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Teaberry Big "T" Service Manual

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S E R V I C E M A N U A L

B I G " T "



TEABERRY
ELECTRONICS CORP.
INDIANAPOLIS, INDIANA U.S.A.
46228

GENERAL INFORMATION OF MODEL : BIG "T"

1. Type of Emmission : "D" Class

2. Frequency Range

<u>Channel</u>	<u>MHz.</u>	<u>Channel</u>	<u>MHz.</u>	<u>Channel</u>	<u>MHz.</u>
1	26.965	9	27.065	17	27.165
2	26.975	10	27.075	18	27.175
3	26.985	11	27.085	19	27.185
4	27.005	12	27.105	20	27.205
5	27.015	13	27.115	21	27.215
6	27.025	14	27.125	22	27.225
7	27.035	15	27.135	23	27.255
8	27.055	16	27.155		

3. RF Output Power Rating : 4 - Watts (max.)

4. Voltage & Current at Final Stage : Voltage: 12 V at 12 ch.
Current: 350 mA at 12 ch.

5. Function of Transistor : Per attached list of Function of Transistors/Diodes

6. Circuit Diagram : Per attached Circuit Diagram

7. Tune-up Procedure : Per attached Alignment Instruction

8. Description of Oscillator Circuit and Devices for Frequency Stabilization : Per attached OSC Circuit description

9. Automatic Modulation Control (AMC) : Per attached AMC Circuit description

SPECIFICATIONS FOR MODEL: BIG "T" (UT - 95A)

GENERAL:

- * Channels : 23 Channels
- * Frequency Range : 26.965 MHz to 27.255 MHz
- * Frequency Controlled : Crystal Controlled Synthesizer
- * Semi Conductors : 25 Transistors, 19 Diodes
- * Microphone : 600 ohm, Dynamic
- * Speaker : 8 ohm, 3 1/2"
- * Antenna Impedance : 50 ohm Coaxial
- * Meter : Indicated Received Signal Strength and Relative Transmit Power Output
- * Size : 9 3/4" W x 8" D x 3 3/4" H
- * Weight :
- * Jacks : Phone (6 ϕ), Ext SP/PA (3.5 ϕ), Mike (4P)
- * Controls : Channel Selector Switch
Power ON-OFF Switch
Volume Control
Squelch Control
PA ON-OFF Switch
ANL ON-OFF Switch
- *Power Supply : 105 V to 129 V AC 60 Hz
12 V to 16 V DC
- * Temperature : - 20° C to +50° C

ACCESSORIES:

- Microphone
- Microphone Hanger & Screw
- Mounting Bracket & Screw
- ID Card w/Envelope
- FCC Application Form
- Instruction Manual

MEASUREMENT CONDITION:

- Audio output power 500 mW
- Audio output load 8 ohm
- Modulation frequency 1 KHz
- Modulation 30%
- ANT impedance 50 ohm
- Power source 13.8 V DC
117 V 60 Hz
- Test temperature 25° ± 5° C

A. TRANSMITTER SECTION

	<u>Nominal</u>	<u>Limit</u>
Final Input Power	:	5 W
RF Output Power	:	3.2 W
Spurious Ratio	:	55 dB
Frequency Tolerance	:	±0.005%
Microphone Input Sensitivity (1 KHz 50% Modulation)	:	4 mV
Current Drain at No Modulation - AC	:	300 mA
- DC	:	900 mA
Current Drain at 80% Modulation - AC	:	400 mA
- DC	:	1,500 mA

B. RECEIVER SECTION (1 uV = 0 dB, ANL: OFF)

Maximum Sensitivity	:	0.5 uV	0.25 ~ 1 uV
Sensitivity at 10 dB S/N	:	0.5 uV	1.0 uV
Image Rejection Ratio ($f_o - 910$ KHz)	:	35 dB	25 dB
1st IF Rejection Ratio (11.275 MHz)	:	50 dB	40 dB
2nd IF Rejection Ratio (455 KHz)	:	100 dB	80 dB
Spurious Rejection Ratio	:	40 dB	25 dB
Squelch Sensitivity at Threshold	:	1 uV	2 uV
Squelch Sensitivity at Maximum	:	500 uV	125 ~ 2,000 uV
AGC (Input 50 mV, Output 10 dB Down)	:	90 dB	70 dB
IF Response at 6 dB Down Band Width	:	7 KHz	4 KHz
Adjacent Channel Selectivity	:	40 dB	30 dB
Cross Modulation	:	45 dB	35 dB
Audio Output Power (RF Input 1 mV)			
at Maximum Power	:	6 W	3 W
at 10% Distortion	:	3 W	2.5 W
Distortion at Input 1 mV	:	4.5%	7%
Distortion at Input 50 mV	:	6%	10%
Audio Fidelity (1 KHz, 0 dB Reference)			
(RF Input 1 mV) at 300 Hz	:	-6 dB	-10 dB
at 2.0 KHz	:	-6 dB	-10 dB
"S" Meter Sensitivity for "S-9"	:	50 uV	
Current Drain at No Signal - AC	:	250 mA	300 mA
- DC	:	350 mA	450 mA
Current Drain at Maximum Output Power			
- AC	:	400 mA	500 mA
- DC	:	1,100 mA	1,300 mA
Hum & Noise at 100 uV	:	45 dB	40 dB

C. PA SECTION

Maximum Output Power	:	5 W	4 W
10% Distortion Output Power	:	4 W	3 W

ALIGNMENT OF VOLTAGE REGULATOR

Equipment, required:

- a. Slide regulator
- b. AC voltage meter (150 V)
- c. DC voltage meter (30 V)

STEP	PRESET TO	CONNECTIONS	ADJUSTMENT	REMARKS
1	Receiving position	DC volt meter to J5	VR101	Adjust for 13.8 V

ALIGNMENT INSTRUCTION

A.. TRANSMITTER SECTION

1. Test equipment required:

- a. V.T.V.M. (Vacuum Tube Volt Meter)
- b. RF output power meter
- c. 50 ohm load (noninduction)
- d. RF attenuator
- e. Frequency counter
- f. DC amp meter (1 amp maximum)
- g. Field strength meter
- h. Oscilloscope
- i. Audio generator
- j. DC power supply (13.8 volt/2 amp) or AC power supply (117 V 60 Hz)

2. Alignment procedure

STEP	PRESET TO	CONNECTIONS	ADJUSTMENT	REMARKS
1	Tx mode, no modulation at channel 23	VTVM to secondary of T-8 (TP-2)	T-8	Adjust at the max point of OSC output; then turn the core to clockwise & fix at the point of 10% lower from the peak OSC (23 MHz OSC alignment)
2	Tx mode, no modulation at channel 13	VTVM to secondary of T-11 (TP-3)	T-9 T-10 T-11	Adjust for the max indication on VTVM (38 MHz mixer output alignment)
3	Same as Step 2	VTVM to secondary of T-14 (TP-4)	T-12 T-13 T-14	Adjust for the max indication on VTVM (27 MHz filter alignment)

4	Same as Step 2	RF output p power meter to Ant JK. (J-4)	L-4 L-7 L-8	Adjust for the max indica- tion on power meter
5	Same as Step 2	Same as Step 4	L-4	Adjust L-4 to obtain nomin- al 3.2W of RF output power
6	Same as item 2	Fieldstrength meter to ANT thru 50 ohm load and attenuator	L-3	Adjust to eliminate 54 MHz spurious radiation as small as possible (spurious alignment)
7	Tx mode, no modu- lation at all channels	Same as Step 2		Check frequency of all channels
8	Same as Step 2	Same as Step 2	VR-7	Adjust to obtain meter need- le indication to the same power indication of RF power meter (meter adjust)
9	Same as Step 2	Oscilloscope w/ 50 ohm load to ANT & AF genera- tor to mic jk (J-3)	VR-8	Adjust to obtain 80% mod- ulation at 10 mV, 1 KHz output of AF generator

B. RECEIVER SECTION

1. Test equipment required:

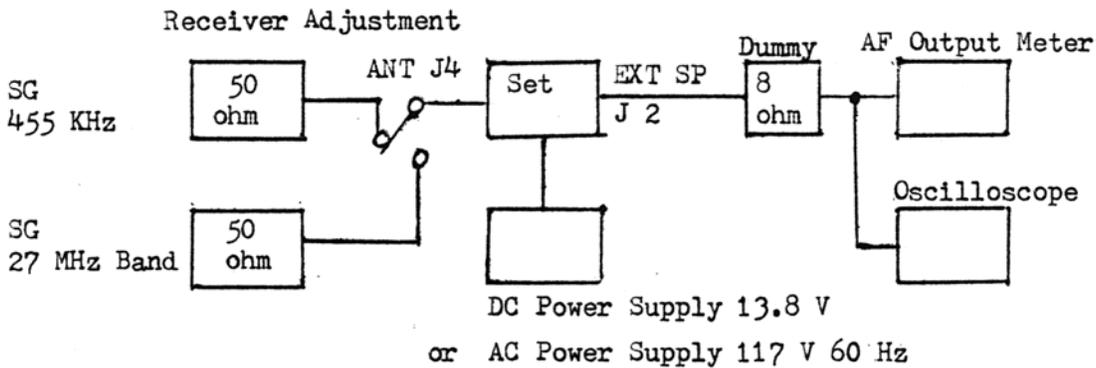
- a. Signal generator (455 KHz and 27 MHz band, 50 ohm output impedance, 1,000 OHZ, 30% modulation)
- b. AF output meter
- c. Oscilloscope
- d. 8 ohm dummy load (resistive)
- e. DC power supply (13.8 volt/2amp) or AC power supply (117 V 60 Hz)

2. Alignment procedure

STEP	SG CONNECTION FREQUENCY	PRESET TO	OUTPUT METER CONNECTION	ADJUSTMENT	REMARKS
1	to the base of TR-3 thru 0.01 uF cap. freq.: 455 KHz	ANL: OFF VOL: MAX SQL: MIN PA: OFF	to EXT SPK jk. (J-2)	T-5 T-6 T-7	Adjust for max indication on AF output meter
2	to ANT connector Freq: 27.115 MHz	SQL: MIN ANL: OFF VOL: MAX PA: OFF RX CH: 13	same as Step 1	T-1 T-2 T-3 T-4	Adjust for max indication on AF output meter
3	Same as Step 2	Same as Step 2	Same as Step 2	VR-3	Adjust to obtain proper sensitivi- ty (0.5 uV)

4	Same as Step 2 ("S" meter adjustment)	Same as Step 2	Same as Step 2	VR-6	Adjust for S-9 position of meter needle indication at SG output level of 50 uV
5	Same as Step 2 (squelch adjustment)	Same as Step 2 SQL: MAX	Same as Step 2	VR-2	Adjust for 2 V AF output at SG input level of 500 uV and Squelch VR: Maximum

Remarks: Further reference of test equipments connection, see the following diagram



TX OSCILLATION CIRCUIT

1. 23 MHz Oscillator Circuit:

This oscillator circuit consists of the crystal controlled oscillator for the frequency synthesizer. The oscillator signal comes out from TR-6 2SC839 silicon transistor which is so called "Pierce B-E Oscillator Circuit." The collector tank circuit can be adjusted to obtain adequate frequency stability of oscillation. The voltage supplied to this circuit is also stabilized by a zener diode ZD-1,CZ-092.

2. 14 MHz Oscillator Circuit:

This oscillator circuit consists of the crystal controlled oscillator for the frequency synthesizer, of which signal comes out from TR-14 2SC839. The circuit is non-adjustable oscillator circuit and it well eliminates the undesirable spurious frequencies.

3. 11 HMz Oscillator Circuit:

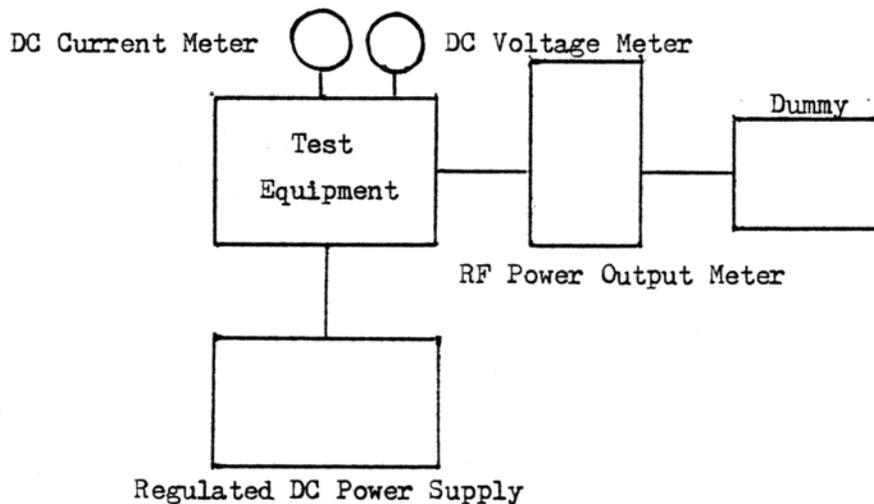
This oscillator circuit consists of the crystal controlled oscillator for the frequency synthesizer, of which signal comes out from TR-15 2SC839. The circuit is non-adjustable oscillator circuit, and it well eliminates the undesirable spurious frequencies.

AMC (AUTOMATIC MODULATION CONTROL) CIRCUIT

To protect overmodulation and to govern occupied band width when modulated, the percentage of modulation is automatically controlled. The modulation output signal is converted to DC signal by D-11, D-12, 1N60 and controlled by TR-17 2SC1364. The circuit works as the attenuator by TR-17 2SC1364 and R- 79 22K_Ω.

TEST CONNECTIONS

(Fig. 1)

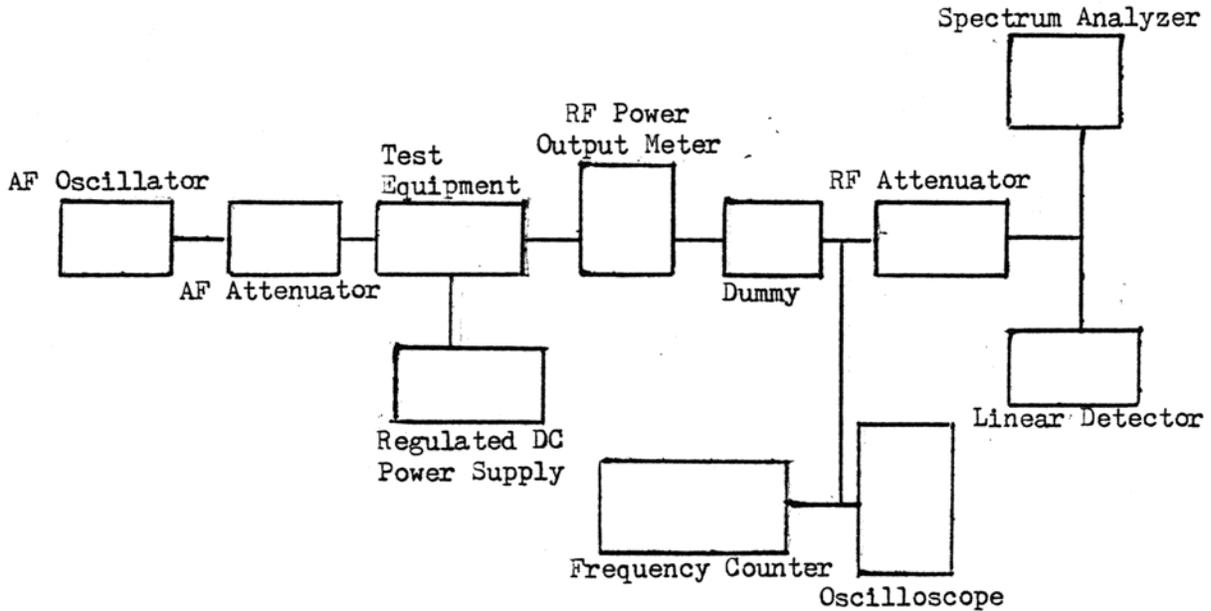


Meter used (Maker, Model):

RF Power Output Meter	Bird Electronics	Moder -43
Dummy	Iwatsu	AF-20N
DC Current Meter	Yokogawa Electronics	Class 0.5.
DC Voltage Meter	Yokogawa Electronics	Class 0.5
Regulated DC Power Supply	Kikusui Electronics	Model PAC20-5

TEST CONNECTIONS

(Fig. 2)



Meter used (Maker, Model):

AF Oscillator.	Meguro Denpa Sokki	MCR-401
AF Attenuator.	Kikusui Electronics	Model 984A
RF Power Output Meter.	Bird Electronics	Model 43
Dummy.	Iwatsu	AF - 20 A
RF Attenuator.	Ando Electronics	AL - 512 N.
Linear Detector.	Meguro Denpa Sokki	Model MDA -450 A
Oscilloscope	Matsushita Communication	VP - 5405 A
Frequency Counter.	Takeda Riken	TR- 3976
Regulated DC Power Supply.	Kikusui Electronics	Model PAC 20-5
Spectrum Analyzer.	Hewlett Packard	Display 141 T
		RF 8554 L
		IF 8552 A

1. Transistor Complement:

TR- 1	2SC839	RF Amplifier
TR- 2	2SC403C	Receiver 1st Mixer
TR- 3	2SC403C	Receiver 2nd Mixer
TR- 4	2SC839	2nd IF Amplifier (455 KHz)
TR- 5	2SC839	2nd IF Amplifier (455 KHz)
TR- 6	2SC839	23 MHz Oscillator
TR- 7	2SC839	38 MHz Band Mixer
TR- 8	2SC839	2nd Local Oscillator (11.730 MHz)
TR- 9	2SC1364	Squelch Gate
TR-10	2SC1364	Receiver AF Pre-Amplifier
TR-11	2SC1364	AF Driver Amplifier
TR-12	2SC1096	AF Power Amplifier
TR-13	2SC1096	AF Power Amplifier
TR-14	2SC839	14 MHz Band Oscillator
TR-15	2SC839	Tx Oscillator (11.275 MHz)
TR-16	2SC839	27 MHz Band Tx Mixer
TR-17	2SC1364	Mic. PA Pre-Amplifier
TR-18	2SC1364	AMC Control Amplifier
TR-19	2SC1364	Modulation Indicator Amplifier
TR-20	2SC756	Tx Power Amplifier
TR-21	2SC1226A	Tx Driver Amplifier
TR-22	2SC735	Tx Buffer Amplifier
TR-101	2SC945	Voltage Regulator
TR-102	2SC1173	Voltage Regulator
TR-103	2SD235	Voltage Regulator

2. Diode Complement:

D- 1	WG-713	Receiver Protector
D- 2	WG-713	Mode Switching
D- 3	WG-713	Receiver Protector
D- 4	1N60	AGC Detector
D- 5	1N60	Receiver "S" Meter Detector
D- 6	1N60	Receiver Detector
D- 7	1N60	Receiver Detector

D- 8	WG-713	ANL Gate
D- 9	MV-1	Varistor
D-10	1N60	Tx Meter Detector
D-11	1N60	AMC Detector
D-12	1N60	AMC Detector
D-13	SR-1K-1	Modulation Stabilizer
D-14	WG-713	Mode Switching
D-101	SR-1K-2	Rectifier
D-103	BZ-162	Voltage Stabilizer
D-104	WZ-071	Voltage Stabilizer
ZD-1	CZ-092	Receiver Voltage Stabilizer