

Cascade Parts Cross Reference List

Reference	Part	Schematic Title		
C1	.1uF -	PROD. DET.	C49	.1uF - PA
C2	47pF - NP0	PROD. DET.	C50	.1uF - PA
C3	2.2uF -	PROD. DET.	C51	.1uF - PA
C4	47pF - NP0	PROD. DET.	C52	.1uF - PA
C5	.047uF -	PROD. DET.	C53	.047uF - PA
C6	220pF - NP0	PROD. DET.	C55	.1uF - PA
C7	.047uF -	PROD. DET.	C56	.1uF - PA
C8	.047uF -	PROD. DET.	C57	.1uF - PA
C9	2.2uF -	PROD. DET.	C58	.1uF - PA
C10	1000pF -	PROD. DET.	C59	.1uF - PA
C11	2.2uF -	PROD. DET.	C60	.1uF - PA
C12	2.2uF -	PROD. DET.	C62	.1uF - PA
C13	2.2uF -	PROD. DET.	C63	.047uF - PA
C14	22uF -	PROD. DET.	C64	.001uF - PA
C15	22uF -	PROD. DET.	C65	22uF - PA
C16	.1uF -	VFO, BFO	C66	22uF - PA
C17	2-24pF - AIR	VFO, BFO	C67	2.2uF - PA
C18	5-40pF - W8:1	VFO, BFO	C68	.047uF - IF
C19	2-20pF - TRIM	VFO, BFO	C69	.047uF - IF
C20	5pF - NP0	VFO, BFO	C70	.047uF - IF
C21	82pF - NP0	VFO, BFO	C71	.047uF - IF
C22	270pF - NP0	VFO, BFO	C72	470pF - C0G IF
C23	47pF - NP0	VFO, BFO	C73	470pF - C0G IF
C24	.1uF -	VFO, BFO	C74	.1uF - IF
C25	100pF - NP0	VFO, BFO	C75	.1uF - IF
C26	10pF - NP0	VFO, BFO	C76	5pF - NP0 IF
C27	100uF -	VFO, BFO	C77	150pF - SM IF
C28	Open -	VFO, BFO	C78	47pF - SM IF
C29	470pF - C0G	VFO, BFO	C79	56pF - SM IF
C30	470pF - C0G	VFO, BFO	C80	47pF - SM IF
C31	100uF -	VFO, BFO	C81	150pF - SM IF
C32	2.2uF -	VFO, BFO	C82	100pF - SM IF
C33	2.2uF -	VFO, BFO	C83	100pF - SM IF
C34	2-24pF - AIR	VFO, BFO	C84	.1uF - PROD. DET.
C35	100uF -	AUDIO AMP	C85	.02uF - PROD. DET.
C37	.1uF -	AUDIO AMP	C86	22uF - PROD. DET.
C38	.47uF -	AUDIO AMP	C87	2.2uF - PROD. DET.
C39	100uF -	AUDIO AMP	C88	.1uF - IF
C40	2.2uF -	AUDIO AMP	C89	Short - VFO, BFO
C41	.22uF -	AUDIO AMP	C90	8-50pF - TRIM VFO, BFO
C42	.1uF -	AUDIO AMP	C91	.047uF - VFO, BFO
C43	.1uF -	AUDIO AMP	C92	.1uF - IF
C44	.47uF -	AUDIO AMP	C94	.47uF - AUDIO AMP
C46	.01uF -	AUDIO AMP	C95	.1uF - AUDIO AMP
C47	2.2uF -	AUDIO AMP	C96	1uF - AUDIO AMP
			C97	.002uF - AUDIO AMP
			C99	10uF - AUDIO AMP

C100	.1uF -	PA	R13	1K -	PROD. DET.
D1	1N914 -	VFO, BFO	R14	1M -	VFO, BFO
D2	1N914 -	VFO, BFO	R15	1M -	VFO, BFO
D3	1N5819 -	VFO, BFO	R16	100 -	VFO, BFO
D5	1N914 -	AUDIO AMP	R17	47 -	VFO, BFO
D6	1N914 -	AUDIO AMP	R18	4.7K -	VFO, BFO
D7	1N914 -	AUDIO AMP	R19	4.7K -	VFO, BFO
D8	1N914 -	AUDIO AMP	R20	47K -	VFO, BFO
D10	1N914 -	AUDIO AMP	R21	4.7K -	VFO, BFO
D12	1N4001 -	PA	R22	2.2K -	VFO, BFO
J1	2.5mm Mono Jack -	PROD. DET.	R24	4.7M -	AUDIO AMP
J2	JACK DC 2.1MM -	VFO, BFO	R25	2.2 -	AUDIO AMP
J3	3.5mm Stereo Jack -	AUDIO AMP	R26	2.2K -	AUDIO AMP
J5	BNC JACK -	PA	R27	1K -	AUDIO AMP
L1	5.1uH - T50-7 34T	VFO, BFO	R28	200 -	AUDIO AMP
L2	33uH - RFC	VFO, BFO	R31	47 -	PA
L3	15uH -	VFO, BFO	R32	39 -	PA
L4	56uH - RFC	PA	R33	4.7 -	PA
L5	56uH - RFC	PA	R34	560 -	PA
L33	15uH -	VFO, BFO	R35	4.7K -	PA
Q1	2N4416 -	VFO, BFO	R36	1K -	PA
Q2	2N4416 -	VFO, BFO	R38	47 -	PA
Q3	2N3906 -	VFO, BFO	R39	1K -	PA
Q5	2N7000 -	AUDIO AMP	R40	180-150	PA
Q6	2N2222A -	PA	R41	180 -	PA
Q7	2SC2312 -	PA	R42	20 -	PA
Q8	2N3866 -	PA	R43	Short -	PA
Q10	2N4124 -	IF	R44	560 -	PA
Q11	2N7000 -	IF	R45	500 TRIM -	PA
Q12	J310 -	PROD. DET.	R46	390 -	PA
Q13	J310 -	IF	R47	470 -	IF
Q14	J176 -	PROD. DET.	R48	470 -	IF
Q15	2N7000 -	PROD. DET.	R49	1K POT -	IF
Q16	2N7000 -	AUDIO AMP	R50	1.8K -	IF
Q17	2N5484 -	AUDIO AMP	R51	390 -	IF
R1	1M -	PROD. DET.	R52	1.5K -	IF
R2	10K -	PROD. DET.	R55	4.7M -	AUDIO AMP
R3	470 -	PROD. DET.	R56	47K -	AUDIO AMP
R4	1K -	PROD. DET.	R57	2.2K -	VFO, BFO
R5	47K -	PROD. DET.	R58	Open -	VFO, BFO
R6	47K -	PROD. DET.	R59	10K -	VFO, BFO
R7	1K -	PROD. DET.	R60	4.7K -	PROD. DET.
R8	Open -	PROD. DET.	R61	4.7K -	PROD. DET.
R9	470 -	PROD. DET.	R62	2.2K -	PROD. DET.
R10	470 -	PROD. DET.	R63	4.7K - 1K	PROD. DET.
R11	10K -	PROD. DET.	R64	10K TRIM POT -	AUDIO AMP
R12	47 -	PROD. DET.	R65	47K -	AUDIO AMP

R67	1.1 -	AUDIO AMP	T5	27uH - FT37-43 8T	PA
R68	47K -	AUDIO AMP	T6	27uH - FT37-43 8T	PA
R69	47K -	AUDIO AMP	U1	NE602AN -	PROD. DET.
R70	4.7K -	AUDIO AMP	U2	NE602AN -	PROD. DET.
R71	22K -	AUDIO AMP	U3	SL6270C -	PROD. DET.
R72	1K -	AUDIO AMP	U4	UA78L08C -	VFO, BFO
R73	10K -	AUDIO AMP	U5	LM383 -	AUDIO AMP
R75	220 -	VFO, BFO	U6	NE602AN -	IF
R80	1 -	PA	U7	NE602AN -	IF
R81	1 -	PA	U8A	NE5532 -	AUDIO AMP
R99	20 -	PA	Y1	9MHz -	VFO, BFO
S2	SPST PCM - ON/OFF	VFO, BFO	Y2	9MHz - MATCH 100Hz	IF
T1	27uH - FT37-43 8T	PA	Y3	9MHz - MATCH 100Hz	IF
T2	Sec 5T, Pri 2T B43-202	PA	Y4	9MHz - MATCH 100Hz	IF
T3	27uH - FT37-43 8T	PA	Y5	9MHz - MATCH 100Hz	IF
T4	27uH - FT37-43 8T	PA	Y6	9MHz - MATCH 100Hz	IF

Cascade Specifications and Goals

Size: 2.6"(H) by 6.3"(W) by 5.3"(D)

DC Power requirements:

Receive: 60mA with 12 to 13.8V

Transmit: 2.0A on voice peaks, 12 to 13.8V

Frequency coverage:

75M SSB: 3.750 to 3.950 MHz (Can be set to any 200 kHz range on 75-80 Meters)

20M SSB: 14.150 to 14.350 MHz

Band-edge adjustment range: +/- 20kHz

Transmitter:

SSB only

Uses 2 Meter Speaker Mike "Kenwood Standard" or Radio Shack #19-310(2.5mm mono mike plug, 3.5mm speaker)

75M LSB Power: 8 Watts pep

20M USB Power: 5 Watts pep

Speech compression

2 Tone IMD distortion products: -35dB

Spurious emissions: - 45dB or better

Receiver:

NE602-Based Super-het, 9MHz IF

5MHz LC VFO, 200kHz tuning range with 8:1 vernier drive built in.

5 Pole crystal filter, 2.7kHz 3dB bandwidth

Audio output power > 1Watt into 8ohms

Audio-derived AGC

RF gain control

Building the Cascade; Do's and Don'ts!!

1. Use a low-wattage, fine-tip iron, heat joint 1/2 second then apply small amount of solder.
2. The resistors are installed standing up, using 0.1" spacing. This was done to conserve board space. Since it will be hard to read the resistor color codes after the part is soldered in, CHECK! each resistor with an Ohm meter before installing it.
3. You must use solder-wick to remove parts. It is the only way to avoid lifting traces due to excess heating.
4. Double-check polarity before installing electrolytic and tantalum caps. With Electrolytic caps, the long lead is the positive side, it goes in the "square" PCB pad. With Tantalum caps, the posi-

tive lead is marked with a + sign on the body.

5. T1, T3, T4, T5 & T6 are all 8-Turn bifilar transformers on FT37-43 cores. Twist the two #26 wires (one brown, one green) at 8 twists per inch (use drill if you like). The brown wire goes in the "round pads" the green wire goes in the "square pads"

6. L1, the VFO inductor, should be annealed after winding. Place in boiling water for a few minutes remove and let dry, then coat with Q-dope to hold turns in place. Let dry overnight. L1 is ready to mount on PCB. Don't forget the black insulating washer for L7, it will prevent any shorts to the ground plane.

Construction:

There are several ways to assemble the kit.... One approach has you install all the resistors, then all the capacitors and so on. The testing starts after the board is populated. There are serious problems with this method, as you find out if you pursue it. The main one is that if you have problems it is hard to isolate.

NorCal prefers the build-a-section, test-a-section approach. This test as you go method helps isolate where the problem is... When seeking help you'll have the problem localized to one section. Getting the receiver working first, then adding the transmitter should help simplify trouble shooting when problems crop up..

Test Equipment Needed:

1. 12V power supply. 1.5A peak current demand
2. A speaker mike wired for Cascade: 2 Meter "Kenwood" standard or RS #19-310
3. Voltmeter / Ammeter, 1mA resolution
4. General-coverage station receiver
5. RF probe for DVM to measure VFO, BFO and RF levels, or use 50MHz scope
6. HF frequency counter, or use station receiver
7. 10-watt dummy load, 75-meter antenna

The Cascade will be built and tested in ten sections. The first 5 sections get the receiver operating, sections 6 to 9 complete the transmitter portion, and section 10 deals with the final assembly into the case.

Because of the building-block style of instruc-

tions, we have printed the schematic broken-down into several sections. That way you will only have to deal with the section that you are working on. If you want to get the "whole picture" you will need to refer to the blocked text on the schematic, which refers to the sheet that the connection goes to. Another word of caution here: make absolutely sure that you have the right part before you solder. It is not impossible to unsolder a double-sided, plated-through board, but it is not fun as you will find out if you have to do it. If you have inventoried your parts, read the complete manual and are ready, it is time to start with the fun part of building the Cascade. Good luck!!

SECTION 1:

DC POWER, 8V REGULATOR

Inspect the board to make sure that all connectors mount flush to the front and rear panels. If you need to file the board, now is the time to do it. Put the connectors on the board, but don't solder yet, and visually inspect to make sure that the front and back panels will fit flush to the edge of the board. This is extremely important for the final appearance of your rig.

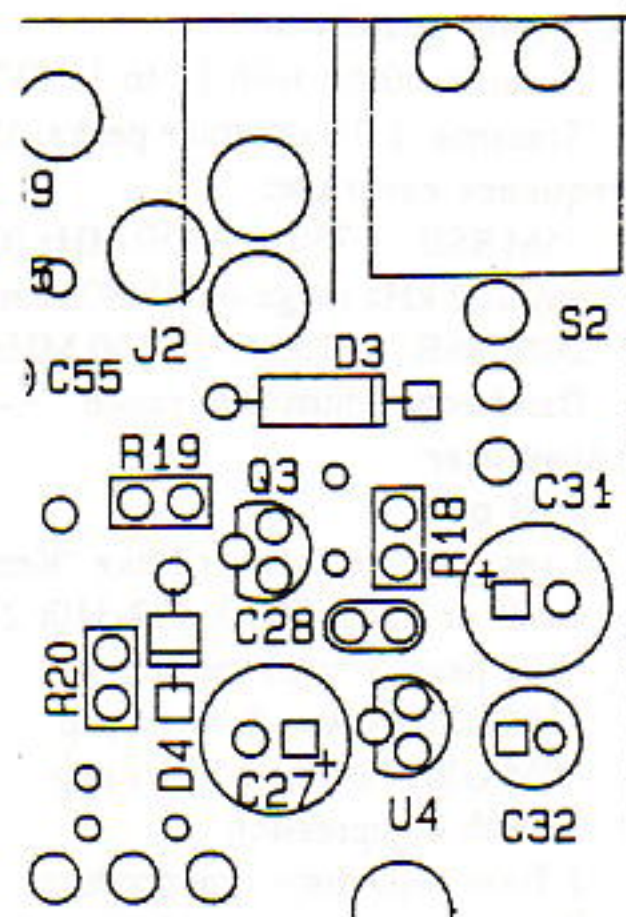
When you are satisfied that the controls will fit the board correctly, mount the following controls and jacks flush to the board edge: C18, J1, J2, J3, J4, J5, R27, R49, S2. Do not install the front and rear panels at this stage, these will be used in step 10. *R19*

Don't wire in RG-174 coax to the RF gain pot yet. We'll add a temporary wire jumper to bypass the RF gain control later.

Install 8V regulator U4 and C27, C31, C32, D3, D4 (100 ohm resistor), Q3, R18, R20. Note that C28 is not used and will be left empty. Also, mount a 100 ohm resistor where D4 is indicated. Please refer to the diagram for parts placement.

Mount two board-support brackets, one next to J2 right above where it says R39. Make sure that the bracket is flush with the edge of the board. Mount the other bracket next to J1. Use 6-32 hardware to secure the bracket to the PCB.

Be careful when you solder the BNC jack. It is quite susceptible to heat. It has a tendency to melt if you apply too much heat.



We are now ready for our first test. Plug in power to the power jack and turn S2 on. Monitor the input current. If it is over 20 mA shut off the power quickly as you have a short. Plug-in the 2-meter speaker Microphone "Kenwood Standard", push the PTT button and confirm the 8TX line goes to 8V DC. Measure 8TX on the collector of Q3. Do not go on until you have confirmed this check.

SECTION 2:

BFO

Install C19, C23, C24, C26, C30, C33, C90, C91, D2, D10, L2, L3, L33, Q1, R15, R17, R22, R59, Y1. Note that R58 is not used and left open. Refer to the VFO/BFO schematic, the BFO is in the upper left. Refer to BFO placement drawing on the next page for this section. NOTE: Identify trimmer C90 by a blue marking on the adjustment slot, trimmer C19 has no color marking on the