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Roanoke Doppler Printed Circuit Board

After a looong time, we have finally finished the production of a PCB for a version of the Roanoke Doppler for \$18 (non-profit).

This Doppler design was based on the well-known Roanoke Doppler system as described and enhanced in Transmitter Hunting by Curlee and Moell (TAB Books). Minor modifications have been made to provide such things as reduced chip count and and audio amplifier for the internal speaker.

Included in the package are:

Cover letter (similar to this announcement)
Printed Circuit Board (7.5"x5.5", 2 sides, solder masked, silkscreen)
Complete schematic
Component layout sheet
Parts List

The user is assumed to be an experienced builder since complete building instructions are NOT included (i.e. its not a Heathkit). It is STRONGLY recommended that the user purchase the Transmitter Hunting book referenced above. It includes a description of the device, theory of operation, building methods, a complete description of the antenna array that must be built, checkout and alignment.

The components are, for the most part, readily available from your local electronics supply or surplus store. If you live in an area without these resources, we are working with Minuteman Electronics in the Fremont, CA area to produce a complete components kit for the Doppler system. Stay tuned for details.

The production of this board is thanks to a number of people:

W6PIY - West Valley Amateur Radio Club - kicked off the whole idea
KK6VF - Kevin - PC'd the design and saw it through the process
Leonard Bernal - layout for the board (several times)
N6PFL - Alan - initial checkout and provided pointers
WB6GBE - Doug - Detailed checkout and corrections

If you would like to evaluate the PCB, the documents listed above are available for electronic distribution (for free), or via mail (for a SASE). Electronic documents are a combination of ASCII text and Postscript files.

Finances: No one is making any money on this effort. The cost of the board just barely covers our costs (assuming I sell them all). The cost is \$18/board. If I need to send it via the Post Office, please add \$3 for postage (1st class) and a mailing envelope.

To purchase a board, please contact me using one of the following methods. I prefer a check (made out to me) or (if you insist) COD.

Mail: Greg Bassett
141 Sobrante Court
Fremont, CA 94536

Internet: bassett@merlot.enet.dec.com

DEC Internal: MERLOT::BASSETT
WRO3-3/R15
DTN 521-3474

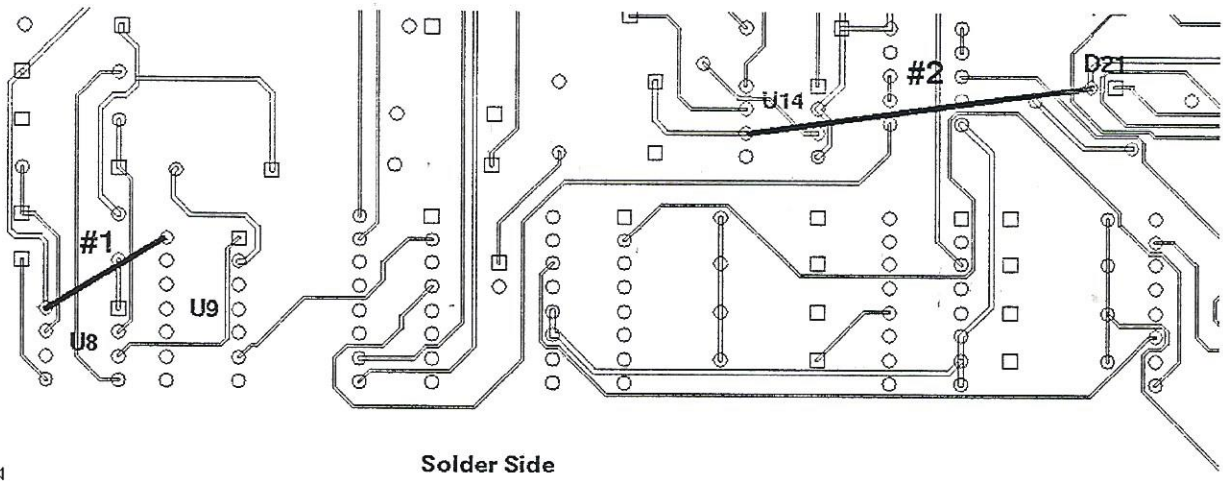
Work Phone: (408) 496-3474

Errata for Roanoke Doppler PCB

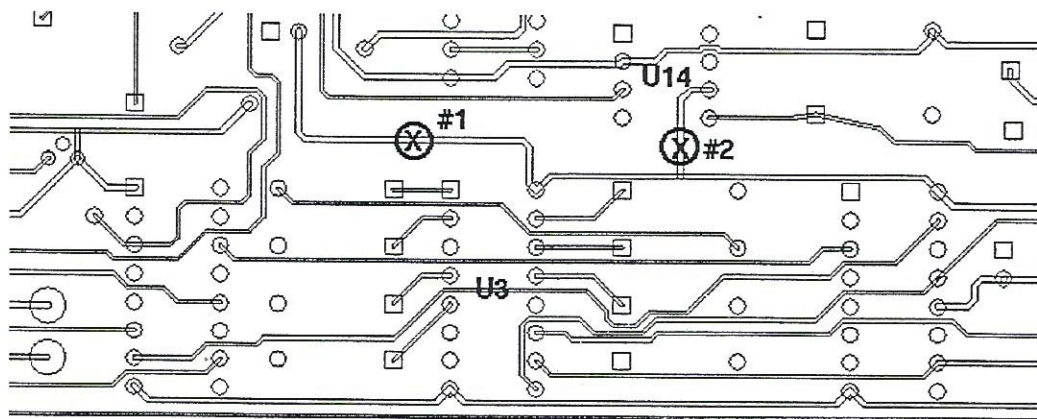
2-November-1992 - KJ6EP

This document will describe corrections to the PCB and documentation for the Roanoke Doppler PCB developed by KK6VF.

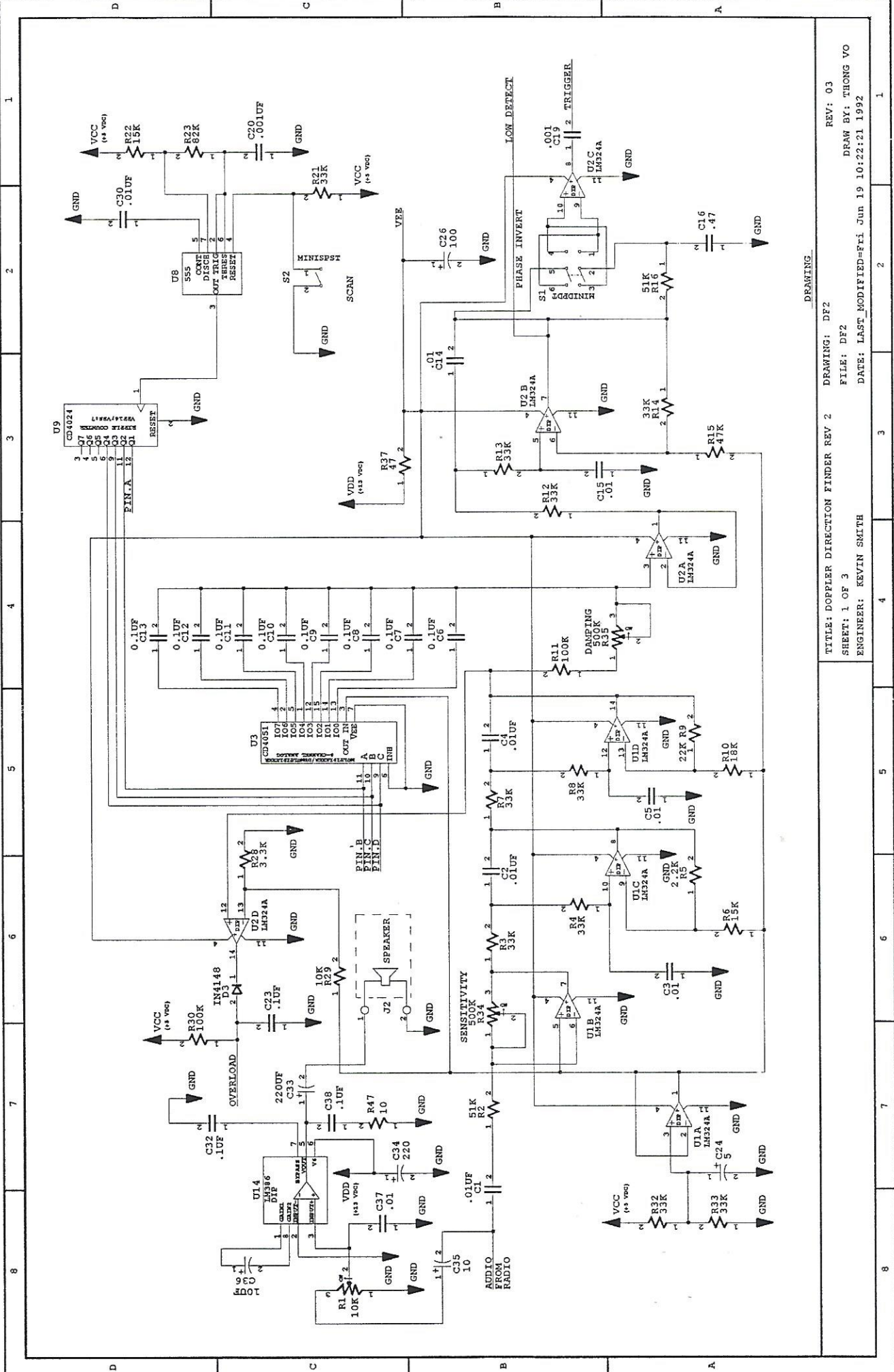
1. In the parts list dated *October 1992*, R1 is improperly defined as a 25 ohm pot. The schematic properly shows R1 as 10K. Please update the parts list to reflect this change.
2. When placing and mounting R1, please check for proper rotation direction for volume control. There are ways that R1 could be mounted that would result in backwards direction for increasing the internal speaker's volume. You may need to reverse pins 1 & 3.
3. The square hole for D2 is not properly marked. The cathode of the diode should be placed in the round hole.
4. The power supply for the CMOS chips was improperly changed to 12v. Perform the following 2 steps to change the voltage back to 5v.
 - a. Cut the trace on the component side that runs between D21 pin 2 (round) and U3 pin 16. It is shown on the drawing below as "X" #1.
 - b. Insert a jumper on the solder side of the board from U8 pin 8 to U9 pin 14. It is shown on the drawing below as jumper #1.
5. If the internal audio power is too low for your environment, it may be necessary to increase the voltage to the audio amplifier IC. If this is needed, perform the following 2 steps:
 - a. Cut the vertical trace on the component side that runs between U14 pin 6 and the horizontal trace. It is shown on the drawing below as "X" #2.
 - b. Insert a jumper on the solder side of the board from U14 pin 6 to D21 pin 2 (round). It is shown on the drawing below as jumper #2.



Solder Side



Component Side

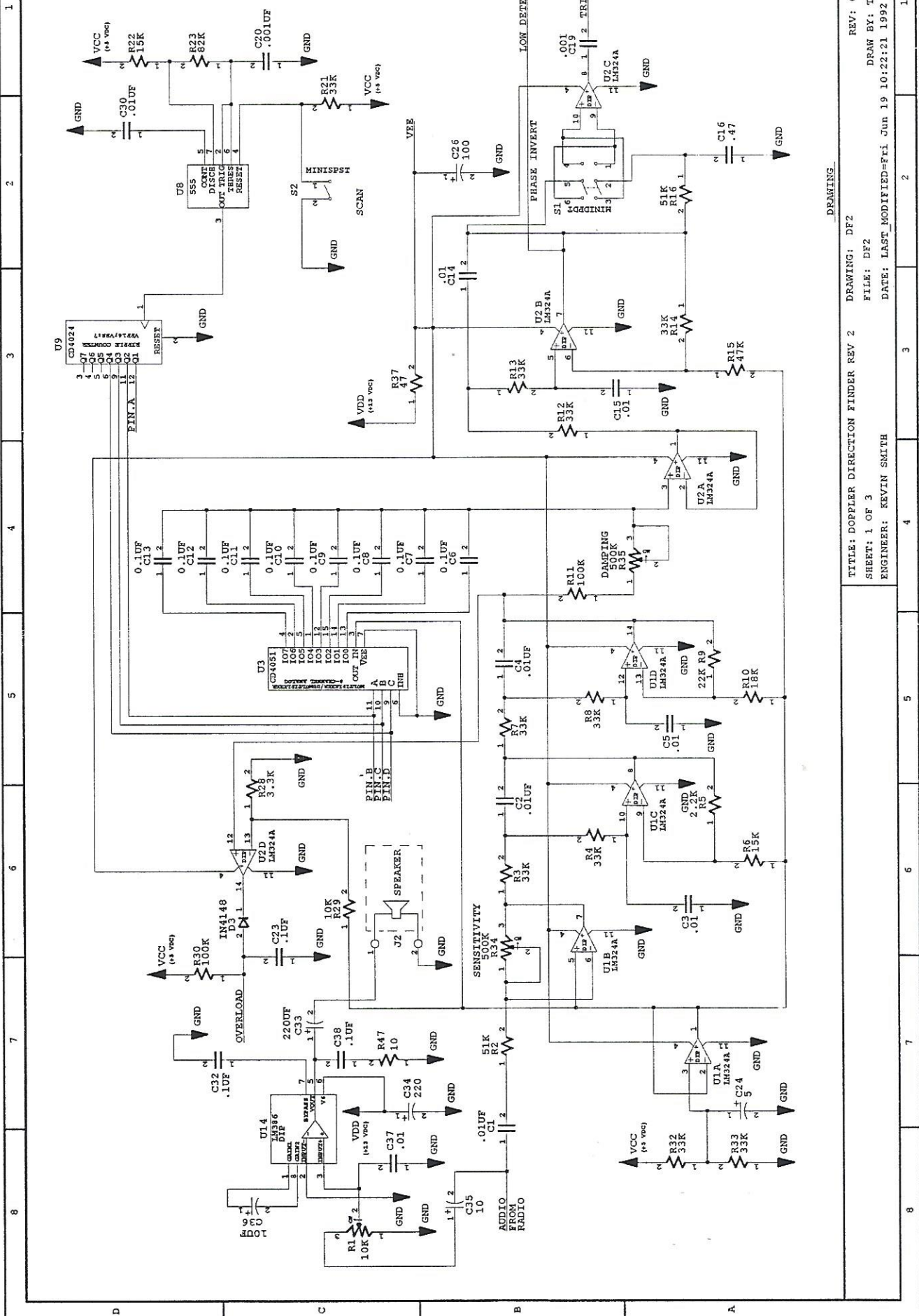


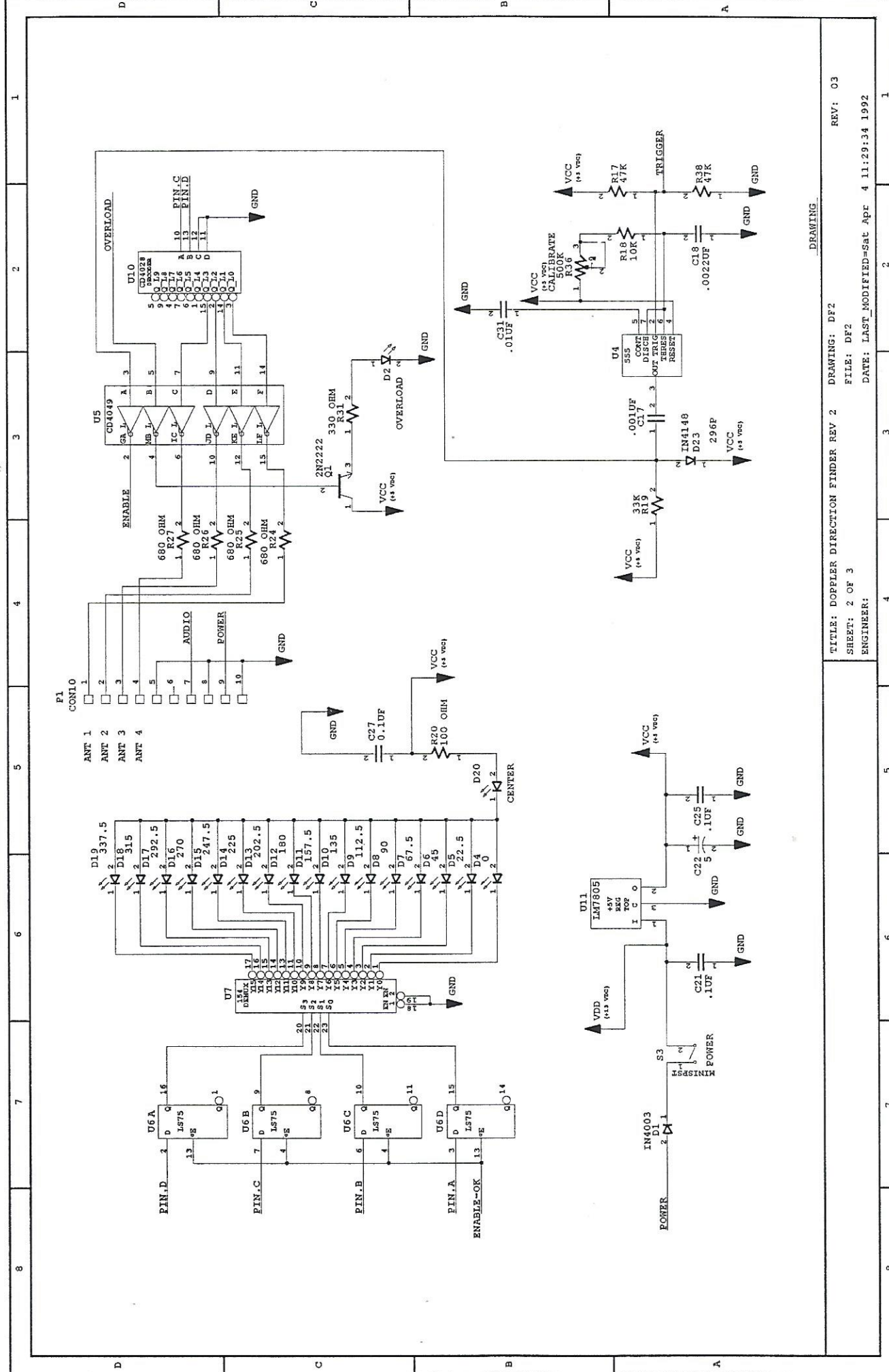
DRAWING

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 SHEET: 1 OF 3 FILE: DF2
 ENGINEER: KEVIN SMITH DATE: LAST_MODIFIED=Fri Jun 19 10:22:21 1992

REV: 03

DRAW BY: THONG VO

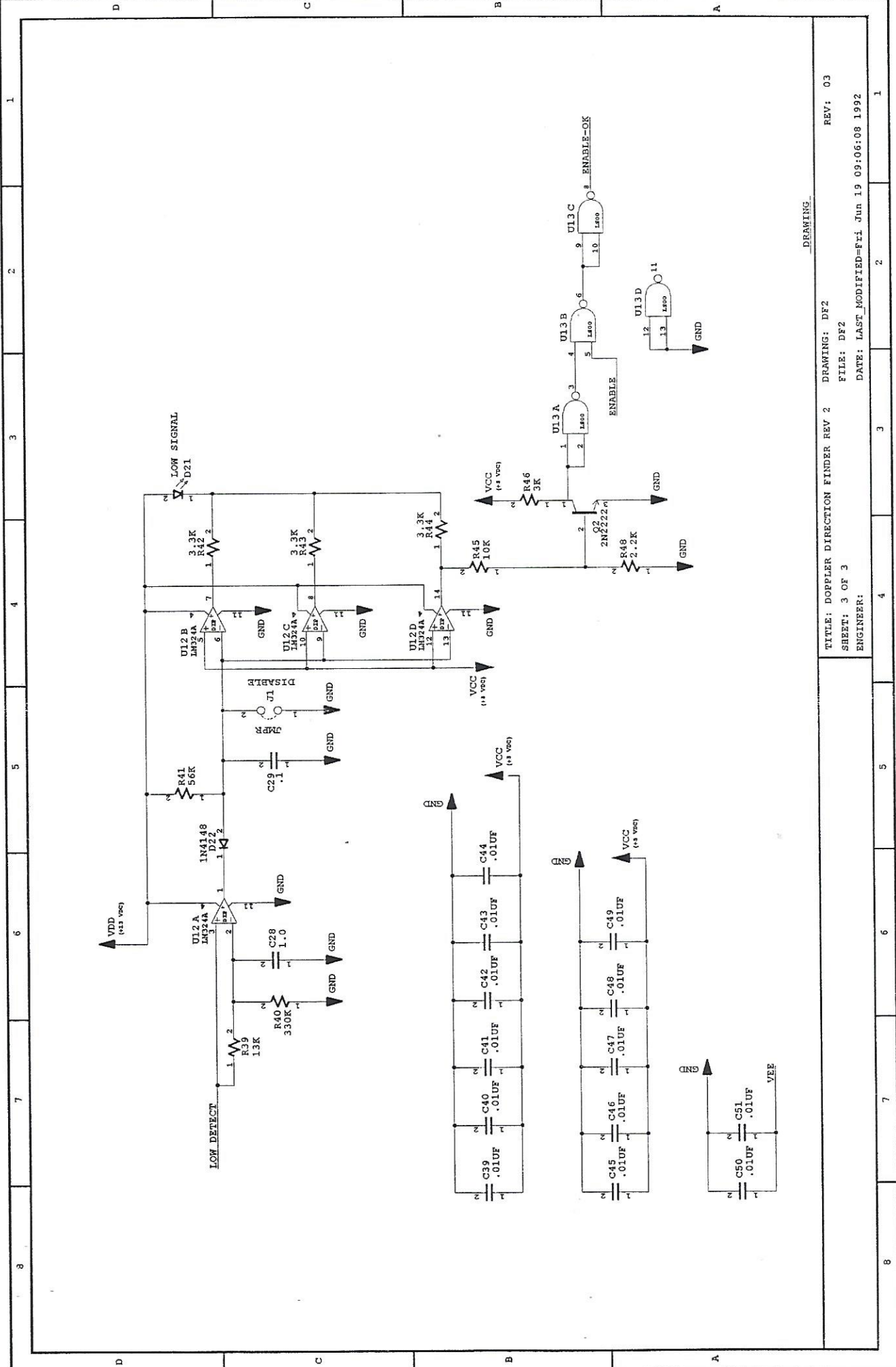




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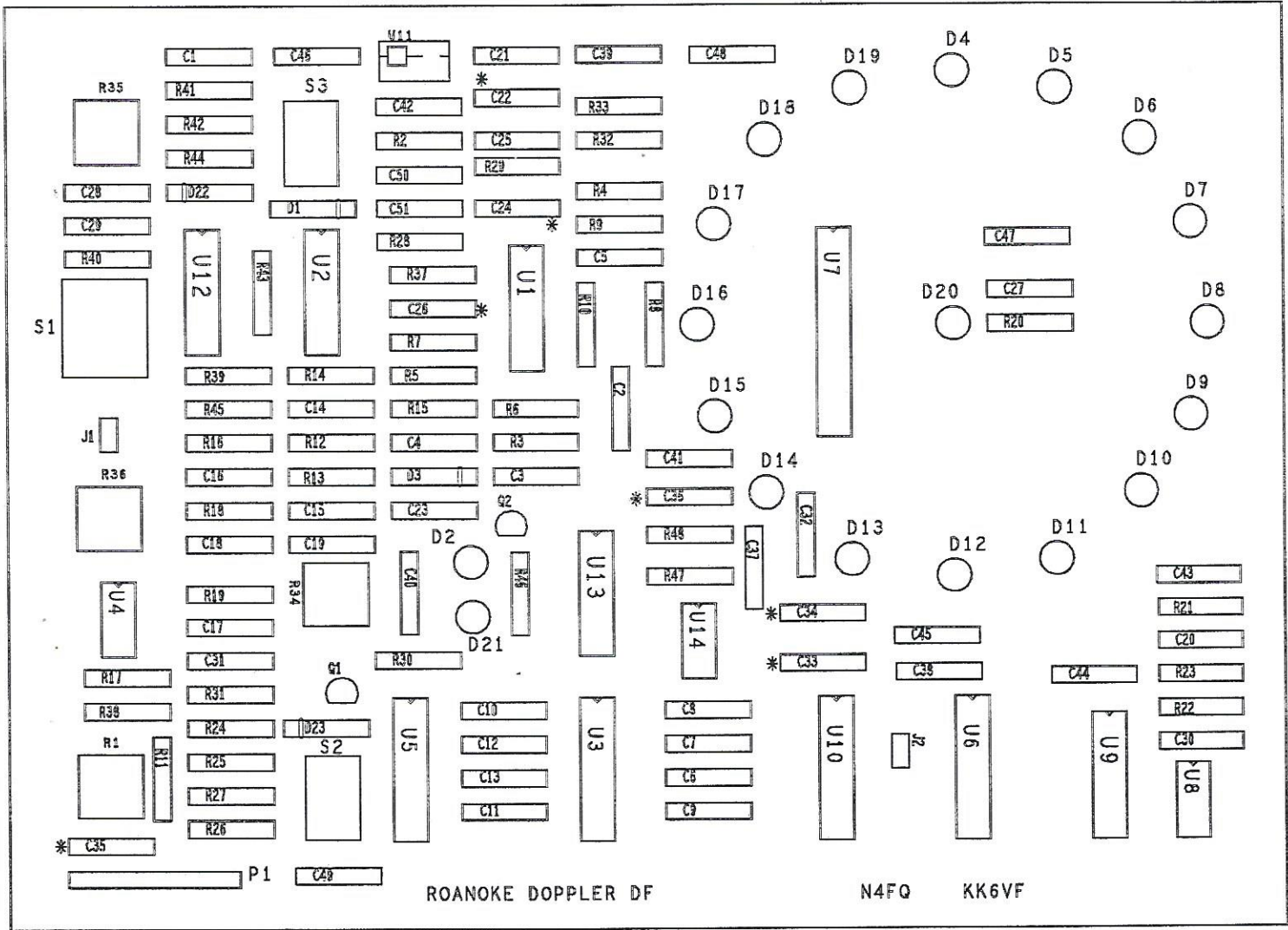
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REV: 03



DRAWING

TITLE: DOPPLER DIRECTION FINDER REV 2 DRAWING: DF2 REV: 03
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This doppler DF unit was designed based on the Transmitter hunting book by Moell and Curlee. That book must be used as reference and to supply the design for the antenna switching system.

This unit is the October 1992 design Revision 0.
This document updated November 1992

This is the parts list for the doppler df unit.

Resistors (in ohms)

10	R47
47	R37
100	R20
330	R31
680	R24, R25, R26, R27
2.2K	R5, R48
3K	R46
3.3K	R28, R42, R43, R44
10K	R18, R29, R45
13K	R39
15K	R6, R22
18K	R10
22K	R9
33K	R3, R4, R7, R8, R12, R13, R14, R19, R21, R32, R33
47K	R15, R17, R38
51k	R2, R16
56K	R41
82K	R23
100K	R11, R30
330K	R40

Pots:

10K	R1
500K	R34, R35, R36

Capacitors (in mfd):

.001	C17, C19, C20
.0022	C18
.01	C1, C2, C3, C4, C5, C14, C15, C30, C31, C37, C39, C40, C41, C42, C43, C44, C45, C46, C47, C48, C49, C50, C51
.1	C6, C7, C8, C9, C10, C11, C12, C13, C21, C23, C25, C27, C29, C32, C38
.47	C16
1	C28 (NON-POLARIZED ELECTROLYTIC - RADIAL LEADS)
4.7	C22, C24 (ELECTROLYTIC - RADIAL LEADS)
10	C35, C36 (ELECTROLYTIC - RADIAL LEADS)
100	C26 (ELECTROLYTIC - RADIAL LEADS)
220	C33, C34 (ELECTROLYTIC - RADIAL LEADS)

Diodes:

1N4003	D1
1N4148	D3, D22, D23

Leds: (15ma max.)

D2, D4, D5, D6, D7, D8, D9, D10, D11, D12
D13, D14, D15, D16, D17, D18, D19, D20, D21

IC's:

LM324 U1, U2, U12
CD4051 U3
555 U4, U8
CD4049 U5
74LS75 U6
74HC154 U7 (Narrow body part - 300 mil spacing - National part)
CD4024 U9
CD4028 U10
LM7805 U11
74LS00 U13
LM386 U14

Transistors:

2N2222 Q1, Q2

Switches:

DPDT S1
SPST S2, S3

Misc:

Box 6x8x2 inches (approx)
Power cord with inline fuse
Audio cord to go between P1 and receiver audio out (earphone jack)
Speaker (8 ohms)

Connectors:

6 PIN P1 pins 1-6 (ANTENNA) pin 6 is not used
2 PIN P1 pins 7-8 (AUDIO)
2 PIN P1 pins 9-10 (POWER)
2 PIN J1 (Shorting jumper to disable Low Detect circuit)
2 PIN J2 (SPEAKER)

Note: Connector P1 can be a single 10 pin connector on .1" centers.

Antenna Parts:

MPN-3401 D1, D2, D3, D4 (PIN Diodes)
6.8uh L1, L2, L3, L4
680pf C1, C2, C3, C4, C5, C6, C7, C8
RG174 Coax - 8 pieces 1/4 wavelenth long times velocity factor of coax.
(13.25" for 146MHz at velocity factor of .66)

Notes:

The square pad on the PCB is pin 1 for the device. This does not apply to Q1 and Q2.

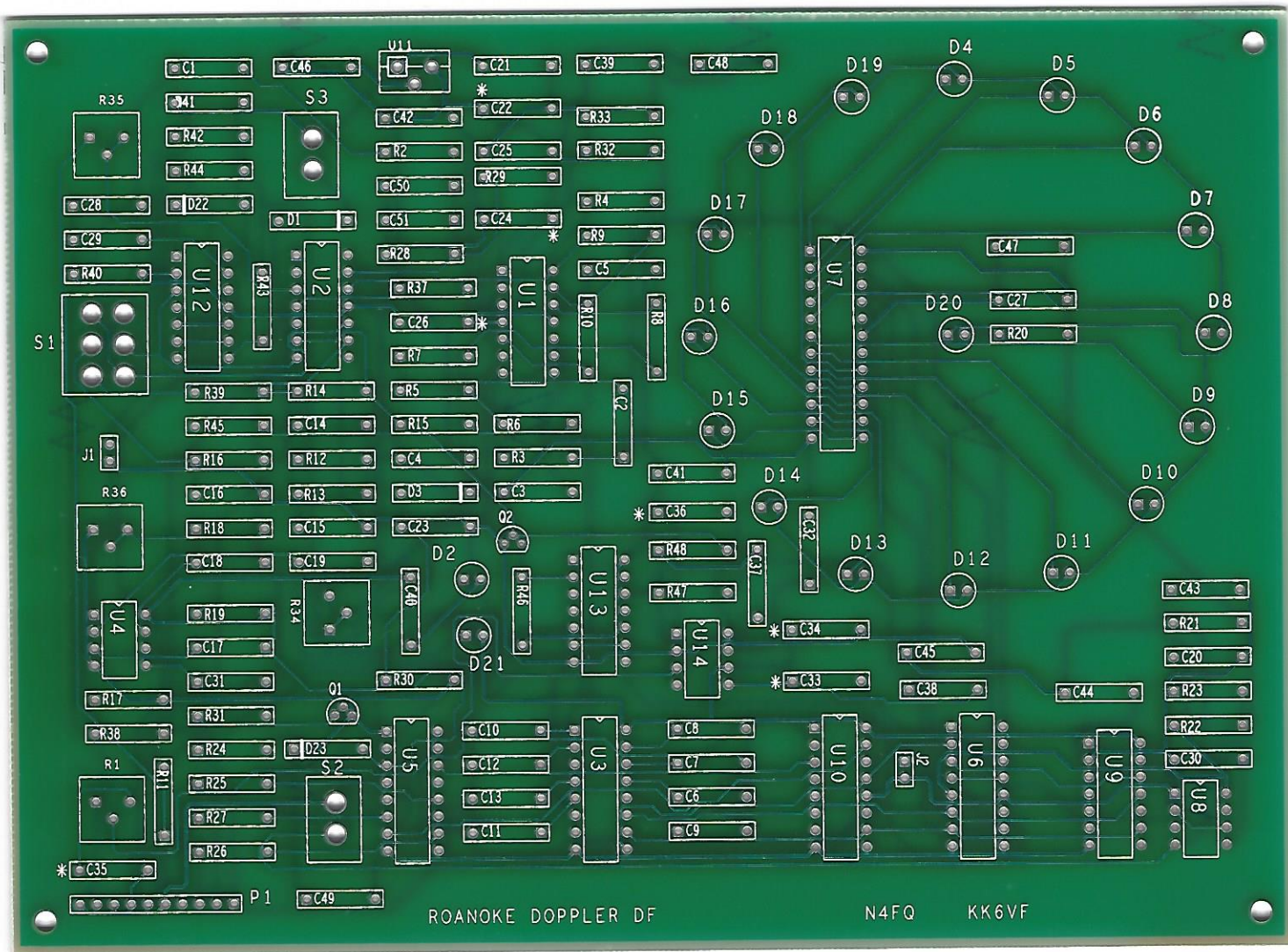
The pinout for U11 (as viewed from the silkscreen side) is 1 2.
3

When installing P1, J1, and J2 connectors, You may want to put them on the solder side of the PCB, depending on your installation.

When the jumper is in on J1, the low detect circuit is disabled and the LOW DETECT LED (D21) will always be off.

The SCAN switch (S2) STOPS the scan when turned ON. You may want to mount this switch upside down so it makes sense on the panel.

The test board (version 1) drew 77ma@12vdc on the test bench without an antenna
3 LED's were lit.



ROANOKE DOPPLER DF

N4FQ KK6VF

