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33cm Transverter Kit
DEM Part Number 903-144

Operational Overview

The DEM 903-144 is a 33cm to 2M transmit and receive converter. The 903-144 has a linear output power of approximately 10 watts. On the receive side, a GaAsFET preamplifier, and interdigital filters provide a sensitive front end with excellent out of band signal rejection. The DEM 903-144 has a built in transmit / receive relay. Options have been provided for a key line input (+1 to 15VDC TTL or PTT to ground) and auxiliary contacts on either transmit or receive with a common line for many applications. The 2M IF levels are adjustable on both transmit and receive and have a dynamic range of approximately 25dB. This is very useful for adjusting your maximum output power and setting the "S" meter level on your IF receiver. IF connections are via BNC connectors. The control, power, and auxiliary connections are via RCA jacks, and the 33cm connectors are Type 'N' or BNC (user choice). The 903-144 is housed in a 8.7" x 5.7" x 2.2" aluminum die cast box.

DEM 903-144 Operating Specifications

Operating Voltage	12.0 - 15.5 VDC, 13.8 nominal
Current Drain	2.5 amps maximum on Transmit, 350 milliamps on Receive
Output Power	Maximum 9 W linear, 12 watts compressed (FM and CW only) Output has 25 dB of adjustable range. Minimum 1 mW (0dBM) for 10 watts output power.
Maximum IF Drive Power	200 mW (+23 dBM) with 25 dB IF adjustment range
Receive Noise Figure	1.0 dB nominal
Conversion Gain	+17 dB nominal (adjustable IF gain)

DEM 903-144 Options	
External TR switching control	Assembled and tested
Separate 33cm Transmit and Receive ports	1W and 10W drive options available
PTT L (ground) or PTT H (1-15V)	Configured for External Power amplifiers and Pre-amplifiers.
Type 'N' or BNC connectors on 33cm side	Common IF Port

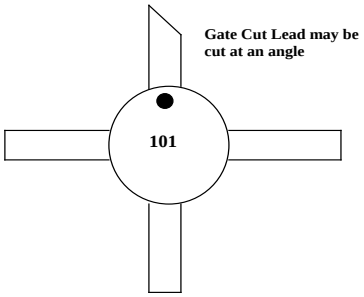
Printed Circuit Assembly Notes:

Your kit is provided with easy to read placement diagrams that show the component layout and the reference designators that correspond to the provided component list. Each side of the printed circuit board (PCB) is also shown to eliminate mirror image assembly errors.

Assembly Tips:

Soldering surface mounted active components (transistors etc.):

- The DOTS on the MMICs (IC1- IC6 and IC8) determine their orientation and must be observed and positioned correctly prior to soldering. The GaAsFET (Q4) angle cut lead or dot is the Gate side which corresponds to the "G" on the assembly diagram (See Figure 1). Leads on all active surface mounted components should be somewhat flat against the mounting surface, if they are not, a small tool such as a small bladed screw driver can be used to flatten them. (See Figure 2).
- Align the component in the proper position based on the assembly diagram, ensure that the leads are placed on the circuit trace and do not over hang it.
- Holding the component in place, solder one lead to the circuit and observe the alignment of all leads.
- If the alignment is acceptable, solder the remaining leads. You need enough solder to cover the lead and mounting surface for the entire lead length. Additional amounts results in a smaller solder roll! (See Figure 2 shaded areas)



Q4 Figure 1

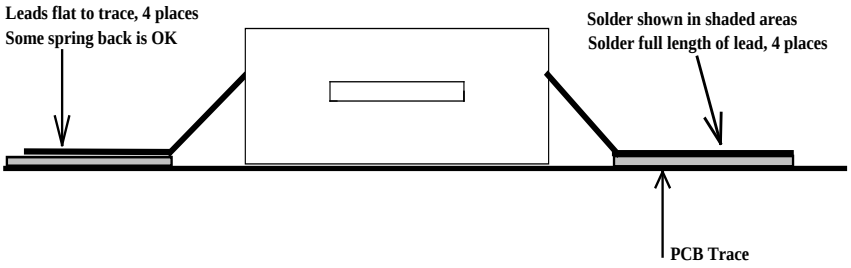


Figure 2. ***Typical side view of four leaded surface mounted device, lead bending close to body***

Soldering surface mounted passive components (chip resistors / capacitors):

- Determine the component mounting position based on the assembly diagram.
- Without the component in place, heat one side of the mounting area and flow a small amount of solder on it.
- Place the component in the correct position per the assembly diagram, it should now have one end over the previously melted solder.
- Holding the component in place with tweezers or other soldering aid, heat the end with the previously melted solder and allow it to flow into the solder, once solidified, remove holding tool.
- Now heat and flow solder to the other side of the component and your done!

Soldering leaded components (resistors, capacitors, diodes, etc.):

Depending on your available tools, you can solder your transverter's leaded components from either the top or bottom of the PCB. It is suggested for the home assembler to use a method that is comfortable. A simple holding vise can be utilized to allow the components to be 'dropped in' from the top side and soldered on this side without flipping over the assembly. As an alternate method, you can insert one component at a time in the correct mounting location and gently push down to the circuit board, while holding the component, flip over the circuit board and bend the leads over in opposite direction to hold the component in place. Although this is the most reliable method, there are some draw backs if the component must be removed when the PCB is installed in the box.

Rework of soldered components if needed:

The easiest method to rework soldered components is to employ a desoldering braid that is specifically designed for this purpose. It can be purchased at most electronics component distributors. Place the desoldering braid on the lead that you are removing and apply heat to it. **Without excessive pressure** the solder will melt and flow into the braid leaving the lead or component ready to be removed.

The DEM 903-144 is fairly easy and fun to assemble even for the first time kit builder and can be completed in any order that is comfortable, however DEM Inc. suggests the following assembly procedure to minimize errors and possible frustration.

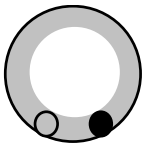
Surface Mount Component Suggested Assembly:

The assembly operation should begin by orienting the PCB with the assembly diagram. Correct orientation can be determined by observing the notches on the long sides of the PCB. The following assembly order is suggested: ***Observed polarity using either the DOTS or lead configuration as explained in the Assembly Tips section.***

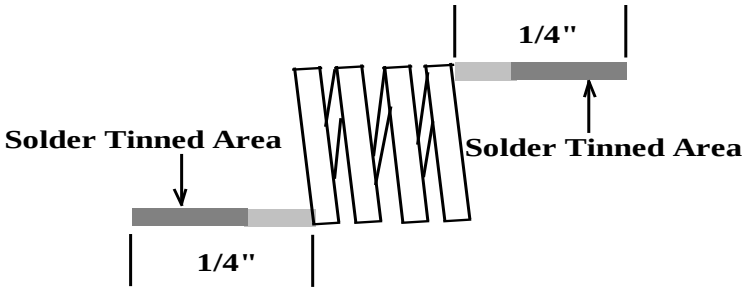
1. Install and solder Q4. See diagram on page 4, step 10 for proper orientation of gate lead.
2. Install and solder the balance of the surface mounted active components IC1 - IC6, IC8.

Observe your soldering and component orientation one more time to ensure everything is correct.

L1, L3 - L6, L10 - L13, L16, L19 must be formed prior to installation. The coils should be wound around an appropriate size mandrel, such as a drill bit. Winding coils is not an exact science and you should not be intimidated by it. Using the supplied specified gauge wire (see component list), extend about ¼" in a perpendicular direction off of the mandrel and wind the wire around it, counting each revolution as one turn. When the total number of turns is completed (see the component list) cut the wire an additional ¼" beyond the mandrel. Form the two ¼" leads so they are pointing in the direction as shown in the detail below.



End view of formed coil



Top view of normally formed coil, (4 turns shown)

Dress the turns together if they are out of shape from winding, remove the coil from the mandrel. The coil forming is complete! To ensure a positive solder connection, the ¼" leads should have the enamel insulation removed prior to soldering. This can be accomplished by applying solder to a hot soldering iron tip and placing the lead in the molten solder, you will see the insulation bubble indicating that it has melted (The tinned lead should be a silver color indicating that the insulation has been removed and the solder has tinned the base metal, if not repeat the process). As an alternative, the enamel can be removed by scraping the ¼" leads with a razor blade until the base copper is exposed. Solder coat the exposed base copper.

Assemble and solder the components in the following suggested order while observing polarities as shown on the assembly diagram.

Note: Some leaded components have their leads soldered directly to the circuit board by forming the leads down as shown in one of the figures below. When devices are formed and installed as shown in Figure A it will be noted by this symbol α. When forming is per Figure B it will be noted by this symbol β.

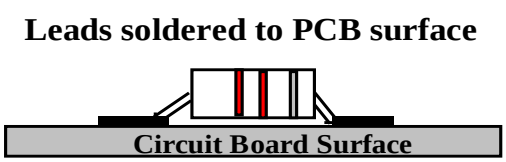


Figure A = α

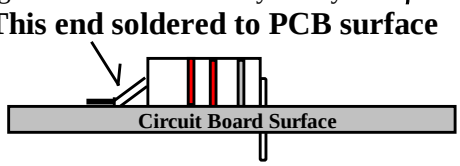
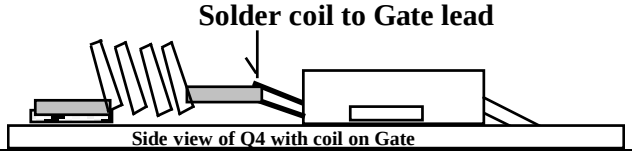


Figure B = β

STEP	OPERATION and NOTES
1	Install and solder chip capacitors C1, C3 - C5, C8 - C16, C19 - C21, C27 - C35, C38 - C41, C44 - C48, C51, C53, C56-C58
2	Install and solder chip resistors R27 and R28
3	Install mixer IC9. Observe polarity dot on cover. Please refer to drawing on page 13 for correct placement. Solder all six leads.
4	Install and solder C2, variable capacitor.
5	Form, install and solder (D1α), D2 - D6 **Note: Ensure proper polarity**
6	Form, install and solder L2, L7 - L9, (L17α) molded inductors
7	Form, install and solder leaded resistors including R14 and R16. Resistors are thru hole unless specified. (R9, R10, R24, R30 - R32 = β) (R20 - R22 = α)
8	Form, install and solder all leaded capacitors **Note: Ensure proper polarity on Tantalums**
9	Install and solder Q1, Q2, Q5, VR1 - VR3 **Note: Ensure proper polarity**
10	Install L1, L3 - L6, L10 - L13, L16, L19 **Note:** One end of L16 must be soldered directly to the GaAs FET Gate lead. 
11	Install Y1 Crystal
12	Install Relays K1, K2

If the transceiver being used for IF provides a key line to ground on transmit select the PTT-L option. If the transceiver provides a positive voltage in transmit select the PTT-H option. **Consult your transceiver's manual for details**.

Install and solder wires in the areas on the board as shown in the table below. Refer to Top and Bottom side PCB drawings.

Note 1: Strip and tin ≈ ¼" from each end of the wires.

Note 2: Flying Leads are wires that will be connected later in the assembly process.

WIRE	LOCATION	FROM	TO	SIZE
#28 Teflon	Bottom Side	E4	13.8SW near K1	3¼"
#28 Teflon	Bottom Side	E1	TR near K1	3½"
#28 Teflon	Bottom Side	E4	+13.7 SW near VR1	4¾"
#28 Teflon	Bottom Side	E5	E2	2.0”
#28 Teflon	Bottom Side	E4	Flying lead	7.5"
#28 Teflon	Bottom Side	E5	Flying lead	4.0"
#28 Teflon	Top Side	Either PTT-L or PTT-H	Flying lead	2¼"
#20 BUSS Wire	Top Side	RXIF	Flying Lead	1¼"
#20 BUSS Wire	Top Side	TXIF	Flying Lead	1¼"

Trim all leads and wires on the bottom side flush wit the surface of the board. Look over your work for solder bridging to adjacent traces, mis-installed components, and protruding leads that may short to the enclosure of the installation of the PCB. The printed circuit board is now complete.

PCB assembly into the external box.

The external box is pre-drilled at the factory for your convenience. If not already done, remove the cover from the box and wipe the inside clean to remove any remaining metal particles that may have been trapped during drilling. Notice that the box and the circuit board have corresponding holes which are directional and must be aligned correctly. Please note the two holes for mounting

Installation in the box is easy if the suggested assembly steps are followed.

Place one screw in a PCB pre-drilled mounting hole from the bottom side of the box. While holding the screw in start a 4-40 nut on the screw threads inside of the box and tighten. Repeat for the balance of nine (9) PCB mounting screws.

Prepare the N connector as follows to establish final pin length:

- If your supplied N connector has a "O" ring seal, remove and discard.
- Insert the connector so it is flush to the box in the proper mounting hole (See Figure 4 for location).
- Place a razor blade on the extended Teflon, using the box wall as a guide, rotate the connector allowing the razor blade to penetrate into the Teflon.
- When the blade reaches the metal center pin, remove the Teflon slug.
- With a large side cutter, cut the center pin to approximately 1/8" beyond the Teflon.

Form the #4 ground lug as shown below prior to installing. Mount the prepared N connector using four 4-40 x 5/16" screws. The screws should be inserted from outside of the box. Position this so the formed end is facing out and is facing the center pin of the N connector. Install the remaining screws and nuts. Start by installing the lower right corner screw with a #4 lug as depicted in figure #3. The coaxial cable will be installed later in the assembly.

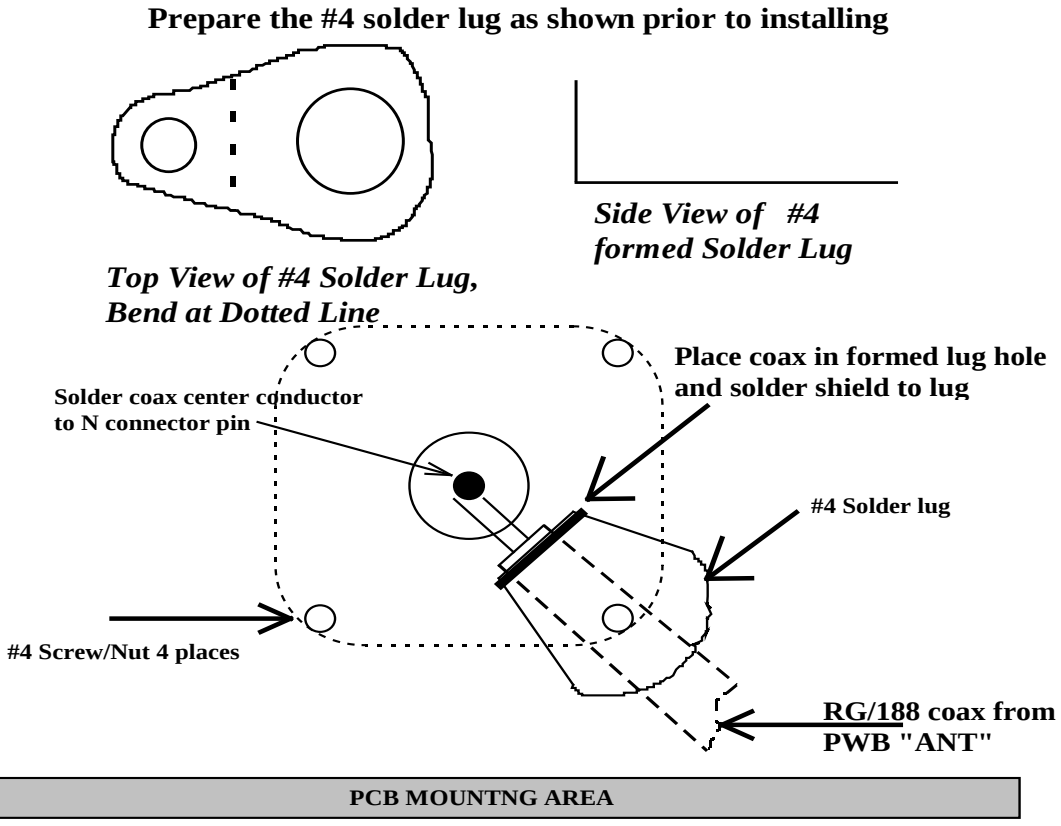


Figure 3 Inside View of Box, Solder Lug Installation on the 'N' Connector

Install the remaining rear wall mounted connectors, location per Figure 4:

2 - BNC connectors at the RX and TX positions using the supplied 3/8" nuts. If washers are supplied, install them on the inside of the box. If you have difficulty tightening the connector, connect an adapter or cable connector and hold this while tightening to keep it from spinning.

1 - BNC connector at the AUX. (3/8" Hole) position as in step one (1), under the nut place the 3/8" solder lug. Bend the lug away from the wall to form right angle. This AUX. connector is used with the separate transmit and receive option.

3 - RCA connectors for AUX., CON and 13.8VDC using the supplied hardware. Both the flat washer and the solder lug should be installed on the inside. Post tightening, the lug should be bent away from the wall.

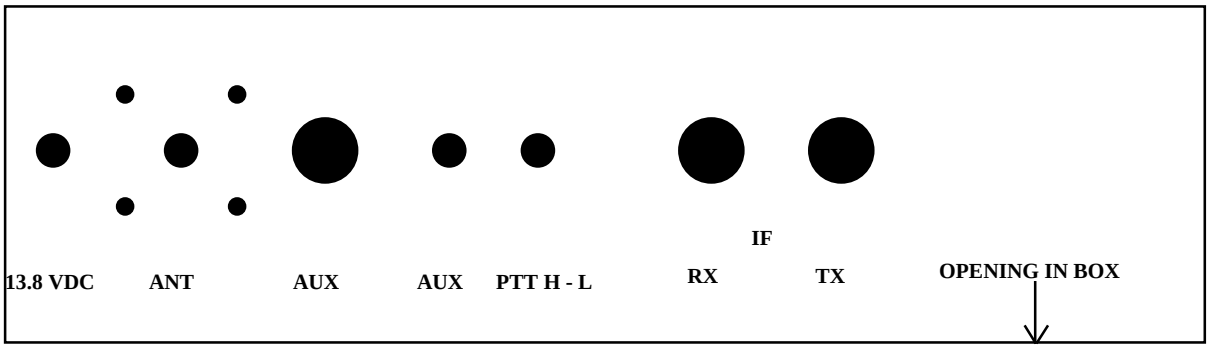


Figure 4 Jack Mounting Positions Outside View

Using caution not to pinch the bottom side wires, place the finished circuit board over the ten (10) 4-40 screw / nut combination and gently push flat against the nuts. Place two nuts on opposite corners on the screws extending through the PCB and tighten evenly.

- Mount switch (SW1) in the hole labeled "POWER" using the supplied hardware.
- Connect the #28 Teflon wire to the wall mounted RCA PTT H- L jack, then connect a 1000pF capacitor between the center pin and solder lug and solder both leads. (See Figure 4 for jack location).
- Connect and solder a 1000pF capacitor between the center pin and the solder lug on the AUX. RCA jack.
- Connect and solder a #18 Teflon wire from the wall mounted 13.8 VDC jack to the middle terminal on the wall mounted switch and solder. (See Figure 4 for jack location)

Note: The longer lead on the LED is positive.

- Prepare both LED's by supporting the **SHORT** lead (negative) at the LED body, bend the lead 90º away from the longer lead.
- Place both the "ON" LED and the XMIT LED in their corresponding wall mounting hole (see Figure 5). Place the previously formed lead on a ground via hole at the edge of board and solder.
- Place the other positive lead of the XMIT LED on a 13.8SW via hole.
- Connect the wire form the top terminal on the switch to the PCB pad located below the Switch label 13.8SW

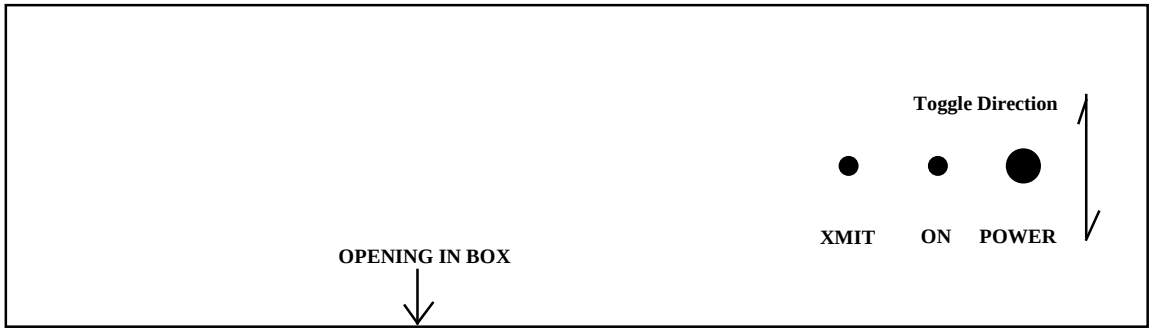


Figure 5 Switch / LED Mounting Positions

Electrical Test Verification:

Receiver Testing:

The following information is provided to electrically pretest the transverter prior to final assembly. If you have a frequency counter it would be helpful but is not mandatory.

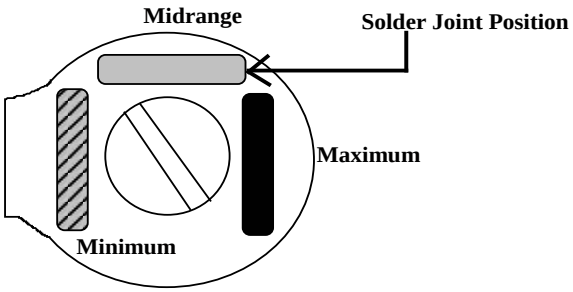
Apply 13.8 volts to the RCA DC Power jack. The center pin is positive. Turn on the power switch, the transverter will now be in the receive mode. The ON LED should light up. Check the voltages in the order shown, then continue by checking the oscillator section. Die cast box is ground.

MODE	LOCATION	VOLTAGE reference to Ground
RX	+13.8SW near K1	13.8 or input line voltage
RX	Output lead of IC8	7.0 +1.0 - 0.5VDC
RX	Output lead of IC2	5.0± 1VDC
RX	Output lead of IC3	5.0± 1VDC
RX	Output lead of IC4	5.0± 1VDC
RX	Junction of VR1 & C6	8.0± 1VDC
RX	Junction of R8 & L3	5.0± 1VDC
RX	Junction of R30 & Q4 Drain Lead	2.0 + 0.5VDC, -0.2VDC ❖

❖Due to variances in the GaAs FET devices you may need to adjust the Drain current. Optimal performance normally occurs between 20 & 30 mA as measured across R30 (150Ω) as I = E÷150. If the current exceeds 30 mA remove either R27 or R28.

Local Oscillator Testing:

Connect the positive lead of a Voltmeter to the R6 / C8 junction. Adjust C2 for maximum voltage, note where the capacitor is positioned. A midrange position is preferred (see diagram below). If the capacitor is at the maximum position, spread coil L1 1 to 2 turns and readjust C2 for maximum voltage, the capacitor should be near midrange, if not repeat. If the capacitor is at minimum position, repeat process but this time compress coil L1. And if necessary, you may need to wind a new coil with an extra turn and replace. The final voltage should be approximately >1.0V. If only a low frequency meter is available probe the input lead of IC1 and tune C2 for 94.8750MHz. If a 1GHz counter is available probe the LO input of IC9 and Tune C2 for 759.000 MHz. See figure 9 on page 13. If the voltage or frequency can not be obtained, check all components in the oscillator circuit for proper installation.



C2 Capacitance Position

Transmitter Testing:
The voltage check list below is for the transverter in the transmit mode. To place the transverter into the transmit mode depending on how your transverter is configured, apply PTT L or H signals.

MODE	LOCATION	VOLTAGE (Reference to Ground unless Specified)
TX	Relay K1 or K2	Audible Click
TX	Junction of R21 & IC5	5.0±1VDC
TX	Junction of R22 & L13	5.0±1VDC
TX	Junction of R23 & R24	3.5±0.5VDC
TX	Junction of D4 & L10	0.8±0.1VDC

***** DO NOT PROCEED UNTIL THE ABOVE CHECK POINTS ARE VERIFIED *****

Once check points are verified, install the remaining nine 4-40 nuts on the screws holding the PCB. Some screws may require a smaller diameter nut to prevent shorting to active circuitry (by IC3, IC7 and IC9), see component layout.

POWER MODULE INSTALLATION

Place the power module (IC7) on the box floor in its mounting location (see assembly drawing) and trim the leads so they do not extend past the solder pads, they will be approximately 3/8" long once trimmed, remove. Wipe the mounting surfaces of the box floor and flange of IC7, verify the surfaces are free of any foreign matter before applying a thin even coating of thermal compound⊙ to the mounting flange. Place IC7 on the box floor and lining up the leads with the solder pads of the circuit board. Install two 4-40 x 3/8" screws through the box , like the PCB mounting screws. Inside of the box place 2 #4 ground lug on top of IC7's flange. Install and tighten evenly the 4-40 nuts (see TOP View PCB diagram).

Form the leads of IC7 flat to the solder pads, solder all leads to the circuit board.

⊙ Thermal Compound can be purchased at most electronics component stores

PCB assembly into the external box, continued

- Connect a piece of #18 Teflon wire from the 13.8SW pad below SW1 power switch and solder, route the wire to the pad labeled +13.8SW near the power output module and solder to the surface. Be sure to loop the wire up and away from the PCB. Connect and solder the 100µF capacitor to the 13.8VDC jack, observed polarity, positive lead to the center pin, negative to the ring ground terminal.
- Solder the #20 BUSS wire from the PCB solder pad labeled RXIF to the BNC RX/IF jack and solder.
- Solder the #20 BUSS wire from the PCB solder pad labeled TXIF to the BNC TX/IF jack and solder.

The following assembly order is recommended for completion of the transverter for common RX/TX connector. For split TX / RX refer to section 1 of DEM 903-144 user options.

- Prepare the common output coaxial cable as follows: (See Figure 6)
  Cut the coax 2" to 2 1/32"
  Remove the outer insulation 1/4" from each end.
  Remove the braided shield 1/8" from each side.
  Remove the center conductor insulation from each end allowing an extension out of the remaining shield.
- Push the center conductor of the un tinned end through the hole in the solder lug of the "ANT" connector and allow the shield to penetrate the ground lug hole. If not so bend ground lug towards the N connector center pin to accommodate coax (See figure 3). Solder the shield to the solder lug, then solder the center conductor to the N connector center pin.
- Solder tin the center conductor on both ends and solder tin the shield on one end.
- Position the end with the pre-tinned shield on the circuit board by placing the center conductor on the circuit soldering pad labeled "ANT". This circuit is located near relay labeled K1. Angle the coax so that it is facing capacitors C38 and C44. (See Figure 7)
- Solder the shield to the ground area adjacent to the "ANT" soldering pad, then solder the center conductor in the "ANT" soldering pad.

You may use the BNC connector instead of the N connector.
Remember to solder the coax's shield to the solder lug on the BNC connector.

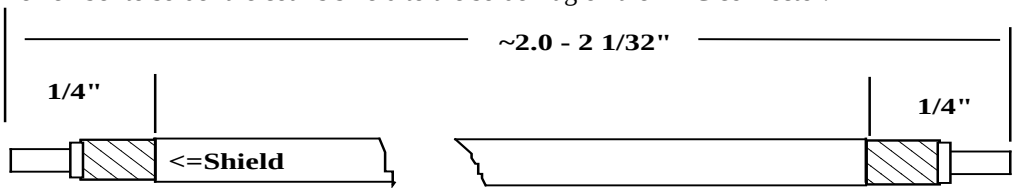


Figure 6 Cable shown broken for clarity

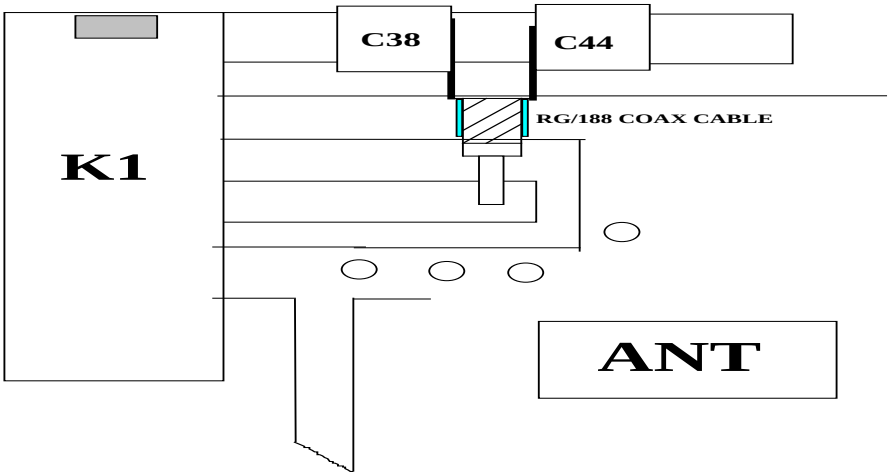


Figure 7 Coaxial Cable mounting on PCB shaded areas are solder points

Transverter Final Tune Up

The assembly portion of your kit is complete, you will now proceed with the final tune up as follows after connecting your transverter to your IF rig:

1. Set R14 to maximum attenuation by turning fully counter-clockwise.

2. Set R16 to the minimum attenuation by turning fully clockwise.

3. Connect the transverter IF ports to your 2M transceiver system using 50Ω cables. Connect the PTT circuit to your transceiver PTT circuit (High of Low to ground). Set the frequency of the transceiver to the WSS portion to the band.

4. Connect 13.8V to the transverter, turn on the power switch, the power LED should be lighted and the transmit LED should be extinguished.

5. Place an Antenna or Generator on the RF connector and confirm increase in receiver noise by switching the power On and Off. No further adjustment should be required to the receiver section if Electrical Test Verification was confirmed. Note: If the receiver is to be aligned on a noise figure meter, L16 can be "tweaked" for desired noise figure and gain.

6. Your "On the air no signal present" 'S' meter resting position can now be set by adjusting R16. This control adjust the 144MHz RXIF gain.

7. If you have a power meter or an in-line forward SWR meter available for the rated output frequency and power level connect it to the antenna jack.

8. Unless there is the correct amount of attenuation between your 2M transceiver and the TXIF port; do not apply more than 200mW. Change the transceiver to the CW position with the carrier level set to minimum.

9. Switch the transceiver into the transmit mode. While observing the power meter slowly increase the carrier control to maximum keeping the transverter power output below 10 watts.

10. If the carrier control is at the maximum and the power output is not at the desired power level slowly turn R14 to increase or decrease the output power.

11. If power output is low connect an Ampere meter in line with the power source to the transverter. If the current level in transmit mode is under 2 - 2.5 Amperes, make sure that R14 is fully clock wise if so, the IF TX level should be verified to ensure that it is approximately 10mW. If current consumption is below this value, the transverter may be under driven. **CAUTION: With R14 in the minimum attenuation position DO NOT EXCEED 20mW MAXIMUM.** If proper power output and current consumption still can not be obtained check all connections and voltages. If you feel that your transverter is not living up to it's specifications, please consult the factory after verifying all voltages, components and IF drive level.

If you need external switching for relays or power amplifiers this can be accomplished via Relay K2 and the RCA Auxiliary connector. Consult the DEM 903-144 supplied schematic for switching details.

12. Put the top on the enclosure and install the screws.

13. Attach the 3/8" adhesive backed rubber feet to the cover.

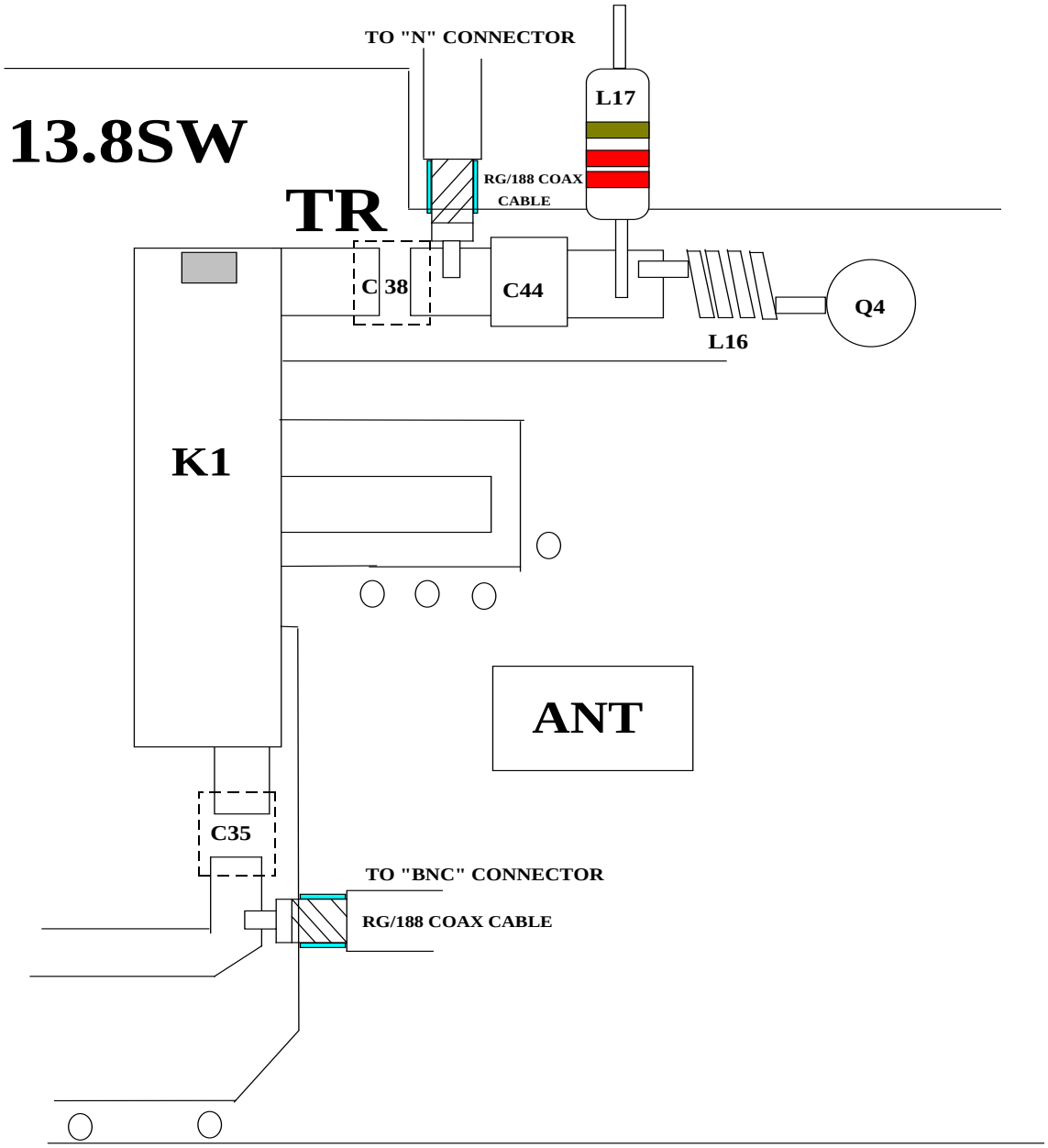
14. Attach the supplied jack / switch labels to the box by first cleaning the mounting surface with a multi-purpose household surface cleaner. Use figure 4 and 5 for placement location.

DEM 903 - 144 User Options

1. Split RX / TX connectors

To operate with split TX / RX connectors it is necessary to perform the following modification, it is recommended by DEMI that the 'N' connector be used on the receive side:

1. Remove chip capacitor C35 and C38.
2. Prepare two pieces of RG/188 coax, one as shown in Figure 6 of the DEM assembly documents. The other should be prepared as shown in Figure 6 with the exception that the cut length should be 3 1/8"
3. Attachment to the circuit board will be per the figure below.
4. Route the RX cable to the N connector and attach and solder as shown in figure 3 of the DEM assembly documents.
5. Route the TX cable to the BNC connector and solder the center conductor to the pin of the connector. Also, solder the shield to the solder lug installed on this connector.



DEM 903-144 Component List

BAG 1 CONTENTS: Resistors (R) values are in Ohms and are ¼W unless otherwise specified. *Chip resistors are attached on a separate card in Bag 2.*

BAG 1

R1 470	R10 330	R19 1K	R32 1K
R2 680	R11 180 1/2W	R20 1K	R33 5.1K
R3 1.5K	R12 1K	R21 330	R34 1K
R4 100	R13 220	R22 180 1/2W	R35 1K
R5 47	R14 1K POT	R23 220	R36 470
R6 100	R15 220	R24 470	R37 1K
R7 470	R16 1K POT	R26 100	
R8 180 1/2W	R17 220	R30 150	
R9 470	R18 220	R31 180 1/2W	

BAG 2 CONTENTS: - All capacitors are surface mounted chips and the values are pF unless otherwise specified. "Tant leaded" = Tantalum Electrolytic leaded "Trimmer" = Variables

BAG 2

C1 1000	C22 120 Leaded	C43 3.3µF Tant leaded
C2 1 - 6 Trimmer	C23 1000 Leaded	C44 22
C3 1000	C24 120 Leaded	C45 470 - ATC Type
C4 15	C25 120 Leaded	C46 470 - ATC Type
C5 39	C26 1000 Leaded	C47 22
C6 3.3µF Tant leaded	C27 22	C48 1000
C7 3.3µF Tant leaded	C28 22	C49 3.3µF Tant leaded
C8 1000	C29 22	C50 3.3µF Tant leaded
C9 1000	C30 22	C51 22
C10 1000	C31 22	C52 1000 Leaded
C11 2	C32 0.1µF	C53 22
C12 15	C33 22	C54 3.3µF Tant leaded
C13 15	C34 0.1µF	C55 3.3µF Tant leaded
C14 22	C35 22	C56 0.1µF
C15 22	C38 22	C57 15
C16 0.1µF	C39 1000	C58 15
C19 0.1µF	C40 0.1µF	R27,R28 75Ω
C20 22	C41 1000	D4 HP3894 Diode Pair
C21 22	C42 3.3µF Tant Leaded	

Hand wound (HW) inductors are close wound, with enamel wire size as specified below. All molded chokes have GOLD and SILVER multiplier and tolerance bands. Please identify desired value by the significant color band combination.

BAG 3

L1 9 Turns 1/8" ID #24 Wire (HW)	L10 4 Turns 1/16"ID #28 Wire (HW)
L2 0.33µH (ORANGE/ORANGE)	L11 4 Turns 1/16"ID #28 Wire (HW)
L3 8 Turns 1/8" ID #24 Wire (HW)	L12 4 Turns 1/16"ID #28 Wire (HW)
L4 8 Turns 1/8" ID #24 Wire (HW)	L13 8 Turns 1/8" ID #24 Wire (HW)
L5 6 Turns 1/8" ID #24 Wire (HW)	L16 7 Turns 1/16"ID #28 Wire (HW)
L6 8 Turns 1/8" ID #24 Wire (HW)	L17 0.33µH (ORANGE/ORANGE) small body
L7 0.10µH (BLACK/BROWN)	L19 4 Turns 1/8”ID #24 Wire (HW)
L8 2.7µH (RED/PURPLE)	#24 Enamel Wire 2'
L9 2.7µH (RED/PURPLE)	#28 Enamel Wire 1'

DEM 903-144 Component List
BAG 4

Q1 MPS5179	IC1 MAR3
Q2 MPS5179	IC2 MAR1
Q4 Selected GaAsFET with ATF prefix	IC3 MAR2
Q5 2N2222	IC4 MAR4
D1 HP5082-2835 (Glass Diode)	IC5 MAR3
D2 MPN3404 (see Fig. 8)	IC6 MAV11
D3 MPN3404	IC8 INA10386
D5 1N914 (Glass Diode) or 1N4148	VR1 78L08
D6 1N4000 Type Diode	VR2 78L05
IC9 LRFMS-4 Mixer	VR3 78L05
Y1 Crystal 94.875 MHz HC 18/U	K1 G5Y
#28 Teflon Wire 3' Length	K2 G5V

HARDWARE KIT

(2) 1000pF Capacitor Leaded	#20 BUSS Wire 4"
(1) 100µF Capacitor Leaded	#18 Teflon Wire 1'
(2) LED, RED	RG/188U Mini Coax 6"
(1) SW1 Power Switch SPST	(1) Eagle Large Box
(1) 3/8" Solder Lug	(1) 330 Ohm 1/4 Watt
(3) BNC Female UG1094/U Connectors	(1) 1K Ohm 1/4 Watt
(3) RCA Jacks (Control, Aux., Power)	(2) #4 Long Lug
(4) 4-40 x 5/16" Machine Screw for "N" connector	(1) Label, Front "XMIT, ON, POWER"
(1) Type "N" connector	(1) Label, Rear "13.8VDC, ANT RX , TX"
(26) 4-40 Nuts (1 smaller diameter)	(1) Label, Rear "CONTROL, AUX, RX IF TX"
(12) 4-40 x 3/8" Pan Head Screws	(4) Adhesive Backed Rubber Feet
(1) #4 Solder Lug (Installed on "N" connector)	

Miscellaneous Loose Parts:
1. RF Power Module IC7, PF0031 or PF0011
2. Printed Circuit Board

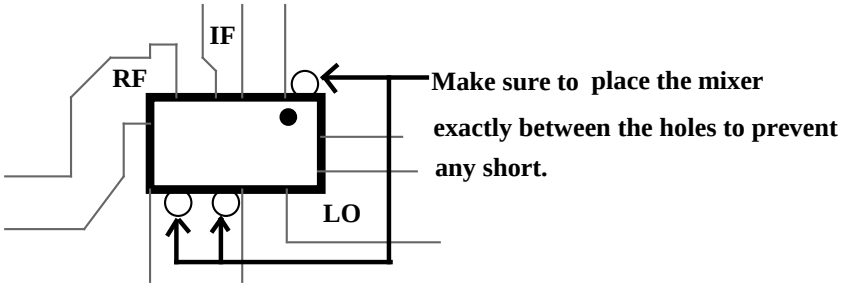


Figure 9 IC9 (LRFMS-4 Mixer) placement

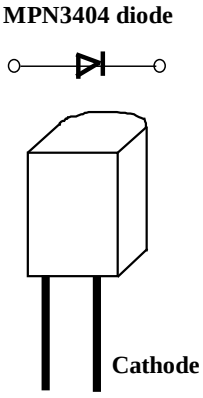
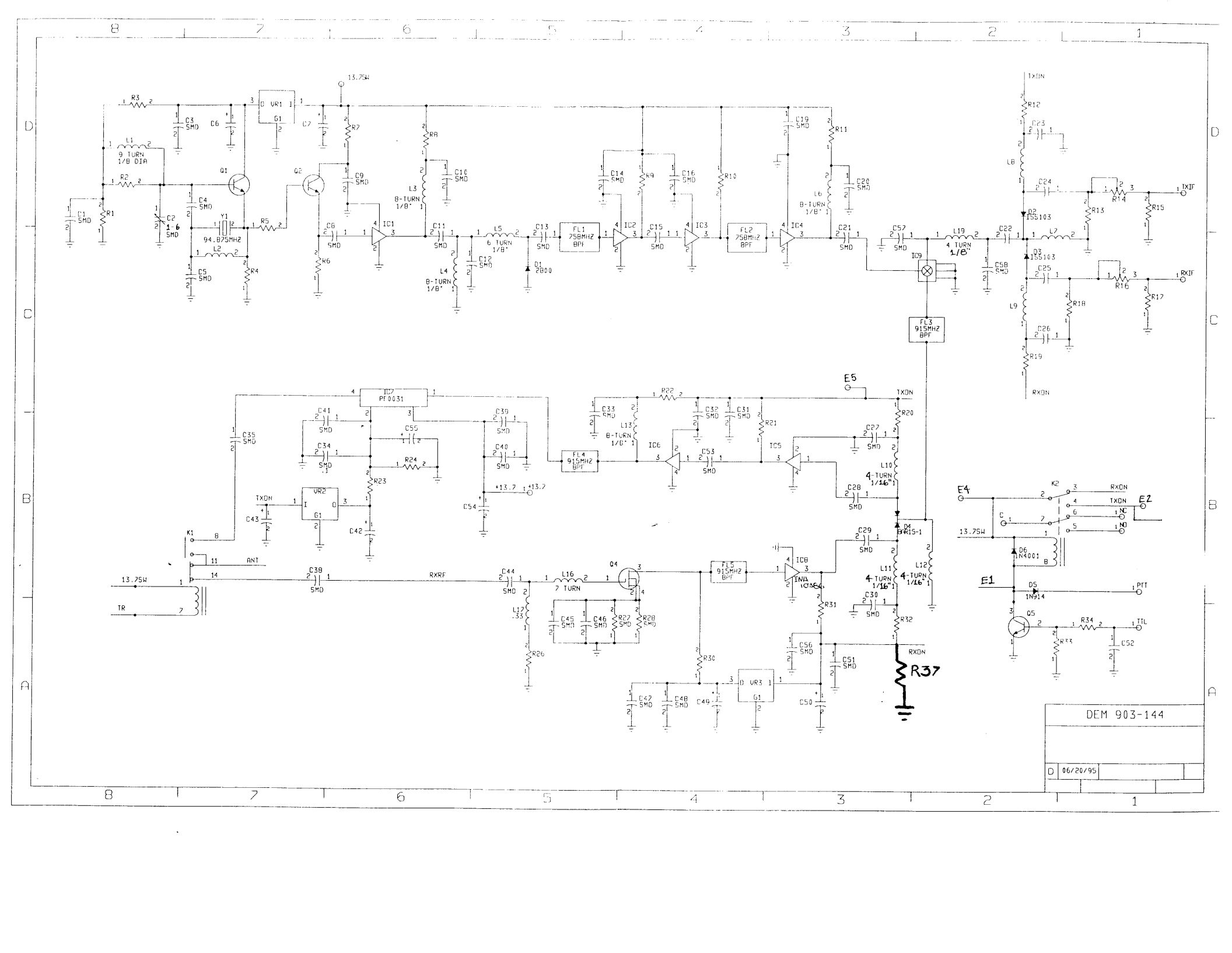
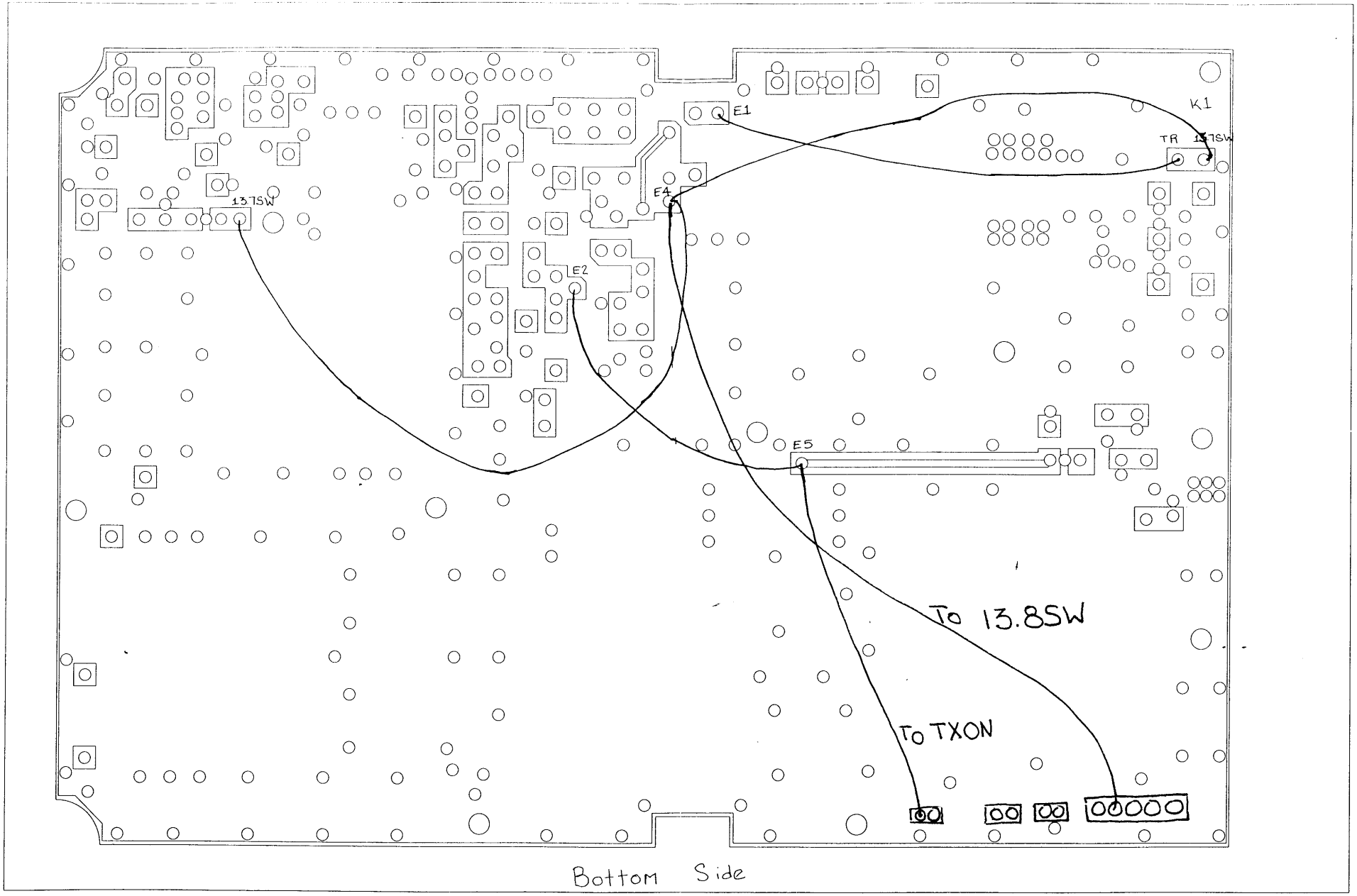
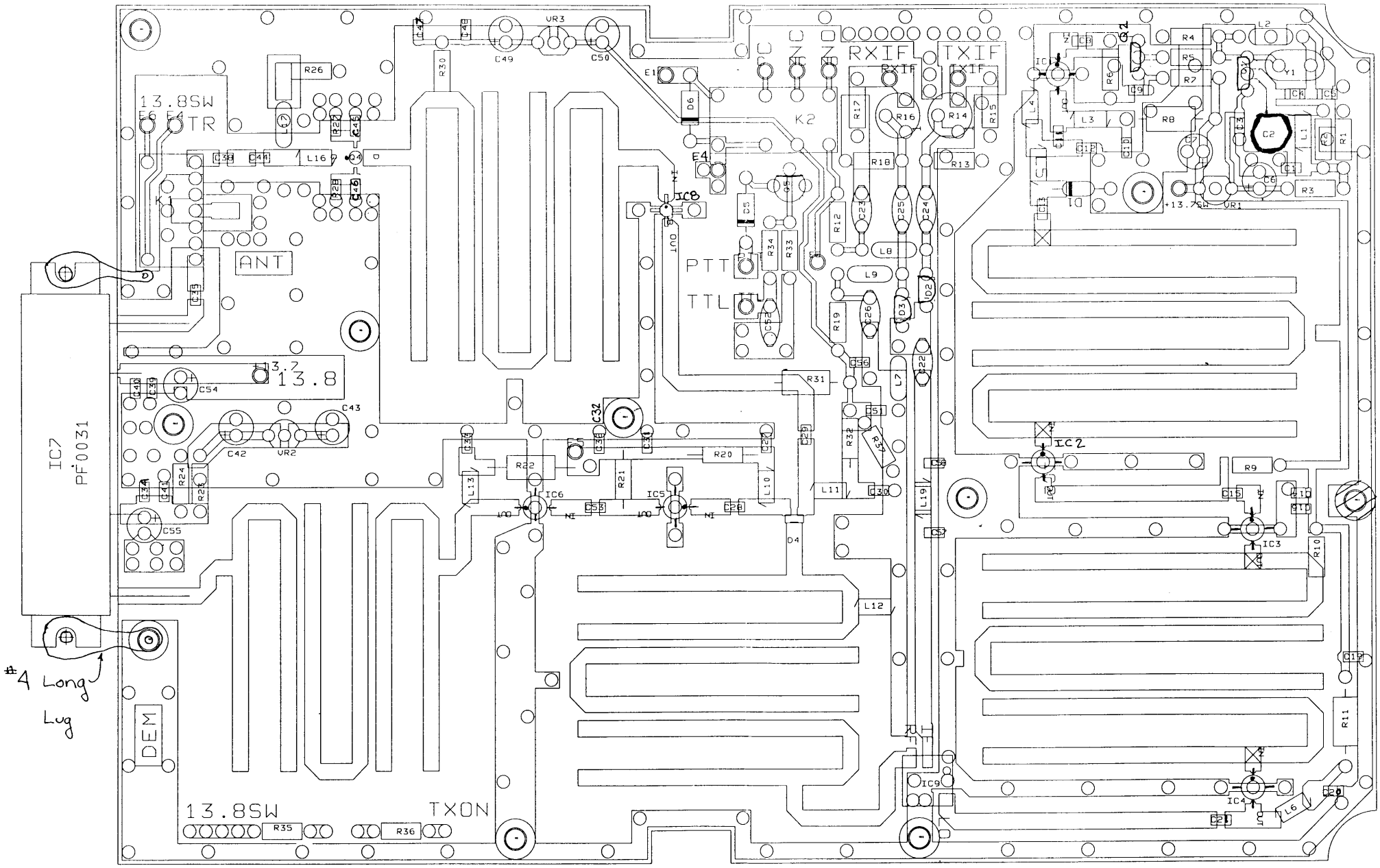


Figure 8


13.75W
R3
VR1
C3 SMD
C6
C7
R7
R8
L1
9 TURN 1/8 DIA
Q1
Q2
C9 SMD
C10 SMD
L3 8-TURN 1/8"
C1 SMD
R1
R2
C2 1-6 SMD
C4 SMD
Y1
94.875MHZ
L2
C5 SMD
R4
R5
C8 SMD
R6
IC1
C11 SMD
L4 8-TURN 1/8"
L5 6 TURN 1/8"
C12 SMD
C13 SMD
D1 2800
FL1 75BMHZ BPF
IC2
C14 SMD
R9
C16 SMD
C15 SMD
IC3
R10
FL2 75BMHZ BPF
IC4
C19 SMD
R11
C20 SMD
L6 8-TURN 1/8"
C21 SMD
C57 SMD
L19 4 TURN 1/8"
IC9
C58 SMD
C22 SMD
TXON
R12
C23
L8
C24
R14
R15
TXIF
D2 1SS103
L7
R13
D3 1SS103
C25
R16
R17
RXIF
L9
R18
C26
R19
RXON
FL3 915MHZ BPF
E5
IC7 PE0031
C41 SMD
C39 SMD
C35 SMD
C55
C34 SMD
C40 SMD
R24
R23
TXON
VR2
C43
C42
+13.7
C54
FL4 915MHZ BPF
R22
C33 SMD
L13 8-TURN 1/8"
C32 SMD
C31 SMD
R21
IC6
C53 SMD
IC5
C27 SMD
R20
L10 4-TURN 1/16"
C28 SMD
D4 BR15-1
C29 SMD
L11 4-TURN 1/16"
L12 4-TURN 1/16"
C30 SMD
R32
R31
IC8
K1
B
11
ANT
14
RXRF
C38 SMD
C44 SMD
L16 7 TURN
Q4
L17 .33
R26
C45 SMD
C46 SMD
R27 SMD
R28 SMD
FL5 915MHZ BPF
R30
C47 SMD
C48 SMD
C49
VR3
C50
C56 SMD
C51 SMD
RXON
R37
E4
K2
RXON
TXON
E2
NC
NO
13.75W
D6 1N4001
E1
D5 1N914
PTT
Q5
R34
TTL
R33
C52
TR
DEM 903-144
D
06/20/95



Bottom Side


13.8SW
TR
ANT
13.8
IC7
PF0031
PTT
TTL
K2
RXIF
TXIF
IC8
IC6
IC5
IC2
IC3
IC4
IC9
13.8SW
TXON
DEM
#4 Long Lug
Ø smaller nut

Top Side