WD7S PRODUCTIONS
TU-6B TUNED INPUT BOARD
ASSEMBLY NOTES

Start by using the unpopulated board as a template to mark the mounting holes on the amplifier or a piece of cardboard for later use as a template. In order to keep the actual matching network values close as possible to the ones given in the charts; the board must be mounted as close to the cathode connection as possible. Normally this is not a problem as most homebrew designs have extra room in the cathode compartment where mounting to the underside of the compartment satisfies the proximity requirement. The relays require 5 VDC for proper operation. Since each band selection represents a constant current load, the board can be supplied with any voltage below 30 VDC using a 1-watt series-dropping resistor sized to provide a 180ma current flow.

The silver alloy contacts in the relays require a minimum current flow of 10ma for reliable operation. This is accomplished by supplying a RF de-coupled voltage through the relays to ground. The supplied schematic shows typical connections for this. Be sure to use at least 1mh or larger chokes for this.

It is very important to know exactly how you plan to operate your amplifier in order to arrive at the correct input impedance. The data sheet for the tube you plan to use is useful for this if your expected operating parameters match those given in the sheet. For those of you using the larger tubes and operating them well below their typical values, you will have to calculate the input impedance, as the data sheets will be of little use. The TAP program from KD9JQ is useful for this purpose or the formulas can be found in the twenty-third edition of the Bill Orr Handbook. If you have no idea of your load impedance set up 14MHZ first and get it working. Use a non-inductive resistor from cathode to ground (power off) with a SWR analyzer. Try different values to find the value of load impedance that matches best the one network you have working. Use the appropriate chart for the other bands.

The value of the coupling capacitor, (C21), is **VERY** critical to proper operation on the lower bands. If you substitute with a different value, you will have to adjust the PI network values for the low bands. If the PC board is mounted in the cathode compartment, use the coupling capacitor to connect directly to the cathode if possible. This is the preferred mounting method and will reduce lead inductance while reducing drive requirements on the higher bands. If the board is mounted outside the cathode compartment, it must be connected to the tube with coaxial cable matching the characteristic impedance of the tube's input. The shorter this distance, the easier it will be to obtain a good match. This type of mounting may require some fine-tuning on the cathode side capacitor of the PI networks.

Refer to the component data charts for winding information corresponding to the input impedance for your particular tube and operating parameters. The capacitors that are

marked with an asterisk need to have the tube's input capacitance as well as any stray capacitance subtracted from their value. This is very important on the higher bands but less critical on the lower bands. Try to pick a value as close as possible to the adjusted chart value for the higher bands. After winding the toroids and cleaning the tails, mount them to the board using a piece of cardboard to space the coils above the surface of the PC board. Remember that one pass through the toroid counts as one turn, not one revolution. Remove the spacer after soldering and stabilize the toroids with a spot of adhesive, (hot glue). Finish populating the board paying close attention to the data sheet values and silk-screen layout.

After mounting the board, testing is accomplished by connecting a non-inductive resistor matching the value of your calculated input impedance from cathode to ground. After connecting an antenna analyzer to the amplifier's input, use a bench supply to key the input transfer relay and the relay pair on the input board for the band under test. With the tube in it's socket (all operating voltages removed) adjust the toroids by compressing or expanding their turns for the lowest SWR for the band selected as necessary. The target SWR value does not have to be 1:1. Most transceivers will still deliver full power at an SWR of 1.5:1 All bands should have a SWR of 1.6:1 or less.

TROUBLESHOOTING

If you have a high SWR only on the higher bands during testing, you have probably used the wrong value of tube input capacitance or miss-calculated the strays to the cathode. Once the amplifier is operational at the desired output, check the SWR for each band. If the best SWR for a particular band is at the lower edge of the band, the actual load resistance is probably lower than your calculated value. If the best SWR is at the high end of the band, the actual load impedance is probably above your calculated value. Not using the correct load impedance will normally affect all the bands. The networks will normally provide an acceptable match for impedances of plus or minus 10-20% of the design impedance. The WARC bands normally will be affected the most as they are operating on the lower edge of other band selections. There is room on the underside of the board for adding padder capacitors should the need arise.

SPECIFICATIONS

Relay voltage, 5vdc@180ma each pair
Power rating, *200 watts SSB or *100 watts CW
Size, 3.25"W X 4.25"L X 1.0"H

*Assumes board mounted in cooling airflow

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TU-6B TUNED INPUT BOARD

COMPONENT DATA FOR
50 OHM IMPEDANCE Q=2

29-24 MHZ	C1= * 100pf	L1= 7T #20 T-50-6	C5= 100pf
21-18 MHZ	C2= * 150pf	L2= 8T #20 T-50-6	C6= 150pf
14-10 MHZ	C3= * 220pf	L3= 11T #20 T-50-6	C7= 220pf
7 MHZ	C4= * 420pf	L4= 13T #20 T-68-2	C8= 470pf
3.8 MHZ	C9= * 750pf	L5= 17T #22 T-68-2	C11= 820pf
1.8 MHZ	C10= * 1300pf	L6= 26T #22 T-68-2	C12= 1600pf

COMPONENT DATA FOR
25 OHM IMPEDANCE Q=2

29-24 MHZ	C1= *140pf	L1= 6T #20 T-50-6	C5= 150pf
21-18 MHZ	C2= *200pf	L2= 7T #20 T-50-6	C6= 200pf
14-10 MHZ	C3= *280pf	L3= 8T #20 T-50-6	C7= 300pf
7 MHZ	C4= *520pf	L4= 10T #20 T-68-2	C8= 620pf
3.8 MHZ	C9= *850pf	L5= 14T #22 T-68-2	C11= 1100pf
1.8 MHZ	C10= *1200pf	L6= 21T #22 T-68-2	C12= 2200pf

COMPONENT DATA FOR
100 OHM INPUT IMPEDANCE Q=2

29-24 MHZ	C1= *75pf	L1= 9T #20 T-50-6	C5= 68pf
21-18 MHZ	C2= *110pf	L2= 10T #20 T-50-6	C6= 100pf
14-10 MHZ	C3= *150pf	L3= 13T #20 T-50-6	C7= 150pf
7 MHZ	C4= *280pf	L4= 15T #20 T-68-2	C8= 270pf
3.8 MHZ	C9= *510pf	L5= 21T #22 T-68-2	C11= 510pf
1.8 MHZ	C10= *1000pf	L6= 30T #22 T-68-2	C12= 1100pf

COMPONENT DATA FOR
75 OHM INPUT IMPEDANCE Q=2

29-24 MHZ	C1= *82pf	L1= 8T #20 T-50-6	C5= 82pf
21-18 MHZ	C2= *120pf	L2= 9T #20 T-50-6	C6= 120pf
14-10 MHZ	C3= *180pf	L3= 12T #20 T-50-6	C7= 180pf
7 MHZ	C4= *350pf	L4= 14T #20 T-68-2	C8= 360pf
3.8 MHZ	C9= *640pf	L5= 19T #22 T-68-2	C11= 680pf
1.8 MHZ	C10= *1200pf	L6= 28T #22 T-68-2	C12= 1300pf

PARTS LIST

C1-C8, CDE-C15 MICA, SEE CHART
C9-C12, CDE-CD19 MICA, SEE CHART
C13-C18, .1mfd 50 VOLT DISK CERAMIC, SUPPLIED
C19, .01mfd 100 VOLT DISK CERAMIC, SUPPLIED
C21, .01mfd 1000 VOLT DISK CERAMIC, SUPPLIED
D1-D6, 1N914, SUPPLIED
RY1-RY12, P&B T77 10A RELAY, SUPPLIED
R1, 500 OHM, ¼ WATT RESISTOR, SUPPLIED
L1-L6, AMIDON CORES, SEE CHART, CORES SUPPLIED
L7, L8, 1MH CHOKE, SUPPLIED
T-50-6 IS YELLOW
T-68-2 IS RED

CONTACT INFORMATION

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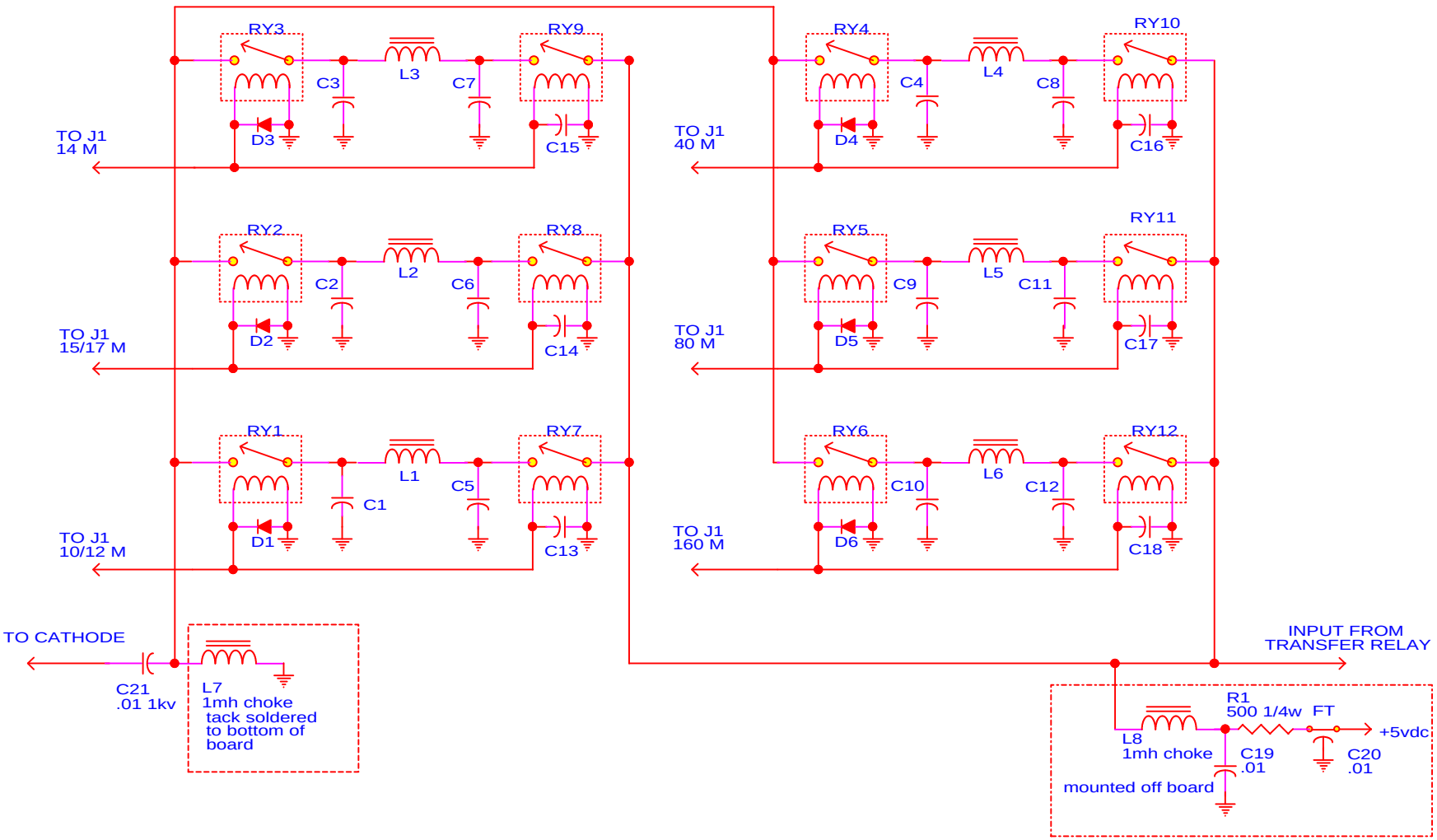
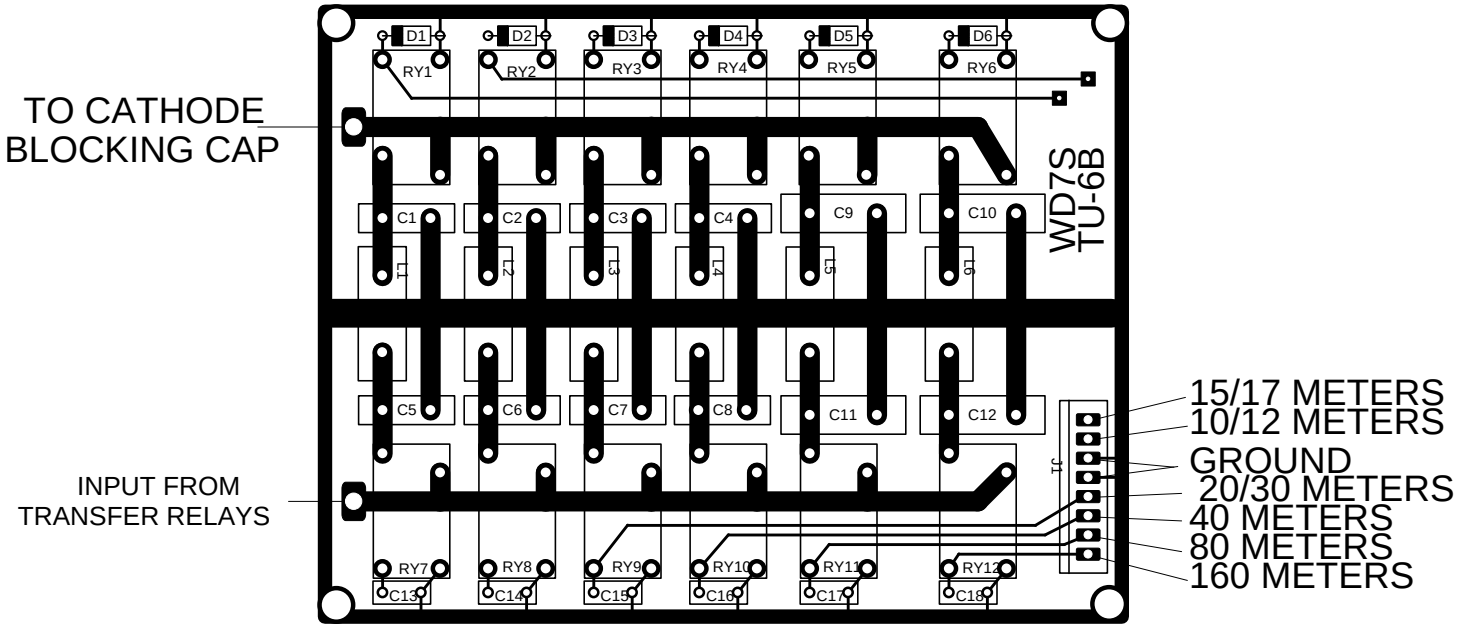


WD7S PRODUCTIONS

Title: INPUT 6B REV-1.PIC	160-10 METER TUNED INPUT	
Size A		Rev -1
Date: 12/30/08 Tue		

TOP VIEW


TO CATHODE
BLOCKING CAP
INPUT FROM
TRANSFER RELAYS
D1
D2
D3
D4
D5
D6
RY1
RY2
RY3
RY4
RY5
RY6
C1
C2
C3
C4
C9
C10
L1
L2
L3
L4
L5
L6
WD7S
TU-6B
C5
C6
C7
C8
C11
C12
J1
RY7
RY8
RY9
RY10
RY11
RY12
C13
C14
C15
C16
C17
C18
15/17 METERS
10/12 METERS
GROUND
20/30 METERS
40 METERS
80 METERS
160 METERS