

GATES

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September 1961

INSTRUCTIONS FOR INSTALLING AND OPERATING
OF
GATES' M5953 SWITCHER

5/1/61

Gates Radio Company

Quincy, Illinois

Book # 888-0604-001

M5953 SWITCHER

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Then It Was Stolen From...

M5953 SWITCHER

SECTION I SPECIFICATIONS

INPUT CHANNELS: Four, 500/600 ohms (factory connected) 150/250 ohms by changing load resistor.

CROSSTALK: More than 65 db below normal recording level.

SWITCHING TIME: 0.02 seconds or less

POWER: 115 Volts, 50/60 cps., 7 watts.

RELAYS: Short telephone type (Type "J" or equivalent).

MECHANICAL

HEIGHT: 3-1/2 inch rack or custom cabinet mounting.

WIDTH: 19 inch rack or 15 inch custom cabinet mounting.

DEPTH: 4 inches behind panel, excluding plugs.

PANEL: Hinged and secured with 1/4 turn fasteners to permit quick access to dust protected relay contacts.

WEIGHT: Net 6 lbs., packed (domestic) 10 lbs., cubage 1.

SECTION II INTRODUCTION

2.1 GENERAL

The Gates Switcher, M5953 is a relay device that will switch four Cartritape audio outputs to one console

input. By connecting more than one Switcher in series, any number of Cartritape outputs may be accommodated by one console input.

NOTE

It is recommended that the complete Instruction Book be read before installation of this equipment.

SECTION III INSTALLATION

3.1 UNPACKING

The Switcher will be received in one shipping carton. Unpack the contents carefully and examine thoroughly for shipping damage. If any such damage is found, file a claim report immediately with the Carrier.

3.2 MOUNTING (ADAPTOR PLATES 15" & 19" MODEL)

The basic unit will be received for 15" custom installation. The 19" panel adaptors are enclosed. These should be installed to the panel mounting angle of the Switcher if rack mounting is planned.

3.3 MOUNTING THE 19" RACK MODEL

Mount the Switcher in a rack with four panel screws. The location of the Switcher in the rack is relatively unimportant, except that accessibility should be kept in mind to allow for routine maintenance and inspection.

3.4 MOUNTING THE 15" CUSTOM MODEL

The unit can be installed in a custom cabinet or located as a table top unit. In either case, the wiring and operation are the same.

3.5 WIRING (J303) CONTROL CIRCUITS

Study Drawing 842 3246 001, and B-67163A. Drawing 842 3246 001 is a system wiring diagram and should be used in wiring a complete Cartritape System. Drawing

B-67163A will be used for the Switcher wiring to an existing system.

NOTE

For ease of pin numbering identification use Drawing 813 5452 001 as reference. Insert plug into jack and observe pin numbers while wiring.

- 1) On each Cartritape, connect Pin 12 (J104) to the correct Pin on J303.
- 2) Pin 11 (J104) on each Cartritape, should be interconnected and this common point should be connected to Pin 11 on J303 of the Switcher.
- 3) Ground Pin 12, (J303) to the station ground.

3.6 WIRING P302 AUDIO JACK

NOTE

See Drawing 813 5852 001 for pin numbering information.

Observe diagram B-67163A, this diagram only shows Switcher wiring.

- 1) On each Cartritape, connect a shielded pair from Pins 1, 2, 3, (P105) to the correct terminals on P302 on the Switcher.
- 2) Ground Pin 14 to shield on P302.
- 3) Run a shielded pair from Pins 1-2 (P302) to the console input.

3.7 LOAD RESISTOR

The Switcher is wired for 500/600 ohm back at the factory. It can be changed to 150 ohm load by changing the load resistor R305 to 150 ohms.

3.8 CONNECTING MORE THAN ONE SWITCHER IN SERIES

By connecting more than one Switcher in series more than four Cartritapes can be fed into one console input.

To connect two or more switchers together the following procedure should be followed (See B-67174):

- Step 1. Remove jumper between Pins 3-4 (J303) on all units to be interconnected.
- Step 2. Remove all jumpers between Pins 1-2 (J303) on all units to be interconnected.
- Step 3. Connect Pin 4 (P303) on the first switcher to Pin 3 (P303) on the second switcher, Pin 4 on the second to Pin 3 of the third (or back to the first if only two switchers are used).
- Step 4. Connect Pin 8 of the first switcher to Pin 1 of the second (and so on), until the last unit. DO NOT connect Pin 8 of the last unit to Pin 1 of the first unit.
- Step 5. Pins 1-2 (J303) on the first unit should be jumpered. If a remote unit, M5960, is used, then the "OFF" switch will replace the jumper.
- Step 6. Connect a shielded pair from Pins 9-10 (P302) of the first switcher to Pins 1-2 (J302) of the second switcher (and so on) until the last unit is reached. Ground the shield to Pin 14 (P302 on all units.)
- Step 7. Diagram B-67174 shows eight audio inputs. If more than two switchers are used, the same pattern of connection should be followed.
- Step 8. The 620 ohm resistor, R305, located in each Switcher between pins 9-10 (J302) should be removed on all switchers except the last switcher in the series.

- Step 9. The output will appear at terminals 1-2 (P302) of the first unit, and should be connected to the console.

NOTE

The jumper between Pins 1-2 (J303) is removed in all units but the first, because only the first unit's power supply is utilized.

3.9 POWER CORD

Power is supplied to the unit through J301. Connect one end of the cord to J301 and plug the other end into a 115 volt 50/60 cps source.

SECTION IV
PRE-OPERATION

The following is a familiarization procedure that should be followed before attempting to place the unit into operation:

4.1 POWER SWITCH (S301)

The power OFF-ON switch is located on the front panel. When power is applied to the unit the neon indicator glows.

4.2 PLAYING BACK CARTRITAPE USING THE SWITCHER

With the Cartritapes installed to the Switcher, the following procedure should be followed to determine if they are wired and functioning properly.

- Step 1. Insert a pre-recorded tape cartridge into each playback unit connected to the Switcher.
- Step 2. Monitor the Switcher output. Pin 1-2 (J302).
- Step 3. Start the first unit. The program material from this unit should be monitored at the Switcher output.

- Step 4. Start all other Cartritapes in any order. In each case, the program material from the last unit started should be heard.

NOTE

It will be noted that this switching does not interfere with the re-cueing of the cartridges.

SECTION V
OPERATION

5.1 THE SWITCHER IN USE

Basic facts to remember about the Switcher:

1. Only one Playback unit is connected to the console input at one time through the Switcher.
2. The Cartritape that is switched to the console is the last unit started.
3. To remove all audio from the console input it is necessary to unlatch all the relays in the Switcher. Therefore, an "OFF" switch is provided as part of the remote unit, M5960.

5.2 TO PLAY BACK MULTIPLE CARTRIDGES, ONE AFTER THE OTHER

Start the first unit at the correct time in the program. When the first recorded program segment has been completed, start the next Cartritape. In each case, as the units are started, the Switcher will switch the program material from that unit to the console.

5.3 MULTIPLE SWITCHERS

If more than four Cartritapes are to feed one console input, multiple switcher operation will be necessary. (See INSTALLATION SECTION). By series connection of these switchers, any number of inputs may be handled. The operation of these units is exactly the same as for one Switcher; except, of course, more Cartritapes are handled.

SECTION VI
THEORY OF OPERATION

The relay circuits perform two basic switching functions. First, the DC control circuits and, second; the audio switching.

6.1 DC CONTROL CIRCUIT

The DC control circuit encompasses the relay switching necessary to activate the necessary relay to feed the correct audio to the console.

Refer to Drawing D-23020, note that many of the contacts on the relays are wired in series. The positive side of the DC source goes to terminal 7 on K301, and (with all relays de-energized) terminal 6 on K301, terminal 7 on K302, and so on until terminal 7 is reached on K304.

There is another set of series contacts from terminal 3 on K301 to terminal 4 on K302, and so on until K304 is reached. It then returns to terminal 4 on K301. These series contacts comprise the latching and releasing circuits that will allow any order of relay operation.

The contacts on terminals 6 and 7 on K301 are operated when that relay coil is activated. These contacts break the DC path to any relay energized above this relay and unlatch it.

Contacts located on terminal 3 and 4 break the DC path to any relay that is energized below the relay being activated.

This double series circuit path is necessary to allow operation of the relays in any sequence.

6.2 AUDIO SWITCHING

The audio output from the Switcher is located on terminals 10 and 13 of K301. The input of each Cartritape is located on Pins 11 and 14 of the relay wired to that Cartritape. When a relay is energized, the audio fed to

that relay is applied to the output line. If no relay is energized, the resistor K305 is placed on the output line to give the console a constant source impedance. This resistor may be changed to 150 ohms (1/2 watt) if the console and the Cartritapes output circuits are wired for that impedance.

6.3 POWER SUPPLY

The DC power to operate the relays is derived from a 6 volt transformer and rectified with a silicon rectifier bridge circuit with capacitor input (C305).

SECTION VII MAINTENANCE

7.1 GENERAL

Periodic preventative maintenance will keep this piece of equipment operating satisfactorily.

7.2 RELAYS

The relays should be inspected at least once a week and cleaned, if necessary, with a burnishing tool. Do not file (or in any way damage) the contacts. Gold alloy contacts are used in circuits where insufficient current flows to remove the oxide from the contacts. The enclosure itself is constructed to act as a large dust cover for the relays.

7.3 INSPECTION

The front panel is hinged and, by turning the thumb screw at the top of the panel, it can be lowered. The relays can then be cleaned and inspected from this point. Also, most of the wiring can be observed from this panel opening. The rear of the relays can be viewed by removing the back inspection plate.

SECTION VIII

PARTS LIST

<u>Symbol No.</u>	<u>Drawing No.</u>	<u>Description</u>
A301	406 0252 000	Neon Indicator
C301,C302, C303,C304	506 0008 000	Cap., 1.0 mfd., 200 V.
C305	522 0067 000	Cap., 100 mfd., 15 V.
CR301,CR302, CR303,CR304	384 0018 000	Rectifier
F301	398 0019 000	Fuse, 2 amp., 250 V.
J301	250 0025 000	Receptacle & Line Cord
J302	612 0247 000	Receptacle, 14 terminal
J303	612 0335 000	Receptacle, 12 terminal
K301,K302, K303,K304	572 0097 000	Relay
P302	610 0318 000	Plug, 14 terminal
P303	610 0254 000	Plug, 12 terminal
R301,R302, R303,R304	540 0170 000	Res., 220 ohm, 1/2 W., 10%
R305	540 0044 000	Res., 620 ohm, 1/2 W., 5%
S301	604 0005 000	Switch Toggle, SPST
T301	472 0316 000	Transformer
XF301	402 0023 000	Fuseholder
XCR301,XCR302, XCR303,XCR304	402 0039 000	Diode Mounting Board

5/3/61

-1-

M5953 Switcher

WARRANTY

This equipment is warranted by Gates Radio Company of Quincy, Illinois to be free from defects in workmanship and material and will be repaired or replaced in accordance with the terms and conditions set forth below:

1. Gates Radio Company believes that the purchaser has every right to expect first-class quality, materials and workmanship and has created rigid inspection and test procedures to that end, and excellent packing methods to assure arrival of equipment in good condition at destination.
2. Gates Radio Company will endeavor to make emergency shipments at the earliest possible time giving consideration to all conditions.
3. Gates Radio Company warrants new equipment of its manufacture for one (1) year and (six (6) months on moving parts), against breakage or failure of parts due to imperfection of workmanship or material, its obligation being limited to repair or replacement of defective parts upon return thereof f.o.b. Gates Radio Company's factory, within the applicable period of time stated. Electron tubes shall bear only the warranty of the manufacturer thereof in effect at the time of the shipment to the purchaser. Other manufacturers' equipment covered by a purchaser's order will carry only such manufacturers' standard warranty. These warranty periods commence from the date of invoice and continue in effect as to all notices, alleging a defect covered by this warranty, received by Gates Radio Company prior to the expiration of the applicable warranty period.

The following will illustrate features of the Gates Radio Company warranty:

Transmitter Parts: The main power or plate transformer, modulation transformer, modulation reactor, main tank variable condensers all bear the one (1) year warranty mentioned above.

Moving Parts: As stated above, these are warranted for a period of six (6) months.

Electron Tubes: As stated, electron tubes will bear such warranty, if any, as provided by the manufacturer at the time of their shipment. Gates Radio Company will make such adjustments with purchasers as given to Gates Radio Company by the tube manufacturer.

All other component parts (except as otherwise stated): Warranted for one (1) year.

Abuse: Damage resulting from abuse, an Act of God, or by fire, wind, rain, hail, in transportation, or by reason of any other cause or condition, except normal usage, is not covered by this warranty.

4. Operational warranty - Gates Radio Company warrants that any new transmitter of its manufacture, when properly installed by purchaser and connected with a suitable electrical load, will deliver the specified radio frequency power output at the output terminal(s) of the transmitter, but Gates Radio Company makes no warranty or representation as to the

coverage or range of such apparatus. If a transmitter does not so perform, or in the event that any equipment sold by Gates Radio Company does not conform to any written statement in a contract of sale relative to its operating characteristics or capabilities, the sale liability of Gates Radio Company shall be, at the option of Gates Radio Company, either to demonstrate the operation of the equipment in conformance with its warranty, or to replace it with equipment conforming to its warranty, or to accept its return, f.o.b. purchaser's point of installation and refund to purchaser all payments made on the equipment, without interest. Gates Radio Company shall have no responsibility to the purchaser under a warranty with respect to operation of equipment unless purchaser shall give Gates Radio Company a written notice, within one (1) month after arrival of equipment at purchaser's shipping point, that the equipment does not conform to such warranty.

5. Any item alleged by a purchaser to be defective, and not in conformance with a warranty of Gates Radio Company shall not be returned to Gates Radio Company until after written permission has been first obtained from the Gates Radio Company home office for such return. Where a replacement part must be supplied under a warranty before the defective part can be returned for inspection, as might be required to determine the cause of a defect, purchaser will be invoiced in full for such part, and if it is determined that an adjustment in favor of the purchaser is required, a credit for an adjustment will be given by Gates Radio Company upon its receipt and inspection of a part so returned.

6. All shipments by Gates Radio Company under a warranty will be f.o.b. Quincy, Illinois or f.o.b. the applicable Gates Radio Company shipping point.

7. Gates Radio Company is not responsible for the loss of, or damage to, equipment during transportation or for injuries to persons or damage to property arising out of the use or operation of Gates equipment. If damage or loss during transportation occurs, or if the equipment supplied by Gates Radio Company is otherwise damaged, Gates will endeavor to make shipment of replacement parts at the earliest possible time giving consideration to all conditions. It is the responsibility of a purchaser to file any claim for loss or damage in transit with the transportation company and Gates will cooperate in the preparation of such claims to the extent feasible when so requested.

8. Gates Radio Company, in fulfilling its obligations under its warranties, shall not be responsible for delays in deliveries due to depleted stock, floods, wars, strikes, power failures, transportation delays, or failure of suppliers to deliver, acts of God, or for any condition beyond the control of Gates that may cause a delayed delivery.

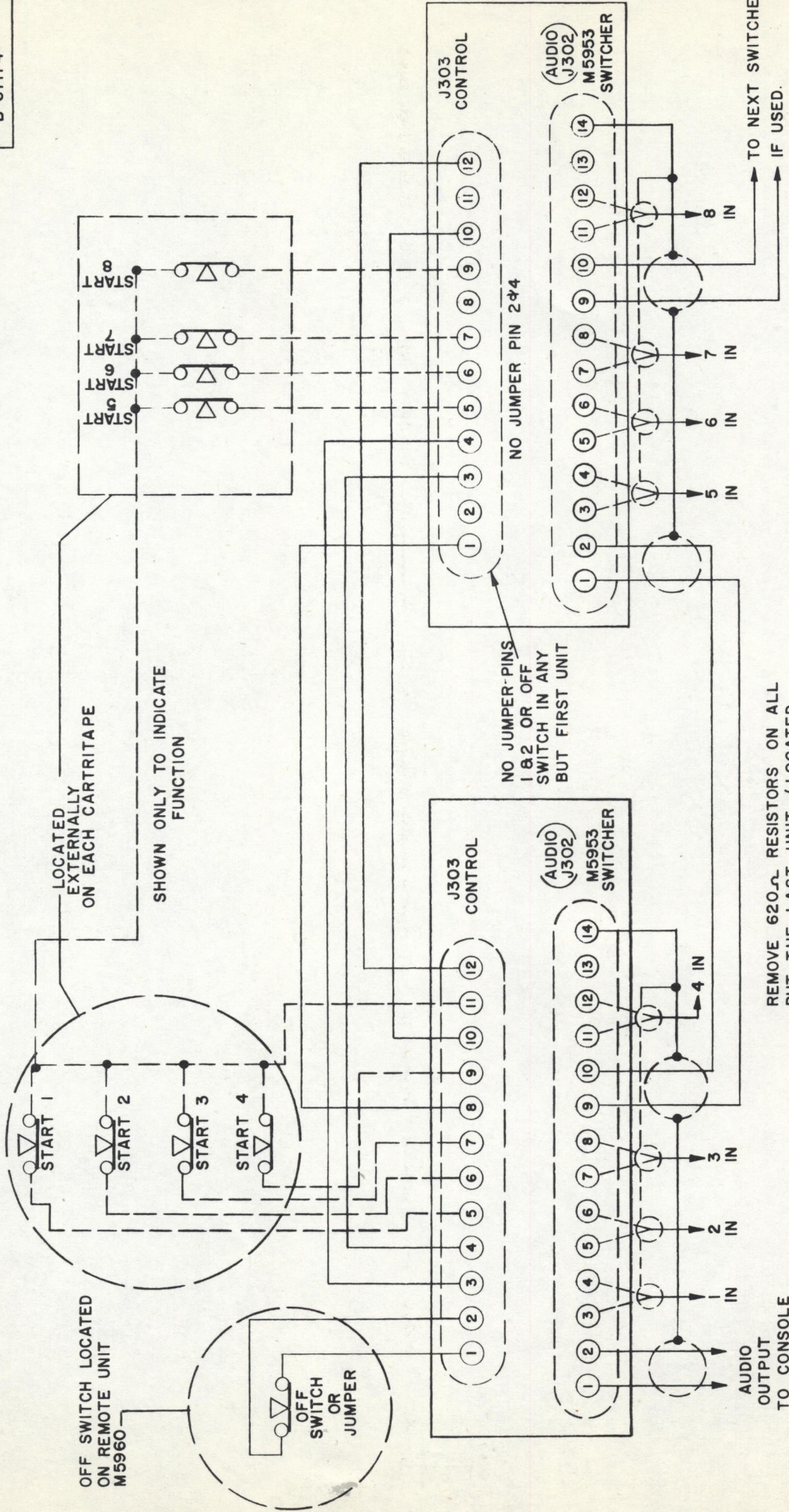
9. This warranty may not be transferred by the original purchaser and no party, except the original purchaser, whether by operation of law or otherwise, shall have or acquire any rights against Gates Radio Company by virtue of this warranty.

10. Gates Radio Company reserves the right to modify or rescind, without notice, any warranty herein except that such modification or rescission shall not affect a warranty in effect on equipment at the time of its shipment. In the event of a conflict between a warranty in a proposal and acceptance and a warranty herein, the warranty in the proposal and acceptance shall prevail.

11. This warranty shall be applicable to all standard Gates catalog items sold on or after March 1, 1960.

Gates Radio Company
Quincy, Illinois

1/6/60



(FIRST UNIT)

(SECOND UNIT) OR LAST

REMOVE 620Ω RESISTORS ON ALL BUT THE LAST UNIT (LOCATED BETWEEN PINS 9-10 J302)

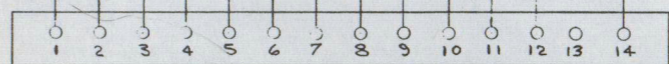
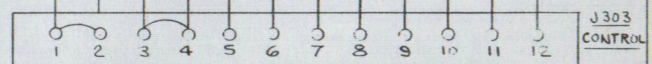
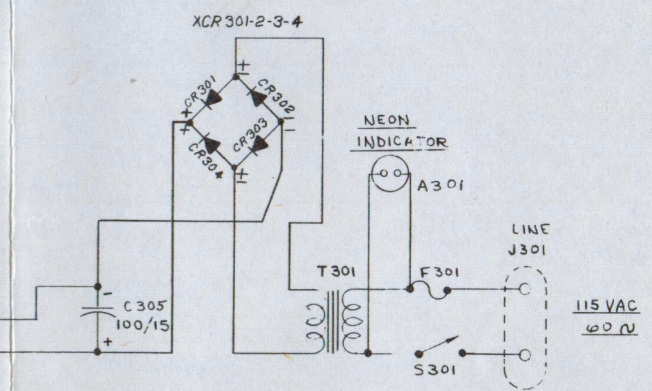
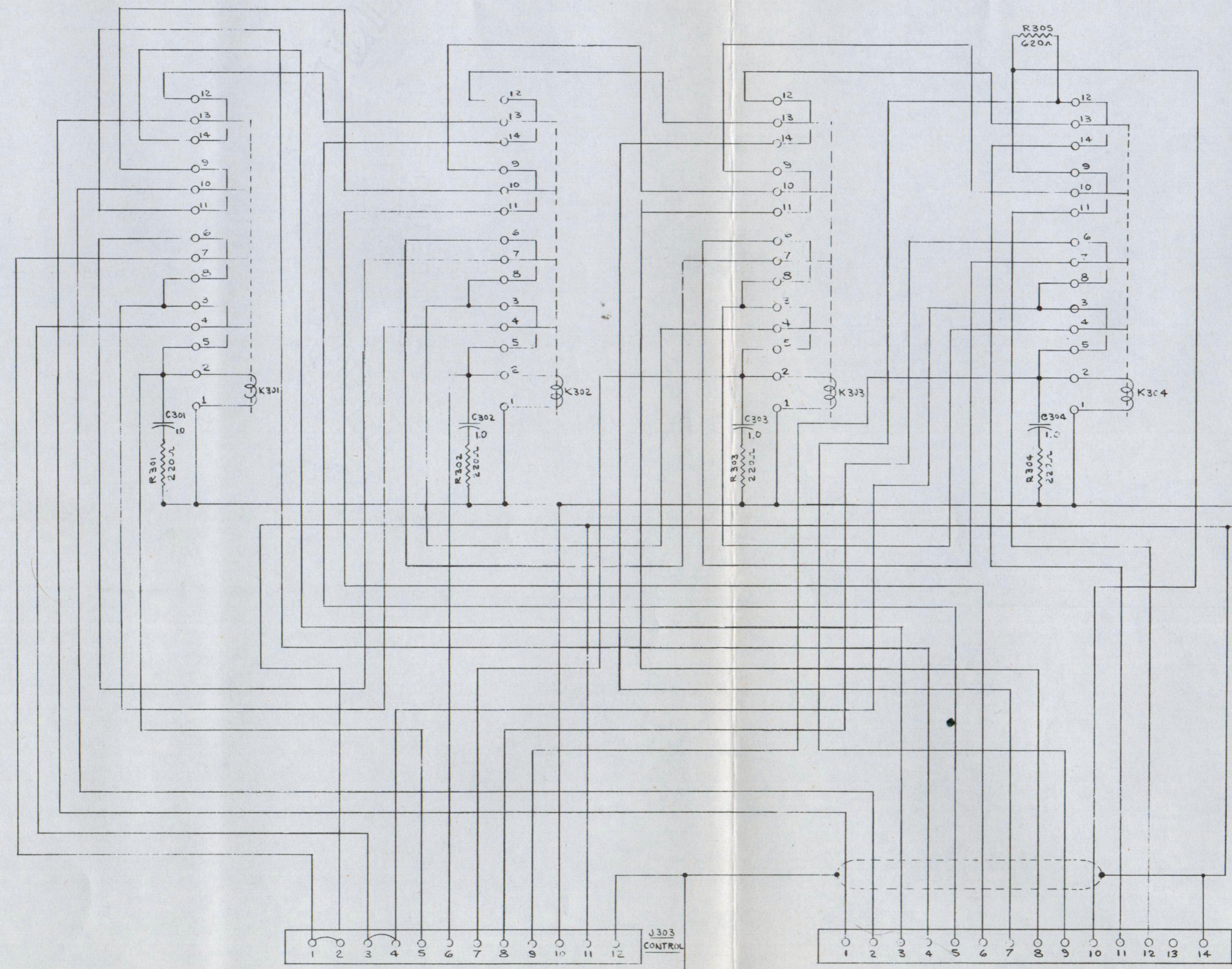
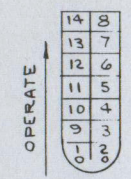
If You Didn't Get This From My Site, Then It Was Stolen From...

NOTE:
BEFORE WIRING J302 & J303 SEE DRAWING 813-5852-001 FOR PIN NUMBERING INFORMATION.

REDRAWN		G.A. 3-21-61	
M.T.L.		FIN.	
DR. BY R.L.H.	CH. BY	ENG.	SHEET OF
7-22-60	U.K.	R.A.	B-67174
TITLE WIRING DIAGRAM FOR MULTIPLE SWITCHER CONNECTION			
M-5953			

GATES RADIO COMPANY QUINCY, ILLINOIS										D-23020							
LIST OF PARTS										SCALE							
106	105	104	103	102	101	QTY.	QTY.	QTY.	QTY.	QTY.	QTY.	ITEM	REFERENCE	PT. OR G.N.	FIN.	DESCRIPTION	MATERIAL

TERM VIEW K301-302-303-304

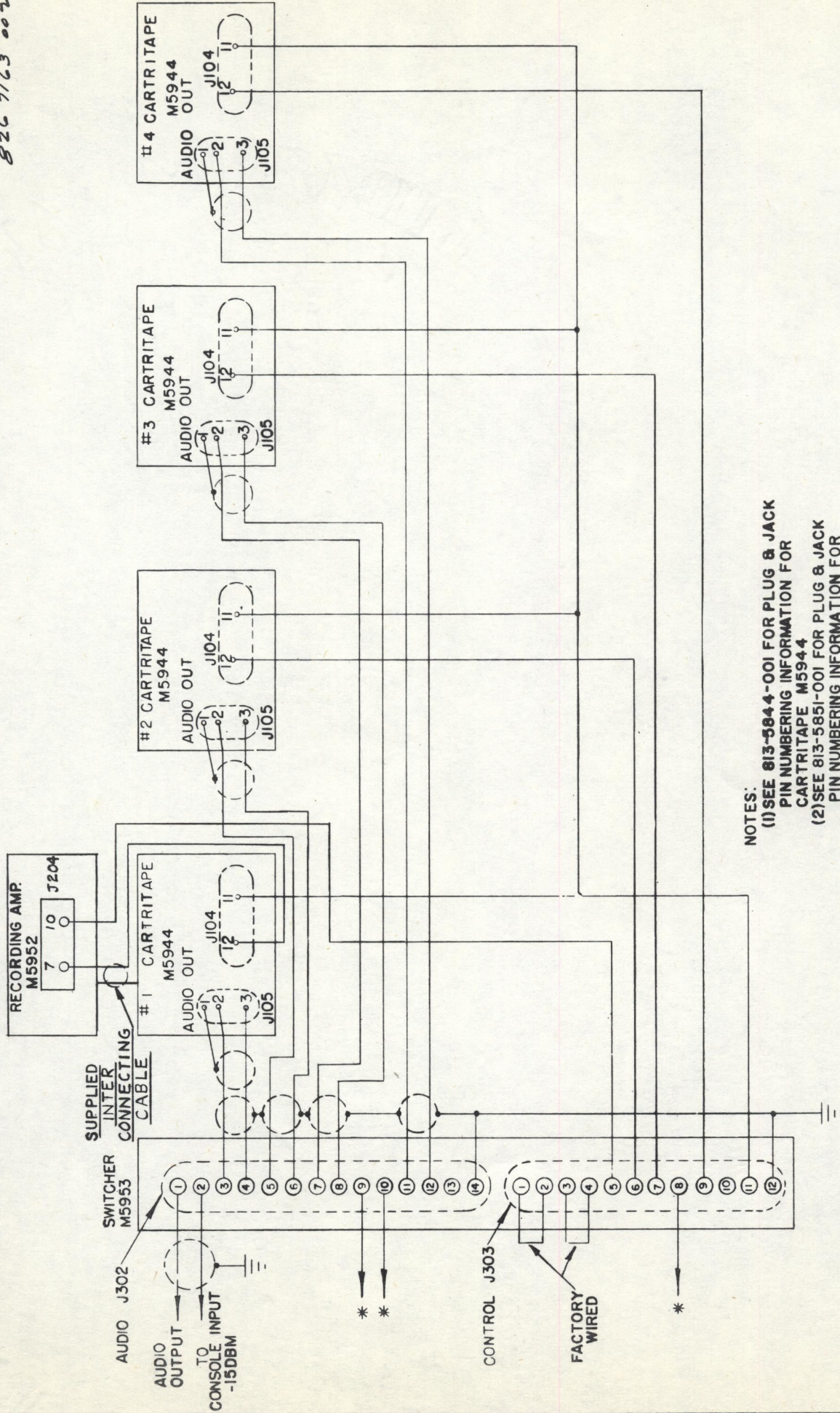


SEE DRAWING 813-5852-001 FOR PIN NUMBERING INFORMATION

SEE DRAWING 813-5852-001 FOR PIN NUMBERING INFORMATION

E.C. 8604 P.S. 4204		E.C. 8601 P.S. 4204		E.C. 8395 F.M. 9-14-60		E.C. 8384 F.M. 9-30-60		E.C. 8384 F.M. 9-30-60		E.C. 8384 F.M. 9-30-60		E.C. 8384 F.M. 9-30-60		E.C. 8384 F.M. 9-30-60		E.C. 8384 F.M. 9-30-60		E.C. 8384 F.M. 9-30-60	
STATUS										TITLE SCHEMATIC SWITCHER M5953		SHEET OF D-23020		842 3020 001					
DR. BY: MTL DATE: 6-27-64										CH. BY:		ENG.:		UNLESS OTHERWISE SPECIFIED ALL TOLERANCES PER GATES SPEC. DRAWING					

B-67163A
826 7163 002



- NOTES:
- (1) SEE 813-5844-001 FOR PLUG & JACK PIN NUMBERING INFORMATION FOR CARTRITAPE M5944
 - (2) SEE 813-5851-001 FOR PLUG & JACK PIN NUMBERING INFORMATION FOR RECORDING AMPLIFIER M5952
 - (3) SEE 813-5852-001 FOR PLUG & JACK PIN NUMBERING INFORMATION FOR SWITCHER M5953

* THESE TERMINALS UTILIZED WHEN CONNECTING MULTIPLE SWITCHERS

WIRING DIAGRAM SWITCHER M5953
FOR CARTRITAPE M5944

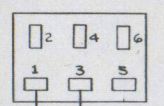
ECN 8608
1/10/15

826 7163 002 B-67163A R1A

CHART I

AUDIO INPUT CONNECTION TO RECORDING AMP P205

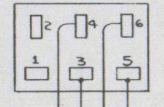
(1) FOR MIC. INPUT -70DBM TO -50DBM



P205
FIG. 1

TRANSFORMER T202 CONNECTED FOR 150Ω AT FACTORY. T2R MAYBE CONNECTED FOR 30/50Ω BY FOLLOWING INSTRUCTION IN SEC. III IN RECORDING AMP. INSTR. BOOK.

(2) BRIDGING 10K HIGH LEVEL -20DBM TO +8DBM

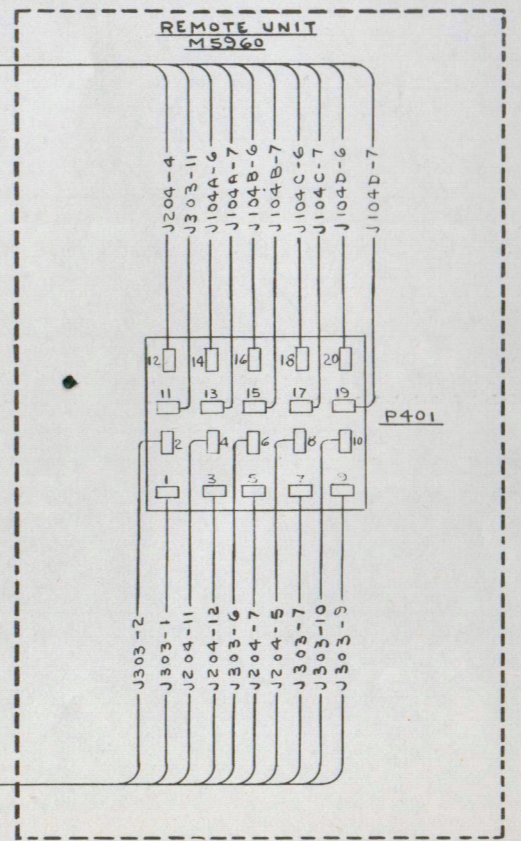
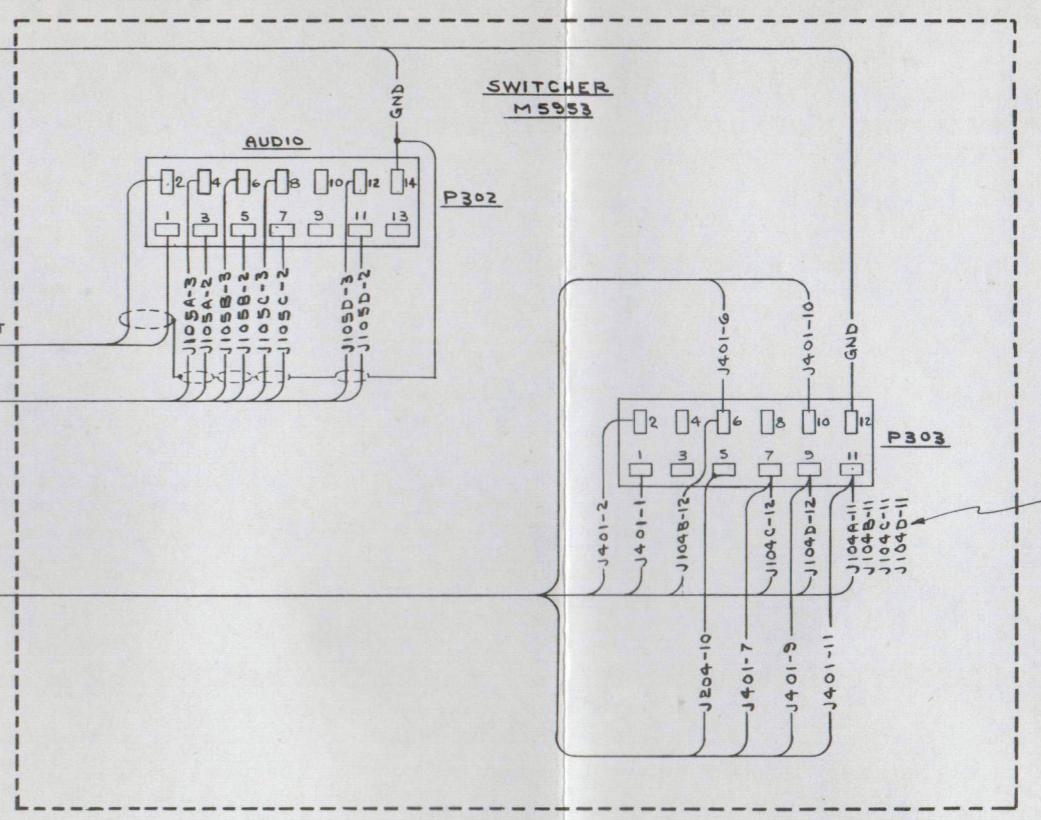
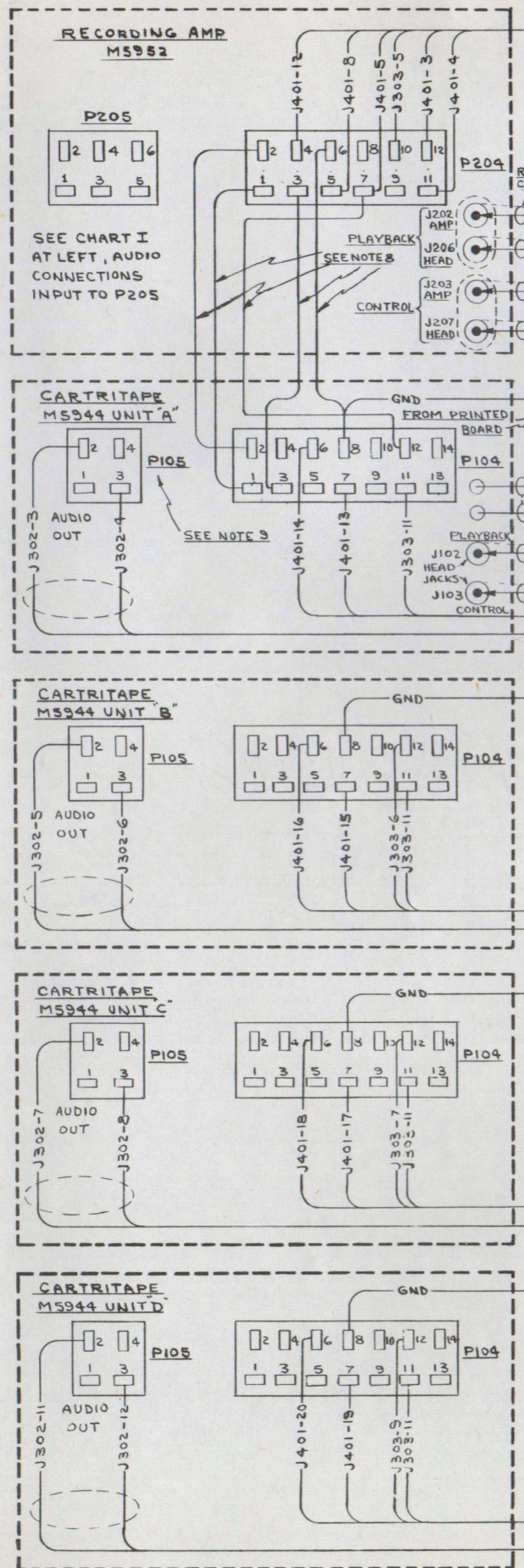


P205
FIG. 2

(1) HIGH LEVEL INPUT PINS 4 & 6
(2) JUMPER PINS 3 & 5

(3) MED. LEVEL BRIDGING -35 TO -20 DBM P205

- (1) INPUT SAME AS ABOVE PINS 4 & 6 (SEE FIG 2)
- (2) JUMPER PINS 3 & 5 SEE FIG 2
- (3) JUMPER OUT R236 & R237 (4.7K) ON AT201 REMOVE R270 620Ω



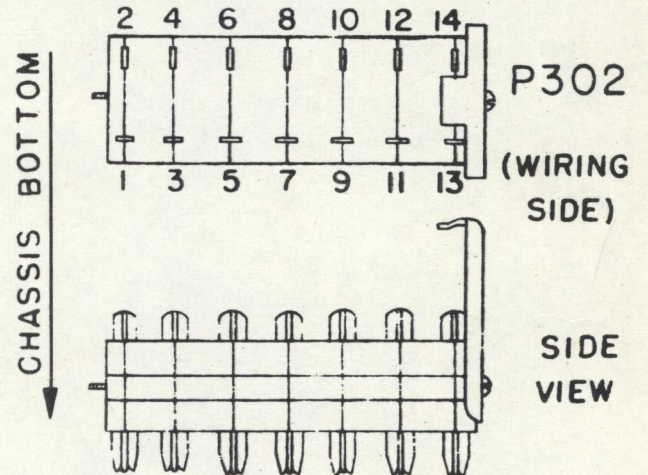
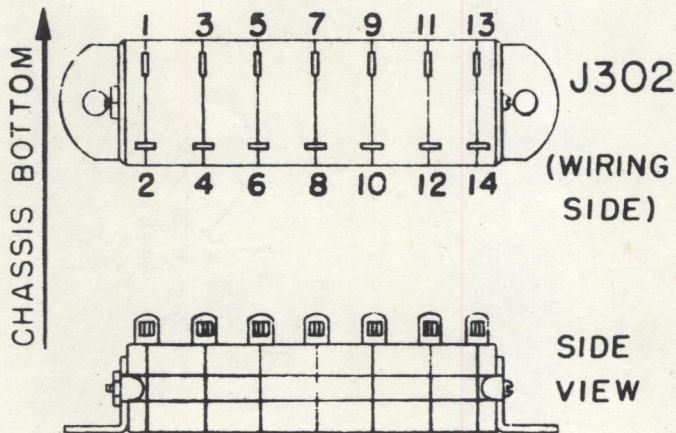
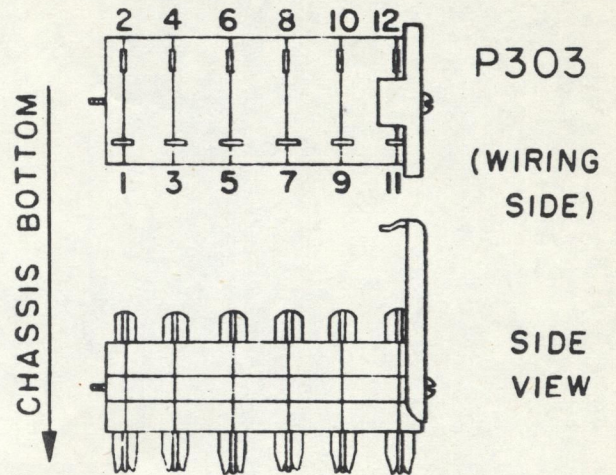
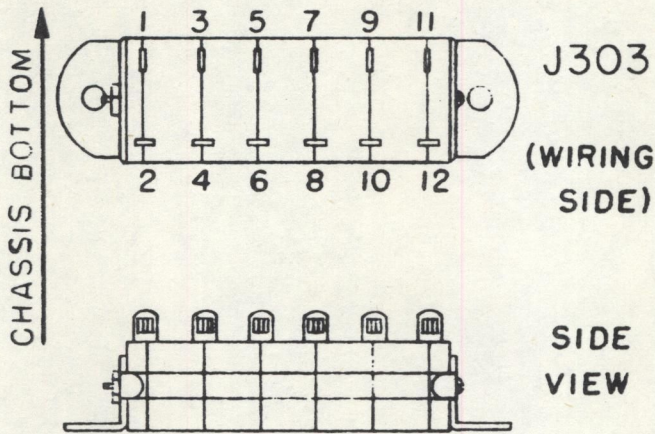
NOTES

- (1) DENOTES SHIELDED PAIR.
- (2) DENOTES #18 STRANDED HOCKUP WIRE.
- (3) PLUGS ARE SHOWN AS VIEWED FROM REAR OF UNIT WHEN THEY ARE INSERTED. (WIRING VIEW)
- (4) GND. ONLY ONE END OF SHIELDED WIRE AS SHOWN TO PREVENT GROUND LOOPS.
- (5) USE ONLY ROSIN CORE SOLDER.
- (6) NOTE THAT CHASSIS GND. FOR RECORD AMPLIFIER COMES FROM PLAYBACK UNIT ONLY.
- (7) LETTER AFTER JACK NO. DESIGNATES UNIT A, B, C OR D CARTRITAPES M5944.
- (8) THE INTERCONNECTING CABLE PROVIDED WITH M5952 (RECORDING AMP) CONTAINS THESE WIRES.
- (9) ALL J100'S ARE ON CARTRITAPES M5944.
- (10) ALL J200'S ARE ON RECORDING AMP M5952.
- (11) ALL J300'S ARE ON SWITCHER M5953.
- (12) ALL J400'S ARE ON REMOTE UNIT M5960.
- (13) SHIELDED WIRE CONNECTIONS FOR HEAD SWITCHING. USE SUPPLIED SHIELDED CABLES. SEE SEC. III, PAR 3.4 M5952 I.B.

USE FOR WIRING INTERCONNECTING PLUGS

RECEPTACLE
SHOWN FOR CIRCUIT
TRACING ONLY

PLUGS
USE FOR WIRING INTERCONNECTIONS.
CAUTION: TO REMOVE HOUSING LOOSEN
NUT ON SIDE DO NOT REMOVE SCREW,
OTHERWISE PLUG WILL COME APART.



NOTES

- 1) MAKE ALL CONNECTIONS, NUMBERING FROM THE WIRING SIDE ONLY.
- 2) THE JACKS ARE SHOWN FOR REF., ONLY IN CIRCUIT TRACING (DO NOT WIRE TO JACKS).

CH. BY	MTL.	TITLE	
DR. BY	ENG.	TERMINAL NUMBER DESIGNATIONS FOR JACKS AND PLUGS	
G.A. 3-2-61	R.L.H. 3-20-61	SWITCHER M5953	813-5852-001