

Allen Telescope Array
Smart Network ADC Processor
1U Enclosure



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1 General

This document describes the design, component list, and assembly for a 1U SNAP Ver 2.1.1 MAR 2016 enclosure. The design is based on standard components and only requires two modified parts, which can be ordered via Front Panel Express using the included design files. In addition to housing the SNAP board, this design also includes SMA connections to support the ADC 5G V2.0 or any other compatible extension cards. Note, that this enclosure is not EMI-RFI shielded!

2 CAD Design and Drawings

This section includes a description of the CAD design. The enclosure has been designed to support all signal, communication, and power connections from the front. As a result of this, there was not enough space to include cooling fans into the front panel as well. In order to still ensure adequate cooling of the SNAP board and the 5G ADC card, directional fans have been installed which create an airflow from the right-hand side to the left-hand side. This configuration allows the 1U cases to be mounted without any space in between units while still providing sufficient cooling.

An image of the CAD model is shown in Figure 3. One can see the internal arrangement of the SNAP board, power supply, directional fans, and the Raspberry Pi 2 Model B. The two custom parts are the front panel and the base plate, both colored in blue. The lid of the enclosure, not shown in this Figure, is perforated to further increase cooling. The drawings for the front panel and base plate are attached at the end of this document.

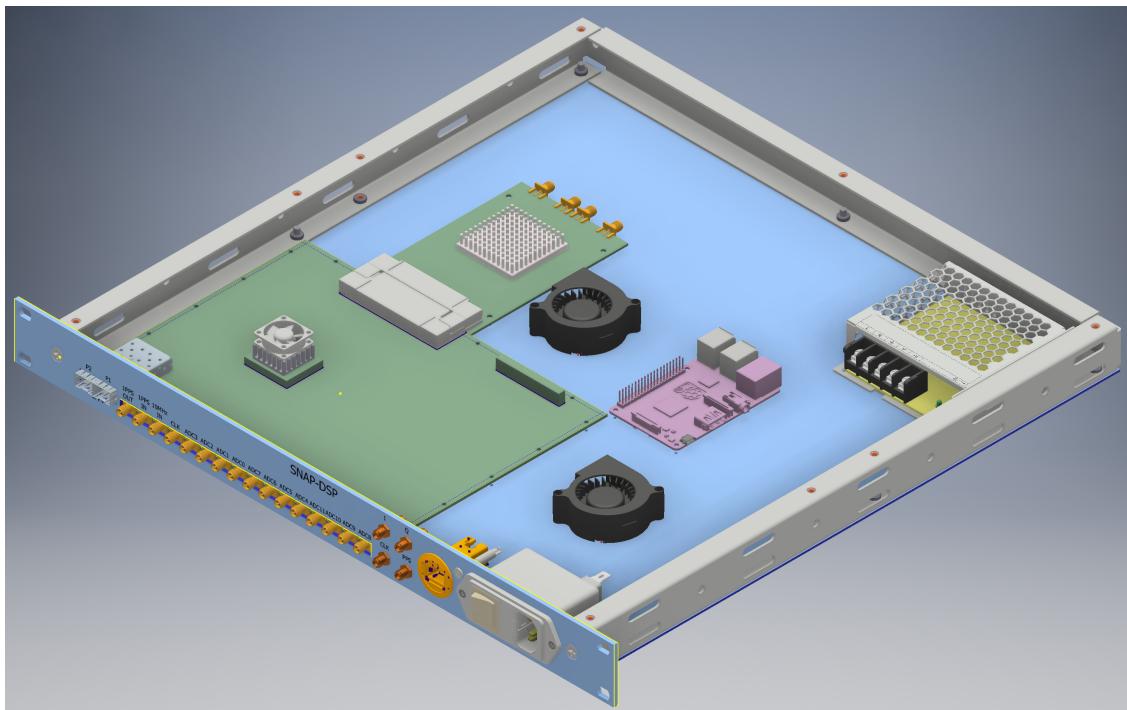


Figure 1: Schematic diagram of the measurement setup.

3 Component List

This section includes a list of the required components including their manufacturer and US distributor. The front panel and base plate can be ordered via <https://www.frontpanelexpress.com> by uploading the design files [VC4039-00-0001.fpd](#) and [VC4084-00-0018.fpd](#). Not included are the SNAP board, 5G ADC card, and power supply cable from the PSU to the SNAP board. The total component cost for the enclosure is approximately 680 USD.

Table 1: Component List 1U SNAP Enclosure

Qty	Unit	Description	Manufacturer	PN Manufacturer	Distributor	PN Distributer
1	Each	LRS-75-12 - POWER SUPPLY, AC-DC, 12V, 6A	Mean Well	LRS-75-12	Newark	44AC5561
1	Each	CHA-01-17, D-4001 1.75" Utility Chassis	General Devices	CHA-01-17	Quail Electronics	CHA-01-17
1	Each	Power Entry Module, Compact, IEC Inlet, 6A, 250VAC	SCHAFFNER	FN282-6-06	Newark	24M2150
1	Pack	Machine Screw, M3, 6 mm	TR FASTENINGS	M3 6 KRSTMC Z100	Newark	53M8781
1	Pack	SCREW, PAN HEAD PZ, M3, 4MM, 50PK	DURATOOL	DT000376	Newark	48AC6542
1	Pack	Machine Screw, M3, 25 mm	TRIPP-LITE	N001-S02-BL	Newark	81Y0762
1	Each	Modular Connector, RJ45 Plug	SCHNEIDER ELECTRIC	XB5PRJ45	Newark	49AC2992
1	Each	Ethernet Cable, Cat5e, 600 mm, 2 ft	SCHNEIDER ELECTRIC	XB5PRJ45	Newark	49AC2992
1	Each	RPI2-MODB-V1.2	RASPBERRY-PI	RPI2-MODB-V1.2	Newark	95Y1948
1	Each	GPIO Ribbon Cable for Raspberry Pi	SAMTEC	FFSD-20-D-04.00-01-N	Newark	99P5134
1	Each	ED Panel Mount Indicator, Green	APEM	Q6F3CXG12E	Newark	05W8310
2	Each	Fan Blower, GB Series, Compact, 12 V, DC	SUNON	GB1205PKV1-8AY.GN	Newark	96M8138
18	Each	SPACER, ROUND, POLYAMIDE, 4MM	WURTH ELEKTRONIK	960040010	Newark	94AC5835
1	Pack	SCREW, PAN HEAD PZ, M2, 8MM, 50PK	DURATOOL	DT000367	Newark	48AC6533
1	Pack	Washer, Plain, Brass, M2, Pack of 100	DURATOOL	M2 WASHER	Newark	03P2386
4	Each	SMA Female to Female Adaptor Frequency: DC-6GHz	Atlantic RF	SMA-1064 Rev A		
4	Each	Coaxial Cable Assemblies Standard Lengths - AFX Series	Atlantic RF	AFX-CA-141-24		
1	Each	Frontpanel	Front Panel Express, LLC	VC4039-00-0001.fpd		
1	Each	Base Plate	Front Panel Express, LLC	VC4084-00-0018.fpd		
2	Each	Fuse, Cartridge, Slow Blow, 2 A, 250 V	Littlefuse	0239002.HXP	Newark	26K8412
5	Each	8-32 X 3/8 STEEL ROUNDHEAD	GC ELECTRONICS	KF-479	Newark	68R7355
1	Each	Barrier Terminal Block Connectors, Jumper, 38723 Series	MOLEX	38723-6502	Newark	72K2052
7	Each	Terminal, Locking, CLS Series, 22AWG to 18AWG, M3.5	MULTICOMP	CLS-TV-1806	Newark	14T2409

4 Power Supply

The SNAP FPGA board and the cooling fans are supplied with a Mean Well 75 W switch-mode PSU. The unit is mounted directly to the base plate of the enclosure, thereby using the case as a thermal heatsink. The operating temperature range of the PSU is from -30°C through 70°C and the technical specifications are shown in Table 2. The power entry module, mounted in the front panel, combines an IEC inlet and a mains filter with a dual-fuse holder. The AC supply fuse current rating for this unit is selected to be 2 A.

Table 2: Power Supply Specification

Description	Output Voltage	Output Current	Power W	Input Voltage
LRS-75-12	12VDC	6A	75W	85 ~ 264 VAC

5 Assembled Unit



Figure 2: Assembled 1U SNAP Enclosure; (a) Front view (b) Iso view.

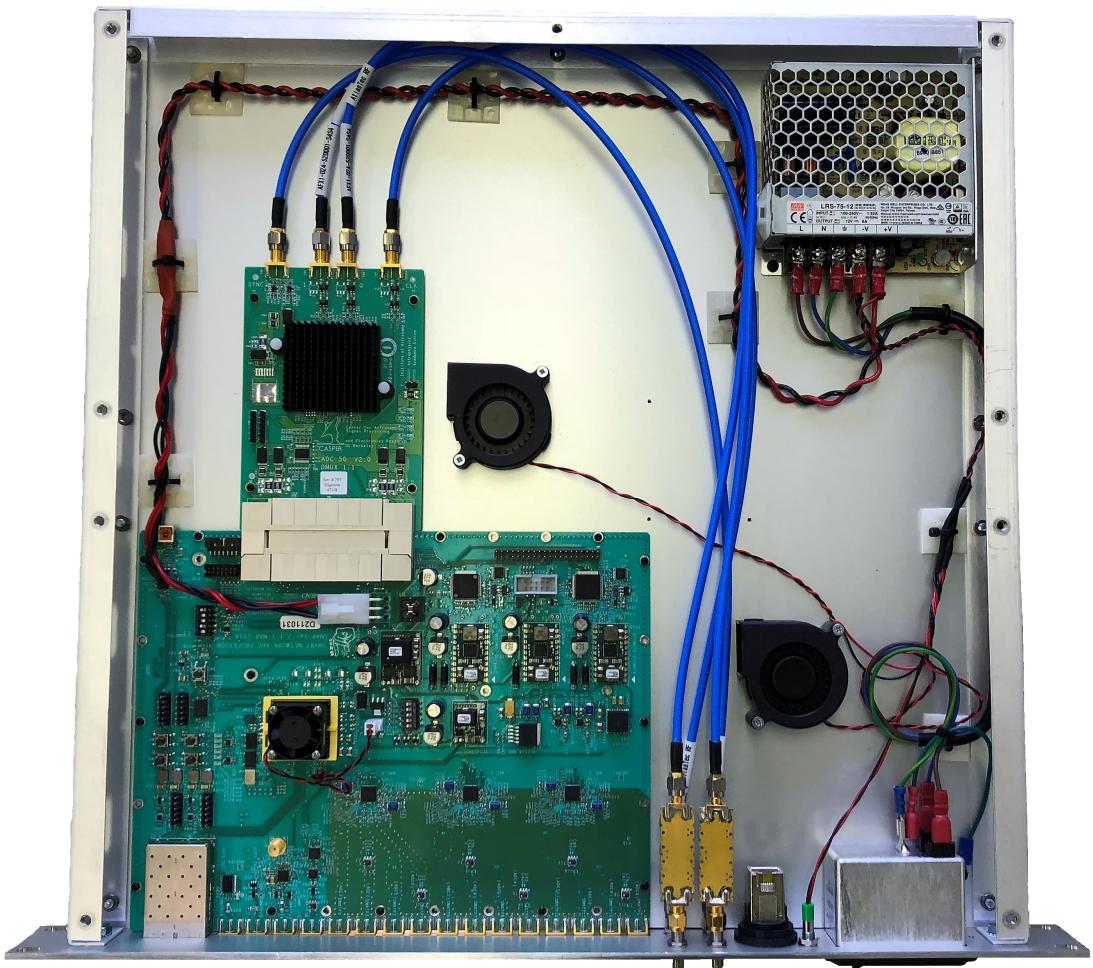
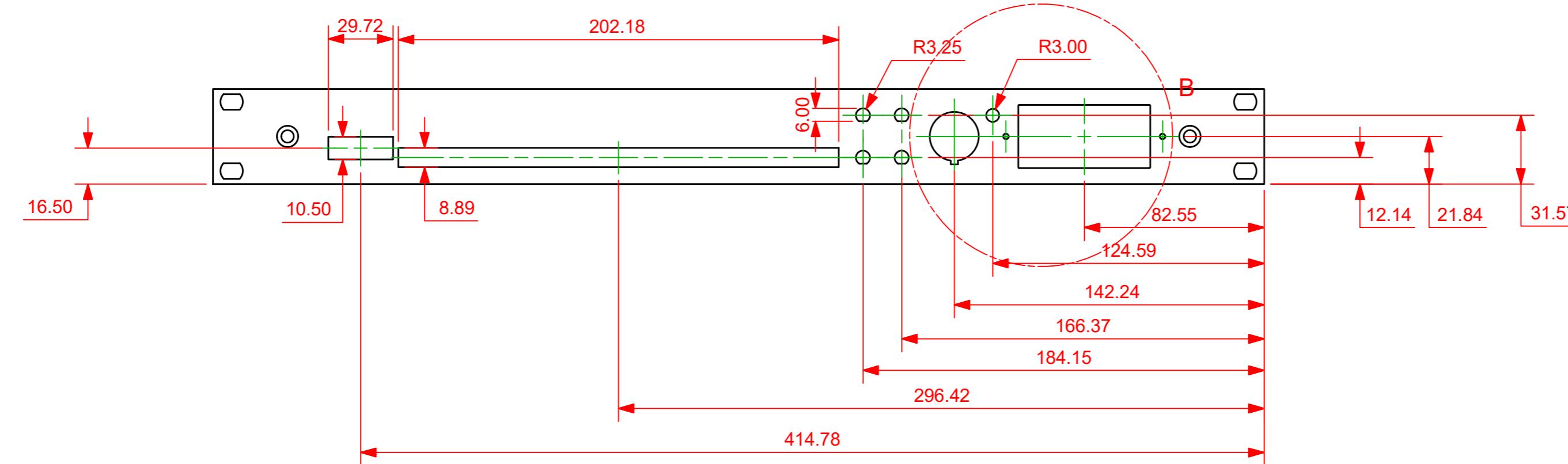
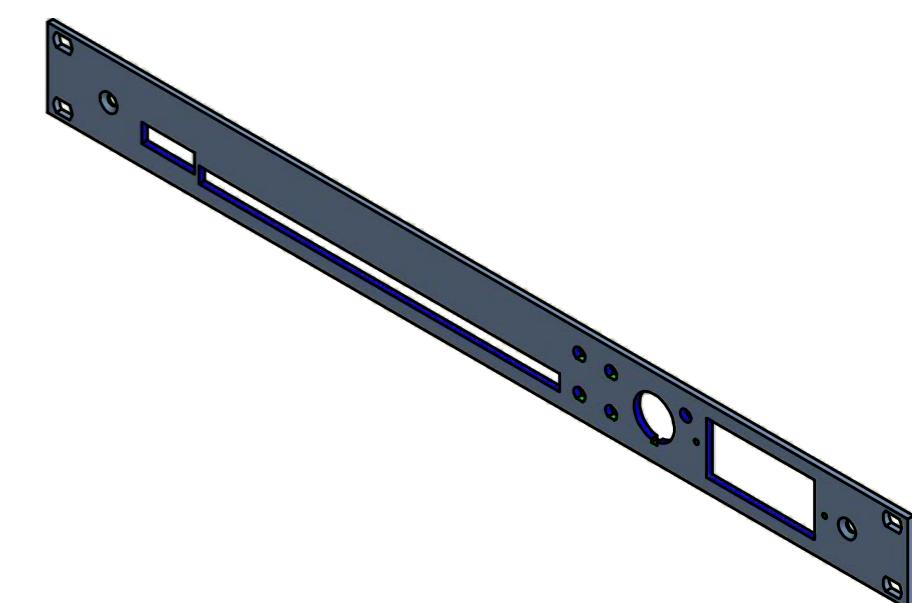


Figure 3: Top view of the assembled case with the lid removed. Note that this unit has no Raspberry Pi installed.

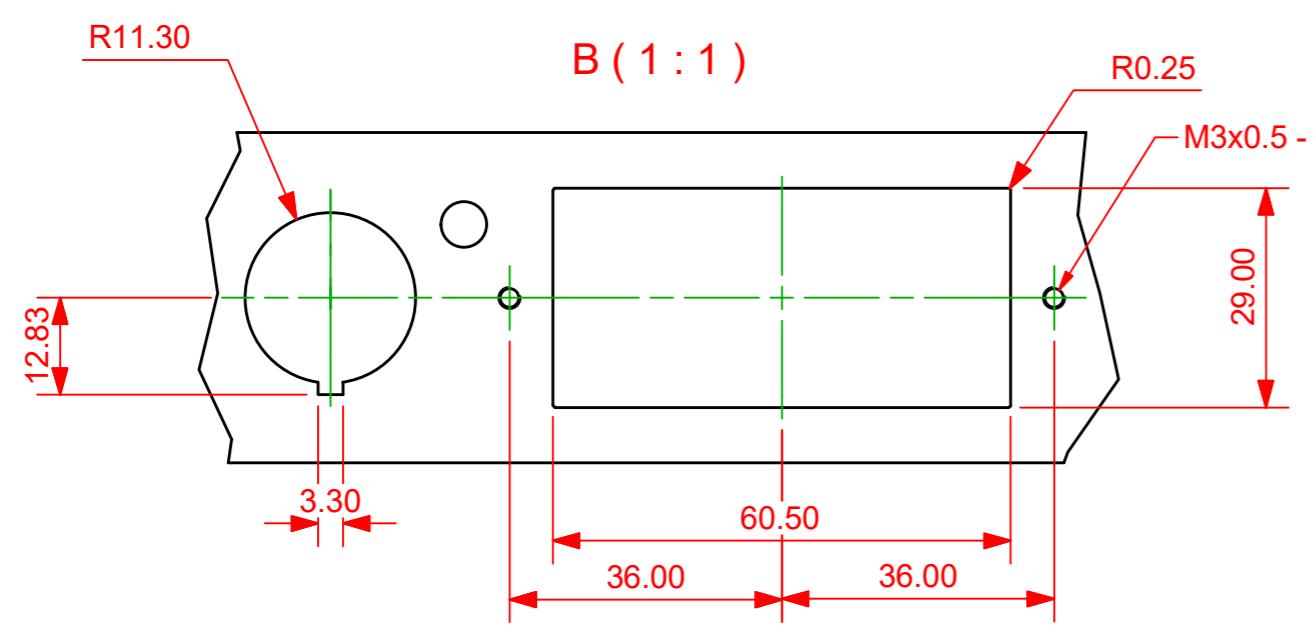


**ISOMETRIC VIEW OF FRONT PANEL
(DO NOT SCALE)**

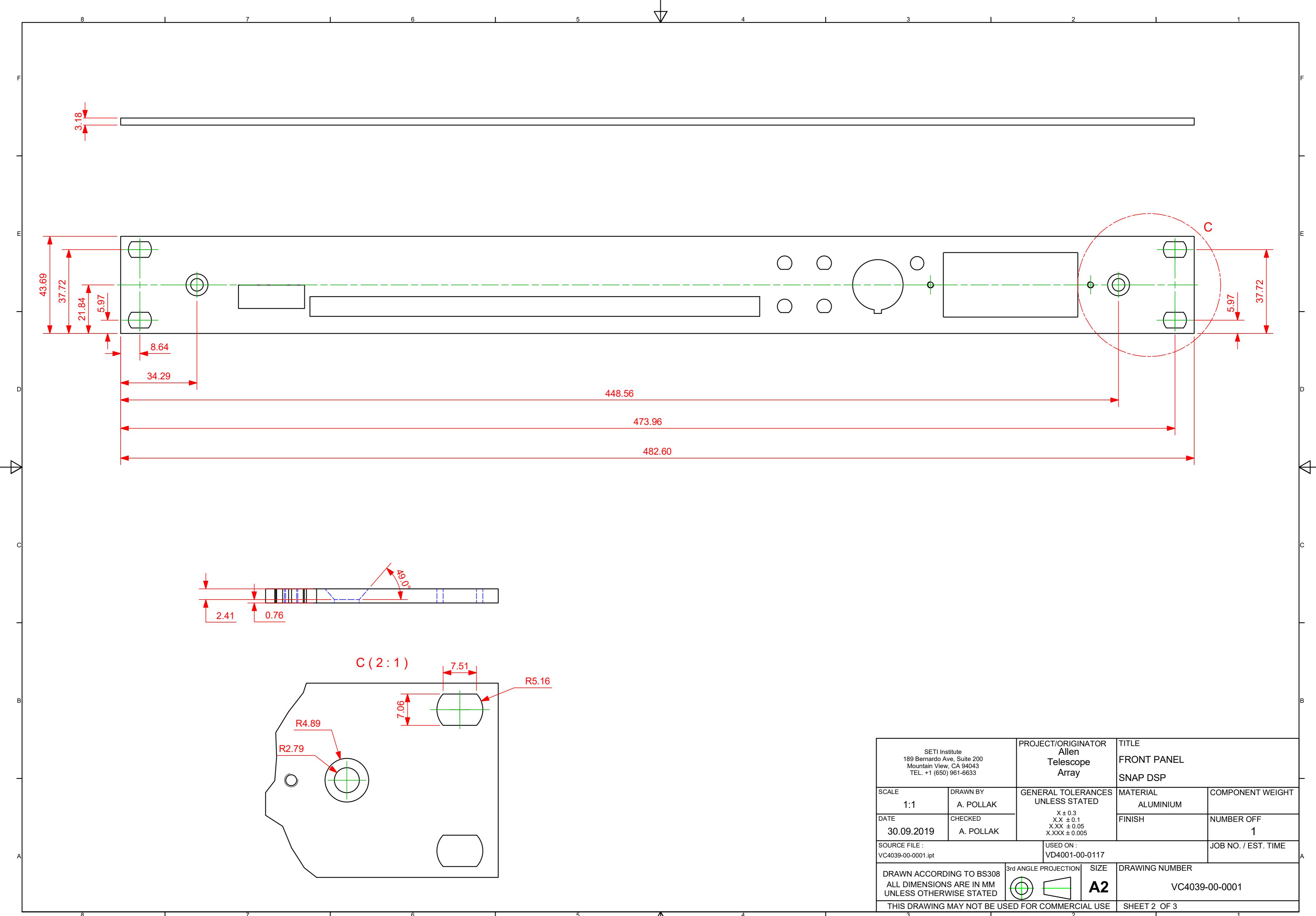


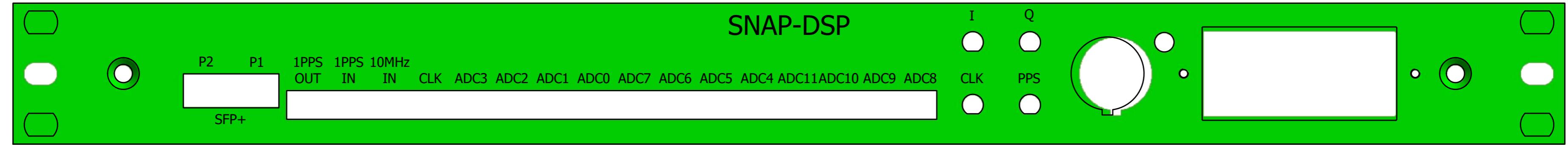
NOTE

1. THIS SHEET SHOWS THE MODIFICATIONS FOR THE SUPPLIED FRONT PANEL.
 2. THE SECOND SHEET SHOWS THE DIMENSIONS IN CASE ONE WANTS TO MACHINE THE ENTIRE PART (NOT REQUIRED WHEN SUPPLIED WITH 1U RACK 'CHA-01-17, D-4001 1.75" Utility Chassis').
 3. THE THIRD SHEET SHOWS THE TEXT FOR THE LASER ENGRAVING.

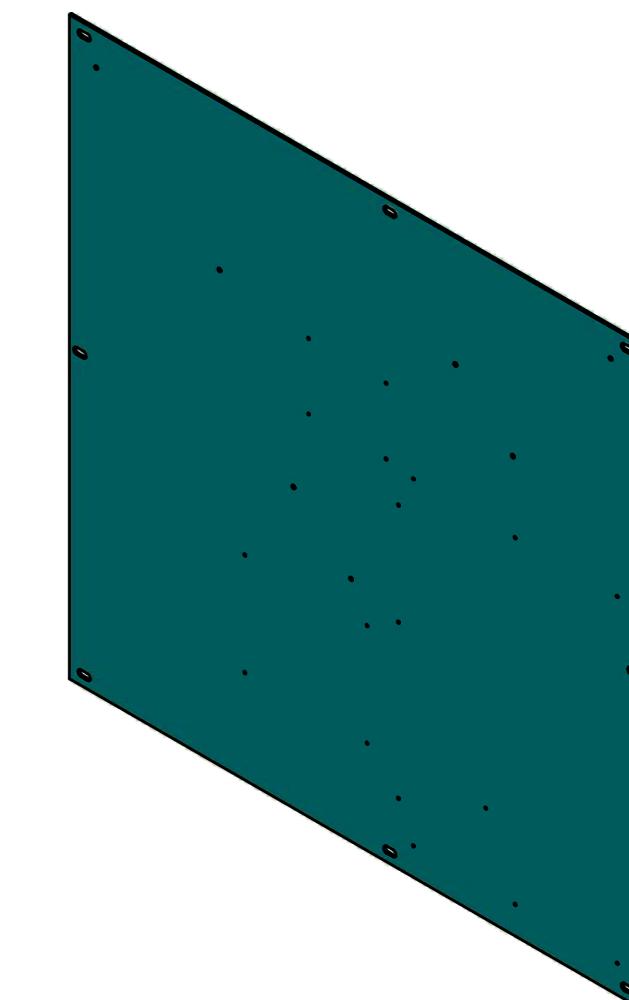
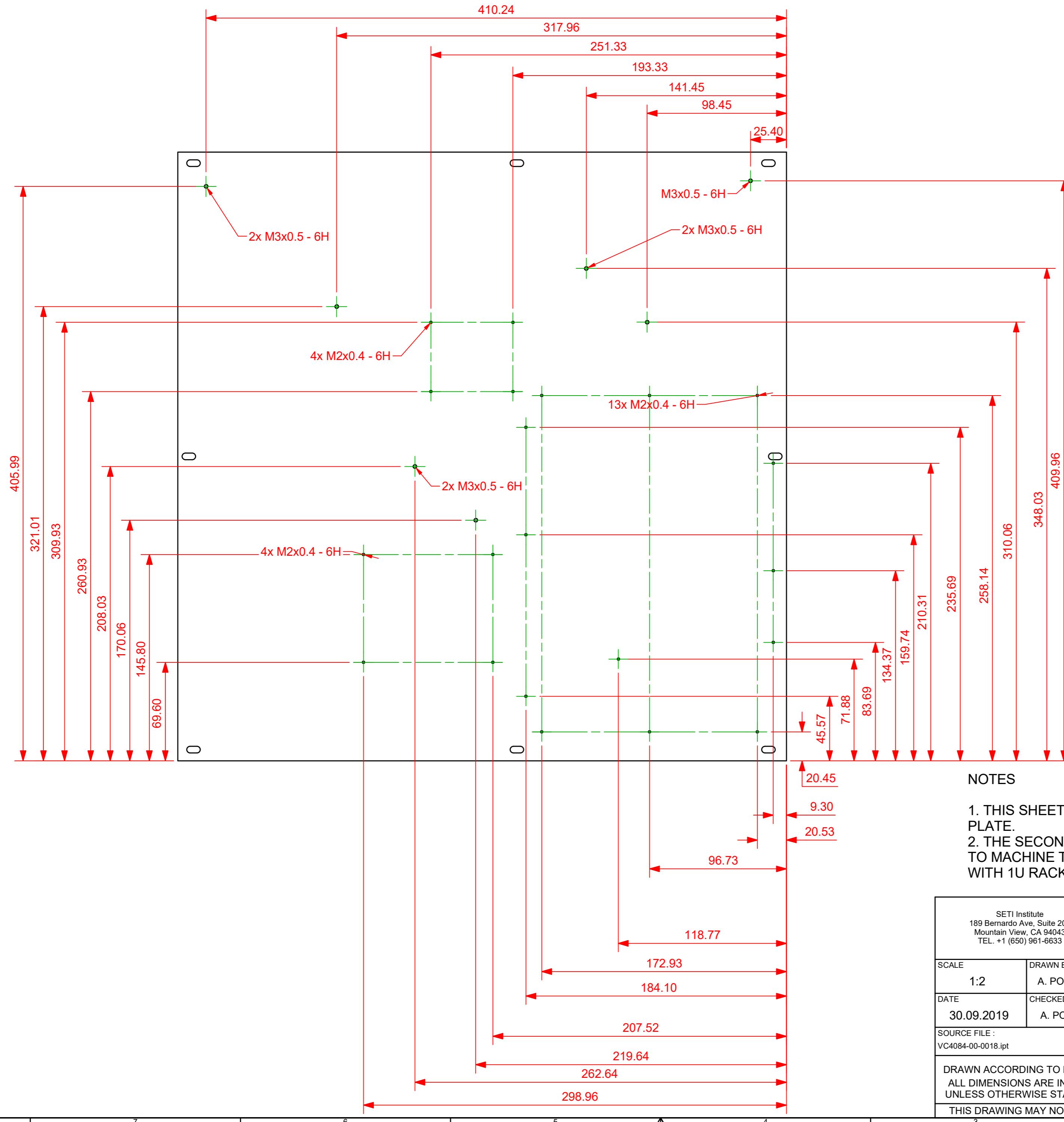


SETI Institute 189 Bernardo Ave, Suite 200 Mountain View, CA 94043 TEL. +1 (650) 961-6633		PROJECT/ORIGINATOR Allen Telescope Array	TITLE FRONT PANEL SNAP DSP	
SCALE 1:2	DRAWN BY A. POLLAK	GENERAL TOLERANCES UNLESS STATED $X \pm 0.3$ $X.X \pm 0.1$ $X.XX \pm 0.05$ $X.XXX \pm 0.005$	MATERIAL ALUMINIUM	COMPONENT WEIGHT
DATE 30.09.2019	CHECKED A. POLLAK		FINISH	NUMBER OFF 1
SOURCE FILE : VC4039-00-0001.ipt		USED ON : VD4001-00-0117	JOB NO. / EST. TIME	
DRAWN ACCORDING TO BS308 ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE STATED		3rd ANGLE PROJECTION 	SIZE A2	DRAWING NUMBER VC4039-00-0001
THIS DRAWING MAY NOT BE USED FOR COMMERCIAL USE		SHEET 1 OF 3		





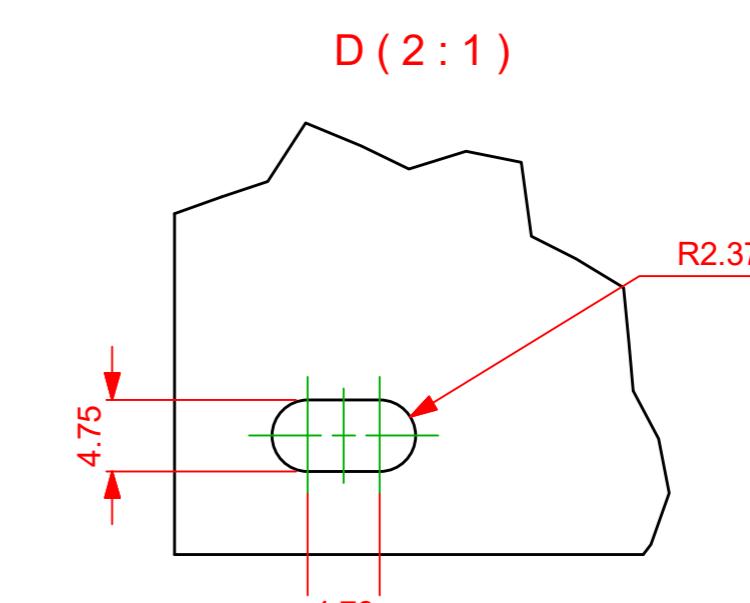
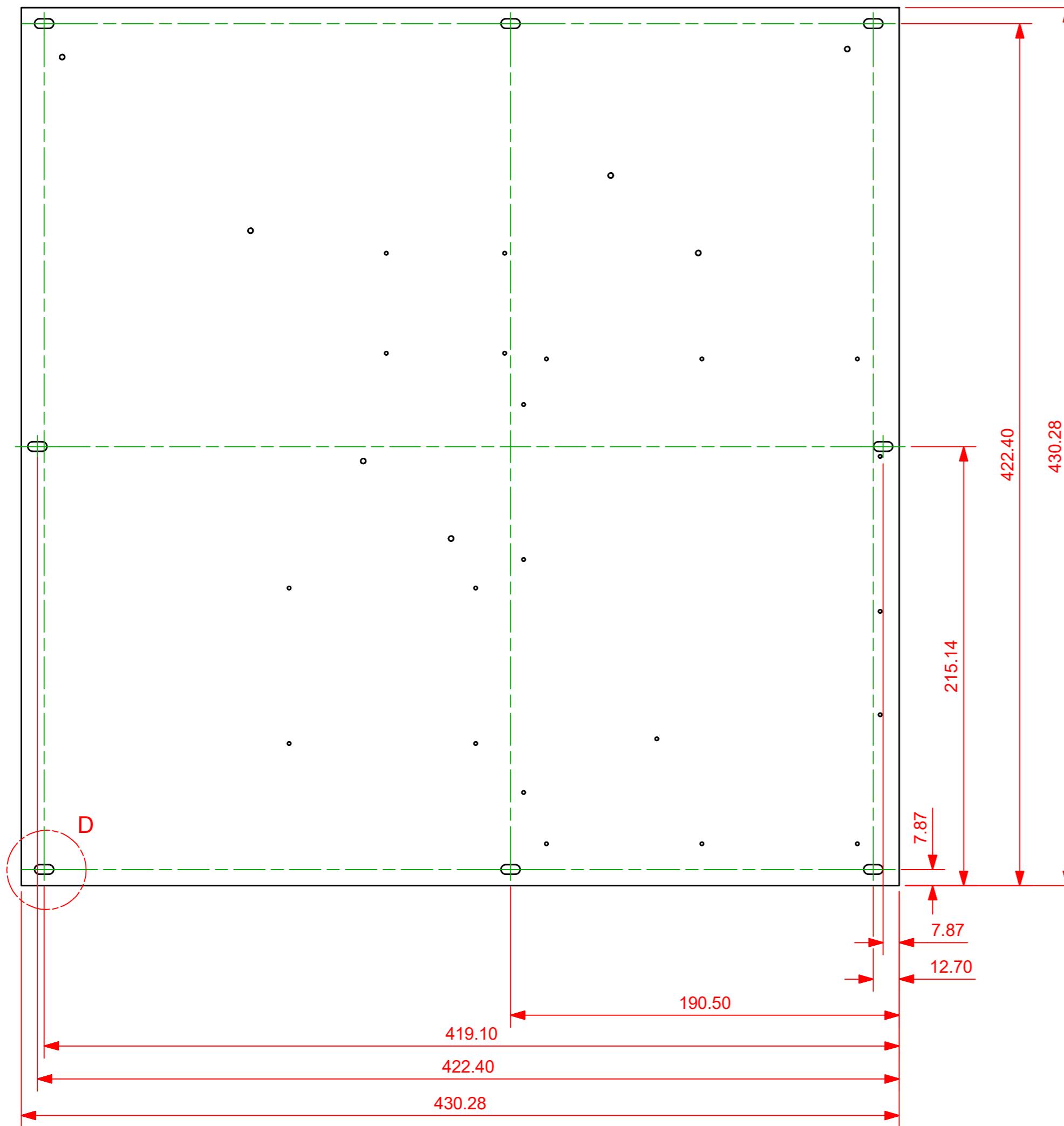
SETI Institute 189 Bernardo Ave, Suite 200 Mountain View, CA 94043 TEL. +1 (650) 961-6633	PROJECT/ORIGINATOR Allen Telescope Array	TITLE FRONT PANEL SNAP DSP
SCALE 1:1	DRAWN BY A. POLLAK	GENERAL TOLERANCES UNLESS STATED $X \pm 0.3$ $XX \pm 0.1$ $XXX \pm 0.05$ $XXXX \pm 0.005$
DATE 30.09.2019	CHECKED A. POLLAK	FINISH NUMBER OFF 1
SOURCE FILE : VC4039-00-0001.upt	USED ON : VD4001-00-0117	JOB NO. / EST. TIME
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THIS DRAWING MAY NOT BE USED FOR COMMERCIAL USE		DRAWING NUMBER VC4039-00-0001
		SHEET 3 OF 3



ISOMETRIC VIEW OF BASE PLATE
(DO NOT SCALE)

1. THIS SHEET SHOWS THE MODIFICATIONS FOR THE SUPPLIED BASE PLATE.
2. THE SECOND SHEET SHOWS THE DIMENSIONS IN CASE ONE WANTS TO MACHINE THE ENTIRE PART (NOT REQUIRED WHEN SUPPLIED WITH 1U RACK 'CHA-01-17, D-4001 1.75" Utility Chassis').

SETI Institute 189 Bernardo Ave, Suite 200 Mountain View, CA 94043 TEL. +1 (650) 961-6633	PROJECT/ORIGINATOR Allen Telescope Array	TITLE BASE PLATE SNAP DSP	
SCALE 1:2	DRAWN BY A. POLLAK	GENERAL TOLERANCES UNLESS STATED	MATERIAL ALUMINIUM
DATE 30.09.2019	CHECKED A. POLLAK	X ± 0.3 XX ± 0.1 XXX ± 0.05 XXXX ± 0.005	FINISH
SOURCE FILE : VC4084-00-0018.ipt	USED ON : VD4001-00-0117		JOB NO. / EST. TIME
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THIS DRAWING MAY NOT BE USED FOR COMMERCIAL USE			SHEET 1 OF 2



SETI Institute 189 Bernardo Ave, Suite 200 Mountain View, CA 94043 TEL. +1 (650) 961-6633	PROJECT/ORIGINATOR Allen Telescope Array	TITLE BASE PLATE SNAP DSP
SCALE 1:2	DRAWN BY A. POLLAK	GENERAL TOLERANCES UNLESS STATED $X \pm 0.3$ $XX \pm 0.1$ $XXX \pm 0.05$ $XXXX \pm 0.005$
DATE 30.09.2019	CHECKED A. POLLAK	FINISH
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