Hands Electronics

Tegryn Llanfyrnach Dyfed
SA35 0BL Tel 023977 427

Thank you for purchasing one of our kits. We hope it will give you many hours of service once built. Our aim is to provide satisfaction and service. If you have any problems with the construction or use of the equipment, please ring, or write to us. We will do all we can to help.If you are new to construction we suggest you read carefully the about part identity and soldering contained in the tools and construction section.

Sheldon Hands

Tools and Construction Practice

We recommend the following tools to make your HANDS kit:

15/25w soldering iron
small electrical screwdriver
4 inch Phillips -----"-----
small side cutters
electricians pliers

Below a some notes on construction practice with a heavy emphasis on soldering.

You must use solder with a non-corrosive flux. Acid cored solder MUST NOT be used.A 60/40 solder type will be ideal. The secret of good soldering is to have the correct temperature at the joint. Make sure the tip of the iron is clean, if necessary wipe it on a damp sponge. Do not carry solder on the iron to the joint, by the time you get it there the flux will have burnt or vaporised. Although it seems to contradict the above do lightly tin the iron before making a joint. This will aid the heat transfer and lessen the chance of damage to the pcb track or component.

When you are ready to make the joint apply the solder and the iron at the same time. Do not apply too much solder, a thin gauge helps in this respect. Humps of solder on a joint either means you did not leave the iron on the joint long enough or you used too much solder.

Try to get a medium coating over the track and the component lead. If you use too much heat you may damage the track or the component. We suggest you try some test joints on scrap wire, you will find it inspires confidence! When the board is complete check for solder bridges and dry joints.

All parts in the kit are readily identifiable, but value codes may need some explanation. For wire ended resistors a colour code chart is included at the back of the manual. Most supplies of resistors are coded with 3 bands for the value,i.e. 1st fig, 2nd fig, 3rd multiplier. But we do sometimes receive resistors with a 4 band code this then becomes 1st fig,2nd fig, 3rd fig, 4th multiplier. Capacitor identification for electrolytics is straight forward but ceramic caps may pose a problem. Where n values are used n10 = 100pf and 1n = 1000pf,those with just a 3 digit number use the first 2 numbers as figures and the 3rd indicating the number of zeros, i.e. 102 = 1000pf. For those with a 3 digit number followed by letters treat as 3 digit number type. Check the parts list for possible codes which are shown in square brackets.

Circuit Description

The board provides a simple change over system for the tx/rx dc supply lines together with a keyed carrier insertion oscillator. Also on the board is a regulated and switched vairable dc supply for a RIT system. The system matches the requirment of the RTX transceiver.

RX/TX 12v Change over /C W Delay

RL1 is usec to change over the 12VT and VR supply lines . For SSB tx RL1 is directly switched by grounding the PTT line through D3, with the PTT line connected to the microphone socket. For CW transmit RL1 is switched via the delay generator from the KEY line which is connected to an external KEY jack.

The CW delay generator TR2/3 provide a timing delay during transmit, holding the transceiver in transmit, yet allowing the carrier oscillator to follow the key action. The hold on time is variable by RV2. The KEY line which is independant of the PTT line, when grounded via D2 pulls TR2 base low thus turning it on. This also turns on TR3 which pulls TR4 low to change over the 12VR/ 12VT supply line. When TR2 conducts C11 is also charged, but when a key up period occurs although TR2 shuts off TR3 will remain on until C11 has discharged. This time period, dependant on the decay time of C11, is variable by RV2 which also discharges C11 via ground. D4 isolates the delay generator from the keyer and allows provision of a 12v keyed output for the companion sidetone oscillator on the RTX AGC board.

Keyed Oscillator

TR1 and its circuitry form a crystal oscillator, the crystal frequency may be adjusted by TC1. The output voltage is adjusted by RV1, the value of C8 may be changed if the output is too low or high in some applications. Keying is accomplished by grounding the KEY line via D1. D1 also insures that TR1 will not be reverse biased if a voltage appeared on the key line.

RIT DC Supply and Switching

IC2 is a 5 volt 3 terminal regulator, +ve is obtained from the permant 13.8v line. The regulated output is supplied to the resistor chain R15,RV3,R16. A voltage variable by approximatly 2 volts is avaible at the wiper of RV3. In the RTX VFO this voltage varies the capacity of a Varicap diode. During transmit TR4 is turned on by IC1 shorting out the RIT control. The potential at the wiper of the control will then be half the voltage drop across the resistor chain. This is effectivly equal to the potentiometer centered.

TX Mute

RV3 and R10 provide a divider network conected to the 12VT line. The variable voltage available at the TX mute pin may be applied to the RTX AGC board IFG pin or the RTX/IF AGC pin to mute the IF amplifier during transmit.

Construction

- Fit the pcb pins listed below by inserting frorn the track side and pushing home with a hot iron. Always support the board with an old cotton or solder reel round the circumference of the pin during this operation.

- Pcb Pins-: +13.8v, KEY, +12VR, +12VT, CW+12V, CW OUT, PTT, RV3 (2 OFF), RIT, MUTE, 12v keyed.

- Fit and solder the resistors R1-10
- Fit and solder the ceramic capacitors
- Fit and solder the electrolytic capacitors C11,13 making sure that the negative indication stripe is aligned with the board - sign.
- Fit and solder diodes D1-4, make sure the cathode band is aligned with band on the board legend.
- Fit and solder TR1-4 the transistor outline should agree with board legend.
- Fit and solder IC1,2. Again make sure the outline agrees with board.
- Fit and solder RV1,2,4
- Fit and solder RFC1
- Fit and solder TC1.

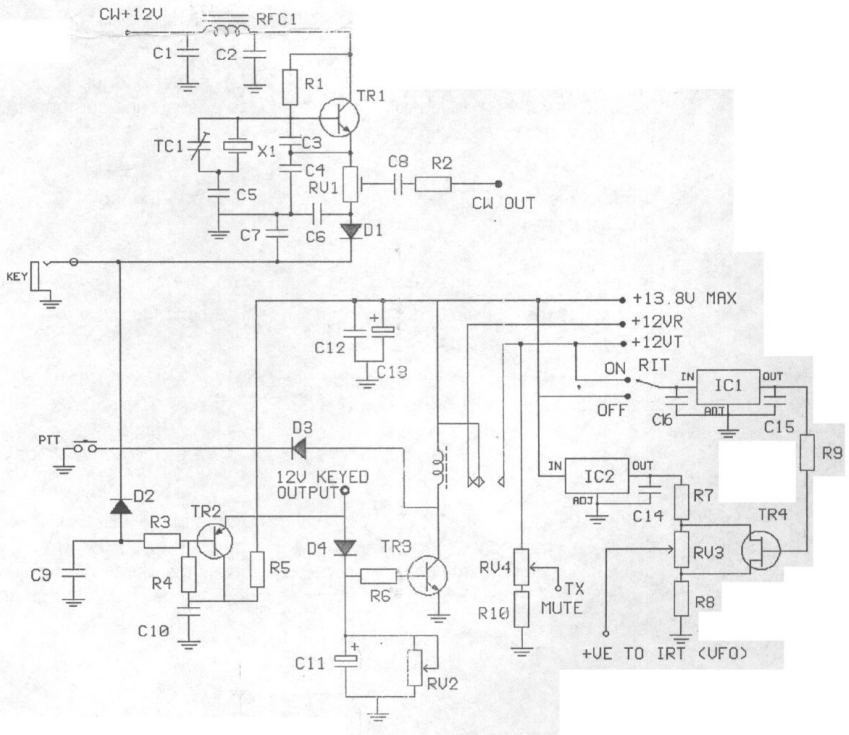
Test

- Check the track side of the completed pcb for any solder bridges, splashes or dry joints. Check the top foil making sure no bridges exist around component leads to ground except where indicated.
- Connect the top foil of the pcb to the -ve of a 13.8v psu and the +13.8v to the +ve side. Make tempory connections to VR3
- Check that the 12VR line is equal to the supply voltage and that the 12VT line is at 0v. Ground the PTT pin and check that the voltages change over.
- Check that you have a voltage at the RIT output pin and that VR3 swings the voltage from around 2-4 volts. Ground the PTT line and check that the voltage goes to the mean of the upper and lower voltage.[the simple system used may not center exactly but any error can usually be offset by the control knob]
- Adjust RV2 wiper to the R4 end of its travel and ground the KEY line. Check that the TX/RX supply lines change over and that when the short is removed there is a delay before the change back. Key again and check that the Oscillator is functioning, if a counter is avaiable the frequency may be checked and trimed with TC1.

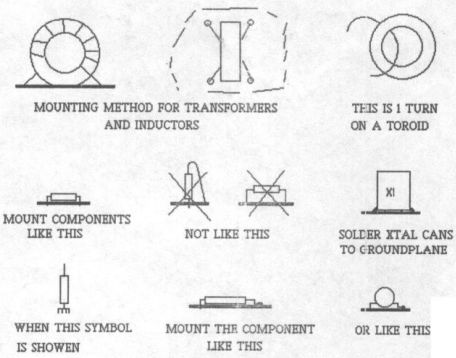
Parts List RTXCO

R1	220K
R2,10	1K
R3	47K
R4	100K
R5	100R
R6,7,8,9	10K
RV1	500R
RV2	220K PRE-SET
RV3	10K Lin
RV4	10K PRE-SET
C1,10	100N [104]
C3,4	150P [151JNPO]
C5,8	27P [27J]

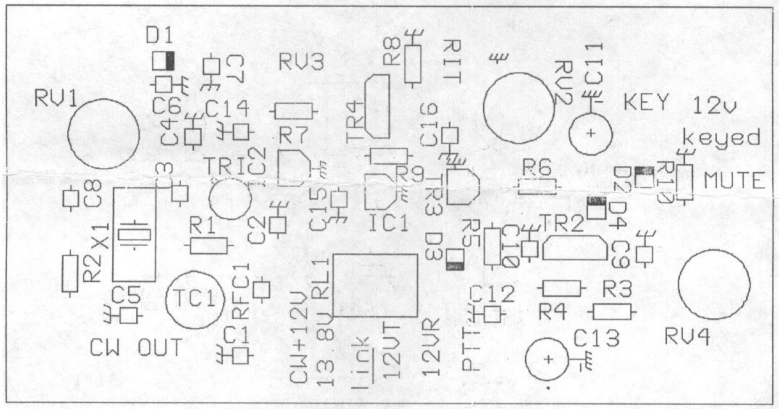
C2,6,7,9,12	
14,15,16	10N [103]
C11	22MFD
C13	10MFD
TC1	30 PF GREEN
RFC1	1MH [102J]
D1,2,3,4	1N4148
TR1	2N2222
TR2	2N3906
TR3	2N3904
TR4	BS107
IC1,2	78L05
RL1	OUC



COMPONENT MOUNTING



Pcb Layout



Resistor Colour Code

Colour	Band 1 1st fig	Band 2 2nd fig	Band3 multiplier
Black		0	X 1
Brown	1	1	X 10
Red	2	2	X 100
Orange	3	3	X 1000
Yellow	4	4	X 10,000
Green	5	5	X 100,000
Blue	6	6	X 1,000,000
Violet	7	7	X 10,000,000
Grey	8	8	
White	9	9	