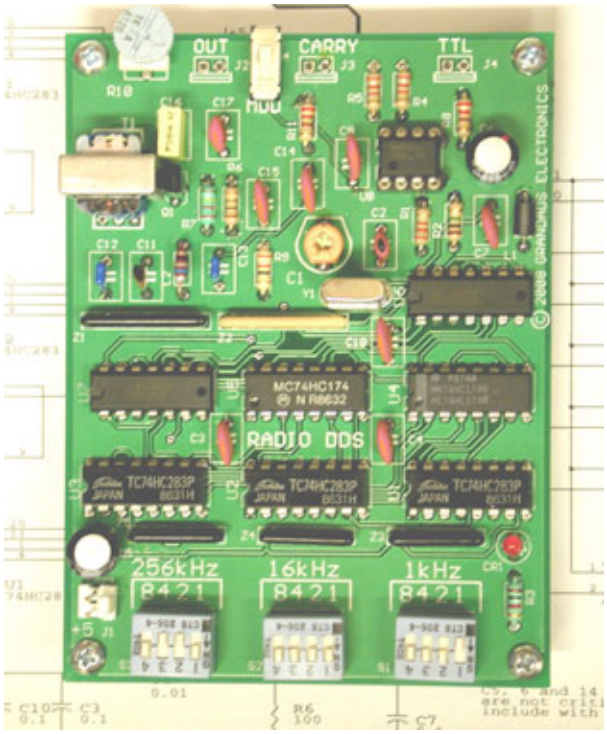
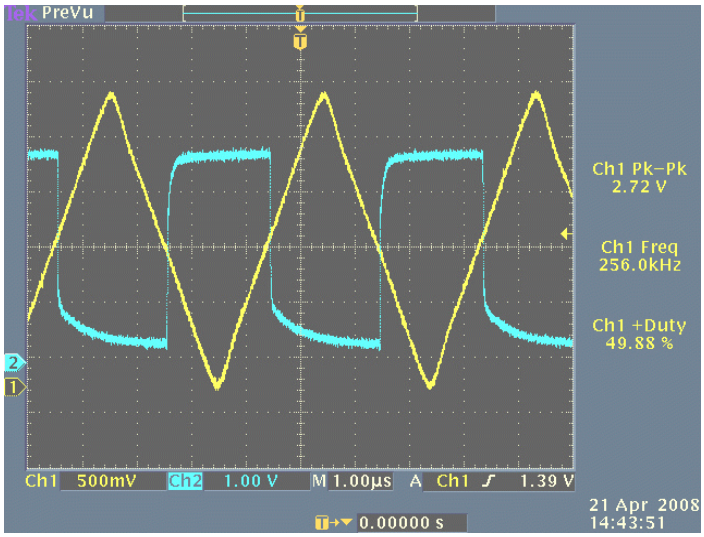
INSTRUCTION MANUAL
Model Radio1





Radio1 (assembled) and 256kHz Output

Assembly Instructions

This kit assumes that the purchaser is familiar with soldering and electronic assembly techniques.

The board has been designed to make assembly rather simple. All capacitors are chosen to be 5mm lead spacing and the resistors are 0.3 inch lead spacing. These spacing allow the user to prepare the leads for insertion into the board without any special tools. You will need wire cutters to trim the leads.

1: Insert all the resistors first. Use the board silk-screened nomenclature and the parts list to locate the proper placement of each component. Bend the leads at the body of the resistor and insert them into the appropriate holes. You may “tack solder” them on the top to make soldering easier, or you can hold them in place and solder from the bottom. It is best to trim the leads to about 1mm before soldering.

2: Next insert the capacitors. No tool will be necessary to form the leads. Since the frequency is low, it is not necessary to mount the capacitors tight to the board. C16, a yellow box capacitor, naturally sits flush. Note that the silk-screen for C1 is reversed. Install C1 the opposite of the screening.

3: Insert the remaining components, starting with the ICs, observing all polarities and keying. Make sure that the metal body of Y1 does not short the traces on the board. This is conveniently accomplished by temporarily using a resistor lead as a spacer under the crystal body. Bend the tabs of T1 flush to the bottom of its body. Do not yet install J1. Make sure the “On” position of the DIP switches are nearest the board edge.

4: Solder all the components and trim any remaining long leads.

5: If you wish to use the provided battery holder with its integral two pin connector, install J1 (white plastic, two-pin header) with its friction lock rib towards the center of the board. If you wish to solder wires directly, please note the square pad of J1 is the + (plus) input. The power switch is on the battery pack.

6: To test, make sure that S1 is off and install fresh AA (LR6) alkaline batteries in the holder. Connect the holder to J1 and slide the switch to the “on” position. CR1 should illuminate. If not, check your parts loading. You will need to adjust C1 for final calibration. This can be done by “zero-beating” to WWV, using a frequency counter, or comparing to a known good frequency source. The Modulation switch inserts an approximately 400Hz tone on the carrier to allow use with radios without CW capabilities.

7: Using the Radio1 is very simple. Each dip switch position has an additive frequency weighting as shown on the silk screen. For example, if you wanted 100kHz, you would set 64kHz + 32kHz + 4kHz = 100kHz.

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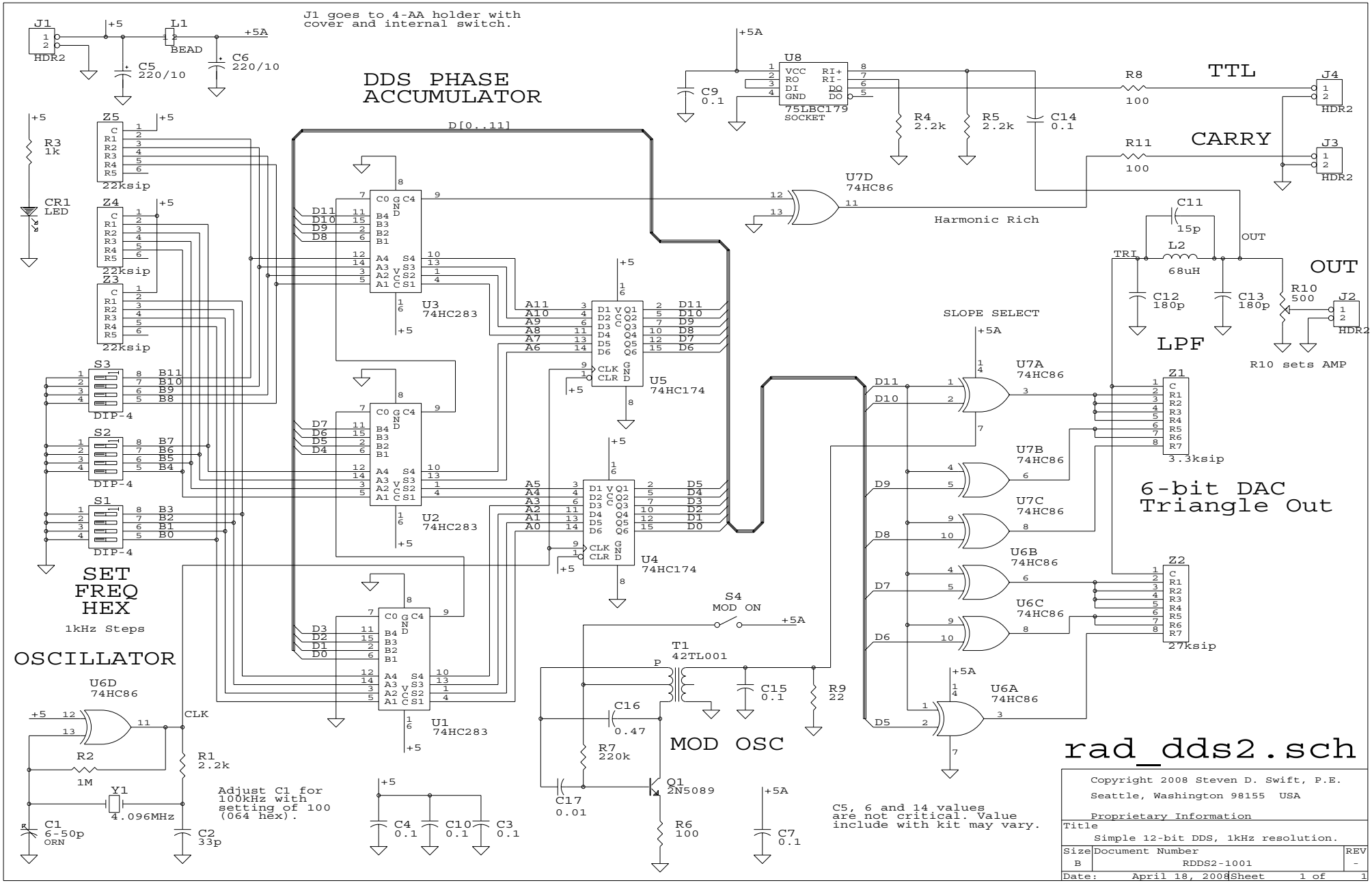
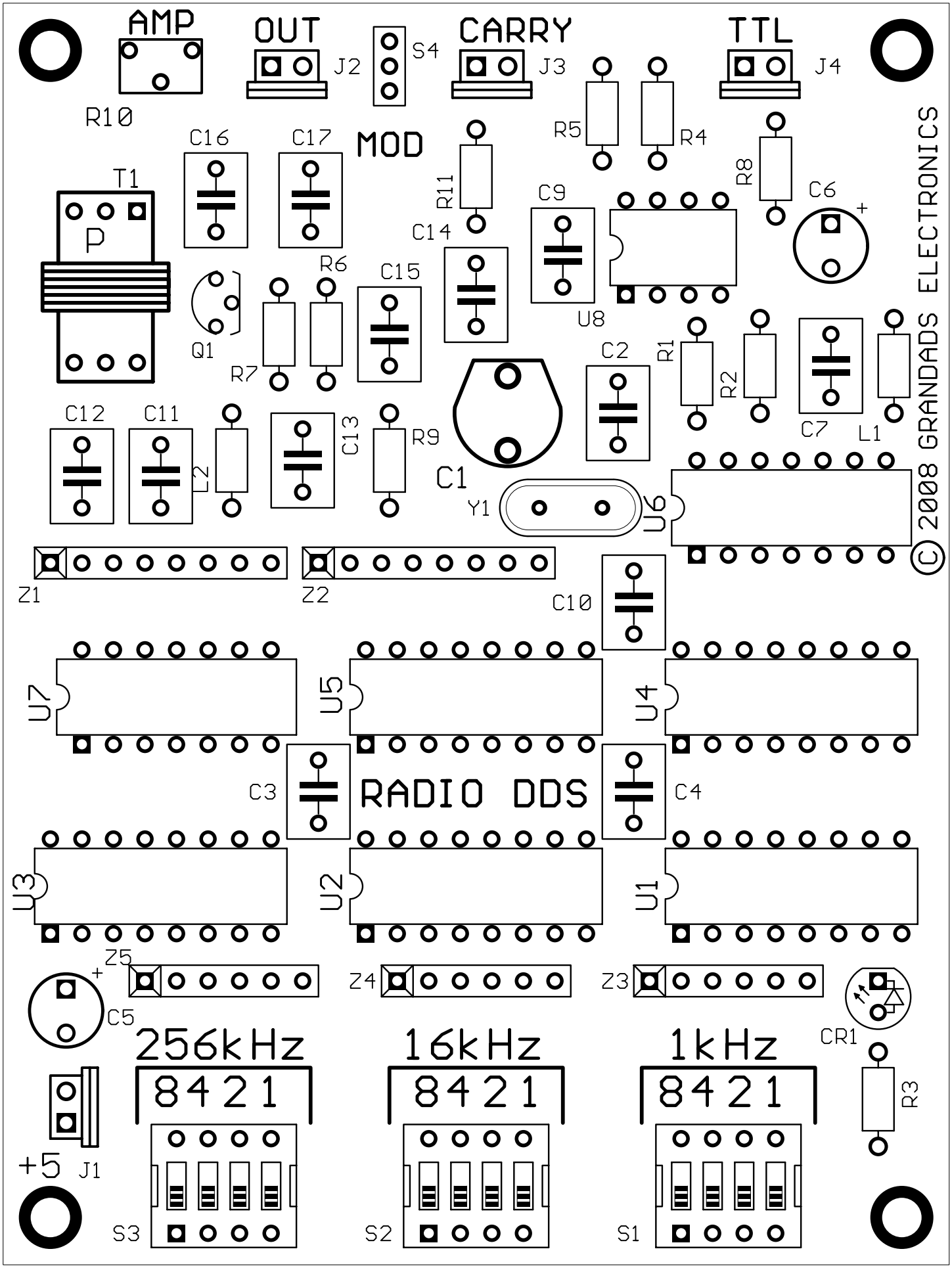

J1 goes to 4-AA holder with cover and internal switch.
DDS PHASE ACCUMULATOR
D[0..11]
SET FREQ HEX
1kHz Steps
OSCILLATOR
MOD OSC
SLOPE SELECT
6-bit DAC Triangle Out
LPF
TTL
CARRY
Harmonic Rich
R10 sets AMP
rad_dds2.sch
Copyright 2008 Steven D. Swift, P.E.
Seattle, Washington 98155 USA
Proprietary Information
Simple 12-bit DDS, 1kHz resolution.
Adjust C1 for 100kHz with setting of 100 (064 hex).
C5, 6 and 14 values are not critical. Value include with kit may vary.


AMP
OUT
J2
S4
CARRY
J3
TTL
J4
R10
MOD
R5
R4
C16
C17
T1
P
R11
C14
C9
R8
C6
U8
R6
C15
Q1
R7
C2
R1
R2
C7
L1
C12
C11
L2
C13
R9
C1
Y1
U6
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Z1
Z2
C10
U7
U5
U4
C3
RADIO DDS
C4
U3
U2
U1
Z5
Z4
Z3
C5
CR1
256kHz
16kHz
1kHz
8421
8421
8421
R3
+5
J1
S3
S2
S1

Radio DDS, Mark 1.				
Description	**Ref Des**	**Vendor PN**	**QPA**	**LOC**
Battery Holder, w/switch, 4-AA	-	12BH348/CS-GR	1	MO
Variable Capacitor, 6-50pF	C1	TZ03Z500F169B00	1	MO
Capacitor, Ceramic, 33pF	C2	140-50N5-330J-RC	1	MO
Capacitor, Ceramic, 0.1uF	C3, 4, 7, 9,10,14,15	140-50V5-104Z-RC	7	MO
Capacitor, Al Electro, 220uF/10v	C5, 6	140-MLR10V220-RC	2	MO
Capacitor, Ceramic, 15pF	C11	140-50N2-150J-RC	1	MO
Capacitor, Ceramic, 180pF	C12, 13	140-50N5-181J-RC	2	MO
Capacitor, Film, 0.47uF	C16	BQ074D0474K	1	MO
Capacitor, Ceramic, 0.01uF	C17	140-50Z5-103M	1	MO
LED, Red, T1-size	CR1	WP7104SRD/D	1	MO
Header, 2-pin friction lock	J1	571-640562	1	MO
Bead, Ferrite, leaded	L1	623-2773009112LF	1	MO
Inductor, RF, 68uH	L2	542-9230-64-RC	1	MO
Transistor, NPN, high gain, TO-92	Q1	2N5089BU	1	MO
Resistor, 1/4W CF, 2.2k	R1, 4, 5	291-2.2k-RC	3	MO
Resistor, 1/4W CF, 1M	R2	291-1M-RC	1	MO
Resistor, 1/4W CF, 1k	R3	291-1k-RC	1	MO
Resistor, 1/4W CF, 100	R6, 8, 11	291-100-RC	3	MO
Resistor, 1/4W CF, 220k	R7	291-220k-RC	1	MO
Resistor, 1/4W CF, 22	R9	291-22-RC	1	MO
Resistor, Trimmer, 500, 1T w/knob	R10	652-3352H-1-501LF	1	MO
Switch, DIP, 4 position	S1, 2, 3	774-2084	3	MO
Switch, slide, SPST, miniature	S4	SSSS912500	1	MO
Transformer, audio miniature	T1	42TL001-RC	1	MO
Socket, 8-pin DIP	XU8	575-83308	1	MO
IC, CMOS, 4-bit adder, 16-pin DIP	U1, 2, 3	CD74HC283E	3	MO
IC, CMOS, 6-bit latch, 16-pin DIP	U4, 5	MM74HC174N	2	MO
IC, CMOS, Quad XOR, 14-pin DIP	U6, 7	SN74HC86N	2	MO
IC, RS422, 75LBC179, 8-pin DIP	U8	595-SN75LBC179P	1	MO
Crystal, 4.096MHz, HC-49/U, 20pF	Y1	520-HCA409-20X	1	MO
Network, 8-pins, 7-res, 3.3k, SIP	Z1	265-3.3k-RC	1	MO
Network, 8-pins, 7-res, 27k, SIP	Z2	265-27k-RC	1	MO
Network, 6-pins, 5-res, 22k, SIP	Z3, 4, 5	264-22k-RC	3	MO
PCB, Radio DDS	-	1700-0101	1	NTI
April 17, 2008. Rev - Board.				