# WPC: Williams Pinball Controller

The WPC boardset was developed by Williams (Williams Electronic Games) and used in their pinball machines starting in 1990. They used it in all pinball machines they produced (and some additional arcade / redemption machines such as Slugfest, Hot Shots, Addams Family Values, and Tic Tac Toe). You can easily identify all games that have these boards: all pinball machines that have the Bally or Williams brand and have a dot matrix display (DMD), run on WPC hardware.. Additionally, some early games (some Dr Dude, Funhouse, Harley Davidson and The Machine (Bride of Pinbot) do not have a dmd screen, but do use WPC boards (in combination with older alpha-numeric display boards). Sometimes the game was made in both a WPC and System11 (the previous hardware) version (like Dr Dude). In 1999 WPC was replaced with the Pinball2000 system. Pinball2000 pinball machines does not use a DMD anymore: a computerscreen is used which is reflected in the playfield glass. Only two models were made using Pin2000 hardware: Revenge from Mars and Star Wars: Episode One.

WPC versions

Williams made several versions and revisions of the WPC boardset. Basically there are 2 totally different sets: WPC-89 and WPC 95. None of the boards are interchangeable between these two. All boards within the WPC-95 generation are compatible with each other. Within WPC-89 there were some revisions, where sometimes only 1 board of the whole set became incompatible with previous versions.
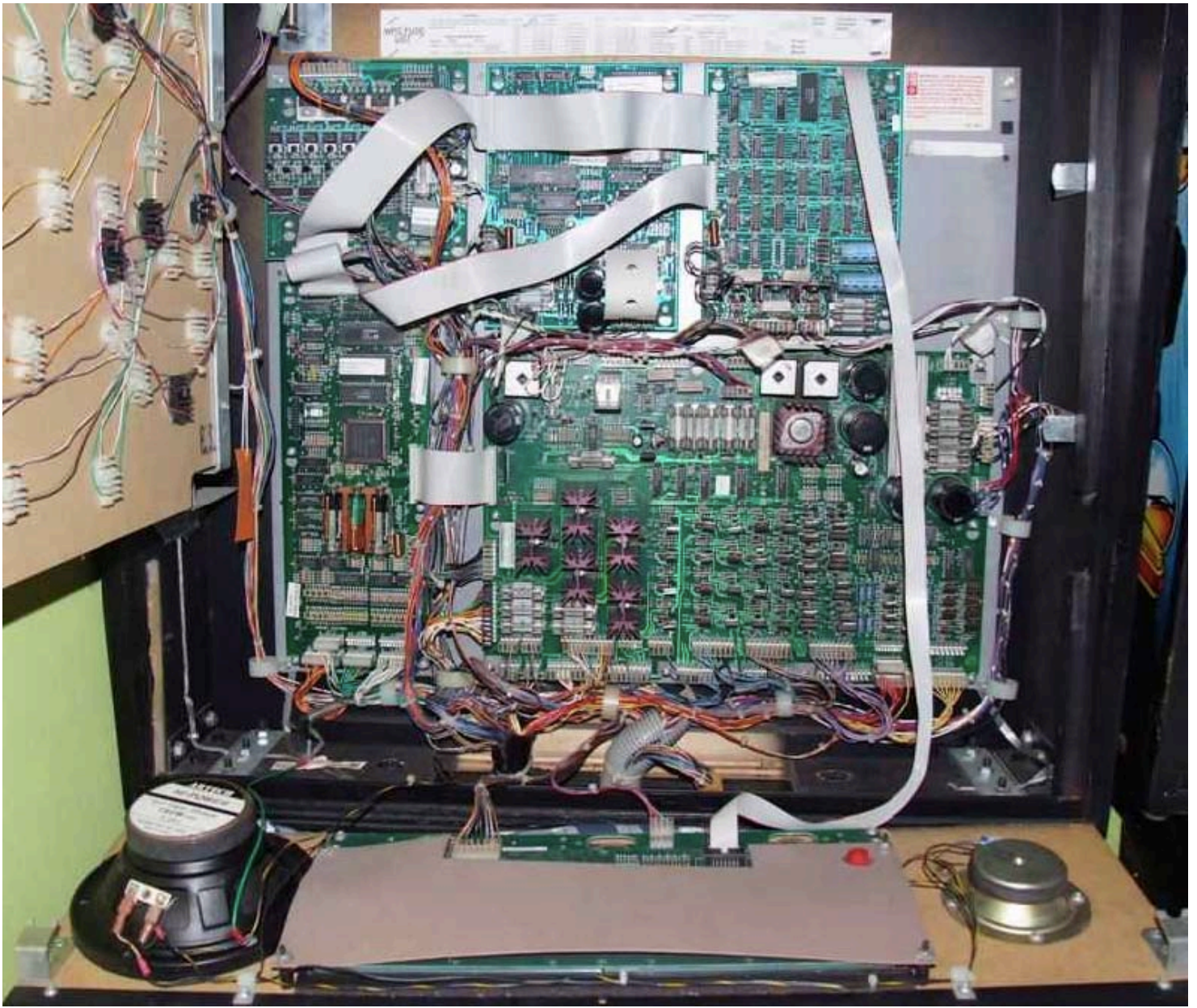
WPC-89 boards as in the Bram Stokers Dracula pinball machine.

Above is a picture of the boards in Bram Stokers Dracula. The game uses a DMD panel to show animations and scores, this is mounted on the speaker panel. In the picture it's laying open, at the bottom (dmd is the board between the speakers). The other WPC-89 boards are mounted in the backbox. At the bottom left there's a tall pcb, this is the main cpu board. The large board at the bottom right is the powerdriver. This board converts voltages (and sends them to other parts), and drives all lamps and coils. At the top left there's a Fliptronics-2 board. This provides power to and controls the flippers. Center top is the sound board. Top right is the DMD driver board, this board provides high voltage to the DMD and sends data to display.
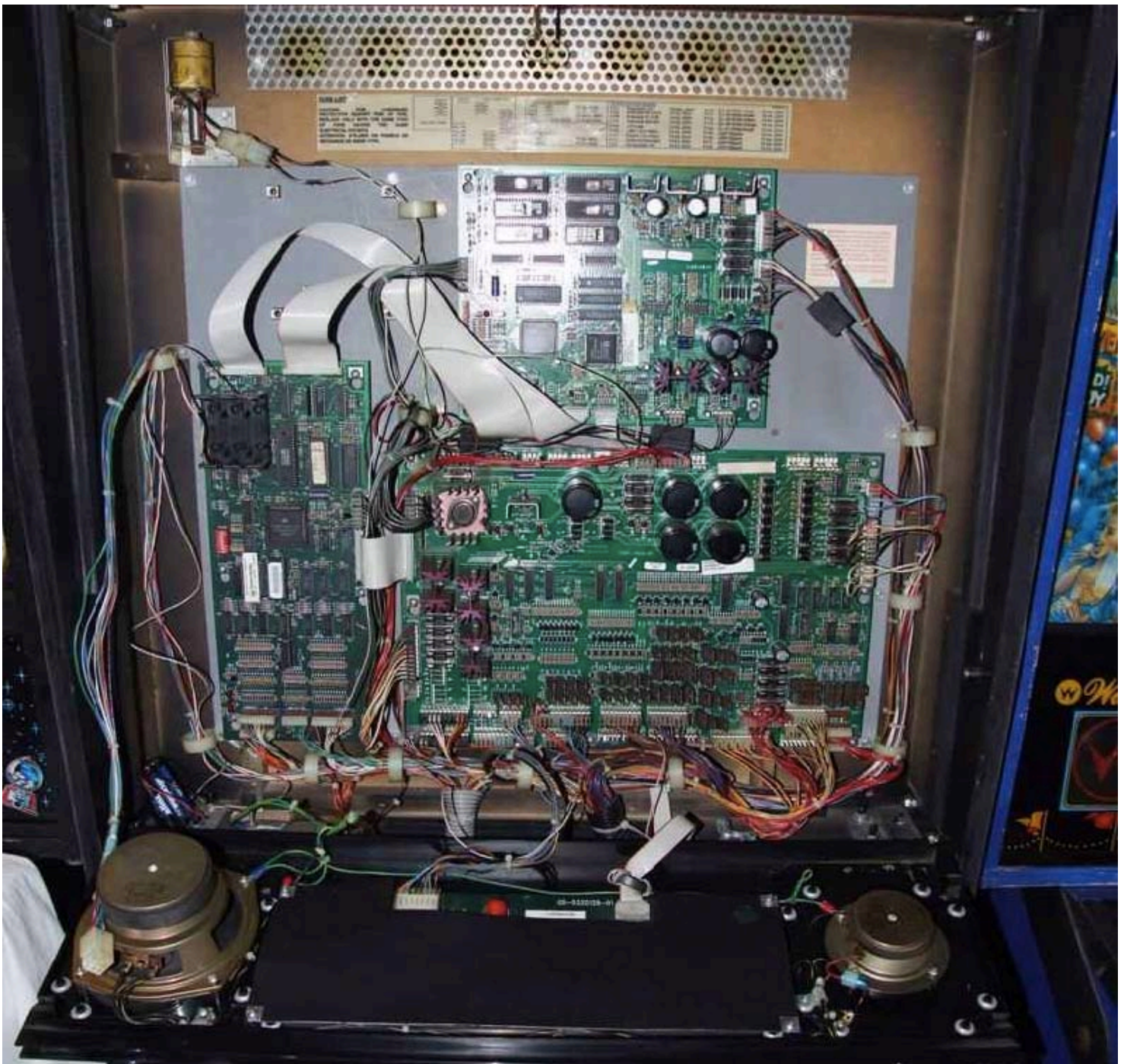
WPC-95 boardset.

This is the WPC-95 boardset. As you can see it's simplified compared to WPC-89: only three boards are used to control the whole pinball machine. Bottom left we have the cpu board. Bottom right is the WPC-95 powerdriverboard (A-20028). Center top is the WPC-95 AV (Audio-Video) board. It seems the cpu and A/V has changed for Cactus Canyon, Champion Pub and Monster Bash, these use part numbers A-21377 (cpu) and A-20516 (A/V), while previous WPC-95 games use part numbers A-21369 and A-20145-2. One of the differences is the RAM chip on the cpu board, but the boards should still be interchangeable.

WPC revisions

There were several revisions of the WPC-89 boardset. Here is an overview of all revisions with the games listed.

WPC Alpha-numeric: this is the first release of the WPC-89 boardset. It uses the WPC-89 cpu (A-12742), but no DMD controller (as it was not ready). Scores are shown on an 16-digit alpha-numeric display. Dr.Dude and some Funhouse prototypes use an older System11 soundboard, other games use the A-12738 sound board. There is also no fliptronics board yet: flippers get their power from the powerdriverboard (A-12697-1), which has a relay (and some additional components for this) at the top left. This powerdriverboard can be used in any WPC-89 pinball machine (also more recent). Games are: Dr.Dude (only about 100 sample games), Funhouse, Harley Davidson, The Machine Bride of Pinbot.
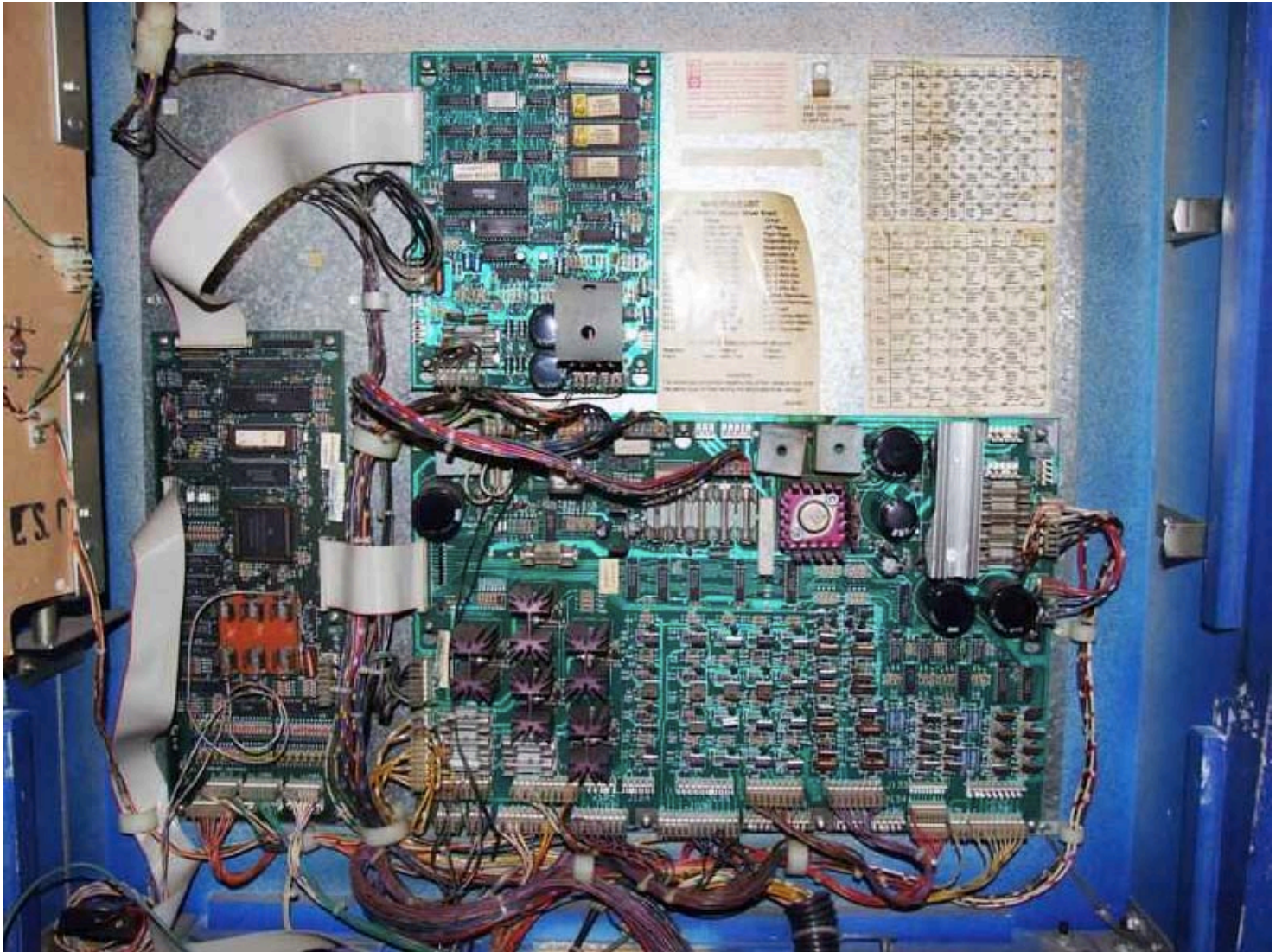
WPC-89 boardset as in Funhouse.

The earliest version of WPC-89 was quite simple: only three boards in the backbox. There was no board to control the displays or show scores, this was done by the cpu (using the flatcable on the center left) in combination with the board where the displays were mounted to (A-12739-1 and A-12793 -which cannot be exchanged with older System11 games that also use alpha-numeric displays).

Funhouse display panel.

WPC Dot Matrix: these are the first games to have a dot-matrix screen. A DMD driver board (A-14039) is added in the backbox. Games are: Slugfest Baseball, Gilligan's Island, Terminator2, Hurricane, Party Zone, Hot Shots.

WPC Fliptronics 1: the fliptronics board made the flippers digital. They are not controlled anymore directly by power which is present at the flipperbuttons inside the cabinet, but are controlled by the cpu. The first revision of this board (fliptronics 1) was used on all The Addams Family games, but was also tested on some Party Zone pinball machines (which used a specific version of roms for this).
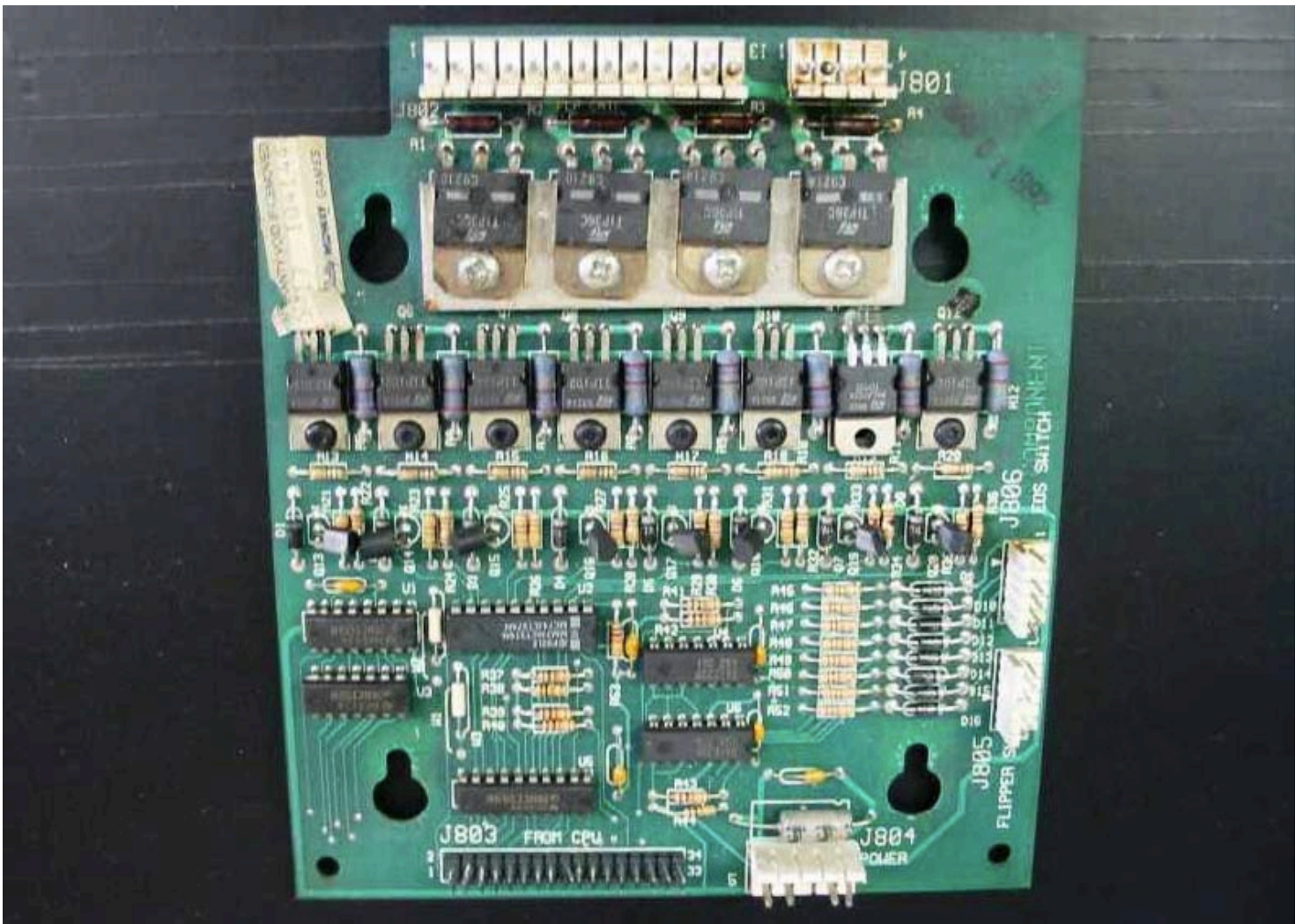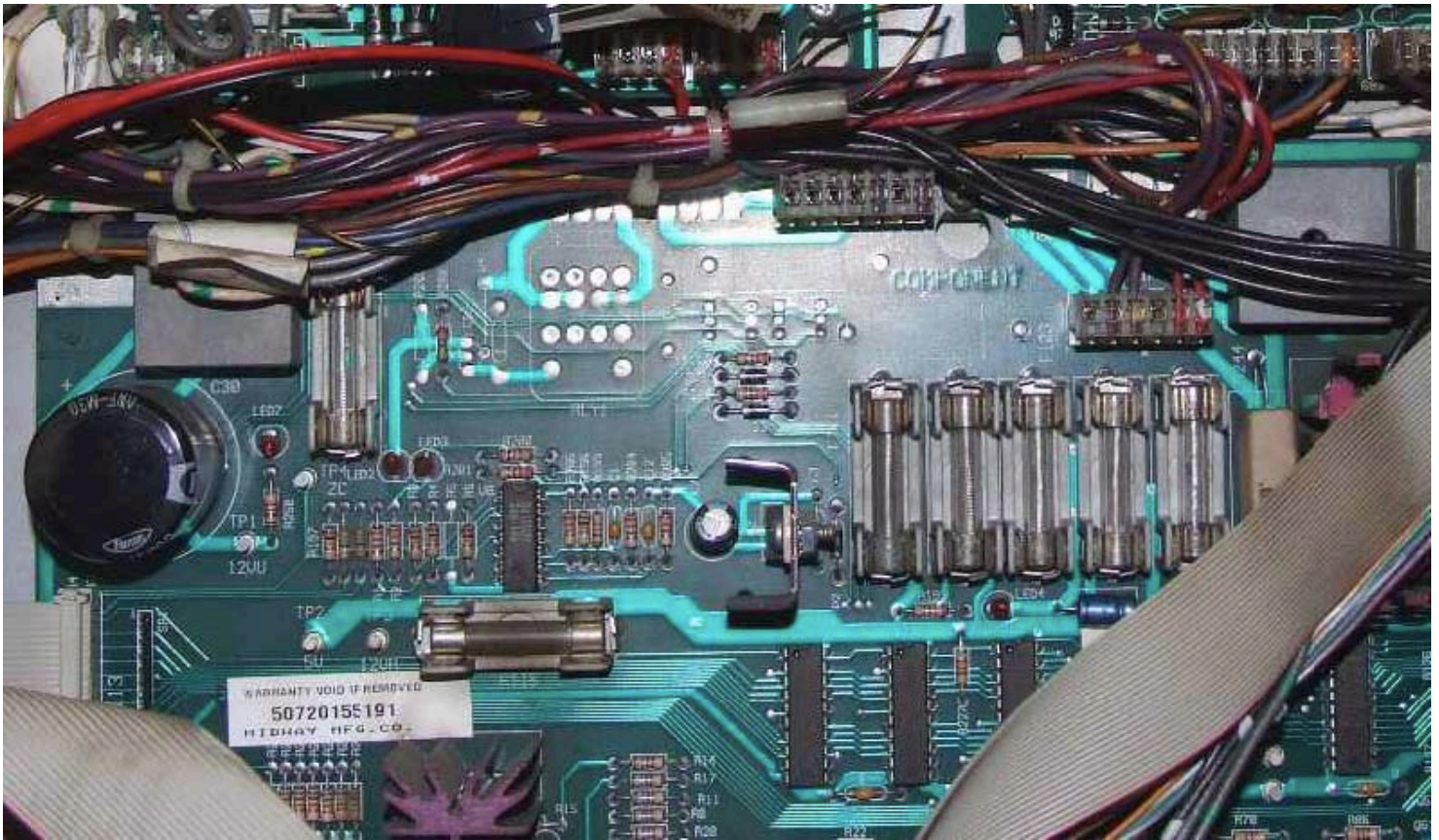
Fliptronics 1 pcb.

WPC Fliptronics II: The Fliptronics 1 board has been replaced with A-15472 Fliptronics-II. This board has a bridge rectifier at the bottom right. The flipper relay on the powerdriverboard is not used anymore, and in the run of Twilight Zone, Williams changed the powerdriverboard to revision 3 (A-12697-3) which does not have this flipper relay circuitry anymore. This new revision of powerdriver board cannot be used in older games that do not have a fliptronics board.

You could install the missing parts into this type of driver board, you need to install: RLY 1 -4PDT 6v 5A relay U7 -4n25 opto isolator U8 -4n25 opto isolator R208 -560 ohm 1/4 watt R209 -4.7k ohm 1/4 watt R210 -3.3k ohm 5 watt R211 -3.3k ohm 5 watt D39 -1n4004 Q99 -2n4403

Games are: The Getaway, Black Rose, Fish Tales, Dr. Who, Whitewater, Creature from the Black Lagoon, Bram Stokers Dracula, Twilight Zone and Addams Family Gold.

Missing components on the A-12697-3 powerdriver board used as from Twilight Zone.
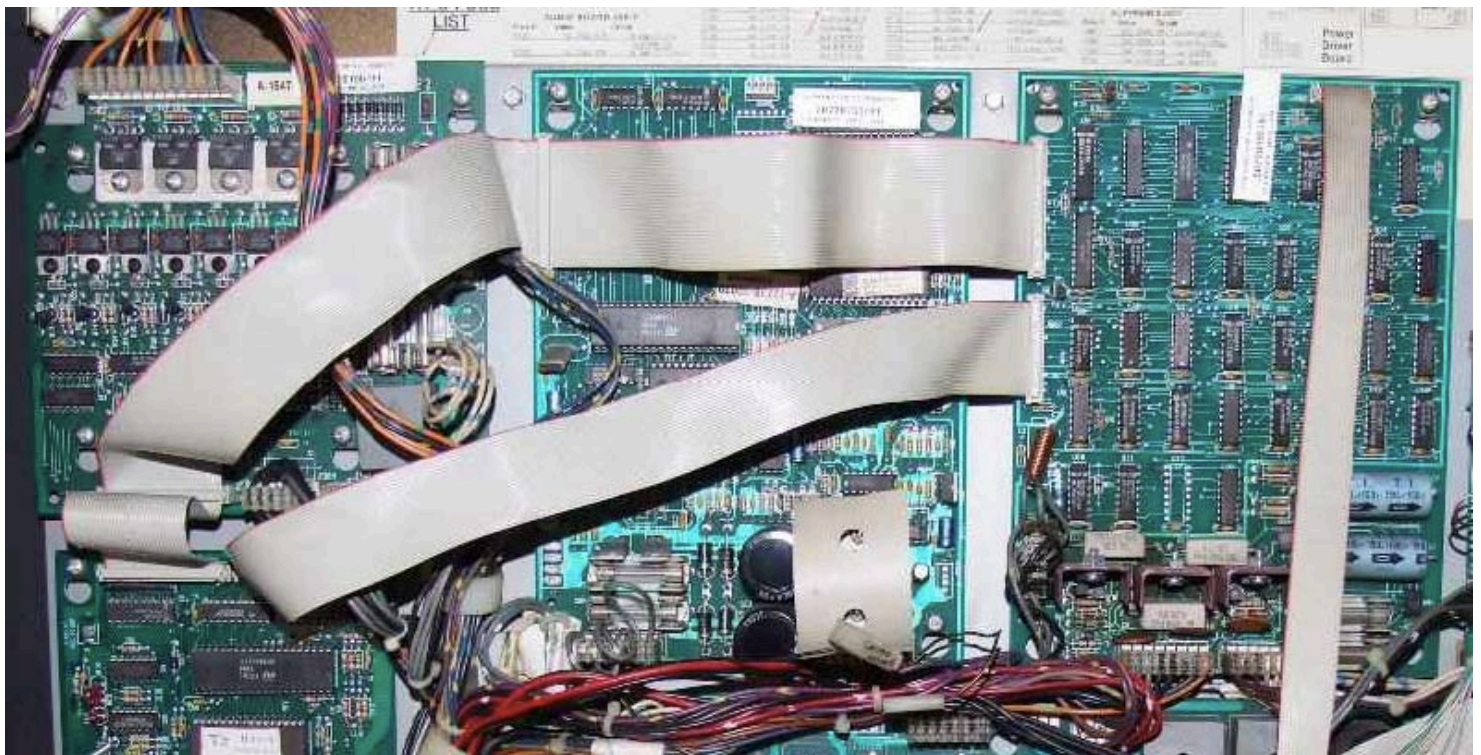
Boards in Twilight Zone. Top left is the Fliptronics-II board. Center is the sound board, right is the DMD Driver board.

WPC DCS: The analogue/digital soundboard is replaced with a completely digital DCS sound board (A-16917). Sound quality is much better on these games: Indiana Jones, Judge Dredd, Star Trek the Next Generation, Popeye, Demolition Man. A minor change is the A-15472-1 fliptronics board, which misses a capacitor, but is still compatible.


A-16917 DCS sound board. Can be recognised with all the eproms on the right.

WPC Security: this series of games uses a new CPU board (A-17651), which is incompatible with the previous. Biggest change is the addition of a security PIC chip. When you want to use this board in another model of game (also with WPC-S cpu), you do not only have to exchange the game eprom, but need a matching security chip. New security chips are available at ShiftedBit.com.

Games with this security chip are: World Cup Soccer, Flintstones, Corvette, Road Show, The Shadow, Dirty Harry, Theatre of Magic, No Fear, Indianapolis 500, Johnny Mnemonic, Jackbot and Who Dunnit.
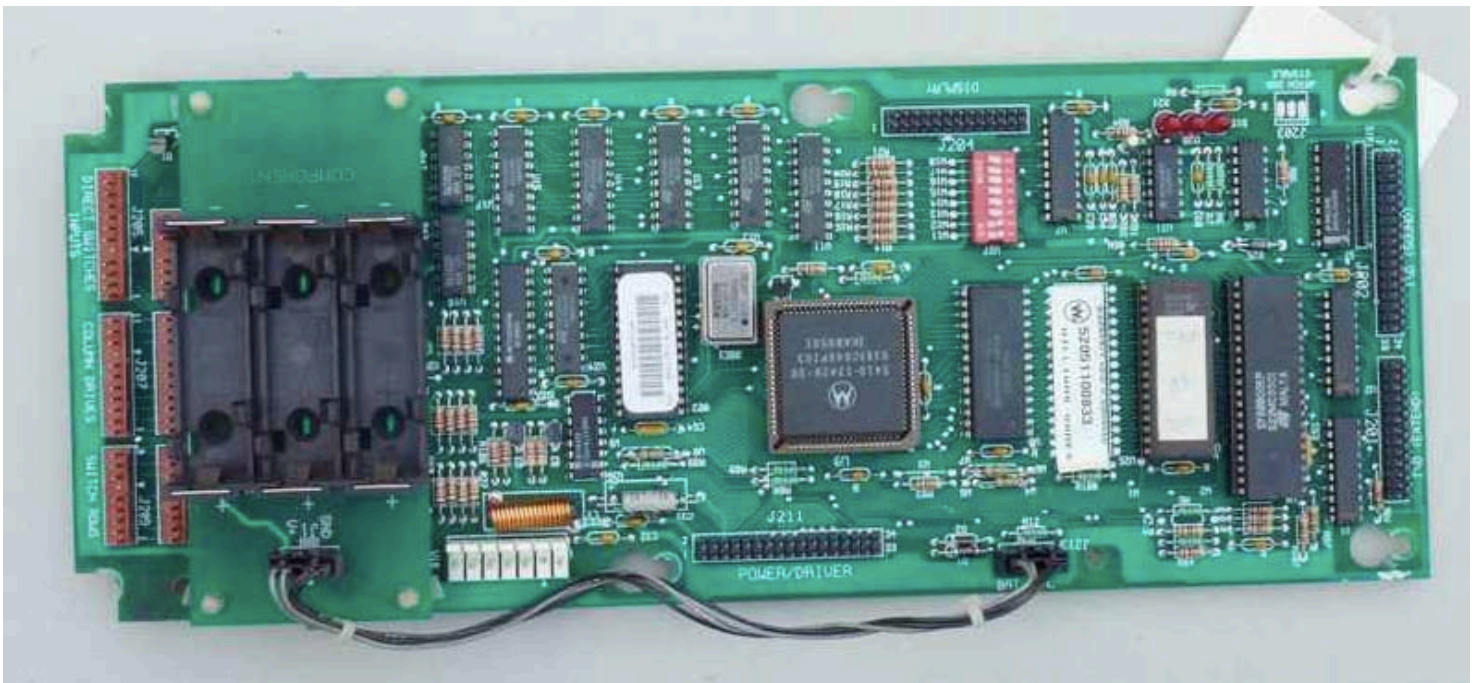
A-17651 WPC-S security cpu board. Security PIC is the IC with the barcode, in position U22.

Some other minor revisions done in this game list: WhoDunnit uses powerdriver board revision 4: A-12697-4, but this board is still compatible with -3 boards. These games use revision 1 of the dmd driver board (A-14039.1), changes unknown.

WPC-95: In 1995 Williams started using a completely new boardset. The cpu still uses a security chip (now at location G10). The powerdriver board has been redesigned, biggest change are the bridge rectifiers at the top right that have been replaced by diodes. There is no fliptronics board anymore, and the sound and dmd driver board have merged into one new audio/video board. All boards can be exchanged between the games.

Games that use these boards are: Congo, Attack from Mars, Safe Cracker, Tales of the Arabian Nights, Scared Stiff, Junk Yard, NBA Fastbreak, Medieval Madness, Cirqus Voltaire, No Good Gofers, Champion Pub, Monster Bash, Cactus Canyon.
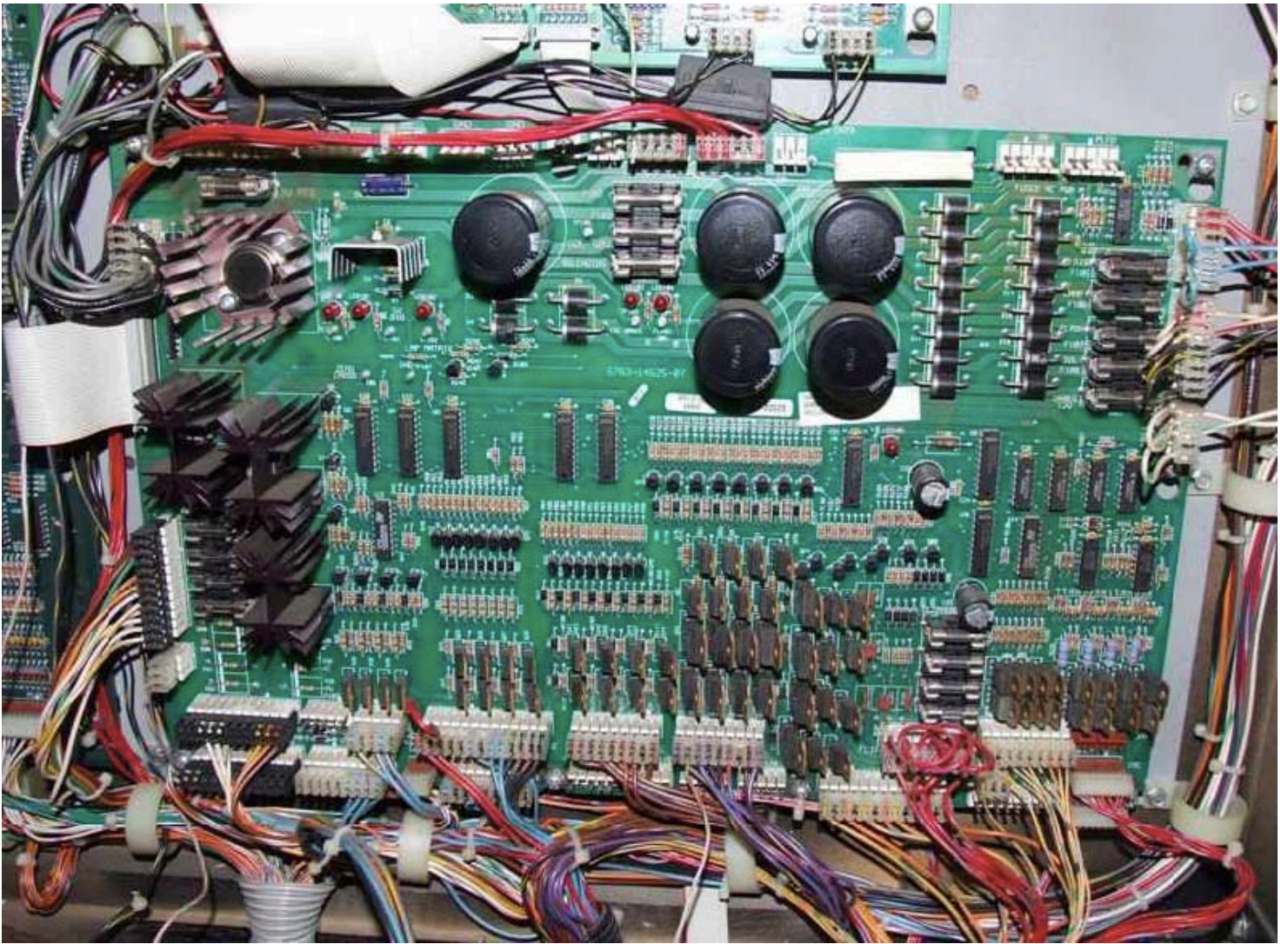
A-20119 WPC-95 cpu board.
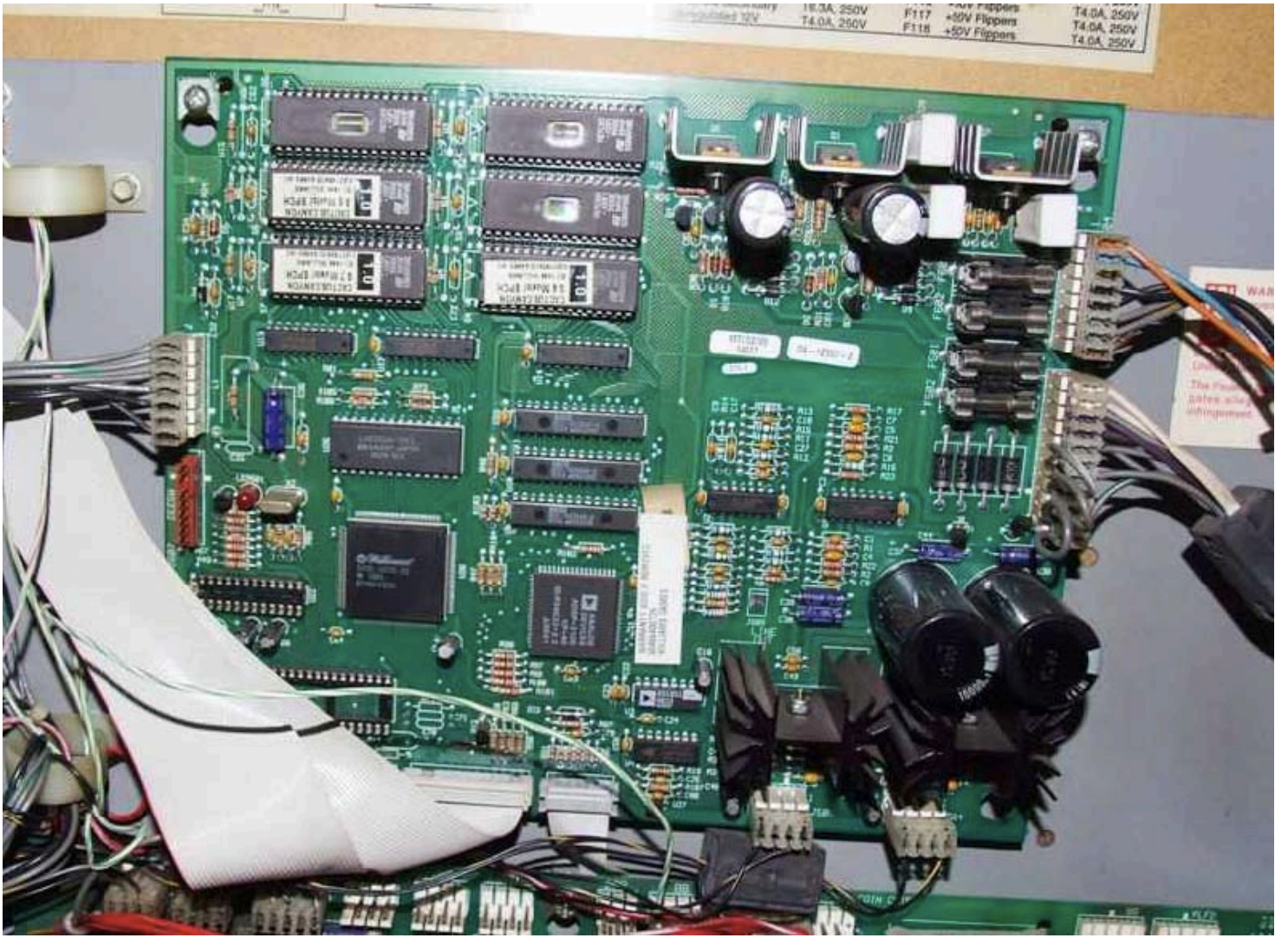
A-20516 WPC-95 A/V board.

A-20028 WPC-95 driver board.

Thanks to www.Flippers.be for creating this document.