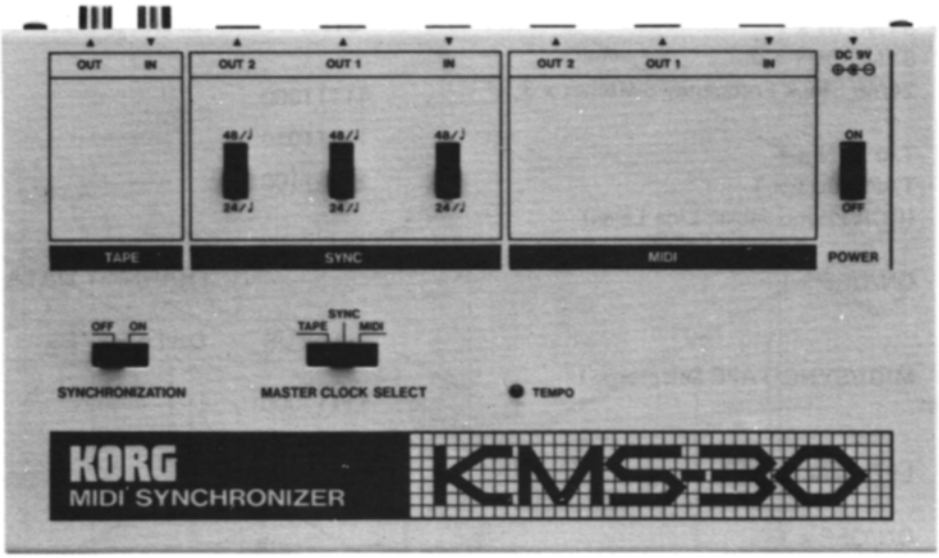
KORG®



MIDI SYNCHRONIZER

SERVICE MANUAL KMS-30

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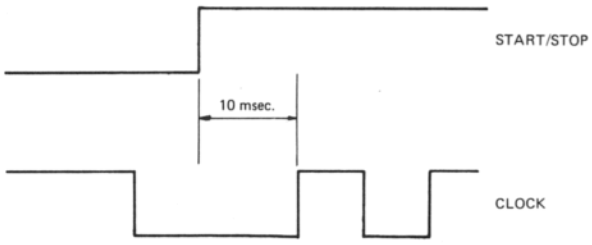
KEIO ELECTRONIC LABORATORY CORPORATION
TOKYO/JAPAN

1. SPECIFICATIONS

- MIDI Section — MIDI IN x 1
MIDI OUT x 2
(MIDI OUT jacks act as MIDI THRU when MASTER CLOCK is set to MIDI.)
- SYNC Section — SYNC IN x 1
SYNC OUT x 2
24/48 Clock Frequency Switches x 3
- TAPE Section — TAPE IN x 1
TAPE OUT x 1
(RCA Phono Jacks; Line Level)
- SYNCHRONIZATION — ON/OFF x 1
- MASTER CLOCK SELECT — MIDI/SYNC/TAPE Selector x 1
- TEMPO — LED Indicator x 1
- POWER — ON/OFF x 1
- Input/Output Jacks — MIDI IN x 1 (DIN Jack)
MIDI OUT x 2 (DIN Jacks)
SYNC IN x 1 (DIN Jack)
SYNC OUT x 2 (DIN Jacks)
TAPE IN x 1 (RCA Phono Jack)
TAPE OUT x 1 (RCA Phono Jack)
DC 9V x 1
- Dimensions — 232(W) x 35(H) x 131(D) mm
- Weight — 850 g
- Supplied Accessories — AC Adaptor (9V) x 1
- Options — MIDI CABLE



Syncro Terminal

Start/stop clock signal is not output until 10 msec. (inhibited time of syncro signal). Passed just after syncro on/off switch is set to on. No signal is output when the switch is off.

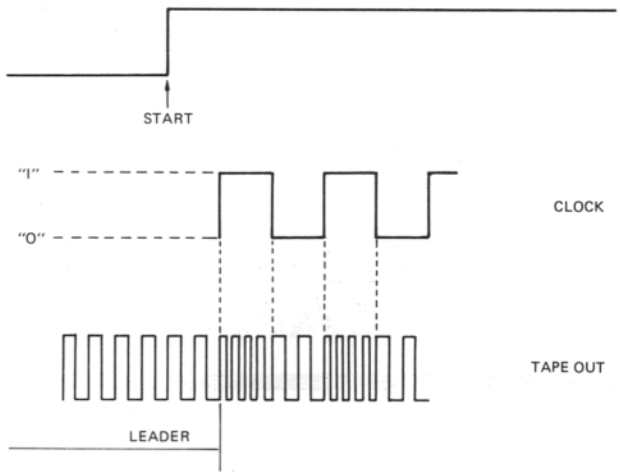
MIDI IMPLEMENTATION

RECEIVE DATA

STATUS	DATA BYTES	DESCRIPTION
11111000	———	TIMING CLOCK
11111010	———	START
11111100	———	STOP

TRANSMIT DATA

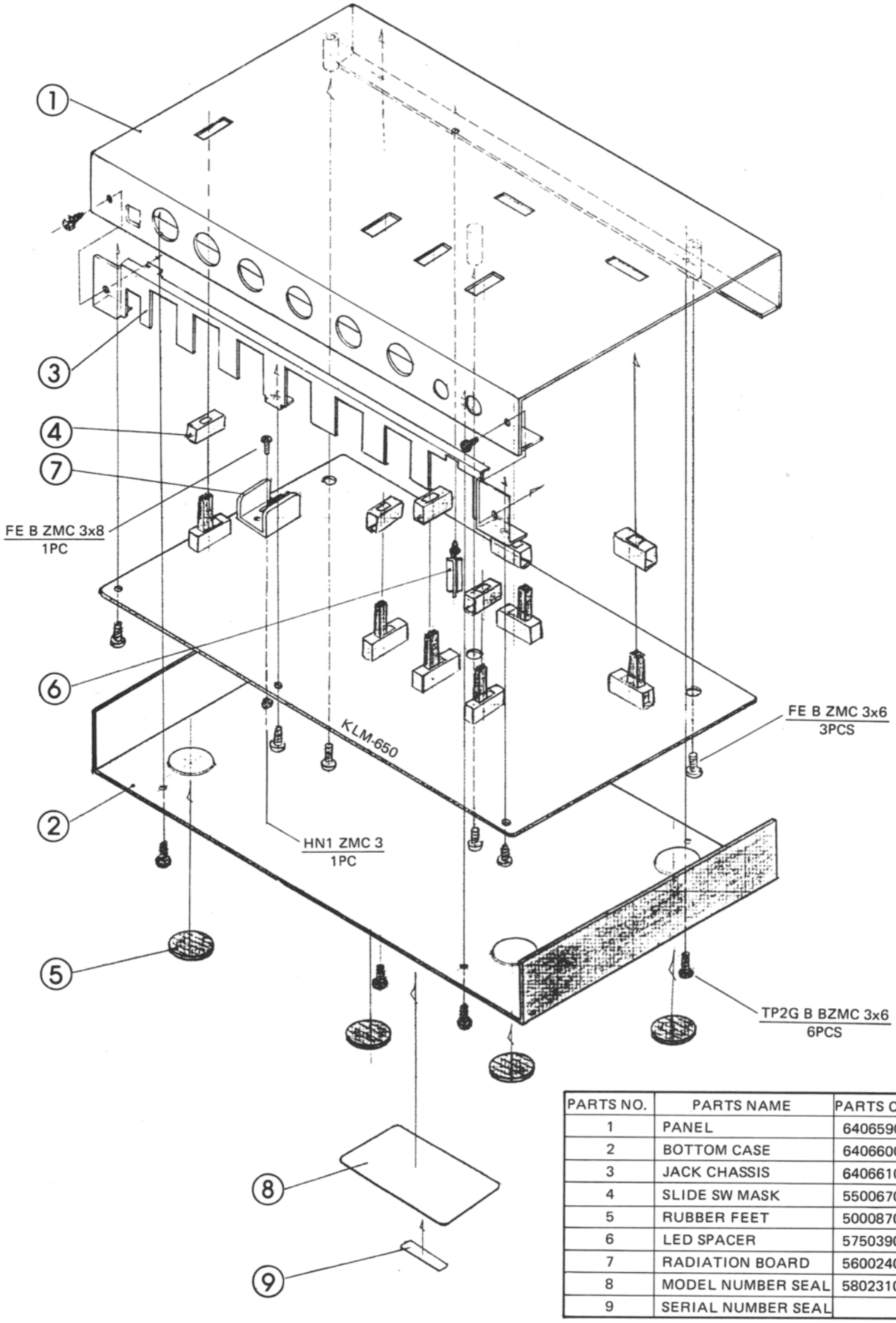
STATUS	DATA BYTES	DESCRIPTION
11111000	———	TIMING CLOCK
11111010	———	START
11111100	———	STOP



Tape Syncro:

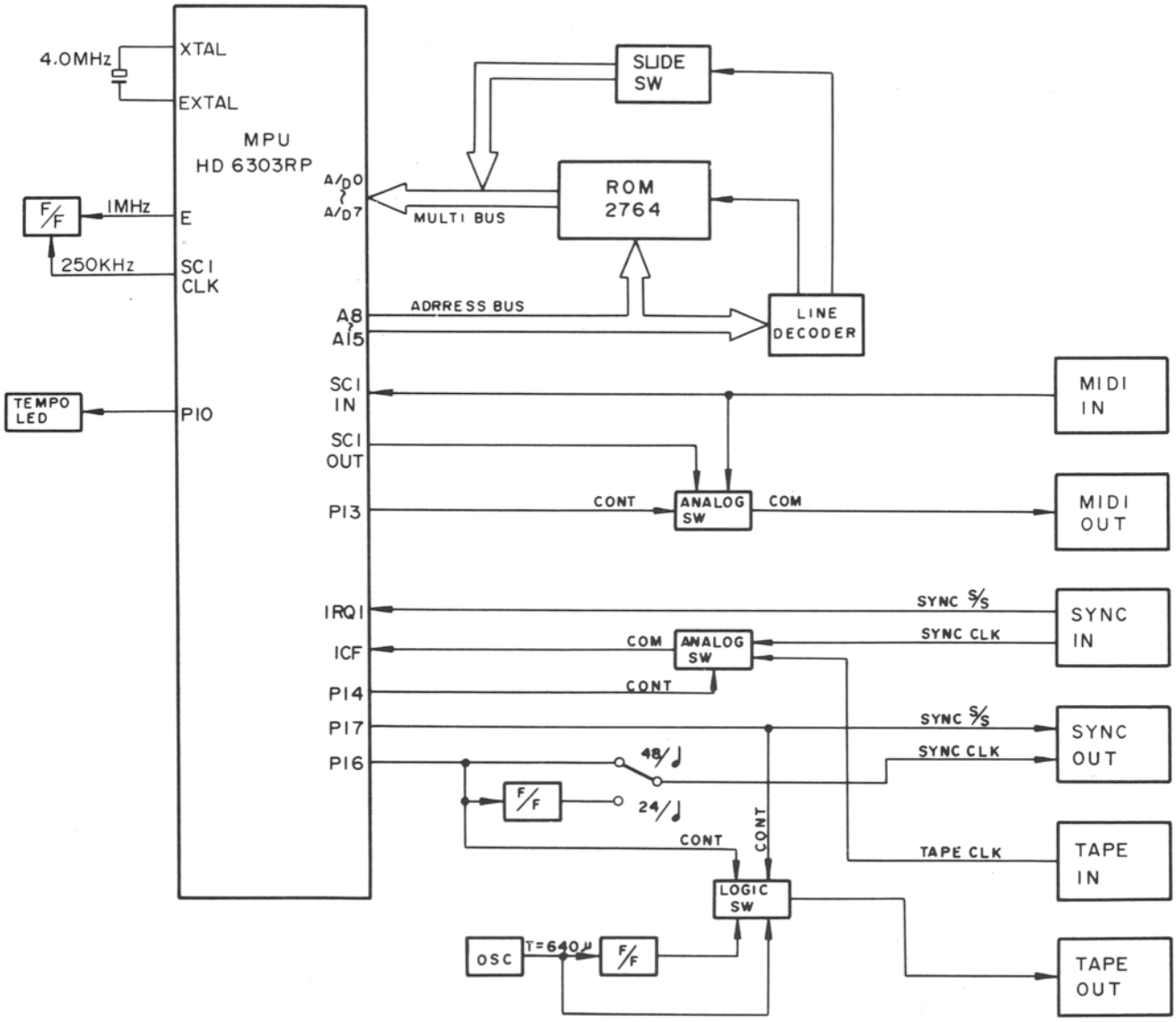
Only clock signal can be saved in external tape at 48/♩ (48 clock frequency per quarter note). Its wave shape is like rectangle and its value is 0;640 msec, 1;320 msec. Its value is 0 when it stops. In case syncro play is controlled by clock signal in external tape, it starts when leader part of the tape changes to clock signal, and it stops when time value of clock signal being 0 over 125 msec. It is impossible to read clock signal = 0 from leader part for there is no stop signal in a tape. So it is set to play when clock signal frequency is over ♩ = 20, and when it is under ♩ = 20, it is read as leader part and syncro play stops.

2. STRUCTURAL DIAGRAM



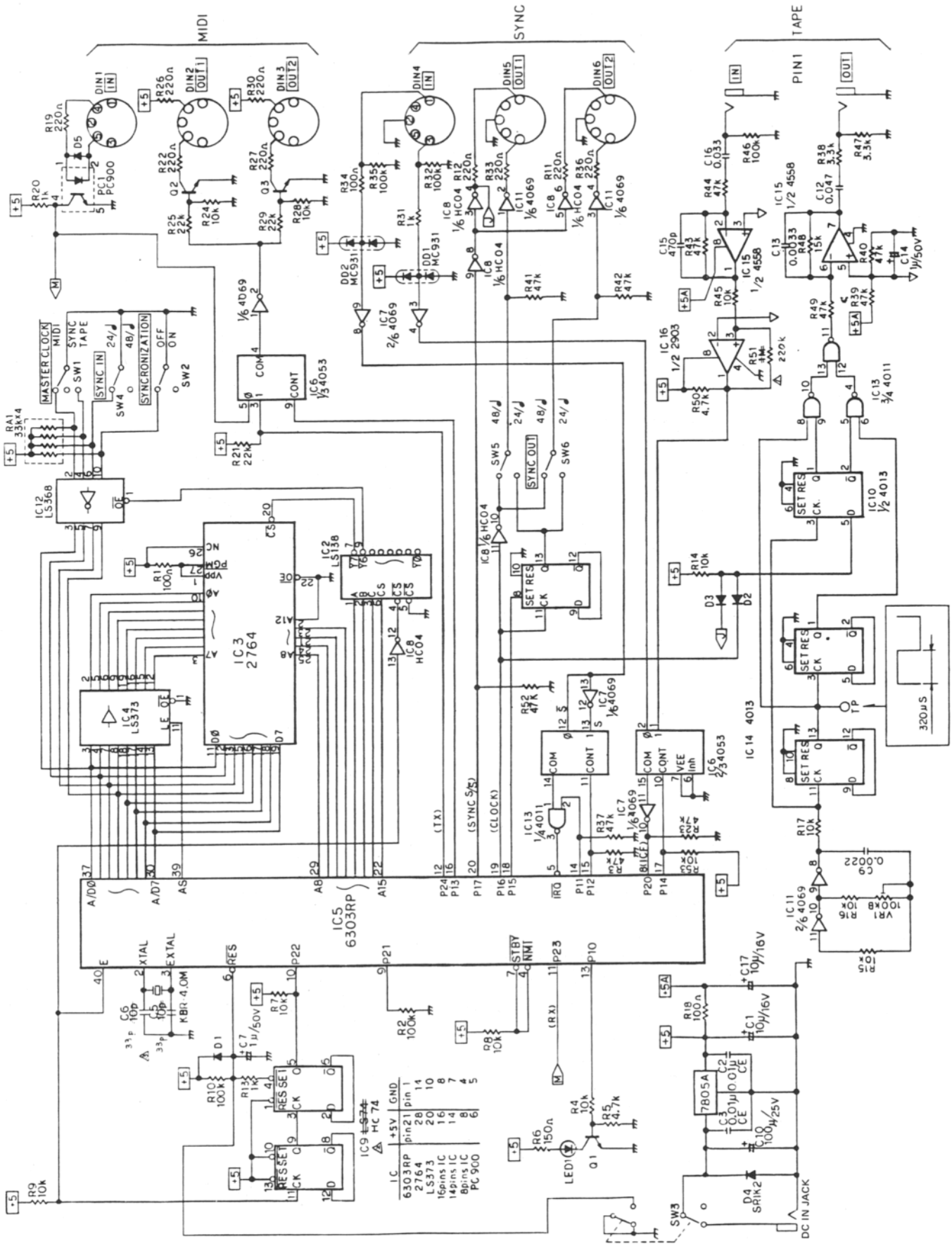
PARTS NO.	PARTS NAME	PARTS CODE
1	PANEL	64065900
2	BOTTOM CASE	64066000
3	JACK CHASSIS	64066100
4	SLIDE SW MASK	55006700
5	RUBBER FEET	50008700
6	LED SPACER	57503900
7	RADIATION BOARD	56002400
8	MODEL NUMBER SEAL	58023100
9	SERIAL NUMBER SEAL	

3. BLOCK DIAGRAM



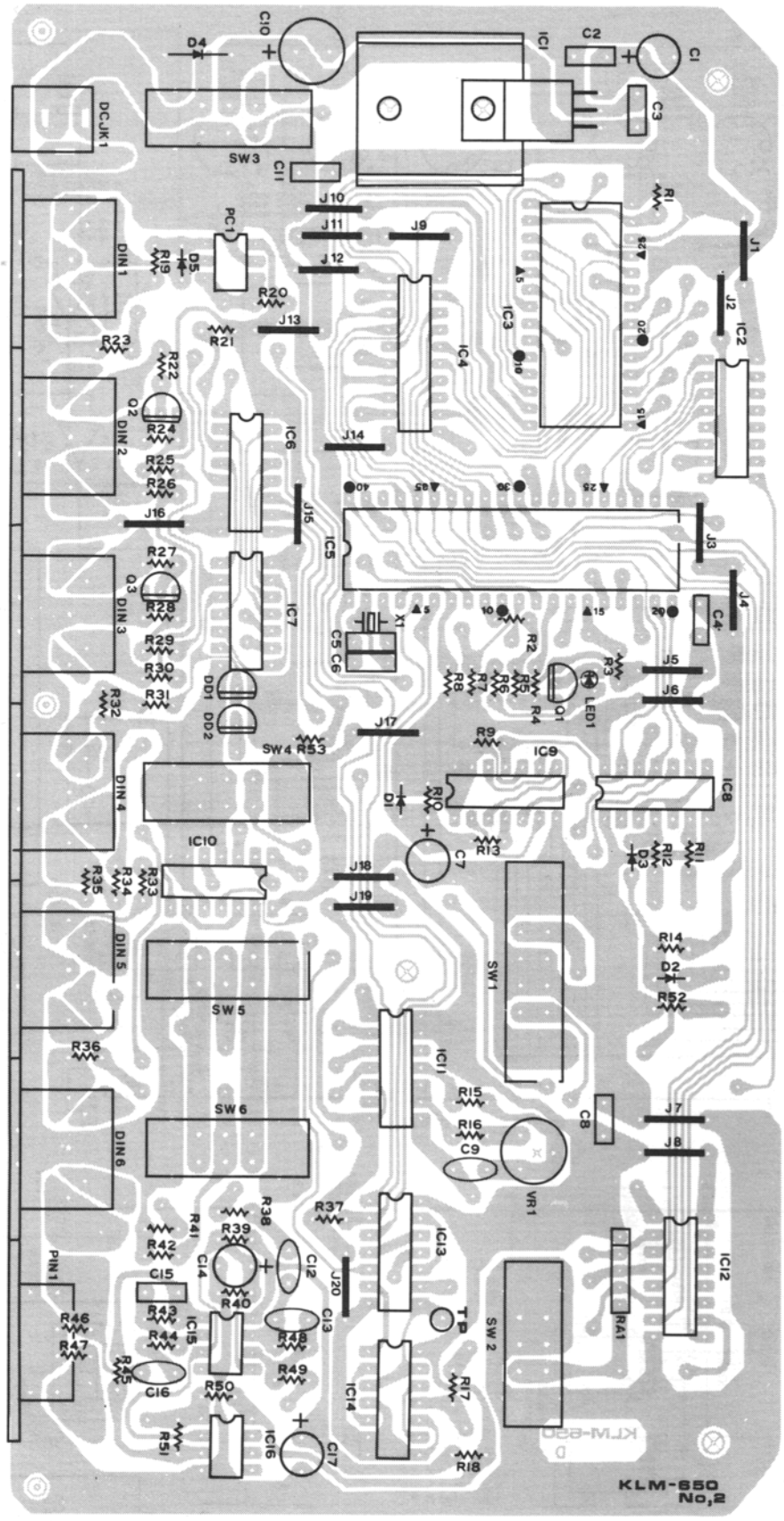
4. CIRCUIT DIAGRAM

KLM-650



5. PC BOARD

KLM-650



6. CIRCUIT DESCRIPTIONS

1. Introduction

The KORG KMS-30 is an interface that synchronizes MIDI and sync signals. The KMS-30 processes the following three kinds of signals:

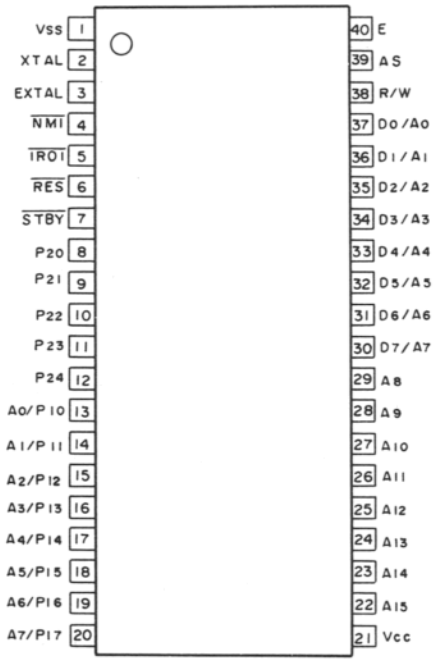
1. Sync (24 and 48 clock frequency per quarter note)
2. MIDI (start, stop, clock)
3. Tape clock

2. System Configuration

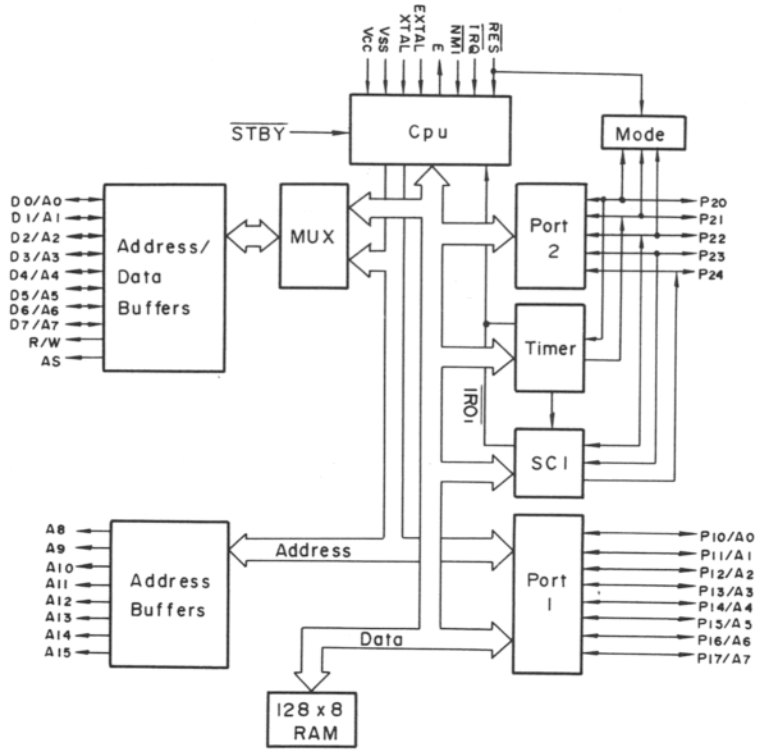
The basic system consists of the HD6303 8-bit CMOS microprocessor and 65,536-bit EPROM. Switching functions are transmitted to the CPU by the LS368 bus driver and processed according to the program stored in EPROM. With an understanding of CPU operation, troubleshooting should by easy.

A block diagram of the CPU is shown in figure below and the function of each terminal is listed in next page.

PIN CONFIGURATION



BLOCK DIAGRAM



3. Terminal Function

Term	Function
VCC, VSS	These two pins are connected to power supply and ground.
XTAL, EXTAL	These two pins are clock supply terminals for the internal oscillator circuit. A 1/4 divider produces the unit's 1MHz system clock.
E	Enable terminal for 1MHz system clock output.
RESET	For resetting the CPU. Requires a minimum of 20msec low signal level, thereby determining the time constant of the externally connected reset circuit.
IRQ	Interrupt request input terminal for detection of sync input start/stop control signal (high to low pulse).
AS	Address strobe signal output terminal. This signal controls LS373 which is used to latch the least significant 8 bits of the address multiplexed with data output at port 3.
P10–P17 P20–P24 P30–P37 P40–P47	These terminals function as IO ports, address buses, or data buses depending on the operating mode and software. In the KMS-30 their functions are as described below.
P10	Output port for LED illumination. Lights once for each quarter note.
P11	Detects position of master clock select switch. Outputs high when set to SYNC, otherwise low.
P12	When master clock select switch is set to SYNC, this outputs start/stop condition of master unit: low at start, high at stop.
P13	Detects position of master clock select switch. Outputs low level for MIDI position, high for other settings.
P14	Detects position of master clock select switch. Outputs high level for TAPE, low for SYNC, and irregular (?) for MIDI.
P15	When master clock select is set to SYNC, this outputs the start pulse (low to high) of the rhythm machine connected to the SYNC IN jack; this sets IC 4013.
P16	Outputs clock for all functions. Outputs at 48 clock frequency per quarter note.
P17	Outputs start/stop condition for all functions. Start is high, stop is low.
P20	SYNC clock and TAPE clock input port.
P21	Port for establishing CPU mode. Connected via R2 to ground.
P22	250kHz (8 times MIDI clock of 31.25kHz) input divided from 1MHz system clock.
P23	MIDI serial data input port.
P24	MIDI serial output port. When master clock selector is not at MIDI, this sends start, stop, & clock signals.
P30–P37	Output port for least significant 8-bits of address A0–A7. IO port for D0–D7 data bus.
P40–P47	Output port for most significant 8-bits of address A8–A15.

4. Adjustment Procedure

FSK clock adjustment

1. Connect oscilloscope to KLM-650 test point (TP) and confirm waveform in figure-1.
2. Adjust VR-1 if necessary.

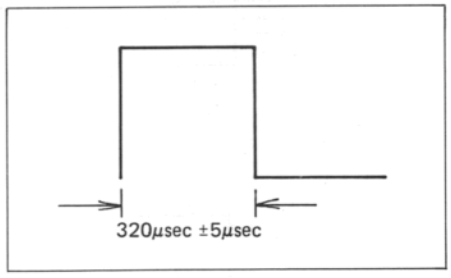
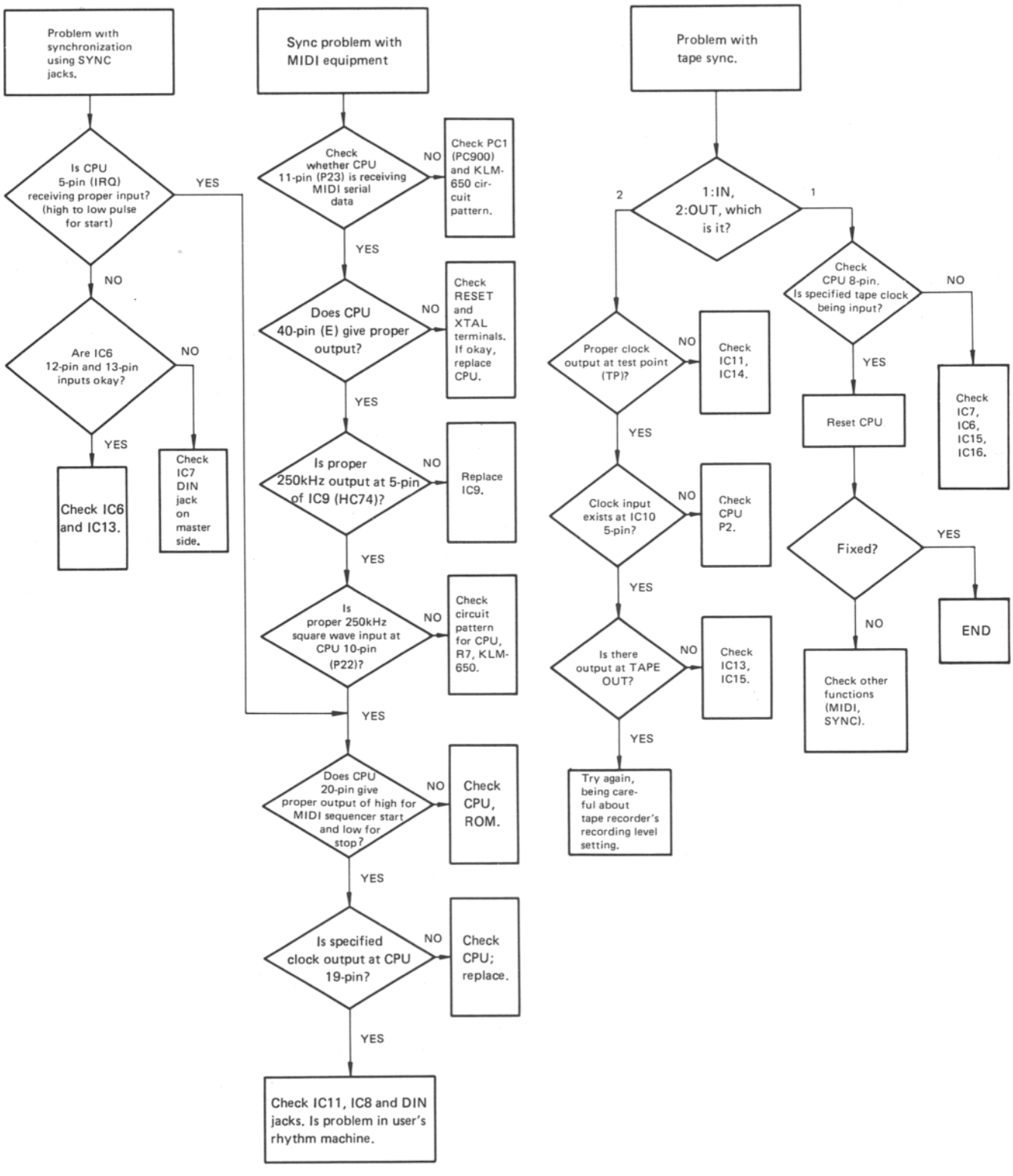


Fig. 1

7. TROUBLESHOOTING CHART



8. PARTS LIST

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
	CARBON RESISTORS			
10416310	1/6JTP 100Ω	KLM-650		3
10416315	1/6JTP 150Ω			1
10416322	1/6JTP 220Ω			9
10416410	1/6JTP 1.0K			3
10416433	1/6JTP 3.3K			2
10416447	1/6JTP 4.7K			2
10416510	1/6JTP 10K			12
10416515	1/6JTP 15K			1
10416522	1/6JTP 22K			3
10416547	1/6JTP 47K			11
10416610	1/6JTP 100K			5
10416622	1/6JTP 220K			1
	BLOCK RESISTOR			
13504533	RKC1/8B4J 33K	KLM-650		1
	MYLAR CAPACITORS			
20402422	50V 0.0022μF K	KLM-650		1
20402433	50V 0.0033μF K			1
20402533	50V 0.033μF K			1
20402547	50V 0.047μF K			1
	CERAMIC CAPACITORS			
21452330	50V 33pF TP	KLM-650		2
21453470	50V 470pF TP			1
21455100	50V 0.01μF TP			2
21456100	25V 0.1μF TP			3
	ELECTROLYTIC CAPACITORS			
25403210	16V 10μF	KLM-650		2
25404310	25V 100μF			1
25406110	50V 1μF			2
	TRANSISTOR			
30420020	TR 2SC2785 K TN	KLM-650		3
	DIODES			
31001500	SR1K-2	KLM-650		1
31401300	1SS-133 T-77			4

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
	LED			
31200800	GL-3PR-2	KLM-650		1
	DOUBLE DIODE			
31430100	MC-931 TP	KLM-650		2
	IC			
32003021	TC-40H074 P	KLM-650	Dual D-type positive edge-triggered flip flop	1
32003104	TC74HC04 P		Hex inverter	1
32004008	HD-14011 BP		Quad 2 input nand gate	1
32004009	HD-14013 BP		Dual D-type flip flop	2
32004019	HD-14069 UBP		Hex inverter	2
32004039	HD-14053 BP		Triple 2 channel analog multiplexer	1
32004056	HD-74LS373		Octal D type transparent latch with 3 state output	1
32004059	HD-74LS368P		Hex bus driver with 3 state output	1
32004066	HN-482764		65,536 bit EP ROM	1
32004071	HD-6303RP		CPU	1
32009001	NJM-4558D-V		OP AMP	1
32009011	NJM-7805 A		Power regulator	1
32009015	NJM-2903 D		OP AMP	1
32021033	SN-74LS138		3 line to 8 line decoder	1
	PHOTO COUPLER			
33000900	PC-900	KLM-650	PC1	1
	CERAMIC OSCILLATOR			
33501400	KBR-4.0MHZ	KLM-650		1
	SEMI-FIXED RESISTOR			
35202410	H1021A 100KB	KLM-650	VR1	1
	SLIDE SW			
37305100	SW J-S 5037	KLM-650	Power SW, synchronization SW, SYNC SW (48/♩, 24/♩)	5
37305200	SW J-S 5428		Master clock select	1

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
AC ADAPTERS				
40502600	KAC-301 100V		100V	1
40502700	KAC-302 UNI/117V		UNI	1
40502800	KAC-303 JAM/CSA		JAM	1
40503000	KAC-305 240AU		240AU	1
40503100	KAC-306 240GE		240 RM	1
40503200	KAC-307 240AF		240 AF	1
40503300	KAC-308 220GE		220 SE	1
			220 GAF	1
			220 FIMKO	1
DC INPUT JACK				
45400300	HEC-0470-01-230	KLM-650		1
DINJACK				
45402500	TCS4650-01-111	KLM-650		6
PINJACK				
45404000	T5900-ABBA	KLM-650		1
IC SOCKET				
48001282	28P DICA-28CTI	KLM-650		1
RUBBER FEET				
50008700	KOC-F40272	KLM-650		4
TEST PIN				
54007100	LC-2-G	KLM-650		1
SLIDE SW MASK				
55006700	KOC-F40305			6
RADIATION BOARD				
56002400	KOC-C40440	KLM-650		1
LED SPACER				
57503900	NO.3 14MM E40171	KLM-650		1

PARTS CODE	PARTS NAME SPECIFICATIONS	P.C. BOARD	IDENTIFICATION NO. FUNCTION	Q'TY
MODEL NUMBER SEAL				
58023100	KOC-F40309			1
PANEL				
64065900	KOC-C30220			1
BOTTOM CASE				
64066000	KOC-C30221			1
JACK CHASSIS				
64066100	KOC-C30222	KLM-650		1
SCREWS, NUT (Please refer to structural diagram)				
70530306	FE B ZMC 3x6			3
70530308	FE B ZMC 3x8			1
72530306	TP2G B ZMC 3x6			3
72560306	TP2G B BZMC 3x6			6
77130300	HN1 ZMC 3			1
INNER CARTON BOX				
80007820	KMS-30			1 set

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