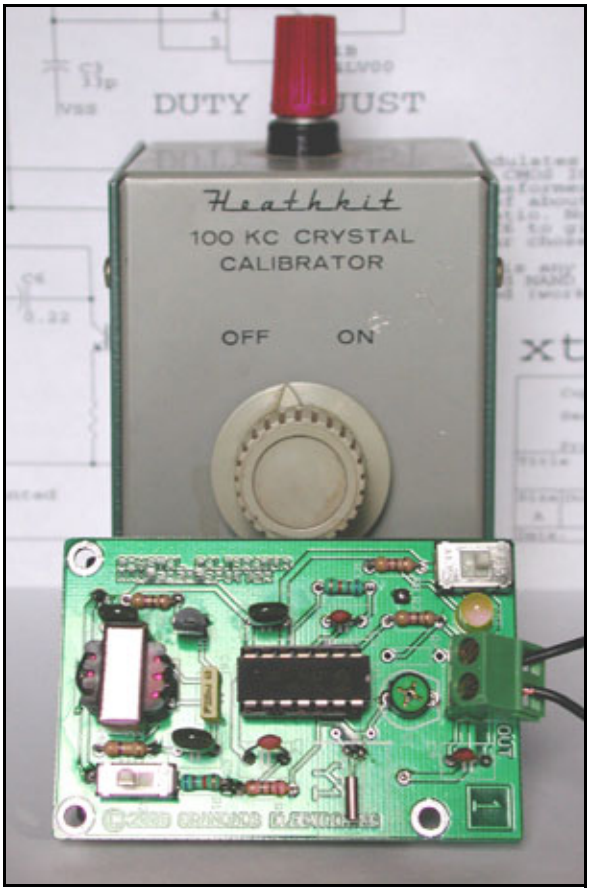
INSTRUCTION MANUAL
Model XTAL1



XTAL1 (assembled)

Assembly Instructions

This kit assumes that the purchaser is familiar with soldering and electronic assembly techniques. (updated for Rev B boards)

The board has been designed to make assembly rather simple. All capacitors footprints are chosen to be 5mm lead spacing and the resistors are 0.3 inch lead spacing. These spacings 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 (R6 is closer to the board edge). 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.

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. C6, a yellow box capacitor, naturally sits flush.

3: Insert the remaining components (XU1, T1, S1-2, Q1, CR1, J1 and Y1A). Lay Y1A flat, making sure that the metal body of Y1A does not short any traces on the board. You may use the holes on either side of Y1A for a wire to hold it in place (do not solder to the crystal body). Do not mount the battery holders until the all the other parts are soldered. The short lead on some LEDs corresponds to the "flat" shown on the silkscreen. Your kit may have either type.

4: Solder all the components and trim the leads. The battery holders mount on the back side of the board. You will find that triming the leads flush with the board in the area of the holders allows them to seat better.

5: Install the battery holders on the back side. The plus lead hole of each holder is marked by an etched +sign and a square pad on the board. You may use double stick foam tape under the holders if you wish.

6: To test, make sure that S1 and S2 are off (slide toward J1 end of board) and install fresh AAA (LR03) alkaline batteries. Slide S1 to the "on" position (away from end of the board). 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. C1 might not allow exact setting due to the lack of "pullability" with cylinder crystals, so set it as close to 100kHz as you can obtain. The Modulation switch inserts an approximately 400Hz tone on the carrier to allow use with radios without CW capabilities.

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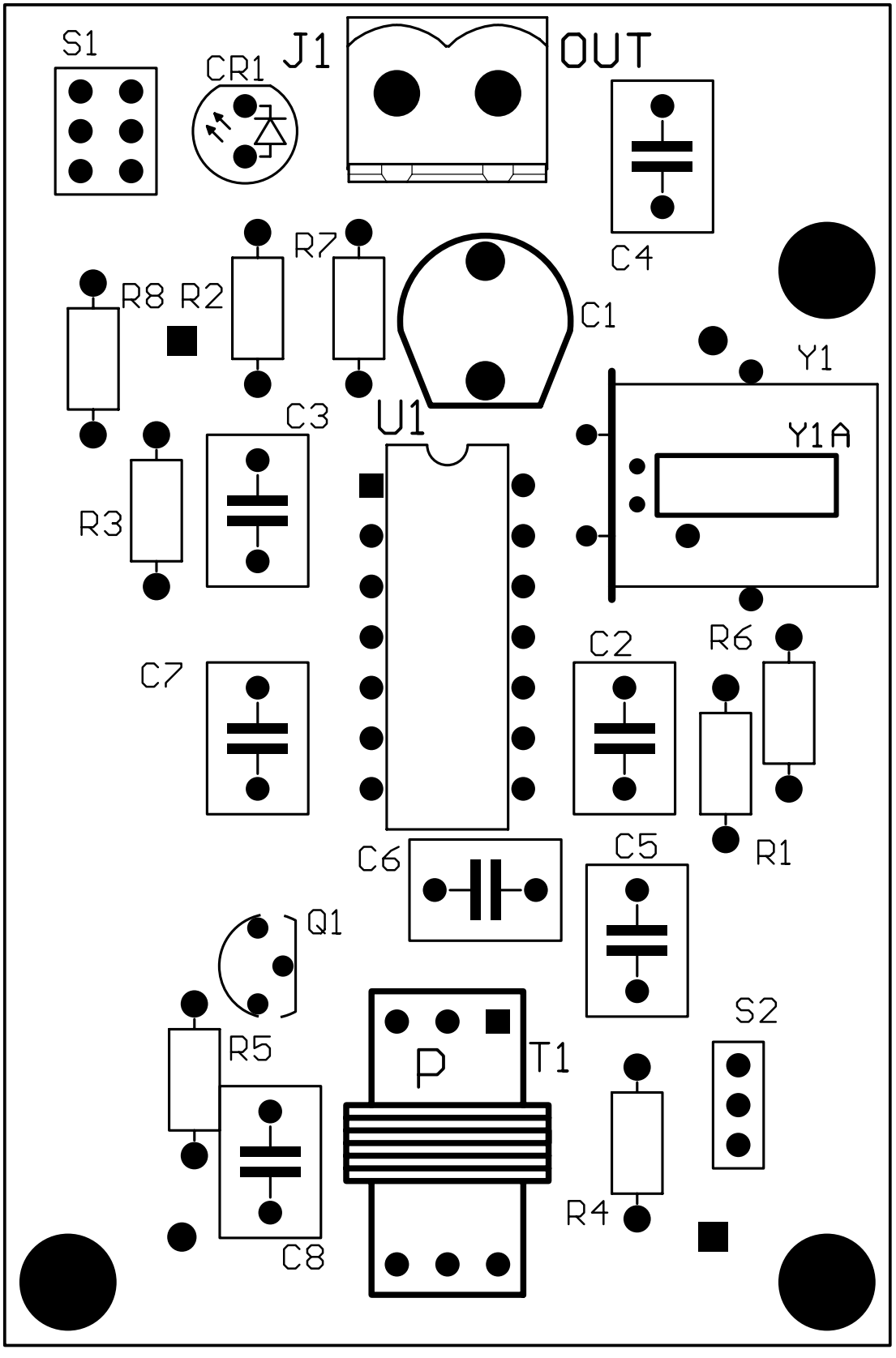
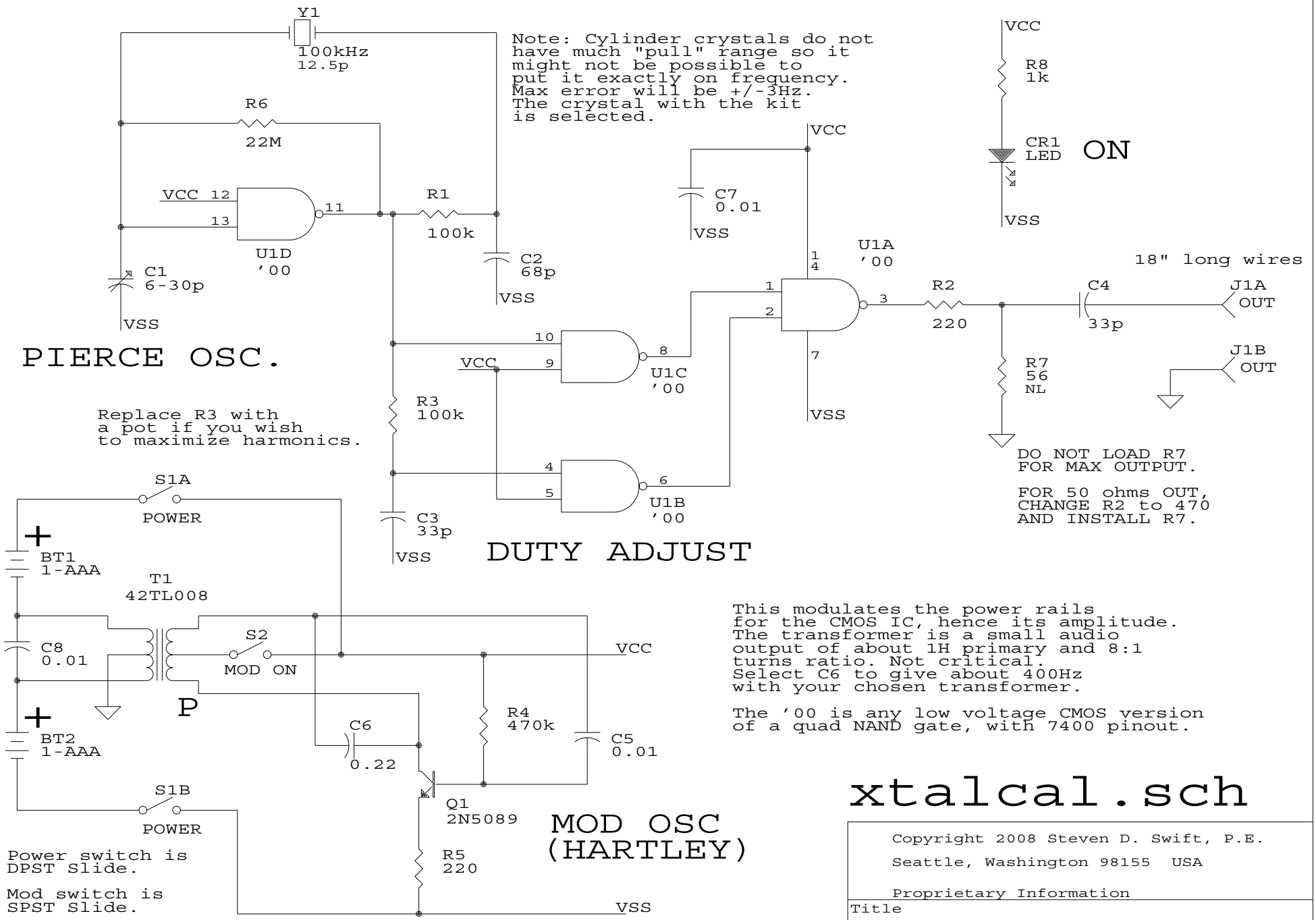

S1
CR1
J1
OUT
C4
R7
R8
R2
C1
Y1
Y1A
C3
U1
R3
C2
R6
C7
C6
C5
R1
Q1
S2
R5
P
T1
R4
C8



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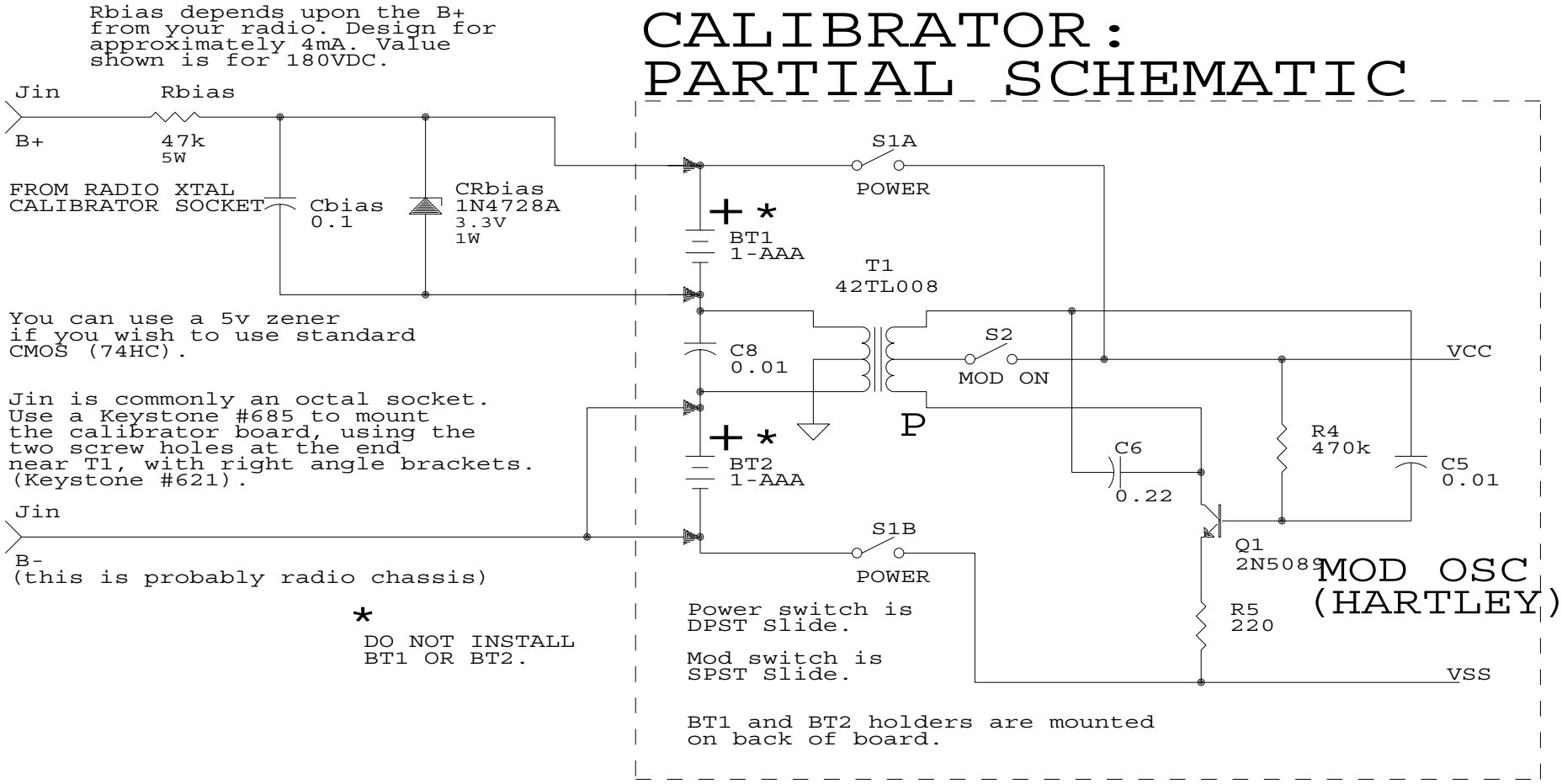
Title: 100kHz Crystal Calibrator		
Size: A	Document Number	REV: C
Date: December 23, 2008	Sheet 1 of 1	

Description	Ref Des	Vendor PN	QPA	PK	LOC
Battery Holder, 1-AAA	BT1, BT2	12BH412-GR	2		MO
Variable Capacitor, 6-30pF	C1	GKG30015	1		MO
Capacitor, Ceramic, 68pF	C2	140-100N2-680J	1		MO
Capacitor, Ceramic, 33pF	C 3, 4	140-50N5-330J	3		MO
Capacitor, Ceramic, 0.01uF	C5, 7, 8	140-50Z5-103M	3		MO
Capacitor, Film, 0.22uF	C6	BQ014D0224K	1		MO
LED, Red, T1	CR1	WP7104SRD/D	1		MO
Terminal Block, 2-pin, 5.08mm	J1	P02EK508A2-E	1		MO
Transistor, NPN, high gain, TO-92	Q1	2N5089BU	1		MO
Resistor, 1/4W CF, 100k	R1, 3	291-100k-RC	2		MO
Resistor, 1/4W CF, 220	R2, 5	291-220-RC	2		MO
Resistor, 1/4W CF, 470k	R4	291-470k-RC	1		MO
Resistor, 1/4W CF, 22M	R6	291-22M-RC	1		MO
Resistor, 1/4W CF, 1k	R8	291-1k-RC	1		MO
Switch, slide, DPST, miniature	S1	SSSS922500	1		MO
Switch, slide, SPST, miniature	S2	SSSS912500	1		MO
Transformer, audio miniature	T1	42TL008	1		MO
IC, CMOS, Quad Nand, 14pin DIP	U1	74HC00	1		DK
Crystal, cylinder, 100kHz, 30ppm	Y1	CFV206 100.000KAZF-UB	1		DK
Socket, 14-pin DIP	XU1	4814-3000-CP	1		MO
PCB, Crystal Calibrator	-	1700-0100	1		NTI
December 23, 2008. Rev B Board.					
(MO = Mouser, DK = Digi-Key)					

CALIBRATOR: PARTIAL SCHEMATIC



DO NOT CONNECT RADIO GROUND TO CALIBRATOR GROUND.

CHANGE C4 ON CALIBRATOR TO MATCH YOUR RADIO. APPROX 10pF IS APPROPRIATE FOR MOST RADIOS.

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Title		
Retrofit to Tube Receivers.		
Size A	Document Number	REV -
Date: March 23, 2008	Sheet 1 of 1	