

# EME at the Deep Space Exploration Society (DSES)

**Roger Oakey W3MIX**

**Alex Nersesian K6VHF**

**Paul Sobon NOØT**

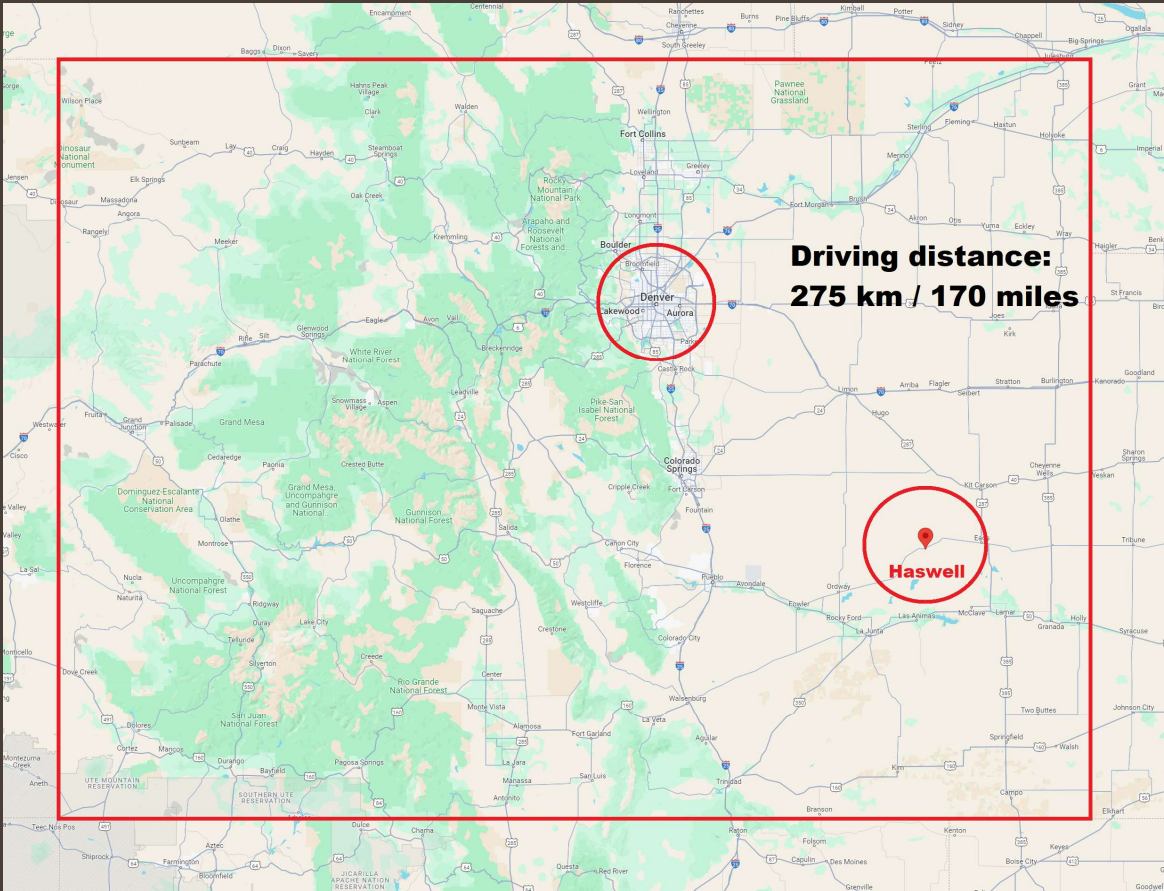
**<https://dses.science>**



# Topics

- Roger Oakey: Site location, history, and EME infrastructure
- Alex Nersesian: 23cm hardware at feed point (“DIANNE”)
- Paul Sobon: Station layout and operation

**DSES site**  
**Haswell**  
**Colorado,**  
**USA**



# Entrance

Kiowa County road 20



# History

- Built in 1958 to research communication to the Distant Early Warning system (DEW line).
- Through government auction, Paul Plishner purchased the site in 1984 and donated it to the Deep Space Exploration Society in 2009.
- Since 2009, the DSES has been reconditioning and maintaining the radio telescope. Its primary use is for studying pulsars, magnetars and interstellar hydrogen distribution - we hams hijack it from time to time for EME use!
- Our callsign, KØPRT, recognizes and memorializes Paul Plishner – “Plishner Radio Telescope”

# Plishner Radio Telescope

**18 meters  
60 feet**





# Control room

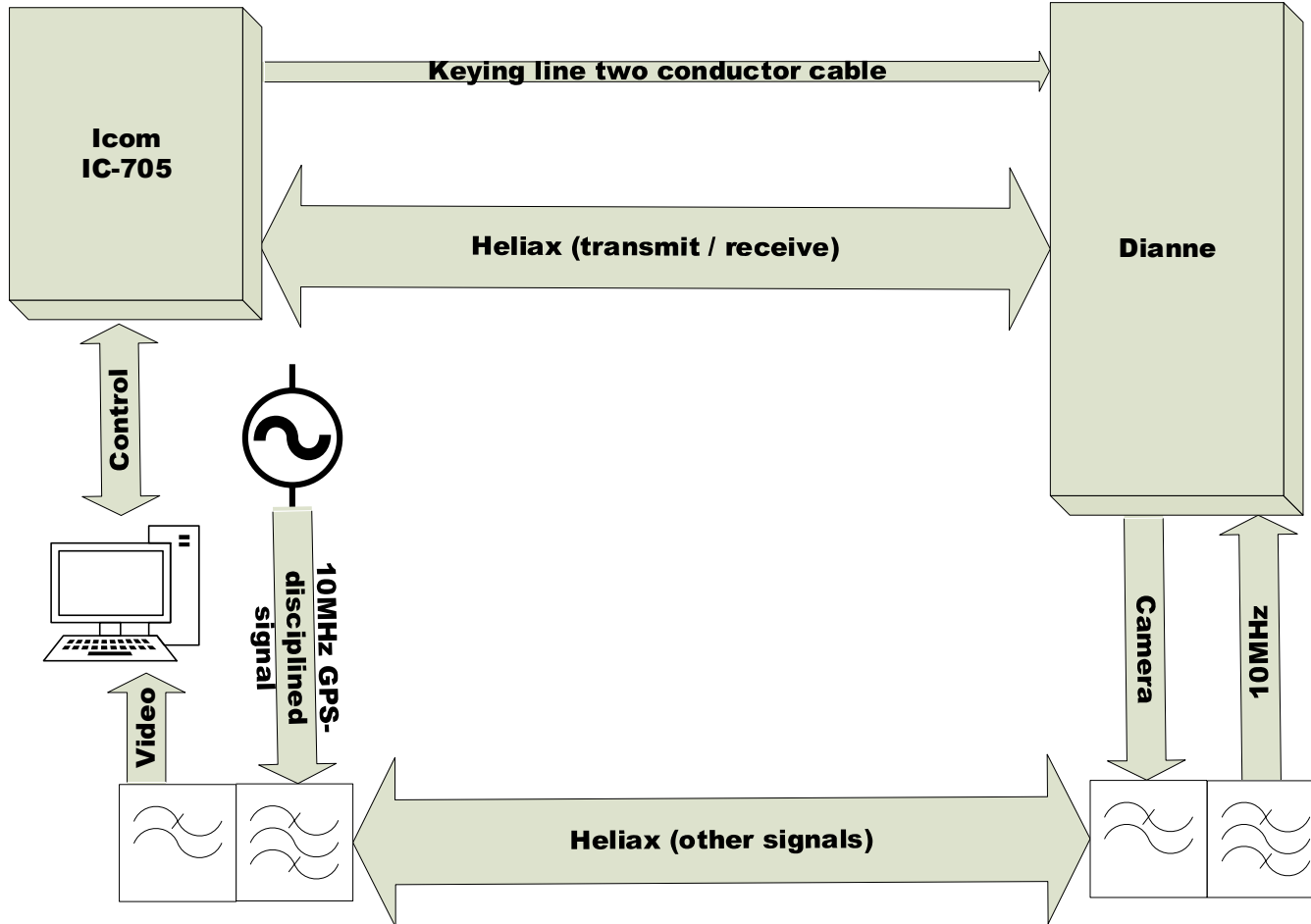






# Trailer

# Dish



**Alex  
Nersesian**

**K6VHF**

**“DIANNE”  
package**



## About me

Alex K6VHF (ex 4L1FP):

- Has been licensed since 1999.
- Holds a Master Degree in Electrical Engineering.
- Has more than 25 years experience in Aerospace/Space/Defense industries as electromagnetic physics engineer/consultant.
- Has passion in RF design, Microwave (1G-134GHz), DX expeditions, EME, MS, Tropo, Satellites & Radio Astronomy.
- Holds multiple records on VHF/UHF and published over 10 technical articles.
- Member of DSES, ARRL(life), QRZ(life), IDEXA, CERT, etc.

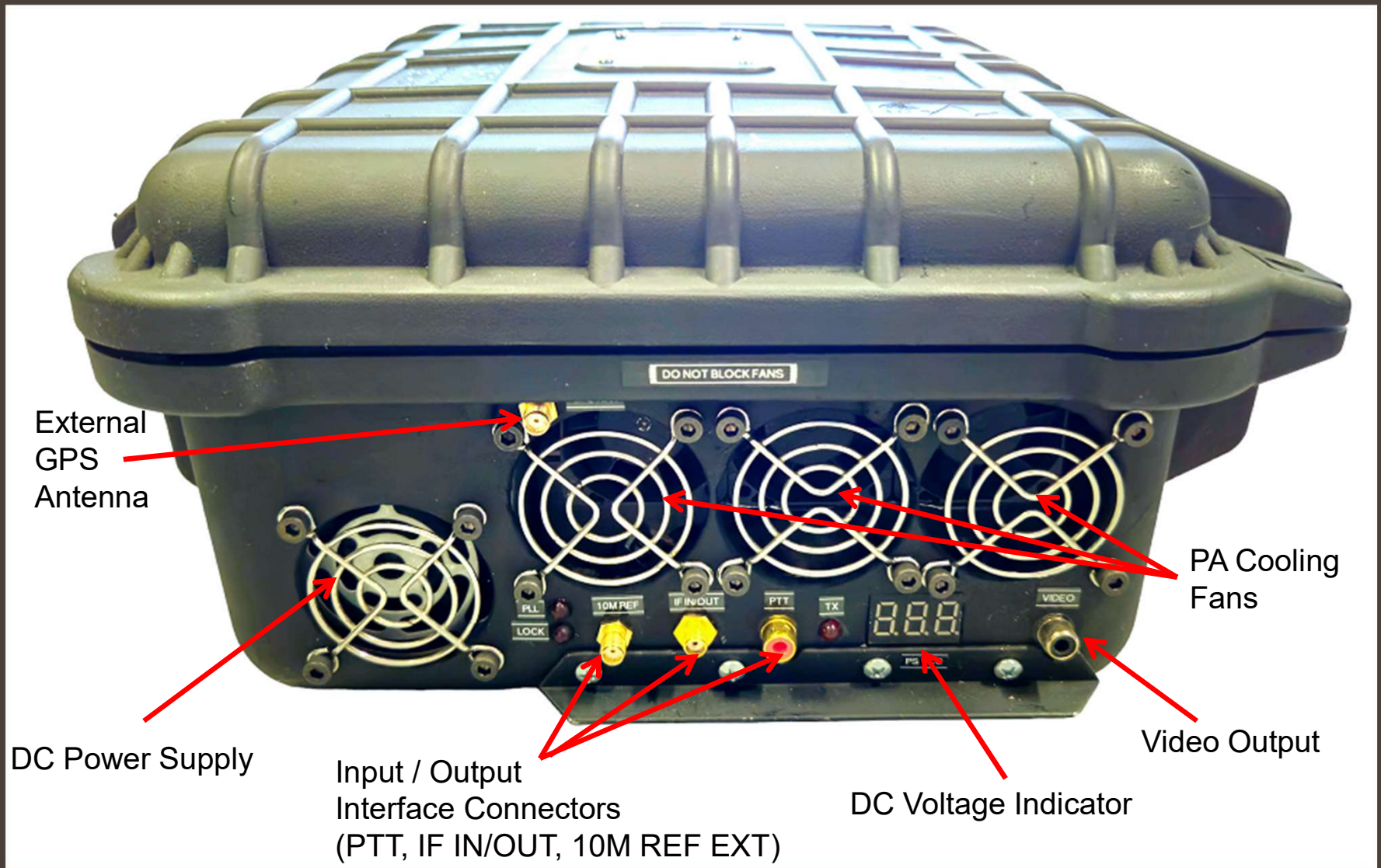
# “DIANNE”

## What is it?

- DIANNE is of Latin origin that means “divine”, “bright”, and “shining one”.
- DIANNE is also the Goddess of the Moon.
- An Advanced Portable 23cm EME System.
- All-In-One solution (To-Go Box).
- Fully remote. Easy to deploy and operate.
- Ideal for DX expeditions, temporary and stationary use.
- Programmable (any IF frequencies) and upgradable.

- Operational RF Range: 1296MHz-1298MHz
- IF Range: 28MHz (can be used 50MHz, 144MHz)
- IF Input Power: 1W
- Total RX Gain: >50dB
- Total RX NF: <0.8dB
- Frequency Stability: GPSDO
- RF Output Power: 300W
- Total DC current:
  - - RX (0.8A)
  - - TX (26A)
- AC Input: 110V-220V (50/60Hz)
- Total Weight: 17.5lbs(8kg)
- Size: 13.75"(350mm) x 11.5"(292mm) x 6"(152mm)







Ground

Cooling Fans

RX Input  
(SMA)

TX Output  
(N-Type)

AC Input

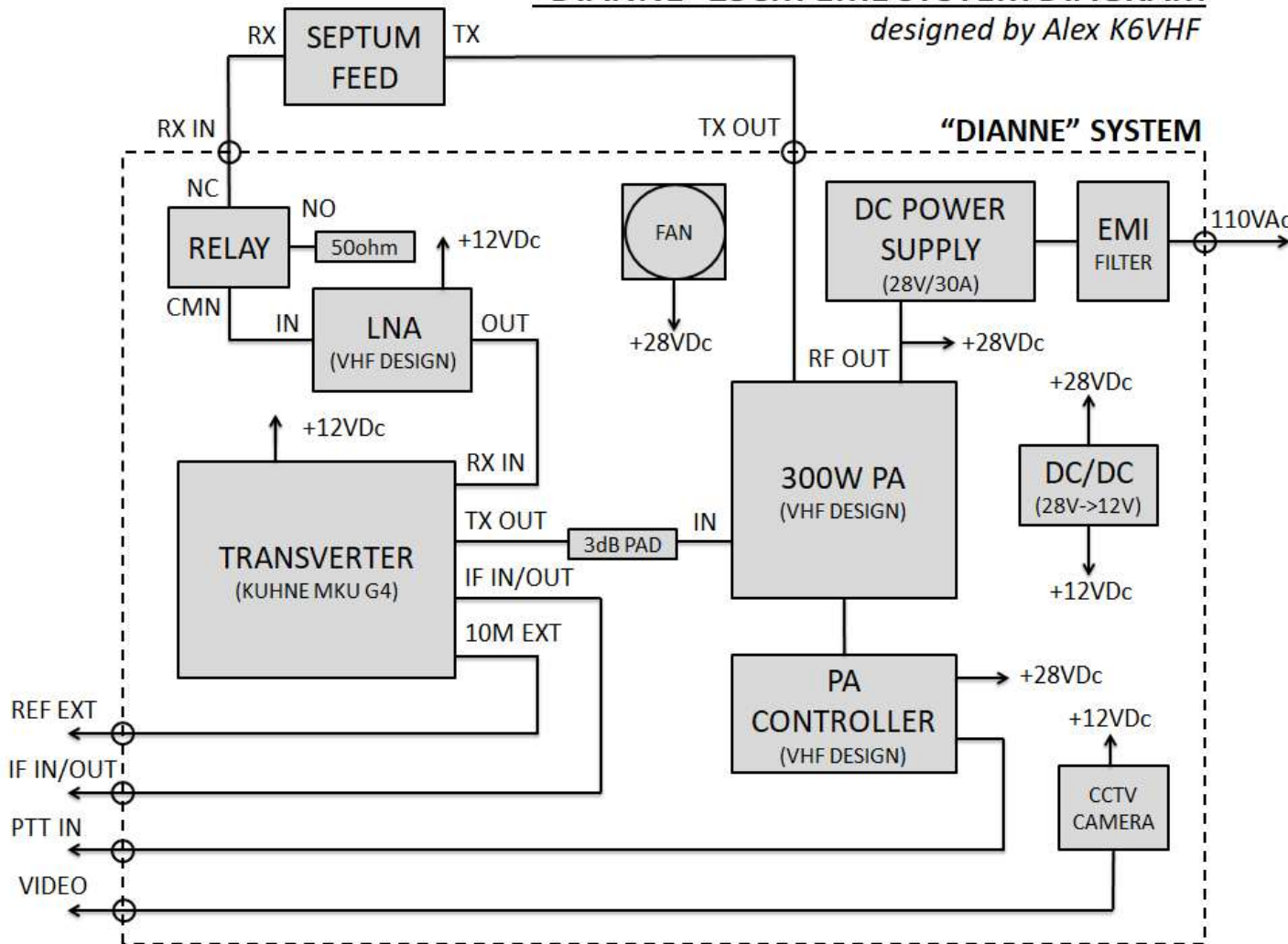
AC Input Switch

Power  
Supply Fan

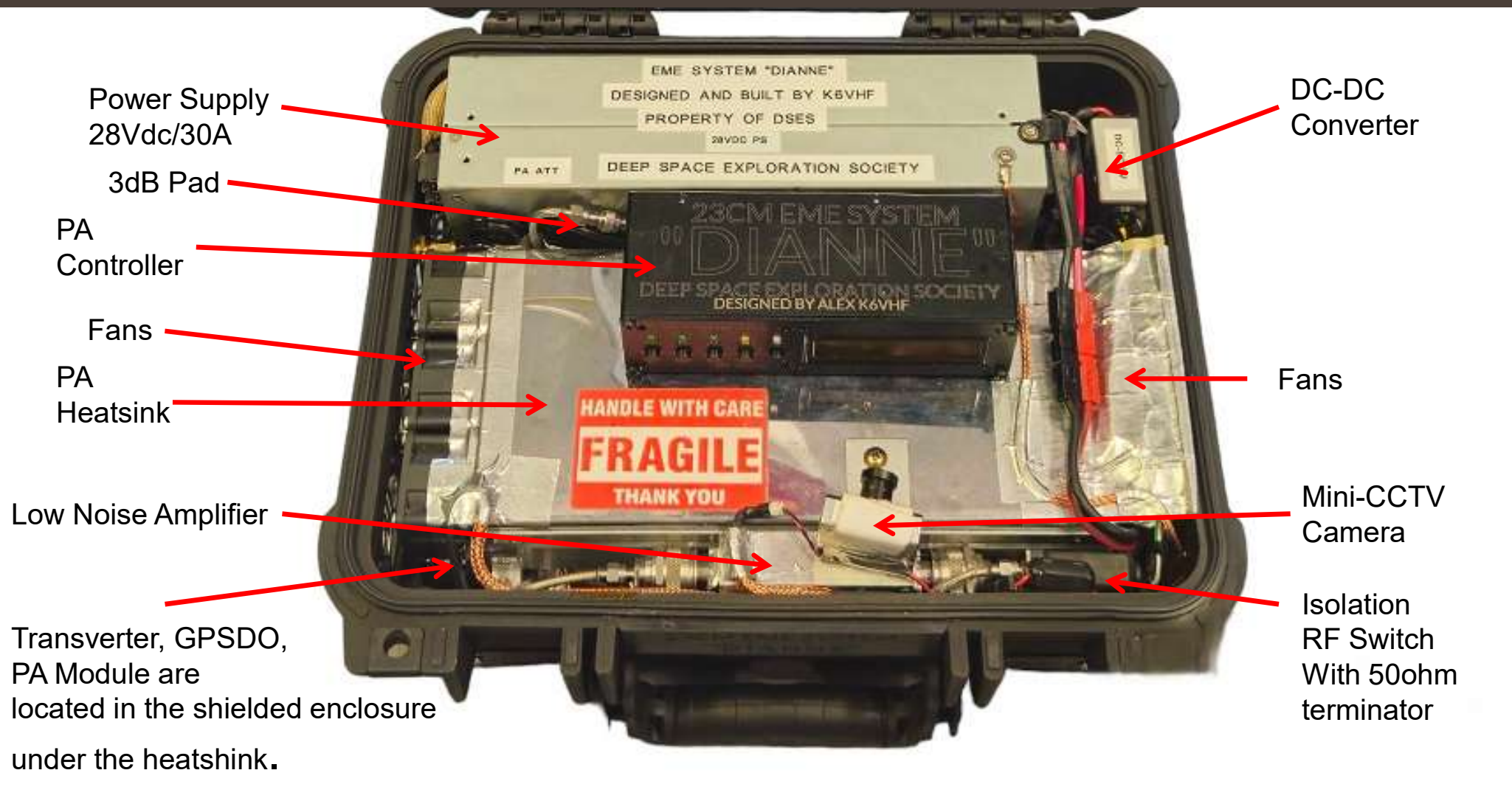


## "DIANNE" 23CM EME SYSTEM DIAGRAM

designed by Alex K6VHF



- Kuhne Transverter MKU G4
- VHF Design Low Noise Amplifier 36dB Gain/0.3dB
- VHF Design 350W Power Amplifier
- Honeywell Power Supply 28VDC/30A
- RADIALL RF Switch
- DC-DC Converter (28V-12V)
- Mini CCTV Camera



Power Supply  
28Vdc/30A

DC-DC  
Converter

3dB Pad

PA  
Controller

23CM EME SYSTEM  
**DIANNE**  
DEEP SPACE EXPLORATION SOCIETY  
DESIGNED BY ALEX K6VHF

Fans

Fans

PA  
Heatsink

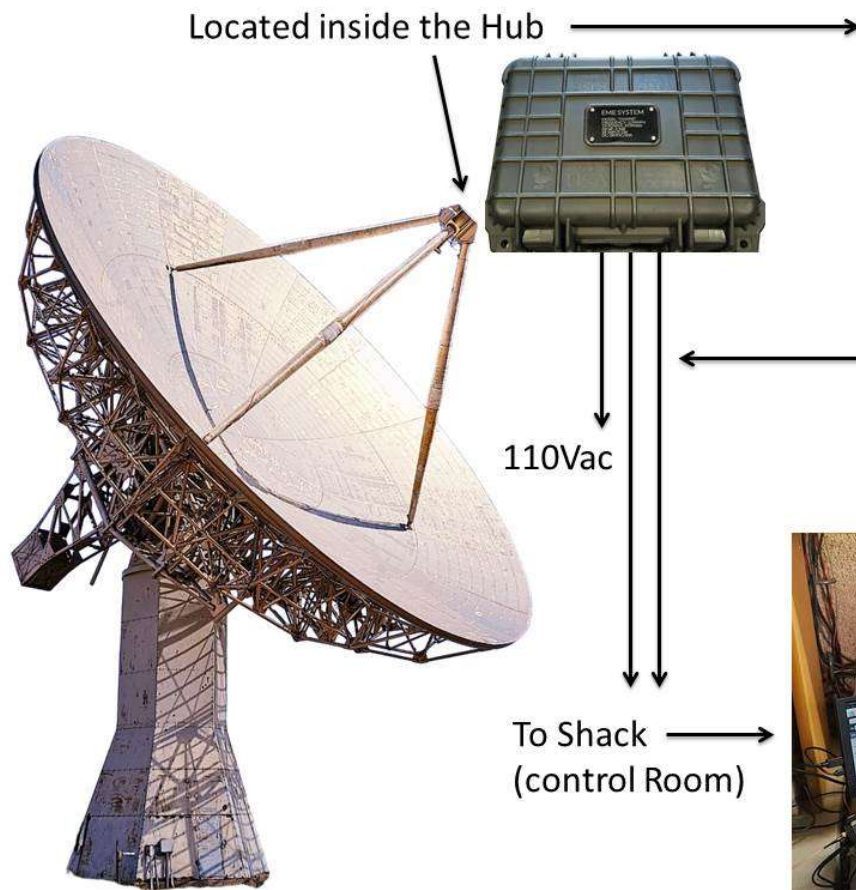
HANDLE WITH CARE  
**FRAGILE**  
THANK YOU

Low Noise Amplifier

Mini-CCTV  
Camera

Transverter, GPSDO,  
PA Module are  
located in the shielded enclosure  
under the heatshink.

Isolation  
RF Switch  
With 50ohm  
terminator



- There are 3 main lines:
- RF Coax (IF signal/Video)
  - AC Line (110V/20A)
  - Low Voltage Control Lines



## Links to essential “DIANNE” components:

- Transverter:  
<https://shop.kuhne-electronic.com/kuhne/en/shop/converter-transverte/transverter/MKU+13+G4++23+cm+Transverter/?card=1912>
- 300W Power Amplifier:  
<https://vhfdesign.com/pas/lmos-rf-power-amplifier-23cm-300-watt.html>
- Low Noise Amplifier:  
<https://vhfdesign.com/las/lna-eme-sky67151-for-23cm-and-21cm-bands.html>
- Hard Plastic Case:  
[https://www.amazon.com/gp/product/B07SPSVX7Q/ref=ppx\\_yo\\_dt\\_b\\_search\\_asin\\_title?ie=UTF8&psc=1](https://www.amazon.com/gp/product/B07SPSVX7Q/ref=ppx_yo_dt_b_search_asin_title?ie=UTF8&psc=1)

**Paul Sobon**

**NOØT**

**EME station  
layout and  
operation**





# Hardware

- Windows 64bit Computer with Windows 10
- ICOM IC-705 <https://www.icomamerica.com/lineup/products/IC-705/>
- IC-705 daughter board upgrade <https://shop.ihelpu.tech/products/icom-ic-705-usb-c-control-board-upgrade>
  - Videos about it: protects the IC-705 better from the amplifier, faster USB-C charging
  - <https://www.youtube.com/watch?v=H1DPDUeaDfw>
  - <https://youtu.be/2Whidw0T9CY>

# Software

- Win4ICOM <https://icom.va2fsq.com/>
- PSTRotator <http://www.pstrotator.com/>
- N1MM+ <https://n1mmwp.hamdocs.com/downloads/n1mm-full-install/>
- OBS Studio <https://obsproject.com/>
- VSPE <https://eterlogic.com/Products.VSPE.html>
- WSJT-X <https://wsjt.sourceforge.io/wsjtx.html>

Contact Mode (RTTY) <-> Contest mode (MIXED) | Type a message here

File Edit View Tools Config Window Help

CW	PH	Snt	Rcv	Name	Comment
160	160				
80	80				
40	40				
30	30				
20	20				
17	17				
15	15				
12	12				
10	10				

● Run ● S&P

F1 S&P CQ	F2 S&P Exch	F3 S&P TU	F4 S&P Call	F5 His Call	F6 KOPRT
F7 My Exch	F8 Agn?	F9 Spare	F10 Spare	F11 Spare	F12 Wipe

Esc: Stop Wipe Log It Edit Mark Store Spot It QRZ

Heading appears here when enabled.  
Call history UserText appears here when enabled.

44/0

Setup Band Sequence Map Radio Links

### Moon Tracking

1296 MHz

Sequence: 01:31:54 RX East 1 min

Azimuth: 265.35° Elevation: 33.07°

SUN AZ: 292.70° EL: 7.37°

Geocentric	Topocentric
RA: 09:49:24	RA: 09:46:48
DEC: 17.03°	DEC: 16.59°
GHA: 163.12°	LHA: 60.64°

Moon distance: 395168 Km  
Path loss: 1.95 dB  
Moon diameter: 29.97'  
Doppler: -2896 Hz  
Sky temperature: 3° K  
Degradation: 2.09 dB

July 2024  
01:31  
PC Time  
Moonrise: 15:14 Moonset: 4:26

7/9/2024 01:31:54Z General Logging - KOPRT.s3db

TS	Call	Freq	M...	Snt	Rcv	Pfx	Name
2024-05-12 15:58	RX3DR	28080.25	CW	579	599	UA	
2024-05-12 16:07	SR7DCS	28080.25	CW	579	599	SP	
2024-05-12 16:09	G4RGK	28080.25	CW	589	599	G	
2024-05-12 16:13	IZ1BPN	28080.25	CW	599	599	I	
2024-05-12 16:20	DL1AT	28080.25	CW	559	589	DL	
2024-05-12 16:20	OZ4MM	28080.25	CW	599	599	OZ	
2024-05-12 16:26	IK3COJ	28080.25	CW	579	589	I	
2024-05-12 16:38	DK5AI	28080.25	CW	559	599	DL	
2024-05-12 16:45	RW6HM	28053.04	CW	559	579	UA	
2024-05-12 16:50	DL6SH	28053.04	CW	599	599	DL	
2024-05-12 17:06	G0LBK	28053.39	USB	579	56	G	
2024-05-12 17:12	DL6SH	28053.39	USB	56	57	DL	
2024-05-12 17:17	OZ6OL	28053.39	USB	55	57	OZ	
2024-05-12 17:38	IZ1BPN	28054.00	USB	43	57	I	
2024-05-12 17:46	CT1DMK	28054.00	USB	44	55	CT	
2024-05-12 18:20	DF3RU	28055.00	USB	57	57	DL	
2024-05-12 18:43	F5JWF	28053.00	USB	59	33	F	



**VA2FSQ Icom Server v1.06**

**Radio Control**

IP Address: 192.168.1.91    Radio Control port: 50003

Com Port: COM5    Baud Rate: 38400

User name: DSES    Password: \*\*\*\*    Disconnect

Time out (s): 20     Auto Start

---

**Audio Control**

Samples per Second: 8000    Jitter buffers: 10

Audio Network Port: 50004

Speak:  Microphone (4- USB Audio CODEC)

Listen:  Speakers (Realtek High Definiti)

---

**Sound Client**

---

**Messages**

Connected to COM5 @38400  
 Server running  
 Client connected from address: 192.168.1.91

**ICOM IC-705 20:35 UTC RF PWR: 0.1W Cinc = 10000**

File Tools Window Help

2200m 630m 6m 4m  
 2m 1.2m 70cm 23cm  
 13cm 9cm 6cm 3cm  
 1.2cm 6mm 4mm 2mm 1mm

Ant 1 RX  
 Att Pre2  
 Tuner Tune  
 IP+ RF

1.296.211.000

28.074.020

SWR    PWR (W)

Voice and Data  
 RX +3.134 TX  
 1 2 3 4  
 5 6 7 8  
 Message Number  
 RIT / XIT

USB LSB CW  
 CW-R AM FM  
 RTTY RTTY-R WFM  
 DV DATA-1 Mode  
 OFF Break In  
 PDL  
 CW Pitch WPM=8

Fine Med Cor A/B A>B DW Split  
 VFO A Tone VFO Tr-Du VFO B

AF Gain RF Gain SQL  
 RF PWR Mic Moni  Comp V-Gain A-VOX V-DLY  
 AGC-M VFO A Mute TX Transmit VOX SSB-M

Inner PBT Outer PBT  
 Reset DSP BW 3000 DSP SFT 0  
 Filters

F1 Sharp F2 Soft F3 Reset  
 NB Depth Digi Sel  
 NB Width NR  
 NB Level  Notch - AUTO

**OBS Studio 30.1.2 - Profile: Untitled - Scenes: Untitled**

File Edit View Docks Profile Scene Collection Tools Help

Preview: Scene    Program: Scene

Transition  
 Quick Transitions +  
 Cut  
 Fade (300ms)  
 Fade to Black (300ms)

Video From Feed Amp    Video From Feed Amp

Next New Project?



## **PROJECT "EVE 25"**

Deep Space Exploration Society  
<https://dses.science>



**Thank You!**

**Questions?**

**Alex K6VHF  
Paul N00T  
Roger W3MIX**

**<https://dses.science>**