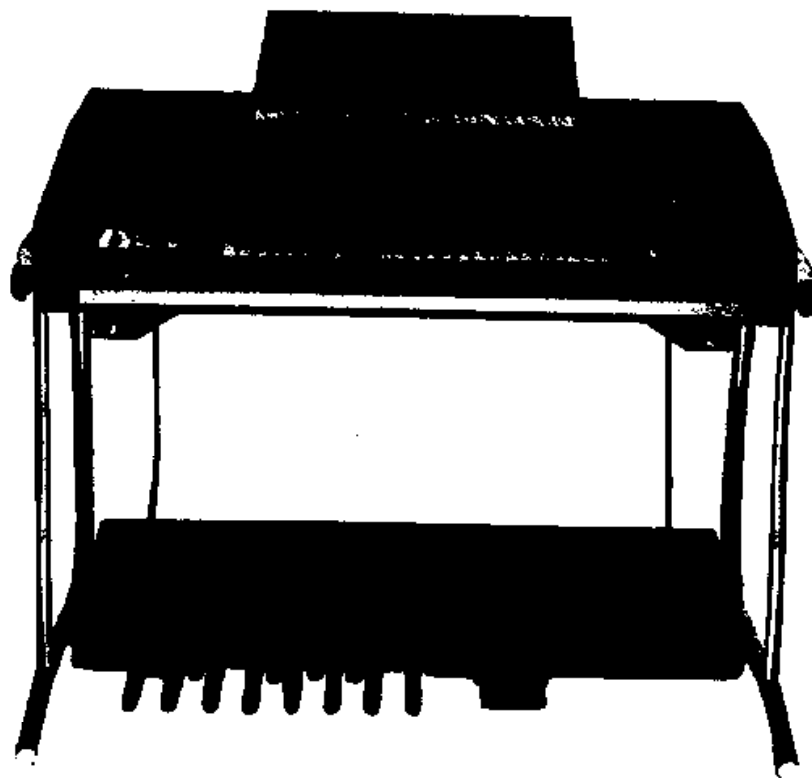


SERVICE MANUAL



HAMMOND X-5 COMBO ORGAN

The Hammond X-5 is the first truly portable organ that embodies all the traditional capabilities of Hammond tonebar organs. It's a synthesis organ that allows you to create your own sound. It's easy to set-up, compact, and weighs only 165 lbs.

- Two 44-note keyboards with overhang keys.
- 13-note pedalboard.
- Nine harmonic tonebars for upper keyboard.
- Seven harmonic tonebars for lower keyboard.
- One 16' harmonic tonebar for bass.
- Vibrato: 3 degrees and off.
- Reverberation: 3 degrees and off.
- 4 presets plus upper and lower tonebar positions.
- Synthesis touch-response percussion.
- Fast and Slow Decay.
- Variable speed repeat/iteration on percussive voices.
- Acoustic tremolo-speaker outlet (Leslie® 910), plus two-speed on/off control tabs.
- 16' and 8' pedal tab.
- Two String Bass tabs: 3 decay times, plus Mute tab.
- Brilliance Knob, continually variable.
- Volume control knob.
- Input jack for external instruments.
- Line-out jack for other amplifiers.
- External speaker jack.

SPECIFICATIONS: Weight: 165 lbs. • Power Source: 60 cycle AC 120 V. • Dimensions: 44½" W., 36" H., 25" D.

PRODUCT SERVICE

For product service, contact nearest authorized Hammond Service Center or write to: Manager, Product Service, Hammond Organ Company, 4200 West Diversey Avenue, Chicago, Illinois 60639.

Parts are also Available by Contacting Product Service as Mentioned Above.

IMPORTANT:

Always supply model designation and serial number when writing.

HAMMOND X-2 COMBO

- Hammond X-2 Combo Organ
- 36 Bass Notes and 36 Treble Notes
- 36 Bass Notes and 36 Treble Notes
- 36 Bass Notes and 36 Treble Notes
- 36 Bass Notes and 36 Treble Notes

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SECTION III - DIAGRAMS AND TEXT

SECTION I. HOW THE ORGAN OPERATES

X-5 — 18050K

GENERAL PERFORMANCE DESCRIPTION

1-1 GENERAL

This section contain a brief description of the various sections of the instrument.

1-2 CABINETRY

The metal frame and wood panels-coated with vinyl leather and CHS- form the case work. Case has a metal handle for carrying and a removable key cover.

1-3 TONE SOURCE

The X-5 (18050K) utilizes the single master oscillator with the multiderivative divider (MDD) system. The twelve (12) I.C.'s mounted on the 229-20316 (DV-4B) Divider Generator Board provide the division of outputs and provide the sine wave tones -seventy nine (79) tones- made use of by the instrument.

1-4 MANUAL

The 18050K uses two (2) 44 note Manual that Upper Manual has 10 contacts under each key. The Manuals provide means of switching signals from 229-20316 Generator Board and keying voltage to the 219-04312 Gate & Percussion Board. The lowest one of these contacts is used for switching voltage for Gate & Percussion, and Others are used for switching the signal directly.

1-5 TONE BARS

Three Groups of Tone Bars complement the Upper Manual, Pedal and Lower Manual. They carry the footage markings and vary loudness.

1-6 PRESETS OR TAB VOICING

The three (3) Presets Tabs may bring in pre-set tones instead of the setting of the upper Tone Bars, And the One (1) Preset Tab may bring in those of lower Tone Bars.

They may be used individually. The presets have the following Tone Bar structure.

	Lower Tone Bars
Preset Ensemble	068888 444
	Upper Tone Bars
String	008888 666
Full Tibias	808808 006
Theater Brass	848868 666

Depression of either Preset Tab disconnects the setting of the Tone Bars, and all Tabs turn to "Off" position and restore the Tone Bars. On Upper Presets, the right-hand Tab has priority over the left-hand Tabs. The Tabs used are of the current switch type. The Preset Tabs are located on the lower left-hand End Block Assembly. The End Block also contains other Tabs whose functions are the following: Percussion (Second Harmonic, Third Harmonic, Decay, Repeat), Vibrato and Leslie (Acoustic-Tremolo).

1-7 PERCUSSION

Percussion Tones are switched on by the Tabs, which are Second Harmonic and Third Harmonic. Each footage of the pitch corresponds to 4' and 2-2/3' of Tone Bars. Percussion affects all upper Tone Bar setting, but not Preset Tones. It has two decay times, approximately 1.5 seconds (Slow) and 80 msec. (Fast).

1-8 REPEAT

The same Percussion gate can be activated by a reiteration or repeat Oscillator, and affect the same Percussions. The Oscillator rate is variable from 13 times/10 seconds to 500 msec. The Repeat Rate control is located on the lower right-hand End Block Assembly. The End Block also contains other Tabs and controls whose functions are the following: Pedal, String Bass, Mute, Reverb, Volume, and Brilliance.

1-9 PEDALS

A 13-note Spine Pedal of the Block Module Design is used. The Spine Pedal is of the Rocker type, with the middle contact used for Common. A series of latching Pedal Gates determines the desired bass note. These contacts are wired High-Note Select. The latching Keyer Gates hold for at least two (2) seconds, but release instantly with the next pedal depressed.

The selected output is then amplified to produce the 8' bass note and then frequency-divided one (1) time in F-F circuit to produce the 16' bass note. An output gate controls the Pedal Sustain envelope. The sustain decay time is selected by String Bass Tabs, whose decay times are follows:

Tab	Decay Time
String Bass I	350 msec.
String Bass II	700 msec.
String Bass III (I + II)	1.5 sec.

The Bass Note is selected 8' and 16' by Pedal Tab. The Mute Tab affects all Bass Tones.

1-10 VIBRATO

A Master Oscillator Vibrato offers three (3) widths at one speed that affects all voices. This rate is 6.6 ± 0.2 Hertz. Vibrato II is wider than I, and the two Tabs are additive, so the Vibrato is widest when both on.

1-11 VOLUME

This Knob controls the overall volume of the organ soft to loud, and its variable range is about 30 dB.

1-12 BRILLIANCE

This Knob controls the overall tone of the organ soft to bright, then gradually attains a slope of 6 dB/octave and rises the response about 16 dB at 3000 Hz.

1-13 EXPRESSION PEDAL

The assembly is made of steel frame, utilizing a single channel.

The variable range is about 22 dB at minimum position.

1-14 REVERBERATION

Three (3) degrees of reverb are available, which affects all organ tones.

1-15 EXT. INPUT

An Input suitable for other Signal-generating devices is provided and located under the right-hand Lower End Block of the cabinet.

1-16 REMOTE TONE CABINET

A jack is provided suitable for an 8 ohm Speaker. A socket is provided suitable for a Leslie 910 Tone Cabinet. The signals are taken from the organ output following the Leslie Selector Tabs, and On/Off, Fast/Slow control Tabs are supplied through the Standard Cable to the Tone Cabinet. The Leslie 910 Tone Cabinet is located on amplifier only in the Pedal Cabinet.

1-17 AMPLIFIER

A single channel 30 Watt Block Module Design is provided and located in the Pedal Unit Assembly.

SECTION II. DISASSEMBLY

2-1 GENERAL

This section contains instructions for removal of specific assemblies of the organ. Step 2-2 thru 2-13 provide disassembly procedures for the Upper Section (Manual Keyboard) of the organ. Steps 2-14 thru 2-17 provide disassembly procedures for the Lower Section of the organ. The removal of some sub-assemblies and unplugging connectors or unsoldering is obvious. These will not be discussed.

For reassembly, use reverse procedures.

UPPER SECTION

2-2 TOP PANEL

- a) Two (2) bronze screws (6½" long) located under Upper Section must be removed FIRST. (Note - See Figure 2-1 for location).
- b) Near top and center of each side of Upper Section remove bronze screw.
- c) From front of top panel, lifting evenly, raise top to swing up position.

2-3 UPPER MANUAL ASSEMBLY

- a) See figure 2-1 for location - Remove six (6) 1" long bronze screws from under side of Upper Section.
- b) Raise manual to swing up position. (Do not lift by keys).

2-4 END BLOCKS - LOWER MANUAL

- a) Remove two (2) phillips screws from rear of each End Block Assembly.
- b) Carefully lift up and avoid marring or scratching.

2-5 LOWER MANUAL ASSEMBLY

- a) Lower Manual End Blocks should be removed first to avoid damage to case or other assemblies.
- b) See Figure 2-1 for location. Remove four (4) 1" long bronze screws from under side and toward front of Upper Section.
- c) Carefully, Manual can be placed in up right position. (Do not lift by keys).

2-6 TONE BAR ASSEMBLY

- a) Unplug Upper and Lower tone bar connectors for T.G-15 (8) PWB assembly located under Upper Manual Assembly.
- b) Remove self tapping screws mounting Tone Bars to Upper Manual Assembly.

2-7 POWER SWITCH AND UPPER MANUAL RIGHT HAND END BLOCK.

- a) Follow steps 2-2 thru 2-3.
- b) Remove End Block, by removing one (1) screw at rear, top of End Block. Screw located under felt.
- c) Raise manual and from under End Block remove screw.
- d) Between Front Strip, remove small screw fastening strip to End Block. Lift up End Block.
- e) From under side of End Block, remove two (2) screws fastening cover to switch. Remove cover.
- f) To remove power switch - after End Block is loose from Manual, remove two (2) black screws from top of End Block. Switch now can be removed from under side of End Block. Reassemble in reverse procedure.

2-8 TO REMOVE END BLOCK POTENTIOMETERS

- a) Follow step 2-2 thru 2-6.
- b) Remove knob of potentiometer. (Volume, Brilliance, or Repeat), by loosening small set screw in knob.
- c) Remove End Block by removing two (2) screws top rear of End Block. Lift Block.
- d) Remove hex nut securing potentiometer to End Block, Potentiometer can be removed from bottom side of Assembly.

2-9 ROCKER TABS (REMOVAL)

- a) Proceed as stated in Steps 2-2 thru 2-4.
- b) From under side of End Block, remove top and bottom screw of associated Rocker Tab Assembly. Rocker Tab will lift out.

DISASSEMBLY CONTINUED

2-10 PRINTED WIRING BOARD REMOVAL

- The removal of PWB Assemblies is quite obvious and will not be necessary to describe.

2-11 TO REPLACE UPPER OR LOWER MANUAL KEYS.

- Follow Steps 2-2 thru 2-3, Upper Manual and thru 2-5 Lower Manual.
- Remove several locking "S" Springs holding plastic covered red in-area of key or keys to be replaced.
- Remove key spring from rear of key channel.
- Lift rear of key channel slightly and in a forward motion carefully remove key and channel assembly from manual. In the removal of sharp (black) keys, it will be necessary to remove neighboring keys. Reassemble in reverse procedure.

c) NOTE — Key contact adjustment can be made by turning screw forward, screw on key and channel assembly (large push key depth).

2-12 POWER SUPPLY

- Follow steps 2-2 thru 2-3.
- Remove six (6) screws fastening cover above power supply assembly — Remove cover.
- From under side, right rear of Upper Section remove four (4) screws. See Figure 2-1 for location.
- Carefully unplug and lift assembly out.

2-13 ACCESS TO REVERB UNIT

- Follow Steps 2-2 thru 2-3.
- Remove six (6) screws fastening cover above power supply. Remove cover.
- Remove two (2) screws and fasteners hold EF-12 PWB to side plate, lift off.
- Remove four (4) screws fastening MG-4 PWB to hinged panel. Carefully unplug and remove.
- Remove four (4) nuts and washers from rear of swing panel.
- Carefully raise panel and gain access to reverb assembly.

LOWER SECTION

2-14 POWER SUPPLY ASSEMBLY

- Remove four (4) nuts fastening base of Assembly to Lower Section.
- Lift out.
- To remove pedal from the metal base. Rubber mat of pedal can be removed by lifting edges of mat. Mat will lift and peel off.
- With mat removed, remove four (4) screws holding metal pedal to Base Section and separate. Reassembly in reverse procedure.

2-15 TO REMOVE LOWER SECTION COVER

- From under side of Lower Section. Remove ten (10) phillips screws.
- Cover will lift off.

2-16 POWER SUPPLY ASSEMBLY

- Remove cover as stated in Step 2-15.
- Remove four (4) nuts fastening amp to wood base.

2-17 PEDAL ASSEMBLY

- Remove the 10 nuts and washers mounting keyboard assembly to wood base.
- Pedal assembly will lift off.
- Contact switch assemblies can be removed by loosening screws at each end of switch module and slide away from screw and lift up. Reassemble in reverse procedure.

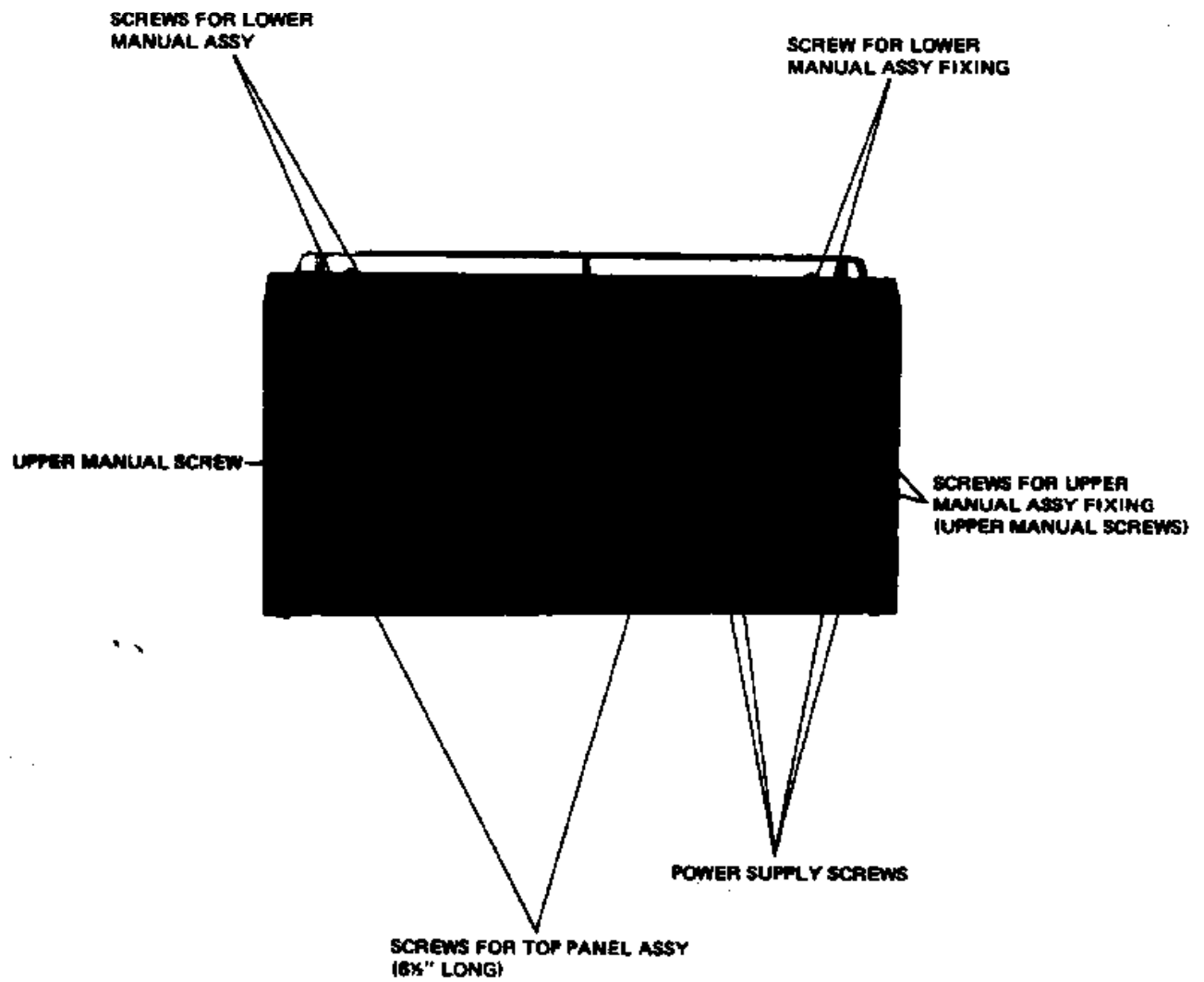


FIGURE 2-1

TEST AND ADJUSTMENT PROCEDURES
X-5 (18050K)

- 1 -

Step	Test & Test Point	Depress Tab, or Extend Tone Bar	Play Keys	Adjust	Oscilloscope or Other Ind	Fig.
1 (a)	<u>Preparations</u> Connect Pedal Connector, Main Amp. Connector					1
(b)	Connect Ext. Sp. Out. of Main Amp. Fig. 1 And Power Switch is to "ON".					
(c)	All Tabs are to "OFF". All Control Knobs are to "MAX."					
	<u>Power Supply</u>					
2 (a)	Indicator Light			Note: Confirm Light "ON".		
(b)	Terminals on PS-5(B) Board			GND~-B2 (BLU) -26~-27.5v D.C. GND~-B1 (GRN) -14~-15v D.C. GND~+ B1 (ORN) +14~-+15.5v D.C. GND~EXP (BRN) +18~-+21v D.C. Note: Confirm AC Line and GND are "OPEN".		
	<u>Tone & Scale</u>					
3 (a)	Across Speaker	Upper Man. Tone/ Bar 8' to 8	Up. Man.	Cal L1 on PA-33(B) Bd.	440 Hz	
(b)		All Foot & All Sounds	All Keys	Note: 3dB MIN. (two keys next to) Except Scale Repeated.		
	<u>Output Level</u>					
4 (a)	Across Speaker	Up. Man. 8' Tone/ Bar to 8 Low. Man. 8' Tone /Bar to 8	Middle Key C on Upper & Lower Man.	Pot. VR1 on PA-33(B) Bd.	Conform Upper Man. & Lower Man. is same level.	
(b)		Ensemble Tab. to "ON".	Mid. C, E, & G on Lower Manual	Pot. VR1 on PA-56 Bd.	3.4v rms.	
		String Tab. to ON Full Tibias Tab. Theater Brass Tab.	Mid. C, E, & G on Upper Manual		4.5v ± 0.5v rms. 4.5v ± 0.5v rms. 4.9v ± 0.5v rms.	
(c)		Upper Man. Tone Bar 16' Tone/Bar 5-1/3' " 8' " 4' " 2-2/3' " 2' " 1-3/5' " 1-1/3' " 1' "		Note: All levels are ±20% MAX.	3.5v rms. 2.6v rms. 2.8v rms. 2.0v rms. 2.0v rms. 2.3v rms. 2.3v rms. 2.3v rms. 2.5v rms.	

Step	Test & Test Point	Depress Tab, or Extend Tone Bar	Play Keys	Adjust	Oscilloscope or Other Ind	Fig.
(c)		Lower Man. Tone Bar 8' Tone/Bar 4' " 2-2/3' " 2' " 1-3/5' " 1-1/3' " 1' "			2.9v rms. 2.3v rms. 2.0v rms. 2.2v rms. 2.2v rms. 2.1v rms. 2.4v rms.	
5 (a)	<u>Pedal</u> I Pedal Decay Time Across Speaker	Pedal Tab. 8' & String Bass I & II Tab. to "ON" String Bass Tab. to "OFF". String Bass Tab. I to "ON". String Bass Tab. II to "ON"	Pedal Key C of High Note	Pot. VR2 on SB-5(B) Bd.	1.5 sec.	2
(b)	II Pedal Level Across Speaker	Pedal Tone Bar to 8 Pedal Tab. to 8' Pedal Tone Bar to 8 Pedal Tab. to 8' Mute Tab. to "ON"	Pedal Key C of High Note Pedal Key G Pedal Key C of Low Note Pedal Key C of High Note	Pot. VR1 on SB-5(B)	150 msec. ± 15 msec. 400 msec. ± 40 msec. 800 msec. ± 80 msec. 3.4v rms. 4.5v ± 0.5v rms. 5.4v ± 0.5v rms. 2.3v ± 0.5v rms.	
6 (a)	<u>Extent of Expression Pedal</u> Across Speaker	Full Tibias Tab. to "ON".	Mid. Key C on Up. Man.	Level is at -20dB ~-24dB when Exp. Pedal MAX to MIN. (Level is 0dB at Exp. Pedal MAX)		
7 (a)	<u>Noise Level</u> Across Speaker	All Tabs to ON (Except Reverb Tab. & Mute Tab.) All Tone Bars to 8 All Tabs to OFF All Tone Bars to 0 (OFF), and Percussion Tabs to ON	Mid. Key C on Up. Man. & Low. Man.		5 mw rms. MAX. 10 mw rms. MAX. No noise occurs.	

*NOTE: During Test Procedure The Following Must Be Maintained Unless Otherwise Stated:

- All Control Knobs and Expression Pedal at Maximum.
- All Tabs and All Tone Bars in the Off Position.

Step	Test & Test Point	Decay Tab. or Extend Tone Bar	Upper Man. Key F of Lowest Note Up. Man. Key F of Highest Note	Point of Brill. Volume Max. MIN. 0dB (Set to Volume Control) -2dB -4dB -13dB -20dB	Oscilloscope or Other Ind	Fig.
8 (a)	Brilliance & Freq. Response Across Speaker	Upper Man. Tone/Bar 4' to 8	Upper Man. Key F of Lowest Note Up. Man. Key F of Highest Note	Point of Brill. Volume Max. MIN. 0dB (Set to Volume Control) -2dB -4dB -13dB -20dB		
9 (a)	Reverberation Across Speaker	Second Harmonic Tab. to "ON" Decay Tab. to "Slow" Next Decay Tab. to "Fast" Third Harmonic Tab. as in step to do Sec. Harm. Tab.	Middle Key C on Upper Manual Check as same to Second Harmonic.	Pot VR2 on PA-33(B) Board	t; 1500 msec. t; 90 msec.	3
(b)	Repeat Across Speaker	Second Harmonic Tab. to "ON" Decay Tab. to "Slow" Repeat Tab. to "ON", and Decay Tab. to "Fast"	Middle Key C on Upper Manual to 3 volt level to 3 volt level	Reit Volume to "Slow" Reit to Fast (MAX.)	t; 500+100 msec. Reit; 13+3 times/10 sec. Reit; 70+7 msec.	4
10 (a)	Vibrato Test Point R-26 on MG-4(B) Bd.	Vibrato I & II Tab. to "ON" Vibrato I & II Tab. to "OFF" Vibrato I Tab. to "ON" Vibrato II Tab. to "ON"		Pot. VR1 on MG-4(B) Board Pot. VR2 on MG-4(B) Board	t; 152 msec. (6.8Hz) 8v p-p 0v 2v p-p 4v p-p	5 6 7
11 (a)	Reverb Test Point R-43 & J4 on PA-56 Board	Low. Man. Tone Bar 8' to 8	Middle Key C on Lower Manual	Pot. VR2 on PA-56 Board	2v p-p	7
(b)	Test Point Reverb Tab. & Ear	Reverb I & II Tab. to "ON"	Mid. Key C E & G on Low. Man.	Pot. VR4 on PA-56 Board	About 70 mv & Decay Time: 2.5-3 sec.	8
(c)	Balance Ear			Pot. VR3 on PA-56 Board	Same Level on Reverb "OFF" from I & II to "ON"	

Step	Test & Test Point	Depress Tab. or Extend Tone Bar	Play Keys	Adjust	Oscilloscope or Other Ind	Fig.
12 (a)	Other Operation					
12 (a)	Leslie Socket; Pin 7, Pin 6, & 1	Leslie ON/OFF to "ON" Leslie Slow/Fast to "Fast" Leslie ON/OFF to "OFF"	Note: That Pin 6 is grounded (to Pin 1) and that Pin 7 is removed from ground (Pin 1). If Tab. is returned to Slow, Pin 7 will be grounded. Pin 6 and Pin 7 are removed from ground (Pin 1).			9
13 (a)	Ear	Ensemble Tab. to "ON" Lower Man. Tone/Bar sets to: 8666444 String Tab. to "ON" Upper Man. Tone/Bar sets to: 008888666 Full Tibias Tab. to "ON" - do -, sets 806808006 Theater Brass Tab. to "ON" - do -, sets 848888666	Note: Same Tone as Tone Bar Setting. Same Tone as Tone Bar Setting. - ditto - - ditto -			

14 Test of Mechanism Operation

- Confirm that Tone Bars are easy to operate, and that one Tone Bar doesn't disturb other Tone Bar operation, and that Mark 8 is visible.
- Confirm that Keyboards are operational.
- Confirm that Expression Pedal is normal to operate and to stop at will.
- Confirm that position of Knob Mark is normal.
- Confirm that Pedal Keys are normal to operate.
- Confirm that Tabs are normal to operate.

15 Assembly

- Confirm that Cabinet can be put on the Leg.
- Confirm that Pedal Unit can be smoothly inserted.
- Confirm that Knob Bolts can be set normally.

Step	Test & Test Point	Adjust	Other Indication	Fig.
16 (a)	Preparations Across Ext. Sp. Out	Connection as Fig. 10, 11		10
(b)	Test Point R26 on PW-27(B) Board	Pot. VR1 on PW-27(B) Board Note: Set VR1 to turn left, and turn right, Stop at 10mV Point.	Set 10mV, and about after Minute 35mV + 5mV	11
(c)	Across Ext. Sp. Out	Input: 0.3V rms. (1000Hz)	Output: 16V Note: Confirm that Output Wave Form is normal or not.	10
(d)	Test Point GND + Vcc GND + Vcc		+ 30V ~ + 35V DC - 30V ~ - 35V DC	

FIGURE

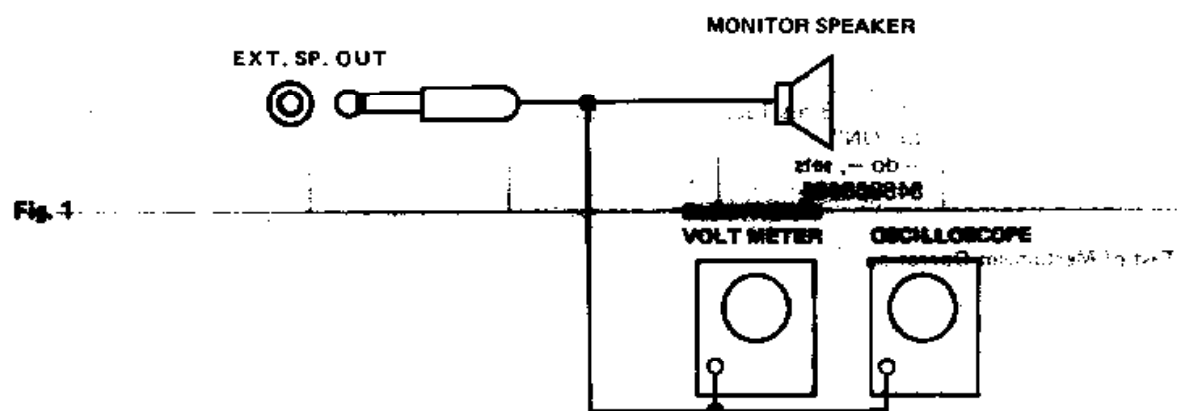


Fig. 1

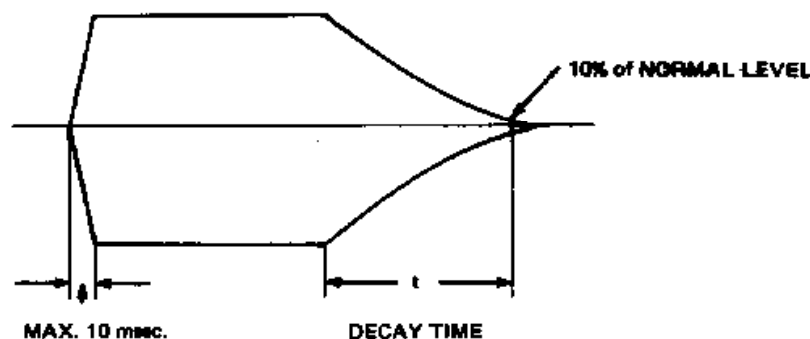


Fig. 2

Fig. 3

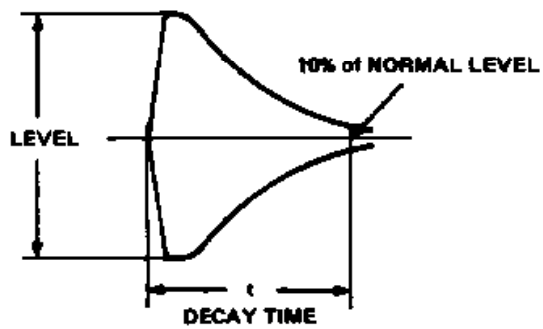


Fig. 4

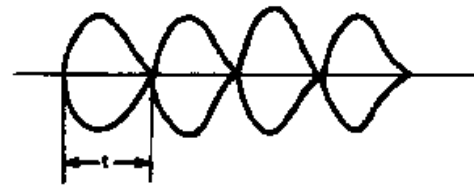


Fig. 5

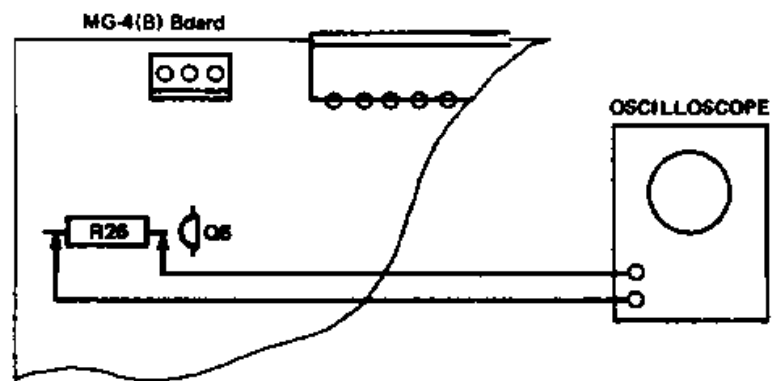


Fig. 6

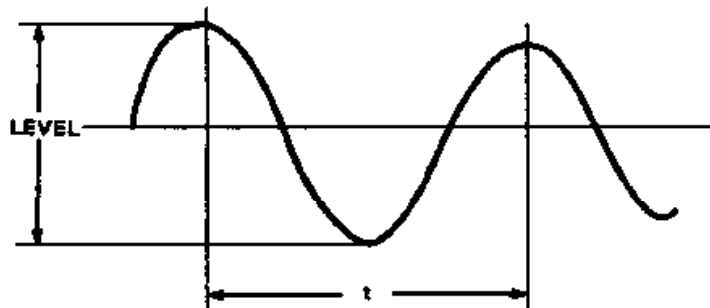


Fig. 7

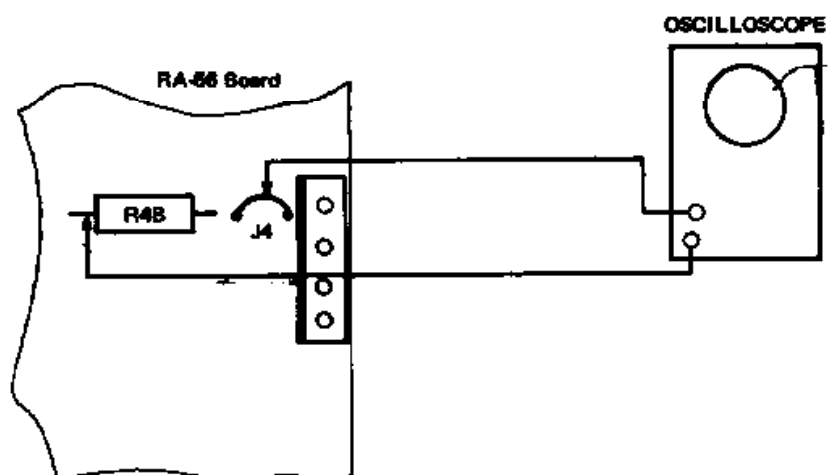


Fig. 8

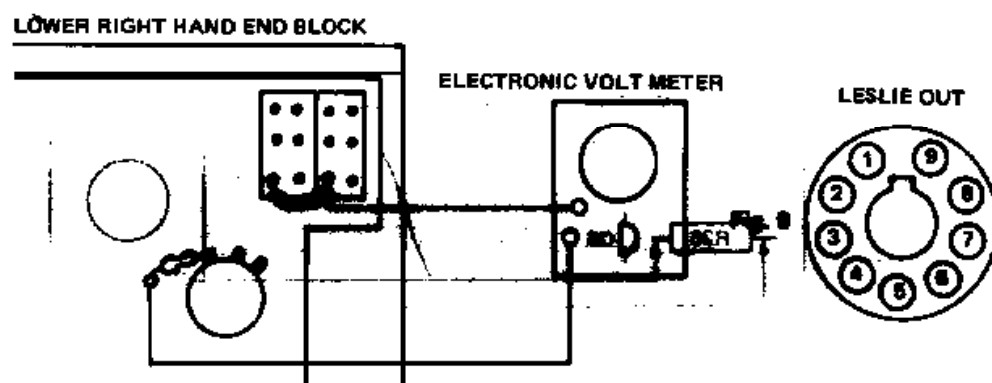


Fig. 10

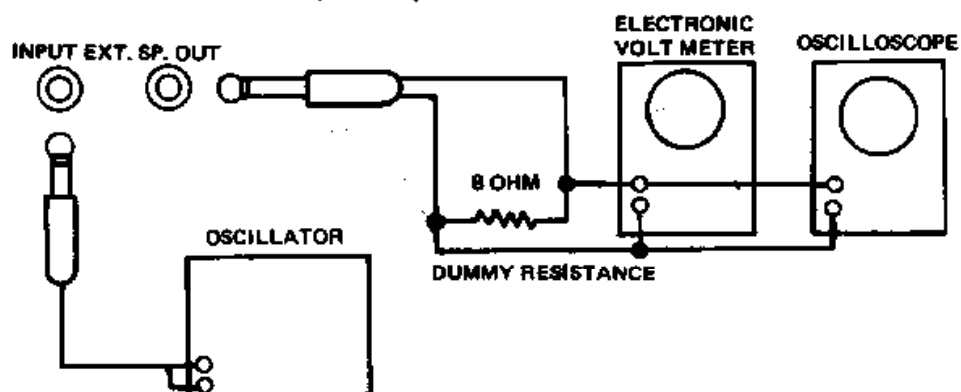
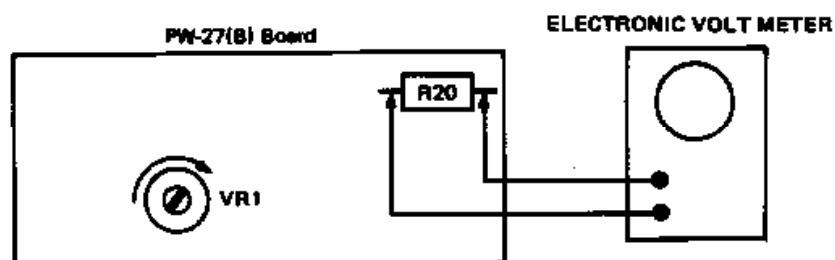


Fig. 11





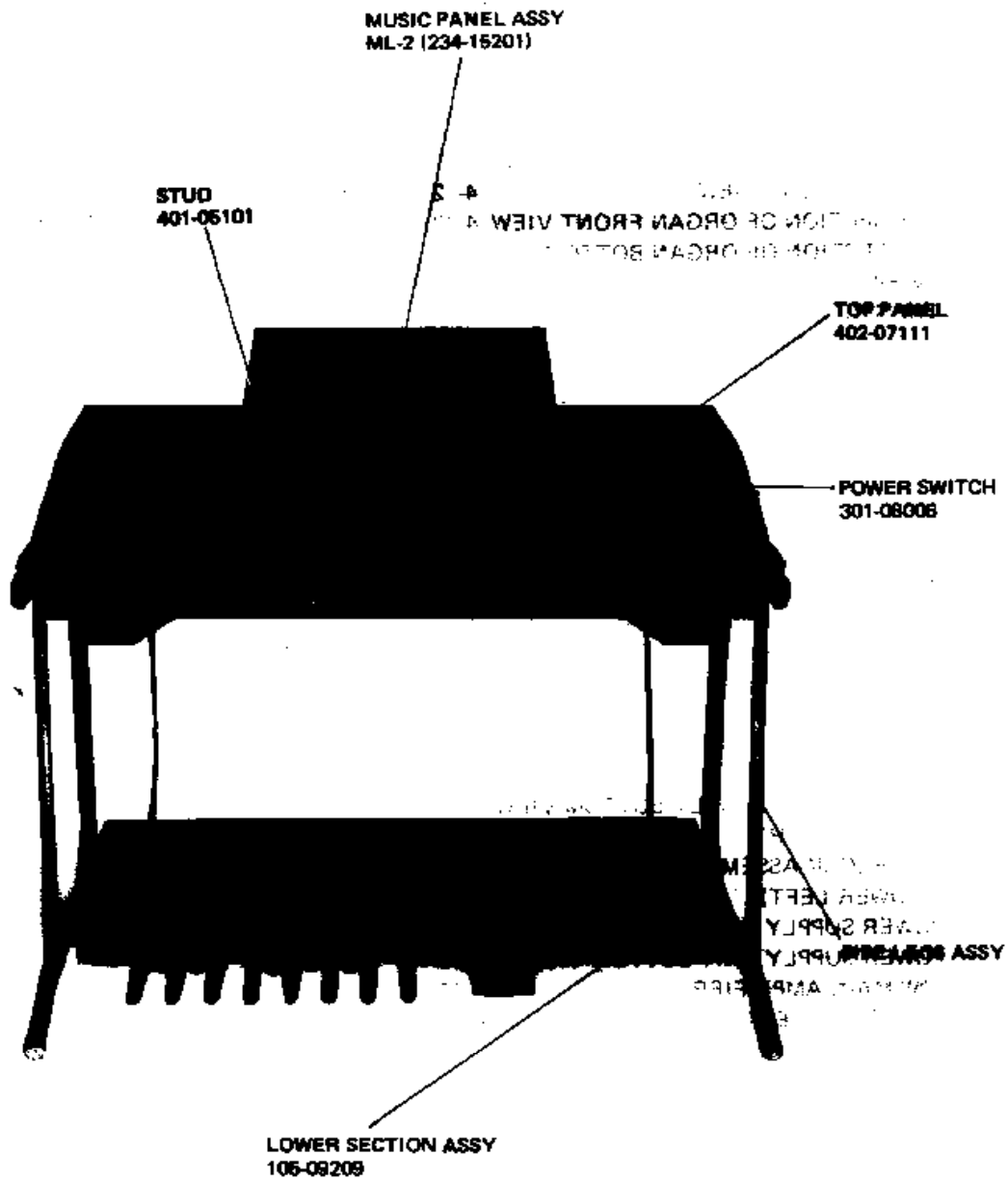
SECTION III. DIAGRAMS AND TEXT

3-1 GENERAL

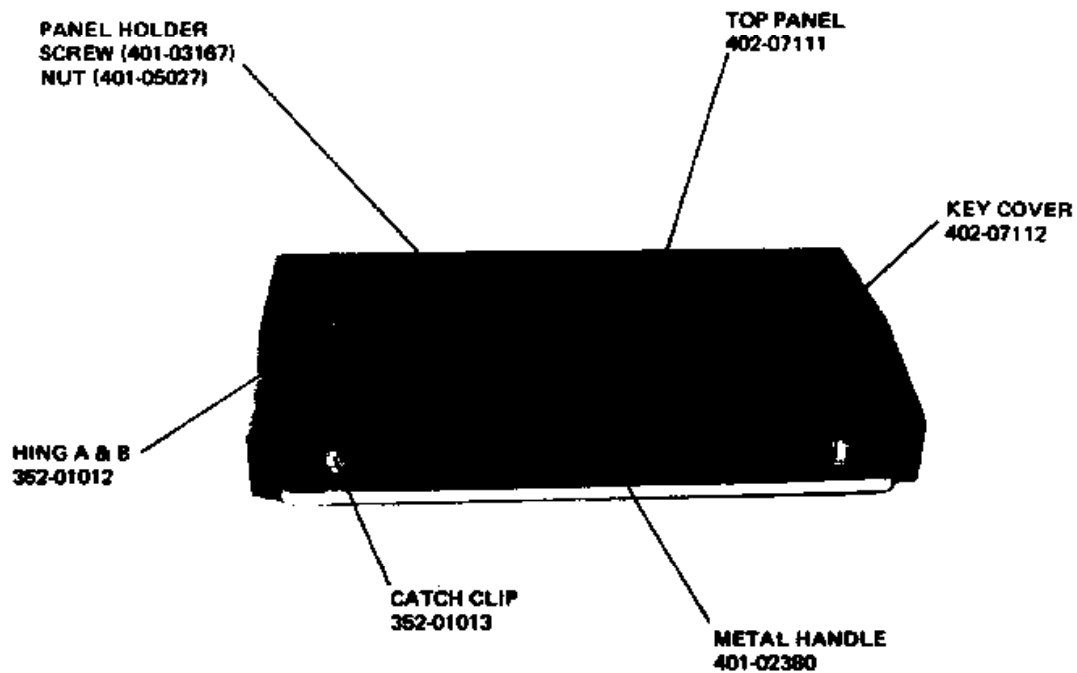
This section contains schematic diagrams and text to illustrate and provide information necessary to proper organ servicing.

SECTION IV PARTS LIST

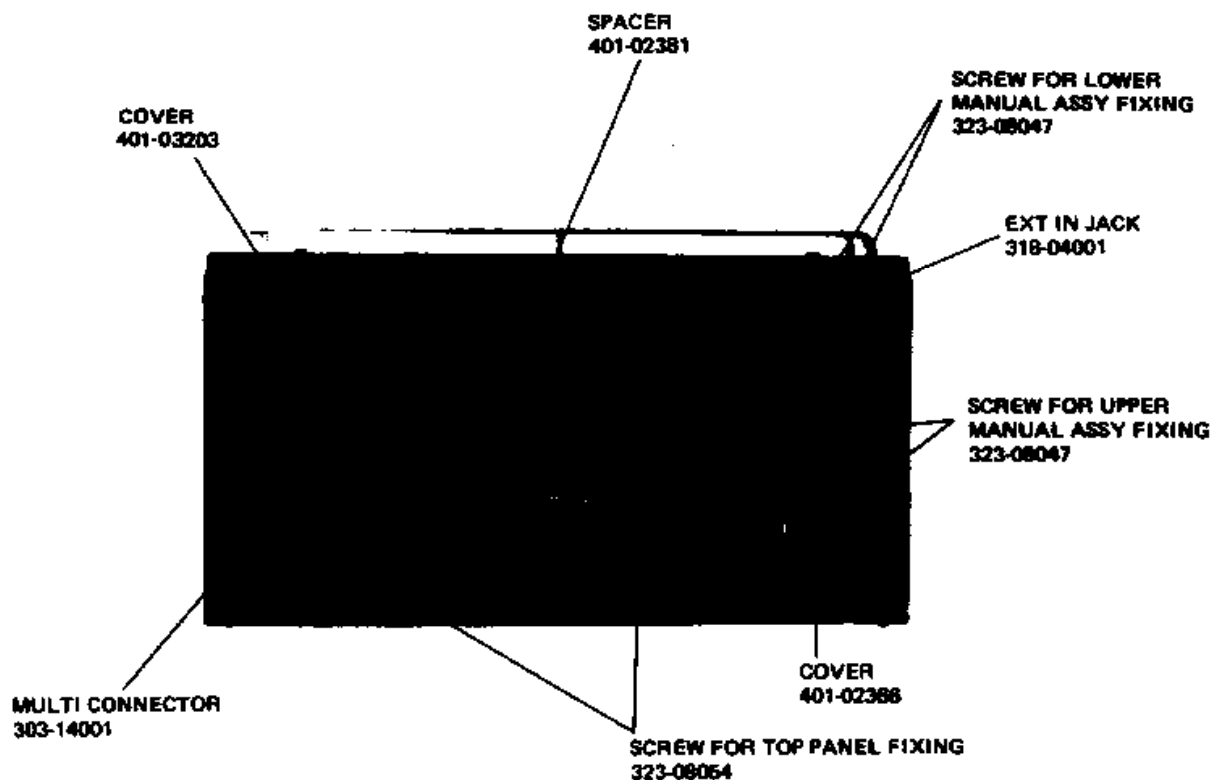
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TOP SECTION OF ORGAN BACK VIEW	4- 4
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MIX TONE BOARD TG-15B	4-14
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POWER SUPPLY BOARD PS-5B	4-14
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18050K FRONT VIEW

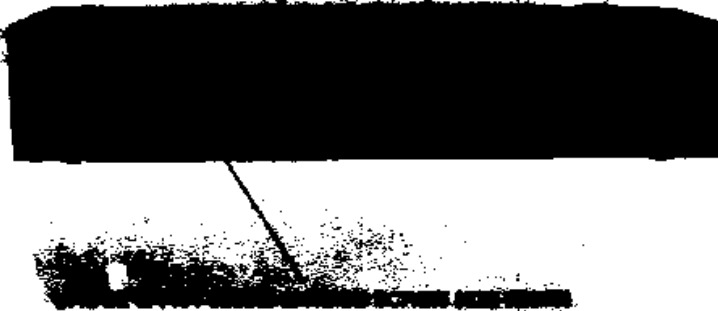


TOP SECTION OF ORGAN FRONT VIEW

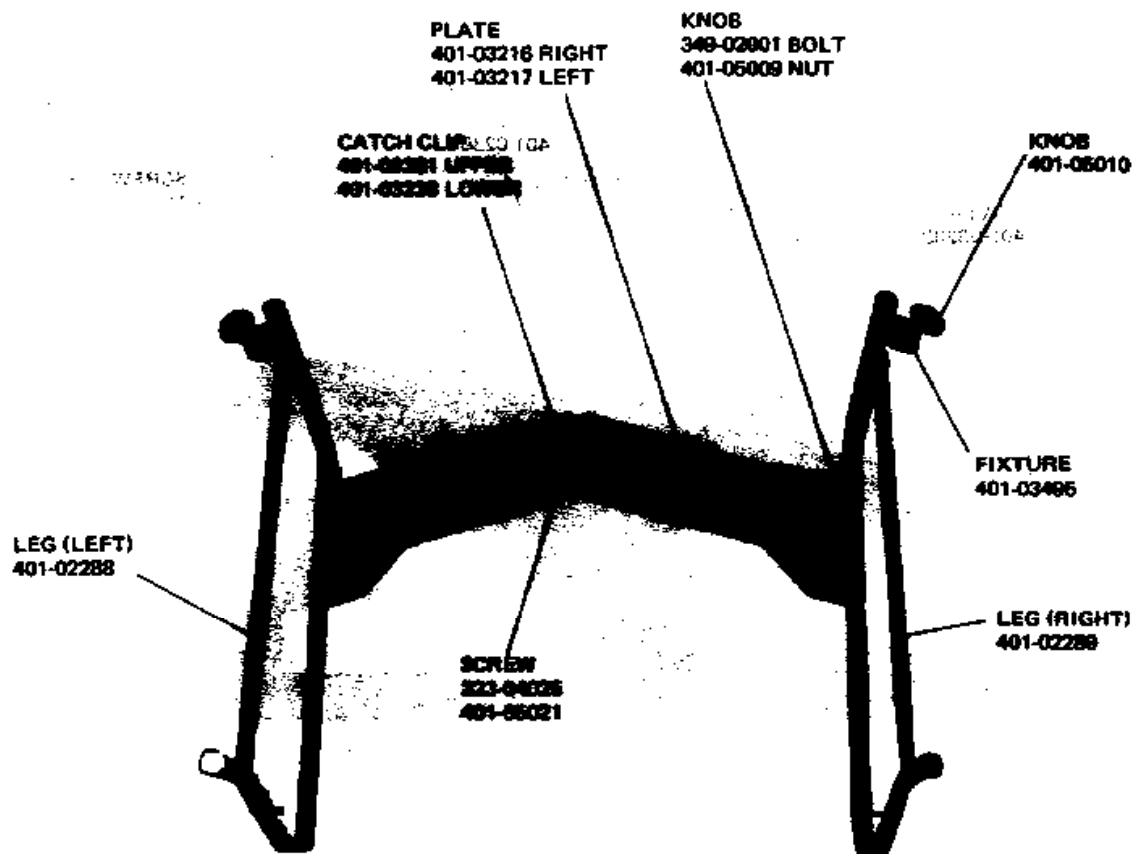


TOP SECTION OF ORGAN BOTTOM VIEW

ORNAMENTAL BAR (401-02290) &
WOOD SCREW (327-04015)

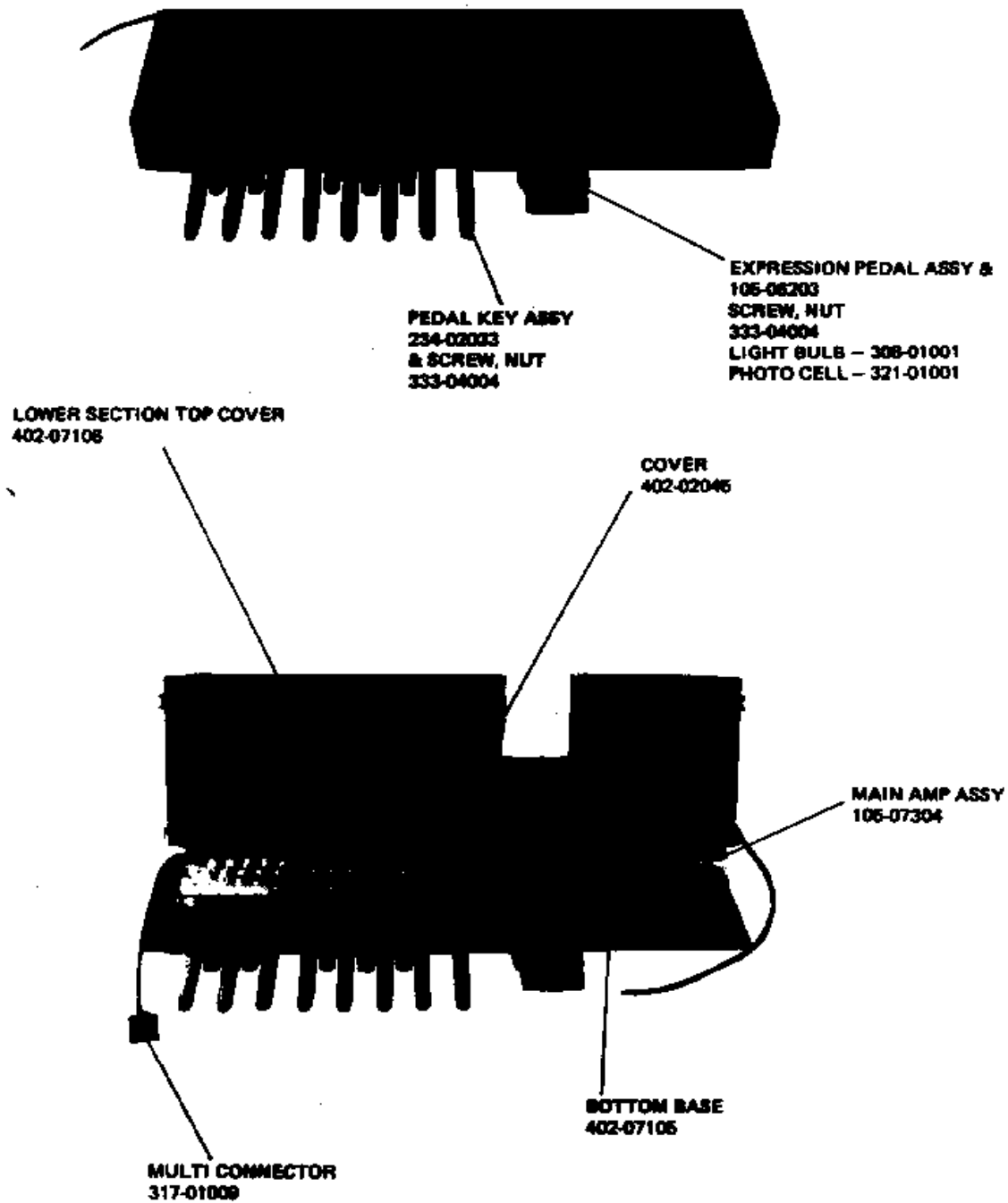


TOP SECTION OF ORGAN BACK VIEW

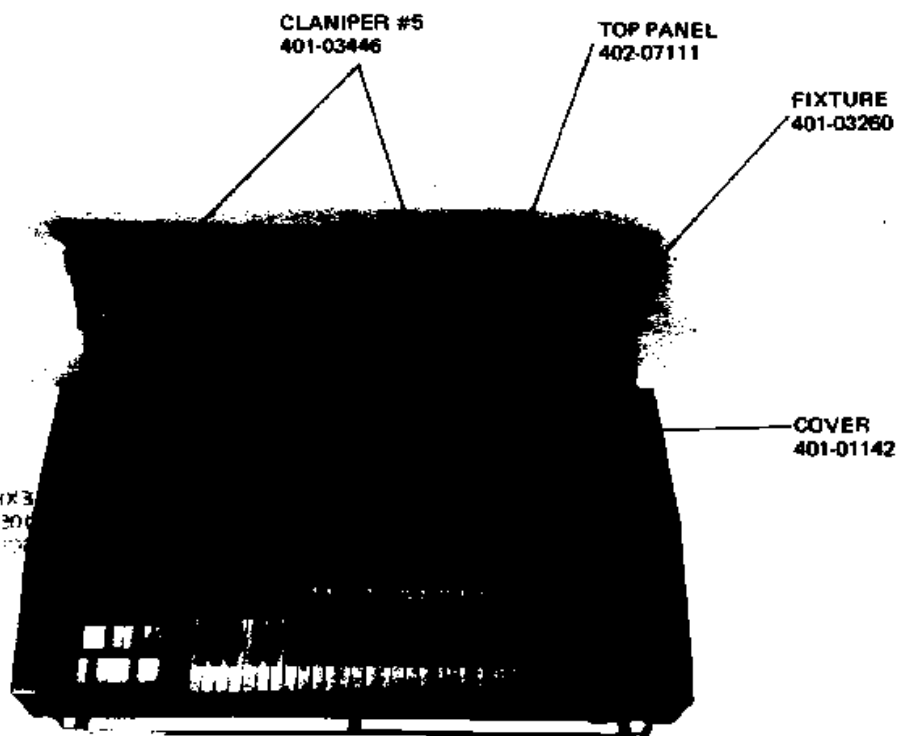


LEG ASSEMBLY

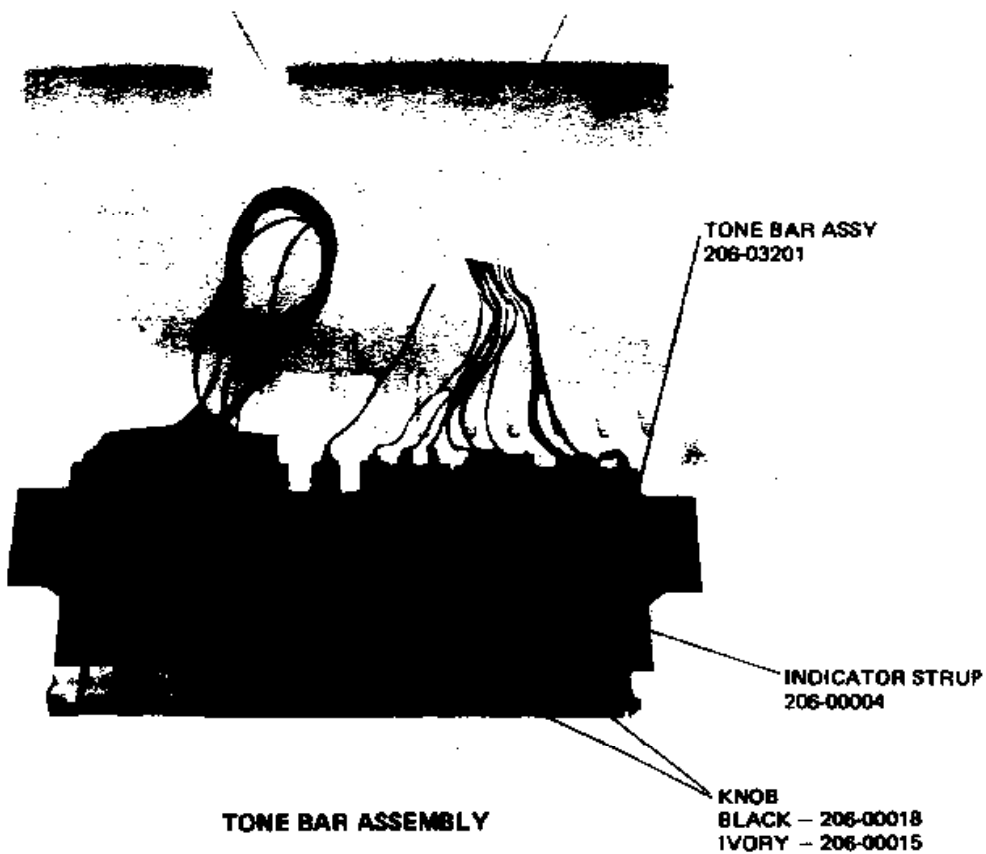
LOWER SECTION OF ORGAN FRONT VIEW

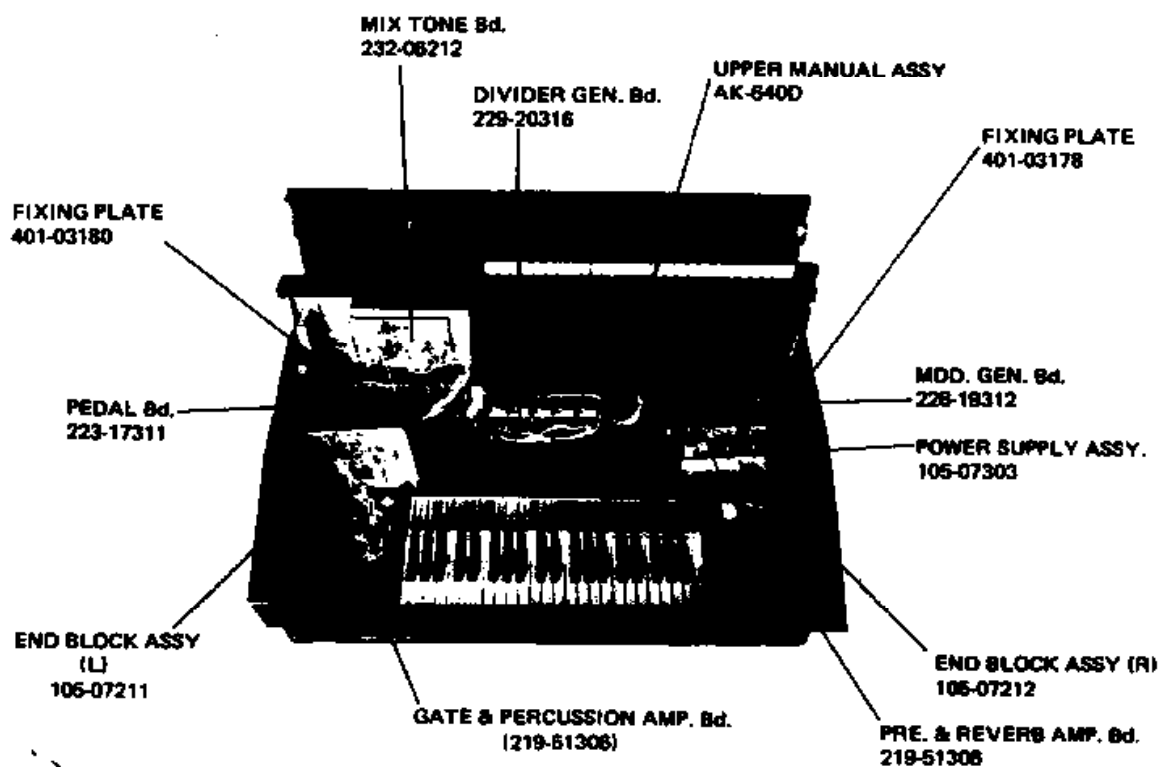


LOWER SECTION OF ORGAN INSIDE VIEW

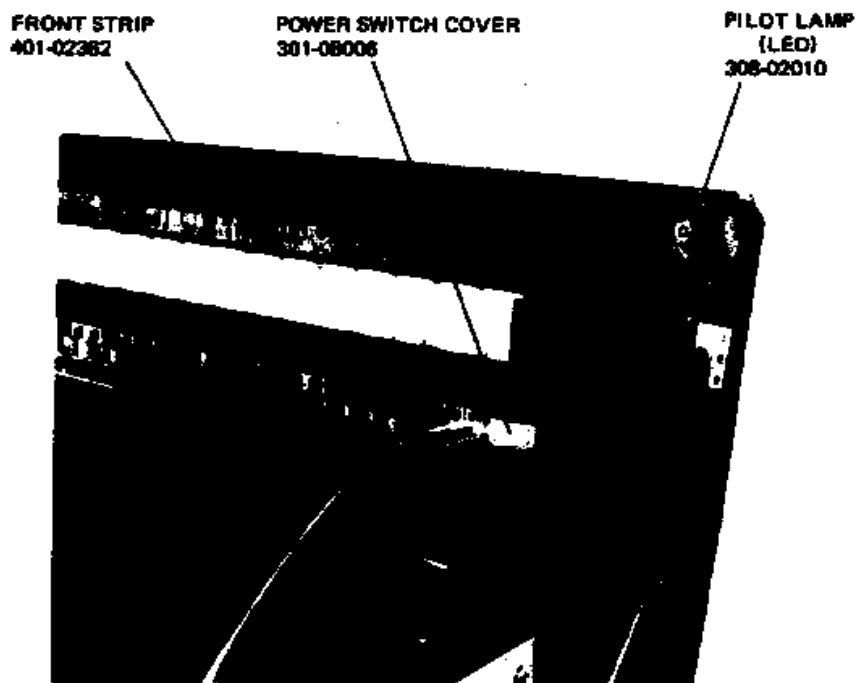


TURE FORM OF ORGAN INSIDE VIEW OF TOP UP





INSIDE VIEW OF UPPER MANUAL ASSEMBLY UP



POWER SWITCH VIEW

LOWER R.H. END BLOCK
(ONLY) 402-04202

KNOBS
304-01022

TAB (8'/PEDAL/16')
247-10025

TAB (STRING BASS I)
247-08021

TAB (REVERB II)
247-08010

TAB (REVERB I)
247-08009

TAB (STRING BASS II)
247-08022

TAB (MUTE)
247-10019

LOWER RIGHT-HAND END BLOCK ASSEMBLY - TOP VIEW (COMPLETE)

LOWER L.H. END BLOCK
(ONLY) 402-04198

TAB (DECAY)
247-08018

TAB (3rd HARMONIC)
247-10037

TAB (REPEAT)
247-08025

TAB (VIBRATO I)
247-05003

TAB (VIBRATO II)
247-05004

TAB (2nd HARMONIC)
247-10036

TAB (8' ENSEMBLE)
247-10027

TAB (SLOW/LESLIE/FAST)
247-10023

TAB (OFF/LESLIE/ON)
247-10022

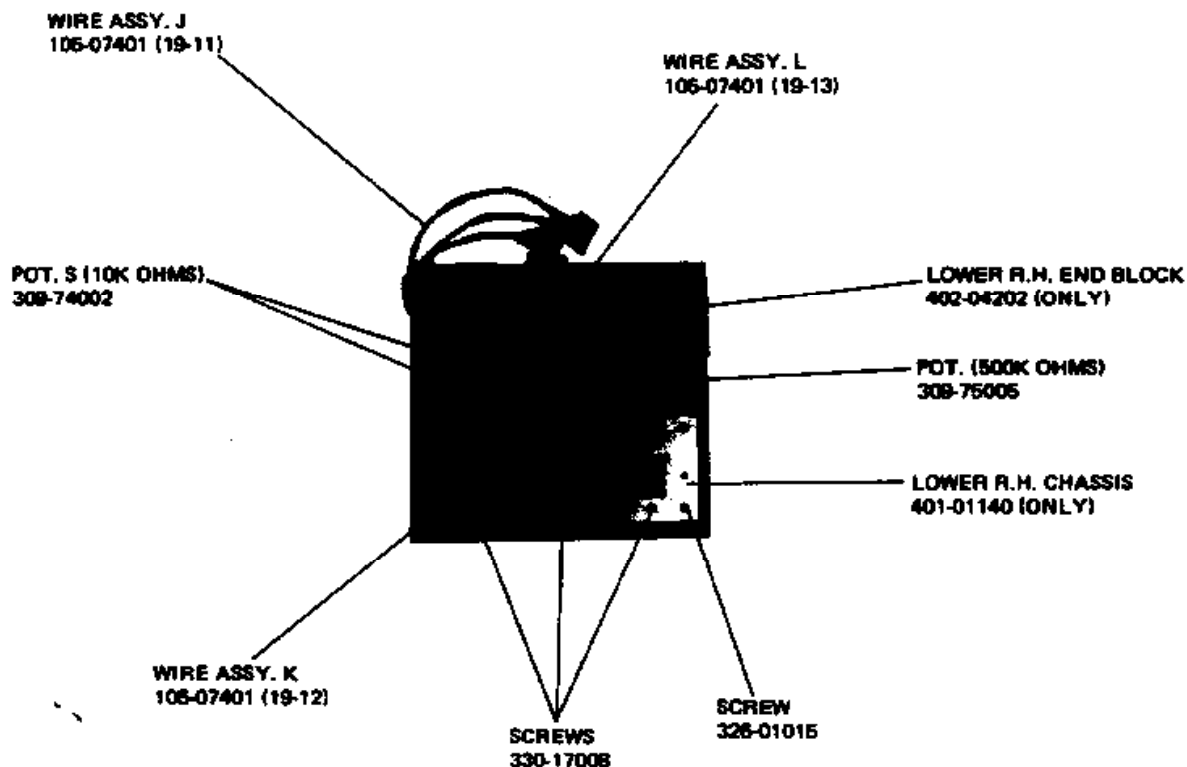
TAB (8' STRING)
247-10028

TAB (16' THEATER BRASS)
247-10030

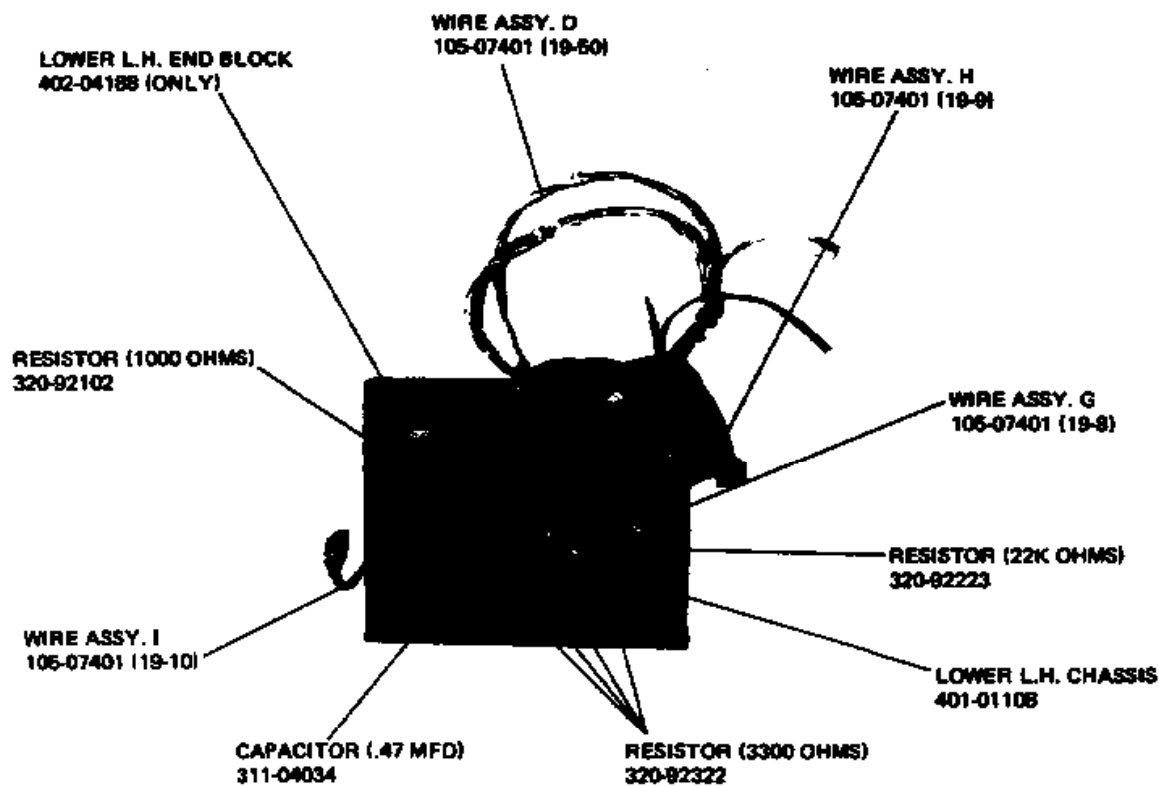
TAB (16' FULL TUBAS)
247-10029

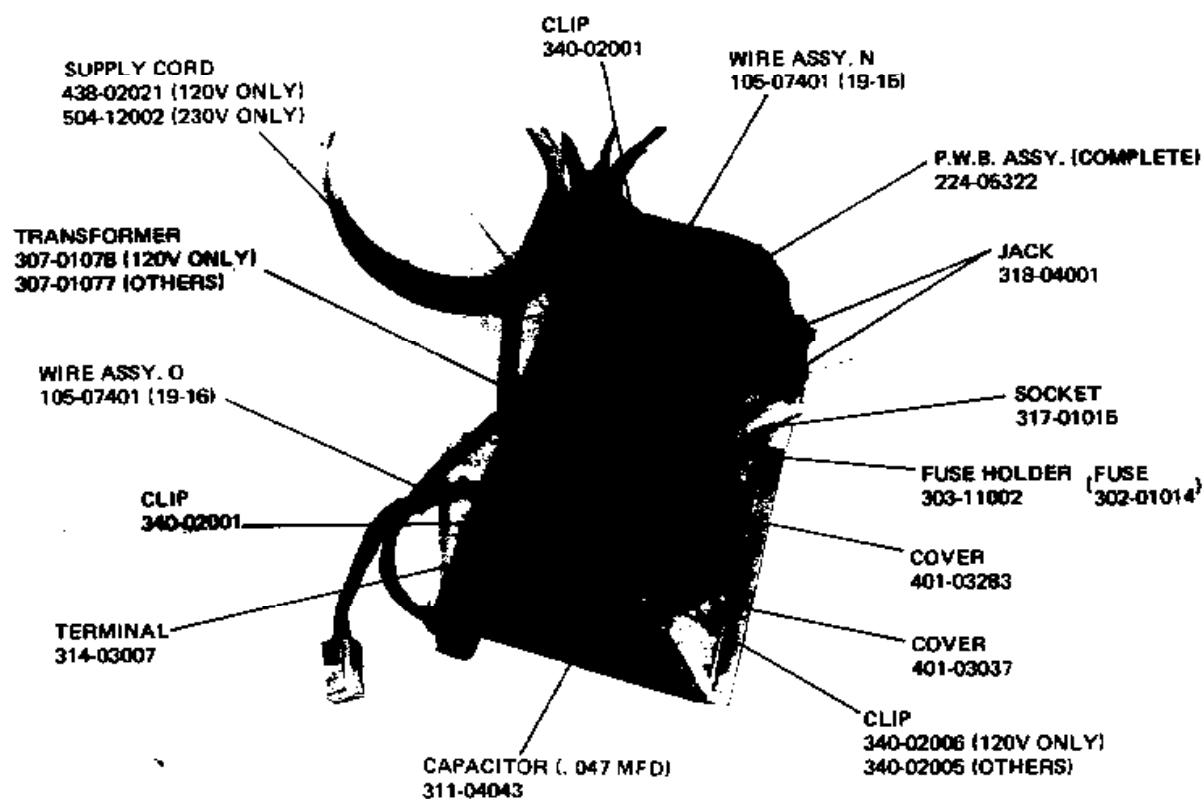
LOWER LEFT-HAND END BLOCK ASSEMBLY - TOP VIEW (COMPLETE)

**LOWER RIGHT-HAND END BLOCK ASSEMBLY – BOTTOM VIEW
(COMPLETE)**



**LOWER LEFT-HAND END BLOCK ASSEMBLY – BOTTOM VIEW
(COMPLETE)**

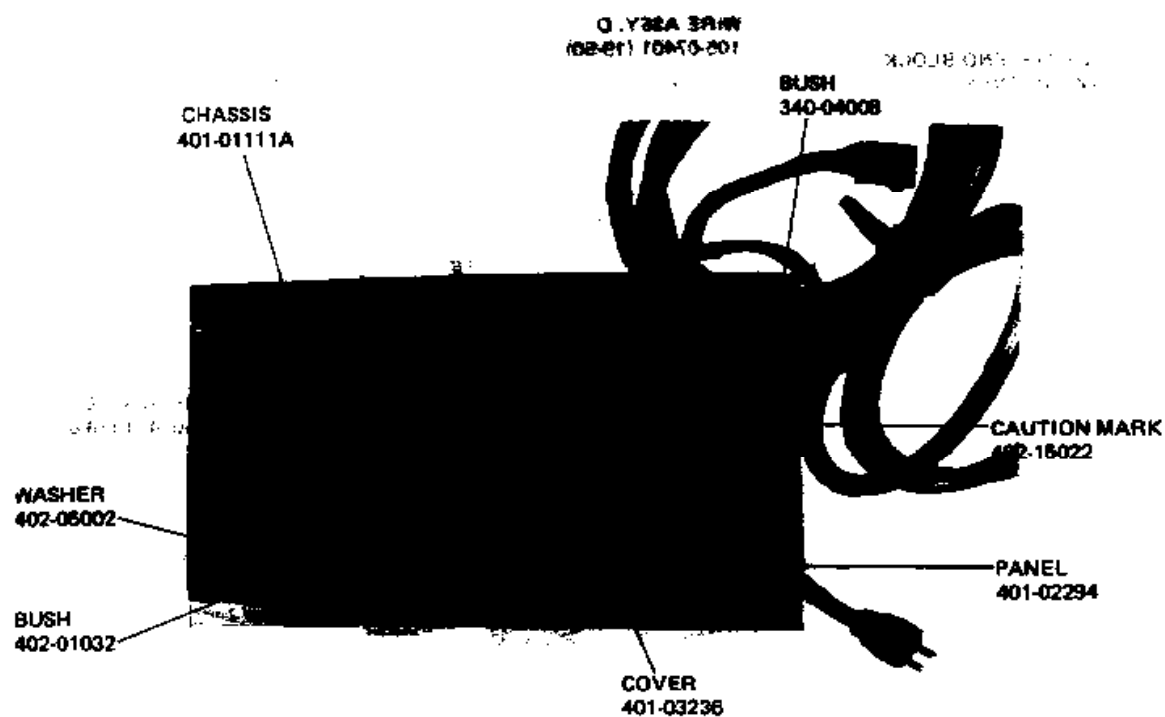




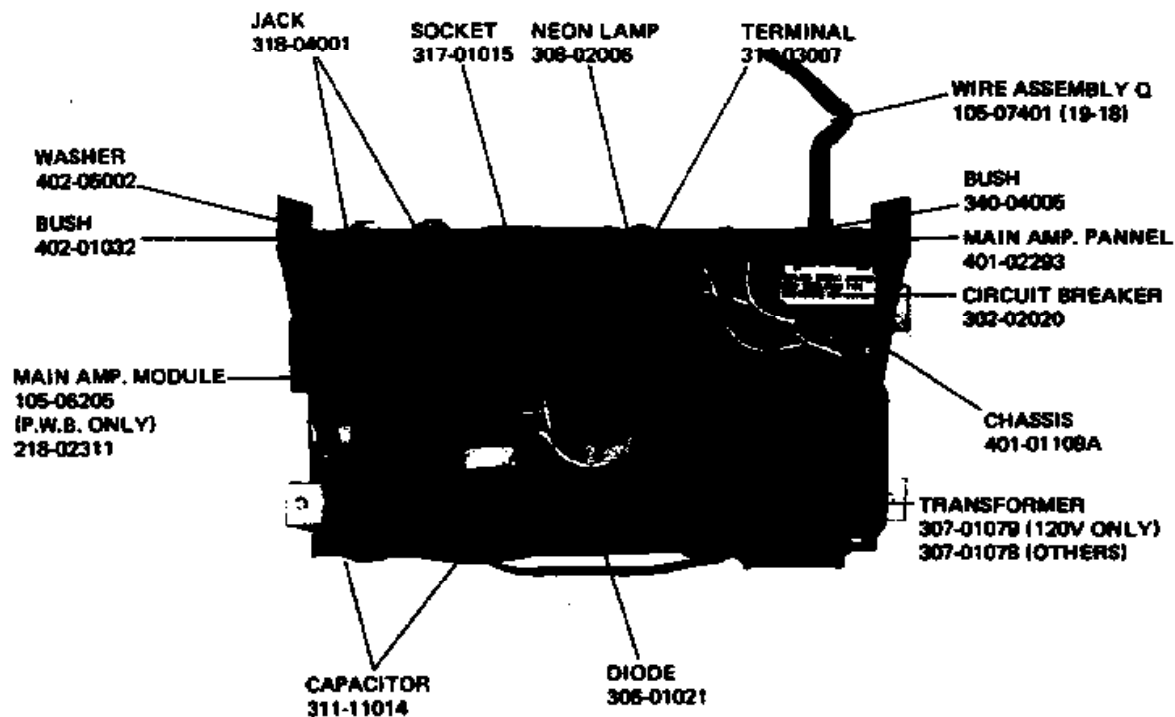
POWER SUPPLY UNIT - TOP VIEW

105-07303

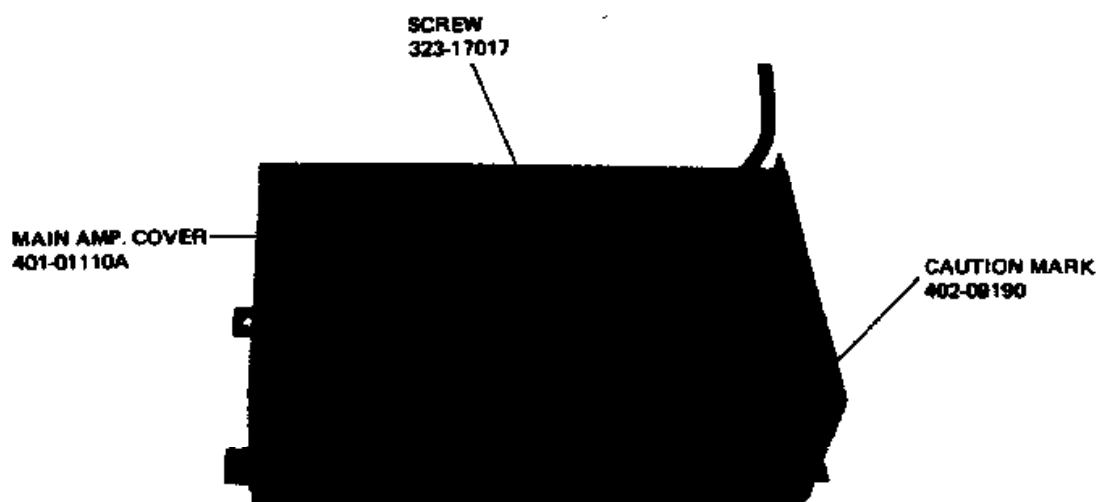
Q.Y38A 39W
(02-01) 10450-201



POWER SUPPLY UNIT - BOTTOM VIEW



30 WATT MAIN AMPLIFIER - (COMPLETE)
105-07304



NATURAL KEY ASSEMBLY 237-00602-6

KEY ONLY

"C"	237-00211	209-00011
"B"	237-00210	209-00010
"A"	237-00209	209-00009
"G"	237-00208	209-00008
"F"	237-00207	209-00007
"E"	237-00206	209-00006

SHARP KEY ASSEMBLY 237-00213
SHARP KEY 209-00013

KEY CHANNEL

TRIM SCREW
323-21024

KEY SPRING
209-00021

FIXED BAR
211-00004

LOCK SPRING
209-00047

Z. PLATE

RESISTOR 100KOHm
235-00104 (441 USED)

SW, COVER "B" #4
238-00003

SW, COVER "C" #4
238-00004

TAP SCREW (FOR FIXING MOLD)

GUIDE BUSH
209-00022

SIDE BLOCK (2 USED)
237-00002

L. PLATE
401-03179

CONTACT LEAF(N) (490 USED)
237-00007

SW, COVER "A" #4
238-00002

BUS BAR 44P
238-00007

POLYURETHANE
COATED WIRE
504-17002

CONTACT LEAF(P) (49 USED)
237-00008

FIGURE 2. MANUAL ASSEMBLY
UPPER MANUAL (AK-640D)
LOWER MANUAL (AK-648D)

MDD Buffer Board -EF-12- 223-35341

Diode, Zener 12V
Diode

D-12
D-1 Through 11

337-02005
306-01017

MDD GENERATOR Board -MG-4(B)- 228-18312

Diode
Diode, Varicap
Diode, Zener 5.6V
Coil 10 μ H
Transistor, NPN
Transistor, NPN
Integrated Circuit
Integrated Circuit
Integrated Circuit
IC Socket 14P
Socket Assembly
Pot Trim 1000 Ohms
Pot Trim 50K

D-2, 3,
D-1
D-4
L-1
Q-1
Q-2, 3, 4, 5, 6,
IC-1
IC-2
IC-3

306-01017
306-05001
337-06014
322-01028
305-03014
305-03040
319-03001
319-01005
319-01006
303-13005
317-03068
336-01003
336-01009

Divider Generator Board -DV-4(B)- 229-20316

Diode
Integrated Circuit
IC Socket 14P

D-1 Through 72
IC-1 Through 12

306-01017
319-01007
303-13005

Pedal Board -SB-5(B)- 223-17311

Diode
Transistor, NPN
Transistor, NPN
Integrated Circuit

D-1 Through 29
Q-1 Through 6
Q-7
IC-1

306-01017
305-03040
305-03023
319-23001

Mix. Tone Board -TG-15(B)- 232-02311**Gate & Percussion Amp. Board -PA-33(B)- 219-04312**

Diode
Diode, Zener 12V
Transistor, PNP
Transistor, NPN
Transistor, NPN
Transistor, FET
Wafer Assembly
Wafer Assembly
Wafer Assembly
Wafer Assembly

D-1, 2, 3, 4,
D-5
Q-1, 2, 3
Q-4, 5, 6, 7, 8, 9,
Q-13, 14, 15
Q-10, 11, 12
J-705
J703(704)
J701, 702
J708(707)

306-01017
337-02007
305-01006
305-03023
305-03040
305-05005
317-03053
317-03054
317-03055
317-03060

MDD Buffer Board -EF-12- 223-35341

Diode, Zener 12V

Diode, Zener

MDD GENERATOR Board -MG-4(B)- 228-18312

Diode

Diode, Varicap

Diode, Zener 5.6V

Coil 10 μ H

Transistor, NPN

Transistor, NPN

Integrated Circuit

Integrated Circuit

Integrated Circuit

IC Socket 14P

Socket Assembly

Pot Trim, 1000 Ohms

Pot Trim 50K

Divider Generator Board -DV-4(B)- 229-20316

Diode

Integrated Circuit

IC Socket 14P

Pedal Board -SB-5(B)- 223-17311

Diode

Transistor, NPN

Transistor, NPN

Integrated Circuit

Mix. Tone Board -TG-15(B)- 232-02311**Gate & Percussion Amp. Board -PA-33(B)- 219-04312**

Diode

Diode, Zener 12V

Transistor, PNP

Transistor, NPN

Transistor, NPN

Transistor, FET

Wafer Assembly

Wafer Assembly

Wafer Assembly

Wafer Assembly

D-12 337-02006

D-1 Through 11 306-01017

D-2, 3, 306-01017

D-1 306-05001

D-4 337-06014

L-1 322-01028

Q-1 305-03014

Q-2, 3, 4, 5, 6, 306-03040

IC-1 319-03001

IC-2 319-01006

IC-3 319-01006

P-302 303-13006

VR-2 317-02008

VR-1 336-01003

VR-1 336-01009

D-1 Through 72 306-01017

IC-1 Through 12 319-01007

X02 303-13006

D-1 Through 29 306-01017

Q-1 Through 6 306-03040

Q-7 306-03023

IC-1 319-23001

D-1, 2, 3, 4, 306-01017

D-5 337-02007

Q-1, 2, 3 306-01006

Q-4, 5, 6, 7, 8, 9, 306-03023

Q-13, 14, 15 306-03040

Q-10, 11, 12 306-05005

J-706 317-03053

J703(704) 317-03054

J701, 702 317-03055

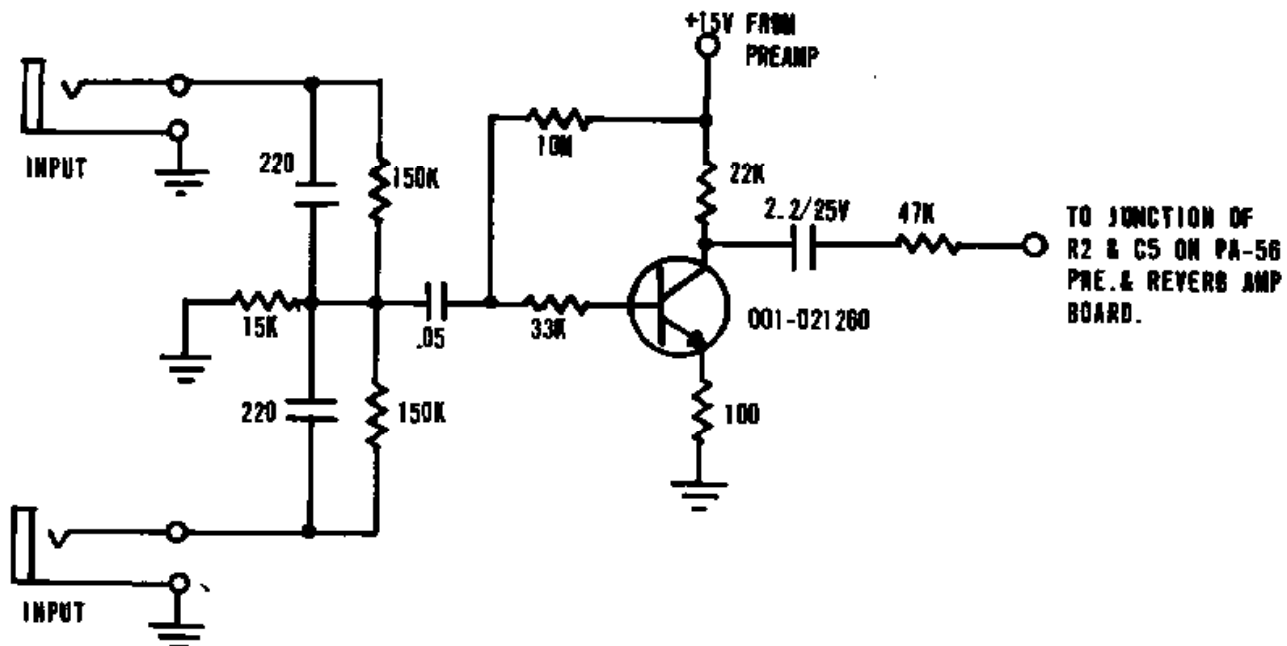
J708(707) 317-03060

JUNE 1976

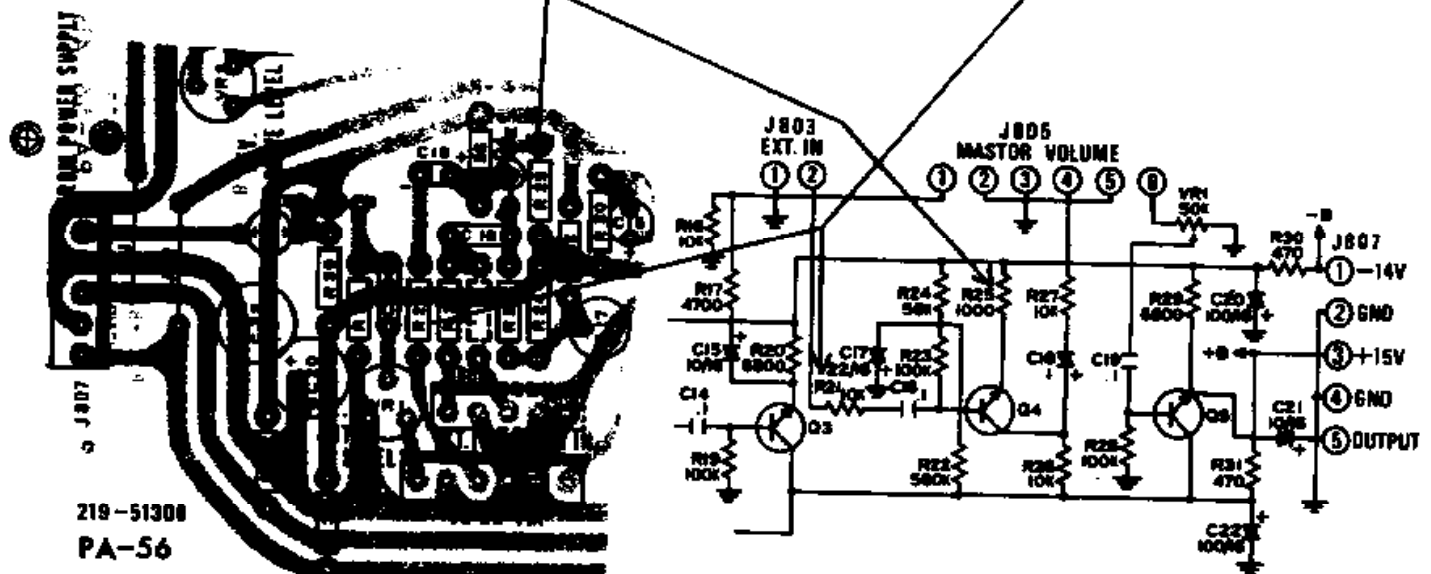
SUBJECT: ACCESSORY INSTALLATION PROCEDURES

Model X-5

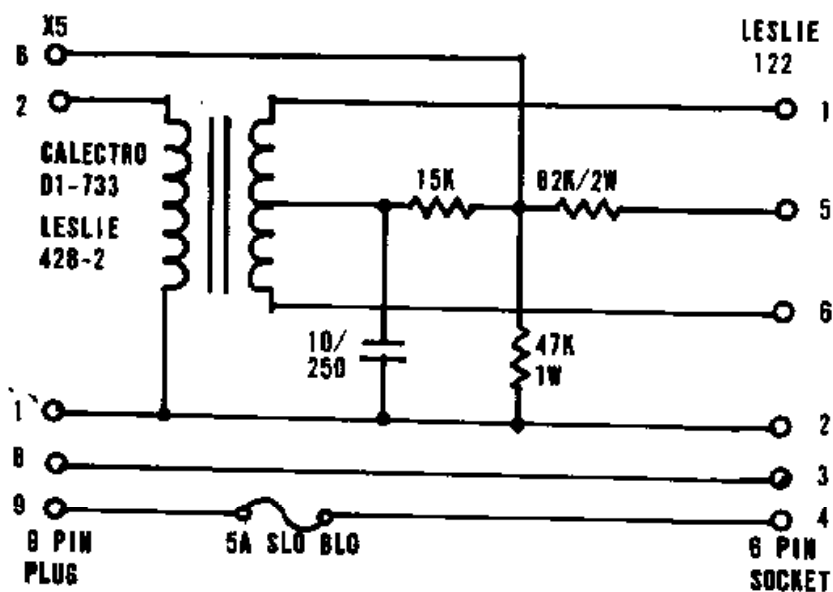
1. For adding Accessory Units such as, Synthesizer and Auto-Vari 64 that can be used simultaneously, we suggest the mixing circuit shown below. This unit is NOT available from our Parts Department, but will have to be built by the technician.



2. There have been some reports of low gain from the Auto-Vari when connected through the External Input jack J803. To increase the gain, two resistors can be changed on the PA-56 Pre and Reverb Amplifier Board. These resistors are R21 from 10K to 1K and R25 from 1K to 270 ohms. See below for details.



3. Leslie Model 122 Tone Cabinet can be used with the X-5 using the adapter shown below. This adapter is not available as a kit, but must be made up by the technician.



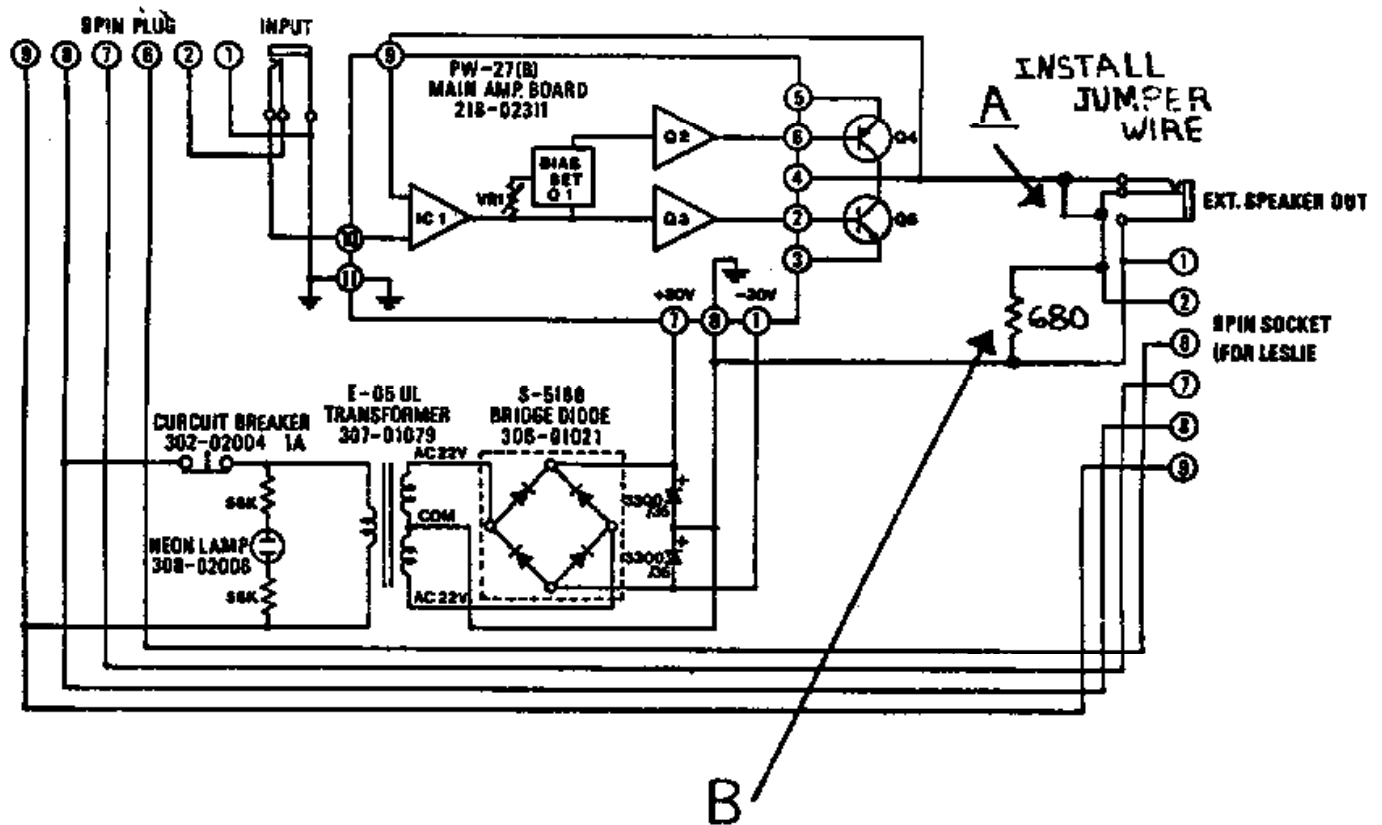
JUNE 1975

Model X-5

PHONE JACK MODIFICATION

If use of the X-5 requires that both the external Speaker Output and the Tone Cabinet Output Plug be used simultaneously, the A modification shown below may be required. The modification is made in the Pedal (lower) section of the X-5, where the amplifier is located.

If hum is encountered in some external Leslie Speaker systems, modification B, the addition of a 680 ohm resistor can be used to reduce the hum level.



NOVEMBER 1975

Model X-5
PORTABLE

SUBJECT: CONNECTOR PLUG (9 PIN) WIRING

PLUG PIN

1
2
3
4
5
6
7
8
9

WIRE COLOR

Light Blue
Dark Blue
No Connection
No Connection
No Connection
Red (Small Diameter)
Orange
Red (Large diameter)
White

