Williams®

MOTORACE -USA

OPERATION·
ADJUSTMENTS
DIAGNOSTICS
PARTS

ROM SUMMARY

BOARD	ROM	PART NO.	DESCRIPTION
M52-A CPU	1 (3L)	A-5343-10373	8K × 8 EPROM
	2 (3K)	A-5343-10374	8K × 8 EPROM
	3 (3J)	A-5343-10375	8K × 8 EPROM
M52-B Character	4 (3N)	A-5343-10376	8K × 8 EPROM
	5 (3M)	A-5243-10377	8K × 8 EPROM
	6 (3K)	A-5343-10378	8K × 8 EPROM
	11 (1F)	A-5282-10383	32 × 8 PROM
	12 (2H)	A-5282-10384	256 × 4 PROM
M52-F Scrolling Video	7 (3E)	A-5343-10379	8K × 8 EPROM
	8 (3C)	A-5343-10380	8K × 8 EPROM
	9 (3A)	A-5343-10381	8K × 8 EPROM
	13 (1F)	A-5282-10385	32 × 8 PROM
	14 (1H)	A-5282-10386	32 × 8 PROM
M52-S Sound	10 (1A)	A-5343-10382	4K × 8 EPROM

MOTORACE-USA

INSTRUCTION MANUAL
FOR UPRIGHT
AND TABLE GAMES

including...

- operation
- adjustment
- diagnostics
- parts

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Warnings & Notices

WARNING:

1. **FOR SAFETY AND RELIABILITY, WILLIAMS** does not recommend or authorize any substitute parts or modifications of WILLIAMS equipment.

2. **USE OF NON-WILLIAMS PARTS** and modifications of game circuitry may adversely affect game play, or may cause injuries.

3. **SUBSTITUTE PARTS, MODIFICATIONS AND GAME "CONVERSIONS"** may void FCC type-acceptance.

4. **SINCE THIS GAME IS PROTECTED** by Federal copyright, trademark and patent laws, so-called game "conversions" may be illegal under Federal law.

5. **THIS "CONVERSION" PRINCIPLE ALSO APPLIES** to unauthorized facsimiles of WILLIAMS equipment, logos, designs, publications, assemblies and games (or game features not deemed to be in the public domain), whether manufactured with WILLIAMS components or not.

RF INTERFERENCE NOTICE:

CABLE HARNESS PLACEMENTS AND GROUND STRAP ROUTING on this game have been designed to keep RF radiation and conduction within levels accepted by FCC regulations.

TO MAINTAIN THESE LEVELS, reposition harnesses and reconnect ground straps to their original placements if they should be disconnected during maintenance.

Location Of Controls

THE ON-OFF SWITCH is situated on the top-left corner of upright games as you face the back of the cabinet. Table games have an on-off switch underneath the game.

THE VOLUME CONTROL is located on the top left corner of the sound board.

GAME ADJUSTMENT SWITCHES. Two 8-position dip switches are located on the CPU Board. They are accessible through a window in the microprocessor module and are used for game adjustments and for diagnostics.

Examine Your Game

When you receive a new WILLIAMS game, examine it carefully before you power it up. Be sure it was delivered in good condition!

☐ **INSPECT THE OUTSIDE** of the shipping carton and/or game cabinet for shipping damage.

☐ **UPRIGHTS: UNLOCK AND SET ASIDE THE TOP-REAR PANEL.** Undo the two trunk latches on the inside of the bottom door. Open the door. Now check circuitry.

☐ **TABLE GAMES:** Unlock the component door on the Player 2 side of the game. Carefully lower the door to the floor.

☐ **ARE CONNECTORS SECURELY ATTACHED?** Reconnect any found loose. DON'T FORCE CONNECTORS. They're **keyed** and only fit one way. By the same token, take care: reversed edge-connectors can damage PC boards!

☐ **ARE PLUG-IN CHIPS FIRMLY-SEATED** in their sockets?

☐ **UNWRAP THE POWER CORD** coiled inside the cabinet. Now position the cord in the wood slot beneath the bottom door. (Table games: Drop the plug through the hole in the floor. DON'T PLUG IT IN YET!)

☐ **SCRUTINIZE MAJOR SUBASSEMBLIES**, such as the monitor, control panel, transformer board and power supply. Make sure they're securely-mounted.

CHAPTER 2   Game Operation

Power Turn-On

Game Operation

Game Adjustments

Dip Switch Settings

Power Turn-on

CAUTION: This game must be plugged into a properly-grounded outlet to prevent shock hazard and to ensure proper game operation. DO NOT use a "cheater" plug to defeat the ground pin on the line cord, and DO NOT cut off the ground pin.

WHEN THE GAME IS FIRST TURNED ON it should come up in the attract mode. If not, refer to TROUBLESHOOTING PROCEDURES.

Game Operation

GAME START

INSERT COINS. Press either the one-player or two-player button. Two-player games require two credits.

PLAYER CONROLS. MOTORACE—USA is a game of teeth-gritting excitement. It requires fast, shrewd thinking...and more than anything else, adroit, appropriate and just plain **quick maneuvering.**

QUICK MANEUVERING *means mastery of all your controls. You may have to feint in one direction, hit the brakes, and surge forward in another!*

- **YOUR JOYSTICK** steers your motorcycle precisely to the left or right.
- **YOUR BRAKE BUTTON** can slow you down fast.
- **YOUR THROTTLE BUTTON** is your friend as the highway opens up. Dare to surge forward! Your bike has just the right pickup. But be prudent when the traffic gets nasty or when the pavement's uncertain!
- **THROTTLE AND BRAKE** at the same time and you can maintain a cruise speed.

GAME PLAY

YOU'RE IN L.A. TRAFFIC and you're prepared to defy all the odds. You're going to put that hammer down and highball your 500cc motorcycle all the way to New York City. But the stakes are higher: You're prepared to take on all the cars on the roadway...to outmanuever them all!

WITH ONLY YOUR WITS and your two wheels, you'll battle the ultimate American frontier: the open road. Your official checkpoints are Las Vegas, St. Louis, Chicago, and Houston...but you'll have to pick up some gas cans (500 points) along the way.

YOU'RE TAKING IT TO THE LIMIT, since you know that's how to earn the most points. *But can your bike stand up to the wheelies (700)...the rugged pathways and narrow bridges...the daredevil jumps (700) across challenging riverbeds?* You're equal to the challenge! Forge ahead!

HOW DO YOU KNOW WHERE YOU STAND? This is mad-dog competition, *but there are rules.* Each time you improve your position you score 500. And at each checkpoint the standing you've achieved pays off in points and gas! But not all drivers are defensive drivers. If you should crash, you'll be penalized in your fuel allotment.

IN NEW YORK your bonus will be tallied based on your rank in the race and the amount of fuel you've conserved. But you're not done yet! A new race is on, and you're back in L.A. Only this time you've got an even more-powerful bike!

1ST RACE	500 cc motorcyle
2ND RACE	750 cc motorcycle
3RD RACE	1200 cc motorcyle
THEREAFTER	1200 cc motorcyle

HIGH SCORE SIGNATURE. Select letters with the joystick and lock them in with the THROTTLE button.

GAME ADJUSTMENTS

Game adjustments are made using switches contained in DIP Switch 1 and DIP Switch 2 (Table 2) on the CPU Board (M52-A). Using a pen or small screwdriver, move switches to desired positions.

Switches 5, 6, 7, and 8 of DIP Switch 1 determine pricing rates as shown. Switch 3 of DIP Switch 2 selects Coin Mode 1 or Coin Mode 2 to go with the settings of switches 5, 6, 7, and 8 of DIP Switch 1.

Coin Mode 1 Is used for coin doors with a single coin chute or a set of coin chutes of equal value. Coin mode 2 is used for coin doors with two coin chutes of different values.

LA to VEGAS—25¢

HOW FAR THE PLAYER GETS can indicate whether game settings are bringing you a satisfactory return on your investment! You'll want to pay particular attention to players' reception of the game for this reason: It takes about two minutes to get from LA to Vegas. We've found that *two-minute games both satisfy players and also keep the quarters flowing.*

Average players should almost get to Las Vegas (or make it part way to Houston) on their first quarter. If not, collections may not be at their peak. You'll want to tailor your game to your game-playing public. It's easy. And it only takes a minute.

HOW TO MAKE GAME ADJUSTMENTS

USE DIP SWITCH BANK #1. Now for the multiple choice section. *Choose one or more:*

☐ *For a shorter game, increase the AMOUNT OF FUEL LOST IN COLLISION. For a longer game, reduce it. See Table 1.*

☐ *For a shorter game, change the FUEL CONSUMPTION from low to high (switch 3 on). For a longer game, change it from high to low (switch 3 off).*

☐ *If you have a lot of real pros that make it to Chicago or close to New York on a quarter (they're playing longer than six minutes), get rid of the CONTINUED-PLAY feature (switch 4 off). This will create a challenge to play even better. But...this is an important feature for both standings in the high score table and for more challenging races (larger and faster bikes). SO USE DISCRETION BEFORE SETTING SWITCH 4 ON.*

Table 1. FUEL LOST PER COLLISION

PERCENT LOST	MEANING	BANK 1 DIP SWITCH #1	BANK 1 DIP SWITCH #2
8	Low	OFF	OFF
12	Med	ON	OFF
15	High	OFF	ON
18	Max	ON	ON

CHANGING GAME PRICING. MOTORACE—USA includes numerous pricing selections. For games that accept only one value of coin ("coin mode 1"), use Table 2 below to choose the appropriate price per game. Now set dip-switch bank #1 accordingly.

Refer to the table for other adjustments. Diagnostics test 01, the DIP Switch test causes most adjustments to be displayed on the monitor and may be used while making game adjustments.
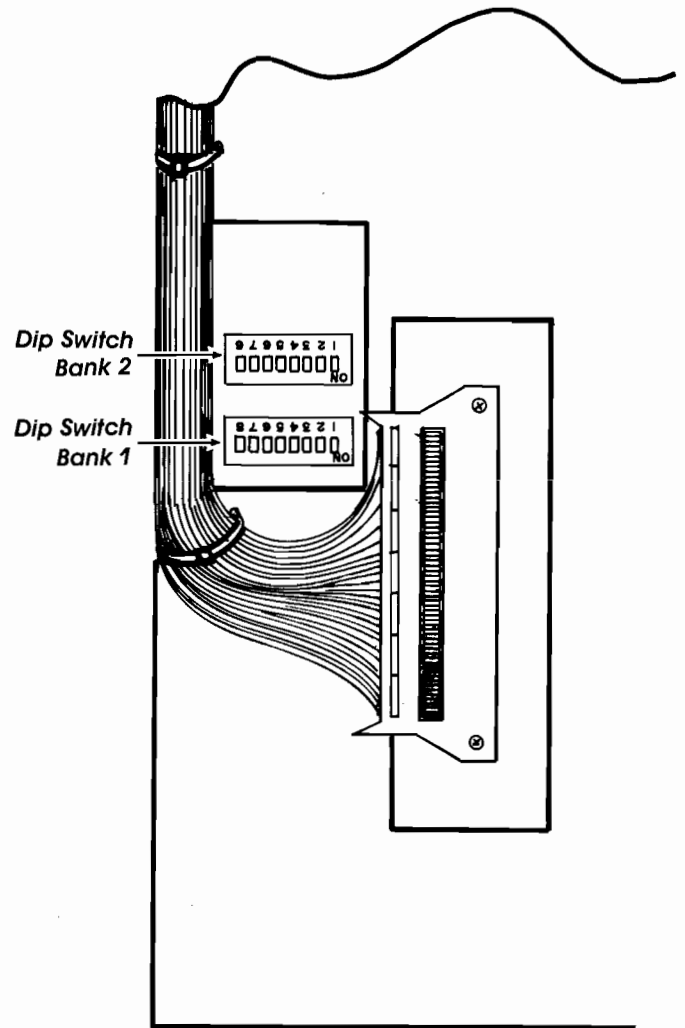

Figure 1. Dip Switches

Table 2. DIP SWITCH SETTINGS

DIP SWITCH NO. 1

ADJUSTMENT		OPTIONS	SWITCH NUMBER							
			1	2	3	4	5	6	7	8
• RECOMMENDED SETTINGS			ON	OFF	OFF	ON	OFF	OFF	OFF	OFF
COIN MODE 1*		6 PLAYS/1 COIN					OFF	OFF	ON	ON
		5 PLAYS/1 COIN					ON	ON	OFF	ON
		4 PLAYS/1 COIN					OFF	ON	OFF	ON
		3 PLAYS/1 COIN					ON	OFF	OFF	ON
		2 PLAYS/1 COIN					OFF	OFF	OFF	ON
	•	1 PLAY/1 COIN					OFF	OFF	OFF	OFF
		1 PLAY/2 COINS					ON	OFF	OFF	OFF
		1 PLAY/3 COINS					OFF	ON	OFF	OFF
		1 PLAY/4 COINS					ON	ON	OFF	OFF
		1 PLAY/5 COINS					OFF	OFF	ON	OFF
		1 PLAY/6 COINS					ON	OFF	ON	OFF
		FREE PLAY					ON	ON	ON	ON
*COIN MODE 2	CHUTE A	1 PLAY/1 COIN					OFF	OFF		
		1 PLAY/2 COINS					ON	OFF		
		1 PLAY/3 COINS					OFF	ON		
		FREE PLAY					ON	ON		
	B	2 PLAYS/1 COIN							OFF	OFF
		3 PLAYS/1 COIN							ON	OFF
		5 PLAYS/1 COIN							OFF	ON
		6 PLAYS/1 COIN							ON	ON
PERCENT OF FUEL LOST IN COLLISION		8.3% Low	OFF	OFF						
	•	11.7%	ON	OFF						
		15.0%	OFF	ON						
		18.3% Max	ON	ON						
FUEL CONSUMPTION	•	LOW			OFF					
		HIGH			ON					
†CONTINUED PLAY	•	NO				OFF				
		YES				ON				

DIP SWITCH NO. 2

ADJUSTMENT		OPTIONS	SWITCH NUMBER							
			1	2	3	4	5	6	7	8
• RECOMMENDED SETTINGS			OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF
**FLIP PICTURE	•	NO	OFF							
		YES	ON							
CABINET TYPE		TABLE		OFF						
	•	UPRIGHT		ON						
COIN MODE SETTINGS FOR DIP SWITCH 1	•	COIN MODE 1			OFF					
		COIN MODE 2			ON					
UNIT OF DISTANCE	•	MILE				OFF				
		KILOMETER				ON				
FREEZE PICTURE	•	NO					OFF			
		YES					ON			
DEMO MODE	•	NO							OFF	
		YES							ON	
TEST MODE	•	NO								OFF
		YES								ON
**SWITCH 6 (not used)	•	NO						OFF		

• Recommended settings are indicated with bullets (•).
*For games with a single coin selector or two selectors of the same value, switch 3 on Dip Switch 2 must be turned OFF.
 For games with selectors for two different coin values, switch 3 must be turned ON.
**Switches 4 and 6 of Dip Switch #2 MUST BE SET TO OFF.
†Permits a player to continue a game at the same point where he left off (on the previous coin).

CHAPTER 3   Troubleshooting Procedures

Introduction

Power-Up Tests

Diagnostics

+ 5VDC Power Supply Adjustments

INTRODUCTION

Certain types of game malfunctions may inhibit the game's diagnostic or display faculties. Troubleshooting procedures for most of these types of malfunctions as well as malfunctions that permit self-diagnosis are covered below. Our trouble-shooting algorithm begins with **Power-Up** and continues until **Game Over Mode**. All procedures can be performed with minimal test equipment or merely by observing the game itself.

POWER-UP TESTS

NO GENERAL ILLUMINATION	NO INITIAL VIDEO	CHECKING POWER SUPPLY BOARD
(1) Check fuse F2 on power supply board. (2) Check for proper installation of jumpers W1, W2, W3 and/or resistor R27. (Some machines MAY NOT have an R27. Refer to your drawing set.) (3) Check 4P1/J1, 4P3/J3, 6P2/J2 and 6P3/J3. (4) If all the above don't turn up the problem, check power supply board.	(1) Press reset button on CPU Board. (2) Try RAM and ROM **Diagnostic-Mode** tests (see below). (3) If these tests don't turn up the problem, check power supply board.	(1) Swap power supply board with one from known-good game. (2) If game plays, problem is on power supply board. (3) If game doesn't play, check power transformer with voltmeter. (4) If known-good power supply is unavailable for tests above, check +5V and +12V outputs on power supply in game. Each MUST BE within 2% of rated output with less than 0.1% AC hum.

Diagnostics

TURN SWITCH 8 OF DIP SWITCH #2 TO THE ON POSITION and turn power ON. The diagnostic program consists of 8 independent tests, 2 of which are automatic at turning power ON in diagnostic mode: RAM Test and ROM Test. After these two tests have been properly completed, pressing the 2-Player button brings a menu of the other tests to the CRT display:
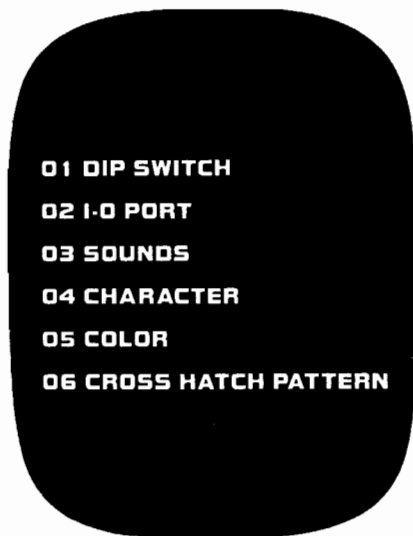


```
01 DIP SWITCH

02 I-O PORT

03 SOUNDS

04 CHARACTER

05 COLOR

06 CROSS HATCH PATTERN
```

Figure 2. Diagnostic Menu

OPERATE THE JOYSTICK to position the cursor at the desired test. Press 1-Player Start to initiate the test.

AS ANY TEST OTHER THAN 02 IS COMPLETED, pressing the 2-Player button returns the test menu to the monitor display. When test 02 is completed, the joystick lever must be moved left while pressing the 2-Player button to return the test menu. If no further testing is desired, turn power OFF and return switch 8 of DIP switch #2 to the OFF position.

RAM TEST

IF OK, "RAM OK" APPEARS ON MONITOR. If not OK, this indication appears on the monitor (without ROM test results)...

RAM NG XXXX	YY	ZZ
Faulty RAM address	**RAM Input Data**	**RAM Output Data**

IF RAM IS SHOWN TO BE NG AT RAM ADDRESS E000-E7FF, failure can have occurred in either 3B RAM or 2K decoder on M52-A CPU Board.

IF RAM IS NG AT ADDRESS 8000-9FFF failure is associated with RAMs on the M52-F scrolling video board. In addition to these RAMs (3K and 3M), chips ID, 4L, 4M, 4N, 3H, 3S, or 3F on the scrolling video board on chip 5M on the CPU Board may cause this failure.

FAILED RAM ADDRESS	RAM
8x0x - 8x3x	3K
9x0x - 9x3x	3K
8x4x - 8x7x	3M
9x4x - 9x7x	3M
8x8x - 8xBx	3K
9x8x - 9xBx	3K
8xCx - 9xFx	3M
9xCx - 9xFx	3M

ROM TEST

If OK, the display below appears on the monitor.
```
RAM   OK
ROM 0 OK FF
ROM 1 OK FF
ROM 2 OK FF
ROM 3 OK FF
```

If any are bad, for example ROM 1, this appears on monitor...

```
RAM   OK
ROM 0 OK FF
ROM 1 NG FF
ROM 2 OK FF
ROM 3 OK FF6
```

A faulty ROM must be replaced to continue diagnostics.

Certain failure modes of ROMs 1 thru 3 on M52-A CPU Board and ROMs 3C and 3E on M52-F Scrolling Video Board prevent fault indications from appearing on the CRT.

M52-A CPU BOARD

Note that ROM 0 is not used.

•CRT locks up with random test pattern

Remove ROMS 2 and 3 and repeat test. If test results are now shown insert ROM 2 and ROM 3 one at a time to determine faulty chip. If not replace ROM 1.

•ROM 1 no good—Replace 3L.

```
RAM OK    ⎫
ROM 0 NG  ⎪
ROM 1 NG  ⎬   Replace 3K
ROM 2 NG  ⎪
ROM 3 NG  ⎭

RAM OK    ⎫
ROM 0 OK  ⎪
ROM 1 OK  ⎬   Replace 3J
ROM 3 OK  ⎪
ROM 3 NG  ⎭
```

M52-F SCROLLING VIDEO BOARD

• After power up tests, arabic numbers are missing from CRT—**Replace ROM 3C.**
• After power up tests, letters are missing from CRT—**Replace ROM 3A or 3E.**
• Blue missing in color test—**PROM 1F.**
• Red missing in color test—**PROM 1H.**

01 DIP SWITCH TEST

Shows state of all switches contained in DIP switches #1 & #2 and the resulting game adjustments. With the monitor displaying the test menu, position the cursor at 01 and depress 1-Player Start.

```
DIP SW 1 2 3 4 5 6 7 8
   SW1 1 0 0 1 0 0 0 0
   SW2 0 1 0 0 0 0 0 0
FUEL CONSUMPTION AT COLLISION
                           *MID
FUEL CONSUMPTION IN RUNNING
                           LOW
CONTINUITY YES
SPEED                      M/h
COIN MODE A    1 COIN   1 PLAY
BODY TYPE                  UPR
*LOW = 8  %         HIGH = 15%
 MID = 12%          MAX = 18%
```

Troubleshooting

GAME ADJUSTMENTS CAN BE SET AND CHECKED using switches contained in DIP 1 and DIP 2. To make sure all switches are functioning properly, set switch 8 of DIP 2 to the ON position and select test 01 of the diagnostic test menu. The video display of test 01 shows the state of every switch in DIP 1 and DIP 2, and the current game adjustments. A "1" = ON, and "0" = OFF for all switches.

Switch functions listed below:

DIP SWITCH 1

Switch	Function
1 & 2	**Determine the percentage of fuel lost in a collision** (8-18%). If these switches fail, measure resistance between pin 1 and pins 2 & 3 of RA5, or replace chip 1F.
3	**Determines fuel consumption rate** (low/high). For failure of this switch measure resistance between pin 1 and pin 4 of RA5, or replace chip 1F.
4	**Continued play** (yes/no). For failure of this switch measure resistance between pin 1 and pin 5 of RA5, or replace chip 1F.
5, 6, 7 & 8	**Determine the pricing** for coin modes 1 & 2. For failure of these switches, measure resistance between pin 1 and pins 6, 7, 8, & 9 of RA5, or replace chip 1E.

IF ALL SWITCHES OF DIP SWITCH 1 FAIL, first check voltage at pin 1 on RA5 for Vcc, then check switches and associated chips and circuitry.

DIP SWITCH 2

Switch	Function
1	**Flips picture** vertically when in the ON position to accomodate different monitors. Set it to OFF for all games. If the picture is flipped anyway, check pins 11, 12, & 13 of chip 6K; measure resistance between pins 1 & 2 of RA6, or replace chip 1H.
2	**Defines the game type.** Upright games require it to be ON and cocktail table games require it to be OFF. For failure of this switch, measure resistance between pins 1 and 3 of RA6, or replace chip 1H.
3	**Determines coin mode** 1 (OFF) or coin mode 2 (ON). Failure of this switch requires measurement of resistance from pin 1 to pin 4 of RA6, or replacement of chip 1H.
4	**Distance Unit** (mH/kmH). Failure of this switch requires measurement of resis-

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tance from pin 1 to pin 5 of RA6, or replacement of chip 1H.

5   **Allows selection of Freeze-Screen** test feature. Freeze-Screen feature allows the 1-Player Start to *start* motion of the game and the 2-Player Start to *stop* motion of the game. Failure of this switch requires measurement of resistance from pin 1 to pin 6 of RA6, or replacement of chip 1F.

6   NOT USED—Must be off.

7   **Permits "Demo" mode** (allows viewing of entire courses in game play since no fuel is used). Failure of this switch requires measurement of resistance from pin 1 to pin 8 of RA6, or replacement of chip 1H.

8   **Permits Diagnostics mode.** Failure of this switch requires measurement of resistance from pin 1 to pin 9 of RA6, or replacement of chip 1H.

IF ALL SWITCHES OF DIP SWITCH 2 FAIL, first check voltage at pin 1 on RA6 for Vcc, then check switches and associated chips and circuitry.

02 I-O PORT TEST
CONTROL PANEL AND COIN DOOR SWITCHES.

Shows if all controls and coin mechanisms are functioning properly by displaying a matrix composed of the states of switches on the Control Panel and Coin Door. With the monitor displaying the test index, position the cursor at 02 and depress 1-PLAYER START.

```
            1 2 3 4 5 6 7 8
KEY     0   0 0 0 0 0 0 0 0
KEY     1   0 0 0 0 0 0 0 0
KEY     2   0 0 0 0 0 0 0 0
```

TIMING 0000. The TIMING number starts at 0000 and adds one count approximately every second.

If any control panel or coin door switch is closed a "1" will appear in the above matrix as follows:

1-Player Start Button	KEY 0-1
2-Player Start Button	KEY 0-2
Coin Switch A	KEY 0-4
P1 Right	KEY 1-1
P1 Left	KEY 1-2
P1 THROTTLE	KEY 1-6
P1 BRAKE	KEY 1-8
P2 Right	KEY 2-1
P2 Left	KEY 2-2
Coin Switch B	KEY 2-5
P2 THROTTLE	KEY 2-6
P2 BRAKE	KEY 2-8

COIN SWITCH B is present only in games with coin doors that accept coins of two different values. The P2 switches are used in cocktail table games only. To end this test and return to test index, move joystick lever left while pressing the 2-Player Start Button.

Troubleshooting

ALL CONTROL PANEL AND COIN DOOR SWITCHES CAN BE CHECKED (see below) with diagnostics test 02. Also, the display includes a TIMING check which should advance about one count per second.

I-O PORT LAYOUT

	1	2	3	4	5	6	7	8
KEY 0	1-P START	2-P START	SERVICE*	COIN A				
KEY 1	P1 RIGHT	P1 LEFT				P1 THROTTLE		P1 BRAKE
KEY 2*	P2 RIGHT	P2 LEFT			COIN B	P2 THROTTLE		P2 BRAKE
TIMING 0000								

* Service switch not provided.
** Player 2 switches on cocktail table games only.

PORT	PULLUP RESISTOR	CHIP
KEY 0-1	RA3-5	1E
KEY 0-2	RA3-3	1E
KEY 0-3	RA3-2	1E
KEY 0-4	RA3-4	1E
KEY 1-1	RA2-9	1D
KEY 1-2	RA2-5	1D
KEY 1-6	RA2-6	1D
KEY 1-8	RA2-8	1D
KEY 2-1	RA1-9	1C
KEY 2-2	RA1-5	1C
KEY 2-5	RA1-4	1C
KEY 2-6	RA1-6	1C
KEY 2-8	RA1-8	1C

03 SOUNDS TEST

A list of sounds normally produced by the game appears as shown below on the monitor. With the monitor displaying the test menu, position the cursor at 03 and depress 1-Player Start. Position the cursor with the joystick to select a sound and press the 1-Player start button for repetition of the sound.

01	PHONE SOUND
02	BRAKE SOUND
03	SPINNING SOUND
04	PASSING SOUND 1
05	COUNTDOWN SOUND
06	ADD. FUEL SOUND
07	JUMPING SOUND
08	COLLISION SOUND
09	OPENING MUSIC
10	ENDING MUSIC
11	ARRIVAL MUSIC
12	FINAL GOAL MUSIC
13	CHECKPOINT MUSIC
14	*BGM 1 STREET
15	*BGM 2 ROUGH WAY
16	*BGM 3 HIGHWAY
17	WARNING SOUND
18	PASSING SOUND 2

*BGM = Background Music

Sound Select Data Levels

Sound Number	D7*	D6	D5	D4	D3	D2	D1	D0
1	1	0	0	0	0	0	0	1
2	1	0	0	1	0	1	1	0
3	1	0	0	1	0	1	1	1
4	1	0	0	1	1	0	0	1
5	1	0	0	1	0	1	0	1
6	1	0	0	1	0	0	1	1
7	1	0	0	1	0	1	0	0
8	1	0	0	1	1	1	1	1
9	1	0	0	1	1	1	0	0
10	1	0	0	1	1	0	1	1
11	1	0	0	1	1	1	0	1
12	1	0	0	1	1	1	1	0
13	1	0	0	1	1	0	1	0
14	1	0	0	1	1	0	0	0
15	1	0	1	0	0	0	0	0
16	1	0	1	0	0	0	0	1
17	1	0	0	1	0	0	1	0
18	1	0	0	1	0	0	0	1

*Pulses Low For Each Sound

• Sounds 2 thru 7 and 17 and 18 not produced—**Chip 1F faulty.**
• Any other sounds missing or duplicated—**Chip 1J or 1F faulty.**

Troubleshooting

NO SOUND:

| CHECK	REMEDY OR ADJUSTMENT
GND, +5V, +12V, and Speaker connections.	Fix as needed.
Rotate Volume Control VR1 on Sound Board and listen for scratching sound in speaker.	If none, chip 2M or associated circuit on Sound Board faulty.
Touch 3M-3 with one end of an unterminated test lead for speaker clicking sound.	If none, chip 3M or associated circuit on Sound board faulty.
Check that chip 3D-3 remains low for 1 second after power up.	If not chip 3D on associated circuit on Sound Board faulty.
CPU Board chip 1K-12 for low pulse each time 1-Player Start is pushed.	If no pulse, disconnect Sound Board from CPU and recheck. If still not pulsing, chip 1K on CPU Board is faulty. If it now pulses, chips 1F or 3J on Sound Board faulty. If pulse present originally, replace plug-in chips on Sound Board one at a time.
Check that chip 3E-8 and -10 are low, and 3E-9 is high when 3D-3 goes high. (This powers up MPU 3E in proper mode.)	If not 2K, associated capacitors, or 3E on Sound Board faulty.
Interchange socketed chips 3F and 3J.	If some sounds are now produced the chip *now in 3F socket* is faulty.
Across each crystal for AC voltage.	If none, crystal or associated capacitors faulty.

04 CHARACTER TEST

With the monitor displaying the test index, position the cursor at 03 and depress 1-Player Start. A display composed of eight numeral fours appears on monitor.
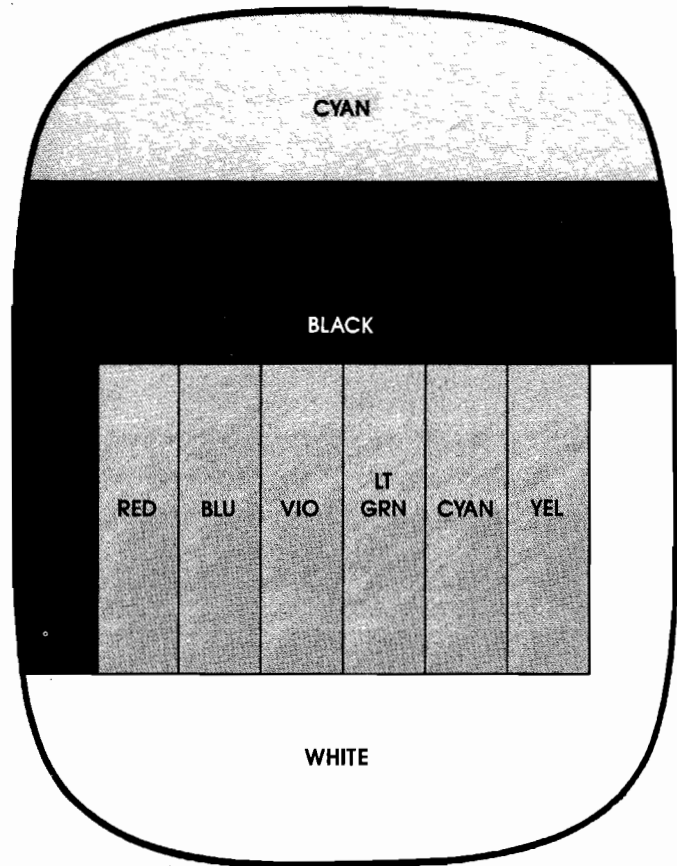

CIRCLES = YELLOW

4s = RED

SCREEN = BLACK
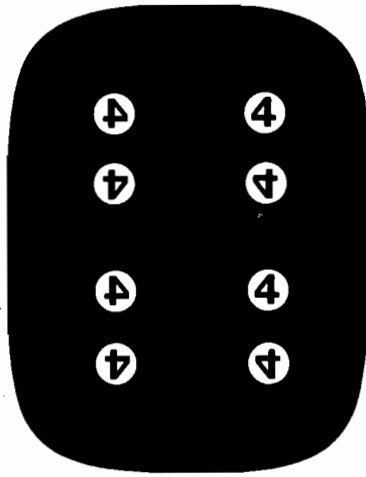
Character Test

Troubleshooting

Faults in chips on M-52-B-C Character Board result in symptoms as follows;

SYMPTOM	CAUSE
Blank Screen	1F
Blank Screen	2H
8 yellow squares with red fours	3N
8 tan squares enclosing red circles with tan fours	3M
Eight light blue squares enclosing dark blue circles with light blue numbers	3K

05 COLOR TEST

Position the cursor at 05 and depress 1-Player Start. This test consists of 5 independent steps (advanced by depressing 1-Player Start) as follows:

1. An alphanumeric display is shown as below over a row of numbers 0 thru 9, letters blue and numbers white.

ABCDEFGHIJKLMNOPQRSTUVWXYZ

0123456789

2. A color-pattern is displayed as shown.

3. A field of red is displayed.

4. A field of green is displayed.

5. A field of blue is displayed.

Each independent step of this COLOR test can be advanced through by pressing the 1 Player start button.

Color-Pattern Test

06 CROSS HATCH PATTERN TEST

Position the cursor at 06 and depress 1-Player Start. A white line matrix 15 lines vertical x 18 lines horizontal is displayed.
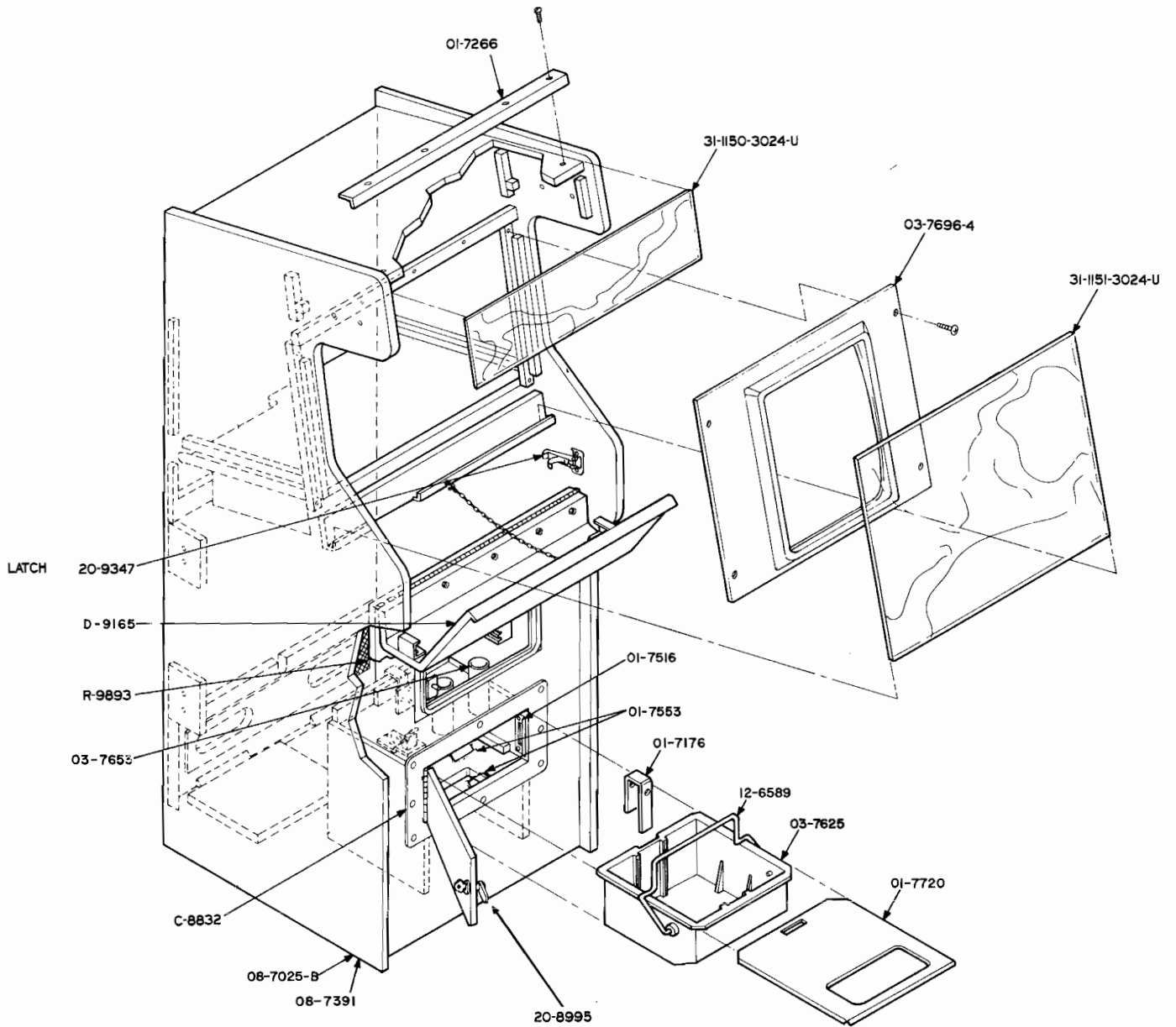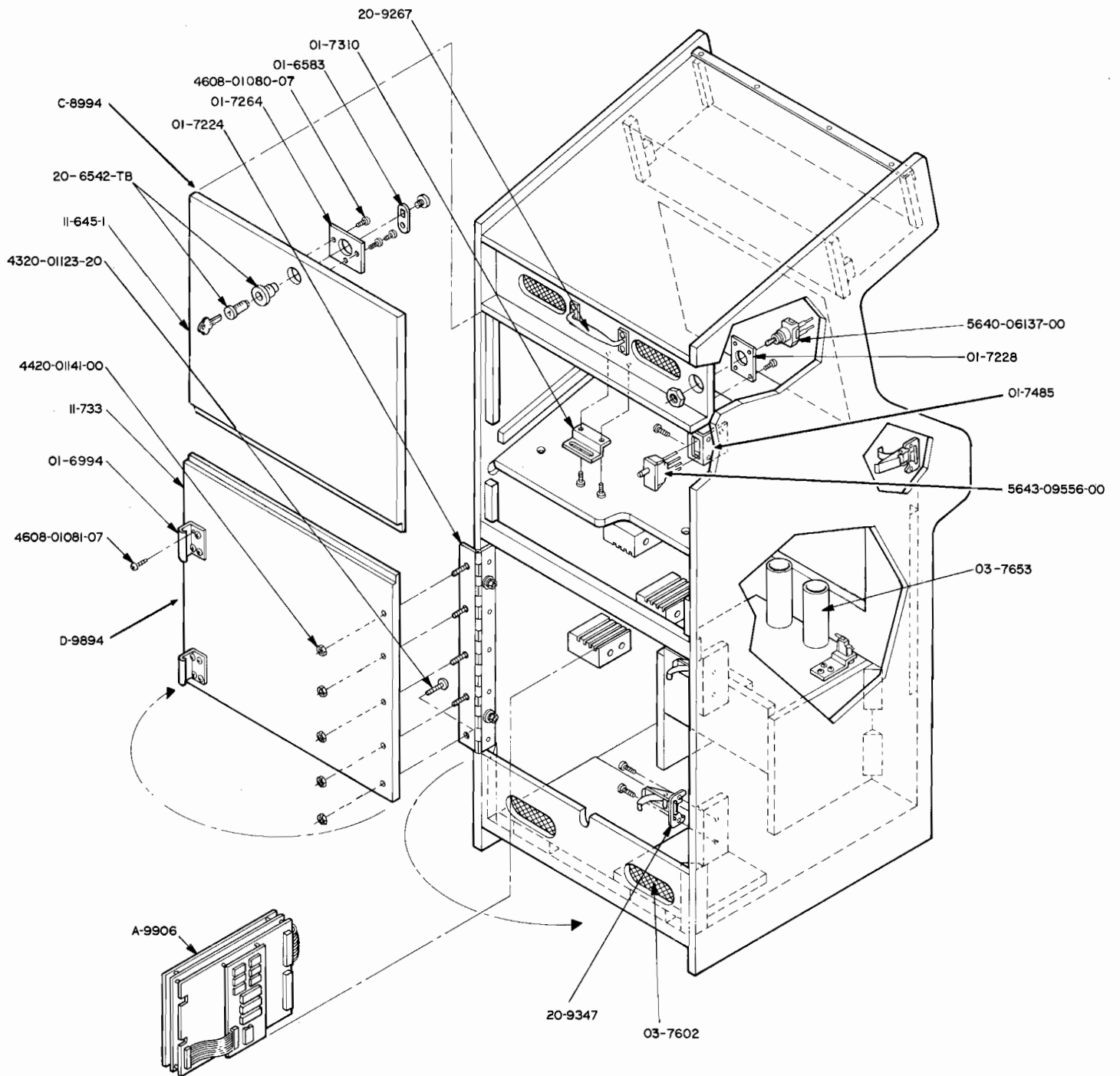
+5VDC Power Supply Adjustments

BEFORE ADJUSTING THE VOLTAGE OUTPUT, always check at the output of the supply for AC hum. This hum should never rise above .005V on the +5VDC supply. If it does, consult your schematic drawing set for proper DC voltages throughout the circuit.
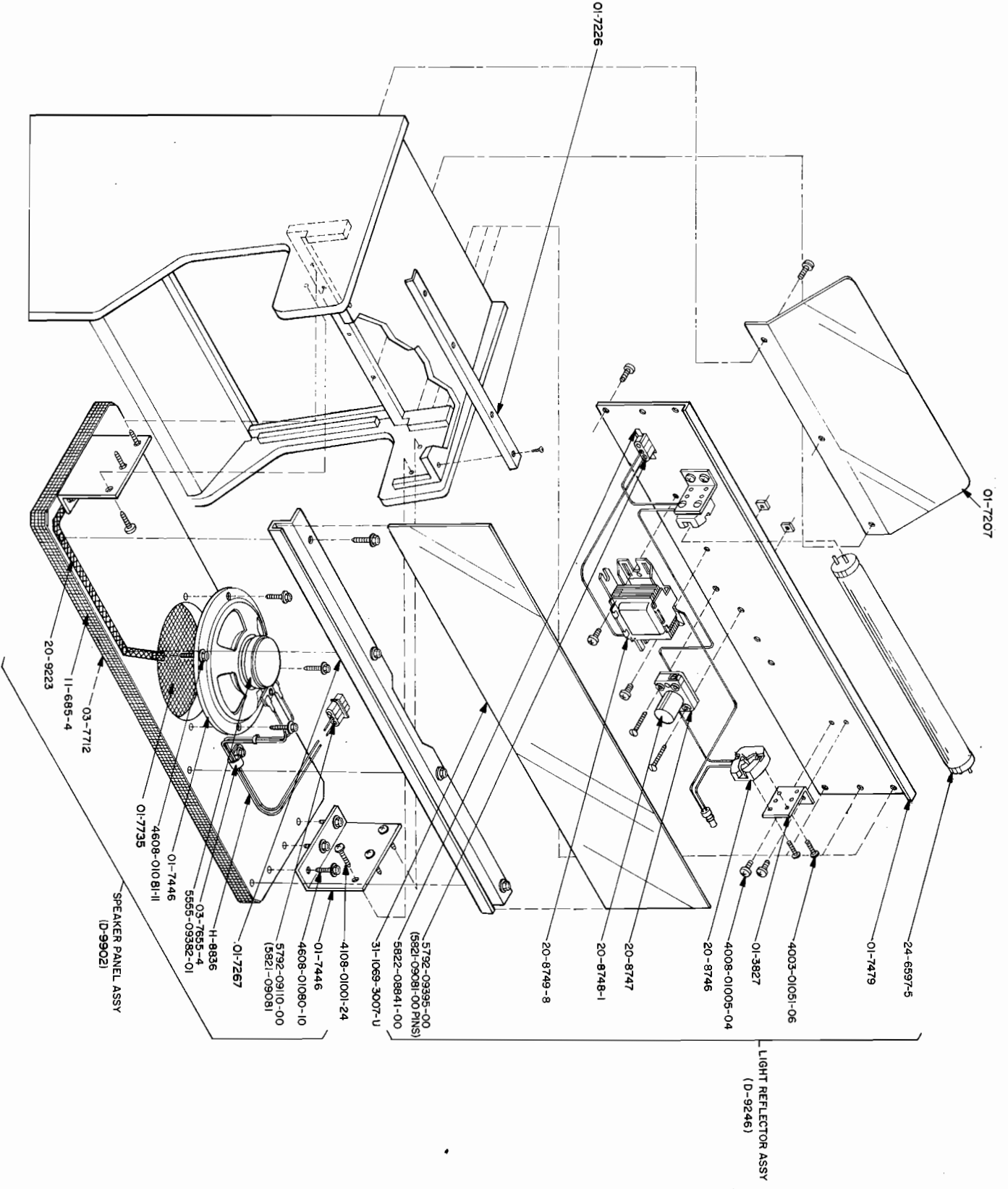
TEST FOR THESE with the DC setting of your multimeter. Make a second check using the AC setting. Pay particular attention to readings at TP5 (top of capacitor C10). If the voltage here is low (less than +11VDC) or if you find excessive ripple (more than 700mVrms), replace the capacitor.

IF TP1 IS LESS THAN +4.95VDC remove R10. If TP1 is still less than +4.95VDC, then check precision resistors R25 and R26. If they are within the 1% tolerance, then check IC2.
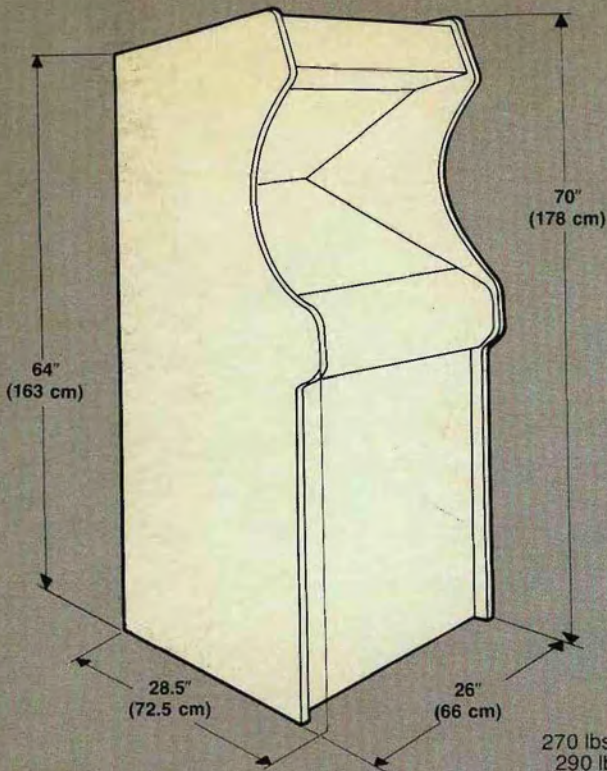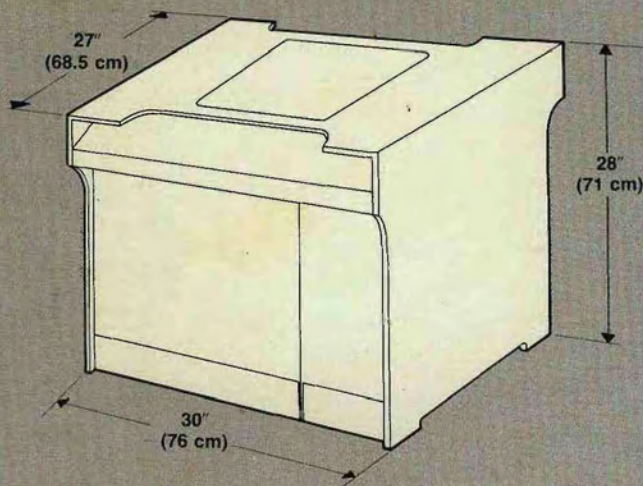
CHAPTER 4   Parts

OI-7266

3I-II50-3024-U

03-7696-4

3I-II5I-3024-U

LATCH   20-9347

D-9I65

R-9893

03-765?

C-8832

08-7025-B

08-7391

20-8995

OI-75I6

OI-7553

OI-7I76

I2-6589

03-7625

OI-7720

20-9267

01-7310

01-6583

4608-01080-07

01-7264

C-8994

01-7224

20-6542-TB

11-645-1

4320-01123-20

4420-01141-00

11-733

01-6994

4608-01081-07

D-9894

A-9906

20-9347

03-7602

5640-06137-00

01-7228

01-7485

5643-09556-00

03-7653

01-7226

01-7207

20-9223

11-685-4

03-7712

01-7735

4608-01081-11

01-7446

03-7655-4

H-8836

5555-09382-01

01-7267

5792-09110-00
(5821-09081)

4608-01080-10

01-7446

4108-01001-24

31-1069-3007-U

5822-08841-00

5792-09395-00
(5821-09081-00 PINS)

20-8749-8

20-8748-1

20-8747

20-8746

4008-01005-04

01-3827

4003-01051-06

01-7479

24-6597-5

SPEAKER PANEL ASSY
(D-9902)

LIGHT REFLECTOR ASSY
(D-9246)

NOTES:

64"
(163 cm)

70"
(178 cm)

28.5"
(72.5 cm)

26"
(66 cm)

UPRIGHT
Weight
270 lbs. (122.5 kg.) uncrated
290 lbs. (131.5 kg.) crated

27"
(68.5 cm)

28"
(71 cm)

30"
(76 cm)

COCKTAIL TABLE
Weight
205 lbs. (93 kg.) uncrated
220 lbs. (100 kg.) crated

POWER REQUIREMENTS
115/230 VAC Nominal, 50/60Hz
@1.8/0.9A 207W
Normal Line = 98-126VAC
      196-252VAC
High Line* = 113-145VAC
      226-290VAC
Low Line* = 88-113VAC
      176-226VAC
*Transformer jumpers required.
See service manual.

ENVIRONMENT
Operating Temperature
$0°$ to $+45°$C ambient
($+32°$ to $+113°$F)

Storage Temperature
$-5°$ to $+60°$C ambient
($+23°$ to $+140°$F)
80% RH at 40°C (104°F), non-condensing

MONITOR
19" Color Raster*
non-interlaced
UL, CSA & DHHS Approved
*13" monitor on cocktail and mini-upright
models

VIDEO SYSTEM
Program:
   24K BYTES ROM
   2K BYTES Scratch RAM
Character:
   24K BYTES ROM
   256 BYTES RAM
Scrolling Video:
   24K BYTES ROM
   4K BYTES RAM

SOUND SYSTEM
6808 Microprocessor
4K BYTES ROM
Two AY-3-8910 Sound Generators

JOYSTICK
2-way optical-digital

Specifications subject to change
without notice.

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