MASTER COPY

71

TM 11-375B

WAR DEPARTMENT TECHNICAL MANUAL

Resc by Cir 310-9
21 January 71

FACSIMILE EQUIPMENT

RC-120, RC-120-A and RC-120-B

AND

FACSIMILE SET

AN/TXC-1

WAR DEPARTMENT *5 APRIL 1944*

TECHNICAL MANUAL

FACSIMILE EQUIPMENT
RC–120, RC–120–A AND RC–120–B
AND
FACSIMILE SET AN/TXC–1

CHANGES No. 2 | WAR DEPARTMENT
WASHINGTON 25, D. C., 17 May 1946

TM 11–375B, 5 April 1944, is changed as follows:

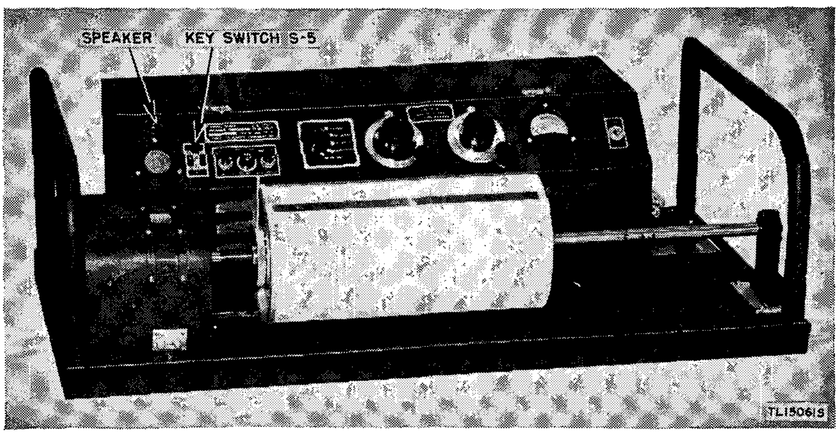


Figure 1.1. Facsimile Set AN/TXC–1A.

4.1. Unpacking facsimile set AN/TXC–1 (as added by CI)

a. Facsimile Set AN/TXC–1 may be packed in one of two ways:

(1) Facsimile Set AN/TXC–1 is generally packed as follows:

Case No.	Component	Weight (pounds)
* *	* * * *	*

(2) (Added.) Facsimile Set AN/TXC–1 (serial Nos. 91 through 190) is packed as follows:

Case No.	Component	Weight (pounds)
1	Facsimile Transceiver TT–1/TXC–1	215
2	Rectifier Power Unit PP–86/TXC–1	100
3	Photographic Equipment PH–549/TXC–1, running spares, and accessories.	200
4	Table MT–252/TXC–1	130

*   *   *   *   *   *   *

e. Take Photographic Equipment * * * equipment consists of:

2 packages of recording paper, 12 x 18¾ inches, Timefax; Times Telephoto Equipment Inc. Each package contains 250 sheets. 4 packages of recording * * * enamel, 16 x 20 x 3 inches.

8. Selector switch

*   *   *   *   *   *   *

c. At STAND BY * * * of the transceiver. **In Facsimile Transceiver TT–1A/TXC–1A, at STAND BY position, the talk-back circuit is established.**

*   *   *   *   *   *   *

8.1. Talk-back circuit (Added)

a. Description. A talk-back circuit has been added to Facsimile Transciever TT–1A/TXC–1 to provide voice communications over a facsimile circuit without additional terminal equipment. It consists of a permanent magnet dynamic speaker (LS–1) and a three-position key switch (S–5). The speaker and switch are mounted adjacent to the START and PHASE switches. (See fig. 1.1.)

b. Operation. (1) With Facsimile Transceiver TT–1A/TXC–1 connected to a wire or radio circuit in the normal manner, throw the power switch to ON.

(2) Turn selector switch (S–1) to STAND BY.

(3) Throw key switch (S–5) to STAND BY position (locking) to keep the tubes ready for operation and to monitor the communications circuit. The motor does not receive power in this position.

(4) Throw key switch (S–5) to MONITOR position (normal) for receiving voice communication from the distant facsimile operator. The motor receives power and may be running in this position.

(5) Throw key switch (S–5) to TALK position (nonlocking) for talking to the distant facsimile operator. The motor receives power and may be running in this position.

Caution: The talk-back circuit will not function over a radio circuit which uses Converter CV–2/TX.

Note. The talk-back circuit operates only when the selector switch is in STAND BY position and thus does not monitor facsimile transmissions.

11.1. Transmitting with Facsimile Set AN/TXC–1 (as added by C1)

* * * * * * *

f. DIRECT RECORDING ON TIMEFAX RECORDING PAPER (Added). When several copies are required and faithful reproduction of half-tones is not important, use the direct recording method on Timefax ready paper. The recording sheet contains dye which is exposed on the received master copy where the top coating on the paper is burned off by the recording current. The master copy is applied to a hectograph pad for making duplicate copies of the message by the hectograph process.

12. Transmitting Positive

* * * * * * *

k. With the selector * * * his machine properly. Use the telephone or radio in the conventional manner for all voice communication **when using Facsimile Transceiver FX–1–( ) or TT–1/TXC–1. When transmitting or receiving with Facsimile Transceiver TT–1A/TXC–1, use the talk-back circuit (par. 8.1) for all voice communication.**

* * * * * * *

p. (As changed by C1.) On Facsimile Transceivers * * * to STAND BY. **On Facsimile Transceiver TT–1A/TXC–1, actuate selector switch (S–1) and key switch (S–5) to STAND BY.** Leave the power * * * to be transmitted.

14. Receiving Copy, Direct Process Recording (Teledeltos)

* * * * * * *

l. When the drum * * * to STAND BY. **When using Facsimile Transceiver TT–1A/TXC–1, also actuate the key switch to STAND BY.** On Facsimile Transceiver * * * from the drum.

24.14. Storage Battery (as added by C1)

* * * * * * *

b. CLEAN (C). Clean the terminals, when corroded, with sandpaper, **and apply a light coat of Compound, Rust-preventive, Light, to prevent corrosion. When rust-preventive compound is not available, substitute Grease, Lubricating, Special.**

24.17. Preventive Maintenance Tools and Materials (as added by C 1)

The following materials * * * performing preventive maintenance:

Light rust-preventive Compound (CL)
Common hand tools.

* * * * * * *

24.28. Lubricating Lead Screw (as added by C 1)

* * * * * * *

c. Wipe the oil from the shaft with a piece of clean lintless cloth. Hold the cloth * * * not rub lengthwise.

* * * * * * *

24.30. Lubricating Motor Bearing, Motor Worm, and Gear (as added by C 1)

The top bearing of the motor, and the motor worm and gear, should be lubricated **every 3 months.** These directions apply * * * built-in lubricating chamber.

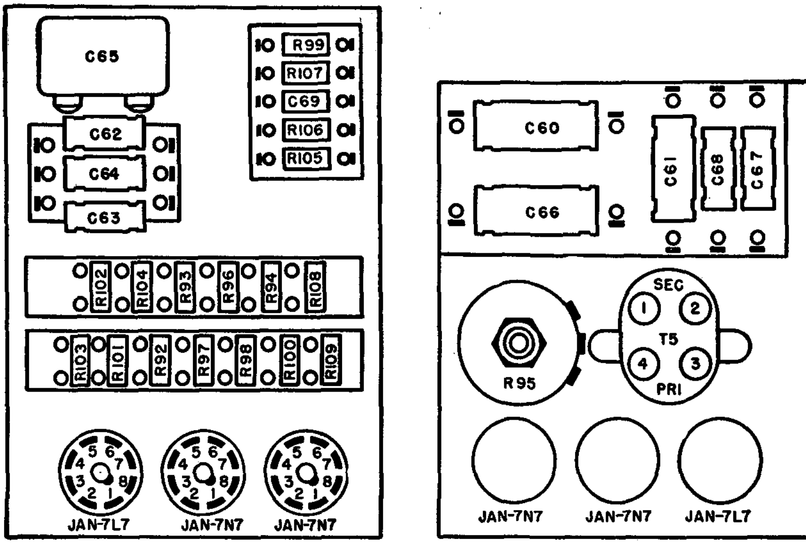
a. Place **2 or** 3 drops of special preservative lubricating oil (PS) on the motor shaft at the point where it passes through the top motor bearing. Use no more * * * gum the bearing.

* * * * * * *

25. Replacements (as changed by C 1)

Two 5-ampere fuses * * * Power Supply PE–150. There is no fuse on Facsimile Transceiver FX–1–(*). **One cartridge-type fuse, 1/8-ampere, is located on the instrument panel of Facsimile Transceiver TT–1/TXC–1. This fuse is in the synchronous motor circuit. To replace a fuse, unscrew the cap, remove the fuse, and insert a new fuse; then screw the cap back in place.** Chest CH–116 contains * * * back into place.

* * * * * * *



TL 14052S

Figure 18.2. Parts lay-out, Facsimile Transceiver TT-1/TXC-1 (serial Nos. 91 through 190)

37. Fork-Oscillator Unit of Facsimile Transceiver FX–1–(*)

The fork-oscillator unit * * * and exciter lamp.

37.1 Fork-Oscillator Unit of Facsimile Transceiver AN/TXC–1 (fig. 23.6) (Added)

The fork-oscillator unit supplies a signal to the photocell circuit and the motor amplifier tube circuit. The output signal frequency is 1,800 cycles per second. This frequency must be maintained at extreme accuracy because of the effect of a slight variation in the motor speed. A deviation in frequency of one cycle in 10 seconds between the transmitting and receiving machines would cause a skew of over 1 inch in the received copy. The stability of the fork is obtained by using a temperature-compensated, bimetallic fork which is vacuum-sealed to do away with the effect of atmospheric and barometric changes. The circuit is arranged so that one half of a Tube JAN–7N7 picks up the weak signal from the fork and amplifies it enough to cause grid saturation on Tube JAN–7L7 pentode. The constant-level output of Tube JAN–7L7 is amplified in the other half of Tube JAN–7N7 which is connected to the drive coils of the fork. A potentiometer in the cathode of this stage provides vernier frequency adjustment. Part of the output of Tube JAN–7L7 is impressed on another Tube JAN–7N7, one half of which feeds the motor amplifier and exciter lamp amplifier. The other half of Tube JAN–7N7 feeds the photocell bridge circuit.

PART VI
CORRECTIVE MAINTENANCE

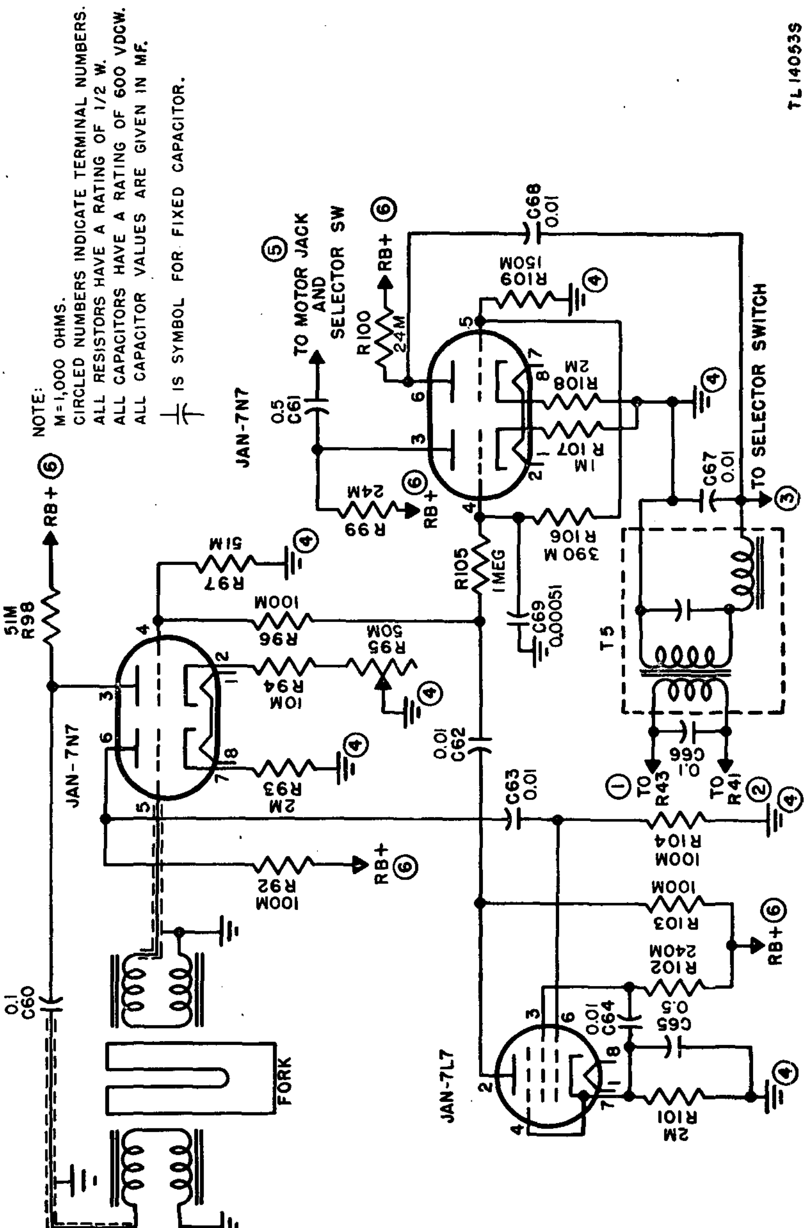


Figure 23.6. Fork-oscillator unit.

Note (as added by C 1). Failure or unsatisfactory * * * Form 54 (Unsatisfactory Report.) **If Army Air Forces Form 54 is not available, prepare letter containing the data elicited by the sample form shown in figure 28.2, without reproducing copies of the form.**

45.1. Unsatisfactory Equipment Report (as added by C 1)

*　　*　　*　　*　　*　　*　　*

b. When trouble in equipment used in Army Air Forces occurs more often than repair personnel feel is normal, Army Air Forces Form 54 should be filled out and forwarded **to the Commanding General, Air Matériel Command, Wright Field, Dayton, Ohio, in accordance with AAF Regulation No. 15–54.**

c. (Superseded.) If Army Air Forces Form No. 54 is not available, prepare letter containing the data elicited by the sample form shown in figure 28.2 without reproducing copies of the form.

WAR DEPARTMENT
AAF Form No. 54
(Revised 2-18-43)

WAR DEPARTMENT
ARMY AIR FORCES
UNSATISFACTORY REPORT
(See AAF Reg. 15-54 for information on Proper Use of this Form)

TO BE FILLED IN BY STATION	
STATION SERIAL No.	DATE SUBMITTED
46-133	31 Mar 45

LEAVE BLANK		
A. S. C. SERIAL No.	REFER TO	CLASS

STATION: Dusty AAF, Dry Point, Arizona		ORGANIZATION: 314th Specialized Depot	
SUBJECT OF REPORT	Property Class—Name: Signal Corps Signal Generator I-72-J	Manufacturer: Espy Mfg. Co.	AAF Order or Shipping No.
AIRCRAFT—Model & AAF Serial No.	ENGINE—Model & AAF Serial No.	UNIT OR ACCESSORY—Type, Model and Serial No.	
AIRCRAFT REPORTS ONLY	LAST D. L. R.—Depot	Date	Flying Time Since / Total Flying Time
ENGINE REPORTS ONLY	LAST OVERHAUL—Depot	Hours Since	Depots and Hours At Each Previous Overhaul

PART					
Name: Signal Generator I-72-J			Part Drawing, Serial and Specification No.: Serial No. 213, Stock # 3F3852J		
Time in Use	Quantity on Hand	Quantity Known Defective	No. Previous Failures	Manufacturer	Inspector's No. or Identification
New	Unknown	9	0	Espy Mfg Co.	SC1324A

Indicate by "X" Disposition of Exhibit	Photographed and Prints Enclosed	Held for Instructions	Sent Under Separate Cover	Sent in Attached Package	Repaired and Returned to Service	Disposed of (Explain Below.)	To Overhaul Facility (INITIALS)
					X		

GIVE COMPLETE DETAILS, PROBABLE CAUSES AND RECOMMENDATIONS BELOW:
(Use Only Applicable Spaces Above—Avoid Unnecessary Repetition)

EXPEDITE

1. DESCRIPTION OF UNSATISFACTORY CONDITION: Backlash causing difficulty in setting of dial to the desired frequency. Main dial knob, reference # K-3, badly warped and rubs against bakelite dial disc, reference D-1, causing additional difficulty in setting the dial to the desired frequency. Main dial knob manufactured by Blank Name Plate and Mfg. Co, Chicago, Illinois.

2. PROBABLE CAUSES:

   a. Rotor shaft grounding washer, between Frequency Control Condenser, Reference C-1, and panel jammed too tightly against condenser.
   b. Main dial knob constructed of material which becomes warped at reasonably high temperature.

3. RECOMMENDATIONS:

   a. Installation of additional spacer, approximately .030" thickness, on the Condenser, Reference #C-1, mounting screws, which sets condenser farther from panel and prevents jamming of grounding washer on rotor shaft.
   b. Main dial knob to be constructed of bakelite or equal material that will withstand temperatures ranging from 100°F to 150°F or above.

4. DISPOSITION: Spacers were installed as noted under Recommendations in paragraph above. Since replacement knobs were not available, distorted knobs were repaired by heating to 150°F and reshaped.

5. REMARKS: All reference numbers taken from TM 11-307J, 14 Apr 43.

James M. Pierce
JAMES M. PIERCE,
Lt Col, Air Corps
Communications Officer

ROUTING SEND ORIGINAL AND TWO COPIES DIRECT TO COMMANDING GENERAL, HQ. AIR SERVICE COMMAND, PATTERSON FIELD, FAIRFIELD, OHIO.

TL15735S

Figure 28.2. Army Air Forces Form No. 54, with sample entries.

46. Depot Repairs

*   *   *   *   *   *   *

c. EMERGENCY ADJUSTMENTS.

*   *   *   *   *   *   *

(4) Emergency adjustments are * * * the frequency control. Frequency variation may be expected **in the unsealed fork assembly** because of atmospheric pressure and humidity changes and variations in tubes 7L7 and 7C5, which are used as replacements. **The vacuum-sealed fork assembly is independent of temperature, pressure, and humidity variations normally encountered.**

(5) Adjustments may be necessary with the **unsealed fork assembly** when operating at altitudes higher than 2,000 feet. A perfectly uniform * * * an irregular skew.

*   *   *   *   *   *   *

48. Synchronous Motor and Amplifier

*   *   *   *   *   *   *

c. CLUTCH (figs. 33.1 and 23.2) (Added). (1) With the motor running and the drum turning, the primary clutch tension measured at the periphery of the drum should be 12 to 14 ounces. To adjust the tension, loosen locknut L, turn the clutch spring retainer R, and again tighten the locknut.

(2) The secondary clutch tension as measured at the periphery of the drum should be approximately one-half (6 to 7 ounces) that of the primary clutch tension and is measured under the following conditions:

(*a*) The drive dog must be blocked in the disengaged position.

(*b*) With the motor running and the drum turning, the tension of the secondary clutch is measured with the phasing button held depressed.

Note. The secondary clutch tension measurement must be made when the secondary clutch drive dog is engaged on the secondary clutch drive ring. If the secondary clutch drive dog is disengaged, a true measurement of the secondary clutch tension cannot be obtained as the drum will be disengaged from the secondary clutch.

(3) To adjust the secondary clutch tension, it is necessary to remove the leadscrew and drum assembly, loosen or tighten screws S (fig. 33.1), reassemble leadscrew and drum assembly and recheck tension in accordance with (2) above.

(4) The leadscrew and motor shaft must be in alinement for proper operation of the clutch and drive assembly.

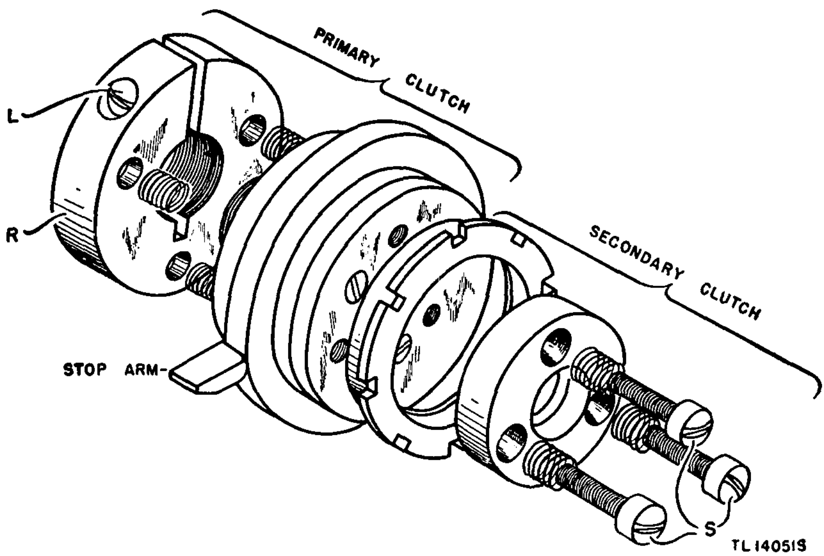


Figure 33.1. Clutch assembly.

57. Maintenance Parts for Facsimile Equipment RC–120A, and B and Facsimile Set AN/TXC–1 (as superseded by C 1)

*   *   *   *   *   *   *

b. Higher Echelon Spare Parts.

*   *   *   *   *   *   *

SIG 8–PE–140
SIG 8–PE–150
SIG 8–FX–1

*   *   *   *   *   *   *

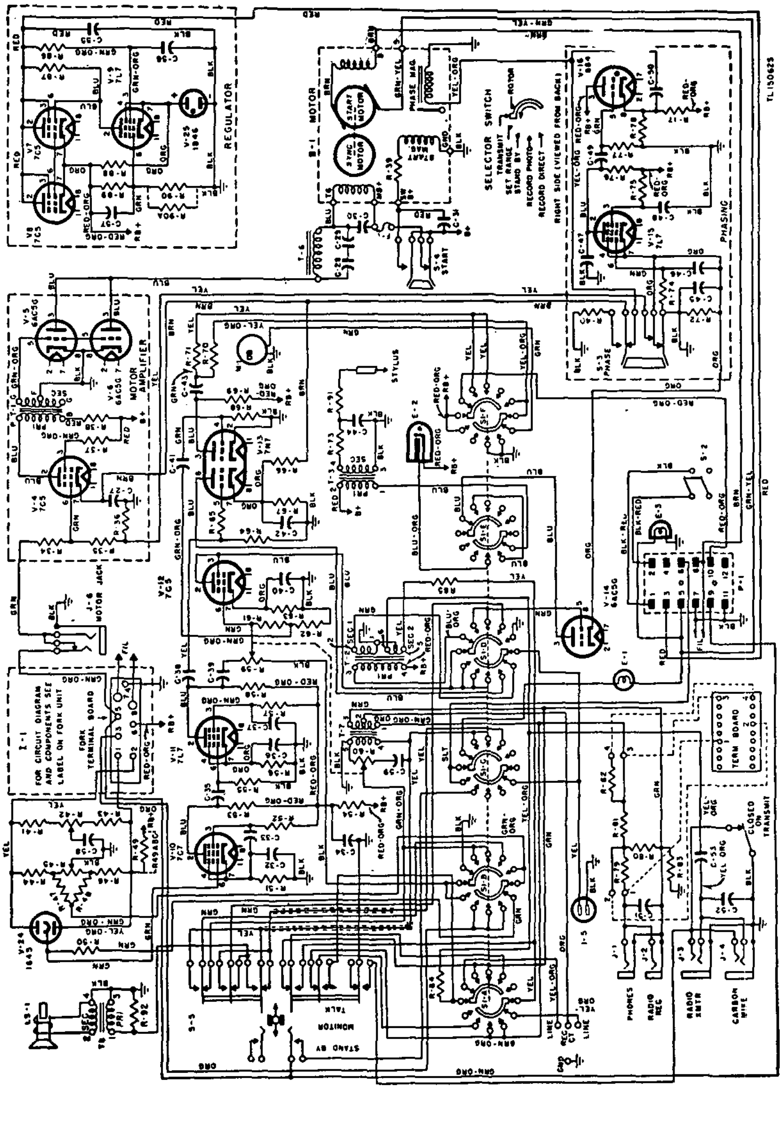


Figure 44. Schematic circuit diagram of Facsimile Set AN/TXC–1A.

[AG 300.7 (15 Mar 46)]

BY ORDER OF THE SECRETARY OF WAR:

DWIGHT D. EISENHOWER
Chief of Staff

OFFICIAL:
EDWARD F. WITSELL
Major General
The Adjutant General

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Refer to FM 21-6 for explanation of distribution formula.

U. S. GOVERNMENT PRINTING OFFICE: 1946

TECHNICAL MANUAL

FACSIMILE EQUIPMENT RC-120, RC-120-A AND RC-120-B AND FACSIMILE SET AN/TXC-1

TM 11-375B
CHANGES No. 4

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON 25, D.C., *21 February 1962*

TM 11-375B, 5 April 1944, is changed as follows:

Page 78, paragraph 57 (pg 59 of C 1 and pg 10 of C 2). Delete in its entirety.

Page 98, Appendix I (as added by C 3, 2 November 1960). Delete and substitute the following:

APPENDIX I (Superseded)
MAINTENANCE ALLOCATION CHART
FACSIMILE EQUIPMENT RC-120, RC-120 A, B

SECTION I
MAINTENANCE ALLOCATION

1. General

a. This section assigns maintenance functions to be performed on Components, assemblies, and sub-assemblies by the lowest appropriate maintenance echelon.

b. Columns in the maintenance allocation chart are as follows:

(1) *Component.* This column shows only the nomenclature or standard item name. Additional descriptive data is included only where clarification is necessary to identify the component. Assemblies which are part of a component are listed immediately below that component, and the sub-assemblies which are part of an assembly are listed immediately below that assembly. Each generation break-down (components, assemblies, or sub-assemblies) are listed in disassembly order or alphabetical order.

(2) *Maintenance function.* This column indicates the various maintenance functions allocated to the echelons.

(*a*) *Service.* To clean, to preserve, and to replenish lubricants.

(*b*) *Adjust.* To regulate periodically to prevent malfunction.

*These Changes supersede C 3, 2 November 1960.

(*c*) *Inspect.* To verify serviceability and to detect incipient electrical or mechanical failure by scrutiny.

(*d*) *Test.* To verify serviceability and to detect incipient electrical or mechanical failure by use of special equipment such as gages, meters, etc.

(*e*) *Replace.* To substitute serviceable components, assemblies, or sub-assemblies, for unserviceable components, assemblies, or sub-assemblies.

(*f*) *Repair.* To restore an item to serviceable condition through correction of a specific failure or unserviceable condition. This function includes but is not limited to welding, grinding, riveting, straightening, and replacement of parts other than the trial and error replacement of running spare type items such as fuses, lamps, or electron tubes.

(*g*) *Align.* To adjust two or more components of an electrical system so that their functions are properly synchronized.

(*h*) *Calibrate.* To determine, check, or rectify the graduation of an instrument, weapon, or weapons system, or components of a weapons system.

(*i*) *Overhaul.* To restore an item to *completely serviceable* condition as prescribed by serviceability standards developed and published by heads of technical services. This is accomplished through employment of the technique of "Inspect and Repair Only as Necessary" (IROAN). Maximum utilization of diagnostic and test equipment is combined with minimum disassembly of the item during the overhaul process.

(*j*) *Rebuild.* To restore an item to a standard as near as possible to original or new condition in appearance, performance, and life expectancy. This is accomplished through the maintenance technique of complete disassembly of the item, inspection of all parts or components, repair or replacement of worn or unserviceable elements using original manufacturing tolerances and/or specifications and subsequent reassembly of the item.

(3) *1st, 2d, 3d, 4th, 5th echelon.* The symbol X placed in the appropriate column indicates the echelon responsible for performing that particular maintenance operation, but does not necessarily indicate that repair parts will be stocked at that level. Echelons higher than the echelon marked by X are authorized to perform the indicated operation.

(4) *Tools required.* This column indicates codes assigned to each individual tool equipment, test equipment, and maintenance equipment referenced. The grouping of codes in this column of the maintenance allocation chart indicates the tool, test,

and maintenance equipment required to perform the maintenance function.

(5) *Remarks.* Entries in this column will be utilized when necessary to clarify any of the data cited in the preceding columns.

c. Columns in the allocation of tools for maintenance functions are as follows:

(1) *Tools required for maintenance functions.* This column lists tools, test, and maintenance equipment required to perform the maintenance functions.

(2) *1st, 2d, 3d, 4th, 5th echelon.* The dagger (†) symbol in these columns indicates the echelons normally allocated the facility.

(3) *Tool code.* This column lists the tool code assigned.

2. Maintenance by Using Organizations

When this equipment is used by signal services organizations organic to theater headquarters or communication zones to provide theater communications, those maintenance functions allocated up to and including fourth echelon are authorized to the organization operating this equipment.

Section II. MAINTENANCE ALLOCATION CHART

(1) Part or component	(2) Maintenance function	(3) 1st echelon	(4) 2d echelon	(5) 3d echelon	(6) 4th echelon	(7) 5th echelon	(8) Tools required	(9) Remarks
FACSIMILE EQUIPMENT RC-120; RC-120 A, B.	Service	X						External parts.
			X				8.	
	Adjust	X						Operational.
	Inspect	X						External parts.
			X				8.	
	Test	X						Operational.
			X				2, 3	Test fuses, lamps, electron tubes. (Use Tool Code 1 in 5th ech in place of Tool Code 2.)
	Repair		X				8.	
	Overhaul					X	8.	
FACSIMILE TRANSCEIVER FX-1, FX-1A and 1B.	Service	X						External parts.
			X				8.	
	Adjust	X						Operation adjustments.
			X				3, 8	Optical System, voltage regulator contact points.
	Inspect	X						Exterior parts.
			X				8.	
	Test	X						Operational test.
			X				2, 3	Electron tubes, exciter lamp.
				X			2, 3, 4, 7, 8	Photocell circuit, amplifier circuit.
					X		2 through 10	All test. (Use Tool Code 1 in place of Tool Code 2 for 5th ech only.)

	Replace		X					
	Repair			X			8.	
	Overhaul				X		8.	
POWER SUPPLY PE-140; PE-140 A and B.	Service	X						External parts.
			X				8.	
	Adjust	X						Operational adjustments.
			X				3, 8.	
	Inspect	X						Exterior parts.
			X				8.	
	Test	X						Operational test.
			X				2, 3	Test tubes, fused, and lamps.
				X			2, 3, 4, 7, 8	Voltage and Resistance.
					X		2 through 10	All tests. (Use Tool Code 1 in place of Tool Code 2 for 5th ech only.)
	Replace		X					
	Repair			X			8.	
	Overhaul				X		8.	

SECTION III. ALLOCATION OF TOOLS FOR MAINTENANCE FUNCTIONS

(1) Tools Required for Maintenance Functions	(2) 1st echelon	(3) 2d echelon	(4) 3d echelon	(5) 4th echelon	(6) 5th echelon	(7) Tool code	(8) Remarks
ELECTRON TUBE TEST SET TV-2/U					(†)	1	Replaces TV/7 for 5th echelon test.
ELECTRON TUBE TEST SET TV-7/U		(†)	(†)	(†)		2	
MULTIMETER AN/URM-105		(†)	(†)	(†)		3	
MULTIMETER TS-352/U			(†)	(†)	(†)	4	
OSCILLOSCOPE OS-8A/U				(†)	(†)	5	
TEST SET TS-140/PCM				(†)	(†)	6	
TK-87/U			(†)	(†)	(†)	7	
TOOL EQUIPMENT TE-123		(†)	(†)	(†)	(†)	8	
TRANSFORMER, VARIABLE CN-16/U				(†)	(†)	9	
VOLTMETER, METER ME-30/U				(†)	(†)	10	

Delete appendix II (as added by C 3) and substitute the following:

APPENDIX II (Superseded)

BASIC ISSUE ITEMS LIST FOR FACSIMILE EQUIPMENT RC-120, RC-120 A, B

Section I. INTRODUCTION

1. Scope

a. This appendix lists items supplied for initial operation and for running spares. The list includes tools, accessories, parts, and material issued as part of the major end item. The list includes all items authorized for basic operator maintenance of the equipment. End items of equipment are issued on the basis of allowances prescribed in equipment authorization tables and other documents that are a basis for requisitioning.

b. Columns are as follows:

(1) *Source, maintenance, and recoverability code.* Not used.

(2) *Federal stock number.* This column lists the 11-digit Federal stock number.

(3) *Designation by model.* Not used.

(4) *Description.* Nomenclature or the standard item name and brief identifying data for each item are listed in this column. When requisitioning, enter the nomenclature and description.

(5) *Unit of issue.* The unit of issue is each unless otherwise indicated and is the supply term by which the individual item is counted for procurement, storage, requisitioning, allowances, and issue purposes.

(6) *Expendability.* Nonexpendable items are indicated by NX. Items not marked NX are expendable.

(7) *Quantity authorized.* Under "Items Comprising an Operable Equipment", the column lists the quantity of items supplied for the initial operation of the equipment. Under "Running Spares and Accessory Items", the quantities listed are those issued initially with the equipment as spare parts. The quantities are authorized to be kept on hand by the operator for maintenance of the equipment.

(8) *Illustrations.* Not used.

2. Comments or Suggestions

Any comments concerning omissions and discrepancies in Appendixes I and II will be prepared on DA Form 2028 and forwarded direct to Commanding Officer, U.S. Army Signal Materiel Support Agency, ATTN: SIGMS-ML, Fort Monmouth, N.J.

Section II. FUNCTIONAL PARTS LIST

(2) Federal stock No.	(4) Description	(5) Unit of issue	(6) Expendability	(7) Quantity authorized
5815-164-7106	FACSIMILE EQUIPMENT RC-120, RC-120A,B: 7 in x 8 5/8 in copy size, pos and neg reproduction; 100-130 v ac, 50-65 cyc single phase; Army spec No. 71-1679, Sig 11-1		NX	
	ITEMS COMPRISING AN OPERABLE EQUIPMENT			
Ord through AGC	TECHNICAL MANUAL TM 11-375B:			2
5815-497-9630	BAG BG-122: 32 in lg x 12 in dia o/a; Sig dwg No. SC-D-7950 (Not installed)		NX	1
5815-497-9631	BAG BG-124: 35 in lg closed x 12 in dia; 8 in lg inserts o/a; Sig dwg No. SC-D-7952 (Not installed)		NX	1
5815-497-9633	BAG BG-126: 32 ½ in lg x 4 in id %; Sig dwg No. SC-D-7951 (Not installed)		NX	1
5815-497-9634	BAG BG-140: 29 in sq excluding sleeves; Sig dwg No. SC-D-7946-1 (Not installed)		NX	1
7510-254-8394	BLOTTING PAPER: photographic; white; 8½ in x 10½ in o/a; 25 sheets per unit; MIL spec UU-P-417 (Not installed)	pk		3
8125-242-3787	BOTTLE, SCREW CAP: rd; soda lime glass; 1¼ in dia mouth; MIL type 20646 class B, size No. 2 (Not installed)			6
5815-164-6558	CABLE ASSEMBLY, SPECIAL PURPOSE: 1 No. 18 AWG stranded; 66 in lg o/a; Times Fax dwg No. 90-37-02 (Not installed)		NX	1
5995-164-6594	CORD CD-1018: 2 wire No. 18 shielded; 10 ft lg o/a; Sig dwg No. SC-D-4821 (Not installed)			1
6760-250-9191	CASE PH-410: 8 compartments inside; 29⅝ in lg x 13⅜ in w x 13⅛ in h o/a; Sig Photographic Equip 71-1635 (Not installed)		NX	1
5820-312-0837	CHEST CH-116: 24⅝ in lg x 15¼ in w x 16¾ in h o/a; Sig dwg SC-D-9654 (Not installed)		NX	1

5815-252-6186	CHEST CH-117: 25¼ in lg x 11¾ in w x 17⅜ in h o/a; Sig dwg SC-D-9658 (Not installed)		NX	1
6740-224-9588	CLIP, PHOTOGRAPHIC FILM: 3 in lg x 7/16 in w x ¾ in thk o/a; MIL type No. MIL-C-4110 style II class A (Not installed)			12
5995-161-8708	CORD CD-1019: 3 wire No. 20 AWG; 96 in lg o/a; Sig dwg No. SC-D-4822 (Not installed)			1
5815-164-7110	FACSIMILE TRANSCEIVER, FX-1; FX-1A,B: transmits and receives; 7 in x 8⅝ in copy and wire, transmission; 110 to 130 v ac, 50 to 65 cyc, single ph; Army spec No. 71-1679 (Not installed)		NX	1
5815-404-8654	FRAME FM-60: Sig dwg SC-D-7948 (Not installed)			1
5815-245-9669	POWER SUPPLY PE-140; PE-140 A, B: full wave rectification; output 500 vdcw, 270 ma, 6.3 v ac 6.25 amp; 10¼ in lg x 12⅛ in wd x 10⅛ in h o/a; Sig spec No. 71-1679 (Not installed)		NX	1
5120-408-1144	PULLER, TUBE: approx 8 in lg o/a; 75 deg bend on 1 end; Timesfax No. 900-00-90; (Not installed)		NX	1
6740-224-9564	TANK PH-409: ss; with cover, 16 oz; 3 13/32 in dia x 7 in d o/a; Sig dwg SC-D-7930 through 7933 (Not installed)			1
6685-245-7050	THERMOMETER, SELF-INDICATING, LIQUID IN GLASS: scale reading −20 deg to +120° F; 5½ in lg; with clip %; Weksler type No. 488AL836 (Not installed)			1
	RUNNING SPARES AND ACCESSORY ITEMS			
5977-247-5368	BRUSH, ELECTRICAL CONTACT: ¼ in lg x 0.156 in dia o/a; Timesfax No. 90-06-02-44 (Not mounted)			2
5960-188-3531	ELECTRON TUBE: MIL type 1B46 (Not mounted)			1
6240-188-3532	ELECTRON TUBE: MIL type 1B59/R1130 (Not mounted)			1
5960-188-8601	ELECTRON TUBE: MIL type 5Z3 (Not mounted)			1
5960-188-8561	ELECTRON TUBE: MIL type 6AC5GT (Not mounted)			1
5960-188-3557	ELECTRON TUBE: MIL type 7C5			3
5960-188-3581	ELECTRON TUBE: MIL type No. 7C7 (Not mounted)			1
5960-100-6017	ELECTRON TUBE: MIL type 7L7 (Not mounted)			2

(2) Federal stock No.	(4) Description	(5) Unit of issue	(6) Expend-ability	(7) Quan-tity author-ized
	RUNNING SPARES AND ACCESSORY ITEMS—Continued			
5960-235-9108	ELECTRON TUBE: MIL type 7N7 (Not mounted)			2
5960-100-6019	ELECTRON TUBE: MIL type 7S7 (Not mounted)			1
5960-108-0257	ELECTRON TUBE: MIL type No. 884 (Not mounted)			1
5920-296-1519	FUSE, CARTRIDGE: 5 amp-250 v; MIL-F-15160 type F02A250V5A (Not mounted)			5
6240-024-0325	LAMP, GLOW: 3¼ in lg o/a; Sylvania No. R1130 (Not mounted)			1
6240-155-8716	LAMP, INCANDESCENT: 2 in max lg o/a; Fed spec No. W-L-111B, trade No. 1129 (Not mounted)			1
5960-189-6514	PHOTOELECTRIC CELL: 2½ in lg x 23/32 in dia o/a; RCA type No. 1645 (Not mounted)			1
5340-498-1678	SPRING, HELICAL EXTENSION: approx 400 turns closely wnd; Timesfax part No. 90-08-07-00 (Not mounted)			2
5815-498-8163	STYLUS: tung wire point, 0.008 in dia x ⅛ in lg; approx 150 cutting hr; Timesfax part/dwg No. 17-03-04-00 (Not mounted)			6

BY ORDER OF THE SECRETARY OF THE ARMY:

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Chief of Staff.

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Sig Sec, GENDEP (5)
Sig Dep (12)
WRAMC (1)
USA Trans Tml Comd (1)
Army Tml (1)
POE (1)
OSA (1)
USAEPG (2)
AFIP (1)
AMS (1)
Army Pictorial Cen (2)
EMC (1)
Yuma Test Sta (2)
USACA (3)
USASSA (20)
USASSAMRO (1)
USASEA (1)
USA Carib Sig Agcy (1)
USA Sig Msl Spt Agcy (13)
Sig Fld Maint Shops (3)
USA Corps (3)
AFSSC (1)
JBUSMC (2)
USMA (5)
Units organized under following TOE's (2 copies unless otherwise indicated):
11–7
11–16
11–57
11–97
11–117
11–155
11–157
11–500 (AA–AE) (4)
11–557
11–587
11–592
11–597

NG: State AG (3)

USAR: None

For explanation of abbreviations used, see AR 320–50.

U.S. GOVERNMENT PRINTING OFFICE: 1962

WAR DEPARTMENT TECHNICAL MANUAL

TM 11-375B

FACSIMILE EQUIPMENT

RC-120, RC-120-A and RC-120-B

AND

FACSIMILE SET

AN/TXC-1

WAR DEPARTMENT *5 APRIL 1944*

WAR DEPARTMENT,
WASHINGTON 25, D. C., 5 APRIL 1944.

TM 11-375B, War Department Technical Manual, is published for the information and guidance of all concerned.

[A.G. 300.7 (24 Mar 44).]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
Chief of Staff.

OFFICIAL:

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

DISTRIBUTION: I C 11 (5)
(For explanation of symbols see FM 21-6.)

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TABLES

LIST OF ILLUSTRATIONS

DESTRUCTION NOTICE

WHY - To prevent the enemy from using or salvaging this equipment for his benefit.

WHEN - When ordered by your commander.

HOW - 1. Smash - Use sledges, axes, handaxes, pickaxes, hammers, crowbars, heavy tools.

2. Cut - Use axes, handaxes, machetes.
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 - The lead screw, meters, controls, switches, tubes, lenses, motor and all moving parts.

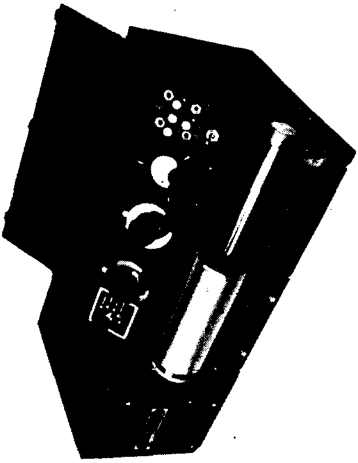
2. Cut - All wiring, all bags.
3. Burn - The bags, all photographic equipment and technical manuals.
4. Bury or scatter - All broken parts and destroyed accessories.

DESTROY EVERYTHING

SAFETY NOTICE

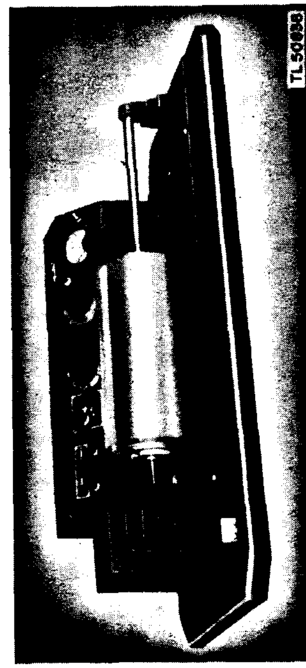
BECAUSE OF HIGH VOLTAGES WHICH MAY BE DANGEROUS TO LIFE, AND BECAUSE OF THE DELICACY OF ELECTRICAL AND OPTICAL ADJUSTMENTS INSIDE THE CASE OF FACSIMILE TRANSCEIVER FX-1 AND POWER SUPPLY PE-140-(*), THE EQUIPMENT COVERS THAT ARE FASTENED ON BY SCREWS MUST NOT BE REMOVED EXCEPT BY QUALIFIED MECHANICS.

Facsimile Transceiver FX-1



Facsimile Transceiver FX-1-A

Facsimile Transceiver FX-1-B



Facsimile Transceiver TT-1()/TXC-1

Figure 1. Facsimile Transceivers of Facsimile Equipment RC-120, RC-120-A, RC-120-B and Facsimile Set AN/TXC-1.

This technical manual supersedes TM 11-375, 29 January 1943.

PART I
Description

1. GENERAL.

a. Purpose. Facsimile Equipment RC-120, RC-120-A, and RC-120-B, and Facsimile Set AN/TXC-1 (fig. 1) provide for the transmission and reception of printed, written, drawn, or photographic copy over regular voice communication channels (radio-wire). Copy 7 x 7⅜ inches can be transmitted in its original size by Facsimile Equipment RC-120-(*) in 7 minutes. Facsimile Set AN/TXC-1 transmits weather maps and copy as large as 12 x 17½ inches in 20 minutes. The Army has adapted various features of well-known commercial facsimile machines and incorporated them into models covered by this manual. Copy transmitted by these models can be recorded on material requiring no further processing, or on material that must be photographically processed. In this manual Facsimile Equipment RC-120-(*) denotes Facsimile Equipment RC-120, RC-120-A, and RC-120-B.

b. Facsimile Defined. Facsimile, as treated in this manual, means the breaking up of a picture into separate small elements and their transformation into electrical impulses that, in turn, are transmitted by a telephone or a radio channel to a distant recorder for reassembling into their original position to form a reproduction of the original. The term copy, as used in this manual, includes diagrams, typed or handwritten copy, photographs, or any form of written or printed matter. Copy may be transmitted to produce either a positive or a negative. Copy to be transmitted can be of any color, but it will be received in shades of black, white, and gray.

c. Operations Performed. Three distinct operations are performed in transmitting and recording facsimile. Brief descriptions of these operations follow:
(1) The breaking up of the picture in an orderly manner into separate elements of varying shades by Facsimile Equipment RC-120-(*) at a transmitting station. This process is called scanning (fig. 2).
(2) The transmission of these elements to the recorder (a second Facsimile Equipment RC-120-(*) at a receiving station) by means of signals arranged to represent electrical equivalents of the elements of varying shades.
(3) The rebuilding of these signals by the recording facsimile equipment at

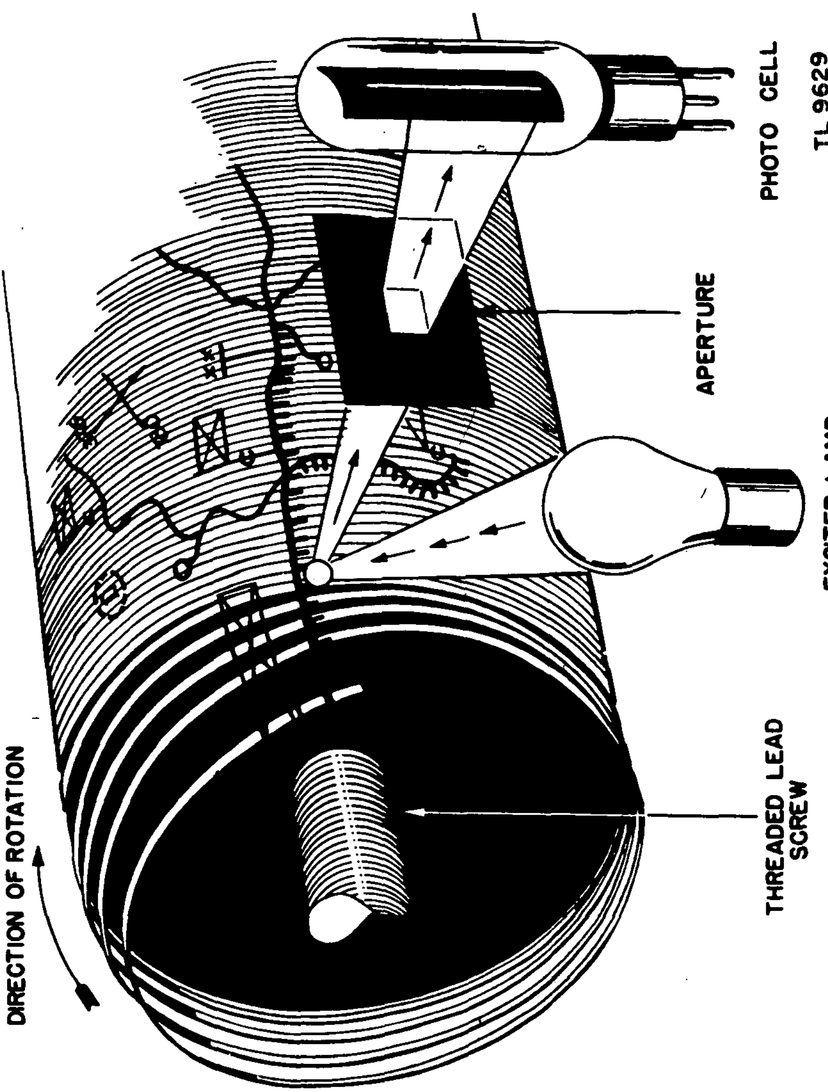


Figure 2. Scanning—transmitting picture elements to the photocell.

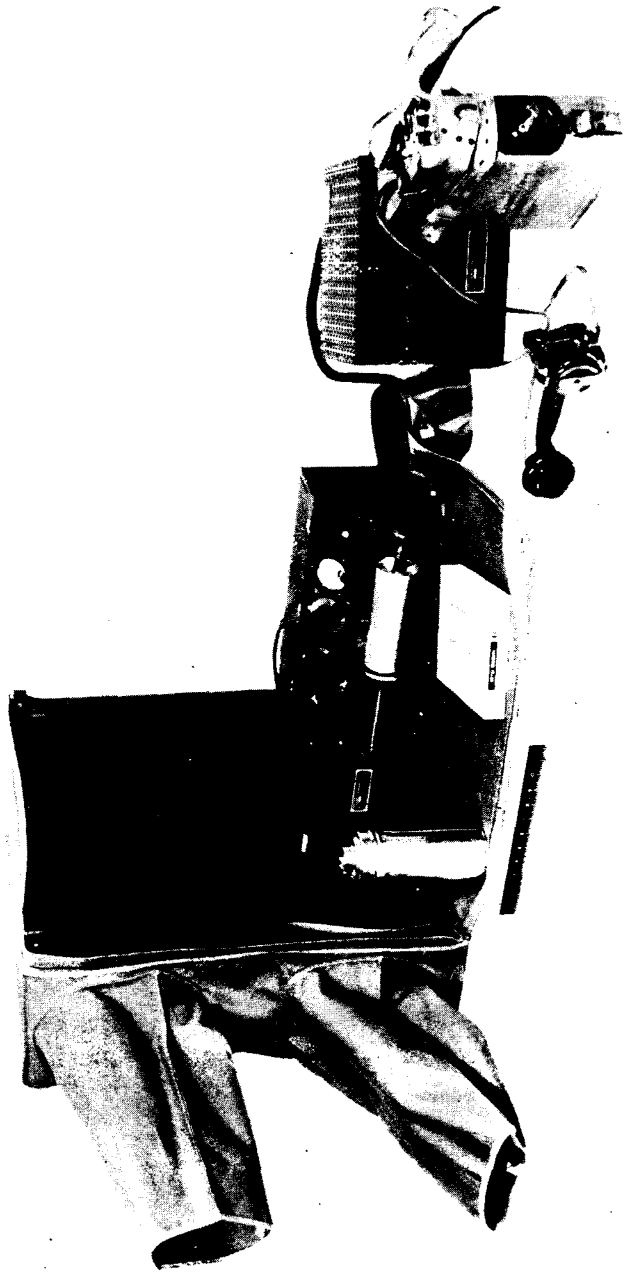


Figure 3. Power Supply PE-140 connected to Facsimile Transceiver FX-1.

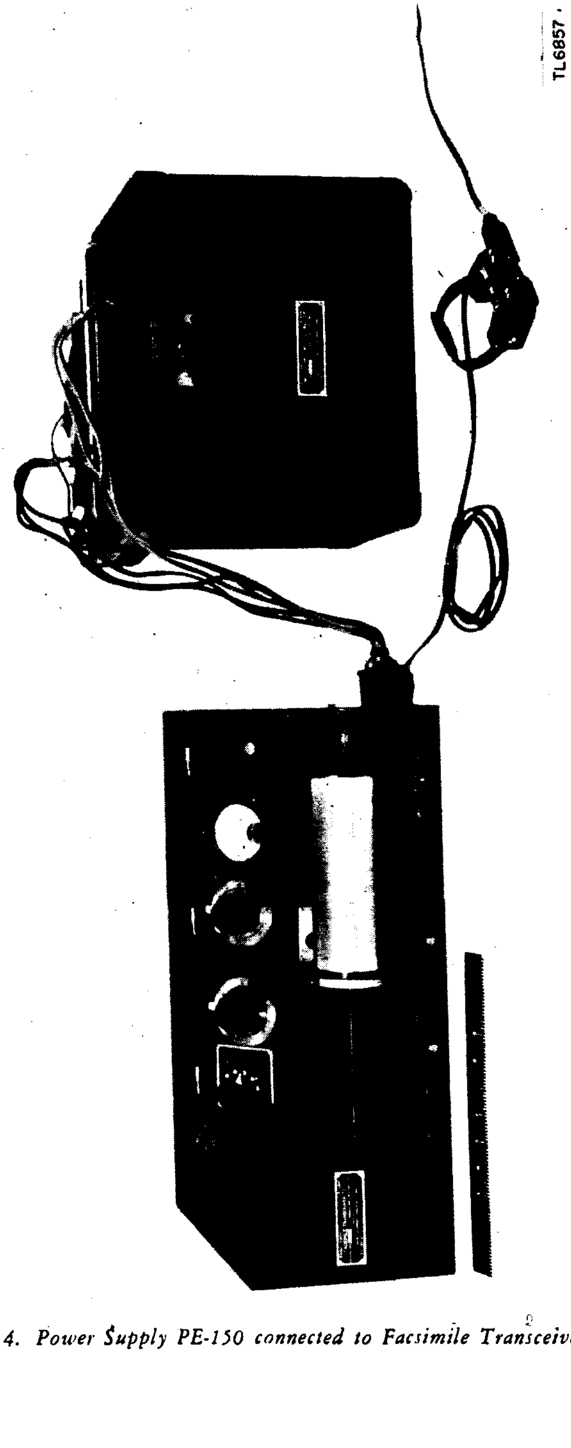


Figure 4. Power Supply PE-150 connected to Facsimile Transceiver FX-1.

the receiving station into a copy of the original by a reversal of the scanning process. A supplementary, but very necessary, part of the receiving operation is a method of synchronizing and phasing (or meshing) the transmitting and receiving stations. If the copy received is to be undistorted, the timing of the scanning at the receiving station must agree exactly with scanning at the transmitting station.

2. LIST OF MAJOR COMPONENTS.

a. Facsimile Transceiver FX-1-(*) (22 x 12 x 10 inches; weight, 60 pounds) (fig. 3) complete with accessories and tubes. In this manual Facsimile Transceiver FX-1-(*) denotes Facsimile Transceivers FX-1, FX-1-A, and FX-1-B. In Facsimile Equipment RC-120, Facsimile Transceiver FX-1 is used; in Facsimile Equipment RC-120-A, Facsimile Transceiver FX-1-A is used and in Facsimile Equipment RC-120-B, Facsimile Transceiver X-1-B is used. Components and assemblies for maintenance of the transceivers are interchangeable in all three models.

b. Power Supply PE-140-(*) (10 x 12 x 12 inches; weight, 50 pounds), complete with tubes (fig. 3). In this manual Power Supply PE-140-(*) denotes Power Supplies PE-140, PE-140-A, and PE-140-B.

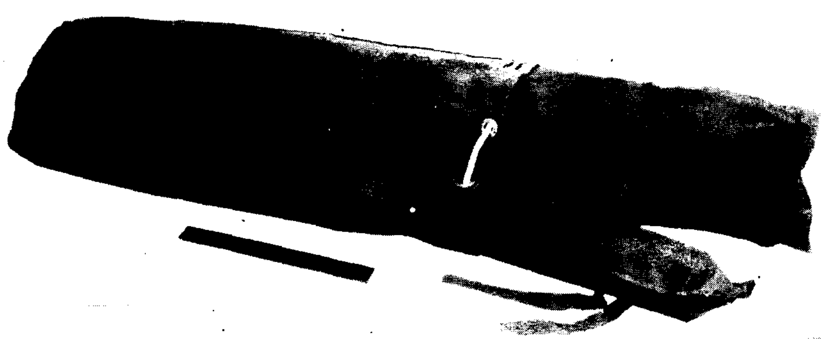
c. Power Supply PE-150 (8¾ x 11½ x 14 inches; weight, 60 pounds). Supplied only with Facsimile Equipment RC-120 (fig. 4).

d. Photographic Equipment PH-411.

e. Chest CH-117, carrying case for Facsimile Transceiver FX-1-(*).

f. Chest CH-116, carrying case for Power Supply PE-140-(*).

g. Packing container Bag BG-124, complete with other bags, including Bag BG-140, which can be made into a portable dark tent (fig. 5).



TL6855

Figure 5. Bag BG-124 packed for transportation. Bag BG-140 in Bag BG-122 and Frame FM-60 in Bag BG-126.

3. POWER SOURCES.

a. The transceivers are operated from Power Supply PE-140-(*) which uses 100- to 130-volt, 50- to 65-cycle alternating current.

b. In emergency, for short periods, the transceiver unit can be operated from a 6-volt storage battery. Power Supply PE-150, containing the battery, battery case, and a charger, is furnished only with Facsimile Equipment RC-120.

NOTE: On battery operation the necessary high voltage is supplied from a dynamotor contained in Facsimile Transceiver FX-1-(*). Keep the battery fully charged to assure successful battery operation.

PART II
Installation

4. UNPACKING.

a. Facsimile Transceiver. Remove the transceiver, which is ready for installation, from Chest CH-117. A KC coupling coil, 100 sheets of direct-recording paper (Teledeltos), and two copies of TM 11-375B, Facsimile Equipment RC-120, RC-120-A, and RC-120-B, and Facsimile Set AN/TXC-1, are packed with Facsimile Equipment RC-120-(*) (also in Chest CH-117). With models of Facsimile Equipment RC-120, an LT transformer is also packed in Chest CH-117. In models of Facsimile Equipment RC-120-A and RC-120-B, the UC coupling coil is packed in the place of the LT transformer. A battery connector cord, a direct line connecting cord, a tube lifter, two garter band springs, six spare stylus needles, and a spool of scotch tape are packed in the cases of all models of the transceiver. A spare meter plug is packed in the case of the transceiver of Facsimile Equipment RC-120. A screwdriver, two low-voltage dynamotor brushes, two high-voltage dynamotor brushes, one Cord CD-1018, one Cord CD-1019, and two motor brushes are packed in the covers of Facsimile Transceivers FX-1-A and FX-1-B.

b. Power Supply PE-140-(*). Remove Power Supply PE-140-(*) from Chest CH-116. The power supply is ready for installation. Also packed in Chest CH-116 are the following (to be removed as they are needed):

1,000 sheets of direct recording paper (Teledeltos).
2 daylight developing Tanks PH-409.
1 set of vacuum tubes (spares) for Facsimile Transceiver FX-1-(*) and Power Supply PE-140-(*).
1 set of special purpose tubes (spares) for Facsimile Transceiver FX-1-(*) and Power Supply PE-140-(*).
3 pads of message paper cut to size.

c. Power Supply PE-150 (fig. 7). (1) Power Supply PE-150 is not furnished with Facsimile Equipment RC-120-A and RC-120-B, but these models can be operated from a 6-volt storage battery.

(2) With models of Facsimile Equipment RC-120 with which Power Supply PE-150 is furnished, the power supply is shipped in two units. The carrying

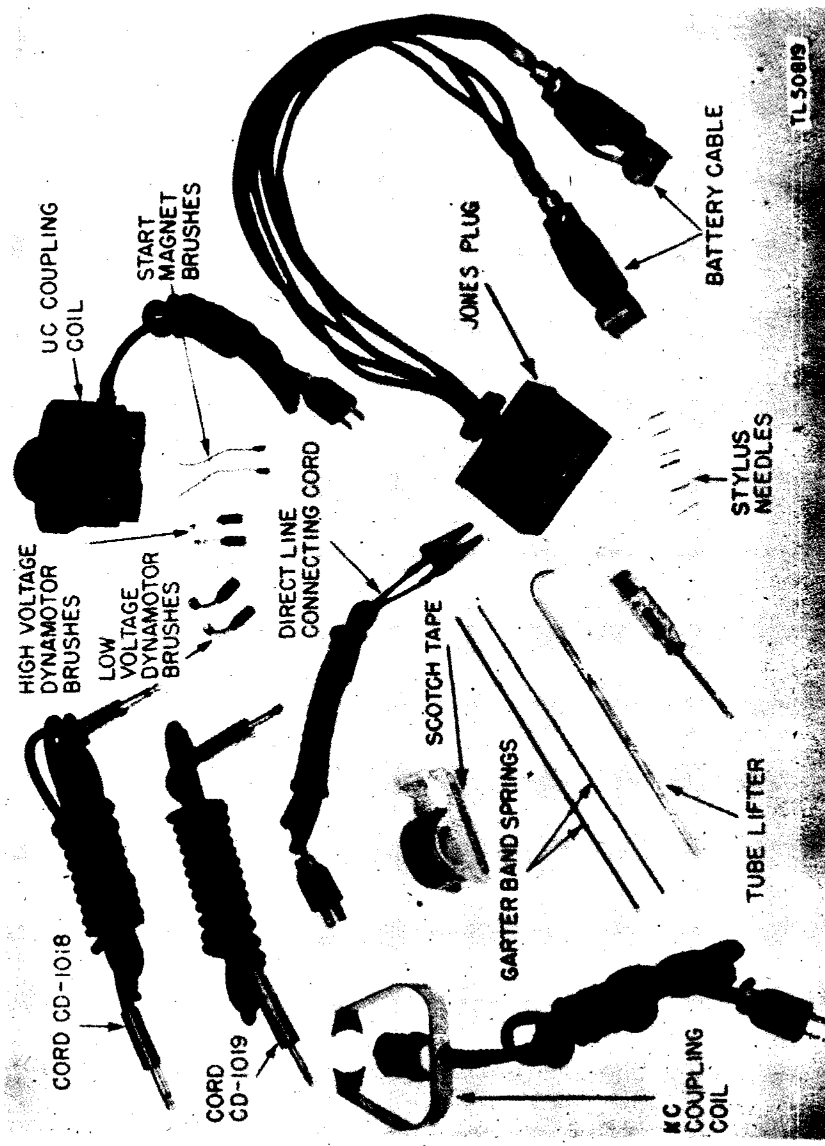


Figure 6. Accessories for use with Facsimile Equipment RC-120-(*).

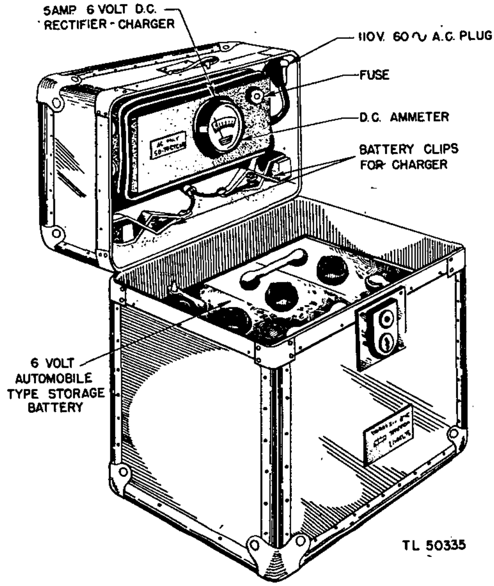


Figure 7. Power Supply PE-150.

case, containing a battery charger, is packed in a cardboard box. The case is made of fiber and is designed to hold a 6-volt battery. The battery, usually fully charged, is packed in a wooden carrying crate. Remove the battery from its wooden crate and place on it the metal handle which will be found in the crate. Unless Power Supply PE-150 is to be transported under rough conditions, keep the battery in its fiber case. When operating, or when charging the battery, take the battery out of the fiber case.

d. Photographic Equipment PH-411. (1) Photographic Equipment PH-411 consists of the following:

Bag BG-122 (contains Bag BG-140).
Bag BG-126 (contains Frame FM-60).
Bag BG-140 (becomes the portable dark tent).
Bag BG-124 (duffle bag to contain all the other bags in this equipment).
Frame FM-60.
6 bottles, quart size, amber colored.
Case PH-410.
1 dozen Clips PH-23.
8 one-quart size cans (or bottles) of developer powder D-72, Eastman Kodak, or equal.
2 one-gallon size cans (or bottles) of developer powder DK-60A, Eastman Kodak, or equal.

8 one-quart size cans (or bottles) of fixing powder acid (hypo).
2 gross of enlarging paper, Royal Bromide F No. 1, 7 x 8⅝ inches.
1 gross of enlarging paper, Kind 1020, or Aero enlarging paper, contrast No. 1, size 7 x 8⅝ inches, Eastman Kodak, or equal.
2 Tanks PH-409 (packed in Chest CH-116).
1 thermometer, −20°F to +120°F (in metal case).
5 dozen transmission film, type A, 7 x 8⅝ inches, Eastman Kodak, or equal.
3 pads of blotting paper, 1 dozen sheets per pad.

NOTE: All items in Photographic Equipment PH-411, except the bags, Frame FM-60, and the tanks, are packed in Case PH-410.

(2) There are enough supplies in this equipment to operate the transceiver photographically either in a dark room or in Bag BG-140 (the portable dark tent) until exact needs are determined and normal photographic stocks are procured.

(3) Major components of the lightproof tent are Bag BG-140 and Frame FM-60. *Handle Bag BG-140 carefully at all times. Otherwise, it might become punctured and thus be rendered useless for dark room purposes.*

5. INSTALLING THE FACSIMILE TRANSCEIVER.

a. Place the transceiver on a flat, solid surface. Lay the equipment down with the handle toward you. Unlatch and lift the cover. It is necessary to disengage the cover of the transceiver from the hinge pins before removal is possible. This is accomplished by swinging the cover back until it rests on the case. By a sliding motion to the left, disengage the cover from the hinge pins.

NOTE: Facsimile Transceivers FX-1-A and FX-1-B are equipped with another hinged top cover which should be kept open during operation for ventilation. Keep it closed when the machine is not in use, so that dust will not accumulate on the lenses within the machine.

b. When the transceiver is used to send copy, place it so the sun cannot shine directly on the drum. When the transceiver is used for receiving copy by the direct recording process, this precaution is unnecessary. However, for receiving copy photographically, the transceiver *must* be operated inside of Bag BG-140 (the portable dark tent) or in a fixed station dark room.

c. The facsimile transceiver will operate from 100- to 130-volt, 50- to 65-cycle alternating current (115-volt, 60-cycle nominal) or 5.6- to 6.5-volt direct current (6-volt nominal).

(1) A-C OPERATION. Locate Power Supply PE-140-(*) so that the 2-prong plug will reach the 110-volt a-c outlet (6 feet). Place Facsimile Transceiver FX-1-(*) to the left of Power Supply PE-140-(*) and insert the Jones plug (fig. 39) into the Jones plug socket of the transceiver.

(2) D-C OPERATION. Remove the hydrometer, which is packed in the cover

of models of Facsimile Transceiver FX-1, and assemble it. The specific gravity of the battery should be checked each time before the battery is used and must be at least 1.225 and preferably above 1.250. Wash the hydrometer inside and out with clean water each time after it is used. Disassemble it and return it to its place in the compartment of the transceiver cover.

(a) In emergencies only, operate the transceiver intermittently on power from a 6-volt battery. An ordinary storage battery cannot be used with this equipment more than an hour before it will need recharging.

NOTE: When larger than a 6-volt battery is used to furnish power with which to operate the transceiver, be careful to use only three of the cells so as to give 6 volts. Each cell will furnish 2 volts.

(b) Locate Power Supply PE-150 so the battery connector cable, which is stored in the compartment in the transceiver case, will reach from the transceiver to Power Supply PE-150. Insert the Jones plug so it seats well into the Jones plug socket located at the right-hand side of the transceiver. The red lead of the battery cable is connected to the positive terminal, and the black lead to the negative terminal of the battery. Fasten securely the battery clips to the battery posts (fig. 8).

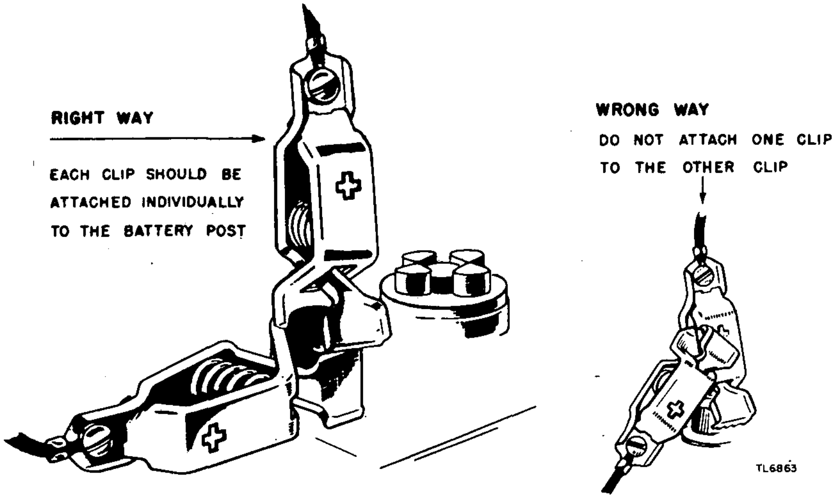


Figure 8. Battery terminal connections.

6. CONNECTING FACSIMILE EQUIPMENT TO COMMUNICATION CIRCUITS. The method and equipment used to connect the facsimile equipment to communication circuits depends on the type of circuit, the type of terminal station equipment, and the loss in the circuit. The chief need is a good voice circuit. It is then possible to send facsimile copy at least as far as the voice will go. During facsimile transmission over wire circuits the transceivers replace the telephone handsets at each end of the wire line. In radio transmissions, the transceivers replace the microphone at the transmitting end and the phones at the receiving end. The same circuits may be used alternately for voice and facsimile communication.

a. Telephone Circuits. (1) PERMANENT INSTALLATION. Use a permanent type of installation if the equipment is to be operated at the same location for a day or longer. If there are three wires coming into the telephone subset, be sure to locate the talking circuit. In commercial circuits this is the red wire and the green wire, or the wire with the red tracer and the wire with the green tracer.

(a) Connections for Facsimile Equipment RC-120-A and RC-120-B. Connect the two wires from the binding posts marked LINE directly to the telephone line. When the facsimile equipment is connected to a leased commercial circuit, the telephone company usually insists on the use of a coupling coil which it will furnish. Connect to the coupling coil rather than directly to the line. The received signal strength from a telephone line having low loss will be higher than the LINE binding posts are designed to accept. This will be indicated by the necessity of setting the GAIN control near zero to obtain a +2 db meter reading. The meter reading will jump in steps of ½ db or more when the GAIN control is varied. When this condition is encountered, the cord with a Plug PL-55, which is furnished with the equipment, should be used to plug the signal into the RADIO RCVR jack on the terminal board. A wire should be connected between the GND terminal and the right-hand LINE terminal to reduce fork beat and hum. Leave Plug PL-55 out of the RADIO RCVR jack except when receiving copy.

NOTE: Be sure that the selector switch is at SET RANGE or STAND BY except when the transceiver is actually sending or receiving copy.

(b) Connections for Facsimile Equipment RC-120. Plug the UC coil cord into the 2-prong socket or input-output receptacle on the right-hand end of the transceiver. Plug the direct line connecting cord into the L V socket of the UC coupling coil. Fasten the clips onto the telephone line, or the coupling coil. Make connection of these clips only while transmitting or receiving copy, as the low impedance of the UC coupling coil prevents the use of the line for talking or signaling.

NOTE: When the UC or KC coupling coils are used, place them as far as possible from the a-c power cord, Power Supply PE-140-(*), the transceiver, and other electrical equipment to prevent interference pickup which will show in the copy received.

(2) TEMPORARY INSTALLATIONS. Use the KC or UC coupling coil. The type of coil to use depends on the physical shape of the telephone receiver on which the coil is to be attached (fig. 9). Do not force a coil on a handset if it is not designed to fit. The UC coil is designed to fit over the receiver of the F-1 handset used on many Telephones EE-8-A and commercial telephone sets. Use the UC coil whenever possible, because the operator can use the handset for talking without having to detach the coil. Use the KC coupling coil for other types of handsets and receivers. Field wire which uses no telephone re-

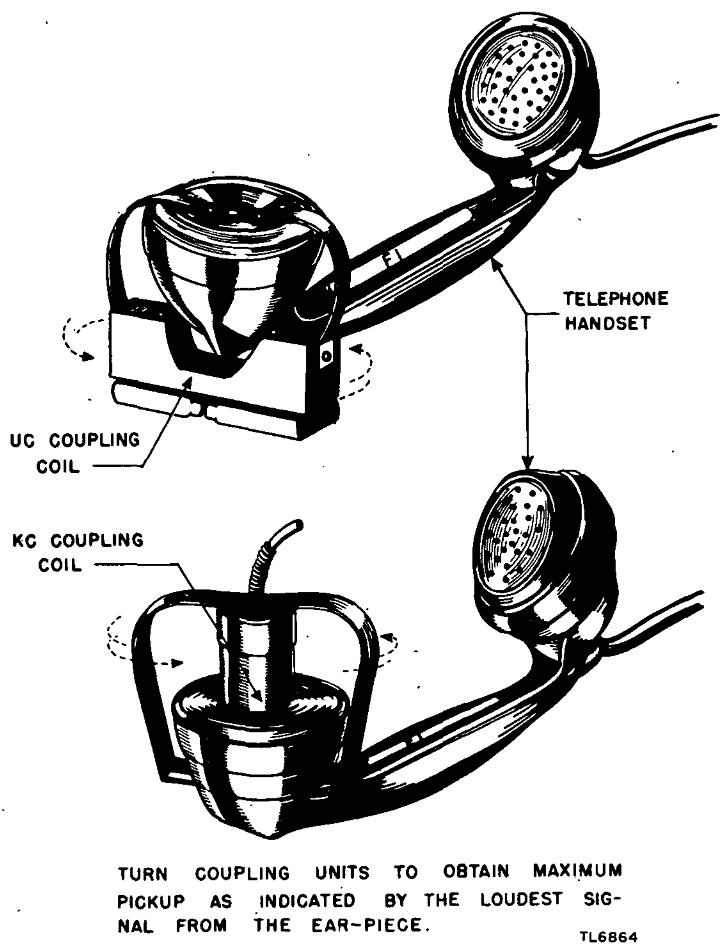


Figure 9. Use of KC and UC coupling coils.

peaters or loading coils can be used for greater distances of facsimile communication than normal, providing the telephone set at the transmitting station can be disconnected temporarily while copy is actually being sent. Connect the 6 V winding of the UC coupling coil to the line as directed in the preceding paragraph. When receiving copy with Facsimile Transceiver FX-1, use the LT transformer. *When receiving pictures with either Facsimile Transceivers FX-1-A or FX-1-B, make connections to the LINE binding posts, which is the normal method.* The communication distances may be extended even farther by transmitting with the LT transformer for Facsimile Transceiver FX-1, or by plugging the line connecting cord into the transceiver for either FX-1-A or FX-1-B.

b. Radio Circuits. In regular radio circuits a Converter CV-2/TX is necessary at both transmitting and receiving ends for satisfactory operation. This equipment is especially designed for use with Facsimile Equipment RC-120-(*) systems using radio voice channels, to diminish the effects of fading and certain types of interference (TM 11-2252, technical manual for Converter CV-2/TX).

NOTE: FM circuits and short AM circuits, which have *no fading,* require no accessory equipment.

(1) CONNECTIONS FOR FACSIMILE EQUIPMENT RC-120-A OR RC-120-B. Plug one end of Cord CD-1018 into the jack marked RADIO RCVR and the other end into the headphone jack of the radio receiver. Plug the headphones into the RADIO PHONES jack of the transceiver. Plug one end of Cord CD-1019 into the RADIO XMTR jack and the other end into the carbon microphone jack of the radio transmitter. Plug the carbon microphone into the jack marked CARBON MIKE. While the selector switch is at SET RANGE or STAND BY, the radio transmitter and the receiver may be operated normally. When using some radio receivers, the meter on the transceiver used in receiving may not read high enough (+2) with a comfortable signal in the earphones, even when the GAIN control is turned to 100. These receivers have a low-impedance output (250 ohms) at the phone jack, and the RADIO RCVR jack of the transceiver must be revised. To do this, remove the grill from the top of the transceiver. A terminal strip is mounted on the meter box. Connect a wire across the 2500-ohm resistor R79 or short terminals 1 and 2 (fig. 19). Change the wire from one side (terminal 3) to the other side of the 10,000-ohm resistor R82 (terminal 4). Turn over the 2,500-ohm tag on the terminal panel so that it reads 250 ohms. Now the transceivers can be used only on those radio receivers which have a low-impedance output. It may be necessary to connect the ground binding post with one of the other three binding posts to avoid pick-up while receiving. Remove this connection when transmitting.

(2) TRANSMITTING WITH FACSIMILE EQUIPMENT RC-120. Connect the 1 V side of the UC coil to the sleeve and the ring of a Plug PL-68 with a wire shorting the tip and the sleeve so that the radio transmitter will go on the air when the plug is inserted into the carbon microphone jack of the radio transmitter.

NOTE: The actual output level of 1 V UC coil is 0.8 volts. On some army radio transmitters only 0.4 volts is necessary to give 100 percent modulation. The reduction may be obtained by turning down the gain of the preamplifier of the radio transmitter or by installing a 100-ohm resistor in series between the UC coil and the transmitter. A temporary alternative is to set up the facsimile transceiver in the normal manner (par. 12*g*) and then reduce the maximum output level by turning the GAIN control so that the meter reading is —4 decibels.

(3) RECEIVING WITH FACSIMILE EQUIPMENT RC-120. For receiving with Facsimile Transceiver FX-1, use the input-output receptacle on the right-hand side of the transceiver. Make up a cord with Plug PL-55 and a series resistor of 50,000 ohms to connect the radio receiver to the LT transformer. Connect the chassis of the transceiver to one of the three terminals of the LT transformer to avoid noise pick-up.

7. INSTALLATION FOR PHOTOGRAPHIC RECEPTION.

a. Developer and Hypo Solutions. Mix developer and hypo solutions according to instructions on the cans (or bottles) of powder. The necessary material will be found in Case PH-410. Mix developer DK-60A for film or developer D-72 for photographic paper. The same type of hypo is used for fixing both film and paper.

b. The Portable Dark Room. Bag BG-140 and its associated equipment is the portable dark room (fig. 3). To assemble this tent, extend Frame FM-60 so that it forms a box-like framework. Lock the frame counterposts. Lay the frame on a flat surface. Open Bag BG-140 and place it over the frame so that the single piece forms the floor and the rest of the bag forms the cover. Then:

(1) Place the transceiver on the bottom of Bag BG-140 and place Power Supply PE-140-(*) to the right-hand side of Bag BG-140.

(2) Remove the decibel meter from the transceiver, put the meter through the sleeve in the top of the tent and tie the drawstring to make the hole lightproof.

(3) Put the necessary photographic material (box of bromide paper or box of film, and Tank PH-409) in front of the transceiver. Turn the selector switch to STAND BY. On the face plate of the selector switch is a small projection so that the operator can determine RECORD PHOTO position when the tent is closed. Close the tent cover and close the zipper.

c. Fixed Dark Room. When a large number of photographic receptions are to be handled, or when a transceiver used as a receiver is to remain in the same location for a long period, a fixed station dark room is more satisfactory.

Provide a room big enough to avoid crowding. Arrange it so that ventilation is possible and so that all light is excluded. Terminate the talking circuit at a place handy to the transceiver. A large sink and running water are necessary. Provide a table for the transceiver and power supply. Install a safelight equipped with a Wratten series OA filter, or its equivalent. This gives a yellowish green light. Place the light at least 5 feet from the transceiver and the sink. In addition to Photographic Equipmnt PH-411, the following items are desirable:

3 developing trays, 8 x 10 inches.
1 safelight with Wratten filter, series OA, and 25-watt bulb.
1 electric print dryer.
1 gross each of contact printing paper, single weight, size 7 x 9 inches, contrast F1, F2, F3, and F4, Eastman Kodak, or equal.
2 dozen each of contact printing paper, contrast F0 and F5.
1 contact printer, 8 x 10 inches.
1 dark room clock (with second hand).
1 squeegee, 8 inches.
2 or more ferrotype plates, chrome, to fit electric dryer.
4 one-gallon, wide-mouthed, brown glass bottles.

PART III

Operation

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8. SELECTOR SWITCH. Components and circuits within Facsimile Transceiver FX-1-(*) are so arranged with the selector switch as to permit various operations necessary for transmitting and receiving. What happens when the selector switch is at its different settings is described below:

a. At TRANSMIT position, the transmitting circuit is established and impulses are sent out over the communication circuit.

b. At SET RANGE position the transmitting circuit is established as in TRANSMIT position, except that the impulses are *not* sent out over the communication circuit.

c. At STAND BY position the tubes are kept ready for operation of the transceiver.

d. At RECORD PHOTO the receiving circuit which uses the recorder lamp is established.

e. At RECORD DIRECT the receiving circuit which uses the stylus is established. Instead of the recorder lamp, the stylus is connected into the circuit, and contacts the direct recording paper mounted on the drum.

9. CONTRAST RANGE.

a. Definition. Contrast range is the difference between the lightest and the darkest portions of a picture. When transmitted by facsimile for positive reception, the lightest scanned area produces the minimum signal and the darkest scanned area produces the maximum signal. *The contrast range of a transmission is the difference between the minimum and the maximum signal strength.* Signal strength is measured in decibels and is indicated on the db meter. Contrast range in facsimile transmission, therefore, is stated in terms of decibels and the amount of contrast range is indicated by the db meter as the difference in maximum and minimum signals. The correct range is one where the minimum signal is just strong enough to record, and where the maximum signal will record as dark as possible within the limitations of the recording method used. For example, in the RECORD DIRECT method, if the maximum signal is too great, the current flowing to the stylus will burn holes through the recording paper. Since the contrast range required varies with different methods of recording, the receiving operator determines the contrast range required which the transmitting operator sets up by making the necessary adjustments at the transmitting unit. Neither transmission line conditions nor any adjustments which the receiving operator may undertake will change the contrast range provided by the transmitting operator.

b. Adjusting for Contrast. The transmitting operator obtains the contrast range requested by the receiving operator by adjusting the CONTRAST and GAIN controls. The CONTRAST control *alone* controls the contrast range. The GAIN control permits the amplification (gain) of the unit to be varied, so that the contrast range obtained may be sent at the proper signal level. *The GAIN control does not change the contrast range.*

10. PHASING. The transmitting operator sends out phase pulses to the receiving operator so that the drum of the receiver may be put in step, or in phase, with the drum of the transmitter. If this is not done, the top end of the picture received might be in the center of the page, cutting the copy in two.

a. Transmitting Phase Pulses. The transmitting operator, having obtained the contrast range asked for by the receiving operator, sends out phase pulses in the following manner: The feed mechanism is disengaged by pushing back on the engaging knob (fig. 10). The drum is moved along the lead screw so that the light from the exciter lamp is focused on the phasing ring mounted on the drum alongside the engaging knob. The feed mechanism is left in the disengaged position so that when the motor is started the drum will not spiral by the action of the lead screw. The selector switch is set to TRANSMIT. During the time the beam of light strikes the white spot of the phasing ring, a phase pulse is transmitted. While the phase pulses are being transmitted, the receiving operator sets his drum in phase with the drum of the transmitter.

b. Phasing the Receiving Transceiver. While the phase pulses are being transmitted, the receiving operator phases his unit in the following manner: (1) The selector switch is set at RECORD PHOTO. The feed mechanism is disengaged, and the drum is moved to the correct position for the method of recording used. For RECORD PHOTO, the drum is moved to the extreme right, permitting a maximum of the original picture to be recorded; for RECORD DIRECT, the drum is placed so that the stylus will just clear the left-hand garter spring. The feed mechanism is left in the disengaged position, and the motor is started so that the drum rotates at the correct speed. The PHASE button is depressed *firmly*, completing the phasing circuit which energizes the phasing magnet. The phasing magnet is arranged so that it stops the drum of the receiver when the PHASE button is pushed and then releases it when the phasing pulse is received, causing the white spots of both drums to pass the scanning points at the same instant. Although the phasing magnet stops the receiving drum for an instant, the motor continues to operate, because

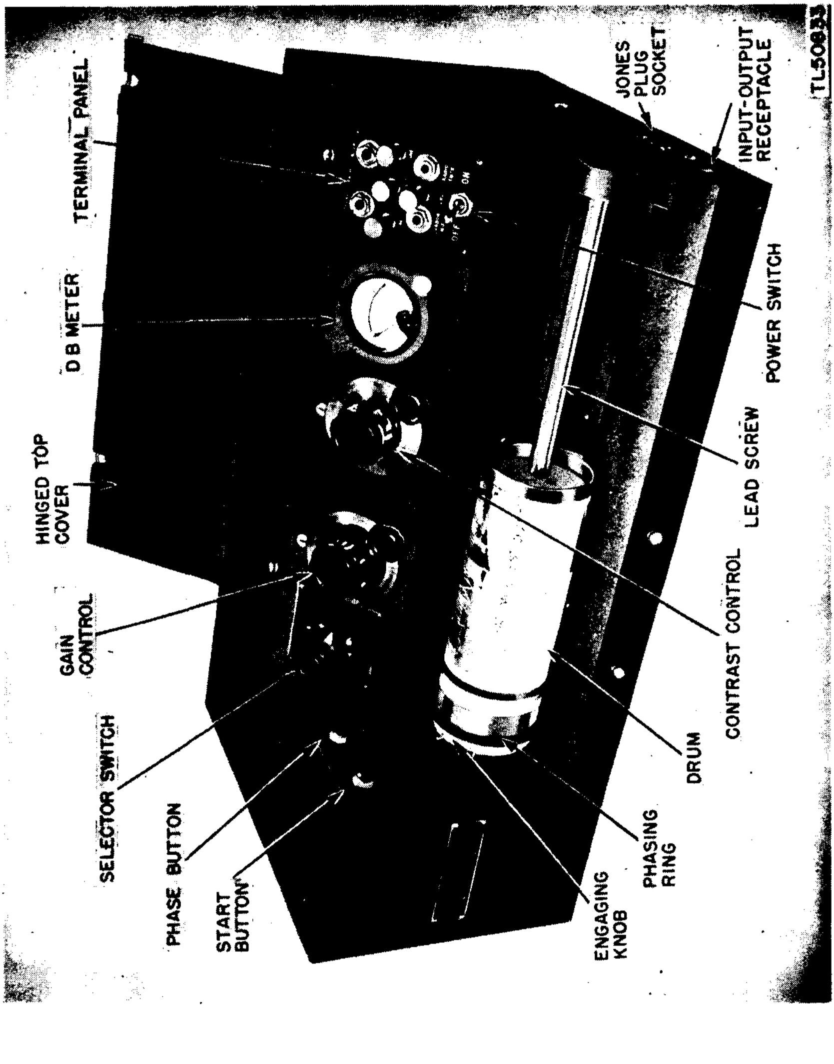

Figure 10. Facsimile Transceiver FX-1-B.

it drives through a friction clutch which has sufficient slippage so that if the drum is held stationary, the motor will continue to rotate at synchronous speed.

(2) Each time thereafter when the phasing spot at the transmitter passes the beam of light, a phase pulse actuates the phasing magnet of the receiver, permitting the receiving drum to rotate freely. The operator must keep the PHASE button firmly depressed even after the drum has been stopped by the action of the phasing magnet. Then the drum will clear, but will not stop, although a click will be heard for each revolution of the receiving drum as a result of the phase pulses operating the phasing magnet. This clicking indicates correct phasing. The receiving operator will not release the PHASE button to complete the phasing operation until several clicks are heard. Occasionally the phasing magnet will operate on every other, instead of every, phasing pulse received. In this case, when the drum is released from a phasing pulse, it will make one revolution and then stop until the second succeeding pulse is received. Usually these machines can be phased by releasing the PHASE button immediately after the drum has been started by a phasing pulse.

NOTE: Be careful not to touch the drum once the units have been phased. Be especially careful when engaging the feed mechanism. Touching the drum is almost certain to throw the units out of phase and to require rephasing.

11. TRANSMITTING.

a. Initial Operation.

(1) Cut the original copy to 7 x 8⅝ inches. Keep the actual message or picture for transmission to 7 x 7⅜ inches for photographic recording and to 6¼ x 7⅜ inches for direct recording. Pages from the message pad included in the equipment are of the right size. Use them if possible.

(2) Put captions on the copy to be transmitted by fastening them to the copy with scotch tape or by writing them on the copy.

(3) Throw the power switch of the transceiver to ON and wait for the high-pitched tone.

(4) Press backward the small knurled engaging knob on the left end of the drum to disengage the drum from the shaft (fig. 10). Push the drum to the right-hand end of the lead screw. Place the clamping bar on top of the drum.

(5) Raise one side of the T-shaped end of the clamping bar and place one edge of the copy, face up, under it. Revolve the drum forward, wrapping the copy around the drum. Raise the other edge of the bar and place the other edge of the copy under it, pulling the copy tight on the drum with a wiping motion.

(6) Make certain that there are no bulges in the copy. If the copy is too small to fit on the drum with the clamping bar, fasten it on with scotch tape.

(7) Transmission can be either positive or negative. In positive transmission, black portions of the copy are translated into high-level signals which print at the receiving end as black. In negative transmission, black portions of the copy

are translated into low-level signals which print as white on the received copy. These levels are indicated by the db meter of the transceiver. The kind of copy being sent and the use to be made of the copy at the receiving end determine whether to transmit positive or negative.

(a) Direct Recording. When only one copy is necessary and when a copy 6¼ x 7⅜ inches is sufficiently large, use the direct recording method. Some slight loss of detail and lack of the fidelity of half tones (shades of gray between white and black) must be tolerated. Copy received by this method is ready for immediate use without processing.

(b) Positive Photographic Recording. When only one copy and finer detail and better half-tone reproduction than can be obtained by direct recording are necessary, or when the copy is 7 x 7⅜ inches, use the positive photographic recording method. Copy received by this method requires photographic processing before it can be used.

(c) Negative Photographic Recording. For receiving copy 7 x 7⅜ inches when more than one copy is required, use the negative photographic recording method. Copy received by this method requires photographic processing to obtain a negative. Prints made from this negative require photographic processing just as prints from any negative.

12. TRANSMITTING POSITIVE. In transmitting positive for reception on photographic paper or direct recording paper (Teledeltos) proceed as follows:

a. Load the drum as directed in paragraph 11.

b. Turn the selector switch to SET RANGE.

c. As a starting point, set the GAIN control at 65 and the CONTRAST control near 0.

d. Turn the drum so that the whitest portion of the copy is illuminated by the spot of light. Raise the CONTRAST control until the meter reads −10 decibels.

CAUTION: Do not turn the CONTRAST control so that it passes through a minimum meter reading before reaching −10 decibels.

e. Move the drum so that the blackest portion of the copy is illuminated by the spot of light.

f. Adjust the GAIN control so that the meter reads +2 decibels. Shift back to the whitest portion of the copy and readjust the CONTRAST control to obtain a −10 decibels meter reading.

g. Return to the blackest portion of the copy and readjust the GAIN control for a +2 decibels meter reading. The final adjustments *must* show a difference of 12 decibels between the black and white on the copy. The maximum reading must not exceed +2 decibels.

h. Under extremely hot conditions, check this reading with the meter removed from the transceiver.

i. If with a +2 decibels meter reading, either the UC or KC coupling coil is used to connect the transceiver inductively to a telephone circuit, turn the selector switch to TRANSMIT and adjust the coupling coil for maximum coupling (fig. 9). Listen closely in the telephone earpiece. Slowly rotate the coupling coil on the telephone set so that the loudest tone is heard. Be sure that the coupling coil is placed at least 2 feet from the transceiver, power supply and other electrical equipment to prevent interference pick-up from the magnetic fields.

j. When using Facsimile Transceivers FX-1-A or FX-1-B, make sure that the plug attached to the coupling coil cord is plugged into the transceiver so that the colored dots match.

k. With the selector switch at SET RANGE, tell the receiving operator that maximum and minimum signals will be sent, so that he can set up his machine properly. Use the telephone or radio in the conventional manner for all voice communication.

l. Turn the selector switch to TRANSMIT, and with the spot of light on the whitest portion of the picture, send a maximum signal for about 15 seconds. This should be enough time for the receiving operator to adjust his levels. Send minimum and maximum signals for about five seconds each, so the receiving operator can check contrast.

m. Move the drum so that the light shines on the phasing ring. Push the START button and hold it until the drum is rotating just over 90 revolutions per minute. Release the START button. The drum will slow down until it reaches synchronous speed. It will then lock into its operating speed, 90 revolutions per minute. If the drum stops, repeat this operation. The light shining on the phasing ring will send out phasing pulses indicated by a flicking of the decibel meter pointer. Send about 25 of these phasing pulses.

n. Turn the selector switch to SET RANGE and listen half a minute so that the receiving operator can ask for more phasing pulses if necessary. If he does not ask for additional phasing pulses, this means that he has phased his machine. Turn the selector switch back to TRANSMIT. Pull down the knurled engaging knob on the left end of the drum. This engages the feed mechanism, which moves the drum lengthwise on the lead screw. Experience and cooperation between receiving and sending operators enables them to carry out the above procedure of setting levels, sending phasing pulses, and scanning the picture without saying a word.

o. On Facsimile Transceiver FX-1 when all the copy has moved past the scanning beam, turn the selector switch to SET RANGE, and stop the transmitter by turning the power switch to OFF.

p. On Facsimile Transceivers FX-1-A or FX-1-B when all the copy has moved past the scanning beam turn the selector switch to STAND BY. Leave the power switch at ON if more copy is to be transmitted.

13. TRANSMITTING NEGATIVE. In transmitting negative for reception on film, proceed as follows:

a. Load the transceiver as described in paragraph 11.

b. Turn the selector switch to SET RANGE. The exciter lamp will light and throw an intense spot of light on the drum. A small area of copy will be transmitted within this brightly-lighted spot.

c. As a starting point, set the GAIN control at about 65 and the CONTRAST control near 100. Turn the drum so that the blackest portion of the copy is illuminated by the spot of light. Lower the CONTRAST control until the meter reads −6 decibels.

CAUTION: Do not turn the CONTRAST control so that it passes through a minimum meter reading before reaching −6 decibels.

d. Move the drum so that the whitest portion of the copy is illuminated by the spot of light. Adjust the GAIN control so that the meter reads +2 decibels.

e. Shift back to the blackest portion of the copy and readjust the CONTRAST control to get a −6 decibels meter reading.

f. Return to the whitest portion of the copy and readjust the GAIN control for a +2 decibels meter reading.

g. Final adjustments *must* show a difference of 8 decibels on the meter between black and white on the copy. The maximum reading must not exceed +2 decibels.

h. From then on, carry on instructions given in paragraph 12*h* through 12*p*.

14. RECEIVING COPY, DIRECT PROCESS RECORDING (TELEDELTOS). Direct process recording requires no dark room.

a. Take the clamping bar from the drum by loosening the two screws in the bar. Keep this bar in the compartment of the transceiver when it is not in use.

b. Take the two garter springs and form a loop with each, around the shaft at the right-hand end of the drum. Work the springs on to the drum. Place one spring at each extreme end of the drum surface.

c. Wrap the direct process paper around the drum with the metallic side toward the drum. Keep the overlap of the paper alongside the white spot on the phasing ring. Place the edge of the paper nearest the back of the machine under the edge nearest the operator (fig. 11). Do not get finger marks on the glazed surface of the paper. Hands should be clean and dry. Move the drum so that the left-hand garter spring is slightly to the left of the stylus needle.

d. Turn the power switch to ON and wait until the high-pitched tone is heard.

e. Turn the selector switch to RECORD PHOTO.

f. If either the UC or KC coupling coil is being used magnetically (coupled to a phone receiver), direct the transmitting operator to send a maximum

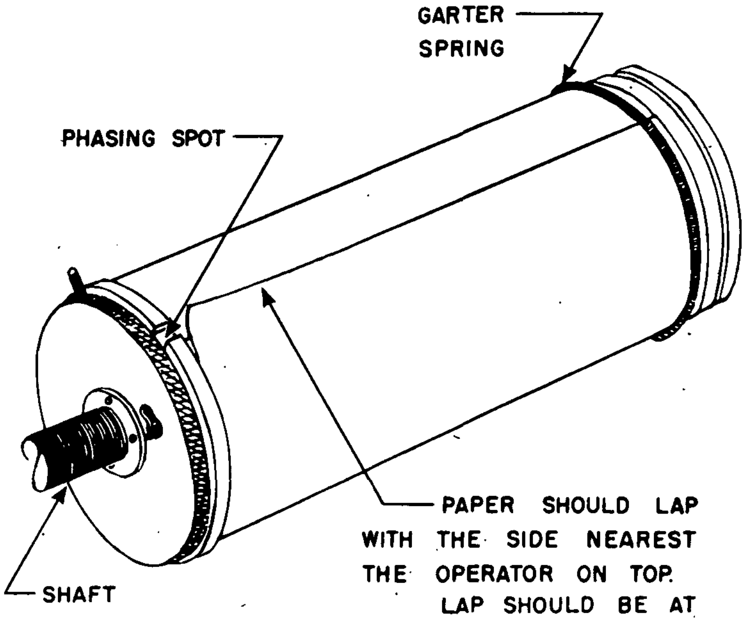

Figure 11. Correct way to mount direct recording paper on drum.

signal. Adjust the GAIN control until the decibel meter reads near zero. Rotate the coupling coil on the earpiece. Note that the decibel meter indicates a change of signal strength. Adjust the coupling coil on the phone to the position that gives a maximum decibel meter reading. This is the best coupling (fig. 9). Be sure the UC or KC coil is placed at least 2 feet from the transceiver, Power Supply PE-140-(*) and other electrical equipment during copy transmission.

g. Contact the transmitting operator using the normal method of voice communication. Ask this person to send transmitting levels as described in the transmitting procedure (par. 12). Adjust the GAIN control so that the meter reads +2 decibels on the steady maximum tone sent from the transmitting transceiver. Note the difference on the decibel meter between the maximum and the minimum signals. If the circuit is functioning properly, this difference will be the same as the contrast set up at the transmitting station.

h. Press the START button, hold it until the drum is rotating just over 90 revolutions per minute and release it. The drum will slow down until it reaches the synchronous speed of 90 revolutions per minute and continue to run at this speed.

i. The transmitting station will send about 25 phasing pulses. These will be indicated by a momentary dip on the decibel meter which occurs once for each revolution of the drum. When these pulses are being received, press the PHASE button and hold it in for about four pulses. The drum should stop as the PHASE button is pushed in and then release itself with the first pulse. It should continue to rotate and make a clicking sound with succeeding pulses.

j. If the machine is properly phased, wait for transmission to begin. If the machine is not phased, turn the selector switch to STAND BY and ask the transmitting operator to send more phasing pulses.

k. When the signal starts, engage the feed mechanism. Turn the selector switch to RECORD DIRECT.

l. When the drum has moved to the left so that the stylus is about to come in contact with the right-hand garter spring, or the transmitting operator stops sending signals (as indicated by no meter reading), turn the selector switch to STAND BY. On Facsimile Transceiver FX-1 only, turn the power switch to OFF. Take the finished copy from the drum.

15. PHOTOGRAPHIC RECORDING.

a. Using a Photographic Darkroom. (1) Set up the transceiver for darkroom photographic recording as outlined in paragraph 7. Be sure hands are clean and dry, so that finger marks will not appear on received pictures.

(2) Use the photographic paper, Royal Bromide F-1 for normal positive recording. Use Kind 1020, (or Aero enlarging paper), contrast No. 1, for positive recording when no shrinkage of the print can be tolerated and when faster processing is imperative. Use the photographic film, type A, for negative recording. These are packed in Chest CH-410.

(3) Turn off all lights in the darkroom except the safelight. Turn the selector switch to STAND BY. Open the box of paper, remove a single sheet, and close the box.

NOTE: If film is used, remove one sheet of film and a piece of black paper from the box. Place the black paper next to the dull side of the film and treat the combination as "paper", in the following manner:

(4) Lift the front side of the T-shaped right-hand end of the clamping bar. Raise this side of the bar and place one edge of the paper under it with the glossy side up. Revolve the drum forward, wrapping the copy around it.

(5) Raise the back side of the bar and place the other edge of the paper under it. Pull the paper tight on the drum with a wrapping motion. Make sure the paper does not bulge. Move the drum to the right-hand end of the lead screw.

(6) To receive copy, follow directions given in paragraph 14, *d* through *j*.

(7) When the drum has moved to the left so the recorder lamp spot of light has passed the right-hand edge of the recording paper, or when the transmitting operator stops sending signals, turn the selector switch to STAND BY. On

Facsimile Transceiver FX-1, turn the power switch to OFF. Take the finished copy from the drum, and process it photographically as directed in paragraph 17.

b. Using the Portable Dark Tent. (1) Set up the transceiver for portable dark tent operation as outlined in paragraph 7. The electrical and mechanical operation of the transceiver when in Bag BG-140 is precisely the same as when operating in a darkroom, except that the paper or film must be loaded on the drum and the operational procedure carried out by feel and by watching the decibel meter, the operator having his hands inserted in the sleeves of the dark tent.

(2) The decibel meter on the top of the tent indicates the electrical performance. All instructions regarding levels to be set for the received copy apply directly to the meter.

CAUTION: BE CERTAIN THAT THE SELECTOR SWITCH IS AT *STAND BY* WHEN THE DRUM IS LOADED AND UNTIL THE OPERATOR IS READY TO RECEIVE. If the switch is at any other position, the recording material will be ruined.

(3) If film is used for recording, load it on the drum in the following manner: Take a sheet of film and a sheet of black paper from the box of film. Hold the film so that the notch is at the top left-hand corner of the film. Then place the sheet of black paper under the film. Place the film and black paper on the drum with the black paper between the surface of the drum and the film.

(4) As soon as the drum is loaded, the operator may remove his right hand from the tent, thus leaving this hand free to operate the voice communications equipment. The right sleeve of the bag must be folded down so that it will be lightproof. All remaining operations may be done with one hand.

(5) Follow procedure outlined in paragraph 15 above.

(6) If the drum is moved 1/2 inch to the left from the extreme right-hand end of the shaft, the recorder light spot will be in the correct position at the edge of the film or paper to start receiving the picture. The motor must be started and the drum phased while the drum is at the extreme right, because the selector switch must be turned to RECORD PHOTO position for these operations.

CAUTION: When working in the dark tent, do not touch the revolving drum after the machine has been phased. Do not turn the selector switch either to SET RANGE or TRANSMIT when the photographic material is out of the box. Do not have the photographic material exposed to light when the tent is to be opened. Always close the box of photographic material after removing each sheet.

(7) At the end of transmission, place both hands in the tent. Turn the power switch to OFF. Open developing Tank PH-409. Slide the drum to the right-hand end of the shaft. Remove the photographic material, and place it inside the tank in such a manner that the emulsion will not be in contact with the metal. This may be done by *rolling film in the same way* it was on the drum or by *rolling paper in the opposite way* it was on the drum. Put the cover on

the tank. Pull the tank out through the sleeve hole. Process photographically the exposed picture in the tank (par. 17*b*).

16. PIECE-BY-PIECE TRANSMISSION. When the entire picture to be transmitted cannot be received in a single recording, it must be sent through piece-by-piece. The maximum size which can be recorded with certainty is 6¼ x 7⅜ inches for RECORD DIRECT and 6¾ x 7⅜ inches for RECORD PHOTO. In piece-by-piece transmission the original copy is cut into sections so that the entire picture is recorded in the minimum number of transmissions. Procedure for piece-by-piece transmission is the same as the standard procedure for transmitting and receiving several successive pictures, with the following exceptions.

a. During the first contact inform the receiving operator that the transmission will be piece-by-piece. Then tell this operator how many recordings will be required.

b. Instead of scanning the lightest and the darkest areas of the picture to be transmitted when adjusting for the desired contrast range, move the drum so that the spot of light from the exciter lamp falls on the white spot, then the black surface of the phasing ring. Therefore, the transmitting and receiving operators do not change the settings of the GAIN and the CONTRAST controls for the successive transmissions.

17. PHOTOGRAPHIC PROCESSING.

a. Dark Room. Keep all lights except the safelight turned off until the photographic copy has been fixed in hypo. Arrange three trays beside the sink so that they are lighted by the safelight (fig. 12). Put developer in the left-

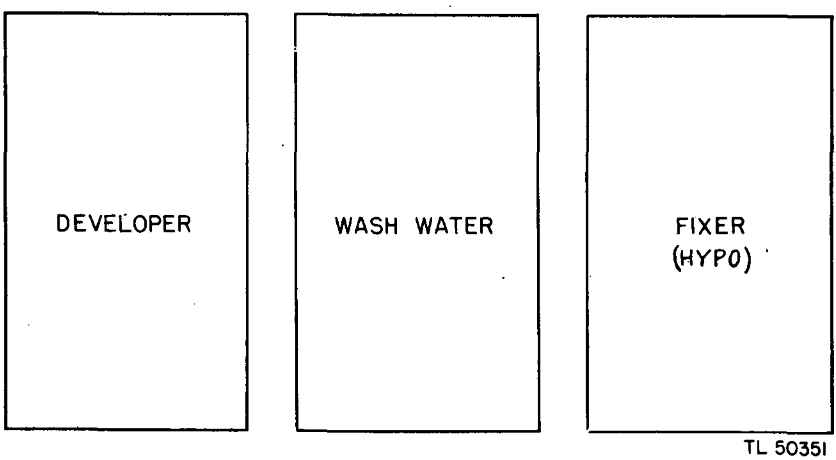

Figure 12. Arrangement of photographic trays.

hand tray, clean water in the middle tray, and hypo in the right-hand tray. There must be enough solution in each tray to cover the copy being processed (at least ½ inch).

(1) NEGATIVE (FILM). Use DK-60A solution, full-strength, for developer. Check the temperature of the developer with the thermometer. It must be between 60°F and 80°F for satisfactory developing.

(a) Immerse the film in the developer tray. Agitate the solution. Watch the film as the picture begins to form. When detail can be noticed in the light portions of the lighter side of the film, remove it from the developer and place it in the middle tray for about 5 seconds. Then place it in the hypo tray.

(b) The lights may be turned on a few minutes after all cloudy white portions of the film have cleared. Leave the film in the hypo for at least 15 minutes. Then wash it for at least 15 minutes in running water. After the film has been washed, hang it up to dry, using the wooden clips provided for this purpose. Throughout the entire handling of the film be careful to avoid getting finger marks, scratches, or dust on the emulsion. Use wash water and tray solutions of as near the same temperature as possible.

> NOTE: If no DK-60A solution is available, D-72 can be used as a developer, but its use is not recommended. *Never use warm water to wash film because it removes the emulsion from the film base.*

(2) POSITIVE (PAPER). Use one part of D-72 solution mixed with two parts of water for developer. Be sure the temperature of the developer is between 60°F and 80°F.

(a) Place the paper in the developing tray and watch the picture begin to form. When the desired density has been obtained (which requires about 1½ minutes), take the picture from the developer and place it in the wash water.

(b) Take the paper from the center or washing tank after about 5 seconds, and place it in the hypo tray. The lights may be turned on after the paper has been in the hypo for about a minute. Leave the paper in the hypo for at least 10 minutes. Then wash it in running water for 15 minutes.

(c) If Royal Bromide paper is used, place the paper, face down, on a ferrotype plate and force out the excess water with a squeegee. Put the ferrotype plate on a drier until the copy is dry. If Aero enlarging paper or Kind 1020 is used, do not use this method, but place it between two blotters, which are furnished, to dry.

b. Using Tank PH-409. Daylight Developing Tank. (1) NEGATIVE (FILM). Use DK-60A solution, full strength, for developer. Keep the solution between 60°F and 80°F.

(a) Pour the developer into the tank through the funnel in the top of the tank, filling it as quickly as possible. Put the top on and shake the tank occasionally. Pour out the developer after about 3 minutes, if the developer

has been kept at about 80°F. If it has been at 70°F, pour it out after 4½ minutes. If it has been at 60°F, allow it to remain in the tank for 8 minutes. Do not throw the developer away. It is good for about 10 films or 4 hours use.

(b) Fill the tank with water, then pour it out and fill the tank with hypo. After 15 minutes, pour out the hypo and save it.

(c) Open the tank, take out the film and wash the film in running water for 15 minutes. If no running water is available, put the film in a tray of water and change the water every 5 minutes for half an hour.

(d) Hang up the negative to dry, using the wooden clips packed in the photographic chest. Rinse out the tank.

(2) POSITIVE (PAPER). Use one part D-72 solution mixed with two parts of water for developer. Keep the temperature between 60°F and 80°F. Pour the developer into the tank through the funnel in the top of the tank, filling it as quickly as possible. Put the top on and shake the tank occasionally.

(a) At 80°F pour out the developer after 1 minute. At 70°F pour out the developer after 1½ minutes and at 60°F after 2½ minutes. Save the developer.

(b) Fill the tank with water, then pour it out and fill the tank with hypo. After 5 minutes pour out the hypo and save it.

(c) Open the tank, take out the paper and wash the paper in running water for 5 minutes, or put it in a tray of water and change the water every 5 minutes for 15 minutes. Rinse out the tank.

(d) Dry the paper between two blotters.

TABLE 1

COMMON FAULTS IN PHOTOGRAPHIC PROCESSING.

Symptom	*Cause*
Print too dark.	Overdevelopment; developer too warm. If contact print—exposure too great, negative too weak or thin.
Print too light.	Underdevelopment; developer too cold. If contact print—exposure not sufficient, negative too dense.
Grayish whites throughout picture.	Developer too cold, requiring too long development.
Grayish granular appearance.	Underexposed contact print and long development; old paper; paper kept in damp place.
Brownish or greenish tones.	Developer solution either too cold, badly discolored, or exhausted.
Brown and red stains.	Developer exhausted; prints not moved about enough during fixing.
Round white spots.	Air bubbles on the surface of the paper. Prints not moved about enough during developing and fixing.
White deposits on surface of prints.	Milky fixer solution; incorrect mixing or impure chemicals.
Blisters on surface.	Print creased or broken while washing; temperature difference between solutions and wash water too great.
Yellowish whites.	Long development; print not kept moving when first immersed in fixer; developer too weak; insufficient washing and fixing; iron in wash water, probably from rusty pipes; print exposed to air too much while developing, especially in warm weather. To remedy, try using fresh developer solution.

18. STANDARD OPERATING PROCEDURE.

BOTH OPERATORS

Establish voice communication system (radio-wire).
Decide what method of recording will be used.
Each operator installs equipment so that it is ready for operation.
Turn power switch to ON.

Transmitting Operator	*Receiving Operator*
Puts copy on drum of his transceiver.	Places recording medium on the drum of his transceiver.
Sets contrast at 8 db. for negative reception or 12 db. for positive reception.	If photographic operation is to be used, sets up trays of developer, water and hypo.
Contacts receiving operator to find out if receiving operator is ready.	
Sends maximum signal, then maximum and minimum signals.	Adjusts for proper receiving level (+2 db.) and notes the contrast.
Sends phasing signals.	Presses PHASE button to phase his machine.
Listens about half a minute to be sure that the receiving operator does not need more phasing pulses.	Does nothing if his machine is properly phased.
Sends copy.	Receives copy.
When all copy has been scanned, turns selector switch to STAND BY and listens for receiving operator to acknowledge receipt of picture.	
	When there is no indication on the meter, turns the machine OFF and contacts transmitting operator.
	If photographic reception is used, removes copy from the drum and processes it.

PART IV

Preventive Maintenance

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19. GENERAL. By following a simple series of cleaning and lubricating operations, Facsimile Transceiver FX-1-(*) can be maintained so it will function dependably and efficiently for a long time without requiring major repairs. Preventive maintenance of the transceiver consists of periodically cleaning the scanning drum and the accessible lenses of the optical systems; cleaning and lubricating the lead screw; lubricating the motor bearing and motor gears; and checking and maintaining the battery of Power Supply PE-150 in models in which this power supply is furnished. The extent of use will dictate the frequency with which these operations must be performed. A transceiver operated for 5 hours each day in a dusty, hot climate will require more frequent cleaning and lubrication than one operated for an hour each day in a temperate climate. The time intervals suggested in this manual are based on average operation under normal conditions. Under unusual conditions more frequent cleaning and lubricating will be necessary.

20. CLEANING SCANNING DRUM. The surface of the scanning drum becomes dirty from the graphite of the direct recording paper. The scanning drum should be kept clean. Therefore, whenever concluding a period of RECORD DIRECT operation, clean the scanning drum with a moist cloth. Use only enough water to moisten the cloth. Do not wet the shaft or the adjacent surfaces. When the scanning drum has been cleaned, dry it thoroughly with a cloth or paper towel.

21. CLEANING LENSES. The lenses become dirty principally as the result of the burning process when receiving by RECORD DIRECT. This condition causes a decrease in the efficiency of the optical systems which, in turn, adversely affects the recording level and transmitting output. Clean the lenses with a dry, lint-free cloth. The various lenses to be cleaned are shown in figure 13. To make the lenses accessible for cleaning, place the scanning drum to either the extreme left-hand or right-hand end of the shaft, as required.

NOTE: The condenser lens of the exciter lamp optical system does not become noticeably dirty from the burning process when receiving by RECORD DIRECT, and normally does not require cleaning until after several months of operation. Remove the top panel of the transceiver before cleaning the interior lens. Disconnect the power supply before opening the transceiver.

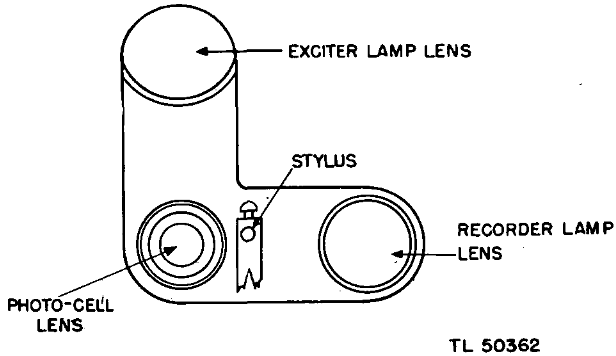


Figure 13. Exterior lenses to be cleaned.

22. CLEANING AND LUBRICATING LEAD SCREW. After 32 hours of normal operation, clean and lubricate the lead screw. If this is not done, the friction clutch may slip, causing skew. Also, sluggish and undependable operation of the scanning drum may result. Clean and lubricate the lead screw in the following manner.

a. With the drum rotating, at the extreme right-hand end of the shaft, and the feed mechanism disengaged, start the motor.

b. Cover the shaft with type PS oil (oil, lubricating, preservative, special Spec. AXS-777).

c. Wipe the oil from the shaft by holding a lint-free cloth or paper towel against the shaft. Do not rub lengthwise on the shaft.

d. Again place a light coating of oil of the same type on the shaft. Engage the feed mechanism and allow the drum to move the length of the threaded portion. Then disengage the feed mechanism and return the drum to the right-hand end of the shaft.

e. Wipe the shaft again and remove any accumulated oil at the left-hand end of the shaft.

f. Repeat the oiling and wiping method several times. Then remove the accumulated oil.

g. When not using the transceiver, place the drum so it covers the threads and so the feed mechanism is engaged. By doing this, a minimum of dirt and dust will accumulate on the threads of the lead screw.

h. After each 128 operating hours, apply two or three drops of PS oil, Spec. AXS-777, to the lead screw end bearing.

23. LUBRICATING MOTOR BEARING, MOTOR WORM AND GEAR. These directions are for Facsimile Transceivers FX-1 and FX-1-B. Facsimile Transceiver FX-1-A has a built-in lubricating chamber. The top bearing of the motor and the motor worm and gear should be lubricated twice each year.

As a safety precaution, disconnect the power supply before opening the transceiver. Remove the cover at the left-hand end of the transceiver. Place only *three drops* of type PS oil, Spec. AXS-777 on the motor shaft at the point where it passes through the top motor bearing. Excess oiling gums up the bearing, the commutator, and the brushes of the motor. Wipe the dirty grease from the motor worm and the fiber gear on the shaft. Put one drop of type PS oil, Spec. AXS-777 in the oil hole of the fiber gear.

24. POWER SUPPLY PE-150. Keep the battery of Power Supply PE-150 clean and the terminals free from corrosion. Make a weekly inspection to be sure that the electrolyte level is maintained 1/4 inch above the top of the plates. Add distilled water when necessary. Maintain the specific gravity of the battery at a minimum of 1.250. An idle storage battery should be charged occasionally. When there is danger of freezing, keep the battery fully charged.

25. REPLACEMENTS. Two 5-ampere fuses are located in Power Supply PE-140-(*), one of which is a spare. A 10-ampere fuse is located in Power Supply PE-150. There is no fuse in Facsimile Transceiver FX-1-(*). Chest CH-116 contains spare fuses for the power supplies. To replace a fuse, unscrew the cap, remove the fuse and insert a new fuse; then screw the cap back into place.

a. If none of the vacuum tubes in Power Supply PE-140-(*) lights when the toggle switch of the transceiver is at ON and the a-c power source is not at fault replace the 5-ampere fuse. A blown fuse in Power Supply PE-140-(*) is not a certain indication of circuit failure, but may be the result of a momentary current surge.

b. If the ammeter of Power Supply PE-150 does not indicate that the battery is charging, and the a-c power source is not at fault, the battery charger leads to the battery should be checked to make certain that correct polarity is observed and that the clips are making good contact with the battery terminals. If, after checking these points, the ammeter still fails to indicate the battery is charging, replace the 10-ampere fuse of Power Supply PE-150.

26. STYLUS. When the tungsten wire point which is set in the brass body of the stylus becomes so worn that a reproduction is blurred when the RECORD DIRECT process is used, change the stylus. The screw holding the stylus is loosened and the old stylus is removed. Six spare stylus needles, in a metal container, are located in the cable compartment at the right-hand side of the transceiver. Insert a new stylus in the holder. It is held in place by tightening the screws. Locate the stylus so that, when the selector switch is set to RECORD DIRECT, the point of the stylus will be in contact with the surface of the direct recording paper mounted on the drum.

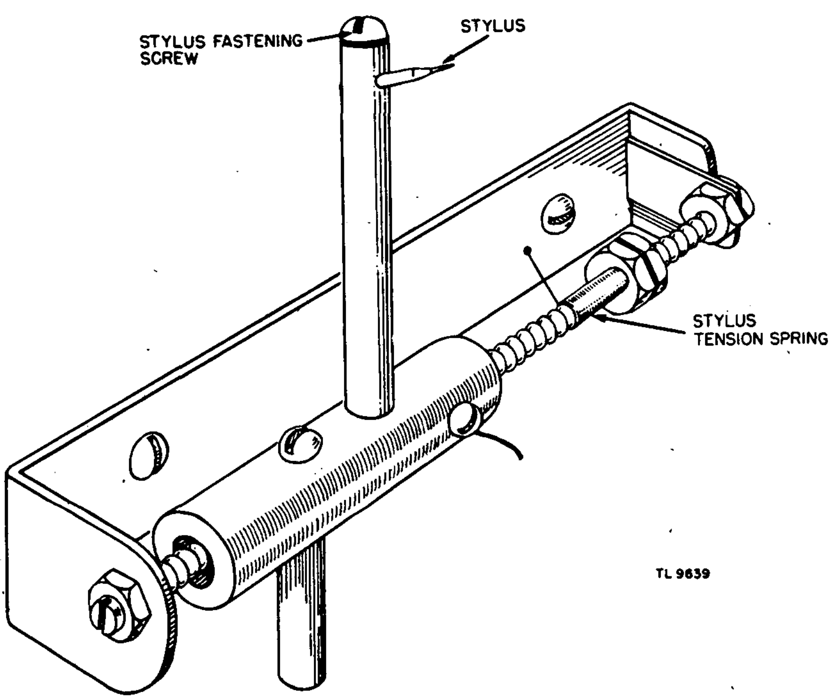


Figure 14. Stylus assembly.

CAUTION: Before trying to replace a stylus, disconnect the power supply. The high voltage present between the stylus and the frame of the transceiver may be dangerous to life. When tightening the screw of the stylus holder, be careful not to exert too great a downward pressure, as this may dislodge the encased stylus assembly. When the stylus assembly is dislodged, the scanning drum and the lead screw must be removed to gain access to the stylus assembly.

27. RECORDER LAMP. When it is necessary to advance the gain of the transceiver (when receiving photographically) so that levels of +3 to +4 decibels are required, and the processed recording is still not as dark as desired, replace the recorder lamp. Before doing so, however, be sure the lightness of the recording is not caused by incorrect strength and temperature of the developer solution. As an emergency measure only, when a replacement recorder lamp is not available, it is sometimes possible to make a temporary repair. The blackened deposit on the inside of the glass envelope of the recorder lamp, which is the cause of the decreased light intensity, may be vaporized by gently heating the darkened portion of the glass envelope with a small gas flame, or its equivalent.

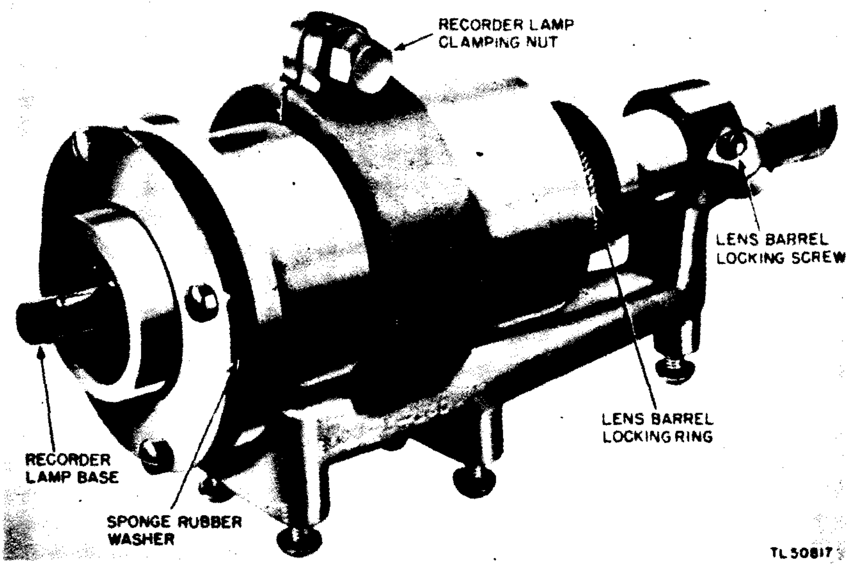


Figure 15. Recorder lamp assembly of Facsimile Transceiver FX-1-A.

28. EXCITER LAMP. If the exciter lamp fails to light, check its voltage before replacing it. To test the exciter lamp, remove the top cover of the transceiver. Because it is essential that the unit be turned on to test the voltage at the exciter lamp, proceed with caution because of the high voltage present within the transceiver. An a-c voltmeter which is reliable at a test frequency of 1,800 cycles, such as the voltmeter contained in Test Set I-56, is required. The normal a-c voltage at the exciter lamp is 5.8 volts. If the voltage is satisfactory and the exciter lamp fails to light, replace it.

29. VACUUM TUBES. Normally, it is not necessary to change a vacuum tube except after many months of operation. When electrical trouble develops, other than that which requires replacement of a recorder lamp, an exciter lamp, or a fuse, the vacuum tubes should be checked as a possible cause of the trouble. The transceiver and Power Supply PE-140-(*) are shipped with the required vacuum tubes already fitted in the correct sockets. A spare set of vacuum tubes is contained in Chest CH-116. Before removing a vacuum tube, disconnect the power supply by pulling out the a-c plug. Otherwise, the vacuum tubes, the recorder lamp, the exciter lamp, and circuit components may be damaged. With the tube lifter, pry the tube base bently from the socket while the operator

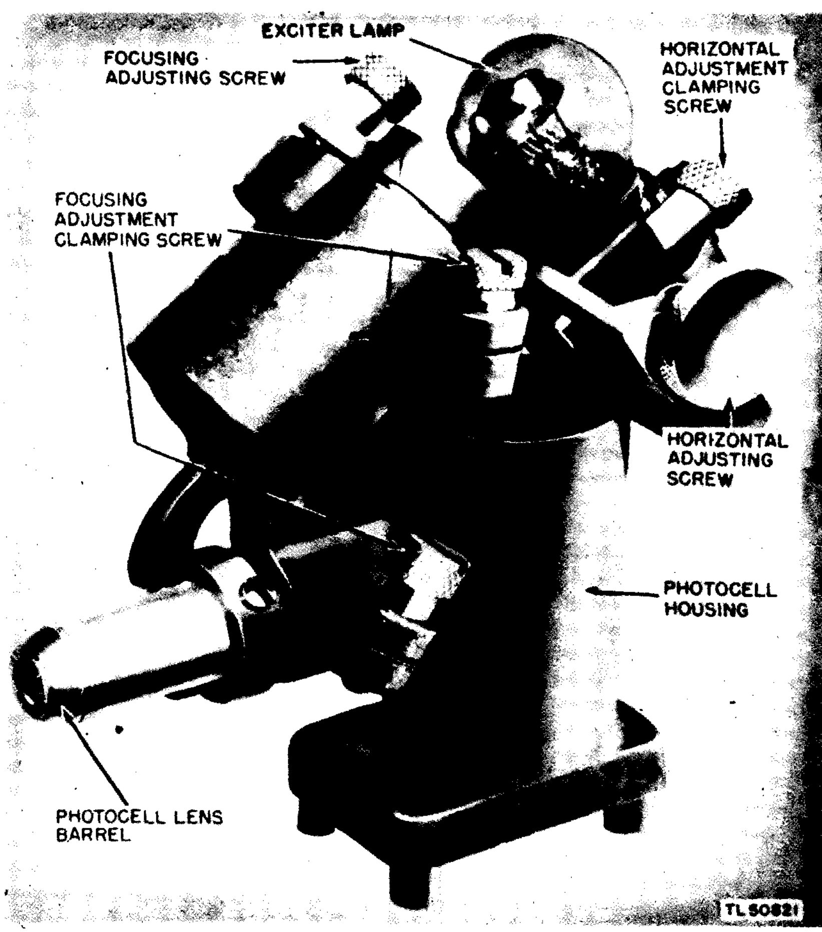


Figure 16. Exciter lamp assembly of Facsimile Transceiver FX-1-A.

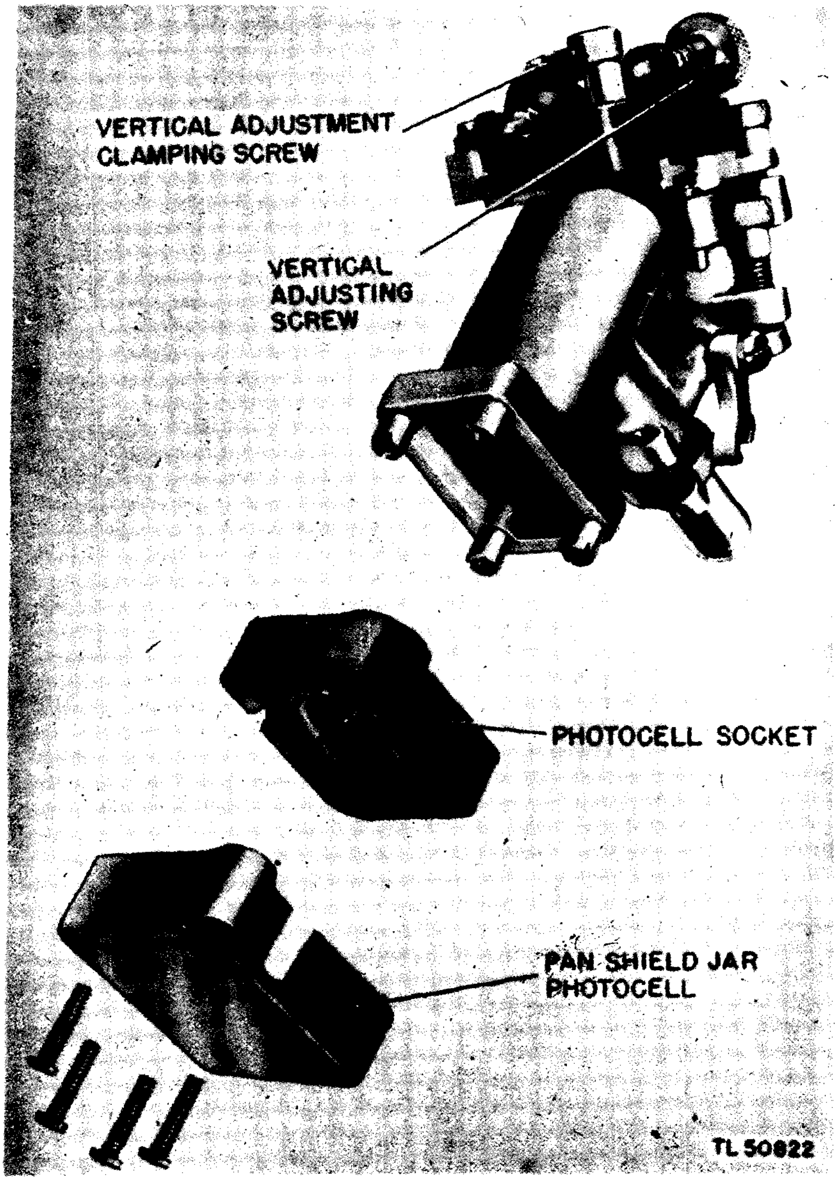


Figure 17. Exciter lamp assembly of Facsimile Transceiver FX-1-A disassembled.

guides the vacuum tube with the free hand. Damage may result by bending the prongs if the vacuum tubes are removed without using the tube lifter. Test the vacuum tube with a tube tester for short circuits and mutual conductance. Return the satisfactory tubes to the same sockets from which they were removed. Because of the critical nature of the circuits, serviceable vacuum tubes of the same type are not to be interchanged in the sockets. When replacing a fork oscillator tube or a voltage regulator tube in the transceiver, the fork oscillator may drift off-frequency. This produces a uniform skew in the recorded copy. If this occurs, substitute another spare vacuum tube of the same type for the vacuum tube replaced in the oscillator circuit. When replacing the 7L7 vacuum tube in the amplifier, select the replacement vacuum tube whose carton is marked, "Pre-Tested For FX-1. Use Only In Socket Next To 7C7"

30. REPLACEMENT VACUUM TUBE 7J7. The 7S7 vacuum tube is to be used as the replacement of vacuum tube 7J7 in Power Supply PE-140.

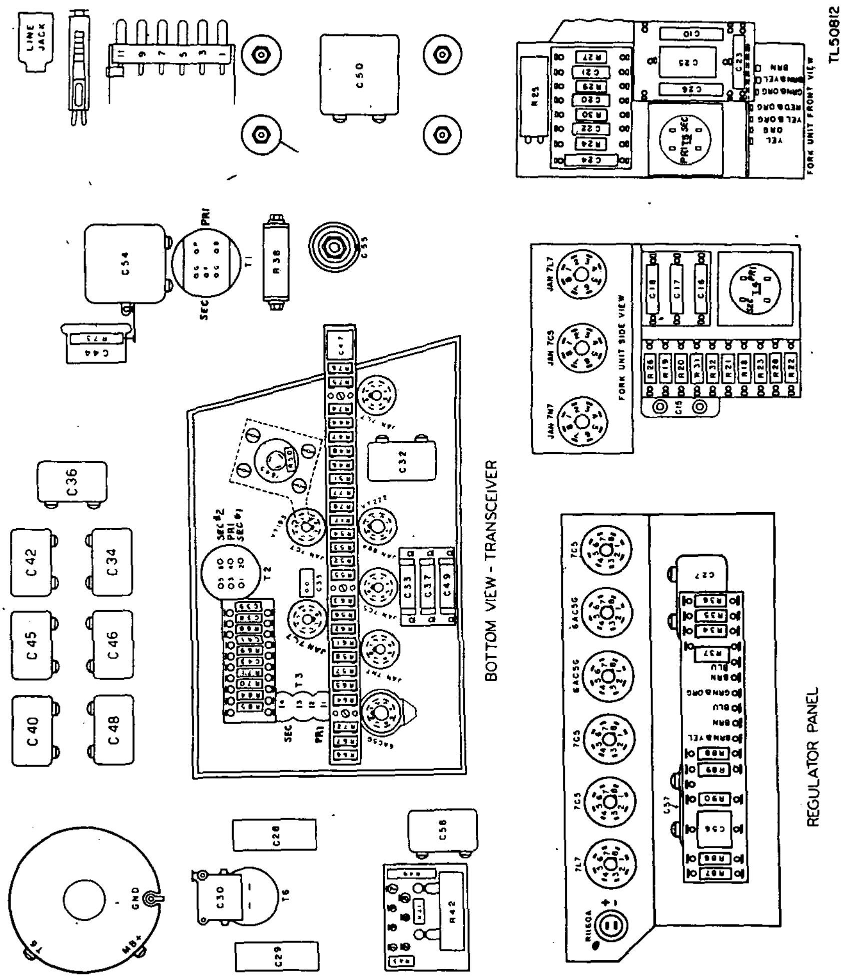
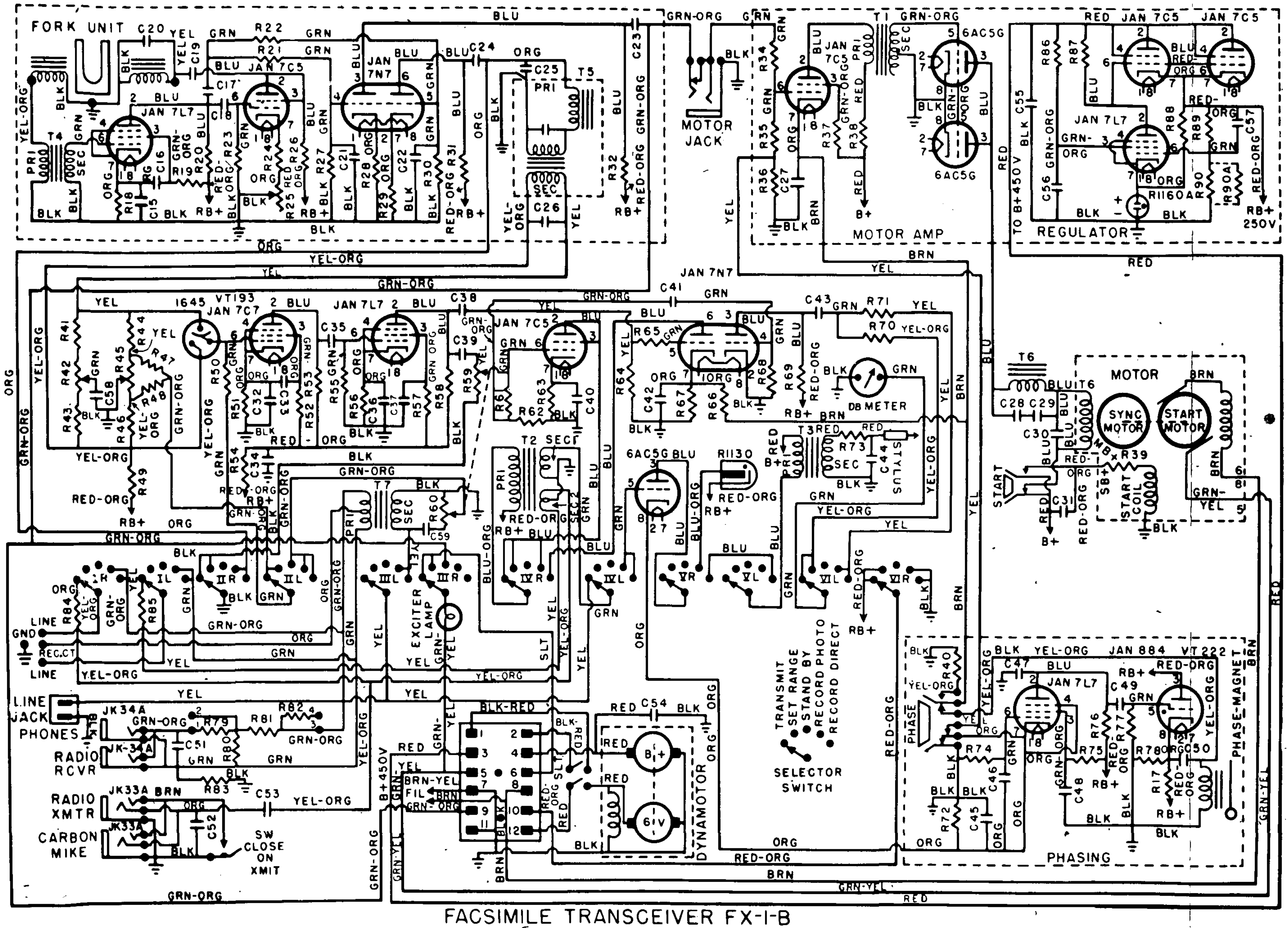


Figure 18. Parts layout, Facsimile Transceiver FX-1-B.



RESISTORS

R 17	25 MEG. 1/2 W	R 43	300 OHM 1/2 W	R 69	.1 MEG. 1/2 W
R 18	2000 OHM 1/2 W	R 44	300 OHM 1/2 W	R 70	58000 OHMS 1/2 W
R 19	5 MEG. 1/2	R 45	50 OHM POT.	R 71	37000 OHMS 1/2 W
R 20	25 MEG. 1/2 W	R 46	300 OHM 1/2 W	R 72	300 OHMS 1/2 W
R 21	1 MEG. 1/2 W	R 47	75 OHM 1/2 W	R 73	2000 OHMS 2 W
R 22	1 MEG. 1/2 W	R 48	50 OHM 1/2 W	R 74	25000 OHM 1/2 W
R 23	1 MEG. 1/2 W	R 49	70000 - .25 MEG. 1W	R 75	2 MEG. 1/2 W
R 24	25000 OHM 1/2 W	R 50	2 MEG. 1/2 W	R 76	1 MEG. 1/2 W
R 25	50000 OHMS POT.	R 51	3000 OHM 1/2 W	R 77	1 MEG. 1/2 W
R 26	40000 OHM 1/2 W	R 52	1 MEG. 1/2 W	R 78	75000 OHMS 1/2 W
R 27	.5 MEG. 1/2 W	R 53	.25 MEG. 1/2 W	R 79	2500 OHMS 5 W
R 28	2000 OHM 1/2 W	R 54	15000 OHM 1/2 W	R 80	300 OHMS 5 W
R 29	2000 OHM 1/2 W	R 55	.25 MEG. 1/2 W	R 81	2500 OHMS 1/2 W
R 30	50000 OHM 1/2 W	R 56	2000 OHM 1/2 W	R 82	10000 OHMS 1/2 W
R 31	25000 OHM 1/2 W	R 57	.5 MEG. 1/2 W	R 83	1 MEG. 1/2 W
R 32	25000 OHM 1/2 W	R 58	.15 MEG. 1/2 W	R 84	300 OHMS 1/2 W
R 34	10000 OHM 1/2 W	R 59	.25 MEG. POT.	R 85	300 OHMS 1/2 W
R 35	10000 OHM 1/2 W	R 60	500 OHM POT.	R 86	2 MEG. 1/2 W
R 36	3000 OHM 1/2 W	R 61	.5 MEG. 1/2 W	R 87	1 MEG. 1/2 W
R 37	50000 OHM 1 W	R 62	.5 MEG. 1/2 W	R 88	.25 MEG. 1/2 W
R 38	15000 OHM 20 W	R 63	600 OHMS 1/2 W	R 89	.1 MEG. 1/2 W
R 39	7500 OHM 20 W	R 64	1 MEG. 1/2 W	R 90	50000 OHM 1/2 W
R 40	3000 OHM 1/2 W	R 65	.5 MEG. 1/2 W	R 90A	.25 MEG. 1/2 W
R 41	500 OHM 1/2 W	R 66	1500 OHMS 1/2 W		
R 42	600 OHM 20 W VAR	R 67	2000 OHMS 1/2 W		
		R 68	.5 MEG. 1/2 W		

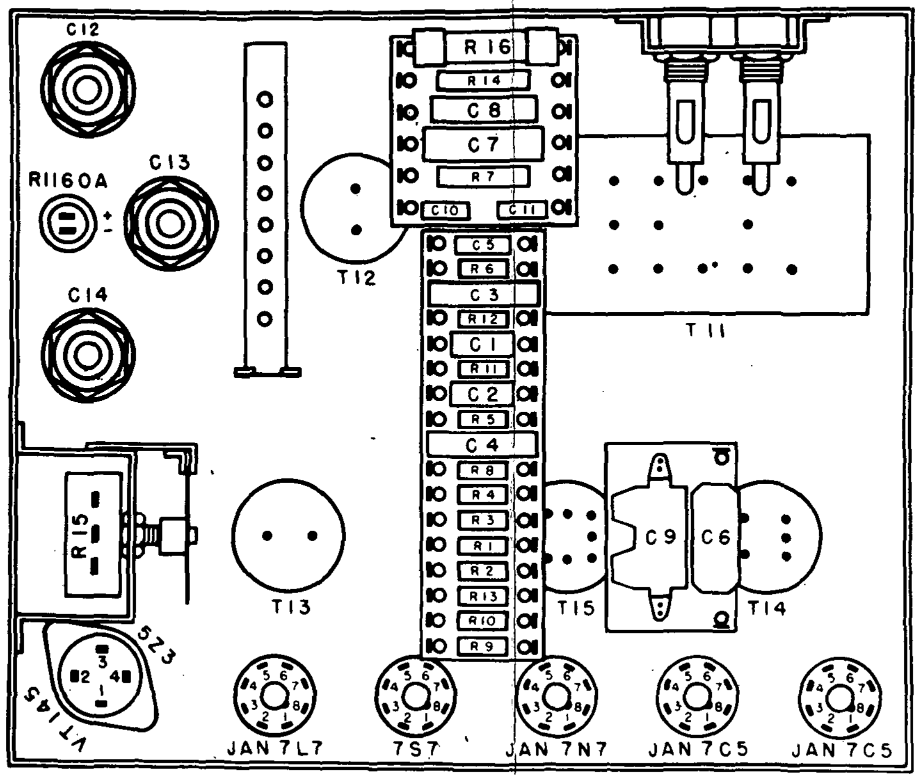
CAPACITORS

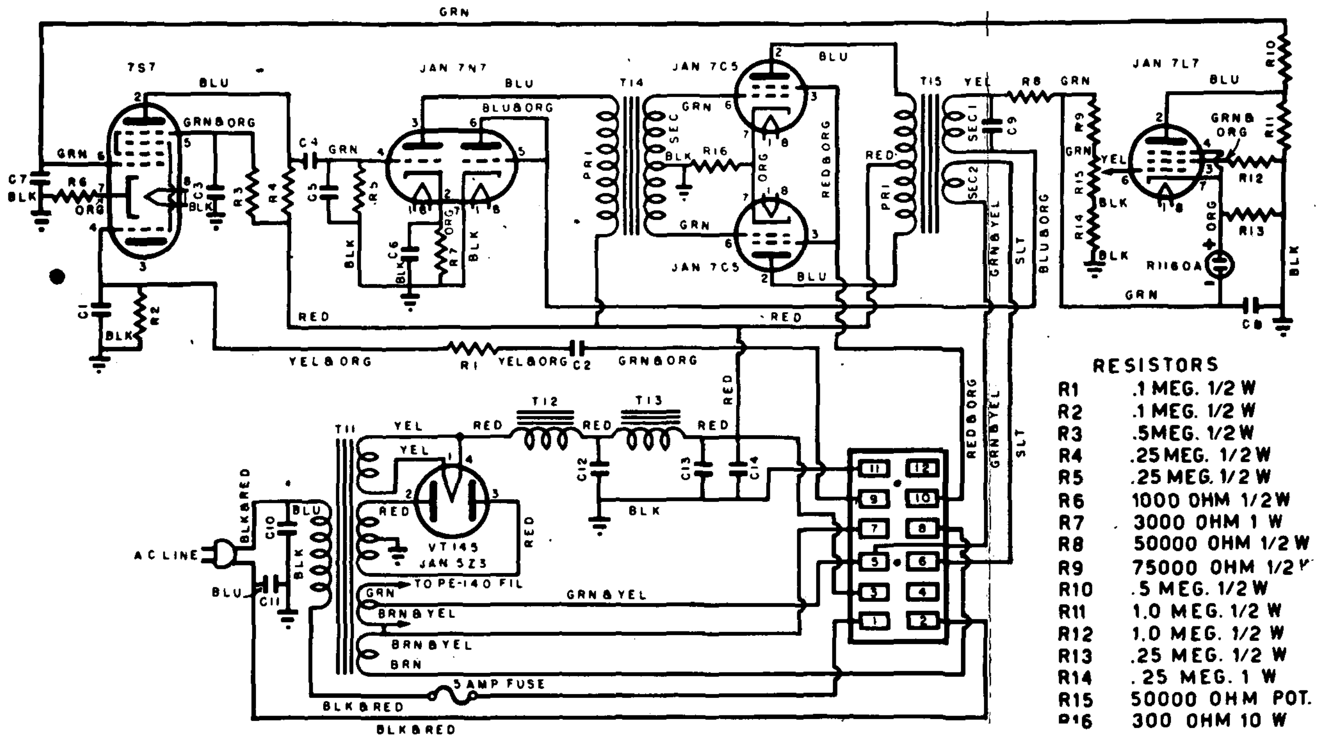
C 16	.5 600 V	C 43	.01 600 V
C 16	.01 600 V	C 44	.0005 2500 V
C 17	.01 600 V	C 45	50 25 V
C 18	.01 600 V	C 46	.1 600 V
C 19	.1 600 V	C 47	.01 600 V
C 20	.00025	C 48	.5 600 V
C 21	.00025	C 49	.01 600 V
C 22	.0015 500 V	C 50	2 600 V
C 23	.01 600 V	C 51	.0005 500 V
C 24	.01 600 V	C 52	.0005 500 V
C 25	.01 600 V	C 53	.5 600 V
C 26	.1 600 V	C 54	2 600 V
C 27	.5 600V	C 55	1 1000 V
C 28	.02 2000 V	C 56	.005 1000V
C 29	.02 2000 V	C 57	.5 600 V
C 30	.001 2500 V	C 58	.5 600 V
C 31	.005 1000V	C 59	.25 600 V
C 32	.5 600 V		
C 33	.01 600 V		
C 34	.5 600 V		
C 35	.00025 600 V		
C 36	.5 600 V		
C 37	.01 600 V		
C 38	.002 500 V		
C 39	.0005 500 V		
C 40	.5 600 V		
C 41	.01 600 V		
C 42	.5 600 V		

TRANSFORMERS

T 1	KENYON T252
T 2	T.T.E. 633A
T 3	T.T.E. 601
T 4	T.T.E. 3353
T 5	T.T.E. 679
T 6	T.T.E. 609
T 7	TTE 680

Figure 19. Schematic circuit diagram of Facsimile Transceiver FX-1-B.





RESISTORS	
R1	.1 MEG. 1/2 W
R2	.1 MEG. 1/2 W
R3	.5MEG. 1/2 W
R4	.25MEG. 1/2 W
R5	.25 MEG. 1/2 W
R6	1000 OHM 1/2 W
R7	3000 OHM 1 W
R8	50000 OHM 1/2 W
R9	75000 OHM 1/2 W
R10	.5 MEG. 1/2 W
R11	1.0 MEG. 1/2 W
R12	1.0 MEG. 1/2 W
R13	.25 MEG. 1/2 W
R14	.25 MEG. 1 W
R15	50000 OHM POT.
R16	300 OHM 10 W

CAPACITORS	
C1	.005 300 V
C2	.005 300 V
C3	.005 1200 V
C4	.005 1200 V
C5	.001 500 V
C6	.1 600 V
C7	.05 600 V
C8	.1 600 V
C9	.001 1250 V
C10	.001 500 V
C11	.001 500 V
C12	2.0 1000 V
C13	2.0 1000 V
C14	2.0 1000 V

TRANSFORMERS & CHOKES	
T11	KENYON T246
T12	KENYON CHOKE T501
T13	KENYON CHOKE T152
T14	KENYON T252
T15	TTE #655

POWER
SUPPLY
PE-140-B

TL 50807

Figure 20. Parts layout and schematic circuit diagram for Power Supply PE-140-B.

PART V

Functioning of Circuits and Parts

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31. GENERAL THEORY. By operating controls on a transceiver, the transceiver can be used either to send or receive copy.

a. Scanning. The drums of the transceivers rotate at constant and identical speed (in synchronism). The drums are fed from right to left by threads on the shaft upon which they rotate. There are 96 threads to each inch of shaft. The copy is mounted on the drum of the sending transceiver. The exciter lamp focuses a light beam on it. The light beam shines on successive elemental areas in lines around the circumference of the drum, always 1/96 of an inch to the right of the previous line (fig. 2). White areas of copy reflect more light than the black areas. As the light strikes various shades of the copy more light or less light is reflected from drum.

b. The Photocell and Recording Lamp. The photocell sees the reflected light from these consecutive elemental areas as black, white, or shades of gray and translates these shades into varying electrical impulses. The intensity of the electrical impulses depends on the intensity of light reflected. These impulses control the strength of a signal which travels over a regular voice communication channel (wire or radio) to the receiving transceiver. These impulses are impressed on a recording lamp of the receiving transceiver. This lamp changes the intensity of its light with the changing intensity of the incoming signals. Photo sensitive material placed on the drum of the receiving transceiver moves past the recording lamp at the same rate of speed as the drum containing the copy moves past the lens on the transmitting machine. A great amount of light will expose the film or paper more than will a lesser amount of light so that after it is developed it will be seen as a copy of the original. Thus a complete reproduction is built up from the elemental areas.

c. Stylus. For direct-process recording, the signal started by the transmitter photocell is transferred in the receiving machine to a stylus which, in turn, burns a specially prepared paper in much the same manner as a recorder lamp affects the photo-sensitive material. When recording is carried out by means of the stylus, the recording lamp is switched out of the circuit and the received signal is applied to the stylus in varying intensities, according to the shades of black, white, and gray as they are translated into electrical impulses at the transmitter. This causes the surface of the specially prepared paper to be blackened, depending on the amount of light reflected to the photocell.

d. ***Preparing to Transmit.*** The copy to be sent is mounted on the drum of the transmitting transceiver. Photo-sensitive material is placed on the drum of the receiving transceiver to receive and to assemble the picture elements. An exciter lamp and the photoelectric cell are switched into a functioning circuit on the sending transceiver. The exciter lamp focuses a spot of light on the copy to be sent, and this light is reflected through the lens and aperture to the photocell, which controls the signal to be transmitted.

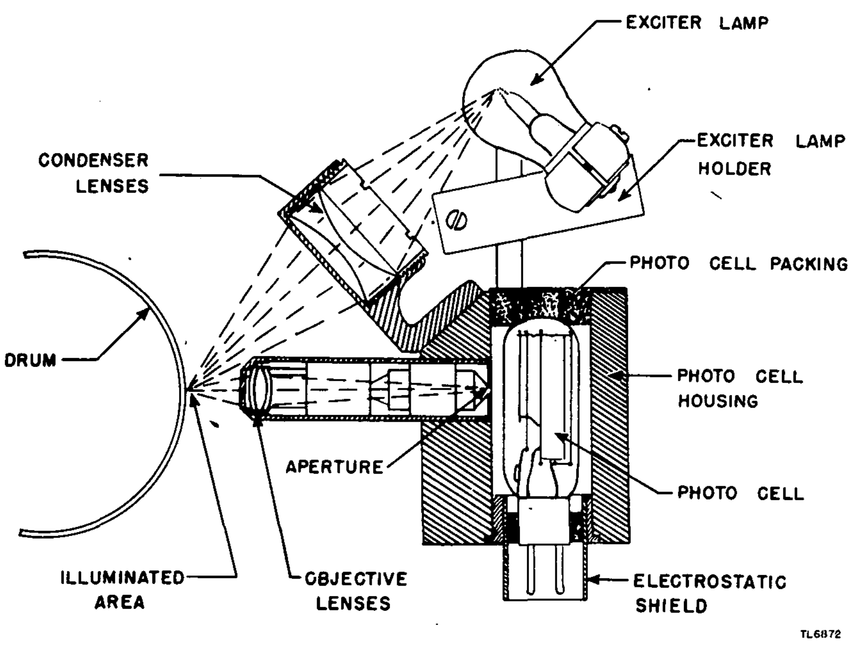

Figure 21. Transmitting optical system.

32. TRANSMITTING (fig. 22). An 1,800-cycle fork-controlled oscillator of high stability serves as the control for the entire unit. Energy from the fork-oscillator unit is amplified and furnishes power for the 1,800-cycle synchronous motor. This motor turns the drum at 90 revolutions per minute and moves the drum along the lead screw at the rate of 1 inch for each 96 revolutions (0.94 inches per minute). Energy from the fork-oscillator unit is amplified in Power Supply PE-140-(*) and furnishes a closely-regulated 6 volts at 1,800 cycles for the exciter lamp. Light from the exciter lamp illuminates a

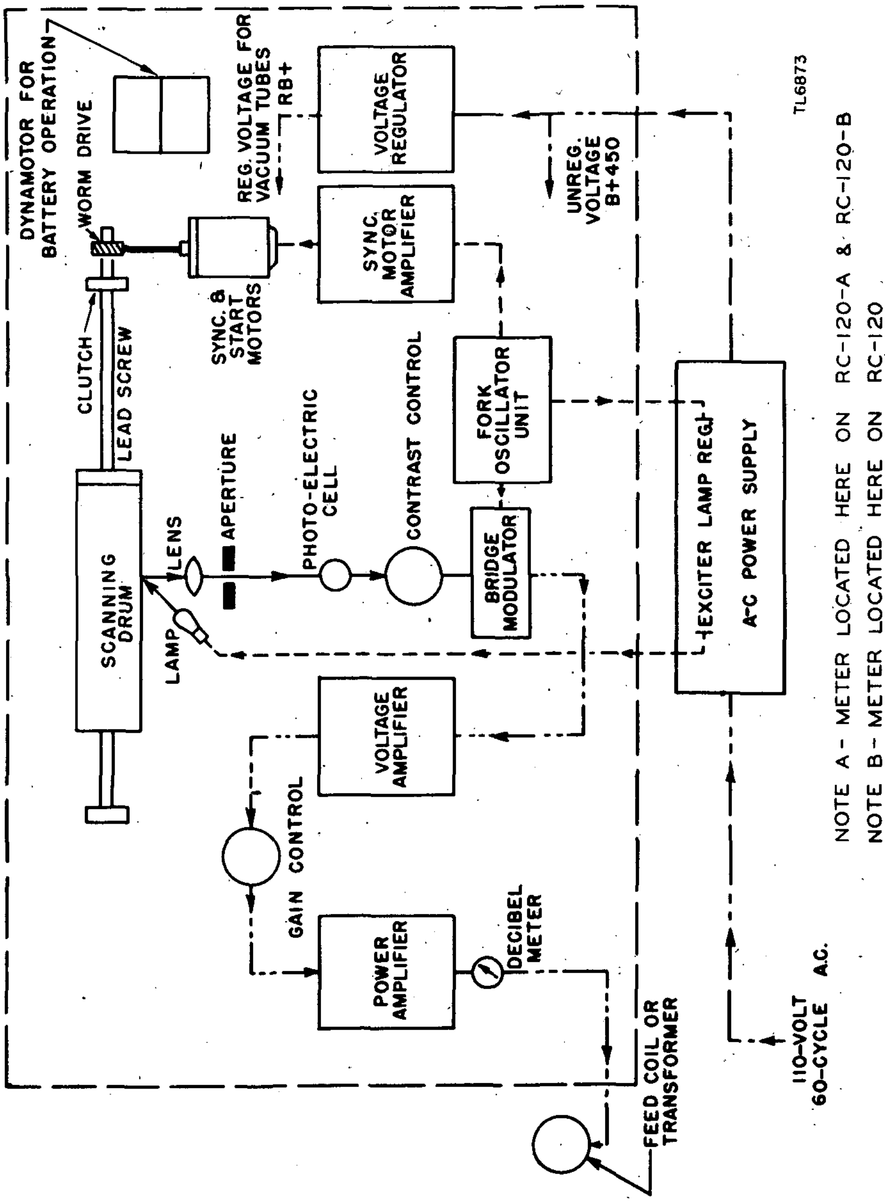

Figure 22. Transmitting block diagram.

spot on the drum. Reflected light from the surface of the copy is projected onto the photocell through the small aperture and lens system (fig. 21). The aperture limits the field of illumination scanned by the photocell to an area of the picture of about 1/100 inch square. Variation in light hitting the photocell controls the bridge modulator upon which is impressed the 1,800-cycle carrier from the fork-oscillator unit. The contrast is associated with the bridge circuit and determines whether the copy will be transmitted as a positive or as a negative (by controlling whether the output signals from the bridge increase or decrease as the amount of reflected light from copy increases). The output signal from the modulator is amplified in a voltage amplifier, attenuated to the desired level by the GAIN control, and then amplified in the power amplifier. The decibel meter indicates the relative amplitude of the output signal.

33. RECEIVING (fig. 23). The fork-oscillator unit in the transceiver at the receiving end functions in the same way as the fork-oscillator unit in the transceiver at the transmitting station. The energy from the fork-oscillator unit controls an amplifier furnishing power for the 1,800-cycle synchronous motor in the receiving transceiver. This motor rotates the drum at a constant speed (exactly the same speed as the drum at the transmitting transceiver). In other words, the drum containing the copy being sent and the drum containing the photo-sensitive material are in exact synchronism. Provision is made for phasing by mechanically stopping the receiver drum and then releasing it on a given impulse from the transmitting transceiver, so that the clamping bars on the two drums will be in the same position, at the same instant. Once the two machines are phased, they remain phased while transmission of the copy takes place.

34. PHOTOCELL CIRCUIT. The photocell circuit is basically a capacitor bridge. The photocell used, RCA 1645, is provided with two anodes. One anode partially balances the capacitance of the other, with respect to the cathode. A slider resistor R42 is used for exact balance on Facsimile Transceivers FX-1-A and FX-1-B. In Facsimile Transceiver FX-1, an external trimming capacitor is connected between the cathode and one of the anodes.

Resistors connected to the photocell form the bridge (fig. 19). An 1,800-cycle signal from the fork-oscillator unit is impressed across the bridge. The amount of light falling on the photocell affects the impedance of the cell and unbalances the bridge. The greater the unbalance of the bridge, the greater is the signal voltage applied to the grid of the first voltage amplifier tube 7C7. The CONTRAST control determines whether an increase of light on the photocell will increase or decrease the signal applied to tube 7C7. An increase in light on the photocell decreases the signal on tube 7C7 grid for positive transmissions.

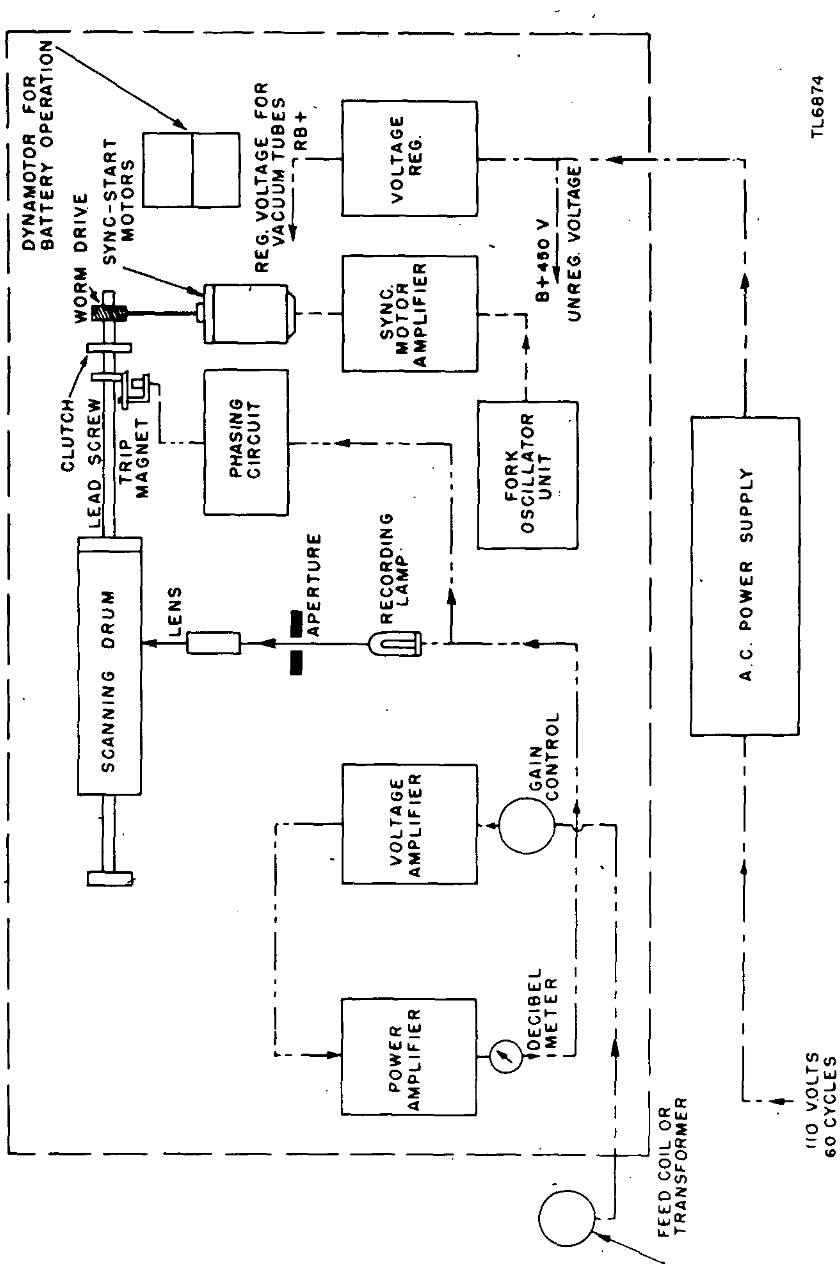

Figure 23. Receiving block diagram.

35. AMPLIFIER. For receiving, the same amplifier is used as in transmitting plus an additional tube 6AC5G. However, when the selector switch is on RECORD DIRECT for stylus operation, tube 7C5 is removed from the circuit and tube 7N7 is substituted. The bias voltage of the first tube 7C5 in the motor amplifier circuit is applied to the cathode circuit of tube 7N7 for stylus recording. Tube 7N7 requires this bias to produce printing of high contrast. On receiving, the GAIN control regulates the signal input to the tube 7C7. The selector switch in the recording position shorts the 1,800-cycle signal on the photocell circuit. Tube 6AC5G operates with zero bias, class B, so that the recorder lamp produces only a slight glow with no signal.

36. PHASING. When the PHASE button is pushed, the holding current ceases to pass through the phasing magnet, lets it release and stop the drum. The phasing pulse sent by the transmitting machine is rectified by the combination of tube 6AC5G and the recorder lamp. The 1,800-cycle component of the phasing pulse is removed by the resistance-capacitance filter on tube 7L7 grid. The pulse is amplified by tube 7L7 and applied on the grid of tube 884. This causes tube 884 to arc, pulling the armature of the phasing magnet and releasing the drum.

37. FORK-OSCILLATOR UNIT. The fork-oscillator unit supplies a signal to the photocell circuit and the motor amplifier circuit. A high degree of frequency stability is required for the motor-driving amplifier. One cycle per second deviation in frequency of the transmitting and receiving machines causes a skew of about 3 inches in the received copy. The stability of fork depends on its bimetallic construction and must be driven by a signal of constant amplitude. Tube 7L7 of the fork-oscillator unit picks up the signal from the coils near the fork, amplifies the signal, and impresses it upon the grid of tube 7C5. Tube 7C5 is driven hard so that variations in amplitude from the pick-up coils will have no effect on its output. In Facsimile Transceivers FX-1-A and FX-1-B, tube 7L7 limits also, so as to provide constant input voltage to the photocell circuit and the motor amplifier. The output of tube 7C5 is fed back to the driving coils of the fork-oscillator unit. A vernier adjustment of frequency over a very small range is obtained by varying cathode resistor of tube 7C5. Tube 7N7 serves as a buffer-amplifier to prevent the load variations from reflecting back into the fork-oscillator unit. The output from one-half of the dual triode tube 7N7 is used for the photocell bridge circuit. The other half is used for the motor amplifier and exciter lamp.

38. SYNCHRONOUS MOTOR AMPLIFIER. The input to the motor amplifier is approximately 30 volts. The wave-form on the grids of the motor amplifier tube is quite flat-topped, but the wave-form impressed on the motor is more nearly sinusoidal. The voltage drop across the motor choke and that across the motor should be about equal and may be as high as 1,000 volts. The value of the capacitor across the motor choke affects the wave-form and is critical if maximum power is to be obtained from the motor. The capacitor across the motor serves to limit the voltage peaks which might otherwise break down the insulation of the motor coils. Its value is not critical. Facsimile Equipment FX-1-A and FX-1-B use a regulator circuit on the driver tube so that the motor current remains constant over the operating range of power supply voltage variations.

39. VOLTAGE REGULATOR RB+. The plate currents of all tubes requiring good voltage regulation pass through the cathode-plate circuit of the two parallel tubes 7C5 in the voltage regulator circuits. Thus, tubes 7C5 act as resistances in series with a plate supply, and their resistance is varied by the grid bias so that the output voltage remains constant. The neon lamp in the cathode circuit of tube 7L7 serves as a constant voltage drop for a voltage reference. A voltage change in the B+ causes a voltage change appearing across tube 7L7 grid resistor, is amplified by tube 7L7 and is applied to the grids of the 7C5s to correct their output voltage back to normal.

40. SYNCHRONOUS MOTOR. The synchronous motor is basically a Lacour phonic wheel motor. The speed of the rotor is brought above 1,800 revolutions per minute by the start winding and then allowed to coast down. Starting is accomplished by a series winding and field coils. Brushes are in actual contact with the commutator only when the START button is pushed, energizing the start magnet. The worm on the shaft is meshed with a fiber gear on the drive shaft which is connected to the lead screw through a friction clutch.

41. CIRCUIT DATA, POWER SUPPLY PE-140-(*) (fig. 20).

a. Power Supply. The B+ supply for the transceiver consists of the power transformer T11, the rectifier tube 5Z3, and the filter. Transformer T11 supplies center-tapped 1,250 volts at 275 milliamperes to the full-wave rectifier tube 5Z3. The output is fed into a choke input filter. The unregulated supply for the transceiver is tapped after the second choke. Transformer T11 also supplies filament power for the transceiver and Power Supply PE-140, and for the start winding of the synchronous motor.

b. Regulated 6-Volt, 1,800-Cycle Exciter Lamp Supply. The exciter lamp is supplied from a closely-regulated 1,800-cycle power source. The power comes from a three-stage amplifier in the power pack. Tube 7S7 or tube 7J7 has 1,800-cycle voltage from the fork-oscillator unit applied on two of its grids. The input voltage is adjustable by potentiometer R91 in Power Supply PE-140. In PE-140-A and PE-140-B this adjustment is unnecessary. The signal is then amplified in one-half of tube 7N7. The output of tube 7N7 drives a pair of tubes 7C5 operating class AB1. The output of tubes 7C5 goes to trans-

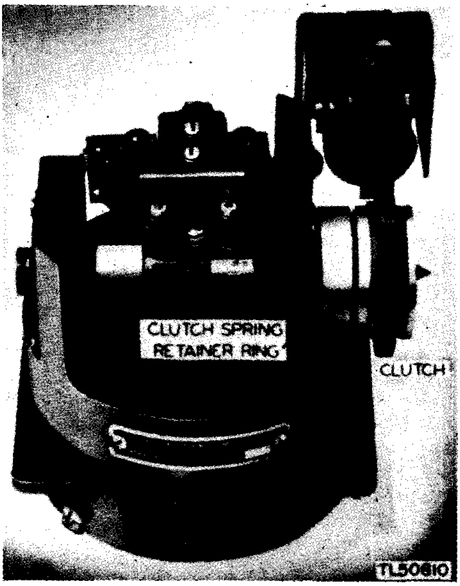

Figure 24. Front top view of synchronous motor for Facsimile Transceiver FX-1-B.

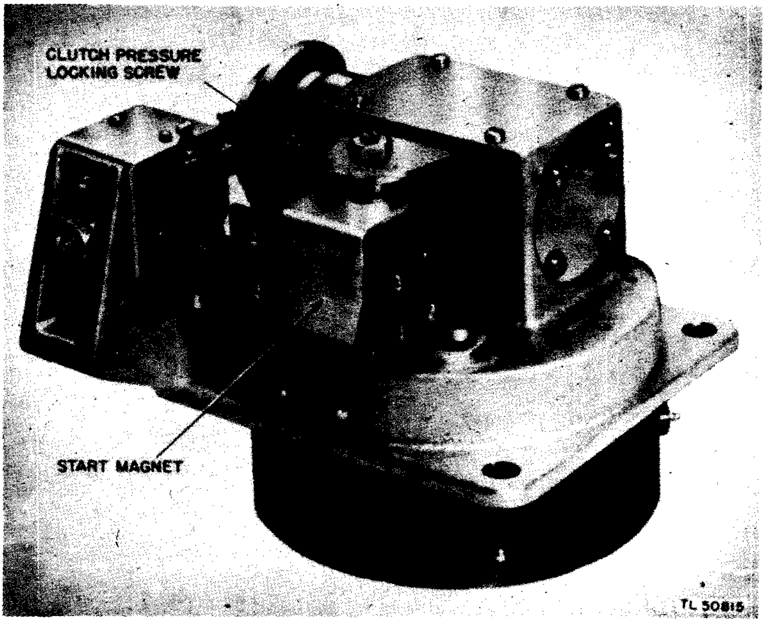

Figure 25. Rear view of synchronous motor for Facsimile Transceiver FX-1-A.

former T15 having two secondary windings. Secondary winding No. 1 serves to actuate the automatic voltage control circuit. The automatic voltage control circuit is similar to the B+ regulator circuit described for the transceiver (par. 39). Secondary winding No. 2 supplies power to the exciter lamp. A neon lamp is used as a constant voltage drop. When the voltage across the output of transformer T15 varies from the required amount, the variation is amplified and used to control the bias voltage on the control grid of tube 7S7 or tube 7J7. In this way the gain of the amplifier is continually adjusted to keep the output on transformer T15 essentially constant. To obtain direct current for the input of regulator tube 7L7, the high voltage appearing across the secondary of transformer T15 is rectified by one half of tube 7N7. The regulator circuit is unconventional in that the plate voltage of tube 7L7 is at ground potential and the cathode is negative with respect to ground.

PART VI

Corrective Maintenance

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42. PHOTOCELL CIRCUIT. If there is too little contrast registered on the db meter between black and white, (less than 12 db), the photocell balance may need adjusting.

a. Turn the selector switch to SET RANGE and adjust the CONTRAST control for minimum on white of the phasing ring. Be sure the GAIN control is set high enough to get a good indication on the meter.

b. On *Facsimile Transceiver FX-1-A or FX-1-B,* loosen the screw on the slidewire resistor R42 and adjust the slider for minimum meter reading. Readjust the CONTRAST control and then the slider to obtain a better minimum. Tighten the slider screw.

c. On *Facsimile Transceiver FX-1,* take the pan from the base of the photocell and reset it to act as a shield (fig. 26). Connect the ground wire to the binding post, and do the following:

(1) With a non-inductive aligning tool, vary the spacing of the copper strip capacitor C8 to the anode. Watch the db meter and adjust the capacitor for minimum meter reading. After each movement of the capacitor strip, rebalance the dip (minimum reading) with the CONTRAST control. A minimum can be obtained by a proper adjustment of capacitor C8 with the scanning beam on white. A compromise usually is better, however, so that a proper contrast also will result on positive transmission. To get this contrast, check the balance with the scanning beam on black of the phasing ring.

NOTE: When this is being done, swing the CONTRAST control for minimum reading. Then readjust the capacity of C8 to further decrease the reading.

(2) Repeat the operations described above several times, balancing first on white and then on black until both dips are about the same.

43. REPLACING THE PHOTOCELL. Unless the photocell is broken physically it will probably never need replacing. If it becomes necessary to replace the cell, proceed as follows:

a. Facsimile Transceiver FX-1-A. Take the shield cover from the bottom of the photocell and unsolder the grid wire from the 7C7 tube socket (pin 6). Remove the molded bakelite base and pull the cell from the socket.

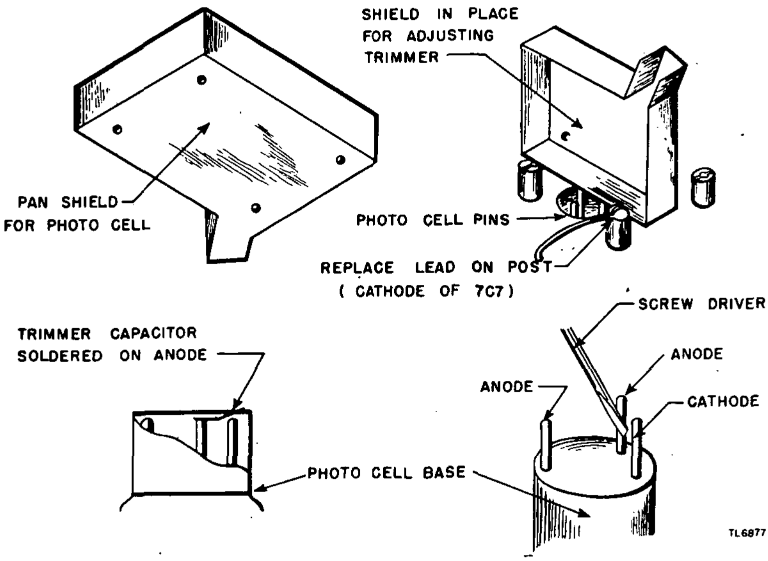

Figure 26. Balancing photocell of Facsimile Transceiver FX-1.

b. Facsimile Transceiver FX-1-B. Remove the top cover of the photocell housing and lift up on the ejector wire on the left-hand side of the photocell housing. This raises the photocell out of its socket (fig. 36).

c. Facsimile Transceiver FX-1. Replace the cell as follows:

(1) Take the pan from the bottom and unsolder wires from the pin of the cell. Note which wire goes to which pin, so that they can be replaced properly.

(2) Remove the shield ring from the base of the cell by taking out the three screws to the flange. Then remove the cell, noting the position of the sponge-rubber rings. Thoroughly wash and dry hands before handling the new cell, or the old cell, if it is to be put back. NEVER HANDLE THE CELL, PARTICULARLY AROUND THE BASE, WITH PERSPIRING HANDS.

(3) Wipe off the cell to be installed with a little cotton moistened with alcohol. Put the rubber rings on the cell and pack them into place as the cell is replaced.

(4) Line up the front of the cell with the scanning beam. Replace the shield ring. Connect the wires to the pins.

(5) Determine which anode requires the trimming capacitor.

NOTE: To do this, temporarily mount the shield pin as shown in figure 26. Turn on the power, place the selector switch to SET RANGE, set the GAIN control to 100, and set the CONTRAST control to 50. Be sure the scanning beam is on black of the phasing ring. Take a small screwdriver with an insulated handle and place the blade on one anode pin and point it toward the cathode. Repeat this test on the other anode. A drop in level on the meter reading indicates the anode which needs the trimmer capacitor.

(6) Solder the small copper capacitor plate directly to the top of the proper anode. Balance the cell as described above (par. 42).

44. AMPLIFIER CIRCUIT. The first amplifier tube 7C7 is highly susceptible to microphonics and must be carefully selected. Test the tube by installing it in the socket and tapping it gently. With the selector switch on RECORD PHOTO and GAIN at 100, there should be little indication on the meter. The cathode resistor of the 7N7 tube adjusts the bias for changing direct-recording contrast. This resistor may be changed in size to adjust printing and to eliminate background. Transformer T_2, feeding the tube 6AC5G, has a low-resistance secondary winding. To replace it for temporary repair, use a plate-to-line transformer. On Facsimile Transceiver FX-1, resistor R55 terminates the transceiver in 600 ohms when the selector switch is on SET RANGE.

45. REPLACING A BURNED-OUT RECORDER LAMP (fig. 27).

a. Disconnect the two wires from the prongs of the recorder lamp by pulling them straight out from the prongs. Take the recorder lamp housing from its mounting bracket. Remove the pressure plate from the back of the recorder lamp housing. Pull out the lamp.

b. Put a new lamp in approximately the same position and pack the rubber rings around it. Do not install the pressure plate. Connect the recorder lamp leads to the lamp prongs, the red lead (+) going to the prong nearest the aligning projection. To center this lamp, connect the UC coupling coil to the transceiver and place the coil on the front of the top left-hand side of the transceiver.

c. Turn the selector switch to RECORD PHOTO. By adjusting the GAIN control and the position of the UC coupling coil, set the meter at about +2 db. Look directly into the lamp lens barrel and adjust the position of the recorder lamp in its housing until the bright spot is centered in this field of view.

d. Disconnect the lamp leads and install the back cushion and the pressure plate. Make sure that the lamp remains centered while tightening the pressure plate screws. Check this position by reconnecting the leads and looking into the lens barrel. Make final adjustments of the lamp's position in the housing as the pressure plate is tightened.

e. Install the recorder lamp housing in its clamp, but do not tighten the clamping screw.

f. Put a thin negative on the drum so that the negative is perfectly tight and extends about ¼ inch over the right-hand end of the drum with the emulsion side out. Push the drum to the left end of the lead screw and set it so the image from the recorder lamp can be seen through the film. Inspect this image with a magnifying glass. Carefully slide the recorder lamp housing backward or forward until a very sharp image of the aperture appears on the negative. By

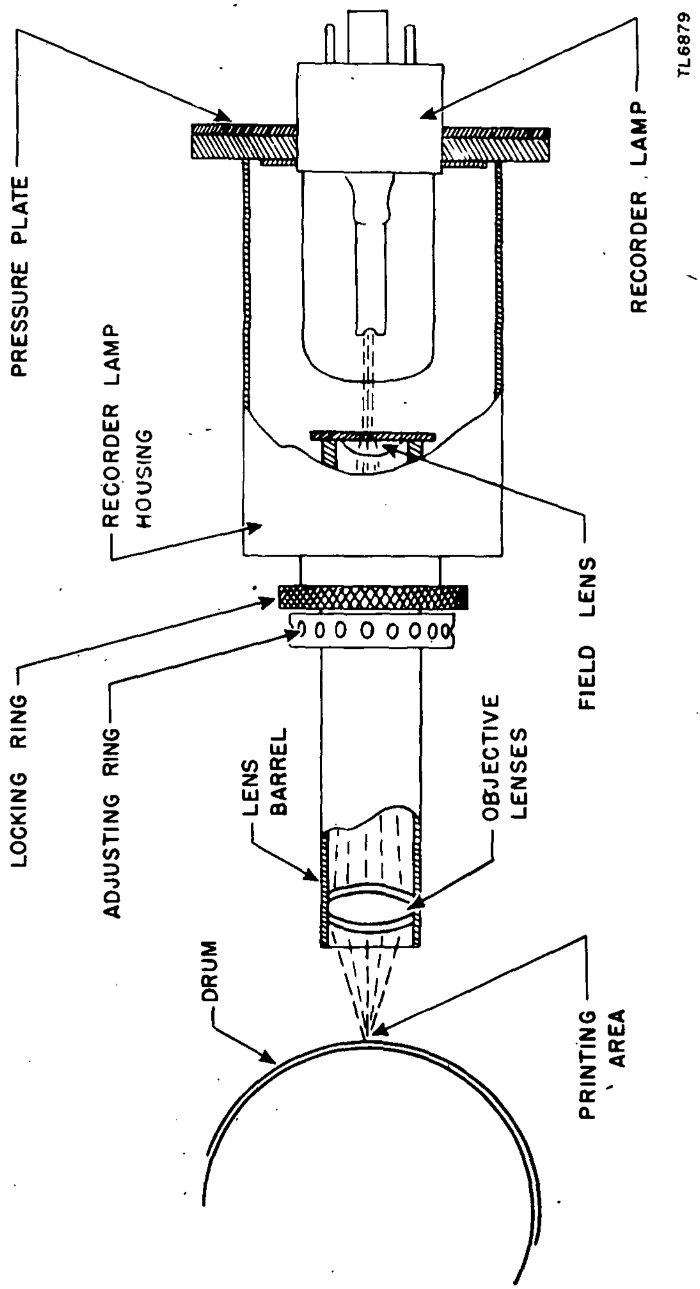

Figure 27. Recording optical system.

turning the housing, set the image so that the long side of the rectangle is horizontal (fig. 28).

NOTE: If the recorder lamp housing is so far back that it hits the outside cover, remove some of the padding in front of the recorder lamp.

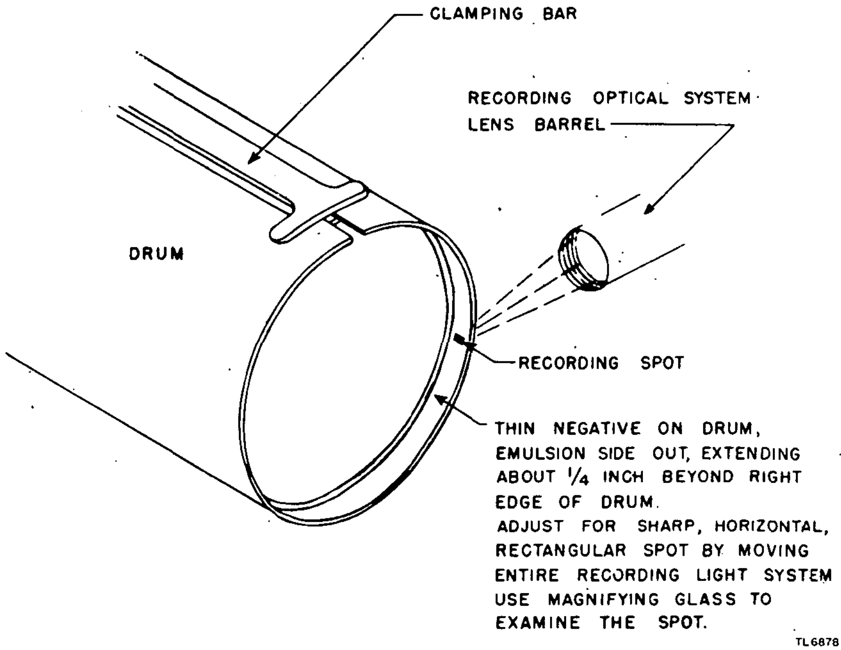

Figure 28. Adjusting the spot size.

g. Tighten the clamping screw. Make a test run on photographic paper to determine whether the focus has been properly adjusted. Examine the copy with a magnifying glass and note how the rectangular images stack up on one another for sharpness and size. In proper adjustment, the rectangles just touch one another on all four sides. If the rectangular spot size is too large and the rectangles overlap one another, turn the lens barrel out of the recorder lamp housing. If the spot size is too small and the rectangles do not meet, turn the lens barrel into the recorder lamp housing. To do this, loosen the locking ring (fig. 27) and turn the adjusting ring and lens barrel five turns in the desired direction as a rough adjustment. Tighten the locking ring, refocus the spot, and make a test run and examine the copy. Repeat this adjustment process until the correct spot size is obtained.

NOTE: Generally it will not be necessary to change the adjustment of the spot size when replacing a burned-out recorder lamp unless the lens barrel adjustment has been moved. When working on the recorder lamp assembly, therefore, be careful not to disturb the position of the objective lens barrel in the housing.

46. DEPOT REPAIRS.

a. Fork-frequency Adjustments. Check fork frequency by putting outputs of two facsimile transceivers on the horizontal and vertical plates of an oscilloscope, or by beating their outputs on an external db meter. Adjustment should be made if there is more than one cycle beat of the two forks in one minute. Correct adjustments can be made only against a frequency standard. If adjustment is necessary, loosen the locking nut and turn the fork frequency control. This method sets the two machines at the same frequency. As soon as possible check both machines against radio station WWV.

b. Frequency Check. A check of the frequency may be made with radio station WWV (2½, 5, 10 or 15 mc) by recording on Teledeltos the one-second pulses. The rows of dots should form straight lines across the paper parallel to the drum axis. Each dot will be 1½ revolutions apart (1 second intervals recorded at 90 rpm).

c. Emergency Adjustments. Emergency adjustments should be made only after a thorough inspection for trouble has been made. *The following adjustments are considered emergency:*

(1) Increasing the capacity of the feedback capacitor to give additional driving power.

(2) An adjustment of the fork-frequency control is necessary when tubes 7L7 or 7C5 are replaced. *Never remove these tubes unless it is absolutely necessary.*

(3) Changing values of the feedback capacitor and the 7C5 plate resistor changes the fork frequency. Make changes here rather than on the fork itself.

(4) Emergency adjustments are seldom necessary on the fork-oscillator unit because small variations in frequency generally can be corrected by adjusting the frequency control. Frequency variation may be expected because of atmospheric pressure and humidity changes and variations in tubes 7L7 and 7C5, which are used as replacements.

(5) Adjustments may be necessary with the frequency control when operating at altitudes higher than 2,000 feet. A perfectly uniform skew in the picture indicates incorrect fork frequencies. Clutch troubles usually give an irregular skew.

CAUTION: NEVER ATTEMPT ADJUSTMENT OF THE FORK IN THE FIELD.

(6) If field adjustment of frequency is attempted, change the frequency control setting until the skew on the received copy is minimized. Return the unit to the depot as soon as possible for checking.

47. PHASING CIRCUIT.

a. Mechanical Adjustments. (1) Mechanical adjustment of the trip magnet assembly (fig. 30) which permits it to engage and stop the drum is determined

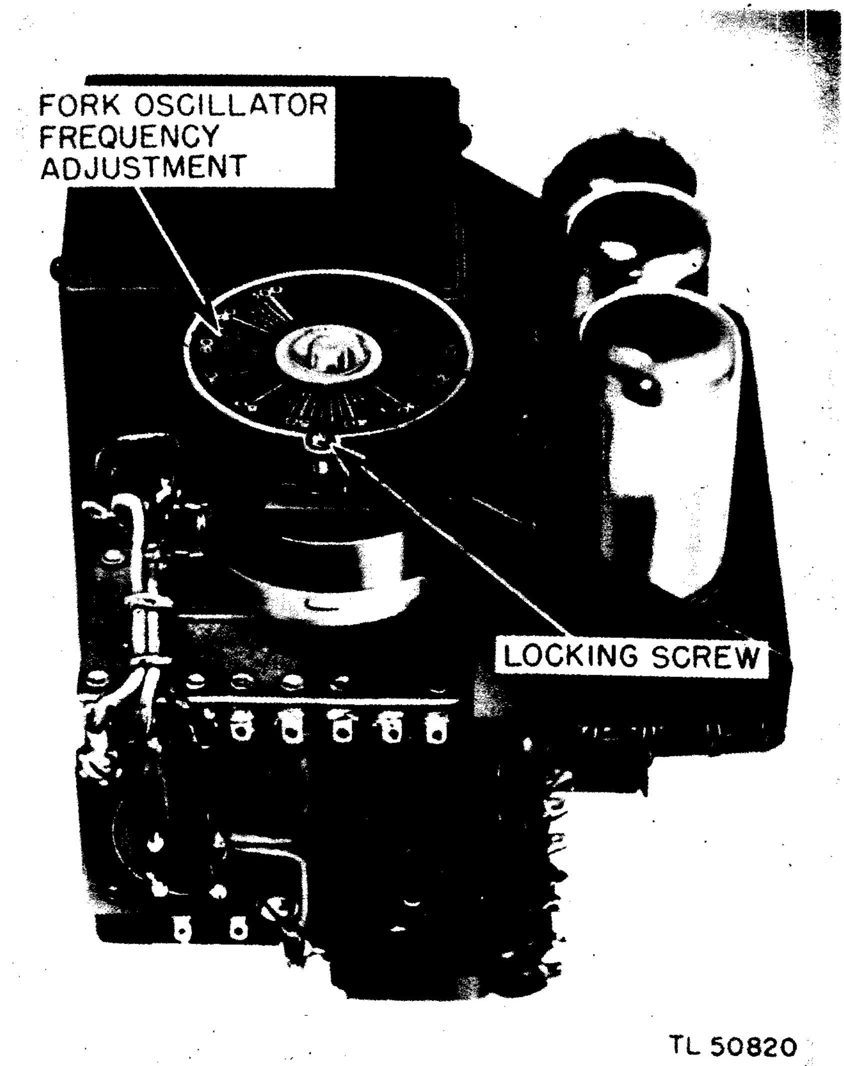

Figure 29. Front view of fork-oscillator unit, Facsimile Transceiver FX-1-B.

by the back-stop screw. Adjust the back-stop screw so that when the armature is released (PHASE button pressed) it engages the stop arm approximately 1/16 inch. When the armature is held up (PHASE button released) the stop arm passes freely, clearing about 1/32 inch.

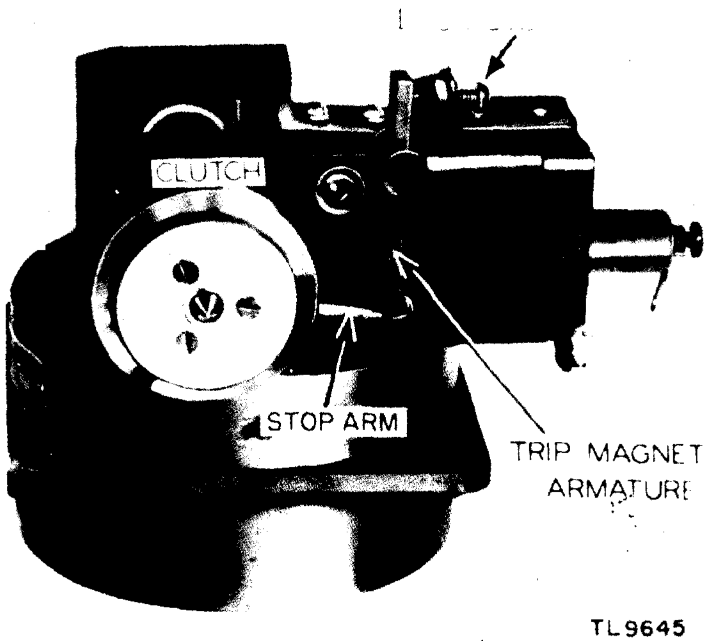

Figure 30. Motor and trip magnet of Facsimile Transceiver FX-1-B.

(2) *Facsimile Transceiver FX-1-A* has no phasing magnet adjustment.

(3) *Facsimile Transceiver FX-1-B* has the back-stop screw adjustment on top of the phasing magnet (fig. 30). Remove the cover on the left-hand end of the machine to expose the adjusting screw.

(4) On *Facsimile Transceiver FX-1,* adjustment of the relay contact spacing is by bending the springs (fig. 31). Contacts should be open except when the push rod on the armature is up. The push rod should move freely. If it shows a tendency to stick or bind, remove the retaining plate, clean out old grease, and relubricate. Carefully remove with a very fine hone any burrs that may have developed.

(5) The back-stop screw permits fine adjustment. Make this adjustment by receiving the phasing pulses from another machine and holding in the PHASE button. Turn the screw until the drum stops and then releases with a phasing pulse.

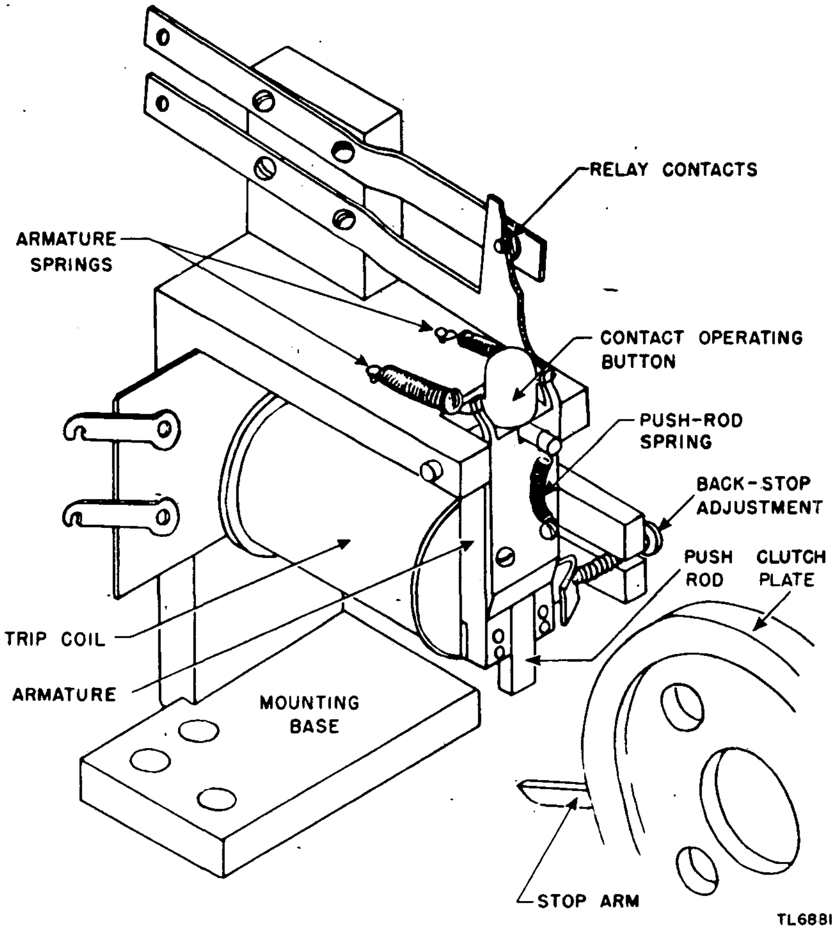

Figure 31. Trip magnet of Facsimile Transceiver FX-1.

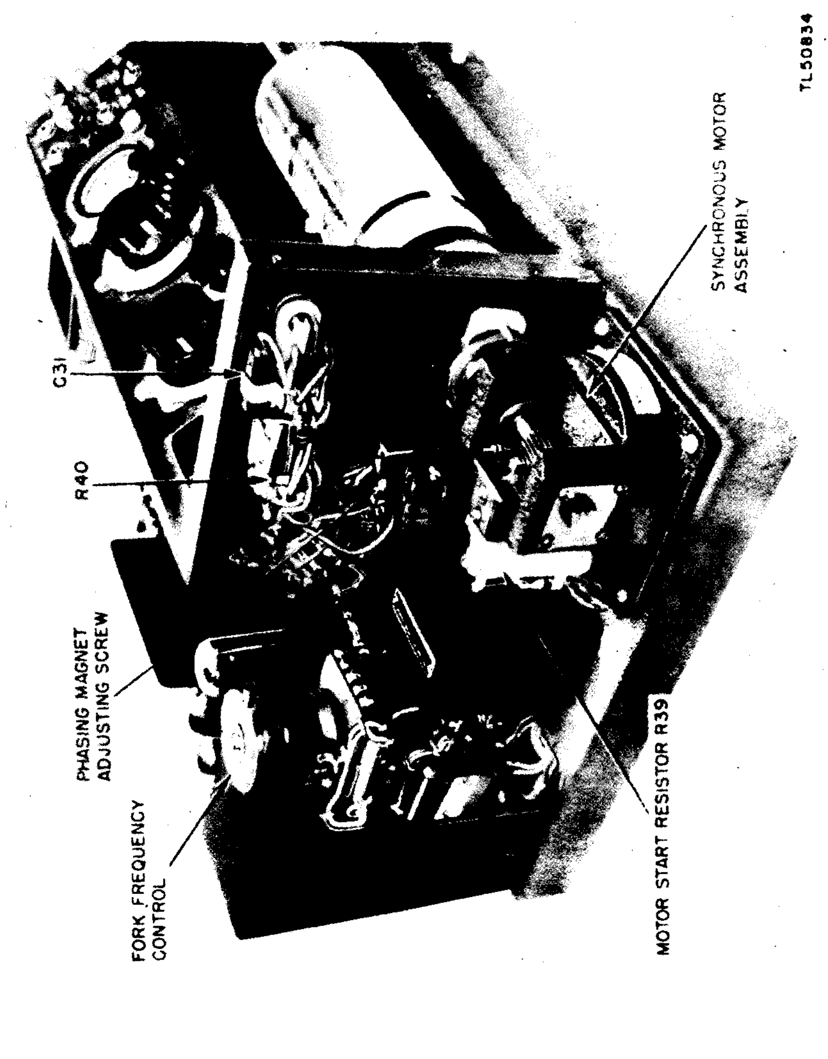

Figure 32. Facsimile Transceiver FX-1-B, cover removed.

b. Electrical Adjustments. (1) If the drum will not release, the trouble may be caused by the setting of the GAIN control. Note the GAIN control setting and then vary the control slowly while holding the PHASE button pressed. The drum should release. Release the PHASE button while the drum is rotating in phase. Return the GAIN control to the original setting. If this condition is chronic, remedy it by proper adjustment of the back-stop screw (figs. 30 and 31).

(2) If the trouble is not mechanical, or if it is as described [subpar. (1) above] check the 884 tube. Replace the tube with a spare. If the phasing pulse on the trip magnet is not large enough to activate the magnet quickly, install a larger cathode by-pass capacitor. Try 1 to 3 microfarads. It may be necessary to change the coupling capacitor between the 7L7 tube and the 884 cathode to 0.05 microfarad. On Facsimile Transceiver FX-1 for radio operation, especially when using FM Converter CV-2/TX, phasing can be improved when working through a noisy signal by adding a 0.015 microfarad capacitor from the plate of the 7L7 tube to ground.

48. SYNCHRONOUS MOTOR AND AMPLIFIER.

a. Motor (fig. 32). (1) Lubricate the top bearing of Transceivers FX-1 and FX-1-B only twice a year with type PS oil, Spec. AXS-777. Excess oil gums the bearing, the commutator, and the brushes. To clean the commutator, remove the bottom plate and carefully remove the rotor. Be careful not to scratch the top bearing when the worm gear is pulled through. Clean the commutator with a lintless cloth or, if necessary, with crocus cloth. *Do not use emery cloth.* Very fine sandpaper may be used if it is first worked in by rubbing on a piece of steel.

(2) To wipe off the start brushes, remove the entire start magnet.

(3) If the motor does not lock into synchronism readily, but has normal power after it does lock in, remove the rotor from the shaft and wipe out any accumulated oil. The rotor should be free on the shaft within the spring plate

(4) The worm gear may require a small amount of lubrication with petroleum jelly if the motor seems to be losing power.

(5) Before suspecting mechanical trouble, check to see if at least 600 volts alternating current appear across the capacitor in parallel with the motor. Low voltage at this capacitor may be due to a defective tube in the motor amplifier circuit, too low B+ voltage from the dynamotor if operating on direct current, low driving signal into the motor amplifier, or defective capacitor in parallel with motor choke.

b. Motor Amplifier. The input voltage to the 7C5 tube should be at least 30 volts. Lower voltage results in decreased motor power. In tracing trouble involving the 7C5 tube, remember that the cathode circuit includes the phasing magnet coil and the 7N7 cathode resistor. Transformer T1 is a step-down

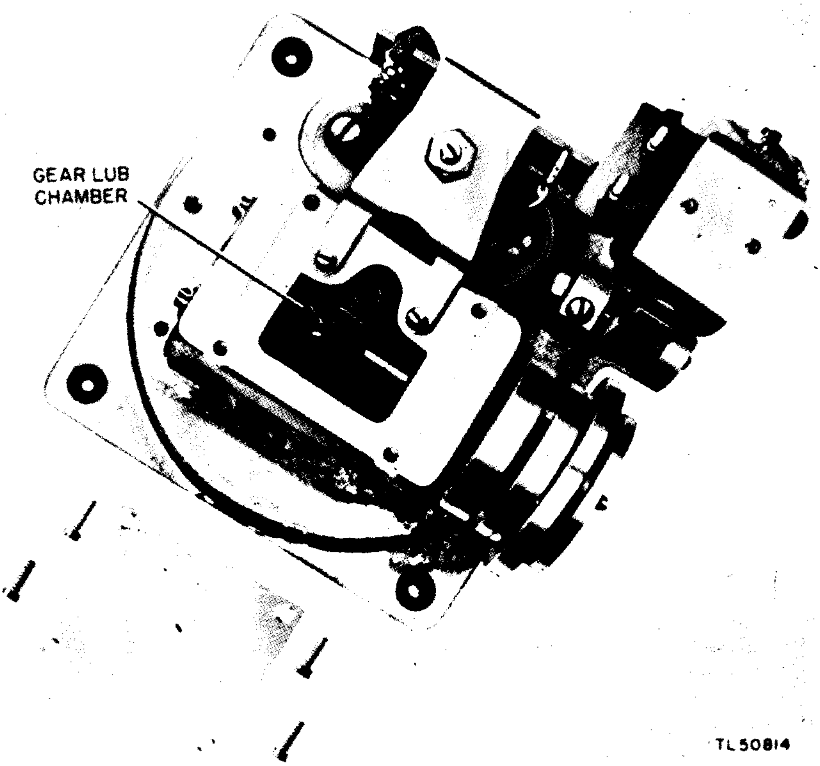

Figure 33. Facsimile Transceiver FX-1-A motor.

NOTE: Facsimile Transceiver FX-1-A has a built-in lubrication chamber (fig. 33).

driver for the motor amplifier tubes. The 6-henry motor choke coil is subjected to very high voltages. It may be replaced by any choke between 3 and 15 henries having an a-c resistance of under 250 ohms and capable of carrying 80 milliamperes. The motor choke capacitor must be replaced with one of at least 2,500-volts rating and of the same capacitance to resonate with the motor at 1,800 cycles.

49. DYNAMOTOR (fig. 35).

a. The dynamotor voltage should be at least 380 with a battery voltage of 6.0.

b. Low-output voltage from the dynamotor generally can be traced to brush trouble in the low-voltage end. Loosen the dynamotor from its mount to remove the brushes. Mark the position, left or right, and the top of each brush; replace

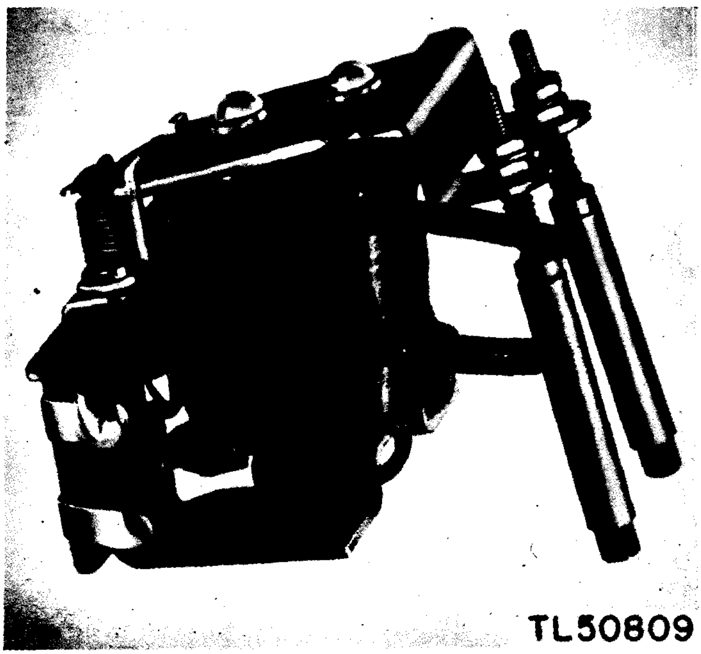

Figure 34. Start magnet.

the brushes in the same positions.

c. The brushes should move freely in the holders and the stranded wire between brush and cap should be copper-colored. If this wire is discolored because of heating, replace the brush. Examine the high-voltage brushes for chipping and cutting. If chipping and cutting recur after new brushes are installed, replace the dynamotor.

50. VOLTAGE REGULATOR RB+.

a. Checking Voltage Regulator Lamps. Regulated B+ must be between 240 and 255 volts. To change the value of RB+, select a different neon lamp or select a different 7L7 tube. A change in value of the 7L7 control grid resistors will change RB+. If RB+ is not correct, try trimming the lower resistance with about 100,000 ohms. Age neon lamps a few hours on direct current external from the transceiver before using them, otherwise the RB+ will not be stable. On Facsimile Transceiver FX-1, capacitor C3 may burn out if the 7L7 resistor is not functioning properly. Check for a bad tube and shorted neon lamps; make continuity tests on resistors. A shorted C3 capacitor may burn out the 7C5 tubes. The resistance measured from RB+ to ground should be approximately 65,000 ohms. An insecure or ungrounded shield over the neon lamp may cause modulation which will show up in the picture.

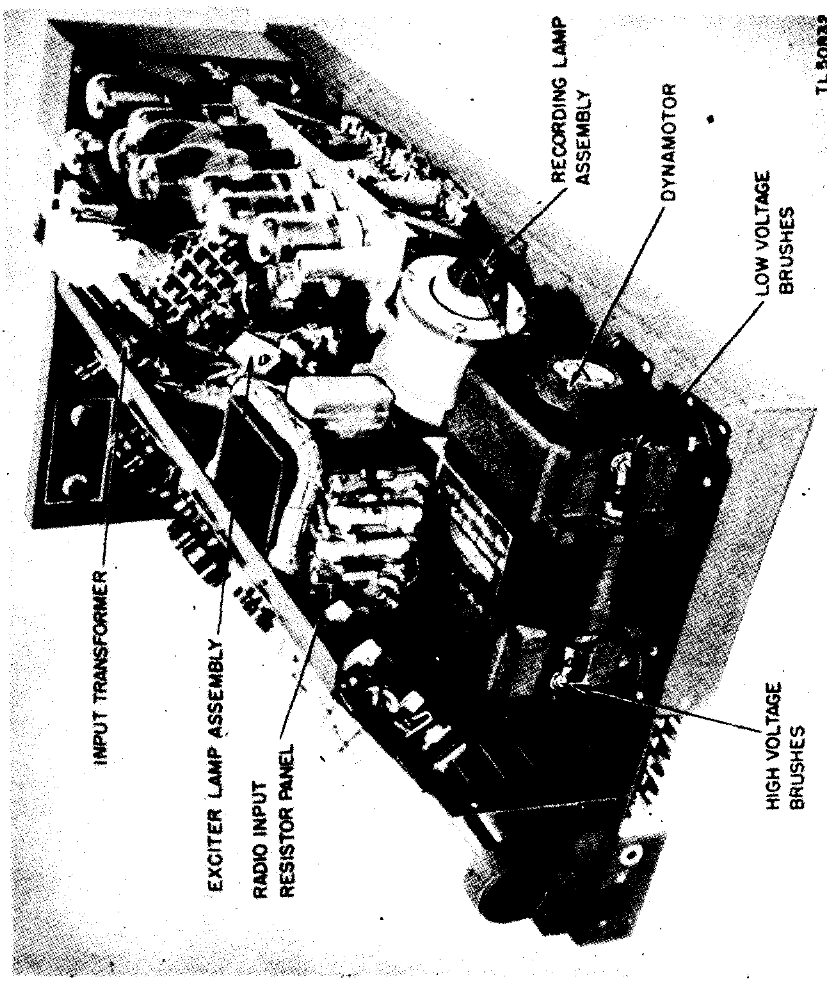

Figure 35. Rear view of Facsimile Transceiver FX-1-B.

b. Replacement of Voltage Regulator Lamps. Voltage regulator lamp R1160 used in Facsimile Transceiver FX-1-(*) and Power Supply PE-140-(*) will glow regardless of polarity, but it must be properly poled for correct regulation action. Some base sockets are not polarized. Therefore it is necessary when making a replacement to determine the positive and negative terminals of each to insert the lamp with the polarities matched. The lamp will be supplied with one terminal marked positive (+). The polarity of the socket must be determined by a voltmeter measurement if it is not marked.

(1) Measure the voltage across the contacts of the socket with the lamp inserted to determine the positive and negative leads to the socket.

(2) Turn the power on. If necessary reverse the lamp in the socket, to make the positive terminal of the lamp contact the positive terminal of the socket.

(3) Replacement of a neon lamp in Facsimile Transceiver FX-1-(*) sometimes results in RB+ higher or lower than the required 240- to 255-volt range. Adjust resistors R1 and R2 as directed in this paragraph.

(4) Replacement of a voltage regulation lamp in Power Supply PE-140-(*) sometimes results in poor regulation and incorrect voltage across the exciter lamp. Correct the voltage across the exciter lamp in the following way:

(a) Operate Facsimile Transceiver FX-1-(*) on a well-charged battery (specific gravity 1.270) and turn to SET RANGE position.

(b) With dip on black and 0 db on white, turn to the white of the phasing ring.

(c) Turn off Facsimile Transceiver FX-1-(*), remove the battery and plug in Power Supply PE-140-(*).

(d) Without moving any dials of Facsimile Transceiver FX-1, turn the power on. On Facsimile Transceivers FX-1-A and FX-1-B, adjust resistor R15 so that the db meter reads +1 db. On Facsimile Transceiver FX-1, adjust resistors R82 and R91 of Power Supply PE-140-(*) until the db meter reads +1 db.

(e) The reading should not vary more than 1 db when the input voltage of Power Supply PE-140-(*) is varied slowly or rapidly from 100 to 130 volts. To adjust the regulation on power Supply PE-140, vary resistors R91 and R82, always bringing the meter back to +1 db.

51. EXCITER LAMP REPLACEMENT. Before deciding that the exciter lamp is burned out and needs replacing, be sure that it is getting power. The voltage at the base of the lamp should be about 6 volts.

a. To remove a defective exciter lamp in *Facsimile Transceivers FX-1-A* and *FX-1-B,* push the bulb down, turn it to the left, and pull it from the socket. Replace with a new bulb. Turn the CONTRAST control for a minimum meter reading on black. Place a sheet of white paper on the drum. Put a screwdriver in the slots of each position adjustment (fig. 36). Turn for maximum meter

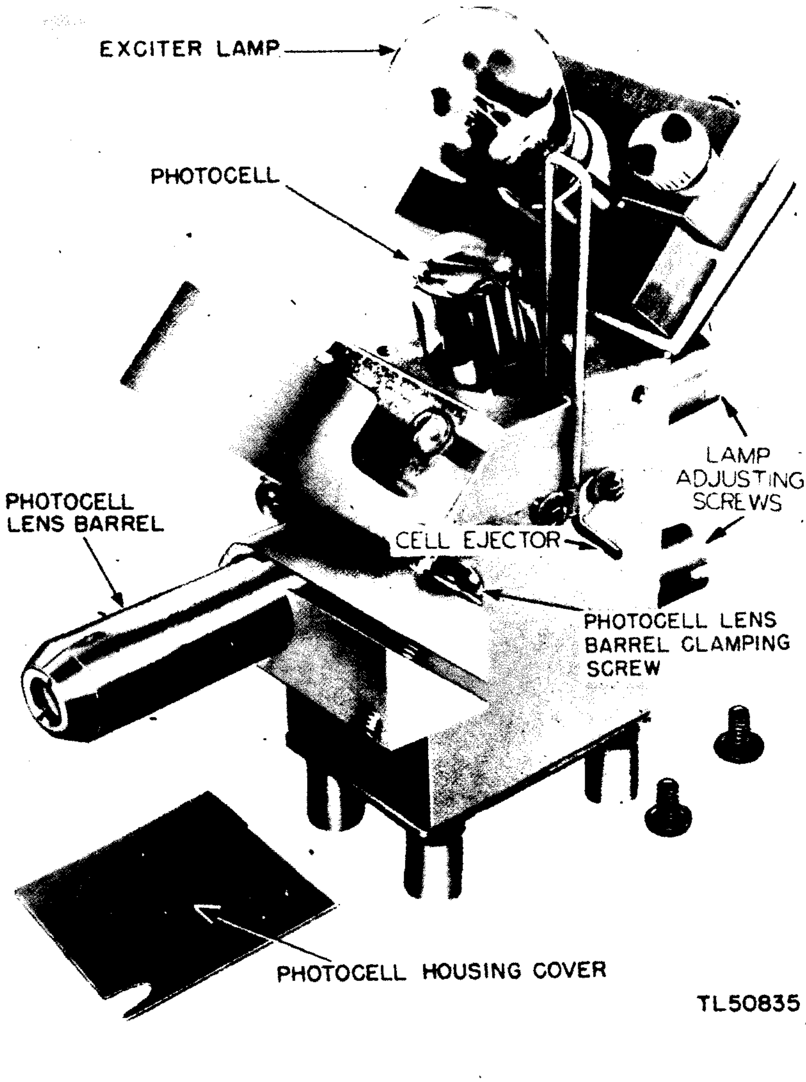

Figure 36. Exciter lamp assembly of Facsimile Transceiver FX-1-B.

reading. On *Facsimile Transceiver FX-1-A,* (figs. 16 and 17) be sure to loosen the locking nuts before making adjustments and to tighten them when the adjustment has been made.

b. If the lamp is to be replaced on *Facsimile Transceiver FX-1,* proceed as follows:

(1) Unsolder the wires at the base and remove the lamp and the bakelite

holder from the metal clamp. In lining up the replaced lamp, set the filament so that the two filament curls lie almost on top of one another when the lamp is adjusted in line with the condenser lens.

(2) To locate the lamp holder position, turn the transceiver to ON, set the CONTRAST control and GAIN control at 50, and adjust the position of the lamp for maximum meter reading. Put a white paper on the drum. The final test for adjustment is to push the lamp mounting gently after it has been tightly clamped. When correctly adjusted, a push in any direction will give a decrease in meter reading.

(3) Be sure that the clamping screws are tight and that the soldered connections on the base of the bulb are well made.

52. CLUTCH. Clutch spring pressure which is too light may cause the clutch to slip. An excessive load caused by binding of the drum mechanism or a dirty lead screw also can cause a clutch to slip. To remedy this condition clean and oil the lead screw. If the trouble continues, adjust the clutch. Field adjustment of the clutch is not recommended, but if absolutely necessary, the procedure is as follows:

a. Remove the cover on the left end of the transceiver.

b. Loosen the spring retainer clamping screw (fig. 24).

c. Slide the spring retainer slightly to the right and tighten the clamping screw.

NOTE: If the clutch is tightened too tight, the motor will stall when phasing.

53. SERVICING POWER SUPPLY PE-140-(*).

a. B+ Supply. B+, as measured across contacts 11 and 3 of the power connecting cord, should be between 350 and 575 volts, depending upon the line voltage. A burned-out fuse may indicate a shorted B+ supply. Check all capacitors from B+ to ground for shorts. Also check tube 5Z3.

b. Exciter Lamp Supply. There should be approximately 30 volts at 1,800 cycles from pin No. 9 of the Jones plug to ground. Check tube 7J7 (or 7S7). A low lamp voltage may be caused by a defective 7C5 power tube or a shorted 7J7 (or 7S7) tube. For Power Supply PE-140 adjust resistor R91 so that there are 3 to 5 volts from the moving arm to ground and adjust resistor R82 so that there are 6.1 volts across the winding of transformer T15. In Power Supplies PE-140-A and PE-140-B, adjust resistor R15 for 6.1 volts across secondary 2 of transformer T15. Shorted turns on transformer T15 greatly reduce its efficiency. About 17 watts are required for the exciter lamp. For Power Supply PE-140 the best possible settings of resistors R82 and R91 will be different for each neon bulb 7L7 or 7J7 (or 7S7) replaced. If a Variac is available, use it to set the regulation [par. 50 (4)]. The 7J7 tube used as input and mixer tube in Power Supply PE-140, has been discontinued and is replaced in the spare parts by a tube 7S7. These two tubes are directly interchangeable in Power Supply PE-140-(*) without modification or circuit changes.

NOTE: The 7S7 tubes in the spare parts are labeled: "This 7S7 vacuum tube is to be used as a replacement for vacuum tube 7J7 in Power Supply PE-140".

CAUTION: NEVER REMOVE THE 7L7 TUBE IN THE VOLTAGE REGULATOR CIRCUIT WHEN THE POWER IS TURNED ON AS THIS WILL BURN OUT THE EXCITER LAMP.

54. GENERAL SERVICE NOTES.

a. Loktal tubes have small area prongs and are subject to poor prong contacts after long periods of storage or use. If the unit does not function properly try wiggling the tubes, or removing them and shine up the prongs if necessary. Because of the small prongs, use the tube lifter supplied when removing the tubes. Tilting the tubes sidewise to loosen the loktal feature results in bent prongs and poor contacts.

b. The equipment will not operate satisfactorily on line voltage below 100 or a battery with specific gravity below 1.225. Make sure these two conditions are met before looking further for trouble.

c. Remember that no signal leaves the transceiver if the selector switch is on SET RANGE. If the machine will not transmit, check here first.

d. Clean and oil the lead screw *regularly,* and check the lead screw as a source of irregular or skewed reception.

CAUTION: WHEN REMOVING THE TUBES FOR CHECKING, DO NOT MIX THEM UP. THIS IS ESSENTIAL IN THE CASE OF THE FORK OSCILLATOR TUBES, THE FIRST AMPLIFIER TUBE, THE VOLTAGE REGULATOR TUBES, AND THE EXCITER LAMP REGULATOR TUBES.

e. The wiring of the circuit is very critical. Even the placement and dressing of the wires is set; do not disturb them unless it is absolutely necessary.

CAUTION: MOVE ONLY THOSE PARTS WHICH ABSOLUTELY MUST BE MOVED WHEN WORKING ON THE SET.

f. Under continual operation or in an extremely hot climate, operation of the db meter does not remain constant due to temperature characteristics of its copper-oxide rectifier element. The output of the transceiver remains essentially constant, however, under wide temperature changes. After a period of operation, the db meter may read as much as 2 db low, necessitating setting the maximum at 0 db rather than +2 db. This may be checked by using the meter externally.

55. 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 and crosstalk.

(5) Moisture provides leakage paths between battery terminals.

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 means of a spray gun. A brief description of the method of application follows:

(1) All repairs and adjustments necessary for the proper operation of the equipment are made.

(2) Equipment to be processed is thoroughly cleaned of all dirt, dust, rust, fungus, oil, grease, etc.

(3) Equipment is partially disassembled and certain points, such as relay contacts, open switches, air capacitors, socket, bearings, etc., are covered with masking tape.

(4) Equipment is thoroughly dried by heat to expel moisture which the circuit elements have absorbed.

(5) All circuit elements and all parts of the equipment are sprayed or painted with three coats of moistureproofing and fungiproofing varnish.

(6) The equipment is given a final operational check.

c. Step by Step Instructions.

NOTE: Make sure that competent operators and repair personnel are available before starting to treat this equipment. Changes in delicate optical and electrical adjustments are bound to occur in the process of treatment and should be repaired as outlined in this manual. Treat Facsimile Transceivers FX-1-(*) and Power Supply PE-140-(*) as individual units.

(1) Disassembly.

(a) Facsimile Transceiver FX-1-(*). Remove the hinged cover. Slide the drum to the left end of the lead screw. This will protect the lead screw threads from damage during treatment. Remove the transceiver parts in the following order: the top cover, motor compartment cover, back and right side cover, tubes, the bottom plate, and the photocell shield located on the bottom of the chassis.

NOTE: Identify each tube so that it may be replaced in the same socket after treatment. This is important: if these tubes become mixed, difficulty will be experienced in obtaining proper performance of the fork oscillator unit and the amplifier. Mark the position of the neon voltage regulator lamp before removing it from its socket. Replace it in the same orientation.

(b) Fork Oscillator Assembly. Remove the fork oscillator assembly by

removing the four screws from the bottom and unsoldering the leads from the terminal strips. Mark each wire for replacement in exactly the same place after treating.

(c) Power Supply PE-140-(*).

1. Remove the cover and protective grill.
2. Remove tubes. Mark the neon regulator tube as to its orientation in the socket so that it may be replaced in exactly the same position.
3. Place dummy tubes or old tubes in the sockets.
4. Remove the bottom cover.
5. Treat the underside of the chassis with spray or brush.

(2) Masking.

(a) Mask the top of the tube sockets or place dummy tubes or old tubes in the sockets while treating.

(b) Mask the frequency dial plate and terminal strip.

(c) Treat the fork oscillator unit as a separate unit with a brush or by spray.

(d) Mask the START switch, PHASE switch, and stylus mechanism under the chassis. Mask the slide wire resistor R42 on transceivers FX-1-A and FX-1-B.

(e) Mask the right half of the lead screw, and the drum.

(f) Place dummy tubes or old tubes in sockets while treating.

(g) Treat the motor amplifier and voltage regulator subpanel separately. Cover the rest of the unit with a cloth and be sure that only the subpanel is exposed to the spray.

NOTE: Treat all exposed resistors and capacitors, the CONTRAST and GAIN controls and exposed cables and wires with a brush. Do not try to treat the selector switch. Prevent varnish from coming in contact with the selector switch wafers or contacts. *Do not treat the motor, clutch assembly, gears or moving parts of the start magnet and phasing relay.* Be sure no varnish gets on the exciter lamp, exciter lamp lens, photocell lens, or recording lens. These may be masked with tape provided they are first covered with soft paper or cloth. Treat the underside of the chassis with spray or brush.

NOTE: For a full description of the varnish spray method of fungiproofing and moistureproofing, refer to TBSig 13.

56. DIAGNOSIS OF CHARACTERISTIC TROUBLES.

Trouble	*Possible causes*
Uniform skew in picture.	If there is a pronounced skew, look for a dirty lead screw; if there is only a slight skew, check the fork oscillator. Trouble also may be a slipping clutch, but usually not if the skew is uniform.
Non-uniform skew or jumps in phasing.	Slipping clutch or something touching the drum as it rotates, or dirty lead screw.
Light and dark columns in the background, lengthwise on the picture.	Forks on receiving and transmitting machines beating because of pick-up in the receiver.
Wavy lines in the background, crosswise on the picture, about 1/4 inch apart.	60-cycle hum pick-up through a coupling unit, or from Power Supply PE-140 being too close to the transceiver, or from the transmission line picking up interference from a power line.
Uniform dark and light streaks crosswise on the picture, about 1/2 inch apart.	Gear hash resulting from too tight a fit between the motor worm and the shaft gear, or to an improperly-matched set of gears.
Wavy lines in the background resembling grain in wood, on battery operation.	Dynamotor hash caused by mechanical vibrations from the dynamotor or from electrical pick-up from the dynamotor commutator.
Random light and dark streaks throughout the picture.	Voltage regulator not functioning properly, or recorder lamp level change, or flaw in lead screw.
Reversal of picture tones.	CONTRAST control on transmitter set improperly.
Individual recording lines, waving slightly lengthwise on the picture, on battery operation.	Vibration from the dynamotor jarring the recording optical system; or a dirty lead screw.
Elemental area rectangles overlapping one another.	Spot size too large or too small because the objective lens of the recording optical system moved when recorder lamp was replaced.
Fuzzy areas on the received picture.	Copy not tightly wrapped on the drum at the transmitting end or receiving end.
Poor contrast in received copy.	Too small a contrast set on transmitter or improper developing of received copy; old or cold developer.
Fogged photographic reception.	Photographic medium ruined by heat, light struck, or developer too hot.
Final photographic copy too light, even with correct development.	Recorder lamp fogged over on the end.
Background and fuzziness on direct-recording process. Poor contrast.	Too small bias on tube 7N7 in amplifier circuit. Increase the size of cathode resistor in 500-ohm steps until satisfactory copy is received.
Mottled direct-process reception or intermittent recording.	Too low stylus needle pressure.

TABLE 2

TUBE SOCKET VOLTAGES OF FACSIMILE EQUIPMENT RC-120

Facsimile Transceiver FX-1

Operated on Power Supply PE-140—Line voltage, 117; all readings between 10 volts and 250 volts refer to 250-volt scale. All readings are from ground.

1000 ohms per volt. B+ = 500 volts, RB+ = 245 volts.

No.	*Tube*	*Use*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1	7L7	Fork pick-up	gnd	75	40	1.8			1.8	
2	7C5	Fork driver	gnd	150	150				45	
3	7N7	Fork buffer amplifier	gnd	7	145			160	6.5	
4	7C7	1st voltage amplifier	gnd	32	30	1.8			1.8	
5	7L7	2nd voltage amplifier	gnd	80	55	2.4			2.4	
6	7C5	Driver amplifier	gnd	240	240	45			15	
7	7N7	Driver amplifier	gnd	20	240			240	20	
8	6AC5G	Power amplifier		gnd	160					
9	7L7	Voltage regulator	gnd	90	50	65			65	
10	7C5	Voltage ballast	gnd	520	520				250	
11	7C5									
12	7C5	Motor amplifier driver	gnd	490	490				50	
13	7C5	Motor amplifier	gnd	440	440				100	
14	7C5									
15	7L7	Phasing amplifier	gnd	10	10				0	
16	884	Phasing trigger tube		gnd	30					50

NOTE: Limits: B+ may be 350 to 575 volts; RB+ may be 240 to 250 volts.

Power Supply PE-140

Line voltage = 117. All readings between 10 volts and 250 volts refer to 250-volt scale. All readings are from ground.

No.	*Tube*	*Use*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1	5Z3	Rectifier	550	650	650	550				
2	7J7	Voltage input & mixer	gnd	250			25		.8	
3	7N7	Amplifier and rectifier	gnd		400	400			20	
4	7C5	Power amplifiers	gnd	450	250				30	
5	7C5									
6	7L7	Voltage regulator	gnd	−10	−5v	−280	gnd	−250	−280	

TABLE 2—*(Continued)*

Facsimile Transceiver FX-1

Operated on Power Supply PE-150—Specific Gravity = 1.250. All readings between 10 volts and 250 volts refer to 250-volt scale. All readings are taken from ground.

1000 ohms per volt. B+ = 350 volts, RB+ = 240 volts.

No.	*Tube*	*Use*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1	7L7	Fork pick-up	gnd	75	40	1.8			1.8	
2	7C5	Fork driver	gnd	150	150				45	
3	7N7	Fork buffer amplifier	gnd	7	145			160	6.5	
4	7C7	1st voltage amplifier	gnd	30	30	1.8			1.8	
5	7L7	2nd voltage amplifier	gnd	75	55	2.4			2.4	
6	7C5	Driver amplifier	gnd	230	230	45			15	
7	7N7	Driver amplifier	gnd	17	220			220	16	
8	6AC5G	Power amplifier		gnd	135					
9	7L7	Voltage regulator	gnd	65	45	65			65	
10	7C5	Voltage ballast	gnd	350	350				250	
11	7C5									
12	7C5	Motor amplifier driver	gnd	350	350				40	
13	7C5	Motor amplifiers	gnd	300	300				75	
14	7C5									
15	7L7	Phasing amplifier	gnd	10	10				0	
16	884	Phasing trigger tube		gnd	30					45

TABLE 3

TUBE SOCKET VOLTAGES OF FACSIMILE EQUIPMENT RC-120-A & RC-120-B

Operated on Power Supply PE-140-A or PE-140-B--Line voltage, 117; all readings between 10 volts and 250 volts refer to 250-volt scale. All readings are from ground.

1000 ohms per volt B+ = 530 volts RB+ = 255 volts

Selector switch in record photo position and meter reading +2 db

Facsimile Transceiver FX-1-A and FX-1-B

	Signal Amp.					*Fork*		
Pin	*7C7*	*7L7*	*7C5*	*6AC5G*	*7N7*	*7L7*	*7C5*	*7N7*
1				x				
2	40	80	250		0	100	200	7.5
3	30	60	250	170	65	40	200	150
4	1.2	1.4	x	170		1.2	x	
5	1.2	1.4	x				x	
6				x				165
7	1.2	1.4	17		13	1.2	45	7
8				0				

TABLE 3—(Continued)

TUBE SOCKET VOLTAGES OF FACSIMILE EQUIPMENT RC-120-A & RC-120-B

Operated on Power Supply PE-140-A or PE-140-B—Line voltage, 117; all readings between 10 volts and 250 volts refer to 250-volt scale. All readings are from ground.
1000 ohms per volt   B+ = 530 volts   RB+ = 255 volts

Selector switch in record photo position and meter reading +2 db

Facsimile Transceiver FX-1-A and FX-1-B

	Phase Button Pushed Phasing Amp.		*Motor Amp.*		*Voltage Reg.*	
Pin	*7L7*	*884*	*7C5*	*6AC5G*	*7L7*	*7C5*
1		x		x		
2	50		270		200	530
3	3.5	255	345	490	100	530
4	8.5	x	0	x	90	x
5	8.5		x		90	0
6		255		x	75	200
7	9		28		90	255
8		50		0		

Power Supply PE-140-A and PE-140-B

Transmit

Pin	*5Z3*	*7L7*	*7J7*	*7N7*	*7C5*
1	560				
2		— 15	225	20	495
3		— 2	x	490	260
4	560	—210			x
5		0	170	—360	x
6		—150	— 20	—360	
7		—205		0	24
8					
T12	560	560			
T13	540	540			

TABLE 4

TUBE SOCKET RESISTANCES OF FACSIMILE EQUIPMENT RC-120

Facsimile Transceiver FX-1

All readings are from ground.

K = 1000

No.	Tube	Use	1	2	3	4	5	6	7	8
1	7L7	Fork pick up	0	300K	560K	2K	2K	1 meg	2K	0
2	7C5	Fork driver	0	100K	100K	150K		100K	20K	0
3	7N7	Fork buffer amplifier	0	2K	90K	50K	60K	90K	2K	0
4	7C7	1st voltage amplifier	0	400K	1.5 meg	3K	3K		3K	0
5	7L7	2nd voltage amplifier	0	200K	600K	2K	2K	250K	2K	0
6	7C5	Driver amplifier	0	60K	60K	1.5K	1.5K	1 meg	600	0
7	7N7	Driver amplifier	0	1K	∞	200K	200K	∞	1K	0
8	6AC5G	Power amplifier	0	0			60		0	0
9	7L7	Voltage regulator	0	1.5 meg	2.5 meg			15K	2 meg	0
10	7C5	Voltage ballast	0	600K	600K					
11	7C5							1.5 meg	60K	0
12	7C5	Motor amplifier driver	0	600K	600K			20K	1.6K	0
13	7C5	Motor amplifier								
14	7C5									
15	7L7	Phasing amplifier	0	1.2 meg	2.2 meg	300	300	30K	300	0
16	884	Phasing trigger tube	0		2 meg		1 meg	60K		60K

Power Supply PE-140

No.	Tube	Use	1	2	3	4	5	6	7	8
1	5Z3	Rectifier	0		50	50				0
2	7J7	Voltage input & mixer	0	1 meg		1 meg	1.5 meg	500K	1K	0
3	7N7	Amplifier & rectifier	0	3K		500K	500K	500K	0	0
4	7C5	Power amplifiers	0		0		0	500	300	0
5	7C5									
6	7L7	Voltage regulator	0	1 meg	1 meg	250K		250K	250K	0

TABLE 5

TUBE SOCKET RESISTANCES OF FACSIMILE EQUIPMENT RC-120-A, RC-120-B

Facsimile Transceiver FX-1-A and FX-1-B

K = 1000

	Record Photo Signal Amp.					*Fork Osc.*		
Pin	*7C7*	*7L7*	*7C5*	*6AC5G*	*7N7*	*7L7*	*7C5*	*7N7*
1	0	0	0	∞	0	0	0	0
2	300K	200K	50K	0	0	300K	90K	1.7K
3	1 meg	750K	50K	∞	150K	1 meg	90K	75K
4	2.9K	1.8K	x	∞	500K	1.8K	x	400K
5	2.9K	1.8K	x	35	2 meg	1.8K	x	50K
6	∞	250K	160K	x	∞	1.6K	1 meg	75K
7	2.9K	1.8K	500	0	1.2K	1.8K	40K	1.8K
8	0	0	0	0	0	0	0	0

	Phasing Button Pushed Phasing Amp.		*Motor Amp.*		*Voltage Reg.*	
Pin	*7L7*	*884*	*7C5*	*6AC5G*	*7L7*	*7C5*
1	0	x	0	x	0	0
2	1 meg	0	∞	0	∞	∞
3	1 meg	50K	∞	∞	∞	∞
4	300	x	0	x	300K	x
5	300	1 meg	x	370	300K	0
6	24K	50K	9K	x	40K	∞
7	300	0	1.6K	0	300K	50K
8	0	60K	0	0	0	0

GE PLUG	LINE-LINE	LINE-CT.
50	35	18-18

Power Supply PE-140-A and PE-140-B

			Transmit			
Pin	*5Z3*	*7L7*	*7S7*	*7N7*	*7C5*	*7C5*
1	∞	—	—	—	—	—
2	∞	1 meg	1 meg	2.6K	∞	∞
3	45	1 meg	x	∞	0	0
4	45	250K	100K	250K	x	x
5		0	∞	450K	x	0
6		250K	2 meg	450K	400	500
7		250K	1.1K	0	300	300
8						

PART VII—Supplementary Data

57. COMPOSITE MAINTENANCE LIST FOR FACSIMILE EQUIPMENT RC-120, RC-120-A AND RC-120-B.

Ref. Symbol	Signal Corps Stock No.	Name of Part and Description	Quan. per RC-120	Quan. per RC-120-A	Quan. per RC-120-B	Running Spares	Org. Stock	3d Echelon Stocks	4th Echelon Stocks	5th Echelon Stocks	Depot Stocks
1	2Z522	BAG: BG-122 (to contain BG-140).	1	1	1		0	0	*	*	*
2	2Z526	BAG: BG-126 (for Frame FM-60).	1	1	1		0	0	*	*	*
3	2Z524	BAG: BG-124 (packaging container).	1	1	1		0	0	*	*	*
4	2Z540	BAG: BG-140 (lightproof operating tent).	1	1	1		0	0	*	*	*
5	6C25-1/C14	COIL: coupling, model UC.	1	1	1		0	0	*	*	*
6	6C25-/C13	COIL: coupling, model KC.	1	1	1		0	0	*	*	*
7	3E4039-1	CORD: battery, 6 No. 12 conductors; terminates in Jones plug at one end and two battery clips on the other.	1	1	1		0	*	*	*	*
8	8A789	CASE: PH-410 (for photo equipment).	1	1	1		0	0	*	*	*
9	2Z2599-116	CHEST: CH-116 (power unit).	1	1	1		0	0	*	*	*
10	2Z2599-117	CHEST: CH-117 (transceiver).	1	1	1		0	0	*	*	*
11	3E4039-2	CORD: line connector.	1	1	1		0	0	*	*	*
12	8C14-1	DEVELOPER: powder D-72 (quart size).	8	8	8		0	0	*	*	*
13	8C48-1	DEVELOPER: powder DK-60A (gallon size).	2	2	2		0	0	*	*	*
14	8D50-1	FILM: transmission, type A.	5	5	5		0	0	*	*	*
15	2Z4660	FRAME: FM-60 (for BG-140).	1	1	1		0	0	*	*	*

*Denotes sources at which maintenance parts are available.

COMPOSITE MAINTENANCE LIST (Continued)

Ref. Symbol	Signal Corps Stock No.	Name of Part and Description	Quan. per RC-120	Quan. per RC-120-A	Quan. per RC-120-B	Running Spares	Org. Stock	3d Echelon Stocks	4th Echelon Stocks	5th Echelon Stocks	Depot Stocks
16	6D13071	TM: 11-375B (technical manual).	2	2	2		0	*	*	*	*
17	3H4496-140Z	POWER SUPPLY: PE-140.	1	0	0		0	0	*	*	*
18	3H4496-140-A	POWER SUPPLY: PE-140-A.	0	1	0		0	0	*	*	*
19	3H4496-140-B	POWER SUPPLY: PE-140-B.	0	0	1		0	0	*	*	*
20	2Z7255-13	PLUG: connects auxiliary meter.	1	0	0		0	*	*	*	*
21	8A3727-409	TANK: developing; PH-409.	2	2	2		0	*	*	*	*
22	6M1550-1	TAPE: scotch.	1	1	1		0	*	*	*	*
23	6M877	TELEDELTOS: 1000 sheets.	1	1	1		0	0	*	*	*
24	6C25-1	TRANSCEIVER FX-1.	1	0	0		0	0	*	*	*
25	6C25-1A	TRANSCEIVER FX-1-A.	0	1	0		0	*	*	*	*
26	6C25-1B	TRANSCEIVER FX-1-B.	0	0	1		0	0	*	*	*
27	6Z8648	THERMOMETER: −20° F. to +120° F.	1	1	1		0	*	*	*	*
28	2Z9637.5	TRANSFORMER: (model LT for connection to line).	1	0	0		0	*	*	*	*
29	6Q36921	TUBE-LIFTER.	1	1	1		0	*	*	*	*
30	6C25-1-( )/B6	BEARING ASSEMBLY: for lead screw.	1	1	1		0	0	*	*	*
31	3H1505-2/B4	BRUSH: H.V., TYPE C48A (for dynamotor).	2	2	2		0	0	*	*	*
32	3H1505-2/B3	BRUSH: L.V., TYPE 556 (for dynamotor).	2	2	2		0	0	*	*	*

*Denotes sources at which maintenance parts are available.

COMPOSITE MAINTENANCE LIST *(Continued)*

Ref. Symbol	Signal Corps Stock No.	Name of Part and Description	Quan. per RC-120	Quan. per RC-120-A	Quan. per RC-120-B	Running Spares	Org. Stock	3d Echelon Stocks	4th Echelon Stocks	5th Echelon Stocks	Depot Stocks
33	3H115/B3	BRUSH: (for motor).	2	2	2		0	0	*	*	*
34	3D9250-13	CAPACITOR: .00025 μf., 400 volts, mica.	2	3	3		0	0	*	*	*
35	3D9500-18	CAPACITOR: .0005 μf., 500 WV, 1000 VDTC, mica.	2	3	0		0	0	*	*	*
36	3D9500-62	CAPACITOR: .0005 μf., 500 volts, mica.	0	0	3		0	0	*	*	*
37	3DB8-40	CAPACITOR: 8 μf., 450 WV, dry-electrolytic.	1	0	0		0	0	*	*	*
38	3D9100-24	CAPACITOR: .0001 μf., 400 WV, mica.	2	0	0		0	0	*	*	*
39	3DA1-87	CAPACITOR: .001 μf., 2500 WV, mica.	1	0	0		0	0	*	*	*
40	3DA2-71	CAPACITOR: .002 μf., 500 WV, mica.	2	1	0		0	*	*	*	*
41	3DKA2-111	CAPACITOR: .002 μf., 500 volts, mica.	0	0	1		0	0	*	0	*
42	3DA5-55	CAPACITOR: .005 μf., 1000 volts.	1	0	0		0	0	*	0	*
43	3DA5-37	CAPACITOR: .005 μf., 600 volts, mica.	0	2	0		0	0	*	*	*
44	3DA5-74	CAPACITOR: .005 μf., 1200 volts, mica.	0	0	2		0	0	*	*	*
45	3DA10-145	CAPACITOR: .01 μf., 400 volts, paper.	2	5	12		0	0	*	*	*

*Denotes sources at which maintenance parts are available.

COMPOSITE MAINTENANCE LIST (Continued)

Ref. Symbol	*Signal Corps Stock No.*	*Name of Part and Description*	*Quan. per RC-120*	*Quan. per RC-120-A*	*Quan. per RC-120-B*	*Running Spares*	*Org. Stock*	*3d Echelon Stocks*	*4th Echelon Stocks*	*5th Echelon Stocks*	*Depot Stocks*
46	3DA20-5	CAPACITOR: .02 μf., 400 volts, paper.	1	0	0		0	0	*	*	*
47	3DA50	CAPACITOR: .05 μf., 400 volts, paper.	1	1	1		0	0	*	*	*
48	3DA100-129	CAPACITOR: .1 μf., 400 WV, paper.	5	5	5		0	0	*	*	*
49	3DA25-6	CAPACITOR: .25 μf., 400 volts, paper.	2	0	0		0	0	*	*	*
50	3DA250-20	CAPACITOR: .25 μf., 600 volts, bathtub.	0	1	1		0	0	*	*	*
51	3D177-A	CAPACITOR: .5 μf., 400 volts.	6	0	0		0	0	*	*	*
52	3DA500-68	CAPACITOR: .5 μf., 600 volts, bathtub.	0	11	11		0	0	*	*	*
53	3DB2-4	CAPACITOR: 2 μf., 400 volts, paper.	1	0	0		0	0	*	*	*
54	3DB2-4	CAPACITOR: 2 μf., 600 volts, bathtub.	0	2	2		0	0	*	*	*
55	3DB4-44	CAPACITOR: 4 μf., 250 volts, shielded.	1	0	0		0	0	*	*	*
56	3DB4-43	CAPACITOR: 4 μf., 600 WV, oil-filled.	4	0	0		0	0	*	*	*
57	3DB2-21	CAPACITOR: 2 μf., 1000 volts, Dykanol.	0	3	3		0	0	*	*	*
58	3DB10-30	CAPACITOR: 10 μf., 25 volts, electrolytic.	4	0	0		0	0	*	*	*

*Denotes sources at which maintenance parts are available.

COMPOSITE MAINTENANCE LIST *(Continued)*

Ref. Symbol	Signal Corps Stock No.	Name of Part and Description	Quan. per RC-120	Quan. per RC-120-A	Quan. per RC-120-B	Running Spares	Org. Stock	3d Echelon Stocks	4th Echelon Stocks	5th Echelon Stocks	Depot Stocks
59	3DB50-6	CAPACITOR: 50 μf., 25 volts, bathtub.	0	1	1		0	0	*	*	*
60	3DB10-29	CAPACITOR: 10 μf., 50 volts, electrolytic.	1	0	0		0	0	*	*	*
61	3DA5-37	CAPACITOR: .005 μf., mica.	2	3	3		0	0	*	*	*
62	MBD-866	CAPACITOR: .001 μf., 600 volts, mica.	0	3	3		0	0	*	*	*
63	3DA10-145	CAPACITOR: .01 μf., 600 volts, molded Tobe CN35A103.	0	0	6		0	0	*	*	*
64	3DA1.50-3	CAPACITOR: .0015 μf., 500 volts, mica.	0	1	1		0	0	*	*	*
65	3DA20-60	CAPACITOR: .02 μf., 2000 volts, oil-filled.	0	2	2		0	0	*	*	*
66	3D9500-103	CAPACITOR: .0005 μf., 2000 volts, mica.	0	1	1		0	0	*	*	*
67	3DB1.15010	CAPACITOR: 1 μf., 1000 volts, Dykanol.	0	1	1		0	0	*	*	*
68	3DA10-29	CAPACITOR: .001 μf., 2500 volts, mica.	0	1	1		0	0	*	*	*
69	3DA10-29	CAPACITOR: .001 μf., 1250 volts, mica.	0	1	1		0	*	*	*	*
70	3H1505-2/C1	CAP: brush (for dynamotor).	2	2	2		0	*	*	*	*
71	3H1505-2/C2	CAP: brush (for dynamotor, negative).	2	2	2		0	*	*	*	*
72	3C368	COIL: choke (stylus). Meissner #19-8770.	1				0	*	*	*	*

*Denotes sources at which maintenance parts are available.

COMPOSITE MAINTENANCE LIST *(Continued)*

Ref. Symbol	*Signal Corps Stock No.*	*Name of Part and Description*	*Quan. per RC-120*	*Quan. per RC-120-A*	*Quan. per RC-120-B*	*Running Spares*	*Org. Stock*	*3d Echelon Stocks*	*4th Echelon Stocks*	*5th Echelon Stocks*	*Depot Stocks*
73	3C316-23	COIL: choke (motor choke) Thordarson #T57C51.	1	1	1		0	*	*	*	*
74	2Z3718.3	DIAL ASSEMBLY: (gain control)	1	1	1		0	0	*	*	*
75	2Z3718.4	DIAL ASSEMBLY: (contrast control)	1	1	1		0	0	*	*	*
76	6C25-1/D5	DOG: drive for lead screw	1	1	1		0	*	*	*	*
77	6C25-1/D8	DRUM ASSEMBLY	1	1	1		0	*	*	*	*
78	3H1505-2	DYNAMOTOR: Carter Motor Co. #401AB	1	1	1		0	*	*	*	*
79	2ZK5788-6	KNOB: Times Telephoto #80-00-86	1	1	1		0	0	*	*	*
80		LAMP ASSEMBLY: (Photocell and exciter)	1	1	1		0	0	*	*	*
81	6Z6806.8	LAMP: exciter, 6v, G.E. #1129	1	1	1		0	*	*	*	*
82	2V1645	PHOTOCELL: RCA #1645	1	1	1		0	0	*	*	*
83	6C25-1/C7	LAMP ASSEMBLY: (recorder)	1	1	1		0	0	*	*	*
84	2Z5936.2	LAMP: recorder, Sylvania R1130	1	1	1		0	*	*	*	*
85	6C25-1/L4.	LATCH ASSEMBLY: (for transceiver and power supply cases)	1	1	1		0	*	*	*	*
86	3F3307.4	METER: decibel, Weston Model 301.	1	1	1		0	*	*	*	*
87	6C25-1/M1	MOTOR ASSEMBLY.	1	1	1		0	*	*	*	*

*Denotes sources at which maintenance parts are available.

COMPOSITE MAINTENANCE LIST *(Continued)*

Ref. Symbol	Signal Corps Stock No.	Name of Part and Description	Quan. per RC-120	Quan. per RC-120-A	Quan. per RC-120-B	Running Spares	Org. Stock	3d Echelon Stocks	4th Echelon Stocks	5th Echelon Stocks	Depot Stocks
88	2Z5889-9	NEON LAMP: polarized base (voltage regulator) Sylvania R1160.	2	2	2		0	0	*	*	*
89	6C25-()/F8	OSCILLATOR ASSEMBLY (fork, mount and amplifier).	1	1	1		0	0	*	*	*
90	2Z7296-40M	POTENTIOMETER: 40,000 ohms (frequency adjustment) Clarostat type 59.	1				0	0	*	*	*
91	2Z7286.1	POTENTIOMETER: dual, 250,-000 ohms and 500 ohms (Clarostat type H-1851).	1	1	1		0	0	*	*	*
92	2Z7299-50	POTENTIOMETER: 50 ohms (contrast control) Clarostat type G-3912B.	1	1	1		0	0	*	*	*
93	2Z7276.10	POTENTIOMETER: 50,000 ohms. Clarostat #P58-50,000 (no taper) Shaft length ½ inch.	1	2	2		0	0	*	*	*
94	3Z6650-45	RESISTOR: 50,000 ohms, ½ W, ± 10 percent.	0	1	0		0	0	*	*	*
95	3Z4541	RESISTOR 75,000 ohms, ½ W, ± 10 percent.	1	2	2		0	0	*	*	*
96	3Z4550	RESISTOR: .1 meg, ½ W, ± 10 percent.	2	5	5		0	0	*	*	*
97	3Z4562	RESISTOR: .25 meg, ½ W, ± 10 percent.	5	8	8		0	0	*	*	*

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COMPOSITE MAINTENANCE LIST (Continued)

Ref. Symbol	Signal Corps Stock No.	Name of Part and Description	Quan. per RC-120	Quan. per RC-120-A	Quan. per RC-120-B	Running Spares	Org. Stock	3d Echelon Stocks	4th Echelon Stocks	5th Echelon Stocks	Depot Stocks
98	3Z4533	RESISTOR: .5 meg, ½ W, ± 10 percent.	5	9	9		0	0	*	*	*
99	3Z4508	RESISTOR: 1 meg, 1 W, ± 10 percent.	1	0	0		0	0	*	*	*
100	3Z4534	RESISTOR: 1 meg, ½ W, ± 10 percent.	16	11	11		0	0	*	*	*
101	3Z4542	RESISTOR: 2 meg, ½ W, ± 10 percent.	5	3	3		0	0	*	*	*
102	3Z6005.37	RESISTOR: 50 ohms, ½ W, ± 5 percent.	2	1	1		0	0	*	*	*
103	3Z4524	RESISTOR: 500 ohms, ½ W, ± 10 percent.	1	1	1		0	0	*	*	*
104	3Z6050.4	RESISTOR: 500 ohms, ½ W, ± 5 percent.	1	0	0		0	0	*	*	*
105	3Z6060.18	RESISTOR: 600 ohms, ½ W, ± 10 percent.	1	1	1		0	0	*	*	*
106	3Z4526	RESISTOR: 2000 ohms, ½ W, ± 10 percent.	5	5	5		0	0	*	*	*
107	3Z6200-9	RESISTOR: 2000 ohms, 1 W, ± 10 percent.	1	0	0		0	0	*	*	*
108	3Z4527	RESISTOR: 3000 ohms, ½ W, ± 10 percent.	2	3	3		0	0	*	*	*
109	3Z6573-2	RESISTOR: 7500 ohms, 10 W, Wire.	1	0	0		0	0	*	*	*
110	3Z6575-37	RESISTOR: 7500 ohms, 20 W, Wire.	0	1	1		0	0	*	*	*

*Denotes sources at which maintenance parts are available.

COMPOSITE MAINTENANCE LIST *(Continued)*

Ref. Symbol	*Signal Corps Stock No.*	*Name of Part and Description*	*Quan. per RC-120*	*Quan. per RC-120-A*	*Quan. per RC-120-B*	*Running Spares*	*Org. Stock*	*3d Echelon Stocks*	*4th Echelon Stocks*	*5th Echelon Stocks*	*Depot Stocks*
111	3Z4529	RESISTOR: 10,000 ohms, ½ W, ± 10 percent.	1	3	3		0	0	*	*	*
112	3Z6715-1	RESISTOR: 150,000 ohms, ½ W, ± 5 percent.	1	0	0		0	0	*	*	*
113	3Z4664	RESISTOR: 150,000 ohms, ½ W, ± 10 percent.	1	1	1		0	0	*	*	*
114	3Z6615-14	RESISTOR: 15,000 ohms, 1 W, ± 10 percent.	1	0	0		0	0	*	*	*
115	3Z4557	RESISTOR: 25,000 ohms, ½ W, ± 10 percent.	5	5	5		0	0	*	*	*
116	3Z4549	RESISTOR: 40,000 ohms, ½ W, ± 10 percent.	2	1	1		0	0	*	*	*
117	3Z4531	RESISTOR: 50,000 ohms, ½ W, ± 10 percent.	1	3	3		0	0	*	*	*
118	3Z6650-8	RESISTOR: 50,000 ohms, 1 W, ± 10 percent.	1	0	1		0	0	*	*	*
119	3Z6012	RESISTOR: 600 ohms, 1 W, ± 10 percent.	1	0	0		0	0	*	*	*
120	3Z6080-20	RESISTOR: 800 ohms, 10 W, "Greenohm."	1	0	0		0	0	*	*	*
121	3Z6150-36	RESISTOR: 1500 ohms, 1 W, ± 10 percent.	1	0	0		0	0	*	*	*
122	3Z4615	RESISTOR: 1500 ohms, ½ W, ± 10 percent.	0	1	1		0	0	*	*	*
123	3Z6100-17	RESISTOR: 1000 ohms, 1 W, ± 10 percent.	1	1	1		0	0	*	*	*

*Denotes sources at which maintenance parts are available.

COMPOSITE MAINTENANCE LIST (*Continued*)

Ref. Symbol	*Signal Corps Stock No.*	*Name of Part and Description*	*Quan. per RC-120*	*Quan. per RC-120-A*	*Quan. per RC-120-B*	*Running Spares*	*Org. Stock*	*3d Echelon Stocks*	*4th Echelon Stocks*	*5th Echelon Stocks*	*Depot Stocks*
124	3Z6300-20	RESISTOR: 3000 ohms, ½ W. ± 10 percent.	0	1	0		0	0	*	*	*
125	3Z6300-21	RESISTOR: 3000 ohms, 1 W ± 10 percent.	0	0	1		0	0	*	*	*
126	3Z6725-17	RESISTOR: .25 meg, ½ W, ± 10 percent.	0	1	0		0	0	*	*	*
127	3Z6725	RESISTOR: .25 meg, 1 W. ± 10 percent.	0	0	1		0	0	*	*	*
128	3Z6030-37	RESISTOR: 300 ohms, 10 W, Wire, Clarostat.	2	1	1		0	0	*	*	*
129	3ZK6615-68	RESISTOR: 15,000 ohms, 20 W, Wire, Ward-Leonard.	0	1	1		0	0	*	*	*
130	3Z6060-35	RESISTOR: 600 ohms, 20 W, Slide-wire.	0	1	1		0	0	*	*	*
131	3Z6030-49	RESISTOR: 300 ohms, ½ W, ± 10 percent.	0	6	6		0	0	*	*	*
132	3Z60007E5-15	RESISTOR: 75 ohms, ½ W, ± 10 percent.	0	1	1		0	0	*	*	*
133	3Z6700-59	RESISTOR: .1 meg, 1 W, ± 10 percent.	0	1	1		0	0	*	*	*
134	3Z4614	RESISTOR: 15,000 ohms, ½ W, ± 10 percent.	0	1	1		0	0	*	*	*
135	3Z6675-13	RESISTOR: 75,000 ohms, ½ W, ± 10 percent.	0	0	1		0	0	*	*	*
136		RESISTOR: 55,000 ohms, ½ W, ± 1 percent.	0		0		0	0	*	*	*

*Denotes sources at which maintenance parts are available.

COMPOSITE MAINTENANCE LIST (Continued)

Ref. Symbol	Signal Corps Stock No.	Name of Part and Description	Quan. per RC-120	Quan. per RC-120-A	Quan. per RC-120-B	Running Spares	Org. Stock	3d Echelon Stocks	4th Echelon Stocks	5th Echelon Stocks	Depot Stocks
137	3Z6656-18	RESISTOR: 56,000 ohms, ½ W, ± 10 percent	0	1	1		0	0	*	*	*
138	3Z6200-32	RESISTOR: 2000 ohms, 2 W, ± 10 percent.	0	1	1		0	0	*	*	*
139	3Z6250-39	RESISTOR: 2500 ohms, 5 W, Wire.	0	1	1		0	0	*	*	*
140	3Z6030-50	RESISTOR: 300 ohms, 5 W, Wire.	0	1	1		0	0	*	*	*
141	3Z6250-45	RESISTOR: 2500 ohms, ½ W, ± 10 percent.	0	1	1		0	0	*	*	*
142	6C24-1-()/S5	SCREW, lead. Stainless steel.	1	1	1		0	*	*	*	*
143	2Z8502-3	SHOCK MOUNT: dynamotor, Lord #102-P4.	4	4	4		0	*	*	*	*
144	6Z8368-3	SOCKET: lamp, (for neon lamps) GM Lab #216.14.	2				0	*	*	*	*
145	6Z8330-1	SOCKET: lamp, (for neon lamps) Culver-Stearns.		2	2		0	*	*	*	*
146	2Z8637.5	SOCKET: tube, loktal, Cinch #6951.	17	17	17		0	*	*	*	*
147	2Z8650.5	SOCKET: tube, loktal, Cinch #9950.	4	4	4		0	*	*	*	*
148	6Z25-1()/S25	SPOT: drum, phasing.	1	1	1		0	*	*	*	*
149	2Z8877.3	SPRING: for half nut on drum.	1	1	1		0	*	*	*	*
150	2Z8877.1	SPRING: garter.	2	4	4		0	*	*	*	*

*Denotes sources at which maintenance parts are available.

COMPOSITE MAINTENANCE LIST (Continued)

Ref. Symbol	Signal Corps Stock No.	Name of Part and Description	Quan. per RC-120	Quan. per RC-120-A	Quan. per RC-120-B	Running Spares	Org. Stock	3d Echelon Stocks	4th Echelon Stocks	5th Echelon Stocks	Depot Stocks
151	6C25-()/S21	STYLUS ASSEMBLY.	1	1	1		0	*	*	*	*
152	6C25-1()/S20	STYLUS: direct recording.	6	6	6		0	*	*	*	*
153	3Z9825-52	SWITCH ASSEMBLY: selector, 5-position.	1	1	1		0	*	*	*	*
154	3Z9824-26	SWITCH: phasing.	1	1	1		0	*	*	*	*
155	3Z9849.21	SWITCH: toggle.	1	1	1		0	*	*	*	*
156	3Z9824-27	SWITCH: pushbutton, starting.	1	1	1		0	*	*	*	*
157	3Z9632.12	TRANSFORMER: Kenyon, model 633, (driver).	1	0	0		0	*	*	*	*
158	3Z9632.12A	TRANSFORMER: Times Telephoto model 633A.	0	1	1		0	*	*	*	*
159	2Z9633.4	TRANSFORMER: Kenyon T252.	1	1	1		0	*	*	*	*
160	2Z9632.13	TRANSFORMER: stylus. Kenyon model 601.	1	1	1		0	*	*	*	*
161	2J7L7	TUBE: 7L7.	5	5	5		0	*	*	*	*
162	2J7C5	TUBE: 7C5.	9	7	7		0	*	*	*	*
163	2J7N7	TUBE: 7N7.	3	3	3		0	*	*	*	*
164	2J884	TUBE: 884.	1	1	1		0	*	*	*	*
165	2J7C7	TUBE: 7C7.	1	1	1		0	*	*	*	*
167	2J6AC5GT/G	TUBE: 6AC5GT/G.	1	3	3		0	*	*	*	*
168	2J7J7	TUBE: 7J7 (directly replaceable by 7S7).	1				0	*	*	*	*
169	2J5Z3	TUBE: 5Z3 (VT-145).	1	1	1		0	*	*	*	*
170	2J7S7	TUBE: 7S7 (directly replaceable by 7J7).		1	1		0	*	*	*	*

*Denotes sources at which maintenance parts are available.

LIST OF MANUFACTURERS OF COMPONENT PARTS

Facsimile Equipment RC-120-(*)

Name of Part	*Manufacturer*
Bags and tent	VA
Bearings and mechanical assemblies	A, TTE
Binding post	EB
Blotting paper	AL
Brushes (dynamotor)	CA
Brushes (motor)	PC
Capacitors	AE, CD, SA, SP, TO
Case	DE
Chests	SJ
Chokes	MSR, TTE, TH
Clips, battery connecting cord	MU
Cords	A, TTE
Developer and fixer	EK
Developing tank	NI
Dynamotor	CA
Dial assembly	GR, TTE
Film	EK
Fuse	LF
Fuse posts	LF
Grommets, rubber	ARH
Jacks	MA
Lamp, exciter	GE
Lamp, recorder	SEP
Lamp, neon (regulator)	SEP
Lenses	BL, MO, PS
Meter	WE, WH
Plugs	A, GE, HBJ, TTE
Potentiometers	CL
Recording paper (Teledeltos)	WU
Resistors	CL, IRC, WL
Scotch tape	MM
Shock mount, dynamotor	LO
Sockets, lamp	CS, GM
Sockets, tube	AM, CI
Switches, start and phase	MA
Switch, power	CH
Switch, selector	TTE
Switch wafers, for selector switch	CE
Thermometers	WK
Transformers	KE, ST, TTE
Vacuum, tubes	RCA, SEP

LIST OF MANUFACTURERS' NAMES AND ADDRESSES

Abbreviations	
A	Alden Products Co., 117 No. Main St., Brockton, Mass.
AE	Aerovox Corp., 740 Belleville Ave., New Bedford, Mass.
AL	Aldine Paper Co., 373 Fourth Ave., New York, N. Y.
AM	American Phenolic Corp., 1830 S. 54th Ave., Chicago, Ill.
ARH	American Radio Hardware, 69 Wooster St., New York, N. Y.
BL	Bausch and Lomb Optical Co., Rochester, N. Y.
CA	Carter Motor Co., 1608 Milwaukee Ave., Chicago, Ill.
CD	Cornell-Dubilier Electric Corp., So. Plainfield, N. J.
CE	Centralab, 900 E. Keefe Ave., Milwaukee 1, Wis.
CH	Cutler-Hammer, Inc., 312 N. 12th St., Milwaukee, Wis.
CI	Cinch Mfg. Co., 2335-2347 Van Buren St., Chicago, Ill.
CL	Clarostat Mfg. Co., Inc., 285 No. Sixth St., Brooklyn, N. Y.
CS	Culver-Stearns Mfg. Co., 53 Grafton St., Worcester, Mass.
DE	Deal Mill & Lumber Co., Inc., Box 77, Deal, N. J.
EB	Hugh H. Eby, Inc., 18 W. Chelton Ave., Philadelphia, Pa.
EK	Eastman Kodak Company, Rochester, N. Y.
GE	General Electric Co., Schenectady, N. Y.
GM	G-M Laboratories, Inc., 4314 No. Knox Ave., Chicago, Ill.
GR	General Radio Co., 30 State St., Cambridge, Mass.
HBJ	Howard B. Jones, 2300 Wabansia Ave., Chicago, Ill.
IRC	International Resistance Co., 401 No. Broad St., Phila., Pa.
KE	Kenyon Transformer Corp., 840 Barry St., New York, N. Y.
LF	Littelfuse Inc., 4757 Ravenswood Ave., Chicago, Ill.
LO	Lord Mfg. Co., Erie, Pennsylvania
MA	P. R. Mallory and Co., Inc., 3029 E. Washington St., Indianapolis, Ind.
MSR	Meissner Mfg. Co., Mt. Carmel, Ill.
MM	Minnesota Mining & Mfg. Co., St. Paul, Minn.
MO	Master Optical Co., 20 W. 47th St., New York, N. Y.
MU	Mueller Electric Co., 1538 E. 31st St., Cleveland, Ohio
NI	Nikor Products Co., 15 Park St., Springfield, Mass.
PC	Pure Carbon Co. Inc., St. Mary's, Pa.
PS	Potter and Schnackenberg, 20 W. 47th St., New York, N. Y.
RCA	RCA Victor Division, 151 Westside Ave., Jersey City, N. J.
SA	Sangamo Electric Co., Springfield, Ill.
SEP	Sylvania Electric Products, Inc., Salem, Mass.
SJ	Spanjer Bros., 267 Mt. Pleasant Ave., Newark, N. J.
SP	Sprague Specialties Co., North Adams, Mass.
ST	Standard Transformer Corp., 1500 No. Halstead St., Chicago, Ill.
TH	Thordarson Electric Mfg. Co., 500 W. Huron St., Chicago, Ill.
TTE	Times Telephoto Equipment, Inc., 229 W. 43rd St., New York, N. Y.
TO	Tobe Deutschmann, Canton, Mass.
VA	Wm. H. Vanderherchen, Inc., 2846 Emerald St., Phila., Pa.
WE	Weston Electrical Instrument Corp., 618 Frelinghuysen Ave., Newark, N. J.
WH	Westinghouse Elec. & Mfg. Co., 150 Varick St., N. Y. C.
WK	Weksler Thermometer Co., 52 W. Houston St., New York, N. Y.
WL	Ward Leonard Elec. Co., Mount Vernon, New York
WU	Western Union Telegraph Co., 60 Hudson St., New York, N. Y.

Signal Corps Order No. 1041-MPD-43—3,280—29 April 44.
No. 887-MPD-43

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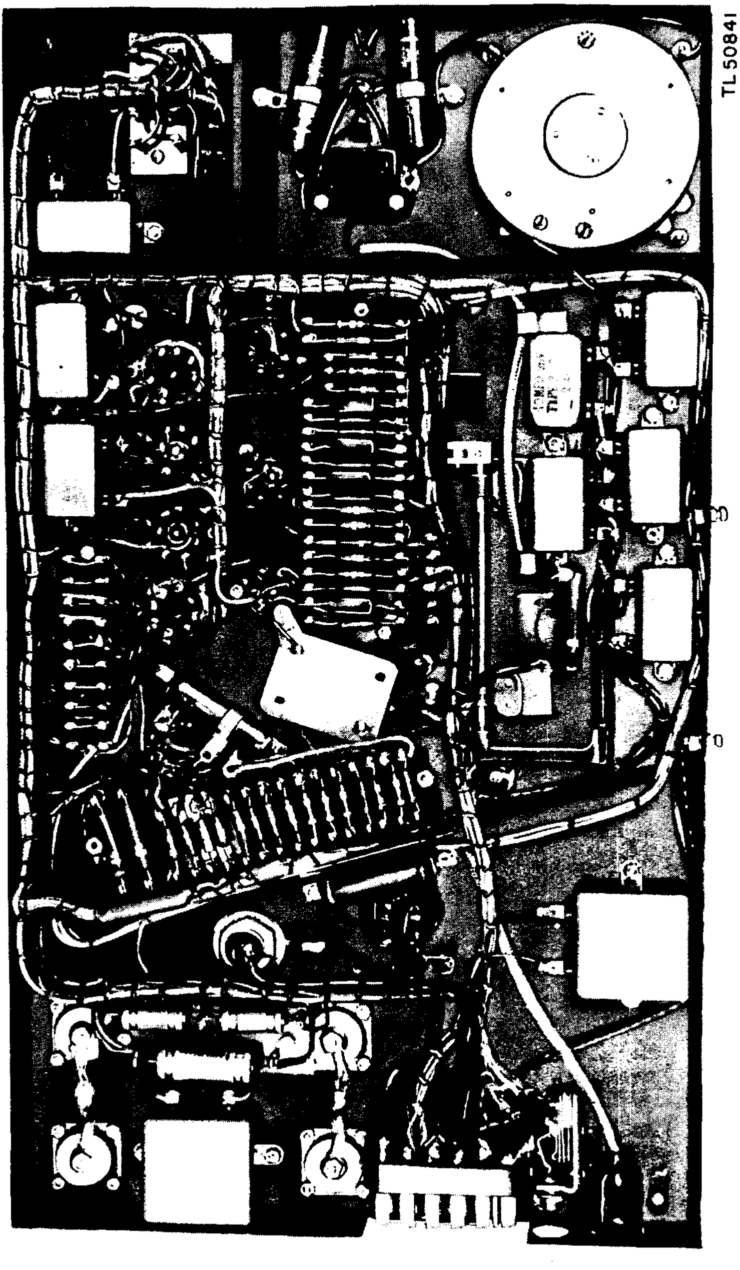

Figure 37. Bottom view of Facsimile Transceiver FX-1-A.

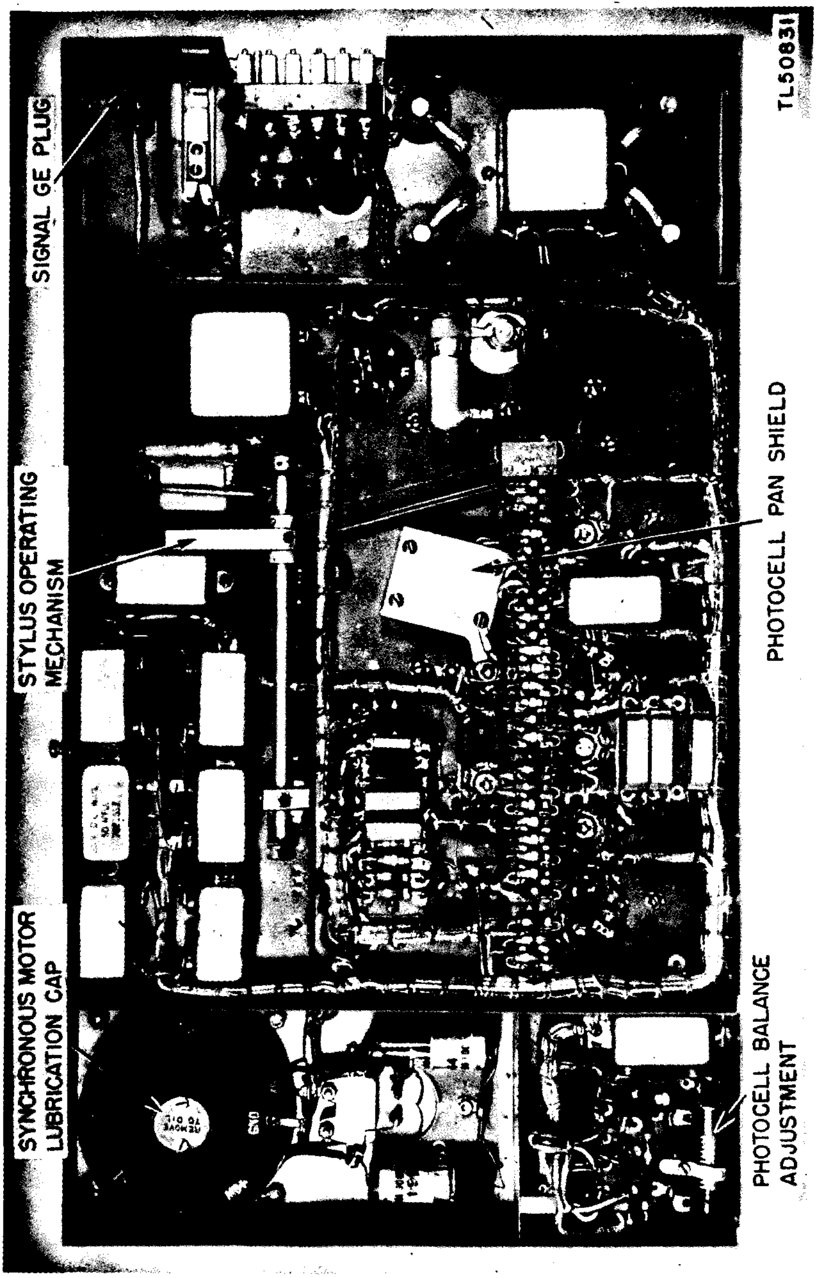

Figure 38. Bottom view of Facsimile Transceiver FX-1-B.

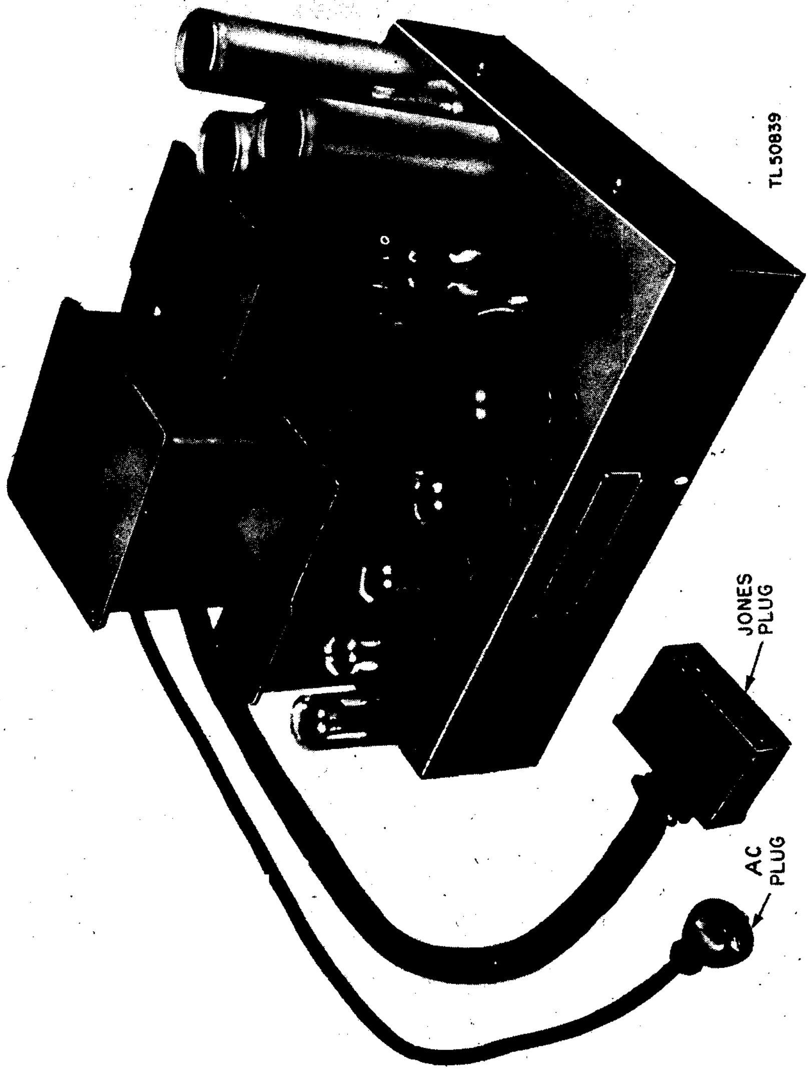

Figure 39. Top view of Power Supply PE-140-B with cover removed.

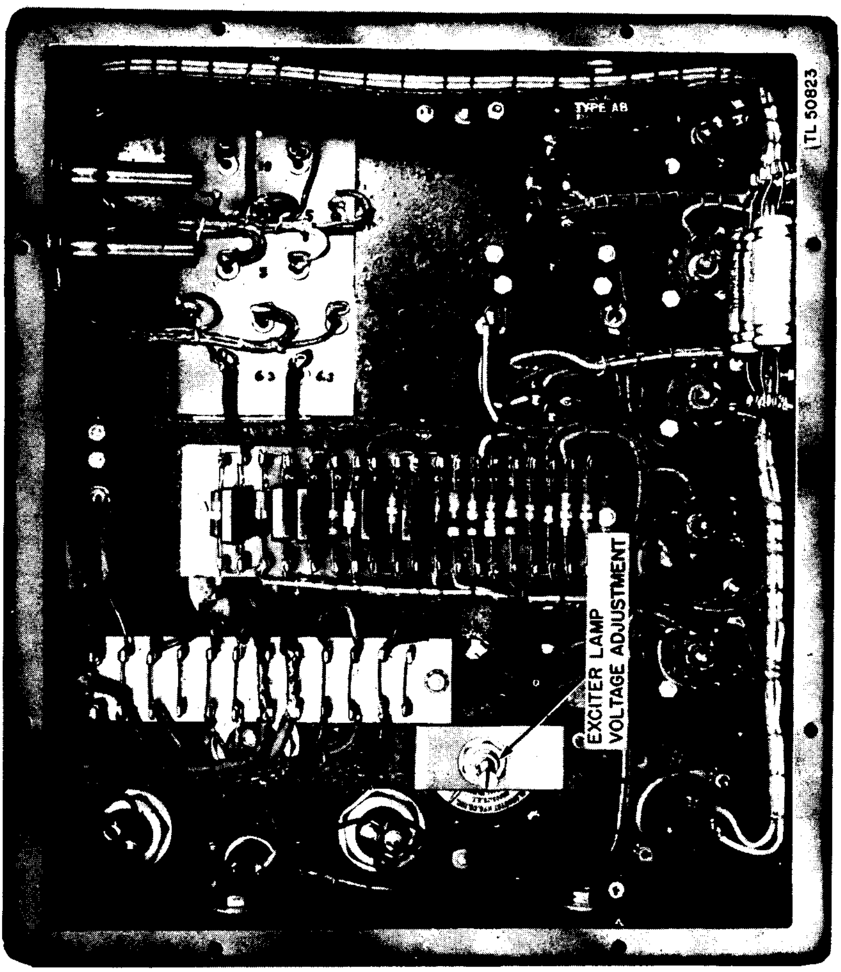

Figure 40. Bottom view of Power Supply PE-140-A.

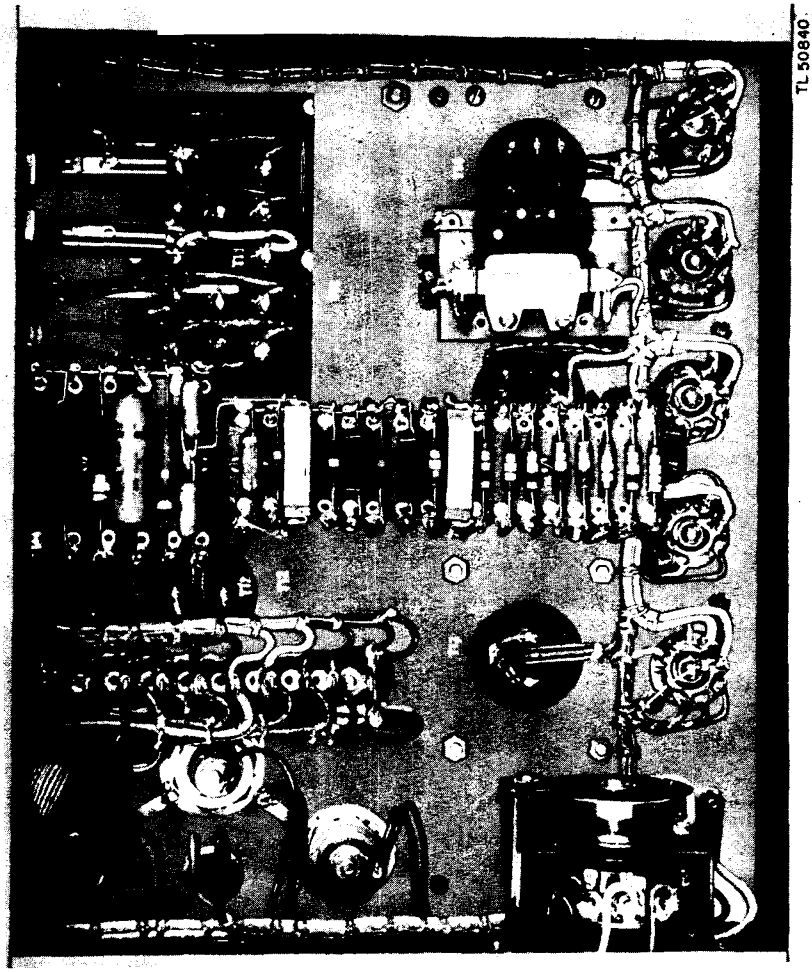

Figure 41. Bottom view of Power Supply PE-140-B.

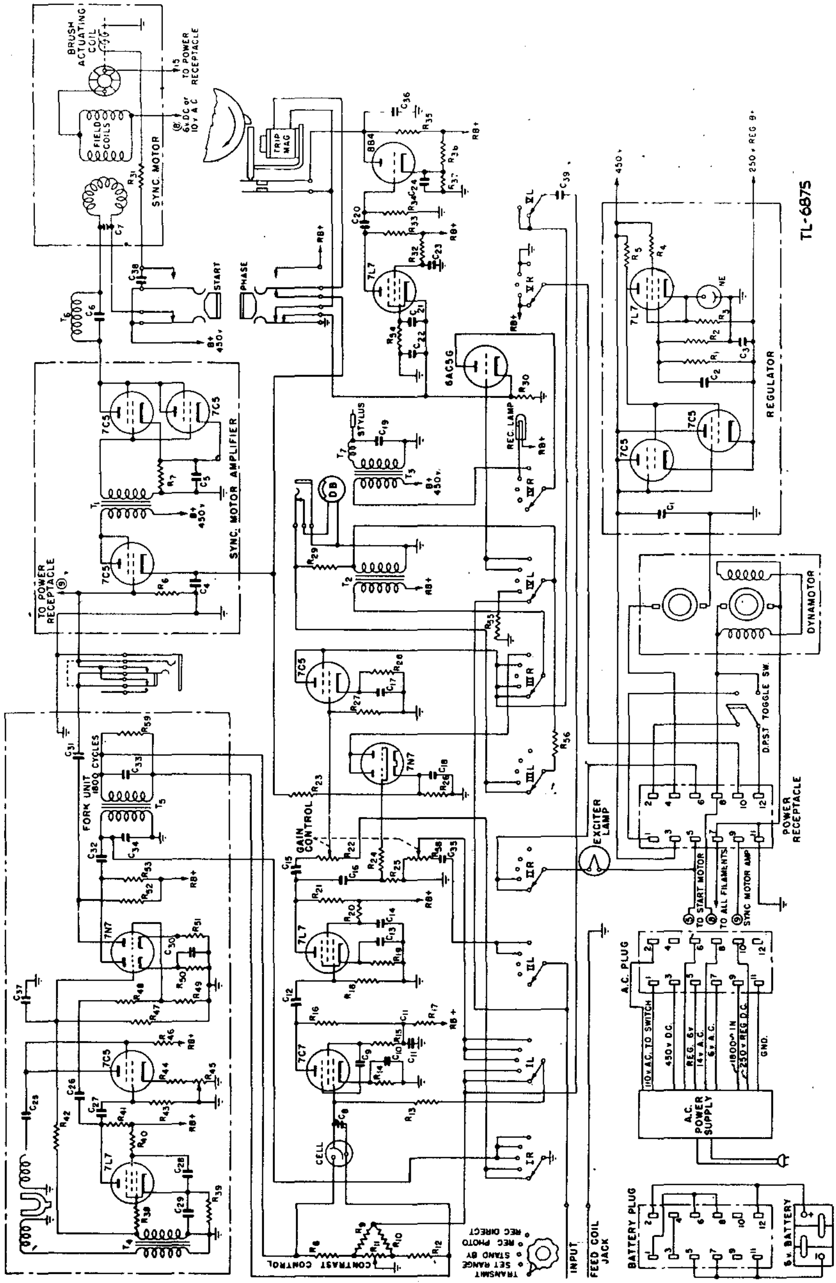

Figure 42. Schematic circuit diagram of Facsimile Transceiver FX-1.

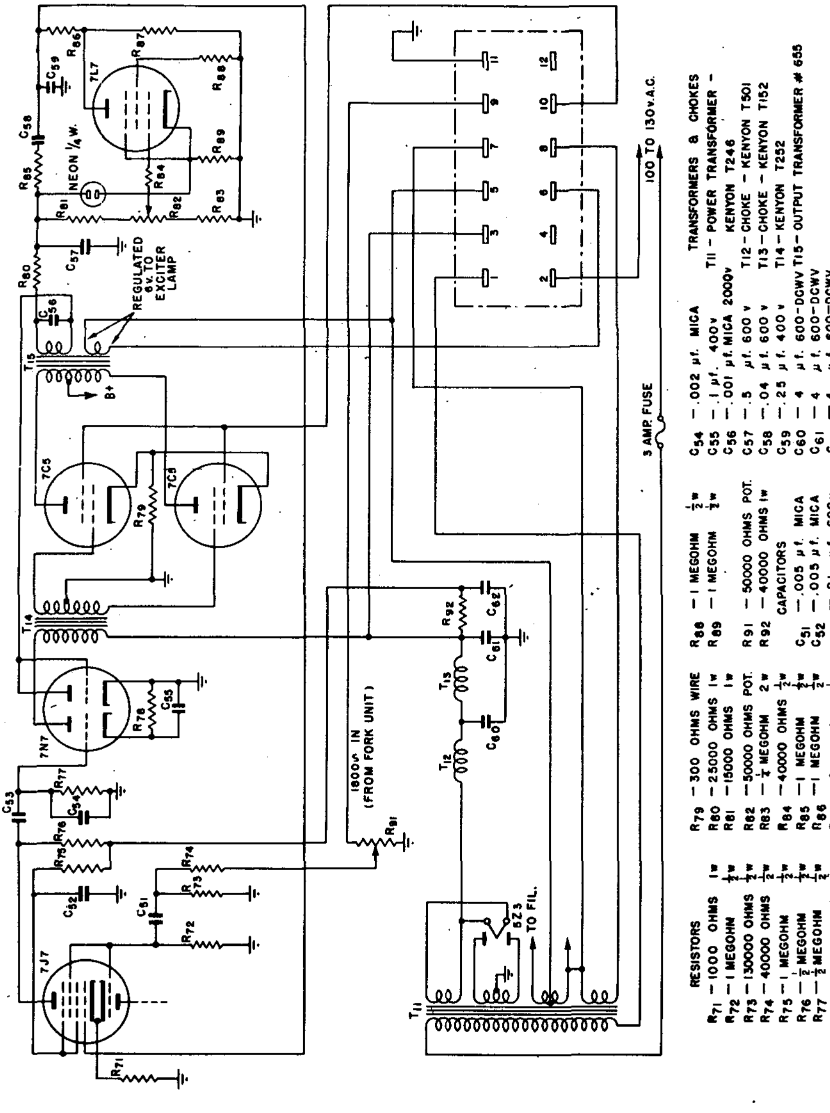

Figure 43. Schematic circuit diagram of Power Supply PE-140.

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