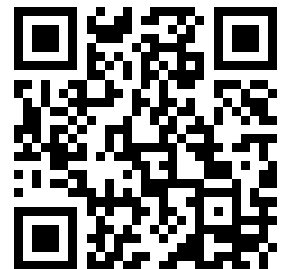


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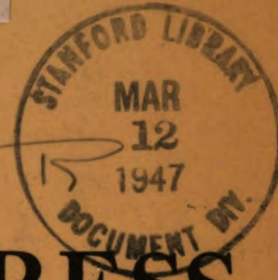
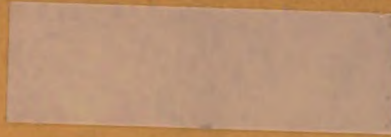
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# TM 11-442

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## PUBLIC ADDRESS SET PA-1-F

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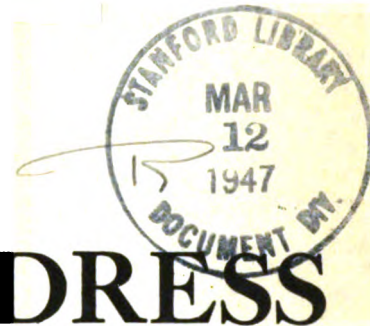


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# TM 11-442

**WAR DEPARTMENT TECHNICAL MANUAL**

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## **PUBLIC ADDRESS SET PA-1-F**

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**PUBLIC ADDRESS**  
**SET PA-1-F**



*WAR DEPARTMENT*

*10 MAY 1944*

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WAR DEPARTMENT,  
WASHINGTON 25, D. C., 10 MAY, 1944.

TM 11-442, Public Address Set PA-1-F, is published for the information and guidance of all concerned.

[A.G. 062.11 (4 Jan 43).]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,  
*Chief of Staff.*

OFFICIAL:

J. A. ULIO,  
*Major General,*  
*The Adjutant General.*

DISTRIBUTION: X

(For explanation of symbols see FM 21-6.)

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## DESTRUCTION NOTICE

- WHY** — To prevent the enemy from using or salvaging this equipment for his benefit.
- WHEN** — When ordered by your commander, or when you are in immediate danger of capture.
- HOW** —
1. Smash—Use axes, sledges, handaxes, pickaxes, hammers, crowbars, heavy tools.
  2. Cut—Use axes, handaxes, machete.
  3. Burn—Use gasoline, kerosene, oil, flame throwers, incendiary grenades.
  4. Explosives—Use firearms, grenades, TNT.
  5. Disposal—Bury in slit trenches, fox holes, other holes, throw in streams.  
Scatter.

### USE ANYTHING IMMEDIATELY AVAILABLE FOR DESTRUCTION OF THIS EQUIPMENT.

- WHAT** —
1. Smash—All tubes, microphones, sockets, capacitors, resistors, transformers, controls, and fittings on both amplifiers. Smash spare tubes, record-player motor, gasoline power plant, and speakers.
  2. Cut—All wires in amplifiers. All interconnecting cables and extensions.
  3. Burn—Technical manuals, wiring diagram on bottom plate of amplifier, and carrying cases.
  4. Bend—Speaker tower stands and microphone stands.
  5. Bury or scatter—Any or all of the above pieces after breaking.

## DESTROY EVERYTHING

---

## SAFETY NOTICE

Protection is provided to keep the operator from coming in contact with high voltages. Connect speakers to amplifier before turning volume control to full. To protect the speaker diaphragm from concussion effects in extreme noise conditions, be sure to place MUSIC-SPEECH switch at SPEECH position. Keep the microphone control as low as possible and speak directly into the microphone.

If the gasoline power unit is operated indoors, make certain that all exhaust connections are gas-tight and the room is properly ventilated. Carbon monoxide contained in exhaust gases is tasteless, odorless, colorless, and a deadly poison.

Do not use amplifier with a fuse rated at more than 4 amperes.

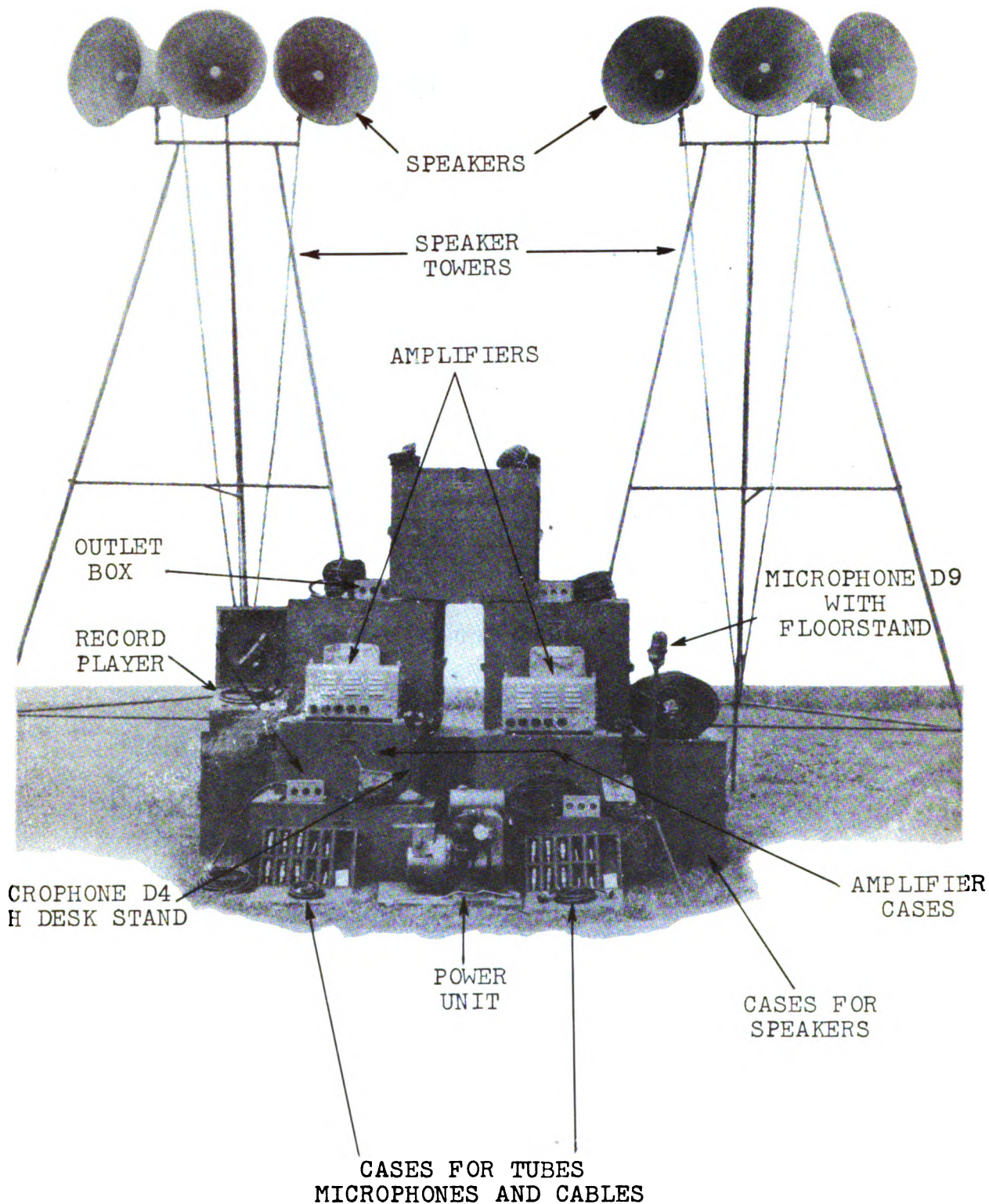


Figure 1. Public Address Set PA-1-F, components.

TL-90674

# SECTION I

## DESCRIPTION

### 1. GENERAL CHARACTERISTICS.

**a. General.** The purpose of Public Address Set PA-1-F is to amplify voice or music and project it over a large area. It consists of two 50-watt amplifiers, each one driving three high-intensity permanent-magnet loud speakers (fig. 1). Each amplifier, housed in a gray metal chassis and having inputs for microphone, record player, and radio, is designed to operate as a single unit or in parallel with the other. Such a parallel arrangement produces 100-watt power, sufficient for covering an area of 80,000 square feet outdoors, with good natural speech and smooth musical reproduction up to 3,000 feet from the speakers. Public Address Set PA-1-F is equipped with two types of microphones, an adjustable-speed record player, six loud speakers, two speaker towers, and a power plant driven by a gasoline engine. Public Address Set PA-1-F is equipped with a high-impedance input marked RADIO. A tuner can be fed into this input.

**b. Power Requirement.** 285 voltamperes at 105 to 125 volts, 60 cycles alternating current.

**c. Power Output.** Maximum output is 90 watts. At 50 watts there is 5 percent distortion between 100 cycles and 3,000 cycles.

**d. Over-all Gain.** 126 db at 1,000 cycles.

**e. A-f Fidelity.** Plus or minus 2.5 db from 50 to 10,000 cycles. Plus or minus 3 db at 10,000 cycles with two amplifiers in parallel.

**f. Hum Level.** 42 db below 50-watt output.

### 2. LIST OF COMPONENTS.

Component	Dimensions (in.)	Unit weight (lb.)
2 amplifiers	11x11x18	75
2 canvas amplifier covers	11x11x18	1
2 amplifier cases	16x16x29½	33.2
1 record player	9x15½x19	35
2 cable and accessory cases	15½x20½x36	39
1 cable set		41
1 desk stand	6x14½	3
1 floor stand	3x33	5
1 microphone (D4)	2x3	1
1 microphone (D9)	4x7	2
2 canvas microphone covers	4x8 and 4¼x6½	
1 power unit	22½x22¼x27½	150
1 record carrying case	3x12½x12½	7
6 speaker cases	28½x28½x30½	50
6 speakers with tops	25x27	27
2 speaker towers	10x15x96	70
1 speaker tower case	11x16x98	45
1 set phonograph needles	1½x2	
1 test record	12 (diam)	
2 spare sets vacuum tubes	3x4x12	9
2 four-ampere fuses (spare)	3/16x¾	
2 pilot lights (spare)	¼x½	

### 3. POWER SOURCES.

**a. Commercial Source.** Public Address Set PA-1-F operates on 115-volt, 60-cycle alternating current. When using a commercially available source of power be sure that the voltage is in the range of 105 to 125 volts. By using the tap switch located on the right side of the amplifier, the voltage sup-

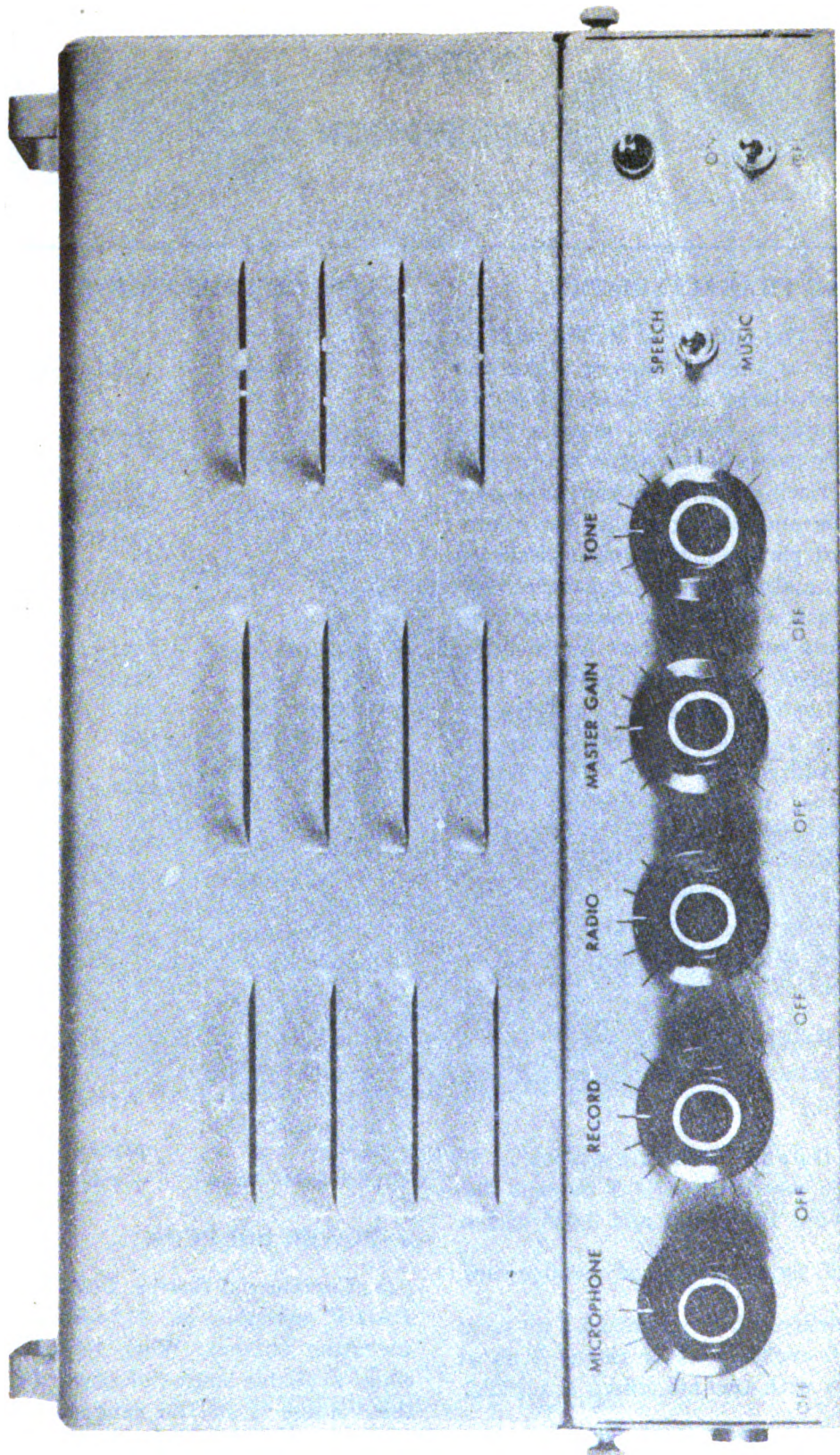


Figure 2. Public Address Set PA-1-F, amplifier, front view.



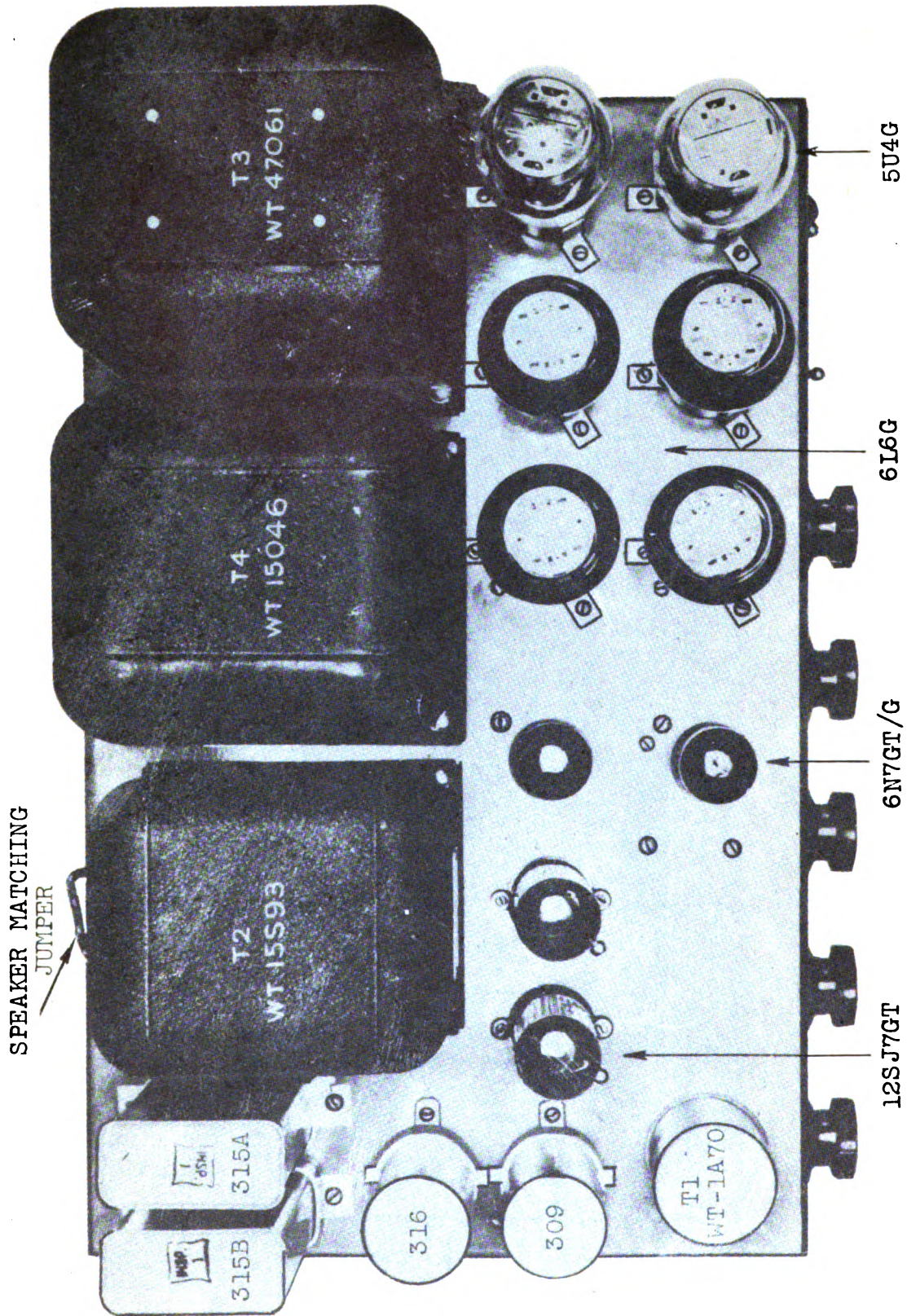


Figure 4. Public Address Set PA-1-F, amplifier, top view.

TL-90677

plied to the power transformer can be matched. This will give correct operating voltage to the amplifier.

**b. Power Unit Source.** In emergencies, use the power unit supplied with Public Address Set PA-1-F. This is a gasoline engine coupled to a generator. The generator will supply enough power to operate the public address set for an indefinite period, provided that the power supply unit is properly maintained (Appendix).

#### 4. AMPLIFIER.

**a. Description.** The amplifier is housed in a gray metal case with two carrying handles on top. A weatherproof cover fits over the entire case for dust and rain protection when the amplifier is not in use. The operating controls MICROPHONE, RECORD, RADIO, MASTER GAIN and TONE, are on the front of the chassis. The SPEECH-MUSIC switch, the a-c ON-OFF switch, and a pilot lamp that glows red when the amplifier is being supplied with its proper voltage are also on the front panel (fig. 2). On the left side of the amplifier are the PARALLEL, RADIO, RECORD, and MICROPHONE input receptacles. The outgoing speaker line receptacle is located on the right side. The LINE VOLTAGE switch, the 4-ampere fuse receptacle, and the a-c cable are also located on the right side of the panel (fig. 3).

**b. Tubes (fig. 4).** A complete operating complement of tubes consists of:

- 2 5U4G full-wave rectifier tubes.
- 4 6L6G beam power output tubes.
- 2 6N7GT/G phase inverter or mixer tubes.
- 2 12SJ7GT input and 2d stage voltage amplifier tubes.
- 1 6- to 8-volt pilot lamp.

#### 5. MICROPHONES (figs. 5 and 6).

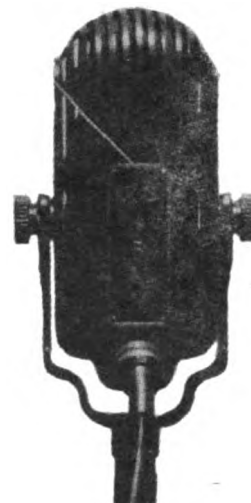
**a. D4 Microphone.** The D4 microphone is a pressure-operated moving-coil type equipped with a 30-foot cord. It can be attached to either the desk or a floor stand.

**b. D9 Microphone.** The D9 unidirectional microphone is a moving coil, pressure-velocity combination type microphone. It has a cardioid pick-up pattern, is equipped with a 30-foot cord, and can be attached to either microphone stand.

**c. Microphone Hoods.** A waterproof hood is provided for covering each microphone.



TL-90678  
Figure 5.  
D4 microphone.



TL-90679  
Figure 6.  
D9 microphone.

**6. SPEAKERS.** The metal horn speakers have permanent-magnet driver units and adjustable angle brackets. The crow's foot can be removed for mounting the speakers on towers. The speakers have a 20-foot cable with a 2-pole polarized plug. Each speaker can handle 25-watt complex wave continuously. The speakers have 16-ohm voice coils and are connected by the polarized plug to the speaker outlet box. The output transformer on each amplifier is set at 6 ohms. This means that for correct matching the three speakers should be used together. If only two speakers are to be used, change the jumper lead on the output transformer from 6 ohms to 8 ohms. For one-speaker operation on a single amplifier, set the jumper to 16 ohms. Best results are obtained with the output matched to the loud speakers.

**7. SPEAKER TOWERS.** Each tower accommodates from one to three speakers. Assemble according to paragraph 13. The speaker outlet box takes the three speaker



plugs which, in turn, plug into the amplifier. All the speakers are phased. The towers are capable of withstanding a 40-mph wind without guying.

### 8. RECORD PLAYER.

a. **General.** The record player is housed in its own wooden carrying case and has a heavy-duty 78-rpm motor with a speed adjustment on the control board. This motor is also designed for 33 $\frac{1}{3}$ -rpm operation, and can be changed to this speed by lifting off the 12-inch turntable and inserting a screwdriver in the slotted stud. By turning this stud the gear ratio can be changed.

b. **Control Board.** The control board contains a volume control, a tone control, and a needle cup. The motor OFF switch is located on the tone control. The tone control with its equalizing circuit produces high fidelity when the knob is turned to the left and reduces the high frequencies when the knob is turned to the right (fig. 7).

c. **Cables.** The a-c and input cables are wound around the metal hanger provided on the inside cover of the phonograph case. This prevents the heavy connectors from scratching the metal plate.

d. **Record Player Pick-up Arm.** The pick-up arm is an Audak magnetic lateral-groove type. It is mounted firmly on the record player plate and is supported by a metal arm rest. A felt pad mounted on the top of the record player case keeps the arm from moving when this unit is to be moved. **Be sure to remove the needle when moving the record player.**

### 9. PACKING THE EQUIPMENT.

a. **Speakers.** Each speaker has its own carrying case. The permanent magnet of the speaker rests in a padded well.

b. **Amplifiers.** Each amplifier has its own carrying case with a separate compartment for a metal record case. The a-c connection is pressed into either of the holes in the top, thus preventing scratching.

c. **Cords and Tubes.** The cord and tube case contains cables, microphones, and stands, and has a top partition holding a spare set of tools.

d. **Record Player.** The record player is permanently mounted in its own carrying case.

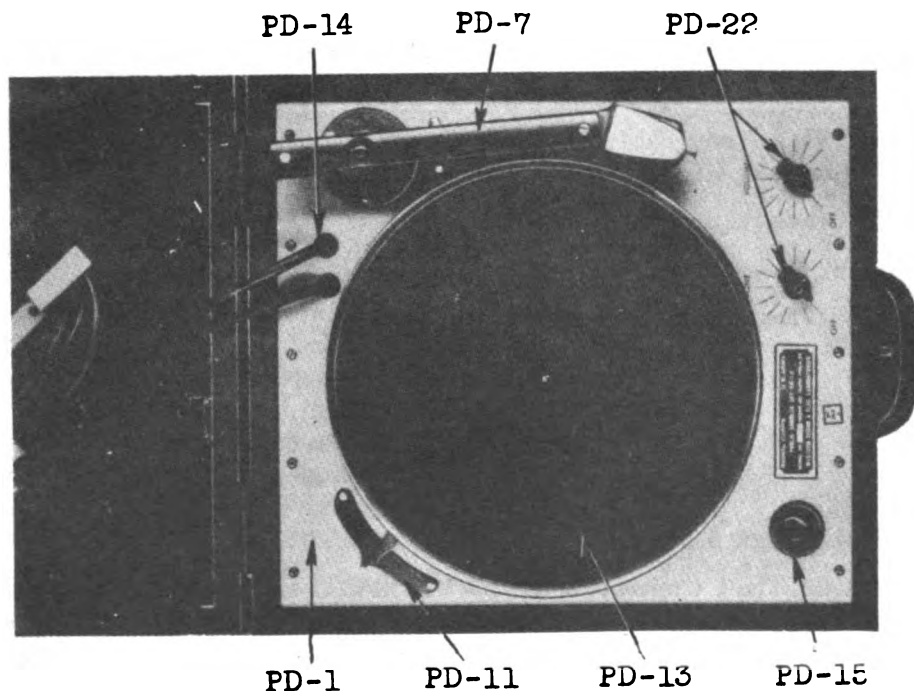


Figure 7. Public Address Set PA-1-F, record player, top view.

TL-90680

## SECTION II

# INSTALLATION AND OPERATION

### 10. GENERAL.

a. **Outdoor Use.** Select a suitable area for outdoor work to accommodate the crowd expected. Mount the speakers on towers (par. 11) and place them in an upright position with the speakers directed to cover the area desired. Place the angle of the speakers so they are directed toward the center of the area. Each tower should be an equal distance from the microphone, with the microphone a few feet in back of the towers. The greater the distance the microphone is placed from the speakers, the more the level that can be had. The amplifiers can be set on their respective cases and connected with the paralleling cable. Be sure to allow a distance of 2 or 3 feet between amplifiers so that no hum will develop. Set the record player on a solid base near the amplifiers and connect. If the power unit is used, place it away from the microphone to avoid interference (fig. 8).

b. **Indoor Use.** For indoor use, place the mounting feet on the speakers. They can then be set on any flat surface or mounted on walls.

### 11. SPEAKER TOWER INSTALLATION (fig. 9).

a. Remove the 12 pieces of the speaker tower from the speaker tower case.

b. Take section A (fig. 9) and assemble the three speaker uprights. These uprights are obtained from the speaker by unscrewing the crow's foot and then removing the wingnut and bolt from the speaker. These three 8-inch studs can then be mounted in section A. Be sure to screw the studs in securely and see that the ribbed face is in the right place for assembling speakers to it.

c. Line up the three loudspeakers by placing them on their bell end. Assemble the

middle speaker to the upright stud on section A and fasten with bolt and wingnut. Assemble the speakers on the left and right of the center speaker with the bell edges just touching. Stud 2 (fig. 9) should now be projecting up and away from studs 1 and 3, which project nearly horizontal.

d. Remove the bolts from the studs on section A and press leg sections G, H, and I in place. Replace bolts and tighten wingnuts securely. Assemble the bottom section of legs J, K, and L by pressing on the upper sections already assembled. Assemble sections C and B to form a T-section. Note the threaded portion on each end of section C which must point up to fit the slant of the legs.

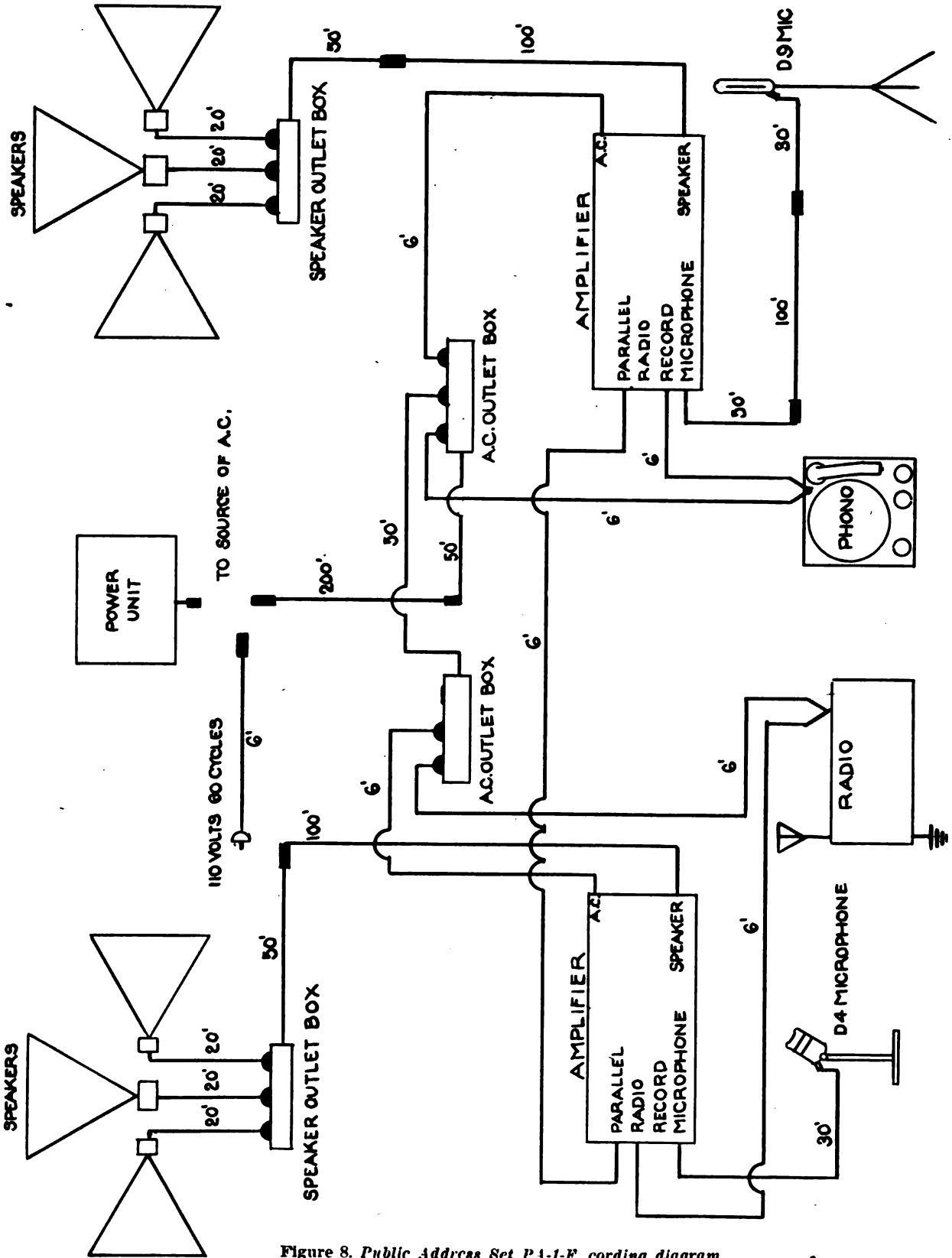
e. Assemble sections C and B in place and see that the bottom plates of the three legs rest solidly on the ground. Wingnuts can then be tightened on the bolts.

f. Sections D, E, and F go on the outside of the legs. One bolt through the lower part of each leg holds two brace sections at that point.

**CAUTION:** Tighten all wingnuts securely and be sure that all speaker cables are free to drop to the ground. Do not use cables to erect the tower. Be sure that speaker and studs are tight.

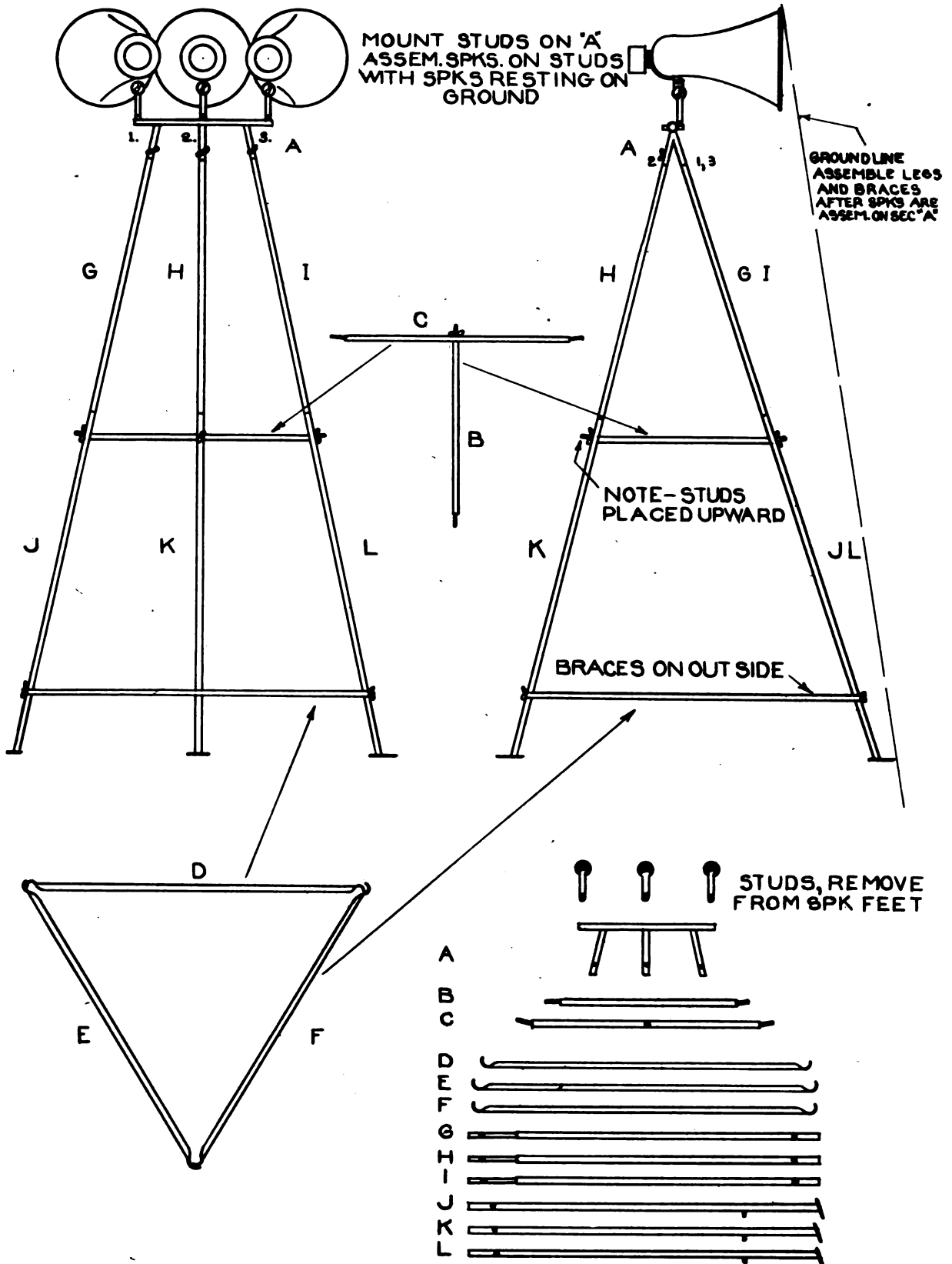
g. The tower is now ready to erect. Five men will be needed to erect the tower. Two men should be at leg J and two at leg L. The fifth man will guide leg K down. The end man on legs J and L should keep the tower from sliding by bracing his foot at the bottom plate.

**NOTE:** This tower is not rigid, but it is strong enough to support the weight of 150



TL-90681

Figure 8. Public Address Set PA-1-F, cording diagram.



TL-90682

Figure 9. Public Address Set PA-1-F, speaker tower assembly.

to 200 pounds in addition to the speakers. Although it is designed to withstand a 40-mph wind without anchoring, the tower may have to be anchored for extreme wind conditions.

**12. AMPLIFIER INSTALLATION.** Remove the amplifier from its shipping box and place it on top of the box for operation. The controls facing the operator are: MICROPHONE, RECORD, RADIO, MASTER GAIN, TONE, SPEECH-MUSIC switch, pilot lamp, and OFF-ON switch. The left side of the unit has four receptacles: PARALLEL, RADIO, RECORD, and MICROPHONE. The right side has a polarized 2-pole receptacle marked SPEAKER. The cover may be removed by removing the two knurled screws on each side of the unit. With the cover removed, the output terminal board is accessible. If necessary, the bottom plate may be removed by removing the six screws. Line voltage adjustments may be made on the voltage selector switch LINE VOLTAGE at the right side of the amplifier (figs. 2 and 3).

**13. CONNECTING SPEAKERS** (fig. 10). Connect the female end of the 50-foot speaker connecting-cable to the amplifier. The male end of this cable is placed under the speaker tower or near the bank of speakers. It has three male receptacles in a metal box. Connect the three cables from the speakers into these three outlets (fig. 8). If two speakers are used, use only two outlets. If more cable length is needed, the 100-foot extension cable provided may be connected at the amplifier and the connecting cable plugged into the extension. Do not use the extension unless it is necessary.

**14. CONNECTING MICROPHONES** (fig. 11). Remove the proper microphone from its compartment in the cable box. Select either floor or desk stand and screw the microphone securely onto the stand. Attach the microphone connecting cable (30 feet long) to the microphone and tighten the knurled nut securely. Connect the other end of this cable, which has the male fitting, to the MICROPHONE receptacle. If more cable is necessary, connect the 50-foot or 100-foot microphone extensions, or both, between the

microphone connecting cable and the amplifiers. The microphone to be used for a given set-up may be chosen as follows:

a. For general use involving close talking, speech, and music, use the pressure-type microphone D4.

b. For long range pick-up of speech or music where all of the sound originates on one side of the microphone, use the cardioid-type microphone D9.

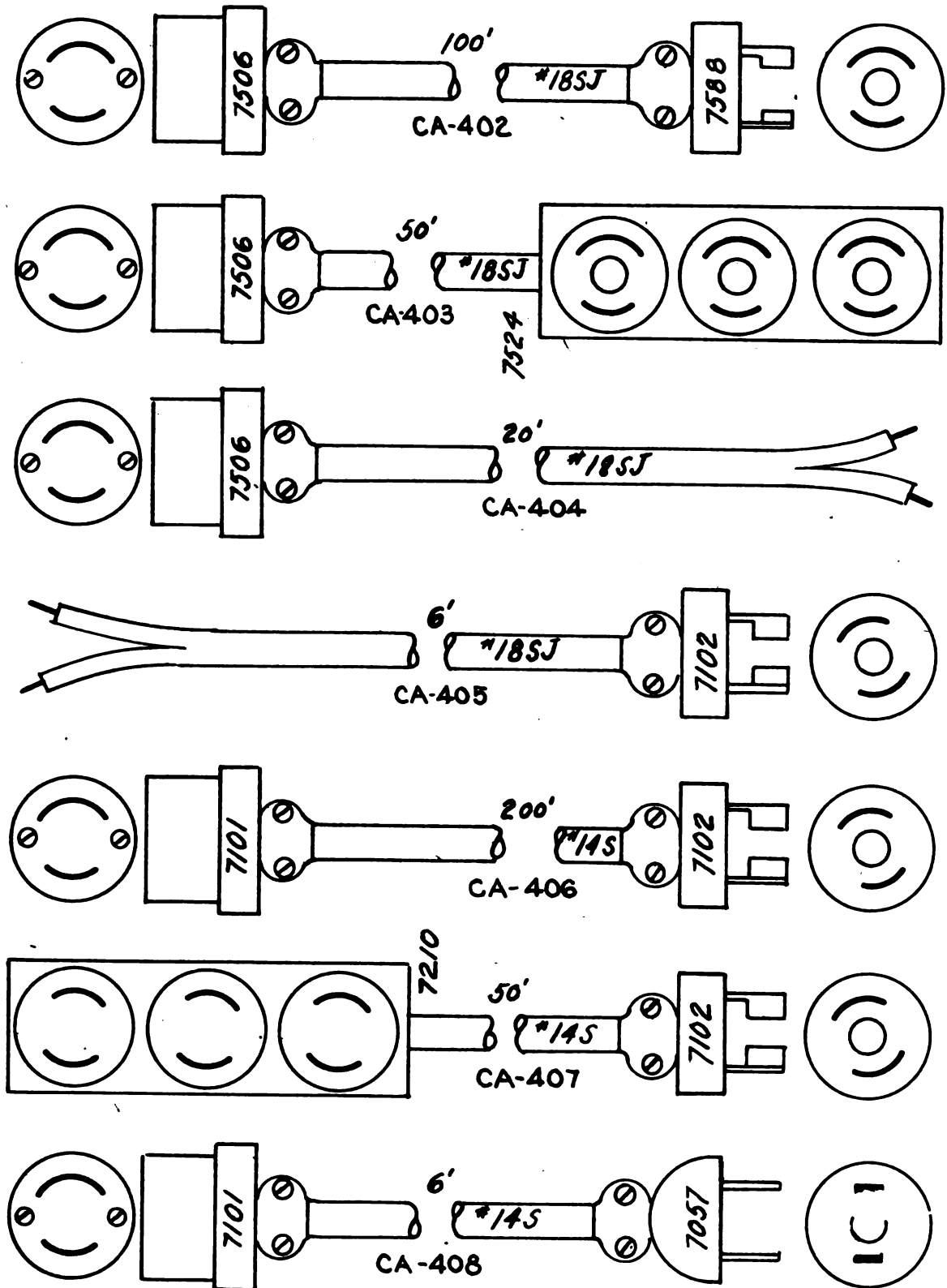
## 15. AMPLIFIER OPERATIONS.

a. Before operation, set all controls as follows: MICROPHONE, off; RECORD, off; RADIO, off; MASTER GAIN, about one-third advanced; TONE, off; MUSIC-SPEECH switch in MUSIC position; and OFF-ON switch, ON. For high noise level put the MUSIC-SPEECH switch in SPEECH position.

b. Turn the amplifier on with the OFF-ON switch on the right side of the amplifier unit. The pilot lamp should light. After the warm-up period of 15 to 30 seconds the amplifier is ready to operate.

c. After all connections are made for microphone operation with MASTER GAIN advanced about one-third (par. 14), advance MICROPHONE until a feedback whistle is heard. Immediately reduce the volume by turning the MICROPHONE control counterclockwise until feedback ceases. This limit should be observed, and for microphone operation the control should be in almost the extreme position to reach the proper latitude of volume control. If the feedback occurs before approximate maximum of the MICROPHONE control is reached, reduce the MASTER GAIN setting until the MICROPHONE control is as close to the extreme position as it is possible for it to be without getting the feedback whistle. Two microphones may be used at one time by connecting the second microphone into the RECORD receptacle and using the RECORD control for the second microphone.

**16. RECORD PLAYER OPERATION.** Connect the record player output cable to the receptacle on the left side of the amplifier



TL-90683 Figure 10. Public Address Set PA-1-F, speaker and power cable connector assemblies.

unit. Connect the a-c power cord to the a-c power connecting cable. Set the RECORD control on the amplifier about one-third open and control the volume of the record player through its volume control. The tone control switch on the record player may be used as desired.

**17. TWO-AMPLIFIER OPERATION.** Two amplifiers are supplied with each set. The second amplifier set-up is a duplicate of the first. To parallel the second amplifier to the first, connect the 6-foot inter-connecting cable between the PARALLEL receptacles

on each amplifier. Connect the a-c power cord from the second amplifier to the a-c outlet box. Each speaker bank may be controlled separately regardless of which amplifier is being used. To control the microphone or record player, set the MASTER GAIN on each amplifier at the proper level. Both inputs (microphone and record player) may be used on both amplifiers simultaneously, or both microphones may be used on one amplifier and the record player on the other as desired. For normal operation set both MASTER GAIN controls at the same approximate setting.

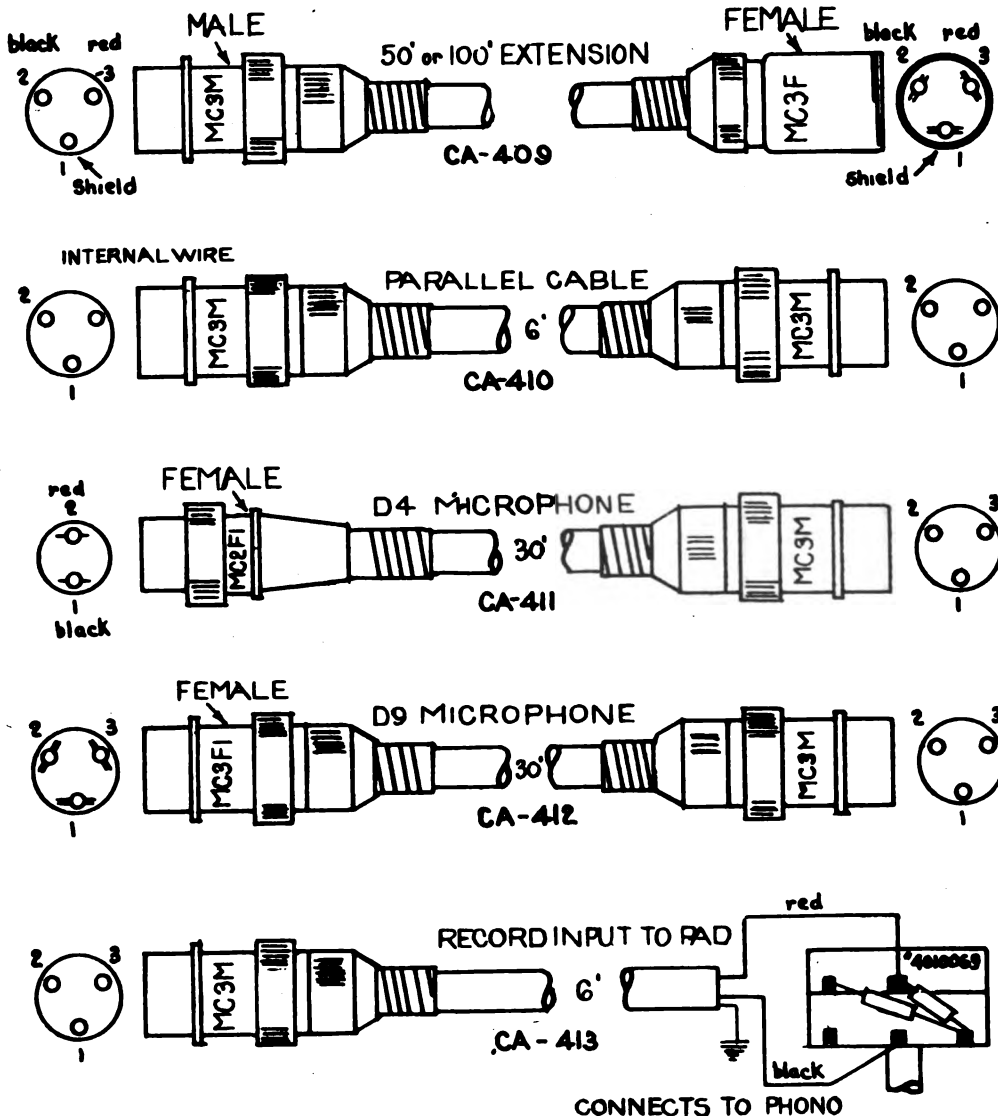


Figure 11. Public Address Set PA-1-F, microphone connector assemblies.

TL-90684

## SECTION III

### FUNCTIONING OF PARTS

**18. D4 MICROPHONE.** The D4 or speech microphone (fig. 5) consists of a moving coil of fine wire suspended in a magnetic field. Sound pressure waves hit the diaphragm, moving the coil and generating an alternating current. This current, which is an electrical form of the sound pressure applied, is amplified through successive stages of the amplifier and through the loudspeakers.

**19. D9 MICROPHONE.** The D9, or cardioid-type microphone (fig. 6), consists of two separate units: a pressure unit and a velocity unit connected in series. These units must be in phase to prevent bucking. This microphone has unidirectional characteristics; the energy response excludes outside pick-up and reduces feedback.

**20. AMPLIFIER (figs. 12, 13, and 14).**

**a. General.** The amplifier is a 250-ohm low-level series-connected input system, fed through the proper matching transformer to the grid of a 12SJ7GT voltage-amplifier tube. Resistance-capacity coupling is provided to a second 12SJ7GT voltage-amplifier tube which is, in turn, resistance-capacity coupled to the master control circuit. This constant-impedance circuit also feeds the interconnected amplifier through the 6-foot connecting cable when used. The variable tap on the master control feeds directly to the grid of the 6N7GT/G driver tube. The 6N7 plate is connected through a resistance-capacity circuit to the grid of the push-pull parallel output stage consisting of four 6L6G tubes. Isolation resistors in series with each grid prevent parasitic oscillation of the grid circuit of the paralleled tubes. A tap on the resistance-voltage-divider network feeds the grid of a second 6N7GT/G tube. The phase shift provided by this divider excites the grid of the 6N7GT/G tube, providing an out-

of-phase voltage on the plate to feed the other half of the push-pull output stage. The 6L6G tubes feed to a multi-match output transformer, providing any output impedance by selecting the proper tap on the terminal board which is mounted on the rear of the amplifier under the protecting cover. In addition, a third or tertiary winding provides an out-of-phase voltage which is fed through a resistance network to the cathode return of the 6N7GT/G driver tubes. This negative feedback helps to stabilize the pentode output stage to the proper load conditions.

**b. Amplifier Power Supply (fig. 14).** (1) **TRANSFORMER.** The power supply on the amplifier consists of a heavy-duty power transformer with a variable tapped primary winding, tapped at 105, 110, 115, 120, and 125 volts. A 5-volt winding supplies the filaments of two 5U4G tubes connected in parallel. The 450-volt winding is connected as a full-wave rectifier with its center tap in series with a 50-watt semi-variable resistor to ground. This arrangement provides a negative voltage on the center tap with respect to ground.

(2) **DIVIDER CIRCUIT.** The d-c voltage for the 5U4G rectifiers is stabilized by a divider circuit or a 3,500-ohm 50-watt resistor and a 20,000-ohm 50-watt resistor in series to ground. The proper screen voltage is drawn off from this divided circuit and fed to the screens of the output tubes. The plate and screen voltages for the input and driver tubes are also brought off at the same junction.

(3) **FILTERING.** Adequate filtering is provided by a heavy-duty choke and two 6-microfarad paper capacitors connected in a pi network. Isolation and filter between stages is provided by resistance-capacity filters between each stage.



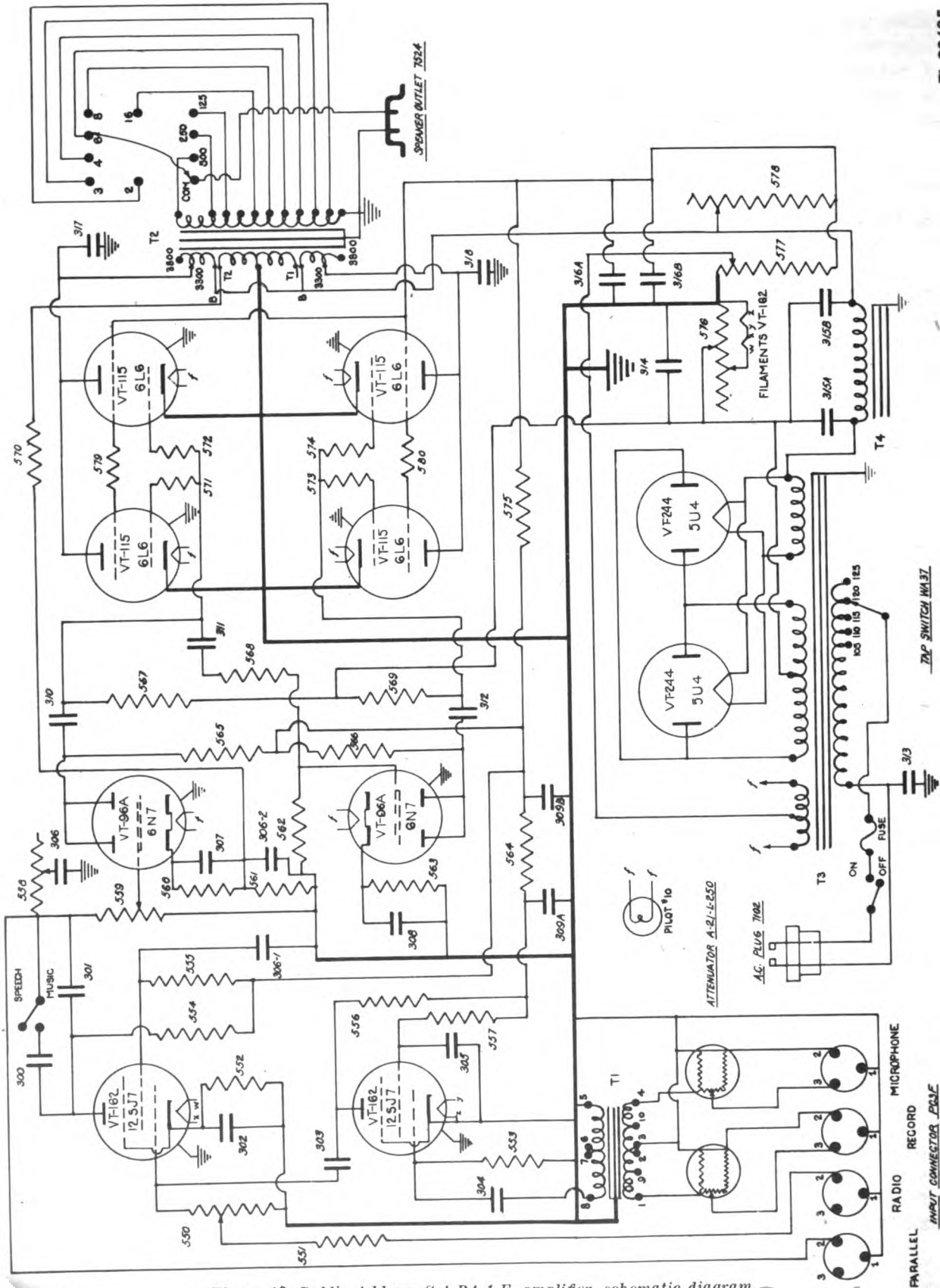


Figure 12. Public Address Set PA-1-F, amplifier, schematic diagram.

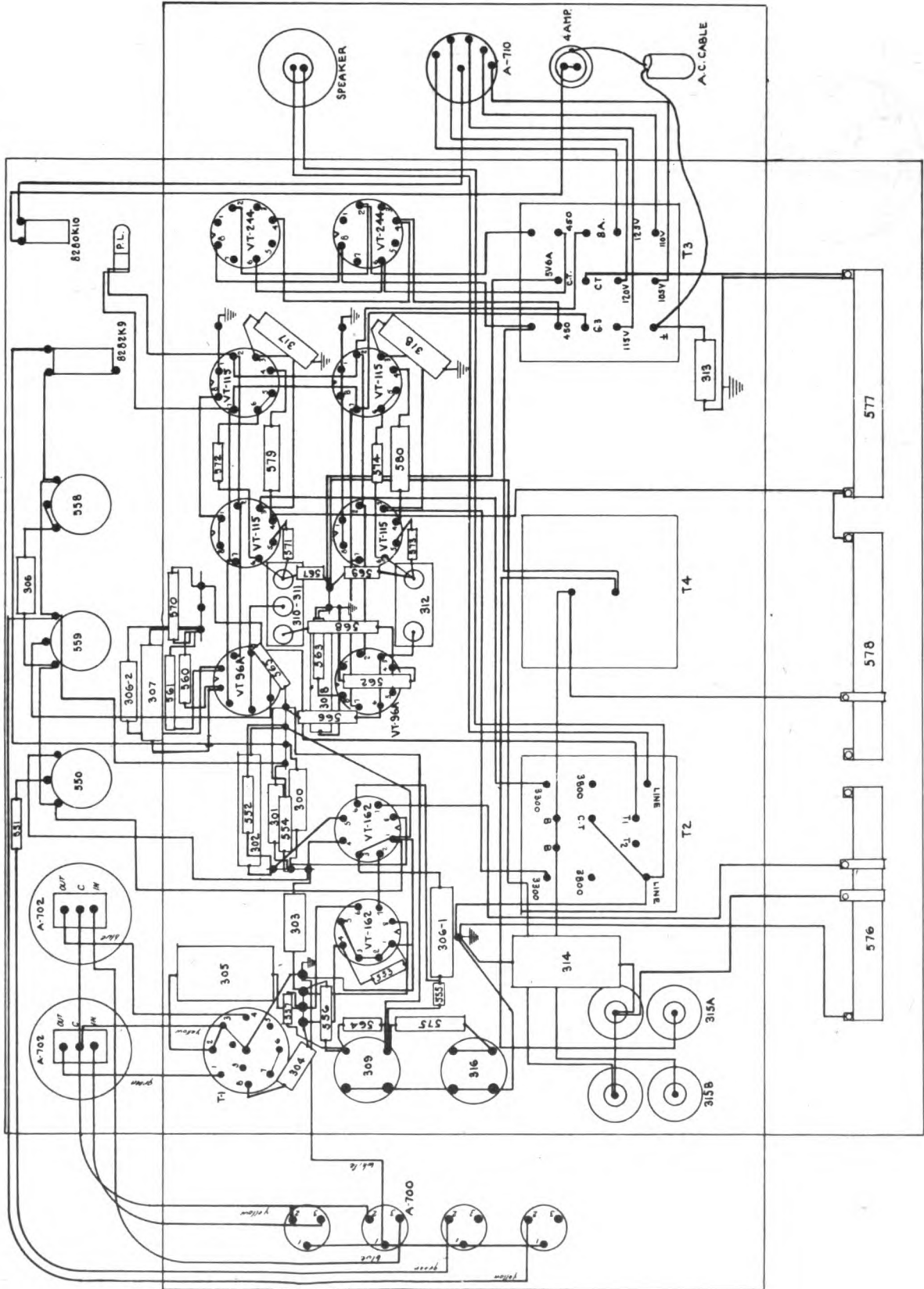


Figure 13. Public Address Set P.A-1-F, amplifier, functional diagram.

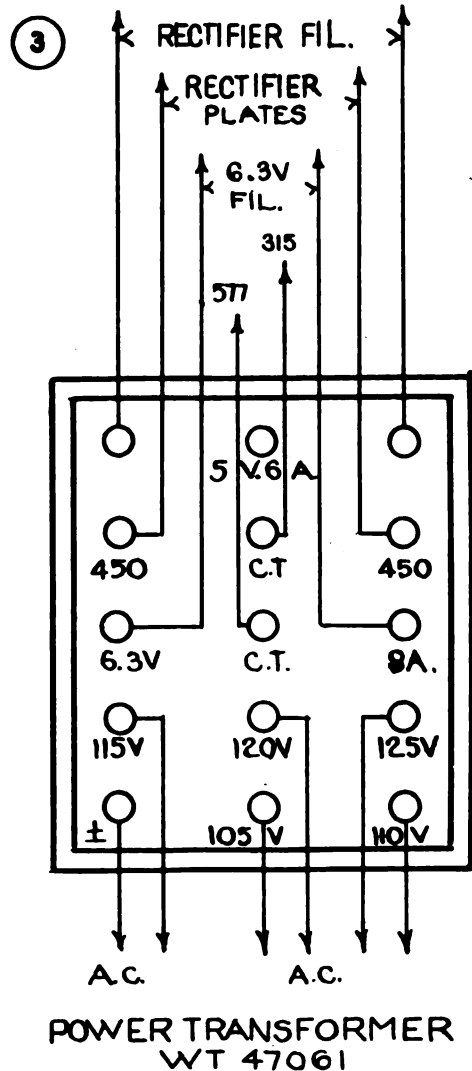
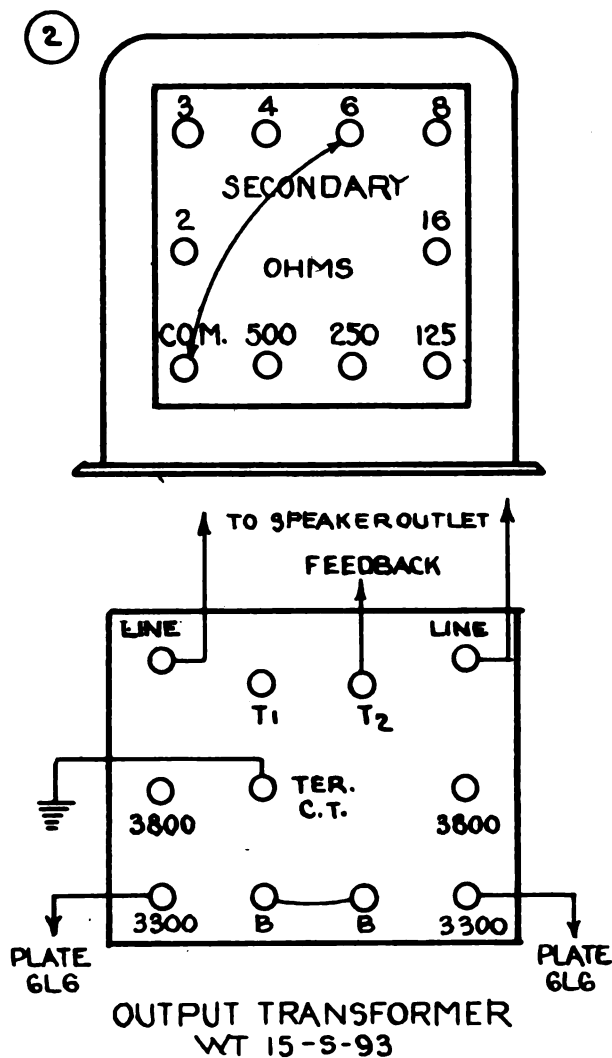
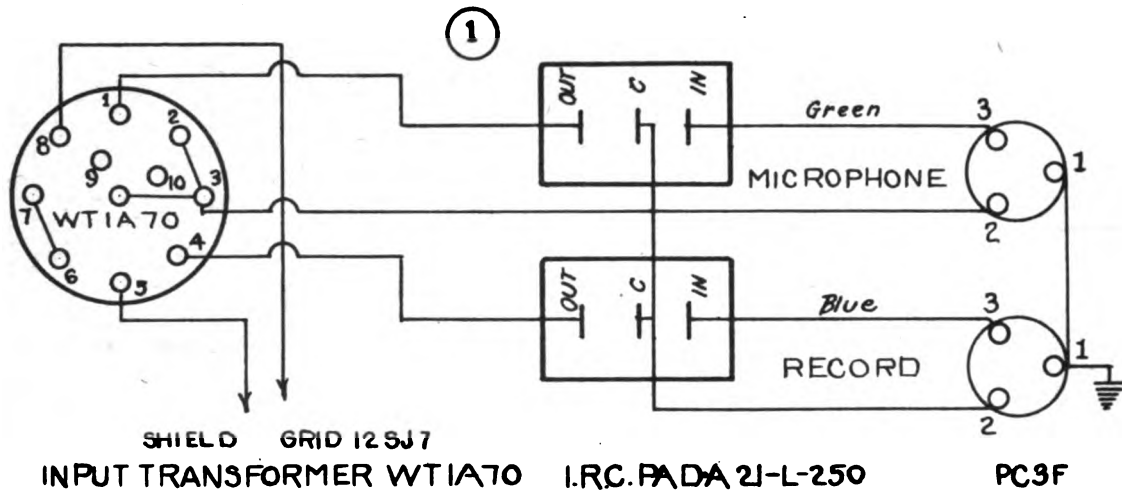


Figure 14. Public Address Set PA-1-F, transformer, functional diagrams.

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c. **SPEECH-MUSIC Switch.** The **SPEECH-MUSIC** switch is operated normally in down position. When the switch is in up position the base frequencies will be cut out. The up position is necessary for projecting sound through a high noise level to prevent injury to the speakers.

**21. SPEAKERS.** The speaker driver unit can be unscrewed from the horn. This driver unit consists of a diaphragm driven by a moving coil in a magnetic field. Alternating current produced by the amplifier drives the diaphragm which, in turn, pushes the air surrounding it. This change produces air waves in the throat of the loudspeaker to which the ear responds as amplified sound. Intense concussion which might rupture the diaphragm can be detected by a rasping sound issuing from the speaker. The rasping sound is due to the fact that the diaphragm is not pushing the air as it should.

**22. MICROPHONE FLOOR STAND.** The tripod-type stand is adjusted for height by turning the upper portion of the stand  $\frac{1}{4}$

turn to the right. Lock it by turning to the left at the height needed.

**23. LINE VOLTAGE SWITCH.** The **LINE VOLTAGE** switch, used to match the incoming voltage to the power transformer, is located on the right side of the amplifier. Measure the power supplied with an a-c voltmeter to determine the voltage. Then set the tap switch to the nearest value marked on the bakelite strip. If in doubt set the switch to 125 volts or use the power plant. Amplifiers are delivered with the switch at 125 volts to insure maximum life of the vacuum tubes.

#### **24. RECORD PLAYER (fig. 15).**

a. **Tone Control.** The tone control circuit is a capacitive shunt circuit varied by a series resistor. The a-c power is supplied to the record player motor through the **OFF-ON** switch located on the tone control knob.

b. **Volume Control.** The volume control circuit is a modified T-network, composed of two fixed and two variable resistors.

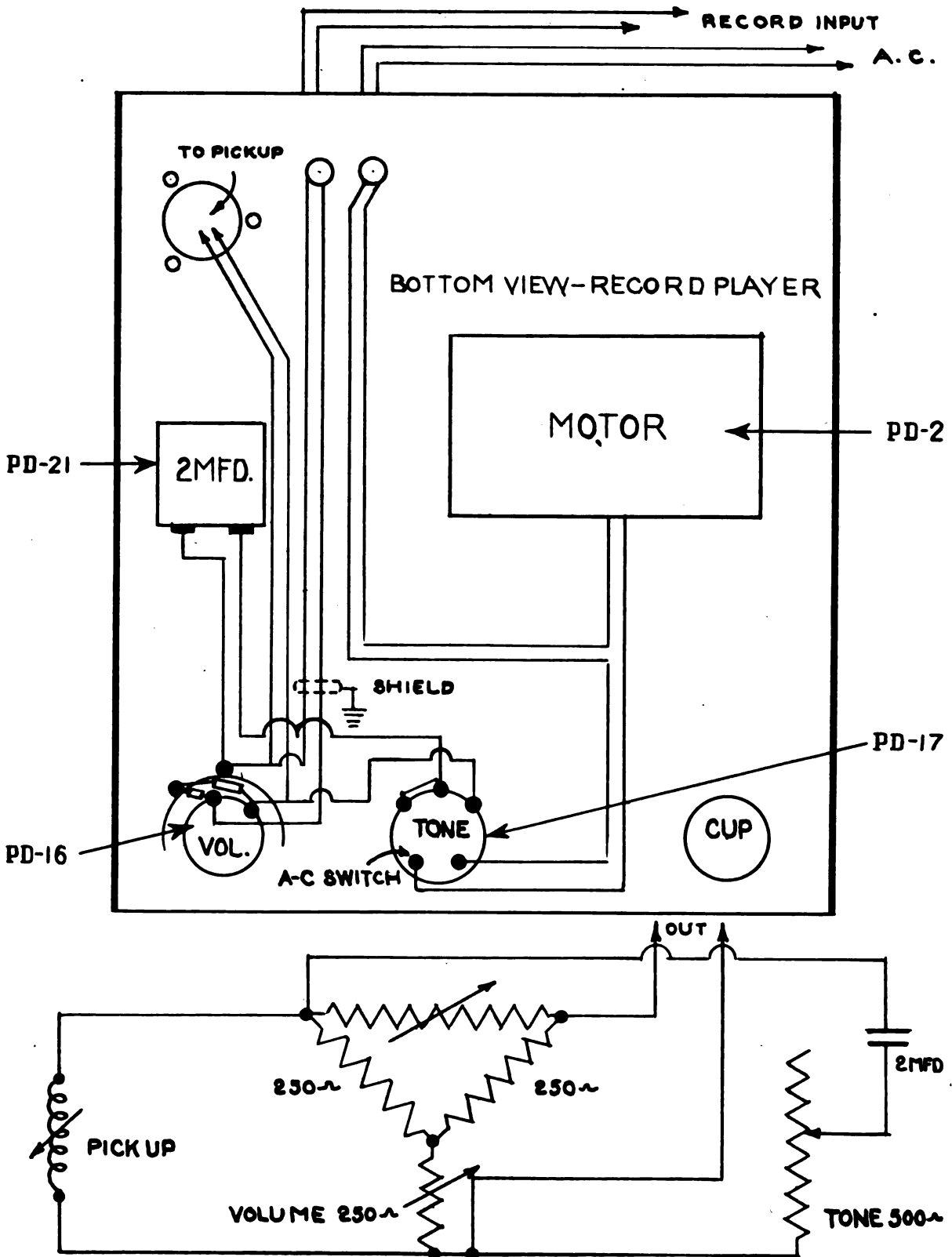


Figure 15. Public Address Set PA-1-F, record player, wiring diagram.

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## SECTION IV

### MAINTENANCE

**NOTE:** Unsatisfactory performance of this equipment will be reported immediately on W.D., A.G.O. Form No. 468. If form is not available see TM 38-250.

#### 25. AMPLIFIER.

**a. General.** If the amplifier is in a permanent location check it at least once every 2 months. If the equipment is used portably and requires frequent setting up give it a complete mechanical and electrical check each time it is used. A mechanical check consists of checking by eye for loose connections, broken cables, and burnt-out tubes. An electrical check consists of testing the equipment under actual working conditions and using an appropriate test set for checking tubes, terminals, controls, and voltages (par. 31). Test Set I-56 or equal may be used for any of the electrical checks indicated.

##### **b. Mechanical Check Procedure.**

- (1) Remove the six screws from bottom of amplifier and remove the bottom plate (fig. 16).
- (2) Inspect all soldered joints.
- (3) Tighten all nuts and screws.
- (4) Check sliders on bleeder resistors to make sure of good contact.
- (5) Tighten pilot light bulb by screwing it in its socket.
- (6) Replace bottom plate.
- (7) Turn amplifier over and remove top cover (fig. 4).
- (8) Check output jumper lead in back of output transformer. It should be set on 6 ohms to common.
- (9) See that all tubes are tight in their sockets.

(10) Check fuse on right side (as viewed from front). Remove with a screwdriver. Fuse must be 4 amperes and never more.

(11) Check voltage tap switch on right side for good contact.

(12) Check inputs on left side to see if they are tight to chassis. Tighten if loose.

(13) Replace cover.

(14) Check to see if control knobs are loose.

(15) Tighten setscrews.

(16) The white line on all control knobs should index to extreme left for OFF position.

##### **c. Electrical Test Procedure (fig. 17).**

- (1) Check amplifier from bottom after bottom plate has been removed.
- (2) Connect the 6-foot a-c cable to a-c supply source and turn OFF-ON switch to ON.
- (3) Pilot light and tube filaments should light.
- (4) Leave all volume controls in OFF position.
- (5) Use an a-c voltmeter to check incoming line voltage. Measure from plus or minus of the power transformer to the ON side of OFF-ON switch.
- (6) Measure filament of 6L6G and 6N7GT/G tubes from terminals No. 2 and No. 7 using a low a-c scale reading. It should measure 6.3 volts.
- (7) Using the same voltmeter scale, measure filament terminals No. 2 and No. 8 of rectifier tubes 5U4G. They should measure 5 volts alternating current each.

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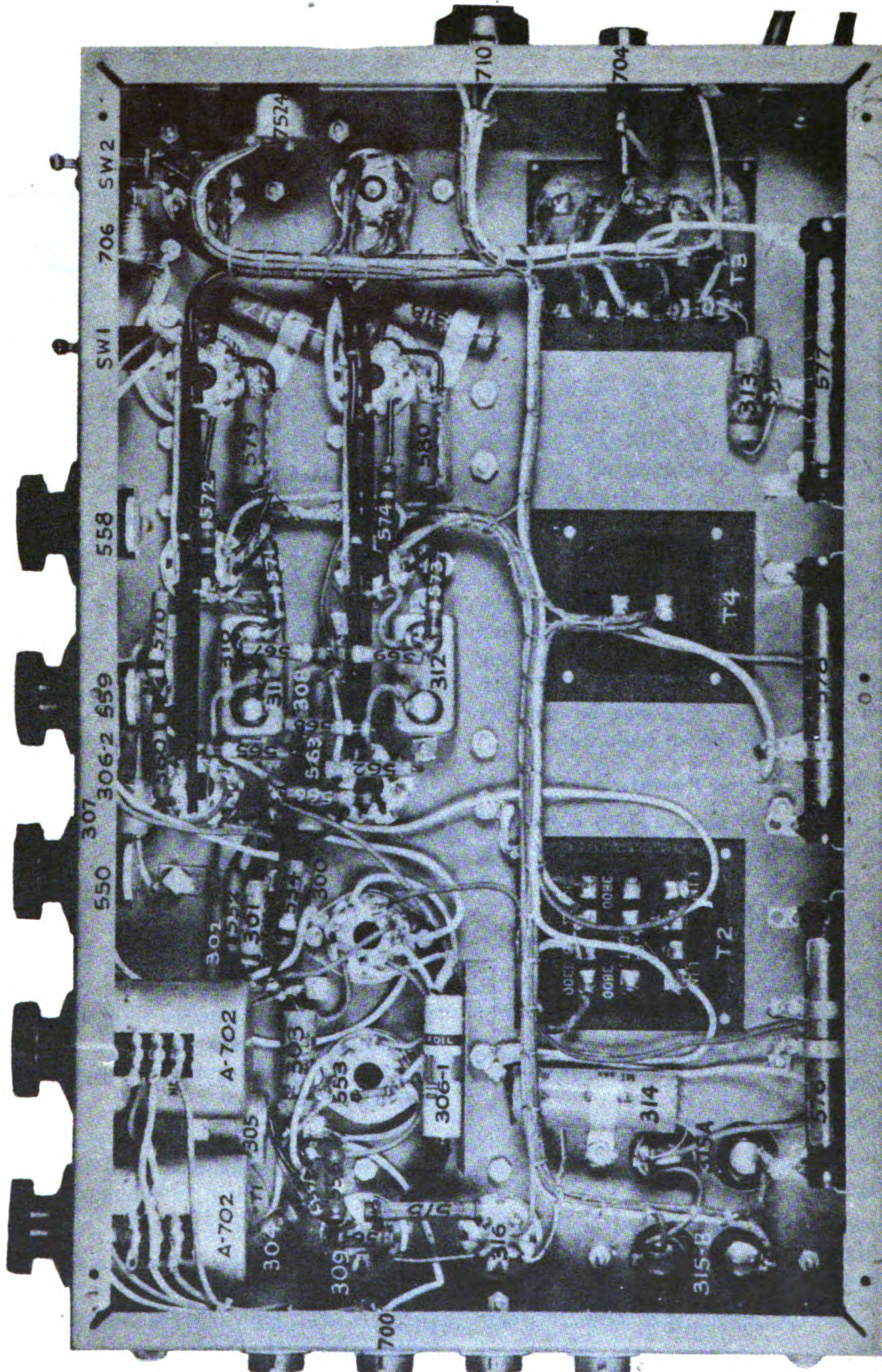


Figure 16. Public Address Set PA-1-F, amplifier, bottom view.

(8) Set the a-c voltmeter to 1,000-volt scale. Measure across the plates of the 5U4G rectifier tubes at terminals No. 4 and No. 6. They should measure 930 volts each.

(9) Use d-c scale on voltmeter to measure the filament voltage on both 12SJ7/GT tubes at terminals No. 2 and No. 7. Reading should be 10 volts direct current each. This voltage is brought off bleeder resistor 567 and helps eliminate hum.

(10) Follow the voltage table (par. 31) and check all screen and plate voltages measured from ground to the terminals indicated. They should check within 10 percent.

(11) Check bias voltages.

**d. Further Electrical Checks.** (1) Further check of the amplifier can be made by connecting it to a loudspeaker and a microphone. By talking through the microphone, operating difficulties can be heard through the speaker, and their source determined. Resistors can be measured by an ohmmeter and the value should correspond within 10 percent of the values shown in the maintenance parts list (par. 32). Electrolytic capacitors also can be checked by an ohmmeter for shorts. In setting up Public Address Set PA-1-F, be sure and make all microphone connections tight by locking, and all a-c and speaker connections tight by turning them to the right until locked.

(2) If operation is unsatisfactory when the equipment is set up, check the 6L6G output tubes. At times an output tube will flash over. This causes it to heat up and affects quality of output. Replace the tube if necessary.

(3) If the amplifier when touched, gives a ringing sound through the loudspeaker, it indicates a microphonic tube in the input stages.

(4) If the amplifier is inactive for a period of time, the volume controls may get noisy when turned. At times the dirt spot on the controls causing the scratching sound can be removed by rotating the knob. If this does not help, change the controls.

**26. CABLES.** All cables should be checked for continuity. Use an ohmmeter to check for open lines or shorts. Check all connectors for loose screw terminals or bent connector terminals.

**27. MICROPHONES.** Rough handling of microphones must be avoided. Voice coil leads on the microphone may become loose or break. Any other failures require complete replacement.

**28. SPEAKERS.** Check speakers for loose parts. The permanent magnet must be tight on the bell. The 20-foot speaker cable must have a tight connection to voice coil terminals. Check the gasket between the permanent-magnet driver unit and the bell.

**29. RECORD PLAYER.** The record player requires a cleaning and oiling once a year. The parts of the record player motor are shown in figure 18.

### **30. MOISTUREPROOFING AND FUNGIPROOFING.**

**a. General.** Communication failures commonly occur when Signal Corps equipment is operated in tropical areas where temperature and relative humidity are extremely high. The following problems are typical:

(1) Resistors and capacitors fail.

(2) Electrolytic action takes place in coils, chokes, transformer windings, etc., causing eventual break-down.

(3) Hook-up wire and cable insulation break down. Fungus growth accelerates deterioration.

(4) Moisture forms electrical leakage paths on terminal boards and insulating strips causing flash-overs.

**b. Treatment.** A moistureproofing and fungiproofing treatment has been devised, which, if properly applied, provides a reasonable degree of protection against fungus growth, insects, corrosion, salt spray, and moisture. The treatment involves the use of a moisture- and fungi-resistant varnish applied by a spray gun and/or a brush.



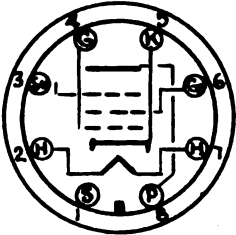
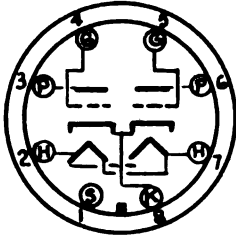
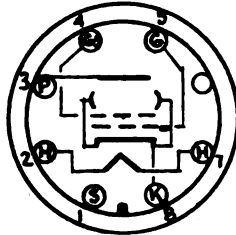
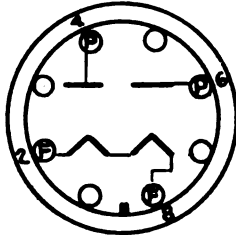
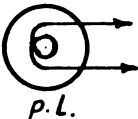

LIST OF SPARE PARTS		
Quan.	Symbol	Identification
4 ea.		VT-162 12SJ7GT Triple grid voltage amplifier tube. Input and second stage.
4 ea.		VT-96A 6N7GT/G Twin triode tube for driver and phase inversion.
8 ea.		VT-115-A 6L6G Beam power amplifier output tube.
4 ea.		VT-244 5U4G Full wave rectifier.
2 ea.	 <i>p.l.</i>	Pilot light, Raytheon 6.3 V <sub>o</sub> .25 A. Miniature Screw base.
2 ea.	 <i>fuse</i>	4 amperes.

Figure 17. Public Address Set PA-1-F, tube sockets, functional diagram.

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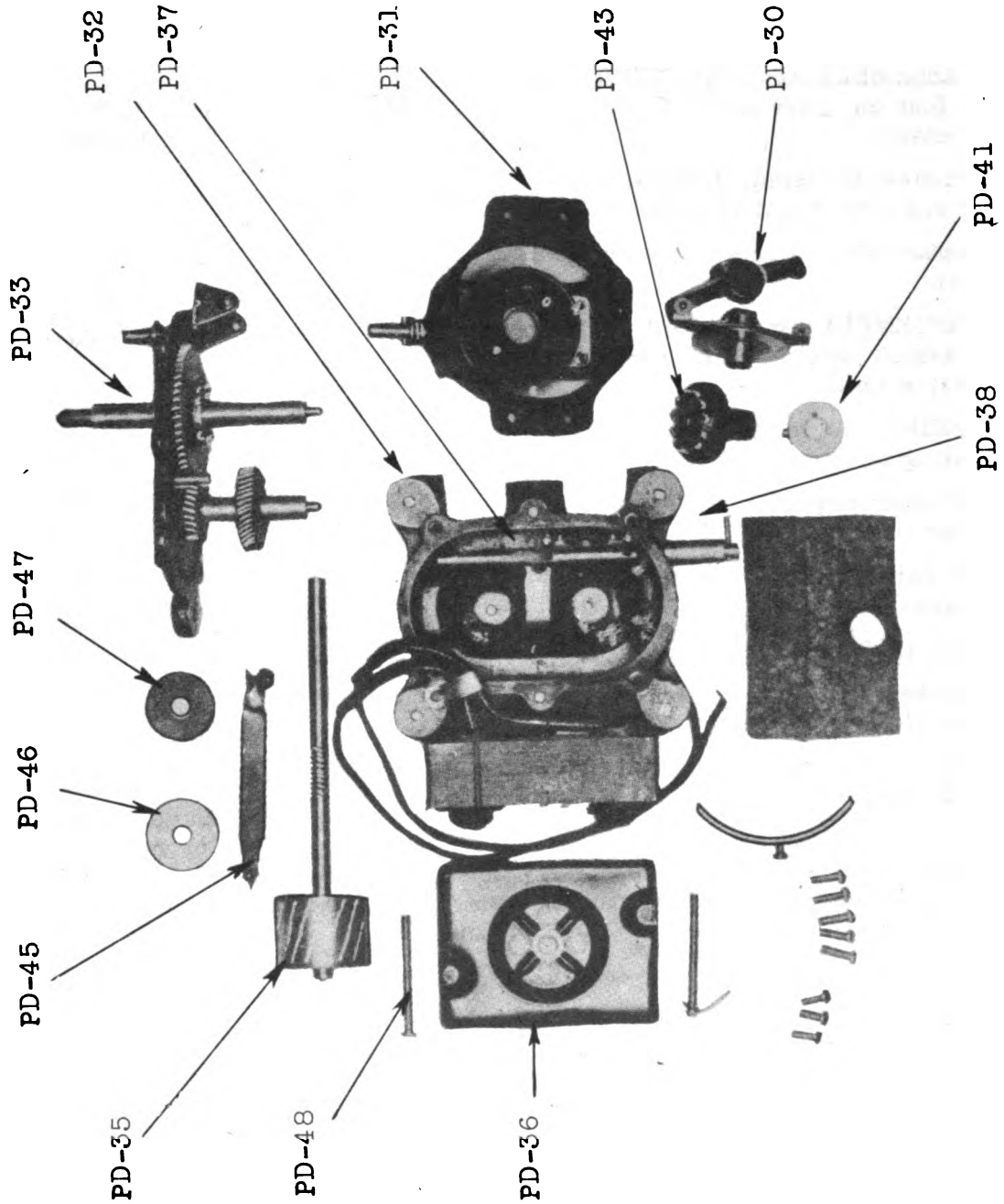


Figure 18. Public Address Set PA-1-F, record player, motor parts.

**c. Step-by-step Instructions.**

(1) **PREPARATION.** (a) Make all repairs and adjustments necessary for the proper operation of the equipment.

(b) Clean all dirt, dust, rust, fungus, oil, and grease thoroughly from the equipment.

(2) **DISASSEMBLY OF AMPLIFIER.** (a) Unscrew four top cover screws and remove amplifier cover.

(b) Unscrew six screws from bottom of amplifier and remove bottom plate.

(c) Replace the 10 screws and tighten them down.

(3) **DISASSEMBLY OF RECORD PLAYER.** Remove 10 screws in the motorboard and lift out of case.

(4) **MASKING.** Cover the following parts with masking tape:

(a) All cable receptacles on side and front of amplifier chassis.

(b) All switches on side and front of amplifier chassis.

(c) Fuse (A-704) on amplifier.

(d) Speaker matching connection of the output transformer (T2) of the amplifier.

(e) Remove the lacing from the amplifier wiring and separate the wires. (Do not unsolder the leads.)

(f) Turntable motor. (Mold paper over turntable and fasten down with masking tape.)

**(5) DRYING.**

(a) **Amplifier.** Dry for 4 or 5 hours at 140°F. (The temperature should not be allowed to rise above 140°F to prevent melting the wax capacitors.)

(b) **Turntable.** Dry for 2 to 3 hours at 160°F.

(6) **VARNISHING.** Apply three coats of moistureproofing and fungiproofing varnish as follows:

**(a) Amplifier.**

1. The entire chassis.
2. The inside of the amplifier cover.
3. Both sides of the amplifier bottom plate.

**(b) Turntable.**

1. Underside of motorboard only.
2. Both sections of record player carrying case.

(7) **REASSEMBLY.** Remove all masking tape. Reassemble the amplifier and record player. Do not attempt to relace the wires. Test for operation.

(8) **MARKING.** Mark the amplifier and record player MFP and date.

**EXAMPLE: MFP: 4 April 44.**

**d. Reference.** For a full description of the varnish spray method of moistureproofing and fungiproofing refer to TB SIG 13, Moistureproofing and Fungiproofing Signal Corps Equipment.

## SECTION V

### SUPPLEMENTARY DATA

#### 31. VOLTAGE TABLE.

- a. All voltages are measured to ground, 20,000 ohms per volt.
- b. The line voltage is 120 volts.
- c. The tap switch is set at 120 volts.

Tube	Element and number (fig. 17)	Voltage reading	
		(ac)	(dc)
6L6G (VT-115-A)	Plate—3 .....		420
	Screen—4 .....		320
	Grid (measured between 250-ohm 50-watt bias resistor center tap and ground)—5 .....		-25
	Filament—2 and 7 .....	6.3	
6N7GT/G (VT-96-A)	Driver plate—3 and 6 .....		180
	Driver grid—4 and 5 .....	0	0
	Cathode—8 .....		5
	Phase inverter plate—3 and 6 .....		173
	Phase inverter grid—4 and 5 .....	0	0
	Phase inverter cathode—8 .....		4½
	Filament—2 and 7 .....	6.3	
12SJ7GT (VT-162)	Plate, 2d stage—8 .....		150
	Screen, 2d stage—6 .....		35
	Cathode—5 .....		1.6
	Filament—2 and 7 .....		10
	Plate, input tube—8 .....		35
	Screen, input tube—6 .....		22
5U4G (VT-244)	Filament—2 and 7 .....		10
	Plates—4 and 6 .....	930	
	Filament—2 and 8 .....	5	

32. MAINTENANCE PARTS LIST FOR PUBLIC ADDRESS SET PA-1-F (stock No. 6C201F).

NOTE: Order maintenance parts by stock number, name, and description.

Ref. Symbol	*Signal Corps Stock No.	Name of Part and Description	Function	Quan. per Major Unit	Lowest Maint. Echelon
Fig. 1	6C201C/B1	<b>AMPLIFIER GROUP (figs. 1, 4, 12 and 16)</b> BOX ASSEMBLY: a-c outlet; 16 gauge steel; 4" x 7" x 2"; WSEL; part DR-500A.....	Connections for three lines	2	Depot
Fig. 1	6C10	BOX ASSEMBLY: speaker outlet; 16 gauge steel; 4" x 7" x 2"; WSEL; part DR-500.....	Connections for three lines	2	Depot
A-712 300	Not stocked 3DA50-36.1	BOTTOM PLATE: steel; 11" x 17"; WSEL; part DR-502..... CAPACITOR: 0.05- $\mu$ f; 600-volt; fixed; paper; tubular; sealed type; $\pm$ 10%; Ind; part PT-138.....	Amplifier bottom	2	Depot
301	3DA2-67	CAPACITOR: 0.002- $\mu$ f; 600-volt; fixed; paper; tubular; sealed type; $\pm$ 10%; Ind; part PT-140.....	Coupling to hi-low tone switch	6	3d
302	3DB4C	CAPACITOR: 10- $\mu$ f; 600-volt; electrolytic; tubular; sealed type; $\pm$ 50%—10%; Ind; part MT-404.....	Coupling 2nd stage to driver	2	3d
303		CAPACITOR: same as 300.....	Cathode bypass	6	3d
304	3DA10-105	CAPACITOR: 0.01- $\mu$ f; 600-volt; fixed; paper; tubular type; $\pm$ 10%; Ind; part PT-135.....	Coupling 1st stage	6	3d
305	3DA500-572	CAPACITOR: 0.5- $\mu$ f; 600-volt; fixed; paper; tubular type; $\pm$ 10%; Ind; part PT-141.....	Coupling from input transformer	4	3d
306		CAPACITOR: same as 304.....	Screen bypass	2	3d
306-1	3DA100-84	CAPACITOR: 0.1- $\mu$ f; 600-volt; fixed; paper; tubular type; $\pm$ 10%; Ind; part PT-139.....	Bypass on tone	2	3d
306-2	3DA20-28.1	CAPACITOR: 0.02- $\mu$ f; 600-volt; fixed; paper; tubular type; $\pm$ 10%; Ind; part PT-171.....	Screen bypass	2	3d
307		CAPACITOR: same as 302.....	Feed-back compensator	2	3d
308		CAPACITOR: same as 302.....	Cathode bypass		
309	3DB8-71	CAPACITOR: 8 + 8; 475-volt; dry electrolytic tube in can; plug-in type; $\pm$ 50%—10%; Ind; part 4P18800.....	Cathode bypass		
310	3DA100-23	CAPACITOR: 0.1- $\mu$ f; 600-volt; oil-filled metal case type; lug terminal on top; $\pm$ 10%; Ind; part 6BAT11.....	Secondary filter on plate supply	4	3d
			Coupling to output tubes	2	3d

\* Items marked Not stocked are not maintenance parts.

Ref. Symbol	*Signal Corps Stock No.	Name of Part and Description	Function	Quan. per Major Unit	Lowest Maint. Echelon
311		CAPACITOR: same as 310	Coupling to phase network		
312	3DKA100-175	CAPACITOR: 0.1- $\mu$ f; 600-volt; metal can; bathtub-type; $\pm 10\%$ ; Ind; part 6BA10	Coupling to output tubes	2	3d
313		CAPACITOR: same as 300	Bypass on a-c line		
314	3DB40-6	CAPACITOR: 40- $\mu$ f; 150-volt; dry electrolytic; tubular type; $\pm 50\%$ -10%; Ind; part MM363	Bias filter	2	3d
315A	3DB6-17	CAPACITOR: 6- $\mu$ f; 600-volt; oil-impregnated case type; $\pm 50\%$ -10%; Ind; part 6SA600	First stage filter on d-c supply	4	3d
315B		CAPACITOR: same as 315A	Second stage filter on d-c supply		
316		CAPACITOR: same as 309	Filter on d-c		
317	3DA5-5	CAPACITOR: 0.005- $\mu$ f; 1,000-volt; fixed; paper; tubular type; $\pm 10\%$ ; Ind; part PT-105	Harmonic suppressor	4	3d
318		CAPACITOR: same as 317	Harmonic suppressor		
A-714	2Z2626.12	CLAMP: tube; steel; $\frac{3}{8}$ "x1 $\frac{1}{8}$ "; WSEL; part DR. 514	Clamp for 6L6/G tubes	8	Depot
A-711	Not stocked	CHASSIS: steel; 3"x11"x18"; WSEL; part DR. 501	Amplifier base	2	
T-4	3C316-15	COIL: filter choke; inductance 12 henries, 300-ma; 107-ohm; Th; part T-15C46	Smoothing of dc	2	Depot
A-713	6C19	COVER: steel; 7 $\frac{1}{2}$ "x11 $\frac{1}{2}$ "x18"; #18; WSEL; part DR. 503	Amplifier top cover	2	Depot
A-715	2Z3351-8	COVER: canvas; #8 waterproof; WSEL; part WC503	Amplifier protector	2	3d
A-705	3Z2604.1	FUSE: glass; 1 $\frac{1}{2}$ " long; Lit; part 3AG	4A protector	2	Orgn.
A-704	3Z3275	FUSE ASSEMBLY: bakelite; single-hole mounting; Lit; part 1075	Holds 4A fuse	2	3d
A-703	6C201C/K1	KNOB: bakelite; 1 $\frac{1}{2}$ " diam x 1"; KK, part S-381-64	Control	10	Orgn.
	6L3106-32	NUT: $\frac{3}{8}$ " hex, 6-32		80	Orgn.
	6L3108-32	NUT: 8-32		8	Orgn.
	6L3110-32	NUT: 10-32		16	Orgn.
	2Z7111.19	PIN: $\frac{1}{8}$ " long x $\frac{1}{8}$ " diam with bakelite cap; Amph; part 71-1M	For connection to output transformer	4	Depot
A-702	6C201C/A1	POTENTIOMETER: ladder-type; 250-ohm type; $\pm 5\%$ IRC; part A-211250	Volume control pad	4	3d

\* Items marked Not stocked are not maintenance parts.

Ref. Symbol	*Signal Corps Stock No.	Name of Part and Description	Function	Quan. per Major Unit	Lowest Main. Echelon
550	326750-26	POTENTIOMETER: wall-type resistor; 500,000-ohm; straight-taper type; ± 10%; Centr; part 33-2100-55.	Controls radio volume	4	3d
558	227271.1	POTENTIOMETER: wall-type; 100,000-ohm type; ± 10%; straight taper; Centr; part 33-010-302.	Tone control	2	3d
559		POTENTIOMETER: same as 550.	Master gain control		
A-700	228668	RECEPTACLE: 3-terminal, female; Amph; part PC3F.	Input connector for cables	8	Depot
A-701	627813-5	RECEPTACLE: 10-ampere; 2-wire, flush base; male; Hub; part 7524.	Loud speaker connector	8	Depot
551	324608	RESISTOR: fixed; carbon; 100,000-ohm; 2-watt type; ± 10%; Centr; part W1001.	Load resistor	4	3d
552	326200-9	RESISTOR: fixed carbon; 2,000-ohm; 1-watt; T; ± 10%; Centr; part W21.	Bias resistor	6	3d
553	326805-8	RESISTOR: fixed; carbon; 5-megohm; 1-watt type; ± 10%; Centr; part W5M1.	Load resistor	2	3d
554		RESISTOR: same as 551.	Plate resistor		
555		RESISTOR: same as 553.	Screen resistor	2	3d
556	326025-31	RESISTOR: fixed; carbon; 250,000-ohm; 1-watt type; ± 10%; Centr; part W2501.	Plate resistor	2	3d
557		RESISTOR: same as 553.	Screen resistor	2	3d
560		RESISTOR: same as 552.	Bias resistor		
561	326060-37	RESISTOR: fixed; carbon; 500-ohm; 1-watt type; ± 10%; Centr; part W011.	Feedback resistor	2	3d
562	326350-5	RESISTOR: fixed; carbon; 35,000-ohm; 1-watt type; ± 10%; Centr; part W201V.	Phase inverter resistor	2	3d
563		RESISTOR: same as 562.	Bias resistor		
564	326660-42	RESISTOR: fixed; carbon; 50,000-ohm; 1-watt type; ± 10%; Centr; part W501.	Filter resistor	4	3d
565	326620-67	RESISTOR: fixed; carbon; 20,000-ohm; 1-watt type; ± 10%; Centr; part W201.	Plate resistor	4	3d
566		RESISTOR: same as 565.	Plate resistor		
567	324608	RESISTOR: fixed; carbon; 100,000-ohm; 1-watt type; ± 10%; Centr.	Plate resistor	4	3d
568	326750-36	RESISTOR: fixed; carbon; 500,000-ohm; 1-watt-type; ± 10%; Centr; part W5001.	Grid resistor	4	3d
			Phase inverter	2	3d

\* Items marked Not stocked are not maintenance parts.

Ref. Symbol	*Signal Corps Stock No.	Name of Part and Description	Function	Quan. per Major Unit	Lowest Maint. Echelon
569		RESISTOR: same as 567.....	Plate resistor		
570		RESISTOR: same as 564.....	Feedback resistor		
571	3RC31AE201K	RESISTOR: fixed; carbon; 200-ohm; 1-watt type; ± 10%; Centr; part W2001.....	Grid isolating resistor	8	3d
572		RESISTOR: same as 571.....	Grid isolating resistor		
573		RESISTOR: same as 571.....	Grid isolating resistor		
574		RESISTOR: same as 571.....	Grid isolating resistor		
575	3Z6620-3	RESISTOR: fixed; carbon; 20,000-ohm; 2-watt type; ± 10%; Centr; part W202.....	Filter resistor	2	3d
576	3Z6625-50	RESISTOR: wire-wound; adjustable; 250-ohm; 50-watt type; ± 10%; OH; part W25050.....	Bias resistor and input tubes filament supply	2	3d
577	3Z6620-2	RESISTOR: wire-wound; adjustable; 20,000-ohm; 50-watt type; ± 10%; OH; part W2050.....	Main bleeder resistor	2	3d
578	3Z6350-5	RESISTOR: wire-wound; adjustable; 3,500-ohm; 50-watt type; ± 10%; OH; part W3550.....	Screen dropping resistor	2	3d
579	3Z6002E5-13	RESISTOR: wire-wound; 25-ohm; 1-watt type; ± 10% Centr; part W251.....	Screen isolating	4	3d
580		RESISTOR: same as 579.....	Screen isolating		
	6L7988-7.315	SCREW: set; 10-32x $\frac{1}{4}$ "; slotted head.....	For control knobs	10	3d
	6L6632-10.1	SCREW: machine; 8-32x $\frac{1}{2}$ "; round head.....		100	3d
	6L6632-6.1	SCREW: machine; 8-32x $\frac{3}{8}$ "; round head.....		8	3d
	6L7032-6.15	SCREW: machine; 10-32x $\frac{3}{8}$ "; round head.....		16	3d
A-706	6C201C/P3	SOCKET ASSEMBLY: steel bracket; DR; part 10.....	Holds pilot light	2	Depot
A-708	6C201C/S6	SOCKET: steatite; cushion assembly; Amph; part W-408.....	Supports input tubes	4	Depot
A-709	2Z8795.1	SOCKET: steatite; octal; Amph; part 55-8.....	Tube base	16	Depot
A-709A	2Z8669-4	SOCKET: steatite; 4-prong female; Amph; SS-4.....	Capacitor base	4	Depot
A-710	6C201C/S3	SWITCH: bakelite; 5-position; single-pole; Amph; part A-37.....	Line voltage matching	2	Depot
SW1	6C201C/S1	SWITCH: single-pole; double-throw; 3 ampere 250-volt; C-H; part 8282K9.....	High-low switch	2	Depot

\* Items marked Not stocked are not maintenance parts.



Ref. Symbol	Signal Corps Stock No.	Name of Part and Description	Function	Quan. per Major Unit	Lowest Maint. Echelon
SW2	6C201C/S2	SWITCH: single-pole; single-throw; 3 ampere 250-volt; C-H; part 8280K10.....	A-c OFF-ON switch	2	3d
T-1	2Z0405.18	TERMINAL STRIP: Jones; part 2005.....	Mounting	4	Depot
	2Z4631.61	TRANSFORMER: input; primary 50/125/200/250/333/500; secondary 50,000-ohm bantam type; 1 1/4" one-hole mounting; Th; part T-1A70.....	Matching of phonograph and microphone to 1st stage	2	Depot
T-2	2Z9632.71	TRANSFORMER: output; 4 6L6's p.p. primary 3,300-3,800; secondary 2/3/4/6/8/16/125/250/500; 155-ma; Th; part T-1S93.....	Matching of output to speaker load	2	3d
T-3	3H5631	TRANSFORMER: power, primary 253-vs; secondary 450-0-450 5-volt 6-ampere; 6.3-volt 8-ampere; 325-ma; dc; Th; part 17061.....	Supplies voltage for tubes	2	3d
CA-402	1B818.33	<b>CABLE GROUP (figs. 10 and 11)</b> WIRE: two-conductor; #18SJ; rubber-covered; 100'; WSEL.....	Speaker extension	2	Depot
CA-403	1B818.33	WIRE: #18SJ; rubber-covered; 50'; WSEL.....	Speaker junction with three outlets in box	2	Depot
CA-404	1B818.33	WIRE: #18SJ; rubber-covered; 20'; WSEL.....	Line-to-speaker voice coil	6	Depot
CA-405	1B818.33	WIRE: #18SJ; rubber-covered; 6'; WSEL.....	Power line to amplifier, phonograph, or radio	4	Depot
CA-406	1B814.31	WIRE: #14; rubber-covered; 200'; WSEL.....	A-c extension	1	Depot
CA-407	1B814.31	WIRE: #14; rubber-covered; 50'; WSEL.....	A-c junction with three outlets in box	2	Depot
CA-408	1B814.31	WIRE: #14; rubber-covered; 6'; WSEL.....	Adapter to standard a-c outlet	2	Depot
CA-409	1B818.55	2-WIRE SHIELDED: #18; rubber-covered; 100'; WSEL.....	Microphone extension	1	Depot
CA-410	1B820.12	PARALLEL CABLE: single-wire; shielded; low-capacity; 6'; WSEL.....	Used to parallel two amplifiers	2	Depot
CA-411	3E1453	MICROPHONE CABLE: 2-wire; shielded; #18; 30'; WSEL.....	Connects D4 microphone to amplifier	1	Depot
CA-412	3E1453A	MICROPHONE CABLE: 2-wire; shielded; #18; 30'; WSEL.....	Connects D9 microphone to amplifier	1	Depot
CA-413	6C201C/C12	PHONOGRAPH CABLE: 2-wire; shielded; rubber-covered; 6'; WSEL.....	Phonograph to amplifier	1	Depot

Ref. Symbol	*Signal Corps Stock No.	Name of Part and Description	Function	Quan. per Major Unit	Lowest Maint. Echelon
CA-408	6Z3149	CONNECTOR; bakelite; 20-ampere; 250-volt; Hub; part 7101.....	A-c female	2	3d
CA-405	6C201C/P2	CONNECTOR; steel; polarized; 20-amp; 250-volt; Hub; part 7102.....	A-c male	7	3d
CA-402	6Z3150-1	CONNECTOR; bakelite; 10-ampere; 250-volt; Hub; part 7506.....	Speaker female	10	3d
CA-407	6Z7808	CONNECTOR; porcelain; 20-ampere; 250-volt; flush mounting; Hub; part 7210.....	A-c female	6	Depot
CA-402	6Z1734.2	CONNECTOR; steel; 10-ampere; 250-volt; Hub; part 7588.....	A-c male	2	3d
CA-408	6Z1727	CONNECTOR; steel; 10-ampere; parallel blades; Hub; part 7057.....	A-c male	1	3d
CA-410	2Z7113.4	MICROPHONE CONNECTOR; steel; 3-prong; male element; Amph; part MC3M.....	Microphone connector	8	3d
CA-411	2Z8672.27	MICROPHONE CONNECTOR; steel; 2-prong; female element; Amph; part MC2F1.....	D4 microphone connector	1	3d
CA-412	2Z8673.10	MICROPHONE CONNECTOR; steel; 3-terminal; female element; Amph; part MC3F1.....	D9 microphone connector	1	3d
<b>CASES (fig. 1)</b>					
	Not stocked	CARRYING CASE; wood; 16 1/4"x16 1/2"x30 1/2"; WSEL; part DR. 511.....	Contains amplifier	2	
	Not stocked	CARRYING CASE; wood; 28 3/4"x29"x32"; WSEL; part DR. 509.....	Contains speakers	6	
	Not stocked	CARRYING CASE; wood; 15"x20 1/4"x37 1/2"; WSEL; part DR. 510.....	Contains microphones, tubes, and cables	2	
	Not stocked	CARRYING CASE; wood; 9 1/2"x16 1/2"x20"; WSEL; part DR. 518.....	Contains phonograph	1	
	Not stocked	CARRYING CASE; steel; 3"x12"x12"; WSEL.....	Contains records	1	
<b>MICROPHONE GROUP (figs. 5 and 6)</b>					
	2B1701	MICROPHONE; D4; 250-ohm; die-cast; AM; part D-9.....	Voice pick-up	1	3d
	2B1702	MICROPHONE; D9; 250-ohm; unidirectional; die-cast; AM; part D-9.....	Music pick-up	1	3d
	6C201C/S4	MICROPHONE FLOOR STAND; steel; WSEL; part WM-102.....	Holds microphone	1	Depot
	6C201C/S5	MICROPHONE DESK STAND; steel; WSEL; part WM-103.....	Holds microphone	1	Depot
	2B224	COVER; canvas; 4 1/4"x6 1/2"; WSEL; part WM-104.....	Protects D4 microphone	1	3d
	2B224A	COVER; canvas; 4 1/2"x8"; WSEL; part WM-104A.....	Protects D9 microphone	1	3d

\* Items marked Not stocked are not maintenance parts.

Ref. Symbol	Signal Corps Stock No.	Name of Part and Description	Function	Quan. per Major Unit	Lowest Maint. Echelon
<b>RECORD PLAYER AND MOTOR (figs. 7, 15, and 18)</b>					
PD-1	Not stocked	PLATE: steel; #16; 14"x16"; WSEL; part D619.....	Supports motor	1	
PD-2	3H3000-23	MOTOR: dual speed; 115-volt; 60-cycle; G.I.; part 4071.....	Drives turntable	1	Depot
PD-7	6C171	ARM; magnetic; 280-ohms; sud; part L-17.....	Pick-up arm	1	Depot
PD-11	Not stocked	PLATE: steel stamping; G.I.; part 4797.....	Indicates speed	1	
PD-13	Not stocked	TURNTABLE: 12" plate; steel; G.I.; part 626.....	Holds record	1	
PD-14	Not stocked	GROMMET: rubber; 1/2" diam; WSEL.....	Protects cable	2	
PD-15	6C21	NEEDLE CUP: bakelite; WSEL.....	Holds needle	1	Depot
PD-16	2Z7284.32	POTENTIOMETER: straight taper; Centr; part 4010069.....	Volume control	1	Depot
PD-17	2Z7287.6	POTENTIOMETER: straight taper; Centr; part 20111256.....	Tone control	1	Depot
PD-21	3DB2.200-2	CAPACITOR: 2-μ; 200-volt; bathtub-type; sealed; Ind; part 6BA200....	Compensator	1	Depot
PD-22	2Z4848.3	KNOB: bakelite; pointer; KK.....	Control	2	Depot
PD-30	Not stocked	GOVERNOR COMPLETE: steel; G.I.; part 1509.....	Stabiliser speed	1	
PD-31	Not stocked	GOVERNOR HOUSING COMPLETE: cast-iron; G.I.; part 3452.....	Covering	1	
PD-32	Not stocked	FRAME COMPLETE: cast-iron; G.I.; part 405B.....	Contains gears	1	
PD-33	Not stocked	TOP PLATE: cast-iron; G.I.; part 2636.....	Cover	1	
PD-35	Not stocked	ROTOR COMPLETE: steel; G.I.; part 4008.....	Electrical	1	
PD-36	Not stocked	COIL SHIELD: steel; G.I.; part 2132.....	Cover	1	
PD-37	Not stocked	CLUTCH SHIFTER SHAFT: steel; G.I.; part 4087.....	Changes speed	1	
PD-38	Not stocked	CLUTCH SHIFTER SHAFT: sleeve; steel; G.I.; part 4664.....	Bearing	1	
PD-41	Not stocked	LOWER DRIVE GEAR: copper; G.I.; part 4082.....	Thrust washer	1	
PD-43	Not stocked	LOWER DRIVE GEAR: bakelite; G.I.; part 1636.....	Gear	1	
PD-45	Not stocked	LEVER: steel; G.I.; part 4091.....	Speed adjuster	1	
PD-46	Not stocked	SUPPORT WASHER: steel; G.I.; part 9356.....	Supports turntable	1	
PD-47	Not stocked	DRIVE WASHER: rubber; G.I.; part 9357.....	Drives turntable	1	
PD-48	Not stocked	COIL SHIELD SCREW: steel; G.I.; part 6011.....	Mounting	2	
	6C171/C1	COIL: pick-up.....	For magnetic arm	1	Depot
	6L7043-12.8K	SCREW: bronze; knurled head.....	Secures needle in pick-up arm	1	Depot

\* Items marked Not stocked are not maintenance parts.

Ref. Symbol	*Signal Corps Stock No.	Name of Part and Description	Function	Quan. per Major Unit	Lowest Maint. Echelon
	6C270-12	RECORD.....	Frequency test	1	Depot
	6C90	NEEDLE: package.....	For record player	1	Depot
	3Z6025-15	RESISTOR: 250-ohm; 1/2-watt; ± 10%.....	For record player	1	Depot
		<b>SPEAKER GROUP</b>			
Fig. 1	6C201C/H1	SPEAKER BELL: steel; tapered bell; KA; part RT-25.....	High-intensity projector	6	Depot
	6C201C/F1	SPEAKER POT: permanent magnet; 25-watt; KA; DU-2.....	Driver for horn	6	3d
Fig. 1	6C283	SPEAKER TOWER: 1" steel tube; three legs; 14' high; WSEL; part WA-18.....	Support for three speakers	2	Depot
	6L3810-16S	NUT: wing; WSEL.....	For speaker towers	3	Orgn.
	6C14	DIAPHRAGM: assembly.....		6	4th
		<b>TUBES (fig. 17)</b>			
VT-115A	2T-115-A	TUBE: glass; octal base; Tun; part 6L6/G.....	Output	8	Depot
VT-96A	2T-96-A	TUBE: glass; octal base; bantam; Tun; part 6N7GT/G.....	Inverter	4	Depot
VT-162	2T-162	TUBE: glass; octal base; bantam; Tun; part 12SJ7GT.....	Input	4	Depot
VT-244	2T-244	TUBE: glass; octal base; Tun; part 5U4G.....	Rectifier	4	Depot
	2Z5897	LAMP: screw base; part 46.....	Indicator	2	Depot
		<b>POWER UNIT (fig. 19)</b>			
	Not stocked	ENGINE: model AA; Wis. M.....	Drives generator	1	
	Not stocked	GENERATOR: 600-watt; 115-v a-c; Pion.....	Supplies alternating current	1	

\* Items marked Not stocked are not maintenance parts.

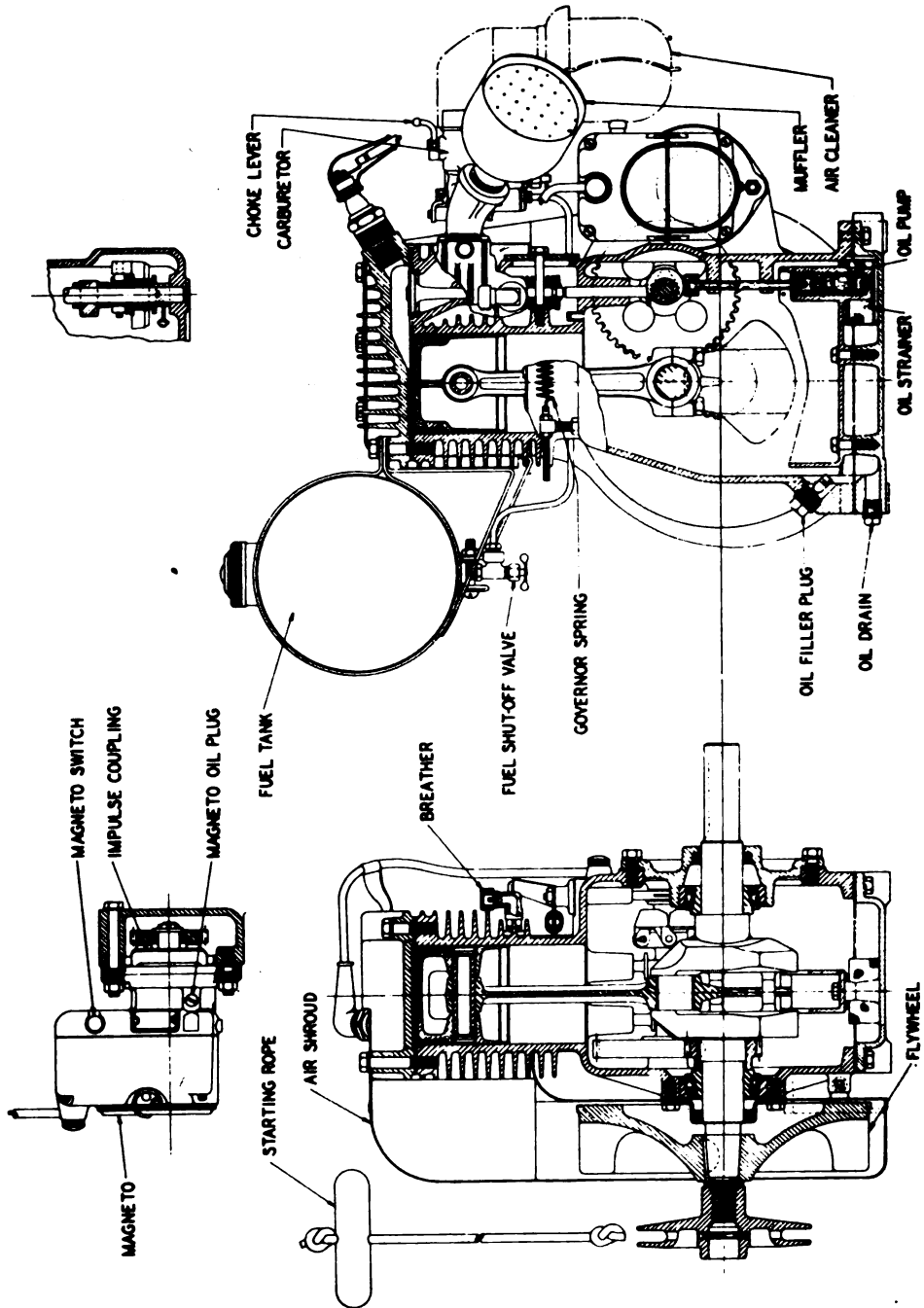


Figure 10. Public Address Set PA-1-F, power unit with Model AA Engine.

## APPENDIX

### POWER UNIT

#### 33. DESCRIPTION (fig. 19).

**a. General.** The power unit described herein is furnished with Public Address Set PA-1-F. For complete replacement of the power unit, it is recommended that Power Unit PE-75 be used.

**b. Purpose.** The gasoline-driven power unit supplies alternating current through a generator to the amplifiers and record player of Public Address Set PA-1-F when a commercial source is not available.

**c. Engine.** The four-cycle type engine develops its maximum power at 3,600 rpm. Each of the four operations of suction, compression, expansion, and exhaust requires a complete stroke, or a total of two revolutions of the crankshaft.

**d. Carburetor.** The OH- $\frac{5}{8}$  horizontal-type carburetor furnishes the proper mixture of gasoline and air in the engine.

**e. Magneto.** The spark for ignition of the mixture is furnished by a high-tension magneto fitted with an impulse coupling.

**f. Lubrication.** Lubrication is of the splash type. A plunger cup maintains the oil level in a trough under the connecting rod.

**g. Cooling.** Cooling is accomplished by a flow of air circulated over cylinder and heads by a combination fan and flywheel encased in a sheet-metal shroud. The air is directed by ducts and baffle plates to insure uniform cooling of all parts.

**h. Generator.** An electric generator delivering 115-volt, 60-cycle, 600-watt, single-phase power is coupled to the motor. A suitable control panel containing a voltmeter is mounted over the generator. Connections for standard a-c fittings are available for connecting the power cable to the power unit.

**i. Instructions.** Operating instructions are found on the metal instruction plate on the engine.

**j. Components.** The power plant is 22 $\frac{1}{4}$  inches long, 19 $\frac{1}{2}$  inches wide, and 19 inches high, and weighs 150 pounds. Four mounting holes spaced 5 inches by 7 $\frac{3}{4}$  inches apart are provided in the base for permanent mounting.

Component	Width (in.)	Height (in.)	Length (in.)	Weight (lb.)
Engine	19 $\frac{1}{2}$	19	11 $\frac{1}{4}$	100
Generator	11	12 $\frac{1}{2}$	11	50
Case	22 $\frac{1}{4}$	22 $\frac{1}{4}$	27 $\frac{1}{4}$	40

#### 34. INSTALLATION AND OPERATION.

**a. Preparation for Operation.** (1) Remove the top of the packing crate and unbolt the power unit from its base. Check the plant for damage in shipping. Set up the plant so it will have adequate ventilation to insure proper cooling. Choose a location easily accessible for refueling, for oil changing, and for having the pulley and rope starter within easy reach. Proper ventilation removes the danger of carbon monoxide fumes when the unit is running.

(2) Connect one end of the power-connecting cable into the power unit. The other end has three receptacles in a metal box. Plug the a-c amplifier cable into one of the receptacles. If both amplifiers are used, connect them into this receptacle box. If the record player is used, connect it into the remaining receptacle. If more cable length is needed, one or more of the extension cables can be used by inserting it, or them, between the unit and the connecting cable at the power unit end.

(3) Remove the oil-filler plug located near the base of the engine. Fill the crankcase

with approximately  $1\frac{3}{4}$  pints of oil. The oil-drain plug is mounted at the bottom of the crankcase.

(4) Fill the fuel tank with gasoline of an octane rating of at least 67. Open the shut-off valve in the gasoline pipe after filling. Do not mix oil with the gasoline.

**b. Power Unit Operations.** (1) **PREPARATION FOR STARTING.** Close the choke on the carburetor air inlet horn. The choke opens automatically after the engine is started. On the horizontal carburetor, the choke is closed when the choke lever is turned away from the engine. Open the carburetor needle valve approximately  $\frac{3}{4}$  turn to  $1\frac{1}{4}$  turns. In cold weather, starting is sometimes facilitated by opening the needle valve slightly more, and then readjusting the needle, after the engine is started, to the position where the engine runs the smoothest. If the engine is operated with too lean or too rich a mixture it will heat up unnecessarily. A lean mixture may also burn the valves. A spark advance of about  $28^\circ$  to  $30^\circ$  is proper. This is fixed by the timing gears of the engine and cannot be changed.

(2) **STARTING THE ENGINE.** Insert the knot at the end of the rope pulley in the notch on the starting sheave at the flywheel end of the engine, and wind the rope on the sheave in a clockwise (to the right) direction. Pull briskly on the rope to turn the crankshaft over. If the engine does not start on the first application of the starting rope, repeat the operation. If the choke on the carburetor accidentally snaps open during hand cranking before the engine starts, close it again for two or three turns of the engine. Do not keep it closed too long. If fuel begins to drip from the carburetor, open the choke. More choking of the carburetor is necessary in starting the engine in cold weather than in warm weather. Never operate the engine with any part of the air shroud removed, as this will allow the engine to overheat and score. The air shroud is necessary to direct the air flow so the engine may be properly cooled.

(3) **STOPPING THE ENGINE.** To stop the

engine, press the stopping clip mounted on the casing over the spark plug. This shorts out the plug. Hold the clip down until the motor stops.

## 35. FUNCTIONING OF PARTS.

**a. Governor.** The governor is of the centrifugal or flyball type. It controls the engine after it is started by varying the throttle opening on the carburetor to suit the load imposed on the engine. When the engine is at rest the governor will hold the throttle valve wide open, but as soon as the engine is started the governor will regulate the speed at the predetermined revolutions per minute. To give close regulation, the governor spring must be suited to the speed required. On this engine, three holes are provided in the governor lever for the spring. For engine speeds up to 1,800 rpm the spring should be hooked into the inner hole; for speeds of 2,000 to 2,200 rpm it should be hooked into the center hole in the lever. For speeds of 2,400 rpm and over the spring should be hooked into the outer hole. After the spring has been hooked into the proper hole for the speed desired, the spring tension must be adjusted to give the desired speed.

**b. Carburetor.** The carburetor consists of a float chamber, throttle valve, choke valve, idle needle valve, and various small openings in the carburetor body for the passage of air and gasoline vapors. It is primarily a chamber for mixing regulated portions of air and gasoline which are drawn into the cylinder by suction caused by the piston.

**c. Magneto.** The magneto operation consists of a rotor revolving in a permanent-magnet field. This inductor type of high-tension magneto system reverses the direction of the flux through the iron core of a stationary coil, thus inducing current in the windings. The only rotating members are the iron core cases imbedded in some nonmagnetic material. The induced current in the primary winding, when interrupted near the time of greatest current, induces high tension in the secondary winding.

**d. Oil Pump.** The plunger-type oil pump is an integral part of the splash trough; the

plunger is held up against the driving eccentric on the camshaft by a spring. The up or suction stroke of the pump is caused by the eccentric. Two ball-check valves are used in the pump.

### 36. MAINTENANCE.

a. **General.** The power unit used to operate the Public Address Set PA-1-F will give long service and wear if proper attention is given to its maintenance. Use the proper fuel and oil. Keep the unit clean both inside and out by cleaning off the outside dirt accumulations and by seeing that no dirt or water enters the motor while filling with gasoline or oil.

b. **Lubrication.** (1) **CHECKING OIL.** Check oil levels daily before starting the engine and after every 4 hours of operation. Maintain the oil level even with the filler hole, located under the fuel tank near the base of the engine, by adding the grade of oil indicated for oil changes. Keep the breather vent in the filler plug open.

(2) **CHANGING CRANKCASE OIL.** (a) Change the crankcase oil every 48 hours of operation. To change the oil, run the engine until the oil is thoroughly heated. Stop the engine and place a container under the oil drain under the oil-filler hole. Remove the plug from the oil-filler hole, then remove the oil-drain plug. Allow the oil to drain completely. Do not flush the crankcase. Every 256 hours of operation, clean the crankcase and oil-pump screen using a brush or lintless cloth.

**NOTE:** If excess sludge has formed in crankcase from use of improper oil, remove by changing oil every  $\frac{1}{2}$  to 1 hour for three or four oil changes.

(b) Replace the drain plug and refill the crankcase with Oil, Engine (OE), U. S. Army Specification 2-104B. Use grade SAE-30 when surrounding temperature is above 32°F and SAE-10 between 32°F and 0°F. Make sure the breather vent in the filler plug is open. Replace the filler plug and check to see that the oil-drain plug is tight. Wipe off accumulated oil and dirt from the engine and its base before starting.

(3) **OPERATION BELOW ZERO.** If engine is to be kept where surrounding temperature is below 0°F, drain the crankcase daily. Refill the crankcase with 75 percent OE SAE-10 and 25 percent gasoline, thoroughly mixed. To dilute the oil, drain the crankcase into a clean container while the oil is still warm and add the necessary amount of gasoline. If new oil is used, be sure the oil is warm enough so the gasoline and oil will mix thoroughly. Refill the crankcase with the diluted oil and run the engine at least 10 minutes to circulate the oil to all moving parts. Check the oil level frequently when diluted oil is being used since there will be some loss from evaporation and more than normal loss due to worn parts. Add undiluted OE SAE-10 only.

c. **Fuel System.** To clean the fuel line, disconnect the gasoline line and the gas filter at the carburetor. Blow through the gas line to clear it. To clean the gas filter, first close the shut-off valve and loosen the thumb-screw. Every 64 hours of operation, remove and clean the glass bowl, the gasket, and the screen. Open the shut-off valve to see if gasoline flows freely from the tank. If a gummy, varnish-like substance is found, use alcohol or acetone to dissolve it.

d. **Checking for Spark.** To prove that a satisfactory spark is being delivered by the magneto, remove the spark plug, open the plug point gap to about  $\frac{1}{8}$  inch, and with cables attached place the spark plug on the cylinder head. Turn the motor with the rope starter. If the spark jumps the gap, the entire ignition system is in working condition. If no spark appears, replace the plug. If still no spark appears, check the magneto and the cable. Before replacing the plug be sure to close the point gap to 0.025 inch.

e. **Spark Plug Adjustment.** Clean spark plugs occasionally and reset the points to 0.025 inch. Points burn away during service. The porcelain prevents the spark from jumping anywhere except at the gap but if it is cracked or broken it will prevent the plug from firing. Water, dirt, and carbon on the outside of the plug may cause the high-voltage current to leak over the surface of



the porcelain. Clean the spark plug by taking the plug apart and washing off the carbon with gasoline. Points should be scraped or sandpapered.

**f. Ignition Cable.** Insulation must not be broken, soaked with oil or water, or the cable grounded in any way where it touches the motor, or it will interfere with good ignition. Spark plug cables should be soldered to the secondary terminal. Avoid touching the coil with the hot soldering iron.

**g. Cylinder Head.** The cylinder head is held on with cap screws. When the cylinder head has been removed for the purpose of cleaning carbon and grinding valves, be careful when replacing it. Use a new gasket if possible, or clean the old one and coat both sides with cup grease. Do not use shellac. Tighten each cap screw a little at a time so that the cylinder head is pulled down evenly. Screws need be only moderately tight.

**h. Compression.** Proper compression is obtained when valves seat properly, gaskets do not leak, and piston rings are properly fitted. When tuning up the motor it is always well to check compression. Do this by turning the motor over quickly by hand. If turned slowly, sticky valves may not be detected. If a point of resistance is offered every other revolution, compression is satisfactory. If a motor turns over without compression resistance for a full cycle, it is possible that a worn piston ring, or leaking valves or gaskets are present. See that the spark plug has a gasket under it and is drawn up tightly. Check the cylinder head gasket and tighten the cylinder head bolts.

**i. Carbon.** Excessive carbon in the combustion chamber may be caused by the burning of oil which gets into the chamber past poorly seated rings. Too rich a mixture in the carburetor and a weak spark will cause carbon to form. Some poor oils will produce carbon more readily than better oils. An unusual amount of carbon is indicated by a knocking in the motor and by a loss of power. Remove carbon from valves and valve port, piston head, piston rings, ring grooves, and cylinder head at top of cylinder bore.

**j. Air Cleaner.** The air cleaner protects the motor from dust and dirt. No motor can stand up under the grinding action that takes place when dust and dirt particles are drawn into the motor by the carburetor. Test the air cleaner to see if it is clogged by blowing through it, or see if the motor performs better with it off. If clogged, replace it. Clean the air cleaner by removing it and washing it with Solvent, dry cleaning, or Diesel fuel oil. Every 24 hours of operation remove the cleaner, drain the oil, clean, and refill with oil to the level mark.

**k. Muffler.** After long periods of service the muffler may become clogged to the point where it will affect the motor's power. To check the muffler, unscrew it from the motor and run water into the open end. If streams of water come out of the small holes at the end it is not clogged. If water runs through very slowly, the muffler is clogged and needs replacing.

**l. Exhaust Valves.** The valves are made of Austenitic steel and the inlets of chrome nickel. Molybdenum iron valve seat rings are used for the exhaust valve. The proper taper clearance for the engine is 0.010 to 0.016 inch.

**m. Magneto.** The magneto should be oiled once every 200 hours of operation. The breaker points should be 0.015 inch to 0.018 inch apart and should be kept smooth and clean.

**n. Pistons.** The pistons are heavy-duty aluminum alloy castings. Each piston is fitted with two compression rings, one scraper ring, and one regulating ring. The clearance should be 0.0055 inch to 0.006 inch measured at the bottom of the skirt.

**o. Generator Maintenance.** (1) CARE OF THE GENERATOR. The generator consists mainly of a steel frame, field coils, an armature with a collector ring, a set of six brushes, a brush-holder assembly, a cast-iron end bracket mounted on the engine, and a fan mounted on the armature to keep the generator cool and to blow out any dust or dirt that may accumulate. The generator is a self-contained unit which will require atten-

tion only for the replacement of brushes. An occasional examination of the commutator and collector rings should be made to make sure that there is a good electrical contact between them and the brushes. Oil, grease, or dirt on the commutator and collector rings will affect the output of the generator by reducing the output voltage or causing the current flow to be unstable. Inspect the generator by loosening two setscrews on each side of the cover and removing the cover. Examine the generator after every 500 running hours.

(2) **BRUSHES.** The brush holders are designed to assure perfect commutation and to prevent the springs from touching the commutator or collector rings after the brushes are worn. The average life of the brushes is estimated at 1,000 running hours. Examine them every 500 running hours. The d-c or commutator brushes can be examined

by removing the brush-holder staple and pulling out the brush assembly. The a-c brushes are fitted into die-cast brush holders with separate springs. To examine the brushes it is necessary to remove the brush-holder strip which is fastened to the top of the brush holder by two small screws. If it is found that the brushes have worn to a length of  $\frac{3}{8}$  inch, replace them. Be careful to replace brushes in the same position from which they were removed so as not to disturb the electrical contact between the armature and the brushes.

(3) **COMMUTATOR AND COLLECTOR RINGS.** The commutator and collector rings of the generator should be examined periodically to be sure that they are clean. If there is oil, grease, or dirt on the commutator or collector rings, clean them by touching very lightly with fine sandpaper (No. 00) while the armature is rotating.

#### p. Trouble Remedy Chart.

##### (1) POWER PLANT.

Symptom	Possible cause	Check	Remedy
Unit will not start	Too heavy electrical load	Load in watts	Reduce load
	Oil too heavy	Grade of oil	Use proper grade
	Improper grade of fuel	Octane rating	Use proper fuel
	High test gasoline	Octane rating	Use proper fuel
	Clogged fuel line or strainer	Gas lines and strainer	Clean or blow out
	Dirty carburetor	Inspect for dirt	Remove and clean
	Improper fuel mixture	Choke operation	Adjust choke
	Clogged air cleaner	Inspect	Remove and clean
	Defective ignition system	Inspect spark plug and breaker points	Clean points and reset
Lack of power	Loose cylinder head, or blown gasket	Inspect bolts and gaskets	Tighten bolts or replace gasket
	Engine overheats	Ventilation	Relocate
	Valves need adjusting	Valve and seat	Grind valves
	Worn piston rings	Inspect rings	Replace if worn
Plant runs too hot	Poor grade of fuel	Fuel supply	Use proper fuel
	Improper fuel mixture	Check operation	Adjust choke
	Generator is overloaded	Load in watts	Reduce load
	Incorrect timing	Magneto	Reset points
	Incorrect lubricating oil	Grade of oil	Change to proper grade
	Insufficient ventilation	Placement of plant	Relocate
	Dirty engine	Inspect engine	Clean
Clogged exhaust lines	Inspect line	Blow out	

Symptom	Possible cause	Check	Remedy
Plant uses too much oil	Incorrect grade of oil	Grade of oil	Change oil
	Insufficient or too much oil	Check oil level	Drain or fill
	Oil not changed often enough	Check maintenance	Change oil
	Worn piston rings	Piston rings	Replace
	Overheating of engine	Ventilation	Relocate
Noise	Loose bearing	Main crankshaft bearing	Worn, replace it
	Loose connecting rod	Clearance	Tighten properly
	Loose piston pin	Clearance	Tighten properly

**NOTE:** Always investigate any unusual noises in the power plant. Do not run plant without correcting condition.

**(2) GENERATOR.**

Generator produces no current	Open line	Check line	Repair
	Brushes not seated properly	Clearance and contact	Reset brushes
	Brushes worn	Brushes	Replace with new brushes
	Brush spring without tension	Spring tension	Replace
	Dirty commutator or collector rings	Commutator	Clean as per instruction
Low voltage	(All of the above points)		
	Defective steel coils	Check continuity	If shorted or open, replace
Flicker	Low engine speed	All operating conditions	See engine symptoms
	Incorrect clearance on resistance points	Points	Reset
	Pitted contact points	Magneto	Dress points
	Defective resistance unit	Resistance on ohmmeter	Replace
	Plant runs unevenly	Operating conditions	See engine remedies
	Brushes not seated properly	Brushes	Reset brushes

**37. SUPPLEMENTARY DATA.**

**a. General.** The power unit as originally supplied with Public Address Set PA-1-F on Orders No. 15494-Phila-43 and 19523-Phila-43 used the Wisconsin Motors' model AA engine. It is desirable to limit the procurement of maintenance parts for the model AA engine to a minimum. In the event of complete failure of a model AA engine, a model AB replacement engine should be substituted. In the case of a complete overhaul, conversion from a model AA to a model AB

should be made. For complete replacement of the power unit, use Power Unit PE-75. The parts not interchangeable between the models AA and AB engines follow; all other parts are either identical or interchangeable.

- (1) Cylinder and crankcase complete with valves, spring seats, pins, inspection plate, welch plugs, and valve inserts.
- (2) Piston and connecting rod assembly.
- (3) Magneto assembly.
- (4) Instruction plate.

**b. Maintenance Parts List for Model AB Engine.†**

NOTE: The following parts list contains only those Model AB engine parts that are stocked. These parts can be substituted for the parts performing the same functions on the Model AA engine. Order maintenance parts by stock number, name, and description.

Signal Corps Stock No.	Name of Part and Description*	Function	Quan. per Major Unit	Lowest Maint. Echelon
3H1925-2	ENGINE: single-cylinder, air-cooled, L-head; four-cycle, 2½" bore x 2¼" stroke; 2.25 hp at 1,800 rpm; complete with rope-starter sheave; part AB.....	Supply power for complete re- placement of model AA engine	1	3d
<b>CRANKSHAFT AND CONNECTING ROD GROUP</b>				
3H1925/C16	ROD: connecting; aluminum alloy; part DA-55-B.....	Connects piston to crankshaft	1	Orgn. stock
3H1909D/B252	BOLT: ¼-18x1¼"; hex. head; part XD-19-A.....	For connecting rod	2	3d
3H1925/B40	*OIL PUMP BODY ASSEMBLY: part K-98.....	Container for oil	1	3d
3H1925/W215	WASHER: lock; internal; ¼"; part PE-52.....	For connecting rod bolts	2	3d
3H1909D/S192	SPRING: 2½"x2¾"; part PM-58.....	Oil pump plunger	1	4th
3H1925/P237	*PLUG: ¾"; with chain; part XK-3-10.....	Oil filler	1	Orgn. stock
3H1925/P236	*PLUG: ¼"; with chain; part XK-2-5.....	Oil drain	1	Orgn. stock
3H1909D/S181	CORK: ¼"x1¼"; part PH-256.....	Main bearing oil seal	2	4th
3H1909D/C6	CUP: part PH-254.....	Oil seal	2	4th
3H1909D/S192	STRAINER: brass; ¼"x1½"; part RD-107.....	Oil pump	1	3d
3H1909D/P156	PIN: straight; ¼"x1¼"; steel; part PA-217.....	For oil pump plunger	1	3d
3H1909D/S173	*BRACKET: part PG-295.....	For oil drain and filler chains	1	Orgn. stock
<b>CYLINDER GROUP</b>				
3H1909D/V1	VALVE: 4½"x1½"; part AE-73-C.....	Exhaust	1	Orgn. stock
3H1909D/V2	VALVE: 4½"x1½"; part AE-73-N.....	Intake	1	Orgn. stock

†Manufacturer: Wisconsin Motors Corp.

\*All parts so marked can be used to replace similar parts on model AA engine. All parts not so marked are identical parts on both the AA and AB engines.

Signal Corps Stock No.	Name of Part and Description*	Function	Quan. per Major Unit	Lowest Maint. Echelon
3H1909D/S108	SEAT: ½"x1"; part AG-26.....	Valve Spring	2	Orgn. stock
3H1909D/S106	SPRING: 2¼"x1"; part AF-48.....	Keeps valves closed	2	Orgn. stock
3H1909D/L109	LOCK: ¾"x¼"; part AH-9.....	Locks valve seats into position	2 pr.	Orgn. stock
3H1909D/G1	GASKET: part QD-569-A.....	Engine base	1	Orgn. stock
3H1909D/G4	GASKET: part QD-568-E.....	Cylinder head	1	Orgn. stock
3H1909D/G8	GASKET: part QD-572.....	Valve tappet inspection plate	1	Orgn. stock
3H1909D/G3	GASKET: 0.006" thick; part QD-573.....	Take-off end	1	Orgn. stock
3H1909D/G2	GASKET: 0.003" thick; part QD-572-A.....	Take-off end	1	Orgn. stock
3H1909D/G6	GASKET: part QD-574.....	Flywheel end	1	Orgn. stock
3H4410-6	*SPARK PLUG: 18 mm; part 4D-24.....	Provide spark	1	Orgn. stock
3H1925/J28	VALVE: insert; part HG-156-1.....	Exhaust	1	4th
<b>GOVERNOR GROUP</b>				
3H1909D/S193	*SPRING: parkenized; part PM-74-1.....	For governor	1	Orgn. stock
3H1909D/G9	GASKET: paper; part QD-571.....	Governor shaft support bracket	1	4th
3H1909D/S184	SCREW: parkenized; special; part PI-121-1.....	Adjusts governor spring	1	Orgn. stock
3H1925-J/L10	LEVER: part TC-332.....	Governor control	1	4th
3H1909D/P225	*PIN: part TC-301-2.....	Governor spring-adjusting screw	1	3d

\*All parts so marked can be used to replace similar parts on model AA engine. All parts not so marked are identical parts on both the AA and AB engines.

Signal Corps Stock No.	Name of Part and Description*	Function	Quan. per Major Unit	Lowest Maint. Echelon
<b>GASOLINE SUPPLY GROUP</b>				
3H1925/T1	*TANK: with filler cap and chain; part WE-112-1.....	Holds gasoline	1	3d
3H1925/S51	STRAP: part PG-187-B.....	Full tank take-off end	1	3d
3H1925/S3	STRAP: part PG-188-C.....	Full tank flywheel end	1	3d
3H1925/C1	*CAP: with chain; part RC-87-1.....	For full tank	1	Orgn. stock
3H1909A/L13	FUEL STRAINER ASSEMBLY: consists of wire mesh strainer, bulb, sediment bulb cover, and gas feedline; part LP-19.....	Trap to catch and settle dirt	1	3d
3H1925/T77	FUEL LINE ASSEMBLY: 3/8" copper tubing with two inverted nuts; part RF-1001.....		1	Orgn. stock
3H1925/E7	ELBOW: 3/8"; part RF-1123.....	From carburetor to fuel line	1	Orgn. stock
3H1909D/N213	*PIPE: nipple; 1/2"x1 1/2"; part RF-903-1.....	From fuel strainer to tank	1	Orgn. stock
<b>CARBURETOR GROUP</b>				
3H751	*CARBURETOR: complete assembly; part L-26-11.....	Mixes gas and air	1	Orgn. stock
3H751-1/F12	FLOAT.....	Regulator	1	3d
3H712/S1	FLOAT NEEDLE VALVE ASSEMBLY.....	Gas flow	1	Orgn. stock
3H712/1	METERING JET: adjustable.....	Regulates gas	1	3d
3H1909D/V5	VALVE: idle needle.....	Gas flow	1	3d
3H751-1/S14	SPRING: idle needle valve.....	Adjuster	1	3d
3H751-1/P16	PIN: aluminum.....	Pivot for float	1	3d
3H751/S15	SPRING.....	For float pivot pin	1	3d
3H1909D/R243	*ROD: part VE-304-2.....	To open and close carburetor throttle	1	3d
3H1909D/G12	GASKET.....	For metering jet	1	3d

\*All parts so marked can be used to replace similar parts on model AA engine. All parts not so marked are identical parts on both the AA and AB engines.

Signal Corps Stock No.	Name of Part and Description *	Function	Quan. per Major Unit	Lowest Maint. Echelon
3H712/G1	GASKET.....	For float needle valve seat	1	Orgn. stock
3H712/G3	GASKET.....	For float chamber cover	1	Orgn. stock
3H1909D/G5	GASKET: part QC-53.....	For carburetor flange	1	Orgn. stock
3H751-1/S16	SPRING.....	Idle adjustment	1	3d
3H1909D/S163	*STUD: special; 1/4-20"x1/4-28"x1/4" long; parkerized; part PC-368-2.....	Carburetor mounting	2	Orgn. stock
6L6632-83P	SCREW.....	Idle adjustment	1	Orgn. stock
6L6632-73P	SCREW: No. 6-32x1/4"; parkerized.....	Float chamber cover	4	Orgn. stock
3H751-1/S25	STRAINER: part RD-122.....	Cleans gas	1	3d
3H751-1/G1	GASKET: fiber.....	For gasoline strainer plug	1	3d
<b>AIR CLEANER GROUP</b>				
3H1909D/F147	*FILTER: oil bath; part LO-28-A.....	Cleans air	1	4th
3H1925/M98	*MUFFLER: part WD-17-C.....	Suppresses noise	1	4th
6Z7245-19	*NIPPLE: exhaust; 1/4"x5" long.....	Outlet from engine.	1	4th
3H4600-108A/P1	*TUBING: flexible; 10'x1/4".....	For exhaust	1	4th
6Z8859	UNION: 1/4".....	For attaching tubing	1	4th
<b>GENERAL HARDWARE</b>				
3H1925/P207	PIN: groove; part PA-269.....	For starter sheave	1	Orgn. stock
3H1909D/N286	NUT: plain; 1/4-28; steel; part PD-9-1.....	For carburetor mounting studs and governor control lever	3	Orgn. stock
6L3504-20P	NUT: plain; 1/4-20; steel; part PD-77-2.....	For fuel tank support clamp and governor spring adjusting screws	4	Orgn. stock

\*All parts so marked can be used to replace similar parts on model AA engine. All parts not so marked are identical parts on both the AA and AB engines.

Signal Corps Stock No.	Name of Part and Description*	Function	Quan. per Major Unit	Lowest Maint. Echelon
6L3610-32SP	NUT: plain; No. 10-32 steel; part PD-115-1.....	For governor spring adjusting screws	2	Orgn. stock
3H1925/W212	WASHER: lock; 1/4"; part PE-3.....	For mounting air shroud to case, fuel tank support strap to shroud, main bearing plate, flywheel end, and oil trough	11	Orgn. stock
3H1901-AP/W19	WASHER: lock; 5/16"; part PE-4.....	For cylinder head and magnet mounting screws	5	Orgn. stock
6L71006	WASHER: lock; 3/8"; part PE-5.....	For mounting generator adaptor	4	Orgn. stock
3H1925/W215	WASHER: lock; 5/16"; part PE-52.....	For connecting rod bolts	2	Orgn. stock
3H1909D/P261	PLUG: slotted pipe; 3/8"; part PE-25-3.....	For timing inspection prep hole in case	1	Orgn. stock
3H1925/W221	*WASHER: lead; 1/4"; part PH-208.....	For valve tappet plate screw	1	Orgn. stock
6L58020	*WASHER: steel; 3/16"; part PH-14-D.....	For main bearing plate	4	Orgn. stock
3H1925/W218	WASHER: steel; 1/4"; part PH-30-A.....	For engine base mounting screws and governor spring adjusting screw pin	11	Orgn. stock
3H1925/W220	WASHER: plain; 5/16"; part PH-77.....	For cylinder head	2	Orgn. stock
3H1909D/5264	SCREW: round head; 1/4-20x1/2"; part XA-34-1.....	For mounting air shroud to case	2	Orgn. stock
6L7920-4-24.IP	SCREW: round head; 1/4-20x1 1/2"; part XA-52-1.....	For fuel tank support strap	1	Orgn. stock

\*All parts so marked can be used to replace similar parts on model AA engine. All parts not so marked are identical parts on both the AA and AB engines.



Signal Corps Stock No.	Name of Part and Description	Function	Quan. per Major Unit	Lowest Maint. Echelon
6L4904-SP	SCREW: hex. head; 1/4-20x1 1/2"; part XD-4-3	For governor shaft support bracket, exhaust muffler, and main bearing plate, take-off end	7	Orgn. stock
3H1909D/S275	SCREW: hex. head; 1/4-20x3/4"; part XD-6-4	For mounting engine base and fuel tank support straps	12	Orgn. stock
3H1909D/S276	SCREW: hex. head; 1/4-20x1"; part XD-7	For mounting oil trough	2	Orgn. stock
6L4905-20P	SCREW: 5/16-18x1 1/4"; part XD-11-1	For mounting cylinder head	1	Orgn. stock
3H1909D/S278	SCREW: hex. head; 5/16-18x3/4"; part XD-15-4	For mounting main bearing plate	4	Orgn. stock
3H1909D/S280	SCREW: hex. head; 5/16-18x1 3/4"; part XD-22-1	For mounting cylinder head	1	Orgn. stock
6L605-1.SP	SCREW: hex. head; 5/16-18x1 1/2"; part XD-21-2	For cylinder head and fuel tank strap	1	Orgn. stock
6L4905-32P	SCREW: hex. head; 5/16-18x2"; part XD-23-1	For mounting cylinder head and shroud	2	Orgn. stock
6L914-4-96	PIN: cotter; 1/8" x 1 1/2"; part XI-5	In oil pump body	1	Orgn. stock
6L914-4-24	PIN: cotter; 1/2" x 3/8"; part XI-33	For governor flyweight toggle pin	4	Orgn. stock
6L914-3-24	PIN: cotter; 1/2" x 3/8"; part XK-3	For governor control rod	1	Orgn. stock
3H1925/P234	PLUG: pipe; square head; part XK-2	For oil drain in base	1	Orgn. stock
3H1925/P235	PLUG: pipe; square head; part XK-3	For oil filler hole	1	Orgn. stock
3H1925/E236	ELL: street; 3/4" x 45"; part XK-66-2	For exhaust muffler	1	3d





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