

Hardware Manual =====

The PC

Starting at the user end, the first component in the flair system is an IBM compatible PC. This is only a user interface and doesn't actually do any calculation or store any of the data that one sees on the screen (unless it is stored as a job file onto disk). It has a lot of memory, 16Mb RAM, because the graphics program uses a lot, and it is a very fast PC, 66MHz minimum, because otherwise the graphics is incredibly slow. To connect up the PC follow the PC instruction manual.

The Parallel Port

The PC talks to the rest of the system through the parallel port. Every PC has one parallel port internally (25-way female D-type connector) some have more. If your PC has more than one, you should use port 1. Because the parallel port is often used to connect to a printer, please consult MRMC if only have one port and would like to print.

The RootBox.

The parallel port is connected to the Rootbox using a simple 25-way to 25-way cable. The rootbox contains the main computer in the Flair system. It is called the Root and it does all the calculations and stores all the move data. The Rootbox has connections at the back for many different features such as syncing to a video camera, using mimic handwheels, triggering other equipment and lights, syncing to a film camera, etc. The hand held box is also connected to the Root box. If you use mimic handwheels your rootbox will also contain a mimicboard next to the rootboard.

The Driver box

The rootbox is connected to the rest of the system using a data cable. This cable ends at the driver box which normally contains 1 or 2 axisboards and upto 8 amplifiers (drivers). An axis board has 6 lights at the front and each one can control 4 motors, indicated by the 4 green lights. Each amplifier is controlled by an axisboard and controls one motor. The power for the driver box normally comes from the large heavy power supply.

The Motors

Each motor has a cable running from it, 19-pin QM plug, to the driver box, 25-way D-type. Each motor contains an encoder to tell the axisboard its position and sometimes a brake. Also each motor has up to 3 limit switches associated with it which are connected to the motor.

AXOR MINISPEED TYPE CONFIGURATION NOTES

=====

ON RECEIPT OF A NEW DRIVER FOR THE FLAIR SYSTEM, THE FOLLOWING CONFIGURATIONS ARE DONE:

1) JUMPER SETTINGS.

A NUMBER OF SOLDER BRIDGES EXIST ON TOP OF THE DRIVER WHICH NEED TO BE REMOVED TO PUT THE AMPLIFIER INTO WHAT'S CALLED 'TORQUE MODE' OR 'CURRENT MODE'.

THE FINAL JUMPER SETTING SHOULD LOOK LIKE THIS:

<|> JP1
< > JP2
<|> JP3
<|> JP4
< > JP5
< > JP6
<|> JP7
< > JP8
< > JP9
< > JP10

2) CURRENT LIMITS

A PERSONALITY HEADER (14-PIN COMPONENT HOLDER FOR RESISTORS) EXISTS ON ONE OF THE CIRCUIT BOARDS WHICH CAN BE REMOVED AND SOLDERED ONTO. WITH THIS THE CURRENT LIMITS CAN BE SET ACCORDING TO THE TABLES GIVEN IN THE MINISPEED MANUAL. ALSO, A RESISTOR IS NORMALLY PRESENT BETWEEN PINS 1 AND 14 FOR THE TACHO FEEDBACK. IN THE RIGS SUPPLIED FOR THE FLAIR SYSTEM THERE IS NO TACHO FEEDBACK BUT IF ONE IS USING THIS WITH AN OLDER RIG WHICH STILL HAS THE TACHO WIRED IN, THIS RESISTOR SHOULD BE REMOVED AS IT WILL AFFECT THE TUNING.

TWO CURRENT LIMITS ARE SET, THE RATED (NOMINAL) AND THE PEAK CURRENTS, FOR EXAMPLE TO SET A RATED CURRENT OF 5 AMPS AND A PEAK OF 8 AMPS ON AN 8/16 AMPLIFIER ONE WOULD CONNECT A 2.2K RESISTOR BETWEEN PINS 4 AND 11 AND A 18K BETWEEN PINS 5 AND 10.

NOTE: A 4/8 AMPLIFIER MAY SOMETIMES BE REDUCED TO A 2/4 AMPLIFIER WHERE THE CURRENT LIMITS NEED TO BE VERY LOW, E.G. FOCUS. THIS IS DONE BY MAKING R80, R89 AND R91 ALL 0.22 OHMS. THE 4/8 TABLES STILL APPLY TO THE 2/4 BUT ALL CURRENT RATINGS ARE HALVED.

—

Trigger Box PCB connectors

J2

1 - +12V Fused	1 - Timing Capacitor 1
2 - 555 Timer Output	2 - Timing Capacitor 2
3 - Sync In+	3 - Timing Capacitor 3
4 - Sync In-	4 - Timing Capacitor 4
5 - Ext Sync+	5 - Timing Capacitor 5
6 - Ext Sync-	6 - Timing Capacitor 6
7 - 555 Timer On/Off	7 - GND
8 - GND	8 - Timing Common
9 - Out1+	9 - Timing Common
10 - Out1-	10 - Timing Common
11 - Camera On/Off+	11 - Output LED1 (Cathode)
12 - Camera On/Off-	12 - Variable Resistor
13 - Switch (on/off)	13 - Output LED2
14 - Switch (on/off)	14 - N.C.
15 - Push SW 1 (In2)	15 - Output LED3
16 - Push SW 1 (In2)	16 - Frequency LED
17 - Push SW 2 (In3)	17 - Output LED4
18 - Push SW 2 (In3)	18 - Camera On LED
19 - Push SW 3 (In4)	19 - Output LED5
20 - Push SW 3 (In4)	20 - +12V Fused

-

37-Way D-type on Stepper Axis box
=====

filename:STEPROOT.DOC
Date: 2/97

1 - +5V	20 - n.c.
2 - STEP0	21 - DIR0
3 - STEP1	22 - DIR1
4 - STEP2	23 - DIR2
5 - STEP3	24 - DIR3
6 - STEP4	25 - DIR4
7 - STEP5	26 - DIR5
8 - STEP6	27 - DIR6
9 - STEP7	28 - DIR7
10 - n.c.	29 - n.c.
11 - n.c.	30 - n.c.
12 - n.c.	31 - n.c.
13 - n.c.	32 - n.c.
14 - n.c.	33 - n.c.
15 - n.c.	34 - n.c.
16 - n.c.	35 - n.c.
17 - n.c.	36 - n.c.
18 - n.c.	37 - n.c.
19 - n.c.	

25-Way D-Type (Limit Switches)

=====

(Axis Board #1)	(Axis Board #2)
1 - Limit1 (End1)	14 - Limit1 (End1)
2 - Limit2 (Datum1)	15 - Limit2 (Datum1)
3 - Limit3 (End1)	16 - Limit3 (End1)
4 - Limit4 (End2)	17 - Limit4 (End2)
5 - Limit5 (Datum2)	18 - Limit5 (Datum2)
6 - Limit6 (End2)	19 - Limit6 (End2)
7 - Limit7 (End3)	20 - Limit7 (End3)
8 - Limit8 (Datum3)	21 - Limit8 (Datum3)
9 - Limit9 (End3)	22 - Limit9 (End3)
10 - Limit10 (End4)	23 - Limit10 (End4)
11 - Limit11 (Datum4)	24 - Limit11 (Datum4)
12 - Limit12 (End4)	25 - Limit12 (End4)
13 - GND	

-

Multiplexer/Demultiplexer Pinouts

=====

(Brackets show how they are used in the current Pan sliprings)

16-Way IDC connector

=====

Pin 1 - Limit1 (Pan L2 4KK)	Pin 2 - Limit2 (Tilt L2 4MM)
Pin 3 - Limit3 (Roll L2 4PP)	Pin 4 - Serial Data
Pin 5 - GND	Pin 6 - GND
Pin 7 - +5V	Pin 8 - +5V
Pin 9 - Limit4 (Pan L1 3NN)	Pin 10 - Limit5 (Focus L1 3RR)
Pin 11 - Limit6 (Tilt L1 4LL)	Pin 12 - Limit7 (Zoom L1 3SS)
Pin 13 - Limit8 (Roll L1 3PP)	Pin 14 - Limit9 (Iris L1 3TT)
Pin 15 - Limit10 (Cam L1 4RR)	Pin 16 - Limit11 (FDX L1 4NN)

Guinness Breakout Motherboard

=====

Encoder

1 - A-
2 - A+
3 - B-
4 - B+
5 - ZM-
6 - ZM+
7 - +5V
8 - -5V
9 - GND
10 - GND

Link In

1 - Watchdog-
2 - Watchdog+
3 - Link1In-
4 - Link1In+
5 - Link1Out-
6 - Link1Out+
7 -
8 - GND

Drive

1 - Inhibit/Enable
2 - D/A-
3 - D/A+
4 - GND

Link Out

1 - Watchdog-
2 - Watchdog+
3 - Link2Out-
4 - Link2Out+
5 - Link2In-
6 - Link2In+
7 -
8 - GND

Brake

1 - Brake+
2 - Brake-
3 - GND

Power

1 - GND
2 - GND
3 - GND
4 - +5V
5 - +5V
6 - -5V
7 - +24V
8 - +24V

Limit

1 - Limit1
2 - Limit2
3 - Limit3
4 - GND

G/P Outputs

1 - G/P1+
2 - G/P1-
3 - G/P2+
4 - G/P2-
5 - G/P3+
6 - G/P3-
7 - G/P4+
8 - G/P4-

Root Board connections:

=====

	a	b	c
1	Watchdog-	-----	Watchdog+
2	O/P 5-	-----	Root Link In+
3	O/P 5+	-----	Root Link In-
4	O/P 6-	-----	Root Link Out+
5	O/P 6+	-----	Root Link Out-
6	O/P 7-	-----	HHB Link In+
7	O/P 7+	-----	HHB Link In-
8	O/P 8-	-----	HHB Link Out+
9	O/P 8+	-----	HHB Link Out-
10	O/P 9-	-----	Pipe Out-
11	O/P 9+	-----	Pipe Out+
12	O/P 10-	-----	Pipe In-
13	O/P 10+	-----	Pipe In+
14	O/P 11-	-----	O/P 1-
15	O/P 11+	-----	O/P 1+
16	+5V	-----	O/P 2-
17	+5V	-----	O/P 2+
18	GND	-----	O/P 3-
19	GND	-----	O/P 3+
20	GND	-----	O/P 4-
21	I/P 1+	-----	O/P 4+
22	I/P 1-	-----	Error LED (O/C)
23	I/P 2+	-----	Reset LED (O/C)
24	I/P 2-	-----	Video In
25	I/P 3+	RTC Link Out-	TRAM Link Out-
26	I/P 3-	RTC Link Out+	TRAM Link Out+
27	I/P 4+	RTC Link In-	TRAM Link In-
28	I/P 4-	RTC Link In+	TRAM Link In+
29	I/P 5+	-----	Not Error (O/C)
30	I/P 5-	-----	Reset Out
31	I/P 6+	-----	Emergency Stop-
32	I/P 6-	-----	Emergency Stop+

Axis Board Socket Connections:

=====

	a	b	c
1	Link 3 in-	Watchdog+	Watchdog-
2	Link 3 in+	Link 1 out+	Link 1 out-
3	Link 2 in-	Link 2 out+	Link 2 out-
4	Link 2 in+	Link 3 out+	Link 3 out-
5	Link 1 in-	DAC1-	DAC1+
6	Link 1 in+	DAC3-	DAC3+
7	G/P1 out+	DAC2-	DAC2+
8	G/P1 out-	DAC4-	DAC4+
9	G/P2 out+	Enable 4-	Enable 4+
10	G/P2 out-	Enable 3-	Enable 3+
11	G/P3 out+	Enable 2-	Enable 2+
12	G/P3 out-	Enable 1-	Enable 1+
13	G/P4 out-	Brake 4-	Brake 4+
14	G/P4 out+	Brake 3-	Brake 3+
15	-----	Brake 2-	Brake 2+
16	+5V	Brake 1-	Brake 1+
17	+5V	Enc 4B+	Enc 4B-
18	GND	Enc 3B-	Enc 3B+
19	GND	Enc 4A+	Enc 4A-
20	GND	Enc 3A-	Enc 3A+
21	Step 1-	Enc 2B+	Enc 2B-
22	Dir 1-	Enc 1B-	Enc 1B+
23	Step 2-	Enc 2A+	Enc 2A-
24	Dir 2-	Enc 1A+	Enc 1A-
25	Step 3-	ZM 4+	ZM 4-
26	Dir 3-	ZM 2+	ZM 2-
27	Step 4-	ZM 3+	ZM 3-
28	Dir 4-	ZM 1+	ZM 1-
29	Limit 1- (End1)	Limit 5- (Dtm2)	Limit 9-
30	Limit 2- (Dtm1)	Limit 6- (etc.)	Limit 10-
31	Limit 3- (End1)	Limit 7-	Limit 11-
32	Limit 4- (End2)	Limit 8-	Limit 12-

Note: Standard axis boards have no connection on the Step and Dir pins, while standard Stepper axis boards have no connection on DAC pins. Also the stepper boards have currently (4/97) no encoder inputs.

HAND HELD BOX CONNECTORS

=====

IDC CONNECTOR PINS ON THE BOARDS ARE LABELLED AS FOLLOWS,

e.g. +---+
 |2 |4 |6 |8 |10|
 +---+---+---+---+
 |1 |3 |5 |7 |9 |
 +---+---+---+---+

LCD CONNECTOR J2

- | | |
|---------------------|----------------------------|
| 1 - GND | 9 - DB2 |
| 2 - +5V | 10 - DB3 |
| 3 - CONTRAST (0-5V) | 11 - DB4 |
| 4 - RS | 12 - DB5 |
| 5 - R/W | 13 - DB6 |
| 6 - E | 14 - DB7 |
| 7 - DB0 | 15 - +5V FOR BACKLIGHT LED |
| 8 - DB1 | 16 - GND (VIA 10R) FOR LED |

NOTE: SOME LCDs ONLY HAVE 15 PINS. THIS MEANS GROUND IS CONNECTED INTERNALLY AND THE LCD PCB HAS A CURRENT LIMITING RESISTOR ALREADY MOUNTED, OR SPACE FOR MOUNTING ONE, OR A RESISTOR NEEDS TO BE MOUNTED BETWEEN PINS 1 AND 15 ON THE LCD.

LINK & POWER CONNECTOR J3

- 1 - +5V OUT (TO CONTRAST POT)
- 2 - CONTRAST
- 3 - GND OUT (TO CONTRAST POT)
- 4 -
- 5 - GND
- 6 - +8V TO +12V
- 7 - LINK IN-
- 8 - LINK IN+
- 9 - LINK OUT-
- 10 - LINKOUT+

REGULATOR CONNECTOR J4

- 1 - VOLTS IN
- 2 - VOLTS OUT
- 3 - GND

JOYSTICK CONNECTOR J1

- | | |
|----------|----------|
| 1 - GND | 13 - GND |
| 2 - IN1 | 14 - IN5 |
| 3 - +5V | 15 - +5V |
| 4 - GND | 16 - GND |
| 5 - IN2 | 17 - IN6 |
| 6 - +5V | 18 - +5V |
| 7 - GND | 19 - GND |
| 8 - IN3 | 20 - IN7 |
| 9 - +5V | 21 - +5V |
| 10 - GND | 22 - GND |
| 11 - IN4 | 23 - IN8 |
| 12 - +5V | 24 - +5V |

KEYBOARD CONNECTOR J5

- 1 - COLUMN IN 1
- 2 - ROW OUT 1
- 3 - COLUMN IN 2
- 4 - ROW OUT 2
- 5 - COLUMN IN 3
- 6 - ROW OUT 3
- 7 - COLUMN IN 4
- 8 - ROW OUT 4
- 9 - COLUMN IN 5
- 10 - ROW OUT 5
- 11 - COLUMN IN 6
- 12 - ROW OUT 6
- 13 - COLUMN IN 7
- 14 - ROW OUT 7
- 15 - COLUMN IN 8
- 16 - ROW OUT 8

MIMIC CONNECTORS

=====

25-WAY D-TYPE

1 - 1A+	14 - 1A-	
2 - 1B+	15 - 1B-	
3 - 2A+	16 - 2A-	FEMALE ON ROOT BOX
4 - 2B+	17 - 2B-	MALE IN MIMIC BOX
5 - 3A+	18 - 3A-	
6 - 3B+	19 - 3B-	
7 - 4A+	20 - 4A-	
8 - 4B+	21 - 4B-	
9 -	22 -	
10 -	23 - GND (SHIELD FOR 1 & 2)	
11 -	24 - GND (SHIELD FOR 3 & 4)	
12 -	25 - 0V	
13 - +12V		

9-WAY D-TYPE

1 A+	6 A-	FEMALE ON MIMIC BOX
2 B+	7 B-	MALE ON ENCODER
3 Z+	8 Z-	
4 SHIELD/-5V	9 0V	
5 +5V		

19-WAY QM PLUG (OBSOLETE)

A - 1A+	J - 1A-
B - 1B+	K - 1B-
C - 2A+	L - 2A-
D - 2B+	M - 2B-
E - 3A+	N - 3A-
F - 3B+	P - 3B-
G - 4A+	R - 4A-
H - 4B+	S - 4B-
T - +12V	
U - 0V	
V - GND (SHIELD)	

8-WAY QM PLUG (OBSOLETE)

A - 1A+
B - 1B+
C - 2A+
D - 2B+
E - +5V
F - 0V
G - -5V

TRIGGER INPUT & OUTPUT CONNECTOR (37-WAY D-TYPE)

(FEMALE ON ROOT BOX)

1 OUT1+	20 OUT1-	(RESERVED:CAMERA CONTROL)
2 OUT2+	21 OUT2-	
3 OUT3+	22 OUT3-	
4 OUT4+	23 OUT4-	
5 OUT5+	24 OUT5-	
6 OUT6+	25 OUT6-	
7 OUT7+	26 OUT7-	
8 OUT8+	27 OUT8-	
9 OUT9+	28 OUT9-	
10 OUT10+	29 OUT10-	
11 OUT11+	30 OUT11-	
12 0V	31 0V	
13 IN1+	32 IN1-	(RESERVED:SYNC INPUT)
14 IN2+	33 IN2-	
15 IN3+	34 IN3-	
16 IN4+	35 IN4-	(NOT USED)
17 IN5+	36 IN5-	(NOT USED)
18 IN6+	37 IN6-	(NOT USED)
19 +12V		

ROOT BOX CONNECTORS

=====

POWER (SMALL 15-WAY D-TYPE SIZE)

(LARGE 25-WAY D-TYPE SIZE)

(MALE ON ROOT BOX)

1A - +8V TO +12V
3A - GND
1 - E-STOP (PIN 5)
2 - E-STOP (PIN 1)
5 - GND (SHIELD)

1A - GND
5A - +8V TO +12V
2A - GND (SHIELD)

E-STOP 9-WAY

(FEMALE)

NOTE: A 15-WAY E-STOP EXISTED BRIEFLY AND IS NOW OBSOLETE.

1 - RIG E-STOP	6 - MODEL MOVER E-STOP
2 - +12V	7 -
3 - OVERRIDE SWITCH	8 -
4 - GND	9 - MODEL MOVER E-STOP
5 - RIG E-STOP	

VTR INTERFACE 9-WAY D-TYPE

(FEMALE ON ROOT BOX)

NOTE: THE POLARITY OF THESE COULD BE WRONG! DEPENDING ON VTR.

1 SPARE	6 COMMON/GND
2 RECEIVE -	7 RECEIVE +
3 TRANSMIT +	8 TRANSMIT -
4 SPARE	9 SPARE
5 SPARE	

DRIVER DATALINK

(FEMALE ON ROOT BOX)

1 - LINK OUT+	6 - LINK OUT- (PIPE OUT)
2 - LINK IN+	7 - LINK IN- (PIPE IN)
3 - WATCHDOG+	8 - WATCHDOG-
4 - RIG E-STOP	9 - RIG E-STOP
5 - SHIELD (GND)	10 - SHIELD (GND)

HAND HELD BOX CONNECTOR

(FEMALE ON ROOT BOX)

A1 - GND	1 - LINK OUT+	6 - LINK OUT-
A3 - +8V TO +12V	2 - LINK IN+	7 - LINK IN-
	4 - E-STOP	9 - E-STOP

AXIS MOTHERBOARD (CONT.)
=====

TAKE-UPS

- 1 - COMMON RELAY 3
2 - N.O. RELAY 3
3 - COMMON RELAY 4
4 - N.C. RELAY 4
5 - N.O. RELAY 4
6 - AXIS 4 DAC+

SPARE LINK

- 1 - LINKOUT-
2 - LINKOUT+
3 - LINKIN+
4 - LINKIN-
5 - GND (RESET)
6 - (no connection)
7 - +5V
8 - GND

G/P OUTPUTS

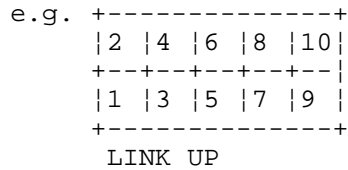
- 1 - EXTERNAL VOLTS IN 1
2 - N.C. OUTPUT 1
3 - EXTERNAL VOLTS IN 2
4 - N.C. OUTPUT 2
5 - EXTERNAL VOLTS IN 3
6 - N.C. OUTPUT 3
7 - EXTERNAL VOLTS IN 4
8 - N.C. OUTPUT 4
9 -
ETC.

- 14 - N.O. OUTPUT 1
15 - GND (INTERNAL 24V RETURN)
16 - N.O. OUTPUT 2
17 - GND (INTERNAL 24V RETURN)
18 - N.O. OUTPUT 3
19 - GND (INTERNAL 24V RETURN)
20 - N.O. OUTPUT 4
21 - GND (INTERNAL 24V RETURN)
22 -

AXIS MOTHERBOARD CONNECTIONS
 =====

NOTE:

RIBBON CONNECTOR PINS ON THE BOARDS ARE LABELLED AS FOLLOWS,



UP LINK

- 1 - WATCHDOG-
- 2 - WATCHDOG+
- 3 - LINK1IN-
- 4 - LINK1IN+
- 5 - LINK1OUT-
- 6 - LINK1OUT+

AXIS DOWN

- WATCHDOG-
- WATCHDOG+
- LINK2OUT-
- LINK2OUT+
- LINK2IN-
- LINK2IN+

AXIS (number)

- 1 - GND (shield)
- 2 - GND (shield)
- 3 - D2A OUTPUT-
- 4 - D2A OUTPUT+
- 5 - BRAKE
- 6 - ENABLE
- 7 - LIMIT3
- 8 - (no connection) ISSUE 4 NOW HAS TACHO SIGNAL
- 9 - LIMIT1
- 10 - LIMIT2
- 11 - ZM-
- 12 - ZM+
- 13 - B-
- 15 - A-
- 16 - A+

THE JUMPERS NEXT TO THE RELAYS SWITCH BETWEEN THE RELAYS SWITCHING THE INTERNAL 24V OR SWITCHING AN EXTERNALLY SUPPLIED VOLTAGE (FROM THE G/P OUTPUT D-TYPE CONNECTOR).

TACHO

- 1 - TACHO AXIS1
- 2 - GND
- 3 - TACHO AXIS1
- 2 - GND
- 5 - TACHO AXIS1
- 2 - GND
- 7 - TACHO AXIS1
- 2 - GND
- 9 - N.C.
- 10 - N.C.

D-TYPE CONNECTORS
 POWER

- 1 - GND
- 2 - GND
- 3 - +24V SWITCHED (ENABLES)
- 4 - +24V UNSWITCHED
- 5 - +24V UNSWITCHED

- 6 - +5V
- 7 - +5V
- 8 -
- 9 -

DRIVER MOTHERBOARD CONNECTIONS

=====

25-WAY D-TYPE TO MOTOR

1	A-	14	A+
2	B-	15	B+
3	Z-	16	Z+
4	ENC GND & SCREEN	17	+5V
5	-5V	18	LIMITS RETURN (GND)
6	LIMIT1 (END)	19	LIMIT2 (DATUM)
7	LIMIT3 (END)	20	BRAKE RETURN
8	BRAKE	21	TACHO SCREEN (GND)
9	TACHO+	22	TACHO- (GND)
10	MOTOR SCREEN (GND)	23	MOTOR-
11	MOTOR+	24	MOTOR-
12	MOTOR+	25	MOTOR-
13	MOTOR+		

15-WAY D-TYPE FOR POWER

1	MOTOR POWER-	9	NO CONNECTION
2	MOTOR POWER-	10	+5V
3	MOTOR POWER-	11	+24V (BRAKE)
4	MOTOR POWER-	12	GND
5	MOTOR POWER+	13	GND
6	MOTOR POWER+	14	-5V
7	MOTOR POWER+	15	MOTOR SCREEN (GND)
8	MOTOR POWER+		

NOTE:

RIBBON CONNECTOR PINS ON THE BOARDS ARE LABELLED AS FOLLOWS,

e.g. +-----+
| 2 | 4 | 6 | 8 | 10 |
+---+---+---+---+
| 1 | 3 | 5 | 7 | 9 |
+-----+

J2

--

- 1 - GND (shield)
- 2 - GND (shield)
- 3 - D2A OUTPUT-
- 4 - D2A OUTPUT+
- 5 - BRAKE
- 6 - ENABLE
- 7 - LIMIT3
- 8 - (no connection) ISSUE 2 WILL NOW CONTAIN TACHO SIGNAL
- 9 - LIMIT1
- 10 - LIMIT2
- 11 - ZM-
- 12 - ZM+
- 13 - B-
- 14 - B+
- 15 - A-
- 16 - A+

MOTOR QM PLUG/SOCKET CONNECTIONS

1/8/94

=====

A ENC A-
B MOTOR+
C MOTOR-
D ENC B-
E MOTOR SCREEN (GND)
F LIMIT1 (END)
G LIMIT2 (DATUM)
H LIMIT3 (END)
J ENC GND
K ENC A+
L ENC B+
M ENC Z+
N ENC Z-
P +5V
R -5V
S BRAKE
T BRAKE RETURN
U SCREEN (GND)
V LIMIT RETURN

NOTE: THIS DESCRIBES THE QM PINOUT FOR
THE CURRENT FLAIR SYSTEM. ON THE MRC4
A AND D ARE TACHO AND THE LIMITS ARE WIRED
TO E, F AND G.

Electronics Hardware Notes.

Last Updated: 28/8/97