SERVICE MANUAL

MIDI DIGITAL SAMPLER
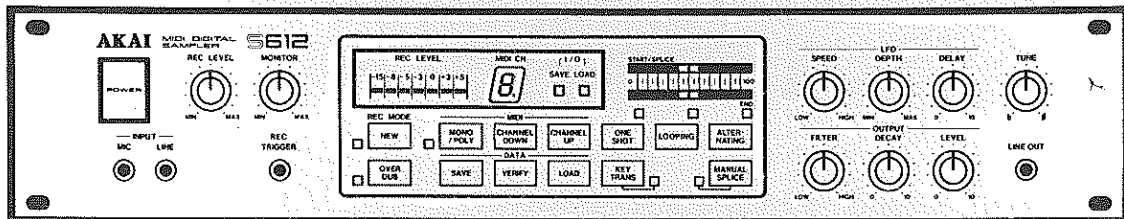
MODEL **S612**

SAMPLER DISK DRIVE

MODEL **MD280**

AKAI

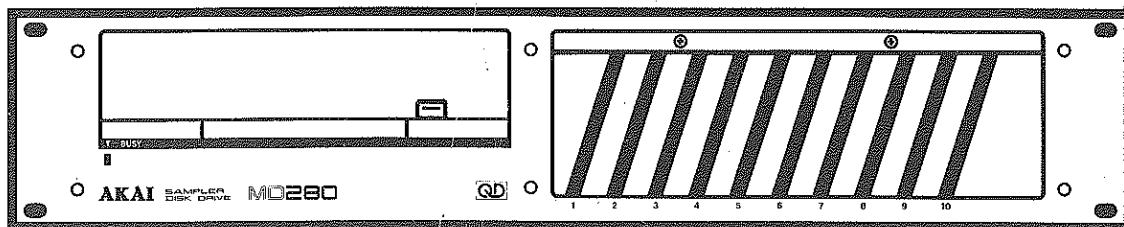# AKAI SERVICE MANUAL

MODEL S612

MIDI DIGITAL SAMPLER

MODEL S612

SAMPLER DISK DRIVE

MODEL MD280

MODEL MD280

ABBREVIATION FOR SERVICE MANUAL

MODEL S612

ABBREVIATION	EXPLANATION	ABBREVIATION	EXPLANATION
ALTER	ALTERnating	MON	MONitor
BUSDIR	BUS DIRection	RFSH	ReFreSH
CASSR	CASSette Read	RXD	Receive Data
CASSW	CASSette Write	RD	RdaD
CH	CHannel	SHOT	one SHOT
CS	Chip Select	SIN	Signal INput
DUB	over DUB	SLTSL	SLoT SeLect
IORQ	I/O ReQuest	TRANS	TRANSpose
LOOP	LOOPing	TRIG	TRIGger
M1	Machin cycle 1	TXD	Transmit Data
MREQ	Memoly REQuest	V.REF	V.REFerence
MIDI	Musical instrument Digital Interface	WR	WRite

MODEL MD280

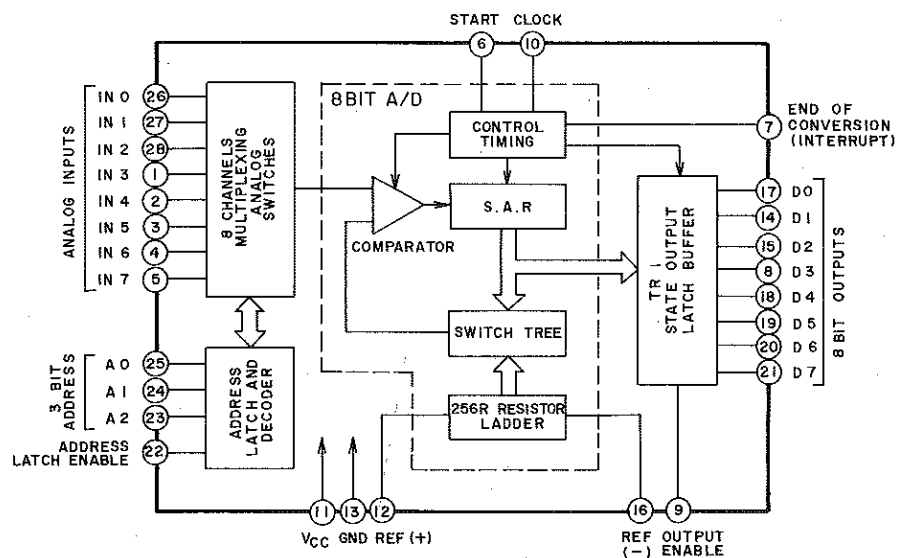| ABBREVIATION	EXPLANATION	ABBREVIATION	EXPLANATION
B/A	channel B/channel A	MTON	MoTor ON
C/D	Command/Data	QD	Quick Disk
CE	Chip Enable	RD	ReaD
CRC	Cyclic Redandancy Check Character	RDDT	ReaD DaTa
CS	Chip Select	RTSA	Request To Send A
CTSA	Clear To Send A	RTSB	Request To Send B
D	system Data bus	RXCA	Receive Clock A
DCDA	Data Carrier Detect A	RXDA	Receive Data A
DCDB	Data Carrier Detect B	SIO	Serial Input Output
DIR	DIRection	SLTSL	SLoT SeLect
DTRB	Data Terminal Ready B	TXCA	Transmit Clock A
IEI	Interrupt Enable In	TXDA	Transmit Data A
IORQ	Input/Output ReQuest	WR	WRite
M1	Machine cycle 1	WRDT	WRite DaTa
MDST	Media SeT	WRGA	WRite GAte
MERQ	MEmory ReQuest	WRPR	WRite PRotect
MFM	Modified Frequency Modulation	ϕ	system clock

AKAI SERVICE MANUAL (ADDITIONAL)

This additional Schematic Diagram is made for the Main PCB of model S612.
Use this additional Schematic Diagram with the model S612 Service Manual which published previously.
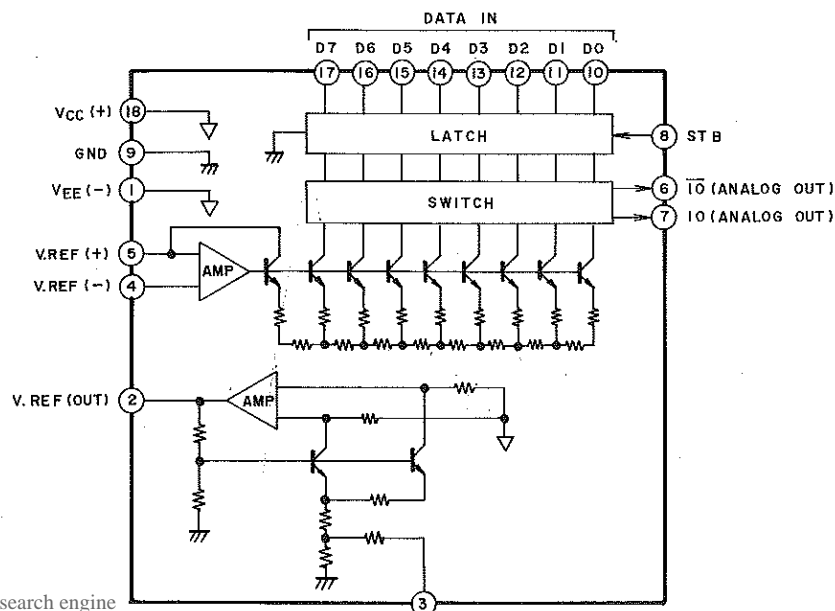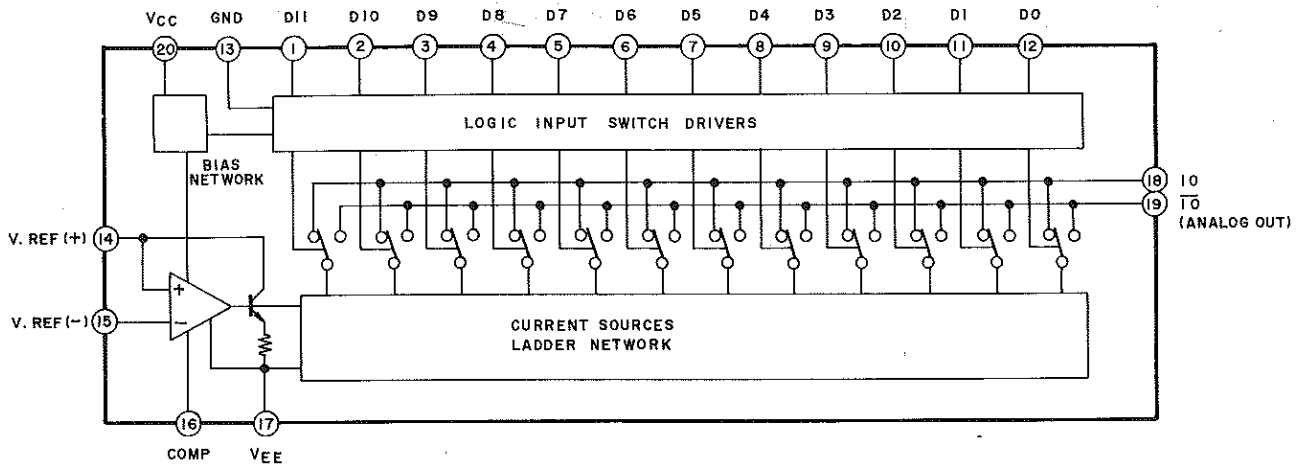
DIGITAL SAMPLER
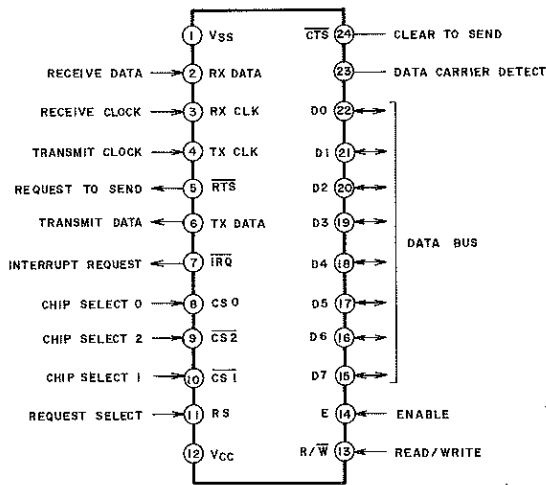
MODEL S612

ADC0809 [8 BIT A/D CONVERTER]
(IC58)

BA9201 [8BIT D/A CONVERTER]
(IC90 to 95)

BA9221 [12BIT D/A CONVERTER]
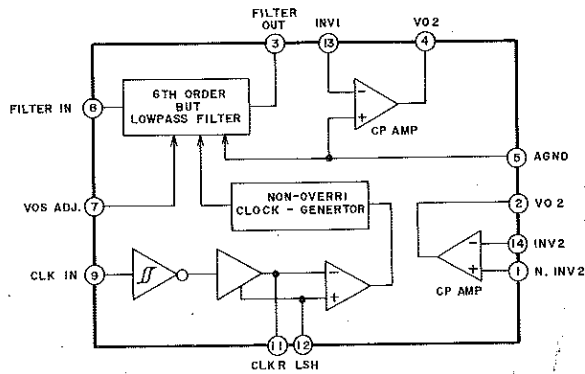(IC57/67)

Vcc	GND	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
20	13	1	2	3	4	5	6	7	8	9	10	11	12

LOGIC INPUT SWITCH DRIVERS

BIAS NETWORK

V. REF (+) 14
V. REF (-) 15

18 IO
19 IO̅
(ANALOG OUT)

CURRENT SOURCES
LADDER NETWORK

16 COMP
17 VEE

HD6850P (IC4)
[COMMUNICATION INTERFACE ADAPTER]

1 Vss
RECEIVE DATA 2 RX DATA
RECEIVE CLOCK 3 RX CLK
TRANSMIT CLOCK 4 TX CLK
REQUEST TO SEND 5 RTS̅
TRANSMIT DATA 6 TX DATA
INTERRUPT REQUEST 7 IRQ̅
CHIP SELECT 0 8 CS 0
CHIP SELECT 2 9 CS̅2̅
CHIP SELECT 1 10 CS̅1̅
REQUEST SELECT 11 RS
12 Vcc

CTS̅ 24 CLEAR TO SEND
23 DATA CARRIER DETECT
D0 22
D1 21
D2 20
D3 19
D4 18   DATA BUS
D5 17
D6 16
D7 15
E 14 ENABLE
R/W̅ 13 READ/WRITE

MF10CN (IC52)
[DUAL SWITCHED CAPACITOR FILTER]

HPA 3 SIA 5   BPA 2   LPA 1
IN VA 4
AGND 15
CLKA 10   LEVEL SHIFT   NON OVERL CLOCK
50/100/CL 12
L SH 9   CONTROL   5 SIA
CLKB 11   LEVEL SHIFT   NON OVERL CLOCK
AGND 15
INVB 17

18 HPB   16 SiB   19 BPB   20 LPB
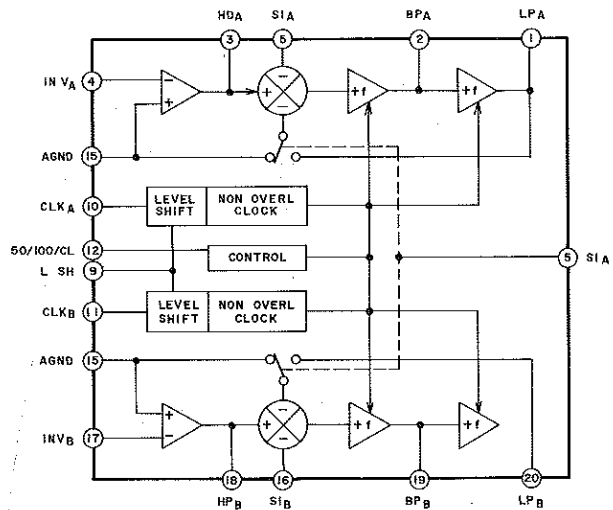
MF6CN-50 [LOWPASS FILTER]
(IC77 to 82)

FILTER OUT 3   INV1 13   VO 2 4
FILTER IN 8   6TH ORDER BUT LOWPASS FILTER
CP AMP
5 AGND
VOS ADJ. 7   NON-OVERRI CLOCK - GENERTOR   2 VO 2
CLK IN 9
14 INV2
1 N. INV2
CP AMP
11 12
CLKR LSH

NE572S [ANALOG COMPANDOR]
(IC83,84,85)

ΔG IN 7,8   RI 6.8k   5,11 ΔG OUT
TMO TRIM 6,10   500Ω   ΔG
GAIN CZLL
1,15 TRACK TRIM
RECT. IN 3,13   270Ω   10k
RECTIFIER   BUFFER   10k
Vcc 16   P.S
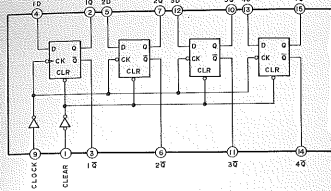8   4,12   2,14
ATTACK CAP   RECOV CAP

TC74C174P [HEX D-FFs]
(IC61, 62, 63)

TC74HC74 [DUAL D FLIP-FLOP]
(IC17 to 19)

FUNCTION TABLE

INPUTS				OUTPUTS	
PR	CLR	CLK	D	Q	Q̄
L	H	X	X	H	L
H	L	X	X	L	H
L	L	X	X	H*	H*
H	H	↑	H	H	L
H	H	↑	L	L	H
H	H	L	X	Q0	Q̄0

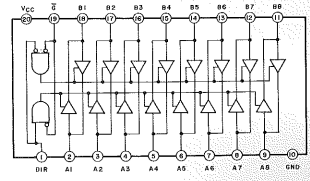## TC74HC175P [QUAD D-FFs]
(IC60)

FUNCTION TABLE

INPUTS			OUTPUTS	
Clear	Clock	D	Q	Q̄
L	X	X	L	H
H	↑	H	H	L
H	↑	L	L	H
H	L	X	Q0	Q̄0

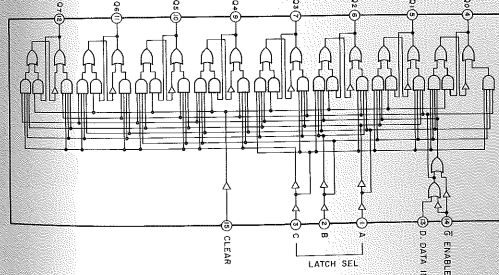## TC74HC138P [3 to 8 DEMULTIPLEXER]
(IC11, 12)

FUNCTION TABLE

INPUTS					OUTPUTS							
ENABLE		SELECT										
G1	G2*	C	B	A	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7
X	H	X	X	X	H	H	H	H	H	H	H	H
L	X	X	X	X	H	H	H	H	H	H	H	H
H	L	L	L	L	L	H	H	H	H	H	H	H
H	L	L	L	H	H	L	H	H	H	H	H	H
H	L	L	H	L	H	H	L	H	H	H	H	H
H	L	L	H	H	H	H	H	L	H	H	H	H
H	L	H	L	L	H	H	H	H	L	H	H	H
H	L	H	L	H	H	H	H	H	H	L	H	H
H	L	H	H	L	H	H	H	H	H	H	L	H
H	L	H	H	H	H	H	H	H	H	H	H	L

TC74HC245P [QCTAL 3 STATE TRANSCEIVER]
(IC25)

FUNCTION TABLE

Control Inputs		Operation
Ḡ	DIR	
L	L	B data to A bus
L	H	A data to B bus
H	X	Isolation

TC74HC139P [DUAL 2 to 4 DEMULTIPLEXERS]
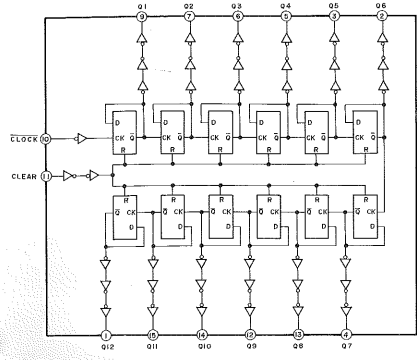(IC2)

FUNCTION TABLE

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

TC74HC259P [8 BIT ADDRESSABLE LATCHES] (IC42, 43)

TC74HC373P [3 STATE OCTAL D-TYPE LATCH]
(IC21)

FUNCTION TABLE

Output Control	Latch Enable G	Data	373 Output
L	H	H	H
L	H	L	L
L	L	X	Q0
H	X	X	Z

TC74HC157P [2 to 1 DATA SELECTORS]
(IC32, 33)

FUNCTION TABLE

INPUTS		OUTPUT
Select	Strobe G	Y
X	H	L
L	L	A
H	L	B

TC74HC74 [DUAL D FLIP-FLOP]
(IC17 to 19)

FUNCTION TABLE

INPUTS				OUTPUTS	
PR	CLR	CLK	D	Q	$\bar{Q}$
L	H	X	X	H	L
H	L	X	X	L	H
L	L	X	X	H	H
H	H	↑	H	H	L
H	H	↑	L	L	H
H	H	L	X	Q0	$\bar{Q}0$

FUNCTION TABLE

INPUTS					OUTPUTS							
ENABLE		SELECT										
G1	G2*	C	B	A	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7
X	H	X	X	X	H	H	H	H	H	H	H	H
L	X	X	X	X	H	H	H	H	H	H	H	H
H	L	L	L	L	L	H	H	H	H	H	H	H
H	L	L	L	H	H	L	H	H	H	H	H	H
H	L	L	H	L	H	H	L	H	H	H	H	H
H	L	L	H	H	H	H	H	L	H	H	H	H
H	L	H	L	L	H	H	H	H	L	H	H	H
H	L	H	L	H	H	H	H	H	H	L	H	H
H	L	H	H	L	H	H	H	H	H	H	L	H
H	L	H	H	H	H	H	H	H	H	H	H	L

FUNCTION TABLE

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

FUNCTION TABLE

INPUTS		OUTPUT
Select	Strobe G	Y
X	H	L
L	L	A
H	L	B

TC74HC175P [QUAD D-FFs]
(IC60)

FUNCTION TABLE

INPUTS			OUTPUTS	
Clear	Clock	D	Q	$\bar{Q}$
L	X	X	L	H
H	↑	H	H	L
H	↑	L	L	H
H	L	X	Q0	$\bar{Q}0$

TC74HC245P [QCTAL 3 STATE TRANSCEIVER]
(IC25)

FUNCTION TABLE

Control Inputs		Operation
$\bar{G}$	DIR	
L	L	B data to A bus
L	H	A data to B bus
H	X	Isolation

TC74HC259P [8 BIT ADDRESSABLE LATCHES] (IC42, 43)

TC74HC373 [3 STATE OCTAL D-TYPE LATCH]
(IC21)

FUNCTION TABLE

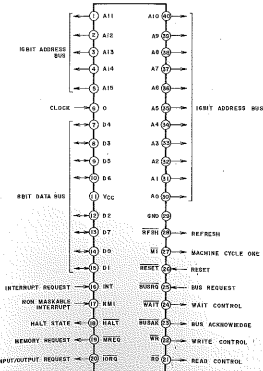| Output Control	Latch Enable G	Data	373 Output
L	H	H	H
L	H	L	L
L	L	X	Q0
H	X	X	Z

TC74HC4040P [12-STAGE BINARY COUNTER]
(IC23, 24)

FUNCTION TABLE
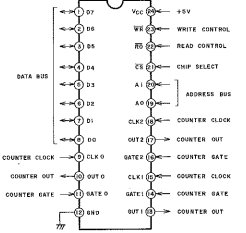
CLOCK	CLEAR	OUTPUT STATE
X	H	ALL OUTPUTS = "L"
↑	L	NO CHANGE
↓	L	ADVANCE TO NEXT STATE

X: DON'T CARE

μPD780C [8 BIT CPU]
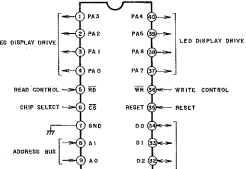### (IC1)

μPD710540P [PROGRAMMABLE INTERVAL TIMER]
μPD8253C-2 (IC5, 6, 7, 8)
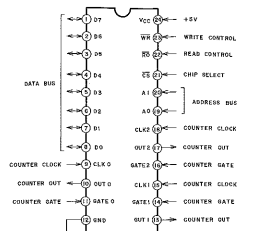
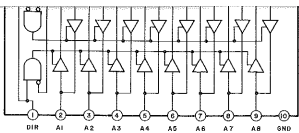## μPD8255 AC-2 [INTER FACE]
(IC41)
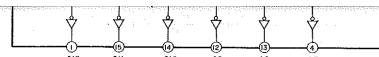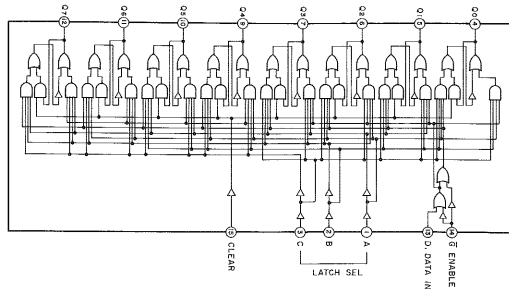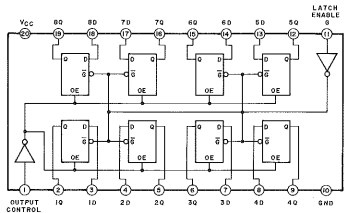
μPD8237 AC-5 (IC9, 10)
[PROGRAMBLE DMA CONTROLER]

H H L X Q0 Q0

FUNCTION TABLE

INPUTS					OUTPUTS							
ENABLE		SELECT										
G1	G2*	C	B	A	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7
X	H	X	X	X	H	H	H	H	H	H	H	H
L	X	X	X	X	H	H	H	H	H	H	H	H
H	L	L	L	L	L	H	H	H	H	H	H	H
H	L	L	L	H	H	L	H	H	H	H	H	H
H	L	L	H	L	H	H	L	H	H	H	H	H
H	L	L	H	H	H	H	H	L	H	H	H	H
H	L	H	L	L	H	H	H	H	L	H	H	H
H	L	H	L	H	H	H	H	H	H	L	H	H
H	L	H	H	L	H	H	H	H	H	H	L	H
H	L	H	H	H	H	H	H	H	H	H	H	L

FUNCTION TABLE

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

FUNCTION TABLE

INPUTS		OUTPUT
Select	Strobe G	Y
X	H	L
L	L	A
H	L	B

FUNCTION TABLE

INPUT						OUTPUTS
Clear	CK	Enable		Output control		QA ~ QD
		G1	G2	M	N	
L	L	L	L	–	–	1D ~ 4D
L		H	X	–	–	–
		X	H	–	–	–
H	X	X	X			LLLL
	–			H	X	Z
				X	H	

G	DIR	
L	L	B data to A bus
L	H	A data to B bus
H	X	Isolation

DIR A1 A2 A3 A4 A5 A6 A7 A8 GND

FUNCTION TABLE

CLOCK	CLEAR	OUTPUT STATE
X	H	ALL OUTPUTS = "L"
	L	NO CHANGE
	L	ADVANCE TO NEXT STATE

X: DON'T CARE

Q12 Q11 Q10 Q9 Q8 Q7

TC74HC259P [8 BIT ADDRESSABLE LATCHES] (IC42, 43)

CLEAR   LATCH SEL   D, DATA IN

TC74HC373 [3 STATE OCTAL D-TYPE LATCH] (IC21)

Vcc 8Q 8D 7Q 7D 6Q 6D 5Q 5D   LATCH ENABLE G

OUTPUT CONTROL   1Q 1D 2Q 2D 3Q 3D 4Q 4D   GND

FUNCTION TABLE

Output Control	Latch Enable G	Data	373 Output
L	H	H	H
L	H	L	L
L	L	X	Q0
H	X	X	Z

TC74HC374 [3 STATE OCTAL D-TYPE FLIP-FLOP] (IC54)

Vcc 8Q 8D 7Q 7D 6Q 6D 5Q 5D   CLOCK

OUTPUT CONTROL   1Q 1D 2Q 2D 3Q 3D 4Q 4D   GND
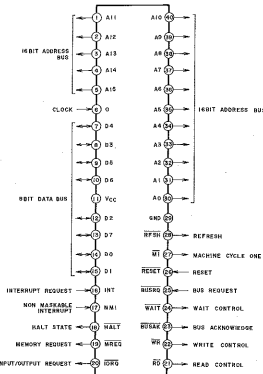
FUNCTION TABLE

Output Control	Clock	Data	Output
L	↑	H	H
L	↑	L	L
L	L	X	Qn
H	X	X	Z

μPD780C [8 BIT CPU] (IC1)

16 BIT ADDRESS BUS — A11, A12, A13, A14, A15

CLOCK — φ, D4, D5, D6, Vcc, D7, D0, D1

16 BIT ADDRESS BUS — A10, A9, A8, A7, A6, A5, A4, A3, A2, A1, A0

8 BIT DATA BUS

RFSH — REFRESH
M1 — MACHINE CYCLE ONE
RESET — RESET
BUSRQ — BUS REQUEST
WAIT — WAIT CONTROL
BUSAK — BUS ACKNOWLEDGE
WR — WRITE CONTROL
RD — READ CONTROL

INTERRUPT REQUEST — INT
NON MASKABLE INTERRUPT — NMI
HALT STATE — HALT
MEMORY REQUEST — MREQ
INPUT/OUTPUT REQUEST — IORQ

μPD8237 AC-5 (IC9, 10) [PROGRAMBLE DMA CONTROLER]

I/O READ — IOR — A7
I/O WRITE — IOW — A6   ADDRESS BUS
MEMORY READ — MEMR — A5
MEMORY WRITE — MEMW — A4
— EOP — END OF PROCESS
READY — READY — A3
HOLD ACKNOWLEDGE — HLDA — A2   ADDRESS BUS
ADDRESS STROBE — ADSTB — A1
ADDRESS ENABLE — AEN — A0
HOLD REQUEST — HRQ — +5V
CHIP SELECT — CS — DB0
CLOCK — CLK — DB1   DATA BUS
RESET — RESET — DB2
DMA ACKNOWLEDGE — DACK 4 — DB3
— DACK 3 — DACK2
— DREQ 3 — DACK2   DMA ACKNOWLEDGE
DMA REQUEST — DREQ 2 — DACK1
— DREQ 1 — DB6
— DREQ 0 — DB6   DATA BUS
— Vss — DB7

μPD710540P [PROGRAMMABLE μPD8253C-2 INTERVAL TIMER] (IC5, 6, 7, 8)

DATA BUS — D7, D6, D5, D4, D3, D2, D1, D0
Vcc — +5V
WR — WRITE CONTROL
RD — READ CONTROL
CS — CHIP SELECT
A1, A0 — ADDRESS BUS
CLK2 — COUNTER CLOCK
OUT2 — COUNTER OUT
GATE2 — COUNTER GATE
COUNTER CLOCK — CLK 0
COUNTER OUT — OUT 0   CLK1 — COUNTER CLOCK
COUNTER GATE — GATE 0   GATE1 — COUNTER GATE
GND   OUT1 — COUNTER OUT

μPD8255 AC-2 [INTER FACE] (IC41)

LED DISPLAY DRIVE — PA3, PA2, PA1, PA0   PA4, PA5, PA6, PA7 — LED DISPLAY DRIVE
READ CONTROL — RD   WR — WRITE CONTROL
CHIP SELECT — CS   RESET — RESET
GND   D0
ADDRESS BUS — A1   D1
A0   D2
PC7   D3   DATA BUS
PC6   D4
KEY TRANS — PC5   D5
MANUAL SPLICE — PC4   D6
ONE SHOT — PC0   D7
LOOPING — PC1   Vcc — +5V
ALTER RATING — PC2   PB7 — CHANNEL UP
TRIMER — PC3   PB6 — CHANNEL DOWN   OPERATION BUTTON
NEW — PB0   PB5 — MONO/POLY
OVER DUB — PB1   PB4 — LOAD
SAVE — PB2   PB3 — VERIFY

OPERATION BUTTON

TC74HC139P [DUAL 2 to 4 DEMULTIPLEXERS] (IC2)

TC74HC157P [2 to 1 DATA SELECTORS] (IC32, 33)

TC74HC173P [4BIT REGISTER 3-STATE] (IC55)

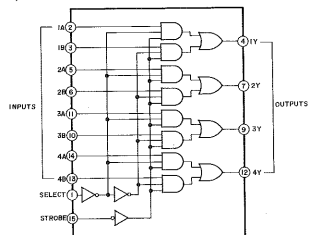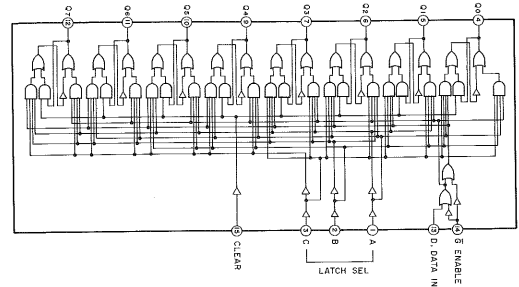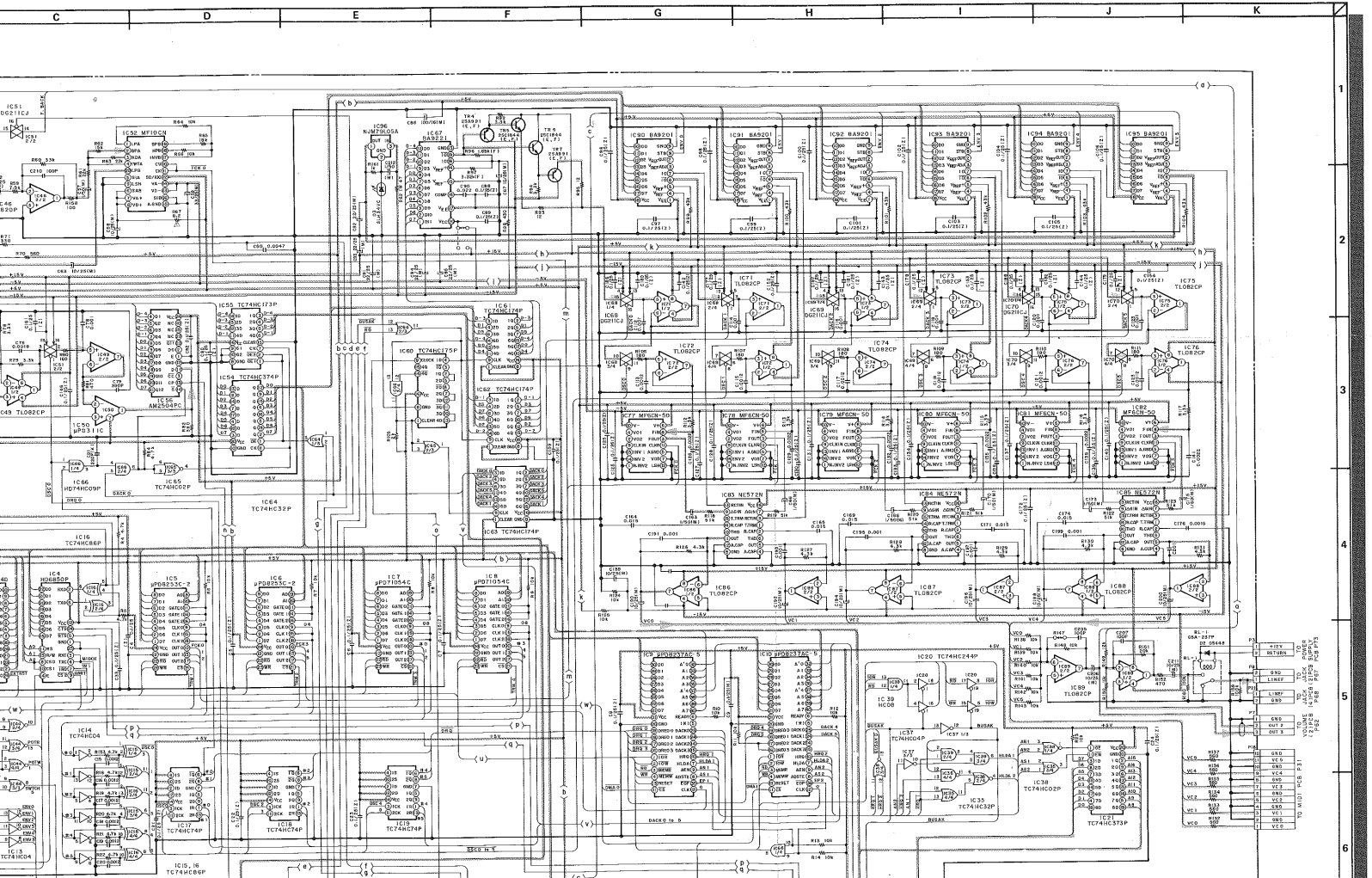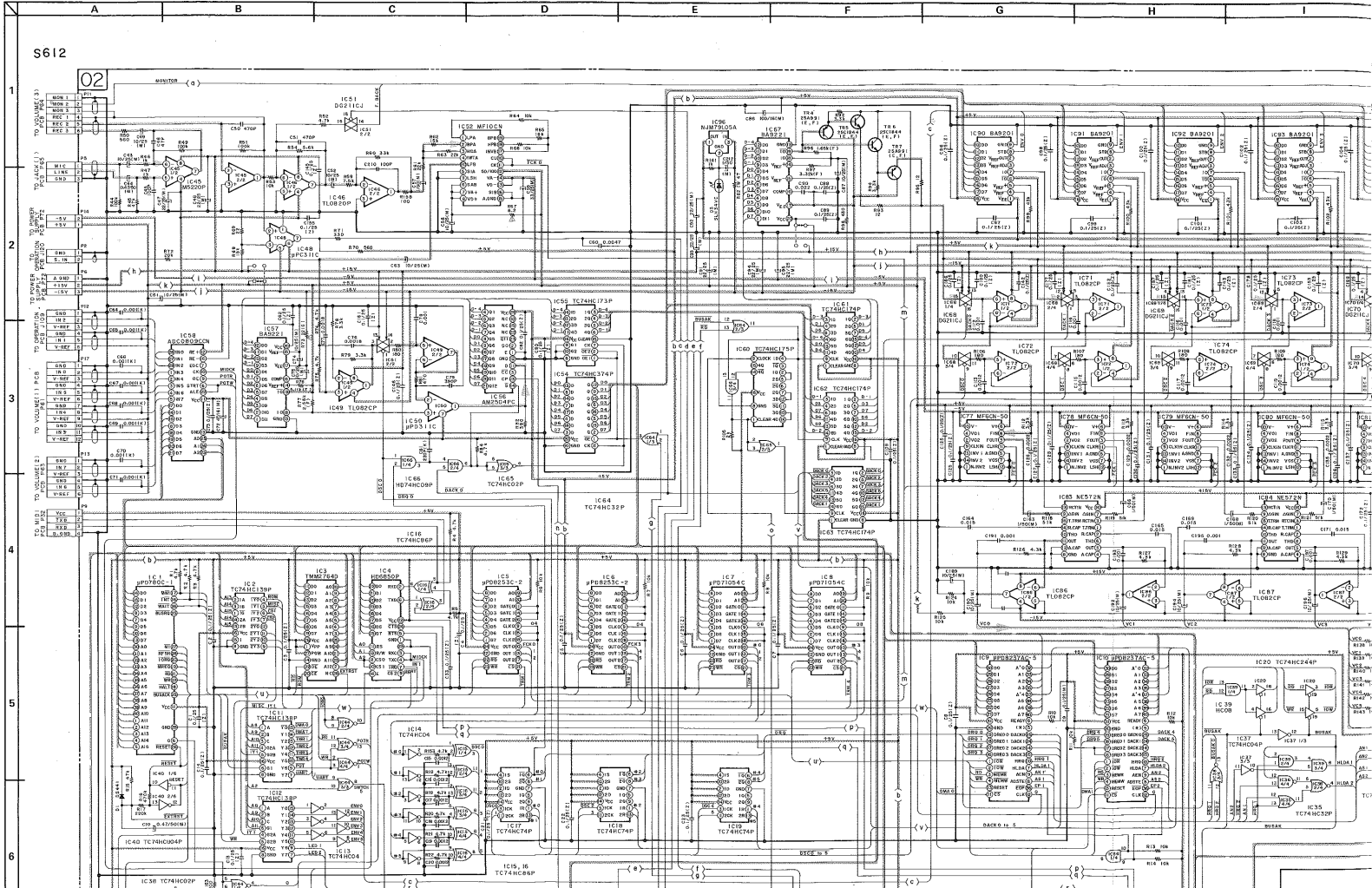| H	H	L	X	Q0	Q̄0

FUNCTION TABLE

INPUTS					OUTPUTS							
ENABLE		SELECT										
G1	G2*	C	B	A	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7
X	H	X	X	X	H	H	H	H	H	H	H	H
L	X	X	X	X	H	H	H	H	H	H	H	H
H	L	L	L	L	L	H	H	H	H	H	H	H
H	L	L	L	H	H	L	H	H	H	H	H	H
H	L	L	H	L	H	H	L	H	H	H	H	H
H	L	L	H	H	H	H	H	L	H	H	H	H
H	L	H	L	L	H	H	H	H	L	H	H	H
H	L	H	L	H	H	H	H	H	H	L	H	H
H	L	H	H	L	H	H	H	H	H	H	L	H
H	L	H	H	H	H	H	H	H	H	H	H	L

FUNCTION TABLE

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

FUNCTION TABLE

INPUTS		OUTPUT
Select	Strobe G	Y
X	H	L
L	L	A
H	L	B

FUNCTION TABLE

INPUT						OUTPUTS QA~QD
Clear	CK	Enable		Output control		
		G1	G2	M	N	
L		L	L	—		1D~4D
L	↑	H	X	—		—
		X	H	—		—
H	X	X	X	—		LLLL
—				H	X	Z
				X	H	Z

G	DIR	
L	L	B data to A bus
L	H	A data to B bus
H	X	Isolation
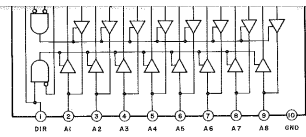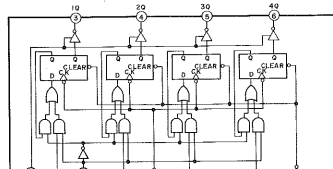
TC74HC259P [8 BIT ADDRESSABLE LATCHES] (IC42, 43)

TC74HC373 [3 STATE OCTAL D-TYPE LATCH] (IC21)

FUNCTION TABLE

Output Control	Latch Enable G	Data	373 Output
L	H	H	H
L	H	L	L
L	L	X	Q0
H	X	X	Z

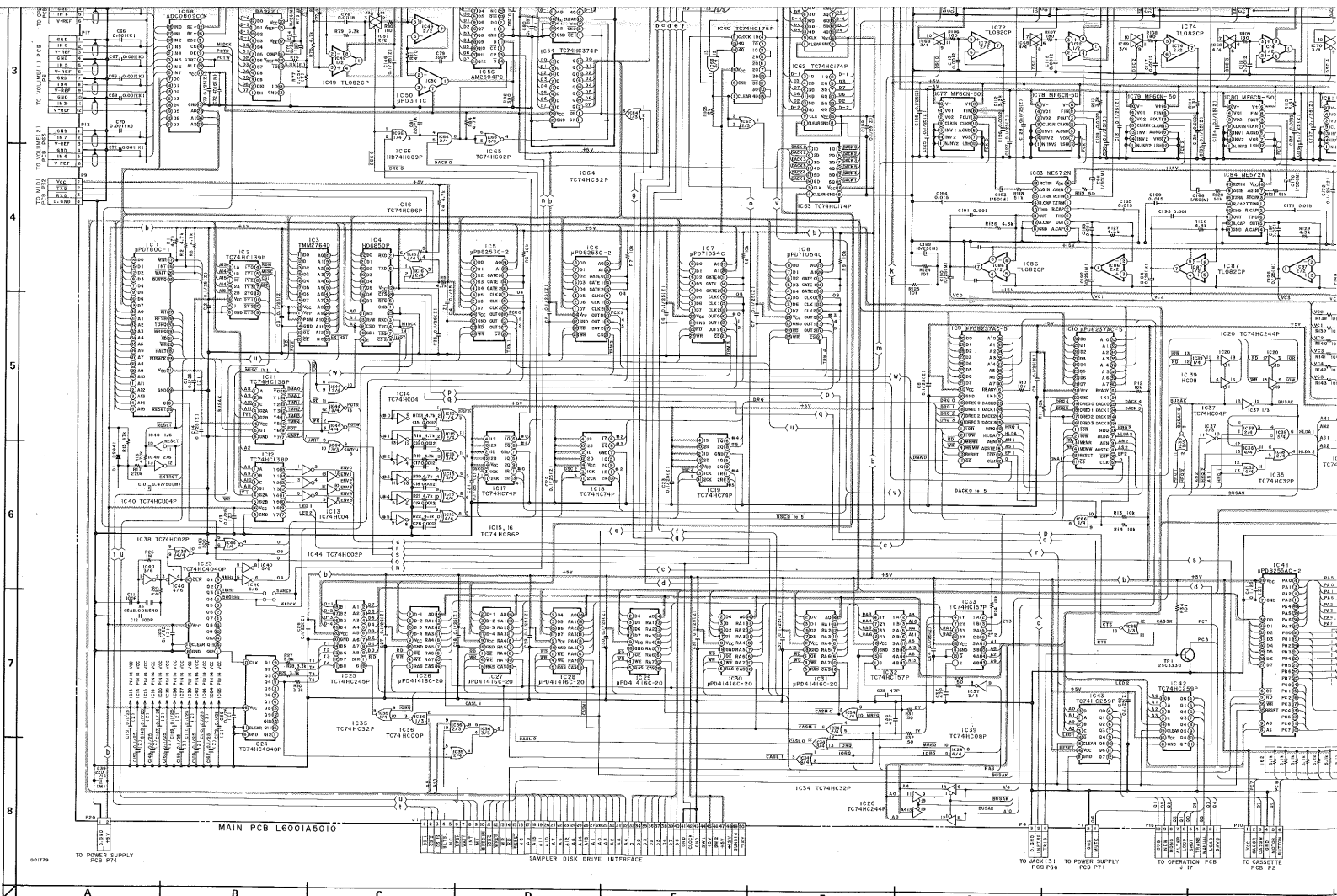**TC74HC374 [3 STATE OCTAL D-TYPE FLIP-FLOP] (IC54)**

FUNCTION TABLE

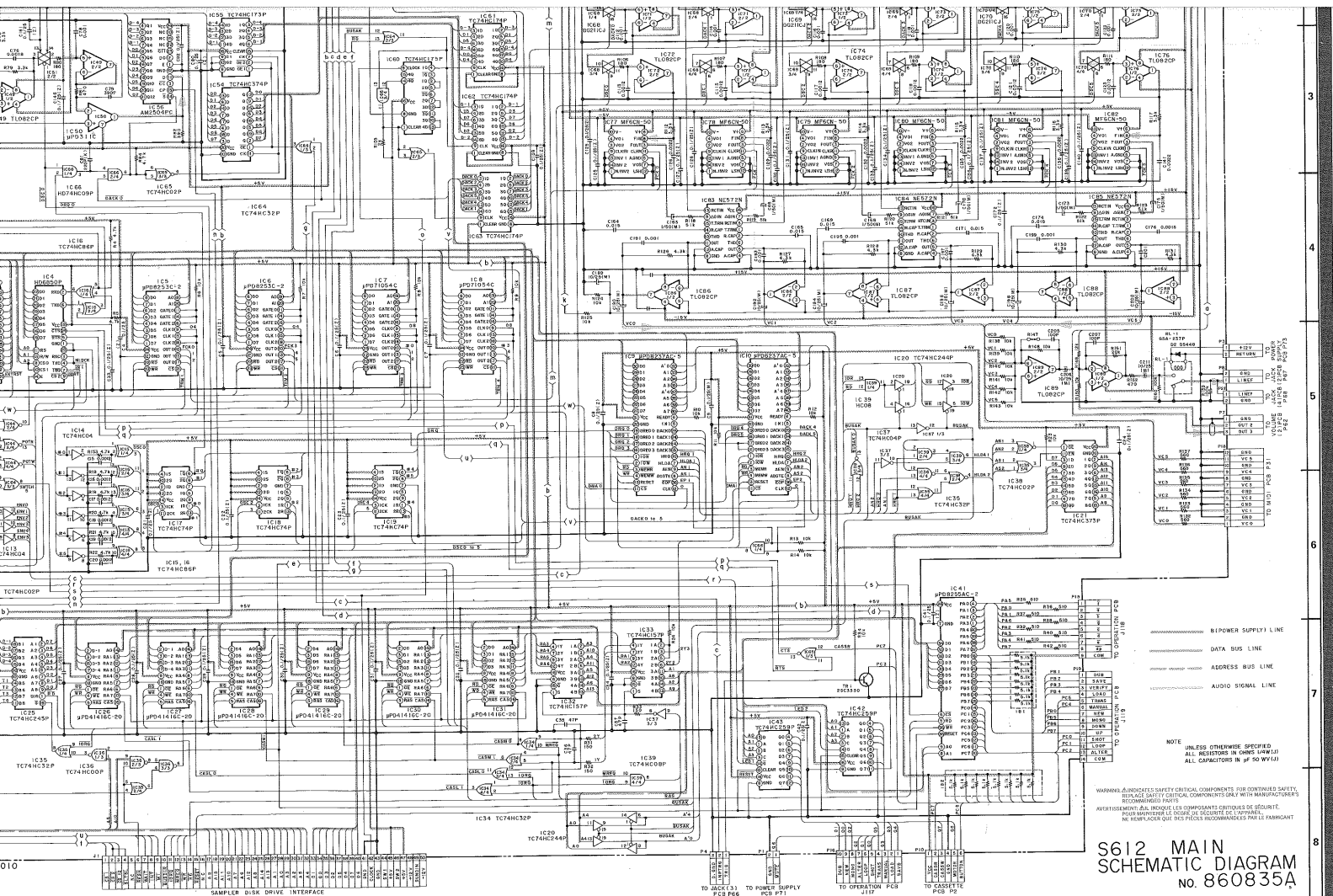| Output Control	Clock	Data	Output
L	↑	H	H
L	↑	L	L
L	X	X	Q0
H	X	X	Z

S612

MAIN PCB L600IA50I0

SAMPLER DISK DRIVE INTERFACE

S612 MAIN
SCHEMATIC DIAGRAM
NO. 860835A

C   D   E   F   G   H   I   J   K

51-1/2
2IICJ

FEED BACK

SUPED

IC52
MF10CN

IC49-1/2
TL082CP

IC51-1/2
DG2IICJ

IC49-2/2
TL082CP

LPF

COMP

IC46-2/2
82OP

FCK 0

DSC0

IC50
µPC311C

ENV 0 to 5

STB   IC90   STB   IC91   STB   IC92   STB   IC93   STB   IC94   STB   IC95
BA9201   BA9201   BA9201   BA9201   BA9201   BA9201

D0 ~ D7   D0 ~ D7   D0 ~ D7   D0 ~ D7   D0 ~ D7   D0 ~ D7

D/A   D/A   D/A   D/A   D/A   D/A
CONVERTER CONV. CONV. CONV. CONV. CONV.
10   10   10   10   10

IC61
74HC174P

D0,1,4,5

D-3,4

IC67
BA9221

D0

D11

D/A
CONV.

F.F

D0

I/O

IC57
BA9221

IC56
AM2504C

Q1

Q12

D11

BUFFER

TR4,5,6,7

IC68-1/4   IC71-1/2   IC68-3/4   IC72-2/2   IC77
DG2IICJ   TL082C   DG2IICJ   TL082C   MF6CN-50

S/H   AMP   LPF   VOICE 1

DACK 0   DSC0   FCK 1

IC62
74HC174P

D2,3,6,7

D-1,2

F.F

VOICE 2   VOICE 2

DACK 1   DSC 1   FCK 2

A/D CONVERTER

IC54 74HC374P   IC55 74HC173P

1D ~ 8D   1D ~ 4D

1Q ~ 9Q   1Q ~ 4Q

IC14
TC74HC04

IC15,16
TC74HC86P

DSC0 to DSC5

VOICE 6   VOICE 6

DACK 5   DSC 5   FCK 6

DACK 0 to 5

F.F

IC63
74HC174P

D0 to 7   D-1 to
D-4

DATA BUS

IC83
NE572N

IC86-1/2
TL082CP

R138

VOICE 1

VCA 1   AMP

RECT IN

RECT IN

R139

VOICE 2

VCA 2   AMP

IC89-2/2
TL082CP

IC89-1/2
TL082CP

MONITOR

R132 to 137

P18   VOICE
OUT

AMP   AMP

VR(1)
VR(3)
PCB

P6   FRONT
LINE OUT

P21   REAR
LINE OUT

RL-1

DO to 7   DO to 7   DO to 7   DO to 7   DO to 7   DO to 7   DO to 7   DSC 0 to 5

IC3
TMM2764D

IC4
HD6850P

IC5
µPD8253C
-2

IC6
µPD8253C
-2

IC7
µPD71054C

IC8
µPD71054C

IC9
µPD8237AC-

IC10
µPD8237AC-

EP-ROM

RDX

TXD

MIDI
INTER
FACE

OUT 0 to 2
to
OUT 2

OUT 0
to
OUT 2

DRQ0 DACK0

DRQ0 DACK0

IR
2R

IC17 to 19
74HC74P

RECT IN

VOICE 6

VCA 5   AMP

IC85
NE572N

IC88-2/2
TL082CP

R148

MIX

CLK 0 to 2   CLK

OUT 0 to 2

COUNTER

A0~A12

O4   CLK

OUT 0 to 2

COUNTER

A0, A1

O8   CLK

COUNTER

A0, A1

O8   CLK

COUNTER

A0, A1

DRQ3 DACK3

DMA

DRQ1 DACK1

DMA

1Q

2Q

RS/RW/CS

A0,1,2

FCK
0 to 2

FCK
3 to 5

DRCK0 to 3

DRCK0 to 3
4,5

DRCK4,5

A0 to 7   A0 to 7   FCK 0 to 5   DSC 0 to 5

ADDRESS BUS

IC25
TC74HC245P

IC26
µPD41416C-
20

IC27
µPD41416C-
20

IC28
µPD41416C-
20

IC29
µPD41416C-
20

IC30
µPD41416C-
20

IC31
µPD41416C-
20

IC32
TC74HC157P

IC33
TC74HC157P

A3 to 6
A10 to13

A1,2
A8,9

A1,2
A8,9

A0 to 3   A0 to3   A0,A1

RA1   RA1   RA1   RA1   RA1   RA1   1A~4B   3A~4B

1Y   3Y

A~D

IC43
TC74HC
259P

A~D

IC42
TC74HC
259P

Q0   Q0

TRG

PC3

TR1

PA 0

PA 7

B

P19

MIDICH

EXT TRIGER
J63
TRIG

IC57 BA9221
I8
I/O
DII

IC56 AM2504C
D
I1
Q12

A/D CONVERTER

IC62 74HC174P
1D
1Q
6D
6Q
F.F

D2,3,6,7
D-1,2

D11
D/A CONV.

TR4,5,6,7
DACK 6

DACK 1

IC14 TC74HC04
IC15,16 TC74HC86P
DSC 0 to DSC 5

DACK 5

DACK 0 to 5

IC63 74HC174P
F.F

END VR2 P12,13,17
START/ SPLICE VR1
IC98 ADC0809CCN A/D CONV.
IN0 to IN7
D0
Q1
A0
A1
A2

DATA BUS

TUNE
DEPTH
DELAY
SPEED

LFO

DECAY
FILTER VR7

OUTPUT

IC1 μPD780C-1 CPU
4MHz
D0
D7
φ6
A0~A15

A0 to A15

D0 to 7
DD~7
IC3 TMM2764D
EP-ROM
A0~A12
A0 to 12

D0 to 7
DD~7
IC4 HD6850P
RDX
TXD
MIDI INTER FACE
RS/RW/CS0
A0,1,2

D0 to 7
DD~7
IC5 μPD8253C -2
CLK 0 to 2
04 CLK
OUT 0 to 2
COUNTER
A0, A1
A0,1

D0 to 7
DD~7
IC6 μPD8253C -2
04 CLK
OUT 0 to 2
COUNTER
A0, A1
A0,1
FCK 0 to 2

D0 to 7
DD~7
IC7 μPD71054C OUT 0 to OUT 2
08 CLK
COUNTER
A0, A1
A0,1
FCK 3 to 5

D0 to 7
DD~8
IC8 μPD71054C OUT 0 to OUT 2
08 CLK
COUNTER
A0, A1
A0,1

D0 to 7
DD~7
IC9 μPD8237AC- 5
DRQ0 DACK0
DRQ3 DACK3
DMA
A0 to 7
DRQ0 to 3
DACK0 to 3

D0 to 7
DD~7
IC10 μPD8237AC- 5
DRQ0 DACK0
DRQ1 DACK1
DMA
A0 to 7
DRCK 4,5

DSC 0 to 5
VOIC
R
VOIC
R
VOIC
VOIC

A3 to 6 A10,11,15
A1,2 A8,9

1R 2R IC17 to 19 74AC74P
1Q 2Q
FCK 0 to 5

ADDRESS BUS

8MHz CLOCK
X1
IC23 TC74HC4040P
Q1
IC24 TC74HC4040P
Q4
IC25 TC74HC245P

IC40-3/6 TC74HCU04P
CLK Q12
COUNT DOWN
CLK Q1
COUNT DOWN
B5 B8
TIMER
A1~A8 B1~B4
D0 to D8 D-1 to D-4

A0
A0
IC26 μPD41416C- 20
RA1 RA6
6
DRAM
D1~D4
D-1 to D-4

A0
A0
IC27 μPD41416C- 20
RA1 RA6
6
DRAM
D1~D4
D-1 to D-4

A0
A0
IC28 μPD41416C- 20
RA1 RA6
6
DRAM
D4~D7
D-1 to D-4

A0
A0
IC29 μPD41416C- 20
RA1 RA6
6
DRAM
D4~D7
D-1 to D-4

A0
A0
IC30 μPD41416C- 20
RA1 RA6
6
DRAM
D0~D3
D-1 to D-4

A0
A0
IC31 μPD41416C- 20
RA1 RA6
6
DRAM
D0~D3
D-1 to D-4

1A~4B
IC32 TC74HC157P
1Y 4Y
DATA SELECTOR

3A~4B
IC33 TC74HC157P
3Y 4Y
DATA SELECTOR

TC7
LED1

DATA BUS

MIDI IN P9
IC16-1/4 TC74HC86P
5 6

MIDI OUT P9
3 1
IC16-2/4

IC12 LED1,2

D2

OVER DUB
NEW
MONO POLY

S612 MAIN
BLOCK DIAGRAM
NO. 860836A

MIDI DIGITAL SAMPLER

MODEL S612

SAFETY INSTRUCTIONS

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 Mohms, but for equipment with external antenna terminals (tuner, receiver, etc.) and is intended for C or A, specified insulation resistance should be more than 2.2 Mohms (ground terminals, microphone jacks, headphone jacks, line-in-out jacks etc.)

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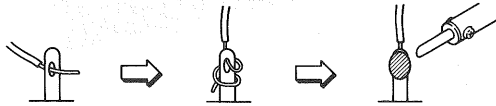
6. Observe that wires do not contact heat producing parts (heatsinks, oxide metal film resistors, fusible resistors, etc.).
7. Check that replaced wires do not contact sharp edged or pointed parts.
8. Also check areas surrounding repaired locations.
9. Use care that foreign objects (screws, solder droplets,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

Voltage conversion
Models for Canada, USA, and Japan are not equipped with this facillity. Each machine is preset at the factory according to its destination, but some machines can be set to 110V, 120V, 220V or 240V as required.
If your machine's voltage can be converted:
Before conmnecting the power cord, trun the VOLTAGE SELECTOR located on the bottom panel with a screwdriver until the correct voltage is indicated.

220V┐ ┌240V

VOLTAGE SELECTOR
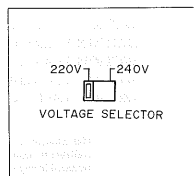
SECTION 1
OPERATING MANUAL

TABLE OF CONTENTS

Controls

MONITOR Control
This control adjusts the monitor level while sampling a live sound. The monitor level is not affected by the output LEVEL control. When sampling by microphone and the monitor level is too high, "howling" may result.

MIDI CH. Display
Normally, this will indicate the **MIDI** reception channel. However the display will light up to confirm proper operation when saving, verifying and loading tone data.
* When the power is on, the display will show "0" (omni on). When the unit receives **MIDI** signals, such as key-on, key-off, etc., the display will brighten momentarily.

LOOPING Button
Press this button to set the scanning mode to looping. The LED indicator will light.

ONE SHOT Button
Press this button to set the scanning mode to one-shot. The LED indicator will light.

Save Load Indicator
The **SAVE, LOAD** LED will light when the respective function has been selected.

END Point lever
This lever sets the end-point of the sampled sound.

MANUAL SPLICE Button
Press this button to set a splicing point manually. The LED indicator will light.

TUNE Control
The sampled sound can be fine tuned using this control. It will also serve as a pitch control when replaying sampled sound.

REC LEVEL Control
This control adjusts the recording level of the incoming signal.

REC LEVEL Indicator
Shows the recording level which can be adjusted by the **REC LEVEL** control.

START/SPLICE Lever
This lever sets the start/splice point of the sampled sound.
Note: Normally, this lever sets the starting point. However, when the **MANUAL SPLICE** button is pressed, it will set the splicing point.

LFO, SPEED, DEPTH, DELAY controls
A vibrato effect can be added to the sampled sound by using the LFO.

SPEED — Adjusts the speed of the vibrato.
DEPTH — Adjusts the depth of the vibrato.
DELAY — Adjust the delay time of the vibrato.

LINE OUT Jack
The monitor/output signal of the S612 appears at this **LINE OUT** jack, which can be connected to the line input of mixers or amplifiers.
* Connect a standard 6.3 mmφ phono plug to this jack.
Note: This jack is connected in parallel with the **LINE OUT** jack on the rear panel.

ALTERNATING Button
Press this button to set the scanning mode to alternating. The LED indicator will light.

POWER Switch
Use the **POWER** switch to turn the power on and off.
Note: Do not attempt to connect the sampler disk drive MD280 after the S612 has been turned on.

REC TRIGGER Jack
This jack allows the use of a foot switch to trigger the sampling process.
Note: Connect a standard 6.3 mmφ phono plug to this jack. Use the Akai PS-X80 or the circuit is opened when the connected switch is pushed down.

KEY TRANS Button
Press this button to transpose the sampled sound. The LED indicator will light.

MIC INPUT Jack
This jack is used for sampling from a microphone or a electric guitar. The input sensitivity is —63 dB. Connect a standard 6.3 mmφ phono plug to this jack.

NEW Button
Press this button when you make a new sample.
* The previous sample will be erased.

SAVE Button
Press this button to save the sound data in the S612 onto disk or tape.

MIDI CHANNEL UP Button
Press this button to increment the **MIDI** channel number.
* Pressing once increase the channel by one. Pressing the button while "9" is displayed on the **MIDI CH.** display will forward the display to "0".

LEVEL Control
This control adjusts the output level of the sampled sound. The monitor level is not affected by the output LEVEL control.

LINE INPUT Jack
This jack is used for sampling the line out from keyboards or audio equipment, etc. The input sensitivity is —27 dB. Connect a standard 6.3 mmφ phono plug to this jack.

Note: When both MIC and LINE input jacks are used, the MIC input has priority.

OVERDUB Button
Press this button when you wish to overdub one or more sounds.
* You can overdub many times.

MIDI MONO/POLY Mode Select Button
This button is used to switch between the **MIDI** mono and poly modes. The indicator lights when the mono mode is set.

MIDI CHANNEL DOWN Button
Press this button to lower the **MIDI** channel number.
* Pressing once decreases the channel by one. Pressing the button while "0" is displayed on the **MIDI CH.** display to "9".

VERIFY Button
Press this button to verify the sound data saved on disk or tape.

LOAD Button
Press this button to load the sound data, saved on disk or tape, into the S612.

DECAY Control
This control adjusts the decay effect of the sampled sound. Turning the knob clockwise will increase the decay time after key-off.

FILTER Control
This control adjusts the low-pass filtering on the sampled sound. The replayed sampled sound will become mellower as the control is turned towards the **LOW** position.

MIDI OUT Jack
This jack is for sending MIDI system exclusive information to other MIDI equipment.

MIDI THRU Jack
This jack provides a direct copy of data coming in the MIDI IN jack.

MIDI IN Jack
This jack is for receiving MIDI information from other MIDI equipment.

VOICE OUT Jack
The six voices of the S612 can be individually accessed through this jack.

LINE OUT Jack
The monitor/output signal of the S612 appears at this LINE OUT jack, which can be connected to the line input of mixers or amplifiers.
* Connect a standard 6.3 mmφ phono plug to this jack.
Note: This jack is connected in parallel with the LINE OUT jack on the front panel.

DC OUT Jack
This jack provides a DC power supply [8 V] for the MD280.

Commodore Cassette Recorder Connector
This connector allows the S612 to save/load sound data to/from a commodore cassette recorder.

MD280 connector (MD280 ONLY)
This connector is specially designed for connection of the Sampler Disk Drive MD280, and is used for save/load operation onto sampler disks.

Connections

The S612 is a MIDI digital sampler which will function only if input information is received at MIDI-IN. Ensure that all the correct connections have been made between the MIDI-IN and MIDI-OUT of the S612 and any keyboards (such as the Akai AX80) or sequencers. Obviously, unless a sound is being input or a sample has been loaded into the S612, it will not reproduce any sounds. The S612 will not "remember" any data after it has been switched off.

Diagram 1

Speaker
Amplifier
Mixer/recorder
Effector device
Keyboard amplifier
to other MIDI equipment
to Personal computer
S612 rear panel
MIDI OUT
DC power supply
Sampler Disk Drive MD280
MIDI Keyboards

Diagram 2

Record/Cassette/CD
Electric guitar
S612 front panel
MIC
Mixer/amplifier
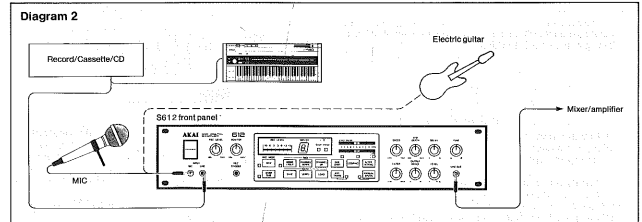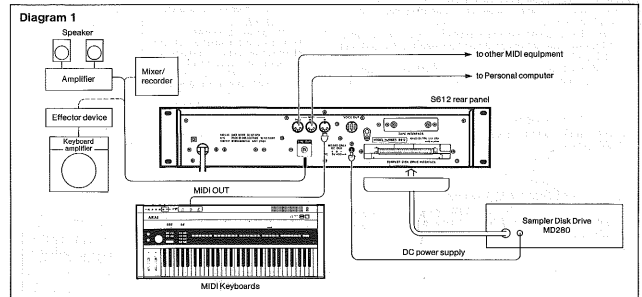
Sampler Disk Drive MD280

The Sampler Disk Drive MD280 (optional) is the device which quickly and accurately saves the sound data. The format of 2.8" disk makes the filing space very compact.

Note: If the MD280 is to be used, it should be connected with the S612 before switching on the S612. Any sampled data in the S612 will be lost if the MD280 is plugged in or unplugged while the S612 is switched on.

Sampling

PREPARATIONS

Before Turning the Power On

Make sure the various connections with **MIDI** and audio equipment have been completed before turning the power of the S612 on. (Refer to the chapter concerning connection with external equipment on page 6.)

When using the specially designed MD280 Sampler Disk Drive, ensure that the correct connections between the MD280 and the S612 have been made.

Note: Connecting the MD280 while the S612 is switched on will result in the loss of sound data sampled in the S612.

Connections to Input

Connect the sound source that you want to sample to the **MIC** or **LINE INPUT** jacks.

Adjustment of Recording Level

Set the recording level by the **REC LEVEL** control. To obtain the best results in sampling, bring the level close to "+3" on the **REC LEVEL** indicator.

Monitor Level

Use the **MONITOR** level control when monitoring the sound source to be sampled. When using a microphone, feedback may occur if the monitor level is too high.
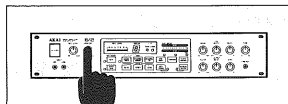
Designation of the Sampling Frequency

This brief outline may help to clarify some different aspects of sampling technique:

Are you trying to reproduce (a) high or (b) low frequency sounds?

(a) To faithfully reproduce high frequency sounds, a faster (therefore, shorter) sampling time will be required.

The S612 can be "instructed" to accept a wider bandwidth sample by pressing a higher note on the **MIDI** keyboard prior to making the sample; see Table #1.

(b) The reproduction of lower frequency sounds, typically much longer in duration, will require a longer sampling time.

The S612 can be "instructed" to accept a long sample by pressing a lower note on the **MIDI** keyboard prior to making the sample; see Table #1.

(c) For accurate reproduction (pitch) of a sampled sound it is necessary to first press the same note on the **MIDI** keyboard as that being sampled.

This process can be extended to allow for pitch transposition if required.

Table 1

Equipment to be connected.	Input.	Input Sensitivity.
Equipment or devices, such as guitars or microphones, have low output levels.	MIC	−63 dB
Audio equipment, such as televisions, cassette tape decks, CD players, tuners or preamplifiers, or musical instruments, such as synthesizers or electric keyboards have higher output levels (line level).	LINE	−27 dB

Note: When both the **MIC** and **LINE INPUT** jacks are connected, the **MIC** jack overrides **LINE** jack.

Example: Press A2 (lowest A) on the **MIDI** keyboard, then play (sample) A3 (A string) on a guitar. Now when A3 is played on the **MIDI** keyboard the actual pitch of the reproduced note will be A4: The pitch has been transposed up by one octave.

This technique can be used to transpose from 1/2 stops through to several octaves if required.

Note: If the **MIDI** keyboard or the S612 have just been switched on and no key has been pressed before sampling, the S612 will automatically designate C4 as the desired pitch.

Key No.	C2	C3	C4	C5
MIDI Note No.	36	48	60	72
Sampling Frequency	4 kHz	8 kHz	16 kHz	32 kHz
Sampling Time	8 sec.	4 sec.	2 sec.	1 sec.

Note: Although only four (4) keys are depicted, other keys may be selected if intermediate frequencies are desired.

Sampling

1. Once you have adjusted the recording level and designated the desired sampling frequency, you are ready to sample. Press the **NEW** button. The LED indicator will light. This indicates that the unit is standby for sampling.
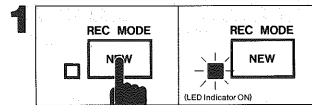
2. Using a microphone, make a sample. Say "ahh..." for example. The LED indicator should start blinking from the moment you begin speaking into the microphone. After blinking for the length of time of the designated sampling frequency, the LED indicator will go out automatically. This indicates the completion of the sampling process.
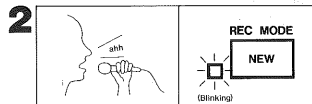
Automatic Trigger

Because the S612 contains an automatic trigger circuit, it will automatically start the sampling process when the sound level reaches a certain preset level. You will notice that the unit may start off the process prematurely by picking up surrounding noise when the sampling is done through a microphone. On the other hand, when the recording level is too low, the sampling process may not begin because the sound level is not high enough to trigger the circuit. In which case, after increasing the recording level, reset the unit by pressing the **NEW** button again to get it into the standby mode, then start sampling.

Cancelling the Sampling Standby Mode

To cancel the sampling standby mode, press the **NEW** button again. The **LED** will go out.

3. Thus, sampling has been completed. This sampled sound data will be maintained until either the power is turned off, the process is repeated for another sampling or other sampled data is loaded from the disk (tape).
   * If necessary, save the sound data for later use with the specially designed Sampler Disk Drive MD280 (optional). Refer to page 22.

4. You should now be able to enjoy six-voice polyphonic, velocity touch sensitive sounds, from the S612, by playing **MIDI** keyboard instruments.

Note: All six voices may not be able to be heard when music is played mostly on the keys around the fifth octave (the highest octave range for the AX80). This is not a defect in the unit.

5. After connecting the **MIDI** keyboards, if sampling is done without any keys being pressed down, the sampling frequency will be set at 16 kHz with a sample time of 2 seconds.
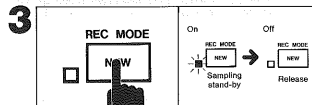
Cautions when Designating the Sample Frequency

1. Because the last key to be pressed down will determine the sampling frequency, if connected with **MIDI** keyboards, make sure to press down the key to designate the frequency before going through the sampling process.

2. The range of the keys to which a sampling frequency can be designated is between **MIDI** key number 36 (C2) and 72 (C5). The keys out of this range are invalid.

Overdubbing

By means of pressing the **OVERDUB** button instead of the **NEW** button for the above mentioned sampling process, you are able to overdub a newly sampled sound without erasing the previously sampled sound.

Let's try to overdub (ohh...) as a second sound over the first sound (ahh...). The setting-up process is identical to the previous chapter for sampling (Refer to page 8).

1. After adjusting the recording level and designating the sampling frequency, press the **NEW** button. Sample your voice (ahh...).

1

```
REC MODE
  NEW
 [ ]          ahh
```
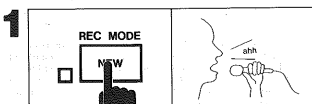
2. You are about to overdub (ohh...) on (ahh...), which you have just sampled. (It is possible to designate the sound to a different frequency.) Press the **OVERDUB** button. The **LED** next to the button will light. This indicates the unit is in standby for overdubbing.

2

```
 [ ]  OVER        [ ]  OVER
      DUB              DUB
                 LED Indicator On
```
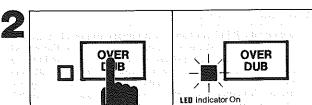
3. Say (ohh...) into the microphone. From the moment you started to say (ohh...), the LED should start blinking. This blinking indicates overdubbing is in progress. After blinking for the length of time equivalent to the designated frequency, the LED will go out automatically.

3

```
      OVER   →    [ ]  OVER
      DUB              DUB
 Blinking        LED Indicator Off
```
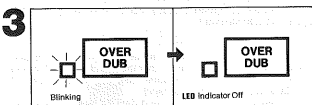
4. Thus, the overdubbing process has been completed. When you play the **MIDI** keyboard, you should be able to hear the combined sounds of (ahh...) and (ohh...).
   Overdubbing can be done as many times as you wish.
   Note: Once the overdubbing is done, there is no way to single out the individually sampled sounds. We, therefore, recommend that you store and save the individual sounds on disk if they are needed for later use.

OVERDUB SOUND LEVEL
As with any overdubbing process, there will be some attenuation (reduction) of previously recorded material (approximately −6 dB) for each "take".
If it is desired that the combined sounds are to be of equal level when replayed, then, the last sound to be sampled should be recorded at a lower level to compensate for the attenuation of previous samples.

Sampling by Rec Trigger

Although the S612 contains an automatic trigger system, it is possible to start sampling at any desired time by connecting a foot switch to the **REC TRIGGER** jack, (it can be used for overdubbing as well.)

This **REC TRIGGER** feature becomes eapecially useful and effective in situations where the sound is slow in reaching the required trigger level, and therefore, "its" initial attack may not be sampled.

1. Connect the Akai PS-X80 foot switch to the **REC TRIGGER** jack.
   * In this case, the automatic trigger system will be overridden.
   * Use a foot switch of the type shown below, if you do not use the Akai PS-X80 foot switch.

   Normal (closed)
   Press Down (open)

1

```
            AKAI        S612
 [=====]
 PS-X80
 Foot switch
```
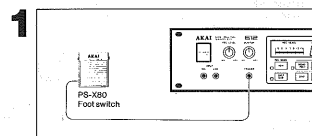
2. The setting-up process is identical to the chapter for sampling (Refer to page 7). After adjusting the recording level and designating the sampling frequency, press down the **NEW** button (or **OVERDUB** button). The **LED** next to the button (either **NEW** or **OVERDUB**, depending on the process you are using), should light. This indicates the unit is ready for sampling (or overdubbing).

2

```
 LED On       LED Blinking      LED Off
 REC MODE     REC MODE          REC MODE
   NEW    →     NEW      →        NEW
 [ ]          [ ]               [ ]
 Sampling     Start of          Finish of
 stand-by     sampling          sampling
     REC TRIGGER
     switch on
```
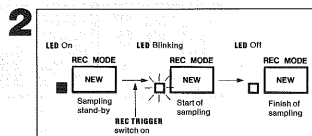
3. Sampling (or overdubbing) is initiated by pressing the foot switch connected to the **REC TRIGGER** jack.

EDIT

Edit
The S612 contains various editing functions so that sampled sounds can be applied more effectively for your musical expressions. These functions include the following:

- Scanning
- LFO
- Output
- Transpose
- Tune

Scanning ——————————————————————————— LFO

——— Tune

Transpose —————————————————————————— Output
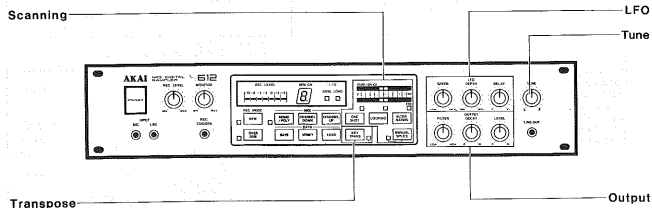
1. SCANNING
This is the function that is controlled by the "START POINT" and "END POINT" levers, in conjunction with the "ONE SHOT", "LOOPING" and "ALTERNATING" mode buttons, that enables you to decide how the sample will be replayed.

2. LFO
It is possible to add a vibrato effect to sampled sounds.

3. OUTPUT
It is possible to control the degree of mellowness of the sampled sound (FILTER). It is also possible to adjust the length of time the note sounds after the key-off (DECAY).

4. TRANSPOSE
It is possible to transpose the samples.

5. Tune
It is possible to tune the samples up or down within the range of ±100 cents.

When saving to disk, the editing parameters will also be stored along with the sampled data, therefore, when the sampled data is retrieved (loaded) from disk, it is ready for playing in its' original, edited form, until/unless the editing control(s) is/are readjusted. For example, if a sound, which has been edited, using the LFO, to contain a very deep vibrato, is saved to disk and then, at some later date is loaded back into the sampler, even though, in the meantime, the LFO controls may have been reset to minimum, that sound will still contain a deep vibrato. However, if any of the LFO controls are adjusted after the sample has been loaded, they will again affect the character of the sound. This superior feature enhances the "useability" of the S612 Digital Sampler.

Note: The output LEVEL control is not a programmable parameter.

Scanning

The S612 stores sampled sounds in memory IC's in digital data form and reconstructs the pitch by altering the speed at which the memory data is read. It works on the same principle as a tape recorder. The pitch changes according to the tape speed. However, because sounds are recorded differently in memory IC's than on tapes, it is possible for us, using the internal computer of the S612, to control the ways in which the data in the memory IC's is read. In other words, it is possible to designate the point at which the S612 starts reading or stops reading the data in the memory IC's; to make a loop, or to reproduce a reverse version. We call these functions "Scanning".

Normal Setting
In order for the scanning functions to be easily understood, let's suppose a situation where we have sampled a phrase "Good Morning". Picture also the situation where the phrase "Good Morning" is stored in digital data form in the memory ICs of the S612, as seen in the diagram. In the normal setting, scanning is done from truncating front to the truncating rear all the way through. This means that with a key-on, the sampled phrase "Good Morning" will be played, and there will be no more sound. In this case, even if the key is held down, there will be no sound after the phrase "Good Morning" is played once.
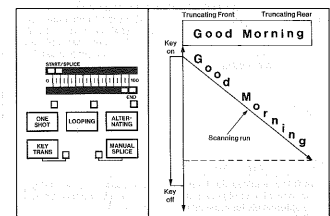
Starting Point and Ending Point
Starting Point
By adjusting the START/SPLICE lever, it is possible to set a starting point (the point where the S612 starts replaying from the memory ICs) at any desired point.
For example, if you choose "Morning" to be the starting point, after sliding the lever to the appropriate position, the "Morning" portion of the phrase will be replayed when a key is pressed, as seen in the diagram.
Note: Re-trigger a key each time the lever is moved to determine (hear) the new starting point.
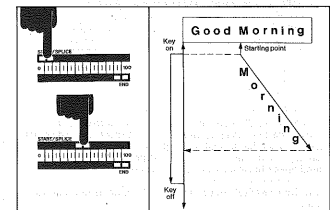
The START/SPLICE lever has two (2) functions.
Normally (if the MANU. SPLICE button has not been pressed), the START/SPLICE lever has the function of setting a starting point. On the other hand, when the S612 is in the manual splicing mode (the MANU. SPLICE button having been pressed), the lever has the function of setting splicing point. (See Page 15)

Ending point
By adjusting the END POINT control, it is possible to set an ending point (the point where the S612 stops replaying from the memory ICs) at any desired point.
For example, as seen in the diagram, by adjusting the control to the appropriate point, only "Good" will be played when a key is pressed.
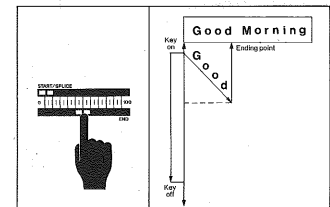
Playback of Reverse Version

If you set the two levers so that the **END** point lever is positioned before the **START** point lever, the playback will be reversed. For example, as seen in the diagram, when the set up is done with the start point at the truncating rear and with the end point at the truncating front, the reverse version "gninroM dooG" will be played when a key is pressed. It follows, therefore, that it is possible to replay any desired portion of the sample in reverse.

Note: Although the **START** and **END** point levers may be reversed, it is not possible to **SAMPLE** in reverse. A sound can only be recorded as it occurs naturally (in its' original form) even through, once sampled, it can be reproduced in reverse.
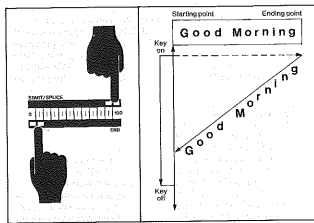
Scanning Mode

The S612 employs the latest computer technology so that it is not only able to play sampled sounds, but can also be used very extensively for musical application.

The following are three special scanning modes:
* One-Shot
* Looping
* Alternating

One-Shot mode

In the "One-Shot" mode, the S612 functions as an ordinary sampling device. For example, when it is set as shown in the diagram (the same as the normal setting), the sampled sound "Good Morning" will be played when a key is pressed. There will be no sound thereafter, even if the key is held down.

With the one-shot mode, scanning is done in the following order.

Starting point → Ending point
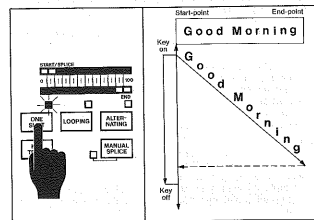
Looping Mode

In the **LOOPING** mode, the setting up of a loop automatically (automatic splicing system) or manually (manual splice mode) within the S612's memory IC's makes it possible for the sampled sound to be played continuously. With this mode, playing the continuous sounds of strings, brasses, chorus, etc., becomes possible. (The sound starts when a key is pressed and will play continually until the key is released.) This makes the application of the S612 very extensive by opening up more paths for your musical expression.

Automatic Splicing System

The S612's looping function makes it feasible, by fully applying today's computer technology, to search out and automatically "Splice" any point ("Splicing Point") of the sample instantaneously. This has been said to be very difficult and time consuming without the aid of the computer.
*   The term "Splicing" is used when joining two audio tapes together with a special adhesive tape to make one continuous tape when editing is necessary. Similarly, we call the restarting point of a scanning loop a "Splicing Point".

The moment the **LOOPING** button is pressed, the automatic splicing system of the S612 finds the most appropriate splicing point of the sampled sound. For example, as seen in the diagram, when the **LOOPING** button is pressed, with the **START/END** point levers in the normal position, the key-on (when a key is pressed) will start the sampled phrase "Good Morning". After "Good Morning" is played once, "ing" will repeat continuously until the key-off (the key is released). This means that the S612's computer selected "O" as the beat splicing point.

In the **LOOPING** mode, the scanning is done in the following order:
Starting point → Ending point → Splicing point
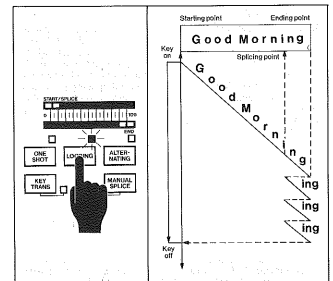
Note: The automatic splicing point is referenced to the position of the **END POINT** lever. Therefore, if the sampled sound does not utilize all of the available memory the computer will be attempting to replay (loop) an "empty" memory; = no sound! This situation can be remedied by repositioning the **END POINT** lever, making a longer sample or, shortening the sample time.
Some sound will not loop well. Sounds which are not produced by musical instruments (human voices, effects and so on) or, with erratic or staccato-like sounds which contain much variation, some noise (splicing noise) may be heard. This is not a defect. Experimentation may be necessary with some sounds. The automatic splicing system will be overridden if the **MANUAL SPLICE** mode is selected.

Alternating Mode

The **ALTERNATING** mode is based on the same idea as the **LOOPING** mode where a loop is built by scanning. But it is different from the **LOOPING** mode in the way the loop is built. For example, as seen in the diagram, when the **ALTERNATING** button is pressed, with the **START/END** point levers in the normal position, the key-on will start the sampled phrase "Good Morning". After "Good Morning" is played once, "gni" then "ing" will be replayed continually until the key-off. The scanning simply reverses direction between the end point and the splicing point.
In the **LOOPING** mode the scanning "jumps" back to the splicing point; scans only from the splicing point to the end point; does not scan from the end point to the splicing point.
This difference in scanning should be comprehended more easily in the next chapter for "Manual Splice".

In the **ALTERNATING** mode, scanning is done in the following order:
(Reverse)
Starting point → Ending point ────────→ Splicing point

Note: The **ALTERNATING** mode is very useful, especially when it comes to building the continuous sounds of strings. But there are some instances where the sound produced by the looping mode is more acceptable. Compare the **LOOPING** mode and the **ALTERNATING** mode when editing and select the continuous tone which sounds better.
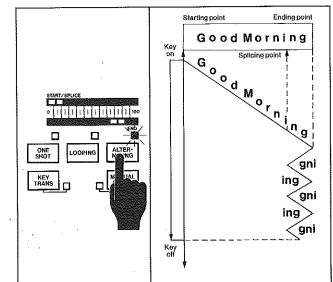
Manual Splice Mode

The S612 normally sets up a splicing point by using the automatic splicing system. However, by pressing the **MANUAL SPLICE** button, the automatic splicing system will be overridden, which makes it possible for you to set a splicing point manually. In this situation, the **START/SPLICE** lever's function is to set a splicing point and by adjusting this lever, a different splicing point may be set. For example, in the **LOOPING** mode, when the **MANUAL SPLICE** button is pressed and the splicing point is set at "Morning" by the lever, a key-on starts the phrase "Good Morning". After the phrase is played once, "Morning" will be repeated until the key-off.
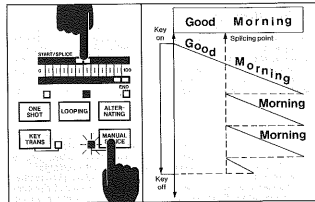
In the **ALTERNATING** mode however, a key-on starts the phrase "Good Morning". After the phrase is played once, "gninroM-Morning-gninroM" will be repeated until the key-off.

Note: The **MANUAL SPLICE** button will not function in the one-shot mode.
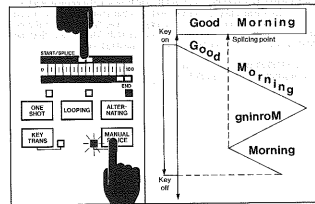
LFO

Because the S612 contains an **LFO** (Low Frequency Oscillator) circuit, it is possible to add vibrato effects to sampled sounds. The waveform of the **LFO** is ∼.

SPEED Control

This control sets the modulation rate of the LFO.
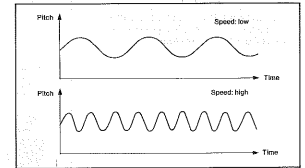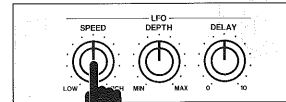
DEPTH Control

This control sets the depth of the modulation.
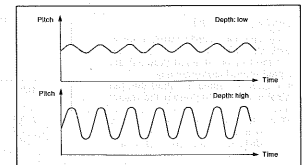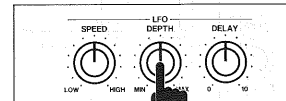
DELAY Control

This control sets the delay time of the vibrato.
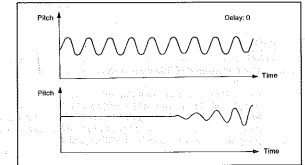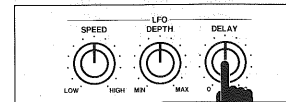
Note: The three controls for the **LFO** (**SPEED**, **DEPTH** and **DELAY**) are programmable parameters. When sounds are to be saved on disks, these data will be saved along with the sampling data.

Note: It is possible to add a vibrato effect not only with the **LFO**, but also by operating the modulation wheel on external **MIDI** keyboards. (Refer to **MIDI** on page 20.)

OUTPUT

The S612 has three **OUTPUT** controls, **FILTER**, **DECAY** and **LEVEL**.

FILTER Control
By processing the sampled sound through a low-pass filter, it is possible to give it a milder or a mellow tone.
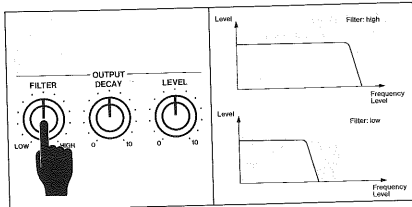
DECAY Control
By adjusting the **DECAY** control, a decay (reverb-like) effect can be added, so that when the key is released (key-off) the sampled sound fades gradually.
The higher the value (number) that the control is set at, the longer the decay effect.
NOTE: The S612 can receives decay effect by "Sustain Pedal On" data from external **MIDI** keyboards.
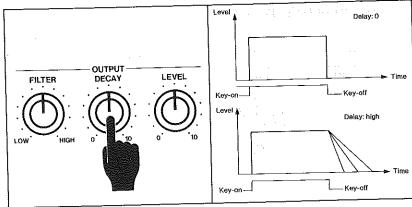
LEVEL Control
This control is for adjusting the output level of sampled sounds.
Note: The adjustment of this control does not affect the monitor level.
Of the three **OUTPUT** controls, the **FILTER** and **DECAY** are programmable parameters. When the sound data is saved on disks, they will be saved along with the sampled data, However, because the **LEVEL** data is not programmable, it cannot be saved on disks.
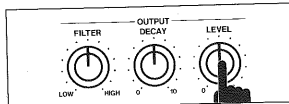
TRANSPOSE

The S612 is able to transpose sampled sounds by a half-step interval through to several octaves, so that they can be played at any desired pitch. The transposition is enabled by the **MIDI** keyboard. For example, let's transpose the sampled sound up by one octave.

Transposition
For example, let's transpose the sampled sound up by one octave.
Note: All transpositions are made relative to middle C.

● Listen to the sampled sound of C4. (Middle C)

● Press the **KEY TRANS** button. The LED indicator will start blinking.

● To move the pitch of the sound by one octave, press down the key of **MIDI** note No. 72 (C5 for AX80). The S612 does not produce any sound in this case.

Upon completion of the key-on process, the LED indicator will stop blinking and stays lit, indicating the completion of the transposition.
At this time when you press down the key of **MIDI** note No. 60, you will get the C5 sound.
The transposition for one octave up has now been completed.

If you wish to transpose to the fifth interval up, press down the key of **MIDI** note No. 67 (G4 for AX80).

When you wish to go back to the original sampled pitch, depress the **KEY TRANS** button while the **KEY TRANS** LED blinking, the transpose mode will be cancelled.
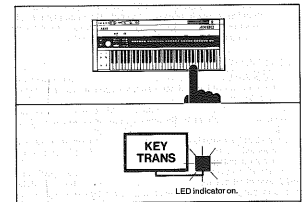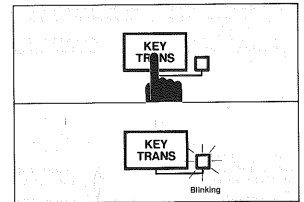
Note: The S612 must be connected to **MIDI** keyboards in order to use the transposing function.
The transposing function is programmable. When you wish to save a sound onto disk, the transposition will be saved along with the other data.

TUNING

With the S612's "Tuning" function, it is possible to freely tune a sampled sound within a range of ±100 cents (a half step), and to save the tuning parameters along with the sampled data. In other words, the data for the TUNE control are programmable.

Tuning when Sampling
When sampling, the tuning is based on the center position of the TUNE control.
1. When the sampled sound is played and the TUNE control points to the center, as shown in the diagram, the sound will be reproduced with the same pitch.
2. When the sampled sound is played, and the TUNE control is turned fully right (left) as shown in the diagram, the pitch will be a half step higher (lower).
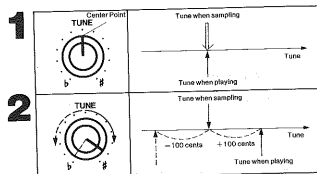
Tuning when Saving
Because the TUNE control is programable, the data to be saved on disks (tapes) will correspond to how much to the right (or left) the control is turned.
Example: If the note A is sampled and then retuned, using the TUNE control, by +100 cent and saved to disk, when the A key is pressed the note A# will be played. However, provided that the TUNE control is not reset, once the save is verified the tuning will again move by +100 cents. This means that now, when the A key is pressed, the note B will be played. It is possible to achieve the previously desired note of A# by resetting the TUNE control to the center position.
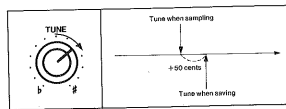
Tuning when Loading
When sound is loaded from disk (tape) the tuning will be either higher or lower than the tuning which had been saved, depending on the present position of the control.
1. When the loaded sound is played and the TUNE control is positioned in the center, the pitch will be the same as the tuning which has been saved.
2. When the loaded sound is played and the TUNE control is set at +50 cents from the center position, the sound is played +50 cents higher than the saved tuning.
When the sound data is loaded from disk (tapes), the present position of the TUNE control will add to, or subtract from, the pitch of the saved data. For example, suppose that the sample was saved 50 cents higher than the originally sampled sound and that the loaded sound is played with the TUNE control set at +50 cents. In this case, the pitch will be (+50) cents + (+50) cents = +100 cents, which is a half step higher than the original sound.
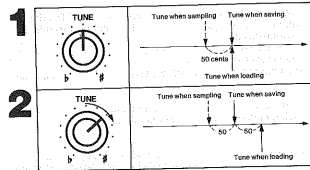
Tuning when Playing after Loading
As stated earlier, after the sound data is loaded, the pitch of the replayed sound will depend on the present setting of the TUNE control (regardless of where the TUNE control was set during loading).
For example, suppose that a sample is retuned to +50 cents and then saved to disk (tape). When that sample is loaded from disk (tape), if the TUNE control is still set at +50 cents, then the replayed sound will now be at (+50) cents + (+50) cents = +100 cents; a half step higher than the original sample. However, if the TUNE control is reset to the center position, the replayed sound will now be at only +50 cents higher than the original sample; the pitch at which the sample was saved. It follows, therefore, that if the TUNE control were to be set at −50 cents, the replayed sound will be (+50) cents + (−50) cents = 0 cent; zero change; which means that the sound will now be the same pitch as the original sample.
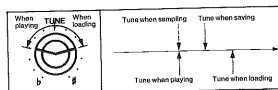
MIDI

MIDI (Musical Instrument Digital Interface)
This is the Internationally recognized standard for electronic musical instruments. It is possible for these instruments to exchange any kind of information needed for musical performance, by utilizing their MIDI connections.
The S612 is able to receive the following MIDI information through midi cables:

- Note No., Key-On, Key-Off and Key Velocity
- Sustain pedal
- Pitch bend
- Modulation wheel (vibrato)
- Mode change for Mono/Poly
- System exclusive

When the S612 receives the MIDI information, its MIDI CH display, which indicates the MIDI channel numbers, will brighten momentarily to let you know that information has been received. (If the MIDI reception channel does not match, the display shows no change.)
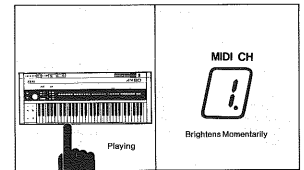
How to set the MIDI Reception Channel
1. When the power is turned on, the S612 initiates to the POLY mode of omni on. In this case, it will receive any channel and play according to the information. The digit "0" on the MIDI CH displays shows omni on.
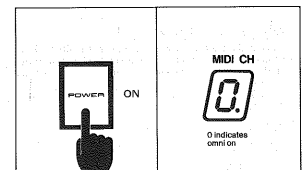
2. When you want to reselect the MIDI reception channel (1—9), press either the CHANNEL DOWN or CHANNEL UP button until you reach the desired number. In this case, the S612 receives information only on the designated MIDI channel.
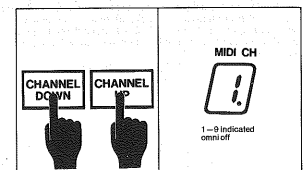
MIDI Mode

There are four **MIDI** modes possible, from combinations of the **MONO/POLY** mode and the **OMNI ON/OFF** mode.

OMNI ON, POLY mode

With this mode, the S612 will receive the MIDI information from any channel, and 6-voice polyphonic sound can be played simultaneously on a channel.
The **OMNI ON. POLY** mode is selected automatically when the S612 is turned on.
(The **MIDI CH** display shows "0" during this mode.)
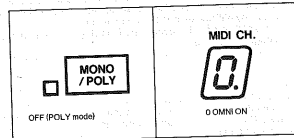
OMNI ON, MONO mode

With this mode, the S612 will receive the **MIDI** information from any channel. However, only one sound can be played at a time on any channel. Press down the **MONO/POLY** button once. (The **LED** indicator will light.)
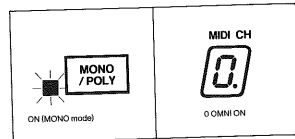
OMNI OFF, POLY mode

With this mode, the S612 will receive the MIDI information only from the channel which has been designated as the reception channel, and 6-voice polyphonic sound can be played simultaneously on a channel.
When the **MIDI CH** display numbers 1—9 are selected, the S612 is in the **OMNI OFF** mode.
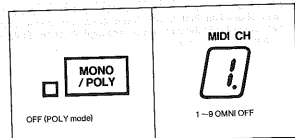
OMNI OFF, MONO mode

With this mode, the S612 will receive the **MIDI** information only from the channel which has been designated as the reception channel. When numbers 1—9 are selected, the One-voice sound corresponding to the designated channel can be played.
Also the designated channel voice can go thru the **VOICE OUT** jack.

VOICE OUT jack

MONO / POLY — OFF (POLY mode) — MIDI CH. — 0 OMNI ON

MONO / POLY — ON (MONO mode) — MIDI CH — 0 OMNI ON

MONO / POLY — OFF (POLY mode) — MIDI CH — 1—9 OMNI OFF

MONO / POLY — ON (MONO mode) — MIDI CH — 1—9 OMNI OFF
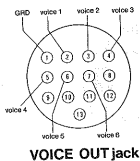
SAVE, VERIFY and LOAD

The sampled sound data can be saved, verified or loaded by the specially designed sampler disk drive MD280 (optional) or a Commodore cassette recorder.
The time it takes to save, verify or load with the MD280 is approximately 8 seconds. The Commodore cassette recorder takes approximately 120 seconds.

* The sound data is a combination of sampled and edited data.
The operation of the sampler disk drive MD280 or the Commodore cassette recorder, will be controled by the S612.
Note: Make sure the power switch of the S612 is turned off before plugging or unplugging the connection cord of the MD280.

Saving

1. Edit the sampled sound of the S612, as required, before saving.
Place the disk into the MD280 sampler disk drive.
(Make sure the tab has not been broken.)
● Press the **SAVE** button on the S612. The letter *d* will appear on the **MIDI** channel display and start blinking.

1
DATA — SAVE — VERIFY — LOAD
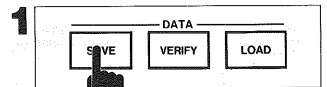
2. Press the **SAVE** button again, while the display is blinking. The *d* display remain lit and the **SAVE** LED lit, indicating that the save function is in progress.
Note: The *d* display will only blink for several seconds. The **SAVE** button must be pressed a second time while the display is blinking to activate the save function, otherwise, the **SAVE** mode will be cancelled.

2
SAVE — MIDI CH — I/O SAVE LOAD — ON
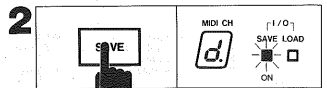
3. The **BUSY** LED on the MD280 will light indicating that a save function is in progress.
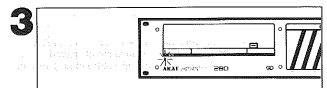
It takes approximately 8 seconds to accomplish the save. Once saving is completed, the **SAVE LED** of the S612 and the **BUSY** LED of the MD280 will go out. After save function, verify that the data has been properly saved.

3

Note: If you encounter any difficulty when trying to save, check the following, and try saving again.
* The anti-record tab has been broken from the disk.
* You are trying to save without inserting a disk in the MD280.
* The power cord of the MD280 is not connected.
* There is no sample in the S612.

Verifying

1. After the save process has been completed,
   ● Press the **VERIFY** button.

1

DATA
| SAVE | VERIFY | LOAD |
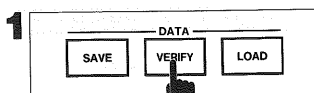
2. The letter *d* will appear on the **MIDI CH** display. At the same time, the **BUSY** LED of the MD280 will light, indicating that it is in the verifying process.

2

MIDI CH

d.

AKAI
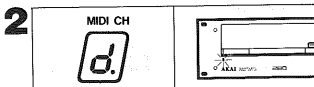
3. The verifying process takes approximately 8 seconds. If the data has been correctly saved, the letter *G* on the **MIDI CH** display will blink for several second.
   The display will return to its previous condition after a few seconds.

3

MIDI CH	MIDI CH
G. →	*0.*
Good	
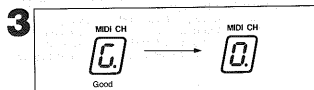
4. If the **MIDI CH** display will indicate the letter *E* and blink for several second the data has not been correctly saved. (After a few seconds, the **MIDI CH** display will return to its previous condition.)
   Try to save function once more time.
   Note: If several unsuccessful attempts have been made to save and verify, the head may need cleaning or the felt may need changing on the MD280 or the sampler disk may need change. Consult your MD280 Operator's Manual for details.

4

MIDI CH	MIDI CH
E. →	*0.*
Error	
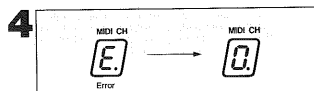
Loading

1. Set the sampler disk with sound data into the MD280.
   ● Press the **LOAD** button of the S612.

1

DATA
| SAVE | VERIFY | LOAD |
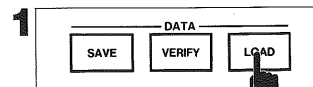
2. The **LOAD** LED will light and loading will begin. At the same time, the letter *d* on the **MIDI CH** display will appear to let you know the S612 is being loaded from the disk.
   Also, the **BUSY** LED of the MD280 will light, indicating that loading is in progress.

2

MIDI CH

d.

AKAI
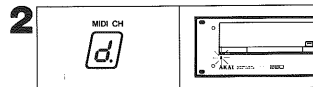
3. Loading will take approximately 8 seconds. If the data has been loaded correctly, the **MIDI CH** display will return to its previous condition.

3
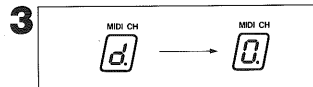
| MIDI CH | MIDI CH |
| *d.* → | *0.* |

4. If the data has not been loaded correctly, *E* will appear and blink for few seconds before the **MIDI CH** display returns to normal. If this happens, check the following:
   * Has the disk been inserted correctly?
   * Is the disk blank?
   * Has the disk been close to a strong magnetic field?
   * Are the power and interface cables connected properly?

4

MIDI CH	MIDI CH
E. →	*8.*
Error	
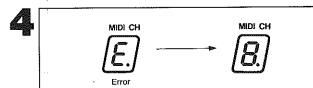
MEMO

SECTION 2
SERVICE MANUAL

TABLE OF CONTENTS

I. SPECIFICATIONS

FORMAT	
	12 bit Sampling
Sampling Frequency	4 kHz – 32 kHz (Min ~ Max)
Sampling Time	8 seconds ~ 1 seconds (Max ~ Min)
Frequency Response	Sampling: 25 Hz ~ 12.5 kHz (–3 dB band width)
	Playback: 25 Hz ~ 20 kHz (–3 dB band width)
Voice	6 voice
Renge	5 octave
FUNCTION CONTROL	Power ON/OFF
	Recording Level
	Monitor Level
	Recording Mode New/Overdub
Edit Scaning	Memory Start (0 ~ 100)
	Memory End (0 ~ 100)
	Scaning Mode
	One Shot, Looping
	Alternating, Manual Splice (0 ~ 100)
Transpose	Half-Step
Tune	± 100 cent
LFO	Speed (Min ~ Max)
	Depth (Min ~ Max)
	Deley (0 ~ 10)
	Filter (Low ~ High)
Output	Decay (0 ~ 10)
	Level (0 ~ 10)
MIDI	Mono/Poly
	Channel Up/Down
Data	Save/Verify/Load
Display	Rec level
	MIDI ch 0 : Omni on
	1 ~ 9 : Omni off
	I/O : Save/Load
INPUT (Sensitivity/Impedance)	
Mic	–63 dBm/5.6 kohms
Line	–27 dBm/47 kohms
OUTPUT	
Line	6-voice Mix out × 2
	output level +2 dBm/2.8 Vp-p
Voice Out	13p/DIN (6-voice separate)
	level-4 dBm/1.4 Vp-p
DC/8V Out	for the MD280 Sampler Disc Drive
MIDI	MIDI IN (5P/DIN)
	MIDI THRU (5P/DIN)
	MIDI OUT (5P/DIN)
INTERFACE	for the MD280 Sampler Disc Drive
POWER REQUIREMENTS	100V 50/60 Hz for Japan
	120V 60 Hz for USA & Canada
	220/240V 50 Hz Convertible for other contries.
DIMENSIONS	483 (W) × 90 (H) × 379 (D) mm
WEIGHT	6.0 kg (13.2 lbs)

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

II. DISMANTLING OF UNIT

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

1

SCREWS

2

SCREW

3

W/SPACER

SCREWS
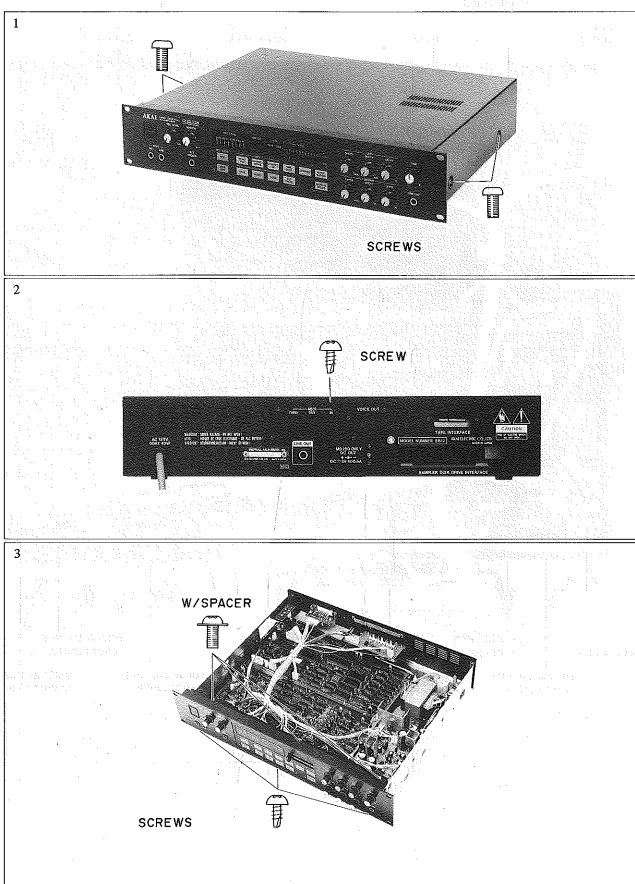
III. PRINCIPAL PARTS LOCATION

SW PCB
L600IC507B

CASSETTE PCB
L600IA5040
EXCEPT J MODEL

MAIN PCB
L600IA50I0

MIDI PCB
L600IA502B

JACK(4) PCB
L600IA502I

POWER TRANSFORMER
T90I

FILTER PCB
L600ID5080

JACK(I) PCB
L600IA502F

JACK(3) PCB
L600IA502H

VOLUME(3) PCB
L600IA502E

POWER SUPPLY PCB
L600IC507A

OPERATION PCB
L600IA502A

VOLUME(2) PCB
L600IA502D

VOLUME(I) PCB
L600IA502C

JACK(2) PCB
L600IA502G
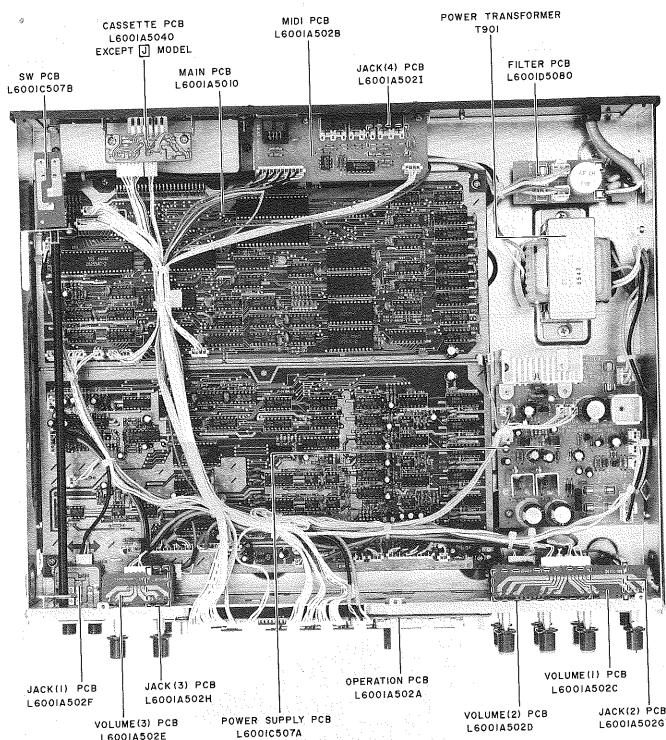
IV. OPERATIONAL CHECKS

For operational checks on Sampler "S612", make con-
nections as illustrated below.

Fig. 4-I
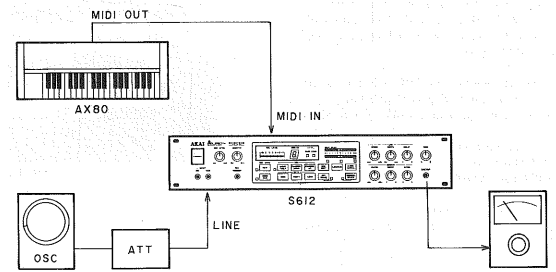
4-1. Power-On Checks

By switching power on, check to assure MIDI-CH to dis-
play "0" and the [LOOPING] lamp to glow.
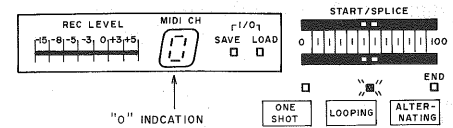
Fig. 4-2 Display of Frontpanel

4-2. B Power Supply Voltage Checks

After switching power on, check to assure the B voltages
to be supplied normally.

Check Item		Check Point	Result
ANALOG	+ 5V	P72-1	+ 5V ± 0.5V
ANALOG	− 5V	P72-2	− 5V ± 0.5V
ANALOG	+15V	P72-3	+15V ± 1.5V
ANALOG	−15V	P72-4	−15V ± 1.5V
DIGITAL	+ 5V	P74-2	+ 5V ± 0.5V
DC OUT	+ 8V	P79-1	
DC	+ 8V	P76-1	
DC	+12V	P73-1	+12V ± 1.2V
DC	+12V	P71-1	+12V ± 1.2V

Chart-1
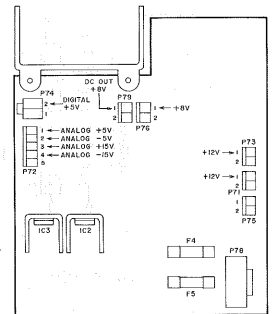
POWER SUPPLY PCB L600IC507A

Fog. 4-3 Check point of Power Supply PCB

4-3. MIDI Signal Reception Checks

By operating the keyboard of an AX80 (or another MIDI accommodating synthesizer) that has been connected onto Sampler "S612", check to assure the channel indicator LED for MIDI-CH to glow more birghtly as Sampler receives a MIDI signal.

When the channel indicator for MIDI-CH fails to be made brighter, check by following the steps below.
1) Connect an oscilloscope onto IC4 pin 2 within Main PCB.
2) IC4 pin 2 should normally be at an "H" level.
3) Push the AX80 keyboard keys, and observe the received MIDI signal waveforms. (See Fig. 4-4)
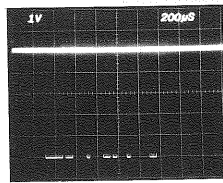
A. When no MIDI Signal is observed:
   Check IC1 and PH1 in the MIDI signal receiver (MIDI PCB).

Fig. 4-4

MIDI PCB

• NORMALLY AT "H" LEVEL
• WHEN RECEIVING : SEE FIG 4-4
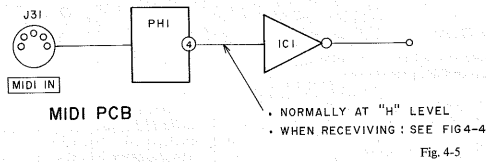
Fig. 4-5

B. When MIDI Signal is observed but MIDI Indicator fails to glow more brightly:
   Check the MIDI-CH indicator driving circuit. (See Fig. 4-6)
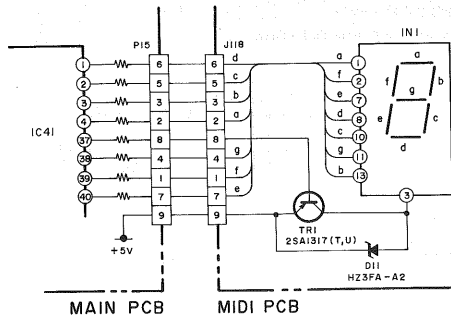
Fig. 4-6 Indicator Driving Circuit

4-4. Operationaly Checks on Operating Buttons. (See Fig. 4-7)

Check to assure IC41 pins 12 to 25 on Main PCB to be at an "H" level (5 VDC) in a normal mode.

1) When Sampler fails to operate despite IC41 pins 12 to 25 at an "H" level in a normal mode, replace IC41.
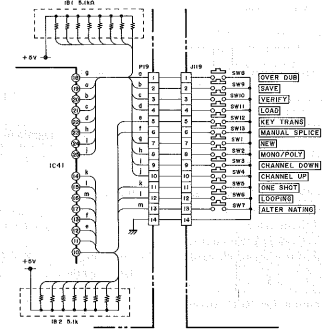
Fig. 4-7 Operation Button Input Circuit

4-5. Operationaly Check on VR (Control) Inputs

1) When all the VRs have been set at their minimum positions, IC58 pins 1 to 5 and 26 to 28 within Main PCB should be at an "L" level (0 VDC).

2) By operating the VRs, check to assure the DC levels at IC58 pins 1 to 5 and 26 to 28 to rise in correspondence with the VR positions, and to reach an "H" level (5 VDC) as the VRs have been set at their maximum positions. (See Fig. 4-8)
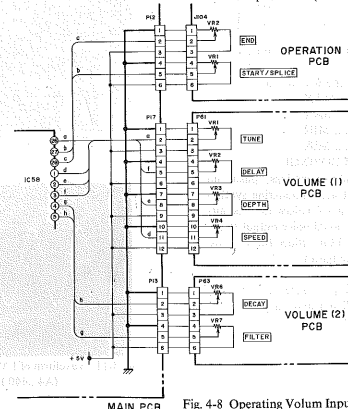
Fig. 4-8 Operating Volum Input Circuit

4-6. Operationaly Checks on In/Output Circuits (Refer to Fig. 4-9)

The audio signal circuit may broadly be broken down into three blocks, the input circuit (analog), the digital circuit (digital), and the output circuit (analog).
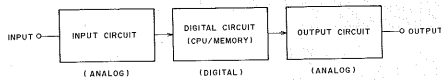
Fig. 4-9 Block Diagram of Main PCB

4-6-1.

When no sound emission or any other trouble due to the audio signal circuit failure has occurred, follow the steps below to localize the trouble to a specific block.
For this job, test signals have already been programmed for. By-block performance should therefore be checked by using these test signals.

1) While holding the [NEW] button for REC Mode down, switch power on.
   By the above operation, MIDI-CH should display 8CH, and the indicator LEDs for [NEW] and [OVERDUB] flash on and off for about 25 to 30 seconds.

2) As the flashing of LEDs ceases, MIDI-CH should return to "0".

3) In this state, a 440 Hz sine wave test signal (key A4 of the synthesizer) should be recorded, irrespective of the input circuit status.

   a) In the above state, connect a millivoltmeter onto LINE OUT.
   b) Set the individual VRs of the S612 as shown below.
      OUTPUT VR .... MAX
      FILTER VR .... MAX
      DECAY VR .... MIN
      Other VRs................ MIN
   c) Set the scaning mode at [LOOPING].
   d) Upon concluding the above settings, push the AX80 (or another MIDI accommodating synthesizer) key board keys to have 6 voices of tones output, and check each individual voice output to assure its being at +2 ± 2 dBm. (Since the keys are touch sensitive, push them hard.)

   * When individual voice outputs have been checked valid at LINE OUT, the digital and output circuits may be judged to have been trouble-free.

● When individual voice outputs cannot be checked:
1) Connect an oscilloscope onto pin 19 or D/A converter IC67 in the digital circuit.

2) Keep holding an AX80 (or another MIDI accommodating synthesizer) keyboard key down, and observe the waveform of a time-shared audio signal emerging at IC67 pin 19. (See Fig. 4-10, 11)
   * When an audio signal has been observed there:
     The output circuit will have been defective.
   * When no audio signal has been observed there:
     The digital circuit will have been defective.
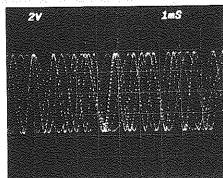
Fig. 4-10 Waveform of 6 Voice Time-Sharing
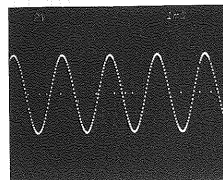
Fig. 4-11 Waveform of 1 Voice Time-Sharing (A4...440 Hz)

4-7. Operationaly Checks on Input, Output, and Digital Circuits

● Check each individual block by observing waveforms at its various locations and checking them against reference waveforms.
● When checking waveforms in the digital circuit, be sure to use a 10 : 1 probe.

4-7-1. Input Circuit (Refer to Fig. 4-13)

1) Input a 400 Hz signal at −29 dBm to LINE IN from an audio signal generator.
2) Set the REC level VR at its maximum position.
3) The voltage waveforms at various locations of the input circuit are shown in Fig. 4-13.

4-7-2. Output Circuit (Refer to Fig. 4-14)

1) By the same procedure as 6-1, record test signals.
2) Disconnect any external input circuit that may have been connected onto LINE IN of the input circuit.
3) Push an AX80 (or another MIDI accommodating synthesizer) keyboard key. In this process, due caution will be required, since the output level varies by the force applied to the key.
4) The voltage waveforms at various locations are shown in Fig. 4-14 to which reference is directed.
   The various waveforms shown apply to the keys for 6 voices that have steadily been held down.

      VOICE 1 .... A4 (440 Hz)
      VOICE 2 .... C4 (261 Hz)
      VOICE 3 .... C5 (523 Hz)
      VOICE 4 .... E5 (659 Hz)
      VOICE 5 .... G5 (783 Hz)
      VOICE 6 .... C6 (1046 Hz)

The voice numbers will be assigned by the key pushing sequence.

4-7-3. Digital Circuit (Refer to Fig. 4-15)

When observing digital circuit signal waveforms, be sure to use a 10 : 1 probe for the oscilloscope.
1) Clock Generator Performance Checks (See Fig. 4.12)
   Connect an oscilloscope onto IC40 pin 1, and check to assure an 8 MHz signal to have been generated.
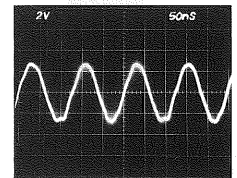
Fig. 4-12

2) The system clock signal input waveforms for the various ICs are shown in Fig. 4-15.

3) If a short-circuit or equivalent occurs while checking the digital circuit, IC(s) may run away, so that in such an event, switch power off and then back on again to kill the runaway.

Input Waveform of Input Diagram
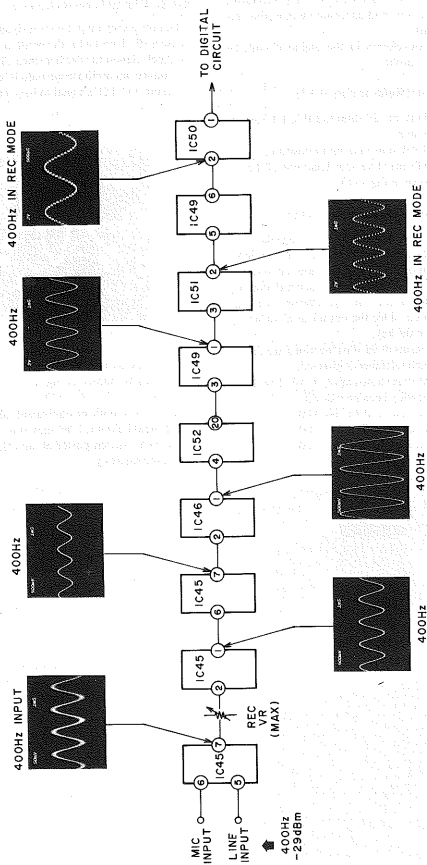
Fig. 4-13 Input Waveform of Input Diagram

Output Waveform of Output Diagram
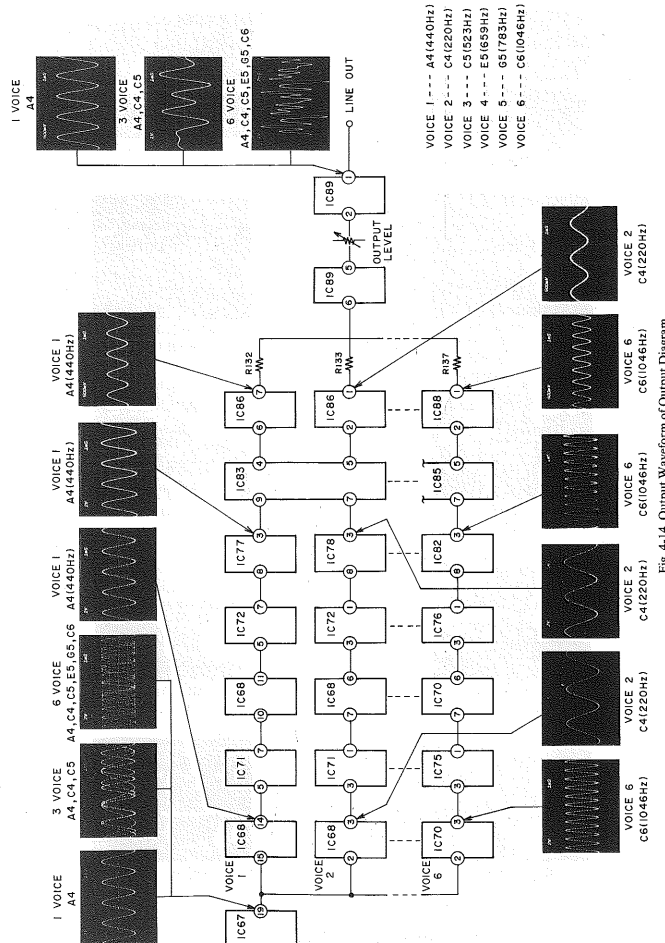
Fig. 4-14 Output Waveform of Output Diagram
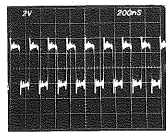
VOICE 1 --- A4(440Hz)
VOICE 2 --- C4(220Hz)
VOICE 3 --- C5(523Hz)
VOICE 4 --- E5(659Hz)
VOICE 5 --- G5(783Hz)
VOICE 6 --- C6(1046Hz)

System clock signal Waveform for the various ICs

IC5 – ⑨ ⑮ ⑱ PIN
IC6 – ⑨ ⑮ ⑱ PIN

IC54 – ⑪ PIN
IC55 – ⑦ PIN

IC17 – ③ ⑪ PIN
IC18 – ③ ⑪ PIN
IC19 – ③ ⑪ PIN

IC4 – ③ ④ PIN
IC58 – ⑪ PIN

IC7 – ⑨ ⑮ ⑱ PIN
IC8 – ⑨ ⑮ ⑱ PIN

IC60 – ⑨ PIN
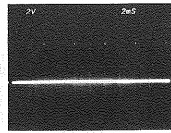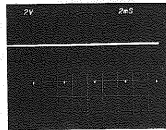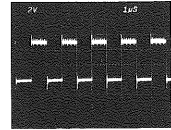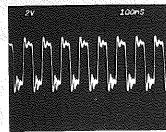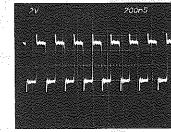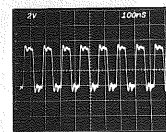
IC23 – ⑪ PIN
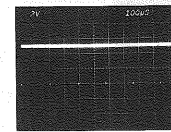
IC61 – ⑨ PIN
IC62 – ⑨ PIN
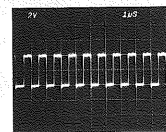
IC52 – ⑪ PINS
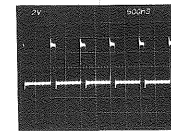
IC63 – ⑨ PIN

Fig. 4-15. System clock signal Waveform for the various ICs

4-8. RECord/Playback Level Checks

1) Input to LINE IN a 400 Hz signal at −29 dBm from an audio signal generator.

2) Set the REC Level VR at its maximum position.

3) Set the other VRs as shown below.
   OUTPUT LEVEL VR .... MAX
   FILTER VR .... MAX
   MONITOR VR .... MAX
   Other VRs .... MIN

4) AL this point in time, check to assure the indication of a millivoltmeter connected to LINE OUT to have been at 0 dBm.

5) Similarly check to assure the REC Level meter indication to have been at 0 dB (with all the green LEDs glowing).

6) In the above state, after pushing key A4 of the AX80, push the [NEW] button for REC Mode, and start recording. (The 400 Hz signal may be played back by pushing key A4 of the AX80.)

7) Upon concluding the recording operation, set the scanning mode at "LOOPING" by pushing the [LOOPING] button.
   Also disconnect the audio signal generator that has been connected onto LINE IN.

8) Push keyboard keys of the AX80 (or another MIDI accommodating synthesizer), and check to assure the output level at LINE OUT to have been made 0 dB.
   ● When pushing the AX80 keyboard keys, the output level will vary in accordance with a force applied to the key, so that push the keys hard. A sound will be emitted while the key is held down.

V. PC BOARD TITLE AND IDENTIFICATION NUMBERS

P.C. Board Titile		P.C. Board Number	Remarks
MAIN	P.C Board	L6001A5010	
OPERATION	P.C Board	L6001A502A	
MIDI	P.C Board	L6001A502B	
VOLUME (1)	P.C Board	L6001A502C	
VOLUME (2)	P.C Board	L6001A502D	
VOLUME (3)	P.C Board	L6001A502E	
JACK (1)	P.C Board	L6001A502F	
JACK (2)	P.C Board	L6001A502G	
JACK (3)	P.C Board	L6001A502H	
JACK (4)	P.C Board	L6001A502I	
SW	P.C Board	L6001C507B	
CASSETTE	P.C Board	L6001D5040	J EXCLUDE
FILTER	P.C Board	L6001D5080	

SECTION 3
PARTS LIST

TABLE OF CONTENTS

HOW TO USE THIS PARTS LIST

1. This Parts List shows those parts which are considered necessary for repairs. Other parts, such as resistors and capacitors, are shown in the "Common List for Service Parts" from which these parts should be selected and parts.
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   b) P.C Board Block

2. HEAD BASE BLOCK

REF. NO.	PART NO.	DESCRIPTION
2-1x	BH-T2023A320A	HEAD BASE BLOCK GX-F66R
2-2x	HP-H2206A010A	HEAD R/P PR4-8FU C
2-3	ZS-477876	PAN20x03STL CMT
2-4	ZS-536488	BID20x08STL CMT
2-5	ZG-402895	CS ANGLE ADJUST SPRING

— SP (Service Parts) Classification

— A small "x" indicates the inability to show that particular part in the Photo or Illustration.

— This number corresponds with the individual parts index number in that figure

— This number corresponds with the Figure Number

6. SYS. CON. P C BOARD BLOCK

REF. NO.	PART NO.	DESCRIPTION
6-1	BA-T2034A070A	PC SYS CON BLK GX-F44R
6-IC1	EI-324536	IC HD14049BP
6-IC2	EI-336801	IC MB8841-564M
6-IC3	EI-331661	IC SN7405N
6-IC4	EI-336725	IC M54527P
6-TR1to4	ET-200985	TR 2SC2603 F,G
6-TR5to28	ET-554657	TR 2SA733A F,Q
6-D1	ED-318292	D SILICON H 1S2473T-77 T26
6-D2to4	ED-308952	D GERMA V 1K34A-LR F07
6-D5to10	ED-318292	D SILICON H 1S2473T-77 T26
6-X1	EI-318384	OSC X'TAL NC-18C
		3.579545MHZ

— SP (Service Parts) Classification

— These reference symbols correspond with component symbols in the Schematic Diagrams.

5. The kind of part and its installation position can both be determined by the Part Number. To determine where a part number is listed, utilize the Parts Index at the end of the Parts List. It is necessary first of all to find the Part Number. This can be accomplished by using the Reference Number listed at the right of the part number in the Parts Index.

RECOMMENDED SPARE PARTS

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	N	BT-360649	⚠ TRANS POWER S612 T-10 (J)
2	N	BT-360650	⚠ TRANS POWER S612 T-30 (C,A)
3	N	BT-360653	⚠ TRANS POWER S612 T-50 (E,V,B,S)
4		ED-359534	D LED SLH34VC3F-R RED
5		ED-330319	⚠ D SILICON DBA10B 100/1.0A
6		ED-200213	⚠ D SILICON DBA40C-K15 200/2.6A
7		ED-357754	⚠ D SILICON DS135D 200/1.0A
8		ED-301911	D SILICON H DS448
9		ED-343996	D ZENER H HZ12 B1
10		ED-346592	D ZENER H HZ3 A2
11		ED-331626	D ZENER H HZ3 B2
12		EF-359225	⚠ FUSE BET T 3.15A 250V (B)
13		EF-355374	⚠ FUSE BET T 500MA 250V (B)
14		EF-691007	⚠ FUSE SEMKO T 3.15A 250V (E,V,S)
15		EF-593706	⚠ FUSE SEMKO T 500MA 250V (E,V,S)
16		EF-306124	⚠ FUSE TSC A 250V 0.63A (J)
17		EF-306949	⚠ FUSE TSC A 250V 1.25A (J)
18		EF-306952	⚠ FUSE TSC A 250V 4.00A (J)
19		EF-305703	⚠ FUSE TSC 125V 0.63A (C,A)
20		EF-308847	⚠ FUSE TSC 125V 1.60A (C, A)
21		EF-306957	⚠ FUSE TSC 125V 4.00A (C,A)
22	N	EI-359552	⚠ IC M5236L
23	N	EI-359626	⚠ IC NJM78M15A
24	N	EI-359628	⚠ IC NJM79M15A
25	N	EI-360051	IC ADC0809CCN
26	N	EI-360049	IC AM2504PC
27	N	EI-390060	IC BA9201
28	N	EI-360050	IC BA9221
29	N	EI-360045	IC DG211CJ
30	N	EI-360021	IC HD6850P
31	N	EI-360763	IC HD74HC09P
32	N	EI-360052	IC IR2E02
33	N	EI-360046	IC MF10CN
34	N	EI-360058	IC MF6CN-50
35	N	EI-360043	IC M5220P
36	N	EI-360059	IC NE572N
37	N	EI-360772	IC NJM79L05A
38	N	EI-360023	IC P8254
39		EI-310044	IC SN74LS05N
40	N	EI-360029	IC S612A
41	N	EI-360030	IC S612B
42	N	EI-360032	IC S612C
43	N	EI-360038	IC S612D
44	N	EI-360047	IC S612E
45	N	EI-360040	IC TC74HCU04P
46	N	EI-360037	IC TC74HC00P
47	N	EI-360026	IC TC74HC04P
48	N	EI-360039	IC TC74HC08P
49	N	EI-360025	IC TC74HC138P
50	N	EI-356049	IC TC74HC139P
51	N	EI-360035	IC TC74HC157P
52	N	EI-360048	IC TC74HC173P
53	N	EI-360054	IC TC74HC174P
54	N	EI-360053	IC TC74HC175P
55	N	EI-360042	IC TC74HC259P
56	N	EI-360036	IC TC74HC32P
57	N	EI-360031	IC TC74HC4040P
58	N	EI-360028	IC TC74HC74P
59	N	EI-360027	IC TC74HC86P
60	N	EI-324255	IC TL082CP
61	N	EI-359608	IC TMM2764D
62		EI-354197	IC µPC311C
63	N	EI-359609	IC µPD41416C-20
64	N	EI-354186	IC µPD780C-1
65	N	EI-354145	IC µPD8237AC-5
66	N	EI-354146	IC µPD8253C-2
67		EI-354149	IC µPD8255AC-2
68	N	EI-359563	OSC CE CSA8.00MS40
69	N	EM-359536	IND LE GL-107S12
70	N	EM-359535	IND LE SL-1179
71		EQ-348929	RELAY SIG G5A-232P 2TR 12V
72		ES-344270	⚠ SW PUSH SDLD1P003 01-1
73		ES-306430	⚠ SW SLIDE J-S4013 µ 01 01-2
74		ES-354115	SW TACT SKHCAC021A
75	N	ET-360687	⚠ TR 2SB1015 Y, GR
76	N	ET-356817	⚠ TR 2SB891 Q ,R
77		ET-349883	⚠ TR2SC3243 D, E
78		ET-354083	⚠ TR 2SD1189 Q, R
79		ET-354167	PHOTO SENSOR PC900
80		ET-349882	TR 2SA1283 D, E
81		ET-355216	TR 2SA1317 T, U
82		ET-338447	TR 2SA991 E, F
83		ET-316523	TR 2SC1844 F
84		ET-353898	TR 2SC3330
85	N	ET-360067	TR 2SC3330 T, U
86	N	EV-359551	VR ROTARY 16P10 A502
87	N	EV-359549	VR ROTARY 16P10 B103
88	N	EV-361200	VR ROTARY 16P10 B502
89	N	EV-359547	VR ROTARY 16P10 (W/CENTER CLICK) B103
90	N	EV-360751	VR SLIDE RSGA1

"NOTE" N: New Parts

SYMBOL FOR DESTINATION
[A] : AAL (U,S,A)
[B] : UK (ENGLAND)
[C] : CSA (CANADA)
[E] : CEE (EUROPE)
[J] : JPN (JAPAN)
[S] : SAA (AUSTRALIA)
[V] : VDE (WEST GERMANY)

1. PC BOARD BLOCK

REF. NO.	PART NO.	DESCRIPTION
1-1	BA-L6001A060A	PC MAIN BLK S612
1-2	BA-L6001A020A	PC OPERATION BLK S612
1-3	BA-L6001A080A	PC CASSETTE BLK S612 (C,A,E,V,B,S) [EXCEPT J]
1-4	BA-L6001A040A	PC POWER BLK S612

NOTE: PC OPERATION BLK CONSISTS OF FOL-
LOWING PC BOARDS.

- OPERATION PC BOARD
- MIDI PC BOARD
- VOLUME PC BOARD (1)
- VOLUME PC BOARD (2)
- VOLUME PC BOARD (3)
- JACK PC BOARD (1)
- JACK PC BOARD (2)
- JACK PC BOARD (3)
- JACK PC BOARD (4)

PC POWER BLK CONSISTS OF FOLLOW-
ING PC BOARDS.

- POWER SUPPLY PC BOARD
- SW PC BOARD

2. MAIN PC BOARD

REF. NO.	PART NO.	DESCRIPTION
2-IC1	EI-354186	IC μPD780C-1
2-IC2	EI-356049	IC TC74HC139P
2-IC3	EI-359608	IC TMM2764D
2-IC4	EI-360021	IC HD6850P
2-IC5,6	EI-354146	IC μPD8253C-2
2-IC7,8	EI-360004	IC P8254
2-IC9,10	EI-360024	IC μPD8237AC-5
2-IC11,12	EI-360025	IC TC74HC138P
2-IC13,14	EI-360026	IC TC74HCU04P
2-IC15,16	EI-360027	IC TC74HC86P
2-IC17 to 19	EI-360028	IC TC74HC74P
2-IC20	EI-360029	IC S612A
2-IC21	EI-360030	IC S612B
2-IC23,24	EI-360031	IC TC74HC4040P
2-IC25	EI-360032	IC S612C
2-IC26 to 31	EI-359609	IC μPD41416C-20
2-IC32,33	EI-360035	IC TC74HC157P
2-IC34,35	EI-360036	IC TC74HC32P
2-IC36	EI-360037	IC TC74HCOOP
2-IC37	EI-360026	IC TC74HCU04P
2-IC38	EI-360038	IC S612D
2-IC39	EI-360039	IC TC74HCO8P
2-IC40	EI-360040	IC TC74HCUO4P
2-IC41	EI-354149	IC μPD8255AC-2
2-IC42,43	EI-360042	IC TC74HC259P
2-IC44	EI-360038	IC S612D
2-IC45	EI-360043	IC M5220P
2-IC46	EI-324255	IC TLO82CP
2-IC48	EI-354197	IC μPC311C
2-IC49	EI-324255	IC TLO82CP
2-IC50	EI-354197	IC μPC311C
2-IC51	EI-360045	IC DG211CJ
2-IC52	EI-360046	IC MF10CN
2-IC54	EI-360038	IC S612E
2-IC55	EI-360048	IC TC74HC173P
2-IC56	EI-360049	IC AM2504PC
2-IC57	EI-360050	IC BA9221

REF. NO.	PART NO.	DESCRIPTION
2-IC58	EI-360051	IC ADC0809CCN
2-IC60	EI-360053	IC TC74HC175P
2-IC61 to 63	EI-360054	IC TC74HC174P
2-IC64	EI-360036	IC TC74HC32P
2-IC65	EI-360038	IC S612D
2-IC66	EI-360763	IC HD74HCO9P
2-IC67	EI-360050	IC BA9221
2-IC68 to 70	EI-360045	IC DG211CJ
2-IC71 to 76	EI-324255	IC TLO82CP
2-IC77 to 82	EI-360058	IC MF6CN-50
2-IC83 to 85	EI-360059	IC NE572N
2-IC86 to 89	EI-324255	IC TLO82CP
2-IC90 to 95	EI-390060	IC BA9201
2-IC96	EI-360772	IC NJM79L05A
2-TR1	ET-353898	TR 2SC3330
2-TR4	ET-338447	TR 2SA991 E, F
2-TR5, 6	ET-316523	TR 2SC1844 F
2-TR7	ET-338447	TR 2SA991 E, F
2-D1, 2	ED-301911	D SILICON H DS448
2-D3	ED-359534	D LED SLH34VC3F-R RED
2-X1	EI-359563	OSC CE CSA8.00 MS40
2-RL1	EQ348929	RELAY SIG G5A-232P 2TR 12V
2-IB1, 2	ER-360201	R COMP RKC1/8B8 512J
2-R67	ER-331188	R FUSE E RD2FC S10 1/4W 8R2J
2-R76	ER-359556	R MF H F10 1/4W 5111F
2-R77	ER-359555	R MF H F10 1/4W 2551F
2-R96	ER-359557	R MF H F10 1/4W 1651F
2-R97	ER-359558	R MF H F20 1/4W 3321F
2-R162	ER-360773	R OMF H S12 FS 1W 470J
2-C45	EC-360719	C PP V S05 CQMFS92 101J 50DC
2-C50	EC-360717	C PP V S05 CQMFS92 471J 50DC
2-C51	EC-360717	C PP V S05 CQMFS92 471J 50DC
2-C79	EC-360716	C PP V S05 CQMFS92 391J 50DC
2-C205, 207 210	EC-360719	C PP V S05 CQMFS92 101J 50DC
2-J1	EJ-359564	SOCKET CONNECT. CE478-25-30-432 50P
2-1	EJ-358691	SOCKET IC DILB28P-8J

3. OPERATION PC BOARD

REF. NO.	PART NO.	DESCRIPTION
3-IC1	EI-360052	~IC IR2E02
3-TR1	ET-355216	TR 2SA1317 T, U
3-D1 to 10	ED-359534	D LED SLH34VC3F-R RED
3-D11	ED-346592	D ZENER H HZ3 A2
3-SW1 to 3	ES-354115	SW TACT SKHCAC021A
3-VR1, 2	EV-360751	VR SLIDE RSGA1
3-IN1	EM-359535	IND LE SL-1179
3-IN2	EM-359536	IND LE GL-107S12

4. CASSETTE PC BOARD

REF. NO.	PART NO.	DESCRIPTION
4-IC1	EI-359552	IC M5236L
4-TR1	ET-349882	TR 2SA1283 D, E
4-TR2	ET-355216	TR 2SA1317 T, U
4-R1	ER-360725	⚠ R OMF H S12 FS 1W 221J

5. POWER SUPPLY PC BOARD

REF. NO.	PART NO.	DESCRIPTION
		POWER SUPPLY PC BOARD
5-IC1	EI-359552	⚠ IC M5236L
5-IC2	EI-359626	⚠ IC NJM78M15A
5-IC3	EI-359628	⚠ IC NJM79M15A
5-TR1	ET-360687	⚠ TR 2SB1015 Y, GR
5-TR2	ET-349883	⚠ TR 2SC3243 D, E
5-TR3	ET-354083	⚠ TR 2SD1189 Q, R
5-TR4	ET-360067	TR 2SC3330 T, U
5-TR5	ET-355216	TR 2SA1317 T, U
5-TR6	ET-356817	⚠ TR 2SB891 Q, R
5-TR7 to 9	ET-360067	TR 2SC3330 T, U
5-D1	ED-200213	⚠ D SILICON DBA40C-K15 200/2.6A
5-D2	ED-357754	D SILICON DS135D 200/1.0A
5-D4	ED-330319	⚠ D SILICON DBA10B 100/1.0A
5-D5	ED-331626	D ZENER H HZ3 B2
5-D6	ED-343996	D ZENER H HZ12 B1
5-D7	ED-301911	D SILICON H DS448
5-D8 to 11	ED-357754	D SILICON DS135D 200/1.0A
5-R1	ER-360725	R OMF H S12 FS 1W 221J
5-R2	ER-356113	R MF H F10 1/4W 1302G
5-R3	ER-360732	R MF H F10 1/4W 4301G
5-R6	ER-355400	R MF H F10 1/4W 1101G
5-R7	ER-359644	R MF H F10 1/4W 3901G
5-R8	ER-357831	R MF H F10 1/4W 5101G
5-R9	ER-359644	R MF H F10 1/4W 3901G
5-C2	EC-322804	C EC V CUT SM 472M 16.0DC
5-C3	EC-313825	C SA V F05 R33K 25DC
5-C6, 7	EC-316188	C EC V CUT SM 102M 25DC
5-1	EZ-200473	SILICON RUBBER SHEET TC-30
5-2	ZW-632226	WASHER INSULATOR (BUSH M)
		ASSEMBLY BLOCK
5-F3A	EF-306952	⚠ FUSE TSC A 250V 4.00A [J]
5-F3B	EF-306957	⚠ FUSE TSC 125V 4.00A [C, A]
5-F3C	EF-691007	⚠ FUSE SEMKO T 3.15A 250V [E, V, S]
5-F3D	EF-359225	⚠ FUSE BET T 3.15A 250V [B]
5-F4A	EF-306124	⚠ FUSE TSC A 250V 0.63A [J]
5-F4B	EF-305703	⚠ FUSE TSC 125V 0.63A [C, A]
5-F4C	EF-593706	⚠ FUSE SEMKO T 500MA 250V [E, V, S]
5-F4D	EF-355374	⚠ FUSE BET T 500MA 250V [B]
5-F5A	EF-306124	⚠ FUSE TSC A 250V 0.63A [J]
5-F5B	EF-305703	⚠ FUSE TSC 125V 0.63A [C, A]
5-F5C	EF-593706	⚠ FUSE SEMKO T 500MA 250V [E, V, S]
5-F5D	EF-355374	⚠ FUSE BET T 500MA 250V [B]

6. FILTER PC BOARD

REF. NO.	PART NO.	DESCRIPTION
6-FL1	E0-360068	COIL LF LF-2 B
6-C2, 3	EC-358450	⚠ C CE V B 102M 400AC
		ASSEMBLY BLOCK
6-F1A	EF-306949	⚠ FUSE TSC A 250V 1.25A [J]
6-F1B	EF-308847	⚠ FUSE TSC 125V 1.60A [C, A]
6-F1C	EF-593706	⚠ FUSE SEMKO T 500MA 250V [E, V, S]
6-F1D	EF-355374	⚠ FUSE BET T 500MA 250V [B]

7. MIDI PC BOARD

REF. NO.	PART NO.	DESCRIPTION
7-IC1	EI-310044	IC SN74LS05N
7-D1	ED-301911	D SILICON H DS448
7-J31 to 33	EJ-360770	DIN J TCS4450-01-1111 5P
7-J34	EJ-360771	DIN J TCS5037-01-241 13P

8. VOLUME PC BOARD (1)

REF. NO.	PART NO.	DESCRIPTION
8-VR1	EV-359547	VR ROTARY 16P10 (W/CENTER CLICK) B103
8-VR2 to 4	EV-359549	VR ROTARY 16P10 B103

9. VOLUME PC BOARD (2)

REF. NO.	PART NO.	DESCRIPTION
9-VR5	EV-359551	VR ROTARY 16P10 A502
9-VR6, 7	EV-359549	VR ROTARY 16P10 B103

10. VOLUME PC BOARD (3)

REF. NO.	PART NO.	DESCRIPTION
10-VR8	EV-361200	VR ROTARY 16P10 B502
10-VR9	EV-359551	VR ROTARY 16P10 A502

11. JACK PC BOARD (1)

REF. NO.	PART NO.	DESCRIPTION
11-J61	EJ-359642	PHONE J 3P HLJ4307-01-3060
11-J62	EJ-354269	PHONE J 3P HLJ0540-110 6.3

12. JACK PC BOARD (2)

REF. NO.	PART NO.	DESCRIPTION
12-J64	EJ-354269	PHONE J 3P HLJ0540-110 6.3
12-L1, 2	E0-345909	COIL FIX 1 LAL03KH 4R7K

13. JACK PC BOARD (3)

REF. NO.	PART NO.	DESCRIPTION
13-J63	EJ-354269	PHONE J 3P HLJ0540-110 6.3

14. JACK PC BOARD (4)

REF. NO.	PART NO.	DESCRIPTION
14-J65	EJ-354269	PHONE J 3P HLJ0540-110 6.3
14-L3, 4	E0-345909	COIL FIX 1 LAL03KH 4R7K

15. SW PC BOARD

REF. NO.	PART NO.	DESCRIPTION
15-SW1	ES-344270	⚠ SW PUSH SDLD1P003 01-1
15-C1	EC-361942	⚠ C CE V V 103Z 400AC

ASSEMBLY BLOCK
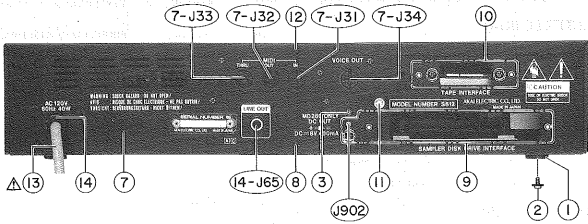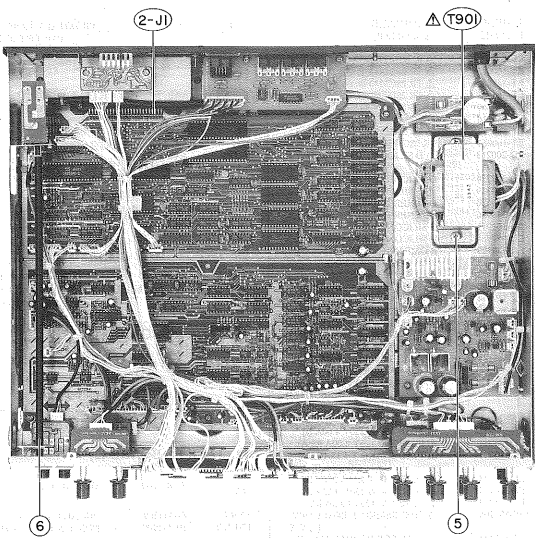
FINAL ASSEMBLY BLOK
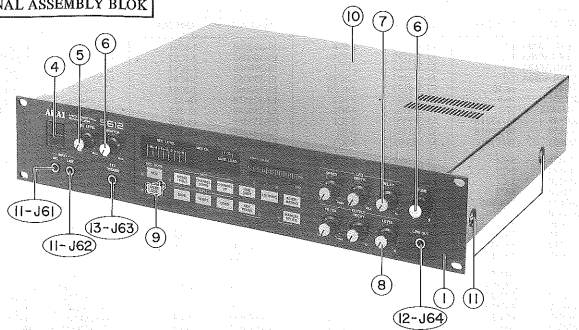
16. ASSEMBLY BLOCK

REF. NO.	PART NO.	DESCRIPTION
	ASSEMBLY BLOCK	
16-1	SA-324129	FOOT
16-2	ZS-344754	ST PAN30×06STL CMT C080 [FOOT FIX]
16-3	ZS-350934	PT BR30×08STL BNI [J902 FIX]
16-4x	TC-516598	TRANS. RETAINER [POWER TRANS FIX]
16-5	ZS-361996	ST BID40×10STL CMT TW [POWER TRANS FIX]
16-6	SZ-360712	JOINT POWER
16-7A	SP-355494C	PANEL REAR S612(J)
16-7B	SP-355494B	PANEL REAR S612(C, A)
16-7C	SP-355494D	PANEL REAR S612(E, V, B, S)
16-8	ZS-447761	T2BR30×06STL BNI
16-9	BC-355501	COVER REAR
16-10	BC-355499	COVER CASSETTE
16-11	EJ-329610	TERMINAL W/SCREW UB-0067 L 1P
16-12	ZS-447761	T2BR30×06STL BNI [COVER UPPER FIX]
16-13A	EW-524845	⚠ AC CORD 2 CORES VM1165B, VFF J [J]
16-13B	EW-358858	⚠ AC CORD 2 CORES KP-11 SJTAWG18 [C, A]
16-13C	EW-359641	⚠ AC CORD 2 CORES KP-419C/KS-17 [E, V]
16-13D	EW-358631	⚠ AC CORD 2 CORES KS-17 LTBS2F BS [B]
16-13E	EW-358630	⚠ AC CORD 2 CORES KP560 LTSA2F KS17 S [S]
16-14A	EZ-631945	STRAIN RELIEF SR-4N-4 [J]
16-14B	EZ-302906	STRAIN RELIEF SR-6N-4 [C, A]
16-T901A	BT-360649	⚠ TRANS POWER S612 T-10 [J]
16-T901B	BT-360650	⚠ TRANS POWER S612 T-30 [C, A]
16-T901C	BT-360653	⚠ TRANS POWER S612 T-50 [E, V, B, S]
16-S901	ES-306430	⚠ SW SLIDE J-S4013 #01 01-2
16-J901	EJ-358633	⚠ SOCKET INLET SOTO17 2P [E, V, B, S]
16-J902	EJ-359643	SOCKET INLET HEC 1757-01-030
16-C901	EC-347832	⚠ C CE V F 104Z 25DC
	MAIN PC BOARD	
2-J1	EJ-359564	SOCKET CONNECT CF478-25-30-432 50P

REF. NO.	PART NO.	DESCRIPTION
	MIDI PC BOARD	
7-J31	EJ-360770	DIN J TCS4450-01-1111 5P
7-J32	EJ-360770	DIN J TCS4450-01-1111 5P
7-J33	EJ-360770	DIN J TCS4450-01-1111 5P
7-J34	EJ-360771	DIN J TCS5037-01-241 13P
	JACK PC BOARD (4)	
14-J65	EJ-354269	PHONE J 3P HLJ0540-110 6.3

17. FINAL ASSEMBLY BLOCK

REF. NO.	PART NO.	DESCRIPTION
	FINAL ASSEMBLY BLOCK	
17-1	BD-B355492	PANEL FRONT PART S612
17-2x	ZW-330423	UW40×130×025SUP CMT [PANEL FRONT FIX]
17-3x	ZS-344754	ST PAN30×06STL CMT C080 [PANEL FRONT FIX]
17-4	SK-343017F	KNOB POWER-B
17-5	SK-B352952X2	KNOB MONITOR RED RART
17-6	SK-B352952X4	KNOB MONITOR WHITE PART
17-7	SK-B352952X1	KNOB MONITOR GREEN PART
17-8	SK-B352952X5	KNOB MONITOR BLUE PART
17-9	SE-357978	BASE KNOB (C)
17-10	SP-355493B	COVER UPPER-B
17-11	ZS-341960	ST BID40×06STL BNI [COVER UPPER FIX]
	JACK PC BOARD (1)	
11-J61	EJ-359642	PHONE J 3P HLJ4307-01-3060
11-J62	EJ-354269	PHONE J 3P HLJ0540-110 6.3
	JACK PC BOARD (2)	
12-J64	EJ-354269	PHONE J 3P HLJ0540-110 6.3
	JACK PC BOARD (3)	
13-J63	EJ-354269	PHONE J 3P HLJ0540-110 6.3

S612