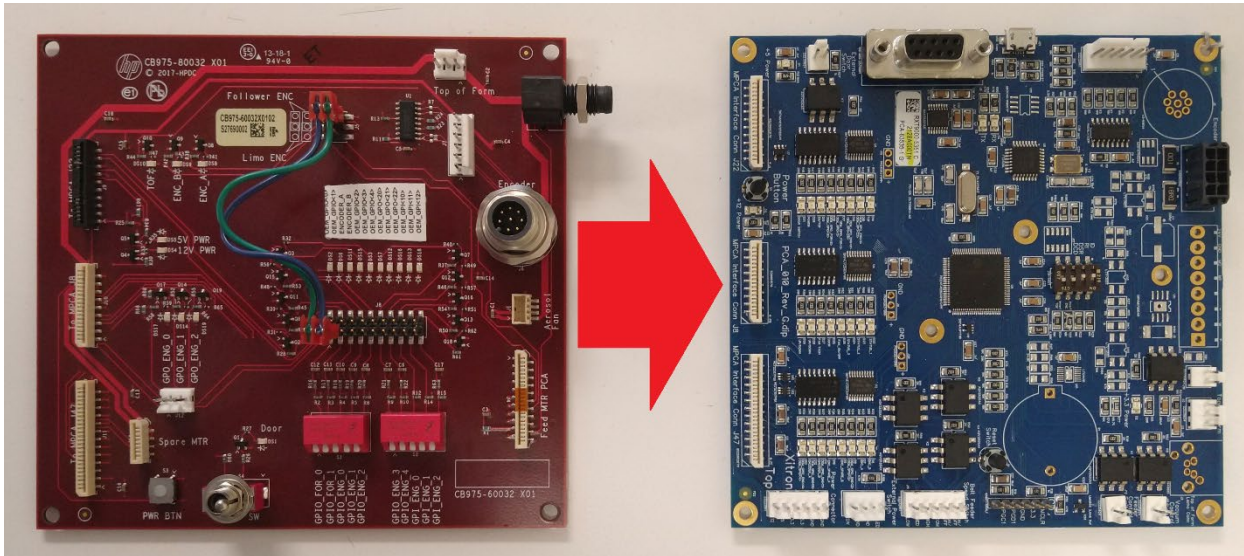


Xitron PCA for the Hewlett Packard "Bar in a Box" Printer

JMS: March 11, 2022

General Information:

Below is a photo comparing the Hewlett Packard PCA reference design (left) to the logical "Evolution" of the Xitron PCA card (pictured on the right):



With the addition of a Microchip PIC 24F microcontroller, communications ports, and a plethora of input, output, monitoring, and status signals, the Xitron HP PCA card is a logical choice for OEMs to integrate their own printing solutions around the HP "Bar in a Box" offering.

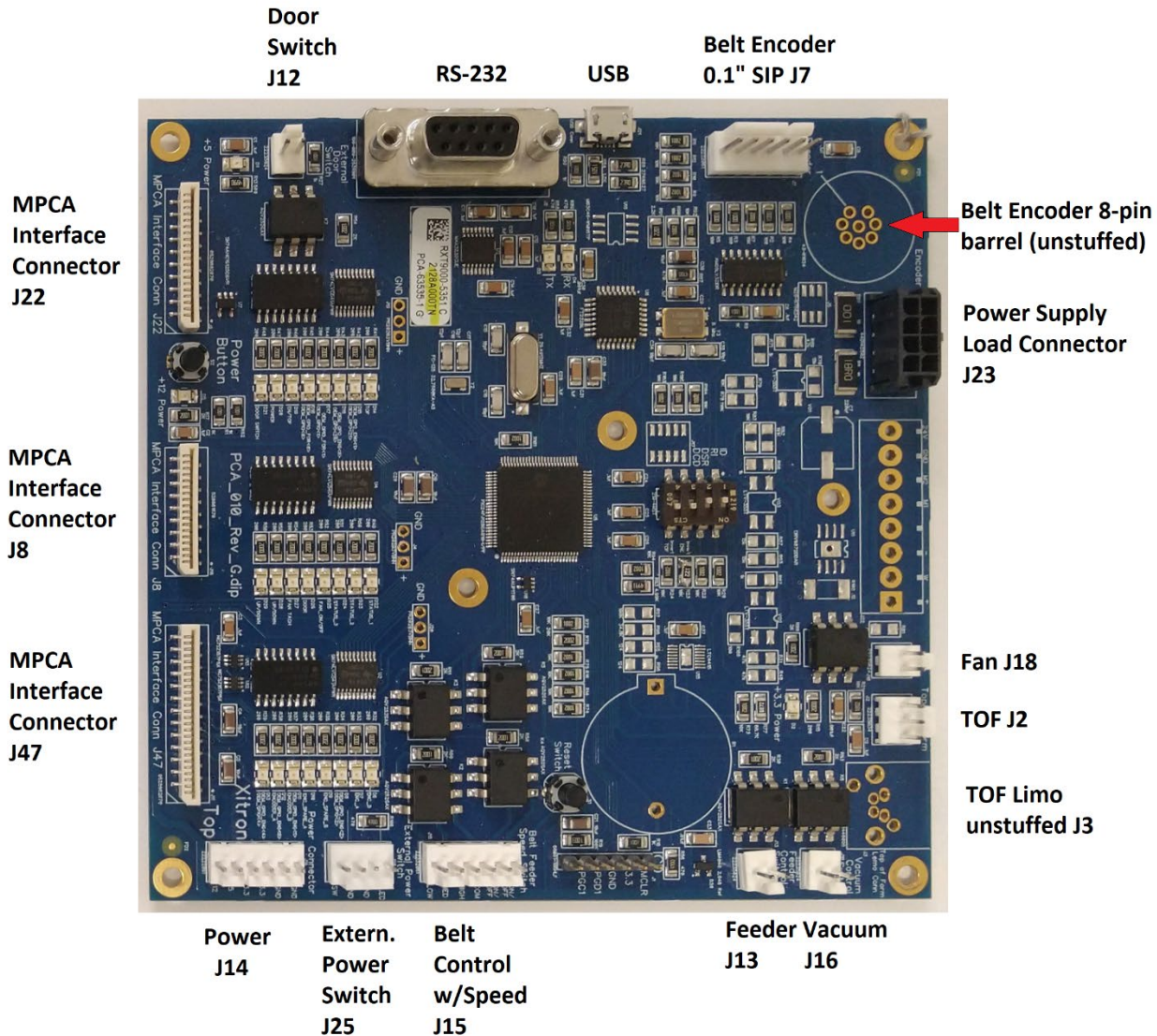
Much of the fundamental interfacing on the reference design has been replicated on the Xitron PCA to allow for 100% compatibility with connections to the HP print head. This includes the MPCA ribbon connectors (3), encoder (both 0.1" SIP and unstuffed 8-pin barrel), Top of Form input (both 0.1" SIP and unstuffed Lemo 4-pin barrel), and power (with bleed resistors).

From that base feature set, the Xitron PCA card provides 2 types of communications interfaces, RS-232 serial and a USB micro peripheral port (onboard USB to serial converter) to interface to PC based software to monitor and control the printing process. Through this communications channel with the Microchip PIC 24F, the integrator can control a number of devices through the use of single-pole, single-throw solid state relays (8 x Panasonic AQV252G) such as main belt (on/off), main belt speed (low/medium/high signals), feeder (on/off), vacuum (on/off), and fan (on/off).

Hardware pulse counters can monitor the main belt encoder to give speed and distance information in real time. The Top of Form (TOF) sensor input can be monitored and gated to the HP print head. There is an auxiliary input for a Door Open function (to monitor access to the ink trays), numerous status LEDs and a power control push button.

More extensive documentation is available on request including schematics, command/status protocol, and a diagnostic menu for bench testing and experimentation.

Detailed list of connectivity for the Xitron PCA card:



Starting with the connectors that are directly coupled to the HP “Bar in a Box” motherboard:

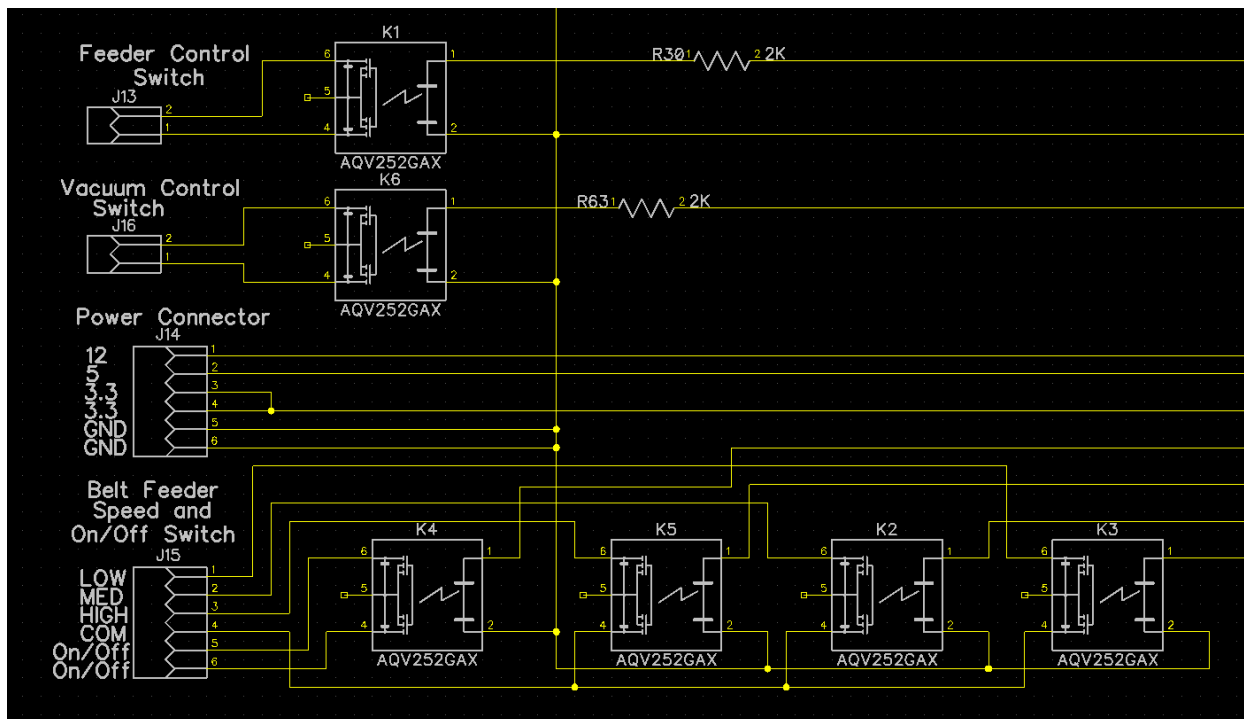
MPCA Interface Connection J22 – 20 pin flat flex cable (FFC) of which only 19 lines are used. This was done because of the relative obscurity of the 19-pin connector/FFC. On the Xitron PCA end all 20 contacts of a 20-line FFC are inserted while the MPCA J22 end has one line trimmed. The clipped line on the FFC connector is on the FAR END from the connector key (angled corner). In the diagram above the unused (20th) line would be all the way to the left.

MPCA Interface Connection to J8 – 18 pin flat flex cable (FFC). Use an 18 line FFC to directly connect this to the HP’s motherboard.

MPCA Interface Connection to J47 - 26 pin flat flex cable (FFC). Use an 26 line FFC cable to directly connect this to the HP’s motherboard.

Power Supply Load Connector J23 – 8-Pin (2x4) required for the HP print head’s power supply that needs a 1 watt load to dissipate charge when the power supply is turned off. This connector supplies that function.

Moving on to the Xitron PCA specific features starting with some of the output control signals that are implemented with the Panasonic AQV252G solid state relays. The following schematic subsection show the implementation of 6 of these signals: Belt on/off, low/medium/high speed, vacuum and feeder controls:

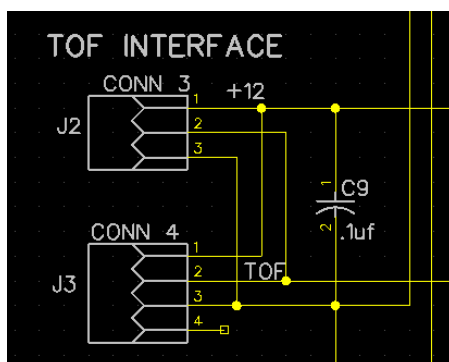


Feeder Control Switch J13 – This simple “closure” on active can accept up to 60 volts and 2.5 amperes. It is, as with all the AQV252G devices, optically isolated for added protection of the Xitron PCA circuit.

Vacuum Control Switch J16 - is implemented in a similar fashion to the Feeder control.

Belt Control w/Speed J15 – is a little more complicated with a “common” signal level for all three speed closures, low/medium/high. The two On/Off pins have their own relay. Note: the communications interface allows for only 3 possible speed settings, enumerated as 1-3. Each of these settings will, in turn, activate a single of the 3 controls lines, low/medium/high.

Fan J18 – While not pictured in the diagram above, this signal is implemented just like the feeder or vacuum lines.



TOF J2 – This connector is attached to a powered 12 volt sensor that will scan the belt for Top Of Form indications (media present). J2 is implemented as a 0.1” 3-pin Single-In-Line (SIP) connector. Pin 1 is a +12 volt supply line to power the sensor with Pin 3 as the ground. The actual TOF indication (high/low) is returned on Pin2.

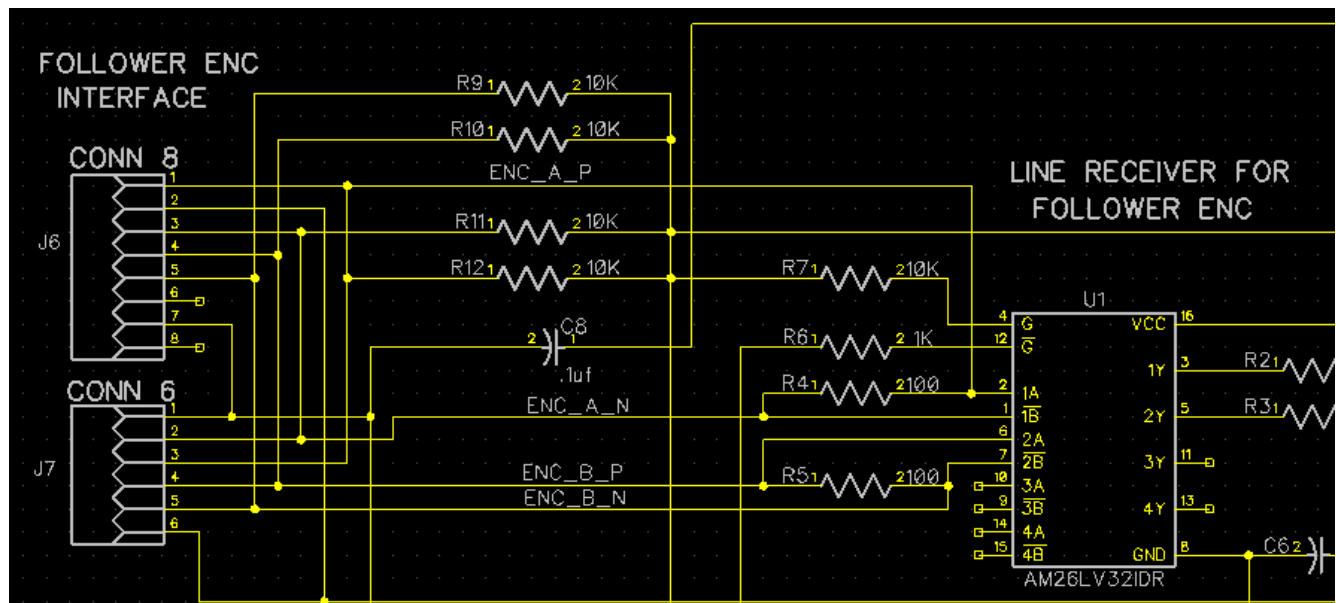
TOF Limo (unstuffed) J3 – This connector was used in earlier implementation and is available to be added if needed. Of the 4 signals on this connector, only 3 are used in a similar fashion to the TOF J2 connection.

Note: The TOF signal can be **inverted** on the Xitron PCA assembly by changing DIP SWITCH 4 to the OFF position (labeled on dip switch). DIP SWITCH 4 ON would NOT invert the TOF signal.

RS-232 – This serial communications interface port is implemented with a standard female 9-pin D-Shell connector. This is a DCE (Data Communications Equipment) pinning with transmit data on pin 2 and receive data on pin 3 with pin 5 being a signal ground. It is meant to be connected with a straight through (1 to 1, no crossover) serial cable to a DTE (Data Terminal Equipment) port on a PC or other controlling device using a male DB-9 connector (as required, other options are OK).

USB – This micro USB connection is implemented as a USB to serial converter peripheral. When this port is connected to a USB host on a computer, it will enumerate itself as a serial port and with the correct configuration will create a virtual COM port on the computer (via standard Windows support for the FTDI Serial to USB converter).

NOTE: It is undesirable to have BOTH RS-232 and USB connected at the same time. This may cause confusion in the communications (input from both at the same time) but is otherwise NOT harmful, electrically.



Belt Encoder 0.1: SIP J7 – This is the input for the rotary optical encoder that monitors the main media belt. Consult the diagram above for connection of the 2 phase (Encoder A and Encoder B) differential input pairs (P & N) that are buffered by U1, a differential line receiver. A similar signal complement is available on J6, the barrel connector version of this interface.

Belt Encoder 8-pin barrel (unstuffed) J6 – This connector was used in an earlier implementation and can be added to the board if needed. Consult J7 above for information on these very similar connections for the belt encoder.

Note: The Belt Encoder signal can be **inverted** on the Xitron PCA assembly by changing DIP SWITCH 3 to the OFF position (labeled on dip switch). Setting DIP SWITCH 3 to ON would NOT invert the Belt Encoder signal.

Documentation for the command and status control protocol being used on the RS-232/USB interfaces is available on request. There is also a diagnostic menu available for testing on this same communications channel using a simple TTY program (Hyperterminal, PuTTY, etc). Full schematics are available to customers.