Cobra 18RV Service Manual

SERVICE MANUAL

SERVICE MANUAL

Cobra®

18RV CB RADIO

America's Most Recognized Name In CB Communication

MODEL 18 RV

Cobra® CONSUMER ELECTRONICS GROUP

DYNASCAN CORPORATION

6500 West Cortland Street • Chicago, Illinois 60635

(312) 889-8870 TELEX: 244-332

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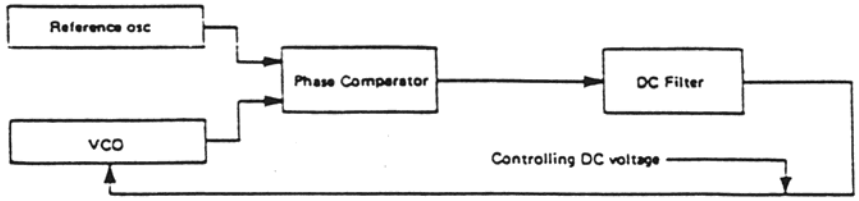
Model 18 RV

1. OPERATING THEORY OF P.L.L. FREQUENCY SYNTHESIZER

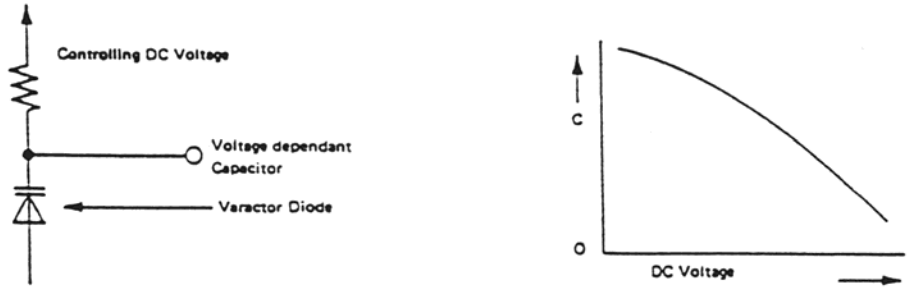
1-1 Fundamental Theory of PLL Circuitry

The purpose of P.L.L. (Phase Locked Loop) circuit is to generate multiple number programmable frequencies from a signal reference frequency with quartz crystal accuracy. A basic PLL circuitry consists of reference oscillator, VCO phase comparator and DC filter (low pass filter). With the above circuit the VCO (Voltage Controlled Oscillator) Frequency is effectively locked to the reference oscillator and its accuracy is as good as the reference oscillator.

Since the CB radio's adjacent channel spacing is 10kHz (or multiple of 2.5kHZ), our purpose should be to produce of programmable frequencies that are spaced apart by 10kHz.



(Figure 1-1)



(Figure 1-2)

Therefore the basic PLL circuitry is expanded as follows:

Note that the reference frequency of 2.5kHz is obtained by dividing the 10.24mhz by 4096 times. (2.5kHz reference is used instead of 10kHz for division convenience).

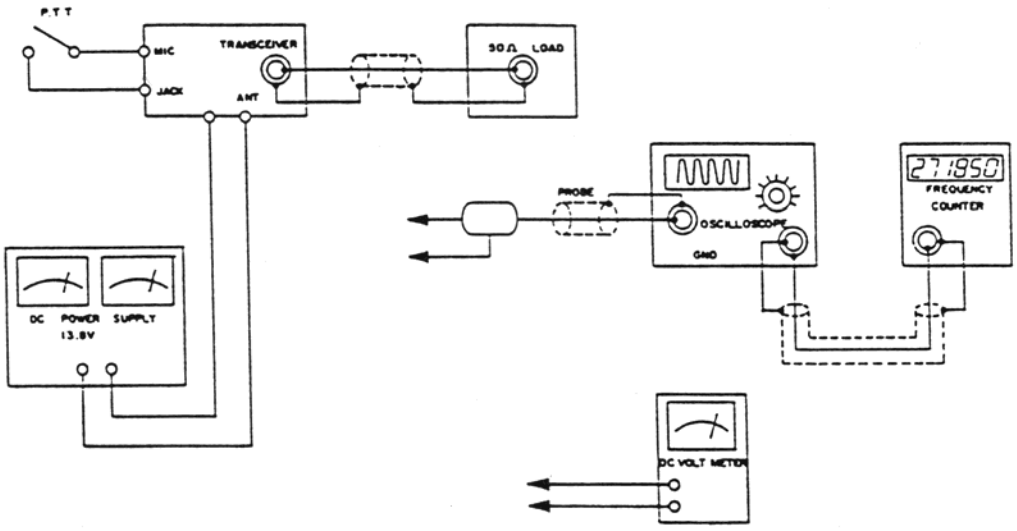
See Table 1 for transmit/receive mode VCO frequencies.
The most important part of VCO circuitry is a voltage controlled variable capacitor called vari-cap or varactor diode whose capacitance depends on DC voltage applied to its cathode.
The varactor diode is responsible for setting VCO frequency, and once set it regulates the VCO frequency against the reference.
The VCO frequencies are chosen in 13 to 16mHz range as shown on Table 1.
To obtain transmit signal the VCO is doubled. As an example for channel 1:
13.4825X2=26.965mHz.
For receiver mode the VCO is used as a first local oscillator. For channel 1:
26.965-16.27=10.695mHz.

The above first IF of 10.695mHz is mixed again with 10.24MHz crystal oscillator frequency which serves as the second local oscillator.
10.695-10.24=0.455MHz.

As can be seen above the VCO frequency shifts from 13.4825 to 16.27MHz when changed from transmit to receive for the same channel 1.
The shift is accomplished by "read only memory" incorporated inside the PLL IC1 between the selector switch and the VCO divider (programmable).
When transmit logic signal is applied to the IC1 through pin 30, the programmable divider will divide incoming VCO frequency by 5393 to product 2.5kHz sampling signal.
13.4825÷5393=2.5kHz.
For the receiver mode the programmable divider will automatically change to divide the VCO frequency by 3254.
16.27÷3254=5kHz.

1-2 PLL Circuit Alignment

PLL AND CARRIER SECTION



(Figure 1-3)

1-3 10.24mHz

Connect a frequency counter to the pin 20 and check to see 10.240000MHz-100Hz. When a defective crystal is replaced, and if the frequency is higher than by 100Hz, the CTI should be increased. If the frequency is lower the CTI should be reduced in capacitance.

1-4 VCO Alignment

1. Set the radio to channel 40 and in receive mode.
2. Connect a circuit tester between C412 and ground.
3. Adjust L401 to obtain 3V DC.
4. Set the radio to channel 1 and in receive mode.
5. Check to see the TP/DC voltage dropping to a level between 1.3 to 1.5V DC.

As long as the DC level stays between 3V DC for receiver at channel 40 and 1.3 to 1.5V DC for receiver at channel 1 the VCO is set properly.

1-5 Frequency chart

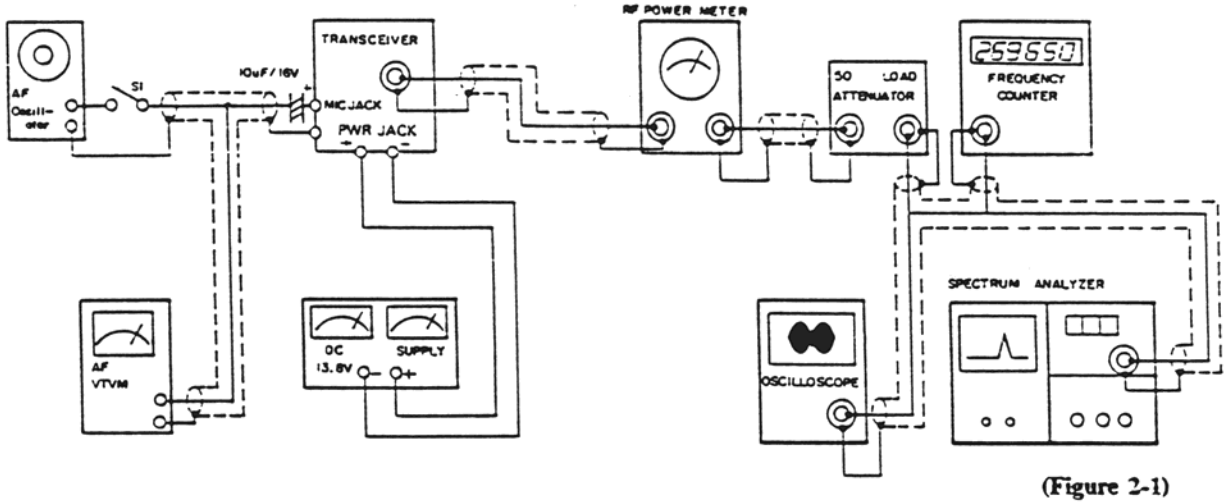
(Table 1)

CH	CHANNEL	CRYSTAL	VCO	
NO.	FREQ (MHz)	OSC	TX	RX
1	26.965	10.24	13.4825	16.27
2	26.975	10.24	13.4875	16.28
3	26.985	10.24	13.4925	16.29
4	27.005	10.24	13.5025	16.31
5	27.015	10.24	13.5075	16.32
6	27.025	10.24	13.5125	16.33
7	27.035	10.24	13.5175	16.34
8	27.055	10.24	13.5275	16.36
9	27.065	10.24	13.5325	16.37
10	27.075	10.24	13.5375	16.38
11	27.085	10.24	13.5425	16.39
12	27.105	10.24	13.5525	16.41
13	27.115	10.24	13.5575	16.42
14	27.125	10.24	13.5625	16.43
15	27.135	10.24	13.5675	16.44
16	27.155	10.24	13.5775	16.46
17	27.165	10.24	13.5825	16.47
18	27.175	10.24	13.5875	16.48
19	27.185	10.24	13.5925	16.49
20	27.205	10.24	13.6025	16.51
21	27.215	10.24	13.6075	16.52
22	27.225	10.24	13.6125	16.53
23	27.255	10.24	13.6275	16.56
24	27.235	10.24	13.6175	16.54
25	27.245	10.24	13.6225	15.55
26	27.265	10.24	13.6325	16.57
27	27.275	10.24	13.6375	16.58
28	27.285	10.24	13.6425	16.59
29	27.295	10.24	13.6475	16.60
30	27.305	10.24	13.6525	16.61
31	27.315	10.24	13.6575	16.62
32	27.325	10.24	13.6625	16.63
33	27.335	10.24	13.6675	16.64
34	27.345	10.24	13.6725	16.65
35	27.355	10.24	13.6775	16.66
36	27.365	10.24	13.6825	16.67
37	27.375	10.24	13.6875	16.68
38	27.385	10.24	13.6925	16.69
39	27.395	10.24	13.6975	16.70
40	27.405	10.24	13.7025	16.71

2. TRANSMITTER CIRCUIT

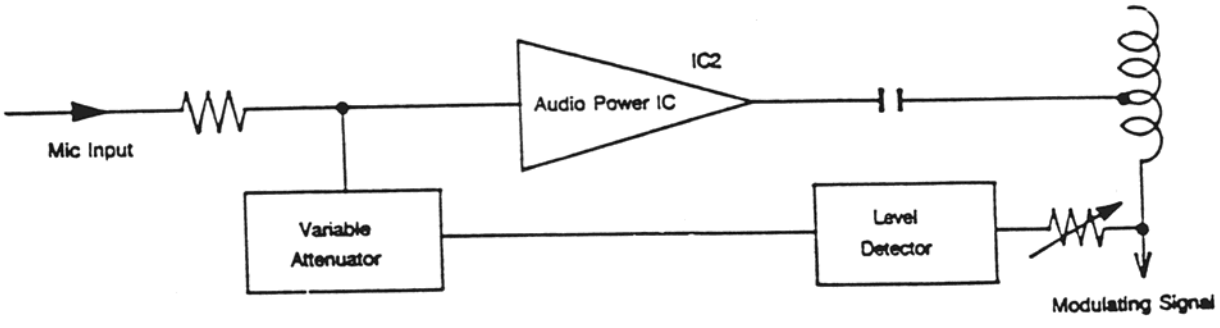
The VCO frequency selected by the channel selector switch is doubled to generate desired transmit frequency. The doubling is done by the Q301.

The resulting transmit frequency is filtered by L301 and L302.
Q302 is an amplifier/switch circuit. When VCO frequency is out of "Lock" condition pin 18 of IC1 pulls down bias voltage of Q302 to ground disabling Q302 from passing possible illegal frequencies.
Q303 is a RF power driver circuit, and Q304 is the final RF power amplifier.



(Figure 2-1)

A modulating audio signal is applied to the collectors of Q303 and Q304 through a audio power transformer T1.
The audio signal (mic input) is amplified by a single power IC2.
The modulation limiting is accomplished by an automatic level control circuit switch which is as follows:



(Figure 2-2)

L305 and C315 are series resonator, and L306, 307, C316 and C317 make up pie-low pass filter. L305, L306 is factory selected and limits the RF output power level to within the FCC limit of 4 watts.

2-1 RF Driver Stage Alignment

1. Select channel "19".
2. Connect an oscilloscope to the base of Q302 and ground.
3. Adjust L301, and L302 for maximum amplitude of scope display (27.185MHz signal).
4. Connect the scope to Q303 collector.
5. Adjust L303 for maximum amplitude of scope display.

2-2 RF Power Amplifier Alignment

1. Set power supply voltage to 13.8V.
2. Connect a watt meter to the antenna connector.
3. Adjust L305 and L306 for maximum power indication.
   Also again touch up L301, L302 and L303 to peak power.
4. When all coils are peaked, the power meter should indicate above 4.0 watts.
5. Turn L305 and L306 until the power reading of 4.0 watts is obtained.

2-3 Transmit Frequency Check

1. Set the radio into transmit mode with no modulation.
2. Connect the frequency counter to the antenna load or to the tab provided at the wattmeter. The frequency should be within ±800Hz from each channel center frequency as tabulated in the frequency table attached.

2-4 Modulation Sensitivity Alignment

1. Set the unit into transmit mode and apply 6mV, 1kHz signal to the Mic input circuit.
2. RV501 should be adjusted to obtain 85% modulation at this condition.
3. Next, decrease signal input to 10mV and observe that the modulation ratio is keeping the value higher than 30%.

2-5 Transmit Power Indicator Alignment

1. Set the unit into transmit mode with no modulation.
2. Adjust RV301 right after the NO.5 LED just lights on.

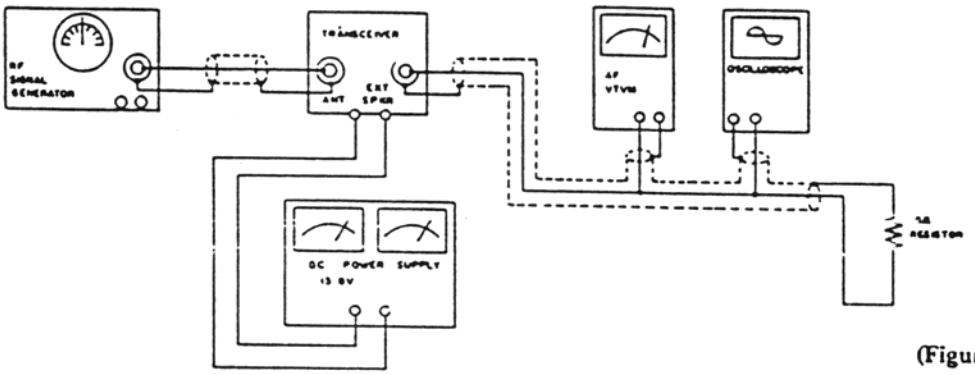
3. RECEIVER CIRCUIT

In the receiver mode of operation, Q305 transistor is turned off.
Also bias voltage is applied to Q108 and a proper bias and AGC voltage is established to Q102, Q103 and Q105.

Q102 is a 27MHz RF input amplifier and any excessive input signal is limited by diodes D101, 102.
The amplified 27MHz is mixed with VCO frequency selected by channel switch.
For channel 1 VCO is set at 16.27MHz. The resulting first IF is 26.965-16.27=10.695MHz.

Q103 is the first converter, and the 10.695MHz is sharply filtered by L103 and a ceramic filter CF-1.

The first IF is again mixed with a second local oscillator or 10.24MHz. 10.695-10.24=0.445MHz. Q104 is the second converter and the 455kHz second IF is filtered by a razor sharp ceramic filter of CF-2 coupled with L104, Q105, 106 (455kHz amplifiers).
D103 is a detector diode which produces audio signal as well as a negative DC voltage for AGC action. The negative voltage also provides forward biasing to the cathode of ANL clipping Tr of Q107.
The biasing voltage has a time constant determined by R130 and C123.



(Figure 3-1)

3-2 Receiver Sensitivity Alignment

1. Set the signal generator at 27.185mHz, 1kHz and 30% modulation. Also set set the radio to channel 19.
2. Adjust L101, L102, L103, L104 and L105 for maximum audio output across the 8 ohm dummy load resistor. This alignment should be performed by gradually decreasing the signal generator output signal to a minimum level required for tuning to avoid inaccurate alignment due to AGC action.

3-3 Squelch Circuit Alignment

1. Set the signal to provide RF input signal of 1000mV (1kHz, 30% modulation).
2. Rotate the squelch control in full clockwise direction.
3. Temporarily adjust RV102 for maximum audio output, and note the audio output level. Then adjust RV102 so that the audio output level decreases by 6dB.

3-4 Receiver Signal Indicator Alignment

1. Set the signal generator to provide RF input signal of 1000mV (1kHz, 30% modulation).
2. Adjust RV101, right after the NO.4 LED just on.
3. Reduce antenna input signal level to 1.0mV, and check to see the first LED light is on.

4. WEATHER BAND CIRCUIT

List of Test Equipment

1. Narrow-band crystal controlled FM signal generator with calibrated output from 100 microvolts to 1 microvolt and RF leakage less that 0.1 microvolt. Frequencies of 162.55, 162.475 and 162.40MHz ± 1kHz.
2. Vacuum Tube Voltmeter or high input impedance solid state voltmeter.
3. Oscilloscope.

General Preparation

1. Check source voltage for DC 13.8V.
2. Set CHANNEL switch to channel being aligned.
3. Use crystal controlled narrow-band FM generator for 162.55, 162.475 and 162.40mHz.
4. Standard modulation is 1kHz, ± 5kHz deviation for alignment and sensitivity tests.
5. Disconnect the Ant. wire from the Ant.

4-1 Weather Band Alignment Procedure

Note: During alignment, keep the RF input reduced to a level so that wave form is visible.

Step	Generator Connection	Generator Frequency	Channel	Meter Connection	Adjustment	Remarks
1		162.475MHz	W2	Across voice coil of speaker	L602, 604	Adjust for max noise
2					L601, 602, 604 and L603 (Stretch Squeeze)	Adjust for maximum output
3	Repeat Step 2 until no further improvement is possible					
4	Same as Step 1	162.40MHz	W3	Same is Step 1	L605	Adjust for maximum output
5	Same as Step 1	162.55MHz	W1 Step 1	Same as	CT-2	Adjust for maximum output

4-2 Weather band general specifications.

Test Condition

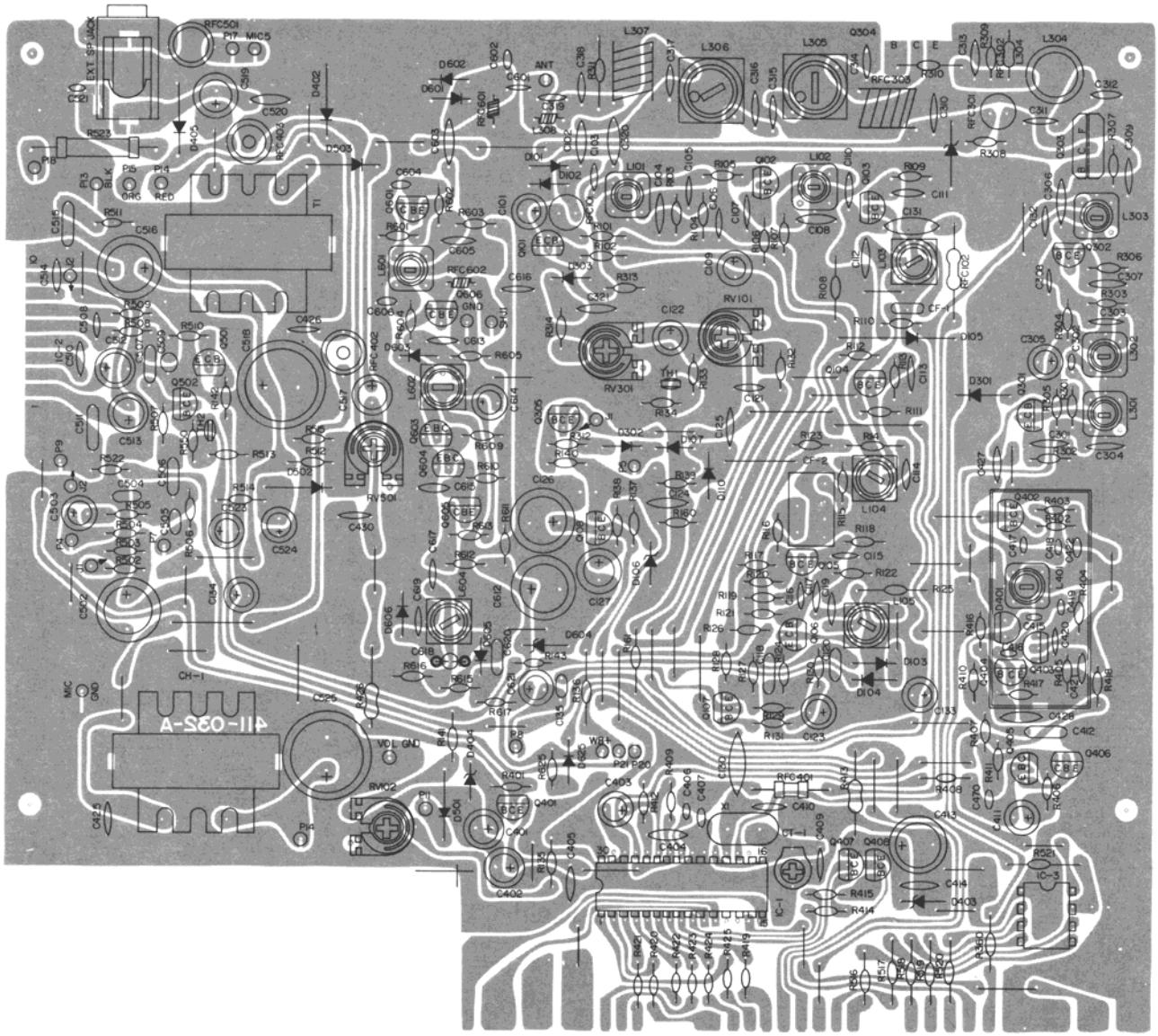
1. Speaker Impedance : 8 ohms (use resistive Load)
2. Reference Output Level : 500mW (total power)
3. Ambient Temperature : 25°C
4. Power Supply : 13.8V D.C

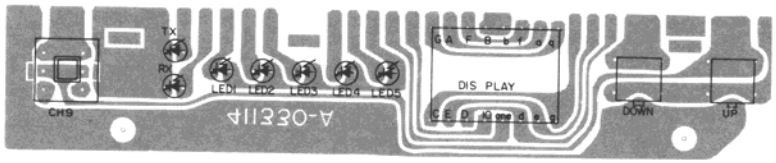
Weather

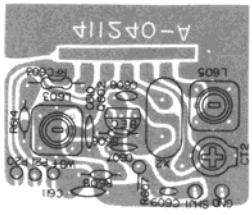
1. Test Frequency : 162.55MHz, 162.475MHz, 162.400MHz
2. Modulation : 1KHz, ±5KHz deviation

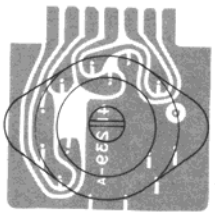
	UNIT	NOMINAL	LIMIT
Sensitivity (6dB S/N)			
162.55MHz	uV	0.7	1.0
162.40MHz	uV	0.7	1.0
162.475MHz	uV	0.7	1.0
20dB Quieting Sensitivity			
162.55MHz	uV	0.7	1.0
162.40MHz	uV	0.7	1.0
162.475MHz	uV	0.7	1.0
−3.0dB Limiting Sensitivity			
162.55MHz	uV	0.7	9.5
96.6 or 97.7MHz Rejection	dB	70	60
De-emphasis, 1000Hz to 2000Hz	dB	−6	−3 to −9
Distortion, 1mV input	%	3	10
10% THD power output, 1mV input	W	4.2	3.0
Maximum power output, 1mV input	W	4.5	3.5
Current drain at No. signal volume Min.	mA	180	200

Top View

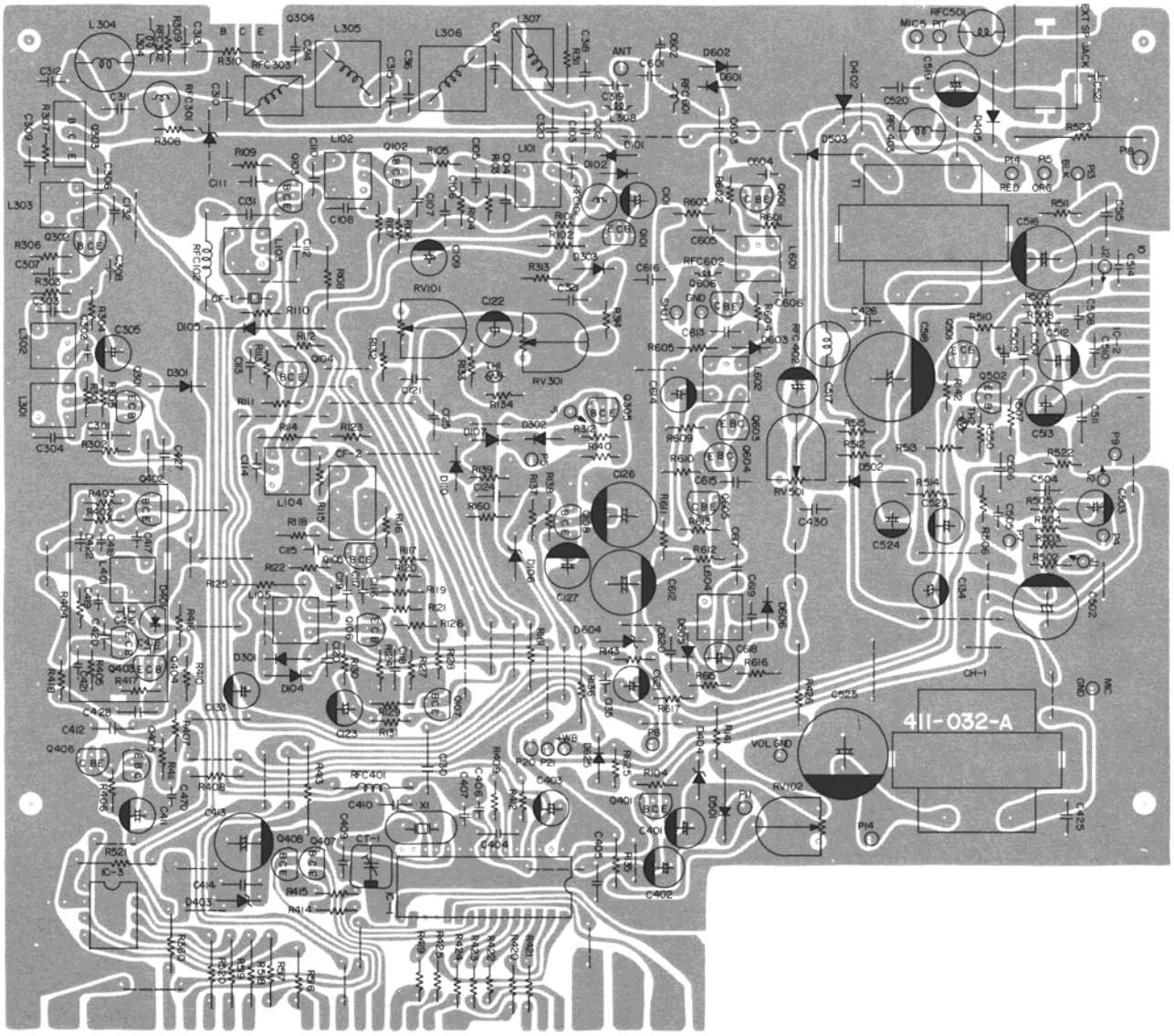


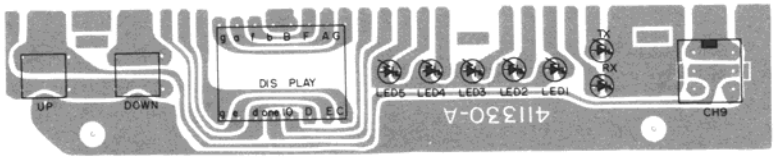


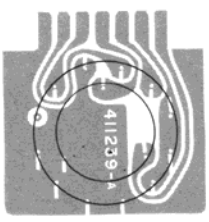




Bottom View


411-032-A


411330-A
DIS PLAY
UP
DOWN
LED5 LED4 LED3 LED2 LED1
CH9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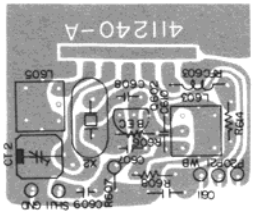
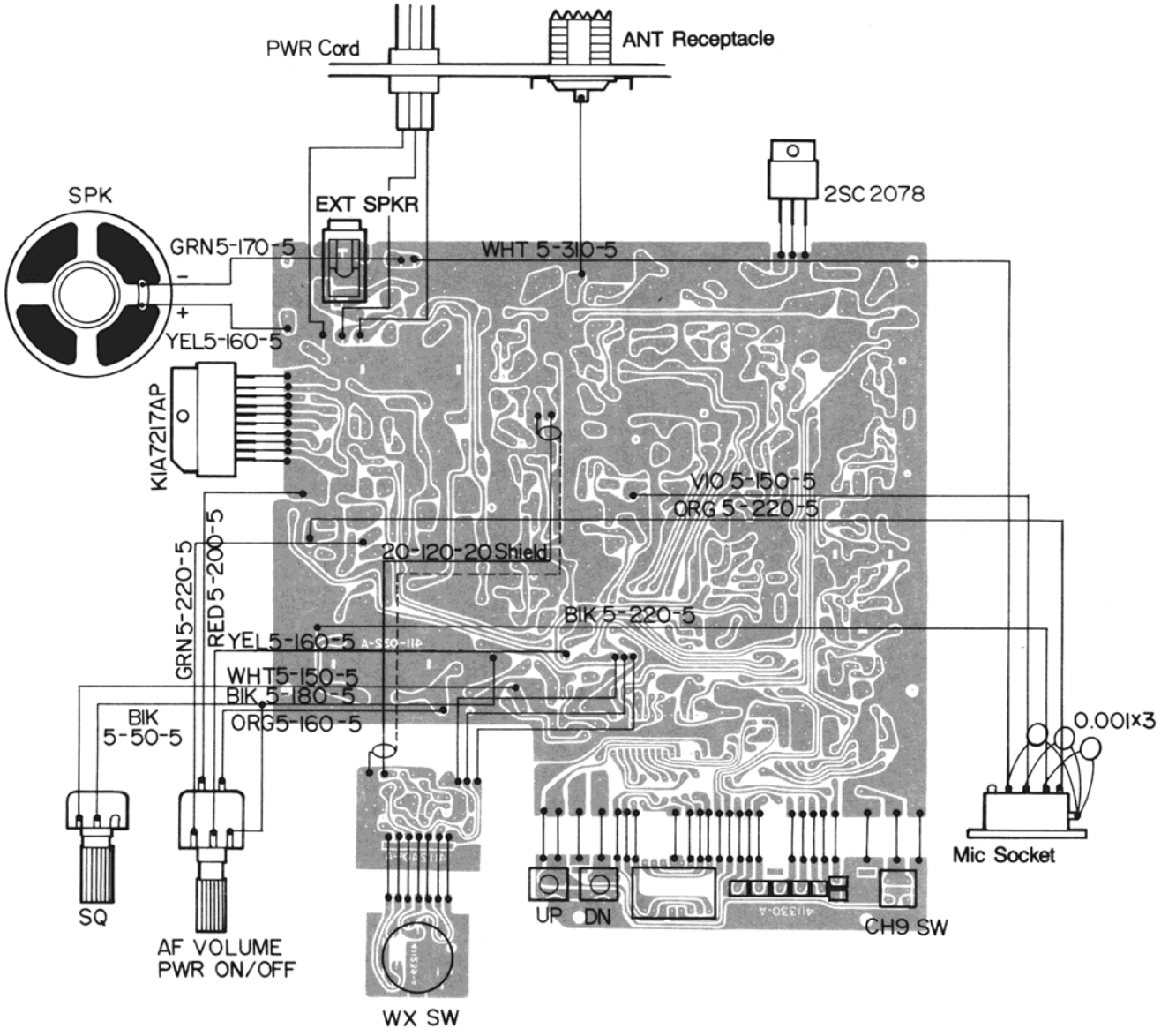
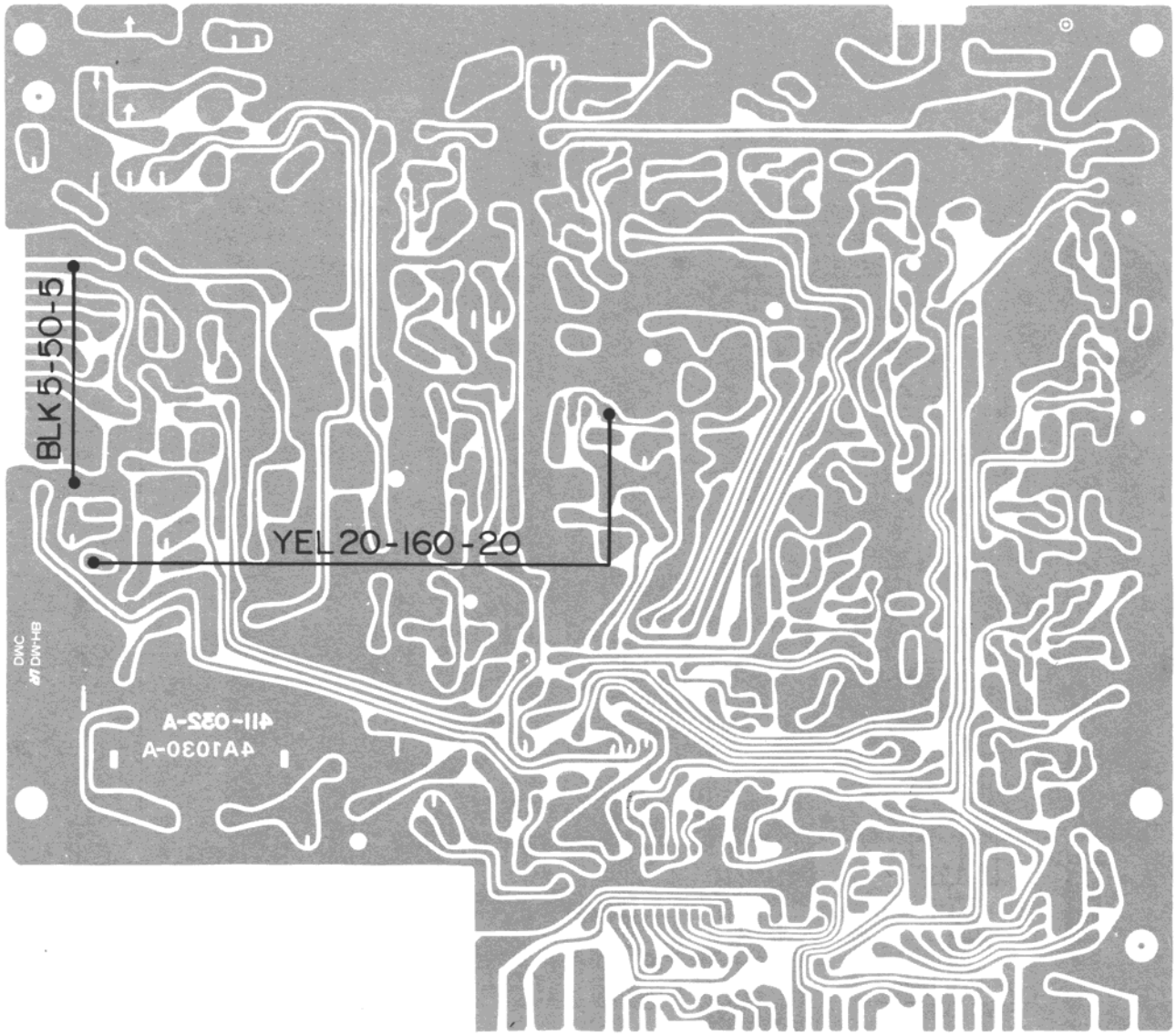

411240-A

Wiring Diagram



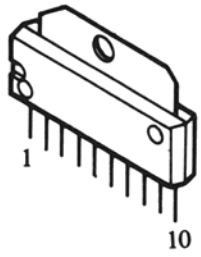
P.C.B Wiring Diagram



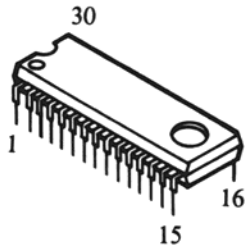
Semiconductor Lead Identification and IC Internal Diagram

Integrated Circuits

KIA7217AP



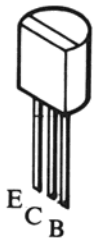
LC7185



TL489CP

Transistors

KTC1815(GR)
KTC9014A(B)
KTC1923(O)
KTC380(Y)
KTA1015(Y)
KTA1015GR

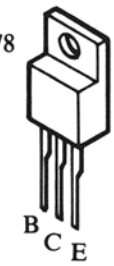


MPS9426(C)

MPS9626(G)
MPS9634(C)

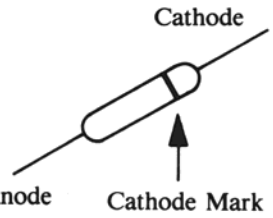
2SC2314

2SC2078



Diodes

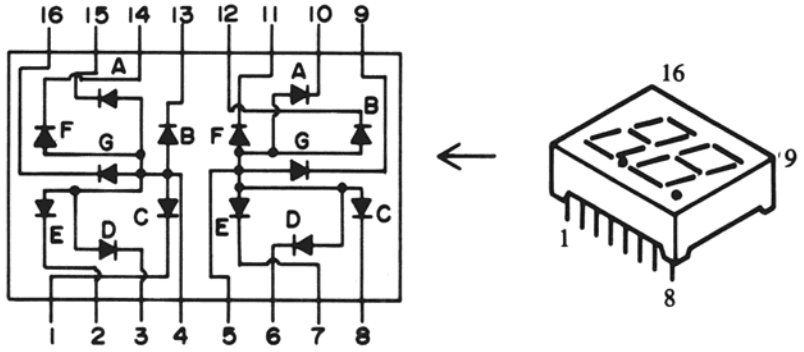
0A90
1S2473
1N4002



LTL 433P RED
LTL 433G AMB
LTL 433A GRN

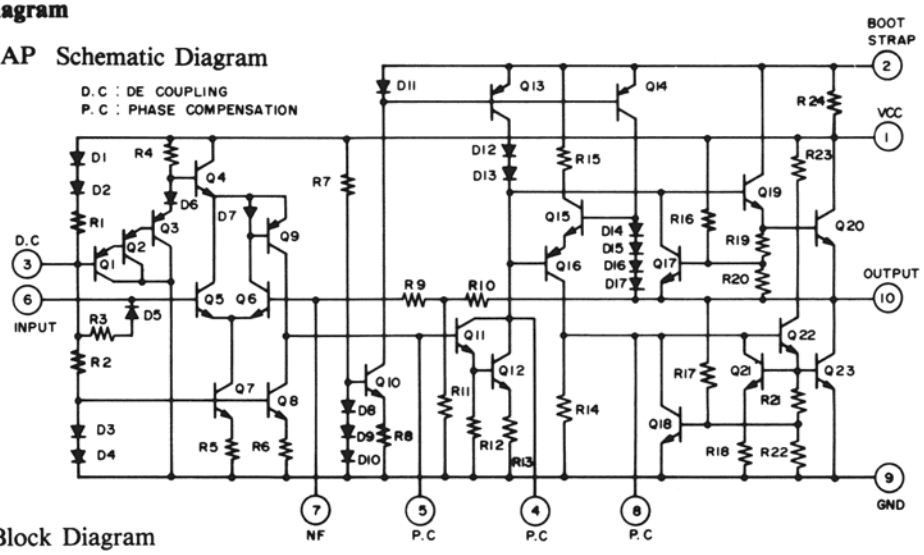
BZ × 83 – C5V6
UZP-9.1V, 6.2V
UZP-8.2B

LTD-482GC-RE

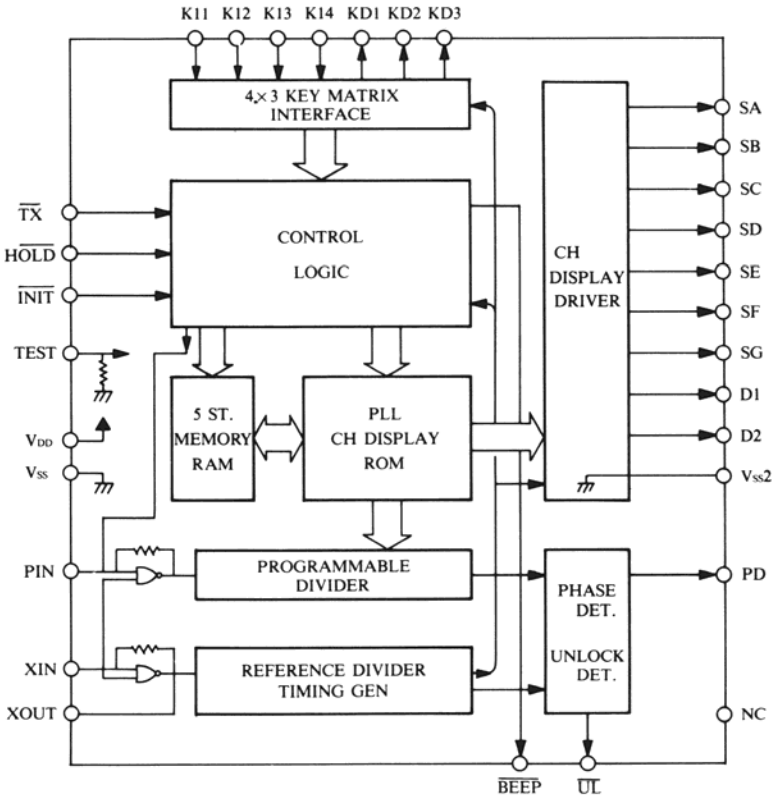


IC Internal Diagram

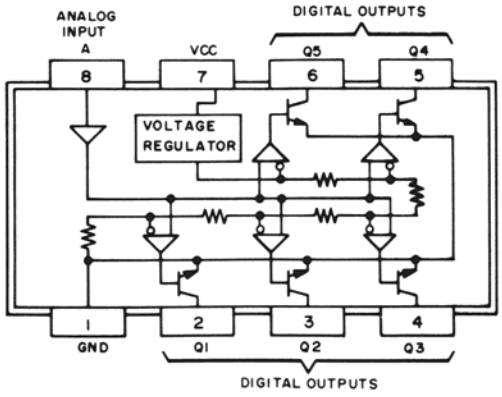
KIA 7217AP Schematic Diagram



LC7185 Block Diagram



TL489CP Block Diagram



SEMICONDUCTOR COMPLEMENT AND FUNCTION

REF NO.	TYPE	FUNCTION IN RX	FUNCTION IN TX	MANUFACTURE
IC1	LC7185	P.L.L	P.L.L	SANYO
IC2	KIA7217AP	AUDIO AMP	AUDIO AMP	KEC
IC3	TL489CP	LED LAMP DRIVE	LED LAMP DRIVE	TI
Q101	KTC1923(O)	RF ATTENUATOR	NONE	KEC
Q102	KTC1923(O)	RF AMP	NONE	KEC
Q103	KTC1923(O)	FIRST MIXER	NONE	KEC
Q104	KTC1923(O)	SCOND MIXER	NONE	KEC
Q105	KTC380(Y)	IF AMP	NONE	KEC
Q106	KTC380(Y)	IF AMP	NONE	KEC
Q107	KTA1015(Y)	ANL	NONE	KEC
Q108	KTC1815(GR)	REGULATOR	REGULATOR	KEC
Q301	KTC1923(O)	NONE	DOUBLER	KEC
Q302	KTC1923(O)	NONE	RF PRE-AMP	KEC
Q303	2SC2314(E)	NONE	RF DRIVER	SANYO
Q304	2SC2078(D)	NONE	RF POWER AMP	SANYO
Q401	KTC1815(GR)	DISPLAY BACKUP	DISPLAY BACK UP	KEC
Q402	KTC1923(O)	V.C.O BUFFER	V.C.O BUFFER	KEC
Q403	KTC1923(O)	V.C.O	V.C.O	KEC
Q404	KTC1923(O)	NONE	TX, V.C.O, S.W	KEC
Q405	MPS9634(C)	CHARGE PUMP	PLL PUMP	MOTOROLA
Q406	MPS9634(C)	CHARGE PUMP	PLL PUMP	MOTOROLA
Q407	KTA1015(GR)	LED DISPLAY DRIVE	LED DISPLAY DRIVE	KEC
Q408	KTA1015(GR)	LED DISPLAY DRIVE	LED DISPLAY DRIVE	KEC
Q501	KTC1815(GR)	SQUELCH CONTROL	NONE	KEC
Q502	KTA1015(Y)	NONE	ALC	KEC
Q601	MPS9626(C)	WX RF AMP	NONE	MOTOROLA
Q602	MPS9426(C)	WX LOCAL OSC	NONE	MOTOROLA
Q603	KTC9014A	IF AMP	NONE	KEC
Q604	KTC9014A	IF AMP	NONE	KEC
Q605	KTC9014A	IF AMP	NONE	KEC
Q606	MPS9626(C)	WX MIXER	NONE	MOTOROLA

SANYO : TOKYO SANYO ELECTRIC CO., LTD.

KEC : KOREA ELECTRONICS CO., LTD.

TI : TEXAS INSTRUMENTS INCORPORATED.

MOTOROLA : MOTOROLA SEMICONDUCTOR PRODUCTS INC.

Voltage Chart

CONDITIONS MEASURED ON CH 19
NO SIGNAL
NO MODULATION

1. Transistor

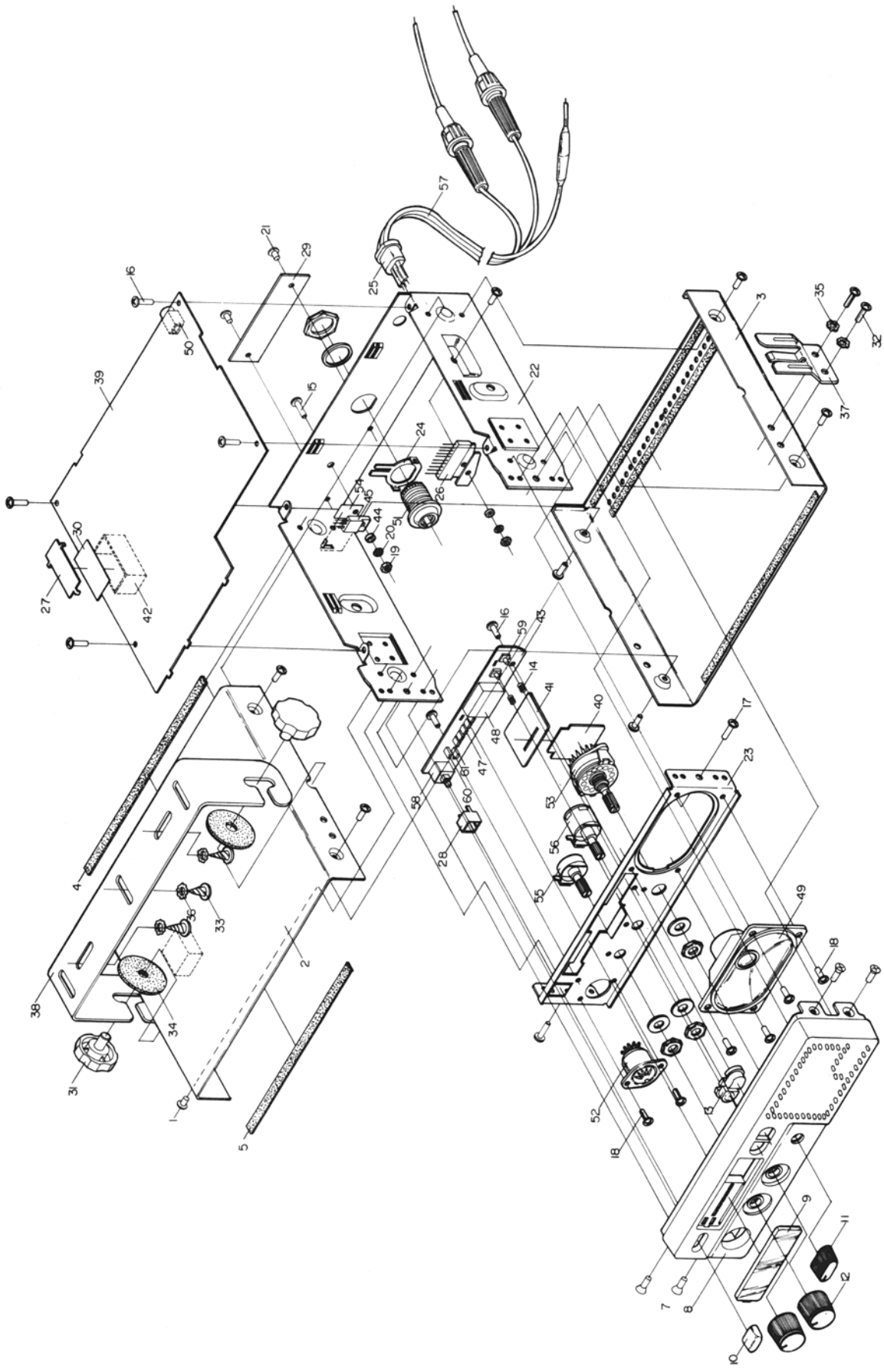
TR NO		E	C	B	TR NO		E	C	B	TR NO		E	C	B
Q101	RX	0	0.2	0.8	Q302	RX	0	13.8	0	Q406	RX	0	2.4	0.6
	TX	0	0	0.4		TX	1.0	13.7	1.9		TX	0	2.5	0.6
Q102	RX	0.5	5.0	1.3	Q303	RX	0	13.8	0	Q407	RX	7.5	7.3	7.0
	TX	0	0.8	0.4		TX	0	13.8	0		TX	7.3	7.1	7.6
Q103	RX	0.4	11.5	1.2	Q304	RX	0	13.7	0	Q408	RX	7.5	7.1	7.0
	TX	0	13.0	0.5		TX	0	13.7	0		TX	7.3	7.0	7.6
Q104	RX	0	5.0	0.6	Q305	RX	8.4	0	8.4	Q501	RX	0	3.5	0.2
	TX	0	0.8	0		TX	8.4	8.4	7.4		TX	0	3.4	0.1
Q105	RX	0.7	4.5	1.4	Q401	RX	5.5	13.8	6.2	Q502	RX	0	0	0.1
	TX	0	0.8	0.4		TX	5.5	13.8	6.2		TX	0	0	0.1
Q106	RX	0.4	13.8	1.1	Q402	RX	0	3.0	0.7	Q601	RX	0.3	4.1	0.9
	TX	0	13.8	0.2		TX	0	3.0	0.7	Q602	RX	1.3	4.0	2.0
Q107	RX	0.1	0	0.4	Q403	RX	4.8	8.0	4.2	Q603	RX	0	0.6	0.6
	TX	0.1	0	0.1		TX	4.8	8.0	4.2	Q604	RX	0	0.6	0.6
Q108	RX	8.4	13.8	9.4	Q404	RX	0	0	0	Q605	RX	0	1.3	0.6
	TX	8.4	13.4	9.4		TX	0	0	0.7	Q606	RX	0	1.8	0.7
Q301	RX	0	0	0	Q405	RX	0.6	2.4	1.0					
	TX	1.4	8.2	2.1		TX	0.6	2.5	1.1					

2. ICs

N.C=No Connection

IC No	Pin No	RX	TX	IC No	Pin No	RX	TX	IC No	Pin No	RX	TX
IC 1	1	5.6	5.6		17	N.C	N.C	IC2	3	3.92	3.82
	2	0.7	0.7		18	1.0	4.9		4	8.05	7.85
	3	0.7	0.7		19	2.6	3.6		5	1.43	1.39
	4	5.6	5.6		20	2.2	2.2		6	3.25	3.13
	5	5.8	5.8		21	0	0		7	3.41	3.31
	6	5.6	5.6		22	0	0		8	1.18	1.22
	7	5.6	5.6		23	2.5	2.5		9	0	0
	8	7.8	7.8		24	5.5	5.5		10	6.82	6.63
	9	7.9	7.9		25	4.5	4.5	IC4	1	0	0
	10	0	0		26	8.5	8.5		2	10.59	0.07
	11	0	0		27	0.6	1.0		3	10.59	0.07
	12	N.C	N.C		28	0	0		4	10.64	0.07
	13	N.C	N.C		29	N.C	N.C		5	10.72	0.07
	14	5.4	5.4		30	5.1	1.0		6	11.08	0.07
	15	5.4	5.4		1	13.70	13.32		7	12.68	11.40
	16	N.C	N.C		2	12.56	12.19		8	0	1.7

Exploded View



Model 18 RV
Exploded View Parts List

No.	Part-Symbol	Description
2	718-078	Cover Upper SPC + Vinyl Sheet t0.8
3	718-094	Cover Bottom SPC + Vinyl Sheet t0.8
8	801-230	E.S.C. ABS 94HB Dark Gray
9	813-722	Lens Acryl Smoke Silk
10	825-590	Knob (Push) ABS 94HB Dark Gray
11	825-595	Knob (Weather) ABS 94HB Dark Gray
12	825-601	Knob (Control) ABS 94HB Dark Gray
13	825-608	Knob (UP/Down) ABS 94HB Dark Gray
14	881-470	Spring SUS304 0.25
29	795-007	Name Plate ALP3 18X70Xt0.4
31	600-051	Securing Screw M6 (P = 1)X9 BLK
38	723-650	Bracket (SET) t1.6 BLK-Plate
45	204-010-1	Transistor 2SC2078(E)
46	222-006-4	I.C. KIA7217AP
47	251-143-6	LED Lamp LTL433G AMB
48	252-062-3	LED Display LTD-482AG-CE
49	420-105-9	Speaker CO72AX-099A00
50	420-707-6	Jack Earphone SHQ9384-01-110
51	421-046-7	Connector CH-239(A) SW-1229
52	421-529-7	Socket TCS-2250-01-1011 5Pin
53	430-042-1	Rotary S.W. SRM-134 20mm
55	450-401-8	Resistor Variable (VR) 10KB(WO/S.W)
56	450-602-3	Resistor Variable (VR) 50KB(W/OFF-ON SW)
57	504-507	Power Cord Ass'y.
58	436-008-1	Tact S.W KPT-2201D
59	436-022-3	Tact S.W SKHHPP
60	251-141-4	LED Lamp LTL 4330 RED
61	251-142-5	LED Lamp LTL 433A GRN

PARTS LIST 18-RV

SYMBOL	DESCRIPTION	PART NO.
	COVER UPPER SPC+ VINYL SHEET TO.8	253 006 N 001
	COVER BOTTOM SPC+ VINYL SHEET TO.8	252 007 N 001
	E.S.C. ABS 94HB DARK GRAY	380 051 N 001
	LENS ACRYL CLEAR SILK	753 008 N 001
	KNOB (PUSH) ABS 94HB DARK GRAY	751 016 N 001
	KNOB (WEATHER) ABS 94HB DARK GRAY	751 016 N 002
	KNOB (CONTROL) ABS 94HB DARK GRAY	751 016 N 003
	KNOB (UP-DOWN) ABS 94HB DARK GRAY	751 016 N 004
	SPRING SUS304 & 0.25	767 006 N 001
Q304	TRANSISTOR 2SC2078(E)	172 062 9 001
IC2	I.C. KIA7217AP	307 331 9 001
LED4,5	LED LAMP LTL433G AMB	158 008 N 001
LED1	LED DISPLAY LTD-482AG-CE	238 002 N 001
	SPEAKER CO72AX-099A00	580 012 N 001
	JACK EARPHONE SHQ9384-01-110	773 126 9 001
	SOCKET TCS-2250-01-1011 5 PIN	749 116 9 001
SW1	ROTARY S.W. SRM-134 20MM	083 002 N 001
VR2	RESISTOR VARIABLE (VR) 10KB (WO/S.W.)LR-401	008 011 N 001
VR1	RESISTOR VARIABLE (VR) 50KA (W/OFF-ON SW)	008 012 N 001
	POWER CORD ASS'Y.	420 002 N 001
	NAME PLATE ALP3 18X70XT0.4	260 010 N 001
SW5	TACT S.W. KPT-2201D	088 008 N 001
SW3,4	TACT S.W. SKHHPP	088 009 N 001
	PUSH S.W. SKD9791-01-010	088 155 9 002
	SECURING SCREW M6 (P=1) X9 BLK	634 166 9 001
	BRACKET (MIC MTG) SPC 60X35XT1	250 213 9 001
	MOUNTING BRACKET (SET) SPC T1.6 BLK-PLAT	250 003 N 001
	KNOB (LEVER) ABS 94HB GRAY	384 127 9 001
CT1	CAPACITOR TRIMMER CTC-6U-020:20PF	028 005 N 001
Q105,106	TRANSISTOR KTC380TM(O)	176 133 9 001
Q107,305,502	TRANSISTOR KTA1015(Y)	177 043 9 002
Q101,102,103,104, 301,302,402,403,404	TRANSISTOR KTC1923(O)	176 085 9 001
Q108,401,501	TRANSISTOR KTC1815(GR)	176 095 9 001
Q407,408	TRANSISTOR KTA1015GR	176 057 9 001
Q603,604,605	TRANSISTOR KTC9014A(B)	176 011 N 001
Q405,406	TRANSISTOR MPS9634(C)	176 128 9 001
Q601,606	TRANSISTOR MPS9626 (G)	176 150 9 001
Q303	TRANSISTOR 2SC2314(F)	176 155 9 001

PARTS LIST 18-RV

SYMBOL	DESCRIPTION	PART NO.
IC1	I.C. LC7185	308 025 N 001
IC3	I.C. TL489CP	307 426 9 003
D604	DIODE ZENER 5.6V	152 157 9 001
D404	DIODE BZX83-C6V2	152 185 9 001
D106	DIODE ZENER UZ9.1B	152 125 9 001
D403	DIODE ZENER UZP-8.2B 1W	152 160 9 002
D401	DIODE VARICAP MV2209	154 009 9 001
D101,102,104,105, 107,110,301,302, 303,601,602,603, 605,606,625	DIODE SI 1S2473	151 035 9 001
D103,501,502	DIODE GE OA90	150 020 9 001
D402,405,503	DIODE SI 1N4002	151 082 9 001
LED6,8	LED LAMP LTL433P RED	158 008 N 002
LED2,3,7	LED LAMP LTL433A GRN	158 008 N 003
X1	CRYSTAL 10.240MHZ HC-18/U	132 036 9 001
CF2	CERAMIC FILTER CFU 455HT	143 014 9 001
CF1	CERAMIC FILTER SFE10.7MJ-M	140 006 9 002
CH1	TRANSFORMER CHOKE	047 052 9 001
T1	TRANSFORMER OPT EI-24	061 070 9 001
RFC402,403	COIL RF CHOKE 20UH CORE	047 039 9 002
L307	COIL AM TX ANT 27MHZ A	046 039 9 012
L305	COIL AM TX ANT 27MHZ B	046 039 9 013
L306	COIL AM IFT 27MHZ TX ANT TUNING-C	046 039 9 014
L103	COIL RF 10.6MHZ 03202926ER(RX)	047 039 9 011
L401	COIL VCO	047 073 9 008
L301,302	27MHZ RF PRE AMP A (TX)	047 073 9 009
L303	27MHZ RF PRE AMP B (TX)	047 073 9 010
	MANUAL INSTRUCTION	480 002 P 001
Q602	TRANSISTOR MPS9426(C)	176 115 9 001
X2	CRYSTAL UNIT HC-49/U 16.202MHZ:30PPM	135 008 N 001

Block Diagram