

## DFD2—FT301 instructions.

**The DFD2FT301 measures the premix local oscillator on the HFO input and the BFO on the BFO input. The VFO input is not used and is disabled by leaving the 74HC4046 out of the socket.**

Adjust the contrast control fully counter-clockwise. Apply power from 8 to 18VDC. You should see some frequency displayed. Adjust the contrast control for the desired effect. The IF frequency should be displayed.

There are two jumpers on the back of the board.

The top zero ohm jumper selects 100Hz resolution (jumper off) or 10Hz resolution (jumper on)

The bottom zero ohm jumper selects display format (where USB is used as an example of the operating mode display):
















10 Hz resolution: 12.345.67MHz USB (jumper off) or 12.345.670 USB (jumper on)

100Hz resolution: 12.345.6 MHz USB (jumper off) or 12.345.600 USB (jumper on)

Using the LED back-lit display (see diagram below)

The back-lit module has a block of LEDs behind the LCD display. It is powered from terminals A (anode) and K (cathode) with A being plus and K being minus (usually ground). The voltage drop across the LEDs is 4VDC. The current can range from 20ma. To 150ma. The dropping resistor required is  $R = (V-4)/I$  where I is the desired current and V is the supply voltage.

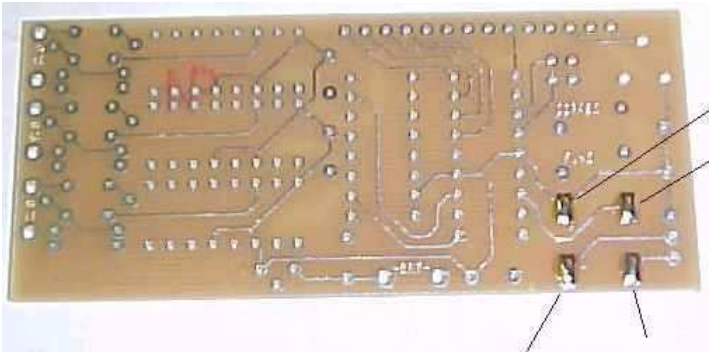
### PARTS LIST

D1, D2, D3, D4, D5, D6	1N4148		U1, U2, U3	74HC4046	
R1	100ohms Brown-black-brown		U4	74HC153	
R2, R3	1000 ohms brown-black-red		U5	PIC16C71 Labeled according To the model DFD2	
			U6	78L05 Voltage regulator	
R4	10K trimpot contrast control adjust fully CCW		U7	20MHz TCXO	
	25 Turn trimpot value may vary		H1 H2	2 pin header 2 Pin jumper	
C1, C2, C3 C4, C5, C6 C7, C8, C11	.1uF C1, 4 and 6 Mislabeled on schematic		J1	Female connector	
C12	10uF		P1	Male connector	

Use pins 1-14 of the display module. If 16 pins are available, last two are not used.

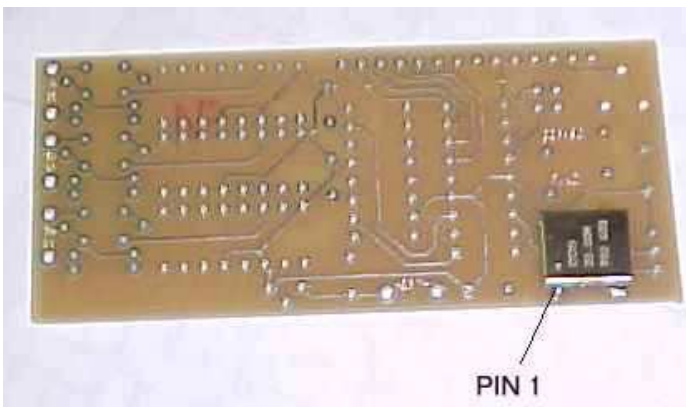
Backlit option is powered by supplying current (a current limiting resistor **MUST** be used) from the A(anode) to K(cathode) connections on the edge of the module. **See schematic for details.**

## DFD2 assembly instructions.

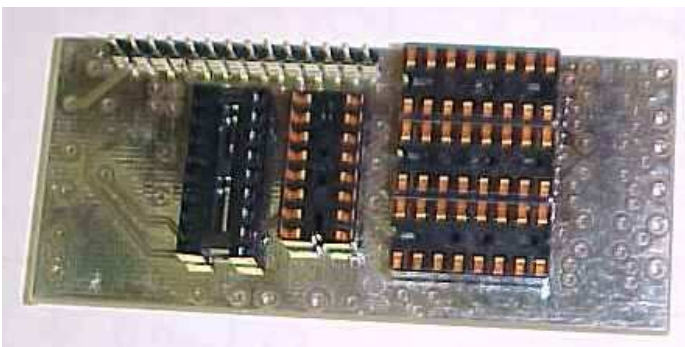


Begin by placing solder globs on the four rectangular pads for the surface mount TCXO.

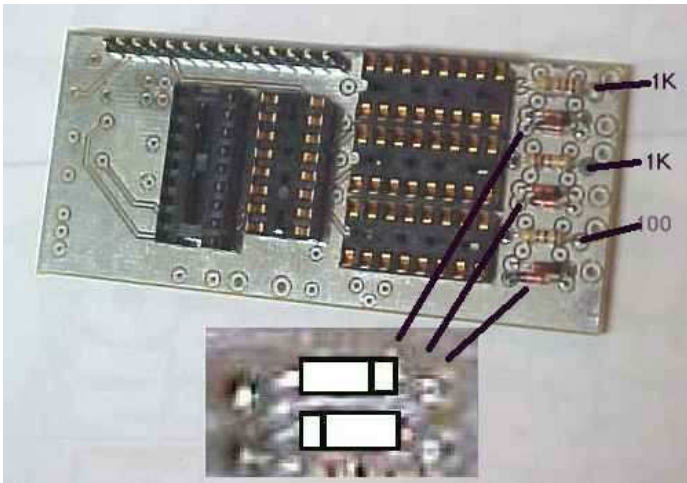
**If I pre-installed the TCXO, I could not test it. If unit displays only 8 black squares then check and reflow the solder on its four corners.**



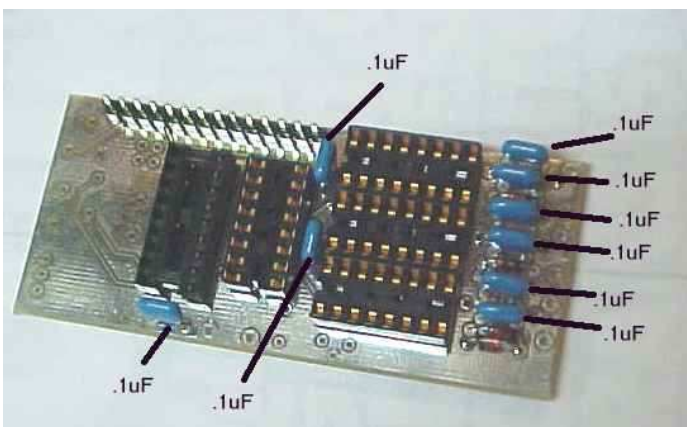
Carefully Position the TCXO with pin 1 as shown and remelt the solder globs while pushing down on that side of the device until all four pads of the TCXO are soldered. You can check by looking at the edge view to verify that solder has flowed onto the TCXO terminals. If later the unit shows only 8 black squares on the display it may be because one or more of these terminals did not properly reflow solder.



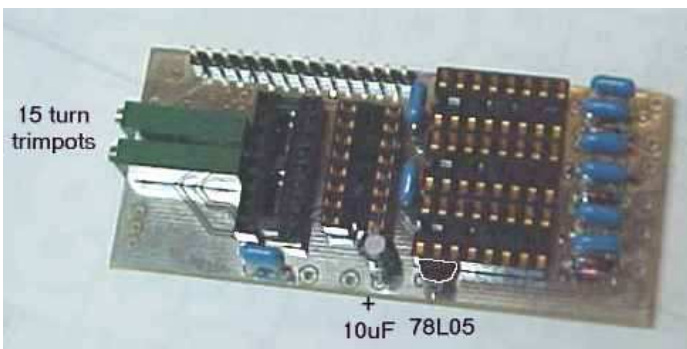
Next mount the IC sockets and display header.



Next install and solder all resistors and the six back to back diodes.

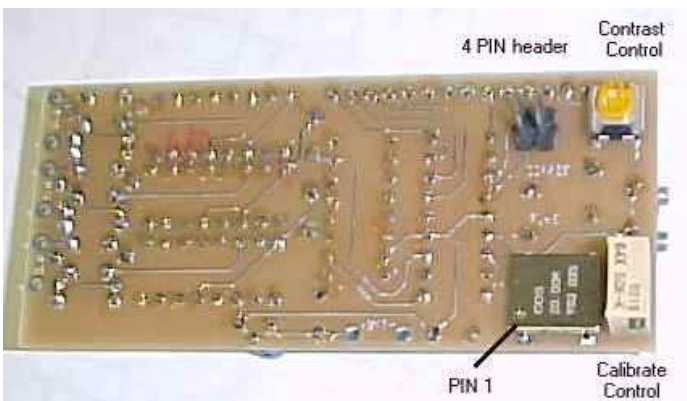


Then install and solder 9 each .1 uF capacitors **Caps can be blue or tan.**

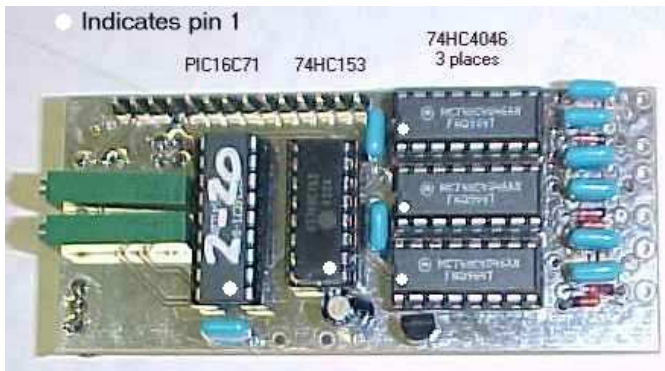


Next install the 78L05 voltage regulator, the 10uF electrolytic  
**The 15 turn trim pots are not used on the FT301 model**

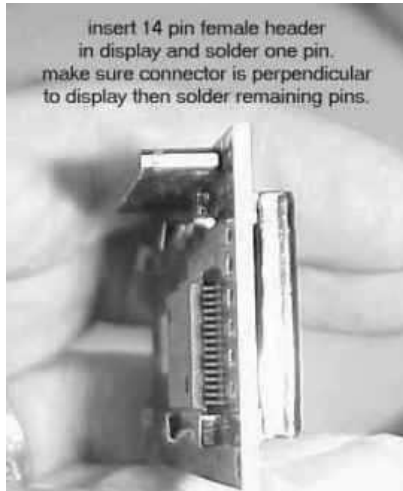
+ **Terminal of 10uF electrolytic in hole closest to edge of PCB. Flat side of 78L05 toward IC sockets.**



On the back side of the PCB install and solder the 10K contrast control **(adjust it fully CCW)** and the 25K calibration control.



Next, Install the ICs.



Mount the 14 pin female header on the display module soldering only one pin.

Then verify the connector is at a right angle to the module, re-melting the soldered pin and adjusting the connector if necessary.

Then solder the remaining pins.

Plug the module into the DFD2 PCB.

At this point you can plug the counter board into the module and power them with a 9 volt battery.

You should see something displayed.

What you see at this point is not important as some inputs are still floating until final assembly in your enclosure.

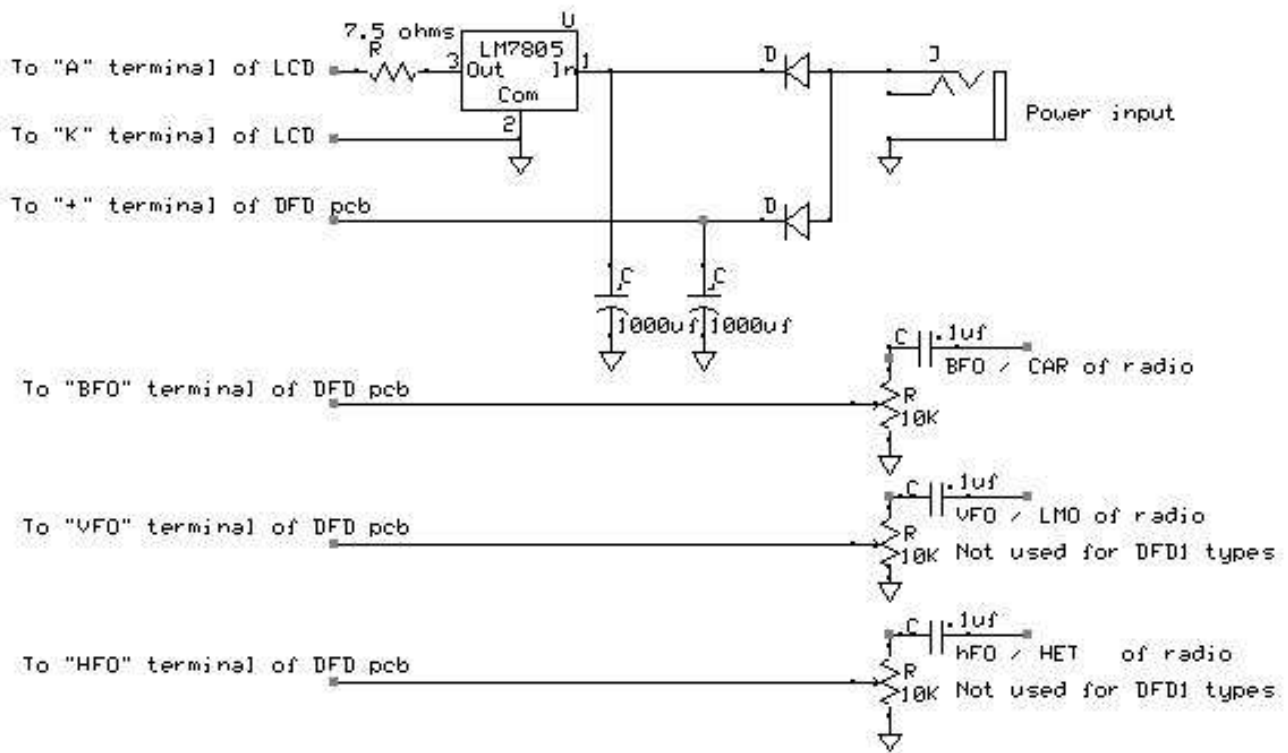
## CALIBRATION

- There are many ways to calibrate a frequency counter depending on available test equipment.
- The simplest is to zero beat a signal generator against WWV (receiver bfo off) while measuring the generator's frequency with the counter.
  - Adjust the 25 turn trimpot on the back of the PCB to obtain the WWV frequency (20 MHz) on the counter's display.
  - Or listen to TCXO on receiver while zero beating it to WWV on 20MHz.
- Any other KNOWN frequency can also be used.

## Installation

It is possible to overdrive the inputs causing erratic frequencies to be displayed. A 10K trimpot can be used to set the levels going into the DFD2.

the levels should be set only slightly greater than required for a stable display. Set the BFO input first, then the VFO and finally the HFO (usually on 10mtr band).



### Power Conditioning module for DFD1 and DFD2 applications

**This is the power conditioning module supplied as part of the plug-n-play fully assembled digital dials. Something similar is recommended for DFD2 applications to provide level controls.**

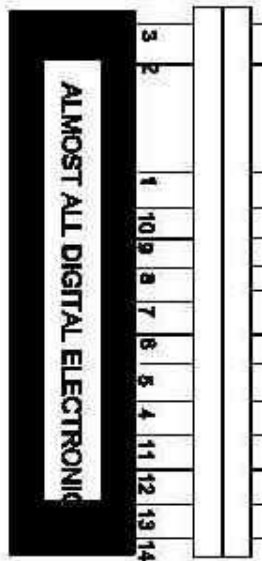
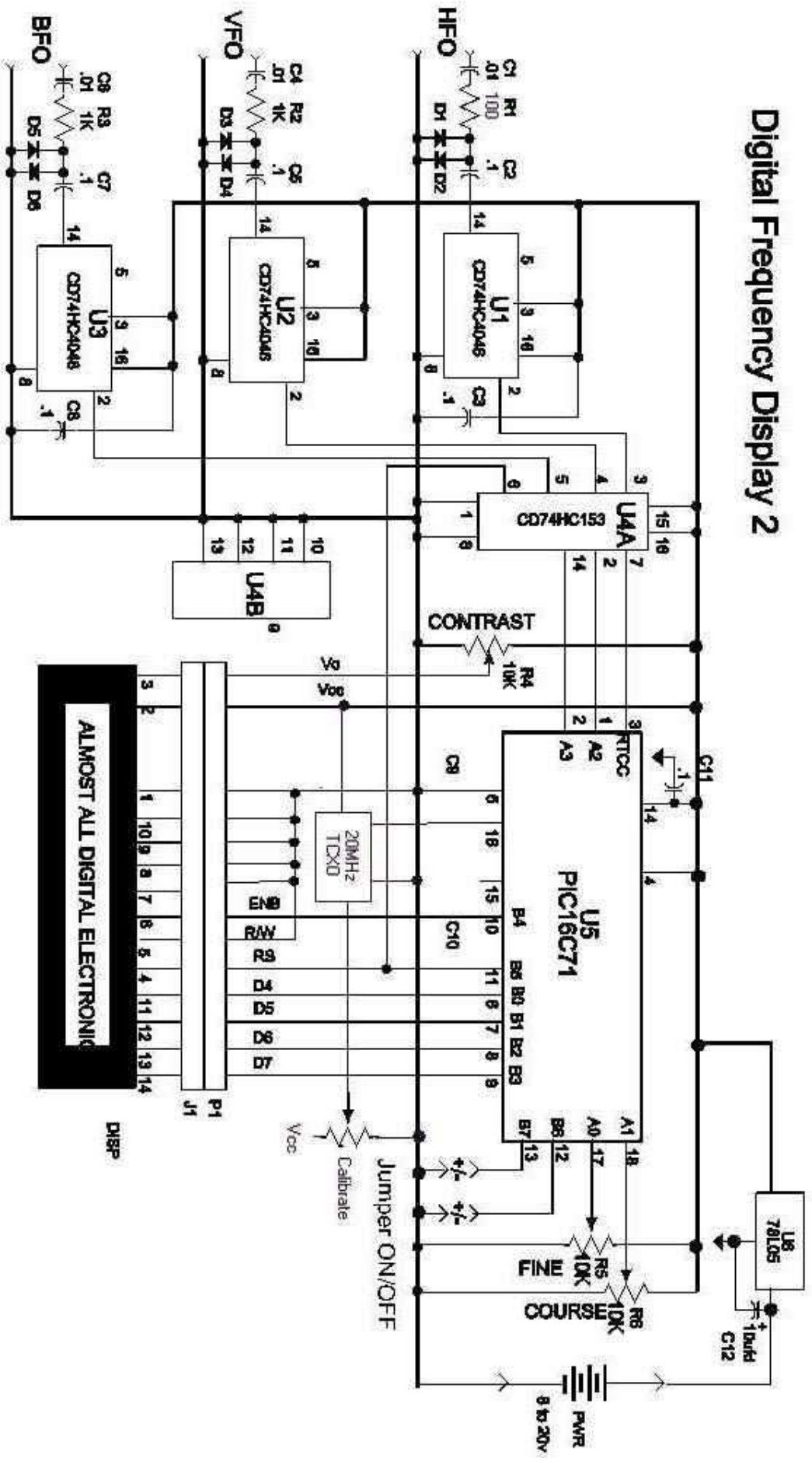
Only one input is required for a DFD1.

**The 7805 part is to power a backlit display option.**

**For additional installation hints see**

**<http://www.aade.com/applications2/app2.html>**

# Digital Frequency Display 2



DISP

# Yaesu FT-301AD

This is for the FT-301 series radios with the pesky digital display

The original display runs very hot. It burns segments out then after a while you have no display, There are no TIL306 and TIL308 segments to be found and no way to know where your at on the band.

This is to help the sorry folk's with a decent radio and no display.

The analog FT-301 has a different front bezel so the internal installation may not work for you.

IF you intend to have the display external (easier) go to the wiring instructions and run the cables to RCA jacks or BNC's on rear panel.

This is how I did it, Looks factory and works way better than original

Internal installation (difficult)

Some pictures should help:



AF-board



RF board



back face showing DFD mounting



Front face showing DFD installation



close up of mounted display boards.



Top view of completed installation

**Remove top cover with the 4 plastic pull knobs**

**Remove the 12 screws on the bottom cover**

**Remove all knobs on the front panel and the 8 counter sunk screws from front panel trim ring.**

**Pull the front panel gently and cut resistor and wires off the calibrate control (save the Cal knob to keep the hole plugged)**

**Remove the Display logic unit PB-1524B and remove the jack nut and old mounting bracket for the board off the front of the VFO, find more compact slim line screws to put back into the VFO for more clearance for the new display board. (Junked CB case screws are a good source)**

**Remove the Display premix unit PB-1541D (bottom of chassis) and cut the 3 wires at the rear, The white is the VFO feed, cut short and heat shrink. The orange wire is +5V cut this short and heat shrink also.**

**The brown wire is the +13.8V source, keep this to hook up the new display power to.**

**Remove the silver braid off the ground lug, The ground lug is where the back wire will go to on the new display board.**

**Unplug the black header plug that runs to the band switch. I kept this intact for maybe band data, etc., every position of the band switch grounds one wire at a time.**

**On the front panel remove the bezel, remove the 3 small post holding on the tinted lens, file these smooth. I had to discard the tin box for the VFO/CLAR/FIX lights ,I'd rather have a display that works then lights telling me this as well as the switches.**

**Remove the wires off the tin box and heat shrink them. Save the VFO/CLAR/FIX lens to put back on to plug the hole up (I used the JB-weld to glue it back on)**

**Trim 1/8" of plastic off the right hand side of the face plate (not the bezel)**

**Trim 1/16th" off the left hand side of the face plate this will trim one side of the plastic box off also.**

**Trim 1/4" of sheet metal off the chassis on the right hand side behind where the face plate goes.**

**All this trimming clears the new display board and the display screen. Take your time it will look nice.**

**Put face plate and plastic bezel back together with the 3 screws, The top screw needs to be replaced with one with a smaller head.**

**Disassemble the new display screen by carefully twisting the tabs back into place, GENTLY pull the metal bezel off the screen and circuit board.**

**I used JB-Weld to mount the metal bezel to the FT-301 face plate & back of the FT-301 plastic bezel (on the back). It worked well and is way strong. If you don't glob on a mess of it, you'll have a clean and durable mount made up. Remember this will also hold both of the new display circuit boards.**

Carefully reinstall the display screen and the board (make sure it's right side up!) Gently twist the tabs back, I checked it with the 9 V battery to make sure the display was lined up properly with the circuit board.

Now solder your RG-174 cables on the new display board mark one cable so you know where it goes, and cut off the 9 V battery connector close to the end of the wires.

Put some double sided sticky tape on the front of the VFO casing to help hold and insulate the display board.

Mount your faceplate and check for interference with the display board with the chassis.

Reinstall the trim ring and 8 screws, reinstall the knobs.

Unscrew and pull out the RF board PB-1433 on the right hand side toward the rear on the radio.

Locate where the premix coax cable solders to the board, at the circuit trace and C107, C118 is soldered.

On the bottom of the board (solder side) solder one leg of a .01uF ceramic disk capacitor with the lead's short. The other leg of the .01uF cap solders to the center leg of a 10k variable resistor.

The left leg of the resistor solders to the center lead of your RG-174 coax. The shield of the RG-174 coax is soldered to the grounded leg of L101. This is your "HFO" signal. Plug the board back into the slot and reinstall the 2 screws.

Remove the 4 screws and the plastic cover at the left hand side of the radio.

The board in the very back is the AF board PB-1437. It's not necessary to remove this board.

Find VR501 - The carrier balance variable resistor. Solder one leg of a .01uF ceramic disk capacitor with the leg's cut short to the center of VR501. The other leg of the .01uF cap solder to the center leg of a 10k variable resistor. The left leg of the 10k variable resistor solder the center lead of the other RG-174 coax.

The shield of the RG-174 solders to the grounded side of R508 This is the "BFO" signal.

Flip the radio over and solder the red wire of the new display unit to the brown wire mentioned earlier, heat shrink.

Solder the black wire to the ground lug mentioned earlier.

Check over your work.

Turn both of the variable resistors counter clock wise.

Put radio on AM, this will have the BFO in off position.

Turn on the radio, Time for the smoke test!

Try the radio in receive mode on all the bands, adjust the variable resistor on the RF board for a steady and stable readout. 15M and 10M bands this is sensitive, If it's not adjusted right it will look like your turning VFO when your not. If it's over adjusted it loads up the circuit on the 40M band and weakens the sensitivity on 40 meters. Adjust and check the bands.

Now flip the radio on SSB and adjust the variable resistor on the AF unit till your mode reads correctly on the display.

Reinstall the plastic cover and 4 screws.

Reinstall the bottom cover and the 12 screws.

Install the top cover and enjoy a very fine display and knowing where your at on the band.

Thanks to All Most All Digital!!

-Terry W5CEU