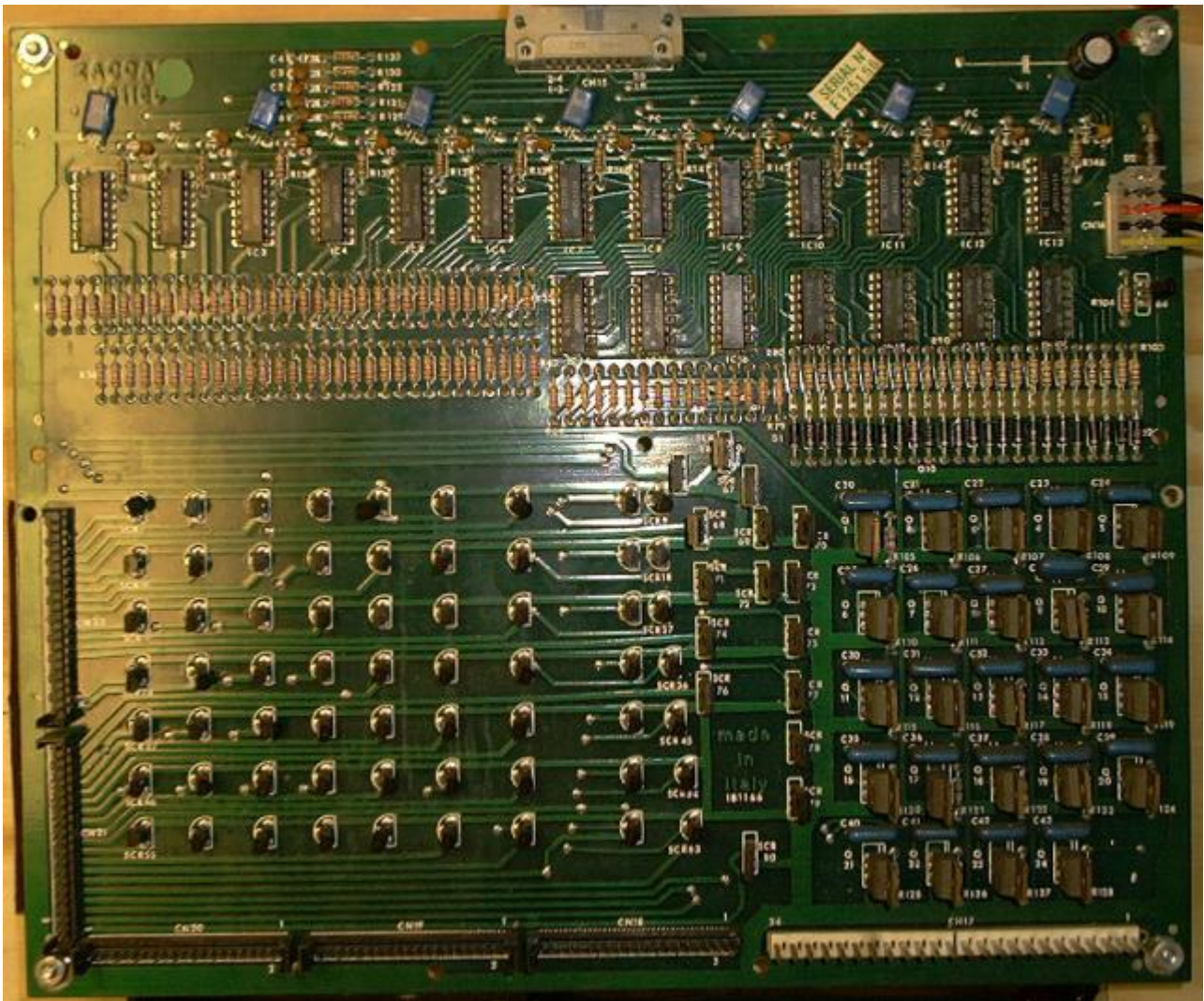


2nd Generation Driver Boards



The driver board houses the lamp drive SCRs and the solenoid drive transistors. It takes a data signal from the CPU board via a short ribbon cable, and has Molex connectors for the controlled lamps and solenoids.

Lamps

The lamps are controlled by the SCRs (SCR1 ... SCR63, and SCR65 ... SCR80) on the left hand side of the board, via support logic chips at IC1 ... IC16. Lamp voltage (5.6VAC) leaves the Power Supply board on connectors CN2 (Head), CN3 (Playfield), and CN4 (Cabinet), goes through the wiring harness, returns on Driver Board connectors CN18 ... CN22, and is grounded through the SCRs.

There are two sets of SCRs used for the lamps. The first set (SCR1 ... SCR63) are rated at 0.8A and listed on the schematic as [2N5060](#) parts, labeled as "Single Lamps". The other set (SCR65 ... SCR80) are BAX62 parts, rated for 4A and labeled as "Group Lamps". I have not found a source for BAX62 SCRs, but they can be replaced with C106B1 SCRs, which are available from

[Jameco](#) as part number [14736](#). According to the catalog page, these are equivalent to NTE5455 or 2N6238 SCRs. I have seen several driver boards with various SCRs here, so it appears that any SCR with a sufficient rating should work fine..

The 2n5060 are used to drive individual bulbs, and the BAX62 are used to drive multiple simultaneous bulbs.

Additionally, there is one SCR, SCR64, that is used to switch the two relays on the Power Supply board on and off to enable and disable the flippers. This is a BF422 and rarely fails.

Solenoids

The solenoids are driven by transistors (Q1 ... Q24) on the bottom right quadrant of the board, via the support logic chips at IC17 ... IC20. As with Williams, Bally, etc., Zaccaria coils are always hot, and the ground side is switched on or off by the driver transistor to turn on (off) the solenoid coil. CN17 on the bottom right corner of the Driver board is where the solenoid ground return lines come back in to the board. 39VDC is supplied to the solenoids via CN2 on the Power Supply board.

The schematic and parts list for Farfalla calls for [BD649](#) transistors for the solenoid drivers. The driver board in my game has [BDW93C](#) transistors actually installed. The specs on a [TIP102](#) transistor are a close match to the BDW93C installed, and the TIP102 is rated higher than the BD649, so it should be safe to use TIP102s to replace these.

Common Failures

The most common failures on 2nd generation Driver boards is solenoid drive transistors. A shorted coil or a shorted diode on a coil will instantly destroy the associated transistor when the coil is fired. The fuse for the 39v supply will also blow, but rarely quickly enough to save the transistor. If you have a board with failed transistors on it, especially if the case is blown apart, that is a big clue that you probably also have a shorted coil or a bad diode. Check them before reconnecting the board to the game, or you will have to replace the transistor again.

Since all of the lamps are directly controlled, a single non-working lamp (assuming that the bulb and socket are good) is likely to be a failed SCR. The SCRs can also, rarely, short out and the lamp will be constantly on. More than one or two non-working lamps may be a clue that the decoder IC (IC1...IC16) may have failed.

Misc. Notes

There is an error in the schematics for Farfalla. The drive transistors for the slingshots ("Left Flap" and "Right Flap") are reversed. Q4 drives the right slingshot, and Q9 drives the left.

On Time Machine, more than 79 lamps were needed, even with the multi-lamp SCRs driving more than one lamp, so they used 12 of the solenoid drive transistors as lamp drivers. These control the chase lamps around the circular mirror in the centre of the backbox insert.

On Soccer Kings, the two-digit LED playfield display is controlled via "solenoid" drive transistors as well.

There is an error in the schematics for Magic Castle. The outhole solenoid is incorrectly shown as being connected to CN17 pin 20, driven by Q16. It is actually connected to CN17 pin 6, driven by Q24.