

TAC/COM 2001 Tactical Repeater Parts List / Tuneup Info:

Exciter (1/2W Driver) Board

<u>Ref.</u> <u>Des.</u>	<u>Manuf.</u> <u>P/N</u>	<u>Functional description</u>
U1	ICL7621	IC, Op-Amp, Audio Pre-amp, Low Pass Filter
U2	N/A	
U3	MAX2620	IC, VCO, Buffer
U4	RF2361	IC, RF Driver
U5	LMX2306	IC, Synthesizer
U6	T-1050-180	9.6 MHz Reference TCXO
U7	LM339	IC, Channel Line Buffers
U8	PIC16LF84A	IC, Microcontroller
U9	MAX6315	IC, Low battery reset
U10	MAX6315	IC, Tx Inhibit
U11	LT1086CM	IC, 8 VDC Linear Regulator
U12	LT1086CM	IC, 5 VDC Linear Regulator
D1	SMV1236	Varactor diode, VCO FM modulator
D2	BZX84C3V6ZX	Zener Diode, Serial Data Protection
D3	BAV99	Diode, Power Rectifier
D4	BZX84C18	Schottky Diode, Gate Clamp
Q1	TRF7003A	N-Channel Mosfet, RF Power Amplifier
Q2	VN605TN-Channel	Mosfet, TX-On control switch
Q3	2N3906	NPN Bipolar Switch, TX-on gate
Q4	VN605TN-Channel	Mosfet, TX-on control switch
Q5	VN605TN-Channel	Mosfet, PA-on control switch

RF Power Amplifier Board

<u>Ref.</u> <u>Des.</u>	<u>Manuf.</u> <u>P/N</u>	<u>Functional description</u>
Q1	MRF227	1.7 Watt RF Power Amplifier
Q2	SI9953DY	P-Channel Mosfet Power Switch
Q3	2N3904	TX KEY Switch Driver
Q4	2N3904	TX KEY Switch Driver

Repeater Controller Board

<u>Ref.</u> <u>Des.</u>	<u>Manuf.</u> <u>P/N</u>	<u>Functional description</u>
U601	LP2950CP	5 VDC Regulator
U602	74C11	Carrier Detect Inverter
U603	N/A	
U604	4025	Carrier Detect Latch
U605	4025	Time-Out-Timer Latch

Repeater Controller Board cont:

U606	ICL7621	RX Audio LPF
U607	4020	Time-Out-Timer Duration Counter
U608	SC 20-400	Scrambler Module (option)
Q601	2N3904	45.5 Hz Clock
Q602	2N3904	45.5 Hz Clock
Q603	2N3904	TX KEY Switch
D1	MMBD914	TX Key B Rectifier
D2	MMBD914	Carrier Det. Clamp
D3	MMBD914	Audio Inhibit Rectifier
D4	MMBD914	TX Key Rectifier

Receiver Board

Ref.	Manuf.	
Des.	P/N	Functional description
U1	SA606	IC, IF AMP/LIMITER/DEMOD
U2	MAX383	IC, Narrowband/wideband IF Filter Switch
U3	MAX2620	IC, Local Oscillator
U4	RF2361	IC, LO Buffer
U5	LMX2306	IC, RX Synthesizer
U6	T-150-1B0	9.6 MHz Reference TCXO
U7	LM339	IC, Channel selector buffer
U8	MAX6315	IC, LO-Battery reset
U9	PIC16LF84A	IC, Microprocessor
U10	ICL7621	IC, Squelch System
U11	LT1086CM	IC, 5VDC Regulator
Z1	TUF-3	Mixer, High Level Diode
Q1	BPF193	Transistor, LNA
Q2	BFR92A	Transistor, IF Pre-Amp
Q3	VNO605T	N-Channel FET, Narrow/Wide Discriminator Switch
Q4	VN0605T	N-Channel FET, Carrier Detect Switch
D1	SMV-1236-011	Diode, Varactor, LO PLL Tune
D2	BZX84C3V6ZX	Zener diode, serial data protection
D3, D4	BAV99	Diode, Squelch Detector

Scope:

This alignment and test procedure is applicable to the following assemblies:

NTIA TAC/COM REPEATER EXCITER 150 - 174 MHz
NTIA TAC/COM REPEATER POWER AMP 150 - 174 MHz

Test Equipment Required Exciter:

- Spectrum Analyzer Advantest R3361A or equiv.
- Digital Ammeter Fluke 8062 or equiv.
- Digital Multimeter Fluke 77 or equiv.
- Service Monitor Marconi 2955(A).
- DC Power Supply 0-16 VDC 1A
- TAC/COM Exciter test Harness / Switch Box

Test Equipment Required PA:

- Spectrum Analyzer Advantest R3361A or equiv.
- Digital Ammeter Fluke 8062 or equiv.
- Digital Multimeter Fluke 77 or equiv.
- Service Monitor Marconi 2955(A).
- Directional Coupler..... Narda 3020A
- Power Meter.....Marconi 6960
- Digital Ammeter.....Fluke 8062
- High Pass Filter.....Mini-Circuits NHP 300
- 30 dB Attenuator 10W.....
- 50 Ohm Terminations, (2)
- Power Amplifier.....Mini-Circuits ZHL-1-2W
- DC Power Supply 0-16 VDC 1A
- DC Power Supply 0-24 VDC 1A
- DUT Mounting (heatsink) Plate
- TAC/COM Exciter test Harness / Switch Box

* The DUT Mounting Plate includes a Thermalloy P/N 2226B heatsink assy.

TAC/COM 2001 Repeater Exciter Tuneup

PROCEDURE	MEASURE POINT	MEASURE DEVICE	NOTES
<p>MicroProcessor Flash:</p> <ul style="list-style-type: none"> • Turn Off Power to the DUT prior to Flashing. • Using a PIC-Start programmer, Flash the DUT via the J3 connector location 			Use an 18 pin DIP to 5 spring-pin adapter cable to connect the PIC-START to the DUT. Flash the DUT with: T1TAC689.HEX Note! J3-1 = Square Pad
<p>Frequencies:</p> <p>The T1TAC.HEX flash will produce the following frequencies:</p> <ol style="list-style-type: none"> 1. 163.9375 MHz 2. 165.8625 MHz 			Note! Frequencies may be changed via the PC Desktop application
End of Flash Procedure			
Add a jumper shunt to JP1 2-3			This configures the Channel Switch for TACOM Mode P/N 8590017
Tune-up & RF Test			
<ul style="list-style-type: none"> • Set RV1 to Mid (deviation) • Set RV2 to Mid (power out) • Set The power supply to 10.0 Vdc • Set the power switch to ON • Activate the DUT via the TX Key Switch • Check That the PA ON LED on the Test Box is ON 			The PA ON LED should be off until the TX KEY switch is activated
<p>Measure Voltages</p> <ul style="list-style-type: none"> • Measure 5V output • Measure 8V output 	U12-Tab (5V) U11-Tab (8V)	DVM DVM	4.9 < V5 < 5.5 7.9 < V9 < 8.5
<ul style="list-style-type: none"> • Adjust VCO • Set The Channel Switch to the highest frequency channel • 150 to 174 MHz Units: <ol style="list-style-type: none"> 1. Measure TP1 Voltage 2. Record reading • 138 to 150 MHz Units <ol style="list-style-type: none"> 1. Adjust L2 2. Switch to the lowest frequency channel and measure TP1 Voltage 3. Record reading 	TP1	DVM	NOTE! Remove the tuning slug from L2 for 150 to 174 MHz 1.5 < Vtp1 < 4.0 Use the tuning slug for 138 to 150 MHz Set Vtp1 = 4.0V (high chan) Check: Vtp1 > 1.5V (low chan) Note! The tuning slug may be cut to prevent it from protruding from the top of the shield can

<p>Audio Amp / Limiter</p> <ul style="list-style-type: none"> • Test Audio Limiter Operation 	U1 pin 7	Oscilloscope / 10x	<p>Initially, input a 200mV RMS. 1kHz signal to the DUT audio input</p> <p>Adjust input level to produce a slightly clipped waveform. Record the <i>input level</i> at which limiting just occurs</p> <p>Test Limit: 190 mV < Vin < 230 mV</p>
<p>limiter Lowpass Filter</p> <ul style="list-style-type: none"> • Test 3dB Bandwidth of LPF 	U1 pin 7	Oscilloscope / 10x	<p>Reduce audio input level until the U1 pin 7 level = 1.4V p-p (Audio Freq = 1kHz)</p> <p>Adjust the Frequency of the audio signal upwards until the U1 pin 7 level = 1.0Vp-p Record this frequency</p> <p>Test Limit: 3000 Hz < F3db < 3600 Hz</p>
<p>Deviation Adjust</p> <ul style="list-style-type: none"> • Set Channel SW to Chan 1 • Adjust RV1 for proper deviation • Set Channel SW to Chan 2 • Check deviation. 	J2 RF out	2955 Deviation	<p>Input a 120mV RMS. 1kHz signal to the DUT audio input</p> <p>Deviation = 1.50 kHz (Chan 1)</p> <p>1.4 kHz < Deviation < 1.6 kHz</p>
<p>Adjust Ref Oscillator & Pout</p> <p>Set Channel SW to Chan 2</p> <ul style="list-style-type: none"> • Adjust Reference Freq • Set Power Output (Chan 2) <p>Set Channel SW to Chan 1</p> <ul style="list-style-type: none"> • Check Output Frequency • Check Output Power 	J2 RF out	2955 Frequency 2955 Power	<p>Adjust U6 for Fout +/- 50 Hz Adjust RV2 for 400mW Po</p> <p>Check that Fout is within 100Hz Check that Po is within: 380mW < Po < 420mW</p>
<p>Microprocessor Power Inhibit</p> <p>Short J4 pin 6 to Ground</p> <ul style="list-style-type: none"> • Check that Po = 0 	J2 RF out	2955 Power	
<p>Current Drain</p> <ul style="list-style-type: none"> • Measure and Record Current on Chan1 and Chan2 	10VDC Current	Current Meter	<p>Test Limit: Idc < 180 mA NOTE! The PA ON LED draws 10 mA (Subtract from reading)</p>
<p>Frequency boundary Programming</p> <ul style="list-style-type: none"> • Connect RS232 cable from the PC to the DUT J5 • Start the T2K331 application programming software • Set the Test Fixture power switch from OFF to ON • Press CTRL+A to access the advanced options menu 			<p>Note frequency boundaries have a 100 kHz resolution</p>

<ul style="list-style-type: none"> • Press Z to access the frequency boundary menu. • Enter the Lower Frequency boundary (in MHz) [ENTER] • Enter the Upper Frequency boundary (in MHz) [ENTER] • Select Y [ENTER] 			<p>TX Limits are Mid Frequency +/- 100 kHz</p> <p>F_l = 165.800 F_h = 166.000</p>
<p>Customer Frequency Programming</p> <ul style="list-style-type: none"> • Press CTRL+A to return to the normal menu • Press the number of the channel you wish to modify • Enter the proper channel frequency (in MHz) • Select NARROW or WIDE deviation • Select LED to off for all channels • When satisfied with all the channel settings, press P then ENTER to program the DUT 			<p>Note:</p> <p>For DEA Repeaters, Set all frequencies to <i>Narrow</i></p>

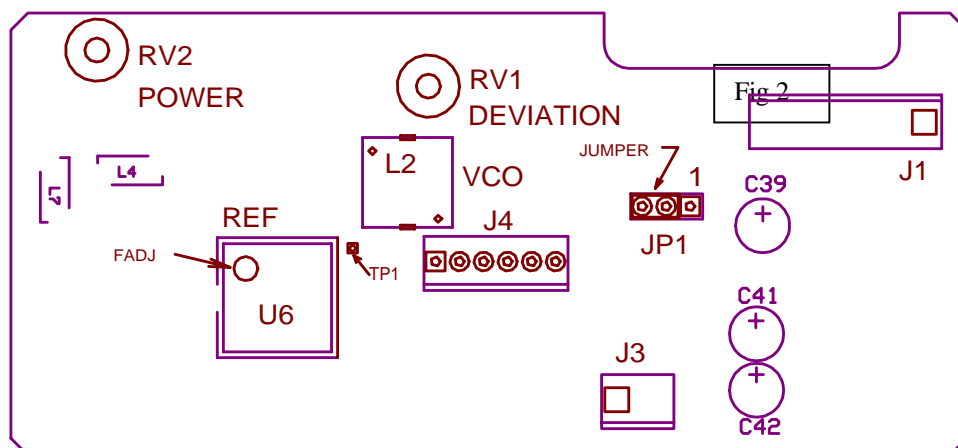
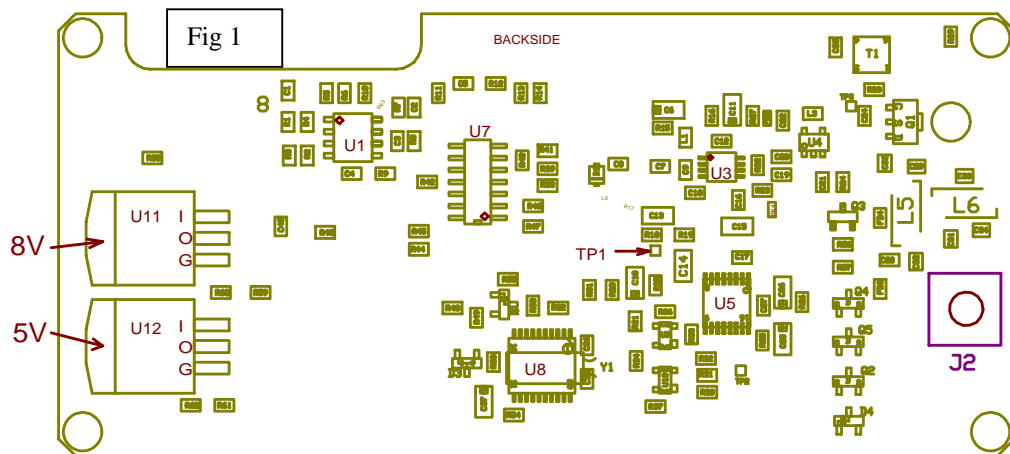
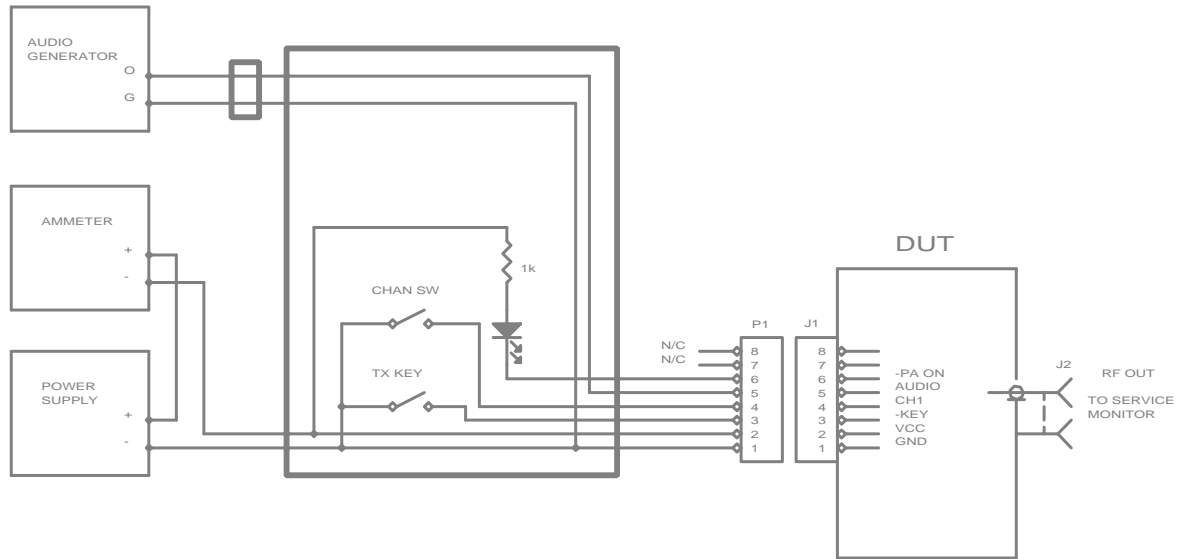


FIGURE 3



1. CLOSE CHAN SWITCH FOR CHANNEL 1
2. CLOSE TX KEY SWITCH TO ENABLE DRIVER

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TACOM NTIA DRIVER TEST INTERFACE		
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TAC/COM Power Amplifier Tuneup

Preliminary Setup

1. Attach the DUT to the mounting plate with four 2-56 screws.
2. Setup the test equipment as shown in Figure 1.
3. Connect the 12 VDC power supply to J3 of the DUT.

Pin 1 = Ground

Pin 2 = Positive

Pin 3 = Enable (active low)

PROCEDURE	MEASURE POINT	MEASURE DEVICE	NOTES
1. Set the power supply voltage to 11.5 VDC.		Power Supply 1	
2. Set Power supply to ON.			
3. Set Service Monitor to supply an RF CW output signal of -6 dBm into the setup.			
4. Connect the spectrum analyzer to the R port of the directional coupler.	R-Port	Spectrum Analyzer	Spectrum Analyzer settings: Center Frequency = 200 MHz Ref. Level. = +10 dBm Span = 100 MHz
5. Connect the ENABLE line to ground.			
6. Tune C5, and C6 for maximum output power as measured on the power meter.	J2	Power Meter	
7. Tune C2 for optimum return loss.	R-Port	Spectrum Analyzer	Spectrum Analyzer Settings: Center Frequency = 200 MHz Ref. Level. = 0 dBm Span = 100 MHz Ampl = 5 dB/Div
8. Adjust the service monitor output level in order to obtain more output from the DUT.		J2	Do not exceed 3.0 Watts
9. Repeat steps 6, 7 and 8 until the output power is 3.0 Watts.			Output power including duplexer loss will be 1.7 W maximum.

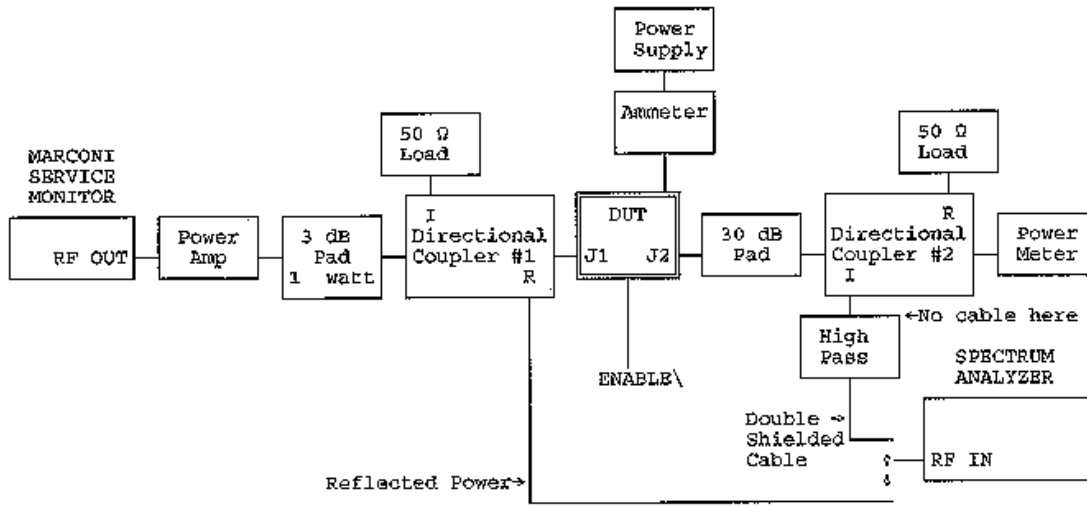


Figure 1