

Williams

Bally

MIDWAY

Service Bulletin Book

1989

Williams Electronics Games, Inc.
Midway Manufacturing Company
Makers of Williams and Bally Amusement Games

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SERVICE BULLETIN

No. SS44

October 16, 1987

Power Supply Transistors

Transistors Q1 and Q3 (respectively, SDS201 and SDS202) in the D-8345 Power Supply are no longer available.

Q1 and Q3 are now, respectively, MJE15030 and MJE15031. If either of the old transistors develops a problem requiring replacement, replace only the defective transistor (either new transistor will work properly in place of the old one; they don't have to be replaced in pairs). A problem does exist, however, in the replacement because the electrode leads are in different order on these new transistors than they were on the old ones.

To install (replace) either of the old transistors with a new one, we recommend the following technique:

1. Completely remove the transistor, with its heat sink, from the Power Supply circuit board:
 - A. Remove the attaching machine screw, nut, and lockwasher from the transistor heat sink. Retain these fastening parts and the heat sink.
 - B. Unsolder the transistor's leads and extract it from the circuit board.
2. If the power supply circuit board is one of the newer boards, which has three *in-line* solder points closer to the 6-pin connector (3J5) than the three *triangle arrangement* solder points, as shown in Figure 1, use these *in-line* connections and install the new transistor (MJE15030 or MJE15031) with its leads straight into their *in-line* solder points. Reattach the heat sink to the transistor. Do NOT bend the leads to lay it on the circuit board. Leave it standing upright.

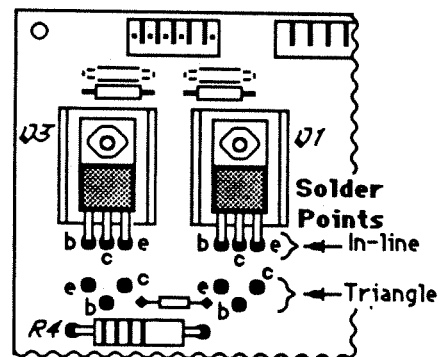


Figure 1. Solder Points for Power Supply Transistors Q1 & Q3.

3. If these *in-line* connections are not present (older power supply board), carefully bend the new transistor's leads to match the old transistor's triangular arrangement of connection points. Figure 2 shows a comparison of the electrode layout between the old and new transistors.

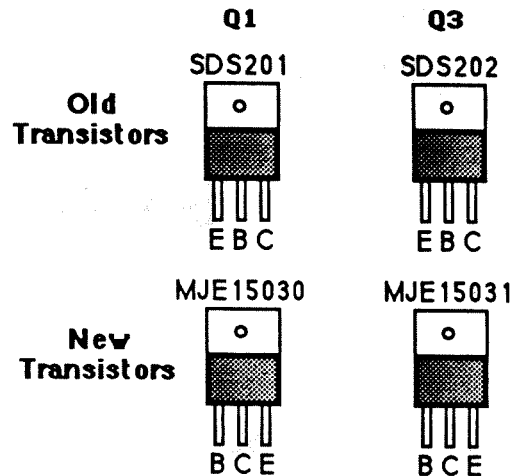


Figure 2. Comparison of Transistor Electrodes - old vs new.

4. The following is one method of installation:

Face the new transistor (MJE1503x) toward the side of the pc board with the emitter lead side toward the 6-pin connector (3J5). (**See Figure 3.**) Bend the base lead slightly forward (away from the heat sink portion of the transistor). Bend the collector lead slightly back (toward the heat sink portion). Bend the emitter lead forward as necessary to reach the emitter solder point (e). Adjust the bends of these leads, until they align with their solder points. Insert the leads into the pc board and solder. **Carefully** inspect the leads to verify that they are not touching each other. Reinstall the heat sink in an upright position. Inspect again to ensure against short circuits, which will damage the transistor.

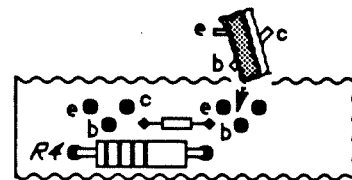


Figure 3. Top View of New Q1 with Leads Bent Ready for Installation.

5. Reference part number information.
Old transistors:

Q1 (SDS201) - 5164-09057-00
Q3 (SDS202) - 5194-09058-00

New transistors:

Q1 (MJE15030) - 5164-12154-00
Q3 (MJE15031) - 5194-12155-00

SERVICE BULLETIN

- SUBJECT:** Inline fuse installation: In case a power rectifier fails, this modification protects the power transformer and wiring harness.
- AFFECTED GAMES:** Games manufactured before *Big Guns* (November, 1987).
- TOOLS AND MATERIALS:** Diagonal cutters
Heatshrink tubing
Inline fuseholder (*You may use waterproof, crimp-on, plastic-insulated types*)
60/40 Solder
5A and 8A Slow-blow fuses
Soldering iron

Procedure

PREPARATIONS

- [] 1. Unplug the game's AC line cord.
- [] 2. Remove the playfield glass and prop up the playfield.
- [] 3. Locate the power transformer in the middle of the cabinet floor. The secondary side of this transformer faces the backbox. Notice two bundles of wires between the secondary and the first connector past the transformer. The larger of these connectors is 7P2/J2.

FUSING THE 26V SECONDARY (5ASB FUSE)

- [] 4. In the bundle of wires between 7P2/J2 and the transformer, locate a white-red wire. (*On some games, this wire will be red instead.*) There are two white-red (*or red*) wires. For this procedure, either one will do.

Cut the wire and strip one-half inch of insulation off the ends.

- [] 5. Slide a length of heatshrink tubing over each wire end. Temporarily slide the tubing well out of the way of the stripped part.
- [] 6. Splice one pigtail from the inline fuseholder with one white-red wire end. Do the same with the other white-red wire end. Now solder the splices.
- [] 7. Insert a five-amp, slow-blow fuse into the fuseholder.

FUSING THE 13.5V SECONDARY (8ASB FUSE)

- [] 8. In the bundle of wires between 7P2/J2 and the transformer, locate a blue-white wire. (*On some games, this wire will be blue instead.*) There are two blue-white (*or blue*) wires. For this procedure, either one will do. Cut the wire and strip one-half inch of insulation off the ends.
- [] 9. Slide a length of heatshrink tubing over each wire end. Temporarily slide the tubing well out of the way of the stripped part.
- [] 10. Splice one pigtail from the inline fuseholder with one blue-white wire end. Do the same with the other blue-white wire end. Now solder the splices.
- [] 11. Insert an eight-amp, slow-blow fuse into the fuseholder.

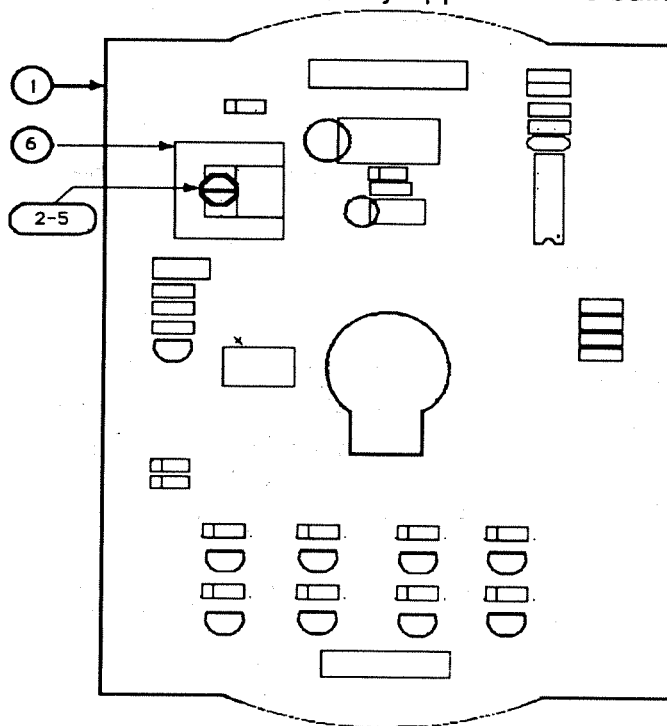
FINISHING THE JOB

- [] 12. Slide the heatshrink tubing over the six splices and any exposed metal on the fuseholders. Use a heatgun or hair dryer to shrink the tubing.
- [] 13. Turn the game on and check for normal operation. Pay particular attention to lamps and solenoids. If any of the new fuses blow, replace it with the proper value (*noted above*). Don't overfuse! Instead, troubleshoot and repair the game. Fuse blowing indicates a shunt or short in the fused circuit (*bad solenoid, etc*).

SERVICE BULLETIN

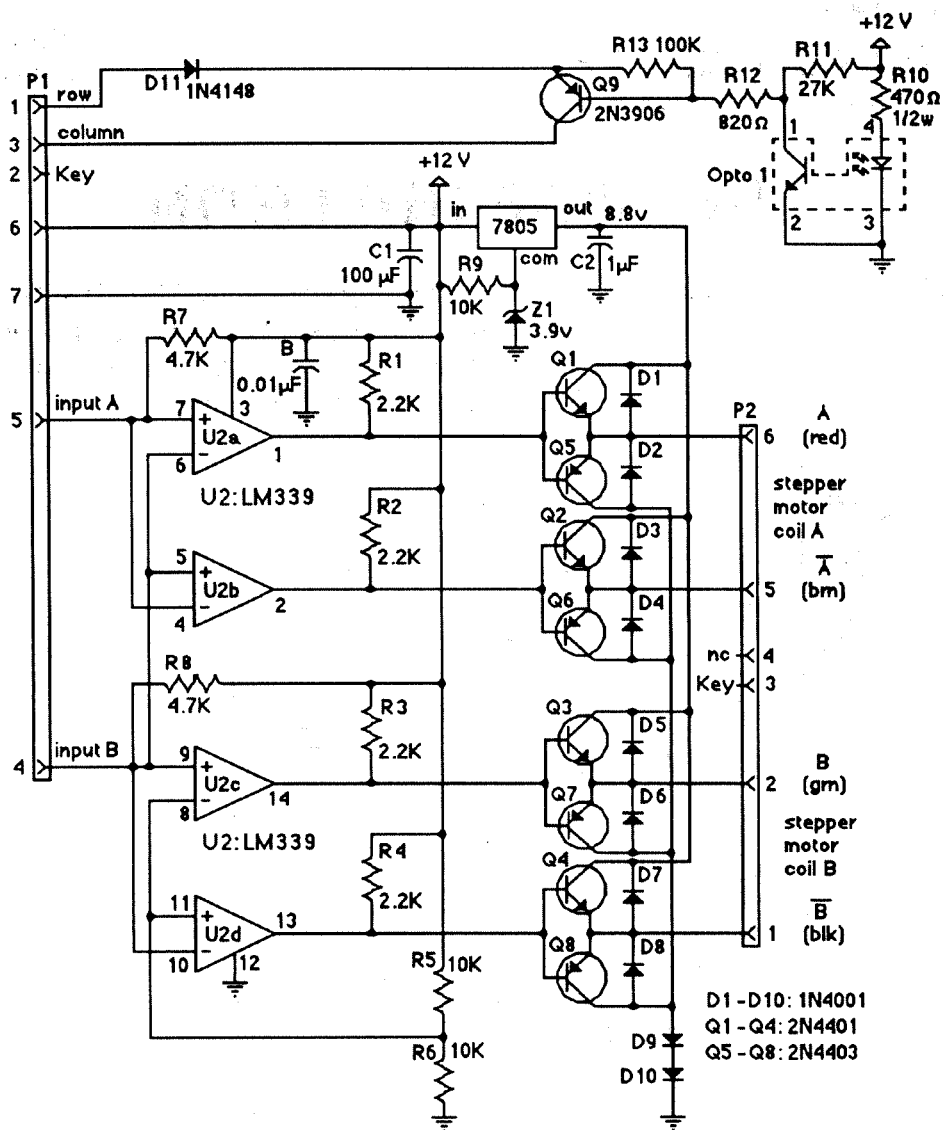
SUBJECT:

Cyclone mystery wheel (D-12045) schematic and assembly drawings. Drawings of this assembly were unavailable when the manual went to press. They appear in this bulletin.



Stepper Control Assembly #D-12045

1	Subassembly D-12046	D-12046
2	Machine screw	4005-01016-07
3	Lockwasher #5, split	4701-00023-00
4	Hex nut 5-40	4005-01017-00
5	Heatsink compound	20-9229
6	Heatsink	5705-09042-00



CYCLONE Mystery Wheel Schematic

SERVICE BULLETIN

SUBJECT: An added post and ring for *Cyclone* games.
These items prevent balls from getting stuck
between playfield plastic and the Cyclone ramp.
Installation instructions follow.

MATERIALS: 23-6305 2" Rubber ring
03-8044-9 Red, plastic post

Procedure

- [] 1. Temporarily remove your game's playfield glass.
- [] 2. Remove the clear, plastic *Cyclone* and *Comet* ramps. 11 screws secure these ramps to the playfield.
- [] 3. Find the blue plastic that has "Freak Show" and "Ken's Vending" screened on it. Three white, plastic cap nuts secure this plastic to playfield posts. Discard the uppermost cap nut.
- [] 4. Discard the small, white rubber ring on the red post above the "Ken's Vending" sign.
- [] 5. Install the 03-8044-9 red, plastic post on the screw where you removed the cap nut.
- [] 6. Install the 23-6305 rubber ring by stretching it between the two red posts.
- [] 7. Reinstall the clear, plastic *Cyclone* and *Comet* ramps.
- [] 8. Remount the game's playfield glass.

SERVICE BULLETIN

SUBJECT:

Cyclone ferris wheel not turning properly. During assembly or routine maintenance, over-lubrication can cause ferris wheel parts to slip. Cleaning the ferris wheel belt and pulleys usually remedies the problem.

Procedure

- [] 1. Turn off and unplug the game.
- [] 2. Temporarily remove your game's playfield glass.
- [] 3. Raise the playfield to the service position.
- [] 4. Disconnect the power connector (white, plastic, two-cavity plug) from the ferris wheel motor.
- [] 5. Under the ferris wheel, find the ball-support bar. Remove the two screws securing the bar to the playfield. Set the bar aside.
- [] 6. Lower the playfield.
- [] 7. Beside the ferris wheel, notice the playfield plastic assembly. Remove the two screws on the assembly's green plastic, and set the assembly aside.
- [] 8. Remove the two screws securing the ferris wheel to the playfield. Temporarily remove the ferris wheel from the playfield and set it aside.

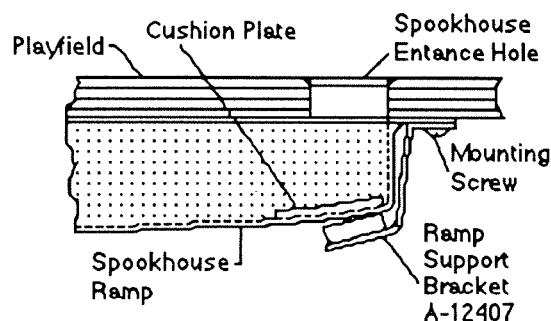
- [] 9. Remove the belt from the assembly: First, slip the belt off the white pulley. Then slide the belt over the metal, ferris wheel bracket. Don't attempt to slip the belt over the ferris wheel!
- [] 10. Clean and inspect the belt and pulleys. Look for excess lubrication or wear. Replace worn-out parts.
- [] 11. Return the belt to the assembly: Slide the belt over the metal, ferris wheel bracket. Then then slip the belt over the white pulley. Don't attempt to slip the belt over the ferris wheel!
- [] 12. Fasten the ferris wheel to the playfield by replacing its two mounting screws.
- [] 13. Remount the playfield plastic assembly by replacing the two screws on the green plastic.
- [] 14. Raise the playfield to its service position.
- [] 15. Remount the two screws securing the ball-support bar to the playfield. Replace the support bar.
- [] 16. Reconnect the power connector (white, plastic, two-cavity plug) from the ferris wheel motor.
- [] 17. Lower the playfield.
- [] 18. Remount the game's playfield glass.
- [] 19. Plug in and turn on the game.

SERVICE BULLETIN

SUBJECT: *Cyclone Spookhouse Ramp Breakage Reduction via Ramp Support Bracket Installation.*

Procedure

- [] 1. Turn off and unplug the game.
- [] 2. Temporarily remove your game's playfield glass.
- [] 3. Raise the playfield to the service position.
- [] 4. Locate the Spookhouse Ramp (left middle of playfield). Observe that the Ramp Cushion Plate (p/n A-12222) is in place on the ramp interior, just under the ramp entrance. Remove the mounting screw at the end of the ramp.
- [] A. If the cushion plate is missing, dismount the ramp entirely from the playfield. Remove the tape cover paper and press the Cushion Plate in place, as shown in Figure 1. Reinstall the ramp, EXCEPT for the mounting screw on the ramp entrance end. Position the Ramp Support Bracket (A-12407) snugly against the end of the ramp and reinstall the mounting screw to secure the bracket and ramp to the bottom of the playfield.
- [] B. If the cushion plate is present, position the Ramp Support Bracket (A-12407) snugly against the end of the ramp and reinstall the mounting screw to secure the bracket and ramp to the bottom of the playfield.



**Figure 1. CYCLONE Playfield Spookhouse Ramp Area:
Parts Locations**

- ☐ 5. Lower the playfield into normal operating position.
- ☐ 6. Remount the game's playfield glass.
- ☐ 7. Plug in and turn on the game. Play several games to verify that it is operating satisfactorily.

SERVICE BULLETIN

SUBJECT: Prevention of Upper Playfield Chute (D-12162)
Damage on BANZAI RUN

Procedure

- [] 1. Turn off and unplug the game.
- [] 2. Unlock and open the marquee to permit access to the Upper Playfield. Remove the Upper Playfield glass. Tilt the Upper Playfield into the horizontal position atop the cabinet, to expose the interior surface of the Upper Playfield.
- [] 3. Remove the screws mounting the Chute Assembly (D-12162) on the Upper Playfield. Lift the Chute Assembly enough to allow placing the Chute Reinforcement Bracket (01-8981) on the inner, bottom portion of the Chute Assembly, as shown in Figure 1.

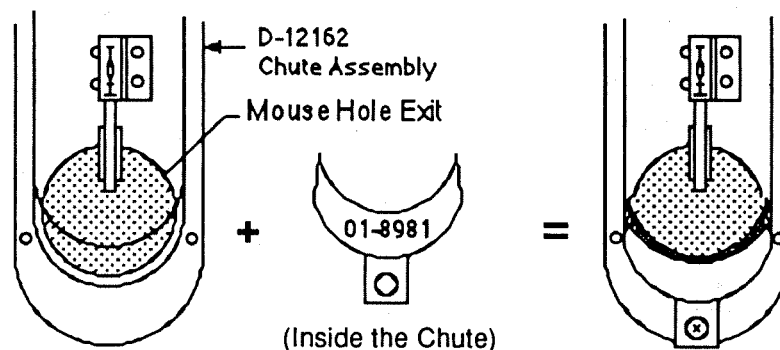


Figure 1. Installation of Chute Reinforcement Bracket

- [] 4. Drill a mounting hole for the bracket in the bottom flange of the Chute Assembly. Mount the Chute Reinforcement Bracket on the bottom flange of the Chute Assembly, using a wood screw to secure the bracket and Chute Assembly to the Upper Playfield.
- [] 5. Raise the Upper Playfield and reinstall the Upper Playfield glass. Position the Upper Playfield into its proper playing position. Close and lock the marquee to restore the game to playing condition.
- [] 6. Plug in the game and check to make sure it is operating properly.

SERVICE BULLETIN

SUBJECT: Prevention of SPINOUT Ramp Damage on TAXI

Procedure

- [] 1. Turn off and unplug the game.
- [] 2. Unlock and open the coin door to permit access to the Front Molding Assembly locking lever. Release and remove the Front Molding Assembly, and remove the Playfield Glass.
- [] 3. Remove the six (6) Phillips-head screws holding down the cover of the Spinout Ramp Assembly (R-12262) to expose the interior of the ramp. Wipe the sidewall of the 'bowl' portion of the spinout ramp as clean as possible.
- [] 4. Remove the tape covering from the back of the Spinout Ramp Wall Protector Strip (A-12471). Starting on the right sidewall of the ramp where the rounded 'bowl' portion begins, as shown in Figure 1, approximately 3/8" below the upper edge of the ramp, mount the Wall Protector Strip by pressing the adhesive side firmly to the sidewall of the ramp.

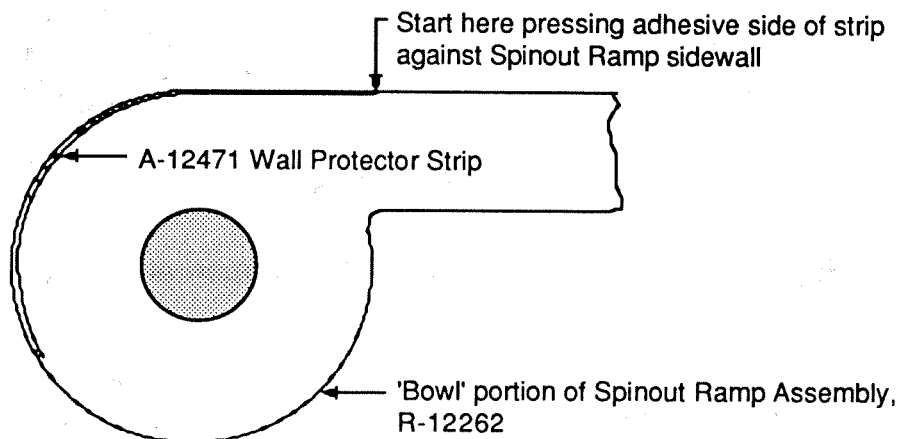


Figure 1. Installation of Spinout Ramp Wall Protector Strip

- [] 5. Replace the Spinout Ramp Assembly cover, and fasten it on with the six screws (removed in step 3). Reinstall the Playfield Glass. Install and secure the Front Molding Assembly by operating its locking lever. Close and lock the coin door to restore the game to playing condition.
- [] 6. Plug in the game and check to make sure it is operating properly.

SERVICE BULLETIN

SUBJECT: Prevention of Overvoltage in the TAXI Power Supply
+100V & -100V Sections.

Procedure

- [] 1. Turn off and unplug the game.
- [] 2. Temporarily remove your game's backbox glass.
- [] 3. Open the Insert Board to provide access to the D-12246 Power Supply Board. Disconnect the three plugs from the board jacks (3J1, 3J2, and 3J3). Remove and retain the screws fastening this board to the plate in the backbox. Remove the board.
- [] 4. Unsolder and remove R2 (680 Ω) and ZR2 in the +100V section (just to the right of the upper smaller heatsink). Note: Check the polarity of the diode. Solder a new 1.2K Ω , 1/2 w resistor, (mounting it on the board surface with very short leads) to replace R2.
- [] 5. Slide insulating tubing onto each full-length lead of a new 1N4764 Zener diode, leaving approximately 1/8" of lead exposed at each end, as shown in Figure 1. Mount it on the board with the proper polarity to replace ZR2. Solder the diode's leads to the board.

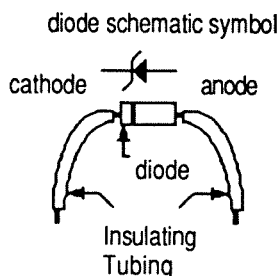


Figure 1. Zener diode Insulating Tubing Installation

- [] 6. Repeat steps 4 and 5 for R5 and ZR4 in the -100V section (just to the right of the lower smaller heatsink).

- [] 7. Bend the leads of ZR3 and ZR4 to the right (away from the heatsinks of the +100V and -100V sections), until the diodes are approximately 1/2" above the power supply board surface. Make sure that they do not contact any other components.
- [] 8. Reinstall the power supply board in its proper position on the plate in the backbox, using the screws retained when it was removed. Connect the plugs to the jacks (3J1, 3J2, and 3J3).
- [] 9. Plug in and turn on the game. Using a voltmeter, measure the output voltage at pin 3J2-1 ($-100\text{Vdc} \pm 5\%$) and at pin 3J2-3 ($+100\text{Vdc} \pm 5\%$), to verify that the Power Supply is now operating properly.
- [] 10. Close and latch the Insert Board and reinstall the game's backbox glass.
- [] 11. Play several games to verify that it is operating satisfactorily.

WILLIAMS
ELECTRONICS GAMES, Inc.
3401 N. California Ave., Chicago, IL 60618

No. SS56
February 13, 1989

SERVICE BULLETIN

SUBJECT: Replacement of Switch 5647-12073-10.

Information:

Where Switch 5647-12073-10 was used in any Williams pinball game, you can substitute a new switch, 5647-12073-19. The new switch has a different Actuator (with wire).

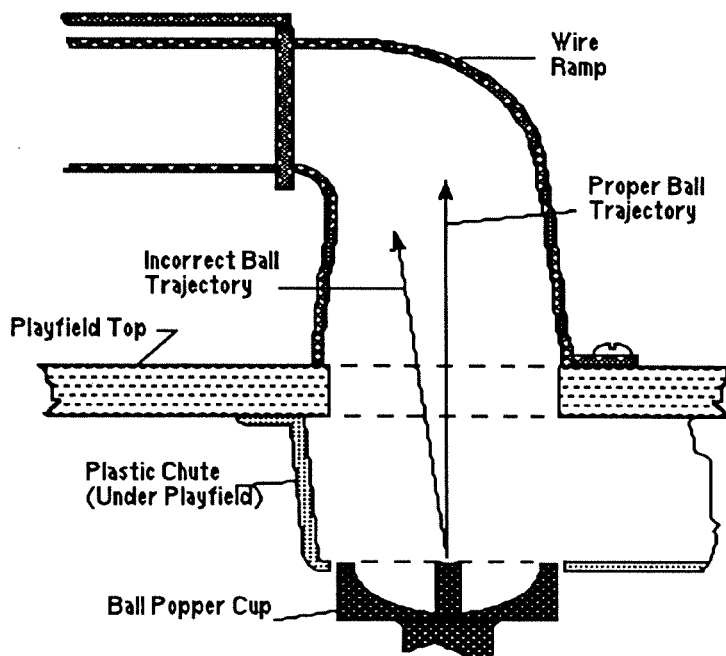
If the game problem is a broken actuator wire, you can replace the broken actuator, rather than the entire switch, by obtaining and installing the new Actuator, 20-9599.

SERVICE BULLETIN

- SUBJECT:** EARTHSHAKER's Bottom Ball Popper Not Always Popping the Ball out.
- SOLUTION:** Test Ball Popper action with only ONE ball to verify that the Ball Popper alignment is proper. Alignment includes the following:
- 1) Verify that the Wire Ramp above the Bottom Ball Popper is centered over the hole. (See the drawing.)
 - 2) Verify that the Ball Popper is centered exactly below the hole. Also, verify that the Ball Popper coil part number is AE-23-800.

Information: If your check shows the need to correct any of the above items, do so. If all of the preceding items are correct, then install Rev. 2 game ROMs; this will act to prevent two balls from stacking at the Ball Popper beneath the playfield.

NOTE: The EARTHSHAKER cabinet is a completely redesigned unit! Playfield pitch is recommended at 6 - 7 degrees. Increasing the pitch angle more than the recommended 6 - 7 degrees can cause the balls to wedge in the plastic chute beneath the playfield, preventing proper Ball Popper action. A rough rule of thumb is to NOT extend the rear levellers more than 1/2 way out.



If further information is required, please contact Williams Service Dept.

Tom Cahill
Technical Field Support Manager

SERVICE BULLETIN

SUBJECT: Solution of possible problems with 3-Bank Drop Target Opto Boards. Problems may include (a) unexpected TILTS or (b) unearned CREDITS.

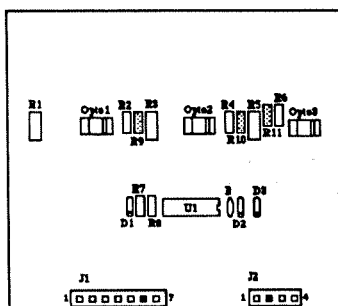
Information: Figure 1 provides a reference illustration.

Procedure:

1. Make sure that the plugs on connectors J1 and J2 of the Opto Board are making proper electrical connections.
2. Check to verify that each of the three 1N4004 diodes (for noise suppression and blocking) on the 3-Bank Opto Board is functioning properly. (See Figure 1.) The cathodes of these diodes connect to the outputs of IC1 (Pins 1, 13, and 14), and the anodes connect to, respectively, Pins 4, 5, and 7 of J1.

For older Opto Boards (C-11318-1) experiencing the problems mentioned above, these diodes can be added, using the proper technique, as follows:

- (A) Cut the circuit board trace between IC pin 1 and J1-4. Connect (solder) the anode of a 1N4004 diode to the trace connected to J1-4. Connect (solder) the cathode of that 1N4004 diode to the trace connected to IC pin 1.
- (B) Cut the circuit board trace between IC pin 13 and J1-5. Connect (solder) the anode of a 1N4004 diode to the trace connected to J1-5. Connect (solder) the cathode of that 1N4004 diode to the trace connected to IC pin 13.
- (C) Cut the circuit board trace between IC pin 14 and J1-7. Connect (solder) the anode of a 1N4004 diode to the trace connected to J1-7. Connect (solder) the cathode of that 1N4004 diode to the trace connected to IC pin 14.



3-Bank Drop Target Opto Board
p/n C-12559

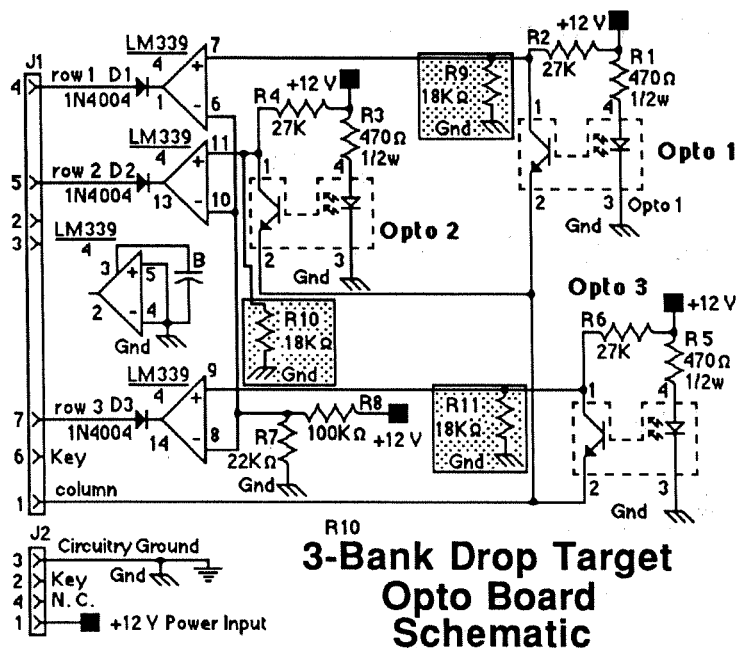


Figure 1. 3-Bank Drop Target Opto Board

SERVICE BULLETIN

SUBJECT: System 11 Pinball Games display the ADJUSTMENT FAILURE message after Power-Up.

Information: During normal game Power-Up, the Coin Door is closed, causing the Memory Protect switch to be actuated. If a problem causes the game program to try to reset to Factory Settings, the ADJUSTMENT FAILURE message appears, when the game program fails to complete the reset operation.

This indicates a problem with the Memory Protect circuitry (which may include the batteries, diodes, U25, U36, or switch and wiring).

- PROCEDURE:**
1. Check that the CPU Board batteries are firmly in place in the battery holder and that they have good electrical contact with the holder's terminals.
 2. With the game turned off, check for a minimum battery voltage of 3.8V dc at pin 24 of U25. Replace batteries if voltage is low.
 3. Check for proper diode action of CPU Board diodes D1 and D2.
 4. Check CPU Board CMOS RAM U25 and associated circuitry.
 5. Check the Coin Door wiring, including the action of the Memory Protect switch.
 6. Check CPU Board U36 (Memory Protect circuit) for proper operation.

BALLY - MIDWAY
SERVICE BULLETINS



S E R V I C E B U L L E T I N

No. SB 01
DEC. 15, 1988

GAME: TRUCK STOP PINBALL
SUBJECT: PROTOTYPE TO PRODUCTION GAME CHANGES

1. ROM ERROR: INTERMITTENT GAME LOCK-UP. THIS CONDITION OCCURS ONLY IN THE MULTI-PLAYER MODE ON PROTO 1 AND 2 MEMORY GAME ROMS U2 AND U3.

THIS CONDITION EXISTS FROM GAME SERIAL NUMBER 180000 TO 182700

TO CORRECT, INSTALL NEW GAME ROMS, PROTO 3 (12 DEC 88) ON THE CONTROL P.C. BOARD AT POSITIONS U2 AND U3.

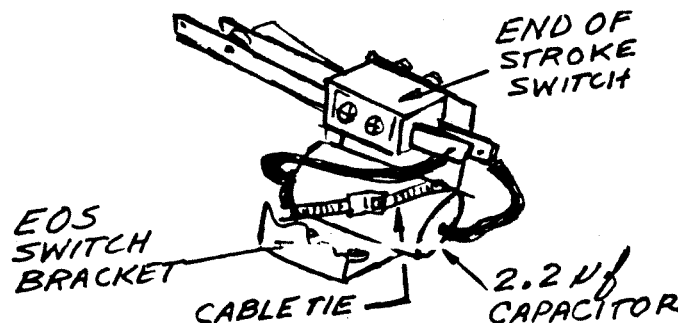
2. FUSE CHANGE: THE FLIPPER POWER SUPPLY P.C. BOARD F2 FUSE VALUE HAS BEEN INCREASED FROM 4 AMP. SLOW BLOW TO 5 AMP. SLOW BLOW.
NOTE: THE FLIPPER POWER SUPPLY P.C. BOARD IS LOCATED ON THE UPPER RIGHT HAND CORNER OF THE BACK BOX.

3. PLAYFIELD FUSE VALUE: THE PLAYFIELD FUSE PROTECTING THE SLINGSHOT AND TRUCK STOP (UPPER LEFT VERTICAL KICKER) COILS MUST BE A 2 AMP. SLOW BLOW.

NOTE: THIS FUSE IS LOCATED ON THE WIRING SIDE OF THE PLAYFIELD APPROXIMATELY TWO INCHES TO THE LEFT THE LOWER LEFT FLIPPER ASSEMBLY. THE FUSE CLIP WIRE COLORS ARE BROWN ON ONE SIDE AND RED WITH WHITE TRACE ON THE OTHER SIDE.

4. CAPACITOR CHANGE EFFECTING THE TWO UPPER BALLY FLIPPER ASSEMBLIES: REMOVE THE EXISTING DISC CAPACITOR (.01 UF, 1K V.) WIRED PARALLEL TO THE END OF STROKE SWITCH. INSTALL THE WILLIAMS CAPACITOR (YELLOW), 2.2 UF, 250 V., WIRED PARALLEL TO THE END OF STROKE SWITCH. THE WILLIAMS CAPACITOR PART NUMBER IS 5045-12098-00. SEE FIGURE 1 BELOW FOR PROPER WILLIAMS CAPACITOR INSTALLATION:

FIGURE 1



- A. USING A CABLE TIE, SECURE THE 2.2 UF CAP. TO THE EOS (U SHAPED) SWITCH BRACKET.
- B. SOLDER 2.2 UF CAP. WIRES TO THE EOS SWITCH AS DRAWN.



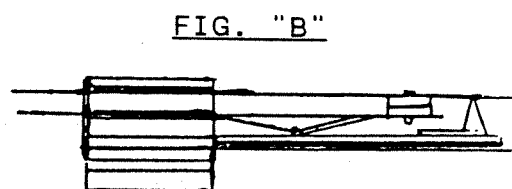
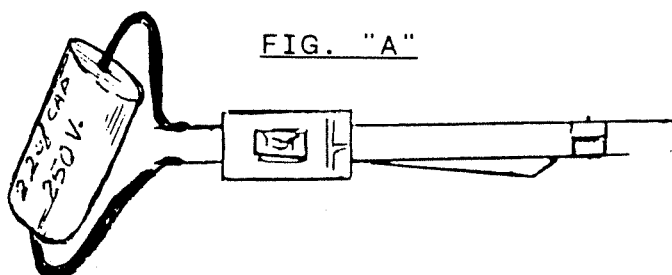
S E R V I C E B U L L E T I N

No. SB 02
JAN. 20, 1989

GAME: TRUCK STOP AND FUTURE BALLY PINBALL GAMES

SUBJECT: A365-00315-0400 AND A365-00045-0000 END OF STROKE SWITCH ASSEMBLY PART CHANGES.

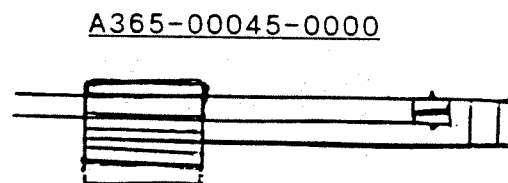
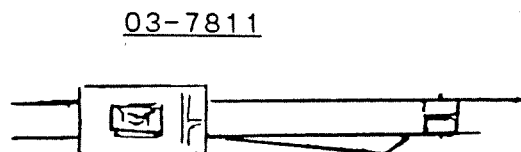
1. WHEN ORDERING A365-00315-0400, YOU WILL BE SENT THE SWITCH AS REPRESENTED IN FIGURE "A" IN PLACE OF FIGURE "B".



NOTE: FIG. "A" ASSEMBLY INCLUDES THE FOLLOWING PARTS:

- 1 E.O.S. SWITCH.....PART NO. 03-7811.
- 1 CAPACITOR, 2.2 UF, 250 V...PART NO. 5045-12098-00
- 2 WIRE SLEEVES.....PART NO. RM 2106

2. 03-7811 HAS REPLACED A365-00045-0000.



3. WHEN ORDERING A365-00315-0400 (FIG. "A") OR 03-7811, ALSO ORDER TWO E.O.S. SWITCH MOUNTING SCREWS, PART NO. 4005-01016-07. DUE TO A SWITCH STACKING HEIGHT DIFFERENCE, THE MOUNTING SCREW LENGTH MUST BE REDUCED FROM 3/4" TO 7/16".

WARNING: USING THE 3/4" SCREW LENGTH WILL SCREW INTO THE FLIPPER COIL ASSEMBLY.

E.O.S. SWITCH MOUNTING SCREW REFERENCE CHART

SW. PART NO.	MOUNTING SCREW SIZE	SCREW PART NO.
a. A365-00315-0400 FIG. "B" AND A365-00045-0000	#5-40 x 3/4" PHILLIPS ROUND HEAD	17-101-528
b. A365-00315-0400 FIG. "A" AND 03-7811	#5-40 x 7/16" PHILLIPS ROUND HEAD	4005-01016-07



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S E R V I C E B U L L E T I N

No. SB_03
JAN. 25, 1989

GAME: TRUCK STOP, PRIOR TO GAME SERIAL NUMBER 180521.

SUBJECT: HUM IN AUDIO

THE FOLLOWING STEPS SHOULD BE TAKEN ONLY IF THE AUDIO HUM IN TRUCK STOP IS OBJECTIONABLE:

1. REMOVE SOUND BOARD FROM GAME.
2. ON SOLDER SIDE OF SOUND BOARD AT I.C. LOCATION U6, MAKE CUTS AROUND THE FEED THROUGH HOLE. SEE FIG 1, ITEM A.
3. ADD A 10uf, 16V., ELECTROLYTIC CAPACITOR BETWEEN PINS 1 AND 2 OF I.C. U6. NOTE: + (POSITIVE) LEAD OF CAP TO PIN 1. SEE ITEM B.
4. ADD A 1K OHM, 1/4 WATT, 5% RESISTOR, BETWEEN PIN 1 OF U6 AND THE +5 VDC SIDE OF THE BYPASS CAPACITOR BELOW I.C. U6. SEE ITEM C.
5. VISUALLY CHECK YOUR SOLDER CONNECTIONS AND INSTALL SOUND BOARD IN THE GAME.

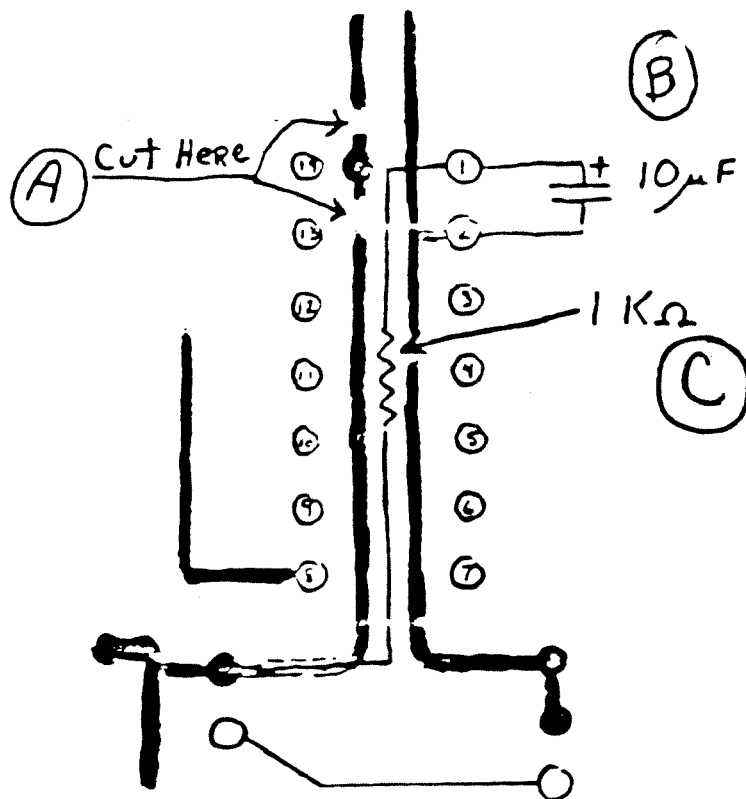
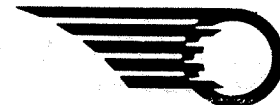


FIG. 1



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MECHANICAL METER INSTALLATION

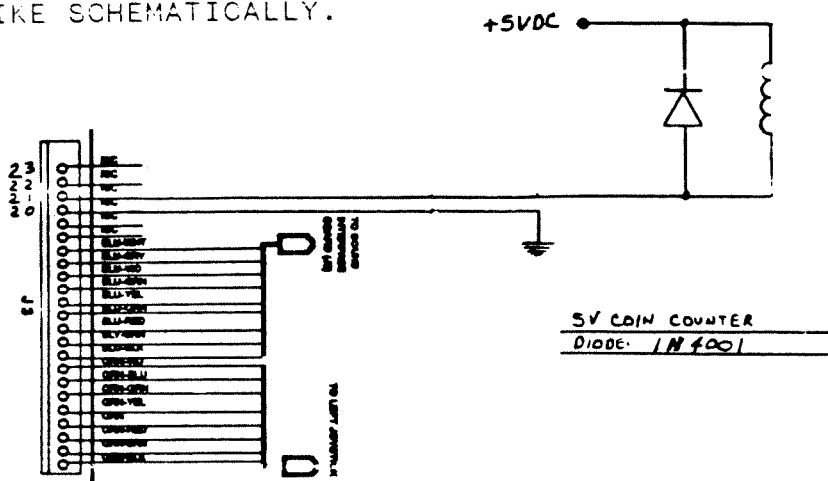
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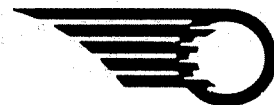
"ARCH RIVALS"

IF YOU WOULD LIKE TO INSTALL A MECHANICAL METER ON YOUR "ARCH RIVALS" PLEASE USE THE FOLLOWING STEPS:

1. USE A 6VDC COIN METER THAT HAS A DIODE ACROSS IT.
2. PUT THE LEAD FROM THE CATHODE SIDE (banded side) OF THE DIODE TO A +5VDC SOURCE.
3. TAKE THE OTHER LEAD, WHICH IS ON THE ANODE SIDE OF THE DIODE, AND ATTACH IT TO CONNECTOR J3, PIN 21 ON THE 68000 VIDEO GAME BOARD.
4. ALSO ADD A WIRE FROM GROUND TO CONNECTOR J3, PIN 20 ON THE 68000 VIDEO GAME BOARD.
5. TEST COMPLETED INSTALLATION BY RUNNING COINS THROUGH THE COINDOOR AND VERIFYING THE METER READING.

HERE'S WHAT THE INSTALLATION LOOKS LIKE SCHEMATICALLY.





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AUGUST 1, 1989

SB08

S E R V I C E B U L L E T I N

GAME: ARCH RIVALS (kit)

SUBJECT: COIN SWITCH WIRING

WHEN INSTALLING THE ARCH RIVALS KIT INTO YOUR CABINET IT IS IMPORTANT THAT YOU CHECK YOUR COIN SWITCH WIRING. REMEMBER, ARCH RIVALS HAS 2 COIN SWITCH INPUT LINES TO THE VIDEO GAME BOARD. IF THE COIN SWITCHES IN YOUR GAME ARE WIRED SO THAT THE WIRES GOING TO THE GAME BOARD (not the ground) ARE CONNECTED AND YOU STILL HAVE BOTH INPUT LINES GOING INTO THE VIDEO GAME BOARD YOUR GAME WILL GET 2 CREDITS PER QUARTER. IF YOU WANT BOTH SWITCHES WIRED TOGETHER, MAKE SURE AND USE ONLY 1 OF THE COIN INPUT LINES. AS ALWAYS BE SURE TO PUT THE GAME INTO SWITCH TEST AND CHECK TO MAKE SURE IT IS WORKING PROPERLY BEFORE YOU PUT IT ON LOCATION. THEN AS A FINAL CHECK TAKE THE GAME OUT OF TEST, CLOSE THE COIN DOOR AND RUN SOME COINS THROUGH THE COIN SLOTS.



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AUGUST 8, 1989

SB11

S E R V I C E B U L L E T I N

GAME: TRANSPORTER

SUBJECT: ROM UPDATE

THE LATEST REVISION FOR THE GAME ROMS AT LOCATIONS U26 AND U27
ARE LABELED LA3. THE CHANGES ARE AS FOLLOWS:

- 1.THE KICKBACK GRACE TIME: HAS BEEN CHANGED FROM 7 SECONDS TO
10 SECONDS.
- 2.THE BALL SEARCH: THE LOCKED BALL KICK SEQUENCE IN THE ORION
LOOKUP HAS BEEN CHANGED TO RIGHT LANE FIRST THEN LEFT LANE
THEN THE RIGHT LANE AGAIN.
- 3.THE BALL SEARCH: THE TIME FOR THE SEARCH TO INITIALIZE HAS
BEEN CHANGED FROM 30 SECONDS TO 15 SECONDS FOR THE FIRST
PASS THEN 10 SECONDS FOR KICKING LOCKED BALLS.

ENCLOSED IS A MASTER COPY OF THESE ROMS FOR USE IF YOUR COSTOMER
IS EXPERIENCING PROBLEMS IN THESE AREAS.



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AUGUST 16, 1989

SB12

S E R V I C E B U L L E T I N

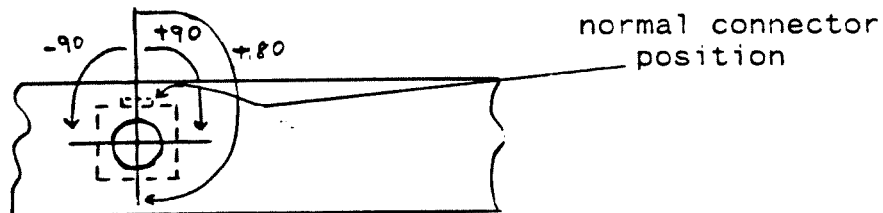
GAME: ARCH RIVALS (kit)

SUBJECT: JOYSTICK INSTALLATION

THE POSITIONING OF THE JOYSTICK ON THE ARCH RIVALS KIT CONTROL PANEL IS SUCH THAT THE CONNECTOR ON THE JOYSTICK PCB SHOULD POINT TOWARDS THE MONITOR (back of the game). IF YOUR CONTROL PANEL IS NOT WIDE ENOUGH TO DO IT THIS WAY, IT IS POSSIBLE TO MODIFY THE JOYSTICK PCB AND CABLING TO MAKE THE CONTROL WORK WHEN THE ASSEMBLY IS ROTATED.

THERE ARE 3 POSSIBLE ROTATIONS FOR THE JOYSTICK ASSEMBLIES, -90, +90, AND 180.

Control Panel
View from the
top side



FOR -90 ROTATION:
MOVE THE WIRES IN THE CABLE HARNESS AT THE 12 PIN JOYSTICK CONNECTOR AS FOLLOWS:

OLD PIN	NEW PIN
2	6
3	7
4	8
5	9
6	4
7	3
8	2
9	5

THE FOLLOWING CUT AND JUMPER MUST ALSO BE DONE:
ON THE OPTO PCB CUT THE TRACE GOING TO PIN 5 ON THE CONNECTOR. THEN RUN AN INSULATED JUMPER WIRE FROM PIN 5 OF THE CONNECTOR TO IC 1 PIN 3 ON THE OPTO PCB.

FOR +90 ROTATION

MOVE THE WIRES IN THE CABLE HARNESS AT THE 12 PIN JOYSTICK CONNECTOR AS FOLLOWS:

OLD PIN	NEW PIN
2	8
3	7
4	6
5	9
6	2
7	3
8	4
9	5

THE FOLLOWING CUT AND JUMPER MUST ALSO BE DONE:

ON THE OPTO PCB CUT THE TRACE GOING TO PIN 9 ON THE CONNECTOR. THEN RUN AN INSULATED JUMPER WIRE FROM PIN 9 ON THE CONNECTOR TO IC 1 PIN 10 ON THE OPTO PCB.

FOR +180 ROTATION

MOVE THE WIRES IN THE CABLE HARNESS AT THE 12 PIN JOYSTICK CONNECTOR AS FOLLOWS:

OLD PIN	NEW PIN
2	4
3	3
4	2
5	5
6	8
7	7
8	6
9	9

THE FOLLOWING CUTS AND JUMPERS MUST ALSO BE DONE:

ON THE OPTO PCB CUT THE TRACE GOING TO PIN 5 OF THE CONNECTOR. THEN RUN AN INSULATED JUMPER WIRE FROM PIN 5 OF THE CONNECTOR TO IC 1 PIN 3. YOU MUST ALSO CUT THE TRACE GOING TO PIN 9 OF THE CONNECTOR. THEN RUN AN INSULATED JUMPER WIRE FROM PIN 9 OF THE CONNECTOR TO IC 1 PIN 10.



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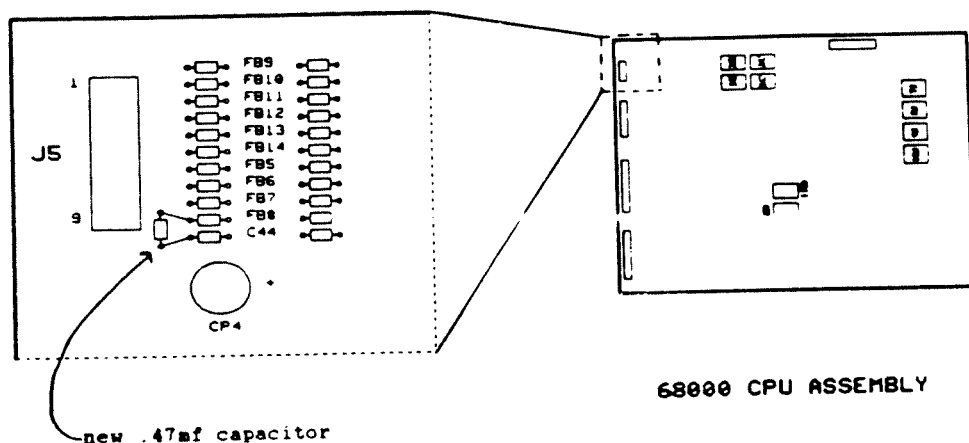
AUGUST 3, 1989

S E R V I C E B U L L E T I N

GAME: ARCH RIVALS (kit)

SUBJECT: MONITOR SYNC MODIFICATION

IF YOU EXPERIENCE MONITOR SYNC PROBLEMS, SUCH AS VERTICAL JITTER, TRY CONNECTING A .47mf CAPACITOR ACROSS FB8 AND C44 ON THE 68000 VIDEO GAME BOARD AS SHOWN BELOW. SOME ADJUSTMENT OF THE MONITOR'S SYNC CONTROLS MAY BE NECESSARY AND YOU MUST HAVE YOUR MONITOR'S VIDEO SIGNAL CABLE HOOKED UP DIRECTLY TO J-5 ON THE GAME BOARD.



IF YOU ARE HAVING A MONITOR SYNC PROBLEM WITH A HANTAREX MONITOR PLEASE REFER TO THE ATTACHED BULLETIN FROM HANTAREX.



HANTAREX[®] CORPORATION OF AMERICA, LTD.
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8/3/89

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teletax (312) 843-7244

SUBJECT: ARCH RIVAL KIT USING HANTAREX MTC 9000 19" MONITOR

ENGINEERING HAS CONFIRMED THE VERTICAL SYNC SIGNAL FROM THE GAME BOARD IS SLIGHTLY INCOMPATIBLE WITH THE VERTICAL CHIP USED ON THE MONITOR.

THE FOLLOWING MODIFICATION IS ADVISED TO COMPENSATE FOR THIS CONDITION:

A CERAMIC CAPACITOR VALUED AT .22 MF 50V CAN BE PLACED IN PARALLEL WITH C8 LOCATED ON THE MOTHER BOARD OF THE MONITOR. PLEASE NOTE, USING A CAPACITANCE OF HIGHER OR LOWER VALUE WILL NOT BE AS EFFECTIVE.



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AUGUST 21, 1989

SEI3

S E R V I C E B U L L E T I N

GAME: TRANSPORTER

SUBJECT: BACK BOX BOLT

TO INSTALL THE LEFT BACK BOX BOLT ON TRANSPORTER, J-14 OF THE BACK BOX INTERCONNECT PCB (part # D-12313) MUST BE REMOVED AND THEN REINSTALLED AFTER THE BOLT HAS BEEN FASTENED.