

Cobra 200GTL DX

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Cobra 200GTL DX

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Version 1.0

Preliminary Information (There will be updates)

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Preliminary Information (There will be updates)

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SET DC POWER SUPPLY VOLTAGE AT 13.8VOLT DC.
WATTMETER (50 OHM) TO THE ANTENNA CONNECTOR

PLL CIRCUIT ALIGNMENT PROCEDURE :

- (1) SET TRANSCEIVER TO FREQUENCY 28.000MHz
- (2) WHILE IN RECEIVER MODE, CONNECT OSCILLOSCOPE DC PROBE TO **TP1** (SEE PARTS LOCATION).
- (3) ADJUST **T712** AND OBSERVE THE DC LEVEL SWING BETWEEN 0.2 TO +7 VOLT DC. THEN SET THE DC LEVEL TO 2.8 VOLT
- (4) CHANGE TO TX MODE, CHECK THE DC LEVEL SHOULD BE < 6V
- (5) WHILE IN RECEIVER MODE, CONNECT OSCILLOSCOPE DC PROBE TO **TP2** (SEE PARTS LOCATION).
- (6) ADJUST **T713** FOR MAXIMUM LEVEL
- (7) SET RECEIVER TO FREQUENCY 28.000 MHz.
- (8) WHILE IN RECEIVER MODE, CONNECT FREQUENCY COUNTER PROBE TO **TP2** (SEE PARTS LOCATION).
- (9) SET THE FREQUENCY 28.000MHz BY MOVING TUNE SWITCH THAN ADJUST IFT **T711** TO FREQUENCY 17.305MHz

CARRIER OSCILLATOR PORTION PROCEDURE :

- (1) SET TRANSCEIVER TO FREQUENCY **28.000MHz**
- (2) CONNECT FREQUENCY COUNTER TO **TP3** (SEE PARTS LOCATION).
- (3) WHILE IN TRANSMIT AM/FM MODE. ADJUST **T716** TO OBTAIN 10.695MHz READING.
- (4) WHILE IN RECEIVER USB MODE ADJUST **T714** TO OBTAIN 10.6975MHz READING.
- (5) WHILE IN RECEIVER LSB MODE ADJUST **T715** TO OBTAIN 10.6925MHz READING.

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RF AMP CIRCUITS ALIGNMENT PROCEDURE :

1.RX ALIGNMENT

-AM

- (1) CONNECT THE PROBE OF RF SIGNAL MEASURING EQUIPMENT BETWEEN GROUND AND ANTENNA POINT. SET THE SINAD OF SSG TO -47dBm AND THEN ADJUST **T703, T704, T705, T706, T707, T708 AND T710** FOR MAXIMUM READING ON THE EQUIPMENT.
- (2) WHILE THE SSG AMPLITUDE IS AT -47dBm ROTATE THE SQUELCH KNOB AT MAXIMUM LEVEL THEN ALIGN **RV2** FOR SQUELCH, IT MUST BE $1000 \mu V \pm 500$ AND HYSTERESIS OF 1-5 dB.
- (3) AT BAND D MODULATION OFF ALIGN THE S-9 BY **RV15** THE UNIT SHOULD OBTAIN $100 \mu V$ READING.
- (4) CONNECT THE TEST PROBE TO THE COLLECTOR OF Q6 AND TURN ON THE NB TESTER AND ALIGN THE **T701** RX NB IT SHOULD READ < 3 dB.

-FM

- (1) CHANGE TO FM BAND. SET THE SINAD OF SSG TO -47dBm AND THEN ADJUST **T702** MAXIMUM READING ON THE EQUIPMENT.

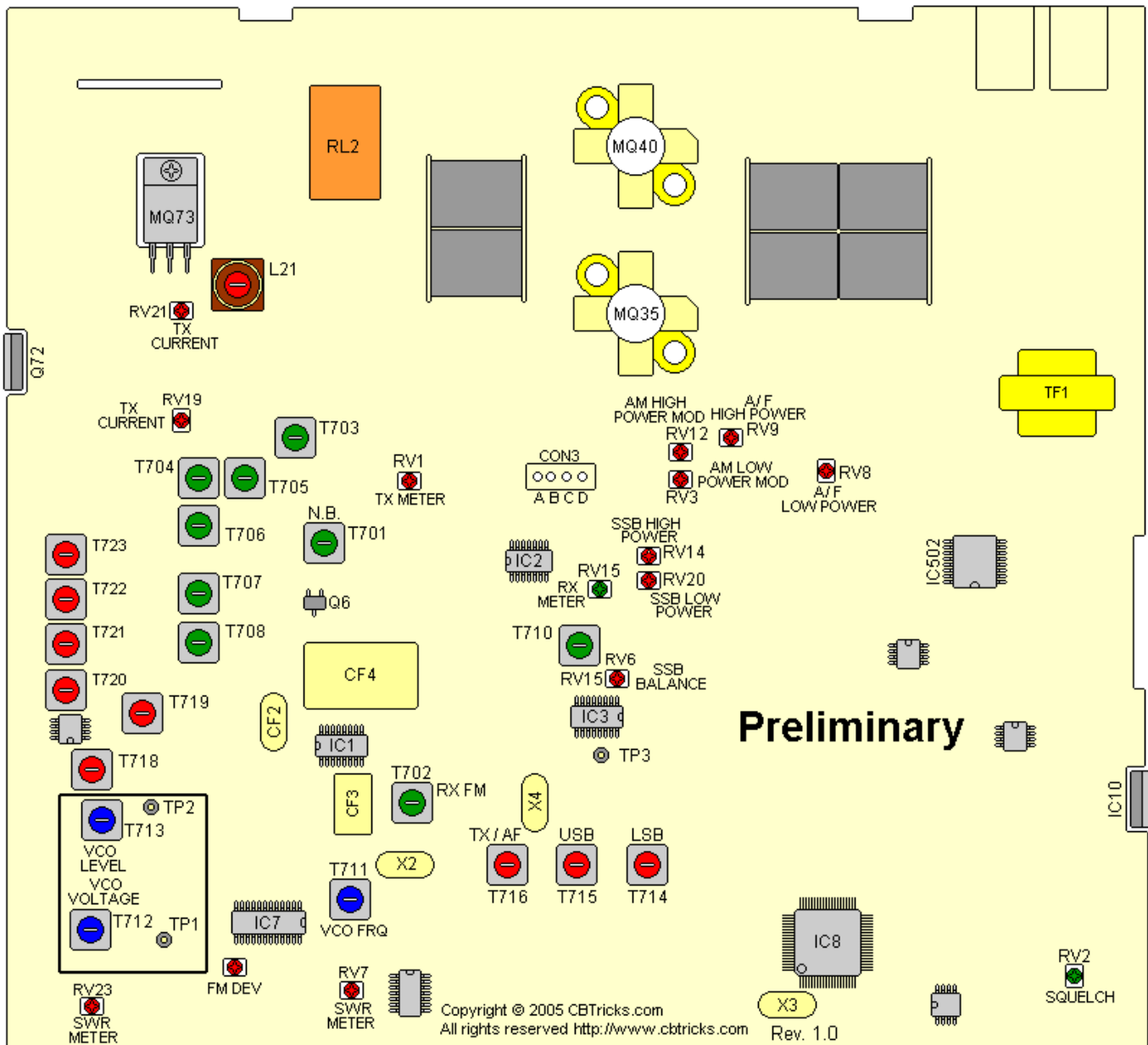
2.TX ALIGNMENT

- (1) TEST EQUIPMENT CONNECTION. CONNECT RF POWER METER, RF VTVM AND OSCILLOSCOPE TO ANTENNA JACK.
MAKE SURE 13.8VDC AT PCB DURING TX.
- (2) TRANSISTOR NO SIGNAL BIAS CURRENT CONTROL PROCEDURAL TUNE THE CHANNEL BAND TO BAND D WITH FREQUENCY 29.7000 MHZ THE UNIT SHOULD BE AT HI POWER MODE MODULATION OFF AT LSB.
PRE DRIVER BIAS
CONTACT CURRENT TESTER PLUG TO **CON 3 OF PIN C (+), PIN D (-)**.
THEN ADJUST CURRENT TO 60mA BY CONTROL **RV19**.
DRIVER BIAS
MOVE CURRENT TESTER PLUG TO **CON 3 OF PIN A (+), PIN B (-)** THEN ADJUST CURRENT TO 1.3A BY CONTROL **RV21**.
- (3) THE UNIT SHOULD BE SET AT HI POWER MODE AM BAND MIC GAIN AT MAXIMUM FREQ. @ 27.195MHZ.
- (4) ADJUST **T718, T719, T720, T721, T722, T723,** AND **L21** COILS TO OBTAIN THE MAXIMUM INDICATION ON RF POWER METER.
CHECK AND READJUST FOR EQUAL POWER 26.065 TO 29.695MHZ.
- (5) AT AM TX MODE AT HI, NO MODULATION ADJUST **RV9** TO OBTAIN RF CARRIER POWER OF 32 WATTS ON RF METER.
- (6) WHILE IN AM TX MODE HI/LOW SWITCH TO LOW, NO MODULATION ADJUST **RV8** TO OBTAIN RF CARRIER POWER OF 4W ON RF POWER METER.

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- (7) WHILE IN AM TX MODE NO MODULATION AND HI/LOW SWITCH TO HIGH ADJUST **RV1** SO THAT THE METER INDICATE " 7 "
- (8) WHILE IN AM. TX. APPLY 1KHZ AT 30MV AND ADJUST **RV12** TO OBTAIN 95% MODULATION AT HI POWER MODE ADJUST **RV3** TO OBTAIN 95% MODULATION AT LOW POWER MODE
- (9) CHANGE THE SETTING OF MODULATION MODES TO FM TX MODE ADJUST **RV5** TO OBTAIN 2.5KHz DEVIATION AT HI/LO POWER MODE
- (10) WHILE IN SSB (USB) MODE, TX.MODE. AF SIGNAL 30mV ADJUST **RV14** TO OBTAIN RF CARRIER POWER OF 100W ON RF POWER METER.
- (11) WHILE IN SSB (USB) MODE TX.MODE AF SIGNAL 30mV ADJUST **RV20** TO OBTAIN RF CARRIER POWER OF 12W ON RF POWER METER.
- (12) WHILE IN SSB MODE TX.MODE NO MODULATION. ADJUST **RV6** TO OBTAIN CARRIER LEVEL OF MINIMUM ON OSILLOSCOPE.
- (13) AT FM SETTING MIC MINIMUM BAND D. CHECK THE SWR CAL.
- (14) PRESS PTT, THEN PRESS SWR BUTTON, SET THE UNIT TO CAL. BY PRESSING THE DIM / SWR CAL BUTTON. ROTATE THE SWR CALIBRATION KNOB CLOCKWISE UNTIL IT REACHES THE "30".
- (15) PRESS DIM / SWR CAL BUTTON AND ALIGN **RV23** UNTIL IT OBTAIN 2.0 READING IN THE METER AT HI POWER MODE.
- (16) REPEAT STEP 14 THEN PRESS DIM / SWR CAL BUTTON AND ALIGN **RV7** UNTIL, IT OBTAIN 2.0 READING IN THE METER AT LOW POWER MODE.

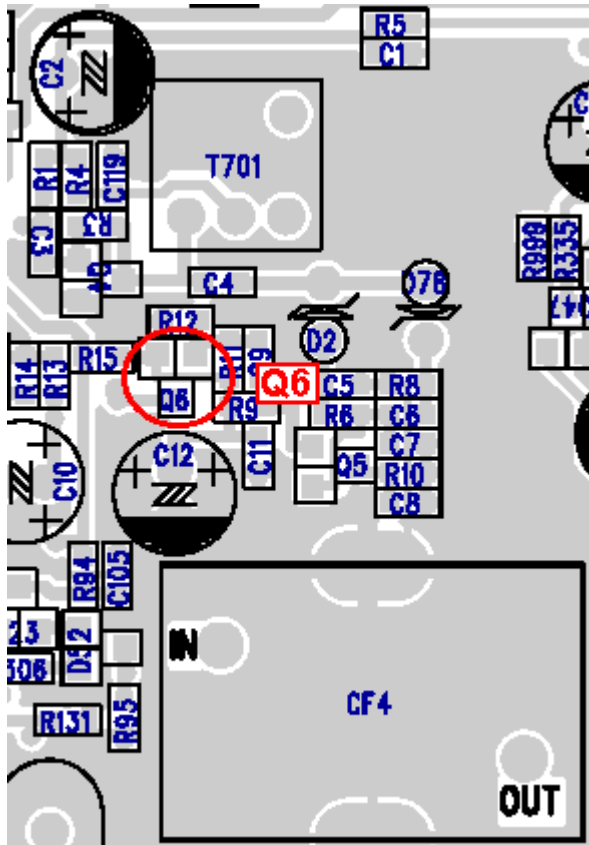
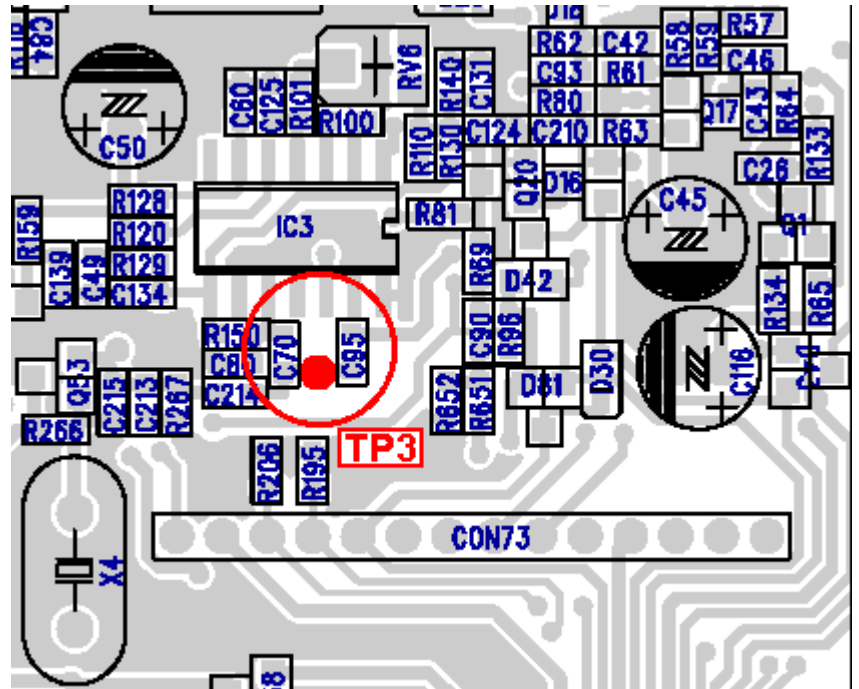
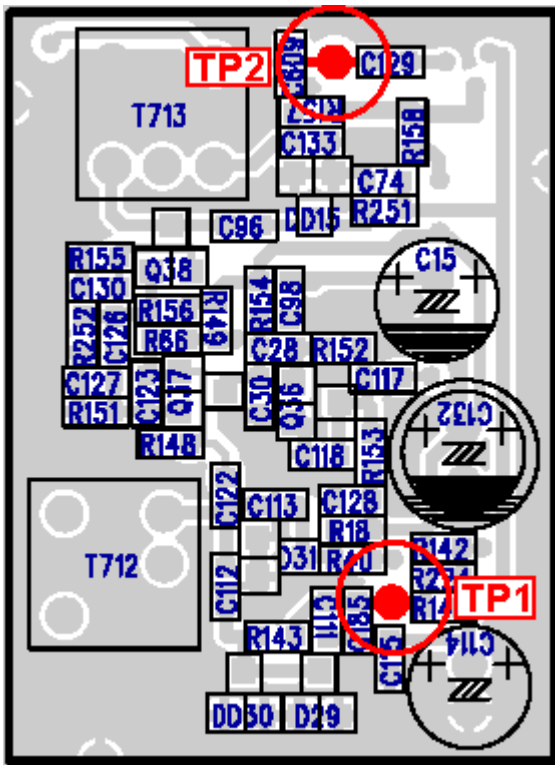
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Test Point Locations



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A description of all circuits and devices provided for determining and stabilizing frequency: Frequency (from 28.000mhz to 29.695mhz) of transmitting, as receiving, frequencies are provided by PLL (phase locked loop) circuitry. The purpose of the PLL is to provide a multiple number of frequencies from VCO (voltage controlled oscillator) with quartz crystal accuracy and stability from one crystal oscillator reference frequency.

Therefore the VCO frequency is as accurate and stable as the crystal oscillator itself. The reference crystal oscillator frequency is 10.240Mhz. And the VCO frequency 17.305mhz or local oscillators 10.695Mhz is mixer to obtain 28mhz band transmit frequency. And accurate as the 10.240mhz crystal oscillators. Therefore the TX frequencies are as stable and accurate as the 10.240mhz crystal oscillators. Stable and accurate within 18ppm over the temperature range between -30°C and 50°C, the transmitted frequencies are also stable within 25ppm over the same temperature range.

DESCRIPTION OF FREQUENCY DETERMINING CIRCUIT:

To eliminate frequency drift to power supply variation. A regulated supply is provided for PLL operation. The regulator consists of a regulated IC10 (8v) the 10.240Mhz crystal oscillator active part is included in the PLL IC7.

See equivalent circuit block diagram of the PLL IC7.

VCO AND FREQUENCY MIXER.

The VCO circuit consists of following, Variator (DC voltage dependent variable capacitor) diode D30 and tuning coil T712. The oscillator of VCO frequency is done by a Q37 and T713.

The resulting 28Mhz output frequency is filtered by T720, T721, T722, T723, Q12, Q69 is a pre-amplifier, but is also as go-no go type switch when illegal transmit frequency is generated. The logic circuit determining the illegal frequencies is located inside the PLL IC7.

Q71, Q72, Q74 is a driver circuit for TX output. And Q35, Q40 is the final power amplifier the class AB type amplifier output, signal is filtered by low pass filter consisting of L21, L230, L24, C302, C306, C308, C309, C346, make up a series resonant and the remaining I/C represents low pass filter.

DESCRIPTION OF ANY CIRCUITS OR DEVICES EMPLOYED FOR SUPPRESSION OF : SPURIOUS RADIATION

When two frequencies are mixed in non-linear devices to obtain a desired output frequency, almost unlimited number of spurious frequencies are generated at the same time. The undesired spurious frequencies are restudied from the differences and the summations of the two frequencies and their harmonics. The far-out frequencies can easily be filtered out. But the most difficult frequencies are those close to the desired output center frequency.

A frequency mixer circuit used in this unit because it is far better than a mixer circuit in eliminating spurious. Also important factors contributing to spurious are poor ground path.

Following steps are taken to eliminate spurious level TP will below 60db :

- (1) Frequency mixer circuit is employed.
- (2) Ground path of the printed circuit board is carefully laid out.
- (3) Adequate band pass filter circuits are employed to eliminate spurious at the frequency mixer output.

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LIMITING MODULATION

Since the nominal microphone (dynamic MIC) output level is about 0.6mv. The overall gain of the audio amplifier is set so that 3mv (at 1khz) will modulate RF signal to 50% then a very effective ALC (automatic level control) circuit.

It is used to limit audio gain so as not to over modulate beyond 95% the dynamic range of the ALC circuit for this purpose is effective over 50 db input increase. The output audio level is sensed by Q56 and set by resistor RV12. A positive going signal will trigger open the Q43, Q44.

LOW POWER

When all the coils are adjusted for peak, the RF power output shall not exceed 4.4 watts at low power mode.

SUPPRESSION OF HARMONICS RADIATION

The class AB type amplifier output signal is filtered by low pass filter consisting of L6, L7, L21 and C312, C330, C331. C332, C333, C334, C335, C348 make up a series resonant circuit and the remaining I/C represents low pass filter.

The harmonics radiation are suppressed by these filter circuits sufficiently and reduced to below 60db.