The Good, The Bad and The Ugly

ACøC Alpha 76pa

One Man's Modernization
- or Unforgivable Butchering -
of a Classic Workhorse Amp

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Beginnings: The Good

It's not your SB200…

- Functional on all bands
- Power output within expected limits
- Great reliability history
- Fit on the bench slot
- Ceramic tube complement
- Reasonably quiet fan

Beginnings: The Bad

Rode hard and put away wet

- Intermittent power out under some cases
- Clunky open-frame TR relay
- Transformer hum under load (common for the EI)
- Unobtanium tube type (8874)
- No grid drive protection
- 120V PTT switching input

Beginnings: The Ugly

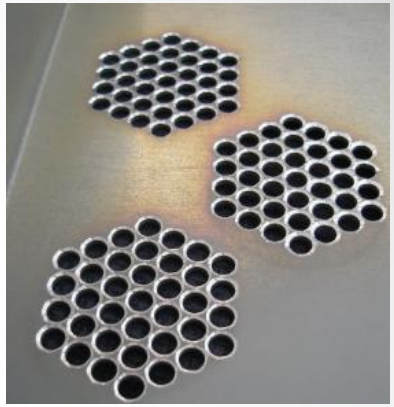
Rode hard and put away wet (paint)

- Alpha's famous non-drying paint
- Incandescent functional but dim lighting

The Mods

Mod: New Faceplate + Screws

Mod: Case Prep and Painting

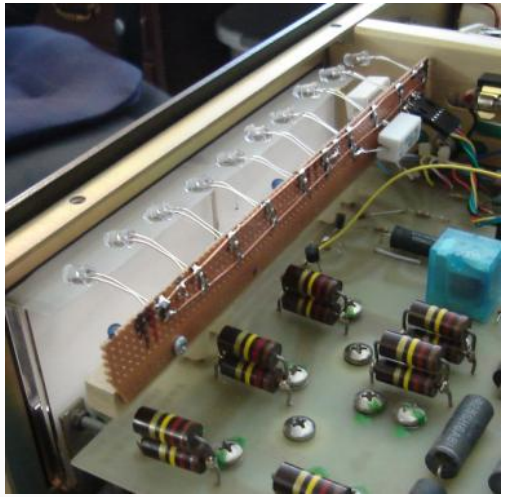


- Interior tube vents were chamfered to improve flow

- Case roughed, degreased and painted with plastic matte-finish paint

Mod: LED for Meter Illumination

- Stock incandessent lamps replaced with a string of white and blue LEDs
- The board is temporary mounted and ties into existing control circuit

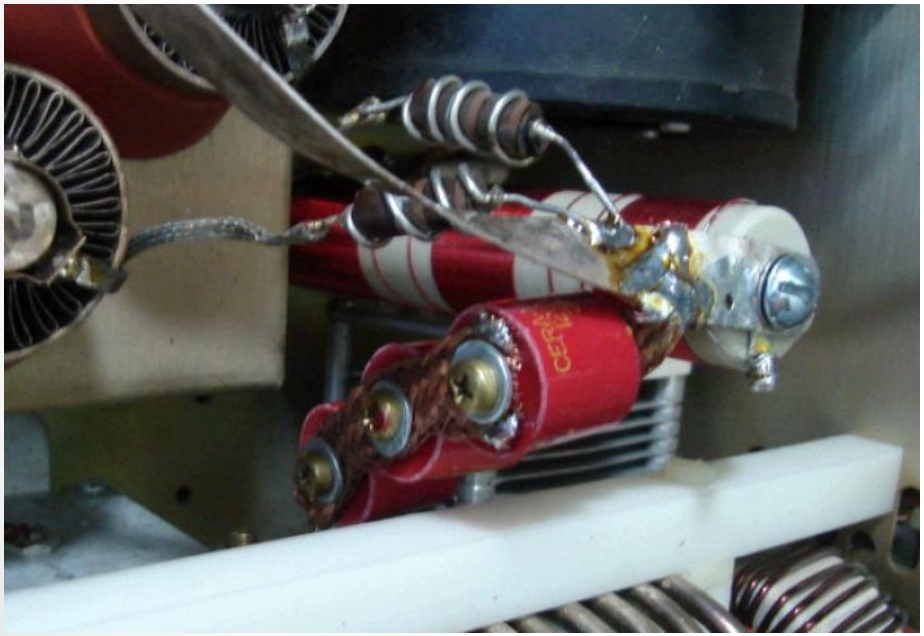


Mod: Plate Choke Swap

- Stock choke is resonant on the 12m band
- Replaced with an Ameritron unit with added turns

Mod: Coupling Cap Swap

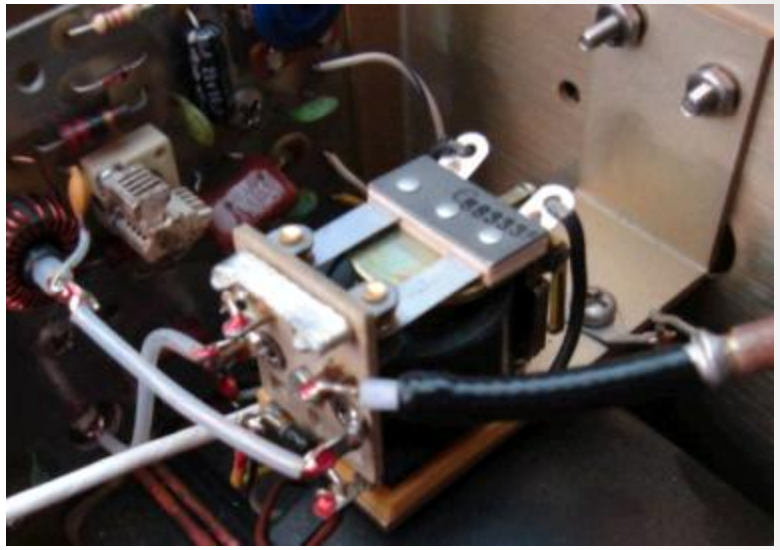
- Replaced stock ceramic with TV type door knobs
- Coupling caps are one of the heating spots observed with the SB200 mod



Mod: TR Relay Swap

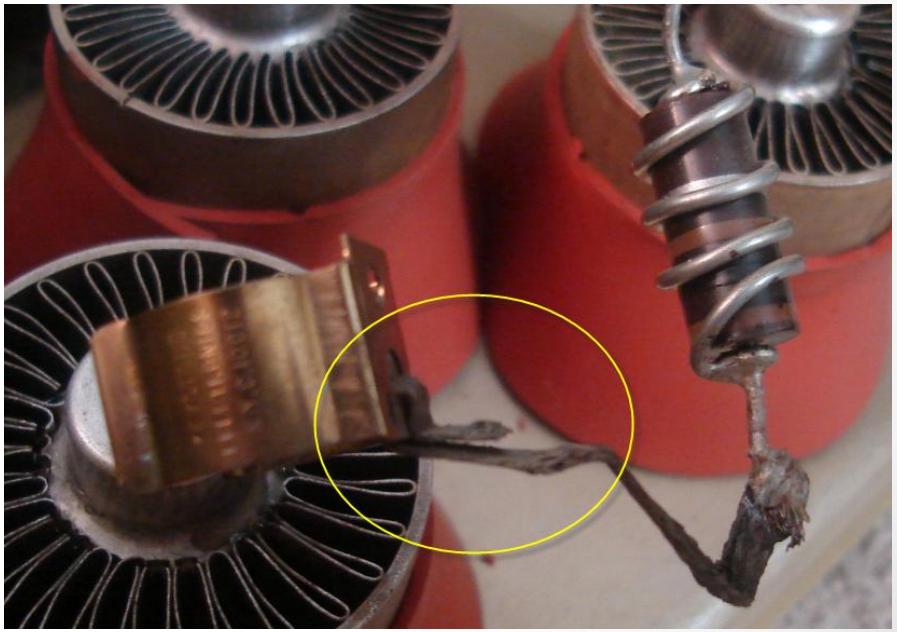
- Stock open frame swap with Panasonic RF reed input relay + GV vac output relay

- Sound deadning:
  1. Foam mounted
  2. Braid connected
  3. Hot glue



Mod: Replacing the Missing Solder

- Solder braid on tube clamps and on bandswitch had serious solder voids
- The tube cap opens were easy to find… the bandswitch intermittent opens were not

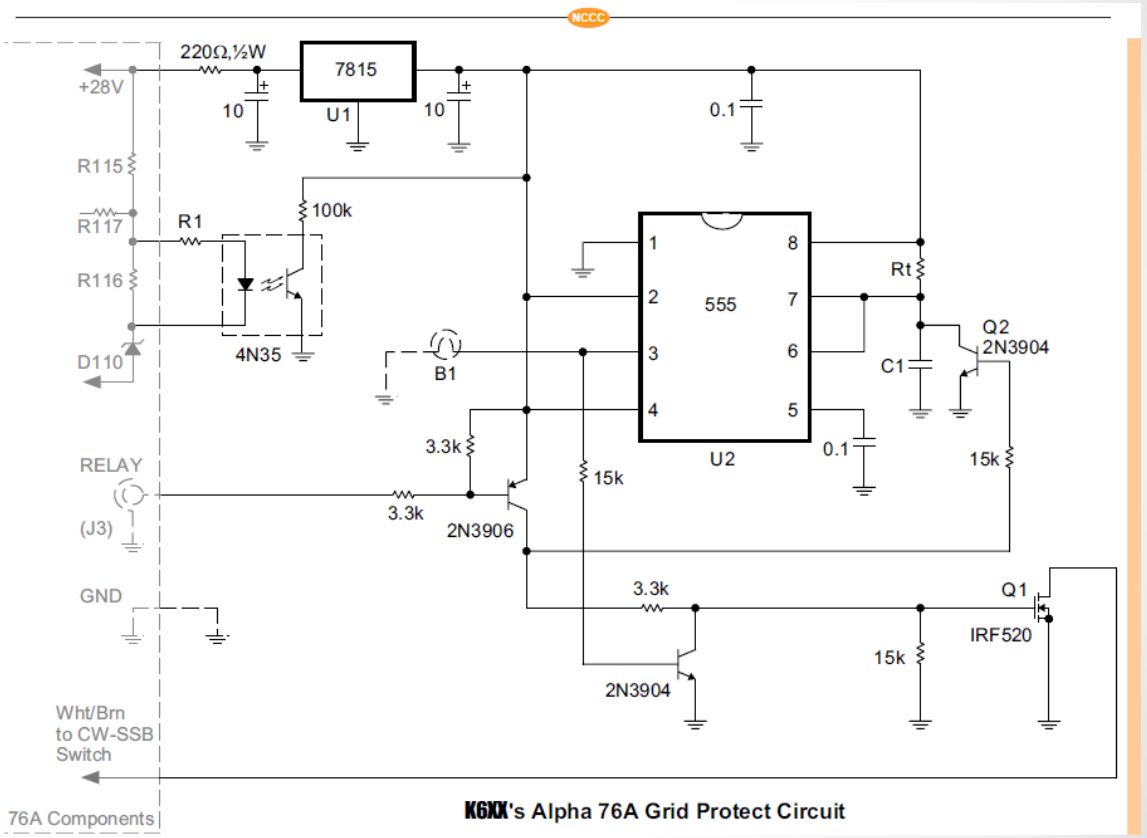


What about the Grid Protection?

- Amp has overcurrent protection
- SWR limit provided by external LP100 + PTT line
- Grid protection capability needed

Considering the K6XX Solution

- Uses voltage across existing resistor + opto iso as current source to trigger a timer
- Problems: Ckt errors and lack of warning level



A uP Alternative

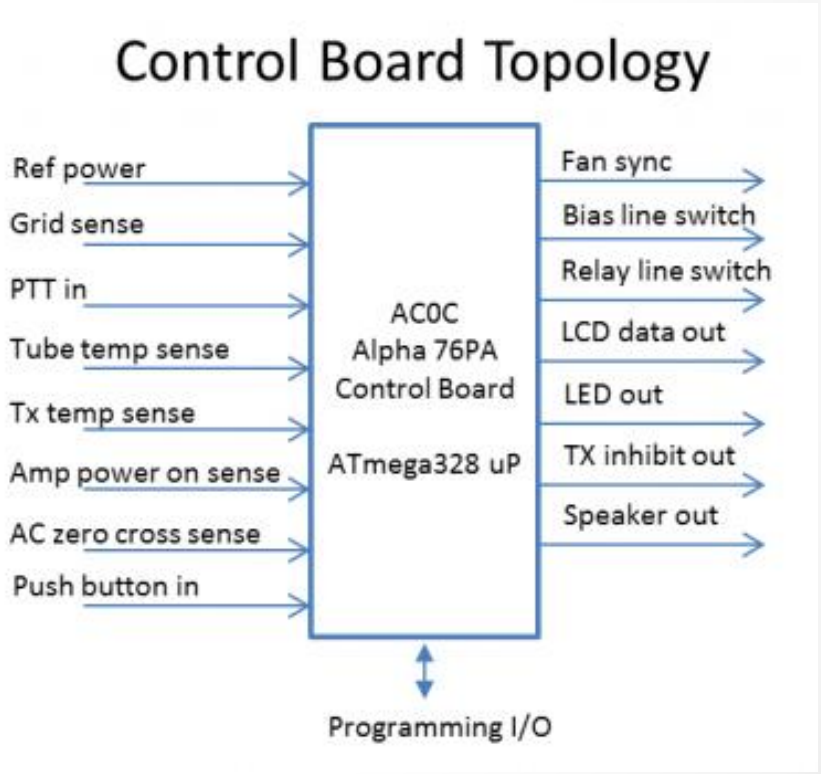
- The opto iso sampling method for the grid current is really an elegant idea
- Stick same sensor onto the ADC of a uP, and could read grid current directly
- The uP also opens the door to a lot of cool features including QSK, relay sequencing, temp monitoring, fan speed control, others. Oh my…

uP Control Board Functional Overview

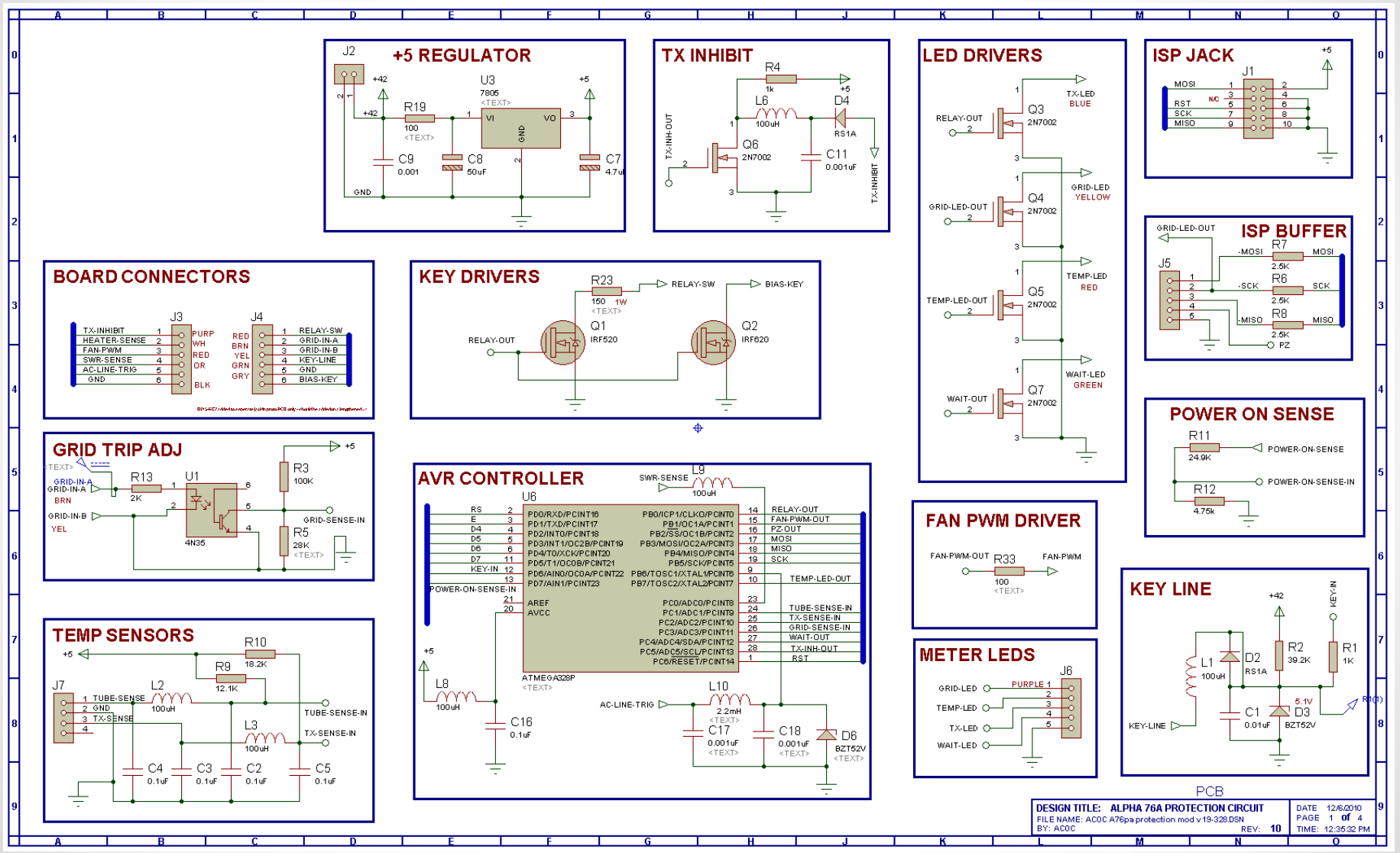
- Real-time grid current measurement - warning and lockout
- 3 mS QSK switching speeds with rig inhibit output
- Automatic fan speed control - based on tube and transformer temperatures
- 4x20 LCD display on a remotely mounted control head
- Real-time measurement of tube and transformer temps - peak-hold function to indicate the max temps reached
- Standby function
- Morse code beeps provide audio clues for key events

uP Control Board Operation Summary

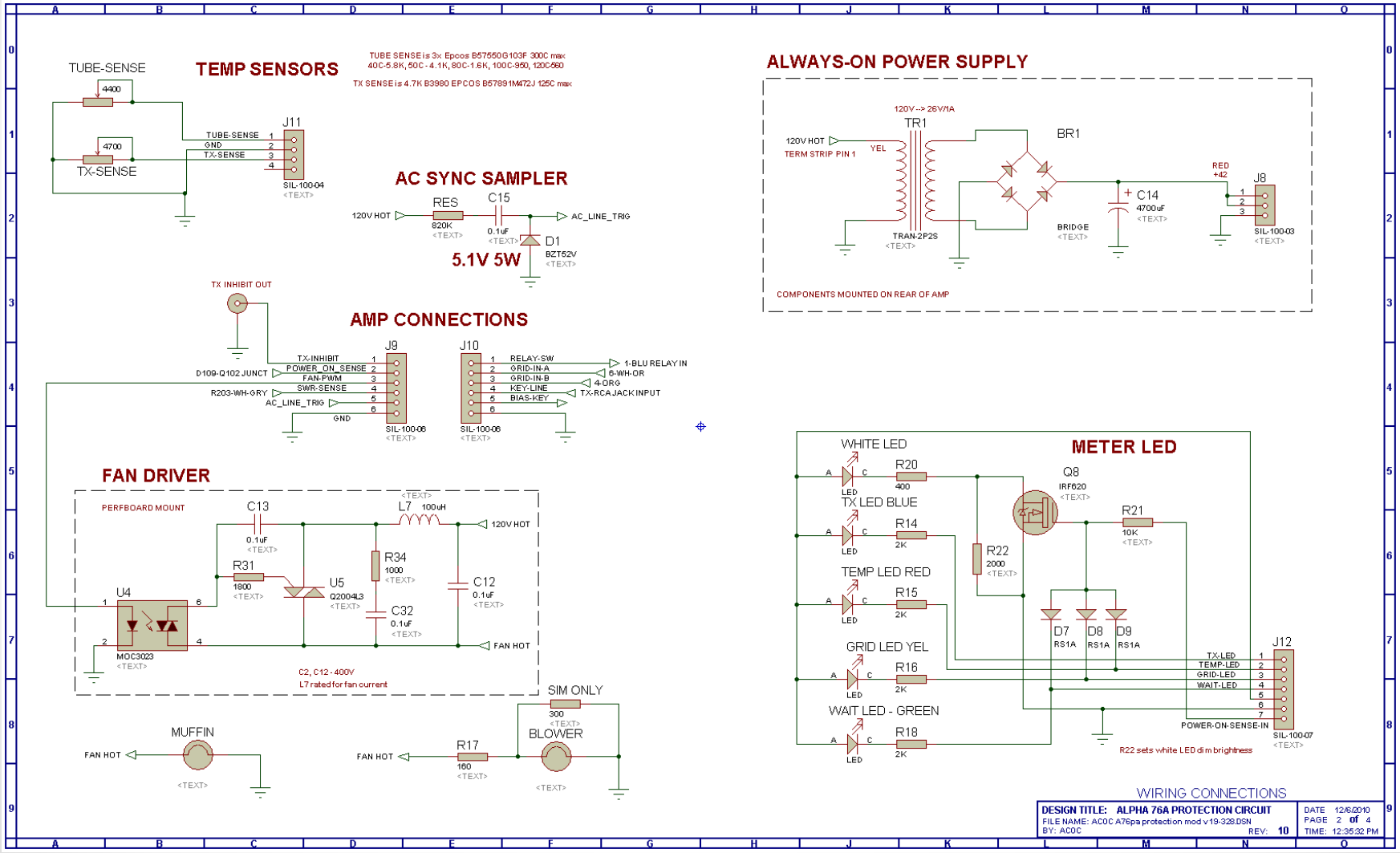
- Inputs:
  - Grid current sense
  - PTT from transmitter
  - Tube temp sensor
  - TX temp sensor
  - Amp power ON
  - AC line sensor
  - Reflected power sense
- Outputs:
  - Bias line
  - TR relay
  - LCD
  - LED
  - TX inhibit
  - Speaker



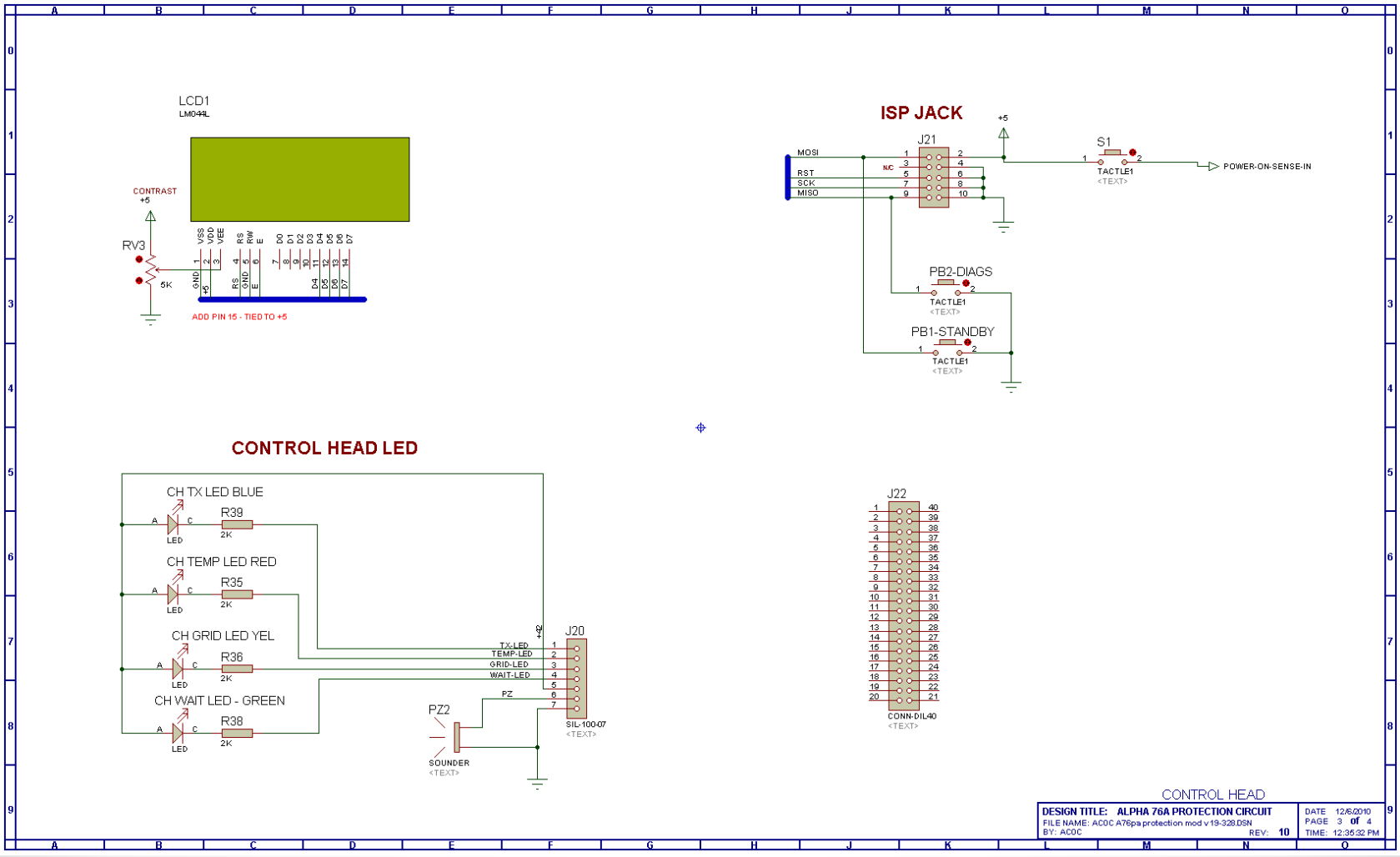
Schematic – Page 1



Schematic – Page 2

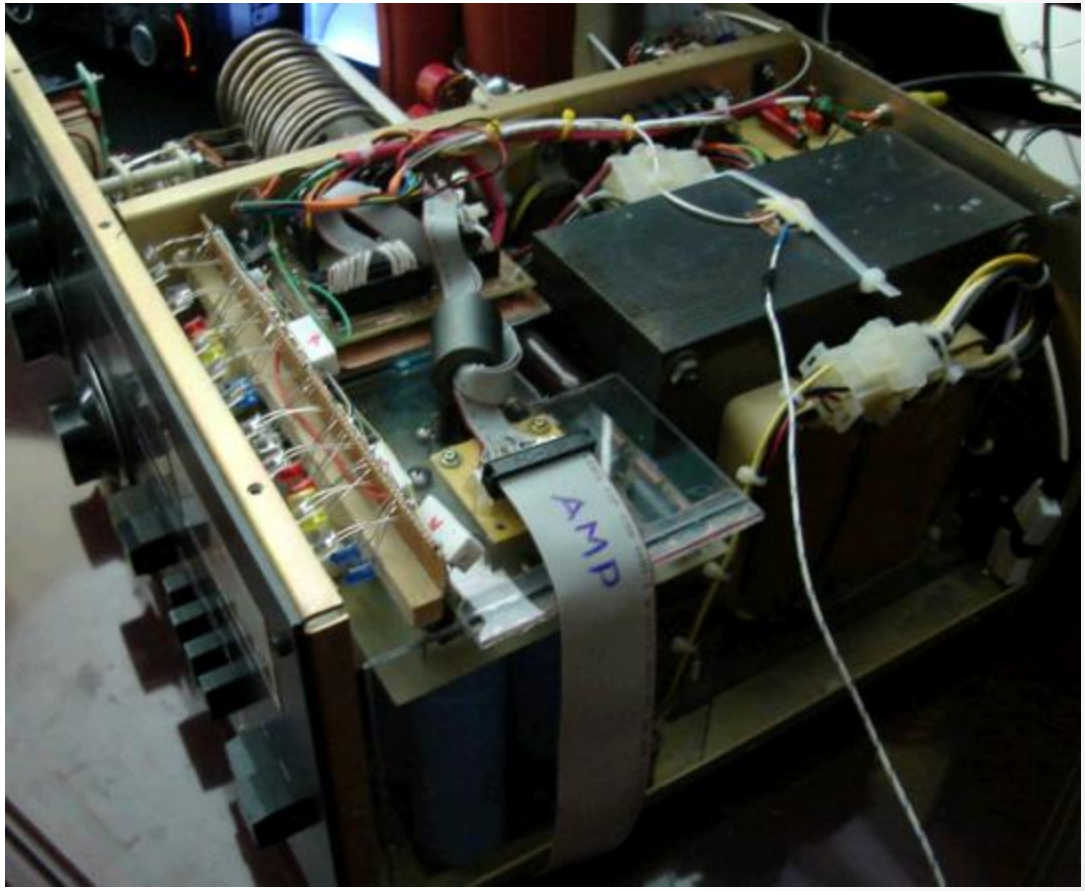


Schematic – Page 3

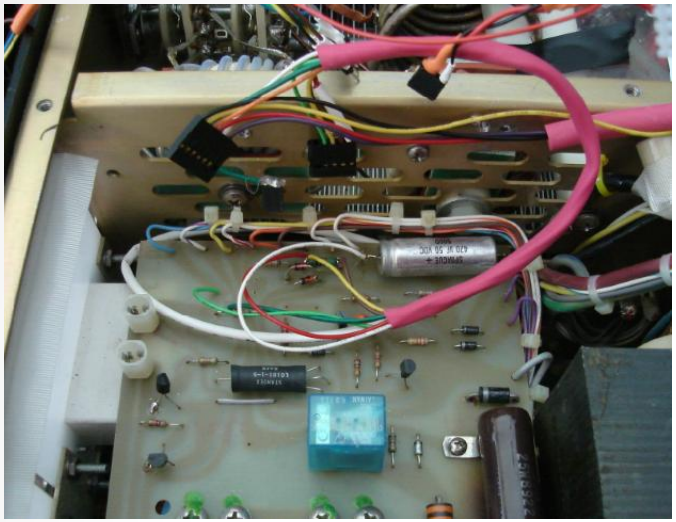


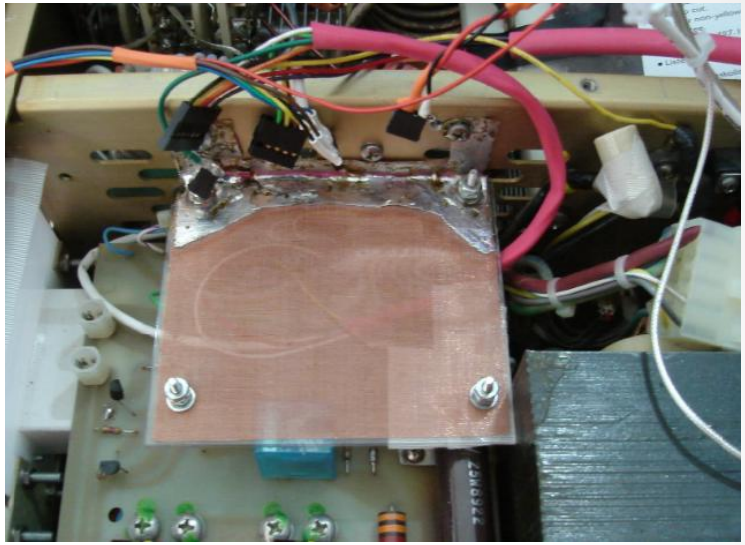
uP Control Board

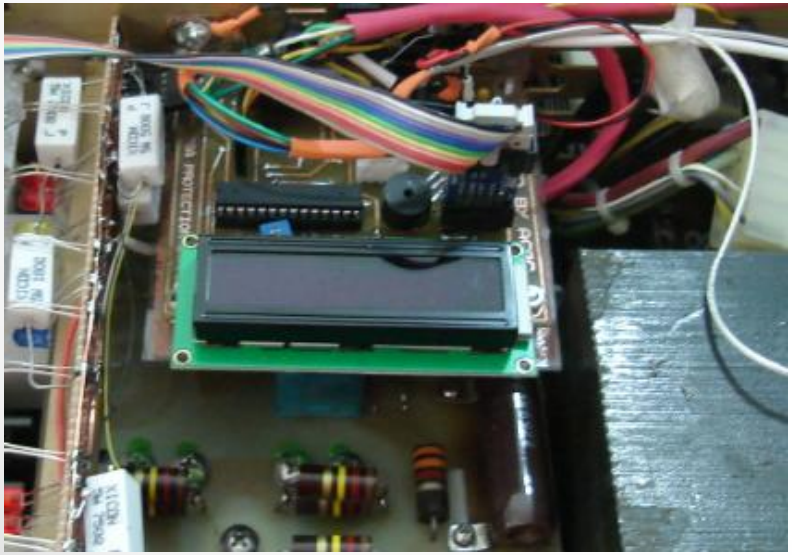
- Fit into amp sitting over the power supply and control board

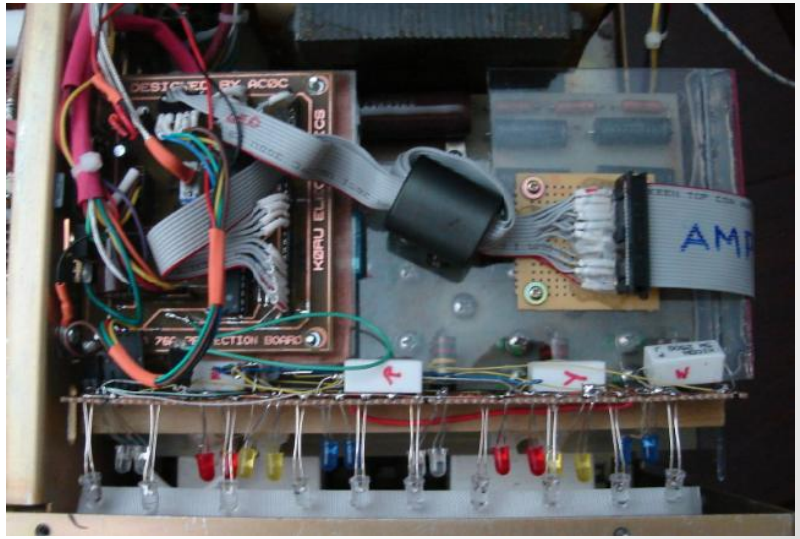


uP Control Board - Mounting

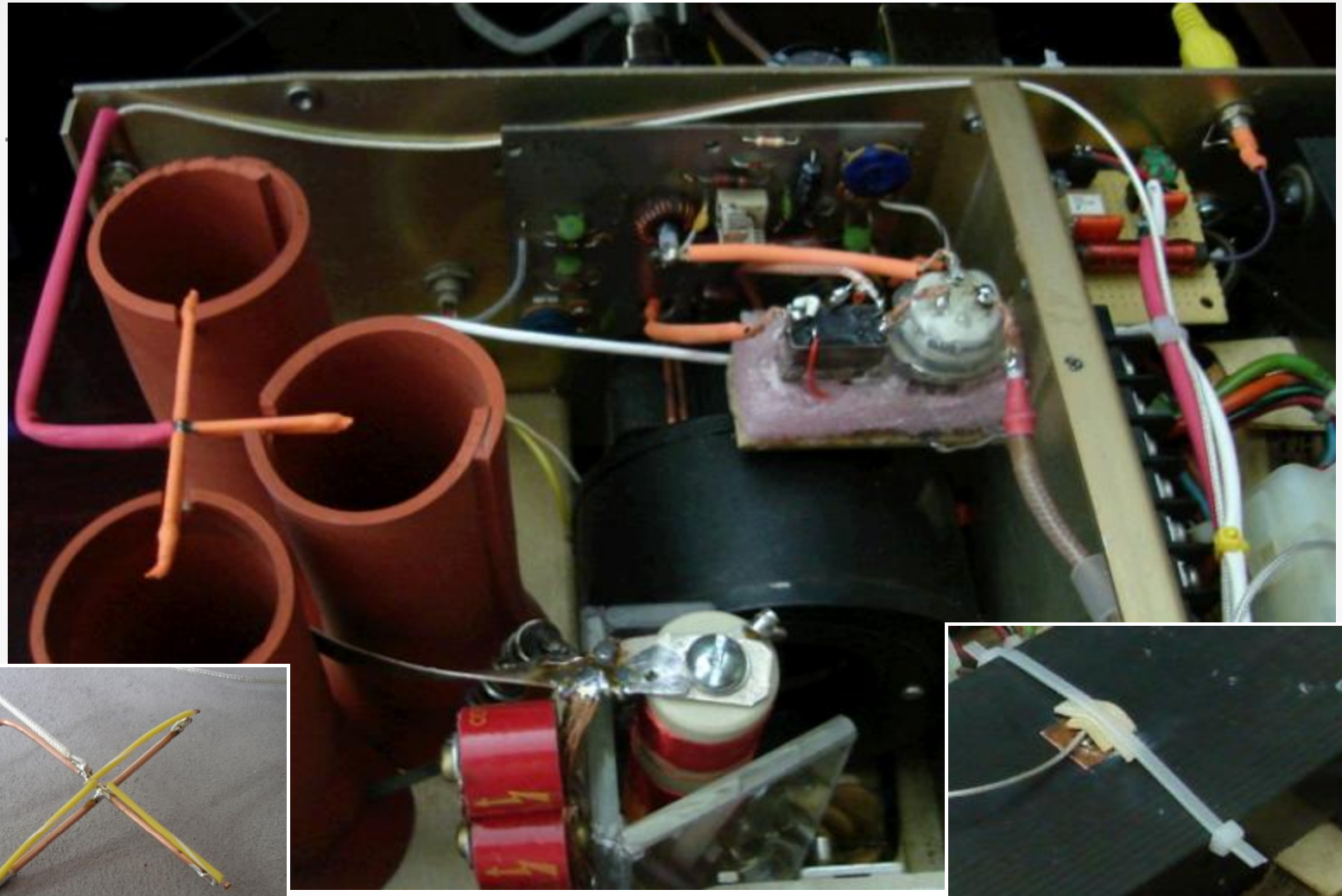






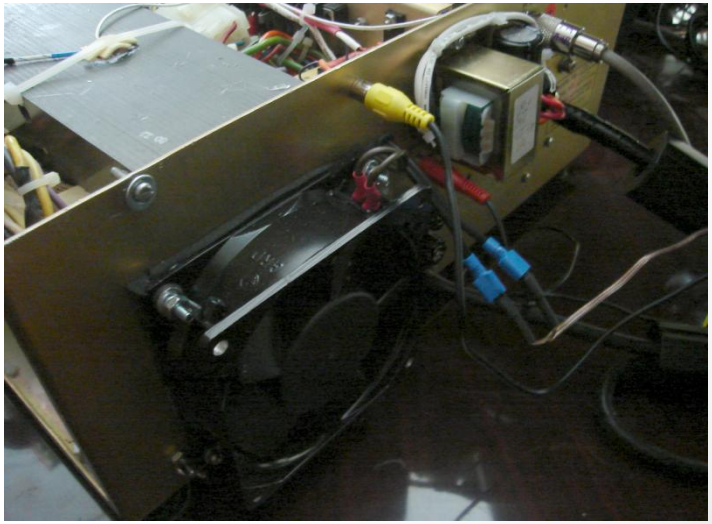


uP Control Board – Temp Sensors



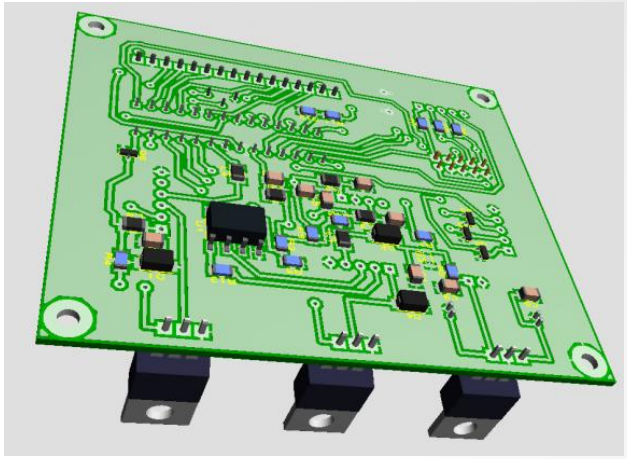
uP Control – Fan System

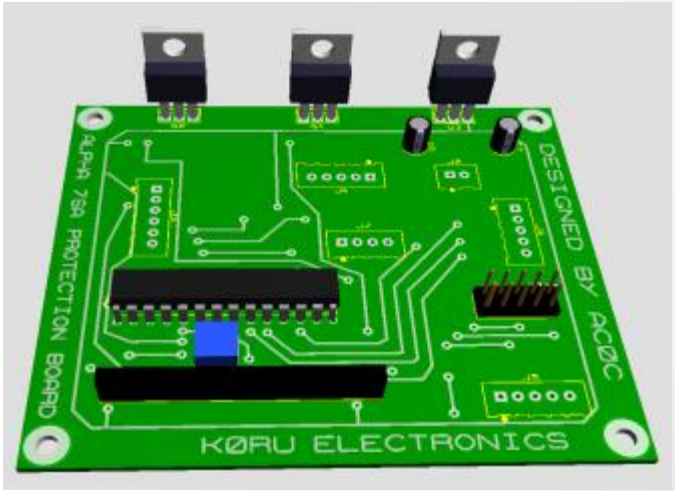
- uP controls internal blower, rear-mounted muffin and desk mounted muffin above the amp
- Fan speed determined by tube and transformer temps



uP Control Board Construction

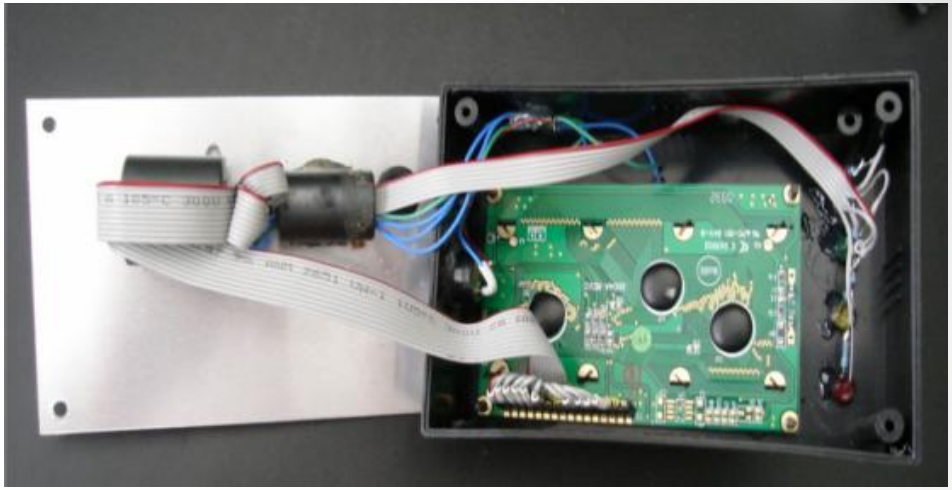
- PCB by K0RU
- Double sided SMT construction
- Size of space available and connections were a challange





uP External Control Head

- Control head sits on shelf above amp



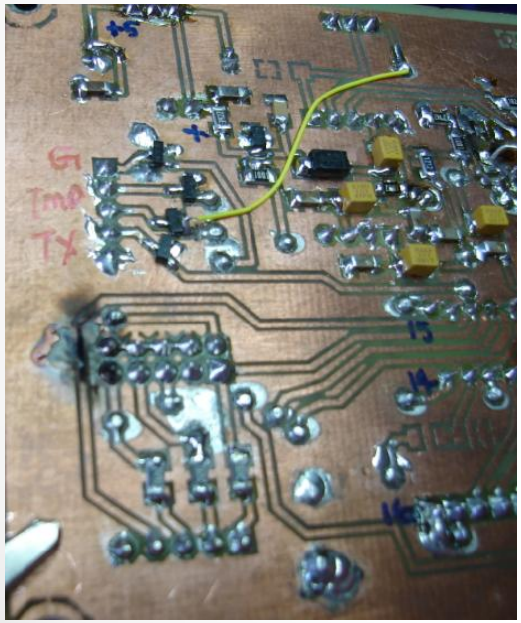
Amp + Control Head Shack Layout

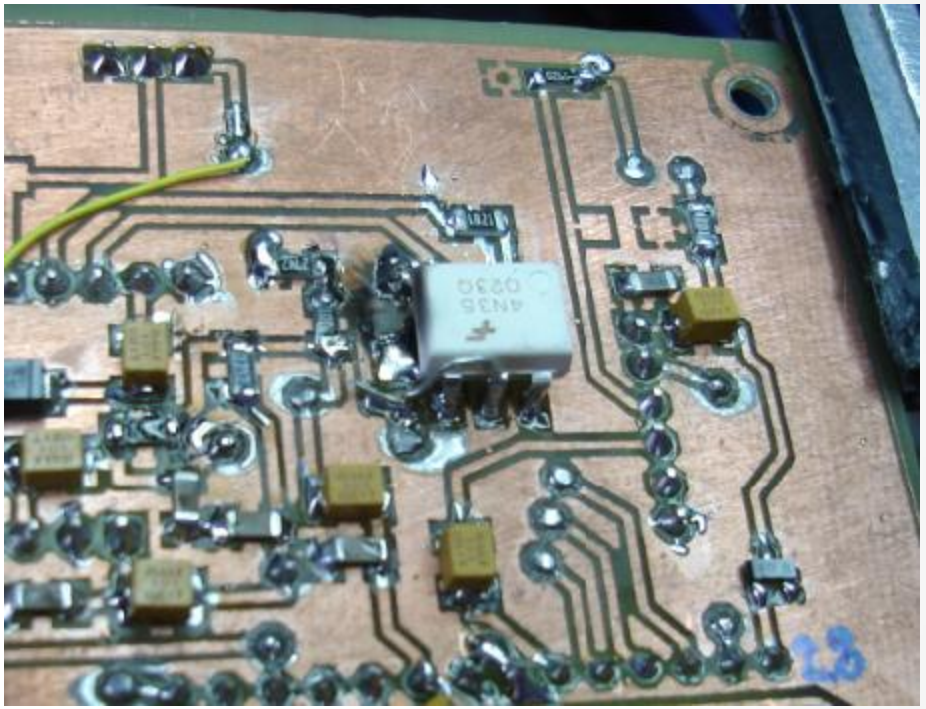
Remaining Tasks

- Replace TV doorknobs with proper RF type
- Paint the not so beautiful pink relay foam
- LED mount – convert from breadboard to PCB
- Intermittent RCA jack on PTT line
- Faster grid protection trigger with 200W input slam

Lessons Learned

- 120V blows up parts very well!!!





Special Thanks To:

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