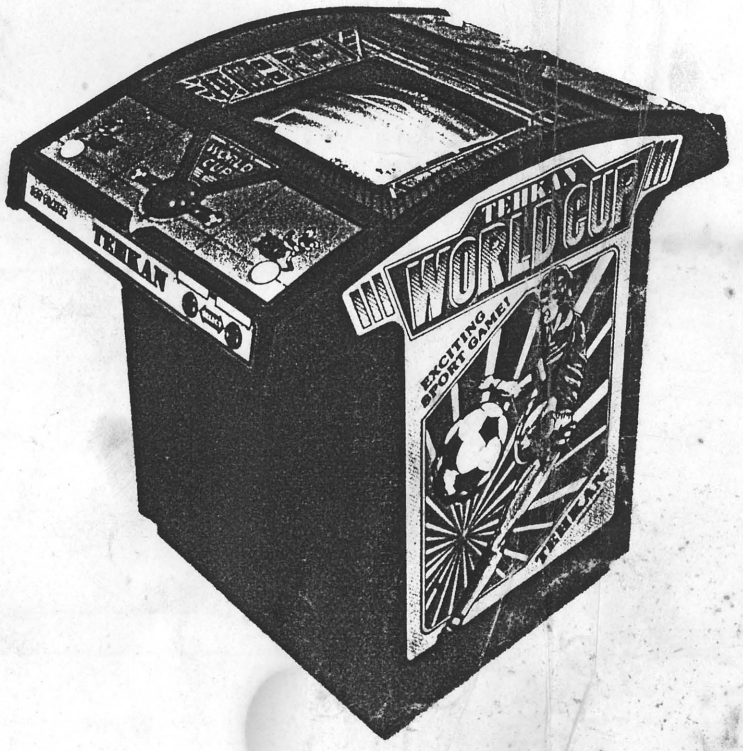
TEHKAN WORLD CUP

TM

SERVICE MANUAL



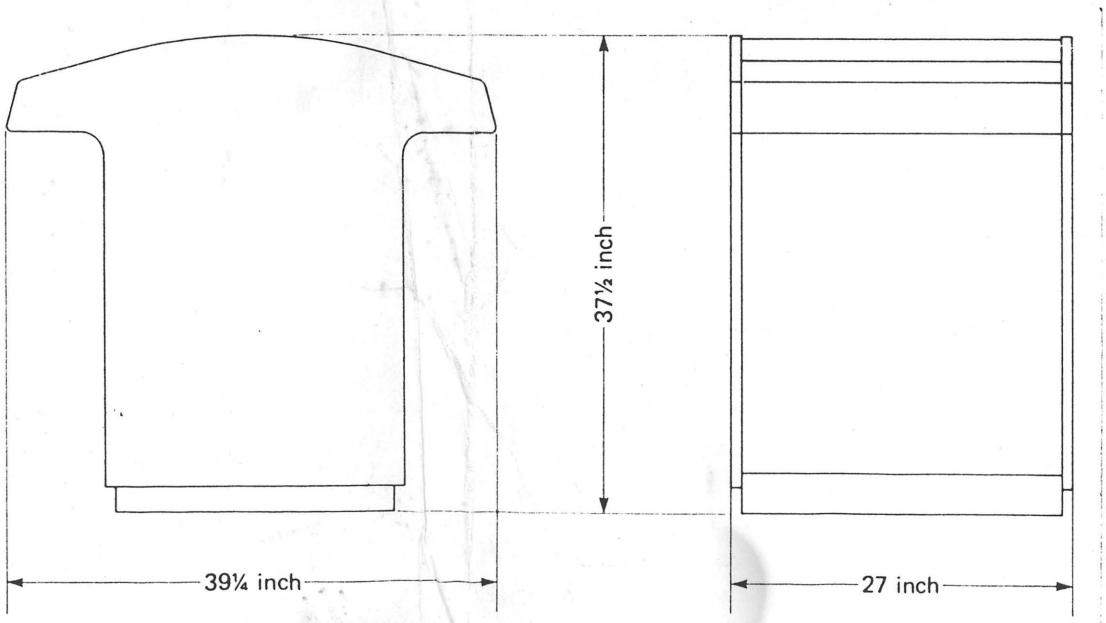
TEHKAN

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1. SPECIFICATION

- Power supply 220v AC
- Power consumption 100W
- Weight 209 1/2 lbs



2. WARNING

⚠ WARNING ⚠

★ Use of non-TEHKAN parts or modification of any TEHKAN game circuitry may adversely affect the safety of your game, and may cause injury to you and your players.

★ This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J or Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

★ Players may receive an electrical shock if this game is not properly grounded! To avoid electrical shock, do not plug in the game until it has been inspected and properly grounded. This game should only be plugged into a grounded 3-wire outlet. If you have only a 2-wire outlet, we recommend you hire a licensed electrician to install a grounded outlet. Players may receive an electrical shock if the control panel is not properly grounded! After servicing any parts on the panel, check that the grounding clip is firmly secured to the metal tab on the inside of the control panel. Only then should you lock up the game.

★ Before connecting the game to the AC power source, verify that the proper voltage-selection plug is installed on the game's power supply.

★ To avoid electrical shock, disconnect the game from the AC power source before removing or repairing any part of the game. When removing or repairing the video display, extra precautions must be taken to avoid electrical shock because high voltages may exist within the display circuitry and cathode-ray tube, (CRT) even after power has been disconnected. Do not touch internal parts of the display with your hands or metal objects! Always discharge the high voltage from the CRT before servicing this area of the game. To discharge the CRT: attach one end of a large, well-insulated, 20-kV jumper to ground. Momentarily touch the free end of the grounded jumper to the anode by sliding it under the anode cap. Wait two minutes and discharge the anode again.

3. CAUTIONS

(1) **Care in Usage**

- Care should be taken to avoid dragging or dropping the machine when transporting to prevent damage to the CRT.
- Use fuse of indicated rating.
- As high voltage is present in the monitor and TV PCB, adjustments or repairs should be left up to a serviceman and should never be touched by the layman.

(2) **Care in Handling**

- Always turn off the power supply switch before handling.
- Avoid inserting and pulling the plug in rapid succession.
- Do not check the IC board circuit with a tester.
- Avoid rough handling in transportation; the picture tube is fragile.

(3) **Installation**

- As the video game is for "indoor use", do not install outdoors.
- When installing, avoid the following places.
  a) Near indoor pools or showers
  b) Where leaks exist
  c) Under direct sunlight
  d) Near heaters or other heat emitting devices
  e) Near hazardous items (volatile fluids, gas cylinders, etc.)
  f) Where vibrations are severe (near construction sites where jack hammers, etc. are used.)
  g) Inclined places
  h) Near fire extinguishing equipment
  i) Near emergency exits

- Caution:
  a) To prevent electric shock do not use this (polarized) plug with an extension cord, receptacle or other outlet unless the blades can be fully inserted to prevent blade exposure.

  In case the machine does not work properly after the power switch is turned on, make sure the proper voltage exists at the line cord.

(4) **Trouble Shooting**

When it is believed that trouble has developed, always confirm the following items.

- Is the fuse intact? (Always use fuse of the designated rating.) When the replaced fuse burns out again, this will indicate that another component is defective.
- Are there any poor connections (connectors) or open circuits? Special care must be taken to ensure connectors are firmly inserted. Troubles due to faulty contacts can be considered from various sources.
  Note: Always turn off the power when inserting or removing the connectors.
- There will be times when a normal picture will not appear when the power supply switch is turned on. As this may sometimes be corrected by a setting of the control circuit, turn power supply switch on and off several times.
- When testing meters, switches, etc. with a tester, always first pull the IC board connectors.

(5) **Caution**

"This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna
- Relocate the computer with respect to the receiver
- Move the computer away from the receiver
- Plug the computer into a different outlet so that computer and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful:

"How to Identify and Resolve Radio-TV Interference Problems". This booklet is available from the US Government Printing Office, Washington, D.C., 20402, Stock No. 004-000-00345-4.

4. HOW TO PLAY

- 1PLAYER — PLAYER VS.COMPUTER
- 2PLAYERS—PLAYER VS.OPPONENT
  WITH ADDITIONAL TIME
  AVAILABLE THRU BUY-IN SYSTEM.
  MORE COIN, MORE TIME.

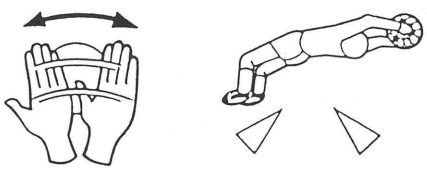
1stPLAYER (Red-team) 2ndPLAYER (Blue-team)



- Operate ◁ ▷ marked player with CONTROLBALL for offensive strategy.
- Defensive player closest to player with ball will be controlled by CONTROLBALL.



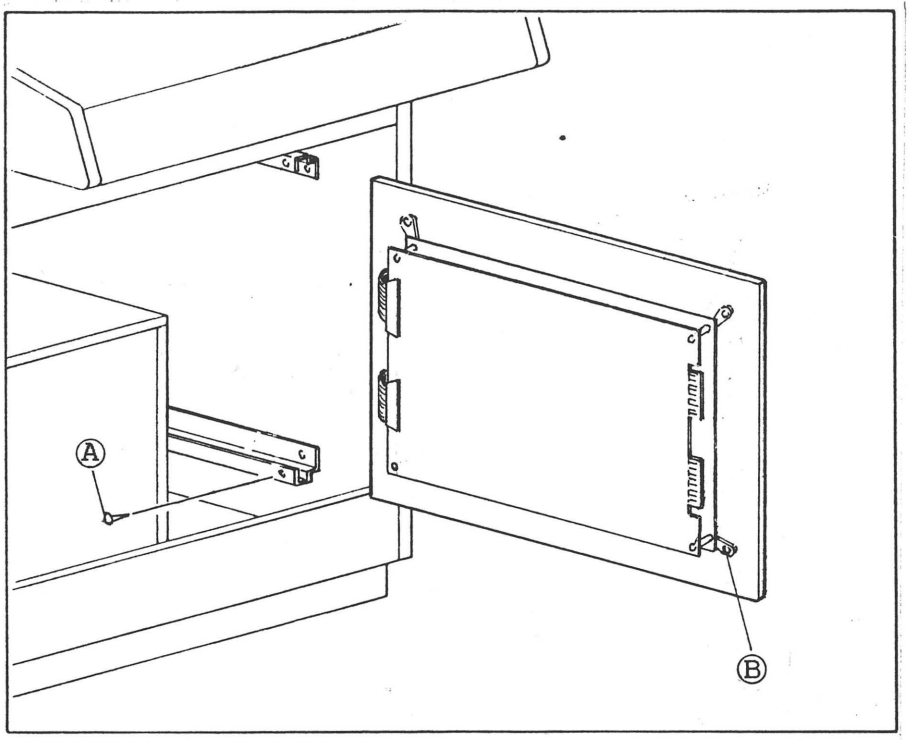
- Rotate CONTROLBALL in direction you want to pass or kick ball by pressing KICK BUTTON.
- Distance of ball travel will be controlled by the CONTROLBALL'S speed of rotation.



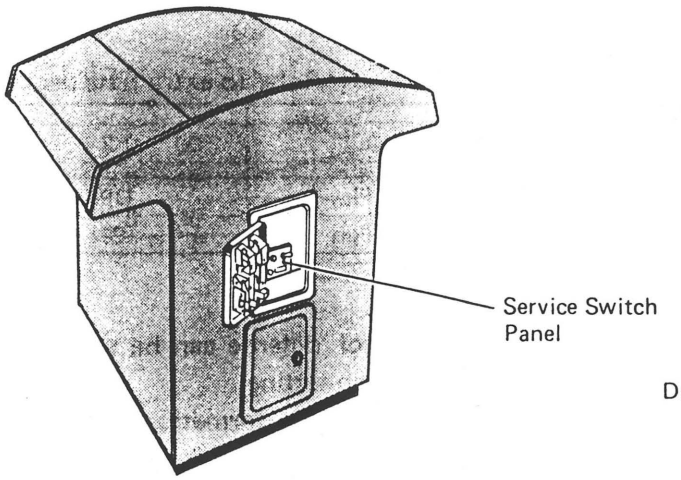
- Goalie is controlled by defensive player's CONTROLBALL,when goalie appears on screen.
- Protect your net,keep opponent from scoring.

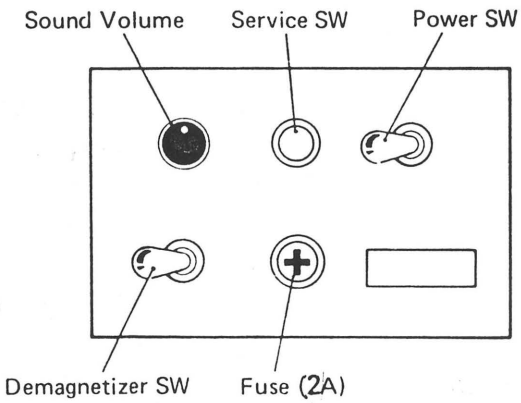
5. HOW TO REMOVE MAIN PCB

- By removing the screws Ⓐ (4 places) extract the main PCB baseplate.
- By removing the Ⓑ (4 place) extract the main PCB.



Switch Panel Description

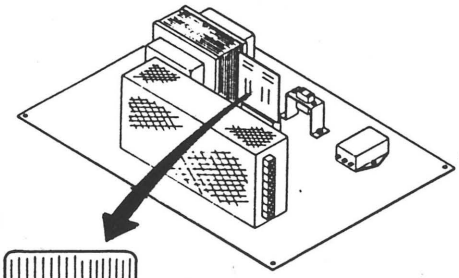




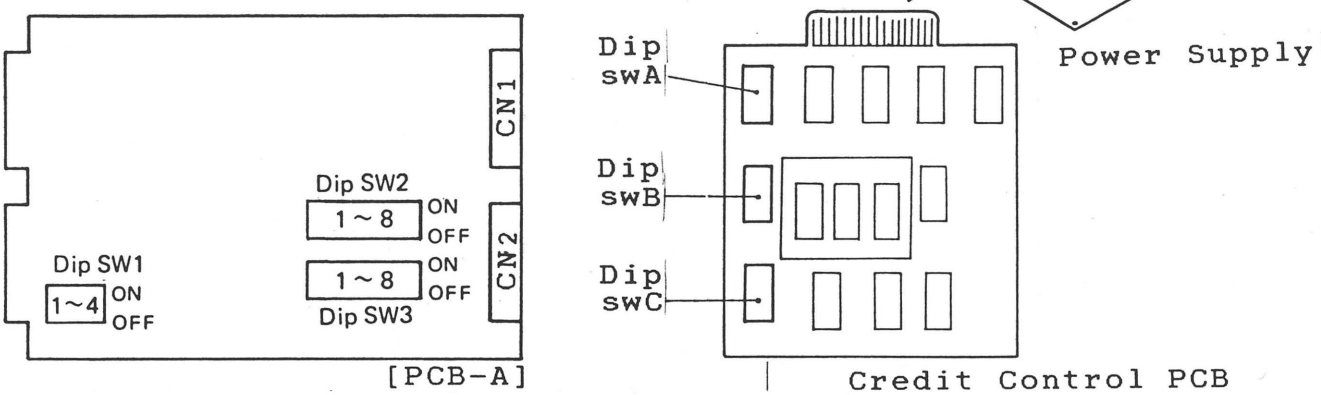
⚠ WARNING ⚠

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6. DIP SWITCH



●POSITION OF DIP SW



●SETTING FOR DIP SW

	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
DIP SW(1)	1P GAME DIFFICULTY		COUNT DOWN	DEMO SOUND	NOT USED			
DIP SW(2)	NOT USED ALL OFF						CREDIT/PLAY	
DIP SW(3)	1P GAME TIME		2P GAME TIME			EXTRA TIME		GAME TYPE

● When turning power on by pressing both 1P and 2P button, checks are conducted in the following sequence. Adjust them as desired.

```
                1   2   3   4   5   6   7   8
DIP SW1:OFF OFF OFF OFF
DIP SW2:OFF OFF OFF OFF OFF OFF OFF OFF
DIP SW3:OFF OFF OFF OFF OFF OFF OFF OFF
E ---- One player      1Credit
      Two Players     2Credits
D ---- Left Slot 1Coin 1Credit
      Right Slot 1Coin 1Credit
F ---- One Player Game Time  1:30
G ---- Two Player Game Time  3:30
H ---- Extra Time Per Coin  2:00
A ---- Difficulty:Moderate
C ---- Demo Sound:On
I ---- Game Type :Timer In
B ---- Timer Count:60/60
```

Cross-hatch is displayed for 4seconds when kick button is pressed. At the time,when pressing again, it continues to be displayed and a demonstration screen will follow by one more press of this button.

DIP SW 1

A.DIP SW1-1,2 DIFFICULTY FOR 1P GAME

Difficulty for 1P game can be set

Difficulty sw	sw1	sw2
2 Moderate	OFF	OFF
1 Easy	ON	OFF
3 Difficult	OFF	ON
4 More difficult	ON	ON

B.DIP SW1-3 COUNT DOWN

Speed of the count down for game time can be set at 1second or 0.9second per 1count.

Countdown	sw3
1Count 1Second	OFF
1Count 0.9Second	ON

C.DIP SW 1-4 DEMONSTRATION SOUND

	sw4
Sound	OFF
No Sound	ON

DIP SW A,B,C ON THE CREDIT CONTROL PCB

Sw no.1-6 of DIP SW 2 should be kept "OFF".
COIN/CREDIT setting of COIN SLOT left and right can be set by DIP SW A,B,C on the credit control PCB.

D. COIN SLOT LEFT(DIP SW A,B)

DIP SWITCH A

	sw1	sw2	sw3	sw4	sw5	sw6
1COIN	ON	OFF	OFF	OFF	OFF	OFF
2COINS	OFF	ON	OFF	OFF	OFF	OFF
3COINS	OFF	OFF	ON	OFF	OFF	OFF
4COINS	OFF	OFF	OFF	ON	OFF	OFF
5COINS	OFF	OFF	OFF	OFF	ON	OFF
6COINS	OFF	OFF	OFF	OFF	OFF	ON

DIP SWITCH B

	sw1	sw2	sw3	sw4	sw5	sw6
1CREDIT	ON	OFF	OFF	OFF	OFF	OFF
2CREDITS	OFF	ON	OFF	OFF	OFF	OFF
3CREDITS	OFF	OFF	ON	OFF	OFF	OFF
4CREDITS	OFF	OFF	OFF	ON	OFF	OFF
5CREDITS	OFF	OFF	OFF	OFF	ON	OFF
6CREDITS	OFF	OFF	OFF	OFF	OFF	ON

D. COIN SLOT RIGHT(DIP SW C)

DIP SWITCH C

	sw1	sw2	sw3	sw4	sw5	sw6
1COIN/1CREDIT	ON	OFF	OFF	OFF	OFF	OFF
1COIN/2CREDITS	OFF	ON	OFF	OFF	OFF	OFF
1COIN/3CREDITS	OFF	OFF	ON	OFF	OFF	OFF
1COIN/4CREDITS	OFF	OFF	OFF	ON	OFF	OFF
1COIN/5CREDITS	OFF	OFF	OFF	OFF	ON	OFF
1COIN/6CREDITS	OFF	OFF	OFF	OFF	OFF	ON

DIP SW 2

E.DIP SW2-7,8 CREDIT/PLAY

1PLAYER	GAME	2PLAYERS	GAME	sw7	sw8
1Credit	1Play	2Credits	1Play	OFF	OFF
1Credit	1Play	1Credit	1Play	ON	OFF
2Credits	1Play	2Credits	1Play	OFF	ON
2Credits	1Play	3Credits	1Play	ON	ON

DIP SW 3

F.DIP SW3-1,2 1P GAME TIME

	sw1	sw2
1:30	OFF	OFF
1:00	ON	OFF
2:00	OFF	ON
2:30	ON	ON

Time for one 1P game can be set.

G.2P DIP SW3-3,4,5 2P GAME TIME

	sw3	sw4	sw5
3:30	OFF	OFF	OFF
1:00	ON	OFF	OFF
1:30	OFF	ON	OFF
2:00	ON	ON	OFF
2:30	OFF	OFF	ON
3:00	ON	OFF	ON
4:00	OFF	ON	ON
5:00	ON	ON	ON

Time for one 2P game can be set.

H.DIP SW3-6,7 EXTRA TIME(2P)

	sw6	sw7
0:30	OFF	OFF
0:00	ON	OFF
0:10	OFF	ON
1:00	ON	ON

Time is increased for 2P game when additional coin is inserted. Also extra time can be set in addition to the normal time. Additional time on the screen is calculated with following formula.

```
Additional time={(2P game time)+(2P extra time)}÷
                    (Fixed credit number for credit/play)
```

In case SW7 and 8 for DIP SW2 are off and SW3,4,5,6,and 7 for DIP SW3 are off, {(3:30)+(0:30)}÷2=2:00

I.DIP SW3-8 GAME TYPE FOR 2P

	sw8
Timer in	OFF
Credit in	ON

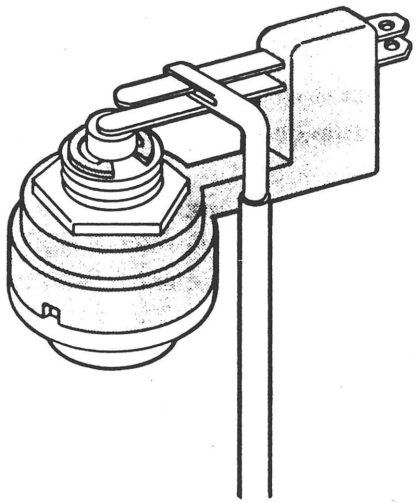
It can be set that how to add EXTRA as time or as credits when additional coins are inserted.

In case CREDIT IN, time is increased every time 2P button pressed.
(Refer to EXTRA TIME regarding to additonal time.)

7. MAINTENANCE

(1) Push Button Blade Switch

- Adjust the blade switch contacts for correct gaps.
- When the blade is bent, straighten it by using the blade adjusting rod.



Blade Adjuster

⚠ WARNING ⚠

To prevent an electrical shock hazard, unplug the game prior to performing any maintenance.

- Take out carbon deposits on the blade switch by using a clean cloth, etc.

(2) Inspecting the Controlball

- Check the controlball to see if its roller shafts have worn.
  In case there is too large a clearance between the C.B spacer and the ball due to the excessive wear of the roller shaft, replace either the roller shaft A or the roller shaft B.
- Lubricate the control ball's ball bearings every month or 2,000 credits.
  After wiping out dust, etc. cleanly, place 2 or 3 drops of light duty oil on each of 6 ball bearings.

8. TROUBLE SHOOTING

(1) **When the power switch has been turned ON after inserting the power plug into the outlet, no action ensues**

- Check if the power source voltage is 220 V.
- Check if the plug has been normally inserted.
- Check if fuses have blown.

(2) **When the power switch is in the ON state**

- The controlball lamp and the coin slot lamp do not come on.
  a) Check if the filament is off.
  b) Check if voltage in the secondary side of the insulator-type transformer is normal at 12V AC.
  c) Check each connector if its contact is normal.

- No image appears on the CRT
  a) Check if the CRT heater is glowing.
  b) Check if power is supplied from the secondary side of the insulator-type transformer.
  c) Check if the CRT itself is malfunctioning.
  d) Check if the main PCB's 5V power source pilot lamp is lit, and 5V is being supplied from the DC power source.

- Images appear on the CRT, but the action seems to be incorrect.
  a) Check if the main PCB is supplied 4.5 ~ 5.5V of DC voltage.
  b) Check if there is improper contact between 3 CPUs (Z80A) on the main PCB 5902-XA and the IC 40-pin socket.
  c) Check if there is improper contact for the J5 connector.

- The cross-hatch on the video display is not normal.
  a) Adjust the knob for voltage supplied to the CRT, and the CRT's horizontal and vertical sync. knobs.

- The game is not credited even when a coin is inserted.
  a) Check if the coin is stopped up.
  b) Check if the coin mechanism or the coin micro-switch is malfunctioning.
  c) Check if the coin credit PCB is malfunctioning, or there is improper contact for each connector.

- The coin counter does not work.
  a) Check if the coin credit PCB is malfunctioning, or there is improper contact for each connector.
  b) Check if the coin counter itself is malfunctioning.

- 'Player Select' cannot be performed.
  a) Check if there is improper contact for the push button blade switch.
  b) Check if there is improper contact for the J3, J2 connectors.

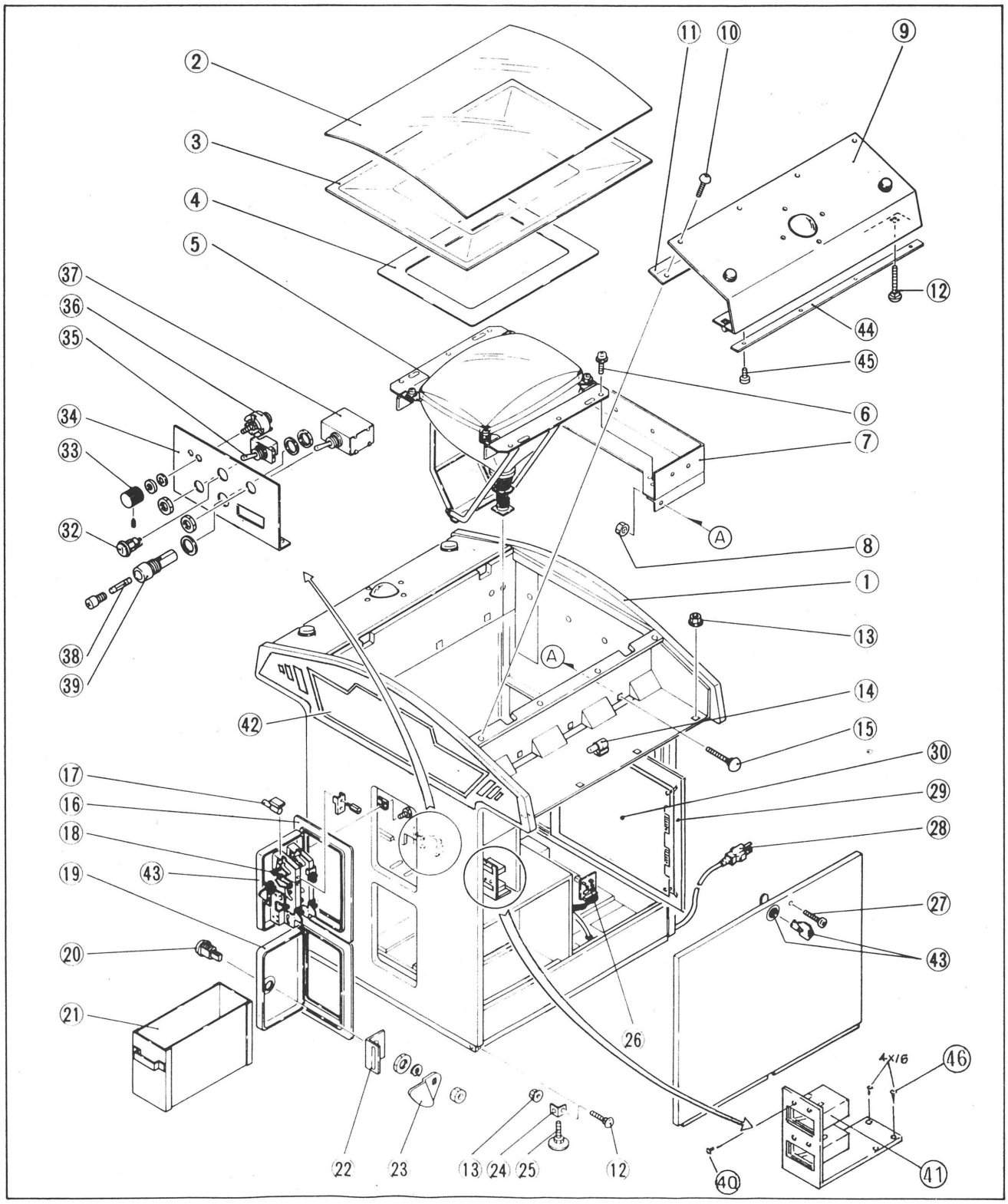
- The controlball itself does not rotate smoothly.
  a) Check if there is something wrong with the ball bearings (see page 10, 'Maintenance').
  b) The controlball ceases to rotate smoothly when there occurs contact between the ball and C.B spacer, due to the loosening of 4 carriage bolts and nuts which fix the ball on the control panel.

- The control ball does not work.
  a) Adjust the interval between 2 photointerrupters of the photo PCB.
  b) Check if the disc plate is bent, or there is improper contact for each connector.

- Cannot perform 'Kick'.
  a) Check if there is improper contact for the push button blade switch, or each connector.

9. ILLUSTRATED PARTS LIST

A. Cabinet



• Cabinet Parts List

Index No.	Part No.	Description	Q'ty
1	CA-01-001	Cabinet	1
2	PG-01-001	Cured Glass	1
3	RF-01-001	Smoke Shield	1
	PP-01-001	Instruction Seal	1 set
	PP-01-002	Graphic Seal	2
4	AP-02-001	CRT Masking Paper	1
5	E-02-001	CRT	1
6	MS-02-620	Machine Screw	4
7	BM-01-001	CRT Bracket	2
8	FN-02-006	Flange Nut	16
9	AM-01-001	Control Panel Ass'y (1 player)	1
	AM-01-002	" (2 player)	1
10	BB-02-630	Button Bolt	8
11	BM-01-002	Glass Plate	2
12	CB-02-630	Carriage Bolt	8
13	FN-02-006	Flange Nut	8
14	E-02-002	Lamp	2
	E-02-003	Lamp Socket	2
15	CB-02-630	Carriage Bolt	16
16	AM-02-001	Coin Door Ass'y	1
17	E-02-004	Lamp	2
	E-02-005	Lamp Socket	2
18	AM-02-002	Coin Mechanism	2
19	AM-02-003	Cash Door	1

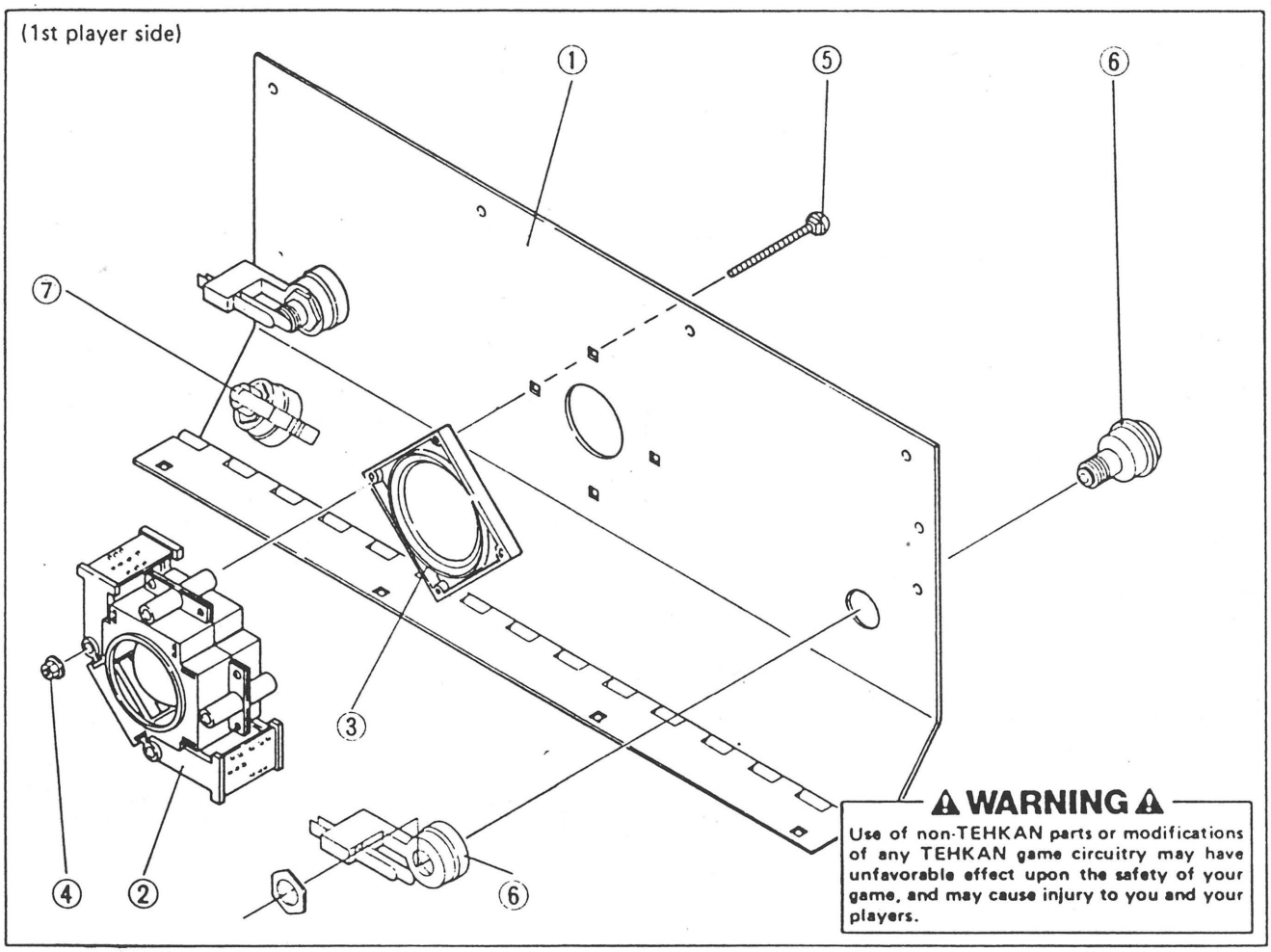
Index No.	Part No.	Description	Q'ty
20	AM-02-004	Lock Ass'y	1 set
21	AM-01-003	Cash Box	1
22	AM-01-004	Lock Cam Bracket	2
23	AM-01-005	Lock Cam	2
24	BM-01-003	Adjuster Bracket	4
25	BM-01-004	Adjuster	4
26	E-02-006	Power Supply Ass'y	1
27	MS-02-420	Machine Screw	1
28	E-02-007	Power Cord	1
29	BW-01-001	Main PCB Baseplate	1
30	E-01-002	Main PCB	1
31	E-02-008	Speaker	2
32	E-02-009	Service Switch	1
33	E-02-011	Volume Control Knob	1
34	BM-01-011	Switch Bracket	1
35	E-02-012	Demagnetizer Switch	1
36	E-02-011	Volume Control	1
37	E-02-013	Power Switch	1
38	E-02-014	Fuse (2A)	1
39	E-02-015	Fuse Post	1
40	MS-02-312	Machine Screw	4
41	E-02-016	Coin Counter	2
42	PP-01-003	Side Graphic (Both side)	1 set
43	AM-02-006	Lock Ass'y	1 set
44	BM-01-012	Overlay Stopper	2
45	MS-02-410	Machine Screw	8
46	WS-02-416	Wood Screw	3

⚠ WARNING ⚠

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To prevent an electrical shock hazard, be sure to turn the game off before removing or replacing components.

B. Control Panel Ass'y & Parts List

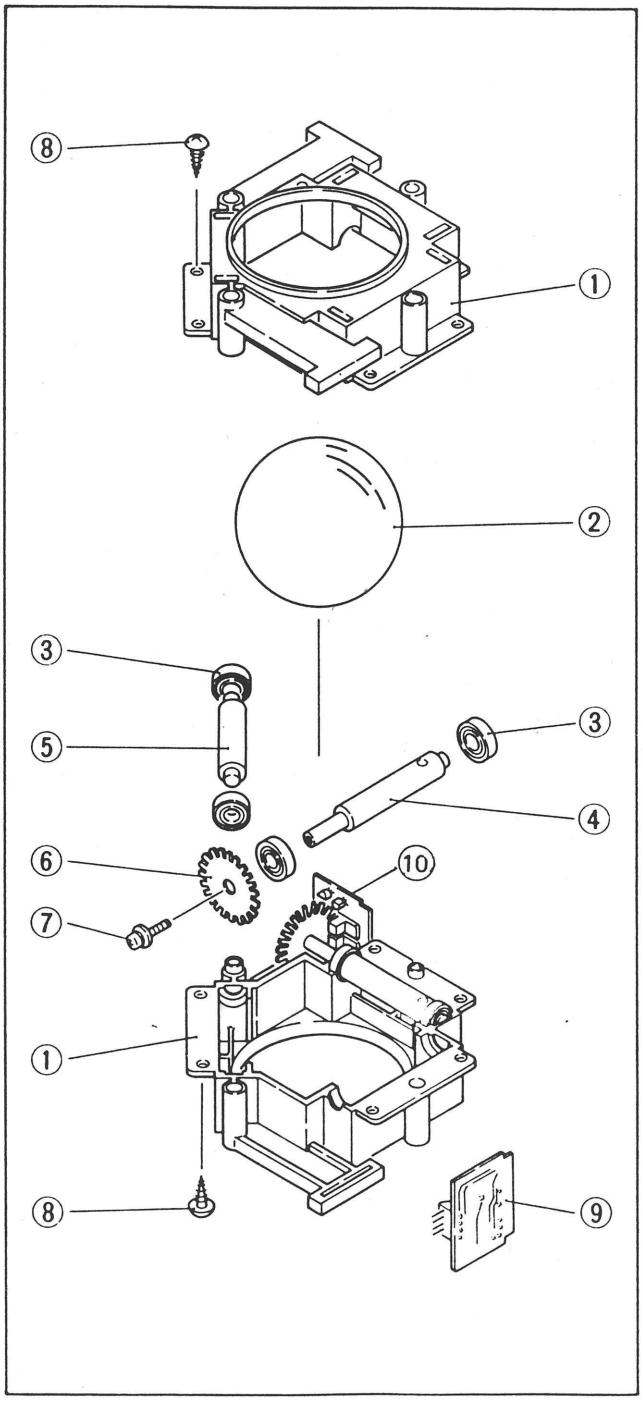


Control Panel Ass'y

Index No.	Part No.	Description	Q'ty
1	BM-01-005	Control Panel (1st player)	1
	BM-01-006	" (2nd player)	1
	PR-01-001	Control Panel Overlay	1 set
2	AR-01-001	Control Ball Ass'y (Red)	1
	AR-01-002	" (Blue)	1
3	RF-01-002	C.B. Spacer	2
4	FN-02-006	Flange Nut	8
5	CB-02-675	Carriage Bolt	8

Index No.	Part No.	Description	Q'ty
6	RF-02-001	Push Button	4
7	RF-02-002	Push Button	2

C. Control Ball Ass'y & Parts List



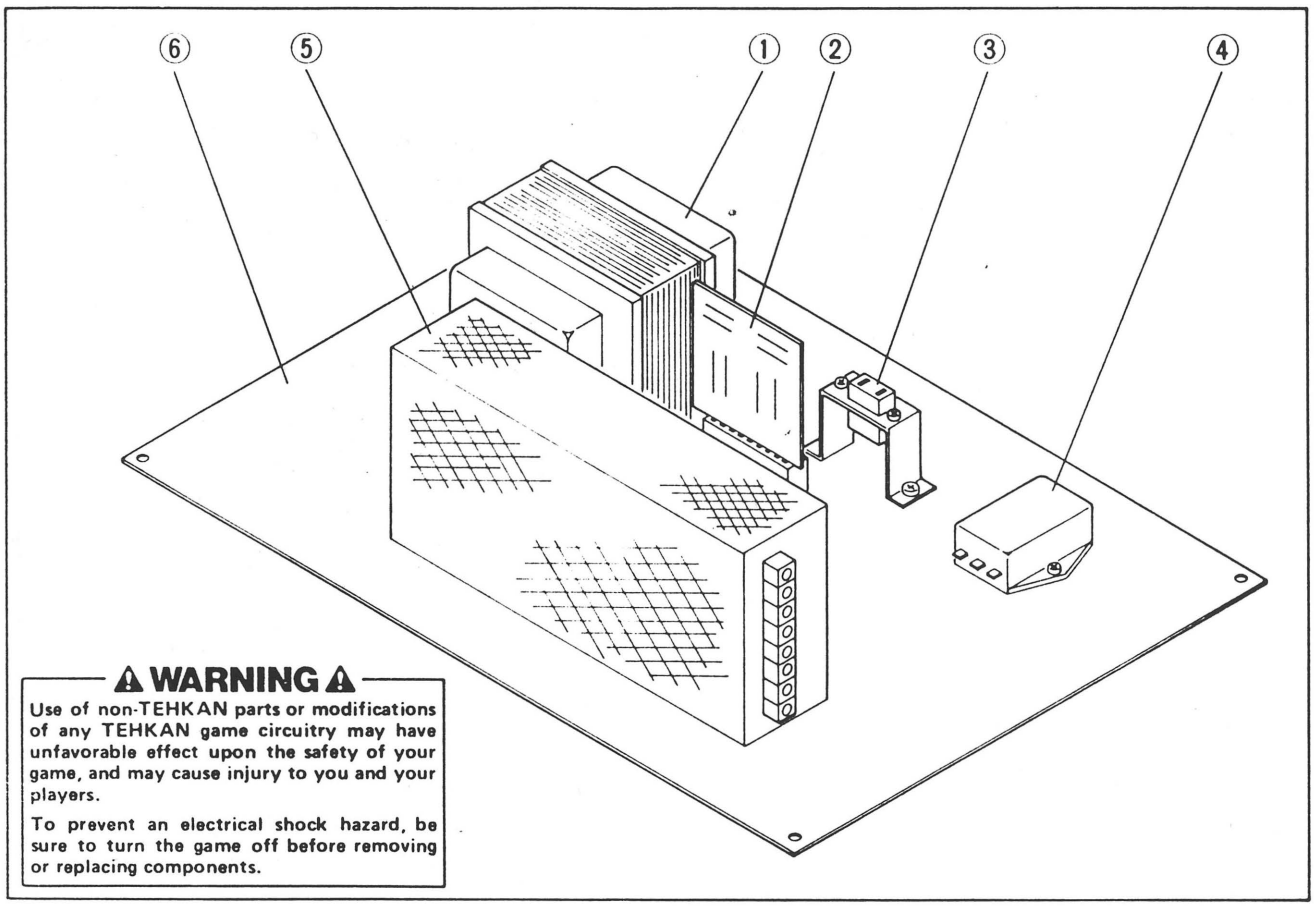
Control Ball Ass'y

Index No.	Part No.	Description	Q'ty
1	RF-01-003	Housing	4
2	RF-02-003	Ball (Red)	1
	RF-02-004	" (Blue)	1
3	AM-02-005	Ball Bearing	12
4	AM-01-007	Roller Shaft A	4
5	AM-01-008	Roller Shaft B	2
6	BM-01-007	Disc Plate	4
7	MS-02-408	Machine Screw	4
8	MS-02-512	Machine Screw	12
9	E-01-004	Photo PCB H 5 P	2
10	E-01-006	Photo PCB H 4 P	2

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D. Power Supply & Parts List



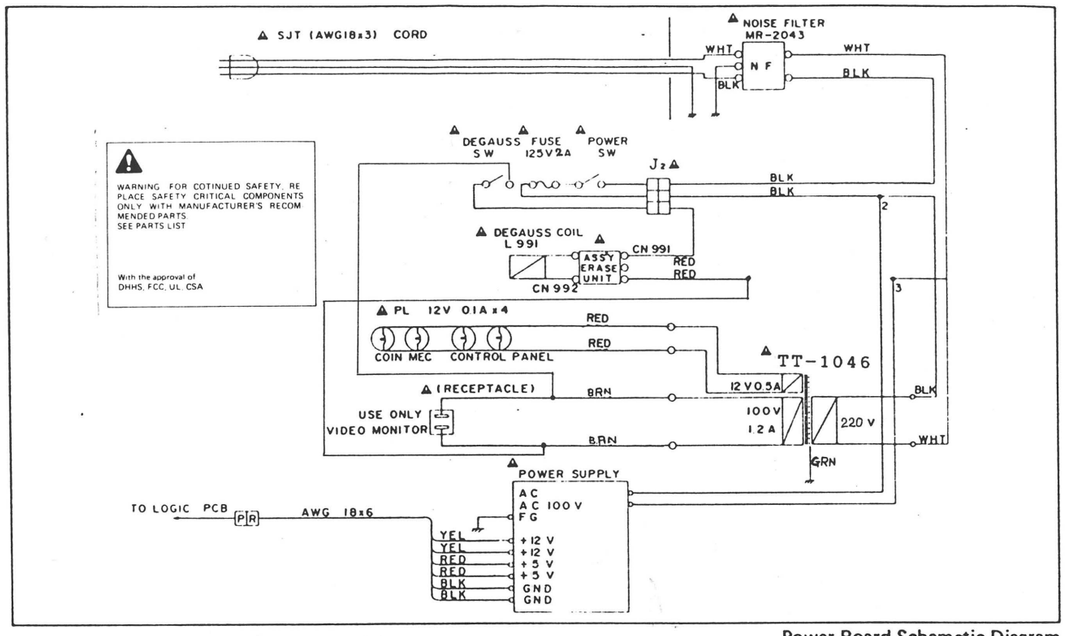
Power Supply

Index No.	Part No.	Description	Q'ty
1	E-02-017	Transformer	1
2	E-01-007	Credit PCB	1
	E-02-018	Credit PCB Connector	1
	BM-01-008	Credit PCB Bracket	2
3	E-02-019	CRT Connector	1
	BM-01-009	CRT Connector Bracket	1

Index No.	Part No.	Description	Q'ty
4	E-02-020	Noise Filter	1
5	E-02-021	D.C. Power Supply	1
6	BM-01-010	Power Supply Plate	1

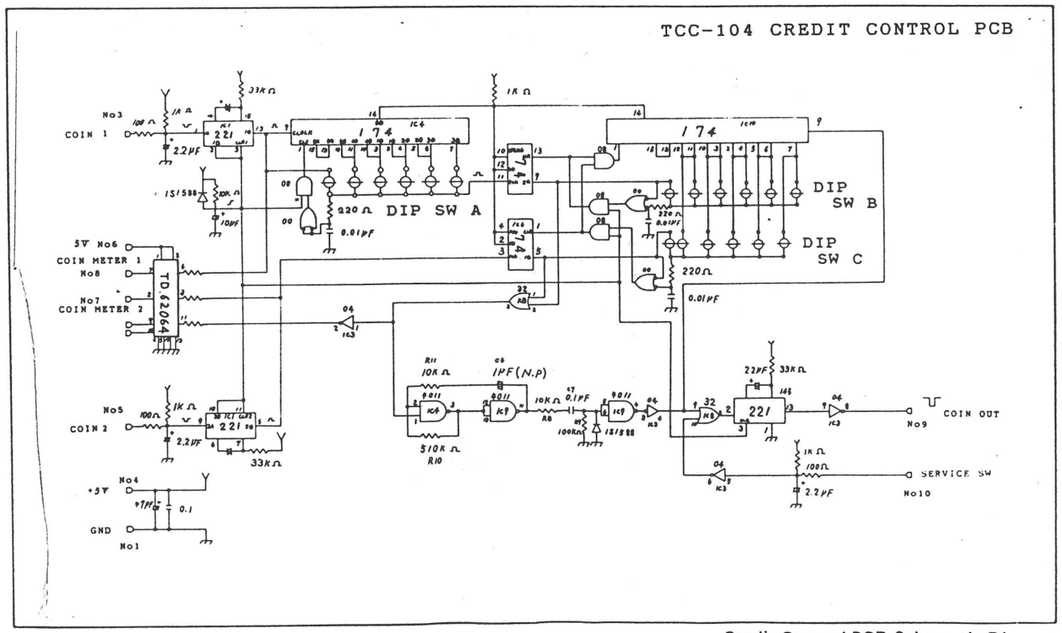
10. SCHEMATIC DIAGRAM

A. Power Board Schematic Diagram



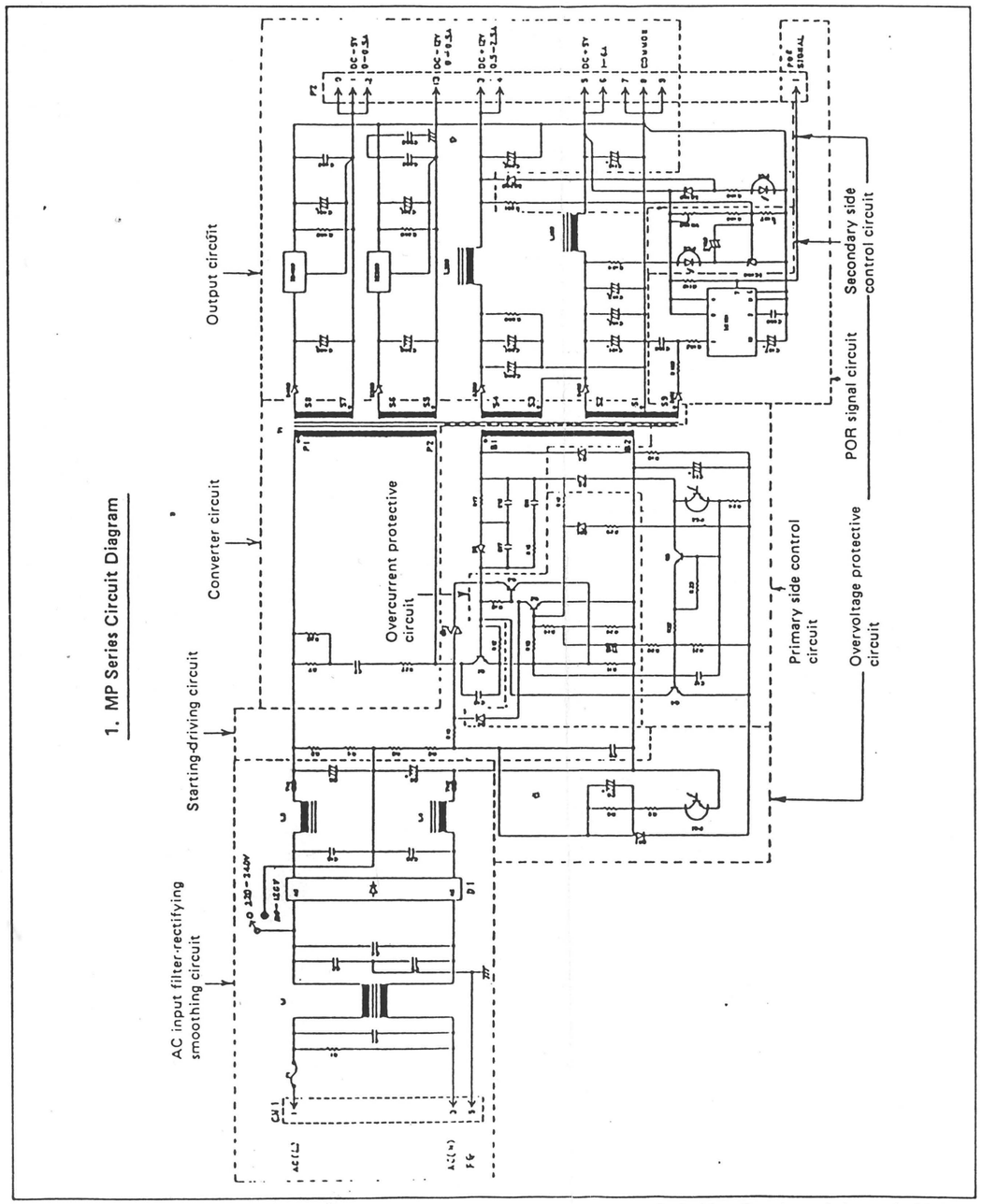
Power Board Schematic Diagram

B. Credit Control PCB Schematic Diagram



Credit Control PCB Schematic Diagram

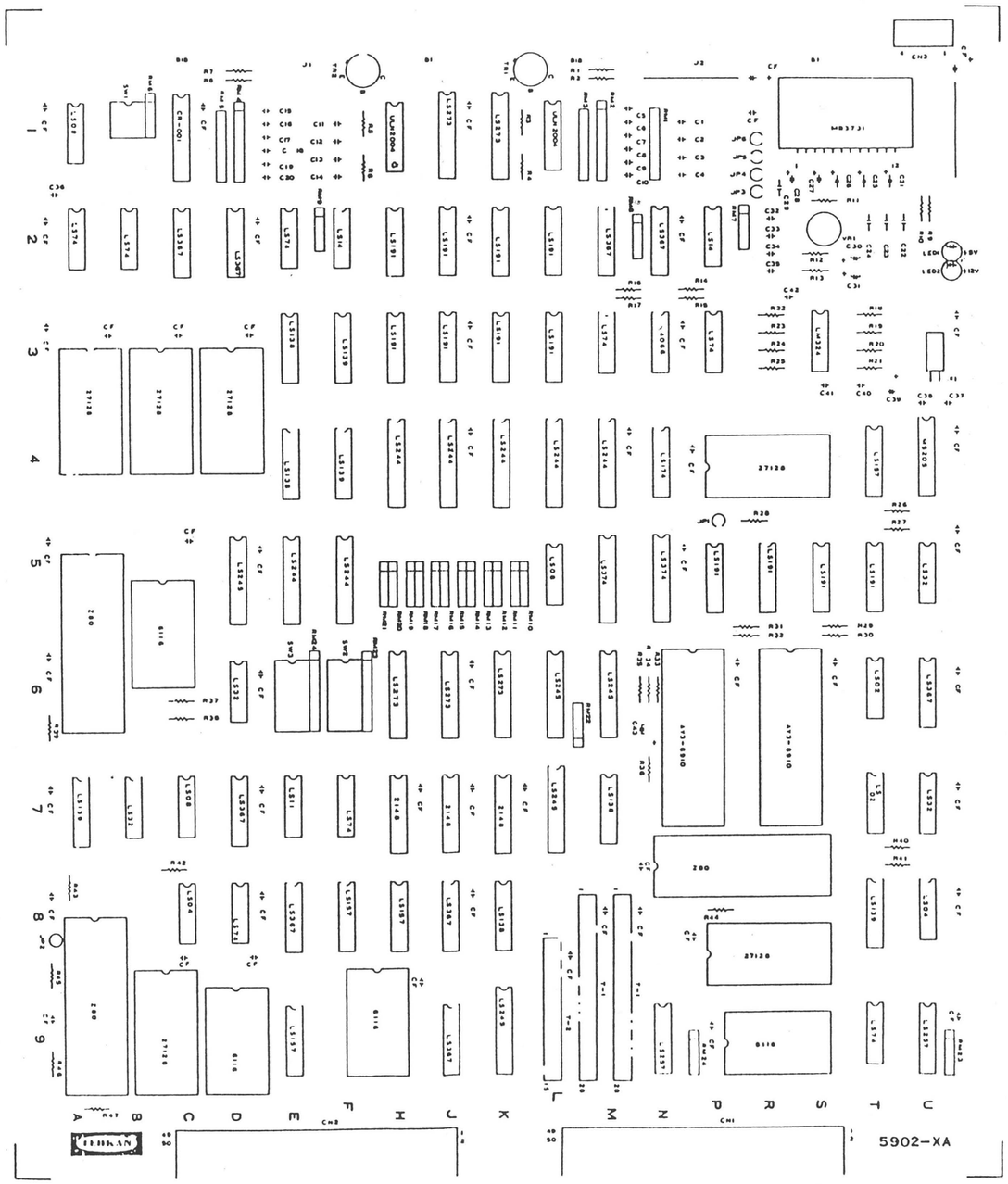
C. Switching Regulator Schematic Diagram



Switching Regulator Schematic Diagram

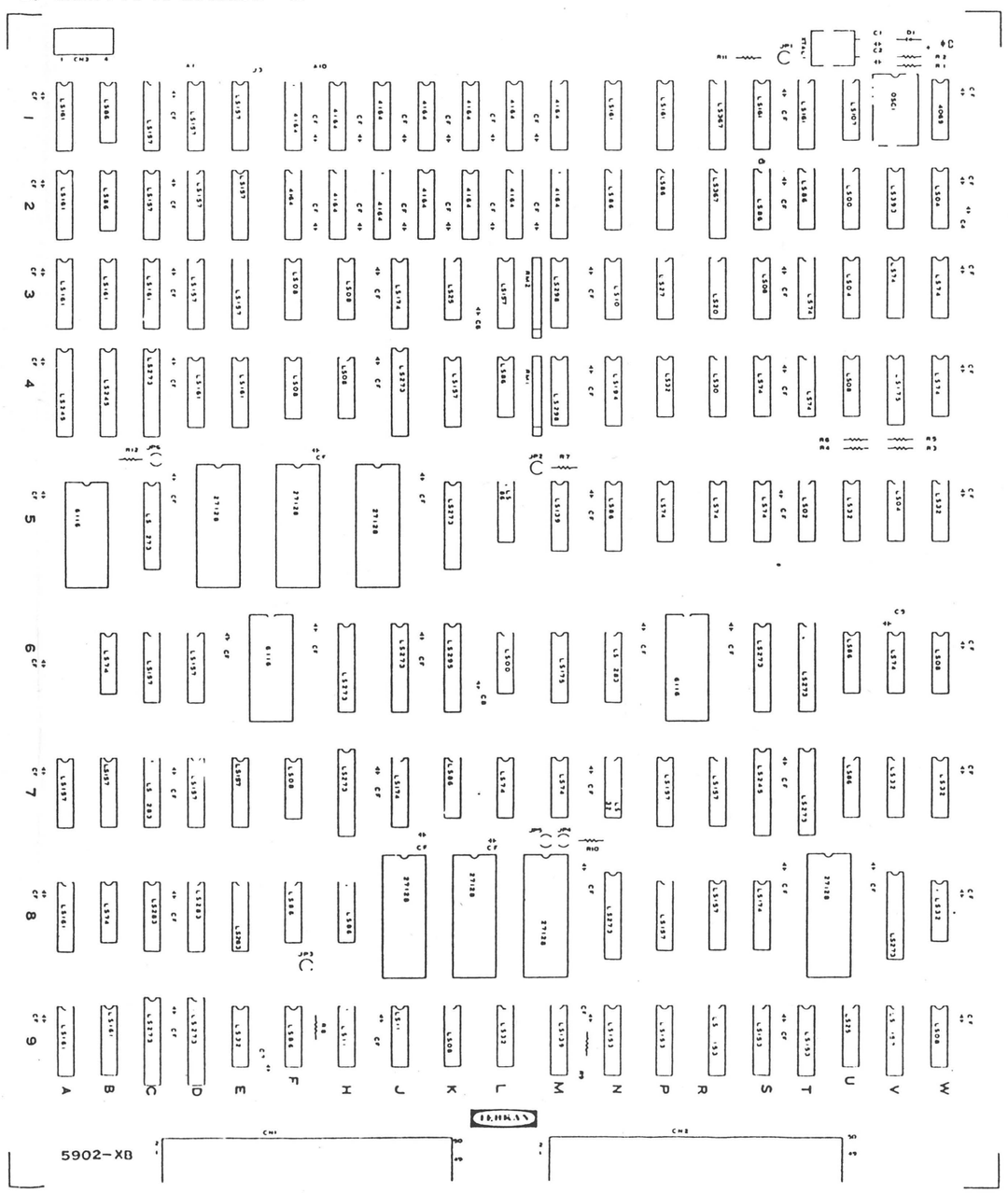
11. MAIN PCB IC LOCATION

A. Main PCB IC Location – 1



Main PCB IC Location – 1

B. Main PCB IC Location – 2



Main PCB IC Location – 2

12. MAIN PCB PARTS LIST

A. Main PCB Parts List – 1

IC

Item No.	Quantity	Description	Location No. 5902-XA	Location No. 5902-XB	Parts No.
7425	2	TTL		3K, 9U	ET0025
74LS00	2	"	2U	6L	ET1000
74LS02	3	"	6T, 7T	5U	ET1002
74LS04	5	"	8C, 8U	2W, 3U, 5V	ET1004
74LS08	13	"	7C, 5L, 1A	3S, 3H, 3F, 4H, 4F, 4U, 6W, 7F, 9K, 9W	ET1008
74LS10	1	"		3N	ET1010
74LS11	3	"	7E	9J, 9H	ET1011
74LS14	2	"	2P, 2F		ET1014
74LS20	1	"		3R	ET1020
74LS27	1	"		3P	ET1027
74LS30	1	"		4R	ET1030
74LS32	13	"	5U, 6D, 7B	5U, 4P, 5W, 7V, 7W, 8W, 9E, 9L, 7U	ET1032
74LS74	22	"	2A, 2B, 2E, 3M, 3P, 7F, 8D, 9T	3T, 3V, 3W, 4S, 4T, 4W, 5P, 5R, 5S, 6B, 6V, 7L, 7M, 8B	ET1074
74LS86	15	"		1B, 2B, 2μ, 2P, 2S, 4L, 5L, 5N, 5U, 6K, 6U, 8F, 8H, 9F, 2S	ET1086
74LS107	1	"		1U	ET1107
74LS138	4	"	3E, 4E, 7M, 8K		ET1138
74LS139	6	"	3F, 4K, 7A, 8T	5M, 9M	ET1139
74LS153	5	"		9N, 9P, 9R, 9S, 9T	ET1153
74LS157	25	"	4T, 8F, 8H, 9E	1C, 1D, 1E, 2C, 2D, 2E, 3D, 3E, 3L, 4K, 6C, 6D, 7D, 7E, 7P, 7R&P, 8R, 9V, 7A, 7B	ET1157
74LS161	14	"		1A, 1S, 1T, 2A, 3A, 3B, 3C, 4D, 4E, 8A, 9A, 9B, 1M, 1N	ET1161
74LS174	4	TTL	4N	3J, 7J, 8S	ET1174
74LS175	2	"		6M, 4V	ET1175
74LS191	12	"	2H, 2J, 2K, 2C, 3H, 3J, 3K, 3L, 3P, 3R, 3S, 3T		ET1191
74LS194	1	"	4N		ET1194
74LS244	7	"	4H, 4J, 4K, 4L, 4M, 4E, 4F		ET1244
74LS245	9	"	5D, 6L, 6M, 7L, 9K	4A, 4B, 6K, 7S	ET1245
74LS257	2	"	9N, 9U		ET1257
74LS273	19	"	1J, 1K, 6H, 6J, 6K	4J, 4C, 5C, 5K, 6H, 6J, 6S, 6T, 7H, 7T, 8N, 8V, 9C, 9D	ET1273
74LS283	5	"		6N, 7C, 8C, 8D, 8E	ET1283
74LS298	2	"		3M, 4M	ET1298
74LS367	11	"	2C, 2D, 2M, 2N, 7D, 8E, 8J, 9J, 6U	1R, 2R	ET1367
74LS374	2	"	5M, 5N		ET1374
74LS393	1	"		2V	ET1393
27128	12	EPROM 16KByte	3A, 3B, 3D, 4PR, 8PR, 9BC	5DE, 5F, 5J, 8J, 8KL, 8M	EM0128
6116	6	RAM 2KByte	6BC, 9D, 9FH, 9PRS	6F, 6P	EM1016
6116 (120Ns)	1	RAM 2KByte		5A	EM1116
2148	3	RAM 4KBit	7H, 7J, 7K		EM1101
4164	14	DRAM 64KBit		1F~1M, 2F~2M	EM1064
Z80A	3	8 Bit CPU	56AB, 8N, 89AB		EP0080
4066	1	CMOSIC Analog SW.	3N		ECS4066
4069	1	CMOSIC Inverter		1W	ECS4069
ULN2004	2	Transistor Array	1L, 1H		ET2004
LM324	1	OP. AMP	3S		ELC0324
MB3731	1	Power Amplifier	1T		ELC3731
YM2149	2	PSG	6N, 6R		ESS2149
MSM5205	1	Voice Synthesizer	1U		ESS5205
CR-001	1	Custom IC	1C		CR-001
T-1	2	Hybrid IC	1M, 1M		T-1
T-2	1	Hybrid IC	1L		T-2

Resistor

Rating	Quantity	Description	Location No. 5902-XA	Location No. 5902-XB	Parts No.
1kΩ VR	1		VR1		EVR0001
1/4W 47Ω	2	Carbon		R4, R6	ER14470
" 100Ω	3		R1, R7, R8		ER14101
" 330Ω	3		R38, R43, R44		ER14331
" 470Ω	4		R29	R3, R5	ER14471
" 1kΩ	21		R4, R6, R10, R28, R30, R31, R32, R33, R34, R35, R39, R40, R41, R45, R46, R47, R37	R8, R10, R11, R12	ER14102
" 2kΩ	3		R3, R5, R18		ER14202
" 4.7kΩ	3		R23, R24, R36		ER14472
" 9.1kΩ	1		R20		ER14912
" 10kΩ	9		R12, R13, R15, R21, R22, R25, R27, R42	R2	ER14103
" 22kΩ	1		R14		ER14223
" 47kΩ	1		R16		ER14473
" 100kΩ	2		R11, R17		ER14104
" 680kΩ	1		R19		ER14684
" 1MΩ	1			R1	ER14105
Resistor Array					
510Ω x 4	6	5 Pin	RM10, RM12, RM14, RM16, RM18, RM20		ERA5511
1kΩ x 4	7	5 Pin	RM6, RM7, RM8, RM9, RM25, RM26, RM22		ERA5102
2.2kΩ x 4	6	5 Pin	RM11, RM13, RM15, RM17, RM19, RM21		ERA5222
1kΩ x 8	4	9 Pin	RM2, RM4, RM23, RM24		ERA9102
4.7kΩ x 8	2	9 Pin		RM1, RM2	ERA9472
100Ω x 4	3	8 Pin	RM1, R3, RM5		ERA8101

B. Main PCB Parts List – 2

Transistor & Diode

Item No.	Quantity	Description	Location No. 5902-XA	Location No. 5902-XB	Parts No.
2SC2320	2	Transistor	1H, 1L		ETR2320
LED	2	LED	2U, 2U		ELD0003
1S1588	1	D100E		1V	ED1588

Capacitor

Rating	Quantity	Description	Location No. 5902-XA	Location No. 5902-XB	Parts No.
16V/1,000μF	4	Chemical	DE Coupling	DE Coupling	EC16102
16V/100μF	3	"	C21, C25, C26		EC16101
16V/10μF	7	"	C27, C28, C30, C31, C39, C43	C3	EC16100
42V/50pF	1	Ceramic		C37	EC12500
12V/100pF	12	"	C11~C14, C32~C35, C38	C1, C2, 5P	EC12101
12V/0.01μF	3	"	C36, C41, C29		EC12103
12V/0.022μF	1	"	C40		EC12223
12V/0.1μF	126	"	C1~C9, C15~C20, DE Coupling		EC12104
0.15μF	3	Film	C23, C24, C25		EC50154

MISC

Name	Quantity	Description	Location No. 5902-XA	Location No. 5902-XB	Parts No.
Dip SW 8P	2	8 SWS	SW2, SW3		ESW008
Dip SW 4P	1	4 SWS	SW1		ESW004
Xtal 18.432MHz	1	OSC Device			EOS186
OSC 3.0MHz	1	Ceramic OSC			EOS036
IC Socket					
18P	4	18 Pin	7H, 7J, 7K, 4U		ESK18
24P	2	24 Pin	9FH	5AB	ESK24
28P	12	28 Pin	3A, 3BC, 3O, 4P, 8P, 9BC	5DE, 5F, 5H, 8KL, 8M, 8TU	ESK28
40P	3	40 Pin	56A, 8N, 89A		ESK40
Heat Sink		For MB3731			EH5902
Flat Cable	2	50 Pin			EFC5902
Header	2	50 Pin			EHR5902

Other Parts

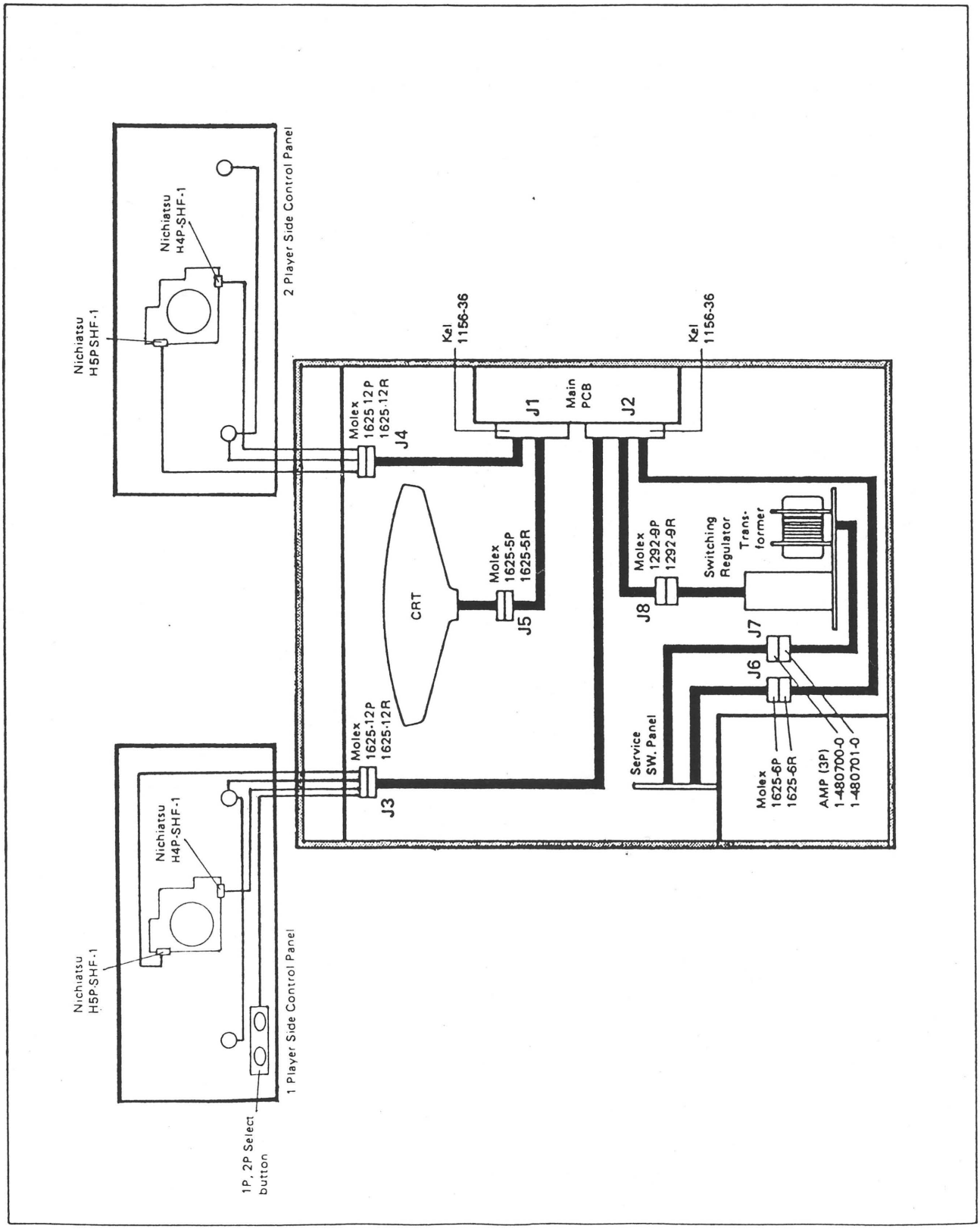
Name	Quantity	Description	Parts No.
EMI Shield PCB	1	Assembly	MOTHE02
Components			
EMI Filter	MAX 45	DSS310-55B222M	EMS222
"	MAX 8	DSS310-55B101M	EMS101
36 Pin Connector	2	KEL1150-36-029	EMC036
20 Pin Connector	1	KEL1150-20-029	EMC020
Photo PCB	4	Assembly	PH5902
7 Segment LED	4	Assembly	P7L5902
PCB			
Connectors			
For Harness	2	Molex 1625-24R	HCM024
	1	Molex 1292-9P	HCM009
	1	Molex 1625-6R	HCM006
	1	Molex 1625-5R	HCM005
	4	S2P-SHF-1	HCJ002
	8	S4P-SHF-1	HCJ004
	4	S12P-SHF-1	HCJ012
	2	S15P-SHF-1	HCJ015
	2	KEL1150-036-009 (EDGE Connector)	HCK036
Lamp PCB	2		PLA5902
Lamp	2	12V AC	LA12AC

50 Pin Flat Cable Signal Name

GND	1	2	GND
"	3	4	"
"	5	6	"
+5V	7	8	+5V
"	9	10	"
"	11	12	"
"	13	14	"
TSEL	15	16	PCBSEL
4MCK	17	18	SSW
MSW	19	20	SBSEL*
MNSEL	21	22	SBSEL
EGCONT	23	24	CSEL
SSE8	25	26	SSE0
SSD8	27	28	SSD0
257EG	29	30	HFL
VFL	31	32	MSE0
SWR	33	34	CSE8
CSE0	35	36	CSD0
CSD8	37	38	CSC8
MSE8	39	40	MSD8
MSD0	41	42	MSC8
SDO0	43	44	SDO1
" 2	45	46	" 3
" 4	47	48	" 5
" 6	49	50	" 7

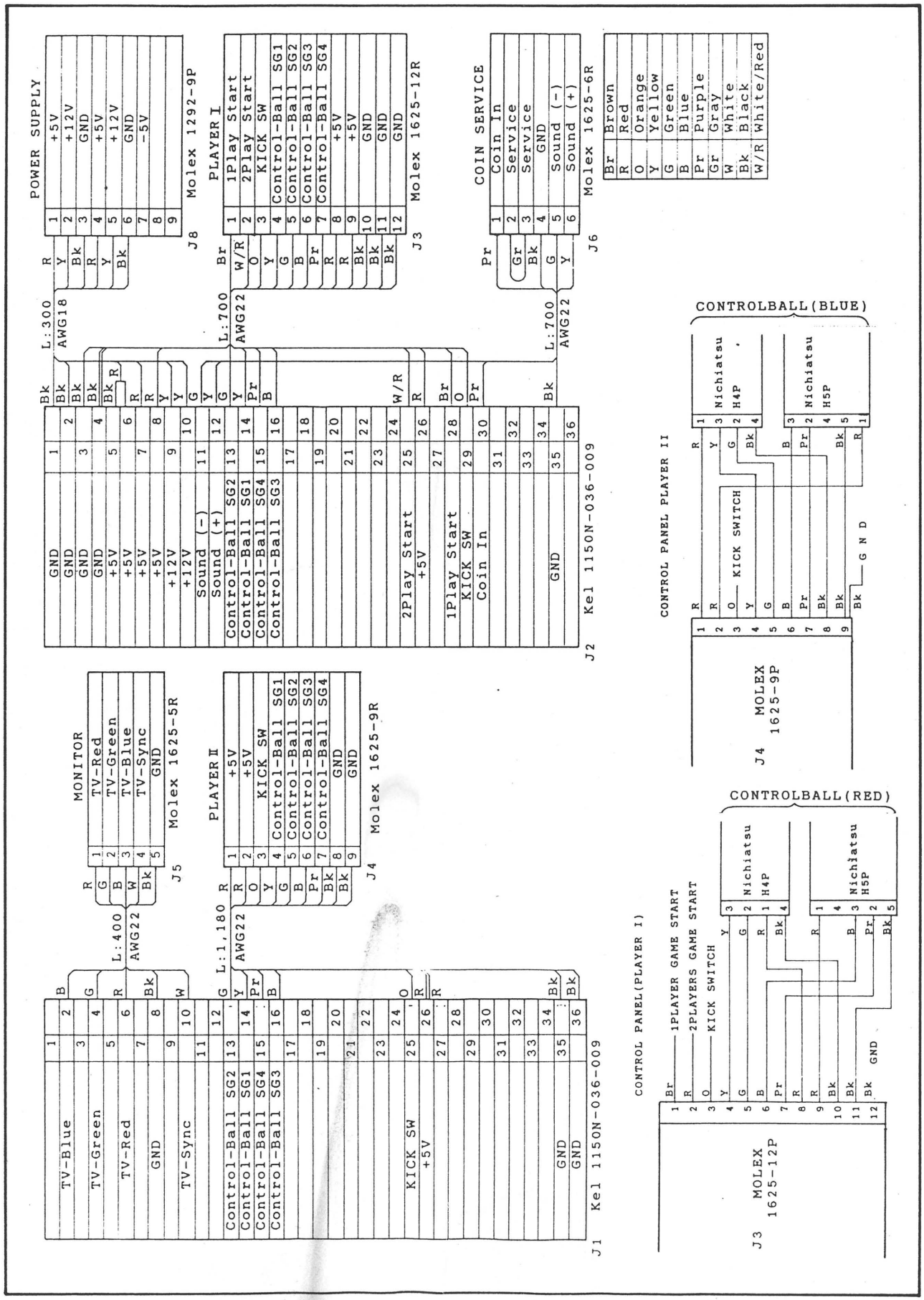
SAB0	1	2	SAB1
" 2	3	4	" 3
" 4	5	6	" 5
" 6	7	8	" 7
" 8	9	10	" 9
" 10	11	12	SWAIT
MWAIT	13	14	4MHZ
Reset	15	16	VBL
MF86R	17	18	1H
Reset BUF	19	20	COLOCK
DISP	21	22	VBL
SRD	23	24	EVENWR
ODDWR	25	26	CWRITEEV
CWRITEOD	27	28	HBL
CR0	29	30	CR1
" 2	31	32	" 3
" 4	33	34	" 5
" 6	35	36	" 7
" 8	37	38	" 9
MNSEL*	39	40	8H
+5V	41	42	+5V
"	43	44	"
GND	45	46	GND
"	47	48	"
"	49	50	"

13. POSITION OF CONNECTOR

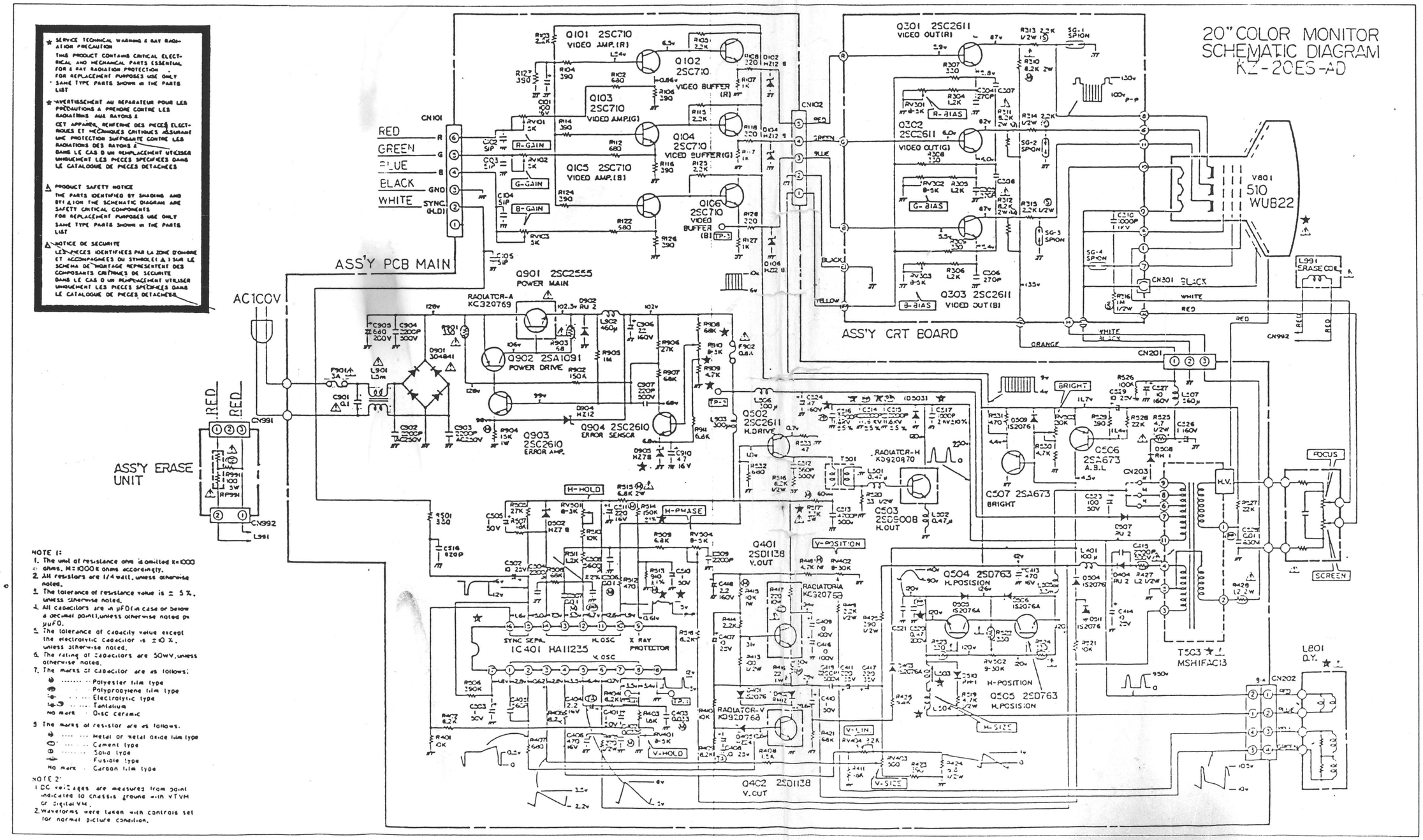


Position of Connector

14. WIRING


POWER SUPPLY
+5V
+12V
GND
+5V
+12V
GND
-5V
J8 Molex 1292-9P
PLAYER I
1Play Start
2Play Start
KICK SW
Control-Ball SG1
Control-Ball SG2
Control-Ball SG3
Control-Ball SG4
+5V
+5V
GND
GND
J3 Molex 1625-12R
COIN SERVICE
Coin In
Service
Service
GND
Sound (-)
Sound (+)
J6 Molex 1625-6R
Br Brown
R Red
O Orange
Y Yellow
G Green
B Blue
Pr Purple
Gr Gray
W White
Bk Black
W/R White/Red
L:300
AWG18
L:700
AWG22
L:700
AWG22
J2 Kel 1150N-036-009
MONITOR
TV-Red
TV-Green
TV-Blue
TV-Sync
GND
J5 Molex 1625-5R
L:400
AWG22
PLAYER II
+5V
+5V
KICK SW
Control-Ball SG1
Control-Ball SG2
Control-Ball SG3
Control-Ball SG4
GND
GND
J4 Molex 1625-9R
L:1,180
J1 Kel 1150N-036-009
TV-Blue
TV-Green
TV-Red
GND
TV-Sync
Control-Ball SG2
Control-Ball SG1
Control-Ball SG4
Control-Ball SG3
KICK SW
+5V
GND
GND
CONTROL PANEL PLAYER II
CONTROLBALL(BLUE)
Nichiatsu H4P
KICK SWITCH
Nichiatsu H5P
G N D
J4 MOLEX 1625-9P
CONTROLBALL(RED)
Nichiatsu H4P
Nichiatsu H5P
CONTROL PANEL(PLAYER I)
1PLAYER GAME START
2PLAYERS GAME START
KICK SWITCH
GND
J3 MOLEX 1625-12P

15. CRT SCHEMATIC DIAGRAM

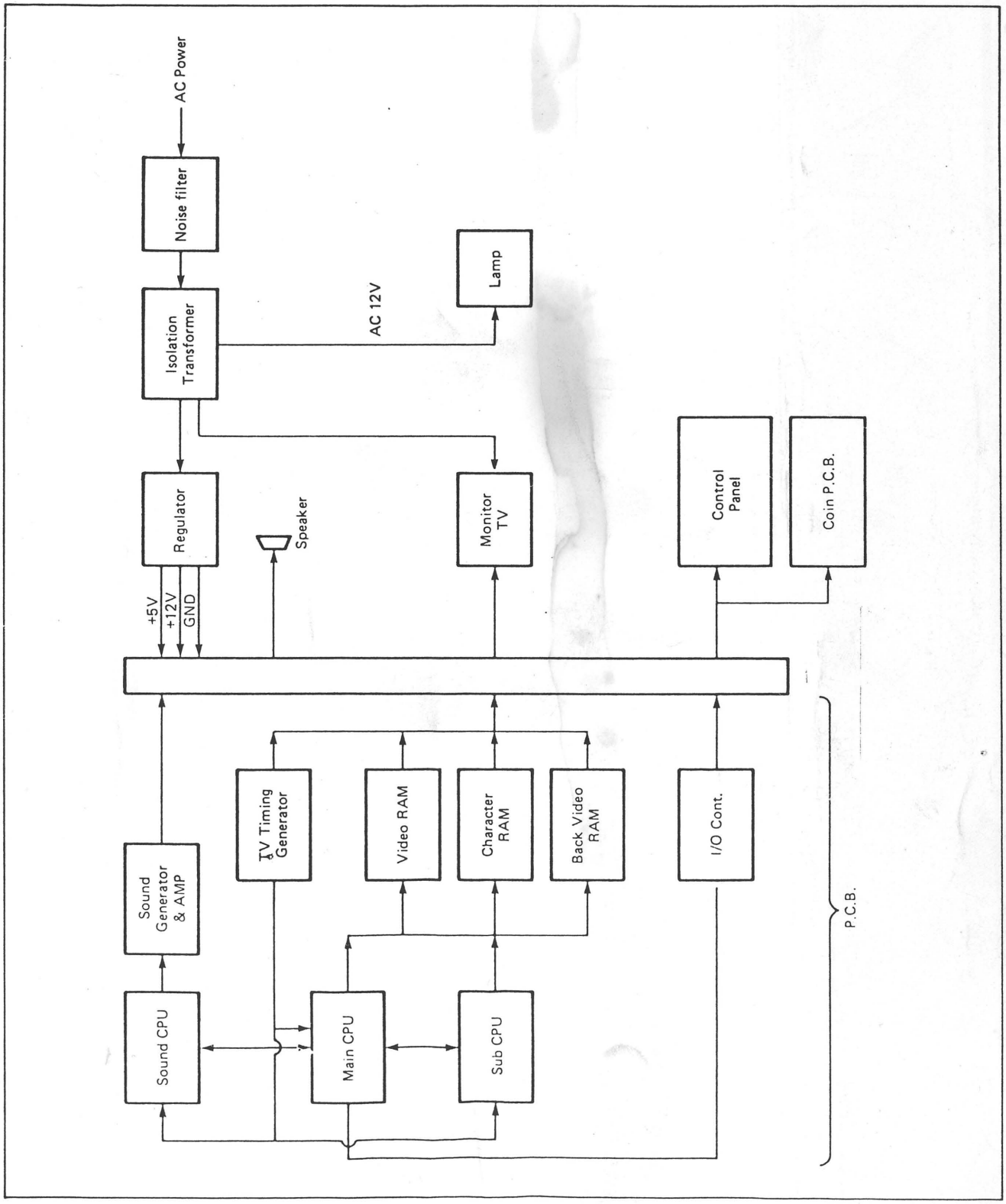


NOTE 1:
1. The unit of resistance ohm is omitted K=1000 ohms, M=1000 K ohms accordingly.
2. All resistors are 1/4 watt, unless otherwise noted.
3. The tolerance of resistance value is ± 5 %, unless otherwise noted.
4. All capacitors are in μF0(in case of below a decimal point),unless otherwise noted as μμF0.
5. The tolerance of capacity value except the electrolytic capacitor is ±10 %, unless otherwise noted.
6. The rating of capacitors are 50WV,unless otherwise noted.
7. The marks of capacitor are as follows:
   - ····· Polyester film type
   - ····· Polypropylene film type
   - ····· Electrolytic type
   - ····· Tantalium
   - no mark ··· Disc ceramic
8. The marks of resistor are as follows.
   - ····· Metal or metal oxide film type
   - ····· Cement type
   - ····· Solid type
   - ····· Fusible type
   - no mark ··· Carbon film type

NOTE 2:
1. DC voltages are measured from point indicated to chassis ground with VTVM or digital VM.
2. Waveforms were taken with controls set for normal picture condition.

CRT Scdematic Diagram

16. BLOCK DIAGRAM



Block Diagram

TEHKAN®

TEHKAN LTD.

TEHKAN LTD.

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