TROUBLESHOOTING THE MC2 CARD

The purpose of this Tech Note is to provide the experienced OmniTurn Service person with the tools necessary for effective trouble shooting of the MC2 CCA. The following tables describe the Name and Function of all the connector pins on the MC2, and the "perimeter" ICs which provide the interface between the card and the world.

A logic probe or DMM, a few common ICs (listed below), and the information on these tables will enable an experienced technician to quickly determine if a fault is on the card or elsewhere in the control.

To troubleshoot outputs, such as M03, execute the function and monitor the IC output. If the signal **is** present at the IC output, the problem is **not** on the MC2. If the signal is **not** present at the IC output, check the IC input. If the signal is present at the IC input, replace the IC. If the signal is not present at the IC input, replace the MC2.

To troubleshoot inputs, such as Motion Stop, press the button and monitor the IC input. If the signal is **not** present at the IC input, the problem is **not** on the MC2. If the signal is present at the IC input, check the IC output. If the signal is not present at the IC output, replace the IC. If the signal is present at the IC output replace the MC2.

Stock (and carry) these ICs:
HCPL2630 Opto Isolator
PC817 Opto Isolator
ULN2803A Driver
75452 Nand Gate
LM324 Op Amp

MC2 CCA CONNECTOR PIN OUTS

P2 (10 PIN HEADER FROM SPINDLE ENCODER)

PIN	NAME	DESCRIPTION	RefDes (input)	RefDes (output)	IC Type
1		No Connection			
2		No Connection			
3		No Connection			
4		No Connection			
5	SERR	SPINDLE ANALOG(out, to Inverter)	------	U19-8	LM324
6	SM	SPINDLE ENCODER MARKER(in)	U7-3	U7-6	HCPL2630
7	SB	SPINDLE ENCODER OUTPUT B(in)	U7-2	U7-7	HCPL2630
8	SA	SPINDLE ENCODER OUTPUT A(in)	U5-3	U5-6	HCPL2630
9	GND	COMMON			
10	E5V	5VDC AFTER INDUCTOR			

MC2 CCA CONNECTOR PIN OUTS (cont)

P1 (37 PIN CONNECTOR): SORT BY DESCRIPTION

PIN	NAME	DESCRIPTION	RefDes (input)	RefDes (output)	IC Type
12	M12	12V (THIS IS **NOT** THE M-FUNCTION)			
1	E5V	5VDC AFTER INDUCTOR			
20	E5V	5VDC AFTER INDUCTOR			
18	GND	COMMON			
36	GND	COMMON			
24	GND	COMMON			
37	GND	COMMON			
5	GND	COMMON			
19	CRDY	CONTROL READY (out, to Servos PB)	U41-1,2	U41-3	SN75452BP
33	OUT2	CYCLE START LAMP(out)	U17-4	U17-15	ULN2803A
8	IN0	CYCLE START (in)	U15-8	U15-10	PC817
30	IN7	INHIBIT (in)	U16-2	U16-6	PC817
10	IN4	JOG-X (in)	U15-4	U15-14	PC817
29	IN5	JOG+Z (in)	U16-4	U16-14	PC817
28	IN3	JOG+X (in)	U16-6	U16-12	PC817
11	IN6	JOX-Z (in)	U15-2	U15-16	PC817
32	OUT0	M03 (out)	U17-6	U17-13	ULN2803A
15	OUT4	M04 (out)	U17-3	U17-16	ULN2803A
14	OUT1	M08 (out)	U17-5	U17-14	ULN2803A
34	OUT5	M13 (out)	U17-2	U17-17	ULN2803A
31	OUT7	M12 (out)	U17-8	U17-11	ULN2803A
16	OUT6	M25 (out)	U17-1	U17-18	ULN2803A
27	IN1	MOTION STOP (in)	U16-8	U16-10	PC817
13	OUT3	MOTION STOP LAMP (out)	U17-7	U17-12	ULN2803A
9	IN2	SERVOS ON (in)	U15-6	U15-12	PC817
3	XB	X AXIS ENCODER B (in)	U4-3	U4-6	HCPL2630
2	XA	X AXIS ENCODER A (in)	U5-2	U5-7	HCPL2630
17	XERR	X AXIS ANALOG TO SERVO(out)	U19-1	---------	LM324
4	XM	X AXIS ENCODER MARKER (in)	U3-3	U3-6	HCPL2630
7	XHS2	X AXIS HOME SWITCH (not used)			
26	YHS2	Y AXIS HOME SWITCH (not used)			
25	YHS1	Y AXIS HOME SWITCH (not used)			
23	YM	Z AXIS ENCODER MARKER (in)	U3-2	U3-7	HCPL2630
35	YERR	Z AXIS ANALOG TO SERVO(out)	---------	U19-7	LM324
22	YB	Z AXIS ENCODER OUTPUT B(in)	U6-3	U6-6	HCPL2630
21	YA	Z AXIS ENCODER OUTPUT A(in)	U6-2	U6-7	HCPL2630

MC2 CCA CONNECTOR PIN OUTS (cont)

P1 (37 PIN CONNECTOR): SORT BY PIN NUMBER

PIN	NAME	DESCRIPTION	RefDes (input)	RefDes (output)	IC Type
1	E5V	5VDC AFTER INDUCTOR			
2	XA	X AXIS ENCODER A (in)	U5-2	U5-7	HCPL2630
3	XB	X AXIS ENCODER B (in)	U4-3	U4-6	HCPL2630
4	SM	X AXIS ENCODER MARKER(in)	U3-3	U3-6	HCPL2630
5	GND	COMMON			
6	XHS1	X AXIS HOME SWITCH (not used)			
7	XHS2	X AXIS HOME SWITCH (not used)			
8	IN0	CYCLE START (in)	U15-8	U15-10	PC817
9	IN2	SERVOS ON (in)	U15-6	U15-12	PC817
10	IN4	JOG-X (in)	U15-4	U15-14	PC817
11	IN6	JOX-Z (in)	U15-2	U15-16	PC817
12	M12	12V (THIS IS **NOT** THE M-FUNCTION)			
13	OUT3	MOTION STOP LAMP (out)	U17-7	U17-12	ULN2803A
14	OUT1	M08 (out)	U17-5	U17-14	ULN2803A
15	OUT4	M04 (out)	U17-3	U17-16	ULN2803A
16	OUT6	M25 (out)	U17-1	U17-18	ULN2803A
17	XERR	X AXIS ANALOG TO SERVO(out)	U19-1	----------	LM324
18	GND	COMMON			
19	CRDY	CONTROL READY(out, to Servos PB)	U41-1,2	U41-3	75452
20	E5V	5VDC AFTER INDUCTOR			
21	YA	Z AXIS ENCODER OUTPUT A (in)	U6-2	U6-7	HCPL2630
22	YB	Z AXIS ENCODER OUTPUT B (in)	U6-3	U6-6	HCPL2630
23	YM	Z AXIS ENCODER MARKER (in)	U3-2 U3-7		HCPL2630
24	GND	COMMON			
25	YHS1	Y AXIS HOME SWITCH (not used)			
26	YHS2	Y AXIS HOME SWITCH (not used)			
27	IN1	MOTION STOP (in)	U16-8	U16-10	PC817
28	IN3	JOG+X (in)	U16-6	U16-12	PC817
29	IN5	JOG+Z (in)	U16-4	U16-14	PC817
30	IN7	INHIBIT (in)	U16-2	U16-6	PC817
31	OUT7	M13 (out)	U17-8	U17-11	ULN2803A
32	OUT0	M03 (out)	U17-6	U17-13	ULN2803A
33	OUT2	CYCLE START LANP (out)	U17-4	U17-15	ULN2803A
34	OUT5	M12 (out)	U17-2	U17-17	ULN2803A
35	YERR	Z AXIS ANALOG TO SERVO (out)	--------	U19-7	LM324
36	GND	COMMON			
37	GND	COMMON			