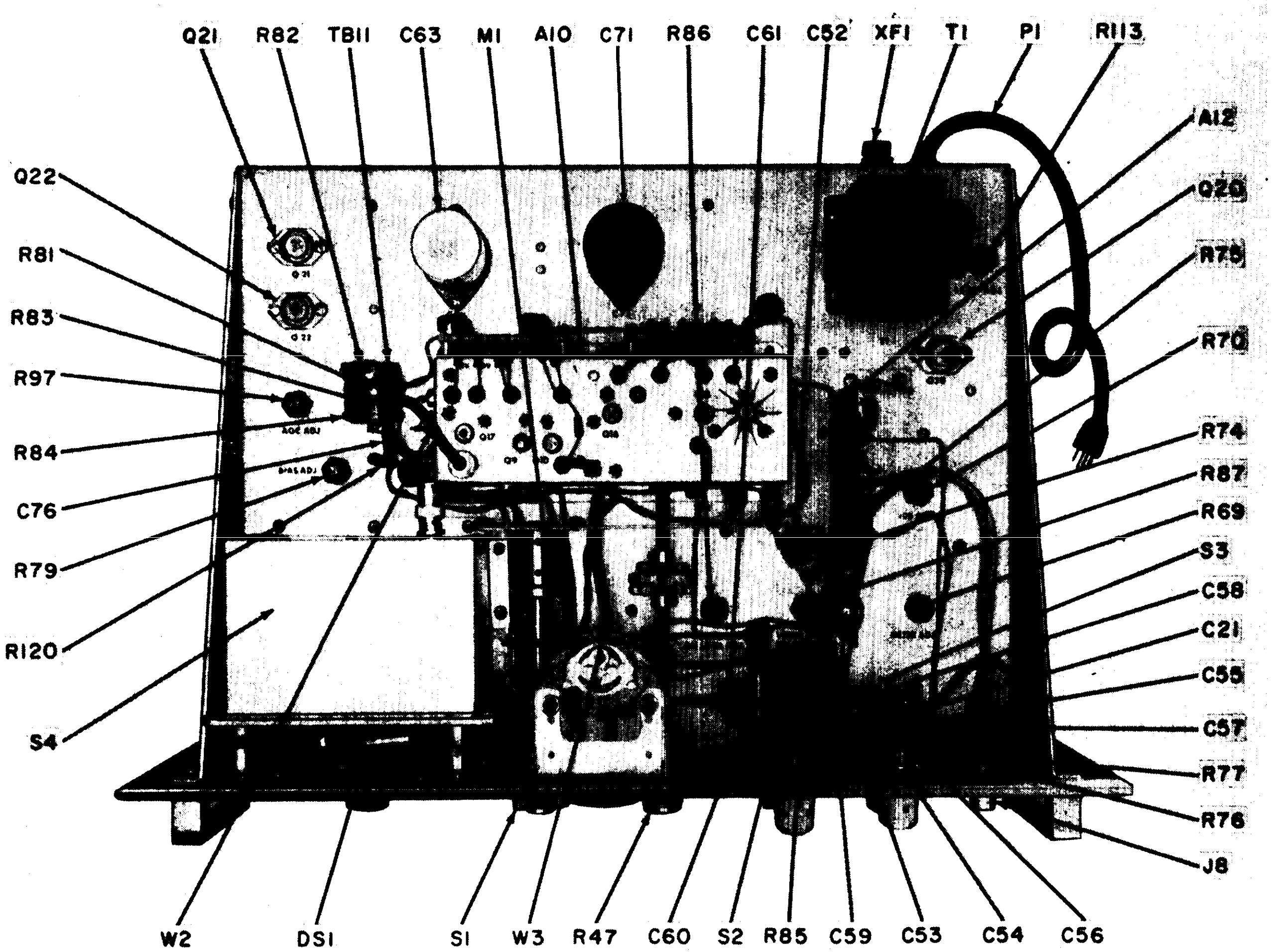


Figure 2-1. Pulse Generator Chassis, Version A, Top View.

2-10. Resistance Measurements

Values of resistance measurements from the emitter, base and collector to ground of the transistors in the version A equipment are given in *a* and *b* below. Values of resistance measurements from the emitter, base and collector to ground of the transistors in the version B equipment are given in *c* and *d* below. The resistance measurements from the pins on the voltage regulators and on the dc amplifier in the version B equipment are also given in *c* and *d* below.

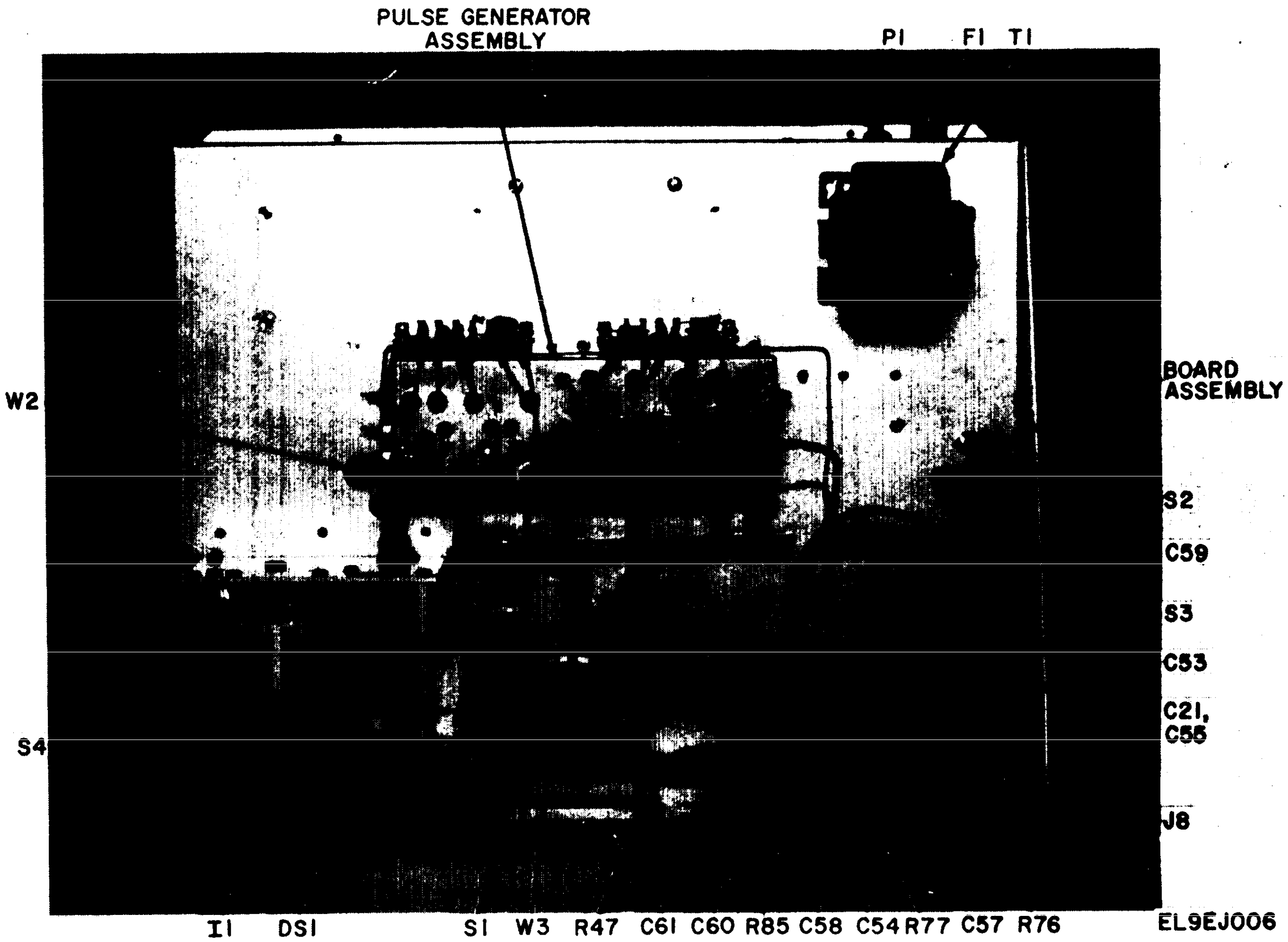


Figure 2-1.1. Pulse Generator Chassis, Version B, Top View.

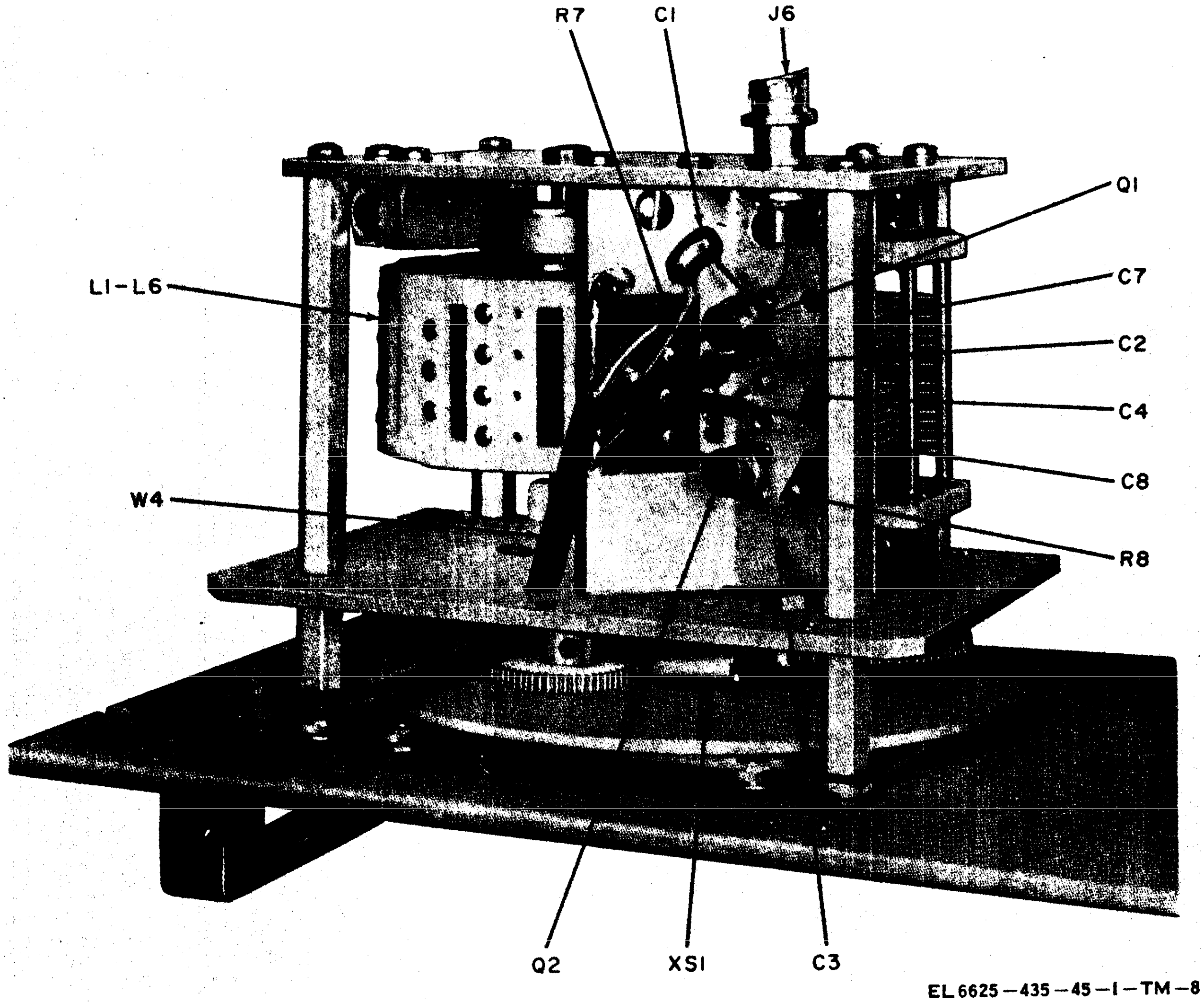


Figure 2-2. Rf oscillator switch assembly top view with cover removed.

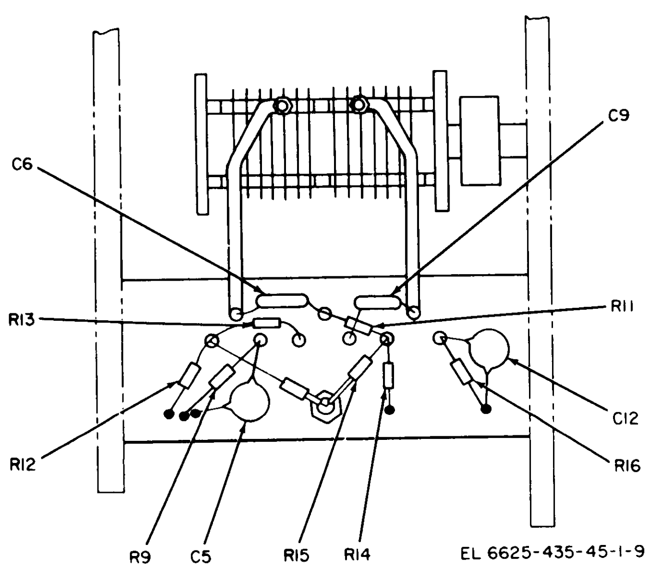


Figure 2-3. Rf oscillator plate, bottom view.

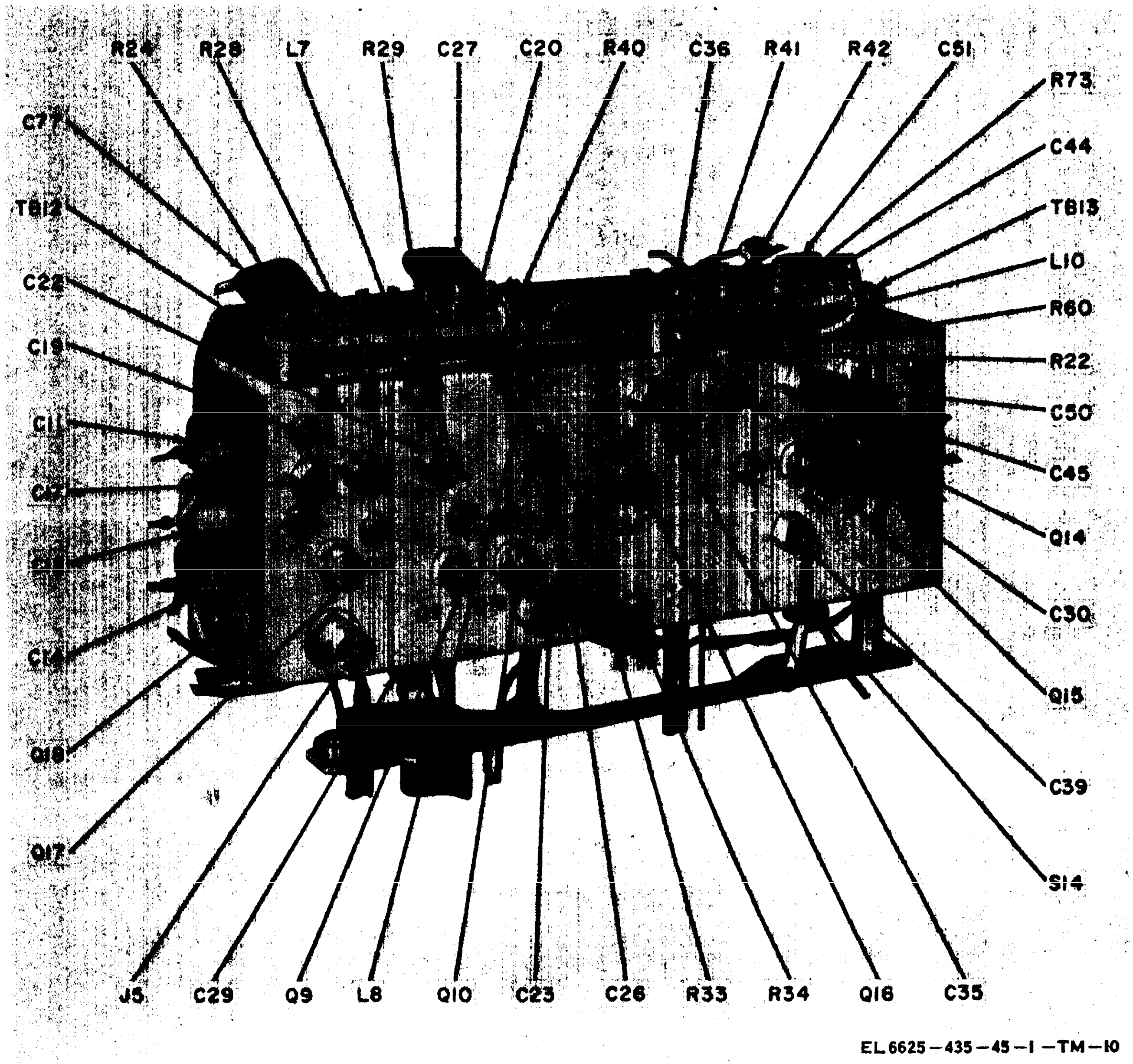


Figure 2–4. Pulse generator assembly, top view.

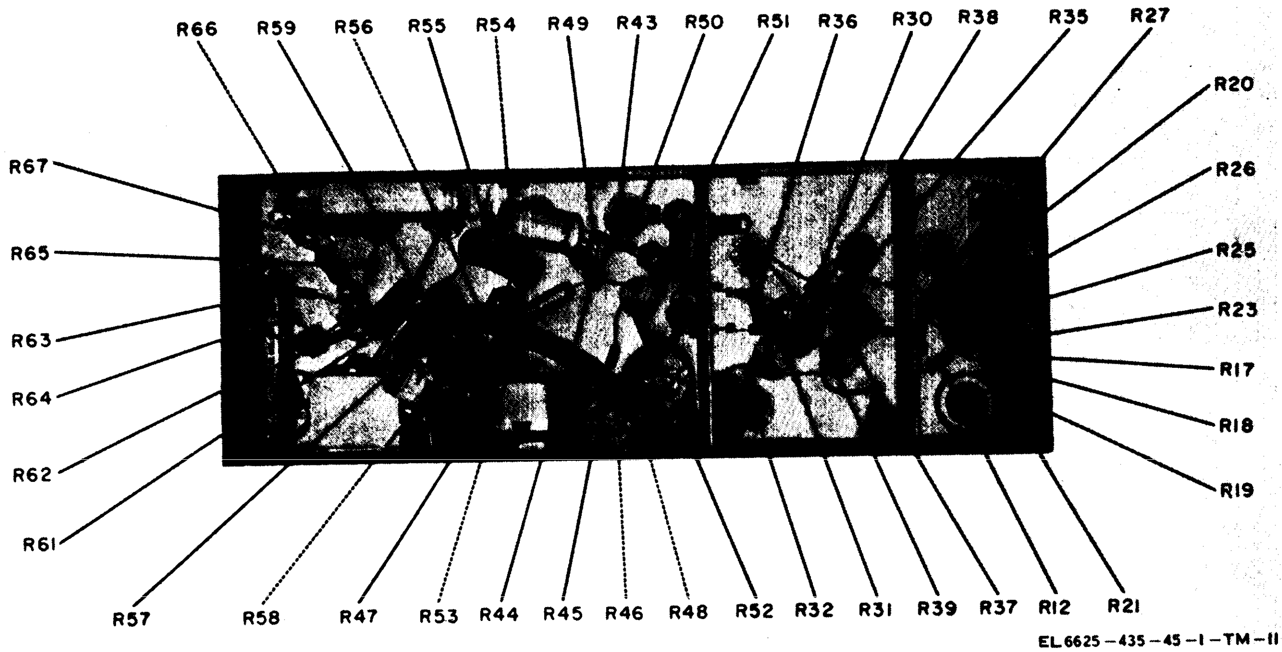


Figure 2-5. Pulse Generator Assembly, Bottom View, Resistive Components.

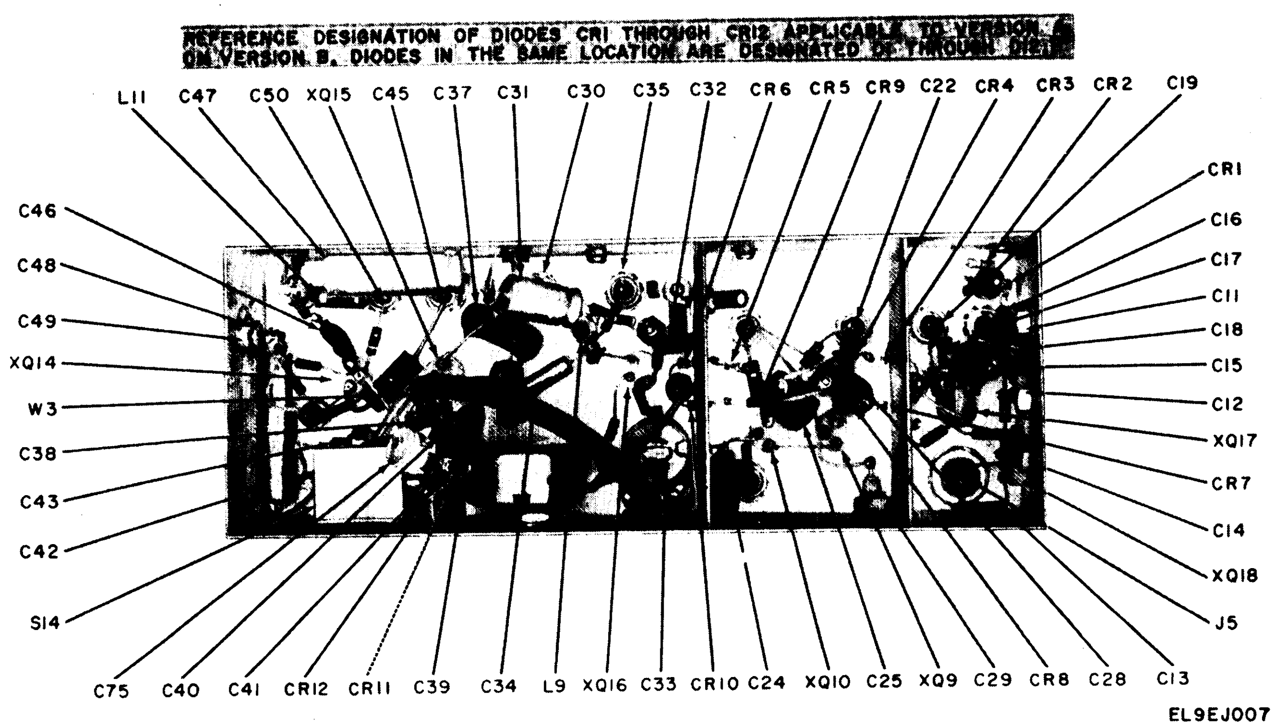


Figure 2-6. Pulse Generator Assembly, Bottom View, Nonresistive Components.

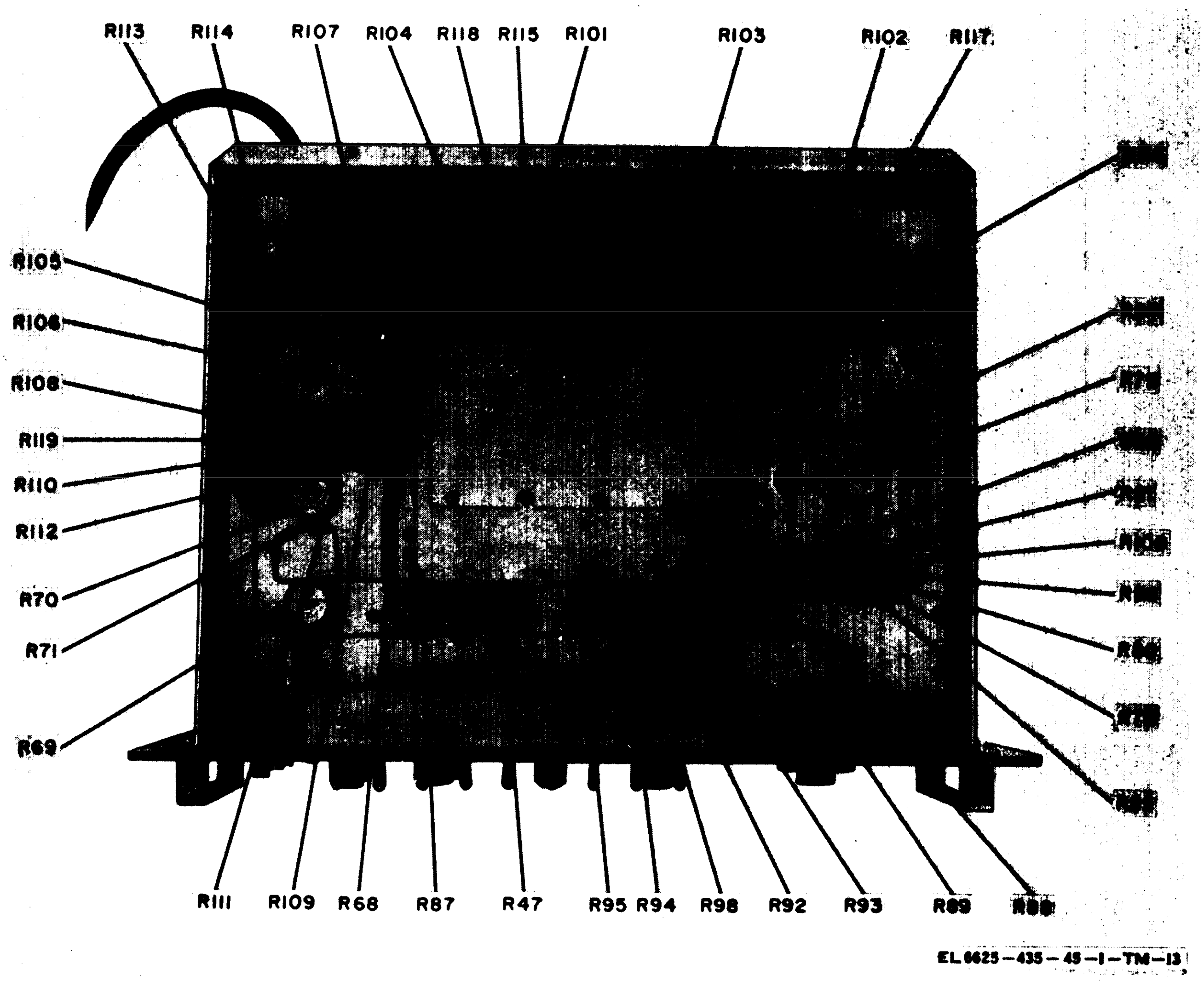


Figure 2-7. Pulse Generator Chassis, Version A, Bottom View, Resistive Components.

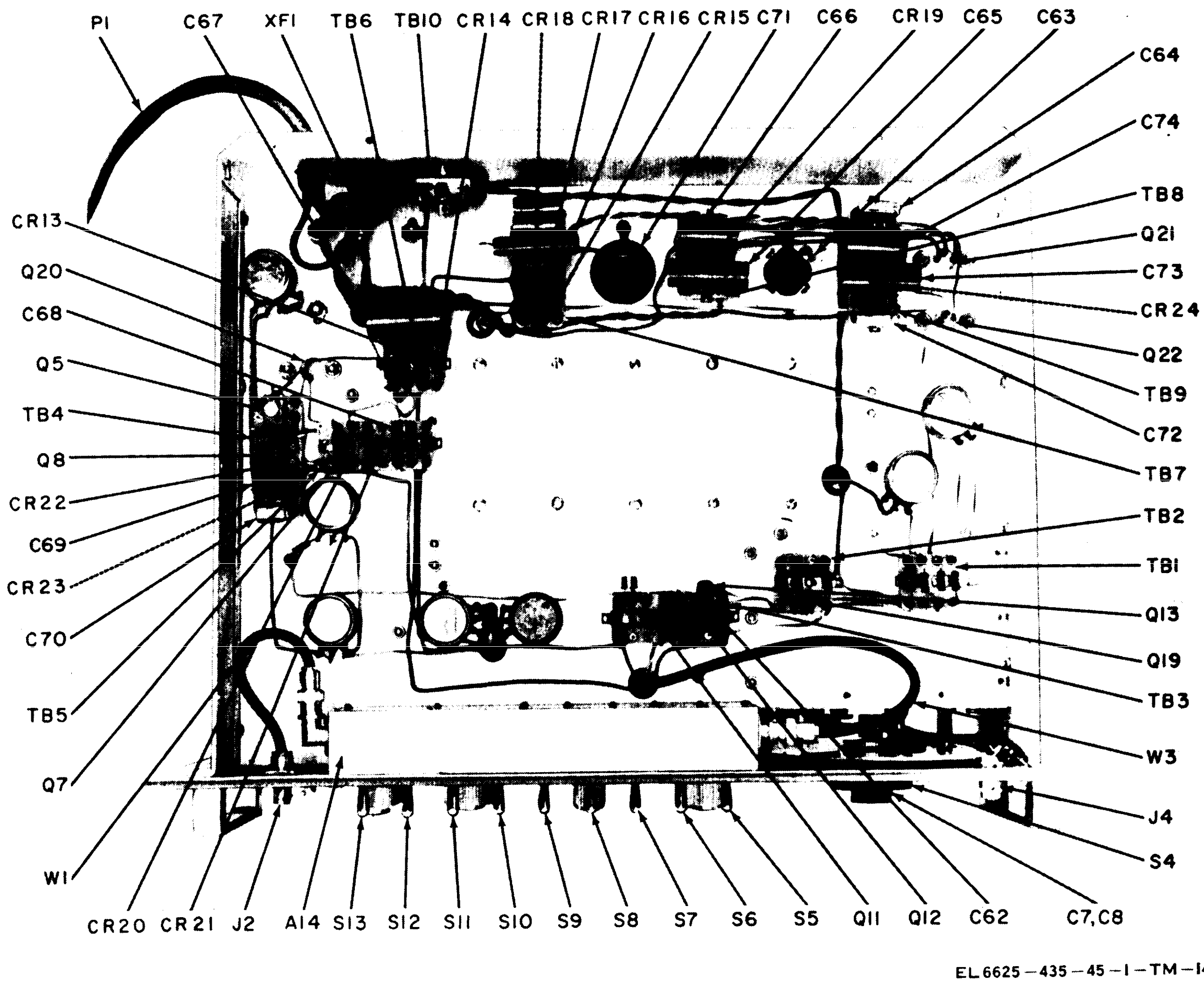


Figure 2-8. Pulse Generator Chassis, Version A, Bottom View Nonresistive Components.

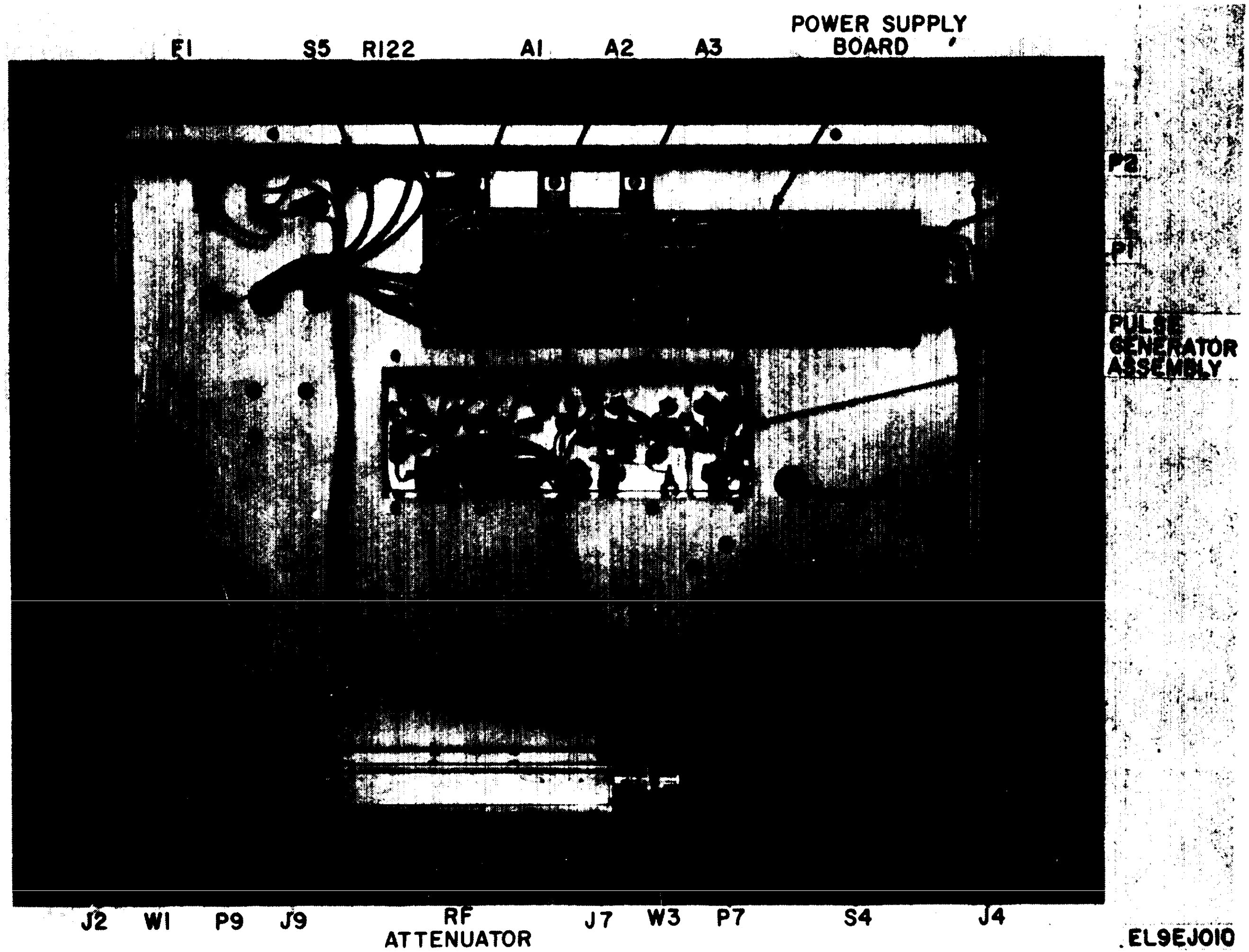


Figure 2-8.1. Pulse Generator Chassis, Version B, Bottom View.

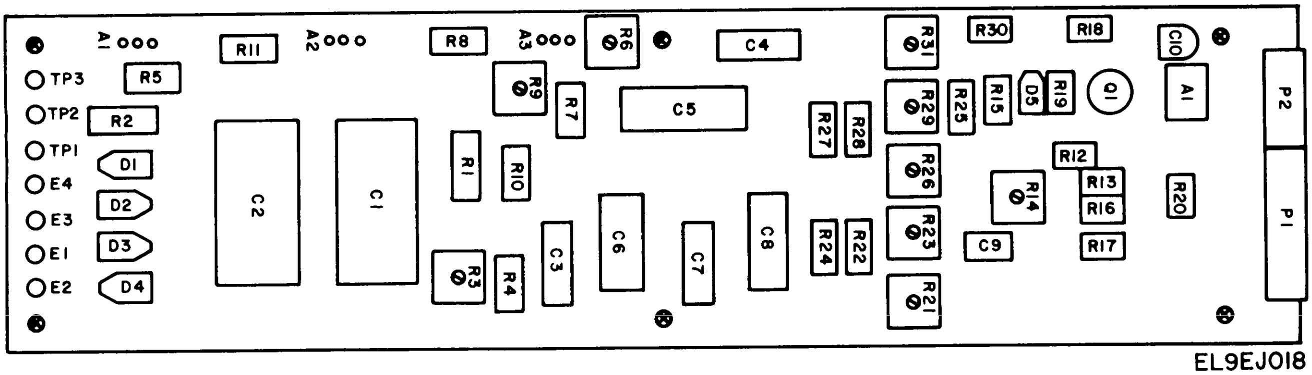


Figure 2-8.2. Power Supply Assembly, Top View.

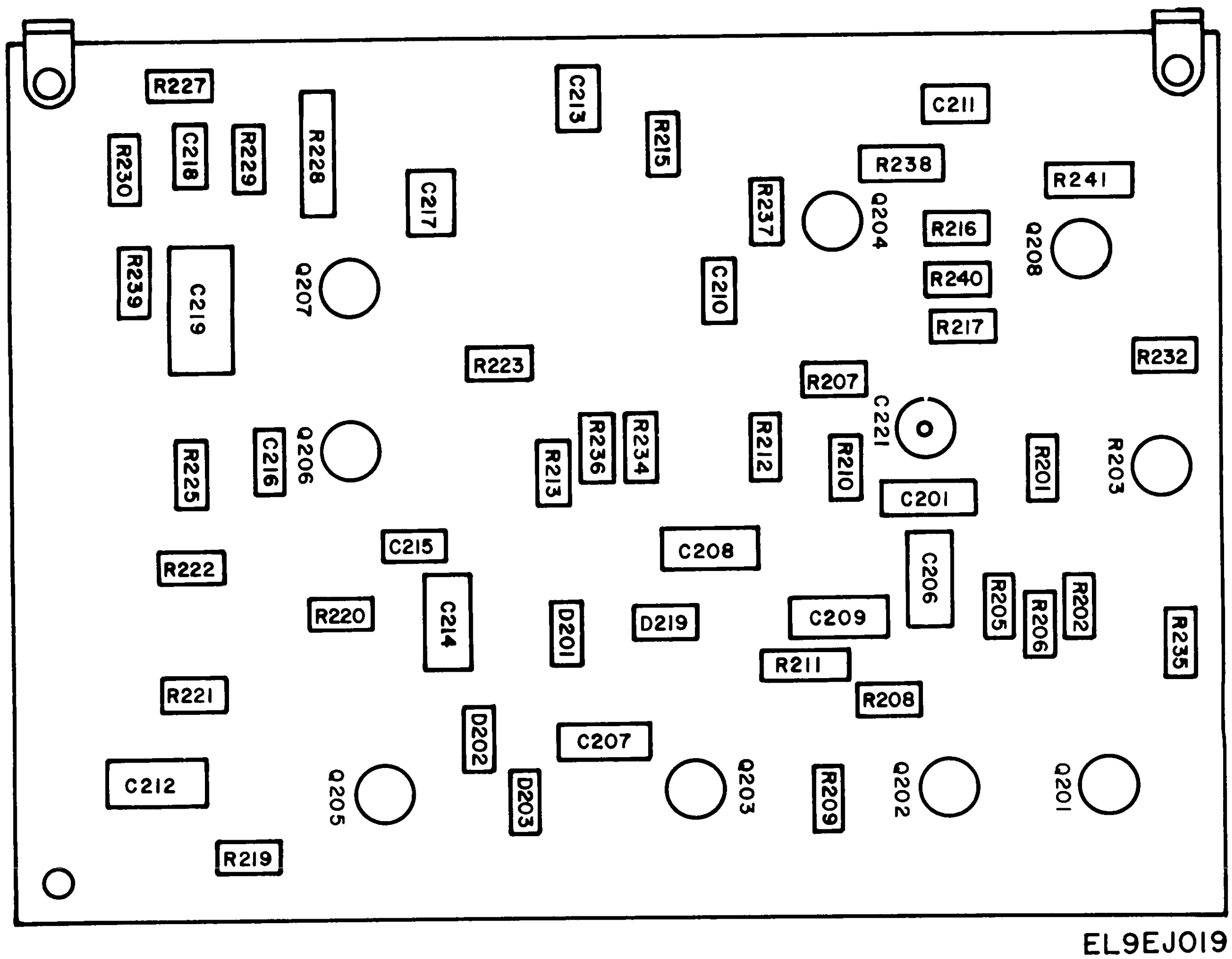


Figure 2-8.3. Printed Circuit Board, Component Side.

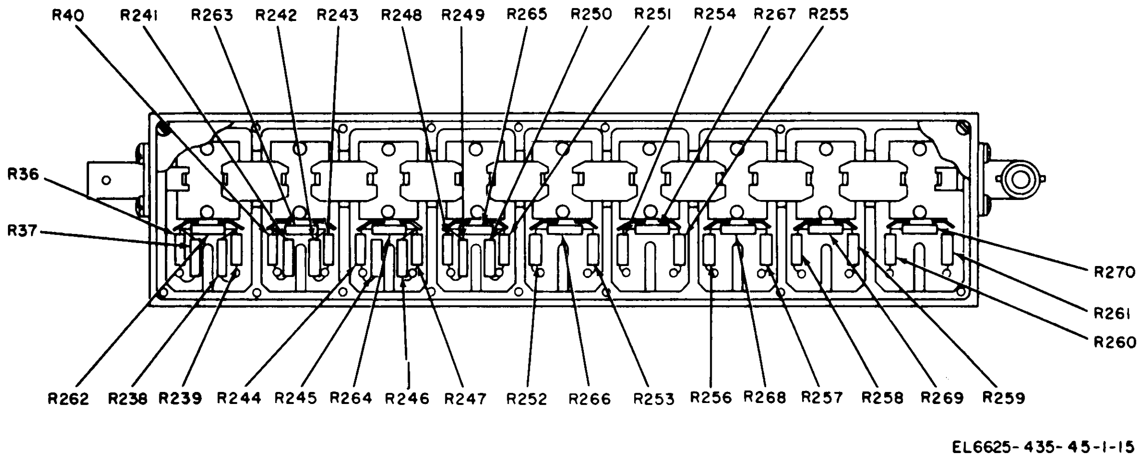
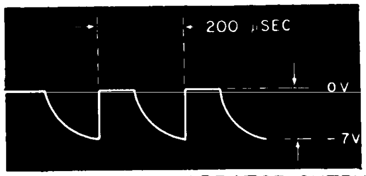
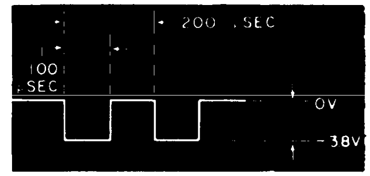


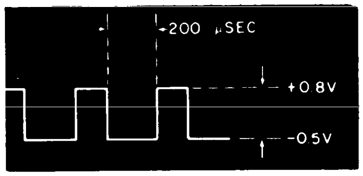
Figure 2-9. Rf Attenuator Network Assembly, Bottom View.



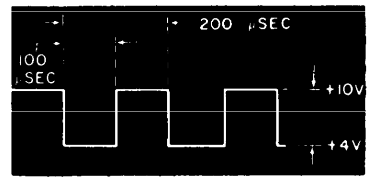
ASTABLE MULTIVIBRATOR OUTPUT
COLLECTOR OF Q202



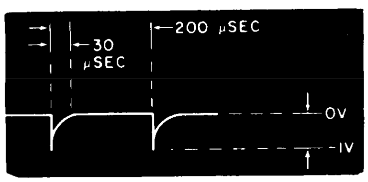
PULSE WIDTH MULTIVIBRATOR OUTPUT
COLLECTOR OF Q206



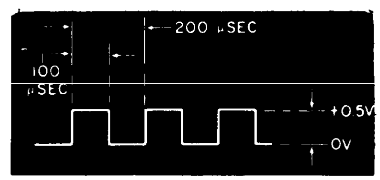
PULSE SHAPING AMPLIFIER INPUT
BASE OF Q203



PULSE AMPLIFIERS OUTPUT
COLLECTOR OF Q208



DIFFERENTIATOR OUTPUT
ANODE OF D202



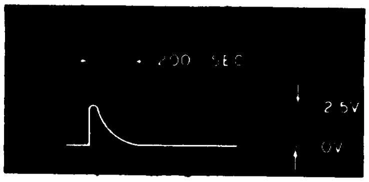
DIODE SWITCH AND DRIVER OUTPUT
CATHODE OF CR10 (VERSION A)
D10, (VERSION B)

NOTES:

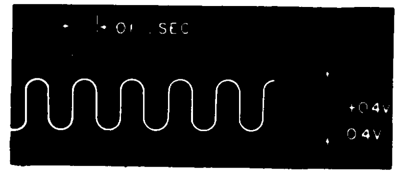
1. SET PULSE GENERATOR CONTROL AS FOLLOWS:
   FUNCTION SELECTOR SWITCH [+ VIDEO PULSE]
   [RF OR PULSE LEVEL] CONTROL - FULL CW
   [PULSE RATE] SWITCH - [500.5KC] OR [500.5KHz]
   [RATE ADJ] CONTROL - FULL CW
   [PULSE WIDTH uSEC] SWITCH - [10.100]
   [WIDTH ADJ] CONTROL - FULL CW
2. CONNECT SIGNAL FROM [SYNC OUT (POS)] JACK OF PULSE GENERATOR TO [EXT TRIG] JACK OF OSCILLOSCOPE.
3. INDIVDUALLY READJUST OSCILLOSCOPE CONTROLS FOR OPTIMUM PRESENTATION OF EACH WAVEFORM.

EL9EJ012

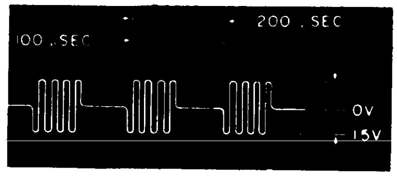
Figure 2-10 (1). Pulse Generator Assembly Waveforms (Part 1 of 2).



SYNC AMPLIFIER OUTPUT
[SYNC OUT (POS)] JACK J1
(NOTE 4)



CARRIER OSCILLATOR OUTPUT
BASE OF Q18
(NOTE 5)



RF ATTENUATOR OUTPUT
[RF OUT] JACK J2
(NOTE 6)

NOTES:

1. SET PULSE GENERATOR CONTROLS AS FOLLOWS:
   FUNCTION SELECTOR SWITCH – [+ VIDEO PULSE]
   [RF OR PULSE LEVEL] CONTROL – FULL CW
   [PULSE RATE] SWITCH – [500 5KC] *
   [RATE ADJ] CONTROL – FULL CW
   [PULSE WIDTH uSEC] SWITCH – [10 100]
   [WIDTH ADJ] CONTROL – FULL CW
2. CONNECT SIGNAL FROM [SYNC OUT (POS)] JACK OF PULSE GENERATOR TO [EXT TRIG] JACK OF OSCILLOSCOPE.
3. INDIVIDUALLY READJUST OSCILLOSCOPE CONTROLS FOR OPTIMUN PRESENTATION OF EACH WAVEFORM
4. CHANGE PULSE GENERATOR CONTROLS AS FOLLOWS:
   [RATE ADJ] CONTROL – 3/4 CW
5. CHANGE PULSE GENERATOR – CONTROLS AS FOLLOWS:
   FUNCTION SELECTOR SWITCH – [CW]
   FREQUENCY CONTROL (OUTER PORTION) – [10-16 MC] *
   FREQUENCY CONTROL (INNER PORTION) – FOR 10 MC READING *
6. CHANGE PULSE GENERATOR CONTROLS AS FOLLOWS:
   FUNCTION SELECTOR SWITCH – [PULSED RF]
   FREQUENCY CONTROL (OUTER PORTION) – [10-16MC] *
   FREQUENCY CONTROL (INNER PORTION) – FOR 10 MC READING * ON FREQUENCY INDICATING DIAL
7. * KC AND MC PANEL MARKINGS ARE APPLICABLE TO VERSION A, MARKINGS ON VERSION B ARE KHz AND MHz. RANGES ON FREQUENCY INDICATING DIAL ON VERSION A ARE MARKED C AND ON VERSION B ARE MARKED Hz.

EL9EJ013

Figure 2-10 ②. Pulse Generator Assembly Waveforms (Part 2 of 2).

a. Resistance Measurements Taken With Ground Lead at Chassis Ground (Version A)

Transistor Number	E Resistance ohms	E Scale multiplier	B Resistance ohms	B Scale multiplier	C Resistance ohms	C Scale multiplier
Q1	100	X10	2.1K	X100	3K	X100
Q2	100	X10	2.1K	X100	3K	X100
Q5	1.2K	X100	2.8K	X100	8K	X1K
Q7	1.2K	X100	1.7K	X100	2.9K	X100
Q8	2.9K	X100	900	X100	2.8K	X100
Q9	720	X100	1.9K	X100	700	X100
Q10	720	X100	120	X100	430	X100
Q11	3K	X100	2.4K	X100	1.3K	X100
Q12	2.4K	X100	1.3K	X100	2.6K	X100
Q13	2.4K	X100	1.3K	X100	2.4K	X100
Q14	270	X100	620	X100	600	X100
Q15	180	X100	1.8K	X100	550	X100
Q16	1.4K	X100	160	X100	1K	X100
Q17	750	X100	220	X100	1.5K	X100
Q18	250	X100	220	X100	330	X100
Q19	1.3K	X100	2.6K	X100	1.2K	X100
Q20	1.2K	X100	1.2K	X100	8K	X1K
Q21	600	X100	1.6K	X100	1K	X100
Q22	300	X100	500	X100	430	X100
Q201	0	0	300	X100	450	X100
Q202	0	0	300	X100	450	X100

Transistor Number	E		B		C	
	Resistance ohms	Scale multiplier	Resistance ohms	Scale multiplier	Resistance ohms	Scale multiplier
Q203	0	0	450	X100	1K	X100
Q204	0	0	480	X100	600	X100
Q205	0	0	420	X100	700	X100
Q206	0	0	450	X100	500	X100
Q207	0	0	420	X100	420	X100
Q208	38	X10	600	X100	650	X100

Resistance readings taken with controls set as follows:

Function switch	VIDEO PULSE +
Band switch	Band 1
RF OR PULSE LEVEL	Fully CW
PULSE RATE	500.5KC
RATE ADJ	Fully CW
WIDTH ADJ	Fully CW
PULSE WIDTH	10.100
ATTENUATOR (dB)	Out

b. Resistance Measurements Taken With Positive Lead at Chassis Ground (Version A)

Transistor Number	E		B		C	
	Resistance ohms	Scale multiplier	Resistance ohms	Scale multiplier	Resistance ohms	Scale multiplier
Q1	100	X10	500	X10	6K	X1K
Q2	100	X10	500	X10	6K	X1K
Q5	10K	X1K	35K	X1K	33K	X1K
Q7	1.2K	X100	1.7K	X100	35K	X1K
Q8	4.8K	X1K	2K	X1K	35K	X1K
Q9	200	X10	1.8K	X100	500	X100
Q10	200	X10	130	X10	170	X10
Q11	6K	X1K	12K	X1K	1.2K	X1K
Q12	2K	X1K	1.2K	X1K	24K	X1K
Q13	2K	X1K	1.5K	X1K	12K	X1K
Q14	130	X10	500	X10	400	X10
Q15	200	X10	700	X10	350	X10
Q16	200	X10	130	X10	200	X10
Q17	120	X10	120	X10	1.7K	X100
Q18	100	X10	120	X10	180	X10
Q19	1.2K	X1K	9.5K	X1K	1.4K	X1K
Q20	1.2K	X1K	9.5K	X1K	34K	X1K
Q21	300	X10	1K	X10	1K	X10
Q22	100	X10	220	X10	180	X10
Q201	0	0	2K	X100	600	X100
Q202	0	0	3K	X100	650	X100
Q203	0	0	1.8K	X100	1K	X100
Q204	0	0	70K	X10K	900	X100
Q205	0	0	1.6K	X100	850	X100
Q206	0	0	18K	X1K	1K	X100
Q207	0	0	1.5K	X100	600	X100
Q208	38	X10	80	X100	750	X100

Resistance readings taken with controls set as follows:

Function switch	VIDEO PULSE +
Band switch	Band 1
RF OR PULSE LEVEL	Fully CW
PULSE RATE	500.5KC
RATE ADJ	Fully CW
WIDTH ADJ	Fully CW
PULSE WIDTH	10.100
ATTENUATOR (dB)	Out

c. Resistance Measurements With Ground Lead at Chassis Ground (Version B).

(1) Transistors.

Transistor Number	E Resistance ohms	E Scale multiplier	B Resistance ohms	B Scale multiplier	C Resistance ohms	C Scale multiplier
Band Switch Assembly						
Q1	100	X10	1.1K	X10	6K	X1K
Q2	100	X10	1.1K	X10	6K	X1K
Rf Switch Box Assembly						
Q9	900	X100	1.4K	X100	422	X10
Q10	900	X100	45	X10	336	X10
Q14	180	X10	470	X10	400	X10
Q15	179	X10	1.1K	X100	377	X10
Q16	90	X100	123	X10	700	X100
Q17	582	X100	210	X10	1.5	X100
Q18	230	X10	208	X10	210	X10
Pulse Generator Assembly						
Q201	0	0	1.5K	X100	682	X100
Q202	0	0	2.5K	X100	664	X100
Q203	0	0	1.5K	X100	564	X100
Q204	0	0	12K	X10K	245	X10
Q205	0	0	840	X100	647	X100
Q206	0	0	22.5K	X10K	384	X10
Q207	0	0	188	X10	387	X10
Q208	0	0	539	X100	572	X100
Power Supply Assembly						
Q1	6.2K	X1K	31K	X10K	1K	X10K

Resistance readings taken with control set as follows:

Function switch	PULSED RF
Band switch	Band 1
RF OR PULSE LEVEL	Fully CW
PULSE RATE	500.5KHz
RATE ADJ	Fully CW
WIDTH ADJ	Fully CW
PULSE WIDTH	10.100
ATTENUATOR (dB)	Out

(2) Voltage regulators A1, A2 and A3.

Regulator	Pin 1 Resistance ohms	Pin 1 Scale multiplier	Pin 2 Resistance ohms	Pin 2 Scale multiplier	Pin 3 Resistance ohms	Pin 3 Scale multiplier
A1	500	X10	359	X10	1K	X100
A2	1K	X100	1.1K	X100	1.5K	X100
A3	233	X10	686	X100	164	X10
Function switch	CW					

(3) Dc amplifier A1 on the power supply board.

Pin	Resistance ohms	Scale multiplier
1	50K	X100
2	4.6K	X100
3	0	0
4	163	X10
5	Not used	
6	Not used	
7	Not used	
8	1K	X100
Function switch	CW	

d. Resistance Measurements Taken With Positive Lead at Chassis Ground (Version B).

(1) Transistors

Transistor Number	E Resistance ohms	E Scale multiplier	B Resistance ohms	B Scale multiplier	C Resistance ohms	C Scale multiplier
Band Switch Assembly						
Q1	100	X10	2K	X100	6.2K	X100
Q2	100	X10	2K	X100	6.2K	X100
Rf Switch Box Assembly						
Q9	29K	X100	1.6K	X100	454	X10
Q10	29K	X100	50	X10	341	X10
Q14	300	X10	473	X100	393	X10
Q15	180	X10	1.6K	X100	371	X10
Q16	909	X100	123	X10	693	X100
Q17	600	X100	210	X10	1K	X100
Q18	230	X10	208	X10	225	X10
Pulse Gen Assembly						
Q201	0	0	1K	X100	682	X100
Q202	0	0	1K	X100	664	X100
Q203	0	0	1K	X100	572	X100
Q204	0	0	1K	X100	245	X10
Q205	0	0	829	X100	648	X100
Q206	0	0	1K	X100	385	X10
Q207	0	0	188	X10	387	X10
Q208	0	0	540	X100	556	X100
Power Supply Assembly						
Q1	1.6K	X100	50K	X100	800	X100

Resistance readings taken with controls set as follows:

Function switch	PULSED RF
Band switch	Band 1
RF OR PULSE LEVEL	Fully CW
PULSE RATE	500.5 KHz
RATE ADJ	Fully CW
WIDTH ADJ	Fully CW
PULSE WIDTH	10.100
ATTENUATOR (dB)	Out

(2) Voltage regulators A1, A2 and A3.

Regulator	Pin 1 Resistance ohms	Pin 1 Scale multiplier	Pin 2 Resistance ohms	Pin 2 Scale multiplier	Pin 3 Resistance ohms	Pin 3 Scale multiplier
A1	490	X10	352	X10	713	X100
A2	1K	X100	900	X100	704	X100
A3	245	X10	1.7K	X100	179	X10
Function switch	CW					

(3) Dc amplifier A1 on the power supply board.

Pin	Resistance ohms	Scale multiplier
1	1K	X100
2	4.5K	X100
3	0	0
4	178	X10
5	Not used	
6	Not used	
7	Not used	
8	1K	X100
Function switch	CW	

CHAPTER 3

REPAIRS

3-1. General Precautions

After the removal of the pulse generator chassis from its cabinet and the removal of the cover plate and the cover screen from the chassis, most of the parts of the pulse generator can be repaired or replaced without special procedures. Repair to the pulse generator generally consists of replacement of faulty electronic components. Observe the following precautions when repairing the pulse generator:

a. Do not distrub the settings of screwdriver-adjustable potentiometers or variable capacitors located on the chassis. Any movement of these parts will void the entire alignment of the unit.

b. Do not overtighten screws when reassembling mechanical parts.

c. Always replace the lockwashers when changing a component that is held by screws.

d. Note the following points when replacing electronic circuit components.

(1) Before a part is unsoldered, note the position of the leads. If the part, such as a power transformer or switch, has a number of connections, tag each lead to avoid improper reconnection.

(2) Be careful not to damage other leads by pushing or pulling them away from maintenance area.

(3) Do not use a large soldering iron when soldering small resistors, ceramic capacitors, or transistors. Overheating of the component may ruin the component or change its value.

(4) Use a pencil-type soldering iron with a 25-watt maximum capacity and solder quickly when soldering germanium diodes CR1 through CR12, D201, D202, D203, and D219 (fig. 2-6 and 5-2) in version A and D1 through D12 and D201, D202, D203 and D219 (fig. 2-6 and 5-3) in version B. Use a heat sink (such as long-nose pliers) between the soldered joint and the diode.

(5) Do not allow excess drops of solder to fall onto parts of the chassis. Excess drops of solder very often cause short circuits.

(6) Make certain that all solder connections are soldered well. A bad solder joint can create new faults and these faults are the most difficult to isolate.

(7) Replace parts in the circuit to exactly the same position occupied by the original part. Note the correct positions of transistors and polarized capacitors.

3-2. Removal and Replacement of Cabinet, Cover Plate, and Cover Screen

a. Removal of the Cabinet. To remove the pulse generator cabinet (fig. 3-1), follow the procedures given in (1) and (2) below.

(1) Remove the four screws (5, fig. 3-1) that fasten the front panel to the cabinet and the two screws (2, fig. 3-1) that fasten the bottom of the chassis to the bottom of the cabinet.

(2) Lift and slide the pulse generator chassis out of the cabinet. Make certain that the power cord is not tangled and is free to pass through the opening at the rear of the cabinet.

b. Removal of Cover Plate. To remove the pulse generator cover plate (fig. 3-1) from the bottom of the chassis, follow the procedures given in (1), (2), and (3) below.

(1) Remove the pulse generator chassis from the cabinet.

(2) Remove the nine screws (3, fig. 3-1) that fasten the cover plate to the bottom of the chassis.

(3) Lift and turn the pulse generator chassis on its side and pull the cover plate free from the bottom of the chassis.

c. *Removal of Cover Screen.* To remove the pulse generator cover screen (fig. 3-1) from the top of the chassis, follow the procedures given in (1), (2), and (3) below:

(1) Remove the pulse generator chassis from the cabinet.

(2) Remove the eleven screws (7, fig. 3-1) that fasten the cover screen to the top and sides of the chassis.

(3) Lift the cover screen free from the top of the chassis.

d. Replacement of Cover Screen. To replace the pulse generator cover screen to the top of the chassis, follow the procedures given in (1) and (2) below.

(1) Place the cover screen over the top of the chassis and align the 11 mounting holes in the cover screen with the mounting holes of the chassis.

(2) Using the 11 screws that were removed from these mounting holes, fasten the cover screen to the chassis.

e. Replacement of Cover Plate. To replace the pulse generator cover plate to the bottom of the chassis, follow the procedures given in (1) and (2) below.

(1) With the pulse generator chassis on its side, insert the cover plate inside the bottom of the chassis

and align nine mounting holes of the cover plate with the mounting holes of the chassis.

(2) Using the nine screws that were removed from these mounting holes, fasten the cover plate to the chassis.

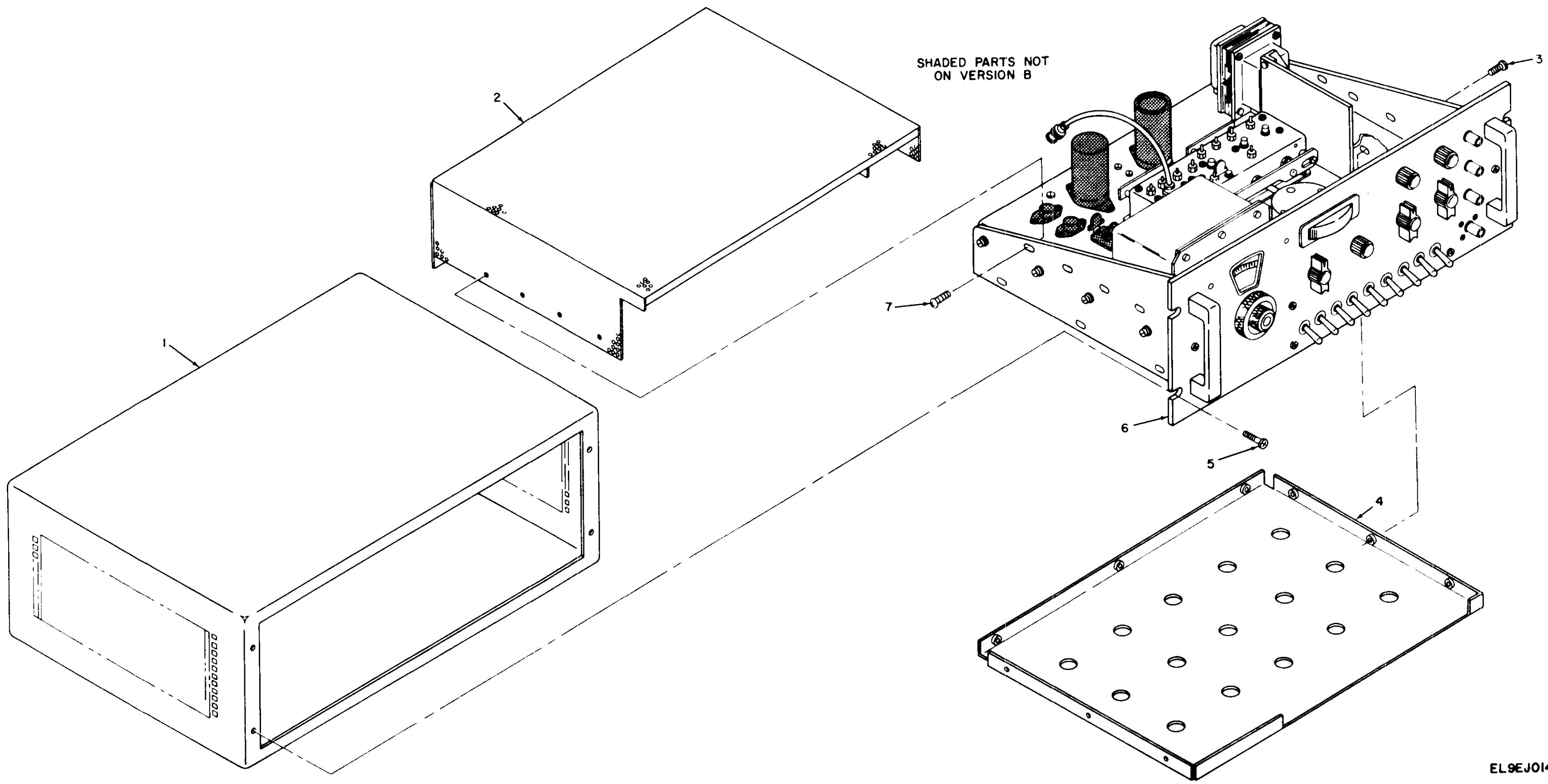
f. Replacement of Cabinet. To replace the pulse generator cabinet, follow the procedures given in (1) through (4) below.

(1) Replace the cover plate and the cover screen to the chassis.

(2) Lift and slide the pulse generator chassis into the cabinet from the front. Make certain that the power cord freely passes through the opening at the rear of the cabinet as the chassis is slid into the cabinet.

(3) Using the two screws that were removed from the mounting holes in the bottom of the cabinet, align the holes in the bottom of the cabinet with the holes in the bottom of the chassis and fasten the chassis to the cabinet.

(4) Using the four screws that were removed from the front panel (5, fig. 3-1), align the four cutout sections on the front panel with the mounting holes in the chassis and fasten the chassis to the front panel.



1 Cabinet
2 Cover screw (on bottom)
3 Screw (9)
4 Cover plate
5 Screw (4)
6 Chassis
7 Screw (11)

Figure 3-1. Pulse Generator, Cover Plate and Cover Screen Removal and Replacement.

3-3. Repair of RF Oscillator Switch Assembly S4

To repair the rf oscillator switch assembly, proceed as follows:

NOTE

Disassemble the rf oscillator assembly only to the extent necessary to replace defective component parts.

a. Removal.

(1) Remove pulse generator from the cabinet and remove cover plate and cover screen (para 3-2).

(2) Disconnect plug connector P6 from receptacle connector J6 (fig. 2-2).

(3) Remove 16 screws (1, fig. 3-2) and lockwashers securing protective cover to rf oscillator switch assembly (4, fig. 3-2) and remove protective cover (3, fig. 3-2).

(4) Disconnect coaxial cable W4 (fig. 2-2) from jack J4 (fig. 2-8).

(5) Loosen two setscrews securing small knob (9, fig. 3-2) to shaft of planetary assembly and remove knob.

NOTE

The 10-16 MC window cited in (6) below is marked 10-16 MHz in version B.

(6) With 10-16 MC window visible, mark with grease pencil the topmost insert assembly on frequency drum.

(7) Loosen two setscrews securing large knob (8, fig. 3-2) to frequency dial assembly and remove large knob.

(8) Remove four screws (10, fig. 3-2) and lockwashers (11, fig. 3-2) securing rf oscillator switch assembly to front panel and the chassis. Draw rf oscillator switch assembly back and remove fiducial plate assembly (5, fig. 3-2) and frequency dial assembly.

NOTE

The fiducial plate assembly is not shown in either figure 3-2 or 3-3. The frequency dial assembly consists of items 5 and 6 on figure 3-3.

NOTE

The white-yellow lead cited in (9) below is white-green in version B equipment.

(9) Tag white-yellow lead to facilitate reconnection and unsolder lead from feedthrough capacitor C3 (fig. 2-2).

(10) Tag brown lead to facilitate reconnection and unsolder lead from lamp socket on lamp bracket.

(11) Remove rf oscillator switch assembly from chassis.

b. Disassembly.

(1) Loosen two setscrews securing collar of frequency dial assembly and separate component parts of assembly.

(2) Loosen two setscrews securing spur gear (46, fig. 3-3) to drum shaft and remove spur gear.

(3) Remove nut (45, fig. 3-3) and lockwasher securing dial drive arm (43, fig. 3-3) to shaft of planetary assembly and remove dial drive arm and associated spur gear (44, fig. 3-3).

(4) Loosen two setscrews securing spur gear (39, fig. 3-3) to shaft of variable capacitor and remove spur gear.

(5) Remove three screws (42, fig. 3-3) and lockwashers (41, fig. 3-3) securing planetary assembly (40, fig. 3-3) to front plate and remove planetary assembly.

(6) Remove lamp bracket (29, fig. 3-3) from front plate by removing one screw, lockwasher, and washer.

(7) Unsolder lead from resistor R8 (fig. 2-2) at feedthrough capacitor C3. Remove nut securing feedthrough capacitor to front plate and remove capacitor.

(8) Remove two screws and lockwashers (48, 49, fig. 3-3) securing front panel to oscillator plate (52, fig. 3-3) and two screws (34, 35, 36, and 37, fig. 3-3) securing front plate to capacitor mounting bar (23, fig. 3-3).

(9) Remove two mounting studs (50, fig. 3-3) and one screw and lockwasher securing front plate to spacers and remove front plate.

(10) Press two oilite bushings (25, 57, fig. 3-3) from front panel.

(11) Remove drum shaft and associated parts from rear plate.

NOTE

Make certain not to lose detent ball and spring when removing drum shaft and associated parts.

(12) Remove two retaining rings (54, 56, fig. 3-3) from drum shaft.

(13) Identify positions of six insert assemblies and draw the assemblies from the frequency drum. Draw six dummy insert assemblies from frequency drum.

(14) Remove two screws and lockwashers securing detent plate to detent plate spacer and remove detent plate.

(15) Loosen two setscrews securing detent plate spacer to drum shaft and remove spacer.

(16) Remove two screws securing retaining washers to front face of frequency drum and remove retaining washer and retaining spring.

(17) Repeat procedure given in (16) above to remove rear retaining washer and spring.

(18) Loosen two setscrews securing frequency drum to drum shaft and remove drum.

(19) Remove two screws and lockwashers securing rear plate to oscillator plate.

(20) Remove two screws, two lockwashers, and detent block from rear plate.

(21) Unsolder lead from capacitor C1 at connector receptacle J6 (11, fig. 3-3). Remove nut securing connector receptacle J6 and ground terminal (12, fig. 3-3) and remove connector receptacle from rear plate.

(22) Remove three screws, lockwashers, and spacers from rear plate.

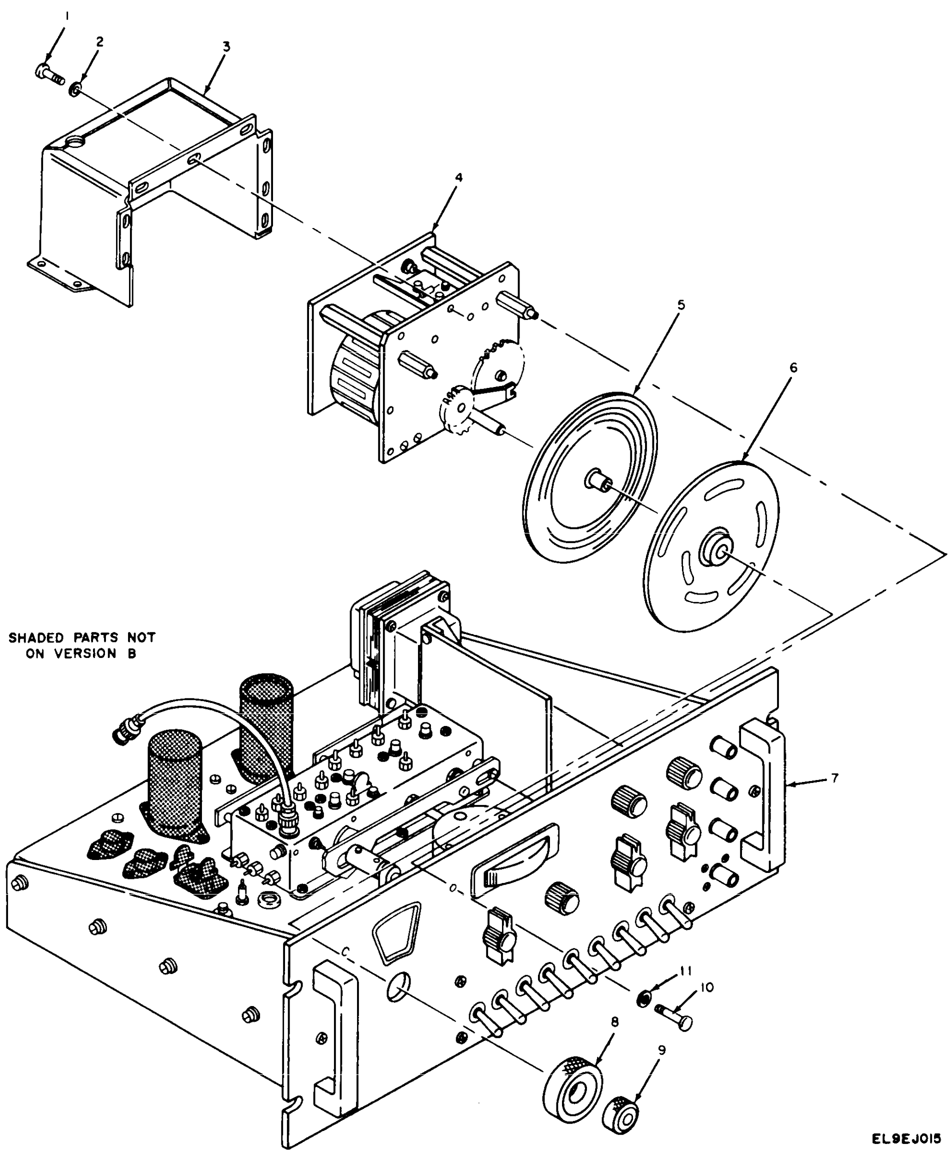
(23) Remove two screws and lockwashers and capacitor mounting bar (23, fig. 3-3) from rear plate.

(24) Remove two nuts from terminals on variable capacitor and separate leads of oscillator plate from terminals.

(25) Remove two screws and lockwashers securing variable capacitor to capacitor mounting bar and remove variable capacitor.

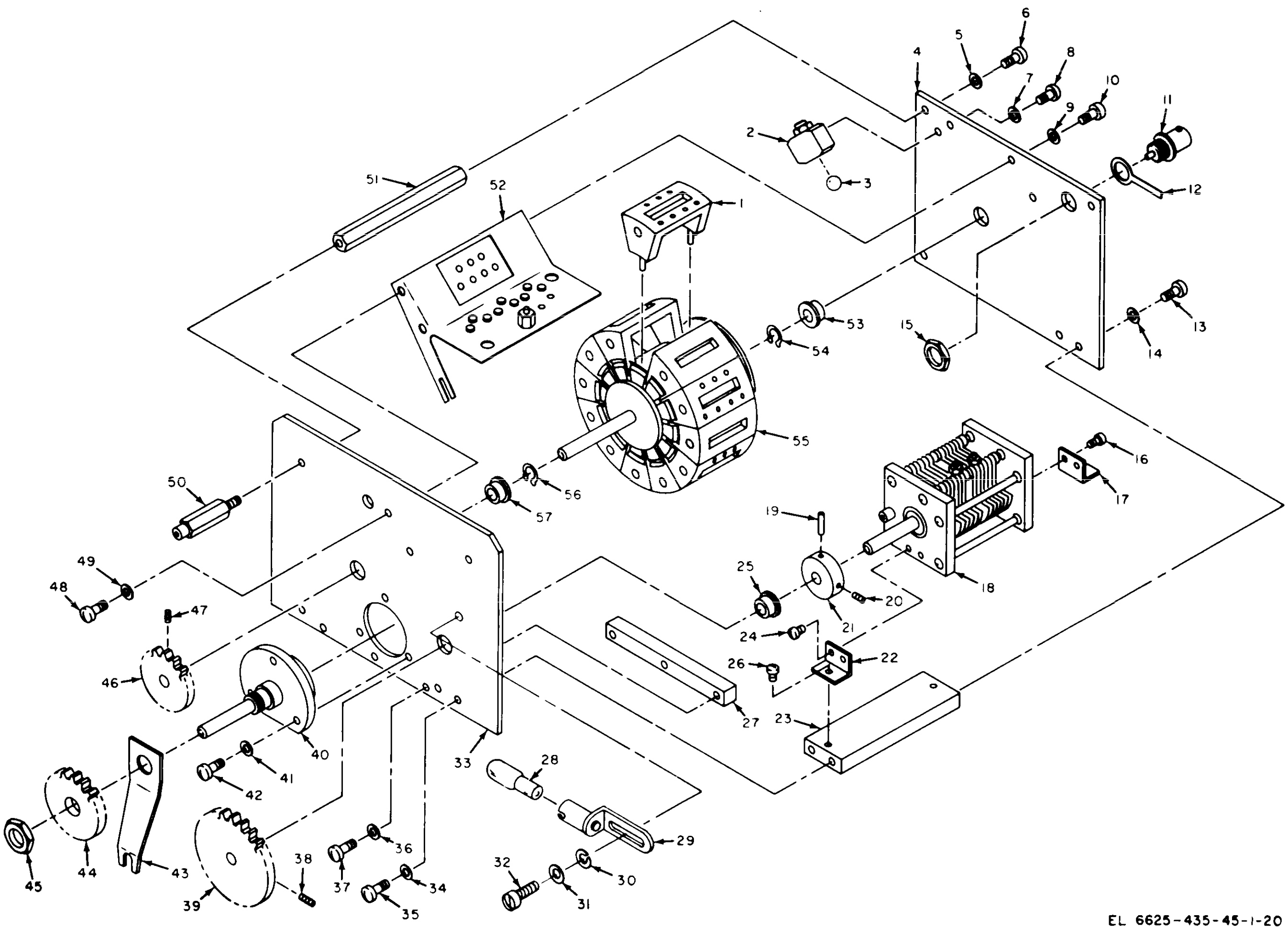
(26) Loosen two setscrews securing stop collar to shaft of variable capacitor and remove collar.

(27) Remove oilite bushing from rear plate.



1 Screw (16)
2 Lockwasher (16)
3 Protective cover
4 Rf oscillator switch assembly
5 Fiducial plate
6 Dial screen window
7 Chassis
8 Large knob
9 Small knob
10 Screw (2)
11 Lockwasher (2)

Figure 3-2. Rf Oscillutor Switch Assembly, Removal and Replacement.



1 Insert
2 Block
3 Detent ball
4 Rear plate
5 Washer (3)
6 Screw (3)
7 Washer (2)
8 Screw (2)
9 Washer (2)
10 Screw (2)
11 Connector
12 Terminal
13 Screw (2)
14 Washer (2)
15 Nut
16 Screw(2)
17 Bracket
18 Variable capacitor
19 Pin
20 Setscrew
21 Collar
22 Bracket
23 Mounting bar
24 Screw (2)
25 Bushing
26 Screw (2)
27 Mounting bar
28 Lamp
29 Lamp holder
30 Lockwasher
31 Washer
32 Screw
33 Front plate
34 Washer (2)
35 Screw (2)
36 Washer (3)
37 Screw (3)
38 Setscrew
39 Gear
40 Planetary gear
41 Washer (3)
42 Screw (3)
43 Dial drive arm
44 Gear
45 Nut
46 Gear
47 Setscrew
48 Screw (2)
49 Washer (2)
50 Mounting stud (2)
51 Spacer (3)
52 Circuit board
53 Bushing
54 Retaining ring
55 Band switch
56 Retaining ring
57 Bushing

Figure 3-3. Rf Oscillator Switch Assembly, Disassembly and Reassembly.

c. Reassembly.

(1) Rotate shaft of variable capacitor (18, fig. 3-3) until rotating plates are fully inserted between stationary plates. Mount stop collar (21, fig. 3-3) on shaft with setscrew, centered between stop pins, oriented toward mounting bracket and stop pin resting against near side of stop. Secure by tightening two setscrews. Turn shaft counterclockwise and be sure that, when second stop pin contacts stop rotating, plates are completely disengaged from stationary plates.

(2) Mount variable capacitor (18, fig. 3-3) on capacitor mounting bar (23, fig. 3-3) with stop collar at end of mounting bar having two threaded holes. Secure with two screws, installing a lockwasher under the head of the larger screw.

(3) Secure terminals of two strap leads from oscillator plate to terminal screws of variable capacitor with two nuts.

(4) Secure capacitor mounting bar (23, fig. 3-3) to rear plate (4, fig. 3-3) with two screws and lockwashers (13, 14, fig. 3-3).

(5) Install connector receptacle J6 (11, fig. 3-3) in rear plate and install ground terminal of oscillator plate on connector receptacle. Secure with receptacle nut (15, fig. 3-3). Solder lead from capacitor C1 to connector receptacle terminal.

(6) Secure three spacers (51, fig. 3-3) at three corners of rear plate by means of three screws and lockwashers (5,6, fig. 3-3).

(7) Install detent block (2, fig. 3-3) on rear plate, orienting it as shown. Secure with two screws and lockwashers (7, 8, fig. 3-3).

(8) Secure oscillator plate to rear plate with two screws and lockwashers.

(9) Secure detent plate to detent plate spacer with two screws and lockwashers.

(10) Install a retaining ring in groove of drum shaft nearest rear end of shaft. Mount detent plate spacer on shaft with detent plate facing retaining ring.

(11) Press oilite bearing (53, fig. 3-3) into rear plate; orienting it as shown.

(12) Mount detent spring and detent ball (3, fig. 3-3) in detent block and mount drum shaft in oilite bushing, centering a notch of the detent plate on the detent ball. Secure detent spacer by tightening two setscrews.

(13) Secure a retaining spring and retaining washer at end of frequency drum with two screws. Orient the parts as shown.

(14) Install one insert assembly (1, fig. 3-3) in its appropriate position on frequency drum, making certain that setscrews in frequency drum are accessible.

(15) Install frequency drum on drum shaft with four contacts of insert assembly in clockwise position. Position frequency drum on shaft so that, with notch of detent plate centered on detent ball, all contacts of insert assembly are centered under contact fingers of oscillator plate. Secure frequency drum by tightening two setscrews.

(16) Install retaining ring in groove of drum shaft.

(17) Press two oilite bushings (25, 57, fig. 3-3) into front plate, orienting the parts as shown.

(18) Install front plate (33, fig. 3-3) on three spacers (51, fig. 3-3) and secure with two studs (50, fig. 3-3) and one screw and lockwasher.

(19) Secure oscillator plate (52, fig. 3-3) to front plate with two screws and lockwashers.

(20) Install feedthrough capacitor C3 in front plate and secure with nut. Solder lead from resistor R8 to terminal of capacitor.

(21) Secure lamp bracket to front plate by means of a washer, lockwasher, and screw. Orient lamp bracket as shown. Install lamp in socket.

(22) Secure planetary assembly (40, fig. 3-3) to front plate by means of three screws and lockwashers.

(23) Install large spur gear (39, fig. 3-3) on shaft of variable capacitor hub first. With hub in contact with oilite bushing, secure gear by tightening two setscrews.

(24) Install medium sized spur gear on shaft of planetary assembly, meshing this gear with gear previously installed.

(25) Install dial drive arm (43, fig. 3-3) on shaft of planetary assembly, orienting it to clear shaft of variable condenser. Secure temporarily with a lockwasher and nut.

(26) Install small spur gear (47, fig. 3-3) on drum shaft hub first. With drum shaft flush with outer face of spur gear, secure by tightening two setscrews.

d. Installation.

(1) Position rf oscillator switch assembly on chassis.

(2) Solder brown lead (previously tagged) to terminal of lamp socket.

NOTE

The white-yellow lead cited in (3), below is white-green in version B.

(3) Solder white-yellow lead (previously tagged) to terminal of feedthrough capacitor C3.

(4) Rotate frequency drum until previously marked insert assembly is topmost.

(5) Assemble parts of frequency dial assembly and fiducial plate assembly on rf oscillator switch assembly. Make certain that pin of dial engages slot of dial drive arm and that when gear hub assembly is meshed with spur gear on drum shaft, 10-6 MC (or MHz) window of dial screen is centered at top. Secure collar on gear hub assembly by tightening two setscrews.

(6) Mount assembled components on front panel (fig. 3-2) and secure with two screws.

(7) Install large knob on gear and hub assembly and secure by tightening two setscrews.

(8) Install small knob on shaft of planetary assembly and secure by tightening two screws.

(9) Connect coaxial cable W4 (fig. 2-2) to jack J4 (fig. 2-8.

(10) Connect plug connector P6 to connector receptacle J6.

(11) Align the dial as follows:

(a) Rotate large knob of frequency dial assembly until 10-16 MC (or MHz) window of dial screen is centered in front panel opening.

(b) Rotate small knob until rotating plates of variable capacitor are fully inserted between stationary plates.

(c) Loosen nut securing dial drive arm.

(d) Holding rotating plates of variable capacitor fully engaged, rotate dial drive arm until 10 MC indication on dial is centered on hairline.

(e) Secure adjustment by tightening nut loosened in *(c)* above.

(f) check to be certain that 10 MC (or MHz) indication on dial is centered on hairline with rotating plates of variable capacitor fully engaged.

(12) Install protective cover over rf oscillator switch assembly and secure with 16 screws and lockwashers.

(13) Install pulse generator in cabinet and install cover plate and cover screen (para 3-2).

CHAPTER 4

GENERAL SUPPORT TESTING PROCEDURES

4-1. General

a. Testing procedures are prepared for use by Electronics Field Maintenance Shops and Service Organizations responsible for general support maintenance of repaired equipment. These procedures set forth specific requirements that repaired equipment *must* meet before it is returned to the using organization.

b. Comply with the instructions preceding each chart before proceeding to the chart. Perform each step in sequence. For each step, perform all the actions required in the *Control settings* column; then perform each specific test procedure and verify it against its performance standard.

4-2. Test Equipment Required

All the test equipment required to perform the testing procedures given in this chapter are listed in the chart below.

Nomenclature	*Technical manual*
Digital Readout, Electronic, Counter AN/USM-207.	TM 11-6625-700-10
Oscilloscope AN/USM-281A	TM 11-6625-1703-15
Pulse Generator AN/PPM-1	
Signal Genertor AN/USM-44	TM 11-6625-508-10

4-3. Modification Work Orders

The performance standards listed in the tests (para 4-4 through 4-11) are based on the assumption that all modification work orders have been performed. A listing of current modification work orders will be found in DA Pam 310-1.

4-4. Physical Tests and Inspections

a. Test Equipment and Materials. None.

b. Test Connections and Conditions.

(1) No connections necessary.

(2) Remove the pulse generator from its case.

c. Procedure.

Step No.	*Test equipment*	*Control settings* *Equipment under test*	*Test procedure*	*Performance standurd*
1	None	Controls may be in any position.	a. Inspect case and chassis for damage, missing parts, and condition of paint. *Note.* Touchup painting is recommended in place of refinishing whenever practical; screwheads, binding posts, receptacles, and other plated parts will not be painted or polished with abrasives.	a. No damage evident or parts missing, external surfaces intended to be painted will not show bare metal.
			b. Inspect all controls and mechanical assemblies for loose or missing screws, bolts, or nuts.	b. Screws, bolts, and nuts will be tight; none missing.
			c. Inspect all connectors, sockets, and receptacles, fuseholders, and meter for looseness, damage, or missing parts.	c. No loose parts or damage. No missing parts.
2	None	Controls may be in any position.	a. Rotate all panel controls throughout their limits of travel.	a. Controls will rotate freely without binding or excessive looseness.
			b. Inspect dial stops for damage, bending, and for proper operation.	b. Stops will operate properly without evidence of damage.
			c. Operate all switches.	c. Switches will operate properly.

4-5. Pulse Repetition Rate Test

a. Test Equipment and Material Digital Readout, Electronic, Counter AN/USM-207.

b. Test Connections and Conditions. Connect the equipment as shown in figure 4-1.

c. Procedure.

Step No.	Control settings: Test equipment	Control settings: Equipment under test	Test procedure	Performance standard
1	*AN/USM-207* SENSITIVITY: 10V FUNCTION: FREQ. GATE TIME (SEC-1) 1	Function selector switch: +VIDEO PULSE RF OR PULSE LEVEL: fully clockwise PULSE RATE: 50. 500 PULSE WIDTH USEC: 10. 100 WIDTH ADJ; fully clockwise. ATTENUATOR (dB): No attenuation.	a. Turn on equipment and allow to warm up for 5 minutes.	a. None.
			b. Turn the RATE ADJ fully counterclockwise.	b. The AN/USM-207 indicates less than 50 pps.
			c. Turn the RATE ADJ fully clockwise.	c. The AN/USM-207 indicates more than 500 pps.
			d. Adjust the PULSE RATE switch to 500.5KC or 500.5 KHz position. Turn the RATE ADJ fully counterclockwise.	d. The AN/USM-207 indicates less than 500 pps.
			e. Turn the RATE ADJ fully clockwise.	e. The AN/USM-207 indicates more than 5,000 pps.

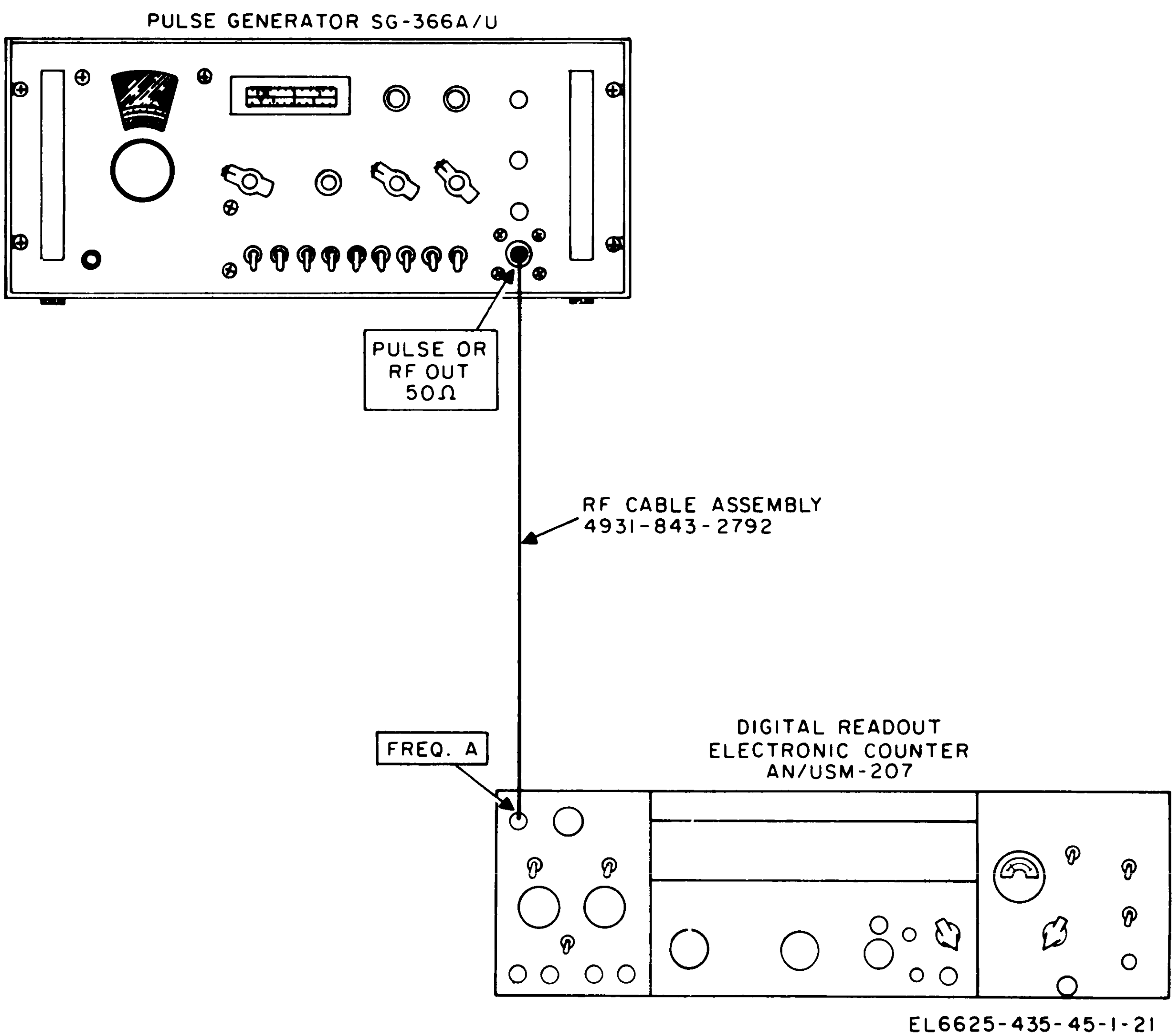


Figure 4-1, Pulse Repetition Rate Test Setup.

4-6. Pulse Width and Pulse Amplitude Tests

a. Test Equipment and Material. Oscilloscope AN/USM-281A.

b. Test Connections and Conditions. Connect the equipment as shown in figure 4-2.

c. Procedure.

Step No.	Control settings: Test equipment	Control settings: Equipment under test	Test procedure	Performance standard
1	*AN/USM-281*	Function selector switch: +VIDEO PULSE	a. Turn on the equipment and let it warm up for 5 minutes.	a. None.
	MAGNIFIER: X1	RF OR PULSE LEVEL: fully clockwise.	b. Adjust the controls of the oscilloscope for a display of 1 pulse per division with an amplitude of 2 cm.	b. None.
	DISPLAY: INT AC-DC switch AC	PULSE RATE: 500.5KC or 500.5 KHz.		
	SWEEP MODE: AUTO	RATE ADJ: fully clockwise.	c. Adjust the pulse width control fully counterclockwise.	c. The pulse width observed on the AN/USM-281 should be less than. 1 μ sec wide.
		ATTENUATOR (dB): no attenuation.	d. Adjust the pulse width control fully clockwise.	d. The pulse width observed on the AN/USM-281 should be more than 1 μ sec wide. The amplitude should be 3 volts ±0.15.

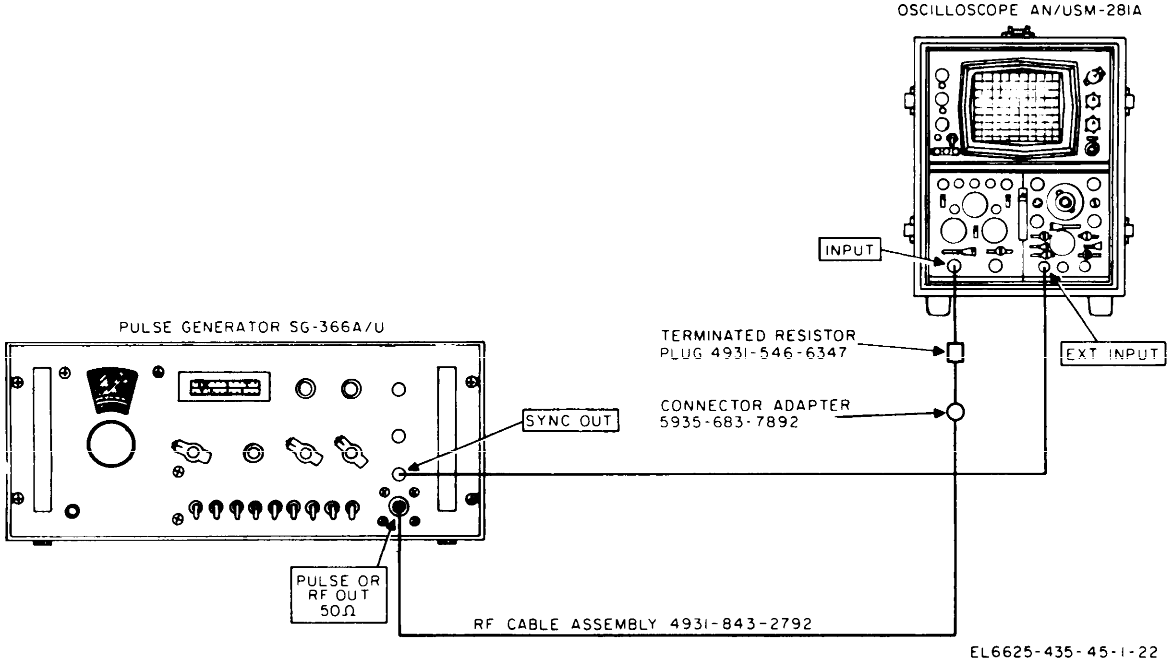


Figure 4-2. Pulse width and pulse amplitude tests, equipment setup.

4-7. Continuous Wave Oscillator Frequency Test

a. Test Equipment and Materials. Digital Readout, Electronic Counter AN/USM-207.

b. Test Connections and Conditions. Connect the equipment as shown in figure 4-3.

c. Procedure

Step No.	Control settings: Test equipment	Control settings: Equipment under test	Test procedure	Performance standard
1	*AN/USM-207* SENSITIVITY: 10V FUNCTION: FREQ SCALER RATIO: 1	Function selector switch: CW RF OR PULSE LEVEL: fully clockwise. PULSE RATE: 500.5KC or 500.5 KHz. RATE ADJ: Fully clockwise. WIDTH ADJ: Fully clockwise. Frequency control (outer portion) 10-16 MC or 10-16 MHz. ATTENUATOR (dB): No attenuation.	*a.* Turn on AN/USM-207 and allow it to warm up. *b.* Rotate frequency control until 12 is indicated on the frequency indicating dial. *c.* Rotate frequency control until 14 is indicated on frequency indicating dial.	*a.* None. *b.* AN/USM-207 indicates 12 MHz ±0.12. *c.* AN/USM-207 indicates 14 MHz ±0.14.
2	Same as step 1......	Same as Step 1 except: Frequency control (outer portion) 16-25 MC or 16-25 MHz.	*a.* Rotate frequency control until 19 is indicated on the frequency indicating dial. Rotate frequency control until 22 is indicated on the frequency indicating dial.	*a.* AN/USM-207 indicates 19 MHz ±0.19. *b.* AN/USM-207 indicates 22 MHz ±0.22.
3	Same as step 1........	Same as step 1 except: Frequency control (outer portion) 25-40 MC or 25-40 MHz.	*a.* Rotate frequency control until 30 is indicated on the frequency indicating dial. Rotate frequency control until 35 is indicated on the frequency indicating dial.	*a.* AN/USM-207 indicates 30 MHz ±0.3. *b.* AN/USM-207 indicates 35 MHz ±0.35.
4	Same as step 1........	Same as step 1 except: Frequency control (outer portion) 40-65 MC or 40-65 MHz.	*a.* Rotate frequency control until 48 is indicated on the frequency indicating dial. *b.* Rotate frequency control until 56 is indicated on the frequency indicating dial.	*a.* AN/USM-207 indicates 48 MHz ±0.48. *b.* AN/USM-207 indicates 56 MHz ±0.56.
5	Same as step 1......	Same as step 1 except: Frequency control (outer portion) 65-120 MC or 65-120 MHz.	*a.* Rotate frequency control until 83 is indicated on the frequency indicating dial. Rotate frequency control until 100 is indicated on the frequency indicating dial.	*a.* AN/USM-207 indicates 83 MHz ±0.83. *b.* AN/USM-207 indicates 100 MHz ±1.0.

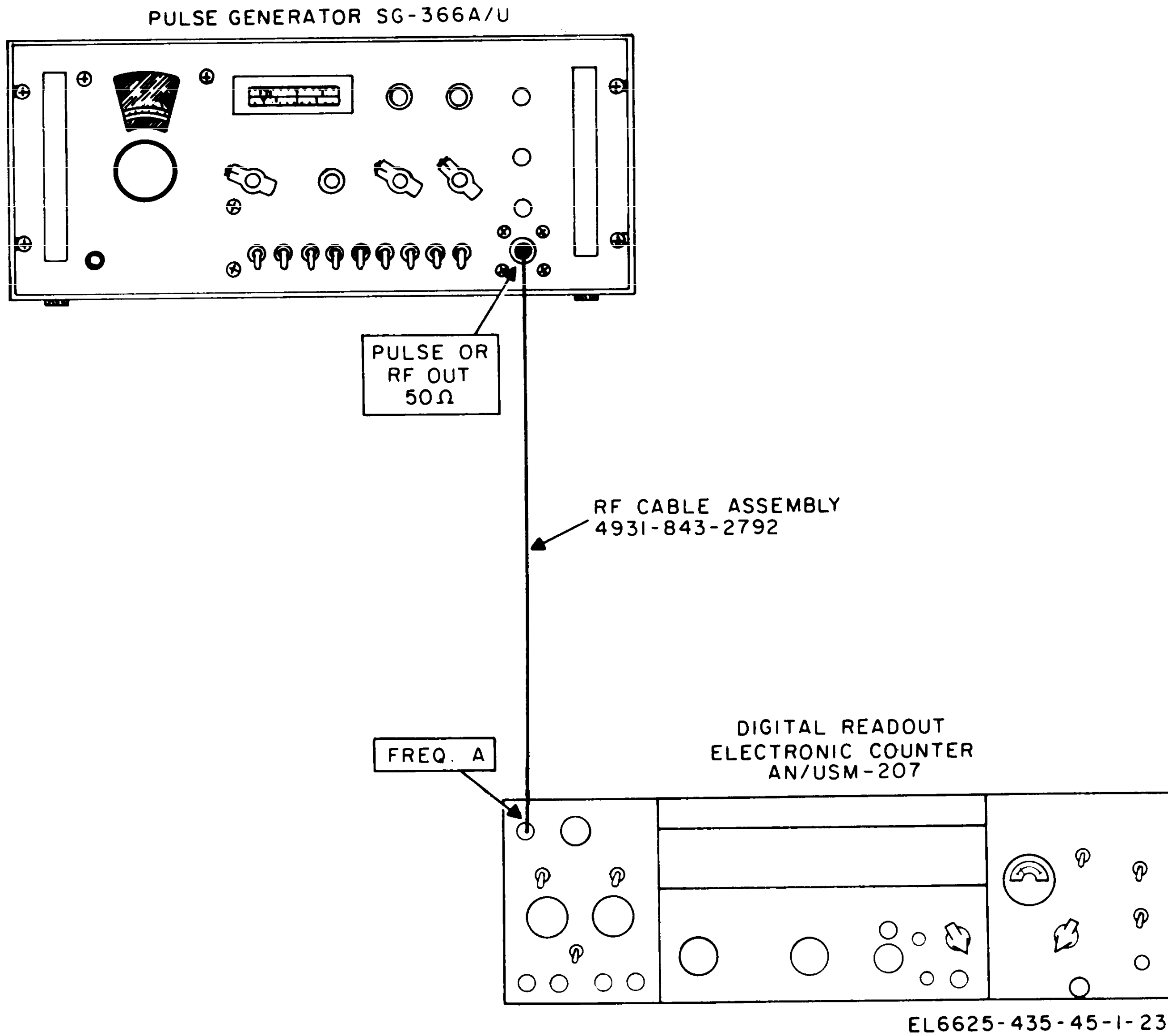


Figure 4-3. Continuous Wave Oscillator Frequency Test, Equipment Setup.

4-8. Continuous Wave Amplitude Test

a. Test Equipmentand Materials. Oscilloscope AN/USM-281.

b. Test Connections and Conditions. Connect the equipment as shown in figure 4-4.

c. Procedure.

Step No.	Control settings: Test equipment	Control settings: Equipment under test	Test procedure	Performance standard
1	*AN/USM-281*	Function selector switch: CW	*a.* Turn on the equipment and let it warm up for 5 minutes.	*a.* None.
	MAGNIFIER: X1 DISPLAY: INT SWEEP MODE: AUTO	RF OR PULSE LEVEL: Fully clockwise. PULSE RATE: 500.5KC or 500.5 KHz.	*b.* Adjust the controls of the oscilloscope for a display of the cw waveform from the SG-366A/U.	*b.* None.
		RATE ADJ: Fully clockwise PULSE WIDTH USEC: 1.10 WIDTH ADJ: Fully clockwise	*c.* Adjust the pulse LEVEL control for a reading of .5 volt rms on the SG-366A/U output meter.	*c.* The amplitude of the display on the AN/USM-281 should indicate 1.4 volts, peak-to-peak.

Step No.	Control settings: Test equipment	Control settings: Equipment under test	Test procedure	Performance standard
		Frequency control: Set for 16 MC or 16 MHz. ATTENUATOR (dB): No attenuation.		

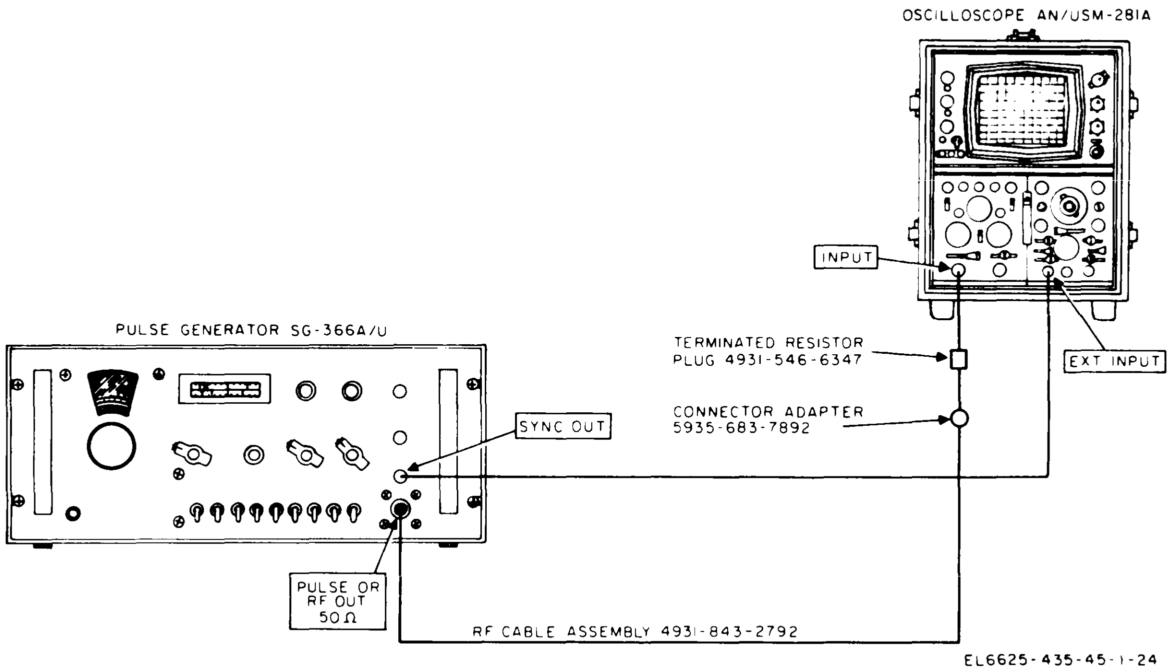


Figure 4-4. Continuous Wave Amplitude Test, Equipment Setup.

4-9. Video Pulse and Pulsed Rf Rise and Decay Tests

a. Test Equipment and Materials. Oscilloscope AN/USM-281A.

b. Test Connections and Materials. Connect the equipment as shown in figure 4-5.

c. Procedure.

Step No.	Control settings: Test equipment	Control settings: Equipment under test	Test procedures	Performance standard
1	*AN/USM-281* MAGNIFIER: X1 DISPLAY: INT SWEEP MODE: NORM	Function: + VIDEO PULSE RF OR PULSE LEVEL: fully clockwise. PULSE RATE: 500.5KC or 500.5 KHz. RATE ADJ: fully clockwise PULSE WIDTH USEC: .1-1 WIDTH ADJ: fully counterclockwise. Frequency control (outer portion): 10-16 MC or 10-16 MHz. Frequency control (inner portion) for 10 MC or 10 MHz. reading on frequency indicating dial. ATTENUATOR (dB): No attenuation.	*a* Turn on the equipment and let it warm up for 5 minutes. *b.* Adjust the AN/USM-281 for a stable trace showing only one or two pulses. Measure the rise and fall time of the pulse.	*a.* None. *b.* The rise time and decay time are both equal or less than 27 ns.
2	Same as step 1	Same as step 1 except: Function selector: –VIDEO PULSE.	Same as step 1 *b*	Same as step 1 *b.*
3	Same as step 1	Same as step 1 except: Function selector: PULSED RF.	Same as step 1 *b*	The risetime and decay time are each 20 ns or less.

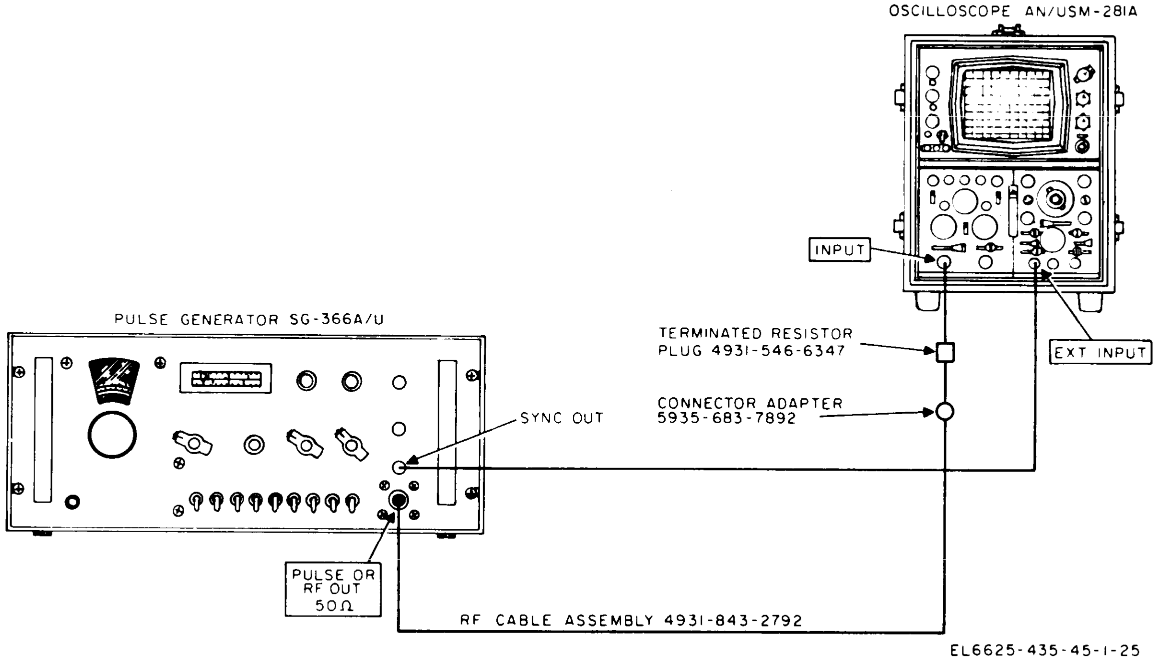


Figure 4-5. Video Pulse and Pulsed Rf Rise and Decay Tests, Equipment Setup.

4-10. External Oscillator Test

a. Test Equipment and Materials.

(1) Oscilloscope AN/USM-281A.

(2) Signal Generator AN/USM-44.

b. Test Connections and Conditions. Connect the equipment as shown in figure 4-6.

c. Procedure.

Step No.	*Control settings* — *Test equipment*	*Control settings* — *Equiment under test*	*Test procedure*	*Performance standard*
1	*AN/USM-281* MAGNIFIER: X1 DISPLAY INT SWEEP MODE AUTO *TS-510/U* FREQUENCY RANGE: A MODE SELECTOR: CW	Function selector switch: CW RF OR PULSE LEVEL: Fully clockwise. PULSE RATE: 500.5KC or 500.5 KHz. RATE ADJ: fully clockwise PULSE WIDTH USEC: 10.100 WIDTH ADJ: fully clockwise. Frequency control: EXT OSC. ATTENUATOR (dB): No attenuation.	*a.* Turn on the equipment and let it warm up for 5 minutes. *b.* Vary the frequency of the TS-510/U and observe the display on the AN/USM-281.	*a.* None. *b.* Observe that the frequency varies as the input frequency varies.

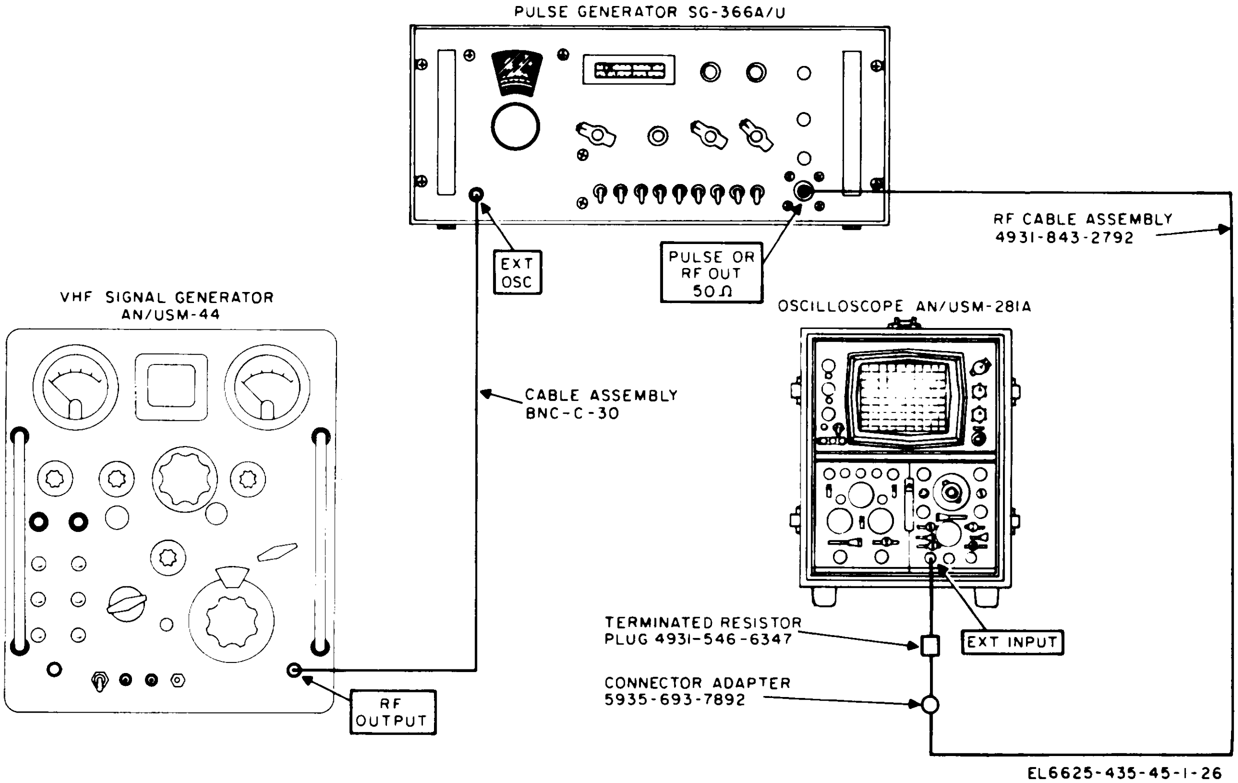


Figure 4-6. External oscillator test, equipment setup.

4-11. External Modulator Test

a. Test Equipment and Materials.

(1) Oscilloscope AN/USM-281A.

(2) Pulse Generator AN/PPM-1A.

b. Test Connections and Conditions. Connect the equipment as shown in figure 4-7.

c. Procedure.

Step No.	*Control settings* *Test equipment*	*Equipment under test*	*Test procedures*	*Performance standard*
1	*AN/USM-281* MAGNIFIER: X1 DISPLAY INT SWEEP MODE: NORM *AN/PPM-1* ATTENUATION (dB): 20 POLARITY: + PULSE LENGTH :2 SYNCH SE-LECTOR: +	Function selector: PULSED RF. RF OR PULSE LEVEL: fully clockwise. PULSE RATE: EXT MOD RATE ADJ: Fully clockwise PULSE WIDTH USEC: 10.100 WIDTH ADJ: fully clockwise. Frequency control (outer portion): 10-16MC or 10-16 MHz Frequency control (inner portion): 10 MC or 10 MHz	*a.* Turn on the equipment and let it warm up for 5 minutes. *b.* Vary pulse rate from 50 to 5,000 pps.	*a.* None. *b.* Pulsed rf signal should vary on oscilloscope 50 to 5,000 pps.

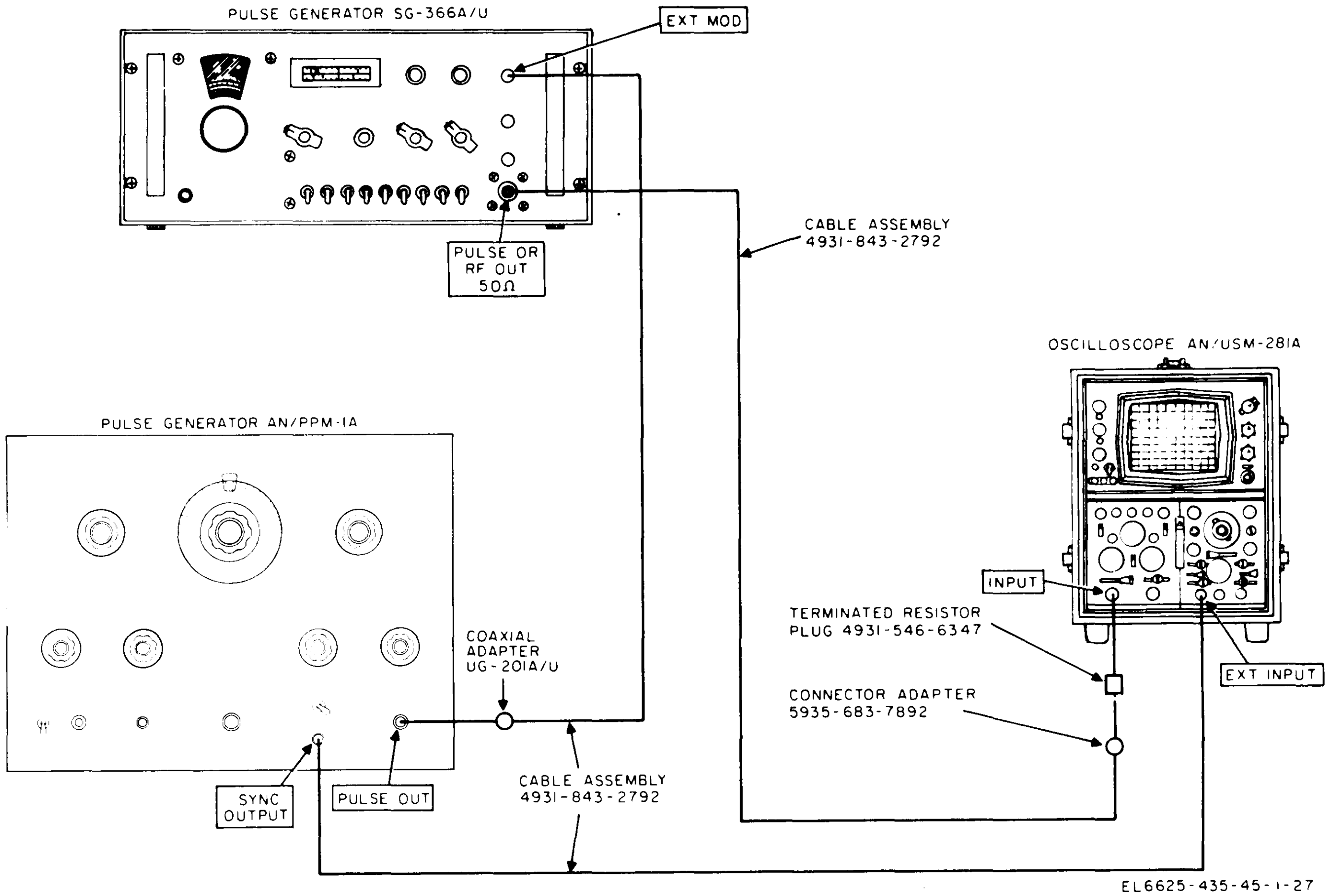


Figure 4-7. External modulutor test, equipment setup.

4-12. External Trigger Test

a. Test Equipment and Matetial.
(1) Oscilloscope AN/USM-281A.
(2) Pulse Generator AN/PPM-1.

b. Test Connections and Conditions. Connect the equipment as shown in figure 4-8.

c. Procedure.

Step No.	*Control settings* — *Test equipment*	*Equipment under test*	*Test procedure*	*Performance standard.*
1	*AN/USM-281* MAGNIFIER: X1 DISPLAY: INT SWEEP MODE: NORM *AN/PPM-1* ATTENUATION (dB): 20 POLARITY:+ PULSE LENGTH: 10	Function selector switch: PULSED RF RF OR PULSE LEVEL: Fully clockwise. PULSE RATE: EXT TRG RATE ADJ: Fully clockwise. PLUSE WIDTH USEC: 10.100 WIDTH ADJ: Fully clockwise. Frequency control (outer portion): 10-16 MC or MHz Frequency control (inner portion) 10 MC or MHz	*a.* Turn on the equipment and let it warm up for 5 minutes. *b.* Adjust the controls of the oscilloscope for a convenient presentation. Vary the pulse rate on the AN/PPM-1 from 50 to 5,000 pps. *c.* Vary the PULSE WIDTH USEC control on the SG-366A/U.	*a.* None. *b.* Observe the pulsed rf signal on the oscilloscope. It should vary from 50 to 5,000 pps. *c.* Observe that oscilloscope presentation varies in pulse width as pulse generator is varied.

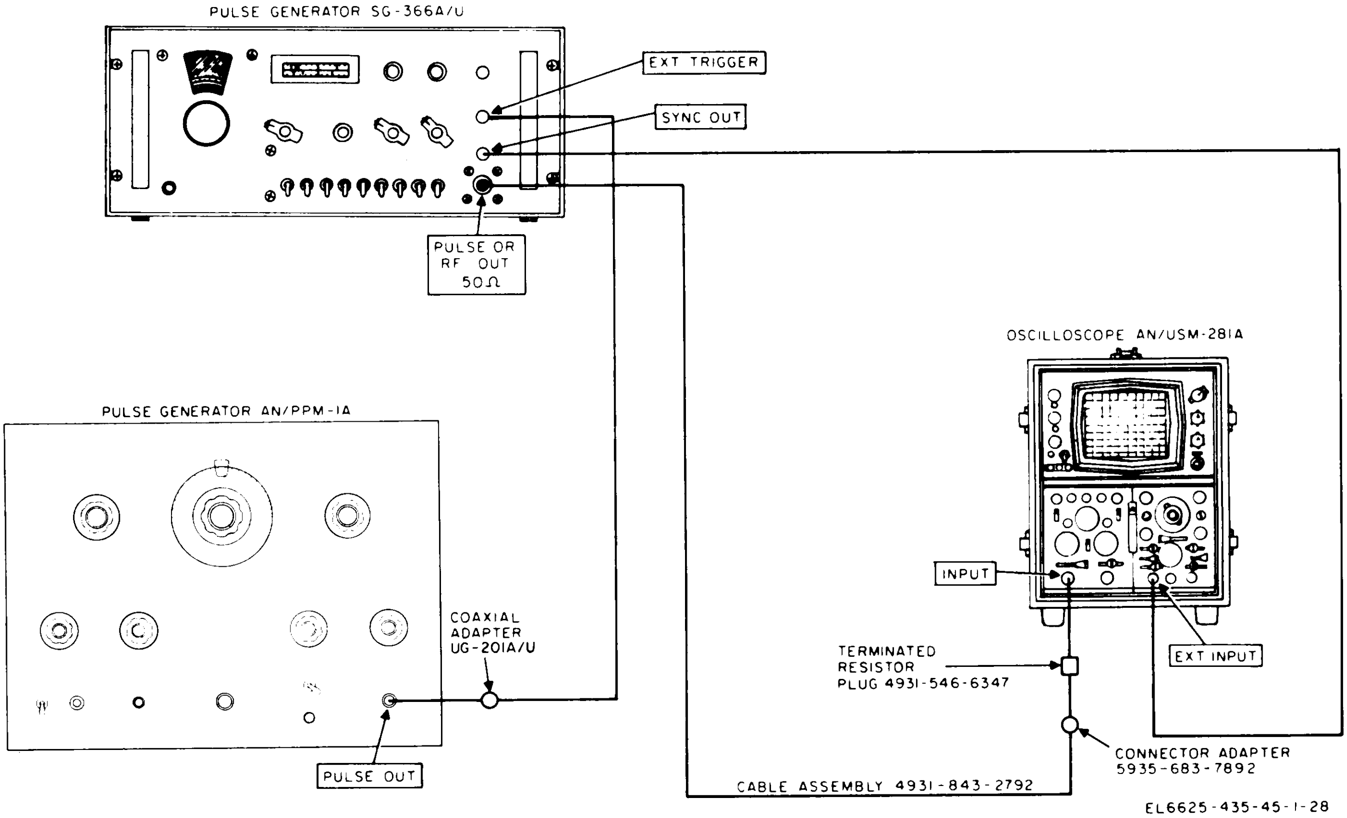


Figure 4-8. External trigger test, equipment setup.

CHAPTER 5

DEPOT OVERHAUL STANDARDS

5–1. Applicability of Depot Overhaul Standards

The tests outlined in this chapter are designed to measure the performance capability of a repaired equipment. Equipment that is to be returned to stock should meet the standards given in these tests.

5-2. Applicable References

a. Repair Standards. Applicable procedures of the depots performing these tests, and the general standards for repaired electronic equipment given in TB SIG 355–1, TB SIG 355–2, and TB SIG 355–3 form a part of the requirements for testing this equipment.

b. Modification Work Orders. Perform all modification work orders applicable to this equipment *before* making the tests specified. DA Pam 310-7 lists all available MWO's.

5-3. Test Facilities Required

The test equipment listed below are required for depot testing.

Item	*Technical manual*	*Common name*
Digital Readout Electronic Counter AN/USM-207.	TM 11-6625-700-10	Electronic counter.
Oscilloscope AN/USM-281A/U.	TM 11-6625-1703-15	Oscilloscope.
Pulse Generator AN/PPM-1.	TM 11-2678 or TM 11-6625-237-15	Pulse generator.
Signal Generator AN/USM-44.	TM 11-6625–508-10	Signal generator.

5-4. Testing of Signal Generator SG–366A/U

Perform the depot inspection tests on Signal Generator SG–366A/U by performing the tests given in paragraphs 4-4 through 4-11.

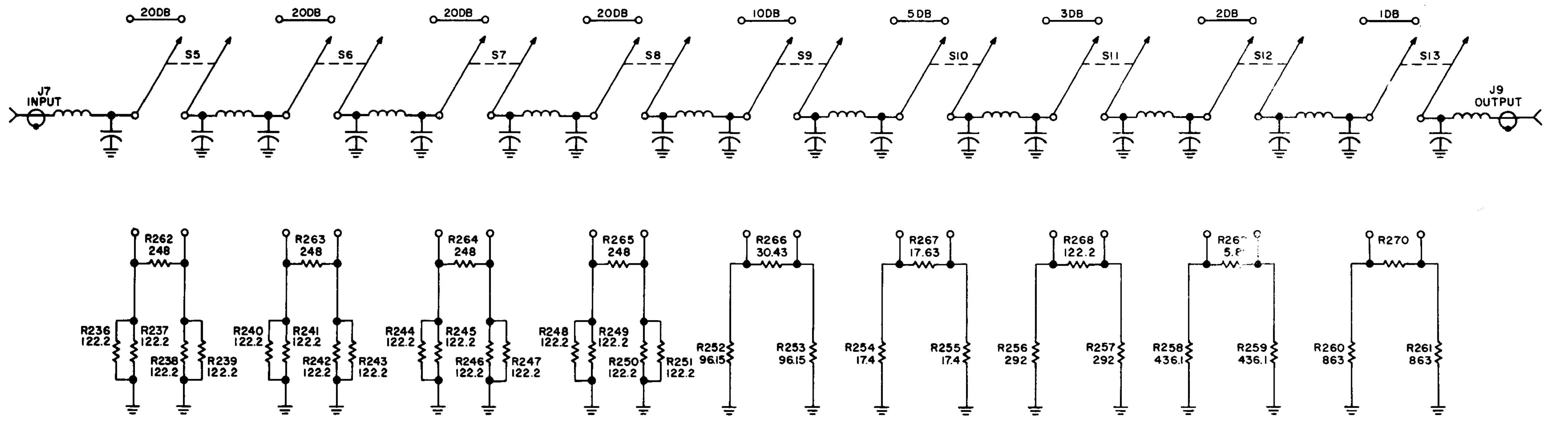
Figure 5-1. MIL-STD resistor and capacitor color codes.
(Located in back of manual)

Figure 5-2. Signal Generator SG-66A/U, schecmatic diagram.
(Located in back of manual)

APPENDIX A

REFERENCES

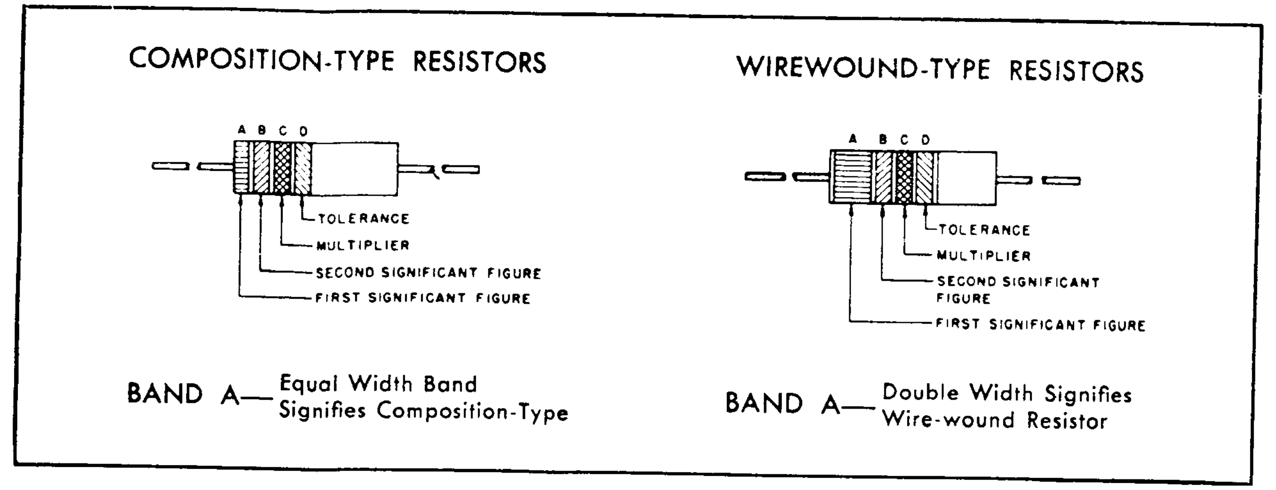
DA Pam 310-1	Consolidated Index of Army Publications and Blank Forms.
TM 11-6625-366-15	Operator's, Organizational, DS, GS, and Depot Maintenance Manual: Multimeter TS-352B/U. (NSN 6625-00-553-0142).
TM 11-6625-435-12-1	Operator and Organizational Maintenance Manual: Generator, Pulse SG-366A/U.
TM 11-6625-508-10	Operator's Manual: Signal Generators AN/USM-44 and AN/USM-44A
TM 11-6625-700-10	Operator's Manual: Digital Readout, Electronic Counter AN/USM-207. (NSN 6625-00-911-6368).
TM 11-6625-1703-15	Operator, Organizational, DS, GS, and Depot Maintenance Manual: Oscilloscope AN/USM-281A. (NSN 6625-00-228-2201).
TM 11-6625-435-12	Operator and Organizational Maintenance Manual: Generator, Pulse SG-366/U.
TM 11-6625-435-24P-1	Organizational, Direct Support and General Support Maintenance Repair Parts and Special Tools Lists (Including Depot Maintenance Repair Parts and Special Tools) Generator, Pulse SG-366/U (NSN 6625-00-168-0471).
TM 11-6625-435-45	GS, and Depot Maintenance Manual Generator, Pulse SG-366/U.
TM 11-6625-435-40P	General Support Maintenance Repair Parts and Special Tools Lists (Including Depot Maintenance Repair Parts and Special Tools) Generator, Pulse SG-366/U. FSN 6625-682-9496.



EL6625-435-45-1-5

Figure 1-5. Rf attenuator network, schematic diagram.

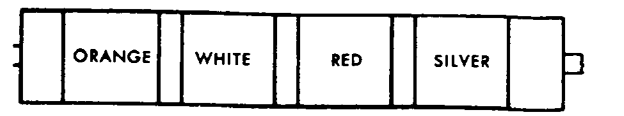
COLOR CODE MARKING FOR MILITARY STANDARD RESISTORS

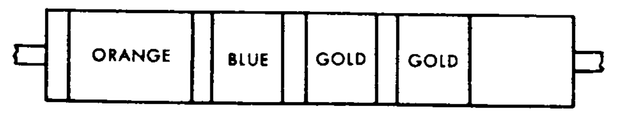


COLOR CODE TABLE

BAND A		BAND B		BAND C		BAND D*	
COLOR	FIRST SIGNIFICANT FIGURE	COLOR	SECOND SIGNIFICANT FIGURE	COLOR	MULTIPLIER	COLOR	RESISTANCE TOLERANCE (PERCENT)
BLACK	0	BLACK	0	BLACK	1		
BROWN	1	BROWN	1	BROWN	10		
RED	2	RED	2	RED	100		
ORANGE	3	ORANGE	3	ORANGE	1,000		
YELLOW	4	YELLOW	4	YELLOW	10,000	SILVER	± 10
GREEN	5	GREEN	5	GREEN	100,000	GOLD	± 5
BLUE	6	BLUE	6	BLUE	1,000,000		
PURPLE (VIOLET)	7	PURPLE (VIOLET)	7				
GRAY	8	GRAY	8	SILVER	0.01		
WHITE	9	WHITE	9	GOLD	0.1		

EXAMPLES OF COLOR CODING



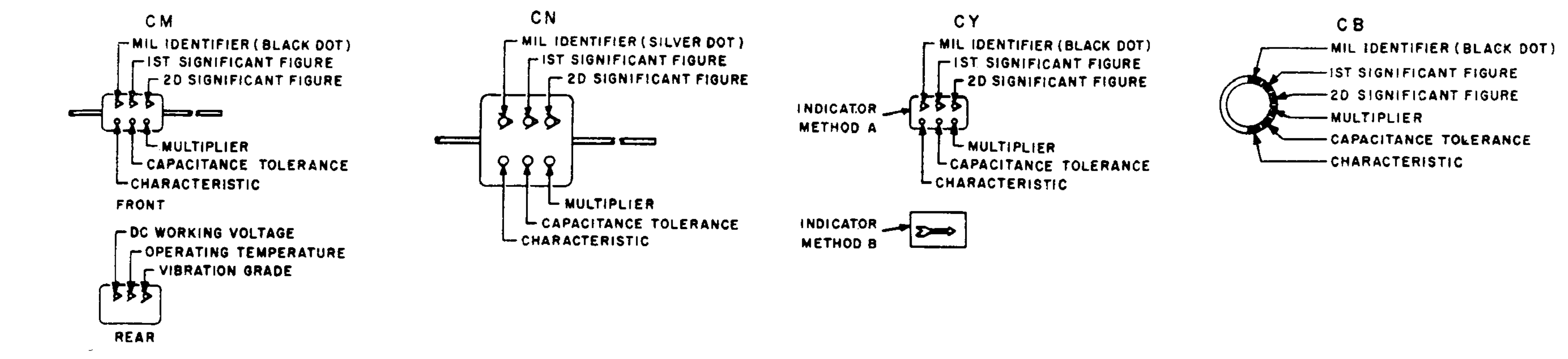


NOMINAL RESISTANCE	3,900 Ohms	3.6 Ohms
RESISTANCE TOLERANCE	± 10 percent	± 5 percent

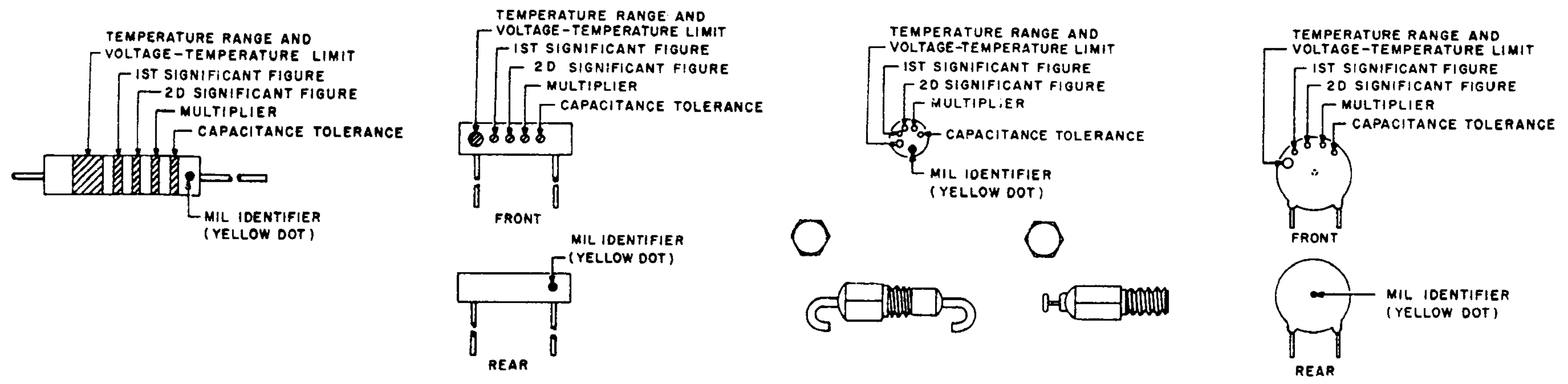
*If Band D is omitted, the resistor tolerance is ±20%, and the resistor is not Mil-Std.

COLOR CODE MARKING FOR MILITARY STANDARD CAPACITORS

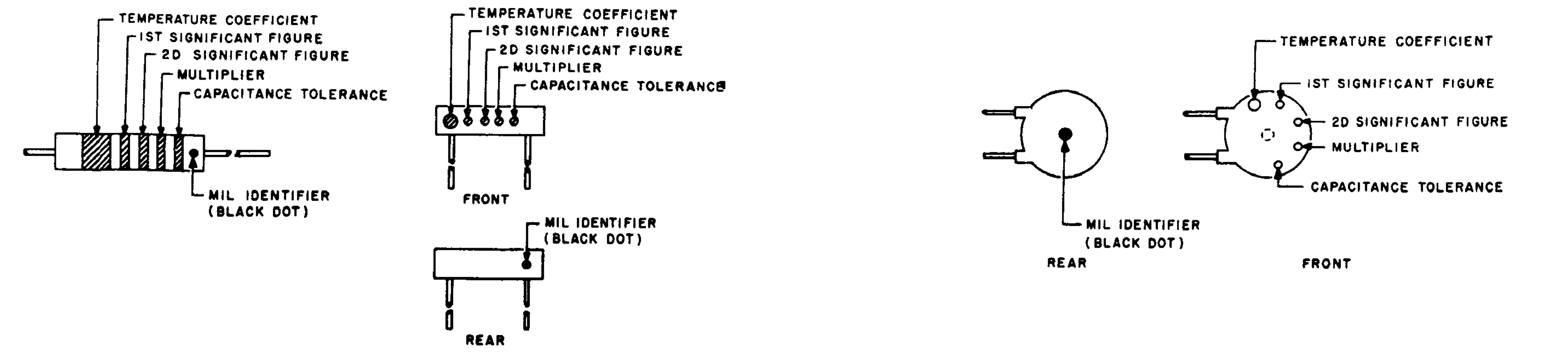
GROUP I Capacitors, Fixed, Various-Dielectrics, Styles CM, CN, CY, and CB



GROUP II Capacitors, Fixed Ceramic-Dielectric (General Purpose) Style CK



GROUP III Capacitors, Fixed, Ceramic-Dieletric (Temperature Compensating) Style CC



COLOR CODE TABLES

TABLE I – For use with Group I, Styles CM, CN, CY and CB

COLOR	MIL ID	1st SIG FIG	2nd SIG FIG	MULTIPLIER[1]	CAPACITANCE TOLERANCE				CHARACTERISTIC[2]				DC WORKING VOLTAGE	OPERATING TEMP. RANGE	VIBRATION GRADE
					CM	CN	CY	CB	CM	CN	CY	CB	CM	CM	CM
BLACK	CM, CY CB	0	0	1			± 20%	± 20%		A				−55° to +70°C	10–55 cps
BROWN		1	1	10					B	E		B			
RED		2	2	100	± 2%		± 2%	± 2%	C		C			−55° to +85°C	
ORANGE		3	3	1,000		± 30%			D			D	300		
YELLOW		4	4	10,000					E					−55° to +125°C	10–2,000 cps
GREEN		5	5		± 5%				F				500		
BLUE		6	6											−55° to +150°C	
PURPLE (VIOLET)		7	7												
GREY		8	8												
WHITE		9	9												
GOLD				0.1			± 5%	± 5%							
SILVER	CN				± 10%	± 10%	± 10%	± 10%							

TABLE II – For use with Group II, General Purpose, Style CK

COLOR	TEMP. RANGE AND VOLTAGE – TEMP. LIMITS[3]	1st SIG FIG	2nd SIG FIG	MULTIPLIER[1]	CAPACITANCE TOLERANCE	MIL ID
BLACK		0	0	1	± 20%	
BROWN	AW	1	1	10	± 10%	
RED	AX	2	2	100		
ORANGE	BX	3	3	1,000		
YELLOW	AV	4	4	10,000		CK
GREEN	CZ	5	5			
BLUE	BV	6	6			
PURPLE (VIOLET)		7	7			
GREY		8	8			
WHITE		9	9			
GOLD						
SILVER						

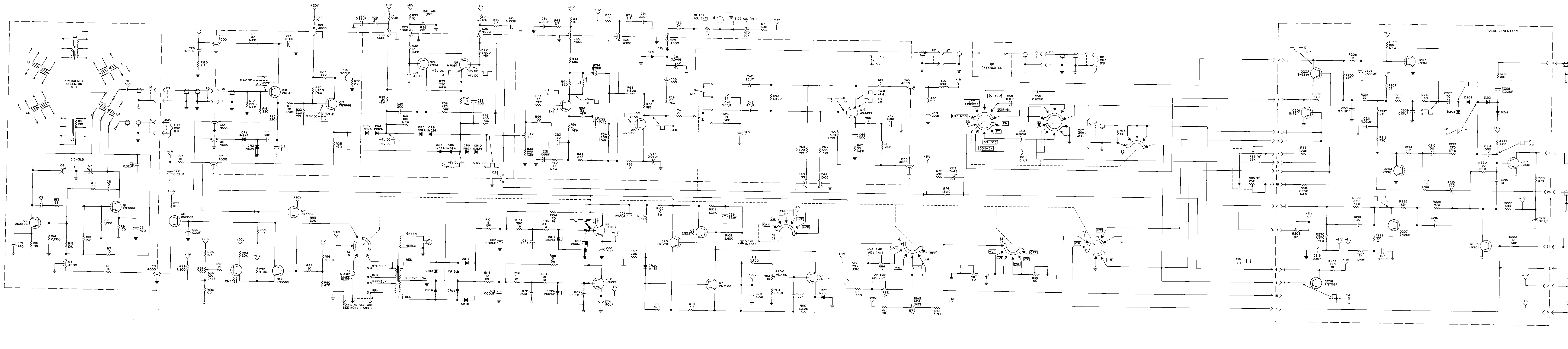
TABLE III – For use with Group III, Temperature Compensating, Style CC

COLOR	TEMPERATURE COEFFICIENT[4]	1st SIG FIG	2nd SIG FIG	MULTIPLIER[1]	CAPACITANCE TOLERANCE		MIL ID
					Capacitances over 10uuf	Capacitances 10uuf or less	
BLACK	0	0	0	1		± 2.0uuf	CC
BROWN	−30	1	1	10	± 1%		
RED	−80	2	2	100	± 2%	± 0.25uuf	
ORANGE	−150	3	3	1,000			
YELLOW	−220	4	4				
GREEN	−330	5	5		± 5%	± 0.5uuf	
BLUE	−470	6	6				
PURPLE (VIOLET)	−750	7	7				
GREY		8	8	0.01			
WHITE		9	9	0.1	± 10%		
GOLD	+100					± 1.0uuf	
SILVER							

1. The multiplier is the number by which the two significant (SIG) figures are multiplied to obtain the capacitance in uuf.
2. Letters indicate the Characteristics designated in applicable specifications: MIL–C–5, MIL–C–91, MIL–C–11272, and MIL–C–10950 respectively.
3. Letters indicate the temperature range and voltage-temperature limits designated in MIL–C–11015.
4. Temperature coefficient in parts per million per degree centigrade.

STD–C2

Figure 5–1. MIL-STD resistor and capacitor color codes.



PUB. NO. TM11-6625-435-45-1 C1
FIG. NO. 5-2

Figure 5-2. Pulse Generator SG-366/U, Version A, Schematic Diagram.

PUB. NO. TM 11-6625-435-45-1 C1
FIG. NO. 5-3

Figure 5-3. Pulse Generator SG-366A/U, Version B, Schematic Diagram.

By Order of the Secretary of the Army:

W. C. WESTMORELAND,
General, United States Army,
Chief of Staff.

Official:
VERNE L. BOWERS,
Major General, United States Army,
The Adjutant General.

Distribution:

Active Army:

USASA (2)
CNGB (1)
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Dir of Trans (1)
CofEngrs (1)
CofSpts (1)
ACSC-E (2)
USAARENBD (2)
USAMB (10)
USAMC (1)
USAMICOM (2)
USATECOM (2)
USAMUCOM (2)
USAECOM (2)
USAESC (50)
USACDC (2)
USACDCCEA (1)
USACDCCEA (Ft Huachuca) (1)
USACDCEC (10)
USASTRATCOM (2)
ARADCOM (2)
ARADCOM Rgn (1)
OS Maj Cored (2)
CONARC (2)
Armies (1)
1st Cav Div (2)
Ft Huachuca (5)
Ft Carson (7)
WSMR (2)
USASCS (10)
USASESS (10)
Svc Colleges (1)
Army Dep (1) except
  LBAD (14)
  SAAD (30)
  TOAD (14)
  LEAD (7)
  ATAD (10)
  NAAD (3)
  SVAD (3)
Gen Dep (1)
Sig See, Gen Dep (5)
Sig Dep (10)
USAERDAA (2)
USAERDAW (2)
USACEREL (1)
Sig FLDMS (1)
Harry Diamond Labs (2)
Units org under fol TOE (1 ea.)
  11-97
  11-98
  11-117
  11-158
  29-41
  29-56
  29-134
  29-136
  29–437
  29–500

ARNG: None.
USAR: None.
For explanation of abbreviations used, see AR 310-50.

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