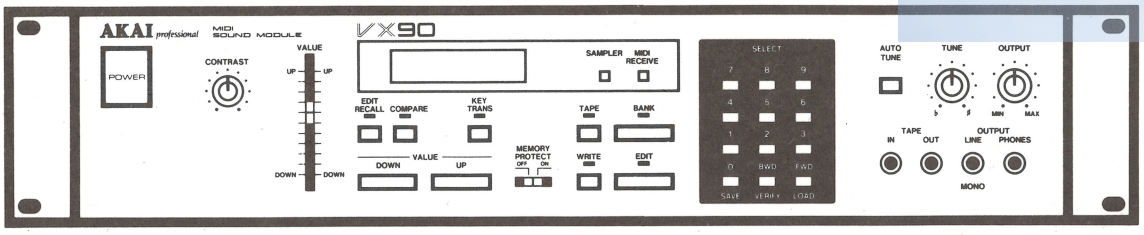
AKAI SERVICE MANUAL



MIDI SOUND MODULE

MODEL VX90

CAUTION: Before servicing, to protect customer's sound data from being damaged, save all data to cassette tape.

SPECIFICATIONS

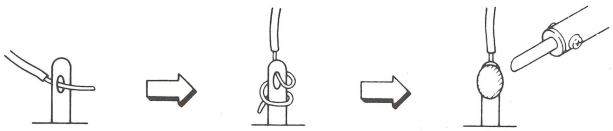
Voice Range	24 – 120 (C1 – C9)
Voices	6
Tone generator	VCO (voltage controlled oscillator)
Internal memory	100 programs
External Memory	Cassette interface
Parameters	
VCO Section	Octave (2′, 4′, 8′, 16′)
	Waveform (◿, ◿◺, ⊓, ◿+◺)
	Pulse width control
	PWM speed control
	EG depth control
	Sampler ON/OFF
	Noise ON/OFF
	A-B balance control
VCF Section	Cut-off frequency control
	Resonance control
	Key follow control
	VCO modulation control
	HPF control
	EG depth and polarity switching (+/–)
	Key velocity control
EG Section	Attack time
	Delay time
	Sustain level
	Release time
	EG switching (VCF, VCA, VCF = VCA, VCA GATE)
VCA Section	Level
	Velocity
LFO Section	LFO switching (VCO, VCF, VCA)
	Waveform (◿, ◿◺, ◺◿, ⊓, RND)
	Depth control
	Speed control
	Delay control
	Chorus (OFF, 1, 2)
Key assign (POLY, UNISON)	
Bend	VCO (± 1 octave)
	Cut-off frequency (MIN – MAX)
	Modulation depth (MIN – MAX)
MIDI channel (1 – 16)	
Functions	Output level control
	Tune control (± 50 cents)
	Auto tune ON/OFF
	Key transpose ON/OFF
	Memory protect ON/OFF
	LCD contrast control
	Edit control
	Value control volume
	Value UP/DOWN key
	Edit recall ON/OFF
	Compare ON/OFF
	Edit
	Write
	Bank
	Ten key
	FWD/LOAD key
	BWD/VERIFY key
	O/SAVE key
Display	LC display, LED
External Jacks	MIDI (IN, OUT, THRU)
	Sampler IN (13 PIN/DIN)
	LINE OUT (MONO) × 1
	STEREO OUT/LEFT (MONO), RIGHT
	Headphone × 1
	Tape (LOAD/IN, SAVE/OUT)
Dimensions	482.6 (W) × 88.1 (H) × 367 (D) mm
	(EIA Rack mount/2U)
Weight	6.0 kg

* For improvement purposes, specifications and design are subject to change without notice.

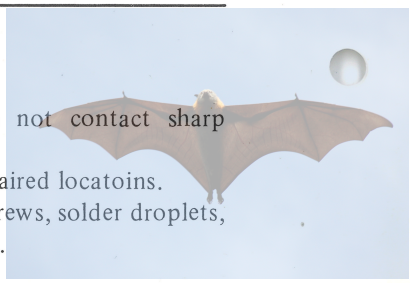
★SAFETY INSTRUCTIONS

PRECAUTIONS DURING SERVICING

1. Parts identified by the ⚠ symbol parts are critical for safety. Replace only with parts number specified.
2. In addition to safety, other parts and assemblies are specified for conformance with such regulations as those applying to spurious radiation.
   These must also be replaced only with specified replacements.
   Examples: RF converters, tuner units, antenna selector switches, RF cables, noise blocking capacitors, noise blocking filters, etc.
3. Use specified internal wiring. Note especially:
   1) Wires covered with PVC tubing
   2) Double insulated wires
   3) High voltage leads
4. Use specified insulating materials for hazardous live parts. Note especially:
   1) Insulation Tape
   2) PVC tubing
   3) Spacers (Insulating Barriers)
   4) Insulation sheets for transistors
   5) Plastic screws for fixing microswitch (especially in turntable)
5. When replacing AC primary side components (transformers, power cords, noise blocking capacitors, etc.), wrap ends of wires securely about the terminals before soldering.



6. Observe that wires do not contact heat producing parts (heatsinks, oxide metal film resistors, fusible resistors, etc.).
7. Check that replaced wires do not contact sharp edged or pointed parts.
8. Also check areas surrounding repaired locatoins.
9. Use care that foreign objects (screws, solder droplets, etc.) do not remain inside the set.



SAFETY CHECK AFTER SERVICING

Confirm the specified insulation resistance between power cord plug prongs and externally exposed parts of the set is greater than 10 M ohms. but for equipment with external antenna terminals (tuner, receiver, etc.) and is intended for [C] or [A], specified insulation resistance should be headphone jacks line-in-out jacks etc. more than 2.2 M ohms (ground terminals, microphone jacks).

PRECAUTION FOR THE LITHIUM BATTERY

The LITHIUM BATTERY employed for memory Back up has a explosive probability when the BATTERY itself is excessive heated.

IN CASE OF REPLACING: RESOLDER and SOLDER AS RECOMMENDED WAY.



〔DANGER〕



〔RECOMMENDED WAY〕

★INFORMATION

SYMBOLS FOR PRIMARY DESTINATION

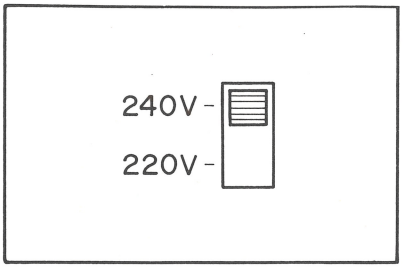
Alphabet indicates the destination of the units as listed below.

Symbols	Principal Destinations
[A]	USA
[B]	UK
[C]	Canada
[E]	Europe (except UK)
[J]	Japan
[S]	Australia
[V]	W. Germany only
[U]	Universal Area
[Y*]	Custom version

VOLTAGE CONVERSION

([E, V, B, S] Model only)

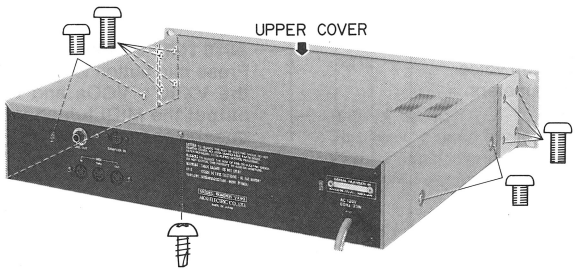
Befor connecting the power cord. SET the VOLTAGE SELECTOR located on the rear panel with a screwdriver so that the correct voltage is indicated.



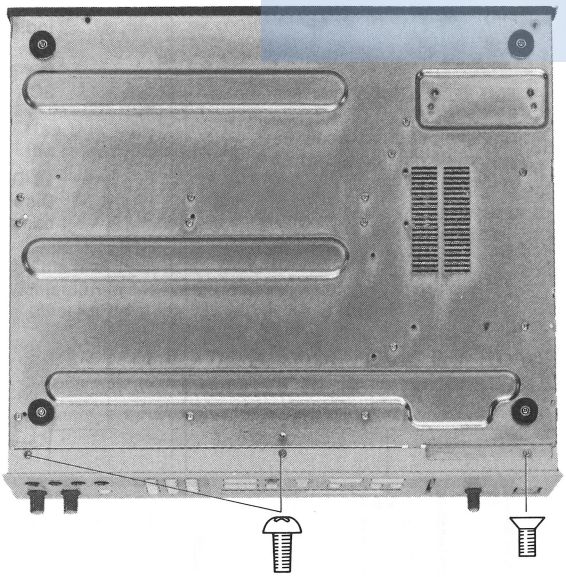
I. DISMANTLING OF UNIT

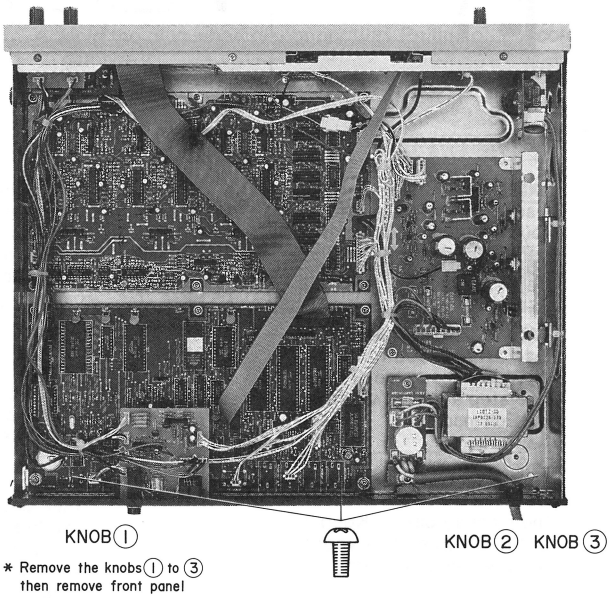
In case of trouble, etc, necessitating dismantling, please dismantle in the order shown in the photographs.
Reassemble in reverse order.

1. REMOVAL OF UPPER COVER



2. REMOVAL OF FRONT PANEL





* Remove the knobs ① to ③ then remove front panel

II. CONTROLS

POWER Switch
Use this switch to turn the VX90 power on and off.

CONTRAST Control
Use this control to adjust the contrast of the LC display.

EDIT RECALL Button and Indicator
Use this button to recall the last voice data edited when in the play mode.

COMPARE Button and Indicator
Use this button to compare the voice to be preset with the previously set voice when in the Edit mode.

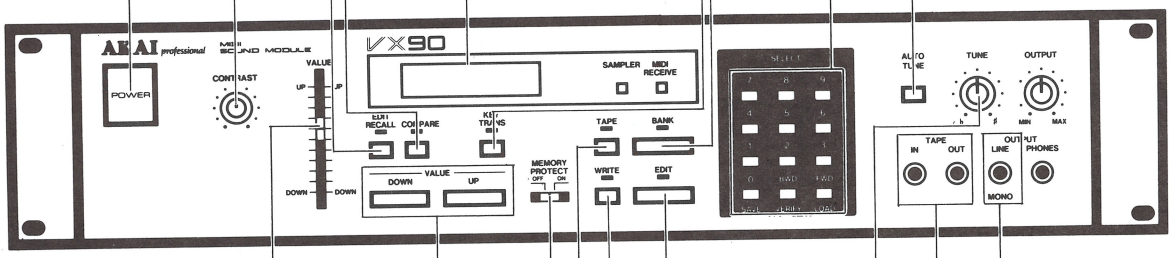
KEY TRANS Button and Indicator
Use this button to transfer the pitch ±1 octave from 3C.

LC Display
Displays the program voice names and the parameters.

BANK Button and Indicator
Use this button with the SELECT buttons to recall the program number or the parameter.

SELECT Button (0—9)
Use these buttons with the BANK button to recall either the program number or the parameter number.

AUTO TUNE Button
Press this button to tune all the VX90's VCOs and to output the MIDI tuning request message to connected equipment.



VALUE Slide Controller
Use this control to perform rough adjustment of the parameter data when in the Edit mode.

VALUE UP/DOWN Buttons
Use these buttons to change the parameter data one step at a time when in the Edit mode.

MEMORY PROTECT Switch
Use this switch to protect the memory banks. Keep it at the ON position except when writing a program.

WRITE Button and Indicator
Use this button to store the parameters preset in the Edit mode in the memory bank.

EDIT Button and Indicator
Use this button to preset new voice data.

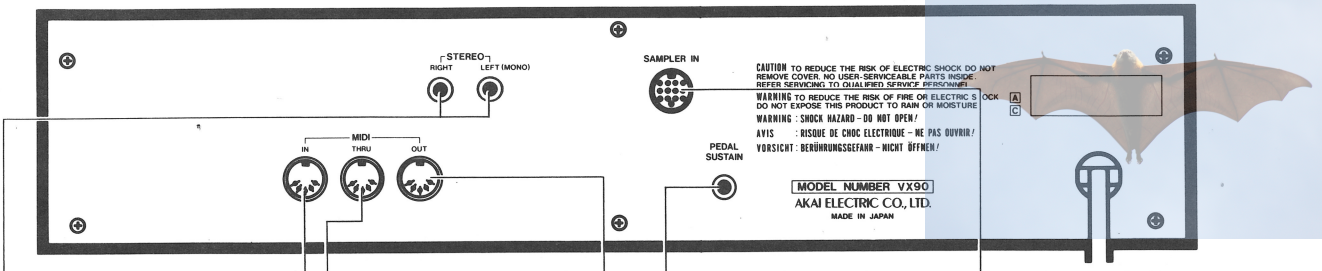
TAPE Button and Indicator
Use this button to store the data onto a cassette, either all programs at once or one bank at a time.

LINE OUTPUT Jack
Use this jack for connection to the input of a keyboard amplifier or mixer.

TAPE IN/OUT Jacks
These jacks are used to connect a tape recorder and save or load the voice data for all programs.

TUNE Control
Use this control to adjust the pitch of the VX90 to match other instruments. The pitch can be changed by ±50 cents.

Fig. 2-1 Front View



STEREO Jacks
Use this jacks for connection to the input of a keyboard amplifier or mixer.

MIDI THRU Jack:
This jack is used to output the data received at the MIDI IN jack without changing it.

MIDI IN Jack:
This jack is used for reception of MIDI signals from other MIDI equipment.

PEDAL SUSTAIN Jack:
Use this jack to increase the release time through a pedal unit.

MIDI OUT Jack:
This jack is used for transmission of MIDI signals to other MIDI equipment.

SAMPLER IN Jack
Connect this jack to an AKAI sampler (the S612, for example) to edit the sampler voices or to mix the sampler voices to the VX90's internal sound sources.

Fig. 2-2 Rear View

III.CONNECTIONS

- The VX90 can be operated by such MIDI equipment as a MIDI sequencer or a MIDI master keyboard or any keyboard.
- As the VX90 is not equipped with a built-in amplifier or speakers, a separate power amplifier (a keyboard amplifier for example) and instrument speakers are needed.

Before Making Connections

- Be sure the power is off, or connect the power cord last.
- Insert the plugs firmly into the jacks. Poor connections will result in noise or distortion.
- Hold the plug when disconnecting. Pulling on the cord will damage it.

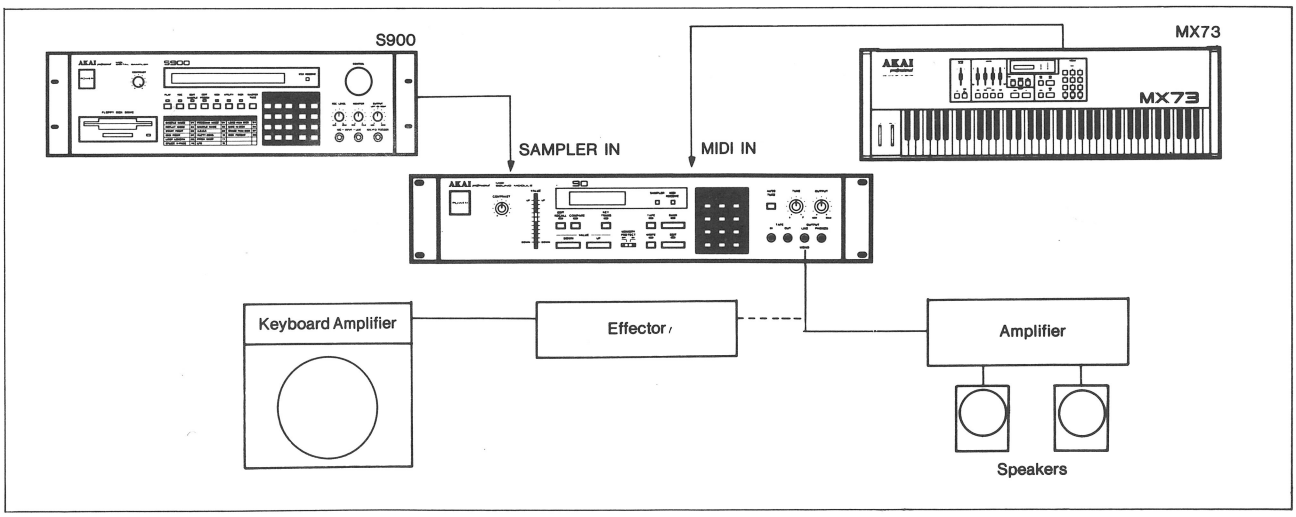


Fig. 3-1

IV. KEYBOARD REACTION-SHIP TO EQUALLY TEMPERED SCALE FREQUENCIES AND MUSICAL-NOTATION

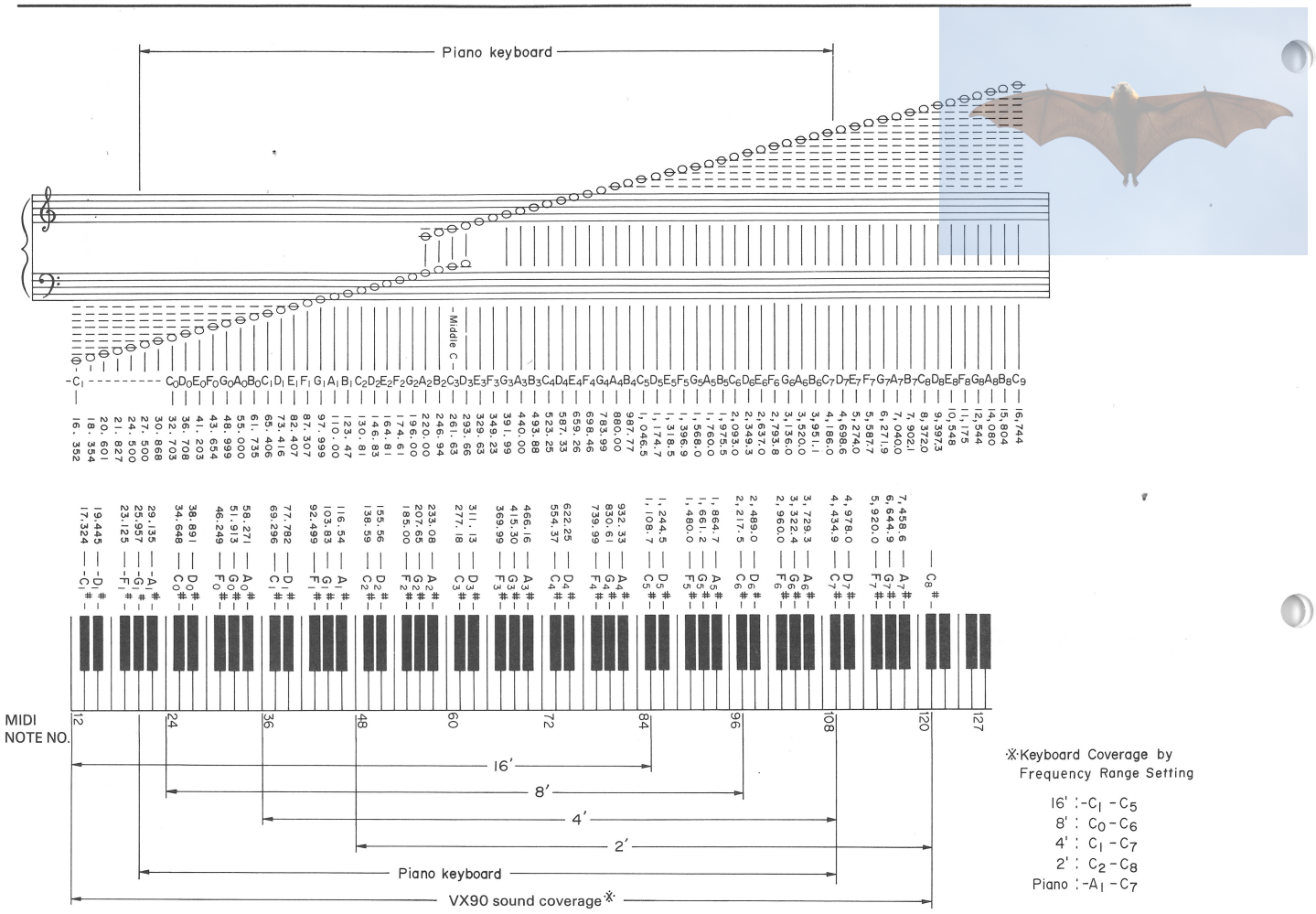
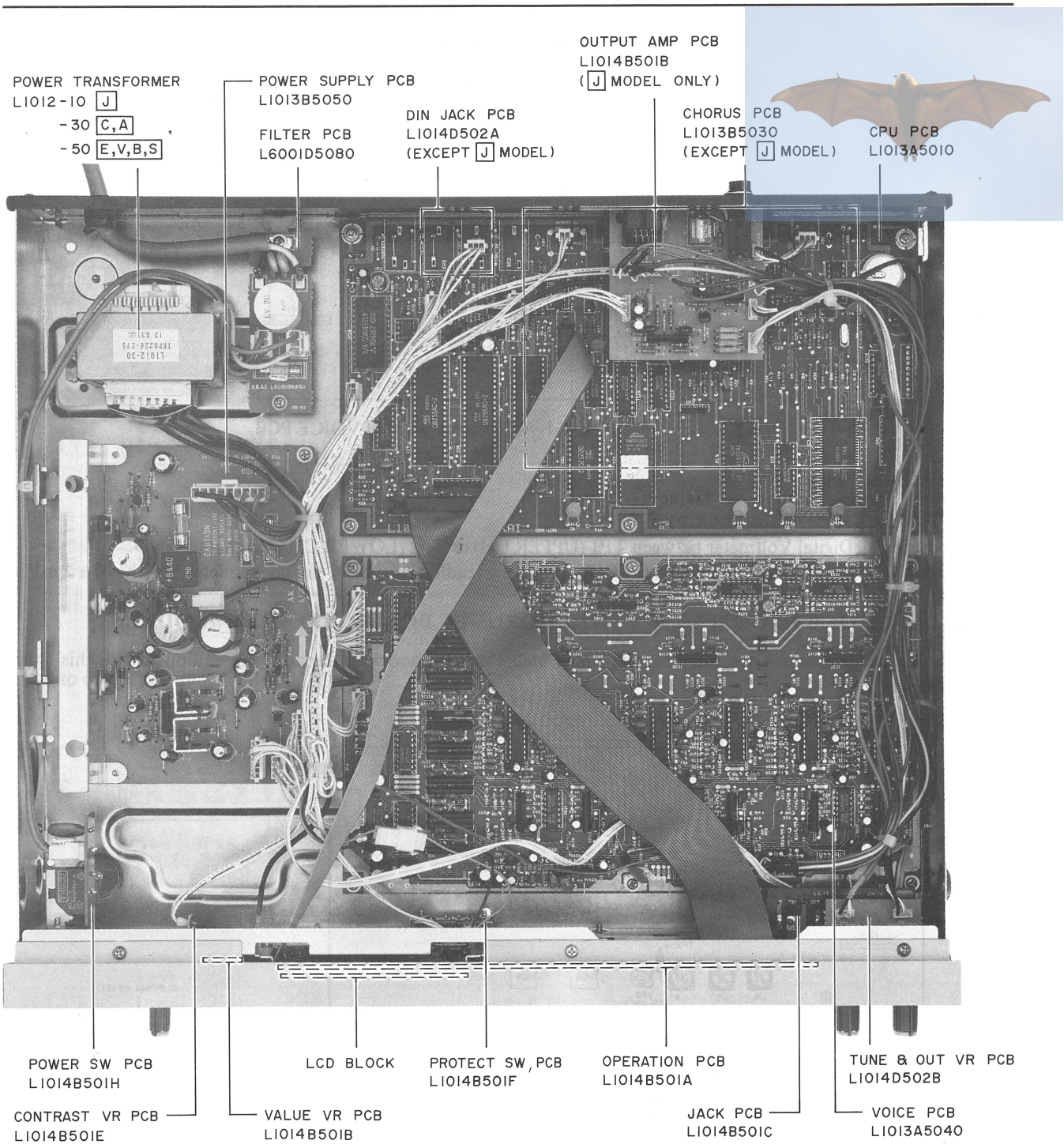


Fig. 4-1

V. PRINCIPAL PARTS LOCATION



VI. ADJUSTMENT



6-1. OFF-SET OF FINAL VCA ON THE VOICE PC BOARD

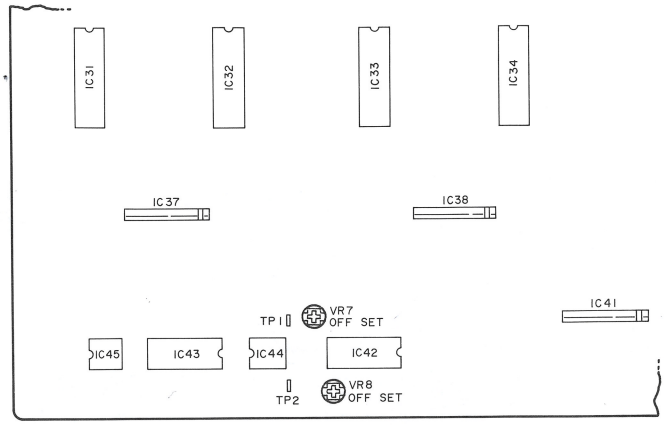


Fig. 6-1 Adjustment point of VOICE PCB

1) Set the VCA LEVEL to "100".
   PUSH PUSH PUSH SET VALUE VR
   [EDIT] ⇨ [BANK] ⇨ [3] [0] ⇨ MAX "100"]
2) Connect the DC Digital Voltmeter between TP1 (UPPER CH) or TP2 (LOWER CH) and chassis GND.
3) Adjust VR7 (UPPER CH) or VR8 (LOWER CH), so that the reading on the DC digital voltmeter is within 0±2 mV.

6-2. BALANCE OF BBD OUTPUT ON THE CHORUS PC BOARD (EXCEPT [J] MODEL)

Note: This adjustment is not necessary for the Japan model due to model for Japan is not equipped with this chorus function.

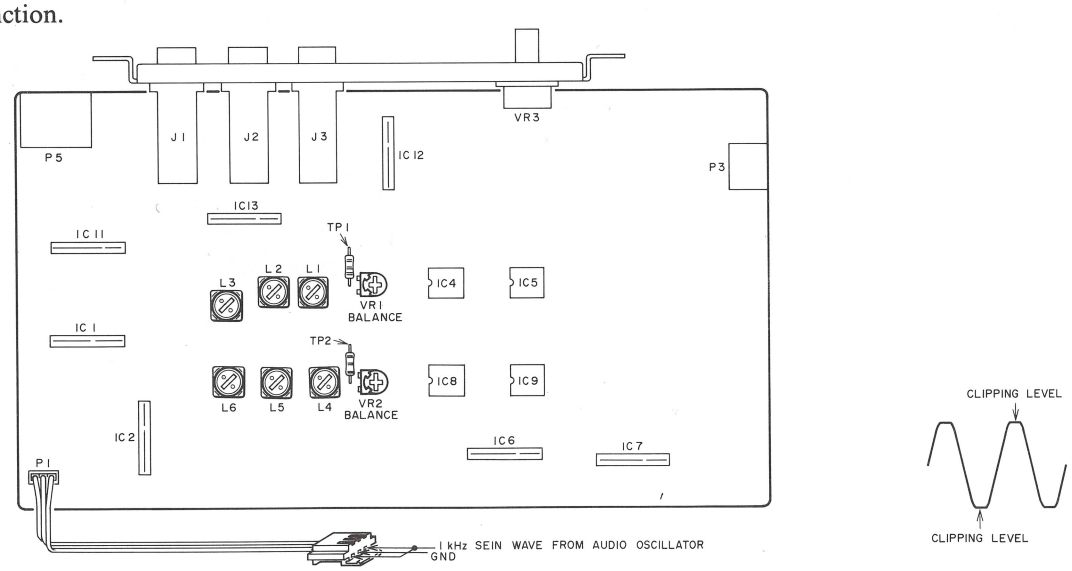


Fig. 6-2. Adjustment point of CHORUS PCB and instrument connection

1) Set the CHORUS "1" mode.
   PUSH PUSH PUSH PUSH
   [EDIT] ⇨ [BANK] ⇨ [4] [5] ⇨ [UP]]
2) Connect the oscilloscope between TP1 and chassis GND.
3) Extract J5 on the VOICE PCB and connect the audio signal generator to the connector J5 as shown in Fig. 6-2.
4) Set the frequency of the audio oscillator to 1 kHz sine wave and adjust its output control so that the waveform on the oscilloscope is clipped a bit.
5) Adjust VR1 so that the clipping level at upper side and lower side of the waveform are the same level.
6) Connect the oscilloscope between TP2 and chassis GND and adjust VR2 as same manner as 5).

Note: For the easy connection between the audio oscillator and the connector J5, build a special connection cord as shown.

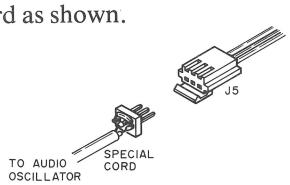


Fig. 6-3. SPECIAL CORD

6-3. OFF-SET OF IC6 (LF356) ON THE CPU PC BOARD



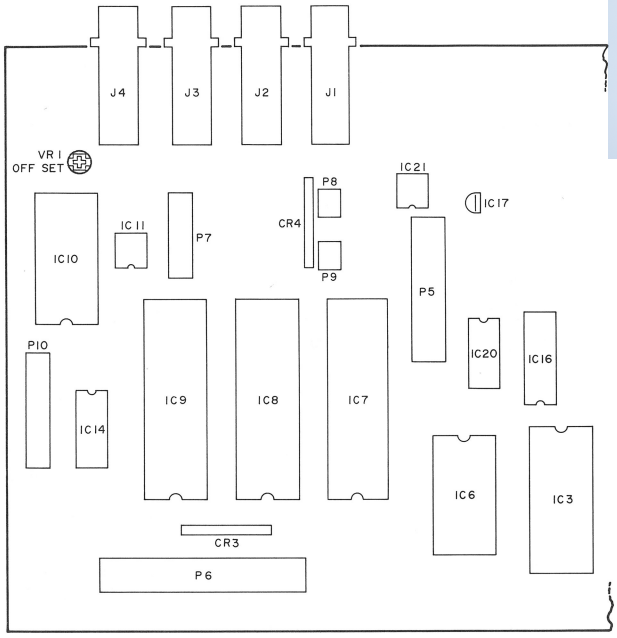


Fig. 6-4. Adjustment point of CPU PCB

1) Set to center position of VR1.

VII. PARAMETERS

Display			
Parameter		Data	Description
E00	VCOaOCT (Octave)	2′, 4′, 8′, 16′	Switches the pitch. 8′ is the basic pitch. When set to 16′ or 4′, the range changes by one octave.
E01	VCOaWF (Wave Form)	⊓, ⋀, ⊓⊔, ⋀+⋀	Switches the output waveform.
E02	VCOaPW	0～100	Sets the pulse width. However, operates at waveform selected by E01.
E03	VCOaPWMS	0～100	Sets the PWM depth depending on the pulse wave set by E02 VCOaPW. (NOTE: When E02 is "0", there is no PWM.) This adjusts the PWM speed.
E04	VCOaEG	0～100	Makes it possible to set EG for the VCOs.
E05	NOISE b	OFF/ON	Pink noise is output when "ON".
E06	SAMPLER b	OFF/ON	When AKAI sampler (S-612, etc.) is connected, it can be used as a sound source for the VX90.
E07	a—b BAL (BALance)	0～100	Adjusts output level balance between VCO(a) and NOISE and SAMPLER(b). When "0", only VCO(a) sound is produced, and when "100", only NOISE and SAMPLER(b) sound is produced.
E10	VCF FREQ (Cutoff FREQuency)	0～100	Adjusts the VCF cut-off frequency.
E11	VCF RESO (RESOnance)	0～100	Allows reinforcement of the cut-off point area determined by E10 VCF FREQ (cut-off frequency).
E12	VCF OWFM (Oscillator Wave Form Modulation)	0～100	Oscillator waveform modulation. Adds modulation from the VCOs to the VCFs depending on the waveform selected by E10.
E13	VCF EG	−50～0～+50	Controls the VCF cut-off frequency by EG signal, and changes the previously set VCF cut-off point. −50 ← 0 → +50 EG EG
E14	VCF KEYF (KEYboard Follow)	0～100	Changes the cut-off frequency depending on the keyboard position. Adjusts the degree of this change.
E15	VCF VELO (VELOcity)	−50～0～+50	Adjusts the amount of E13 VCF control by the speed at which the key is struck. (NOTE: When VCF EG is "0", VCF VELO effect is "0".)
E16	HPF (High Path Filter)	0～100	Adjusts the amount of low frequency which passes.

E20	EG SEL (Mode SELect)	A≠F,A=F	I. When A≠F, the EG effect acts on VCA for E21—24 and the EG effect acts on VCO and VCF for E25—28. (Refer to I) II. When A=F, the EG effect acts on VCA and VCF for E21—24 and on VCO for E25—28. (Refer to II)
I.			
E21	EGA A (Attack)	0~100	Sets the VCA attack time.
E22	EGA D (Decay)	0~100	Sets the VCA decay time.
E23	EGA S (Sustain)	0~100	Sets the VCA sustain level.
E24	EGA R (Release)	0~100	Sets the VCA release time.
E25	EGOF A	0~100	Sets the VCO and VCF attack time.
E26	EGOF D	0~100	Sets the VCO and VCF decay time.
E27	EGOF S	0~100	Sets the VCO and VCF sustain level.
E28	EGOF R	0~100	Sets the VCO and VCF release time.
II.			
E21	EGAF A	0~100	Sets the VCA and VCF attack time.
E22	EGAF D	0~100	Sets the VCA and VCF decay time.
E23	EGAF S	0~100	Sets the VCA and VCF sustain level.
E24	EGAF R	0~100	Sets the VCA and VCF release time.
E25	EGO A	0~100	Sets the VCO attack time.
E26	EGO D	0~100	Sets the VCO decay time.
E27	EGO S	0~100	Sets the VCO sustain level.
E28	EGO R	0~100	Sets the VCO release time.
E30	VCA LEV (LEVel)	0~100	Sets the Final VCA output level.
E31	VCA VELO (VELOcity)	−50~0~+50	Adjusts the degree to which the VCAs are controlled by the strength at which the key is struck.
E40	LFO SEL	OFF,VCO,VCF,VCA	Makes it possible to apply LFO to either the VCOs, VCFs, or VCAs.
E41	LFO WF (Wave Form)	⋀, ◿, ⋀, ⊓, RNDM	Makes it possible to select the LFO waveform.
E42	LFO FREQ (FREQuency)	0~100	Adjusts the LFO change speed.
E43	LFO DP (Depth)	0~100	Sets the depth of frequency modulation.
E44	LFO DEL (DELay)	0~100	Adjusts the time required from when a key is pressed until the effect is produced.
E45 (*)	CHORUS	OFF, 1, 2	Applies the stereo chorus effect.

(*): Model for Japan is not equipped with this E45 function.

E50	ASSIGN	POLY,DUAL,UNI	Sets to 6 chords in the POLY mode, 3 chords in the DUAL mode, and 1 chord in the UNI (unison) mode.
E51	SOL PORT (PORTament)	0~100	Applies the portamento effect in the DUAL or UNI (unison) modes.
E52	DETUNE	0~100	Applies the effect in the DUAL or UNI (unison) modes. Richness and softness can be added to the sound by slightly changing the VCO frequency.
E60	WH BND O (Pitch BeND Range, VCO)	0~12	Makes pitch variable in semi-tone steps. At "12", the pitch is variable by ±1 octave.
E61	WH BND F (Pitch BeND Range, VCF)	0~100	Makes the cut-off frequency variable.
E62	WH MOD (MODulation level)	0~100	Makes the LFO modulation variable. * When "0", LFO is not applied when the modulation wheel is operated.
E72	MIDI CH	1~16	Makes MIDI CH. selection possible.
E73	MIDI PC (Program Change)	ENA,DIS	When set at ENA (enable), the MIDI program change data can be transmitted or received. When set at DIS (disable), the data cannot be transmitted or received.
E80	LABEL	A~Z, 0~9, [SPACE], Etc	Makes it possible to input a voice name in up to 12 letters. The cursor is moved by the FWD/BWD buttons, and the letters are selected by the slide controller or the UP/DOWN buttons. (Refer to Page 7)

* The E72 MIDI CH and E73 MIDI PC are common for all 100 programs.

VIII. MIDI IMPLEMENTATION CHART

[MIDI Sound Module]

Model VX-90 MIDI Implementation Chart

Version: 1.0

Function ...		Transmitted	Recognized	Remarks
Basic	Default	1 – 16	1 – 16 ★	☆ memorized
Channel	Changed	1 – 16	1 – 16 ★	
Mode	Default	MODE 3, MODE 4	MODE 3	memorized
	Messages		X	
	Altered	**********	X	
Note Number	: True voice	24 – 96 **********	0 – 127 24 – 120	
Velocity	Note ON	X 9nH V = 1 – 127	○	
	Note OFF	X 9nH V = 0, 8nH	○	
After Touch	Key's	X	X	
	Ch's	X	X	
Pitch Bender		X	○	7 bit RESO
Control Change	1	X	○	Modulation wheel
	7	X	○	Volume
	64	X	○	Sustain foot sw
Prog Change:	True #	○ 0 – 99 **********	○ 0 – 127 0 – 99	
System Exclusive		X	X	
System	: Song Pos	X	X	
	: Song Sel	X	X	
Common	: Tune	○	○	
System	: Clock	X	X	
Real Time	: Commands	X	X	
Aux	: Local ON/OFF	X	X	
	: All Notes OFF	○	○	
Mes-	: Active Sense	X	X	
sages	: Reset	X	X	
Notes				

Mode 1: OMNI ON, POLY
Mode 2: OMNI ON, MONO
Mode 3: OMNI OFF, POLY
Mode 4: OMNI OFF, MONO

○: Yes
X: No

IX. PARTS LIST

ATTENTION

1. When placing an order for parts, be sure to list Part No., Model No. and the description of each part. Otherwise, the non-delivery of the part or the delivery of a wrong part may result.
2. Please make sure that Part No. is correct when ordering. If not, a part different from the one you ordered may be delivered.
3. Since the parts shown in Parts List of Preliminary Service Manual may have been the subject of changes, please use this Parts List for all future reference.

HOW TO USE THIS PARTS LIST

1. This Parts List lists those parts which are considered necessary for repairs. Other common parts, such as resistors and capacitors, are listed in the "Common List for Service Parts" from which these parts should be selected and stocked.
2. The Recommended Spare Parts List shows those parts in the Parts List which are considered particularly important for service.
3. Parts not shown in the Parts List and "Common List for Service Parts" will not in principle be supplied.
4. How to read the Parts List.

a) Mechanism Block

2. HEAD BASE BLOCK

REF. NO.	PART NO.	DESCRIPTION
2-1x	BH-T2023A320A	HEAD BASE BLOCK
2-2	HP-H2206A010A	HEAD R/P PR4-8FU C
2-3	ZS-477876	PAN20×03STL CMT
2-4	ZS-536488	BID20×08STL CMT
2-5	ZG-402895	SP CS ANGLE ADJUST

- ZG-402895: SP (Service Parts) Classification
- 2-1x: A small "x" indicates that this part is not shown in the Photo or Illustration.
- 2-5: This number corresponds with the individual parts index number in that figure.
- 2-1x: This number corresponds with the Figure Number.

b) PC Board

6. MAIN PC BOARD

REF. NO.	PART NO.	DESCRIPTION
6-IC1	EI-324536	IC HD14049BP
6-IC2	EI-336801	IC MB8841-564M
6-C1A	EC-338399	C MMY V 223M 250AC [U,E,B,S]
6-C1B	EC-350949	C MMY V 223M 250DC [J]
6-C1C	EC-338397	C MMY V 223M 125AC [C,A]
6-X1	EI-318384	OSC X'TAL NC-18C

- [C,A]: Symbols for primary destination
  - [A]: AAL(U.S.A.) [S]: SAA(Australia)
  - [B]: BEAB(England) [U]: U/T(Universal Area)
  - [C]: CSA(Canada) [V]: VDE(W. Germany)
  - [E]: CEE(Europe) [Y]: Custom Version
  - [J]: JPN(Japan)
- EI-318384: SP (Service Parts) Classification
- 6-IC1, 6-X1: These reference symbols correspond with component symbols in the Schematic Diagrams.

The available PC Board Blocks are listed separately.

5. When Part No. is known, Parts Index at end of Parts List can be used to locate where that part is shown in Parts List by its Reference No. listed at right of Part No.

WARNING

⚠ INDICATES SAFETY CRITICAL COMPONENTS. FOR CONTINUED SAFETY, REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURE'S RECOMMENDED PARTS

AVERTISSEMENT

⚠ IL INDIQUE LES COMPOSANTS CRITIQUES DE SÉCURITÉ. POUR MAINTENIR LE DEGRÉ DE SÉCURITÉ DE L'APPAREIL, NE REMPLACER QUE DES PIÉCES RECOMMANDEES PAR LÉ FABRICANT

RECOMMENDED SPARE PARTS LIST

Because, if the parts listed below are on hand, almost any repair can be accomplished, we suggest that you stock these Recommended Spare Parts Items.



REF. NO.		PART NO.	DESCRIPTION
1		BT-364697	⚠ TRANS POWER L1012-10 (J)
2		BT-364243-A	⚠ TRANS POWER L1012-30 (C,A)
3		BT-364698-A	⚠ TRANS POWER L1012-50 (E,V,B,S)
4		ED-200213	⚠ D SILICON DBA40C-K15 200/2.6A
5		ED-357038	⚠ D SILICON DBB10B 100/1.0A
6		ED-364261	D LED SLP-981C-50
7		ED-361055	D SILICON DS135E-UB1
8		ED-301911	D SILICON H DS448
9		ED-344280	D SILICON H GMA-01-FY2 F05
10		ED-624903	D SILICON H 1S2473
11		ED-331626	D ZENER H HZ3 B2
12		ED-329058	D ZENER H HZ5 C1
13		ED-331617	D ZENER H HZ6 A3
14		ED-319167	D ZENER H HZ6 C3
15		ED-306012	D ZENER H HZ7 A3
16		ED-346463	D ZENER H HZ7FA F10 C3
17		EF-355226	⚠ FUSE BET T 1.00A 250V [B]
18	N	EF-359343	⚠ FUSE BET T 1.60A 250V [B]
19		EF-358974	⚠ FUSE BET T 630MA 250V [B]
20		EF-623103	⚠ FUSE SEMKO T 1.00A 250V [E,V,S]
21		EF-601964	⚠ FUSE SEMKO T 1.60A 250V [E,V,S]
22		EF-601942	⚠ FUSE SEMKO T 630MA 250V [E,V,S]
23		EF-309387	⚠ FUSE TSC A 250V 1.00A [J]
24		EF-311839	⚠ FUSE TSC A 250V 1.60A [J]
25		EF-309392	⚠ FUSE TSC 125V 1.25A [C,A]
26		EF-308847	⚠ FUSE TSC 125V 1.60A [C,A]
27		EI-364319	IC CD4051BE
28		EI-364246	IC CEM3394
29		EI-365872	IC EHK-MD6207
30		EI-355891	IC HD74LS32P
31		EI-360954	IC IR9311
32		EI-364245	IC LA6082S
33		EI-364273	IC LF356N
34		EI-364308	IC MN3009
35		EI-353227	IC M5216L
36	N	EI-337228	IC M5218L
37		EI-348123	IC M5230L
38		EI-362588	IC M5238P
39		EI-355904	IC M74LS04P
40		EI-364275	IC M74LS05N
41		EI-366167	IC M74LS139
42		EI-355906	IC M74LS14P
43		EI-355917	IC M74LS373P
44		EI-355909	IC M74LS38P
45		EI-355910	IC M74LS42P
46		EI-364247	IC NJM13600
47		EI-359626	IC NJM78M15A
48		EI-359628	IC NJM79M15A
49		EI-364253	IC PST520D-2
50		EI-302233	IC TC4051BP
51		EI-310036	IC TC4066BP
52		EI-362521	IC TC5564PL-20
53		EI-367332-C	IC TMM27128AD-20 AX73 V1.2A CUSTOM [C,A,E,B,S]
54	N	EI-365584	IC TMM27128AD-20 VX90 V1.2 CUSTOM [J]
55		EI-357060	IC μPD7811G-144
56		EI-354146	IC μPD8253C-2
57		EI-354149	IC μPD8255AC-2
58		EI-364257	OSC X'TAL NR-18 12MC
59		EJ-364256	DIN J M1704 3P
60		EJ-364322	PHONE J 2P HLJ0520-110 W/NUT WASHER
61		EJ-354105	PHONE J 2P HLJ0520-110 6.3
62		EJ-357735	PHONE J 3P HLJ0540-010 6.3
63		EJ-354269	PHONE J 3P HLJ0540-110 6.3
64		EM-365880	IND LCD DM001Z-1BL7
65		EQ-348929	RELAY SIGNAL G5A-232P 2TR 12V
66		ER-326169	⚠ R FUSE ERD2FC S10 1/4W 22ROG
67		ER-365262	⚠ R FUSE ERD2FC S10 1/4W 7R5J
68		ER-328278	⚠ R FUSE ERD2FC 1/4W 10ROG
69		ER-364336	⚠ R OMF H S12 FS 1W 201J
70		ER-360725	⚠ R OMF H S12 FS 1W 221J
71		ER-341331	⚠ R OMF H S15 FS 1W 181J
72		ER-366282	⚠ R OMF H S15 FS 1W 911J
73		ES-337902	⚠ SW PUSH SDLD1P 01-1
74		ES-306430	⚠ SW SLIDE J-S4013#01 01-2 [E,V,B,S]
75		ES-360242	SW SLIDE SSSU02 2-02-02N
76		ES-365851	SW TACT SPPQ19
77		ET-354167	DETECTOR PC900
78		ET-348302	TR FET 2SK381 C,D F05
79		ET-353899	TR 2SA1317 S,T,U
80		ET-356817	TR 2SB891 Q,R
81		ET-360067	TR 2SC3330 T,U F05
82		ET-349081	TR 2SC3383 S,T
83		ET-349608	TR 2SC3383 T,U
84		ET-349592	TR 2SC3400 F05
85		ET-352994	TR 2SC3401 F05
86		ET-354083	TR 2SD1189 Q,R
87		EV-362513	VR ROTARY EVH-60AF20 B14
88	N	EV-367321	VR ROTARY 16P L35 3B203×2
89		EV-359549	VR ROTARY 16P10 B103
90		EV-365852	VR SLIDE VJ4513-2PVN10C 103

1. P.C BOARD BLOCK

REF. NO.	PART NO.	DESCRIPTION
1-1	BA-L1013A050B	PC VOICE BLK VX90
1-2	BA-L1013A020B	PC CPU BLK VX90
1-3	BA-L1014A030A	PC OPERATION BLK VX90
1-4	BA-L1013A060A	PC POWER BLK AX73 (J)
1-4A	BA-L1013A060B	PC POWER BLK AX73 (C,A)
1-4B	BA-L1013A060C	PC POWER BLK AX73 (E,V,B,S)
1-5	BA-L1013A070B	PC CHORUS BLK VX90 [EXCEPT JPN]

2. VOICE P.C BOARD

REF. NO.	PART NO.	DESCRIPTION
2-C80 to 85	EC-362220	C PP V F05 PP 202J 50DC
2-D1	ED-331626	D ZENER H HZ3 B2
2-D2	ED-346463	D ZENER H HZ7FA F10 C3
2-D3	ED-301911	D SILICON H DS448
2-D4 to 19	ED-344280	D SILICON H GMA-01-FY2 F05
2-IC1,2	EI-364319	IC CD4051BE
2-IC3,4	EI-302233	IC TC4051BP
2-IC5 to 20	EI-364245	IC LA6082S
2-IC21 to 27	EI-337228	IC M5218L
2-IC28 to 30	EI-310036	IC TC4066BP
2-IC31 to 36	EI-364246	IC CEM3394
2-IC37 to 39	EI-337228	IC M5218L
2-IC40	EI-360954	IC IR9311
2-IC41	EI-337228	IC M5218L
2-IC42,43	EI-364247	IC NJM13600
2-IC44,45	EI-362588	IC M5238P
2-TR1 to 3	ET-349592	TR 2SC3400 F05
2-TR4	ET-360067	TR 2SC3330 T,U F05
2-TR5,14,15	ET-349081	TR 2SC3383 S,T
2-TR16	ET-352994	TR 2SC3401 F05
2-VR7,8	EV-336770	R S-FIX H RH0651CS4 3P 0.05W 473
2-1	EJ-363001	SOCKET IC DILB20P-8J

3. CPU P.C BOARD

REF. NO.	PART NO.	DESCRIPTION
3-C11	EC-347205	C MC V F05 FM 220J 500DC
3-D1 to 6,9	ED-301911	D SILICON H DS448
3-D7,8	ED-624903	D SILICON H 1S2473
3-FR1	ER-326169	⚠ R FUSE ERD2FC S10 1/4W 22R0G
3-IB1 to 4	EH-355561	COMP R EXB-R88 103K
3-IB5	EH-362519	COMP R RML-S4-J103
3-IC1	EI-357060	IC μPD7811G-144
3-IC2	EI-355917	IC M74LS373P
3-IC5	EI-362521	IC TC5564PL-20
3-IC6	EI-354146	IC μPD8253C-2
3-IC7 to 9	EI-354149	IC μPD8255AC-2
3-IC10	EI-365872	IC EHK-MD6207
3-IC11	EI-364273	IC LF356N
3-IC12	EI-355910	IC M74LS42P
3-IC13,14	EI-366167	IC M74LS139
3-IC15	EI-355891	IC HD74LS32P
3-IC16	EI-355917	IC M74LS373P
3-IC17	EI-364253	IC PST520D-2
3-IC18	EI-355906	IC M74LS14P
3-IC19	EI-364275	IC M74LS05N
3-IC20	EI-355904	IC M74LS04P
3-IC21	EI-360954	IC IR9311
3-J4	EJ-364322	PHONE J 2P HLJ0520-110 W/NUT WASHER
3-J5	EJ-364256	DIN J M1704 3P
3-PH1	ET-354167	DETECTOR PC900
3-R37	ER-366282	⚠ R OMF H S15 FS 1W 911J
3-TR1,2	ET-349608	TR 2SC3383 T,U
3-TR4	ET-360067	TR 2SC3330 T,U F05
3-VR1	EV-307709	R S-FIX H RH0651CJ4 3P 0.05W 223
3-X1	EI-364257	OSC X'TAL NR-18 12MC
3-1	EJ-358691	SOCKET IC DILB28P-8J
3-IC3	EI-365584	IC TMM27128AD-20 VX90 V1.2 CUSTOM [J]
3-IC3A	EI-367332-C	IC TMM27128AD-20 AX73 V1.2A CUSTOM [C,A,E,V,B,S]

4. OPERATION P.C BOARD

REF. NO.	PART NO.	DESCRIPTION
4-D1 to 22	ED-301911	D SILICON H DS448
4-D24 to 31	ED-364261	D LED SLP-981C-50
4-IB1	EH-362502	COMP R RML S8 J221
4-IC1,2	EI-355909	IC M74LS38P
4-SW1 to 22	ES-365851	SW TACT SPPQ19

5. DIN JACK P.C BOARD (EXCEPT JAPAN MODEL)

REF. NO.	PART NO.	DESCRIPTION
5-J1	EJ-360771	DIN J TCS5037-01-241 13P

6. JACK P.C BOARD

REF. NO.	PART NO.	DESCRIPTION
6-J1	EJ-357735	PHONE J 3P HLJ0540-010 6.3
6-J2 to 4	EJ-354269	PHONE J 3P HLJ0540-110 6.3

7. TUNE & OUT P.C BOARD

REF. NO.	PART NO.	DESCRIPTION
7-VR1	EV-367321	VR ROTARY 16P L35 3B203×2
7-VR2	EV-359549	VR ROTARY 16P10 B103

8. CONTRAST VR P.C BOARD

REF. NO.	PART NO.	DESCRIPTION
8-VR1	EV-362513	VR ROTARY EVH-60AF20 B14

9. VALUE VR P.C BOARD

REF. NO.	PART NO.	DESCRIPTION
9-VR1	EV-365852	VR SLIDE VJ4513-2PVN10C 103

10. PROTECT SW P.C BOARD

REF. NO.	PART NO.	DESCRIPTION
10-SW1	ES-360242	SW SLIDE SSSU02 2-02-02N

11. POWER SUPPLY P.C BOARD

REF. NO.	PART NO.	DESCRIPTION
11-C1	EC-322804	C EC V CUT AS1 472M 16.0DC
11-C2,3	EC-316231	C EC V CUT AS1 222M 35.0DC
11-D1	ED-200213	⚠ D SILICON DBA40C-K15 200/2.6A
11-D2	ED-357038	⚠ D SILICON DBB10B 100/1.0A
11-D3,5,6	ED-361055	D SILICON DS135E-UB1
11-D4	ED-319167	D ZENER H HZ6 C3
11-D7	ED-306012	D ZENER H HZ7 A3
11-D9,11	ED-329058	D ZENER H HZ5 C1
11-D12	ED-361055	D SILICON DS135E-UB1
11-D13	ED-301911	D SILICON H DS448
11-D14	ED-331617	D ZENER H HZ6 A3
11-D15	ED-319167	D ZENER H HZ6 C3
11-FR1, 2	ER-328278	⚠ R FUSE ERD2FC 1/4W 10R0G
11-FR3	ER-365262	⚠ R FUSE ERD2FC S10 1/4W 7R5J
11-IC1	EI-359552	IC M5236L
11-IC2	EI-359626	IC NJM78M 15A
11-IC3	EI-359628	IC NJM79M 15A
11-IC4	EI-348123	IC M5230L
11-R1	ER-360725	⚠ R OMF H S12 FS 1W 221J
11-TR1	ET-356817	TR 2SB891 Q,R
11-TR2	ET-354083	TR 2SD1189 Q,R
11-TR3	ET-356817	TR 2SB891 Q,R
11-TR4 to 6	ET-360067	TR 2SC3330 T,U F05
11-TR7	ET-354083	TR 2SD1189 Q,R
11-1	EZ-200473	SILICON RUBBER SHEET TC-30
11-2	ZW-632226	WASHER INSULATOR (BUSH M)
11-F2	EF-311839	⚠ FUSE TSC A 250V 1.60A [J]
11-F2A	EF-308847	⚠ FUSE TSC 125V 1.60A [C,A]
11-F2B	EF-601964	⚠ FUSE SEMKO T 1.60A 250V [E,V,S]
11-F2C	EF-359343	⚠ FUSE BET T 1.60A 250V [B]
11-F3,4	EF-309387	⚠ FUSE TSC A 250V 1.00A [J]
11-F3A,4A	EF-309392	⚠ FUSE TSC 125V 1.25A [C,A]
11-F3B,4B	EF-623103	⚠ FUSE SEMKO T 1.00A 250V [E,V,S]
11-F3C,4C	EF-355226	⚠ FUSE BET T 1.00A 250V [B]



12. POWER SW P.C BOARD

REF. NO.	PART NO.	DESCRIPTION
12-C1	EC-361942	⚠ C CE V DNS103ZV V 103Z 400AC
12-SW1	ES-337902	⚠ SW PUSH SDLD1P 01-1

13. FILTER P.C BOARD

REF. NO.	PART NO.	DESCRIPTION
13-C2,3	EC-358450	C CE V DNS102MBE B 102M 400AC
13-C4	EC-338411	C CE V FZ 103P 400AC
13-FL1	EO-360068	COIL LF LF-2 B
13-F1	EF-309387	⚠ FUSE TSC A 250V 1.00A [J]
13-F1A	EF-309392	⚠ FUSE TSC 125V 1.25A [C,A]
13-F1B	EF-601942	⚠ FUSE SEMKO T 630MA 250V [E,V,S]
13-F1C	EF-358974	⚠ FUSE BET T 630MA 250V [B]

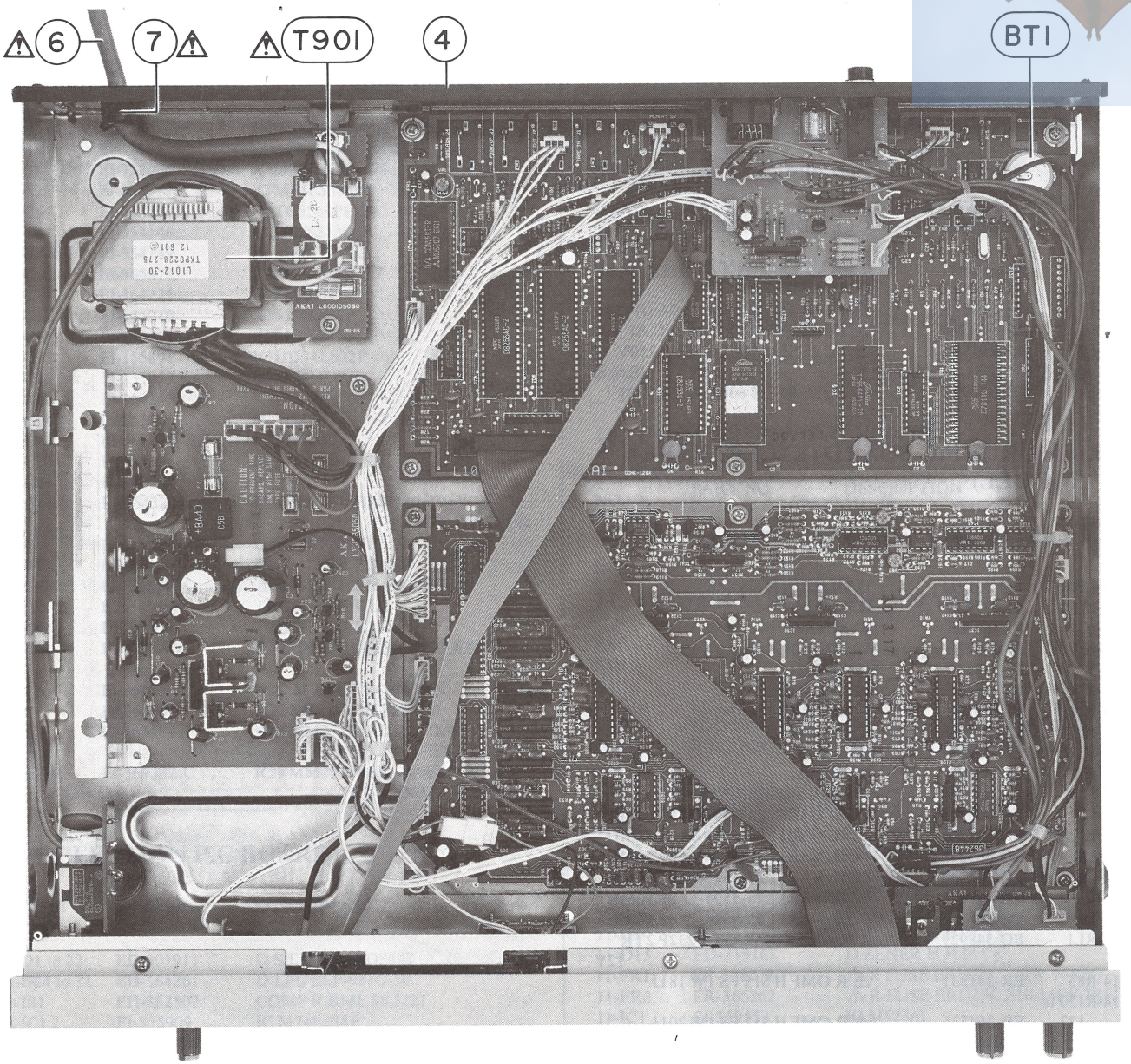
14. CHORUS P.C BOARD (EXCEPT JAPAN MODEL)

REF. NO.	PART NO.	DESCRIPTION
14-D3 to 10	ED-301911	D SILICON H DS 448
14-IC1,2	EI-337228	IC M5218L
14-IC4	EI-364308	IC MN3009
14-IC5	EI-360228	IC MN3101
14-IC6,7	EI-337228	IC M5218L
14-IC8	EI-364308	IC MN3009
14-IC9	EI-360228	IC MN3101
14-IC11	EI-337228	IC M5218L
14-IC12	EI-353227	IC M5216L
14-IC13	EI-337228	IC M5218L
14-J1,2	EJ-354105	PHONE J 2P HLJ0520-110 6.3
14-L1	EO-365240	COIL VARI 1 25-5592-11 85.80MH
14-L2	EO-365241	COIL VARI 1 25-5593-11 86.70MH
14-L3	EO-365243	COIL VARI 1 25-5594-11 81.20MH
14-L4	EO-365240	COIL VARI 1 25-5592-11 85.80MH
14-L5	EO-365241	COIL VARI 1 25-5593-11 86.70MH
14-L6	EO-365243	COIL VARI 1 25-5594-11 81.20MH
14-RL1	EQ-348929	RELAY SIGNAL G5A-232P 2TR 12V
14-R85	ER-341331	⚠ R OMF H S15 FS 1W 181J
14-R120 to 123	ER-364336	⚠ R OMF H S12 FS 1W 201J
14-TR3,4	ET-360067	TR 2SC3330 T,U F05
14-TR5,8	ET-348302	TR FET 2SK381 C,D F05
14-TR10	ET-352994	TR 2SC3401 F05
14-TR11	ET-353899	TR 2SA1317 S,T,U
14-TR12,13	ET-360067	TR 2SC3330 T,U F05
14-TR14	ET-352994	TR 2SC3401 F05
14-TR15	ET-353899	TR 2SA1317 S,T,U
14-TR16,17	ET-360067	TR 2SC3330 T,U F05
14-TR18	ET-348302	TR FET 2SK381 C,D F05
14-VR1,2	EV-358829	R S-FIX H RH0615CJ4J 3P 223

15. AMP P.C BOARD (JAPAN MODEL ONLY)

REF. NO.	PART NO.	DESCRIPTION
15-IC1	EI-346071	IC M5218L-21
15-IC2	EI-353227	IC M5216L
15-J1	EJ-354105	PHONE J 2P HLJ0520-110 6.3
15-J2	EJ-360771	DIN J TCS5037-01-241 13P

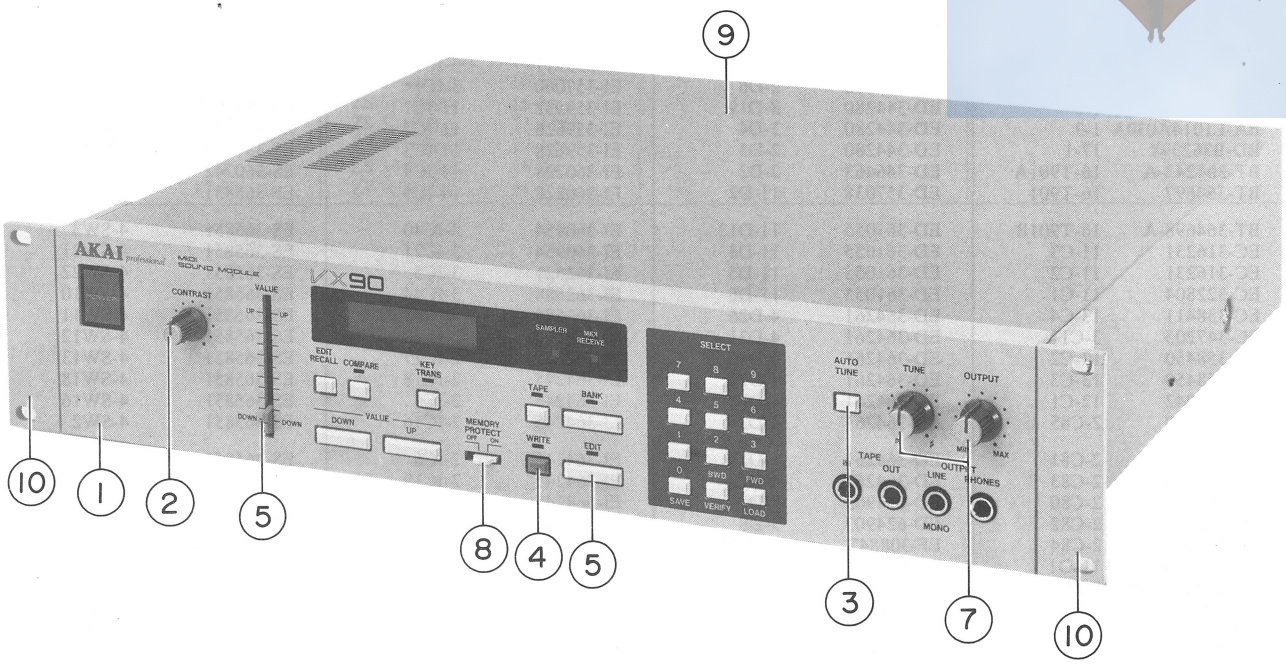
ASSEMBLY BLOCK



16. ASSEMBLY BLOCK

REF. NO.	PART NO.	DESCRIPTION
16-1x	SA-349332	FOOT
16-2x	ZS-344754	ST PAN30×06STL CMT C080 [FOOT FIX]
16-3x	ZS-304022	ST PAN40×06STL CMT [TRANS POWER FIX]
16-4	SP-362396B	PANEL REAR VX90 (J)
16-4A	SP-362396C-A	PANEL REAR VX90 (C,A)
16-4B	SP-362396A-A	PANEL REAR VX90 (E,V,B,S)
16-5x	ZS-319460	T2BR30×06STL BZN PROJECTION [PANEL REAR FIX]
16-6	EW-365947	⚠ AC CORD 250 SKP210KS17B A J [J]
16-6A	EW-357931	⚠ AC CORD 3 CORES VM0033A SJT18 AWG UC [C]
16-6B	EW-366055	⚠ AC CORD 250 KP11WSJT18UC
16-6C	EW-359641	⚠ AC CORD 2 CORES KP-419C/KS-17 EV [E,V]
16-6D	EW-358631	⚠ AC CORD 2 CORES KS-17 LTBS2F BS [B]
16-6E	EW-358630	⚠ AC CORD 2 CORES KP560 LTSA2F KS17 S [S]
16-7	EZ-302906	⚠ STRAIN RELIEF SR-6N-4 [C,A]
16-8x	ZW-698308	RV NYL30×055 BL
16-BT1	EZ-358816	BATTERY LITHIUM BR2032-1HF
16-IN901	EM-365880	IND LCD DM001Z-1BL7
16-J901	EJ-358633	⚠ SOCKET INLET SOT017 2P
16-SW901	ES-306430	⚠ SW SLIDE J-S4013#01 01-2 [E,V,B,S]
16-T901	BT-364697	⚠ TRANS POWER L1012-10 [J]
16-T901A	BT-364243-A	⚠ TRANS POWER L1012-30 [C,A]
16-T901B	BT-364698-A	⚠ TRANS POWER L1012-50 [E,V,B,S]

FINAL ASSEMBLY BLOCK



17. FINAL ASSEMBLY BLOCK

REF. NO.	PART NO.	DESCRIPTION
17-1	BD-B362398	PANEL FRONT PART
17-2	SK-B371692-A	KNOB SINGLE GRAY PART
17-3	SK-362347A-A	KNOB PUSH (1)
17-4	SK-362347B-A	KNOB PUSH (2)
17-5	SK-362352-A	KNOB PUSH (L)
17-6	SK-358066C	KNOB SLIDE (2)
17-7	SK-B364614	KNOB MONITOR WHITE (2) PART
17-8	SK-363999	KNOB EQ
17-9	SP-362394B	COVER UPPER (B)
17-10	SH-362401A	RACK HANDLE
17-11x	ZS-321783	ST BID40×10STL NI3
17-12x	ZS-341959	ST BID40×06STL NI3

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VX90

PART NO.	REF. NO.	PART NO.	REF. NO.	PART NO.	REF. NO.	PART NO.	REF. NO.
BA-L1013A020B	1-2	ED-344280	2-D12	EI-355909	4-IC2	ER-364336	14-R121
BA-L1013A050B	1-1	ED-344280	2-D18	EI-355910	3-IC12	ER-364336	14-R122
BA-L1013A060A	1-4	ED-344280	2-D7	EI-355917	3-IC2	ER-364336	14-R123
BA-L1013A060B	1-4A	ED-344280	2-D15	EI-355917	3-IC16	ER-364336	14-R120
BA-L1013A060C	1-4B	ED-344280	2-D6	EI-357060	3-IC1	ER-365262	11-FR3
BA-L1013A070B	1-5	ED-344280	2-D19	EI-359552	11-IC1	ER-366282	3-R37
BA-L1014A030A	1-3	ED-344280	2-D4	EI-359626	11-IC2	ES-306430	16-SW901
BD-B362398	17-1	ED-344280	2-D5	EI-359628	11-IC3	ES-337902	12-SW1
BT-364243-A	16-T901A	ED-346463	2-D2	EI-360228	14-IC9	ES-360242	10-SW1
BT-364697	16-T901	ED-357038	11-D2	EI-360228	14-IC5	ES-365851	4-SW15
BT-364698-A	16-T901B	ED-361055	11-D12	EI-360954	2-IC40	ES-365851	4-SW3
EC-316231	11-C3	ED-361055	11-D3	EI-360954	3-IC21	ES-365851	4-SW21
EC-316231	11-C2	ED-361055	11-D5	EI-362521	3-IC5	ES-365851	4-SW22
EC-322804	11-C1	ED-361055	11-D6	EI-362588	3-IC44	ES-365851	4-SW10
EC-338411	13-C4	ED-364261	4-D26	EI-362588	3-IC45	ES-365851	4-SW11
EC-347205	3-C11	ED-364261	4-D31	EI-364245	2-IC20	ES-365851	4-SW12
EC-358450	13-C2	ED-364261	4-D30	EI-364245	2-IC17	ES-365851	4-SW13
EC-358450	13-C3	ED-364261	4-D24	EI-364245	2-IC18	ES-365851	4-SW18
EC-361942	12-C1	ED-364261	4-D28	EI-364245	2-IC5	ES-365851	4-SW16
EC-362220	2-C85	ED-364261	4-D25	EI-364245	2-IC16	ES-365851	4-SW2
EC-362220	2-C81	ED-364261	4-D29	EI-364245	2-IC6	ES-365851	4-SW9
EC-362220	2-C83	ED-364261	4-D27	EI-364245	2-IC19	ES-365851	4-SW1
EC-362220	2-C80	ED-624903	3-D7	EI-364245	2-IC10	ES-365851	4-SW4
EC-362220	2-C82	ED-624903	3-D8	EI-364245	2-IC8	ES-365851	4-SW7
EC-362220	2-C84	EF-308847	11-F2A	EI-364245	2-IC7	ES-365851	4-SW20
ED-200213	11-D1	EF-309387	11-F3	EI-364245	2-IC15	ES-365851	4-SW14
ED-301911	2-D3	EF-309387	11-F4	EI-364245	2-IC9	ES-365851	4-SW5
ED-301911	3-D9	EF-309387	13-F1	EI-364245	2-IC11	ES-365851	4-SW19
ED-301911	3-D6	EF-309392	11-F4A	EI-364245	2-IC12	ES-365851	4-SW6
ED-301911	3-D5	EF-309392	11-F3A	EI-364245	2-IC13	ES-365851	4-SW17
ED-301911	3-D3	EF-309392	13-F1A	EI-364245	2-IC14	ES-365851	4-SW8
ED-301911	3-D4	EF-311839	11-F2	EI-364246	2-IC31	ET-348302	14-TR18
ED-301911	3-D2	EF-355226	11-F3C	EI-364246	2-IC33	ET-348302	14-TR5
ED-301911	3-D1	EF-355226	11-F4C	EI-364246	2-IC32	ET-348302	14-TR8
ED-301911	4-D6	EF-358974	13-F1C	EI-364246	2-IC34	ET-349081	2-TR5
ED-301911	4-D21	EF-359343	11-F2C	EI-364246	2-IC36	ET-349081	2-TR15
ED-301911	4-D1	EF-601942	13-F1B	EI-364246	2-IC35	ET-349081	2-TR14
ED-301911	4-D15	EF-601964	11-F2B	EI-364247	2-IC43	ET-349592	2-TR3
ED-301911	4-D16	EF-623103	11-F3B	EI-364247	2-IC42	ET-349592	2-TR2
ED-301911	4-D17	EF-623103	11-F4B	EI-364253	3-IC17	ET-349592	2-TR1
ED-301911	4-D7	EH-355561	3-IB1	EI-364257	3-X1	ET-349608	3-TR1
ED-301911	4-D14	EH-355561	3-IB4	EI-364273	3-IC11	ET-349608	3-TR2
ED-301911	4-D11	EH-355561	3-IB2	EI-364275	3-IC19	ET-352994	2-TR16
ED-301911	4-D18	EH-355561	3-IB3	EI-364308	14-IC8	ET-352994	14-TR14
ED-301911	4-D13	EH-362502	4-IB1	EI-364308	14-IC4	ET-352994	14-TR10
ED-301911	4-D10	EH-362519	3-IB5	EI-364319	2-IC1	ET-353899	14-TR15
ED-301911	4-D12	EI-302233	2-IC4	EI-364319	2-IC2	ET-353899	14-TR11
ED-301911	4-D19	EI-302233	2-IC3	EI-365584	3-IC3	ET-354083	11-TR2
ED-301911	4-D20	EI-310036	2-IC30	EI-365872	3-IC10	ET-354083	11-TR7
ED-301911	4-D22	EI-310036	2-IC29	EI-366167	3-IC13	ET-354167	3-PH1
ED-301911	4-D9	EI-310036	2-IC28	EI-366167	3-IC14	ET-356817	11-TR1
ED-301911	4-D8	EI-337228	2-IC38	EI-367332-C	3-IC3A	ET-356817	11-TR3
ED-301911	4-D2	EI-337228	2-IC27	EJ-354105	14-J2	ET-360067	2-TR4
ED-301911	4-D4	EI-337228	2-IC21	EJ-354105	14-J1	ET-360067	3-TR4
ED-301911	4-D3	EI-337228	2-IC22	EJ-354105	15-J1	ET-360067	11-TR5
ED-301911	4-D5	EI-337228	2-IC25	EJ-354269	6-J2	ET-360067	11-TR6
ED-301911	11-D13	EI-337228	2-IC23	EJ-354269	6-J4	ET-360067	11-TR4
ED-301911	14-D4	EI-337228	2-IC39	EJ-354269	6-J3	ET-360067	14-TR13
ED-301911	14-D6	EI-337228	2-IC37	EJ-357735	6-J1	ET-360067	14-TR17
ED-301911	14-D8	EI-337228	2-IC41	EJ-358633	16-J901	ET-360067	14-TR16
ED-301911	14-D10	EI-337228	2-IC24	EJ-358691	3-1	ET-360067	14-TR4
ED-301911	14-D9	EI-337228	2-IC26	EJ-360771	5-J1	ET-360067	14-TR3
ED-301911	14-D5	EI-337228	14-IC11	EJ-360771	15-J2	ET-360067	14-TR12
ED-301911	14-D7	EI-337228	14-IC13	EJ-363001	2-1	EV-307709	3-VR1
ED-301911	14-D3	EI-337228	14-IC2	EJ-364256	3-J5	EV-336770	2-VR8
ED-306012	11-D7	EI-337228	14-IC1	EJ-364322	3-J4	EV-336770	2-VR7
ED-319167	11-D4	EI-337228	14-IC7	EM-365880	16-IN901	EV-358829	14-VR2
ED-319167	11-D15	EI-337228	14-IC6	EO-360068	13-FL1	EV-358829	14-VR1
ED-329058	11-D11	EI-346071	15-IC1	EO-365240	14-L1	EV-359549	7-VR2
ED-329058	11-D9	EI-348123	11-IC4	EO-365240	14-L4	EV-362513	8-VR1
ED-331617	11-D14	EI-353227	14-IC12	EO-365241	14-L5	EV-365852	9-VR1
ED-331626	2-D1	EI-353227	15-IC2	EO-365241	14-L2	EV-367321	7-VR1
ED-344280	2-D13	EI-354146	3-IC6	EO-365243	14-L6	EW-357931	16-6A
ED-344280	2-D11	EI-354149	3-IC7	EO-365243	14-L3	EW-358630	16-6E
ED-344280	2-D9	EI-354149	3-IC9	EQ-348929	14-RL1	EW-358631	16-6D
ED-344280	2-D17	EI-354149	3-IC8	ER-326169	3-FR1	EW-359641	16-6C
ED-344280	2-D8	EI-355891	2-IC15	ER-328278	11-FR2	EW-365947	16-6
ED-344280	2-D10	EI-355904	3-IC20	ER-328278	11-FR1	EW-366055	16-6B
ED-344280	2-D14	EI-355906	3-IC18	ER-341331	14-R85	EZ-200473	11-1
ED-344280	2-D16	EI-355909	4-IC1	ER-360725	11-R1	EZ-302906	16-7

VX90

PART NO.	REF. NO.	PART NO.	REF. NO.	PART NO.	REF. NO.	PART NO.	REF. NO.
EZ-358816	16-BT1	SP-362394B	17-9	ZW-698308	16-8x		
SA-349332	16-1x	SP-362396A-A	16-4B				
SH-362401A	17-10	SP-362396B	16-4				
SK-B364614	17-7	SP-362396C-A	16-4A				
SK-B371692-A	17-2	ZS-304022	16-3x				
SK-358066C	17-6	ZS-319460	16-5x				
SK-362347A-A	17-3	ZS-321783	17-11x				
SK-362347B-A	17-4	ZS-341959	17-12x				
SK-362352-A	17-5	ZS-344754	16-2x				
SK-363999	17-8	ZW-632226	11-2				



ABBREVIATIONS FOR THE SERVICE MANUAL

ABBREVIATION	EXPLANATION	ABBREVIATION	EXPLANATION
AMP (Amp)	AMPlifier	MINI	MINImum
BBD	Backet Brigade Diode	MIX	MIXer
BCD	Binary Code Decimal	MOD	MODulation
B.DOWN	Brak Down	M.WHEEL	Modulation WHEEL
B.UP	Back UP	OSC	OSCillator
CE	Chip Enable	RAM	Random Access Memory
CH	CHannel	RD	ReaD
COMP	COMParator	REG	REGulator
CONT	CONTrol	RESO	RESOnance
CV	Control Voltage	RL	ReLay
D/A	Digital to Analogue	ROM	Read Only Memory
EG	Envelope Generator	S/H	Sample and Hold
EXT	EXTernal	SW	SWitch
FREQ	FREQuency	THRU	THRoUgh
HPF	High Pass Filter	TRANS	TRANSpose
INH	INHibit	U	Upper
INT	INTerrupt	VA	Voltage Analog
INV	INVerter	VCA	Voltage Controlled Amplifier
L	Lower	VCF	Voltage Controlled Filter
LFO	Low Frequency Oscillator	VR	Variable Resistor
MAX	MAXimum	V_{REF}	REFerence Voltage
MEMO	MEMOry	WR	WRite
MIDI	Musical Instrument Digital Interface		



VX90

AKAI ELECTRIC CO., LTD.

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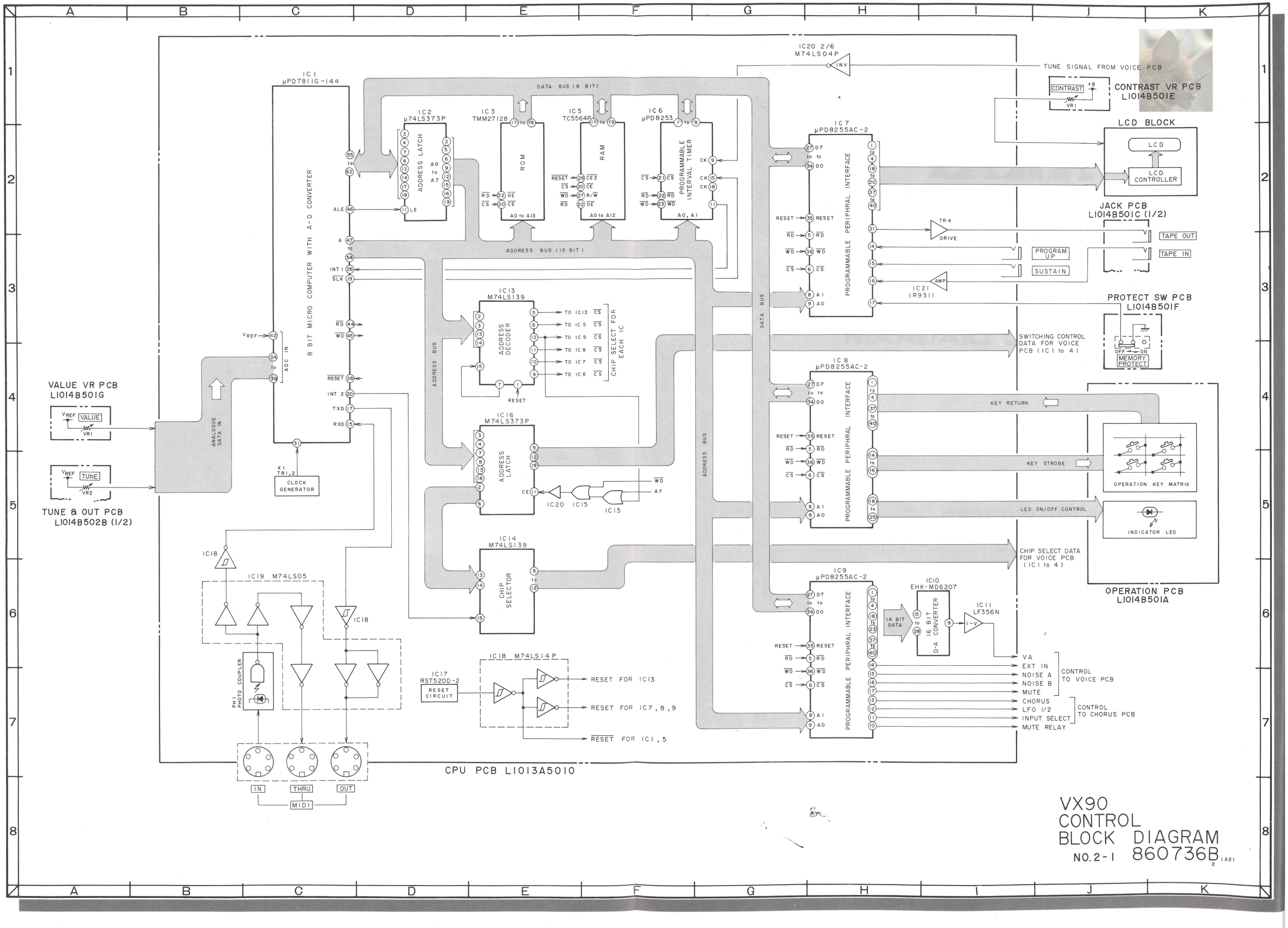
AKAI

MODEL VX90

SCHEMATIC DIAGRAM AND PC BOARDS

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IC1 μPD78IIG-144
8 BIT MICRO COMPUTER WITH A-D CONVERTER
DATA BUS (8 BIT)
ADDRESS BUS (16 BIT)
IC2 μ74LS373P
ADDRESS LATCH
A0 to A7
IC3 TMM27128
ROM
IC5 TC5564P
RAM
IC6 μPD8253
PROGRAMMABLE INTERVAL TIMER
IC20 2/6 M74LS04P
INV
TUNE SIGNAL FROM VOICE PCB
CONTRAST
CONTRAST VR PCB L1014B501E
LCD BLOCK
LCD
LCD CONTROLLER
IC7 μPD8255AC-2
PROGRAMMABLE PERIPHRAL INTERFACE
JACK PCB L1014B501C (1/2)
TAPE OUT
TAPE IN
TR4
DRIVE
PROGRAM UP
SUSTAIN
IC21 IR9311
AMP
PROTECT SW PCB L1014B501F
OFF ON
MEMORY PROTECT
SWITCHING CONTROL DATA FOR VOICE PCB (IC1 to 4)
IC8 μPD8255AC-2
KEY RETURN
KEY STROBE
OPERATION KEY MATRIX
LED ON/OFF CONTROL
INDICATOR LED
OPERATION PCB L1014B501A
CHIP SELECT DATA FOR VOICE PCB (IC1 to 4)
IC9 μPD8255AC-2
IC10 EHK-MD6207
16 BIT D-A CONVERTER
14 BIT DATA
IC11 LF356N
I-V
VA
EXT IN
NOISE A
NOISE B
MUTE
CONTROL TO VOICE PCB
CHORUS
LFO 1/2
INPUT SELECT
MUTE RELAY
CONTROL TO CHORUS PCB
ADDRESS BUS
DATA BUS
IC13 M74LS139
ADDRESS DECODER
CHIP SELECT FOR EACH IC
TO IC13 CS
TO IC 5 CS
TO IC 9 CS
TO IC 8 CS
TO IC 7 CS
TO IC 6 CS
RESET
IC16 M74LS373P
ADDRESS LATCH
IC14 M74LS139
CHIP SELECTOR
IC20 IC15
IC15
WD
A7
IC18 M74LS14P
IC17 RST520D-2
RESET CIRCUIT
RESET FOR IC13
RESET FOR IC7, 8, 9
RESET FOR IC1, 5
IC18
IC19 M74LS05
PHI PHOTO COUPLER
VALUE VR PCB L1014B501G
VREF
VALUE
VR1
TUNE
VR2
ANALOGUE DATA IN
TUNE & OUT PCB L1014B502B (1/2)
ADC IN
VREF
X1
TRI, 2
CLOCK GENERATOR
ALE
INT 1
SLK
RD
WD
RESET
INT 2
TXD
RXD
IN
THRU
OUT
MIDI
CPU PCB L1013A5010
VX90
CONTROL
BLOCK DIAGRAM
NO.2-1
860736B (A2)



FROM CPU PCB P1
GND 12
VA 11
GND 10
MUTE 9
TUNE 8
A1 7
A2 6
A3 5
Y0 4
Y1 3
Y2 2
Y3 1

IC1 TC4051
IC2 TC4051
IC3 TC4051
IC4 TC4051
INH
SW CONT

IC5 to 20 LA6082S

S/H 1/2 IC5 FREQ-1
S/H 2/2 IC5 FREQ-2
S/H 2/2 IC6 FREQ-3
S/H 1/2 IC6 FREQ-4
S/H 2/2 IC8 FREQ-5
S/H 1/2 IC8 FREQ-6
S/H 2/2 IC7 VCF-1
S/H 1/2 IC7 VCF-2
FREQ CVS FOR EACH VOICE
VCF CVS FOR EACH VOICE

S/H 2/2 IC9 VCF-3
S/H 1/2 IC9 VCF-4
S/H 1/2 IC10 VCF-5
S/H 2/2 IC10 VCF-6
S/H 2/2 IC12 VCA-1
S/H 1/2 IC12 VCA-2
S/H 1/2 IC11 VCA-3
S/H 1/2 IC11 VCA-4
VCA CVS FOR EACH VOICE

S/H 2/2 IC13 VCA 5
S/H 1/2 IC13 VCA 6
S/H 1/2 IC14 RESONANCE (U)
S/H 1/2 IC14 WAVE (U)
S/H 2/2 IC15 FILTER MOD
S/H 2/2 IC16 PW (U)
S/H 1/2 IC16 A-B BALANCE (U)
S/H 1/2 IC15 RESONANCE (L)
TO UPPER VOICES (VOICE-2 to 4)

S/H 1/2 IC17 WAVE (L)
S/H 1/2 IC18 FILTER MOD (L)
S/H 2/2 IC18 PW (L)
S/H 2/2 IC17 A-B BALANCE (L)
S/H 2/2 IC20 FINAL VCA (U)
S/H 1/2 IC20 HPF (U)
S/H 2/2 IC19 FINAL VCA (L)
S/H 1/2 IC19 HPF (L)
TO LOWER VOICES (VOICE-5 & 6)

DIN JACK PCB L1014D502A
SAMPLER /EXT IN
J1

FROM CPU PCB P3
EXT IN ON/OFF 1
NOISE A ON/OFF 2
NOISE B ON/OFF 3
TR1 INV → TO VOICE-2 to 6 (EXT IN ON/OFF)
TR2 INV → TO VOICE-2 to 4 (NOISE A ON/OFF)
TR3 INV → TO VOICE-5 & 6 (NOISE B ON/OFF)

TO VOICE-2 to 6 (EXT IN)

IC31 CEM3394

FREQ-1 CV
FILTER MOD (U) CV
WAVE SELECT (U) CV
PW (U) CV
VCF-1 CV
VCA-1 CV
RESONANCE (U) CV
A-B BALANCE (U) CV
EXT IN
NOISE IN
EXT IN ON/OFF
NOISE IN ON/OFF

VCO
VCA
A TO A CONVERTER
WAVE SELECT
COMP
IREF
VCF
AMP
IC22 1/2
IC22 2/2
IC28 1/4
IC28 2/4
IC37 2/2

VOICE 1
VOICE 1 OUT

TO VOICE 2 to 6 (NOISE IN)
IC21 2/2 AMP
IC21 1/2 FILTER
TR5, D2 PINK NOISE GENERATOR
TR4 REG
TR16 MUTE → "ON"
MUTE

FROM VOICE-2 R152
FROM VOICE-3 R151
FROM VOICE-4 R150
FROM VOICE-5 R149
FROM VOICE-6 R148
R153

IC41 2/2 MIX
IC42 VCA
IC44 2/2 BUFFER
IC43 HPF
IC45 2/2 BUFFER
FINAL VCA (U)
HPF (U)
IC40 COMP
TR14
TR15
MUTE
TUNE
IC41 1/2 MIX
IC VCA
IC44 1/2 BUFFER
IC HPF
IC45 1/2 BUFFER
FINAL VCA (L)
HPF (L)

VOICE-2
VOICE-3
VOICE-4
VOICE-5
VOICE-6
FREQ 2 CV
FILTER MOD (U) CV
WAVE SELECT (U) CV
PW (U) CV
VCF-2 CV
VCA-2 CV
RESONANCE (U) CV
A-B BALANCE (U) CV
EXT IN
NOISE IN
EXT IN ON/OFF
NOISE IN ON/OFF
VOICE 2 OUT

VOICE PCB L1013A5040

P5
1 UPPER OUT
2 GND
3 LOWER OUT

P1
UPPER 1
GND 2
LOWER 3

R3
R4
IC 1 1/2 MIX
IC 1 2/2 AMP
IC2 LPF
IC8 DELAY (BBD)
L4 to 6 C28 to 31
LPF
TR18
R106
R107
IC11 1/2 MIX
IC6 LFO
TR13 BUFFER
IC9 CLOCK GENERATOR
TR17
R39
R40
IC11 2/2 MIX
IC4 DELAY (BBD)
L1 to 3 C12 to 15
LPF
TR5
TR8
R57
R58
TR10 INV
TR11 INV
TR14 INV
TR15 INV
IC7 2/2 INV
TR12 BUFFER
IC5 CLOCK GENERATOR
TR4

FROM CPU PCB P13
CHORUS 1/2 2
CHORUS ON/OFF 3

FROM POWER SUPPLY PCB P3
+15V 1 → +15V
GND 2
−15V 3 → −15V
RELAY 4
RL1

TUNE & OUT PCB L1014D502B (1/2)
P5
1 SEND 1
2 GND
3 SEND 2
4 RETURN 1
5 GND
6 RETURN 2
VOLUME
IC13 1/2 AMP
IC13 2/2 AMP
IC12 1/2 AMP
IC12 2/2 AMP
J1
J2
LEFT
OUTPUT
RIGHT
LINE
PHONES

JACK PCB L1014B501C (1/2)

CHORUS PCB L1013B5030 (EXCEPT J MODEL)

VX90 VOICE & CHORUS BLOCK DIAGRAM NO. 2-2 860737B 2

VX90

J MODEL ONLY

EXCEPT J MODEL

02 VOICE PCB L1013A5040

03 CPU PCB L1013A5010

10 PROTECT SW PCB L1014B501F

08 CONTRAST VR PCB L1014B501E

09 VALUE VR PCB L1014B501G

07 TUNE & OUT PCB L1014B501D

15 AMP PCB L1014B501B

06 JACK PCB L1014B501C

05 DIN JACK PCB L1014D502A

14 CHORUS PCB L1013B5030

07 TUNE & OUT PCB L1014D502B

06 JACK PCB L1014B501C

04 OPERATION PCB L1014B501A

12 POWER SW PCB L1014B501H

13 FILTER PCB L6001D5080

11 POWER SUPPLY PCB L1013B5050

*	F1	F2	F3	F4
J	1.0A 250V	1.6A 250V	1A 250V	1A 250V
C, A	1.25A 125V	1.6A 125V	1.25A 125V	1.25A 125V
E, V, B, S	T630mA	T1.6A	T1A	T1A

WARNING: ⚠INDICATES SAFETY CRITICAL COMPONENTS FOR CONTINUED SAFETY. REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS

AVERTISSEMENT: ⚠IL INDIQUE LES COMPOSANTS CRITIQUES DE SÉCURITÉ. POUR MAINTENIR LE DEGRÉ DE SÉCURITÉ DE L'APPAREIL, NE REMPLACER QUE DES PIÈCES RECOMMANDÉES PAR LE FABRICANT

B電源 (POWER SUPPLY) LINE

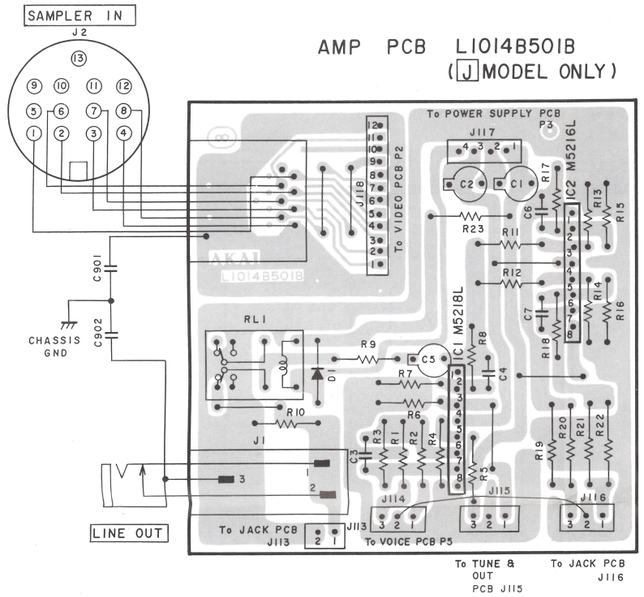
NOTE
UNLESS OTHERWISE SPECIFIED
ALL RESISTORS IN OHMS 1/4W(J)
ALL CAPACITORS IN μF 50WV(M)
POWER TRANSFORMER IS DIFFERENT ACCORDING TO AREA

備考
C.Rの単位(特に指定された部品以外)
抵抗……Ω 1/4W(J)
コンデンサ……μF 50WV(M)
各電圧は、GND間のDC電圧をデジタルボルトメーターにて測定した値です

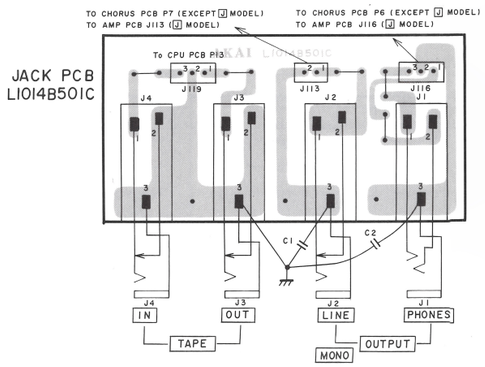
VX90 CONNECTION DIAGRAM

NO.4-1 860826A 3

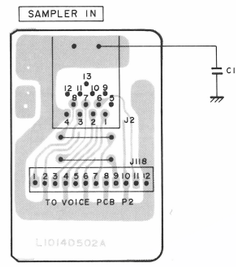
AMP PCB L1014B501B (J MODEL ONLY)



JACK PCB L1014B501C

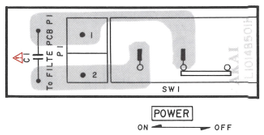


DIN JACK PCB L1014D502A (EXCEPT J MODEL)

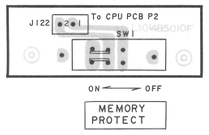




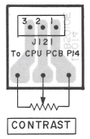
POWER SW PCB L1014B501H



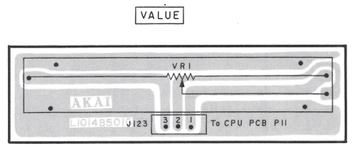
PROTECT SW PCB L1014B501F



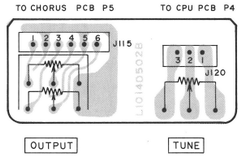
CONTRAST PCB L1014B501E



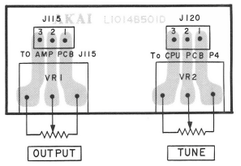
VALUE VR PCB L1014B501G



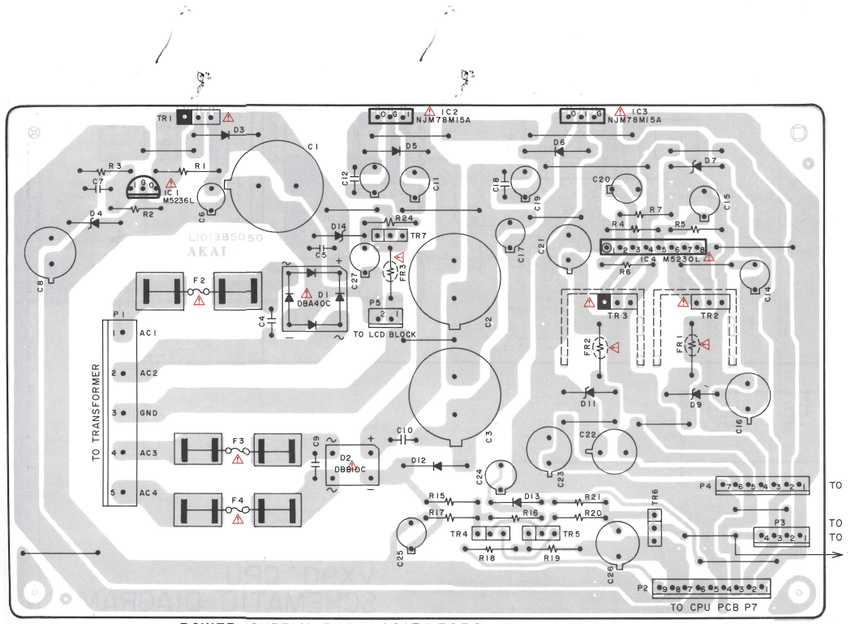
TUNE & OUTPUT PCB L1014D502B (EXCEPT J MODEL)



TUNE & OUTPUT PCB L1014B501D J MODEL ONLY



POWER SUPPLY PCB L1013B5050





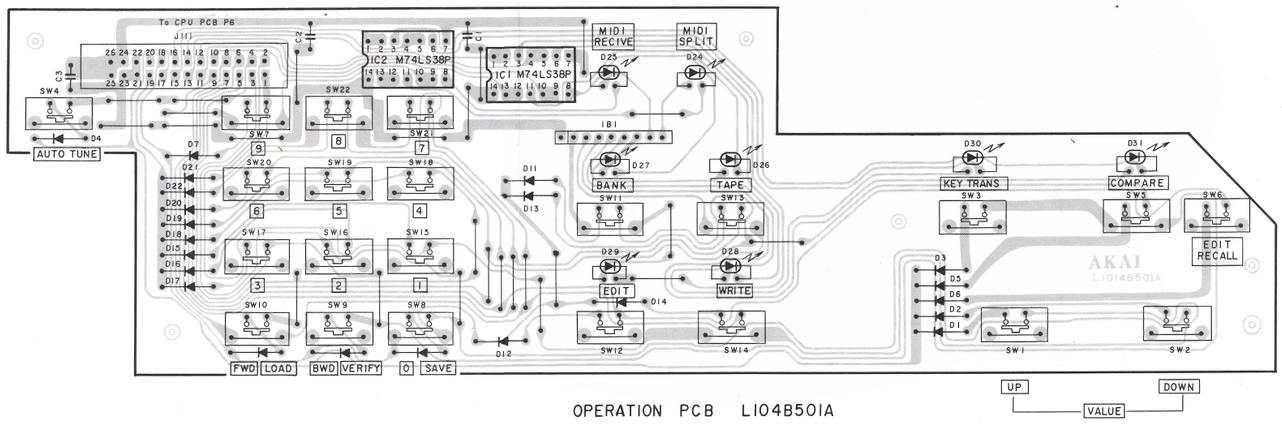
B = PNP TRANSISTOR

B = NPN TRANSISTOR

WARNING: ⚠ INDICATES SAFETY CRITICAL COMPONENTS. FOR CONTINUED SAFETY, REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS

AVERTISSEMENT: ⚠ IL INDIQUE LES COMPOSANTS CRITIQUES DE SÉCURITÉ. POUR MAINTENIR LE DEGRÉ DE SÉCURITÉ DE L'APPAREIL, NE REMPLACER QUE DES PIÈCES RECOMMANDÉES PAR LE FABRICANT

OPERATION PCB L104B501A



03

CPU PCB L1013A5010

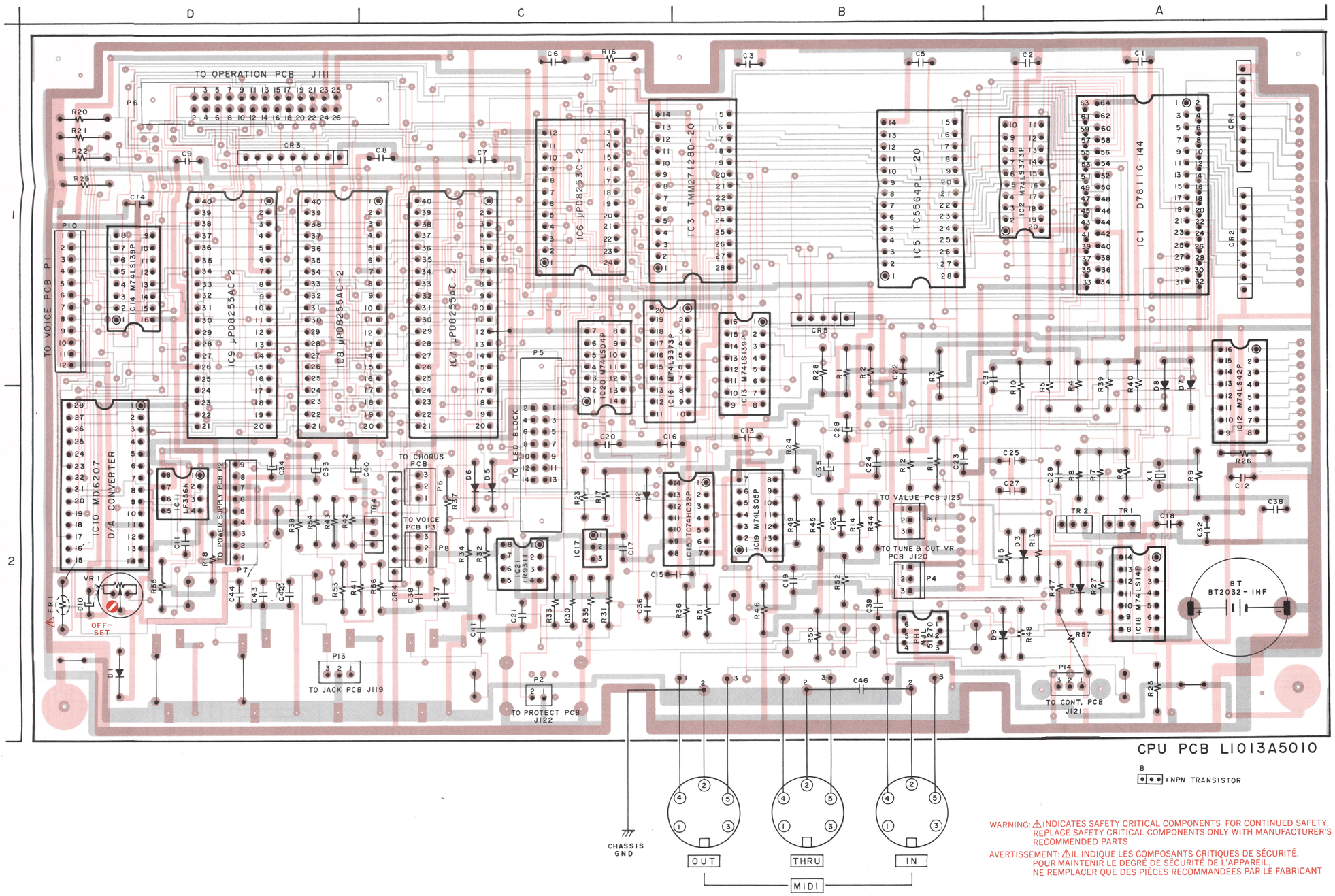
B(POWER SUPPLY) LINE

NOTE
UNLESS OTHERWISE SPECIFIED
ALL RESISTORS IN OHMS 1/4W(J)
ALL CAPACITORS IN μF 25WV(Z)

WARNING: ⚠INDICATES SAFETY CRITICAL COMPONENTS FOR CONTINUED SAFETY, REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS.
AVERTISSEMENT: ⚠IL INDIQUE LES COMPOSANTS CRITIQUES DE SÉCURITÉ. POUR MAINTENIR LE DEGRÉ DE SÉCURITÉ DE L'APPAREIL, NE REMPLACER QUE DES PIÈCES RECOMMANDÉES PAR LE FABRICANT

VX90 CPU SCHEMATIC DIAGRAM NO.4-2 860739B

001957



CPU PCB LI013A5010

B = NPN TRANSISTOR

WARNING: ⚠ INDICATES SAFETY CRITICAL COMPONENTS FOR CONTINUED SAFETY, REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS

AVERTISSEMENT: ⚠ IL INDIQUE LES COMPOSANTS CRITIQUES DE SÉCURITÉ. POUR MAINTENIR LE DEGRÉ DE SÉCURITÉ DE L'APPAREIL, NE REMPLACER QUE DES PIÈCES RECOMMANDEES PAR LE FABRICANT

LOCATION OF COMPONENTS

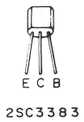
IC1 --- A1	IC12 --- A2
IC2 --- A1	IC13 --- B1
IC3 --- B1	IC14 --- D1
IC5 --- B1	IC15 --- C2
IC6 --- C1	IC16 --- C1
IC7 --- C1	IC17 --- C2
IC8 --- D1	IC18 --- A2
IC9 --- D1	IC19 --- B2
IC10 --- D2	IC20 --- C1
IC11 --- D2	IC21 --- C2

PHI --- B2

TRI --- A2
TR2 --- A2
TR4 --- C2

TRI, 2 --- 2SC3383
TR4 ---- 2SC3330





2SC3383



2SC3330

02

J107 P1

A.GND	12
VA	11
A.GND	10
MUTE	9
TUNE	8
A1	7
A2	6
A3	5
Y0	4
Y1	3
Y2	2
Y3	1

TO CPU PCB P10

J3 P3

EXT IN ON/OFF	1
NOISE A ON/OFF	2
NOISE B ON/OFF	3

TO CPU PCB P8

J2 P2

VOICE 1	1
GND	2
VOICE 2	3
GND	4
VOICE 3	5
GND	6
VOICE 4	7
GND	8
VOICE 5	9
GND	10
VOICE 6	11
GND	12

TO DIN JACK PCB J118 (EXCEPT U MODEL)
TO AMP PCB J118 (U MODEL)

IC 1 CD4051BE
IC 2 CD4051BE
IC 3 TC4051BP
IC 4 TC4051BP
BINARY-TO-8 DECODER
LOGIC LEVEL CONVERTER

IC 5 LA6082S
IC 6 LA6082S
IC 7 LA6082S
IC 8 LA6082S
IC 9 LA6082S
IC 10 LA6082S
IC 11 LA6082S
IC 12 LA6082S
IC 13 LA6082S
IC 14 LA6082S
IC 15 LA6082S
IC 16 LA6082S
IC 17 LA6082S
IC 18 LA6082S
IC 19 LA6082S
IC 20 LA6082S

VCF 2
FREQ 5
VCF 1
FREQ 3
FREQ 2
FREQ 1
FREQ 4
FREQ 6
VCA 3
VCA 1
VCA 4
VCF 5
VCF 4
VCF 3
VCF 6
VCA 2
A-B BALANCE (U)
FILTER MOD (U)
RESONANCE (L)
RESONANCE (U)
VCA 6
VCA 5
WAVE SHAPER (U)
PW (U)
FINAL VCA (L)
FINAL VCA (U)
HPF (L)
PW (L)
FILTER MOD (L)
WAVE SHAPER (L)
A-B BALANCE (L)
HPF (U)

TR 1 2SC3400
TR 2 2SC3400
TR 3 2SC3400

D1 DS448

IC36 IC27 IC39 (1/2) IC30 (3/4,4/4)
(LOWER) VOICE 6
IC35 IC26 IC39 (2/2) IC30 (1/4,2/4)
(LOWER) VOICE 5
IC34 IC25 IC38 (1/2) IC29 (3/4,4/4)
(UPPER) VOICE 4
IC33 IC24 IC38 (2/2) IC29 (1/4,2/4)
(UPPER) VOICE 3
IC32 IC23 IC37 (1/2) IC28 (3/4,4/4)
(UPPER) VOICE 2
(UPPER) VOICE 1

IC31~36 CEM3394
VCO
VCA
VCF
IREF
WAVE SELECT
TO CONVERTER
COMP

IC37~39 M5218L
IC22~27 M5218L
IC28~30 TC4066BP

IC40 IR-9311
IC41 M5218L
IC42(2/2),IC43(2/2),IC44(1/2),IC45(1/2)
LOWER CH
(SAME AS UPPER CH)
IC42 NJM13600
IC44 M5238P
IC43 NJM13600
IC45 M5238P
UPPER CH
IC21 M5218L

TR4 2SC3301(T,U)
TR5 2SC3383(S,T)
TR16 2SC3401
Q2 H27C-3

TP1
TP2

TO CHORUS PCB 3
TO CHORUS PCB 1
TO CHORUS PCB 2

P4 J105
TO POWER SUPPLY PCB P4

P5 J108
TO CHORUS PCB P1 (EXCEPT U MODEL)
TO AMP PCB J114 (U MODEL)

E C B
2SC3383

2SC3330
2SC3400
2SC3401

NOTES
UNLESS OTHERWISE SPECIFIED
ALL RESISTORS IN OHMS 1/6W(J)
ALL CAPACITORS IN μF 50 WV(J)

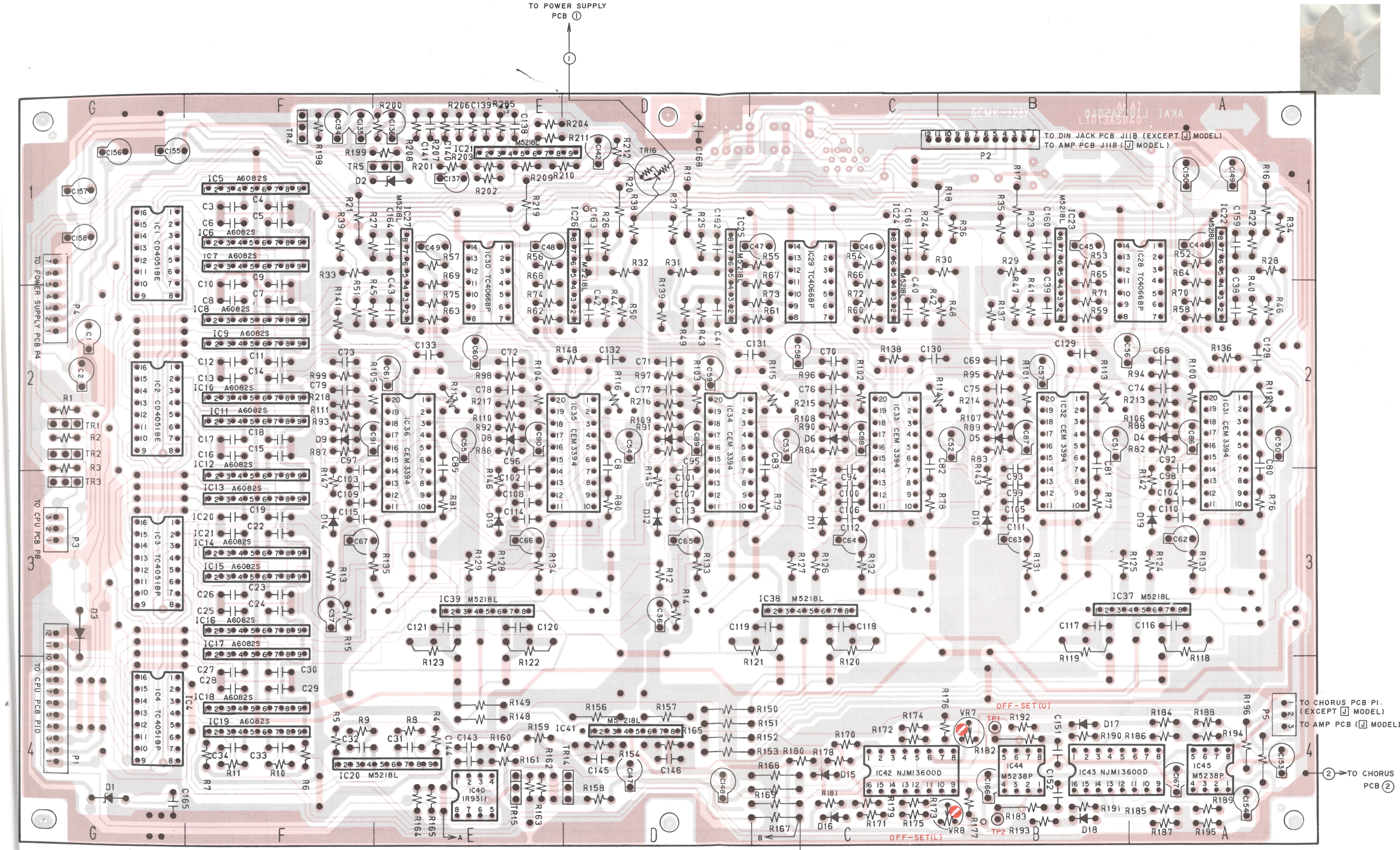
※ Indicated voltage are mesuared at all VR controls "MIN", and program 11 position
Also mesuared after initialased by power SW "ON"

= B (POWER SUPPLY) LINE

VOICE PCB L1013A5040

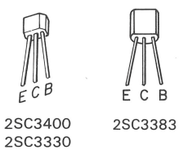
VX90 VOICE SCHEMATIC DIAGRAM

NO. 4-3 860215B



VOICE PCB L1013A5040

IC1 : G-1	IC11 : F-2	IC21 : E-1	IC31 : A-2	IC41 : D-4	TR1 : G-2	2SC3400.....TR1,2,3		
IC2 : G-2	IC12 : F-3	IC22 : A-1	IC32 : B-2	IC42 : C-4	TR2 : G-2	2SC3330.....TR4		
IC3 : G-3	IC13 : F-3	IC23 : B-1	IC33 : C-2	IC43 : B-4	TR3 : G-3	2SC3383.....TR5,TR14,TR15		
IC4 : G-4	IC14 : F-3	IC24 : C-1	IC34 : D-2	IC44 : B-4	TR4 : F-1			
IC5 : F-1	IC15 : F-3	IC25 : D-1	IC35 : D-2	IC45 : A-4	TR5 : E-1			
IC6 : F-1	IC16 : F-3	IC26 : E-1	IC36 : E-2		TR14 : D-4			
IC7 : F-1	IC17 : F-3	IC27 : E-1	IC37 : A-3		TR15 : E-4			
IC8 : F-2	IC18 : F-4	IC28 : A-1	IC38 : C-3					
IC9 : F-2	IC19 : F-4	IC29 : C-1	IC39 : E-3					
IC10 : F-2	IC20 : E-4	IC30 : E-1	IC40 : E-4					



2SC3400
2SC3330

2SC3383

VX90

14



TO VOICE PCB P5 — UPPER / GND / LOWER — P1 — TO VOICE PCB ③

IC1 M5218L — IC2 M5218L — IC4 MN3009 — TR3 2SC3330(T,U) — TR5 2SK381 — IC11 M5218L

P5: 1 SEND I, 2 GND, 3 SEND 2, 4 RETURN I, 5 GND, 6 RETURN 2 — TUNE & OUT PCB J115

IC7 — IC5 MN3101 — TR12 2SC3330 (T,U) — TR4 2SC3330 (T,U) — IC13 M5218L

P7: 2 GND, 1 LINE — TO JACK PCB J113

RL1-1 — RL1-2 — J1 Lch — STEREO — J2 Rch

TO CPU PCB P9 — W9 — LFO 1,2 — CHORUS ON/OFF

TR11 2SA1317 (T,U) — TR10 2SC3401 — IC6 1/2 — IC6 2/2 — IC8 MN3009 — TR16 2SC3330(T,U) — TR18 2SK381 — IC11 2/2

TO VOICE PCB ②

TR15 2SA1317 (T,U) — TR14 2SC3401 — TR8 2SK381 (C,D) — TR13 2SC3330 (T,U) — IC9 MN3101 — TR17 2SC3330 (T,U)

IC12 M5216L

P6: 3 PHONO I, 1 PHONO 2, 2 GND — TO JACK PCB J116

RL1 — D8 DS448

P3: 1 +15V, 2 GND, 3 −15V, 4 RELAY — TO POWER PCB P3

CHORUS PCB L1013B5030

B (POWER SUPPLY) LINE

SIGNAL LINE

NOTE
UNLESS OTHERWISE SPECIFIED
ALL RESISTORS IN OHMS 1/4W(J)
ALL CAPACITORS IN μF 50WV(J)

VX90 CHORUS SCHEMATIC DIAGRAM

NO.4-4 860741C4 (A2)

B = PNP TRANSISTOR

B = NPN TRANSISTOR



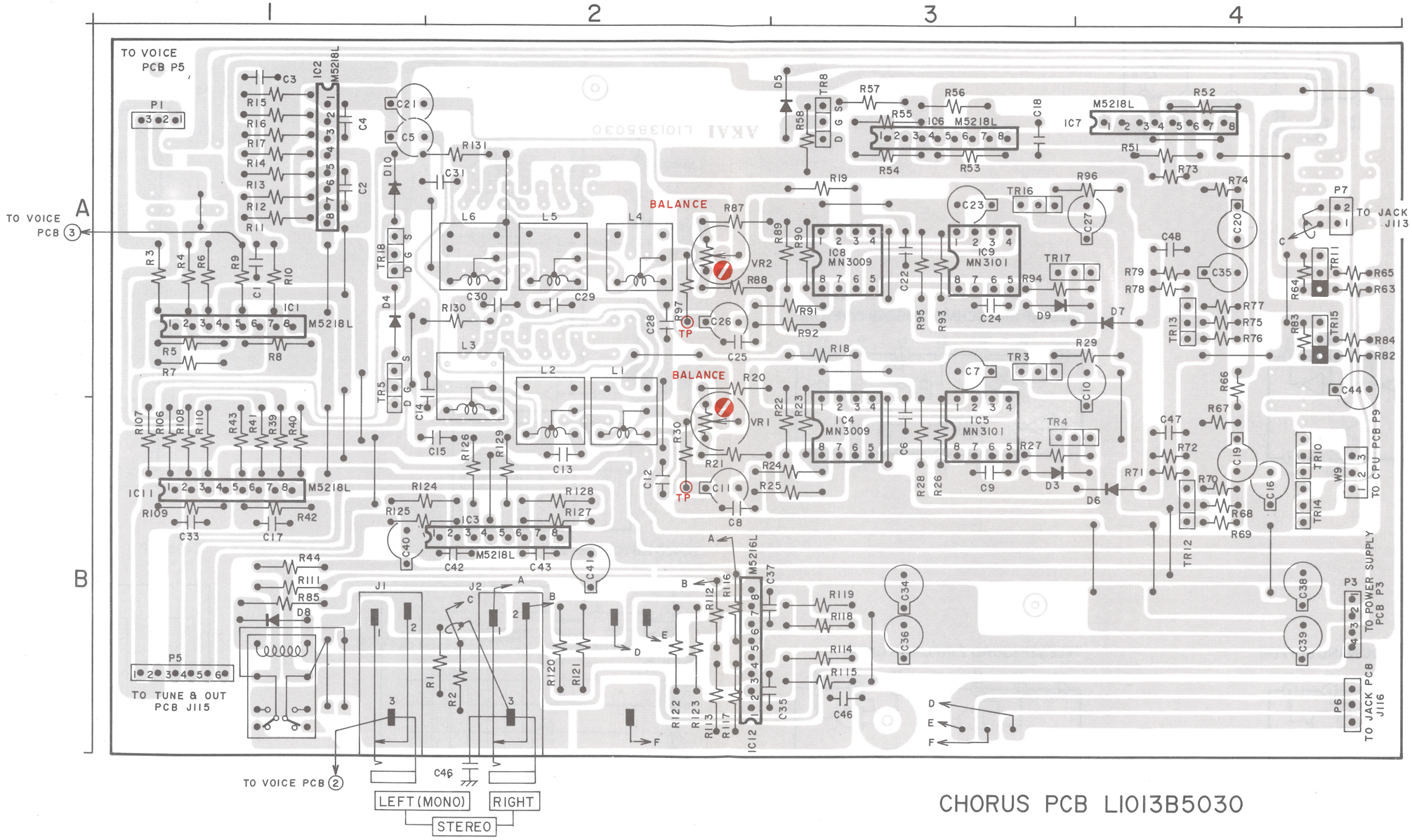
2SC3330
2SA1317
2SC3401

2SK381

LOCATION OF COMPONENTS

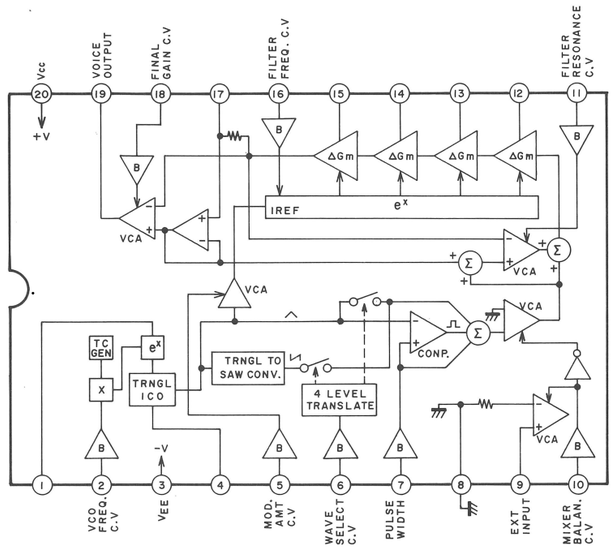
IC's		TR's			
IC1	A1	TR3	A3	TR17	A3,4
IC2	A1	TR4	B3,4	TR18	A1
IC4	B3	TR5	A,B1		
IC5	B3	TR8	A3		
IC6	A3	TR10	B4		
IC7	A4	TR11	A4		
IC8	A3	TR12	B4		
IC9	A3	TR13	A4		
IC11	B1	TR14	B4		
IC12	B2	TR15	A4		
IC13	B2	TR16	A3		



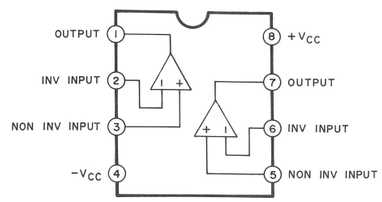


CHORUS PCB L1013B5030

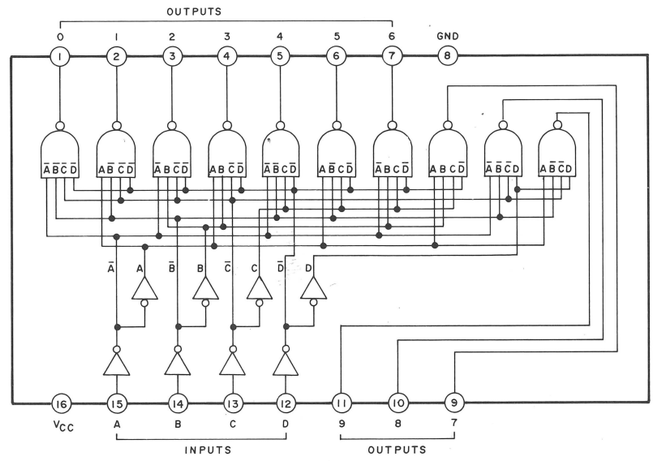
CEM33 94



M5218L



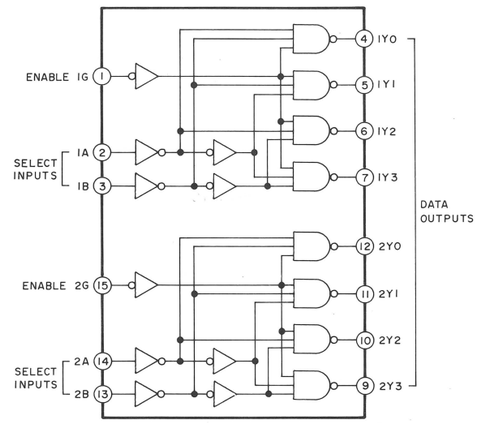
74LS42P (BCD TO DECIMAL DECODER)



FUNCTION TABLE

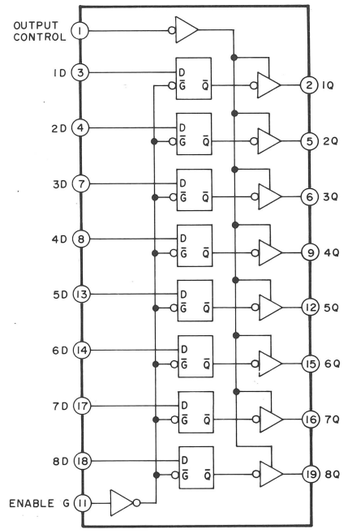
NO.	INPUTS				OUTPUTS									
	D	C	B	A	0	1	2	3	4	5	6	7	8	9
0	L	L	L	L	L	H	H	H	H	H	H	H	H	H
1	L	L	L	H	H	L	H	H	H	H	H	H	H	H
2	L	L	H	L	H	H	L	H	H	H	H	H	H	H
3	L	L	H	H	H	H	H	L	H	H	H	H	H	H
4	L	H	L	L	H	H	H	H	L	H	H	H	H	H
5	L	H	L	H	H	H	H	H	H	L	H	H	H	H
6	L	H	H	L	H	H	H	H	H	H	L	H	H	H
7	L	H	H	H	H	H	H	H	H	H	H	L	H	H
8	H	L	L	L	H	H	H	H	H	H	H	H	L	H
9	H	L	L	H	H	H	H	H	H	H	H	H	H	L
INVALID	H	L	H	L	H	H	H	H	H	H	H	H	H	H
	H	L	H	H	H	H	H	H	H	H	H	H	H	H
	H	H	L	L	H	H	H	H	H	H	H	H	H	H
	H	H	L	H	H	H	H	H	H	H	H	H	H	H
	H	H	H	L	H	H	H	H	H	H	H	H	H	H
	H	H	H	H	H	H	H	H	H	H	H	H	H	H

74LS139 (DUAL 2 TO 4 DEMULTIPLEXER)

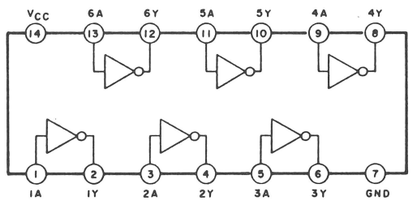


INPUTS			OUTPUTS			
ENABLE	SELECT					
G	B	A	Y0	Y1	Y2	Y3
H	X	X	H	H	H	H
L	L	L	L	H	H	H
L	L	H	H	L	H	H
L	H	L	H	H	L	H
L	H	H	H	H	H	L

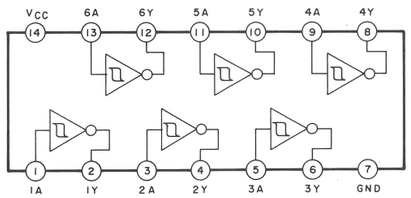
74LS373 (OCTAL 3 STATE D-LATCH)



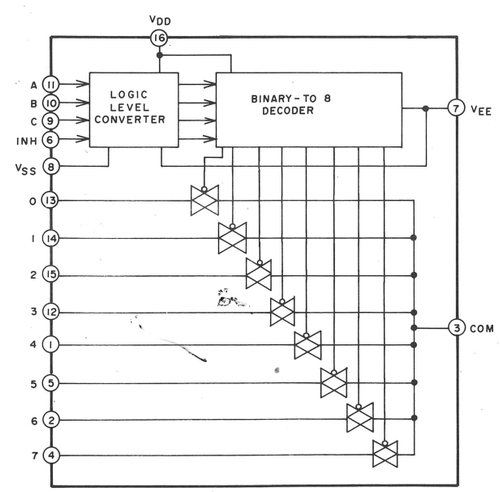
74LS04P (Hex INVETOR)



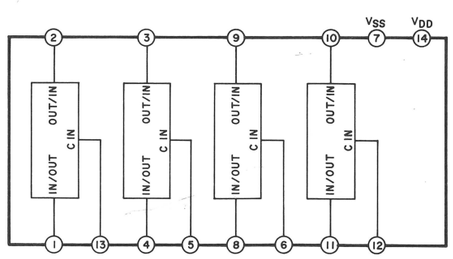
74LS14P (Hex SCHMIT TRIGGER INVETOR)



TC4051BP/CD4051BE

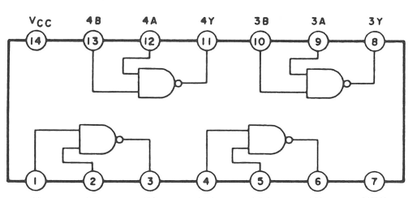


TC4066BP



C IN	IMPEDANCE BETWEEN IN/OUT – OUT/IN
H	0.5 to 5×10^2 OHMS
L	MORE THAN 10^9 OHMS

74LS38P (QUAD 2 INPUT OC NAND BUFFER)



74LS32P (QUAD 2 INPUT OR GATE)

