

Maintenance Manual

KPC-300/400
Portable Radio

UHF



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NOTICE!

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NOTE

Repairs to this equipment should be made only by an authorized service technician or facility designated by the supplier. Any repairs, alterations or substitution of recommended parts made by the user to this equipment not approved by the manufacturer could void the user's authority to operate the equipment in addition to the manufacturer's warranty.

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SPECIFICATIONS

General Specifications

Input Voltage:
7.5 VDC (nominal)

Vibration:
5 G (per U.S. Forest Service)

Shock:
One (1) meter drop (per EIA)

Dimensions (typical) H x W x D
Less knobs and antenna
With high capacity battery:
137x66x43 mm
(5.4"x2.6"x1.7")
With extra high capacity battery:
150x66x43 mm
(5.9"x2.6"x1.7")

Weight
Radio (Less battery):
235g (8.3oz)
Radio and high capacity battery:
451g (15.9oz)
Radio and extra high capacity battery:
484g (17.0oz)

Batteries
High capacity:
Dimension (H x W x D)
93x64x22 mm
(3.7"x2.5"x0.9")
Weight
203g (7.2oz)
Extra high capacity:
Dimension (H x W x D)
106x64x34.5mm
(4.2"x2.5"x1.35")
Weight
248g (8.6oz)

Ambient Temperature Range:
-30°C to +60°C

Relative Humidity:
95% at +50°C

Altitude
Operational: 5,000 m (16,400 ft)
In Transit: 15,240 m (50,000 ft)

Transmitter

Frequency Range (MHz): 403-440, 440-470, 470-512
Rated RF Power (Watts): 4/1
Frequency Stability
(-30°C to +60°C; +25 Ref): ±0.00025%
Modulation/Deviation (kHz): ±2.5 / ±5
FM Hum And Noise
(Companion Receiver) (dB): -40/-34 (25/12.5 kHz mode)
Audio Response: Meets TIA/EIA-603, Par 5.2.6
(6dB/octave pre-emphasis from 300 to 3000 Hz)
Spurious And Harmonics (dB): Meets FCC/DOC
Frequency Separation (MHz): Full Bandwidth
Audio Distortion: <5 % at rated audio @ 1000 Hz for entire range

Receiver

Frequency Range (MHz): 403-440, 440-470, 470-512
Channel Spacing (kHz): 12.5 / 25
Sensitivity 12 dB SINAD
(µV): 0.35
Selectivity
@ 12.5 kHz (dB): 60
@ 25 kHz (dB): 68
Intermodulation 12.5/25 kHz (dB): -60/-65
Spurious And Image Rejection (dB): -68
Rated Audio Output: 500 mW @ 5% maximum distortion

Environmental

STANDARD	U.S. Military Spec 810E Methods & Procedures
Low Pressure	500.3/1,2
High Temperature	501.3/1,2
Operational	501.3/2
Low Temperature	502.3/1,2
Temperature Shock	503.3/1
Solar Radiation	505.3/2
Blowing Rain	506.3/1
Humidity	507.3/2
Salt fog	509.3/1
Blowing dust	510.3/1
Vibration	514.4/1, <i>Category 1,10</i>
Shock	516.4/1
Transit drop	516.4/4
Drop	Section 5.3.5, <i>ANSI/TIA/EIA-603</i>

Regulatory Data

Frequency Range MHz	FCC Type Acceptance No.	DOC Cert. Number
403-440	AXATR-350-A2	
440-470	AXATR-350-A2	287-195 168A
470-512	AXATR-350-A2	

GENERAL

The KPC-300/400 Portable Radio Unit operates in the conventional 403-512 MHz frequency band. There are two versions, Scan and System, with the System Version having a DTMF keypad. Up to sixteen (16) RF channels may be pre-programmed into the radio using a personal computer. Power output on each channel can be programmed for either high power (4 watts) or low power (1 watt). The power output on each channel can be toggled between high or low depended upon the pre-programmed setting with High/Low button on the left side panel.

Each radio is capable of operation in 12.5 kHz or 25 kHz channel spacing systems. System deviation for 12.5 kHz channel spacing is 2.5 kHz and 5 kHz for 25 kHz channel spacing.



Figure 1 - Scan Radio

The KPC-300 radio contains three (3) buttons on the front panel. The KPC-400 contains three (3) buttons along with a twelve (12) button DTMF pad on the front panel. The scan function allows monitoring of any or all channels. Any channel may be scanned with or without a priority level. One channel can be programmed for Priority 1 (P1) and another for Priority 2 (P2), with any or all remaining channels programmed as non-priority channels (S). There is also Emergency mode transmission capability. A LCD display provides status display of the radio functions along with the display of the selected channel number.

The Universal Device Connector (UDC), located on the side of the radio, provides connections for external audio accessories. This connector also allows the radio system personnel to connect programming equipment and program the per-channel and overall radio features.



Figure 2 - System Radio



Figure 3 - Back, Left And Top Panel Views

CONTROLS

The radio controls consist of an ON/OFF/VOLUME control, PTT button, MONITOR button, Channel Select switch, EMERgency button and a High/Low button.

ON/OFF/VOLUME Turns radio on and off and adjusts audio listening level.

When the radio is turned on, it will resume operation at the last operating state (channel, etc.) and the power-up alert tones will be sounded. Three (3) beeps indicate the radio is in the normal (receive mode); four (4) beeps indicates the radio is scanning. The operating status of the radio will be displayed in the Liquid Crystal Display (LCD) window.

PTT BUTTON Pressing the **PTT** button on the side of the radio will key the radio transmitter.

If the radio is not scanning, it will transmit on the selected (displayed) channel. If the radio is scanning when the **PTT** button is pressed, the radio may be programmed to transmit on the selected channel or on the current receive scan channel if the **PTT** is pressed during the scan hang time.

If the selected channel is programmed with Type 99 Tone Decode enabled, pressing the **PTT** button will disable Type 99 Tone Decode by switching the radio from the Selective Call mode to the Monitor mode. The **PTT** button must be released and then pressed a second time to key the radio.

MONITOR The Monitor button has several functions. Its operation will vary depending upon programming.

When the Monitor button is pressed and held down, all transmissions will be heard after three (3) seconds have passed, even if Channel Guard protected. This permits channel monitoring before transmitting. If the button is held for more than three (3) seconds, Channel Guard decode will

CHANNEL SELECT A rotary switch permits selection of channels. Rotating the switch clockwise increases the channels and counterclockwise decreases the channels. The channel is visible by looking at the channel switch from the top or viewing the LCD display.

EMERgency Pressing for at least one (1) second will transmit the emergency ANI code on the selected channel or pre-programmed channel.

H/L Selects the transmit power output by toggling from high-low or low-high.

Three (3) buttons below the LCD display are used to control a variety of operations when used alone and to control scan operations when used in conjunction with the  button.

 Toggles the scan feature on and off.

 Used in conjunction with the  button to add channels to the scan list or increase the channel's priority status.

 Used in conjunction with the  button to erase the selected channel from the scan list.

DTMF Keypad (KPC-400 only) Permits operator to make telephone interconnect calls on radio systems equipped with this option.

The top row of buttons (, , ) provide access to up to three pre-programmed telephone interconnect numbers (see **Telephone Interconnect Calls** section).

INDICATORS

The Liquid Crystal Display (LCD) indicates the channel number. In addition there are seven (7) status indicators (flags) which show scan status, Type 99 Tone Decode status, transmit High/Low power status and Channel Guard status.

The LCD backlighting will turn on anytime a control button is pressed. It will remain on for five (5) seconds after the button is released. If a control button is pressed while the backlight is on, the backlight remains on for another five (5) seconds. Backlighting may be programmed to remain off at all times.



Figure 4 - Liquid Crystal Display (LCD)

CHANNEL

12

The selected channel number is displayed in the LCD window.. When data is written into or read from the radio a **P** is displayed.

STATUS

TX LED

Red light on steady - transmitter is active or keyed.
Red light blinking - low battery voltage, recharge or replace battery.
Yellow on steady - channel busy indication, radio has detected a carrier on selected channel.

SCN

This status indicator turns on when the scan function of the radio has been enabled.

S

When this indicator is on, the selected channel is a non-priority scan channel.

P1

When this indicator is on, the selected channel is a Priority 1 scan channel.

P2

When this indicator is on, the selected channel is a Priority 2 scan channel.

PG

When this indicator is on, the selected channel is programmed as a paging channel (Type 99 Tone Decode). The indicator will blink

when the selected channel is placed in the monitor mode or the reception of a call.

CG

When this indicator is on, Channel Guard or digital Channel Guard is enabled on the selected channel. The indicator will go out when the selected channel is placed in the monitor mode.

HI

When this indicator is on, the selected channel is enabled for transmit high power.

OPERATION

Detail operating procedures are found in Operator's Manual AE/LZT 123 1898.

THEORY OF OPERATION

Refer to the Block Diagram during the following explanations.

TRANSMITTER

The transmitter consists of an exciter Q201, PA module U201, auto power control (APC) U202 with Q202 and Q203, directional coupler Z201 and associated components. The local signal input of approximately 0 dBm to the transmitter is provided by the synthesizer to the exciter. An amplifier provides 17 dB of gain to produce +17 dBm (50 mW) of drive level to the PA module. During the receive mode, a band switch diode, D202, attenuates the receive first local oscillator signal at the exciter input to reduce LO leakage at the antenna connector. The PA module is a 3-stage amplifier that provides a minimum RF power output of 7.0 watts at a battery voltage of 7.2 VDC. The RF power output is fed through the directional coupler Z201 to the antenna. A shottkey diode D201 converts the detected RF signal in the directional coupler to a DC voltage to feed the auto power control circuitry.

Low Pass Filter

The low pass filter Z101 and impedance matching network, consisting of L121 and C171 are provided to prevent excessive transmitter harmonics during the transmit function.

Tx/Rx Antenna Switch

The Tx/Rx antenna switch, consisting of D101, D102 and associated circuitry, provides the switching of RF output to the antenna and the receive signal to the receiver. During the receive function, the diodes are cut off, isolating the transmit circuit from the antenna. During the transmit function, +5 volts is supplied to both diodes, turning them on and feeding the RF output from the transmitter PA module through the low pass filters via D101 to the antenna. The RF output is suppressed at the receiver RF front end filter by D102.

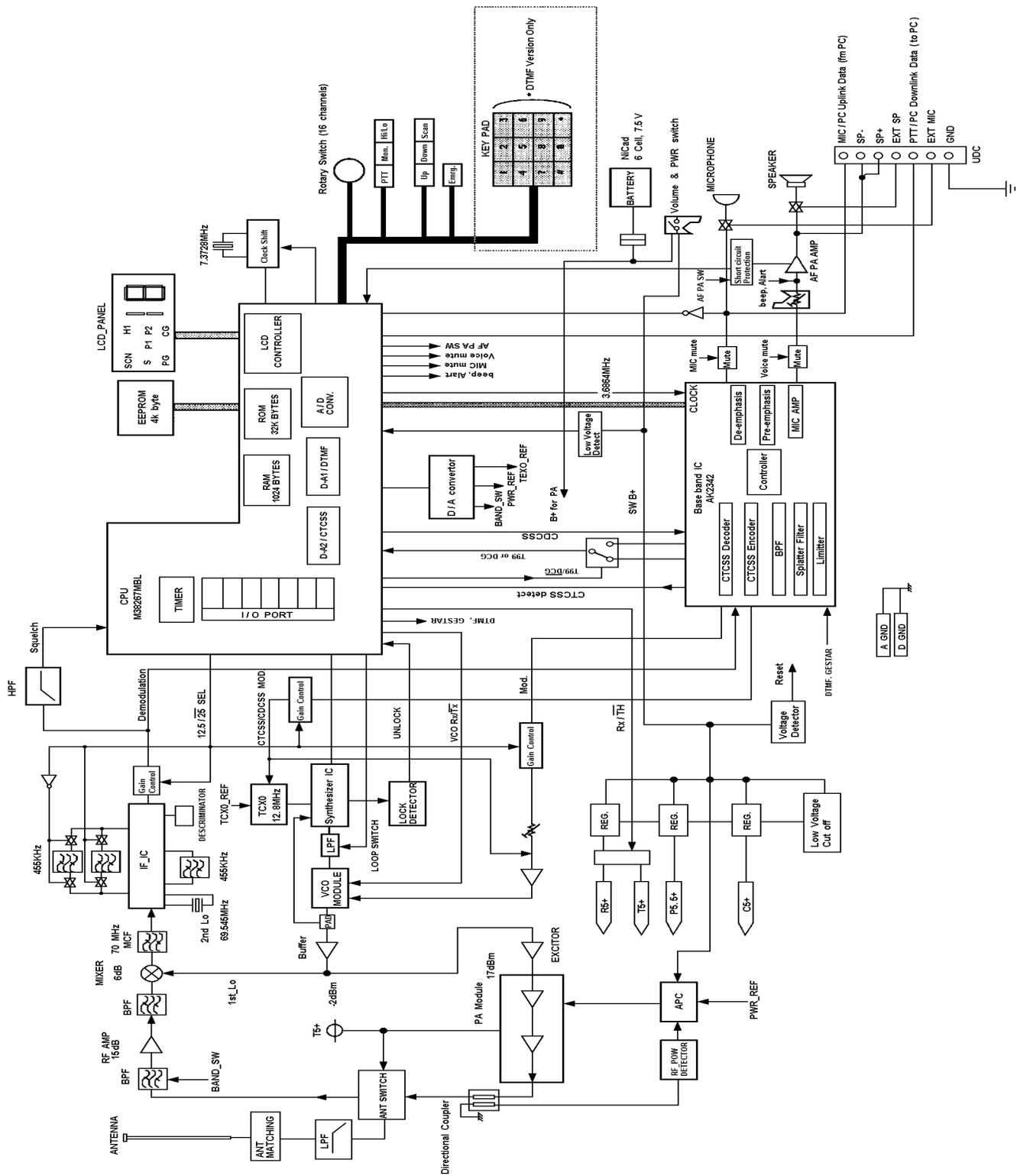


Figure 5 - Block Diagram

Rf Power Control

The DC voltage detected by the directional coupler Z201 is supplied to comparator U202 where it is compared with the power reference voltage PWR_REF. This comparison voltage controls the bias voltage to the PA module by drive transistor Q202, and the output power is stabilized by the auto power control circuitry. PWR_REF is provided by the central processing unit (CPU) from information programmed into the EEPROM. The PWR_REF voltage consists of six reference voltages: low frequency, middle frequency and high frequency band in both the high and low power modes. This power control provides the flatness of the RF output under varied temperature, voltage supply and frequency bandwidth conditions.

RECEIVER

The receiver has a dual conversion circuitry consisting of a receiver front end, RF amplifier Q101, 1st mixer Q102, 1st IF 70 MHz Monolithic Crystal Filter (MCF) Z102 and Z601, IF amplifier/limiter/discriminator U101, 2nd IF 455 kHz ceramic filters Z107, Z104, Z105 and ceramic discriminator Z106. Receiver IF selectivity for 25 or 12.5 kHz channel spacing is determined by selecting the 455 kHz ceramic filter Z104 for 25 kHz spacing or Z105 for 12.5 kHz spacing.

The demodulated receive audio at the AF OUT port of U101 is adjusted by Q104, R113 and R114 to produce a constant demodulated audio level input into the Audio Speech Processor (ASP) regardless of the receiver channel spacing mode, 12.5 or 25 kHz. The receive audio gain controlled by Q104, R113 and R114 is increased by 6 dB when the receiver is switched from 25 kHz to 12.5 kHz channel spacing. Received audio signals and beep tones are amplified by audio frequency power amplifier U407 to achieve the rated 0.5 W audio output power to speaker SP1.

Short circuit protection for U407 consists of U416 and Q416. When AF PA AMP outputs, SP+ and SP-, are shorted together or shorted to ground, an excessive current will be sourced through transistor Q407 which is the pass transistor that provides bias to U407. This voltage drop across pass transistor Q407 will be compared in differential amplifier U416 and fed to voltage level translator Q416 which sends the excessive current status state information to the CPU. The CPU then sends a signal to Q407, turning it off and removing bias from U407. The software in the CPU assumes the short circuit is an intermittent short and resets for the excessive current state approximately six (6) seconds later. If the excessive current state still exists, the CPU again turns Q407 off. After five retries, the CPU assumes the short circuit is not intermittent and keeps Q407 turned off. The short circuit condition must be removed before the radio is turned off and then back on to reset the CPU.

Receiver Front End And Mixer

The receive signal is fed from the antenna to a bandpass filter, a RF amplifier and an additional bandpass filter to

remove the 1st IF image ($F_{rx} - 140$ MHz) and 1st IF/2 (-35 MHz) and other out-of-band spurious responses. Total gain is approximately 8 dB with the first IF image rejection more than 68 dB.

To achieve the required RF bandpass filtering characteristics across the frequency band, the first front end filter is electronically tuned by changes in the BAND_SW voltage which is fed to varactor diode D601-D603. This voltage is generated by the D/A converter U421 from the CPU input. The frequency band is divided into three sub-split bands, one at the low end, one in the middle and one at the upper end of the band. The CPU determines which sub-split the desired receive frequency is in and provides the appropriate digital input to U421 to generate the correct BAND_SW signal for RF passband tuning.

The receive signal is applied to dual gate GaAsFET mixer Q102 and mixed with the 0 dBm local oscillator injection from the synthesizer section to produce the 70 MHz first IF signal.

70 Hhz Filter

The mixer output is connected to the matching circuit and provided to the four pole 70 MHz MCF Z102. The 70 MHz crystal filter reduces the second IF image response ($F_{rx} - 910$ kHz) to meet spurious response specification. The output of Z601 is applied to the 2nd mixer in the IF IC U101 through the matching circuitry.

U101 consists of the second mixer, two IF amplifiers/limiters, a quadrature detector and a noise filter amplifier. The second mixer downconverts the first IF 70 MHz signal to the second IF frequency of 455 kHz. Crystal resonator Y101 and associated components provide a 69.545 MHz second IF local oscillator signal. Y101 operated in the third overtone mode.

The second mixer output is applied to the 455 kHz ceramic filter Z107 and then to the first IF amplifier/limiter. The first IF amplifier/limiter output is provided to either 455 kHz ceramic filter Z104 (for 25 kHz channel space mode) or Z105 (for 12.5 kHz channel space mode). These filters are switched by analog switches U102, U103, U107 and U108 depending on the desired channel spacing mode. Ceramic discriminator Z106 and internal quadrature detector provide the demodulated audio output signal at AF OUT. The demodulated audio signal, filtered with an internal low pass filter ($f_c \approx 47$ kHz) is then routed to the baseband audio signal processor U401 and a noise squelch circuit.

The noise squelch circuit consists of slow and fast squelch time constants and an additional high pass filter ($f_c \approx 4.0$ kHz). The slow squelch time constant is around 70 ms and is provided to U404-2. The fast squelch time constant is around 8 ms and is provided to U404-3. During scanning mode, only the fast squelch is monitored by the CPU. In all other modes, the slow squelch is monitored.

Synthesizer

The synthesizer circuit generates all transmit and receive RF frequencies. This circuit consists of synthesizer IC U302, temperature compensated crystal oscillator (TCXO) U303, voltage controlled oscillator (VCO) U301 and associated loop filter circuitry.

The VCO operates at the transmitter frequency during transmit function and 70 MHz below the receive frequency during the receive function. The synthesizer is controlled by the CPU. Frequency stability is maintained by the TCXO module.

A portion of the VCO output is applied to the synthesizer IC and divided by 65/64 dual modulus prescaler, which is set by pulse swallow counter A and programmable counter B to provide a 6.25 kHz output for comparison with a reference signal. The reference signal is derived from the 12.8 MHz TCXO module. The synthesizer IC divides the 12.8 MHz signal down to the 6.25 kHz signal. (The KPC-300/400 PC Programming Software will only permit synthesis of transmit or receive frequencies that are integer multiples of 6.25 kHz. Other frequencies cannot be input into the radio's personality.) An unlock detector is used to prevent transmission when the frequency synthesizer is unlocked.

Audio modulation from the Audio Signal Processor (ASP) IC U401 is applied to the VCO modulation input via amplifier U402 and the TCXO modulation input via amplifier U403. The gain of U402 is adjusted dependent upon the channel spacing mode of the radio. In the 25 kHz channel space mode, U418 is open-circuited, removing R453 from being in parallel with R411. In the 12.5 kHz channel space mode, U418 is short-circuited, placing R453 in parallel with R411 and reducing the transmitter audio gain by a factor of two. (This establishes the 5 kHz maximum frequency deviation for 25 kHz channel spacing and the 2.5 kHz maximum frequency deviation for 12.5 kHz channel spacing.) VR403 and VR402 are adjustable to provide a constant modulation flatness for voice audio and Channel Guard (CG) and Digital Channel Guard (DCG) sub-audible modulation.

MOSFET transistor Q316 is turned on during the transmit mode to change the loop gain in order to get lower modulation frequency response. A ripple filter, consisting of Q312, C312 and R331, provides a filtered 4.7 VDC to the VCO to improve the phase noise characteristic of the receiver local injection signal for enhanced receiver performance for adjacent channel selectivity, intermodulation and FM hum and noise.

Audio Logic

The audio logic section consists of CPU U404, Audio Signal Processor (ASP) IC U401, EEPROM U406 and associated components. The CPU controls all radio operations. The EEPROM contains the personality data and the alignment data.

CPU

The CPU contains the LCD controller, LED controls, 32k bytes of ROM, 1k byte of RAM, an 8-channel A/D converter and a 2-channel D/A converter. The CPU generates DTMF tones, alert tones, beep tones, GE-STAR (ANI) codes and Digital Channel Guard (DCG) encode codewords. The DCG encode codeword from the CPU is applied to a low pass filter in the ASP IC U401 and summed with the voice signal at U402. Received DCG codewords and Type 99 tones from the ASP U401 are supplied and decoded by the CPU.

AUDIO SIGNAL PROCESSOR U401

The ASP IC U401 contains the CG encoder and decoder, pre-emphasis audio shaping filters, de-emphasis audio shaping filters, limiter, post-limiter filter (i.e., splatter filter) and various Switched Capacitor Filters (SCF). U401 generates CG tones controlled by the CPU. CG and DCG sub-audible modulation signals are summed with the voice audio signal at op-amp U402 and supplied to the VCO and TCXO modulation inputs.

The demodulated audio signal from IF IC U101 can provide voice signal information, CG tones, DCG codewords and Type 99 two-tone sequential information. CG tones are filtered by a tone filter and decoded in the ASP. DCG codewords are filtered by the tone filter and input to multiplexer U417. Type 99 tones are filtered by a bandpass filter and also input to U417. Multiplexer U417 selects either the DCG or Type 99 signals, outputs the signal to a comparator to "square" the signal to a TTL level digital waveform and then sends the digitized signal to the CPU for detection.

Before the transmit voice audio signal is input to the ASP, it can be optionally mixed with DTMF or GE-STAR (ANI) encode signals. These baseband signals are pre-emphasized, bandpass filtered, hard limited, run through a post-limiter filter (splatter filter) and then summed at op-amp U402 with CG tones or DCG codewords.

CLOCK SHIFT

The CPU uses a nominal 7.3728 MHz clock frequency, which is divided down to 3.6864 MHz to become the clock frequency input provided to the ASP IC U401. Harmonics of this clock frequency can potentially interfere with the performance of the transmitter and receiver, producing self-quieting "beat" notes at specific receiver frequencies or producing an audio whine at specific transmitter frequencies. A clock shift can be programmed for each channel's receive and/or transmit frequency to move the potentially interfering harmonics of the microprocessor clock frequency. The microprocessor clock frequency is shifted more than +100 ppm, effectively moving potentially interfering clock harmonics off-channel.

POWER SUPPLY

The battery voltage, provided by six nickel cadmium cells, is a nominal 7.5 volts. This voltage is provided to the series regulators via a 4 amp fuse F401. The regulated supply provides +5 volts for the logic section, the analog section, receiver and transmitter sections. The +5.5 volts for the PLL frequency synthesizer section is also provided.

RADIO PROGRAMMING

PC PROGRAMMING

The KPC-300/400 Portable Radio is programmed using an IBM compatible personal computer equipped with a RS-232 serial port. Adapter TQ-3370 provides the RS-232 serial interface and the cable between the PC and the adapter box. Programming Cable RPM 113 2472/1 provides the connection from the adapter box to the radio's Universal Device Connector (UDC). The programming software is AE/LZY 213 761.

PROGRAMMABLE FEATURES

The following features are programmable on a per-channel basis:

- Receive Frequency
- Transmit Frequency
- Channel Busy Lock-Out
- Carrier Control Timer (CCT)
- Squelch Tail Elimination (STE)
- Fixed Priority 1 Scan Channel
- Channel Guard Encode/Decode (Tone or Digital)
- Type 99 Tone Decode
- Automatic Number Identification (ANI)
- Telephone Interconnect DTMF Keypad Enable (KPC-400 only)

The following features are programmable on an overall radio basis:

- Display Backlighting
- Alert Tones
- Emergency Channel
- Three (3) Auto-Dial Telephone Numbers (KPC-400 only)

CHANNEL BUSY LOCK-OUT

If channel busy lock-out has been programmed on the selected channel, the transmit function will be inhibited when the operator presses the **PTT** button while the radio detects a carrier on the channel unless the carrier is modulated with the corresponding Channel Guard tone or code for that selected channel. The radio will immediately begin transmitting when the carrier disappears. Channel busy lock-out continues to function if Channel Guard decode is disabled with the **MONITOR** button. The channel-busy feature is programmable on a per-channel basis. Type 99 cannot be programmed on a channel with channel busy lock-out.

CHANNEL GUARD

Channel Guard (CG) provides a means of restricting calls to specific radios through the use of Continuous Tone Coded Squelch System (CTCSS) tone frequencies ranging from 67.0 Hz to 210.7 Hz. Digital Channel Guard (DCG) also can provide a means of restricting calls through the use of 83 standard Continuous Digital Coded Squelch System (CDCSS) codes. Each channel may be programmed for encode/decode, encode only, decode only or for no CG or DCG. Both tone frequencies and digital codes may be used. The tones and codes are listed in Tables 1 and 2.

SQUELCH TAIL ELIMINATION (STE)

STE is used with tone and Digital Channel Guard to eliminate squelch tails. The STE burst is transmitted when the microphone PTT is released. The receiving radio decodes the burst and mutes the receiver audio for 250 ms. This mute time allows the transmission to end and to eliminate the squelch tail. The radio looks for STE on the received signal when the microphone is either on or off-hook. STE is enabled for transmit and/or receive through PC programming.

AUTOMATIC NUMBER IDENTIFICATION (ANI)

Automatic Number Identification is a 320 ms burst of code (GE-STAR) that is generated at the beginning of each transmission to identify the radio unit to the dispatcher. If programmed, a beep is sounded at the end of ANI transmission to indicate when conversation can begin as the microphone is disabled until the ANI transmission is completed.

Systems with CG require that ANI be delayed long enough for the system to respond before ANI can be decoded. A programmable delay is provided to meet this requirement. For example, a delay of 350 ms requires the operator to wait for 670 ms after pressing the PTT before conversation can be started. If desired, the ANI message can be programmed to be sent at the end of a transmission.

Table 1 - Standard Tone Frequencies (Hz)

67.0	71.9	74.4	77.0	79.7	82.5	85.4	88.5	91.5	94.8	97.4
100.0	103.5	107.2	110.9	114.8	118.8	123.0	127.3	131.8	136.5	141.3
146.2	151.4	156.7	162.2	167.9	173.8	179.9	186.2	192.8	203.5	210.7

- Do not use 179.9 Hz or 118.8 Hz in areas served by 60 Hz power distribution systems (or 100.0 Hz or 151.4 Hz in areas supplied with 50 Hz power). Hum modulation of co-channel stations may "false" Channel Guard decoders.
- Do not use adjacent Channel Guard tone frequencies in systems employing multiple Channel Guard tones. Avoid same-areas co-channel use of adjacent Channel Guard tones whenever possible. As stated in TIA/EIA-603, there is a possibility of decoder falsing.
- To minimize receiver turn-on time delay, especially in system using Channel Guard repeaters or receiver voting, choose the highest usable Channel Guard tone frequency. Do not use tones below 100 Hz when it is necessary to meet the receiver response time requirements as specified in TIA/EIA-603.

Table 2 - Digital Channel Guard Codes

PRIMARY CODE	EQUIVALENT CODE	PRIMARY CODE	EQUIVALENT CODE	PRIMARY CODE	EQUIVALENT CODE
023	340 766	251	236 704 742	632	123 657
025		261	227 567	565	307 362
026	566	263	213 736	654	163 460 607
031	374 643	265	171 426	662	363 436 443 444
032		271	427 510 762	664	344 471 715
043	355	306	147 303 761	703	150 256
047	375 707	311	330 456 561	712	136 502
051	520 771	315	321 673	723	235 611 671
054	405 675	331	372 507	731	447 473 474 744
065	301	343	324 570	732	164 207
071	603 717 746	346	616 635 724	734	066
072	470 701	351	353 435	743	312 515 663
073	640	364	130 641	754	076 203
074	360 721	365	107	036	137
114	327 615	371	217 453 530	053	
115	534 674	411	117 756	122	535
116	060 737	412	127 441 711	145	525
125	173	413	133 620	212	253
131	572 702	423	234 563 621 713	225	536
132	605 634 714	431	262 316 730	246	542 653
134	273	432	276 326	252	661
143	333	445	222 457 575	255	425
152	366 415	464	237 642 772	266	655
155	233 660	465	056 656	274	652
156	517 741	466	144 666	325	550 626
162	416 553	503	157 322	332	433 552
165	354	506	224 313 574	356	521
172	057	516	067 720	446	467 511 672
174	142 270	532	161 345	452	524 765
205	135 610	546	317 614 751	454	513 545 564
223	350 475 750	606	153 630	455	533 551
226	104 557	612	254 314 706	462	472 623 725
243	267 342	624	075 501	523	647 726
244	176 417	627	037 560	526	562 645
245	370 554	631	231 504 636 745		

NOTE:
Primary codes in bold are unique Ericsson codes.

CARRIER CONTROL TIMER

This feature, programmable on a per-channel basis, prevents unnecessary channel traffic and radio damage if the transmit timer limit is exceeded. If the programmed timer times-out during a transmission, the radio will beep and stop transmitting. The beeping tone will continue until the operator releases the **PTT** button. Releasing the **PTT** button resets the timer.

TYPE 99 TONE DECODE

The radio is programmable to power-up in either selective (Type 99) or monitor mode for channels programmed for Type 99 decode.

When selective mode is chosen, the radio operates as a tone and voice receiver and allows only those calls that are tone coded for the radio to be heard. Selecting monitor mode allows all calls with the correct Channel Guard (if programmed) on the channel to be heard.

In either mode, when a correct T99 and Channel Guard (if programmed and enabled) have been decoded, a series of intermittent beeps will be heard to alert the operator of an incoming call. The **PG** status flag will blink in the display to indicate that a call has been received. If the selective mode was chosen, the radio switches automatically to monitor mode.

At the end of the message, if selective mode is desired, press and release the **MONITOR** button to reset the Type 99 tone signalling function. The **PG** status flag will cease blinking.

While in selective mode, the radio can be put in monitor mode by pressing and releasing the **PTT**. A series of beeps is sounded while the **PTT** is pressed to indicate that no transmission has occurred and the monitor mode has been selected as indicated by with the blinking of the **PG** status flag. A second press of the **PTT** will result in normal transmission.

The radio is programmable to decode any Ericsson or Motorola decode combinations from any one of two T99 tone tables on a per-channel basis. Transmit and/or receive Channel Guard can be programmed to any channel with Type 99.

Type 99 receive Channel Guard (if programmed) can be disabled by pressing the **MONITOR** button for more than three (3) seconds.

NOTE

Resetting Type 99 from monitor to selective mode does not affect Channel Guard switch setting.

If a Type 99 channel is in the scan list and scan is enabled, Type 99 tones are ignored. Scanning is provided on a carrier and Channel Guard basis only.

TELEPHONE INTERCONNECT (DTMF) (KPC-400 ONLY)

The operator may make telephone interconnection calls on radio systems equipped for this option. Specific procedures for placing these calls are determined by the operating system.

There are two methods to make telephone interconnect calls. One method uses the top three keys (1, 2ABC, 3DEF) to send one of three pre-programmed numbers. The other method is to use the keypad (0-9WXY) to manually enter the telephone number.

The keypad is not active until the **PTT** button is pressed. Therefore, the **PTT** button must be pressed at all times when operating any button on the DTMF keypad. Communications takes place in a simplex mode. You cannot talk and listen at the same time. The **PTT** button must be pressed each time you wish to talk and, released when you wish to listen.

SCAN

The scan feature permits monitoring of up to 16 receive channels. The scanned channels can be any frequency within the frequency band limits of the radio and can be Channel Guard protected (tone or digital).

Any channel can be scanned with or without a priority level. One channel can be programmed for Priority 1 (P1), another for Priority 2 (P2) or any or all remaining channels programmed as Non-Priority (S). The radio can be pre-programmed to permit an operator front panel selectable scan list, a fixed Priority 1 channel or a selected Priority 1 channel using the channel select switch.

Scan Vocabulary

The following terms are frequently used in scan operation description.

- Simple Scan - describes the condition when scan is enabled and there is no activity on any channel in the scan list.
- Priority Scan - describes the condition when scan is enabled and the priority scan channel is sampled during the scanning of the channels on the scan list.
- Channel Guard Scan - describes the condition when scan is enabled and tone or digital Channel Guard must also be detected before locking on any channel.
- Selected Channel - indicates that this is the last channel that the operator selected with the channel select switch. This channel is displayed unless scan is enabled and activity is detected on another channel being scanned.

- Receive Channel - indicates the channel that has been detected and identified with the correct carrier and Channel Guard (if enabled). The receive channel number will be shown in the display.
- Scan List - indicates an internal list either pre-programmed or programmed from the front panel that includes each channel status that will be scanned when the scan mode is enabled.
- Non-Scan Channel - indicates a channel that is not in the scan list and will not be scanned when scan is enabled.
- Non-Priority Channel - indicates that this channel is on the scan list. Activity on this channel will be interrupted by activity on either the Priority 1 or Priority 2 channel.
- Priority 2 Channel - indicates that this channel is also on the scan list. Activity on this channel will interrupt any activity on any non-priority channel. However, activity on this channel will be interrupted only by activity on the Priority 1 channel (if on scan list).
- Priority 1 Channel - indicates that this channel is also on the scan list. Activity on this channel will interrupt and supercede any other channel activity.
- Channel Activity - indicates the presence of a correct carrier with correct Channel Guard (if programmed).
- Hang Time - describes the time interval (pre-programmable) that a channel remains locked to a frequency although no channel activity is present. This condition arises after channel activity has stopped or the **PTT** button has been released.
- Fixed Priority 1 Channel - indicates that the channel has been pre-programmed as the Priority 1 scan channel and cannot be changed by the operator.
- Selected Priority 1 Channel - indicates that the channel selected by the channel select switch will be the Priority 1 scan channel. The operator can still select the Non-Priority and Priority 2 channels.

Pre-Scan Operation

A scan list must be created before scan operation can be used. The scan list can be created in several ways. The radio will not go into the scan mode when no channel are programmed or in a scan list.

- Fixed Programmable - the scan list is pre-programmed using the PC programming software and cannot be changed by the operator.
- Front Panel Programmable - the scan list is created by the operator using the front panel controls.
- Selected Channel Programmable - the operator creates the scan list for all Non-Priority and Priority 2 channels. The Priority 1 channel is selected by the channel select switch. This is also pre-programmable using the PC programming software.

ALERT TONES

Alert tones or “beeps” are sounded when a button is pressed and when the operating status of the radio changes. All alert tones may be programmed to be remain off.

Power-up Self-test

Each time the radio is turned on, it will perform power-up self-test. All display segments will turn on, and after successful completion of the test, the radio will change to the last operating state (channel, etc.) and sound three (3) or four (4) beeps. Three (3) beeps sound if the radio is operating in the normal (not scan) state. Four (4) beeps will sound if the radio is scanning. The status will be indicated in the LCD. If the radio fails the self-test, no beeps will be sounded.

Carrier Control Timer

This feature, programmable on a per-channel basis, prevents unnecessary channel traffic and radio damage if the transmit timer limit is exceeded. If the programmed timer times-out during a transmission, the radio will beep and stop transmitting. The beeping tone will continue until the operator releases the **PTT** button. Releasing the **PTT** button resets the timer.

Channel Busy Lock-out

If channel busy lock-out has been programmed on the selected channel, the transmit function will be inhibited when the operator presses the **PTT** button while the radio detects a carrier on the channel unless the carrier is modulated with the corresponding Channel Guard tone or code for that selected channel. The radio will immediately begin transmitting when the carrier disappears. Channel busy lock-out continues to function if Channel Guard decode is disabled with the **MONITOR** button. The channel-busy feature is programmable on a per-channel basis.

Type 99 Alert Tone

The Type 99 alert tone, indicating a receive Type 99 call, may be enabled or disabled by programming. If the programmed tone sequence is detected, the radio will beep two (2) times. If the alert tone is disabled, no alert tone will be present when a Type 99 call is received.

ANI Alert Tone

The Automatic Number Identification (ANI) alert tone beep can be enabled or disabled by programming. If the alert tone is enabled, a beep will sound after the **PTT** is pressed to indicate to the operator to begin voice transmission. Some communication systems require a time delay before voice transmission begins. If the alert tone is disabled, no beep will sound.

SCAN Alert Tone

The radio will sound a beep when the  button is pressed.

Priority-One (P1) Scan

If the Priority 1 alert tone is enabled by programming and the radio receives a signal on the Priority 1 channel when scanning, the radio will sound a beep.

Radio/Channel Failure

The simultaneous flashing of the LCD display and the sounding of beeps indicates the synthesizer is unable to correctly lock on the selected channel. At this time the radio changes to a mute condition and no audio is heard from the speaker when receiving and the transmit is inhibited if the PTT button is pressed. Select another channel, change the battery pack or have the radio repaired.

SCAN OPERATING MODES

Simple SCAN

Once SCAN is activated, the radio will perform a Simple SCAN routine. This routine is performed when there is no activity on any of the channels that are in the Scan list.

The scanning list at right, is an example of the routine performed when there are more than four (4) channels in the Scan list.	np6...np5...np4...np3...P1.. .P2...np2...np1...np6...np5.. ..P1...P2...np4...np3...np2.. np1...P1...P2, etc.
---	---

(The abbreviation "np" indicates a non-priority channel, and P1 and P2 indicate Priority 1 and Priority 2, respectively.)

The scanning list at right, is an example of the routine performed when there are less than four (4) channels in the Scan list.	np3...np2...np1...P1...P2...n p3...np2...np1...P1...P2, etc.
---	---

The above scanning orders assume that Priority 1 and Priority 2 channels exist. If they have not been assigned, their positions in the scanning order are eliminated.

NOTE

Priority channels will continue being scanned during hang time.

PTT

Pressing the PTT switch causes the radio to transmit on the selected channel frequency and to stop the scanning routine. A programmable hang time (0.3 to 5.0 seconds) will start as soon as the PTT switch is released. Scanning will resume at the end of the hang time. The hang time is a PC programmable option and can be enabled or disabled.

Channel Change

Any channel change will change the selected channel and show it in the display window. A channel change will also stop the scanning routine for a fixed, 2-second hang time. If no activity is detected on this new selected channel during this 2-second hang time, scanning will resume.

Priority SCAN

As soon as any activity is detected on a channel, the radio will change the scanning mode from Simple SCAN to Priority SCAN. The new receive channel will appear in the LCD window.

If the receive channel is a Non-Priority channel, both Priority 1 and Priority 2 channels will be sampled (scanned) every 500 milli-seconds in the order indicated at the right.	P1...P1...P2...P1...P1...P2.. .P1...P1...P2, etc.
--	--

- If a Priority 1 channel has not been established, the radio will only break away to sample the Priority 2 channel every 1.0 second.
- If a Priority 1 channel has been established but not a Priority 2 channel, the radio will break away to sample the Priority 1 channel every 500 milliseconds.
- If neither a Priority 1 or Priority 2 channel has been established, the radio will lock on this channel until activity on this channel goes away.
- When the receive channel is a Priority 2 channel, the radio only samples Priority 1 channel every 500 milliseconds.
- When the receive channel is a Priority 1 channel, no other channels will be scanned.

Once activity on the receive channel has ended, a programmable hang time (0.3 to 5.0 seconds) is started. Scanning will resume at the end of the hang time if there is no activity on that channel. The selected channel will appear now on the display. Note that Priority channels will continue being scanned during hang time.

To alert the operator of an incoming call on the Priority 1 channel, an option is available to sound a beep upon receiving this Priority 1 channel.

Scanning for Channel Guard

The scanning for Channel Guard option may be selected if, in addition to carrier activity alone, a correct Channel Guard is also required to lock on a channel when scanning. This option is selected on an individual radio basis.

Scanning Priority channels with the wrong Channel Guard will change the scanning rate as follows:

Priority 1 with wrong Channel Guard: The radio will change its Priority 1 sample rate from 0.5 seconds (.5 seconds) to 2.5 seconds, but it will still sample the Priority 2 channel every 1.0 second.

Priority 2 with wrong Channel guard: The radio will change its Priority 2 sample rate from 1.0 second to 5.0 seconds, but will continue to sample the Priority 1 channel every 500 milliseconds (.5 seconds).

PTT The operator has two PC programmable options to select from in regard to what channel to transmit on. The operator can choose to transmit on the selected channel or on the receive channel. The transmit channel will be shown on the display. Releasing the PTT switch will unkey the transmitter and start the programmable hang time (0.3 to 5.0 seconds), if enabled. Scanning will resume again at the end of the hang time unless there is activity on that channel.

Channel Change Any channel change will change the selected channel. The receive channel, if any, will stop being displayed/heard and replaced by the new selected channel. The scanning routine is temporarily stopped for a fixed 2 seconds and will resume again if there is no activity on the selected channel.

NOTE

Priority channels will continue being scanned during hang time.

TONE PROGRAMMING

An IBM-compatible personal computer using MS-DOS and a Programmer Interface Box plus the proper programming software is used to program the Type 99 tones, Channel Guard tones, and Channel Guard digital code. The Programmer Interface Box is connected between the UDC on the side of the radio and the back of the personal computer. Refer to Programming Guide for details.

Two sets of Type 99 tones can be programmed in the radio. Any channel can be programmed to decode any call or all calls based on any one of the two tone sets. Individual, group, and super group paging can be used. Motorola formats are also acceptable.

PG is displayed on the LCD when that channel has been programmed to receive Type 99 calls. Both receive and transmit Channel Guard may also be programmed to any channel with Type 99 tone.

An Intermittent beep is sounded to alert the operator of an incoming Type 99 call.

Upon receiving a call, the radio will open the audio and flash the **PG** indicator until it is reset by momentarily pressing the MONITOR button.

NOTE

If a Type 99 channel is in the Scan list and SCAN is enabled, Type 99 tones are ignored. Scanning is done on a Carrier and Channel Guard basis only.

The optional Type 99 programming provides individual, group, and super group call decode. The Motorola-formatted, two-tone, sequential signalling schemes can also be decoded.

In Type 99 tone systems, calls will not be heard from the receiver until the proper two tones are detected. When the second tone is decoded and recognized as correct, an alert tone sounds during the remaining portion of the second tone. The receiver audio path opens and remains open to receive messages until the decoder is reset. The **PG** indicator will also flash to show a call has been received.

The radio can be programmed with up to two separate tables of tones. Either the Ericsson Type 99 format or the Motorola format can be assigned to each tone table. The tone decoder (individual, group, and super group for Ericsson format or individual, group, and quick call for the Motorola format) can be enabled individually for each channel. Once enabled, one of the two tone tables can be selected for each channel.

The Group Call format allows communication with all radios in a group. The Super Group Call (in Ericsson Tone systems) or Quick Call (in Motorola tone systems) allows communications between all radios in a system.

TYPE 99 FORMAT

Tone frequencies in the Ericsson tone system fall within the range of 517.5 to 997.5 Hz.

In the tone format, the first tone can be from Tone Group A (for individual or group calls) or from Tone Group C (for super group calls). The second tone may be from Tone Group B (for individual calls) or from Tone Group D (for group or super group calls). The tone format is illustrated as follows.

INDIVIDUAL CALL FORMAT	<...1.0 SEC...> 20% TONE A	<...200 MS...> 25% GAP	<..1.0 SEC..> +300%, -0% TONE B
GROUP CALL FORMAT	<...1.0 SEC...> 20% TONE A	<...200 MS...> 25% GAP	<..1.0 SEC..> +300%, -0% TONE D
SUPER GROUP CALL FORMAT	<...1.0 SEC...> 20% TONE C	<...200 MS...> 25% GAP	<..1.0 SEC..> +300%, -0% TONE D

For example, assume the paging number to be 123; the first digit of the paging number is a "1." Look in Table 3 and read down the column labeled "100's Digit" to a "1." Read horizontally across the column labeled "10's Digit." The Tone Group is B. The second digit of the paging number is a "2." The tone number is B2. Look in Table 4 and down the column labeled "Tone Designator" to find B2. Read horizontally across the column labeled "Tone Frequency." The first tone frequency is 787.5 Hz.

To determine the second tone frequency, look in Table 3 and, as before, find the first digit of the paging number ("1").

The second Tone Group is A. The third digit of the paging number is a "3" and the Tone Designator is A3. In Table 4, read down the column labeled "Tone Designator" and find A3. Read horizontally across the column labeled "Tone Frequency." The second tone frequency is 802.5 Hz.

For different paging numbers, locate the first digit in the "100's Digit" column and determine the tone frequencies as described in the example.

Tone D is the diagonal tone used (in Ericsson systems only) when the first and second tone frequencies are the same. The standard frequency for Tone D is 742.5 Hz, but may be programmed with any tone frequency.

Table 3 - Ericsson Tone Groups

100's Digit	10's Digit For First Tone	1's Digit For Second Tone
0	A	A
1	B	A
2	B	B
3	A	B
4	C	C
5	C	A
6	C	B
7	A	C
8	B	C
9	NOT USED	

MOTOROLA FORMAT

Tone frequencies in the Motorola tone system are within the range of 288.5 to 1433.4 Hz. In the Motorola tone format, the first tone may be one of three tones: A for Individual Call, B for Quick Call, and C for Group Call. The second or final tone is B in all cases.

NOTE

The radio is able to recognize the A, B, and C tones. Individual, Group, and Quick Call formats may be used simultaneously.

The Motorola tone format is illustrated as follows:

INDIVIDUAL CALL FORMAT	<..1.0 SEC..> (Minimum) TONE A	<..NONE..> (Minimum) GAP	<..3.0 SEC..> TONE B
GROUP CALL FORMAT	<..1.0 SEC..> (Minimum) TONE C	<..NONE..> (Minimum) GAP	<..3.0 SEC..> TONE B
QUICK CALL FORMAT	<.....8 SEC.....> TONE B		

Individual Call

Tables 5 and 7 may also be used to determine the tone frequencies. The first digit of the code determines the tone group used in the code (see Table 5). Then Table 6 is used to determine the actual tone frequencies. For a code of 124, the tone groups used are shown in Table 5. Tone A and Tone B are both located in Tone Group 1 and Tone B is tone number 4. Refer to the following examples for additional information.

Example 1 - Code 098:

The digit "0" in Table 5 (First Digit of Code) shows the Tone A is in Tone Group 4 and Tone B is in Tone Group 2 (see Table 5).

Tone number 9 in Tone Group 4 is 524.6 Hz.

Tone number 8 in Tone Group 2 is 879.0 Hz.

Example 2 - Code 265:

The digit "2" in Table 5 shows that both Tone A and Tone B are in Tone Group 2.

Tone number 6 in Tone Group 2 is 788.5 Hz.

Tone number 5 in Tone Group 2 is 746.8 Hz.

Group Call (Quick Call Format)

In Group Call applications, the tone group is determined by Table 7, while the frequency is determined by Table 6. Refer to the following examples.

Example 1- Group Call Code 07 (also code 27 and 37):

The digit "0" in Table 7 shows that Tone B is in Tone Group 2 along with 20 to 29 and 30 to 39. Tone number 7 in Tone Group 2 is 832.5 Hz (see Table 6).

NOTE

Group Call code numbers range from 00 to 99. However, there are several Group Calls with the same Tone B frequency. This limits the total number of Group Calls to 40.

Example 2 - Group Call 98 (also 48 and 88):

The digit "9" in Table 7 shows that Tone B is in Tone Group 4 along with 40 to 49 and 80 to 89. Tone number 8 in Tone Group 4 is 496.8 Hz.

Table 4 - Ericsson Tone Generator Frequencies

TONE GROUP	TONE DESIGNATOR	TONE FREQUENCY (Hz)
A	A0	682.5
	A1	592.5
	A2	757.5
	A3	802.5
	A4	847.5
	A5	892.5
	A6	937.5
	A7	547.5
	A8	727.5
	A9	637.5
B	B0	652.5
	B1	607.5
	B2	787.5
	B3	832.5
	B4	877.5
	B5	922.5
	B6	967.5
	B7	517.5
	B8	562.5
	B9	697.5
C	C0	667.5
	C1	712.5
	C2	772.5
	C3	817.5
	C4	862.5
	C5	907.5
	C6	952.5
	C7	532.5
	C8	577.5
	C9	622.5
DIAGONAL TONE		742.5

Table 5 - Motorola Type Code Numbers

First Digit of Code	Tone Group from which Tone A is Selected	Tone Group from which Tone B is Selected
1	1	1
2	2	2
3	1	2
4	4	4
5	5	5
6	2	1
7	4	5
8	5	4
9	2	4
0	4	2
A	3	3

Table 7 - Motorola Group Call Tone Groups (TG)

GROUP CALL CODE NUMBER	TONE GROUP (TONE B)
00-09	TG2
10-19	TG1
20-29	TG2
30-39	TG2
40-49	TG4
50-59	TG5
60-69	TG1
70-79	TG5
80-89	TG4
90-99	TG4

Table 6 - Motorola Type Code Numbers

TONE NO.	TONE GROUP 1 (Hz)	TONE GROUP 2 (Hz)	TONE GROUP 3 (Hz)	TONE GROUP 4 (Hz)	TONE GROUP 5 (Hz)	TONE GROUP 6 (Hz)
1	349.0	600.9	288.5	339.6	584.8	1153.4
2	368.5	634.5	296.5	358.6	617.4	1185.2
3	389.0	669.9	304.7	378.6	651.9	1217.8
4	410.8	707.3	313.0	399.8	688.3	1251.4
5	433.7	746.8	953.7	422.1	726.8	1285.8
6	457.9	788.5	979.9	445.7	767.4	1321.2
7	483.5	832.5	1006.9	470.5	810.2	1357.6
8	510.5	879.0	1034.7	496.8	855.5	1395.0
9	539.0	928.1	1063.2	524.6	903.2	1433.4
0	330.5	569.1	1092.4	321.7	553.9	1122.5

ALIGNMENT

This section describes the alignment procedure for the radio. This procedure should be used whenever a board or component is replaced or the operation of the radio is in doubt.. Almost all alignment and checks can be accomplished through the Universal Device Connector (UDC) using the maintenance section of the PC Programming Software. The setting of the transmitter deviation requires the removal of the front case of the radio to adjust VR402 and/or VR403.

TEST EQUIPMENT

The following test equipment is recommended for radio alignment:

- Communications Monitor (HP8920B or equivalent)
- DC Voltmeter (1 megohm input impedance)
- DC Power Supply (7.5 volts at 5 amp)
- IBM or compatible personal computer
- PC Programming Software
- Programming Adapter Box TQ-3370 with Interface Cable
- Radio Programming Cable
- DC Power Adapter
- DC Power Cable
- RF Coaxial Cable (50 ohms)

Initial Setup

NOTE

If transmitter modulation does not require adjustment, begin with Step 5.

1. Remove the channel select and volume knobs. Then remove top cover and front case from radio.
2. Attach DC power adapter to radio and set voltage on power supply for 7.5 volts.
3. Connect Programming Adapter TQ-3370, interface cable and radio programming cable between computer and radio UDC.
4. Connect radio to Communications Monitor.
5. Turn on radio and note that all LCD segments light.
6. Program the default personality file into the radio using the PC Programming Software.
7. Execute radio programming software and program three (3) test channels as follows:

BAND (MHz)	CHANNEL		
	<u>1</u>	<u>2</u>	<u>3</u>
403-440	403.025	421.500	439.975
440-470	440.025	455.500	469.975
470-512	470.025	491.000	511.975

CPU Clock Adjustment C445

1. Set communications monitor for Antenna Input mode.
2. Ensure that CPU clock shift is turned off for receive.
3. Monitor on Communications Monitor the 7.3728 MHz radiation leakage using any type of antenna.
4. Adjust trimer capacitor C445 to obtain 7.3728 MHz 50 Hz.
5. Enable CPU clock shift and confirm that clock shifts approximately +800 Hz.

RF Output Power

1. Select radio channel 1 and key the radio under low power mode.
2. If necessary, change default value to obtain the required low power output.
3. Set the radio for high power mode.
4. If necessary, change default value to obtain the required high power output.
5. Repeat the above steps using channel 2 and 3.

Transmitter Modulation

NOTE

The front cover of the radio must be removed to gain access to modulation controls VR402 and VR403.

Make sure that the limiter is not clipping the transmitter audio input at the standard input level before the adjustment. (LIMITER CONTROL value should be more than 3.0Vin-itially.)

1. Set up HP8920B; <20 Hz HPF, 15 kHz LPF, De-Emp. off, Peak ± 2 .
2. Set the radio channel 2 (mid. channel) at 25 kHz step.
3. Apply a 1 kHz tone at 14mV input level to the transmitter audio input.
4. Roughly Adjust VR403 to obtain standard deviation 3.0 kHz.
5. Enable 67.0 Hz CG tone without audio input.
6. Adjust VR402 to obtain 0.85 kHz deviation.
7. Enable 192.8 Hz CG tone without audio input.
8. Adjust VR403 to obtain 0.85 kHz deviation.
9. Enable 67.0 Hz CG tone without audio input again.
10. Adjust VR402 to obtain 0.85 kHz deviation again.
11. Make sure to obtain 0.6 to 0.9 kHz deviation at 100 Hz CG tone and DCG code 627.
12. Set up HP8920B; <20 Hz HPF, 15 kHz LPF, De-Emp. off, Peak \pm Max.
13. Disable CG tone.
14. Set the radio channel 1 (lowest channel) at 25 kHz step.
15. Apply a 1 kHz tone at the standard input level (+20 dB) to the transmitter audio input.

16. Adjust LIMITER CONTROL value to obtain 3.75 kHz deviation without CG.
17. Enable CG encode and insure that total deviation is 4.5 kHz at 25 kHz step.
18. Repeat the above step 15 to 17 using channel 2 and 3 (Highest channel).

TCXO

1. Connect Communications Monitor to radio.
2. Key the radio and monitor the transmitter frequency stability.
3. Adjust TCXO reference voltage using the PC Programming Software to get required transmitter frequency (typical voltage should be 2.20V, adjustable range is between 2.00 and 2.40 V).

BATTERY INFORMATION

CHARGE BEFORE USING

Insert the radio into the slot on the charger and ensure that the ON/OFF/VOLUME control is in the OFF position. Connect charger to an AC power source. Charge the battery for the first time at least 14 hours but no longer than 48 hours. Over-charging may reduce battery life.

RECHARGING THE BATTERY

Recharge the battery when you experience difficulty in receiving or sending a message. Also the battery may need recharging when the red TX indicator is blinking.

Chargers are available with nominal charge times of one to 14 hours. Combinations include single and multiposition chargers. When charging a battery pack that is attached to a radio, always turn the radio OFF to ensure a full charge. For specific instructions, refer to the applicable charger Operator's Manual. Charging in non-Ericsson equipment may lead to battery damage and void the battery warranty.

Batteries which have been stored (charged or discharged) will generally not be capable of full capacity until the batteries have been fully cycled two or three times. (Charging the battery in an Ericsson rapid charger and then discharging the battery pack with the radio until low battery is indicated is considered one cycle.)

INSTALLING THE BATTERY PACK

1. Ensure the ON/OFF/VOLUME control knob is in the OFF (detent) position.
2. Align the battery pack tabs with the battery mounting plate slots on the back of the radio (see Figure 6).
3. Insert the tabs into the slots, push down and slide the battery toward the battery latch until the battery latch clicks into place.

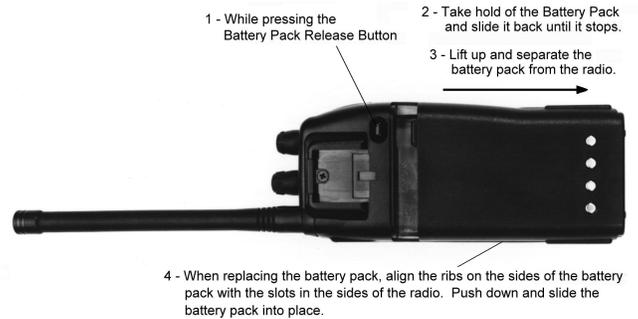


Figure 6 - Installing And Removing The Battery Pack

REMOVING THE BATTERY PACK

1. Ensure the ON/OFF/VOLUME control knob is in the OFF (detent) position.
2. Press the battery release button to release the battery.
3. Remove the battery pack by sliding it back until it stops. Then lift up and away until it separates from the radio.

BATTERY CARE & MAINTENANCE

- Your charger is intended for indoor use only. Keep the charger and/or wall cube dry. **Do Not** use in or near water.
- **Never** let the battery contacts touch metal objects that could short-circuit the contacts. For example, keys or coins in your pocket.
- **Do Not** disassemble a battery.
- **Do Not** dispose of a battery in a fire.
- Use only the supplied or specified battery and charger.
- Periodically condition your battery for improved battery capacity and performance.

BATTERY RECYCLING



The product you have purchased contains a rechargeable battery. The battery is recyclable. At the end of its useful life under various state and local laws, it may be illegal to dispose of this battery into the municipal waste stream. Check with your local solid waste officials for details concerning recycling options or proper disposal in your area. Call Toll Free 1-800-8-BATTERY for information and/or procedures for returning rechargeable batteries in your state.

OPERATING TIPS

Antenna location and condition is important when operating a portable radio. Operating the radio in low areas or terrain, under power lines or bridges, inside of a vehicle or

in a metal or steel framed building can severely reduce the range of the unit. Mountains and buildings can also reduce the range of the unit.

In areas where transmission or reception is poor, some improvement may be obtained by ensuring that the antenna is vertical. Moving a few yards in another direction or moving to a higher elevation may also improve communications. Vehicular operation can be aided with the use of an externally mounted antenna.

Battery condition is another important factor in the trouble free operation of a portable radio. Always properly charge the batteries.

EFFICIENT RADIO OPERATION

Hold the portable radio approximately three inches from your mouth and speak into the microphone at a normal voice level.

Keep the antenna in a vertical position when receiving or transmitting a message.

Do not hold the antenna when receiving a message and, especially, do **not** hold when transmitting a message.

ANTENNA CARE AND REPLACEMENT

Do not use the portable radio with a damaged or missing antenna. A minor burn may result if a damaged antenna comes into contact with the skin. Replace a damaged antenna immediately. A missing antenna could damage your portable radio.

Use only the supplied or approved antenna. Unauthorized antennas, modifications or attachments could damage the radio unit and may violate FCC regulations.

ELECTRONIC DEVICES

RF energy from your portable radio may affect some electronic equipment. Most modern electronic equipment in cars, hospitals, homes, etc. are shielded from RF energy. However, in areas that instruct you to turn off two-way radio equipment, always observe the rules. If in doubt, turn it off.

AIRCRAFT

Always turn off your portable radio before boarding any aircraft.

- **Use it on the ground only with crew permission**
- **Do not use it in the air**

BLASTING AREAS

To avoid interfering with blasting operations, turn your radio OFF when in a "blasting area" or in areas posted "turn off two-way radio". Remote control RF devices are used by some construction crews to set off explosives.

POTENTIALLY EXPLOSIVE ATMOSPHERES

Areas with potentially explosive atmosphere are often, but not always, clearly marked. These may be fueling areas, such as gas stations, fuel or chemical transfer or storage facilities, and areas where the air contains chemicals or particles, such as grain, dust or metal powders.

Sparks in such areas could cause an explosion or fire resulting in bodily injury or even death.

Turn OFF your radio when in any area with a potentially explosive atmosphere. It is rare, but not impossible that the radio or its accessories could generate sparks.

ACCESSORIES

The following accessories are available for use with the KPC-300/400 radio units:

- VHF Antenna (Helical) KRE 101 1219/1, /2 or /3
- UHF Antenna (Helical) KRE 101 1219/10, /12 or /13
- Rechargeable Battery Pack (High Capacity) BKB 191 202
- Rechargeable Battery Pack (Extra High Capacity) BKB 191 203
- Belt Clip KRY 101 1232/2
- Speaker/Microphone KRY 101 1617/31
- Rapid Charger Base with sleeve BML 161 59/1
BML 161 51/005
- Swivel Mount with Belt Clip KRY 101 1609/A1
- Leather Case w/Belt Loop KRY 101 1622/1
- Leather Case w/swivel & Belt Loop KRY 101 1622/A2
- UHF Antenna (Whip) KRE 101 1223/10, /12
- Earpiece RLD 541 07/11
- Leather Case w/Belt Loop KRY 101 1622/1
- Leather Case w/Swivel/Belt Loop KRY 101 1622/A2
- Shoulder Strap (for Leather Case) KRY 101 1607/1

SWIVEL MOUNT REMOVAL AND REPLACEMENT

To remove the swivel mount, slide a flat blade screwdriver underneath the spring retainer and twist. While twisting, slide the swivel mount out from under the holder.

To replace the swivel mount, place the end of the swivel in the grooves of the holder on the back of the radio and slide the mount up until it snaps into place.

MAINTENANCE

It is highly recommended that no repairs to this unit be attempted. All defective units should be returned to Ericsson Inc. for repair and/or replacement. See *Portable Radio Limited Warranty* paragraph for additional information. Parts List, component drawings and schematic diagram are provided for reference only.

DISASSEMBLY

Disassembly of the KPC-300/400 Portable Radio Units should be done very carefully. Damage to the watertight/dustproof seals could occur when disassembling or reassembling the unit. The following procedure should be followed to permit removal of the front housing.

NOTE

There are no electronics under the plastic rear cover which merely covers the latching mechanism and provides appearance.

1. Remove the battery pack.
2. Remove the two screws on bottom of casting holding the plastic front to the casting.
3. Remove the rubber overcoat from both the volume and channel switches.
4. Remove the plastic bushings from the shafts of the volume and channel switches.
5. Remove the nut holding the volume to the top panel
6. Carefully remove the top cover.
7. The front housing is now ready for removal. This housing is still attached to the casting by detents in the plastic housing engaging bumps in the casting.
 - a. Insert a narrow object between the casting and the plastic cover along the sides of the radio and gently spread the plastic housing away from the casting.
 - b. Gently lift the plastic housing, starting at the bottom of the radio, and working upwards to the top of the radio (top of plastic housing held by pin at top of casting).
8. Reassemble the radio in reverse order.

CAUTION

When reassembling the radio, failure to replace and/or seat the watertight/dustproof gaskets and seals may affect the integrity of the seals and affect the weatherproof and dustproof feature of the radio. All weatherproof sealing is done between the casting in the front cover.

Water seals are provided around the battery contacts, the UDC connector and the volume and channel select switches. A watertight/dustproof gasket is located between the speaker cone and the grille covering. All pushbutton switches use silicon rubber gaskets and are pressed against the plastic housing to insure watertight seals.

REPLACEMENT PARTS

The following parts or kits prefixed by "KG/" will be stocked in Service Parts and will be available for replacement.

KIT NAME	PART NO.	CONTENTS/DESCRIPTION
KNOB KIT	KG / XX000001	KNOB INNER (VOL)
		KNOB INNER (CH)
		VOL KNOB OUTER
		CH KNOB OUTER
		SCREW (M2.6)
		M7 NUT FOR VOL
CHANNEL SWITCH KIT	KG / XX000002	CH SWITCH
		TACT SWITCH
		MAIN FPC
		EMERGENCY BUTTON SPACER
		M6 NUT (CH)
Z107 FILTER (455 MHZ)	KG / FL001005	CHIP TYPE
Z102 FILTER	KG / FL114002	70 MHZ FILTER FOR UHF (PAIR)
Z104 FILTER (455 MHZ)	KG / FL001005	CHIP TYPE
Z105 FILTER (455 MHZ)	KG / FL001006	CHIP TYPE
Z106 FILTER (455 MHZ)	KG / FL001007	DISC. TYPE
Y101 2ND LO X'TAL	KG / XT112002	69.545 X'TAL OSC FOR UHF
Y402 CLOCK X'TAL	KG / XT112003	7.3728 MHZ X'TAL OSC
U201 TX POWER AMP	KG / IC090007	FOR UHF-L
		FOR UHF-M
		FOR UHF-H
F401 CHIP FUSE	KG / FU111001	CHIP FUSE 4A
LCD REPAIR KIT	KG / XX000003	LCD DISPLAY
		INTER CONNECTOR
		LCD HOLDER
		LCD SPACER
		LCD RUBBER
DTMF FRONT KIT	KG / XX000004	24 OHM .5W 36mm SPEAKER
		MIC UNIT
		FRONT FPC
		ELEMENT KEY SWITCH
		TACT SWITCH
		DTMF FPC
		ELEMENT KEY SWITCH
		DTMF BUTTON
		FRONT CASE ASSY
		FRONT BUTTON
		FRONT BUTTON STOPPER
		SCREW 2 X 4
		SIDE BUTTON
		VR. TAPE (S. BUTTON)
SPEAKER COVER		
SCAN FRONT KIT	KG / XX000005	MIC COVER
		BUSHING (MIC)
		24 OHM .5W 36mm SPEAKER
		MIC UNIT
		FRONT FPC
		ELEMENT KEY SWITCH
		TACT SWITCH
		FRONT CASE ASSY
		FRONT BUTTON
		FRONT BUTTON STOPPER
		SCREW 2 X 4

KIT NAME	PART NO.	CONTENTS/DESCRIPTION
		SIDE BUTTON
		VR. TAPE (S. BUTTON)
		SPEAKER COVER
		MIC COVER
		BUSHING (MIC)
NAME PLATE G.E.	KG / XX000006	
NAME PLATE ERICSSON	KG / XX000007	
MAIN CIRCUIT BOARD	KG / XX000010	UHF-L DTMF TYPE
		UHF-M DTMF TYPE
		UHF-H DTMF TYPE
		LCD HOLDER
		LCD SPACER
		LCD RUBBER
		SHIELD VCO
		SHIELD CASE (BPF)
SUB BOARD KIT	KG / XX000015	FOR UHF-L
		FOR UHF-M
		FOR UHF-H
		PARTS
		M7 NUT (VOL)
RADIO CASTING	KG / XX000018	UDC FPC
		UDC CONNECTOR 6 PIN
		UDC BRACKET
		UDC RUBBER
		SPRING (SUB. PCB)
		UDC COVER
		SCREW (UDC COVER)
		PLATE (GROUND)
		SPRING (GROUND)
		DIECAST HOUSING
		EJECT PLATE
		SPRING
		KNOB
		SCREW
SPACER BATTERY		
LABEL		
REAR PLASTIC HOUSING		
PA SHIELD		
WATER SEAL KIT	KG / XX000019	GASKET
		BATTERY PROBE RUBBER
		GASKET SHEET
TOP PANEL KIT	KG / XX000020	TOP PANEL
		EMERGENCY BUTTON
		EMERGENCY BUTTON SPACER
HARDWARE KIT	KG / XX000021	FOR REAR CASE (SCREW)
		FOR EJECT PLATE (SCREW)
		FOR VOL&CH INNER (SCREW)
		FOR F. BUTTON STOPPER (SCREW)
		FOR UDC BRACKET (SCREW)
		FOR UDC CONNECTOR (NUT)
		FOR UDC CONNECTOR (WASHER)
		FOR BATTERY CONNECTOR (SCREW)
		FOR REAR CASE (SCREW)
		PA SHIELD (SCREW)
		SUB PCB (SCREW)
SUB PCB (WASHER)		

PARTS LIST
UHF 403-440 MHz
REV. 2

SYMBOL	PART NO.	DESCRIPTION
C100		Chip capacitor 1000P K
C101		Chip capacitor 1000P K
C102		Chip capacitor 5P
C109		Chip capacitor 2P
C110		Chip capacitor 3P
C112		Chip capacitor 6P
C124		Chip capacitor 1000P K
C126		Chip Capacitor 0.1u 25V
C127		"Chip Tantalum 4.7uF 10V,,A"
C128		Chip Capacitor 0.1u 25V
C129		Chip capacitor 1000P K
C132		Chip capacitor 1000P K
C133		"Chip Tantalum 4.7uF 10V,,A"
C134		Chip capacitor 0.01uF 50V K
C135		Chip Capacitor 0.1u 25V
C136		Chip capacitor 12P SH 50V
C137		Chip capacitor 27P
C138		Chip Capacitor 0.1u 25V
C139		Chip capacitor 100P
C140		"Chip Tantalum 4.7uF 10V,,A"
C141		Chip Capacitor 0.1u 25V
C142		Chip capacitor 1000P K
C151		Chip capacitor 220P CH 50V
C152		Chip Tantalum 2.2uF 16V
C153		Chip Capacitor 1u 10V Z JF
C156		"Chip Tantalum 4.7uF 10V,,A"
C157		Chip Capacitor 0.1u 25V
C160		Chip capacitor 0.01uF 50V K
C161		Chip Capacitor 0.1u 25V
C171		Chip capacitor 2P
C180		Chip Capacitor 0.1u 25V
C181		Chip Capacitor 1u 10V Z JF
C185		Chip capacitor 220P CH 50V
C186		Chip Tantalum 0.1uF K 35V
C187		Chip Tantalum 0.22uF K 35V
C188		Chip capacitor 680P CH 50V
C189		Chip Capacitor 4P CH 50V
C190		Chip capacitor 1000P K
C193		Chip Capacitor 2.2uF 10V Z JF
C201		Chip capacitor 0.01uF 50V K
C202		"Chip Tantalum 10uF 16V,,B2"
C203		Chip capacitor 1000P K
C205		Chip capacitor 1000P K
C206		Chip capacitor 1000P K
C207		Chip Capacitor 7P CH 50V
C210		Chip capacitor 47P
C211		Chip Capacitor 0.1u 25V
C212		Chip Capacitor 1u 10V Z JF
C213		Chip Capacitor 0.1u 25V
C214		"Chip Tantalum 4.7uF 10V,,A"
C215		Chip capacitor 1000P K
C216		Chip capacitor 1000P K

SYMBOL	PART NO.	DESCRIPTION
C218		Chip capacitor 1000P K
C220		Chip capacitor 1000P K
C221		Chip Capacitor 1u 10V Z JF
C231		Chip capacitor 0.01uF 50V K
C232		Chip capacitor 0.01uF 50V K
C233		Chip capacitor 1000P K
C234		Chip capacitor 1000P K
C301		Chip Capacitor 0.1u 25V
C302		Chip capacitor 33P
C303		Chip Capacitor 7P CH 50V
C304		Chip capacitor 10P
C305		Chip capacitor 6P
C306		Chip capacitor 1000P K
C307		Chip capacitor 1000P K
C308		Chip capacitor 1000P K
C309		Chip capacitor 0.01uF 50V K
C311		Chip Tantalum 1uF 16V
C312		"Chip Tantalum 10uF 10V,,A"
C313		Chip capacitor 100P
C314		Chip capacitor 0.01uF 50V K
C316		Plastic Film Capacitors 0.033u J 16 V 3216
C317		Chip Tantalum 2.2uF 10V K
C318		Chip Tantalum 0.22uF K 35V
C322		Chip capacitor 0.01uF 50V K
C323		"Chip Tantalum 4.7uF 10V,,A"
C324		Chip capacitor 1000P K
C325		Chip Capacitor 0.1u 25V
C326		Chip Capacitor 0.1u 25V
C327		Chip Capacitor 0.1u 25V
C331		Chip capacitor 0.01uF 50V K
C332		Chip capacitor 5P
C335		Chip capacitor 1000P K
C337		Chip Capacitor 0.1u 25V
C338		none
C401		Chip capacitor 220P CH 50V
C413		Chip Capacitor 1u 10V Z JF
C415		"Chip Tantalum 4.7uF 10V,,A"
C416		Chip capacitor 100P
C417		Chip Tantalum 0.22uF K 35V
C418		Chip capacitor 33P
C419		Chip capacitor 470P CH 50V
C420		Chip capacitor 0.022uF 25V
C421		Chip capacitor 100P
C422		Chip Capacitor 1u 10V Z JF
C423		Chip capacitor 150P CH 50V
C426		Chip Capacitor 1u 10V Z JF
C427		Chip Capacitor 1u 10V Z JF
C428		Chip capacitor 6800P
C429		Chip capacitor 82P
C430		Chip capacitor 100P
C431		Chip Capacitor 1u 10V Z JF
C434		Chip Capacitor 0.1u 25V
C440		Chip Capacitor 0.1u 25V
C441		"Chip Tantalum 4.7uF 10V,,A"
C442		Chip capacitor 10P

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SYMBOL	PART NO.	DESCRIPTION
C443		Chip capacitor 3P
C444		Chip capacitor 47P
C445		Trimmer Chip Capacitor 20PF
C446		Chip Capacitor 0.1u 25V
C448		Chip capacitor 1000P K
C449		Chip capacitor 1000P K
C450		Chip capacitor 1000P K
C451		Chip capacitor 1000P K
C452		Chip capacitor 1000P K
C453		Chip Capacitor 1u 10V Z JF
C454		"Chip Tantalum 10uF 16V,,B2"
C455		Chip Capacitor 0.1u 25V
C456		Chip Capacitor 0.1u 25V
C457		"Chip Tantalum 10uF 16V,,B2"
C458		Chip capacitor 0.01uF 50V K
C459		Chip Capacitor 4700P 50V B K
C460		Chip capacitor 0.01uF 50V K
C461		Chip capacitor 0.01uF 50V K
C462		Chip Capacitor 0.1u 25V
C463		Chip Capacitor 0.1u 25V
C464		Chip capacitor 1000P K
C465		Chip Capacitor 1u 10V Z JF
C466		"Chip Tantalum 10uF 16V,,B2"
C467		Chip capacitor 0.01uF 50V K
C468		"Chip Tantalum 10uF 10V,,A"
C469		"Chip Tantalum 10uF 10V,,A"
C470		"Chip Tantalum 4.7uF 10V,,A"
C471		Chip capacitor 0.01uF 50V K
C472		Chip capacitor 0.01uF 50V K
C473		"Chip Tantalum 4.7uF 10V,,A"
C474		Chip capacitor 1000P K
C476		Chip capacitor 1000P K
C480		Chip capacitor 1000P K
C481		Chip capacitor 1000P K
C482		Chip capacitor 1000P K
C483		Chip capacitor 1000P K
C484		Chip capacitor 1000P K
C485		Chip capacitor 1000P K
C486		Chip capacitor 1000P K
C494		Chip capacitor 1000P K
C495		Chip capacitor 1000P K
C496		Chip capacitor 1000P K
C497		Chip capacitor 1000P K
C498		"Chip Tantalum 10uF 10V,,A"
C499		Chip Capacitor 0.1u 25V
C500		"Chip Tantalum 4.7uF 10V,,A"
C513		Chip Capacitor 1u 10V Z JF
C514		Chip capacitor 1000P K
C515		Chip capacitor 1000P K
C516		Chip capacitor 1000P K
C517		Chip Capacitor 0.1u 25V
C518		"Chip Tantalum 4.7uF 10V,,A"
C519		Chip capacitor 0.01uF50V Z
C521		Chip capacitor 470P CH 50V
C522		Chip Capacitor 1u 10V Z JF

SYMBOL	PART NO.	DESCRIPTION
C523		Chip capacitor 1000P K
C524		Chip capacitor 1000P K
C525		Chip capacitor 1000P K
C526		Chip Capacitor 0.1u 25V
C527		Chip capacitor 22P
C601		Chip capacitor 5P
C608		Chip capacitor 3P
C610		Chip capacitor 1000P K
C612		Chip capacitor 10P
C613		Chip capacitor 8P
C615		Chip Capacitor 3.5P 50V
C616		Chip capacitor 18P
C617		Chip Capacitor 2.5P 50V
C618		Chip capacitor 18P
C619		Chip capacitor 27P
C620		Chip capacitor 6P
C621		Chip Capacitor 2.5P 50V
C622		Chip Capacitor 15P CH 50V
C623		Chip Capacitor 7P CH 50V
C624		Chip capacitor 1000P K
C626		Chip Capacitor 0.1u 25V
C627		Chip capacitor 1000P K
D101		"RF Switching PIN Diode 10W, SMT"
D102		"RF Switching PIN Diode 10W, SMT"
D201		Shottky Barrier Diode Dual
D202		Band Switch Diode
D401		LED SMT Green
D402		LED SMT Green
D403		Band Switch Diode
D406		LED SMT Yellow & Red
D408		Zener Diode 11V 150mW
D409		LED SMT Green
D410		LED SMT Green
D601		"Varactor diode, rs=.28, c1v/c4v=2.0"
D602		"Varactor diode, rs=.28, c1v/c4v=2.0"
D603		"Varactor diode, rs=.28, c1v/c4v=2.0"
D604		Diode
D605		"Varactor diode, rs=."
F401		Chip Fuse 4A
J101		Antenna Connector
J103		Co-axial Connector female
J401		FPC 0.625 Vertical Connector 18 pin
J402		"SMT/ZIF Type Flexible PCB Connector 24pin, 0.5mm,,Vertical"
J403		"SMT/ZIF Type Flexible PCB Connector 10pin, 0.5mm,,Vertical"
J404		FPC 0.8 Horizontal Connector 11 pin
J408		UDC Connector 6pin (Trial 15pcs)
JP1		Chip Resistor 0 1/10W
JP12		Chip Resistor 0 1/10W
JP2		Chip Resistor 0 1/10W
JP3		Chip Resistor 0 1/10W
L101		Chip Inductor 22nH K
L103		Chip coil 25n
L104		Chip coil 25n
L105		Chip coil 25n

SYMBOL	PART NO.	DESCRIPTION
L106		Chip Inductor 39nH J
L108		Chip coil 25n
L110		33n chip inductor
L111		"Chip Shielded Inductor,,2520 ,,0.47u,,K"
L112		"Chip Shielded Inductor,,2520 ,,1.8u,,K"
L113		Chip Inductor 330nH J
L114		Chip Inductor 470nH J
L116		82n J chip inductor
L117		Chip Inductor 100nH J
L118		Chip Inductor 22nH K
L119		470n chip inductor
L121		High Q Chip Inductor 21.6nH
L201		Chip Inductor 18nH K
L203		Chip Inductor 10nH K
L301		Chip Inductor 22nH K
L303		Chip Inductor 22nH K
L316		Chip Inductor 47nH J
L317		Chip Inductor 47nH J
L601		Chip coil 25n
L609		Chip Inductor 22nH K
L610		Chip Inductor 15nH K
L611		Chip Inductor 15nH K
L612		"Chip Shielded Inductor,,2520 ,,0.82u,,K"
L613		Chip Inductor 47nH J
MC1		MIC UNIT w/o water proof seal
P102		"Co-Axial Connector Cable 60mm,male"
P401		Battery Connector 2pin (Trial 15pcs)
P402		Main Flex Circuit
P403		UDC Flex Circuit
P404		Front Housing Flex Circuit
P407		INTER CONNECTOR
Q101		RF Transistor LNA
Q102		MMIC Mixer Dual gate
Q104		Digital Transistor NPN30mA
Q105		Digital Transistor NPN30mA
Q201		""TRANSISTOR,,2SC3357T""
Q202		General Purpose Transistor
Q203		General TRANSISTOR
Q205		Digital Transistor NPN30mA
Q301		RF Transistor LNA
Q302		TRANSISTOR 2SA1586
Q312		General TRANSISTOR
Q316		MOS FET 2.5 ohm@5V
Q404		Digital Transistor NPN30mA
Q407		Digital TR Power management 500mA
Q408		Digital Transistor NPN30mA
Q409		Digital Transistor NPN30mA
Q410		Digital Transistor NPN30mA
Q411		Digital Transistor NPN30mA
Q412		Digital TR Power management 500mA
Q413		General Purpose Transistor
Q414		Digital TR DTA143XKA DTC144EKA
Q415		Digital Transistor NPN30mA
Q416		Digital Transistor NPN30mA
R103		Chip Resistor 100K 1/10W

SYMBOL	PART NO.	DESCRIPTION
R104		Chip Resistor 300 1/10W
R106		Chip Resistor 300 1/10W
R107		Chip Resistor 100 1/10W
R108		Chip Resistor 18 1/10W
R111		Chip Resistor 1.2K 1/10W
R113		Chip Resistor 15K 1/10W
R114		Chip Resistor 12K 1/10W
R115		Chip Resistor 300k 1/10W
R116		Chip Resistor 15K 1/10W
R119		Chip Resistor 56K 1/10W
R120		Chip Resistor 5.1k 1/10W
R121		Chip Resistor 100K 1/10W
R122		Chip Resistor 10K 1/10W
R123		Chip Resistor 3.3K 1/10W
R133		Chip Resistor 10K 1/10W
R134		Chip Resistor 22K 1/10W
R135		Chip Resistor 0 3216
R201		Chip Resistor 120 1/10W
R202		Chip Resistor 18 1/10W
R203		Chip Resistor 10 1/10W
R204		Chip Resistor 1.5K 1/10W
R205		Chip Resistor 620 1/10W
R207		Chip Resistor 1K 1/10W
R208		Chip Resistor 300 1/10W
R209		Chip Resistor 1.5K 1/10W
R210		Chip Resistor 470K 1/10W
R211		Chip Resistor 240k 1/10W
R212		Chip Resistor 220K 1/10W
R213		Chip Resistor 10K 1/10W
R214		Chip Resistor 10K 1/10W
R215		Chip Resistor 2k 1/10W
R216		Chip Resistor 2.2K 1/10W
R301		Chip Resistor 220 1/10W
R302		Chip Resistor 150K 1/10W
R303		Chip Resistor 51 1/10W
R304		Chip Resistor 150 1/10W
R305		Chip Resistor 39 1/10W
R306		Chip Resistor 150 1/10W
R308		Chip Resistor 51 1/10W
R310		Chip Resistor 0 1/10W
R311		Chip Resistor 4.7K 1/10W
R312		Chip Resistor 560 1/10W
R315		Chip Resistor 33K 1/10W
R316		Chip Resistor 9.1k 1/10W
R317		Chip Resistor 100K 1/10W
R320		Chip Resistor 5.6K 1/10W
R321		Chip Resistor 1K 1/10W
R331		Chip Resistor 3k 1/10W
R332		Chip Resistor 560 1/10W
R333		Chip Resistor 51 1/10W
R411		Chip Resistor 100K 1/10W
R414		Chip Resistor 22K 1/10W
R415		Chip Resistor 18K 1/10W
R416		Chip Resistor 510k 1/10W
R417		Chip Resistor 30k 1/10W

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SYMBOL	PART NO.	DESCRIPTION
R418		Chip Resistor 220K 1/10W
R419		Chip Resistor 5.6K 1/10W
R420		Chip Resistor 33K 1/10W
R421		Chip Resistor 1M 1/10W
R422		Chip Resistor 510k 1/10W
R423		Chip Resistor 56K 1/10W
R424		Chip Resistor 56K 1/10W
R426		Chip Resistor 100K 1/10W
R430		Chip Resistor 68K 1/10W
R432		Chip Resistor 56K 1/10W
R433		Chip Resistor 7.5k 1/10W
R434		Chip Resistor 1M 1/10W
R435		Chip Resistor 100K 1/10W
R436		Chip Resistor 10K 1/10W
R437		Chip Resistor 2.7K 1/10W
R438		Chip Resistor 56K 1/10W
R439		Chip Resistor 100K 1/10W
R443		Chip Resistor 330K 1/10W
R444		Chip Resistor 33K 1/10W
R445		Chip Resistor 100K 1/10W
R446		Chip Resistor 100K 1/10W
R447		Chip Resistor 24k 1/10W
R448		Chip Resistor 56K 1/10W
R449		Chip Resistor 100K 1/10W
R450		Chip Resistor 100K 1/10W
R451		Chip Resistor 560K 1/10W
R452		Chip Resistor 100K 1/10W
R453		Chip Resistor 100K 1/10W
R460		Chip Resistor 56K 1/10W
R461		Chip Resistor 100K 1/10W
R462		Chip Resistor 100K 1/10W
R463		Chip Resistor 100K 1/10W
R464		Chip Resistor 1K 1/10W
R465		Chip Resistor 470 1/10W
R466		Chip Resistor 470 1/10W
R467		Chip Resistor 470 1/10W
R468		Chip Resistor 2k 1/10W
R469		Chip Resistor 2k 1/10W
R470		Chip Resistor 470 1/10W
R471		Chip Resistor 47K 1/10W
R472		Chip Resistor 47K 1/10W
R473		Chip Resistor 3.3K 1/10W
R474		Chip Resistor 1K 1/10W
R475		Chip Resistor 1K 1/10W
R476		Chip Resistor 1.8K 1/10W
R477		Chip Resistor 4.7K 1/10W
R478		Chip Resistor 2.7K 1/10W
R479		Chip Resistor 10 1/10W
R480		Chip Resistor 10 1/10W
R481		Chip Resistor 470K 1/10W
R482		Chip Resistor 10K 1/10W
R483		Chip Resistor 470K 1/10W
R484		Chip Resistor 47K 1/10W
R485		Chip Resistor 10K 1/10W
R486		Chip Resistor 10K 1/10W

SYMBOL	PART NO.	DESCRIPTION
R489		Chip Resistor 15K 1/10W
R490		Chip Resistor 22K 1/10W
R491		Chip Resistor 560 1/10W
R492		Chip Resistor 69.8k F +/-200 .063W 1608
R493		Chip Resistor 62k F +/-200 .063W 1608
R496		Chip Resistor 3.9 1/10W
R497		Chip Resistor 470 1/10W
R499		Chip Resistor 3.3K 1/10W
R500		Chip Resistor 56K 1/10W
R501		Chip Resistor 56K 1/10W
R502		Chip Resistor 62k F +/-200 .063W 1608
R503		Chip Resistor 69.8k F +/-200 .063W 1608
R504		Chip Resistor 220k F +/-200 .063W 1608
R505		Chip Resistor 56K 1/10W
R506		Chip Resistor 10K 1/10W
R507		Chip Resistor 220k F +/-200 .063W 1608
R508		Chip Resistor 47K 1/10W
R509		Chip Resistor 47K 1/10W
R510		Chip Resistor 47K 1/10W
R511		Chip Resistor 47K 1/10W
R512		Chip Resistor 47K 1/10W
R513		Chip Resistor 1M 1/10W
R521		Chip Resistor 4.7K 1/10W
R523		Chip Resistor 2.2K 1/10W
R524		Chip Resistor 470K 1/10W
R525		Chip Resistor 470K 1/10W
R526		Chip Resistor 2.2K 1/10W
R527		Chip Resistor 470 1/10W
R528		Chip Resistor 470 1/10W
R530		Chip Resistor 100K 1/10W
R531		Chip Resistor 1M 1/10W
R532		Chip Resistor 33K 1/10W
R533		Chip Resistor 3k 1/10W
R601		Chip Resistor 100K 1/10W
R602		Chip Resistor 100K 1/10W
R603		Chip Resistor 100K 1/10W
R606		Chip Resistor 100K 1/10W
R607		Chip Resistor 300 1/10W
SP1		Speaker 24 ohm 0.5W 36mm
SW1		"Rotary Switch, 16 position w/ stopper"
SW2		Element Key SWITCH
SW3		Element Key SWITCH
SW4		Element Key SWITCH
SW5		"Tact Switch with stem"
SW6		Element Key SWITCH
SW7		Element Key SWITCH
SW8		"Tact Switch with stem"
U101		IF IC (.65 SSOP)
U102		L-MOS Analog Switch single
U103		L-MOS Analog Switch single
U105		OP AMP LM358 compatible
U107		L-MOS Analog Switch single
U108		L-MOS Analog Switch single
U201		PA Module UHF (400-430MHz)
U202		OP AMP LM358 compatible

UHF 440-470 MHz
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SYMBOL	PART NO.	DESCRIPTION
U301		VCO UHF-L
U302		Synthesizer IC 1.1G
U303		TCXO w/ Modulation 12.8MHz +/- 2.5ppm@-30-70
U401		CTCSS Encoder/Decoder with voice security
U402		OP AMP LM358 compatible
U403		OP AMP LM358 compatible
U404		CPU 8bit
U405		LCD Module
U406		EEPROM 4k bit
U407		Dual Low Voltage Power Amp. 1W BTL
U408		Photo Relay AC 300mA 2ohm max 6pin DIP
U409		L-MOS Analog Switch single
U411		Voltage Detector 5.5V
U412		Voltage Regulator 5V External Tr.
U413		5V series regulator with cont.
U414		Voltage Regulator 5.5V
U415		Voltage Detector 4.0V
U416		OP AMP LM358 compatible
U417		Analog Multiplexer
U418		L-MOS Analog Switch single
U421		"D/A Converter, 8bits, 8ch with OP AMP, 16 SSOP"
VR401		VOLUME WITH SWITCH
VR402		Chip Pot 100k 3.0mm
VR403		Chip Pot 100k 3.0mm
Y101		69.545MHz Crystal OSC SMT
Y402		7.3728MHz Crystal OSC HC-49
Z101		LPF 400-470MHz 12W
Z102		70MHz MCF+/-7.5k 80dB@-910k pair
Z104		Chip Ceramic Filter 455k 4elements
Z105		Chip Ceramic Filter 455k 4elements
Z106		Ceramic Filter 455kHz SMT
Z107		Chip Ceramic Filter 455k 4elements
Z201		"Chip Coupler, 20dB 403-520MHz "
Z601		70MHz MCF+/-7.5k 80dB@-910k pair

SYMBOL	PART NO.	DESCRIPTION
C100		Chip capacitor 1000P K
C101		Chip capacitor 1000P K
C102		Chip capacitor 6P
C109		Chip capacitor 2P
C110		Chip Capacitor 3.5P 50V
C112		Chip capacitor 5P
C124		Chip capacitor 1000P K
C126		Chip Capacitor 0.1u 25V
C127		"Chip Tantalum 4.7uF 10V,,A"
C128		Chip Capacitor 0.1u 25V
C129		Chip capacitor 1000P K
C132		Chip capacitor 1000P K
C133		"Chip Tantalum 4.7uF 10V,,A"
C134		Chip capacitor 0.01uF 50V K
C135		Chip Capacitor 0.1u 25V
C136		Chip capacitor 12P SH 50V
C137		Chip capacitor 27P
C138		Chip Capacitor 0.1u 25V
C139		Chip capacitor 100P
C140		"Chip Tantalum 4.7uF 10V,,A"
C141		Chip Capacitor 0.1u 25V
C142		Chip capacitor 1000P K
C151		Chip capacitor 220P CH 50V
C152		Chip Tantalum 1uF 16V
C153		Chip Capacitor 2.2uF 10V Z JF
C156		"Chip Tantalum 4.7uF 10V,,A"
C157		Chip Capacitor 0.1u 25V
C160		Chip capacitor 0.01uF 50V K
C161		Chip Capacitor 0.1u 25V
C171		Chip capacitor 3P
C180		Chip Capacitor 0.1u 25V
C181		Chip Capacitor 1u 10V Z JF
C185		Chip capacitor 220P CH 50V
C186		Chip Tantalum 0.1uF K 35V
C187		Chip Tantalum 0.22uF K 35V
C188		Chip capacitor 680P CH 50V
C189		Chip Capacitor 3.5P 50V
C190		Chip capacitor 1000P K
C192		Chip Capacitor 4P CH 50V
C193		Chip Capacitor 2.2uF 10V Z JF
C201		Chip capacitor 0.01uF 50V K
C202		"Chip Tantalum 10uF 16V,,B2"
C203		Chip capacitor 1000P K
C205		Chip capacitor 1000P K
C206		Chip capacitor 1000P K
C207		Chip capacitor 8P
C210		Chip capacitor 47P
C211		Chip Capacitor 0.1u 25V
C212		Chip Capacitor 1u 10V Z JF
C213		Chip Capacitor 0.1u 25V
C214		"Chip Tantalum 4.7uF 10V,,A"
C215		Chip capacitor 1000P K
C216		Chip capacitor 1000P K

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SYMBOL	PART NO.	DESCRIPTION
C218		Chip capacitor 1000P K
C220		Chip capacitor 1000P K
C221		Chip Capacitor 1u 10V Z JF
C231		Chip capacitor 0.01uF 50V K
C232		Chip capacitor 0.01uF 50V K
C233		Chip capacitor 1000P K
C234		Chip capacitor 1000P K
C301		Chip Capacitor 0.1u 25V
C302		Chip capacitor 33P
C303		Chip capacitor 5P
C304		Chip capacitor 8P
C305		Chip Capacitor 4P CH 50V
C306		Chip capacitor 1000P K
C307		Chip capacitor 1000P K
C308		Chip capacitor 1000P K
C309		Chip capacitor 0.01uF 50V K
C311		Chip Tantalum 1uF 16V
C312		"Chip Tantalum 10uF 10V,,A"
C313		Chip capacitor 100P
C314		Chip capacitor 0.01uF 50V K
C316		Plastic Film Capacitors 0.033u J 16 V 3216
C317		Chip Tantalum 2.2uF 10V K
C318		Chip Tantalum 0.22uF K 35V
C322		Chip capacitor 0.01uF 50V K
C323		"Chip Tantalum 4.7uF 10V,,A"
C324		Chip capacitor 1000P K
C325		Chip Capacitor 0.1u 25V
C326		Chip Capacitor 0.1u 25V
C327		Chip Capacitor 0.1u 25V
C331		Chip capacitor 0.01uF 50V K
C332		Chip capacitor 3P
C335		Chip capacitor 1000P K
C337		Chip Capacitor 0.1u 25V
C338		none
C401		Chip capacitor 220P CH 50V
C413		Chip Capacitor 1u 10V Z JF
C415		"Chip Tantalum 4.7uF 10V,,A"
C416		Chip capacitor 100P
C417		Chip Tantalum 0.22uF K 35V
C418		Chip capacitor 33P
C419		Chip capacitor 470P CH 50V
C420		Chip capacitor 0.022uF 25V
C421		Chip capacitor 100P
C422		Chip Capacitor 1u 10V Z JF
C423		Chip capacitor 150P CH 50V
C426		Chip Capacitor 1u 10V Z JF
C427		Chip Capacitor 1u 10V Z JF
C428		Chip capacitor 6800P
C429		Chip capacitor 82P
C430		Chip capacitor 100P
C431		Chip Capacitor 1u 10V Z JF
C434		Chip Capacitor 0.1u 25V
C440		Chip Capacitor 0.1u 25V
C441		"Chip Tantalum 4.7uF 10V,,A"
C442		Chip capacitor 10P

SYMBOL	PART NO.	DESCRIPTION
C443		Chip capacitor 3P
C444		Chip capacitor 47P
C445		Trimmer Chip Capacitor 20PF
C446		Chip Capacitor 0.1u 25V
C448		Chip capacitor 1000P K
C449		Chip capacitor 1000P K
C450		Chip capacitor 1000P K
C451		Chip capacitor 1000P K
C452		Chip capacitor 1000P K
C453		Chip Capacitor 1u 10V Z JF
C454		"Chip Tantalum 10uF 16V,,B2"
C455		Chip Capacitor 0.1u 25V
C456		Chip Capacitor 0.1u 25V
C457		"Chip Tantalum 10uF 16V,,B2"
C458		Chip capacitor 0.01uF 50V K
C459		Chip Capacitor 4700P 50V B K
C460		Chip capacitor 0.01uF 50V K
C461		Chip capacitor 0.01uF 50V K
C462		Chip Capacitor 0.1u 25V
C463		Chip Capacitor 0.1u 25V
C464		Chip capacitor 1000P K
C465		Chip Capacitor 1u 10V Z JF
C466		"Chip Tantalum 10uF 16V,,B2"
C467		Chip capacitor 0.01uF 50V K
C468		"Chip Tantalum 10uF 10V,,A"
C469		"Chip Tantalum 10uF 10V,,A"
C470		"Chip Tantalum 4.7uF 10V,,A"
C471		Chip capacitor 0.01uF 50V K
C472		Chip capacitor 0.01uF 50V K
C473		"Chip Tantalum 4.7uF 10V,,A"
C474		Chip capacitor 1000P K
C476		Chip capacitor 1000P K
C480		Chip capacitor 1000P K
C481		Chip capacitor 1000P K
C482		Chip capacitor 1000P K
C483		Chip capacitor 1000P K
C484		Chip capacitor 1000P K
C485		Chip capacitor 1000P K
C486		Chip capacitor 1000P K
C494		Chip capacitor 1000P K
C495		Chip capacitor 1000P K
C496		Chip capacitor 1000P K
C497		Chip capacitor 1000P K
C498		"Chip Tantalum 10uF 10V,,A"
C499		Chip Capacitor 0.1u 25V
C500		"Chip Tantalum 4.7uF 10V,,A"
C513		Chip Capacitor 1u 10V Z JF
C514		Chip capacitor 1000P K
C515		Chip capacitor 1000P K
C516		Chip capacitor 1000P K
C517		Chip Capacitor 0.1u 25V
C518		"Chip Tantalum 4.7uF 10V,,A"
C519		Chip capacitor 0.01uF50V Z
C521		Chip capacitor 470P CH 50V
C522		Chip Capacitor 1u 10V Z JF

SYMBOL	PART NO.	DESCRIPTION
C523		Chip capacitor 1000P K
C524		Chip capacitor 1000P K
C525		Chip capacitor 1000P K
C526		Chip Capacitor 0.1u 25V
C527		Chip capacitor 22P
C601		Chip capacitor 5P
C608		Chip Capacitor 2.5P 50V
C610		Chip capacitor 1000P K
C612		Chip capacitor 10P
C613		Chip capacitor 6P
C615		Chip Capacitor 2.5P 50V
C616		Chip capacitor 18P
C617		Chip Capacitor 2.5P 50V
C618		Chip capacitor 18P
C619		Chip capacitor 27P
C620		Chip capacitor 6P
C621		Chip Capacitor 1.5P 50V
C622		Chip capacitor 10P
C623		Chip capacitor 6P
C624		Chip capacitor 1000P K
C626		Chip Capacitor 0.1u 25V
C627		Chip capacitor 100P
C628		Chip capacitor 5P
D101		"RF Switching PIN Diode 10W, SMT"
D102		"RF Switching PIN Diode 10W, SMT"
D201		Shottky Barrier Diode Dual
D202		Band Switch Diode
D401		LED SMT Green
D402		LED SMT Green
D403		Band Switch Diode
D406		LED SMT Yellow & Red
D408		Zener Diode 11V 150mW
D409		LED SMT Green
D410		LED SMT Green
D601		"Varactor diode, rs=.28, c1v/c4v=2.0"
D602		"Varactor diode, rs=.28, c1v/c4v=2.0"
D603		"Varactor diode, rs=.28, c1v/c4v=2.0"
D604		Diode
D605		"Varactor diode, rs=."
F401		Chip Fuse 4A 3.2*1.6
J101		Antenna Connector
J103		Co-axial Connector female
J401		FPC 0.625 Vertical Connector 18 pin
J402		"SMT/ZIF Type Flexible PCB Connector 24pin, 0.5mm,,Vertical"
J403		"SMT/ZIF Type Flexible PCB Connector 10pin, 0.5mm,,Vertical"
J404		FPC 0.8 Horizontal Connector 11 pin
J408		UDC Connector 6pin (Trial 15pcs)
JP1		Chip Resistor 0 1/10W
JP12		Chip Resistor 0 1/10W
JP2		Chip Resistor 0 1/10W
JP3		Chip Resistor 0 1/10W
L101		Chip Inductor 12nH K
L103		Chip coil 25n
L104		Chip coil 25n

SYMBOL	PART NO.	DESCRIPTION
L105		Chip coil 25n
L106		Chip Inductor 33nH J
L108		Chip coil 25n
L110		33n chip inductor
L111		"Chip Shielded Inductor,,2520 ,,0.47u,,K"
L112		"Chip Shielded Inductor,,2520 ,,1.8u,,K"
L113		Chip Inductor 330nH J
L114		Chip Inductor 470nH J
L116		Chip Inductor 47nH J
L118		Chip Inductor 22nH K
L119		470n chip inductor
L121		High Q Chip Inductor 21.6nH
L201		Chip Inductor 18nH K
L203		Chip Inductor 12nH K
L301		Chip Inductor 22nH K
L303		Chip Inductor 22nH K
L316		Chip Inductor 39nH J
L317		Chip Inductor 47nH J
L601		Chip coil 25n
L609		Chip Inductor 22nH K
L610		Chip Inductor 15nH K
L611		Chip Inductor 15nH K
L612		"Chip Shielded Inductor,,2520 ,,0.82u,,K"
L613		Chip Inductor 68nH J
MC1		MIC UNIT w/o water proof seal
P102		"Co-Axial Connector Cable 60mm,,male"
P401		Battery Connector 2pin (Trial 15pcs)
P402		Main Flex Circuit
P403		UDC Flex Circuit
P404		Front Housing Flex Circuit
P407		INTER CONNECTOR
Q101		RF Transistor LNA
Q102		MMIC Mixer Dual gate
Q104		Digital Transistor NPN30mA
Q105		Digital Transistor NPN30mA
Q201		""""TRANSISTOR,,2SC3357T""""
Q202		General Purpose Transistor
Q203		General TRANSISTOR
Q205		Digital Transistor NPN30mA
Q301		RF Transistor LNA
Q302		TRANSISTOR 2SA1586
Q312		General TRANSISTOR
Q316		MOS FET 2.5 ohm@5V
Q404		Digital Transistor NPN30mA
Q407		Digital TR Power management 500mA
Q408		Digital Transistor NPN30mA
Q409		Digital Transistor NPN30mA
Q410		Digital Transistor NPN30mA
Q411		Digital Transistor NPN30mA
Q412		Digital TR Power management 500mA
Q413		General Purpose Transistor
Q414		Digital TR DTA143XKA DTC144EKA
Q415		Digital Transistor NPN30mA
Q416		Digital Transistor NPN30mA
R103		Chip Resistor 100K 1/10W

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SYMBOL	PART NO.	DESCRIPTION
R104		Chip Resistor 300 1/10W
R106		Chip Resistor 620 1/10W
R107		Chip Resistor 100 1/10W
R108		Chip Resistor 18 1/10W
R111		Chip Resistor 1.2K 1/10W
R113		Chip Resistor 15K 1/10W
R114		Chip Resistor 12K 1/10W
R115		Chip Resistor 300k 1/10W
R116		Chip Resistor 15K 1/10W
R119		Chip Resistor 82K 1/10W
R120		Chip Resistor 5.1k 1/10W
R121		Chip Resistor 100K 1/10W
R122		Chip Resistor 10K 1/10W
R123		Chip Resistor 3.3K 1/10W
R133		Chip Resistor 10K 1/10W
R134		Chip Resistor 22K 1/10W
R135		Chip Resistor 0 3216
R201		Chip Resistor 120 1/10W
R202		Chip Resistor 18 1/10W
R203		Chip Resistor 10 1/10W
R204		Chip Resistor 1.5K 1/10W
R205		Chip Resistor 620 1/10W
R207		Chip Resistor 1K 1/10W
R208		Chip Resistor 470 1/10W
R209		Chip Resistor 1.5K 1/10W
R210		Chip Resistor 470K 1/10W
R211		Chip Resistor 240k 1/10W
R212		Chip Resistor 220K 1/10W
R213		Chip Resistor 10K 1/10W
R214		Chip Resistor 10K 1/10W
R215		Chip Resistor 2k 1/10W
R216		Chip Resistor 2.2K 1/10W
R301		Chip Resistor 220 1/10W
R302		Chip Resistor 150K 1/10W
R303		Chip Resistor 51 1/10W
R304		Chip Resistor 150 1/10W
R305		Chip Resistor 39 1/10W
R306		Chip Resistor 150 1/10W
R308		Chip Resistor 51 1/10W
R310		Chip Resistor 0 1/10W
R311		Chip Resistor 4.7K 1/10W
R312		Chip Resistor 680 1/10W
R315		Chip Resistor 33K 1/10W
R316		Chip Resistor 9.1k 1/10W
R317		Chip Resistor 100K 1/10W
R320		Chip Resistor 5.6K 1/10W
R321		Chip Resistor 1K 1/10W
R331		Chip Resistor 3k 1/10W
R332		Chip Resistor 240 1/10W
R333		Chip Resistor 51 1/10W
R411		Chip Resistor 100K 1/10W
R414		Chip Resistor 22K 1/10W
R415		Chip Resistor 18K 1/10W
R416		Chip Resistor 510k 1/10W
R417		Chip Resistor 30k 1/10W

SYMBOL	PART NO.	DESCRIPTION
R418		Chip Resistor 220K 1/10W
R419		Chip Resistor 5.6K 1/10W
R420		Chip Resistor 33K 1/10W
R421		Chip Resistor 1M 1/10W
R422		Chip Resistor 510k 1/10W
R423		Chip Resistor 56K 1/10W
R424		Chip Resistor 56K 1/10W
R426		Chip Resistor 100K 1/10W
R430		Chip Resistor 68K 1/10W
R432		Chip Resistor 56K 1/10W
R433		Chip Resistor 7.5k 1/10W
R434		Chip Resistor 1M 1/10W
R435		Chip Resistor 100K 1/10W
R436		Chip Resistor 10K 1/10W
R437		Chip Resistor 2.7K 1/10W
R438		Chip Resistor 56K 1/10W
R439		Chip Resistor 100K 1/10W
R443		Chip Resistor 330K 1/10W
R444		Chip Resistor 33K 1/10W
R445		Chip Resistor 100K 1/10W
R446		Chip Resistor 100K 1/10W
R447		Chip Resistor 24k 1/10W
R448		Chip Resistor 56K 1/10W
R449		Chip Resistor 100K 1/10W
R450		Chip Resistor 100K 1/10W
R451		Chip Resistor 510k 1/10W
R452		Chip Resistor 0 1/10W
R453		Chip Resistor 100K 1/10W
R460		Chip Resistor 56K 1/10W
R461		Chip Resistor 100K 1/10W
R462		Chip Resistor 100K 1/10W
R463		Chip Resistor 100K 1/10W
R464		Chip Resistor 1K 1/10W
R465		Chip Resistor 470 1/10W
R466		Chip Resistor 470 1/10W
R467		Chip Resistor 470 1/10W
R468		Chip Resistor 2k 1/10W
R469		Chip Resistor 2k 1/10W
R470		Chip Resistor 470 1/10W
R471		Chip Resistor 47K 1/10W
R472		Chip Resistor 47K 1/10W
R473		Chip Resistor 3.3K 1/10W
R474		Chip Resistor 1K 1/10W
R475		Chip Resistor 1K 1/10W
R476		Chip Resistor 1.8K 1/10W
R477		Chip Resistor 4.7K 1/10W
R478		Chip Resistor 2.7K 1/10W
R479		Chip Resistor 10 1/10W
R480		Chip Resistor 10 1/10W
R481		Chip Resistor 470K 1/10W
R482		Chip Resistor 10K 1/10W
R483		Chip Resistor 470K 1/10W
R484		Chip Resistor 47K 1/10W
R485		Chip Resistor 10K 1/10W
R486		Chip Resistor 10K 1/10W

SYMBOL	PART NO.	DESCRIPTION
R489		Chip Resistor 15K 1/10W
R490		Chip Resistor 22K 1/10W
R491		Chip Resistor 560 1/10W
R492		Chip Resistor 69.8k F +/-200 .063W 1608
R493		Chip Resistor 62k F +/-200 .063W 1608
R496		Chip Resistor 3.9 1/10W
R497		Chip Resistor 470 1/10W
R499		Chip Resistor 3.3K 1/10W
R500		Chip Resistor 56K 1/10W
R501		Chip Resistor 56K 1/10W
R502		Chip Resistor 62k F +/-200 .063W 1608
R503		Chip Resistor 69.8k F +/-200 .063W 1608
R504		Chip Resistor 220k F +/-200 .063W 1608
R505		Chip Resistor 56K 1/10W
R506		Chip Resistor 10K 1/10W
R507		Chip Resistor 220k F +/-200 .063W 1608
R508		Chip Resistor 47K 1/10W
R509		Chip Resistor 47K 1/10W
R510		Chip Resistor 47K 1/10W
R511		Chip Resistor 47K 1/10W
R512		Chip Resistor 47K 1/10W
R513		Chip Resistor 1M 1/10W
R521		Chip Resistor 4.7K 1/10W
R523		Chip Resistor 2.2K 1/10W
R524		Chip Resistor 470K 1/10W
R525		Chip Resistor 470K 1/10W
R526		Chip Resistor 2.2K 1/10W
R527		Chip Resistor 470 1/10W
R528		Chip Resistor 470 1/10W
R530		Chip Resistor 100K 1/10W
R531		Chip Resistor 1M 1/10W
R532		Chip Resistor 68K 1/10W
R533		Chip Resistor 300 1/10W
R601		Chip Resistor 100K 1/10W
R602		Chip Resistor 100K 1/10W
R603		Chip Resistor 100K 1/10W
R606		Chip Resistor 100K 1/10W
R607		Chip Resistor 1K 1/10W
R608		Chip Resistor 620 1/10W
SP1		Speaker 24 ohm 0.5W 36mm
SW1		"Rotary Switch, 16 position w/ stopper"
SW2		Element Key SWITCH
SW3		Element Key SWITCH
SW4		Element Key SWITCH
SW5		"Tact Switch with stem"
SW6		Element Key SWITCH
SW7		Element Key SWITCH
SW8		"Tact Switch with stem"
U101		IF IC (.65 SSOP)
U102		L-MOS Analog Switch single
U103		L-MOS Analog Switch single
U105		OP AMP LM358 compatible
U107		L-MOS Analog Switch single
U108		L-MOS Analog Switch single
U201		PA Module UHF (430-470MHz)

SYMBOL	PART NO.	DESCRIPTION
U202		OP AMP LM358 compatible
U301		VCO UHF-M
U302		Synthesizer IC 1.1G
U303		TCXO w/ Modulation 12.8MHz +/- 2.5ppm@-30-70
U401		CTCSS Encoder/Decoder with voice security
U402		OP AMP LM358 compatible
U403		OP AMP LM358 compatible
U404		CPU 8bit
U405		LCD Module
U406		EEPROM 4k bit
U407		Dual Low Voltage Power Amp. 1W BTL
U408		Photo Relay AC 300mA 2ohm max 6pin DIP
U409		L-MOS Analog Switch single
U411		Voltage Detector 5.5V
U412		Voltage Regulator 5V External Tr.
U413		5V series regulator with cont.
U414		Voltage Regulator 5.5V
U415		Voltage Detector 4.0V
U416		OP AMP LM358 compatible
U417		Analog Multiplexer
U418		L-MOS Analog Switch single
U421		"D/A Converter, 8bits, 8ch with OP AMP, 16 SSOP"
VR401		VOLUME WITH SWITCH
VR402		Chip Pot 100k 3.0mm
VR403		Chip Pot 100k 3.0mm
Y101		69.545MHz Crystal OSC SMT
Y402		7.3728MHz Crystal OSC HC-49
Z101		LPF 450-520MHz 12W
Z102		70MHz MCF+/-7.5k 80dB@-910k pair
Z104		Chip Ceramic Filter 455k 4elements
Z105		Chip Ceramic Filter 455k 4elements
Z106		Ceramic Filter 455kHz SMT
Z107		Chip Ceramic Filter 455k 4elements
Z201		"Chip Coupler, 20dB 403-520MHz "
Z601		70MHz MCF+/-7.5k 80dB@-910k pair

**UHF 470-512 MHz
REV. 2**

SYMBOL	PART NO.	DESCRIPTION
C100		Chip capacitor 1000P K
C101		Chip capacitor 1000P K
C102		Chip Capacitor 4P CH 50V
C103		Chip capacitor 10P
C109		Chip capacitor 2P
C110		Chip capacitor 2.7P
C112		Chip capacitor 8P
C124		Chip capacitor 1000P K
C126		Chip Capacitor 0.1u 25V
C127		"Chip Tantalum 4.7uF 10V,,A"
C128		Chip Capacitor 0.1u 25V
C129		Chip capacitor 1000P K
C132		Chip capacitor 1000P K
C133		"Chip Tantalum 4.7uF 10V,,A"
C134		Chip capacitor 0.01uF 50V K
C135		Chip Capacitor 0.1u 25V
C136		Chip capacitor 12P SH 50V
C137		Chip capacitor 27P
C138		Chip Capacitor 0.1u 25V
C139		Chip capacitor 100P
C140		"Chip Tantalum 4.7uF 10V,,A"
C141		Chip Capacitor 0.1u 25V
C142		Chip capacitor 1000P K
C151		Chip capacitor 220P CH 50V
C152		Chip Tantalum 2.2uF 16V
C153		Chip Capacitor 1u 10V Z JF
C156		"Chip Tantalum 4.7uF 10V,,A"
C157		Chip Capacitor 0.1u 25V
C160		Chip capacitor 0.01uF 50V K
C161		Chip Capacitor 0.1u 25V
C171		Chip Capacitor 1.5P 50V
C180		Chip Capacitor 0.1u 25V
C181		Chip Capacitor 1u 10V Z JF
C185		Chip capacitor 220P CH 50V
C186		Chip Tantalum 0.1uF K 35V
C187		Chip Tantalum 0.22uF K 35V
C188		Chip capacitor 680P CH 50V
C189		Chip capacitor 2.4P
C190		Chip capacitor 1000P K
C193		Chip Capacitor 2.2uF 10V Z JF
C201		Chip capacitor 0.01uF 50V K
C202		"Chip Tantalum 10uF 16V,,B2"
C203		Chip capacitor 1000P K
C205		Chip capacitor 1000P K
C206		Chip capacitor 1000P K
C207		Chip capacitor 6P
C210		Chip capacitor 47P
C211		Chip Capacitor 0.1u 25V
C212		Chip Capacitor 1u 10V Z JF
C213		Chip Capacitor 0.1u 25V
C214		"Chip Tantalum 4.7uF 10V,,A"
C215		Chip capacitor 1000P K
C216		Chip capacitor 1000P K

SYMBOL	PART NO.	DESCRIPTION
C218		Chip capacitor 1000P K
C220		Chip capacitor 1000P K
C221		Chip Capacitor 1u 10V Z JF
C231		Chip capacitor 0.01uF 50V K
C232		Chip capacitor 0.01uF 50V K
C233		Chip capacitor 1000P K
C234		Chip capacitor 1000P K
C301		Chip Capacitor 0.1u 25V
C302		Chip capacitor 33P
C303		Chip capacitor 12P CH 50V
C304		Chip capacitor 12P CH 50V
C305		Chip capacitor 3P
C306		Chip capacitor 1000P K
C307		Chip capacitor 1000P K
C308		Chip capacitor 1000P K
C309		Chip capacitor 0.01uF 50V K
C311		Chip Tantalum 1uF 16V
C312		"Chip Tantalum 10uF 10V,,A"
C313		Chip capacitor 100P
C314		Chip capacitor 0.01uF 50V K
C316		Plastic Film Capacitors 0.033u J 16 V 3216
C317		Chip Tantalum 2.2uF 10V K
C318		Chip Tantalum 0.22uF K 35V
C322		Chip capacitor 0.01uF 50V K
C323		"Chip Tantalum 4.7uF 10V,,A"
C324		Chip capacitor 1000P K
C325		Chip Capacitor 0.1u 25V
C326		Chip Capacitor 0.1u 25V
C327		Chip Capacitor 0.1u 25V
C331		Chip capacitor 0.01uF 50V K
C332		Chip Capacitor 4P CH 50V
C335		Chip capacitor 1000P K
C337		Chip Capacitor 0.1u 25V
C338		none
C401		Chip capacitor 220P CH 50V
C413		Chip Capacitor 1u 10V Z JF
C415		"Chip Tantalum 4.7uF 10V,,A"
C416		Chip capacitor 100P
C417		Chip Tantalum 0.22uF K 35V
C418		Chip capacitor 33P
C419		Chip capacitor 470P CH 50V
C420		Chip capacitor 0.022uF 25V
C421		Chip capacitor 100P
C422		Chip Capacitor 1u 10V Z JF
C423		Chip capacitor 150P CH 50V
C426		Chip Capacitor 1u 10V Z JF
C427		Chip Capacitor 1u 10V Z JF
C428		Chip capacitor 6800P
C429		Chip capacitor 82P
C430		Chip capacitor 100P
C431		Chip Capacitor 1u 10V Z JF
C434		Chip Capacitor 0.1u 25V
C440		Chip Capacitor 0.1u 25V
C441		"Chip Tantalum 4.7uF 10V,,A"
C442		Chip capacitor 10P

SYMBOL	PART NO.	DESCRIPTION
C443		Chip capacitor 3P
C444		Chip capacitor 47P
C445		Trimmer Chip Capacitor 20PF
C446		Chip Capacitor 0.1u 25V
C448		Chip capacitor 1000P K
C449		Chip capacitor 1000P K
C450		Chip capacitor 1000P K
C451		Chip capacitor 1000P K
C452		Chip capacitor 1000P K
C453		Chip Capacitor 1u 10V Z JF
C454		"Chip Tantalum 10uF 16V,,B2"
C455		Chip Capacitor 0.1u 25V
C456		Chip Capacitor 0.1u 25V
C457		"Chip Tantalum 10uF 16V,,B2"
C458		Chip capacitor 0.01uF 50V K
C459		Chip Capacitor 4700P 50V B K
C460		Chip capacitor 0.01uF 50V K
C461		Chip capacitor 0.01uF 50V K
C462		Chip Capacitor 0.1u 25V
C463		Chip Capacitor 0.1u 25V
C464		Chip capacitor 1000P K
C465		Chip Capacitor 1u 10V Z JF
C466		"Chip Tantalum 10uF 16V,,B2"
C467		Chip capacitor 0.01uF 50V K
C468		"Chip Tantalum 10uF 10V,,A"
C469		"Chip Tantalum 10uF 10V,,A"
C470		"Chip Tantalum 4.7uF 10V,,A"
C471		Chip capacitor 0.01uF 50V K
C472		Chip capacitor 0.01uF 50V K
C473		"Chip Tantalum 4.7uF 10V,,A"
C474		Chip capacitor 1000P K
C476		Chip capacitor 1000P K
C480		Chip capacitor 1000P K
C481		Chip capacitor 1000P K
C482		Chip capacitor 1000P K
C483		Chip capacitor 1000P K
C484		Chip capacitor 1000P K
C485		Chip capacitor 1000P K
C486		Chip capacitor 1000P K
C494		Chip capacitor 1000P K
C495		Chip capacitor 1000P K
C496		Chip capacitor 1000P K
C497		Chip capacitor 1000P K
C498		"Chip Tantalum 10uF 10V,,A"
C499		Chip Capacitor 0.1u 25V
C500		"Chip Tantalum 4.7uF 10V,,A"
C513		Chip Capacitor 1u 10V Z JF
C514		Chip capacitor 1000P K
C515		Chip capacitor 1000P K
C516		Chip capacitor 1000P K
C517		Chip Capacitor 0.1u 25V
C518		"Chip Tantalum 4.7uF 10V,,A"
C519		Chip capacitor 0.01uF50V Z
C521		Chip capacitor 470P CH 50V
C522		Chip Capacitor 1u 10V Z JF

SYMBOL	PART NO.	DESCRIPTION
C523		Chip capacitor 1000P K
C524		Chip capacitor 1000P K
C525		Chip capacitor 1000P K
C526		Chip Capacitor 0.1u 25V
C527		Chip capacitor 22P
C601		Chip Capacitor 15P CH 50V
C608		Chip capacitor 3P
C610		Chip capacitor 1000P K
C612		Chip capacitor 22P
C613		Chip capacitor 18P
C615		Chip Capacitor 4P CH 50V
C616		Chip capacitor 18P
C617		Chip capacitor 10P
C618		Chip capacitor 18P
C619		Chip capacitor 27P
C620		Chip capacitor 5P
C621		Chip capacitor 2.2P
C622		Chip capacitor 10P
C623		Chip capacitor 5P
C624		Chip capacitor 1000P K
C626		Chip Capacitor 0.1u 25V
C627		Chip capacitor 1000P K
D101		"RF Switching PIN Diode 10W, SMT"
D102		"RF Switching PIN Diode 10W, SMT"
D201		Shottky Barrier Diode Dual
D202		Band Switch Diode
D401		LED SMT Green
D402		LED SMT Green
D403		Band Switch Diode
D406		LED SMT Yellow & Red
D408		Zener Diode 11V 150mW
D409		LED SMT Green
D410		LED SMT Green
D601		"Varactor diode, rs=.28, c1v/c4v=2.0"
D602		"Varactor diode, rs=.28, c1v/c4v=2.0"
D603		"Varactor diode, rs=.28, c1v/c4v=2.0"
D604		Diode
D605		"Varactor diode, rs=."
F401		Chip Fuse 4A
J101		Antenna Connector
J103		Co-axial Connector female
J401		FPC 0.625 Vertical Connector 18 pin
J402		"SMT/ZIF Type Flexible PCB Connector 24pin, 0.5mm,,Vertical"
J403		"SMT/ZIF Type Flexible PCB Connector 10pin, 0.5mm,,Vertical"
J404		FPC 0.8 Horizontal Connector 11 pin
J408		UDC Connector 6pin (Trial 15pcs)
JP1		Chip Resistor 0 1/10W
JP12		Chip Resistor 0 1/10W
JP2		Chip Resistor 0 1/10W
JP3		Chip Resistor 0 1/10W
L101		Chip Inductor 12nH K
L103		Chip coil 21n
L104		Chip coil 21n
L105		Chip coil 25n

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SYMBOL	PART NO.	DESCRIPTION
L106		Chip Inductor 27nH K
L108		Chip coil 16n
L110		33n chip inductor
L111		"Chip Shielded Inductor,,2520 ,,0.47u,,K"
L112		"Chip Shielded Inductor,,2520 ,,1.8u,,K"
L113		Chip Inductor 330nH J
L114		Chip Inductor 470nH J
L116		82n J chip inductor
L117		Chip Inductor 100nH J
L118		Chip Inductor 22nH K
L119		470n chip inductor
L121		High Q Chip Inductor 15.3nH
L201		Chip Inductor 18nH K
L203		Chip coil 12n
L301		Chip Inductor 10nH K
L303		Chip Inductor 18nH K
L316		Chip Inductor 33nH J
L317		Chip Inductor 47nH J
L601		Chip coil 16n
L609		Chip Inductor 22nH K
L610		Chip Inductor 15nH K
L611		Chip Inductor 15nH K
L612		"Chip Shielded Inductor,,2520 ,,0.82u,,K"
L613		Chip Inductor 47nH J
L620		Chip Inductor 100nH J
MC1		MIC UNIT w/o water proof seal
P102		"Co-Axial Connector Cable 60mm,,male"
P401		Battery Connector 2pin (Trial 15pcs)
P402		Main Flex Circuit
P403		UDC Flex Circuit
P404		Front Housing Flex Circuit
P407		INTER CONNECTOR
Q101		RF Transistor LNA
Q102		MMIC Mixer Dual gate
Q104		Digital Transistor NPN30mA
Q105		Digital Transistor NPN30mA
Q201		""""TRANSISTOR,,2SC3357T""""
Q202		General Purpose Transistor
Q203		General TRANSISTOR
Q205		Digital Transistor NPN30mA
Q301		RF Transistor LNA
Q302		TRANSISTOR 2SA1586
Q312		General TRANSISTOR
Q316		MOS FET 2.5 ohm@5V
Q404		Digital Transistor NPN30mA
Q407		Digital TR Power management 500mA
Q408		Digital Transistor NPN30mA
Q409		Digital Transistor NPN30mA
Q410		Digital Transistor NPN30mA
Q411		Digital Transistor NPN30mA
Q412		Digital TR Power management 500mA
Q413		General Purpose Transistor
Q414		Digital TR DTA143XKA DTC144EKA
Q415		Digital Transistor NPN30mA
Q416		Digital Transistor NPN30mA

SYMBOL	PART NO.	DESCRIPTION
R103		Chip Resistor 100K 1/10W
R104		Chip Resistor 300 1/10W
R106		Chip Resistor 620 1/10W
R107		Chip Resistor 100 1/10W
R108		Chip Resistor 18 1/10W
R111		Chip Resistor 1.2K 1/10W
R113		Chip Resistor 15K 1/10W
R114		Chip Resistor 12K 1/10W
R115		Chip Resistor 300k 1/10W
R116		Chip Resistor 15K 1/10W
R119		Chip Resistor 62k 1/10W
R120		Chip Resistor 5.1k 1/10W
R121		Chip Resistor 100K 1/10W
R122		Chip Resistor 10K 1/10W
R123		Chip Resistor 3.3K 1/10W
R133		Chip Resistor 10K 1/10W
R134		Chip Resistor 22K 1/10W
R135		Chip Resistor 0 3216
R201		Chip Resistor 120 1/10W
R202		Chip Resistor 18 1/10W
R203		Chip Resistor 10 1/10W
R204		Chip Resistor 1.5K 1/10W
R205		Chip Resistor 620 1/10W
R207		Chip Resistor 1K 1/10W
R208		Chip Resistor 470 1/10W
R209		Chip Resistor 1.5K 1/10W
R210		Chip Resistor 470K 1/10W
R211		Chip Resistor 240k 1/10W
R212		Chip Resistor 220K 1/10W
R213		Chip Resistor 10K 1/10W
R214		Chip Resistor 10K 1/10W
R215		Chip Resistor 2k 1/10W
R216		Chip Resistor 2.2K 1/10W
R301		Chip Resistor 220 1/10W
R302		Chip Resistor 150K 1/10W
R303		Chip Resistor 51 1/10W
R304		Chip Resistor 300 1/10W
R305		Chip Resistor 18 1/10W
R306		Chip Resistor 300 1/10W
R308		Chip Resistor 51 1/10W
R310		Chip Resistor 0 1/10W
R311		Chip Resistor 4.7K 1/10W
R312		Chip Resistor 750 1/10W
R315		Chip Resistor 33K 1/10W
R316		Chip Resistor 9.1k 1/10W
R317		Chip Resistor 100K 1/10W
R320		Chip Resistor 5.6K 1/10W
R321		Chip Resistor 1K 1/10W
R331		Chip Resistor 3k 1/10W
R332		Chip Resistor 390 1/10W
R333		Chip Resistor 51 1/10W
R411		Chip Resistor 100K 1/10W
R414		Chip Resistor 22K 1/10W
R415		Chip Resistor 18K 1/10W
R416		Chip Resistor 510k 1/10W

SYMBOL	PART NO.	DESCRIPTION
R417		Chip Resistor 30k 1/10W
R418		Chip Resistor 220K 1/10W
R419		Chip Resistor 5.6K 1/10W
R420		Chip Resistor 33K 1/10W
R421		Chip Resistor 1M 1/10W
R422		Chip Resistor 510k 1/10W
R423		Chip Resistor 56K 1/10W
R424		Chip Resistor 56K 1/10W
R426		Chip Resistor 100K 1/10W
R430		Chip Resistor 68K 1/10W
R432		Chip Resistor 56K 1/10W
R433		Chip Resistor 7.5k 1/10W
R434		Chip Resistor 1M 1/10W
R435		Chip Resistor 100K 1/10W
R436		Chip Resistor 10K 1/10W
R437		Chip Resistor 2.7K 1/10W
R438		Chip Resistor 56K 1/10W
R439		Chip Resistor 100K 1/10W
R443		Chip Resistor 330K 1/10W
R444		Chip Resistor 33K 1/10W
R445		Chip Resistor 100K 1/10W
R446		Chip Resistor 100K 1/10W
R447		Chip Resistor 33K 1/10W
R448		Chip Resistor 56K 1/10W
R449		Chip Resistor 100K 1/10W
R450		Chip Resistor 100K 1/10W
R451		Chip Resistor 680K 1/10W
R452		Chip Resistor 0 1/10W
R453		Chip Resistor 100K 1/10W
R460		Chip Resistor 56K 1/10W
R461		Chip Resistor 100K 1/10W
R462		Chip Resistor 100K 1/10W
R463		Chip Resistor 100K 1/10W
R464		Chip Resistor 1K 1/10W
R465		Chip Resistor 470 1/10W
R466		Chip Resistor 470 1/10W
R467		Chip Resistor 470 1/10W
R468		Chip Resistor 2k 1/10W
R469		Chip Resistor 2k 1/10W
R470		Chip Resistor 470 1/10W
R471		Chip Resistor 47K 1/10W
R472		Chip Resistor 47K 1/10W
R473		Chip Resistor 3.3K 1/10W
R474		Chip Resistor 1K 1/10W
R475		Chip Resistor 1K 1/10W
R476		Chip Resistor 1.8K 1/10W
R477		Chip Resistor 4.7K 1/10W
R478		Chip Resistor 2.7K 1/10W
R479		Chip Resistor 10 1/10W
R480		Chip Resistor 10 1/10W
R481		Chip Resistor 470K 1/10W
R482		Chip Resistor 10K 1/10W
R483		Chip Resistor 470K 1/10W
R484		Chip Resistor 47K 1/10W
R485		Chip Resistor 10K 1/10W

SYMBOL	PART NO.	DESCRIPTION
R486		Chip Resistor 10K 1/10W
R489		Chip Resistor 15K 1/10W
R490		Chip Resistor 22K 1/10W
R491		Chip Resistor 560 1/10W
R492		Chip Resistor 69.8k F +/-200 .063W 1608
R493		Chip Resistor 62k F +/-200 .063W 1608
R496		Chip Resistor 3.9 1/10W
R497		Chip Resistor 470 1/10W
R499		Chip Resistor 3.3K 1/10W
R500		Chip Resistor 56K 1/10W
R501		Chip Resistor 56K 1/10W
R502		Chip Resistor 62k F +/-200 .063W 1608
R503		Chip Resistor 69.8k F +/-200 .063W 1608
R504		Chip Resistor 220k F +/-200 .063W 1608
R505		Chip Resistor 56K 1/10W
R506		Chip Resistor 10K 1/10W
R507		Chip Resistor 220k F +/-200 .063W 1608
R508		Chip Resistor 47K 1/10W
R509		Chip Resistor 47K 1/10W
R510		Chip Resistor 47K 1/10W
R511		Chip Resistor 47K 1/10W
R512		Chip Resistor 47K 1/10W
R513		Chip Resistor 1M 1/10W
R521		Chip Resistor 4.7K 1/10W
R523		Chip Resistor 2.2K 1/10W
R524		Chip Resistor 470K 1/10W
R525		Chip Resistor 470K 1/10W
R526		Chip Resistor 2.2K 1/10W
R527		Chip Resistor 470 1/10W
R528		Chip Resistor 470 1/10W
R530		Chip Resistor 100K 1/10W
R531		Chip Resistor 1M 1/10W
R532		Chip Resistor 33K 1/10W
R533		Chip Resistor 300 1/10W
R601		Chip Resistor 100K 1/10W
R602		Chip Resistor 100K 1/10W
R603		Chip Resistor 100K 1/10W
R606		Chip Resistor 100K 1/10W
R607		Chip Resistor 1K 1/10W
SP1		Speaker 24 ohm 0.5W 36mm
SW1		"Rotary Switch, 16 position w/ stopper"
SW2		Element Key SWITCH
SW3		Element Key SWITCH
SW4		Element Key SWITCH
SW5		"Tact Switch with stem"
SW6		Element Key SWITCH
SW7		Element Key SWITCH
SW8		"Tact Switch with stem"
U101		IF IC (.65 SSOP)
U102		L-MOS Analog Switch single
U103		L-MOS Analog Switch single
U105		OP AMP LM358 compatible
U107		L-MOS Analog Switch single
U108		L-MOS Analog Switch single
U201		PA Module UHF (470-512MHz)

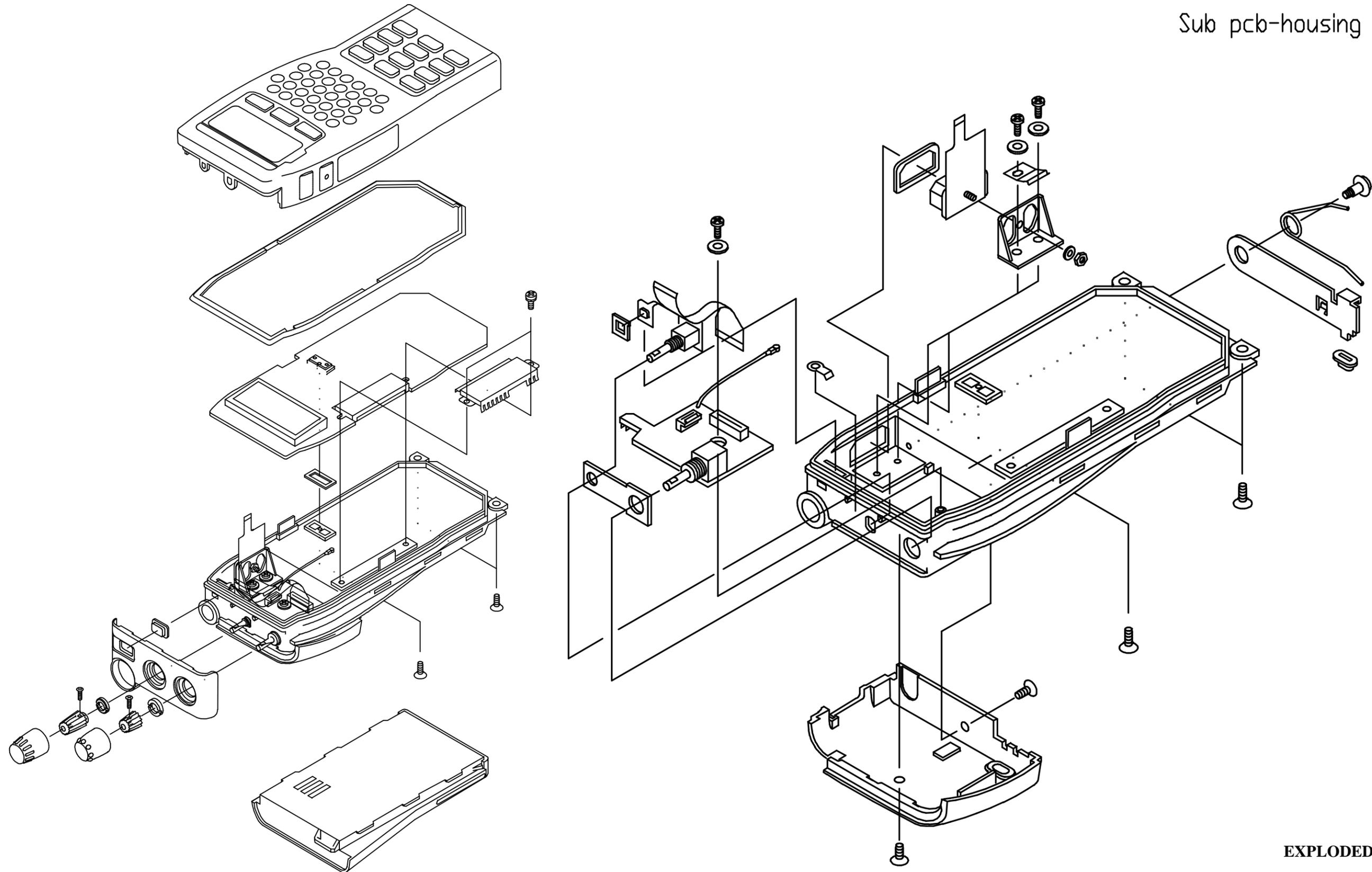
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SYMBOL	PART NO.	DESCRIPTION
U202		OP AMP LM358 compatible
U301		VCO UHF-H
U302		Synthesizer IC 1.1G
U303		TCXO w/ Modulation 12.8MHz +/- 2.5ppm@-30-70
U401		CTCSS Encoder/Decoder with voice security
U402		OP AMP LM358 compatible
U403		OP AMP LM358 compatible
U404		CPU 8bit
U405		LCD Module
U406		EEPROM 4k bit
U407		Dual Low Voltage Power Amp. 1W BTL
U408		Photo Relay AC 300mA 2ohm max 6pin DIP
U409		L-MOS Analog Switch single
U411		Voltage Detector 5.5V
U412		Voltage Regulator 5V External Tr.
U413		5V serie regulator with cont.
U414		Voltage Regulator 5.5V
U415		Voltage Detector 4.0V
U416		OP AMP LM358 compatible
U417		Analog Multiplexer
U418		L-MOS Analog Switch single
U421		"D/A Converter, 8bits, 8ch with OP AMP, 16 SSOP"
VR401		VOLUME WITH SWITCH
VR402		Chip Pot 100k 3.0mm
VR403		Chip Pot 100k 3.0mm
Y101		69.545MHz Crystal OSC SMT
Y402		7.3728MHz Crystal OSC HC-49
Z101		LPF 450-520MHz 12W
Z102		70MHz MCF+/-7.5k 80dB@-910k pair
Z104		Chip Ceramic Filter 455k 4elements
Z105		Chip Ceramic Filter 455k 4elements
Z106		Ceramic Filter 455kHz SMT
Z107		Chip Ceramic Filter 455k 4elements
Z201		"Chip Coupler, 20dB 403-520MHz "
Z601		70MHz MCF+/-7.5k 80dB@-910k pair

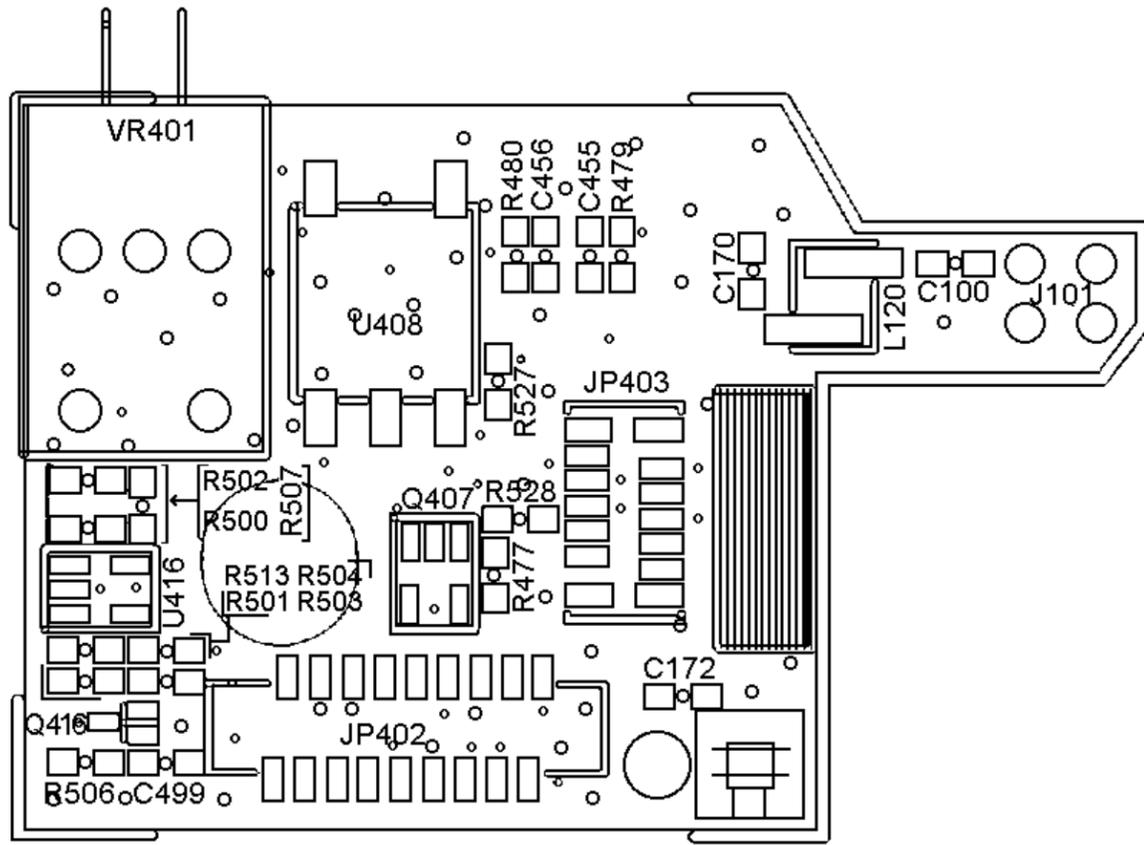
KEYPAD

SYMBOL	PART NO.	DESCRIPTION
C487		Chip capacitor 1000P K
C488		Chip capacitor 1000P K
C489		Chip capacitor 1000P K
C490		Chip capacitor 1000P K
C491		Chip capacitor 1000P K
C492		Chip capacitor 1000P K
C493		Chip capacitor 1000P K
J409		FPC 0.8 Horizontal Connector 8 pin
P409		DTMF Flex Circuit
SW10		Element Key SWITCH
SW11		Element Key SWITCH
SW12		Element Key SWITCH
SW13		Element Key SWITCH
SW14		Element Key SWITCH
SW15		Element Key SWITCH
SW16		Element Key SWITCH
SW17		Element Key SWITCH
SW18		Element Key SWITCH
SW19		Element Key SWITCH
SW20		Element Key SWITCH
SW9		Element Key SWITCH

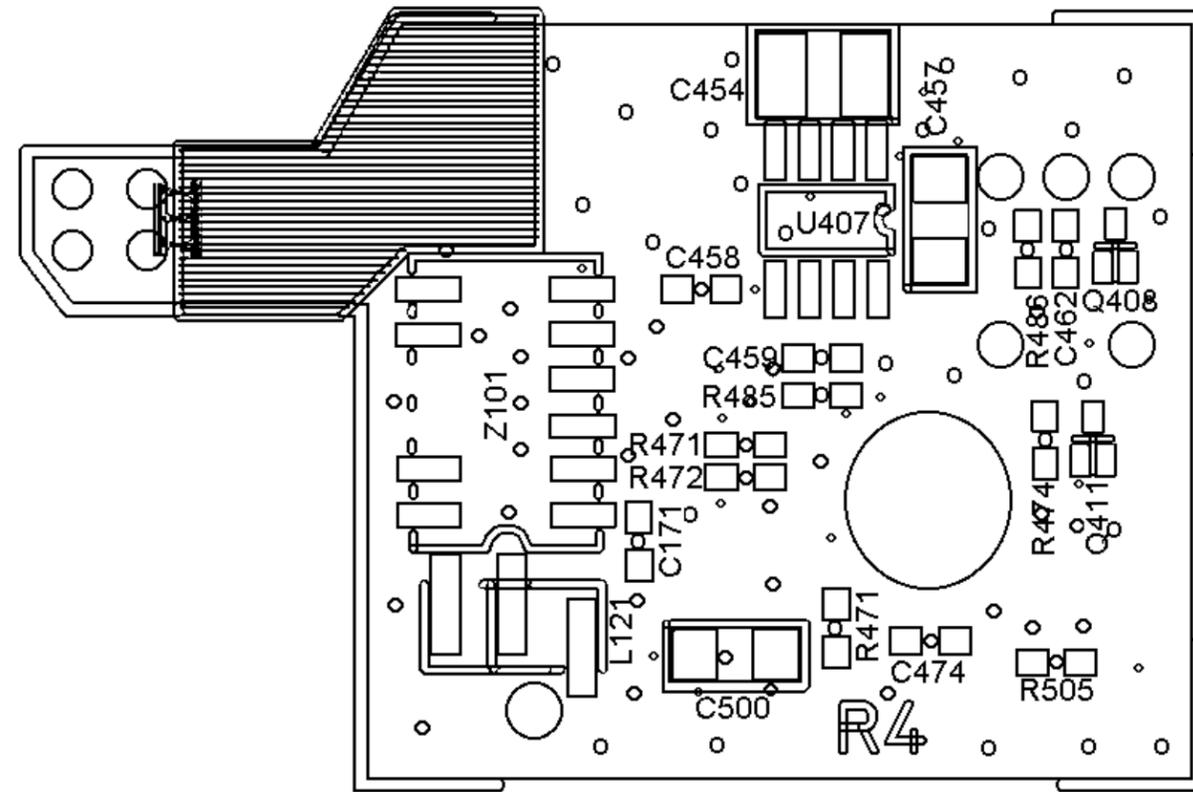
Sub pcb-housing Assy



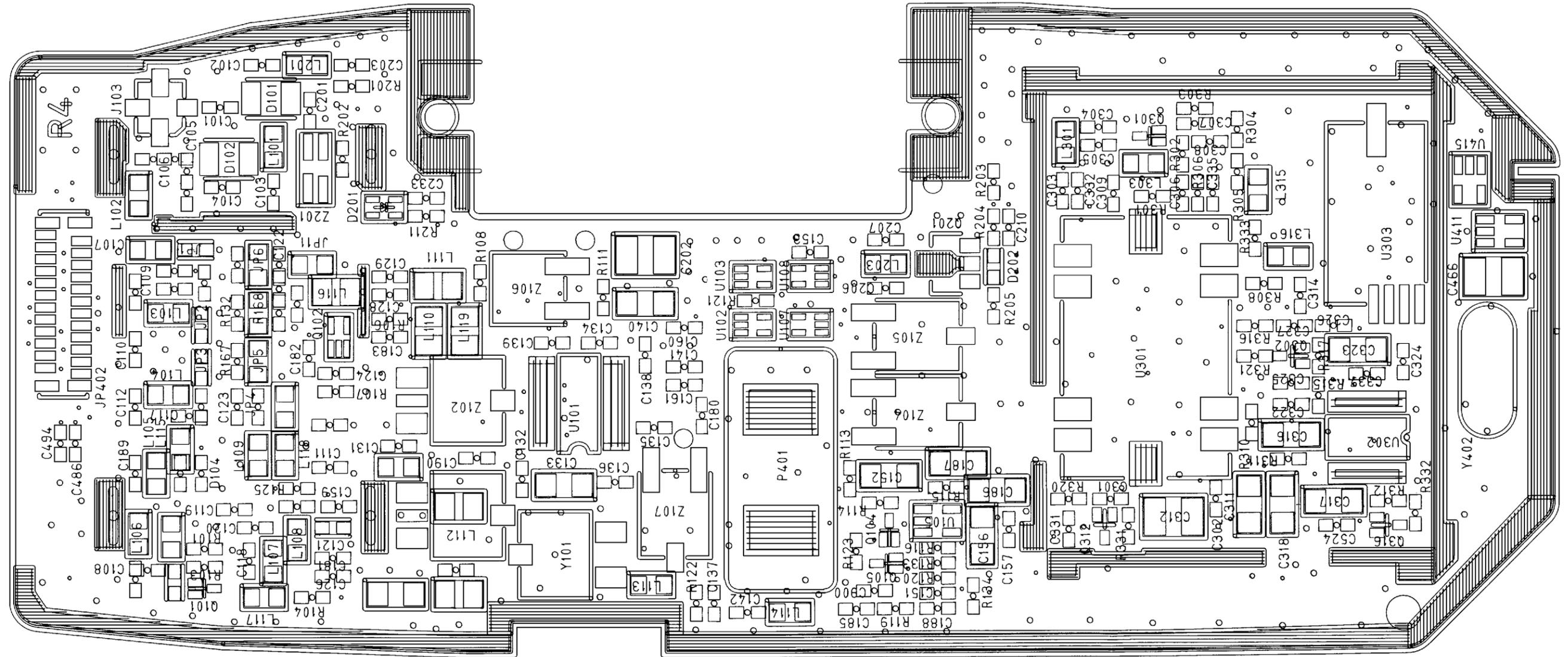
EXPLODED VIEWS



TOP

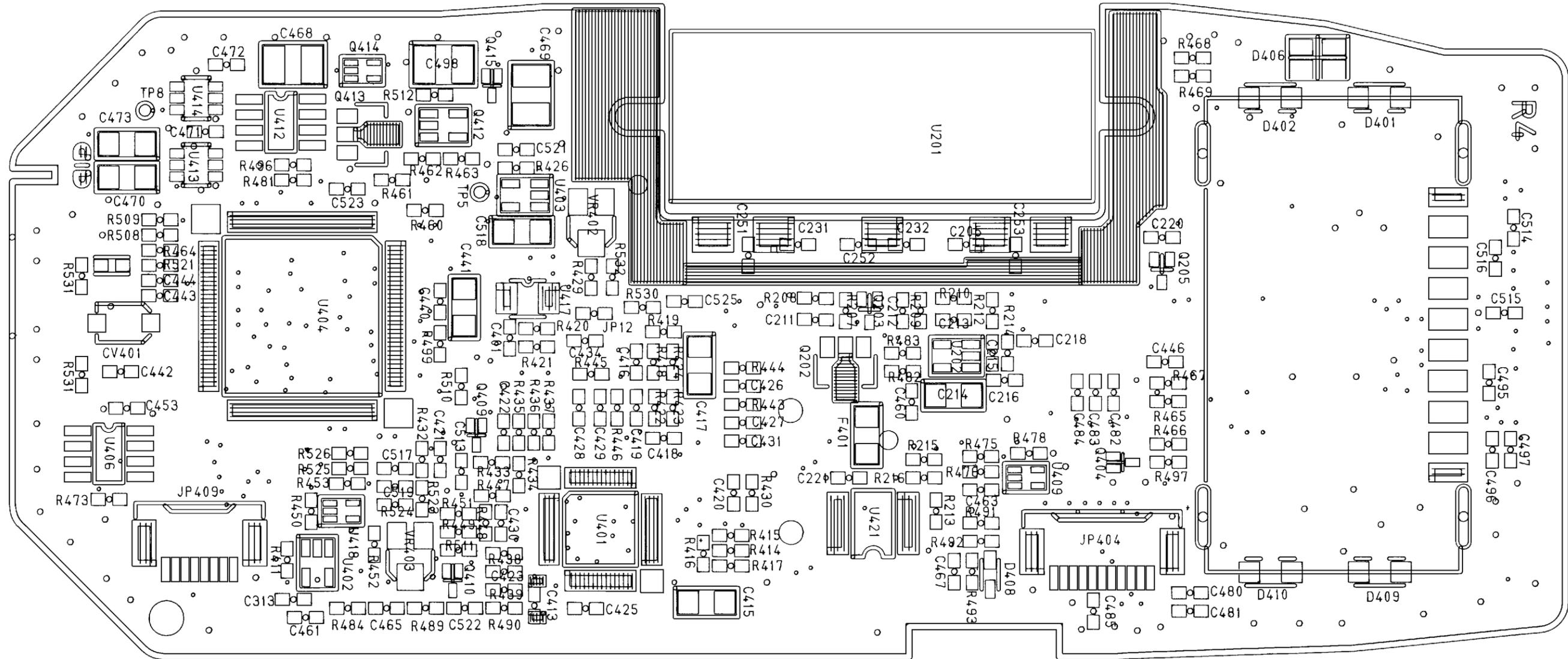


BOTTOM



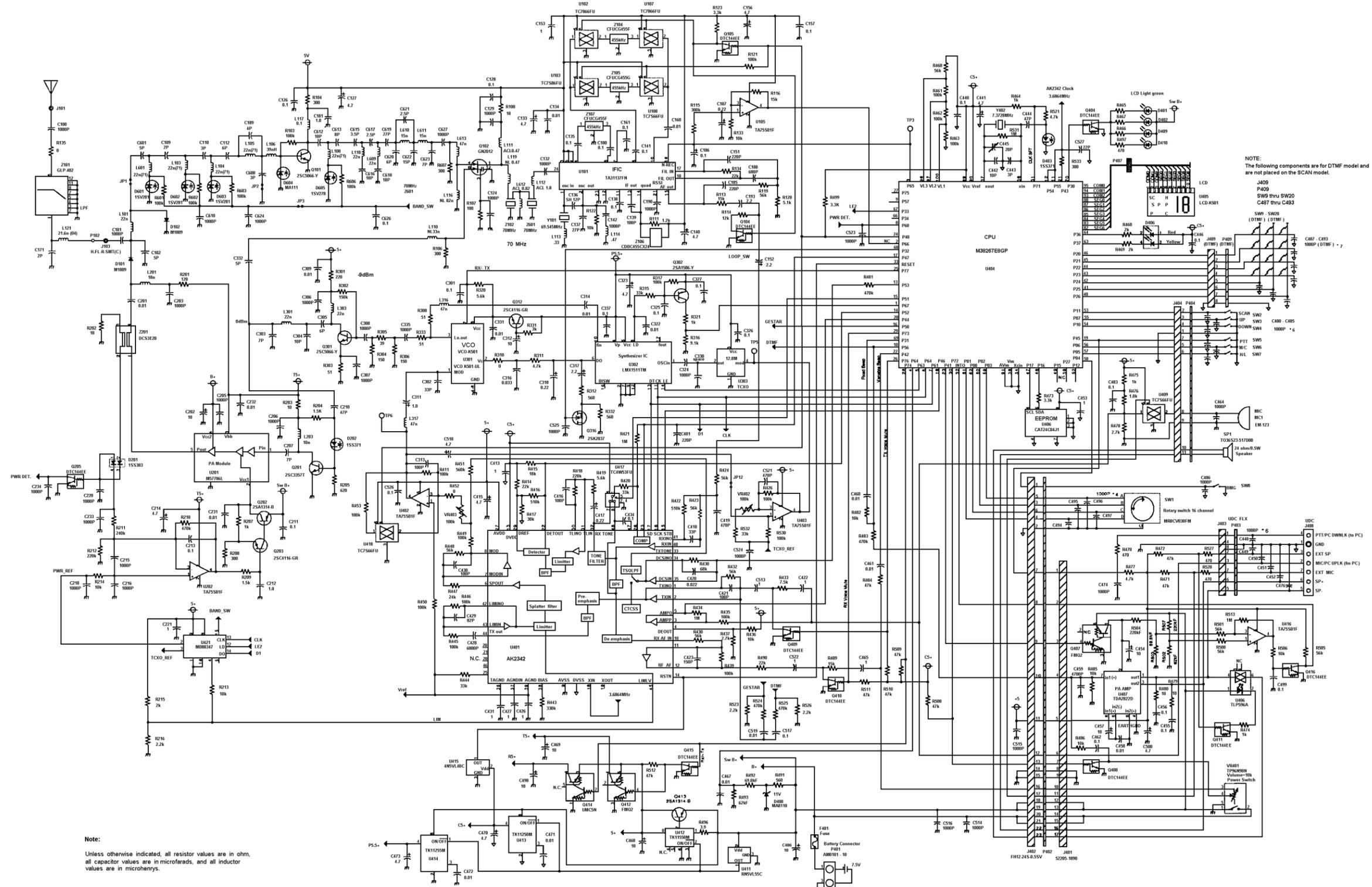
TOP

MAIN BOARD



BOTTOM

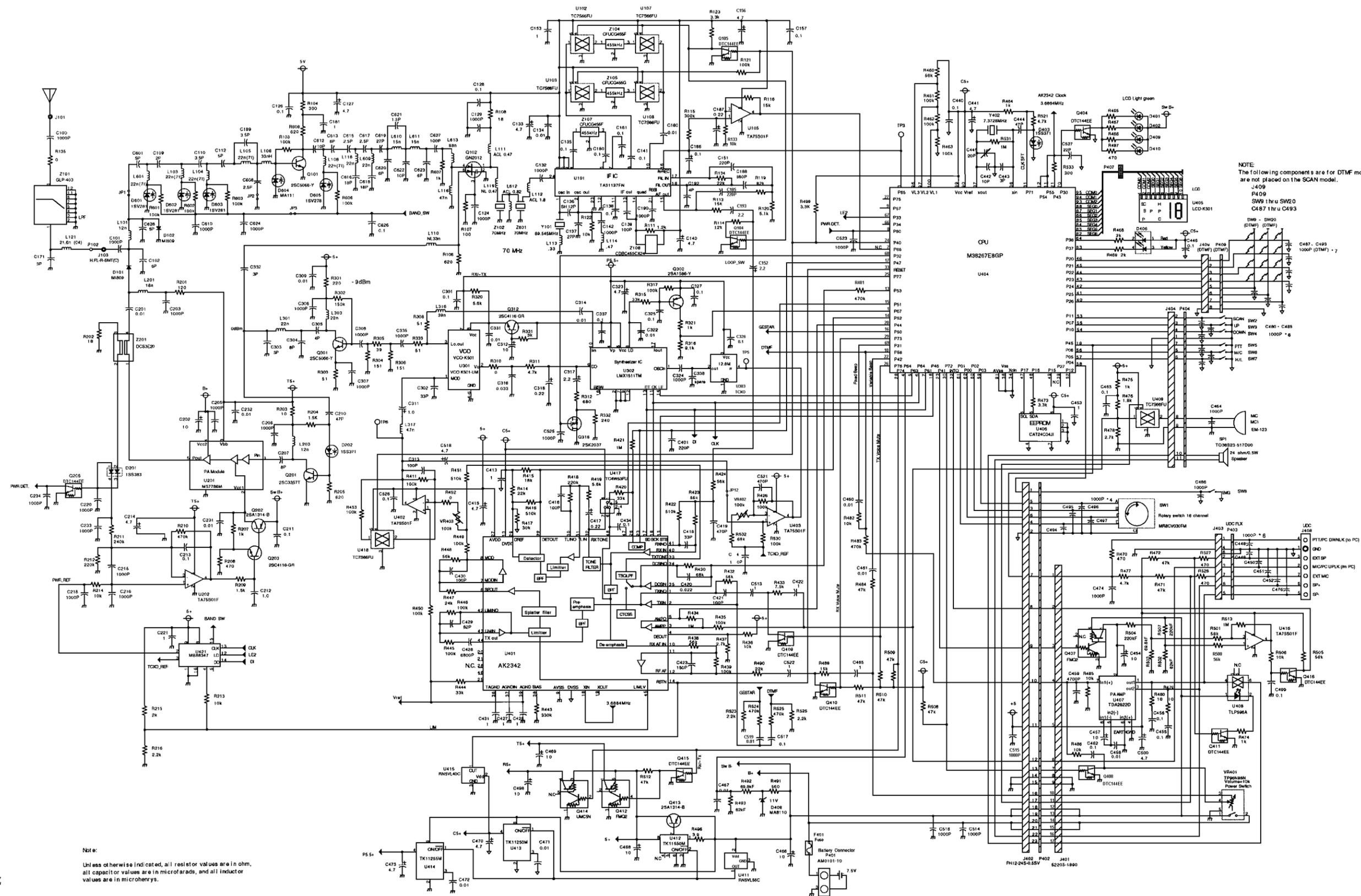
MAIN BOARD



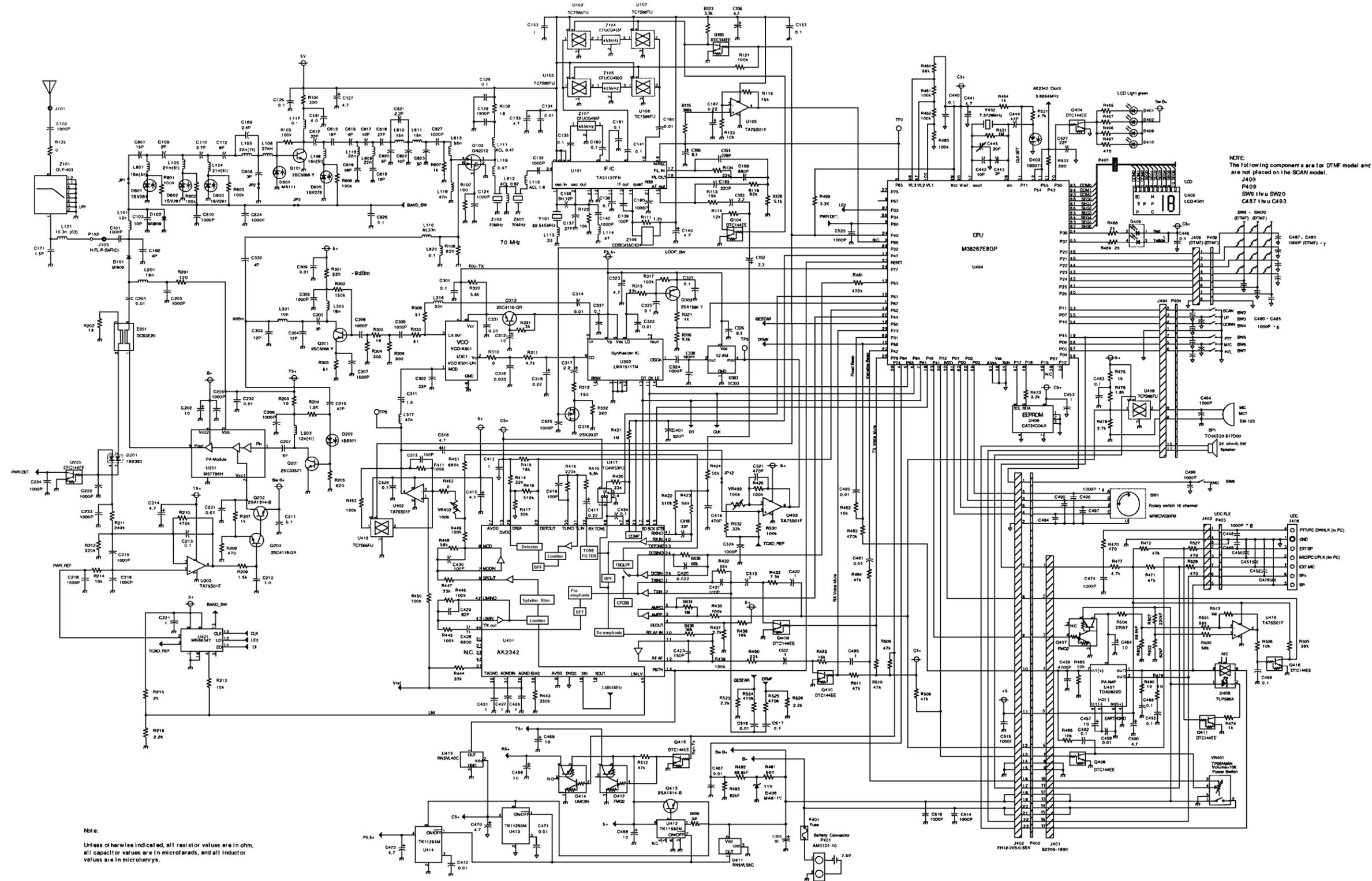
Note:
 Unless otherwise indicated, all resistor values are in ohm,
 all capacitor values are in microfarads, and all inductor
 values are in microhenrys.

NOTE:
 The following components are for DTMF model and
 are not placed on the SCAN model.

- J409 P409
- SW9 thru SW20
- C487 thru C493
- SW9 - SW20 (DTMF) (DTMF)
- C807 - C813
- U001 (DTMF)
- C808 - C815
- U002 (DTMF)
- C816 - C823
- U003 (DTMF)
- C824 - C831
- U004 (DTMF)
- C832 - C839
- U005 (DTMF)
- C840 - C847
- U006 (DTMF)
- C848 - C855
- U007 (DTMF)
- C856 - C863
- U008 (DTMF)
- C864 - C871
- U009 (DTMF)
- C872 - C879
- U010 (DTMF)
- C880 - C887
- U011 (DTMF)
- C888 - C895
- U012 (DTMF)
- C896 - C903
- U013 (DTMF)
- C904 - C911
- U014 (DTMF)
- C912 - C919
- U015 (DTMF)
- C920 - C927
- U016 (DTMF)
- C928 - C935
- U017 (DTMF)
- C936 - C943
- U018 (DTMF)
- C944 - C951
- U019 (DTMF)
- C952 - C959
- U020 (DTMF)
- C960 - C967
- U021 (DTMF)
- C968 - C975
- U022 (DTMF)
- C976 - C983
- U023 (DTMF)
- C984 - C991
- U024 (DTMF)
- C992 - C999
- U025 (DTMF)
- C1000 - C1007
- U026 (DTMF)
- C1008 - C1015
- U027 (DTMF)
- C1016 - C1023
- U028 (DTMF)
- C1024 - C1031
- U029 (DTMF)
- C1032 - C1039
- U030 (DTMF)
- C1040 - C1047
- U031 (DTMF)
- C1048 - C1055
- U032 (DTMF)
- C1056 - C1063
- U033 (DTMF)
- C1064 - C1071
- U034 (DTMF)
- C1072 - C1079
- U035 (DTMF)
- C1080 - C1087
- U036 (DTMF)
- C1088 - C1095
- U037 (DTMF)
- C1096 - C1103
- U038 (DTMF)
- C1104 - C1111
- U039 (DTMF)
- C1112 - C1119
- U040 (DTMF)
- C1120 - C1127
- U041 (DTMF)
- C1128 - C1135
- U042 (DTMF)
- C1136 - C1143
- U043 (DTMF)
- C1144 - C1151
- U044 (DTMF)
- C1152 - C1159
- U045 (DTMF)
- C1160 - C1167
- U046 (DTMF)
- C1168 - C1175
- U047 (DTMF)
- C1176 - C1183
- U048 (DTMF)
- C1184 - C1191
- U049 (DTMF)
- C1192 - C1199
- U050 (DTMF)
- C1200 - C1207
- U051 (DTMF)
- C1208 - C1215
- U052 (DTMF)
- C1216 - C1223
- U053 (DTMF)
- C1224 - C1231
- U054 (DTMF)
- C1232 - C1239
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- C1240 - C1247
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- U063 (DTMF)
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- C1352 - C1359
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- C1360 - C1367
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- C1368 - C1375
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- C1376 - C1383
- U073 (DTMF)
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- C1592 - C1599
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- C2000 - C2007
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- C2168 - C2175
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- C2992 - C2999
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- C3392 - C3399
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- C3472 - C3479
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- U336 (DTMF)
- C3488 - C3495
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- C3696 - C3703
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- C3704 - C3711
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- C3760 - C3767
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- C3768 - C3775
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- C3776 - C3783
- U373 (DTMF)
- C3784 - C3791
- U374 (DTMF)
- C3792 - C3799
- U375 (DTMF)
- C3800 - C3807
- U376 (DTMF)
- C3808 - C3815
- U377 (DTMF)
- C3816 - C3823
- U378 (DTMF)
- C3824 - C3831
- U379 (DTMF)
- C3832 - C3839
- U380 (DTMF)
- C3840 - C3847
- U381 (DTMF)
- C3848 - C3855
- U382 (DTMF)
- C3856 - C3863
- U383 (DTMF)
- C3864 - C3871
- U384 (DTMF)
- C3872 - C3879
- U385 (DTMF)
- C3880 - C3887
- U386 (DTMF)
- C3888 - C3895
- U387 (DTMF)
- C3896 - C3903
- U388 (DTMF)
- C3904 - C3911
- U389 (DTMF)
- C3912 - C3919
- U390 (DTMF)
- C3920 - C3927
- U391 (DTMF)
- C3928 - C3935
- U392 (DTMF)
- C3936 - C3943
- U393 (DTMF)
- C3944 - C3951
- U394 (DTMF)
- C3952 - C3959
- U395 (DTMF)
- C3960 - C3967
- U396 (DTMF)
- C3968 - C3975
- U397 (DTMF)
- C3976 - C3983
- U398 (DTMF)
- C3984 - C3991
- U399 (DTMF)
- C3992 - C3999
- U400 (DTMF)
- C4000 - C4007
- U401 (DTMF)
- C4008 - C4015
- U402 (DTMF)
- C4016 - C4023
- U403 (DTMF)
- C4024 - C4031
- U404 (DTMF)
- C4032 - C4039
- U405 (DTMF)
- C4040 - C4047
- U406 (DTMF)
- C4048 - C4055
- U407 (DTMF)
- C4056 - C4063
- U408 (DTMF)</



440-470 MHz (K501C401, R8)



NOTE:
The following components are for DTMF model and are not placed on the SCAN model.

- J409
- P409
- SW1 thru SW20
- C487 - C493
- C487 thru C493
- C487 - C493
- C487 thru C493

Note:
Unless otherwise indicated, all resistor values are in ohms, all capacitor values are in picofarads, and all inductor values are in microhenrys.

470-512 MHz
(K501C403, R2)

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