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SERVICE MANUAL

COBRA 28

SOLID STATE CITIZENS BAND
2 WAY RADIO



A PRODUCT OF
DYNASCAN CORPORATION
1801 W. BELLE PLAINE AVE., CHICAGO, ILLINOIS 60613

COBRA 28

SERVICE MANUAL

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1. GENERAL DESCRIPTION

This Service Manual is used for COBRA 28 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 10 dB S+N/N @30% modulation @ 1000 Hz
Selectivity	4 kHz @ - 6 dB 20 kHz @ -50 dB
Image rejection	better than 50 dB
Squelch	minimum sensitivity--1 μ V, maximum signal stop, factory setting, 100 μ V
Delta tune	variable \pm 1.5 kHz
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

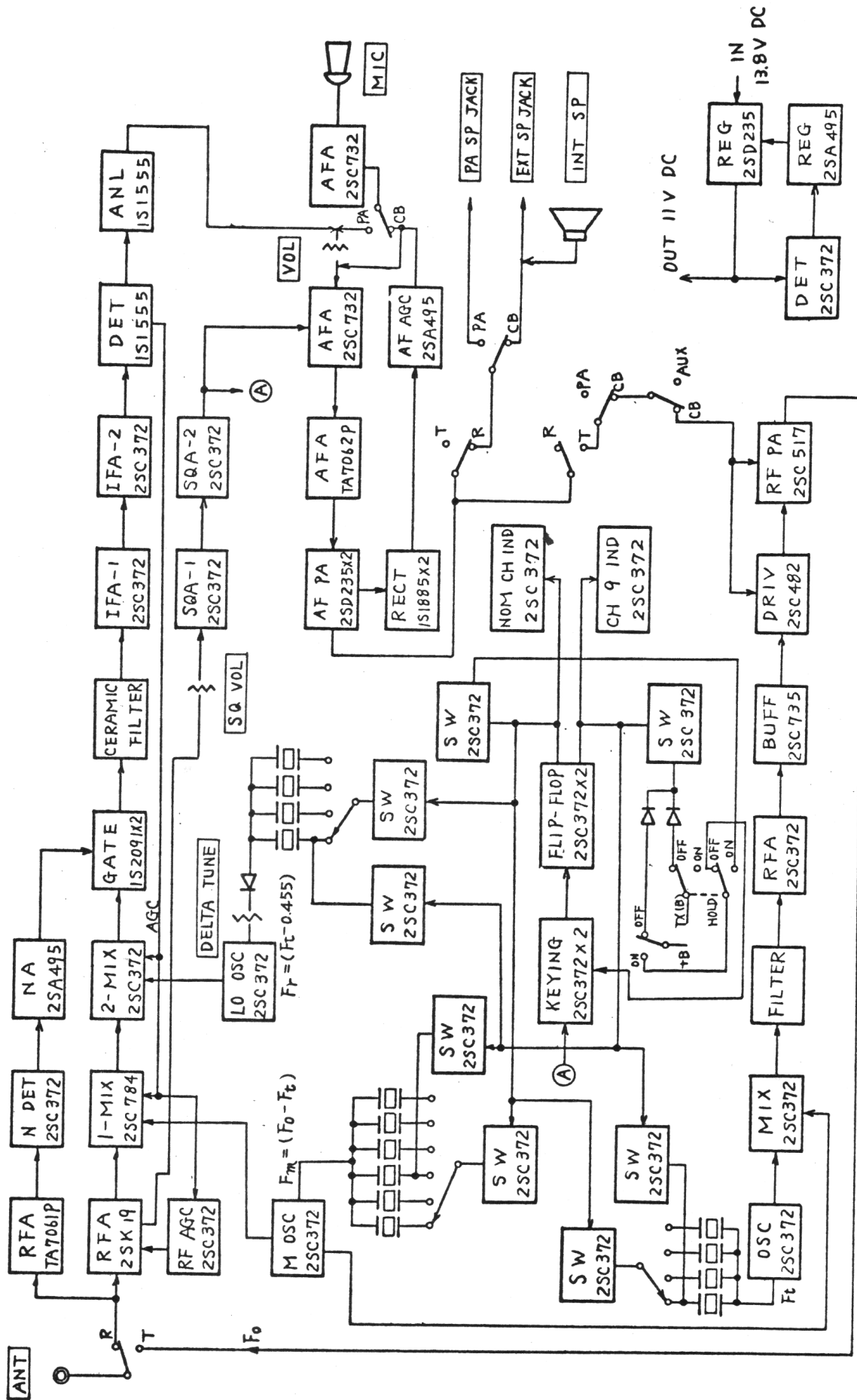
2-4. Weight

4.5 pounds

2-5. Size

2.36"(H) x 6.0"(W) x 8.46"(D)

3. BLOCK DIAGRAM OF TRANSCEIVER COBRA 28



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{C} .
- b. Inject 455 kHz 30% modulated signal at test point \textcircled{A} using a 0.01 mfd capacitor in series with the signal generator cable.
- c. Adjust 2nd IF transformers T6, T7, T8 and T9 for maximum deflection.
- d. Connect a signal generator to J1. Inject 27 MHz 30% modulated signal of about 1000uV.
- e. Adjust 1st IF transformers T4 and T5 decreasing the signal generator output.
- f. Adjust RF transformers T1, T2 and T3 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{E} .
- 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{E} .
- e. Connect the oscilloscope to J1 and adjust T16, T17 and L4 for maximum deflection.
- f. Adjust 63 for 3.5W RF output.

4-3. Delta tune

- a. Connect the frequency counter to the test point \textcircled{A} .
- b. Set the Delta tune control R38 to the center click position.
- c. Adjust RF choke coil L1 to obtain center frequency.
(approx. within fr ± 200 Hz)
- d. Check the frequency variable range by operating Delta tune control R38. (approx. over fr ± 1.5 kHz)

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 R26, broken Q6 or short circuited T7, T9.

STEP	TROUBLE	CAUSE
2.	No signal output (455 kHz)	defective Q4, Q5, Q6, CD2, CD3, short circuited T6, T7, T8, T9.
3.	No signal output (10 MHz band)	no oscillation of Q10, defective Q3, short circuited T4, T5.
4.	No signal output (27 MHz band)	no oscillation of Q9 defective Q2, short circuited T1, T2, T3.

5-4. Receiver (audio circuit)

STEP	TROUBLE	CAUSE
1.	No signal output	defective Q23, IC2, Q24, Q25.
2.	Excessive distorted signal	defective CD18

5-5. Transmitter

STEP	TROUBLE	CAUSE
1.	Zero or excessive low voltage at REPA stage	bad contact of S2b, K1b disconnection of T20
2.	No RF output (Final 5 stages)	defective Q14, Q15, Q16, Q17, Q18.
3.	No RF output	no oscillation of Q9, Q13.
4.	Normal RF output but no modulation.	layer short circuited T20, 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, CD9, CD10, no AGC behavior
b. AF compressor (Transmitter)		
1.	Excessive modulation or excessive distorted modulation wave form	defective Q21, CD19, CD20, R99, R100

STEP	TROUBLE	CAUSE	COBRA 28
c. Squelch control			
1.	Squelch control does not function (does not quiet the receiver enen in ON position)	disconnected CD17 defective R51	
2.	Squelch control does not function (quiets even in OFF position)	shortened CD17 defective R51.	
d. Delta tune			
1.	No deviation of frequency	defective CD7, R38.	
e. Transmission and modulation lamp			
1.	Lamp does not light	defective RL1, Q19, CD11, CD12,	
f. S meter			
1.	Meter does not swing	defective CD4, M1, R19,	
g. RF meter			
1.	Meter does not swing	defective CD11, M1, R73, C70	
h. Noise blanker (tuning frequency: approx. 23 MHz)			
1.	NB does not function (RF stage)	defective IC1, layer shorted T10, T11.	
2.	NB does not function (NA, SW stage)	defective Q7, Q8.	
3.	NB does not function effectively	defective CD2, CD3.	
i. CH 9 scan alert			
1.	CH 9 scan circuit does not function when scan switch is ON position.	disconnected S5, S6, open circuit of CD22, Q35, no oscillation of Q36, Q37, open circuit of CD23, CD24, defective Q38, Q39, shorted Q40, Q42.	
2.	CH 9 scan circuit does not stop by incoming signal when scan switch is ON position.	short circuit of Q35, defective Q11, Q12, CD10,	

STEP	TROUBLE	CAUSE
3.	CH 9 hold circuit does not function when scan and hold switches are ON position.	disconnected S5, S6, defective Q42, shorted Q40.

j. PA operation

1.	PA does not function (sound does not come)	disconnection Klc, S2c, J3, S2a, MK1.
2.	Volume control does not function.	disconnection S2b, defective R88.

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)