

This transverter project was conceived and developed by Jimmy Howard VE2JWH and the objective was to share his expertise in the microwave communications domain.

The combination of existing circuits and some modifications will yield a linear, all-mode transverter that allows “transmit/receive” operation at a frequency of 2.0304 GHz from a 2 meter radio at 144 MHz.

Transmitter SD-97327 will be the starting main circuit, since most of its parts will be used.

- Discard module AMP/FLT SD-97262 from transmitter. It won't be used.
- Replace it by module SD-96404 (Down-Converter) coming from the receiver.
- Remove the voltage regulator circuit from the receiver and place it next to the transmitter's regulator.
Holes must be made to match with the spacers.

NOTE : *One of the regulators will be used for the oscillator and the other for the rest of the circuits. This is to avoid a frequency shift of the oscillator when we alternate from TX and RX. Even a slight variation of few millivolts may cause frequency shift of the oscillator.*

VE2JWH

TRANSVERTER 2.304 GHz TO 144 MHz

R.P. LECLERC VA2RPL

ANNOTATIONS

VE2JWH



- **Do modifications to PA module as shown in Appendix 4**
- **Remove the main supply connector and replace it with a red and black wire and a strain relief.**

- **Build the « Demi TC Kit » as shown in Appendix 1**

DO NOT PLACE THE HIGHLIGHTED ITEMS P. 5 AND 6

Pay special attention since several parts are not used in the circuit. The circuit is designed to work with 1 to 10 Watts input from a two meter radio. Do the usual checks before use.

- **On the front panel, install the main switch and the 3 L.E.D's.**
- **On the back panel, install the RCA connector (PTT).**
- **Install the « DEMI TC » circuit on the bottom of the chassis, using 2 spacers, and close enough to the side wall so you can bolt the 50-ohm load to the side panel.**
- **Install the 50 ohm resistor to the side panel so it provides heat exchange.**
- **Modify the Local Oscillator as shown in Appendix 2**
- **Modify the up-converter as shown in Appendix 3**
- **Modify the Power Amp. As shown in Appendix 4**

- **Make all tests and place in the chassis**
- **Tune the large copper filter at 2304 MHz**
There is about 1db loss.
- **Install the 3dB splitter SD-96605 as shown on photo 1.**
- **Do the electrical wiring as shown in Appendix 5.**
- **Wire the coax cables (Appendix 6).**
- *Pay attention to this wiring. Existing cables should take care of most of the connexions. Only one extra cable (SMA) will be built.*
- **The Power Supply will be placed onto the cover so everything will be enclosed in the box.**

RECOMMANDATIONS :

- **Conduct a thorough test of the two regulators before using : a bad capacitor could make an unwanted circuit oscillation .**
 - **Also make a proper verification of the « DEMI TC » .**
- It is good practice to connect the power on modules in sequence to check for short-circuits or other problems.**

FINAL STEPS

- Connect a 2meter radio output to the *IF* connector of the transverter. Connect the PTT line to the RCA connector. You may chose LOW or HIGH level of the PTT on the DEMI TC, depending on your radio.
- Connect a Power Meter to the N connector
- Set the radio output power to 5 Watts.
- On the DEMI TC circuit, adjust TX to obtain 1 Watt at 2304 MHz.
- On the « Down Converter », adjust gain for a maximum and adjust the RX of the DEMI TC for a small deflection of the S-meter.

NOTE : Keep this deflection to a minimum, otherwise it will overload the two meter's front-end and will degrade reception.

ENJOY !

On the *DEMI* board, you may connect your PTT line to one of two pads, depending on the condition (high or low) supplied by your *IF* radio.

APPENDIX 1-1



Down East Microwave Inc. 19519 78th Ter., Live Oak FL 32060

Phone: 386-364-5529 (Voice) <http://www.downeastmicrowave.com>



input will switch all RX/TX functions in your transverter and provide external DC switching functions. If your transceiver has +voltage on the coax during transmit, the addition of the L1 inductor will perform the TX/RX switching functions of the transverter. The output of the +24 volt relay driver should measure +24 to +28 VDC with no load. It will only measure the DC input voltage of the transverter if it is loaded with a common type SMA relay.

The TC is not designed to be a RF sensed switch. It has 3 relays and it may be connected to external mechanical relays. If any RF sensing scheme is added to the circuit, it will cause excessive relay chatter that will not only wear out the relays prematurely, but could cause other failures to external preamplifiers and/or power amplifiers if used in your system. RF sensing circuits are not recommended with any circuit that contains mechanical relays at RF frequencies!!

= Parts not used

Parts List

C1 0.01 μ F	C11 2.2 μ F elect.	Q1 PN2222	R10 5.1K Ω
C2 0.01 μ F	C13 330 μ F elect.	R1 220 Ω use 100 Ω	R11 5.1K Ω
C3 0.01 μ F	D1 -D6 1N4000	R2 1K pot	R12 330 Ω
C4 0.01 μ F	D7 1N914 or 1N4148	R3 220 Ω	2 - Red LED
C5 0.01 μ F	D8 1N914 or 1N4148	R4 220 Ω ③	VR1 78S09
C6 0.01 μ F	IC 1 MAR6 ①	R5 1K Ω	50 Ω load
C7 0.01 μ F	K1 G6Y or G5Y relay	R6 220 Ω	1 pF ③
C8 0.01 μ F	K2 G5V or AZ8222 relay	R7 1K pot	
C9 100 μ F elect.	K3 G5V or AZ8222 relay	R8 220 Ω	
C10 2.2 μ F elect.	L1 1.0 μ h (Brown/Black) ②	R9 330 Ω	

- ① To add RXIF gain, the circuit board trace is cut before installation if IC1.
- ② L1 is used with transceivers that have + DC voltage on RF line during transmit
- ③ Depending on the drive level used, R4 may be replaced with a 0.01 chip, a 1pF leaded capacitor, a 220 ohm leaded resistor or a variable capacitor. See text for description.

Single Mixer Option Parts List for 144MHz IF

C14 0.01 μ F	C16 18pF ①	D10 MPN3404	R13 1K Ω
C15 18pF ①	D9 MPN3404	L2 5T 1/8" dia. ①	

- ① For 70cm IF operation use 6.8 pF and 3 turn inductor.

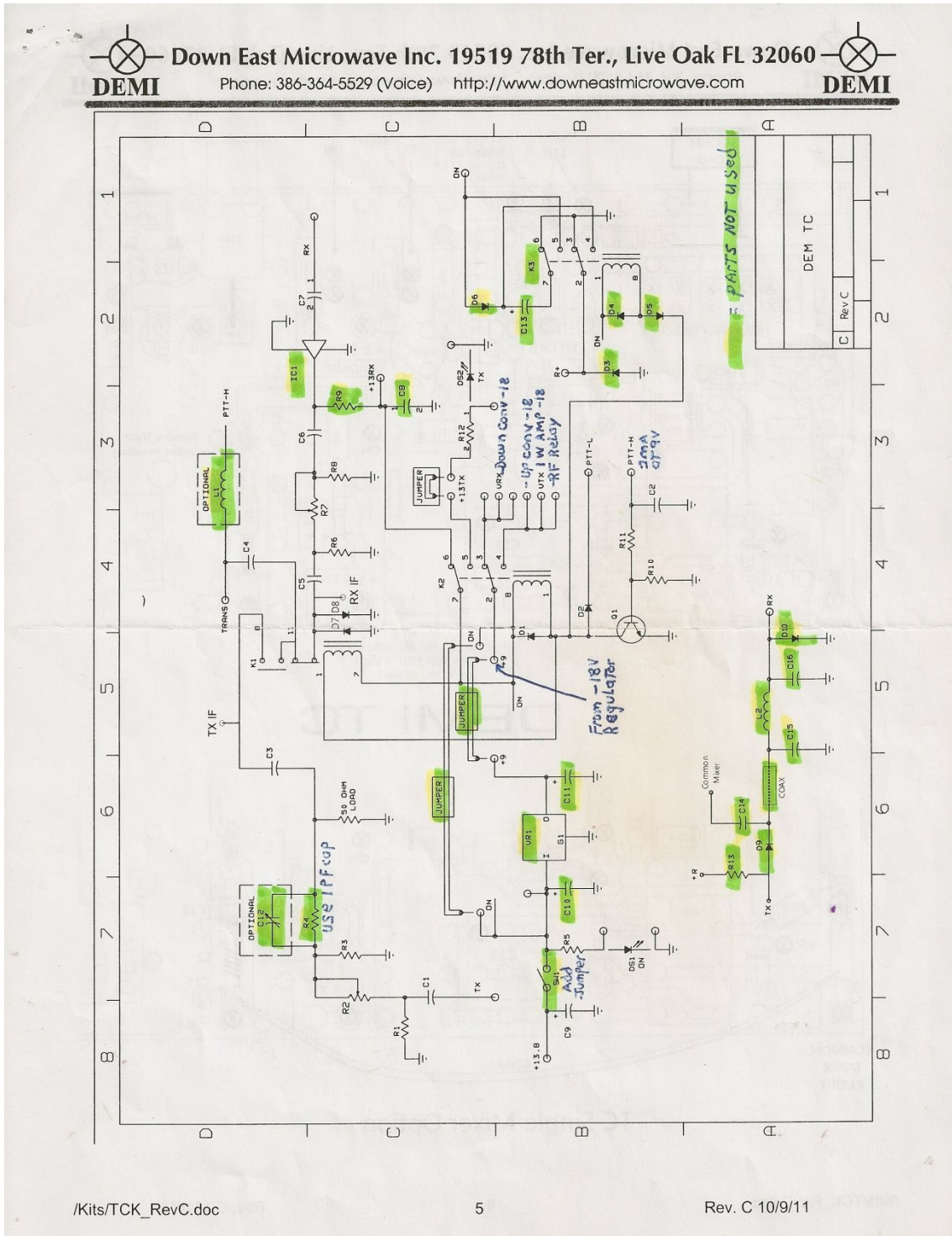
Single mixer option instructions: Cut traces before installing D9 and L2. Install all components as shown. Isolation may be optimized by stretching/compressing L2 if required. Keep Coax as short as possible.

Install D1 and D2.

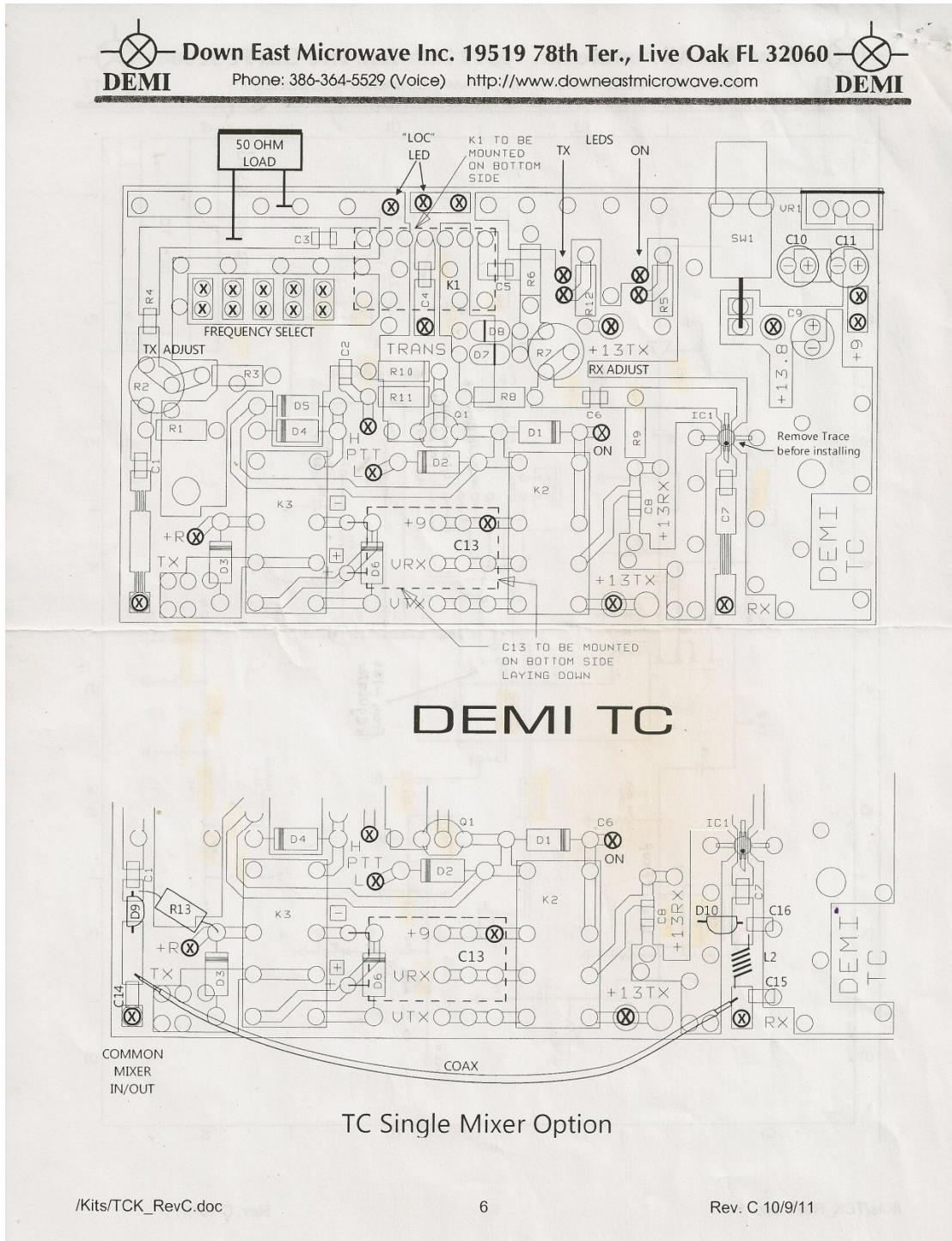
DO NOT install
D3,D4,D5 and D6

REPLACE R4 by a
1 pF capacitor

APPENDIX 1-2



APPENDIX 1-3

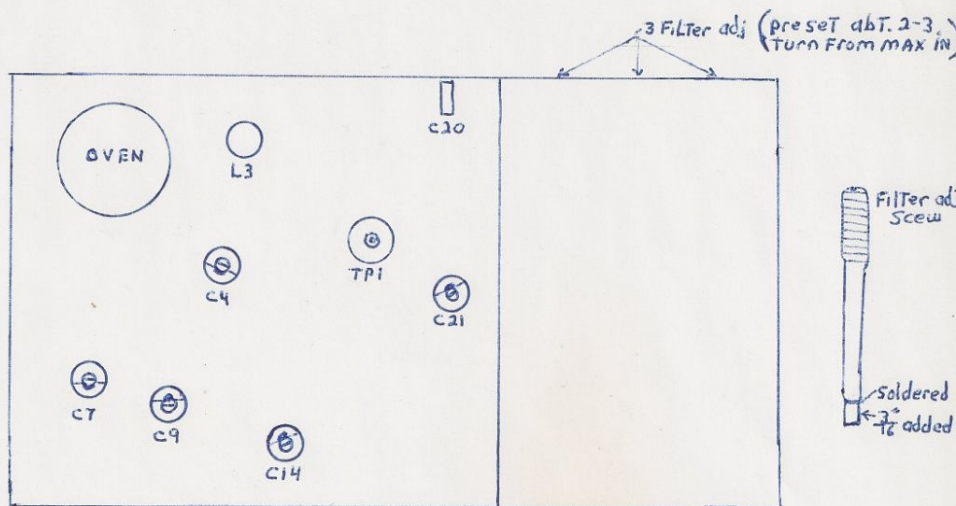


APPENDIX 2

LOCAL OSCILLATOR SD-96405

BY VE2JWH Jan 2013

mode TO make 2160 MHz LOCAL plus Tune up



Put new 90.000000 MHz XTAL in socket (be sure to add a insulator under XTAL or a short will happen). also be sure to cut XTAL Leads like the original

Add a $\frac{3}{16}$ " length of no. 12 copper wire to all 3 of the Filter adj screws, (Remove screws Solder to copper lengths, File smooth Then put them back into the Filter). See screw above.

Tune up: Apply -18 V Regulated, preset trim caps as above, couple a Freq Counter near L3 and adj for max Level and smooth Tuning, now adj C4 to 90 MHz. next plug a voltmeter in the Test Plug TPI and ground, now alter adj C7, C9, C14, C21 till you get a reading and keep Tuning to get abt 150 mV. next hook up a power meter to the SMA output coax adj the 3 Filter screws and C20 to max output (note: Tune C20 for a smooth peak not the max output) now go back Repeak C7, C9, C14, C21 for max output (note: when First Trying for power out the power meter will have to be set to it micro watts setting then to milli watts as the Tuning is done.

When done you should have 7 - 10 DBM output (less than 7 DBM will degrade Receiver Sensitivity).

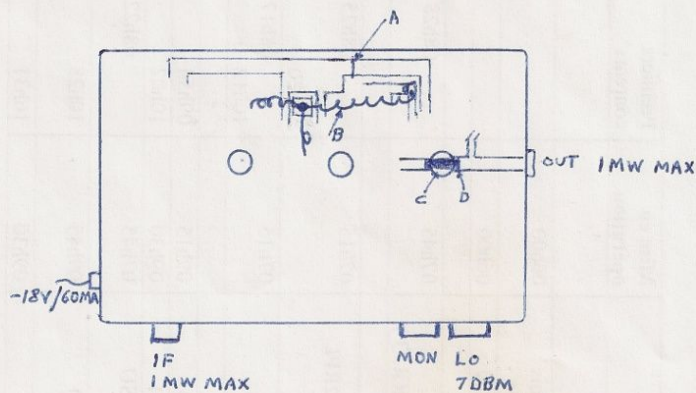
XTAL: you may order it From International crystal Tell 405-236-3741 in The USA IF so use The Ref no. Farinon SD94966/9593780-100 086R13 90000000 MHz

V = -18

I = .14A hot (.4A cold start)

Muti: XTAL Freq x 2 x 2 x 6

OVEN = 80°C

APPENDIX 3UP CONVERTER SD-97332BY VE2JWH JAN 2012To much gain, Remove LAST stage Bypass stageDO LIST

- A CUT TRACE
- B REMOVE END OF THIS COIL FROM PAD WITH 3 COILS
- C REMOVE THIS FET
- D BYPASS FET WITH COPPER STRIP

FROM

HARRIS FARINON

LR4-2500 TRANSMITTER

SD-97327

APPENDIX 4

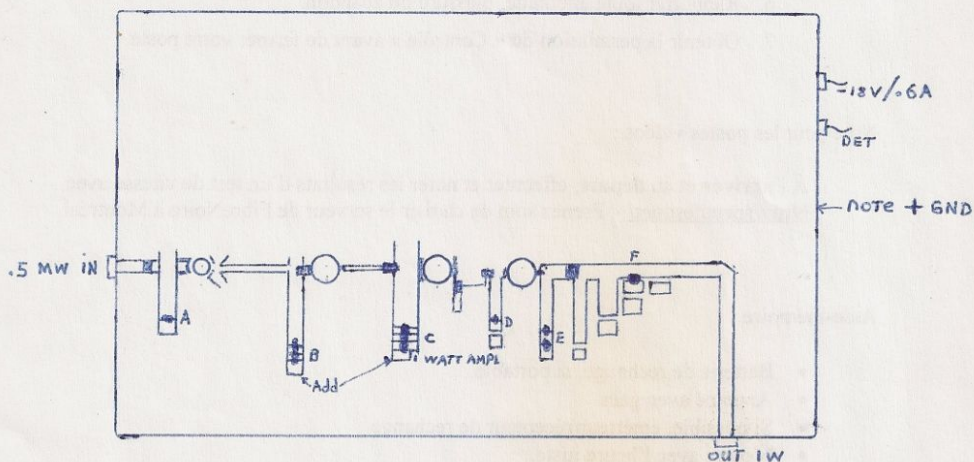
1 WATT AMPLIFIER MODES

SD-97330

BY VE2JWH

JAN 2012

BeFor mode will do abt .8 watt, after modes 1 watt + easy! at
2304 MHz. INPUT .5 MW (-3DBM)



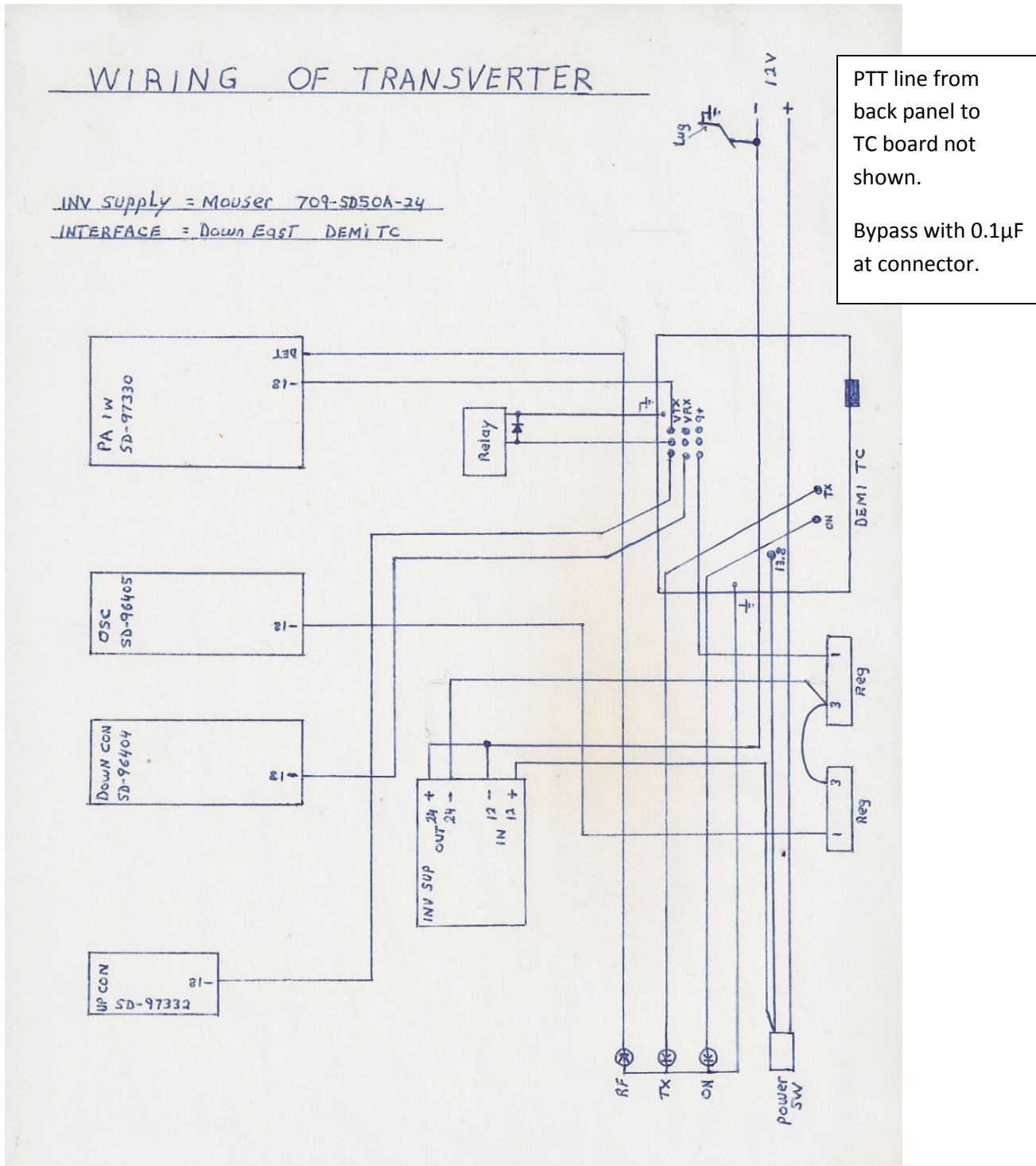
DO LIST

- A Join ALL
- B Join ALL + Add 3MM x 3MM
- C Join ALL + Add 1.5MM x 4MM
- D Join ALL but LAST pad
- E Join ALL
- F Join This pad
- G REMOVE A 2 CM STRIP OF THE RF FOAM under top cover so it no longer comes in contact with the 3 metal case transistors. (This stops a oscillation when cover was in place)

FROM

HARRIS FARINON
LR4-2500 TRANSMITTER
SD-97327 2.3-2.7 GHZ

APPENDIX 5



APPENDIX 6

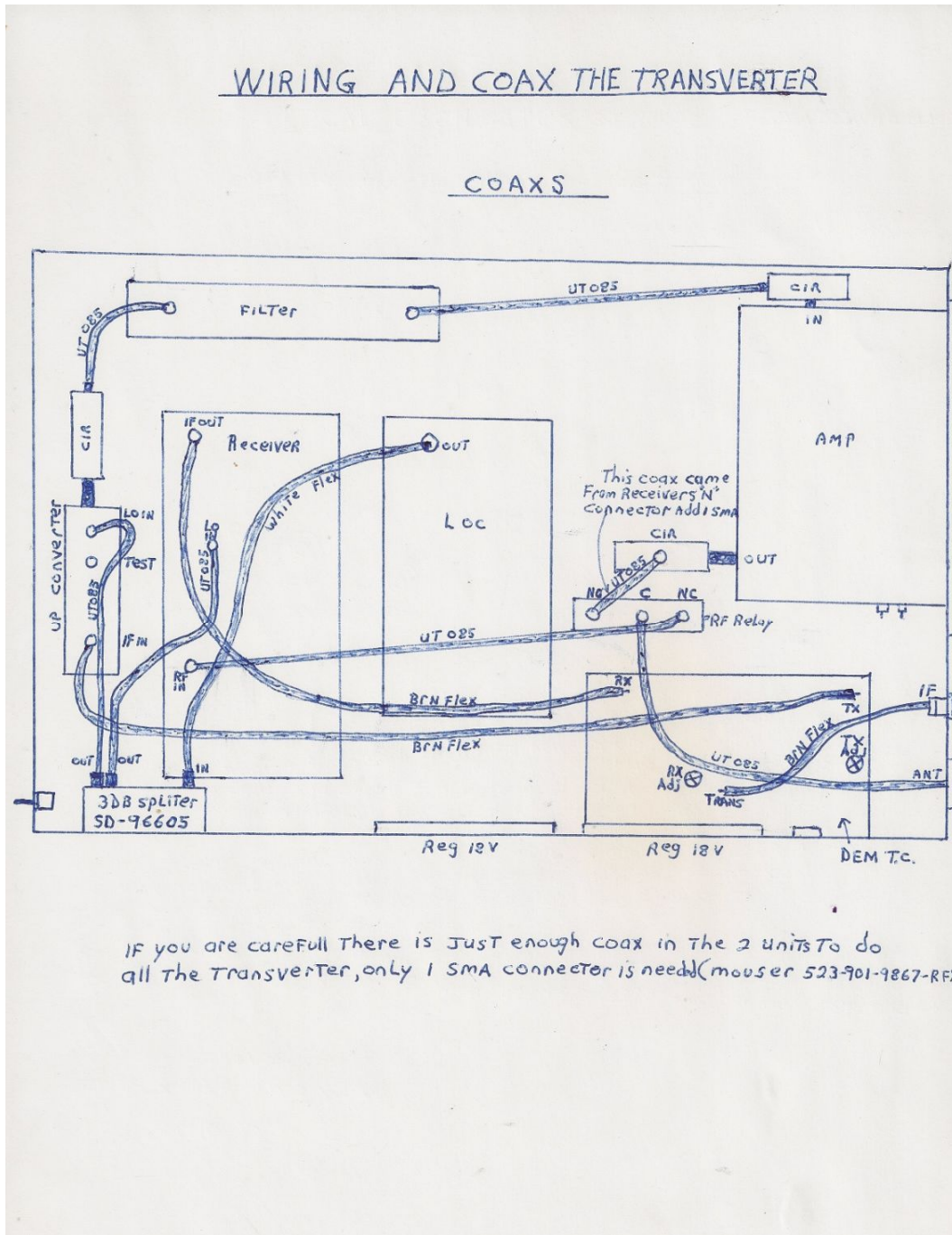
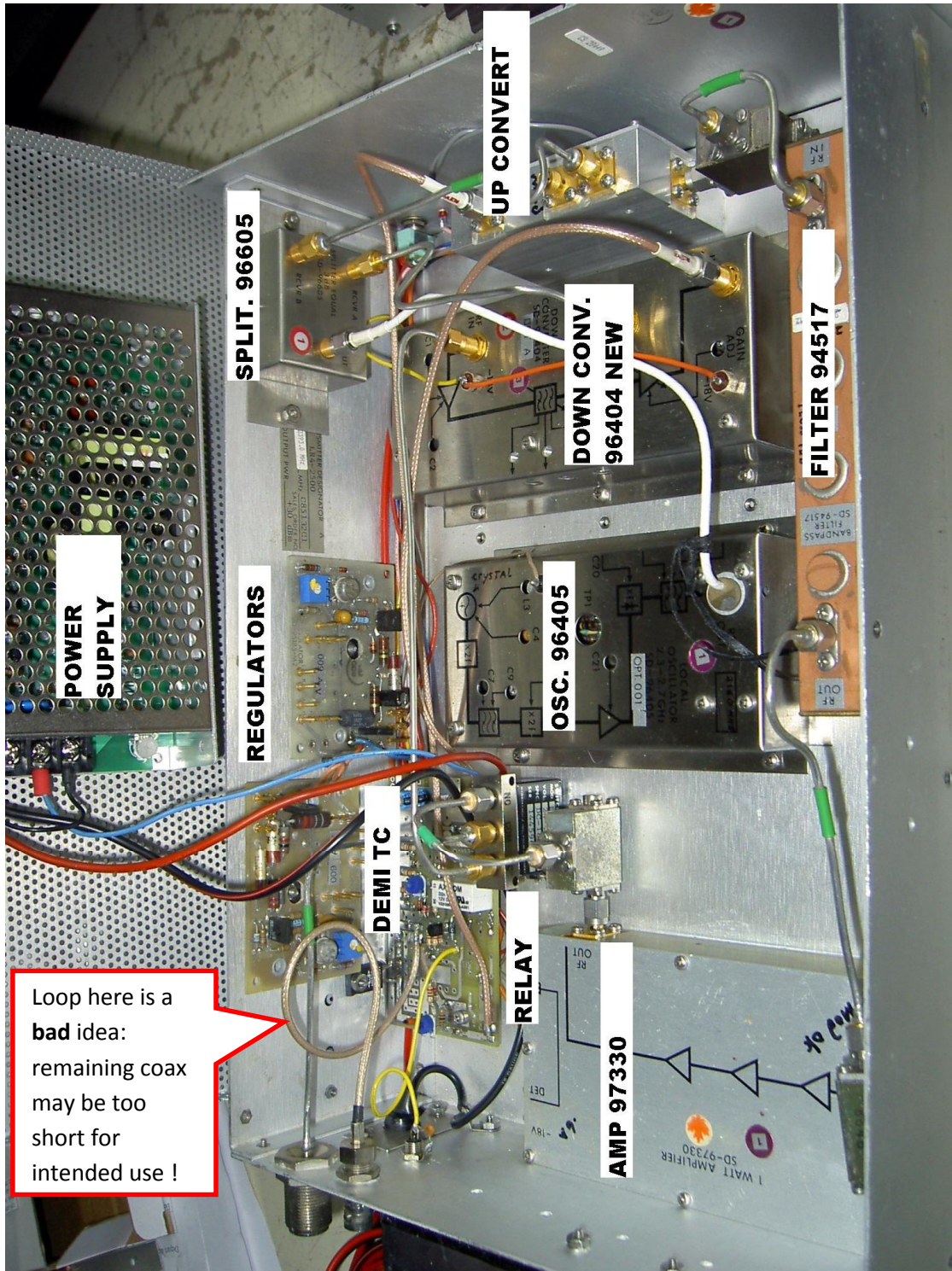


PHOTO 1 OVERVIEW



THANKS TO EVERYONE for PARTICIPATING!

73

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VE2QAF ANDRÉ
VE2DYB YVAN
VE2GTZ SÉBASTIEN