

## Hands Electronics

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*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 are 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  $n10 = 100\text{pf}$  and  $1n = 1000\text{pf}$ , those with just a 3 digit number use the first 2 numbers as figures and the 3rd indicating the number of zeros, i.e.  $102 = 1000\text{pf}$ . 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

Detected audio from the receiver is pre-amplified by IC1B. IC2 a/b is configured as a low pass active filter with a cut off of approximately 700hz. The filtered audio is routed back to the main amplifier from the CW OUT pin. The SSB output pin allows pre-amplified audio to be routed to the main audio amplifier without any filtering.

Audio from IC1b is also fed to IC1a/d which act as agc amplifiers. D1/2 rectify the audio to provide a dc control voltage for the IF amplifier. The dc voltage is held high at the end of an audio signal for the time taken by C4 to discharge, thus providing 'hang' control. IC1c buffers the control voltage. D4 is used to isolate the manual IF gain control, but still allow it to override the automatic control is needed. For use with the TCV/RTX transceivers D4 is replaced with a wire link.

TR1/2 together with C13/14 form a multivibrator tone generator of approximately 1khz. The voltage for the generator is taken from the 12volt keyed line, RV1 and the value of C16 are used to control output level which is routed to the main audio amplifier.

## CONSTRUCTION

- Fit the pcb pins listed below by inserting from 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 +12v, AF IN, SSB OUT, AGC OUT, CW OUT, IFG, +12VT (KEYED), TONE OUT, GND[ADJ TO C3]
- Fit and solder the resistors R1-24
- Fit and solder the ceramic capacitors
- Fit and solder the electrolytic capacitors C2,3,4, making sure that the negative indication stripe is aligned with the board - sign.
- Fit and solder diodes D1-6, make sure the cathode band is aligned with band on the board legend.
- Fit and solder TR1,2 the transistor outline should agree with board legend.
- Fit and solder IC1,2. The cut out on the ic should match the cutout on the board legend, this identifies the pin 1 end. Pin 1 is further identified by a square pad on the track side.
- Fit and solder RV1
- Fit and solder RFC1

## TEST AND INSTALLATION

Check the board for solder splashes, bridged tracks or ic pins and dry joints. If you suspect a dry joint you may carry out a resistance check with your multimeter between the component lead on one side of the board and the track on the other.

Make a temporary connection from the GND connection to the transceiver gnd line or chassis. Connect the +12v line to the transceiver +12v receive line via a multimeter on its current range. Check that when switched on the current drawn is less than 1 ma.

Make another temporary connection, from the detector side of the volume control to the AF input pin. Check with the multimeter that the AGC OUT pin is around 5-6 volts with a weak signal and rises when tuned across a strong signal.

Remove the AF IN connection and reconnect to the TONE OUT pin. Apply 12v to the 12VT(keyed) pin and check that the tone oscillator functions. If the output level is excessive the value of C16 may be changed or R24. The normal connection for the tone oscillator is to the amplifier side of the volume control with the level pre-set on RV1.

Break the connection to the transceiver volume control from the detector and rewire it to the agc board AF IN pin connect a lead from the CW OUT pin back to the volume control. With the agc board powered check that filtered audio is ok. Remove the CW OUT connection and reconnect to the SSB OUT pin and recheck the audio. If all the tests are satisfactory the board can now be installed in the transceiver and permanently wired as shown on the connection diagram.

### Customising the agc for the RTX

For max sensitivity where the IF manual gain is not used replace D3 with a wire link and wire agc out to the RV1 pin on the IF board. Lower R6 to 6K8, this reduces the no signal agc voltage. TX/RX cw recovery time is improved if a 10v zener is placed across R11 to limit the max charge to C4 hang capacitor. For cw rx, agc action may be speeded up by reducing R11 to 2m, alternatively R11 may be removed to a switch allowing selection of other values for different time constants.

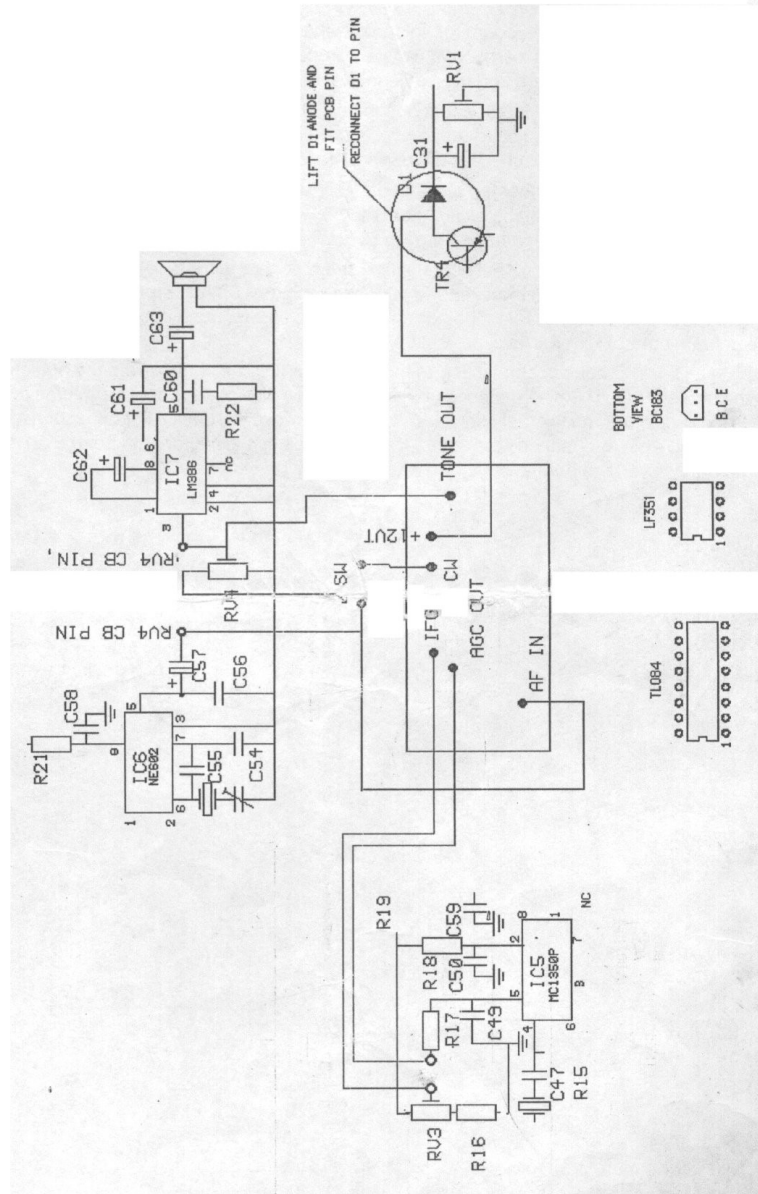
### Parts List RTX/TCV AGC/FILTER/SIDETONE

|                              |                  |
|------------------------------|------------------|
| R1,4,9,14                    | 100K             |
| R2,3,6,8,19                  | 10K              |
| R5                           | 56R              |
| R7                           | 4K7              |
| R10                          | 1K               |
| R11                          | 4M7              |
| R12,13,15,16,17,18           | 33K              |
| R20,23                       | 2K2              |
| R21,22                       | 47K              |
| R24                          | 330R             |
| RV1                          | 10k              |
| C1,5,11,15                   | 100N             |
| C2,3                         | 22MFD            |
| C4                           | 1MFD             |
| C6,8,10,13,14                | 10N              |
| C7,9                         | 2200PF           |
| C12                          | 10MFD            |
| C16                          | 1nF OR SOT       |
| D1-6                         | 1N4148           |
| D4 fit wire link for TCV/RTX |                  |
| IC1                          | TL084            |
| IC2                          | LM358            |
| TR1,TR2                      | BC183L<br>BC184L |
| RFC 1                        | 1MH              |

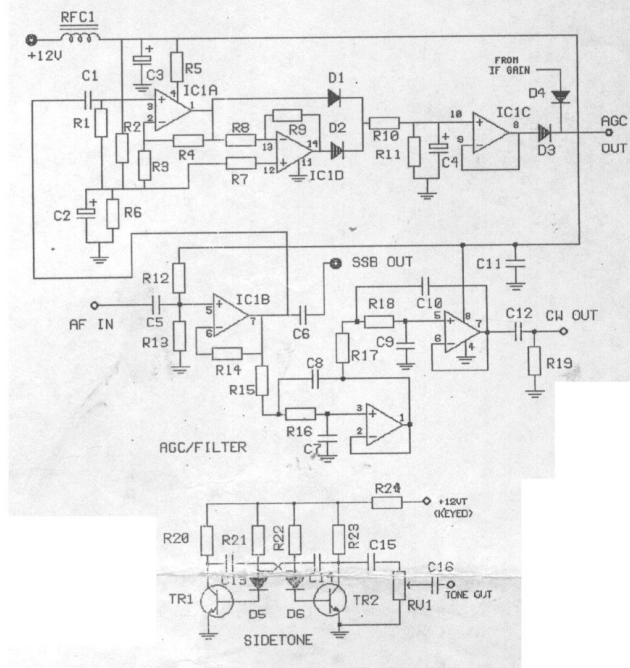
### Resistor Colour Code

|        | Band 1  | Band 2  | Band 3       |
|--------|---------|---------|--------------|
| Colour | 1st fig | 2nd fig | 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       |              |

# TCV AGC CONNECTIONS



## AGC CIRCUIT DIAGRAM



## AGC PCB LAYOUT

