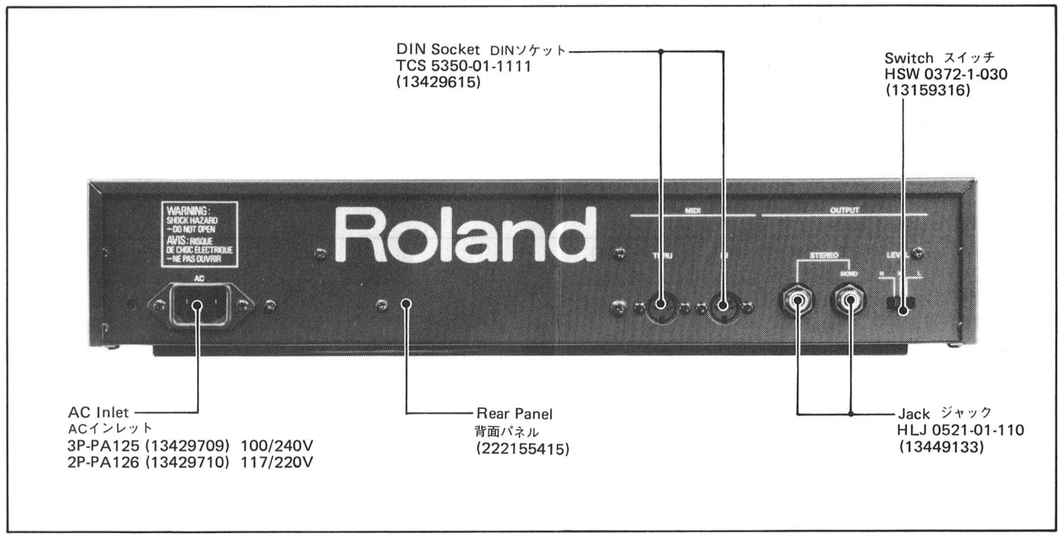
MKS-10

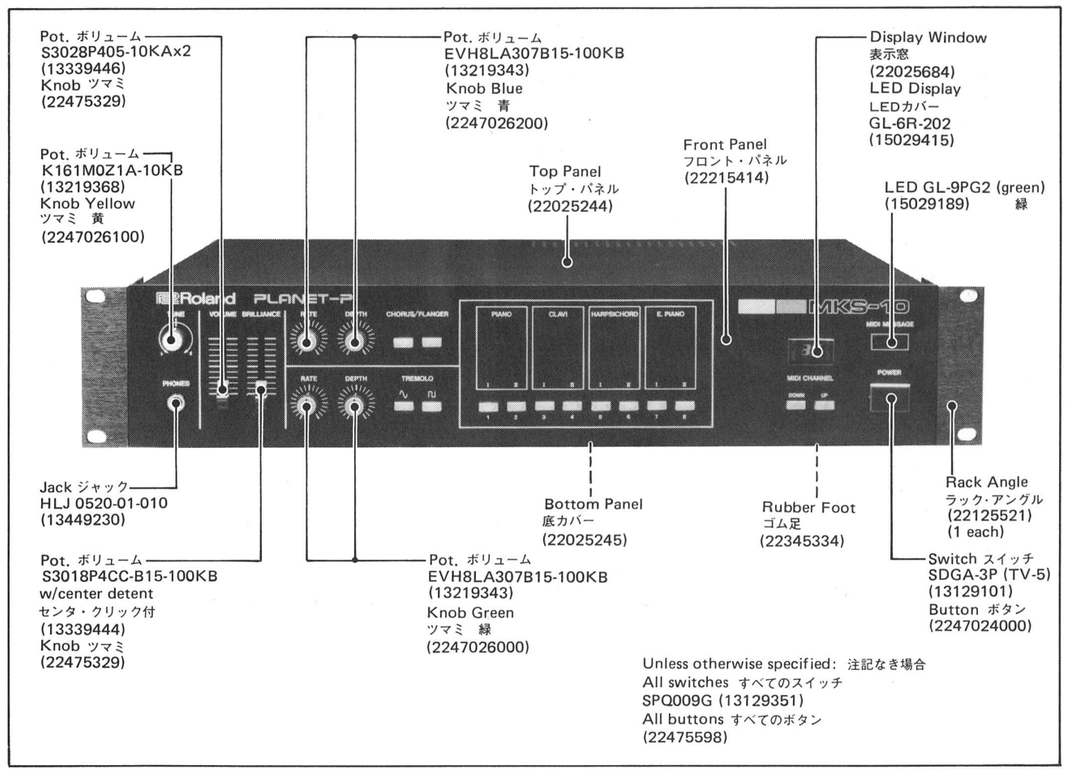
SERVICE NOTES

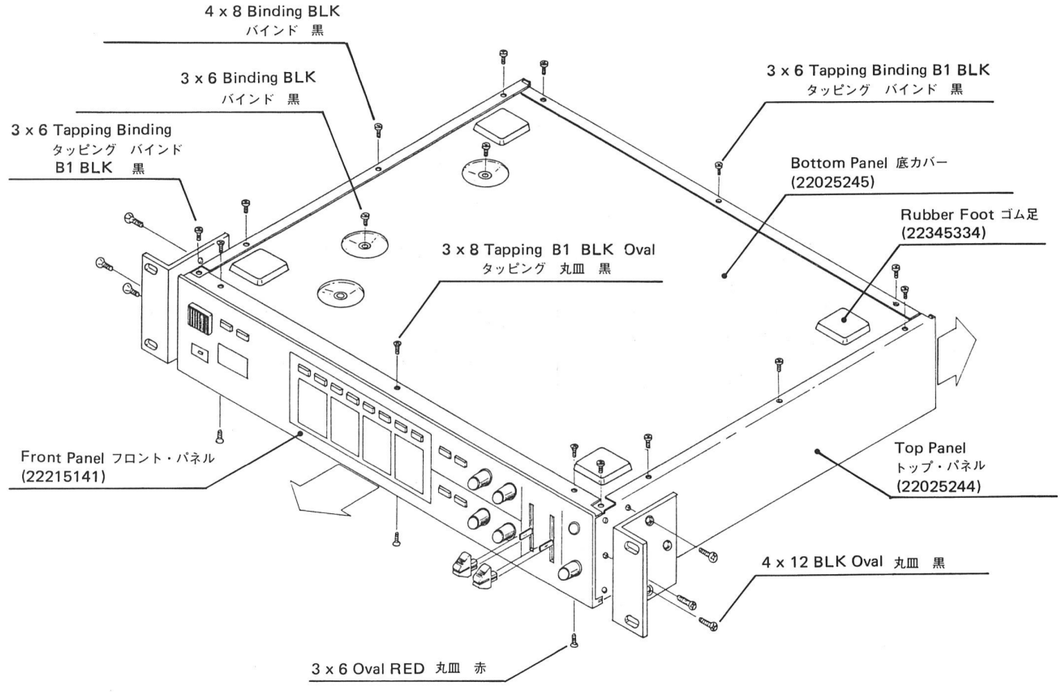
First Edition

SPECIFICATIONS

Output:	
Level	H 0dB M −10dB L −20dB
Tunable Range:	± 50 cents
Power Consumption:	30 W
Dimensions:	480 (W) x 400 (D) x 90 (H) mm 19″ (W) x 15-3/4″ (D) x 3-9/16″ (H) in.
Weight:	10 kg/22 lb. 1 oz.







PARTS LIST

CASE ケース

22215414	Front Panel	フロント・パネル
22215415	Rear Panel	背面パネル
22025244	Top Panel	トップ・パネル
22025245	Bottom Panel	底カバー
22195469	Front Holder	フロント・ホルダ
22815431	Subchassis	サブ・シャーシ
22195472	Side Holder	側面ホルダ
22125521	Rack Angle	ラック・アングル
22465471	Heat Sink	放熱器
22345334	Rubber Foot	ゴム足
22025684	Display Window	LEDカバー

KNOB, BUTTON ツマミ, ボタン

2247026000	Knob(green)	ツマミ(緑)	ロータリ	rotaly
2247026100	Knob(yellow)	ツマミ(黄)	ロータリ	rotaly
2247026200	Knob(Blue)	ツマミ(青)	ロータリ	rotaly
22475329	Knob	ツマミ	スライド	slide
2247024000	Button	ボタン	プッシュ	push
22475598	Button	ボタン	プッシュ	push

JACK, SOCKET ジャック, ソケット

13449133	HLJ0521-01-110(mono) (モノ)	ジャック	jack
13449230	HLJ0520-01-010(stereo) (ステレオ)	ジャック	jack
13429615	TCS5350-01-111	DINソケット	DIN socket

AC INLET ACインレット

13429710	2P-PA126	117/220V
13429709	3P-PA125	100/240V

SWITCH スイッチ

13159137	SSS 212A	
13159316	HSW0372-1-030	LEVEL
13129351	SPQ009G	
13129101	SDGA-3P(TV-5)	POWER

POTENTIOMETER ボリューム

13219368	K161M0Z1A-10KB	TUNE
13219343	EVH8LA307B15-100KB	RATE, DEPTH
13339444	S3018P4CC-B15-100KB w/center detent センタ・クリック付	BRILLIANCE
13339446	S3028P405-10KA dual	VOLUME
13299178	H0615C-100KB	半固定 trimmer
13299177	H0615C-10KB	半固定 trimmer

POWER TRANSFORMER 電源トランス

22455378U0	100/117/220/240V

FUSE, FUSE HOLDER ヒューズ, ヒューズホルダ

12559368	T-GGS 1.5A	Fuse	ヒューズ	1次	pri.
12559507	CEE T200mA	Fuse	ヒューズ	1次	pri.
12559513	CEE T1A	Fuse	ヒューズ	2次	sec.
12559532	CEE T630mA	Fuse	ヒューズ	2次	sec.
12199519	TF-758	Fuse Holder	ヒューズホルダ		

PCB ASSEMBLY 基板完成品

7933808000	CPU Board	CPU基板	(pcb 22915935)
7933806000	16-Module Board	16モジュール基板	(pcb 22915936A)
7933810000	I/O Board	I/O基板	(pcb 22915937)
7933805000	Panel Board SN521800-up	パネル基板	(pcb 2291593802)
or			
7933805000	Panel Board Prior to SN521800	パネル基板	(pcb 22915938)
7933812100	Power Supply Board	電源基板	(pcb 22915934) 100/117V
7933812400	Power Supply Board	電源基板	(pcb 22915934) 220/240V

IC

15179183	HD6801S0A78P	CPU
15179328	HD46821NP	peripheral interface adapter
15179185	M82C53-5	triple programable interval timer
15179623	TMM2764D	8K x 8bit EP ROM
15179317	TC5517APL	2K x 8bit static RAM
15159503	TC40H000P	quad 2 input NAND gate
15159505	TC40H004P	hex inverter
15159514	TC40H032P	quad 2 input OR gate
15159510	TC40H074P	dual D-type flip flop
15159506	TC40H138P	3 to 8 demultiplexer
15159508	TC40H373P	octal D-type latch
15159128T0	TC4050BP	hex non iverting buffer
15159113T0	TC4051BP	single 8-channel multiplexer/demultiplexer
15159115T0	TC4066BP	quad bilateral switch
15159123T0	TC4071BP	quad 2-input OR gate
15159120T0	TC4099BP	8-bit addressable latch
15169346B0	74LS03	quad 2-input NAND gate(open-collector)
15169304B0	74LS04	hex inverter
15169334B0	74LS05	hex inverter(open-collector)
15169347B0	74LS32	quad 2 input OR gate
15169316B0	74LS125	quad 3 state buffer
15169318B0	74LS138	3 to 8 demultiplexer
15169322B0	74LS174	hex D-type flip flop
15169323B0	74LS175	quad D-type flip flop
15219133	SN76707AN	channel selector
15219140	SN76708AN	channel selector
15219141	SN29764AN	7-segment LED driver
15229801	IR3109	VCF
15219205	MN3007	1024-stage BBD
15169504	MN3101	BBD driver
15229706	TLP552	photocoupler
15219124	PC1252H-2	dbx VCA
15189142	TA75558S	Op amp
15189136	M5218L	Op amp
15189148	NJM072S	FET input Op amp
15189118	TL082CP	FET input Op amp
15199106NH	7805	+5V voltage regulator
15119118N0	7815	+15V voltage regulator
15199102N0	7915	-15V voltage regulator
15169303B0	74LS02	quad 2 input NOR
15169334H0	74LS05	hex O.C. inverters
15169353	74LS145	O.C. BCD to DECIMAL decoder/driver
15169321B0	74LS161	synchronous presettable 4-bit counter with clear
15169303T0	TC-4584BP	hex schmitt trigger

TRANSISTOR トランジスタ

15129114	2SC1815-GR	
15129132	2SC1923-O	
15129136	2SC2878-A	
15129130	2SC1583-F	2個入り dual
15119113	2SA1015-GR	
15119402	2SA682-Y	
15139103	2SK30ATM	FET
15129154	DTA144A	デジタル digital
15129155	DTC144A	デジタル digital

DIODE ダイオード

15019126	1SS133	
15019259	1SR35-200	
15019236	WO-2	ブリッジ整流器 bridge rectifier
15019136	DAN401	アレイ array
15019137	DAP401	アレイ array
15019662	MTZ12B	ツェナー zener
15029152	GL-9HD12 (red) 赤	LED
15029189	GL-9PG2 (green) 緑	LED
15029415	GL-6R-202	ディスプレイ 7-segment display

RESISTOR ARRAY 抵抗アレイ

13919330	RMLS11-472J(4.7K x 11)
13919301	RMLS8-472J (4.7K x 8)
13919140	RGSD8-103K (10K x 8)
13919303	RMLS8-333J (33K x 8)
13919327	RMLH7-683J (68K x 8)
13919313	RMLS8-104J (100K x 8)
13919328	RMLS8-124J (120K x 8)
13919320	RMLS6-333J (33K x 6)
13919325	RMLS4-561J (560Ω x 4)
13919332	RMLS4-102J (1K x 4)
13919323	RMHE8-103J 10K
13919324	RMHE8-223J 22K
13919118	RGSD16L104G (200K x 9, 100K x 7)
13919144	RMLS6-472J (4.7K x 6)

XTAL クリスタル

12389729	CSA 4.00MG	コンデンサ付 w/capacitor
13519571	CSC 300K 30p x 2	コンデンサ capacitor

CAPACITOR コンデンサ

13589501	F20H473Z 0.047F/5.5V	super (for RAM back up) スーパ(RAMのバック・アップ用)
13659214M0	ECET25R682SW 6800μF/25V	
13659226M0	ECET35R472SW 4700μF/35V	
13529104	DE715F472MVA1	C13, C14 (Power Supply Board)

COIL コイル

12449229	FKOB160MH15	ライン・フィルタ line filter
13529105	DSS310-55D-223S	エミ・フィルタ emission filter
12449221	40M-067-018 10μH	
224402050C	3R 700mH	

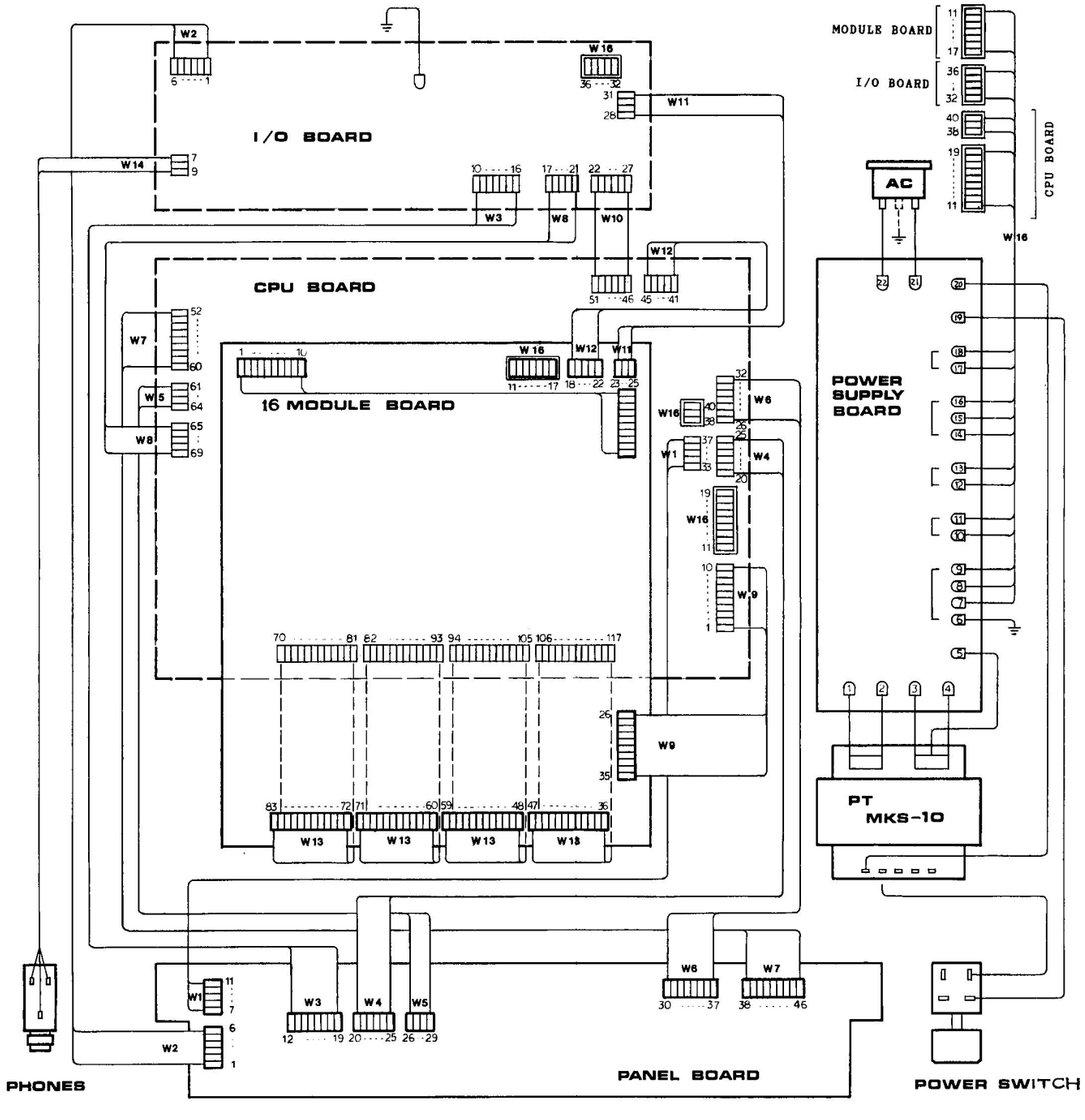
DETACHABLE AC CORD ACコード(着脱式)

13439816F0	DC-357-J01	100V
13439812F0	UC-704-J01	117V
13439813F0	EC-210-J06	3芯 2Pプラグ 220V 3-conductor w/2-prong
13439817F0	EC-702-J05	3芯 2Pプラグ 240V (UK) 3-conductor w/2-prong
13439814F0	SC-415-J06	240V 3P (Australia)

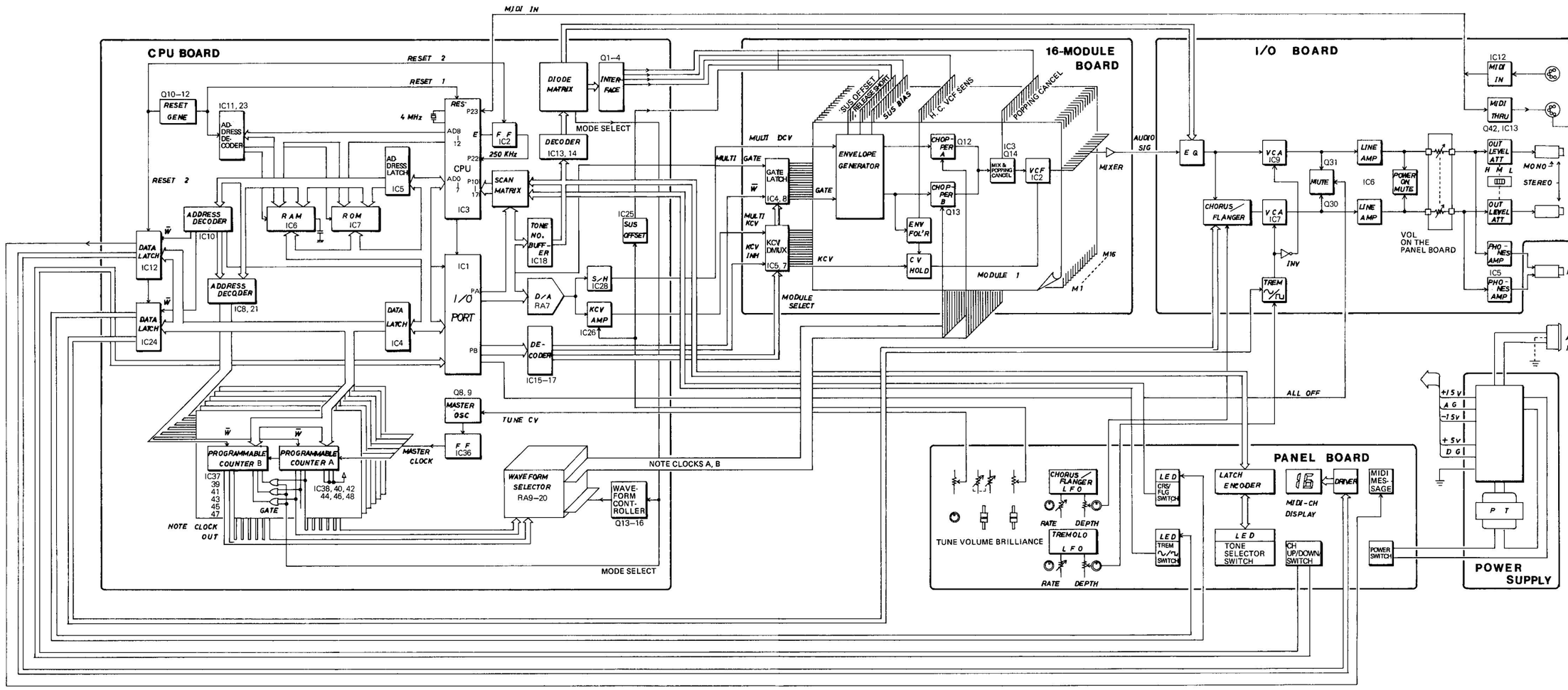
OTHERS その他

22445240	BLD2RN2-R62	フェライト・ビーズ felyte bead
15229919	ERS-A33J 561T 560	ポジスタ posistor

CONNECTION DIAGRAM

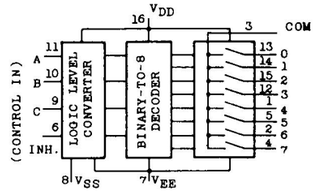


BLOCK DIAGRAM



TC4051BP

Block Diagram



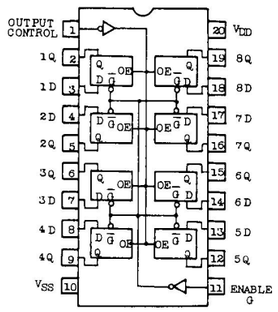
Truth Table

CONTROL INPUTS				"ON" CHANNEL
INHIBIT	C	B	A	TC4051BP
L	L	L	L	0
L	L	L	H	1
L	L	H	L	2
L	L	H	H	3
L	H	L	L	4
L	H	L	H	5
L	H	H	L	6
L	H	H	H	7
H	※	※	※	NONE

※ Don't Care

TC40H373P

Pin Configuration (Top View)



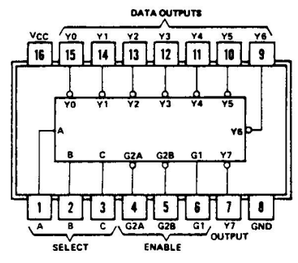
Truth Table

INPUTS			OUTPUT
OUTPUT CONTROL	ENABLE G	DATA	Q
L	H	H	H
L	H	L	L
L	L	•	Qo
H	•	•	High Impedance

*=Don't care

74LS138P

Pin Configuration (Top View)



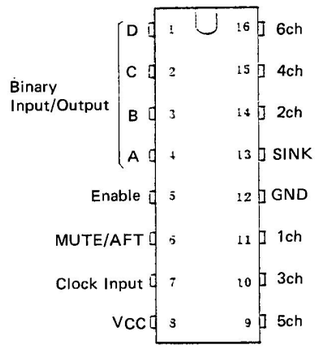
Truth Table

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

*G2 = G2A + G2B

SN76707AN

Pin Configuration (Top View)



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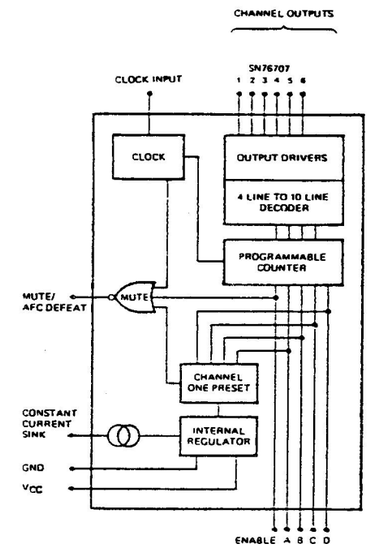
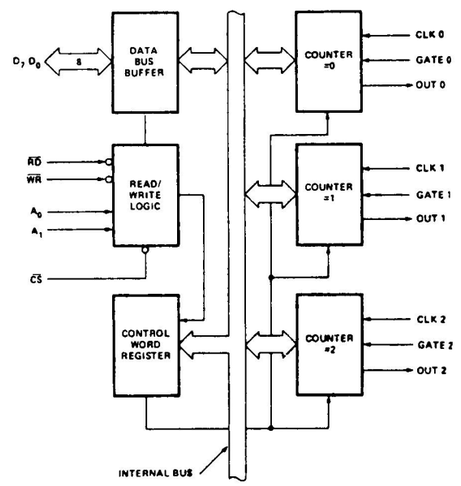
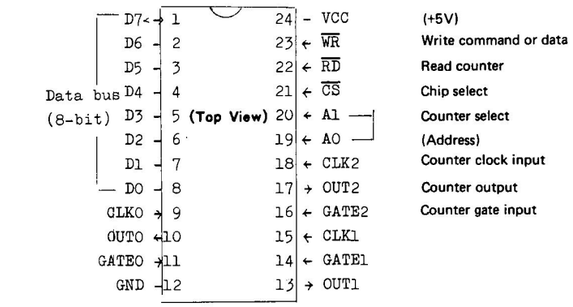


M82C53-5

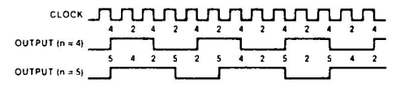
Block Diagram



Pin Configuration

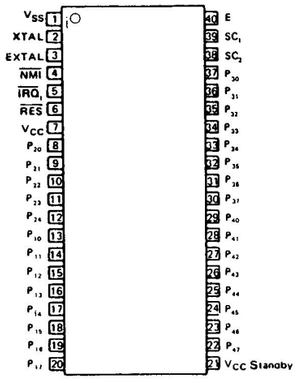


MODE 3: Square Wave Generator

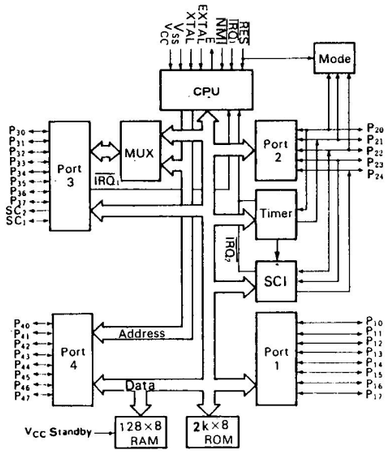


HD6801S0A78P

Pin Configuration (Top View)

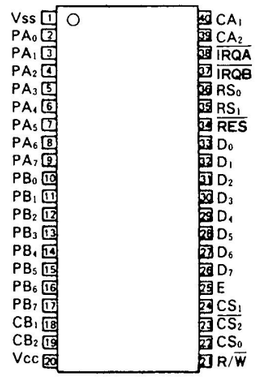


Block Diagram



HD46821NP

Pin Configuration (Top View)



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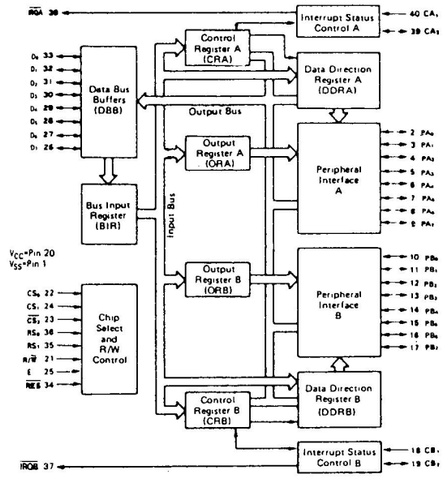
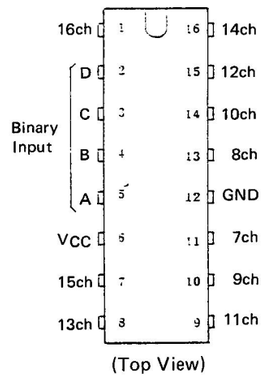


SN76708AN

Pin Configuration



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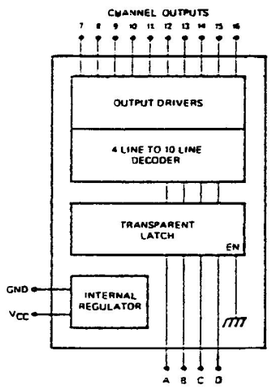


CIRCUIT DESCRIPTIONS

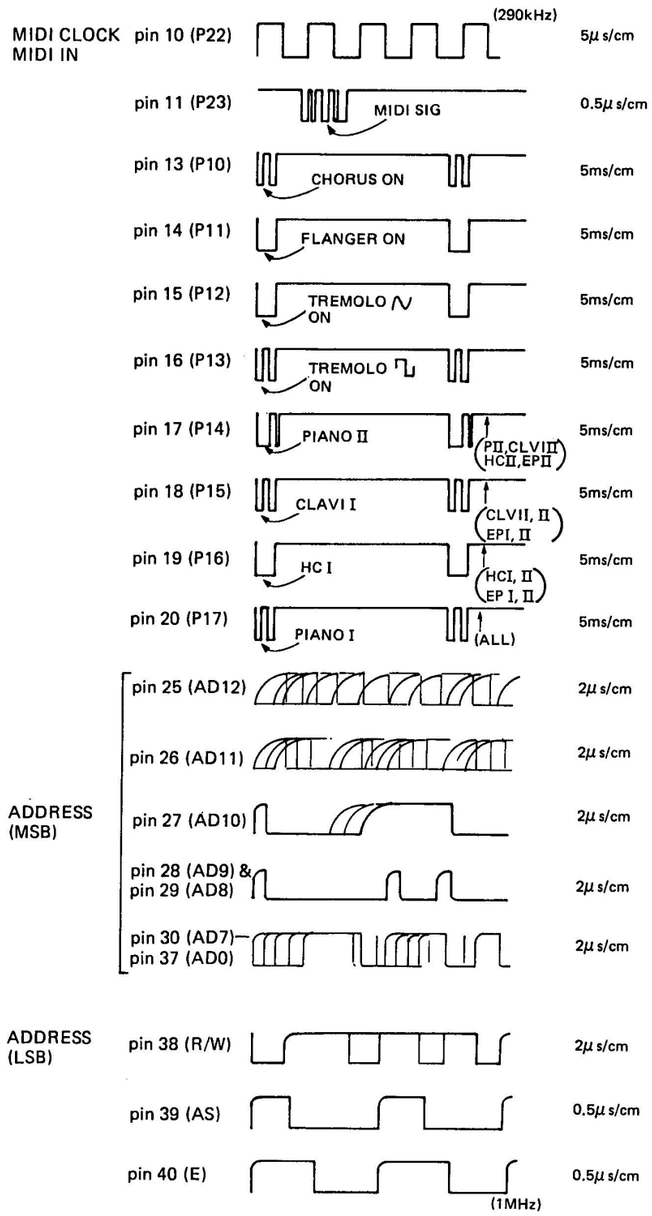
CPU.....IC3 (CPU BOARD)

The operation mode of the CPU HD6801SOP is determined by the voltage levels on its P20, P21 and P22 at the completion of CPU reset.
For executing the MKS-10 program they must be:

P20 —— L P21 —— H P22 —— L

The CPU processes MIDI information coming into P23 and the scan data coming into P10–P17, and places various resultant data on Address/Data bus. These data are first put either into Data Latch IC4 or I/O Port IC1, then routed to the designated device directly or through successive stage(s) in digital format or after converted into analog voltage.

IC3 HD6801 (CPU BOARD)



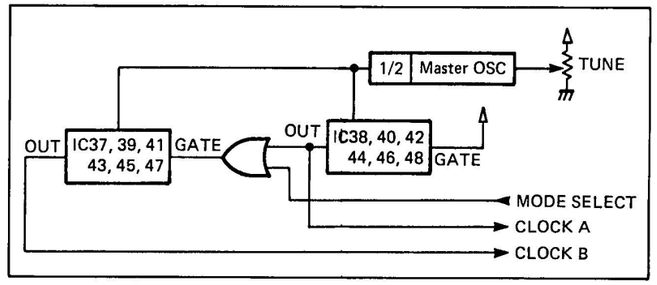
DCO.....(CPU BOARD)

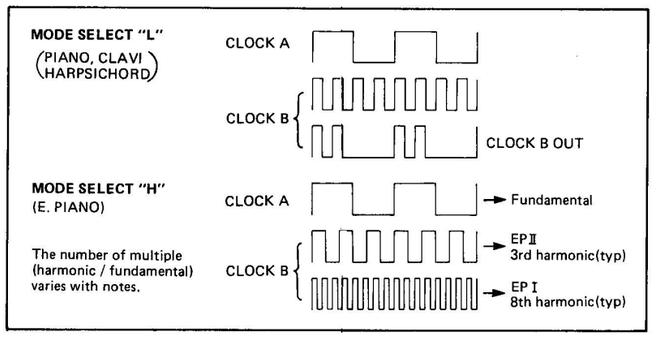
MASTER OSCILLATOR Q8, 9

The master oscillator Q8 and Q9 runs at approx. 3.6MHz and can shift it by ± 50cents in response to the base bias Q9 which can be controlled from TUNE on the panel. The frequency is divided by two at IC36 flip-flop and then commonly fed to the Programmable Interval Timers IC37–IC48.

PROGRAMMABLE COUNTERS IC37– IC48

Each Programmable Interval Timer consists of three Programmable Counters. The four out of 36 counters are left unused. The remaining 32 counters are grouped into A and B. An OR gate pairs off each A and B electrically. All A and B pairs are permanently connected to the individual modules on the 16-Module Board respectively.
A MIDI NOTE ON message causes the CPU to assign a pair of counters A and B to the note. The CPU, with a given NOTE ON data, provides different pitch data for counters A and B: For A a fundamental pitch data and for B various harmonic data depending on Tone and Note to be reproduced.
The counter A divides the master oscillator by the pitch data and generates square wave at fundamental. The counter B also divides the master oscillator by one of three pitch data: its output is governed by both Clock A from counter A and MODE SELECT. As can be seen from the figure counter B is enabled to output its original frequency during only the positive cycles of clock A when MODE SELECT is low (PIANOs, HARP, CLAVI).
The MODE SELECT is one of 10 parameters from Diode Matrix where Decoders IC13 and IC14 switch ON or OFF parameters based on the data coming from panel TONE SELECTOR or Tone Number Buffer IC18.
The same MODE SELECT has another effect on clocks A and B via WAVEFORM CONTROLLER (Q13–Q16) at WAVEFORM SELECTOR where it determines the level of clocks and also a combination level of both clocks, creating the basic characteristics of a tone to be sounded.





ENVELOPE GENERATOR

CHOPPER Q12,13 (16-MODULE BOARD)

Clock A from the waveform selector is passed on to the base of Chopper Q12 which chops the voltage generated at the Envelope Generator at the clock rate and sends it to the next stage IC3. IC3 gives further characteristics to it by combining clock B which has also formed a unique envelope in a similar way as clock A has made.

GATE & DCV (CPU & 16-MODULE BOARDS)

Gate and DCV are placed on PA bus of I/O port (IC1 of CPU board) at the same timing; they are in a multiplexed fashion.

GATE

Multi Gate signal from PA7 of I/O port (CPU BD IC1) is routed to two Gate Latches (IC4 and IC8) on the 16-module board. Because the same gate signal and MODULE SELECT code (A, B and C) are commonly fed to these latches, the gate signal is directed to the correct module only when the associated latch receives a low GATE W. The module selection is made in the same way as for Programmable counter, that is through the key assignment program.

DCV

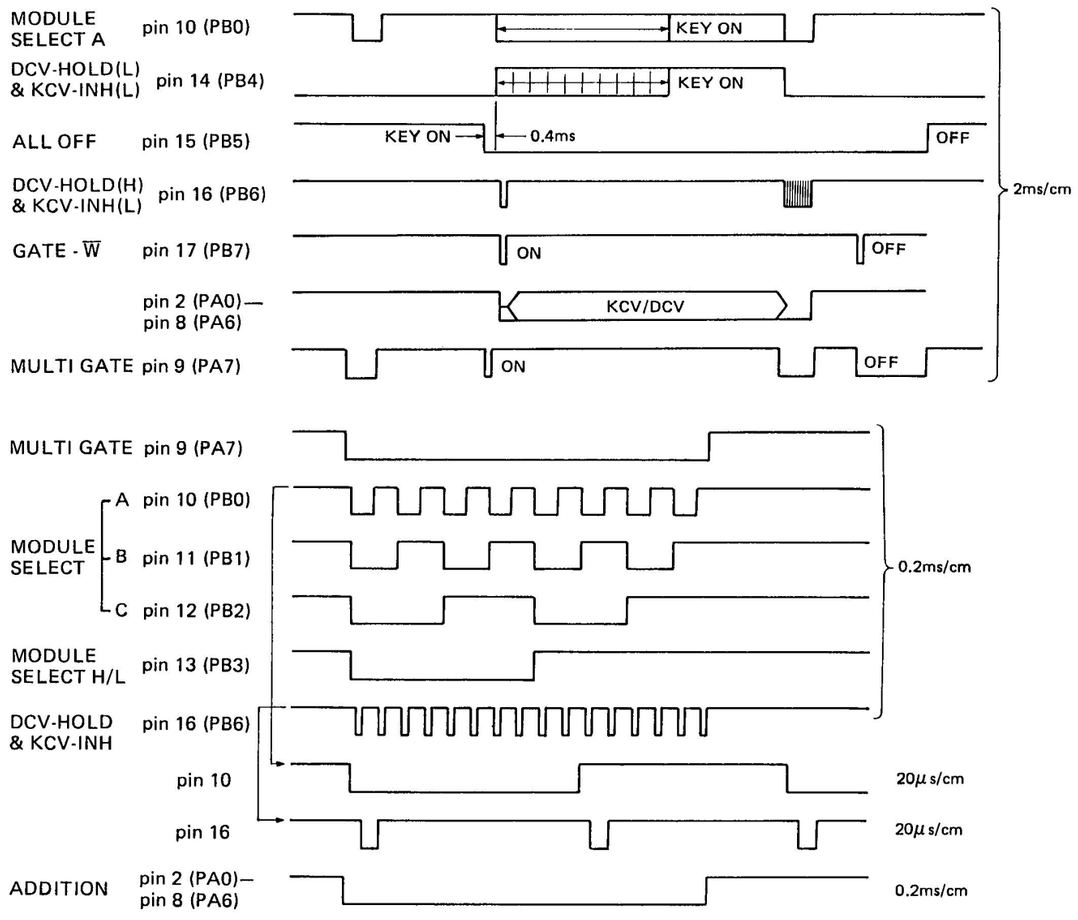
Multi DCV (Dynamics Control Voltage) time shares the I/O Port (CPU BD IC1) PA0–PA6 and D/A converter with KCV. The DCV determines the peak of a sound level (envelope). The DCV is a combination of MIDI Velocity message and a compensating data internally obtained; the compensating data varies with TONE.
The multi DCV is first sampled through IC28 (a and b) then charged into Hold capacitor C37 and is boosted at IC26b, Q6 and Q7. The Multi gate is applied commonly to 16 modules as it is but not allowed to enter the all modules freely. It flows into Q4 (Q2) of the envelope generator of a module when its Q4 (Q2) is forward biased by a GATE signal.
IC28 (c and d) of the CPU board is switched ON or OFF by SOFT ON/OFF signal and selects the range of dynamics.

KCV.....(CPU & 16-MODULE BOARDS)

As mentioned earlier, MULTI KCV shares the PA0–PA6 of I/O port with DCV and precedes it in a data output cycle. The multi KCV is converted into analog equivalent, sampled and delivered to the correct module much the way as Multi Gate signal is, but through KCV DMUX IC5 (IC7). A KCV includes not only pitch dependent data but also various data which reflect tone color of the sound being selected. In addition, KCV is refreshed in every 15ms so that envelope dependent data is also added to it.
Altogether, the KCV can change the cutoff frequency of the VCF to alter the frequency response of the filter to make it faithfully characterize the tone being selected and changed.

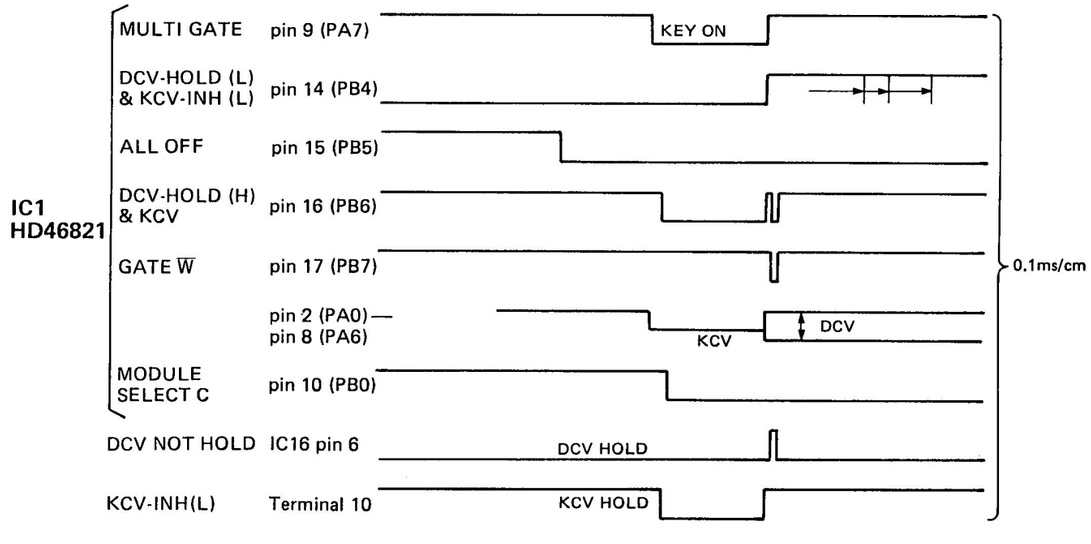
TIMING CHART 1

IC1 HD46821 (CPU BOARD)



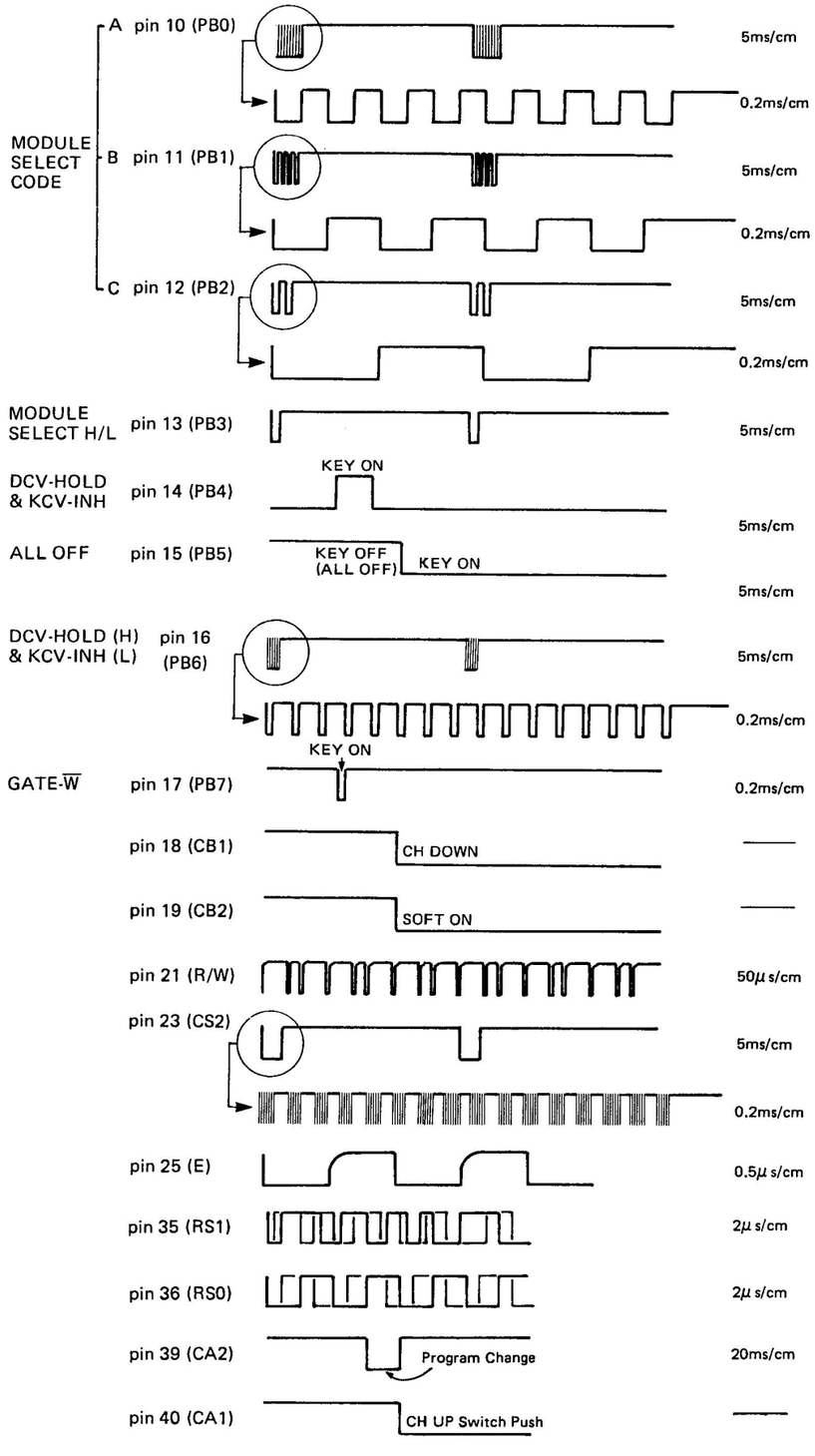
TIMING CHART 2

(CPU BOARD)



WAVEFORM

IC1 HD46821 (CPU BOARD)



MIDI ALL NOTES OFF SELECTION.....SW1 (CPU BOARD)

Mode message 1011 nnnn 0111 1011 (7B) left undefined by the preliminary MIDI has been given definition ALL NOTES OFF in Ver. 1.0.
This difference may give rise to some problems in linking the MKS-10 to a preliminary MIDI equipment. For example, if Roland PR-800 (or PB-300) ——preliminary MIDI is connected to MIDI keyboard (Ver. 1.0) upstream and the MKS-10 downstream, it will transmit every ALL NOTES OFF being generated at the keyboard and the PR-800 itself. The ALL NOTES OFF (7B) from the MIDI keyboard through PR-800 to the MKS-10 turns OFF the NOTE(s) that the PR-800 still wants to keep ON. This is because the PR-800 does not recognize the 7B, and retransmits it straight.
SW1 on the CPU board will cure this problem when it is set to 7C, enabling the MKS-10 to ignore 7B.

NOTE: The Roland preliminary MIDI products other than PR-800 and PB-300 will conform to MIDI Ver. 1.0 when software-updated.

ADJUSTMENT

KEY ASSIGNMENT

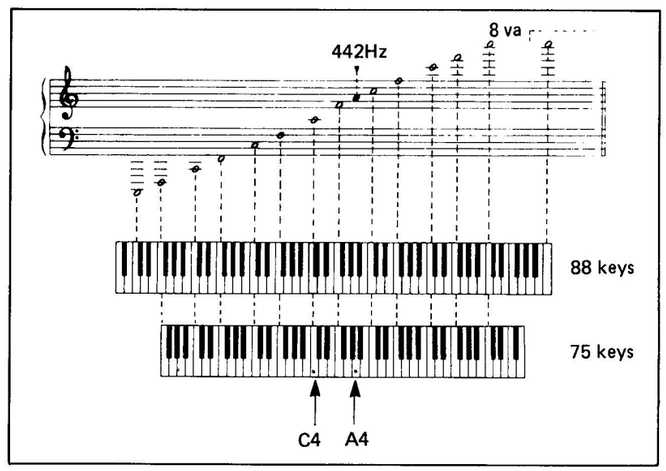
The MKS-10 is provided with two Key assignment programs: NORMAL and TEST. Under as delivered-condition NORMAL is selected.
The selection between two modes can easily be made by setting SW1 on the CPU board.

NORMAL

Pressing different keys assignes modules in the order from the small number in sequence. The 17th key steals the module being assigned to the first key. Repetition of the same key will assign the same module that once assigned to it provided that none of the other keys has stolen the module.

TEST

ROTARY: Assignment is made in cyclic fashion whether the same key is repeated or a different key is played.
Use of this mode is particularly suitable to compare the tone colors between modules at the same pitch.



1. TUNING.....CPU BOARD

The following steps are applicable to either method using a tuning instrument or done by ear (beat sound).

SETTING-UP

PANEL: TUNE —— center; TONE SELECTOR —— PIANO I or II
Connect MKS-10 to the MIDI Keyboard.

TAKING UP DIRECT SOUND ONLY

Since CHORUS EFFECT remains effective on PIANOs even CHORUS is set at OFF, cut off the delay sound:
Connect the tuning instrument or the monitor amp to MONO jack (direct sound).
Connect an open plug to the other OUTPUT jack (delayed sound).

1-1. Depress A4 (A above middle C) and adjust L1 on CPU board for 442Hz.

2. VCF CUTOFF FREQUENCY.....16-MODULE BOARD

This adjustment must be done on the module whose IC2 IR3109 is replaced. If more than one module need adjusting, one module at a time.

SETTING-UP

PANEL: TONE SELECTOR —— PIANO II
CPU BOARD: SW2 —— TEST (Key Assignment: Rotary Mode)
Connect MKS-10 to the MIDI keyboard.

TAKING UP DIRECT SOUND ONLY
(For the reason mentioned in TUNING.)

Connect the monitor amp to MONO jack (direct sound).
Connect an open plug to the other OUTPUT jack (delayed sound).

2-1. Join two terminals of CP1 of the module to be adjusted and those of an adjacent module (correctly adjusted one because it is used as a reference). The two modules will start VCF regeneration.

2-2. Hit a key repeatedly until "squeak" is heard twice. The two modules are now oscillating to the same KCV.

2-3. When only two resonating sounds become heard, adjust VR1 of the module being adjusted for zero beat sound.

2-4. Set SW2 on CPU board to NORMAL. Open the CPs.

3. BBD BIAS.....I/O BOARD

This adjustment must be done on the I/O board whose IC2 MN3007 has been replaced.

SETTING-UP

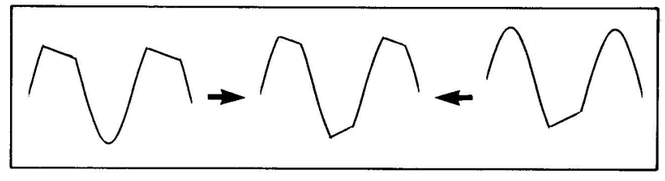
PANEL: TONE SELECTOR —— PIANO I or II
CHORUS/FLANGER —— RATE FCCW (MIN)
DEPTH FCW (MAX)

TAKING UP DELAYED SOUND ONLY

Connect an open plug to MONO jack.
Connect the scope to the other OUTPUT jack.

3-1. Disconnect the connector bearing terminal numbers 28–31; feed a signal 3.3Vp-p, 1kHz, sine through terminal 28 from the audio generator.

3-2. Adjust VR1 so that the positive and negative tops are flatened to the same degree.



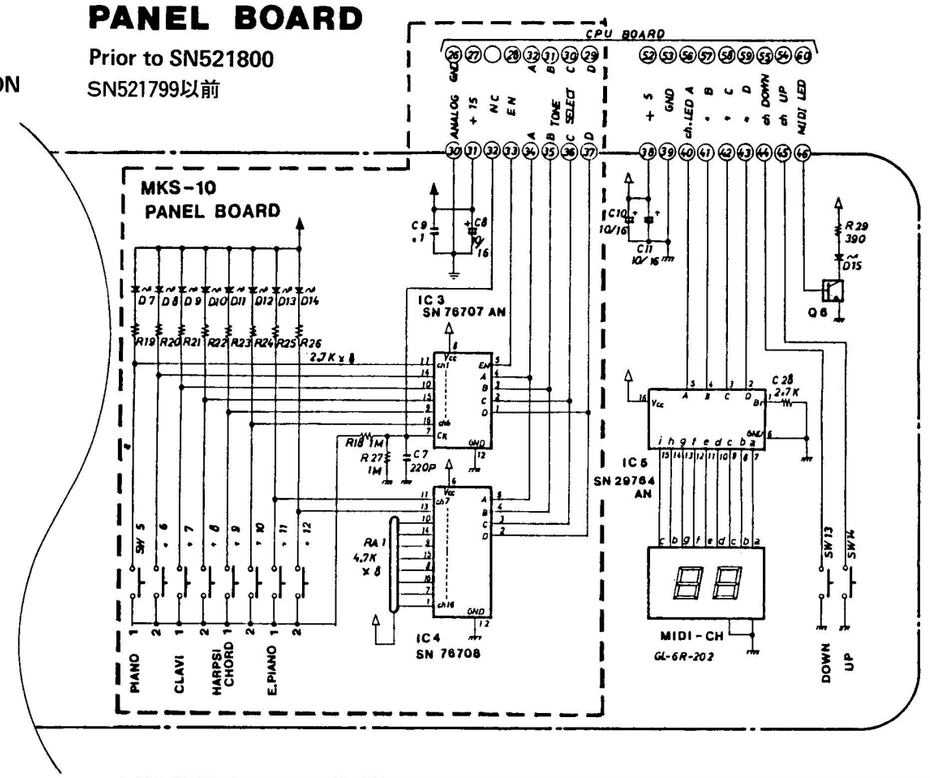
ENGINEERING CHANGE INFORMATION

Rushing semiconductor industry sometimes bewilders electronics engineers with various changes. Here an example that forces the factory to change IC.
The dotted lines indicate circuit difference between two PCB versions. The entire circuit specification and terminal connection are kept unchanged to have the new PCB compatible and bear the same ass'y number.

パネル基板変更案内

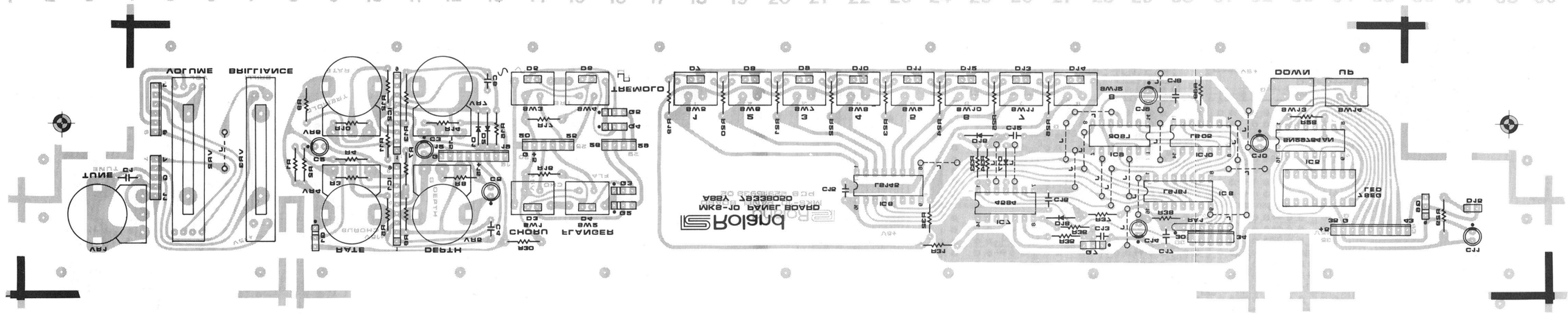
生産性を考慮のため、SN521800以降よりIC3、IC4及びその周辺の回路を変更しています。
回路図……変更後(9頁)と変更前(右図)とでは点線で囲んだ部分が異なります。その他は変更ありません。
基板完成品…基板自身は異なりますが、端子及び仕様については変わらないので、基板完成品としては互換性があります。
従って、アッセンブリ番号は同じになっています。

PANEL BOARD
Prior to SN521800
SN521799以前

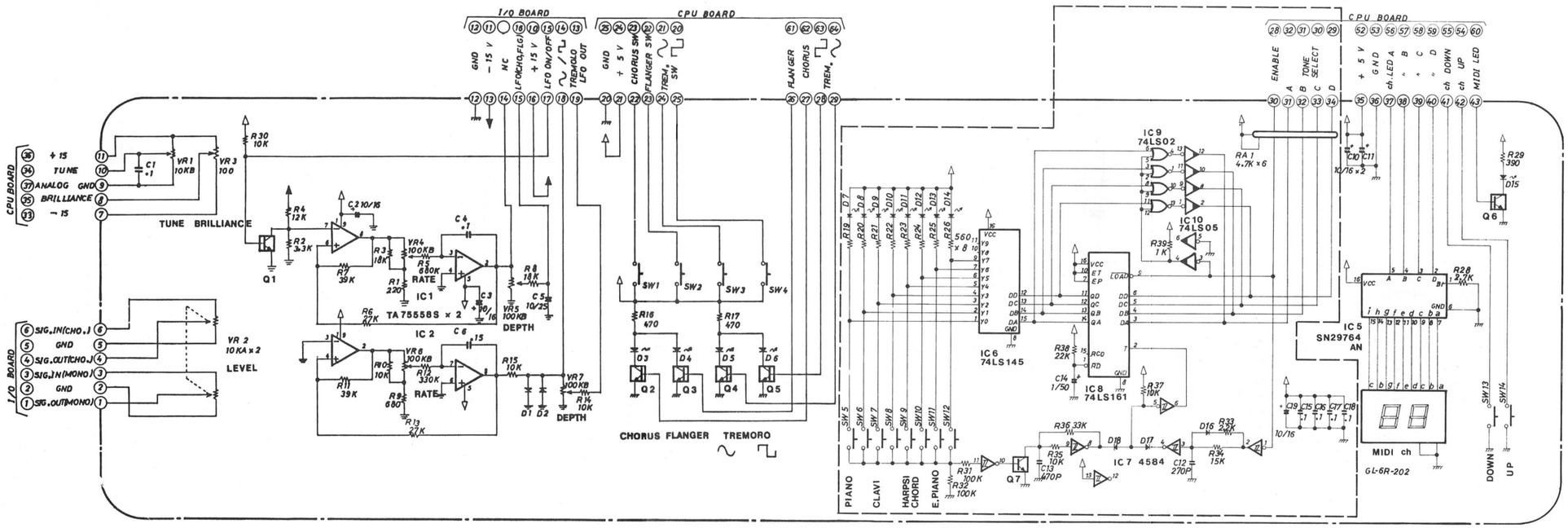


PANEL BOARD 7933805000 (pcb 2291593802) SN521800-up SN521800以後

View from foil side



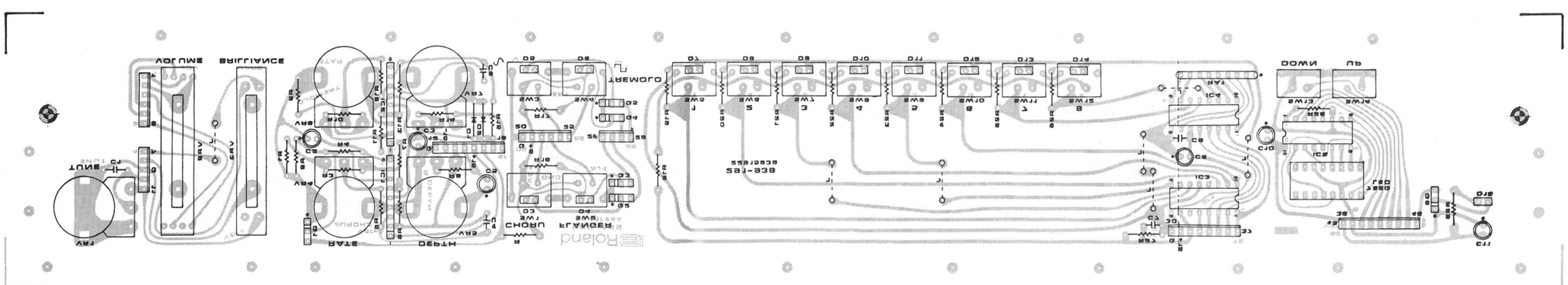
SN521800-up
SN521800以後



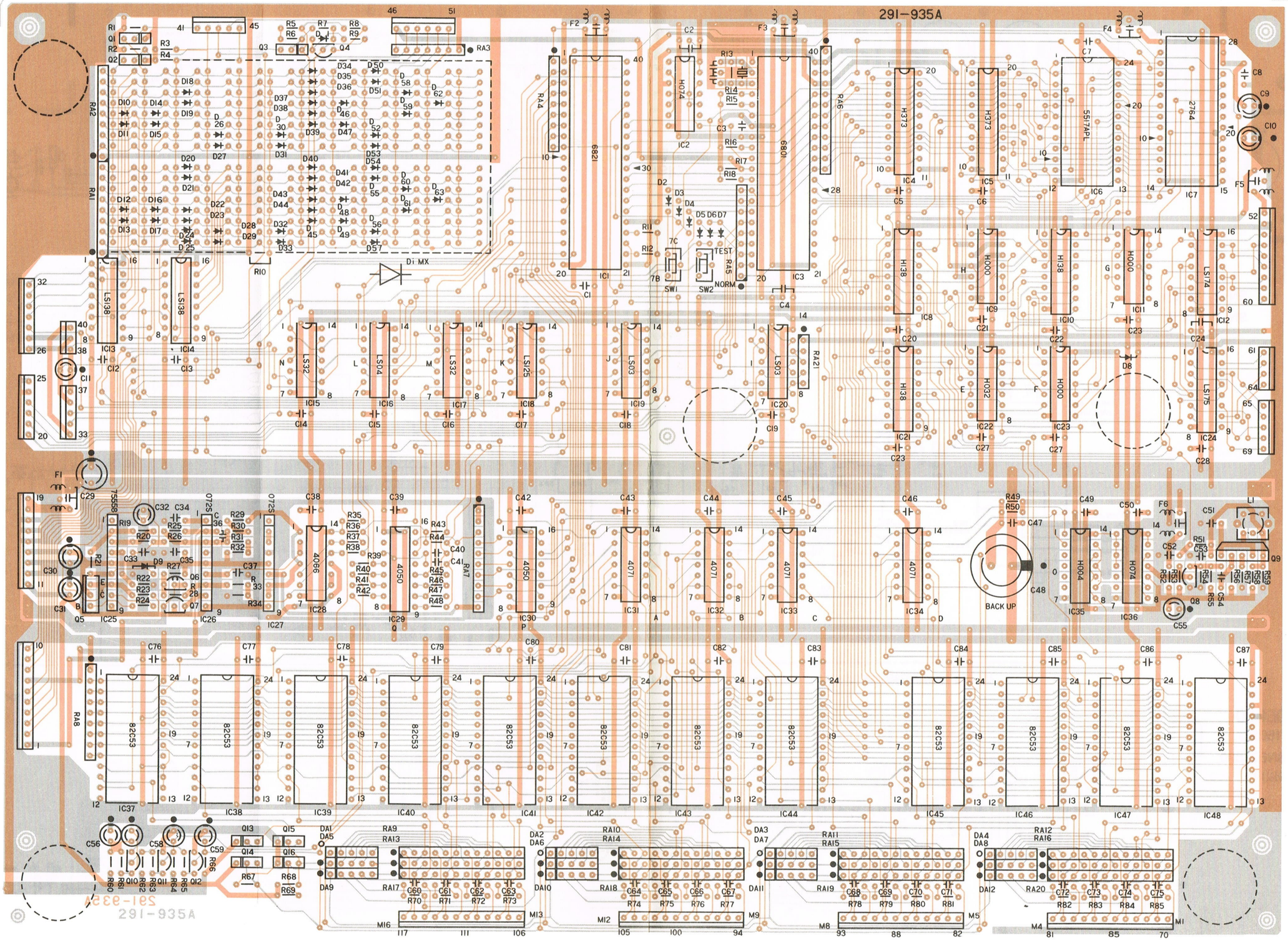
ALL NPN TRANSISTORS ARE DTC144A D1,2---1SS133 D3~14---GL-9-HD12 D15---GL-9P-G2

View from foil side

7933805000
(pcb 22915938)
Prior to SN521800
SN521799以前



CPU BOARD 7933808000 (pcb 22915935)



CPU BOARD

POWER SUPPLY BOARD

PANEL BOARD

I/O BOARD

16-MODULE BOARD

I/O BOARD

INTERFACE

DECODER

SUSTAIN OFFSET

MODE SELECT

IC13
74LS138 x 2
IC14

IC25
TA75558S

IC19, 20: 74LS03

IC16: 74LS04
IC18: 74LS125
IC30: 4050

KCV

MASTER OSC 3.6MHz

IC36
40H074

IC27

IC26, 27: MJM072S

IC28
4066BP

IC26

IC35: 40H001

IC29: 4050
D/A

S/H

DCV

IC15, 17: 74LS32
IC16: 74LS04

IC35: 40H004

WAVEFORM CONTROLLER

WAVEFORM SELECTOR

RESET GEN

IC2 40H074

IC22: 40H032
IC29: 4050

RESET 1

RESET 2

CSC300

CPU

IC3
HD6801 SOP

MIDI IN

MIDI ALL NOTES OFF

SW1

SW2

ADDRESS DECOD

DATA LATCH

IC12
74LS174

IC10
40H138

IC22: 40H032
IC23: 40H000

IC6
TC5517 APL

RAM

IC7
TMM2764D

ROM

IC9: 40H000

IC5
40H373

ADDRESS LATCH

IC11, 23: 40H000

IC11: 40H000
IC22: 40H032

I/O PORT

SIP

IC4
40H373

DATA LATCH

IC24
74LS175

IC8
40H138

IC21
40H138

ADDRESS DECOD

IC1
HD46821 SIP

IC38

IC40 IC42 IC44 IC46 IC48 IC37 IC39 IC41 IC43 IC45 IC47

PROGRAMMABLE COUNTER
82C53 x 12

IC31–34: 4071

CLOCKS A

CLOCKS B

MODE SELECT

CLOCK (CHOPPER) B

CLOCK (CHOPPER) A

KEY FOLLOWER

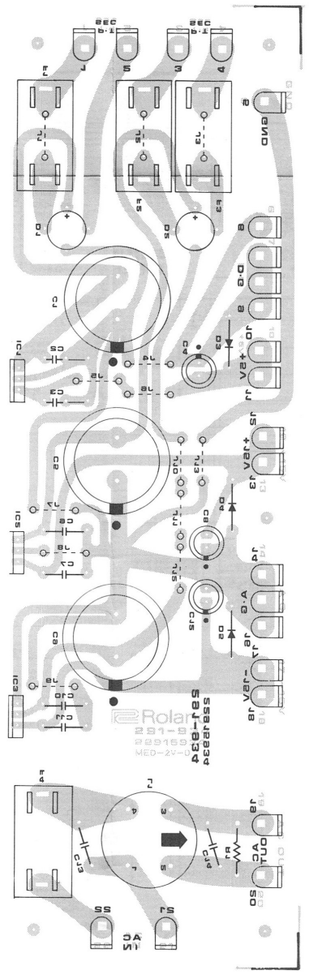
IC29, 30

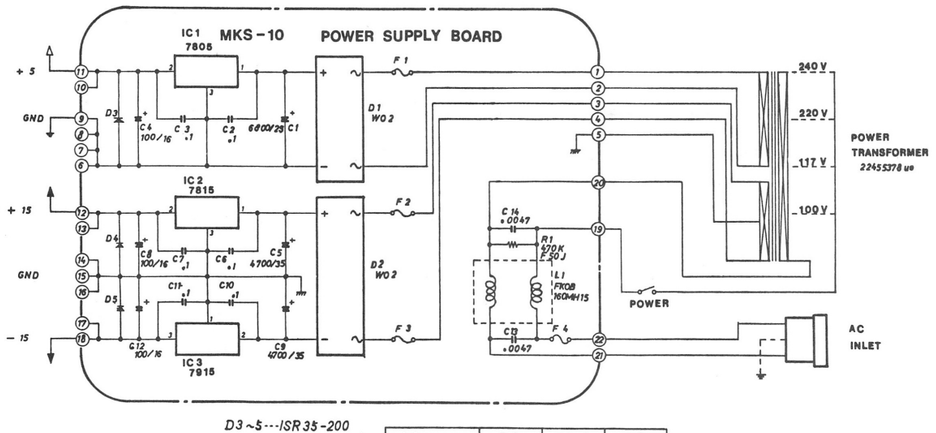
IC9, 15–20, 22, 23, 28, 31–34

Q1, 2, 13, 14 ..... DTA144
Q3, 15, 16 ..... DTC144
Q4, 7, 8, 10, 11, 12 ..... 2SC1815GR
Q5 ..... 2SA682Y
Q6 ..... 2SC2878
Q9 ..... 2SC1583
ALL DIODES ARE 1SS133

POWER SUPPLY BOARD

7933812100 100/117V (pcb 22915934)
7933812400 220/240V (pcb 22915934)

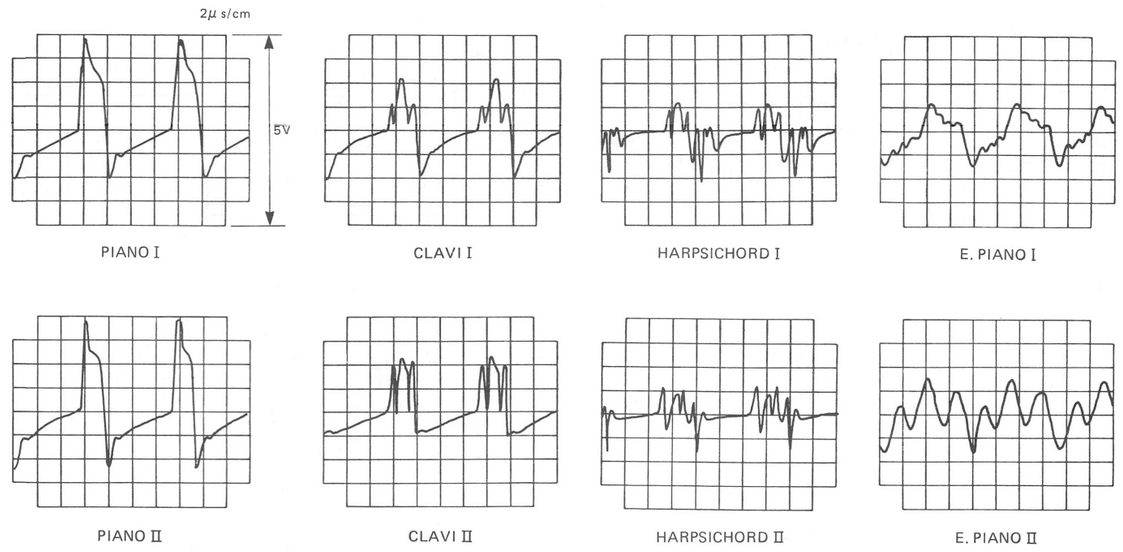




D3~5---ISR35-200

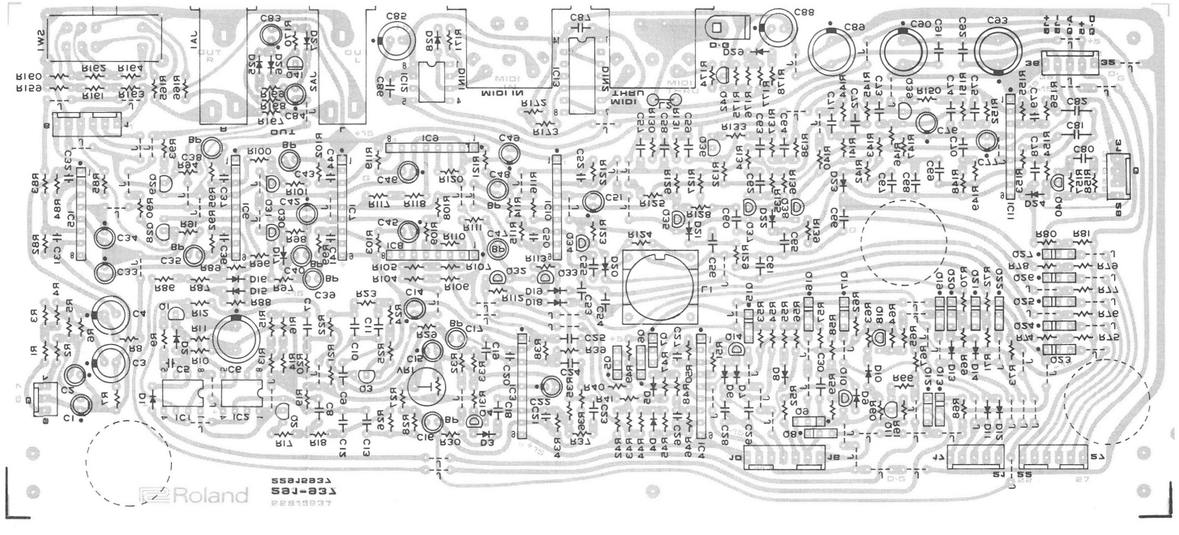
AC	F1	F2, 3	F4
100V 117V	J1	J2, 3	GGS1.5A
220V 240V	CEE T1A	CEE T630mA	CEE T200mA

OUTPUT WAVEFORM

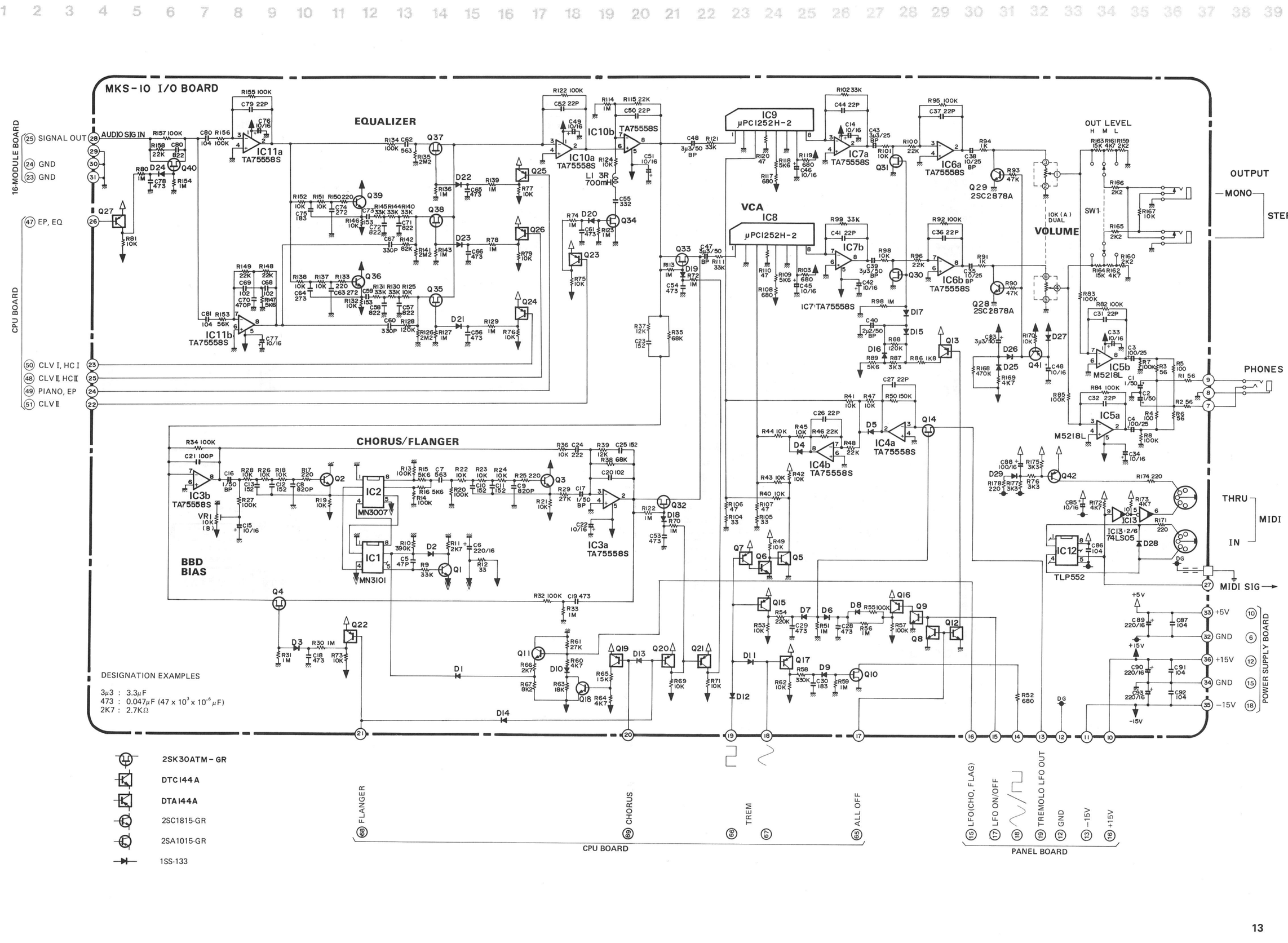


I/O BOARD

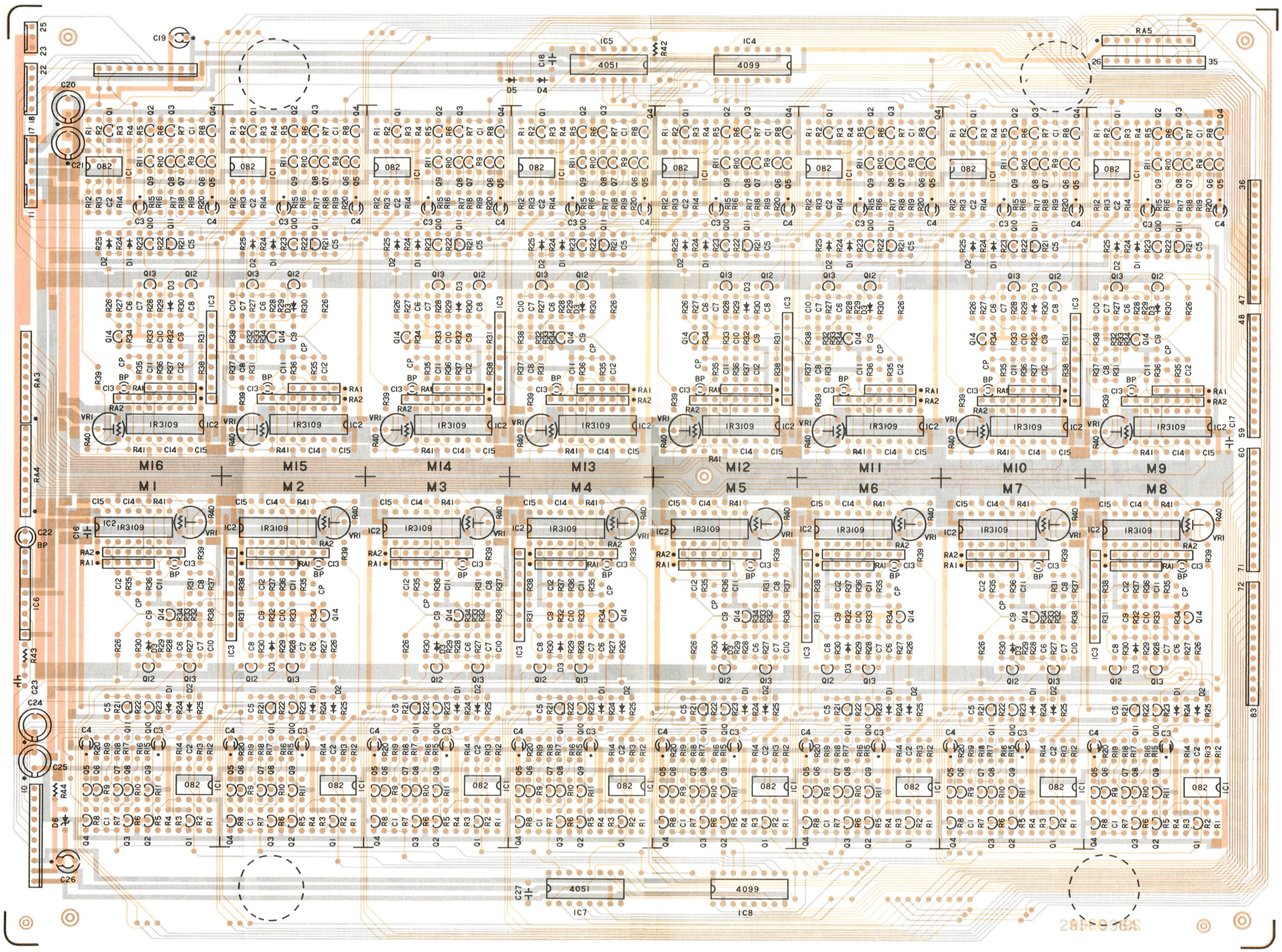
7933810000
(pcb 22915937)

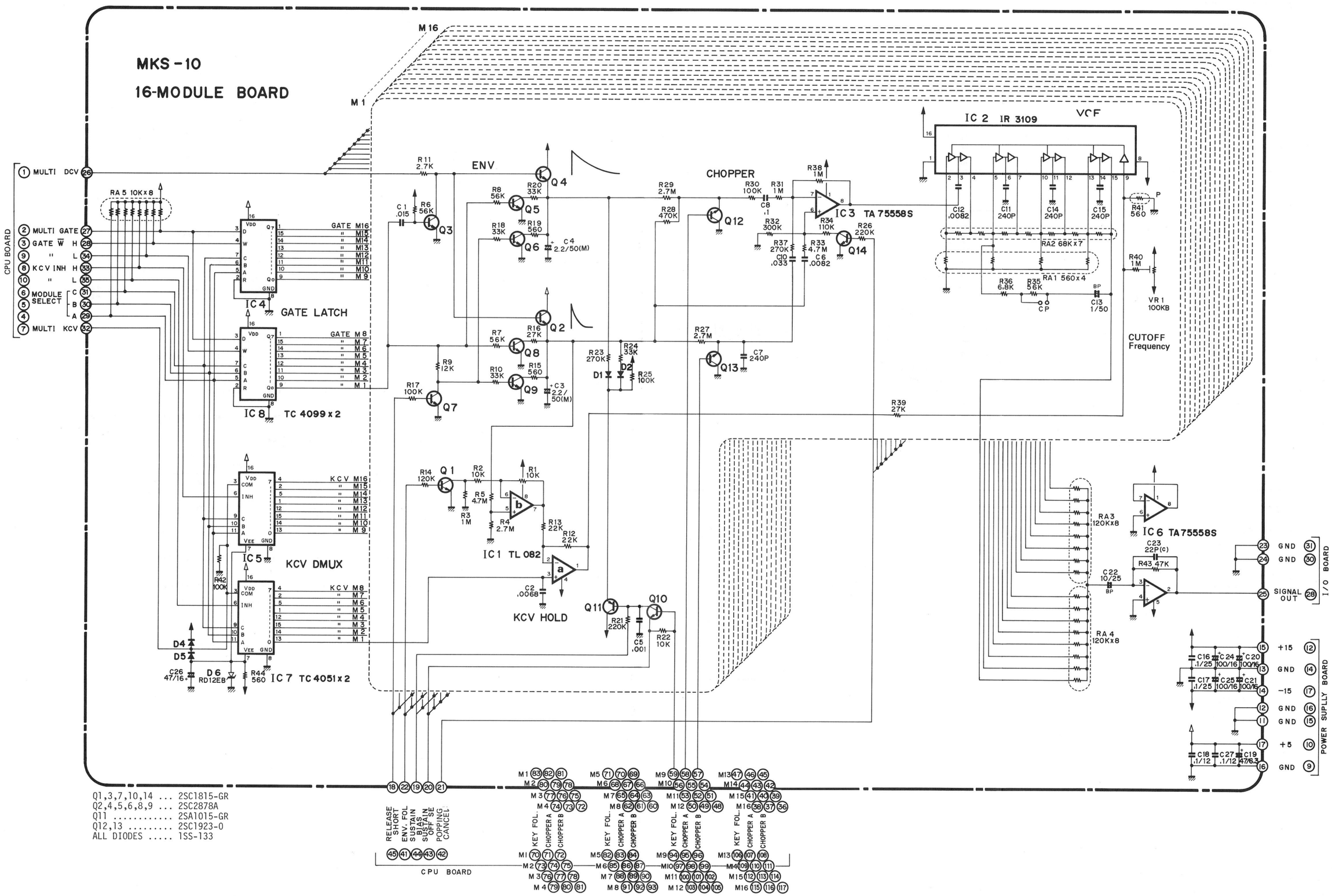


View from foil side


MKS-10 I/O BOARD
16-MODULE BOARD
CPU BOARD
EQUALIZER
CHORUS/FLANGER
BBD BIAS
VCA
VOLUME
OUT LEVEL
OUTPUT
MONO
STEREO
PHONES
THRU
MIDI
IN
MIDI SIG
SIGNAL OUT
GND
EP, EQ
CLV I, HC I
CLV II, HC II
PIANO, EP
CLV II
AUDIO SIG IN
IC1 MN3101
IC2 MN3007
IC3a TA75558S
IC3b TA75558S
IC4a TA75558S
IC4b TA75558S
IC5a M5218L
IC5b M5218L
IC6a TA75558S
IC6b TA75558S
IC7a TA75558S
IC7b TA75558S
IC7 TA75558S
IC8 μPC1252H-2
IC9 μPC1252H-2
IC10a TA75558S
IC10b TA75558S
IC11a TA75558S
IC11b TA75558S
IC12 TLP552
IC13 74LS05
Q29 2SC2878A
Q28 2SC2878A
DESIGNATION EXAMPLES
3μ3 : 3.3μF
473 : 0.047μF (47 x 10³ x 10⁻⁶ μF)
2K7 : 2.7KΩ
2SK30ATM-GR
DTC144A
DTA144A
2SC1815-GR
2SA1015-GR
1SS-133
FLANGER
CHORUS
TREM
ALL OFF
CPU BOARD
LFO(CHO, FLAG)
LFO ON/OFF
TREMOLO LFO OUT
GND
−15V
+15V
PANEL BOARD
+5V
GND
+15V
GND
−15V
POWER SUPPLY BOARD

16-MODULE BOARD 7933806000 (pcb 22915936A)





Q1,3,7,10,14 ... 2SC1815-GR
Q2,4,5,6,8,9 ... 2SC2878A
Q11 ..... 2SA1015-GR
Q12,13 ..... 2SC1923-O
ALL DIODES 1SS-133

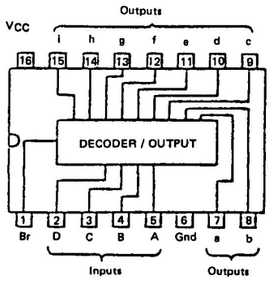
IC DATA

SN29764AN

PIN ASSIGNMENT	DIP
Brightness Control	1
Input D	2
Input C	3
Input B	4
Input A	5
Ground	6
Output a	7
Output b	8

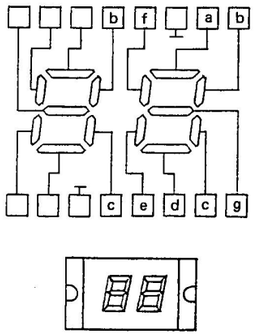
PIN ASSIGNMENT	DIP
Output c	9
Output d	10
Output e	11
Output f	12
Output g	13
Output h	14
Output i	15
Power Supply VCC	16

Pin Configuration (Top View)



Truth Table

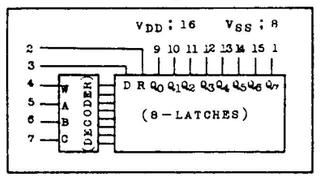
DISPLAY	INPUT					OUTPUT								
	D	C	B	A	Br	a	b	c	d	e	f	g	h	i
1	L	L	L	L	L	off	on	on	off	off	off	off	off	off
2	L	L	L	H	L	on	on	off	on	on	off	on	off	off
3	L	L	H	L	L	on	on	on	on	off	off	on	off	off
4	L	L	H	H	L	off	on	on	off	off	on	on	off	off
5	L	H	L	L	L	on	off	on	on	off	on	on	off	off
6	L	H	L	H	L	on	off	on	on	on	on	on	off	off
7	L	H	H	L	L	on	on	on	off	off	off	off	off	off
8	L	H	H	H	L	on	on	on	on	on	on	on	off	off
9	H	L	L	L	L	on	on	on	on	off	on	on	off	off
10	H	L	L	H	L	on	on	on	on	on	on	off	on	on
11	H	L	H	L	L	off	on	on	off	off	off	off	on	on
12	H	L	H	H	L	on	on	off	on	on	off	on	on	on
13	H	H	L	L	L	on	on	on	on	off	off	on	on	on
14	H	H	L	H	L	off	on	on	off	off	on	on	on	on
15	H	H	H	L	L	on	off	on	on	off	on	on	on	on
16	H	H	H	H	L	on	off	on	on	on	on	on	on	on
none	X	X	X	X	H	off	off	off	off	off	off	off	off	off



*$V_1 = V_{16}$

TC4099BP

Block Diagram



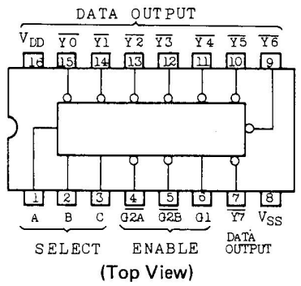
Truth Table

Write Disable	Reset	Addressed Latch	Unaddressed Latch
0	0	Data	Q_n*
0	1	Data	Reset†
1	0	Q_n*	Q_n*
1	1	Reset	Reset

* Q_n is previous state of latch.
† Reset to zero state.

TC40H138P

Pin Configuration



(Top View)

Truth Table

INPUTS						OUTPUTS							
ENABLE			SELECT										
G1	$\overline{G2A}$	$\overline{G2B}$	A	B	C	$\overline{Y0}$	$\overline{Y1}$	$\overline{Y2}$	$\overline{Y3}$	$\overline{Y4}$	$\overline{Y5}$	$\overline{Y6}$	$\overline{Y7}$
L	※	※	※	※	※	H	H	H	H	H	H	H	H
※	H	※	※	※	※	H	H	H	H	H	H	H	H
※	※	H	※	※	※	H	H	H	H	H	H	H	H
H	L	L	L	L	L	L	H	H	H	H	H	H	H
H	L	L	H	L	L	H	L	H	H	H	H	H	H
H	L	L	L	H	L	H	H	L	H	H	H	H	H
H	L	L	H	H	L	H	H	H	L	H	H	H	H
H	L	L	L	L	H	H	H	H	H	L	H	H	H
H	L	L	H	L	H	H	H	H	H	H	L	H	H
H	L	L	L	H	H	H	H	H	H	H	H	L	H
H	L	L	H	H	H	H	H	H	H	H	H	H	L

※ : Don't care

MIDI IMPLEMENTATION

1. RECOGNIZED RECEIVE DATA

Status	Second	Third	Description
1000 nnnn	0kkk kkkk	0vvv vvvv	Note OFF kkkkkkk = 0 – 127 (21 – 108) velocity ignored
1001 nnnn	0kkk kkkk	0000 0000	Note OFF kkkkkkk = 0 – 127 (21 – 108) *2
1001 nnnn	0kkk kkkk	0vvv vvvv	Note ON kkkkkkk = 0 – 127 (21 – 108) *2 vvvvvvv = 1 – 127, velocity ignored
1011 nnnn	0100 0000	01xx xxxx	damper pedal on (xx xxxx do not care)
1011 nnnn	0100 0000	00xx xxxx	damper pedal off
1011 nnnn	0100 0001	01xx xxxx	soft on *3
1011 nnnn	0100 0001	00xx xxxx	soft off *3
1011 nnnn	0100 0011	01xx xxxx	soft on *4
1011 nnnn	0100 0011	00xx xxxx	soft off *4
1100 nnnn	0ppp pppp		Program Change *5 ppppppp = 0 – 127
1011 nnnn	0111 1011	0000 0000	ALL NOTES OFF *1
1011 nnnn	0111 1100	0000 0000	OMNI OFF (ALL NOTES OFF) *1
1011 nnnn	0111 1101	0000 0000	OMNI ON (ALL NOTES OFF) *1
1011 nnnn	0111 1110	0mmm mmmm	MONO ON (ALL NOTES OFF) *1
1011 nnnn	0111 1111	0000 0000	POLY ON (ALL NOTES OFF) *1
1111 1110			active sensing

Notes:

* nnnn = 0 – 15 corresponds to channel 1 – 16.

*1 Mode messages (all notes off, omni on/off, mono on, poly on) are recognized in only the basic channel.

While in OMNI ON mode, voice messages in all channels are recognized. While in OMNI OFF mode, voice messages in only the basic channel are recognized.

Mode messages (123 – 127) are also recognized as ALL NOTES OFF in OMNI OFF mode.

Mode messages are recognized as follows:

	POLY ON (127)	MONO ON (126) mmmmmm = 1	MONO ON (126) mmmmmm <> 1
OMNI OFF (124)	OMNI = OFF POLY	OMNI = OFF POLY	OMNI = ON # POLY
OMNI ON (125)	OMNI = ON POLY	OMNI = ON POLY	OMNI = ON POLY

\# In this mode, only 'POLY ON' message can change the mode to OMNI OFF.

* When power is first applied, the default mode is MODE 3 (OMNI OFF, POLY).

* The basic channel can be changed by panel operation, and memorized.

*2 Note numbers below 20 or over 109 (included) are recognized octave(s) up or down.

*3 These messages can be recognized as soft pedal functions (instead of *4) if the power is applied while holding down any effect switch such as 'CHORUS', 'FLANGER' or 'TREMOLO'. (Normally they are ignored.)

*5 Program change assigments are as follows:

ln: long sh: short

	piano 1 ln	piano 2 sh	clavi 1 ln	clavi 2 sh	harpsi 1 ln	harpsi 2 ln	e.piano 1 ln	e.piano 2 ln	piano 1 sh	piano 2 sh	clavi 1 ln	clavi 2 ln	harpsi 1 sh	harpsi 2 sh	e.piano 1 sh	e.piano 2 sh
release time																
	program change numbers															
no effects	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
chorus	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
flanger	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
tremolo (sin)	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
tremolo (sq)	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79
ch+trml (sin)	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
ch+trml (sq)	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111
fl+trml (sin)	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127

ch: chorus sin: sine wave
fl: flanger sq: square wave
trml: tremolo

* When power is first applied, the default tone select is 0 (piano-1, no effects).
* Functions in right half such as 8 thru 15, 24 thru 31 etc are selected only the program change messages received from MIDI IN. Others can also be selected from panel operations.