

Note #	Item #	Part	Manufacturer	P/N	Qty	Cost Each	Lead Time
		Spectrograph spares					
							Must specify cathode to window measurement of 77mm and 10% Argon, 90% Neon LICK-HCL-002
3	1	Thorium argon calibration lamp	S&J Juniper & Co. (England)		2		
3	2	Quartz lamp, 10W			6		
3	3	Quartz lamp, 50W			6		
3	4	Load encoder	Turck	T8.L2.122.2211.0005	1		
3	5	Encoder tape	Turck	K180520	1M		
	6	Encoder tape	Siko	MB100-1-10-0.01-VA-TM-	1M	\$172.00	(Original price)
	7	Recording DVD	Q-See	AM-P-0.02	1	\$244.78	Costco
	8	Color camera	Q-See	QPSCDCA	1	\$71.16	Amazon
	9	IR camera	Q-See	QSC48030	1	\$91.00	Amazon
	10	IR camera	Q-See	QD28414	1	\$72.00	Amazon
	11	Camera cooling system	CryoTiger		1		
	12	Proportional valve	Tempresco	SD8202G063V	1	\$307.50	
	13	Valve	Tempresco	8908A001	1	\$329.64	
	14	Galil RIO		RIO-47122	1	\$395.00	
	15	Galil RTD board		SCB-48206	1	\$175.00	
	16	Fluid flow switch	Proteus Industries	08004BN1	1	\$325.00	
	17	Fluid flow switch	Proteus Industries	08008BN14	1	\$325.00	
	18	Guide camera	Princeton Instruments	PhotonMAX 512	1	\$37,850.00	4-6 weeks?
	19	Guide camera "cube" power supply			1		Replacement for our ProEM-512B camera. New camera uses a Gigabit Ethernet interface to connect it to the host computer rather than the CameraLink interface that is used on the PhotonMAX-512B camera. Power supply comes with the ProEM-512B camera
	20	Shutter controller	Uniblitz	VMM-D3	1	\$1,865.00 ??	
	22	Corner cube shutter	Uniblitz		1		
	22	Science shutter	Uniblitz		1		
	23	Instrument chiller	Thermo Scientific	Neslabs Thermoflex 900 IPR Pump 2	1	\$5,000.00	20 days
	24						Cloe Parmer part # EW-13042-22
					sum	\$47,223.08	
						Sum of Critical items	\$42,850.00

Part	Manufacturer	P/N	Qty	Cost Each	Lead Time
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Notes:

Spares on hand

Part	Manufacturer	P/N	Qty
APF equipment spares			
1	Galil	DMC-2280	1
2	Galil	AMP-19540	1
3	Galil	IOM-1964	1
4	Omega + Lick	CN-833-EI (in chassis)	1
5	Omega	HX302V	1
6	Omega	SA1-RTD-B-80	2
7	Siko	MSK1000-5-E8/1-I-0.2-0.25	1
8	Varian	9190520	1
9	Varian	929-0200	1
10	Bud Industries		1
11	Bud Industries		1
12	Lick		1
13	Lick		1
14	Winford	BRK25	1
15	Littlefuse		1
16	Crydom	D1225	2
17	US Digital	E6-2000-079-I-S-D-D-B	1
18	Magmotor	SR15-O-200x	1
19	Magmotor/US Digital	(as above)	1
20	Selco	CA-85	1
21	Selco	CA-200	2
22	Q-See	QD28414	1
23	Lambda	DT36PW/OLOP	2
24	Lambda	DT70PWW12P	1
25	S & J Juniper		1
26	Lick		3
27	Microswitch	DT-2RV22-A7	2

Part	Manufacturer	P/N	Qty	Cost Each	Lead Time
1	Lamp current monitor board	Lick	EL-1384	4	
2	HCL lamp current monitor board	Lick	EL-3520		
3	16-channel logic inverter	Lick	EL-1396	1	
4	8-Channel AC control	Lick	EL-1398	1	
5	Stage limit board	Lick	EL-3593	1	
6	Stage limit board <i>Dewar stage only</i>	Lick	EL-3594	1	
7					
8					
9					
	Part	Manufacturer	P/N	Qty	
	APF cable spares				
1	Stage cable	Lick		1	
2	Prototype stage cable (4')	Lick		1	
3	Prototype motor cable (4')	Lick		1	
4	Controller-amp dual encoder cable	Lick modified Galil cable		1	
5	Controller to amplifier cable	Galil	CABLE-100-1m	1	
6	Extended I/O cable	Galil	CABLE-80-1m	1	
7	DB25 cable for temperatures	B&B Electronics	232AMF2	1	
8	Encoder cable - unterminated	U.S. Digital		1	
9	AC power cord for Pulizzi			2	
10	Network patch cable 10'			2	
	APF test cables/jigs				
1	Lamp test box	Lick	EL-3514:5	1	
2	Direct motor encoder to AMP19540	Lick		1	
3	Galil to encoder & hall switches	Lick		1	
4	DB15HD 5 1/2' extension cable	Lick		1	
5	Limit to breakout board 12"	Lick		1	
6	Galil analog breakout	Lick		1	
7	Siko to AMP-19540 adaptor	Lick		1	
8	Motor extension 4 1/2'	Lick		1	
9	Dewar focus cable	Lick		1	

Part	Manufacturer	P/N	Qty	Cost Each	Lead Time
Shell size	Number of pins	P/N	Qty		
APF connector spares					
1	12	3	MS3126F12-3S	3	
2	12	3	MS312E12-3P	1	
3	16	8	MS3122E16-8S	1	
4	16	8	MS312F16-8S	1	
5	16	8	MS3126F16-8P	1	
6	20	16	MS3112E20-16P	4	
7	20	16	MS3126F20-16S	3	
8	20	16	MS3112E20-16S	4	
9	20	16	MS3126F20-16P	4	
10	20	27	PT02E20-27S	3	
11	20	27	PT06A20-27P(SR)	2	
12	20	27	PT02R20-27P	4	
13	20	27	PT06A20-27S(SR)	2	
14	22	32	PT02E22-32S	1	
15	22	32	PT06A22-32P(SR)	1	
16	22	32	PT02E22-32P	1	
17	22	32	PT06A22-32S(SR)	1	
18	22	17	MS3102A22-29S	1	
19	22	17	MS3106E22-29P	1	
20	22	17	MS3102A22-29P	1	
21	22	17	MS3106E22-29S	1	
22	Hi-density DB	15	Pins	4	
23	Hi-density DB	15	Sockets	4	
24	Hi-density DB	26	Pins	2	
25	Hi-density DB	26	Sockets	2	
26	Hi-density DB	44	Pins	2	
27	Hi-density DB	44	Sockets	2	
28	Regular DB	9	Pins	2	
29	Regular DB	9	Sockets	2	
30	AMP Mate-n-Lok (with pins)	8	770579-1	2	
31	AMP Mate-n-Lok (with pins)	4	172167-1	2	
Part	Manufacturer	P/N	Qty		
APF delivered documentation					
1	HSF servace manual (+5v)	Kepeco			
2	HSP service manual (+48V)	Kepeco			
3	RA-19-1U manual (+5V rack mtg)	Kepeco			
4	DMC-2xxx command manual	Galil			
5	AMP-19520/40 manual	Galil			
6	IOM-1964 manual	Galil			
7	Galil products/manuals DVD	Galil			
8	Siko MSK1000 manual	Siko			

APF Spectrograph Spares

Revised:

11/11/2012

	Part	Manufacturer	P/N	Qty	Cost Each	Lead Time
	Other equipment					
1	Bell transformer		10088291P1	2		
2	TUV power supply		PS5R-A12	1		
	B & B Electronics Fiber/Serial					
3	Conv		FOSTCDR	1		
4	Transition Media Conv.		E100BTX-FX-05	1		
5	Netgear Wireless switch			1		

APF Telescope Spares

Revised: 11/11/2012

Part	Manufacturer	P/N
Telescope electronics		
EOS recommended spares list (from EOST document)		
1 IAC Backplane	Vox Techenologies	AP-PSL14
2 Mother board	Vox Techenologies	IAC-F846A
		[79754 400-602204-trx As Installed] New part number 4-3588C0-1000-000000 then select option Option 1: Additional 4 channel axis & Option 2: DPRAM Click on this text for link/attachment regarding the part number. Option 1 and 2 are in G and F on the attachment
3 PMAC card set	Delta Tau	
4	Delta Tau	[Turbo PMAC PC ISA Legacy as installed]
5	Delta Tau	[156767 301-00 PMAC-Opt 1 As installed]
6	Delta Tau	[156968 302-00 PMAC-DPRAM As installed]
7 DIOP 676 card	EOST	DIOP_676
8 DIOP Connector Card	EOST	GEN_DIOP_CONN
9 ENCP 676 Card	EOST	ENCP_676
10 ENCP Daughter Bd.	EOST	ENCP_DP
11 24V LED Panel Lamps (Green)	Omron	2265Z6
12 Omron 24V LED Panel Lamps (Yellow)	Omron	0965Z6
13 Omron 24V LED Panel Lamps (Red)	Omron	23265Z6
14 Encoder Head	Heidenhain 13 week lead time	LIDA 10C, IdNr 309237-01
16 Servo Drive	Advanced Motion Controls	50a20

17	Copley 421 Drive amplifier	Copley Controls	OLD model # 421, new model # 422CE
18	Limit Switch	Omron	D4A-2918N
19	LA30 Linear Actuator (Mirror Cover)	Linak	301100-0040000N with XLSD30-40 Limit Switches.
20	Mirror Cover Controller	ESOT	PBC-4223-3
21	Truss Temperature Sensor	Omega Engineering	RTD-830
22	Optics Surface Mount RTD	Omega Engineering	RTD-805
23	Air Temperature Sensor	Omega Engineering	RTD-2-F3105-36-T
24	Airpot	Airpot Corporation	2KS444A1-0TX
25	LSF Flexures	Riverhawk	6016-400
26	QSTT Limit Switches (tip/tilt)	Honeywell S&C	111SM1-T
27	QSTT Linear Encoder	Heidenhain	MT 2581
28	QSTT Limit Switches (focus)	Grayhill	39-2
29	QSTT Actuator	HD Systems	RH-14D-3002-E050AL
30	Contactactor	GE	CL00A310TJ
31	Thermal Overload	GE	RT1F
32	Recirculation Fan	?	?
33	Measurement Computing PC-DIO-96	Measurement Computing	PCI-DIO96
34	48v Power Supply	Power-One	NHC3021-8
35	GEN_CONTROLLER CARD	EOST	SCH #4224-2
Other Telescope electronics			
From schematics			
1	Non-metallic Nema box	Bud Industries	91F3909 (Newark)
2	Cable Gland	Bud Industries	83F3333 (Newark)
3	LED Lamp (blue)		XB6AV6BB (17C7000 Newark)
4	LED Lamp (yellow)		XB6AV5BB (17C6999 Newark)
5	Encoder Splitter	(EOS?)	MDD-4241-1
6	GPS Receiver	?	?
7	Thermal Switch	Bud Industries	TS-15
8	Cabinet Fan 24V	?	?
9	Circuit Breaker	Tyco/Potter & Brumfield	W93-X112-30 (56F838 Newark)
10	Terminal strip	Marathon	604-GP-4 (44F7841 Newark)

11	AC Power Plug		NEMA L14-30P (Amazon)
12	Murcury Displacement Relay	Magnacraft	WM60A-24D (88K2820 Newark)
13	Murcury Displacement Relay	Magnacraft	WM35AA-24D (88K2812 Newark)1
14	Solid-State Relay	Crydom	A2450 (79K4310 Newark)
15	Solid-State Relay	Crydom	D1D40 (80K9298 Newark)
16	Switch-mode Power Supply	Emmerson (was Astec)	MP8 Power supply (Newark 38C8407)
17	Mirror Cover Motor		
18	Mirror Cover Motor Encoder		
19	Elevation EOT Switch		

Sum of

NOTES: EOST LONG LEAD ITEMS TOTAL= \$7485

Critical items (green)

NOTES BELOW FOR REFERENCE ONLY

Limit switch types

1	Dome shutters		
2	Elevation	Omron	
3	Azimuth	Omron	
4	Vent doors		
5	M2 actuators		
6	M3 rotator	Omron (proximity)	
7	Mirror cover		
8			

Motor types

1	Dome shutters (2)		
2	Elevation		
3	Azimuth (2)		
4	Vent doors	Lift-Master	SD3321LR (right) SD3321LI (left)

- 5 M2 actuators
- 6 M3 rotator
- 7 Mirror cover
- 8 Dome chillers low speed(?) (?)
- 9 Dome speed1 (?) (2)
- 10 Recirculation fan (2)

Telescope/Dome motions

Elevation

Azimuth

M2 focus/rotate

M3 rotation

Front shutter

Rear shutter

Vent doors

Qty	Cost Each	
1	\$ 595.00	
1	\$ 12,895.00	
		Sent tech support request to support@deltatau.com on 10/4/11 ISA communication is not compatible with PCI communication so installed software probably will not work with PCI unless it uses our newer drivers. <u>Old board set can be repaired for a spare.</u> Contact Stephen G. Milici @ DELTA TAU DATA SYSTEMS Telephone: 818 998 2095 smilici@deltatau.com
1		4-6 weeks
	\$3,700.00	http://www.deltatau.com/common/sales/distributorsandintegrators.asp?connectionStr=release
1	\$ 639.00	http://www.deltatau.com/common/sales/distributorsandintegrators.asp?connectionStr=release
1	\$ 261.00	http://www.deltatau.com/common/sales/distributorsandintegrators.asp?connectionStr=release
1	\$ 2,891.00	16 weeks SCH-4038?
1	\$ 1,950.00	16 weeks SCH-4224?
1	\$ 2,644.00	16 weeks SCH-4110?
1		Can't find on web Can't find on web Can't find on web
	\$ 1,136.25	13 weeks Encoders Elev A, B, Az A, B . Sent email to service@heidenhain.com to locate source and verify part number.
1	\$ 570.00	4-6 weeks

1	\$	754.00	4-6 weeks	Click here for quote. Dan Henderson at Olympus Controls in Fremont CA 408 744 2114 to quote 2 of the 422CE .
1	\$	206.97		Mouser non-stock item
1		\$749.91	4-6 weeks	Click here for quote. NOTE*** EOST is the only one Linak will sell to as a policy. Shelby received the quote
1	\$	64.00		
1	\$	86.00		
1	\$	45.00		
1	\$	121.11		
1				Sent RFQ. http://www.flexpivots.com/doubleendedpivotbearings.asp
1	\$	7.35		
1		\$1,338.00	12 weeks	product, Id. numbers are required if these are a replacement for an existing unit. available with x5 or x10 interpolation as with a couple variants in connectors
1	\$	7.47		pushbutton switch
1				Data Sheet. Called number no one would pick up 10/11/15
1	\$	178.02		Contactora
1	\$	69.60		relay thermal overload
1				
1				
2	\$	1,967.14	4-6 weeks	
1	\$	1,950.00	4-6 weeks	
1	\$	16.80		J-box
1	\$	1.70		cable gland
1	\$	22.96		Ind. Lamp, panel mtg - blue
1	\$	22.96		Ind. Lamp, panel mtg - yellow
1				
1				
1	\$	21.56		(No longer available)
1	\$	70.74		
1	\$	23.94		

1	\$	24.25		30 Amp locking plug
1	\$	100.32		
1	\$	153.12		
1	\$	43.98		Solid-state relay
1	\$	74.12		Solid-state relay
1	\$	1,172.94	4-6 weeks	48V @ 16.6 amp

all spares \$ 36,575.21

highlight) \$ 34,313.24

APF Dome Spares

Revised:

Part	Manufacturer
Dome control electronics	
1 VS1GV63	Baldor
2 Pulse Follower Board	Baldor
3 Flex+ Drive II	Baldor
4 Azimuth motor	Baldor
5 Azimuth Encoder	1024-ABZC-4469-LED-SM12-
6 Shutter motor	Baldor
7 3-Phase Inductor	Baldor
8 Inductor	Baldor
9 Dynamic Brake Resistor Assy	Baldor
10 Line filter	Schaffner
11 Relay, 24VDC	Omron
12 Relay, 24VDC	Omron
13 Relay, 24VDC	Omron
14 Relay, 24VDC	Omron
15 MW Power supply	Mean Well
16 Circuit Breaker	Hager
17 Brake Rectifier	Mayr
18 Limit switch, shutter assy	Honeywell
19 Proximity switches, shutter assy	Omron
20 Proximity switches, Interface beam.	Omron
21 Manual shutter control unit	
22 Manual shutter control unit	
23 Snow melt heaters	
24 Snow melt heaters	
25 Snow melt heaters	
26 Snow melt heaters	
27 Snow melt heaters	
28 Cooling fans - control cabinet	Sunon
29 Thermostat	Radio Shack
30 E-STOP PB switch	
31 Emergency Reset switch	
32 Azimuth Enable switch	

33	Azimuth EOT Override key switch	
34	Vent doormanual PB box	
35	Pushbutton switches for above	
36	Vent door power cutoff	
37	Spindle Heating Element	Siemans
38	Proportional Valve Actuator	Siemans
39	Temperature sensor	Mamac
40	Differential Pressure Sensor	Mamac
41	24VAC Power Supply	Hammond
42	Suppressor	GA
43	Connector	Radio Shack
44	Connector	Radio Shack

Azimuth Drive Box

1	Nutone Cooling Fan	
2	Temperature controller	Radio Shack
3	BEI Encoder	

1	PCA - unprogrammed	EOS Custom boards
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9/9/2011

P/N	Qty	Cost Each	Lead Time (wks)
ZD18H207-E	2	\$1,930.00	4 to 6 weeks
EXBHH07A01	1	\$539.00	4 to 6 weeks
FDH2A07TR-RC20	1	\$1,888.00	4 to 6 weeks
ZDNM3661	1	\$4,882.00	4 to 6 weeks
924-01002-7529	1	??	
BSM90N-3150BA	1	\$3,110.00	4 to 6 weeks
LRAC01201	2	\$495.00	4 to 6 weeks
L040-12	2	\$324.00	4 to 6 weeks
RGA12120	1	\$849.00	4 to 6 weeks
FN2070-10-06	2	\$50.92	
MY4Z-D2	4	\$37.70	
MY2N	4	\$19.72	
MY4Z-D2	4	\$32.51	
G2R-2-SND	2	\$19.90	
DR4524	2	\$25.24	
NT 102C	2		
Size 1 Type 25.0006 , P/N 1/025.000.6 #			
0802471	2	\$55.97	
GLAC01A2B	6	\$80.98	
E2E-X18MEI	2	\$99.82	
E2E-X18MEI	2	\$99.82	
	1		
	1		
Power connect kit 386505	4	\$27.95	
Splice and tee kit 386513	2	\$19.95	
End seal kit 386521	2	\$15.95	
180' roll gutter application tape 386546	2	\$47.50	
250' roll TW6-1CR 120V heater cable			
386476-250	1	\$1,338.75	
2123HBT	2	\$22.56	
434-9911	2		
	2		
	2		
	2		

	2	
	1	
	2	
	2	
ASZ6.5	1	\$171.90
SQP62	1	
TE-213-E-E-2-1-C-7	1	
PR-274-R6-VDC	1	\$118.13
PTD50PG	1	
BSLR2G	1	
274001	1	\$3.99
	1	\$3.99
696N	2	\$15.06
434-9911	2?	
	?	

(2 each EOS asy08046-02,asy 05943-01,
asy05931-01,asy500046-01, asy500480-01)

\$12,157.00 16 weeks

Total cost for 1 each \$28,482.31

total cost for 1 each of critical items (green highlight) \$26,174.00

[Replacement for discontinued 18H vector drive](#)

Shutter driver

2kW 1750 RPM wound for 3-phase 240 V power (no encoder feedback). NOTE: need to specify the line voltage and frequency, in this case 230V 60Hz

[encoder on page 1 OF 1 & 2 OF 2 Drawing # WD-500917-01 Azimuth control panel. NOTE:](#)

Looks like the feedback is an internal resolver circuit. Need to confirm.

LRAC01201 LR0305 - Line Reactor - 12 Amps - 1.25 mH - 3 Phase

Recommend FI0029A00 - 230VAC filter - List

See page from 501 catalog

www.plccenter.com

Possible problem. Circuit breaks trip when power is cycled. Looking for different package type.

Stock in New Jersey. sinclair@mayrcorp.com

http://www.mayr.com/fileadmin/user_upload/Dokumentationen/englisch/Accessoires/DS_Half-wave_and_Bridge_Rectifiers.pdf

Sent email to jak (Andrew Gray) @ EOS confirming location 9/27/11

Sent email to jak (Andrew Gray) @ EOS confirming location 9/27/11

Sent email to Matt R. confirming location 9/27/11

see page 6 of

http://loel.ucolick.org/manual/APF/documents/dome/Lick%20Electrical%20Drawings%20As%20Built_A3.pdf

see page 6 of

http://loel.ucolick.org/manual/APF/documents/dome/Lick%20Electrical%20Drawings%20As%20Built_A3.pdf

Sent email to Matt R. confirming location 9/27/11 All snow melt heater products are available at <http://www.snowmeltcables.com>

See 2.11.10 shutter heater cables ,

http://apf.ucolick.org/site_enclosure/enclosure_general/Scanned_EOS_documents/EOS_Dome_Tech_Description_Nov_06_144pgs.pdf

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No listing on Radio Shack web site

Can't find on web
Can't find on web

Can't find on web
Can't find on web

Amazon

This is NOT a complete set of spare boards but is adequate

& Drive evaluation .

Digi-Key
Digi-Key
Digi-Key
Digi-Key

PowerGate LLC

midwestBAS.com

controlstop.com