



DATA EAST PINBALL, INC.

## Improvement Service Bulletin #23.

To: Service Manager  
From: Data East Pinball Service Department  
Date: June 29, 1990  
Subject: The TY-FFASI 2006 Solid State Flipper.

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Our experience with our solid state flippers has been excellent. We did learn a few things which have been incorporated into our games. Specifically, we changed the cabinet flipper button from a leaf switch to a micro switch which prevents dirt build up and minimizes adjusting. We also made some improvements to the PCB design. Both these changes eliminate a very rare symptom which should not cause a service call. The improvements are to make game play better.

Symptom: Very intermittently while playing, the player may see the flipper react in one of three ways:

- 1) Give a weak flip.
- 2) Give a double flip.
- 3) Flip quickly and return to the rest position without the player releasing the flipper button.

Problem: There are two possibilities:

\*\*\*\*Most Likely\*\*\*\*

The cabinet flipper button switch is dirty or poorly adjusted. The contacts must be centered over each other and they must have good wiping action when the switch is closed. By being dirty or mis-adjusted, the flipper board will not get a valid switch closure from the flipper button. This causes the above mentioned symptoms to occur randomly. (On Phantom of the Opera and BTTF we have replaced the leaf switch with a micro switch.)

\*\*\*\*Least Likely\*\*\*\*

The board is not receiving enough current from the flipper switch to turn on the 4093 CMOS IC and the 2N3906 transistors simultaneously. (The 4093 controls the 50V flipper power driver transistor and the 2N3906 turns on the 9V flipper hold in circuit.)

Solution: First, simply try cleaning and adjusting the flipper cabinet switches. This will resolve the vast majority of problems. If that does not help, a modification to the board is required. This modification does two things:

- A) It allows the flipper switch to get extremely dirty. (Originally the switch could cause intermittent problems if the switch had 1K ohms of resistance between the contacts. With the modification the switch can get up to 22K ohms of resistance between its contacts and still work properly.)
- B) It will cause the flipper switch to turn on only the 4093 CMOS IC. The 4093 then drives both the 50V and 9V circuit.

The modification follows. Please follow along using the Version F Solid State Flipper board schematic on page 156 in your BTF game manual for reference during the modification.

\*\*\* Please note \*\*\*

These changes did not all happen at once. The bulk of them occurred between RoboCop and Phantom of the Opera. Look your boards over carefully to see what changes are necessary. All BTF games have the version F flipper boards. No updates are necessary for BTF flipper boards.

Read and understand the modification before beginning. If you have any questions during the modification....

!!!!STOP!!!!

And call Pete or Arnie at 1-800-542-5377 (In Illinois call 1-708-345-7700.)

Modification of the TY-FFASI 2006 Solid State Flipper PCB  
to Version F.

Time Required	30 Minutes
Parts Required	Two 4.7K ohm resistor Two 1K ohm resistors. Two 10K ohm resistors. Two 2N3904 transistors. Two 220K ohm resistors. Two 390K ohm resistors. Two 100 ohm resistors. Four 1/2" insulated jumper wires. One 2" insulated jumper wire.
Tools Required	25 watt soldering iron. Small side cutters. Solder wick/solder sucker. Rosin core solder.

- 1) Cut the trace to pin 2 of U1A & U2A and tie pin 2 to +5VDC.
- 2) Change R1 & R21 to 4.7K ohm resistors.
- 3) R7 and R23 are kluged to be a pull up resistor for CN1-9 and CN1-1. Change R7 and R23 to 1.0K ohm resistors.
- 4) Change R5 & R22 to 10K ohm resistors. One side of R5 & R22 is removed from CN1-1 and CN1-9 and tied to pin 3 of U1A & U2A respectively.
- 5) Q6 & Q12 are changed from 2N3906 to 2N3904 transistors. Also the collector and emitter of Q6 & Q12 are swapped.
- 6) Change R33 & R34 to 220K ohm resistors.
- 7) Change R10 and R26 to 390K ohm resistors.
- 8) Remove and discard C4, C9, C10, C11, R12, R13, R20 & R29.
- 9) Jumper pin 5 to pin 8 of IC's U1 and U2.
- 10) Change R16 and R32 to 100 ohm resistors.
- 11) Inspect your work for any solder splashes.
- 12) Install the board into a game and verify proper operation.

If you need any additional help or information regarding this modification please call Pete or Arnie.

*Pete and Arnie*

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