1. Unless otherwise stated:
   Resistors are 250 mΩ, 1% tolerance.
   Capacitors are 56V, 15% tolerance.

2. Port and Net names scopes for this project are:
   Port Name = NOT Global (connected via Sheet Symbol)
   Net Name = Local (connected on same page only)
   Do not install (DNI).

Tailored values. Nominal value shown.

[Diagram showing connections and components]
Power Filtering & References
Axis Incremental Encoder Converters

Note: US Digital Corp EQUAD accepts TTL logic or open collector. It has 5k pullup to +5V. Configurable via switch for rising/falling edge.

Note: Input signals are RS422 (differential).
Dec Tachometer & Servo Command

Note: Silkscreen "North Tach"
- Nominally 8.78 mV/(arcsec/s)

Note: Silkscreen "South Tach"
- Nominally 8.78 mV/(arcsec/s)

Note: Silkscreen "South Tach +"

Note: Silkscreen "Dec Vel"

- 1.7 mV/(arcsec/s)

Notes:
- 114 (arcsec/s)/V
- 588 (arcsec/s)/V

- Nominally 8.78 mV/(arcsec/s)

- Nominally 8.78 mV/(arcsec/s)
Watchdog Circuits

Note: The 0.ohm jumpers make it possible to use another watchdog IC. For example, a PIC 16F629 microcontroller could be programmed as a watchdog IC.
Relays - Brake, Telescope Amp, Dome Amps

Note: Drives another relay. (Drive current is ~700mA)

24V Brake_Release_Relay NC NC NC NC SEGND DGND 249 R177 2A 1 2 6 5 PS710EL-1A-A 3 0 4 D D S 80V U16 2A 1 2 6 5 PS710EL-1A-A 3 0 4 D D S 80V U17

Note: Zeners and relays are redundant to prevent single point failure. (From Safety Board perspective)

0.5W 26V 400W @ 1ms D26 0.5W 26V 400W @ 1ms D27

Note: Emerg_Stop_N is connected directly to the push button switch via cables.

MMBT3904 Q3 249 R176 4.87k R167 10k R171 10k DGND Red_Tele_Brake_Release_&_Amp_Enable Tel_Brake_Release_&_Amp_Enable_N MMBT3904

MMBT3906 Q1 247 4.87k R166 10k R170 10k +5V_DIG +5V_DIG 1 2 6 5 +5V_DIG +5V_DIG 3 4 14 13 +5V_DIG +5V_DIG

Note: 4 amplifier enables with 15k pullup to +15V. (total current = 4mA)

Dome_Amp_Enable_&_Therm_Stat

Note: Tied to amp rtn through thermal switches.

TLP281-4 U15B 1 16 15 12 11 10 9 8 7 TLP281-4 U15C 5 6 12 11 5 6 12 11

Tel_Amp_Enable_&_Therm_Stat

Note: Tied to amp rtn through thermal switches.

TLP281-4 U15A 1 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 TLP281-4 U15D

Dome_Amp_Enable_&_Therm_Stat

Note: Tied to amp rtn through thermal switches.

TLP281-4 U15E 1 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 TLP281-4 U15F

Note: 4 amplifier enables with 15k pullup to +15V. (total current = 4mA)

Dome_Amp_Enable_&_Therm_Stat

Note: Tied to amp rtn through thermal switches.

TLP281-4 U15G 1 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 TLP281-4 U15H

Dome_Amp_Enable_&_Therm_Stat

Note: Tied to amp rtn through thermal switches.
Limit Switches & Parallel Port

Parallel Port Inputs
Note: Parallel Port drive is 2.6mA @ 2.4V
(which equates to approximately Vs=5V and Rs=1k)

Note:Currently Not Implemented Note:Currently Not Implemented

Note:Parallel Port Inputs

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Note:Parallel Port Inputs

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Note:Parallel Port Inputs

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Note:Parallel Port Inputs

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Note:Parallel Port Inputs

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Note:Parallel Port Inputs

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Note:Parallel Port Inputs

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Note:Parallel Port Inputs

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Note:Parallel Port Inputs

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Note:Parallel Port Inputs
Dome Overcurrent

Note: silkscreen "Dome3 adj"

Note: Signal is 11.66 A/V (85.6 mV/A)

Note: Negative going trip point is 5.1V.

Note: Positive going trip point is 5.1V.

Note: LM339 Comparators pulldown to -15V.

Note: LM339 Comparators

Note: trip point is -5.1V.

Note: Positive going trip point is 5.1V.

Note: Negative going trip point is 5.1V.

Note: Signal is 11.66 A/V (85.6 mV/A)
Spare / Unused Multipart Circuits