

Brisbane VHF Group

<http://brisbanevhfgroup.com/>

VK4RTT 6 & 2m Beacon



Handbook

Introduction

The Brisbane VHF Group beacon provides 100W on each 6 and 2 m bands. The beacons identify with CW and digital JT modulation. Fault status is broadcast on the digital modes together with the operating temperature. CW ident indicates a fault has occurred. The frequency is GPS locked and is generated with two ZL PLL modules controlled by the ZL2BKC Multi Beacon Controller.

The beacons are configured to operate on 50.285 MHz with Carrier/CW-id/JT65A-id modulation on 6m and on 144.440 MHz with Carrier/CW-id/JT4D-id.

The beacon is housed in a network server 12U high enclosure. The front panel provides local metering and display of critical beacon parameters.

The RF sections are housed in shielded enclosures attached to large heatsinks. These assemblies are attached to the rear panel of the enclosure. Fan cooling is provided on the heatsinks.

A BG7TBL GPS Disciplined Frequency Reference provides GPS locked 10MHz to the ZL PLLs.

Each band RF unit is monitored and protected by a microprocessor-based controller. The operational and fault status of each beacon is displayed on front panel LEDs.

A microprocessor-based monitor and display module polls each controller for its status and displays this information with power supply voltage for each beacon and the ambient and heatsink temperature for each beacon.

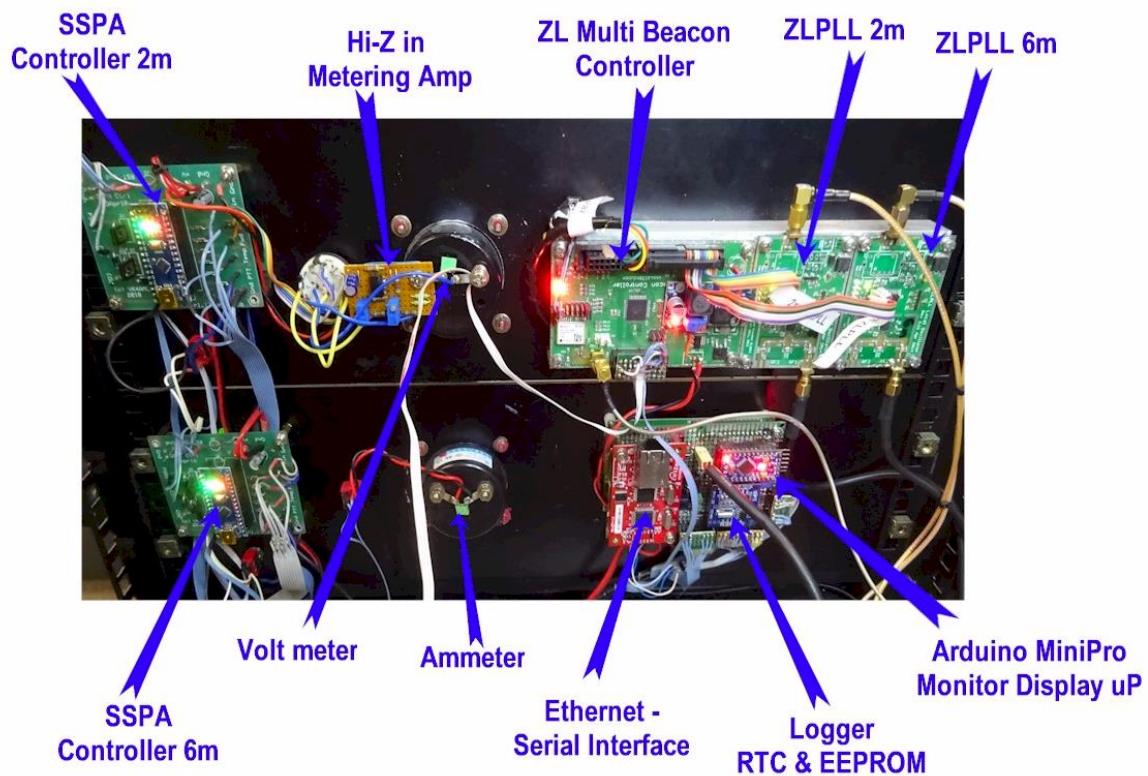
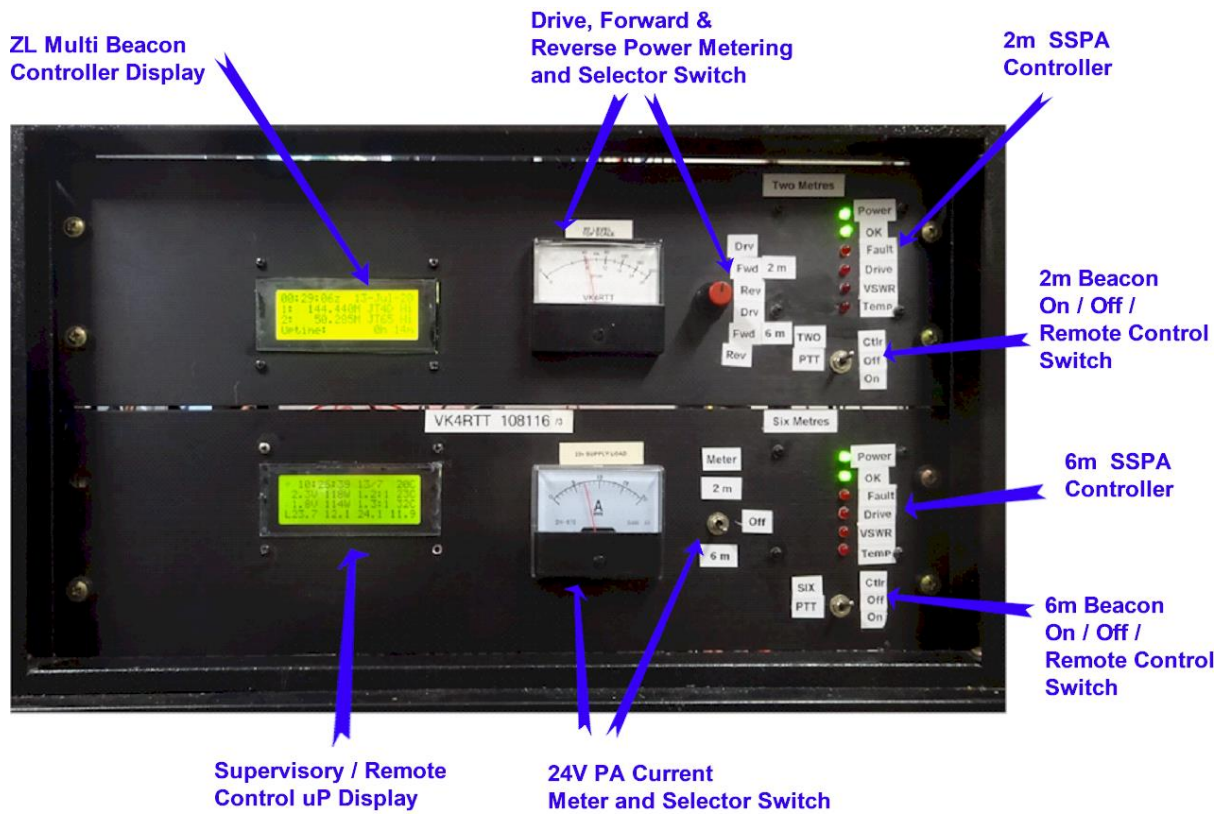
The serial messages between the monitor display module and the PA controllers are combined into a single stream and an Ethernet interface is provided.

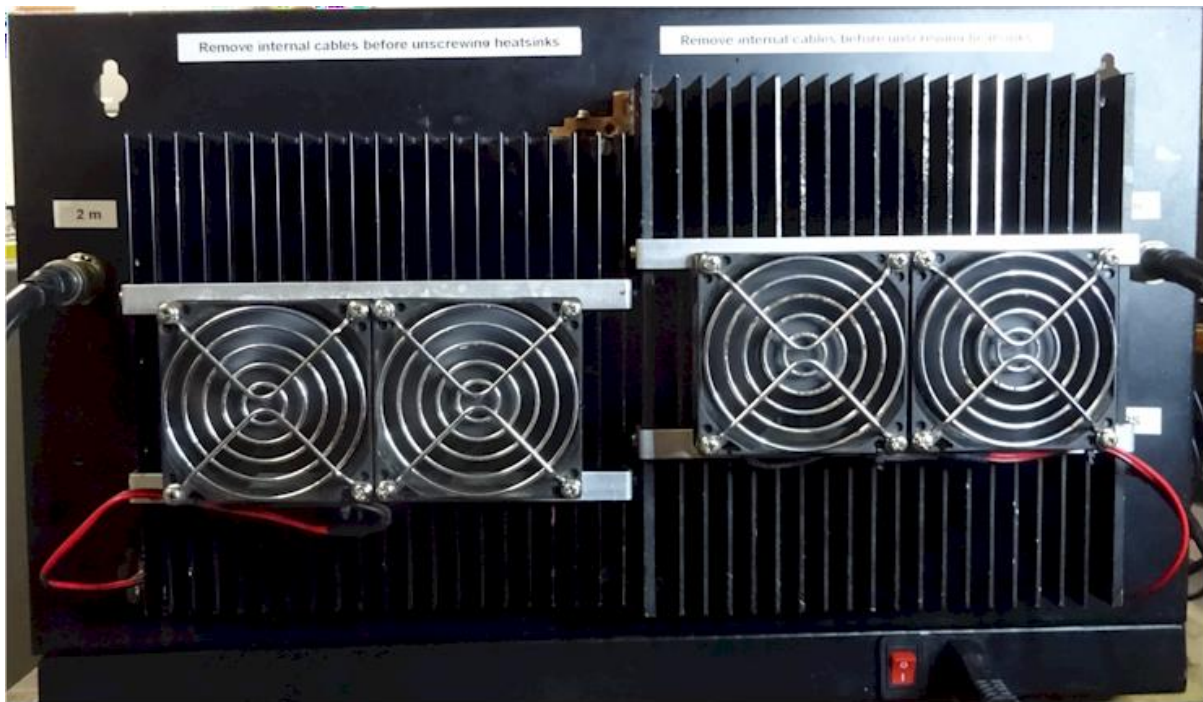
In addition to the remote monitoring via Ethernet, the monitor display module provides access to a short log for each beacon and remote control to enable/disable each beacon independently and reset individual or all controllers.

Mains powered switching power supplies provide the 12V and 24V for the beacon. 12V is distributed to the RF driver modules and to the controller and monitor modules. 24V is distributed to the power amplifiers. A fuse panel is included in the distribution to limit a failure to only one of the two bands. Supply to the RF sections are relay switched and their voltage and current separately metered.

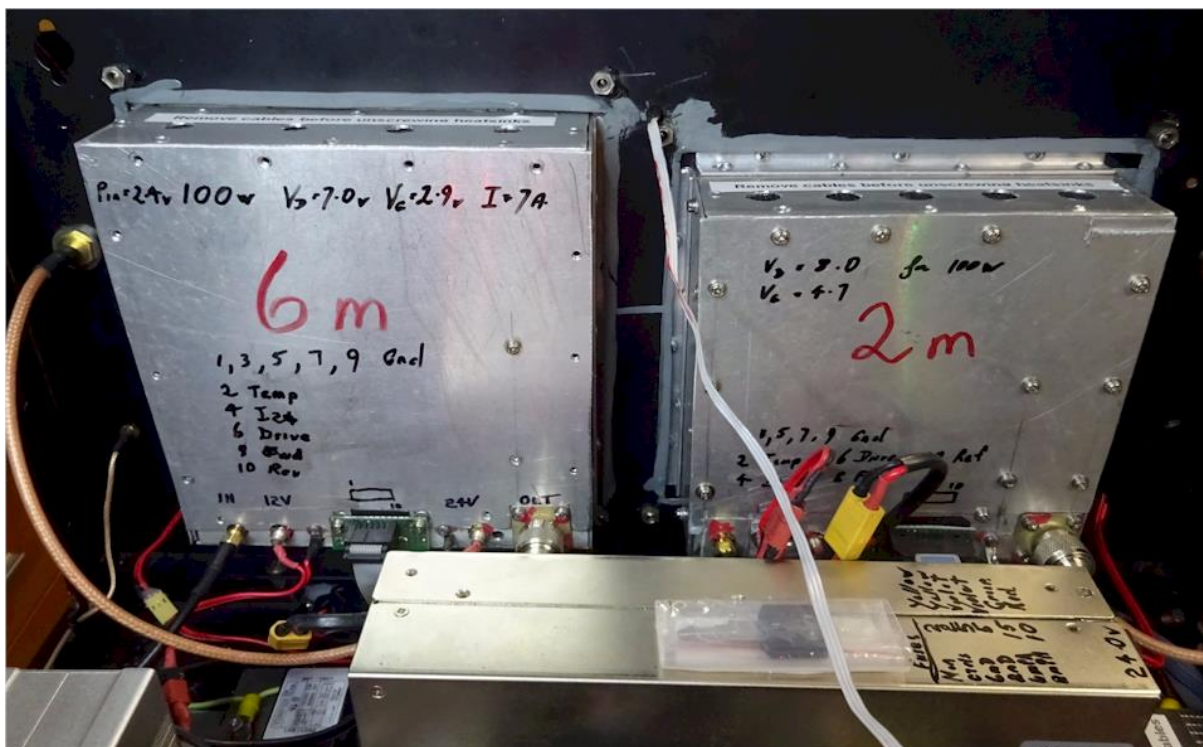
Mains input is filtered and fused. Surge protection is included in the mains wiring and internal to the power supply modules.

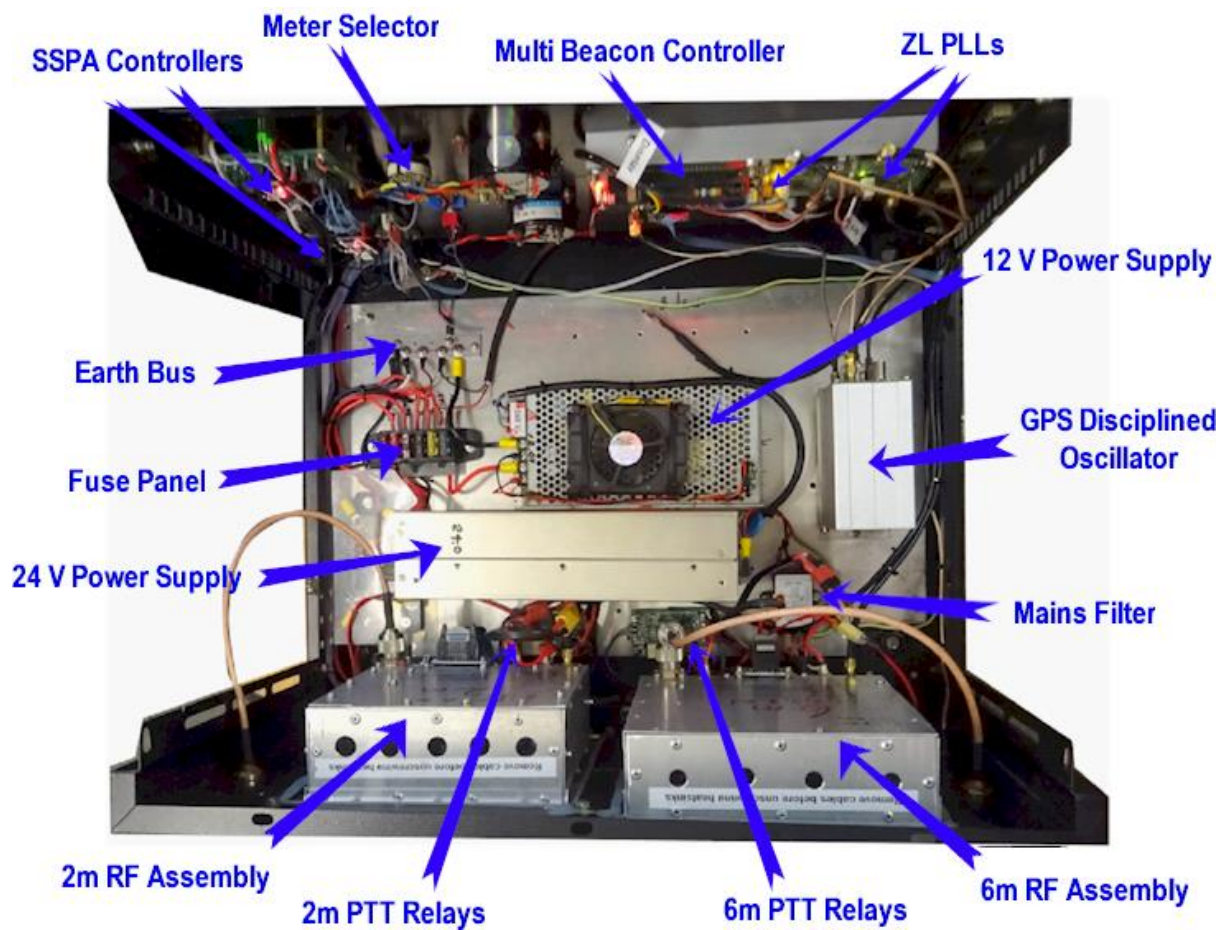
Front Panel Metering and Display





Rear Panel RF Assemblies





Front Panel Controls and Displays

The front panel carries a range of analogue meters, digital displays, and LED indicators to provide the status and key parameters.

The ZL2BKC Multi Beacon Controller has a 4-line 20-character LCD display showing the GPS date time and the status of the beacon controller. The following photos show a selection of the status reports. The top line shows the date time; the 2nd & 3rd lines show the mode and the status of the beacons. The last line cycles status reports for Power Cycles, Up time, Lat, Long, Grid Square, Error Status, and current and maximum temperature.



Each of the SSSPA controllers provides LED indicator for power, OK, and fault status. The control panel also allow the beacon PTT to be permanently ON, OFF, or controlled by the beacon monitor and display controller.

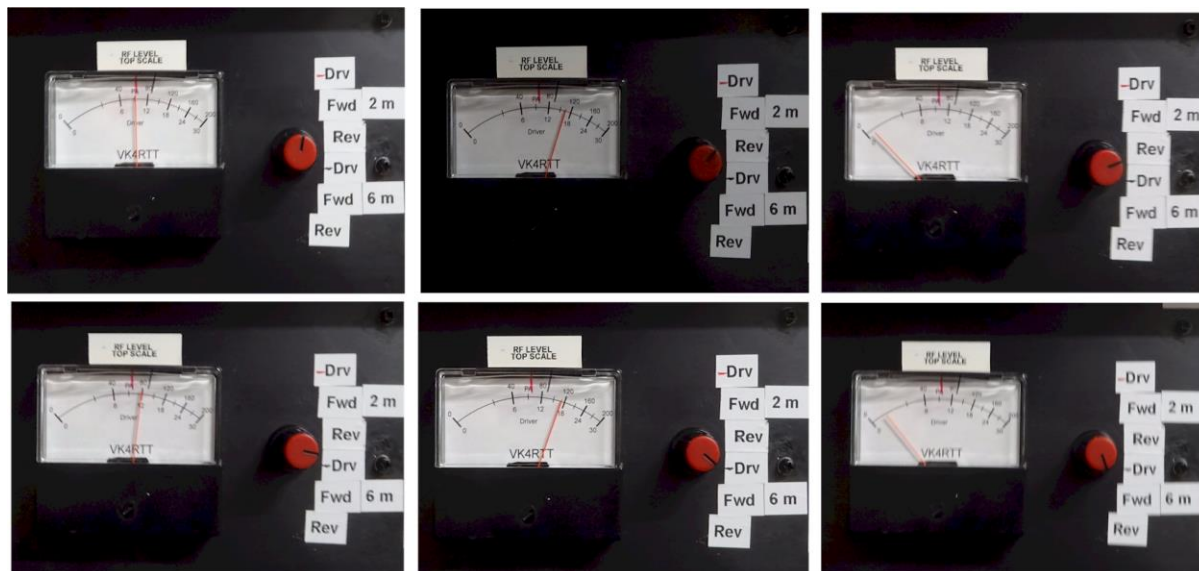
The OK status shows PTT is applied to the RF assembly and that operation of the beacon is normal.

Should a fault occur the PTT is dropped, the OK LED is extinguished, and the FAULT LED is lit together with a status indicator for Drive, VSWR, and temperature. For excess 24V supply current and no output when driven, only the fault LED is lit.

The temperature LED will also flash if the heatsink temperature exceeds 45 °C. The rate of flashing increases until the fault level of 65 °C, where the PTT is dropped, the Fault and Temp LEDs light.

The beacon may be reset by removal and application of the PTT using the Ctrl/Off/On switch. IF the fault has been cleared the beacon will return to OK indicating normal operation.

Analog meters are provided for drive, output power, and reflected power. A six-position switch allows selection of the required parameter. The lower scale on the meter is calibrated for output and reflected power. The upper scale is used for reference on drive level. Marking on the face of the meter indicate historical values for the 6 & 2m drive levels.

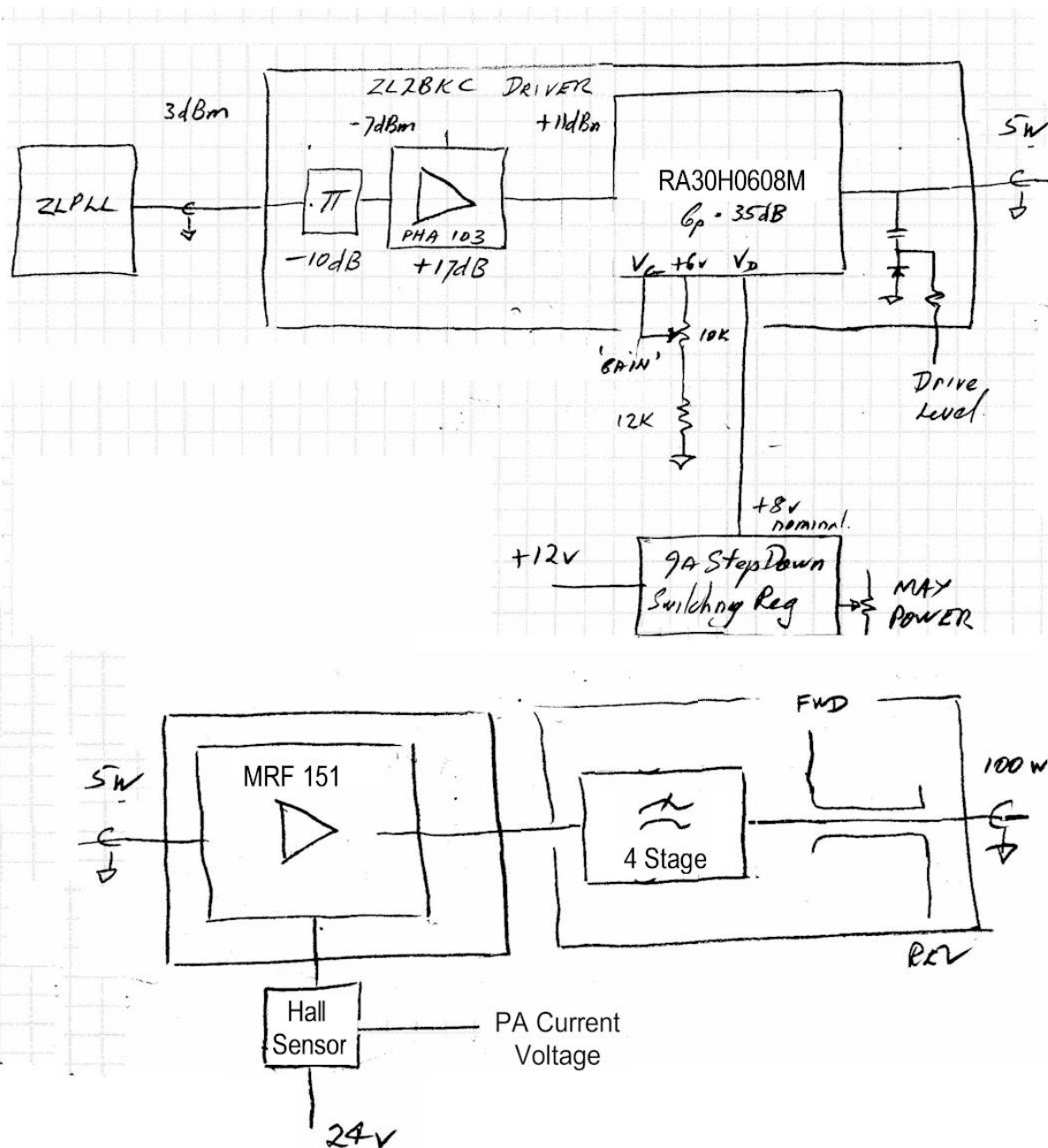


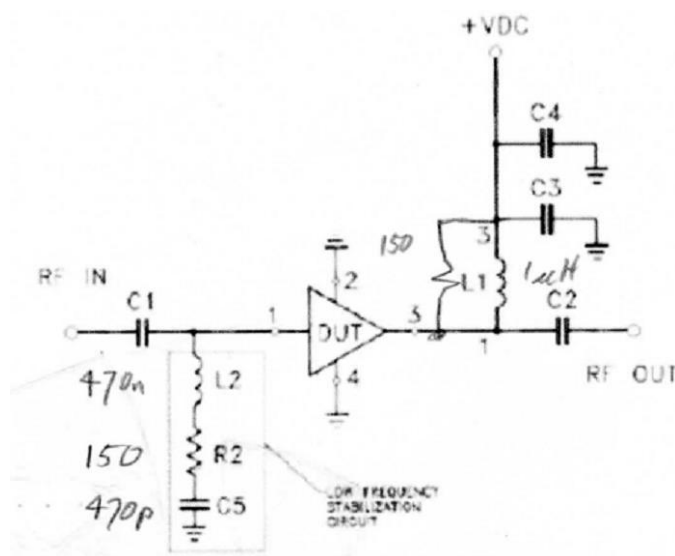
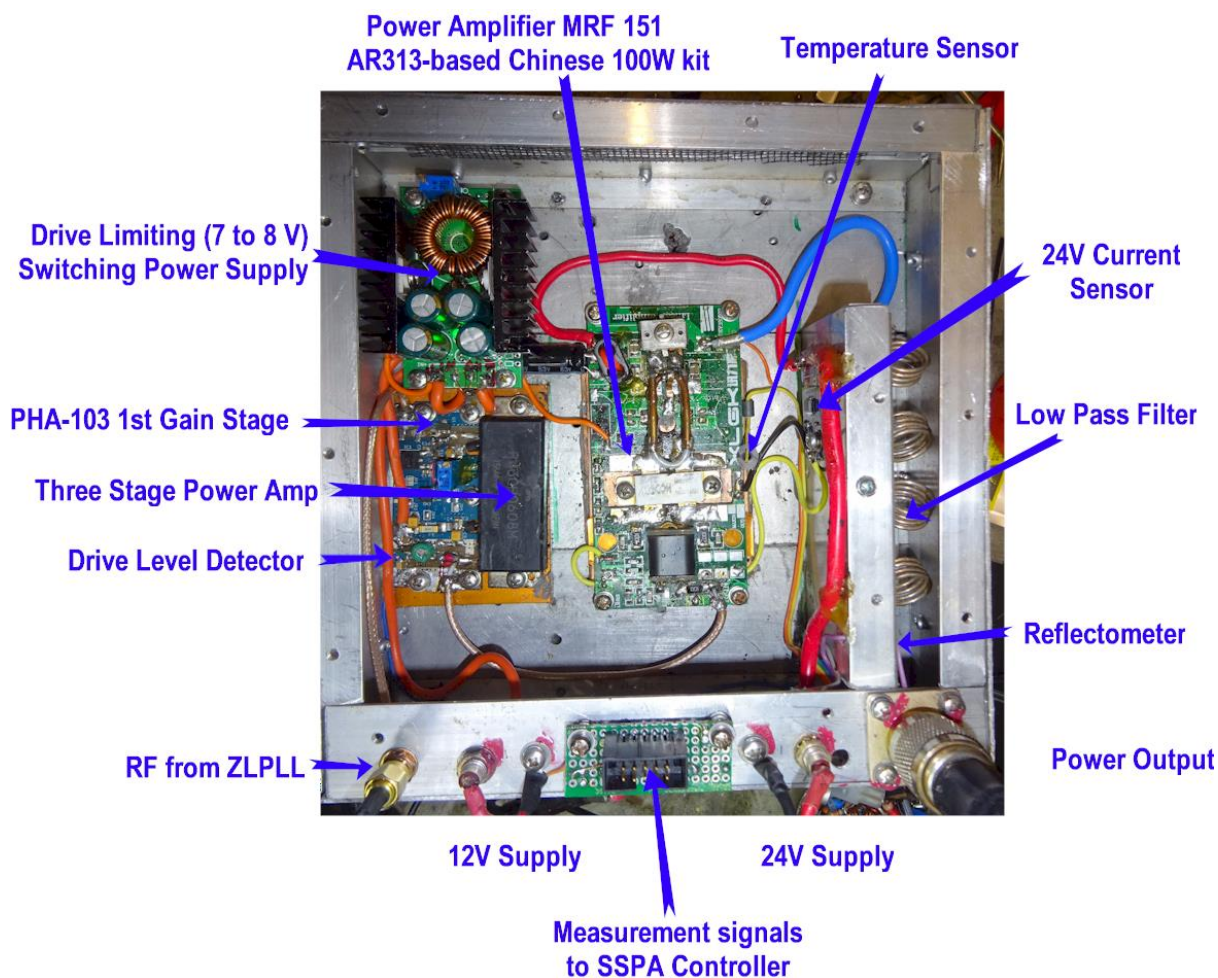
An ammeter is provided for the power amplifier 24V supply current. The meter switch allows selection of the 6m or 2m PA current.



6m RF Assembly

Block Diagram



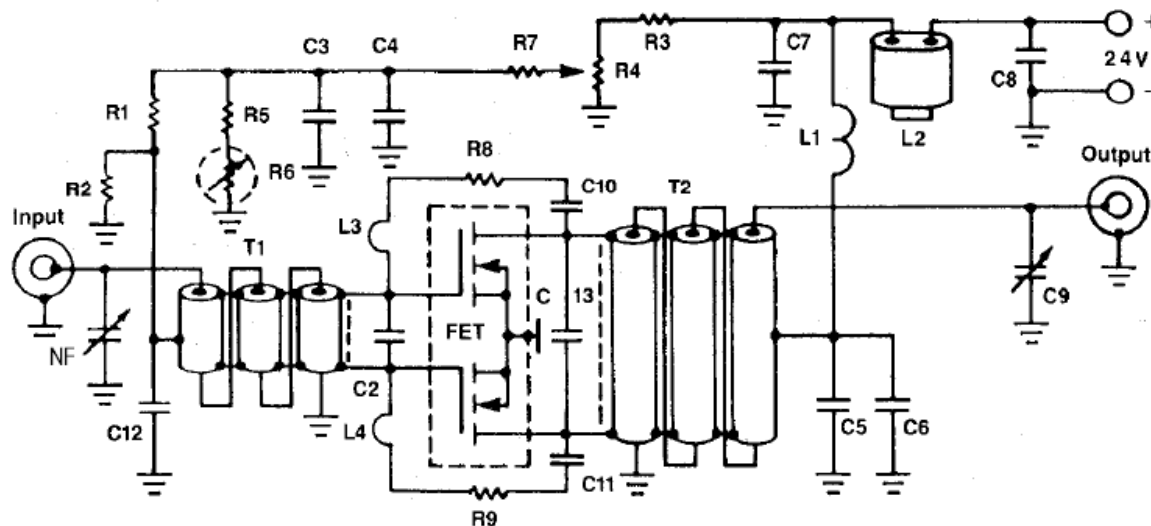


Component	Value
DUT	PGA-103+
C1,C2	0.01μF
C3	0.33μF
C4	10 μF
C5	330 pF
R1	Not Used
R2	150Ω
L1(RF-Choke)	Mini Circuits TCCH-80+
L2	620nH

Stabilization Circuit (Ref: MiniCircuits TB-761-103+)

6m Pre Driver

Mitsubishi Driver —***** HERE *****

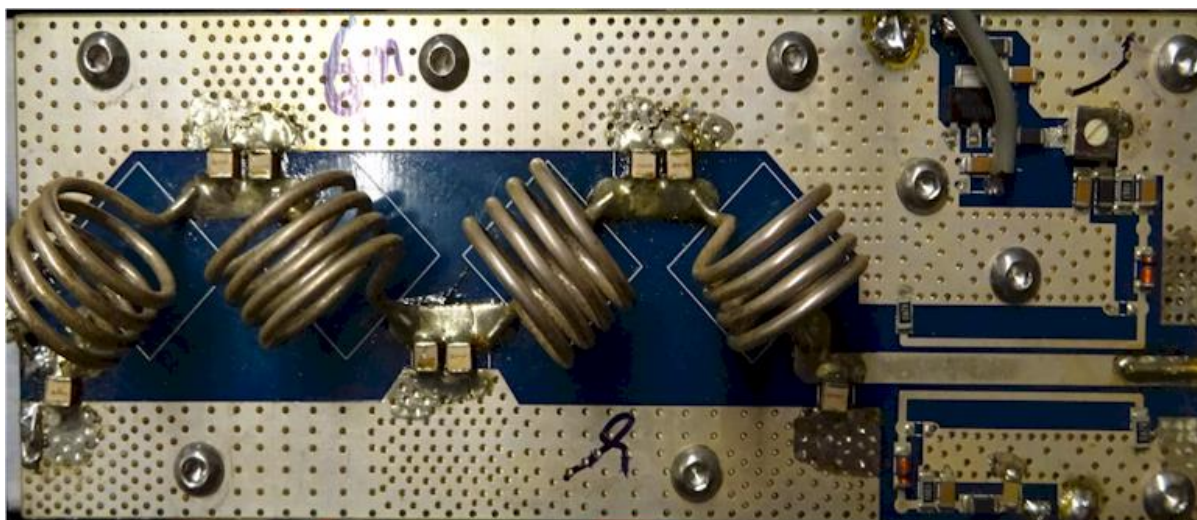


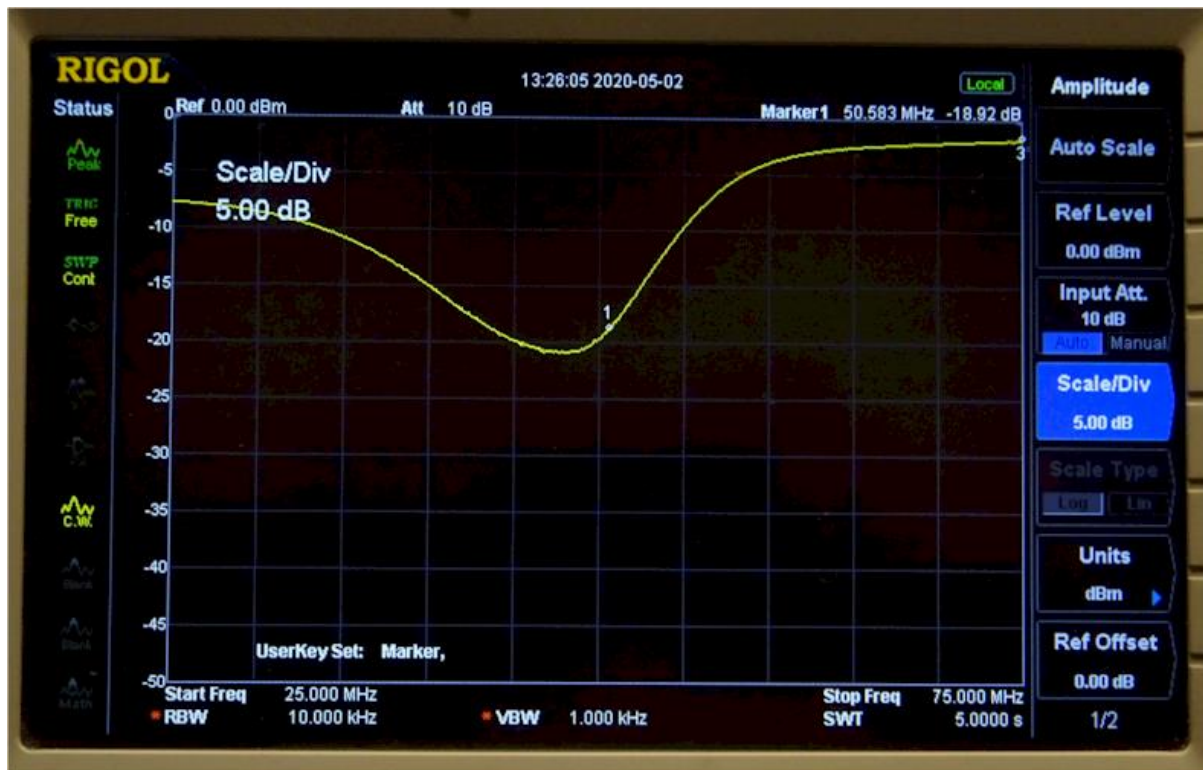
- R1 — 1K/½W
 R2 — 10K/½W
 R3 — 330 Ohms/2W
 R4 — 1K Trimpot
 R5 — 6.8K/¼W
 R6 — Thermistor, 10K at 25°C/2.5K at 75°C
 R7 — 2K/½W
 R8, R9 — 100 Ohms KDI Pyrofilm Power Resistors,
 C1 — Not Fitted
 C9 — ARCO 402, 1.5-20pF Compression Mica or
 equivalent
 C2 — Not Fitted
 C3 — 0.1uF Ceramic Chip
 C4, C5, C12 — 1000pF Ceramic Chip
 C6, C7 — 0.01uF Ceramic Chip
 C8 — 0.47uF Ceramic Chip or lower values in
 parallel for the value indicated
 C13 — Not Fitted

- L1 — 10 Turns AWG #16 Enameled Wire, 5mm I.D.
 L2 — Ferrite Beads over AWG #16 Wire, 1.5 uH
 total
 L3, L4 — Lead Lengths of R8 and R9, 20mm total
 FET — MRF151G
 T1 — 9:1 RF Transformer.
 Balun core PCB brass tube with 3T Teflon wire
 as per Chinese MRF168 100W kit
 T2 — 1:9 RF Transformer. (15-25 Ohm, 1.8-2.3mm
 O.D. semi rigid coax.)

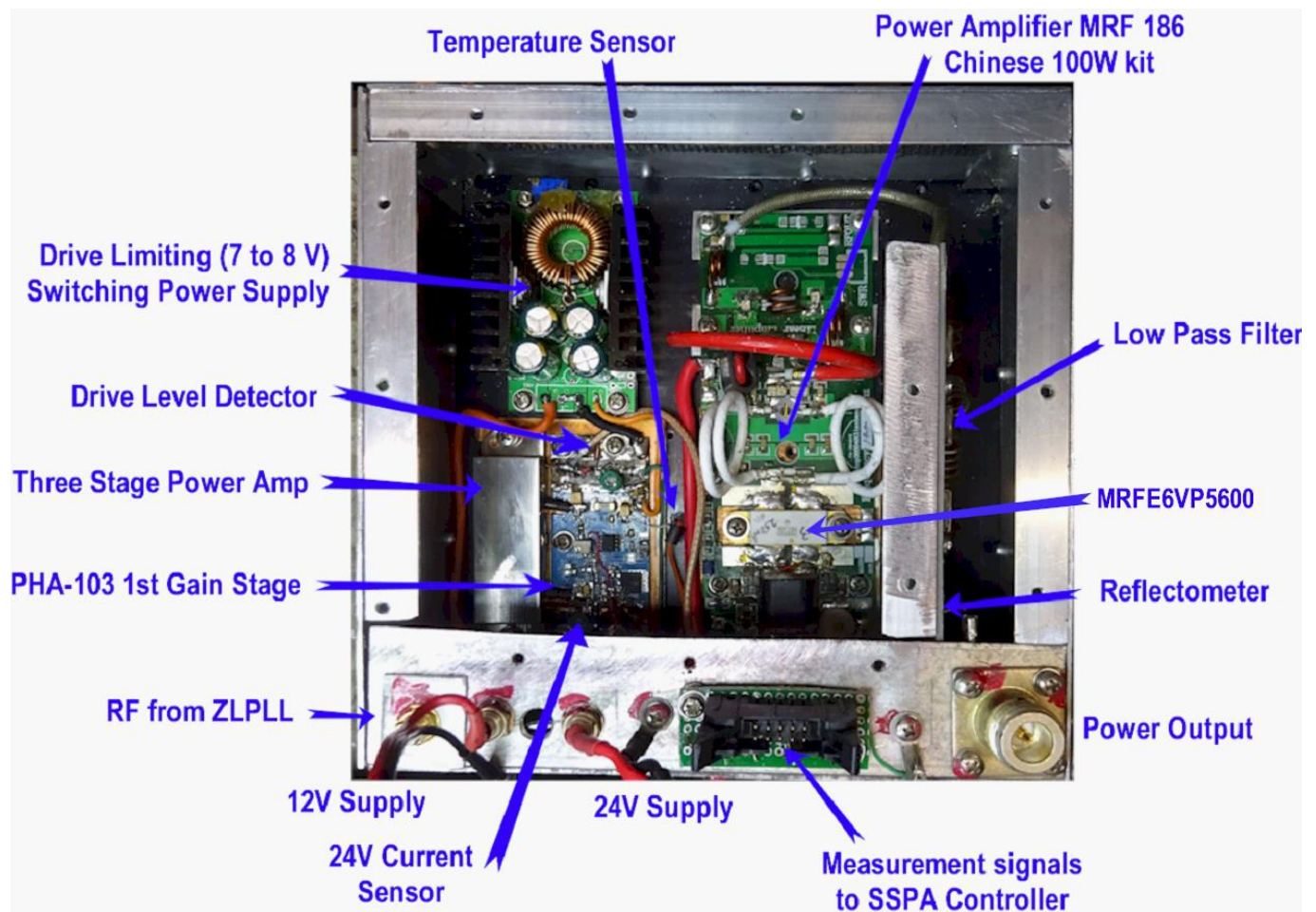
Note: All chip capacitors of 0.01uF and less in
 value are ATC type 100 or equivalent.

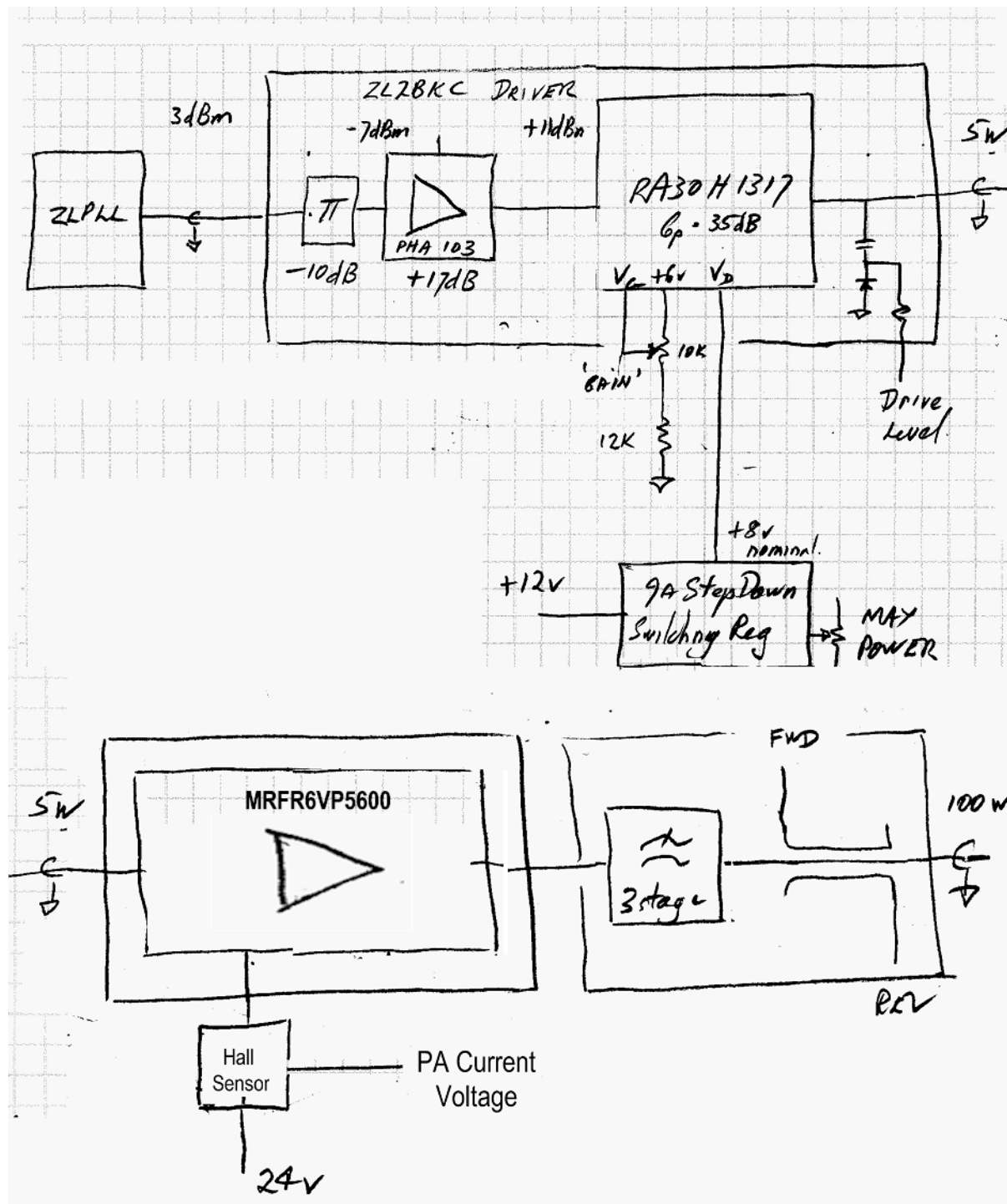
Motorola AR-313 Broad Band Power Amplifier



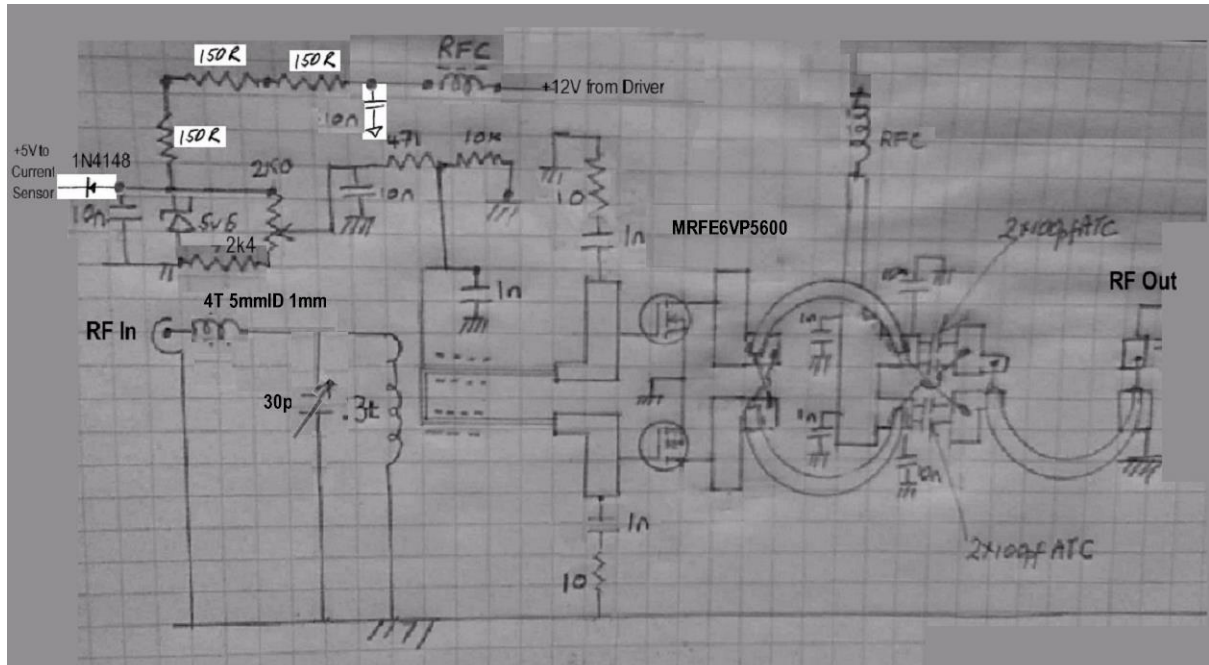


2m RF Assembly

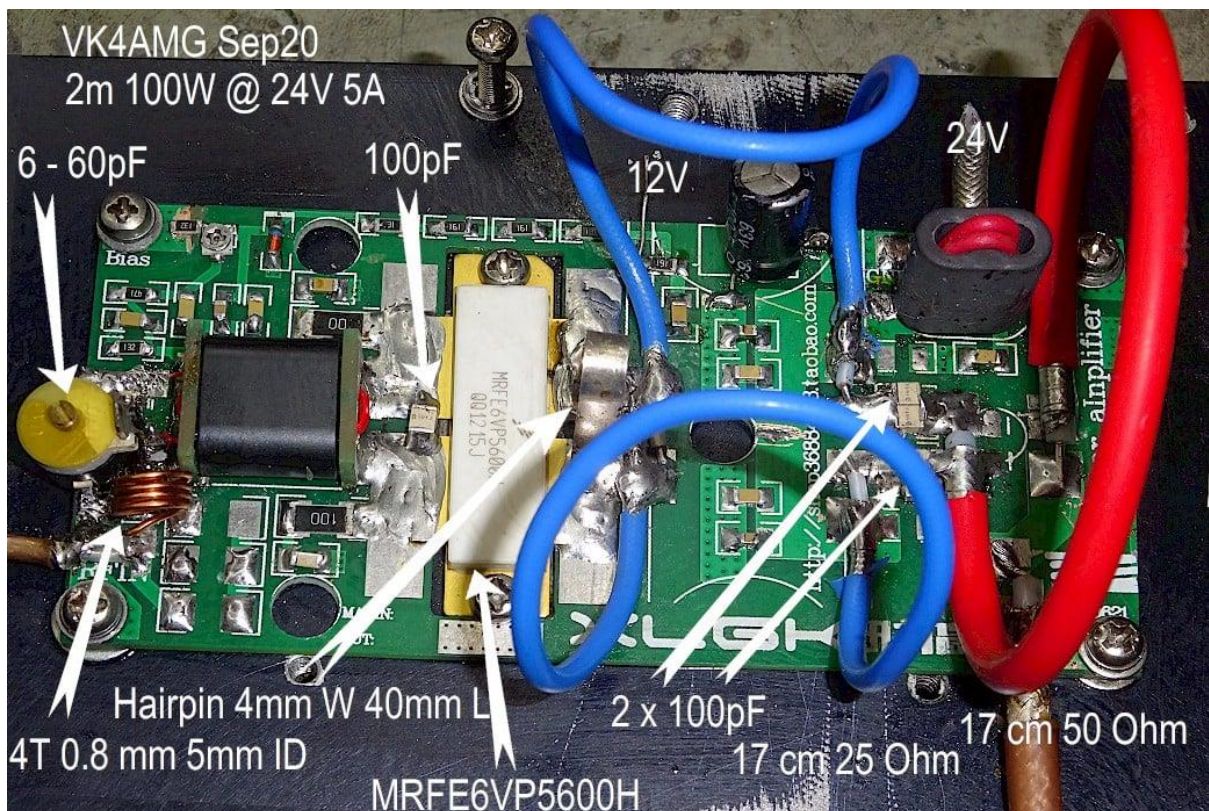


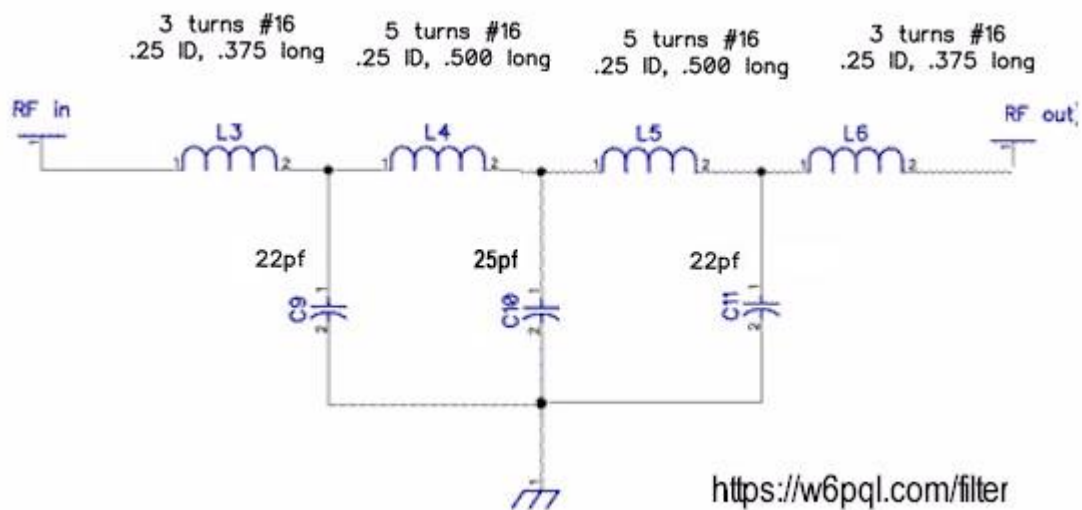
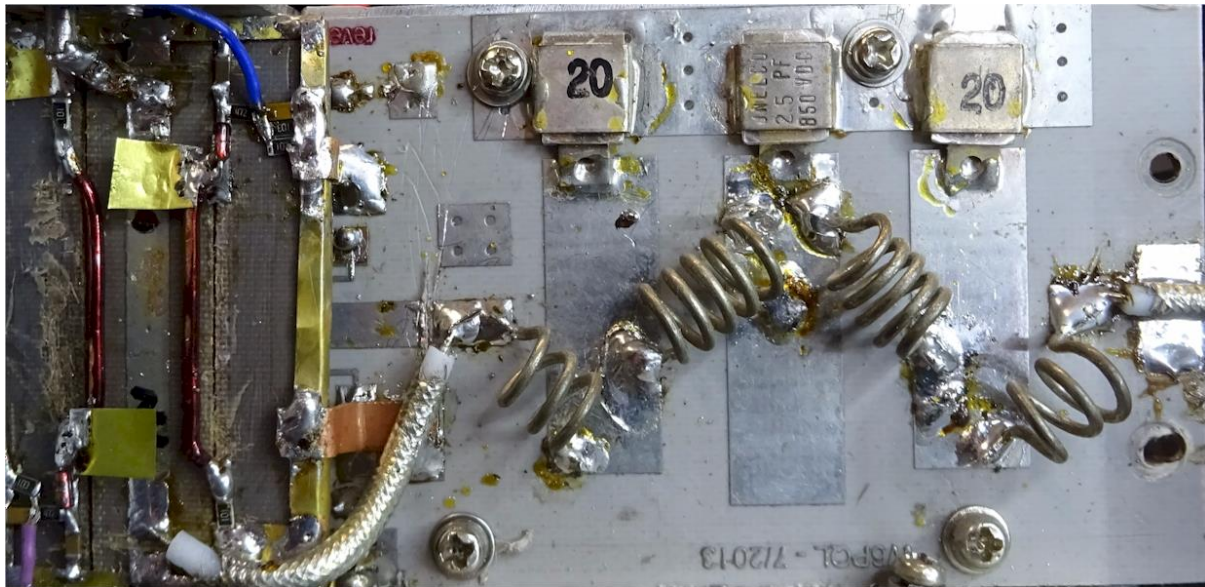
Block Diagram

Mitsubishi Driver —***** HERE *****



<http://g4fev.atspace.com/mrf186linear.htm>

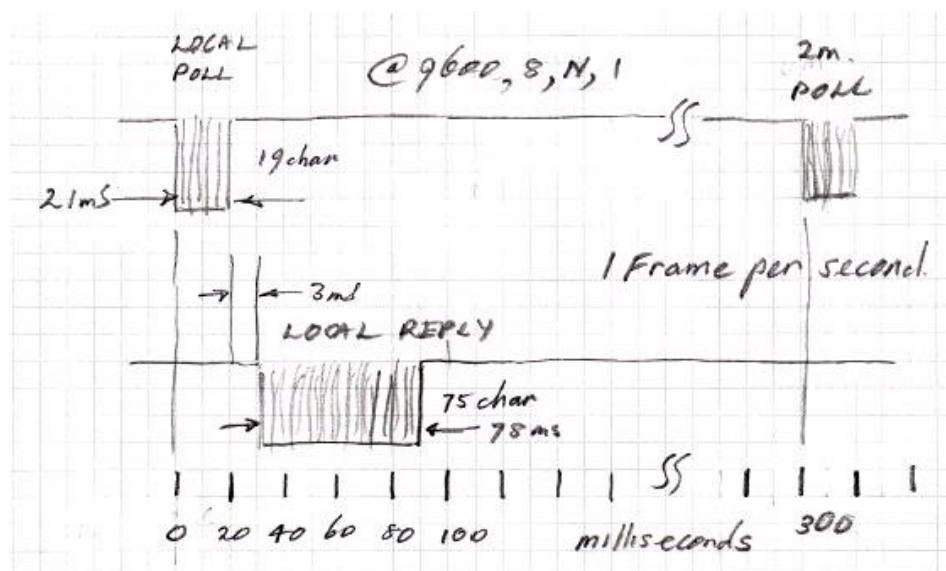


2m Low Pass Filter

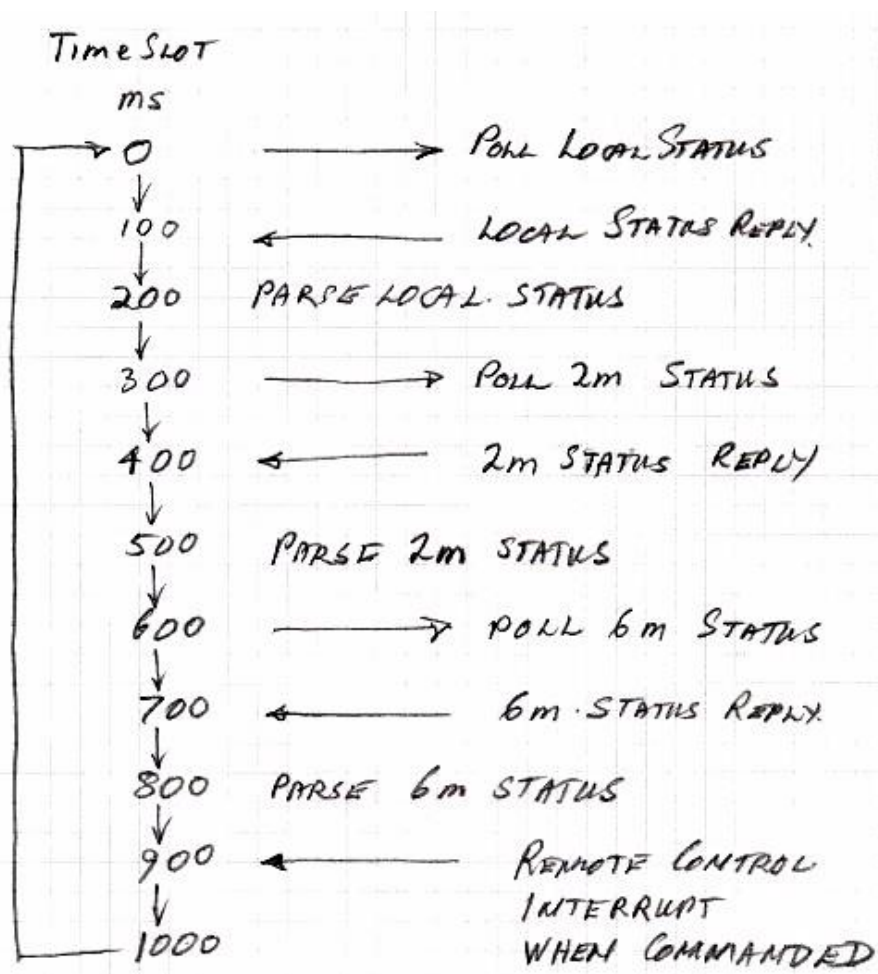
***** *** Power Supply distribution Fuse rating *** *****

Normal currents



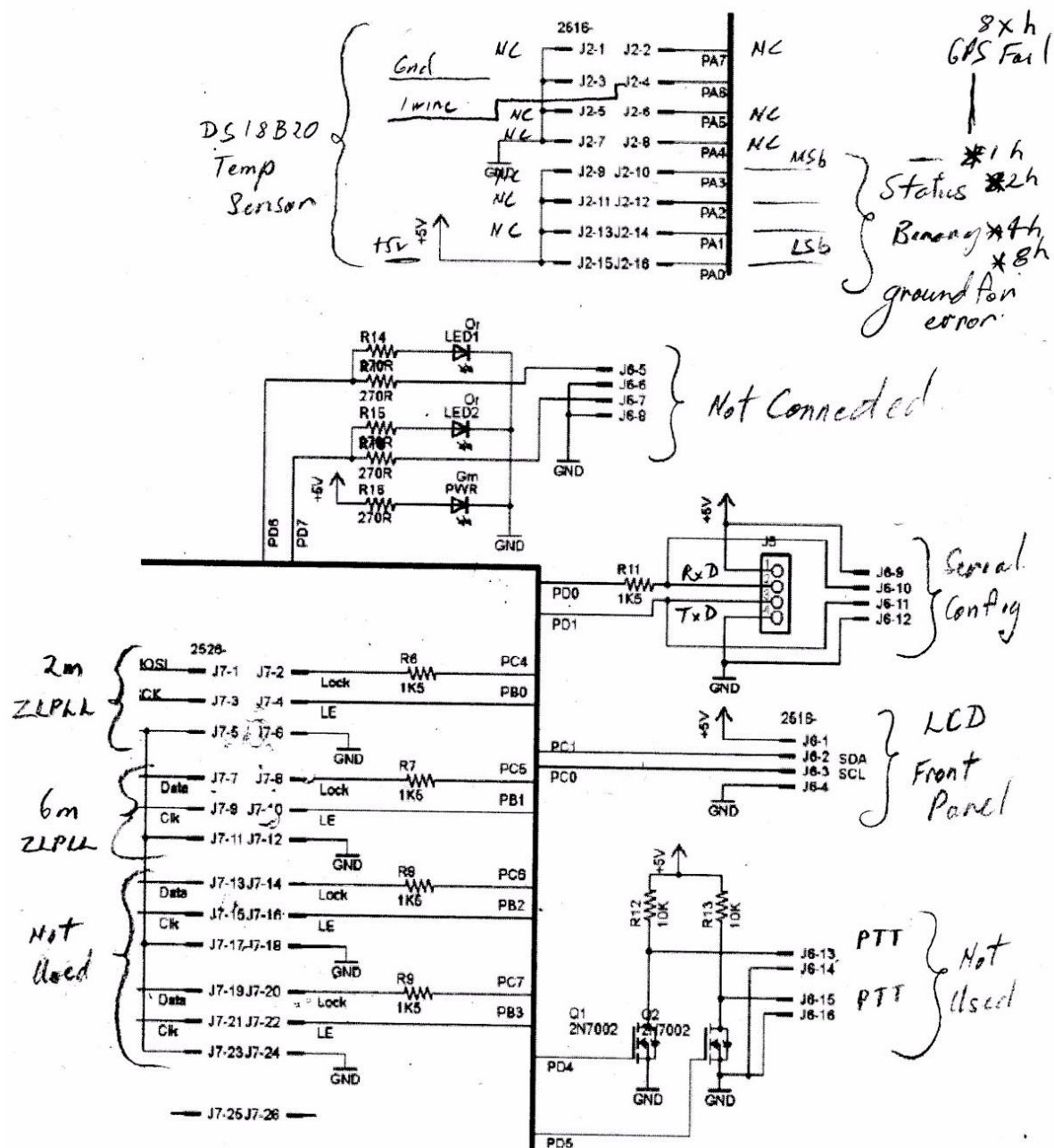


Poll Reply Timing



Poll Reply Sequence

Multi Beacon Controller Interface



SSPA Fault Status

Fault status reported by SSPA Controllers is the “OR” of:

PA Current	0x01	
SWR	0x02	
Pin	0x04	
Temp	0x08	
Error	0x10	No output when driven
Fault	0x20	
Transmitting	0x40	
PTT_State	0x80	

e.g.	PTT not applied	0x00
	Normal operation	0x0C
	SWR Fault	0xA2
	Over Drive Fault	0xA4

The serial message in response to the Monitor Display Controller includes this status byte e.g.

```
Lm,0839:41 15/8
AmbTemp=21,6m24V=24.05,6m12V=11.92,2m24V=23.80,2m12V=12.13
2m,08:39:41 15/8
Status=C0,Temp=23.64,Pin(V)=2.35,Pout(W)=112.70,SWR=1.16:1,PA(A)=5.85
6m,08:39:41 15/8
Status=C0,Temp=28.71,Pin(V)=2.55,Pout(W)=100.66,SWR=1.34:1,PA(A)=7.45
```

The status byte is parsed to provide the ‘LED’ status display on the remote monitoring and control application GUI.

This status byte is also recorded in the log which can be downloaded via the serial Ethernet link e.g.

```
Log6m,08:18:00 15/8,C0,21C,24.0V,11.9V, 2.5V,100W, 1.3:1, 7.45A,29C
Log6m,08:19:30 15/8,C0,21C,24.0V,11.9V, 2.5V,100W, 1.3:1, 7.45A,28C
Log6m,08:20:00 15/8,A2,21C,0.0V,0.0, 0.0V,0W, na:1, 0.0A,29C

Log2m,08:38:00 15/8,C0,21C,23.8V,12.1V, 2.3V,112W, 1.1:1, 5.81A,23C
Log2m,08:39:30 15/8,C0,21C,23.8V,12.1V, 2.3V,112W, 1.1:1, 5.85A,23C
Log2m,08:40:00 15/8,C0,21C,23.8V,12.1V, 2.3V,112W, 1.1:1, 5.85A,23C
```

Note: When a fault occurs the logging for that beacon stops to record the date time of the fault and the previous two records of ‘normal’ operation.

VK4RTT Error Codes

The status bytes from the SSPA Controllers are encoded as four digital outputs to the ZL Multi Beacon Controller.

The ZL MBC sends: 5 dits in CW ident and sends the fault codes in the JT digital message in place of the grid square:

		encoded from ZL Multi Controller	
E80	GPS lock Fault		
		encoded from 2m status byte from SSPA controller	
E01	PA Current 2m	PA Current	0x01
E02	SWR Fault 2m	SWR	0x02
E03	Power Input Fault 2m	Pin	0x04
E04	Temperature Fault 2m	Temp	0x08
E05	No Power Output 2m	Error	0x10
E06	Not Implemented		
E07	Not Implemented		
E08	Not Implemented		
		encoded from 6m status byte from SSPA controller	
E09	PA Current 6m	PA Current	0x01
E0A	SWR Fault 6m	SWR	0x02
E0B	Power Input Fault 6m	Pin	0x04
E0C	Temperature Fault 6m	Temp	0x08
E0D	No Power Output 6m	Error	0x10
E0E	Not Implemented		
E0F	Not Implemented		

An error in the lock of the Multi Beacon Controller GPS is indicated by the most significant bit of the eight bit error code. Bits 7, 6, & 5 are not used. The GPS status of the GPS Disciplined Frequency Reference is not reported. Where there are no errors, the locator of the beacon is transmitted.

```

061900 9 -14 1.1 24 9 * VK4RTT QG53TC 1 0 C
062000 0 -23 3.1 81 9
062100 10 -13 1.2 22 9 * VK4RTT I19/20 1 0 C
062200 0 -23 3.1 81 7
062300 10 -13 1.2 22 9 * VK4RTT E02 1 0 C

```

Example error codes are : Temp Fault on 2m Beacon is E04;
Power In Fault on 6m Beacon is E03; GPS lock Fault is E80.

The combined heatsink temperature is sent in the JT message every 10 minutes.
The format is Txx/zz where xx=current room temp.
zz=max temp recorded since restart in deg. C

```
C:\>ipconfig

Windows IP Configuration

Ethernet adapter Ethernet:

    Connection-specific DNS Suffix  . : 
    Link-local IPv6 Address . . . . . : fe80::594f:f3df:a8a7:bc79%5
    IPv4 Address. . . . . : 192.168.1.2
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 192.168.1.1

Wireless LAN adapter Local Area Connection* 14:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . : 

Wireless LAN adapter Local Area Connection* 15:

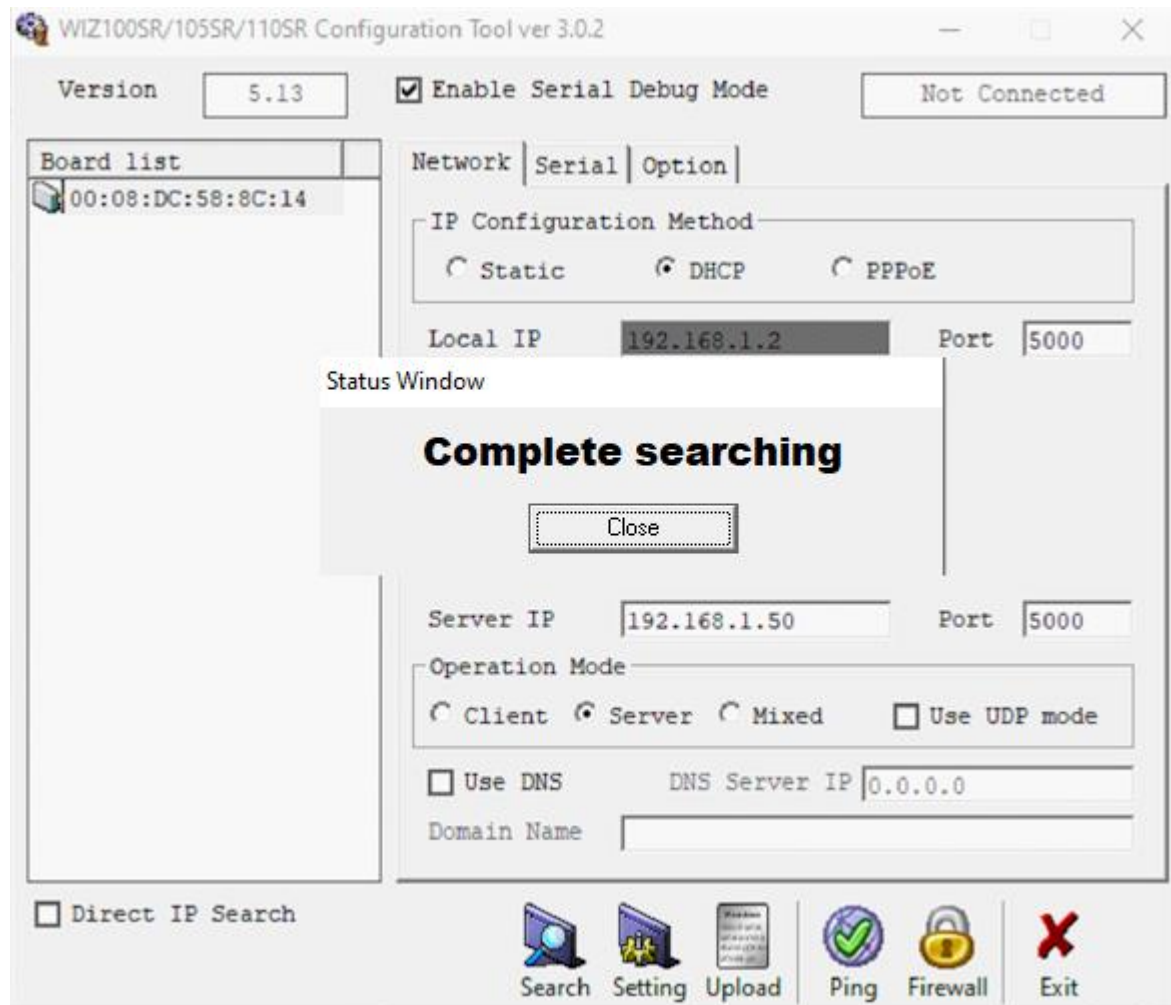
    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . : 

Wireless LAN adapter WiFi:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . : modem

Ethernet adapter Bluetooth Network Connection 3:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . :
```



TELSTRA GATEWAY PRO  IT'S HOW WE CONNECT

BASIC **ADVANCED**

ADVANCED Home **LAN Setup** Cancel Apply

Setup Wizard

WPS Wizard

Setup

[Internet Setup](#)
[xDSL Settings](#)
[Wireless Setup](#)
[Guest Network](#)
[WAN Setup](#)
[LAN Setup](#)
[Voice Calling Setup](#)
[Re-run Wizard](#)

Security
Administration
Advanced Setup
VPN

Device Name: V7610

LAN TCP/IP Setup

IP Address: 192.168.1.1

IP Subnet Mask: 255.255.255.0

RIP Direction: In Only

RIP Version: Disable

☒ Use Router as DHCP Server

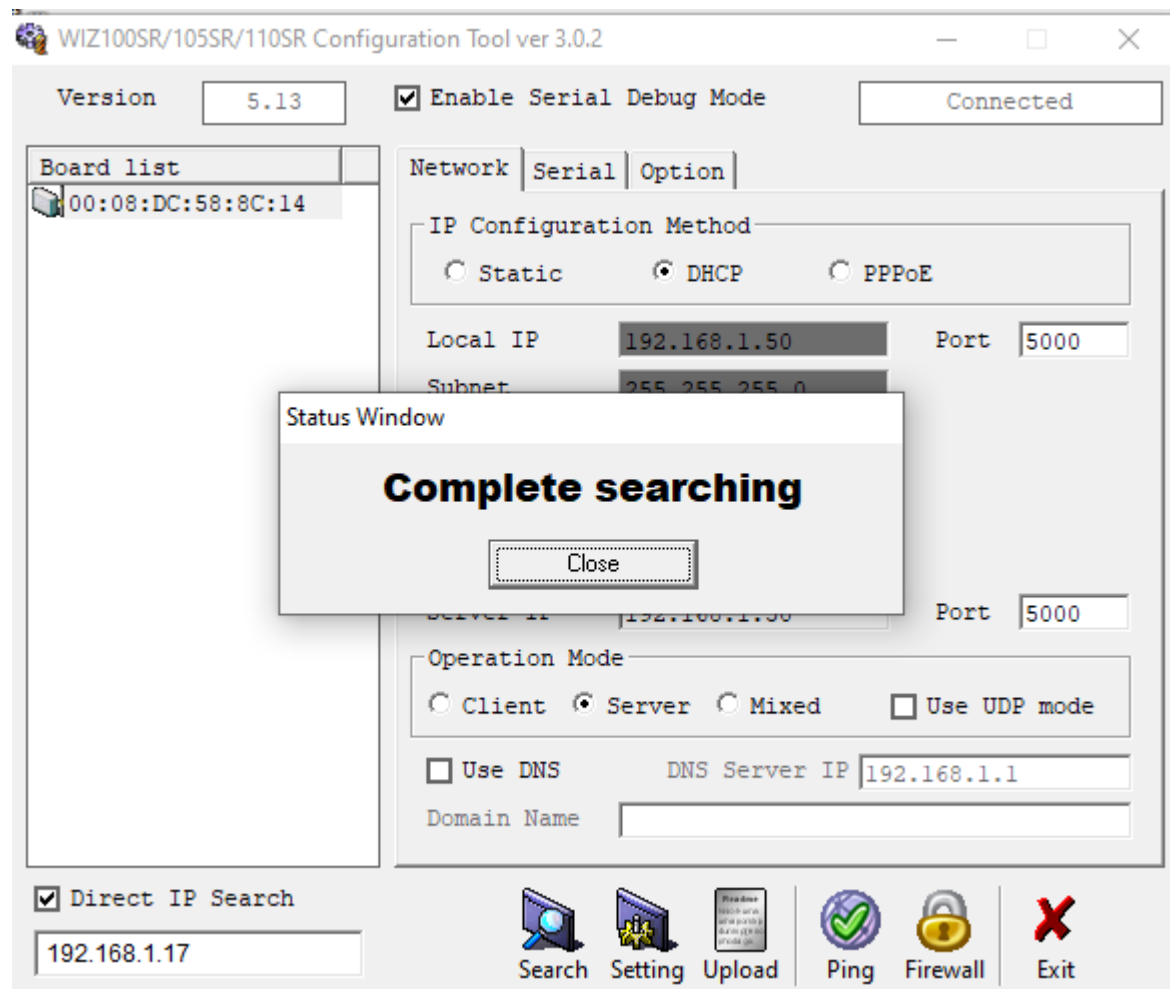
Starting IP Address: 192.168.1.2

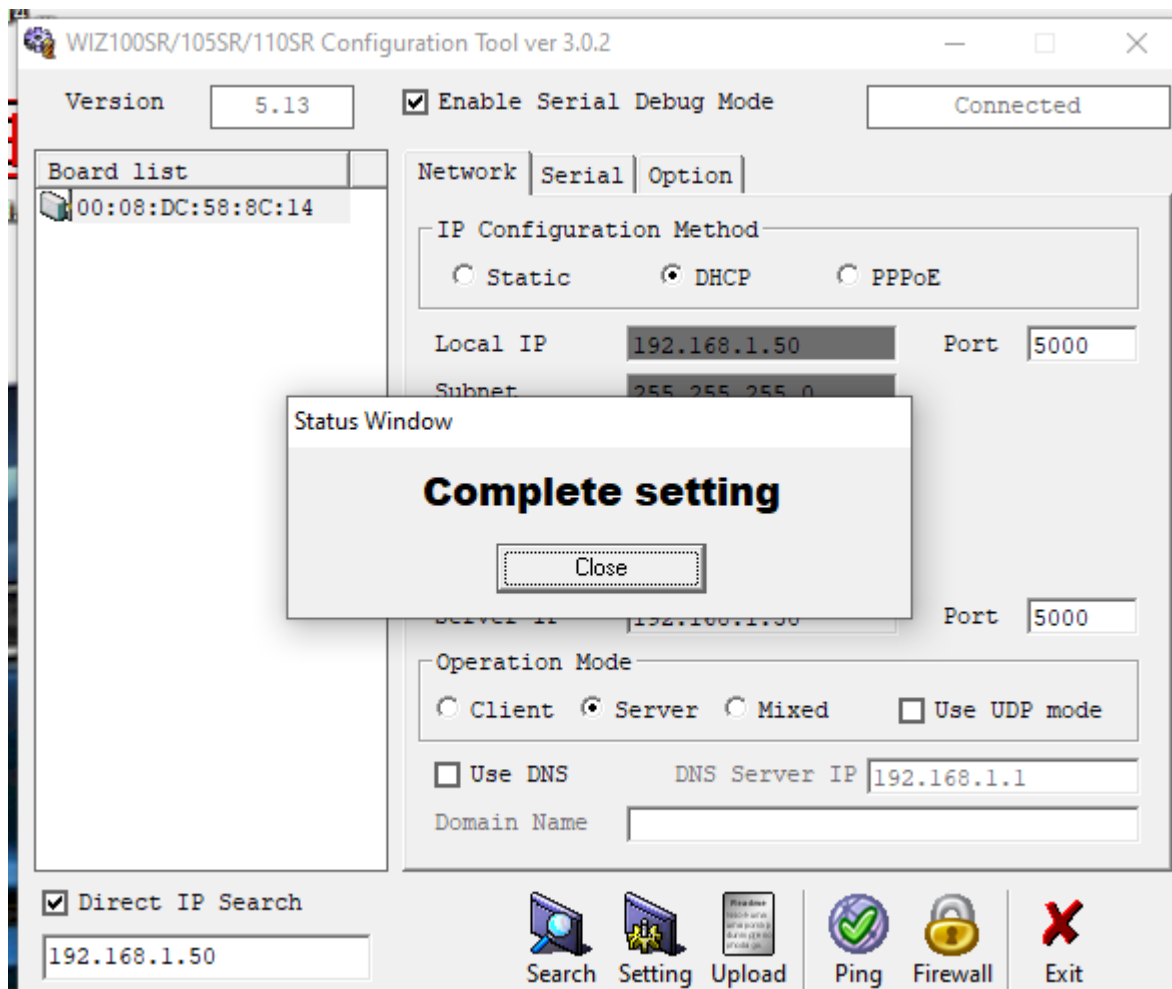
Ending IP Address: 192.168.1.254

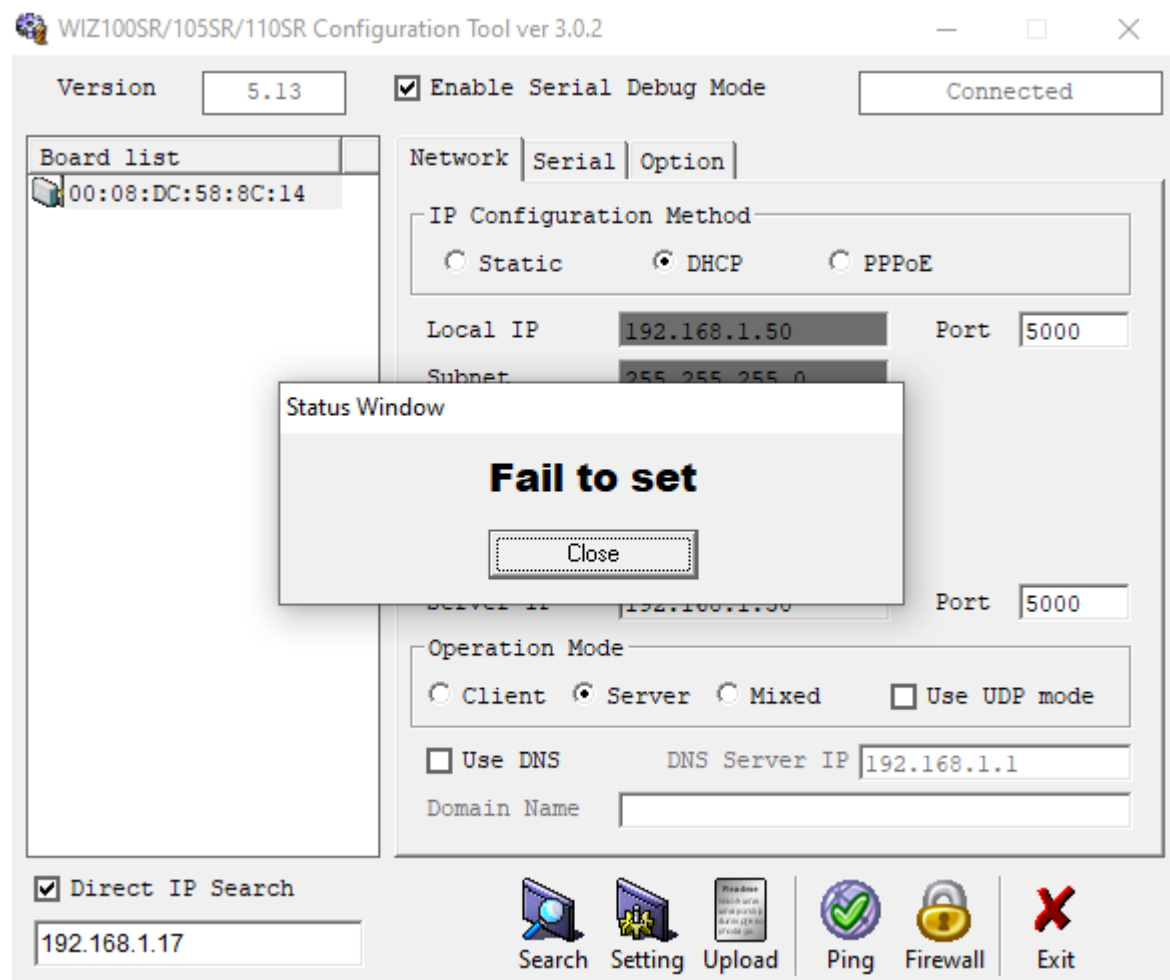
Address Reservation

#	IP Address	Device Name	MAC Address
☐ 1	192.168.1.20	GEOSHP	80:CE:62:3D:78:9E
☐ 2	192.168.1.2	GEO-G41-XHTPC	1C:6F:65:98:E8:0A
☐ 3	192.168.1.17	WizNet	00:08:dc:58:8c:14

+ Add ✎ Edit ✕ Delete



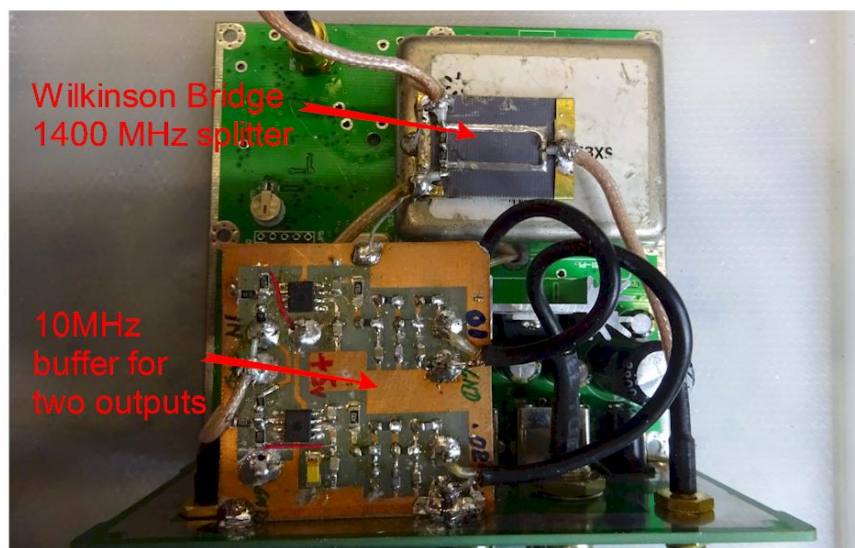




GPS Disciplined 10MHz Frequency Reference

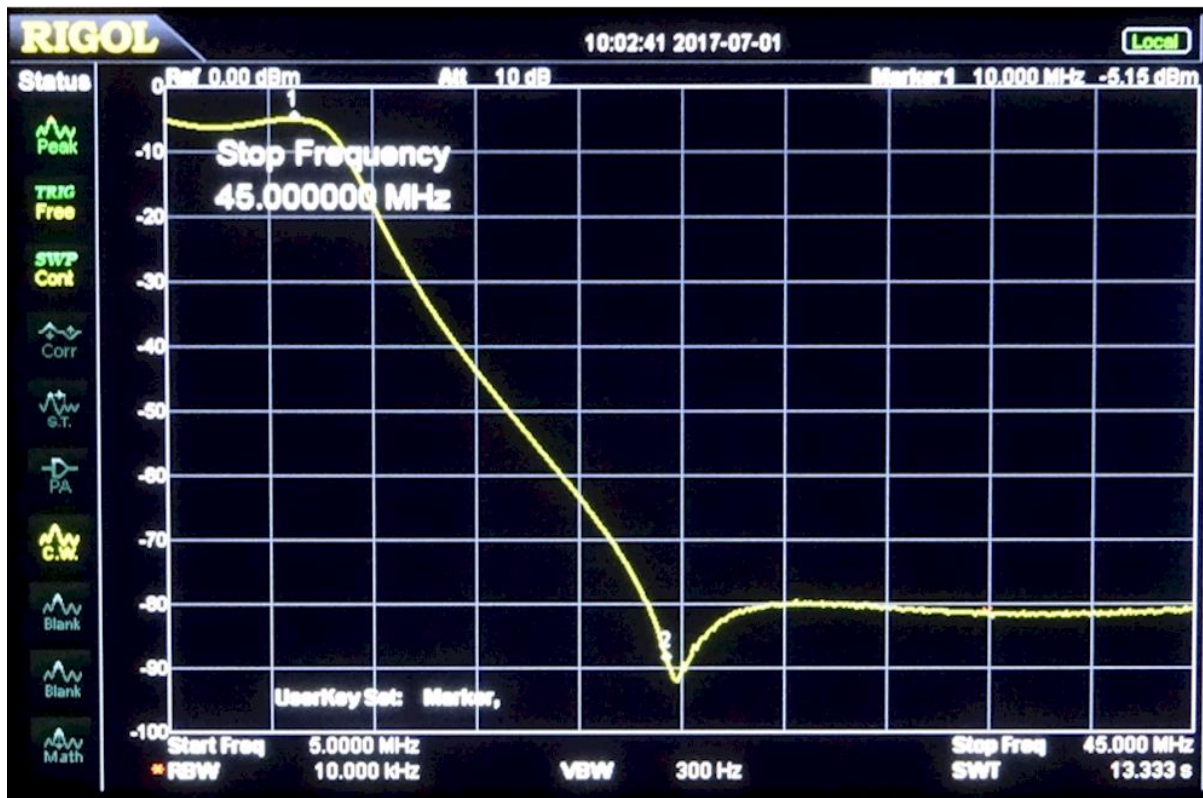
A BG7TBL Disciplined Oscillator is used to provide the GPS locked reference to the ZL PLL generators for each of the beacons.

This unit was modified for the beacon operation. As the ZL multi Beacon Controller has a separate GPS receiver for date/time and lat/long data, the external GPS antenna is split to a front panel SMA connector and to the internal GPS receiver of the disciplined oscillator.



Each of the ZLPLLs require a separate 10MHz reference input. A two-output buffer amplifier was installed in the disciplined oscillator to feed BNC female connectors added to the front panel.

The disciplined oscillator is powered from the 12V power supply via the fuse feeding the ZL multi beacon controller and ZLPLLs.

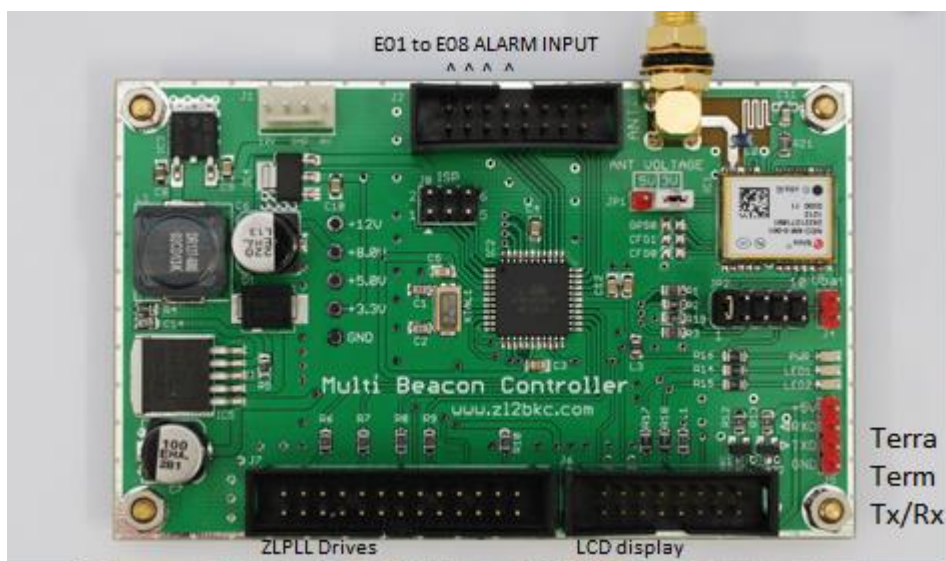


25 Sep 2020

ZL Multi beacon Controller

Current Beacon Controller Features

- Ability to drive 4 ZLPLL boards providing 4 separate bands
- All parameters and message formats setup via RS232 interface
- DTMF control to remotely change power levels, frequency shifts, mode schedules and power off bands as required
- Daytime and Night-time schedule for changing power levels or go QRT overnight.
- Supports JT4D on 144MHz and 432MHz, JT4F on 1296MHz and JT4G on 2.4 or 3.4GHz bands
- Supports FSK CW or OOK CW (On-Of-Keyed)
- Supports FSK441 on all bands for MS experimentation
- CW Frequency exactly on designated frequency making it suitable for GPS locked standard



The ZLPLL micro pretty much does nothing in a beacon controller setup - the firmware just disables itself and tri-states the pins--
Wayne

Current Beacon controller is F/W (Version 4.0B) 14/06/2018

The user configurable Eprom, set via the Terminal connections above. configures the beacon call sign and CW / Dig broadcast etc

Connect a USB to TTL dongle to the terminals above. The one I have has 4 leads.

Black=ground, Green=RXD, White=TXD, RED –don't connect maybe 5v, not required. Plug in the

dongle and run Terra Term, select com6 (in my case) and power up the Multi beacon controller. The terminal should display as below. 'show, enter' displays the current configuration.

Redcliffe Club house configuration: QG62NS

```

ZLPLL HSJT Beacon Rev 4.0B
(C)2012 H. Knowles, ZL2BKC

LCD Init: lcd_addr=0x3F
Checking EEPROM status
PLL Setup
OTMF Setup
FSK441 Init
JT4 Init
CW Init
Enable Interrupts
Startup Wait
Temperature: 28.9 degC
Cmd=00 txlen=2 rxlen=9 resp=0
Chan1: OK
Cmd=00 txlen=2 rxlen=9 resp=0
Chan2: OK
Cmd=00 txlen=2 rxlen=9 resp=0
Chan3: Absent
Cmd=00 txlen=2 rxlen=9 resp=0
Chan4: Absent
Setup all channels
Ch1> d
*Unknown Command: d
Ch1> show
Ref Freq=10.000000 MHz
Params=0x1 [cp=1, ntld=0, spur=0, no_dblr=0]

CW Text = DE VK4RTT_QG62NS_[EEEE_]*****
JT4 Text=VK4RTT QG62NS

CW Speed=12 WPM
CW Step=500 Hz
SPS Time Adj=-2 (Start @T+-0.2s)
Alert Mask=0x0F Normal=0x00 Temp=55 degC
Night Schedule= 00:00-00:00

Channel Configuration:
-----

```

Chan	Freq (MHz)	Lev	CW Offset	CW Shift	Modelist	JT4 Mode	JT65 Mode	JT4 Offset
1	144.440	4,4	0	0	04	JT4D	JT65B	0
2	50.285	4,4	0	0	06	JT4D	JT65A	0
3	0.000	0,0	0	0	0	JT4D	JT65C	0
4	0.000	0,0	0	0	0	JT4F	JT65C	0

```

-----

```

Configuration changes for Mt Cootha 8/11/2019 QG62LM . There are 44 ^ symbols required for the CW text line. (shift 6)

```
*Unknown Command: Cg
Ch1> channel 2
Ch2> show
Ref Freq=10.000000 MHz
Parans=0x1 [cp=1, mtd=0, spur=0, no_dblr=0]

CH Text = _DE VK4RTT_QG62LM_[EEEE_]
JT4 Text=VK4RTT QG62LM
CH Speed=12 WPM
CH Step=500 Hz
GPS Time Adj=-2 (Start QT+0.2s)
Alert Mask=0x0F Normal=0x00 Temp=55 degC
Night Schedule= 00:00-00:00

Channel Configuration:
-----
Chan | Freq | Lev | CH | CH | Modelist | JT4 | JT65 | JT4
      | (MHz) |    | Offset | Shift |         | Mode | Mode | Offset
-----
1 | 144.440 | 4,4 | 0 | 0 | 04 | JT4D | JT65B | 0
2 | 50.285 | 4,4 | 0 | 0 | 06 | JT4D | JT65A | 0
3 | 0.000 | 0,0 | 0 | 0 | 0 | JT4D | JT65C | 0
4 | 0.000 | 0,0 | 0 | 0 | 0 | JT4F | JT65C | 0
-----

DTMF Prefix=*440, timeout=30
HSR Freq: 50.285 MHz + 440 Hz offset = 50.285 440 MHz
HSR Channel: 256 period: 0 Min
HSR Power: +37 dBm
Ch2> show
Ref Freq=10.000000 MHz
Parans=0x1 [cp=1, mtd=0, spur=0, no_dblr=0]

CH Text = _DE VK4RTT_QG62LM_[EEEE_]
JT4 Text=VK4RTT QG62LM
CH Speed=12 WPM
CH Step=500 Hz
GPS Time Adj=-2 (Start QT+0.2s)
Alert Mask=0x0F Normal=0x00 Temp=55 degC
Night Schedule= 00:00-00:00

Channel Configuration:
-----
Chan | Freq | Lev | CH | CH | Modelist | JT4 | JT65 | JT4
      | (MHz) |    | Offset | Shift |         | Mode | Mode | Offset
-----
1 | 144.440 | 4,4 | 0 | 0 | 04 | JT4D | JT65B | 0
2 | 50.285 | 4,4 | 0 | 0 | 06 | JT4D | JT65A | 0
3 | 0.000 | 0,0 | 0 | 0 | 0 | JT4D | JT65C | 0
4 | 0.000 | 0,0 | 0 | 0 | 0 | JT4F | JT65C | 0
-----

DTMF Prefix=*440, timeout=30
HSR Freq: 50.285 MHz + 440 Hz offset = 50.285 440 MHz
```

Command List type ?

```

Ch1> ?
Command      Description
cu speed #   Set the CH Speed in MPH
cu text      Update CH message text
cu offset #   CH Freq shift for KeyUp
cu shift1 #   CH Freq shift for KeyDown
cu step #     CH Frequency Step (PLL step size)
uptime       Uptime and reboot diagnostic information
version      Software Version
jt4 mode A-F  JT4 operating mode
jt4 text     JT4 Beacon Text
jt65 mode A-C JT65 Operating Mode
gpsadj #     JT4/JT65/WSPR Start time offset (* 0.1 sec)
channel #    Set the channel for reconfiguration
freq ##,###  Set RF frequency
level #,#    Set RF Level (0=Off to 4=High)
multiplier # Set external multiplier factor
param #      PLL Parameters
dtnf prefix XXX DTMF Prefix (without leading *)
dtnf timeout # Timeout for DTMF command
dtnf test #   Test DTMF command (no prefix)
odelist XXXY  Set nodes for this channel
ref_freq #,## Reference frequency - Internal
schedule HH-HH Night Schedule hour range
alert mask ## Bitmask for alert interface
alert polarity ## Polarity for alert interface
alert temp ## Alert if temperature > val
wspr channel n Channel number for WSPR mode (1-4)
wspr freq ##,### Alternate WSPR Frequency
wspr offset ##### WSPR sub KHz frequency offset (400-600)
wspr power nn  Power level for WSPR broadcast (dBm)
wspr period nm WSPR Transmission interval (even min)
diag           Display PLL data for channel
debug # #     Display debugging information
test          Enter RF Test mode
init          Reload PLL Setup
shou          Display current config

```

Final:

```

Ch2> show
Ref Freq=10.000000 MHz
Params=0x1 [cp=1, mtld=0, spur=0, no_dblr=0]

CH Text = DE VK4RTT_QG62LH_[EEEE_]*****
JT4 Text=VK4RTT_QG62LH

CH Speed=12 WPM
CH Step=500 Hz
GPS Time Adj=-2 (Start @T+-0.2s)
Alert Mask=0x0F Normal=0x00 Temp=55 degC
Night Schedule= 00:00-00:00

Channel Configuration:
-----
Chan | Freq | Lev | CH | CH | Modelist | JT4 | JT65 | JT4
      | (MHz) |    | Offset | Shift |         | Mode | Mode | Offset
-----
  1 | 144.440 | 4,4 | 0 | 0 | 04 | JT4D | JT65B | 0
  2 | 50.285 | 4,4 | 0 | 0 | 06 | JT4D | JT65A | 0
  3 | 0.000 | 0,0 | 0 | 0 | 0 | JT4D | JT65C | 0
  4 | 0.000 | 0,0 | 0 | 0 | 0 | JT4F | JT65C | 0
-----

OTMF Prefix=*440, timeout=30
WSPR Freq: 50.285 MHz + 440 Hz offset = 50.285 440 MHz
WSPR Channel: 256 period: 0 Min
WSPR Power: +37 dBm
Ch2> show
Ref Freq=10.000000 MHz
Params=0x1 [cp=1, mtld=0, spur=0, no_dblr=0]

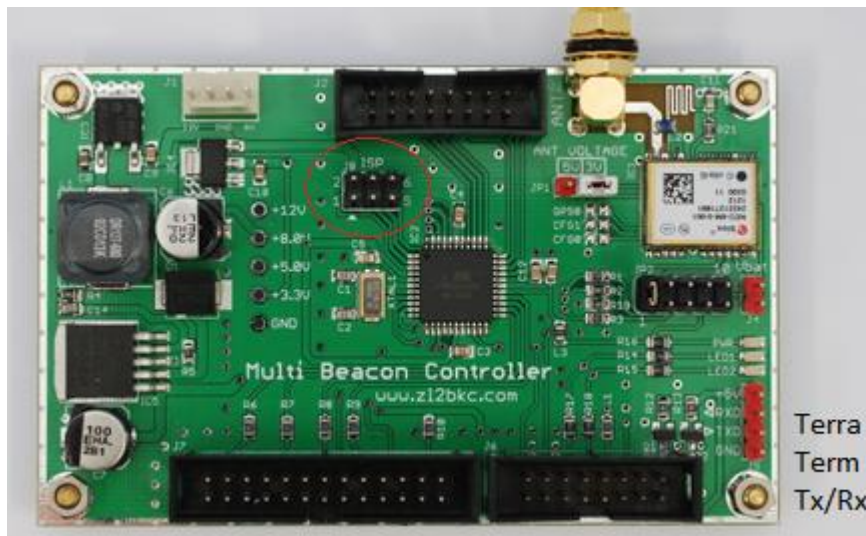
CH Text = DE VK4RTT_QG62LH_[EEEE_]*****
JT4 Text=VK4RTT_QG62LH

CH Speed=12 WPM
CH Step=500 Hz
GPS Time Adj=-2 (Start @T+-0.2s)
Alert Mask=0x0F Normal=0x00 Temp=55 degC
Night Schedule= 00:00-00:00

Channel Configuration:
-----
Chan | Freq | Lev | CH | CH | Modelist | JT4 | JT65 | JT4
      | (MHz) |    | Offset | Shift |         | Mode | Mode | Offset
-----
  1 | 144.440 | 4,4 | 0 | 0 | 04 | JT4D | JT65B | 0
  2 | 50.285 | 4,4 | 0 | 0 | 06 | JT4D | JT65A | 0
  3 | 0.000 | 0,0 | 0 | 0 | 0 | JT4D | JT65C | 0
  4 | 0.000 | 0,0 | 0 | 0 | 0 | JT4F | JT65C | 0
-----

OTMF Prefix=*440, timeout=30
WSPR Freq: 50.285 MHz + 440 Hz offset = 50.285 440 MHz
WSPR Channel: 256 period: 0 Min
WSPR Power: +37 dBm

```



Firmware upgrade notes below: Using a cable attached to the 6 'ISP' pins **circled** in the pic above and a USBasp device.

Pre 2019 Method see 4 pages below for later programming method with the upgraded V2.0 USBasp device 18/12/19

.....

Wayne:

'Found the original documentation - this was tailored towards Linux, and the ZLPLL instructions are for Windows so you need to combine the relevant pieces of both where appropriate. You have done well to install avrdude, so pretty much a matter of running the programming steps in the document I have attached, namely:'

```
avrdude -p m1284p -F -c usbasp -n -U eeprom:r:backup-eeprom.hex:i
```

```
avrdude -p m1284p -F -c usbasp -n -U flash:r:backup-flash.hex:i
```

```
avrdude -p m1284p -F -c usbasp -U flash:w:WSJT.hex
```

Assuming the driver is usbasp of course, and WSJT.hex is the actual file I sent you. Note the first 2 commands are just to read out the data for backup purposes - don't progress unless they complete without error.

First comment: You don't need to reprogram the ZLPLL boards - they are OK as is. The only firmware that needs updating is the main beacon controller with the supplied file(s). And yes the boards need to be powered up when you reprogram them.

What may have been confusing is having the procedure for the ZLPLL - there is a different set of options to use for the Beacon controller (which needs a -t 1284 option to match the processor type)

Multi Beacon Controller firmware upgrade notes

ZL2BKC 16 March 2016 (Linux)

Commands:

```
sudo aptitude search avrdude
sudo avrdude -p m1284p -F -c usbasp -n -U eeprom:r:backup-eeprom.hex:i
sudo avrdude -p m1284p -F -c usbasp -n -U eeprom:r:backup-eeprom.hex:i
sudo avrdude -p m1284p -F -c usbasp -U flash:w:WSJT.hex
```

Detailed Procedure:

Install the avrdude package:

```
wdk@wdk-mint17KDE:~ > sudo aptitude search avrdude
[sudo] password for wdk:
p avrdude - software for programming Atmel AVR microcontrollers
p avrdude:i386 - software for programming Atmel AVR microcontrollers
p avrdude-doc - documentation for avrdude
wdk@wdk-mint17KDE:~ > sudo aptitude install avrdude
The following NEW packages will be installed:
avrdude libftdi1{a}
0 packages upgraded, 2 newly installed, 0 to remove and 703 not upgraded.
Need to get 304 kB of archives. After unpacking 1,067 kB will be used.
Do you want to continue? [Y/n/?] y
Get: 1 http://archive.ubuntu.com/ubuntu/ trusty/main libftdi1 amd64 0.20-1ubuntu1 [15.1 kB]
Get: 2 http://archive.ubuntu.com/ubuntu/ trusty/universe avrdude amd64 6.0.1-1 [289 kB]
Fetched 304 kB in 10s (30.3 kB/s)
Selecting previously unselected package libftdi1:amd64.
(Reading database ... 182728 files and directories currently installed.)
Preparing to unpack .../libftdi1_0.20-1ubuntu1_amd64.deb ...
Unpacking libftdi1:amd64 (0.20-1ubuntu1) ...
Selecting previously unselected package avrdude.
Preparing to unpack .../avrdude_6.0.1-1_amd64.deb ...
Unpacking avrdude (6.0.1-1) ...
Processing triggers for man-db (2.6.7.1-1) ...
Setting up libftdi1:amd64 (0.20-1ubuntu1) ...
Setting up avrdude (6.0.1-1) ...
Processing triggers for libc-bin (2.19-0ubuntu6) ...
dk@wdk-mint17KDE:~ > avrdude
Usage: avrdude [options]
Options:
-p <partno> Required. Specify AVR device.
-b <baudrate> Override RS-232 baud rate.
-B <bitclock> Specify JTAG/STK500v2 bit clock period (us).
-C <config-file> Specify location of configuration file.
-c <programmer> Specify programmer type.
```

```
-D Disable auto erase for flash memory
-i <delay> ISP Clock Delay [in microseconds]
-P <port> Specify connection port.
-F Override invalid signature check.

-e Perform a chip erase.

-O Perform RC oscillator calibration (see AVR053).
-U <memtype>:r|w|v:<filename>[:format]
```

Memory operation specification.

Multiple -U options are allowed, each request is performed in the order specified.

-n Do not write anything to the device.

-V Do not verify.

-u Disable safemode, default when running from a script.

-s Silent safemode operation, will not ask you if fuses should be changed back.

-t Enter terminal mode.

-E <exitspec>[,<exitspec>] List programmer exit specifications.

-x <extended_param> Pass <extended_param> to programmer.

-y Count # erase cycles in EEPROM.

-Y <number> Initialize erase cycle # in EEPROM.

-v Verbose output. -v -v for more.

-q Quell progress output. -q -q for less.

-l logfile Use logfile rather than stderr for diagnostics.

-? Display this usage.

avrdude version 6.0.1, URL: <<http://savannah.nongnu.org/projects/avrdude/>>

wdk@wdk-mint17KDE:~ >

Insert programmer and verify it is detected:

```
wdk@wdk-mint17KDE:~ > lsusb
Bus 004 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub
Bus 003 Device 003: ID 0e0f:0002 VMware, Inc. Virtual USB Hub
Bus 003 Device 005: ID 16c0:05dc Van Ooijen Technische Informatica shared ID for use with libusb
Bus 003 Device 004: ID 0e0f:0003 VMware, Inc. Virtual Mouse
Bus 003 Device 002: ID 0e0f:0002 VMware, Inc. Virtual USB Hub
Bus 003 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
Bus 002 Device 002: ID 0e0f:0002 VMware, Inc. Virtual USB Hub
Bus 002 Device 001: ID 1d6b:0001 Linux Foundation 1.1 root hub
wdk@wdk-mint17KDE:~ >
```

Connect programming cable adapter to MBC board ensuring pin 1 = MISO

```
wdk@wdk-mint17KDE:~ > sudo avrdude -p m1284p -c usbasp
avrdude: warning: cannot set sck period. please check for usbasp firmware update.
avrdude: AVR device initialized and ready to accept instructions
Reading | ##### | 100% 0.00s
avrdude: Device signature = 0x1e9706
avrdude: Expected signature for ATmega1284P is 1E 97 05
Double check chip, or use -F to override this check.
avrdude done. Thank you.
```

avrdude: warning: cannot set sck period. please check for usbasp firmware update.

Fix for the 'cannot set sck period' fault and the USBasp won't program:

[VK4RTT ZLPLL/MBC programmer Guide 18/12/2019](#) **Install 'khazama AVR Programmer'**

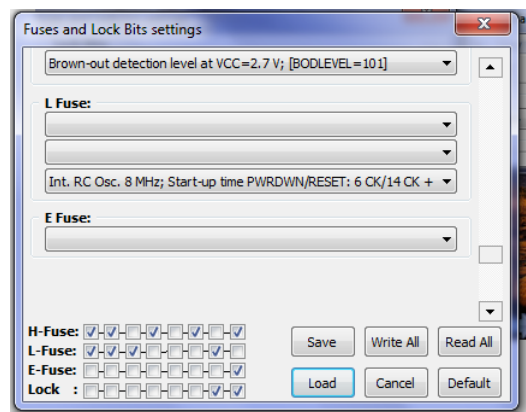
Use a USBasp V2.0 dongle with the firmware updated so it can write with a 500hz clock

<https://blog.podkalicki.com/how-to-update-avr-usbasp-firmware-to-latest-version/>

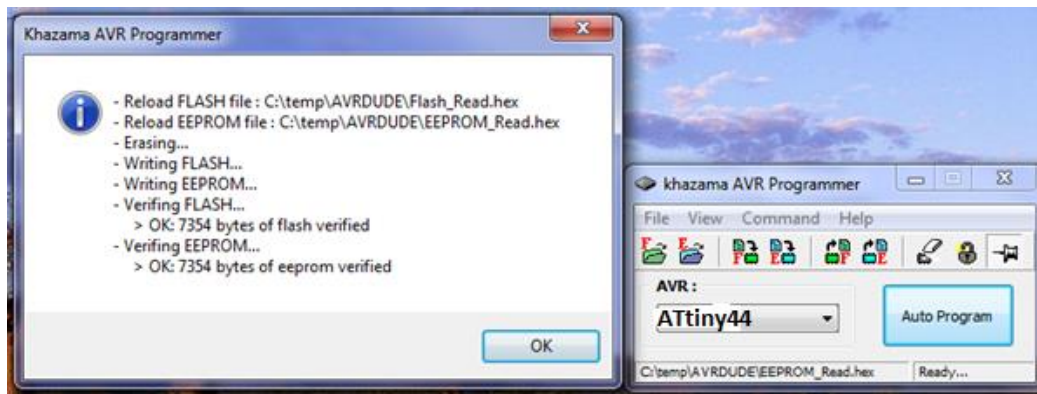
<https://www.fischl.de/usbasp/> with the file '2011_05_28 tar.gz'

Connect the JP3 link for slow programming. I used the 3.3v setting on JP3. Make sure JP2 is open.

You will need AVRDUDE in the same directory as your hex and eeprom 'files'.



When done and successful, 'cancel' the window above and select 'File' load hex and eeprom source files. Select 'Auto Program' with ISP 500Hz clock set under 'Command Program Options' XXX_READ.xxx refers to a previously saved file from a known good chip or the latest files.



Fault Finding and diagnostic —***** HERE *****

Test Report 14 Jul 2020 VK4AMG**Power Supply Voltages**

	24 V	12V
6m	23.7	12.0
2m	23.7	12.1

Drive and Power Output

	Drive V	Power (W)	24V (A)	12V (A)	Drive V_D	Drive V_G
6m	2.1	110	7.8	1.2	7.0	2.9
2m	3.0	100	6.5	1.7	8.0	4.7

Faults

	Drive	SWR	Current	Temp °C		Output Error
6m	3.0	2.0 : 1	10.0	45	65	OK
2m	4.0	2.0 : 1	8.5	45	65	OK