STEP & DIRECTION DB37S

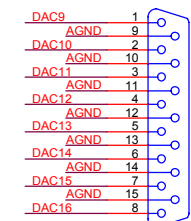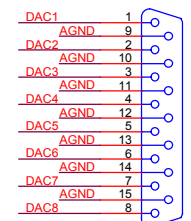| Pin	Signal	Pin	Signal
1	GND	20	+5VOLTS_OUT
2	STEP1	21	DIR1
3	STEP2	22	DIR2
4	STEP3	23	DIR3
5	STEP4	24	DIR4
6	STEP5	25	DIR5
7	STEP6	26	DIR6
8	STEP7	27	DIR7
9	STEP8	28	DIR8
10	STEP9	29	DIR9
11	STEP10	30	DIR10
12	STEP11	31	DIR11
13	STEP12	32	DIR12
14	STEP13	33	DIR13
15	STEP14	34	DIR14
16	STEP15	35	DIR15
17	STEP16	36	DIR16
18	GND	37	+5VOLTS_OUT
19	GND		

STEP & DIRECTION SIGNALS ARE 5VOLT, DRIVEN LOGIC SQUARE WAVES. STEP IS ALWAYS LOGIC 1 WHEN NOT ACTIVE.

DAC TOP CONNECTOR DB15S

Pin	Signal	Pin	Signal
1	DAC9	9	AGND
2	DAC10	10	AGND
3	DAC11	11	AGND
4	DAC12	12	AGND
5	DAC13	13	AGND
6	DAC14	14	AGND
7	DAC15	15	AGND
8	DAC16		

DAC BOTTOM CONNECTOR DB15S

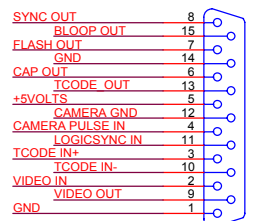| Pin	Signal	Pin	Signal
1	DAC1	9	AGND
2	DAC2	10	AGND
3	DAC3	11	AGND
4	DAC4	12	AGND
5	DAC5	13	AGND
6	DAC6	14	AGND
7	DAC7	15	AGND
8	DAC8		

ANALOG DAC OUTPUTS AND "AGND" ARE OPTO-ISOLATED FROM ALL OTHER KUPERNODE SIGNALS AND GROUNDS. CONNECT AGND DIRECTLY TO THE CONTROLLED DEVICE, BUT DO NOT CONNECT AGND LOCALLY TO ANY OTHER KUPERNODE GROUND. OUTPUT RANGE IS -10 TO +10 VOLTS
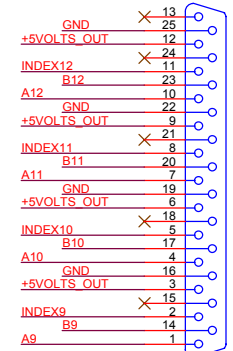
ACCESSORY DB15P

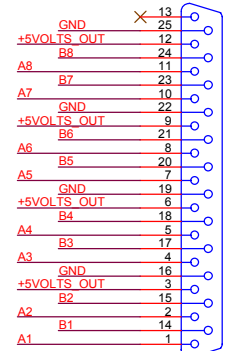| Pin	Signal	Pin	Signal
8	SYNC OUT	15	BLOOP OUT
7	FLASH OUT	14	GND
6	CAP OUT	13	TCODE_OUT
5	+5VOLTS	12	CAMERA GND
4	CAMERA PULSE IN	11	LOGICSYNC IN
3	TCODE IN+	10	TCODE IN-
2	VIDEO IN	9	VIDEO OUT
1	GND		

USE ONLY "CAMERA GND" AS THE "CAMERA PULSE IN" COMMON. NORMALLY USE "TCODE IN-" AS THE TIMECODE COMMON. ALL OTHER SIGNALS REFERENCE TO "GND." TIMECODE INPUTS ARE CAPACITIVELY ISOLATED. FOR BEST RESULTS TIMECODE SHOULD ARRIVE AS A DIFFERENTIAL PAIR INSIDE A SHIELDED CABLE, BUT SINGLE-ENDED MAY ALSO BE USED. FOR SINGLE ENDED TIMECODE, CONNECT THE TIMECODE SIGNAL TO "TIMECODEIN+" AND TIE "TMECODEIN-" TO GND.
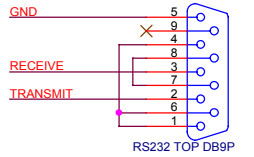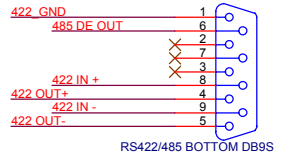
ENCODER TOP CONNECTOR DB25P

Pin	Signal	Pin	Signal
13	GND	25	GND
12	+5VOLTS_OUT	24	INDEX12
11	INDEX12	23	B12
10	A12	22	GND
9	+5VOLTS_OUT	21	INDEX11
8	INDEX11	20	B11
7	A11	19	GND
6	+5VOLTS_OUT	18	INDEX10
5	INDEX10	17	B10
4	A10	16	GND
3	+5VOLTS_OUT	15	INDEX9
2	INDEX9	14	B9
1	A9		

ENCODER BOTTOM CONNECTOR DB25P

Pin	Signal	Pin	Signal
13	GND	25	GND
12	+5VOLTS_OUT	24	B8
11	A8	23	B7
10	A7	22	GND
9	+5VOLTS_OUT	21	B6
8	A6	20	B5
7	A5	19	GND
6	+5VOLTS_OUT	18	B4
5	A4	17	B3
4	A3	16	GND
3	+5VOLTS_OUT	15	B2
2	A2	14	B1
1	A1		

ALL ENCODER INPUTS ARE 5 VOLT, SINGLE-ENDED LOGIC. IF THE TOTAL CURRENT DRAW FOR ALL ENCODERS EXCEEDS 800 MILLIAMPERES, AN EXTERNAL 5 VOLTS POWER SUPPLY SHOULD BE USED. 12 US DIGITAL "S2 SERIES" ENCODERS NORMALLY REQUIRE 600 MILLIAMPERES TOTAL.   THE "INDEX" INPUTS ON ENCODERS 9 THRU 12 MAY BE USED WITH AXES SUCH AS THROTTLE CONTROLS THAT DO NOT ROTATE CONTINUOUSLY. THE INDEX PULSE RESETS THE HARDWARE ENCODER POSITION COUNTERS.
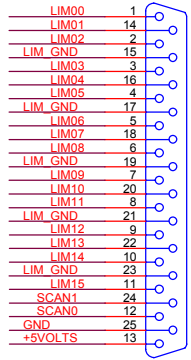
RS232 TOP DB9P

Pin	Signal
5	GND
9	
4	
8	
3	RECEIVE
7	
2	TRANSMIT
6	
1	

RS422/485 BOTTOM DB9S

Pin	Signal
1	422_GND
6	485 DE OUT
2	
7	
3	
8	422 IN +
4	422 OUT+
9	422 IN -
5	422 OUT-

THE RS422/485 GROUND AND SIGNALS ARE FULLY OPTO-ISOLATED. DO NOT CONNECT THESE GROUNDS OR SIGNALS TO ANY OTHER KUPERNODE GROUND OR SIGNAL. THE ISOLATED 422 GND SHOULD BE CARRIED VIA A WIRE IN THE CABLE TO THE RS422 GROUND OF THE MASTER DEVICE. DO NOT USE THE CABLE SHIELD TO CARRY THE SERIAL GND SIGNAL. CONNECT KUPERNODE RS422/485 PINS 4 & 5 TO THE KUPER MASTER'S PINS 8 & 9, AND VICE VERSA. CONNECT THE PIN 1 "422 GND" PINS OF KUPERNODE2 AND THE KUPER MASTER, BUT DO NOT CONNECT THESE ISOLATED GROUNDS TO ANY OTHER GROUND.

LIMITS CONNECTOR DB25S

Pin	Signal
1	LIM00
14	LIM01
2	LIM02
15	LIM_GND
3	LIM03
16	LIM04
4	LIM05
17	LIM_GND
5	LIM06
18	LIM07
6	LIM08
19	LIM_GND
7	LIM09
20	LIM10
8	LIM11
21	LIM_GND
9	LIM12
22	LIM13
10	LIM14
23	LIM_GND
11	LIM15
24	SCAN1
12	SCAN0
25	GND
13	+5VOLTS

LIMITxx SHOULD CONNECT TO LIM_GND WHEN A LIMIT OR HOME SWITCH IS ENCOUNTERED.   SCANx ARE OUTPUTS FOR LIMIT AND HOME SWITCH EXPANSION VIA AN EXTERNAL BREAK OUT BOARD. DO NOT SINK MORE THAN 100 MILLIAMPERES FROM THE +5VOLT PIN ON THIS CONNECTOR.

Title	KUPERNODE2 CONNECTORS	
Size: B	Document Number: KUPERNODE2	Rev 2
Date:	Monday, January 03, 2005	Sheet 1 of 1