



CLRC

20th March 2001

To: Matt Griffin, Bruce Swinyard.

From: John Delderfield

cc: Doug Griffin, Don.Peterson, John Hackett, Terry Girard, Gary Davis, Joe Taylor, Dennis Henry.

HERSCHEL SPIRE SHUTTER WIRING.

You will note the below E-mail.

I thought it fair to work through a wiring layout quickly rather than just decree arbitrary numbers of contacts. Please find this on the next page. It even has all critical functions duplicated to make probability of the shutter causing us to break vacuum the product of two very small numbers. This is not intended to be a prescriptive design, just a verification of required contacts and robustness.

The SPIRE cryoharness harness contacts are still in short supply but 14+15 instead of 2 x 14 will just fit, see tabulation. So I've made it 2x15 for symmetry. I don't think that I've never listed had 36 contacts in the cryoharness for the shutter, or put a signature on a document agreeing to this number. They do not fit.

Cheers

John

From: Don.Peterson
Sent: Friday, March 16, 2001 22:34
To: 'Griffin, DK (Doug) '
Subject: RE: Shutter Meeting at MSSL

Hi, Doug,

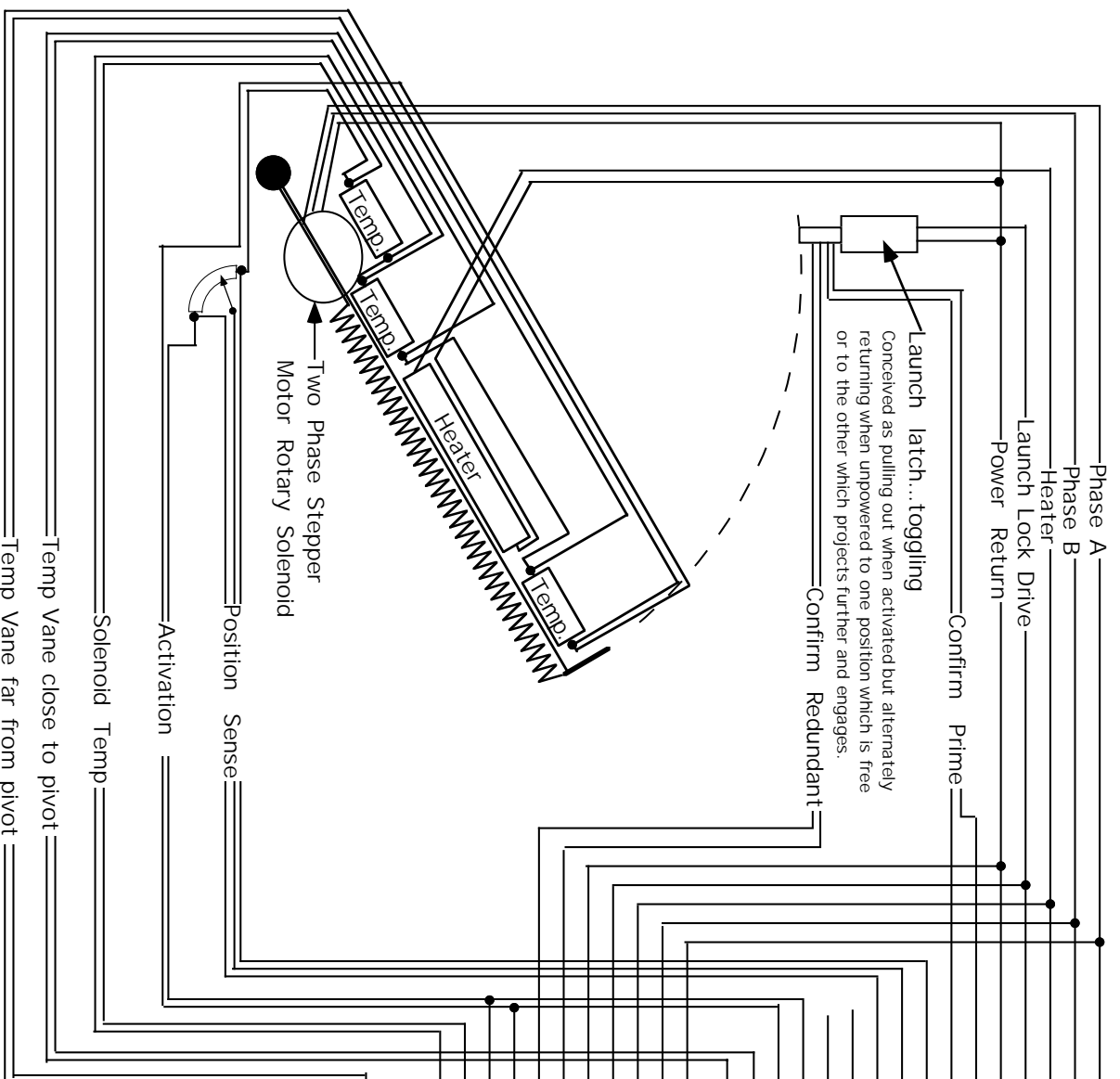
I'll be out of the office next week, but I wanted to remind people that, while I recognize the need to keep wire counts as low as possible, the number of wires that we have previously negotiated in the IID is 36. Until we have a chance to review the shutter design carefully, all references to 28 wires should probably be indicated as "TBD".

At present ComDev is examining various actuators, latches, and temperature sensors which have differing wiring. We will not compromise the strict requirement to remain "Open" on orbit, and will evaluate wire count reductions for the Project's consideration, keeping in mind that fewer wires may increase the need to break vacuum during testing, in the event of failures which are highly improbable, but possible.

Sorry if this note seems abrupt; I do want to get it to you for Monday, as I will not have a chance to do so at all next week. You can direct questions to John Hackett or Joe Taylor. I will monitor my voice mail.

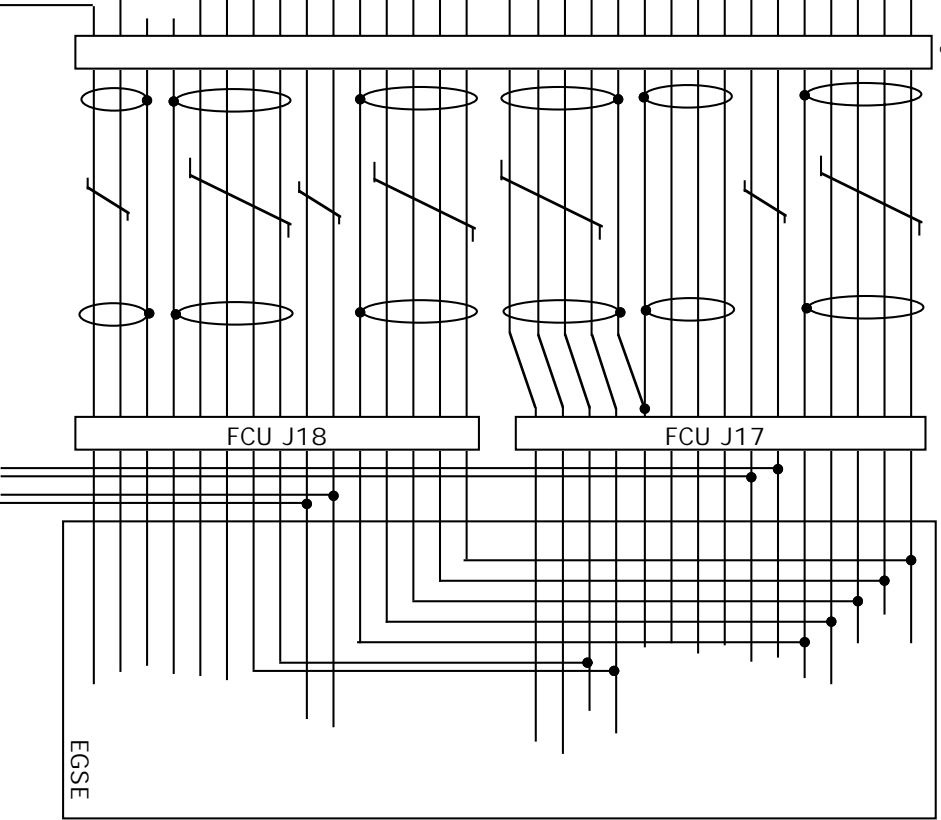
Regards,
Don

Note: For simplicity all wires are shown singly in the subsystem but in practice the implementer may choose to double up some/all.



Unit's 37way connector
31ways used

2x FPU Filter 37way connectors
15ways on each and hence into 100ways



Possible Shutter Configuration

with robustness on critical functions.

JD 20/3/01

AUXILIARY PRIME 10		No. of Cond. Pins	No. of shield pins	Max-allowed Res. (Ohms)	Mean Current (A)/cond.	Peak Current (A)/cond.	Remarks	Cernox Type or Connect ID
<i>Total CVV 100way Pins in Use= 100</i>								
Shutter Actuator	2	1	10				Scr. Tw. Quad* with*	FCU J15
Shutter Launch latch drive	1	0	10				Twisted Pair	FCU J15
Shutter launch latch confirm	2	0	1000	2.50E-09	2.50E-09		with*	FCU J15
Shutter Heater	1	0	10					FCU J15
Shutter Sensor Activation	2	0.5	1000	2.50E-09	2.50E-09		Scr. Tw. Quad	FCU J15
Shutter Vane Therm A	2	0	1000	2.50E-09	2.50E-09		With activation	FCU J15
Shutter Vane Position	2	0.5	1000	2.50E-09	2.50E-09		Scr. Tw. Tripl	FCU J15
<i>Total CVV 100way Pins in Use= 100</i>								
3000k Pump heater	2	0	10	3.00E-02	3.00E-02		Twisted Pair	FCU J11
3000k Pump heater (rob)	2	0	10	3.00E-02	3.00E-02		Twisted Pair	FCU J11
3000k Pump Therm	4	0.2	1000	2.50E-09	2.50E-09		Scr. Tw. Quad	FCU J11
3000k Evap. diag heater	2	0	10	0.00E+00	0.00E+00		Twisted Pair	FCU J11
3000k Evap. Therm	4	0.2	1000	2.50E-09	2.50E-09		Scr. Tw. Quad	FCX-1030
3000k Shunt therm	4	0.2	1000	2.50E-09	2.50E-09		Scr. Tw. Quad	FCX-1030
3000k Pump heat SW heater	2	0	10	1.60E-03	1.60E-03		Twisted Pair	FCU J11
3000k Evap. heat SW heater	2	0	10	1.60E-03	1.60E-03		Twisted Pair	FCU J11
3000k Pump heat SW heater(rob)	2	0	10	1.60E-03	1.60E-03		Twisted Pair	FCU J11
3000k Evap. heat SW heater(rob)	2	0	10	1.60E-03	1.60E-03		Twisted Pair	FCU J11
3000k Pump heat SW therm.	4	0.2	1000	2.50E-09	2.50E-09		Scr. Tw. Quad	FCX-1050
3000k Evap. heat SW therm.	4	0.2	1000	2.50E-09	2.50E-09		Scr. Tw. Quad	FCX-1050
<i>Total CVV 100way Pins in Use= 96</i>								
FTS BB Flood Heater	2	0	30	3.00E-03	3.00E-03		Twisted Pair	FCU J21
FTS BB Flood Heater (rob)	2	0	30	3.00E-03	3.00E-03		Twisted Pair	FCU J21
FTS BB Flood Therm.	4	0.5	1000	2.50E-09	2.50E-09		Scr. Tw. Quad	FCX-1070
FTS BB case nr. SOB I/F therm	4	0.5	1000	2.50E-09	2.50E-09		Scr. Tw. Quad	FCX-1070
FTS BB Point Stimulus	2	0	30				Twisted Pair	FCU J21
<i>Total CVV 100way Pins in Use= 96</i>								
Spec JET chassis therm.	15	14	1	2.50E-09	2.50E-09		9Therm+6	Therm=FCU J25
Prot. JET chassis therm.	4	0.25	1000	2.50E-09	2.50E-09		Scr. Tw. Quad	FCX-1070
FSFPU chassis therm.	4	0.25	1000	2.50E-09	2.50E-09		Scr. Tw. Quad	FCX-1070
Photometer 2K box	4	0.25	1000	2.50E-09	2.50E-09		Scr. Tw. Quad	FCX-1050
Spectrometer 2K box	4	0.25	1000	2.50E-09	2.50E-09		Scr. Tw. Quad	FCX-1050
M3.5.7 Optical Subbench	4	0.33	1000	2.50E-09	2.50E-09		Scr. Tw. Quad	FCX-1050
Input Barfie Therm	4	0.34	1000	2.50E-09	2.50E-09		Scr. Tw. Quad	FCX-1050
BSM/SOB I/F therm	4	1	1000	2.50E-09	2.50E-09		Scr. Tw. Quad	FCX-1070
<i>Total CVV 100way Pins in Use= 96</i>								
DRIVES PRIME 11								
<i>Total CVV 100way Pins in Use= 96</i>								
BSM chop drive coil	2	0.5	10	0.010	0.050		Scr. Tw. Pair	FCU J25
BSM jiggle drive coil	2	0.5	10	0.010	0.050		Scr. Tw. Pair	FCU J25
BSM chop drive coil(rob)	2	0.5	10	0.010	0.050		Scr. Tw. Pair	FCU J25
BSM jiggle drive coil(rob)	2	0.5	10	0.010	0.050		Scr. Tw. Pair	FCU J25
BSM drop posn. Sense	5	1	100	1.00E-04	1.00E-04		STP+ STT	FCU J25
BSM jiggle posn. Sense	5	1	100	1.00E-04	1.00E-04		STP+ STT	FCU J25
BSM therm	4	1	1000	2.50E-09	2.50E-09		Scr. Tw. Quad	FCX-1050
BSM Launch Latch	2	0	10				Twisted Pair	FCU J25
BSM Launch Latch sensor	2	0	1000				Twisted Pair	FCU J25
Prot. BB Point Stimulus	2	1	30				Twisted Pair	FCU J25
<i>Total CVV 100way Pins in Use= 96</i>								
<i>Total CVV 100way Pins in Use= 96</i>								
SMEC drive coil	2	1	10	8.00E-03	8.00E-03		Scr. Tw. Pair	FCU J27
SMEC drive coil(rob)	2	1	10	8.00E-03	8.00E-03		Scr. Tw. Pair	FCU J27
SMEC drive coil volts	2	1	1000	2.50E-09	2.50E-09		Scr. Tw. Pair	FCU J27
SMEC posn sensors	19	1	1000	1.00E-04	1.00E-04		TBD	FCU J29
SMEC home/limit switches	18	1	1000	1.00E-03	1.00E-03		TBD	FCU J29
SMEC Mechanism Temp	4	1	1000	2.50E-09	2.50E-09		Scr. Tw. Quad	FCX-1050
SMEC Launch Latch	2	0	10				Scr. Tw. Pair	FCU J27
BSM Launch Latch sensor	2	0	1000				Twisted Pair	FCU J27
SMEC/SOB I/F therm	4	1	1000	2.50E-09	2.50E-09		Scr. Tw. Quad	FCX-1070
<i>Total CVV 100way Pins in Use= 96</i>								
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NOTE: Shutter Actuator(rob) Shutter launch latch drive(rob) Shutter launch latch confirm Shutter Heater(rob) Shutter Sensor Activation Shutter Vane Therm B Shutter Actuator Therm

AUXILIARY REDUNDANT 12		No. of Cond. Pins	No. of shield pins	Max-allowed Res. (Ohms)	Mean Current (A)/cond.	Peak Current (A)/cond.	Remarks	Cernox Type or Connect ID
<i>Total CVV 100way Pins in Use= 100</i>								
Shutter Actuator(rob)	2	1	10				Scr. Tw. Quad* with*	FCU J16
Shutter launch latch drive(rob)	1	0	10				Twisted Pair	FCU J16
Shutter launch latch confirm	2	0	1000	2.50E-09	2.50E-09		with*	FCU J16
Shutter Heater(rob)	1	0	10					FCU J16
Shutter Sensor Activation	2	1	1000	2.50E-09	2.50E-09		Scr. Tw. Quad	FCU J16
Shutter Vane Therm B	2	1	1000	2.50E-09	2.50E-09		Scr. Tw. Quad	FCU J16
Shutter Actuator Therm	2	0	1000	2.50E-09	2.50E-09		With activation	FCU J16
<i>Total CVV 100way Pins in Use= 100</i>								
3000k Pump heater	2	0	10	3.00E-02	3.00E-02		Twisted Pair	FCU J12
3000k Pump heater(rob)	2	0	10	3.00E-02	3.00E-02		Twisted Pair	FCU J12
3000k Pump Therm	4	0.2	1000	2.50E-09	2.50E-09		Scr. Tw. Quad	FCX-1050
3000k Evap. diag heater	2	0	10	0.00E+00	0.00E+00		Twisted Pair	FCU J12
3000k Evap. Therm	4	0.2	1000	2.50E-09	2.50E-09		Scr. Tw. Quad	FCX-1030
3000k Shunt therm	4	0.2	1000	2.50E-09	2.50E-09		Scr. Tw. Quad	FCX-1030
3000k Pump heat SW heater	2	0	10	1.60E-03	1.60E-03		Twisted Pair	FCU J12
3000k Evap. heat SW heater	2	0	10	1.60E-03	1.60E-03		Twisted Pair	FCU J12
3000k Pump heat SW heater(rob)	2	0	10	1.60E-03	1.60E-03		Twisted Pair	FCU J12
3000k Evap. heat SW heater(rob)	2	0	10	1.60E-03	1.60E-03		Twisted Pair	FCU J12
3000k Pump heat SW therm.	4	0.2	1000	2.50E-09	2.50E-09		Scr. Tw. Quad	FCX-1050
3000k Evap. heat SW therm.	4	0.2	1000	2.50E-09	2.50E-09		Scr. Tw. Quad	FCX-1050
<i>Total CVV 100way Pins in Use= 96</i>								
<i>Total CVV 100way Pins in Use= 96</i>								
FTS BB Flood Heater	2	0	30	3.00E-03	3.00E-03		Twisted Pair	FCU J21
FTS BB Flood Heater (rob)	2	0	30	3.00E-03	3.00E-03		Twisted Pair	FCU J21
FTS BB Flood Therm.	4	0.5	1000	2.50E-09	2.50E-09		Scr. Tw. Quad	FCX-1070
FTS BB case nr. SOB I/F therm	4	0.5	1000	2.50E-09	2.50E-09		Scr. Tw. Quad	FCX-1070
FTS BB Point Stimulus	2	0	30				Twisted Pair	FCU J21
<i>Total CVV 100way Pins in Use= 96</i>								
<i>Total CVV 100way Pins in Use= 96</i>								
Spec JET chassis therm.	15	14	1	2.50E-09	2.50E-09		9Therm+6	Therm=FCU J25
Prot. JET chassis therm.	4	0.25	1000	2.50E-09	2.50E-09		Scr. Tw. Quad	FCX-1070
FSFPU chassis therm.	4	0.25	1000	2.50E-09	2.50E-09		Scr. Tw. Quad	FCX-1070
Photometer 2K box	4	0.25	1000	2.50E-09	2.50E-09		Scr. Tw. Quad	FCX-1050
Spectrometer 2K box	4	0.25	1000	2.50E-09	2.50E-09		Scr. Tw. Quad	FCX-1050
M3.5.7 Optical Subbench	4	0.33	1000	2.50E-09	2.50E-09		Scr. Tw. Quad	FCX-1050
Input Barfie Therm	4	0.34	1000	2.50E-09	2.50E-09		Scr. Tw. Quad	FCX-1050
BSM/SOB I/F therm	4	1	1000	2.50E-09	2.50E-09		Scr. Tw. Quad	FCX-1070
<i>Total CVV 100way Pins in Use= 96</i>								
<i>Total CVV 100way Pins in Use= 96</i>								
DRIVES REDUNDANT 13								
<i>Total CVV 100way Pins in Use= 96</i>								
BSM chop drive coil	2	0.5	10	0.010	0.050		Scr. Tw. Pair	FCU J26
BSM jiggle drive coil	2	0.5	10	0.010	0.050		Scr. Tw. Pair	FCU J26
BSM chop drive coil(rob)	2	0.5	10	0.010	0.050		Scr. Tw. Pair	FCU J26
BSM jiggle drive coil(rob)	2	0.5	10	0.010	0.050		Scr. Tw. Pair	FCU J26
BSM drop posn. Sense	5	1	100	1.00E-04	1.00E-04		STP+ STT	FCU J26
BSM jiggle posn. Sense	5	1	100	1.00E-04	1.00E-04		STP+ STT	FCU J26
BSM therm	4	1	1000	2.50E-09	2.50E-09		Scr. Tw. Quad	FCX-1050
BSM Launch Latch	2	0	10				Twisted Pair	FCU J26
BSM Launch Latch sensor	2	0	1000				Twisted Pair	FCU J26
Prot. BB Point Stimulus	2	1	30				Twisted Pair	FCU J26
<i>Total CVV 100way Pins in Use= 96</i>								
<i>Total CVV 100way Pins in Use= 96</i>								
SMEC drive coil	2	1	10	0.00E+00	8.00E-03		Scr. Tw. Pair	FCU J28
SMEC drive coil(rob)	2	1	10	0.00E+00	8.00E-03		Scr. Tw. Pair	FCU J28
SMEC drive coil volts	2	1	1000	2.50E-09	2.50E-09		Scr. Tw. Pair	FCU J28
SMEC posn sensors	19	1	1000	1.00E-04	1.00E-04		TBD	FCU J30
SMEC home/limit switches	18	1	1000	1.00E-03	1.00E-03		TBD	FCU J30
SMEC Mechanism Temp	4	1	1000	2.50E-09	2.50E-09		Scr. Tw. Quad	FCX-1050
SMEC Launch Latch	2	0	10				Scr. Tw. Pair	FCU J28
BSM Launch Latch sensor	2	0	1000				Twisted Pair	FCU J28
SMEC/SOB I/F therm	4	1	1000	2.50E-09	2.50E-09		Scr. Tw. Quad	FCX-1070
<i>Total CVV 100way Pins in Use= 96</i>								
<i>Total CVV 100way Pins in Use= 96</i>								

NOTE: Shutter Actuator(rob) Shutter launch latch drive(rob) Shutter launch latch confirm Shutter Heater(rob) Shutter Sensor Activation Shutter Vane Therm B Shutter Actuator Therm

- All screens insulated and no currents to be returned via above listed screens. The 100 CVV connectors are in the middle of this run. For end tails at FCU and FPU see Block diagram.
- Outside of each of these cables to be separately r.f. screened in addition to wires shown in the tables and these screens joined to connector backshells
- Mean current per conductor when that side (prime or redundant) is active, shall be zero in unpowered state. When 4 wires are used, 2 for current and 2 for voltage sense, mean current = half conditioning current (x fraction of time energised).
- Peak current per conductor is for "derating" sizing and is the worst case for any one conductor in group over a Unrescale of 5 msec/cond.
- "(rob)" means robustness and spels out that the harness includes duplicate wires for critical functions, permitting some wire breakages without forcing prime to redundant side switching
- ... such wires drive the same heater/coil as others, although might initially measure volts and amps rather than having identical function.
- Friction numbers of pins for shields means that sometimes more than one insulated signal ground shield terminates to a given pin.
- The above listing applies from the FSFPU RF Filter outputs to the DCU warm electronics, excluding that the "tails" at the DCU end are partitioned to suit its connectors i.e. temperature sensors are regrouped.
- The choice of material and its gauge to keep below the required overall impedance end-to-end are to be specified by the harness supplier, the specification applying in the case of the cryostat running at working temperature. This suggests stainless steel for many of the conductors in the other element outside the 100-way CVV connectors.