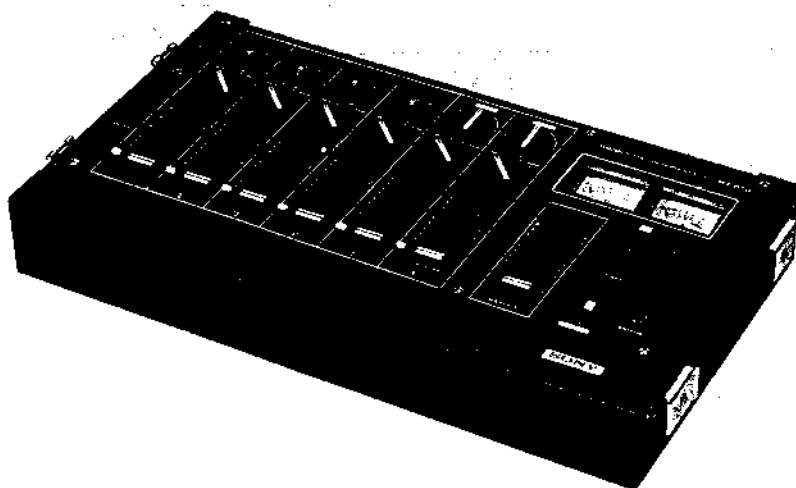


# MX-650

*E Model*  
*UK Model*  
*AEP Model*



## 6-CHANNEL MIXER

### SPECIFICATIONS

<b>Power Requirement:</b>	DC 12V size "C" battery (1.5V) x 8 AC operation with the use of Sony AC Power Adaptor AC-12 (optional)	<b>Outputs:</b>	LOW (phone type) ..... 2 rated output level -60 dB (0.775 mV) load impedance more than 600 $\Omega$ HIGH (phono type) ..... 2 rated output level -5 dB (0.435 V) load impedance more than 10 k $\Omega$ HEADPHONE (binaural type) ..... 1 rated output level -24 dB (49 mV) load impedance 8 $\Omega$
<b>Power Consumption:</b>	0.45 W	<b>Frequency Response:</b>	30 - 25,000 Hz
<b>Battery Life:</b>	Approx. 45 hours of continuous operation (with Sony long-life size "C" batteries)	<b>Distortion:</b>	0.5 %
<b>Inputs:</b>	MICROPHONE (phone type) ..... 6 sensitivity -72 dB (0.2 mV) low impedance LINE IN* (phono type) ..... 6 sensitivity -22 dB (60 mV) input impedance 100 k $\Omega$ PHONO* (phono type) ..... 6 sensitivity -51 dB (2.2 mV) input impedance 50 k $\Omega$ including RIAA equalization network CASCADE IN (phono type) ..... 2 sensitivity -5 dB (0.435 V) input impedance 50 k $\Omega$	<b>Signal-to-Noise Ratio:</b>	60 dB
		<b>Dimensions:</b>	Including projecting parts and controls. Approx. 452(w) x 83(h) x 252(d) mm (17 $\frac{7}{8}$ x 3 $\frac{3}{8}$ x 10 inches)
		<b>Weight:</b>	Approx. 4.3 kg (9 lb 8 oz) (with batteries included)

\*MX-650 uses the same input for line and phono input connection. The mixer circuit will be switched by setting the input selector to either "LINE IN" or "PHONO".

**SONY**<sup>®</sup>  
**SERVICE MANUAL**

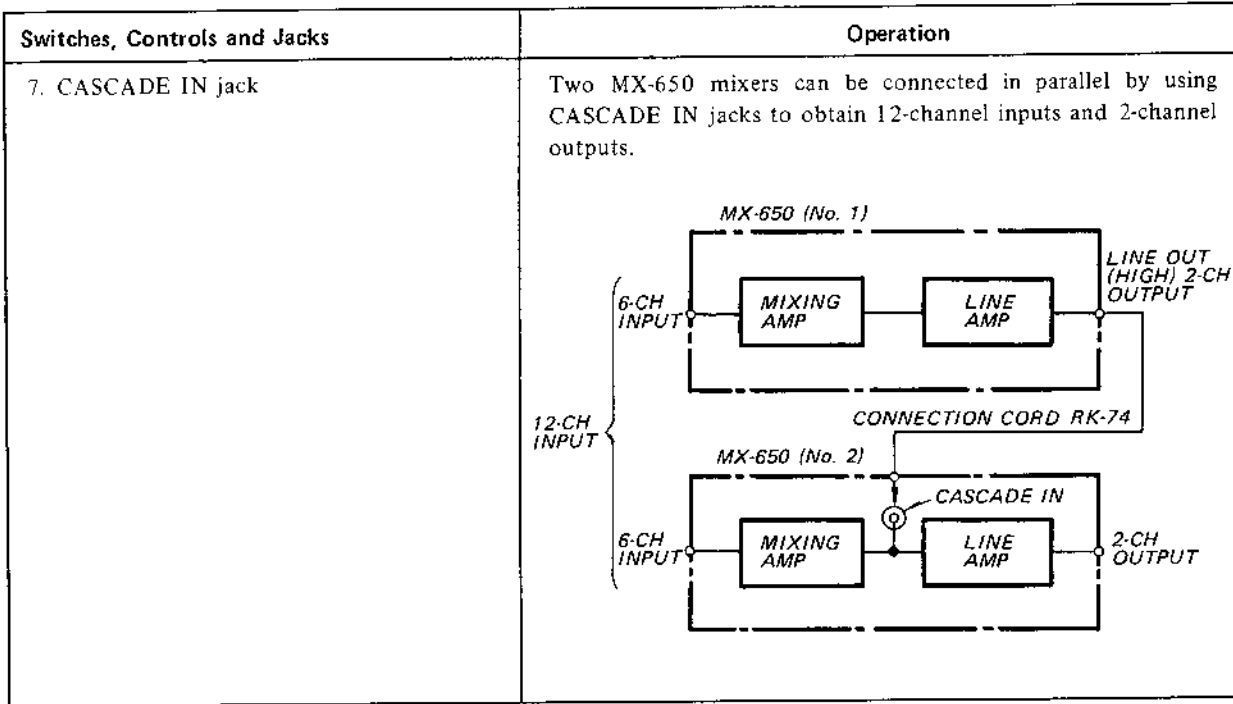
**SECTION 1  
OUTLINE**

**1-1. DESCRIPTION**

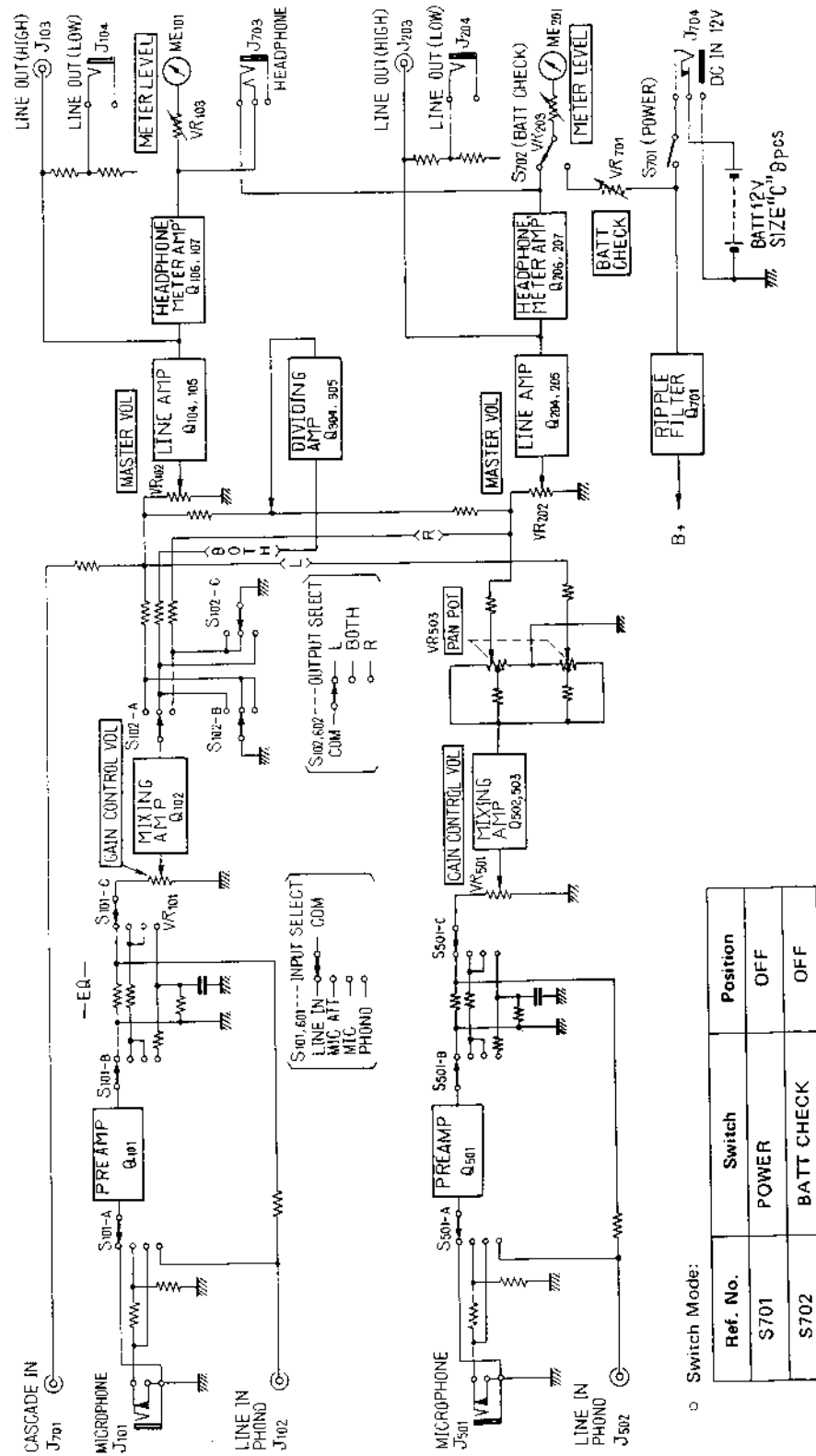
MX-650 is a 6-channel mixer provided with 2-channel outputs. This model contains amplifiers to

cover mixing loss and to improve S/N ratio. Power supply is an internal or external 12 V dc.

Switches, Controls and Jacks	Operation
1. INPUT SELECT switch	selectors of input source MIC ..... for microphone input source LINE IN/PHONO .... for line input source or record player 20 dB microphone input attenuator to prevent distortion caused by excessive input level It is effective for microphone placement close to the source.
2. GAIN CONTROL	It is possible to control each channel input level of 6-channel. Double horizontal lines of GAIN CONTROL indicate the best usable condition. Cursors are used for preset.
3. OUTPUT SELECT switch	2-channel output selectors for 6-channel inputs GAIN CONTROL can be adjusted according to VU meter reading of selected output channel. When any output channel selector is set to BOTH position, the same signal feeds to output channels 1 and 2. This feature facilitates "center-mixing" of a monaural sound source such as announcements or a single instrument between L-and R-channel microphones.
4. MASTER control	This control simultaneously adjusts four overall output levels. After finishing level set with each GAIN CONTROL, slide the MASTER control to 10 at record starting. After recording, slide the MASTER control gradually down to 0. It is usually used at 10 position.
5. HEADPHONE jack	This jack is to be used for level setting or record monitoring. No output signal appears when MASTER control is set to 0.
6. INPUT and OUTPUT jacks	INPUT    MICROPHONE x 6 LINE IN/PHONO x 6 CASCADE IN x 2 OUTPUT  LINE OUT (LOW) x 2 LINE OUT (HIGH) x 2  Normal LINE OUT (LOW) -60dB (0.775 mV) Normal LINE OUT (HIGH) -5 dB (0.435 V)



1-2. BLOCK DIAGRAM

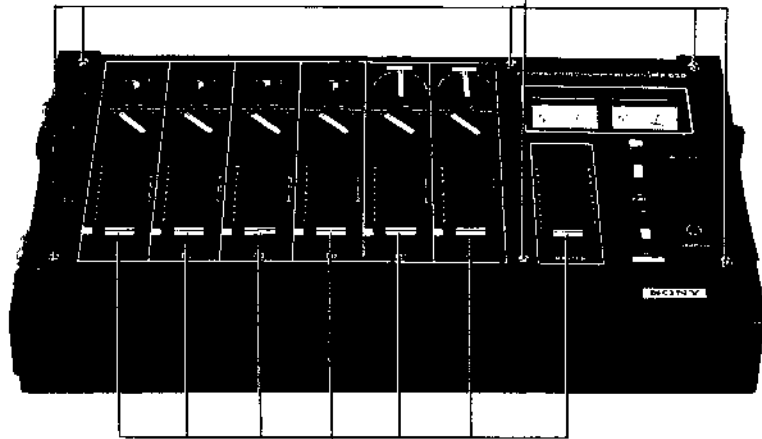


**SECTION 2  
DISASSEMBLY**

**2-1. PANEL REMOVAL**

Note: Perform "ADJUSTMENTS" after removing the panel.

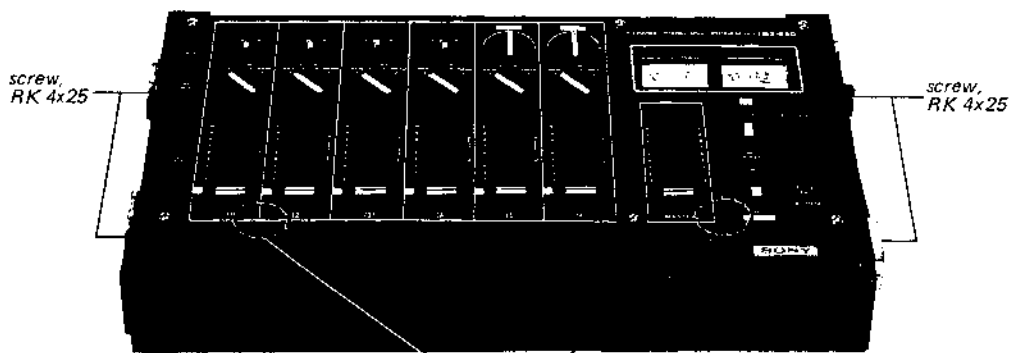
② Remove six screw, T3x5 and plastic washers, 3.3.



① Pull off seven control knobs.

**2-2. LOWER CASE REMOVAL**

① Remove four screws, RK 4x25.



② Release lead wires.

**SECTION 3  
ADJUSTMENTS**

**Test Equipment/Tools Required:**

- VTVM
- Audio oscillator (af osc)
- Attenuator
- Resistors ..... 300 Ω, 600 Ω, 10 kΩ, 100 kΩ (¼ W)
- Regulated dc power supply

**Normal Input Level (Frequency: 1 kHz)**

	MICROPHONE	LINE IN/ PHONO
impedance	300 Ω	10 kΩ
input level	-60 dB (0.77 mV)	-10 dB (0.25 V)

**Normal Output Level (Frequency: 1 kHz)**

	LINE OUT (HIGH)	LINE OUT (LOW)
load impedance	100 kΩ	3.9 kΩ
Output level	-5 dB (0.435 V)	-60 dB (0.77 mV)

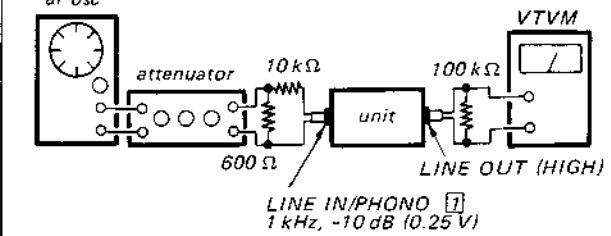
**1. VU Meter Calibration**

**Settings:**

- MASTER control: 10
- INPUT SELECT switch: LINE IN
- OUTPUT SELECT switch: L, R
- CAL TONE switch: ON

**Procedure:**

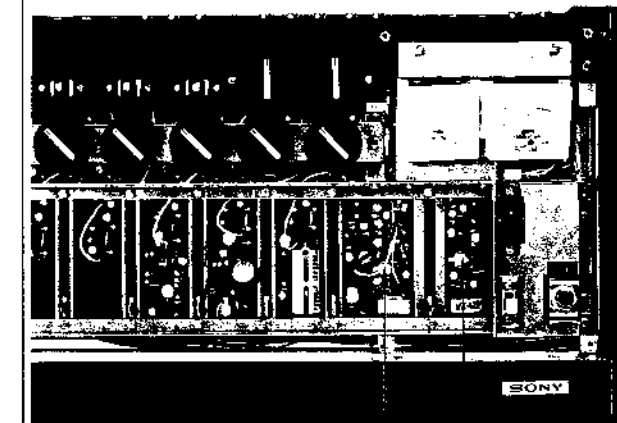
1. af osc



Adjust GAIN CONTROL for -5 dB (0.435 V) VTVM reading.

2. Adjust VR103 (L-CH) and VR203 (R-CH) for 0 VU meter reading.

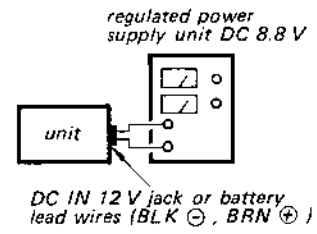
**Adjustment Locations:**



VR103 VR203  
(L-CH) (R-CH)

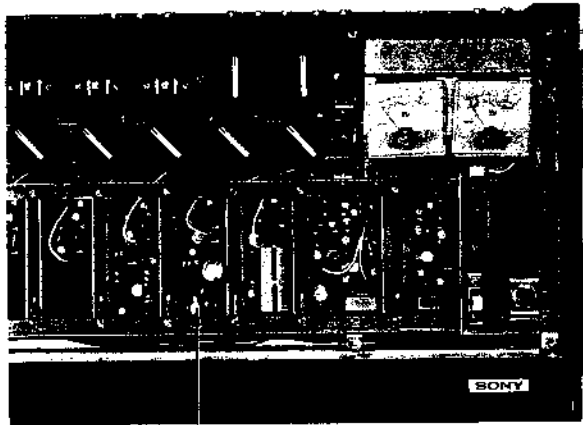
2. BATT CHECK Calibration

Procedure:



With BATT CHECK button depressed, adjust VR701 for 0 VU meter reading on right VU meter (ME201).

Adjustment Location:



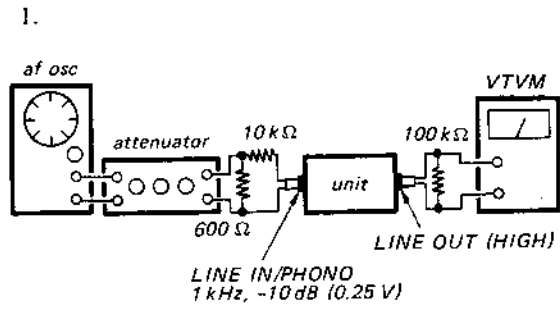
VR701

3. Level Adjustment

Settings:

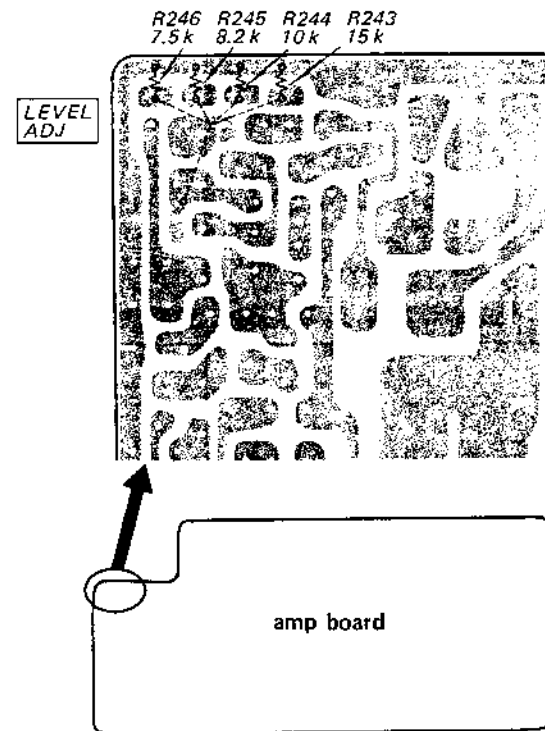
- MASTER control: 10
- INPUT SELECT switch: LINE IN
- OUTPUT SELECT switch: L, R
- CAL TONE switch: ON

Procedure:



1. Adjust GAIN CONTROL for -5 dB (0.435 V) VTVM reading.
2. Adjust resistance value by changing the pattern connection so that the output level of R-CH becomes equal to that of L-CH.

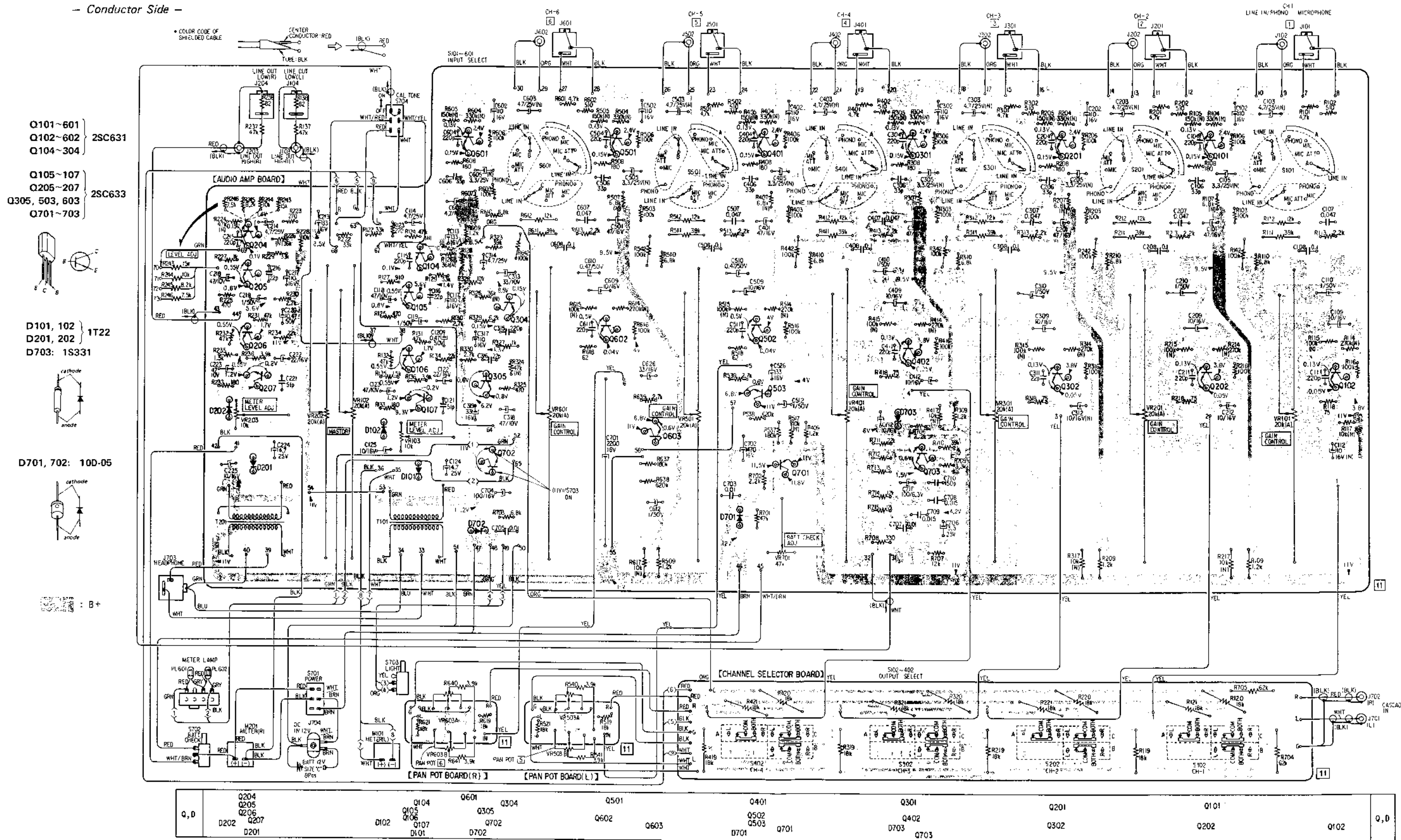
Adjustment Location:



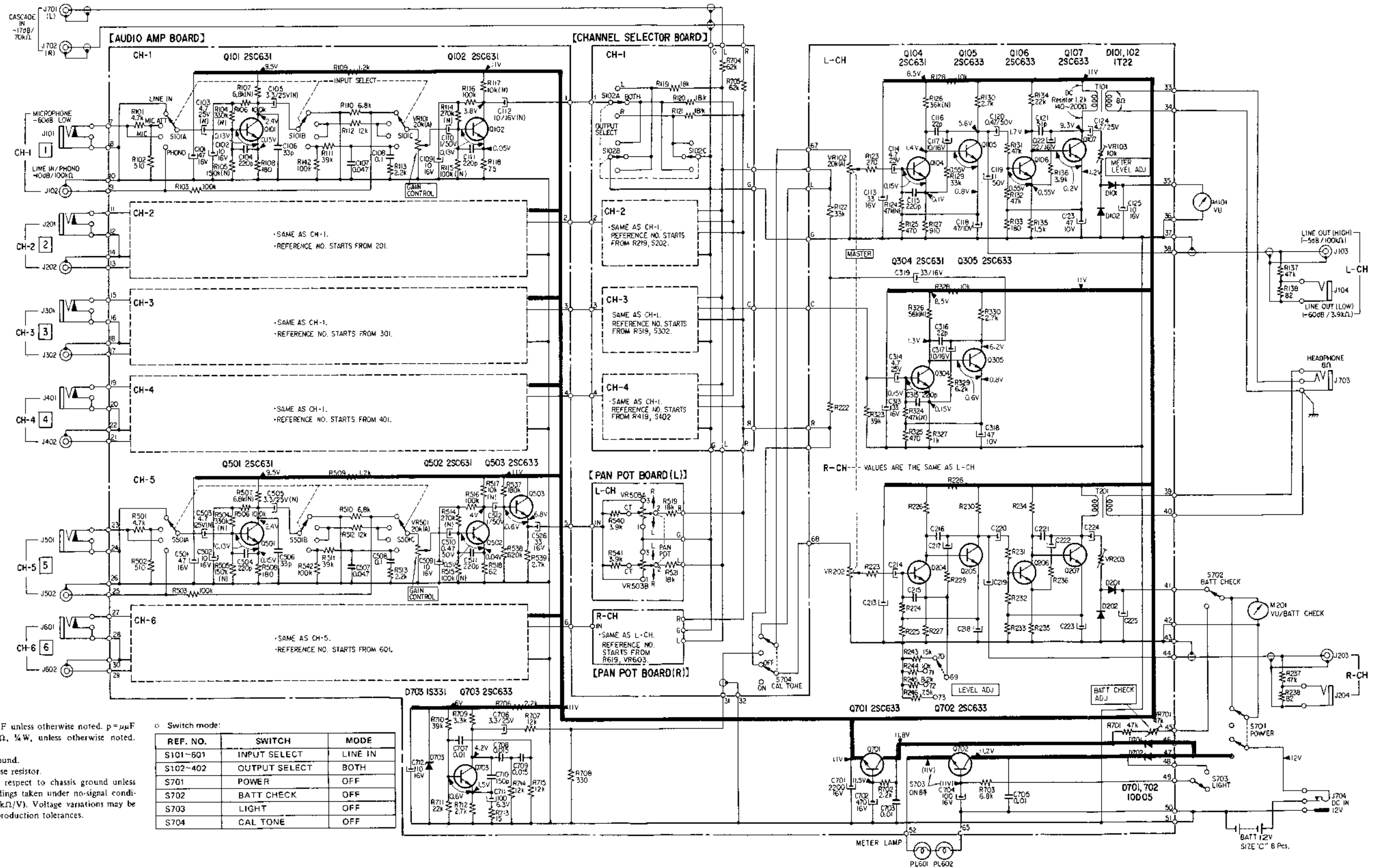
SECTION 4  
DIAGRAMS

4-1. MOUNTING DIAGRAM

- Conductor Side -



4-2. SCHEMATIC DIAGRAM



**Note:**

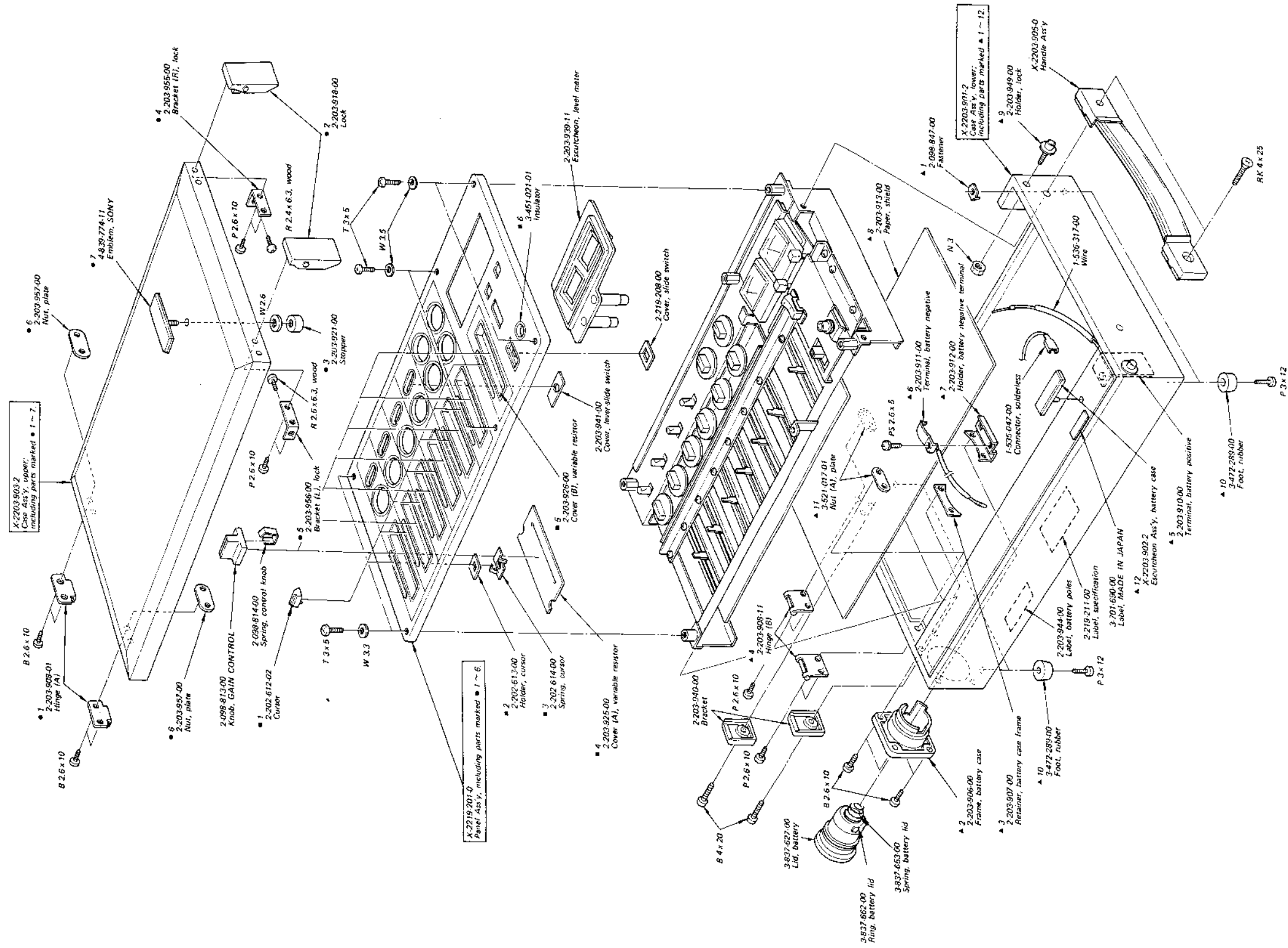
- All capacitors are in  $\mu\text{F}$  unless otherwise noted.  $p = \mu\text{pF}$
- All resistors are in  $\Omega$ ,  $\frac{1}{4}\text{W}$ , unless otherwise noted.  $k = 1,000$   $M = 1,000k$
- $\text{---}$  indicates chassis ground.
- (N) indicates a low-noise resistor.
- Voltages are DC with respect to chassis ground unless otherwise noted. Readings taken under no-signal conditions with a VOM (20k $\Omega/V$ ). Voltage variations may be noted due to normal production tolerances.
- $\text{---}$  : B+

○ Switch mode:

REF. NO.	SWITCH	MODE
S101-601	INPUT SELECT	LINE IN
S102-402	OUTPUT SELECT	BOTH
S701	POWER	OFF
S702	BATT CHECK	OFF
S703	LIGHT	OFF
S704	CAL TONE	OFF

SECTION 5  
EXPLODED VIEWS

5-1.



Note:  
 ○ Items with no part number and/or no description are not stocked because they are seldom required for routine service.  
 ○ All screws are Phillips (cross recess) type unless otherwise noted.  
 (-) = slotted head





**SECTION 6  
ELECTRICAL PARTS LIST**

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description	Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
<b>CIRCUIT BOARDS</b>			C106,206	1-107-119-11	33 p silvered mica	C502,602	1-121-651-11	10 16 V elect	<b>SWITCHES</b>		
A-2095-102-A		Audio Amp, complete	C107,207	1-105-521-12	0.047 mylar	C503,603	1-121-915-11	4.7 25 V elect	S101~601	1-516-195-00	Rotary, INPUT SELECT
A-2023-104-A		Channel Selector, complete	C108,208	1-105-525-12	0.1 mylar	C504,604	1-107-139-11	220 p silvered mica	S102~402	1-516-298-00	Lever-slide, OUTPUT SELECT
1-582-873-00		Pan-pot	C109,209	1-121-651-11	10 16 V elect	C505,605	1-121-913-11	3.3 25 V elect	S701	1-514-655-31	Rocker, POWER
			C110,210	1-121-391-11	1 50 V elect	C506,606	1-107-119-11	33 p silvered mica	S702,703	1-514-486-00	Pushbutton, BATT CHECK/LIGHT
			C111,211	1-107-139-11	220 p silvered mica	C507,607	1-105-673-12	0.047 mylar	S704	1-514-449-00	Slide, CAL TONE
			C112,212	1-121-916-11	10 16 V elect	C508,608	1-105-525-12	0.1 mylar			
<b>SEMICONDUCTORS</b>			C113,213	1-121-404-11	33 16 V elect	C509,609	1-121-651-11	10 16 V elect			
<b>Transistors</b>			C114,214	1-121-395-11	4.7 25 V elect	C510,610	1-121-726-11	0.47 50 V elect			
Q101~601	2SC631		C115,215	1-107-139-11	220 p silvered mica	C511,611	1-107-139-11	220 p silvered mica	<b>JACKS</b>		
Q102~602			C116,216	1-107-115-11	22 p silvered mica	C512,612	1-121-391-11	1 50 V elect	J101~601	1-507-480-XX	Phone, MICROPHONE
Q104~304			C117,217	1-121-651-11	10 16 V elect	C526,626	1-121-404-11	33 25 V elect	J102~602	1-507-176-XX	Phono, LINE OUT (HIGH)/CASCADE IN/LINE IN/PHONO
Q105~107			C118,218	1-121-352-11	47 10 V elect	C701	1-119-140-11	2200 16 V elect	J701,702		
Q205~207	2SC633		C119,219	1-121-391-11	1 50 V elect	C702	1-121-426-11	470 16 V elect	J104,204	1-507-480-XX	Phone, LINE OUT (LOW)
305,503,603			C120,220	1-121-726-11	0.47 50 V elect	C703	1-105-673-12	0.01 mylar	J703	1-507-476-XX	Binaural, HEADPHONE
701~703			C121,221	1-107-124-11	51 p silvered mica	C704	1-121-415-11	100 16 V elect	J704	1-507-127-00	DC IN 12 V
			C122,222	1-121-479-11	22 16 V elect	C705	1-105-673-12	0.01 mylar	<b>MISCELLANEOUS</b>		
			C123,223	1-121-352-11	47 10 V elect	C706	1-121-392-11	3.3 25 V elect	M101	1-520-114-61	Meter, level
<b>Diodes</b>			C124,224	1-121-395-11	4.7 25 V elect	C707	1-105-673-12	0.01 mylar	M201	1-520-114-71	Meter, level
D101,201	1T22		C125,225	1-121-651-11	10 16 V elect	C708,709	1-105-675-12	0.015 mylar	PL601,602	1-518-115-XX	Lamp, 6 V 35 mA
D102,202			C301,401	1-121-409-11	47 16 V elect	C710	1-107-135-11	150 p silvered mica	1-535-047-00	Connector, solderless	
D701,702	10D05		C302,402	1-121-651-11	10 16 V elect	C711	1-121-413-11	100 6.3 V elect	1-536-317-00	Wire	
D703			1S331	C303,403	1-121-915-11	4.7 25 V elect	C712	1-121-651-11	10 16 V elect	1-536-397-00	Terminal Strip, 2L1
			C304,404	1-107-139-11	220 p silvered mica	<b>RESISTORS</b>					
			C305,405	1-121-913-11	3.3 25 V elect	All resistors are in ohms. Regular type $\pm 5\%$ $\frac{1}{4}W$ carbon and composition resistors are omitted. Check schematic diagram for the resistance values. k = 1,000, M = 1,000k					
<b>TRANSFORMERS</b>			C306,406	1-107-119-11	33 p silvered mica						
T101,201	1-427-359-00	Output	C307,407	1-105-521-12	0.047 mylar						
			C308,408	1-105-525-12	0.1 mylar						
			C309,409	1-121-651-11	10 16 V elect						
			C310,410	1-121-391-11	1 elect						
<b>CAPACITORS</b>			C311,411	1-107-139-11	220 p silvered mica	VR101~601	1-224-230-00	20 k (A), variable; GAIN CONTROL	<b>ACCESSORIES</b>		
All capacitors are in $\mu F$ unless otherwise indicated. 50 or less working volts are omitted except for electrolytic type. (elect = electrolytic, p = $\mu F$ )			C312,412	1-121-916-11	10 16 V elect	VR102,22	1-224-231-00	20 k (A), variable; 2-gang; MASTER	1-528-026-00	Battery, size "C"	
C101,201	1-121-409-11	47 16 V elect	C313	1-121-404-11	33 25 V elect	VR103,203	1-222-752-00	10 k (A), adjustable	1-534-049-31	Cord, connection; RK-74	
C102,202	1-121-651-11	10 16 V elect	C314	1-121-395-11	4.7 25 V elect	VR503,603	1-222-375-00	20 k (B), variable; 2-gang; PAN POT	3-701-363-00	Label, tack	
C103,203	1-121-915-11	4.7 25 V elect	C315	1-107-139-11	220 p silvered mica	VR701	1-222-765-00	47 k, adjustable	3-780-570-11	Manual, instruction	
C104,204	1-107-139-11	220 p silvered mica	C316	1-107-115-11	22 p silvered mica						
C105,205	1-121-913-11	3.3 25 V elect	C317	1-121-651-11	10 16 V elect						
			C318	1-121-352-11	47 10 V elect						
			C319	1-121-404-11	33 25 V elect						
			C501,601	1-121-409-11	47 16 V elect						

**SECTION 7  
HARDWARE**

<u>Part No.</u>	<u>Description</u>	<u>Part No.</u>	<u>Description</u>
<b>Screws</b>		7-682-566-05	B 4 x 20
All screws are Phillips (cross recess) type unless otherwise indicated.		7-682-633-01	PS 2.6 x 4
7-621-255-29	P 2 x 4	7-682-647-01	PS 3 x 6
7-621-259-69	P 2.6 x 10	7-682-660-01	PS 4 x 6
7-621-559-63	K 2.6 x 10	7-685-145-23	P 3 x 6, self-tapping
7-621-773-87	B 2.6 x 10	<b>Washers</b>	
7-621-841-46	R 2.4 x 6.3, wood	7-623-108-09	3 (small)
7-621-843-29	R 3.1 x 13, wood	7-623-205-12	2, spring
7-628-253-03	PS 2 x 5	7-623-208-12	3, spring
7-628-254-03	PS 2.6 x 5	7-623-315-01	
7-629-100-13	R 1 x 6	7-623-908-04	3.3 x 8
7-682-128-05	P 2 x 10	7-622-105-05	Nut 2
7-682-150-05	P 3 x 12	7-684-013-01	Nut 3
7-682-367-04	PK 4 x 25	7-684-013-11	
7-682-446-05	T 3 x 5		