printed: February 27, 1999

# Preliminary Instructions for Quad Piggyback Digital to Analog (D/A) Converter

The Quad Piggyback D/A converter is a small printed circuit card which can be attached directly to any playback-only MICRO MACs 'Brick' card. When installed, this card converts all 4 eight bit channels on a brick to four separate analog outputs. Two of the four output channels on the Brick cards J6 connector are taken over by the installation of the Quad Piggyback D/A. Channels zero and one of the brick can still be used as normally as digital outputs, but will carry the same data as is converted to an analog signals on the Quad Piggyback D/A card. What would normally be used as channel two of the Brick is used as a TTL level input for feeding test data into the Quad Piggyback D/A. The 1/4 J6 which would normally be used as channel three's output from the brick is converted into a 1/4 J6/A output and carries all four of the analog output channels.

## Installation:

1) Remove the fuse 'F4' (the one closest to the edge of the card) from the MICRO MACs card.

2) Bend down the end of the fuse holder which will come precariously close to the Quad Piggyback D/A card when it is installed (or insulate this end of the fuse holder with some double faced tape or similar material).

3) Remove the two ULN2803 chips from the two sockets near the large filter capacitor (C1).

4) Plug the Quad Piggyback D/A converter into the two 18 pin sockets you removed the ULN2803's from and the long single row header that runs down the center of the board (JP-3).

## Outputs:

Note that only the second two channels of the J6 output gets changed by the installation of a Quad Piggyback D/A card:

| wire number | color | wire function |
|---|---|---|
| 1 | brown | circuit ground |
| 2 | red | channel 0 data bit 7 |
| 3 | orange | channel 0 data bit 6 |
| 4 | yellow | channel 0 data bit 5 |
| 5 | green | channel 0 data bit 4 |
| 6 | blue | channel 0 data bit 3 |
| 7 | violet | channel 0 data bit 2 |
| 8 | gray | channel 0 data bit 1 |
| 9 | white | channel 0 data bit 0 |
| 10 | black | +15 VDC unregulated power supply (fused for 1 amp) |
| 11 | brown | circuit ground |
| 12 | red | channel 1 data bit 7 |
| 13 | orange | channel 1 data bit 6 |
| 14 | yellow | channel 1 data bit 5 |
| 15 | green | channel 1 data bit 4 |
| 16 | blue | channel 1 data bit 3 |
| 17 | violet | channel 1 data bit 2 |
| 18 | gray | channel 1 data bit 1 |
| 19 | white | channel 1 data bit 0 |
| 20 | black | +15 VDC unregulated power supply (fused for 1 amp) |

### TTL level test data input:

| | | |
|---|---|---|
| 21 | brown | circuit ground |
| 22 | red | TTL LEVEL TEST DATA INPUT bit 7 |
| 23 | orange | TTL LEVEL TEST DATA INPUT bit 6 |
| 24 | yellow | TTL LEVEL TEST DATA INPUT bit 5 |
| 25 | green | TTL LEVEL TEST DATA INPUT bit 4 |
| 26 | blue | TTL LEVEL TEST DATA INPUT bit 3 |
| 27 | violet | TTL LEVEL TEST DATA INPUT bit 2 |
| 28 | gray | TTL LEVEL TEST DATA INPUT bit 1 |
| 29 | white | TTL LEVEL TEST DATA INPUT bit 0 |
| 30 | black | +15 VDC unregulated power supply |

### J6/A analog output:

| | | |
|---|---|---|
| 31 | brown | circuit ground |
| 32 | red | +15 VDC unregulated power supply |
| 33 | orange | + channel 3 output data |
| 34 | yellow | - channel 3 output reference |
| 35 | green | + channel 2 output data |
| 36 | blue | - channel 2 output reference |
| 37 | violet | + channel 1 output data |
| 38 | gray | - channel 1 output reference |
| 39 | white | + channel 0 output data |
| 40 | black | - channel 0 output reference |

The first two channels are used and connected (if the data isn't being used as a source for an analog signal) just like any other standard 1/4 J6.

The TTL level test data is fed to the test inputs on the Quad Piggyback D/A card. **Standard 1/4 J6 output data from a programming console, Togglodyte, or other source must not be fed directly into this input**. A TTL BUFFER must be used to convert the relatively high voltages (15 to 24) found on a standard 1/4 J6 to TTL levels (5 volt). If the Quad Piggyback D/A cards are being installed in a card cage, the eight data bits for this channel (wires 22 through 29) should be bussed down the backplane to connect all of the slots with Quad Piggyback D/A's in them. A single TTL BUFFER can then be permanently connected to this buss to send test data to any Quad Piggyback D/A card in the cage.

## Using the test function:

When TTL level data is being sent to the test inputs on a Quad Piggyback D/A, any analog channel can be told to use this data as a source by simply turning on the appropriate dipswitch on the Quad Piggyback D/A card. Any number of these can be switched on at the same time, and all of them will follow the command signals coming down the TTL level Test Buss.

If the function an analog output is attached to can be damaged by sudden movements, it is a good idea to write down the normal 'parked' command position it so that the test command levels can be matched when you switch in to or out of test mode.