

CX6DD Rotator Controller for Yaesu 5400.

The following pages, detail a modified version of Fernando's CX6DD rotor controller, which I have modified to interface directly with the Yaesu series of az / el rotors, to enable tracking of NOAA satellites.

When coupled with David Taylor's excellent WXTrack, which has recently been modified to drive this controller,(or several other amateur tracking programs, using Wispdde), the combination provides a cheap and accurate method of antenna tracking.

I have included in this document, pcb designs, schematics and some pictures of the prototype.

The pcbs have been designed as pth, but with some difficulty they could be made unplated and soldered both sides.

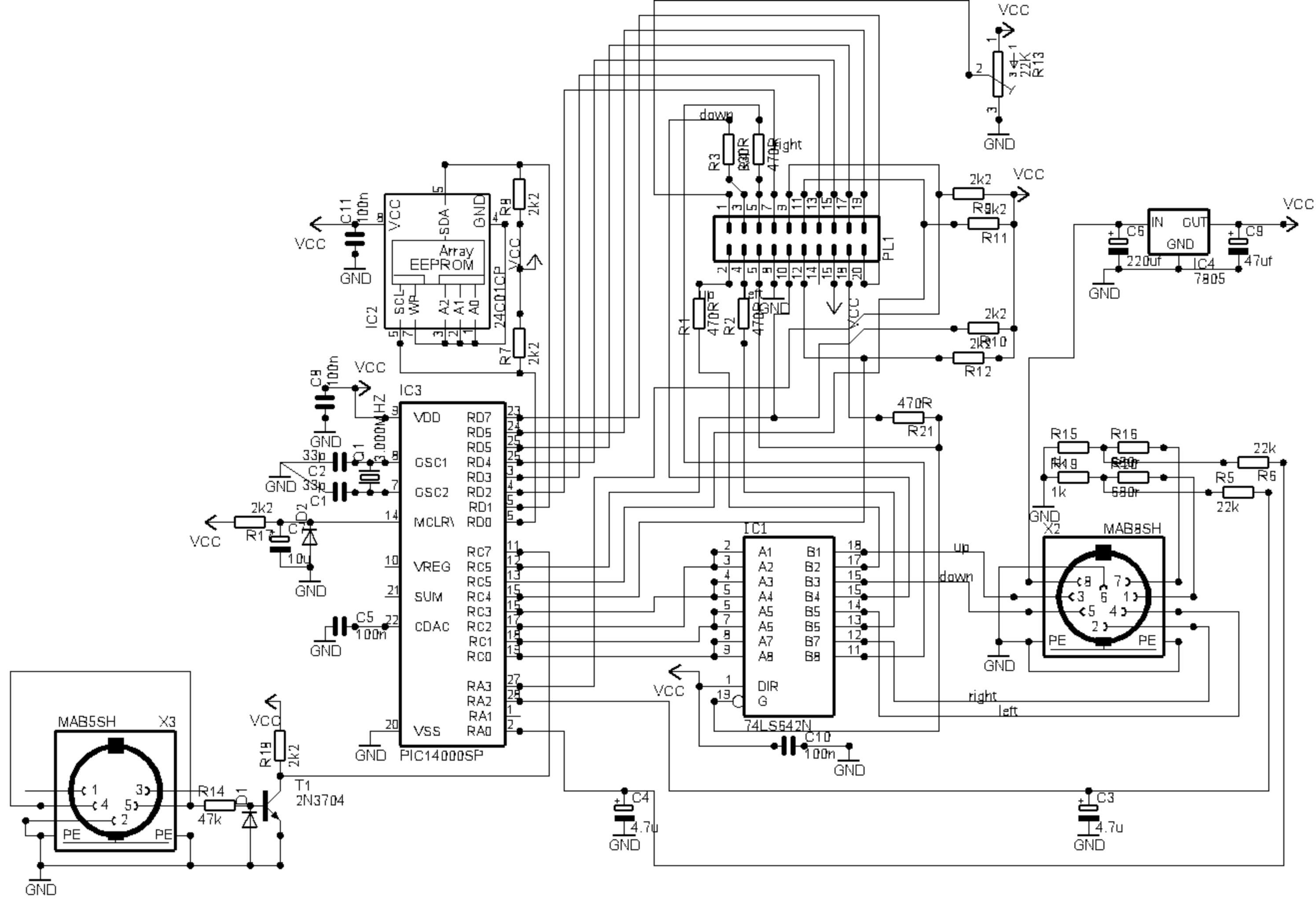
I can supply the pcbs and the programmed pic if required, or the hex file is available from Fernando's site <http://www.chasque.apc.org/franky/6ddrc/6ddrceng.htm>

Anyone wishing to contact me can do so at gramar@netaccess.co.nz

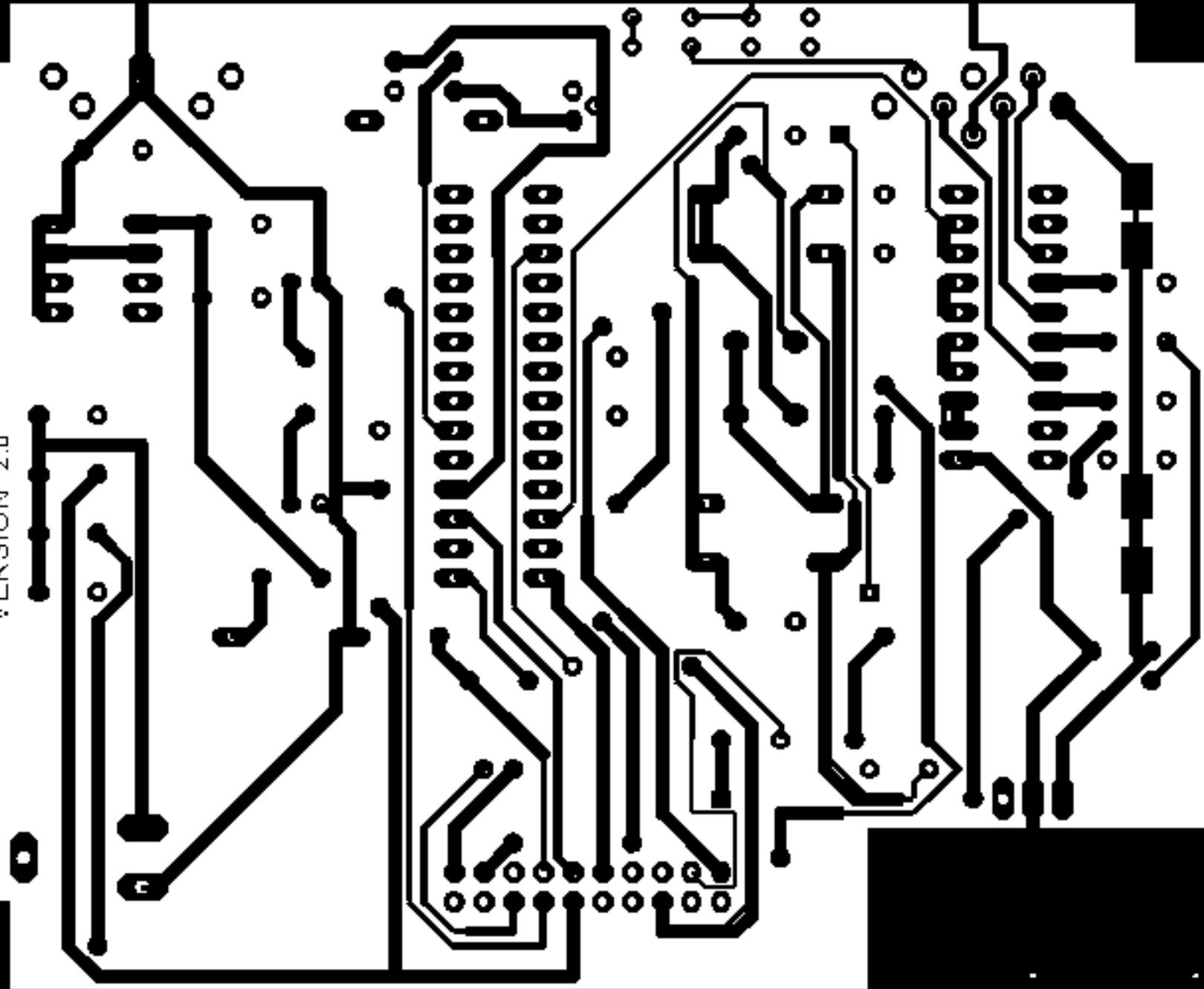
Wxtrack can be downloaded from David's site.....

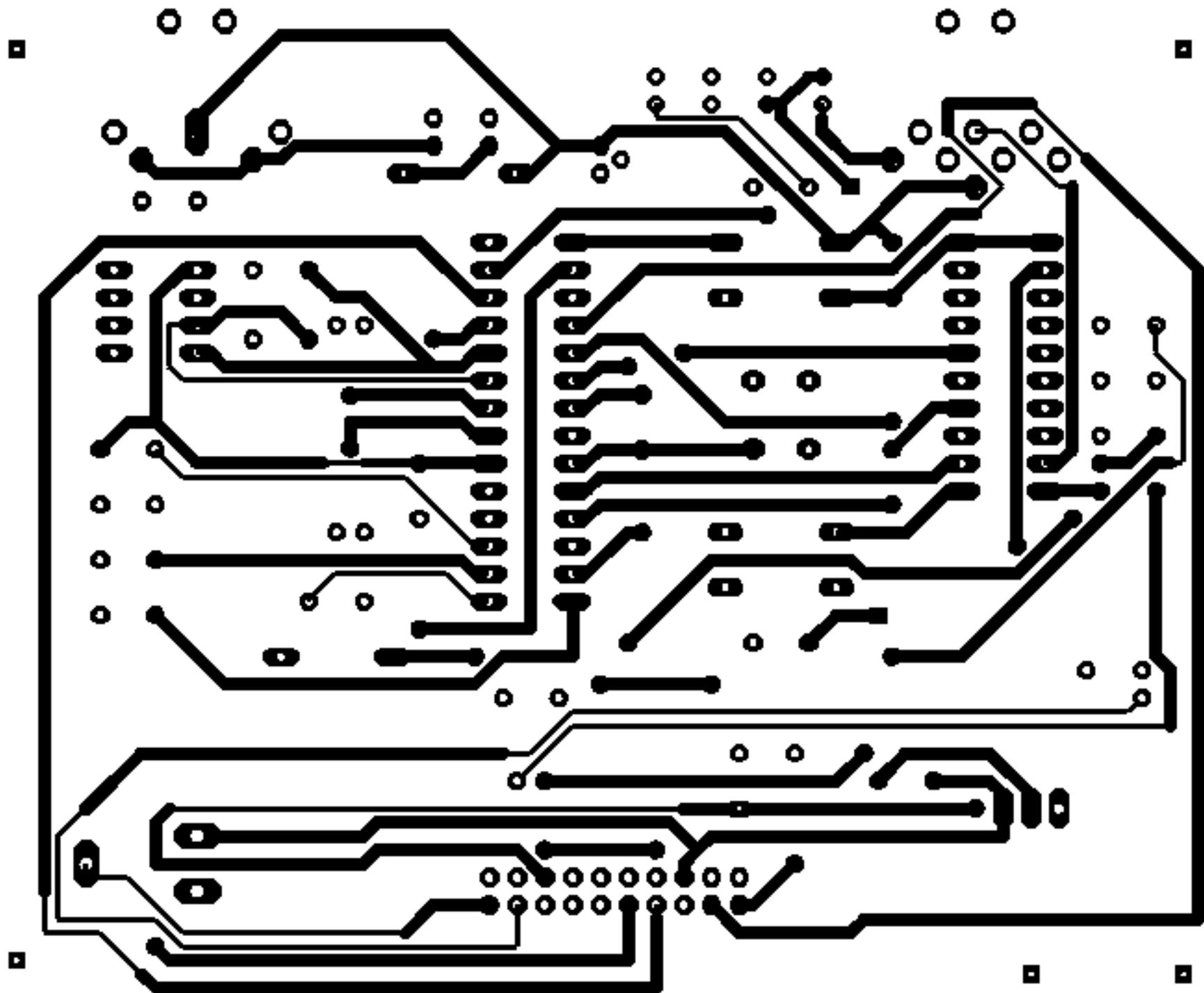
<http://www.david-taylor.pwp.blueyonder.co.uk/software/>

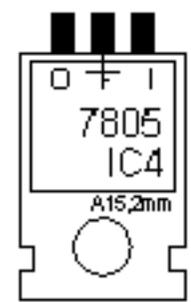
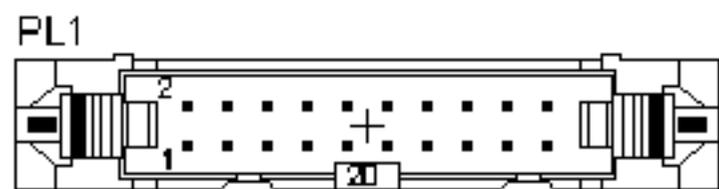
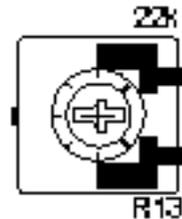
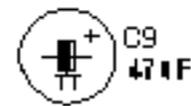
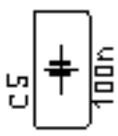
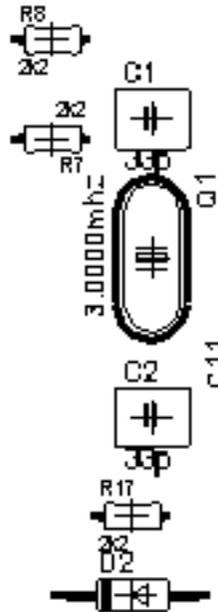
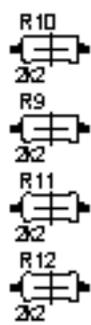
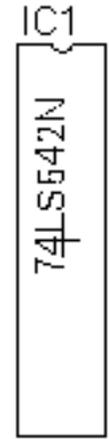
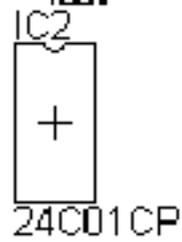
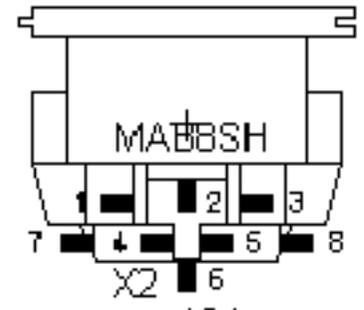
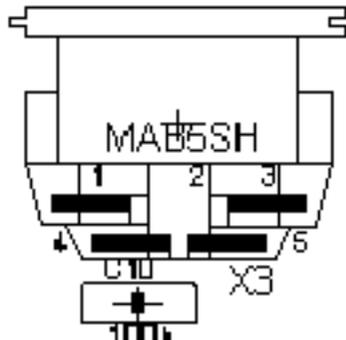
Graham Langton 16 Nov 2001

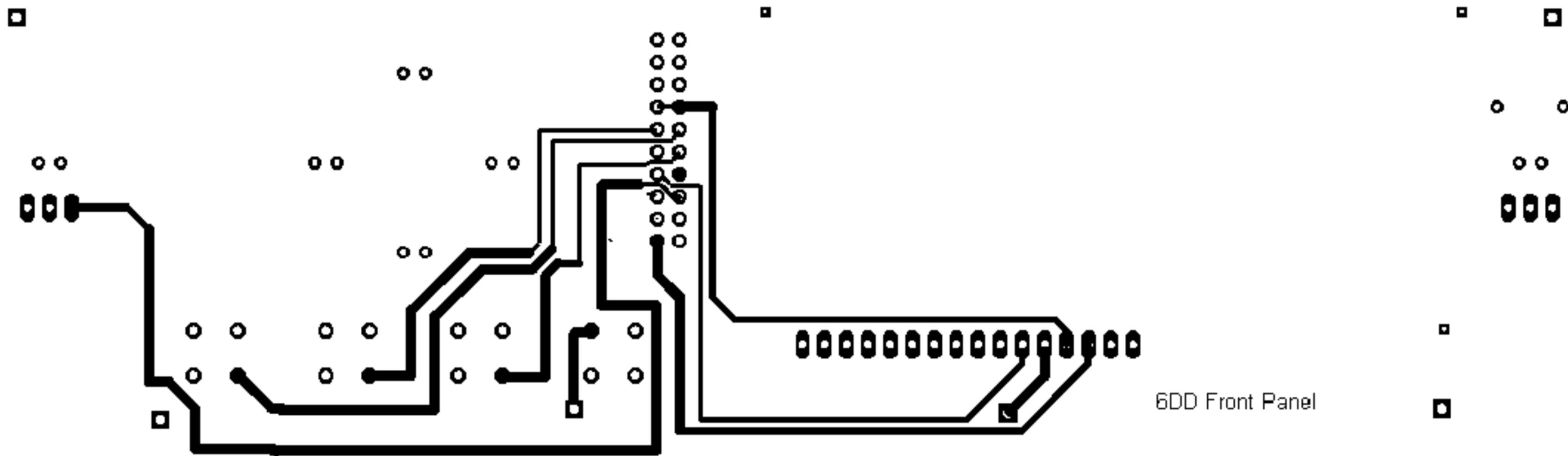


5DD ROTOR CONTROLLER FOR YAESU 5400/5500/5600
VERSION 2.0

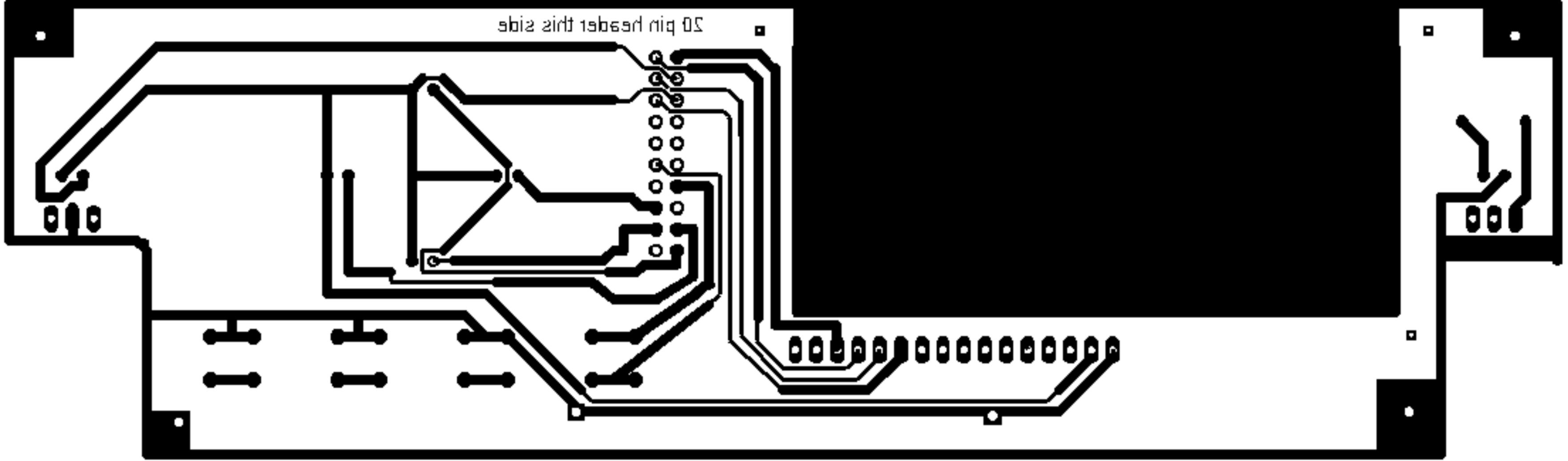


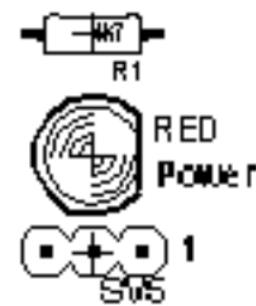
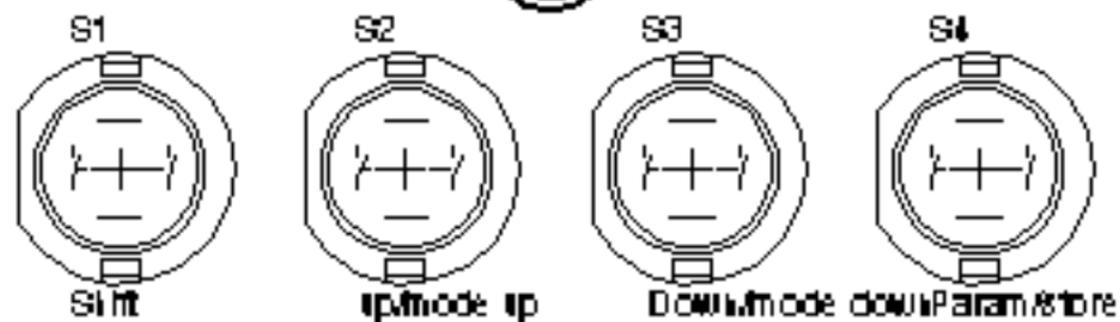
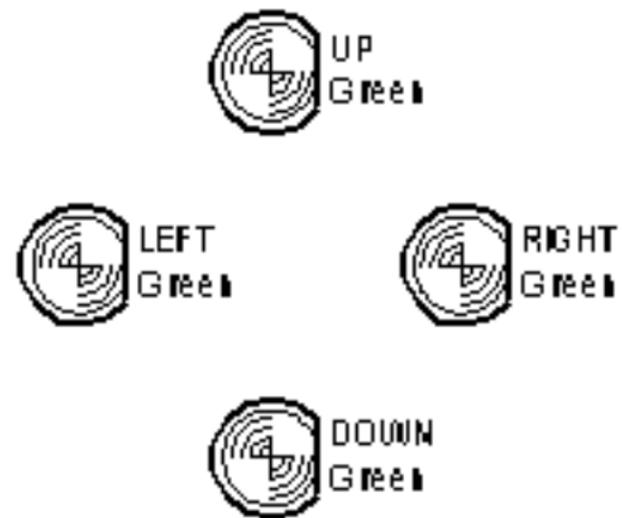






30 pin header this side







ROTOR CONTROLLER



AZIMUTH / ELEVATION

TRACK



LEFT



UP



RIGHT

DOWN



SHIFT



UP



DOWN



PARASTORE



POWER



cx6dd_cal.txt

The recommended calibration procedure for the CX6DD rotor controller is the following:

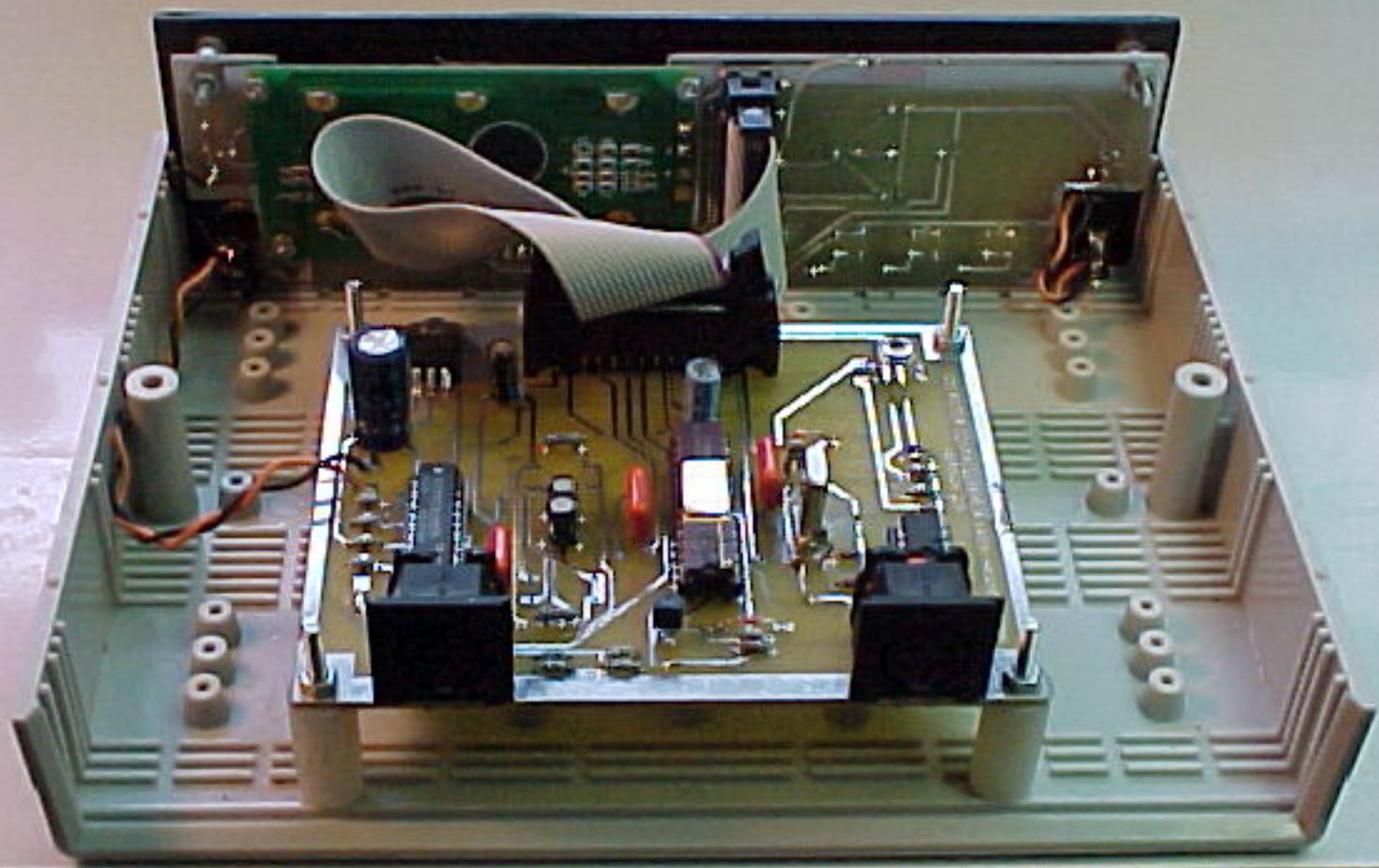
- 1- Turn-on the controller while depressing the four keys, SHIFT, UP, Dn & PARAM. 'RESET' will appear on the display and the controller will store default data into the non-volatile memory. This will let the controller indicate some values for Az. & El although they will not be calibrated yet. After the reset the display will show 'Remote' indicating that the controller is expecting data to be entered from the serial port.
- 2- Hold down the SHIFT key and depress the UP key to enter the Manual mode. Initially 'Azimuth' is displayed indicating that the Az rotor will be manually controlled with the UP/DN keys. This can be switched to 'Elevation' by depressing the 'PARAM' key. In this mode Az & El values will be displayed continuously (take into account that this indication will not be calibrated at first) and unlike in 'Remote' mode no stop positions will be regarded. This means that you can make your rotors reach mechanical stops!.
- 3- Turn the Az rotor counterclockwise (seen from the sky) until the antennas are pointing north.
- 4- Hold down the SHIFT key and depress the UP key to enter the Calibration mode. The desired calibration parameter will be selected by repeatedly depressing the PARAM key. The first time, Az.Zero will be selected.
- 5- Enter a value of 0.0 (for North) with UP/DN keys and then store this data into non-volatile memory by holding down the SHIFT key and depressing the PARAM key for at least 1 second.
- 6- Go back to Manual mode by holding down SHIFT and depressing DN key. Now an Az of 0.0 should be indicated in the display (Elev indication doesn't matter yet). If Az is not 0.0 then the Az.Zero data was not correctly stored, repeat steps 4&5 carefully.
- 7- While in Manual mode turn the Az rotor clockwise until antennas are pointing North again (full turn) or South (1/2 turn) if exact-north is not possible.
- 8- Enter Calibration mode and select Az.Scale calibration parameter.
- 9- If antennas are pointing North enter a value of 360.0 with UP/DN keys, if they are pointing South enter 180.0 etc. Store data by holding down SHIFT and depressing PARAM key at least for 1 second.
- 10- Go back to Manual mode and verify a correct Az indication. If indication is not correct repeat steps 8&9 carefully.
- 11- While in Manual mode depress the PARAM key in order to take control over the Elevation rotor. Turn the Elev rotor until the antennas are in their normal-horizontal position (not upside-down), this position will be 0 deg. elevation.
- 12- Enter Calibration mode by holding SHIFT and depressing UP and then select El.Zero parameter with PARAM key.
- 13- Enter a value of 0.0 with UP/DN keys and store into non-volatile memory by holding SHIFT and depressing PARAM at least for a second.
- 14- Go back to Manual mode and verify a correct El indication of 0.0, otherwise repeat steps 12&13.
- 15- While in Manual mode depress PARAM key to take control over the El rotor. Turn the Elev rotor with the UP key until the antennas are horizontal up-side-down, this position will be 180.0 deg Elevation.
- 16- Enter Calibration mode and select El.Scale parameter.
- 17- Enter a value of 180.0 and store data holding SHIFT and depressing PARAM during 1 second.
- 18- Go back to Manual mode and verify a correct Elevation indication, otherwise repeat steps 16&17.
- 19- Enter Calibration mode and select Az.Inert parameter. This parameter stores the amount that the rotor keeps moving after de-energized, It is used in the Remote mode to increase the pointing accuracy of the controller. This parameter is not initialized on reset, so it is advisable to manually initialize.
- 20- Enter a value of 1.0 and store by holding SHIFT and depressing PARAM. This parameter will be fine-tuned later by observing the

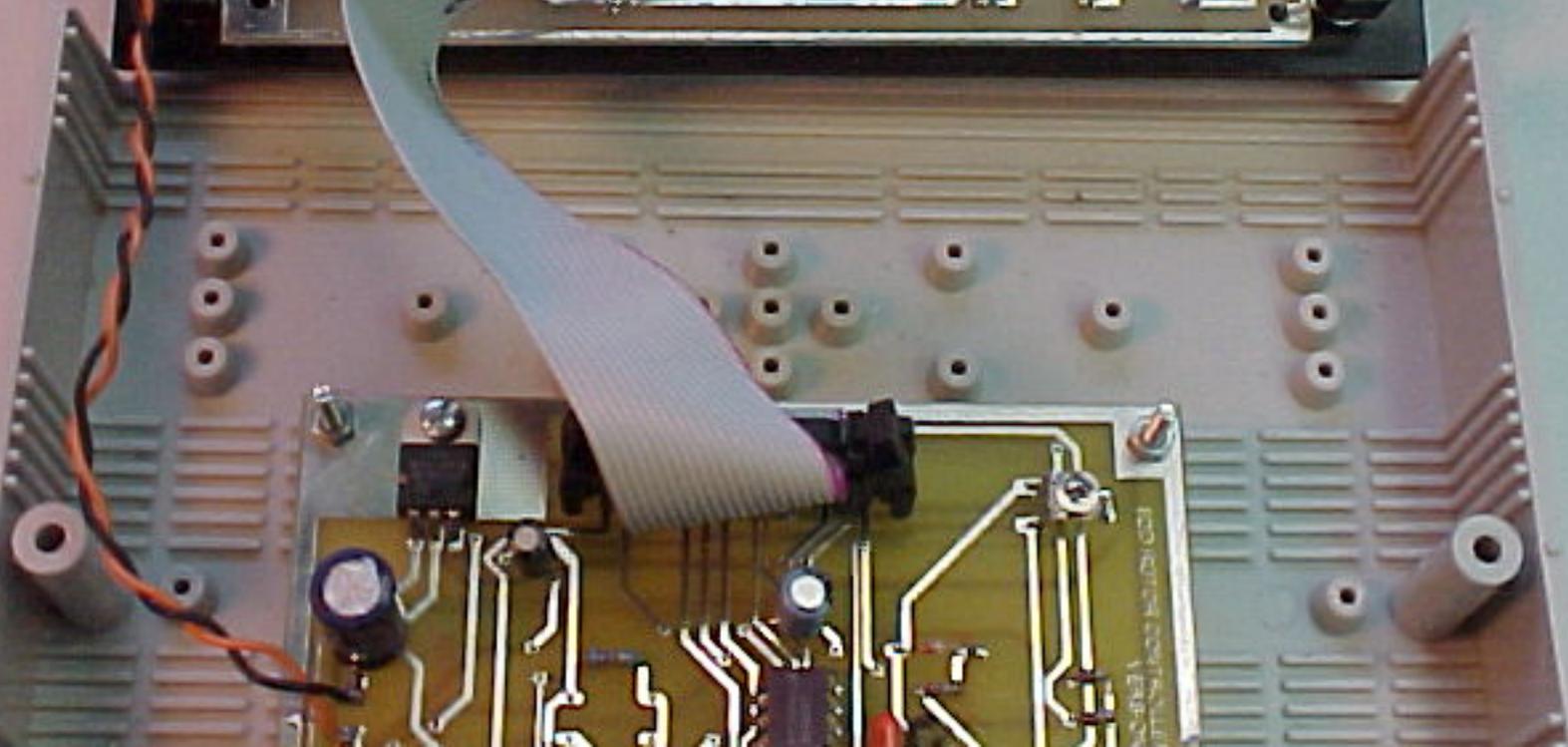
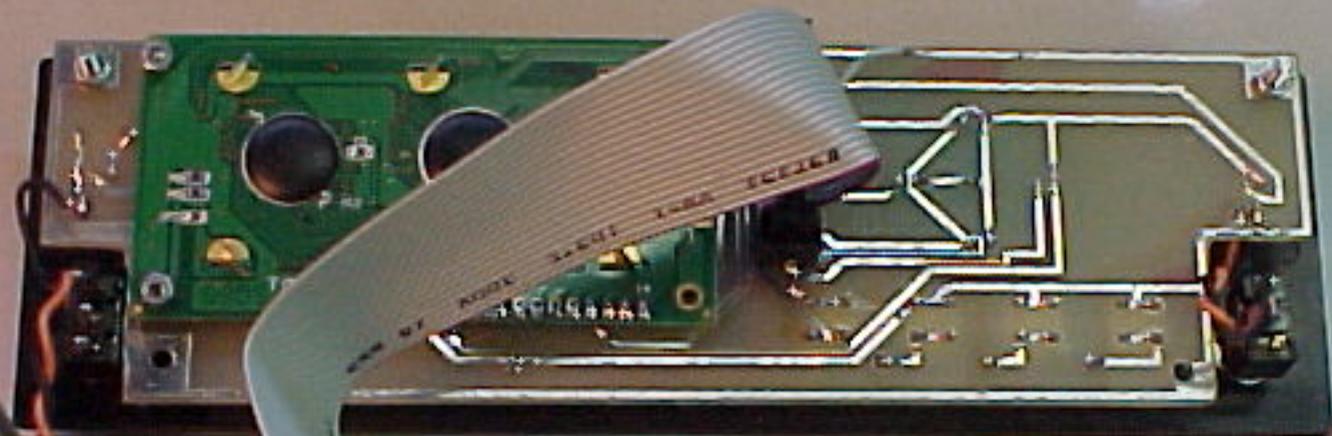
- behaviour of the system in remote mode.
- 21-Still in Calibration mode select El.Inert parameter.
 - 22-Initialize this parameter to 1.0 in a similar way as described in step 20, this will be fine tuned later if required.
 - 23- Still in Calibration mode depress PARAM key repeatedly until Az.Inert is reached again and verify the value of 1.0 is stored.
 - 24- Follow the same procedure to verify stored El.Inert parameter.

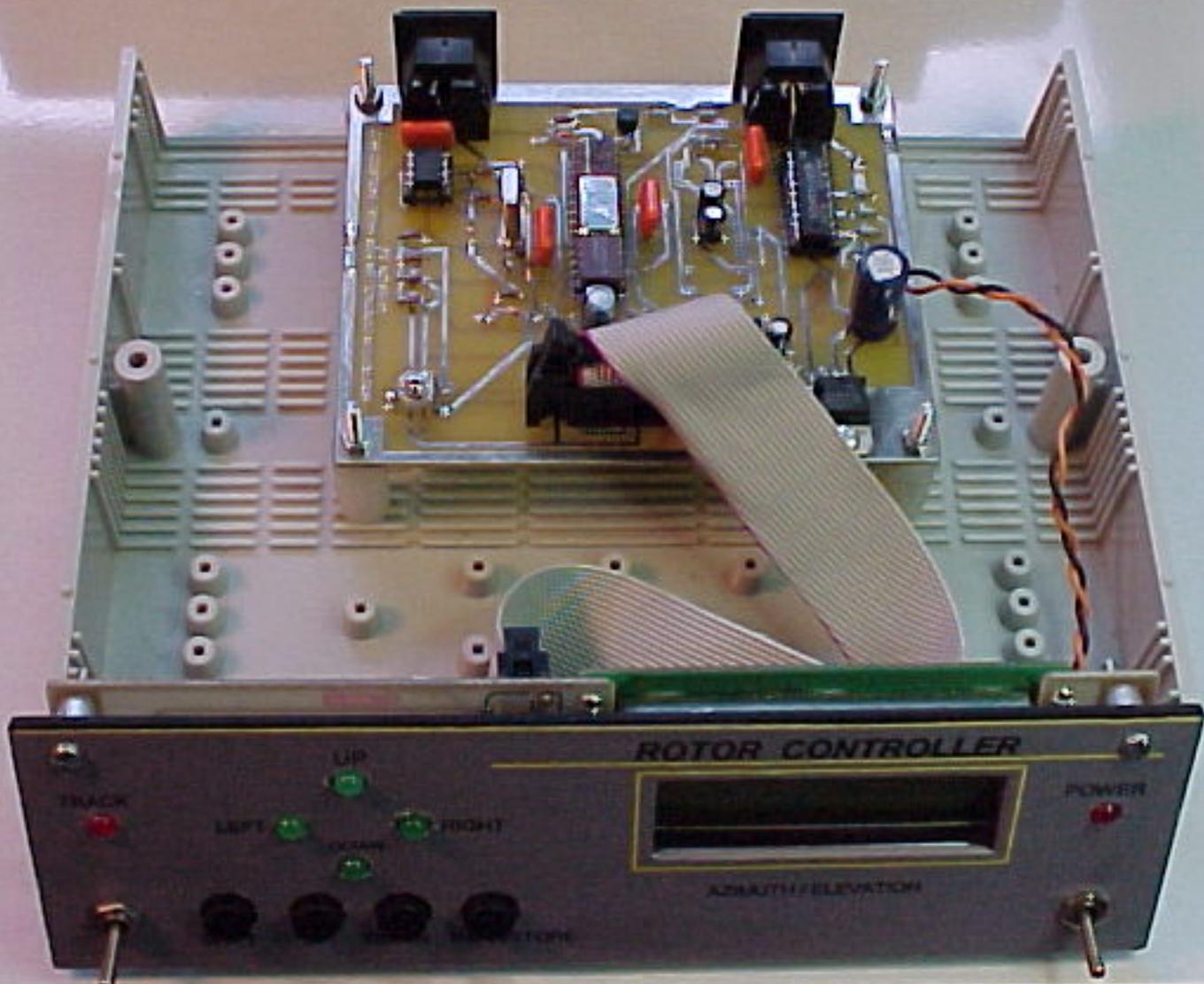
This completes controller calibration for operation in Manual and Remote modes.

NOTE: During the reset procedure, the parameters Az.Stop-, Az.Stop+, El.Stop- and El.Stop+ are initialized to 0, 360, 0 and 180 degrees respectively. It is not recommended to modify these parameters unless your antenna system requires so. Take into account that when these parameters are selected in Calibration mode, the current rotor position is indicated and not the stored parameter value.

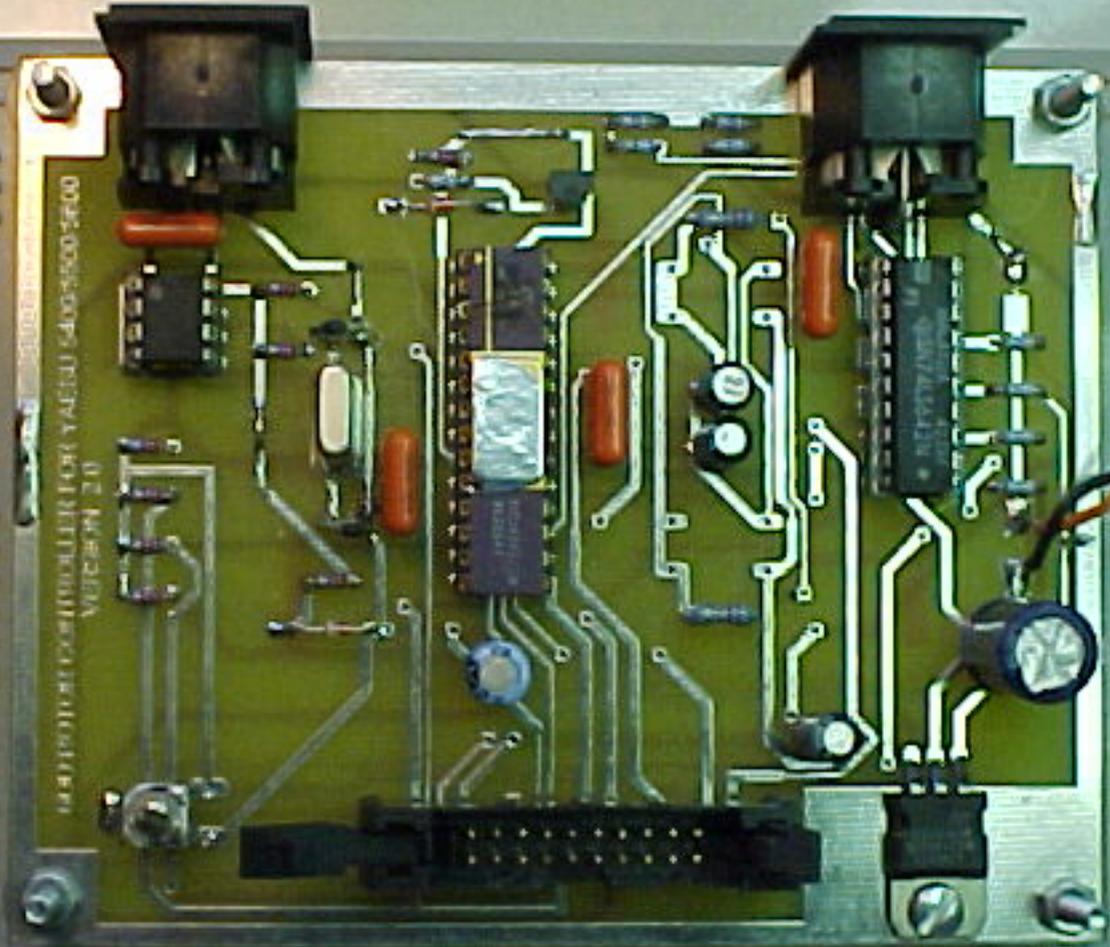
Fernando Mederos - CX6DD August-2001

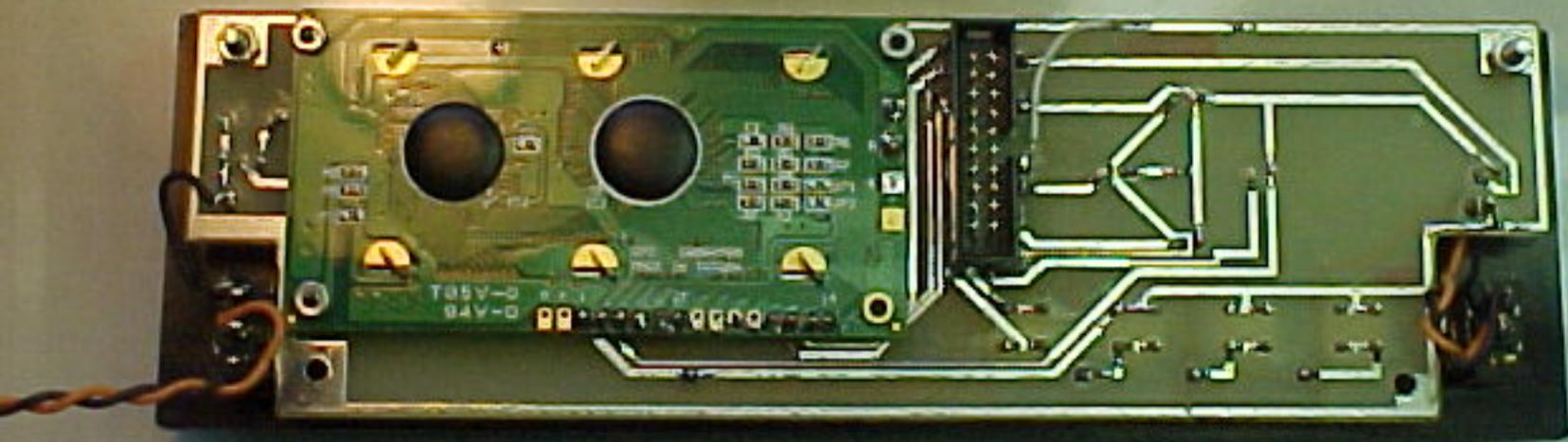






44150011 CONTROL UNIT FOR V4411U 54003500 1600
Version 2.0





Part Number	Qty	Description	Supplier
111375	1	M24C01 serial eeprom	Farnell
790060	1	Pic14000-04	Farnell
290415	1	Socket DIN pcb 8pin	Farnell
290373	1	Socket DIN pcb 5pin 60deg	Farnell
151145	4	ITT push button DT6	Farnell
657511	1	Xtal 3.000mhz	RS comp
	2	20 pin ribbon sockets	Various
	2	20 pin ribbon plugs	Various
	1	Sn74ls642	Various
	1	16x2 LCD module to suit Front pcb	Various

This parts list is not comprehensive and only lists the more difficult to obtain or pcb critical parts.

I have used Farnell part numbers as an indicator only ,as parts may be sourced from your local supplier, but specs if required are in the Farnell catalogue

Notes

- 1- Connections between the 8pin DIN socket and the Yaesu control box are pin to pin, ie pin1 on controller is connected to 1 on the Yaesu control box etc.
- 2- Connections between the 5pin DIN socket and the comms port on the PC are DB9 pin3 connected to DIN pin 4&5, DB9 pin5 connected to DIN pin 2.
- 3- Max voltage from AZ/EL pots on Yaesu control should be adjusted to between 4.8 and 5.0v.
- 4- Configuration bits when programming the Pic14000 are....OSC = HS, WDT= OFF, PWRT= ON, CODE PROT=OFF

Dish Alignment using Wxtrack

Note: This procedure is intended to be used in conjunction with the Calibration Procedure found on page 10 of this document.

- 1 Turn dish manually (using Yaesu control box) fully ccw to mechanical stop.
- 2 Turn dish manually 2 or 3 degrees cw, set az zero=0.0 on controller.
- 3 Mark both sections (stationary and moving) of the azimuth rotator, with a vertical felt pen line.
- 4 Turn dish manually cw until felt pen marks line up again, set az scale=360.0
- 5 Rotate dish manually (elevation) to mechanical stop on “down” position.
- 6 Rotate dish manually “up” 1 or 2 degrees, check with straight edge and level indicator across face of dish to ensure horizontal, mechanically adjust if necessary.
- 7 Set el zero=0.0 on controller.
- 8 Rotate dish through 180 degrees towards “up”, check with straight edge and level and adjust to “horizontal pointing” using manual controls on Yaesu control box.
- 9 Set el =180.0 on controller.
- 10 Wait for a fine day, using “point at” function in Wxtrack, select “sun” and allow dish to point at where sun “should” be. Mechanically adjust dish to point so that the shadow of the feed is in the centre of the dish.
- 11 Repeat the above procedure with the dish flipped , by changing the azimuth stop setting (this should normally be set to north stop), and checking the shadow of the feed again. If there is some difference, average the error using the antenna offset boxes.