Showbiz Plasma

TB2 - Step and direction

Pin - TB2	Signal	Connection	Remarks
TB2- 1	GND	No connection	Joint 0 - X axis
TB2- 2	STEP0-	Brown	
TB2- 3	STEP0+	White	
TB2- 4	DIR0-	Green	
TB2- 5	DIR0+	Blue	
TB2- 6	+5VP	No connection	
TB2- 7	GND	No connection	Joint 1 - Y
TB2- 8	STEP1-	Brown	
TB2- 9	STEP1+	White	
TB2- 10	DIR1-	Green	
TB2- 11	DIR1+	Blue	
TB2- 12	+5VP	No connection	
TB2- 13	GND	No connection	Joint 2 - Y
TB2- 14	STEP2-	Brown	
TB2- 15	STEP2+	White	
TB2- 16	DIR2-	Green	
TB2- 17	DIR2+	Blue	
TB2- 18	+5VP	No connection	
TB2- 19	GND	No connection	Joint 3 - Z axis
TB2- 20	STEP3-	Brown	
TB2- 21	STEP3+	White	
TB2- 22	DIR3-	Green	
TB2- 23	DIR3+	Blue	
TB2- 24	+5VP	No connection	

Pin - TB3	Signal	Connection	Remarks
TB3-1	GND		Joint 4 - A - rotary axis
TB3-2	STEP3-	Brown	
TB3-3	STEP3+	White	
TB3-4	DIR3-	Green	
TB3-5	DIR3+	Blue	
TB3-6	+5VP	THCAD +5 V (Green)	Encoder 0 THCAD-10 torch voltage
TB3-7	A-FOUT+	THCAD FOUT+ (Encoder A+) (Blue)	
TB3-8	A-FOUT-	THCAD FOUT- (Encoder A-) White	
TB3-9		THCAD GND (Black)	
TB3-10	B-FOUT+	THCAD FOUT+ (Encoder B+) (Blue)	Encoder 1 THCAD-5 Ohmic sensing
TB3-11	B-FOUT-	THCAD FOUT- (Encoder B-) (White)	
TB3-12	+5 V	THCAD +5 V (Green)	
TB3-13	IDX+	NC	Encoder 2 (not used)
TB3-14	IDX-	NC	
TB3-15	GND	THCAD GND (Black)	THCAD-5
TB3-16	RS-422 RX+		
TB3-17	RS-422 RX		
TB3-18	RS-422 TX+		
TB3-19	RS-422 TX		
TB3-20	+5v		
TB3-21	Unreg +V		
TB3-22	Unreg +V		
TB3-23	GND		
TB3-24	GND		

TB4 - Spindle Connector

Pin - TB4	Signal	Connection	Remarks
TB4- 1			
TB4- 2			
TB4- 3			
TB4- 4			
TB4- 5	SPINDLE ENA+	Torch On	
TB4- 6	SPINDLE ENA-	Torch On	
TB4- 7			
TB4- 8			

7i76e Inputs

Connector	Input	Signal
TB6-1	00	HMI Run/Step (white)
TB6-2	01	Pendant Function minus - (Blue)
TB6-3	02	Pendant Function plus + (Blue)
TB6-4	03	Pendant Function tilde ~ (Blue)
TB6-5	04	Estop emc-enable-in
TB6-6	05	Home-0 (X)
TB6-7	06	Min-Limit-0 (X)
TB6-8	07	Max-Limit-0 (X)
TB6-9	08	Max-Limit Y2
TB6-10	09	Z-Home/min LImit (shared)
TB6-11	10	Float Switch
TB6-12	11	Pendant Scale Select 0 (Pendant Scale X1 - Brown)

TB6-13	12	Pendant Scale Select 1 (Pendant Scale X10 - Brown)
TB6-14	13	Pendant Jog Axis Select 0 (pendant X - Blue)
TB6-15	14	Pendant Jog Axis Select 1 (Pendant Y - Blue)
TB6-16	15	Pendant Jog Axis Select 2 (Pendant Z - Blue)

Connector	**Input**	**Signal**
TB5-1	16	Pendant MPG Jog Wheel A+ (white)
TB5-2	17	Pendant MPG Jog Wheel B+ (white)
TB5-3	18	Pendant yellow enable button (blue)
TB5-4	19	HMI Pause Resume (white)
TB5-5	20	Breakaway
TB5-6	21	Arc-Ok 100R 10W HS10 pulldown resistor to Gnd
TB5-7	22	Drive Fault-0 (White)
TB5-8	23	Drive Fault-1 (White)
TB5-9	24	Drive Fault-2 (White)
TB5-10	25	Drive Fault-3 (White)
TB5-11	26	Drive Fault-4 (White)
TB5-12	27	Y1 - Home
TB5-13	28	Y1 - Min Limit
TB5-14	29	Y2 Max Limit
TB5-15	30	Y2 Home
TB5-16	31	Y2 Min Limit

7i76e Outputs

Connector	**Output**	**Signal**
TB6-17	00	HMI - Blue light operational (Brown)
TB6-18	01	Boost-0 (Brown)
TB6-19	02	Boost-1 (Brown)
TB6-20	03	Boost-2 (Brown)

TB6-21	04	Boost-3 (Brown)
TB6-22	05	Boost-5 (Brown)
TB6-23	06	Laser on
TB6-24	07	Engraver
TB5-17	08	
TB5-18	09	
TB5-19	10	
TB5-20	11	
TB5-21	12	
TB5-22	13	
TB5-23	14	
TB5-24	15	

THCAD Torch Height Control

THCAD Calibration data:
THCAD Divider setting: 32
Frequency at 0 volts: 122900 (1/32: 3840.625)
Frequency at full scale: 925700 (1/32: 28928)

Connector	**Pin**	**Signal**
TB3-06	06	THCAD +5 V
TB3-06	07	THCAD FOUT+ (Encoder A+)
TB3-06	08	THCAD FOUT- (Encoder A-)
TB3-06	09	THCAD GND
THC SHIELD	N/A	THC Shield - Leave disconnected or Connect to Frame Ground Earth point
Plasma Pin 6	THC IN+	20:1 divided voltage +
Plasma Pin 4	THC IN-	20:1 divided voltage -

THCAD-5 Ohmic Sensing

THCAD Calibration data:

THCAD Divider setting: 32
Frequency at 0 volts: 136900 (1/32: 4278.125)
Frequency at full scale: 966100 (1/32: 30190.625)

REQUIRES 390K SCALING RESISTOR

Signal	Signal
+5 V	TB2-12
FOUT+	TB2-10
FOUT-	TB2-11
GND	TB2-15
SHIELD	THC Shield Connect to Frame Ground Earth point
IN+	390k Resistor => +24V (23)
IN-	To Torch Ohmic Clip

Power Supply -24V to Table Star Ground

Hypertherm CNC Port

Set Divider board to 20:1
Frequency at 0 volts: 124000 (1/32 0v = 3875
Frequency at 10 volts: 945400 (1/32 10v = 29543.75)
Do not connect cable shield at this end

Pin	Signal		
1	NC		
2	NC		
3	Torch on	Green	TB4-5 (reverse if required)
4	Torch On	Black	TB4-6
5	Divided Voltage -	Black	THCAD-10 IN -
6	Divided Voltage +	White	THCAD-10 IN +
7	NC		
8	NC		
9	NC		
10	Arc OK	Red	FIeld Power +24
11	Ground	Yellow	
12	Arc Ok	Black	TB5-6 with pulldown to GND

Stepper wiring - NEMA 23's

Signal	**Stepper Wire Colour**	**Cable Wire Colour**
A+	Black	Yellow
A-	Green	Green
B+	Red	Red
B-	Blue	Blue

Stepper panel mount 5 pin socket (from rear)

Pin	**Cable Wire Colour**
Left bottom	Blue
Left top	Red

Centre	Shield
Right top	Green
Right Bottom	Yellow

Lam Technologies Drive

Pin	Signal	Connection	Remarks
1	STEP+		White
2	STEP-		Brown
3	DIRECTION+		Green
4	DIRECTION-		Blue
5	ENABLE+	No connection	Not required. Estop drops power to drives
6	ENABLE-	No connection	
7	BOOST+	OUTPUT	Brown
7	BOOST-	-24V	Black
9	FAULT+	+24V	Red
10	FAULT-	INPUT	White

Stepper Cable 5 pin plug (from rear)

Pin	Cable Wire Colour
Left bottom	Yellow; Blue & White
Left top	Green; Black & Orange
Centre	Shield
Right top	Red; Red & Yellow
Right Bottom	Blue;Green & Brown

Gantry Sensors

DB9 Pin	Signal	Gantry Sensor	7i76e Input
1	CD	X Home (blue)	Input-05 TB6-6
2	RXD	X Max Limit (Green)	Input-06 TB6-7
3	TXD	X Min Limit (White)	Input-07 TB6-8
4	DTR	Breakaway (Brown)	Input-20 TB5-5
5	GND	-24V (Black)	Bus Bar -
6	DSR	Z home/min Limit (shared) (Brown)	Input-14 - TB6-15
7	RTS	Float (White)	Input-15 TB6-16
8	CTS	Laser on (Green)	Output-08 TB6-23
9	RI	24 Volt + (Red)	Bus Bar +

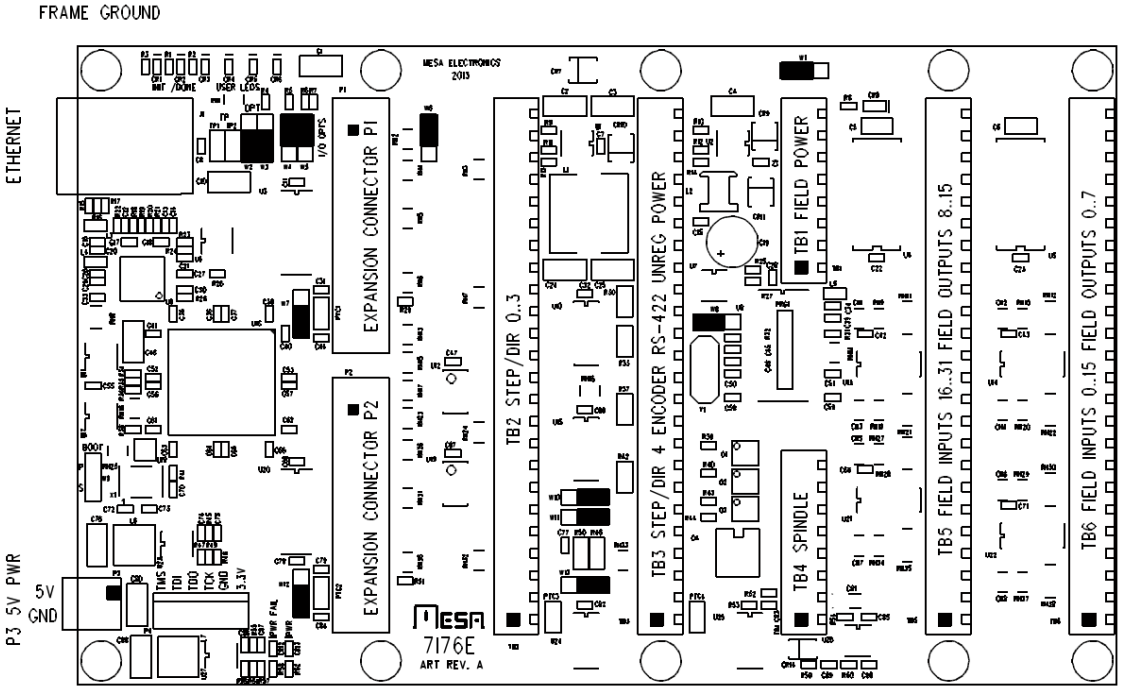
Table Sensors

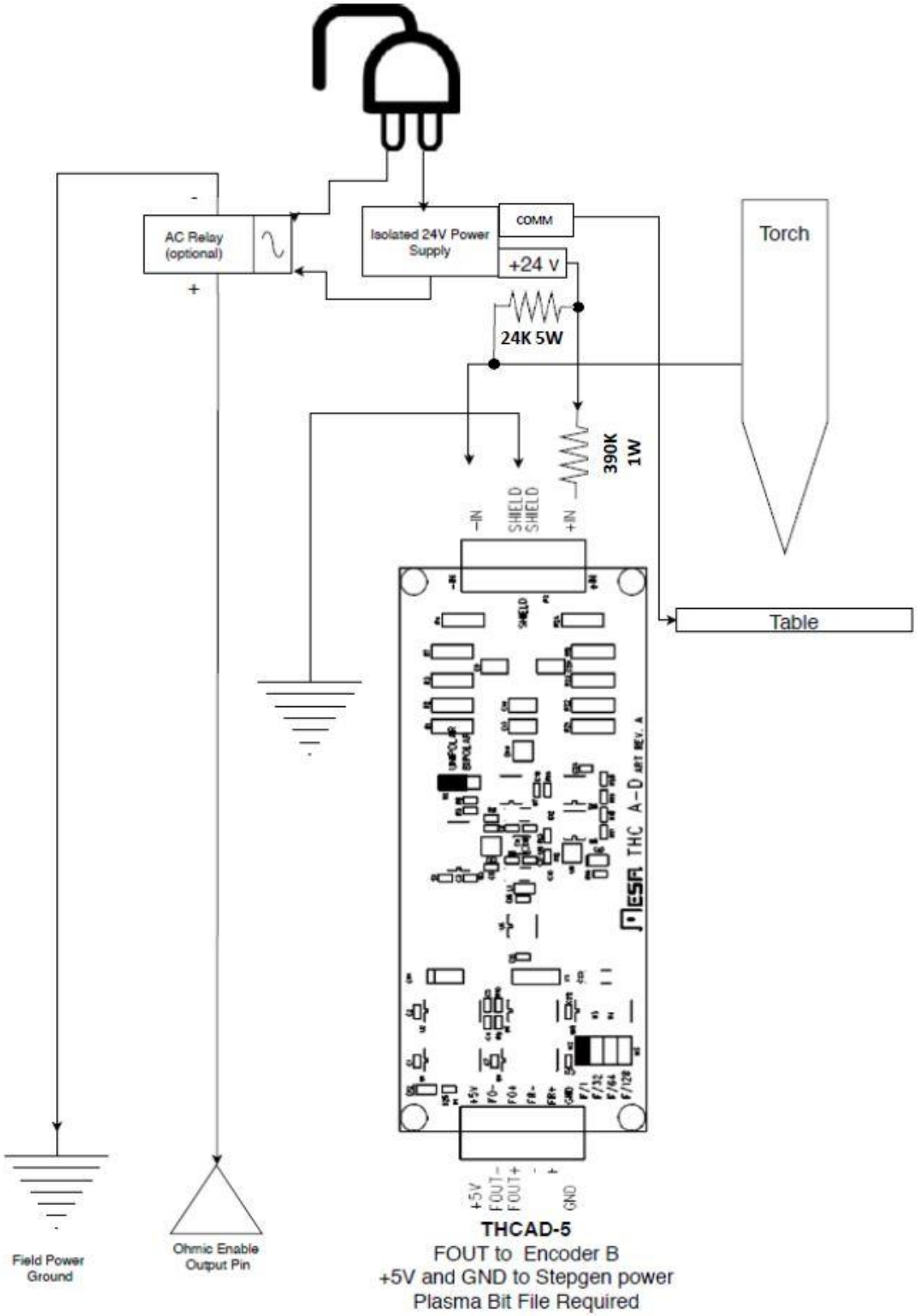
DB9 Pin	Signal	Gantry Sensor	7i76e Input
1	CD	Y - Home (Blue)	TB5-12 Input 27
2	RXD	Y - Min Limit (Green)	TB5-13 Input 28
3	TXD	Y- Max Limit (White)	TB5-14 Input 29
4	DTR	Y1 - Home (Brown)	TB5-15 Input 30
5	GND	24 Volt - (Black)	Bus Bar -
6	DSR	Y1 Min Limit (Brown)	TB5-16 Input 31
7	RTS	X1 Max Limit (Green)	TB6-9 Input 10
8	CTS	NC	NC
9	RI	24 Volt + (Red)	Bus Bar +

MPG Encoder Inputs

Connector	Input	Signal
TB1	1	Field Power ground, must tie to TB3.23 5 volt GND

ENCODER 0		
TB2	1	MPG X axis GND (-5v) - Blue
TB2	6	MPG X axis +5v - Red
TB3	16	MPG X axis A - Yellow
TB3	17	MPG X axis B - Green
ENCODER 1		
TB2	7	MPG Y axis GND (-5v) - Blue
TB2	12	MPG Y axis +5v - Red
TB3	18	MPG Y axis A - Yellow
TB3	19	MPG Y axis B - Green


FRAME GROUND
ETHERNET
P3 5V PWR
5V
GND
EXPANSION CONNECTOR P1
EXPANSION CONNECTOR P2
TB2 STEP/DIR 0..3
TB3 STEP/DIR 4 ENCODER RS-422 UNREG POWER
TB1 FIELD POWER
TB4 SPINDLE
TB5 FIELD INPUTS 16..31 FIELD OUTPUTS 8..15
TB6 FIELD INPUTS 0..15 FIELD OUTPUTS 0..7
MESA ELECTRONICS
2015
7I76E
ART REV. A

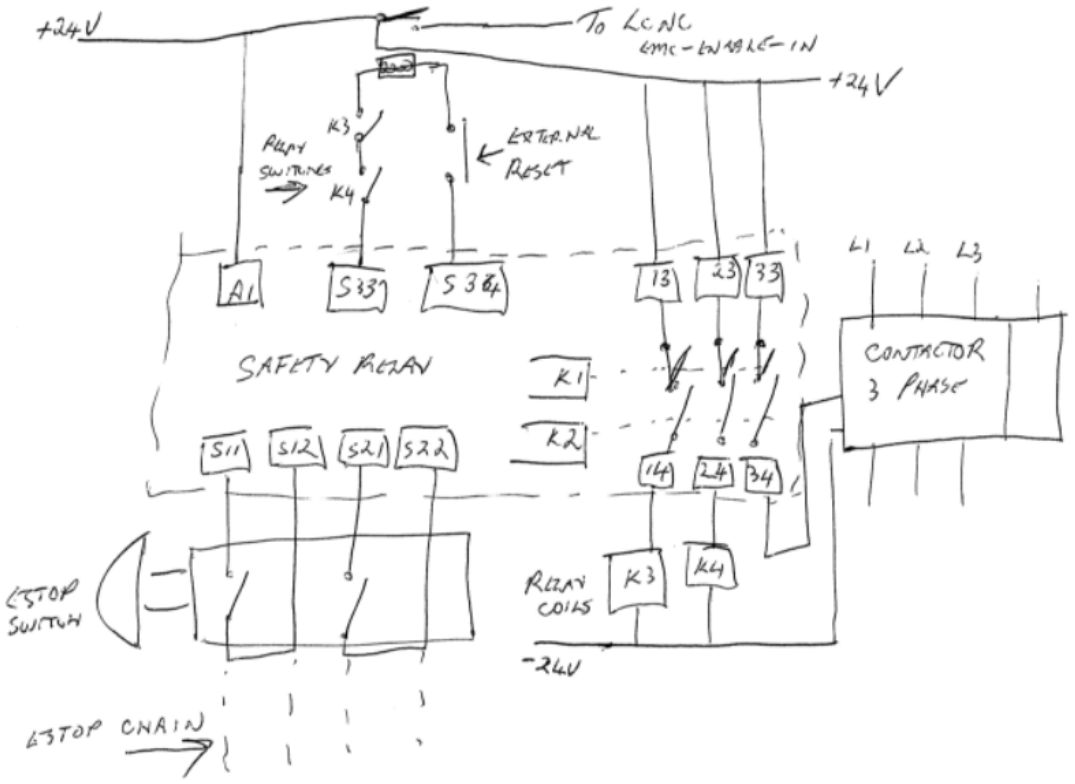


THCAD-5

FOUT to Encoder B

+5V and GND to Stepgen power

Plasma Bit File Required


+24V
To LcNC
+24V
K3
K4
RELAY SWITCHES
EXTERNAL RESET
A1
S33
S34
13
23
33
L1
L2
L3
SAFETY RELAY
K1
K2
CONTACTOR 3 PHASE
S11
S12
S21
S22
14
24
34
ESTOP SWITCH
RELAY COILS
K3
K4
-24V
ESTOP CHAIN