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# **Service Manual**

For

**25 LTD ST**

**25 WX ST**

# **Model 25 LTD ST / 25 WX ST**

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## **THEORY OF OPERATIONS CB25 LTD ST / CB 25 WX ST**

The COBRA models CB25 LTD ST and CB 25 WX ST are the citizen band AM radio transceivers operated in the frequency range of 26,965 to 27.405 MHz (40 channels). For model CB 25 WX ST, it can also receive the seven channels of 162 MHz weather signal.

### **1. CB Mode of Operation**

#### **1.1 CB Transmitter Section**

When in transmit mode, TR15 and the crystal oscillator generate a fundamental frequency 10.24 MHz and send it to the Phase-Locked-Loop IC3 25LTD to produce the reference frequencies of 16.725 to 17.165 MHz. The fundamental frequency and the reference frequencies are then mixed up in IC2 TA7310P to produce the RF signal of 26.695 to 27.405 MHz. This signal, after magnified by the RF amplifiers TR8 and TR7, is fed to the antenna for transmitting.

In the meantime, the speech signal picked up by the microphone is amplified by TR13 and IC1 TA7222AP, and then applied to the collectors of TR8 and TR7 for RF amplitude modulation. Thus completes the speech signal modulation and transmitting.

A soundtracker switch controls the speech signal path of the microphone amplifier TR13. When the ST switch is set to ON, it cuts the TR13 output and directs it to a compander chip IC801 TA31101AP for speech signal dynamic range compressing. The output of IC801 is then fed to IC1 TA7222AP for the remaining processing. When the ST switch is set to off, the compander function is turned off.

#### **1.2 CB Receiver Section**

When in receive mode, TR15 and the crystal oscillator generate a fundamental frequency 10.24 MHz and send it to the Phase-Locked-Loop IC3 25 LTD to produce the first local oscillator frequencies 16.270 to 16.710 MHz.

In the meantime, the AM RF signal (26.695 to 27.405 MHz) picked up by the antenna is magnified by TR1 and fed to the first mixer FET1. This signal is then mixed with the first local oscillator frequencies 16.270 to 16.710 MHz. That produces the first IF frequency 10.695 MHz. The first IF signal, after passing through the ceramic filter, is fed to the second mixer FET2 for mixing with the second local oscillator frequency 10.24 MHz. That produces the second IF frequency 455 kHz. The second IF signal, after filtered by the ceramic filter and magnified by TR2, TR3, TR4, is demodulated by D6 for speech signal recovery. The recovered speech signal is then magnified by the TA7222 and fed to the speaker. Thus completes the speech signal receiving.

A soundtracker switch controls the recovered speech signal path of the demodulation diode D6. When the ST switch is set to ON, it cuts the D6 output and directs it to a compander chip IC801 TA31101AP for speech signal dynamic range expanding. The output of IC801 is then fed to IC1 TA7222AP for the remaining processing. When the ST switch is set to OFF, the compander function is turned off.



## **2. PA Mode of Operation**

With the CB-PA switch set at PA position, the speech signal picked up by the microphone is fed to TR13 and TA7222 for magnification to a level of about 4 watts, and then via the PA terminal sent to the speaker for speech sound reproduction.

A soundtracker switch controls the speech signal path of the microphone amplifier TR13. When the ST switch is set to ON, it cuts the TR13 output and directs it to a compander chip IC801 TA31101AP for speech signal dynamic range compressing. The output of IC801 is then fed to IC1 TA7222AP for the remaining processing. When the ST switch is set to OFF, the compander function is turned off.

## **3. WX Mode of Operation (162 MHz Weather receiving) - for CB 25 WX ST only**

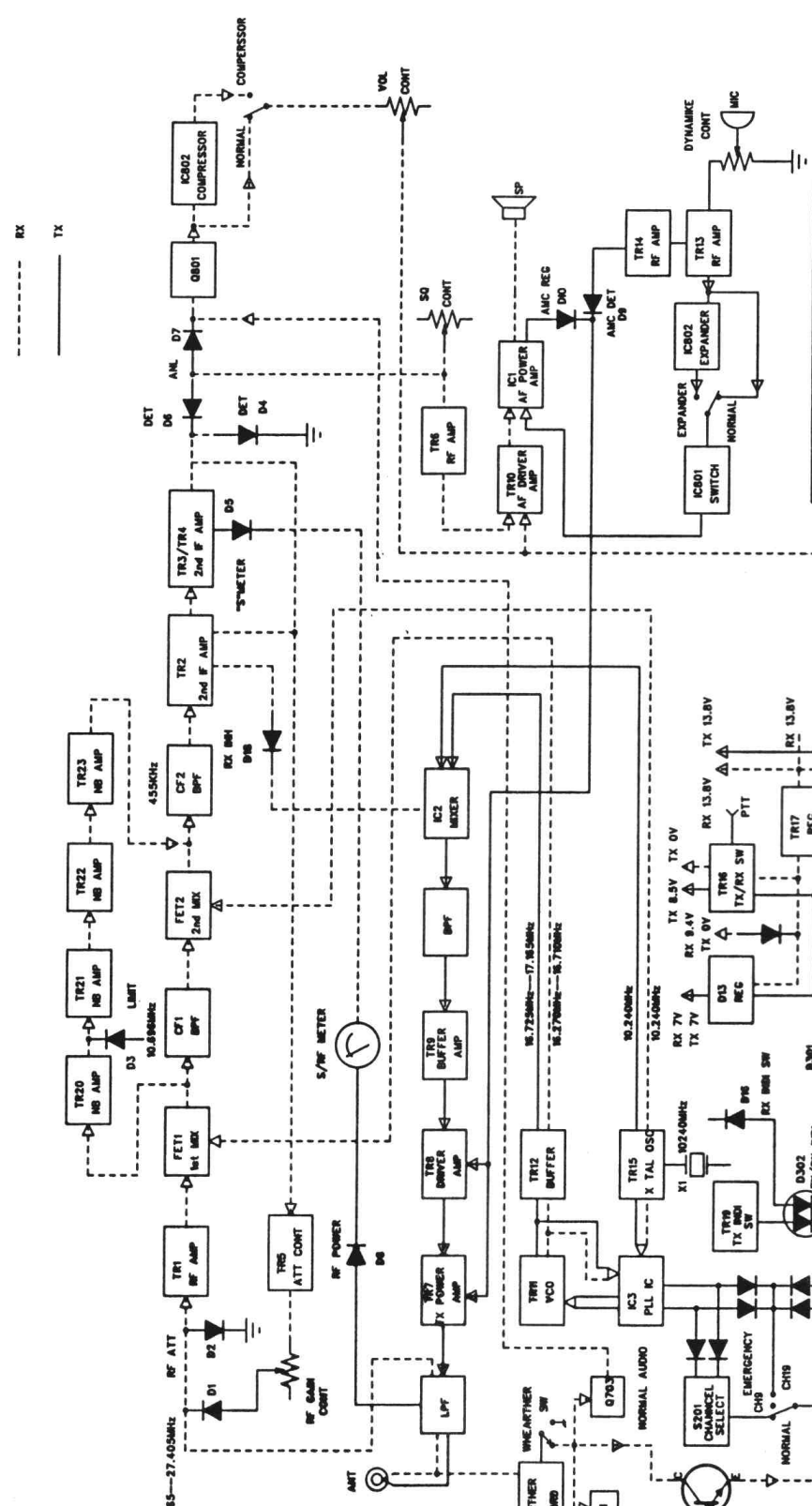
**3.1** With the CB-WX switch set at WX position, the 162 MHz weather signal (frequency modulated) picked up by the antenna is magnified by Q601 and fed to the mixer Q606. In the meantime, Q602 and crystal oscillator generate a local oscillation frequency in the range of 162 MHz, also fed to Q606 for mixing. That produces the IF frequency 455 kHz. The IF signal, after magnified by Q603, Q604, Q605, is frequency discriminated by D605, D606 for audio signal recovery. The recovered WX signal is then magnified by Q703, Q801, IC TA7222 and fed to the speaker for WX signal reproduction.

A soundtracker switch controls the recovered WX signal path of Q801. When the ST switch is set to ON, it cuts the Q801 output and directs it to a compander chip IC801 TA31101AP for speech signal dynamic range expanding. The output of IC801 is then fed to IC1 TA7222AP for the remaining processing. When the ST switch is set to OFF, the compander function is turned off.

**3.2** Before the weather messages broadcasted, there will be a 10-second alert tone (at 1050Hz) sending out from the weather station. When received the 1050 Hz alert tone signal, the tone decoder IC701 NJM567D sends out a control signal that turns on the power supply for the CB transceiver. It also turns on Q704 and sends the 1050 Hz signal to IC1 for amplification and to be produced at the speaker output for alerting.

6 5 4 3 2 1

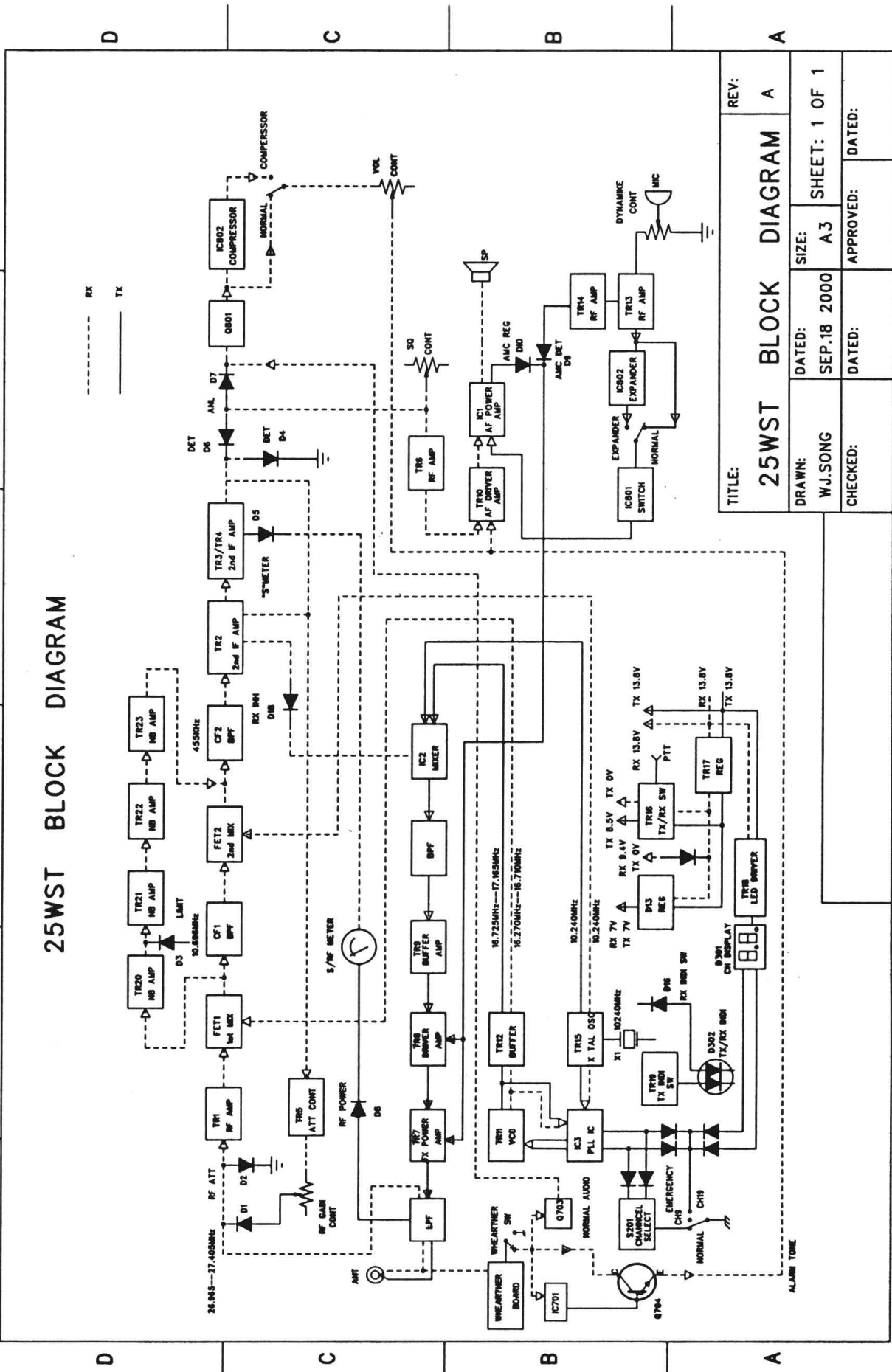
# 25LDM BLOCK DIAGRAM



TITLE:	25LDM BLOCK DIAGRAM			REV:	A
DRAWN:	WJ.SONG	DATED:	SEP.18 2000	SIZE:	A3
CHECKED:		DATED:		APPROVED:	
		DATED:			

SHEET: 1 OF 1					
DATED:					
APPROVED:					
DATED:					

# 25WSW BLOCK DIAGRAM



TITLE:		25WSW BLOCK DIAGRAM		REV:	A
DRAWN:	WJ.SONG	DATED:	SEP.18 2000	SIZE:	A3
CHECKED:		DATED:		APPROVED:	
				SHEET:	1 OF 1
				DATED:	

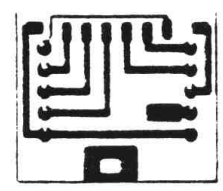
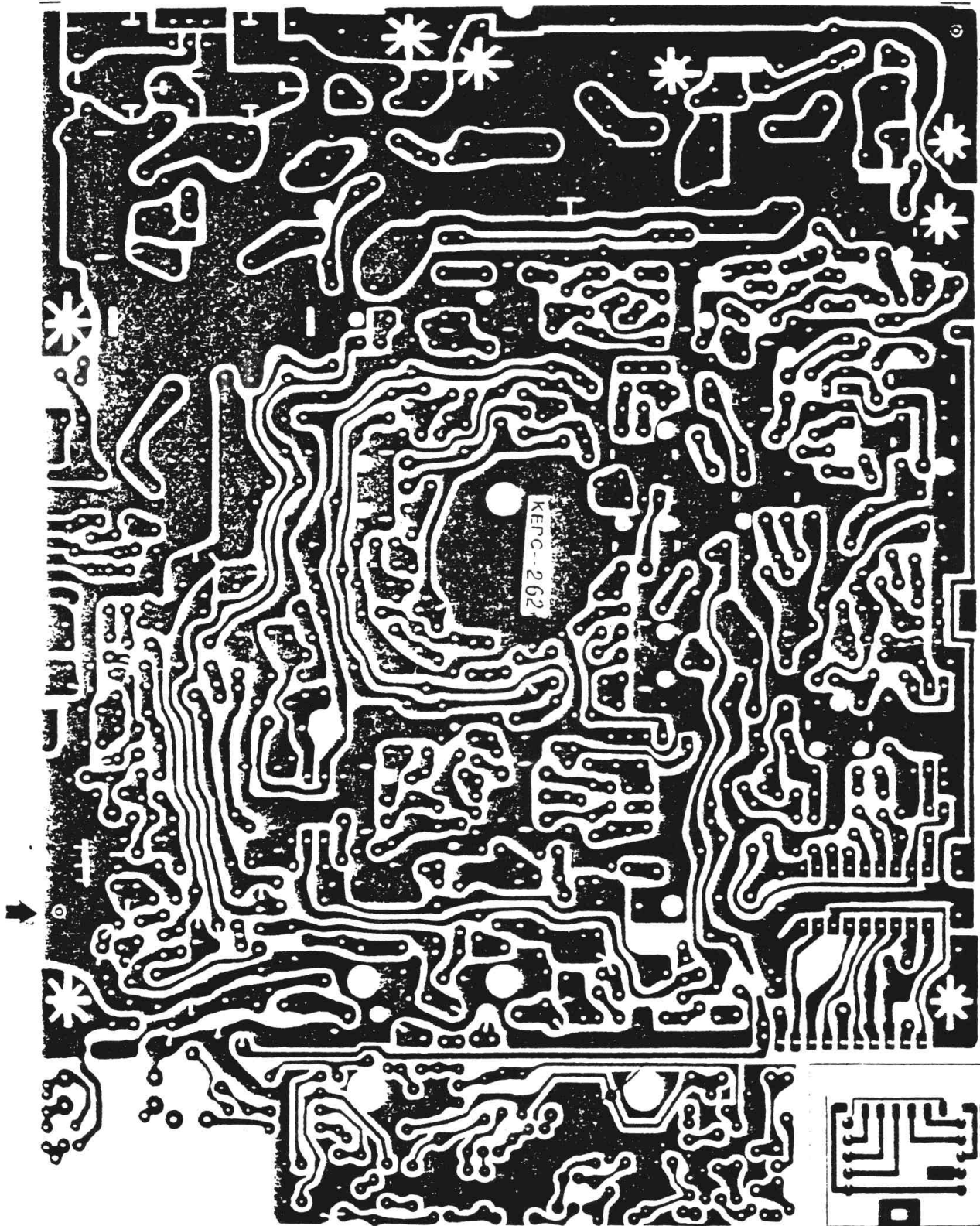
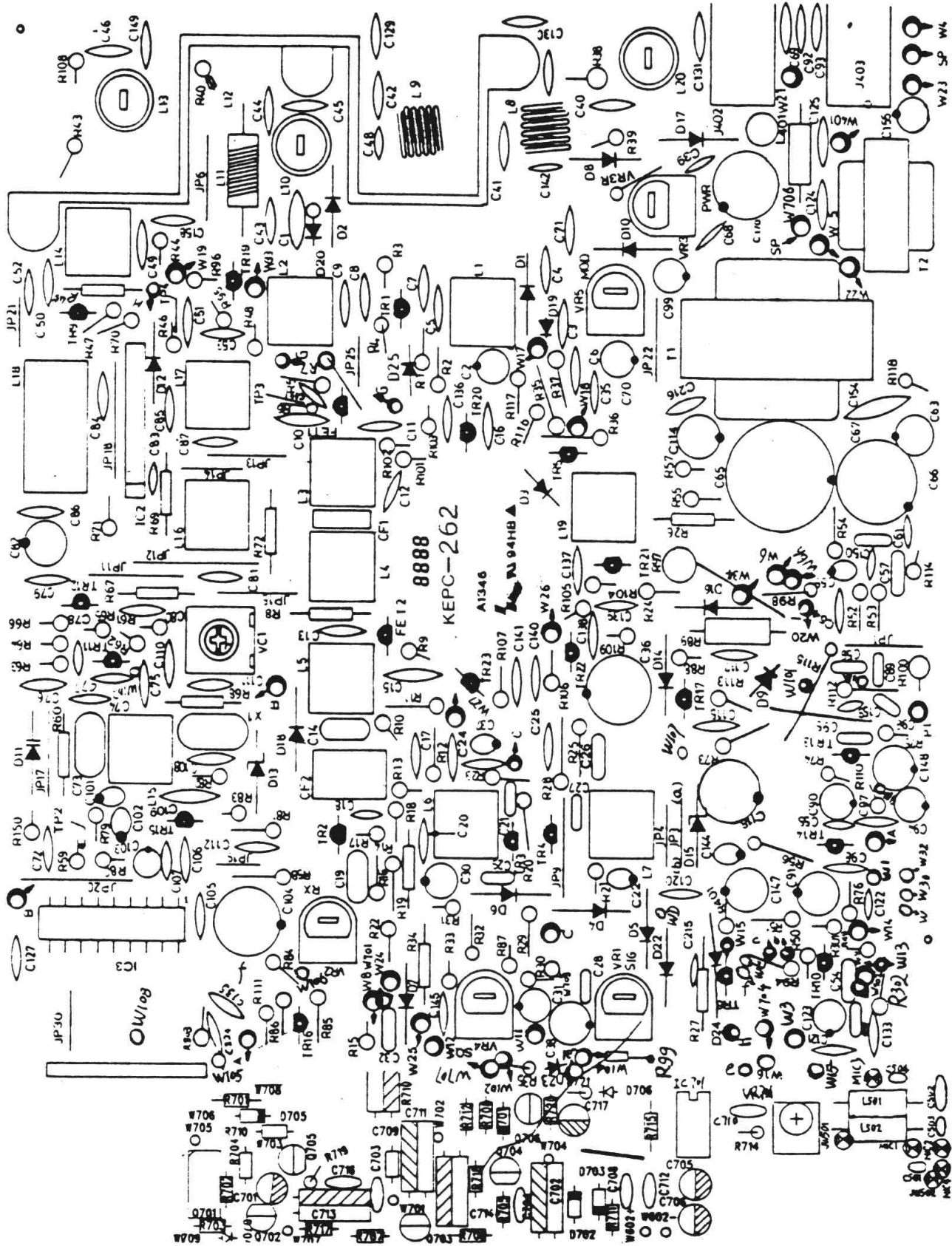
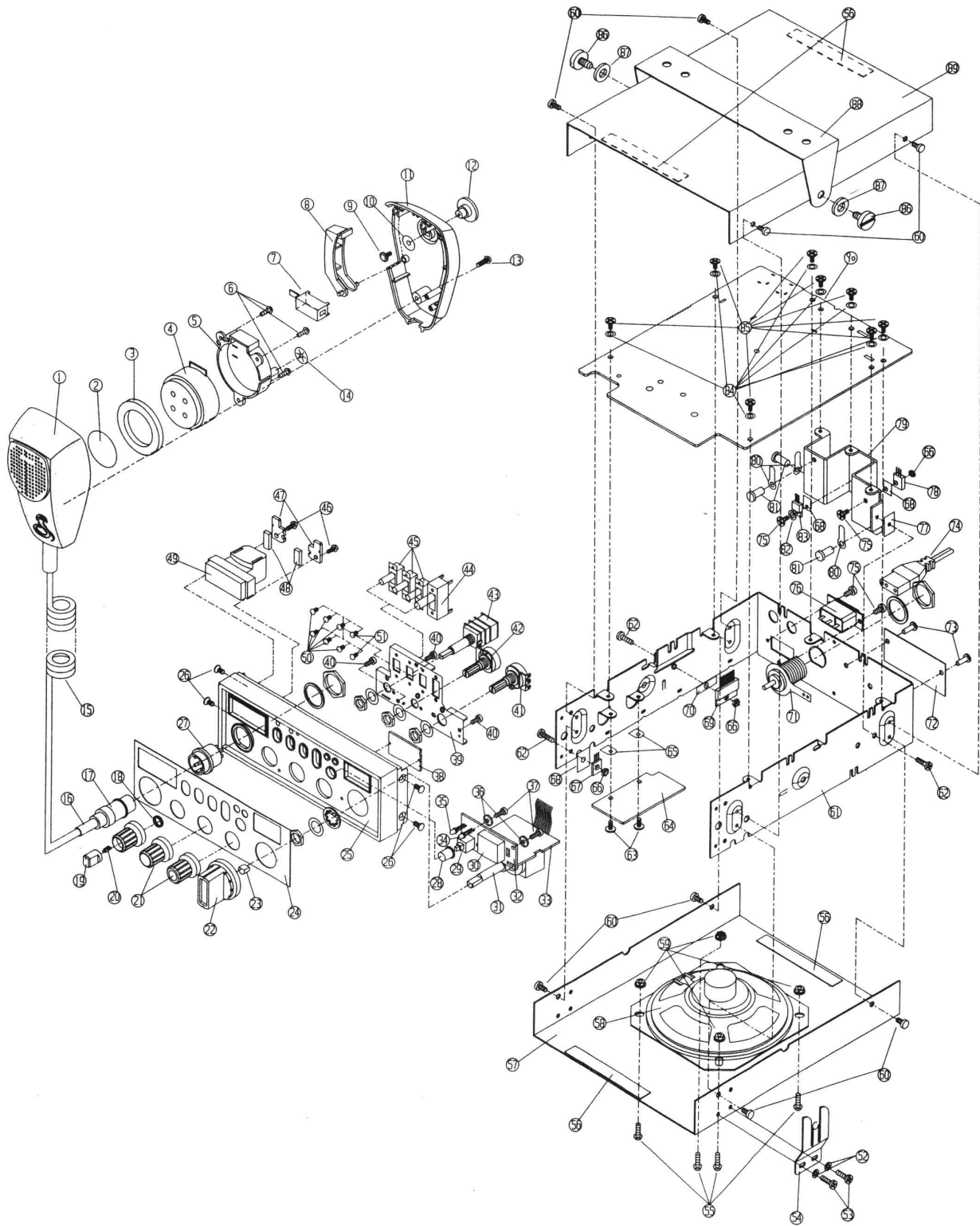


Fig. 10000





MODEL: 25LTD ST

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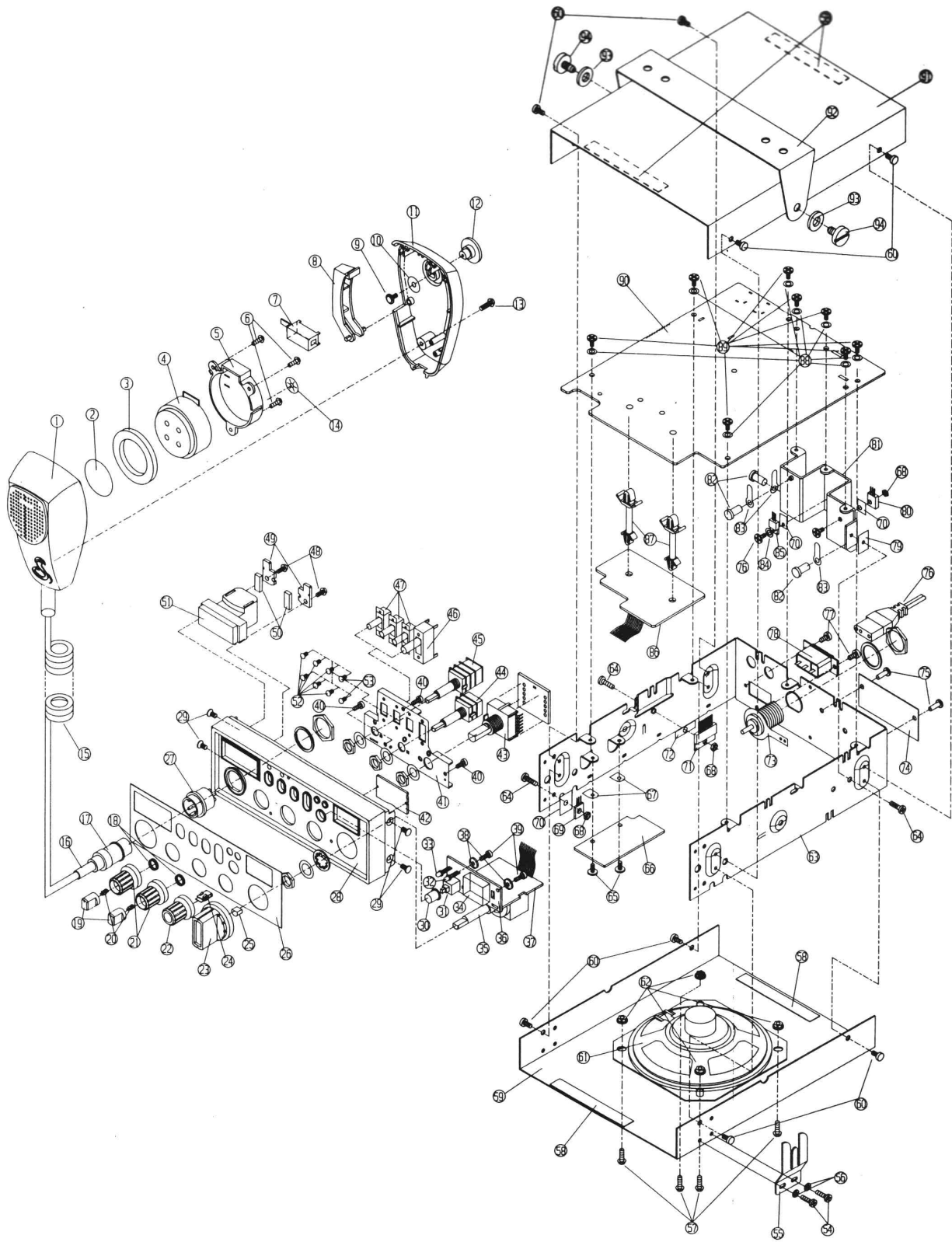


**EXPLODED VIEW PART LIST MODEL: CB 25LTD ST**

REF. NO.	PART NO.	PART NAME	DESCRIPTION
1	KEM-P7001A	FRONT CABINET	ABS 94HB/Cr-PLATED
2	KEM-OT7001	FELT DIA. 2.8	FELT
3	KEM-OT0702	SPONGY 38 ODX26IDX5 THK	SPONGY
4	KESP-016	MIC. DYNAMIC	
5	KEM-P7003A	MIC. BRACKET	ABS 94HB
6	KEM-TS2608BIN	TAPPING SCREW B/HD T2.6X8	NI-PLATED
7	KESW-079	PUSH-BUTTON SWITCH 4P2T	
8	KEM-P7103D	PTT SWITCH KNOB	ABS 94HB
9	KEM-TS2606BIN	TAPPING SCREW B/HD T2.6X6	NI-PLATED
10	KEM-WP0952805N	M2.8 PLAIN WASHER 103J-1	
11	KEM-P7002A	REAR CABINET	ABS 94HB
12	KEM-P7107B	HANGING KNOB	ABS 94HB
13	KEM-TS3010PIB	TAPPING SCREW P/HD T3X10	
14	KEM-WI1003903X	SELF LOCKING WASHER DIA.4	
15	KEIC-036-1	CURL CORD 4 CORES	
16	KEM-OT9005	P.V.C. SLEEVE - CURL CORD	PVC
17	KEJ-163	MIC PLUG 4 PIN FOR COBRA	
18	KEM-M8407	LOCK SPRING	
19	KEM-P8407	INNER KNOB	ABS 94HB/Cr-PLATED
20	KEM-M8403	INSERT 1	STAINLESS STEEL
21	KEM-P8408	VR KNOB	ABS 94HB/Cr-PLATED
22	KEM-P0708B	BAND SELECT KNOB	ABS 94HB/Cr-PLATED
23	KEM-M0610-01	INSERT KNOB	BRASS
24	KEM-M8602A-01	TRIM PLATE	AL. SHEET
25	KEM-P8601C	FRONT PANEL	ABS 94HB/Cr-PLATED
26	KEM-MS3006C2N	SCREW MACHINE F/H M3X6MM	NI-PLATED
27	KEJ-032-1	MIC SOCKET 4PIN PLT-164-R	4PIN
28	KEM-P8405B	PUSH COVER	ABS 94HB/Cr-PLATED
29	KESW-064	PUSH BUTTON SWITCH 2C2P W/LOCK	2P2T
30	KED-LC402NDGC-1	DIODE LED	
	KEOE-OT295	A-402NDGC COVER	
31	KESW-047	CHANNEL SELECTOR GPS-0736 40CH	
32	KEPC-261-B	PCB LED 54X25X1.6MM S.S 94HB	54X25X1.6 mm PHENOLIC
33	KEPC-260	PCB CHANNEL SW 46X55X1.6MM S.S	46X55X1.6 mm PHENOLIC
34	KED-L204R	DIODE LED EL204HD RED	
35	KED-L64GR	DIODE LED LT0362-25-D63 RED-GREEN	
36	KEM-WF0703308X	FIBRE WASHER 7.00DX3.3IDX0.8THK	
37	KEM-TS2306B2N	TAPPING SCREW B/HD T2.3X6	NI-PLATED
38	KEM-P9003B	FILTER DISPLAY	PMMA
39	KEM-M8601B	BRACKET-MIC BODY	SPCC ZINC-PLATED
40	KEM-TS2605B2N	TAPPING SCREW B/HD T2.6X5	NI-PLATED
41	KER-102P11	POT. 1KB RV160-10-20K-B13-3020	
42	KER-502P10	POT. 5KA RV160-10-20K-A53-3020	
43	KER-D503B503A-7	VR DUAL SHAFT 50KBO /50KAI W/SW	
44	KESW-027-2	SLIDE SW 2P3T SS2324BAT11	2P3T
45	KESW-028-2	SLIDE SW 2P2T SS2249BAT11	2P2T
46	KEM-TS2605B2N	TAPPING SCREW B/HD T2.6X5	NI-PLATED
47	KEM-M8603	METER CLAMP	SPCC/ZINC-PLATED
48	KEM-OT0608	CLAMP CUSHION	PE FORM
49	KEOE-OT123	METER ANALOG H-319-8828	
50	KEM-MS2005B2N	SCREW-MACHINE B/HD DIA M2.0X5MM	NI-PLATED
51	KEM-MS2604P2N	M2.6X4 P/HD SCREW	NI-PLATED
52	KEM-WI0643304N	INNER TOOTHED LOCK WASHER DIA3	







Cobra Electronics

MODEL: 25WX ST

**EXPLODED VIEW PART LIST MODEL: CB 25WX ST**

REF. NO.	PART NO.	PART NAME	DESCRIPTION
1	KEM-P7001A	FRONT CABINET	ABS 94HB/Cr-PLATED
2	KEM-OT7001	FELT DIA. 2.8	FELT
3	KEM-OT0702	SPONGY 38 ODX26IDX5 THK	SPONGY
4	KESP-016	MIC. DYNAMIC	
5	KEM-P7003A	MIC. BRACKET	ABS 94HB
6	KEM-TS2608BIN	TAPPING SCREW B/HD T2.6X8	NI-PLATED
7	KESW-079	PUSH-BUTTON SWITCH 4P2T	
8	KEM-P7103D	PTT SWITCH KNOB	ABS 94HB
9	KEM-TS2606BIN	TAPPING SCREW B/HD T2.6X6	NI-PLATED
10	KEM-WP0952805N	M2.8 PLAIN WASHER 103J-1	
11	KEM-P7002A	REAR CABINET	ABS 94HB
12	KEM-P7107B	HANGING KNOB	ABS 94HB
13	KEM-TS3010PIB	TAPPING SCREW P/HD T3X10	
14	KEM-WI1003903X	SELF LOCKING WASHER DIA.4	
15	KEIC-036-1	CURL CORD 4 CORES	
16	KEM-OT9005	P.V.C. SLEEVE - CURL CORD	PVC
17	KEJ-163	MIC PLUG 4 PIN FOR COBRA	
18	KEM-M8407	LOCK SPRING	
19	KEM-P8407	INNER KNOB	ABS 94HB/Cr-PLATED
20	KEM-M8403	INSERT 1	STAINLESS STEEL
21	KEM-P8406	OUTER KNOB	ABS 94HB/Cr-PLATED
22	KEM-P8501C	WS. KNOB	ABS 94HB/Cr-PLATED
23	KEM-P0708B	BAND SELECT KNOB	ABS 94HB/Cr-PLATED
24	KEM-M8501	INSERT	STAINLESS STEEL
25	KEM-M0610-01	INSERT KNOB	BRASS
26	KEM-M8602A-02	TRIM PLATE	AL. SHEET
27	KEJ-032-1	MIC SOCKET 4PIN PLT-164-R	4PIN
28	KEM-P8601C	FRONT PANEL	ABS 94HB/Cr-PLATED
29	KEM-MS3006C2N	SCREW MACHINE F/H M3X6MM	NI-PLATED
30	KEM-P8405B	PUSH COVER	ABS 94HB/Cr-PLATED
31	KESW-064	PUSH BUTTON SWITCH 2C2P W/LOCK	2P2T
32	KED-L204R	DIODE LED EL204HD RED	
33	KED-L64GR	DIODE LED LT0362-25-D63 RED-GREEN	
34	KED-LC402NDGC-1	DIODE LED	
	KEOE-OT295	A-402NDGC COVER	
35	KESW-047	CHANNEL SELECTOR GPS-0736 40CH	
36	KEPC-261-B	PCB LED 54X25X1.6MM S.S 94HB	54X25X1.6 mm PHENOLIC
37	KEPC-260	PCB CHANNEL SW 46X55X1.6MM S.S	46X55X1.6 mm PHENOLIC
38	KEM-WF0703308X	FIBRE WASHER 7.00DX3.3IDX0.8THK	
39	KEM-TS2306B2N	TAPPING SCREW B/HD T2.3X6	NI-PLATED
40	KEM-TS2605B2N	TAPPING SCREW B/HD T2.3X5	NI-PLATED
41	KEM-M8601B-01	BRACKET	SPCC ZINC-PLATED
42	KEM-P9003B	FILTER DISPLAY	PMMA
43	KESW-063	CHAN SELECTOR SRB18-F002-11	
44	KER-DIO2B502A-C	VR DUAL SHAFT 1KBO/5KAI	
45	KER-DSO3B503A-7	VR DUAL SHAFT 50KBO/50KAI W/SW	
46	KESW-027-2	SLIDE SW 2P3T SS2324BAT11	2P3T
47	KESW-028-2	SLIDE SW 2P2T SS2249BAT11	2P2T
48	KEM-TS2605B2N	TAPPING SCREW B/HD T2.6X5	NI-PLATED
49	KEM-M8603	METER CLAMP	SPCC/ZINC-PLATED
50	KEM-OT0608	CLAMP CUSHION	PE FORM
51	KEOE-OT123	METER ANALOG H-319-8828	
52	KEM-MS2005B2N	SCREW-MACHINE B/HD DIA M2.0X5MM	NI-PLATED



## Voltages with alignment points

Part No.	TX Voltages (V)			RX Voltages (V)		
	c	b	e	c	b	e
TR1	0	0	0	8.8	1.9	1.2
TR2	0	0	0	8.3	1.6	0.9
TR3	0	0	0	1.7	0.7	0
TR4	0	0	0	12	1.7	1.0
TR5	0	0	0	0	0.7	0
TR6	0	0	0	1.0(SQ off)	0(SQ off)	0
				0(SQ on)	0.6(SQ on)	0
TR7	13	0	0	0	0	0
TR8	11	0	0	0	0	0
TR9	12	1.2	1.4	0	0	0
TR10	0	0	0	10.5	0(SQ on)	0(SQ on)
				10.5	1.0(SQ off)	0.4(SQ off)
TR11	6.6	3.6	3.0	6.6	3.6	3.4
TR12	2.9	2.2	1.6	2.9	2.2	1.6
TR13	3.0	1.3	0.7	0	0	1.7
TR14	0	0	0	0	0	0
TR15	7.9	6.7	6.0	7.9	6.7	0
TR16	9.0	0	9.0	9.0	0	6.0
TR17	12.4	9.6	9.0	12.4	9.6	9.0
TR18	13	7.8	7.1	13.0	7.8	7.1
TR19	1.7	0.7	0	0	0.7	0
*TR20	0	0	0	12.3	3.0	2.4
*TR21	0	0	0	6.4	0.6	0
*TR22	0	0	0	0	12.3	12.3
*TR23	0	0	0	0	0	0
**FET1	0	0	0	7.8	0.7	0
**FET2	0	0	0	12.0	1.1	0
Q801	5.3	3.1	2.4	5.3	3.1	2.4
IC1-1	12.8			12.8		
IC2-8	4.7			0		
IC3-1	8.0			8.1		
IC801-13	8.3			8.3		
IC802-14	8.3			8.3		
TP2	3.5±0.2			3.5±0.2		
TP3(Vpp)				>0.35		
TP4(Vpp)	>1.2					

MARKER:

1. Marker "\*" ----- the voltages of TR20,TR21,TR22,TR23 is measured in NB ON.
2. Marker "\*\*\*"-----the "c" means "D",the "b"means "G", the "e" means "S".

# **ALIGNMENT PROCEDURE**

**MODLE: 25WX ST**

Cobra Electronics

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## 25WST ALIGNMENT PROCEDURE

### Alignment of P.L.L. Portion.

#### 1: Test Equipment Required.

- a: Oscilloscope (0 - 50MHz).
- b: DC Volt Meter (10 Volts Max. 100k ohm/Volt).

#### 2: Alignment Procedure.

Step	Preset to	Connections	Adjustment	Procedure
1	TX mode. No modulation. Channel: 40	Connect the DC Volt meter to the R59's lead side of R60.(TP2)	L15	Adjust L15 to obtain approx.3.5V reading.
2	TX mode. No modulation. Channel: 1	Connect the Oscillo-scope to R6's lead side of JP14.(TP3)	L16	Adjust L16 for the Max. indication on the Oscilloscope.

### Alignment of Transmitter Portion

#### 1: Equipment Required.

- a: VTVM (Full scale: 1V DC with RF Probe).
- b: RF Output Power Meter.
- c: Tuorable Field Intensity Meter (Wave Meter).
- d: Frequency Counter (0 - 30MHz).
- e: DC Power Supply (13.8V, 2Amp.).
- f: 50 ohm load and Attenuator.
- g: Oscilloscope (0 - 30MHz).
- h: AF Oscillator.

25WST ALIGNMENT PROCEDURE

**2: Alignment Procedure.**

Step	Preset to	Conditions	Alignment	Remarks
1	TX Mode No Modulation Channel 19	RF Output Power Meter to ANT. Jack J401 VTVM to TP4	L17, L18	Adjust for a maximum indication on VTVM
2	same as step 1.	RF Output Power Meter to ANT JACK J401	L10,13,14	Adjust for a maximum indication on RF Output Power Meter
3	same as step 1.	same as step 2.	L10	Adjust to obtain Nominal 3.8W of RF Output Power
4	same as step 1.	2nd Harmonics Meter to Ant. Jack J401 through a suitable load and attenuator	L20	Adjust for a minimum 2nd Harmonics Output
5	Repeat the above adjustments, in order to confirm if the adjustments were made correctly.			
6	TX Mode Ch19 1KHz 100mV Applied to Mic Input for MOD. ST: OFF	Audio Generator to Microphone Jack J501. Oscilloscope to ANT. Jack J401 through a suitable load and attenuator	VR5	Adjust for 95% Modulation
7	Same as step 1.	RF Output Power Meter to Ant. Jack J401	VR3	Check that RF Output Power Meter reads 3.8W then adjust VR3 so that the Meter pointer of the transceiver just approaches 3 to 4 mark
8	Same as step 1.	Frquency Counter to Ant. Jack J401 through a suitable load and attenuator	VC1	Adjust VC1 to obtain 27.185MHz indication and check Frequency of all channels.

**Alignment of Receiver Portion.**

**1: Equipment Required.**

- a: Signal Generator (27MHz Band, 1000Hz, 30% AM modulation & Output Impedance 50 ohm).
- b: Audio VTVM.
- c: Oscilloscope.
- d: Dummy Load (8 ohm, 5Watts, Resistive.).
- e: DC Power Supply (13.8V, 2Amp.).

**2: Alignment Procedure.**

Step	SG Connection Frequency	Preset to	Audio VTVM	Adjustments	Remarks
1	To Ant. Connector for J401 Channel:19 Freq.27.185MHz	Vol:max SQL:Min NB:OFF ST:OFF	T0 EXT. SPK JACK403	L1.2.3.4.5.6. 7.	Adjust for a max.Audio Output
2	Same as step 1.	Same as step 1.	Same as step 1.	VR2	Adjust the VR2 to obtain 2V reading on AF VTVM with the SG output level of 0.4uV
3	Same as step 1.	Vol:max SQL:max NB:OFF ST:OFF	Same as step 1.	VR4 (Squelch)	Set the level of SG to 1000uV Then adjust VR4 to 2V reading on AF VTVM.
4	Same as step 1.	Same as step 1.	Same as step 1.	VR1	Set the level of SG to 100uV. Adjust for a reading of S-9 on the S-meter of the Transceiver.
5	Same as step 1.	SQL:Min NB:OFF ST:ON	Same as step 1.		Set the level of SG to 1000uV. Tun the AF Vol. to 2V Audio output. Then remove Mod. from SG. The lever of Audio must drop by 50dB or more