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Teaberry Five By Five Service Manual

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

G F I V E B Y B I V E ***** (A)



TEABERRY
ELECTRONICS CORP.
INDIANAPOLIS, INDIANA U.S.A.
46226

GENERAL INFORMATION OF MODEL: FIVE by FIVE

1. Type of Emission : "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: 400 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 Instructions.

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.

CB AM TRANSCEIVER
SPECIFICATIONS FOR MODEL:FIVE by FIVE (UT-190)

GENERAL:

* Channels	:	23-Channels
* Frequency Range	:	26.965 MHz. to 27.255 MHz.
* Frequency Control	:	Crystal Controlled Synthesizer
* Semiconductors	:	23-Transistors, 15-Diodes, 1-LED
* Microphone	:	500 (ohm) Dynamic
* Speaker	:	8 (ohm), 3W Max.
* Antenna Impedance	:	50 (ohm)
* Meter	:	Indicate received signal strength and relative transmit power output.
* Size	:	220mm(L) X 175mm(W) X 58mm(H)
* Weight	:	5 $\frac{1}{2}$ (Pounds)
* Jacks	:	Ext.SP. 3.5 ϕ , PA 3.5 ϕ , MIKE 4P
* Controls	:	Channel Selector Volume (w/ Power ON-OFF) Squelch Control ANL ON-OFF Switch PA-CB Switch
* Power Supply	:	12V DC to 16V DC
* Temperature	:	+ 25 $^{\circ}$ C

ACCESSORIES:

Microphone
Microphone Hanger & Screw
Mounting Bracket & Screw
I.D. Card w/ Envelope
FCC Application Form
Instruction Manual

<u>RECEIVER</u> (0 dB = 1 uV)	<u>Nominal</u>	<u>Limit</u>
Maximum Sensitivity	: 0.5 uV	0.25 - 1 uV
Sensitivity at 10 dB S+N/N	: 0.5 uV	1 uV
Image Rejection Ratio at ($f_o - 910$ KHz)	: 35 dB	25 dB
1st IF Rejection Ratio at 11.275 MHz	: 50 dB	40 dB
2nd IF Rejection Ratio at 455 KHz	: 100 dB	80 dB
Spurious Rejection Ratio	: 40 dB	25 dB
Squelch Sensitivity at Maximum	: 500 uV	125 - 2,000 uV
Squelch Sensitivity at Threshold	: 1 uV	2 uV
A.G.C. (Input 50 mV, Output 10 dB down)	: 90 dB	75 dB
IF Response at 6 dB down Bandwidth	: 5.5 KHz	4 KHz
Adjacent Channel Selectivity....(10 KHz)	: 60 dB	40 dB
(20 KHz)	: 60 dB	40 dB
Cross Modulation	: 50 dB	35 dB
Frequency Stability	: $\pm 0.003\%$	0.005%
Audio Output Power at Maximum (Input 1 mV)	: 6 W	3 W
Audio Output Power 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)		
at 300 Hz	: -8 dB	-10 dB
at 2,000 Hz	: -6 dB	-8 dB
S. Meter Sensitivity for "S-9"	: 50 uV	
Current Drain at no Signal	: (DC) 300 mA	(DC) 450 mA
Current Drain at Maximum Output Power	: (DC) 1,100 mA	(DC) 1,300 mA
Hum & Noise at 100 uV	: 45 dB	40 dB
P.A. Output Power	: 5 W	4 W

MEASUREMENT CONDITION:

Audio Output Power : 0.5 W
Audio Output Load : 8 ohm Resistive
Modulation Frequency : 1,000 Hz.
Modulation : 30%
Antenna Impedance : 50 ohm
Test Temperature : 25^o C unless otherwise specified
Power Supply : 13.8 V DC
Squelch Control : Defeated
ANL Switch : "OFF" position

TRANSMITTER:

	<u>Nominal</u>	<u>Limit</u>
Final Input Power	5 W	
RF Output Power	3.2 W	2.7 W ~ 4 W
Modulation Capability	90% ±100%	70% ±95%
Frequency Stability (-20 ^o C to +50 ^o C)	±0.003%	±0.005%
Spurious Ratio	55 dB	50 dB
Microphone Input Pre-amp. Sensitivity (1KHz. 50% Modulation)	5 mV	3 ~ 7 mV
Current Drain at no Modulation	(DC)800 mA	(DC)1,000 mA
Current Drain at Maximum Modulation	(DC)1,700 mA	(DC)1,800 mA
Temperature Range (RF Output Power Deviation Within 3dB)		-20 ^o C to +50 ^o C

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 power supply (13.8 Volt/2 amp.)
- g. Field strength meter
- h. Oscilloscope
- i. Audio generator

2. Alignment Procedure

STEP	PRESET TO	CONNECTIONS	ADJUSTMENT	REMARKS
1	Tx Mode, No Modulation at Channel 23	VTVM to secondary of T-11 (TP-9)	T-11	Adjust at the max point of OSC output, then turn the core to clockwise and 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-14 (TP-1)	T-12 T-13 T-14	Adjust for the max indication on VTVM (38 MHz mixer output alignment)
3	Same as Step 2	VTVM to secondary of T-17 (TP-2)	T-15 T-16 T-17	Adjust for the max indication on VTVM (27 MHz filter alignment)
4	Same as Step 2	RF output power meter to ANT jk (J-1)	L-9 L-12 L-13	Adjust for the max indication on power meter
5	Same as step 2	Same as Step 4	L-9	Adjust L-9 to obtain Nominal 3.2 W of RF output power
6	Same as item 2	Field strength meter to ANT thru 50 ohm load and attenuator	L-7	Adjust to eliminate 54 MHz spurious radiation as small as possible (spurious alignment)
7	Tx Mode, No Modulation at all channels	Frequency counter to ANT thru 50 ohm load and attenuator		Check frequency of all channels

8	Same as Step 2	Same as Step 2	VR-6	Adjust to obtain meter needle indication to the same power indication of RF power meter (meter adjustment)
9	Same as Step 2	Oscilloscope with 50 ohm loss to ANT & AF generator to mic. jk. (J-2)	VR-5	Adjust to obtain 80% modulation at 10 mV, 1 KHz output of AF generator

B. Receiver Section

1. Test equipment required:

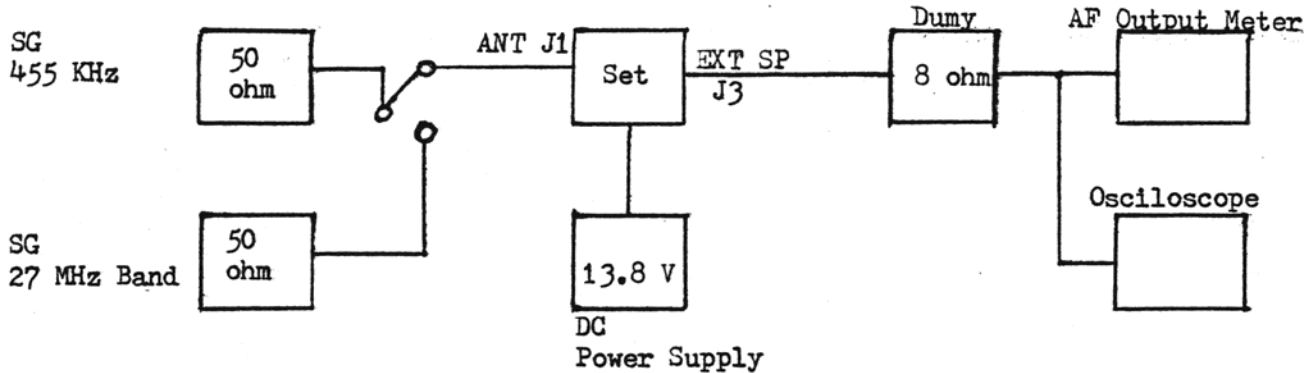
- a. Signal generator (455 KHz and 27 MHz band, 50 ohm output impedance, 1,000 Hz, 30% modulation)
- b. AF output meter
- c. Oscilloscope
- d. 8 ohm dummy load (resistive)
- e. DC power supply (13.8 volt/2 amp.)

2. Alignment Procedure

STEP	SG CONNECTION FREQUENCY	PRESET TO	OUTPUT MTR CONNECTION	ADJUSTMENT	REMARKS
1	to the base of TR-3 thru 0.01uF Cap. Freq: 455KHz	ANL: OFF VOL: MAX SQL: MIN PA/CB: CB	to EXT SPK jack (J-3)	T-5 T-6 T-7	Adjust for the max. indication on AF output meter
2	to the ANT connector Freq: 27.115 MHz	SQL: MIN ANL: OUT VOL: MAX PA/CB: CB RX CH: 13	Same as Step 1	T-1 T-2 T-3 T-4	Adjust for the max. indication on AF output meter
3	Same as Step 2	Same as Step 2	Same as Step 2	VR-1	Adjust to obtain proper sensitivity (0.5 uV)
4	Same as Step 2 (S meter adjustment)	Same as Step 2	Same as Step 2	VR-7	Adjust for S-9 position of meter needle indication at SG output level of 5 uV
5	Same as Step 2 (Squelch Adjustment)	Same as Step 2 SQL: MAX	Same as Step 2	VR-3	Adjust for 2 V AF output at SG level of 500 uV and Squelch VR: maximum

Remarks: Further reference of test equipment's connection, see the following diagram.

Receiver Adjustment



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-10 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 D16.

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-17 2SC839. The circuit is non-adjustable oscillator circuit, and it well eliminates the undesirable spurious frequencies.

3. 11 MHz Oscillator Circuit:

This oscillator circuit consists of the crystal controlled oscillator for the frequency synthesizer, of which signal comes out from TR-18 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, and D-12 and controlled by TR-16 2SC1364. The circuit works as the attenuator by TR-16 2SC1364 and R-212.

FUNCTION / TRANSISTOR / DIODE

1. Transistor Complement:

TR- 1	2SC394	RF Amplifier
TR- 2	2SC394	Receiver 1st Mixer
TR- 3	2SC839	Receiver 2nd Mixer
TR- 4	2SC839	2nd IF Amplifier (455KHz)
TR- 5	2SC839	2nd IF Amplifier (455KHz)
TR- 6	2SC1364	Receiver AF Pre Amplifier
TR- 7	2SC1364	Receiver AF Driver Amplifier
TR- 8	2SD325	AF Power Amplifier
TR- 9	2SD325	AF Power Amplifier
TR-10	2SC839	23 MHz Band Oscillator
TR-11	2SC839	38 MHz Band Mixer
TR-12	2SC839	2nd Local Oscillator (11.730 MHz)
TR-13	2SC945	Squelch Amplifier
TR-14	2SA495	Squelch Amplifier
TR-15	2SC1364	Mic. PA Pre Amplifier
TR-16	2SC1364	AMC Control Amplifier
TR-17	2SC839	14 MHz Band Oscillator
TR-18	2SC839	Transmitter Oscillator (11.275 MHz)
TR-19	2SC839	Transmitter 27 MHz Band Mixer
TR-20	2SC756	Transmitter Power Amplifier
TR-21	2SC1226A	Transmitter Driver Amplifier
TR-22	2SC735	Transmitter Buffer Amplifier
TR-23	2SC403	Modulation Indicator Amplifier

2. Diode Complement:

D- 1	WG-713	Receiver Protector
D- 2	WG-713	Receiver Protector
D-33	WG-713	Mode Switching
D- 4	WG-713	Receiver Protector
D- 5	1N60	Receiver Detector
D- 6	1N60	Receiver Detector
D- 7	1N60	AGC Detector
D- 8	1S1588	ANL Gate

D- 9	MV-1	Varistor
D-11	1N60	AMC Detector
D-12	1N60	AMC Detector
D-13	SR-1K-1	Modulation Stabilizer
D-14	1N60	Transmitter Meter Detector
D-15	1N60	Receiver "S" Meter Detector
D-16	CZ-092	Receiver Voltage Stabilizer
LED-1	T1R104	Modulation Indicator