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DEM Part Number L144-28INT

144 MHz Transverter with 28 MHz IF, S/N_____

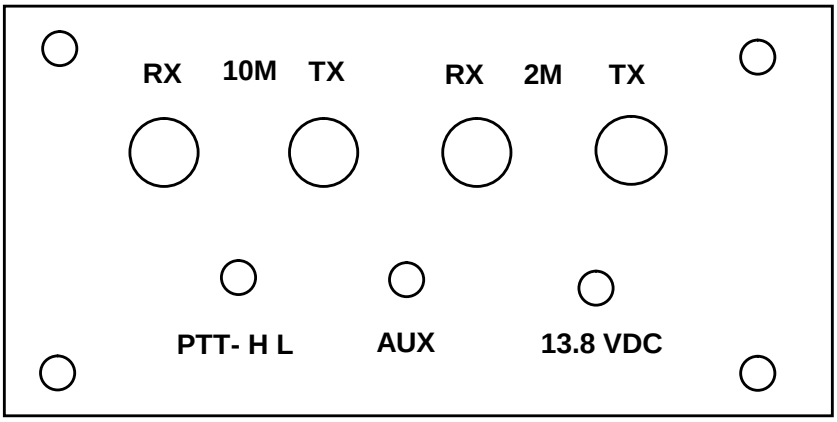
Power Out:	50 mW linear, adjustable minimum
Noise Figure and Gain:	3.5 dB NF nominal, 5 dBG nominal maximum
DC Power Requirement:	12 - 15.5 VDC, 13.8 nominal @ 0.5 Amps
IF Option:	Common Separate TX &RX
IF Drive Level Maximum:	
Keying Option:	PTT-L (to ground) PTT-H (Positive Voltage)
Aux. Connection Output Option:	TX RX High Low Open
Antenna Option:	Common Separate TX & RX
Ext. Switching Options installed:	RF COM RX TX IF COM RX TX None

Operational Overview:

The new DEM L144-28INT is a low power, high performance 144 MHz to 28 MHz transverter design to be used in conjunction with most 28 MHz transceivers. **This transverter is not designed to be used as a stand-alone 2-meter device!** It is intended to be used as a 2nd conversion IF for microwave transverters. The L144-28INT has a nominal linear output power of 50 mW with the 28 MHz. IF drive maximum indicated on the table above. On the receive side, a high dynamic range amplifier, a high level double balanced mixer (+17.0 dBm) and a three chamber helical filter are employed to providing a over load resistant low gain front end with superior selectivity. It is similar design as our high performance 2 meter transverter without the GaAs FET front end. The transverter may be configured in different manners to suite any requirements.

Options have been provided for a key line input of PTT Low (ground) or PTT High (+Voltage). Auxiliary contacts are included for either transmit or receive with a common line for many applications. The 28 MHz 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 28 MHz IF receiver. IF and RF connections are via BNC connectors. The control, power, and auxiliary connections are via RCA jacks. The 144-28INT is housed in the same aluminum clam shell enclosure as our microwave transverters.

This transverter, when assembled, has your requested options installed and will be configured to your transceivers specifications. It is important to fully understand the functions of your transceiver before interfacing the transverter. Please review your transceivers owner's manual for any details regarding transverter operation. If necessary, you may consult us regarding interfacing. We have not interfaced every transceiver on the market, but could help you in making the correct decision regarding yours.



Connect your transceiver to the transverter:

Interfacing the transverter to the transceiver is easy. Follow the steps listed below.

1. Open the top half of transverter by removing 4 screws. (two front, two back)
2. Depending on the make and model of your transceiver, it may or may not be necessary to enable it's transverter ports. Follow whatever instructions you have in your transceiver's operation manual to enable transverter operation. If it requires a special connector or cable assembly, it should be made now.
3. Connect the 10M IF cables. The will depend on the configuration of the transverter. Use good quality coax cable to connect the transverter ports to your transceiver.
4. Connect the Push to Talk line out of your transceiver to the transverter. It is labeled PTT-H or PTT-L on the transverter and uses a RCA connector. The correct keying type is already configured for your transceiver.
5. Connect the 2M ports to a dummy load, a power meter, or a microwave transverter. If the BNC connectors are labeled "Transmit" and "Receive", the internal transfer relay has been bypassed.
6. Connect the DC power to the transverter. It uses a RCA type connector. 13.8 volts is optimum but the transverter will operate normally from 12 to 15 volts.
7. Preset the TXIF and RXIF gain controls. Turn both the TXIF and RXIF fully clockwise.
8. Power your transceiver on and leave it in the Receive mode on 28.100 MHz.
9. Apply power to the transverter and turn on the power switch. The power LED should light and the transmit LED should not. If the 144-28INT is connected to a microwave transverter, power the microwave system on also.
10. If a microwave system is not connected to the 144-28INT, very little if any system noise will be heard in the 28 MHz. transceiver. If you have a 2M signal generator, a RX signal may be applied for testing. If the microwave system is connected, the system gain should be quite obvious and require adjustment of the RXIF gain in the L144-28 INT to decrease the noise heard in the transceiver or just so there is a slight movement is detected in the "S" meter. The RXIF gain may be increased beyond this point, but it will start to degrade the dynamic range of your transceiver. Find a signal on the microwave band or use a signal generator to determine correct frequency, or minimum signal level.
11. To test the transmit section, place your transceiver in the CW mode. It is recommended to test the transverter in the CW mode because most transceivers have carrier level or power controls in this mode only. If your transceiver has FM, it may be use to test the transverter if it has a power output control. Do not use SSB or AM because it is not possible to obtain maximum

output power with a transceiver in these modes. Set the carrier/output power control to minimum or "0" output power. Place the L144-28INT into transmit. Note the transmit LED on the transverter. It should be on. After connecting a power meter to the L144-28INT or the microwave transverter system, observe the power meter and slowly increase the carrier control (with key down) or power output control to maximum on the transceiver. If the transverter is configured correctly for your transceiver, minimal power may be detected on the power meter. Now slowly adjust the TXIF control in the L144-28INT in a counter -clockwise direction while observing the power meter. Set it to obtain the desired level in the microwave system or the desired 2M output level.

12. You may re-adjust both RXIF and TXIF again if desired. The adjustments of the local oscillator frequency may be done after warm up. The helical filter should not need adjustment.
13. Put the top on the enclosure and install the screws. Your transverter system is ready to use. Connect as you wish to use it in your microwave system and have fun!

Auxiliary Switching contacts:

The auxiliary contacts in K1 are labeled C (common) NO (normally open) and NC (normally closed). The C connection can be wired to ground or +13.8 VDC. This will then be connected or un-connected depending on weather the transverter is in transmit or receive. The contacts are marked for the receive mode. The NO or NC can be wired to the AUX connector on the enclosure.

DEM 144- 28INT User Options

Depending on the configuration of your 144-28INT, all components listed in the parts list, on the component placement diagram, and in the schematic, may or may not be installed or utilized. All components are listed and indicated so that all options may be installed or un-installed as desired.

1. 2M connections:

Reconfiguration of the 2M ports may be done at any time if desired. The circuit board is labeled and BNC connectors may be installed or un-installed. Use good quality coax to make the connections. Reposition Capacitors C45 and C44 as required and shown

2. 10M connections:

Reconfiguration of the 10M ports may be done at any time if desired. Follow the component placement and schematic diagram for any changes. Additional TX attenuation or gain may also be install or removed as desired. Consult the diagrams.

3. Optional TX Gain Stage

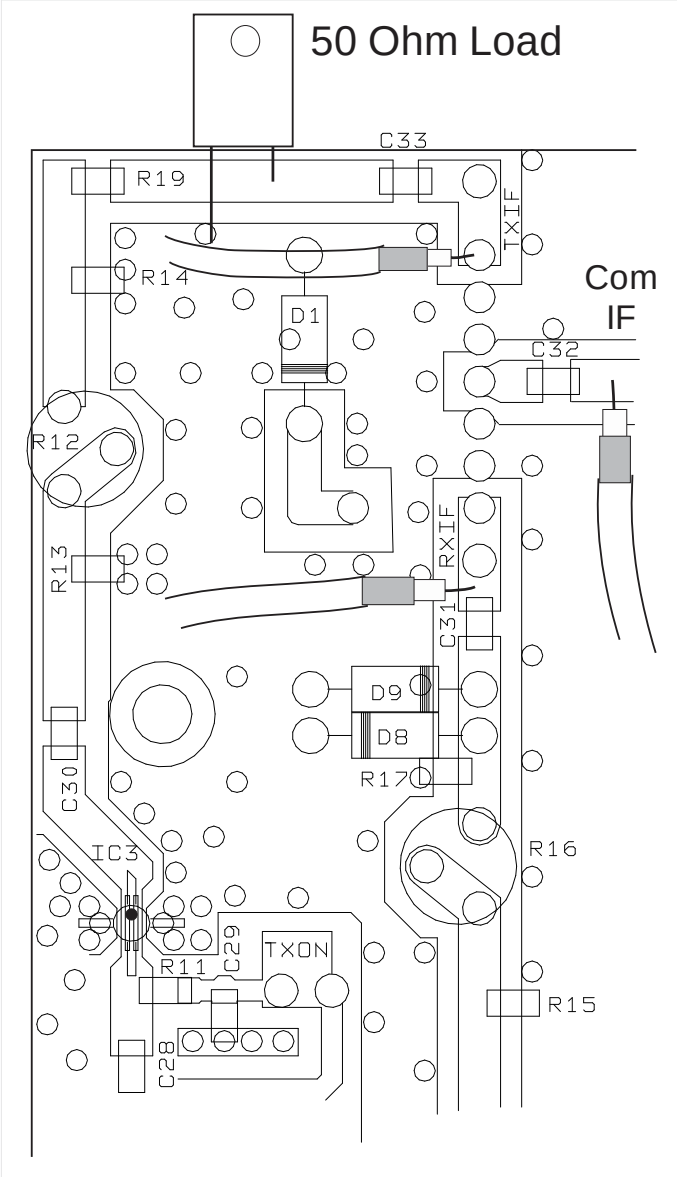
You have the option of installing a additional gain stage in the transmit section of the transverter. Only consider this option if your transceiver has less than 0dBm output. Please feel free to consult Down East Microwave Inc. for the proper MMIC. The MMIC is then placed in the IC3 position after cutting the shorting ribs. Refer to the component placement diagram and proceed to install MMIC

4. DC switching on the RF Coax

If you desire to "mirror" the transceivers PTT signal or to key your microwave transverter with a signal from the L144-28INT, it may be installed on any RF port desired. View the schematic and the Top side assembly and configure L14 for the IF and L19and C43 for the RF. Then wire as required.

28 MHz. IF Configuration Drive ranges

	-20 dBm to 0 dBm	1-200 mW Drive	200 mW-1W Drive	1-10W Drive
R19	1000 pF	1000 pF	100pF	10 pF
50 Ohm	Not Installed	Not Installed	Installed	Installed
IC3	Installed	Not Installed	Not Installed	Not Installed



Common or Split IF Configuration

DEM L144-28INT Component List

Resistors (R) values are in Ohms

R1 470	R8 39	R15 220	R22 1K
R2 470	R9 51	R16 1K Pot	R23 470
R3 1.5K	R10 1K	R17 220	R24 39
R4 100	R11 330	R18 50 Ohm Load	R25 1K
R5 51	R12 1K Pot	R19 Short, or Cap	R26 1K
R6 100	R13 220	R20 330	
R7 100	R14 220	R21 39	

Capacitors (C) values are in ρF unless otherwise specified "E" = Electrolytic

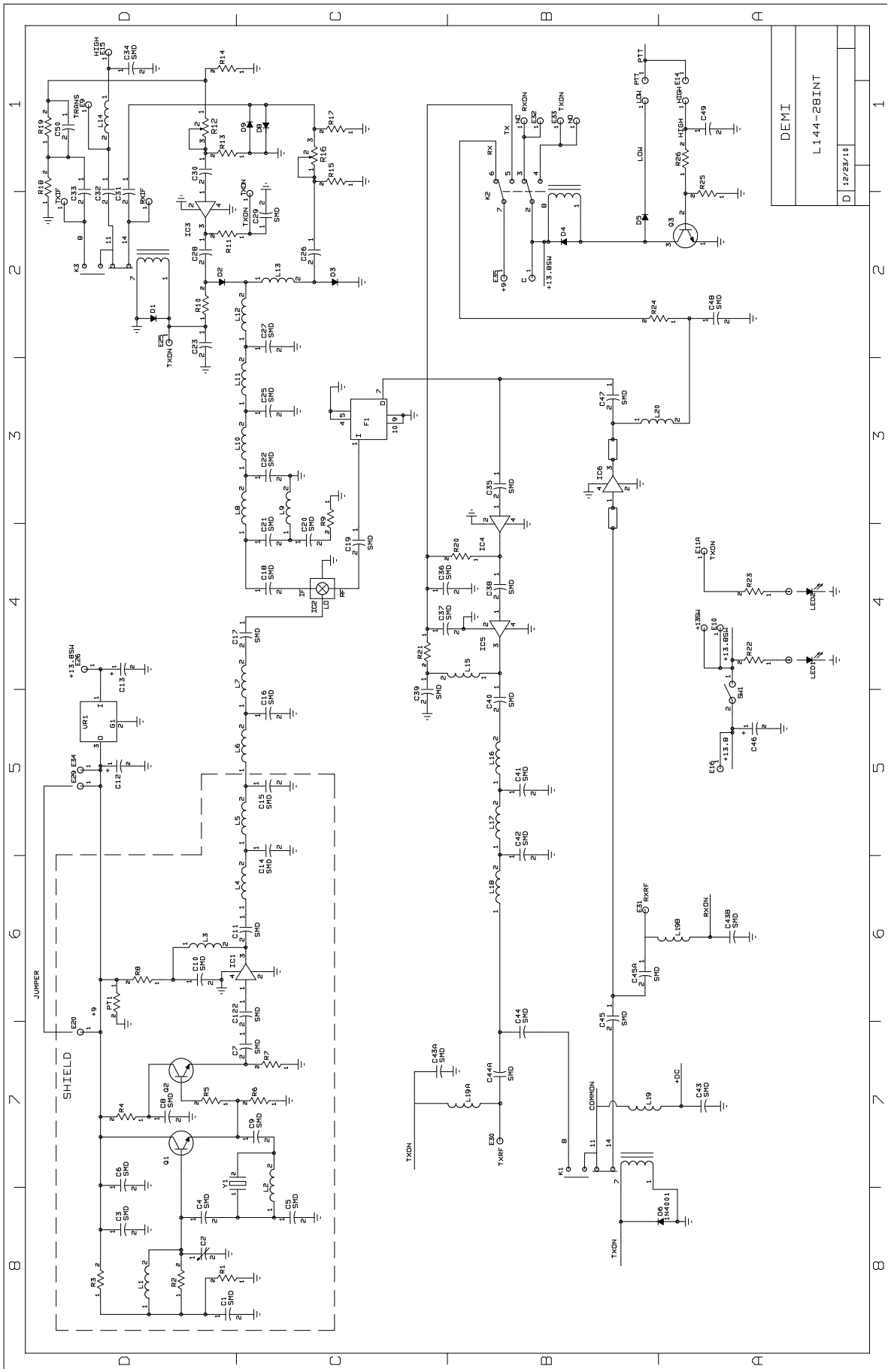
C1 0.1μF	C10 0.1μF	C19 150	C29 0.1μF	C38 150
C2 1-4 piston	C11 1000	C20 150	C30 1000	C39 0.1μF
C3 0.1μF	C12 1.0μF	C21 56	C31 1000	C40 1000
C4 18	C13 0.1μF	C22 150	C32 1000	C41 27
C5 33	C14 33	C23 1000	C33 1000	C42 27
C6 0.1μF	C15 36	C25 56	C34 1000	C43 1000
C7 1000	C16 33	C26 1000	C35 150	C44,A 100
C8 0.1μF	C17 1000	C27 150	C36 0.1μF	C45,A 100
C9 Option	C18 1000	C28 1000	C37 1000	C46 100 μF “E”
C48 0.1μF	C49 1000	C122 1000		C47 150

Inductors values are in ηH unless specified

L1 8 turns #24 1/8” dia. Enamel	L8 330	L15 1.0 μH
L2 330	L9 150	L16 39
L3 1.0 μH	L10 220	L17 82
L4 56	L11 330	L18 39
L5 120	L12 150	L19 1.0 μH OPT
L6 120	L13 330	L20 1.0 μH
L7 56	L14 1.0 μH OPT	

Solid State, Relays and Filter Components

D1 1N4000 Type	IC1 PHA-1	Q1 2N5179
D2 MPN3404	IC2 SYM-18H	Q2 2N5179
D3 MPN3404	IC3 MAR-6 (opt)	Q3 MMBT 3904
D4 1N4000 Type	IC4 MAR-6	VR1 78S09
D5 1N914	IC5 PHA-1	PTC-50 and shield
D6 1N4000 Type	IC6 PHA-1	Y1 Crystal 116 MHz
D8 1N914	K1 G6Y	PC Board
D9 1N914	K2 D2N or G5V	LO shield
F1 144-3	K3 G6Y	(2) 4-40 x1/4” screw
(2) 4-40 lock nuts	(2) #4 washers	


DEMI
L144-28INT
D 12/23/10
SHIELD
JUMPER
TXON
RXON
TXRF
RXRF
PTT
+13.8SW
+13.8
+9
+DC

L144-28INT

TOP SIDE ASSEMBLY