W5HN

North Texas NTMS Microwave Society

Recent SolidState PA Projects

Microwave Update 2011

Dave Robinson WW2R

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Topics

W6PQL 400W 1296MHz

Toshiba 100W 3400MHz

Spectrian 13cm Single

Spectrian 13cm Dual

I0JXX 500W 144MHz

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W6PQL 1296 AMP

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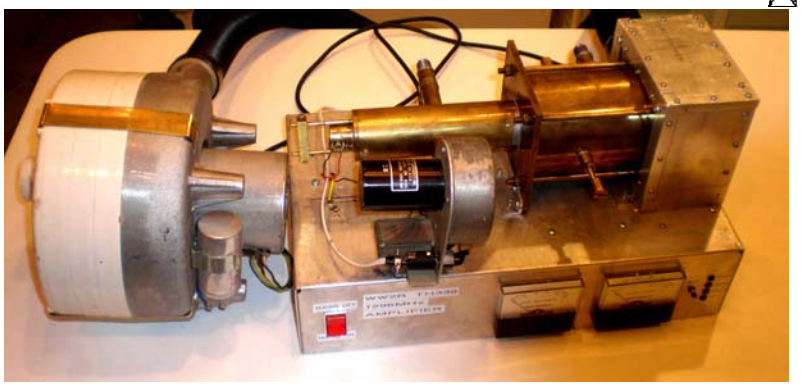
Previous 1296MHz PA



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W6PQL 400W 1296PA

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Was looking to replace TH338

Saw W6PQL board with 2 x MRF286 = 170W

No devices then saw EBAY listing from a local! Got some devices. Note they were genuine Motorola devices NOT Far east copies.

Got two kits, input and output combiner and copper heat spreaders from W6PQL

BIG heatsink from Ebay

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W6PQL 400W 1296PA

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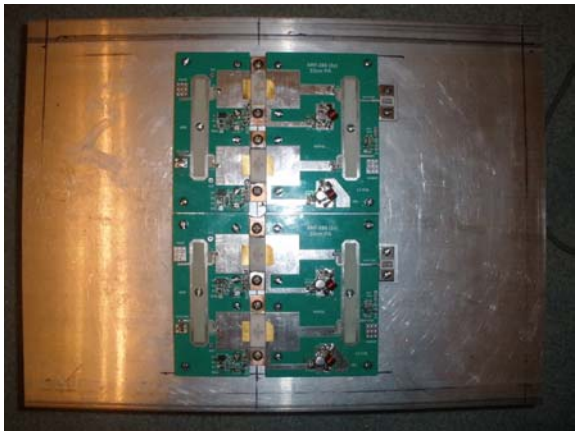

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W6PQL Circuit

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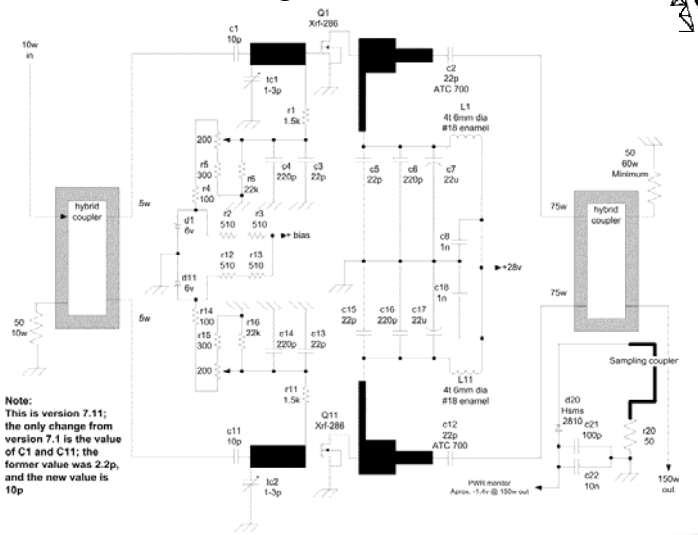

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W6PQL AMP Initial Test

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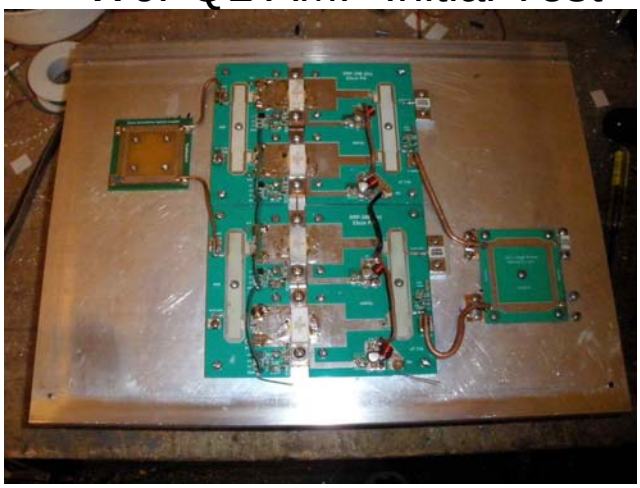

Worked well:-20W Input 350W output 28V

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W6PQL PA Controller needs

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Status display

Fan control (enable fan at trigger temp, needs hysterisis)

SWR protection (error if rev power = 20W)

Monitor O/p of each module (error if either power=0 with drive)

Overcurrent protection (error if either module >18A)

Over Voltage (error if volts > 29V)

Need Microchip PIC with an LCD display

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W6PQL AMP Controller

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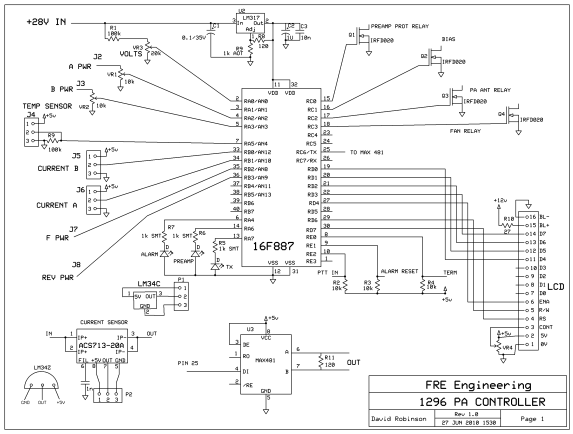

Note RS422 output for remote Display: put PA out at dish, monitor in shack! Use 50' premade keyboard extension cable (6 pin minidin to 6 pin minidin)

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W6PQL Amp Front

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W6PQL Amp Controller

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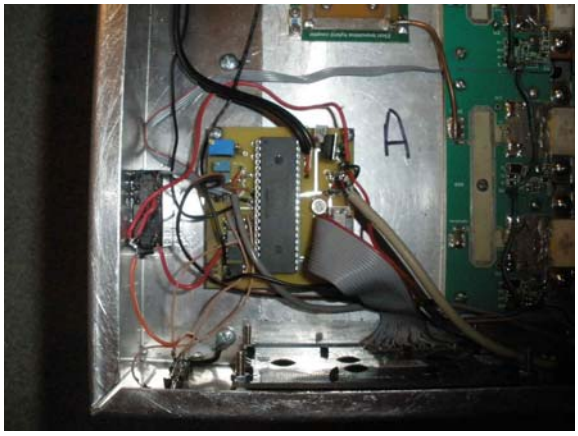

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W6PQL AMP Current monitor

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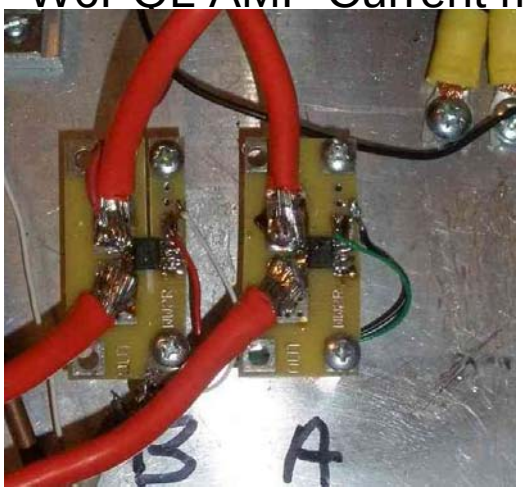

Allegro micro Hall effect ACS512

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W6PQL AMP Finished

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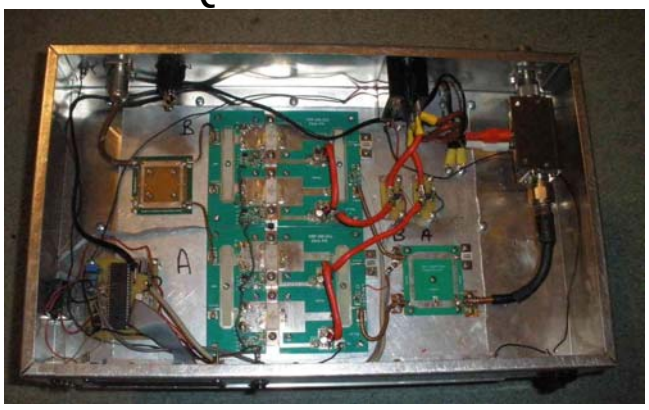

With Extra protection could now “tune it up”: 20W gives 400W
Tried HB9BBD mods (7.20 board, MUD 2010) didn’t help my 7.11 board.

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W6PQL Amp LCD

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W6PQL Remote monitor

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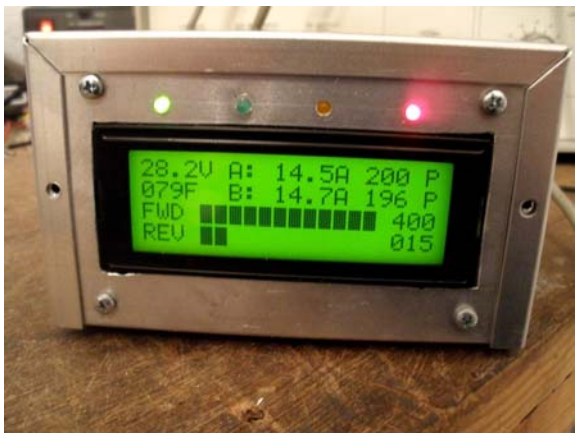

LCD in amplifier mounted out at dish disabled

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W6PQL Remote monitor Inners

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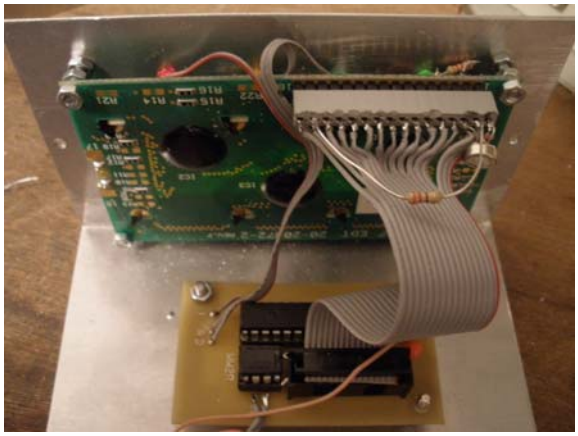

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TOSHIBA 100W 3400MHz AMP

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Dual Toshiba 9cm PA

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Have single amp. 5mW in 45W

Decided needed to combine two amplifiers

12V operation. Around 37A max

10mW In 100W output at 3400MHz

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Dual Toshiba Output Hybrid

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0.82 to 4.2 GHz

Type N Coaxial 90° Hybrids

- Broadband Coverage
- Signal Isolation Over a Complete Band
- Low VSWR
- Flat Frequency Response
- 200 Watt Power Handling
- Cellular Band 500W Model 3322

Specifications

FREQUENCY RANGE GHz	MODEL	COUPLING (Nominal)	VSWR dB	INSERTION LOSS dB (max)	ISOLATION dB (max)	AMP BAL dB	PHASE BAL Degrees	POWER Avg Watts	POWER Peak kW	WEIGHT lbs	WEIGHT kg
0.82-0.98	3322	3	1.25	0.20	20	±0.25	5	500	10	2	0.9
.95-2.0	3032	3	1.20	0.30	20	±0.25	5	200	5	1.5	.68
1.7-4.2	3033B*	3	1.25	0.35	20	±0.25	5	200	5	1	.5

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Dual Toshiba Combining

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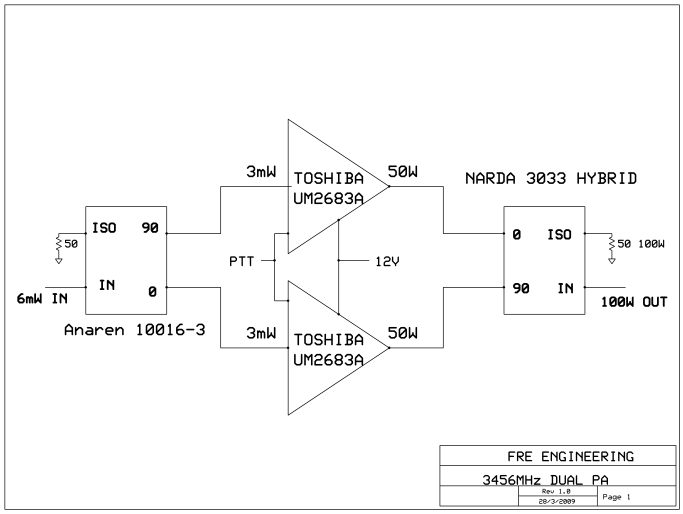

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Dual Toshiba 9cm PA

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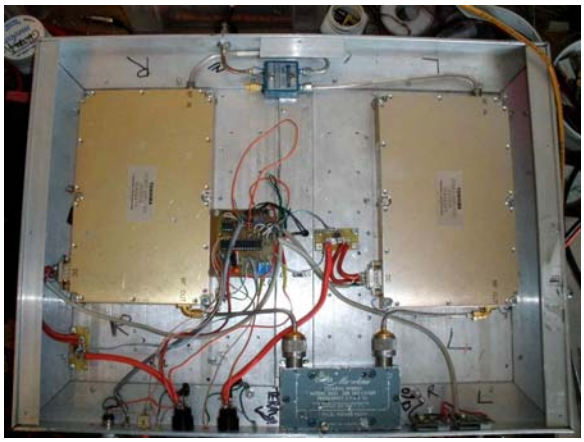

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9cm amp location

In Infamous kennel at base of Dish

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Dual Toshiba Controller needs

Status display

Fan control

Reverse power protection

Overcurrent protection

Bias control

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9cm Amp remote unit

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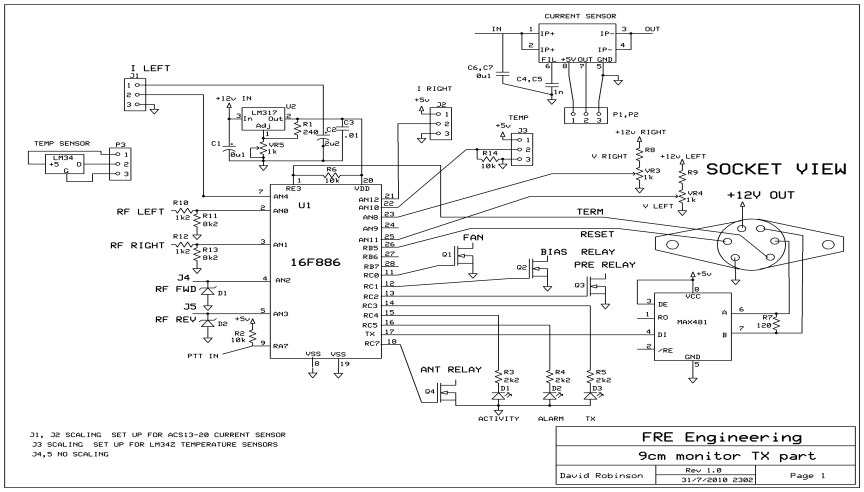

Note communication over RS422 link, RS232 doesn't work at 70'

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9cm Amp local display

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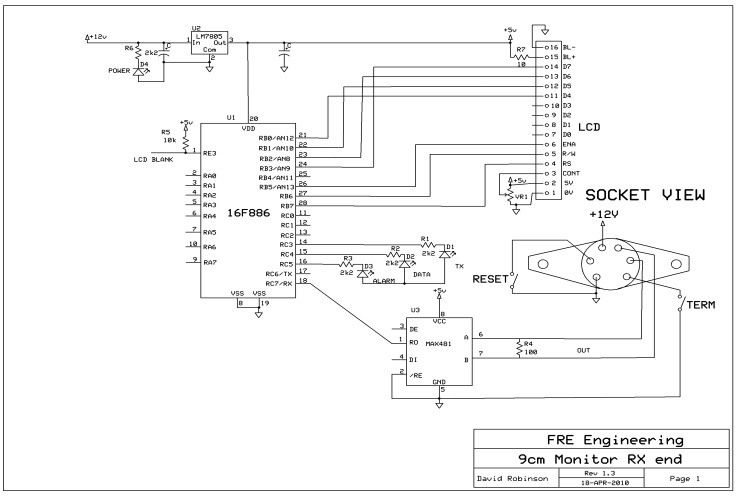

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Display in Shack

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LEDS

Power

Data from remote

Alarm

Transmit

SWITCHES (On Back)

Preamp Term Reset

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SPECTRIAN 13cm Amp

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Spectrian 13cm PA

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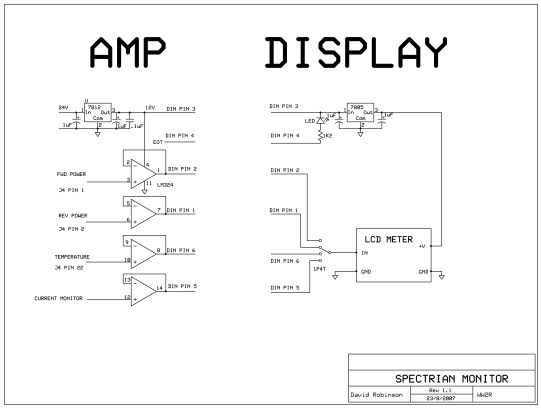

Like the Toshiba amp it lives out at the dish. Originally I fed 4 analog voltages back to shack to monitor status on LCD Voltmeter. Hard to see monitor all at once.

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Spectrian 13cm PA

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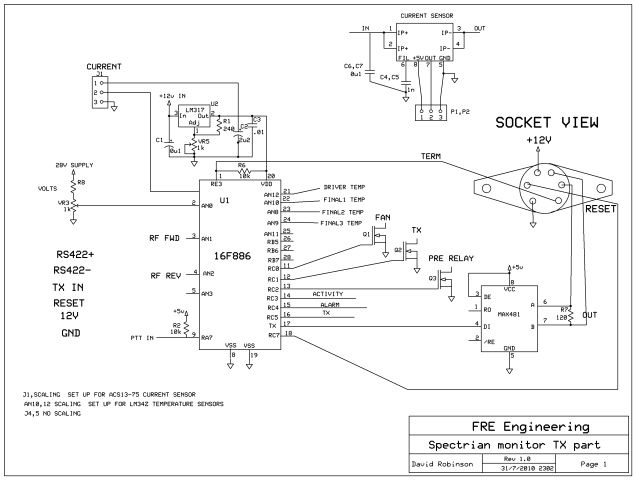

I Sensor: Allegro ACS750SCA-100 100A max

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Spectrian 13cm PA

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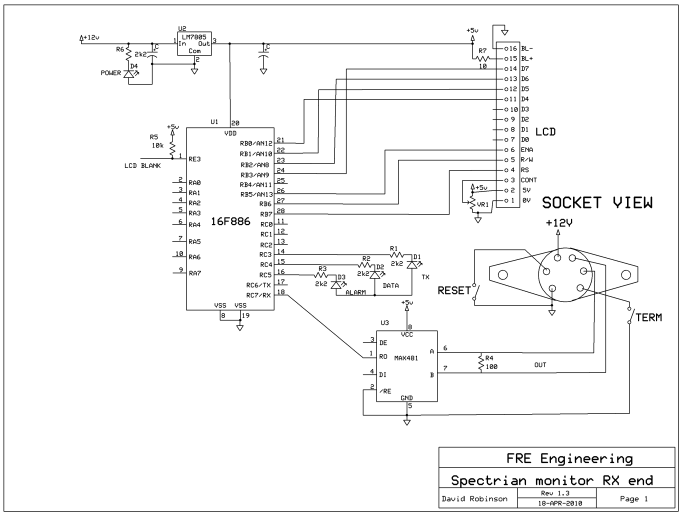

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Having now got some protection for amps time to try a pair

Got some 500W rated hybrids that were CNC cut.

Isolation and phase balance were impressive

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Dual Spectrian 13cm PA

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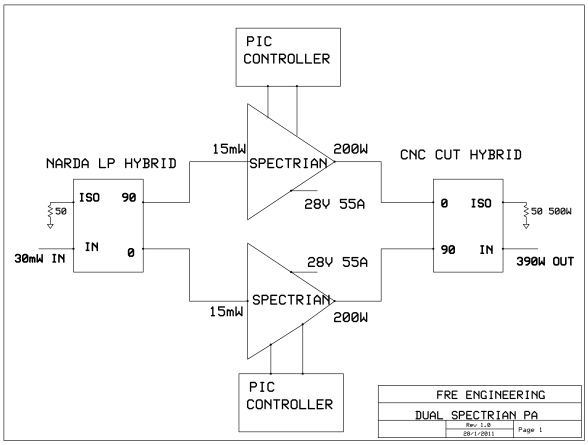

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Dual Spectrian 13cm PA

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Dual Spectrian 13cm PA

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30mW input 390W output

28V 110A total

Each amp has ~40dB gain. As W5LUA predicted this made equalising gain and phase a challenge

Tweaking driver stage bias helped get the expected output

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I0JXX 144MHz Amp

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I0JXX Amp

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Single MRF6VP2600 Device

2.5W In 500W output…IC202 Overdrives it

48V 16A peak

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I0JXX AMP Finished

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I0JXX AMP Components

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Low Pass Filter

Surplus Directional Coupler

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I0JXX AMP Controller

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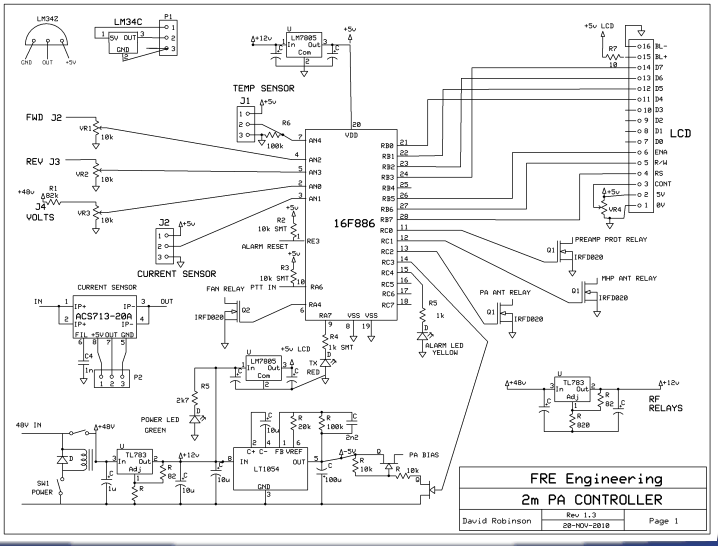

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More Information

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- 1296 Amp: http://w6pql.com/xrf-286_amplifiers_for_23cm.htm
- 1296 Amp Integration: http://g4fre.com/400w1296pa.htm
- Single Toshiba Amp: http://g4fre.com/Toshiba_amp.htm
- Remote Spectrian monitoring http://g4fre.com/Spectrian.htm
- I0JXX integration: http://g4fre.com/500w144pa.htm
- HB9BBD W6PQL mods. Proceedings of MUD 2010 P22-27

Note W6PQL no longer sells the kits but I have seen PCB on the surplus market