

VECTOR #1247 FEATURE OPERATION & SCORING

A. FLIP-O-METER FEATURE

There is a readout in the center of the playfield which has 2 functions:

- 1) It displays your bonus score when the "Bonus Lite" is on.
- 2) It displays your flip speed and the fastest flip-to-date when the Flip-O-Meter lites are on.

Every time a ball enters the Vector-scan ramp (left side) and trigger the F.O.M. start switch, the F.O.M. readout starts to count down from 999 until the F.O.M. stop switch (right side) is made or to 000 on a slow flip. F.O.M. does not have to be qualified to capture a ball in order to have the readout function—it records your flip speed at all times (first 2 digits $\times$ 1000 is always added to your score if SW. #23 is ON).

A ball hitting the F.O.M. stop switch collects 3000 points for each lit top bonus arrow. It is then kicked back up onto the playfield or, if qualified to capture, down into the captive ball area.

Beating the fastest Flip-to-Date scores 1 special.

F.D.S. #14 allows more players to beat the fastest flip-to-date.

F.D.S. #14 ON — Self percentaging; every 8th game, the fastest flip-to-date is lowered by 20 points.
OFF—No change.

F.D.S. #24 ON — 700 FLIP SPEED awards X-Ball and lites one outlane special lite.
OFF—750 FLIP SPEED awards X-Ball and lites one outlane special lite.

F.D.S. #23 ON — First two numbers of flip speed are multiplied by 1000 and added to your score every time the ball is shot through the ramp.
OFF—First two numbers $\times$ 1000 only when F.O.M. qualified to capture a ball.

B. FLIP-O-METER DROP TARGETS 1-6 FEATURE

At the start of a game, targets 1, 2, and 3 (top level by F.O.M. entrance ramp) are up. If these targets are knocked down in sequence, you score 10K and qualify the F.O.M. to capture a ball (if F.D.S. #6 is ON; if #6 is OFF, 4-5-6 pop up).

If you knock down 1-2-3 out of sequence, 4-5-6 pop up; then you have to knock down 4-5-6 to qualify the F.O.M. to capture a ball. Making both V return lanes drops the next target in the 1-6 sequence. Targets 1-2-3 reset when a ball is captured and on a new ball (if switch #16 is OFF).

The 1-6 F.O.M. drop targets are controlled by F.D.S.'s #6, #15, and #16:

SWITCH #6: ON — 1-2-3 qualifies F.O.M. to capture.
OFF—1-2-3 does not qualify F.O.M. to capture. 4-5-6 pop up.
SWITCH #15: ON — 4-5-6 memory W/F.O.M. qualified on new ball.
OFF—4-5-6 reset W/F.O.M. qualified on new ball.
SWITCH #16: ON — Targets 1-6 on memory recall W/F.O.M. not qualified.
OFF—Targets 1-6 not on memory W/F.O.M. not qualified 1-2-3 resets on new ball.

C. F.O.M. DROP TARGET LITES 1-2-3

At the start of a new game, the 1-2-3 target lites are flashing. Each lite goes off when you drop its corresponding target. The lites always reset to the flashing mode whenever the bank resets.

If you start to hit the targets in sequence the remaining lites will continue to flash you will qualify the F.O.M. to capture a ball when you complete the sequence (if #6 is not ON).

If you hit the targets out of sequence, the remaining lites will stop flashing; upon completion of the top bank, the foremost bank (4-5-6) will reset up and the arrow will then flash and strobe randomly until the foremost bank is knocked down.

D. READOUT BONUS

advanced by X-Y-Z targets—3 adv.
advanced by T.B.—3 adv.
advanced by 1-6 D.T.s—3 adv. = 9 adv.
advanced by H-Y-P-E targets—3 adv.
advanced by return lanes—3 adv.
advanced by outlanes—3 adv.

Collected in outhole; resettable from ball-to-ball or in memory.

F.D.S. #21 ON — Memory of readout bonus.
OFF—Reset ball-to-ball.

E. VECTOR BONUS

advanced by H-Y-P-E targets (SW #30 ON) (SW. #30 OFF = advance only W/L).
advanced by top R.O.B.
advanced by return lane.

Collected in outhole and bottom saucers; multipliers only in effect in outhole. A special is awarded for 20K + 19 steps. Only 1 special per game.

F.D.S. #30 ON — H-Y-P-E advances always.
OFF—H-Y-P-E advances only W/L.

F. H-Y-P-E BONUS ARROWS FEATURE

The outhole and the top F.O.M. stop switch scores 3000 points for each lit arrow. Arrows lite from the H-Y-P-E feature.

When the F.O.M. is qualified to capture a ball, all of the arrows strobe left to right; if any arrows are lit when the strobing begins, they stay lit and only go off and only in the sequence of the strobing to indicate strobing.

G. H-Y-P-E FEATURE

At the start of a new ball, all of the H-Y-P-E lites are flashing. The lites go off when you hit their corresponding targets. The lites always reset to the flashing mode.

If you start to hit the targets in order (H-Y-P-E), the remaining lites continue to flash and you will lite all 8 of the bonus arrows at the top if the playfield upon completion, score 10K for completing them in sequence lite the readout bonus multiplier (2X or 3X, which ever is the next increment) and reset H-Y-P-E.

If you hit the targets out of order, the remaining lites reset and the "Release all Ball" arrow starts to flash. Making H-Y-P-E in order now keeps the lites flashing and releases all the balls that you have captured (your qualified balls). Making H-Y-P-E out of order turns off this arrow and stops the lites from flashing — (this arrow comes back on when H-Y-P-E is reset and at the start of a new ball if you have qualified balls captured).



H. H-Y-P-E LAST BALL FEATURE

There is a special feature that is available only on the last ball of each player's turn.

If you have captured any balls previously in the game and you hit H-Y-P-E in sequence, you will release them. If you hit H-Y-P-E out of sequence, you will release only 1 ball. (Release one ball arrow comes on). This out of sequence feature can only be used once per game and only on the last ball, if you have captured balls previously.

I. CAPTIVE BALL FEATURE

Targets 1-2-3 in sequence (and 4-5-6 if F.D.S. #6 is OFF) or targets 1-2-3-4-5-6 out of sequence qualifies the F.O.M. speed shot to capture a ball. When qualified, the "Capture W/L" lite flashes, along with the strobing of the top bonus arrows. (See H-Y-P-E feature), and upper panel G.I. flash.

If a ball enters the top saucer without being qualified to be captured, it will be kicked up onto the playfield.

If a ball enters the top saucer qualified to be captured, it will be kicked down into the captive ball area (see F.O.M. feature) and qualifier lite will come on drop targets 1-2-3 reset every time a ball is captured; plunger lites flash when a new ball is kicked out to the plunger after a ball is captured.

The balls that you have captured are remembered from ball-to-ball with these qualifier lites. If some other player releases the balls that you have captured, your qualifier lites will still remain on; then, your next shots into the top saucer will replace the balls that you lost whether or not targets 1-6 are down.

You can release your captured balls by capturing all 3 balls or by hitting the H-Y-P-E targets (see H-Y-P-E feature).

F.D.S. #22 ON —Voice on game start
OFF—No Voice

J. X-Y-Z DROP TARGET FEATURE

At the start of a new ball, the X-Y-Z drop target lites are flashing. Each lite goes off when you drop its corresponding target. The lites always reset to the flashing mode. Knocking down the targets scores the lit value. This value is adjustable by two fixed data switches.

SWITCH #7 ON— 2x-3x-5x-25K—SPL
(lite value always scores and advances)

(LIBERAL)

OFF—	2x	Qualify	- 3x -	Qualify	- 5
		Next		Next	
		Lite		Lite	
		Qualify	- 25K -	Qualify	- SPL
		Next		Next	
		Lite		Lite	

(lit value advances every other time)

If you start to hit the target in the X-Y-Z sequence, the remaining lites will continue to flash, you will score 10K in addition to the lit value and drop one F.O.M. defending target upon completion of the bank.

If you hit the targets out of sequence, the remaining lites will stop flashing and remain on until hit.

You will score only the lit value upon completion of the bank.

These targets also reset when a ball is captured in addition to the completion of the bank and on a new ball.

K. TOP R.O.B. FEATURE

Each ball starts with the 5000 value. Every time a ball goes over the button, it scores the lit value and advances the lite to the next value. Once the value reaches 25,000, it remains there for the rest of the ball.

L. THUMPER BUMPER FEATURE

Bumper scores 5,000 + 3 bonus advances on 3 + 5 ball.

M. SPECIAL REPLAY/X-BALL/NOVELTY MODES

Self test positions 16 and 17 give the operator flexibility to award a replay ball or score (Novelty) when a special is scored. A combination of X-Ball Novelty can be obtained through the following chart.

Self test position 16
Playfield X-Balls and Specials
X-Y-Z drop target Special
Bonus Special
Left or right out Special
Gate and Top right lane feature X-Ball
Self-Test Position 17

Set to "03"	Set to "02"	Set to "01"
AWARD	AWARD	AWARD
REPLAY	X-BALL*	50,000
REPLAY	X-BALL*	50,000
REPLAY	X-BALL*	50,000
X-BALL	X-BALL**	25,000
Set to "03"	Set to "02"	Set to "01"
AWARD	AWARD	AWARD
REPLAY	X-BALL**	NO AWARD

Scoring Thresholds

(*) 50,000 if same player shoot again is it.

(**) 25,000 if same player shoot again is it.

V. GAME ADJUSTMENTS

A. Playfield Panel Post Adjustments:

Posts that control left and right outlane opening on panel can be removed to make access to outlanes easier or harder for ball to enter. See Figure II.

Easier entry will decrease playing time and scoring (conservative).

Harder entry will increase playing time and scoring (liberal).

B. Back Box Game Adjustments:

Each game has thirty-two switches located on A4, the MPU module, located in the back box, that allow play to be customized to the location. See Figure III. Credits per coin, maximum credits, credit display, balls per game, match feature, high game feature, special award and melody are selectable by means of the switches. The switches are contained in four sixteen lead packages numbered S1-8, S9-16, S17-24, and S25-32 for easy identification. The "ON" toggle position is marked on the assembly. **Turn off power before making adjustments.**

Credits/Coin Adjustments:

The credits per coin are selectable by means of switch S20 for coin chute #2 (Center). The switch settings and resultant credits/coin are as follows:

S20	S19	S18	S17	Credits/Coin	S20	S19	S18	S17	Credits/Coin
OFF	OFF	OFF	OFF	Same as Coin Chute #1 Settings	ON	OFF	OFF	OFF	8/1 Coin
OFF	OFF	OFF	ON	1/1 Coin	ON	OFF	OFF	ON	9/1 Coin
OFF	OFF	ON	OFF	2/1 Coin	ON	OFF	ON	OFF	10/1 Coin
OFF	OFF	ON	ON	3/1 Coin	ON	OFF	ON	ON	11/1 Coin
OFF	ON	OFF	OFF	4/1 Coin	ON	ON	OFF	OFF	12/1 Coin
OFF	ON	OFF	ON	5/1 Coin	ON	ON	OFF	ON	13/1 Coin
OFF	ON	ON	OFF	6/1 Coin	ON	ON	ON	OFF	14/1 Coin
OFF	ON	ON	ON	7/1 Coin	ON	ON	ON	ON	15/1 Coin

The credits given are selectable by means of switches 1-5 incl., for coin chute #1 and switches 9-13 incl., for coin chute #3. Thirty-one different credit ratios are available for each coin chute. The switch settings and resultant credits/coin are listed below.

CREDITS/COIN ADJUSTMENTS

COIN CHUTE	SWITCHES					CREDITS	CREDITS	CREDITS	CREDITS	CREDITS	TOTAL CREDITS/COINS
#1 (HINGE SIDE) OR #3 (RIGHT SIDE)	5	4	3	2	1						
	13	12	11	10	9						
OFF	OFF	OFF	OFF	OFF	OFF	1/1 Coin					
OFF	OFF	OFF	OFF	ON	ON	2/1 Coin					
OFF	OFF	OFF	ON	OFF	OFF	3/1 Coin					
OFF	OFF	OFF	ON	ON	ON	4/1 Coin					
OFF	OFF	ON	OFF	OFF	OFF	5/1 Coin					
OFF	OFF	ON	OFF	ON	ON	6/1 Coin					
OFF	OFF	ON	ON	OFF	OFF	7/1 Coin					
OFF	OFF	ON	ON	ON	ON	8/1 Coin					
OFF	ON	OFF	OFF	OFF	OFF	9/1 Coin					
OFF	ON	OFF	OFF	ON	ON	12/1 Coin					
OFF	ON	OFF	ON	OFF	OFF	14/1 Coin					
OFF	ON	OFF	ON	ON	ON	1/2 Coins*					
OFF	ON	ON	OFF	OFF	OFF	2/2 Coins*					
OFF	ON	ON	OFF	ON	ON	3/2 Coins*					
OFF	ON	ON	ON	OFF	OFF	4/2 Coins*					
OFF	ON	ON	ON	ON	ON	5/2 Coins*					
ON	OFF	OFF	OFF	OFF	OFF	6/2 Coins*					
ON	OFF	OFF	OFF	ON	ON	7/2 Coins*					
ON	OFF	OFF	ON	OFF	OFF	8/2 Coins*					
ON	OFF	OFF	ON	ON	ON	9/2 Coins*					
ON	OFF	ON	OFF	OFF	OFF	12/2 Coins*					
ON	OFF	ON	OFF	ON	ON	14/2 Coins*					
ON	OFF	ON	ON	OFF	OFF	1/1st Coin	2/2nd Coin				3/2
ON	OFF	ON	ON	ON	ON	0/1st Coin*	1/2nd Coin				3/4
ON	ON	OFF	OFF	OFF	OFF	0/1st Coin*	1/2nd Coin	0/3rd Coin**	1/4th Coin		3/4
ON	ON	OFF	OFF	ON	ON	1/1st Coin	1/2nd Coin	1/3rd Coin	2/4th Coin		5/4
ON	ON	OFF	ON	OFF	OFF	1/1st Coin	2/2nd Coin	1/3rd Coin	3/4th Coin		7/4
ON	ON	OFF	ON	ON	ON	1/1st Coin	2/2nd Coin	2/3rd Coin	2/4th Coin		7/4
ON	ON	ON	OFF	OFF	OFF	0/1st Coin***	0/2nd Coin***	1/3rd Coin			1/3
ON	ON	ON	OFF	ON	ON	0/1st Coin***	0/2nd Coin***	0/3rd Coin**	1/4th Coin		1/4
ON	ON	ON	ON	OFF	OFF	0/1st Coin****	0/2nd Coin****	0/3rd Coin****	0/4th Coin****	1/5th Coin	1/5
ON	ON	ON	ON	ON	ON	0/1st Coin****	0/2nd Coin****	1/3rd Coin	0/4th Coin****	1/5th Coin	2/5

*No Credits until 2nd coin is dropped.

**No Credits until 4th coin is dropped.

***No Credits until 3rd coin is dropped.

****No Credits until 5th coin is dropped.

MAXIMUM CREDITS:

The maximum credits accepted by the machine limits the number of games that can be accumulated by coining, by winning replays or both. The maximum number of credits is selectable by means of switches 25 and 26. Four credit limits are available. Switch settings are listed below.

MAXIMUM CREDITS	SWITCHES	
	26	25
10	OFF	OFF
15	OFF	ON
25	ON	OFF
40	ON	ON

BALLS PER GAME:	# BALLS /GAME	SWITCHES		32	31
	5			OFF	ON
	4			ON	OFF
	3			OFF	OFF
	2			ON	ON

MATCH FEATURE:

When the Match Feature is ON, a random number appears on the Match/Ball in Play window and the word Match is illuminated. If the number matches the tens digit in a player's score, a free game is awarded. The Match Feature creates an incentive to play.

CREDIT DISPLAY:	MATCH	SWITCH 28
	ON OFF	ON OFF
CREDITS DISPLAYED	SWITCH 27	
	ON OFF	

HIGH SCORE FEATURE:

The game is designed to award an Extra Ball or Free Game at each of the two or three score levels. See Front Door Game Adjustments.

AWARD	SELF TEST POSITION 16	SELF TEST POSITION 17
	SET TO "03"	SET TO "03"
	SET TO "02"	SET TO "02"
	SET TO "01"	SET TO "01"
	SET TO "00"	SET TO "00"

For combinations of replay/X-ball/Novelty Modes see page 4A "K. Special Replay/X-ball/Novelty Modes"

HIGH SCORE TO DATE OR OVER 10,000,000 SCORE FEATURE:

The game is designed to award free games as an option if high score to date is beat or player exceeds 10,000,000 points. Each time this happens, the winning score becomes the new high score to beat. This score is displayed on all 4 player score displays at the end of each game as an incentive to play. Recommended setting is underlined.

HIGH SCORE TO DATE FEATURE	SELF TEST POSITION 19
No Award	SET TO "00"
One Credit	SET TO "01"
Two Credits	SET TO "02"
<u>Three Credits</u>	SET TO "03"

State and local laws may regulate the use of the above features, and they have been designed to allow for appropriate adjustment in order to conform to such requirements.

#1247 VECTOR

SOUND OPTION

The game is designed to make several tones and noises to announce power-up, game-up etc. The tones are intended to attract attention to the game and increase game usage. The tones are controlled by pressing self test button until the #18 shows on the match/ball in play display. Now pulse replay button to desired sound setting.

Setting "00," "01"

Most switches associated chimes without feature background.

Setting "02"

Most scoring will have noise effect without background.

Setting "03"

Most all scoring will have a noise effect with background.

NOTE: To correct clarities of speech and sound, adjust controls as follows:

- Turn remote volume control on front door all the way up.
- Turn the speech volume control on the printed circuit board full clockwise, then counterclockwise until speech is clear and understandable.
- Turn the sound volume control full clockwise, then turn counterclockwise until sound is not garbled.
- Then adjust remote volume control to desired volume level.

GAME FEATURE OPTIONS

Lower 3 left side drop target adjustment:

Liberal	SW. 6 ON	Making 3 upper left side targets will not reset 3 lower targets.
Conservative	SW. 6 OFF	Making 3 upper left side targets will reset 3 lower targets.

X-Y-Z drop targets spots multipliers lite adjustment:

Liberal	SW. 7 ON	Multipliers lite stays on till 2X, 3X, 5X bonus lites are made.
Conservative	SW. 7 OFF	Multipliers lite will be off then alternate.

X-Y-Z drop targets special lite adjustment:

Liberal	SW. 8 ON	25,000 lites then special then keeps on alternating.
Conservative	SW. 8 OFF	25,000 lites then special then 25,000 which stays on.

Vectorscan to date readout adjustment:

Liberal	SW. 14 ON	After every set of 8 total games played, whether 1 or more player will decrease readout by 20,000.
Conservative	SW. 14 OFF	Readout can only be decreased manually.

Vectorscan capture ball lite On, 3 lower left side targets adjustment:

Liberal	SW. 15 ON	With lite on 3 lower targets will go back down.
Conservative	SW. 15 OFF	With lite on 3 lower targets will reset.

Vectorscan capture ball lite Off, 3 upper and lower targets adjustment:

Liberal	SW. 16 ON	With lite off any targets down will go back down.
Conservative	SW. 16 OFF	With lite OFF targets down will reset.

Vectorscan bonus score readout adjustment:

Liberal	SW. 21 ON	Any bonus score readout will come back on for next ball.
Conservative	SW. 21 OFF	Any bonus score readout will reset to 1.

Coined game voice adjustment:

SW. 22 ON	Voice says "I Am A P.A.C. ... play analysis Computer ... for your vector game play.
SW. 22 OFF	No Voice

Capture ball lite, vectorscan speed readout scoring adjustment:

Liberal	SW. 23 ON	Scores in top saucer first 2 numbers by thousands whether capture ball lite is on or not.
Conservative	SW. 23 OFF	Scores only when capture ball lite is on.

Vectorscan score readout threshold special and extra ball adjustment:

Liberal	SW. 24 ON	Hitting vector speed 750 or over will lite right out special and shoot again.
Conservative	SW. 24 OFF	Hitting vector speed 800 or over will lite right out special and shoot again. (Note hitting over 850 lites left and right out specials)

Number of games replays per game adjustment:

Liberal	SW. 29 ON	All replays earned will be collected.
Conservative	SW. 29 OFF	Only 1 replay per player per game.

H-Y-P-E target bonus advances adjustment:

Liberal	SW. 30 ON	Hitting targets advance bonus every time.
Conservative	SW. 30 OFF	Advances bonus only when lite is lit.

C. FRONT DOOR GAME ADJUSTMENTS

High Score Feature Adjustments:

The game is designed to award an extra ball (option) or a free game at each of three score levels. The recommended levels are on the score card in the game.

Any level from 10,000 to 9,990,000 can be set, as desired. It is also possible to reset or turn off (00) any or all of the levels, if desired.

1. Push and release Self-Test button (See Figure III) at one second intervals approximately six times or until identification number 01 appears on the 'Match/Ball in Play' display.
2. The number on the Player Score Displays is the score level.* It can be increased, if desired, by holding the credit button in. To decrease the score level, hold the credit button in and depress and release the Self-Test button. Release the credit button when the desired number appears. Note that the level changes 10,000 points at a time. If the number '00' is left on the displays, the high score feature is eliminated for that level.
3. Repeat steps 1 and 2 for the second and third score levels. The identification numbers '02' and '03' on the Match/Ball in Play display are for the second and third levels, respectively.

High Score to Date and 10,000,000 Feature:

The game is designed to award free games when 'High Score to Date' is beat, or if the player exceeds 10,000,000 points.

It is recommended that the level, which will build with play, be periodically reset to the factory recommended level to encourage game play. The adjustment procedure is the same as for the High Score Feature Adjustment, Steps 1 and 2. Continue pushing the Self-Test button until the identification number '04' appears on the 'Match/Ball in Play' display and then do Step 2.

Any level from '00' to 9,990,000 can be set as described. It is to be noted that '00' does NOT turn off the feature, as it does on High Score feature. The feature is turned off by self test position 19 as discussed under 'Back Box Game Adjustments'.

SELF TEST SETUP FOR 16-22:

To set up positions 16-22 push and release self test button till 16 shows on match/ball in play. Now pulse replay button for recommended setup from "00" thru "03." Repeat for positions 17, 18, 19 or 22. Positions 20, 21 setups go from "00" thru "15."

SOUND

In addition to individual volume controls for speech and other game sounds on the Squawk and Talk Board. There is also a Master Volume Control located on the front door. (refer to page 10)

Please note that these module volume controls should be adjusted prior to setting the control on the front door.

*Can be quickly set to '00' by pressing S33 on the MPU assembly in the back box or Coin Chute switch #3. (See Figure III).

#1247 VECTOR RECOMMENDED SETTINGS

RECOMMENDED REPLAY GAME SETTING FOR:

		3-BALL	5-BALL
LOWER 3 LEFT SIDE DROP TARGET	SW. 6	OFF	OFF
X-Y-Z DROP TARGETS MULTIPLIERS LITE	SW. 7	OFF	OFF
X-Y-Z DROP TARGETS SPECIAL LITE	SW. 8	OFF	OFF
VECTORSCAN TO DATE READOUT	SW. 14	OFF	OFF
VECTORSCAN CAPTURE BALL LITE ON, 3 LOWER LEFT SIDE TARGETS	SW. 15	ON	OFF
VECTORSCAN CAPTURE BALL LITE OFF, 3 UPPER AND LOWER TARGETS	SW. 16	OFF	OFF
VECTORSCAN BONUS SCORE READOUT	SW. 21	OFF	OFF
COINED GAME VOICE	SW. 22	ON	ON
CAPTURE BALL LITE, VECTORSCAN SPEED READOUT SCORING	SW. 23	OFF	OFF
VECTORSCAN SCORE READOUT THRESHOLD SPECIAL AND EXTRA BALL	SW. 24	OFF	OFF
NUMBER OF GAMES REPLAYS PER GAME	SW. 29	ON	ON
H-Y-P-E TARGET BONUS ADVANCES	SW. 30	OFF	OFF
BALLS PER GAME	SW. 31	OFF	ON
BALLS PER GAME	SW. 32	OFF	OFF

REPLAYS

Instruction Card
Score Card
Major Mode

Match
High Score to Date

3-BALL

M-1508-104-E1
M-1508-104-B
Self Test Position 16, 17
Set to "03"
SW. 28 ON
Self Test Position 19
Set to "03"

5-BALL

M-1508-104-E1
M-1508-104-A
Self Test Position 16, 17
Set to "03"
SW. 28 ON
Self Test Position 19
Set to "03"

X-BALL

Instruction Card
Score Card
Major Mode

Match
High Score to Date

M-1508-104-F
M-1508-104-A W/00
Self-Test Position 16, 17
Set to "02"
SW. 28 OFF
Self Test Position 19
Set to "00"

NOVELTY

Instruction Card
Major Mode

Match
High Score to Date

M-1508-104-G
Self Test Position 16, 17
Set to "01"
SW. 28 OFF
Self Test Position 19
Set to "00"

M-1508-104-G
Self Test Position 16, 17
Set to "01"
SW. 28 OFF
Self Test Position 19
Set to "00"

VIII. ROUTINE MAINTENANCE ON LOCATION:

Self-Test routines are written into the game design. They are particularly useful for routine maintenance. The tests are described below. The first test is automatic and occurs on power-up. This test causes the MPU module A4 to examine itself for failures. Seven flashes of an LED indicates proper operation. The second series of self-diagnostic tests causes the MPU to 'exercise' each of the other modules in such a way as to make their faults, if any, obvious. See Figure III and Page ii.

It is recommended that these tests be used several times a week to check out the games before play. If faults are discovered, they may be corrected on location if the operator has a stock of replacement modules. See "Trouble Shooting on Location."

MPU Module Self-Test:

At power on, the LED on the MPU module flashes once. (Flicker-Flash). After a pause, it flashes six more times and goes out. A power-up tune is played to announce game readiness. This indicates proper MPU operating condition and successful completion of the power-up test.

Game Self-Diagnostic Tests:

1. Pressing the Self-Test button inside the door initiates the Self-Test routine. See Figures III and IV. All switched lamps flash off and on continuously.
2. Pressing the Self-Test button again causes each digit on each display to cycle from 0 thru 9, and repeat continuously.
3. Pressing the Self-Test button again causes each solenoid to be energized, one at a time, in a continuous sequence. Hold both flipper buttons 'in' during this test. The number appearing on the Player Score displays is the same as the number assigned to the solenoid. The sound of a solenoid pulling-in as a number appears indicates proper operation. The absence of sound is improper. If sound is absent, see Page 17 for help in Solenoid identification.
4. Pressing Self-Test button again causes the sound module to play the "Game Over" tune repeatedly.
5. Pressing the Self-Test button again causes the MPU to search each switch assembly for stuck contacts. If any are found, the number of the first set encountered is flashed on the Player Score displays. The number remains until the fault is cleared. See Page 17 for help in Stuck Switch identification. Other numbers may follow if more stuck contacts are present. If there are no stuck switches, the Match/Ball in Play display flashes "0".
6. Pressing the Self-Test button 22 more times causes the MPU to step thru the threshold and bookkeeping functions described previously and finally to repeat the power-up test. For more rapid exit to power-up, turn the game off, then on. The game is now ready to play.

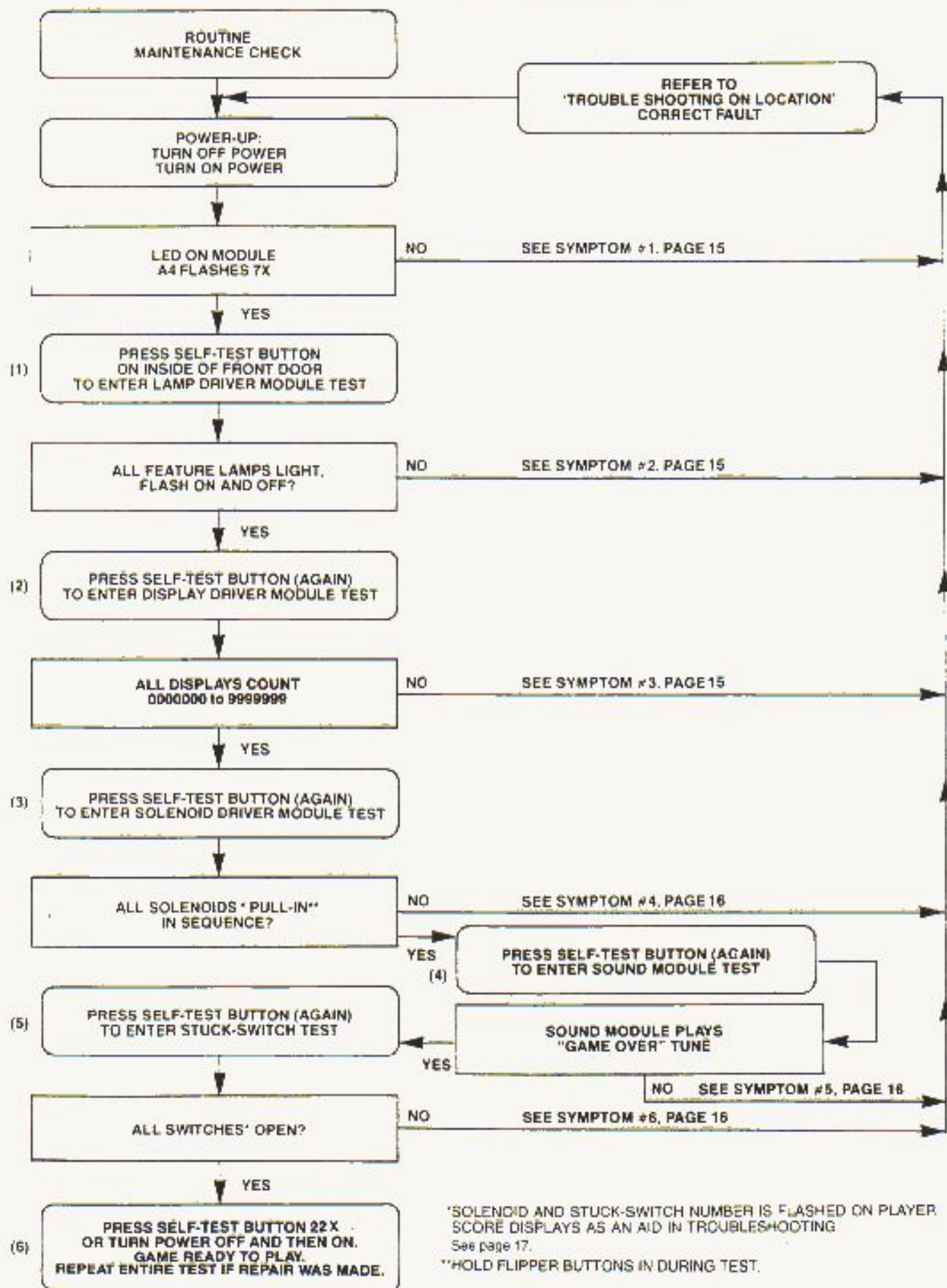
After successful completion of the Self Diagnostic Test procedure, set the game up for play. Exercise each rollover, thumper-bumper, slingshot, etc., by hand until each switch assembly on the playfield has been checked for proper operation. If actuating a switch assembly results in intermittent or no response, clean contacts by gently closing them on a clean business card or piece of paper and wiping until they wipe clean. Regap, if necessary, to 1/16". **Do not burnish or file Gold Plated Switch Contacts.**

IX. TROUBLESHOOTING ON LOCATION

The game is designed to make troubleshooting easy. Several simple procedures are given herein that cover the greatest percentage of game failures. They are written for an operator on location and require module replacement. (See Figure III) Symptoms and the action to be taken are given for each type of problem.

If the problem is more complicated and is not solved by following this procedure, more detailed procedures are available from Bally. See the Parts List for ordering information.

FIGURE IV SELF DIAGNOSTIC TEST



- 1A) SYMPTOM:** Game does not play power-up tune when power is turned on. General illumination is present.
- ACTION:**
- A)** Turn power OFF. Open back box. Locate light emitting diode (LED) on MPU module A4.
 - B)** Turn Power ON. LED must flash 7X to indicate that module A4 is good. Correct flash sequence is flicker/flash-pause-and then six more flashes and LED goes out.
 - C.** If LED does not come on, or does not flash, or flashes, but less than 7X, turn off power. Replace MPU module A4.
- CAUTION:** **Replacement MPU Module must have same Part Number or incorrect operation will result! See Parts List for MPU Module Part Number.**
- Turn power ON.
- D)** If game is correct, it is now ready for play. If game is not correct, refer to Module Replacement procedure. (See Parts List.)
- 2A) SYMPTOM:** Not all feature lamps light during game play.
- ACTION:**
- A)** With power ON, open front door. Press button (Self Test switch) once. If the game is correct, **all** feature lamps flash ON and OFF.
 - B)** Carefully raise playfield or open back box to gain access to lamps
 - C)** Replace bulbs that do not flash.
 - D)** If game is correct, it is now ready for play.
 - E)** If game is not correct, turn power OFF. Replace Lamp Driver Module A5. Turn power ON and repeat A.
 - F)** If game is correct, it is now ready for play.*
 - G)** If game is not correct, turn power OFF. Replace MPU module A4. See CAUTION, 1C. Turn power ON and repeat A.
 - H)** If game is correct, it is now ready for play.* If game is not correct, refer to Module Replacement procedure. (See Parts List.)
- 2B) SYMPTOM:** One or some switched lamps always ON.
- ACTION:** Repeat 2AA, AB, AE, and AF and, if necessary AG & AH.
- 3A) SYMPTOM:** Display digits improper on **one** or **several**, but less than all Display Driver module(s). A1. Improper: One or several segments always OFF, digits mottled or several segments or digit(s) always ON.
- ACTION:**
- A)** With power ON, open front door. Press button (Self-Test switch) twice. If the game is correct, each digit on each Display Driver Module A1 (5 used/game) displays the count 1-9 and 0 continuously in all 6 digit positions. Note defective Display Driver modules.
 - B)** Turn power OFF.
- CAUTION: High Voltage is supplied to the Display Driver Modules, A1, from the Solenoid Driver/Voltage Regulator Module A3. Wait 30 seconds for High Voltage to Bleed Off.**
- C)** Replace Display Driver module(s) A1. Turn power ON. Repeat A.
 - D)** If game is correct, it is now ready to play.* If game is not correct, refer to Module Replacement procedure. (See Parts List.)
- 3B) SYMPTOM:** All displays improper (all five display Driver modules). Improper: Digit(s) always on or off/segment(s) always on or off, all displays.
- ACTION:**
- A)** Repeat 3AA, and AB.
 - B)** Replace MPU module A4. See CAUTION NOTE, 1C. Turn power ON. Repeat A.

- C) If game is correct, it is now ready to play.* If game is not correct, refer to Module Replacement procedure. (See Parts List.)
- 3C) **SYMPTOM:** One or several displays always off.
ACTION: A) Do 3AA, AB, AC, and AD.
 B) Repeat 3BB and BC, if necessary.
- 4A) **SYMPTOM:** Solenoid(s) do(es) not pull-in during course of game.
ACTION: A) With power ON, open front door. Press button (Self-Test switch) three times.
 B) If game was correct, each solenoid would be energized. A number is flashed on the Player Score displays as each solenoid is pulsed. Note any numbers that do not have the sound of a solenoid associated. See Solenoid Identification Table, Page 17 and Figure V.
 C) Carefully lift the playfield (or open the back box) to gain access to the solenoid. Turn power OFF. Inspect the solenoid.
 D) If a lead is broken off, repair. Repeat A & B. If game is correct, it is now ready for play.* If solenoid wiring was correct, turn power OFF.
 E) Replace Solenoid Driver/Voltage Regulator module A3. See CAUTION NOTE 3AB.
 F) Repeat AA & AB. If game is correct, it is now ready to play.* If game is not correct, turn power OFF.
 G) Replace Sound Module A8.
 H) Repeat AA and AB if game is correct. It is now ready to play. If game is not correct, turn power OFF.
 I) Replace MPU module A4. See CAUTION NOTE, 1C.
 J) Repeat A & B. If game is correct, it is now ready to play.* If game is not correct, refer to Module Replacement Procedure. (See Parts List.)
- 4B) **SYMPTOM:** Solenoid(s) always energized—Note: if impulse solenoids (ball ejects, slingshots, thumper-bumpers, etc.) are energized continuously, they are subject to damage. Limit troubleshooting to one minute with power ON, followed by **five minutes with power OFF**. Repeat as necessary. Replace damaged solenoids.
ACTION: Do 4AA, AB, AE, AF, AG, AH and if necessary, AI and AJ.
- 5) **SYMPTOM:** No Sound.
ACTION: A) With Power ON, open front door, press Self-Test switch four times.
 B) Turn volume control clockwise to Max.
 C) If correct, sound will be heard. If incorrect, try seating speaker lead connector (J2) and input connector (J1).
 D) If correct, sound will be heard. If incorrect, refer to Module Replacement procedure."
- 6) **SYMPTOM:** Feature (Drop Targets, etc.) does not score.
ACTION: A) With power ON, open front door. Press button (Self-Test switch) five times.
 B) If the game is correct. Match/Ball in Play display would flash '0'. If a number appears on the Player Score displays, see Switch Assembly Identification Table, Page 17 and Figure V.
 C) Carefully lift the playfield. Locate the switch assembly identified from the number. Visually inspect the switch assembly. If the contacts are 'stuck,' regap them to 1/16". See section under ADJUSTMENTS. Repeat A & B. If the game is correct, it is now ready to play.* If game is not correct, turn the power OFF.
 D) Replace MPU module A4. See CAUTION NOTE 1, C.
 E) Repeat A & B. If the game is correct, it is now ready to play.* If the game is not correct, refer to Module Replacement Procedure. (See Parts List).
- 7) **SYMPTOM:** Game blows fuse(s) repeatedly.
ACTION: See Module Replacement Procedure. F.O. 560

*Turn power On-Off switch OFF and then ON