

HARDWARE REFERENCE MANUAL

Accessory 8FS

Digital Interface Board

3F0-603673-xHxx

October 29 2003



DELTA TAU
Data Systems, Inc.

NEW IDEAS IN MOTION ...

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INTRODUCTION

The Accessory 8FS digital interface board (Acc-8FS) is a 4-channel direct PWM stack breakout board for PMAC2A-PC/104. It is used to control the digital amplifiers that require direct PWM control signals. Each digital amplifier is connected through a separate Mini-D 36-pin connector (J15, J16, J17 and J18). It also provides box header connectors for two Acc-28B, 2- or 4-channel 16-bit A/D converter boards.

Note:

The same channel cannot be used for both Direct PWM and A/D conversion (Acc-28B).

Encoder inputs and main flags must be wired to the JMACH1 (50-pin IDC) connector (CPU and Acc-1P board). For more information about these connections, refer to the PMAC2A-PC/104 Hardware Reference manual.

Note:

If using a digital amplifier with current feedback, the analog inputs provided by the Option 12 of the PMAC2A-PC/104, the Option 2 of the Acc-1P or the Acc-28B cannot be used.

Compatibility

The Acc-8FS can be used only with the PMAC2A-PC/104 controller, interfacing through the JEXP and PC/104 communication connectors.

Formal Specifications

Size:	11.56cm x 9.59cm x 1.27cm (4.55" x 3.775" x 0.5")
Weight:	0.126 kg. (0.27 lb.)
Temperature	
Operating:	0°C to 60°C (32°F to 140°F)
Storage:	-12°C to 82°C (10°F to 180°F)
Humidity:	10% to 95%, non-condensing

Configuration

The Acc-8FS provides a PC/104 size board with:

- Interface connectors for two Acc-28B
- Four channels axis-interface circuitry, each including:
 - Direct PWM digital output
 - Mini-D 36-pin connector

HARDWARE SETUP

Resistor Pack Configuration

Termination Resistors

The Acc-8FS provides sockets for termination resistors on differential input pairs coming into the board. As shipped, there are no resistor packs in these sockets. If these signals are brought long distances into the Acc-8FS board and ringing at signal transitions is a problem, SIP resistor packs may be mounted in these sockets to reduce or eliminate the ringing.

All termination resistor packs are the type that has independent resistors (no common connection) with each resistor using two adjacent pins. The following table shows which packs are used to terminate each input device:

Input	Pack	Pack Size
ADCA 1	RP43	8-pin
ADCB 1	RP43	8-pin
ADCA 2	RP43	8-pin
ADCB 2	RP43	8-pin
ADCA 3	RP48	8-pin
ADCB 3	RP48	8-pin
ADCA 4	RP48	8-pin
ADCB 4	RP48	8-pin
Fault 1 and 2	RP44	6-pin
Fault 3 and 4	RP49	6-pin

MACHINE CONNECTIONS

Mounting/Installation

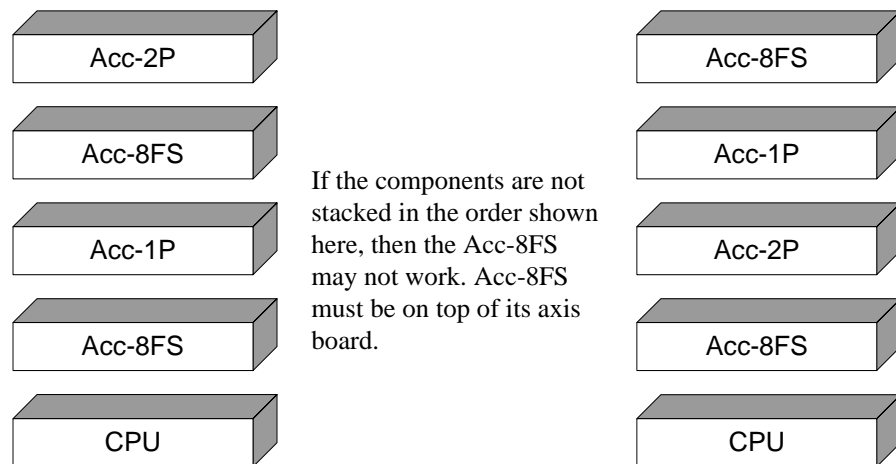
The Acc-8FS is always stacked on top of a PMAC2A PC/104 CPU/axis board or Acc-1P. At each of the four corners of the PMAC2A PC/104 board there are mounting holes that can be used to mount the board on standoffs.

It is recommended that the Acc-8FS board be placed above the board with the DSPGATE (CPU/axis board or Acc-1P) at the stack. Up to two Acc-8FSs can be used in a single PMAC2A PC/104 system (total of eight PWM axes).

The Acc-8FS stacks on top of the CPU/axis board or the Acc-1P through the PC/104 bus connectors [J6 (50-pin), J5 (50-pin), J1A-J1B (64-pin), J2C-J2D (38-pin)].

Example:

To setup an 8-axis PWM system with PMAC PC/104 controller and USB/Ethernet communications board (Acc-2P), the bottom board will be the CPU/axis board (603670-10x). Stack on the first Acc-8FS (603673-10X) on top of it. Then stack the Acc-1P (603671-10x) on top of the first Acc-8FS. This provides four additional channels axis interface circuitry for eight servo channels. Then stack the other Acc-8FS on top of it. Another configuration could be: on top of the first Acc-8FS, stack the Acc-2P (603672-10x) and then the Acc-1P on top of it and the second Acc-8FS on top of it.

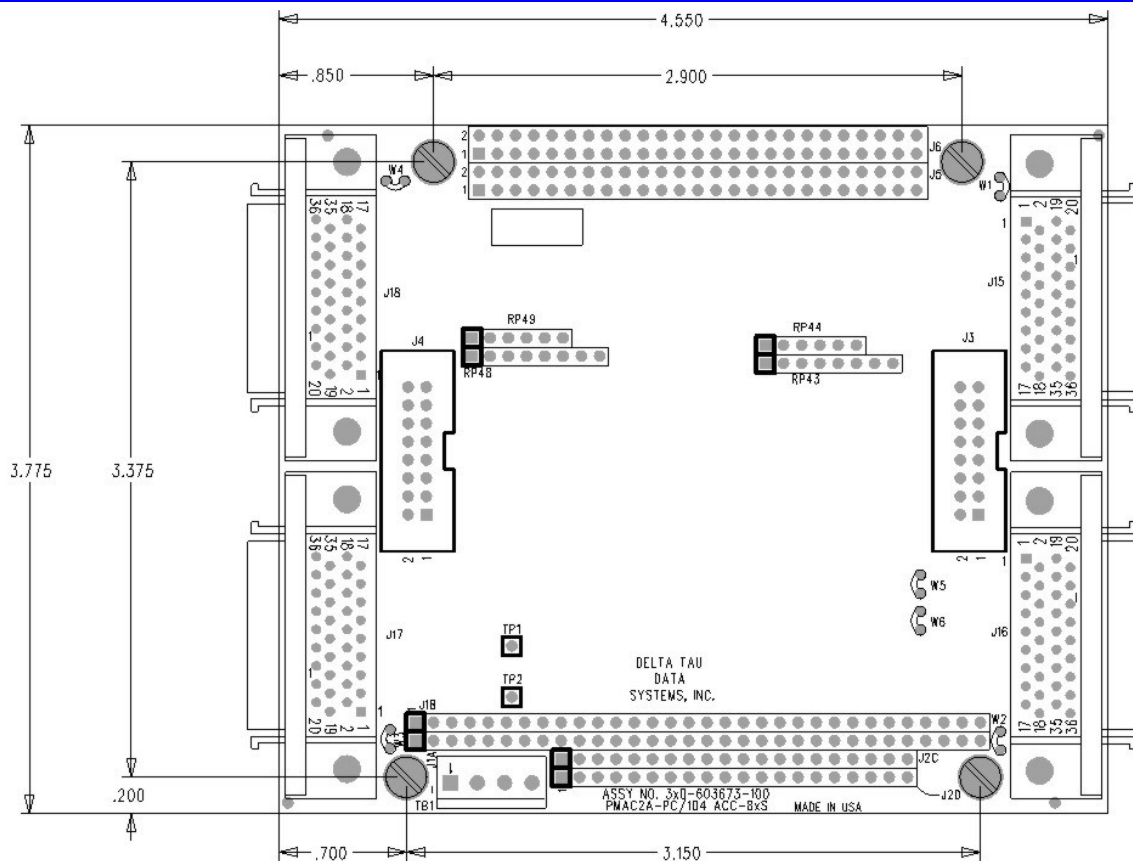


Power Supply Connection

The Acc-8FS requires 5V power for its digital circuits: 1A in a 4-channel configuration. The digital 5V (regulated, +/-5%) power can be provided through the JEXP Bus connector: The Acc-8FS is stacked on top of the CPU/axis board or the Acc-1P via electrically active ISA bus standoffs. It draws its 5V power from the bus automatically.

HARDWARE REFERENCE SUMMARY

Mechanical Drawing



Mating Connectors

A pin definition listing for each connector is described in the following section.

J3 and J4

These are 16-pin headers for connecting devices that use the ADC strobe and the clock and serial data return lines to the PMAC2. Typically, these inputs are used with Delta Tau's Acc-28B A-D converter accessory (J3 for the first Acc-28B and J4 for the second Acc-28B).

J15, J16, J17 and J18

These are 36-pin mini D-connectors that output the digital amplifier interface signals (TTL levels) to a digital pulse-width-modulated (PWM) amplifier.

For each machine interface channel, PMAC2A-PC/104 has three pairs of top and bottom PWM signals, which can be used for the half-bridges of a 3-phase motor. Each of these six out-put signals is a differential line-driver pair, for a total of 12 PWM pins. These pins are named:

- PWMATOP n +PWMATOP n -(Phase A top transistor command)
- PWMABOT n +PWMABOT n -(Phase A bottom transistor command)
- PWMBTOP n +PWMBTOP n -(Phase B top transistor command)
- PWMBBOT n +PWMBBOT n -(Phase B bottom transistor command)
- PWMCTOP n +PWMCTOP n -(Phase C top transistor command)
- PWMCBOT n +PWMCBOT n -(Phase C bottom transistor command)

*Where n is the PMAC2 channel number

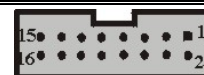
For more information, refer to the PMAC 2 User Manual and the PMAC1/2 Software Reference Manual.

Note:

If CE approval is needed, then W1, W2, W3 and W4 must be jumper wired so as to capacitively-coupled shield the D type metal connectors with the chassis GND. In addition, CE1, CE2, CE3 and CE4 need 0.1UF capacitor to capacitively coupled shield the boards GND with the Chassis GND.

CONNECTOR DESCRIPTIONS

J3 A-D Converter Breakout Header (16-pin IDC Connector)

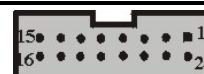


Pin #	Symbol	Function	Description	Notes
1	ADC_CLK1-	Output	A-D Clock Output	
2	ADC_CLK1+	Output	A-D Clock Output	
3	N.C.	-		
4	N.C.	-		
5	ADC_STB1+	Output	A-D Converter	Serial command word
6	ADC_STB1-	Output	A-D Converter	For future use
7	ADC_DAA1-	Input	Serial Data Input Channel 1/	
8	ADC_DAB1-	Input	Serial Data Input Channel 1/	
9	ADC_DAA2-	Input	Serial Data Input Channel 2/	
10	ADC_DAB2-	Input	Serial Data Input Channel 2/	
11	ADC_DAA1+	Input	Serial Data Input Channel 1	
12	ADC_DAB1+	Input	Serial Data Input Channel 1	
13	ADC_DAA2+	Input	Serial Data Input Channel 2	
14	ADC_DAB2+	Input	Serial Data Input Channel 2	
15	+5Vdc	Output		
16	GND	Output		

The user's connector is a 16-pin IDC (ribbon cable crimp style) connector.

Note: ADC_STB1-, pin #6, must be connected to W5 to be jumper-wired (not needed for Acc-28B).

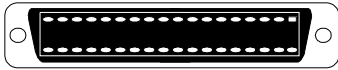
J4 A-D Converter Breakout Header (16-pin IDC Connector)



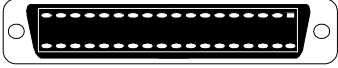
Pin #	Symbol	Function	Description	Notes
1	ADC_CLK2-	Output	A-D Clock Output	
2	ADC_CLK2+	Output	A-D Clock Output	
3	N.C.	-		
4	N.C.	-		
5	ADC_STB2+	Output	A-D Converter	Serial command word
6	ADC_STB2-	Output	A-D Converter	For future use
7	ADC_DAA3-	Input	Serial Data Input Channel 3/	
8	ADC_DAB3-	Input	Serial Data Input Channel 3/	
9	ADC_DAA4-	Input	Serial Data Input Channel 4/	
10	ADC_DAB4-	Input	Serial Data Input Channel 4/	
11	ADC_DAA3+	Input	Serial Data Input Channel 3	
12	ADC_DAB3+	Input	Serial Data Input Channel 3	
13	ADC_DAA4+	Input	Serial Data Input Channel 4	
14	ADC_DAB4+	Input	Serial Data Input Channel 4	
15	+5Vdc	Output		
16	GND	Output		

The user's connector is a 16-pin IDC (ribbon cable crimp style) connector.

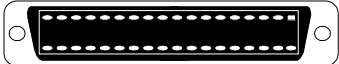
Note: ADC_STB2-, pin #6, must be connected to W6 to be jumper-wired (not needed for Acc-28B).

J15- PWM AMP 1 (36-pin Mini-D Connector)				
Pin #	Symbol	Function	Description	Notes
1	FC0	N.C.	1 of 4 Fault Code Bits	Not connected
2	FC1	N.C.	1 of 4 Fault Code Bits	Not connected
3	ADC_CLK1+	Command	A/D Converter Clock	
4	ADC_STB1+	Command	A/D Converter Strobe	
5	CURRENTA+	Feedback	Phase A Actual Current Data	Serial digital
6	CURRENTB+	Feedback	Phase B Actual Current Data	Serial digital
7	AENA1+	Command	Amplifier Enable	High is enable
8	FAULT1+	Feedback	Amplifier Fault	High is fault
9	PWMATOP1+	Command	Phase A Top CMD	High is on command
10	PWMABOT1+	Command	Phase A Bottom CMD	High is on command
11	PWMBTOP1+	Command	Phase B Top CMD	High is on command
12	PWMBBOT1+	Command	Phase B Bottom CMD	High is on command
13	PWMCTOP1+	Command	Phase C Top CMD	High is on command
14	PWMCBOT1+	Command	Phase C Bottom CMD	High is on command
15	GND	Common	Reference Voltage	
16	+5V	Power	+5V Power	From controller
17	RESERVED			
18	RESERVED			
19	FC1	N.C.	1 of 4 Fault Code Bits	Not connected
20	FC3	N.C.	1 of 4 Fault Code Bits	Not connected
21	ADC_CLK1-	Command	A/D Converter Clock	
22	ADC_STB1-	Command	A/D Converter Strobe	
23	CURRENTA-	Feedback	Phase A Actual Current Data	Serial digital
24	CURRENTB-	Feedback	Phase B Actual Current Data	Serial digital
25	AENA1-	Command	Amplifier Enable	Low is enable
26	FAULT1-	Feedback	Amplifier Fault	Low is fault
27	PWMATOP1-	Command	Phase A Top CMD	Low is on command
28	PWMABOT1-	Command	Phase A Bottom CMD	Low is on command
29	PWMBTOP1-	Command	Phase B Top CMD	Low is on command
30	PWMBBOT1-	Command	Phase B Bottom CMD	Low is on command
31	PWMCTOP1-	Command	Phase C Top CMD	Low is on command
32	PWMCBOT1-	Command	Phase C Bottom CMD	Low is on command
33	GND	Common	Reference Voltage	
34	+5V	Power	+5V Power	From controller
35	RESERVED			
36	RESERVED			

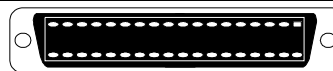
A mini-D 36-pin connector is used for the first digital amplifier command outputs and current feedback. This connector provides the interface to a fully digital amplifier for the first channel. Note that current feedback data must be in serial digital form, already converted from analog in the amplifier.

J16- PWM AMP2 (36-pin Mini-D Connector)				
Pin #	Symbol	Function	Description	Notes
1	FC0	N.C.	1 of 4 Fault Code Bits	Not connected
2	FC2	N.C.	1 of 4 Fault Code Bits	Not connected
3	ADC_CLK2+	Command	A/D Converter Clock	
4	ADC_STB2+	Command	A/D Converter Strobe	
5	CURRENTA+	Feedback	Phase A Actual Current Data	Serial digital
6	CURRENTB+	Feedback	Phase B Actual Current Data	Serial digital
7	AENA2+	Command	Amplifier Enable	High is enable
8	FAULT2+	Feedback	Amplifier Fault	High is fault
9	PWMATOP2+	Command	Phase A Top CMD	High is on command
10	PWMABOT2+	Command	Phase A Bottom CMD	High is on command
11	PWMBTOP2+	Command	Phase B Top CMD	High is on command
12	PWMBBOT2+	Command	Phase B Bottom CMD	High is on command
13	PWMC TOP2+	Command	Phase C Top CMD	High is on command
14	PWMCBOT2+	Command	Phase C Bottom CMD	High is on command
15	GND	Common	Reference Voltage	
16	+5V	Power	+5V Power	From controller
17	RESERVED			
18	RESERVED			
19	FC1	N.C.	1 of 4 Fault Code Bits	Not connected
20	FC3	N.C.	1 of 4 Fault Code Bits	Not connected
21	ADC_CLK2-	Command	A/D Converter Clock	
22	ADC_STB2-	Command	A/D Converter Strobe	
23	CURRENTA-	Feedback	Phase A Actual Current Data	Serial digital
24	CURRENTB-	Feedback	Phase B Actual Current Data	Serial digital
25	AENA2-	Command	Amplifier Enable	Low is enable
26	FAULT2-	Feedback	Amplifier Fault	Low is fault
27	PWMATOP2-	Command	Phase A Top CMD	Low is on command
28	PWMABOT2-	Command	Phase A Bottom CMD	Low is on command
29	PWMBTOP2-	Command	Phase B Top CMD	Low is on command
30	PWMBBOT2-	Command	Phase B Bottom CMD	Low is on command
31	PWMC TOP2-	Command	Phase C Top CMD	Low is on command
32	PWMCBOT2-	Command	Phase C Bottom CMD	Low is on command
33	GND	Common	Reference Voltage	
34	+5V	Power	+5V Power	From controller
35	RESERVED			
36	RESERVED			

A mini-D 36-pin connector is used for second digital amplifier command outputs and current feedback. This connector provides the interface to a fully digital amplifier for the second channel. Note that current feedback data must be in serial digital form, already converted from analog in the amplifier.

J17- PWM AMP3 (36-pin Mini-D Connector)				
Pin #	Symbol	Function	Description	Notes
1	FC0	N.C.	1 of 4 Fault Code Bits	Not connected
2	FC1	N.C.	1 of 4 Fault Code Bits	Not connected
3	ADC_CLK3+	Command	A/D Converter Clock	
4	ADC_STB3+	Command	A/D Converter Strobe	
5	CURRENTA+	Feedback	Phase A Actual Current Data	Serial digital
6	CURRENTB+	Feedback	Phase B Actual Current Data	Serial digital
7	AENA3+	Command	Amplifier Enable	High is enable
8	FAULT3+	Feedback	Amplifier Fault	High is fault
9	PWMATOP3+	Command	Phase A Top CMD	High is on command
10	PWMABOT3+	Command	Phase A Bottom CMD	High is on command
11	PWMBTOP3+	Command	Phase B Top CMD	High is on command
12	PWMBBOT3+	Command	Phase B Bottom CMD	High is on command
13	PWMCTOP3+	Command	Phase C Top CMD	High is on command
14	PWMCBOT3+	Command	Phase C Bottom CMD	High is on command
15	GND	Common	Reference Voltage	
16	+5V	Power	+5V Power	From controller
17	RESERVED			
18	RESERVED			
19	FC1	N.C.	1 of 4 Fault Code Bits	Not connected
20	FC3	N.C.	1 of 4 Fault Code Bits	Not connected
21	ADC_CLK3-	Command	A/D Converter Clock	
22	ADC_STB3-	Command	A/D Converter Strobe	
23	CURRENTA-	Feedback	Phase A Actual Current Data	Serial digital
24	CURRENTB-	Feedback	Phase B Actual Current Data	Serial digital
25	AENA3-	Command	Amplifier Enable	Low is enable
26	FAULT3-	Feedback	Amplifier Fault	Low is fault
27	PWMATOP1-	Command	Phase A Top CMD	Low is on command
28	PWMABOT3-	Command	Phase A Bottom CMD	Low is on command
29	PWMBTOP3-	Command	Phase B Top CMD	Low is on command
30	PWMBBOT3-	Command	Phase B Bottom CMD	Low is on command
31	PWMCTOP3-	Command	Phase C Top CMD	Low is on command
32	PWMCBOT3-	Command	Phase C Bottom CMD	Low is on command
33	GND	Common	Reference Voltage	
34	+5V	Power	+5V Power	From controller
35	RESERVED			
36	RESERVED			

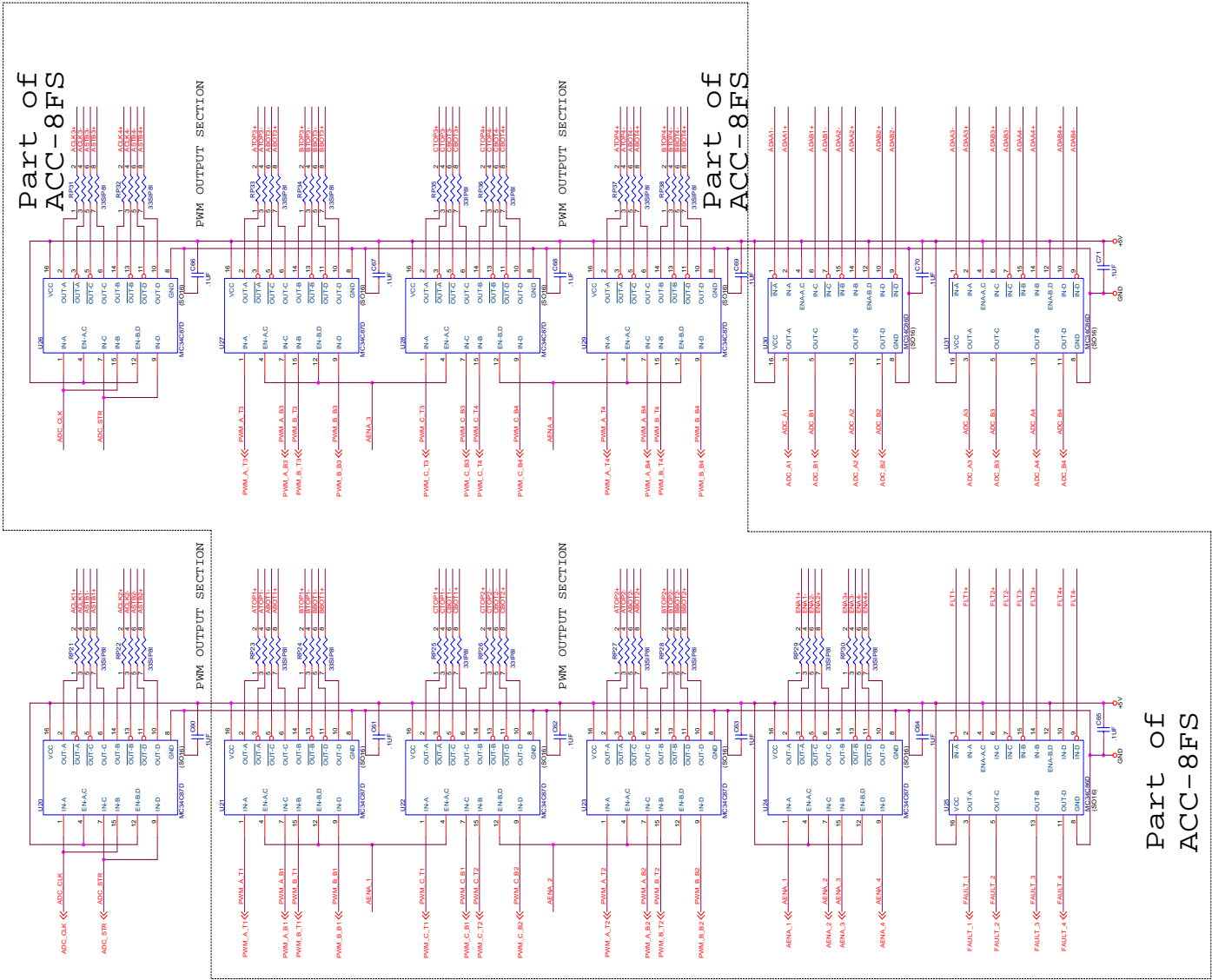
A mini-D 36-pin connector is used for third digital amplifier command outputs and current feedback. This connector provides the interface to a fully digital amplifier for the third channel. Note that current feedback data must be in serial digital form, already converted from analog in the amplifier.

J18- PWM AMP 4 (36-pin Mini-D Connector)

Pin #	Symbol	Function	Description	Notes
1	FC0	N.C.	1 of 4 Fault Code Bits	Not connected
2	FC1	N.C.	1 of 4 Fault Code Bits	Not connected
3	ADC_CLK4+	Command	A/D Converter Clock	
4	ADC_STB4+	Command	A/D Converter Strobe	
5	CURRENTA+	Feedback	Phase A Actual Current Data	Serial digital
6	CURRENTB+	Feedback	Phase B Actual Current Data	Serial digital
7	AENA4+	Command	Amplifier Enable	High is enable
8	FAULT4+	Feedback	Amplifier Fault	High is fault
9	PWMATOP4+	Command	Phase A Top CMD	High is on command
10	PWMABOT4+	Command	Phase A Bottom CMD	High is on command
11	PWMBTOP4+	Command	Phase B Top CMD	High is on command
12	PWMBBOT4+	Command	Phase B Bottom CMD	High is on command
13	PWMC TOP4+	Command	Phase C Top CMD	High is on command
14	PWMCBOT4+	Command	Phase C Bottom CMD	High is on command
15	GND	Common	Reference Voltage	
16	+5V	Power	+5V Power	From controller
17	RESERVED			
18	RESERVED			
19	FC1	N.C.	1 of 4 Fault Code Bits	Not connected
20	FC3	N.C.	1 of 4 Fault Code Bits	Not connected
21	ADC_CLK4-	Command	A/D Converter Clock	
22	ADC_STB4-	Command	A/D Converter Strobe	
23	CURRENTA-	Feedback	Phase A Actual Current Data	Serial digital
24	CURRENTB-	Feedback	Phase B Actual Current Data	Serial digital
25	AENA4-	Command	Amplifier Enable	Low is enable
26	FAULT4-	Feedback	Amplifier Fault	Low is fault
27	PWMATOP4-	Command	Phase A Top CMD	Low is on command
28	PWMABOT4-	Command	Phase A Bottom CMD	Low is on command
29	PWMBTOP4-	Command	Phase B Top CMD	Low is on command
30	PWMBBOT4-	Command	Phase B Bottom CMD	Low is on command
31	PWMC TOP4-	Command	Phase C Top CMD	Low is on command
32	PWMCBOT4-	Command	Phase C Bottom CMD	Low is on command
33	GND	Common	Reference Voltage	
34	+5V	Power	+5V Power	From controller
35	RESERVED			
36	RESERVED			

A mini-D 36-pin connector is used for fourth digital amplifier command outputs and current feedback. This connector provides the interface to a fully digital amplifier for the fourth channel. Note that current feedback data must be in serial digital form, already converted from analog in the amplifier.

SCHEMATICS

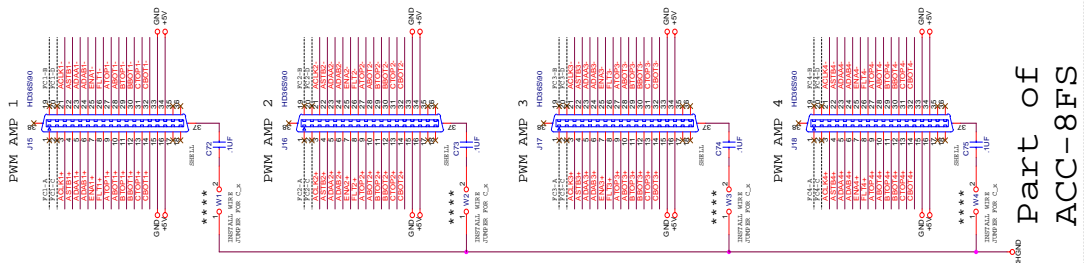


NOTE: 1. Top Section is a standard module design and should not be used for 100V.

Part of
ACC-8FS

Part of
ACC-8FS

Part of
ACC-8FS



Part of
ACC-8FS

Delta Tau Data Systems, Inc.
2554 Alameda
Chattanooga, TN 37411
ACC-8FS & ACC-8TS, DIGITAL I/O SECTION
PMAC2A-PC/104, STACK BREAKOUT BOARD
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