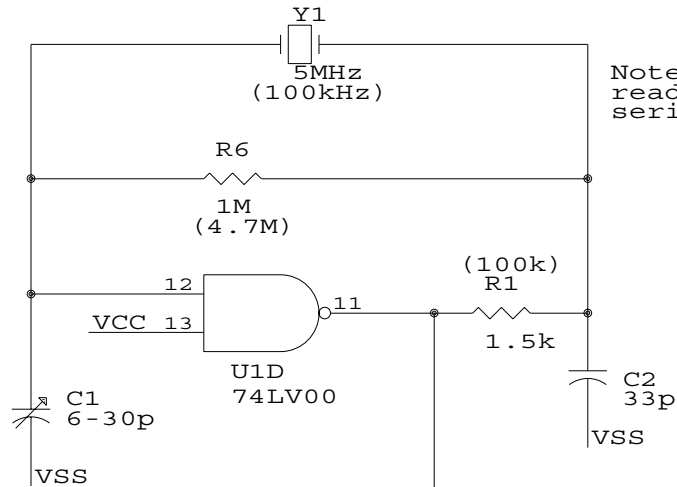


INSTRUCTION MANUAL Model Xtal-1



Xtal-1 (assembled) Table of Contents

<u>Section</u>	<u>Page</u>	<u>Contents</u>
1.0	25MHz Schematic
2.0	3	100kHz Schematic
3.0	3	100kHz Parts list



PIERCE OSC.

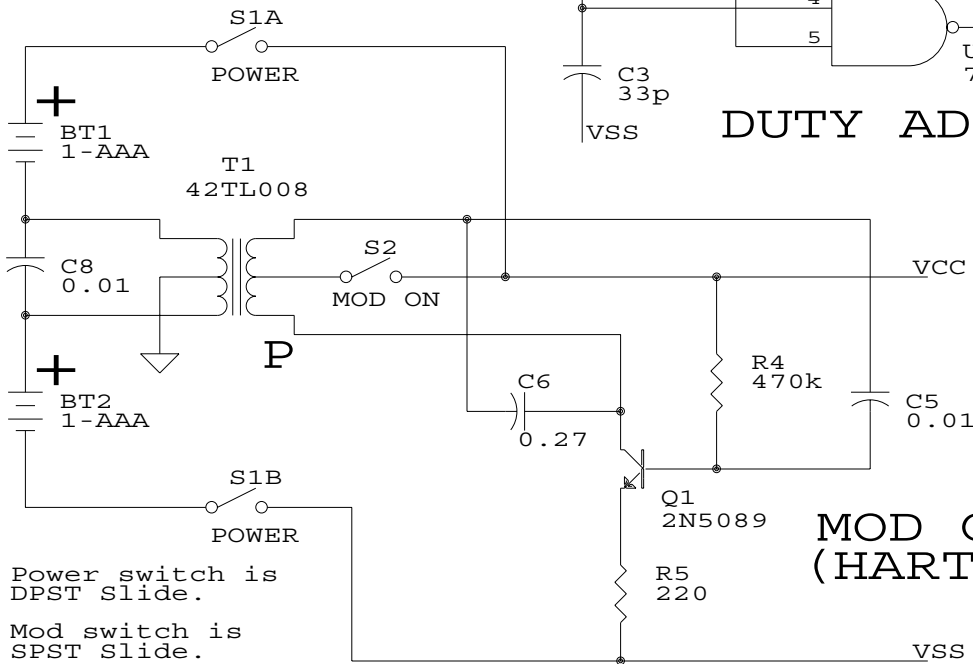
Replace R3 with a pot if you wish to maximize harmonics.

Note: 2.5MHz can be used, but readily available crystals are series mode.

DUTY ADJUST

This modulates the power rails for the CMOS IC, hence its amplitude. The transformer is a small audio output of about 1H primary and 8:1 turns ratio. Not critical. Select C6 to give about 400Hz with your chosen transformer.

The '00 is any low voltage CMOS version of a quad NAND gate. The 74LV00 is preferred (works to lower voltage).

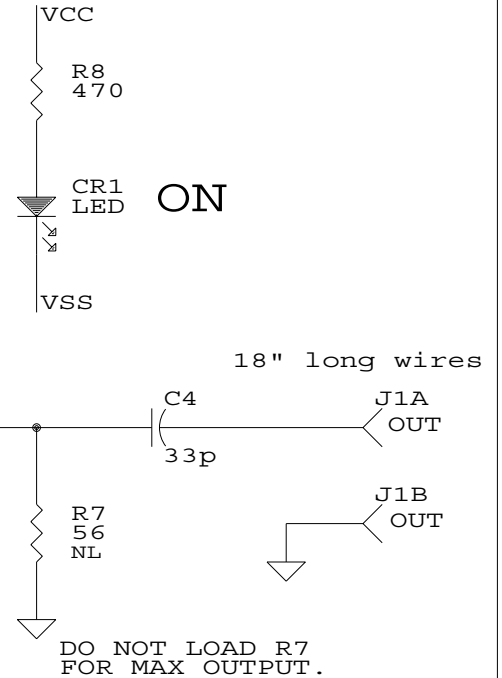


MOD OSC (HARTLEY)

Power switch is DPST Slide.

Mod switch is SPST Slide.

BT1 and BT2 holders are mounted on back of board.



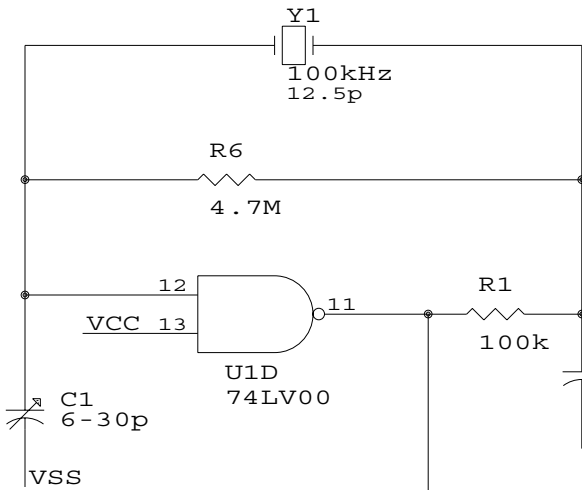
DO NOT LOAD R7 FOR MAX OUTPUT. FOR 50 ohms OUT, CHANGE R2 to 470 AND INSTALL R7.

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Seattle, Washington 98155 USA

Proprietary Information

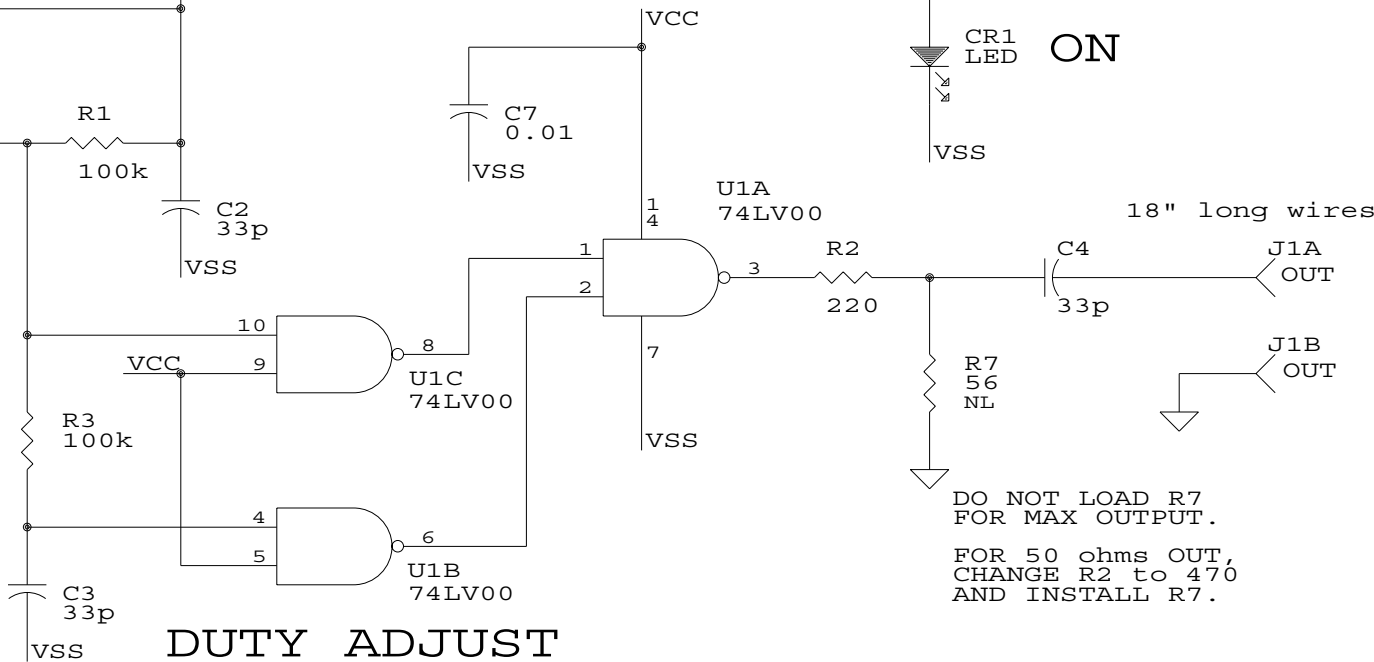
Title		
WWV Spotter - Mark 2.		
Size	Document Number	REV
A		A
Date:	March 19, 2008	Sheet 1 of 1



PIERCE OSC.

Replace R3 with a pot if you wish to maximize harmonics.

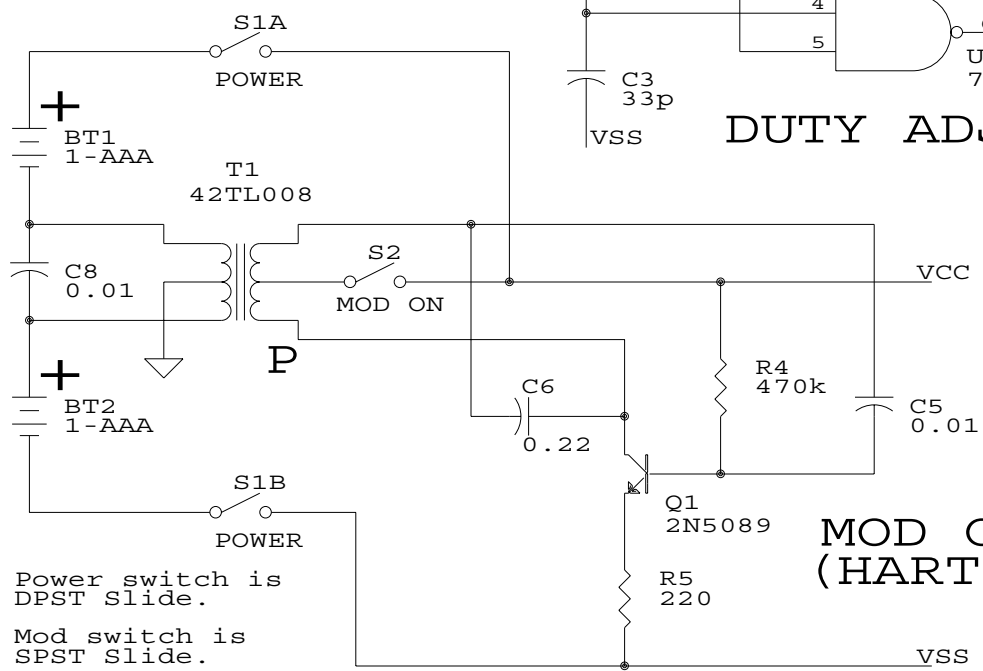
Note: Cylinder crystals do not have much "pull" range so it might not be possible to put it exactly on frequency. Max error will be +/-3Hz.



DUTY ADJUST

This modulates the power rails for the CMOS IC, hence its amplitude. The transformer is a small audio output of about 1H primary and 8:1 turns ratio. Not critical. Select C6 to give about 400Hz with your chosen transformer.

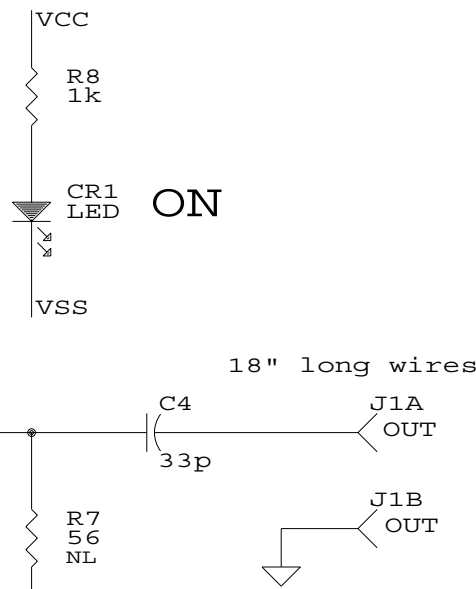
The '00 is any low voltage CMOS version of a quad NAND gate. The 74LV00 is preferred (works to lower voltage).



MOD OSC (HARTLEY)

Power switch is DPST Slide.
Mod switch is SPST Slide.

BT1 and BT2 holders are mounted on back of board.



DO NOT LOAD R7 FOR MAX OUTPUT.
FOR 50 ohms OUT, CHANGE R2 to 470 AND INSTALL R7.

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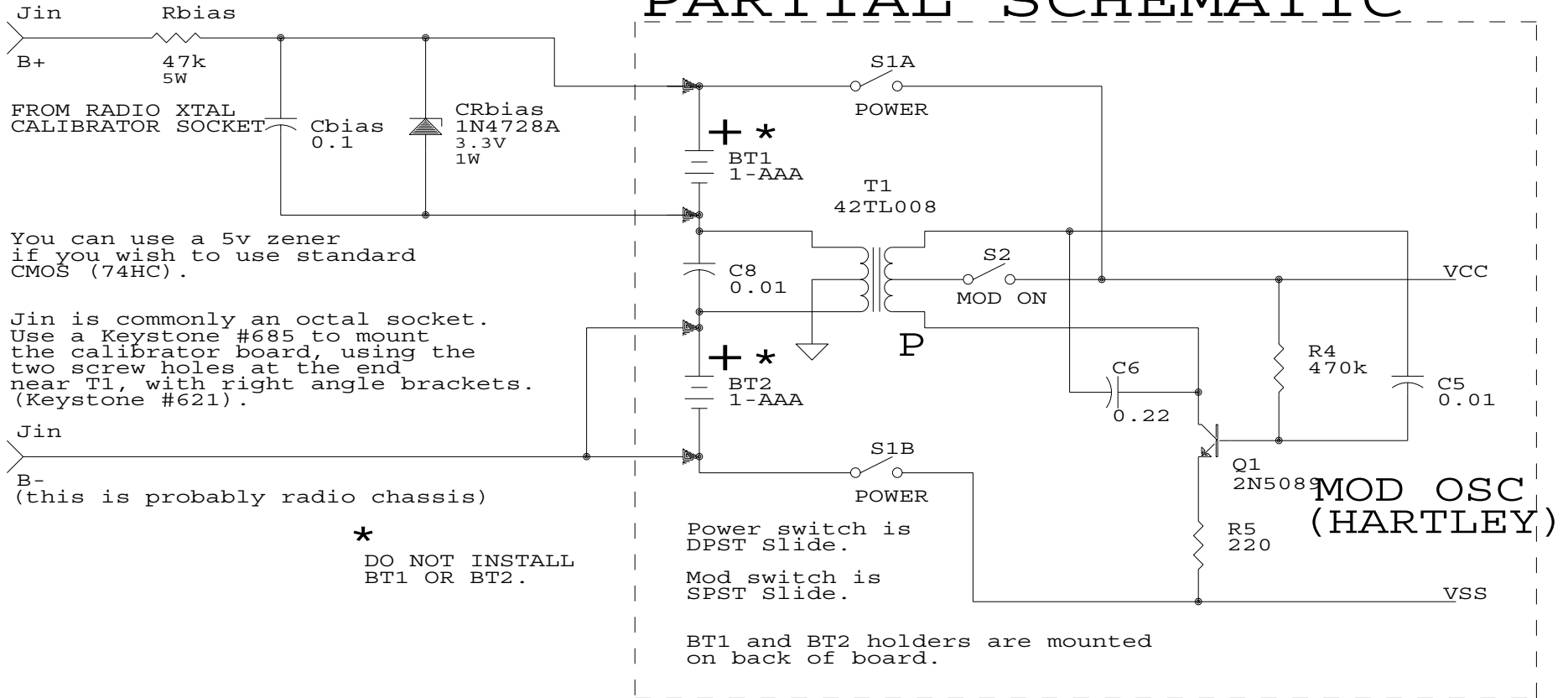
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Proprietary Information		
Title 100kHz Crystal Calibrator		
Size A	Document Number	REV A
Date:	March 10, 2008	Sheet 1 of 1

Sheet1

Description	Ref Des	Vendor PN	QPA	LOC
Battery Holder, 1-AAA	BT1, BT2	12BH412-GR	2	MO
Variable Capacitor, 6-30pF	C1	GKG30015	1	MO
Capacitor, Ceramic, 33pF	C2, 3, 4	140-50N5-330J	3	MO
Capacitor, Ceramic, 0.01uF	C5, 7, 8	140-50Z2-103M	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	2N5089	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, 4.7M	R6	291-4.7M-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	74LV00N	1	DK
Crystal, cylinder, 100kHz, 30ppm	Y1	ECS-1.00-12.5-13	1	MO
Socket, 14-pin DIP	XU1	4814-3000-CP	1	MO
PCB, Crystal Calibrator	-	1700-0100	1	NTI
March 10, 2008. Rev A Board.				

Rbias depends upon the B+ from your radio. Design for approximately 4mA. Value shown is for 180VDC.

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