

Ammo Can Repeater

*how I crammed
a VHF repeater inside
.50 Cal Ammo Can*



Doug – NO1D
YARC Talk 20170302

Agenda

- Bit of history of this project
- Evaluation phase
- Packaging options for portable repeaters
- Meeting w/ Randy W6TYV at Jeep Posse Bld.
- Construction
- Results / Lessons Learned

Jeep Posse VHF Portable Repeater

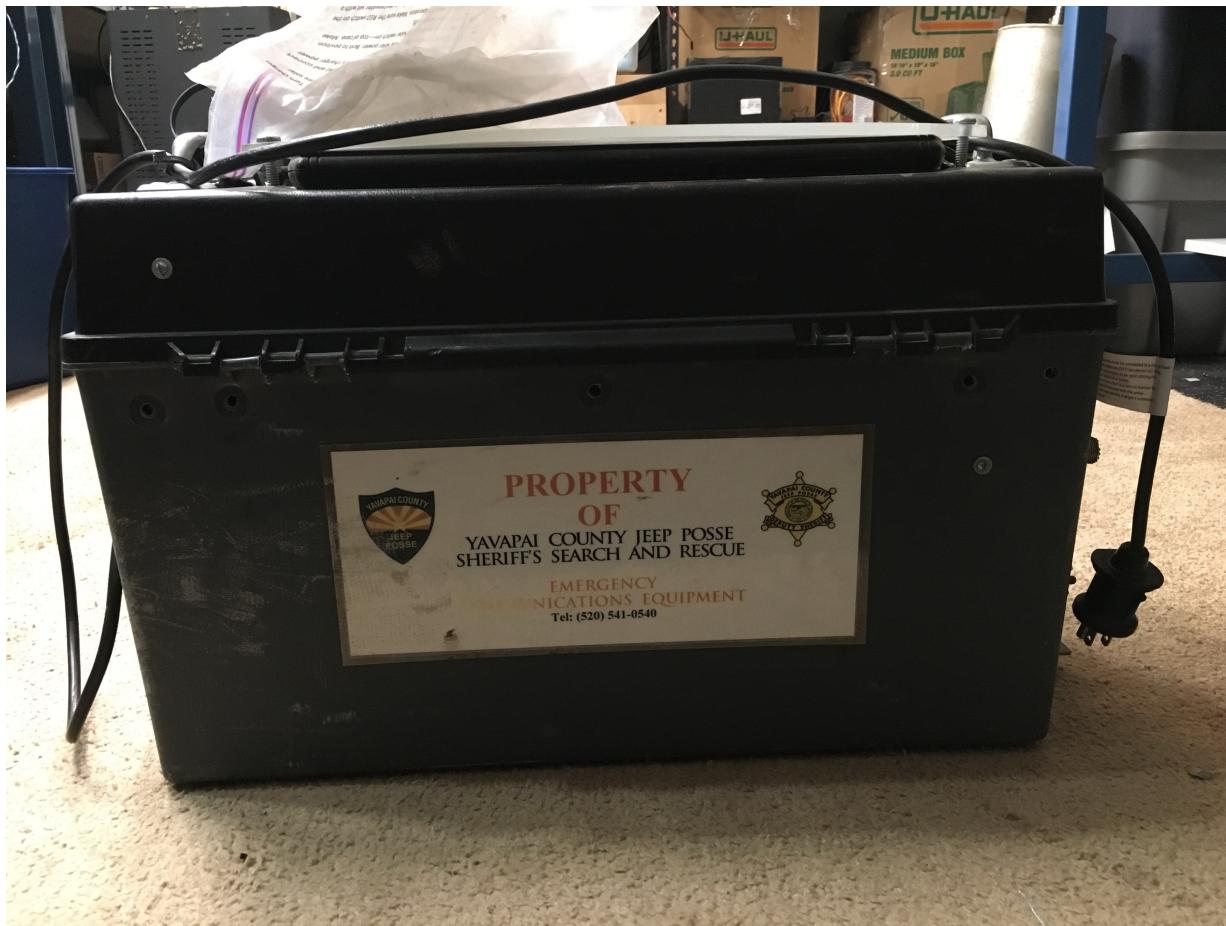
- First approached by Bud N7CW and John K7PRS
- Evaluate a Portable VHF repeater (150Mhz)
- Repeater was not working
- Was it worth repairing
- John delivers me a treasure chest full of VHF goodness
- Always willing to help out the JP Team











Evaluation

- Plastic Toolbox was used for packaging
- Batteries, Lead Acid, loose in box, not great deal of protection against shorts
- Solar Power Panels... neat, but trickle charge of batteries at best
- Small Mobile Duplexer, bit beat up but tunable
- Two nice Kenwood high band rigs; working
- CES Repeater Maker controller, velcro'd in place
 - Repeater Controller does not ID... FCC Compliance issue
- Wiring left something to be desired
- Packaging did not look like would survive bouncing around in a Jeep in back country...





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RELM LAND MOBILE
COMMUNICATIONS

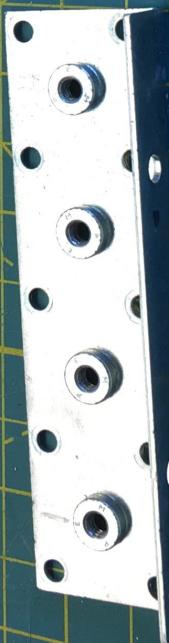
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SERIAL T662248-7
150.8150.157.575

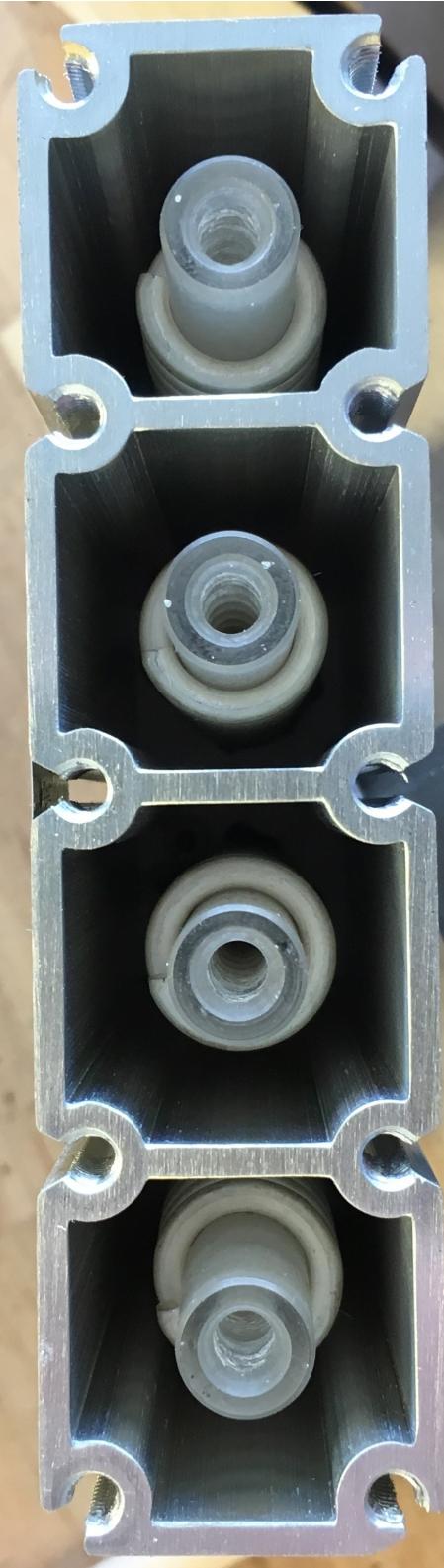
MADE IN U.S.A.

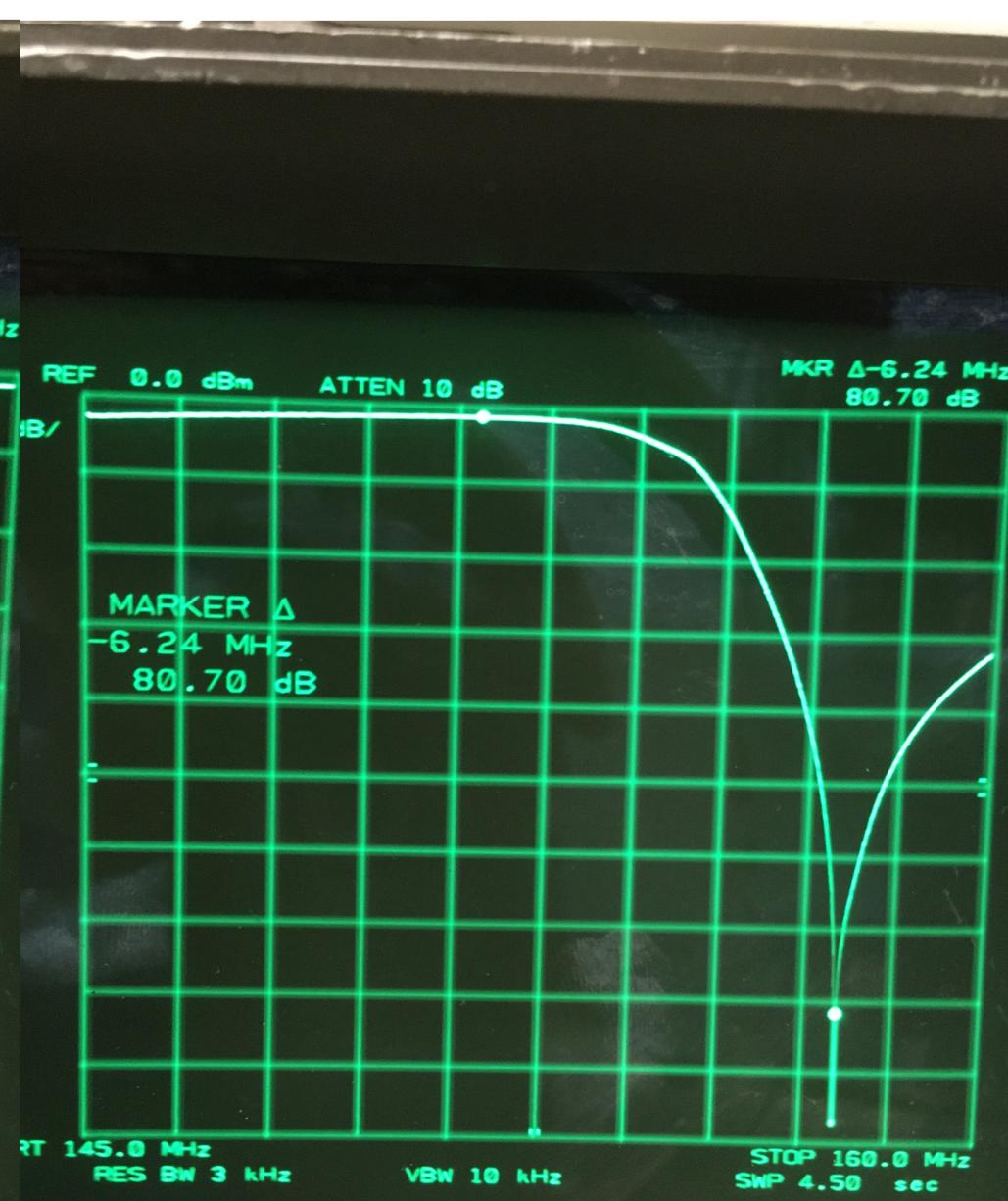
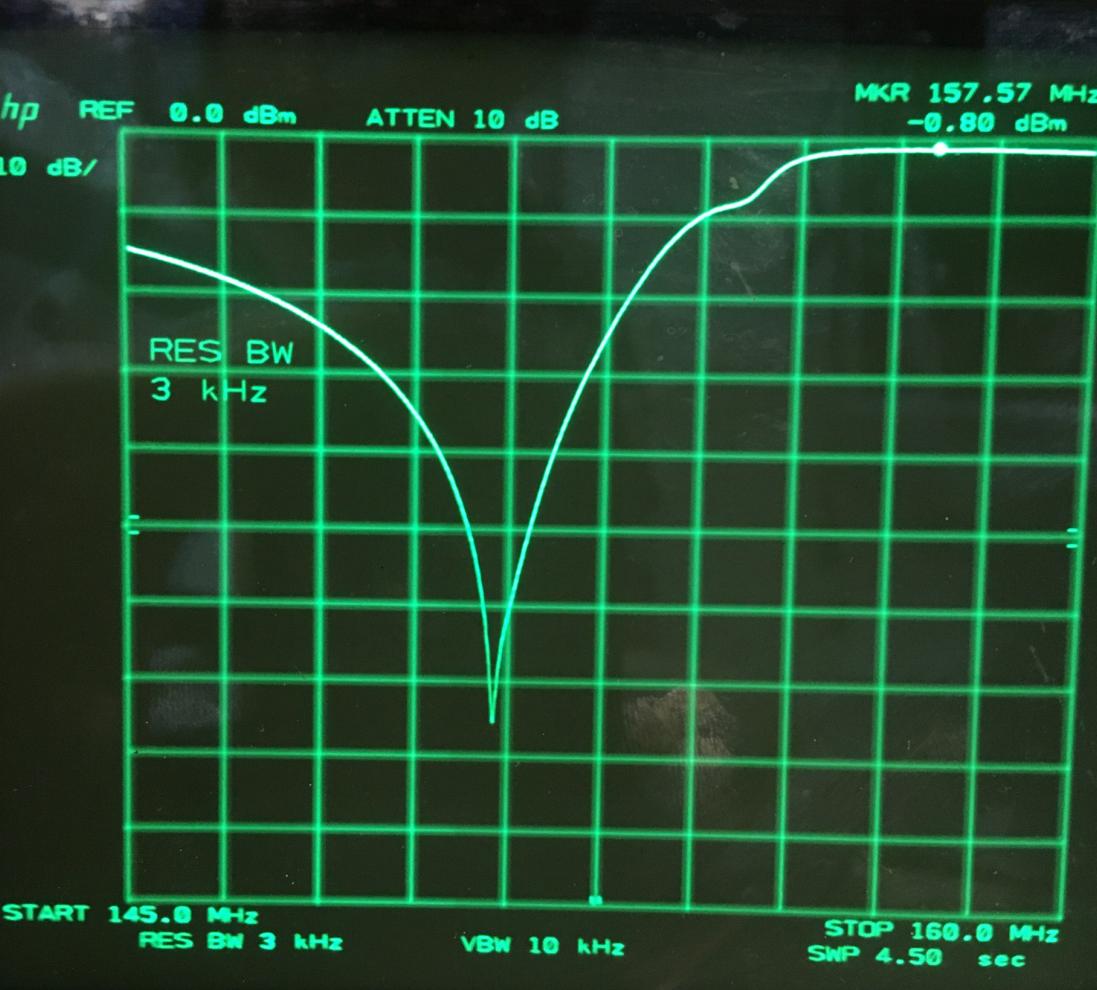
HIGH PASS

ANTENNA

LOW PASS







Type Compliance Check

- First had to read up on FCC Rules for commercial and Public Safety gear; recent change for narrow band
 - 12.5Khz deviation with 6.25Khz futures
 - Ham gear is 15Khz BW max but some rigs are using narrow band 11-12Khz
- Kenwood Rigs identified as narrow band per todays rules
 - TK7301(H)
 -



- Narrow banding allows more “channels” per spectrum allocation.

Packaging Options

- Flight Line 19" cases
 - Very nice options, DJ cases, Test Eq. transports
 - Amazon has some good pricing
 - Great idea if using full size duplexer's
- Boat Anchor Chassis
 - Old Collins Spec An chassis from K7PRS
- Wooden
 - But I'm horrible at wood working
- Ammo Cans
 - Many size options
 - Waterproof, solid clasp mechanism, carrying handle
 - Built to survive war !







Meeting w/ Randy W6TYV

- Discussed use of Portable Repeater with Fire Team
 - Unit never really worked if at all
 - Max coverage should be about 5 to 10 miles max
 - Deployed with someone w/ vehicle so power readily available.
 - Would like in place before Fire Season
- Discussed Flight Line case options, but settled on goal to try and fit in an Ammo Can
- Separate battery box or run from Jeep battery
 - No solar panels, charger box, 110v. Keep it simple; 12v Repeater
- Reprogrammed Tx rig to run from 50W to 20W.
 - Found that Tx freq on JP rigs may be mis-programmed
 - 150.851 Mhz vs 150.815 Mhz on spread-sheet

Construction

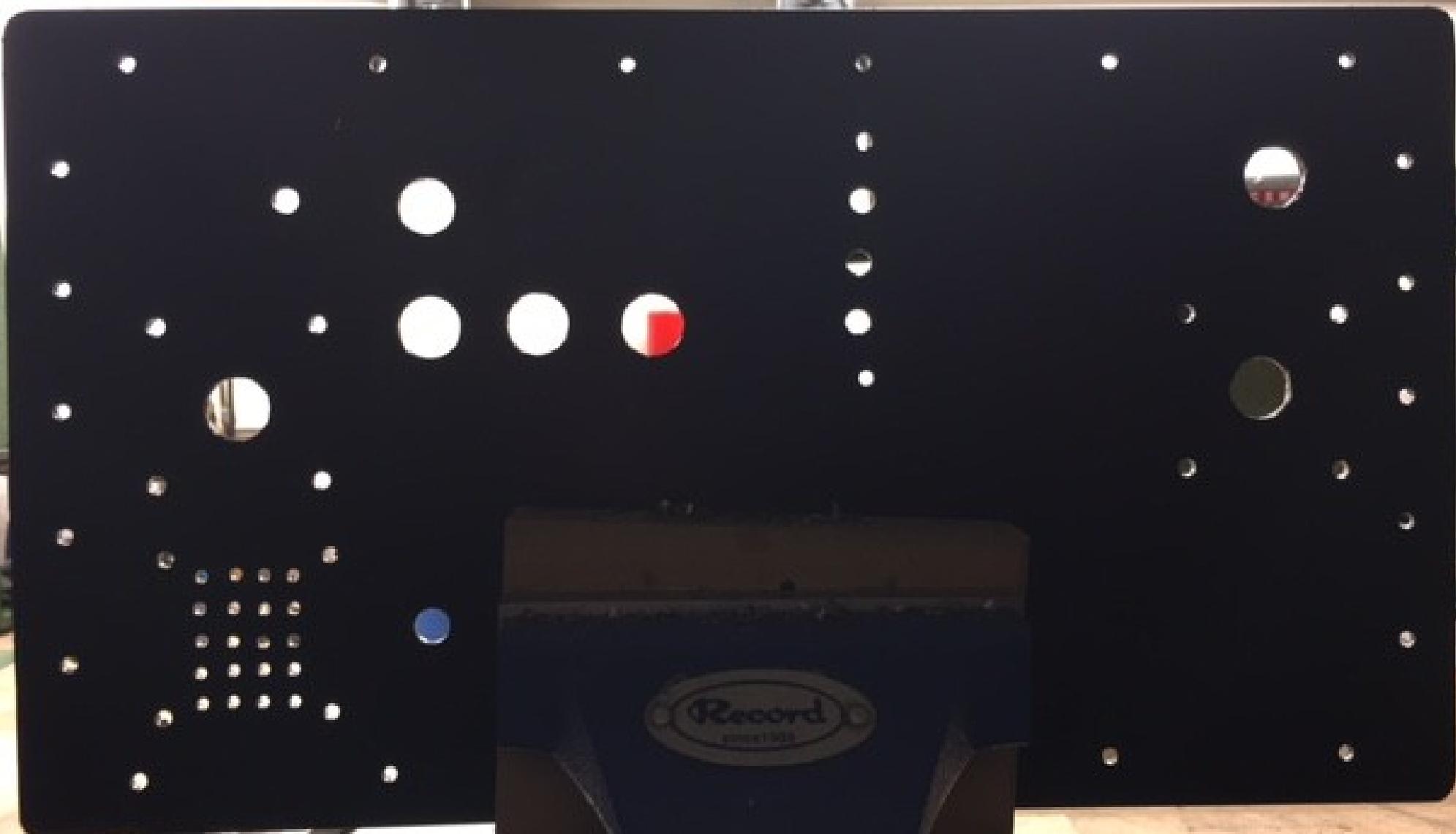
- Rough dry fit of rigs, duplexer and controller
- Normal .50 Cal can too small, but Fat .50 can was just right; 1" to 2" more in each dimension
- Paper sketched up front panel layout
- Didn't want to drill many if any holes at all in Ammo Can to preserve water proofing
- Decided on slide in chassis w/ minimal screws thru can
- Front panel would need to supply air in/out to help keep rigs cool or at least not overheat
- Re-used angle stock, sheet metal from the old case

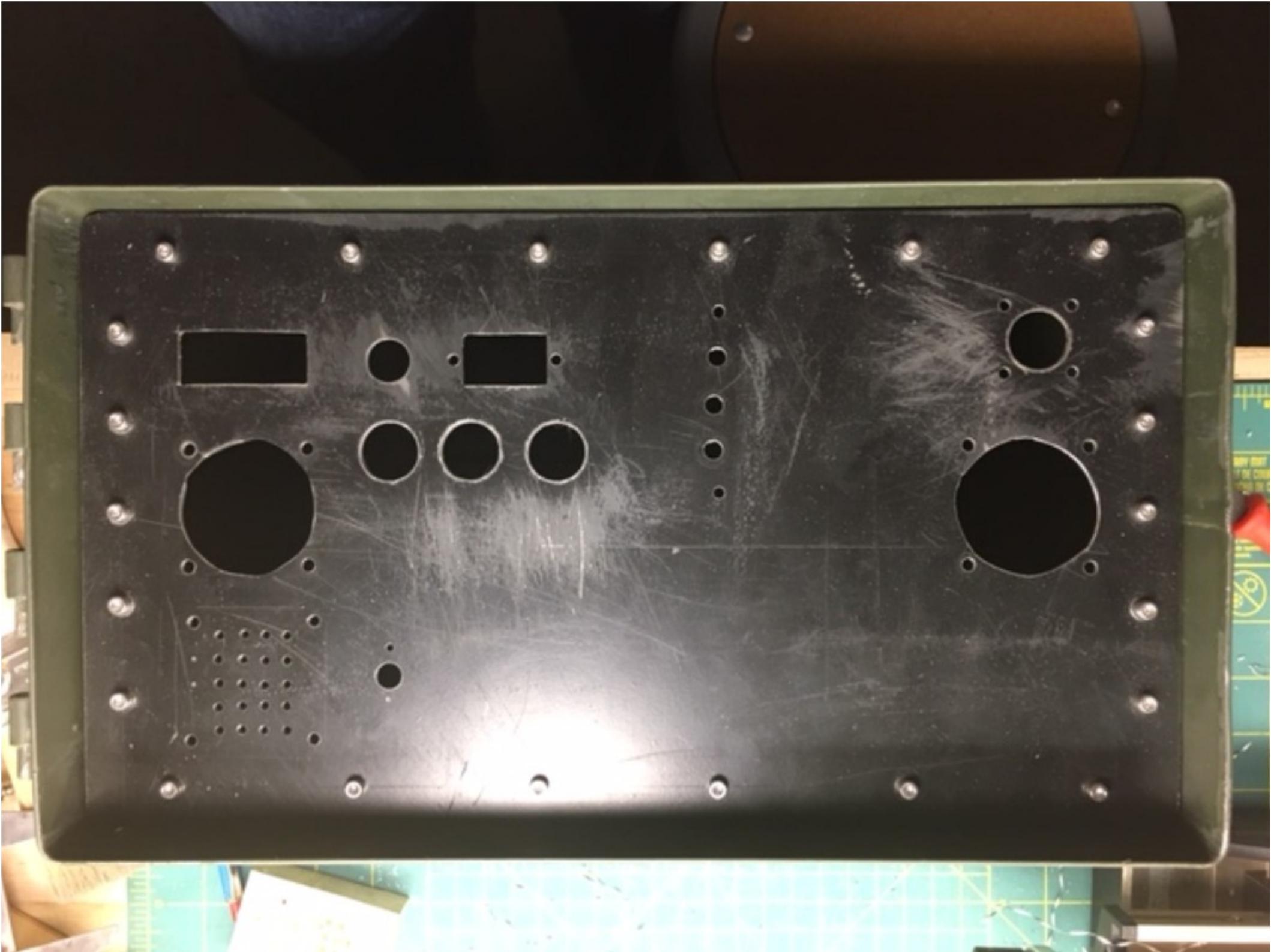
800 CRTG 5.56MM
4 BALL M855
1 TRACER M856
M27 LINK

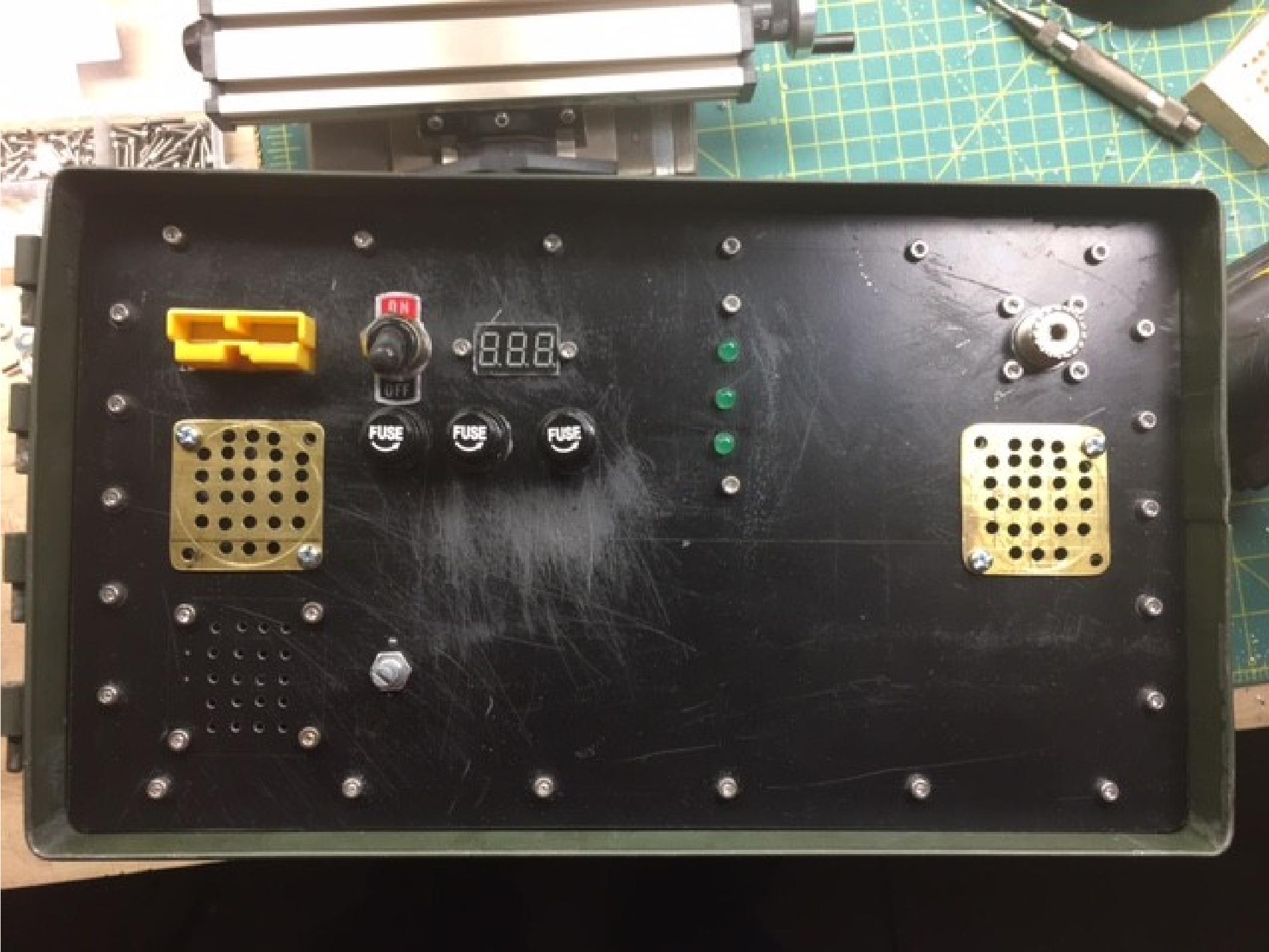
LC-09C694L097

Blades





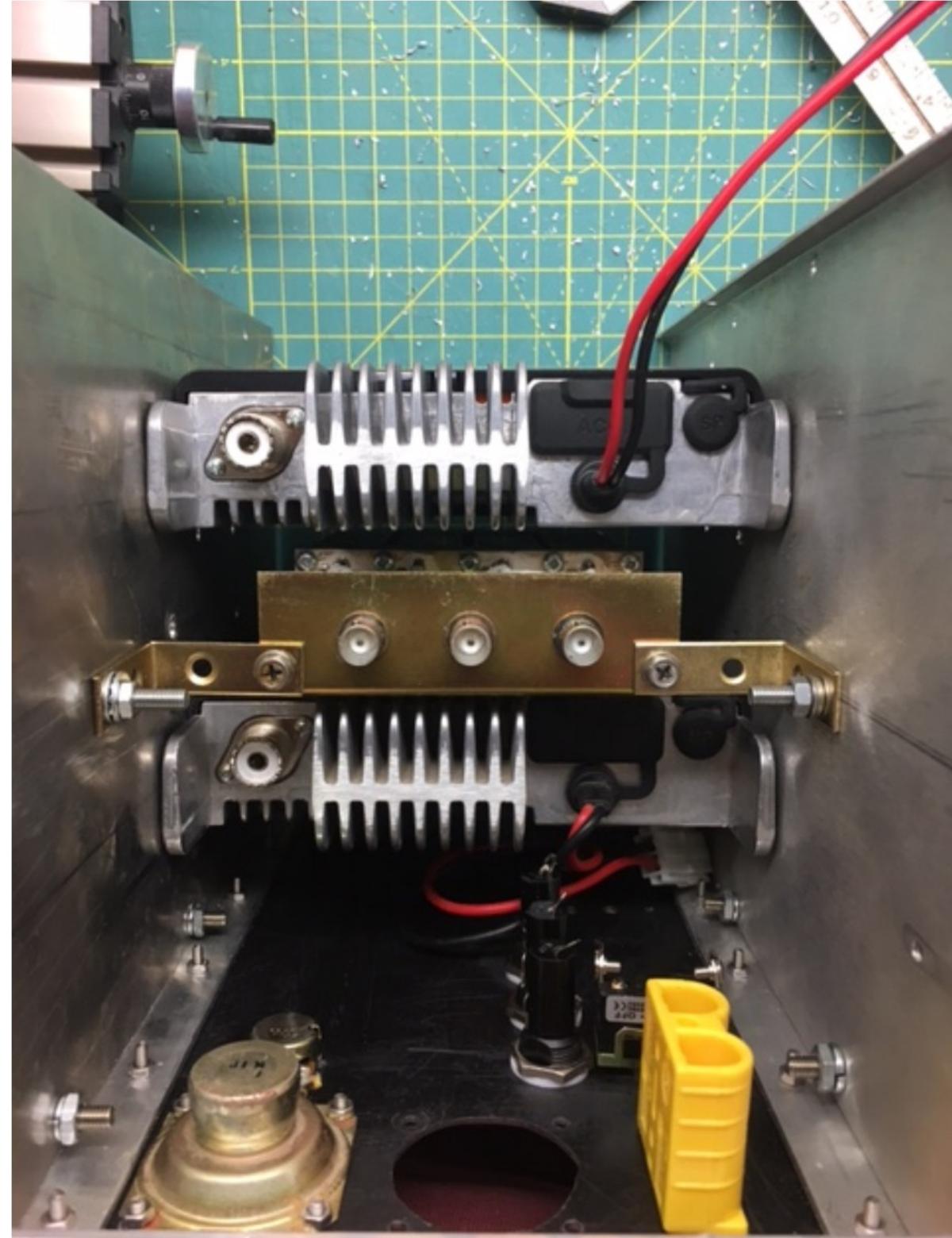






- Slide in chassis allows for servicing and reprogramming of rigs without removal
- And allows for periodic duplexer tuning

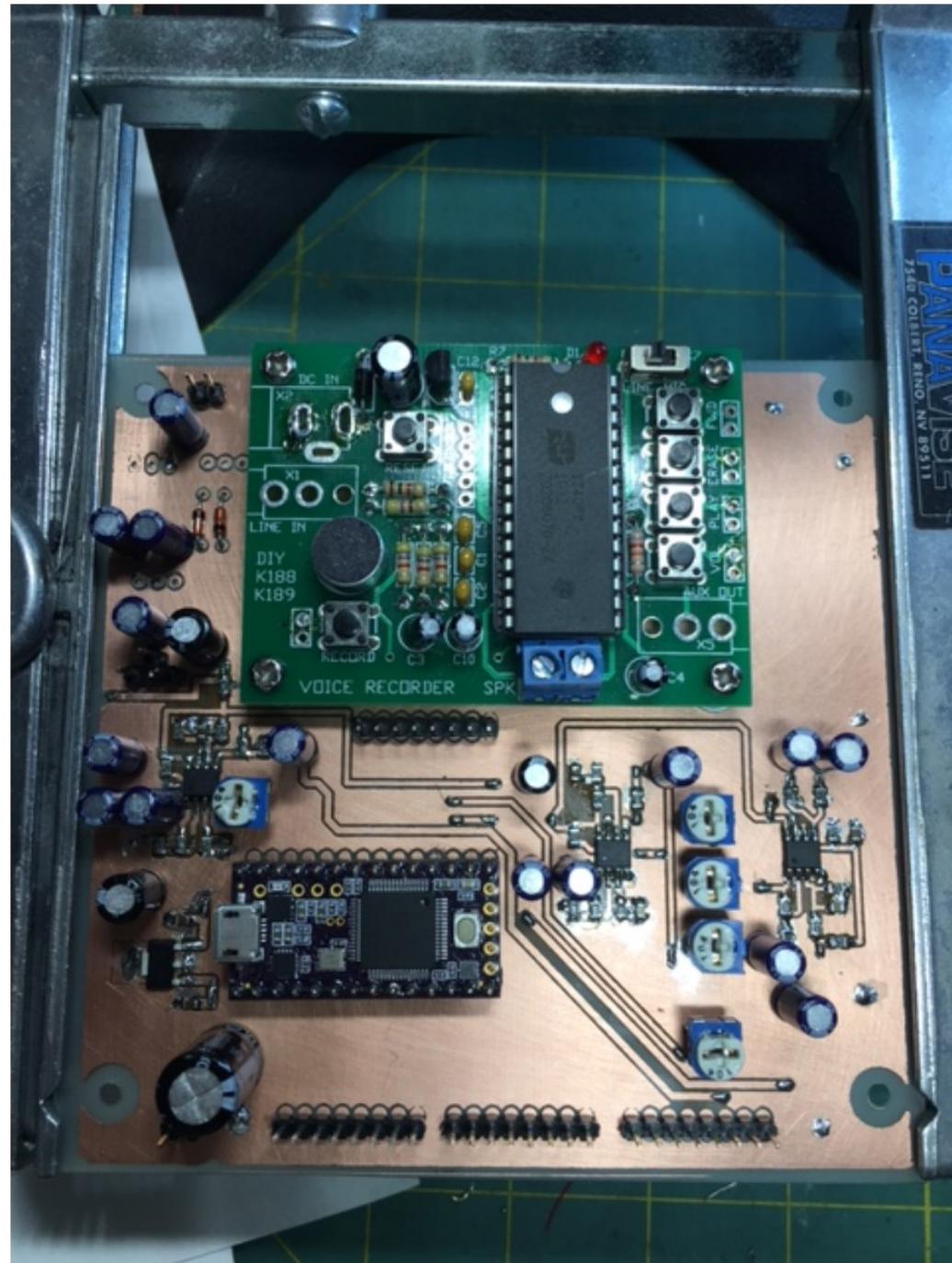




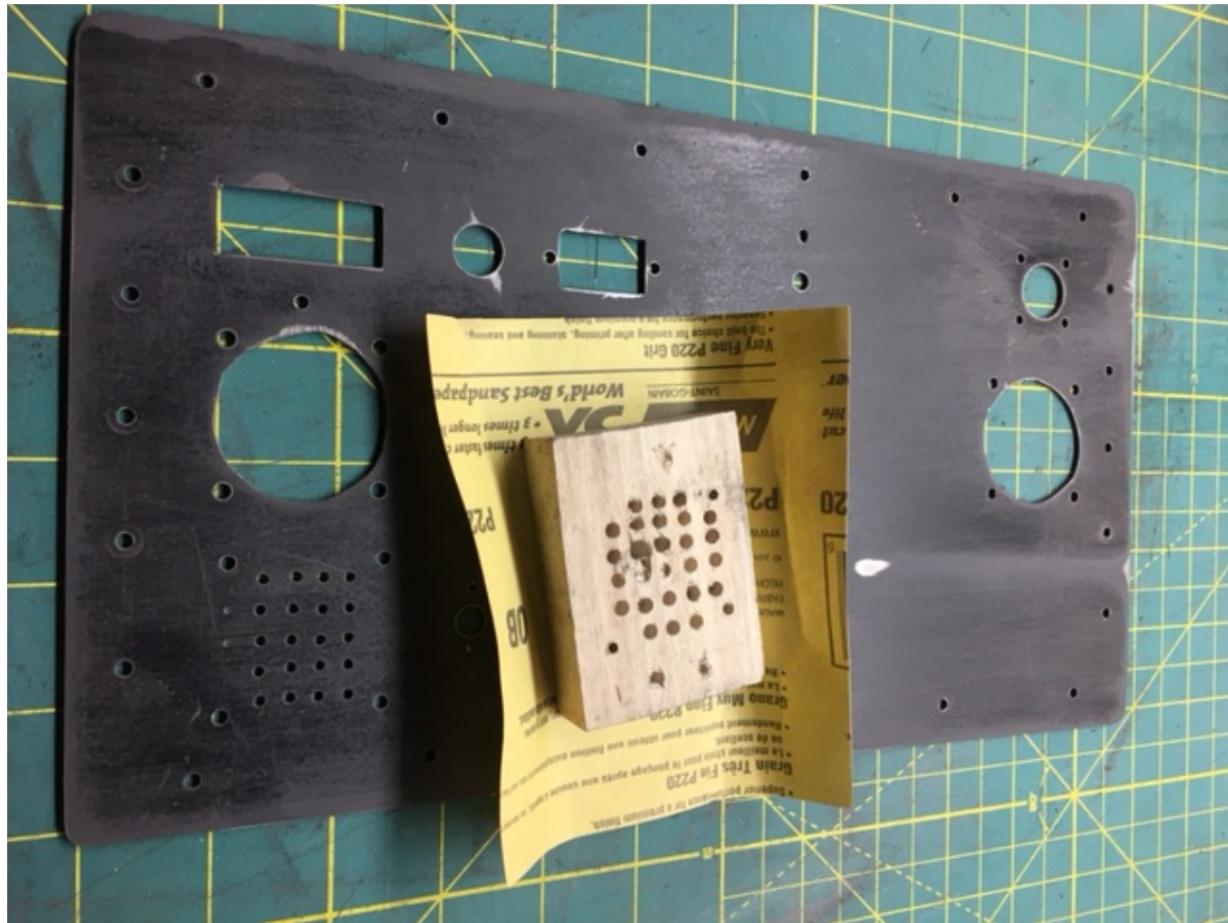
- Rigs fit perfectly in width of can
- TX nearest front panel for cooling
- Re-used old brackets or made new ones from scrap

Teensy 3.2 Repeater Controller

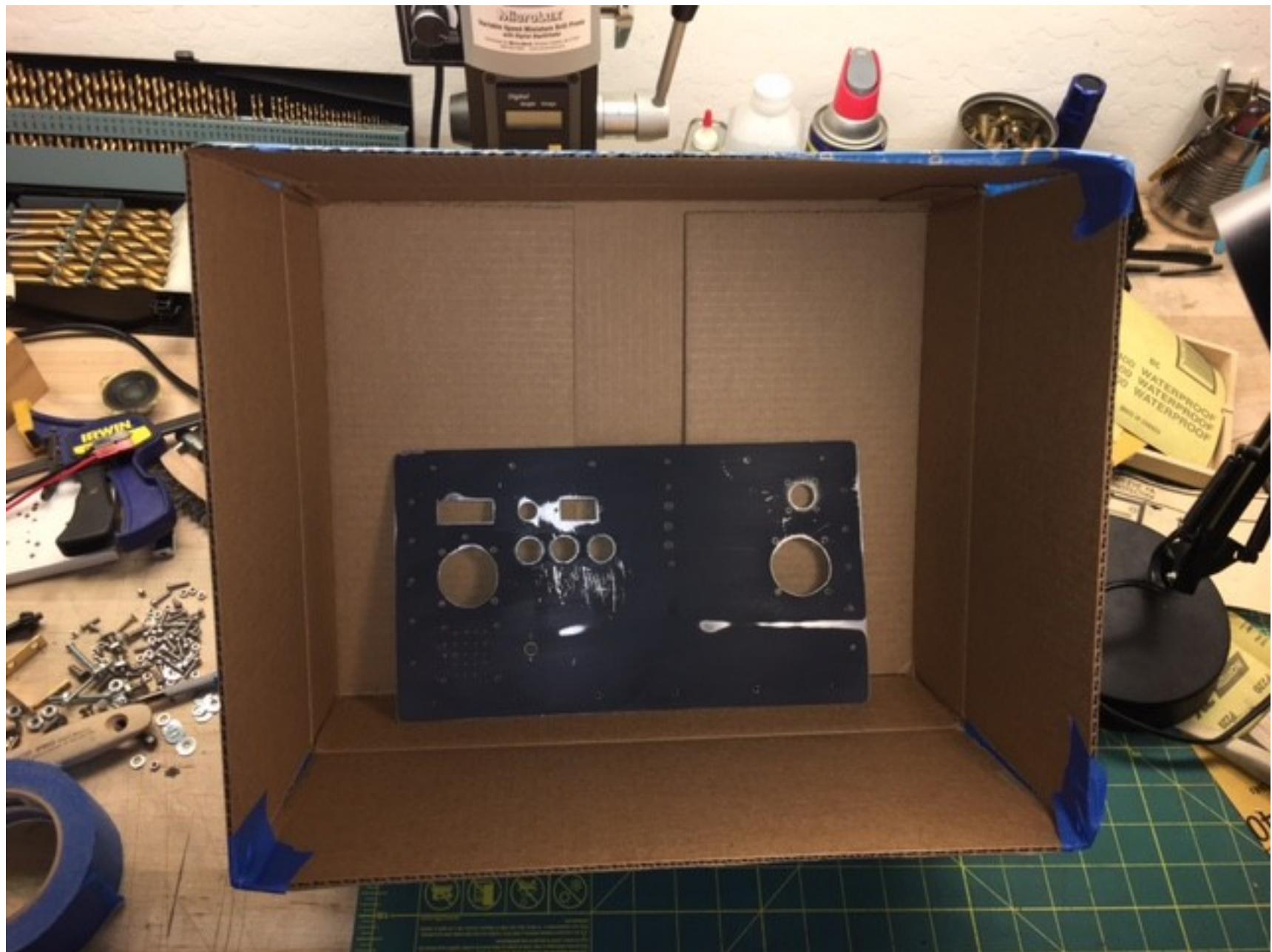
- Leveraging work from the Westel Repeater project for Sherwin WB7NFX
- CW ID every 30m when repeater is active per public safety rules



Prepping the Panel... sanding up to 800 grit



Spray Box using cardboard box

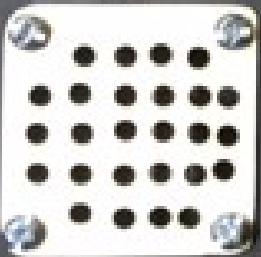


Gloss... But I bought Flat - Ugghh





888



800 CRTG 5.56MM
4 BALL M855
1 TRACER M856
M27 LINK
LC-09C694L097



5 6 7 8 9

Remaining Work

- Add Teensy Repeater ID Timer Board
- Power Cable to Jeep
- RX PLL Check – Possible Reprogramming
- Clean up and secure internal wiring
 - LEDs for Controller/Timer Board
- Front Panel Lettering – License Info
- Recommendation on Antenna/Mast/Base
- Range/Field Test

Lessons Learned

- My metal fabrication techniques need a lot of work
- Cutting 1/8" steel plate with scroll saw takes time
 - John those Greenlee Punches would have been great !
- Harbor Freight drill bits break/bend easily with hand drills
- Try not to drag metal fillings from the lab to the kitchen... or you'll hear about it when one sticks into your wifes foot
- Screw hole alignments... did I say metal work was hard !
- Painting... wanted flat, somehow can was gloss ?
 - Still don't know what went wrong here

Finale'

- Fun project
 - As many complaints I had, was still fun to build
 - Hope it works well for our friends at the JP who are doing great work, especially during Fire Season
- Ammo Cans are a good base to build with
 - Battery Box – spare batteries for your GoBox
 - Go Box – HF or VHF/UHF portable rigs
 - Tool box for Field Day; antenna gear, connectors etc.
 - or prepping for the “Zombie Apocalypse”
- Need to package gear... consider an old Ammo Can