

TRAM

TRAM/DIAMOND CORPORATION

D-64

Solid State Citizen Band Transceiver

Service Manual

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Barkett Electronics is proud to announce the acquisition of the remaining production and service department inventory of Browning Labs of Laconia NH. We now have over 100,000 parts now in stock to keep those great Browning radios going.

Call us for all your CB and Export radio sales and service needs. We specialize in Tram and Browning tube type radio repairs.

NEW!!!! Mark IV and IVA Face Plates now in stock. \$119.95 (per set)

NEW!!!! New Updated Service Manuals for Mark IV and IVA's. These complete service manuals include many production and service changes plus parts locators and larger schematics that are not included in the original manuals. Available only from Barkett Electronics \$29.95 each

Parts

BROWNING TWO PIN MIKE PLUGS	\$7.95
BROWNING TWO PIM MIKE SOCKETS	\$8.50
BROWNING FOUR PIN MIKE PLUGS FOR IV OR IVA	\$7.95
BROWNING FOUR PIN MIKE SCOKETS	\$8.50
TRAM BASE FOUR PIN MIKE PLUGS	\$6.95
TRAM FOUR PIN MIKE SOCKETS	\$8.50
BROWNING MARK IV REPLACEMENT POWER PLUG	\$7.95
BROWNING MARKIV REPLACEMENT POWER SOCKETS	\$6.30

NOTE ITEMS 9 AND 10 ARE USE TO REPLACE THE MOLEX POWER PLUGS AND SOCKETS WITH THE LATER JONES PLUGS . THIS REQUIRES SOME

MODIFICATION TO THE SOCKET HOLE. WE NOW HAVE COMPLETE REPLACEMENT UNITS.

MARK IV LED DISPLAYS, TWO PER UNIT. \$3.00 EACH

MARK IVA LED DISPLAYS, ONE PER UNIT. \$4.80

Browning Mark IV & IVA Parts List Transmitter

	Part #	Price
CM2181 On The Air / Mode Lamps	8-0026	1.95
B8542 Balance Modulator Tank	4-0018	35.00
B8529 5 MHZ Transformer	4-0017	35.00
B8546 T-301 to T-303	4-0019	35.00
T-601 Modulation Transformer	4-0020	49.95
SW601 Spot Switch	11-0006	8.95
SW602 LED Test / reset Switch	11-0029	14.95
SW603 E591 Mode Switch	11-0002	59.95
SW604 E592 Meter Switch	11-0003	19.95
SW605 Channel UP/Down Switch	11-0029	14.95
R602 E595 5K pot SWR Control	11-0010	11.95
R601 A8002 100K pot Scan Rate	11-0028	11.95
R604 A657 25K pot Bias	11-0008	11.95

MORE PARTS ON BACK

Receiver Parts

R2	A8009 500ohm pot S-Meter	11-0014	11.95
R4	A-8007 1K pot / Switch RF Gain/AGC	11-0015	22.95
R5	A8011 500K pot Tune	11-0030	11.95
R6	A8008 500K Volume on/off switch	11-0017	19.95
R7	A325 10k pot with switch Squelch/ANL	11-0016	22.95
B8584	T201 to T205 455khz	4-0023	35.00
B8546	T101 27Mhz	4-0019	35.00
B8141	4Mhz Tank	4-0022	35.00
T-1	A8037 Speaker Transformer	4-0012	19.95
T-2	C8006 Power Transformer	4-0021	129.95
Speaker		14-0010	24.95
TMS-1022NL	Mark IVA Controller	7-0122	89.95
MM1702AQ/1302	Mark IV Eprom	7-0108	49.95

Mark III Parts List
Receiver

		Part #	Price
T7	Audio Transformer	4-0012	19.95
T6	Power Transformer	4-0008	69.95
R3	RF Gain/AGC 1K	11-0015	11.95
R27	500ohm pot Meter	11-0014	11.95
R45	Squelch/ANL 10K pot	11-0016	22.95
R49	Volume/ on/off 500k	11-0017	19.95
R74	Band Spread 100k pot	11-0018	11.95
Speaker		14-0010	24.95
SW2	Tuning 3P3T	11-0012	
	Sub for SW2, A8017	11-0032	29.95
SW5	INT-EXT- ALL Speaker switch	11-0013	8.95
SW6	Mode 3P3T	11-0011	
	Sub for SW6 A-8018	11-0031	22.95
Transmitter			
R4	Carrier Balance 150ohm	11-0007	19.95
R27	SWR Cal 5k	11-0010	11.95
R38	Audio Gain 500k	11-0009	11.95
R55	Bias 25k	11-0008	11.95
T7	Modulation Transformer	4-0003	49.95
T8	Power Transformer	4-0002	69.95

Tubes

Type	Brand	Price			Price
7558	Sylvania	9.95	6BQ5	Browning	14.95
5763	Jan	7.50	6BQ5	EI	6.95
12BY7	Jan	11.00	6BE6	Browning	6.20
12AX7	Browning	12.95	6BE6	Mix	4.20
12AX7	EI	6.95	6BA6/5749	Jan	3.95
12AU7	Browning	12.95	6AQ5	SYL	4.95
12AU7	Pro Com	6.95		Jan	4.95
12AT7	Browning	12.95		GE	4.95
12AT7	Sylvania 9.95	10 for 6.95	6AL5/5726	JAN/GE	3.20
6GH8A	RCA&GE	3.90	0B2		4.85
6DS4	Mix	9.95			
6CB6	Jan/Mul	3.90			
6CA7		16.95			
6BQ7		3.50			
6BK7		5.40			

SERVICE MANUAL
DIAMOND 64
SOLID STATE CITIZENS BAND TRANSCEIVER

WARNING

Transmitter adjustment must be made by, or under the direct supervision of, persons holding a first or second class commercial radio operator's license.

ALIGNMENT PROCEDURE

1. PLL SYNTHESIZER

- 1.1 Set Clarifier Control to center slot position and the Mode Selector to AM.
- 1.2 Connect Frequency Counter to IC 903, Pin 3, and adjust L905 for 10.000MHz.
- 1.3 Place Mode Selector to LSB and adjust L904 for 9.998695 MHz.
- 1.4 Select Channel 1 and adjust L901 for 3.0V at R903 And C905.
- 1.5 Select Channel 20 and connect Frequency Counter to Synthesizer output at C917.
- 1.6 Check frequency output as follows.

<u>Mode Select</u>	<u>Frequency</u>
LSB	19.4025 MHz
AM	19.405 MHz
USB	19.4075 MHz

2. CARRIER OSCILLATOR

- 2.1 Connect RF output to a 50 ohm dummy load and turn MIC GAIN Control fully CCW.
- 2.2 Connect a Frequency Counter to TP2.
- 2.3 Place the Mode Selector to LSB, and adjust C607 for 7.8025 MHz
- 2.4 Place the Mode Selector to USB, and adjust L601 for 7.7975 MHz.
- 2.5 Place the Mode Selector to AM, key transmitter, and Adjust C605 for 7.8000 MHz.

3. RECEIVER ALIGNMENT

3.1 AUTOMATIC GAIN CONTROL BIAS

- 3.1.1 Adjust R517 for +1.5 VDC at the source of Q502 [TP1].

3.2 RECEIVER RF & IF ALIGNMENT

- 3.2.1 Set up as follows: Connect an AC VTVM and 8 ohm load To Ext Spkr jack. Adjust volume control for suitable Reading on meter [$\approx 2.83V$ RMS]. Initially set RF generator low enough to be below AGC knee \approx or Less than 10uv. Set clarifier to center slot, RF Gain Maximum, Mode AM, squelch minimum and NB on.
- 3.2.2 Set Channel Selector to Channel 20 and Signal Generator To 27.205 MHz. 1000 Hz 30% modulation.
- 3.2.3 Tune L302 for maximum DC voltage[+ 1.1 VDC] at the Source of Q302.
- 3.2.4 Tune L301, T301, T302, T303, T304, T305, T306 and T307 For maximum audio output.
- 3.2.5 Reduce the signal generator output to 0.5 uv and Repeat Step 4, then check for 10db signal to noise At 0.5uv input audio gain should be at least 2.83V With 8 ohm load.

3.3 TIGHT SQUELCH ADJUSTMENT

- 3.3.1 Turn the squelch knob full clockwise, and set the Mode control to AM mode.
- 3.3.2 Check that RF Gain control is fully clockwise, clarifier Is centered and channel selector to 20.
- 3.3.3 Apply a 27.205 MHz signal with 30% 1 KHz modulation At a level of 1MV (1000uv).
- 3.3.4 Adjust R518 until audio is just heard in the speaker.

3.4 S-METER

- 3.4.1 Place the mode switch in the AM position, RF Gain Fully clockwise, and the clarifier centered to 12:00.
- 3.4.2 Place channel selector to channel 20 and apply a 27.205 MHz Signal with NO modulation at a level of 100uv.
- 3.4.3 Adjust R507 for S9 indication on the meter.

3.5 NOISE BLANKER ALIGNMENT

- 3.5.1 Turn Noise Blanker on and connect an oscilloscope Or Audio/AC Voltmeter to the base of Q402.
- 3.5.2 Apply a 24.5 MHz signal with 30% modulation to The Transceiver.
- 3.5.3 Adjust T401 and T402 for peak level. Reduce Signal Generator input as necessary to prevent overload.
- 3.5.4 Connect an oscilloscope or Audio/AC Voltmeter to the base of Q403 and adjust T403 for maximum.

4.0 TRANSMITTER ALIGNMENT SSB AND AM POWER ADJUSTMENT

- 4.1.1 Select Channel 20, LSB Mode, and MIC GAIN full CW.
- 4.1.2 Turn ALC, R721 off(CW).
- 4.1.3 Inject a 2.5 MV, 2.4 KHz audio signal into the MIC Jack and key transmitter.
- 4.1.4 Adjust input audio so that output power is approximately 10 watts. Peak L709, L706, L704 and L702. Reduce audio input as required so as to hold power output to 10 watts and avoid saturation of final stage.
- 4.1.5 Detune T702 in the CCW direction until power output is approximately 4 watts
- 4.1.6 Peak T701, then tune T702 back to peak.
- 4.1.7 Check power output on Channel 1 and 40 and adjust T702 to balance as required.
- 4.1.8 Inject a 2.5 MV, 2 tone audio signal of 500Hz + 2400 Hz into the Mic Jack.
- 4.1.9 Select Channel 40 and observe output wave form on an oscilloscope.
- 4.1.10 Tune L709 slightly CCW while observing peaks of envelope. Tune for minimal flat-topping.
- 4.1.11 Select Channel 20 and AM Mode.
- 4.1.12 Inject sufficient audio into the Mic Jac so as to provide 85 to 90% modulation.
- 4.1.13 Verify that the unmodulated carrier is at least 3.75 watts on Channels 1, 20 and 40. Verify that there is a slight upward power indication when modulation is applied.
- 4.1.14 If modulation is downward, select Channel 40, and detune L706 slightly CW while applying and removing input audio. Tune until upward swing is observed. NOTE: This detuning may cause some power loss and R207 should be adjusted for an unmodulated carrier level of at least 3.75 watts.
Note: TRANSMITTER SHOULD NOT BE TUNED FOR PEAK ON AM.

4.2 AMC ADJUSTMENT

- 4.2.1 Set Mode selector to AM and select Channel 20.
- 4.2.2 Apply a 3MV 2.4 KHz audio signal to the MIC Jack and key transmitter.
- 4.2.3 Adjust R217 for 85-90% modulation.

4.3 ALC ADJUSTMENT

- 4.3.1 Set Mode Selector to LSB or USB and select Channel 20.
- 4.3.2 Apply a 3 MV 2.4 KHz audio signal to MIC jack.
- 4.3.3 Adjust R721 for 12 watts PEP.

4.4 SSB CARRIER SUPPRESSION ADJUSTMENT

- 4.4.1 Set MODE Selector to either LSB or USB and Channel 20.
- 4.4.2 Turn MIC Gain fully CCW and key transmitter.
- 4.4.3 Connect an RF voltmeter or VTVM with a sensitive director probe across the 50 dummy load.
- 4.4.4 Adjust R616 and R611 for a minimum indication on the meter.

4.5 SWR METER CAL ADJUSTMENT

- 4.5.1 Select Channel 20 and place the Mode Selector in AM position.
- 4.5.2 Connect a 50 ohm termination directly to the output coaxial fitting on the back of transceiver.
- 4.5.3 Place the SWR/CAL switch in the CAL position.
- 4.5.4 Turn the SWR/CAL knob clockwise until the meter is set at the Cal point.
- 4.5.5 Place the SWR/CAL switch in the SWR position.
- 4.5.6 Adjust R723 for minimum on the meter.

4.6 SWR ALERT

- 4.6.1 Select Channel 20, place the mode selector in AM position. Raise the power supply voltage to 15VDC. Turn MIC GAIN control fully CCW.
- 4.6.2 Install a 4:1 load on the output coax connector.
- 4.6.3 Key the transmitter and adjust R728 until the SWR ALERT lamp goes out.
- 4.6.4 Unkey the transmitter and install a 6:1 load on the output coax connector.
- 4.6.5 Key the transmitter and apply 3.0 MV of audio modulation at 2.4 KHz to the MIC Jack.
- 4.6.6 Verify the SWR ALERT lamp is lit.

TRUTH CHART

1 = 5.00 Volts 0 = 0 Volts

L	PROGRAM DIVIDER														LSB SYNTH OUTPUT IN MHZ AT C917	AM DIVIDER INPUT IN MHZ AT IC903-2	USB DIVIDER INPUT IN MHZ AT IC903-2	LSB DIVIDER INPUT IN MHZ AT IC903-2
	IC903																	
	C	F	E	D	C	B	A	1	0	1	0	1	0	1				
1	1	0	1	0	1	0	0	1	1	0	1	1	1	1	19.1625	.8350	.8299	.8349
2	1	0	1	0	0	0	1	1	0	1	0	1	0	1	19.1775	.8250	.8199	.8249
3	1	0	1	0	0	0	0	1	1	0	1	1	0	1	19.1825	.8150	.8099	.8149
4	1	0	0	1	1	1	1	1	1	1	1	1	1	1	19.2075	.7950	.7899	.7949
5	1	0	0	1	1	1	1	1	1	1	1	1	1	1	19.2125	.7850	.7799	.7849
6	1	0	0	1	1	1	1	0	1	0	1	1	0	1	19.2225	.7750	.7699	.7749
7	1	0	0	1	1	1	0	0	1	0	0	1	0	1	19.2325	.7650	.7599	.7649
8	1	0	0	1	1	0	1	0	1	0	1	0	0	1	19.2525	.7450	.7399	.7449
9	1	0	0	1	1	0	0	1	1	0	1	1	0	1	19.2625	.7350	.7299	.7349
10	1	0	0	1	1	0	0	0	1	0	0	1	0	1	19.2725	.7250	.7199	.7249
11	1	0	0	0	1	1	1	1	1	1	1	1	1	1	19.2825	.7150	.7099	.7149
12	1	0	0	0	1	0	1	0	1	0	1	1	0	1	19.3025	.6950	.6899	.6949
13	1	0	0	0	1	0	1	0	0	0	1	1	0	1	19.3125	.6850	.6799	.6849
14	1	0	0	0	1	0	1	0	1	1	1	1	0	1	19.3225	.6750	.6699	.6749
15	1	0	0	0	1	0	0	1	1	0	1	1	0	1	19.3325	.6650	.6599	.6649
16	1	0	0	0	0	1	1	0	0	0	1	1	0	1	19.3525	.6450	.6399	.6449
17	0	1	1	1	1	1	1	1	1	1	1	1	1	1	19.3625	.6350	.6299	.6349
18	0	1	1	1	1	1	1	1	1	1	1	1	1	1	19.3725	.6250	.6199	.6249
19	0	1	1	1	1	1	1	0	1	0	1	1	0	1	19.3825	.6150	.6099	.6149
20	0	1	1	1	1	0	1	0	1	1	1	1	0	1	19.4025	.5950	.5899	.5949
21	0	1	1	1	1	0	1	0	1	0	1	1	0	1	19.4125	.5850	.5799	.5849
22	0	1	1	1	1	0	1	0	1	0	1	1	0	1	19.4225	.5750	.5699	.5749
23	0	1	1	1	0	1	1	1	1	0	1	1	0	1	19.4325	.5650	.5599	.5649
24	0	1	1	1	1	0	0	1	1	0	0	1	0	1	19.4375	.5650	.5599	.5649
25	0	1	1	1	0	1	1	1	1	1	1	1	1	1	19.4425	.5550	.5499	.5549
26	0	1	1	1	0	1	1	0	1	0	1	1	0	1	19.4625	.5350	.5299	.5349
27	0	1	1	1	0	1	1	0	1	0	1	1	0	1	19.4725	.5250	.5199	.5249
28	0	1	1	0	0	1	0	1	1	1	1	1	1	1	19.4825	.5150	.5099	.5149
29	0	1	1	1	0	0	1	0	1	0	1	1	0	1	19.4925	.5050	.4999	.5049
30	0	1	1	1	0	0	0	1	0	0	1	1	0	1	19.5025	.4950	.4899	.4949

CHANNEL	I = 5.00 Volts. D = 0 Volts													
	IC903 PROGRAM DIVIDER								AM	USB	LSB	AM	USB	LSB
	PINS								SYNTH	SYNTH	SYNTH	DIVIDER	DIVIDER	DIVIDER
	8	9	10	11	12	13	14	OUTPUT	OUTPUT	OUTPUT	INPUT	INPUT	INPUT	
								IN MHz AT	IN MHz AT	IN MHz AT	IC903-2	IC903-2	IC903-2	
								CG17	CG17	CG17				
1	1	0	1	0	0	1	1	19.165	19.1675	19.1675	.8250	.8299	.8299	
2	1	0	1	0	0	1	0	19.175	19.1775	19.1775	.8250	.8199	.8249	
3	1	0	1	0	0	0	1	19.185	19.1875	19.1875	.8150	.8099	.8149	
4	1	0	0	0	1	1	1	19.205	19.2075	19.2075	.7950	.7899	.7949	
5	1	0	0	0	1	1	0	19.215	19.2175	19.2175	.7850	.7799	.7849	
6	1	0	0	1	1	0	1	19.225	19.2275	19.2275	.7750	.7699	.7749	
7	1	0	0	1	1	0	0	19.235	19.2375	19.2375	.7650	.7599	.7649	
8	1	0	0	1	0	1	0	19.255	19.2575	19.2575	.7450	.7399	.7449	
9	1	0	0	0	0	0	1	19.265	19.2675	19.2675	.7350	.7299	.7349	
10	1	0	0	1	0	0	0	19.275	19.2775	19.2775	.7250	.7199	.7249	
11	1	0	0	0	1	1	1	19.285	19.2875	19.2875	.7150	.7099	.7149	
12	1	0	0	0	1	1	0	19.305	19.3075	19.3075	.6950	.6899	.6949	
13	1	0	0	0	0	0	0	19.315	19.3175	19.3175	.6850	.6799	.6849	
14	1	0	0	0	0	1	1	19.325	19.3275	19.3275	.6750	.6699	.6749	
15	1	0	0	0	0	0	0	19.335	19.3375	19.3375	.6650	.6599	.6649	
16	1	0	0	0	0	0	0	19.355	19.3575	19.3575	.6450	.6399	.6449	
17	0	1	1	1	1	1	1	19.365	19.3675	19.3675	.6350	.6299	.6349	
18	0	0	1	1	1	1	0	19.375	19.3775	19.3775	.6250	.6199	.6249	
19	0	0	1	1	0	0	1	19.385	19.3875	19.3875	.6150	.6099	.6149	
20	0	0	1	1	0	1	1	19.405	19.4075	19.4075	.5950	.5899	.5949	
21	0	1	1	1	0	1	0	19.415	19.4175	19.4175	.5850	.5799	.5849	
22	0	0	1	1	1	0	1	19.425	19.4275	19.4275	.5750	.5699	.5749	
23	0	0	1	1	0	1	0	19.455	19.4575	19.4575	.5450	.5399	.5449	
24	0	0	1	1	0	0	0	19.435	19.4375	19.4375	.5650	.5599	.5649	
25	0	0	1	1	0	1	1	19.445	19.4475	19.4475	.5550	.5499	.5549	
26	0	1	1	0	1	0	1	19.465	19.4675	19.4675	.5350	.5299	.5349	
27	0	1	1	0	0	0	1	19.475	19.4775	19.4775	.5250	.5199	.5249	
28	0	1	1	1	1	1	1	19.485	19.4875	19.4875	.5150	.5099	.5149	
29	0	1	1	0	0	0	0	19.495	19.4975	19.4975	.5050	.4999	.5049	
30	0	1	1	0	0	0	1	19.505	19.5075	19.5075	.4950	.4899	.4949	
31	0	1	1	0	0	0	0	19.515	19.5175	19.5175	.4850	.4799	.4849	
32	0	1	0	1	1	1	1	19.525	19.5275	19.5275	.4750	.4699	.4749	
33	0	1	1	1	1	1	0	19.535	19.5375	19.5375	.4650	.4599	.4649	
34	0	1	0	1	1	0	0	19.545	19.5475	19.5475	.4550	.4499	.4549	
35	0	1	0	1	1	1	1	19.555	19.5575	19.5575	.4450	.4399	.4449	
36	0	1	0	1	0	1	1	19.565	19.5675	19.5675	.4350	.4299	.4349	
37	0	1	0	0	0	1	0	19.575	19.5775	19.5775	.4250	.4199	.4249	
38	0	1	0	1	1	1	0	19.585	19.5875	19.5875	.4150	.4099	.4149	
39	0	1	0	0	0	0	1	19.595	19.5975	19.5975	.4050	.3999	.4049	
40	0	1	0	0	0	1	1	19.605	19.6075	19.6075	.3950	.3899	.3949	

