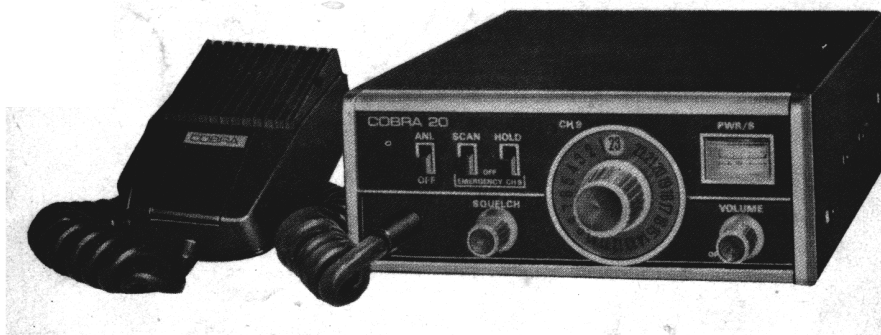


SERVICE MANUAL

COBRA 20

**SOLID STATE CITIZENS BAND
2 WAY RADIO**



A PRODUCT OF

DYNASCAN CORPORATION

1801 W. BELLE PLAINE AVE., CHICAGO, ILLINOIS 60613

COBRA 20
SERVICE MANUAL

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1. GENERAL DESCRIPTION

This Service Manual is used for COBRA 20 which are fully solid state 23 channel frequency synthesized 5W transceiver for class D Citizens Radio Service of FCC Rules and Regulations.

2. SPECIFICATIONS

2-1. Receiver

Sensitivity	0.5 μ V 10dB S+N/N @ 30% modulation @ 1000Hz
Selectivity	4 KHz @ -6dB 20 KHz @ -50dB
Image rejection	better than 40dB
Squelch	minimum sensitivity... 1 μ V maximum signal stop, factory setting, 100 μ V
Noise limiter	series gate type
Audio output	2.5 watts 8 ohm speaker high level class B audio

2-2. Transmitter

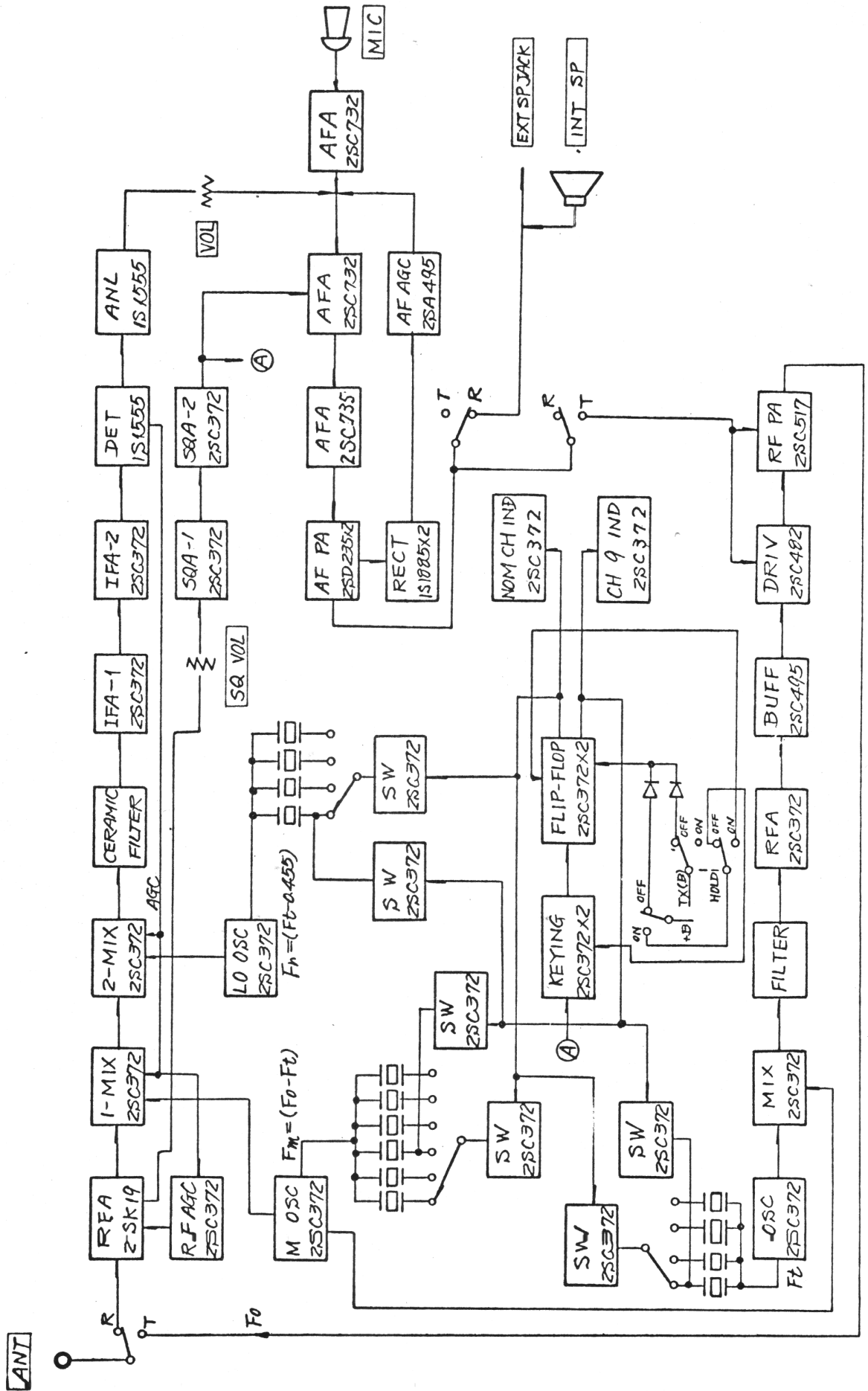
Power output	better than 3.0 watts @ 13.8 volts
Modulation	better than 90%

2-3. Microphone dynamic microphone 500 Ω

2-4. Weight 4.5 pound

2-5. Size 2.36" (H) x 6.0" (W) x 8.46" (D)

3. BLOCK DIAGRAM OF TRANSCEIVER COBRA 20



4. ALIGNMENT INSTRUCTIONS

Note: This transceiver meets all requirements of FCC Rules and Regulations Parts 95, Subpart "C", and requires station license. Therefore only those persons properly licensed by the FCC are permitted to repair or adjust any malfunctioning unit found to be transmitting or radiating illegally.

4-1. Receiver

- a. Connects an oscilloscope or VTVM to test point \textcircled{D}
- b. Inject 455 KHz 30% modulated signal at test point \textcircled{C} using a 0.01 mfd capacitor in series with the signal generator cable.
- c. Adjust 2nd IF transformers T4 and T5 for maximum deflection.
- d. Connect a signal generator to J1. Inject 27 MHz 30% modulated signal of about $1000\mu\text{V}$.
- e. Adjust 1st IF transformers T3 decreasing the signal generator output.
- f. Adjust RF transformers T1 and T2 decreasing the signal generator output.
- g. Check the receiver specifications.

4-2. Transmitter

- a. Connect 50 ohms dummy load to J1.
- b. Connect an oscilloscope to test point \textcircled{G} .
- c. Depress the press talk switch on microphone and make sure 2 ± 0.2 peak to peak synthesizer output.
- d. Disconnect the oscilloscope from test point \textcircled{G} .
- e. Connect the oscilloscope to J1 and adjust T10, T11, and L3 for maximum deflection.
- f. Adjust C60 for 3.5W RF output.

5. TROUBLE SHOOTING

5-1. Test equipment

- a. RF signal generator, with a frequency range of at least from 455 KHz to 30 MHz, from 1 microvolt to 100 millivolts.
- b. Oscilloscope, with a range of 30 MHz.
- c. DC power source, 10 ~ 15 volts 2 ampere.
- d. RF power meter with 50 ohms dummy load, with a full scale of at least 5.0 watts.
- e. Multimeter.
- f. VTVM with a full scale of at least 50 volts.
- g. 8-ohm dummy load with plug.

5-2. Precautions in trouble shooting

- a. Tests are made on DC 13.8V.
- b. Antenna connector must be connected to signal generator or 50-ohm dummy load.
- c. EXT connector is connected to 8-ohm dummy load to measure audio output.

5-3. Receiver (RF - IF stage)

STEP	TROUBLE	CAUSE
1.	Zero or excessive low voltage at RF-IF stage circuit power source line.	defective R25, broken Q6 or short circuited T4, T5.
2.	No signal output (455 KHz)	defective Q4, Q5, Q6, short circuited T4, T5.
3.	No signal output (10 MHz band)	no oscillation of Q14, defective Q3, short circuited T3.
4.	No signal output (27 MHz band)	no oscillation of Q11, defective Q2, short circuited T1, T2.

5-4. Receiver (audio circuit)

STEP	TROUBLE	CAUSE
1.	No signal output	defective Q33, Q34, Q35, Q36
2.	Excessive distorted signal	defective CD19

5-5. Transmitter

STEP	TROUBLE	CAUSE
1.	Zero or excessive low voltage at RFPA stage.	bad contact of K1b, disconnection of T14.
2.	No RF output (Final 5 stages)	defective Q23, Q24, Q25, Q26, Q27.
3.	No RF output	no oscillation of Q11, Q22.
4.	Normal RF output but no modulation	layer short circuited T14, miss connection of MK1.

5-6. Others

STEP	TROUBLE	CAUSE
a. RF compressor		
1.	No or excessive small signal at over 1 volt RF signal.	defective Q1, CD12, CD13, no AGC behavior.
b. AF compressor (Transmitter)		
1.	Excessive modulation or excessive distorted modulation wave form.	defective Q32, CD20, CD21, R110, R111.
c. Squelch control		
1.	Squelch control does not function (does not quiet the receiver even in ON position)	disconnected CD18, defective R83.
2.	Squelch control does not function (quiets even in OFF position)	shortened CD18, defective R83.

STEP	TROUBLE	CAUSE
d.	S meter	
1.	Meter does not swing	defective CD3, M1, R17.
e.	RF meter	
1.	Meter does not swing	defective CD11, M1, R78.
f.	ANL	
1.	ANL does not function (not effective)	disconnection S4, defective CD5.
2.	ANL does not function (signal drop is excessive)	short circuit CD13.
g.	CH9 scan alert	
1.	CH9 scan circuit does not function when scan switch is ON position.	disconnected S2, S3, open circuit of CD6, Q17, no oscillation of Q15, Q16, open circuit of CD7, CD8, defective Q18, Q19.
2.	CH9 scan circuit does not stop by incoming signal when scan switch is ON position.	short circuit of Q17, defective Q28, Q29, CD6.
3.	CH9 hold circuit does not function when scan and hold switches are ON position.	disconnected S2, S3, defective R52.

6. FREQUENCY SYNTHESIS

Channel	(Fo) Frequency (MHz)	MOSC (Fm)						ROSC(Fr)				TO3C (Ft)			
		X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14
		16.965	17.015	17.065	17.115	17.165	17.215	9.545	9.555	9.565	9.585	10.000	10.010	10.020	10.040
1	26.965	○						○				○			
2	26.975	○							○				○		
3	26.985	○								○				○	
4	27.005	○									○				○
5	27.015		○					○				○			
6	27.025		○						○				○		
7	27.035		○							○				○	
8	27.055		○								○				○
9	27.065			○				○				○			
10	27.075			○					○				○		
11	27.085			○						○				○	
12	27.105			○							○				○
13	27.115				○			○				○			
14	27.125				○				○				○		
15	27.135				○					○				○	
16	27.155				○						○				○
17	27.165					○		○				○			
18	27.175					○			○				○		
19	27.185					○				○				○	
20	27.205					○					○				○
21	27.215						○	○				○			
22	27.225						○		○				○		
23	27.255						○				○				○

* Formula at frequency synthesis

$F_o = F_m + F_t$ (circle mark in the table)
 $455 \text{ kHz} = F_o - F_m - F_r = F_t - F_r$
 (circle mark in the table)

COBRA 20 VOLTAGE CHART

SWITCH

	<u>E</u>	<u>B</u>	<u>C</u>
Q30	0.0	13.0	0.0

AUDIO

	<u>E</u>	<u>B</u>	<u>C</u>
Q31	0.6	1.2	0.6
Q32	0.0	0.0	0.0
Q33	0.0	0.6	0.0
Q34	0.0	0.0	13.7
Q35	0.0	0.52	13.7
Q36	0.0	0.52	13.7

* Using Demodulator Probe and 11 MEG VTVM

COBRA 20 VOLTAGE CHART

RECEIVE

	<u>E</u>	<u>B</u>	<u>C</u>
Q1	1.95	1.55	1.15
Q2	1.95	4.2	8.5
Q3	1.55	2.2	9.6
Q4	2.2	2.65	9.7
Q5	0.0	0.63	2.1
Q6	1.4	2.1	9.9
Q7	0.0	0.65	0.0
Q8	0.0	0.1	0.0
Q9	0.0	0.1	0.0
Q10	0.0	0.0	0.0
Q11	3.8	4.3	12.7
Q12	0.0	0.0	0.2
Q13	0.0	0.6	0.0
Q14	5.5	4.4	12.6

SCANNER
(NO SCAN)

SCAN ON
(HOLD)

	<u>E</u>	<u>B</u>	<u>C</u>	<u>E</u>	<u>B</u>	<u>C</u>
Q15	0.0	0.0	0.0	0.0	0.0	0.0
Q16	0.0	0.0	0.0	0.0	0.0	0.0
Q17	0.0	0.0	0.0	0.0	0.7	0.0
Q18	0.0	0.0	10.2	0.0	0.8	0.08
Q19	0.0	8.2	0.0	0.0	0.06	10.2
Q20	0.0	0.0	7.3	0.0	0.8	0.0
Q21	0.0	0.8	0.0	0.0	0.0	7.4

TRANSMIT (MIKE KEYED)

	<u>DC VOLTS</u>			<u>RF VOLTS*</u>		
	<u>E</u>	<u>B</u>	<u>C</u>	<u>E</u>	<u>B</u>	<u>C</u>
Q22	3.8	4.2	12.7	2.65	2.9	0.6
Q23	3.0	3.6	12.1	0.65	1.4	0.7
Q24	3.2	3.8	13.0	0.65	9.0	0.7
Q25	0.0	0.0	13.7	0.4	3.0	13.0
Q26	0.0	0.0	13.6	16.0	14.0	1.0
Q27	0.0	0.0	13.7	12.5	12.0	1.5

UNSQUELCHED

SQUELCHED

	<u>E</u>	<u>B</u>	<u>C</u>	<u>E</u>	<u>B</u>	<u>C</u>
Q28	0.0	0.7	0.74	0.0	0.7	0.1
Q29	0.0	0.74	0.0	0.0	0.1	8.8