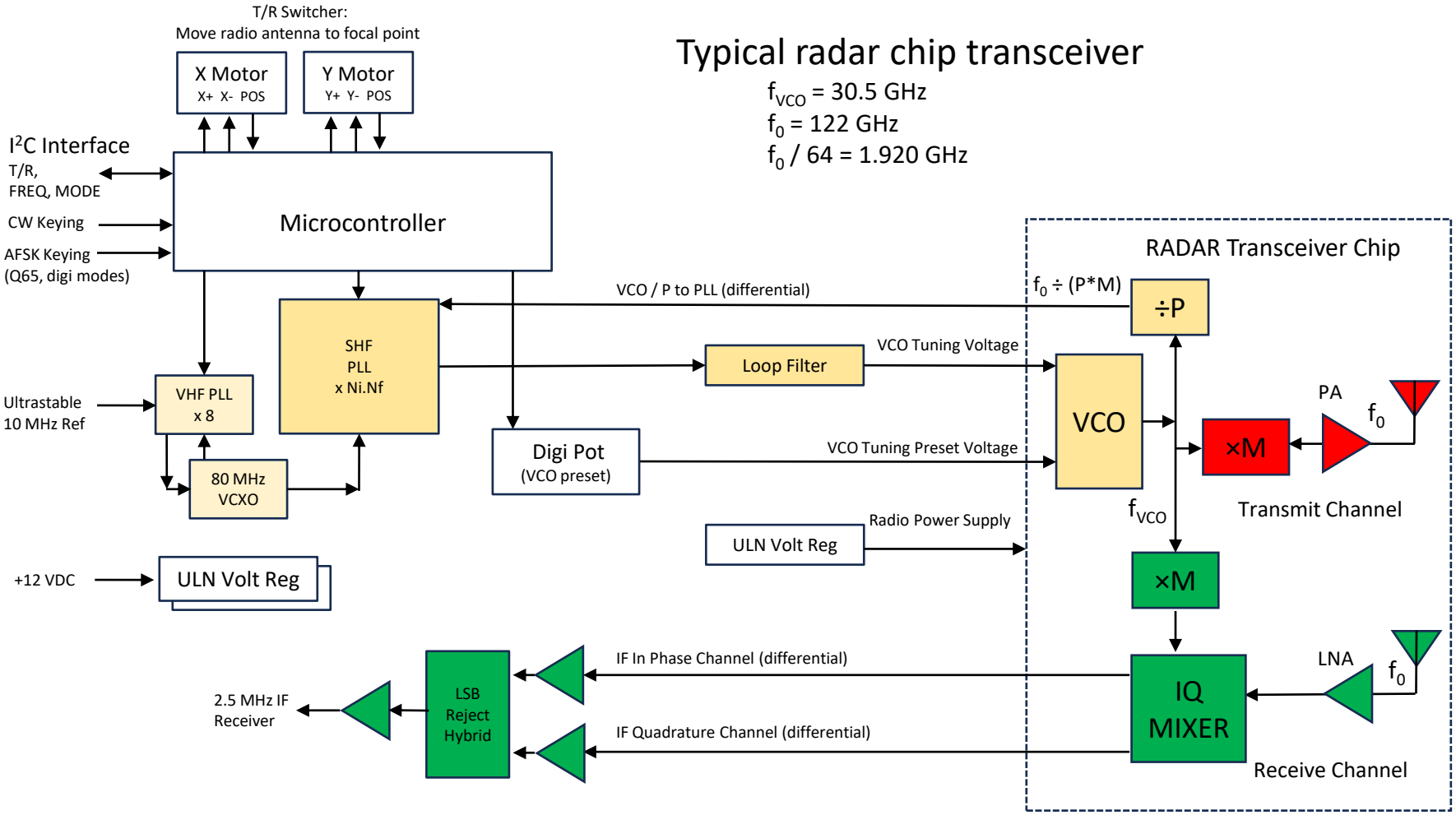
Hydra Project

Four Band Millimeter Wave Radio

K6ML, not an April Fool's, 2025

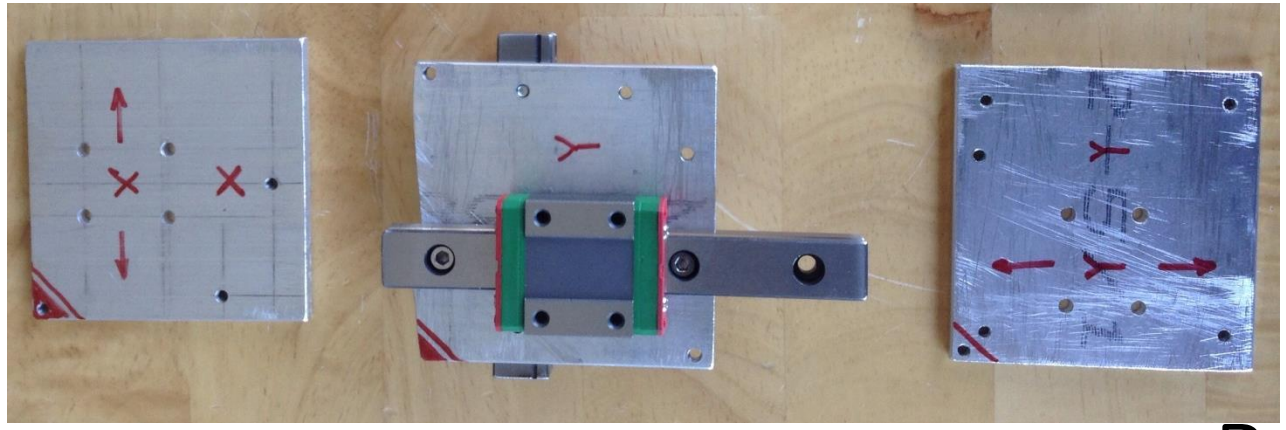
Typical radar chip transceiver

f_{VCO} = 30.5 GHz
f_0 = 122 GHz
f_0 / 64 = 1.920 GHz



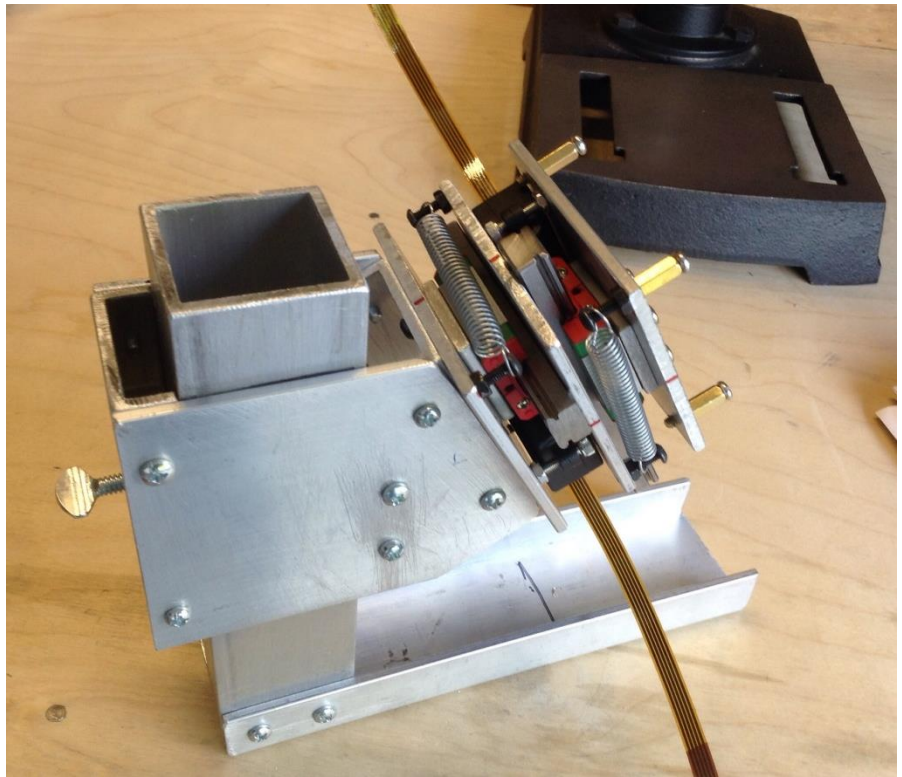
Building the feed positioner

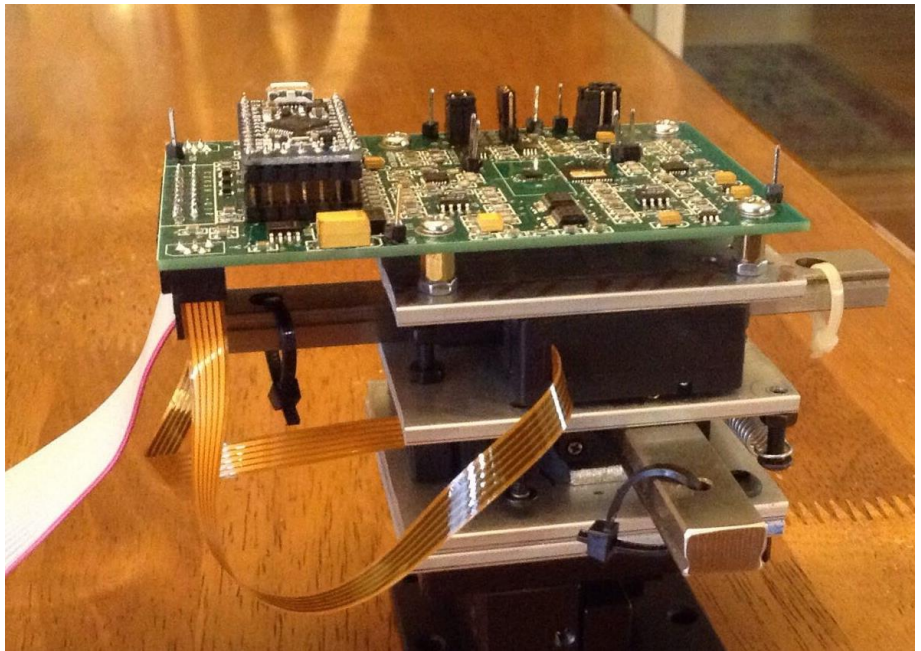
Motorized X-Y Stage for Feed Positioning uses linear slide bearings



Actuonix PQ12
Mininature
Linear Actuator

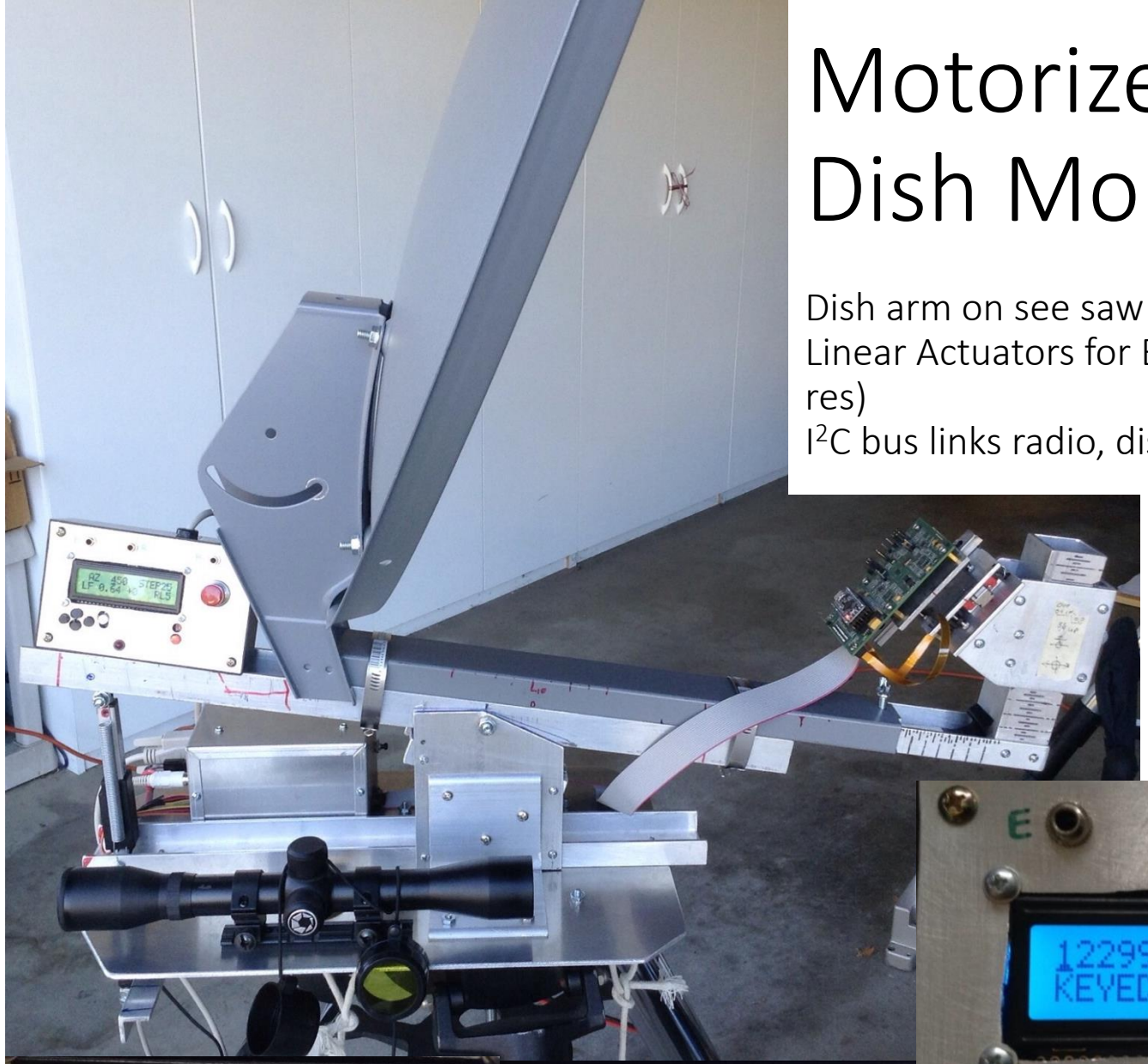
Assembled stage w/backlash springs on adjustable feed arm insert





Motorized Dish Mount

Dish arm on see saw pivot & lazy susan rotor
Linear Actuators for El & Az (+/- 5 deg, ~0.02 deg res)
I^2C bus links radio, dish & hand controller

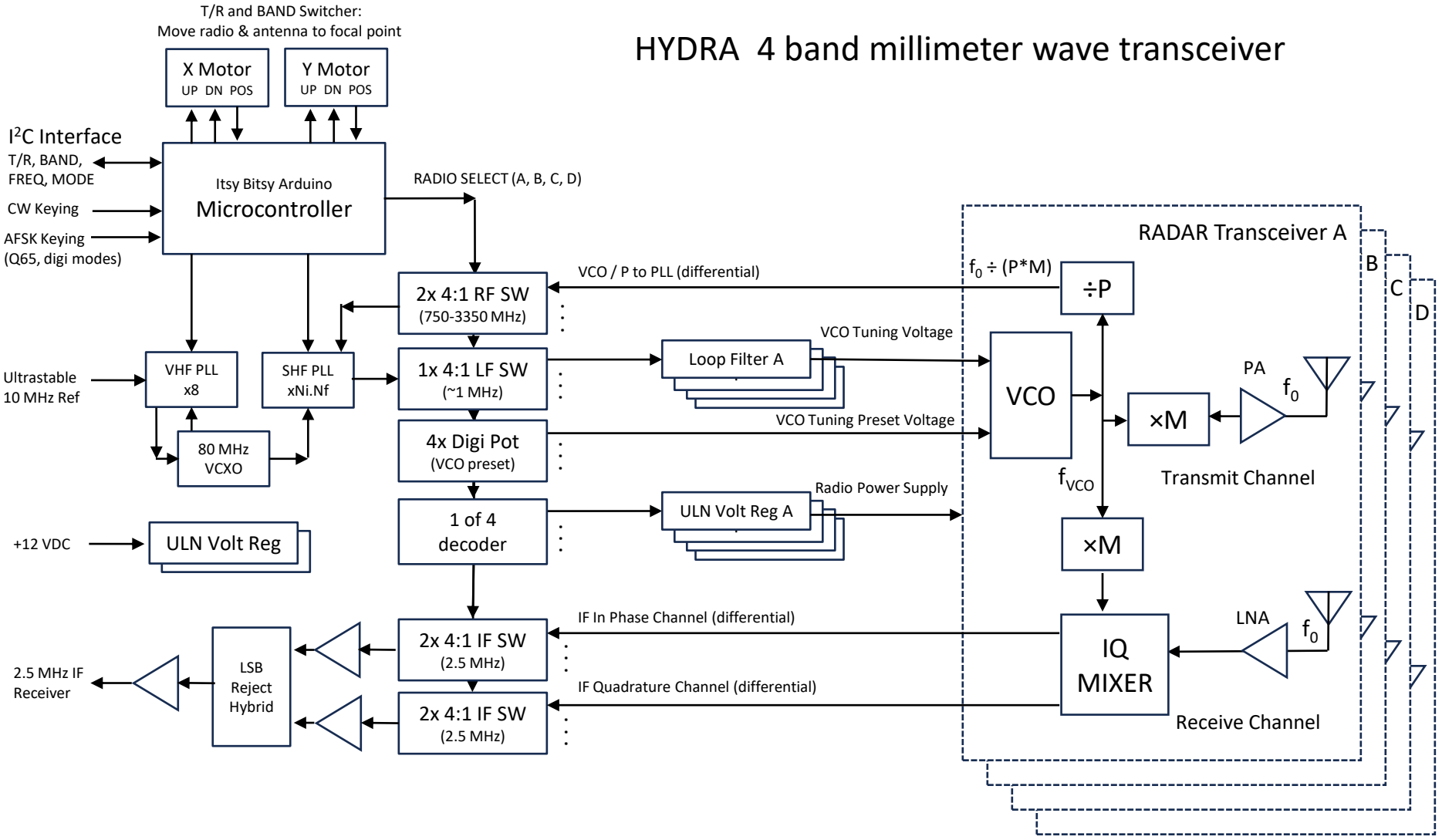


Hand controller menus:

- Pointing the dish
- Tuning the radio
- Calibrating feed offsets
- Radio settings

PLL and motor status display

HYDRA 4 band millimeter wave transceiver

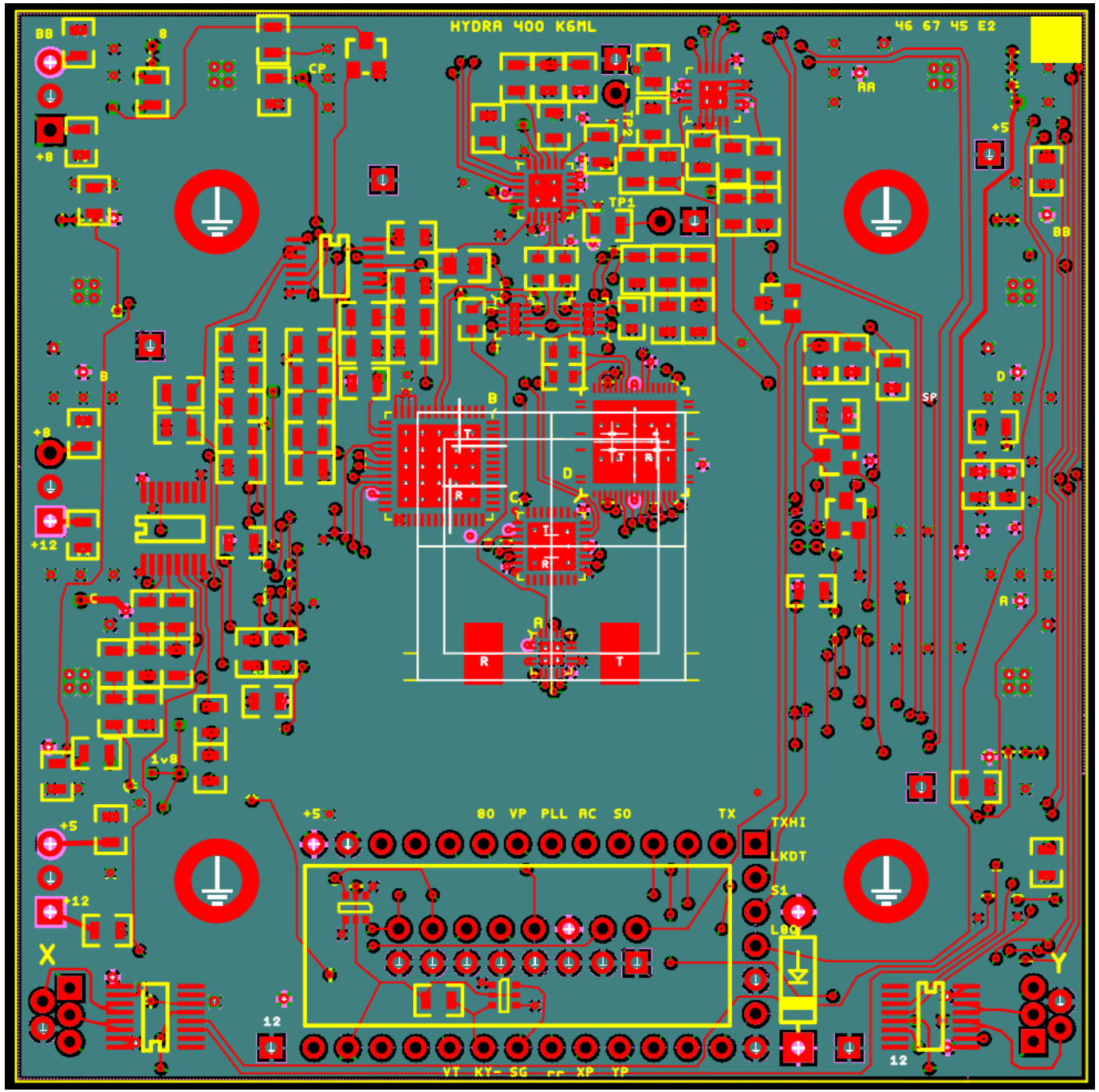


Radio Chips & Bands

- Version 0: Prove out switched architecture and test new chips
  - Radio A = Indie TRX_024_046 24 GHz
  - Radio B = Indie TRX_120_067 122 GHz
  - Radio C = Indie TRA_120_045 134 GHz
  - Radio D = Eurosky 1202 122 GHz (two high power Tx channels)

- Version 1: Four band radio
  - Radio A = Indie TRX_024_046 24 GHz
  - Radio B = winner ver 0 shootout 122 GHz
  - Radio C = Indie TRA_120_045 134 GHz
  - Radio D = Indie TRA_240_097 241 GHz

- Plan to try on both offset and Cassegrain dishes


HYDRA 400 K6ML
46 67 45 E2
BB
+8
CP
TP2
TP1
AA
+5
BB
SP
D
+12
C
A
1v8
80 VP PLL AC SO
TX
TXHI
LKDT
S1
LBG
12
VT KY- SG rr XP YP
X
Y