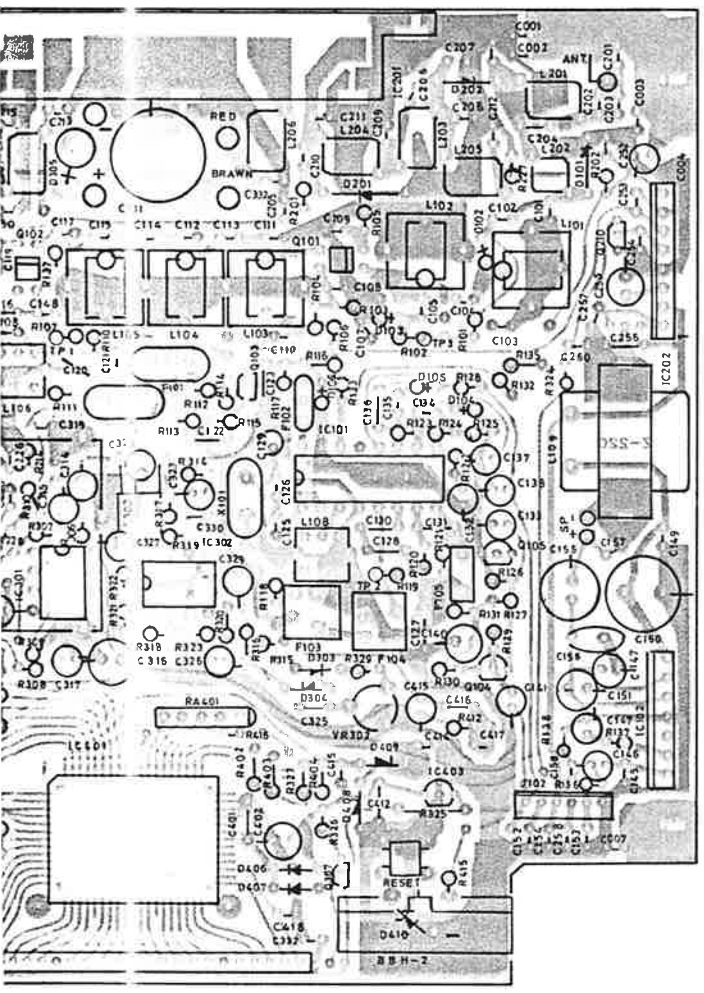
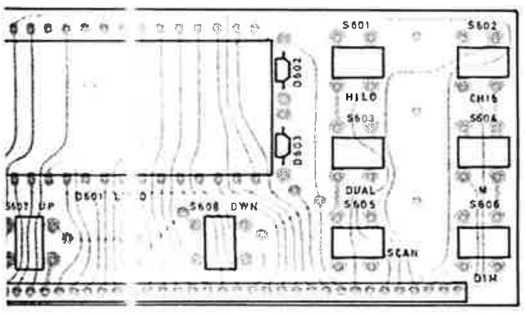




CIRCUIT ALIGNMENT

RCUIT :

nnect a frequenc counter and an RF-voltmeter to TP-1 (Q102 gate 2).

nnect a DC voltm ter to TP-3 (L215).

sh the CH16 swit to set the CH16.

just L213 until e DC voltmeter connected to TP-3 indicates 2.0V.

just L210 until e RF-voltmeter connected at TP-1 indicates a ximum value.

just VC401 until he frequency counter connected to TP-1 indicates 6.100 MHz.

t the channel to 6.

ke sure the PLL rcuit can lock at a voltage lower than 10V.

ITTER :

power adjustmen

) Connect an RF- ower meter, frequency counter, and a FM receiver to the antenna c nector.

) Set the chann to 18.

) Place the 1W - 25W switch in the 1W position.

) Adjust VR201 obtain the RF power output of 0.8W.

) Place the 1W - 25W switch in the 25W position.

) Adjust VR301 obtain the RF power output of 25W.

equency Adjustme

) Set the chann to 18.

) Adjust VC401 set the antenna frequency to 156.900 MHz.

dulation Adjustm t

) Place the cha el to 18.

) Feed a 1 KHz, 0mV audio signal to the microphone input circuit.

) Adjust VR302 set the FM receiver's deviation to ±4.7 KHz.

) Adjust the mi ophone input signal level so that the deviation becomes ±3 KH

) Make sure tha distortion of demodulated output of the FM receiver is less than 3 %.

R :

ect a signal ge rator to the antenna connector and adjust the rator to provid frequency of 156.800 MHz., deviation of +3 KHz., the output leve of 20 dBuV.

the channel to .

ect the DC-volt ter to TP-2 (R119).

st L101, L102, 03, L104, L105 and L106 until the DC-voltmeter ected to TP-2 i icates a maximum value.

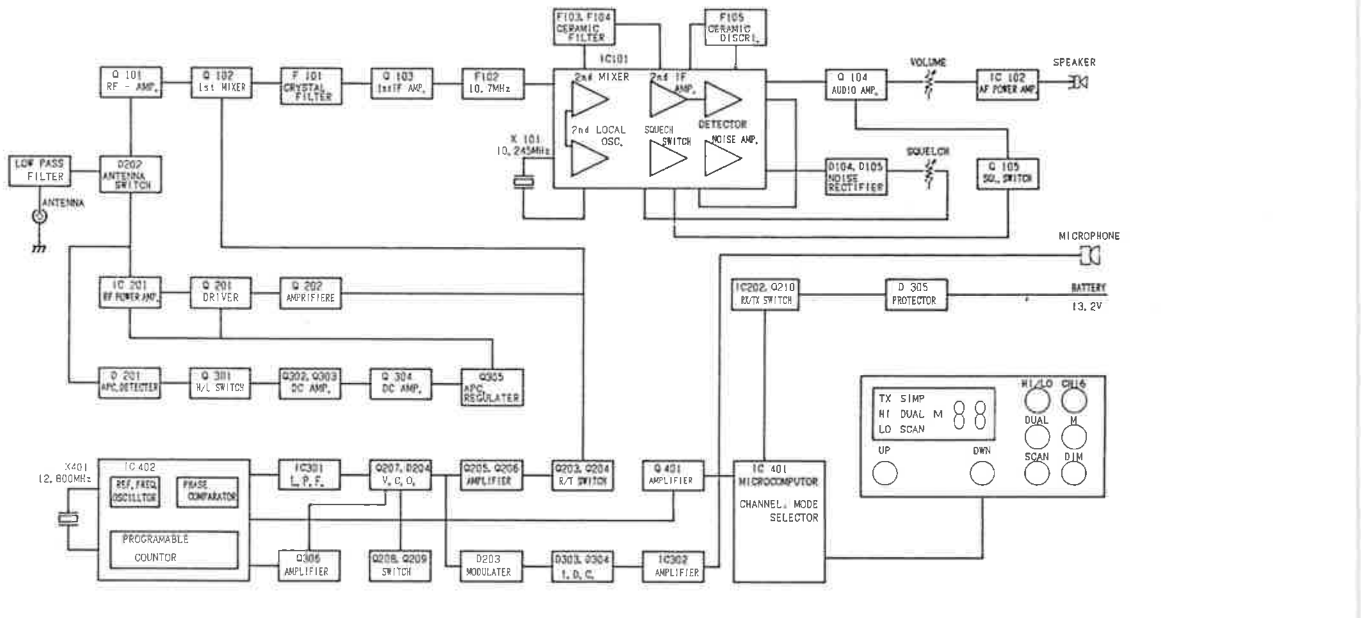
the channel to .

st the signal g erator frequency to 162.00 MHz.

st L104 until t DC-voltmeter connected to TP-2 indicates a mum value.

ure 12 dB SIND nsitivity at channels 06, 16, and 28, and make sure all channels i icate sensitivity of 0.5 uV or higher.

BLOCK DIAGRAM



CIRCUIT OPERATIONS

Phase Locked Loop (P.L.L.) and Voltage Controlled Oscillator (V.C.O.)

The oscillating frequency of V.C.O.(Q207) is set as (channel frequency - 10.7) MHz. in receiving and (channel frequency) MHz. in transmitting, and the channel spacing is 25 KHz.
Press the channel selector switch and select the channel number you want, which will be indicated on the LCD display.
The selected channel is entered to the microcomputer (IC401).
The microcomputer conveys the counter number corresponds to the registered channel number to the programmable counter (IC402).
The counter number to be conveyed to the programmable counter will be transmitted with the syncronized serial data system. The counter number entered to the programmbale counter will be latched until the next number is entered.

The counter number will be calculated with the following methods.

When receiving $N = \frac{\text{Channel Frequency (MHz.)} - 10.7}{0.00625}$

When transmitting $N = \frac{\text{Channel Frequency (MHz.)}}{0.00625}$

The oscillating frequency of V.C.O. is amplified at AMP (Q306) and entered to the programmbale counter. The programmable counter divides the V.C.O. oscillating frequency with the "N" value which is the counter number.
The oscillating circuit inside of IC402 will do a crystal oscillation of 12.8 MHz. The crystal oscillating frequency 12.8 MHz. will be divided and becomes to the reference frequency of P.L.L.

The P.L.L. comparates the oscillating frequency of V.C.O. divided at the programmable counter and the reference frequency, and controls the oscillating frequency in stability through a lowpass filter (IC301) and a voltage controlled capacitor diode (D204).

The oscillating frequency of V.C.O. is amplified at AMP (Q206, Q207) and to be applied to the receiving section (block) or the transmitting section (block).

1. TRANSMITTER (TX)

The channel frequency signal is amplified by amplifiers Q201 & Q202 and drives the RF-power module IC201.

In the RF-power module, the channel signal is subject to automatic power control, and amplified to 25W in the high power mode and to 1W in the low power mode. Thus amplified power output is finally fed to the antenna connector in passing through an antenna filter.

An antenna filter are provided to reject spurious frequencies adjacent to the channel frequency and harmonc frequencies, respectively.

2. AUTOMATIC POWER CONTROL (A.P.C.)

A signal, which is proportional to the RF-output power of the RF-power module, is detected and rectified buy a detector D201.

The DC output proportional to the RF-output power is amplified in DC amplifiers Q302, Q303 and Q304, and then applied to the control circuit Q305.

The control circuit controls the power supply voltage to the RF power module and the voltage to the driver circuit Q201, thus controlling the antenna output power.

Q301 functions as a power output switch which selects either 25W or 1W.

3. MODULATOR

An audio signal developed ip a microphone is fed to the audio amplifier IC302 and amplified.

The amplitude of the audio signal is limited to the value which gives the maximum deviation by the I.D.C. circuit D303 and D304.

The amplified audio signal enters the modulator D203 through a roll-off filter circuit which limits the occupied bandwidth.

The modulator uses a voltage controlled capacitor and modulates the V.C.O. frequency with the audio signal.

4. RECEIVER (RX)

Signals induced on an antenna are amplified by the RF amplifier Q101 and all undesirable frequency components outside the band are eliminated in passing through the five stage resonator.

The amplified RF signal is mixed with the local frequency signal sent from the V.C.O. in the first mixer circuit Q102, thus developing a first IF signal of 10.7 MHz. The IF signal is then amplified in the first IF amplifier circuits Q103.

Undesirable frequency signals including adjacent channel frequencies, etc. caused in conversion process are removed by two stages of crystal filters F101 & F102.

The 10.7 MHz. signal amplified in this way is applied to the 2nd mixer circuit and mixed with the second local oscillator frequency of 10.245 MHz. generated in the crystal oscillator circuit I101 to create a 2nd IF signal of 455 KHz.

The 455 KHz. IF signal is amplified in the 2nd IF amplifier circuits IC101.

Adjacent interference signals included in the IF signal are also removed with the ceramic filters F103 and F104.

Thus processed IF signal is detected with the discriminator F105 and demodulated into the audio signal.

The audio signal is amplified by the audio amplifiers Q104 and IC102 and drives the speaker.

5. SQUELCH (SQ)

(In a FM receiver, excessive noise will be heard at no signal condition)

A noise amplifier IC101 amplifies noise components in the outputs developed in the discriminator circuit F105 and rectifier diodes D104 and D105 rectify the amplified output to create a DC control signal.

The DC control signal turns the electronic switch Q105 on so that the noises can not be amplified. Thus noises will be suppressed at no signal conditon.

On the other hand, the noises will be reduced when a signal enters through the antenna. Then the DC control signal created from the noise signal also reduces and the electronic switch Q105 turns off, allowing the audio signal to enter the audio amplifier.

6. AUDIO POWER AMPLIFER

A volume contorl resistor VR102 adjusts audio signal level and the audio power amplifier IC102 amplifies the adjusted audio signal to a sufficient power level capable of driving the speaker.

7. RX AND TX SWITCHING

Normally, the transceiver is in a RX standby mode. To switch the transceiver to the TX mode, a P.T.T. switch provided on the microphone is pushed. When a transmit operation is available, the microcomputer develops a TX enable signal and this signal is added with the P.T.T. ON signal in the logic circuit IC401 and the resultant output turns on the TX-RX switch IC202 and Q210.

8. SIMPLEX AND DUPLEX OPERATION SWITCHING

Switching operations for the Simplex or Duplex mode is conducted automatically according to a command from the microcomputer.

9. VOLTAGE REGULATOR CIRCUIT

To assure stable operation of the transceiver if the battery voltage varies (10.8V - 15.6V), voltage regulators are provided.

IC202 is used to stabilizes line voltage for the P.L.L. circuit, receive circuit, and transmit circuit; and IC403 for the microcomputer circuit.

10. DIMMER CIRCUIT

To control brightness of the display on the transceiver a DIMMER switch is provided.

DUAL WATCH OPERATION

When the DUAL WATCH switch is placed in the depressed in position, CH16 and an arbitrary channel selected are received alternately.

When the squelch is closed for the CH16 and the selected channel at no signals, receive-standby operation is alternately switched with a ratio of 150 msec for CH16 and 850 msec for the selected channel.

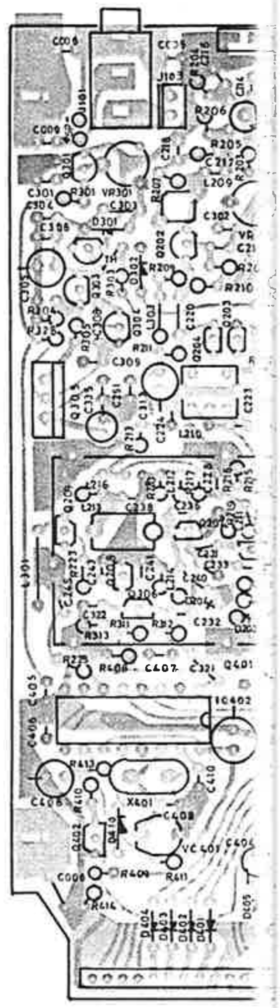
When a signal is received through the selected channel, the signal is reproduced for 850 msec, and then the receiver enters the standby operation for 150 msec in the CH16. The receiver repeats the above cycles.

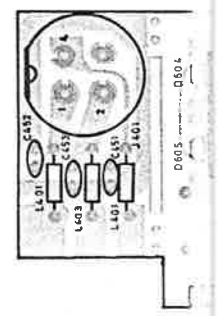
When a signal is received through the CH16, the receiver reproduces the signal until the signal disappears. Approx. 700 - 1400 msec after the disappearance, the selected channel is actuated for 850 msec. Then, the receiver repeats the above cycles in the same way.

HUSUN COMPACT SERVICE DATA

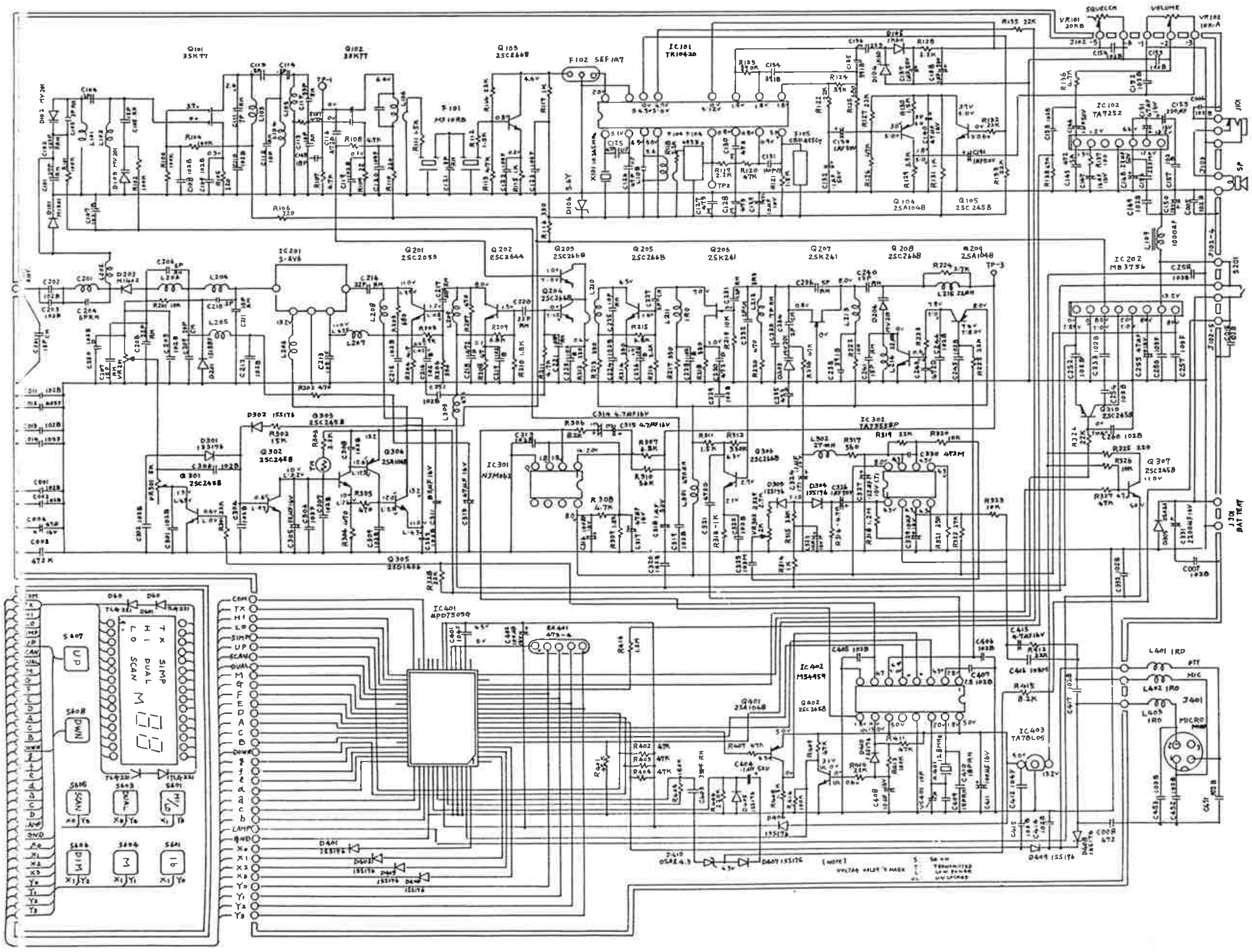
P.C. BOARD LAYOUT

MAIN LCD





CIRCUIT DIAGRAM



PARTS LIST

Circuit Symbol	Description	Parts No.
	Print Circuit Board Main	Z-220
	Print Circuit Board L. C. D.	Z-221
IC101	Integrated Circuit TK10420	
IC102	Integrated Circuit TA7252AP	
IC201	Integrated Circuit S-AV-6	
IC202	Integrated Circuit MB3756	
IC301	Integrated Circuit TL062CP	
IC302	Integrated Circuit TA75558P	
IC401	Integrated Circuit uPD7503G	
IC402	Integrated Circuit M54959P	
IC403	Integrated Circuit TA78L005AP	
Q101, 102	Field Effect Transistor 3SK77GR	
Q206, 207	Field Effect Transistor 2SK241GR	
Q103, 203, 204, 205	Transistor 2SC2668Y	
Q306		
Q104, 209, 304, 401	Transistor 2SA1048Y	
Q105, 210, 301, 302	Transistor 2SC2458Y	
Q303, 307, 402		
Q201	Transistor 2SC2053	
Q202	Transistor 2SC2644	
Q208	Transistor 2SC2786K	
Q305	Transistor 2SD1406GR	
D101	Si Diode MI301	
D102, 103, 203, 204	Si Diode MV201	
D104, 105	Ge Diode 1K60	
D106	Si Diode 05AZ5. 6X	
D201	Ge Diode 1K188FM	
D202	Si Diode MI402	
D301, 302, 303, 304	Si Diode 1SS176	
D401, 402, 403, 404		
D405, 406, 407, 408		
D305	Si Diode DSA3A	
D401	Si Diode 05AZ4. 3Y	
D601	Liquid Crystal Display LT0385	
D602, 603, 604, 604	Light Emitting Diode TLG-221	
X101	Crystal 10. 245MHz	X-12
X401	Crystal 12. 800MHz	X-21
F101	Crystal Filter MF10RB	PU-215
F102	Ceramic Filter SFE10. 7MA5	
F103, 104	Ceramic Filter CFU455E2	PU-166
F105	Ceramic filter CDB455C7	PU-236
VC401	Trimmer Capacitor CTZ-51A-6PF	
VR201	Trimmer Resistor RVF6P01-50Kohm	
VR301	Trimmer Resistor RVF6P01- 5Kohm	
VR302	Trimmer Resistor RVF6P01- 2Kohm	
T H	Thermistor	
RA401	Resistor Array	
L101, 102, 103, 104	Rf-coil 6145D	R-041
L105, 213		
L210	Rf-coil	R-040
L106	If-coil	1-017
L108	If-coil	1-024
L201, 203, 204	Coil	C-030
L202	Coil	C-029
L205, 206, 207	Coil	C-027
L208, 209	Coil	C-028
L211, 216, 401, 402	Inductor LAL03NA1R0K	
L403		
L212	Inductor LAL03NA3R3K	
L214, 215	Inductor LAL03NA220K	
L301, 303	Inductor LAL03NA471M	
L302	Inductor LC162S6-303K	
L109	Choke coil	Z-48
C331	Cap. Electrolytic 2200uF 16V	
C105	Cap. Electrolytic 1000uF 16V	
C155	Cap. Electrolytic 220uF 16V	
C313, 316, 402, 411	Cap. Electrolytic 100uF 16V	

Circuit Symbol	Description	Parts No.
C140, 151, 255, 311	Cap. Electrolytic 47uF 16V	
C313, 408, 004		
C305, 311	Cap. Electrolytic 33uF 16V	
C147, 323, 329	Cap. Electrolytic 10uF 16V	
C415	Cap. Electrolytic 4. 7uF 25V	
C133, 137, 138, 141	Cap. Electrolytic 1uF 50V	
C146, 326, 318		
C148	Cap. Electrolytic 0. 22uF 50V	
C132, 404	Cap. Electrolytic 0. 1uF 50V	
C129	Cap. Tantalum 10uF 10V	
C314, 315	Cap. Tantalum 4. 7uF 10V	
C327	Cap. Tantalum 0. 22uF 10V	
C324	Cap. Tantalum 0. 1uF 10V	
C127, 128, 130	Cap. Mylar 0. 047uF 50V	
C136, 156	Cap. Mylar 0. 022uF 50V	
C325, 416	Cap. Mylar 0. 01uF 50V	
C330	Cap. Mylar 0. 0047uF 50V	
C401, 412	Cap. Ceramic 0. 1uF F 50V	
C120, 122, 123, 213	Cap. Ceramic 0. 01uF F 50V	
C256, 257, 306, 001		
C012, 014		
C116, 218, 243, 230	Cap. Ceramic 0. 0047uF D 50V	
C321, 008		
C415	Cap. Ceramic 0. 0047uF SR 50V	
C107, 108, 109, 110	Cap. Ceramic 0. 001uF B 50V	
C119, 149, 152, 153		
C154, 157, 158, 202		
C203, 205, 212, 215		
C216, 219, 223, 224		
C226, 228, 245, 250		
C251, 252, 253, 260		
C301, 302, 303, 304		
C307, 308, 309, 313		
C319, 320, 322, 332		
C335, 405, 406, 407		
C414, 415, 417, 451		
C453, 001, 002, 003		
C005, 006, 007, 011		
C013		
C134, 135, 238	Cap. Ceramic 390PF B 50V	
C131	Cap. Ceramic 120PF UJ 50V	
C125, 126	Cap. Ceramic 47PF UJ 50V	
C117, 403	Cap. Ceramic 33PF RH 50V	
C101, 220	Cap. Ceramic 27PF PH 50V	
C102, 208, 214, 217	Cap. Ceramic 22PF RH 50V	
C220		
C209	Cap. Ceramic 20PF CH 50V	
C148, 410	Cap. Ceramic 18PF RH 50V	
C105, 201, 207, 241	Cap. Ceramic 15PF RH 50V	
C409		
C231, 240	Cap. Ceramic 12PF RH 50V	
C112, 115, 211, 225	Cap. Ceramic 10PF RH 50V	
C111, 233	Cap. Ceramic 7PF RH 50V	
C204, 206	Cap. Ceramic 6PF RH 50V	
C236	Cap. Ceramic 5PF RH 50V	
C103, 121	Cap. Ceramic 3PF RH 50V	
C227, 232, 234	Cap. Ceramic 2PF CH 50V	
C104, 113, 114, 210	Cap. Ceramic 0. 5PF SL 50V	
R318	Resistor Carbon 1. 2Mohm J 1/6W	
R123	Resistor Carbon 390Kohm J 1/6W	
R312	Resistor Carbon 330Kohm J 1/6W	
R406	Resistor Carbon 220Kohm J 1/6W	
R405	Resistor Carbon 150Kohm J 1/6W	
R101, 102, 103, 104	Resistor Carbon 100Kohm J 1/6W	
R413, 414		
R310	Resistor Carbon 56Kohm J 1/6W	
R120, 126, 137, 138	Resistor Carbon 47Kohm J 1/6W	
R226, 401, 402, 403		
R404, 407, 409, 411		
R315, 321	Resistor Carbon 33Kohm J 1/6W	
R322	Resistor Carbon 27Kohm J 1/6W	

Circuit Symbol	Description	Parts No.
R114, 127, 132, 133	Resistor Carbon 22Kohm J 1/6W	
R135, 225, 301, 319		
R324, 328, 410, 412		
R302	Resistor Carbon 15Kohm J 1/6W	
R201, 219, 320, 323	Resistor Carbon 10Kohm J 1/6W	
R326		
R306, 415	Resistor Carbon 8. 2Kohm J 1/6W	
R209, 215, 307	Resistor Carbon 6. 8Kohm J 1/6W	
R108, 113, 136, 211	Resistor Carbon 4. 7Kohm J 1/6W	
R308, 316		
R124, 129, 205	Resistor Carbon 3. 9Kohm J 1/6W	
R223	Resistor Carbon 3. 3Kohm J 1/6W	
R224, 329	Resistor Carbon 2. 7Kohm J 1/6W	
R118, 128, 216, 303	Resistor Carbon 2. 2Kohm J 1/6W	
R210	Resistor Carbon 1. 8Kohm J 1/6W	
R111, 112, 121, 130	Resistor Carbon 1. 5Kohm J 1/6W	
R311, 309, 408		
R115, 117, 131, 227	Resistor Carbon 1Kohm J 1/6W	
R313, 314		
R125, 203	Resistor Carbon 680ohm J 1/6W	
R317	Resistor Carbon 560ohm J 1/6W	
R202, 207, 220, 304	Resistor Carbon 470ohm J 1/6W	
R305		
R116, 206, 213, 214	Resistor Carbon 330ohm J 1/6W	
R217, 218		
R105, 106, 110, 212	Resistor Carbon 220ohm J 1/6W	
R137	Resistor Carbon 100ohm J 1/6W	
R208	Resistor Carbon 47ohm J 1/6W	
R109	Resistor Carbon 22ohm J 1/6W	
R204	Resistor Carbon 4. 7ohm J 1/6W	
R107	Resistor Carbon 4. 7Kohm J 1/4W	
R119	Resistor Carbon 2. 2Kohm J 1/4W	
S601, 602, 603, 604	Switch SKHHAJ	
S605, 606, 607, 608		
J101	Earphone Jack	
J102	Wire Connector W-P0807	WH-04A
J103	Wire Connector W-P5002	WH-04B
J201	Antenna Jack M-RN-D2501	PU-364
J401	Microphone Jack No. 15041	PU-268
VR101	Variable Resistor RK0971110-20KB	PU-420
VR102	Variable Resistor 5M1C1150 -10KA	PU-339
	Speaker	PU-408
	Power Cord A	PU-393
	Power Cord B	PU-394
	Stren Relief SP-3W-1	
	Front Panel	M-155
	Key Panel	Z-203
	UV Filter	Z-218
	Knob AS	M-102
	Key Shaft	G-60
	Case	M-123
	Case	M-124
	Speaker Bracket	N-18
	Chassis	N-165
	IC Holder	N-63
	Heat Sink	PU-531
	Silicon Rubber	G-96
	Silicon Rubber	G-78
	Insulater Tube	G-84
	Insulater Bush	PU-501
	Terminal	S-45
	Cap	G-40
	Packing	G-51
	Packing	G-52
	O Ring	G-95
	Shield Plate	N-171
	Cushion	G-36
	Shield Case for V. C. O.	N-174
	Shield Plate for V. C. O.	N-175
	Insulater for V. C. O.	Z-223
	Shield Lid	N-176
	Light Leader	Z-138

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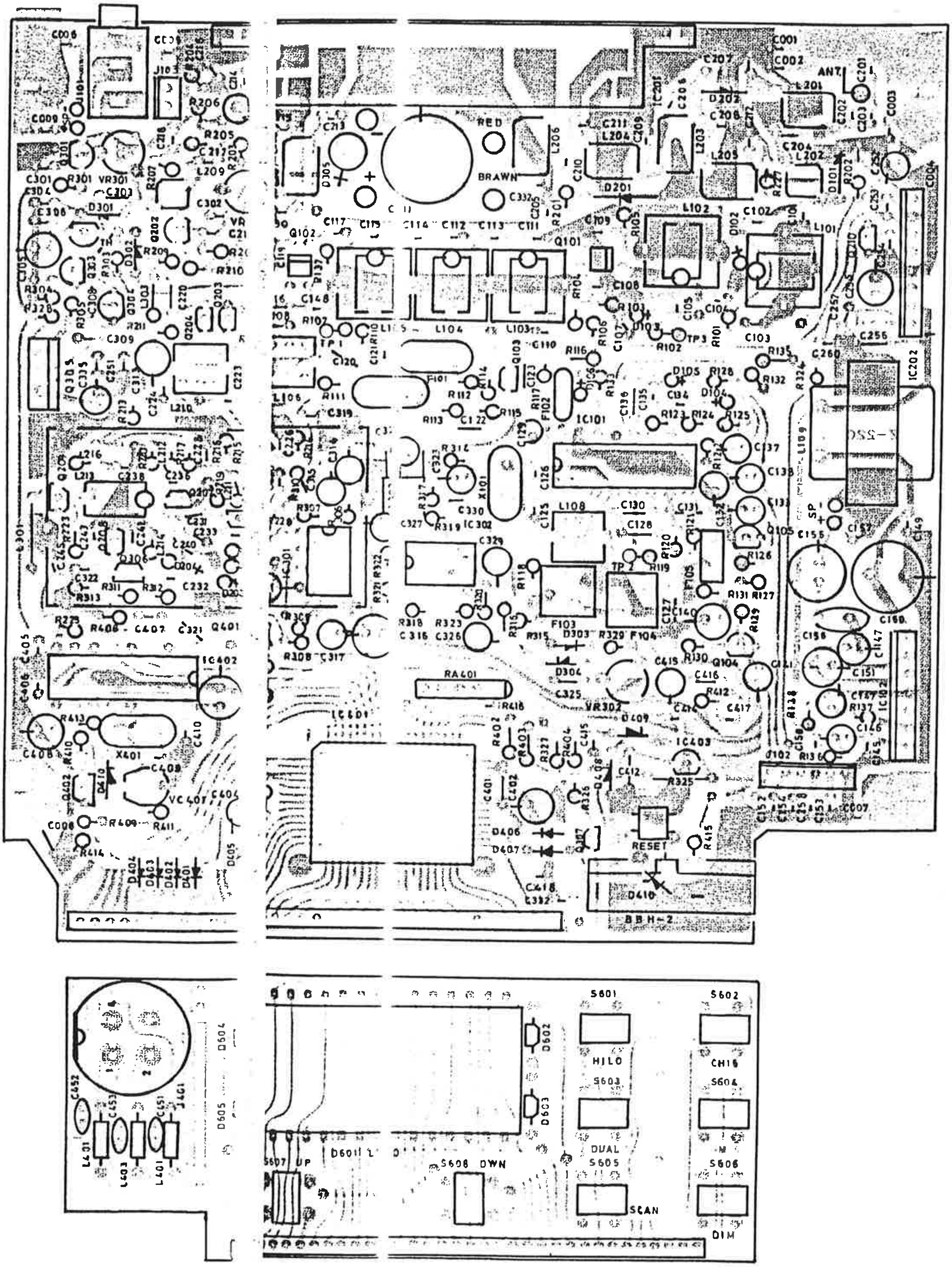
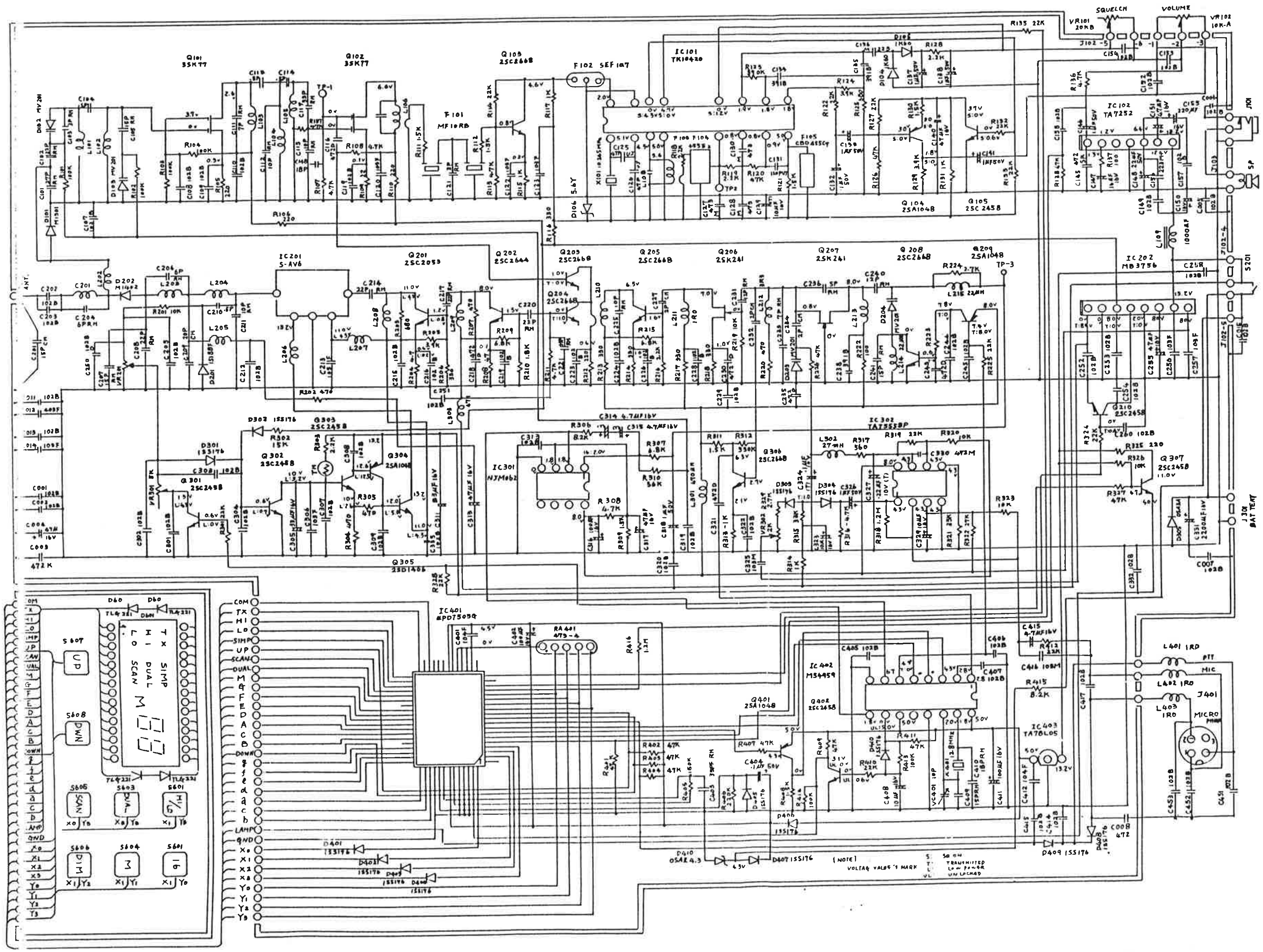


CIRCUIT ALIGNMENT

HUSUN COMPACT SERVICE DATA

CIRCUIT DIAGRAM



P.C. BOARD LAYOUT

MAIN LCD