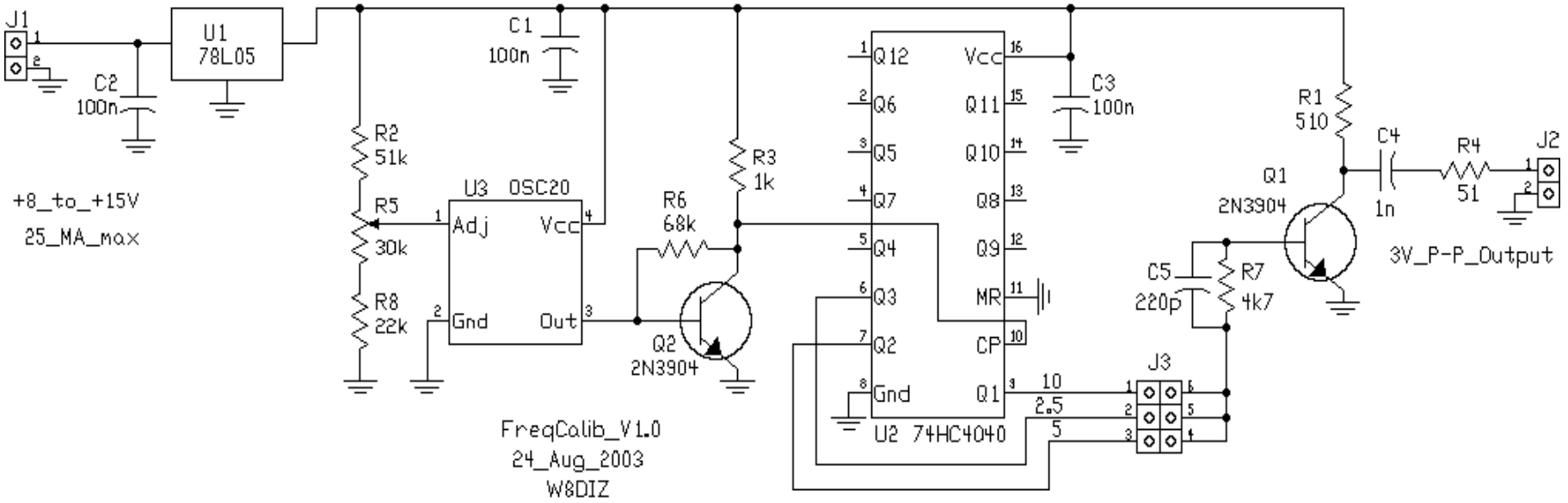
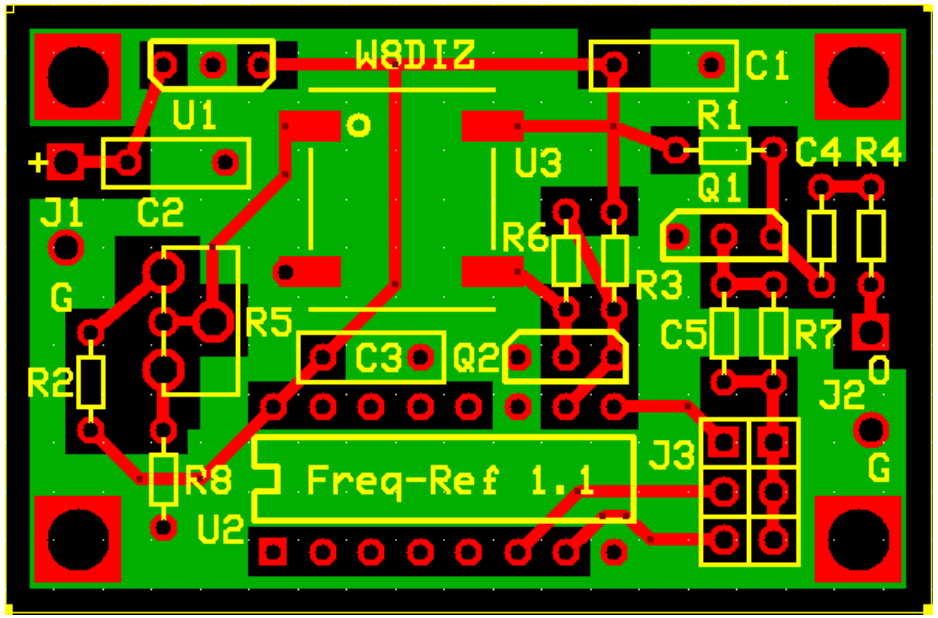
Build this Frequency Standard/Reference Kit for $12





Instructions for building the FREQUENCY STANDARD

INVENTORY all the parts against the parts list and check the box.

√		Qty.	Description		√		Qty.	Description
	Capacitors					Transistors		
	220 pF	1	C5			2N3904	2	Q1, Q2
	1 nF	1	C4					
	100 nF	3	C1, C2, C3			IC		
						74HC4040	1	U2
	Resistors					78L05	1	U1
	51 Ω	1	R4			TCXO 20 MHz	1	U3
	510 Ω	1	R1					
	1 kΩ	1	R3			Hardware		
	4.7 kΩ	1	R7			PCB	1	-
	22 kΩ	1	R8			6 pin header	1	J3
	30 kΩ POT	1	R5			jumper	1	Red jumper
	51 kΩ	1	R2			(16 pin socket)	1	-
	68 kΩ	1	R6					

STEP BY STEP INSTRUCTIONS (I)

___ Remove the 74HC4040 chip from the DIP socket on the PCB
___ Remove the 16 pin DIP socket from the PCB
___ Remove any residual Aluminum foil

___ Install the TCXO, matching the DOT on the PCB with the TCXO
Place (melt) a very small amount of solder on **one** of the TCXO pads on the PCB, not the TCXO.
Place the TCXO on the Pads and solder that pad in place.
Solder the remaining pads of the TCXO.

INSTALL ALL FIXED RESISTORS

____	R4	51Ω	Green	Brown	Black	Gold
____	R1	510 Ω	Green	Brown	Brown	Gold
____	R3	1 kΩ	Brown	Black	Red	Gold
____	R7	4.7 kΩ	Yellow	Violet	Red	Gold
____	R8	22 kΩ	Red	Red	Orange	Gold
____	R2	51 kΩ	Green	Brown	Orange	Gold
____	R6	68 kΩ	Blue	Gray	Orange	Gold

STEP BY STEP INSTRUCTIONS (II)

INSTALL ALL CAPACITORS
___ C5 220pF labeled 221
___ C4 1nF labeled 102

note: Straighten the pins on the blue 100n capacitors and mount flush on the PCB
___ C1 100nF labeled 104
___ C2 100nF labeled 104
___ C3 100nF labeled 104

INSTALL THE 3x2, 6 PIN HEADER
___ J3 6 pin header

INSTALL THE IC1. - This IC is STATIC SENSITIVE.
___ xx Install Socket for U2
___ U2 Insert the 74HC4040 IC into the socket

INSTALL Transistors and Voltage Regulator
Push the next 3 devices about half way thru the PCB
___ U1 78L05 Match package outline with PCB
___ Q2 2N3904 Match package outline with PCB
___ Q1 2N3904 Match package outline with PCB

STEP BY STEP INSTRUCTIONS (III)

INSTALL BLUE POT.

Note: This is a single turn pot. Good enough for calibration.
The PCB has holes for a multiturn pot. You supply.

___ R5 Install the blue 50 kΩ (30 kΩ on schematic) pot

INSTALL POWER AND SIGNAL WIRES.

___ Solder power supply wires (yours) labeled "+" and "G" at J1
Note that power supply voltage range is +7 to +15 VDC

___ Solder RF output wires (yours) labeled "O" and "G" at J2
Use a twisted pair of wires or small coax like RG174

___ Place red jumper over top 2 pins near C5 and R7 (10 MHz setting)
The middle pins are for 2.5 MHz and lower for 5 MHz.
Select whichever you want, but for calibration use 10 MHz.

CALIBRATION

CALIBRATE THE FREQ REF (using a WWV Receiver)

___ Set a receiver to WWV on either 10 or 20 MHz.

20 MHz is best for daylight reception and 10 MHz is best at night.
Not sure about the UK or Europe.

Power up the Freq Ref. Observe polarity.
Use a 9v battery or a 12 volt source.

Let the reference stablize for 2-3 minutes.

If you hear WWV in your receiver, also listen for the Freq Ref.

It should be within 1 kHz from WWV. If you can't hear it, verify that your Freq Ref is working with an oscilloscope.

Zero beat WWV with the Freq Ref signal by adjusting R5 until the heterodyne is beating at less than 1 Hz (1 beat per second).

SUGGESTION FOR BOXING