

Northern Electric

COMPANY LIMITED

COMMUNICATIONS EQUIPMENT DIVISION - BELLEVILLE

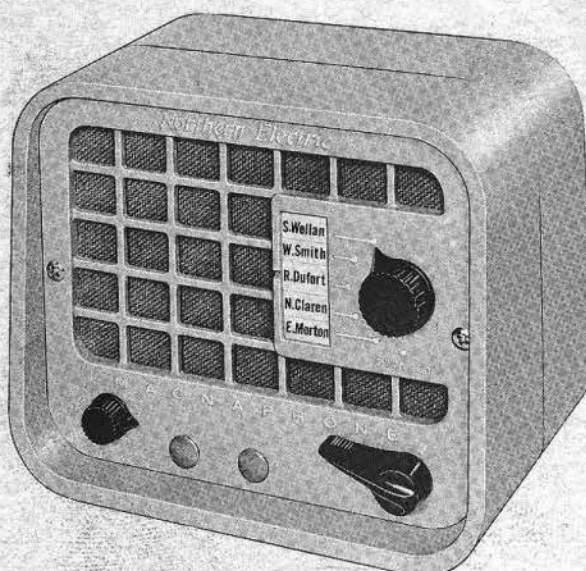
INTERCOM

PART II

SERVICE MANUAL

CM SERIES

MAGNAPHONE



PART II ASSEMBLY 1

MAY 1958

CONTENTS

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WARRANTY

Northern Electric Company Limited warrants this equipment to be free from defects in material and workmanship under normal use and service, its obligation under this warranty being limited to shipping a replacement for any numbered part or parts thereof, except vacuum tubes, which shall within ninety (90) days from the date of purchase of such equipment by the original retail purchaser be returned to Northern through its distributor or dealer with transportation charges prepaid, and which examination shall disclose to Northern's satisfaction to have been thus defective, such replacement will be shipped charges collect; this warranty being expressly in lieu of all other warranties expressed or implied, and Northern neither assumes nor authorizes any representative or other person to assume for it any other liability in connection with the sale of its products.

This warranty shall not apply to any equipment which shall have been repaired or altered in any way so as, in Northern's opinion, to affect its stability or reliability, nor to any equipment which has been subjected to misuse, neglect or accident, nor to any equipment which has had the serial number altered, effaced or removed.

"Northern Electric reserves the right, without notice, to make such changes in equipment, design, or components as progress in engineering or manufacturing methods may warrant."

Northern Electric

COMPANY LIMITED

BELLEVILLE, ONTARIO.

ASSOCIATED DISTRIBUTORS:

CANADA - DOMINION SOUND EQUIPMENTS LIMITED, 4040 ST. CATHERINE ST. WEST, MONTREAL

U.S.A. - ALTEC LANSING CORPORATION, 1515 S. MANCHESTER AVENUE, ANAHEIM, CALIFORNIA

FOREIGN (EXCEPT U.S.A.) - WESTREX CORPORATION, 111 EIGHTH AVENUE, NEW YORK 11, U.S.A.

DESCRIPTION:

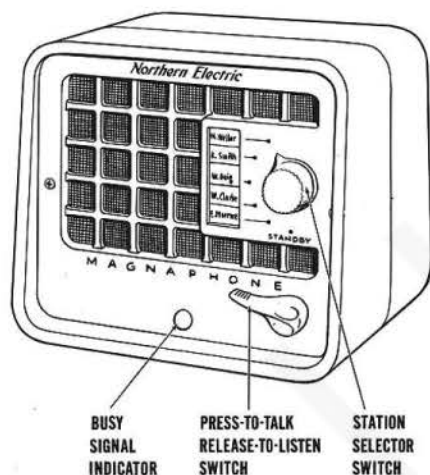
The Complete Master Magnaphone is an economical and efficient loudspeaker intercom system which provides intercommunication facilities for industries, offices, institutions and homes. The cabinets, suitably styled for office and home use as well as industrial applications, are built to withstand years of rugged use and yet retain their original appearance.

All Master System (6 stations maximum)

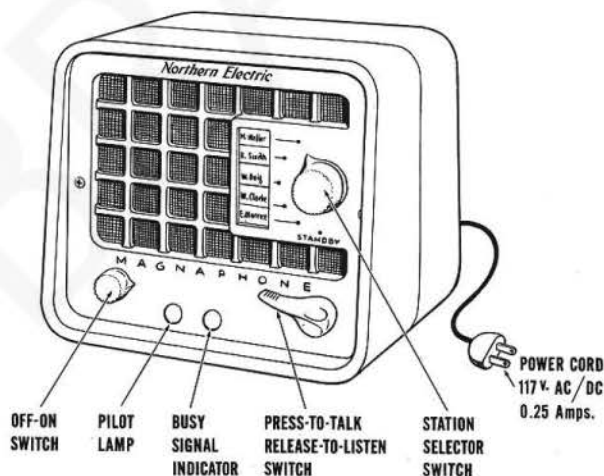
FEATURING:

- * Remote Answering.
- * Busy Signal.
- * Individual Volume Control.
- * Confidential Handset.
- * Loud Paging.

CM-5A



CMA-5A



SPECIFICATIONS:

Impedance, Input and Output :	45 ohms.
Frequency Response :	Specially adjusted for maximum intelligibility of voice transmission.
Gain :	80 db nominal.
Power Supply :	117 volts AC/DC at 0.25 amps.
Vacuum Tubes :	1- 12AX7 (voltage Amplifier) 1- 35W4 (Rectifier) 1- 50C5 (Output Amplifier)
NOTE :	As the loudspeakers are disconnected when the selector switches are in standby position, the residual noise is zero.
Colour :	Rosy Beige.
Dimensions :	7- 1/2" wide x 6- 1/8" high x 5- 1/2" deep.
Weight: CM- 5A;	4 lbs. net; 6 lbs. shipping.
CMA- 5A;	5 lbs. net; 7 lbs. shipping.

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INSTALLATION:

The two following basic systems are presented to illustrate the installation of a Complete Master System. Both systems use the same basic units, without modification, and a choice of either system will be dependant upon requirements and building arrangement. The number of stations used in a system will depend on the number of locations desiring intercommunication and may vary from a minimum of two to a maximum of six.

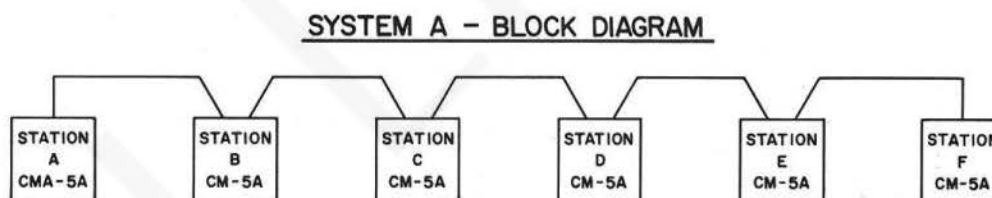
Although a CMA-5A Master Station (amplifier unit) may be placed at any point from A to F in either system, it is suggested it be located in a position where its operator will be in control of the system and turn the unit on and off at the beginning and ending of each day. It is also recommended that it be located near an AC outlet.

CAUTION - FOR SYSTEMS "A" & "B":

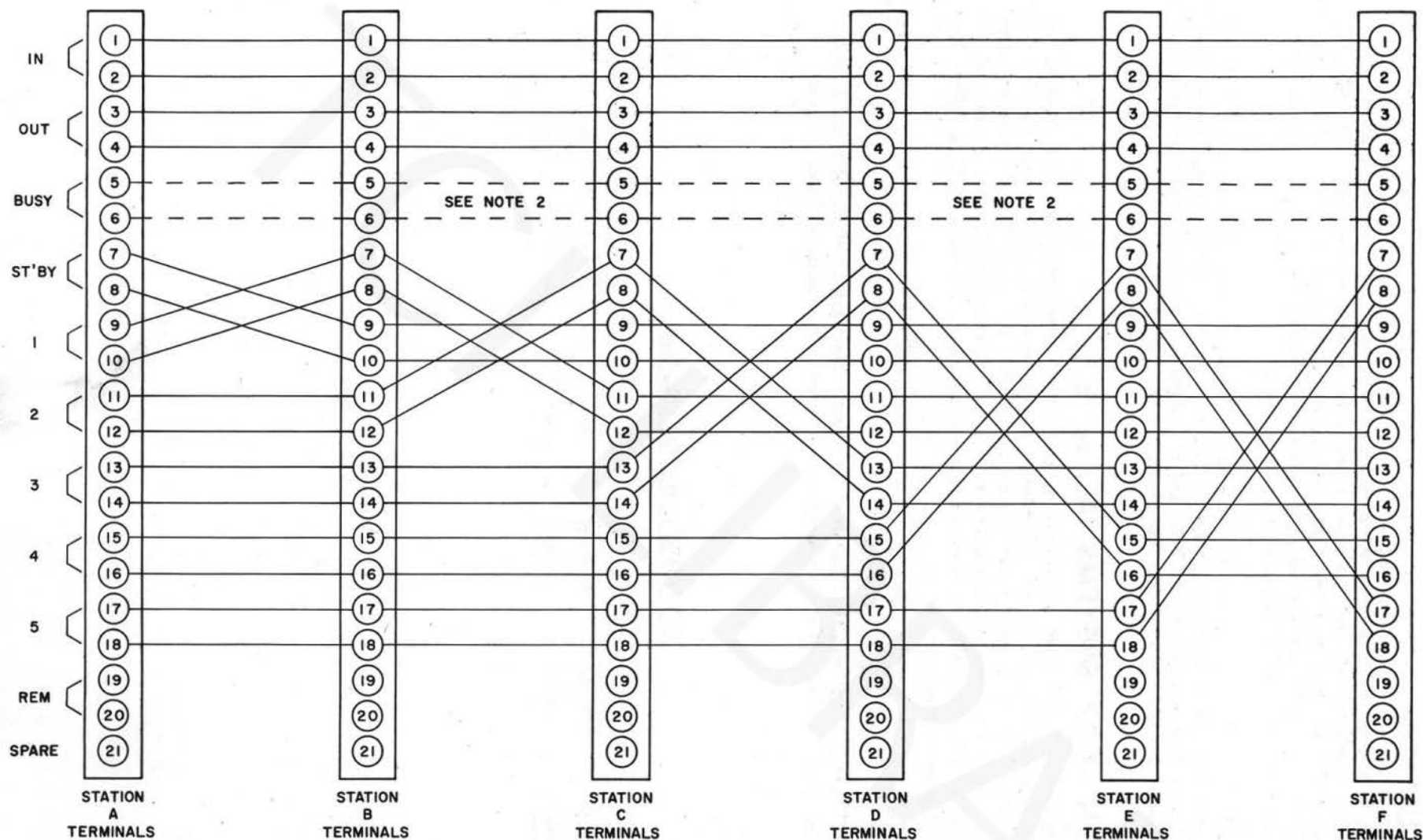
It is essential that twisted pairs be used for station interconnection. Each twisted pair should be connected to a pair of odd and even numbered terminals, e.g. one pair for terminals 1 and 2, another pair for 3 and 4, another pair for 5 and 6 etc. Individual conductors in each twisted pair must not be cross connected. That is, odd numbered terminals are connected with one conductor of a twisted pair and even numbered terminals are connected with the other conductor of that same twisted pair.

SYSTEM "A":

The "A" System illustrates the "in-line" or direct wiring method of installation. A multi-conductor cable runs through all station locations as shown in the following block diagram.



TYPICAL INTERSTATION WIRING



NOTE. 1. For ease of representation, station terminal boards have been illustrated as shown in the Typical Interstation Wiring diagram.

2. Interstation wires to terminals 5 and 6 are required on the initial installation only when a busy signal transformer kit has been installed in a system.

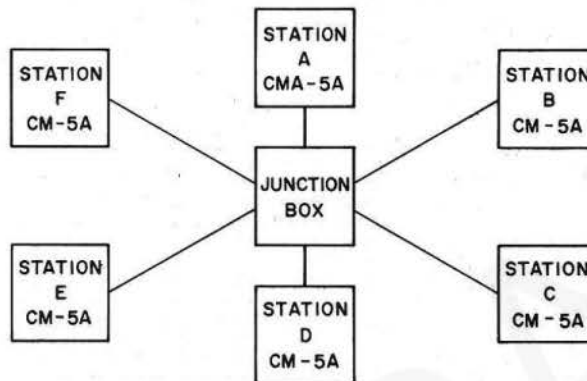
See CAUTION note under installation.

STATION TERMINAL	BOARD
1	020180705050403
2	02012020050807
3	02010050807
4	02004050505050
5	02004050505050
6	02004050505050
7	02004050505050
8	02004050505050
9	02004050505050
10	02004050505050
11	02004050505050
12	02004050505050
13	02004050505050
14	02004050505050
15	02004050505050
16	02004050505050
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18	02004050505050
19	02004050505050
20	02004050505050
21	02004050505050

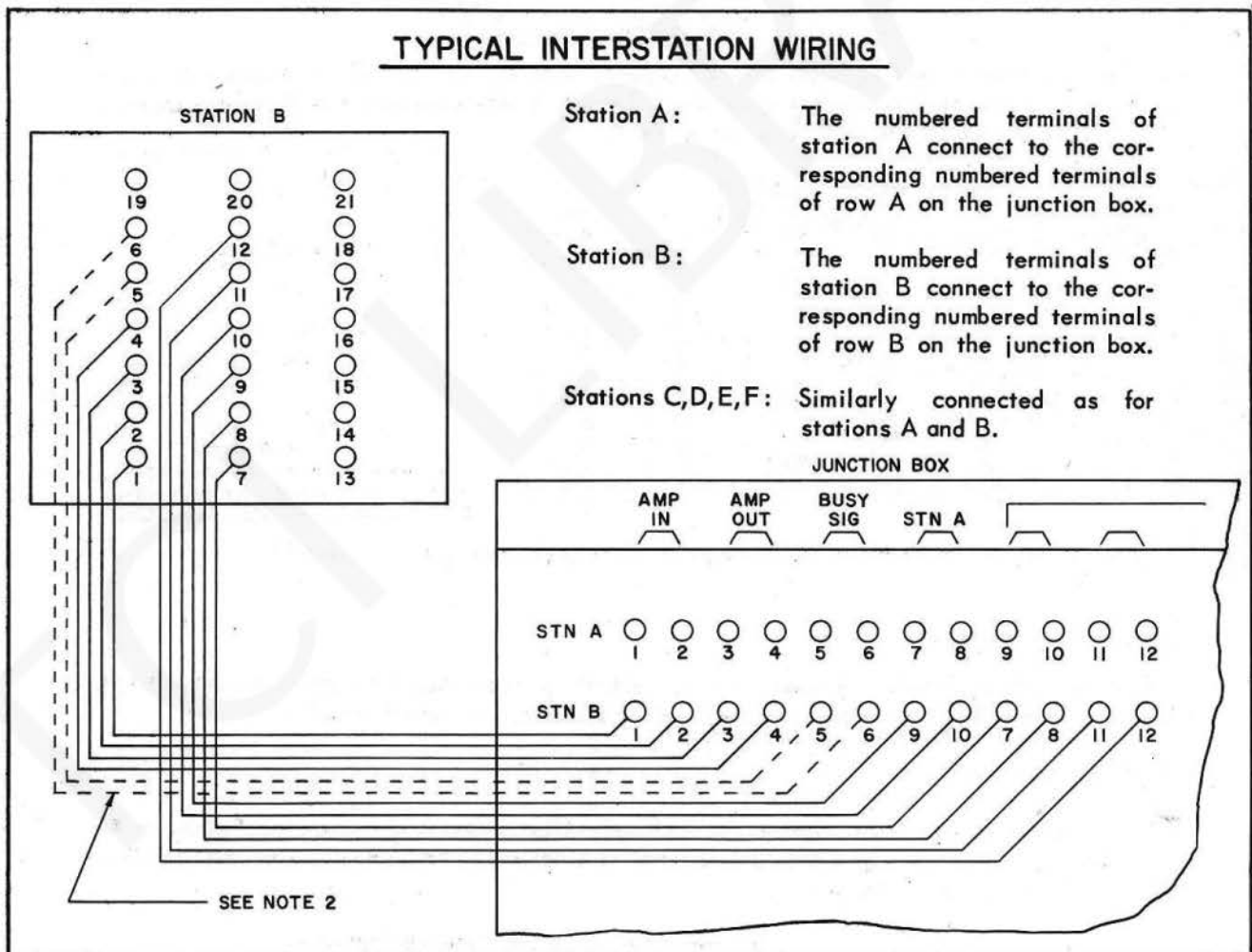
SYSTEM "B":

System "B" illustrates the centralized or junction box wiring method of installation where all wires from outlying stations connect to appropriate terminals in a junction box. Suitable strapping provides the necessary through connections to other stations.

SYSTEM B - BLOCK DIAGRAM



TYPICAL INTERSTATION WIRING



NOTE: 1. Terminals on junction box are not numbered consecutively.

2. Interstation wires to terminals 5 and 6 are required on the initial installation only when a busy signal transformer kit has been installed in a system.

SEE CAUTION NOTE UNDER INSTALLATION.

Northern Electric CM MAGNAPHONE

CM SERIES JUNCTION BOX

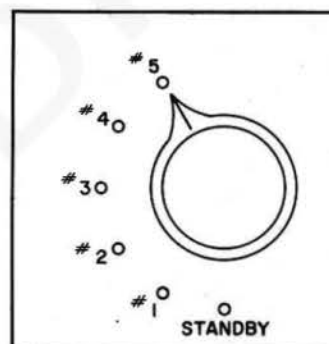
AMP IN		AMP OUT		BUSY SIG		STN A		STN B		STN C		CALLING CIRCUITS TO STN D		STN E		STN F		REM POS #1
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
STN A	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
STN B	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
STN C	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
STN D	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
STN E	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
STN F	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1	2	3	4	5	6	9	10	11	12	13	14	7	8	15	16	17	18	19
																		20
																		19
																		20
																		19
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																		19
																		20

OPERATING TABLE

When installation has been made in accordance with system "A" or "B" wiring diagrams, the various station selector switch positions will be in accordance with the following operating table. This table applies to both, Systems A and B.

OPERATING TABLE

STATION	SWITCH POSITION				
	#1	#2	#3	#4	#5
A	(B)	(C)	(D)	(E)	(F)
B	(A)	(C)	(D)	(E)	(F)
C	(A)	(B)	(D)	(E)	(F)
D	(A)	(B)	(C)	(E)	(F)
E	(A)	(B)	(C)	(D)	(F)
F	(A)	(B)	(C)	(D)	(E)



STN SELECTOR SWITCH

Example: Station A calls station D by turning his selector switch to position 3.

MASTER GAIN CONTROL:

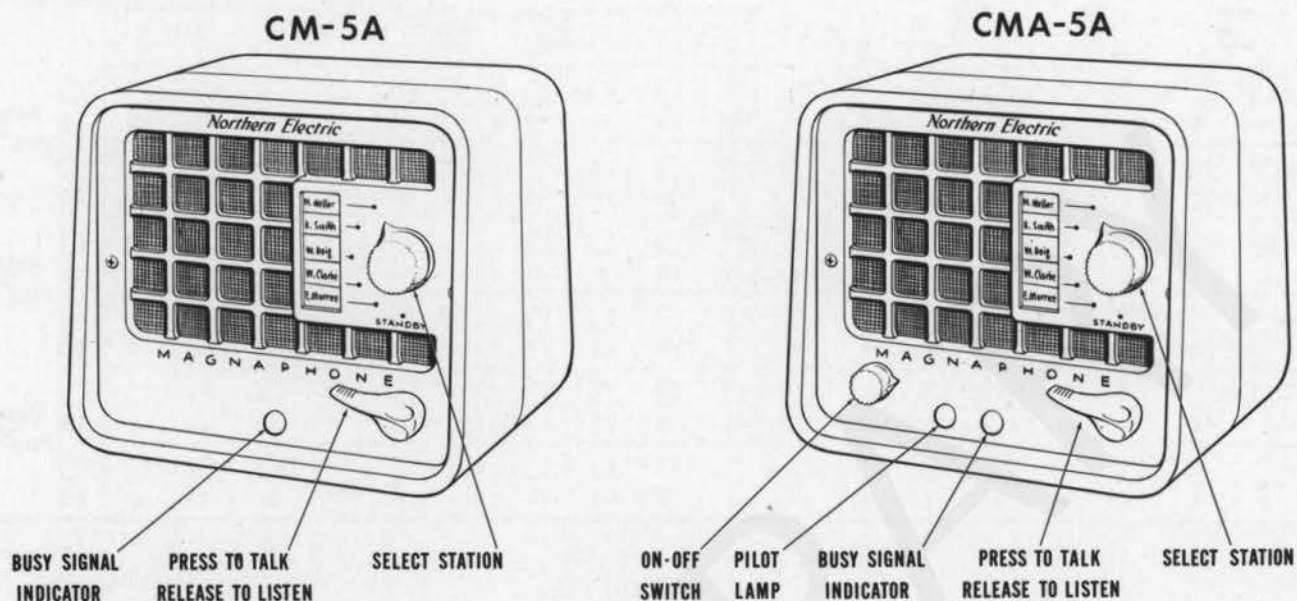
A screw-driver adjusted type gain control, which is accessible through a knockout at the rear of the CMA-5A Master Station, is provided for adjusting the system level.

INTERSTATION CABLE:

A good grade of interphone type cable, utilizing colour coded and twisted pair wires, is recommended. The length of cable between stations will determine the wire size and the following chart can be used for this purpose.

Wire Gauge	Recommended Maximum Distance Between Stations (Busy signal current limitation)
22	500 ft.
19	1000 ft.
18	1100 ft.
16	2000 ft.

OPERATION - ALL STATIONS:



TO CALL ANOTHER STATION:

1. Select the station to be called by turning the station selector switch to the desired position.
2. Depress "Press-To-Talk" switch to talk - release to listen.
3. On completion of conversation, restore the station selector switch to the "Standby" position.

TO ANSWER AN INCOMING CALL:

1. When incoming call is heard, depress "Press-To-Talk" switch to talk - release to listen.

NOTE: When answering an incoming call, it is not necessary to move the station selector switch off the "Standby" position.

EXTRA DESIGNATION STRIPS

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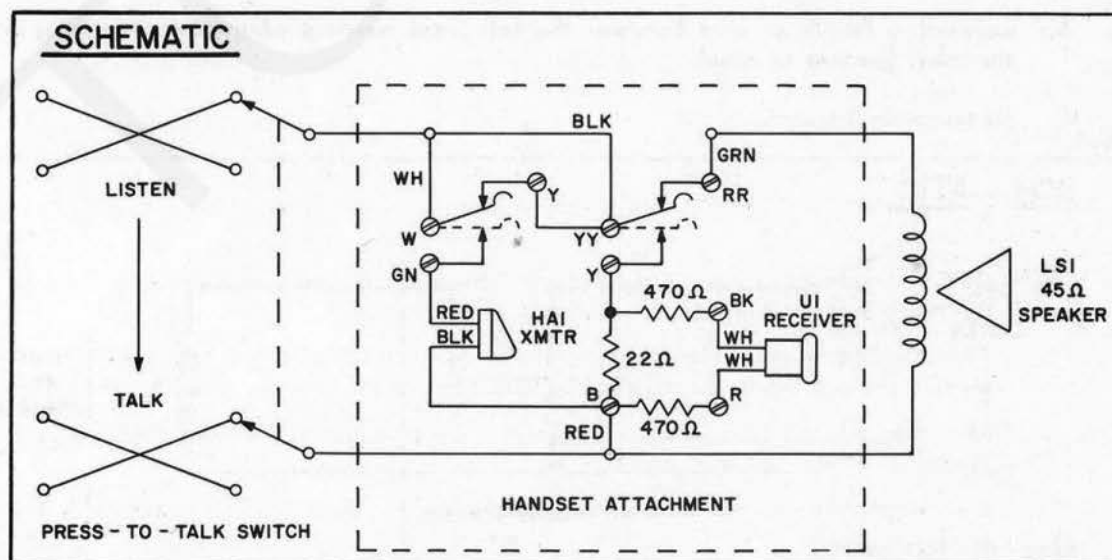
R19726A HANDSET:

Where confidential communication is desired or essential, a telephone handset is available. As illustrated, the R19726A Handset mounts in the same manner as a regular telephone set. It connects directly to the CMA-5A and CM-5A Master Stations and when the handset is removed from the hook, the loudspeaker is substituted by the handset attachment and the unit is operated in the normal manner.



INSTALLATION:

1. Remove the chassis from its cabinet and, with the speaker facing you, turn it up-side down.
2. Insert the rubber grommet in the lower 3/8" hole on the back flange of the chassis.
3. Feed the four conductor cable from the handset through the grommet and tie a knot about 5" from the end.
4. Connect the red lead from the handset to the terminal at the bottom of the press-to-talk switch which has an orange lead that connects to the speaker.
5. Disconnect the orange lead from the top terminal of the press-to-talk switch (this lead connects to speaker) and connect it to the only blank terminal on the top of the press-to-talk switch.
6. Connect the black and white lead from the handset to the terminal at the top of the press-to-talk switch now left free from step 5.
7. Connect the green lead from the handset to the same blank terminal referred to in step 5.
8. Re-assemble the unit.

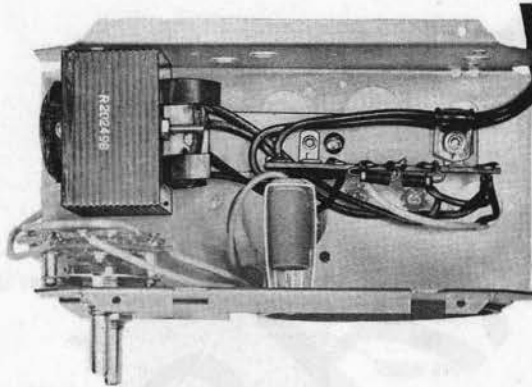


R19824-45 TRANSFORMER KIT:

The R19824-45 Transformer Kit provides the necessary power for operating the busy signal lamps in a Complete Master Magnaphone system. The kit, consisting of a transformer, bridging resistors and a terminal strip mounted on a metal strip, is completely wired for quick and easy installation in a CM-5A Master Station. As a 117 volt A.C. source is required for the operation of this kit, it should be installed in a CM-5A Master Station adjacent to a power outlet.

INSTALLATION:

1. Using the two drive screws supplied, mount the kit as illustrated in the following photo.

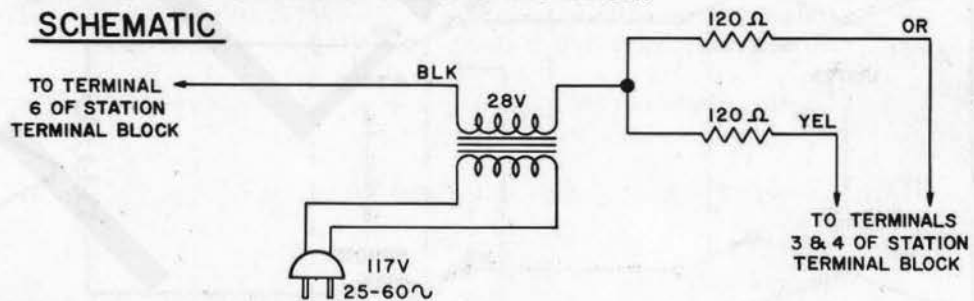


2. When the transformer has been mounted, connect the black lead to terminal number 6 of the station terminal board, the orange lead to terminal number 3 and the yellow lead to terminal number 4.

INTERSTATION WIRING:

For interstation wiring refer to the System A and System B wiring diagrams contained in the Installation section of this manual.

SCHEMATIC



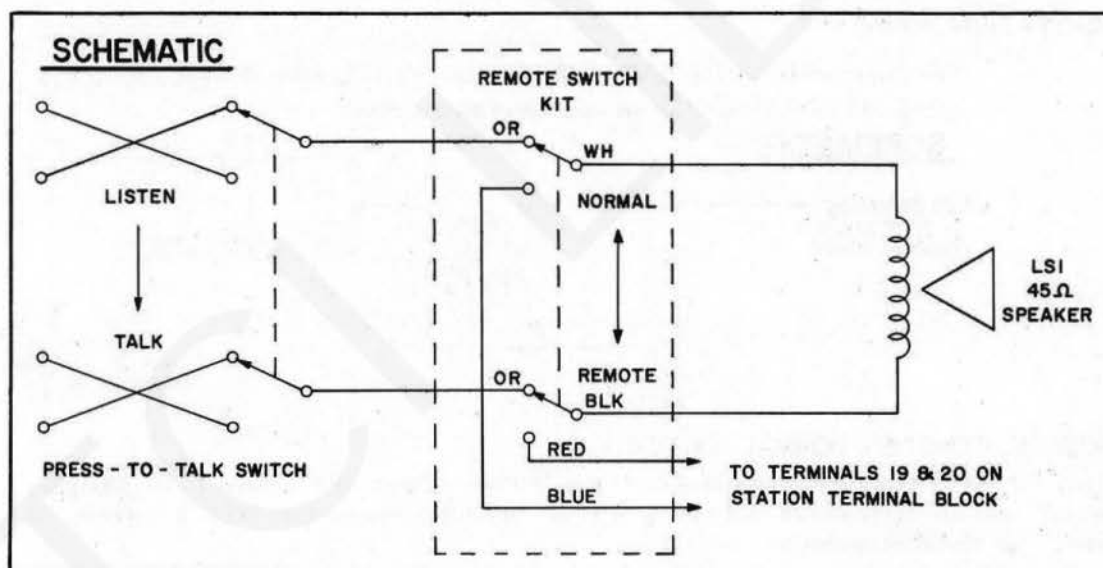
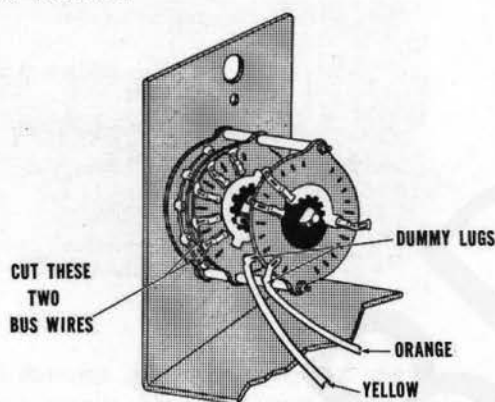
R19824-40 REMOTE - NORMAL SWITCH KIT:

This kit, when installed in a CM-5A Master Station, allows that station to be switched to "Remote" answering (permits answering without operating the press-to-talk switch) or to "Normal" for standard operation.

INSTALLATION:

1. Remove the CM-5A chassis from its cabinet and mount the switch in 3/8" hole at the left of the front flange. The locating pin should be placed in the upper locating hole.
2. Remove the two orange leads from the speaker terminals and connect them to the two blank terminals on the remote - normal switch.
3. Run the black and white leads, which are connected to the remote - normal switch, through a hole in the chassis and connect them to the speaker terminals.
4. Run the red and blue leads through the same hole and connect them to lugs 19 and 20 on the terminal board.
5. Remove the knock-out in the lower left hand corner of the front cabinet half-shell.

6. Remove the tab covering the adhesive on the designation plate and mount it so that the hole in the plate is concentric with the hole which was just cleared in step 5. Press firmly when in position.
7. To interconnect with other CM Series Magnaphones desiring to call this station as a remote operated unit, run a pair of wires from terminals 19 and 20 (referred to in step 4) to terminals 17 and 18 of the other stations. As illustrated in the following sketch, cut the buss wires leading to the lugs, on the station selector switch, that are connected to terminals 17 and 18. Transfer the two wires, that are connected to the dummy lugs on the back wafer of the selector switch, to the lugs that were just isolated from the buss wires.
8. Reassemble the unit.

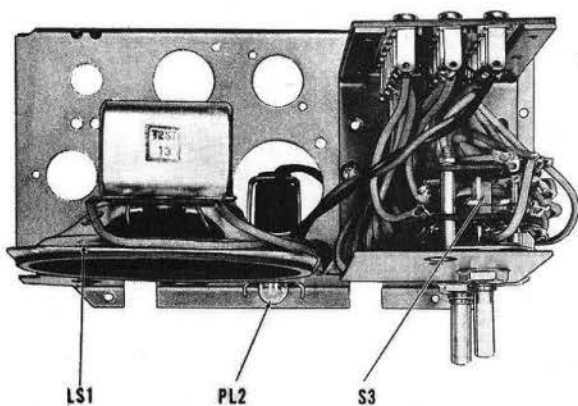


APPLICATION NOTES

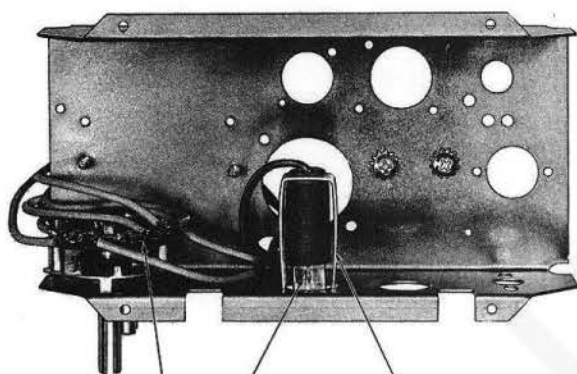
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SERVICE INFORMATION:

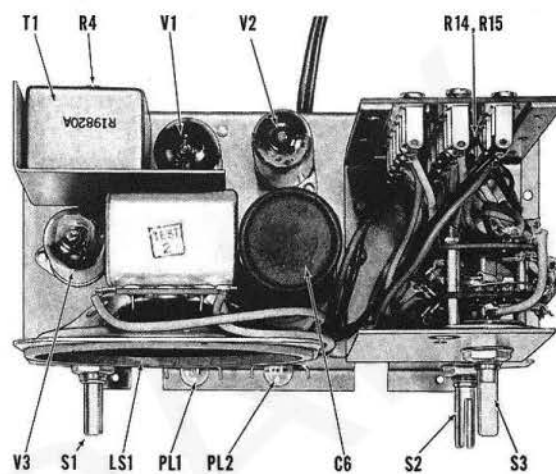


CM-5A TOP VIEW

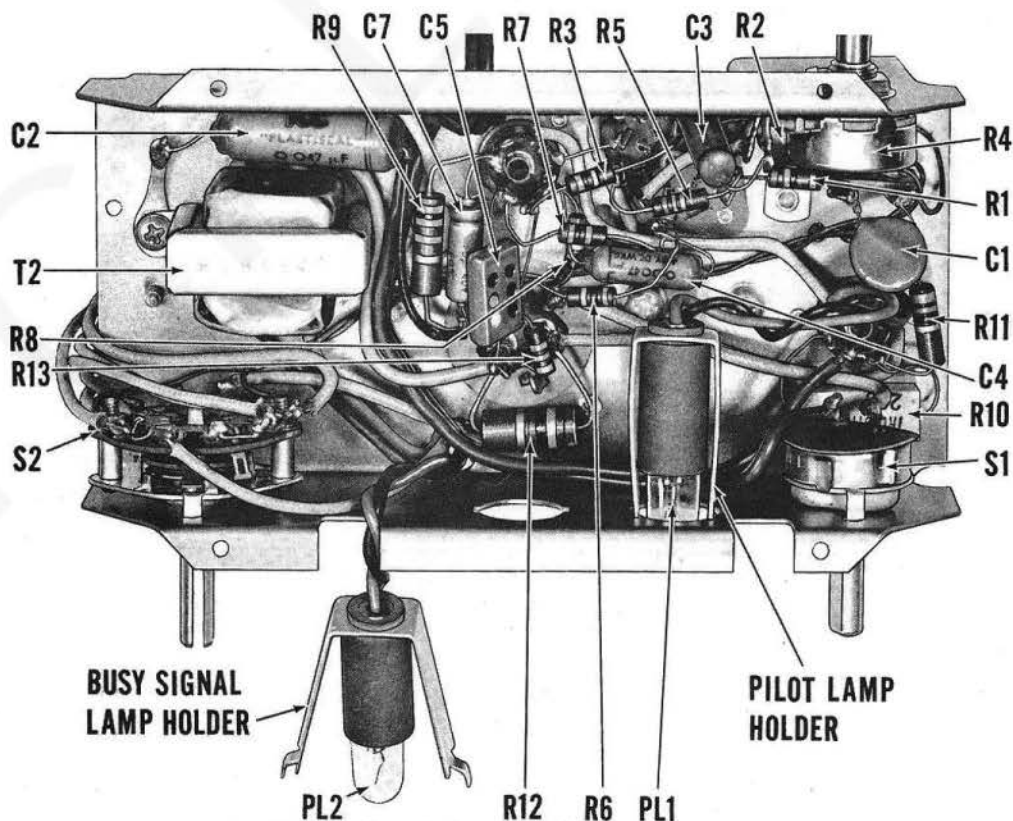


S2 PL2 BUSY SIGNAL LAMP HOLDER

CM-5A BOTTOM VIEW



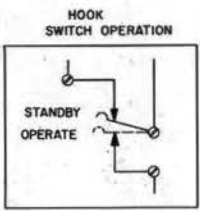
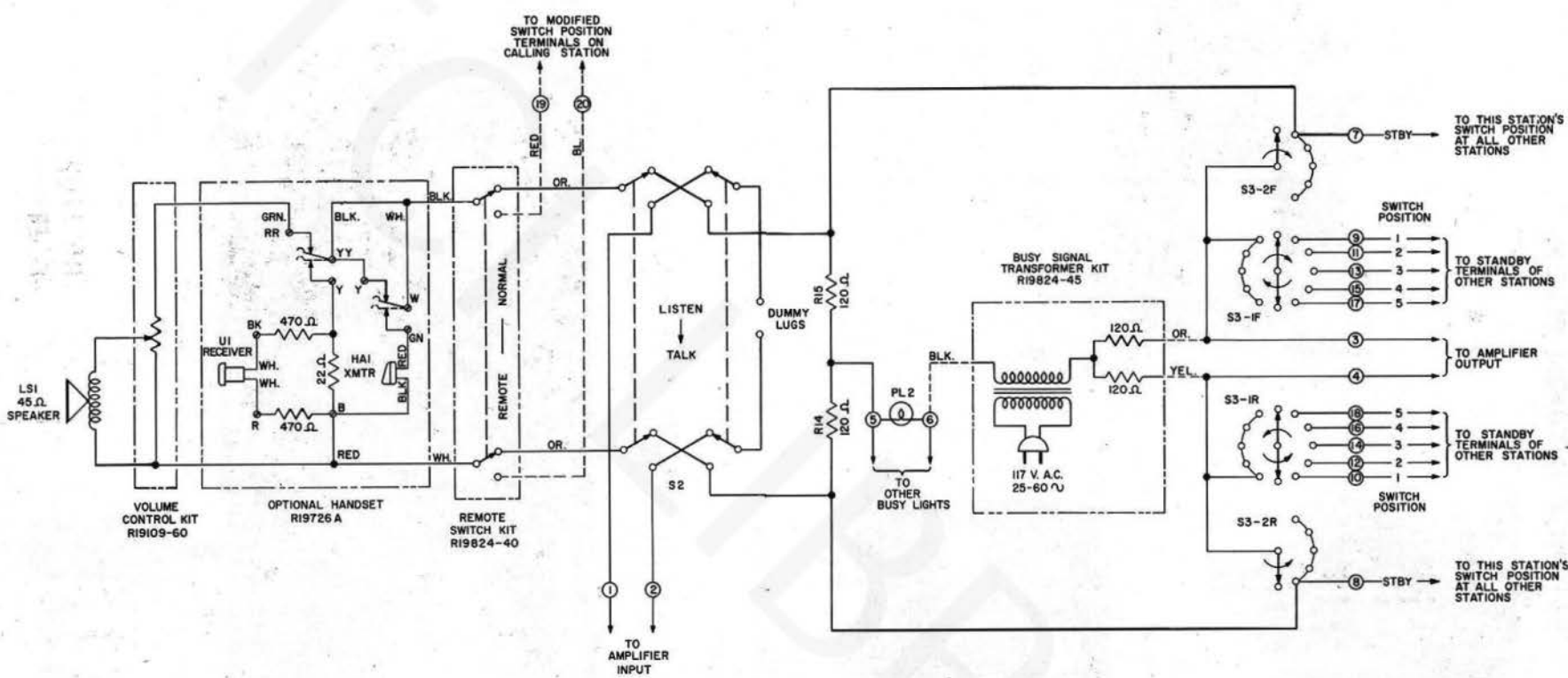
CMA-5A TOP VIEW



**BUSY SIGNAL
 LAMP HOLDER**

**PILOT LAMP
 HOLDER**

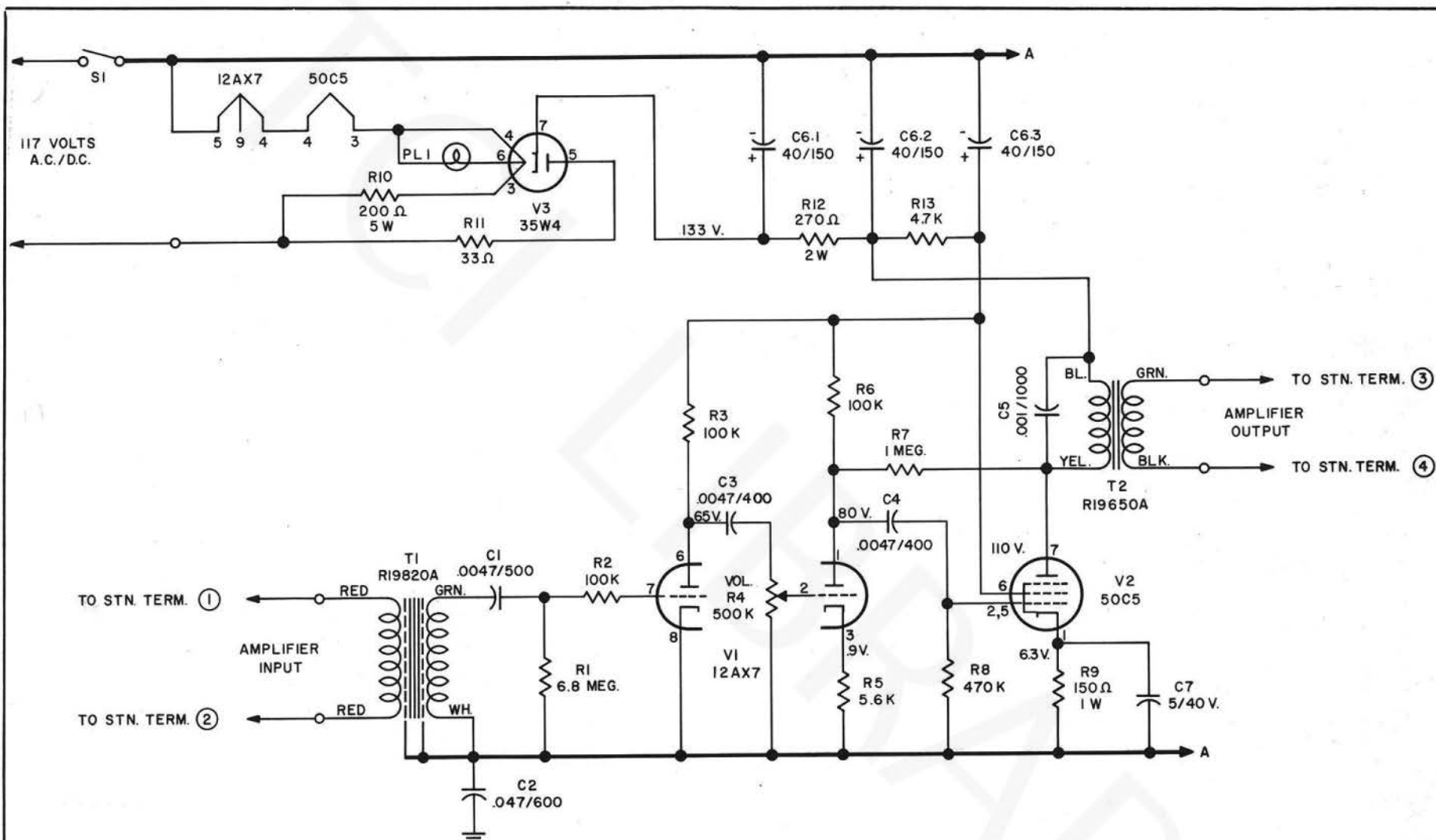
CMA-5A BOTTOM VIEW



CAUTION
ODD AND EVEN NUMBER
TERMINALS MUST NOT
BE CROSS-CONNECTED.

- NOTES:**
- 1- ① REPRESENTS TERMINALS ON STATION TERMINAL BOARD.
 - 2- ② REPRESENTS TERMINALS ON HANDSET-MTG.
 - 3- WIRING FROM SWITCH "S2" FOR ODD TERMINAL CIRCUITRY IS COLOURED ORANGE; WIRING FROM SWITCH "S2" FOR EVEN TERMINAL CIRCUITRY IS COLOURED YELLOW.
 - 4- DOTTED LINES INDICATE ASSOCIATED WIRING ADDED WITH KITS.

SWITCHBANK SCHEMATIC



NOTES:

1. ALL RESISTORS 1/2 W \pm 10% UNLESS OTHERWISE SPECIFIED.
2. ALL CAPACITORS MFD. UNLESS OTHERWISE SPECIFIED.
3. ALL DC VOLTAGES MEASURED TO B- WITH 20,000 OHM/VOLT METER.

AMPLIFIER SCHEMATIC

Replacement Parts List

CIR. SYMBOL	DESCRIPTION	PART NUMBER	VALUE	RATING	TOLER- ANCE ± %	MANUFACTURER OR TYPE
CMA-5A (AMPLIFIER UNIT) MASTER STATION						
C1	Amplifier Chassis Ass'y	R19824-60A	.0047 ufd	500V	20	N.E. Co.
C2	Capacitor, Ceramic Disc		.047 ufd	600V	20	
C3	Capacitor, Tubular Paper Plastic Sealed		.0047 ufd	400V	20	
C4	Capacitor, Tubular Paper Plastic Sealed		.0047 ufd	400V	20	
C5	Capacitor, Mica		.001 ufd	1000V	20	
C6	Capacitor, Electrolytic		40-40-40	150V		Aerovox AFH 3004
C7	Capacitor, Electrolytic Tubular, Miniature		5 ufd	40V		Rogers
LS1	Speaker	R19824-34	45 ohm			Majestic Corp AC57
PL1	Pilot Lamp		.15 amp	6-8V		N.E. Co.
PL2	Busy Signal Lamp		.035 amp	24V		Mazda #47
						National #1139B
R1	Resistor, Composition		6.8 meg	1/2W	10	
R2	Resistor, Composition		100K	1/2W	10	
R3	Resistor, Composition		100K	1/2W	10	
R4	Volume Control	K10660-57	500K	1/2W	30	N.E. Co.
R5	Resistor, Composition		5.6K	1/2W	10	
R6	Resistor, Composition		100K	1/2W	10	
R7	Resistor, Composition		1 Meg	1/2W	10	
R8	Resistor, Composition		470K	1/2W	10	
R9	Resistor, Composition		150	1W	10	
R10	Resistor, Wire Wound		200	5W	10	
R11	Resistor, Wire Wound		33	1/2W	10	
R12	Resistor, Composition		270	2W	10	
R13	Resistor, Composition		4.7K	1/2W	10	
R14	Resistor, Composition		120	1/2W	10	
R15	Resistor, Composition		120	1/2W	10	
S1	Switch, On, Off	R13645-8				N.E. Co.
S2	Switch, Press-to-talk	R19824-35				N.E. Co.
S3	Switch, Station Selector	R19824-44				N.E. Co.
T1	Input Transformer	R19820A				N.E. Co.
T2	Output Transformer	R19650A				N.E. Co.
V1	Vacuum Tube	12AX7				
V2	Vacuum Tube	50C5				
V3	Vacuum Tube	35W4				
	Pilot Lamp Holder					Philmore Mfg. 2127B
						Co. Inc.
	Busy Signal Lamp Holder					Philmore Mfg. 2127B
						Co. Inc.
	Cabinet Assembly (FRONT) R19824-50A HALF					N.E. Co.
	Cabinet Assembly (BACK) R19824-52A HALF					N.E. Co.
	Knob, on-off switch	R19721E				N.E. Co.
	Knob, press-to-talk	R19824-28				N.E. Co.
	Knob, station selector	R19721D				N.E. Co.
	Rubber foot kit (4)	R19824-29				N.E. Co.
	Spacer & Screw Kit	R19109-36				N.E. Co.
CM-5A MASTER STATION						
LS1	Speaker	R19824-34				N.E. Co.
PL2	Busy Signal Lamp		.035 amp	24V		National #1139B
						Carbon Co.
S2	Switch, Press-to-talk	R19824-35				N.E. Co.
S3	Switch, Station Selector	R19824-44				N.E. Co.
	Busy Signal Lamp Holder					Philmore Mfg. 2127B
						Co. Inc.
	Cabinet Assembly (FRONT) HALF	R19824-50B				N.E. Co.
	Cabinet Assembly (BACK) HALF	R19824-52B				N.E. Co.
	Knob, Press-to-talk	R19824-28				N.E. Co.
	Knob, Station Selector	R19721D				N.E. Co.
	Rubber foot kit (4)	R19824-29				N.E. Co.
	Spacer & Screw Kit	R19109-36				N.E. Co.
R19726A TELEPHONE HANDSET ATTACHMENT						
	Receiver Unit	U1				N.E. Co.
	Receiver Unit	HA1				N.E. Co.
	Handset Cord	H4B4-3				N.E. Co.