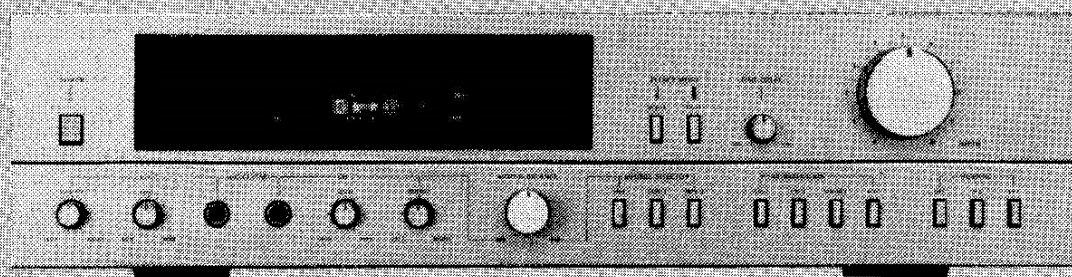


# SERVICE MANUAL

## REVERBERATION AMPLIFIER

# SANSUI RA-990

(Silver & Black Model)



### ● SPECIFICATIONS

Rated output voltage (reverberation off)	
TAPE REC . . . . .	150 mV/1 kohms
OUTPUT . . . . .	150 mV/1 kohms
Maximum output voltage (at 0.05 % total harmonic distortion) . . . . . 8 V	
Input sensitivity and impedance (at 1 kHz)	
MIC (GUITAR) . . . . .	0.8 mV/10 kohms
SOURCE/TAPE . . . . .	150 mV/47 kohms
Total harmonic distortion (20 Hz to 20 kHz, at 3 V, reverberation off) . . . . . less than 0.025 %	
Frequency response (at 1 V, reverberation off)	
SOURCE/TAPE . . . . .	10 Hz to 80,000 Hz, +0 dB, -3.0 dB
MIC (GUITAR) . . . . .	100 Hz to 15,000 Hz, +0 dB, -3.0 dB
Signal to noise ratio (at 3 V, A-network, short-circuit)	
MIC (GUITAR) . . . . .	more than 82 dB
SOURCE . . . . .	more than 90 dB
Reverberation time	
ECHO . . . . .	0 to 3 sec
DUET . . . . .	30 to 100 msec
Maximum input capability (at 1 kHz, 0.02 % T.H.D., reverberation off)	
SOURCE . . . . .	8 V
MIC (GUITAR) . . . . .	45 mV
Power requirements	
Power voltage . . . . .	120/220/240 V (50/60 Hz)
Power consumption . . . . .	15 W
Dimensions . . . . .	
	430 mm (16-15/16") W
	112 mm (4-7/16") H
	272 mm (10-3/4") D
Weight . . . . .	
	3.7 kg (8.2 lbs.) net
	4.7 kg (10.4 lbs.) packed

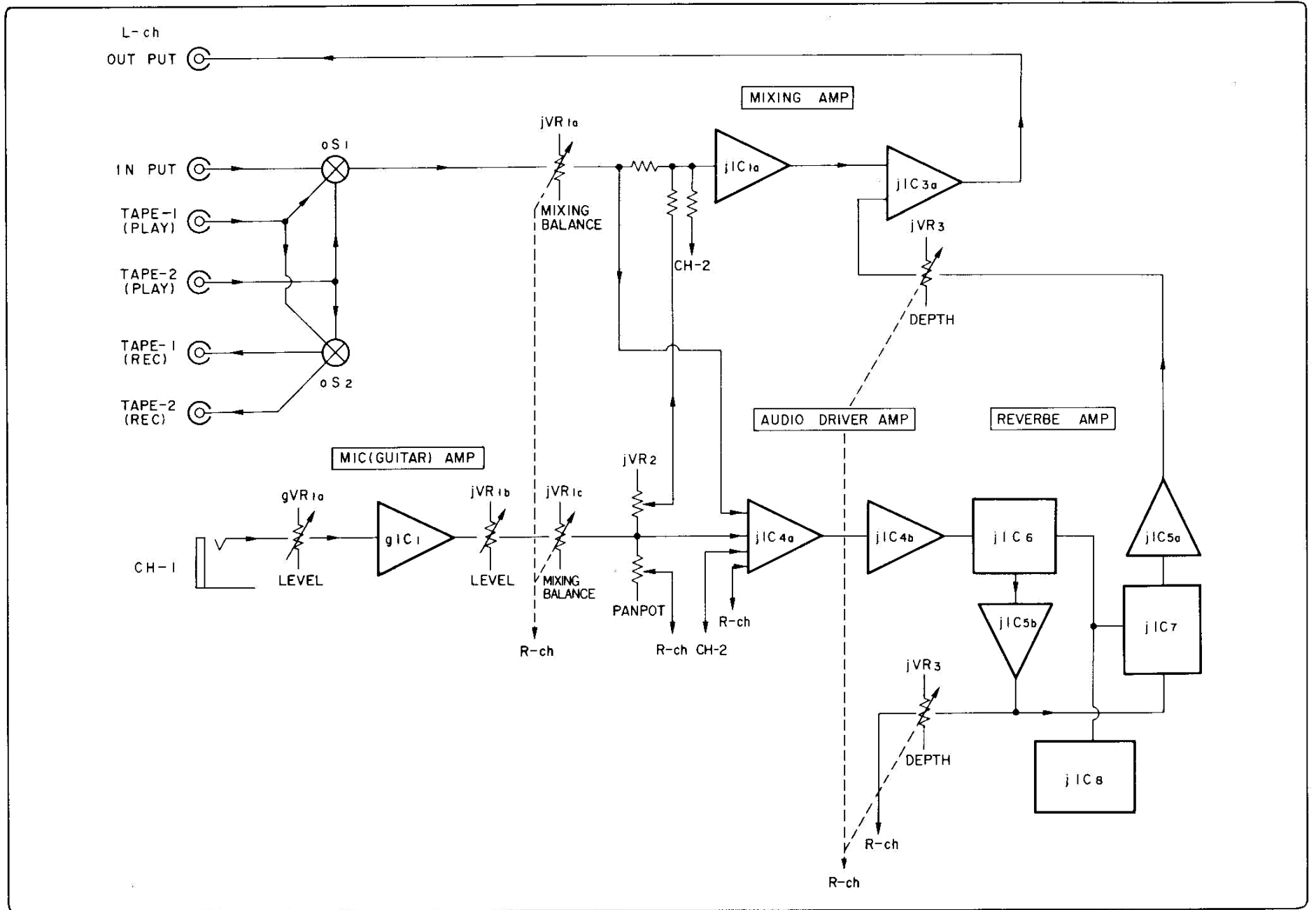
\* Design and specifications subject to changes without notice for improvements.

*Sansui*

SANSUI ELECTRIC CO., LTD.



# 1. BLOCK DIAGRAM

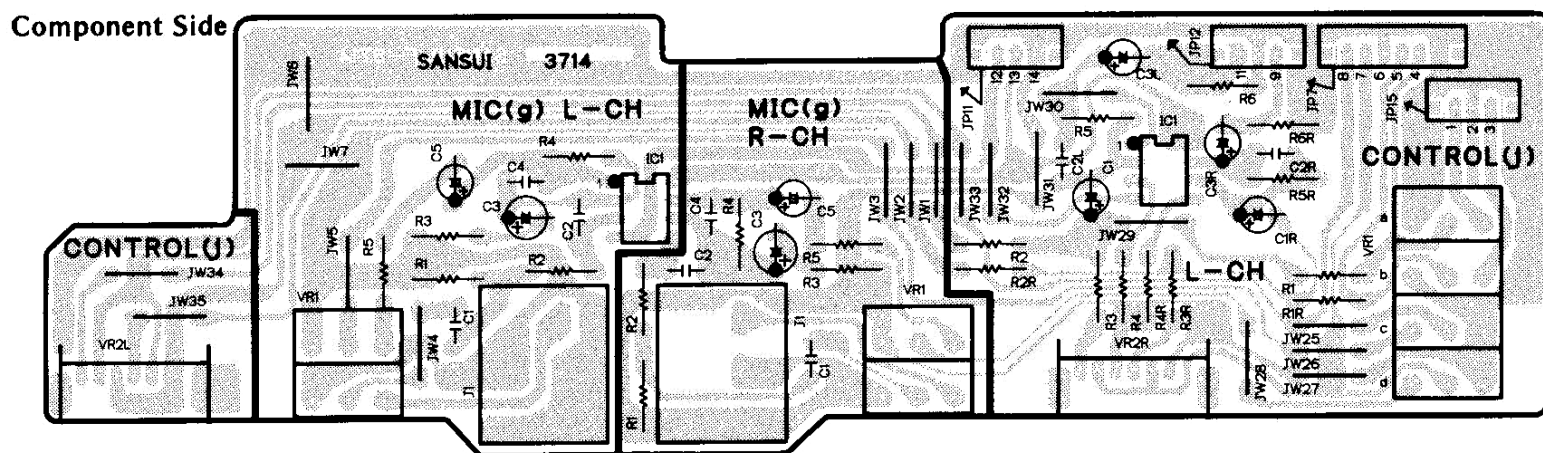


• Since the Reverberation Circuit, BBD IC and BBD clock Drive IC employed RA-990 are similar to those of RG-7, the explanation of these circuits are omitted from this manual, therefore please refer to the page 2 on service manual of RG-7.

# 2. PARTS LOCATION & PARTS LIST

## 2-1. F-3714 Control & Mic Amp. Circuit Board (Stock No. 00689101)

• Since some of capacitors and resistors are omitted from parts lists in this Service Manual, refer to the Common Parts List for capacitors & resistors, which was appended previously to Sansui Manual.



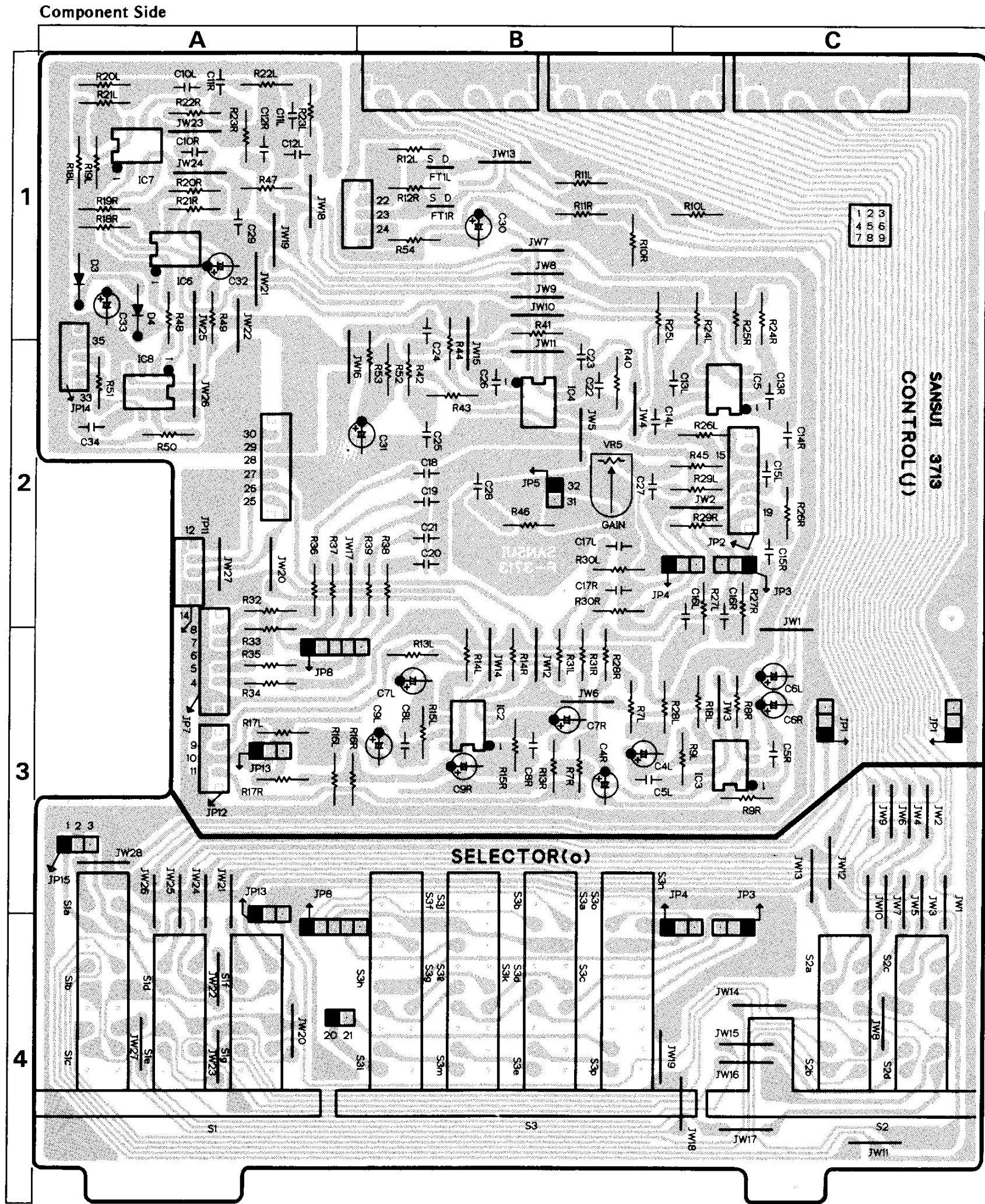
### Parts List

Parts No.	Stock No.	Description
•IC		
jIC1	03607700	NJM4558D
jVR1	46265800	250kΩ VR, MIXING BALANCE
jVR2	46266200	250kΩ VR, MIC PANPOT

Parts No.	Stock No.	Description
oJ1	46266300	Jack, MIC (GUITAR)
•IC		
gIC1	07208900	NJM4558D-X
gVR1	46266100	20kΩ (B), VR, MIC LEVEL



2-2. F-3713 Control & Reverberation Amp. Circuit Board (Stock No. 00689001)



Parts List

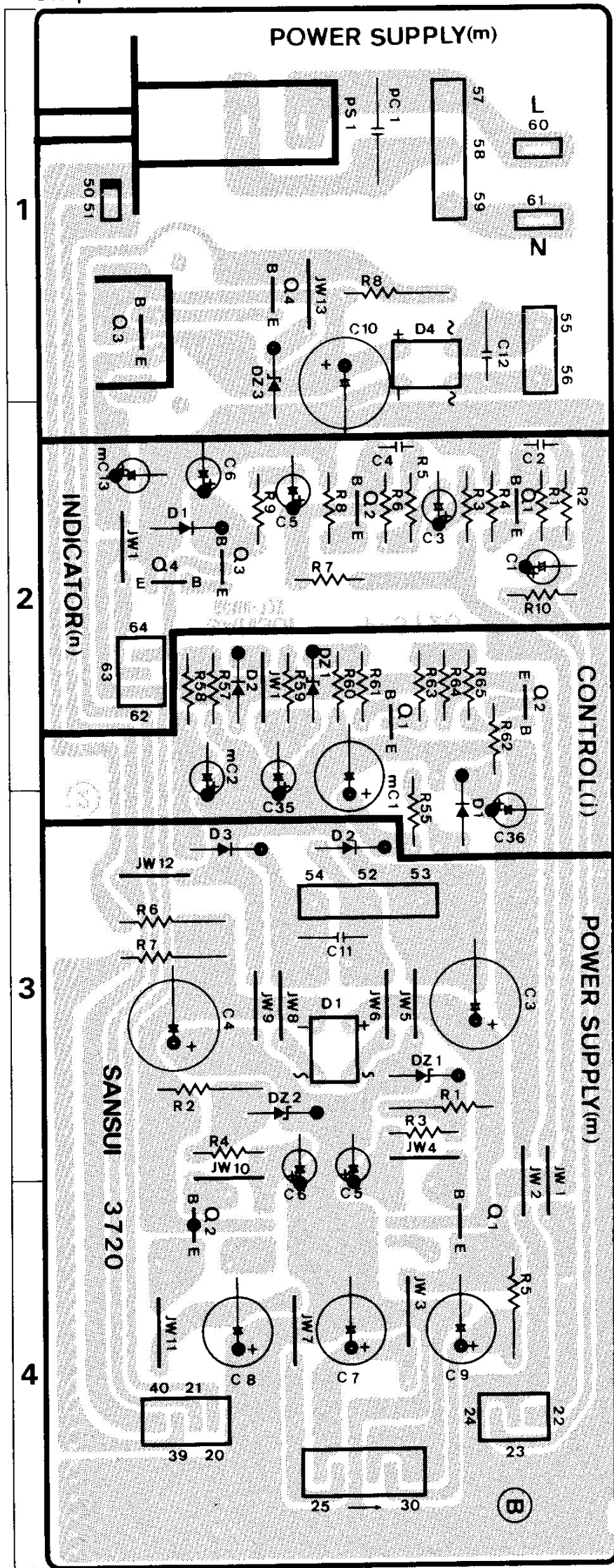
Parts No.	Stock No.	Description
●FET		
jFT1	03703000	2SK117-O
	or 03703001	2SK117-Y
	or 03703400	2SK163-K1
	or 03703401	2SK163-K2
●IC		
jIC2 ~ 5	03607700	NJM4558D
jIC6, 7	46221500	MN3007
jIC8	46080300	MN3101

Parts No.	Stock No.	Description
●Diode		
jD3	03117600	1S2473
	or 46086000	1S1588
jD4	03117600	1S2473
	or 46086000	1S1588
jVR5	46264600	220kΩ (B) SVR, echo level adj.
oS1	46266600	Push SW., SOURCE SELECTOR
oS2	46266700	Push SW., DUBBING
oS3	46266400	Push SW., REVERBERATION



2-3. F-3720 Power Supply & Indicator Circuit Board (Stock No. 00689801)

Component Side



Parts List

Parts No.	Stock No.	Description
●Transistor		
jQ1	07197001 or 07194701 or 03012701	2SA733A 2SA1015 2SA999
jQ2	03059501 or 07194801 or 03068301	2SC945 2SC1815 2SC2320
●Diode		
jD1, 2	03117600 or 46086000	1S2473D 1S1588
●Zener Diode		
jDZ1	03177400	RD 6.2E-B
jR55	46236100	220Ω 0.5W N.I.R.
●Transistor		
mQ1	03068301 or 07194801	2SC2320 2SC1815
mQ2	03012701 or 07194701	2SA999 2SA1015
mQ3	03083901	2SD313
mQ4	03068301 or 07194801 or 03059501	2SC2320 2SC1815 2SC945
●Diode		
mD1, 4	46273600	DBB10-B
mD2, 3	03117700	10E-2
●Zener Diode		
mDZ1, 2	03179400	RD 16E-B
mDZ3	03178800	RD 12E-B
●Resistor		
mR1, 2	46237300	2.2kΩ 0.5W N.I.R.
mR5	46235400	56Ω 0.5W N.I.R.
mR6 ~ 8	46237300	2.2kΩ 0.5W N.I.R.
mC11, 12	08680400	0.01μF 500V C.C.
●Transistor		
nQ1	03059501 or 07194801 or 03068301	2SC945 2SC1815 2SC2320
nQ2	03059501 or 07194801 or 03068301	2SC945 2SC1815 2SC2320
nQ3	03059501 or 07194801 or 03068301	2SC945 2SC1815 2SC2320
nQ4	07254901 or 07206901	2SC1741 2SC2001
●Diode		
nD1	03117600	1S2473D
pC1	08302600	0.01μF 400V C.C.
pS1	46360300 or 46360400	Push SW., POWER Push SW., POWER

• Note: The circuit boards, F-3715, F-3716, F-3717, F-3721 & F-3722 are not supplied as the assembled. However, the individual parts on the circuit boards are provided for orders.

2-4. F-3715 Time Delay Circuit Board

Parts List		
Parts No.	Stock No.	Description
jVR4	46266000	200kΩ (B) VR, TIME DELAY
oS4	46266500	Push SW., TIME DELAY

2-5. F-3716 Depth Volume Circuit Board

Parts List		
Parts No.	Stock No.	Description
jVR3	46265900	100kΩ (B) VR, DEPTH

2-6. F-3717 Effect Mode Indicator Circuit Board

Parts List		
Parts No.	Stock No.	Description
nLD1,2	46169300	LED SEL-1210S, ECHO, DUET

2-7. F-3721 Echo Lense Lamp Circuit Board

Parts List		
Parts No.	Stock No.	Description
nPL1 ~ 4	46286600	Pilot Lamp 12V 0.15A

2-8. F-3722 Power Indicator Circuit Board

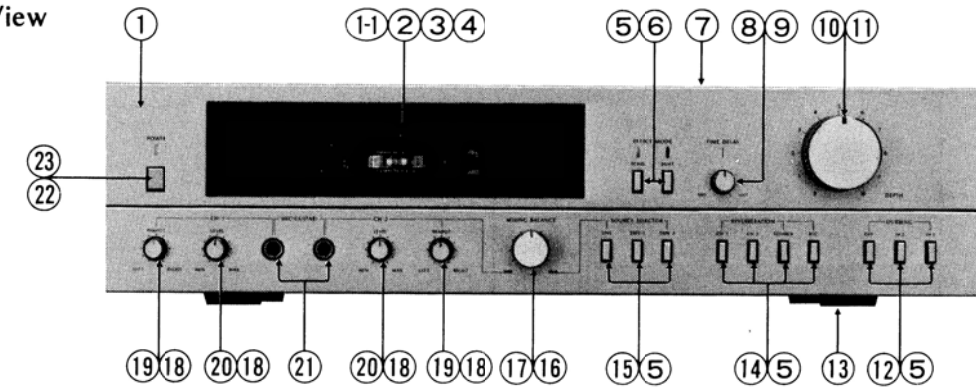
Parts List		
Parts No.	Stock No.	Description
nLD3	46169300	SEL-1210S, POWER

• Abbreviations

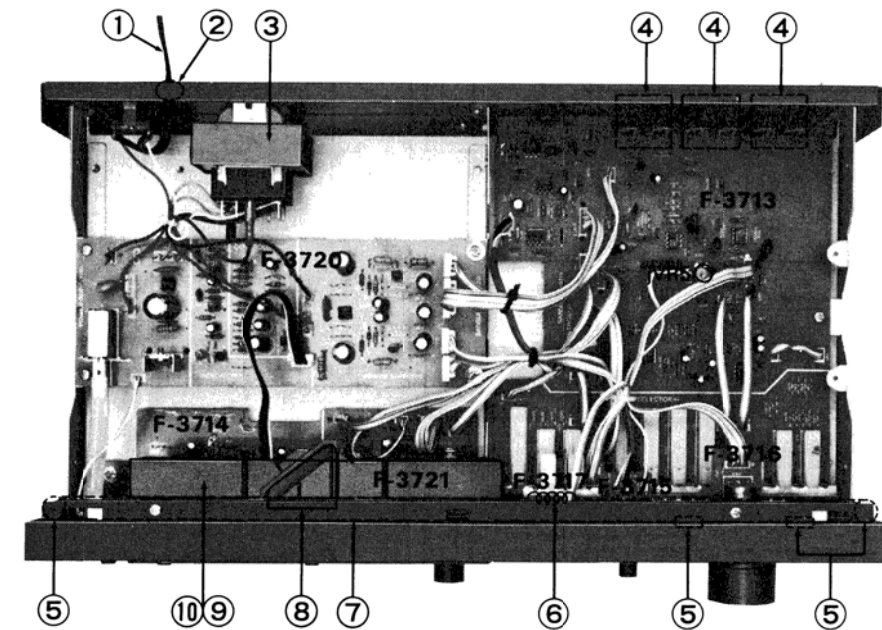
C.R. : Carbon Resistor	E.B. : Bi-Polar Electrolytic Capacitor
S.R. : Solid Resistor	E.BL. : Low Leak Bi-Polar Electrolytic Capacitor
Ce.R. : Cement Resistor	
M.R. : Metal Film Resistor	Ta.C. : Tantalum Capacitor
F.R. : Fusing Resistor	F.C. : Film Capacitor
N.I.R. : Non-Inflammable Resistor	M.P. : Metalized Paper Capacitor
C.C. : Ceramic Capacitor	P.C. : Polystyrene Capacitor
C.T. : Ceramic Capacitor, Temperature Compensation	G.C. : Gimmic Capacitor
E.C. : Electrolytic Capacitor	V.R. : Variable Resistor
E.L. : Low Leak Electrolytic Capacitor	S.V.R. : Semi Variable Resistor
	SW. : Switch

3. OTHER PARTS

4-1. Front View



4-2. Top View



Parts List <Front View>

Parts No.	Stock No.	Description
1-1	07887800	Front Glass
2	07887600	Echo Lens
3	46286600	Lamp, echo screen
4	07895600	Echo Film
6	46266500	Push SW, EFFECT MODE
9	46266000	200kΩ (B) VR, TIME DELAY
11	46265900	100kΩ (B) VR, DEPTH
12	46266700	Push SW, DUBBING
13	07822600	Leg
14	46266400	Push SW, REVERBERATION
15	46266600	Push SW, SOURCE SELECTOR
17	46265800	250kΩ VR, MIXING BALANCE
19	46266200	250kΩ VR, PANPOT
20	46266100	20kΩ (B) VR, MIC LEVEL
21	46266300	Jack, MIC (GUITAR)
23	46360300	Push SW, POWER
<Silver Model>		
1	07888500	Front Panel Ass'y
5	07809500	Push Knob, EFFECT MODE, SOURCE SELECTOR, REVERBERATION, DUBBING
7	07888300	Bonnet
8	07895500	Knob, TIME DELAY
10	07808900	Knob, DEPTH
16	07808700	Knob, MIXING BALANCE
18	07895300	Knob, MIC LEVEL, PANPOT
22	07809700	Push Knob, POWER

Parts No.	Stock No.	Description
<Black Model>		
1	07888600	Front Panel Ass'y
5	07809600	Push Knob, EFFECT MODE, SOURCE SELECTOR, REVERBERATION, DUBBING
7	07888400	Bonnet
8	07764600	Knob, TIME DELAY
10	07809000	Knob, DEPTH
16	07808800	Knob, MIXING BALANCE
18	07895400	Knob, MIC LEVEL, PANPOT
22	07809800	Push Knob, POWER

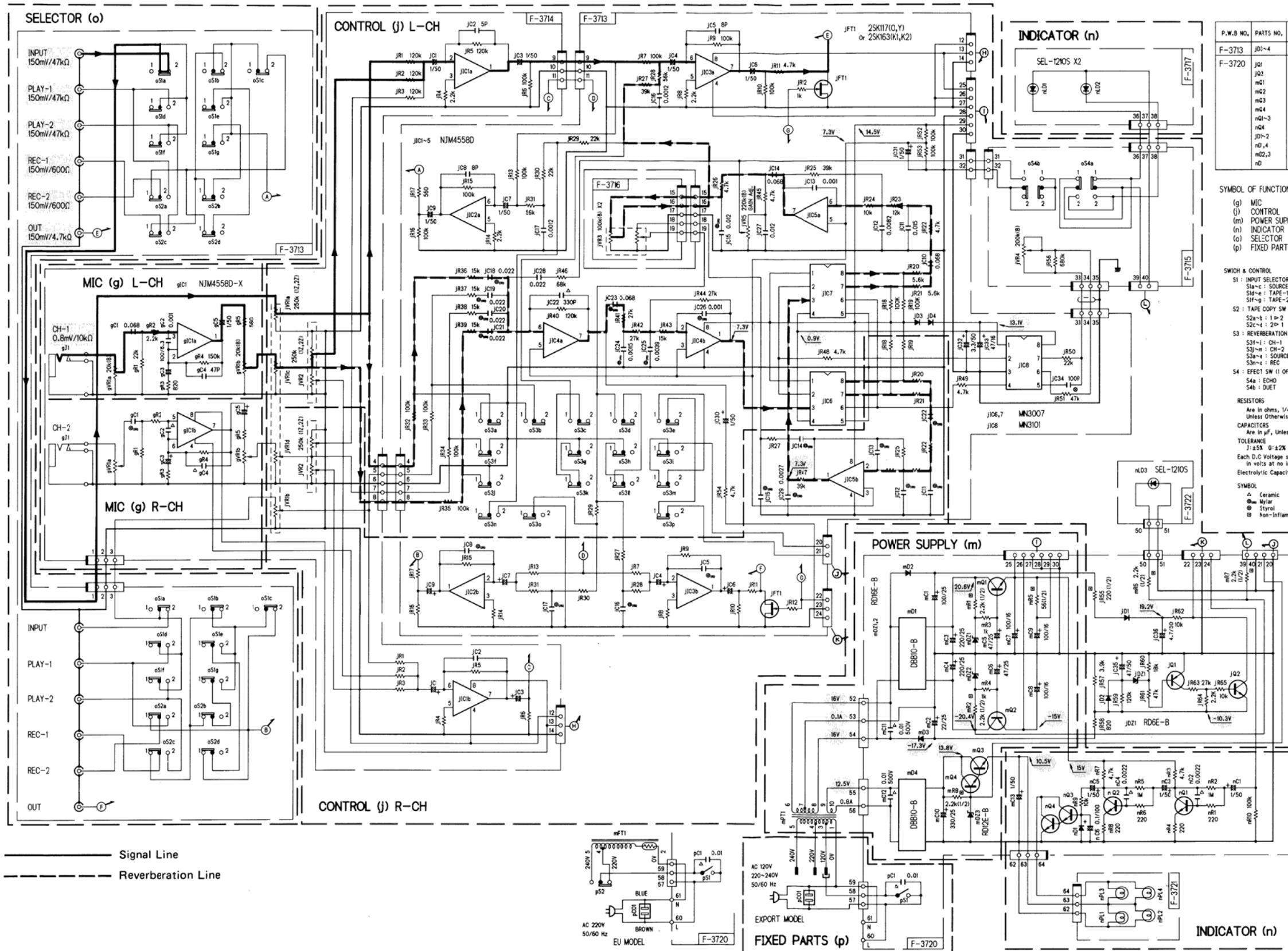
Parts List <Top View>

Parts No.	Stock No.	Description
1	38004700	Power Supply Cord
2	39106000	Strain Relief
3	15007501	Power Transformer
4	46096800	4P Pin Terminal, INPUT, TAPE-1, TAPE-2, OUTPUT
5	61467600	Pulley
6	69061300	Spring, echo lens cord
7	60360530	Dial Cord (0.6 mmφ)
8	07888100	Slider
9	07887900	Outer Case
10	07888000	Inner Case



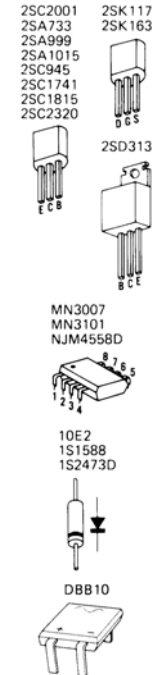
4. SCHEMATIC DIAGRAM

\* Design and specifications subject to change without notice for improvement.  
 \* La présentation et les spécifications sont susceptibles d'être modifiées sans préavis par suites d'améliorations éventuelles.  
 \* Änderungen, die dem technischen Fortschritt dienen, bleiben vorbehalten.



P.W.B NO.	PARTS NO.	DIODE & TRANSISTOR	OPTIONAL USE FOR TRANSISTOR & DIODE
F-3713	J01-4	1S2473	1S1588
F-3720	J01	2SA733 (Q,P)	2SA1015, 2SA999
	J02	2SC945 (Q,P)	2SC1815, 2SC2320
	m01	2SC2320 (E,F)	2SC1815
	m02	2SA999 (E,F)	2SA1015
	m03	2SD313 (D,E)	
	m04	2SC945 (Q,P)	2SC1815, 2SC2320
	m01-3	2SC945 (Q,P)	2SC1815, 2SC2320
	m04	2SC1741 (Q,R)	2SC2001
	J01-2	1S2473	1S1588
	m0-4	DBB10-B	
	m02,3	10E-2	
	m02	1S2473	1S1588

- SYMBOL OF FUNCTION**
- (g) MIC
  - (j) CONTROL
  - (m) POWER SUPPLY
  - (n) INDICATOR
  - (o) SELECTOR
  - (p) FIXED PARTS
- SWITCH & CONTROL**
- S1: INPUT SELECTOR (1 OFF, 2 ON)
  - S1a-c: SOURCE
  - S1d-e: TAPE-1
  - S1f-g: TAPE-2
  - S2: TAPE COPY SW (1 OFF, 2 ON)
  - S2a-b: 1:1 > 2
  - S2c-d: 2 > 1
  - S3: REVERBERATION SW (1 OFF, 2 ON)
  - S3f-1: CH-1
  - S3g-m: CH-2
  - S3a-e: SOURCE
  - S3n-o: REC
  - S4: EFFECT SW (1 OFF, 2 ON)
  - S4a: ECHO
  - S4b: DUET
- RESISTORS**
- Are in ohms, 1/4 Watts, ±5% Tolerance Unless Otherwise Noted. k:K1, M:MD
- CAPACITORS**
- Are in μF, Unless Otherwise Noted. P:pF
- TOLERANCE**
- J: ±5% G: ±2% F: ±1%
- Each D.C. Voltage shows the nominal value in volts at no input signal.
- Electrolytic Capacitor: Capacitance (μF/Volt (V))
- SYMBOL**
- Ceramic
  - Molar
  - ⊖ Styrol
  - ⊞ Non-Inflammable Resistor



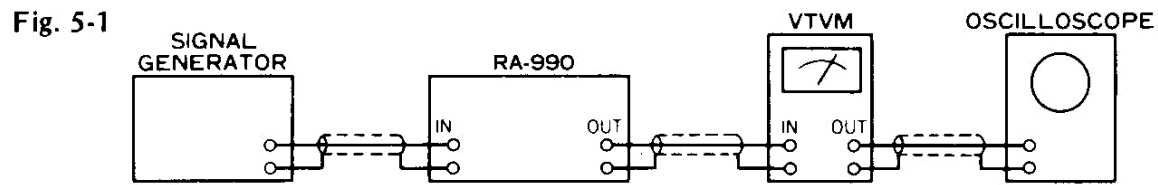
1  
2  
3  
4  
5

## 5. ECHO LEVEL ADJUSTMENT

SETTING: 1) Connect the measurement units as Fig. 5-1.  
 2) Set the control knobs as follows.

REVERBERATION . . . . . SOURCE  
 REVERB-MODE . . . . . ECHO  
 CH1/CH2 LEVEL . . . . . Min.

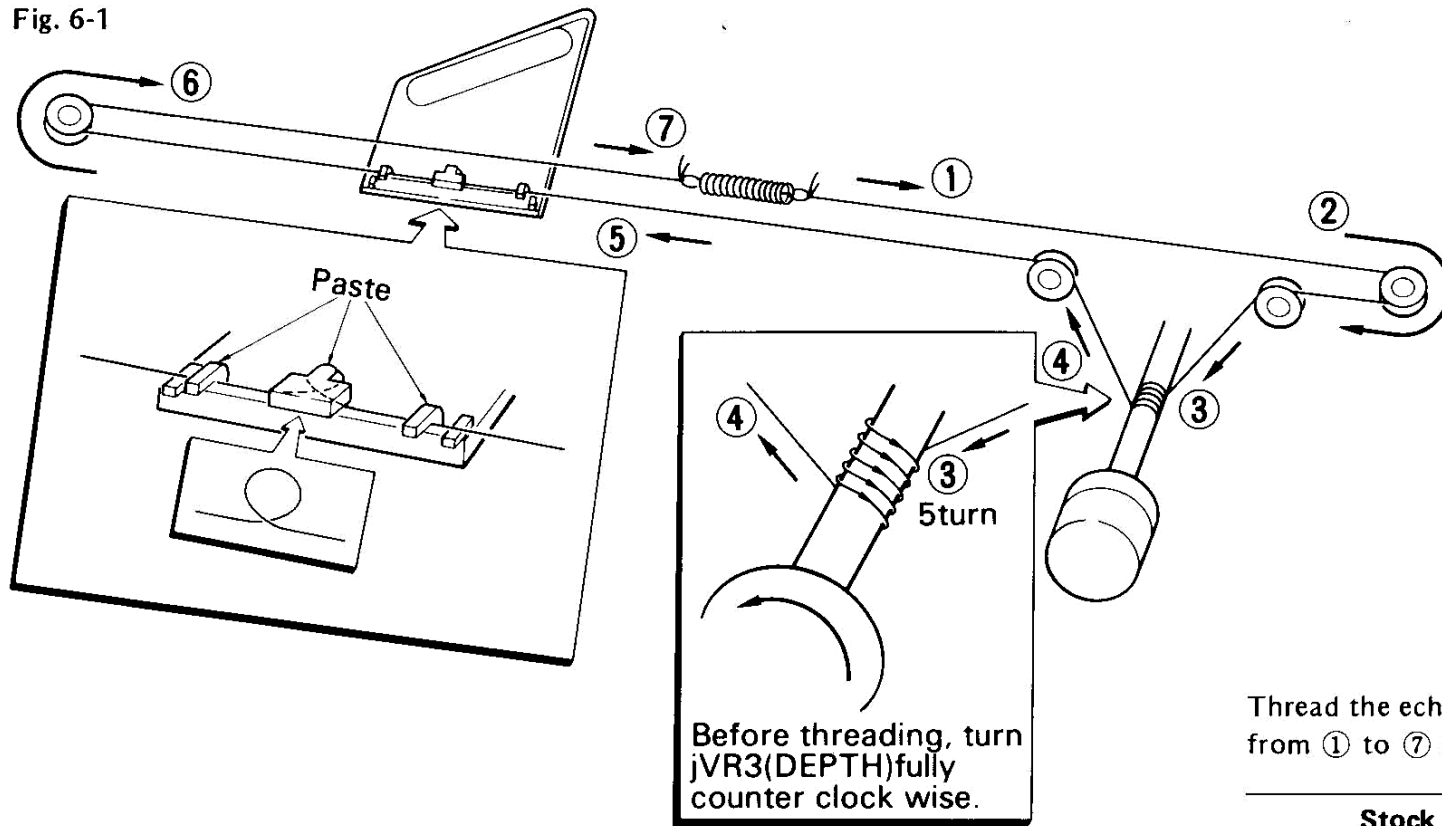
SOURCE SELECTOR . . . . . LINE  
 TIME DELAY . . . . . Max.  
 CH1/CH2 PANPOT . . . . . Center



INPUT SIGNAL	MEASURE OUTPUT	STEP	ADJUSTMENT
800 Hz 1.5V SG INPUT	OUTPUT VTVM, Scope	1	Turn the semi-variable resistor jVR5 (F-3713) fully clockwise.
		2	Push SOURCE SELECTOR switch to set to TAPE-1 position.
		3	Confirm that the reverberation circuit starts to oscillate, and its wave form comes out from OUTPUT.
		4	Turn jVR5 slowly counterclockwise until the oscillation stops.

## 6. THREADING OF ECHO LENS CORD

Fig. 6-1



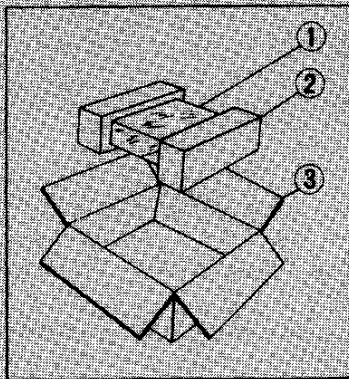
Thread the echo lens cord in numerical order from ① to ⑦ as Fig. 6-1.

Stock No.	Description
69061300	Spring (F)
60360530	Dial Cord (0.6mmφ)



## 7. PACKING LIST

Parts No.	Stock No.	Description
1	07599500	Vinyl Cover
2	07890100	Styrofoam Packing
3	07890000	Carton Case (Silver)
	07889900	Carton Case (Black)



## 8. ACCESSORY LIST

Stock No.	Description
38103300	Pin Plug Cord
46208000	Operating Instruction

SANSUI ELECTRIC CO., LTD.:

SANSUI ELECTRONICS CORPORATION:

SANSUI ELECTRONICS (U.K.) LTD.:  
SANSUI ELECTRONICS G.M.B.H.:

14-1, Izumi 2-chome, Suginami-ku, Tokyo 168 Japan  
PHONE: (03) 324-8891/TELEX: 232-2076 (International Division)  
1250 Valley Brook Ave. Lyndhurst, N.J. 07071 U.S.A.  
333 West Alondra Blvd. Gardena, California 90247 U.S.A.  
3036 Koapaka St. Honolulu, Hawaii 96819 U.S.A.  
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Paul Ehrlich Strasse 8, 6074 Rödermark 2, West Germany

**Sansui**