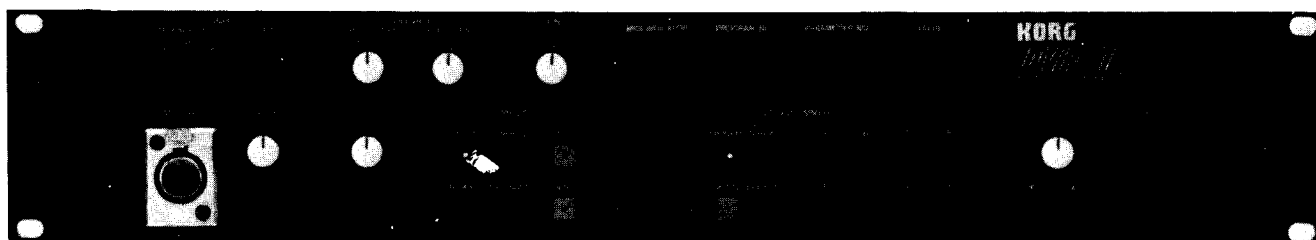


# KORG®

## DIGITAL VOICE PROCESSOR

# DVP-1



# ***SERVICE MANUAL***

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KORG INC.  
TOKYO/JAPAN

# 1. SPECIFICATIONS

- **Modes** ..... Vocoder, Internal wave, Harmonize, Pitch shift
- **Range** ..... Vocoder and internal wave modes: 5 octaves  
 Harmonize: 1 octave above and below key note  
 Pitch shift: -1200 cents to +1299 cents (1-cent steps)
- **Audio processing method** ..... Digital processing by DSP (x2)
- **A/D, D/A quantization bits** ..... A/D 12-bit: D/A 16-bit (linear)
- **Polyphonic voices** ..... 5 (4 when chorus is ON)
- **Program capacity** ..... 64
- **Inputs** ..... 3P cannon (impedance: 10kohms), Standard phone jack (impedance 100kohms), (Input level: -50dB/-10dB/+4dB)
- **Outputs** ..... Direct out (impedance 1kohm), Mix out (impedance: H = 1kohm, L = 10kohm; output level H:L = 10:1), Phones out.
- **Frequency response** ..... Direct: 20Hz ~ 20kHz ( $\pm 3$ dB)  
 Effect: 20Hz ~ 6.5kHz (-3dB), 20Hz ~ 9kHz (-6dB)
- **Dynamic range** ..... Direct 104dB
- **S/N ratio** ..... Effect: 70dB (JIS-A, Pitch shift mode, Attenuator at +4dB).
- **Parameters** ..... Vocoder & internal wave modes: Formant (Formant shift, Keyboard track, Window length), Breath bypass (Level, Level threshold, Pitch threshold), Internal (Waveform), Pitch EG (Attack time, Decay time, Polarity, Intensity), DCA EG (Attack time, Release time), MG (Frequency, Delay, Pitch, DCA), Bend (Pitch, Formant), Portamento (Portamento time, Hold).  
 Harmonize mode: Key note, Key change, Chord memory, Chord (Note 1 ~ Note 5).  
 Pitch shift mode: Shift level (Coarse, Fine)  
 Chorus: Speed, Intensity, Effect level.  
 Unison: Detune.  
 Gate: Threshold, Decay  
 MIDI: Channel, Enable, OMNI, Key window bottom, Key window top, Foot switch.
- **Controls** ..... Input Attenuator, Input level control, Direct level control, Effect level control, Total level control, Tune ( $\pm 50$  cents), Mode keys (x4), Chorus key, Unison key, Write switch, Write key, Program key, Parameter key, Bank hold key, Number keys (1 ~ 8), Edit control, UP key, DOWN key, Power switch, HIGH/LOW switch (Output level switch).
- **Indicators** ..... Input level indicator, MIDI indicator, Program number display, Parameter number display, Value display.
- **Control inputs** ..... Freeze ( $\overline{\text{GND}}$ ), Portamento ( $\overline{\text{GND}}$ ), MIDI (IN/OUT/THRU)
- **Power supply voltage** ..... Local voltage
- **Power consumption** ..... 30W
- **Weight** ..... 6.3kg (not including rack mount adaptors)
- **Dimensions** ..... 429.5(W) x 412.5(D) x 90(H)mm (not including rack mount adaptors)
- **Supplied accessories** ..... Rack mount adaptors, AC cord, SYNC/MIDI cable (3m)

★ Specifications subject to change without notice.

# Voice Processor Model DVP-1 MIDI Implementation Chart

Function		Transmitted Enable : Disable	Recognized Enable : Disable	Remarks
Basic Channel	Default Changed		1 - 16 1 - 16	Data is memorized
Mode	Default Messages Altered	x : x *****	1, 3 OMNI ON/ OMNI OFF	Data is memorized
Note Number	: True voice	*****	0 - 127 24 - 84	*1
Velocity	Note On Note OFF	x : x x : x	x : x x : x	
After Touch	Key's Ch's	x : x x : x	x : x x : x	
Pitch Bender		x : x	○ 0 - 12 SEMI : x	Max. 8 bit resolution
Control Change	1 2 7 64 65 69	x : x x : x x : x x : x x : x x : x	○ : x ○ : x ○ : x ○ : x ○ : x ○ : x	Pitch Modulation DCA Modulation Volume Freeze Switch *2 Portamento Switch Freeze Switch *2
Program Change	: Range can be set.	x : x *****	○ 0 - 127 : x 0 - 63	0=11, 7=18, 8=21 120=81, 127=88
System Exclusive		○ : x	○ : x	Program Data Dump etc.
System Common	: Song Position : Song Select : Tune	x : x x : x x : x	x : x x : x x : x	
System Real Time	: Clock : Command	x : x x : x	x : x x : x	
Aux Messages	: Local ON/OFF : All notes OFF : Active Sensing : Reset	x : x x : x x : x x : x	x : x x : ○ ○ : ○ x : x	123 - 127
Notes	Disable : When "Note Data" is selected at parameter No. 83. Enable : When "All" is selected at parameter No. 83. *1 : Change according to settings of parameters No. 86 & 87. *2 : Either can be chosen, according to the setting of parameter No. 88. Recognized messages change according to mode of operation.			

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

○ : Yes  
 x : No

## 2. MIDI IMPLEMENTATION

### 1. TRANSMITTED DATA

#### 1. System exclusive messages

##### 1. DEVICE ID

BYTE	DESCRIPTION
1 1 1 1 0 0 0 0	Exclusive Status
0 1 0 0 0 0 1 0	KORG ID 42H
0 0 1 1 n n n n	Format ID 3nH (nnnn = channel number) (NOTE 1)
0 0 0 0 1 0 0 1	DVP-1 ID 09H
1 1 1 1 0 1 1 1	EOX

★ The DEVICE ID is sent when a DEVICE ID REQUEST is received.

##### 2. WRITE COMPLETED

BYTE	DESCRIPTION
1 1 1 1 0 0 0 0	Exclusive Status
0 1 0 0 0 0 1 0	KORG ID 42H
0 0 1 1 n n n n	Format ID 3nH (nnnn = channel number) (NOTE 1)
0 0 0 0 1 0 0 1	DVP-1 ID 09H
0 0 1 0 0 0 0 1	Write Completed 21H
1 1 1 1 0 1 1 1	EOX

★ WRITE COMPLETED is sent after a WRITE REQUEST has been received and a program write performed.

##### 3. WRITE ERROR

BYTE	DESCRIPTION
1 1 1 1 0 0 0 0	Exclusive Status
0 1 0 0 0 0 1 0	KORG ID 42H
0 0 1 1 n n n n	Format ID 3nH (nnnn = channel number) (NOTE 1)
0 0 0 0 1 0 0 1	DVP-1 ID 09H
0 0 1 0 0 0 1 0	Write Error 22H
1 1 1 1 0 1 1 1	EOX

★ A WRITE ERROR is sent if a program write was not performed after receipt of a WRITE REQUEST (as occurs if the front panel write switch is set to the disable position.)

#### 4. DATA SAVE (DATA DUMP)

BYTE	DESCRIPTION
1 1 1 1 0 0 0 0	Exclusive Status
0 1 0 0 0 0 1 0	KORG ID 42H
0 0 1 1 n n n n	Format ID 3nH (nnnn = channel number) (NOTE 1)
0 0 0 0 1 0 0 1	DVP-1 ID 09H
0 1 0 0 0 0 0 0	Data Dump 40H
0 v v v v v v v v	Data 24 bytes (See DVP-1 BIT MAP)
⋮	
0 v v v v v v v v	
1 1 1 1 0 1 1 1	EOX

★ DATA SAVE (DATA DUMP) is sent when a DATA SAVE REQUEST is received.

NOTE: 1. nnnn = 0 ~ 15: Channel number set by parameter number 83 (exclusive message transmission channel).

## 2. RECOGNIZED RECEIVE DATA

### 1. Channel messages

STATUS		SECOND		THIRD		DESCRIPTION
1 0 0 0	n n n n	0 k k k	k k k k	0 x x x	x x x x	Note Off (NOTE 1) Velocity will be ignored.
1 0 0 1	n n n n	0 k k k	k k k k	0 v v v	v v v v	Note On (0vvvvv>0) (NOTE 1) Velocity will be ignored.
1 0 0 1	n n n n	0 k k k	k k k k	0 0 0 0	0 0 0 0	Note Off (NOTE 1)
1 0 1 1	n n n n	0 0 0 0	0 0 0 1	0 v v v	v v v v	Pitch Modulation (7 bit resolution)
1 0 1 1	n n n n	0 0 0 0	0 0 1 0	0 v v v	v v v v	DCA Modulation (7 bit resolution)
1 0 1 1	n n n n	0 0 0 0	0 1 1 1	0 v v v	v v v v	Volume (7 bit resolution)
1 0 1 1	n n n n	0 1 0 0	0 0 0 0	0 0 0 0	0 0 0 0	Freeze Off (NOTE 2)
1 0 1 1	n n n n	0 1 0 0	0 0 0 0	0 1 1 1	1 1 1 1	Freeze On (NOTE 2)
1 0 1 1	n n n n	0 1 0 0	0 0 0 1	0 0 0 0	0 0 0 0	Portamento Off
1 0 1 1	n n n n	0 1 0 0	0 0 0 1	1 1 1 1	1 1 1 1	Portamento On
1 0 1 1	n n n n	0 1 0 0	0 1 0 1	0 0 0 0	0 0 0 0	Freeze Off (NOTE 2)
1 0 1 1	n n n n	0 1 0 0	0 1 0 1	0 1 1 1	1 1 1 1	Freeze On (NOTE 2)
1 0 1 1	n n n n	0 1 1 1	1 0 1 1	0 0 0 0	0 0 0 0	All Notes Off
1 0 1 1	n n n n	0 1 1 1	1 1 0 0	0 0 0 0	0 0 0 0	Omni Mode Off (All Notes Off)
1 0 1 1	n n n n	0 1 1 1	1 1 0 1	0 0 0 0	0 0 0 0	Omni Mode On (All Notes Off)
1 0 1 1	n n n n	0 1 1 1	1 1 1 0	0 x x x	x x x x	(All Notes Off)
1 0 1 1	n n n n	0 1 1 1	1 1 1 1	0 0 0 0	0 0 0 0	(All Notes Off)
1 1 0 0	n n n n	0 p p p	p p p p			Program Change (NOTE 3)
1 1 1 0	n n n n	0 v v v	v v v v	0 v x x	x x x x	Pitch Bender Change (8 bit resolution)

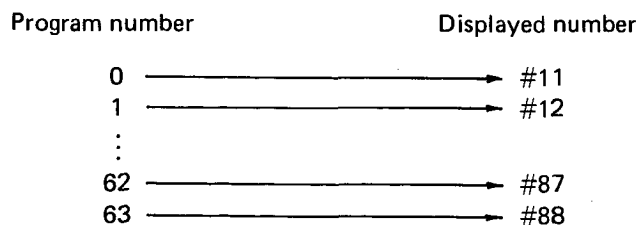
**NOTES:** 1. NOTE NUMBER (0kkkkkk) = 24 ~ 84: If message data beyond this range is received, then the note will be voiced as the same note name within the nearest valid octave.

The parameter 86 and 87 key window values can limit the range of note-on/note-off data which will be voiced.

2. Parameter number 88 allows this to be set to control No. 64 or 69.

3. Program number (0pppppp) = 0 ~ 63: If program number data higher than 63 is received, then 64 is subtracted from that data to arrive at the program number data that will be used.

Program numbers are indicated on the display with the numbering system used by the DVP-1. This results in the kind of relationships shown here.



### 2. System real time messages

STATUS	DESCRIPTION
1 1 1 1 1 1 1 0	Active Sensing

★ 640ms time out

Active sensing is always received, regardless of a "0" value for parameter number 84.

### 3. System exclusive messages

#### 1. DEVICE ID REQUEST

BYTE	DESCRIPTION
1 1 1 1 0 0 0 0	Exclusive Status
0 1 0 0 0 0 1 0	KORG ID 42H
0 1 0 0 n n n n	Format ID 4nH (nnnn = channel number) (NOTE 1)
1 1 1 1 0 1 1 1	EOX

#### 2. WRITE REQUEST

BYTE	DESCRIPTION
1 1 1 1 0 0 0 0	Exclusive Status
0 1 0 0 0 0 1 0	KORG ID 42H
0 0 1 1 n n n n	Format ID 3nH (nnnn = channel number) (NOTE 1)
0 0 0 0 1 0 0 1	DVP-1 ID 09H
0 0 0 1 0 0 0 1	Write Request 11H
0 p p p p p p p p	Program Number (pppppppp = 0 - 63)
1 1 1 1 0 1 1 1	EOX

#### 3. DATA SAVE REQUEST

BYTE	DESCRIPTION
1 1 1 1 0 0 0 0	Exclusive Status
0 1 0 0 0 0 1 0	KORG ID 42H
0 0 1 1 n n n n	Format ID 3nH (nnnn = channel number) (NOTE 1)
0 0 0 0 1 0 0 1	DVP-1 ID 09H
0 0 0 1 0 0 0 0	Data Save Request 10H
1 1 1 1 0 1 1 1	EOX

#### 4. DATA LOAD (DATA DUMP)

BYTE	DESCRIPTION
1 1 1 1 0 0 0 0	Exclusive Status
0 1 0 0 0 0 1 0	KORG ID 42H
0 0 1 1 n n n n	Format ID 3nH (nnnn = channel number) (NOTE 1)
0 0 0 0 1 0 0 1	DVP-1 ID 09H
0 1 0 0 0 0 0 0	Data Dump 40H
0 v v v v v v v v	Data 24 bytes (See DVP-1 BIT MAP)
0 v v v v v v v v	
1 1 1 1 0 1 1 1	EOX

### 5. PARAMETER CHANGE

BYTE	DESCRIPTION
1 1 1 1 0 0 0 0	Exclusive Status
0 1 0 0 0 0 1 0	KORG ID 42H
0 0 1 1 n n n n	Format ID 3nH (nnnn = channel number) (NOTE 1)
0 0 0 0 1 0 0 1	DVP-1 ID 09H
0 1 0 0 0 0 0 1	Parameter Change 41H
0 v v v v v v v v	Parameter Offset (See DIP-1 BIT MAP)
0 v v v v v v v v	Parameter Value (See DVP-1 BIT MAP)
1 1 1 1 0 1 1 1	EOX

NOTE: 1. nnnn = 0 ~ 15: Channel number set by parameter number 83 (exclusive message transmission channel).

### 3. USING THE SYSTEM EXCLUSIVE MESSAGES

#### 1. DVP-1 Bit map

PARAMETER OFFSET	BIT PATTERN							
	MSB							LSB
	7	6	5	4	3	2	1	0
0	0	KBD TRACK		FORMANT SHIFT				
1	0	WINDOW LENGTH			0	INTERNAL WAVEFORM		
2	0	BREATH BYPASS LEVEL			PITCH EG ATTACK			
3	0	0	PITCH THRESHOLD	LEVEL THRESHOLD	PITCH EG DECAY			
4	0	0	0	PITCH EG POLARITY	PITCH EG INTENSITY			
5	0	0	0	0	DCA EG ATTACK			
6	0	0	0	0	DCA EG RELEASE			
7	0	0	0	0	MG FREQUENCY			
8	0	0	0	0	MG DELAY			
9	0	0	0	0	MG PITCH			
10	0	0	0	0	MG DCA			
11	0	0	0	BEND FORMANT	BEND PITCH			
12	0	0	0	HOLD	PORTAMENTO TIME			
13	0	UNISON DETUNE		PITCH SHIFT COARSE				
14	0	PITCH SHIFT FINE						
15	0	0	CHORUS EFFECT		CHORUS INTENSITY		CHORUS SPEED	
16	0	0	0	0	0	0	KEY CHANGE	CHORD MEMORY
17	0	KEY NOTE						
18	0	0	NOTE 1 ON/OFF	NOTE 1				
19	0	0	NOTE 2 ON/OFF	NOTE 2				
20	0	0	NOTE 3 ON/OFF	NOTE 3				
21	0	0	NOTE 4 ON/OFF	NOTE 4				
22	0	0	NOTE 5 ON/OFF	NOTE 5				
23	0	0	0	0	CHORUS ON/OFF	UNISON ON/OFF	MODE	

## 2. Bit map and corresponding parameter values

PARAMETER NO. NAME MODE	PARAMETER OFFSET	BIT	CORRESPONDING PARAMETER VALUE MODE
11 FORMANT SHIFT	0	b4 – b0	00000 – 01111 = 0 – 15 11111 – 10001 = (-1) – (-15) 10000 = INHIBIT *
12 KBD TRACK	0	b6 – b5	00 – 10 = 0(OFF) – 2(FULL) 11 = INHIBIT
13 WINDOW LENGTH	1	b6 – b4	000 – 111 = 1 – 8
14 BREATH BYPASS LEVEL	2	b6 – b4	000 – 111 = 0 – 7
15 LEVEL THRESHOLD	3	b4	0 – 1 = 1 – 2
16 PITCH THRESHOLD	3	b5	0 – 1 = 1 – 2
21 INTERNAL WAVEFORM	1	b2 – b0	000 – 111 = 1 – 8
31 PITCH EG ATTACK	2	b3 – b0	0000 – 1111 = 0 – 15
32 PITCH EG DECAY	3	b3 – b0	0000 – 1111 = 0 – 15
33 PITCH EG POLARITY	4	b4	0 – 1 = 1(√) – 2(Λ)
34 PITCH EG INTENSITY	4	b3 – b0	0000 – 1111 = 0 – 15
35 DCA EG ATTACK	5	b3 – b0	0000 – 1111 = 0 – 15
36 DCA EG RELEASE	6	b3 – b0	0000 – 1111 = 0 – 15
41 MG FREQUENCY	7	b3 – b0	0000 – 1111 = 0 – 15
42 MG DELAY	8	b3 – b0	0000 – 1111 = 0 – 15
43 MG PITCH	9	b3 – b0	0000 – 1111 = 0 – 15
44 MG DCA	10	b3 – b0	0000 – 1111 = 0 – 15
45 BEND PITCH	11	b3 – b0	0000 – 1100 = 0 – 12 1101 – 1111 = INHIBIT
46 BEND FORMANT	11	b4	0 – 1 = 0(OFF) – 1(ON)
47 PORTAMENTO TIME	12	b3 – b0	0000 – 1111 = 0 – 15
48 HOLD	12	b4	0 – 1 = 0(OFF) – 1(ON)
51 KEY NOTE	17	b6 – b0	0011000 – 1010100 = C1 – C6 0000000 – 0010111 = INHIBIT 1010101 – 1111111 = INHIBIT
52 KEY CHANGE	16	b1	0 – 1 = 0(DISABLE) – 1(ENABLE)
53 CHORD MEMORY	16	b0	0 – 1 = 0(DISABLE) – 1(ENABLE)
54 NOTE 1 ~ 58 NOTE 5	18 – 22	b5	0 – 1 = (OFF) – (ON)
		b4 – b0	00000 – 01100 = 0 – 12 11111 – 10100 = (-1) – (-12) 01101 – 01111 = INHIBIT 10011 – 10000 = INHIBIT *
61 PITCH SHIFT COARSE	13	b4 – b0	00000 – 01100 = 0 – 12 11111 – 10100 = (-1) – (-12) 01101 – 01111 = INHIBIT 10011 – 10000 = INHIBIT *
62 PITCH SHIFT FINE	14	b6 – b0	0000000 – 1100011 = 0 – 99 1100100 – 1111111 = INHIBIT
71 CHORUS SPEED	15	b1 – b0	00 – 11 = 1 – 4
72 CHORUS INTENSITY	15	b3 – b2	00 – 11 = 1 – 4

\* = 2's COMPLEMENT



PARAMETER NO. NAME MODE	PARAMETER OFFSET	BIT	CORRESPONDING PARAMETER VALUE MODE
73 CHORUS EFFECT	15	b5 – b4	00 – 10 = 1 – 3 11 = INHIBIT
74 UNISON DETUNE	13	b6 – b5	00 – 11 = 0 – 3
MODE	23	b1 – b0	00 = VOCODER 01 = HARMONIZE 10 = INTERNAL WAVE 11 = PITCH SHIFT
CHORUS ON/OFF	23	b3	0 – 1 = (OFF) – (ON)
UNISON ON/OFF	23	b2	0 – 1 = (OFF) – (ON)

### 3. Communications between a computer and the DVP-1

The DVP-1 can send and receive the following kinds of information via system exclusive messages.

#### Sending

**DEVICE ID** : Identifies equipment. Sent when a DEVICE ID REQUEST is received.

**WRITE COMPLETED** : Indicates a successful program write. Sent in response to a WRITE REQUEST.

**WRITE ERROR** : Indicates program write failure due to front panel write switch being set to DISABLE. Sent in response to a WRITE REQUEST.

**DATA SAVE (DATA DUMP)** : The program data. Sent in response to a DATA SAVE REQUEST.

#### Receiving

**DEVICE ID REQUEST** : A request to send the DEVICE ID.

**WRITE REQUEST** : Request to write loaded program data to the DVP-1 programmer.

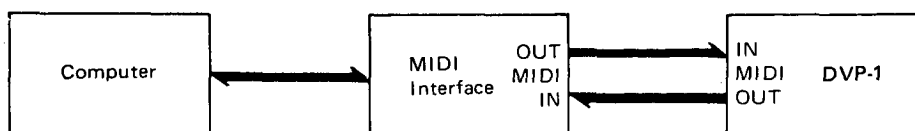
**DATA SAVE REQUEST** : A command to send program data.

**DATA LOAD (DATA DUMP)** : The program data to be loaded to the DVP-1.

**PARAMETER CHANGE** : Data which changes parameter values.

These system exclusive messages can be used for data transmission between the DVP-1 and a computer equipped with a MIDI interface and software that handles these system exclusive messages.

Setup is shown here:

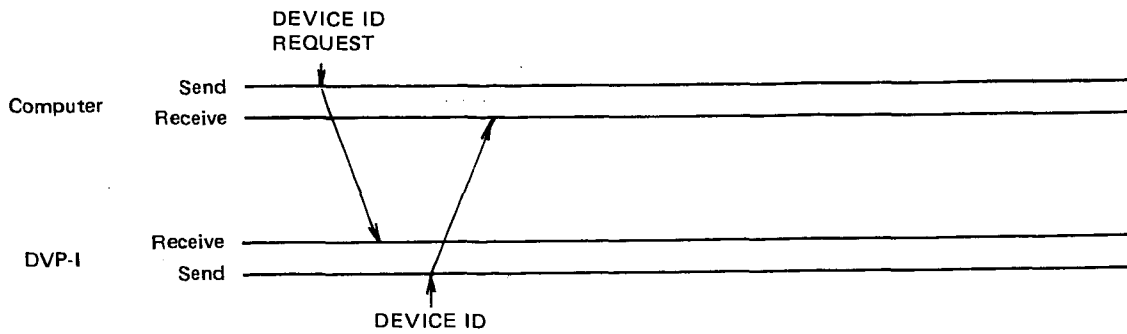


All DVP-1 exclusive messages use a "channel" determined by the value of parameter number 83. The channel set on the DVP-1 must match the channel used by the computer. Otherwise messages will be ignored. (This channel is for exclusive messages only and has no effect on omni mode channel mode messages.)

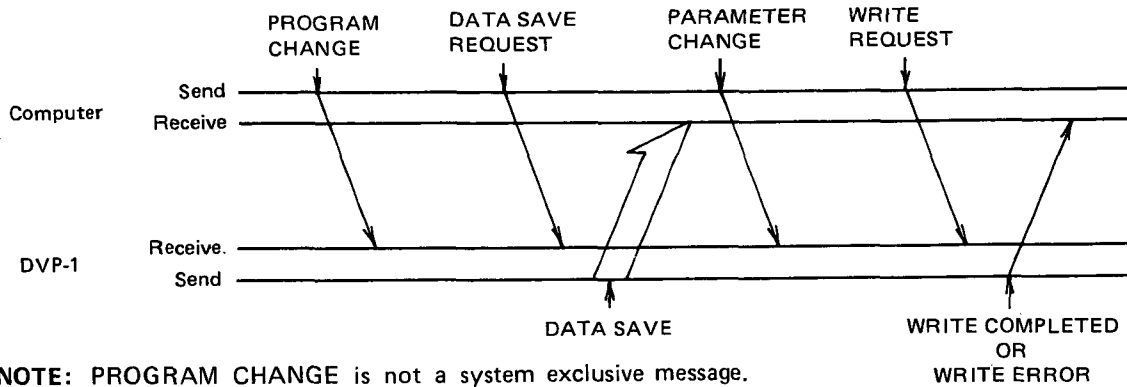
If these channels are used then several DVP-1 units can be used in a system and program control can be independently performed for each.

**Communications examples**

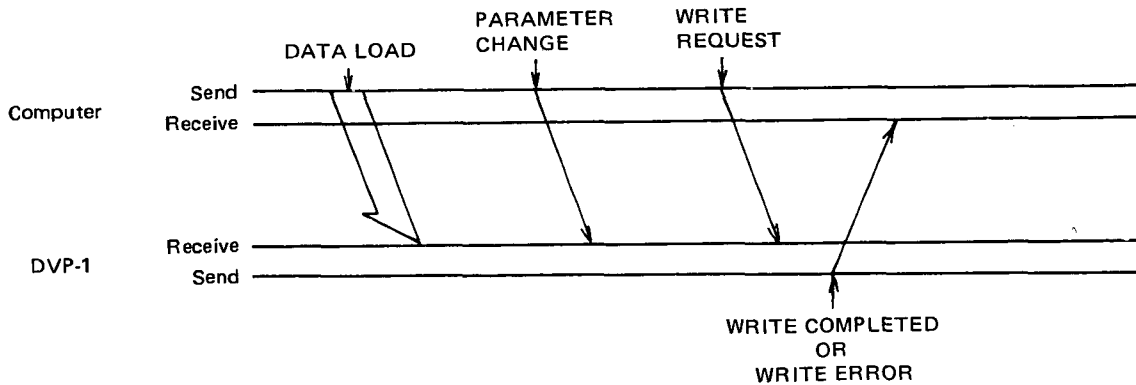
(1) To determine what equipment is connected to the computer.



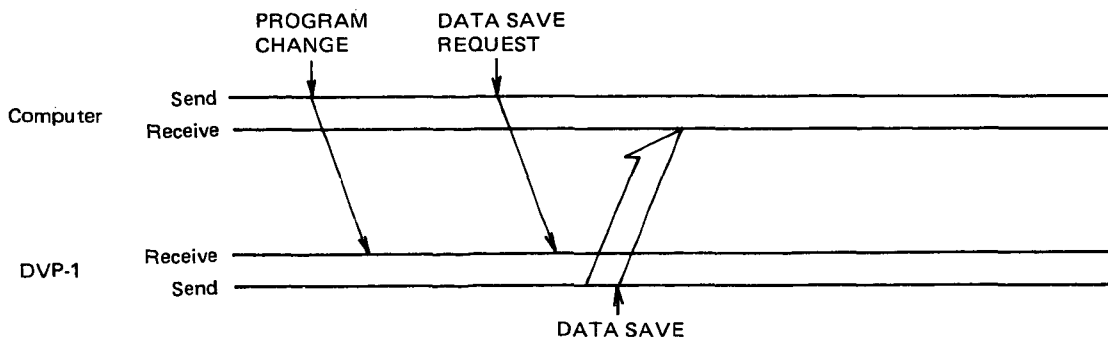
(2) To edit program data within the DVP-1.



(3) To edit program data prepared on the computer.

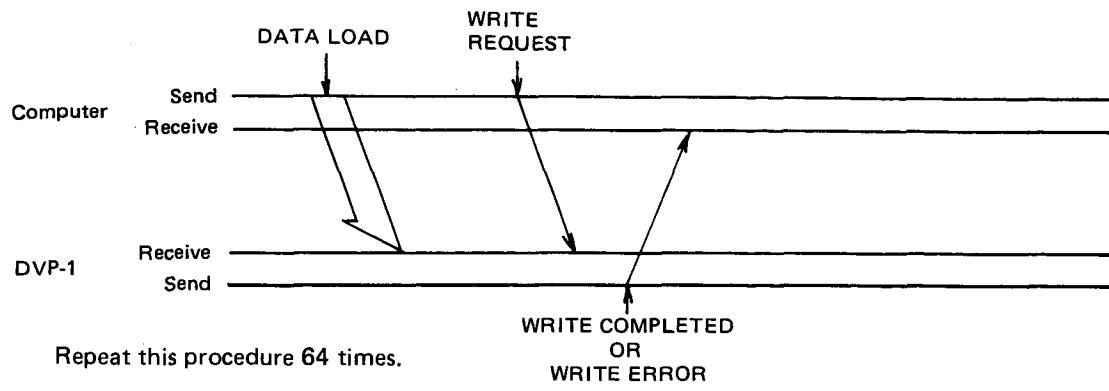


(4) To save all 64 programs from the DVP-1 to the computer.



Repeat this procedure 64 times.

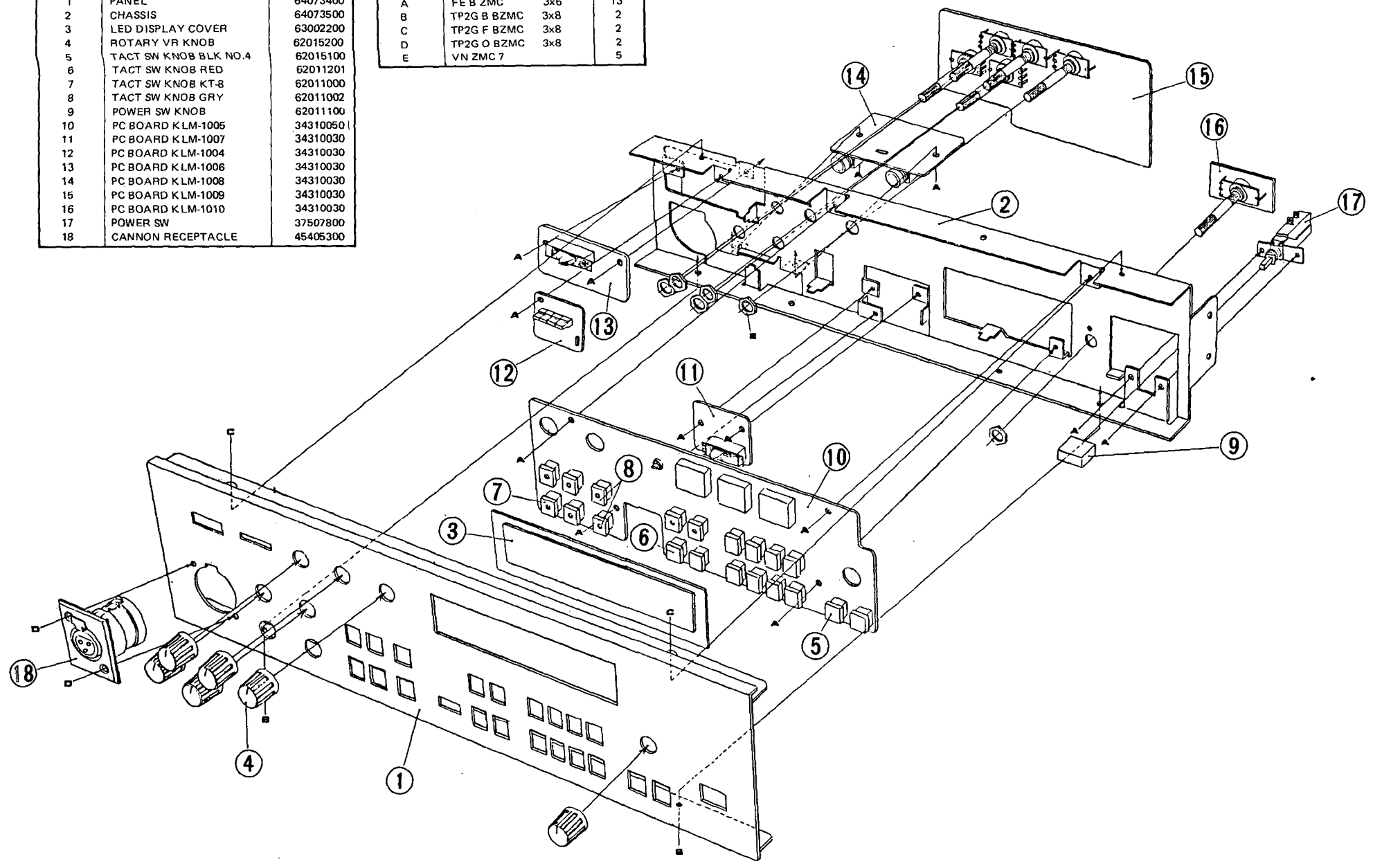
(5) To load all 64 programs to the DVP-1 from the computer.

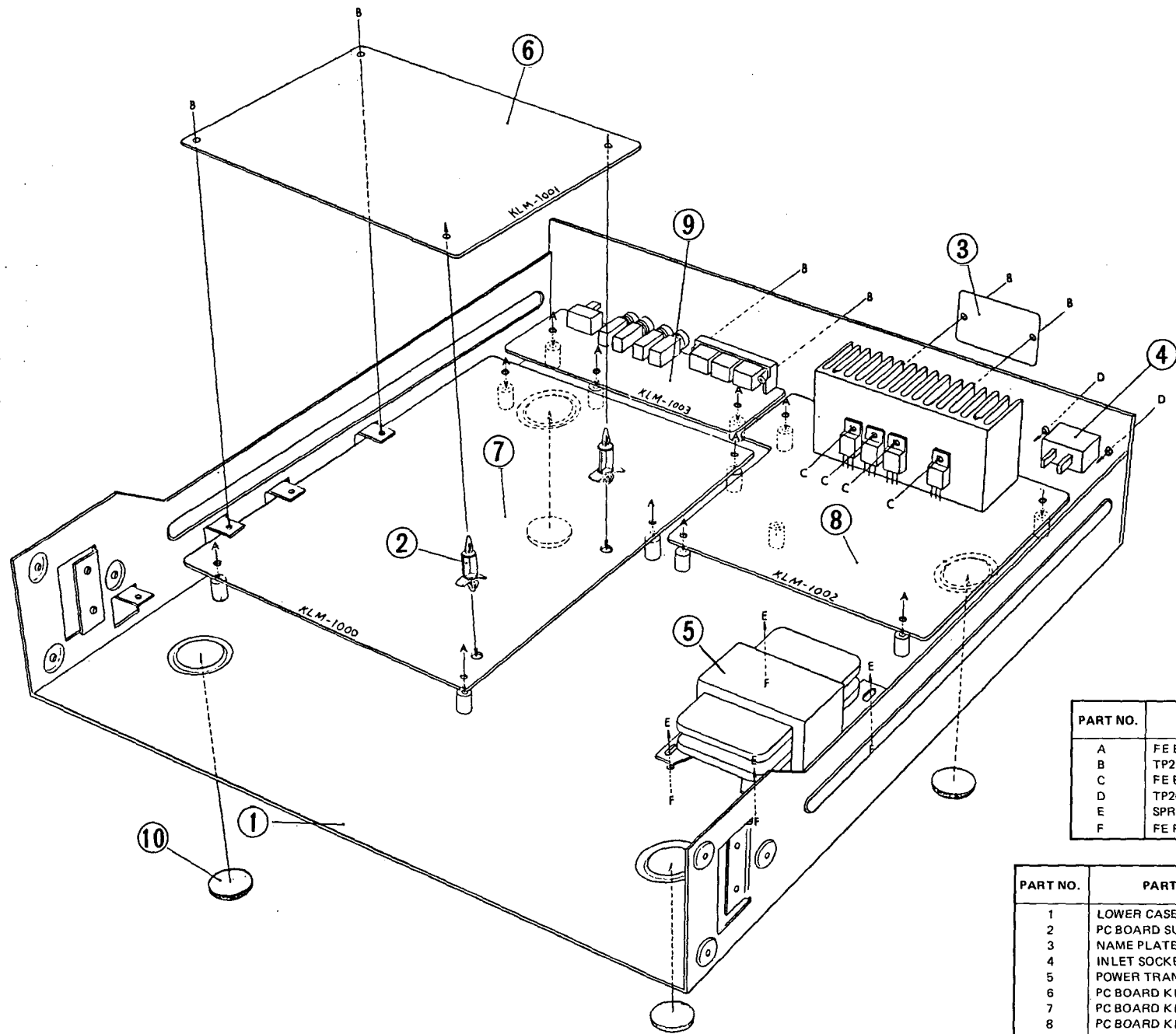


### 3. STRUCTURAL DIAGRAM

PART NO.	PART NAME	PART CODE
1	PANEL	64073400
2	CHASSIS	64073500
3	LED DISPLAY COVER	63002200
4	ROTARY VR KNOB	62015200
5	TACT SW KNOB BLK NO.4	62015100
6	TACT SW KNOB RED	62011201
7	TACT SW KNOB KT-8	62011000
8	TACT SW KNOB GRY	62011002
9	POWER SW KNOB	62011100
10	PC BOARD KLM-1005	34310050
11	PC BOARD KLM-1007	34310030
12	PC BOARD KLM-1004	34310030
13	PC BOARD KLM-1006	34310030
14	PC BOARD KLM-1008	34310030
15	PC BOARD KLM-1009	34310030
16	PC BOARD KLM-1010	34310030
17	POWER SW	37507800
18	CANNON RECEPTACLE	45405300

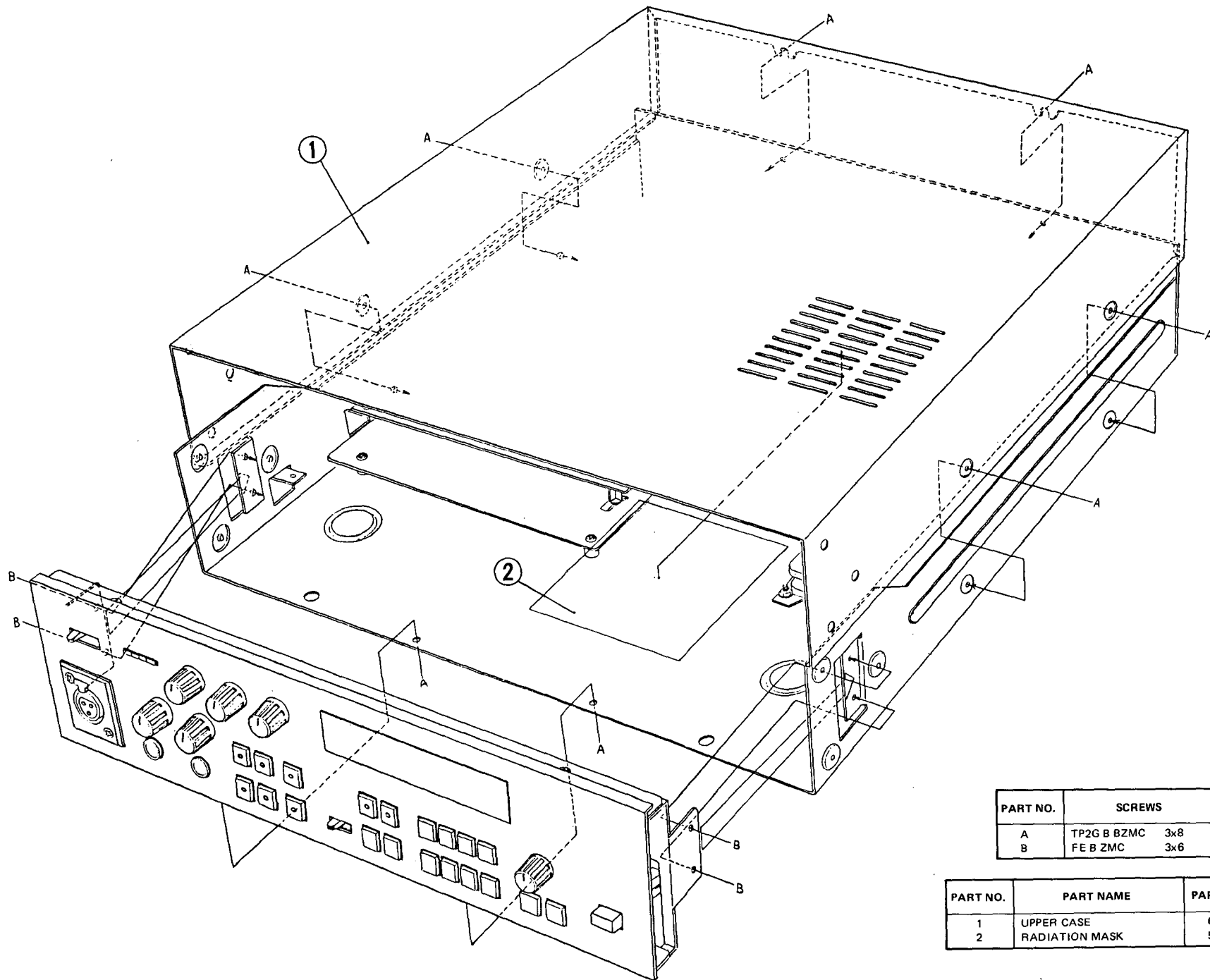
PART NO.	SCREWS, NUT	Q'TY
A	FE B ZMC 3x6	13
B	TP2G B BZMC 3x8	2
C	TP2G F BZMC 3x8	2
D	TP2G O BZMC 3x8	2
E	VN ZMC 7	5





PART NO.	SCREWS, NUT	Q'TY
A	FE B ZMC 3x6	12
B	TP2G B ZMC 3x8	6
C	FE B ZMC 3x8	4
D	TP2G F BZMC 3x8	2
E	SPRING NUT ZMC4	4
F	FE FEW BZMC 4x10	4

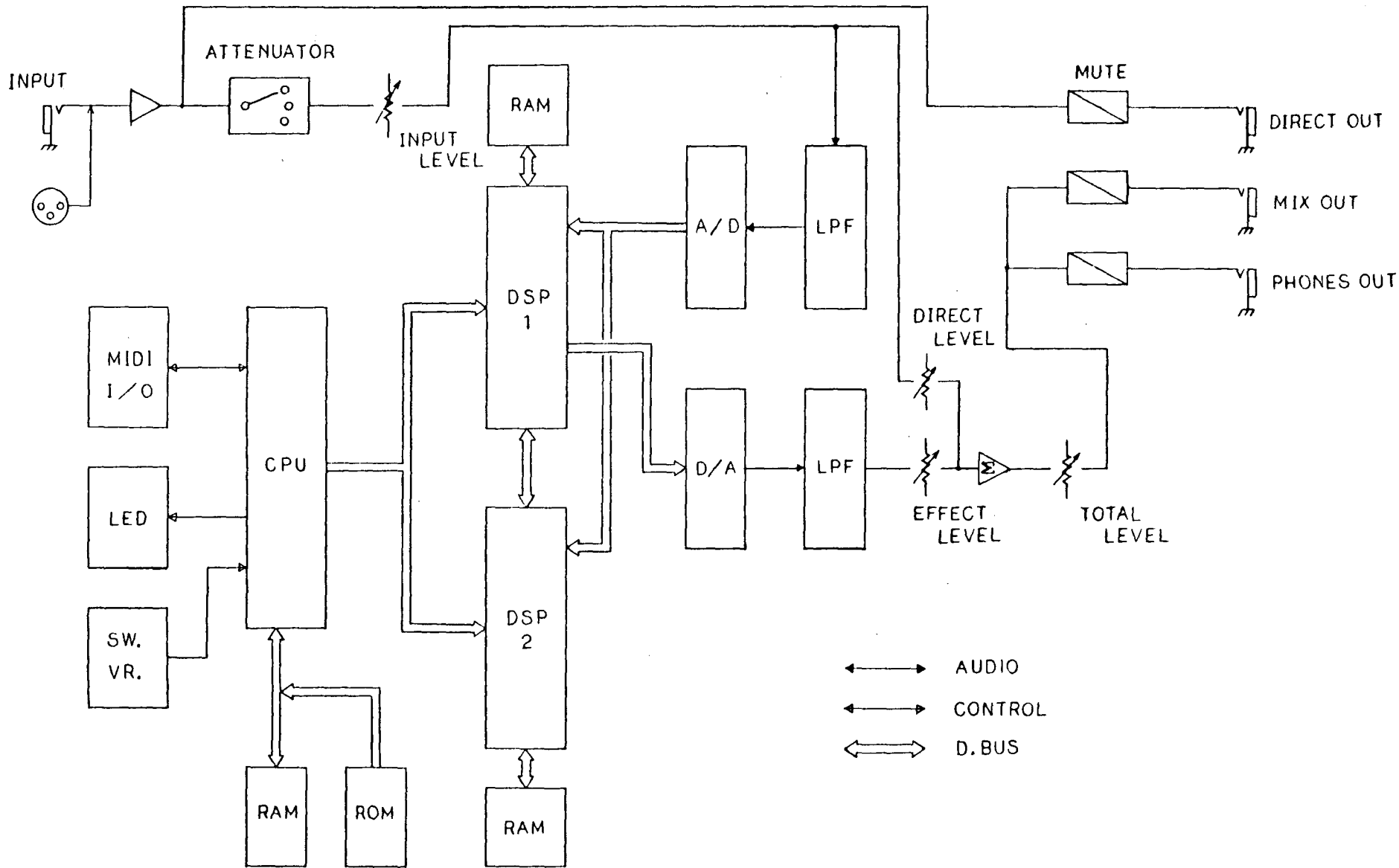
PART NO.	PART NAME	PART CODE
1	LOWER CASE	64073600
2	PC BOARD SUPPORT	54011700
3	NAME PLATE	68600700
4	INLET SOCKET	54010900
5	POWER TRANSFORMER	40009800
6	PC BOARD KLM-1001	34310010
7	PC BOARD KLM-1000	34310000
8	PC BOARD KLM-1002	34310020
9	PC BOARD KLM-1003	34310030
10	RUBBER FEET	50008700



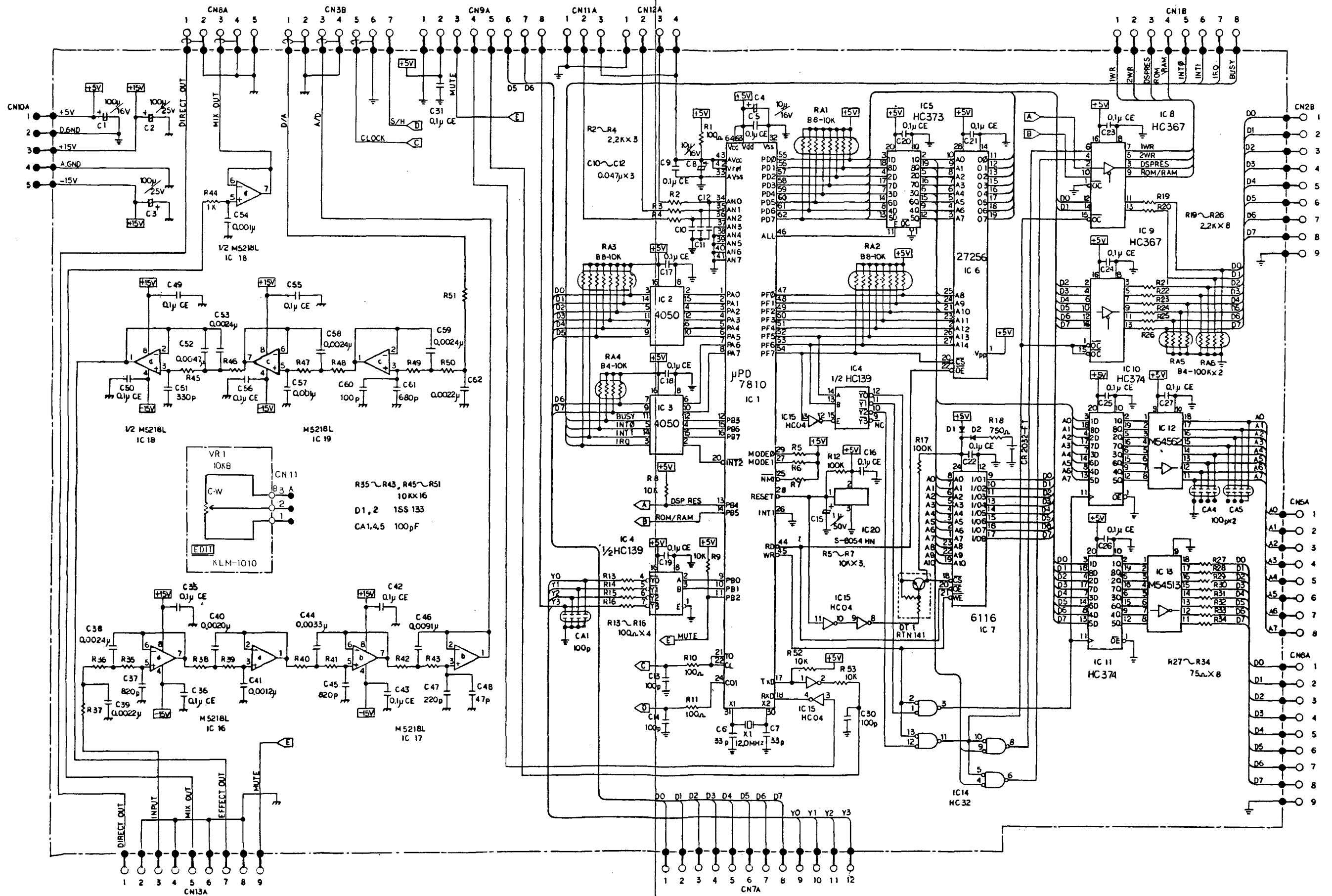
PART NO.	SCREWS	Q'TY
A	TP2G B BZMC 3x8	8
B	FE B ZMC 3x6	4

PART NO.	PART NAME	PART CODE
1	UPPER CASE	64073700
2	RADIATION MASK	55005100

# 4. BLOCK DIAGRAM



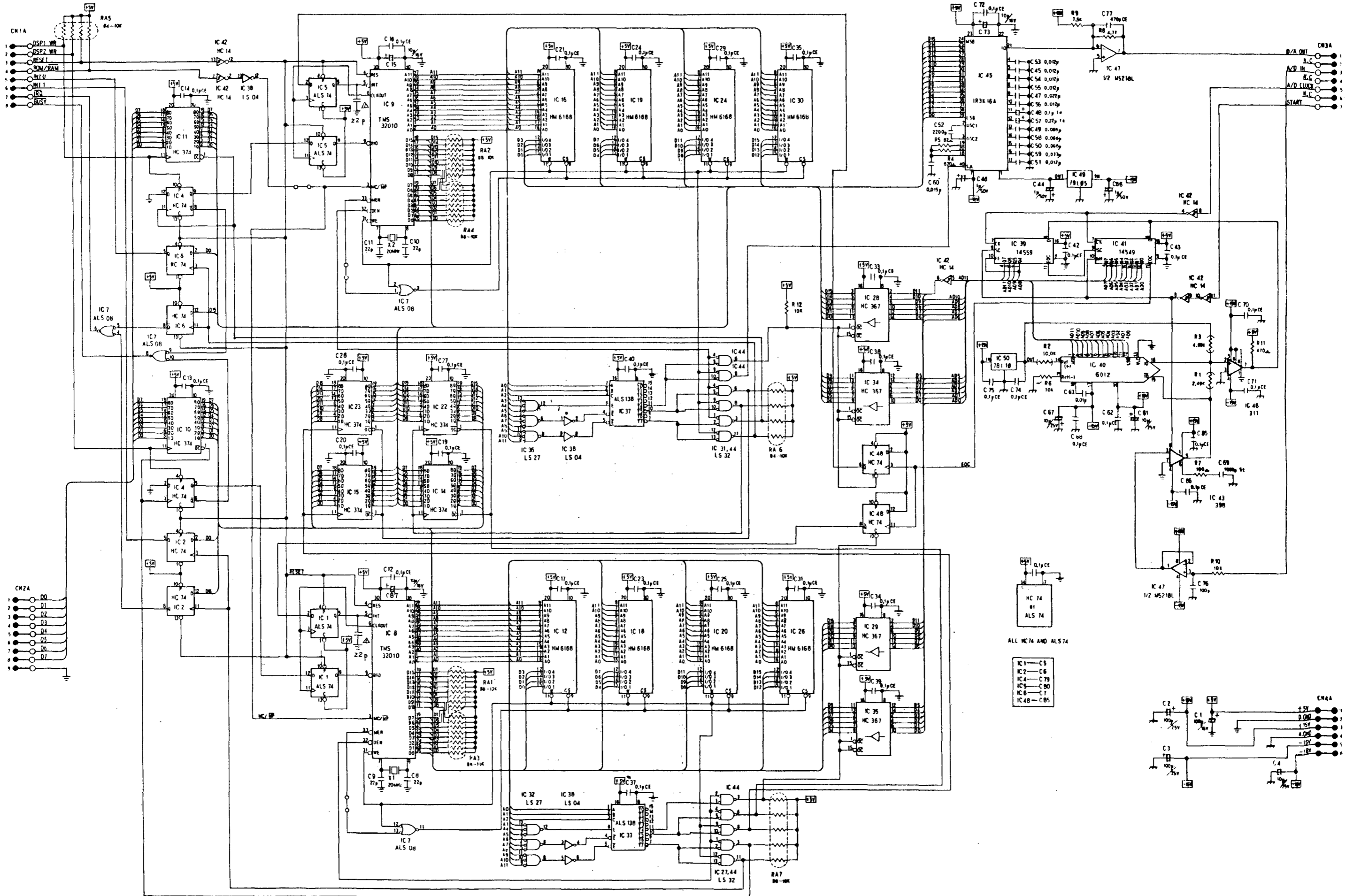
KLM-1001, 1010

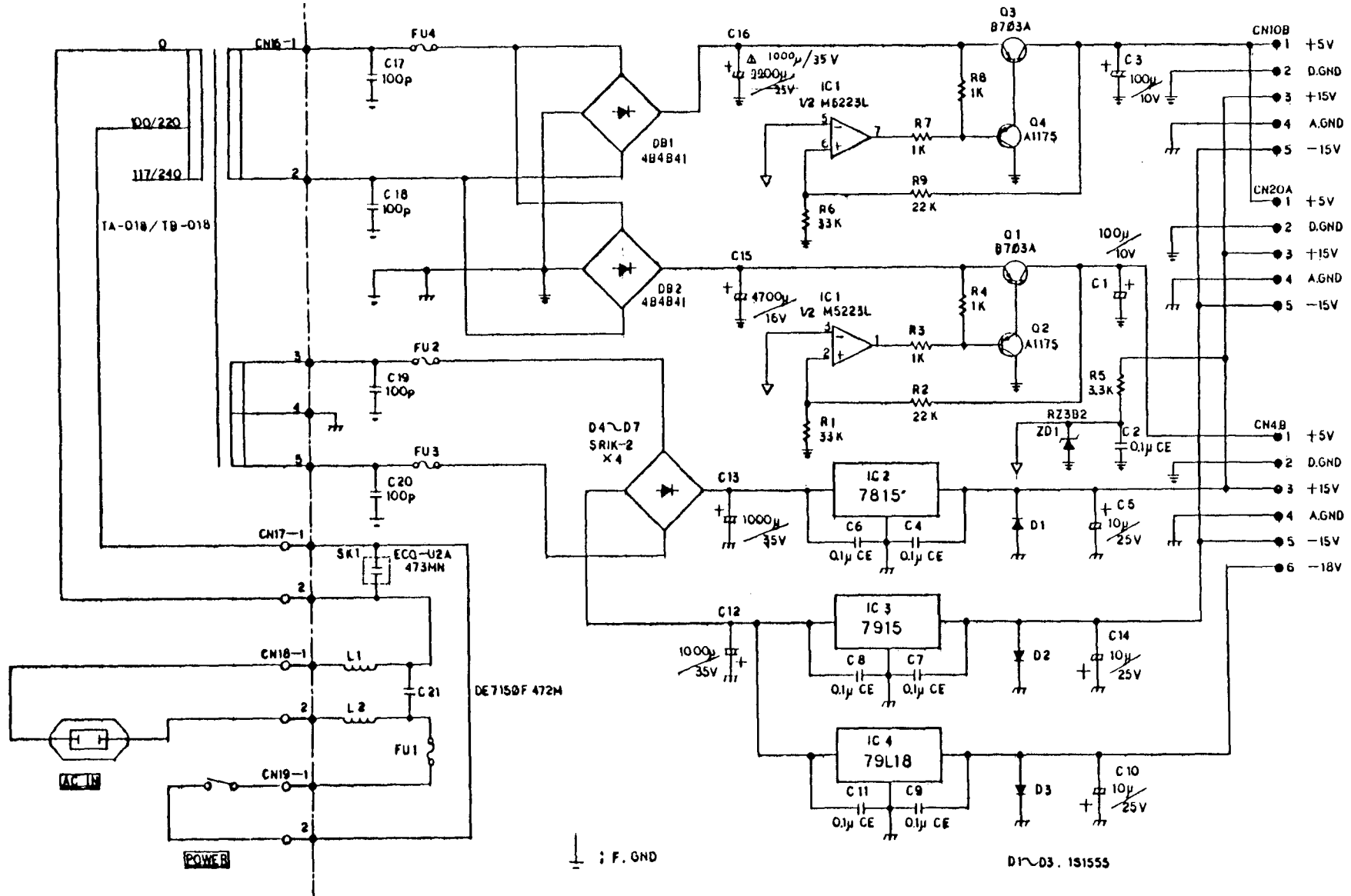




# 5. CIRCUIT DIAGRAM

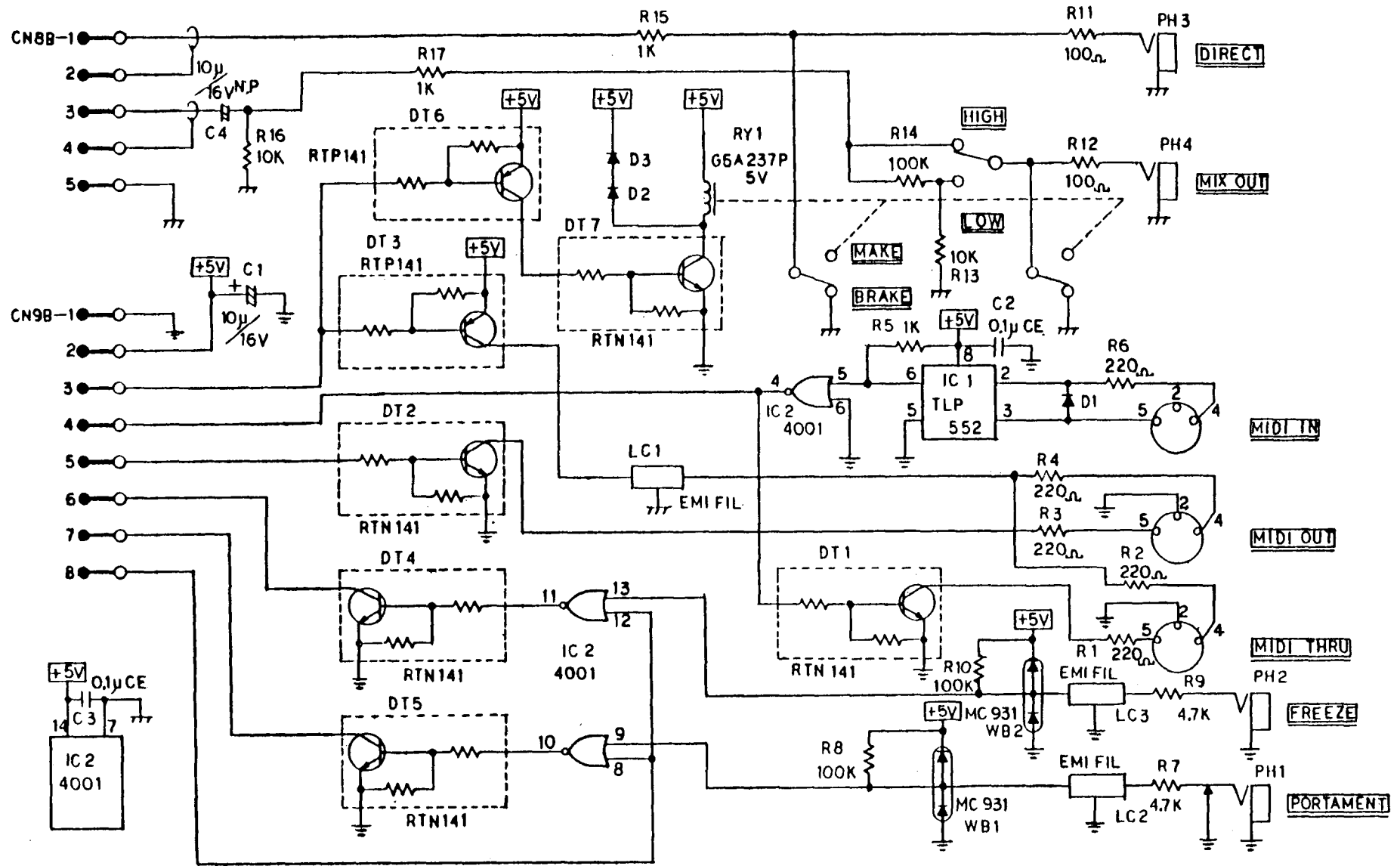
KLM-1000



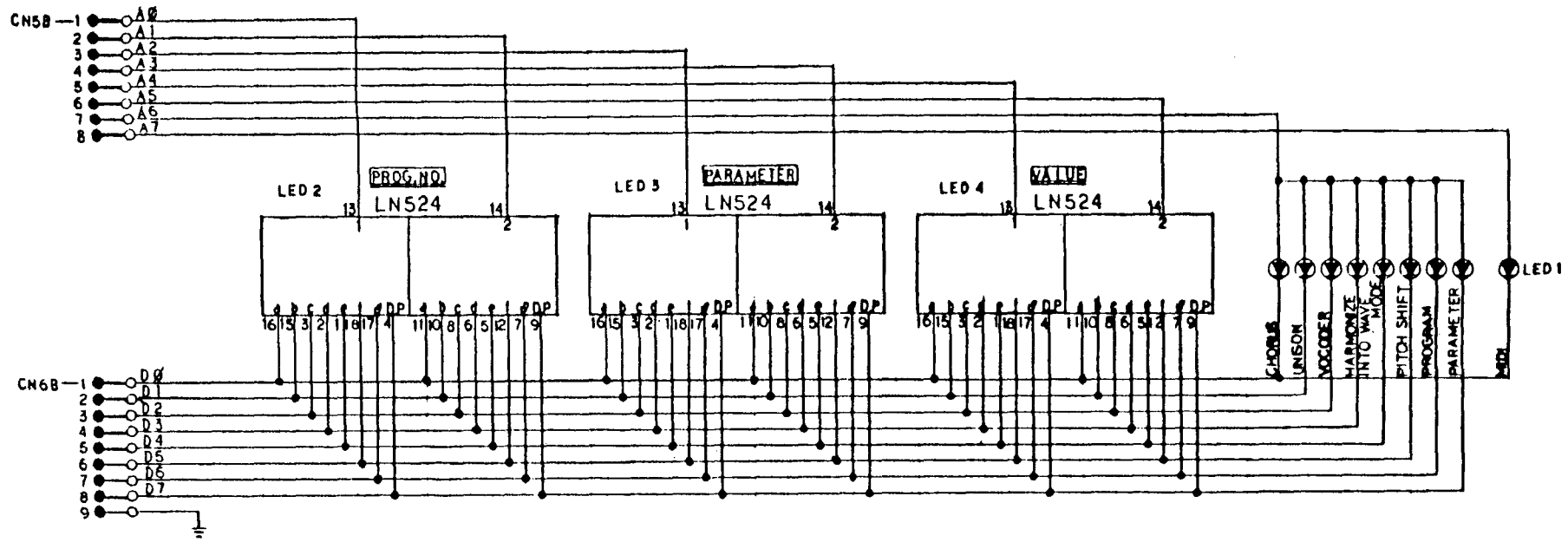


KLM-1002

D1~D3. 1S1555

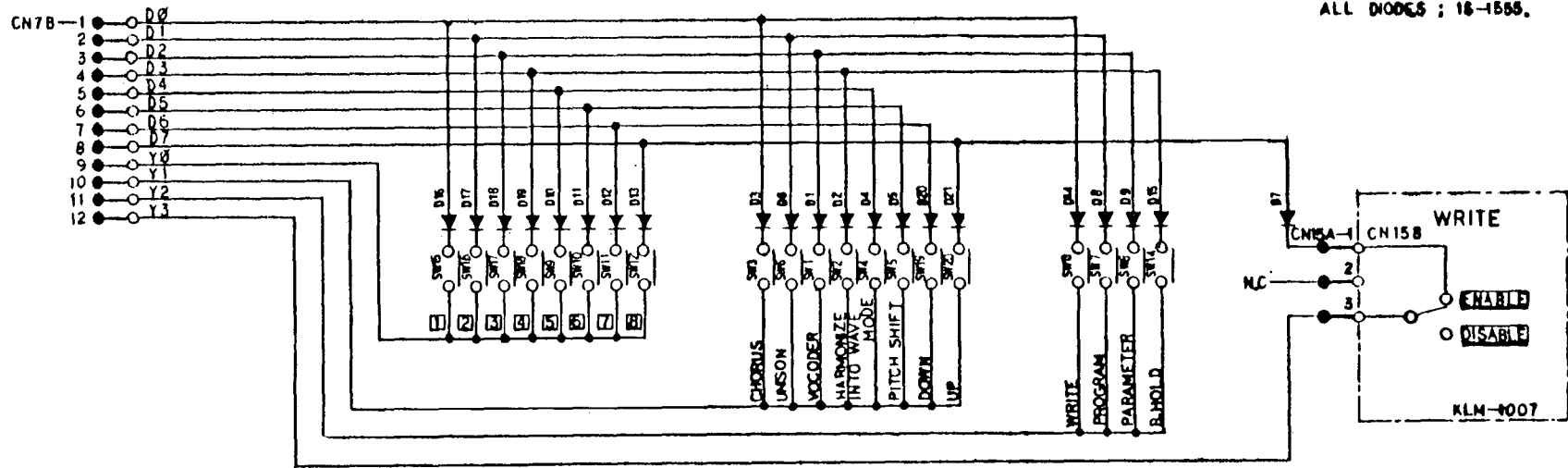


KLM-1003

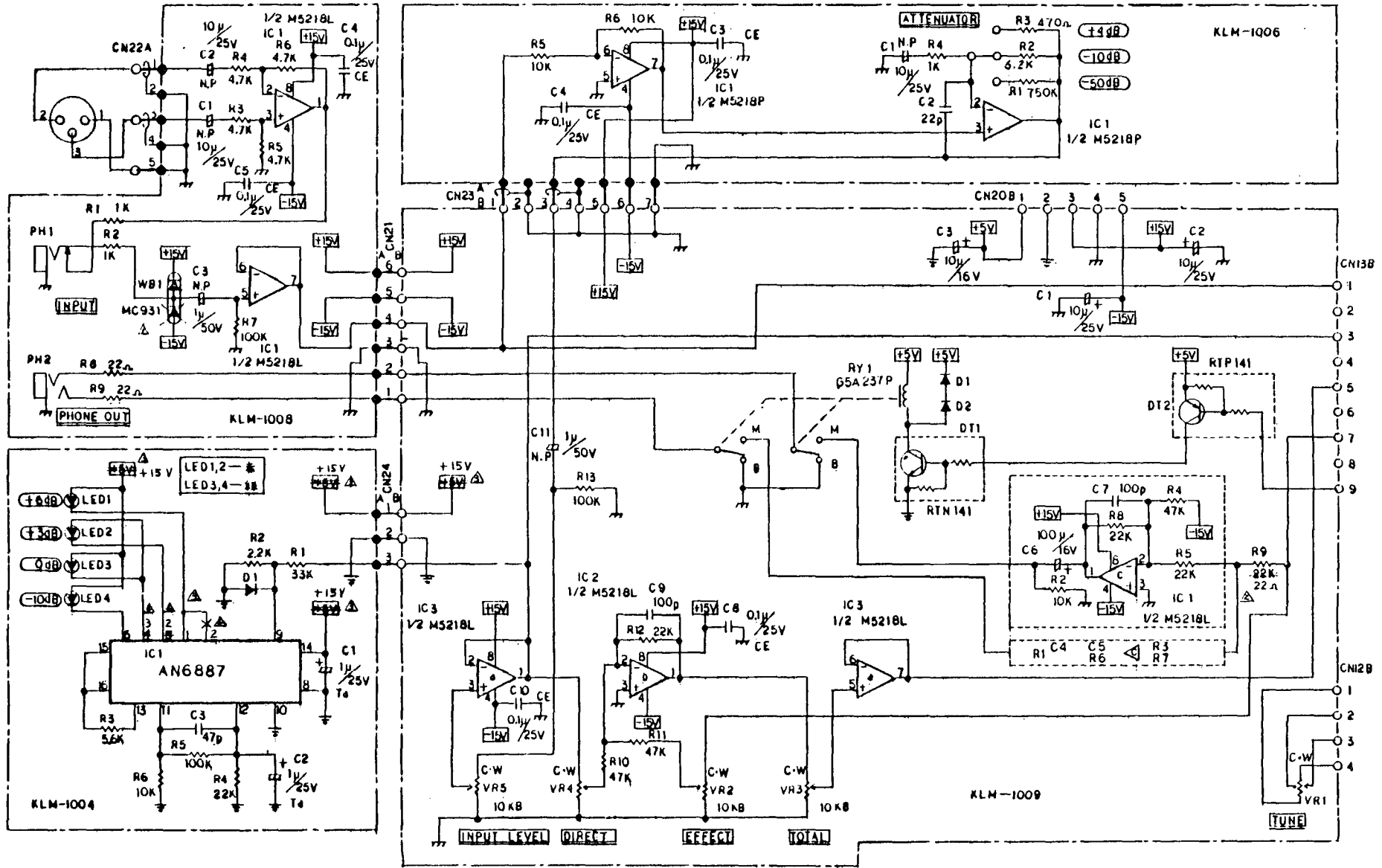


KLM-1005

ALL DIODES : 18-1555.



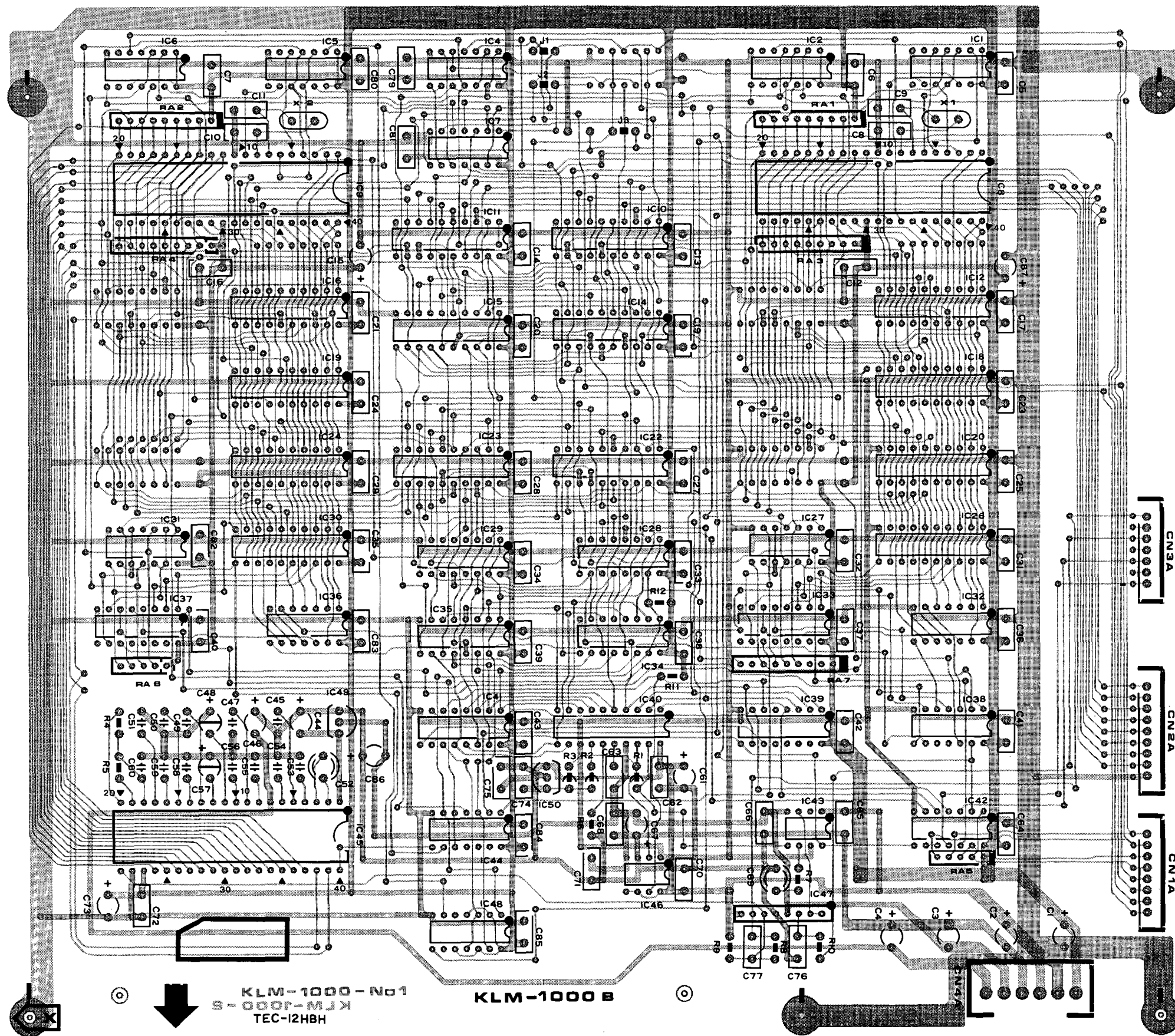
KLM-1005



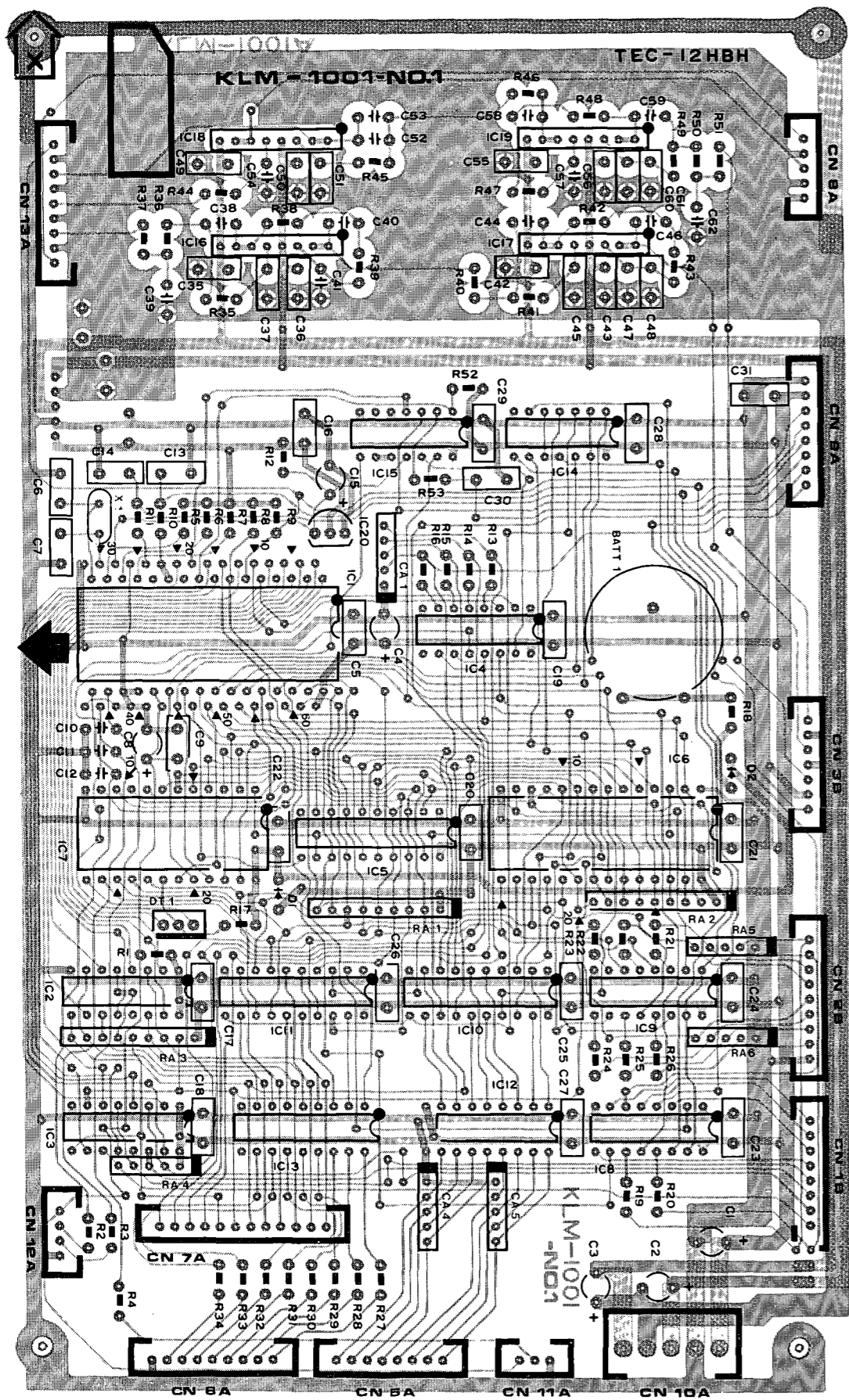
KLM-1004, 1006, 1008, 1009

# 6. P.C. BOARD

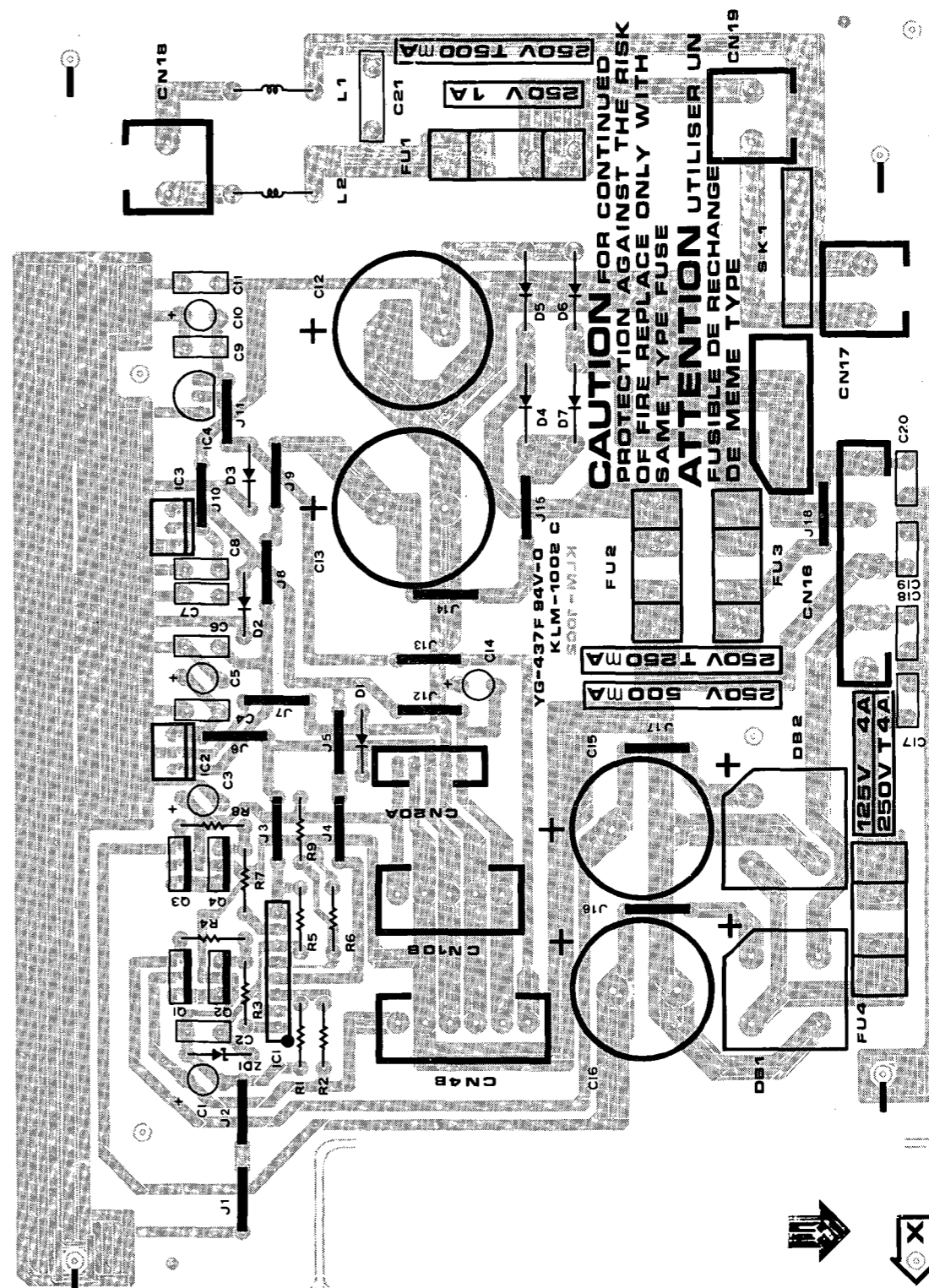
KLM-1000

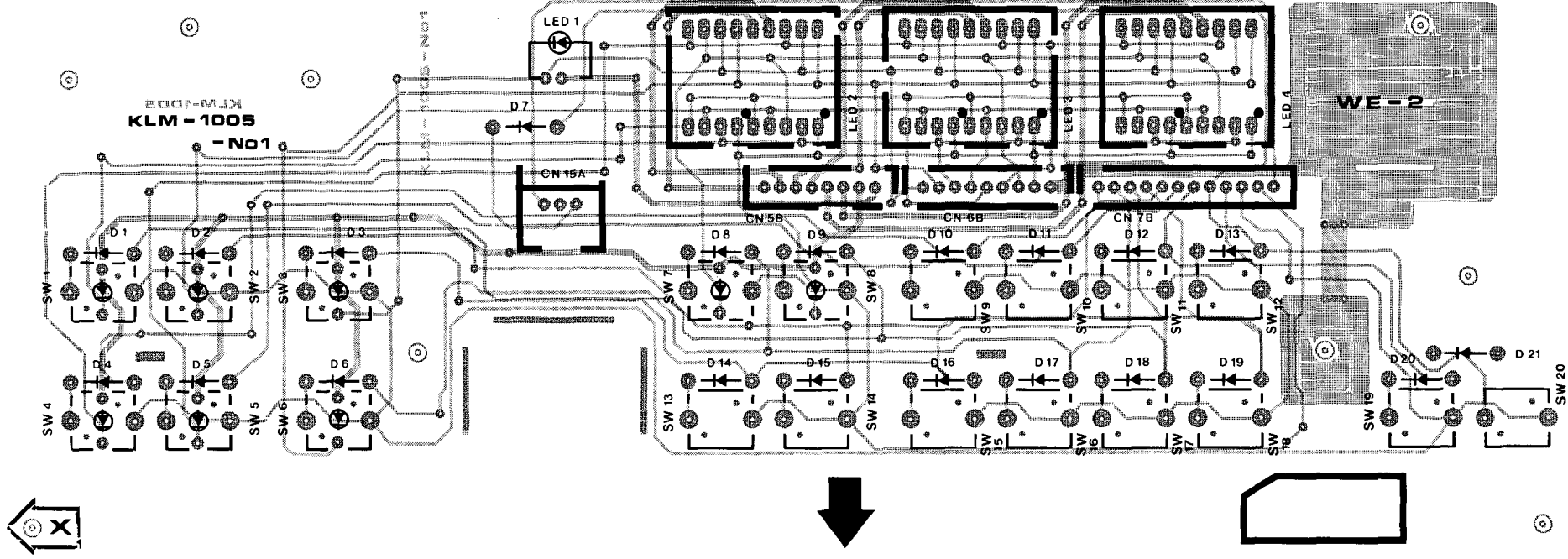


KLM-1001

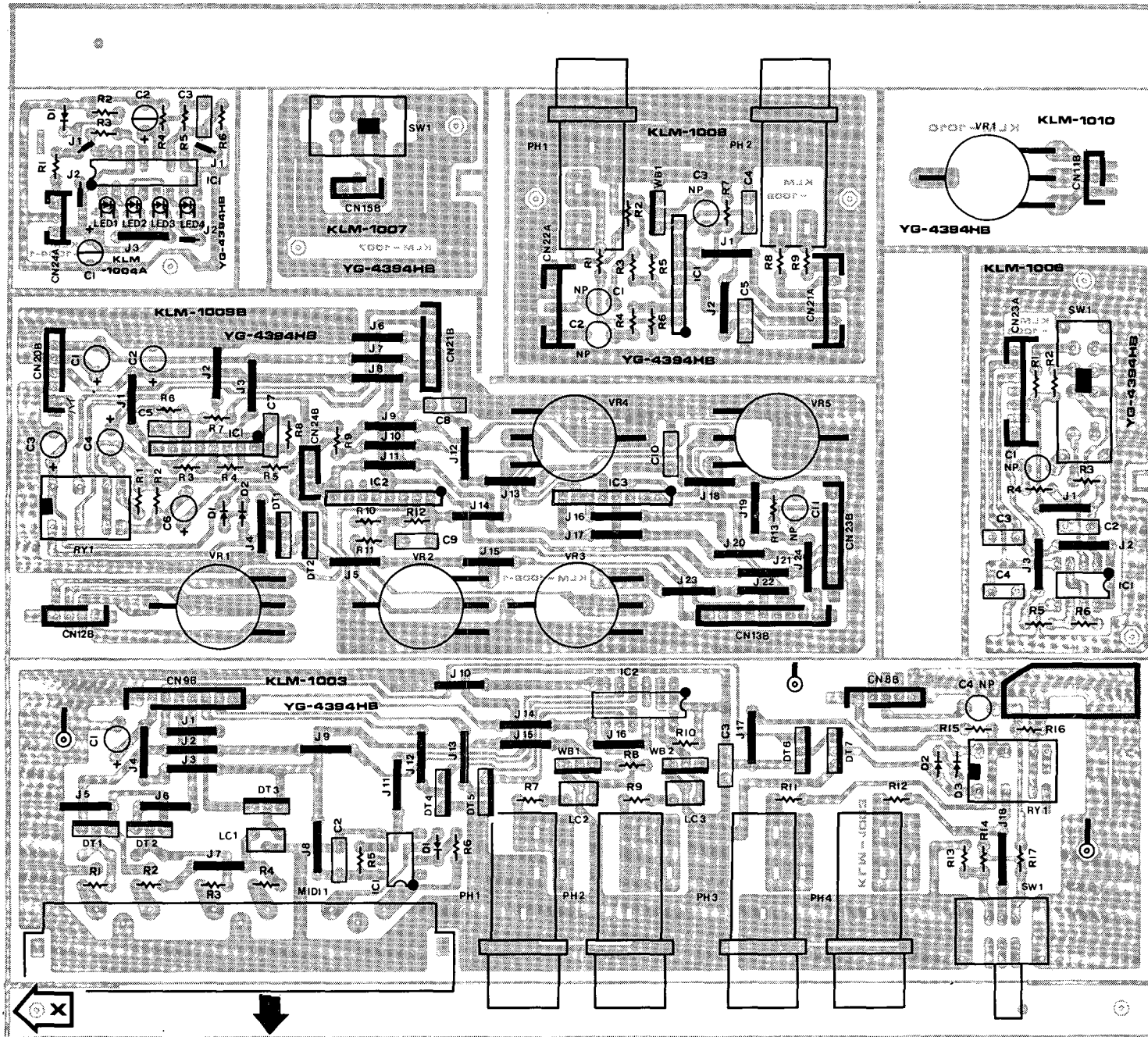


KLM-1002









KLM-1003, 1006-1010

# 7. CIRCUIT DESCRIPTIONS

The Korg DVP-1 is a MIDI voice processor, a new kind of device based on the high speed audio signal processing capabilities of DSP (digital signal processor) chips.

## 1. System configuration

The DVP-1 uses one CPU ( $\mu$ PD7811) and two DSP (TMS32010) chips. The main function of the DSPs is to process input from the ADC according to instructions from the CPU about pitch, EG, trigger, parameter changes, etc., and then output it to the DAC.

All functions are processed via the CPU under software control.

## 2. Voicing assignment

One of the DSPs works as the master, the other as its slave. The DVP-1 is 5-voice when the chorus effect is off, and 4-voice when chorus is on.

When chorus is off, the master DSP handles common processing and 2-voice output while the slave DSP processes 3-voice output. When chorus is on, the master DSP handles chorus processing and 1-voice output, while the slave DSP processes 3-voice output.

## 3. Basic operation

There is one interrupt per sampling clock; during interrupt processing, data is read in from the ADC to the input buffer and written out from the output buffer to the DAC or master DSP. The master DSP waits for completion of input of one frame (256 samples) and prepares the next output frame data based on the input signal and data from the CPU. During this time it is inputting the next frame. The slave DSP waits to receive data from the master DSP and performs the same kinds of operations.

This chart shows data flow between the CPU and DSPs.

## 4. Test (Utility) program explanation

The following utility programs are run by simultaneously holding down the specified function keys and turning on the power (resetting the circuitry).

(1) Preload data: INT WAVE, CHORUS, UP.

Shows PrLoAd on display and preloads program data. Performs the same processing if it determines that program data has been corrupted when power is turned on.

(2) Change INT WAVE waveform: CHORUS, UNISON, UP, DOWN.

Changes the INT WAVE waveform. If you perform a program write in this mode then the selected waveform can be retrieved in the normal mode.

**Note:** This capability is not covered in the owner's manual so avoid using it in such a way that it could cause confusion.

## 5. System problem determination

If the DVP-1 doesn't operate properly when you turn on the power there are several possible reasons. Compare the symptoms with the list here and check the suggested circuit board.

(1) System hangs up with display showing AA or bb.

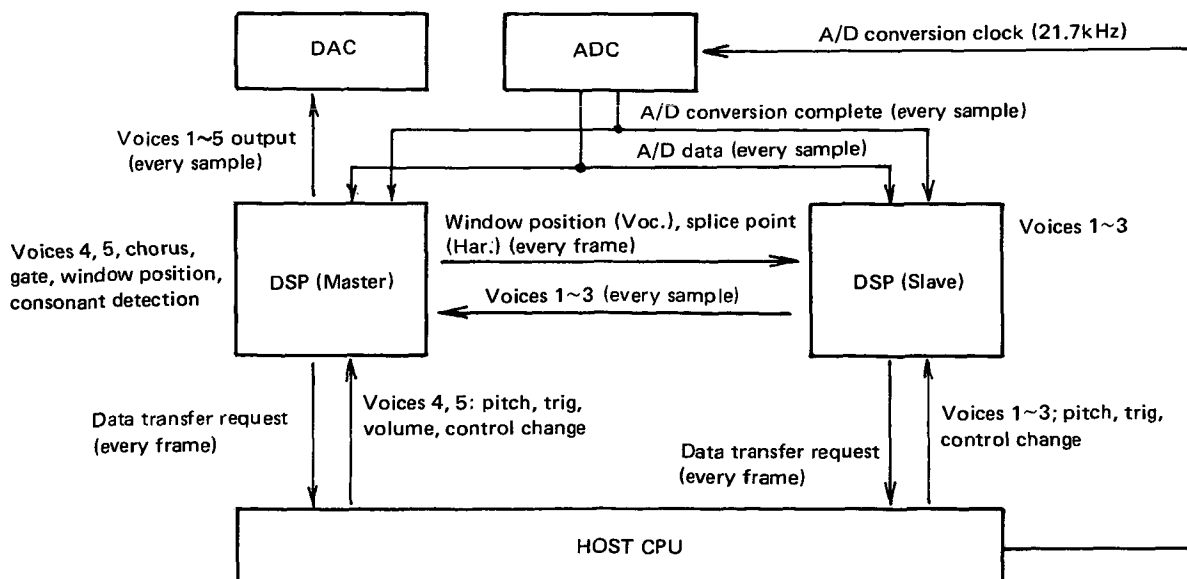
Problem with RAM and CPU adjoining circuitry (probably KLM-1001) though CPU ( $\mu$ PD7811) and ROM (27256) are okay.

(2) Stops with display showing HELLO! with dots flashing.

CPU ( $\mu$ PD7811) and ROM (27256) are okay but there is a problem with the CPU adjoining circuitry (KLM-1001).

(3) Hangs up with display showing C or CC.

Problem with DSP (KLM-1000) circuit or CPU-DSP interface.



## 6. Main Circuit Explanation

### Power supply (KLM-1002)

Uses a 3-terminal regulator to supply  $\pm 15V$  and  $-18V$ . Because of the high current consumption of  $+5V$ , it is provided on two lines. Standard voltage is  $3V$  at ZD1. The IC1 M5223L is controlled so that its "+" terminal is  $3V$ .

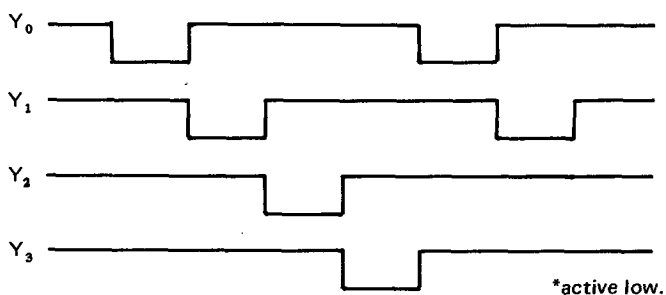
### Rear jacks (KLM-1003)

CN-9B-3 is for muting release; DT6 and DT7 are to prevent the relay from causing spurious MIDI output when DT3 power comes on. IC1 TLP552 is the MIDI receive IC, providing output at number 6 pin when current flows between number 2 pin and 3 pin.

### Display (KLM-1005)

CN5 and CN6 are the LED display lines providing dynamic display with 80% duty cycle. CN5 is the voltage supply line providing  $3\sim 4V$  to the LED by anode common connection. CN6 is the data line providing about  $20\mu A$  to each segment.

CN7 is the switch scanning line. Refer to the chart below.



When a switch is pressed, data bus  $D_n$  goes to 0 for the duration that  $Y_n$  is active.

### Panel board (KLM-1004, 6, 8, 9)

IC1 is a differential amplifier for balanced input from the Cannon connector; it is connected to the S terminal of the standard jack. Therefore, the standard jack input receives priority if both the Cannon and standard jack are used at the same time.

Amplification factors for attenuator settings  $+4$ ,  $-10$ , and  $-50dB$  are 3.3, 17, and 58dB, respectively. Frequency response is degraded at the  $-50$  setting so if measuring gain does not go higher than around 1kHz.

KLM-1004 IC1 is the attenuator LED driver designed so that when CN24 number 3 gets a  $10V_{pp}$  input it should indicate  $+10dB$  (though it actually shows only up to  $+6dB$ ). This is because  $10V_{pp}$  is the maximum range handled by the DVP-1's ADC.

### CPU (KLM-1001)

The left third of the circuit diagram is the LPF connected to ADC input and DAC output, with cutoff frequencies (fc) of 10kHz for both.

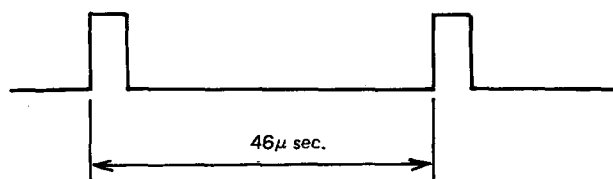
The CPU is the 7810 with ROM attached externally so that it is possible to replace it with the 7811. The 7810's PD0~PD7 are a multiplexed A/D bus with address (least significant 8 bit) register IC5. PF0~PF7 carry the most significant part of the address. PA0~PA7 are input lines for the switches and foot switches with input passing through "4050" to improve the threshold level. PB3~PB7 and INT2 are communication lines with the KLM-1000 DSP; front panel LED dots flash when the interrupt signal ceases being input to INT2.

ROM 27256 is a strict Fujitsu specification since the use of NEC ROM may result in loss of RAM contents when power is turned off.

ICs 10 and 11 are data registers for the LED display while ICs 8 and 9 are a tri-state buffer for communication with the DSP circuitry; these also are address mapped.

### DSP, ADC, DAC (KLM-1000)

The ADC is 12-bit using 6012 (or 9221) and 311 with 14549 and 14559 as SAR. CN3A-5 is for the A/D clock at 500kHz, while the sampling frequency is about 22Hz and the CN3A-7 waveform is as shown below. This signal combines S/H and A/D start information.



The DSP gets an interrupt (EOC signal) every  $46\mu s$ ; DSP operation becomes uncontrolled if this signal is not received.

The DAC is 16-bit complete with registers so that it can store data with WR signals from the DSP. Waveform distortion is generated if capacitors C48 and 57 are connected to the DAC with reverse polarity.

The DSP chips are in a master-slave relationship with the IC9 side being the master. Data communication between the two DSP chips uses ICs 14, 15, 22, and 23, via HC374. The DSPs use mask ROM. Usually externally connected ROM is not needed with 1-chip microcontrollers having mask ROM, but the TMS32010 has small ROM capacity so only the program load sequence is masked. The actual program is transferred from the CPU to the DSP and stored in RAM (6168 or 3168), so that operation depends on data in RAM. Since the DSP operates at such high speed, high speed RAM is required; ordinary RAM is unsuitable. DSP number 3 terminal is for MC/MP switching. When this is high internal ROM is used and when it is low then externally connected RAM is used for operation. This terminal goes high and program data is transferred from the CPU when power is turned on, when DVP-1 mode changes, and when the INT WAVE mode waveform is changed.

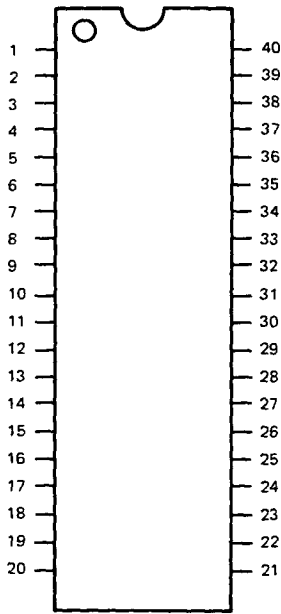
### JOB STATUS OF DSP, CPU

PARAMETER	ASSIGNMENT	PARAMETER	ASSIGNMENT	PARAMETER	ASSIGNMENT
FORMANT 11 SHIFT	△	43 PITCH	△	SHIFT LEVEL 61 COARSE	○
KBD 12 TRACK	△	44 DCA	△	62 FINE	○
WINDOW 13 LENGTH	△	BEND 45 PITCH	○	CHORUS 71 SPEED	△
BREATH BYPASS 14 LEVEL	△	46 FORMANT	○/△	72 INTENSITY	△
LEVEL 15 THRESHOLD	△	PORTAMENTO 47 TIME	○	73 EFFECT	△
PITCH 16 THRESHOLD	△	48 HOLD	○	UNISON 74 DEFINE	○/△
INTERNAL 21 WAVE FORM	△	KEY 51 NOTE	○	GATE 81 THRESHOLD	△
GATE 74 DETUNE	○	KEY 52 CHANGE	○	82 DECAY	△
32 DECAY	○	CHORD 53 MEMORY	○	MIDI 83 CHANNEL	○
X 33 POLARITY	○	54 NOTE 1	○	84 ENABLE	○
34 INTENSITY	○	55 NOTE 2	○	85 OMNI	○
DCA EG 35 ATTACK	△	56 NOTE 3	○	KEY. W 86 BOTTOM	○
36 RELEASE	△	57 NOTE 4	○	KEY. W 87 TOP	○
MG 41 FREQUENCY	△	58 NOTE 5	○	88 FOOT SW	○
42 DELAY	△				

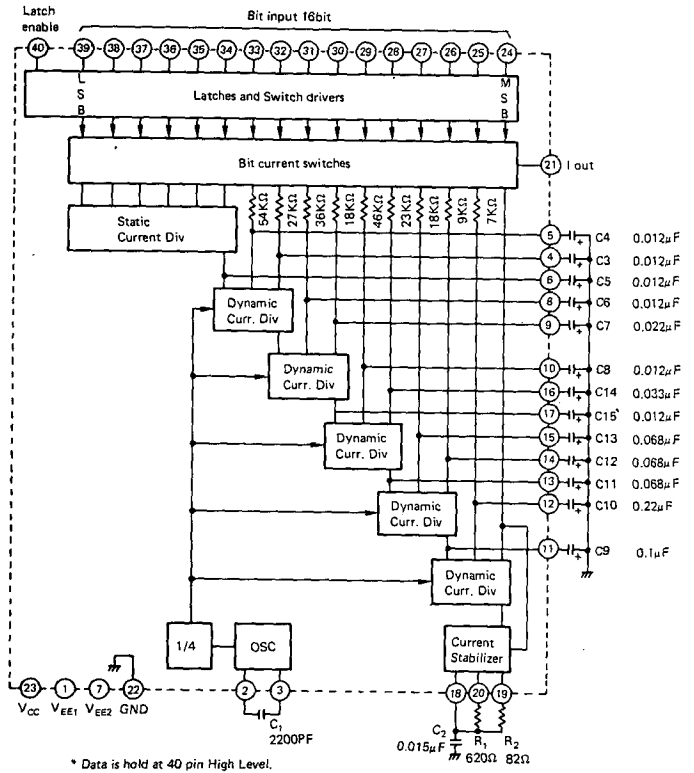
- △ Cases where the CPU sends commands to the DSP in order to have the DSP perform the processing.
- Cases where the CPU does the processing and sends the resulting data (pitch, trigger, master volume) to the DSP.

# IR3K16A

## PIN CONFIGURATION



## BLOCK DIAGRAM

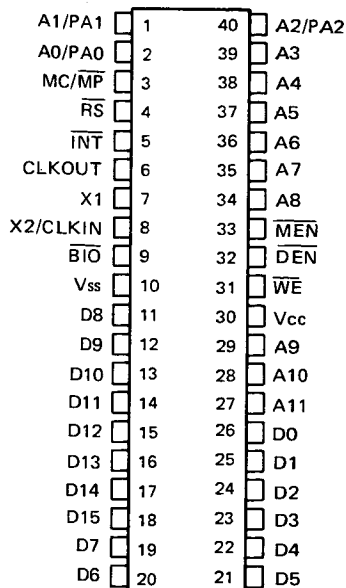


## TERMINAL NAMES

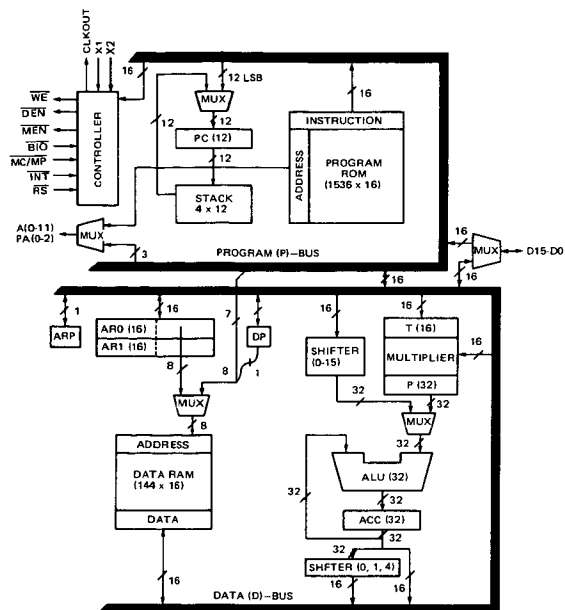
Pin No.	Symbol	Terminal	Pin No.	Symbol	Terminal
1	V <sub>EE1</sub>	Power supply (-5V)	21	I <sub>0</sub>	Output (Source current)
2	OSC <sub>1</sub>		22	GND	GND
3	OSC <sub>2</sub>		23	V <sub>CC</sub>	Power supply (+5V)
4	C <sub>3</sub>	Smoothing capacitor	24	I <sub>16</sub>	Digital input MSB
5	C <sub>4</sub>	Smoothing capacitor	25	I <sub>15</sub>	Digital input MSB
6	C <sub>5</sub>	Smoothing capacitor	26	I <sub>14</sub>	Digital input MSB
7	V <sub>EE2</sub>	Power supply (-18V)	27	I <sub>13</sub>	Digital input MSB
8	C <sub>6</sub>	Smoothing capacitor	28	I <sub>12</sub>	Digital input MSB
9	C <sub>7</sub>	Smoothing capacitor	29	I <sub>11</sub>	Digital input MSB
10	C <sub>8</sub>	Smoothing capacitor	30	I <sub>10</sub>	Digital input MSB
11	C <sub>9</sub>	Smoothing capacitor	31	I <sub>9</sub>	Digital input MSB
12	C <sub>10</sub>	Smoothing capacitor	32	I <sub>8</sub>	Digital input MSB
13	C <sub>11</sub>	Smoothing capacitor	33	I <sub>7</sub>	Digital input MSB
14	C <sub>12</sub>	Smoothing capacitor	34	I <sub>6</sub>	Digital input MSB
15	C <sub>13</sub>	Smoothing capacitor	35	I <sub>5</sub>	Digital input MSB
16	C <sub>14</sub>	Smoothing capacitor	36	I <sub>4</sub>	Digital input MSB
17	C <sub>15</sub>	Smoothing capacitor	37	I <sub>3</sub>	Digital input MSB
18	C <sub>SC</sub>	Preventive capacitor of oscillation	38	I <sub>2</sub>	Digital input MSB
19	CSR <sub>1</sub>	Resistor	39	I <sub>1</sub>	Digital input LSB
20	CSR <sub>2</sub>	Resistor	40	LA	Latch input

# TMS320M10

## PIN CONFIGURATION



## BLOCK DIAGRAM

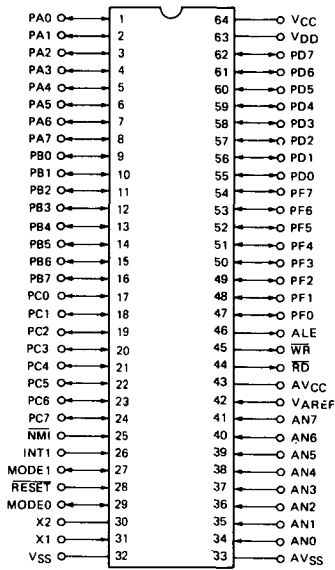


## SIGNALS AND FUNCTIONS

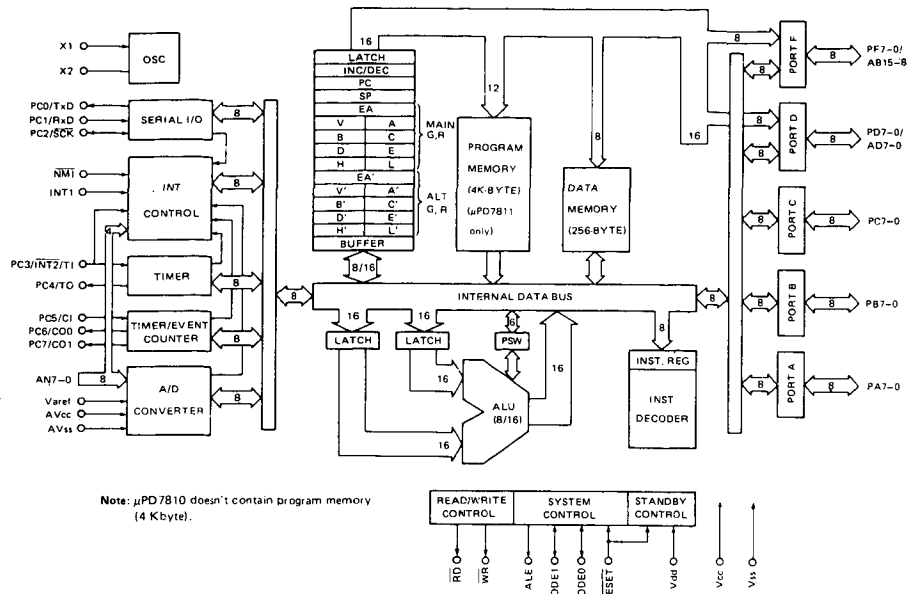
Signal	Pin	Input/Output	Function
V <sub>cc</sub>	30	IN	+5 volt supply
V <sub>ss</sub>	10	IN	Ground Reference
X2/CLKIN	8	IN	Crystal Clock Input, Outer Clock Input (Terminal)
X1	7	IN	Crystal Clock Input (Terminal)
CLKOUT	6	OUT	Clock Output
WE	31	OUT	Write Enable
DEN	32	OUT	Data Enable
MEN	33	OUT	Memory Enable
RS	4	IN	Reset
INT	5	IN	Interrupt (Request)
BIO	9	IN	I/O Branch Control
MC/MP	3	IN	Microcomputer/Microprocessor Mode
D0~D15		IN/OUT	Data Bus
A0~A11		OUT	Program Memory Address (PA0~PA2 – I/O Address)

μPD7811G · 7810G

PIN CONFIGURATION



BLOCK DIAGRAM



TERMINAL NAMES

Terminal	Input+Output	Terminal	Input+Output	Terminal	Input/Output
PA7-0 (Port A)	In+Out	WR (Write Strobe)	Out	VAREF (Reference Voltage)	In
PB7-0 (Port B)	In+Out	RD (Read Strobe)	Out	AVcc (Analog Vcc)	
PC0/TxD	In+Out/Out	ALE (Address Latch Enable)	Out	AVss (Analog Vss)	
PC1/RxD	In+Out/In	MODE 0	In+Out	X1, X2 (Crystal)	
PC2/SCK	In+Out/ In+Out	MODE 1 (Mode)		RESET (Reset)	In
PC3/INT2/TI	In+Out/In/In	NMI (Non-Maskable Interrupt)	In	VDD	
PC4/TO	In+Out/Out	INT 1 (Interrupt Request)	In	VCC	
PC5/CI	In+Out/In	AN7-0 (Analog Input)	In	Vss	
PC6/CO0 PC7/CO1	In+Out/Out				
PD7-0/ AD7-0	In+Out/ In+Out				
PF7-0/ AB15-8	In+Out/Out				

# 8. PARTS LIST

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
<b>CARBON RESISTORS</b>				
10413410	S1/4JYTP 1K	KLM-1002		4
10413433	S1/4JYTP 3.3K			1
10413522	S1/4JYTP 22K			2
10413533	S1/4JYTP 33K			2
10416000	1/6JTP 0Ω	KLM-1000		3
		KLM-1009		3
10416222	1/6JTP 22Ω	KLM-1008		2
		KLM-1009		1
10416275	1/6JY 75Ω	KLM-1001		8
10416282	1/6JY 82Ω	KLM-1000		1
10416310	1/6JTP 100Ω			1
		KLM-1001		7
		KLM-1003		2
				5
10416322	1/6JTP 220Ω			1
10416347	1/6JTP 470Ω	KLM-1000		1
		KLM-1006		1
10416362	1/6JTP 620Ω	KLM-1000		1
10416375	1/6JTP 750Ω	KLM-1001		1
10416410	1/6JTP 1.0K			1
		KLM-1003		3
		KLM-1006		1
		KLM-1008		2
10416422	1/6JTP 2.2K	KLM-1001		11
		KLM-1004		1
10416447	1/6JTP 4.7K	KLM-1000		1
		KLM-1003		2
		KLM-1008		4
10416456	1/6JTP 5.6K	KLM-1004		1
10416462	1/6JTP 6.2K	KLM-1006		1
10416475	1/6JTP 7.5K	KLM-1000		1
10416510	1/6JTP 10K			3
		KLM-1001		23
		KLM-1003		2
		KLM-1004		1
		KLM-1006		2
		KLM-1009		2
10416522	1/6JTP 22K	KLM-1004		1
		KLM-1009		5
10416533	1/6JTP 33K	KLM-1004		1
10416547	1/6JTP 47K	KLM-1009		4
10416610	1/6JTP 100K	KLM-1001		2
		KLM-1003		3
		KLM-1004		1
		KLM-1008		1
		KLM-1009		1

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
10416675	1/6JY 750K	KLM-1006		1
<b>METAL FILM RESISTORS</b>				
12514249	1/6TP 2.49K	KLM-1000		1
12514499	1/6TP 4.99K			1
12515100	1/6TP 10.0K			1
<b>BLOCK RESISTORS</b>				
13504510	RKC1/8B4J 10K	KLM-1000		2
		KLM-1001		1
13504610	RKC1/8B4J 100K			2
13508510	RKC1/8B8J 10K	KLM-1000		5
		KLM-1001		3
<b>MYLAR CAPACITORS</b>				
20401410	50V 0.001μF	KLM-1001		2
20401412	50V 0.0012μF			1
20401420	50V 0.002μF			1
20401422	50V 0.0022μF			2
20401424	50V 0.0024μF			4
20401433	50V 0.0033μF			1
20401447	50V 0.0047μF			1
20401491	50V 0.0091μF			1
20402512	50V 0.012μF	KLM-1000		6
20402515	50V 0.015μF			1
20402522	50V 0.022μF			1
20402533	50V 0.033μF			1
20402547	50V 0.047μF	KLM-1001		3
20402568	50V 0.068μF	KLM-1000		3
<b>STYROL CAPACITORS</b>				
20503410	50V JT 1000pF	KLM-1000		1
20503422	50V JT 2200pF			1
<b>CERAMIC CAPACITORS</b>				
21374470	DE7150F472M VA1-K	KLM-1002		1
21452220	50V 22pF TP	KLM-1000		6
		KLM-1006		1
21452330	50V 33pF TP	KLM-1001		2
21452470	50V 47pF TP			1
		KLM-1004		1



PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
21453100	50V 100pF TP	KLM-1000 KLM-1001 KLM-1002 KLM-1009		1 4 4 3
21453220	50V 220pF TP	KLM-1001		1
21453330	50V 330pF TP			1
21453470	50V 470pF TP	KLM-1000		1
21453680	50V 680pF TP	KLM-1001		1
21453820	50V 820pF TP			2
21455100	50V 0.01μF TP	KLM-1000		1
21456100	25V 0.1μF TP	KLM-1001 KLM-1002 KLM-1003 KLM-1006 KLM-1008 KLM-1009		47 25 7 2 2 2
<b>SPARK KILLER</b>				
21900600	ECQ-U2A473MN	KLM-1002		1
<b>EMI FILTERS</b>				
21950100	DSS310-55D223S	KLM-1003		3
<b>TAMTALUM CAPACITORS</b>				
22424110	25V 1μF	KLM-1004		2
22425010	35V 0.1μF	KLM-1000		1
22425022	35V 0.22μF			1
<b>ELECTROLYTIC CAPACITORS</b>				
23917447	16V 4700μF	KLM-1002		1
23923410	35V 1000μF			3
24511210	A25V 10μF	KLM-1006		1
24515110	A50V 1μF	KLM-1009		1
25402310	10V 100μF	KLM-1002		2
25403210	16V 10μF	KLM-1001 KLM-1003		2 1
25403310	16V 100μF	KLM-1000 KLM-1001		1 1
25404210	25V 10μF	KLM-1002		3
25404310	25V 100μF	KLM-1000 KLM-1001		2 2
25406110	50V 1μF			1

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
25443210	16V 10μF	KLM-1009		1
25443310	16V 100μF			2
25444210	25V 10μF			2
25453210	16V 10μF	KLM-1000		3
25454210	25V 10μF			3
25456110	50V 1μF			3
25463210	16V 10μF	KLM-1003		1
25464210	25V 10μF	KLM-1008		2
25466110	50V 1μF			1
<b>BLOCK CAPACITORS</b>				
24815310	50V 100pFX4	KLM-1001		3
<b>TRANSISTORS</b>				
30100930	2SB703 A R/Q	KLM-1002		2
30400050	2SA1175			2
30420100	BA1A4M	KLM-1001 KLM-1003 KLM-1009		1 5 1
30420110	BN1A4M	KLM-1003 KLM-1009		2 1
<b>DIODES</b>				
31001500	SR1K-2	KLM-1002		4
31400100	1S1555			3
31401300	1SS-133	KLM-1005 KLM-1001 KLM-1003 KLM-1004 KLM-1009		21 2 3 1 2
<b>BRIDGE DIODES</b>				
31010200	4B4B41	KLM-1002		2
<b>LEDs</b>				
31203200	LN524RA	KLM-1005		3
31203900	SLB-26VR3F RED	KLM-1004		2
31204000	SLB-26MG3F GREEN			2
31206100	SLP-178B	KLM-1005		1

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
<b>ZENER DIODE</b>				
31423000	HZ-3B2-TD	KLM-1002		1
<b>DOUBLE DIODES</b>				
31500100	MC931	KLM-1003		2
<b>ICs</b>				
32001061	μPD-4050BC	KLM-1001	Analog multiplexer	2
32001065	μPD7811-161-36		CPU	1
32001069	74HC32C		Quad 2-input OR gate	1
32001070	74HC74C	KLM-1000	Dual D-type Flip-Flop	4
32001073	74HC(40H)373C	KLM-1001	Octal 3-state D-type transparent latch	1
32001083	74HC374C	KLM-1000	Octal 3-state D-type Flip-Flop	6
		KLM-1001		2
32001093	μPC398C	KLM-1000	Comparator	1
32001097	74HC04C	KLM-1001	Hex inverter	1
32002025	AN6887	KLM-1004	LED driver	1
32004007	HD-14001 BP	KLM-1003	Quad 2-input NOR gate	1
32004028	HM-6116LP-4	KLM-1001	RAM	1
32004098	HD14549B	KLM-1000	Successive approximation registers	1
32004099	HD14559B		Successive approximation registers	1
32004100	74HC14P		Hex schmitt-trigger inverter	1
32004101	74HC139P	KLM-1001	Dual 1-of-4 decoder	1
32004102	74HC367P	KLM-1000	Hex 3-state buffer	4
		KLM-1001		2
32007017	BA9221	KLM-1000	D-A converter	1
32009012	NJM-311D		Comparator	1
32009018	NJM79L05A		-5V regulator	1
32009023	NJM-7815A	KLM-1002	+15V regulator	1
32009024	NJM-7915A		-15V regulator	1
32009042	NJM79L18A		-18V regulator	1
32009043	NJM78L10K	KLM-1000	+10V regulator	1
32011004	M-74LS04		Hex inverter	1
32011006	M-74LS32		Quad 2-input OR gate	3
32011025	M-54513P	KLM-1001	TR array	1
32011042	M54562P		TR array	1
32011047	M5218P	KLM-1006	OP AMP	1
32011063	M5218L	KLM-1000	OP AMP	1
		KLM-1001		4
		KLM-1008	OP AMP	1
		KLM-1009		3

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
32011065	M5223L	KLM-1002	OP AMP	1
32011066	M74ALS08P	KLM-1000	Quad 2-input AND gate	1
32011067	M74ALS74P		Dual D-type edge-triggered Flip-Flop	2
32011068	M74ALS138P		3-line to 8-line decoder	2
32011069	M74LS27P		Triple 3-input NOR gate	2
32012015	MB8168-55		RAM	8
32012017	MBM27256-25	KLM-1001	PROM	1
32013006	IR3K16A	KLM-1000	D-A converter	1
32021048	TMS320M10NL		Digital signal processor	2
32023005	S-8054HN	KLM-1001	Reset	1
<b>PHOTO COUPLER</b>				
33001000	TLP-552	KLM-1003		1
<b>CERAMIC OSCILLATOR</b>				
33501700	KBR-12.0MHz	KLM-1001		1
33502300	CSA20.00MX11	KLM-1000		2
<b>P.C. BOARD</b>				
34310000	KLM-1000	KLM-1000		1
34310010	KLM-1001	KLM-1001		1
34310020	KLM-1002	KLM-1002		1
34310030	KLM-1003/10	KLM-1003		1
34310050	KLM-1005	KLM-1005		1
<b>VRs</b>				
36019500	RK1631120A3DA 10KB	KLM-1009		4
36019600	RK163112000ZA 10KB	KLM-1010 KLM-1009		1 1
<b>SLIDE SWs</b>				
37301000	SSSB-02715A	KLM-1007		1
37303500	SSSB-02B61A	KLM-1006		1
37305300	SLS-25-2022-1	KLM-1003		1
<b>TACT SWs</b>				
37504800	SKECAF015A	KLM-1005		12
37504900	SKECF013B			8

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
<b>POWER SW</b>				
37507800	ESB-8213V			1
<b>POWER TRANSFORMERS</b>				
40009800	TA-018		100V 117 US JAM	1 1 1
40009900	TB-018		117 2P 220 GE 220 SE 240 AF 240 AU DEMKO SEMKO NEMKO 240 GE GAF FIMKO 240 RME VDE	1 1 1 1 1 1 1 1 1 1 1 1 1
<b>COILS</b>				
40202200	36640	KLM-1002		2
<b>RELAY SWs</b>				
40301000	G5A237P 5V	KLM-1003 KLM-1009		1 1
<b>PHONE JACKS</b>				
45404300	YKB21-5012	KLM-1003		4
45404400	YKB21-5010	KLM-1008		1 1
<b>CANNON RECEPTACLE</b>				
45405300	XLB-3-31			1
<b>FUSES</b>				
46402601	125V 4.0A UL		100V 117 US JAM	1 1 1

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
46411701	250V 0.5A UL		117 2P 100V 117 US JAM	1 2 2 2
46412003	250V 1.0A UL		117 2P 100V 117 US JAM	2 1 1 1
46461401	250V T250MA		117 2P 220 GE 220 SE 240 AF 240 AU DEMKO SEMKO NEMKO 240 GE GAF FIMKO 240 RME VDE	1 2 2 2 2 2 2 2 2 2 2 2 2
46461701	250V T500MA		220 GE 220 SE 240 AF 240 AU DEMKO SEMKO NEMKO 240 GE GAF FIMKO 240 RME VDE	1 1 1 1 1 1 1 1 1 1 1 2
46462601	250V T4A		220 GE 220 SE 240 AF 240 AU DEMKO SEMKO NEMKO 240 GE GAF FIMKO 240 RME VDE	1 1 1 1 1 1 1 1 1 1 1 1

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
<b>HARNESSES</b>				
47055000	HNS-450	K LM-1000		1
47055100	HNS-451			1
47055200	HNS-452			1
47055300	HNS-453			1
47055400	HNS-454			1
47055500	HNS-455			1
47055600	HNS-456			1
47055700	HNS-457	K LM-1003		1
47055800	HNS-458			1
47055900	HNS-459			1
47056000	HNS-460	K LM-1010		1
47056100	HNS-461	K LM-1009		1
47056200	HNS-462			1
47056300	HNS-463	K LM-1007		1
47056400	HNS-464			1
47056500	HNS-465			1
47056600	HNS-466			1
47056700	HNS-467	K LM-1009		1
47056800	HNS-468			1
47056900	HNS-469			1
47057000	HNS-470	K LM-1009		1
47057100	HNS-471			1
<b>CONNECTORS</b>				
47150500	B5P-VH	K LM-1001		1
		K LM-1002		1
47150600	B6P-VH	K LM-1000		1
		K LM-1002		1
47160300	B3B-EH	K LM-1001		1
47160400	B4B-EH			1
47160500	B5B-EH			1
		K LM-1002		1
47160700	B7B-EH	K LM-1001		1
47160800	B8B-EH			3
47160900	B9B-EH			3
47161200	B12B-EH			1
47260300	S3B-EH	K LM-1004		1
		K LM-1005		1
47260500	S5B-EH	K LM-1008		1
47260600	S6B-EH			1
47260700	S7B-EH	K LM-1006		1

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
<b>CONNECTOR TOPS</b>				
47190200	5096-02C	K LM-1002		3
47190500	5096-05C			1
<b>IC SOCKET</b>				
48001282	28P DICA-28CTI	K LM-1001		1
<b>DIN JACK SOCKET</b>				
48010180	(X3) M-1704	K LM-1003		1
<b>RUBBER FEET</b>				
50008700				4
<b>FUSE HOLDERS</b>				
51502300	S-N5057 #01	K LM-1002		8
<b>LITHIC BATTERY</b>				
52001300	CR2032-FT			1
<b>ISOLATING WASHERS</b>				
54007300	B-1725K	K LM-1002		4
<b>INLET SOCKET</b>				
54010900	PA-126			1
<b>P.C. BOARD SUPPORTS</b>				
54011700	LCBS-10N			2
<b>SPACER</b>				
54011800	PS-303	K LM-1005		1
<b>RADIATION MASKS</b>				
55005100	120X105		100V	1
			117 US	1
			117 2P	1
			220 GE	1

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
			220 SE	1
			240 AF	1
			240 AU	1
			DEMKO	1
			SEMKO	1
			NEMKO	1
			240 GE	1
			GAF	1
			FIMKO	1
			240 RME	1
			VDE	1
<b>SLIDE SW MASKS</b>				
55005400				2
<b>RADIATOR</b>				
56003300		KLM-1002		1
<b>RADIATION SHEETS</b>				
56500300	BFG-30			4
<b>AC CORDS</b>				
60002100	SPT-2 UC-695-S01		117 US	1
			117 2P	1
60002200	CEE EC-215-S01		220 GE	1
			240 AF	1
			DEMKO	1
			SEMKO	1
			NEMKO	1
			240 GE	1
			GAF	1
			FIMKO	1
			VDE	1
60002300	SAA SS-455-S01		240 AU	1
60002400	DC-325-S01		100V	1
60002500	BS BH-115-S01		240 RME	1
60002600	CSA UC-707-S01		JAM	1
60002900	SE EX-221-S01		220 SE	1
<b>SYNC/MIDI CABLE</b>				
60202400	SMC-3 BLK			1

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
<b>SLIDE SW KNOBS</b>				
62001800	SSB L=9 BLK			2
<b>TACT SW KNOBS</b>				
62011000	KT-8			6
62011002	GRY			2
62011202	RED			1
62015100	BLK No.4			11
<b>POWER SW KNOB</b>				
62011100	SUE55102			1
<b>ROTARY VR KNOBS</b>				
62015200	GRY No. 2			6
<b>LED DISPLAY COVER</b>				
63002200				1
<b>RACK MOUNT ADAPTORS</b>				
64073300				2
<b>PANEL</b>				
64073400				1
<b>CHASSIS</b>				
64073500				1
<b>LOWER CASE</b>				
64073600				1
<b>UPPER CASE</b>				
64073700				1
<b>NAME PLATES</b>				
68600700			117 US	1
			117 2P	1

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
<b>SCREWS</b>				
70060512	FE P BZMC 5X12			4
70160410	FE F BZMC 4X10			6
70530306	FE B ZMC 3x6			29
70530308	FE B ZMC 3X8	KLM-1002		4
70760410	FE FEW BZMC 4X10			4
72160308	TP2G F BZMC 3X8			2
72260308	TP2G O BZMC 3X8			4
72560308	TP2G B BZMC 3X8	KLM-1002		16
				2
<b>NUTS</b>				
77330701	VN ZMC 7 (=10)			6
<b>WASHERS</b>				
78060500	WM BZMC 5X12			4
<b>SPRING NUTS</b>				
79060400	ZMC 4			4

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