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T.O. 31R2-2GRC32-2
(Formerly 16-30GRC32-2)

**HANDBOOK
SERVICE INSTRUCTIONS**

RADIO SETS
AN/GRC-32, AN/GRC-32A AND AN/GRC-32B

(FEDERAL MANUFACTURING AND ENGINEERING)

REVISION
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AF Olmsted AFB, Pa., 3 Jul 56 2500

15 FEBRUARY 1954

REVISED 1 JUNE 1956

T.O. 31R2-2GRC32-2

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Page No.	Date of Latest Revision
i	1 June 1956
54	1 June 1956
54A	1 June 1956
54B	1 June 1956

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Section I

AN 16-30GRC32-2

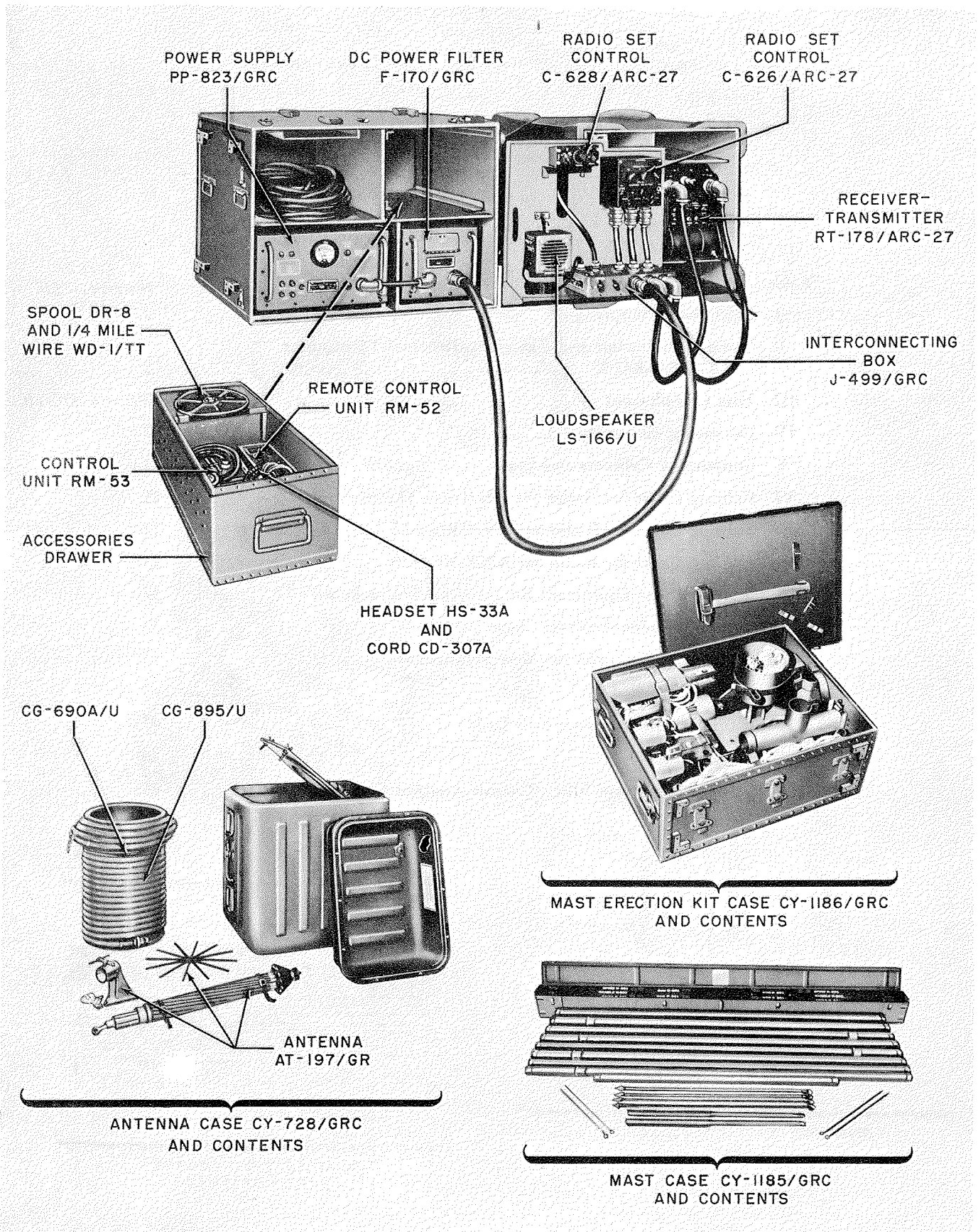


Figure 1-1. Radio Set AN/GRC-32

AN 16-30GRC32-2

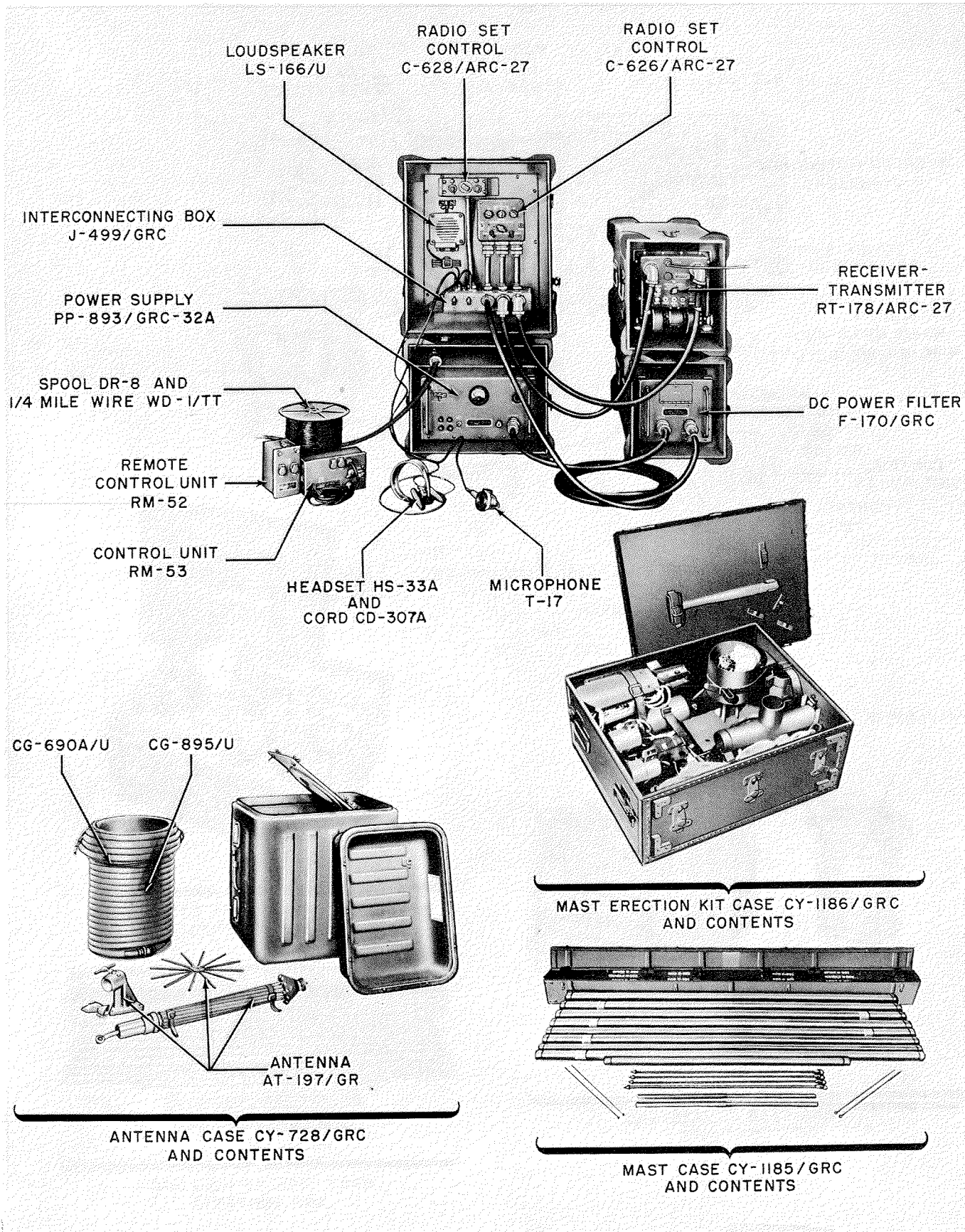


Figure 1-2. Radio Set AN/GRC-32A

AN 16-30GRC32-2

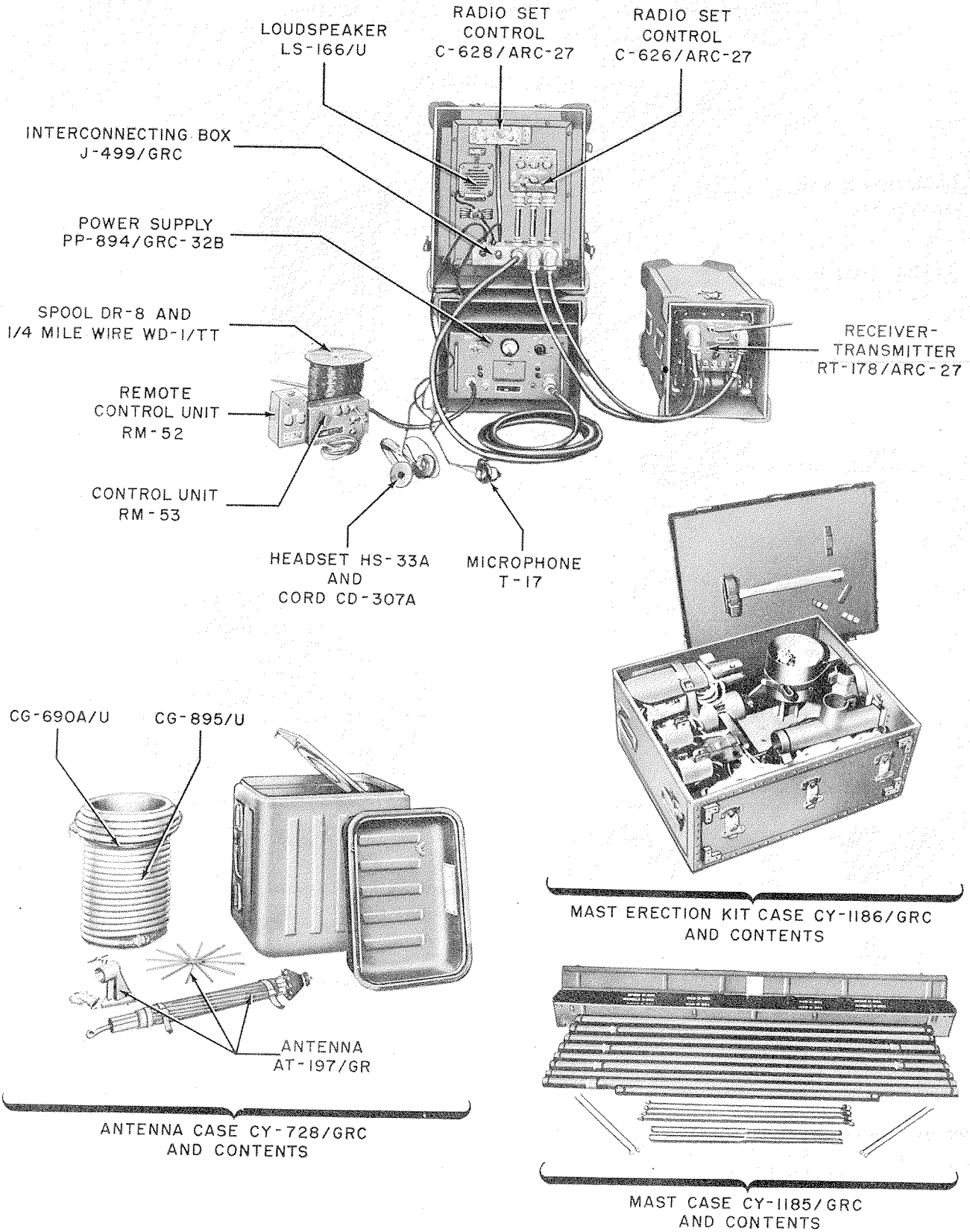


Figure 1-3. Radio Set AN/GRC-32B

SECTION I

DESCRIPTION AND LEADING PARTICULARS

1-1. PURPOSE OF HANDBOOK.

1-2. This handbook contains service instructions for Radio Sets AN/GRC-32, AN/GRC-32A and AN/GRC-32B, manufactured by the Federal Manufacturing and Engineering Corporation, Brooklyn, New York.

1-3. PURPOSE OF EQUIPMENT.

1-4. Radio Sets AN/GRC-32, AN/GRC-32A and AN/GRC-32B (figures 1-1, 1-2 and 1-3) are three portable versions of Radio Set AN/ARC-27 adapted for ground station operation. Each provides radiotelephone (A-3) communication from a fixed location. There are 1750 channels provided in the frequency range of 225 to 399.9 megacycles. The transmitter may be tone-modulated (A-2) at 1020 cycles per second for direction-finder use. Provision has been made for the selection of any one of 18 preset frequencies or for operation on a guard-channel frequency. A single broadband uhf antenna is used for transmission and reception.

1-5. CAPABILITIES AND LIMITATIONS.

1-6. Radio Sets AN/GRC-32, AN/GRC-32A and AN/GRC-32B provide a minimum r-f power output of 10 watts in the frequency range of 225 to 399.9 megacycles. This output can be modulated up to 95 percent. The receiver will deliver a minimum of 50 milliwatts of audio into a 300-ohm resistive load, with an r-f signal at the antenna terminals of 5 microvolts, 30 percent modulated at 1000 cycles per second. The maximum audio output is 2 watts. This output is available at either the main or guard-channel receivers.

1-7. COMPARISON AMONG SETS.

1-8. Radio Set AN/GRC-32A differs from Radio Set AN/GRC-32 both in the power supply and the number of cabinets housing the electrical components. Radio Set AN/GRC-32A (excluding the mast, antenna and mast-erection kit) is housed in four cabinets, the receiver-transmitter, control units, filter and power supply each having a separate cabinet. Radio Set AN/GRC-32 houses these units in two cabinets, the receiver-transmitter and control units in one cabinet and the power supply and filter in the second. Power supply PP-823/GRC is used in Radio Set AN/GRC-32, while Power Supply PP-893/GRC-32A is used in Radio Set AN/GRC-32A.

1-9. Radio Set AN/GRC-32B differs from Radio Set AN/GRC-32A in that the separate filter is eliminated. A filter is incorporated as an integral part of

Power Supply PP-894/GRC-32B. Because there is no separate filter, there are three cabinets instead of four as in Radio Set AN/GRC-32A. The same cabinet supplied for the power supply AN/GRC-32A is used for the power supply of AN/GRC-32B.

1-10. Mechanical components (mast, antenna, cables and mast erection kit) are identical for all sets of the series and are housed in three cases as shown in figures 1-1, 1-2, and 1-3.

1-11. DESCRIPTION AND PRINCIPLES OF OPERATION.

1-12. Radio Sets AN/GRC-32, AN/GRC-32A and AN/GRC-32B are three versions of Radio Set AN/ARC-27 adapted for ground station operation. There are no modifications of Radio Set AN/ARC-27 itself. Instead, power supplies furnish d-c power, replacing the usual aircraft batteries. Radio Sets AN/GRC-32 and AN/GRC-32A use a power supply consisting of a dry-disc, full-wave rectifier with a separate pi-section filter. Radio Set AN/GRC-32B uses a dry-disc, full-wave rectifier incorporating an L-section filter. Power supplies operate from a 115- or 230-volt (± 10 percent), 50- to 60-cps, single-phase, a-c source capable of supplying 1250 watts to the system.

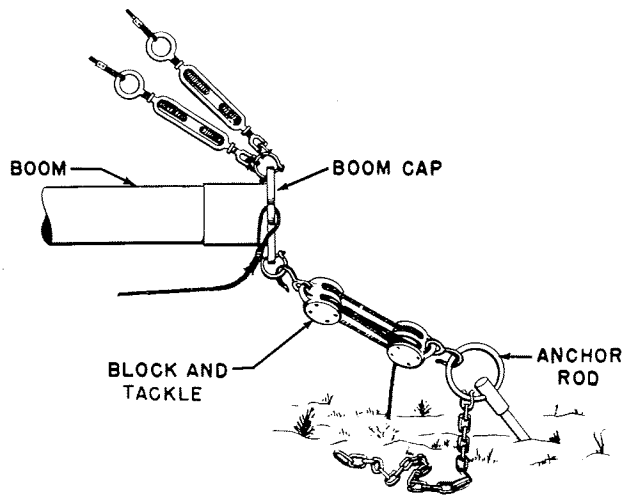
1-13. Interconnecting Box J-499/GRC (used in all sets of the series) connects Radio Set Controls C-626/ARC-27 and C-628/ARC-27, Loudspeaker LS-166/U, and the 27.5-volt d-c supply with Receiver-Transmitter RT-178/ARC-27. There are jacks for the microphone and headset on the interconnecting box, as well as controls to dim the panel lights on Radio Set Control C-628/ARC-27 and to adjust the volume from Loudspeaker LS-166/U.

1-14. Remote Control Equipment RC-261, consisting of Control Unit RM-53 and Remote Control Unit RM-52, is furnished as part of the radio set. Remotely located installations up to one-quarter mile from the receiver-transmitter are possible. Control Unit RM-53 connects to the microphone and phone jacks on top of Interconnecting Box J-499/GRC. Remote Control Unit RM-52 is connected to Control Unit RM-53 with Wire WD-1/TT supplied as part of the equipment.

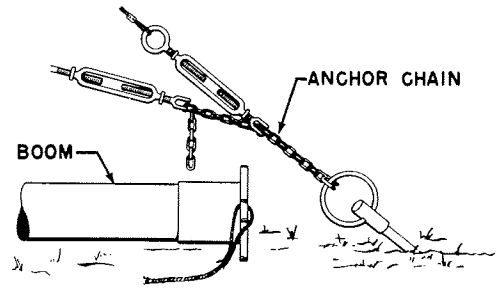
1-15. Receiver-Transmitter RT-178/ARC-27 can be operated from either Radio Set Control C-626/ARC-27 or Radio Set Control C-628/ARC-27.

Section I

AN 16-30GRC32-2



BOOM ANCHOR POSITION FOR A TEMPORARY INSTALLATION



BOOM ANCHOR POSITION FOR A PERMANENT INSTALLATION

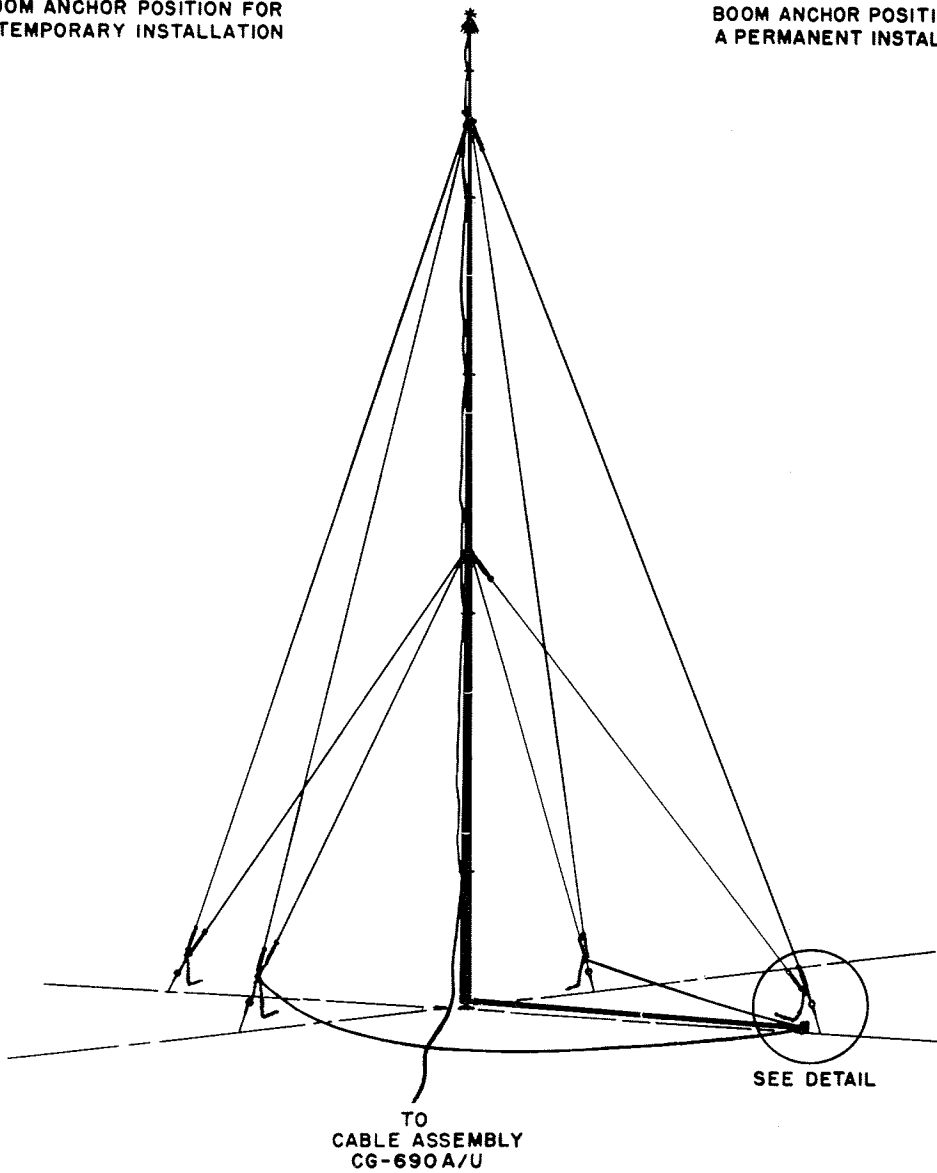


Figure 1-4. Erected Structure of Mast AB-282/GRC and Antenna AT-197/GR

unit or from Radio Set Control C-628/ARC-27. For further information, refer to AN 16-30ARC27-3, the Handbook of Maintenance Instructions for Radio Set AN/ARC-27.

1-17. Mast AB-282/GRC includes Cases CY-1185/GRC, CY-1186/GRC and their contents. The mast assembly (figure 1-4) is a prefabricated structure composed of six tapering, hollow plywood sections fitting one into the next. Two boom sections are similarly fabricated and attached at the base of the mast. The separate crossarm, the support for the antenna, is added to the top and braced either horizontally or vertically. The erected mast, 55 feet high, is held erect by a system of guy wires, baseplates and anchor rods. The mast sections are delivered in Mast Case CY-1185/GRC. Mast Erection Kit Case CY-1186/GRC contains block and tackle, wrenches, and a maul (hammer) for erection, along with many other mast parts, such as guy-wire assemblies, mast base, etc. (Refer to table I.)

1-18. Antenna AT-197/GR is delivered with r-f cables in Antenna Case CY-728/GRC; see table I. All parts are supplied for quick assembly. The antenna is a broadband, uhf, disc-cone type used in the frequency range of 225 to 400 megacycles. The antenna is attached to the crossarm bracket (see figure 1-4) prior to the erection of the mast.

1-19. SUMMARY OF TECHNICAL DATA.

1-20. FREQUENCY.

- a. Range: 225 to 399.9 megacycles
- b. Available channels: 1750
- c. Preset channels: 18
- d. Stability: ± 0.0015 percent

1-21. OUTPUT.

- a. Receiver: 2 watts audio into 300 ohms
- b. Transmitter: 10 watts r-f into 50 ohms

1-22. MODULATION.

- a. Maximum: 95 percent (voice or tone)
- b. Microphone: low-impedance carbon

1-23. SENSITIVITY. The receiver will deliver 50 milliwatts of audio into a 300-ohm load with a 5-microvolt signal, 30 percent modulated at 1000 cycles, at the antenna terminals.

1-24. POWER SUPPLY EQUIPMENT.

1-25. Radio Set AN/GRC-32 uses Power Supply PP-823/GRC in conjunction with DC Power Filter F-170/GRC. With an input of 115 or 230 volts (± 10 percent), single-phase, 50- to 60-cycle ac, it has an output of 27.5 volts dc at 27 amperes with less than 1 percent ripple content.

1-26. Radio Set AN/GRC-32A uses Power Supply PP-893/GRC-32A in conjunction with DC Power Filter F-170/GRC. The electrical characteristics are the same as described in paragraph 1-25.

1-27. Radio Set AN/GRC-32B uses Power Supply PP-894/GRC-32B which has an integral filter. With an input of 115 or 230 volts (± 10 percent), single-phase, 50- to 60-cycle ac, it has an output of 27.5 volts dc at 20 amperes with less than 1 percent ripple content.

1-28. POWER REQUIRED. Radio Sets AN/GRC-32, AN/GRC-32A and AN/GRC-32B require 1250 watts at either 105-125 or 210-250 volts, single-phase, 50 to 60 cps. Receiver-Transmitter RT-178/ARC-27 requires 27.5 volts dc at 16.5 amperes during reception, 27.5 volts dc at 19.1 amperes during transmission, and 27.5 volts dc at 25.5 amperes during channel switching.

Note

For additional details on sensitivity, selectivity, rotating power generators, etc, in Radio Set AN/ARC-27, refer to AN 16-30ARC27-3, the handbook of maintenance instructions for that equipment.

TABLE II. TUBE COMPLEMENT AND FUNCTIONS, RECEIVER-TRANSMITTER RT-178/ARC-27

SYMBOL DESIGNATION	TYPE	DESCRIPTION	FUNCTION
Main Receiver			
V-101	6J4	Triode	R-F Amplifier
V-102	6J4	Triode	R-F Amplifier
V-103	6AG5	Pentode	R-F Mixer
20-30 Mc I-F Amplifier			
V-201	6AG5	Pentode	1st I-F Amplifier
V-202	6AG5	Pentode	2nd I-F Amplifier
V-203	6AG5	Pentode	3rd I-F Amplifier
V-204	6AG5	Pentode	4th I-F Amplifier
V-205	6AG5	Pentode	20-30 Mc Mixer
V-206	6AG5	Pentode	20-30 Mc Mixer
V-207	12AT7	Pentode	"B" Oscillator

TABLE II. TUBE COMPLEMENT AND FUNCTIONS, RECEIVER-TRANSMITTER RT-178/ARC-27 (Cont)

SYMBOL DESIGNATION	TYPE	DESCRIPTION	FUNCTION
I-F and Audio Amplifiers			
V-301	6BA6	Pentode	8-9 Mc I-F Amplifier
V-302	6BA6	Pentode	8-9 Mc I-F Amplifier
V-303	6BA6	Pentode	8-9 Mc I-F Amplifier
V-304	6BA6	Pentode	8-9 Mc I-F Amplifier
V-305	12AT7	Dual Triode	Mixer-Oscillator
V-306	12AT7	Dual Triode	Mixer-Oscillator
V-307	6BA6	Pentode	3.45 Mc I-F Amplifier
V-308	6BA6	Pentode	3.45 Mc I-F Amplifier
V-309	6BA6	Pentode	3.45 Mc I-F Amplifier
V-310	6AL5W	Dual Diode	Noise Limiter
V-311	6AL5W	Dual Diode	2nd Detector and AVC Gate
V-312	12AT7	Dual Diode	AVC Rectifier-Amplifier
V-313	12AT7	Dual Triode	Squelch-Audio Amplifier
V-314	12AT7	Dual Triode	Audio Amplifier
V-315	6AQ5	Power Pentode	Output Amplifier
V-316	12AT7	Dual Triode	Cathode Follower
Spectrum Oscillator			
V-401	6AG5	Pentode	Crystal Oscillator
V-402	6AG5	Pentode	Isolation Amplifier
V-403	6AG5	Pentode	Harmonic Generator
Spectrum Amplifier			
V-501	6AG5	Pentode	Harmonic Generator
V-502	6AG5	Pentode	90 Mc Amplifier
V-503	6AS6	Pentode	Spectrum Mixer
V-504	6J4	Triode	Spectrum Amplifier
V-505	6J4	Triode	Spectrum Amplifier
V-506	6J4	Triode	Transmitter Mixer
V-507	6J4	Triode	Transmitter Preamp
V-508	6J4	Triode	Transmitter Preamp
Power Amplifier			
V-601	2C43	Power Triode	Driver-Amplifier
V-602	2C39A	Power Triode	Driver-Amplifier
V-603	2C39A	Power Triode	Output Power Amplifier
Modulator			
V-701	12AT7	Dual Triode	Relaying Amplifier
V-702	12AT7	Dual Triode	Modulator Driver
V-703	829B	Dual Power Tetrode	Modulator
Guard Receiver			
V-801	6AK5W	Pentode	R-F Amplifier
V-802	12AT7	Dual Triode	H-F Mixer and Multiplier
V-803	6AG5	Pentode	I-F Amplifier
V-804	12AT7	Dual Triode	I-F Mixer-Oscillator

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TABLE II. TUBE COMPLEMENT AND FUNCTIONS, RECEIVER-TRANSMITTER RT-178/ARC-27 (Cont)

SYMBOL DESIGNATION	TYPE	DESCRIPTION	FUNCTION
Guard Receiver (Cont)			
V-805	6BA6	Pentode	I-F Amplifier
V-806	6BA6	Pentode	I-F Amplifier
V-807	12AT7	Dual Triode	H-F Oscillator
V-808	6AL5W	Dual Diode	Noise Limiter
V-809	6AL5W	Dual Diode	2nd Detector, AVC Gate
V-810	12AT7	Dual Triode	AVC Rectifier and Amplifier
V-811	12AT7	Dual Triode	Squelch-Audio Amplifier
Relay Unit			
V-901	12AT7	Dual Triode	Tone Oscillator-Bias Rectifier

TABLE III. FUSE COMPLEMENT

COMPONENT	FUNCTION	RATING	TYPE	QUANTITY AND SYMBOL
Power Supply PP-823/GRC ¹	Input Line Fuse	15 amp, 250 V ac	Bussman 3AG-1 Navy Type 28032-1	2 active (F-101, F-102) 2 spare
Power Supply PP-893/GRC-32A ²	Input Line Fuse	15 amp, 250 V ac	Bussman 3AG-1 Navy Type 28032-1	2 active (F-101, F-102) 2 spare
Power Supply PP-894/GRC-32B ³	Input Line Fuse	15 amp, 250 V ac	Bussman 3AG-1 Navy Type 28032-1	2 active (F-101, F-102) 2 spare
	Output Fuse	30 amp, 120 V dc	Bussman ACO-30	2 active (F-103, F-104) 2 spare
DC Power Filter F-170/GRC ^{1,2}	Output Fuse	40 amp, 120 V dc	Bussman ACO-40	2 active (F-601, F-602) 2 spare

¹ Used in Radio Set AN/GRC-32.² Used in Radio Set AN/GRC-32A.³ Used in Radio Set AN/GRC-32B.**Note**

For information covering fuses in Radio Set AN/ARC-27, refer to AN 16-30ARC27-3, the handbook of maintenance instructions covering that equipment.

TABLE IV. OPERATING CONTROLS

NAME OF CONTROL	LOCATION	FUNCTION
POWER ON-OFF	Power Supply PP-823/GRC, PP-893/GRC-32A or PP-894/GRC-32B	Primary power control.
INPUT VOLTAGE RANGE		Selects nominal 105/125- or 210/250-volt input
INPUT VOLTAGE ADJUSTMENT		Adjusts supply for variations in line voltage.

TABLE IV. OPERATING CONTROLS (Cont)

NAME OF CONTROL	LOCATION	FUNCTION
OFF-RMT CNTRL PNL LIGHTS SPKR VOL SPEAKER PHONES MIC	Interconnecting Box J-499/GRC	Dims panel lights on Radio Set Control C-628/ARC-27. Loudspeaker volume control. Receptacle for loudspeaker plug. Headphone jack. Microphone jack.
FIELD OR PACK SET USE- VEHICULAR SET USE	Loudspeaker LS-166/U	"FIELD OR PACK USE" position connects loudspeaker. "VEHICULAR SET USE" position disconnects loudspeaker.
OFF-T/R-T/R + G REC-ADF CHANNEL VOLUME	Radio Set Control C-628/ARC-27	"OFF" position removes power from all equipment except power supply when "LOCAL-REMOTE" switch of C-626/ARC-27 is set to "REMOTE." ("OFF" position is not normally used.) "T/R" position permits operation on the selected frequency. "T/R + G REC" position permits operation on the selected frequency and guard channel. "ADF" position is not used. Selects one of 18 preset channels or guard channel when the "LOCAL-REMOTE" switch of C-626/ARC-27 is set to "REMOTE." Controls loudspeaker and headset volume at J-499/GRC.
MEGACYCLES ON-OFF LOCAL CHANNEL SELECTOR TONE-VOICE	Radio Set Control C-626/ARC-27	Three selector switches to preset frequency of channels or for manual operation. Power control for all equipment except power supply when "LOCAL-REMOTE" switch is set to "LOCAL." (When "LOCAL-REMOTE" switch is set to "REMOTE," power is controlled from Radio Set Control C-628/ARC-27.) Selects one of 18 preset channels or allows manual selection of all channels in 225 to 399.9 mc range when "LOCAL-REMOTE" switch is set to "LOCAL." Selects type of emission "TONE": A-2, 1020 cps. "VOICE": A-3, use microphone.

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TABLE IV. OPERATING CONTROLS (Cont)

NAME OF CONTROL	LOCATION	FUNCTION
LOCAL-REMOTE GUARD-BOTH-COMD T/R		Selects operation from Radio Set Control C-626/ARC-27 ("LOCAL") or Radio Set Control C-628/ARC-27 ("REMOTE"). Selects operation on guard frequency, indicated frequency, or both when "LOCAL-REMOTE" switch is set to "LOCAL."
GUARD REC SENS SQ OFF GUARD REC EIN-IB-MOD IK-DRVR IG-FINAL IG-IANT SQ OFF MAIN REC MAIN REC SENS MIC METER PHONE	Receiver-Transmitter RT-178/ARC-27	Controls sensitivity of guard receiver. Disables guard-receiver squelch circuit. Metered-circuit selector switch. Disables main-receiver squelch circuit. Controls sensitivity of main receiver. Microphone jack. Meter jack. Headphone jack.
RADIO-REMOTE-INTERPHONE HEADSET MIC HIGH-LOW	Control Unit RM-53 (Interior)	Selects operation of Remote Control Equipment RC-261 (RM-53 and RM-52). Headphone jack. Microphone jack. Selects input impedance (Set to "LOW.")
HIGH-LOW	Remote Control Unit RM-52 (Interior)	Selects input impedance (Set to "LOW.")

SECTION II

SPECIAL TEST EQUIPMENT AND SPECIAL TOOLS

2-1. There are no special tools or test equipment required for the maintenance of Radio Set AN/GRC-32, AN/GRC-32A or AN/GRC-32B.

SECTION III

PREPARATION FOR USE AND RESHIPMENT

3-1. SITE SELECTION.

3-2. The prime consideration in selecting an operating site is the ease with which the mast can be erected. Do not erect the mast on sandy or swampy ground. The ideal site would be a cleared circle of firm level ground, 120 feet in diameter, free from bushes and obstructions. (See figure 3-1.) The minimum requirement for an operating site is a cleared rectangular area 30 by 70 feet in size with enough clearance so that guy wires will not tangle in bushes or trees when the mast is laid on the ground prior to erection. If a remote installation is to be used, the site can be a maximum of one-quarter mile away from Remote Control Unit RM-52. Since an external power source is required, the installation must be made within 100 feet from where power is, or can be made, available.

3-3. UNPACKING.

3-4. The cabinets and cases in which Radio Sets AN/GRC-32, AN/GRC-32A and AN/GRC-32B are shipped are listed in table V, together with the contents of each cabinet or case. The cabinets are operational housings for the contained electrical equipment. The equipments inside the cabinets are ready for field operation upon removal of the cabinet covers. There is no reason to remove the equipment from the cabinets except for cleaning, inspection, service or replacement of parts. The cabinets are protected against impact and vibration through the use of internal rubber shock pads, and in the case of Radio Sets AN/GRC-32A and AN/GRC-32B, through the use of external rubber bumpers which absorb the shock of abnormal field handling.

3-5. The three radio sets differ from each other only in the distribution of electrical equipment in the various cabinets. All the radio sets of this series have generally the same electrical equipment.

3-6. To unpack equipment packaged for overseas shipment, follow steps "a" through "f" below. To unpack equipment packaged for domestic shipment, follow steps "d" through "f".

- a. Cut the metal bands on the crate.
- b. Remove the nails and open the top of the crate.
- c. Tear open the waterproof liner.
- d. Open the cardboard carton and remove the component packed in a barrier bag.
- e. Tear open the barrier bag and remove the inner carton.
- f. Open the inner carton and remove the contents.

3-7. MAST ERECTION.

3-8. PREPARING THE SITE. (See figure 3-1.) Clear away all brush, trees, and obstructions that might interfere with the erection of the mast. The site selected for the baseplate (point *O*, figure 3-1) should be level and firm. If the ground is too soft, pack gravel into the ground in a three-foot circle around point *O*. Open Mast Erection Kit Case CY-1186/GRC and remove radius rope O-803. (See figure 3-2.)

Note

Radius rope O-803 is used as a layout gage and may shrink when exposed to extremes of temperature and humidity. Measure the rope before use. If it is not 22 feet long, add enough rope to make it so.

3-9. LOCATING THE GROUND ANCHORS.

- a. Place one loop of radius rope O-803 at point *O*, the proposed location of the mast baseplate.
- b. Stretch the rope out its full length and mark point *A*, the boom or front anchor position.
- c. With one end of the rope still at point *O*, lay out point *B*, the back anchor position. *AOB* should be a straight line. Check the line by sighting along it with the eye, or use a transit, if available.
- d. Lay out points *C* and *D*, the side anchor sites, in the same manner. Lines *AOB* and *COD* should be perpendicular to each other. Check the angle with an azimuth compass or transit, if available. If no instruments are available, check the angles by measuring distances *DA*, *DB*, *CA* and *CB*; they should all be approximately 31 feet.

3-10. SETTING THE BASEPLATE.

- a. Remove mast-base assembly H-818 and hammer H-805 from Mast Erection Kit Case CY-1186/GRC (figure 3-2).
- b. Open Mast Case CY-1185/GRC (figure 3-3) and remove spikes H-801.
- c. Center the mast-base assembly at point *O* with the mast socket upright and the boom socket pointing toward point *A*.
- d. With the hammer drive the spikes into the ground through the four holes in the baseplate. Check to see that the baseplate is level and secure.

3-11. SINKING THE ANCHORS. (See figure 3-4.)

- a. Assemble the post-hole digger from the blades, H-803, packed in the mast erection kit case and the handles, H-802, packed in the mast case. (See figures 3-2 and 3-3.)

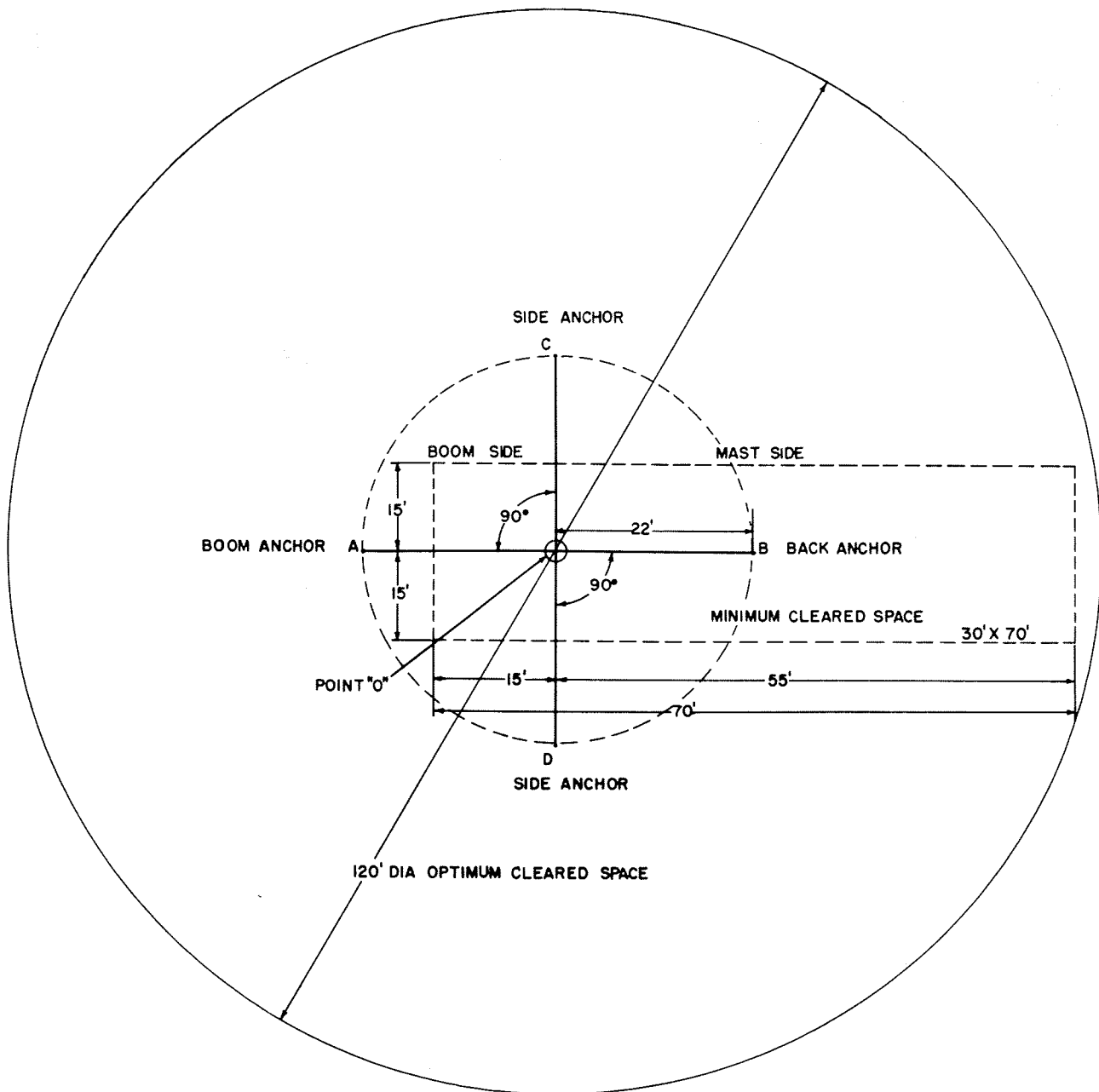


Figure 3-1. Optimum and Minimum Mast-Layout Requirements

Note

If the mast is to be erected on hard, rocky or frozen ground, disassemble the post-hole digger blades and assemble the blades and handles into two separate shovels, which can then be used to dig holes.

b. At anchor position *A*, dig a hole three feet deep, using the post-hole digger.

c. Remove anchor rods O-801 from the mast case (figure 3-3). At a point 18 inches away from the edge of the hole on the *O* side of line *AO*, drive an anchor

rod into the ground toward the hole at a 60-degree angle with the ground. The anchor rod should enter the hole six inches or less from the bottom of the hole and lie directly under line *AO*.

d. Remove anchor plate A-805 from the mast erection kit case (figure 3-2). Place the anchor plate in the hole, slot up. Slip the plate over the anchor rod so that the narrow part of the slot catches on the head of the anchor rod. Make sure the plate is locked securely against the head of the anchor rod.

e. Fill the hole and tamp down the earth.

TABLE V. CONTENTS OF CABINETS AND CASES

^{2,3} CABINET CY-1191/GRC-32A	¹ CABINET CY-1184/GRC	^{2,3} CABINET CY-1288/GRC	¹ CABINET CY-1187/GRC-32	^{1,2,3} MAST ERECTION KIT CASE CY-1186/GRC
² Power Supply PP-893/GRC-32A ³ Power Supply PP-894/GRC-32B Cable Assembly CX-2007A/U	Receiver-Transmitter RT-178/ARC-27 Radio Set Control C-626/ARC-27 Mounting MT-821/ARC-27 Radio Set Control C-628/ARC-27 Interconnecting Box J-499/GRC Loudspeaker LS-166/U Cable Assembly CX-2053/U Cable Assembly CX-2054/U	Radio Set Control C-626/ARC-27 Mounting MT-821/ARC-27 Radio Set Control C-628/ARC-27 Interconnecting Box J-499/GRC Loudspeaker LS-166/U Remote Control Unit RM-52 Control Unit RM-53 Spool DR-8 1/4 mile Wire WD-1/TT Headset H-33A Cord CD-307A Microphone T-17 ² Cable Assembly CX-2162/U ² Cable Assembly CX-2055/U Cable Assembly CX-2053/U Cable Assembly CX-2054/U ³ Cable Assembly CX-2163/U	Power Supply PP-823/GRC DC Power Filter F-170/GRC Headset HS-33A Cord CD-307A Microphone T-17 Spool DR-8 1/4 mile Wire WD-1/TT Remote Control Unit RM-52 Control Unit RM-53 Cable Assembly CX-2007/U Cable Assembly CX-2052/U	1—block and tackle 4—chains 1—clamp assembly 1—post-hole digger (less handles) 2—guy assemblies 1—hammer 3—mountings 4—plates 1—rope rope 1—rope assembly 5—straps 2—wrenches 1—bag spare parts containing: 4—plates 1—guy wire 2—turnbuckles 1—chain 5—straps 1—bag spare parts containing: 2—clamps 8—pins 4—shackles 3—thimbles 2—bolts
^{2,3} CABINET CY-1287/GRC	² CABINET CY-1188/GRC-32A	^{1,2,3} ANTENNA CASE CY-728/GRC	^{1,2,3} MAST CASE CY-1185/GRC	
Receiver-Transmitter RT-178/ARC-27	DC Power Filter F-170/GRC	Antenna AT-197/GR Cable Assembly CG-690A/U Cable Assembly CG-895/U	4—anchor rods 2—boom sections 1—crossarm 6—mast sections 4—spikes 2—post-hole digger handles	

¹ Radio Set AN/GRC-32.² Radio Set AN/GRC-32A.³ Radio Set AN/GRC-32B.

f. Repeat the procedures of steps "a" through "e" at positions B, C, and D.

Note

If an obstruction prevents the driving of an anchor rod or the digging of an anchor hole, either remove the obstruction or change the location of *all four anchors*.

3-12. MAST ASSEMBLY. (See figure 3-3.) Remove mast sections A-808 through A-813, boom sections A-806 and A-807, and crossarm A-815 from the mast case and lay them on the ground. All the mast sections, except the largest, have plywood collars at one end. This prevents the adjacent sections from sliding too far into each other. To assemble the mast, proceed as follows:

a. Seat the largest mast section, A-813, in the large socket of the mast-clamp assembly H-812 of mast-base

assembly H-818 (figure 3-5). Tip the socket toward point B so that the mast section lies along the ground after being seated.

b. Insert the collared end of the next largest section A-812, into the end of the largest section, A-813.

c. Insert the collared end of the third largest section, A-811, into the second largest section, A-812.

d. Insert the collared end of the fourth largest section, A-810, into the third largest section, A-811.

e. Remove collar-and-guy assembly O-819 from the mast-erection-kit case (figure 3-2).

f. Slide the collar-and-guy assembly down over mast section A-810 until it is seated at the joint of the third and fourth largest mast sections (A-810 and A-811). Turn the collar-and-guy assembly so that the guy wire with the turnbuckle terminating at the guy collar is on top. This is the front boom guy wire.

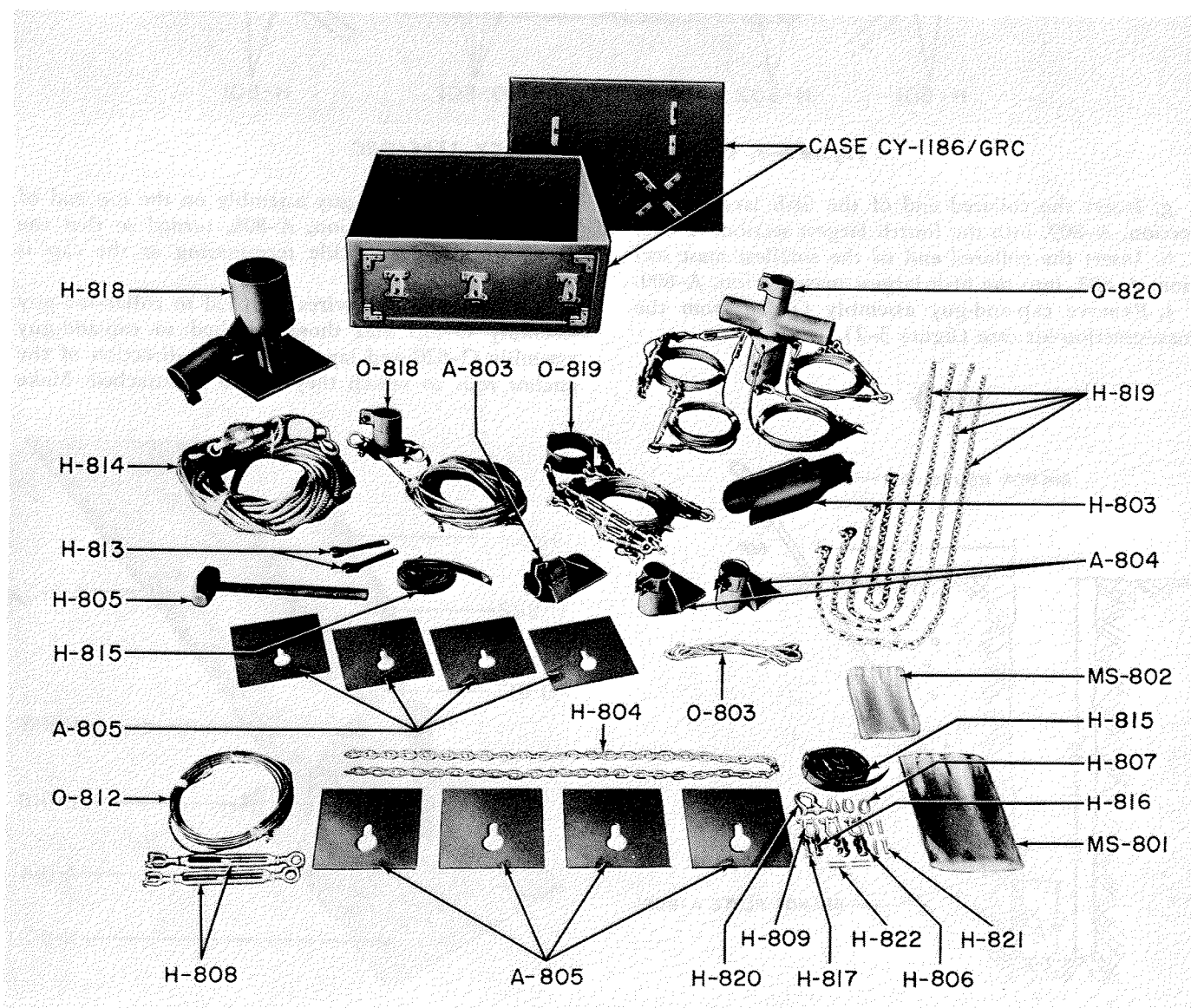


Figure 3-2. Contents of Mast Erection Kit Case CY-1186/GRC

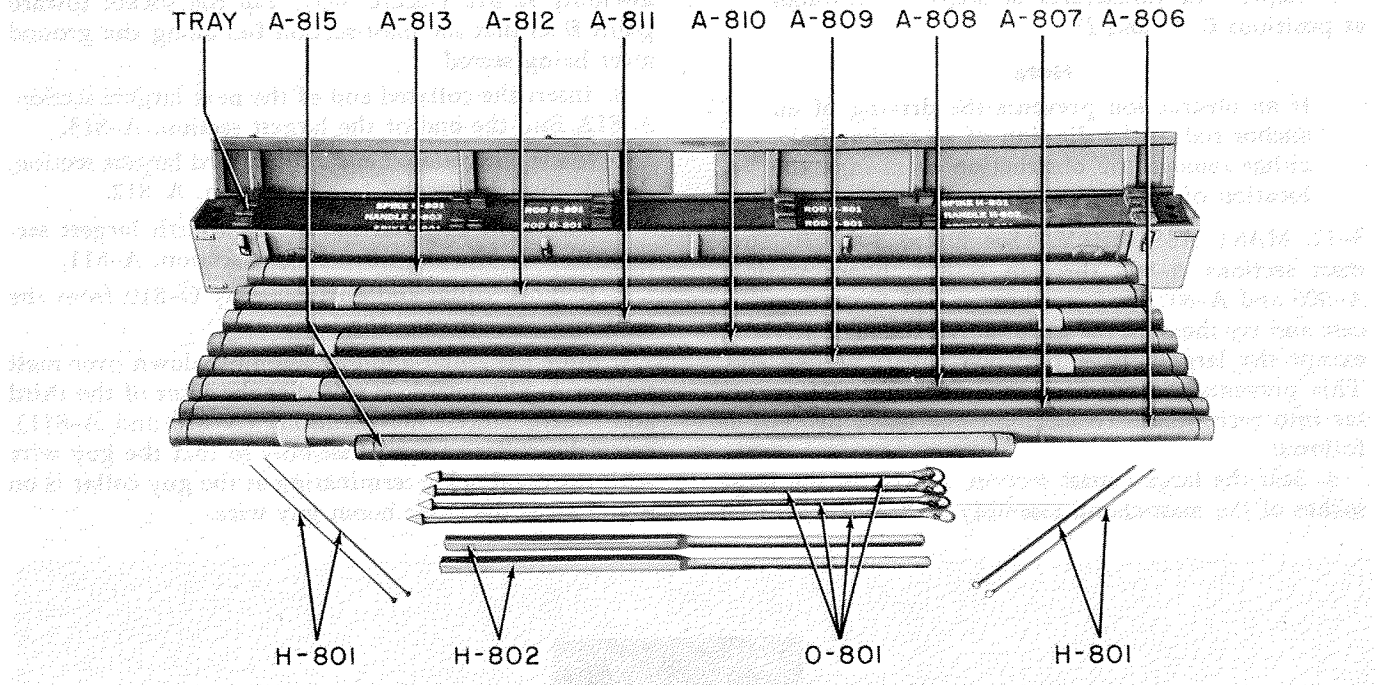


Figure 3-3. Contents of Mast Case CY-1185/GRC

- g. Insert the collared end of the fifth largest mast section, A-809, into the fourth largest section, A-810.
- h. Insert the collared end of the smallest mast section, A-808, into the fifth largest mast section, A-809.
- i. Remove cap-and-guy assembly O-820 from the mast-erection-kit case (figure 3-2).

- j. Seat the cap-and-guy assembly on the top end of the smallest mast section, A-808, turned so that the guy with the turnbuckle terminating at the cap is on top.
- k. Uncoil the guy wires attached to collar-and-guy assembly O-819 and those attached to cap-and-guy assembly O-820 and lay them in the direction of the anchor rods to which they are to be attached. Make

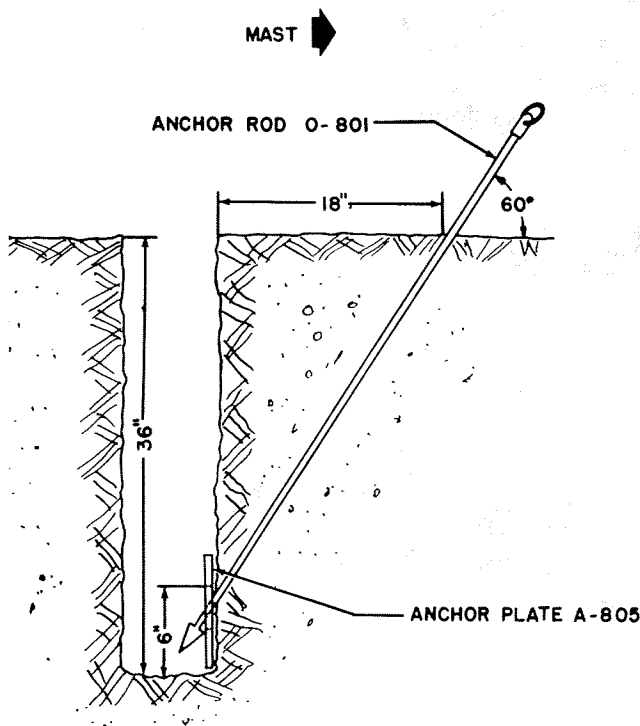


Figure 3-4. Properly Sunk Anchor

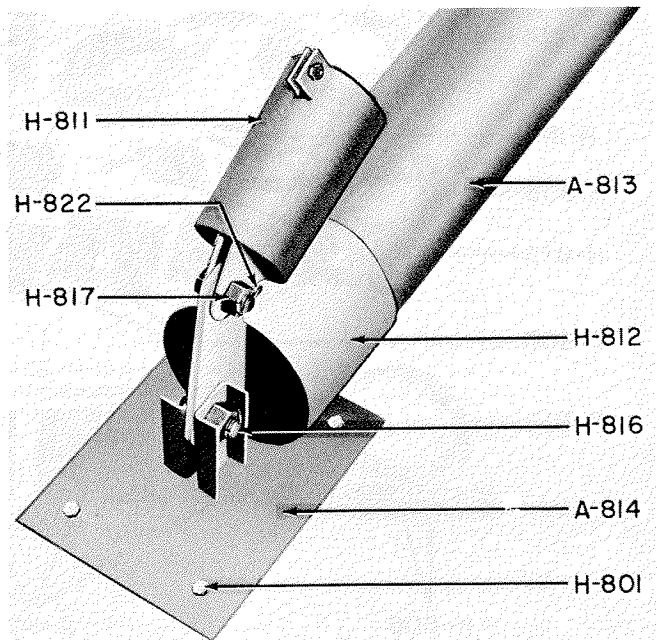


Figure 3-5. Mast Base Assembly

sure that the rear guys are placed under the side guys to prevent their fouling during erection. The front guys must be above the side guys.

l. The smallest diameter (2-3/8 inch) plywood tube section is crossarm A-815. Place it near the top of the mast, but do not mount it at this time.

m. Insert the collared end of the smaller boom section, A-806, into the larger boom section, A-807.

n. Rest the boom on the mast by doubling the boom over on the mast as it lays on the ground. (The large end of the boom is not yet in the base socket, but is adjacent to the socket.)

o. Remove boom-cap assembly O-818 and wrench H-813 from the mast erection kit case (figure 3-2).

p. Place the boom-cap assembly on the small end of the boom so that the ropes appear as illustrated in figure 3-6.

q. Tighten the boom-cap-assembly hex nut with wrench H-813. Use two wrenches, if necessary.

3-13. RIGGING THE MAST. (See figure 3-7.)

a. Remove the four chain assemblies, H-819, from the mast erection kit case (figure 3-2). Attach one of the four chains to each anchor with a screw-pin shackle. Unscrew the pin from the shackle supplied, slip the shackle through the eye of the anchor rod and through the end link of the anchor chain. Reinsert the screw pin and tighten it securely with wrench H-813.

b. Open the turnbuckles attached to all guy wires approximately halfway. Take up the slack on the upper side guy wires and shackle their turnbuckles to the side anchor chains, as shown in detail A of figure 3-7. Attach the lower side guy wires to the same chains in the same manner. Leave a few links of chain between attaching points so that the chain can distribute the pull and prevent the turnbuckles from interfering with one another when the final adjustment in tension is made.

c. Secure each boom vang rope (part of boom-cap assembly O-818) to a side anchor rod ring. The ropes should not be taut, but should have all the slack taken up.

d. Attach the front upper and lower guy wires (these have a turnbuckle on each end) to the lower shackle on boom-cap-assembly clamp H-818. The back guy wires are not attached at this time. The "upper" guy wires are these attached to the cap-and-guy assembly; the "lower" guys are those attached to the collar-and-guy assembly.

e. Remove block and tackle H-814 from the mast erection kit case (figure 3-2). Hook the block with the becket to the upper shackle on boom-cap-assembly clamp H-818. Tighten all pin shackles and check the boom vang ropes to see that they are secure and not slack.

f. Carefully check the mast rigging against figures 3-6 and 3-7.

g. Seat the larger boom section, A-807, into boom-clamp assembly H-811 (small socket) on mast-base assembly H-818; see figure 3-5. Tighten the socket clamp around the seated boom section using the wrenches supplied.

WARNING

Never attempt to raise or lower the boom before the boom vang ropes have been attached, as they must always be in place when lowering or raising the mast. They may be removed after the mast has been erected. Damage to the equipment and injury to personnel may result if an attempt is made to raise or lower the mast when these ropes are not attached.

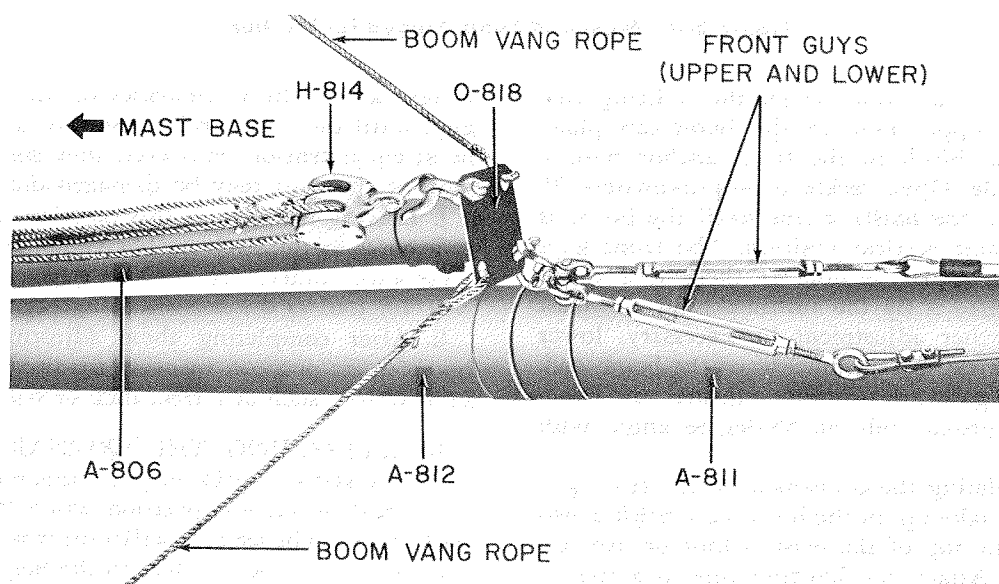


Figure 3-6. Boom-Cap Rigging Prior to Erection of Mast

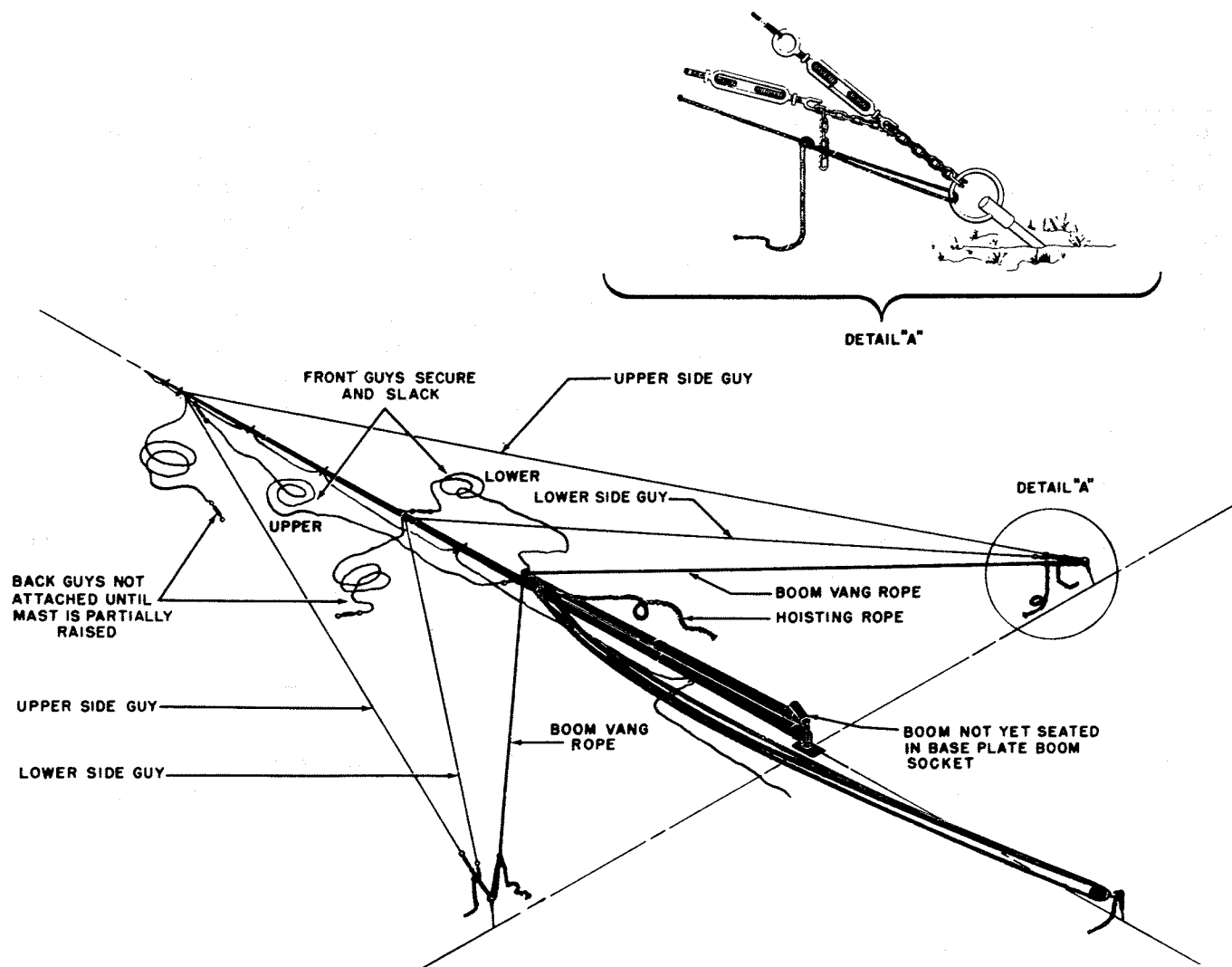


Figure 3-7. Mast and Boom Rigged for Erection

h. Attach the block from which the hoisting line emerges to the upper hole in the boom-cap plate. Attach the other block to the front anchor with a screw pin shackle. Open tackle to approximately 25 feet. Take up on the hoisting line until the boom is raised to an almost vertical position. The front guys should all be of equal tension. If there is a slight difference, equalize it by the turnbuckle at the mast end. Should further adjustment be necessary, lower the boom and adjust the turnbuckles at the boom end. When the front guys are properly adjusted, the boom should form approximately an 85-degree angle with the mast.

i. After completing the adjustment of the front guy wires, gradually take up on the block and tackle hoisting line until the top of the mast is four or five feet off the ground. Attach the hoisting line to a tree or other suitable object to hold the mast in this position. Sight along the mast, noting if it is perfectly straight.

If not, adjust the turnbuckles on the front and side guys until the mast straightens. The side guys should be at equal tension. However, they should not be too taut, or the mast may be damaged during erection.

j. Leaving the mast in this position, attach the back guy wires to the back anchor chain. Be sure to place these wires underneath the side guy wires so that they will not foul as the mast is being raised.

k. After completing these adjustments, keep the boom in its position by securing the hoisting line to some object, such as a tree, rock or truck.

3-14. ATTACHING THE CROSSARM. (See figure 3-8.) Crossarm A-815 may be mounted in either a horizontal or vertical position while the mast is partially raised. The usual installation is with the crossarm vertical, which adds six feet to the height of the mast. To attach the crossarm in the vertical position, proceed as follows:

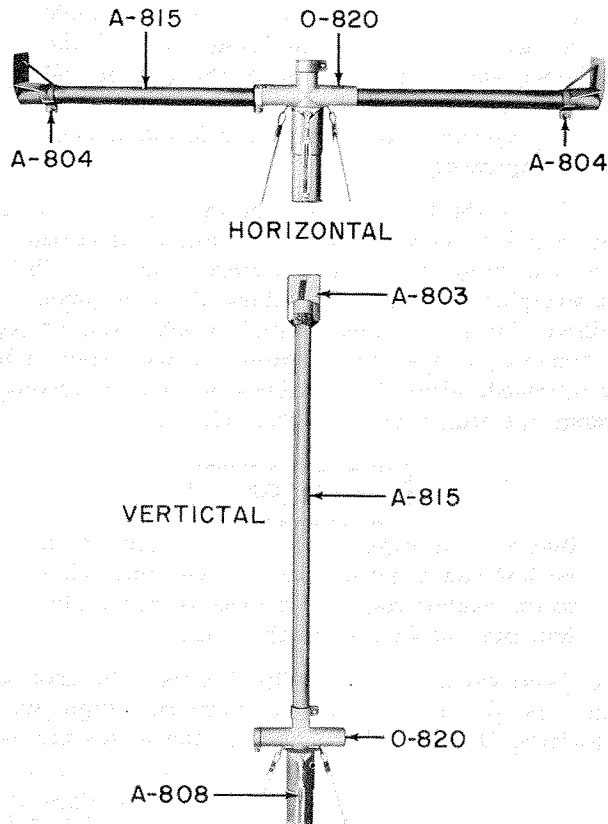


Figure 3-8. Crossarm Mounted

- Slide crossarm A-815 into the top (vertical opening) of cap-and-guy assembly O-820.
- Fasten the crossarm in the cap-and-guy assembly clamp socket by tightening the hex nut on the cap-and-guy assembly with wrench H-813. Use two wrenches, if necessary.
- Seat vertical mounting assembly A-803 on top of the crossarm and fasten the mounting to the crossarm by tightening its hex nut with wrench H-813.

3-15. Horizontal mounting is used when two antennas are to be mounted on the mast; see figure 3-8. To mount the crossarm horizontally, proceed as follows:

Note

Only one antenna is furnished with Radio Sets AN/GRC-32, AN/GRC-32A and AN/GRC-32B.

- Slide crossarm A-815 through the horizontal opening in cap-and-guy assembly O-820.
- Center the crossarm and fasten it in place by tightening the proper hex nut on the cap-and-guy assembly.
- Place the horizontal mounting assemblies, A-804, on the crossarm, one mounting on each end.
- Fasten the mountings in place by tightening their hex nuts.

3-16. ASSEMBLING, MOUNTING AND CONNECTING ANTENNA AT-197/GR.

- Open Antenna Case CY-728/GRC (figure 3-9). Remove the antenna support and bolt it to the mounting assembly on the crossarm with the bolts supplied in the small bag.
- Remove the two remaining disassembled antenna parts from the antenna case. Unfasten the straps holding the elements together. Insert the Dzus-fastener end of each rod into the receptacle closest to it on the hub. Lock them in place by pushing and turning the elements clockwise. Fasten the spoked section of the antenna to the top of the antenna column by means of the Dzus fastener on the column and the receptacle in the hub of the spokes.
- Slide the base of the antenna through the antenna support and tighten the support handscrew. Figure 3-10 shows a properly assembled antenna mounted vertically on the crossarm.
- Unscrew the cap on the antenna connector receptacle. Take Cable Assemblies CG-895/U and CG-690A/U from the antenna case and remove from their reel. Connect the appropriate end of Cable Assembly CG-895/U to the antenna receptacle. Connect the other end of Cable Assembly CG-895/U to the appropriate end of Cable Assembly CG-690A/U.

- Remove five straps, H-815, from the mast erection kit case (figure 3-2). Strap the cable to the crossarm about two feet back from the mounting assembly. Strap the cable to the mast about two feet down from cap-and-guy assembly H-820 and about two feet up from the base of the mast. Strap the cable to the third and fifth largest mast sections (A-811 and A-809, respectively).

Note

For horizontal orientation of crossarm, allow enough slack in cable to make gradual curves.

- If two antennas and r-f cable assemblies are used, mount the additional cable securely by utilizing some of the spare web straps supplied.

3-17. RAISING THE MAST. (See figure 3-11.)

WARNING

Raising the mast is hazardous. Keep all except detailed personnel at a safe distance.

- Place the slacked guys so that they will not foul the mast during erection.

CAUTION

Do not allow the side guy wires to become taut during erection. Tighten these wires after the mast has been fully erected.

- Untie the hoisting line of the block and tackle and take up on it slowly and smoothly until the mast

is vertical. If the mast bends noticeably during erection, lower it and readjust the guy wires.

CAUTION

Do not allow the mast to reach a vertical position too quickly. The back anchor may become loosened or the back guy wire damaged.

c. When the mast is vertical, secure the hoisting line. Unshackle one of the front guy wires from the boom cap and attach it to the chain shackled to the anchor rod. When this guy is securely shackled to the anchor chain, unshackle the second guy wire and attach it to the anchor chain. These steps will leave the boom resting on the ground completely detached from the front guy wires; see figure 1-4.

CAUTION

Do not unshackle the second guy wire until the first is tightly shackled to the anchor chain.

d. Unhook the block and tackle from the boom cap and replace it in the mast erection kit case.

Note

If the installation is a temporary one, leave the guys attached to the boom cap and the block and tackle secured to the anchor rod and boom cap. See figure 1-4 for illustration of permanent and temporary boom anchor arrangement.

e. To reduce the strain on the mast and guy wires and enable the mast to withstand high wind velocities, keep the mast vertical and perfectly straight. Check the straightness by sighting along the mast from the ground. Check the plumb with a level, a plumb bob or a transit, if available. Should the mast need to be straightened, adjust the turnbuckles and, if necessary, change the length of the anchor chains.

CAUTION

Before attempting to adjust the length of an anchor chain, secure the adjacent guy wires to the anchor rod with a piece of rope. This will prevent damage to the mast.

f. Make the guy wires of equal tension, but not too tight, or the mast will not withstand high wind velocities. On the other hand, if the wires are too

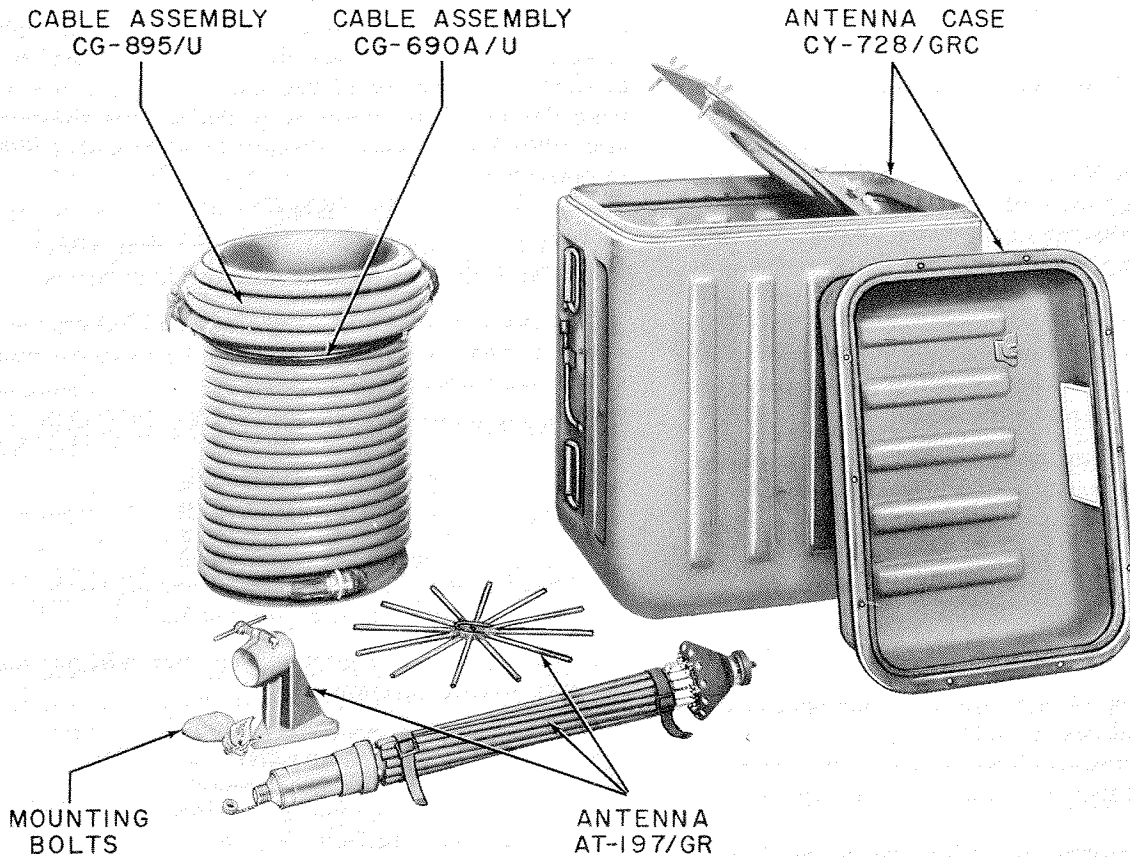


Figure 3-9. Contents of Antenna Case CY-728/GRC

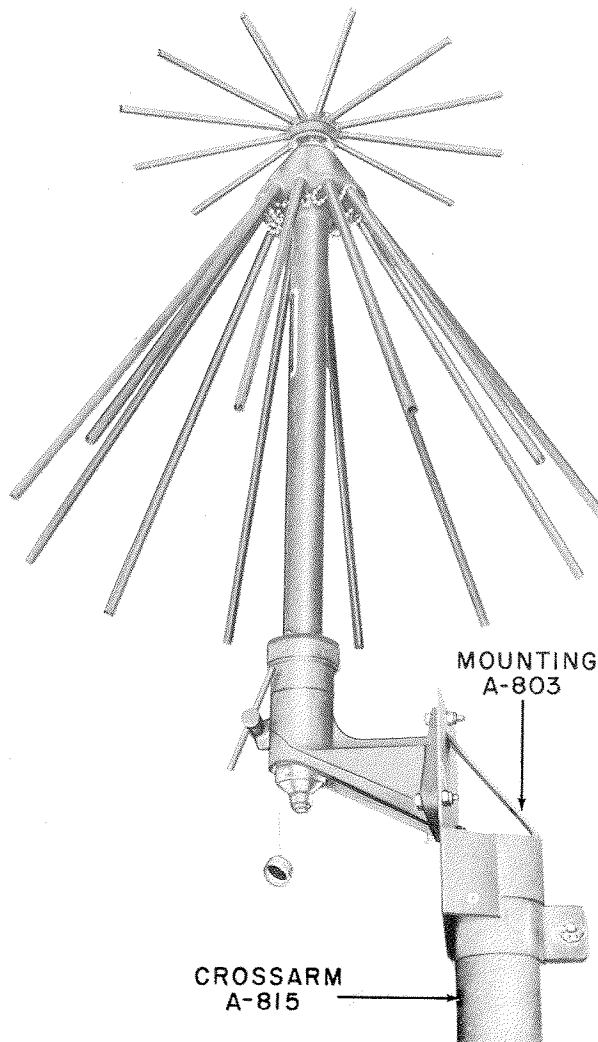


Figure 3-10. Antenna AT-197/GR

loose, the mast will sway and twist excessively. Leave some slack in the guy wires.

3-18. LOCATING THE ELECTRICAL COMPONENTS OF THE RADIO SET.

3-19. Cable Assemblies CG-690A/U and CG-895/U have a combined length of 77 feet when connected together. After being connected to the antenna, they run the 61 feet of combined mast and crossarm and end 16 feet from the base of the mast. Therefore, the electrical components must be installed within 16 feet of the mast base.

3-20. Group the cabinets, as shown in the appropriate portion of the applicable illustration (figures 1-1, 1-2 or 1-3), by stacking them along side, or on top, of one another after removing their covers.

3-21. CONNECTIONS.

3-22. Connect the radio set according to the appropriate interconnecting wiring diagram (figures 7-10, 7-11 or 7-12) and the appropriate table of cable con-

nections (tables VI, VII or VIII). The radio set controls and the interconnecting box are shipped with their cables installed.

CAUTION

Some cable assemblies having outer conduit are relatively stiff; care must be taken not to damage them at the ferrule joints during handling.

3-23. Cable interconnection procedures are divided into the categories of connections peculiar to Radio Set AN/GRC-32, AN/GRC-32A or AN/GRC-32B, and connections common to all radio sets of the series. When connecting any cable assembly containing conduit, it will first be necessary to loosen the conduit coupling nuts at each end a few turns. Connect each connector to its mate, and then hand tighten the conduit coupling nuts. This procedure is necessary to provide flexibility in handling the cable assembly.

3-24. CABLING APPLICABLE ONLY TO RADIO SET AN/GRC-32.

3-25. This information involves cabling between components mounted in Cabinet CY-1187/GRC-32 (Radio Set Group OA-385/GRC-32) and Cabinet CY-1184/GRC (Radio Set Group OA-384/GRC).

a. Uncoil the 100-foot integral a-c cable of Power Supply PP-823/GRC from its compartment and connect to the primary power source.

b. Attach Cable Assembly CX-2052/U between output connector J-101 of the power supply and input connector J-601 of DC Power Filter F-170/GRC.

c. Attach Cable Assembly CX-2007/U between output connector J-602 of the filter and connector J-203 mounted on Interconnecting Box J-499/GRC.

3-26. CABLING APPLICABLE ONLY TO RADIO SET AN/GRC-32A.

3-27. This information involves cabling between components mounted in Cabinets CY-1191/GRC-32A, CY-1188/GRC-32A, CY-1288/GRC and CY-1287/GRC.

a. Remove Cable Assembly CX-2162/U from rear of Cabinet CY-1288/GRC and attach one end to plug P-101 on the short a-c cable of Power Supply PP-893/GRC-32A and the other end to the primary power source.

b. Remove Cable Assembly CX-2055/U from rear of Cabinet CY-1288/GRC and attach between output connector J-101 of the power supply and input connector J-601 of DC Power Filter F-170/GRC.

c. Remove Cable Assembly CX-2007A/U from its compartment in Cabinet CY-1191/GRC-32A and attach it between output connector J-602 of the filter and connector J-203 on Interconnecting Box J-499/GRC.

Section III
Paragraphs 3-28 to 3-32

AN 16-30GRC32-2

3-28. CABLING APPLICABLE ONLY TO RADIO SET AN/GRC-32B.

3-29. This information involves cabling between components mounted in Cabinets CY-1191/GRC-32A, CY-1288/GRC and CY-1287/GRC.

a. Remove Cable Assembly CX-2163/U from the rear of Cabinet CY-1288/GRC and attach it between input power receptacle J-101 on Power Supply PP-894/GRC-32B and the primary power source.

b. Attach Cable Assembly CX-2007A/U between output connector J-102 of the power supply and connector J-203 of Interconnecting Box J-499/GRC.

3-30. CABLING COMMON TO ALL RADIO SETS.

3-31. This information involves cabling between components of Radio Set AN/ARC-27, Interconnecting Box J-499/GRC, and the antenna r-f cables.

3-32. The operator's control panel is mounted on a sliding assembly panel in Radio Set AN/GRC-32 and is

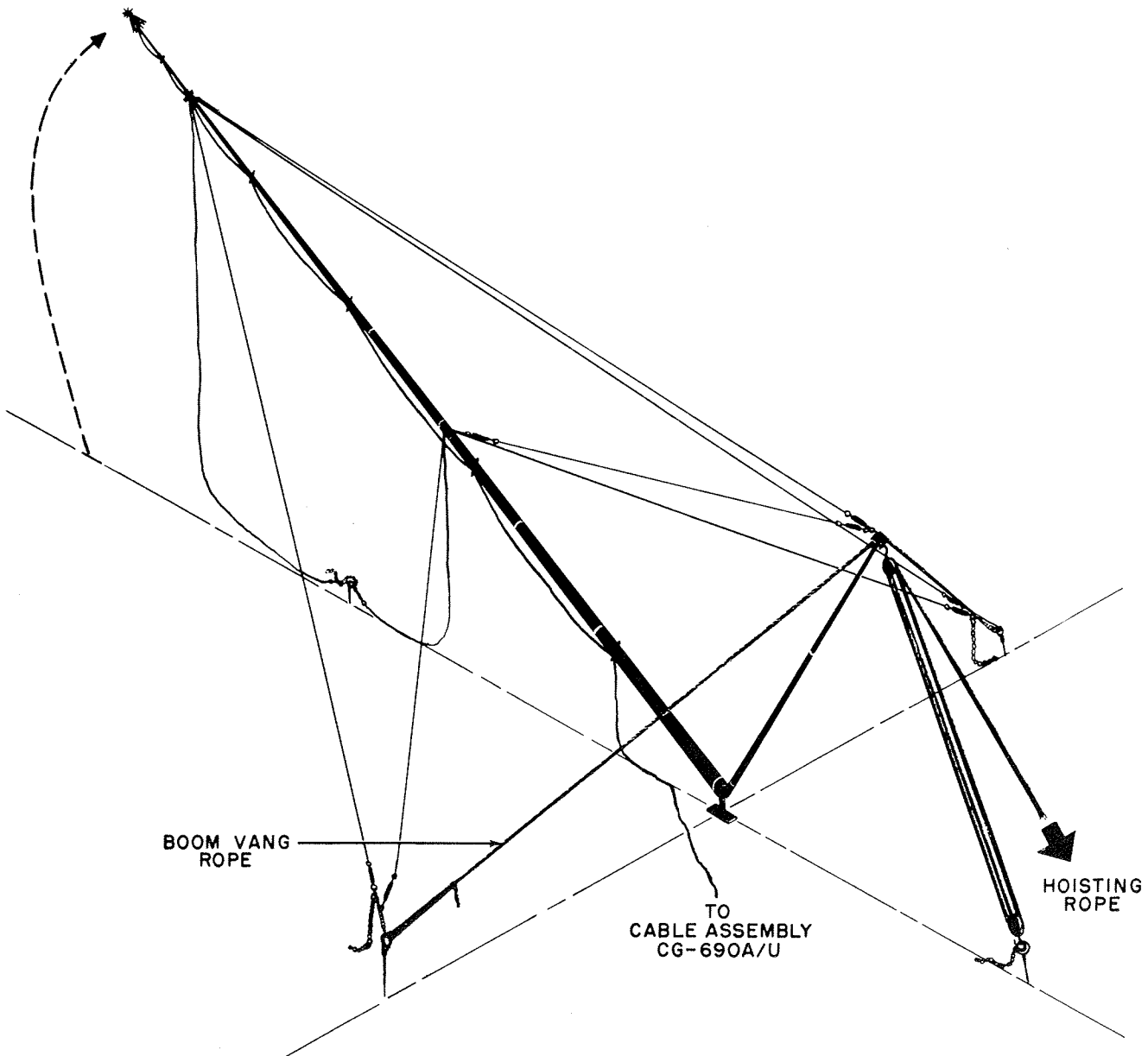


Figure 3-11. Mast Rigged for Erection and Partially Raised

TABLE VI. CABLING CHART FOR RADIO SET AN/GRC-32

CABLE ASSEMBLY AN DESIGNATION	REFERENCE SYMBOL	CONNECTED		APPROXIMATE LENGTH	LOCATION	TYPE
		TO	FROM			
CD-307A		Headset HS-35A	Interconnecting Box J-499/GRC	5 ft, 5 in.	Cabinet CY-1187/GRC-32	Adapter
CG-895/U	W-503	Antenna AT-197/GR	Cable Assembly CG-690A/U	75 ft	Antenna Case CY-728/GRC	RF
CG-690A/U	W-501	Cable Assembly CG-895/U	Receiver-Transmitter RT-178/ARC-27	2 ft, 3 in.	Antenna Case CY-728/GRC	RF
CX-2007/U	W-401	DC Power Filter F-170/GRC	Interconnecting Box J-499/GRC	15 ft, 6 in.	Cabinet CY-1187/GRC-32	D-C power
CX-2052/U	W-701	Power Supply PP-823/GRC	DC Power Filter F-170/GRC	10 in.	Cabinet CY-1187/GRC-32	D-C power
CX-2053/U	W-302	Interconnecting Box J-499/GRC	Receiver-Transmitter RT-178/ARC-27	4 ft	Cabinet CY-1184/GRC	Special purpose
CX-2054/U	W-301	Interconnecting Box J-499/GRC	Receiver-Transmitter RT-178/ARC-27	4 ft	Cabinet CY-1184/GRC	Special purpose
	¹ W-101	Power Source	Power Supply PP-823/GRC	100 ft	Cabinet CY-1187/GRC-32	A-C input
	² W-201	Interconnecting Box J-499/GRC	Radio Set Control C-628/ARC-27	2 ft, 6 in.	Cabinet CY-1184/GRC	Special purpose
	² W-202	Interconnecting Box J-499/GRC	Radio Set Control C-626/ARC-27	12 in.	Cabinet CY-1184/GRC	Special purpose
	² W-203	Interconnecting Box J-499/GRC	Radio Set Control C-626/ARC-27	12 in.	Cabinet CY-1184/GRC	Special purpose
	² W-204	Interconnecting Box J-499/GRC	Radio Set Control C-626/ARC-27	12 in.	Cabinet CY-1184/GRC	Special purpose

¹ Part of Power Supply PP-823/GRC.² Part of Interconnecting Box J-499/GRC.

TABLE VII. CABLING CHART FOR RADIO SET AN/GRC-32A

CABLE ASSEMBLY AN DESIGNATION	REFERENCE SYMBOL	CONNECTED		APPROXIMATE LENGTH	LOCATION	TYPE
		TO	FROM			
CD-307A		Headset HS-33A	Interconnecting Box J-499/GRC	5 ft, 5 in.	Cabinet CY-1288/GRC	Adapter
CG-895/U	W-503	Antenna AT-197/GR	Cable Assembly CG-690A/U	75 ft	Antenna Case CY-728/GRC	RF
CG-690A/U	W-501	Cable Assembly CG-895/U	Receiver-Transmitter RT-178/ARC-27	2 ft, 3 in.	Antenna Case CY-728/GRC	RF
CX-2007A/U	W-401	DC Power Filter F-170/GRC	Interconnecting Box J-499/GRC	15 ft, 6 in.	Cabinet CY-1191/GRC-32A	D-C power
CX-2055/U	W-701	Power Supply PP-893/GRC-32A	DC Power Filter F-170/GRC	3 ft	Cabinet CY-1288/GRC	D-C power
CX-2053/U	W-302	Interconnecting Box J-499/GRC	Receiver-Transmitter RT-178/ARC-27	4 ft	Cabinet CY-1288/GRC	Special purpose
CX-2054/U	W-301	Interconnecting Box J-499/GRC	Receiver-Transmitter RT-178/ARC-27	4 ft	Cabinet CY-1288/GRC	Special purpose
CX-2162/U	W-901	Power Source	Cable Assembly W-101	97 ft, 6 in.	Cabinet CY-1288/GRC	A-C input
	¹ W-101	Cable Assembly CX-2162/U	Power Supply PP-893/GRC-32A	5 ft, 3 in.	Cabinet CY-1191/GRC-32A	A-C input
	² W-201	Interconnecting Box J-499/GRC	Radio Set Control C-628/ARC-27	2 ft, 6 in.	Cabinet CY-1288/GRC	Special purpose
	² W-202	Interconnecting Box J-499/GRC	Radio Set Control C-626/ARC-27	12 in.	Cabinet CY-1288/GRC	Special purpose
	² W-203	Interconnecting Box J-499/GRC	Radio Set Control C-626/ARC-27	12 in.	Cabinet CY-1288/GRC	Special purpose
	² W-204	Interconnecting Box J-499/GRC	Radio Set Control C-626/ARC-27	12 in.	Cabinet CY-1288/GRC	Special purpose

¹ Part of Power Supply PP-893/GRC-32A.² Part of Interconnecting Box J-499/GRC.

TABLE VIII. CABLING CHART FOR RADIO SET AN/GRC-32B

CABLE ASSEMBLY AN DESIGNATION	REFERENCE SYMBOL	CONNECTED		APPROXIMATE LENGTH	LOCATION	TYPE
		TO	FROM			
CD-307A		Headset HS-33A	Interconnecting Box J-499/GRC	5 ft, 5 in.	Cabinet CY-1288/GRC	Adapter
CG-895/U	W-503	Antenna AT-197/GR	Cable Assembly CG-690A/U	75 ft	Antenna Case CY-728/GRC	RF
CG-690A/U	W-501	Cable Assembly CG-895/U	Receiver-Transmitter RT-178/ARC-27	2 ft, 3 in.	Antenna Case CY-728/GRC	RF
CX-2007A/U	W-401	Power Supply PP-894/GRC-32B	Interconnecting Box J-499/GRC	15 ft, 6 in.	Cabinet CY-1191/GRC-32A	D-C power
CX-2053/U	W-302	Interconnecting Box J-499/GRC	Receiver-Transmitter RT-178/ARC-27	4 ft	Cabinet CY-1288/GRC	Special purpose
CX-2054/U	W-301	Interconnecting Box J-499/GRC	Receiver-Transmitter RT-178/ARC-27	4 ft	Cabinet CY-1288/GRC	Special purpose
CX-2163/U	W-901	Power Source	Power Supply PP-894/GRC-32B	100 ft	Cabinet CY-1288/GRC	A-C input
	¹ W-201	Interconnecting Box J-499/GRC	Radio Set Control C-628/ARC-27	2 ft, 6 in.	Cabinet CY-1288/GRC	Special purpose
	¹ W-202	Interconnecting Box J-499/GRC	Radio Set Control C-626/ARC-27	12 in.	Cabinet CY-1288/GRC	Special purpose
	¹ W-203	Interconnecting Box J-499/GRC	Radio Set Control C-626/ARC-27	12 in.	Cabinet CY-1288/GRC	Special purpose
	¹ W-204	Interconnecting Box J-499/GRC	Radio Set Control C-626/ARC-27	12 in.	Cabinet CY-1288/GRC	Special purpose

¹ Part of Interconnecting Box J-499/GRC.

Section III
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mounted on a fixed panel in Radio Sets AN/GRC-32A and AN/GRC-32B. This operating control panel supports control units for operating Receiver-Transmitter RT-178/ARC-27 and also supports the interconnecting box and a loudspeaker. The control units, the interconnecting box and the loudspeaker (if supplied) are shipped in an *already interconnected condition*. Do not uncable these units except for service or replacement purposes.

3-33. CABLING BETWEEN INTERCONNECTING BOX J-499/GRC AND RECEIVER-TRANSMITTER RT-178/ARC-27. Attach Cable Assembly CX-2053/U between connector J-201 on the interconnecting box and connector J-1401 on the front panel of the receiver-transmitter. Similarly, connect Cable Assembly CX-2054/U between J-202 and J-1403 on the interconnecting box and receiver-transmitter, respectively.

3-34. CONNECTING RECEIVER-TRANSMITTER RT-178/ARC-27 TO ANTENNA AT-197/GR. Attach the free end of Cable Assembly CG-690A/U to antenna connector J-1405 on the receiver-transmitter. The other end of the cable assembly has already been connected to Cable Assembly CG-895/U, which leads to the antenna at the top of the mast; refer to paragraph 3-16. Cable Assembly CG-690A/U serves as a

flexible element which adapts the relatively stiff Cable Assembly CG-895/U to the antenna connector of the receiver-transmitter.

3-35. MISCELLANEOUS CONNECTIONS AT INTERCONNECTING BOX J-499/GRC. Plug Microphone T-17 into "MIC" jack J-205. Plug Cord CD-307A into "PHONES" jack J-204 and plug headset HS-33A into the jack at the other end of Cord CD-307A.

Note

The radio set is now ready for basic operation at the mast site. If remote-control operation is to be used, proceed with the instructions of paragraphs 3-36 and 3-37.

3-36. CONNECTING REMOTE CONTROL EQUIPMENT. (See figure 3-12.)

3-37. Remote Control Equipment RC-261 (consisting of Remote Control Unit RM-52 and Control Unit RM-53) enables the radio set to be operated remotely at distances up to one-quarter mile. The equipment is shipped less batteries. Six type BA-30 batteries are required; two for Control Unit RM-53, and four for Remote Control Unit RM-52. When a remote installation is used, Control Unit RM-53 is mounted adjacent

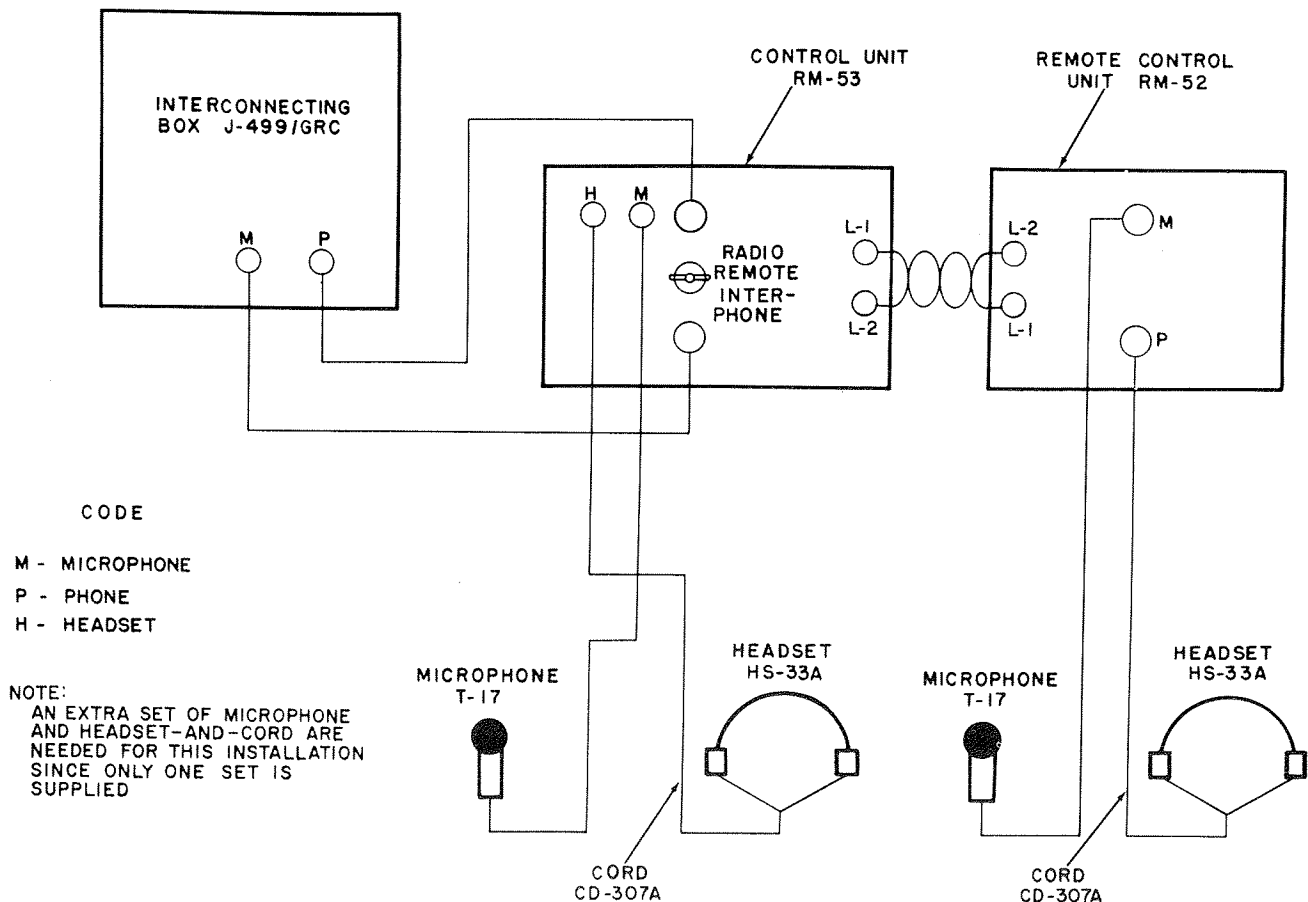


Figure 3-12. Remote Control Equipment RC-261 Connections

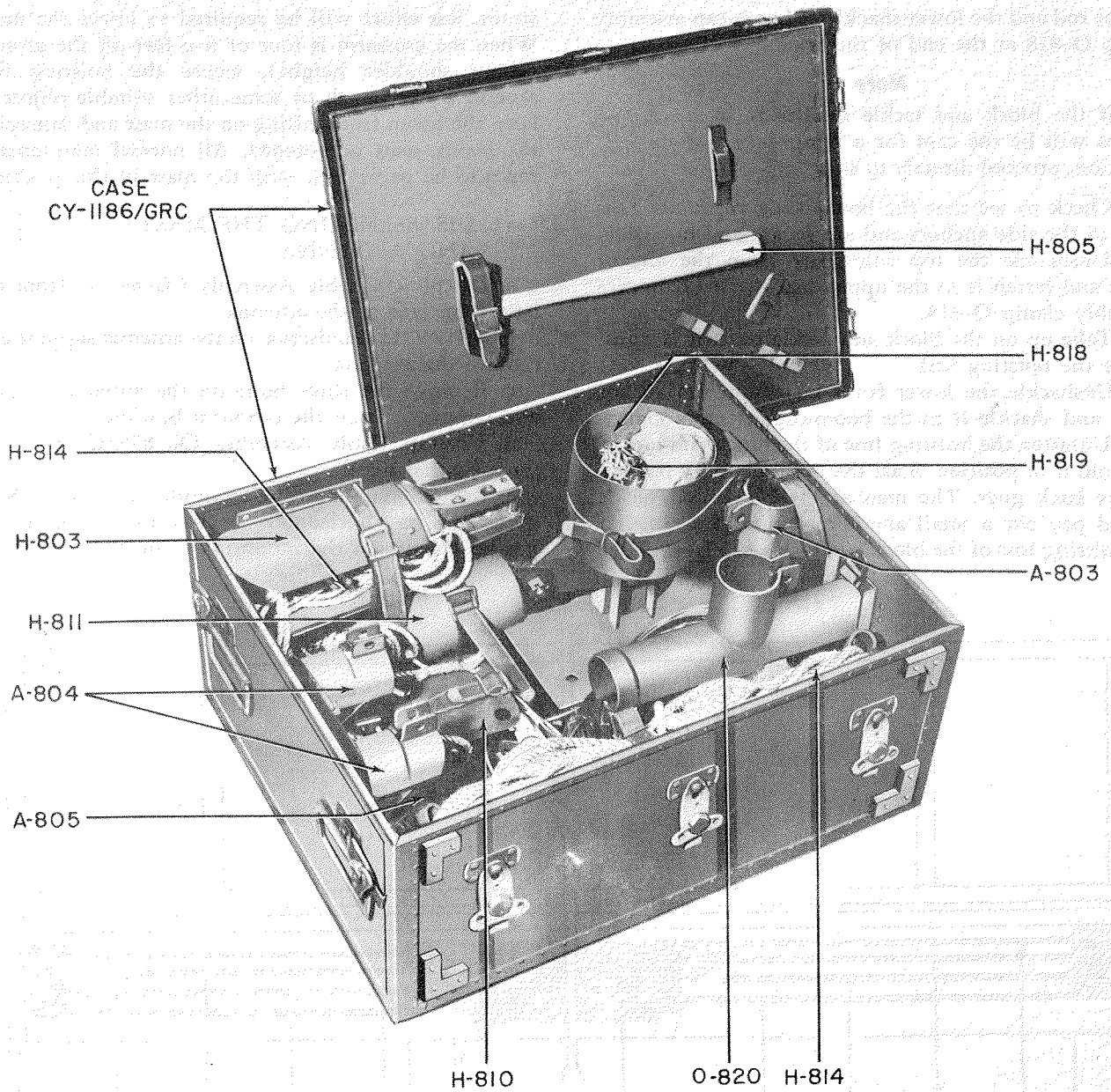


Figure 3-13. Mast Erection Kit Packed for Shipment

to the interconnecting box and Remote Control Unit RM-52 is mounted remotely. Two-conductor Wire WD-1/TT, supplied with the equipment on Spool DR-8, is used to connect them. The microphone and headset no longer used at the mast site are to be plugged into Remote Control Unit RM-52 for operation of the radio set from the remote location. Refer to Technical Manual TM 11-2632 for servicing and battery installation instructions.

3-38. PREPARATION FOR RESHIPMENT.

3-39. DISASSEMBLING THE RADIO SET.

a. Disconnect all cables except those on the operating control panel which interconnect Radio Set Con-

trols C-626/ARC-27 and C-628/ARC-27, Loudspeaker LS-166/U and Interconnecting Box J-499/GRC. Store the cables and other components of the radio set in the cabinets in which they were shipped. (Refer to table V.) If a remote installation was used, recover Remote Control Unit RM-52 and replace the wire on the spool.

b. Close and fasten the cabinet covers. Check to see that all the fasteners are fully locked and the cabinets themselves are not damaged.

3-40. LOWERING THE MAST.

a. Disconnect the power supply a-c cable from the power source; then disconnect Cable Assembly CG-690A/U from Cable Assembly CG-895/U.

b. Attach the block and tackle between the front anchor rod and the lower shackle of boom-cap-assembly clamp O-818 at the end of the boom.

Note

If the block and tackle is already in place, as will be the case for a temporary installation, proceed directly to step "g."

c. Check to see that the boom vang ropes are fastened to the side anchors and are secure and not slack.

d. Unshackle the top front guy from the anchor chain and fasten it to the upper shackle of boom-cap-assembly clamp O-818.

e. Take up on the block and tackle until it is tight; secure the hoisting line.

f. Unshackle the lower front guy from the anchor chain and shackle it to the boom-cap-assembly clamp.

g. Unfasten the hoisting line of the block and tackle, but hold it in position. Start the mast down by pulling on the back guys. The man at the block and tackle should pay out a small amount of line at a time. If the hoisting line of the block and tackle can be snubbed

around a tree or other object that can withstand the strain, less effort will be required to lower the mast. When the crossarm is four or five feet off the ground (about shoulder height), secure the hoisting line around a tree, truck or some other suitable object to keep the boom from falling on the mast and damaging the boom, mast or antenna. All normal maintenance can also be performed with the mast in this position.

3-41. DISASSEMBLING THE MAST AND ANTENNA.

a. Disconnect Cable Assembly CG-895/U from the base connector of the antenna.

b. Loosen the handscrew on the antenna support and remove the antenna.

c. Remove the three bolts on the antenna support and remove it from the crossarm bracket.

d. Unstrap Cable Assembly CG-895/U from the crossarm and mast.

e. Remove the mounting assembly (vertical, A-803) or assemblies (horizontal, A-804) by loosening the hex-head bolts on the mounting clamps.

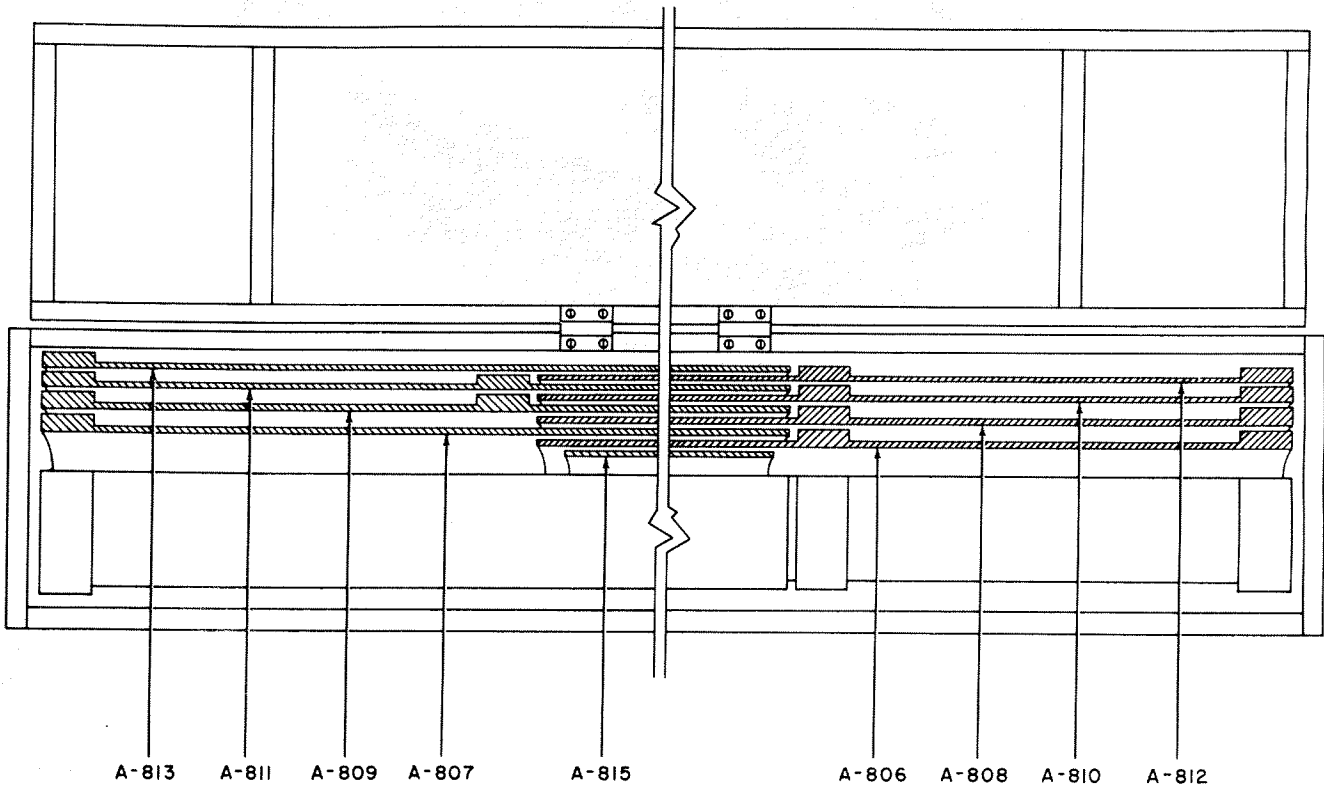


Figure 3-14. Mast Nesting Diagram

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- f. Loosen the hex nut on cap-and-guy assembly O-820 and remove the crossarm from the cap.
- g. Unfasten the hoisting line of the block and tackle and lower the mast gently to the ground.

CAUTION

Do not allow the boom to fall. If the mast is to be disassembled, lower the boom gently, guiding it down by hand. Disengage the boom from the clamp socket of the mast base and lay the boom alongside the lowered mast.

- h. Unshackle all guy wires from the anchor chains, loosening the turnbuckles of the guys, if necessary, to provide slack.
- i. Remove cap-and-guy assembly O-820. Coil the wires carefully so that they do not kink or tangle.
- j. Disassemble the mast sections.
- k. Remove collar-and-guy assembly O-819. Coil the wires carefully so that they do not kink or tangle.
- l. Untie the boom vang ropes from the side anchor rods.
- m. Remove rope assembly O-818 and coil the ropes.

- n. Disassemble the two boom sections.
- o. Unshackle the anchor chains from the anchor rods.
- p. Dig up the anchor rods, anchor plates, mast-base assembly and spikes. Clean these parts before repacking them.
- q. Coil Cable Assemblies CG-895/U and CG-690A/U on their spool, as shown in figure 3-9.
- r. Turn the antenna rods to disengage them from the antenna column. Rotate the spoked disc counter-clockwise to free it from the antenna column. Strap the twelve rods to the antenna column with the linked straps supplied in Antenna Case CY-728/GRC. Pack the antenna mounting hardware in its bag and replace it in the antenna case.
- s. Replace the antenna and mast parts in the cases in which they were originally shipped. Refer to figures 3-9 for Antenna Case CY-728/GRC, figure 3-13 for stowage in Mast Erection Kit Case CY-1186/GRC and figure 3-14 for nesting mast sections and stowage in Mast Case CY-1185/GRC. Be sure that the covers of the cases are securely locked and fastened tightly.

SECTION IV THEORY OF OPERATION

4-1. GENERAL.

4-2. Radio Sets AN/GRC-32, AN/GRC-32A and AN/GRC-32B are portable ground-equipment adaptations of Radio Set AN/ARC-27, which is an airborne, 27.5-volt battery-powered radio used for reception, transmission or automatic direction finding in the uhf band. In its portable ground version, Radio Set AN/ARC-27 is used as a ground-based, two-way radio set and is operated from a 50 to 60 cps, single-phase, 115-volt or 230-volt a-c source. The basic adaptation of Radio Set AN/ARC-27 in these systems consists of replacing the aircraft antenna with a mast and antenna, and replacing the battery power source with one of the three available power supplies. Also supplied are portable operating cabinets, an interconnecting box, accessories and necessary cables. Mast AB-282/GRC and Antenna AT-197/GR provide for the transmission and reception of signals to other bases or to aircraft in flight. The antenna is a disc-cone type covering the range of 225 to 400 mc. The three power supplies available are designated PP-823/GRC, PP-893/GRC-32A and PP-894/GRC-32B; the first is used with Radio Set AN/GRC-32, the second with Radio Set AN/GRC-32A and the third with Radio Set AN/GRC-32B.

4-3. The first two power supplies, PP-823/GRC and PP-893/GRC-32A, require the use of DC Power Filter F-170/GRC as part of the system. The two power supplies are very nearly identical electrically, and differ mechanically only in the type of switch used for adjusting the a-c input voltage and in the length of integral a-c power cord. Power Supply PP-894/GRC-32B differs mechanically and electrically from the other two, in that both a power supply and a d-c power filter have been built into one chassis. In spite of these differences, design and operation of the three power supply systems are basically similar. The interconnecting box and cables provide for the necessary connections between all the units of a system.

4-4. This section is concerned primarily with Power Supplies PP-823/GRC, PP-893/GRC-32A, PP-894/GRC-32B, DC Power Filter F-170/GRC and Interconnecting Box J-499/GRC. Detailed information will be supplied only for those components. Information of a general nature is supplied here for Radio Set AN/ARC-27 and Remote Control Equipment RC-261. For detailed information about the theory of operation of Radio Set AN/ARC-27 or Remote Control Equipment RC-261 components, refer to AN 16-30ARC27-3.

the Handbook of Maintenance Instructions for Radio Set AN/ARC-27, and/or Technical Manual TM 11-2632, covering the remote control equipment.

4-5. FUNCTIONAL THEORY OF OPERATION.

4-6. Radio Sets AN/GRC-32, AN/GRC-32A and AN/GRC-32B function identically in operation and are similar in detail, except for those differences discussed in paragraphs 1-7 and 4-3. Therefore, it is to be understood that the information in the following paragraphs refers to all three radio sets, unless otherwise stated. Refer to figures 1-1, 1-2, 1-3 and 1-4 for illustrations of each of the three radio sets and the mast and antenna. Figures 4-7, 4-8 and 4-9 show each radio set in block diagram form.

4-7. It is the function of the radio set to provide two-way communication for ground-to-air, ground-to-ship or ground-to-ground stations. Communications from the equipment are made by voice, over any one of 1750 discrete frequencies which are crystal-controlled. These frequencies cover the range of 225.0-399.9 mc in steps of 0.1 mc. Transmission and reception are on the same frequency and both functions make use of the same antenna.

4-8. The chief component of the radio set is Receiver-Transmitter RT-178/ARC-27 (part of Radio Set AN/ARC-27) and its associated control units. The receiver-transmitter contains its own high-voltage power supply, which is the output of a dynamotor

operated from 27.5 volts dc obtained from the power supplies described in paragraphs 4-2 and 4-3. It also contains all of the other circuits necessary for operation as a complete radio, all mounted in one enclosure. To achieve operation as either a receiver or a transmitter, several of its circuits are arranged to operate bilaterally, the signal passing through them in one direction during reception, and in the opposite direction during transmission. The circuits used both in reception and transmission are the i-f amplifiers and the crystal-controlled oscillator circuits.

4-9. The main receiver employs a triple conversion superheterodyne circuit; see figure 4-1. R-f amplifier stages are followed by the 20-30 mc i-f amplifier, which is followed by the fixed-tuned 5.7-4.8 mc i-f amplifier. After another frequency conversion to 3.45 mc, and amplification at this frequency, the signal is applied to two detectors, the avc detector and the final detector. Audio output is made available at a headset jack.

4-10. The guard-channel receiver is a dual-conversion superheterodyne. It has its own avc detector and final detector, and thus is independent of the main channel. The guard-channel receiver can be set to monitor any one of the channels in the range of 238.0-248.0 mc.

4-11. The transmitter consists of a crystal-controlled frequency-generation system, a preamplifier unit, and a power amplifier unit, see figure 4-2. The frequency-generation system employs the same crystals used for receiver frequency conversion. The power amplifiers

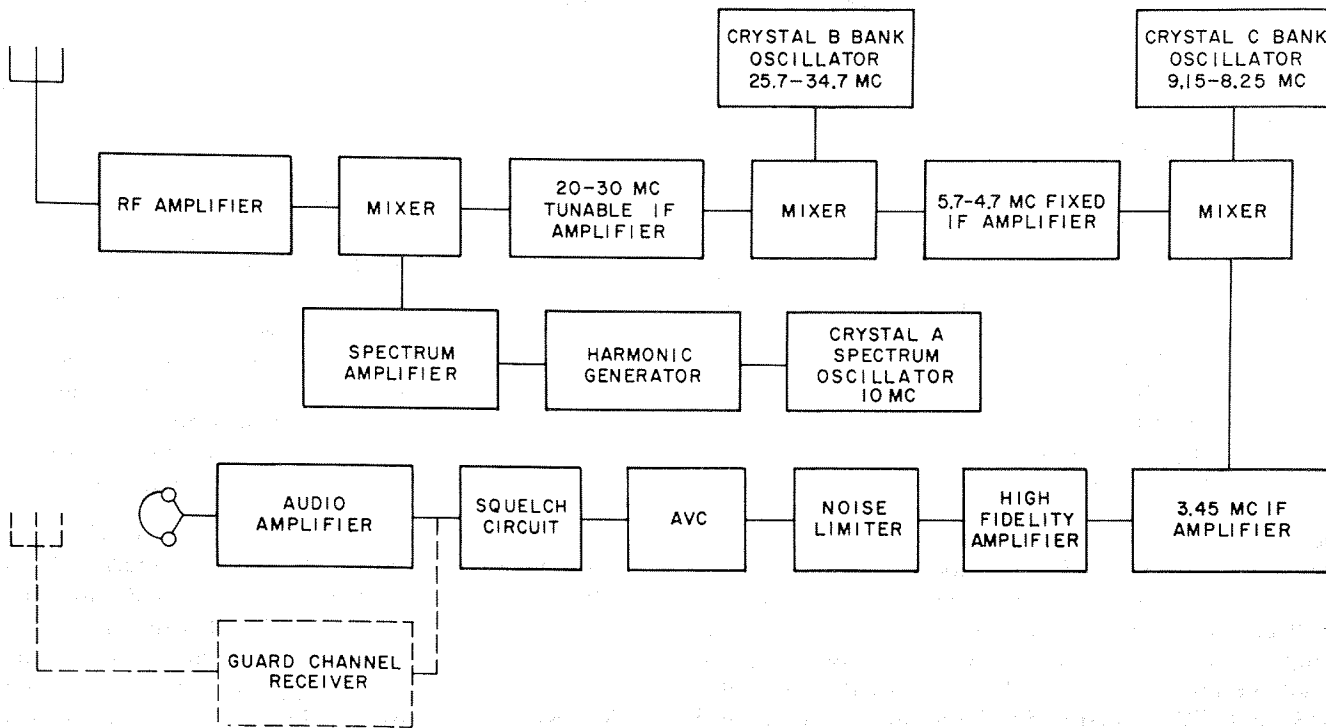


Figure 4-1. Block Diagram of Main Receiver of Receiver-Transmitter RT-178/ARC-27

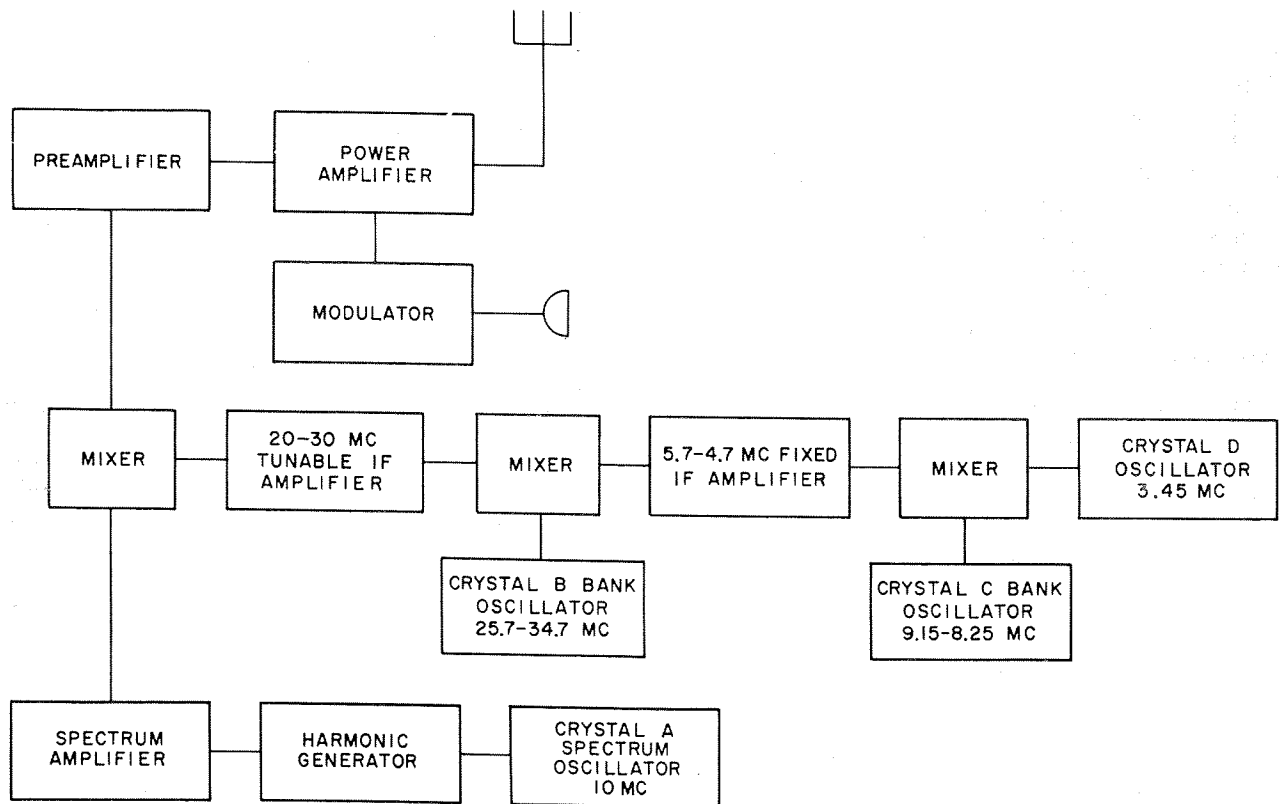


Figure 4-2. Block Diagram of Transmitter of Receiver-Transmitter RT-178/ARC-27

raise the r-f output level to approximately 10 watts over the entire available output frequency range. The frequency-generation system is the same as that which converts all incoming signals to a final i-f of 3.45 mc for the receiver. In transmitting, a 3.45-mc crystal oscillator replaces this i-f signal and the 5.7-4.8 mc and 20-30 mc amplifiers are arranged to amplify in the opposite direction. The output frequency is obtained from the sum of the spectrum frequency and the 20-30 mc intermediate frequency. This is amplified first in the transmitter preamplifier and then in the power amplifier.

4-12. Frequency selection is made either by the autotune or the autopositioner. The autopositioner provides for the choice of any one of the 1750 available frequency channels. The autotune provides for the choice of any one of 18 preset channels, the guard channel or manual tuning (i.e. the use of the autopositioner). In using both the autotune and the autopositioner, changing the frequency controls starts the operation of an open-circuit-seeking switch system, which causes a motor to rotate. The motor rotates until the selected frequency is reached, at which time the open-circuit condition is satisfied. Refer to AN 16-30ARC27-3, the Handbook of Maintenance Instructions for Radio Set AN/ARC-27, for details.

4-13. Either Radio Set Control C-626/ARC-27 or C-628/ARC-27 provides the operation and frequency-

selection controls for the radio set, depending on the setting of the "LOCAL-REMOTE" switch on Radio Set Control C-626/ARC-27. Radio Set Control C-626/ARC-27 (the "MASTER" Control Unit) has the "ON-OFF" switch, both autotune and autopositioner controls, and controls the operation of the set as a receiver, transmitter, for ADF or on the guard channel, or for certain combinations of these functions. Radio Set Control C-628/ARC-27 (the "remote" unit) was provided in the airborne set for the use of the pilot. It has autotune controls, a volume control and a selector switch which controls the operation of the set for either transmission and reception, ADF or on the guard channel. Refer to AN 16-30ARC27-3, the Handbook of Maintenance Instructions for Radio Set AN/ARC-27, for details.

Note

Radio Set AN/ARC-27 was originally designed for aircraft installation. Therefore, Radio Set AN/ARC-27 controls are marked accordingly. The "LOCAL" or "REMOTE" positions (marked on Radio Set Control C-626/ARC-27) originally designated operation at the receiver-transmitter ("LOCAL") or operation at the pilot's radio set control box ("REMOTE"). These terms when applied to Radio Set AN/GRC-32, AN/GRC-32A or AN-GRC-32B have a slightly different mean-

Section IV

Paragraphs 4-14 to 4-21

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ing. "LOCAL" operation is considered to be that obtained from Radio Set Control C-626/ARC-27, while "REMOTE" operation is that obtained at Radio Set Control C-628/ARC-27. Both radio set controls are situated near Receiver-Transmitter RT-178/ARC-27 in all three radio sets, so that true "remote" operation is not obtainable with these units. Remote Control Equipment RC-261, consisting of Remote Control RM-52 and Control Unit RM-53, provides actual remote operation of the receiver-transmitter.

4-14. The remote control equipment (Control Unit RM-53 and Remote Control Unit RM-52) is supplied with enough wire to permit remote operation of the radio set from a distance of one-quarter of a mile. Refer to Technical Manual TM 11-2632, covering Remote Control Equipment RC-261, for details.

4-15. Antenna AT-197/GR and Mast AB-282/GRC are supplied for use with Radio Sets AN/GRC-32, AN/GRC-32A and AN/GRC-32B. The antenna is of the broad-band, disc-cone type. It is omni-directional in azimuth and operates over the range 225-400 mc. The mast is a structure 55 feet high when raised, and consists of sections which are fitted together in telescopic fashion for assembly and which are nested together (inside one another) in a small space when disassembled. The mast supports the antenna and r-f Cable Assembly CG-895/U when erected. The mast sections, boom sections, mast parts and hardware, tools, mast case and mast erection kit case all comprise Mast AB-282/GRC.

4-16. DETAILED THEORY OF OPERATION.

4-17. POWER SUPPLIES.

4-18. Power Supplies PP-823/GRC, PP-893/GRC-32A and PP-894/GRC-32B are essentially similar when DC Power Filter F-170/GRC is used with the first two units. The latter supply utilizes an integral filter. Therefore, it should be understood that the information and circuit analysis in this section applies to all three power supplies, unless the text specifically states otherwise.

4-19. The function of each power supply is to provide d-c power for the operation of the dynamotor and tube filaments in the receiver-transmitter when operating from a 115-volt or 230-volt, 50 to 60 cps, single-phase a-c source. Each of Power Supplies PP-823/GRC and PP-893/GRC-32A provides a continuous-duty d-c output of 21 volts at 27 amperes having a ripple voltage of 12 volts rms. The external filter converts this to 27.5 volts dc and reduces the ripple to a maximum of 0.35 volts rms at rated load. Since Radio Set AN/ARC-27 draws an average current of considerably less than 27 amperes, the ripple content never exceeds one percent rms when used with Radio Set AN/ARC-27. Power Supply PP-894/GRC-32B provides a continu-

ous-duty output of 27.5 volts dc at 20 amperes having a ripple voltage of one percent rms maximum at rated load.

4-20. INPUT AND RECTIFIER CIRCUITS. Schematic diagrams of the three power supplies appear in figures 7-1, 7-2 and 7-3. The a-c input is applied through line fuses F-101 and F-102 to the primary windings of step-down transformer T-101. To enable the power supply to operate from either a nominal 115-volt or 230-volt source, the "INPUT VOLTAGE RANGE" switch is arranged so that the two primary windings of T-101 can be connected either in series or in parallel. For the low-voltage range, the windings are connected in parallel, while a series arrangement (doubling the effective number of primary turns) is used for the high-voltage range. The primary windings are also tapped to permit the power supply to compensate for variations of ± 10 percent from the nominal a-c input voltages. The tapped windings are connected to the "INPUT VOLTAGE ADJUSTMENT" switch(es), which can be set for operation from 105, 115 or 125 volts on the low-voltage range, or from 210, 230 or 250 volts when operating from a high-voltage source. The only significant difference between Power Supply PP-823/GRC and Power Supply PP-893/GRC-32A, other than a difference in a-c input cables, is that the former utilizes two separate toggle switches (S-102 and S-103, figure 7-1) for input-voltage adjustment, while the latter uses a single rotary switch (S-102, figure 7-2). The input-voltage adjustment switch on Power Supply PP-894/GRC-32B is also a rotary type.

4-21. The voltage from the secondary of T-101 is applied to selenium dry-disc bridge rectifiers (CR-101 and CR-102) which convert the transformed a-c input to a full-wave rectified d-c voltage. The rectifier is contained in two banks in Power Supplies PP-823/GRC and PP-893/GRC-32A, and in one bank in Power Supply PP-894/GRC-32B. Lamp E-101, connected across the secondary winding, indicates the presence or absence of voltage. In Power Supply PP-894/GRC-32B, a dropping resistor (R-101) is connected in series with the lamp. A selenium rectifier consists of a metallic junction of selenium and an alloy contact electrode applied in a thin coating to a processed steel or aluminum plate. In a selenium rectifier the forward resistance is much lower than the backward resistance. This is directly analogous to a diode vacuum tube where electrons flow from the cathode to the plate but not in reverse. Refer to figure 4-3 for a simplified diagram of the power supply. During the input a-c half-cycle, when the polarities are as shown in figure 4-3, current will flow (from positive to negative) in the direction indicated by the arrow through CR-101B, through the load and through CR-102A. This establishes the indicated polarity of output voltage across A-B. During the reverse input a-c half-cycle, current will flow (from positive to negative) through CR-102B, through the load and through CR-101A. The

indicated polarity of output voltage across *A-B* remains the same. The output of the selenium units is taken for ultimate use in a load or for additional filtering. Explicitly, the output from Power Supply PP-823/GRC or PP-893/GRC-32A is applied to DC Power Filter F-170/GRC, while the output from the rectifiers in Power Supply PP-894/GRC-32B is connected directly through a filter circuit, which is an integral part of that unit.

4-22. **FILTERING.** DC Power Filter F-170/GRC (see figure 7-4) is a capacitance-input, pi-section filter used in conjunction with Power Supply PP-823/GRC and Power Supply PP-893/GRC-32A. It serves the dual purpose of reducing output ripple voltage and boosting the d-c input from Power Supply PP-823/GRC or PP-893/GRC-32A and thus raises the delivered d-c voltage from the filter by its capacitance effect. It is designed to operate from an input of 21 volts dc at 27 amperes with a ripple of 12 volts rms and to supply at its output 27.5 volts dc at 27 amperes with a maximum ripple of 0.35 volt rms at full rated load. When used with Radio Set AN/GRC-32 or AN/GRC-32A, the output voltage of the filter is higher than 27.5 volts because the current drain of the equipment is lower than the power supply and filter rating. Under these loads, the filter ripple voltage is also reduced from that obtained at rated load.

4-23. The input-capacitance section (C-601 through C-622) of the pi filter reduces the 12-volt a-c ripple at rated load to 1.5 volts ac. Filter choke L-601 and the output-capacitance section (C-623, C-624 and C-625) of the filter further reduce the ripple to 0.35 volt ac at rated load or as low as 0.15 volt when the radio set is functioning for reception. The input-capacitance section lowers ripple by discharging only

partially each cycle after being once initially charged by the fluctuating dc from the power supply. Further attenuation of the ripple is obtained with the choke, which resists any tendency for the load current to fluctuate. Finally, the output-capacitance section absorbs much of the remaining ripple by discharging only partially after each ripple cycle. Bleeder resistor R-601 provides improved regulation and insures that the capacitors will discharge in a reasonable time after removing the input voltage to the filter while the load is disconnected.

4-24. The filter incorporated into Power Supply PP-894/GRC-32B differs from that of DC Power Filter F-170/GRC in that a choke-input, L-section configuration is used; see figure 7-3. Both types of filter circuits utilize a similar value of inductance and have a high value of shunt capacitance. In either case, the ripple voltage is reduced to the same low level, one percent rms maximum, with Radio Set AN/ARC-27 functioning for reception. Since the function and application of both filter circuits are identical, the discussion of the external filter in the two preceding paragraphs can be applied to the filter section of Power Supply PP-894/GRC-32B.

4-25. **OUTPUT VOLTMETER.** An output voltmeter (M-101) is connected across the output of each power supply. Therefore, the meter is connected across the output terminals of rectifier CR-101 in Power Supplies PP-823/GRC and PP-893/GRC-32A, at the input of the external filter; see figures 7-1 and 7-2. In Power Supply PP-894/GRC-32B, the meter is connected across the output of the filter section; see figure 7-3.

4-26. The meter has a green area extending from 24 to 29 volts on its scale. This area represents the limits of the normal operating voltage of the power supply.

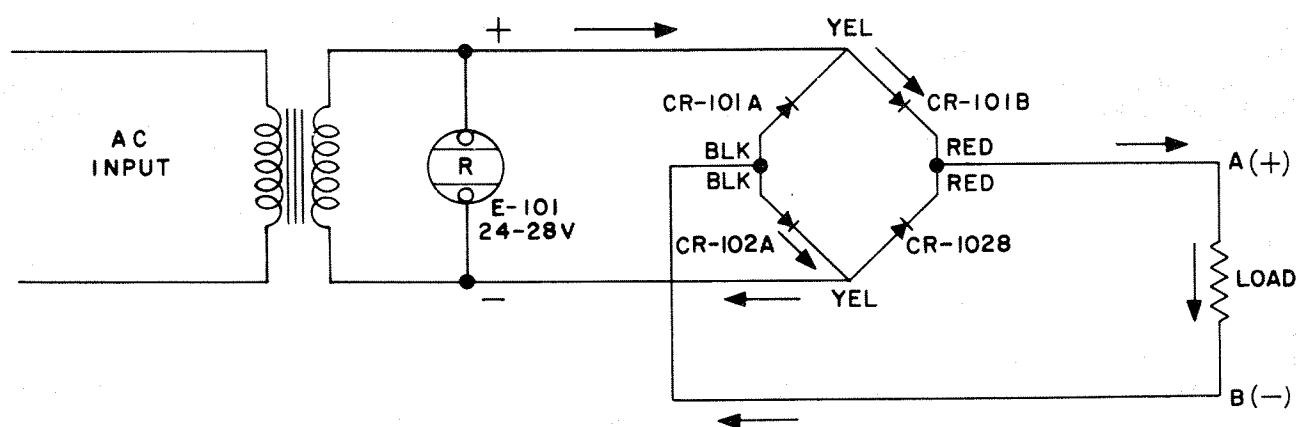
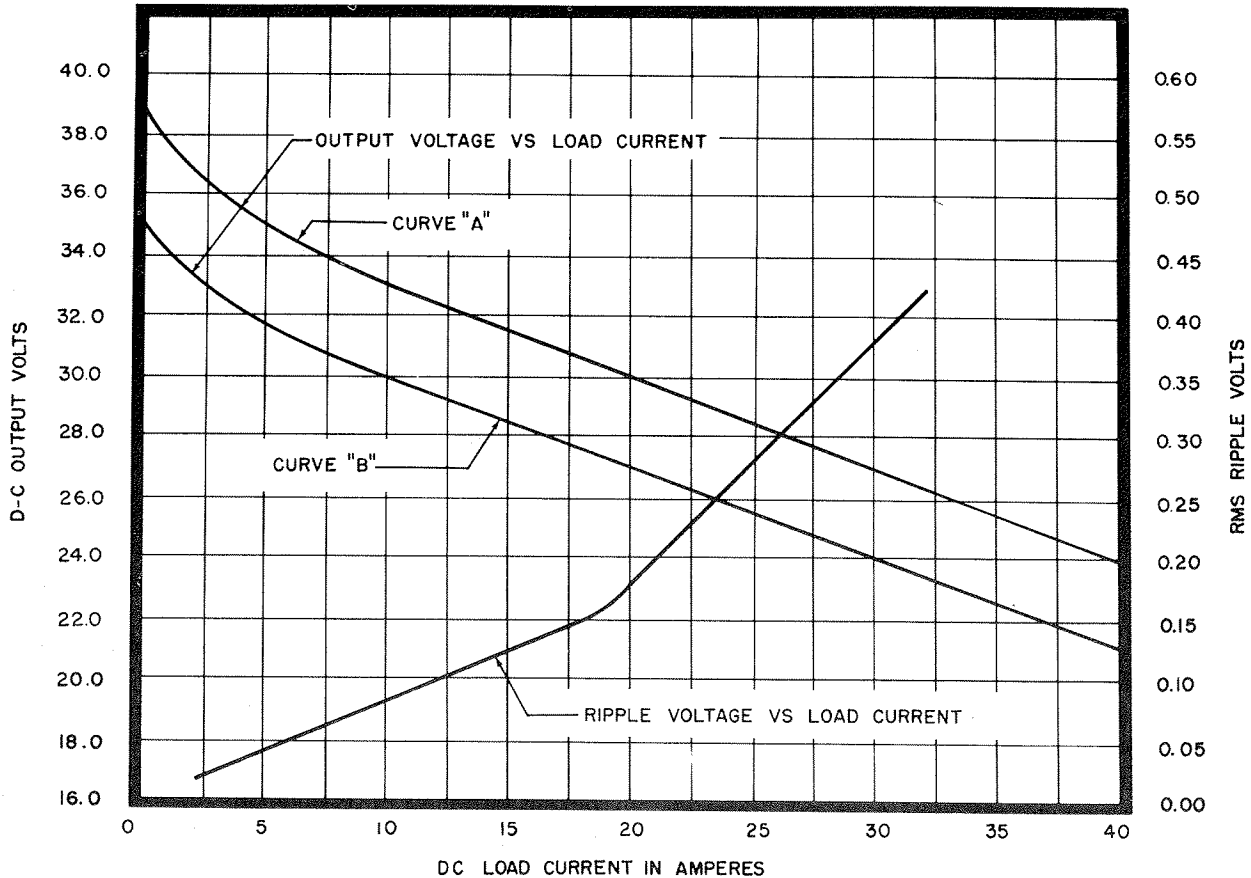


Figure 4-3. Simplified Schematic Diagram of Power Supply

MEASUREMENTS TAKEN AT OUTPUT OF FILTER F-170/GRC



CURVE "A" TAP ADJUSTMENT FOR 115-VOLT OPERATION } WITH 115-VOLT A-C INPUT
 CURVE "B" TAP ADJUSTMENT FOR 125-VOLT OPERATION }

Figure 4-4. Regulation and Ripple Characteristics of Power Supplies PP-823/GRC and PP-893/GRC-32A with DC Power Filter F-170/GRC

However, the readings on the meters of Power Supplies PP-823/GRC and PP-893/GRC-32A differ from the input to the receiver-transmitter by up to 2.5 volts at full load. This condition is due to a 1-volt drop in the external filter and a 1.5-volt drop in the interconnecting cables between power supply and receiver-transmitter. The voltage reading on the meter of Power Supply PP-894/GRC-32B differs from the receiver-transmitter input by only 1.5 volts because no external filter is used.

4-27. REGULATION. Output voltage depends on load current, as shown in the regulation characteristics of figures 4-4 and 4-5. When a load current of less than 23 amperes is drawn from the power supply and separate filter (DC Power Filter F-170/GRC combined with either Power Supply PP-823/GRC or PP-893/GRC-32A), as is the case when operating the radio set during reception, the output voltage will be higher than 29 volts and will therefore be outside the green area. If it is necessary to supply a voltage below 29 volts at low load currents, the front-panel "INPUT VOLTAGE ADJUSTMENT" switch(es) may be ad-

justed accordingly. For example: if the input source supply voltage is 115 volts ac and the expected load current is less than 23 amperes, adjust the switch(es) for 125-volt operation. The output voltage curve for this adjustment is shown as curve "B" on figure 4-4. The curve indicates that with this resetting, a load as low as 13 amperes will still give proper output voltage (within the green area of the "D.C. OUTPUT VOLTS" meter). If the primary source is as high as 125 or 250 volts, it is not possible to set the adjustment switches on the power supply to a higher setting in order to reduce the d-c output voltage of the power-supply system. In this case the system would operate with a voltage indication above the green area on the meter scale. Such operation is possible although the dynamotor windings and the vacuum-tube filaments of the receiver-transmitter will be somewhat overloaded and shorter life of Radio Set AN/ARC-27 will result. Where feasible, connect a high-current variable auto-transformer or series dropping resistor at the input of Power Supply PP-823/GRC or PP-893/GRC-32A. None of this will be necessary with Power Supply PP-894/GRC-32B because its regulation is centered

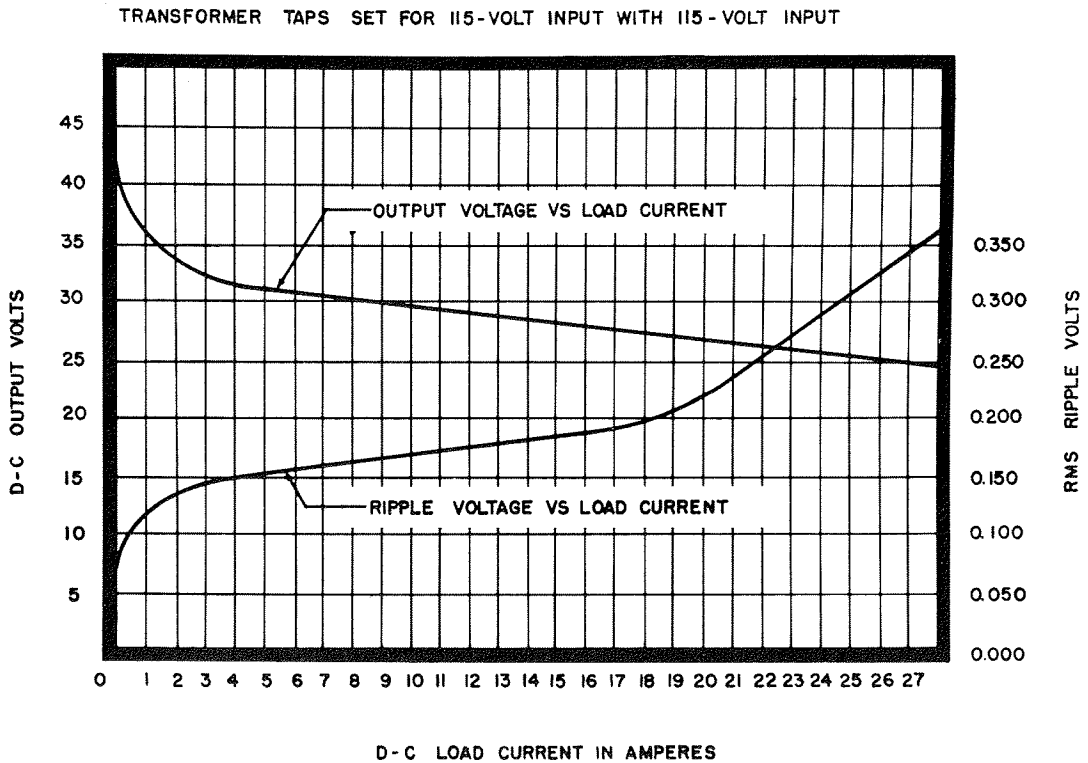


Figure 4-5. Regulation and Ripple Characteristics of Power Supply PP-894/GRC-32B

about the normal current drain of Radio Set AN/ARC-27 and the overvoltage condition will not exist.

CAUTION

The pointer on voltmeter M-101 should never read below 24 volts under load. This condition indicates excessive load current. Reset the input power switches to raise the output voltage for a particular load current, when necessary.

4-28. It is only permissible to operate within the 24- to 26.5-volt range when using highly "aged" selenium rectifiers. In this condition, the d-c output voltage will not be as high as indicated by figures 4-4 and 4-5 for a particular load current. However, if a load current exceeding 30 amperes is being drawn, the caution note following paragraph 4-27 will apply.

WARNING

Do not reset "INPUT VOLTAGE ADJUSTMENT" switch(es) while the power supply is operating if an explosive atmosphere is present. There is some arcing between switch contacts when switching is done with an energized power supply and this may constitute a hazard in the presence of explosive fumes.

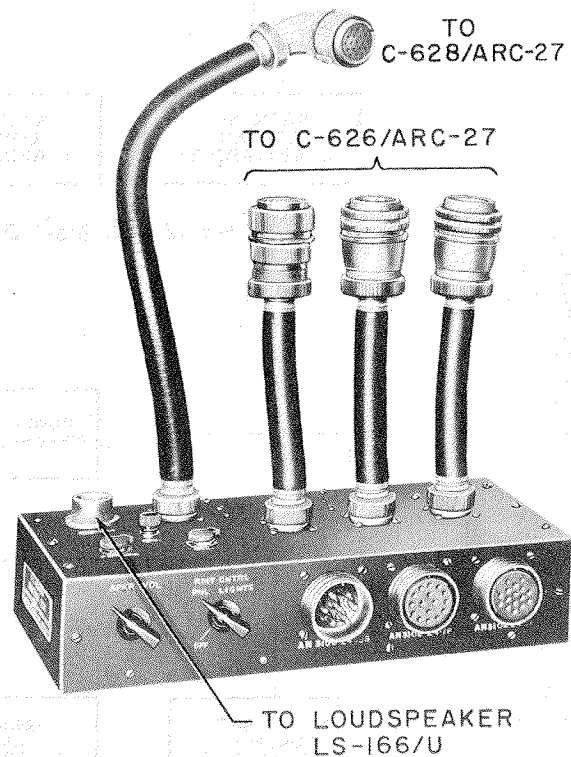


Figure 4-6. Interconnecting Box J-499/GRC

AN 16-30GRC32-2

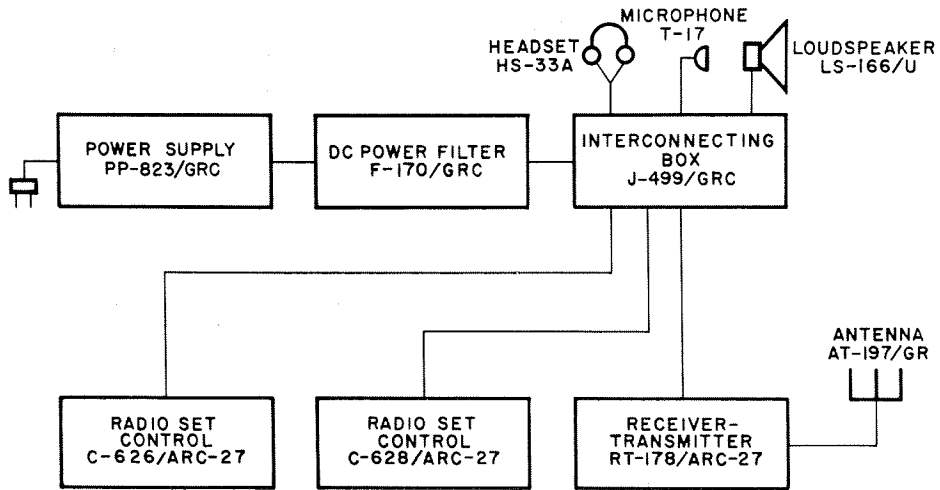


Figure 4-7. Block Diagram of Radio Set AN/GRC-32

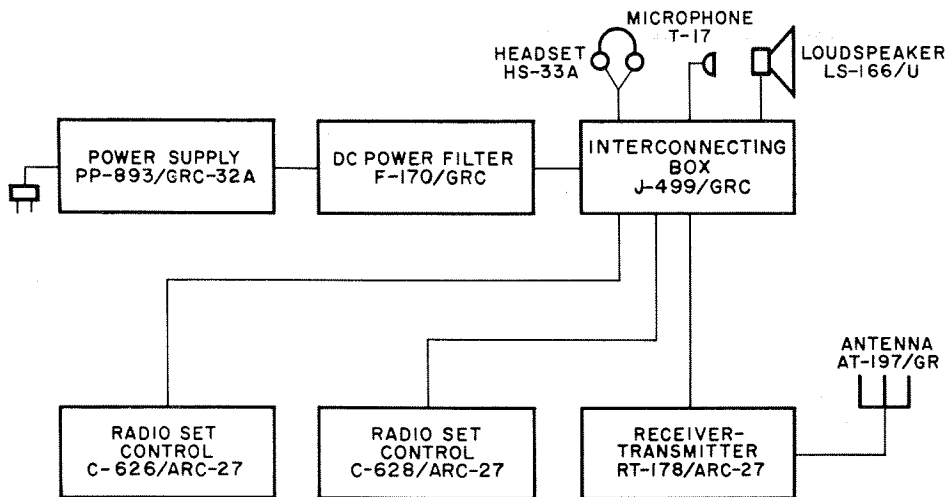


Figure 4-8. Block Diagram of Radio Set AN/GRC-32A

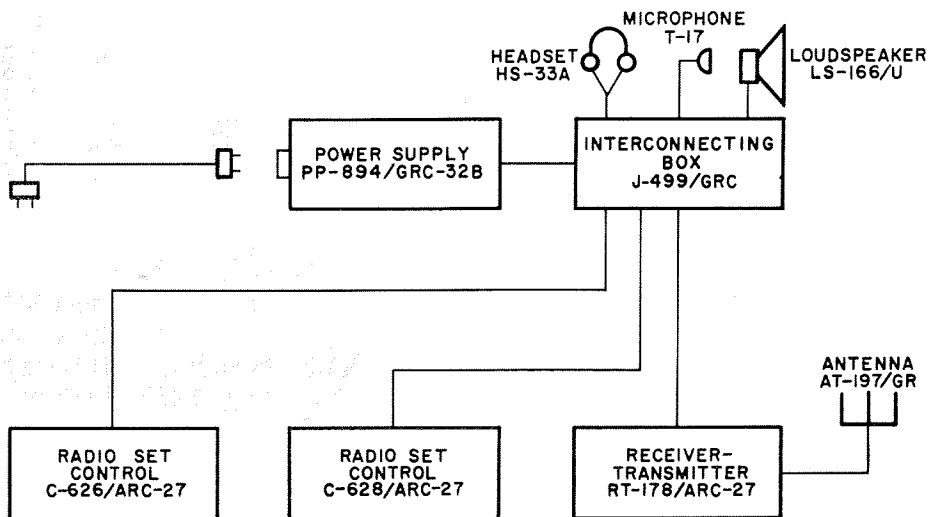


Figure 4-9. Block Diagram of Radio Set AN/GRC-32B

AN 16-30GRC32-2

4-29. INTERCONNECTING BOX J-499/GRC.

4-30. Through the interconnecting box and its cables, as shown in figures 7-10, 7-11 and 7-12, are made all connections for the transfer of audio signal, for power distribution and for the operation of the radio set controls. Two potentiometers are mounted on the interconnecting box. One, R-201, serves to dim the panel lights on Radio Set Control C-628/ARC-27. The other, R-202, is the loudspeaker volume control. Also mounted on the interconnecting box (see figure 4-6) are jacks for connections to the loudspeaker, headset and microphone, as well as four special-purpose cable assemblies for connections to the radio set controls and

three connectors for cables to the power supply and to the receiver-transmitter.

4-31. DETAILED SYSTEM OPERATION.

4-32. Sufficient information has been presented in preceding paragraphs of this section to give maintenance personnel an adequate understanding of the basic components of Radio Sets AN/GRC/32, AN/GRC-32A and AN/GRC-32B. Refer to figures 4-7, 4-8 and 4-9 for block diagrams of each overall system. The block diagrams relate the component parts of the system to the complete structure and require no additional explanatory text.

SECTION V

ORGANIZATIONAL AND OPERATIONAL MAINTENANCE

5-1. SCOPE.

5-2. This section outlines maintenance work which may be performed at organizational and operational maintenance levels. As previously explained in preceding sections of this handbook, Radio Sets AN/GRC-32, AN/GRC-32A and AN/GRC-32B are simply ground versions of airborne Radio Set AN/ARC-27. This section is concerned with only those components of Radio Sets AN/GRC-32, AN/GRC-32A and AN/GRC-32B that are different from the components of Radio Set AN/ARC-27. For maintenance information regarding Radio Set AN/ARC-27, refer to AN 16-30ARC27-3, the handbook of maintenance instructions for that equipment. Also, as stated in preceding sections of this handbook, Radio Sets AN/GRC-32, AN/GRC-32A and AN/GRC-32B are supplied with Remote Control Equipment RC-261. For maintenance information concerning the remote control equipment, refer to Technical Manual TM 11-2632.

5-3. ROUTINE MAINTENANCE OF ELECTRONIC COMPONENTS.

5-4. GENERAL.

5-5. Reasonable care in transporting, handling and operating the units will prolong the useful life of the radio set and minimize trouble. Keep the power turned off when the units are not in use. Protect the units from moisture, dust and temperature extremes as far as it is practicable. It is desirable to make a daily check of the exterior of all units and the interior of the power supply and separate filter for Radio Set AN/GRC-32 and AN/GRC-32A or the power supply and integral filter used with Radio Set AN/GRC-32B. The one-hour non-operating period each day is the proper time for this check.

5-6. REMOVAL.

5-7. POWER SUPPLIES PP-823/GRC, PP-893/GRC-32A AND PP-894/GRC-32B. To remove a power supply, follow the procedure indicated in the following paragraphs. Be sure that the "POWER ON-OFF" switch is in the "OFF" position.

5-8. To remove Power Supply PP-823/GRC from Cabinet CY-1187/GRC-32, disconnect the integral 100-foot cable, W-101, from the power source and feed several feet of the cable through the hole at the rear of the cable compartment as the unit is pulled forward by its guard rail handles from the slide angles in the power supply compartment. The power supply may now be handled as desired even though the bulk of the integral a-c cord is still retained in the cable compartment.

5-9. To remove Power Supply PP-893/GRC-32A from Cabinet CY-1191/GRC-32A, detach the separate extension cable assembly, W-901, from the connector at the short integral cable of the power supply. Unfasten the two cable clamps which support the short integral cable in the upper shelf of the cabinet by unscrewing the clamps from the shelf. With the clamps still fastened to the cable, the unit may be removed by pulling outward from the compartment as the short cable is fed back through the slot at the rear of the shelf.

5-10. To remove Power Supply PP-894/GRC-32B from Cabinet CY-1191/GRC, detach the separate extension cable assembly, W-901, from the power supply front-panel receptacle. Pull out on handles of unit to remove it from its compartment.

5-11. DC POWER FILTER F-170/GRC. (The following is not applicable to Radio Set AN/GRC-32B.) Disconnect cable assemblies W-401 and W-701. Draw the filter out of its cabinet by means of the handles or

the front panel. It should slide out easily on the mounting slide angles.

5-12. RECEIVER-TRANSMITTER RT-178/ARC-27. Disconnect cable assemblies W-501, W-302 and W-201. Pull the receiver-transmitter out of its cabinet by means of the handles on the front panel.

5-13. OPERATING CONTROL PANEL. Disconnect cable assemblies W-401, W-301 and W-302 from their receptacles on the interconnecting box. Disconnect the loudspeaker cord from its connection on the interconnecting box. Do not attempt to remove permanent cables W-201, W-202, W-203 and W-204. Four units, the interconnecting box, the loudspeaker and the two radio set controls, are fastened to the panel. In Radio Set AN/GRC-32, this panel pivots out of Cabinet CY-1184/GRC, which also houses the receiver-transmitter. In Radio Sets AN/GRC-32A and AN/GRC-32B, this panel is fixed in position in its separate Cabinet CY-1288/GRC. It is not recommended that the small units be removed from the operating control panel except in case of trouble.

5-14. INSPECTION AND CLEANING.

5-15. POWER SUPPLIES PP-823/GRC, PP-893/GRC-32A AND PP-894/GRC-32B. Inspect the interior for dust, dirt, corrosion and blistering or signs of excessive heating. Inspect all cable assemblies for rubber deterioration, excessive wear, cuts and kinks. Remove grease and oil from the cable assemblies with a cloth moistened with dry-cleaning solvent, Federal Specification P-S-661. Clean the "DC OUTPUT VOLTS" receptacle (J-101), the "DC OUTPUT VOLTS" meter (M-101), the pilot lamp (E-101) and the exterior of the chassis and panel with a soft cloth. Make certain that all the selenium rectifiers are in place. Check the power transformer for blistering or signs of overheating. Inspect all electrical connections for breaks. Tighten all loose nuts and bolts. In Power Supply PP-894/GRC-32B, also examine the filter capacitors and bleeder resistors for signs of overheating.

5-16. DC POWER FILTER F-170/GRC. Inspect interior for dust, dirt and corrosion. Inspect filter capacitors, choke and bleeder resistor for signs of blistering or excess heating. Inspect Cable Assembly W-401 for rubber deterioration, cuts and excessive wear. Remove grease and oil with a cloth dampened with cleaning solvent. Clean, with a soft cloth, the "INPUT" receptacle (J-601), the "OUTPUT" receptacle (J-602), and the exterior of the chassis and the front panel. Inspect all electrical connections for breaks. Tighten all loose mounting nuts and bolts. Tighten the Dzus fastener of the output-fuse compartment door on the front panel.

5-17. RECEIVER-TRANSMITTER RT-178/ARC-27. Inspect the exterior of unit for dust, dirt, corrosion or blistering. Clean all surfaces, toggle switches and knobs with a soft cloth. Check the screws on the front casing for tightness. The receiver-transmitter is hermetically sealed and should not be tampered with unless tube

checking is to be done. It is to be opened only under extreme circumstances. Instructions for handling the interior of the receiver-transmitter are in AN 16-30ARC27-3, the Handbook of Maintenance Instructions for Radio Set AN/ARC-27.

5-18. OPERATING CONTROL PANEL. Inspect exterior of units for dust, dirt and corrosion or blistering. Inspect cables for rubber deterioration, excessive wear, cuts or kinks. Remove grease or oil from cables with a cloth dampened with dry-cleaning solvent. Inspect connectors for rust or corrosion. Remove grease and oil from cables if this has not already been done. Clean, with a soft cloth, the exterior of all four units, switches, knobs and jacks. Inspect all electrical connections for breaks. Tighten all loose mounting nuts and bolts. All units should be secure on the panel. Check the wing-nut locks on Radio Set Control C-626/ARC-27 to be sure that the preset frequencies are not disturbed.

5-19. REMOTE CONTROL EQUIPMENT RC-261. Make a visual check of the two units (Remote Control Unit RM-52 and Control Unit RM-53). Inspect plugs, jacks and binding posts on the front panels. Remove the units from their cases. Check the battery surfaces for corrosion. Clean all dirt from the contact surface. Make sure the contacts have sufficient spring tension to make good connection with the end of the battery. Check the selector switch in Control Unit RM-53 to make sure it is tight. Check the relay switch and terminal screws on Control Unit RM-53. Check contact adjustments. Be sure that the nuts on the contact screws are tight. Make sure that the bare pigtail leads on the relay do not touch each other. Check the "HIGH-LOW" toggle switches to make sure they are tight and in the "LOW" position. Check all internal wiring to make sure all connections are tight. Wipe or blow all dust from the parts and the inside of the metal case.

5-20. ROUTINE MAINTENANCE OF MECHANICAL COMPONENTS.

5-21. ANTENNA AT-197/GR. Inspect the antenna visually from the ground in its position mounted to the antenna mast. It is not necessary to lower the mast unless the following qualifications are *not* fulfilled.

a. The antenna should stand upright. If attached to the vertical crossarm, it should continue in a straight line from the crossarm. If attached to the horizontal crossarm, it should stand upright at a right angle to the crossarm.

b. The rods forming the cone should splay out evenly from the main column of the antenna. If any become detached, the antenna must be lowered to put the rods in place.

c. The spoked disc atop the antenna should be at a right angle to the antenna column, and should be secure.

d. The antenna cable should issue from the base of the antenna column and should be attached to the crossarm and antenna mast by web straps at proper intervals.

5-22. MAST AB-282/GRC. Inspect the mast visually for straightness. Search for damage in the mast sections, and for scraped paint. The crossarms should be straight and vertical or horizontal to earth, depending upon the desired orientation at installation. Test the guy wires by hand; they should be secure, but with some slack. Stamp on the baseplate; it should be level and firm, with the spikes firmly in the ground. Kick the anchor rods, they should be firm. Test the turn-buckle locknuts; they should be tight.

5-23. TROUBLE ANALYSIS.

5-24. Table X, the system trouble-analysis chart, provides a step-by-step procedure for isolating the trouble in a non-operative radio set to one of the major components thereof. The chart is organized so that the trouble can be localized to the defective component by checking the primary power source, its conversion to direct current, its path through the interconnecting box, etc. Major test points are identified on schematic and wiring diagrams (figures 7-1 through 7-4 and 7-10 through 7-12) by arabic numerals enclosed in a star, while secondary test points are identified by capital letters enclosed in a circle. In table X (and also in table XV), the stars and circles are omitted. The standard test equipment to be used in trouble shooting and testing is listed in table IX.

5-25. After repair, the equipment component may be tested by being substituted in an otherwise complete radio set known to be in good operating condition. Or, all components of the radio set under repair can be reconnected and the receiver-transmitter metered. Satisfactory operation is indicated by obtaining meter readings which are comparable to those listed in table XIV.

5-26. PARTS REPLACEMENT.

5-27. Although specific replacement discussion is limited, an activity may replace any component if the operation is within its capabilities and knowledge.

5-28. POWER SUPPLY PILOT LAMP. (See figure 5-1, 5-2 or 5-3.) To replace pilot lamp E-101 on the front panel of any of the three power supplies, unscrew the metal casing by turning it counterclockwise. Remove the old bulb by pressing inward, turning and

pulling out. Reverse this procedure in putting in a new lamp. Return the lamp lens casing by screwing on in a clockwise direction.

5-29. POWER SUPPLY LINE FUSES. (See figure 5-1, 5-2 or 5-3.) To replace line fuse F-101 or F-102, unfasten the fuse-holder cap on the front panel of the power supply and remove the fuse. Twist the fuse-holder cap in the counterclockwise direction indicated on the fuse cap. Replace the fuse from the spares and twist on the fuse cap in a clockwise direction.

Note

In extremely cold environments, starting the power supply with the load connected may produce high starting surges and cause the line fuses to blow. To prevent this, disconnect the load by setting the "ON-OFF" switch on Radio Set Control C-626/ARC-27 to the "OFF" position before placing the power supply "POWER ON-OFF" in its "POWER ON" position. Allow the power supply to warm up for about a minute before connecting the load.

5-30. POWER SUPPLY RECTIFIERS. The four selenium bridge-arm rectifier units (CR-101A, CR-101B, CR-102A and CR-102B) are physically contained in two banks in Power Supplies PP-823/GRC and PP-893/GRC-32A. One bank contains CR-101A and CR-101B, while the other bank contains CR-102A and CR-102B. It is, therefore, obvious that replacement of a single selenium bridge arm is impossible without simultaneous replacement of its mate. The wiring to these banks is shown in figures 7-5 and 7-6. To remove either selenium bank from Power Supply PP-823/GRC (figure 5-1) or PP-893/GRC-32A (figure 5-2), unscrew the three terminal-lead lug connections and remove the three screws (painted yellow) which secure each of the two end mounting brackets to the chassis. When the selenium bank and bracket are free from the chassis, unscrew the two end mounting nuts (painted yellow) and slide the selenium bank out of the bracket. To install the new selenium rectifier, reverse the process just described. Replacement of the rectifier in Power Supply PP-894/GRC-32B (figures

TABLE IX. STANDARD TEST EQUIPMENT REQUIRED FOR MAINTENANCE

NAME	TYPE DESIGNATION	ALTERNATE	APPLICATION
Test Meter	TS-80/U		Metering Receiver-Transmitter RT-178/ARC-27
Multimeter	TS-352/U	Navy Model OE, Simpson 260	Voltage (20,000 ohms/volt) and resistance measurements
Tube Tester	TV-3/U	I-177A, Hickok 540	Checking tubes of Receiver-Transmitter RT-178/ARC-27

TABLE X. SYSTEM TROUBLE-ANALYSIS CHART

STEP	*TEST POINT	TEST EQUIPMENT CONTROL POSITION	EQUIPMENT CONTROL SETTINGS	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1	1	Multimeter TS-352/U set to appropriate a-c volts scale.	Power Supply "POWER ON-OFF" switch set at "POWER ON," "INPUT VOLTAGE RANGE" and "INPUT VOLTAGE ADJUSTMENT" switches set for the available line voltage.	Line voltage should be read on multimeter.	No a-c input to the cable. Faulty cable or switch.
2	2	Multimeter TS-352/U set to 50-volt d-c scale.	Same as 1.	D-c should be indicated on the multimeter in accordance with figure 4-4 or 4-5.	Input line fuses blown. Output line fuses blown (on Power Supply PP-894/GRC-32B only). Defective power supply.
3	3	Same as 2.	Same as 1.	Same as 2.	Defective cable between the power supply and filter.
4	4	Same as 2.	Same as 1.	Same as 2.	Defective fuse. Defective filter.
5	5	Same as 2.	Same as 1.	Same as 2.	Defective cable between filter and interconnecting box.
6	6	Same as 2.	Same as 1.	Same as 2.	Defective interconnecting box.
7	7	Same as 2.	Same as 1.	Same as 2.	Same as 6.
8	8	Same as 2.	Same as 1.	Same as 2.	Same as 6.
9	9	Multimeter TS-352/U set to 50-volt a-c scale.	Same as 1 and either Radio Set Control C-626/ARC-27 "LOCAL-REMOTE" switch set to "LOCAL," "GUARD-BOTH-COMD T/R" switch set to "BOTH" and "ON-OFF" switch "ON," or "LOCAL-REMOTE" switch set to "REMOTE" and "OFF-T/R-COMD T/R+GREC-ADF" switch on Radio Set Control C-628/ARC-27 set to "COMD T/R+GREC" and volume control at maximum (counterclockwise). "SPKR VOL" control on Interconnecting Box J-499/GRC set at maximum (counterclockwise). Loudspeaker LS-166/U switch set to "VEHICULAR SET USE."	A-c should be indicated on the meter. Sound should be heard from loudspeaker, varying volume controls should vary volume.	Same as 6. Defective loudspeaker. Defective Radio Set Control C-628/ARC-27†.
10		Meter TS-80/U plugged into "METER" jack on receiver-transmitter.	Same as 9, meter switch varied in accordance with table XIV.	See table XIV.	Defective receiver-transmitter†.

* See paragraph 5-24 and figures 7-1 through 7-4 and 7-10 through 7-12, as applicable.

† Refer to Handbook of Maintenance Instructions, AN 16-30ARC27-3, for procedures for two radio set controls and receiver-transmitter.

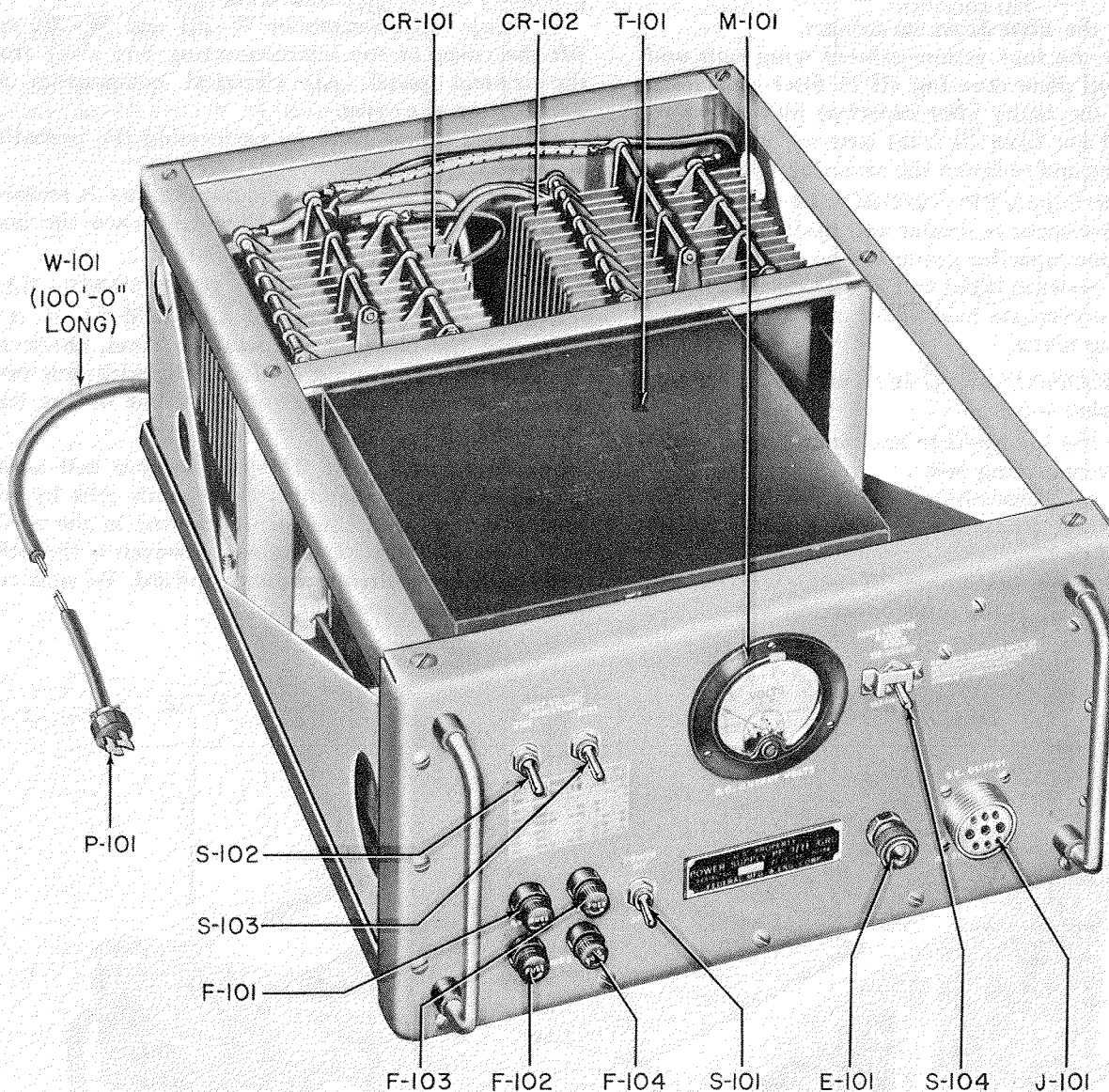


Figure 5-1. Front Oblique View of Power Supply PP-823/GRC

5-3 and 5-4) is similar, except that only one bank is involved and four terminal-lead lug connections must be loosened.

5-31. POWER SUPPLY AND FILTER OUTPUT FUSES. To replace output fuse F-601 or F-602 in DC Power Filter F-170/GRC (figure 5-5) or Fuse F-105 or F-106 in Power Supply PP-894/GRC-32B (figure 5-3), open the fuse-compartment door by turning the Dzus fastener counterclockwise. (The compartment door marked "FUSES" is on the filter front panel in Radio Sets AN/GRC-32 and AN/GRC-32A and is on the power supply front panel in Radio Set AN/GRC-32B.) Place the thumb under the projecting fuse handle. Pivot the fuse around the top knife blade so that the bottom knife blade becomes free of its contact.

Grasp the fuse along its body and pull outward. To replace a fuse, merely press the fuse into the fuse-holder contacts.

5-32. FILTER CAPACITORS. In DC Power Filter F-170/GRC (figure 5-5), a filter capacitor may be leaky and cause an increase in the a-c voltage component (ripple) of the d-c output of the filter. An a-c or d-c voltage reading across the 22 parallel input filter capacitors (C-601 through C-622) or three parallel output filter capacitors (C-623 through C-625) ordinarily does not locate the defective condenser. The offending capacitor is generally located by noting that it runs warmer than its mates. (In normal operation, C-601 through C-622 always run warmer than C-623

Section V
Paragraphs 5-33 to 5-36

AN 16-30GRC32-2

through C-625.) To replace a filter capacitor, proceed as follows:

- a. Remove the filter from its cabinet.
- b. Unscrew the four yellow-painted wing nuts and remove the top plate covering all 25 filter capacitors.
- c. Remove the faulty filter capacitor by pulling directly up and out from its octal base socket. Replace with a new one and re-fasten the retaining plate.

5-33. In Power Supply PP-894/GRC-32B (figure 5-4), capacitor replacement is similar and made easier since there is only one capacitor group and no differentiation need be made between input and output sections. These capacitors, however, are held under one large and two small retaining plates.

5-34. INTERCONNECTING BOX REPLACEMENT.
 (See figure 4-6.)

- a. Remove the loudspeaker and microphone cables from the interconnecting box.
- b. Remove cable assemblies W-201, W-202, W-203 and W-204 from Radio Set Control C-626/ARC-27 and C-628/ARC-27.
- c. Remove cable assemblies W-301, W-302, and W-401 or W-401A at the interconnecting box.

d. Remove the screws (painted yellow) around the periphery of the interconnecting box.

e. Grasp cable assemblies W-201 and W-204 and lift the cover of the interconnecting box away from the control panel. All electrical components are mounted on the cover.

f. Install a new cover by performing the preceding steps in reverse sequence.

g. The body of the interconnecting box is removed by removing the three screws which fasten the body to the operating control panel shelf.

5-35. REMOTE CONTROL EQUIPMENT BATTERIES. In Remote Control Unit RM-52, if it is suspected the batteries are weak or dead, check the batteries by substituting all four cells with new ones. Install batteries according to the outline on the label inside the unit.

5-36. In Control Unit RM-53, if either cell is suspected of being ineffectual, check both cells by substituting new ones. One cell is inserted in the spring clip with the positive terminal downward; the other cell, with its positive terminal upward. Be sure that the battery clips are tight.

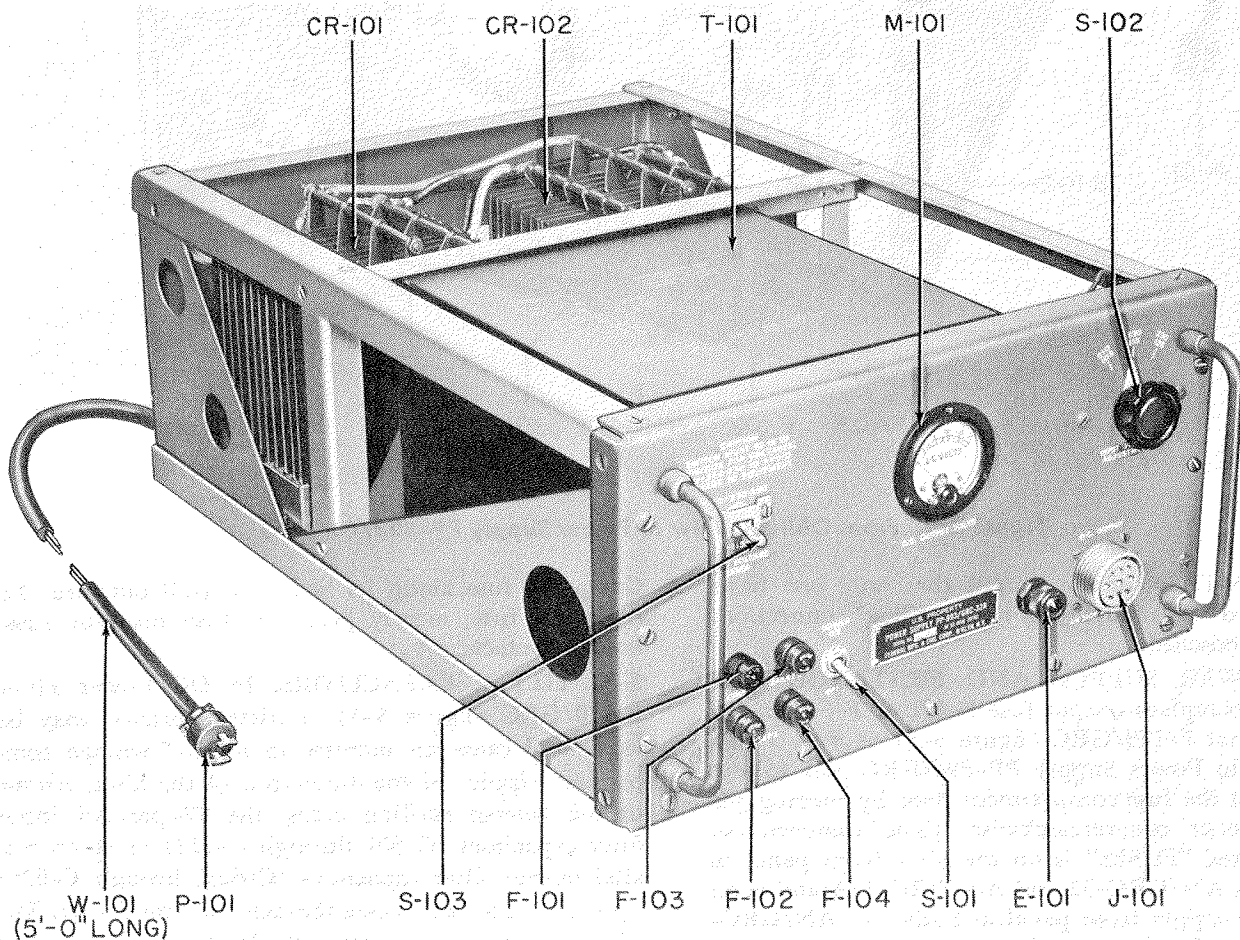


Figure 5-2. Front Oblique View of Power Supply PP-893/GRC-32A

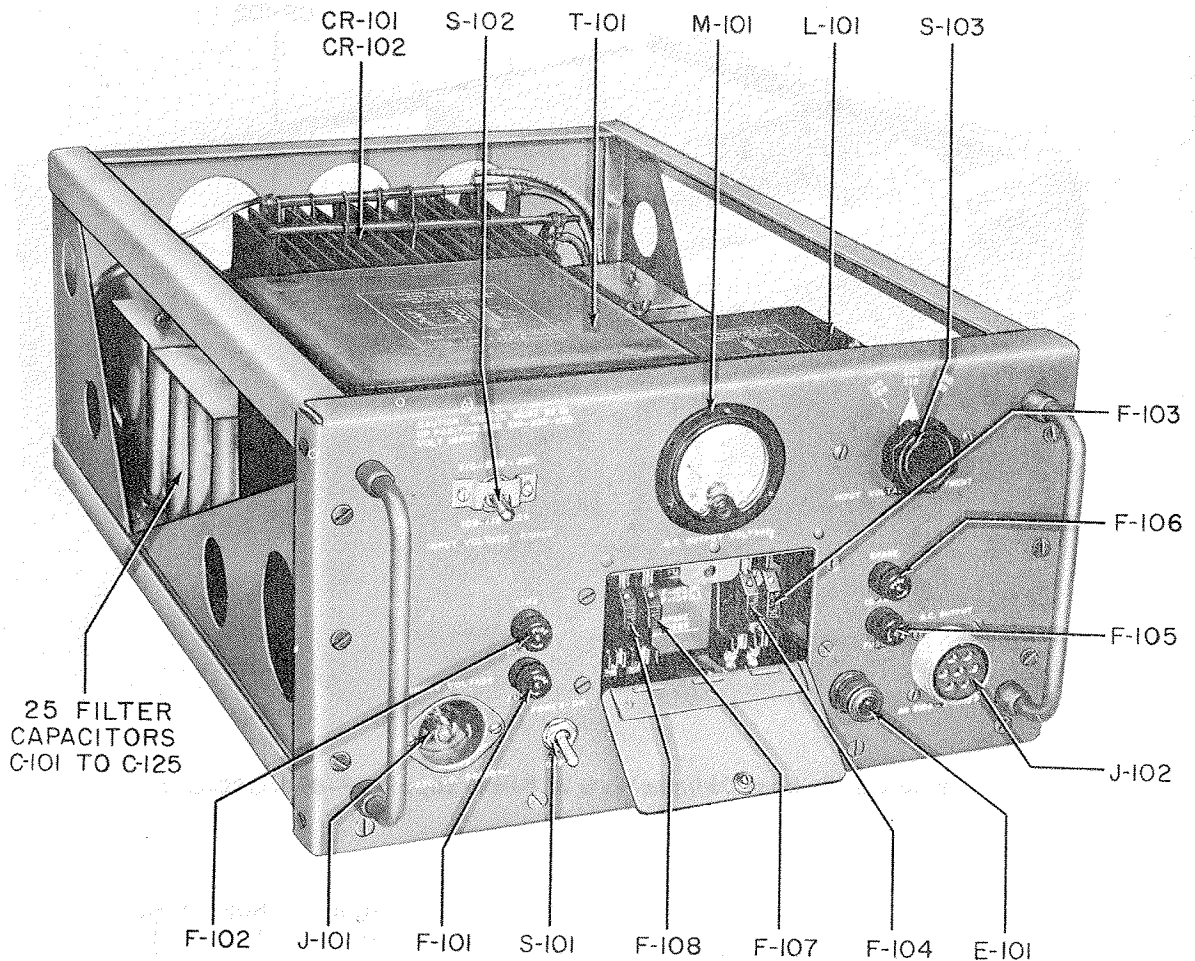


Figure 5-3. Front Oblique View of Power Supply PP-894/GRC-32B

5-37. MINOR REPAIRS AND ADJUSTMENTS.

5-38. REPAIRS AND ADJUSTMENTS OF MAST AB-282/GRC.

5-39. The tools required by maintenance crews for the maintenance of the mast are listed in table XI. Normally, there are only three reasons for calling maintenance personnel to service the mast. These are:

- a. To inspect the paint and the guy wire connections above the ground.
- b. To straighten the mast if it has settled at an angle of less than 90 degrees and cannot be straightened by adjusting the turnbuckles.
- c. To replace a damaged mast section or the antenna.

5-40. The operator, however, is responsible for the daily mast inspection as indicated in table XII. Attention to this chart will aid in the detection of any antenna or mast defect which may develop.

5-41. REPLACING AND REPAIRING GUY WIRES. A length of guy wire is included with the spare parts which may be cut to length and used to replace a damaged guy wire. It may be possible to splice the

ends of a broken guy and compensate for decreased length by adjusting the turnbuckles. Also, two spare clamps are supplied for making repairs on a broken guy wire. Proceed as follows:

- a. Ascertain whether the guy wire will be long enough after repairs are made.
- b. Cut the ends of the guy clean with the hacksaw.
- c. Open the clamps by unscrewing the nuts at each end.
- d. Put the guy wires in the clamps. Be sure that they overlap three inches on each end of the clamp. Tighten the clamp.
- e. Adjust the turnbuckles to compensate for the decreased length.

5-42. ALIGNING THE MAST. In the event that the mast is not straight and vertical after erection, or that it settles out of the vertical after being erected, adjust the turnbuckles to attempt to straighten it. Three men and a transit, if available, are required for this operation. If a transit is not available, a plumb bob and a tripod will do. Follow the procedure described in paragraph 3-17, steps "e" and "f."

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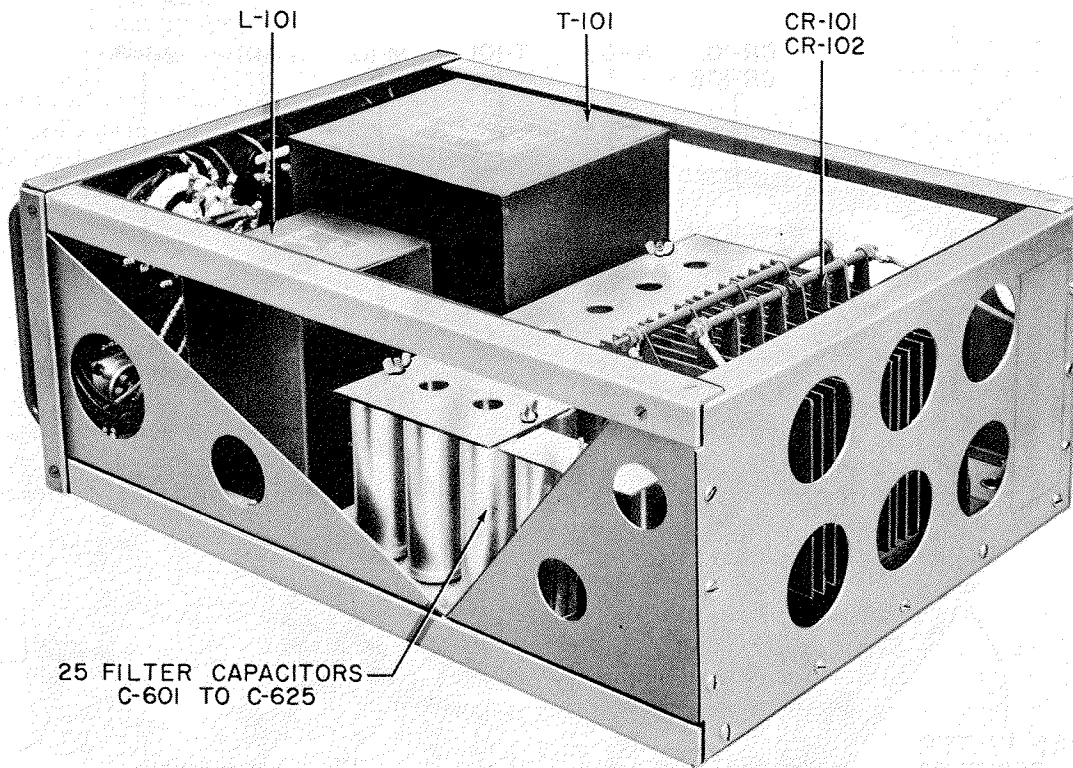


Figure 5-4. Rear Oblique View of Power Supply PP-894/GRC-32B

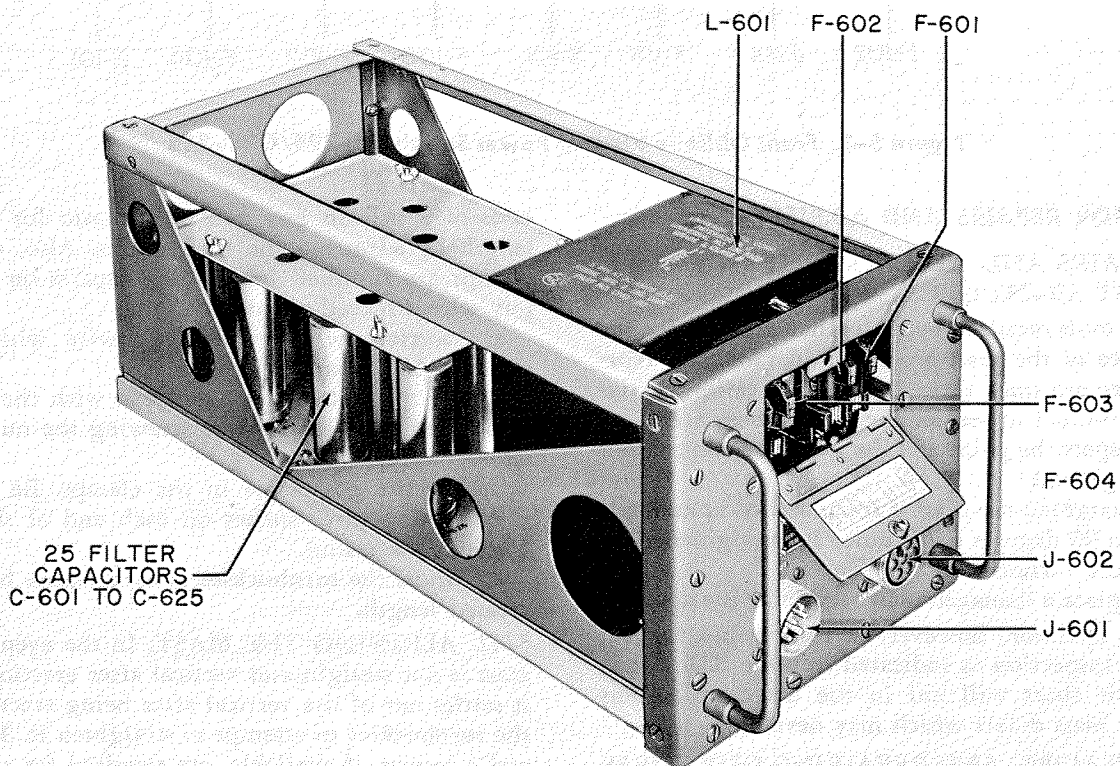


Figure 5-5. Front Oblique View of DC Power Filter F-170/GRC

**TABLE XI. EQUIPMENT REQUIRED FOR
MAST MAINTENANCE**

PART NO.	NOMENCLATURE
H-805	Maul
H-814	Block and Tackle
H-818	Clamps
No. 319	Paint, olive drab, lustreless
	Paint brush
	Transit or tripod and plumb line
	Hacksaw
	Spare parts from Mast Erection Kit Case CY-1186/GRC, as required

5-43. If the mast cannot be straightened by the procedure described in the preceding paragraph, make the following examination.

a. Check whether the anchors are still secure. If not, refer to paragraph 5-46.

b. Check whether the baseplate is still level. If not, lower the mast and reseal the baseplate. Mast-lowering instructions appear in paragraph 3-40.

c. Adjust the length of the anchor chains and re-erect the mast in accordance with the instructions of paragraph 3-17.

CAUTION

Before attempting to adjust the length of the anchor chains, secure the guy wires to the anchor rod with a heavy rope. After adjustment, be sure that the guy wires are not too tight.

5-44. **REPAIRING THE MAST.** Should a mast section, the crossarm, or the antenna itself be damaged, it will be necessary to lower the mast to make repairs or replacements. Bring along the hacksaw, four to six strips of wood or metal 1/2 inch by 1 inch and at least 36 inches long (for use as splints), and several feet of wire.

a. Lower the mast according to the instructions in paragraph 3-40.

b. Remove the coaxial cable from the damaged section, if necessary.

c. If spare parts are available, replace the damaged part and proceed to step "f." Otherwise, the mast may be temporarily repaired for continued use by following the succeeding instructions.

d. Fit the damaged pieces together, if the part is completely split. Place the splints at equal distances around the damaged section. Tie a length of wire as tightly as possible around the lower end of the splints,

TABLE XII. INSPECTION SCHEDULE

COMPONENT	INSPECTION	TIME
Antenna AT-197/GR	1. Antenna straight and perpendicular to earth when mounted on mast.	24 hours
	2. Rods forming cone splayed out evenly from main column.	24 hours
	3. Spoked disc fastened at right angle to column.	24 hours
Mast AB-282/GRC	1. Mast straight (visual inspection). Separate sections undamaged; examine for scraped paint.	24 hours
	2. Crossarm straight and either parallel or perpendicular to horizon.	24 hours
	3. R-f Cable Assembly CG-895/U properly fastened to mast.	24 hours
	4. Baseplate level, firm; spikes planted firmly in ground. Base pivot pin free of corrosion.	24 hours
	5. Guy wires secure, with some slack. (Test with hand.)	24 hours
	6. Turnbuckles free of corrosion.	24 hours
	7. Locknuts on turnbuckles tight.	24 hours
	8. Anchor rods firmly fastened in ground.	24 hours

TABLE XII. INSPECTION SCHEDULE (Cont)

COMPONENT	INSPECTION	TIME
Power Supply PP-823/GRC and DC Power Filter F-170/GRC, Power Supply PP-893/GRC-32A and DC Power Filter F-170/GRC, or Power Supply PP-894/GRC-32B	1. "POWER ON-OFF" switch in "OFF" position when not in use.	24 hours
	2. Exterior and interior free from dust, moisture and protected from temperature extremes. (Keep in cabinets.)	24 hours
	3. All input and output receptacles clean; toggle switches clean. With Radio Sets AN/GRC-32A and AN/GRC-32B, clean wafer switch if necessary.	24 hours
	4. No signs of blistering or excess heating from any component on interior.	24 hours
	5. Selenium rectifiers mechanically secure.	24 hours
	6. Mounting bolts and nuts tight; all Dzus fasteners tight.	24 hours
	7. All fuses secure in fuse holders.	24 hours
	8. In PP-823/GRC and PP-893/GRC-32A, integral cable free of dirt and grease; no detrimental wear, cuts, or kinks.	24 hours
	9. Selenium rectifiers replaced, if voltage drops 10 percent because of aging.	2000 hours
	10. Capacitors replaced if necessary.	1000 hours
Interconnecting Box J-499/GRC	1. Exterior free from dust, moisture and protected from temperature extremes. (Keep in cabinet.)	24 hours
	2. "SPEAKER" jack J-206 and connector receptacles J-203, J-202 and J-201 clean.	24 hours
	3. No signs of blistering or excess heating.	24 hours
	4. Mounting nuts and bolts tight.	24 hours
	5. Potentiometers secure, with knobs tight.	24 hours
	6. Jack covers adequately seated.	24 hours
Cables and Cable Assemblies	1. Connectors secure.	24 hours
	2. Connectors clean and corrosion free.	24 hours
	3. Cable lengths free of dirt, dust, and grease.	24 hours
	4. No rubber deterioration, cuts or kinks in cables.	24 hours
Cases and Cabinets	1. No breaks or cracks in exterior.	175 hours
	2. Scraped paint touched up.	175 hours
	3. Metal reinforcements undamaged; all rivets in place.	175 hours
	4. Cover aligned with cabinet; locking gear in perfect working condition.	175 hours
	5. External rubber corners intact and in place.	175 hours

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TABLE XII. INSPECTION SCHEDULE (Cont)

COMPONENT	INSPECTION	TIME
Radio Set Control C-626/ARC-27	1. Preset frequencies undisturbed.	24 hours
	2. Exterior free from dust, moisture and protected from temperature extremes.	24 hours
	3. Knobs and switches clean.	24 hours
	4. Mounting nuts and bolts tight; facilities secure.	24 hours
Radio Set Control C-628/ARC-27	1. Exterior free from dust, moisture and protected from temperature extremes.	24 hours
	2. Knobs and switches clean.	24 hours
	3. Mounting nuts and bolts tight; facilities secure.	24 hours
Loudspeaker LS-166/U	1. Exterior free from dust.	24 hours
	2. Mounting nuts and bolts tight.	24 hours
Receiver-Transmitter RT-178/ARC-27	1. Exterior of unit and cabinet free from dust, moisture and protected from temperature extremes.	24 hours
	2. Receptacles P-1401, P-1403 and P-1405 clean; switches and knobs clean.	24 hours
	3. No signs of blistering or excess heating on unit or cabinet.	24 hours
	4. Mounting nuts and bolts mechanically secure. Screws around front casing tight.	24 hours
Remote Control Equipment RC-261 (if used)	1. Plugs, jacks and binding posts on front panels of RM-52 and RM-53 free of dust, moisture or blistering, and protected from temperature extremes.	24 hours
	2. Inside, battery surfaces show no corrosion. Clean dirt from contact surfaces. Contacts should have enough spring tension for good connection.	24 hours
	3. Selector switch tight.	24 hours
	4. Relay and terminal screws tight, contact adjustment checked, nuts or contact screws tightened.	24 hours
	5. "HIGH-LOW" toggle switches tight (in "LOW" position).	24 hours
	6. Connections on internal wiring tight.	24 hours
	7. All dust wiped or blown from interior parts.	24 hours

and another length as tightly as possible around the upper half. Do not allow the cable to be tied under the wire.

e. A broken mast section or the crossarm may also be temporarily replaced with any piece of wood of the proper diameter, after its ends have been shaved to fit the adjoining sections.

f. Replace the coaxial cable.

g. Re-erect the mast according to the instructions in paragraph 3-17.

5-45. REPAIRING A BROKEN CROSSARM. If the crossarm becomes damaged or broken, lower the mast as described in paragraph 3-40. Examine the crossarm to determine whether it can be repaired with splints until a new crossarm can be obtained. Follow the same procedure as for splinting a broken mast; refer to

Section V

Paragraphs 5-46 to 5-54

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paragraph 5-44. The size of the splint used will depend on the nature of the damage.

5-46. **REINFORCING ANCHORS IN SOFT GROUND.** If the anchors cannot withstand the tension of the guy wires and come loose, reset them according to the procedure outlined below.

a. Remove the guys and fasten them to a nearby tree, truck or other temporary support.

CAUTION

One man should hold each guy wire while a third disconnects it from the anchor rod.

b. Drive the anchor back into the ground in its original position.

c. Dig a trench at right angles to the direction of the guy wires, and in front of the anchor plate.

d. Place logs above and below the point where the anchor rod goes through the anchor plate. If necessary, remove the anchor plate until the logs are in place. Make sure the anchor rod shaft is in the slot of the key hole in the anchor plate after it is re-inserted.

e. Fill the hole and pack tightly; place logs or rocks over the hole.

f. Re-attach the guy wires and adjust as necessary.

5-47. **EQUALIZING THE GUY-WIRE SLACK.** The weight of the mast and the type of terrain on which it rests may sometimes cause the base assembly to settle. This will permit the guy wires to become slack, thereby resulting in the undesirable moving and straining of the mast. Should this occur, check the baseplate spikes. If these are loose, drive them farther into the ground with the hammer (H-805) and adjust the guy wires as described in steps "e" and "f," paragraph 3-17. If the base assembly settles so that the baseplate is no longer level, either lower the mast and reseal the baseplate or, if this is not practicable, adjust the guy wires until the mast is again vertical. However, do not adjust the mast to a vertical position in this manner if so doing will cause any strain on

the base assembly; this may seriously damage the bottom section of the mast or the base assembly.

5-48. **ADJUSTING THE TURNBUCKLES.** If the turnbuckles work loose after they have been adjusted, readjust and tighten the locknuts securely. If a turnbuckle fails, replace it with a spare one from the spare parts. Should no spares be available, fasten a piece of rope or wire to the guy wire and tie it to the guy wire plate or anchor chain.

CAUTION

If replacing a turnbuckle, temporarily secure the guy wire to the anchor with a piece of rope or wire to avoid the possibility of damaging the mast.

5-49. **REPAIRS AND ADJUSTMENTS OF RADIO SET AN/ARC-27 AND REMOTE CONTROL EQUIPMENT RC-261.**

5-50. Detailed repair and adjustment instructions for Radio Set AN/ARC-27 and Remote Control Equipment RC-261 appear in AN 16-30ARC27-3, the Handbook of Maintenance Instructions for Radio Set AN/ARC-27, and Technical Manual TM11-2632, covering Remote Control Equipment RC-261.

5-51. LUBRICATION.

5-52. Coat the turnbuckles and the base pivot pin at the mast installation with lubricant, Federal Specification VV-2-751, as often as needed to prevent exposure of the bare metal.

Note

For information concerning the lubrication of receiver-transmitter dynamotor, refer to AN 16-30ARC27-3, the Handbook of Maintenance Instructions for Radio Set AN/ARC-27.

5-53. INSPECTION SCHEDULE.

5-54. Careful attention to the inspection schedule of table XII will aid in the early detection of defective parts of the equipment.

SECTION VI

FIELD AND FASRON MAINTENANCE

6-1. GENERAL.

6-2. This section outlines work which may be performed at field maintenance levels. Only those components of Radio Sets AN/GRC-32, AN/GRC-32A and AN/GRC-32B that are different from the components of Radio Set AN/ARC-27 are covered herein. For maintenance information regarding Radio Set AN/ARC-27, refer to AN 16-30ARC27-3, the handbook of maintenance instructions for that equipment. For information regarding Remote Control Equipment RC-261, refer to Technical Manual TM 11-2632.

6-3. MINIMUM PERFORMANCE STANDARDS.

6-4. Minimum performance standards for DC Power Filter F-170/GRC and Power Supplies PP-823/GRC, PP-893/GRC-32A and PP-894/GRC-32B are listed in table XIII. Although the current required for channel switching is 25.5 amperes and Power Supply PP-894/GRC-32B is rated at 20 amperes, actual operation is not affected. It has been determined that the maximum time required for channel switching is eight seconds. For this short period of time, Power Supply PP-894/GRC-32B is not damaged by overload, even under severe duty cycles involving channelling. During the overload period the output voltage will drop, but not enough to reduce significantly the efficiency of the receiver-transmitter.

6-5. Plug a TS-80/U meter into the receiver-transmitter front-panel meter jack and compare the readings obtained with those listed in table XIV. The best check for achievement of minimum standards of performance if a meter is not available is to set up the doubtful component in a system known to be in good operating order with the doubtful unit in place. If all the equip-

ment is available, set up the radio set and place it in operation. Good performance during reception and transmission, with no difficulties during channel switching, indicates satisfactory performance of doubtful units.

Note

If the performance is unsatisfactory, the receiver-transmitter may be opened to test the tubes. Refer to table II for the tube complement. Suitable tube testers are listed in table IX.

6-6. TROUBLE ANALYSIS.

6-7. Table XV, the trouble-analysis chart, does not repeat information covered in table X, which deals with the radio set system; instead, it logically isolates the faulty part in the power supply component found to be inoperative or abnormal. Trouble location in the power supply and other components of the radio set appears in paragraphs 6-8 through 6-23. When checking a-c ripple voltage, a high-impedance a-c voltmeter with a one-volt scale will be required. Suitable instruments for this test are Electronic Multimeter ME-6/U (Ballantine Model 300) or Navy Type -60123 Vacuum-Tube Voltmeter (Hewlett-Packard Model 400A). Other standard test equipment is listed in table IX.

6-8. TROUBLE LOCATION IN RADIO SET AN/ARC-27.

6-9. For detailed charts which list troubles and remedies related to Receiver-Transmitter RT-178/ARC-27, Radio Set Control C-626/ARC-27 and Radio Set Control C-628/ARC-27, refer to AN 16-30ARC27-3, the Handbook of Maintenance Instructions for Radio Set

TABLE XIII. MINIMUM PERFORMANCE STANDARDS

COMPONENT	D-C OUTPUT		RIPPLE	
	CONNECTED TO FILTER	NOT CONNECTED TO FILTER	CONNECTED TO FILTER	NOT CONNECTED TO FILTER
Power Supply PP-823/GRC and DC Power Filter F-170/GRC or Power Supply PP-893/GRC-32A and DC Power Filter F-170/GRC	27.5 V dc at 27 amp	21 V dc at 27 amp	0.35 V ac max	12 V ac max
Power Supply PP-894/GRC-32B	27.5 V dc at 20 amp		0.35 V ac max	

TABLE XIV. METER READINGS

COMPONENT	METER USED	SWITCH POSITION	FUNCTION	METER READING	FACTOR	CORRECTED READING
Receiver-Transmitter RT-178/ARC-27 (Receive)	TS-80/U	EIN	Supply Voltage	.48-.58	x50	24-29 V
		IB	Total B+ Current	.26-.28	x1000	260-280 ma
		MOD Ik	Modulator Cathode Current	0	—	0
		DRVR Ig	Driver Grid Current	0	—	0
		FINAL Ig	Power Amplifier Grid Current	0	—	0
		IANT	R-F Output	0	—	0
Receiver-Transmitter RT-178/ARC-27 (Transmit)	TS-80/U	EIN	Supply Voltage	.48-.58	x50	24-29 V
		IB	Total B+ Current	.40-.45*	x1000	400-450 ma
		MOD Ik	Modulator Cathode Current	.20-.25*	x200	40-50 ma
		DRVR Ig	Driver Grid Current	.15-.20	x100	15-20 ma
		FINAL Ig	Power Amplifier Grid Current	.3-.5	x100	30-50 ma
		IANT	R-F Output	.20 min	x50	10 watts
Power Supply PP-823/GRC	Front-panel voltmeter	POWER ON	Power Supply Out- put Voltage	24-31	x1	24-31 V
Power Supply PP-893/GRC-32A	Front-panel voltmeter	POWER ON	Power Supply Out- put Voltage	24-31	x1	24-31 V
Power Supply PP-894/GRC-32B	Front-panel voltmeter	POWER ON	Power Supply Out- put Voltage	24-29	x1	24-29 V

* Modulated approximately 30 percent.

AN/ARC-27. This handbook is supplied to the field destination by the government.

6-10. TROUBLE LOCATION IN REMOTE CONTROL EQUIPMENT RC-261.

6-11. For trouble-location information related to Remote Control Unit RM-52 and Control Unit RM-53, refer to Technical Manual TM 11-2632.

6-12. TROUBLE LOCATION IN POWER SUPPLIES.

6-13. TROUBLE LOCATION IN SELENIUM UNITS. A drop in rated output voltage may be due to defective selenium rectifiers (CR-101, CR-102). As a result of "aging" (operating for a long period of time), the forward resistance of these units will increase. This results in an increase in the ratio of forward to reverse resistance. When it is suspected that the selenium rectifiers are the cause of trouble, disconnect the filter and input power source and check the forward and reverse resistance of each of these rectifier stacks in the following manner (see figure 5-1, 5-2, or 5-4):

a. Electrically separate the rectifier stacks from the rest of the circuit by removing the leads that connect to the yellow, red and black terminals of the rectifier stacks.

b. Measure the forward and reverse resistance by reading the resistance across the red and black terminals on each of the selenium stacks normally, and then again by reversing the ohmmeter leads. The forward resistance should be approximately 8 ohms or somewhat less. The reverse resistance should be at least 1000 ohms. Such a resistance test is not highly accurate, but it may serve as a rough guide to the condition of the rectifier.

c. An appreciable increase (three times or more) in forward resistance will develop a larger voltage drop in the selenium rectifier and result in a decrease in output voltage. A decrease in reverse resistance will not affect the output unless it approaches the magnitude of the forward resistance. However, an increase in output ripple may result if the reverse resistance becomes less than 10 times the forward resistance.

TABLE XV. POWER SUPPLY AND FILTER TROUBLE-ANALYSIS CHART

STEP	*TEST POINT	TEST EQUIPMENT CONTROL POSITION	EQUIPMENT CONTROL SETTINGS	NORMAL INDICATION	POSSIBLE CAUSE OF ABNORMAL INDICATION
1			Power supply "POWER ON-OFF" switch "ON." "INPUT VOLTAGE RANGE" and "INPUT VOLTAGE ADJUSTMENT" switches set for available line voltage.	Indicator light on power supply lit; front-panel voltmeter reads in accordance with figure 4-4 or 4-5.	"POWER ON-OFF" switch not making contact. Power transformer open. Meter burnt out. Indicator lamp burnt out. A-c cable open. Selenium rectifiers operating abnormally. On Power Supply PP-894/GRC-32B only: filter capacitors open or shorted. Filter choke open or shorted. R-101 open.
2	A	Multimeter TS-352/U set for a-c line voltage.	Same as 1.	Meter should read a-c line voltage.	Defective "POWER ON-OFF" switch. Blown input fuse.
3	B	Multimeter TS-352/U set at 50-volt a-c scale.	Same as 1.	Meter should read approximately same numerical value as indicated on figure 4-4 or 4-5.	Open transformer.
4	C	Multimeter TS-352/U set at 50-volt d-c scale.	Same as 1.	Meter should read in accordance with figure 4-4 or 4-5.	Defective rectifiers, or connections thereto.
5	D	Same as 4.	Same as 1.	Meter should read approximately 1.5 volts at full load.	Choke open.

* See paragraph 5-24 and figures 7-1 through 7-4, as applicable.

d. If the output voltage falls off due to "aging," replace the selenium rectifier; refer to paragraph 5-30. As a temporary expedient, however, it is possible to reset the transformer primary taps to a lower line-voltage setting in order to raise the output voltage. For example, if the input a-c power source is 115 volts, throw the transformer primary toggle switches or rotary switch for 105 volts operation.

Note

In some cases, exposure of the equipment to abnormal extremes of high humidity or salt-laden atmosphere for extended periods of time will cause short circuits inside the rectifier banks. It is possible to burn out these short circuits by placing two wire jumpers across the power supply line input fuses and then applying very short-duration power transients to the power supply by flicking the "POWER ON-OFF" switch off and on several times. This will usually re-form the rectifier plates and allow the rectifier to operate for long periods of time beyond their normal life expectancy. *Avoid inhaling the fumes that may be given off from the rectifier in this process.*

6-14. TROUBLE LOCATION IN POWER SUPPLY TRANSFORMER. Refer to table XV, the trouble-analysis chart in this section, for the localization of troubles in power transformer T-101; see figure 5-1, 5-2 or 5-3. Remove the a-c power source from the power supply before making any ohmmeter tests. To check for an open transformer winding, make a continuity test with an ohmmeter. Since the normal d-c resistance of each winding is approximately 0.1 ohm, it is not possible to check for a shorted transformer winding in the same manner. In operation, however, a shorted transformer winding should blow line fuse F-101 and/or F-102. As a normal procedure, always replace a blown fuse with another fuse before looking for trouble. If the second fuse blows, then troubleshooting will be necessary. Remove all leads to the secondary of power transformer T-101, replace the blown fuse and, with the a-c power disconnected, throw the power switch to "ON." Unsolder the leads to the input of the transformer and take a resistance reading across the leads to the input and output of the transformer. There should be infinite resistance (an open circuit) across each pair of leads. If no short is found in the leads to the transformer, then it is likely that the transformer itself is shorted. Replace the transformer as directed in paragraph 6-26.

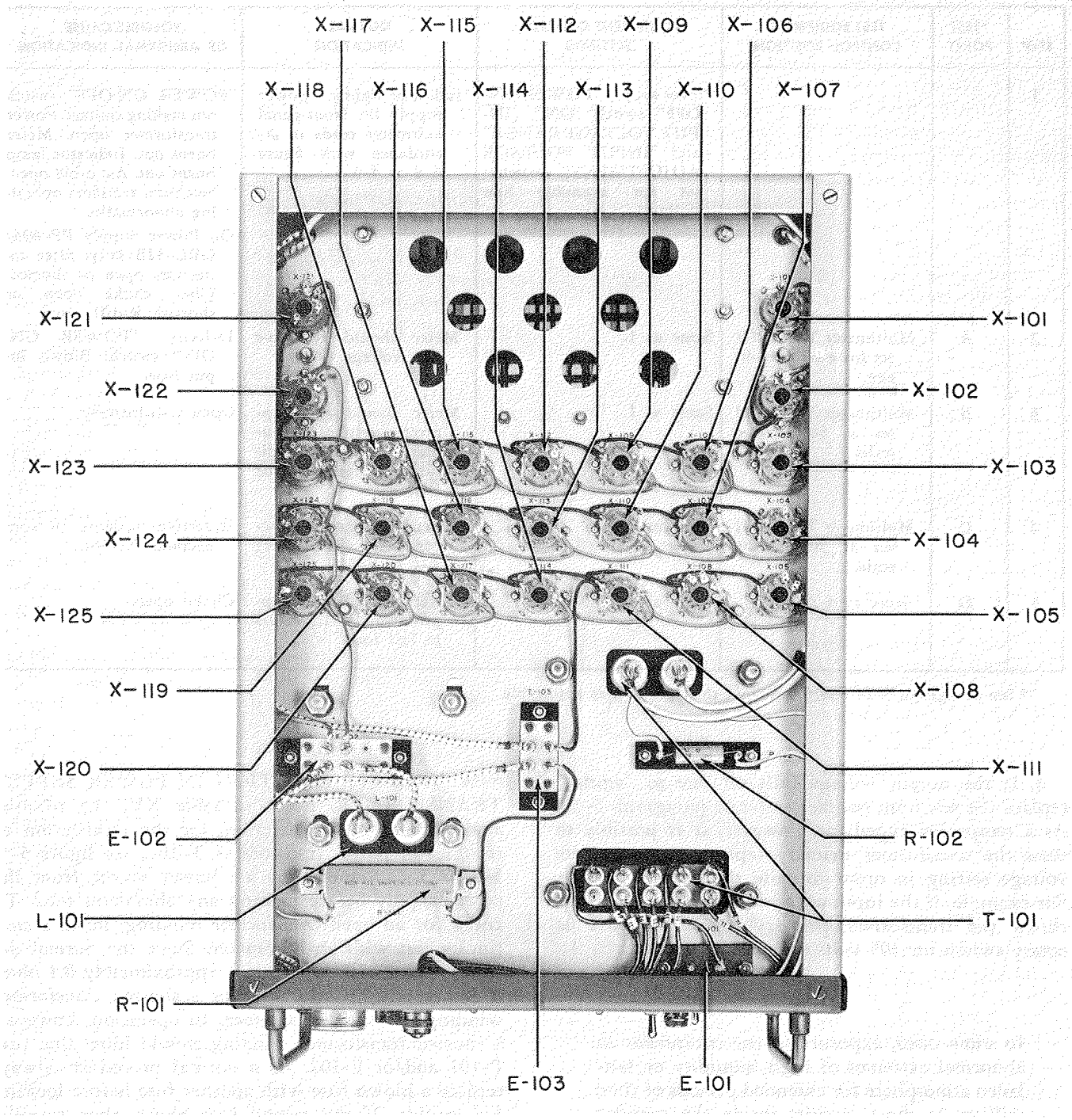


Figure 6-1. Bottom View of Power Supply PP-894/GRC-32B

6-15. TROUBLE LOCATION IN DC POWER FILTER F-170/GRC OR FILTER SECTION OF POWER SUPPLY PP-894/GRC-32B.

6-16. TROUBLE LOCATION IN FILTER CAPACITORS. Filter capacitors C-601 through C-625 in DC Power Filter F-170/GRC (figure 5-5) and C-101 through C-125 in Power Supply PP-894/GRC-32B (figures 5-4 and 6-1) have a normal minimum d-c re-

sistance of several thousand ohms. Since the load across these capacitors is approximately one ohm at full load (27 amp), a defective or leaky filter capacitor will not be immediately noticeable. The effect of a leaky filter capacitor is to increase the a-c voltage component (ripple) in the d-c output of the filter. This will increase the amount of hum in the load. If a filter capacitor is suspected of being leaky, proceed as follows:

a. Remove DC Power Filter F-170/GRC from Cabinet CY-1187/GRC-32 or CY-1191/GRC-32A, or remove Power Supply PP-894/GRC-32B (incorporating the filter) from Cabinet CY-1191/GRC-32A by pulling the two front panel handles straight out.

b. Turn the filter or power supply-filter chassis on its side. The terminals of the filter capacitors will now be available for voltage measurements.

c. Connect the load and place the power supply in operation.

d. Make an a-c and d-c voltage reading in DC Power Filter F-170/GRC across any of the 22 parallel input or three parallel output filter capacitors, or in Power Supply PP-894/GRC-32B across the 25 parallel filter capacitors. Use Multimeter TS-352/U for the voltage readings. The ratio of the a-c reading to the d-c reading, multiplied by 100, will give the percent ripple. For example, if the a-c voltage reading is 0.3 volt, and the d-c reading is 27 volts,

$$\text{Percent ripple} = 0.3/27 \times 100 = 1.1$$

Refer to figure 4-4 for the normal output d-c voltage and a-c ripple voltage from the combined separate filter and power supply under different loads and refer to figure 4-5 for the output characteristics of the integral power supply and filter.

Note

The a-c ripple voltage at the 22 parallel input filter capacitors of DC Power Filter F-170/GRC is approximately 2.0 volts at rated load. The output d-c voltage and a-c ripple voltage curves on figure 4-4 do not apply to measurements at the input section of the pi-type filter.

6-17. The 25 filter capacitors have a rated life of 1000 hours minimum in normal environments. However, the climatic temperature at which the equipment operates (such as arctic or tropic zones) will have a major effect on the life of the filter capacitors. Regardless of any other factor, the filter output ripple voltage should determine the replacement point for the capacitors. When DC Power Filter F-170/GRC or Power Supply PP-894/GRC-32B is connected to Receiver-Transmitter RT-178/ARC-27, the maximum permissible ripple voltage from the filter should be 0.5 volt ac. Replace all 25 capacitors when the a-c ripple voltage from the filter exceeds 0.5 volt.

6-18. TROUBLE LOCATION IN FILTER CHOKE. Filter choke L-601 in DC Power Filter F-170/GRC (figure 5-5) is rated at 5 millihenries with a d-c load current of 30 amperes and a d-c resistance of 0.05 ohm. Filter choke L-101 in Power Supply PP-894/GRC-32B (figure 5-3) is rated at 8.6 millihenries with a d-c load of 20 amperes and has a d-c resistance of 0.07 ohm. While it is impractical to measure for shorted turns with an ohmmeter, it is possible to measure for an open circuit. If the filter choke is suspected of being shorted, proceed as follows:

a. Remove the filter or power supply from its cabinet.

b. Measure the d-c voltage drop across the filter choke under full load. The d-c voltage drop should be approximately 1.5 volts.

c. Measure the a-c ripple voltage at the output of the filter. If the filter choke is shorted, the a-c ripple voltage will be about 2 volts rms at full load.

6-19. TROUBLE LOCATION IN BLEEDER RESISTOR. Bleeder resistor R-601 in DC Power Filter F-170/GRC is a 100-ohm, 21-watt, non-inductive, wire-wound resistor. Bleeder resistor R-102 in Power Supply PP-894/GRC-32B is an 80-ohm, 37-watt resistor. Its major function is to lower the no-load d-c output voltage from the filter (improves regulation and protects the filter capacitors from breakdown) and to provide a low-resistance path to discharge the filter capacitors when the power supply and filter are shut off under no load. Check the resistance value with an ohmmeter for a possible "open" or change in value.

6-20. TROUBLE LOCATION IN FUSE CIRCUITS.

6-21. Power Supply PP-823/GRC or PP-893/GRC-32A and DC Power Filter F-170/GRC are designed to operate together. The power supply has two input fuses; the filter has two output fuses. Neither the output of the power supply nor the input to the filter are fused. A short in the load will blow a filter output fuse. A short in any component in the filter or power supply (such as filter capacitors, selenium rectifiers or the power transformer) will blow a power supply input fuse. No other fuse protection is needed. If either the power supply or filter is used without its mate, make sure that adequate fusing is available. In Power Supply PP-894/GRC-32B, input and output fuses are contained in the same chassis and no special precautions need be taken when using this power supply with other equipment. Short circuits in the load will blow output fuses and short circuits in the transformer, rectifier or capacitor circuits will blow input fuses.

6-22. TROUBLE LOCATION IN INTERCONNECTING BOX J-499/GRC.

6-23. To locate trouble in Interconnecting Box J-499/GRC, proceed as follows (see figure 6-2):

a. Inspect all solder connections for frayed ends, cold solder and corrosion.

b. Inspect wires for breaks or insulation gashes.

c. Tighten nuts holding terminal boards to chassis.

d. Using figure 7-10, 7-11 or 7-12 as a guide, make sure all the internal wiring is in order.

e. Test variable resistors R-201 and R-202 with an ohmmeter. If necessary, replace by following the instructions in paragraphs 6-31 and 6-35.

f. Inspect terminal boards E-202 and E-203 for cracks and broken lugs. If such damage is evident, replace by following the instructions of paragraphs 6-31 and 6-36.

g. Check cable assemblies W-201 through W-204 for continuity with an ohmmeter. Check the cables

visually for breaks or cuts in the insulation. If necessary, replace by following the instructions of paragraphs 6-31 and 6-32.

h. Check cable connectors J-201, J-202, J-203 and J-206 for corrosion. Be certain that the locking nut on each connector holds tight. If necessary, replace by following the instructions of paragraphs 6-31 and 6-33.

6-24. PARTS REPLACEMENT.

6-25. In addition to the procedures outlined in the following paragraphs, refer to paragraphs 5-26 through 5-36 for replacement of fuses, pilot lamps, capacitors and rectifier stacks of the power supplies and filter.

6-26. **REPLACEMENT OF POWER TRANSFORMER.** In Power Supplies PP-823/GRC and PP-893/GRC-32A, power transformer T-101 is mounted to the chassis by means of six hex-head cap screws and nuts; see figures 5-1 and 5-2. To provide support and rigidity to the assembly, a flat metal strip is placed on top of each of the two transformer mounting flanges (between the flange and cap screws) and a flat metal plate is placed beneath the chassis (between the chassis and mounting nuts). To replace the transformer, unsolder the output and input terminal leads. Then remove the six transformer chassis-mounting screws and nuts (painted yellow). Lift the transformer away from the chassis and replace with a new unit by reversing the procedure indicated.

6-27. In Power Supply PP-894/GRC-32B, power

transformer T-101 is mounted to the chassis by four nuts; see figures 5-3 and 5-4. To replace the transformer, see figures 5-3 and 5-4. To replace the transformer, unsolder the output and input terminal leads. Remove the four mounting nuts (painted yellow) from the underside of the chassis and lift the transformer away from the chassis. Replace by reversing this procedure.

6-28. **REPLACEMENT OF POWER SUPPLY FRONT-PANEL COMPONENTS.** (See figures 5-1 through 5-4.) The front panels of Power Supplies PP-823/GRC, PP-893/GRC-32A and PP-894/GRC-32B mount fuse holders, a meter, a pilot lamp holder, toggle and rotary switches, and power receptacles. Replacement of any of these components does not require the disassembly of the front panel from the chassis. In general, unsolder all connections to the component and remove the screws or nuts mounting the components to the front of the panel. Tag all leads removed to facilitate replacement to the proper terminal contact on the new component.

6-29. **REPLACEMENT OF FILTER CHOKE.** In DC Power Filter F-170/GRC, filter choke L-601 is mounted to the chassis by four nuts (painted yellow); see figure 5-5. Unsolder the leads to the choke terminals and remove the mounting nuts and lockwashers from the underside of the chassis. Pull out the filter choke from the top side of the chassis. In Power Supply PP-894/GRC-32B, filter choke L-101 is mounted similarly and is removed in a similar fashion; see figures 5-3 and 5-4.

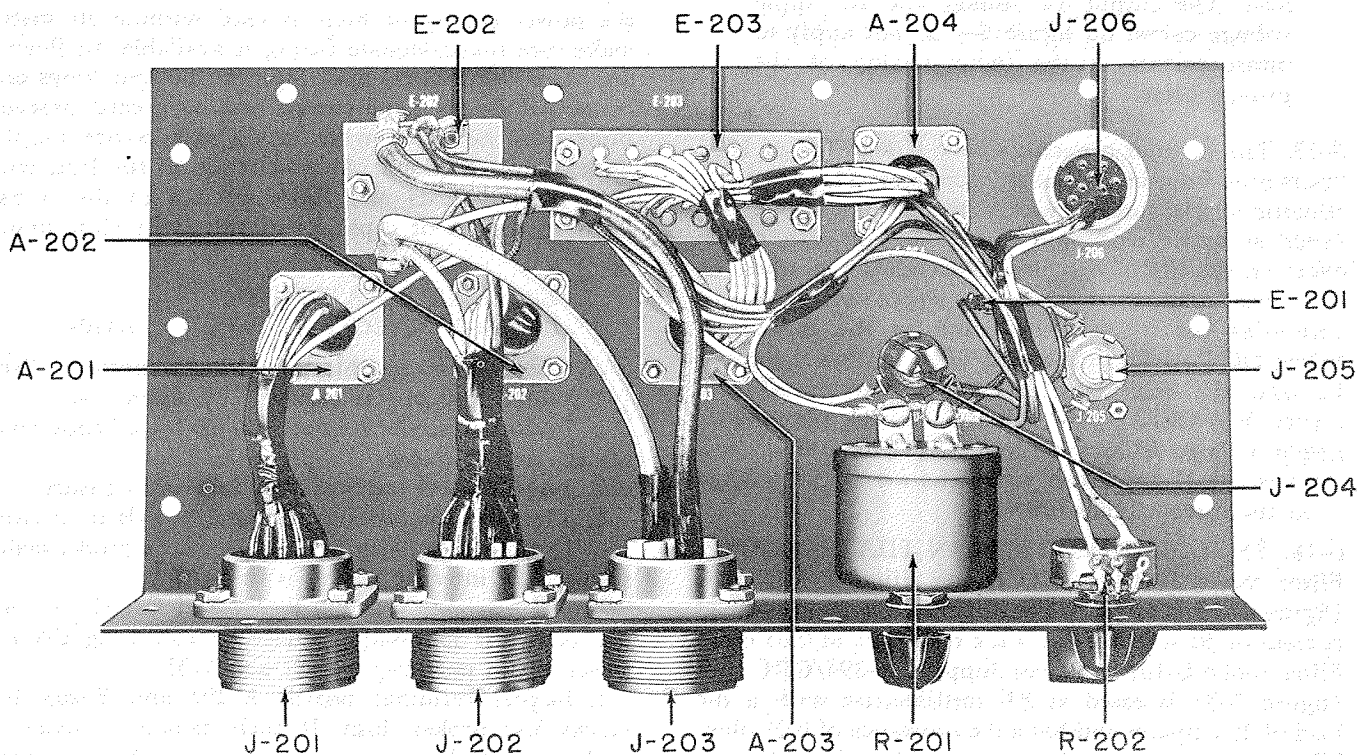


Figure 6-2. Interior View of Cover of Interconnecting Box J-499/GRC

6-30. REPLACEMENT OF BLEEDER RESISTOR. The bleeder resistor is located in DC Power Filter F-170/GRC in Radio Sets AN/GRC-32 and AN/GRC-32A and is located in Power Supply PP-894/GRC-32B in Radio Set AN/GRC-32B. To remove the bleeder resistor, unscrew the two hex nuts (painted yellow) from the mounting screws at the underside of the filter or power supply, and unsolder the leads to the resistor and lift it away from the underside of the chassis.

6-31. REPLACEMENT OF PARTS IN INTERCONNECTING BOX J-499/GRC. (See figures 4-6 and 6-2.) Interconnecting Box J-499/GRC is composed of mechanical and electrical items wired together, as indicated in figure 6-2. To remove the cover from the interconnecting box, proceed as follows:

a. Perform steps "a" and "c" through "e" of paragraph 5-34.

b. Disconnect connector P-201 of cable W-201 from the rear of Radio Set Control C-628/ARC-27.

c. Slide the two snap-locks on the mounting for Radio Set Control C-626/ARC-27 apart, and release the radio set control from the operating panel. Lift Radio Set Control C-626/ARC-27 off the operating panel and pull the cover chassis of the interconnecting box (which hangs by three cables) with it, as one unit. All components of the interconnecting box are mounted to the box cover chassis. Lay the radio set control and cover chassis of the interconnecting box on a horizontal surface. Then, disconnect the connector coupling nuts at the radio set control and uncouple the radio set control from the cover chassis.

6-32. The wires in cable assemblies W-201, W-202, W-203 and W-204 are all soldered at one end directly to the various component parts. To remove any cable assembly, first unsolder all the leads in the cable assembly terminating in the interconnecting box, unthread the coupling nut from the mounting shell on the cover chassis and pull the cable assembly out from the cover chassis. Replace in reverse sequence.

6-33. Connectors J-201, J-202, J-203 and J-206 are each mounted by four mounting screws and nuts. To remove any of these connectors, first unsolder all leads to the connector. Then, unscrew the mounting hardware and pull the connector out and away from the inside of the cover chassis. Replace in reverse sequence.

6-34. Telephone jacks J-204 and J-205 are each mounted to the cover chassis by a single hexagonal mounting nut. To remove either of these jacks, first unsolder all leads to the jack. Then, unscrew the hexagonal mounting nut and pull the jack out and away from the inside of the cover chassis. Replace in reverse sequence.

6-35. Variable resistors R-201 and R-202 are each mounted to the front cover chassis by hexagonal

mounting nuts. To remove either resistor, first unsolder all leads to the resistor. Then, loosen the slotted-head setscrew in the knob (E-204 and E-205) and pull off the knob. Finally, remove the hexagonal mounting nuts and pull the resistor out from the inside of the cover chassis. Replace in reverse sequence.

6-36. Terminal boards E-202 and E-203 are mounted to the underside of the cover chassis. Terminal board E-202 is mounted by two screws and nuts, while terminal board E-203 is mounted by four screws and nuts. To remove either board, first unsolder all leads to the terminal board. Then, unscrew the mounting hardware, and pull the terminal board off the cover chassis from the inside. Replace in reverse sequence.

6-37. When replacing an interconnecting box cover, reverse the removal procedure of paragraph 6-31, except that the conduit coupling nuts on the three cable assemblies from the interconnecting box to Radio Set Control C-626/ARC-27 should be tightened last. This will provide rigidity to these mounted components.

6-38. REPLACEMENT OF PARTS IN EQUIPMENT OF RADIO SET AN/ARC-27. Refer to the Handbook of Maintenance Instructions for Radio Set AN/ARC-27, AN 16-30ARC27-3.

6-39. REPLACEMENT OF PARTS IN REMOTE CONTROL EQUIPMENT RC-261. Refer to Technical Manual TM 11-2632 for information involving replacement of parts in Remote Control Unit RM-52 and Control Unit RM-53.

6-40. REPLACEMENT OF PARTS IN MAST AB-282/GRC. Repair and replacement of damaged mast components is to be performed by organizational maintenance personnel and is described in paragraphs 5-38 through 5-48.

6-41. MAINTENANCE AND INSPECTION SCHEDULE.

6-42. Refer to table XII.

6-43. OVERHAUL SCHEDULE.

6-44. The following electronic components of each radio set are to be overhauled every 5000 hours of operation: Receiver-Transmitter RT-178/ARC-27, Radio Set Control C-626/ARC-27, Radio Set Control C-628/ARC-27, Power Supply PP-823/GRC (used only with Radio Set AN/GRC-32), Power Supply PP-893/GRC-32A (used only with Radio Set AN/GRC-32A), Power Supply PP-894/GRC-32B (used only with Radio Set AN/GRC-32B), DC Power Filter F-170/GRC (not used with Radio Set AN/GRC-32B), Interconnecting Box J-499/GRC, Remote Control Unit RM-52, and Control Unit RM-53.

6-45. All mechanical equipment, such as the mast, antenna, guy assemblies, block and tackle, etc are to be overhauled every six months.

Paragraphs 6-46 to 6-54

6-46. FLIGHT TEST FOR ENTIRE SYSTEM.

6-47. Purpose. To provide proof of equipment performance.

6-48. Scope. The flight test is limited to a technical evaluation of equipment performance and is not intended to provide facility check.

6-49. Applications. Flight test of this equipment is required after initial installation, modification resulting in deviation from original operational standards and after overhaul.

6-50. Conditions:

a. This equipment will meet T.O. specifications with particular emphasis on transmitter power output and receiver sensitivity. Transmitter power output and receiver sensitivity will be tested prior to and after completion of the flight test. The variation between the beginning and the end of the flight test will not exceed 1%.

b. Aircraft altitude — maximum.

c. The flight pattern will be radial from the site until loss of communication occurs. Determine maximum range of communications for communications evaluation. This range will not be less than 130 nautical miles.

d. Equipment in aircraft utilized in the flight test will meet T.O. specifications with particular emphasis on transmitter power output and receiver sensitivity. Transmitter power output and receiver sensitivity will be tested prior to and after completion of the flight test. The variation between the beginning and the end of the flight test will not exceed 1%.

e. The activity supporting the aircraft utilized in the flight test will furnish performance figures of transmitter power output and receiver sensitivity of the airborne equipment prior to and after the completion of the flight test, to the activity whose equipment is being flight tested.

f. There will be a minimum of one flight.

6-51. Records:

a. The following data will be recorded on the flight test report:

- (1). Organization (facility being tested).
- (2). Type of test (after installation, modification or overhaul).
- (3). Date of flight test.

(4). Altitude of aircraft at time of test.

(5). Type and serial number of aircraft used in flight test.

(6). Serial number of airborne equipment.

(7). Type of airborne antenna utilized.

(8). Airborne receiver sensitivity (prior to and after completion of flight test).

(9). Airborne transmitter power output (prior to and after completion of flight test).

(10). Type of ground antenna utilized.

(11). Ground component types and serial numbers (RT-178, power supply and filter).

(12). Frequency utilized in flight test.

(13). Ground transmitter power output (prior to and after completion of flight test).

(14). Ground receiver sensitivity (prior to and after completion of flight test).

(15). Maximum range of communications recorded.

b. One report for each radial flight is required.

c. Completed copies of the flight test report will be prepared at the activity being checked and will be made a permanent part of the facility acceptance records.

d. AFTO Form 73 will be utilized in recording the flight test data.

6-52. Procurement of forms:

a. The subject AFTO form will be procured as required, in accordance with the procedures contained within Air Force Manual 67-1 for implementation of the test prescribed by this technical order.

6-53. Distribution of forms:

a. Distribution of filled in AFTO Form 73 will be as follows:

- (1). One copy to plant in place records.
- (2). Two copies to the installation activity.
- (3). One copy to the cognizant major command.
- (4). One copy to the activity supporting the Test Aircraft.

6-54. Disposition of forms:

a. AFTO Form 73 will be disposed of as prescribed in AFM 181-5, Chap. 3, Sect. C, Para. 126.

GROUND - AIR COMMUNICATIONS FLIGHT TEST REPORT			
ORGANIZATION			DATE
TYPE OF TEST <input type="checkbox"/> AFTER INSTALLATION <input type="checkbox"/> AFTER MODIFICATION <input type="checkbox"/> AFTER OVERHAUL			
AIRCRAFT			
SERIAL NR	TYPE	ALTITUDE <i>ft.</i>	FLIGHT NR
AIRBORNE EQUIPMENT DATA			
TYPE	SERIAL NR		ANTENNA TYPE
TRANSMITTER POWER OUTPUT		RECEIVER SENSITIVITY	
WATTS (<i>Prior to test</i>)	WATTS (<i>After test</i>)	UVOLTS INPUT FOR RATED OUTPUT (<i>Prior to test</i>)	UVOLTS INPUT FOR RATED OUTPUT (<i>After test</i>)
GROUND EQUIPMENT DATA			
COMPONENT TYPES		SERIAL NUMBERS	
TRANSMITTER ANTENNA TYPE		RECEIVER ANTENNA TYPE	
TRANSMITTER POWER OUTPUT		RECEIVER SENSITIVITY	
WATTS (<i>Prior to test</i>)	WATTS (<i>After test</i>)	UVOLTS INPUT FOR RATED OUTPUT (<i>Prior to test</i>)	UVOLTS INPUT FOR RATED OUTPUT (<i>After test</i>)
FLIGHT TEST DATA			
FREQUENCY UTILIZED		MAXIMUM RANGE OF COMMUNICATIONS RECORDED <input type="checkbox"/> <input type="checkbox"/> NAUTICAL MILES	
REMARKS			
PREPARED BY (<i>Name & Title</i>)			SIGNATURE

AFTO FORM 73
15 APR 56

Revised 1 June 1956

**SECTION VII
DIAGRAMS**

AN 16-30GRC32-2

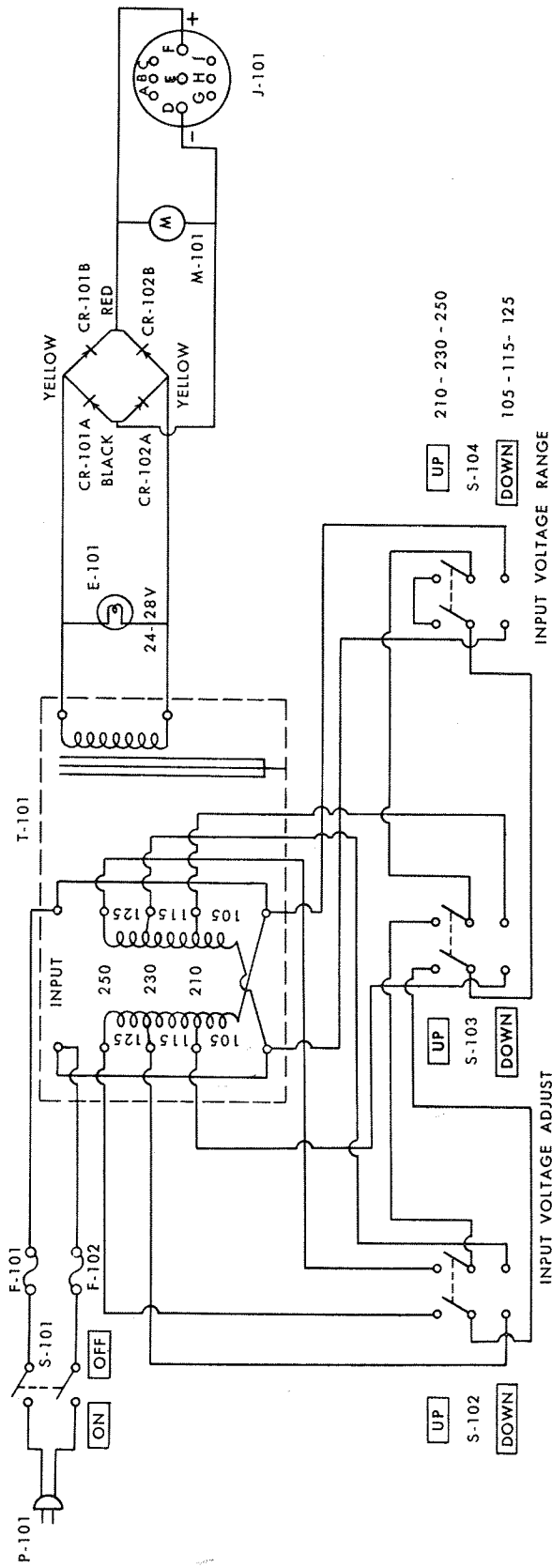


Figure 7-1. Schematic Diagram of Power Supply PP-823/GRC

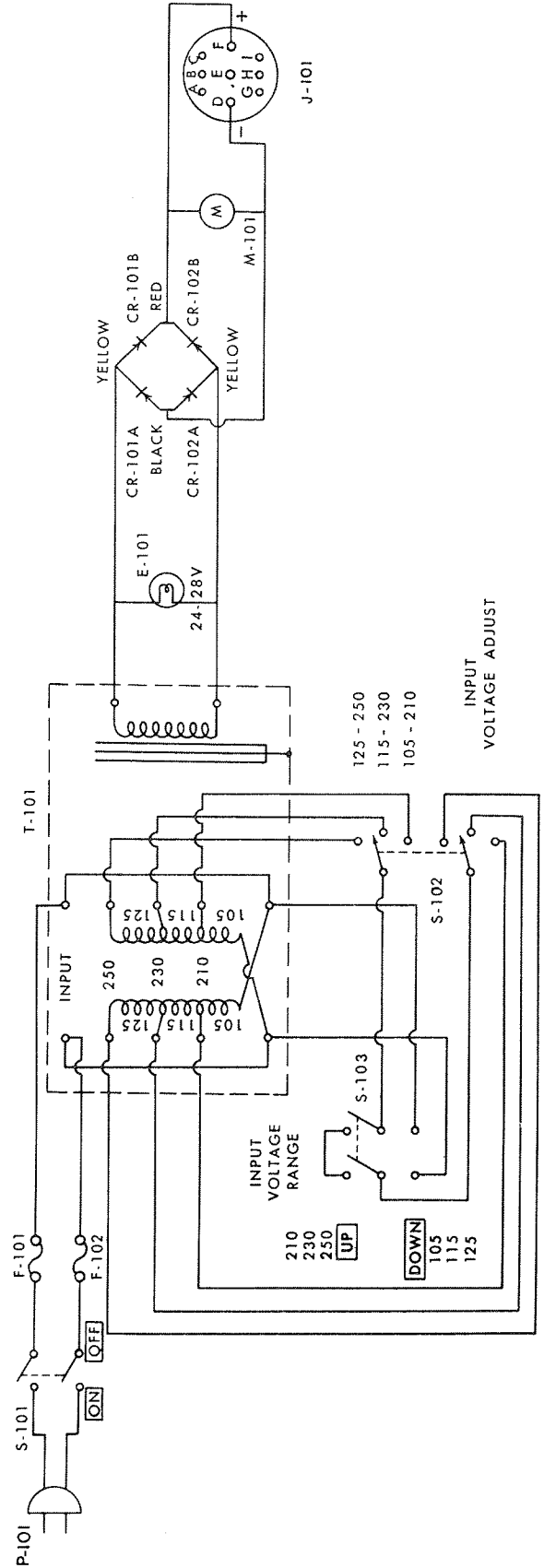


Figure 7-2. Schematic Diagram of Power Supply PP-893/GRC-32A

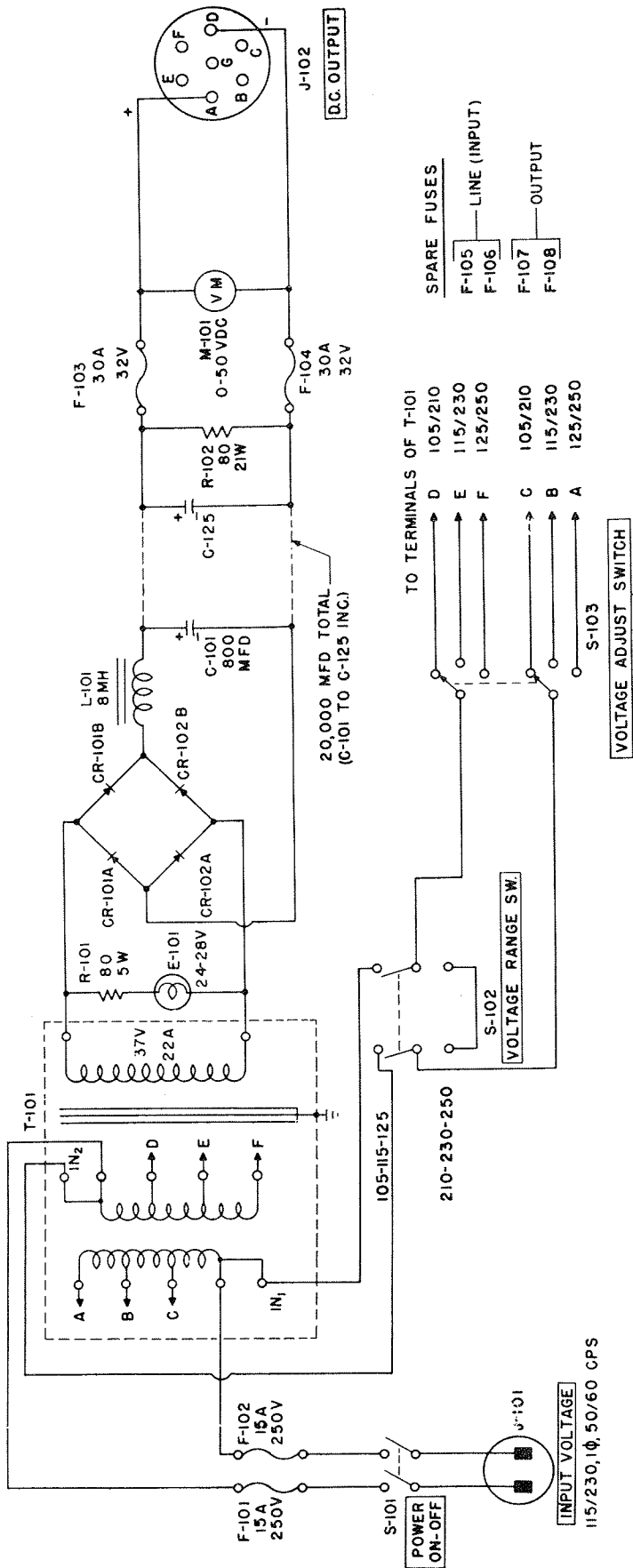


Figure 7-3. Schematic Diagram of Power Supply PP-894/GRC-32B

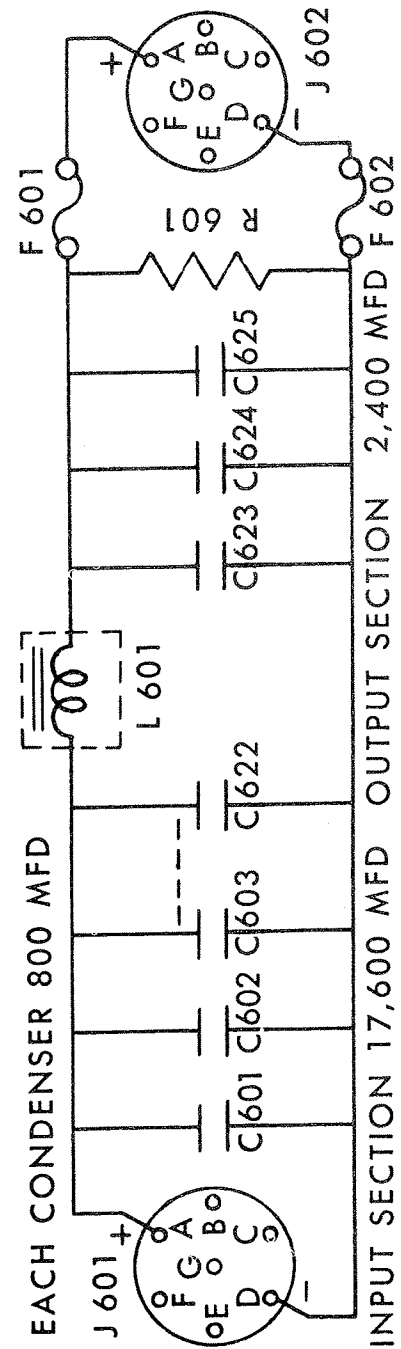


Figure 7-4. Schematic Diagram of DC Power Filter F-170/GRC

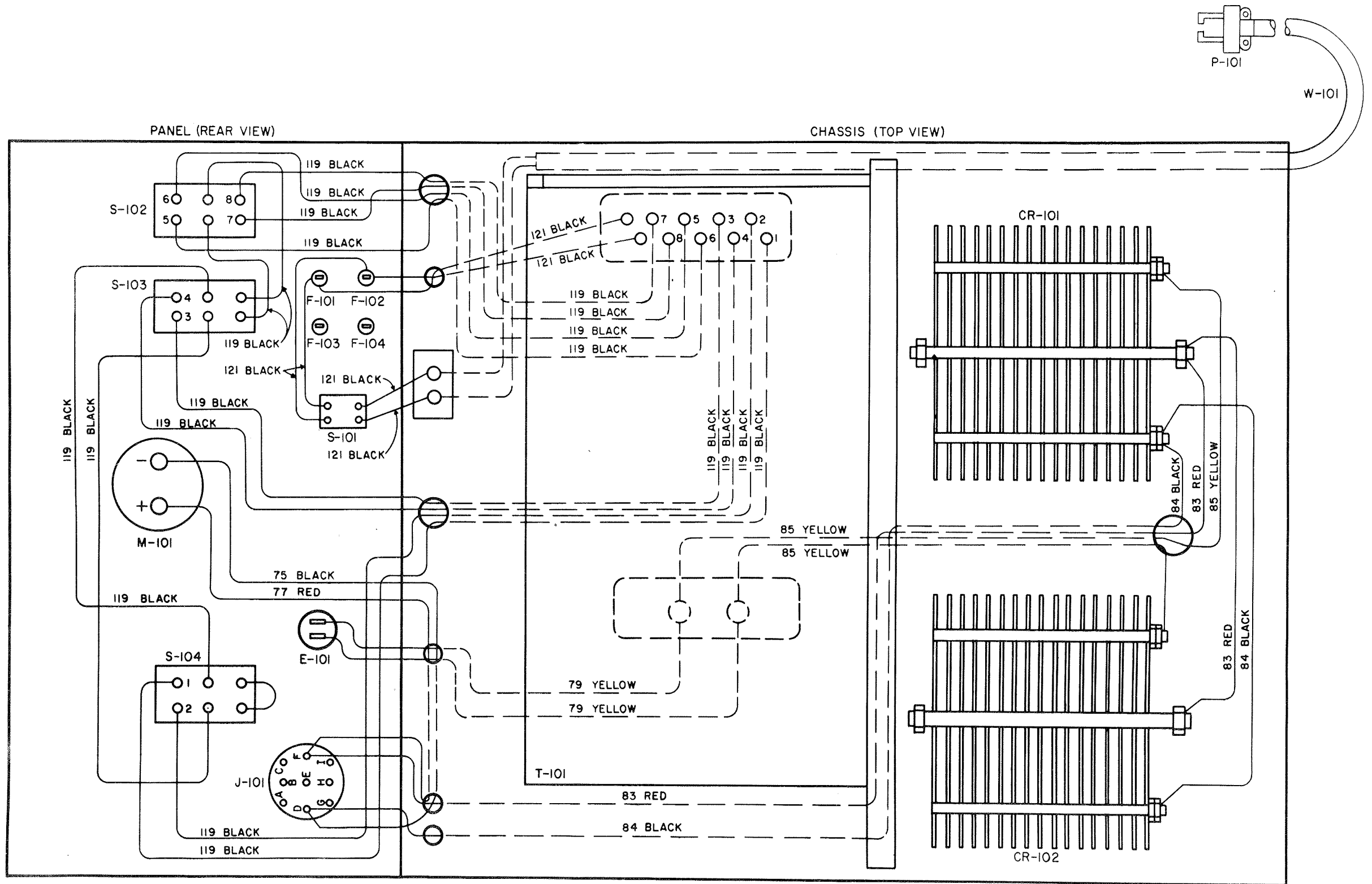
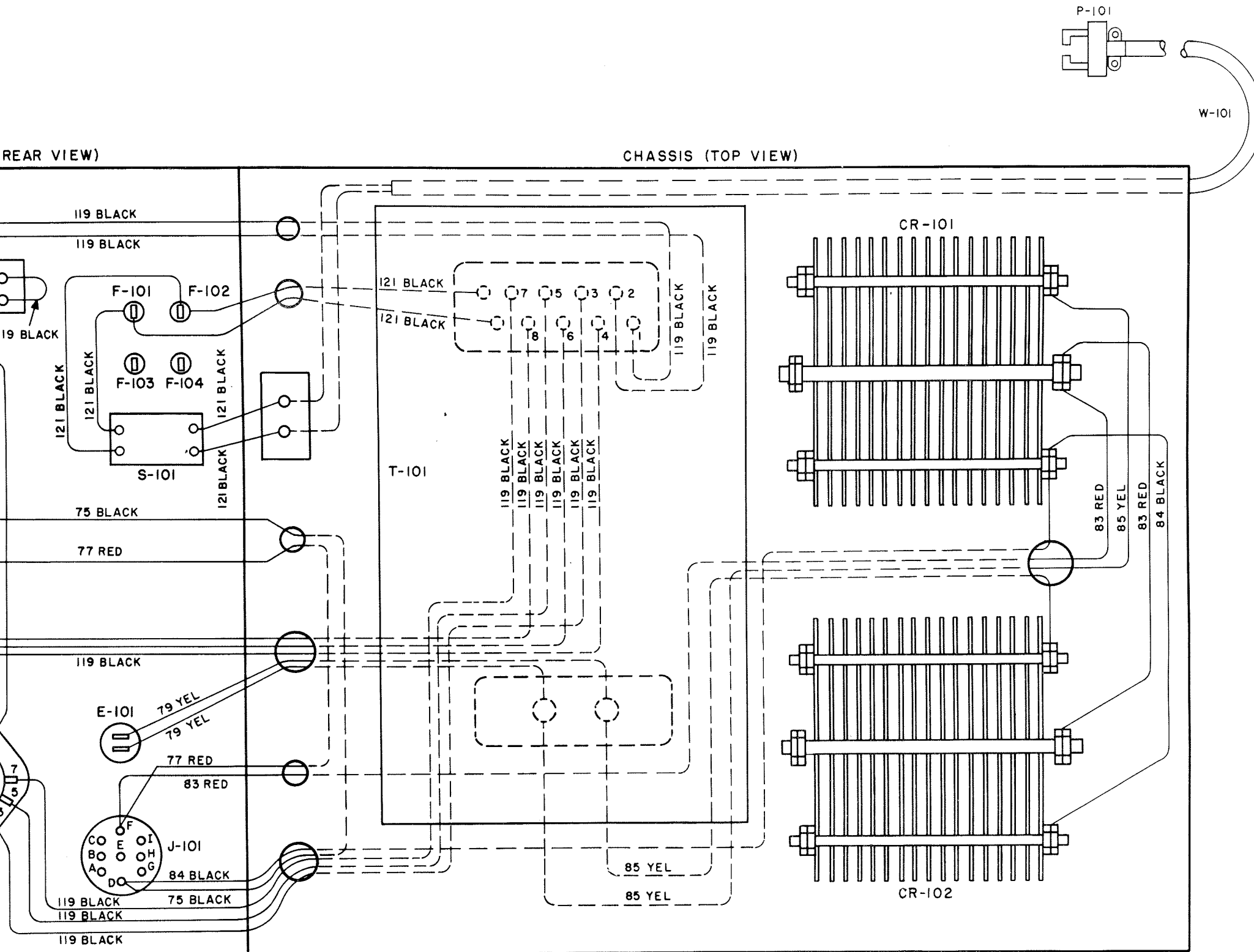
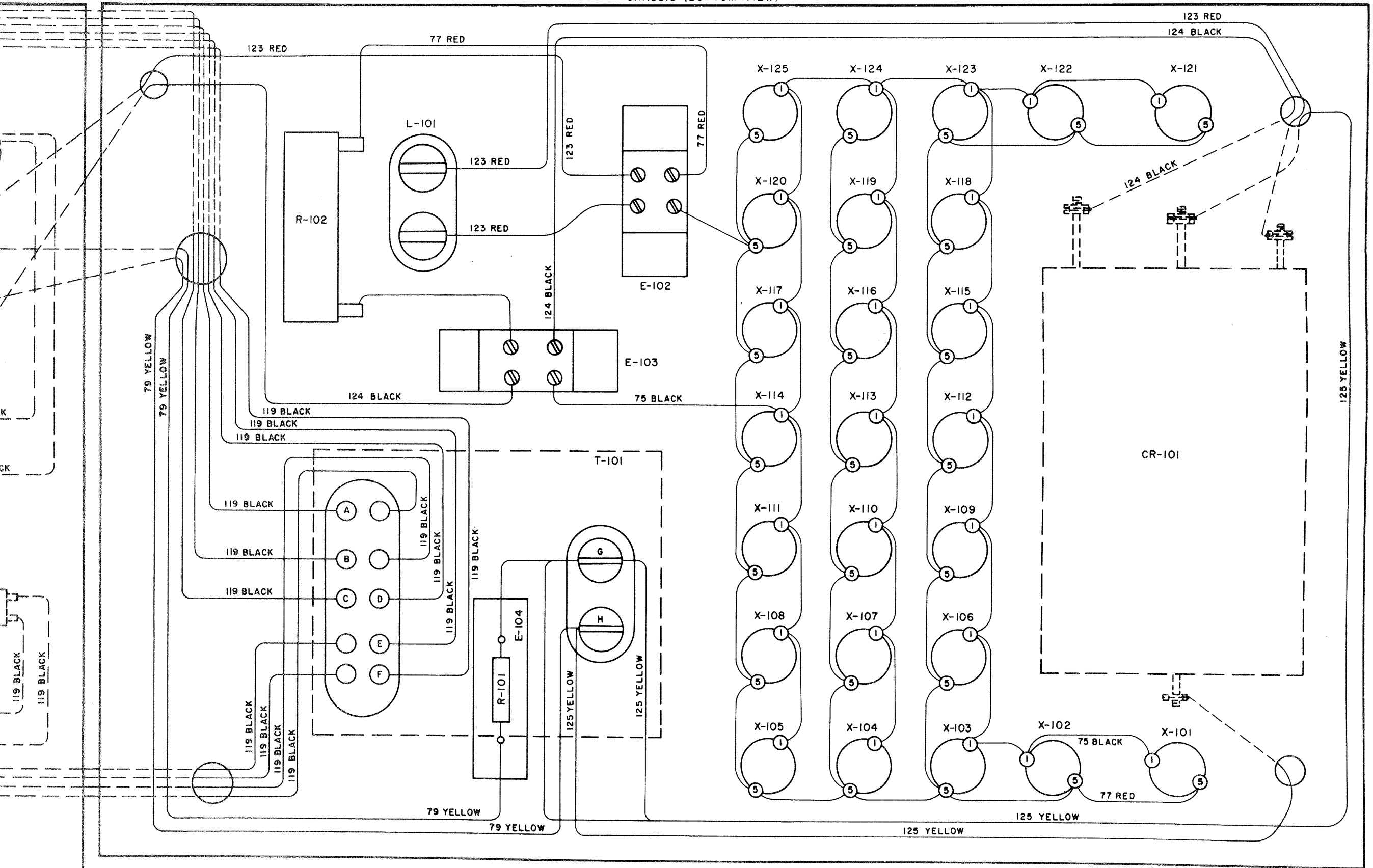


Figure 7-5. Wiring Diagram of Power Supply PP-823/GRC



CHASSIS (BOTTOM VIEW)



PANEL (FRONT VIEW)

CHASSIS (BOTTOM VIEW)

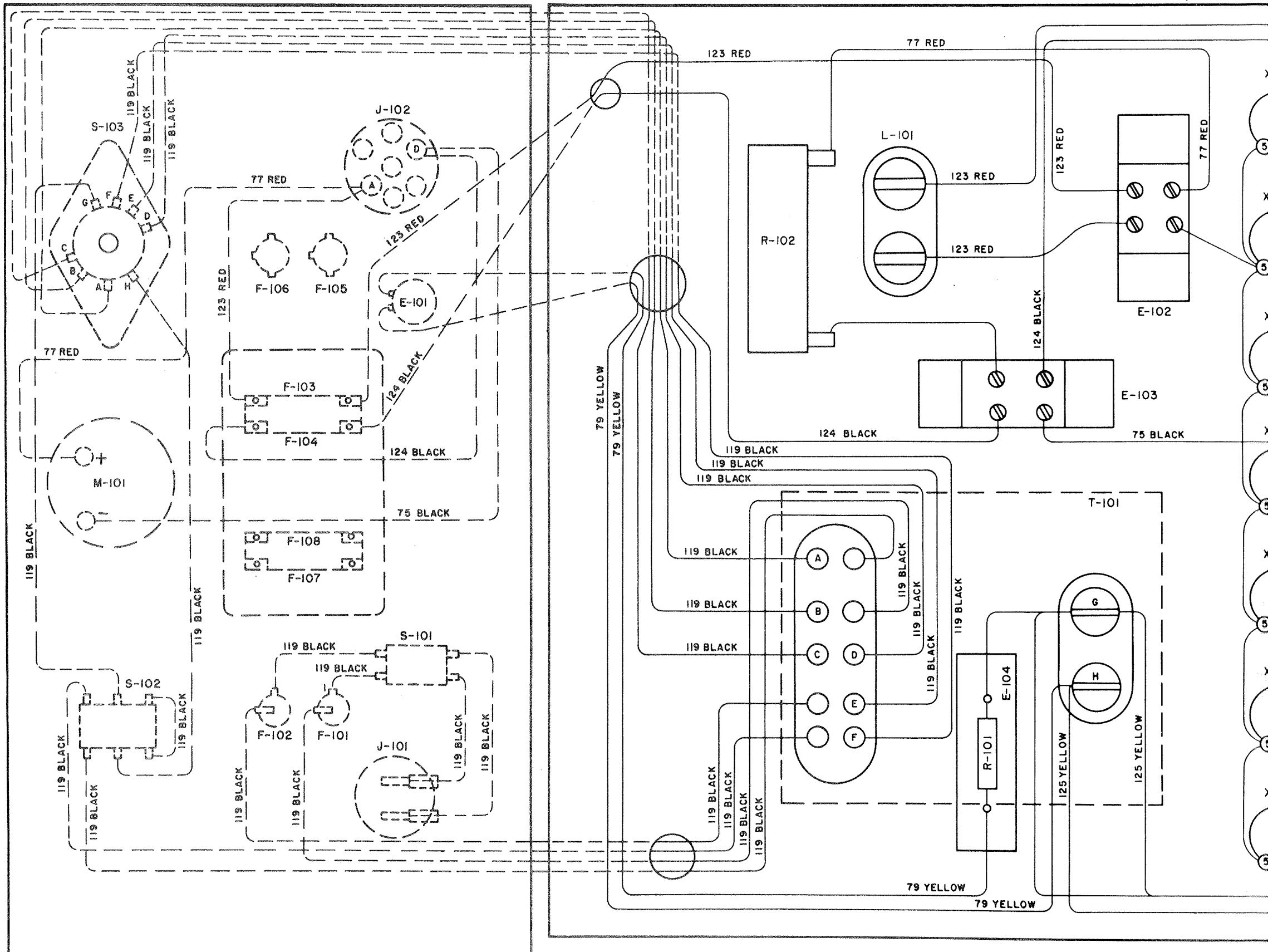


Figure 7-7. Wiring Diagram of Power Supply PP-894/GRC-32B

CHASSIS (BOTTOM VIEW)

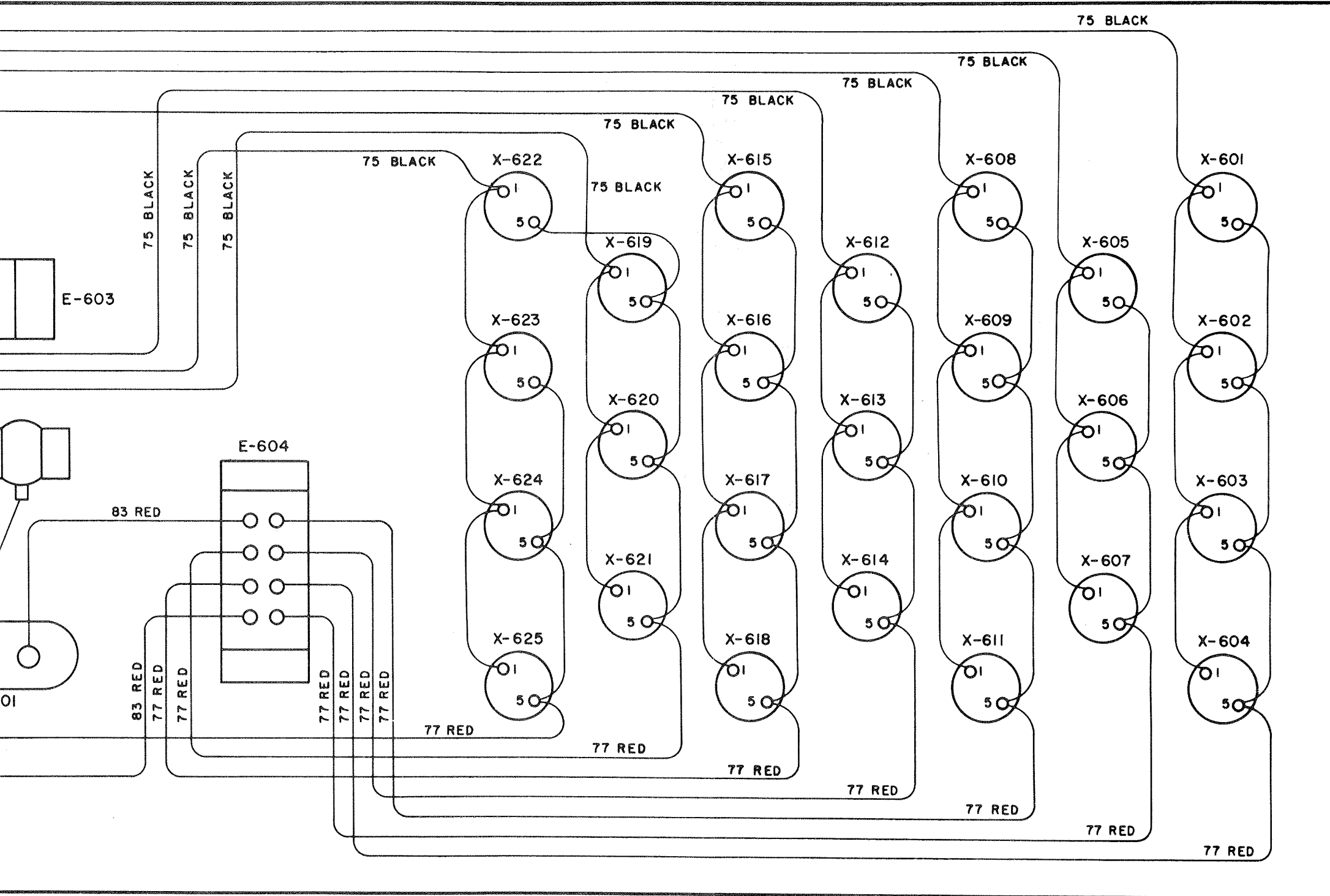


Figure 7-8. Wiring Diagram of DC Power Filter F-170/GRC

PANEL (FRONT VIEW)

CHASSIS (BOTTOM VIEW)

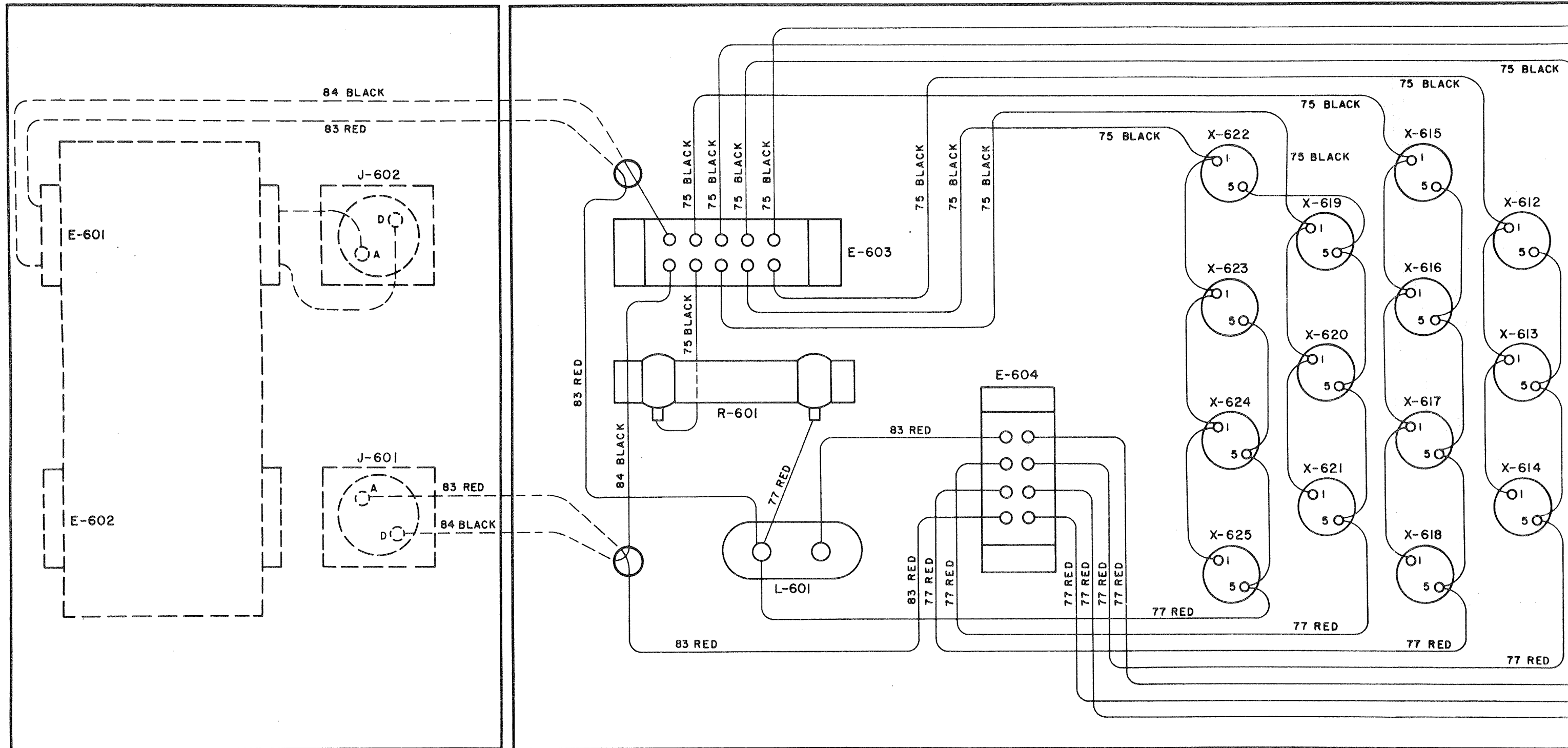
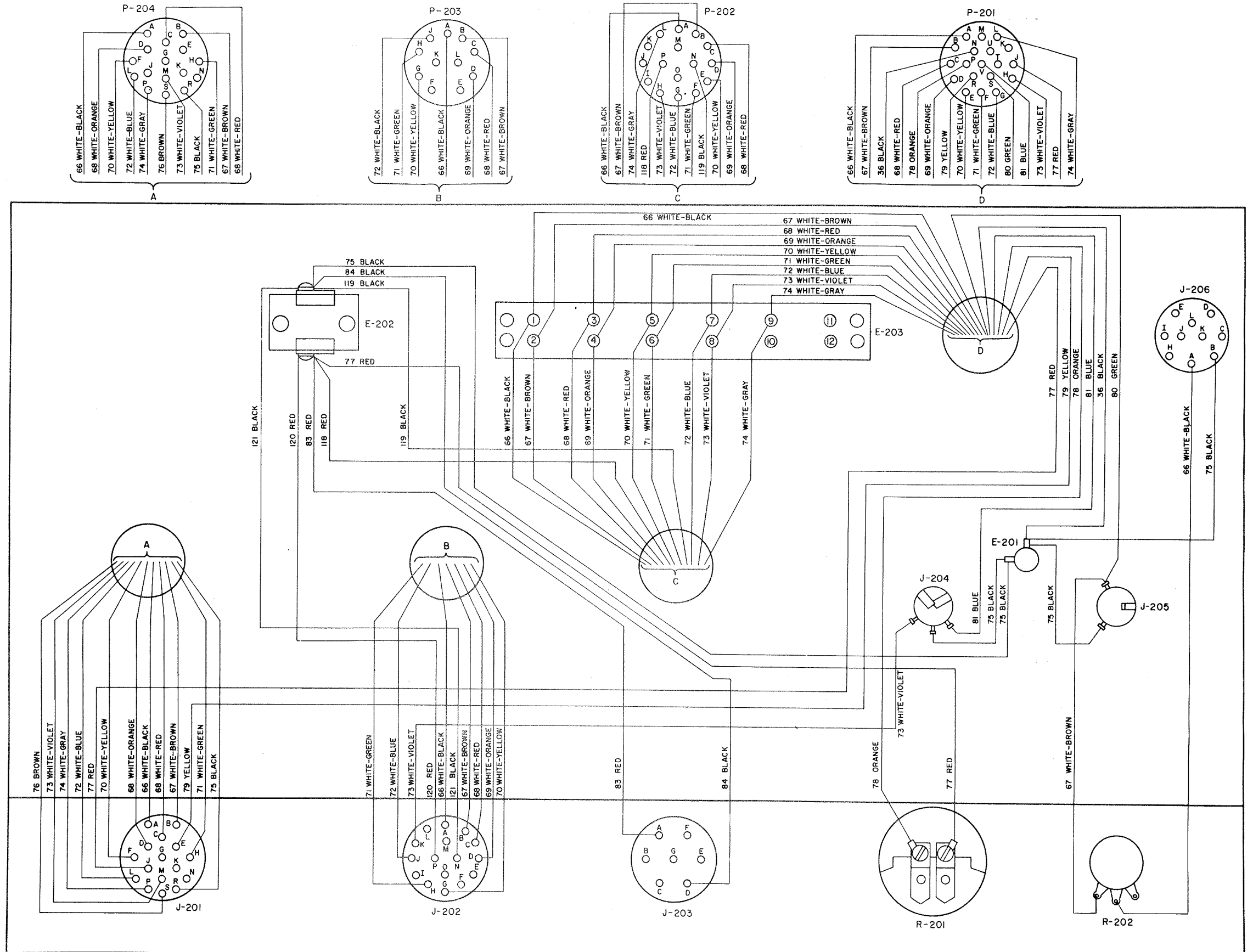


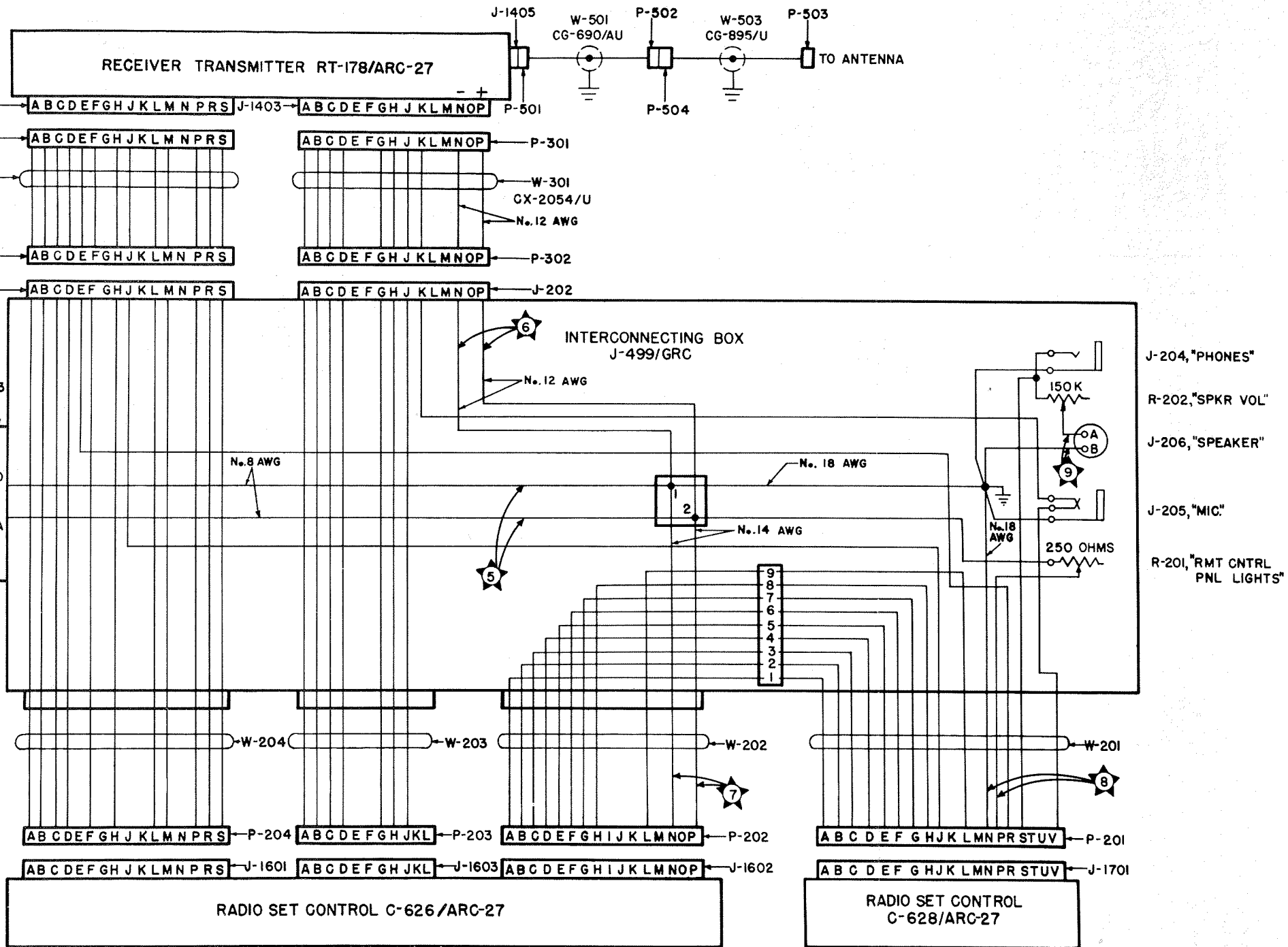
Figure 7-8. Wiring Diagram

AN 16-30GRC32-2



Section VII

AN 16-30GRC32-2



NOTE:
ALL WIRE NO.20 AWG UNLESS OTHERWISE NOTED.

Figure 7-10. Interconnecting Wiring Diagram of Radio Set AN/GRC-32

AN 16-30GRC32-2

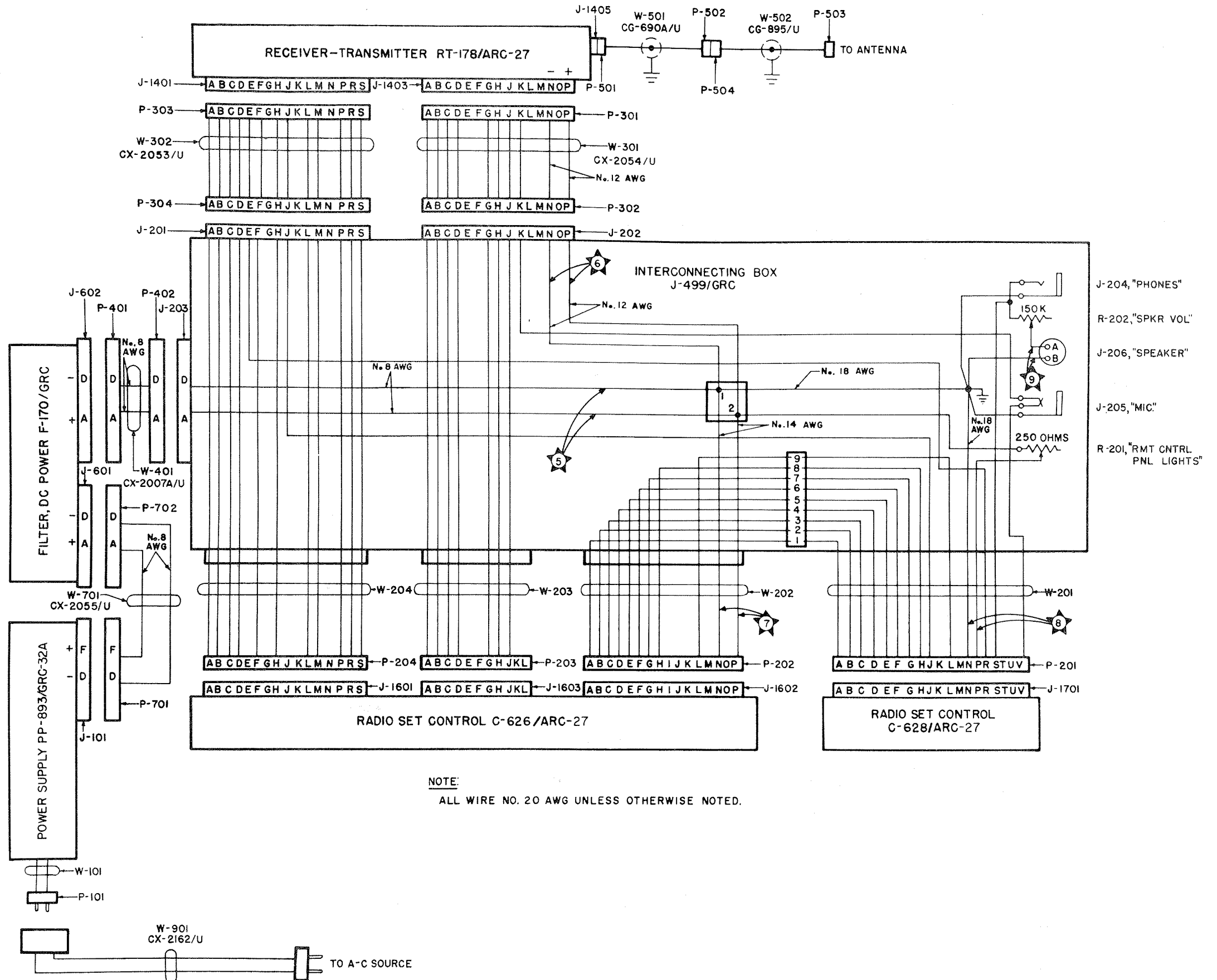
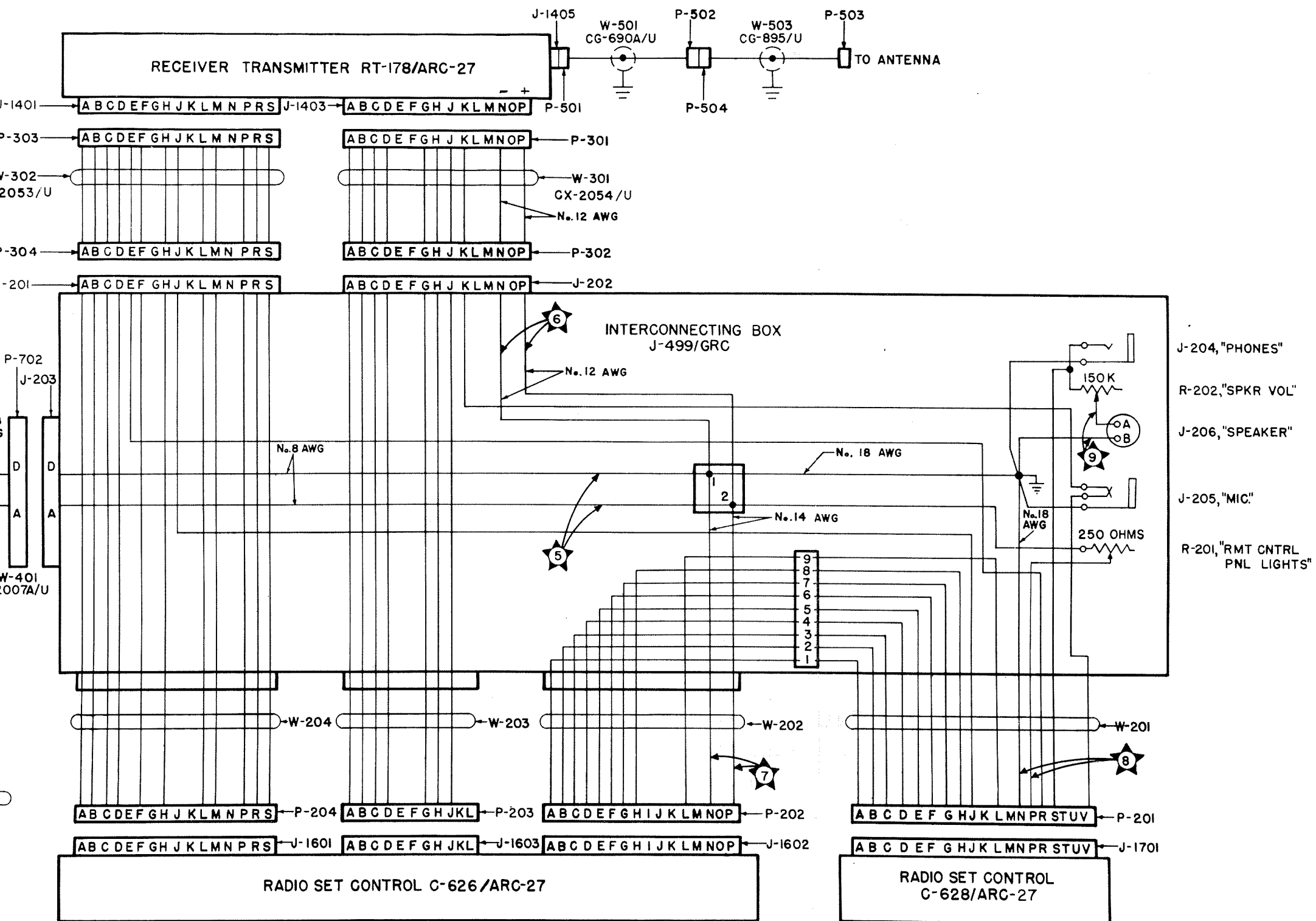


Fig. 7-11 Interconnecting Wire Diagram for AN/GRC-32A

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NOTE:
ALL WIRE NO. 20 AWG UNLESS OTHERWISE NOTED.

Figure 7-12. Interconnecting Wiring Diagram of Radio Set AN/GRC-32B

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