



PARTS: (561) 253-3311 PARTS FAX (561) 493-2990
SERVICE: (561) 253-3310



TRAPDOOR



**PLEASE READ FIRST BEFORE
PLUGGING IN MACHINE**

ALL RIGHT RESERVED. PAT. PENDING

79MAN-01-E



TABLE OF CONTENTS



> MANUAL REVISION HISTORY.....	2
1- BASIC COMPONENTS	3
2- GAME PLAY SEQUENCE/BEHAVIOR	4
3- GAME SETUP.....	6
Recommended Payout Settings.....	8
4- TECHNICAL OPERATION	10
Inter-Board Communication	10
Main Electronic Components	11
5- PROGRAMMING OPTIONS.....	17
6- ALTERNATIVE CONFIGURATIONS.....	20
7- MECHANICAL	22
Claw Operation	22
Service and Adjustment Procedures	22
Claw Travel Assembly Removal	22
Trap Door Sensor Adjustment	24
Claw Cord Replacement	25
Exploded view drawings	26
8- ERROR CODES AND TROUBLESHOOTING GUIDE	30

MANUAL REVISION HISTORY

-08-16-11: REV E

- Revised for new firmware version 1.3. Pages 13,14,19
- Revised "Recommended Plush Merchandise" for compatibility with chute revisions. Page 8.

-05-10-11: REV-D

- Revised for new firmware version 1.2. Pages 13,14,19

-03-02-11: REV-C

- Revised "Trap Door Sensitivity Adjustment" section
- Revised "Recommended Plush Merchandise" and added prize test section

-11-30-10: REV-B

- Added "Trap Door Sensitivity Adjustment" section.
- Added symptom #20 to troubleshooting guide.
- Updated "Claw Lift Travel Assembly" drawing sheet 1.
- Add gear cover plate side screw removal to "Trap Door Sensor Adjustment"
- Update Table of Contents

-10-04-10: REV-A Created

Benchmark Games Inc. holds exclusive copyright in the Hardware and Software contained within this game machine. Benchmark also owns the copyright in the ARTWORK DESIGNS, MUSIC, and original SOUND EFFECTS that are incorporated in the game machine. No part of this artwork, music, sound effects, images, displays, software or firmware may be reproduced in any way without the express written permission of Benchmark Games Inc. Benchmark Games Inc. also retains other various intellectual property rights in the game machine including pending patent rights, trade dress rights and trademarks.

PERSONS WISHING TO MAKE USE OF ANY OF THE INTELLECTUAL PROPERTY DESCRIBED ABOVE SHOULD CONTACT BENCHMARK GAMES INC. IN THE FIRST INSTANCE.

Every effort has been made to ensure that the information contained within this manual is accurate. Benchmark Games Inc. reserves the right to make alterations without prior notice.

1- BASIC COMPONENTS

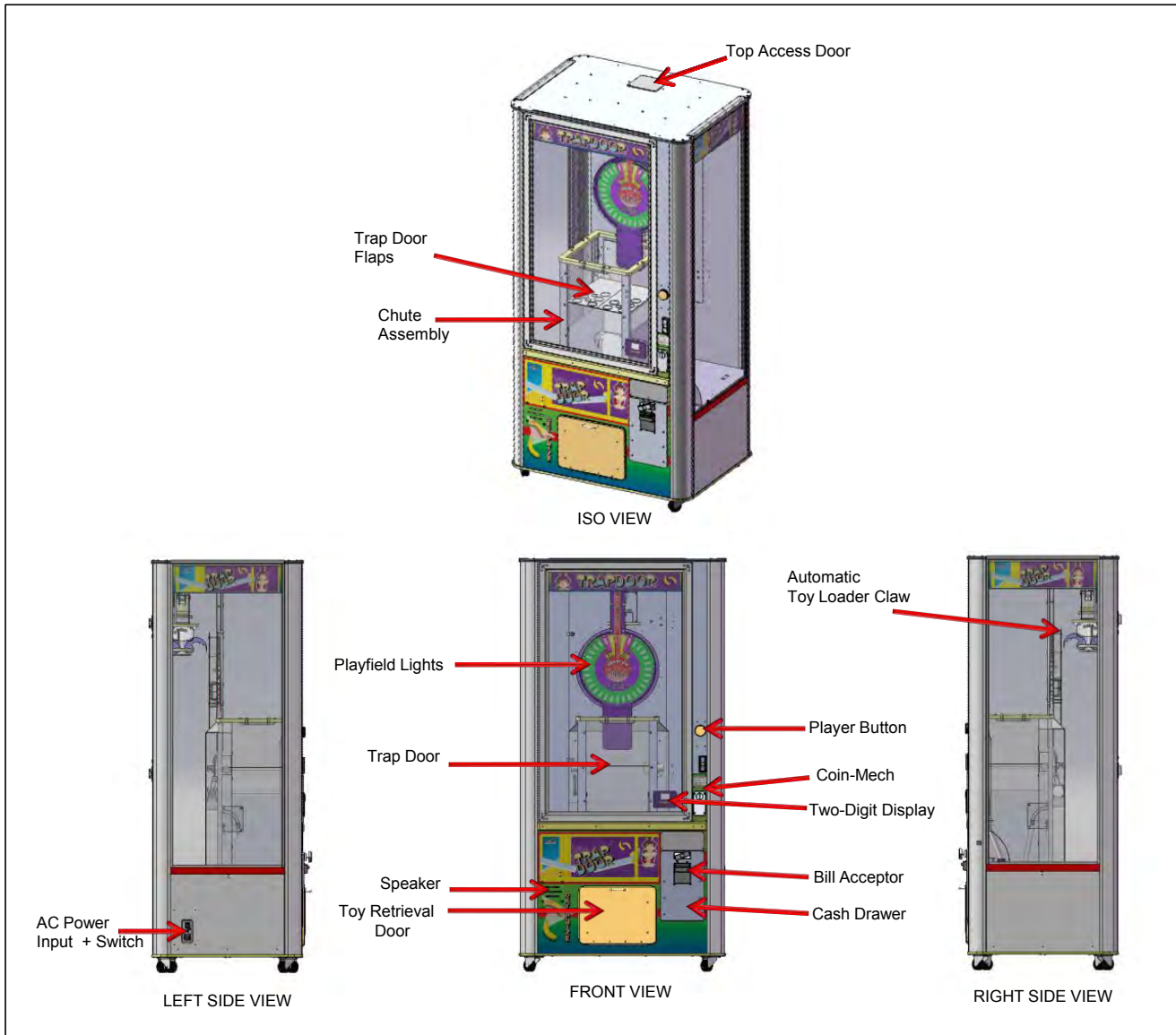


Figure 1. Overview of main components

2- GAME PLAY SEQUENCE/BEHAVIOR

I-Power-up initialization Sequence (10 seconds):

This is useful to quickly confirm that the machine features are operational.

- The Two-Digit Display will flash the firmware version number (i.e “10” for version 1.0)
- Claw will start its vertical homing sequence and will arm its latch mechanism, then it will go park at the back of the game.
- Simultaneously, the Trap Door will start its homing sequence until it is fully closed and parked or it detects that a toy is already present.
- Playfield lights and cabinet lights will glow up and down, confirming operation.
- The game will then go into Attraction-mode, or Play-mode, if there were any previous credits saved.



II- Attraction Mode:

- Various light patterns are shown while the background sound plays on.
Note that since this is a ‘Street’ piece, there is a rest period (which is programmable, see section) before these sequence is re-triggered, to avoid becoming repetitive .

III- Adding Money (Coin-Mech /Bill Acceptor / Card-swipe system):

- “Coin-in” or “bill-in” sound is heard on speaker.
- When enough money is added to buy credit(s), the current credits value will be shown on the two-digit Display, and the game will enter Play-Mode

IV- Play Mode:

- Play-mode start sound “Lightning Bolt” is heard if a prize toy is already loaded on Trap Door
- The Playfield Lights will start the clockwise spinning pattern fading in behind a quick ‘glow down’ pattern. They will restart every ten seconds to ensure both top and bottom halves are in synch.

V- Player Hits Button:

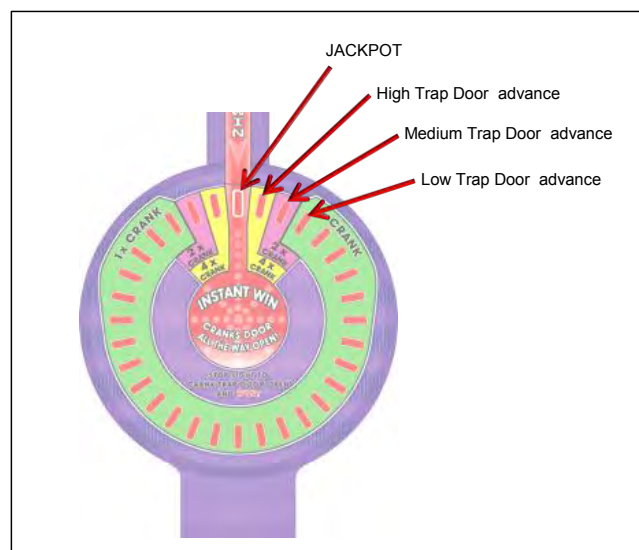
- Light 'puck' stops immediately and flashes in its current position.
- Credit will be discounted.
- Trap Door will open proportionally by a preset amount (operator programmable) depending on whether the light stopped in the playfield's x1, x2 or x3 positions.
- Trap Door lights flash and "cranking" sound is heard.
- If player has more credits, the light spinning will restart for a new try, otherwise the game will go back into Attract-Mode.

V- Game Win, normal (Toy falls after progressive opening of Trap Door)

- Playfield and Trap Door lights will flash and sound effects will begin, lasting about 10 seconds.
- Trap Door will home back to its closed position.
- Simultaneously, Claw will automatically look for a new toy to drop on Trap door.
Note: Chosen 'pickup' position is pseudo-random, optimized to use toy piles more efficiently.
- If player has more credits, the machine will continue on play mode, otherwise the game will go back into Attract-Mode.

VI- Game Win, Jackpot Hit

- Light 'puck' stops immediately and flashes in its current position. All other lights turn off for 2 seconds
- All lights commence flashing and sound effects will begin, lasting about 25 seconds
- Trap Door will open all the way until toy falls down to chute door.
- Trap Door will home back to its closed position.
- Simultaneously, Claw will automatically look for a new toy to drop on Trap door.
Note: Chosen 'pickup' position is pseudo-random, optimized to use toy piles more efficiently.
- If player has more credits, the machine will continue on play mode, otherwise the game will go back into Attract-Mode.



3- GAME SETUP

Unloading/Assembly

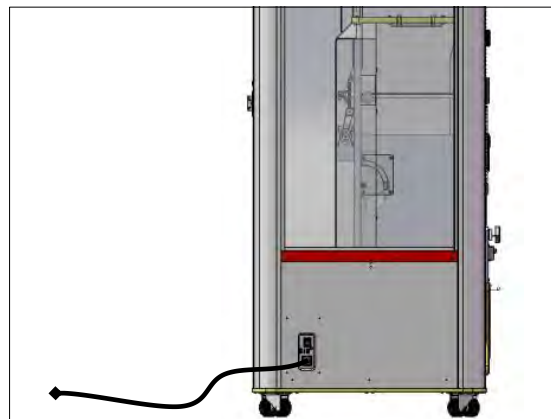
The game is pre-assembled in the factory; all you have to do is unpack it and check/locate the following:

- The cabinet keys are tie-wrapped to the lower chute door handle.
- Remove any shipping foam that might still be holding any parts.
- Remove the hardware and tie-wraps/foam holding the claw assembly against the back of the game.
- Remove the foam/cardboard holding the trap-door flaps on the chute assembly.



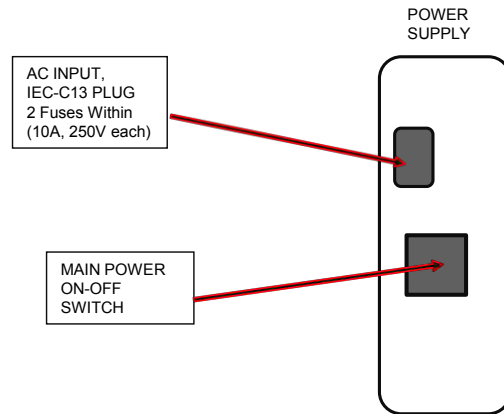
- Confirm that the claw carriage can travel freely all around the track, without finding obstructions or debris. It should be able to travel both ways to the stopper found on the front-center of the game. Also, the claw's electrical cables should not bind/snag to anything.

- The power cord is stored inside the cash drawer, along with this manual and any spare parts included.



Power up

Plug-in the machine and turn it On from the Switch located on the lower-left side of the cabinet.



Note: There are two AC fuses on the within the power supply (10Amp, 250V each). They're found inside of the ICE-C13 receptacle on the power supply.

First-Time Setup

- If your Trap Door was not ordered with a dollar bill acceptor, we recommend installing one to maximize revenue potential
- Ensure that all motors/sensors work by observing the sequence described on section 2-I.
Any major anomaly, if present, should be seen at this point.
- If a toy is not present within the Trap-Door, let the automatic claw load one, or place one by hand.



- Run through the 'Programming Mode' options and define your desired settings, like credits settings, sound Volumes, etc (See Section 5 for Benchmark's defaults).
- Confirm your settings to ensure they are what you wanted.

Recommended Plush Merchandise

The type and quality of merchandise run in the Trap Door machine will correlate directly to reliability and revenue. Be sure to use the correct size and desirable toys.

Size

Large prizes up to 16-17” should not be a problem in the Trap Door machine on the later models containing secondary acrylic walls on the sides of the chute above the doors. Toys with very long limbs or snake like toys may need to be tied to keep them from hanging on the top edge of the chute when the prize is dropped from the claw (as shown in picture).

Verifying Size

If you have any question about the compatibility of a particular toy you should try it in the machine. Allow the claw to lift and deliver the toy to the chute and then play the game until win to verify.



Example of Inappropriate toy

Note: Tweaking the payout of the Trap Door to low levels will affect your net revenue negatively. Quality merchandise and fair payout (28-35%) should maximize net income. **More door movement = more consecutive play = more gross revenue.** The player recognizes an investment in the prize as they have paid for the door to move open and will be more apt to insert more money if the doors show generous movement on the way to an inevitable win.

Recommended Payout Settings

-Section 5 of this manual describes the different Settings that can be used to configure the machine.

From those settings, the following are the ones that will most likely affect the payout-percentage and the income of the machine:

- Coins-per-credit
- Plays-per-credit.
- Trap Door Increment
- Jackpot Win Window Tolerance.

Prize Size and Payout: It should be noted that prize size will contribute to payout percentage variation. Larger prizes will take more plays for the trap doors to open enough to drop the prize for wins when no instant win is hit. Smaller prizes take fewer plays. Therefore large inexpensive prizes will yield a lower payout percentage than smaller expensive prizes using the same configuration settings.

Other Considerations: The settings you choose to set the payout, particularly the ‘Trap Door Increment’ and the ‘Jackpot Win Window’, may have a dramatic effect on how much play the machine gets. To maintain the game psychology which makes the player feel he can win and that he is getting significantly closer to a win each play the preferred setting is 3 (2 minimum) on the ‘Trap Door Increment’ and do not go below 2 on the ‘Jackpot Win Window’.

Operators that try to dramatically reduce payout or percentage the machine with too low credit cost combined with too high prize value will be forced to reduce these settings. This will affect the players' perception of his ability to win and curb his interest in playing.

The Excel file TrapDoor_PAYOUT_CALC.xls is a payout estimator for this game, available on the 'Downloads' section of our website.

This calculator allows you to plug in different configuration values and get an idea of the expected payout %.

The following varied examples are some recommended settings that can be tried and later adjusted according to your plush merchandise and demographics. The below examples will get you close to a 33% payout using standard Jumbo sized crane plush.

Note that these examples are not necessarily proportional to each other, they just illustrate different ways to configure the game.

25 Cents Per Credit, 1 Play Per credit

Average Plush Cost:	\$1.75 (operator cost)
Coins-per-Credit:	1
Trap Door increment:	2
Jackpot Win Window:	2

50 Cents Per Credit, 1 Play Per Credit (Factory Default)

Average Plush Cost:	\$2.70 (operator cost)
Coins-per-Credit:	2
Trap Door increment:	3
Jackpot Win Window:	2

1 Dollar Per Credit, 1 Play Per Credit

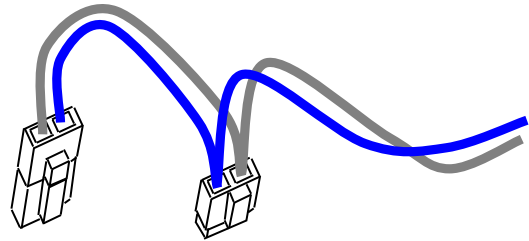
Average Plush Cost:	\$5.40 (operator cost)
Coins-per-Credit:	4
Trap Door increment:	3
Jackpot Win Window:	2

4- TECHNICAL OPERATION

Inter-Board Communication

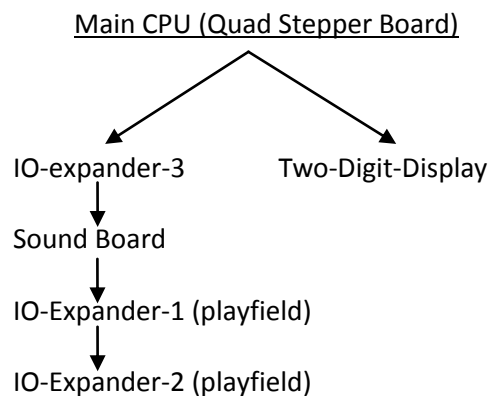
The Circuit Boards communicate with each other using a 485 differential wire-pair network, using the SNAP software protocol layer.

- On this machine, this wire pair has colors Blue and Gray.
- The Main CPU Board acts as the master, initiating commands and receiving responses from the slave boards.
- Like-boards differentiate from each other by means of an ID-Switch setting. See the following pages to find each board's ID-Switch location and setting.
- The following board(s) is NOT connected to the 485 network:
 - > The Power distribution board.
 - > The Opto Sensors.



- Note that the 485 network wire-pair chain jumps from board to board:
 - > In some places the chaining is done by double-crimps at the connector (these are usually 2-pin connectors)
 - > In other places, PCB traces on the board itself carry the chain from a pair of connector pins to the next (usually a four-pin connector); thus, disconnecting such a board's 485 might actually disconnect the rest of the 485 chain. Keep this in mind when troubleshooting or replacing parts.

-485 Communication network chain:



Main Electronic Components



Figure 3. PCB Boards: Top Panel

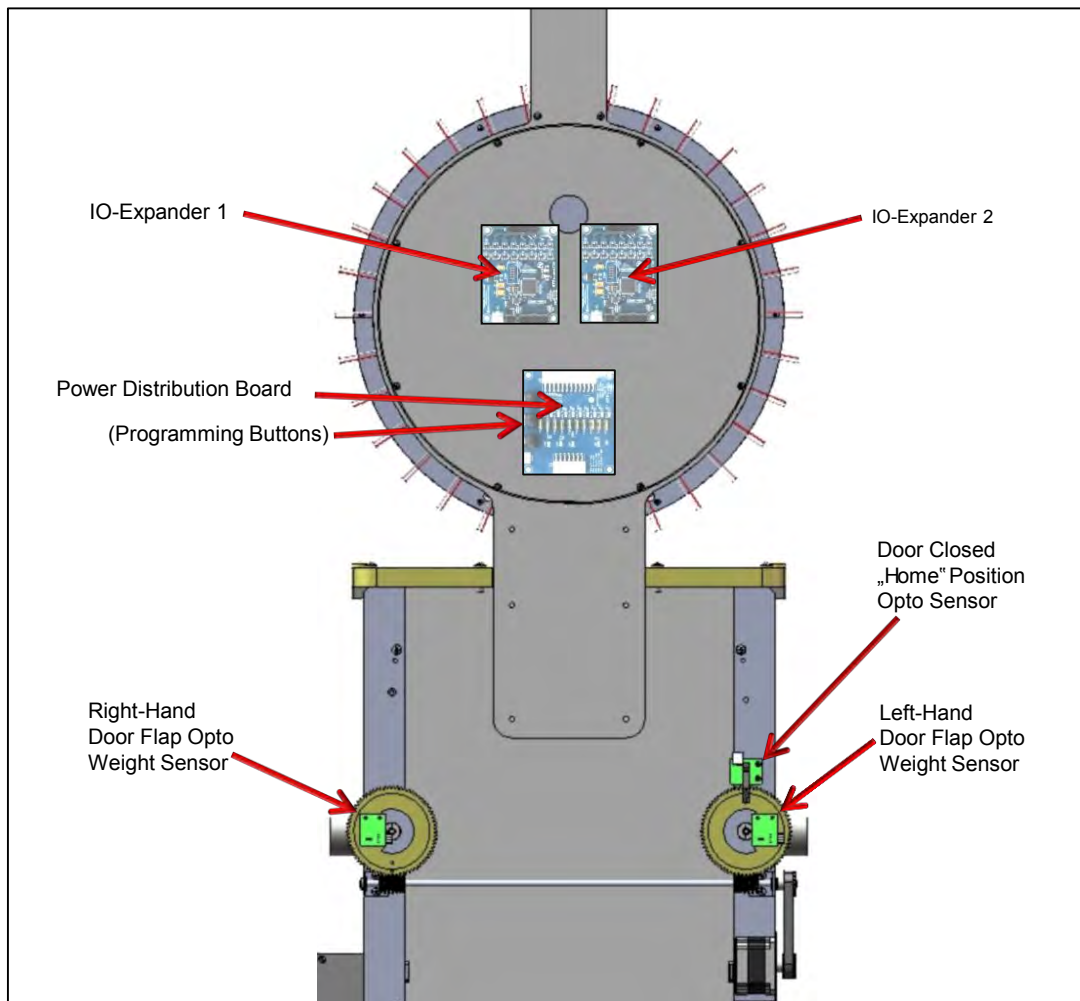


Figure 4. PCB Boards: Back Panel and Trap Door mechanism

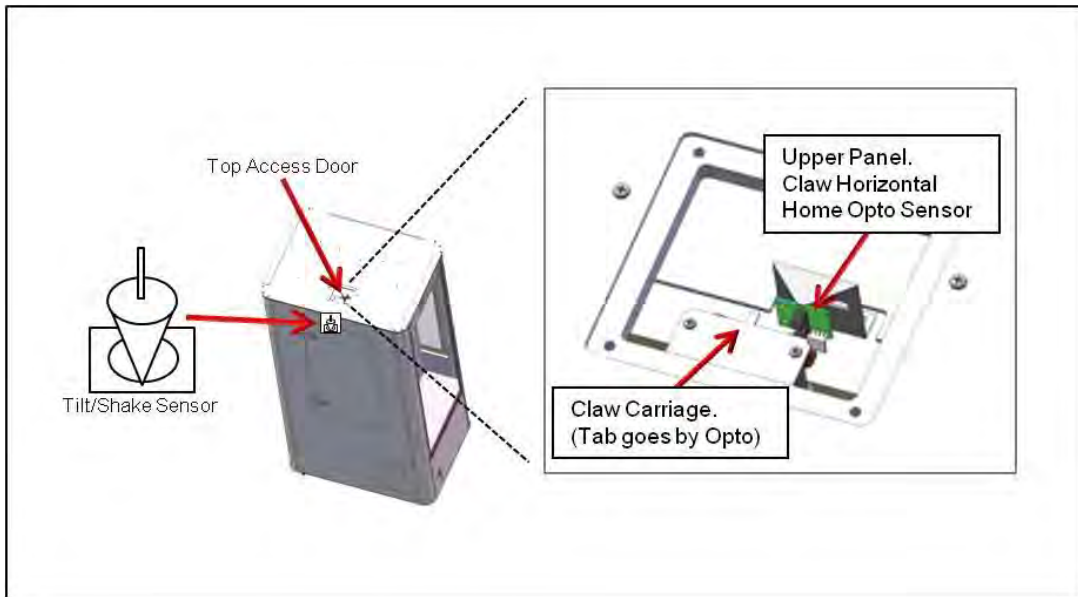


Figure 5. Upper panel Opto sensor

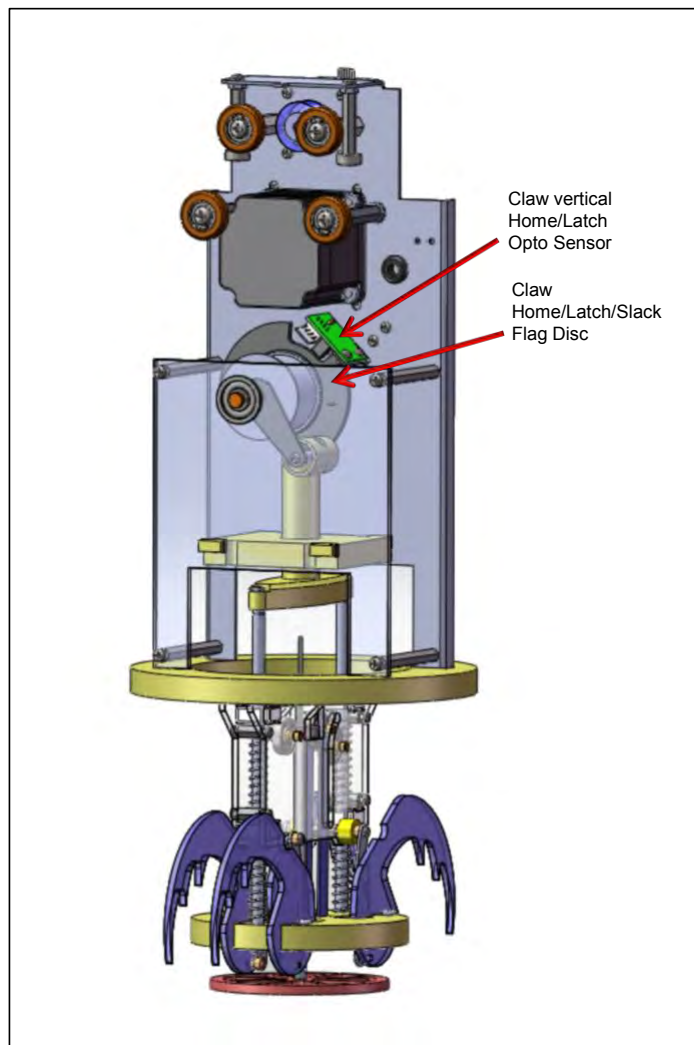


Figure 6. Claw Vertical Home/Latch Opto Sensor

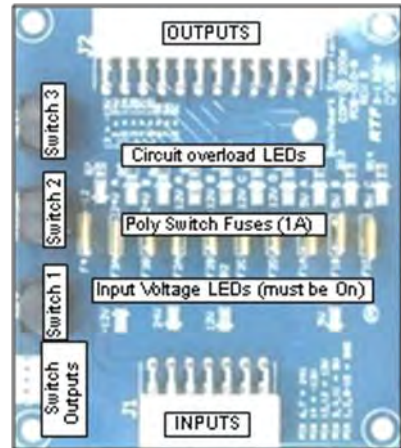
Power Distribution Board

Part# PCB17001

Location: Back Panel.

ID-Switch setting: None, board has no computer.

Distributes DC power from the power-supply to the different devices, through a Poly-Switch (thermal, resettable fuse) for each voltage circuit. Not that for convenience, the 'Programming Options' Buttons are also located on this board, although they're not power related. Power is distributed in the following manner (worst case estimations):



<u>Board/Device</u> <u>circuit (see board)</u>	<u>Estimated consumption</u>	<u>Fuse</u>
-Quad Stepper Board (main CPU) + 3 Motors	(24V, 3A)	(*24A*)
-Sound Board (on Top Panel)	(12V, 140mA)	(*12B*)
-IO-Expander 1 (+Playfield Top Lights)	(12V, 500mA)	(*12C*)
-IO-Expander 2 (+Playfield Bottom Lights)	(12V, 500mA)	(*12C*)
-IO-Expander 3 (+Coin/Bill,light-strips)	(12V, 4A)	(*12A* + *12D*) [3A peak: Bill Acceptor]
- x3 Opto sensors (Trap Door Assy)	(5V, 60mA)	(*5A*)
- x2 Opto sensors (Claw Assy) + Credits Display	(5V, 160mA)	(*5B*)

Related Note: There are 2 AC fuses on the Power supply group (10Amp, 250 V). They're found inside of the ICE-C13 receptacle on the power supply.

Main CPU Board (Quad Stepper Controller)

Part# PCB11006

Location: Back Panel.

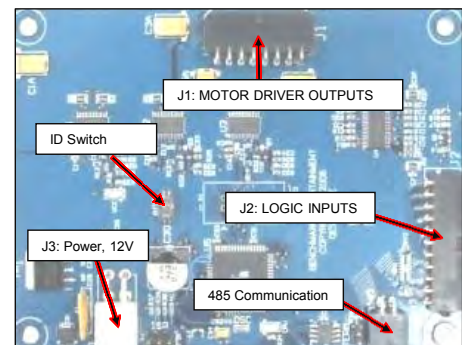
ID-Switch setting: **00** (off-off)

The stepper-motor controller board handles both the game logic and the low-level control of the game's motors.

This board is the main controller of the game. It decides all the game actions and commands the other boards to act according to the game scheme.

Communication to the other boards is performed via a 485 differential wire-pair (Gray and blue wires).

The 'Programming Mode' game-settings information is saved in on-chip Flash.



Main ROM program Version Updates:

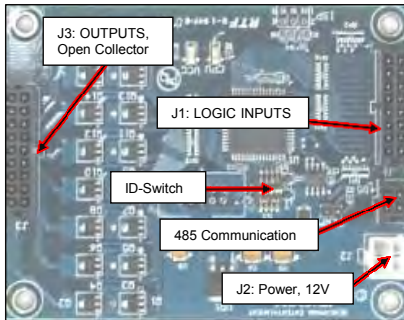
1.3 (08-15-11) Corrected eeprom silicon errata, which affected 'programing options' retention

1.2 (05-10-11)

- Meter Counts coins, as opposed to credits
- Finer resolution accuracy on light-stop.[REQUIRES IO-EXPANDER BOARD WITH 2.3 FIRMWARE].
- Trap door increment range adjusted to more practical values
- other internal performance adjustments

1.0 (09-14-10) First release version

IO-Expander 1



Part# PCB14008

Location: Back Panel

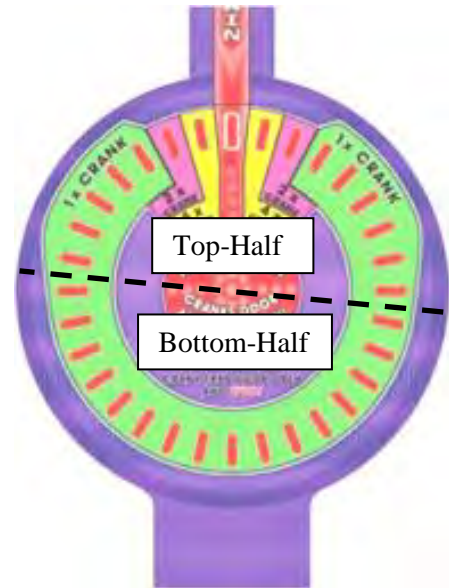
ID-Switch setting: **0000** (off-off-off-off)

Handles the 16 LEDs on the top half of the play-field.

Light #1 is the one immediately after 9 o'clock, they follow clockwise.

The jackpot light is the 8th light.

Note: For trap-Door version 1.1 and above, it is recommended (but not required) that IO-expanders have firmware 2.3.



IO-Expander 2

Part# PCB14008

Location: Back Panel

ID-Switch setting: **1000** (on-off-off-off)

Handles the 16 LEDs on the bottom half of the playfield.

Light #1 is the one immediately after 3 o'clock, they follow clockwise.

IO-Expander 3

Part# PCB14008

Location: Back Panel

ID-Switch setting: **0100** (off-on-off-off)

Handles the LED strips found on the cabinet columns, the playfield perimeter and in the trap door chute. It also handles the two Accounting Hard-meters (credits count, toys count), as well as the drive enable line going to the coin-mech and Bill Acceptor.

Sound Board

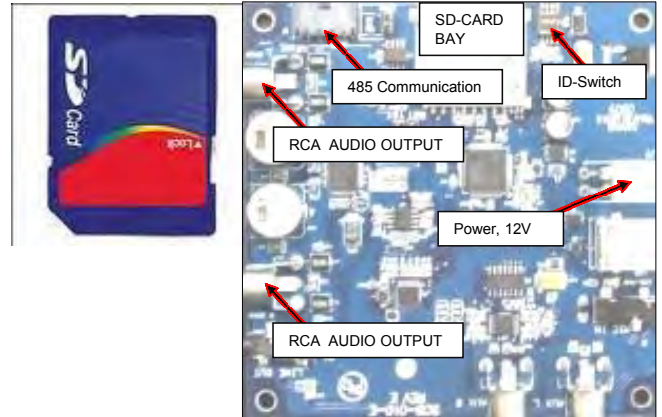
Part# PCB18001

Location: Upper Assembly

ID-Switch setting: **0000** (off-off-off-off)

Handles background and event sounds.

Sound files are stored on the plug-in SD-card memory board.



Opto Sensors

Part# OPTO4070 [Right Angle Connector]

Locations: Claw track and mechanism, and behind Trap Door assembly

Qty: x5

ID-Switch setting: None, it has no 485 communication.

They detect the following five occurrences:

- Claw Vertical Home (Home/latch, cord slack)
- Claw Horizontal Home (Back of game, claw track panel)
- Trap Door Home (Door closed)
- Trap Door Left (flap toy-weight sense)
- Trap Door Right (flap toy-weight sense)



Notes:

This sensor board has a Green LED that lights up when the IR beam is interrupted.

All Five sense signals go to the Quad stepper Board Inputs, J2 connector

Small 2-Digit Display

Part# PCB2DD-010-D [485 capable]

Location: Front of Game

ID-Switch settings: **0000** (off-off-off-off)

The ID-Switch is located on the back of the Display and is labeled as "S1".

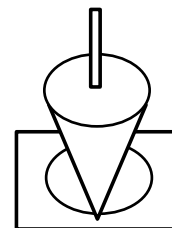


Tilt/Shake Sensor

Part# GEN00074

Location: Back side of game, behind Claw parking position.

Detects when someone shakes the cabinet in an attempt to have the toy fall through Trap Door. The signal goes straight to Main CPU (Quad Stepper Board); The Trap Door will close-back a few degrees and a ten second audible alarm will be set off.



Hard-meter Pair



Part# ASM001 [2-in-1 Assembly, with common connector]
 Or #ELM007 (individual)
 Qty: x2 meters
 Location: Cash Drawer
 Non-resettable type
 #1 (left) : Credits Purchased Count
 #2(Right): Toy Vend Count

Coin Mech (factory default)

Imonex 0.900 type with Coin Lock Solenoid
 Part# ELM-014
 Location: Front of Game

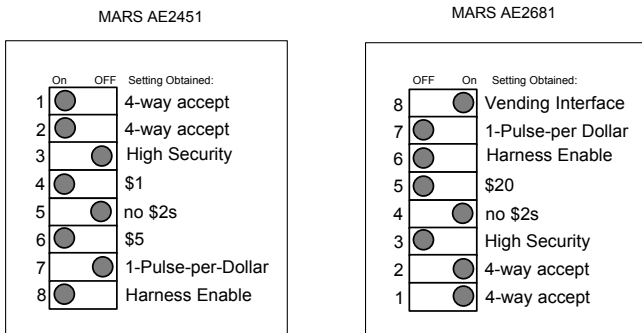


Bill Acceptor (Optional)

MARS Mei 2451 or 2681 (115VAC Models)
 Location: Cash Drawer

Default Benchmark Games Operational Settings:

This is done by setting the side configuration Dip-Switches as follows:



Enable/Disable feature (Game controlled):

[Note that we provide the appropriate adaptor harness/connector for this bill acceptor]

Pin Name (all pins refer to P1)	Type	115 VAC pin	
115VAC HOT / 24VAC HOT	Power	20	✓
115VAC NEUTRAL / 24VAC NEUTRAL	Power	4	✓
Earth	Power	21	✓
Denom 1 ENABLE, High	Input	15	✓
Denom 2 ENABLE, High	Input	14	✓ (+5V)
Denom 3 ENABLE, High	Input	13	✓
ESCROW, High	Input	12	✓
Denom 1 ENABLE, Low	Input	27	✓
Denom 2 ENABLE, Low	Input	28	✓
Denom 3 ENABLE, Low	Input	29	✓
ESCROW, Low	Input	30	✓
CREDIT-PULSE NOT	Output	7	✓
LOW LEVEL GROUND	Ground	10	✓
OUT-OF-SERVICE POWER (200 ohms to +5 VDC)	Output	25	✓
OUT-OF-SERVICE NOT	Output	22	✓

5- PROGRAMMING OPTIONS

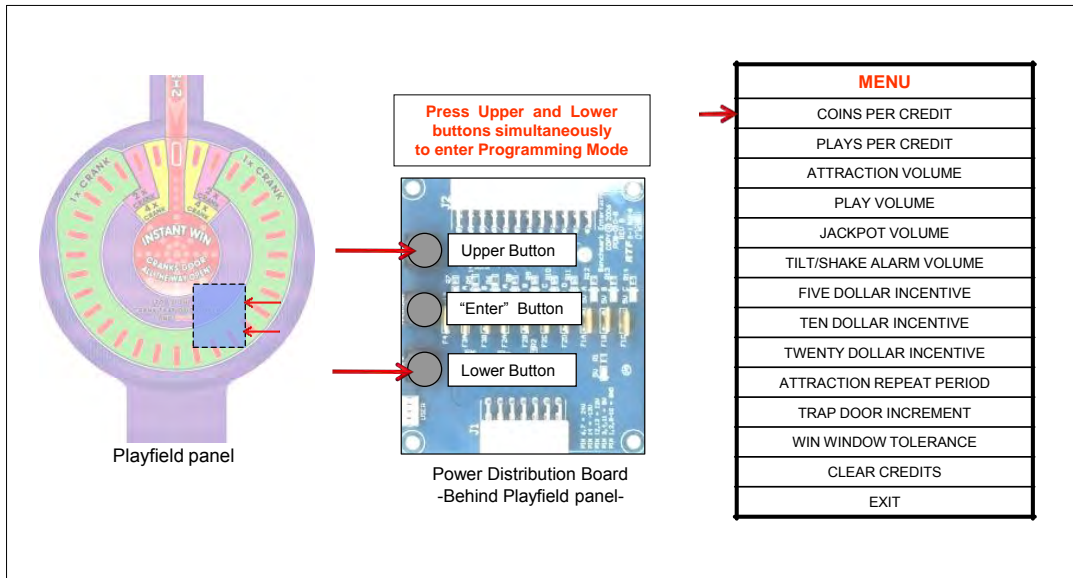


Figure 7. Programming Mode Scheme.

Button Assignments:

"Upper": Increment Value

"Enter": Save option value and advance to next option

"Lower": Decrement Value

To enter Programming mode, press Upper and Lower buttons on the Power Distribution Board, by reaching behind the Playfield Panel, on the right, as shown in figure 8.

The menu is followed in a sequential order, by using the center button to advance through the options.

Once you enter Programming Mode:

As you go through the menu, each option number will appear in the small two-digit display, the name will be called by a voice, and the value set will be displayed by the top-left quadrant playfield-lights, acting as a tach. Possible values displayed are: 0 (all dim) and 1 to 8 highlighted.



Figure 8. Programming value tach range, 1 to 8

PROGRAMMING MENU

1- COINS PER CREDIT

How many Coin-Mech pulses are required to add +1 credit.

Value Range: 0 – 8 Default: 2 note: '0' is meant as a demo-mode, when showcasing the game.

Notes:

-One Bill Acceptor pulse will count as four coins internally (i.e. \$1= \$0.25 x4)

-Actual coin value is determined by your coin-mech/swipe-card configuration,
[i.e. the 'coin' could be \$0.25 or \$1.00, without the game having to be aware of this]

2- PLAYS PER CREDIT

How many play-tries are allowed per each purchased credit.

This allows to set for example: 3 tries for \$1 , etc.

Value Range: 1 – 8 Default: 1

3-ATTRACTION VOLUME

Background music volume, when outside of play mode

Value Range: 0-8 (0-100%) Default: 25%

4- PLAY VOLUME

Background music and event volume, when Player has credits.

Value Range: 0-8 (0-100%) Default: 30%

5- JACKPOT VOLUME

Background music and event volume when Player wins toy, regardless of it being through Jackpot or not.

Value Range: 0-8 (0-100%) Default: 50%

6- TILT/SHAKE ALARM VOLUME

The volume for the alarm sound set off when someone shakes the machine.

Value Range: 0-8 (0-100%) Default: 50%

7-FIVE DOLLAR INCENTIVE

How many extra credits are given when the player introduces at least \$5 (accumulated in coins or bills) before pressing the play button.

Note that these extra credits will then be multiplied by the 'Plays per Credit' option value.

Value Range: 0-6 Default: 1

8-TEN DOLLAR INCENTIVE

How many extra credits are given when Player introduces at least \$10 (accumulated in coins or bills) before pressing the play button.

Note that this value already accounts for the 'Five Dollar Incentive' option value.

Value Range: 0-8 Default: 2

9-TWENTY DOLLAR INCENTIVE

How many extra credits are given when Player introduces at least \$20 (accumulated in coins or bills) before pressing the play button.

Note that this value already accounts for the 'Ten Dollar Incentive' option value.

Value Range: 0-8 Default: 3

10-ATTRACTION PERIOD

Length of time before the attraction fan-fare repeats when there are no credits present on machine.

Value Range: 0-8 Default: 1 Note: 0=off(no attraction) 1 to 8 = 5 to 40 minutes

11- TRAP DOOR INCREMENT

Proportion by which trap door opens on play mode. All three x1, x2, x3 playfield hits are proportional to this setting.

Value Range: 1-8 (small – large) Default: 5

Example: For a setting of 3, a "1x hit" will move the door by about 3°

12-WIN WINDOW TOLERANCE



The width of the jackpot window.

Value Range: 1-8 (harder - easier) Default: 5

13- CLEAR CREDITS

Return the credits to zero.

Press either the Upper or lower button to clear.

Then press 'Enter'(middle button) again to continue.

14-EXIT

6- ALTERNATE COIN/BILL AND CARD-SWIPE SYSTEM CONFIGURATIONS

There are a few alternative configurations regarding Card Swipe systems and Bill Acceptor devices that are possible to setup, depending on your location. These are described in a general fashion as follows.

Note that the system expects the following timing ranges for any pulses:

Low time: 40-80mS

Up time: 100-150ms

CARD SWIPE SYSTEM

The Coin-Mech and/or Bill Acceptor can be replaced to set up a swipe-for-credits scheme.

The recommended set up is as follows:

-Remove the Coin-Mech and/or Bill Acceptor and install your card swipe systems in one of the two spots.
[contact customer service for custom plastic plates for this purpose].

-Have your card swipe system tap into the Coin or Bill signal line.

-Configure your card swipe system for a 1-pulse-per-swipe response.

-If tapping the coin signal line (Gray-Red wire), 1 pulse (swipe) will count as 1 coin internally.

-If tapping the bill signal line (Gray-Green wire), 1 pulse (swipe) will count as 4 coins internally.

-Configure the game to provide the necessary credits for the 'coin' count indicated above and the actual money you will charge per-swipe.

-If possible (strongly recommended), hook up your system to the enable line (Blue-Green wire), so that the game can stop money intake in case of any error or fault.

-Additionally, if your scheme supports/requires accounting, you can tap from the pulse signal (White-Blue wire) going to Hard-meter box #2 (see page 16), which tracks the number of toys vended.

COIN MECHS

It is possible to use other coin mechanisms on this machine. The wiring harness terminates on both Spade-type connectors and an IDC connector for this purpose, the signal lines are:

#	Wire Color	Signal
1	Yellow	12V
2	Gray-Red	Coin Signal
3	Blue-Green	Enable (low=enable, high=disable) (this should be hooked to coin-mech ground)
4	Black	GND, actual DC Ground

Notes:

The 'Device Ground/Enable line comes from the IO-Expander 3 Board, as commanded by the main CPU to enable or disable money intake. It is necessary that your coin-mech device has a coin-lock 'reject' solenoid so that this feature is available.

Normally, for an Imonex, if it has a coin reject solenoid, you hook the solenoid's 'ground' to the enable line, so that the game can control it.

For an electronic coin-mech, like the MPU, you hook up the coin-mech's 'ground' to the enable line.

BILL ACCEPTORS

It is possible to use other bill acceptors on this machine, like the IT-Bellis BV50, or the Pyramid Apex 5000 Series.

The wiring harness on the Cash Drawer terminates on a 12-Pin Molex female connector, providing all the necessary signal lines:

Pin	Wire color	Signal
1	Red	5V
2	Yellow	12V
3	Black	GND, actual DC Ground
4	Gray-Green	Bill Pulse Signal
5	Blue-Green	Enable (low=enable, high=disable) (same 'Enable' line as for coin-mech above)
6	White	AC Neutral
7	Black	AC Hot
8-12	--	Reserved



This connector is followed by an adaptor harness for the appropriate device. We stock adaptor harnesses for the Mars 2451, the IT-Bellis BV50 and the Pyramid bill acceptors. [Please note that we strongly recommend a device that supports a Logic-Enable line, so that the game can stop money intake in case of any error or fault]. Please contact customer service if necessary.

7- MECHANICAL

Claw Operation

The Trap Door claw uses a “mouse trap” style mechanism for activation. There is no sensitivity adjustment. The claw is activated when the weight of the claw rests on the trip sensor plate upon descending onto a prize. The claw is set open when it is lifted up into the travel assembly.

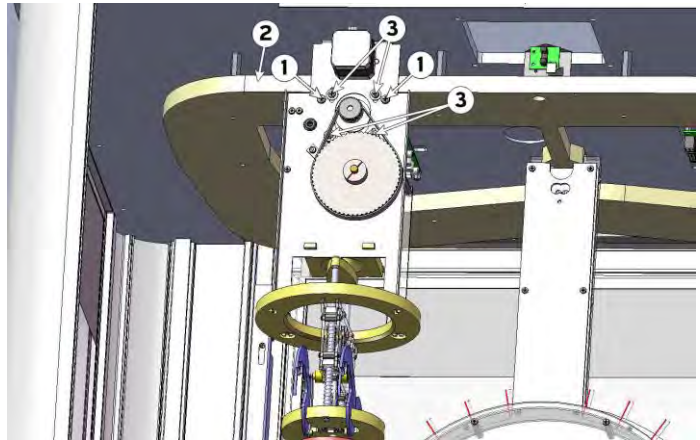
It is normal that the claw will not activate every time due to the nature of bulk prize storage in the prize bin. “Holes” in the top layer of product may not allow enough pressure directly on the trip sensor plate to activate the claw in some instances. If this occurs, or if the claw just misses a prize, the machine will continue to cycle the load sequence until a prize is finally loaded.

Service and Adjustment Procedures

Claw Travel Assembly Removal

1. Power machine off
2. Loosen (2) lower roller mount screws①
3. Disconnect harness
4. Lift assembly up and out of track②. Do not force assembly out as you may bend the bracket. If necessary, loosen the (4) motor mount screws③ and allow motor to fall to its lowest position to allow more clearance before lifting assembly out.

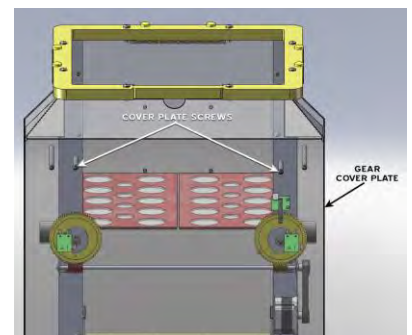
To replace, reverse above procedure.

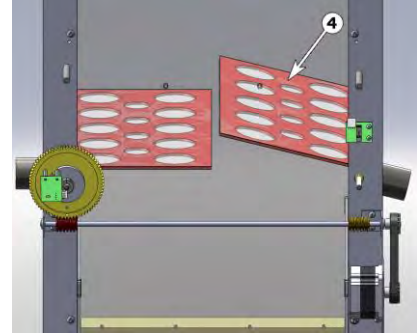
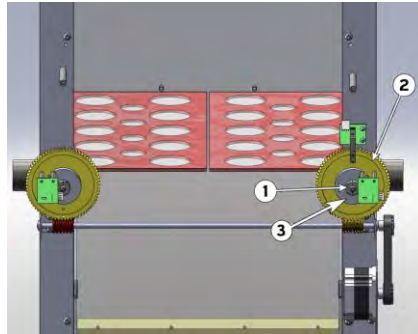
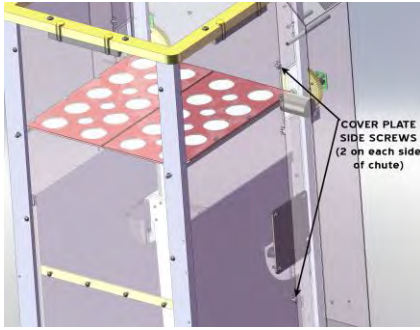


Trap Door Sensor Adjustment

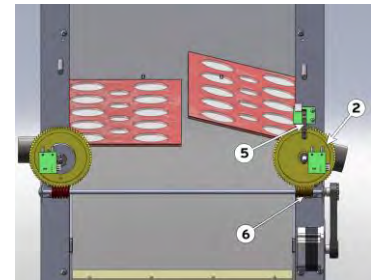
(Use this procedure if the trap doors are uneven (one higher than the other) with no prize in the chute.)

1. Power machine off.
2. Remove all toys from machine.
3. Remove (2) gear cover plate screws and (4) cover plate side screws (2 on each side).
4. Remove gear cover plate.
5. Loosen right side shaft collar①.
6. Remove right side gear② and pin plate③ and allow the right side trap door④ to raise completely.

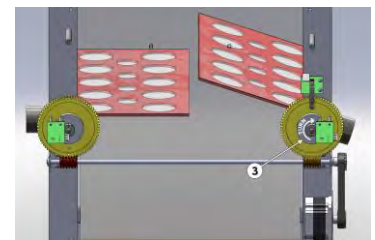




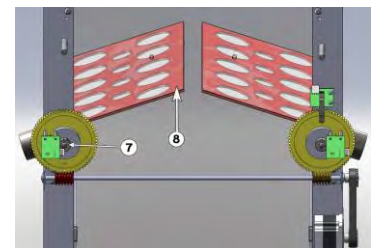
7. Replace the right side gear② on the shaft so that the opto flag⑤ is in the up position and within the opto “horseshoe” when engaged with the worm gear⑥.



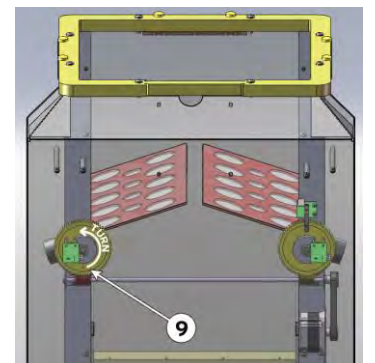
8. Replace the right side pin plate on the shaft, turn the pin plate③ clockwise until it stops on the opto mount spacer while the right side trap door is in the up limit position, and tighten the shaft collar.



9. Loosen the left side shaft collar⑦ and allow left side trap door⑧ to raise completely.



10. Turn the left side pin plate⑨ completely counterclockwise until it stops on the opto mount spacer while the left side trap door is in the up limit position, and tighten the shaft collar⑦.

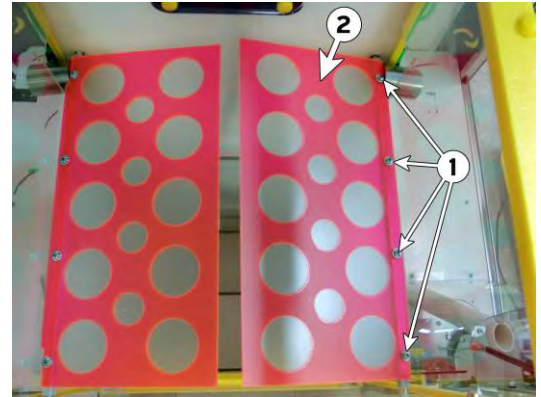


11. Replace gear cover plate and screws.

Trap Door Sensitivity Adjustment

(Use this procedure to adjust the sensitivity of the prize sensing on the doors.)

1. Power the machine off and then on again with no prize in the chute allowing the boot up sequence to take place.
2. Power the machine off (trap doors should be horizontal or slightly angled up).
3. Loosen trap door attaching screws① on one of the doors.
4. Adjust the door② so that it is at the slot limit toward the center of the chute and tighten one of the trap door attaching screws to hold in place.
5. Test this setting by gently pushing the door down about ½” to see if it will return up reliably.
 - a. If the door returns up reliably, tighten remaining screws.
 - b. If the door remains down or does not reliably return up, loosen the trap door attaching screw and slide the door back slightly toward the side of the chute and retest. Repeat until the door returns up reliably, but stays as sensitive as possible.
6. Repeat steps 3-5 on the other door.
7. Verify Operation
 - a. With the doors in the up position, place the lightest prize that will be used in the machine on the doors. The prize should easily depress the doors and activate the sensors notifying the computer that there is a prize in the chute.
 - b. Remove the small, light prize and place the largest prize that will be used in the machine. This prize should require that the doors open almost completely before dropping.
 - c. Play the machine without hitting the jackpot until the prize drops. When the prize drops, the counterweights should cause the doors to immediately return slightly notifying the computer that a prize has dropped. The machine should then return the doors to the up position and continue normal operation. If the doors do not return at all after dropping the prize and the machine doesn't know the prize has dropped, the doors need to be adjusted in the slots away from the center of the chute. Adjust them out slightly and repeat steps 5-7.

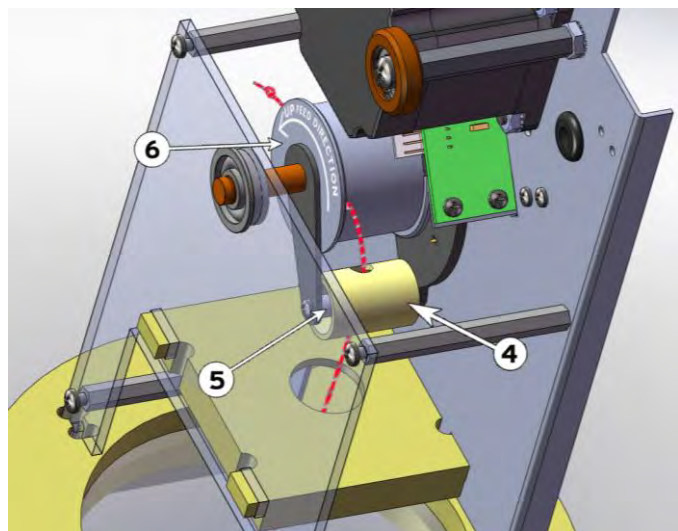
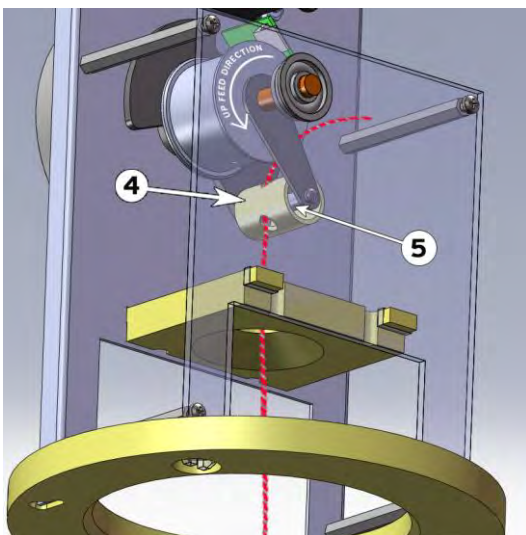
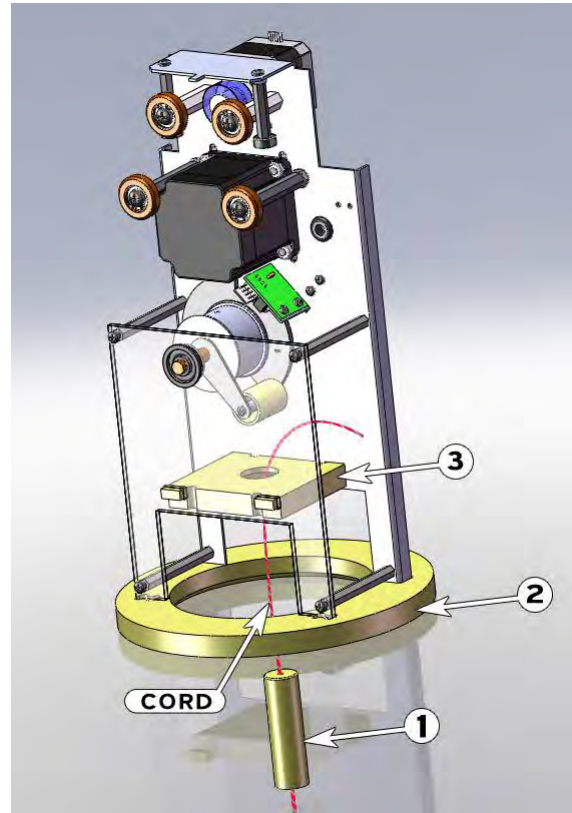


Claw Cord Replacement

Notes: Use Benchmark supplied cord to insure proper operation.

You may perform cord replacement with the claw travel assembly within the game or removed.

1. Cut old cord and remove claw.
2. Remove cord from lift reel.
3. Feed new cord up through claw position rod①, claw reset hoop②, and claw centering plate③.
4. Feed string through the cord guide spacer④:
 - a. Position the cord guide spacer so that the cross drilled hole is offset to the left of the pivot spacer⑤.
 - b. Feed the string through the cord guide spacer and to the left of the pivot spacer as shown (very important).
 - c. Feed the cord through the cable pulley⑥ and tie a knot to secure.
 - d. Trim cord above knot.
 - e. Take up the slack by turning the large timing belt pulley in the up feed direction at least until claw is suspended by the cord and not sitting on the prize bin floor.
 - f. Power machine on and verify operation.



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	079MAC026	claw top bracket3	2
2	079MAC027	claw rod bearing	4
3	079SCM008	trigger bearing spindle	2
4	AFBMA 12.2 - 0.2500 - 0.7500 - 0.2188 - 8.SLINC.8		4
5	CR-PHMS 0.112-40x0.375x0.375-N		12
6	CR-PHMS 0.112-40x0.5625x0.5625-N		2
7	CR-PHMS 0.112-40x0.875x0.875-N		2
8	spacer #440x500x250 hex		8
9	079SHM009	claw arm linkage2	4
10	079SCM11	claw bushing	4
11	079ASM	trigger lever assy	1
12	079MAC030	rod slide block inside	2

Note:
All screws this assembly have lock patch on threads or use Loctite #220.

BENCHMARK GAMES	
TITLE: claw main top assy3	
SIZE B	DWG. NO. 079ASM011
SCALE: 1:1	WEIGHT: SHEET 1 OF 1

ITEM NO.	PART NUMBER	DESCRIPTION	claw base plate assy small arms/QTY.
1	079MAC025	claw base plate3	1
2	#6x500 PPSM		8
3	pin 094 x 500		4
4	079MAC032	claw arm small blunt	4

BENCHMARK GAMES	
TITLE: claw base plate assy3 short blunt	
SIZE B	DWG. NO. 079ASM035
SCALE: 1:4	WEIGHT: SHEET 1 OF 1

ZONE	REV.	DESCRIPTION	DATE
1		Prototype Release	
A		Release to Production	04/24/10

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	079ASM020	claw base plate assy3	1
2	079ASM011	claw main top assy3	1
3	079ASM012	plunger assy3	1
4	B27.1 - NA 1-25		1
5	079SCM010	trigger alignment rod	1
6	079SCM011	claw bushing	4
7	079MAC031	claw cable attach plate3	1
8	079SCM007	claw guide rod	2
9	pin 125x750		1
10	#6x500 PPSM		2
11	HAR11170	retaining ring external 250 shaft	6
12	079SPR002	claw spring	2

PROPRIETARY AND CONFIDENTIAL
 THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF BENCHMARK GAMES, INC. REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF BENCHMARK GAMES IS PROHIBITED.

DRAWN BY: S. Corso

UNLESS OTHERWISE SPECIFIED:
 DIMENSIONS ARE IN INCHES
 TOLERANCES:
 ANGULAR: ±1.0 DEG.
 .XXX" - +.005
 .XXX" - +.005
 .XXX" - +.005

Benchmark Games

TITLE:
claw main assy3

SIZE: DWG. NO. 079ASM022
SCALE: 1:3 **WEIGHT:** **SHEET 1 OF 1**

ITEM NO.	PART NUMBER	DESCRIPTION	Default/QTY.
1	079ASM009	travel motor assy	1
2	079SHM007	travel motor bracket shrm	1
3	079ASM019	roller 985ODx188ID bearing assy	4
4	spacer #10-32 x 2 x 313hex		2
5	stepper PK266-01A 1.8 step	MOT015	1
6	CER003	timing belt pulley XL15 247 bore	1
7	60XL037-01PS60-1H 875L0.3125N		1
8	CR-PHMS 0.19-32x0.5x0.5-N		4
9	CR-PHMS 0.138-32x0.375x0.375-N		8
10	CR-PHMS 0.19-24x0.375x0.375-N		2
11	CR-PHMS 0.164-32x0.5x0.5-N		4
12	CR-PHMS 0.112-40x0.25x0.25-N		8
13	spacer 632 x 2500 hex	opto 4070 right angle	4
14	PCB009		1
15	ARMA 122-0.1815-0.5000-0.1940-8SINC8		2
16	grommet	HAR054	1
17	250dx375hole		1
18	claw main assy3	claw reset hoop	1
19	079MAC023		1
20	Regular FW 0.164		4
21	nut #8 kep	nut #8 kep	4
22	Default	nut #6 kep	4
23	079ASM023	cable pulley assy w/lag	1
24	079MAC020	pulley support plate	1
25	BRG008	bearing ball 313IDx866OD flanged	2
26	079SPR001	torsion spring 375IDx035wire 51 td prep	1
27	079SHM006	opto bracket 1d claw shrm	1
28	079SCM012	claw centering plate	1
29	nut #10 kep		2
30	spacer #10-32 x 1500 x 3/5 hex		2
31	spacer 632 x 1250 hex		2
32	B111002	timing belt 140XL	1
33	Default	nut #6 kep	2
34	CR-PHMS 0.138-32x0.425x0.625-N		2
35	CR-PHMS 0.138-32x0.425x0.625-N		2

ZONE	REV.	DESCRIPTION	DATE
A		Release to Production	04/26/10
B		change motor & add 12 #10-32 nuts; change 12 spacer to 1.5" long	09/10/10
C		Add belt, change spacers & screws	09/14/10

PROPRIETARY AND CONFIDENTIAL
 THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF BENCHMARK GAMES, INC. REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF BENCHMARK GAMES IS PROHIBITED.

DRAWN BY: S. Corso

UNLESS OTHERWISE SPECIFIED:
 DIMENSIONS ARE IN INCHES
 TOLERANCES:
 ANGULAR: ±1.0 DEG.
 .XXX" - +.005
 .XXX" - +.005
 .XXX" - +.005

Benchmark Games

TITLE:
claw lift travel assy

SIZE: DWG. NO. 079ASM024
SCALE: 1:4 **WEIGHT:** **SHEET 1 OF 3**

ITEM NO.	PART NUMBER	DESCRIPTION	exploded view/2/ QTY.
1	079ASM009	travel motor assy	1
2	079SHM007	travel motor bracket shm	1
3	079ASM019	roller 985ODx188ID bearing assy	4
4	spacer #10-32 x 2 x 313hex		2
5	stepper PK266-01A 1.8 step	MOT015	1
6	GER003	timing belt pulley XL15 247 bore	1
7	60XLO37-UFS60-1H 875L0.3125N		1
8	CR-PHMS 0.138-32x0.375x0.375-N		4
9	CR-PHMS 0.138-32x0.375x0.375-N		8
10	CR-PHMS 0.112-40x0.25x0.25-N		2
11	CR-PHMS 0.164-32x0.5x0.5-N		4
12	CR-PHMS 0.112-40x0.25x0.25-N		8
13	spacer 632 x 2500 hex		4
14	PCB009	opto 4070 right angle	1
15	AFBMA 122-0.250-0.5000-0.1940-83UNC 8		2
16	grommel 250dx375hole	HAR054	1
17	claw main assy3		1
18	079MAC023	claw reset hoop	1
19	Regular FW 0.164		4
20	nut #8 kep		4
21	Default	nut #6 kep	4
22	079ASM023	cable pulley assy wflag	1
23	079MAC020	pulley support plate	1
24	BRG006	bearing ball 3130Dx860D flanged	2
25	079SPR001	torison spring 375dx033wire 31 td prep	1
26	079SHM008	opto bracket td claw shm	1
27	079MAC024	claw centering plate	1
28	079SCMD12	claw position rod	2
29	nut #10 kep		2
30	spacer #10-32 x 1500 x 375 hex		2
31	spacer 632 x 1250 hex		2
32	BLT10012	timing belt 140XL	1
33	Default	nut #6 kep	2
34	CR-PHMS 0.138-32x0.625x0.625-N		2
35	CR-PHMS 0.138-32x0.625x0.625-N		2

REVISION:		DATE
ZONE	REV	DESCRIPTION
B		09/10/10
C		09/14/10
D		09/28/10

PROPRIETARY AND CONFIDENTIAL
THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF BENCHMARK GAMES, INC. NO REPRODUCTION OR TRANSMISSION IS TO BE MADE WITHOUT THE WRITTEN PERMISSION OF BENCHMARK GAMES, INC.

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES:
ANGULAR: ±0.1 DEG.
XXX+ ±0.005
XXX- ±0.005
XXX± ±0.005

DRAWN BY: []
MATERIAL: []
FINISH: []

COMMENTS: []

Benchmark Games
TITLE: claw lift travel assy

SCALE: 1:3 | DWG. NO: 079ASM024 | REV [] | SHEET 2 OF 3

ITEM NO.	PART NUMBER	DESCRIPTION	Default/ QTY.
1	079ASM009	travel motor assy	1
2	079SHM007	travel motor bracket shm	1
3	079ASM019	roller 985ODx188ID bearing assy	4
4	spacer #10-32 x 2 x 313hex		2
5	stepper PK266-01A 1.8 step	MOT015	1
6	GER003	timing belt pulley XL15 247 bore	1
7	60XLO37-UFS60-1H 875L0.3125N		1
8	CR-PHMS 0.112-40x0.25x0.25-N		6
9	spacer 632 x 2500 hex		4
10	PCB009	opto 4070 right angle	1
11	AFBMA 122-0.1875-0.5000-0.1940-83UNC 8		2
12	grommel 250dx375hole	HAR054	1
13	claw main assy3		1
14	079MAC023	claw reset hoop	1
15	Regular FW 0.164		4
16	nut #8 kep		4
17	Default	nut #6 kep	4
18	079ASM023	cable pulley assy wflag	1
19	079MAC020	pulley support plate	1
20	BRG006	bearing ball 3130Dx860D flanged	2
21	079SPR001	torison spring 375dx033wire 31 td prep	1
22	079SHM008	opto bracket td claw shm	1
23	079MAC024	claw centering plate	1
24	079SCMD12	claw position rod	2
25	nut #10 kep		2
26	spacer #10-32 x 1500 x 375 hex		2
27	spacer 632 x 1250 hex		2
28	BLT10012	timing belt 140XL	1
29	Default	nut #6 kep	2
30	CR-PHMS 0.138-32x0.625x0.625-N		1
31	6435K12		1
32	CR-PHMS 0.112-40x0.75x0.75-N		12
33	PreviewC1g		4
34	CR-PHMS 0.112-40x0.375x0.375-N		4
35	SCM001	pin .1250 dia. x .750 long	1

REVISION:		DATE
ZONE	REV	DESCRIPTION
B		09/10/10
C		09/14/10
D		09/28/10

PROPRIETARY AND CONFIDENTIAL
THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF BENCHMARK GAMES, INC. NO REPRODUCTION OR TRANSMISSION IS TO BE MADE WITHOUT THE WRITTEN PERMISSION OF BENCHMARK GAMES, INC.

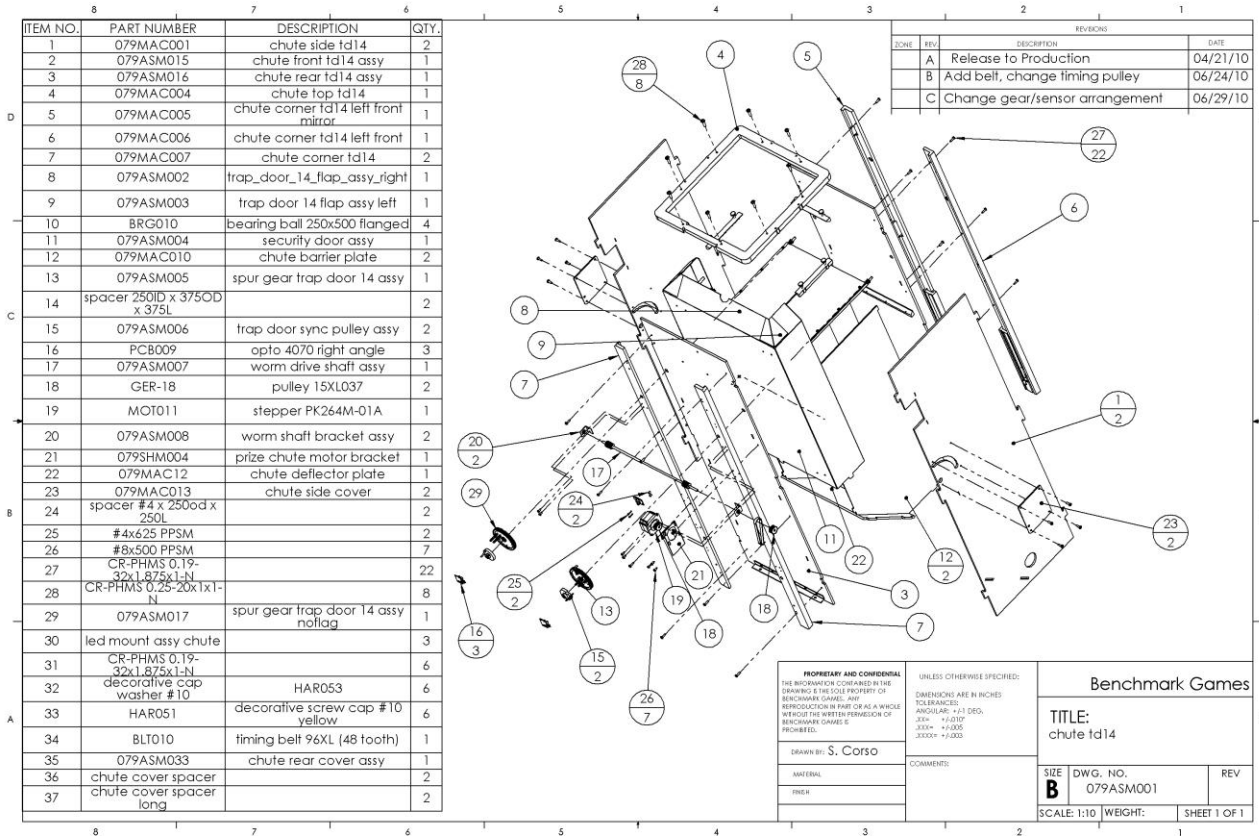
UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES:
ANGULAR: ±0.1 DEG.
XXX+ ±0.005
XXX- ±0.005
XXX± ±0.005

DRAWN BY: S. Corso
MATERIAL: []
FINISH: []

COMMENTS: []

Benchmark Games
TITLE: claw lift travel assy

SCALE: 1:4 | DWG. NO: 079ASM024 | REV [] | SHEET 1 OF 3



8- ERROR CODES AND TROUBLESHOOTING GUIDE

ERROR CODES, QUICK SUMMARY

Shown on the red 2-Digit Display.

- E1: IO-Expander 1 (Playfield Top-half), Communication Error.
- E2: IO-Expander 2 (Playfield Bottom-half), Communication Error.
- E3: IO-Expander 3, Communication Error.
- E4: Sound Board, Communication Error.
- E5: Two Digit Display, Communication Error.
- E6: Out-of-Plush Condition.
- E7: Toy Stuck Error.
- E8: Claw Horizontal Homing Error.
- E9: Claw Vertical Homing Error.
- EA: Trap Door Homing Error.
- Eb: Trap Door Load Error.
- EC: Tilted/Shaken Cabinet.

TROUBLESHOOTING GUIDE

#	SYMPTOM	POSSIBLE CAUSES / ACTIONS	SEE RELATED SYMPTOMS:
0	It doesn't work	Multiple. Plug the game to a wall receptacle and determine more exactly what features don't work.	All
1	E1 Error Code: IO-Expander 1 (Playfield top-half) Communication Error	Most likely top-half of playfield lights will behave erratically or will show nothing at all. > Check board has power, Vcc-LED should be lit. > Check board program is running, heartbeat LED should be flashing slowly, fast when receiving 485 serial comm. Commands. > Check on-board ID-switch setting, should be Off-Off-Off-Off. > Check 485 communication connector for proper crimping and polarity (try flipping 485 connector or its pins) > Check that all boards are connected to the 485 network, remember that in some of them, a disconnection will break the rest of the 485 chain. > Check 485 communication connector on Main CPU Board	3,4
2	E2 Error Code: IO-Expander 2 (Playfield bottom-half) Communication Error	Most likely bottom-half of playfield lights will behave erratically or will show nothing at all. > Check board has power, Vcc-LED should be lit. > Check board program is running, heartbeat LED should be flashing slowly, fast when receiving 485 serial comm. Commands. > Check on-board ID-switch setting, should be On-off-off-off. > Check 485 communication connector for proper crimping and polarity (try flipping 485 connector or its pins) > Check that all boards are connected to the 485 network, remember that in some of them, a disconnection will break the rest of the 485 chain. > Check 485 communication connector on Main CPU Board	1,3,4
3	E3 Error Code: IO-Expander 3 (Auxiliary IO control) Communication Error	This board controls the Playfield backlights, the trap door lights, the column lights, the accounting hard-meters, and the failure of these can be a symptom to confirm the E3 Error. > Check board has power, Vcc-LED should be lit. > Check board program is running, heartbeat LED should be flashing slowly, fast when receiving 485 serial comm. Commands. > Check on-board ID-switch setting, should be On-off-off-off. > Check 485 communication connector for proper crimping and polarity (try flipping 485 connector or its pins) > Check that all boards are connected to the 485 network, remember that in some of them, a disconnection will break the rest of the 485 chain. > Check 485 communication connector on Main CPU Board (Quad stepper Board)	1,2,4
4	E4 Error Code: Sound Board Communication Error	> Check for Sound Board power (Vcc LED On) > Check Sound Board program is running, (green LED flashes slowly) > Check Sound Board communication-485, including on-board ID-switch setting.	3

5	E5 Error Code: Two Digit Display Communication Error	> Check for Sound Board power (Vcc LED On) > Check Sound Board program is running, (green LED flashes slowly) > Check Sound Board communication-485, including on-board ID-switch setting.	
6	E6 Error Code: Out-of-Plush Condition	>Add Plush, reboot machine.	
7	E7 Error Code: Toy-Stuck on Trap Door Condition	>The system senses the Door is all the way open but the doors don't unload (no toy fall) check the door flap Opto sensors and/or the counter-weight mechanism. >The plush being used is indeed too large for the door. Toy sno larger than 17" are recommended.	
8	E8 Error Code: Claw Horizontal Homing Error	>Check that claw carriage assembly is not stuck and free to move around track all the way to the stop at the front. > Check Opto on back of Claw travel assembly. Remove small top access door to do this. > Check Home opto lights up when claw carriage assembly flag covers it. >If opto seems ok, measure continuity on the signal line from opto to quad stepper board inputs.	14
9	E9 Error Code: Claw Vertical Homing Error	> Check Opto-Flag- disc covers vertical Home-opto when latching claw, or when there is slack on the string. > Check Claw vertical-Home opto lights up when flag-disc covers it. >If opto seems ok, measure continuity on the signal line from opto to quad stepper board inputs.	11,14
10	EA Error Code: Trap Door Homing Error	> Check Trap Door Home Opto lights up when door assembly flag covers it. >If opto seems ok, measure continuity on the signal line from opto to quad stepper board inputs.	
11	Eb Error Code: Trap Door Loading	>Check if Claw has any trouble latching its mechanism. >Check Trap Door flap Optos for proper operation.	9,15
12	Ec Error Code: Tilted/Shaken Game	>There is a tilt sensor at the back of the game. This alarm should last no more than 10 seconds and then go away. If the condition persist, the sensor may be stuck to the contact rim. Check the position/ alignment of this sensor. >Make sure the sensor line is not getting grounded by any other wire around the cabinet. The line should not have 0V unless the sensor makes contact.	
13	Trap Door Past upper home position	> Check Trap Door Home Opto lights up when door assembly flag covers it. >If opto seems ok, measure continuity on the signal line from opto to quad stepper board inputs. >Check proper assembly and orientation of all parts in the pulley assembly, especially if a string replacement was just performed.	
14	Claw stuck over Trap door can't find center position on back	>Check that the claw carriage assembly is not stuck on the travel limit stop screw at the front of the track over the trap doors. >Check claw carriage home opto for operation and that flag on travel assembly interrupts opto when passing through sensor.	7
15	Claw won't reach vertical home/latch I	>Make sure string is wound the in the proper direction >If the claw is all the way down at the bottom, this might be creating slack on the string, fooling the detection mechanism. Wind the string so that the claw hangs about a foot from the bottom loading the mechanism; the opto should be unblocked at this point; turn on the machine.	9,11
16	One of the Light Strips is dead	>On Power-up, measure the voltage across the strip (remove the tape covering the solder-points if necessary). You should see 12V sporadically. As the signal goes through the attraction patterns. >Check for 12V on the yellow wire only, against DC ground on the power distribution board. >Check continuity between the signal wire (Sink) and the corresponding IO-expander3 board (top-panel) output.	
17	Claw picks up more than one toy at a time.	>This is somewhat rare but normal behavior, depending on the size of the toys being used.	
18	Won't accept Bills/Coins	>The game does disable the coins/bill when there is a E fault code present, check for that. >Check the signals on the interface connector on the Cash Drawer, (12-pin Molex connector) as per section6 (page 22) >make sure those signals go past the interface connector and reach the actual Bill Acceptor connector >Check continuity between the Enable signal wire (sink) and the corresponding IO-expander3 board (top-panel) output.	
19	Claw won't latch open at end of vertical Travel	>Check that the lift motor belt pulleys or string pulley are not slipping on the shafts. >Check claw vertical home sensor operation. If upper limit opto is not working, the claw will continue past its latch position and slip down and unlatch. >Check proper assembly and orientation of all parts in the pulley assembly, especially if a string replacement was just performed.	9,11,15
20	Game Jackpots but prize remains in chute. Usually the claw will stop short of reloading a prize before play is allowed to continue	Problem: Trap doors are not adjusted sensitive enough. The cause of the problem is a prize, when of a certain size and weight, is dropped on the chute in such a way that as the door opens, the weight sensing opto(s) located in the back of the chute are activated before the prize is dropped. The game thinks the prize has dropped and begins to return the trap doors back to the up position when it will almost immediately reset the opto letting the game know there is a prize n the chute. Solution: Perform "Trap Door Sensitivity Adjustment" described in this manual	