HASP Payload Specification and Integration Plan

Payload Title: OSIRIS LITE

Payload Class: Small Large (circle one)

Payload ID: 03

Institution: **The Pennsylvania State University**

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Submit Date: 6/30/2010

I. Mechanical Specifications:

A. Measured weight of the payload (not including payload plate)

Subsystem	Mass (g)	Quantity	Total Mass (g)
Comm	213.38	1	213.38
PWR EXP	124.85	1	124.85
GNC	87.54	1	87.54
PWR SUB	85.83	1	85.83
CDH	89.98	1	89.98
PWR Distro	5.32	6	31.92
solar panel	95.56	1	95.56
back plane board	96.67	1	96.67
sun sensors	9.28	5	46.4
Skeleton w/ negZ Panel	521.01	1	521.01
Side Skin Panels	352.37	1	352.37
posZ Skin Panel w/ Standoffs	72.93	1	72.93
Skin Fasteners (20)	7.14	1	7.14
COM EMI Shield	42.37	1	42.37
Board Bracket	7.87	5	39.35
sun sensor box	11.55	5	57.75
Antenna	229	1	229
Antenna Cabling	183.25	1	183.25
		Total Mass	2377.3

Current payload mass is 2377.3 g with all masses measured.

B. Provide a mechanical drawing detailing the major components of your payload and specifically how your payload is attached to the payload mounting plate.

See attached PDF drawings.

C. If you are flying anything that is potentially hazardous to HASP or the ground crew before or after launch, please supply all documentation provided with the hazardous components (i.e. pressurized containers, radioactive material, projectiles, rockets…)

The OLite bus does not contain any potentially hazardous components.

D. Other relevant mechanical information

Sun sensor boxes, shown in orange on provided drawings, exceed the width of the specified payload footprint. These boxes are 29.8cm (11.7in) above the interface plate and will not cause mechanical interference.

II. Power Specifications:

A. Payload power specification

OLite has three operational modes. Subsystems have a power line switching and monitoring module controlled by TTL signals from C&DH, thus they can be turned on and off as the modes require.

Mode transitions are triggered off an internal timer set prior to flight.

1. *Ascent with communications only*

   OLite will be in this mode for the 3 hours

2. *Float with communications (includes GNC and PWR experiments)*

   The payload will be in this mode for the second hour of flight.

3. *Float without communications*

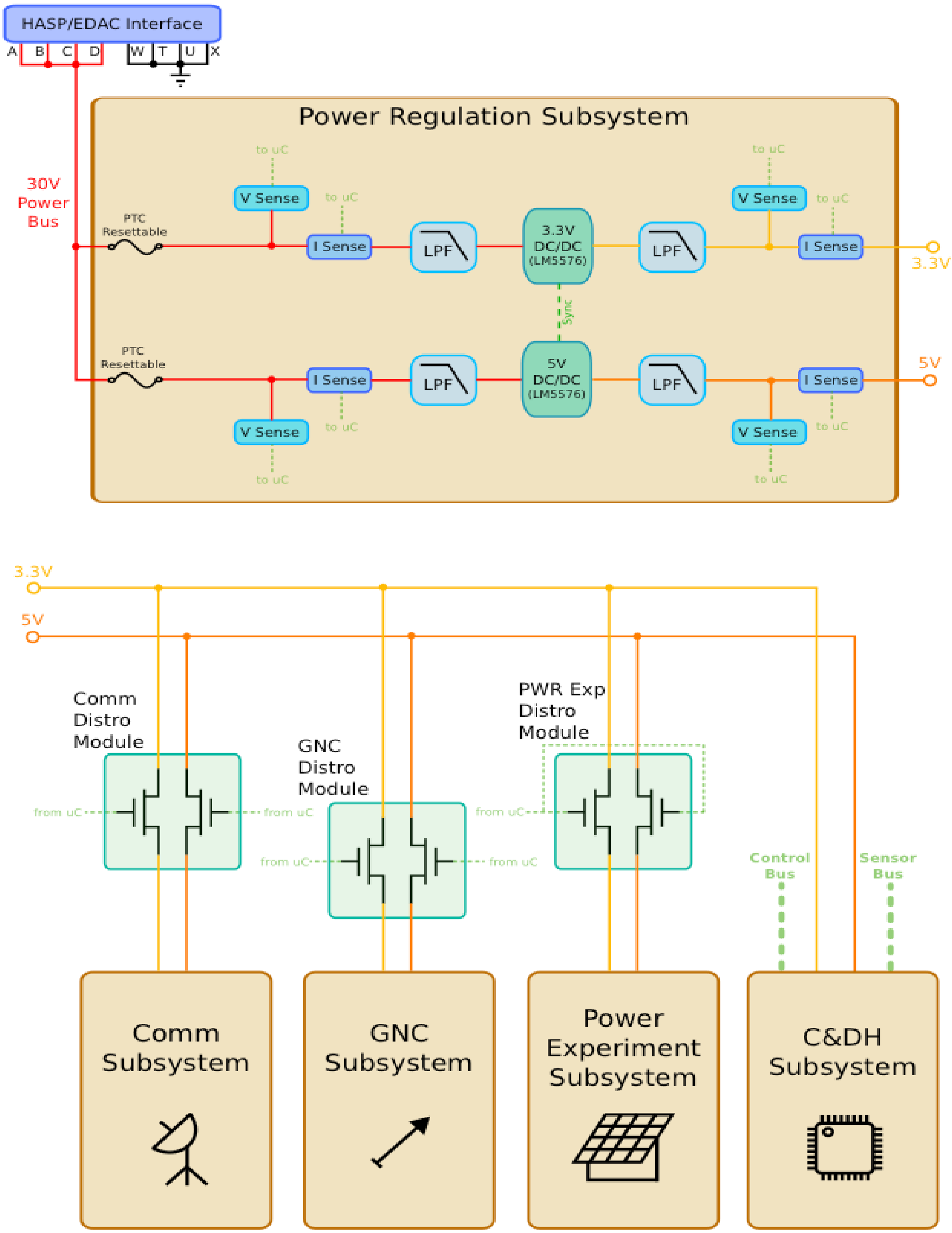
   OLite will be in this mode for the duration of flight.

Table 1 Assent (and float start) with Comm Only

GNC Experiment	0	W
PWR Experiment	0	W
COM Experiment	5.49	W
CDH Subsystem	1.75	W
Housekeeping	0.5	W
Thermal	0	W
Total	7.74	W
PWR Efficiency	75%	
Total	9.675	W
Margin	5.325	W

Table 2 Float Without Communications

GNC Experiment	0.25	W
PWR Experiment	0.33	W
COM Experiment	0	W
CDH Subsystem	1.75	W
Housekeeping	0.5	W
Thermal	2	W
Total	4.83	W
PWR Efficiency	75%	
Total	6.0375	W
Margin	8.9625	W



Simplified Schematic of OLite Power Systems

III. Downlink Telemetry Specifications:

A. Serial data downlink format: Stream Packetized (circle one)

B. Approximate serial downlink rate (in bits per second)

1200 bps (OLite is planning on using the entire allotted bandwidth)

C. Specify your serial data record including record length and information contained in each record byte.

Telemetry Packet				GNC Packet				Power Packet				Camera Packet		
Data type	Size in bits	Descr		Data type	Size in bits	Descr		Data type	Size in bits	Descr		Data type	Size in bits	Descr
Subframe ID	8	0, 1, 2, 3… 255, 0, 1, 2…		Subframe ID	8	0, 1, 2, 3… 255, 0, 1, 2…		Subframe ID	8	0, 1, 2, 3… 255, 0, 1, 2…		Subframe ID	8	0, 1, 2, 3… 255, 0 1, 2…
Time Stamp	32	UNIX time		Time Stamp	32	UNIX time		Time Stamp	32	UNIX time		Time Stamp	32	UNIX time
Frame ID	8	T		Frame ID	8	G		Frame ID	8	P		Frame ID	8	C
Packet Data	312	Telemetry data (current, volage, and temp sensors)		Packet Data	304	GNC sun sensor and magnetometer data		Packet Data	40384	Power experiment data		Packet Data	256000	Image data
IRIG Standard Sync Word	16	0xEB90		IRIG Standard Sync Word	16	0xEB90		IRIG Standard Sync Word	16	0xEB90		IRIG Standard Sync Word	16	0xEB90

	Telemetry Packet			GNC Packet			Power Packet			Camera Packet	
Downlink Rate:	Period (seconds):	Hz:		Period (seconds):	Hz:		Period (seconds):	Hz:		Period (seconds):	Hz:
Ascent	10	0.1		0	0		0	0		250	0.004
Float	10	0.1		10	0.1		180	0.005555556		400	0.0025

D. Number of analog channels being used:

2 analog lines are being used

E. If analog channels are being used, what are they being used for?

Analog 1 (Pin K) Command and Data Handling Current and Analog 2 (Pin M) Voltage Sensors

F. Number of discrete lines being used:

No discrete lines are being used.

G. If discrete lines are being used what are they being used for?

N/A

H. Are there any on-board transmitters? If so, list the frequencies being used and the transmitted power.

Yes, 915Mhz at 1W.

I. Other relevant downlink telemetry information.

The transmitted packet will be as follows:

256 bit Packet (transmit every 5 seconds @64bkps)

	KB3OQG	Counter	Timestamp	WE_ARE_PENN_STATE
#bits	48	24	48	136

IV. Uplink Commanding Specifications:

A. Command uplink capability required: Yes No (circle one)

B. If so, will commands be uplinked in regular intervals: Yes No (circle one)

C. How many commands do you expect to uplink during the flight (can be an absolute number or a rate, i.e. *n commands per hour*)

If everything operates correctly we expect to send no (0) uplink commands.

D. Provide a table of all of the commands that you will be uplinking to your payload

ID:	Size (bits):	Description:	Type:
0x00	8	GNC Experiment On	General
0x01	8	GNC Experiment Off	
0x02	8	Power Experiment On	
0x03	8	Power Experiment Off	
0x04	8	Comm RSSI Experiment On	

0x05	8	Comm RSSI Experiment Off	
0x06	8	Comm BER Experiment On	
0x07	8	Comm BER Experiment Off	
0x08	8	Patch Heater On	
0x09	8	Patch Heater Off	
0x0A	8	Reset Magnetometer	GNC
0x0B	8	Sun sensor 1 On	
0x0C	8	Sun sensor 2 On	
0x0D	8	Sun sensor 3 On	
0x0E	8	Sun sensor 4 On	
0x0F	8	Sun sensor 5 On	
0x10	8	Sun Sensor 1 Off	
0x11	8	Sun Sensor 2 Off	
0x12	8	Sun Sensor 3 Off	
0x13	8	Sun Sensor 4 Off	
0x14	8	Sun Sensor 5 Off	
0x15	8	Reset 3.3V Power Line	Comm
0x16	8	Reset 5V Power Line	
0x17	8	Transceiver - RSSI Mode	
0x18	8	Transceiver - Transmit Mode	
0x19	8	Transceiver - Receive Mode	
0x1A	8	Power Cycle C&DH	Power
0x1B	8	Power Cycle GNC	
0x1C	8	Power Cycle Comm	
0x1D	8	Ascent Mode	C&DH
0x1E	8	Float Mode	
		Change Config Files - Last 4 bite: data (0 - 15)	C&DH Config Files
0x2	4	Change HK Interval (seconds)	
0x3	4	Change Camera Ascent Interval (Minutes)	
0x4	4	Change Camera Float Interval (Minutes)	

E. Are there any on-board receivers? If so, list the frequencies being used.

No.

F. Other relevant uplink commanding information.

N/A

V. Integration and Logistics

A. Date and Time of your arrival for integration:

Sunday afternoon August 1st

B. Approximate amount of time required for integration:

8 Hours

C. Name of the integration team leader:

Scott Teal

D. Email address of the integration team leader:

Rst5039@psu.edu

E. List **ALL** integration participants (first and last names) who will be present for integration with their email addresses:

Scott Teal rst5039@psu.edu

Tim Brubaker trb5084@psu.edu

Miles Frain mhf5029@psu.edu

Josh Miller jim5166@psu.edu

F. Define a successful integration of your payload:

A successful integration will demonstrate that the payload passes:

1) a mechanical fit check,

2) electrical interfaces (power draw, EMI, pinouts),

3) successfully communicate with the HASP gondola,

4) successful operation during environmental test.

5) verify cl

G. List all expected integration steps:

1. *Mechanical mount OLite to HASP Gondola*
2. *Connect HASP power cable*
3. *Verify power connection through communications test with our own laptop*
4. *Connect HASP communications cable*
5. *Verify proper communications with HASP*
6. *Attach antenna to OLite interface plate, attach coax cable for communications test*
7. *While other payload radios are operating, verify that communications can be maintained*

H. List all checks that will determine a successful integration:

   1. *Mechanical Check*
   2. *Verify payload current draw powers up while communicating with PSU computers*
   3. *Verify that OLite communicates properly with the HASP gondola. Verify Uplink and downlink capabilities*
   4. *Verify that OLite radios do not negatively interfere with other payload radios.*
   5. *Verify that other payload radios do not interfere with OLite radios.*
   6. *Verify operation through thermal vacuum checkout*

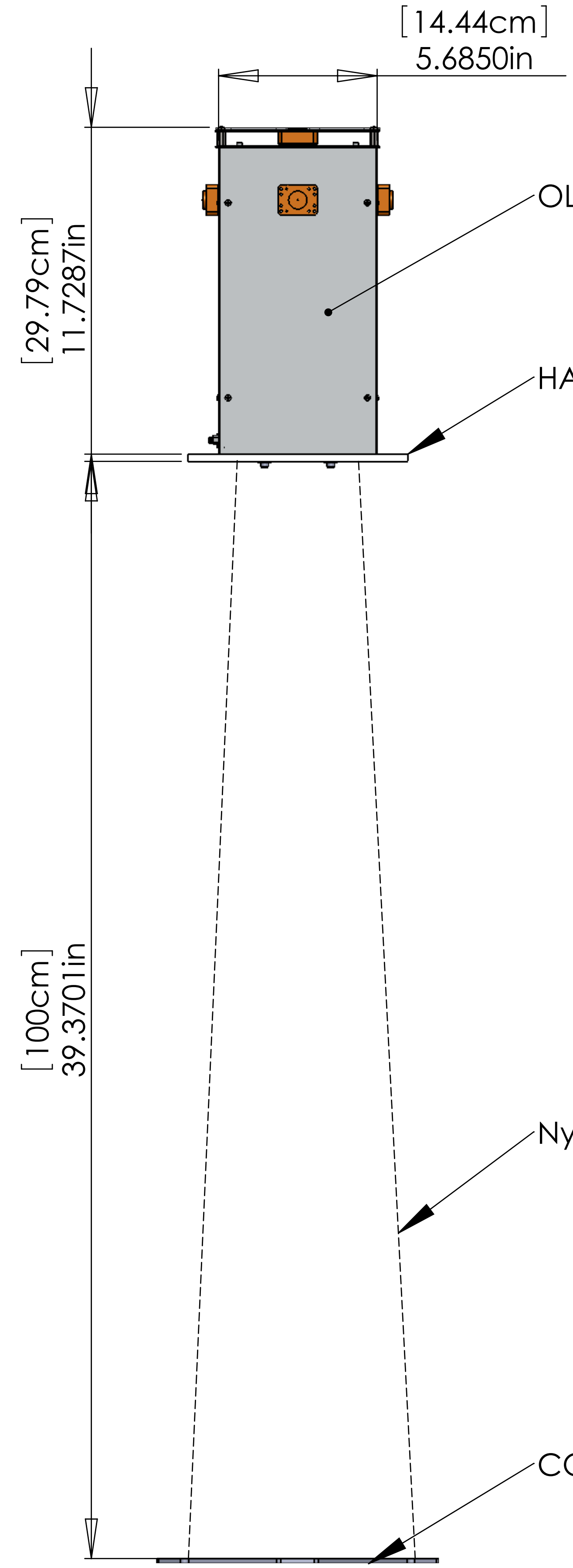
I. List any additional LSU personnel support needed for a successful integration other than directly related to the HASP integration (i.e. lifting, moving equipment, hotel information/arrangements, any special delivery needs…):

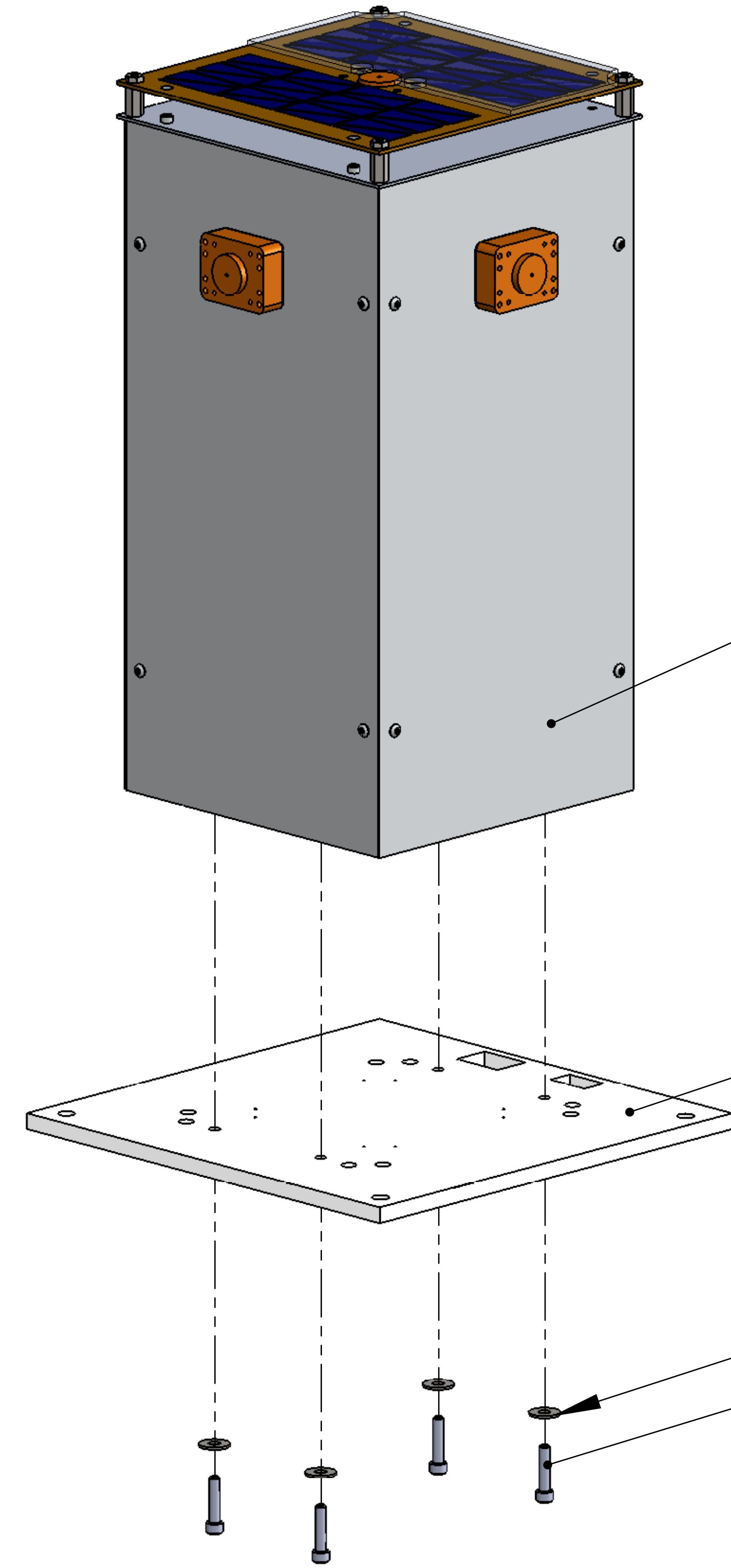
   Please provide recommendations on accommodations and eateries available during integration.

   Please coordinate a communications test to verify interference free operation between all transmitters.

J. List any LSU supplied equipment that may be needed for a successful integration:

   Adjustable power supply (or supplies) that can provide output voltages: 3V, 5V, and 30V. Oscilloscope (preferably mixed signal that can serve as logic analyzer). Soldering station for last minute harness modifications.





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TOLERANCES:
FRACTIONAL ± .05
ANGULAR:
MACH ± 1° BEND ± 1°
TWO PLACE DECIMAL ± .005
THREE PLACE DECIMAL ± .0005
INTERPRET GEOMETRIC TOLERANCING PER: ANSI Y14.5M
MATERIAL
FINISH
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OLITE INTEGRATION PLAN DRAWING

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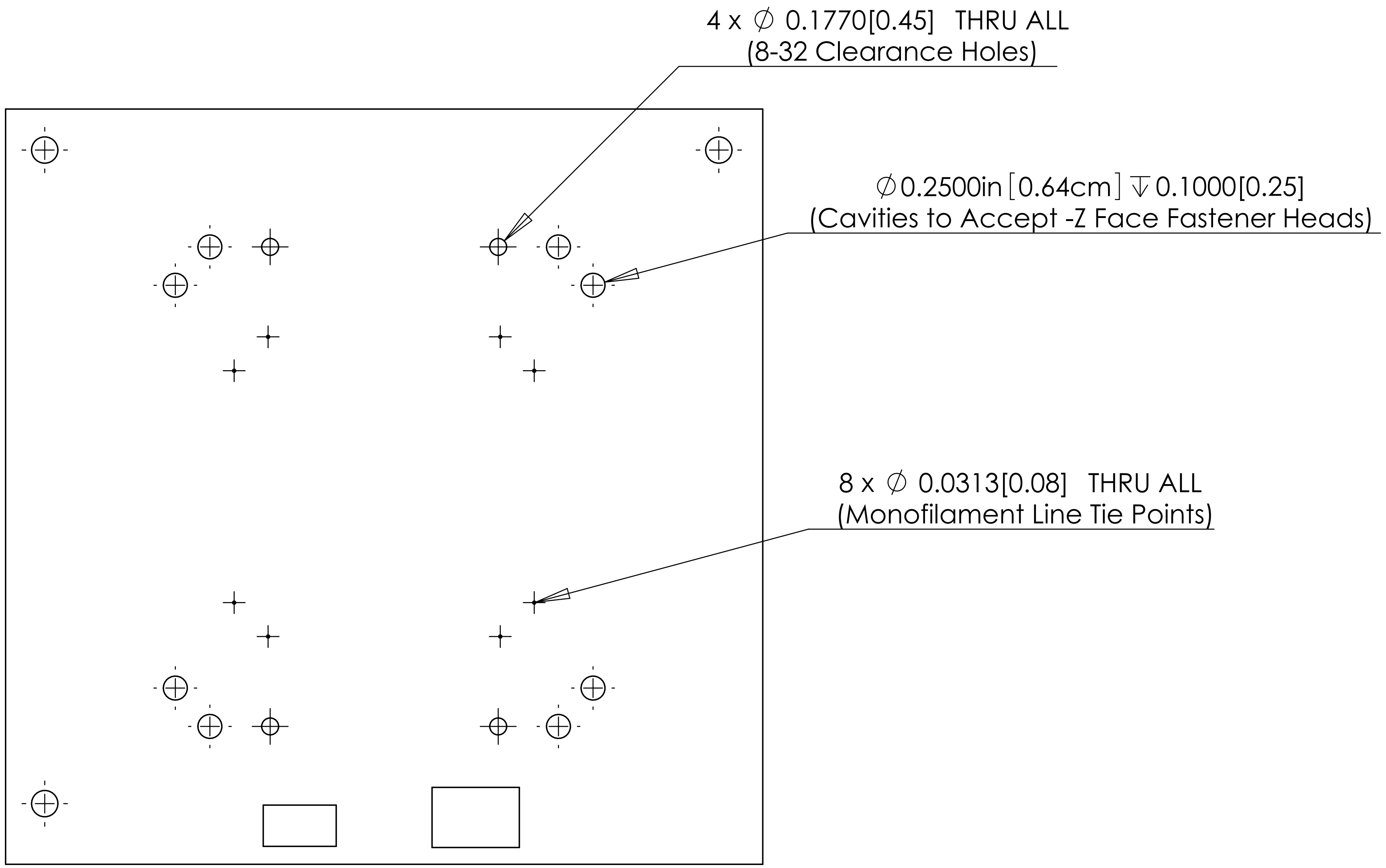

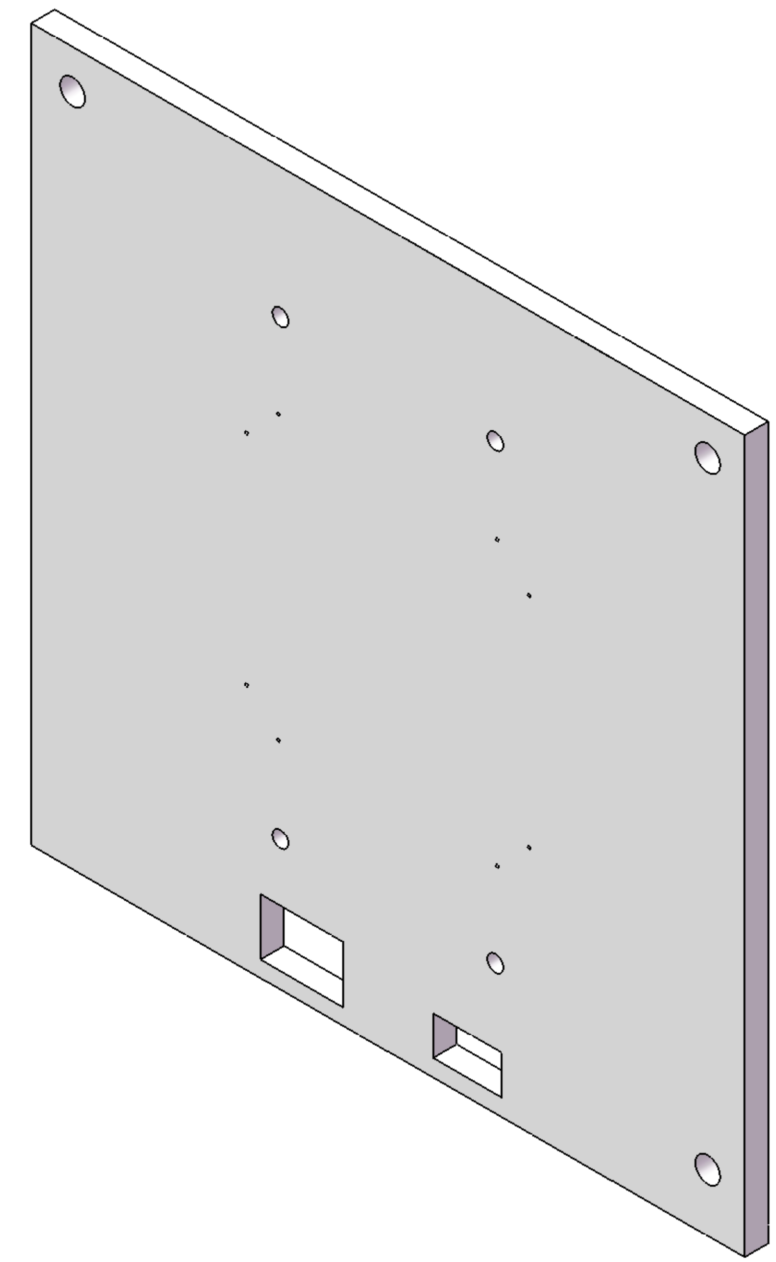

NOTE: THIS DRAWING IS FOR ILLUSTRATING CHANGES TO HASP INTERFACE PLATE ONLY. IT IS NOT A COMPLETE MACHINE DRAWING AND SHOULD NOT BE USED TO MAKE MODIFICATIONS.

NEXT ASSY

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
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FRACTIONAL ±.05
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HASP INTERFACE PLATE MODIFICATION

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SCALE: 2:3 *SHEET* 2 *OF* 2