

HEADLINE

HL-1510/1520 SERVICE MANUAL



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SPECIFICATIONS

Measurement Condition

1) POWER SOURCE	-----	7.4 Volt DC
2) DC VOLTAGE FINAL STAGE	-----	7.4 Volt DC
3) ANT IMPEDANCE	-----	50 ohm
4) TEST TEMPERATURE	-----	25 °C
5) RF SIGNAL INPUT	-----	1 mV(-47dBm)
6) NORMAL DEVIATION	-----	1.5[N]KHz
7)AUDIO OUTPUT LOAD	-----	4 ohm

General

1) OPERATING FREQUENCY	-----	150.025MHz (VHF) 450.025MHz (UHF) 14 Hours
2) BATTERY LIFE(0.5:0.5:9)	-----	Li-ion (1700mAh) 11 Hours NiMH (1350mAh)
3) OPERATING TEMPERATURE	-----	-20°C ~ +55°C
4) FREQUENCY CONTROL	-----	PLL SYNTHESIZER
5) FREQUENCY STABILITY	-----	+/- 2.5PPM
6)CHANNEL SPACING	-----	12.5/25KHz
7) NO OF CHANNELS	-----	199

Receiver Specifications

1) SENSITIVITY	-----	-116dBm [12dB SINAD]
2) SQUELCH THRESHOLD	-----	6~14dB SINAD
3) AUDIO OUTPUT	-----	1.0 WATTS (MAX.)
4) FREQUENCY RESPONSE	-----	300Hz ---- 3000Hz
5)INTERMEDIATE FREQUENCY	-----	1'st IF : 43.655 MHz 2'nd IF : 0.455MHz
6) IMAGE / SPURIOUS REJECTION	-----	65 dB
7) INTERMODULATION	-----	65 dB
8)ADJACENT CHANNEL REJECTION	-----	65 dB

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Transmitter Specifications

1) FREQUENCY COVERAGE	-----	136.00MHz TO 174.00MHz (VHF) 430.00MHz TO 470.00MHz (UHF)
2) OUTPUT POWER HIGH (L/H)	-----	1/5 Watts (VHF), 1/4 Watts (UHF)
3) TYPE OF MODULATION - FM DOUBLE-SIDE BAND FULL CARRIER MODULATION		
4) MODULATION CAPABILITY	-----	+/- 2.5 KHz (MAX.)
5) SPURIOUS EMISSION	-----	LESS THAN -60dB
6) FREQUENCY TOLERANCE	-----	+/- 2.5PPM (-20°C ~ 55°C)
7) ANTENNA IMPEDANCE	-----	50 ohm
8) CURRENT DRAIN	-----	BELOW 1900mA / 7.4 Volt

Receiver

Test Item	Nominal	Limit
Sensitivity (12 dB SINAD)	-118dBm	-116dBm
Squelch – Threshold	11dB	+/-5dB
Audio output	2V	1.6V
Hum & Noise Ratio	40 dB	35 dB
Current – Stand By	60 mA	65mA
Power saving mode	50 mA	40 mA
Audio Response		
300 Hz	- 3	+/- 3 dB
3 kHz	- 10	+/- 3 dB
Audio Distortion @ 1 mV	3 %	5 %
In Band Conducted RX Spurious	.	-54 dB
Spurious Rejection Ratio	.	-60 dB
Image Rejection Ratio	.	-60dB
Adjacent Channel Rejection Ratio	.	-60dB
Battery Low	6.5 V	_0.2 V
Intermediate Frequency	1 st IF 43.655MHz 2 nd IF 455KHz	

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Transmitter

Test Item	Nominal	Limit
Carrier Output (Conducted power) @7.4 V DC Power Input	4.8 Watts (VHF) 3.6 Watts (UHF)	+/-0.3 W
Maximum Current @ 7.4 V DC input	1700 mA	1900 mA
Conducted Harmonics Emission	- 65 dBc	- 60 dBc
Audio Response		
300 Hz	- 8 dB	_3 dB
2.5 KHz	+ 8 dB	_3 dB
Audio Frequency Deviation (AF 1 KHz / 1.5 KHz Dev 20 dB up)	2.0 KHz	_0.3 KHz
TX Hum & Noise	35 dB	30 dB
TX Distortion	3 %	5 %
Carrier Frequency	_300 Hz	_500 Hz
Tolerance (_2.5 ppm)		
Mic sensitivity	5 mV	_3 mV

OPERATING INSTRUCTIONS



(1) On/Off & Volume Knob

Rotate the On/Off Power & Volume knob clockwise to turn on the radio. All icons will appear on the LCD for a second, the backlight will illuminate, and a beep will sound to confirm that the radio is on. You can adjust the volume by rotating the volume knob.



(2) Channel

You can select the desired channel using the Up/Down buttons. A press and hold will cause the channels to scroll fast.



(3) Receive

There are 5 levels to indicate received signal strength. During receive the volume control can be adjusted to a comfortable level. The LED will illuminate green when a call is coming in.

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(4) Transmit

Select a channel using the Up/Down buttons. Press and hold the PTT (push to talk) button and speak into the microphone. The red LED will be on and the transmission icon will appear on the LCD. You can select High or Low transmit power by pressing the Down (low power) or the Up (high power) buttons during PTT.



(5) Monitor

You can verify if the channels are out of service by releasing the squelch. Press the 'M' button to monitor. Press the 'M' button for two to three seconds to continuously monitor the channel. You can release the monitor by pressing the 'M' button again.



(6) Function

You can use this button to change the 8 functions available. Each press will go to the next available function. Use the Up/Down buttons to toggle the available options for the current function. Press the PTT button to exit and save the settings. If no buttons are pressed within 10 seconds, the selected function mode will be cancelled.



(7) Squelch

Press the 'F' button once to select Squelch system, the icon "Sq" will begin flashing. This is a sensitivity adjustment function for users to communicate with. Select Low/High using the Up/Down buttons. If no buttons are pressed in 5 seconds after selecting functions, the monitor will switch back to the main display. Press the PTT button to finish the function mode.



THEORY OF OPERATION

The HL Series Handheld Radio Transceivers are comprised of one main PCB. The main PCB contains the transmitter, receiver, and control circuits.

Receiver (HL-1510)

The receiver circuit adopts dual conversion super heterodyne with 1st IF 43.655 MHz and 2nd IF 455 kHz.

Front-end

Front-end consists of pre-selector filter, RF Amplifier, Post-selector filter. The receive signal is routed through C111 and selected by D106, D108, D111, D113 and L106, L107, L110, L111 to amplified around 13dB at RF amp Q101. Front-end adjusts bandwidth by varicap diode tuning. This circuit removes unnecessarily spurious 1st image.

First Mixer

The signal from front-end is input to Q105 gate1 of 1st mixer. Local signal generated from VCO is input to Q103, gate2. These two signals are mixed at Mixer into 1st IF signal 43.655 MHz, which is resonated in parallel at C155, L120 and inputted to XF101, pair crystal filter.

IF Amplifier

1st IF signal from XF101 is amplified about 20dB at IF amp Q105 and inputted to IC101, IF DEMOD IC.
2nd Local oscillator is 43.2 MHz. The signal from 2nd Mixer is refined removing unnecessary spurious signal and detected through high gain linear amp. This detected signal is inputted to IC101 pin.

AF Amplifier

300 Hz high pass filter IC606 removes the signal under 300 Hz of the demodulated signal IC101 so that noise under sub tone use is removed.
De-emphasis functions to get 6dB/Oct by R641, C638 and this signal controls volume of sound by SW701. IC603 can operate a speaker as audio current amplifier amplifying the signal. The operating current can be reduced by mute signal.

Squelch

The demodulated signal from IC101 is coupled of noise to C173. The noise is filtered and amplified by C177, C166, R147 and used internal amplifier of IC101. This noise signal is used as the signal to mute CPU[IC801] D/A .

Audio Amp

After Sub-tone signal is removed at 300 Hz High pass filter and de-emphasized to 6dB/Oct at R641, C638 the volume of sound is controlled by SW701.
IC603 is doing low frequency current amplify as audio amplifier to operate a speaker.
IC603 has mute function and if pin4, mute port is Low, it's on mute. If it is High, it's unmuted.

Receiver (HL-1520)

The receiver circuit adopts dual conversion super heterodyne with 1st IF 43.655 MHz and 2nd IF 455 kHz.

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Front-end

Front-end consists of per-selector filter, RF Amplifier, Post-selector filter. The receive signal is routed through C111 and selected by D103, D105, D107, D108 and L106, L107, L111, L112 to amplified around 13dB at RF amp Q101. Front-end adjusts bandwidth by varicap diode tuning. This circuit removes unnecessarily spurious 1st image.

First Mixer

The signal from front-end is input to Q103 gate1 of 1st mixer. Local signal generated from VCO is input to Q105, gate2. These two signals are mixed at Mixer into 1st IF signal 43.655 MHz, which is resonated in parallel at C137, L120, R117 and inputted to XF1, pair crystal filter.

IF Amplifier

1st IF signal from XF1 is amplified about 20dB at IF amp Q103 and imputed to U1, IF DEMOD IC. 2nd Local oscillator is 43.2 MHz. The signal from 2nd Mixer is refined removing unnecessary spurious signal and detected through high gain linear amp. This detected signal is inputted to U1 pin.

AF Amplifier

300 Hz high pass filter U606 removes the signal under 300 Hz of the demodulated signal U1 so that noise under sub tone use is removed. De-emphasis functions to get 6dB/Oct by R641, C638 and this signal controls volume of sound by SW701. IC603 can operate a speaker as audio current amplifier amplifying the signal. The operating current can be reduced by mute signal.

Squelch

The demodulated signal from U1 is coupled of noise to C163. The noise is filtered and amplified by C165, 166, R147 and used internal amplifier of U1. This noise signal is used as the signal to mute CPU [IC801] D/A .

Audio Amp

After Sub-tone signal is removed at 300 Hz High pass filter and de-emphasized to 6dB/Oct at R641, C638 the volume of sound is controlled by SW701. IC603 is doing low frequency current amplify as audio amplifier to operate a speaker. IC603 has mute function and if pin4, mute port is Low, it's on mute. If it is High, it's unmuted.

Transmitter (UHF and VHF)

The transmitter consists of buffer, power amplifier, low-pass filter, antenna switch, auto-power control.

Buffer

+2dBm TX RF signal from VCO is amplified to around +15dBm by buffer Q205, Q202 to have desired output power at final amp. Pie style resistor attenuator is used between VCO and buffer amp. To minimize the effect of load caused by transmit amplifier in TX.

Power Amplifier

TX RF signal form buffer Amp. Gains 5 Watt output by final Amp Q201. Collect impedance of Q201 states in low so that it is matching to 50ohm by C203~207, strip line and imputed to 5th low pass filter [L102~103, C105, 106].

Low Pass Filter

5th Low pass filter reduces the unwanted spurious for TX output power from final amp. L102~103, C105, 106 are chebisheve filter.

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Antenna Switch

Ant. Switch is to share the antenna in TX and RX. It prevents TX sensitivity from degradation by LPF. Also, it protects receive circuit by blocking TX signal to receive end, turning on D101, 102. Flow of the signal in RX is designed to minimize the loss of the signal using the character of series resonance of L105, C111.

Auto-Power Control

This circuit control TX power by detection on the current through R505.

The voltage difference from these resistors is amplified by IC501-A, and gets the voltage comparing the signal with the reference voltage from R510, 511 at IC501-B.

This voltage difference is kept to stable value by D/A1 changing gate voltage of final Amp.

PLL Synthesizer

Reference frequency is 14.4 MHz and this oscillated frequency is compensated in temperature.

The frequency from VCO is inputted to PLL IC and this inputted signal is divided by the ratio set by data and compared with reference step frequency.

Then, the difference comes to IC401 pin5 port. HL series consists of internal charge pump at IC401.

Charge pump output turns into DC by PLL LPF R403, 405, 406, C407, 406, 405, so that is can vary VCO control voltage to have set frequency.

For TX and RX switch, Q305 and Q306 base switch to control voltage. (TX_EN)

Audio and Control circuit

IC801 controls all factions of the radio as Microprocessor.

It detects outer condition such as function data on frequency, Power supply switching and make it operate correctly.

IC606 consists of 250 Hz LPF to function Sub-tone decoding correctly and the output of this filter is amplified at IC606. Then, it goes to IC606 to be changed to logic signal so that Sub-tone decoding is enabled.

IC602-A, B, C, and D is TX Audio Amp and limiter. It amplifies the voice signal from C-MIC and has the character of 6dB/Oct Pre-Emphasis. This voice signal is controlled by RV301 for the volume.



ALIGNMENT INSTRUCTIONS

The HL-1500 has been carefully aligned at the factory for the specified performance across the frequency range specified for each version. Re-alignment should therefore not be necessary except in the event of component failure, or altering version type. All component replacement and service should only be performed by an authorized HEADLINE I&C Ltd representative, or the warranty policy may be void.

Required Test Equipment

RF signal generator with calibrated output level at 1 MHz (or RADIO COMMUNICATION TEST SET)
 Deviation Meter (Liner Detector)
 AC Voltmeter
 SINAD Meter
 In-Line Wattmeter with 5% accuracy at 500 MHz
 Regulated DC Power Supply adjustable from 4 to 10V, 3A
 50Ω Non-reactive Dummy Load: 10W at 500 MHz
 Frequency Counter: ± 0.2 ppm accuracy at 500 MHz
 AF Signal Generator
 DC Voltmeter: High impedance

HL- 1510 (Using factory program)
 Low Band Edge (channel 1) : 136.000 MHz
 Band Center (channel 2) : 150.000 MHz
 High Band Edge (channel 3) : 174.000 MHz

HL- 1520 (Using factory program)
 Low Band Edge (channel 1) : 430.000 MHz
 Band Center (channel 2) : 450.000 MHz
 High Band Edge (channel 3) : 470.000 MHz

Disassembling the Unit

1. Remove the antenna.
2. Remove the battery by pressing down on both locking tabs while pulling away from the radio.
3. Remove the volume knob by pulling it off.
4. Remove the accessory dust cover.
5. Remove the 2 screws on the back cover.
6. Remove the radio from the front cover by gently tapping the bottom of the radio on a table top. The unit should be held at a 45 degree angle.
7. Unplug the speaker wiring harness from the main PCB.

Before You Begin

Many of the adjustments are controlled by software and can be accessed by using "Tune Mode". First set the beeps to "on" by using the function key. To access "Tune Mode" you must power the unit on while holding the (Up+Down+Function) keys. Release the buttons when all the segments are displayed. The display should now read, [001F-xx]. Each alignment requiring "Tune Mode" will be designated. In most instances it is best to program a channel for carrier squelch and no tones on transmit, unless otherwise noted. For the mechanical adjustments refer to the Alignment Points Diagram.

VCO Adjustment

Refer to the chart below for voltage levels and coil adjustments.

Step	Setting	Connection	Adjustment	Set To:
1	RX VCO voltage adjustment Frequency: High FQ (174MHz) (470MHz)	DC voltmeter to VCO test point VT1(Figure 1)	L304 (VHF) L303 (UHF)	3.8V DC [3.6V~4.0V]
2	RX VCO voltage adjustment Frequency: Low FQ (136MHz) (430MHz)	DC voltmeter to VCO test point VT1(Figure 1)	L304 (VHF) L303 (UHF)	1.1V DC [0.9V~1.3V]

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3	TX VCO voltage Frequency: High FQ (174MHz) (470MHz) Mic: Transmit (Unmodulated)	DC voltmeter VCO Test point1 (Figure 1) (VT1)	L307 (VHF and UHF)	3.8V DC [3.6V~4.0V]
4	TX VCO voltage Frequency: Low FQ (136MHz) (430MHz) Mic: Transmit (Unmodulated)	DC voltmeter VCO Test point1 (Figure 1) (VT1)	L307 (VHF and UHF)	1.1V DC [0.9V~1.3V]

It will be necessary to remove the PCB from the metal casting if adjustments are needed.

1. Remove the nut on the volume control.
2. Remove the PCB securing screws.
3. Remove the solder from the antenna jack or heat it with a soldering iron while pulling the PCB down to remove the PCB from the casting.

Set up the test equipment as shown in Figure 1. Adjust the supply voltage to 7.4V. Measure the voltage at VT1 during RX mode. Refer to the Alignment Points Diagram for test point location. If the voltage is not within the limits specified, adjust the appropriate coil by either pressing the loops in the coil closer together or spreading them apart. To adjust the transmitter VCO voltage, make sure the radio is connected to a 50 ohm load before transmitting. The alignment procedure is the same as above except the PTT button must be pressed. * Use caution to prevent RF burns during transmit.

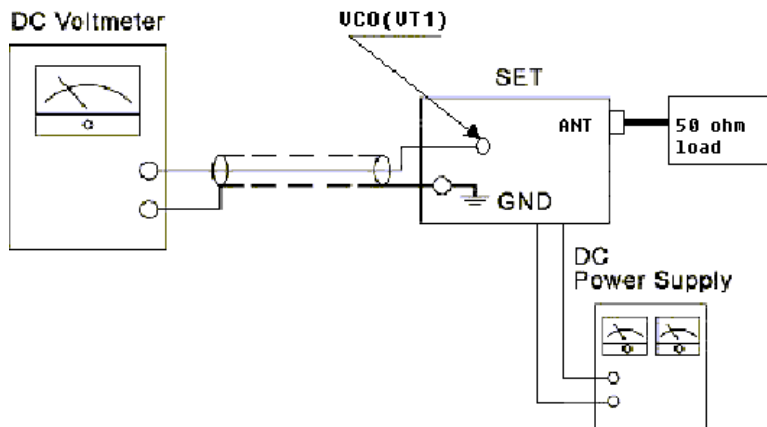


Figure 1

Transmitter Adjustments

Transmit Frequency

Setup the equipment as in figure 2. Press PTT and adjust RV401 to tune the frequency within +/- 200Hz of the carrier frequency.

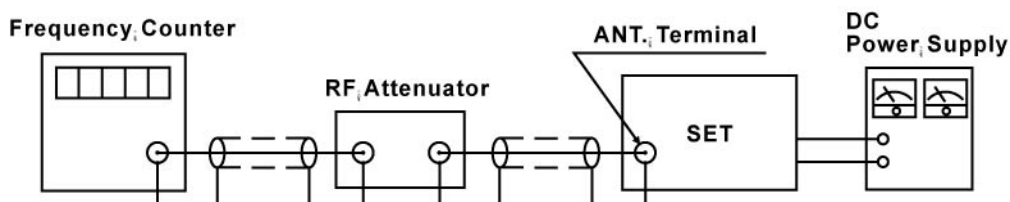




Figure 2

Transmitter High/Low Output Power (Tune mode)

Connect a Watt meter to the radio and enter Tune Mode.

Press the function button until [001P-XX] is displayed. Whereas, 001 is the Ch. number and "P" stands for Power. This is the adjustment menu for low power on channel 1. Press PTT and then use the "up/down" keys to tune. Once tuned, press the monitor button to save the setting. Next press the function button to set the high power. Note: the "H" icon should be on while the display still reads [001P-XX]. Press PTT and using the "up/down" keys tune for high power. Press monitor to save the setting. Turn the unit off then back on for final testing.

Transmitter Sub-Audible Tone Deviation

Connect the radio to a service monitor or modulation meter. Transmit on a channel with a DCS code of 023 and no audio modulation. Adjust RV601 for 400Hz deviation. Acceptable range is from 300Hz to 500Hz. See figure 3 for typical equipment setup.

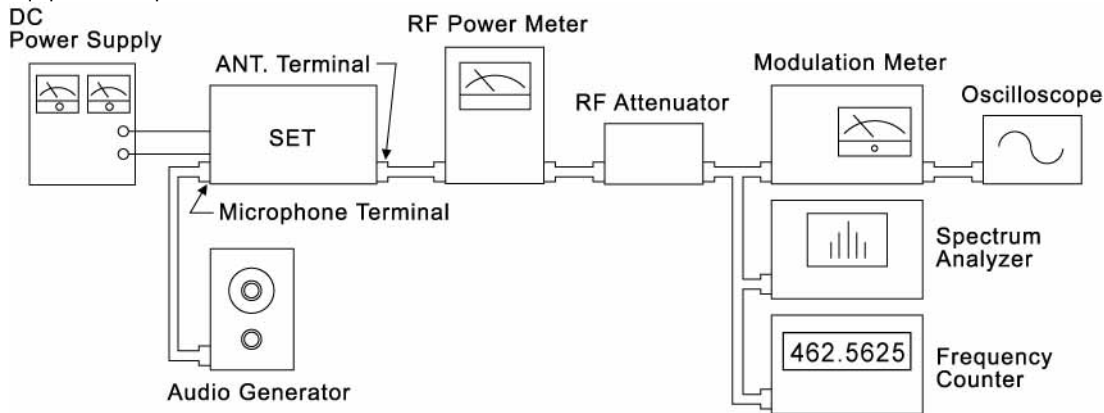


Figure 3

Transmitter Modulation Limiter and Microphone Sensitivity (Tune Mode)

Connect the unit as shown in Figure 3. Inject a 1 kHz tone at 100mVrms into the MIC jack. Adjust RV301 for 2.0 kHz (for 12.5 kHz spacing) deviation.

Receiver Adjustments

Front End Adjustment (Tune Mode)

Setup the test equipment as in figure 4. In Tune Mode go to [001F-XX]. Set the generator to produce 9 to 12dB SINAD. Using the Up and Down arrows adjust to produce the highest SINAD possible. This should be around -118 dBm. Press the monitor button to save the setting.

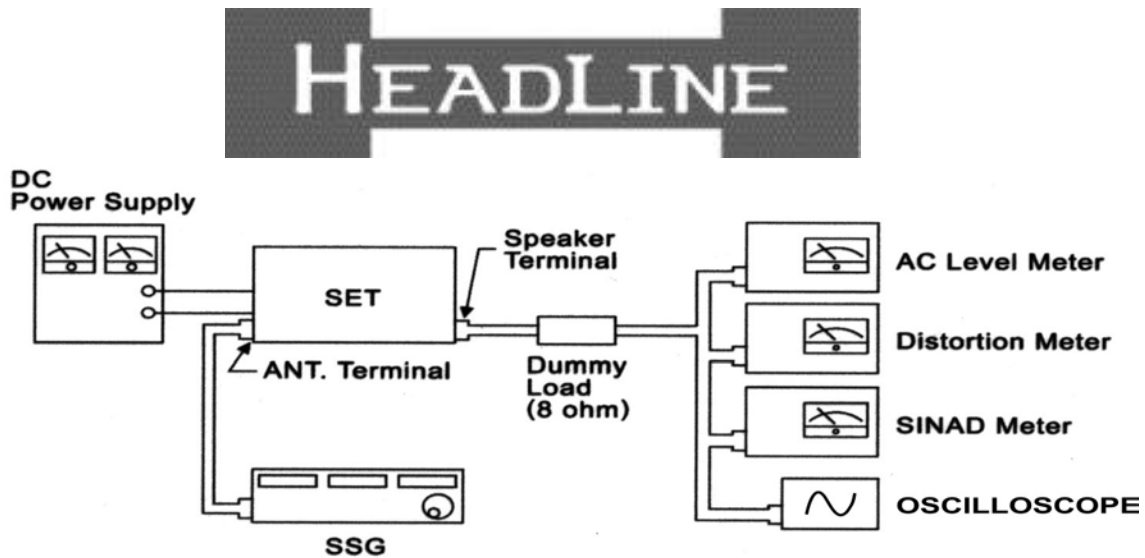


Figure 4

Receiver Squelch Adjustments (Tune Mode)

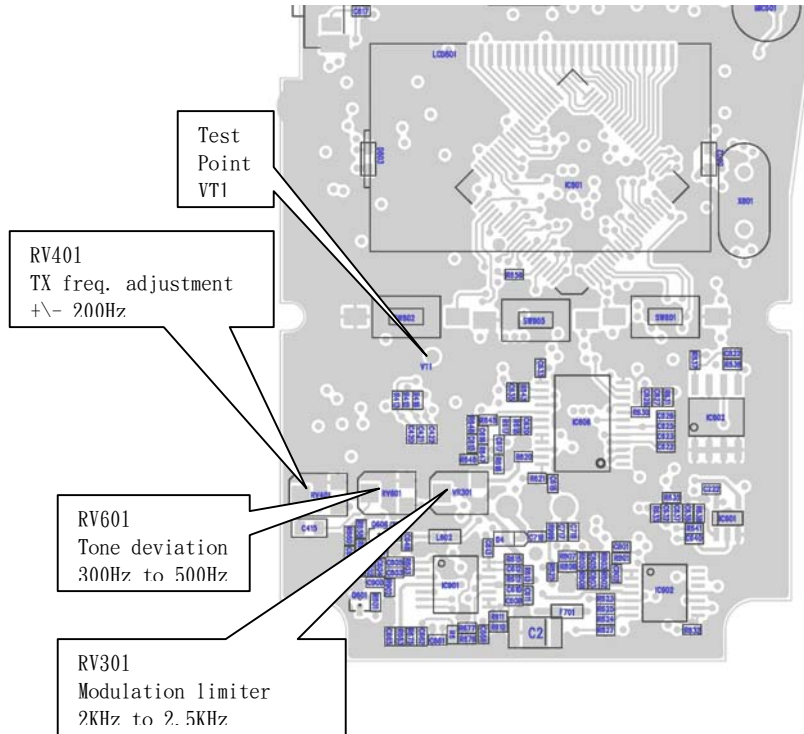
Connect an RF generator and set it to the receive frequency of channel 1, or the channel from which you went into tune mode. Press the function button until [001S-XX] and the "H" icon are displayed. Whereas, 001 is the Ch. number and "S" stands for Squelch. This is the adjustment menu for squelch threshold. Generate from the service monitor and check the squelch open point. Press the "up/down" keys to tune. The lower the number, the tighter the squelch becomes. Typical squelch threshold is from 9 – 12dB Sinad or around 0.25uV. Once tuned, press the monitor button to save the setting. Next press the function button until the display shows [001S-XX] and no "H" icon. This is the squelch close point. Reduce the signal generator from squelch threshold about 2-3dB. Press the "up/down" keys to tune. Tune until the radio audio mutes. Press monitor to save the setting. Turn the unit off then back on for final testing.

Tune Mode Paramaters

- The "001 F – A0" , means 1ch, Front-end (RX sens.), A0 hex Value(Up/Down)
- The "001 S – 00" , means 1ch, Squelch(Close), 00 hex Value(Up/Down)
- The "001 S – 00" , H " means 1ch, Opening Squelch, 00 hex Value(Up/Down)
- The "001 P – 1P" , means 1ch, RF Low Power, 1P hex Value(Up/Down)
- The "001 P – 86" , H" means 1ch, RF High Power, 86 hex Value(Up/Down)
- The "001 A – 21" , Not currently used. Originally for microphone sensitivity.

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ALIGNMENT POINTS DIAGRAM



CHANNEL FREQUENCY TONE GENERATION

CTCSS Tone Frequencies

1 = 67.0 Hz	11 = 97.4 Hz	21 = 136.5Hz	Code = Freq
2 = 71.9 Hz	12 = 100.0 Hz	22 = 141.3Hz	31 = 192.8 Hz
3 = 74.4 Hz	13 = 103.5 Hz	23 = 146.2Hz	32 = 203.5 Hz
4 = 77.0 Hz	14 = 107.2 Hz	24 = 151.4Hz	33 = 210.7 Hz
5 = 79.7 Hz	15 = 110.9 Hz	25 = 156.7Hz	34 = 218.1 Hz
6 = 82.5 Hz	16 = 114.8 Hz	26 = 162.2Hz	35 = 225.7 Hz
7 = 85.4 Hz	17 = 118.8 Hz	27 = 167.9Hz	36 = 233.6 Hz
8 = 88.5 Hz	18 = 123.0 Hz	28 = 173.8Hz	37 = 241.8 Hz
9 = 91.5 Hz	19 = 127.3 Hz	29 = 179.9 Hz	38 = 250.3 Hz
10 = 94.8 Hz	20 = 131.8 Hz	30 = 186.2 Hz	



DCS Code Format

PARITY BITS											ALWAYS 4			THREE DIGIT DCS CODE								
P	P	P	P	P	P	P	P	P	P	P	F	F	F	C	C	C	C	C	C	C	C	C
11	10	9	8	7	6	5	4	3	2	1	3	2	1	9	8	7	6	5	4	3	2	1
1	1	1	0	1	1	0	0	0	1	1	1	0	0	0	0	0	0	1	0	0	1	1
														0			2			3		

Where C= Octal Digit

F= Fixed Octal Digit

P= Parity bits Calculated Modulo Two addition as follows"

P1 = C1+C2+C3+C4+C5+C8

P2 = NOT (C2+C3+C4+C5+C6+C9)

P3 = C1+C2+C6+C7+C8

P4 = NOT (C2+C3+C7+C8+C9)

P5 = NOT (C1+C2+C5+C9)

P6 = NOT (C1+C4+C5+C6+C8)

P7 = C1+C3+C4+C6+C7+C8+C9

P8 = C2+C4+C5+C7+C8+C9

P9 = C3+C5+C6+C8+C9

P10 = NOT (C4+C6+C7+C9)

P11 = NOT (C1+C2+C3+C4+C7)

Code assignments and resulting bit patterns as found in TIA-EIA 603 Para. 1.3.5.7:

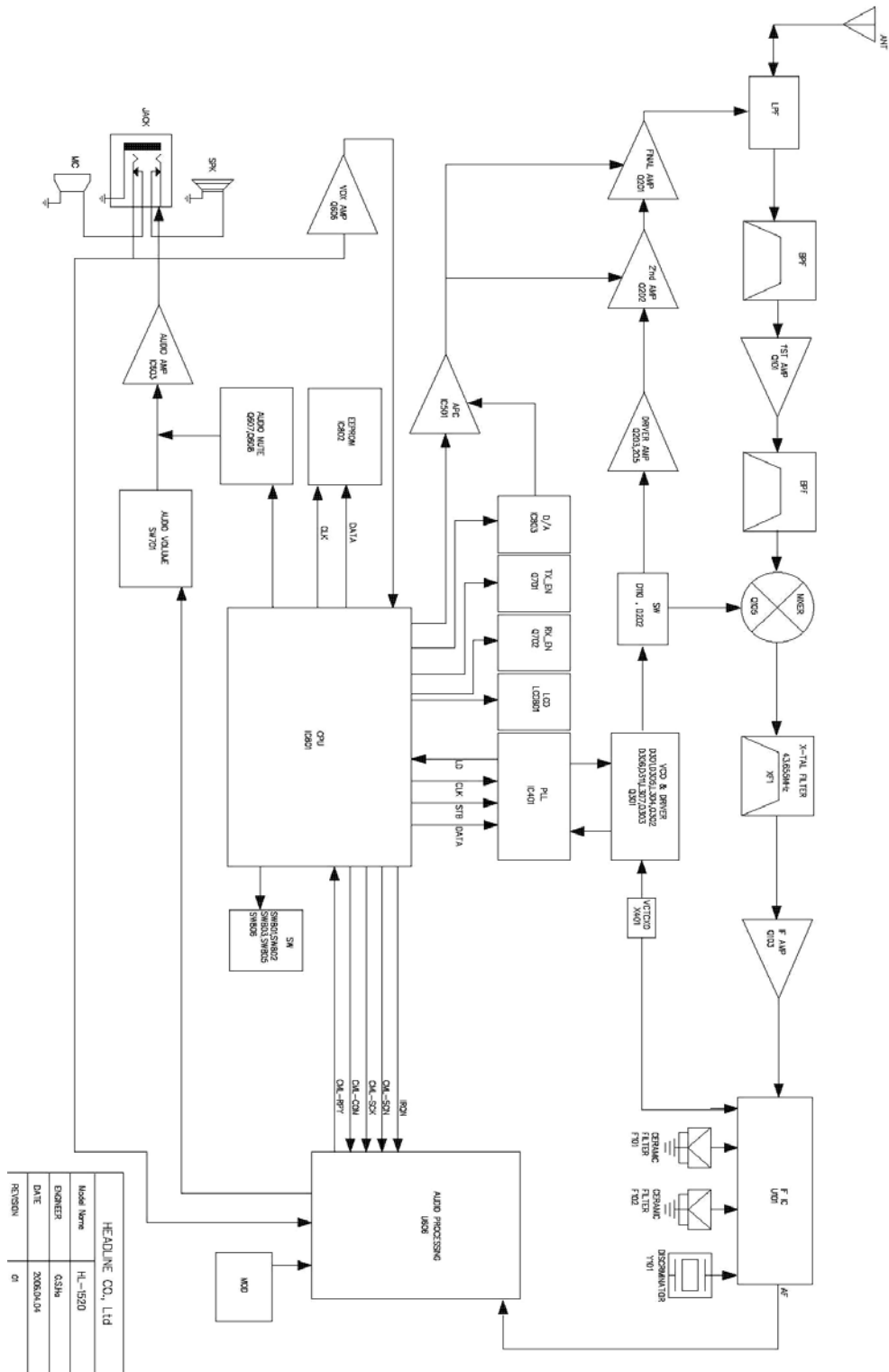
Code	Octal Code	Bit Pattern		Code	Octal Code	Bit Pattern
1	023	11101100011100000010011		43	315	11011000110100011001101
2	025	11010110111100000010101		44	331	01000111110100011011001
3	026	11001011101100000010110		45	343	01010010111100011100011
4	031	10100011111100000011001		46	346	01110101001100011100110
5	032	10111110101100000011010		47	351	00011101011100011101001
6	043	10110110110100000100011		48	364	11010000101100011110100
7	047	00011111101100000100111		49	365	01011110000100011110101
8	051	11111001010100000101001		50	371	00101011000100011111001
9	054	11011110100100000101100		51	411	11101110110100100001001
10	065	10111010001100000110101		52	412	11110011100100100001010
11	071	11001111001100000111001		53	413	01111101001100100001011
12	072	11010010011100000111010		54	423	10010111001100100010011
13	073	01011100110100000111011		55	431	11011000101100100011001
14	074	11101000111100000111100		56	432	11000101111100100011010
15	114	01101011110100001001100		57	445	11110111000100100100101

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16	115	11100101011100001001101		58	464	01001111110100100110100
17	116	11111000001100001001110		59	465	11000001011100100110101
Code	Octal Code	Bit Pattern		Code	Octal Code	Bit Pattern
18	125	00001111011100001010101		60	466	11011100001100100110110
19	131	01111010011100001011001		61	503	01111000110100101000011
20	132	01100111001100001011010		62	506	01011111000100101000110
21	134	01011101101100001011100		63	516	10000011011100101001110
22	143	01101111010100001100011		64	532	00011100011100101011010
23	152	00111101100100001101010		65	546	00110011110100101100110
24	155	10001001101100001101101		66	565	00011000111100101110101
25	156	10010100111100001101110		67	606	10111011001100110000110
26	162	11010111100100001110010		68	612	11001110001100110001010
27	165	01100011101100001110101		69	624	00011110101100110010100
28	172	00001011111100001111010		70	627	00000011111100110010111
29	174	00110001011100001111100		71	631	11100101000100110011001
30	205	11011101001100010000101		72	632	11111000010100110011010
31	223	11010001110100010010011		73	654	10011000011100110101100
32	226	11110110000100010010110		74	662	01001000111100110110010
33	243	10001011011100010100011		75	664	01110010011100110110100
34	244	00111111010100010100100		76	703	01000101011100111000011
35	245	10110001111100010100101		77	712	00010111101100111001010
36	251	11000100111100010101001		78	723	01110011000100111010011
37	261	00101110111100010110001		79	731	00111100100100111011001
38	263	10111101000100010110011		80	732	00100001110100111011010
39	265	10000111100100010110101		81	734	00011011010100111011100
40	271	11110010100100010111001		82	743	00101001101100111100011
41	306	00011001111100011000110		83	754	01000001111100111101100
42	311	01110001101100011001001				

HEADLINE

BLOCK DIAGRAM

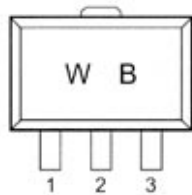


HEADLINE

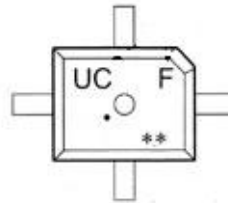
Semiconductor Lead Identification and IC Internal Connectors

TRANSISTOR

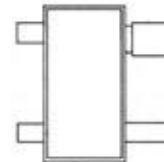
2SK3475



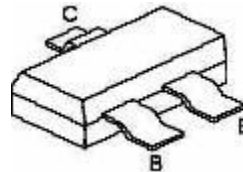
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3SK240

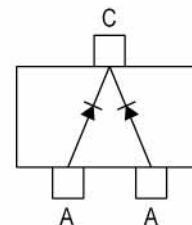
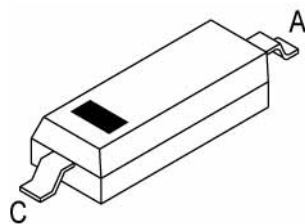


2SC4226-R25
2SC5006
KRA 226S
KRA 301E
KRA 302E
KRA 305E
KRA 307E
KRA 313E
KRC 404E
KTC4075E
KRC411E



DIODES

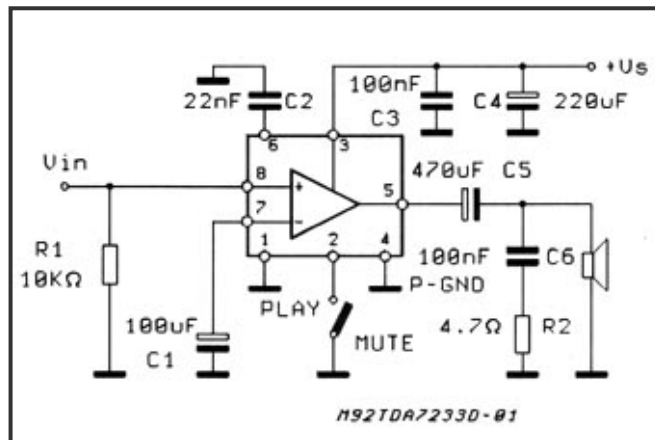
SMAB14
KDS 114E
KDS 121E
KDS 122



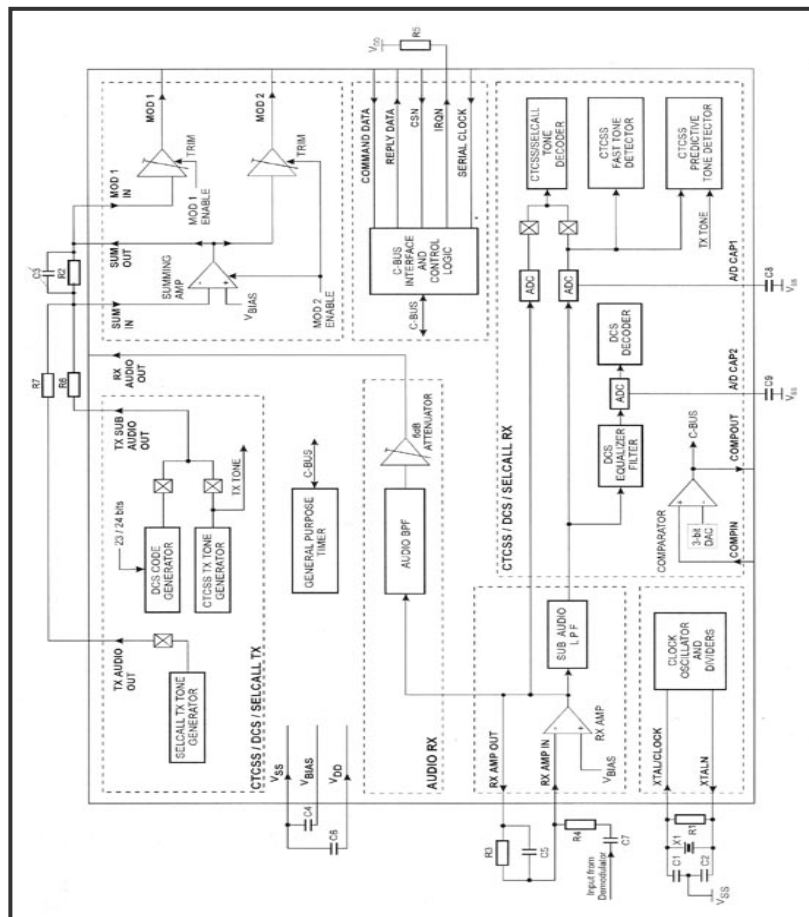
HEADLINE

SEMICONDUCTOR LEAD IDENTIFICATION

IC8 TDA7233D



IC2 FX828D5



TecNet international inc.

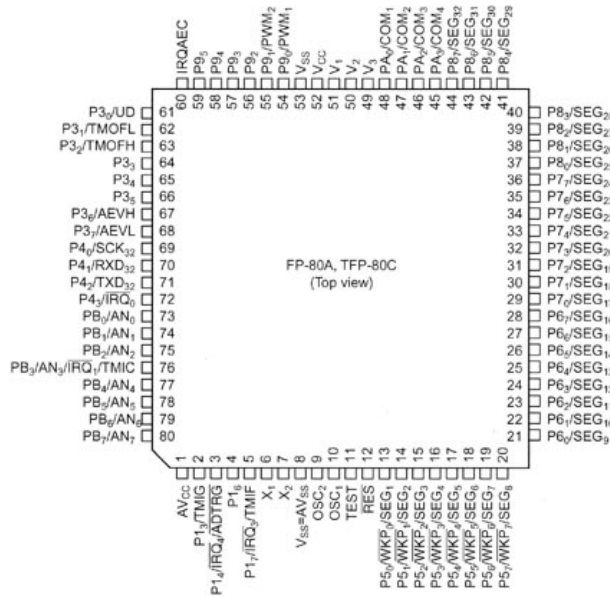
11535 West 83rd Terrace ▪ Lenexa, Kansas ▪ 66214

Telephone: 913-859-9515 ■ Fax: 913-859-9550

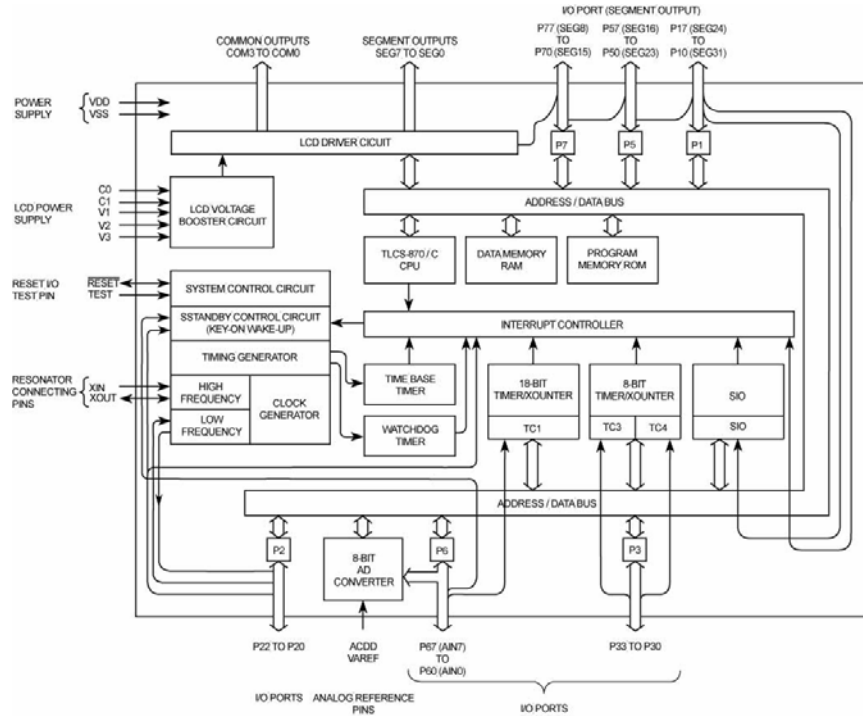
Website: www.tecnetusa.com ▪ Email: tecnet@tecnetusa.com

HEADLINE

IC12 HD6473802W



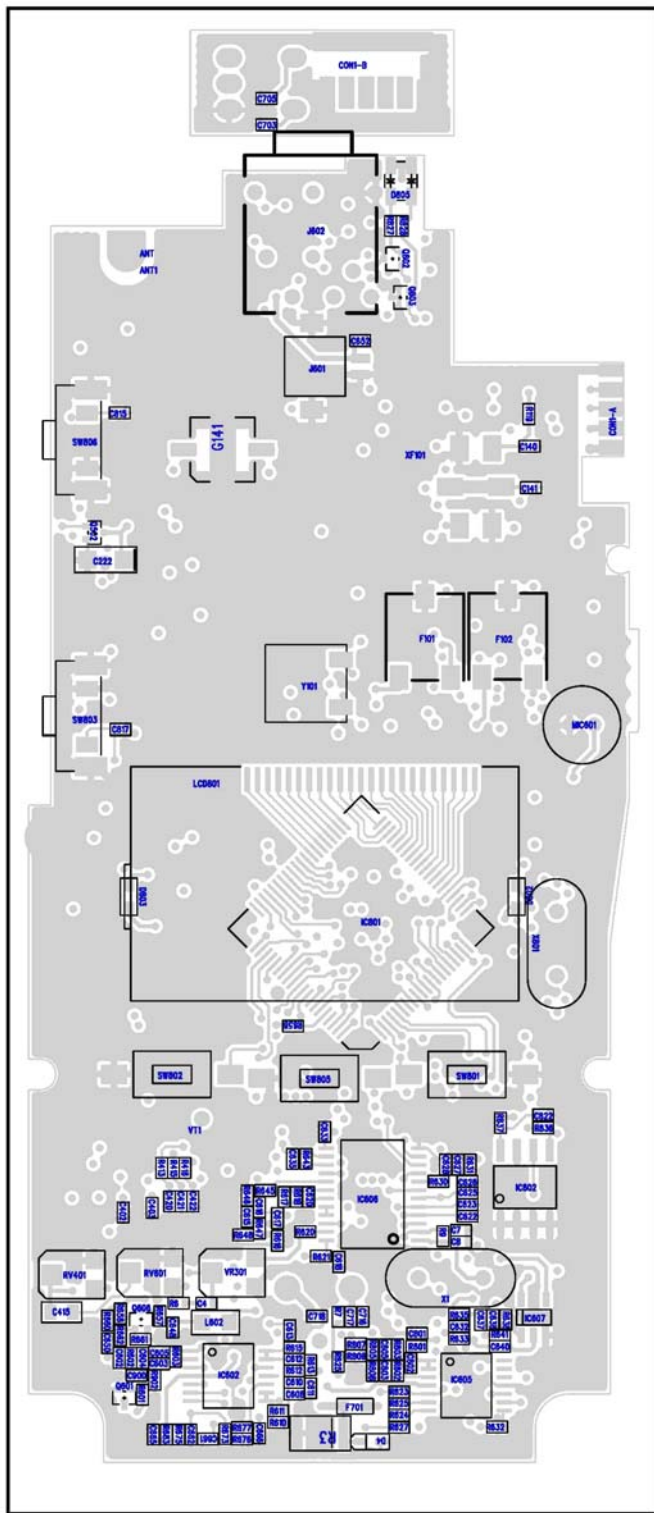
BLOCK DIAGRAM



HEADLINE

PCB LAYOUTS

Top View



TecNet International Inc.

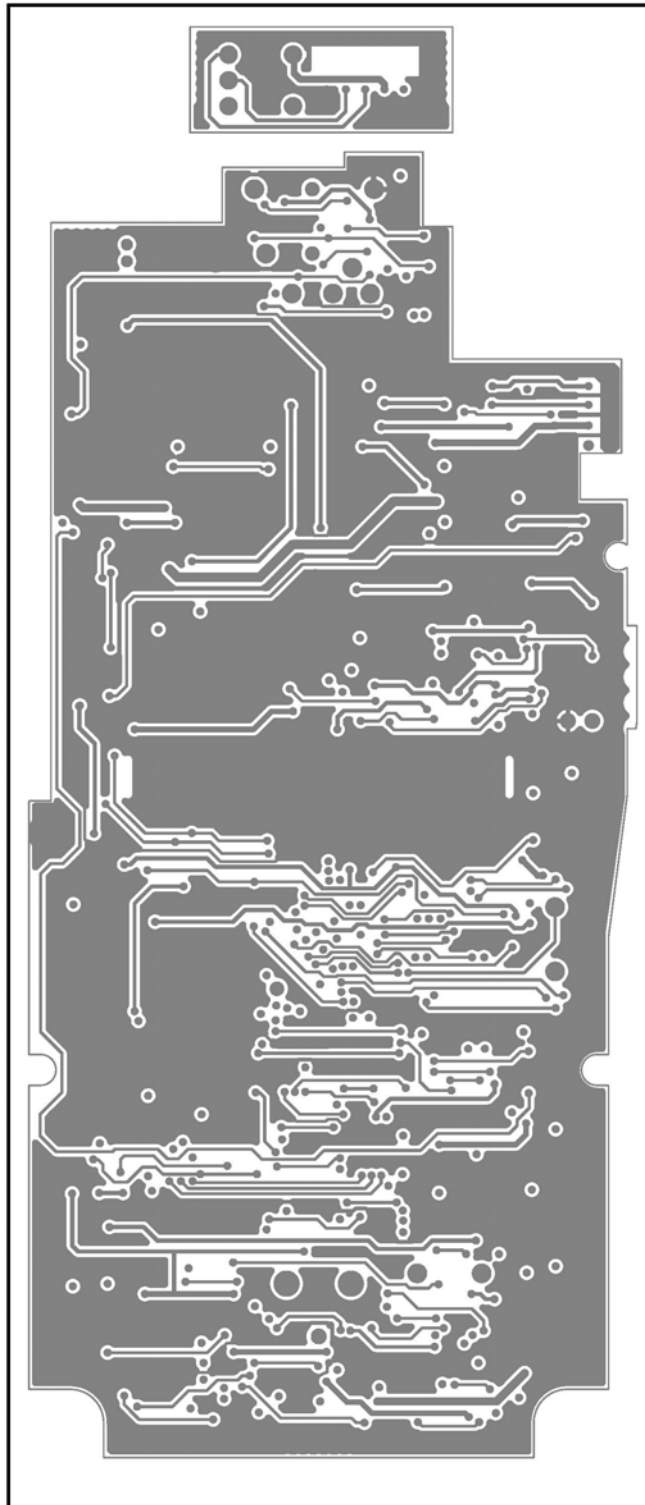
11535 West 83rd Terrace ▪ Lenexa, Kansas ▪ 66214

Telephone: 913-859-9515 • Fax: 913-859-9550

Website: www.tecnetusa.com ▪ Email: tecnet@tecnetusa.com

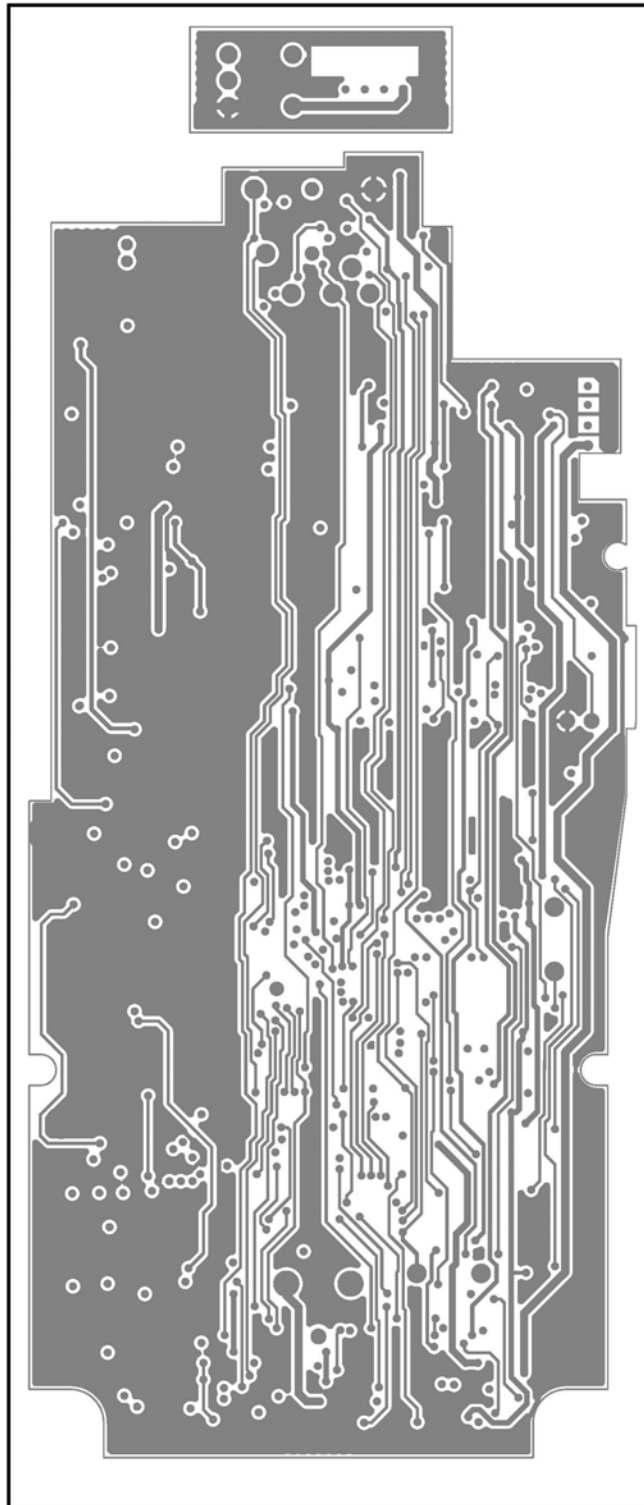
HEADLINE

2nd Layer View



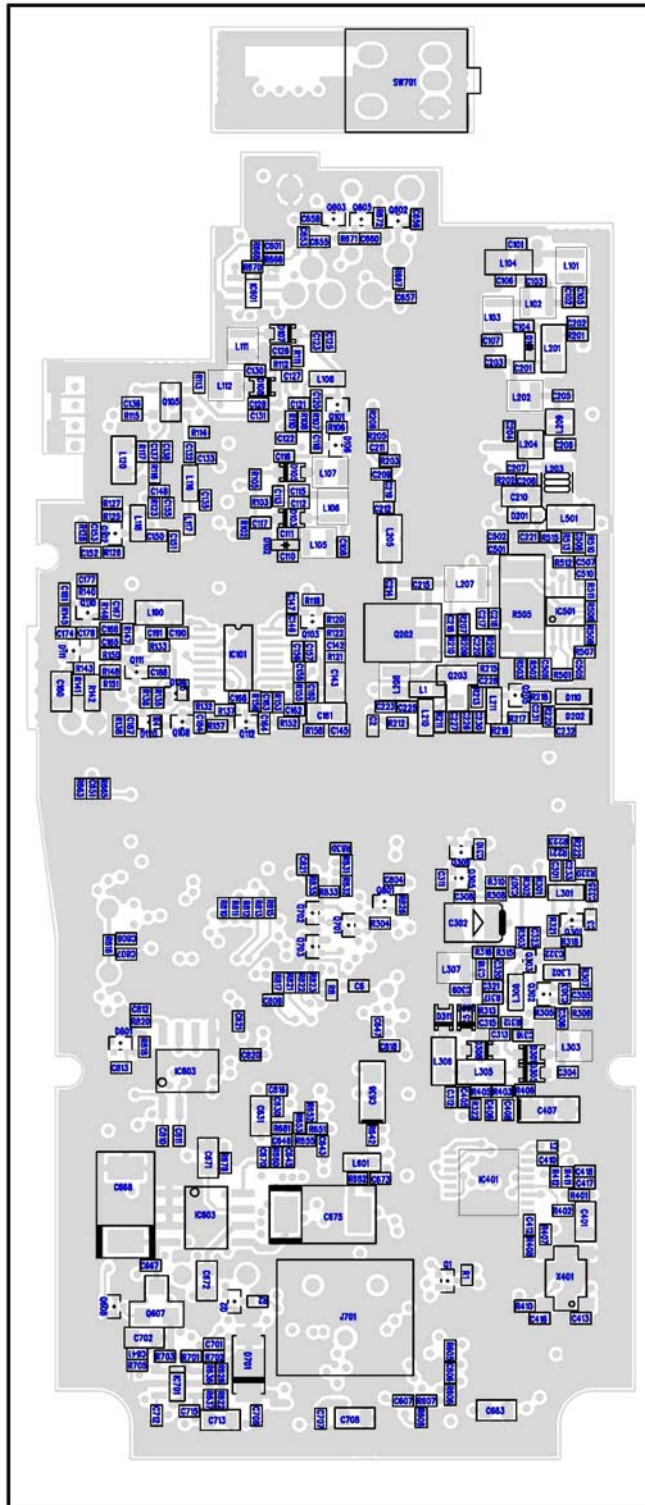
HEADLINE

3rd Layer View



HEADLINE

Bottom View





VOLTAGE CHARTS

Integrated Circuits

Part Name	Pin No.	RX	TX
H38024	1	5V	4.98V
	2	1.6mV	1.6mV
	3	5.25V	5.25V
	4	4.96V	4.96V
	5	4.96V	4.94V
	6	0	0
	7	1.4V	1.4V
	8	0	0
	9	2.1V	2.1V
	10	2.0V	2.0V
	11	0	0
	12	3.4V	3.4V
	13	2.4V	2.4V
	14	2.4V	2.4V
	15	2.4V	2.4V
	16	2.4V	2.4V
	17	2.4V	2.4V
	18	2.4V	2.4V
	19	2.4V	2.4V
	20	2.4V	2.4V
	21	2.4V	2.4V
	22	2.4V	2.4V
	23	2.4V	2.4V
	24	2.4V	2.4V
	25	2.4V	2.4V
	26	2.4V	2.4V
	27	2.4V	2.4V
	28	2.4V	2.4V
	29	2.4V	2.4V
	30	2.4V	2.4V
	31	2.4V	2.4V
	32	2.4V	2.4V
	33	4.96V	4.96V
	34	4.94V	4.82V
	35	4.97V	4.94V
	36	4.94V	1.7mV
	37	4.93V	4.96V
	38	4.	4.93V
	39	4.93V	4.91V
	40	4.91V	4.88V
	41	34.8mV	34.8mV
	42	1.1mV	1.8mV

HEADLINE

	43	1.1mV	1.8mV
	44	1.1mV	1.8mV
	45	2.4V	2.4V
	46	2.4V	2.4V
	47	2.4V	2.4V

Part Name	Pin No.	RX	TX
H38024	48	2.4V	2.4V
	49	1.6V	1.6
	50	3.2V	3.2V
	51	4.97V	4.97V
	52	4.98V	4.96V
	53	0	0
	54	2.4mV	5.9V
	55	6.24V	3.8Mv
	56	6V	6V
	57	13.7mV	4.97V
	58	4.99V	15.6mV
	59	5.4V	17.2Mv
	60	1.4V	0.5V
	61	4.97V	4.96V
	62	4.96V	4.93V
	63	4.96V	3.5mV
	64	4.96V	4.94V
	65	4.96V	4.96V
	66	4.96V	4.96V
	67	4.96V	90mV
	68	4.97V	4.96V
	69	4.97V	4.97V
	70	4.99V	4.98V
	71	4.97V	4.97V
	72	4.98V	4.98V
	73	3.7V	1.0V
	74	250mV	0
	75	0.5V	0.3mV
	76	1.1V	1.1V
	77	-	-
	78	4.9V	4.9V
	79	-	-
	80	5V	23.8mV

HEADLINE

Part Name	Pin No.	RX	TX
FX828D5	1	3.2V	3.2V
	2	0.7V	0.6V
	3	4.97V	4.95V
	4	4.97V	4.95V
	5	4.95V	4.98V
	6	4.97V	4.95V
	7	5V	4.98V
	8	5.7mV	5.7mV
	9	2.2V	2.2V
	10	18mV	16mV
	11	2.1V	2.1V
	12	0	0
	13	2.3V	2.3V
	14	2.3V	2.3V
	15	2.4V	2.4V
	16	2.3V	2.3V
	17	2.2V	2.2V
	18	2.3V	2.3V

Part Name	Pin No.	RX	TX
FX828D5	19	2.3V	2.3V
	20	2.3V	2.3V
	21	2.3V	2.3V
	22	2.3V	2.3V
	23	2.2V	2.3V
	24	4.84V	4.85V

Part Name	Pin No.	RX	TX
NJM2902V[IC602]	1	2.9V	2.9V
	2	2.9V	2.9V
	3	2.9V	2.9V
	4	5V	5V
	5	2.9V	2.9V
	6	2.9V	2.9V
	7	2.9V	2.9V
	8	2.9V	2.9V
	9	2.9V	2.9V
	10	2.9V	2.9V
	11	0	0
	12	2.9V	2.9V
	13	2.9V	2.9V
	14	2.9V	2.9V

HEADLINE

Part Name	Pin No.	RX	TX
NJM2902V[IC605]	1	2.2V	2.2V
	2	2.2V	2.2V
	3	2.2V	2.2V
	4	5V	5V
	5	2.2V	2.2V
	6	2.2V	2.2V
	7	2.0V	2.0V
	8	2.4V	2.4V
	9	2.4V	2.4V
	10	2.4V	2.4V
	11	0	0
	12	-	-
	13	-	-
	14	3.9V	3.9V

Part Name	Pin No.	RX	TX
TA31136FN	1	4.8V	291mV
	2	4.3V	253mV
	3	4.3V	216mV
	4	4.8V	291mV
	5	4.8V	291mV
	6	4.45V	291mV
	7	0.7V	0
	8	0.66V	0
	9	51mV	4.5mV
	10	4.8V	0.4V
	11	3.9V	278mV
	12	252mV	0
	13	0.4V	0.4V
	14	1.5V	0
	15	0	0
	16	0.9V	85mV

Part Name	Pin No.	RX	TX
TA75W01FU	1	1.7V	3.8V
	2	5.5V	6.1V
	3	4.9V	4.9V
	4	0	0
	5	1.68mV	1.9V
	6	1.6V	3.7V
	7	6mV	4.6mV
	8	1.2V	4.9V

Part Name	Pin No.	RX	TX
M62334FP	1	17.2mV	1.99V
	2	1.9V	20mV
	3	15.4mV	15.4mV
	4	0.4V	0.4V
	5	0	0
	6	4.98V	4.95V
	7	4.98V	4.95V
	8	5V	4.99V

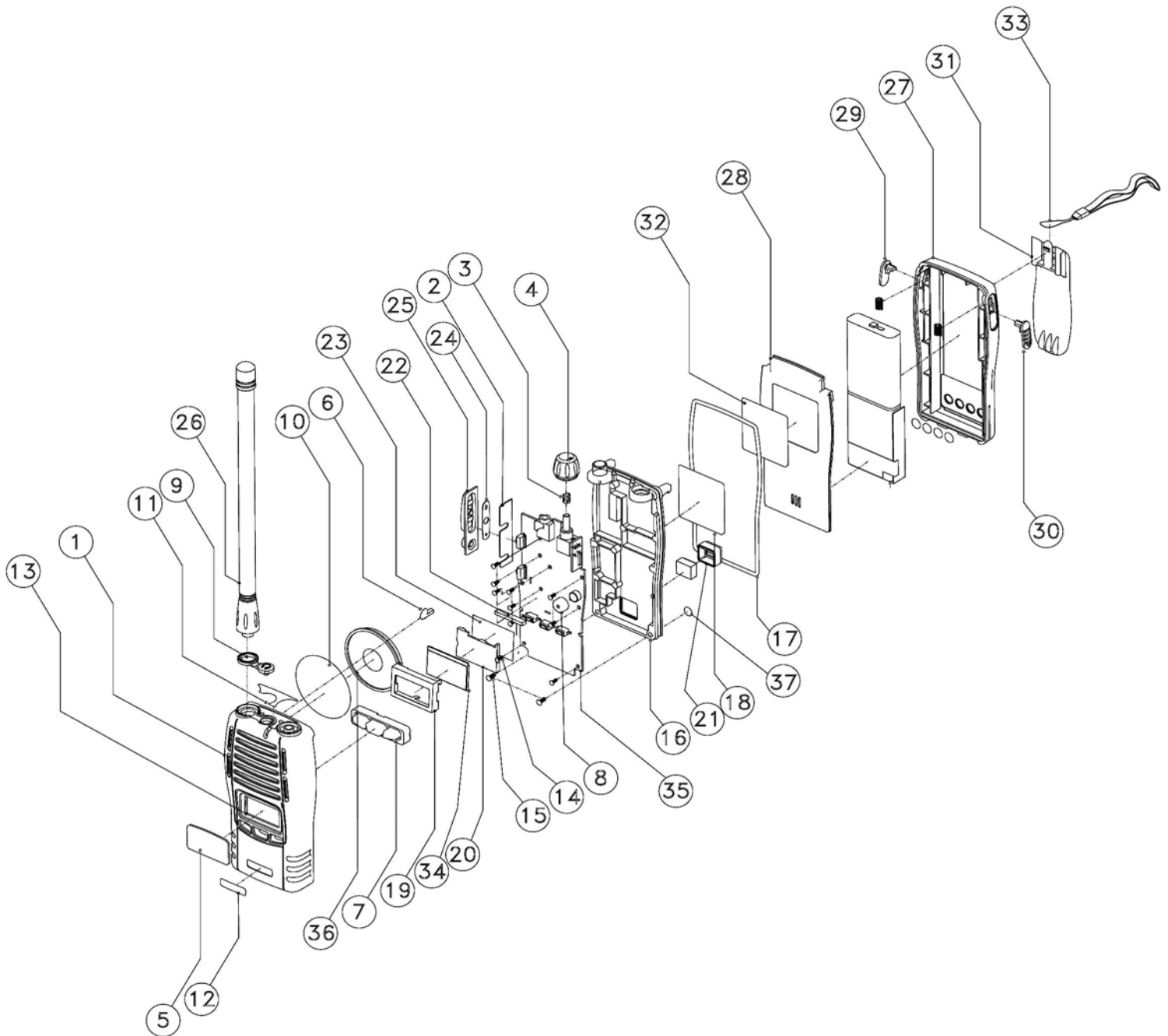
HEADLINE

Part Name	Pin No.	RX	TX
AT23AC32A	1	0	0
	2	0	0
	3	0	0
	4	0	0
	5	4.98V	4.95V
	6	4.98V	4.95V
	7	0	0
	8	5V	5V

Part Name	Pin No.	RX	TX
MB15E03SL	1	OSC IN	OSC IN
	2	OSC OUT	OSC OUT
	3	4.6V	4.6
	4	3V	3V
	5	PLL DO	PLL DO
	6	0	0
	7	2V	2V
	8	2V	2V
	9	CLK	CLK
	10	DATA	DATA
	11	LE	LE
	12	3.6V	3.6V
	13	3V	3V
	14	3V	3V
	15	0	0
	16	0	0

HEADLINE

EXPLODED VIEW



HEADLINE

EXPLODED VIEW PARTS LIST

ASSEMBLIES

LMR-00006-UCA, FRONT COVER ASSEMBLY
INCLUDES #1, 5, 6, 10, 11, 12, 13, AND 36

HB-21HB, BATTERY PACK INCLUDES
#27, 28, 29, 30, AND 32

REF. #	PART NO.	PART NAME	QTY.
1	SEE ASSEMBLIES	UPPER COVER	1
2	740-00005-AA	PTT PLATE	1
3	780-00020-AA	LOCKING SPRING	1
4	830-00088-AA	VOLUME KNOB	1
5	850-00054-AA	LENS	1
6	860-00030-AA	INDICATOR	1
7	880-00083-AA	KEY PAD	1
80	880-00085-AA	MIC CAP	1
9	880-00116-AA	EAR CAP	1
10	901-00017-AA	FELT SPK	1
11	911-00023-AA	TOP PLATE	1
12	911-00024-AA	FRONT PLATE	1
13	920-00075-AA	DOUBLE SIDE TAPE HOLE	1
14	611-00003-AA	SCREW	10
15	643-00003-AA	SCREW	2
16	700-00005-AB	MAIN FRAME	1
17	881-00036-AA	GASKET MAIN	1
18	990-00450-AB	NAME LABEL	1
19	770-00064-AA	LCD HOUSING	1
20	860-00031-AA	REFLECTOR	1
21	881-00037-AA	GASKET POWER	1
22	882-00021-AA	ZEBRA	1
23	920-00070-AA	WHITE SHEET	1
24	740-00006-AA	PTT INSERT	1
25	880-00082-AA	PTT BUTTON	1
26A	ZAC-450WS-CA	UHF ANTENNA	1
26B	ZAC-222HS-CA	VHF ANTENNA	1
27	SEE ASSEMBLIES	BATT UPPER COVER	1
28	SEE ASSEMBLIES	BATT BOTTOM COVER	1
29	SEE ASSEMBLIES	LOCK BUTTON L	1
30	SEE ASSEMBLIES	LOCK BUTTON R	1
31	870-00031-AA	BELT CLIP	1
32	SEE ASSEMBLIES	BATT NAME LABEL	1
33	902-00003-AA	HAND STRAP	1
34	ALD-10720-SA	LCD	1
35	PFM-00078-AD	MAIN PCB	1
36	ZSP-40AE2-MA	SPEAKER	1
37	990-00313-AA	PASS STICKER	1



HL-1510 ELECTRICAL PARTS

PART NO	PART NAME	DESCRIPTION	Q'TY	REFERENCE
LMR-00007-PHBKGS	HL-1510 (HP) USA GS (BLACK)	LMR-VHF		
LMR-00007-COA	COVER ASSY			
680-00021-AA	PIN	SUS 301 PIE1.76x24.15	1.000	
740-00005-AA	PTT PLATE	SUS 301 3/4H T=0.5	1.000	
780-00020-AA	LOCKING SPRING	SK5 T=0.25	1.000	
780-00036-AA	SPRING	SWP PIE 1.2 Ni PLATING	1.000	
830-00088-AA	VOLUME KNOB	ABS 94HB L380-9001 BLACK	1.000	
850-00054-AA	LENS	PC LEXAN SHEET T=1.0	1.000	
860-00030-AA	INDICATOR	ACRYL CLEAR	1.000	
870-00037-AA	BELT CLIP	PC BLACK	1.000	
870-00038-AA	BELT CLIP BRACKET	PC BLACK	1.000	
880-00083-AA	KEY PAD	SILICONE 50 BLACK	1.000	
880-00085-AA	MIC CAP	SILICONE 50 BLACK	1.000	
880-00116-AA	EAR CAP	URETHANE P319A 90 BLACK	1.000	
900-00022-AA	SPONGE BATTERY	EVA SPONGE 10x24 T=2.0	1.000	
901-00017-AA	FELT SPK	PIE39.0x T=0.2 BLACK	1.000	
911-00023-AA	TOP PLATE	PC LEXAN SHEET T=0.25	1.000	
911-00024-AA	FRONT PLATE	PC LEXAN SHEET T=0.25	1.000	
920-00075-AA	DOUBLE SIDE TAPE HOLE	3M-Y 9448HK T=0.2 5x5	1.000	
991-00005-AA	SILICONE BOND	CEMEDINE SUPER X NO.8008 CLEAR(g)	1.000	
LMR-00007-MFA	MAIN FRAME ASSY			
611-00003-AA	SCREW	(+)MACHINE(PH)2.0x5.0 SUS ST27	11.000	
643-00003-AA	SCREW	(+)MACHINE(FH) M2.6x10.0 SUS ST27	2.000	
700-00005-AB	MAIN FRAME	AL DIE CASTING	1.000	
881-00036-AA	GASKET MAIN	SILICONE RUBBER 50 DEGREES	1.000	
990-00426-AB	NAME LABEL	POLYESTER STICKER T=0.075	1.000	
LMR-00007-MPA	MAIN PCB MECHANICAL			
770-00064-AA	LCD HOUSING	SPTE T=0.3	1.000	
860-00031-AA	REFLECTOR	ACRYL CLEAR	1.000	
881-00037-AA	GASKET POWER	SILICONE 50 ORANGE	1.000	
882-00021-AA	ZEBRA	SP1 20.0x2.0 T=3.5	1.000	
900-00022-AA	SPONGE BATTERY	EVA SPONGE 10x24 T=2.0	1.000	
900-00060-AA	SPONGE BATTERY A	EVA SPONGE 35.0x8.0 T=4.0	.143	
920-00070-AA	WHITE SHEET	PVC 26.8x16.9 T=0.05	1.000	
LMR-00007-MPM	MAIN PCB MANUAL ASSY			
ALD-10720-SA	LCD	SEQ1072/03(A2)	1.000	LCD801
JDN-35M7M-HA	SPK MIC JACK	HSJ1594-010115	1.000	J602
MCN-44PBB-DA	MIC CONDENSER	DKO-6052B-P40, 4.5V,2.2K,-44+/-1dB	1.000	MIC601
NCS-02TD1-GA	CONNECTER SOCKET	1.25 HOUSING-2P	1.000	J1
NPC-GR254-GA	POWER CONTACT	GR2.54-BT-3SG(BATTERY)	1.000	J701

HEADLINE

PART NO	PART NAME	DESCRIPTION	Q'TY	REFERENCE
NSM-00005-AA	CONNECTOR ANT	SMA PLUG ASSY	1	
XCN-4032A-KA	CRYSTAL	4.032Mhz,30ppm,49/S	1	X801
ZAC-153HS-CA	ANTENNA,SMA,MOLD	SMA,153MHZ,HELICAL	1	
ZME-203KM-TA	POTENTIO METER	TPS0602-12FP-A20K	1	SW701
ZSP-40AE2-MA	SPEAKER	A404B01, 4 ohm 40mm	1	SPK1
LMR-00007-MPS	MAIN PCB SMD ASSY			
ALC-1204W-SA	LED DUAL CHIP	BRBG1204W-TR	1	D805
AMC-1113F-SB	LED LAMP CHIP	UG1113F-TR	2	D802,803
LMR-00007-MPS	MAIN PCB SMD ASSY			
B16-120NJ-TA	COIL CHIP	12nH HK1608-120NJ	1	L117
B16-121NJ-TA	COIL CHIP	120nH HK1608-121NJ	1	L301
B16-181NJ-TA	COIL CHIP	180nH HK1608-181NJ	1	L108
B16-221NJ-TA	COIL CHIP	220nH HK1608-221NJ	3	L302,308,L201
B16-270NJ-TA	COIL CHIP	27nH HK1608-270NJ	1	L118
B16-390NJ-TA	COIL CHIP	39nH HK1608-390NJ	1	L206
B16-470NJ-TA	COIL CHIP	47nH HK1608-470NJ	4	L210,211,L212,L116
BBA-121VS-SA	CHIP BEAD	SBY100505T-121Y-S	1	R901
BBA-320VS-SA	CHIP BEAD	PBY201209T-320Y-S	1	L501
BBA-451VS-SA	CHIP BEAD	SBK160808T-451Y-S	2	L601,602
BSC-3010C-SA	COIL SPRING	E2L 0.3x1.0x3TL	1	L202
BSC-3516F-SA	COIL SPRING	E2L 0.35x1.6x6TL	1	L207
BSC-H020B-SA	COIL SPRING	E2L 0.45x0.7x2TN	1	L203
BSC-H07TB-SA	COIL SPRING	E2L 3.0x1.7x7TL	6	L101,102,103,105,205,307
BSC-H080A-AB	COIL SPRING	0.3x1.4Rx8T	1	L304
BWC-560GN-AA	COIL WOUND	0805AS-560G	2	L110,111
BWC-680GN-AA	COIL WOUND	0805AS-680G	2	L106,107
BWC-681JN-AA	COIL WOUND	0805AS-681J	1	L123
BWC-821JN-AA	COIL WOUND	0805AS-821J	3	L120,305,306
BWN-121JN-AA	COIL WOUND	0603AS-121J	1	L113
C10-005HC-MA	CHIP CERAMIC 1005	GRP15551H0R5CZ01E CAP1005	1	C313
C10-010HC-MA	CHIP CERAMIC 1005	GRP15551H1R0CZ01E CAP1005	1	C316
C10-020HC-MA	CHIP CERAMIC 1005	GRP15551H2R0CZ01E CAP1005	3	C116,908,907
C10-040HC-MA	CHIP CERAMIC 1005	GRP15551H4R0CZ01E CAP1005	5	C112,130,325,306,136
C10-050HC-MA	CHIP CERAMIC 1005	GRP15551H5R0CZ01E CAP1005	3	C125,126,318
C10-060HD-MA	CHIP CERAMIC 1005	GRP15551H6R0DZ01E CAP1005	2	C143,158
C10-070HD-MA	CHIP CERAMIC 1005	GRP15551H7R0DZ01E CAP1005	1	C205
				C323
				[138-102-C6] C410,200,220,
C10-080HD-MA	CHIP CERAMIC 1005	GRP15551H8R0DZ01E CAP1005	1	C651,652,658,662,667,R605

HEADLINE

PART NO	PART NAME	DESCRIPTION	Q'TY	REFERENCE
C10-100HJ-MA	CHIP CERAMIC 1005	GRP15551H100JZ01E CAP1005	5	C150,152,216,206,230
				[138-102-C6] C703,
				C705~707,715,717,718,810,
				C811,815~818,820,821,146,
				C161,646
C10-102HK-MA	CHIP CERAMIC 1005	GRP155R71H102KA01E CAP1005	48	C111,118,120,132,133,153,
				C170,173,178,181,201,227,
				C231,235,236,308,311,412,
				C502,615,645
C10-103EK-MA	CHIP CERAMIC 1005	GRP155R71E103KA01E CAP1005	18	C142,148,156,160,162,188,
				C402,416,418,613,617,643,
				C656,C657,670,822,801,805
				C123,164,166,167,180,191,
C10-104CZ-MA	CHIP CERAMIC 1005	GRP155F51C104ZA01E CAP1005	28	C222,233,301,310,417,503,
				C508,618,627,630,633,602,
				C661
				C403,640,653,813,660,804
C10-105CZ-MA	CHIP CERAMIC 1005	GRP155F50J105ZA01E CAP1005	6	[138-104-C6] C641,650,665,
				C673,701,712,808,812,616
				C110,122,303,320,106,
				R131,C155,185
LMR-00007-MPS	MAIN PCB SMD ASSY			
C10-153CK-MA	CHIP CERAMIC 1005	GRP155R71C153KA01E CAP1005	1	C608
C10-180HJ-MA	CHIP CERAMIC 1005	GRP15551H180JZ01E CAP1005	3	C101,147,228
C10-182HK-MA	CHIP CERAMIC 1005	GRP155R71H182KA01E CAP1005	1	C175
C10-220HJ-MA	CHIP CERAMIC 1005	GRP15551H220JZ01E CAP1005	5	C226,806,807,151,C1
C10-221HJ-MA	CHIP CERAMIC 1005	GRP155R71H221JA01E CAP1005	6	C622,623,625,626,635,655
C10-222HK-MA	CHIP CERAMIC 1005	GRP155R71H222KA01E CAP1005	1	C637
C10-223CK-MA	CHIP CERAMIC 1005	GRP155R71C223KA01E CAP1005	1	C221
C10-224AZ-MA	CHIP CERAMIC 1005	GRP155R61A224KE01E CAP1005	1	C716
C10-270HJ-MA	CHIP CERAMIC 1005	GRP15551H270JZ01E CAP1005	2	C225,321
C10-330HJ-MA	CHIP CERAMIC 1005	GRP15551H330JZ01E CAP1005	2	C621,212
C10-331HJ-MA	CHIP CERAMIC 1005	GRP155R71H331KA01E CAP1005	5	C601,666,611,176,177
C10-333AK-MA	CHIP CERAMIC 1005	GRP155R71A333KA01E CAP1005	1	C638
C10-390HJ-MA	CHIP CERAMIC 1005	GRP15551H390JZ01E CAP1005	3	C102,105,305
C10-471HK-MA	CHIP CERAMIC 1005	GRP155R71H471KA01E CAP1005	14	C107,145,238,307,C413,
				C420,421,422,501,505,507,
				C510,647,648
				C600
C10-472HK-MA	CHIP CERAMIC 1005	GRP155R71H472KA01E CAP1005	1	C600
C10-473AK-MA	CHIP CERAMIC 1005	GRP155R71A473KA01E CAP1005	3	C190,802,406
C10-560HJ-MA	CHIP CERAMIC 1005	GRP15551H560JZ01E CAP1005	3	C202,217,R407

HEADLINE

PART NO	PART NAME	DESCRIPTION	Q'TY	REFERENCE
C10-561HK-MA	CHIP CERAMIC 1005	GRP155R71H561KA01E CAP1005	1	C803
C10-562EK-MA	CHIP CERAMIC 1005	GRP155R71E562KA01E CAP1005	3	C607,612,628
C10-680HJ-MA	CHIP CERAMIC 1005	GRP15551H680JZ01E CAP1005	1	C203
C10-683AK-MA	CHIP CERAMIC 1005	GRP155R61A683KA01E CAP1005	1	C405
C10-820HJ-MA	CHIP CERAMIC 1005	GRP15551H820JZ01E CAP1005	1	C168
C20-225ZJ-MA	CHIP CERAMIC 2012	2.2uF GRM21BF51C225ZA01L	2	C631,192
		CAP 2012		
C20-475ZJ-MA	CHIP CERAMIC 2012	4.7uF GRM21BF51C475ZA01L	12	C163,171,237,302,401,415, C671,C672,702,708,713,C663
		CAP 2012		
CTC-010AM-FA	CHIP TANTALUM	1uF 16V TLM1C105ASSB A	1	C636
CTC-022AM-FA	CHIP TANTALUM	2.2uF 16V TSM1C225ASSB A	1	C407
CTC-100AM-FA	CHIP TANTALUM	10uF 16V TLM1C106ASSB A	1	C232
CTC-101CM-FB	CHIP TANTALUM	100uF 16V TLM1C107CSSB C	1	C675
CTC-220ZM-FA	CHIP TANTALUM	22uF 16V TLMIC226TSSR B	1	C2
CTC-470CN-FA	CHIP TANTALUM	47uF 16V TLM1C476CSSB C	1	C668
DBC-S114E-BA	DIODE BAND S/W CHIP	KDS114E	2	D122,202
DIC-H131E-HA	DIODE Si CHIP	HVC131TRF	2	D101,102
DIC-S121E-AA	DIODE Si CHIP	KDS121E	1	D801
DRC-SMA14-KA	DIODE RECTIFIER	(SMAB14) TN4001,SMD	1	D701
DSC-S7000-AA	DIODE S/W	SDS7000EF	2	D103,118
DVC-0273U-AA	DIODE VARICAP CHIP	KDV273RTK	8	D301,302,305,306,307,
				C308,310,311
DVC-154CS-AA	DIODE VARICAP CHIP	KDV154	8	D105,106,107,108,110,
				C111,112,113
DZC-5115E-AA	DIODE ZENER CHIP	KDZ5.1EV USM	1	D201
DZC-9115E-AA	DIODE ZENER CHIP	KDZ9.1EV-RTK	1	D900
FCC-455G3-TA	FILTER CERAMIC	ELFC455G	1	F101
FMC-436CP-FA	CRYSTAL MCF	43.655MHz, 1D43613GQ2	1	XF101
IAA-7233D-SA	IC AUDIO AMP	TDA7233D	1	IC603
IAP-828D5-CA	IC AUDIO PROCSSOR	FX828D5	1	IC606
ICP-3802W-TA	IC CPU, OTP	HD64738024W	1	IC801
LMR-00007-MPS	MAIN PCB SMD ASSY			
IDA-62334-MA	IC D/A SMD	M62334FP	1	IC803
IEE-24C32-MA	IC EEPROM SMD	24LC32A-5.0V	1	IC802
IFI-31136-TA	IC IF SMD	TA31136FN	1	IC101
IMX-3SK24-TA	TRANSISTOR	3SK240	1	Q103
IOA-2902V-JA	IC AMP SSOP	NJM2902V	2	IC901,902

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PART NO	PART NAME	DESCRIPTION	Q'TY	REFERENCE
IOA-75W01-DA	IC OP AMP SMD	TA75W01FU	1	IC501
IPL-1503C-UA	IC PLL	MB15E03SL	1	IC401
IRG-250CS-TA	IC REGULATOR	TK11250CS	1	IC701
ISW-4S66F-TA	IC ANALOG-SW	TC4S66F	2	IC602,601
NCH-02HC1-GA	CONNECTER HEADER	1.25 WAFER-2P (SMD)	1	J601
PFM-00077-AE	PCB MAIN (HL-10V2)	2/2 GOLD 47.57x119.6x1.2t	1	
				R601,638,C141,603,C604,
				R500,800,302,C187,L208,
R10-000AJ-AA	FILM CHIP RESISTOR	0 RC1005 J 000 CS	12	R645,620
R10-100AJ-AA	FILM CHIP RESISTOR	10 RC1005 J 100 CS	5	R216,401,408,682,R2
R10-101AJ-AA	FILM CHIP RESISTOR	100 RC1005 J 101 CS	4	R105,118,209,301
R10-102AJ-AA	FILM CHIP RESISTOR	1K RC1005 J 102 CS	6	R207,515,403,405,406,410
				R111,112,217,303,307,308,
				R315,316,411,412,512,656,
R10-103AJ-AA	FILM CHIP RESISTOR	10K RC1005 J 103 CS	18	R657,662,811,305,R3,4
				R102,103,106,107,208,310,
R10-104AJ-AA	FILM CHIP RESISTOR	100K RC1005 J 104 CS	12	R646,647,651,815,312,311
R10-105AJ-AA	FILM CHIP RESISTOR	1M RC1005 J 105 CS	1	R513
R10-122AJ-AA	FILM CHIP RESISTOR	1.2K RC1005 J 122 CS	1	R672
R10-124AJ-AA	FILM CHIP RESISTOR	120K RC1005 J 124 CS	1	R150
R10-152AJ-AA	FILM CHIP RESISTOR	1.5K RC1005 J 152 CS	1	R206
R10-153AJ-AA	FILM CHIP RESISTOR	15K RC1005 J 153 CS	1	R680
R10-154AF-BA	FILM CHIP RESISTOR	150K RMC 1/16S, 154, FTP	2	R701,702
R10-154AJ-AA	FILM CHIP RESISTOR	150K RC1005 J 154 CS	6	R121,147,322,607,661,606
R10-182AJ-AA	FILM CHIP RESISTOR	1.8K RC1005 J 182 CS	1	R145
R10-183AJ-AA	FILM CHIP RESISTOR	18K RC1005 J 183 CS	1	R625
R10-184AF-BA	FILM CHIP RESISTOR	180K RMC 1/16S, 184, FTP	3	R503,506,510
R10-184AJ-AA	FILM CHIP RESISTOR	180K RC1005 J 184 CS	1	R652
				R621,683,817,820,835,
R10-220AJ-AA	FILM CHIP RESISTOR	22 RC1005 J 220 CS	7	R837,222
R10-221AJ-AA	FILM CHIP RESISTOR	220 RC1005 J 221 CS	5	R115,120,122,201,826
R10-222AJ-AA	FILM CHIP RESISTOR	2.2K RC1005 J 222 CS	6	R110,220,602,663,665,807
R10-223AJ-AA	FILM CHIP RESISTOR	22K RC1005 J 223 CS	6	R511,642,806,808,812,641
R10-224AF-BA	FILM CHIP RESISTOR	220K RMC 1/16S, 224, FTP	4	R501,502,507,508
R10-224AJ-AA	FILM CHIP RESISTOR	220K RC1005 J 224 CS	2	R631,648
R10-270AJ-AA	FILM CHIP RESISTOR	27 RC1005 J 270 CS	2	R153,158
R10-271AJ-AA	FILM CHIP RESISTOR	270 RC1005 J 271 CS	3	R113,828,402
R10-273AJ-AA	FILM CHIP RESISTOR	27K RC1005 J 273 CS	2	R803,636
R10-274AJ-AA	FILM CHIP RESISTOR	270K RC1005 J 274 CS	3	R655,677,618
R10-331AJ-AA	FILM CHIP RESISTOR	330 RC1005 J 331 CS	4	R221,223,306,317
R10-332AJ-AA	FILM CHIP RESISTOR	3.3K RC1005 J 332 CS	4	R123,218,318,155

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PART NO	PART NAME	DESCRIPTION	Q'TY	REFERENCE
R10-333AJ-AA	FILM CHIP RESISTOR	33K RC1005 J 333 CS	5	R205,632,637,676,151
R10-334AJ-AA	FILM CHIP RESISTOR	330K RC1005 J 334 CS	2	R146,R6
R10-392AJ-AA	FILM CHIP RESISTOR	3.9K RC1005 J 392 CS	2	R802,156
R10-393AJ-AA	FILM CHIP RESISTOR	39K RC1005 J 393 CS	5	R608,612,613,626,1
LMR-00007-MPS	MAIN PCB SMD ASSY			
R10-470AJ-AA	FILM CHIP RESISTOR	47 RC1005 J 470 CS	2	R140,320
R10-471AJ-AA	FILM CHIP RESISTOR	470 RC1005 J 471 CS	2	R117,827
R10-472AJ-AA	FILM CHIP RESISTOR	4.7K RC1005 J 472 CS	9	R610,615,616,630,670, R801,810,671,C606
R10-473AJ-AA	FILM CHIP RESISTOR	47K RC1005 J 473 CS	25	R104,143,622,623,635,643, R653,666~668,675,703,813, R818,821~823,825,830, R831~833,836,900,7
R10-474AJ-AA	FILM CHIP RESISTOR	470K RC1005 J 474 CS	1	R816
R10-475AJ-AA	FILM CHIP RESISTOR	4.7M RC1005 J 475 CS	1	R678
R10-560AJ-AA	FILM CHIP RESISTOR	56 RC1005 J 560 CS	1	R203
R10-562AJ-AA	FILM CHIP RESISTOR	5.6K RC1005 J 562 CS	1	R157
R10-563AJ-AA	FILM CHIP RESISTOR	56K RC1005 J 563 CS	1	R141
R10-564AJ-AA	FILM CHIP RESISTOR	560K RC1005 J 564 CS	1	R603
R10-681AJ-AA	FILM CHIP RESISTOR	680 RC1005 J 681 CS	3	R413,415,416
R10-682AJ-AA	FILM CHIP RESISTOR	6.8K RC1005 J 682 CS	3	R627,681,321
R10-683AJ-AA	FILM CHIP RESISTOR	68K RC1005 J 683 CS	2	R617,624
R10-684AJ-AA	FILM CHIP RESISTOR	680K RC1005 J 684 CS	2	R660,633
R10-822AJ-AA	FILM CHIP RESISTOR	8.2K RC1005 J 822 CS	3	R611,658,805
R25-901FF-BA	FILM CHIP RESISTOR	0.1 RMC 1S, 2512 1% FTP	1	R505
RSC-224ZN-JA	CHIP SEMI RESISTOR	220KB 868-9007C-31	3	RV301,401,601
RTC-103ZJ-JA	CHIP THERMISTOR	ECTH160808 103J3435HT	1	R142
STA-101HC-SA	TACT S/W SMD	SKTS-1101NS	3	SW801,802,805
STA-106VC-SA	TACT S/W SMD	SKTS-1106VSA	2	SW803,806
TRA-C404E-AA	TRANSISTOR BRT	KRC404E	9	Q112,305,306,502,601, R603,608,700,108
TRC-226YU-NA	TRANSISTOR	2SC4226-R24	1	Q300
TRC-3475C-DA	MOS FET-TR	2SK3475	1	Q202
TRC-3476M-DA	MOS FET-TR	2SK3476	1	Q201
TRC-4075G-AA	TRANSISTOR	KTC4075E/GR	2	Q110,606
TRC-5006E-TA	TRANSISTOR	2SC5006(R24)	7	Q101,102,205,301,302, Q303,105
TRR-A226S-AA	TRANSISTOR BRT	KRA226S	1	Q607
TRR-A301E-AA	TRANSISTOR	KRA301E	4	Q605,801,802,803
TRR-A305E-AA	TRANSISTOR BRT	KRA305E	3	Q701,702,703
TRR-A307E-AA	TRANSISTOR	KRA307E	1	Q602

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PART NO	PART NAME	DESCRIPTION	Q'TY	REFERENCE
XED-455TA-KB	CERAMIC DISCRIMINATOR	JTBB455C24,SMD	1	Y101
XTC-1440I-PA	VCTCXO	HKE3059A-14.4M-ETD14B-00109C	1	X401
ZFZ-C2Q3A-WA	FUSE SMD	C2Q3A	1	F701
LMR-00007-PKA	PACKING ASSY			
902-00003-AA	HAND STRAP	NYLON BLACK	1	
930-90170-AA	POLY BAG	OTP 90x170 T=0.08	2	
942-00040-AA	PAD	SW1S T=2.0	1	
950-00172-BB	OWNERS MANUAL	100 WOOD/ 100 WOOD FREE PAPER	1	
970-00055-AA	INNER BOX	450SC T=0.5 MANILA PAPER	2	
970-00088-BB	GIFT BOX	SW1S 450SC T=2.0	1	
980-00275-AB	OUT BOX	DW1S 320(W)x205(D)x230(H) T=7.5	0.1	
990-00313-AA	PASS STICKER	NORU SHEET 35g R2.5	2	
990-00538-AA	SERIAL BARCODE LABEL	ART PAPER STICKER 38x28	2	
LMR-00007-PTA	PTT ASSY			
740-00006-AA	PTT INSERT	PBS T=0.25	1	
LMR-00007-PTA	PTT ASSY			
880-00082-AA	PTT BUTTON	SILICONE 50 RUBBER BLACK	1	
LMR-00007-UCA	UPPER COVER ASSY		1	
810-00232-AA	UPPER COVER	HF1023M-K2261 PC BLACK	1	



HL-1520 ELECTRICAL PARTS

PART NO	PART NAME	DESCRIPTION	Q'TY	REFERENCE
LMR-00009-PHBKGS	HL-1520(HP) USA GS (BLACK)	LMR-UHF		
LMR-00009-COA	COVER ASSY		1	
680-00021-AA	PIN	SUS 301 PIE1.76x24.15	1	
740-00005-AA	PTT PLATE	SUS 301 3/4H T=0.5	1	
780-00020-AA	LOCKING SPRING	SK5 T=0.25	1	
780-00036-AA	SPRING	SWP PIE 1.2 Ni PLATING	1	
830-00088-AA	VOLUME KNOB	ABS 94HB L380-9001 BLACK	1	
850-00054-AA	LENS	PC LEXAN SHEET T=1.0	1	
860-00030-AA	INDICATOR	ACRYL CLEAR	1	
870-00037-AA	BELT CLIP	PC BLACK	1	
870-00038-AA	BELT CLIP BRACKET	PC BLACK	1	
880-00083-AA	KEY PAD	SILICONE 50 BLACK	1	
880-00085-AA	MIC CAP	SILICONE 50 BLACK	1	
880-00116-AA	EAR CAP	URETHANE P319A 90 BLACK	1	
900-00022-AA	SPONGE BATTERY	EVA SPONGE 10x24 T=2.0	1	
901-00017-AA	FELT SPK	PIE39.0x T=0.2 BLACK	1	
911-00023-AA	TOP PLATE	PC LEXAN SHEET T=0.25	1	
911-00024-AA	FRONT PLATE	PC LEXAN SHEET T=0.25	1	
920-00075-AA	DOUBLE SIDE TAPE HOLE	3M-Y 9448HK T=0.2 5x5	1	
LMR-00009-MFA	MAIN FRAME ASSY			
611-00003-AA	SCREW	(+)MACHINE(PH)2.0x5.0 SUS ST27	11	
643-00003-AA	SCREW	(+)MACHINE(FH) M2.6x10.0 SUS ST27	2	
700-00005-AB	MAIN FRAME	AL DIE CASTING	1	
881-00036-AA	GASKET MAIN	SILICONE RUBBER 50 DEGREES	1	
990-00427-AB	NAME LABEL	POLYESTER STICKER T=0.075	1	
LMR-00009-MPA	MAIN PCB MECHANICAL		1	
770-00064-AA	LCD HOUSING	SPTE T=0.3	1	
770-00102-AA	VCO CAN FOR LMR	SPTE T=0.3	1	
860-00031-AA	REFLECTOR	ACRYL CLEAR	1	
881-00037-AA	GASKET POWER	SILICONE 50 ORANGE	1	
882-00021-AA	ZEBRA	SP1 20.0x2.0 T=3.5	1	
900-00022-AA	SPONGE BATTERY	EVA SPONGE 10x24 T=2.0	1	
900-00060-AA	SPONGE BATTERY A	EVA SPONGE 35.0x8.0 T=4.0	1	
920-00070-AA	WHITE SHEET	PVC 26.8x16.9 T=0.05	1	
LMR-00009-MPM	MAIN PCB MANUAL ASSY		1	
ALD-10720-SA	LCD	SEQ1072/03(A2)	1	LCD801
JDN-35M7M-HA	SPK MIC JACK	HSJ1594-010115	1	JACK
MCN-44PBB-DA	MIC CONDENSER	DKO-6052B-P40, 4.5V,2.2K,-44+/-1dB	1	MIC601
NCS-02TD1-GA	CONNECTER SOCKET	1.25 HOUSING-2P	1	J1
NPC-GR254-GA	POWER CONTACT	GR2.54-BT-3SG(BATTERY)	1	J701
NSM-00005-AA	CONNECTOR ANT	SMA PLUG ASSY	1	
XCN-4000A-KA	CRYSTAL	HC-49S 4.0MHZ	1	X801

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PART NO	PART NAME	DESCRIPTION	Q'TY	REFERENCE
XCN-4032A-KA	CRYSTAL	4.032Mhz,30ppm,49/S	1	X1
ZAC-450WS-CA	ANTENNA,SMA,MOLD	SMA,450MHZ,WHIP	1	
ZME-203KM-TA	POTENTIO METER	TPS0602-12FP-A20K	1	SW701
ZSP-40AE2-MA	SPEAKER	A404B01, 4 ohm 40mm	1	SPK1
LMR-00009-MPS	MAIN PCB SMD ASSY			
ALC-1204W-SA	LED DUAL CHIP	BRBG1204W-TR	1	D805
AMC-1113F-SB	LED LAMP CHIP	UG1113F-TR	2	D802,803
B16-068NK-TA	COIL CHIP	6.8nH HK1608-6N8S	2	L205,1
B16-181NJ-TA	COIL CHIP	180nH HK1608-181NJ	1	L108
B16-220NJ-TA	COIL CHIP	22nH HK1608-22NJ	1	L210
B16-221NJ-TA	COIL CHIP	220nH HK1608-221NJ	3	L201,302,308
B16-270NJ-TA	COIL CHIP	27nH HK1608-270NJ	3	L118,211,301
B16-470NJ-TA	COIL CHIP	47nH HK1608-470NJ	1	L116
BBA-320VS-SA	CHIP BEAD	PBY201209T-320Y-S	1	L501
BBA-451VS-SA	CHIP BEAD	SBK160808T-451Y-S	2	L601,602
BSC-2811F-KL	COIL SPRING	0.28x1.1x6T/L	4	L101,102,103,105
BSC-3009B-KL	COIL SPRING	0.3x0.9x2T/L	2	L204,209
BSC-3010C-KL	COIL SPRING	0.3x1.0x3T/L	1	L303
BSC-3010E-KL	COIL SPRING	0.3x1.0x5T/L	4	L106,107,111,112
BSC-3011C-KL	COIL SPRING	0.3x1.1x3T/L	1	L202
BSC-3013G-KL	COIL SPRING	0.3x1.3x7T/L	2	L203,207
BSC-3209C-KL	COIL SPRING	0.32x0.9x3T/L	1	L307
BWC-681JN-AA	COIL WOUND	0805AS-681J	3	L305,306,190
BWC-821JN-AA	COIL WOUND	0805AS-821J	1	L120
C10-010HC-MA	CHIP CERAMIC 1005	GRP15551H1R0CZ01E CAP1005	1	C103
C10-020HC-MA	CHIP CERAMIC 1005	GRP15551H2R0CZ01E CAP1005	1	C313
C10-030HC-MA	CHIP CERAMIC 1005	GRP15551H3R0CZ01E CAP1005	6	C151,323,125,133,153,22
C10-040HC-MA	CHIP CERAMIC 1005	GRP15551H4R0CZ01E CAP1005	5	C111,113,126,150,225
C10-050HC-MA	CHIP CERAMIC 1005	GRP15551H5R0CZ01E CAP1005	4	C306,101,107,214
C10-060HD-MA	CHIP CERAMIC 1005	GRP15551H6R0DZ01E CAP1005	3	C112,141,130
C10-070HD-MA	CHIP CERAMIC 1005	GRP15551H7R0DZ01E CAP1005	1	C318
C10-080HD-MA	CHIP CERAMIC 1005	GRP15551H8R0DZ01E CAP1005	4	C205,C320,233,321
C10-090HD-MA	CHIP CERAMIC 1005	GRP15551H9R0DZ01E CAP1005	1	C309
C10-100HJ-MA	CHIP CERAMIC 1005	GRP15551H100JZ01E CAP1005	7	C303,325,305,1,105,106,304
				C412,201[C10-102HK-MA]
C10-101HJ-MA	CHIP CERAMIC 1005	GRP15551H101JZ01E CAP1005	2	C121,136,146,217,410,606,658,316
				C163,160,167,190,615,652,
				C662,667,810,811,502,645,
				C646,703,705~707,715,717,
C10-102HK-MA	CHIP CERAMIC 1005	GRP155R71H102KA01E CAP1005	33	C815~818,820,821

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PART NO	PART NAME	DESCRIPTION	Q'TY	REFERENCE
C10-103EK-MA	CHIP CERAMIC 1005	GRP155R71E103KA01E CAP1005	22	C122,138,142,145,148,402,
				C416,418,118,127,177,613,
				C656,657,643,822,117,227,
				C2,801,805,617,670
C10-104CZ-MA	CHIP CERAMIC 1005	GRP155F51C104ZA01E CAP1005	27	C308,311,403,417,156,157,
				C168,181,618,627,630,633,
				C641,661,665,673,701,808
C10-105CZ-MA	CHIP CERAMIC 1005	GRP155F50J105ZA01E CAP1005	5	C640,653,813,660,804,207
				[C10-104CZ-MA] C812,310,
C10-120HJ-MA	CHIP CERAMIC 1005	GRP155R71H120JA01E CAP1005	2	C221,508,650,712 ,602,616,
C10-122HJ-MA	CHIP CERAMIC 1005	GRP15551H122JA01E CAP1005	1	C123,137
C10-150HJ-MA	CHIP CERAMIC 1005	GRP15551H150JZ01E CAP1005	1	C670
C10-153CK-MA	CHIP CERAMIC 1005	GRP15551H153JA01E CAP1005	3	C191,206,R119
C10-180HJ-MA	CHIP CERAMIC 1005	GRP155R71C153KA01E CAP1005	1	C608
C10-182HK-MA	CHIP CERAMIC 1005	GRP15551H180JZ01E CAP1005	1	C231,116
C10-220HJ-MA	CHIP CERAMIC 1005	GRP155R71H182KA01E CAP1005	1	C162
C10-221HJ-MA	CHIP CERAMIC 1005	GRP15551H220JZ01E CAP1005	6	C806,807,128,5,7,8
				C622,623,625,626,635,
				C655,102,420,421,422
C10-222HK-MA	CHIP CERAMIC 1005	GRP155R71H222KA01E CAP1005	10	C637
C10-223CK-MA	CHIP CERAMIC 1005	GRP155R71C223KA01E CAP1005	1	C216,220
C10-224AZ-MA	CHIP CERAMIC 1005	GRP155R61A224KE01E CAP1005	2	C716,4
C10-330HJ-MA	CHIP CERAMIC 1005	GRP15551H330JZ01E CAP1005	2	C132,120,L208
C10-331HJ-MA	CHIP CERAMIC 1005	GRP155R71H331KA01E CAP1005	3	C601,611,666,165,166
C10-333AK-MA	CHIP CERAMIC 1005	GRP155R71A333KA01E CAP1005	5	C638
C10-470HJ-MA	CHIP CERAMIC 1005	GRP15551H470JZ01E CAP1005	1	C104,204,212,215
C10-471HK-MA	CHIP CERAMIC 1005	GRP155R71H471KA01E CAP1005	14	C6,230,413,647,648,202,
				C208,226,301,307,501,
				C505,507,651
C10-472HK-MA	CHIP CERAMIC 1005	GRP155R71H472KA01E CAP1005	2	C174,408
C10-473AK-MA	CHIP CERAMIC 1005	GRP155R71A473KA01E CAP1005	4	C178,802,405,406
C10-560HJ-MA	CHIP CERAMIC 1005	GRP15551H560JZ01E CAP1005	1	R407
C10-561HK-MA	CHIP CERAMIC 1005	GRP155R71H561KA01E CAP1005	4	C232,510,211,803
C10-562EK-MA	CHIP CERAMIC 1005	GRP155R71E562KA01E CAP1005	3	C607,612,628
C10-820HJ-MA	CHIP CERAMIC 1005	GRP15551H820JZ01E CAP1005	1	C158
C20-225ZJ-PA	CHIP CERAMIC 2012	2.2uF CC0805ZKY5V6BN 225	2	C631,180
C20-475ZJ-PA	CHIP CERAMIC 2012	4.7uF CC0805ZKY5V6BN 475	12	C143,210,161,401,415,671,
				C672,702,708,713,663,222
CTC-010AM-FA	CHIP TANTALUM	1uF 16V TLM1C105ASSB A	2	C636,407
CTC-101CM-FA	CHIP TANTALUM	100uF 10V TLM1A107CSSB C	1	C675
CTC-220ZM-FA	CHIP TANTALUM	22uF 16V TLMIC226TSSR B	1	C800
CTC-470CN-FA	CHIP TANTALUM	47uF 16V TLM1C476CSSB C	2	C302,668
DBC-S114E-BA	DIODE BAND S/W CHIP	KDS114E	2	D110,202
DIC-H131E-HA	DIODE Si CHIP	HVC131TRF	2	D102,101

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PART NO	PART NAME	DESCRIPTION	Q'TY	REFERENCE
DIC-S121E-AA	DIODE Si CHIP	KDS121E	1	D801
DRC-SMA14-KA	DIODE RECTIFIER	(SMAB14) TN4001,SMD	1	D701
DSC-S7000-AA	DIODE S/W	SDS7000EF	2	D106,111
DVC-0273U-AA	DIODE VARICAP CHIP	KDV273RTK	1	D308
DVC-154CS-AA	DIODE VARICAP CHIP	KDV154	4	D103,105,107,108
DVC-SV270-TA	DIODE VIRICAP CHIP	1SV270TF	3	D305,306,311
DZC-5115E-AA	DIODE ZENER CHIP	KDZ5.1EV USM	1	D201
DZC-9115E-AA	DIODE ZENER CHIP	KDZ9.1EV-RTK	1	D4
FCC-455G3-TA	FILTER CERAMIC	ELFC455G	1	F101
FMC-436CP-FA	CRYSTAL MCF	43.655MHz, 1D43613GQ2	1	XF1
IAA-7233D-SA	IC AUDIO AMP	TDA7233D	1	IC603
IAP-828D5-CA	IC AUDIO PROCSSOR	FX828D5	1	U606
ICP-3802W-TA	IC CPU, OTP	HD64738024W	1	IC801
IDA-62334-MA	IC D/A SMD	M62334FP	1	IC803
IEE-24C32-MA	IC EEPROM SMD	24LC32A-5.0V	1	IC802
IFI-31136-TA	IC IF SMD	TA31136FN	1	U1
IMX-3SK24-TA	TRANSISTOR	3SK240	1	Q105
IOA-2902V-JA	IC AMP SSOP	NJM2902V	2	IC602,605
IOA-75W01-DA	IC OP AMP SMD	TA75W01FU	1	IC501
IPL-1503C-UA	IC PLL	MB15E03SL	1	IC401
IRG-250CS-TA	IC REGULATOR	TK11250CS	1	IC701
ISW-4S66F-TA	IC ANALOG-SW	TC4S66F	2	IC601,607
NCH-02HC1-GA	CONNECTER HEADER	1.25 WAFER-2P (SMD)	1	J2
PFM-00078-AD	PCB MAIN	47.57x119.6x1.2(T) 2/2 GOLD	1	
R10-000AJ-AA	FILM CHIP RESISTOR	0 RC1005 J 000 CS	11	R126,601,L117,C219,603, C604,187,R4,5,638,645
R10-100AJ-AA	FILM CHIP RESISTOR	10 RC1005 J 100 CS	2	R682,401
R10-101AJ-AA	FILM CHIP RESISTOR	100 RC1005 J 101 CS	5	R116,302,320,209,110
R10-102AJ-AA	FILM CHIP RESISTOR	1K RC1005 J 102 CS	8	R515,403,405,413,415, R416,207,410
R10-103AJ-AA	FILM CHIP RESISTOR	10K RC1005 J 103 CS	17	R305,306,308,310,315,316, R321,512,656,657,662,811, R411,412,217,220,128
R10-104AJ-AA	FILM CHIP RESISTOR	100K RC1005 J 104 CS	12	R102,103,105,111,112,322, R,647,651,815,208,312,150
R10-105AJ-AA	FILM CHIP RESISTOR	1M RC1005 J 105 CS	1	R513
R10-122AJ-AA	FILM CHIP RESISTOR	1.2K RC1005 J 122 CS	1	R672
R10-123AJ-AA	FILM CHIP RESISTOR	12K RC1005 J 123 CS	1	R108
R10-124AJ-AA	FILM CHIP RESISTOR	120K RC1005 J 124 CS	1	R643
R10-152AJ-AA	FILM CHIP RESISTOR	1.5K RC1005 J 152 CS	1	R206
R10-153AF-YA	FILM CHIP RESISTOR	RC0402FR-07150K 1005,1%,150K	9	R701,702,502,503,506, R510,501,507,508
R10-153AJ-AA	FILM CHIP RESISTOR	15K RC1005 J 153 CS	1	R680
R10-154AJ-AA	FILM CHIP RESISTOR	150K RC1005 J 154 CS	5	R607,618,661,120,606

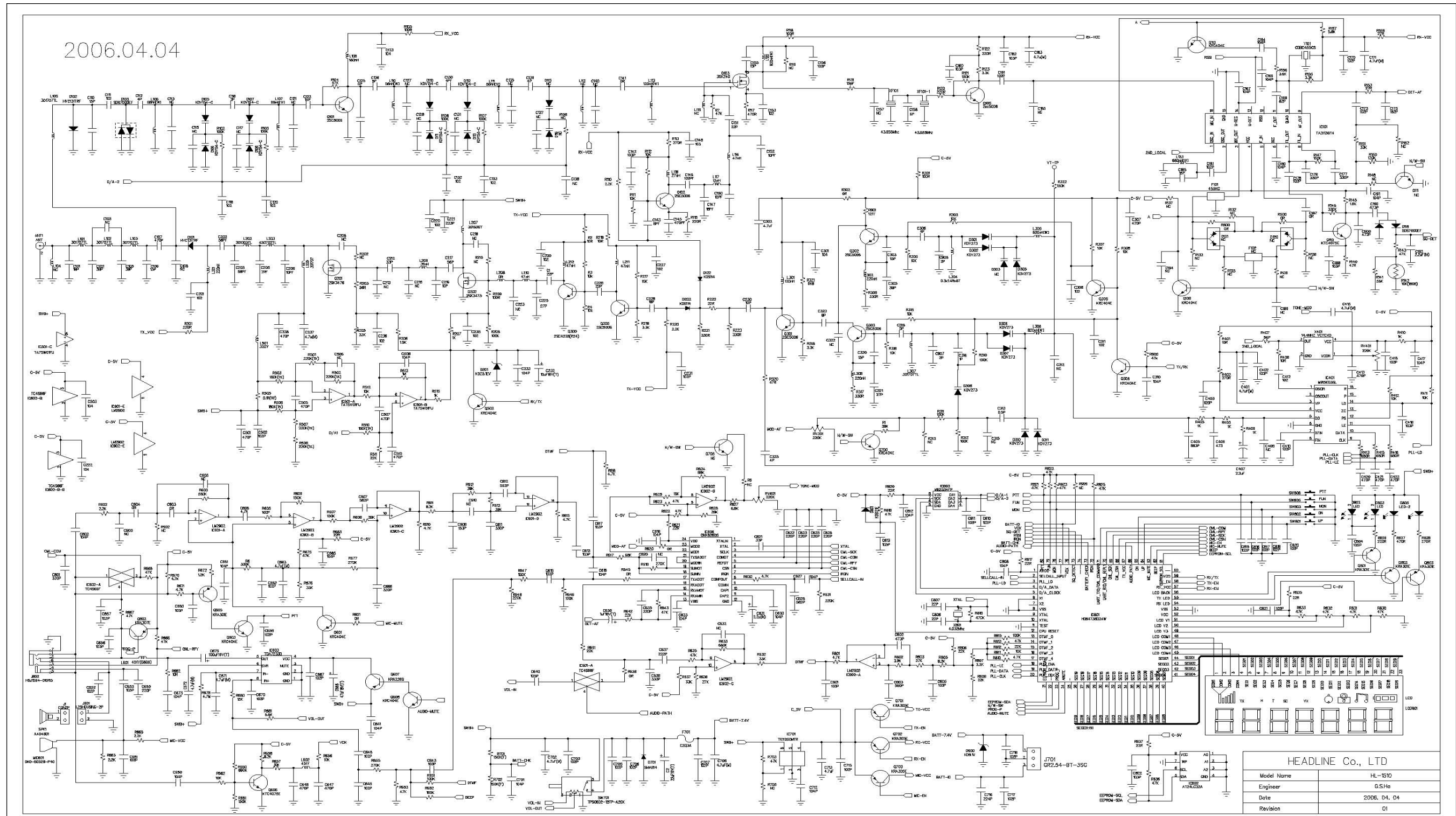
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PART NO	PART NAME	DESCRIPTION	Q'TY	REFERENCE
R10-181AJ-AA	FILM CHIP RESISTOR	180 RC1005 J 181 CS	2	R221,223
R10-183AJ-AA	FILM CHIP RESISTOR	18K RC1005 J 183 CS	1	R625
R10-184AJ-AA	FILM CHIP RESISTOR	180K RC1005 J 184 CS	2	R652,147
				R837,212,216,621,683,817
R10-220AJ-AA	FILM CHIP RESISTOR	22 RC1005 J 220 CS	9	R820,835,301
R10-221AJ-AA	FILM CHIP RESISTOR	220 RC1005 J 221 CS	6	R408,118,121,201,826,202
R10-222AJ-AA	FILM CHIP RESISTOR	2.2K RC1005 J 222 CS	4	R602,663,665,807
R10-223AJ-AA	FILM CHIP RESISTOR	22K RC1005 J 223 CS	5	R511,806,808,812,8
R10-224AJ-AA	FILM CHIP RESISTOR	220K RC1005 J 224 CS	3	R631,648,6
R10-270AJ-AA	FILM CHIP RESISTOR	27 RC1005 J 270 CS	2	R158,153
R10-271AJ-AA	FILM CHIP RESISTOR	270 RC1005 J 271 CS	2	R123,828
R10-272AJ-AA	FILM CHIP RESISTOR	2.7K RC1005 J 272 CS	3	R155,318,145
R10-273AJ-AA	FILM CHIP RESISTOR	27K RC1005 J 273 CS	2	R636,803
R10-274AJ-AA	FILM CHIP RESISTOR	270K RC1005 J 274 CS	2	R655,677
R10-330AJ-AA	FILM CHIP RESISTOR	33 RC1005 J 330 CS	1	R222
R10-331AJ-AA	FILM CHIP RESISTOR	330 RC1005 J 331 CS	2	R307,317
R10-332AJ-AA	FILM CHIP RESISTOR	3.3K RC1005 J 332 CS	1	R122
R10-333AJ-AA	FILM CHIP RESISTOR	33K RC1005 J 333 CS	6	R632,637,676,205,151,641
R10-334AJ-AA	FILM CHIP RESISTOR	330K RC1005 J 334 CS	2	R146,673
R10-392AJ-AA	FILM CHIP RESISTOR	3.9K RC1005 J 392 CS	1	R802
R10-393AJ-AA	FILM CHIP RESISTOR	39K RC1005 J 393 CS	4	R608,612,613,626
R10-470AJ-AA	FILM CHIP RESISTOR	47 RC1005 J 470 CS	2	R140,303
R10-471AJ-AA	FILM CHIP RESISTOR	470 RC1005 J 471 CS	3	R827,115,406
				R610,615,616,630,670,801
				R810,215,218,107,605,671
R10-472AJ-AA	FILM CHIP RESISTOR	4.7K RC1005 J 472 CS	13	R117
				R143,304,622,623,635,653
				R666~668,675,703,813,818,
				R821,822,823,825,830~833,
R10-473AJ-AA	FILM CHIP RESISTOR	47K RC1005 J 473 CS	25	R113,114,836,642
R10-474AJ-AA	FILM CHIP RESISTOR	470K RC1005 J 474 CS	2	R9,816
R10-475AJ-AA	FILM CHIP RESISTOR	4.7M RC1005 J 475 CS	1	R678
R10-560AJ-AA	FILM CHIP RESISTOR	56 RC1005 J 560 CS	1	R203
R10-562AJ-AA	FILM CHIP RESISTOR	5.6K RC1005 J 562 CS	2	R620,313
R10-563AJ-AA	FILM CHIP RESISTOR	56K RC1005 J 563 CS	1	R141
R10-564AJ-AA	FILM CHIP RESISTOR	560K RC1005 J 564 CS	1	R603
R10-681AJ-AA	FILM CHIP RESISTOR	680 RC1005 J 681 CS	1	R402
R10-682AJ-AA	FILM CHIP RESISTOR	6.8K RC1005 J 682 CS	3	R627,681,106
R10-683AJ-AA	FILM CHIP RESISTOR	68K RC1005 J 683 CS	3	R125,617,624
R10-684AJ-AA	FILM CHIP RESISTOR	680K RC1005 J 684 CS	2	R660,633
R10-822AJ-AA	FILM CHIP RESISTOR	8.2K RC1005 J 822 CS	4	R611,658,213,805
R25-901FF-BA	FILM CHIP RESISTOR	0.1 RMC 1S, 2512 1% FTP	1	R505
RSC-224BN-BA	CHIP SEMI RESISTOR	220KB TMC3KJB220KTR	3	RV301,401,601
RTC-103ZJ-JA	CHIP THERMISTOR	ECTH160808 103J3435HT	1	R142

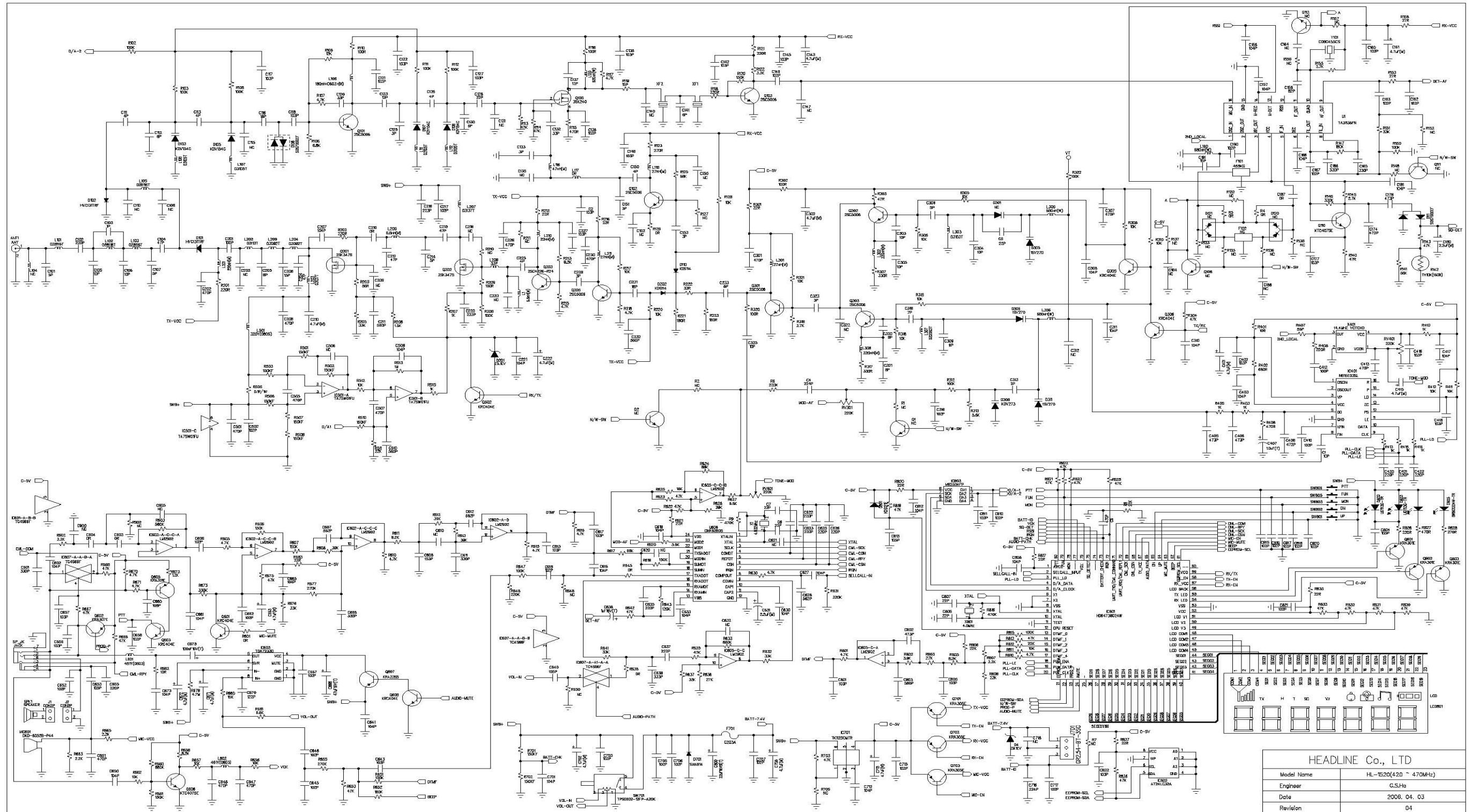
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PART NO	PART NAME	DESCRIPTION	Q'TY	REFERENCE
STA-101HC-SA	TACT S/W SMD	SKTS-1101NS	3	SW801,802,805
STA-106VC-SA	TACT S/W SMD	SKTS-1106VSA	2	SW803,806
TRA-C404E-AA	TRANSISTOR BRT	KRC404E	68	Q305,306,502,601,603,60
TRC-226YU-NA	TRANSISTOR	2SC4226-R24	1	Q203
TRC-3475C-DA	MOS FET-TR	2SK3475	1	Q202
TRC-3476M-DA	MOS FET-TR	2SK3476	1	Q201
TRC-4075G-AA	TRANSISTOR	KTC4075E/GR	2	Q110,606
TRC-5006E-TA	TRANSISTOR	2SC5006(R24)	7	Q102,103,101,205, Q301,302,303
TRR-A226S-AA	TRANSISTOR BRT	KRA226S	1	Q607
TRR-A301E-AA	TRANSISTOR	KRA301E	4	Q605,801,802,803
TRR-A305E-AA	TRANSISTOR BRT	KRA305E	3	Q701,702,703
TRR-A307E-AA	TRANSISTOR	KRA307E	1	Q602
XED-455TA-KB	CERAMIC DISCRIMINATOR	JTBB455C24,SMD	1	Y101
XTC-1440I-PA	VCTCXO	HKE3059A-14.4M-ETD14B-00109C	1	X401
ZFZ-C2Q3A-WA	FUSE SMD	C2Q3A	1	F701
LMR-00009-PKA	PACKING ASSY			
902-00003-AA	HAND STRAP	NYLON BLACK	1	
930-90170-AA	POLY BAG	OTP 90x170 T=0.08	2	
942-00040-AA	PAD	SW1S T=2.0	1	
950-00172-BB	OWNERS MANUAL	100 WOOD/ 100 WOOD FREE PAPER	1	
970-00055-AA	INNER BOX	450SC T=0.5 MANILA PAPER	2	
970-00088-BB	GIFT BOX	SW1S 450SC T=2.0	1	
980-00274-AB	OUT BOX	DW1S 320(W)x205(D)x230(H) T=7.5	1	
990-00313-AA	PASS STICKER	NORU SHEET 35g R2.5	2	
990-00540-AA	SERIAL BARCODE LABEL	ART PAPER STICKER 38x28	2	
C10-060ZC-AA	CHIP CERAMIC 1005	6pF CL05C060CB5ANNC	1	CX2
LMR-00009-PTA	PTT ASSY			
740-00006-AA	PTT INSERT	PBS T=0.25	1	
880-00082-AA	PTT BUTTON	SILICONE 50 RUBBER BLACK	1	
LMR-00009-UCA	UPPER COVER ASSY			
810-00232-AA	UPPER COVER	HF1023M-K2261 PC BLACK	1	

SCHEMATICS



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