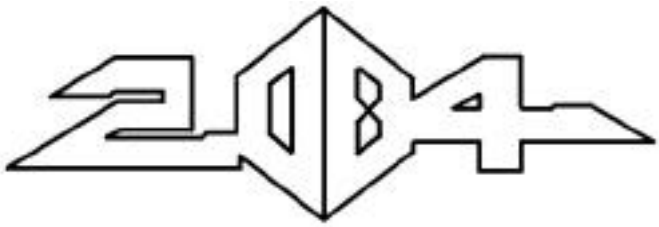
Williams®

16P-3005-101
March, 1982

ROBOTRON:



INSTRUCTION MANUAL

Including procedures for…

- Operation
- Auditing
- Adjustment
- Diagnostics

For service…
NOTE NEW TOLL-FREE
TELEPHONE NUMBERS:

800-621-1253

Williams® ELECTRONICS, INC.

3401 N. California Av.
Chicago, IL 60618

ROM SUMMARY

ROM	PART NO.	DESCRIPTION
ROBOTRON 1B	A-5343-09898	PROM, 4Kx8
ROBOTRON 2B	A-5343-09899	PROM, 4Kx8
ROBOTRON 3B	A-5343-09900	PROM, 4Kx8
ROBOTRON 4B	A-5343-09901	PROM, 4Kx8
ROBOTRON 5B	A-5343-09902	PROM, 4Kx8
ROBOTRON 6B	A-5343-09903	PROM, 4Kx8
ROBOTRON 7B	A-5343-09904	PROM, 4Kx8
ROBOTRON 8B	A-5343-09905	PROM, 4Kx8
ROBOTRON 9B	A-5343-09906	PROM, 4Kx8
ROBOTRON 10B	A-5343-09907	PROM, 4Kx8
ROBOTRON 11B	A-5343-09908	PROM, 4Kx8
ROBOTRON 12B	A-5343-09909	PROM, 4Kx8
Decoder ROM 4 (Horizontal)	A-5342-09694	PROM, 512x8
Decoder ROM 6 (Vertical)	A-5342-09821	PROM, 512x8
Video Sound ROM 3	A-5343-09910	ROM, 4Kx8
Special Chip 1	A-5410-09911	Special Chip

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 produces a sound. Simultaneously general illumination should come on and a moment later a scanning “rug pattern”' indicating the RAM test should appear on the screen. Next the rug should become stationary as the ROM test is performed. In a correctly running game the rug pattern will be followed by the message "INITIAL CHECKS INDICATE: OPERATIONAL". If RAM or ROM failure messages come up on the screen instead, refer to Power-Up Tests in TROUBLESHOOTING PROCEDURES.

GAME OPERATION

GAME START - Insert coins; a random sound is produced and credits are displayed on the CRT. With one or more credits displayed, pressing **1-player start** initiates a l-player, *3-turn game. With two or more displayed, pressing **2-player start** initiates a 2-player, *3-turn game.

PLAYER CONTROLS

MOVE JOYSTICK (LEFT) maneuvers mutant clone (our hero) in any of eight directions: N-NE-E-SE-S-SW-W-NW.

FIRE JOYSTICK (RIGHT) fires anti-robot laser gun in same eight directions.

GAME PLAY

ROBOTS ARE THE ENEMY - The player (represented by the mutant clone) must deactivate six types of robots with a laser gun. However the robots' armada including tanks, electrodes and cruise missiles will be deployed against the mutant. Meanwhile defenseless normal clones must be protected by the mutant or they will be captured and reprogrammed by the robots. Arriving at 25,000* points (or any multiple of 25,000), the mutant is awarded a new opportunity to defend his clone-kinsmen.

HIGH SCORE SIGNATURE

Select letters with the MOVE joystick. Push up to move forward through the alphabet; pull down to move backward. Then push the FIRE joystick up to lock in the letter.

BOOKKEEPING AND EVALUATION TOTALS

1. In Game-Over Mode, open the cashbox and depress the cashbox advance switch. The advance switch located on the coin door can also be used. The CRT should indicate all bookkeeping and evaluation totals. If so, go to step 3. If the CRT display comes up in the ROM test, perform step 2.

2. Continue to depress the cashbox advance switch, stepping the game through test programs for ROMs, RAMs, CMOS RAMs, color RAMs, sounds, switches, and then CRT test patterns, of which there are five. The fifth test pattern, color bars, directly precedes the CRT display of the bookkeeping and evaluation totals.

3. The bookkeeping and evaluation totals appear on the displays as in Figure 1.

CLEARING BOOKKEKPING TOTALS

1. Depress ADVANCE to display Game Adjustments.
2 Operate MOVE joystick to position cursor on CLEAR BOOKKEEPING TOTALS.
3. Push FIRE.
4. Depress ADVANCE.

* Adjustable feature

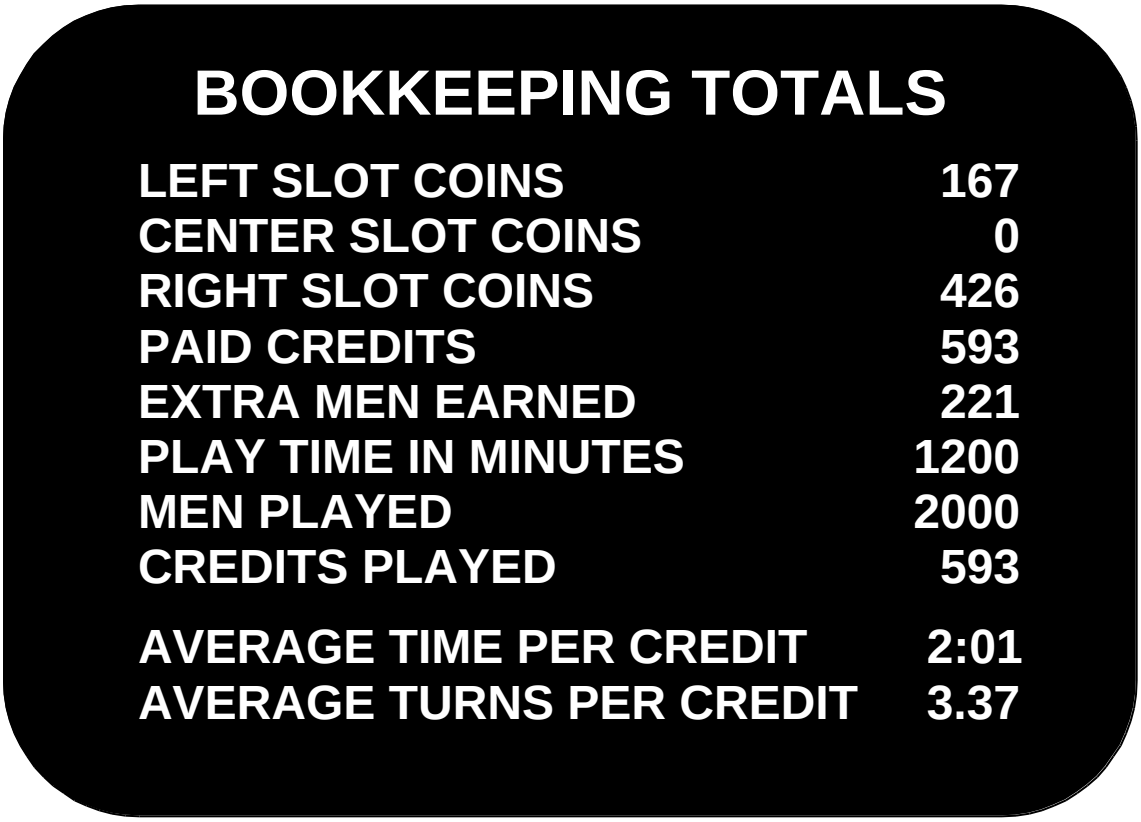


Figure 1. Bookkeeping display

GAME ADJUSTMENTS

In the Game-Over Mode open the coin door with AUTO-UP, and depress the coin door ADVANCE switch twice to cause a CRT display as shown in Figure 2.

To select and then set functions to the desired values, use the MOVE (UP-DOWN) joystick to select the that is to be changed and then, making sure the coin door is open, use the FIRE (UP-DOWN) joystick to increase or reduce the value of the selected function.

The number of turns per game can be set anywhere from 1 to 20 (3 recommended). Difficulty is factory-programmed at 5 (moderate; recommended). It can be custom-programmed as desired.

Game pricing is selected with standard settings or with custom settings as shown in Tables 1 & 2. Table 1 lists some common pricing schemes and directs the reader to the proper entry in Table 2, which shows what the CRT display should look like to accomplish the desired pricing. Note that free play can be elected by entering the code number 9 at the PRICING SELECTION function (see Tables 1 and 2).

For standard settings you need change only the PRICING SELECTION. For custom settings, first set PRICING SELECTION to zero and then set the remaining values according to Table 2.

Figure 2. Game Adjustment

Highest Score Signature

The number of letters allowed the highest scoring player for entering his name can be varied from 3 to 20 and is recommended as 3. If objectionable words are entered as the signature name, you can change the lettered entry leaving the highest score the same. See Setting Highest Score Name.

Restore Factory Settings

1. Position the cursor on RESTORE FACTORY SETTINGS.
2. Push FIRE.
3. Depress ADVANCE.

Resetting High Score Table

1. Position the cursor on RESET HIGH SCORE TABLE.
2. Push FIRE.
3. Depress ADVANCE.

Setting Attract Mode Message

1. Position the cursor on SET ATTRACT MODE MESSAGE.
2. Push FIRE.
3. Depress ADVANCE.
4. Enter up to two lines of your message following instructions on the screen
5. Depress ADVANCE to terminate process.

NOTE:
To restore the Williams attract mode message, it is necessary to perform steps 1 through 3 and then turn the game OFF then ON.

Setting High Score Name

1. Position the cursor on SET HIGHEST SCORE NAME.
2. Push FIRE.
3. Depress ADVANCE.
4. Enter new signature; depress ADVANCE to terminate process.

NOTE:
An alternate, simpler method enters the factory highest score signature. In the game over mode, hold HIGH SCORE RESET Depressed. After a few seconds a sound is produced and the factory highest score signature has been activated

Table 1. Pricing Schemes

COIN DOOR MECHANISM	CREDITS/MONEY	TABLE 2 STANDARD SELECTION/ CUSTOM KEY
Twin Quarter	1/25¢, 5/$1	A
Quarter, Dollar, Quarter	2/50¢, 5/$1	B
	1/25¢, 4/$1	3
	2/50¢, 4/$1	C
	1/50¢, 3/$1, 4/$1.25	D
	1/50¢, 3/$1, 7/$2	E
	1/50¢, 3/$1, 6/$2	1
	1/50¢	5
1DM, 5DM	1/1DM, 6/5DM	2
20-Cent, 50-Cent	1/20¢, 3/50¢	F
1 Franc, 5 Franc	1/2F, 3/5F	4
25 Cent	1/25¢, 4/1G	6
1 Guilder	1/25¢, 5/1G	G
5 Franc	1/5F, 2/10F	7
10 Franc	1/10F	8
1 Franc, 2 Franc	2/1F 5/2F	2
100 Lire, 200 Lire	1/200 Lire	8
Twin Coin	1/1 Coin	3
	1/2 Coins	5
	1/3 Coins, 2 5 Coins	H
1 Unit, 5 Unit	1/2, 3/5	4
	1/1, 5/5	I
	1/3, 2/5	J
FREE PLAY	-	9

Table 2. Pricing Settings

DISPLAY FUNCTIONS	STANDARD SELECTION									CUSTOM KEY									
										A	B	C	D	E	F	G	H	I	J
Pricing Selection	1	2	3	4	5	6	7	8	9	0	0	0	0	0	0	0	0	0	0
Left Slot Units	1	6	1	1	1	1	1	1	1	1	1	1	3	12	6	1	2	1	2
Center Slot Units	4	0	4	16	4	0	0	0	4	4	4	4	12	48	0	0	0	0	0
Right Slot Units	1	1	1	6	1	4	2	2	1	1	1	1	3	12	15	4	2	5	10
Units per Credit	2	1	1	2	2	1	1	2	1	1	1	1	4	14	5	1	5	1	5
Units for Bonus Credit	4	0	0	0	0	0	0	0	0	4	4	0	15	96	0	4	0	0	0
Minimum Units for Credit	0	0	0	0	0	0	0	0	0	0	2	2	0	24	0	0	0	0	0

TROUBLESHOOTING PROCEDURES

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 troubleshooting 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 (RUG PATTERN)	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 DO NOT have an R27. Refer to your drawing set.) (3) Check 4P1/J I, 4P3/J3, 6P2/J2 and 6P3/J3. (4) If all the above don't turn up the problem check power supply board.	(1) Open back doors (2) Press reset button on CPU Board. (3) Try RAM and ROM tests (see below). (4) If all the above 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, – 5V and + 12V outputs on power supply in game. Each MUST BE within 2% of rated output.

MORE POWER-UP TESTS

TEST	ROM BOARD LEDS RECOGNIZE CONDITION	ROM BOARD LEDS IDENTIFY CHIPS	VIDEO	REMEDY
GENERAL	"0" means all power-up tests passed	-	(1) Scanning rug pattern (2) Stationary rug pattern (3) "INITIAL TESTS INDICATE: OPERATIONAL" (4) Game-Over Mode	If any video (see left) is missing or error message is displayed, proceed to **Diagnostic Mode** tests.
CMOS (See Appendix A)	"0" means tests passed	-	"HIGH SCORE TABLE RESET" "BOOKKEEPING TOTALS CLEARED" "ADJUSTMENT FAILURE" "RESTORE FACTORY SEITINGS BY OPENING FRONT DOOR AND TURNING GAME OFF AND ON"	(1) Open coin door and turn power off and on.
	"0" means tests passed	-	"FACTORY SEITINGS RESTORED"	(2) Press ADVANCE. Game should return to Game-Over Mode.
BATTERY (See Appendix A)	"0" means tests passed	-	"HIGH SCORE TABLE RESET" "BOOKKEEPING TOTALS CLEARED" "ADJUSTMENT FAILURE" "RESTORE FACTORY SEITINGS BY OPENING FRONT DOOR AND TURNING GAME OFF AND ON"	(1) Open coin door and turn power off and on. Or press ADVANCE. In either case, game should return to Game-Over Mode. (2) Check AA alkaline cells on CPU Board. (3) If problem persists proceed with CMOS RAM test by putting the game into its **Diagnostic Mode** (see SELF-DIAGNOSTICS).
MEMORY PROTECT INTERLOCK (See Appendix A)	"0" means tests passed	-	"HIGH SCORE TABLE RESET" "BOOKKEEPING TOTALS CLEARED" "ADJUSTMENT FAILURE" "RESTORE FACTORY SEITINGS BY OPENING FRONT DOOR AND TURNING GAME OFF AND ON"	(1) Making and breaking coin door interlock switch, check with VOM and replace if faulty. (2) Replace if faulty: Memory protect gates 6E, IC1, Ql, or CMOS RAM 1C.
SPECIAL CHIP	"0" means tests passed	-	(1) Scanning rug pattern. (2) Blank screen instead of "INITIAL TESTS INDICATE: OPERATIONAL" (3) High score table with no scores. (4) Intro blank or program crash.	(1) Turn power off. (2) To find bad chip replace 2 special chips one at a time with known good chips. (3) Turn Machine on after each replacement and run through Power-Up Tests.

SELF DIAGNOSTICS

If RAM or ROM failure messages are displayed on the CRT after the "rug pattern" proceed with self-diagnostics. Self-diagnostic procedures are controlled by the AUTO-UP/MANUAL-DOWN and ADVANCE switches in the coin door. Set the AUTO-UP/MANUAL-DOWN switch to the MANUAL-DOWN position and depress the ADVANCE pushbutton. The game is now in its **Diagnostic Mode** and a ROM test is performed. With ROM test results present on the CRT display, depressing the ADVANCE pushbutton initiates the RAM test. Further tests (CMOS, sound, switch, color RAM, monitor test patterns) are encountered one after the other as the ADVANCE pushbutton is depressed (once more for each subsequent test).

MONITOR TEST PATTERNS - For ease in monitor adjustments, the monitor may be slid back and the screen viewed in a mirror. Remove the two bolts and carefully slide the monitor back in its shelf; secure the monitor in the extended position by inserting the two bolts though holes in the monitor base and monitor shelf provided at the left side of the monitor.

AUTO CYCLE MODE - From the color bar pattern (or Game Over with the switch set to AUTO-UP) depress ADVANCE two times to display GAME ADJUSTMENTS.

1. Position the cursor on AUTO CYCLE with the MOVE Joystick and push the FIRE joystick up.
2. Depress ADVANCE.
3. The system will now sequence through ROM, RAM, and CMOS RAM tests repeatedly. The coin door must be open during the Auto Cycle test. If an error is detected, the test is terminated and the failure indication is displayed on the CRT.
4. To terminate the Auto-Cycle test, turn the game OFF and ON.

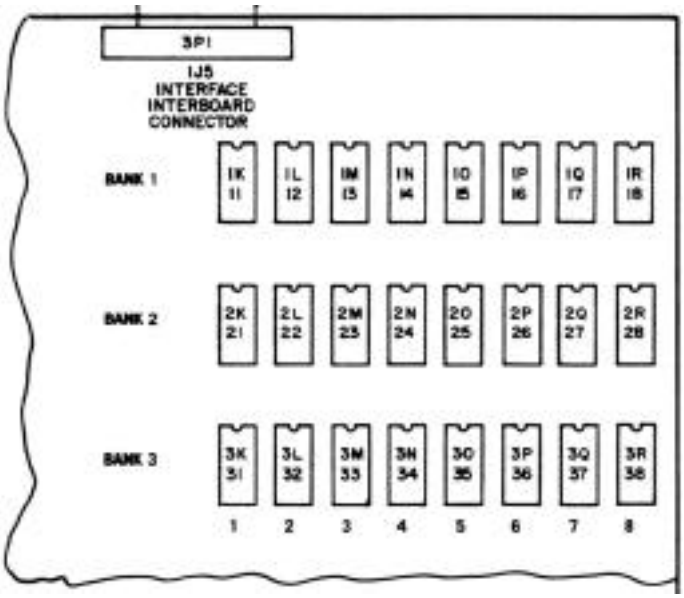
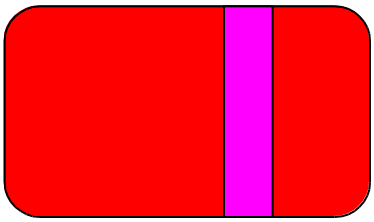


Figure 3. RAM Location and Numbering on the CPU Board (See above)

DIAGNOSTIC MODE RAM AND ROM TESTS				
TEST	**ROM BOARD LEDS RECOGNIZE CONDITION**	**ROM BOARD LEDS IDENTIFY CHIPS**	**VIDEO**	**REMEDY**
ROM	"2" means ROM error.	2-digit ROM chip number	"ROM ERROR" and ROM chip no.	(1) Turn power off. (2) Replace suspected chip.
RAM	"1" means RAM error.	Bank number first . . . then chip number in bank (see figure 3)	"RAM ERROR" followed by RAM bank number and chip number (Note: with multiple RAM failures this display may not appear)	(1) Check for normal voltages on indicated RAM chip: -5v/pin 1, +12v/pin 8, +5v/pin 9. (2) Turn power off. (3) Replace suspected chip. (4) With multiple RAM failures always check power supply. See POWER-UP TESTS.
CMOS (See Appendix A)	"3" means CMOS RAM error	-	"CMOS RAM ERROR OR WRITE PROTECT FAILURE"	(1) Check pin 22 of CMOS RAM for +3.8VDC. If present, replace CMOS chip 1C. If absent replace AA alkaline cells. (2) With new alkaline cells, check for +3.8VDC. If still absent, replace diodes D9 and D10. (3) Upon power-up and re-entry into diagnostics if CMOS error message persists replace memory protect gates 6E, IC1, Ql and address decoder 4G/6J.
SPECIAL CHIP	-	No – indicated by CRT display in color test only.	Thick vertical band indicates color RAM fault	Replace 1 B, 2B or color analogue circuit. If both RAMs appear bad, may actually be flip-flop 1A See Table 3 and Figure 4 for details.

COLOR RAM TEST - TEST 4

(1) CRT SEQUENCES THROUGH COLORS, 2 SECONDS EACH



(2) VERTICAL BAND INDICATES COLOR RAM FAULT.

Figure 3. Color Test

Table 3. Which Color RAM is Bad?

COLOR SEQUENCES	FAULT	
	RAM 1B	**RAM 2B**
1 Light red 2 Red 3 dark red	Too-light or too dark red or gray band	Magenta band
4 Light green 5 Green 6 Dark green	Yellow band	Cyan band
7 Light blue 8 Blue 9 Dark blue	Magenta band	Too-light or too dark blue or gray band
4 Light green	Green band	Dark green band or gray band
5 Green	Light green band	Dark green band or gray band
6 Dark green	-	Grey band

MORE DIAGNOSTIC TEST MODES

Tests 5 and 7 provide sequential subtests. To stop automatic cycling set switch to MANUAL-DOWN. Depress ADVANCE in MANUAL-DOWN to step through subtests.

SOUND TEST - TEST 5

From color RAM test, depress ADVANCE in AUTO-UP.

Table 4. Tracing the Missing Sound

Test sequences, sound lines 1 through 6:	
Missing	Check
1	2P4/lOP3 Pin 3
2	2P4/10P3 Pin 2
3	2P4/10P3 Pin 5
4	2P4/10P3 Pin 4
5	2P4/10P3 Pin 7
6	2P4/10P3 Pin 6
All	Perform sound board diagnostics

SWITCH TEST - TEST 6

CRT indicates AUTO-UP closed and any stuck switches. Set black coin door switch to MANUAL-DOWN and clear any stuck switches. CRT should indicate no switches closed. Operate switches and check for display of switch name.

Table 5. CRT Display for Each Switch

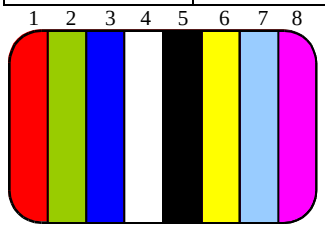
Coin Door	Player Panel
ADVANCE	1- PLAYER START
AUTO-UP	2- PLAYER START
HIGH SCORE RESET	MOVE UP
LEFT COIN (next to hinge)	MOVE DOWN
CENTRE COIN	MOVE LEFT
RIGHT COIN'	MOVE RIGHT
SLAM SWITCH	FIRE UP
	FIRE DOWN
	FIRE LEFT
	FIRE RIGHT

MONITOR SET UP TEST PATTERNS - TEST 7

From Switch Test depress ADVANCE in AUTO-UP. The color bar pattern is also analyzed to detect color RAM faults. If color RAM Test 4 indicates no faults, a double-width band, half width bands, transposition or missing bands indicates a fault in 1A, 1B, 2B or 2C chips.

Table 6. Patterns Indicate Problems

Pattern	Alignment/Adjustment
Cross Hatch	Vertical and Horizontal Linearity, Convergence, Focus
Red Green Blue Color bars	} } Color Purity }



1 = RED
2 = GREEN
3 = BLUE
4 = WHITE
5 = BLACK
6 = YELLOW
7 = CYAN
8 = MAGENTA

Figure 4. Color Bar Pattern

SOUND BOARD DIAGNOSTICS

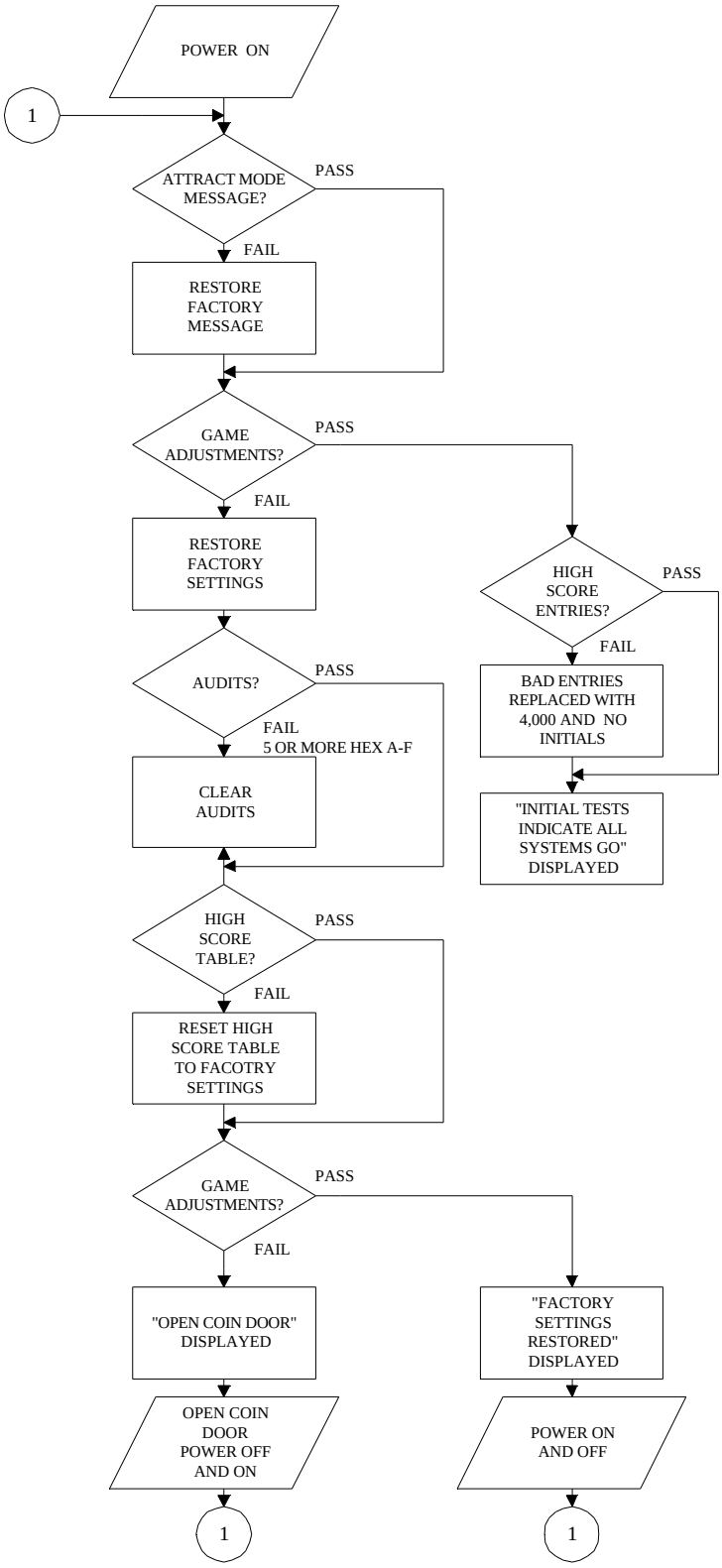
Depress the DIAGNOSTIC pushbutton on the bottom of the Sound Board. A check is made of the Sound ROM and sounds are produced if the check is good. If sounds are produced but not in Audio Test 5 check for ROM board PIA output on Sound Board inputs that are stuck low. If no sound is produced either the Sound ROM, IC12, input power, or other Sound Board circuitry is faulty.

APPENDIX A

CMOS RAM Data Test Protocol

The first sub-test of the CMOS RAM data is that of the ATTRACT MODE MESSAGE checksum. If the test does not pass, the factory ATTRACT MODE MESSAGE is restored. Next, the game adjustments are checked and restored to factory settings if an error is found. If game adjustments are found intact, the high score table is checked for any bad entries. Bad entries are replaced with a score of 4,000 points and no initials. If all entries check, the game returns to the Game Over Mode.

If game adjustments are restored to factory settings, the AUDIT TOTALS are checked. If 5 or more audit digits are other than 0-9 (that is hexadecimal A through F) all audit totals are cleared. This is followed by a check of the high score table and the table is reset to factory settings if errors are found. Finally, game adjustments are rechecked and either OPEN COIN DOOR or FACTORY SETTINGS RESTORED is displayed. With the former, open the coin door and turn the game OFF and ON and then FACTORY SETTINGS RESTORED will be displayed. Return to game over by depressing the ADVANCE pushbutton or by turning the game OFF and ON a second time.



"Warning: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. As temporarily permitted by regulation it has not been tested for compliance pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference. 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