

Upgrades to SpeX's Motor, Temperature Control System. \$50K.

The SpeX array and readout electronic will be upgraded in 2013. However, this upgrade proposal does not include any funds to upgrade the SpeX's instrument control hardware. This hardware over 12 years old and will require replacement when Spex's arrays are upgraded. Hardware includes: one computer, motor controllers, Ethernet based IO controller, three temperature controller/monitors, ten motors, two electronic boxes, and power supplies.

Estimates include spare units.

2 Motor Controller			
DMC_4183, 8 axis, plus accessories	2500	2	5000
3 Ethernet IO control unit			
RIO_47120-16	500	3	1500
4 Ethernet to serial server			
PortServer TS8 - R-232 serial port server	600	4	2400
5 AC power Control			
WTI NPS-8HS20-1 Network Power Switch	800	3	2400
6 Motor/Drivers			
SM3416 - replaces SM3410-V	1200	4	4800
Equivalent ISM M202232-D stepper motors	220	10	2200
Equivalent to IMS 4831 Drivers	200	10	2000
7 Analog Conditioning/Compairator Board			
Custom Circuit board and parts	1000	3	3000
8 Three Temperature controlllers			
Lakeshore 335	4000	3	12000
Lakeshore 218	2500	2	5000
9 19" case, Cables, Power supplies, misc hardware			
Custom Circuit board and parts	5000	1	5000
		Total	46000

1. Computer, littledog



Dell OptiPlex 990 SFF Desktop Computer-
Intel® Core™ i3 2120 Processor (3.3GHz,
3M)

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Small Form Factor Computer, Moderate speed, linuxOS, \$550.

Spex1.0 uses a PCI Backplane with x486 SBC. ISA controller card are used.

Spex 2.0 will move all controller functions to Ethernet based hardware.

The PC is needed only to run littledog code.

2. Motor Controller

Spex 1.0 uses a PC-58 ISA motor controller board. The PC-58 drives 6 steppers (calmer, dit, osf, slit, gflt, afoc).

Spex 2.0 can use a DMC 4183, 8 axis controller

DMC-4183 – 8 axis controller, \$2K

BOX8 - Metal Enclosure, \$128

-16BIT – 16bit DC, \$100

Approx cost is 2.5 x 2 each = \$5K

3. Ethernet IO control unit

Spex 1.0 has a ISA Digital and Analog IO card. 8 channels of AI is used to sample the hall-effect voltages for each of the 8 mechanism.

Spex 2.0, the DMC-41x3 has a AI channel per axis. An additional IO controller is not actually necessary to duplicate spex 1.0, but we will purchase RIO units for any additional Analog/Digital monitoring.

RIO_47120-16, \$400, each

Power supplies, \$85, each.

Approx. \$500 per unit. 3 unit will be purchased.

4. DigiPort Terminal Server

Spex 1.0 uses a mult port serial card located in the littledog PC for: (1) rotator SM, (2) Grating SM, (3) bigdog TC, (4) guidedog TC, (5) Spex Dewar Temp Monitor.

Spex 2.0 requires two 4 port terminal server. One for the temperature controller (3 ports), and 1 for the Smart Motors (2 ports). We will purchase:

- DigiPort Terminal Server, PortServer TS4 MEI 70001807, 4 each
- AC Power Supply 76000734, 4each

5. WTI NPS-8HD20-1 AC power control unit.

Spex 1.0 uses Baytech RPC3 units to control power supplies for the calibration labs. 4 outlets are used.

Spex 2.0 will use WIT's NPS model (IRTF has moved towards WTI units).

1 for callamps, 1 to power off/in electronics, 1 spare.

Purchase 3 units, total cost about \$2.1K.

6. Smart Motors

Spex 1.0 uses two SM3410, and SM3410D for Rotator, and Grating.

Will purchase replacement units for spex 2.0

Will purchase SM3416 (updated model), 4 each, total cost is $1.2 * 4 = \$4.8K$ (est)

	C.Tor oz-in	P.Tor oz-in	Encoder	shaft dia(in)
SM3410	45	180	4000	0.375
SM34165D	155	226	8000	0.375 same size; x3 torque x2 resolutions
SM23305D	64	110	4000	0.25 smaller; more continuous
SM23405D	78	129	4000	0.25 less peak torque

7. Stepper Motors

Spex 1.0 uses

M2-2232-6.0D, 150 oz-in stepper motors

IM483-34P1 Motor Drivers

Spex 2.0 requires 6 stepper and drivers are required. Plus 4 spares

Purchase 10 each drivers/motors to replace the current drivers+motors.

Part numbers are:

M-2222-6.0D Stepper Motor

IM483-34P1 Motor Drivers

7. Analog Condition/Comparator Board

The analog signal from the Hall Effect sensors used by the mechanism requires conditioning prior to being sample in an A/D or feed into an TTL input. A custom board by the IRTF EE will be build. Estimated cost for board manufacture and parts is \$1000 per board. We are requesting building 3 boards.

8. Three electronic chassis, and power supplies

Motor controllers, driver, power supplies and other hardware will be mounted in a custom build electronic boxes to be housed in the cool rack electronic rack at the IRTF. These 19" rackmount boxes will be have custom wiring and connector, and cables required to interface with Spex instrument. Appox. \$5000 is budget for these items.

9. Temperature Controllers

Spex 1.0 used two TC330 and one TC208 temperature controller and monitors.

The 330 has 50W max power to heater.

Nsfcam uses a 331 has two auto tuning loop 50W and 1W.

Spex 2.0 will replace these with Models 335 and 218.

- Lakeshore 335 - Temperature controller with 2 diode/RTD inputs and 2 control outputs w/ VAC-120 - instrument configured for 120 VAC with U.S. power cord.3 each.
- Lakeshore 218E - Temperature monitor, 2-channel w/ VAC-120, 2 each
- Lakeshore RM-2 – Kit for mounting two 1/2-rack temperature controllers in a 19 in rack, 1 each

