






SERVICE






SAFETY INSTRUCTIONS

The following safety instructions apply to operators and service personnel. Read these instructions thoroughly prior to servicing or preparing the game machine for play. Other safety instructions appear throughout this manual where necessary.

DEFINITIONS OF SAFETY TERMS

- **DANGER** indicates an imminent hazard. If you fail to avoid this hazard, it **WILL** cause death or serious injury.
- **WARNING** indicates a potential hazard. If you fail to avoid this hazard, it **COULD** cause death or serious injury.
- **CAUTION** indicates a potential hazard. If you fail to avoid this hazard, it **MAY** cause minor or moderate injury. **CAUTION** also alerts you about unsafe practices.
- **NOTE** indicates information of special importance.

	<p>WARNING: TRANSPORTING GAMES. The game machine contains glass and fragile electronic devices. Use appropriate care when transporting to avoid rough handling of cabinet. Never move with power switched on.</p>
	<p>WARNING: DISCONNECT POWER. Always turn power OFF and unplug game machine before attempting service or adjustments unless otherwise instructed. Installing or repairing boards with power switched on can damage components and void the warranty.</p>
	<p>WARNING: GROUND GAMES. Avoid electrical shocks! Do not plug in a VGM until you have inspected and properly grounded it. Only plug this game into a grounded, three-wire outlet. Do not use a “cheater” plug, or cut off ground pin on line cord.</p>
	<p>WARNING: AVOID ELECTRICAL SHOCKS. The game machine system does not utilize an isolation transformer. Internal cabinet AC is not isolated from external AC line.</p>
	<p>WARNING: HANDLE FLUORESCENT TUBE AND CRT WITH CARE. If you drop a fluorescent tube or CRT and it breaks, it will implode! Shattered glass can fly eight feet or more from implosion.</p>

	<p>CAUTION: CHECK POWER SELECTOR, LAMP. Set the 115/230VAC selector on the power supply for the correct line voltage. Check the selector setting before switching on game machine. Verify fluorescent lamp assembly is correct for the local line voltage.</p>
	<p>CAUTION: USE PROPER FUSE. Avoid electrical shock! Replacement fuses must be identically rated. Fuse voltage and current ratings must be identically rated to original fuse.</p>
	<p>CAUTION: ATTACH CONNECTORS PROPERLY. Be sure board connectors mate properly. If connectors do not slip on easily, do not force them. A reversed connector may damage the game machine and void the warranty. Connector keys only allow a connector to fit one set of pins on a board.</p>
	<p>CAUTION: USE CARE WHEN SHIPPING HARD DISKS. The hard disk drive (HDD) must be packed in an anti-static bag. When shipping HDD for repair or replacement, pack it in an approved container (P/N 08-8068). Do not stack or drop hard disk drives.</p>
	<p>WARNING: HAZARD TO EPILEPTICS. A very small portion of the population has a condition which may cause them to experience epileptic seizures or have momentary loss of consciousness when viewing certain kinds of flashing lights or patterns that are present in our daily environment. These persons may experience seizures while watching some kinds of television pictures or playing certain video games. People who have not had any previous seizures may nonetheless have an undetected epileptic condition.</p> <p>If you or anyone in your family has experienced symptoms linked to an epileptic condition (e.g., seizures or loss of awareness), immediately consult your physician before using any video games.</p> <p>We recommend that parents observe their children while they play video games. If you or your child experience the following symptoms: dizziness, altered vision, eye or muscle twitching, involuntary movements, loss of awareness, disorientation, or convulsions, DISCONTINUE USE IMMEDIATELY and consult your physician.</p>

SERVICING

Only qualified service personnel should perform maintenance and repairs. Product guidelines apply to *all* operators and service personnel.

Specific notes, cautions, and warnings appear throughout the manual where they apply. We recommend that you thoroughly read the SAFETY NOTICES section prior to beginning service. **NOTE:** *Always switch off power to the game machine before servicing.*

To service Marquee...

Refer to *Marquee Service* and *General Dash Service* illustrations.

- Switch off power to game machine and unplug AC line cord.
- *Remove controller assembly:*
 1. Remove tamper-resistant screws used to fasten controller cover to controller housing and set aside.
 2. Lift up controller cover enough to expose wiring.
 3. Label and disconnect all wiring, including ground.
 4. Completely remove controller cover and set aside until reinstallation.
 5. Locate and remove center hub. Remove screws from hub, lift hub from shaft, then set aside until reinstallation.
 6. Locate and remove the hex nut used to fasten controller housing to motor shaft.
 7. Grab each controller grip and lift up and away from dashboard. *If controller housing sticks, perform bulleted steps listed below, otherwise advance to step 8.*
 - Replace the hub removed in step 5. Fasten in place with the screws provided.
 - Locate hex-head bolt. This bolt is secured with a retention clip inside of the controller assembly.
 - Insert bolt in hub and tighten down until the controller housing begins to lift up and can be removed completely.
 - Be sure to return bolt to retention clip for future use.
 8. Locate and remove Phillips head screws used to fasten anti-pinch plate around motor shaft.
 9. Remove anti-pinch plate and set aside with hardware until reinstallation.
- *Remove dash pod:*
 1. Locate and remove tamper-resistant screws used to fasten pod to cabinet.
 2. Gently slide pod off and away from cabinet.
 3. Place pod in a safe place along with hardware to prevent breakage or loss.
- *Remove Marquee:*
 1. Locate and remove tamper-resistant screws used to fasten marquee to cabinet.
 2. Lift marquee from cabinet to expose opening in cabinet. Store marquee in a safe place along with hardware to prevent breakage or loss.
- Perform desired repair or equipment replacement.

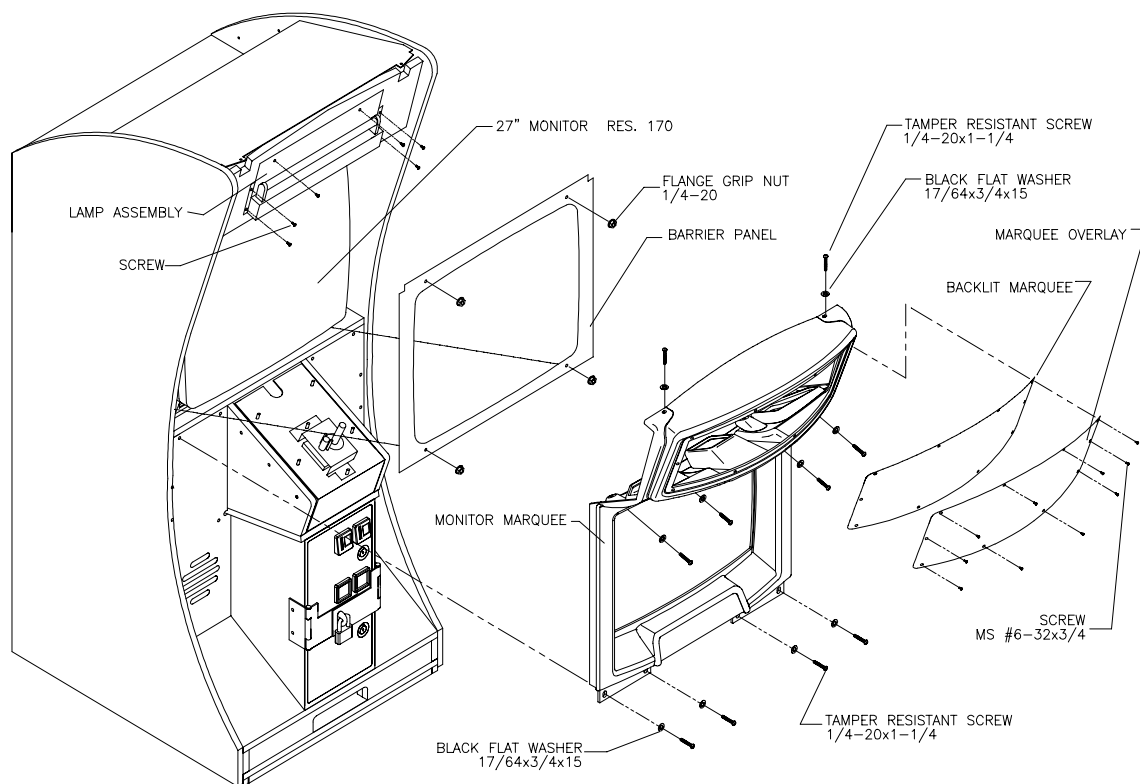
**WARNING**

Fluorescent tubes implode on impact when dropped. Use care in handling.

To service the Fluorescent Light Assembly...

Refer to *Marquee Service* illustration.

- Switch off power to game machine and unplug the AC line cord.
- Remove screws used to fasten the clear plastic overlay and marquee artwork to marquee.
- Remove both the marquee overlay and artwork and set aside in a safe place to prevent damage.
- Reach up inside the opening in cabinet and disconnect the power cable from fluorescent light assembly.
- Loosen, but do not remove the screws fastening assembly to cabinet.
- Slide assembly slightly forward to disengage the keyholes. Lift out the assembly.
- Perform desired repair or equipment replacement.



MARQUEE ILLUSTRATION

To service Backlit Marquee ...

Refer to *Marquee Service* illustration.

- Switch off power to game machine and unplug AC line cord.
- Remove screws used to fasten the clear plastic overlay and marquee artwork to marquee.
- Remove both the marquee overlay and artwork and set aside in a safe place to prevent breakage.
- Perform desired repair or equipment replacement.



To service the Fluorescent Lamp or Starter...

Refer to *Marquee Service* illustration.

- Switch off power to game machine and unplug AC line cord.
- Remove screws used to fasten clear plastic overlay and marquee artwork to marquee.
- Remove both the marquee overlay and artwork and set aside in a safe place to prevent breakage.
- Reach up inside the opening in cabinet and remove fluorescent lamp locks.
- Both the fluorescent tube and the starter require a quarter turn for removal. Grasp tube or starter, give it a quarter turn and pull it from its socket.
- Carefully place a new starter or tube into the sockets and rotate it a quarter turn to reinstall.
- Reinstall both fluorescent lamp locks. Wipe tube clean to remove fingerprints and dust.

To service the Monitor (CRT)...

We recommend that you read WARNINGS thoroughly before beginning this procedure.

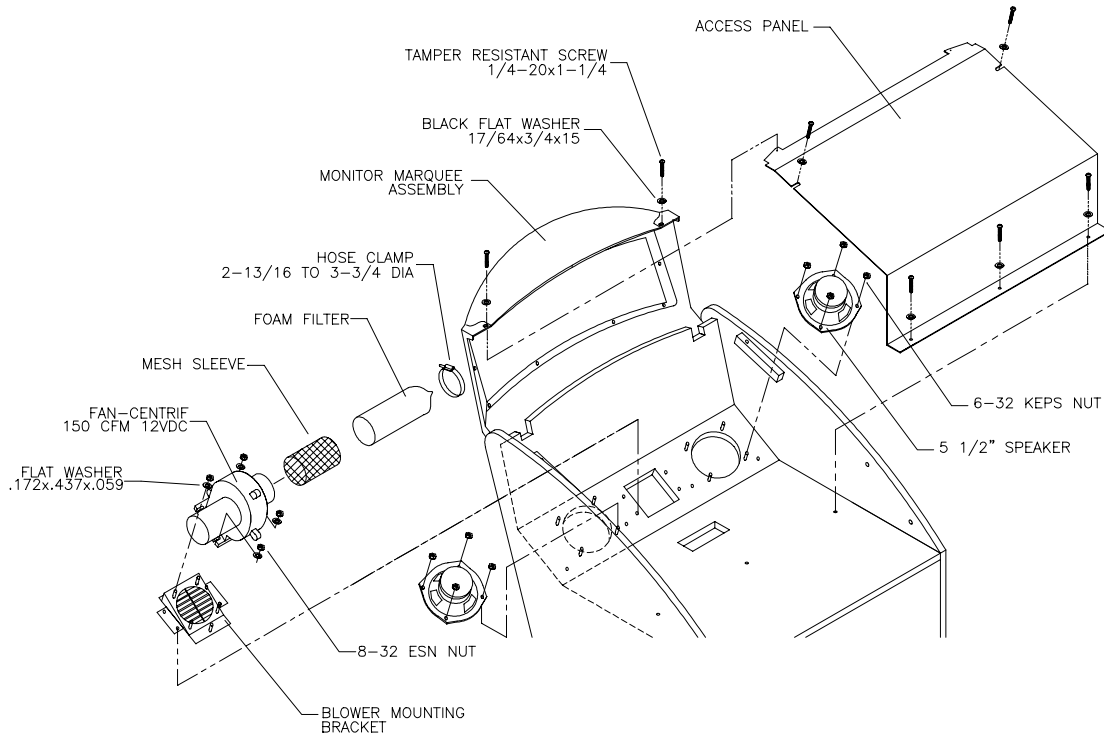
	<p>CAUTION The video monitor is heavy, with most of the weight toward the front of the assembly. Be sure it is firmly supported as it is moved from the cabinet.</p>
	<p>WARNING The monitor does not require isolation from the AC line voltage in normal operation. When operating outside the cabinet or servicing the monitor on a test bench, ISOLATE THE MONITOR FROM LINE VOLTAGE WITH AN ISOLATION TRANSFORMER.</p>

- Switch off power to game machine and unplug AC line cord.
- Remove Marquee and Barrier Panel. *Refer to service instructions for Marquee and Barrier Panel.*
- Open rear cabinet door and disconnect monitor from wiring harness and ground wires.
- Remove nuts securing monitor mounting flanges to mounting panel.
- Pull monitor carefully from cabinet and set aside.
- Perform desired repair or equipment replacement.

To service Barrier Panel...

Refer to *Marquee Service* illustration.

- Switch off power to game machine and unplug AC line cord.
- Remove Marquee. *Refer to service instructions for Marquee.*
- Locate and remove hex nuts used to fasten barrier panel in cabinet. Grasp barrier panel along bottom edge and lift it out of cabinet.
- Perform desired repair or equipment replacement.



BLOWER SERVICE

To service Blower Fan...

Refer to *Blower Fan and Speaker Service* illustration.

- Switch off power to game machine and unplug AC line cord.
- *Remove access panel from atop cabinet.*
 1. Locate and remove screws used to fasten access panel to cabinet.
 2. Lift and pivot panel to remove from cabinet. **NOTE:** This panel is heavy and may require a bit of maneuvering during removal and reinstallation.
- Label and disconnect wiring.
- Remove hex nuts and washers from mounting screws before removing fan assembly from enclosure. Set aside hardware. Lift out fan assembly.
- Perform desired repair or equipment replacement.
- Be sure to clean fan filter, or replace with new one, before reinstallation of blower fan.

To service Marquee Mounted Cabinet Speakers...

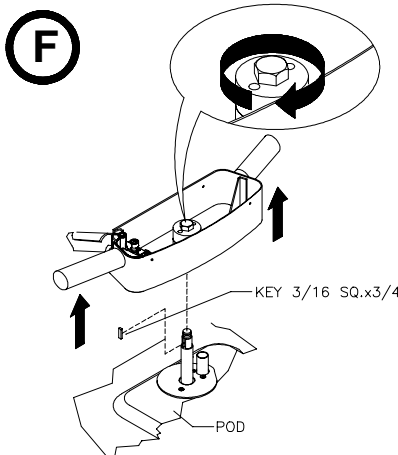
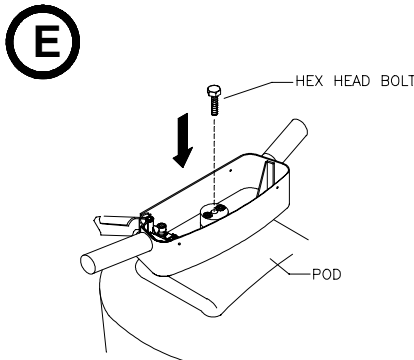
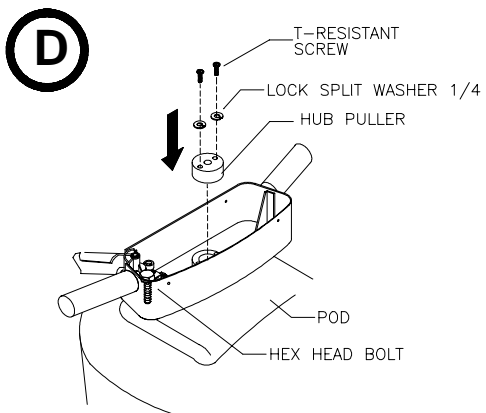
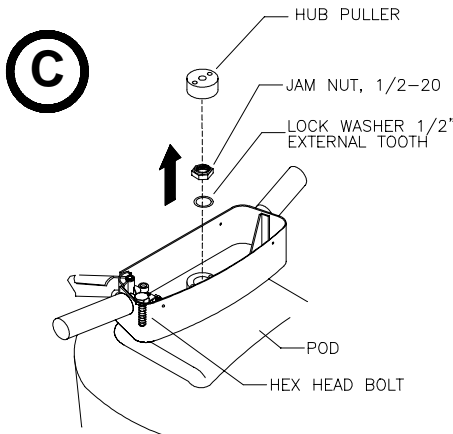
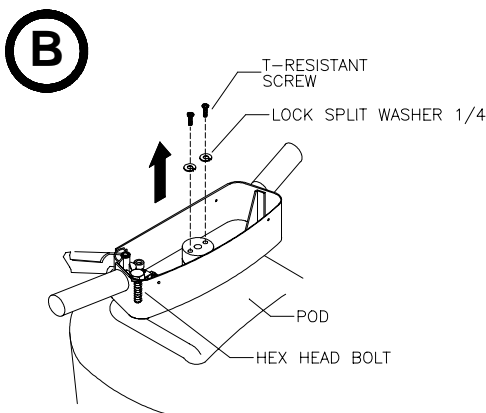
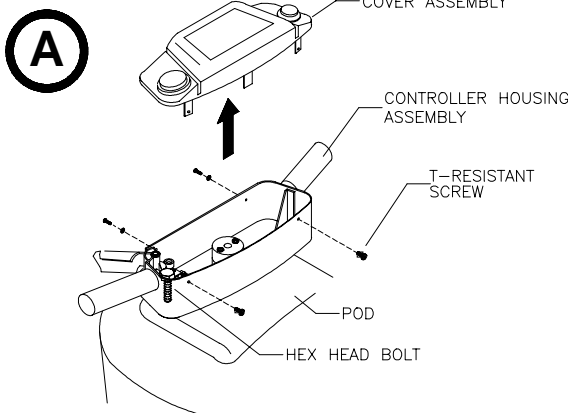
Refer to *Blower Fan* and *Speaker Service* illustration. Speakers are located in the underside of marquee.

- Switch off power to game machine and unplug AC line cord.
 - *Remove fan access panel from atop cabinet.*
 1. Locate and remove screws used to fasten access panel.
 2. Lift and pivot panel to remove from cabinet. **NOTE:** Access panel is heavy and may require a bit of maneuvering during removal and reinstallation.
 - Label and disconnect speaker wiring, including ground strap.
 - Remove hex nuts from mounting screws before removing speakers from enclosure.
 - Perform desired repair or equipment replacement.
 - Carefully reseal seals upon completing any task inside speaker enclosure.
 - Reconnect wires, including ground. Refer to the Cabinet Wiring Diagram for correct speaker polarity.
- NOTE:** The speakers are magnetically shielded to prevent video monitor color impurity. Be sure that any replacement speakers are also magnetically shielded.

To service Controller...

Refer to *Controller Service* illustration.

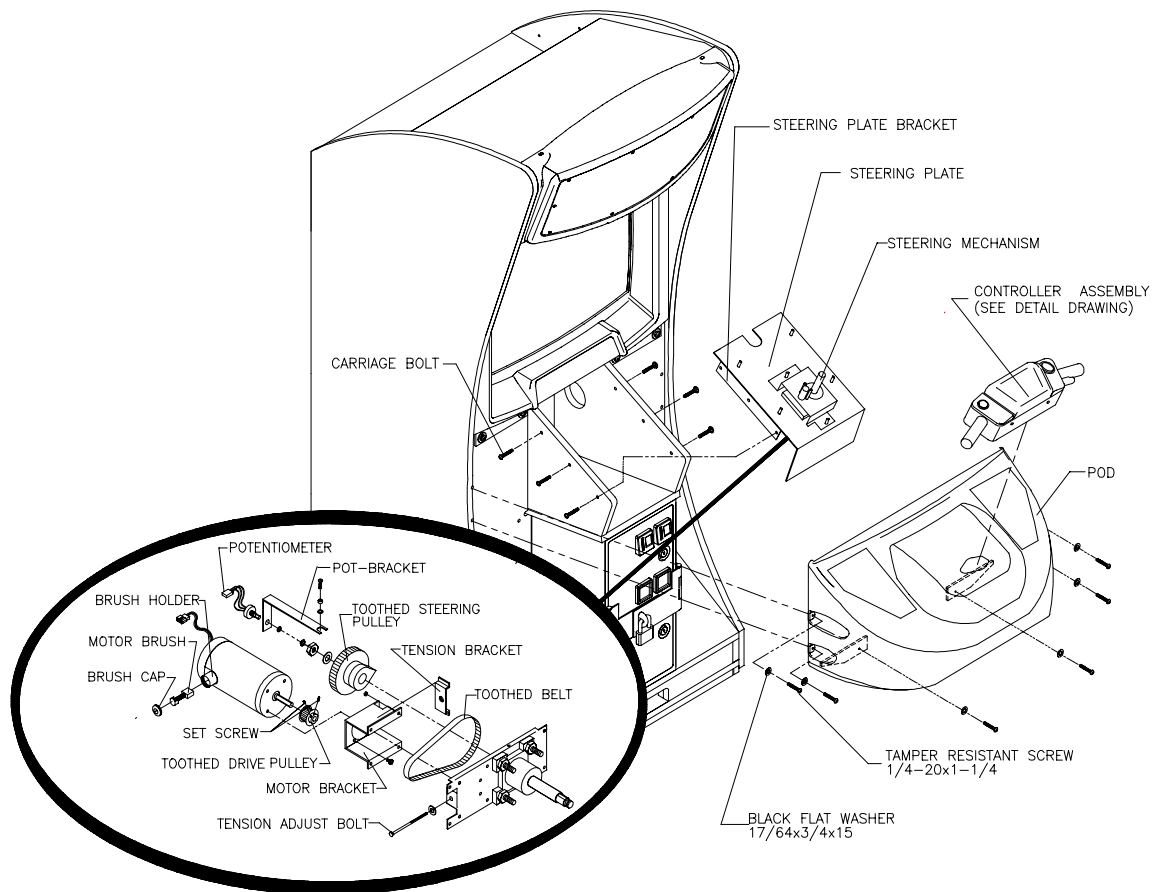
- Switch off power to game machine and unplug AC line cord.
- Open rear cabinet door.
- Label and disconnect all dash wiring, including ground strap.
- *Remove controller assembly.*
 1. Remove tamper-resistant screws used to fasten controller cover to controller housing and set aside.
 2. Lift up controller cover enough to expose wiring.
 3. Label and disconnect all wiring, including ground.
 4. Completely remove controller cover and set aside until reinstallation.
 5. Locate and remove center hub. Remove screws from hub, lift hub from shaft, then set aside until reinstallation.
 6. Locate and remove jam nut and lock washer used to fasten controller housing to motor shaft.
 7. Grab each controller grip and lift up and away from dashboard. *If controller housing sticks, perform bulleted steps listed below, otherwise advance to step 8.*
 - Replace the hub removed in step 5. Fasten in place with the screws provided.
 - Locate hex-head bolt. This bolt is secured with a retention clip inside of the controller assembly.
 - Insert bolt in hub and tighten down until the controller housing begins to lift up and can be removed completely.
 - Be sure to return bolt to retention clip for future use.
 8. Set aside controller housing with matching hardware until reinstallation.
- Perform desired repair or equipment replacement.



CONTROLLER SERVICE

To service Start and Attack Buttons...

- Switch off power to game machine and unplug AC line cord.
- *Remove controller assembly:*
 1. Remove tamper-resistant screws used to fasten controller cover to housing and set aside.
 2. Lift up controller cover enough to expose wiring. Label and disconnect all wiring, including ground.
 3. Completely remove controller cover.
- Perform desired repair or equipment replacement.



GENERAL DASH SERVICE

To service Throttle...

Refer to *Controller Service* illustration.

- Switch off power to game machine and unplug AC line cord.
- Open rear cabinet door.
- Label and disconnect all dash wiring, including ground strap.
- *Remove controller assembly:*
 1. Remove tamper-resistant screws used to fasten controller cover to housing and set aside.

To service Throttle (continued)...

2. Lift up controller cover enough to expose wiring. Label and disconnect all wiring, including ground.
 3. Completely remove controller cover and set aside until reinstallation.
- Perform desired repair or equipment replacement.
 - Reconnect wires and reinstall. Check for pinched wires.

To service Steering Assembly...

- Switch off power to game machine and unplug AC line cord.
- Unlock and open rear cabinet door.
- Label and disconnect wiring, including ground strap, for steering assembly.
- *Remove controller assembly:*
 1. Remove tamper-resistant screws used to fasten controller cover to the housing and set aside.
 2. Lift up controller cover enough to expose wiring.
 3. Label and disconnect all wiring, including ground.
 4. Completely remove controller cover and set aside until reinstallation.
 5. Locate and remove center hub. Remove screws from hub, lift hub from shaft, then set aside until reinstallation.
 6. Locate and remove jam nut and lock washer used to fasten controller housing to motor shaft.
 7. Grab each controller grip and lift up and away from dashboard. *If controller housing sticks, perform bulleted steps listed below, otherwise advance to step 8.*
 - Replace the hub removed in step 5. Fasten in place with the screws provided.
 - Locate hex-head bolt. This bolt is secured with a retention clip inside of the controller assembly.
 - Insert bolt in hub and tighten down until the controller housing begins to lift up and can be removed completely.
 - Be sure to return bolt to retention clip for future use.
 8. Set aside controller housing with matching hardware until reinstallation.
 9. Locate and remove Phillips head screws used to fasten the anti-pinch plate around motor shaft.
 10. Remove anti-pinch plate and set aside with hardware until reinstallation.
- *Remove dash pod:*
 1. Locate and remove tamper-resistant screws used to fasten pod to cabinet.
 2. Gently slide dash pod off of and away from cabinet.
 3. Place pod in a safe place along with hardware to prevent breakage or loss.
- Remove hex nuts used to fasten dash plate to cabinet.
- Pull plate forward to expose motor. Lift out steering assembly. **NOTE:** Use caution when removing motor due to its weight.
- Perform desired repair or equipment replacement.

To service Steering Assembly (continued)...

- Reinstall and fasten all items in place with hardware provided.

While the steering mechanism is exposed, inspect belt for splits in the rubber or other signs of wear at the edges of the teeth. Install a new belt if necessary following the instructions below.

To service Steering Belt...

- Loosen four mounting nuts for the motor bracket.
- Tighten the tension-adjust bolt only until there is no belt deflection, then loosen the bolt one full turn and tighten the four nuts.
- Reattach the mechanism and recalibrate the assembly.

IMPORTANT: Apply removable anaerobic adhesive thread lock (Loctite Blue 242 or equivalent) and torque set screw to seven to nine ft.-lbs. (84 to 108 in.-lbs.) if it was loosened.


To service Lower Cabinet Speaker...

Speaker is located on the left-hand side of cabinet just above the foot rest.

- Switch off the power to the game machine and unplug the AC line cord.
- Unlock and remove rear cabinet door.
- Label and disconnect wiring, including ground strap, to PC assembly attached to electronics shelf.
- Remove screws used to fasten the electronics shelf to the inside of cabinet, then remove the shelf and set it aside.
- Locate speaker. Remove nuts from mounting screws before removing speaker from enclosure.
- Perform desired repair or equipment replacement.
- Carefully reseal the seals upon completing any task in speaker enclosure.
- Reconnect wiring, including ground. Refer to the Cabinet Wiring Diagram for correct speaker polarity.

To service Power Supply...

- Switch off power to game machine and unplug the AC line cord.
- Unlock and remove the rear cabinet door.
- Unplug the IEC AC connector from rear of power supply and the DC connector from the front.
- Remove two front and two rear screws from supply, then lift it off of the power chassis. Note voltage setting.
- Perform desired repair or equipment replacement.
- Be sure to set voltage switch to correct value prior to reinstallation.
- Set the supply on the power chassis and align the mounting holes. Install the four screws and the two power connectors.

	<p>DANGER High voltage present. Exercise extreme caution while servicing transformer.</p>
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To service Transformer...

- Switch off power to game machine and unplug AC line cord.
- Unlock and remove rear door.
- If power to game machine was only recently disconnected, the transformer may still be warm. Allow transformer to cool completely before handling.
- Label and disconnect all wiring, including ground.
- Remove screws used to fasten transformer to base of cabinet.
- Perform desired repair or equipment replacement.

To service Coin Mechanism...

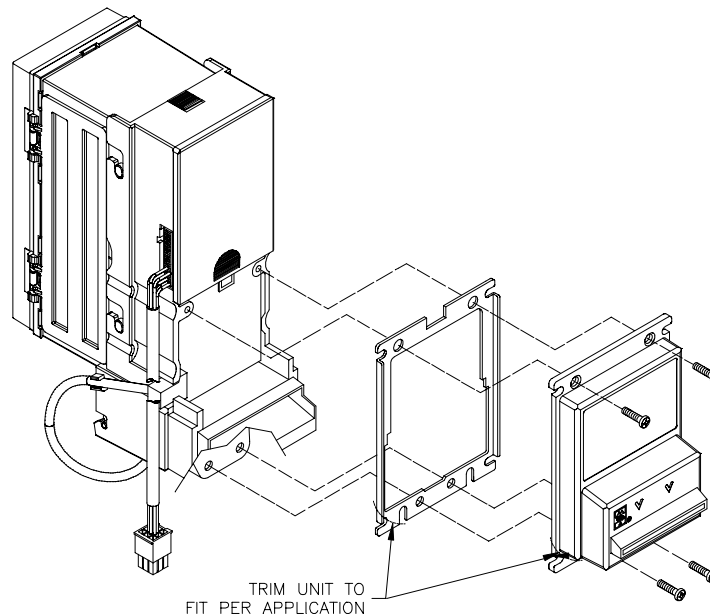
- Switch off power to game machine and unplug the AC line cord.
- Unlock coin door and swing it open.
- Unlatch and remove each coin mechanism separately to clean or replace with a different type. Ensure mechanism seats fully in the holder upon reinstallation.
- Close and lock the release latch, then close the door.
- Switch on power to game and change the mechanism setup, then test known good and bad coins to verify operation.

To service Coin Counter...

- Switch off power to game machine and unplug the AC line cord.
- Unlock and open cash door.
- Locate meter in lower left corner of the vault opening. Record meter count before testing or replacement.
- Locate meter wires. Label and disconnect wiring.
- Remove screws from front bracket.
- Perform the desired repair or equipment replacement. **NOTE:** Be sure replacement meter has a diode across the terminals to protect driver circuits.

To service Coin Meter...

- Switch off power to game machine and unplug the AC line cord.
- Unlock and open cash door. Remove cash tubs.
- The meter is located at the bottom of vault on a plate. Remove the screws and lift the plate just enough to disconnect the meter wires from the harness.
- Record meter count before testing or replacement.
- Perform desired repair or equipment replacement.



DOLLAR BILL VALIDATOR SERVICE

To service Dollar Bill Validator...

(Use MARS AE2411-U3 UL recognized currency changer)

Dollar bill validators or other currency acceptors may be installed in games that are manufactured with an additional wiring connector.

- Switch off power to game machine and unplug the AC line cord.
- Unlock and open coin door. Read label affixed to the inside of door for additional information.
- Disassemble validator and remove material to permit it to fit inside coin door as shown in *Dollar Bill Validator Service* illustration, then reassemble unit.

To service Shaker Motor Assembly in Seat...

Refer to *Seat Service* illustration.

- Switch off power to game machine and unplug AC line cord.
- Remove tamper resistant screws used to fasten seat access panel and pull panel forward.
- Label and disconnect wiring, including ground.
- Remove hex nuts used to fasten shaker motor to seat and remove.
- Perform desired repair or equipment replacement.
- Reinstall motor and reattach wiring.

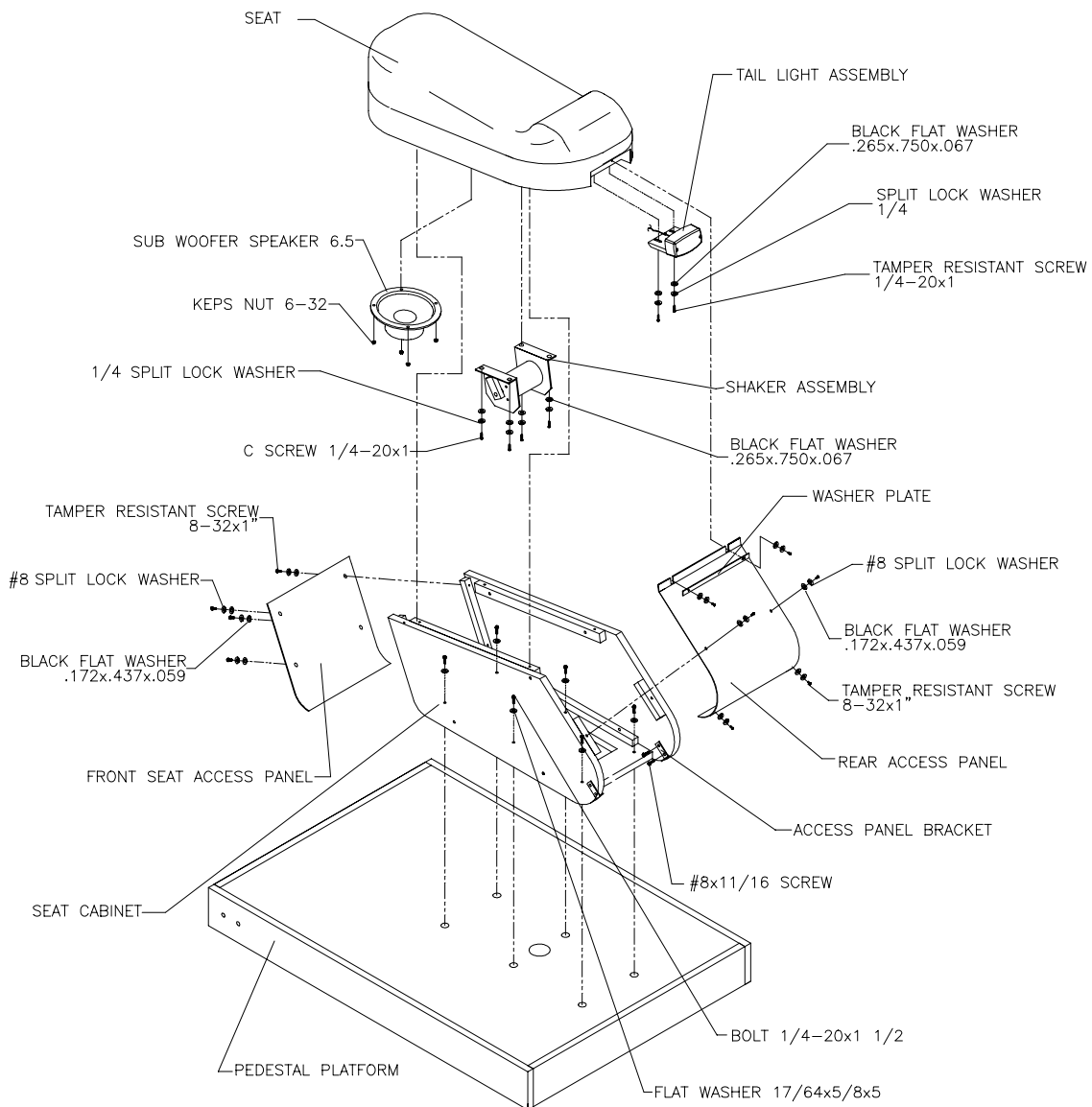
IMPORTANT: Apply removable anaerobic adhesive thread lock (Loctite Blue 242 or equivalent) and torque each bolt to 20 to 25 in-lbs (177 Nm to 221.25 Nm) if it was loosened.

To service Speaker in Seat...

Refer to *Seat Service* illustration.

- Switch off power to game machine and unplug AC line cord.
- Remove tamper resistant screws used to fasten seat access panel, and pull panel forward.
- Label and disconnect speaker wiring, including ground.
- Remove hex nuts used to fasten speaker to seat and remove speaker.
- Perform desired repair or equipment replacement.
- Reinstall speaker and reattach wiring, including ground.

IMPORTANT: Apply removable anaerobic adhesive thread lock (Loctite Blue 242 or equivalent) and torque each bolt to five to seven in-lbs (44.25 Nm to 62 Nm) if it was loosened.



SEAT SERVICE

To service Seat Tail Lamp...

Refer to *Seat Service* illustration.

- Switch off power to game machine and unplug the AC line cord.
- Remove tamper resistant screws used to fasten red lens cover.
- Perform desired repair or equipment replacement.



CAUTION

Discharge any static electricity built up in your body by touching the chassis for the power supply. Do this **BEFORE** touching or handling the electronic assemblies.

To service PCB Board Assemblies...

Refer to the following procedure when servicing the Wheel Driver Board, I/O Board, Amplifier Board, or Quad High Current Board.

- Switch off power to game machine and unplug AC line cord.
- Unlock and remove rear door.
- Locate desired PCB Assembly.

NOTE: Consult illustrated parts chapter for part numbers and/or detailed illustrations showing locations.

- Carefully label wiring and note the orientation of JAMMA connections and any other cables. Extract harness and other cables from board connectors.
- Remove mounting screws from desired circuit board assembly. Lift board out of cabinet and set in a safe place. Use anti-static bags and protective containers to store board(s) that are not reinstalled immediately.
- Perform desired repair or equipment replacement.

To service Arcade Computer...

- Contact your authorized *Midway Amusement Games, LLC* distributor.