ALAN HP 106

SERVICE MANUAL

ALAN HP106

Portable VHF Transceiver

Service Manual

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1 TECHNICAL SPECIFICATIONS

1.1 Test methods

- ETS 300-086
- IEC 529 IP54 and MIL STD 810 C/D/E

1.2 Specifications table

<table>
<tr><th colspan="4">General</th></tr>
<tr><th>Characteristic</th><th>Units</th><th colspan="2">Value/Measurements conditions</th></tr>
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<tr><td>Operating Band</td><td>MHz</td><td colspan="2">26</td></tr>
<tr><td>Number of Programmable Channels</td><td>-</td><td colspan="2">16</td></tr>
<tr><td>Channel Spacing</td><td>KHz</td><td colspan="2">12.5 / 20 / 25</td></tr>
<tr><td>Frequency Steps</td><td>KHz</td><td colspan="2">5 / 6.25</td></tr>
<tr><td>Rated Power Supply</td><td>Vcc</td><td colspan="2">7.5</td></tr>
<tr><td>Battery Capacity</td><td>mAh</td><td colspan="2">Ni-MH 1.300</td></tr>
<tr><td rowspan="3">Duty Cycle</td><td rowspan="3">hours</td><td>5% on TX at the maximum power</td><td rowspan="3">8</td></tr>
<tr><td>5% on RX at 60 % of the maximum rated A.F. power</td></tr>
<tr><td>90% on RX with closed squelch in power save mode</td></tr>
<tr><td>Antenna Impedance</td><td>Ohm</td><td colspan="2">50</td></tr>
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<tr><td>Frequency Stability</td><td>ppm</td><td colspan="2">±2.5</td></tr>
<tr><td>Operating Temperature Range</td><td>°C</td><td colspan="2">from –30 to +60</td></tr>
<tr><th colspan="4">Transmitter</th></tr>
<tr><td>Output Power (±1 dB)</td><td>W</td><td colspan="2">1 / 5</td></tr>
<tr><td rowspan="2">Spurious Emissions</td><td rowspan="2">μW</td><td>from 9 KHz to 1 GHz</td><td>< 0,25</td></tr>
<tr><td>from 1 to 4 GHz</td><td>< 1</td></tr>
<tr><td>Modulation System</td><td>-</td><td colspan="2">F3E (FM)</td></tr>
<tr><td>Modulation</td><td>KHz</td><td colspan="2">± 2,5 / 5</td></tr>
<tr><td>Audio Distortion</td><td>-</td><td colspan="2">5 % or less</td></tr>
<tr><td>Maximum Deviation</td><td>KHz</td><td colspan="2">± 2.5 / 5</td></tr>
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<tr><th colspan="4">Receiver</th></tr>
<tr><td>Configuration</td><td></td><td colspan="2">Double Conversion Superetherodyne</td></tr>
<tr><td>Sensitivity (at 12 dB SINAD)</td><td>μV</td><td colspan="2">< 0.35</td></tr>
<tr><td>Squelch Sensitivity (SINAD)</td><td>dB</td><td colspan="2">10</td></tr>
<tr><td>Selectivity (Adjacent Channel)</td><td>dB</td><td colspan="2">At least -65 / -75</td></tr>
<tr><td>Spurious Response Rejection</td><td>dB</td><td colspan="2">> 70</td></tr>
<tr><td>Intermodulation</td><td>dB</td><td colspan="2">> 65</td></tr>
<tr><td>Hum & Noise Suppression</td><td>dB</td><td colspan="2">< -45 / < -40</td></tr>
<tr><td>Audio Output (1 KHz at 5% T.H.D.)</td><td>mW</td><td colspan="2">400</td></tr>
<tr><th colspan="4">Mechanical Specifications</th></tr>
<tr><td>Size (Battery Pack Included)</td><td>mm</td><td colspan="2">130 x 42 x 60</td></tr>
<tr><td>Weight (Battery Pack Included)</td><td>g</td><td colspan="2">355</td></tr>
<tr><td>Battery</td><td>-</td><td colspan="2">Back slide battery</td></tr>
<tr><td>Accessories Connector / Programming</td><td>-</td><td colspan="2">2.5 and 3.5 mm standard monophonic jacks</td></tr>
<tr><td>Moisture & Dust Resistance</td><td>-</td><td colspan="2">According to the IEC529 and IP54 regulations</td></tr>
</table>

2 CIRCUIT DESCRIPTION

2.1 General information

The HP-106 has three printed circuit boards. Circuitry is divided in the following sections:

- Microprocessor/Control
- VCO/Synthesizer
- Transmitter
- Receiver
- Signalling
- Battery

Refer to the Block Diagram and the Schematics.

2.2 Microprocessor/control

The microprocessor **IQ9** is constantly operating when the radio is turned ON. It is continuously monitoring the keyboard, the PTT line and other internal inputs such as the squelch detect, etc. When a change occurs, the microprocessor makes the appropriate response. The microprocessor is used for control. The Radio emits a beep on channel change and the synthesizer is loaded with the correct frequency information. The microprocessor runs off a 8 MHz oscillator which is composed of **IX1**, **IC30**, **IC31** and **IR48**.

When the radio is first turned on, the microprocessor reads the radio status from the EEPROM **IQ8**.

The microprocessor determines the receive frequency codes, then loads the synthesizer via its pins **42** (PLL LE), **46** (PLL CLK) and **43** (PLL DATA).

The microprocessor is fitted with an internal program flash memory as well, therefore functions can be customised, if necessary, upon specific request from the customer.

2.3 VCO / Synthesizer (PLL)

This section consists of the Temperature-Compensated Crystal Oscillator (TCXO), Voltage Controlled Oscillator(VCO), Synthesizer and the Loop Filter.

2.3.a Temperature-Compensated Crystal Oscillator (TCXO)

The reference oscillator (**X401**) is a temperature compensated crystal- oscillator, **RV402** is used to adjust the oscillator on frequency (14.4 MHz) at room temperature (22 ℃). The reference oscillator is held within the specified ±2.5 PPM from -30 to +60℃.

2.3.b Voltage-Controlled Oscillators

Only one of the VCOs runs at a time, which is controlled by **Q420** and **IQ9**. When the PTT is pressed, **IQ9** pin **34** goes low (approx. 0V) disabling the receive VCO by the **Q420** and biases on **Q419** to enable the transmitter VCO.

The receive VCO consists of **C482-C485**, **CV401**, **L426-L428**, and **Q422-Q424**. This VCO oscillates at 45.1 MHz above the programmed receive frequency. The VCO's oscillating frequency is tuned by the varactors **Q423** and **Q424**. The tuning voltage is supplied from the output of the Loop Filter. The output of the VCO is AC coupled (**C475** and **R558**, **C530**, **C505**) to the synthesizer and the output buffer **Q414** respectively.

The transmitter VCO consists of **C487**, **C489-C491**, **CV402**, **L424**, **L425**, **L429** and **Q416-Q418**.

This VCO oscillates on the programmed transmit frequency. The VCO's oscillating frequency is tuned by the varactors **Q417** and **Q418**. The tuning voltage is supplied from the output of the Loop Filter. The output of the VCO is AC coupled (**C486**) to the synthesizer input buffer **Q428** and the output buffer **Q415** respectively.

The transmit voltage controlled oscillator is directly frequency-modulated and operates on the carrier frequency. In the receive mode, the transmit VCO is disabled and the receive VCO is enabled, producing the receive local oscillator signal at a frequency 45.1 MHz below the incoming receive frequency.

The synthesizer is tuned in 5.00 KHz or 6.25 KHz step.

2.3.c Synthesizer

The frequency synthesizer is a large scale monolithic synthesizer integrated circuit **Q429**.

The synthesizer IC contains a dual modular prescaler, programmable divide-by-N counter, prescaler control (swallow) counter, reference oscillator, reference divider, phase detector, charge pump and lock detector.

Also, included in **Q429** are shift registers and control circuits for frequency controls and general device control.

RF output from the active VCO is AC coupled to the synthesizer **Q429** prescaler input at Pin **8**. The divide-by-N counter chain in **Q429**, consisting of the dual-modulus prescaler, swallow counter and programmable counter, divides the VCO signal down to a frequency very close to 5.00 KHz or 6.25 KHz which is applied to the phase detector. The phase comparator compares the edges of this of this signal with that of the 5.00 KHz or 6.25 KHz reference signal from the reference divider and drives the external charge pump (**Q425** and **Q426**).

The synthesizer unlock detector circuit prevents the operation of the transmitter, when the phase lock loop (PLL) is unlocked. The following discussion assumes the unit has been placed in the transmit mode. **Q429** lock detector Pin **7** goes high when the PLL is locked. This high level is applied to Pin **21** of the microprocessor **IQ9**. A software timing routing brings the **RX/TX** line low (Pin **29** of **IQ9**), feeding this signal through the switch/buffer **IQ15**. With the **RX/TX** line low, **Q223A** is cut off and **Q223B** is biases on passing **+5VTX** to **Q431B,** it biases on **Q430** to pass switched **TX B+** to the transmitter amplifier string which enables transmission.

When the PLL become unlocked, the lock detector at **Q429** Pin7 will begin pulsing low. A RC circuit converts pulsing low to a low level for the microprocessor. The microprocessor then changes the RX/TX line to a high, thus signalling the other transistor switches to drive **Q430** into cutoff which disable transmission. Therefore, the transmitter remains disabled while the loop remains out of lock.

2.3.d Loop Filter

The Loop Filter, a passive lead-lag filter consisting of **R461-R464** and **C493-C495**, integrates the charge pump output to produce the DC turning voltage for the VCO. One parasitic pole, consisting of **R461**/**C493** and RF chokes **L428**/**L429**, prevent modulation of the VCOs by the 5.00 KHz or 6.25 KHz reference energy remaining at the output of the loop filter. Direct FM is obtained for modulating frequencies outside the PLL bandwidth by applying the CTCSS/DCS signals and the pre-emphasized, limited microphone audio to the VCO modulation circuit.

The modulation circuit consists of **R452**, **Q421** and **C487**.

2.4 Transmitter

2.4.a RF Power Amplifier

After the PTT is pressed, the **+5VTX** line switches to approximately 5V. **Q419** is turned on enabling transmit VCO.

The VCO buffer, pre-driver, driver and power amplifier are biased on by **Q430**, which is biased on by the **+5VTX** line switching to 5V. RF output from the transmit VCO(**Q416**) is applied to the VCO output buffer **Q415**.

Output from **Q415** feeds the pre-driver amplifier **Q413**. The output signal from **Q413** feeds the driver amplifier **Q412**, whose output from the driver stage feeds the final RF power amplifier **Q407** to produce the rated output power of 2 watts. The output of the final is applied to a low-pass filter(**C451**, **C452** and **L413**) and then to the transmit/receive switch **Q402**. RF power is then fed to the antenna via the output low-pass filter consisting of **C401**,**C403**, **C405-C408**, **L401**, and **L402**.

2.4.b Antenna Switching

Switching of the antenna between the transmitter and the receiver is accomplished by the antenna transmit/receive switch consisting of diodes **Q401** and **Q402** in conjunction with **C410** and **R402**. In the transmit mode, switched **TX B+** is applied through **R420** and RF choke **L414**,hard forward biasing the two diodes on. **Q402** thus permits the flow of RF power from output of the low-pass filter fed by the output amplifier to the output low-pass filter. **Q401** shorts the receiver input to **C410**, which is AC coupled to ground. **L403**, **C409**, **C410** and **R402** then function as a lumped constant quarter-wave transmission line, thus presenting a high impedance to the RF output path, effectively isolating the receiver input and transmitter output sections.

2.4.c Power control

Output power is controlled via the dual Op-Amp (**Q408**) , which is used as a differential amplifier and comparator.

Current is sensed by the voltage drop across **R421** and **R422**. This voltage is compared to the one set by the 2-watt Adjustment **RV401**. The power output is then reduced or increased by varying the **Q410**'s output voltage applied to the power amplifier **Q407**'s pin 2.

2.4.d Transmitter Audio Circuits

The transmitter audio circuits consist of the audio processing circuits, the CTCSS circuits and the DCS circuits.

2.4.e Audio Processing

Transmit speed audio is providing by either the internal electric microphone **N101** or the external microphone. The microphone audio is applied to MIC MUTE SW **Q235**, and Lo-pass filter **Q214A**, **Q214B**. The audio is pre - emphasized by 6dB per octave by **C236** and **R284**, and then signal amplification. The gain is such that when a signal greater than 20 dB.

Limiting the peak-to-peak output. Under these conditions, the MOD. ADJ. Pot **RV201** configured as a four-pole active low-pass filter. The resulting signal is then limited when respect to side band splatter, and has an 18 dB per octave roll-off above 3 KHz.

The audio is then applied through the 25 KHz/12.5 KHz channel spacing SW **Q215** to transmit VCO. By varying the voltage on the varactor diode **Q921** at an audio rate. The resonant frequency of VCO is varied. The result is an oscillator output that is frequency -modulated at the audio frequency.

2.5 Receiver

2.5.a Receiver Front End

In the receive mode, the RF signal enters thorough the antenna, then through the low-pass filter **C401**, **C403**, **C405**-**C409** and **L401**-**L403**. The diodes **Q401** and **Q402** are biased off so that the output of the low-pass filter is coupled (**C411**) to the first band-pass filter **C412**-**C415**, **C417**-**C420**, **L404**-**L407** and to the Front End RF overload protection diode pair **Q403**. The signal from the band-pass filter is applied to the input of the RF amplifier **Q404**.

The output of the RF amplifier feeds the input to three more stages of band-pass filters consisting of **C424**-**C431**, and **L408**-**L410**. The output from the band-pass filter is applied to the mixer's **Q405/L411**.

2.5.b Local Oscillator (LO)

The Receive VCO (**C482**-**C485**, **CV401**, **L426**-**L427**, **Q422**-**Q424** and **R453**-**R454**) provides the LO signal. The VCO is running at 45.1 MHz above the desired receive frequency and is applied to output Buffer **Q415**/**Q414**. The output of the buffer through the low-pass filter **C433**-**C435**, **L432**-**L433** and applied to the mixer **Q405/L411/L412**.

2.5.c Mixer

The mixer is a DBM type (**L411,Q405,L412**). The mixer LO frequency is 45.1 MHz below the desired receiver frequency.

When the receiver frequency is present, the mixer output will be a 45.1MHz signal. The mixer output is peaked for 45.1MHz at **L434**, **C437** and **R413**, and the signal is filtered by crystal filter **F401A** and **F401B** and amplified by **Q406** before being applied to the input of the IF IC **IC6**.

Inside **IC6**, the 45.1MHz IF signal becomes the input to a second mixer with a LO frequency of 44.645 MHz set by **X201**. The 455 KHz ceramic filter **F201** or **F202** filters the second mixer's output which is the second IF signal. The mixer's output is then fed to the internal limiting amplifier and then on to the FM decoder.

2.5.d FM Detector and Squelch

The FM detector output is used for squelch, decoding tones and audio output. The setting of the squelch adjustment potentiometer **RV204** (for 25 KHz channel spacing) and **RV205** (for 12.5 KHz channel spacing) sets the input to the squelch amplifier.

The squelch amplifier is internal to **IC6** and its output is fed to an internal rectifier and squelch detector.

The output on **IC6** Pin **14** signals the microprocessor **IQ9** with a low level (～0V) to unmute the radio.

The audio is unmuted by the microprocessor **IQ9** Pin 27 switching to a high value (～5V on SQL MUTE) thus biasing on **Q206**. The audio is then routed to the audio amplifier **Q221** via the volume control **S201**.

2.5.e Receiver Audio Circuit

The detector's audio output also is fed to the tone(CTCSS and DCS) low-pass filter **Q212C**.

Then the output of the low-pass filter is routed to the second stage filter **Q212B**. The output of **Q210B** is applied to the squaring circuit **Q212A** and finally to the microprocessor **IQ9** Pin **60** for decoding.

Another branching of the detector output feeds the audio high-pass filter **Q208** via **Q212D**. The output of the audio high-pass filter feeds the Volume Control **S201**(VOL). From the wiper arm on the Volume Control, the audio is routed to Pin 2, the input to the audio power amplifier **Q221**. The output of the audio power amplifier is routed through the earphone jack **J401** to the internal speaker **E101**.

2.6 Signalling

2.6.a General

The microprocessor is fitted with a ADC/DAC converter built-in, so it provides generating and decoding the tones for selective calls, CTCSS and DCS. It can do that without using any other external ICs, but only by means of some transistors. The deviation of the selective call can be adjusted by the trimmer IRV1.

The microprocessor manages the analogue switches for the scrambler as well, which is base-band-inversion type.

2.6.b CTCSS Tone Encoder / Digital Code Squelch (DCS) Encoder

CTCSS signals and DCS signals are synthesized by microprocessor **IQ9** and appear as pulse waveform on I/O line at Pin **39**. This I/O line is a pseudo-sine wave for CTCSS or a DCS pseudo-waveform and is applied to the transistor **IQ5** which makes the signals closer to the theoretic CTCSS/DCS signals. The waveform is then smoothed by low pass filters **Q213B** to produce an acceptable sine wave output. The CTCSS tone signal is adjust to the proper level by **RV202**. The DCS signal is adjust to the proper balance by **RV203**. The signal is then applied to the audio processing circuit at **R305** and to the TCXO circuit at **X401**.

2.6.c Selective call

Similarly to CTCSS/DCS, selcal signals are also generated and decoded by the microprocessor **IQ9**. The selcal decode input is the pin **59** (**ADC_SELCALL**), whilst the TX tones are generated at pin **37** (**SELCALL_PWM**), then fed to the transistor **IQ4** and associated circuitry which provides to amplify and smooth the tones in order to make them suitable for the modulator. **IRV1** adjusts the level (deviation) of the tones.

2.6.d Scrambler

It's a classic "baseband inversion" scrambler which inverts the audio baseband (300-30000 Hz). The audio baseband **AFTX_IN** is mixed with a fixed tone (1300 Hz) **SCRMBLR_CLK** generated by the microprocessor **IQ9**. The mixer's output **AFTX_OUT** is a scrambled baseband which sounds garbled (not understandable) by normal receivers. However, if the receiver is equipped with the same kind of scrambler which is properly set on the same fixed tone, the received scrambled baseband is fed in the RX mixer which provides a complementary process obtaining a clear (understandable) baseband at its output. If fact if the scrambled transmission is received by the party's HPx06 (with scrambled activated), the scrambled baseband **AFRX** is fed to the scrambler unit and mixed with the same tone generated by the microprocessor. The output of the mixer **AFRX_OUT** is a normal (unscrambled) baseband and can be clearly heard.

As you can see, the over stated fixed audio tone acts as a encoding/decoding key, so it must be the same both at the TX and RX parties. As already stated, the standard version of HPx06 is fitted with a 1300 Hz encoding/decoding key, however a different tone can be required.

2.7 Battery

The battery connects to the contact pins(**CN201** and **CN202**) on the bottom end of the Radio. The positive terminal of the battery connects to the ON/OFF Volume Control switch (**S201**) and the negative terminal connects to chassis ground. Low battery sense **R101**/**R102**, voltage regulator **Q222** and transmit power module **Q407**.

The battery voltage status is monitored by the microprocessor **IQ9** Pin **61** which senses the battery voltage through the **BATT+SW** line by means of **IR51**/**IR49**. When the battery voltage is approximately 5.8V, the microprocessor considers the battery discharged and switches off the circuits of the radio.

When the Radio is on a channel with no tone programmed, the BATTERY SAVER Mode is enabled when programmed.

In the BATTERY SAVER mode, the microprocessor **IQ9** generates a square wave signal at Pin **48** which is applied to the inverter **IQ10:6**. The signal’s duty cycle varies according to what the POWER SAVE TIMER is set. When the microprocessor **IQ9** Pin **48** goes high (approx. 5 V) **Q226** (receiver module) is biased off, **Q225** is biased on, **Q224A** is cut off, and **Q223A** is cut off, thus turning the supply off to **IC6**.

3 ADJUSTMENTS

3.1 General

For proper alignment, the unit should be programmed with the following channel and frequency information

Channel number	Receive Frequency (MHz)	Transmit Frequency (MHz)	RX/TX Tone Code	Channel Spacing (KHz)
CH 1	174.050	174.025	NO TONE	25
CH 2	163.050	163.025	NO TONE	25
CH 3	163.050	163.050	100Hz TONE	25
CH 4	163.050	163.050	627 DCS CODE	25
CH 5	163.050	163.025	NO TONE	12.5

Make connections to the Unit per Figure 1 (Equipment Test Set-up) below and Figure 2 (Test Adapter). For the location of the components called out in these procedures, refer to RF Board and SUB Board.

3.2 Synthesizer/Transmitter VCO Check

NOTE: VCO check must be accomplished before proceeding with the Transmitter and/or Receiver Alignment.

1) Connect the voltmeter to **TP6**.
2) Place the unit on channel 1 (174.050MHz. RX; 174.025MHz, TX).
3) Tune **CV401** in Receive mode for 4.90V ± 0.05V at **TP6**.
4) Push the PTT switch (TX) and tune **CV402** for 4.30V ± 0.05V at **TP6**.

3.2.a Frequency Adjustment

1) Connect the Radio in accordance with Figure 1.
2) Place the unit on channel 1 (174.050MHz, RX; 174.025MHz, TX).
3) Operate the transmitter and adjust **RV402** for a Frequency Counter reading within ± 50Hz of the programmed transmit frequency.

3.3 Transmitter Alignment

NOTE: In order to obtain proper transmission output power, connect the Radio to the power supply with a cable that is rated to withstand a current of 2 amperes or greater.

3.3.a Power Adjustment

1) Connect the Radio in accordance with Figure 1.
2) Place the radio on the **channel 2** (163.050MHz, RX; 163.025MHz. TX).
3) Place the unit in HIGH POWER mode.
4) Turn **RV401** and **RV405** fully clockwise.
5) Operate the transmitter, using TA-S1, to make sure that the maximum RF output power reading on the wattmeter is 5.5 W or greater.
6) Adjust **RV401** (HI PWR ADJ) for a reading of 5.0 W ±0.1 W. Check to make sure that the transmit current is within 1000 - 1400 mA after the adjustment has been made.
7) Place the unit in the LOW POWER mode.
8) Adjust **RV405** (LO PWR ADJ) for a reading of 1.0 W ±0.1 W. Check to make sure that the transmit current is within 500 - 700 mA after the adjustment has been made.

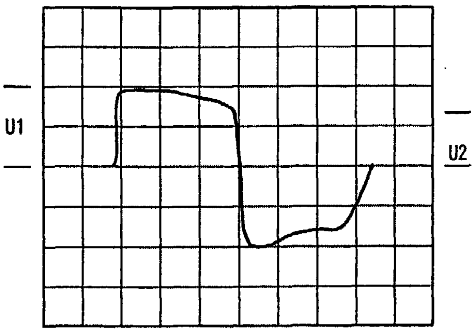
3.3.b Modulation Adjustment

1) Connect the Radio in accordance with Figure 1.
2) Place the Radio on **channel 2** (163.050MHz, RX; 163.025MHz, TX).
3) Apply a 1 KHz tone signal to Test Adapter's AF Input (Figure 2), which is the microphone impedance matching network.
4) Plug the Test Adapter into the external speaker/microphone jack.

5) Set the audio generator's output level at approximate 300mVrms at **TPA** of the Test adapter.
6) Operate the transmitter, using TA-S1, and adjust **RV201**(MOD.ADJ) for ±4.0 KHz deviation.

3.3.c CTCSS/DCS adjustment

7) To adjust CTCSS and DCS Deviation, perform step1 though 6 above. Then set the FM liner detector audio bandwidth of 0.25 Hz or less to15,000 Hz or more. Turn the de-emphasis function off.
8) Place the Radio on channel 4 (163.050MHz. TX; 627 DCS CODE). Set the audio generator output to 0V operate the transmitter, using TA-S1 and adjust the DCS balance control **RV203** to U1-U2 is minimum on the Oscilloscope.
9) Place the Radio on channel 3 (163.050MHz, TX; 100Hz Tone). Operate the transmitter using TA-S1, and adjust **RV202** to ±800Hz deviation on Modulation Analyzer.



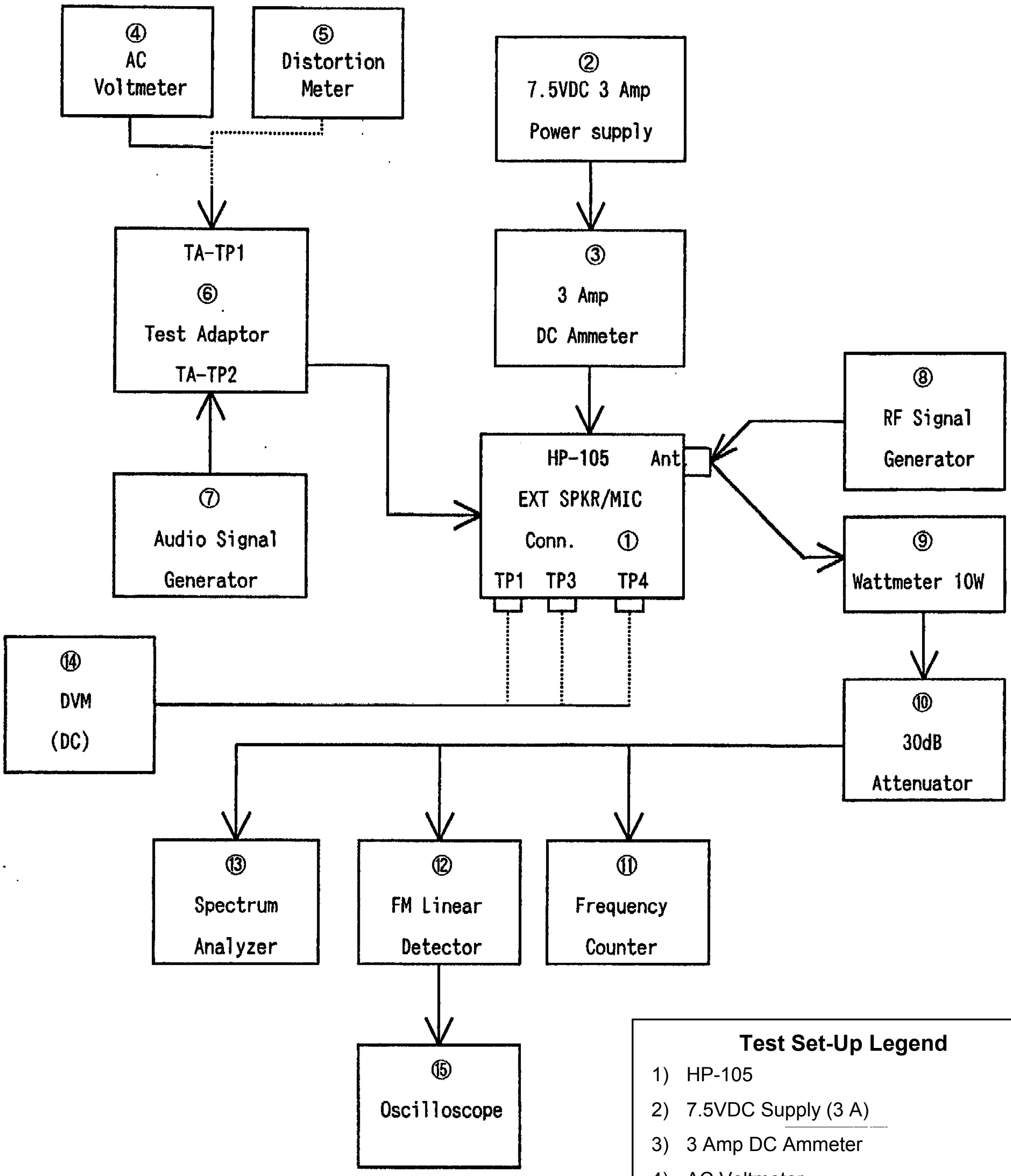
3.3.d Selcal adjustment

10) Set up a selcall sequence which includes, at least, an hi-pitched tone and a tone length of 1 second minimum (in order to allow a convenient deviation check)
11) Send the selcal by keeping pressed the **MON** or **FUNC** keys and adjust **RV1** in order to obtain the following minimum /maximum deviation according to the channel bandwidth:
    - For 12.5 KHz channel bandwidth - min ±1.5 KHz / max ±2.5 KHz
    - For 25 KHz channel bandwidth - min ±2.5 KHz / max ±3 KHz

3.4 Receiver Alignment

1) Connect the Radio in accordance with Figure 1.
2) Place the Radio on the **channel 2** (163.050MHz, RX; 163.025MHz, TX).
3) Adjust the Squelch Control **RV204** until the BUSY LED (Green) turns ON.
4) Apply the RF generator signal with 1 KHz tone at 3 KHz deviation so that the tone can be heard in the speaker.
5) Adjust the volume control for the rated audio.
6) Set the RF signal generator's level obtain a 9dB SINAD reading.
7) Adjust **RV204** (Squelch control) counter clockwise slowly just until the BUSY LED goes out.
8) Adjust **RV204** clockwise slowly just until the BUSY LED goes ON.
9) Place the radio on the **channel 5** (163.050MHz, RX; 163.025MHz, TX).
10) Adjust the squelch control **RV205** until the BUSY LED (Green) turns ON.
11) Apply the RF generator signal with 1 KHz tone at 1.5 KHz deviation so that the tone can be heard in the speaker.
12) Ad just the volume control for the rated audio.
13) Set the RF signal generator's level obtain 9dB SINAD reading.
14) Adjust **RV205** counter clockwise slowly just the BUSY LED goes on.
15) Ad just **RV205** clockwise slowly just until the BUSY LED goes on.

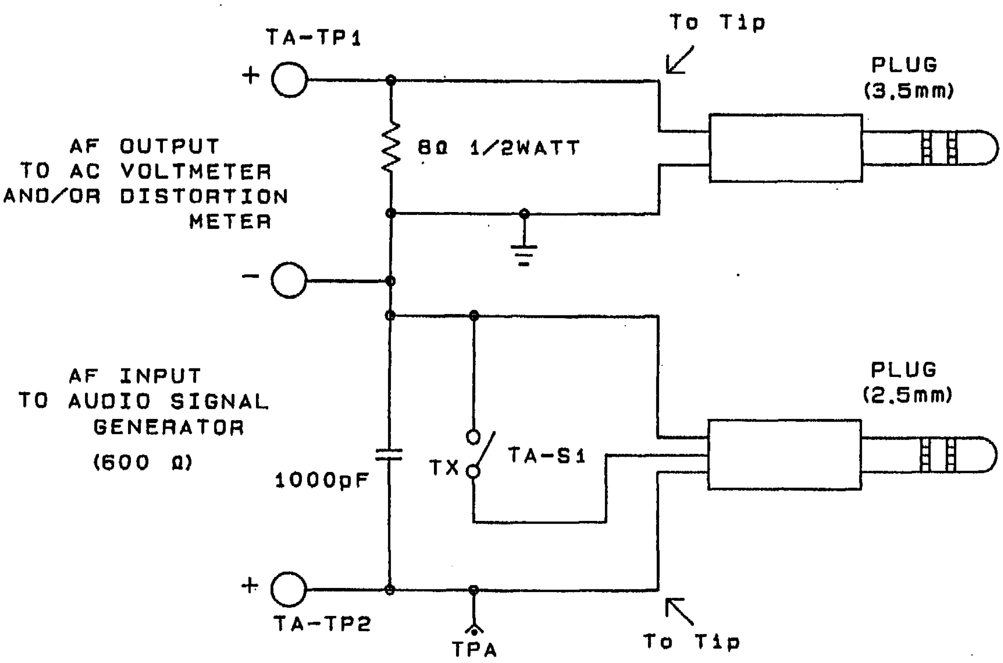
3.5 Figure 1 - Equipment Test set-up


④ AC Voltmeter
⑤ Distortion Meter
② 7.5VDC 3 Amp Power supply
TA-TP1
⑥ Test Adaptor
TA-TP2
③ 3 Amp DC Ammeter
⑧ RF Signal Generator
HP-105
Ant
EXT SPKR/MIC Conn. ①
TP1 TP3 TP4
⑦ Audio Signal Generator
⑨ Wattmeter 10W
⑭ DVM (DC)
⑩ 30dB Attenuator
⑬ Spectrum Analyzer
⑫ FM Linear Detector
⑪ Frequency Counter
⑮ Oscilloscope

Test Set-Up Legend

1) HP-105
2) 7.5VDC Supply (3 A)
3) 3 Amp DC Ammeter
4) AC Voltmeter
5) Distortion Meter
6) Test Adapter (Figure 2)
7) Audio Signal Generator (600 Ohm)
8) RF Signal Generator
9) Wattmeter - 10W
10) 30 dB Attenuator
11) UHF Frequency Counter
12) FM Linear Detector
13) Spectrum Analyzer
14) Digital Voltmeter
15) Oscilloscope

3.6 Figure 2 - Test adaptor


TA-TP1
+
To Tip
PLUG
(3.5mm)
AF OUTPUT
TO AC VOLTMETER
AND/OR DISTORTION
METER
8Ω 1/2WATT
−
AF INPUT
TO AUDIO SIGNAL
GENERATOR
(600 Ω)
1000pF
TX
TA-S1
PLUG
(2.5mm)
+
TA-TP2
TPA
To Tip

ALAN HP 406

SERVICE MANUAL

ALAN HP406

Portable VHF Transceiver

Service Manual

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1 TECHNICAL SPECIFICATIONS

1.1 Test methods

- ETS 300-086
- IEC 529 IP54 and MIL STD 810 C/D/E

1.2 Specifications table

General			
Characteristic	**Units**	**Value/Measurements conditions**	
Frequency	MHz	from 440 to 470	
Operating Band	MHz	30	
Number of Programmable Channels	-	16	
Channel Spacing	KHz	12.5 / 20 / 25	
Frequency Steps	KHz	5 / 6.25	
Rated Power Supply	Vcc	7.5	
Battery Capacity	mAh	Ni-MH 1.300	
Duty Cycle	hours	5% on TX at the maximum power	8
		5% on RX at 60 % of the maximum rated A.F. power	
		90% on RX with closed squelch in power save mode	
Antenna Impedance	Ohm	50	
Speaker Impedance	Ohm	8	
Frequency Stability	ppm	±2.5	
Operating Temperature Range	°C	from –30 to +60	
Transmitter			
Output Power (±1 dB)	W	1 / 5	
Spurious Emissions	µW	from 9 KHz to 1 GHz	< 0,25
		from 1 to 4 GHz	< 1
Modulation System	-	F3E (FM)	
Modulation	KHz	± 2,5 / 5	
Audio Distortion	-	5 % or less	
Maximum Deviation	KHz	± 2.5 / 5	
Adjacent Channel Power Attenuation	dB	< -60 / -70	
Receiver			
Configuration		Double Conversion Superetherodyne	
Sensitivity (at 12 dB SINAD)	µV	< 0.35	
Squelch Sensitivity (SINAD)	dB	10	
Selectivity (Adjacent Channel)	dB	At least -65 / -75	
Spurious Response Rejection	dB	> 70	
Intermodulation	dB	> 65	
Hum & Noise Suppression	dB	< -45 / < -40	
Audio Output (1 KHz at 5% T.H.D.)	mW	400	
Mechanical Specifications			
Size (Battery Pack Included)	mm	130 x 42 x 60	
Weight (Battery Pack Included)	g	355	
Battery	-	Back slide battery	
Accessories Connector / Programming	-	2.5 and 3.5 mm standard monophonic jacks	
Moisture & Dust Resistance	-	According to the IEC529 and IP54 regulations	

2 CIRCUIT DESCRIPTION

2.1 General information

The HP-406 has three printed circuit boards. Circuitry is divided in the following sections:

- Microprocessor/Control
- VCO/Synthesizer
- Transmitter
- Receiver
- Signalling
- Battery

Refer to the Block Diagram and the Schematics.

2.2 Microprocessor/control

The microprocessor **IQ9** is constantly operating when the radio is turned ON. It is continuously monitoring the keyboard, the PTT line and other internal inputs such as the squelch detect, etc. When a change occurs, the microprocessor makes the appropriate response. The microprocessor is used for control. The Radio emits a beep on channel change and the synthesizer is loaded with the correct frequency information. The microprocessor runs off a 8 MHz oscillator which is composed of **X1**, **C30**, **C31** and **R48**.

When the radio is first turned on, the microprocessor reads the radio status from the EEPROM **Q8**.

The microprocessor determines the receive frequency codes, then loads the synthesizer via its pins **42** (PLL LE), **46** (PLL CLK) and **43** (PLL DATA).

The microprocessor is fitted with an internal program flash memory as well, therefore functions can be customised, if necessary, upon specific request from the customer.

2.3 VCO / Synthesizer (PLL)

This section consists of the Temperature-Compensated Crystal Oscillator (TCXO), Voltage Controlled Oscillator(VCO), Synthesizer and the Loop Filter.

2.3.a Temperature-Compensated Crystal Oscillator (TCXO)

The reference oscillator (**X401**) is a temperature compensated crystal- oscillator, **RV402** is used to adjust the oscillator on frequency (14.4 MHz) at room temperature (22 ☐). The reference oscillator is held within the specified ±2.5 PPM from -30 to +60☐.

2.3.b Voltage-Controlled Oscillators

Only one of the VCOs runs at a time, which is controlled by **Q420** and **Q17**. When the PTT is pressed, **Q17** pin **34** goes low (approx. 0V) disabling the receive VCO by the **Q420** and biases on **Q919** to enable the transmitter VCO.

The receive VCO consists of **C482-C485**, **CV901**, **L926-L928**, and **Q922-Q923**. This VCO oscillates at 45.1 MHz above the programmed receive frequency. The VCO's oscillating frequency is tuned by the varactors **Q923** . The tuning voltage is supplied from the output of the Loop Filter. The output of the VCO is AC coupled (**C475** and **R558**, **C530**, **C505**) to the synthesizer and the output buffer **Q414** respectively.

The transmitter VCO consists of **C984**, **C980-C982**, **CV902**, **L924**, **L925**, **L929** and **Q916-Q917**.

This VCO oscillates on the programmed transmit frequency. The VCO's oscillating frequency is tuned by the varactors **Q917** . The tuning voltage is supplied from the output of the Loop Filter. The output of the VCO is AC coupled (**C486**) to the synthesizer input buffer **Q428** and the output buffer **Q415** respectively.

The transmit voltage controlled oscillator is directly frequency-modulated and operates on the carrier frequency. In the receive mode, the transmit VCO is disabled and the receive VCO is enabled, producing the receive local oscillator signal at a frequency 45.1 MHz below the incoming receive frequency.

The synthesizer is tuned in 5.00 KHz or 6.25 KHz step.

2.3.c Synthesizer

The frequency synthesizer is a large scale monolithic synthesizer integrated circuit **Q429**.

The synthesizer IC contains a dual modular prescaler, programmable divide-by-N counter, prescaler control (swallow) counter, reference oscillator, reference divider, phase detector, charge pump and lock detector.

Also, included in **Q429** are shift registers and control circuits for frequency controls and general device control.

RF output from the active VCO is AC coupled to the synthesizer **Q429** prescaler input at Pin **8**. The divide-by-N counter chain in **Q429**, consisting of the dual-modulus prescaler, swallow counter and programmable counter, divides the VCO signal down to a frequency very close to 5.00 KHz or 6.25 KHz which is applied to the phase detector. The phase comparator compares the edges of this of this signal with that of the 5.00 KHz or 6.25 KHz reference signal from the reference divider and drives the external charge pump (**Q425** and **Q426**).

The synthesizer unlock detector circuit prevents the operation of the transmitter, when the phase lock loop (PLL) is unlocked. The following discussion assumes the unit has been placed in the transmit mode. **Q429** lock detector Pin **7** goes high when the PLL is locked. This high level is applied to Pin **21** of the microprocessor **Q17**. A software timing routing brings the **RX/TX** line low (Pin **29** of **Q17**), feeding this signal through the switch/buffer **Q15**. With the **RX/TX** line low, **Q223A** is cut off and **Q223B** is biases on passing **+5VTX** to **Q431B,** it biases on **Q430** to pass switched **TX B+** to the transmitter amplifier string which enables transmission.

When the PLL become unlocked, the lock detector at **Q429** Pin7 will begin pulsing low. A RC circuit converts pulsing low to a low level for the microprocessor. The microprocessor then changes the RX/TX line to a high, thus signalling the other transistor switches to drive **Q430** into cutoff which disable transmission. Therefore, the transmitter remains disabled while the loop remains out of lock.

2.3.d Loop Filter

The Loop Filter, a passive lead-lag filter consisting of **R461-R464** and **C493-C495**, integrates the charge pump output to produce the DC turning voltage for the VCO. One parasitic pole, consisting of **R461/C493** and RF chokes **L928/L929**, prevent modulation of the VCOs by the 5.00 KHz or 6.25 KHz reference energy remaining at the output of the loop filter. Direct FM is obtained for modulating frequencies outside the PLL bandwidth by applying the CTCSS/DCS signals and the pre-emphasized, limited microphone audio to the VCO modulation circuit.

The modulation circuit consists of **R952**, **Q921** and **C987**.

2.4 Transmitter

2.4.a RF Power Amplifier

After the PTT is pressed, the **+5VTX** line switches to approximately 5V. **Q919** is turned on enabling transmit VCO.

The VCO buffer, pre-driver, driver and power amplifier are biased on by **Q430**, which is biased on by the **+5VTX** line switching to 5V. RF output from the transmit VCO(**Q916**) is applied to the VCO output buffer **Q915**.

Output from **Q415** feeds the pre-driver amplifier **Q413**. The output signal from **Q413** feeds the driver amplifier **Q412**, whose output from the driver stage feeds the final RF power amplifier **Q407** to produce the rated output power of 2 watts. The output of the final is applied to a low-pass filter(**C451**, **C452** and **L413**) and then to the transmit/receive switch **Q402**. RF power is then fed to the antenna via the output low-pass filter consisting of **C401**,**C402**, **C404-C405**,**C407-C408**,**L401**, and **L402**.

2.4.b Antenna Switching

Switching of the antenna between the transmitter and the receiver is accomplished by the antenna transmit/receive switch consisting of diodes **Q401** and **Q402** in conjunction with **C410** and **R402**. In the transmit mode, switched **TX B+** is applied through **R420** and RF choke **L414**,hard forward biasing the two diodes on. **Q402** thus permits the flow of RF power from output of the low-pass filter fed by the output amplifier to the output low-pass filter. **Q401** shorts the receiver input to **C410**, which is AC coupled to ground. **L403**, **C409**, **C410** and **R402** then function as a lumped constant quarter-wave transmission line, thus presenting a high impedance to the RF output path, effectively isolating the receiver input and transmitter output sections.

2.4.c Power control

Output power is controlled via the dual Op-Amp (**Q408**) , which is used as a differential amplifier and comparator.

Current is sensed by the voltage drop across **R421A** and **R422**. This voltage is compared to the one set by the 2-watt Adjustment **RV401**. The power output is then reduced or increased by varying the **Q410**'s output voltage applied to the power amplifier **Q407**'s pin 2.

2.4.d Transmitter Audio Circuits

The transmitter audio circuits consist of the audio processing circuits, the CTCSS circuits and the DCS circuits.

2.4.e Audio Processing

Transmit speed audio is providing by either the internal electric microphone **N101** or the external microphone. The microphone audio is applied to MIC MUTE SW **Q235**, and Lo-pass filter **Q214A**, **Q214B**. The audio is pre - emphasized by 6dB per octave by **C236** and **R284**, and then signal amplification. The gain is such that when a signal greater than 20 dB.

Limiting the peak-to-peak output. Under these conditions, the MOD. ADJ. Pot **RV201** configured as a four-pole active low-pass filter. The resulting signal is then limited when respect to side band splatter, and has an 18 dB per octave roll-off above 3 KHz.

The audio is then applied through the 25 KHz/12.5 KHz channel spacing SW **Q215** to transmit VCO. By varying the voltage on the varactor diode **D921** at an audio rate. The resonant frequency of VCO is varied. The result is an oscillator output that is frequency -modulated at the audio frequency.

2.5 Receiver

2.5.a Receiver Front End

In the receive mode, the RF signal enters thorough the antenna, then through the low-pass filter, **C404**-**C409** and **L401**-**L402**. The diodes **Q401** and **Q402** are biased off so that the output of the low-pass filter is coupled (**C411**) to the first band-pass filter **C811**-**C818**, **C822**, **L404**-**L407** and to the Front End RF overload protection diode pair **D9**. The signal from the band-pass filter is applied to the input of the RF amplifier **Q804**.

The output of the RF amplifier feeds the input to three more stages of band-pass filters consisting of **C826**-**C839**, and **L804**-**L808, L411**. The output from the band-pass filter is applied to the mixer's **Q405/L411**.

2.5.b Local Oscillator (LO)

The Receive VCO (**C989**-**C991**, **CV901**, **L926**-**L928**, **Q922**, **Q923, Q919** and **R953**) provides the LO signal. The VCO is running at 45.1 MHz above the desired receive frequency and is applied to output Buffer **Q915**/**Q414**. The output of the buffer through the low-pass filter **C433**-**C435**, **L432**-**L433** and applied to the mixer **Q405/L411/L412**.

2.5.c Mixer

The mixer is a DBM type (**L411,Q405,L412**). The mixer LO frequency is 45.1 MHz below the desired receiver frequency.

When the receiver frequency is present, the mixer output will be a 45.1MHz signal. The mixer output is peaked for 45.1MHz at **L434**, **C437** and **R413**, and the signal is filtered by crystal filter **F401A** and **F401B** and amplified by **Q406** before being applied to the input of the IF IC **IC6**.

Inside **IC6**, the 45.1MHz IF signal becomes the input to a second mixer with a LO frequency of 44.645 MHz set by **X201**. The 455 KHz ceramic filter **F201** or **F202** filters the second mixer's output which is the second IF signal. The mixer's output is then fed to the internal limiting amplifier and then on to the FM decoder.

2.5.d FM Detector and Squelch

The FM detector output is used for squelch, decoding tones and audio output. The setting of the squelch adjustment potentiometer **RV204** (for 25 KHz channel spacing) and **RV205** (for 12.5 KHz channel spacing) sets the input to the squelch amplifier.

The squelch amplifier is internal to **IC6** and its output is fed to an internal rectifier and squelch detector.

The output on **IC6** Pin **14** signals the microprocessor **Q17** with a low level (□0V) to unmute the radio.

The audio is unmuted by the microprocessor **Q17** Pin 27 switching to a high value (□5V on SQL MUTE) thus biasing on **Q206**. The audio is then routed to the audio amplifier **Q221** via the volume control **S201**.

2.5.e Receiver Audio Circuit

The detector's audio output also is fed to the tone(CTCSS and DCS) low-pass filter **Q212C**.

Then the output of the low-pass filter is routed to the second stage filter **Q212B**. The output of **Q210B** is applied to the squaring circuit **Q212A** and finally to the microprocessor **Q17** Pin **60** for decoding.

Another branching of the detector output feeds the audio high-pass filter **Q208** via **Q212D**. The output of the audio high-pass filter feeds the Volume Control **S201**(VOL). From the wiper arm on the Volume Control, the audio is routed to Pin 2, the input to the audio power amplifier **Q221**. The output of the audio power amplifier is routed through the earphone jack **J101** to the internal speaker **E101**.

2.6 Signalling

2.6.a General

The microprocessor is fitted with a ADC/DAC converter built-in, so it provides generating and decoding the tones for selective calls, CTCSS and DCS. It can do that without using any other external ICs, but only by means of some transistors. The deviation of the selective call can be adjusted by the trimmer RV1.

The microprocessor manages the analogue switches for the scrambler as well, which is base-band-inversion type.

2.6.b CTCSS Tone Encoder / Digital Code Squelch (DCS) Encoder

CTCSS signals and DCS signals are synthesized by microprocessor **Q17** and appear as pulse waveform on I/O line at Pin **39**. This I/O line is a pseudo-sine wave for CTCSS or a DCS pseudo-waveform and is applied to the transistor **IQ5** which makes the signals closer to the theoretic CTCSS/DCS signals. The waveform is then smoothed by low pass filters **Q213B** to produce an acceptable sine wave output. The CTCSS tone signal is adjust to the proper level by **RV202**. The DCS signal is adjust to the proper balance by **RV203**. The signal is then applied to the audio processing circuit at **R305** and to the TCXO circuit at **X401**.

2.6.c Selective call

Similarly to CTCSS/DCS, selcal signals are also generated and decoded by the microprocessor **Q17**. The selcal decode input is the pin **59** (**ADC_SELCALL**), whilst the TX tones are generated at pin **37** (**SELCBALL_PWM**), then fed to the transistor **Q4** and associated circuitry which provides to amplify and smooth the tones in order to make them suitable for the modulator. **RV1** adjusts the level (deviation) of the tones.

2.6.d Scrambler

It's a classic "baseband inversion" scrambler which inverts the audio baseband (300-30000 Hz). The audio baseband **AFTX_IN** is mixed with a fixed tone (1300 Hz) **SCRMBLR_CLK** generated by the microprocessor **Q17**. The mixer's output **AFTX_OUT** is a scrambled baseband which sounds garbled (not understandable) by normal receivers. However, if the receiver is equipped with the same kind of scrambler which is properly set on the same fixed tone, the received scrambled baseband is fed in the RX mixer which provides a complementary process obtaining a clear (understandable) baseband at its output. If fact if the scrambled transmission is received by the party's HPx06 (with scrambled activated), the scrambled baseband **AFRX** is fed to the scrambler unit and mixed with the same tone generated by the microprocessor. The output of the mixer **AFRX_OUT** is a normal (unscrambled) baseband and can be clearly heard.

As you can see, the over stated fixed audio tone acts as a encoding/decoding key, so it must be the same both at the TX and RX parties. As already stated, the standard version of HPx06 is fitted with a 1300 Hz encoding/decoding key, however a different tone can be required.

2.7 Battery

The battery connects to the contact pins(**CN201** and **CN202**) on the bottom end of the Radio. The positive terminal of the battery connects to the ON/OFF Volume Control switch (**S201**) and the negative terminal connects to chassis ground. Low battery sense **R101**/**R102**, voltage regulator **Q222** and transmit power module **Q407**.

The battery voltage status is monitored by the microprocessor **Q17** Pin **61** which senses the battery voltage through the **BATT+SW** line by means of **R51**/**R49**. When the battery voltage is approximately 5.8V, the microprocessor considers the battery discharged and switches off the circuits of the radio.

When the Radio is on a channel with no tone programmed, the BATTERY SAVER Mode is enabled when programmed.

In the BATTERY SAVER mode, the microprocessor **Q17** generates a square wave signal at Pin **48** which is applied to the inverter **Q10-F**. The signal's duty cycle varies according to what the POWER SAVE TIMER is set. When the microprocessor **Q17** Pin **48** goes high (approx. 5 V) **Q226** (receiver module) is biased off, **Q225** is biased on, **Q224A** is cut off, and **Q223A** is cut off, thus turning the supply off to **IC6**.

3 ADJUSTMENTS

3.1 General

For proper alignment, the unit should be programmed with the following channel and frequency information

Channel number	Receive Frequency (MHz)	Transmit Frequency (MHz)	RX/TX Tone Code	Channel Spacing (KHz)
CH 1	469.950	469.975	NO TONE	25
CH 2	455.050	455.075	NO TONE	25
CH 3	455.050	455.075	100Hz TONE	25
CH 4	455.050	455.075	627 DCS CODE	25
CH 5	455.050	455.075	NO TONE	12.5

Make connections to the Unit per Figure 1 (Equipment Test Set-up) below and Figure 2 (Test Adapter). For the location of the components called out in these procedures, refer to RF Board and SUB Board.

3.2 Synthesizer/Transmitter VCO Check

NOTE: VCO check must be accomplished before proceeding with the Transmitter and/or Receiver Alignment.

1) Connect the voltmeter to **TP6**.
2) Place the unit on channel 1 (469.975MHz. RX; 469.950MHz, TX).
3) Tune **CV401** in Receive mode for 4.50V ± 0.05V at **TP6**.
4) Push the PTT switch (TX) and tune **CV402** for 4.50V ± 0.05V at **TP6**.

3.2.a Frequency Adjustment

1) Connect the Radio in accordance with Figure 1.
2) Place the unit on channel 1 (469.950MHz, RX; 469.975MHz, TX).
3) Operate the transmitter and adjust **RV402** for a Frequency Counter reading within ± 50Hz of the programmed transmit frequency.

3.3 Transmitter Alignment

NOTE: In order to obtain proper transmission output power, connect the Radio to the power supply with a cable that is rated to withstand a current of 2 amperes or greater.

3.3.a Power Adjustment

1) Connect the Radio in accordance with Figure 1.
2) Place the radio on the **channel 2** (455.050MHz, RX; 455.075MHz. TX).
3) Place the unit in HIGH POWER mode.
4) Turn **RV401** and **RV405** fully clockwise.
5) Operate the transmitter, using TA-S1, to make sure that the maximum RF output power reading on the wattmeter is 5.5 W or greater.
6) Adjust **RV401** (HI PWR ADJ) for a reading of 4.0 W ±0.2 W. Check to make sure that the transmit current is within 1000 - 1400 mA after the adjustment has been made.
7) Place the unit in the LOW POWER mode.
8) Adjust **RV405** (LO PWR ADJ) for a reading of 1.0 W ±0.2 W. Check to make sure that the transmit current is within 500 - 700 mA after the adjustment has been made.

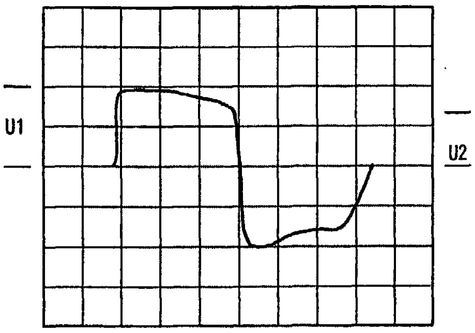
3.3.b Modulation Adjustment

1) Connect the Radio in accordance with Figure 1.
2) Place the Radio on **channel 2** (455.050MHz, RX; 455.075MHz, TX).
3) Apply a 1 KHz tone signal to Test Adapter's AF Input (Figure 2), which is the microphone impedance matching network.
4) Plug the Test Adapter into the external speaker/microphone jack.

5) Set the audio generator's output level at approximate 300mVrms at **TPA** of the Test adapter.
6) Operate the transmitter, using TA-S1, and adjust **RV201**(MOD.ADJ) for ±4.0 KHz deviation.

3.3.c CTCSS/DCS adjustment

7) To adjust CTCSS and DCS Deviation, perform step1 though 6 above. Then set the FM liner detector audio bandwidth of 0.25 Hz or less to15,000 Hz or more. Turn the de-emphasis function off.
8) Place the Radio on channel 4 (163.050MHz. TX; 627 DCS CODE). Set the audio generator output to 0V operate the transmitter, using TA-S1 and adjust the DCS balance control **RV203** to U1-U2 is minimum on the Oscilloscope.
9) Place the Radio on channel 3 (163.050MHz, TX; 100Hz Tone). Operate the transmitter using TA-S1, and adjust **RV202** to ±800Hz deviation on Modulation Analyzer.



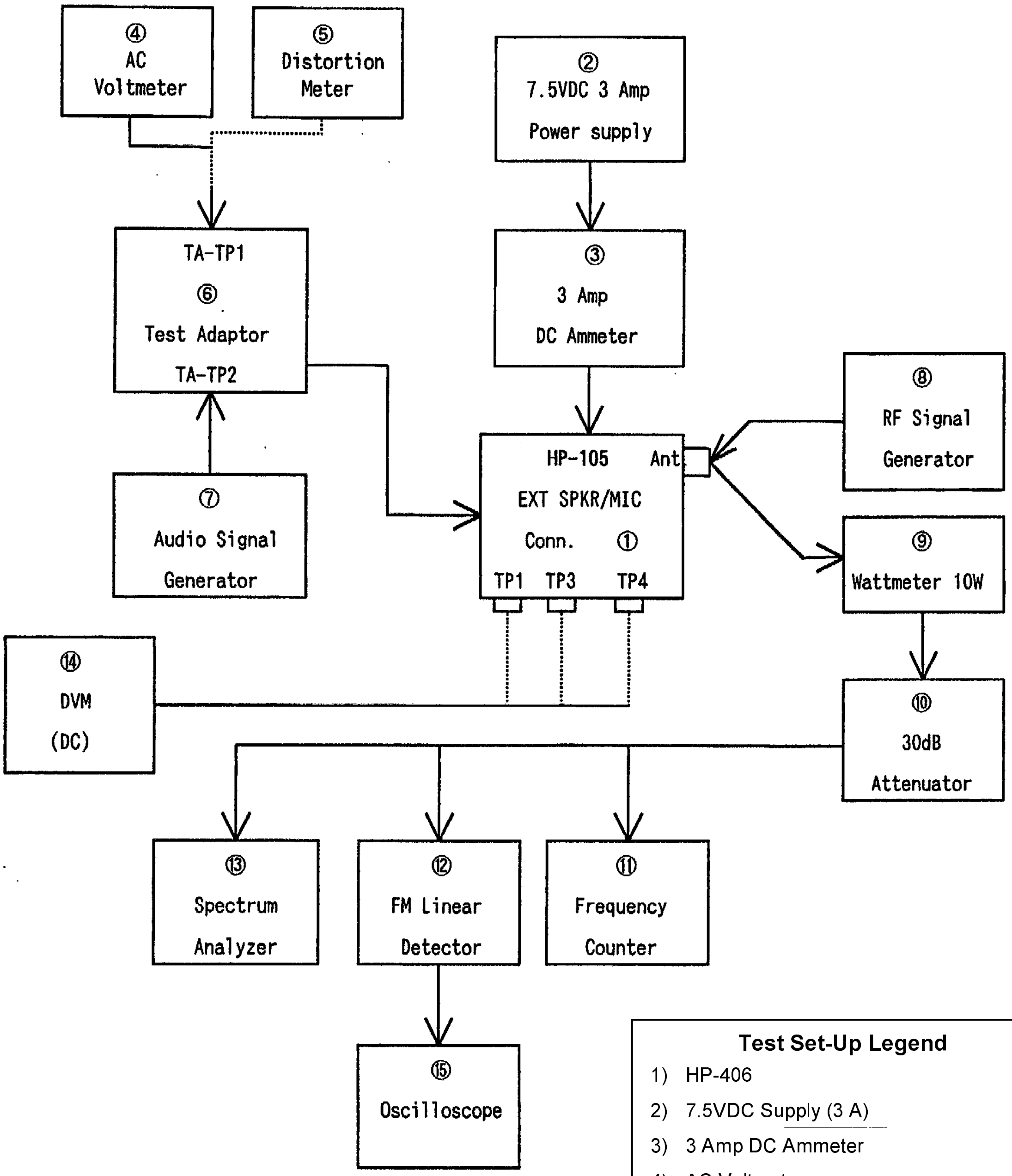
3.3.d Selcal adjustment

10) Set up a selcall sequence which includes, at least, an hi-pitched tone and a tone length of 1 second minimum (in order to allow a convenient deviation check)
11) Send the selcal by keeping pressed the **MON** or **FUNC** keys and adjust **RV1** in order to obtain the following minimum /maximum deviation according to the channel bandwidth:
    - For 12.5 KHz channel bandwidth - min ±1.5 KHz / max ±2.5 KHz
    - For 25 KHz channel bandwidth - min ±2.5 KHz / max ±3 KHz

3.4 Receiver Alignment

1) Connect the Radio in accordance with Figure 1.
2) Place the Radio on the **channel 2** (455.050MHz, RX; 455.075MHz, TX).
3) Adjust the Squelch Control **RV204** until the BUSY LED (Green) turns ON.
4) Apply the RF generator signal with 1 KHz tone at 3 KHz deviation so that the tone can be heard in the speaker.
5) Adjust the volume control for the rated audio.
6) Set the RF signal generator's level obtain a 9dB SINAD reading.
7) Adjust **RV204** (Squelch control) counter clockwise slowly just until the BUSY LED goes out.
8) Adjust **RV204** clockwise slowly just until the BUSY LED goes ON.
9) Place the radio on the **channel 5** (163.050MHz, RX; 163.025MHz, TX).
10) Adjust the squelch control **RV205** until the BUSY LED (Green) turns ON.
11) Apply the RF generator signal with 1 KHz tone at 1.5 KHz deviation so that the tone can be heard in the speaker.
12) Ad just the volume control for the rated audio.
13) Set the RF signal generator's level obtain 9dB SINAD reading.
14) Adjust **RV205** counter clockwise slowly just the BUSY LED goes on.
15) Ad just **RV205** clockwise slowly just until the BUSY LED goes on.

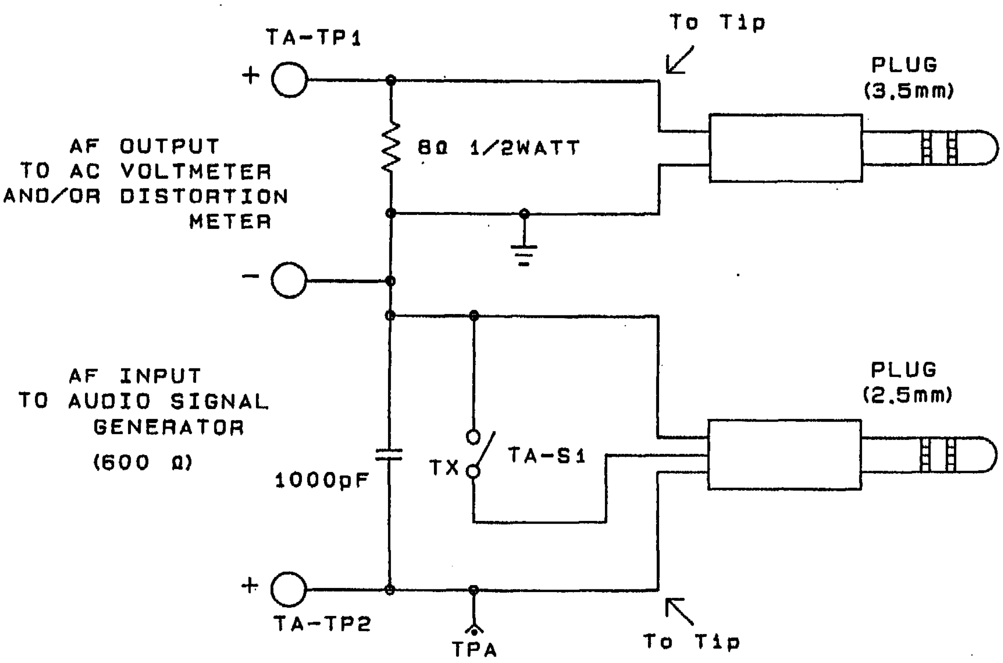
3.5 Figure 1 - Equipment Test set-up


④ AC Voltmeter
⑤ Distortion Meter
② 7.5VDC 3 Amp Power supply
TA-TP1 ⑥ Test Adaptor TA-TP2
③ 3 Amp DC Ammeter
⑧ RF Signal Generator
HP-105 Ant EXT SPKR/MIC Conn. ① TP1 TP3 TP4
⑦ Audio Signal Generator
⑨ Wattmeter 10W
⑭ DVM (DC)
⑩ 30dB Attenuator
⑬ Spectrum Analyzer
⑫ FM Linear Detector
⑪ Frequency Counter
⑮ Oscilloscope

Test Set-Up Legend

1) HP-406
2) 7.5VDC Supply (3 A)
3) 3 Amp DC Ammeter
4) AC Voltmeter
5) Distortion Meter
6) Test Adapter (Figure 2)
7) Audio Signal Generator (600 Ohm)
8) RF Signal Generator
9) Wattmeter - 10W
10) 30 dB Attenuator
11) UHF Frequency Counter
12) FM Linear Detector
13) Spectrum Analyzer
14) Digital Voltmeter
15) Oscilloscope

3.6 Figure 2 - Test adaptor

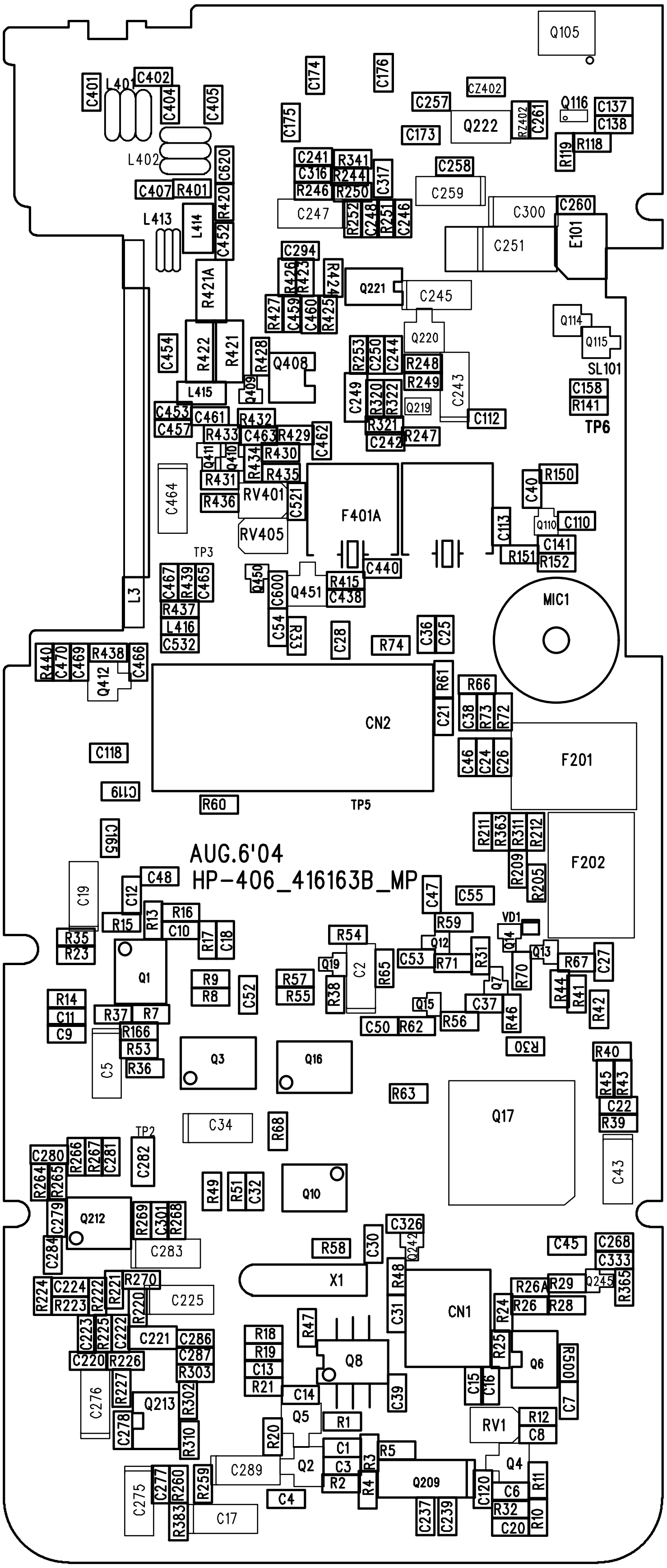

TA-TP1
+
AF OUTPUT
TO AC VOLTMETER
AND/OR DISTORTION
METER
−
8Ω 1/2WATT
To Tip
PLUG
(3.5mm)
AF INPUT
TO AUDIO SIGNAL
GENERATOR
(600 Ω)
1000pF
TX
TA-S1
PLUG
(2.5mm)
+
TA-TP2
TPA
To Tip

ALAN HP 106

PCB LAYOUTS AND TEST POINTS

ALAN HP 406

PCB LAYOUTS AND TEST POINTS

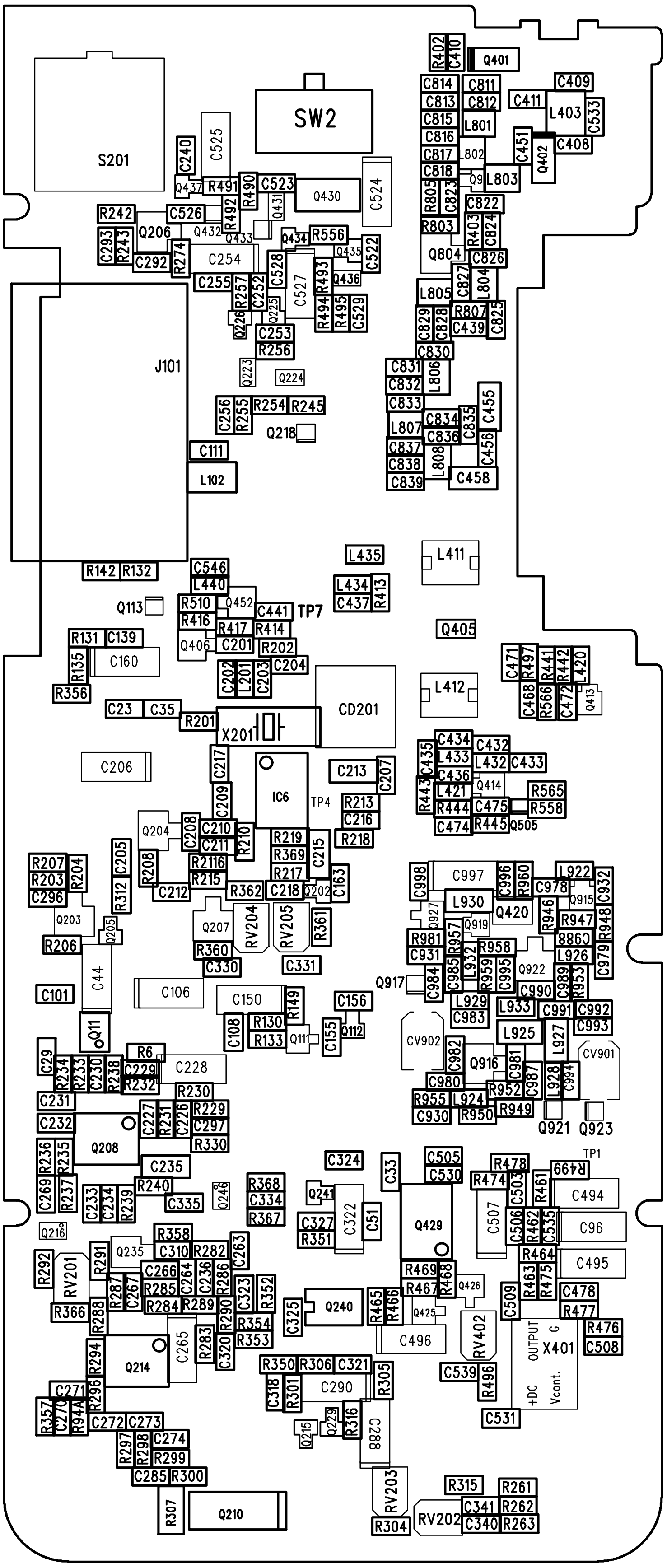

AUG.6'04
HP-406_416163B_MP
Q105
Q222
Q221
Q220
Q219
Q408
F401A
MIC1
CN2
F201
F202
Q1
Q3
Q16
Q17
Q10
Q212
X1
CN1
Q8
Q6
Q5
Q2
Q4
Q209
Q213
E101
TP2
TP3
TP5
TP6

TOP SCREEN

MODEL : HP-406

PCB. Size : 51X120.6X1.0T

MATERIAL : FR-4 4LAYER GOLD

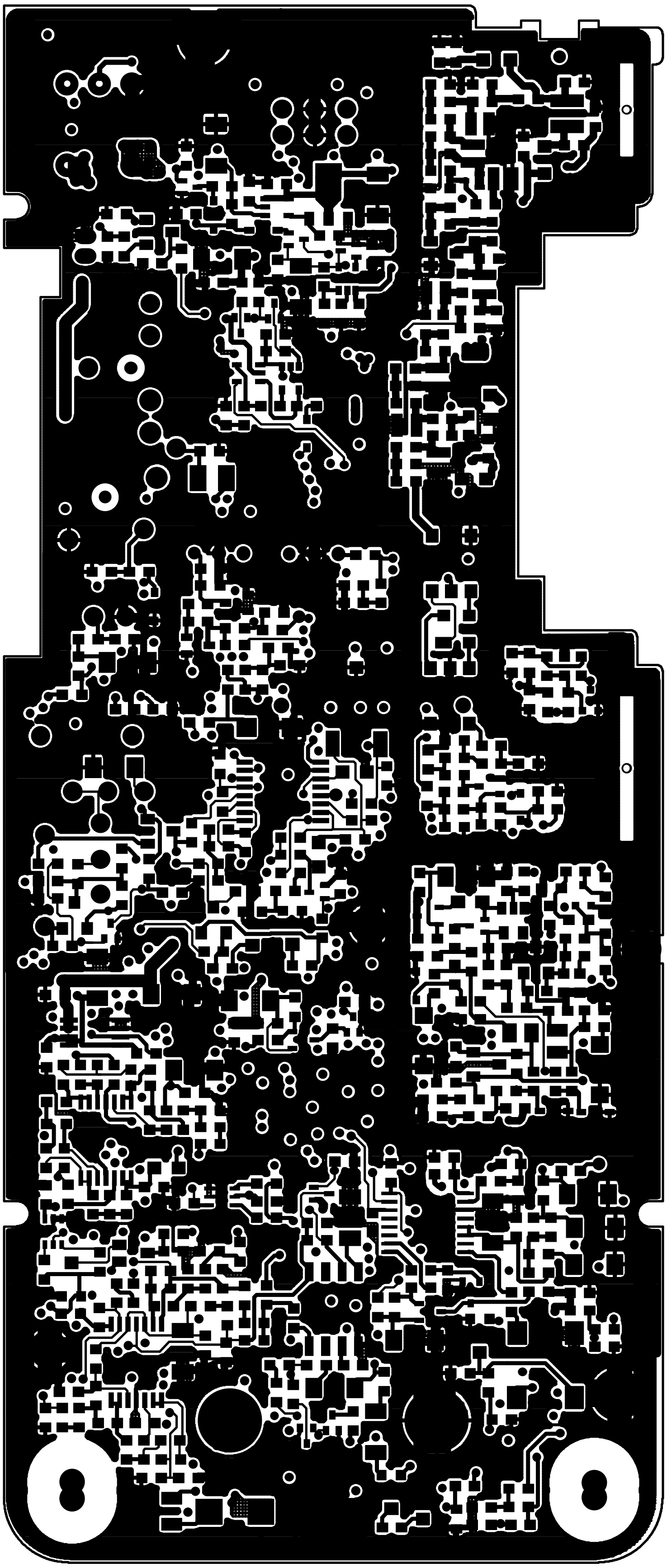


BOTTOM SCREEN

MODEL : HP-406

PCB. Size : 51X120.6X1.0T

MATERIAL : FR-4 4LAYER GOLD

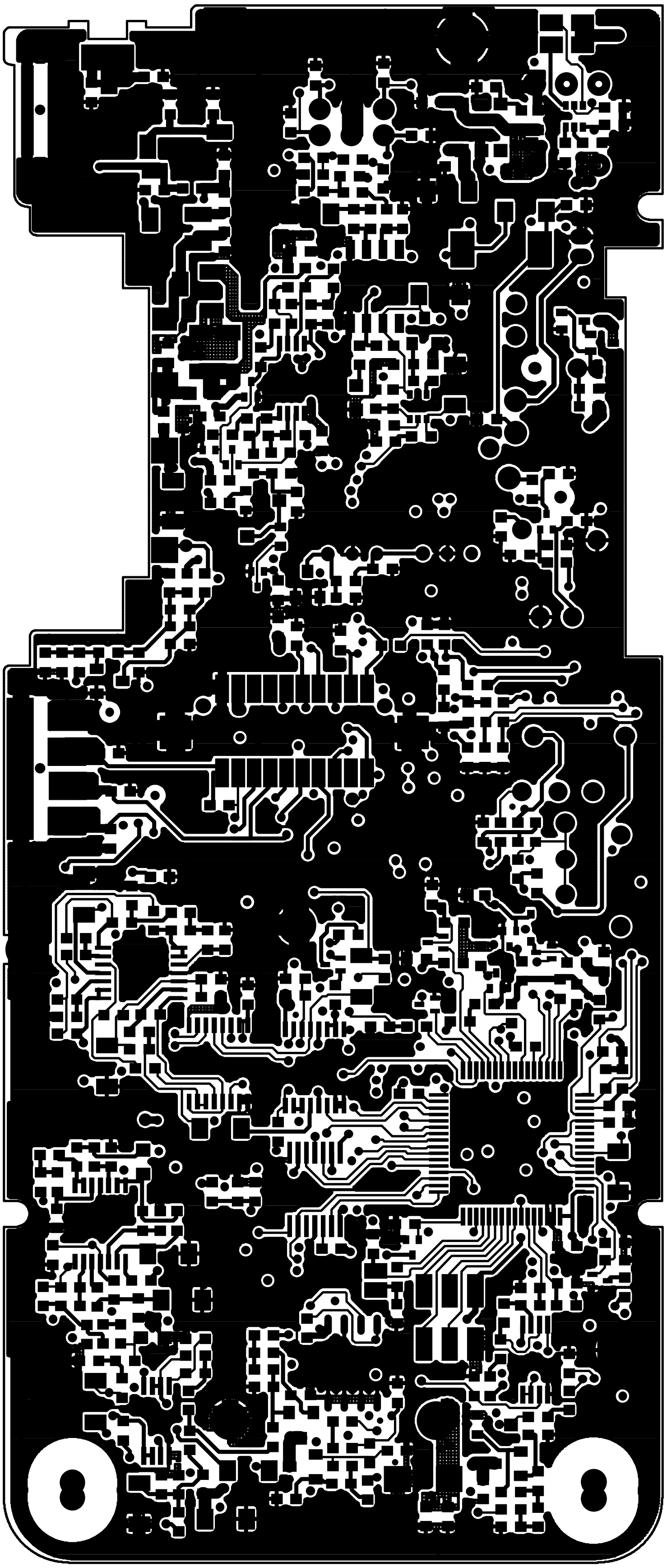


BOTTOM PATTREN

MODEL : HP-406

PCB. Size : 51X120.6X1.0T

MATERIAL : FR-4 4LAYER GOLD

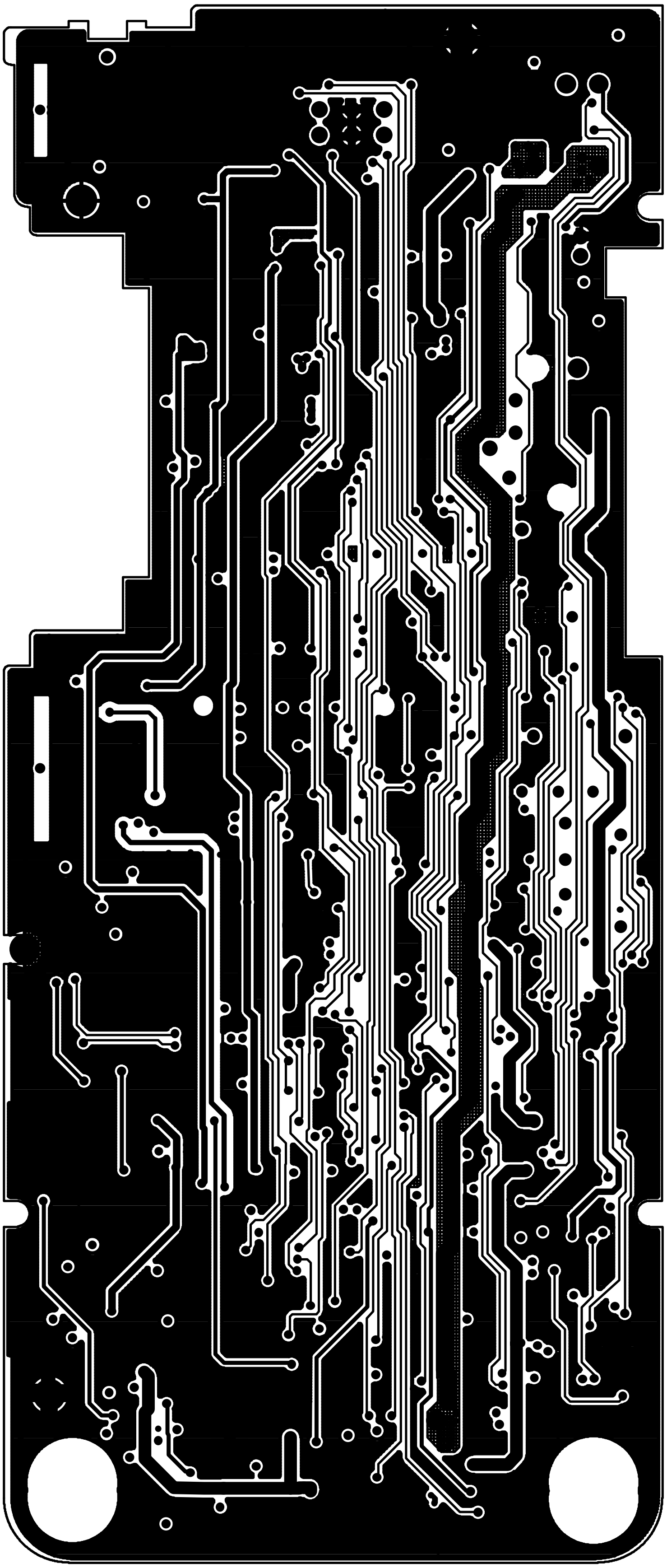


TOP PATTERN

MODEL : HP-406

PCB. Size : 51X120.6X1.0T

MATERIAL : FR-4 4LAYER GOLD

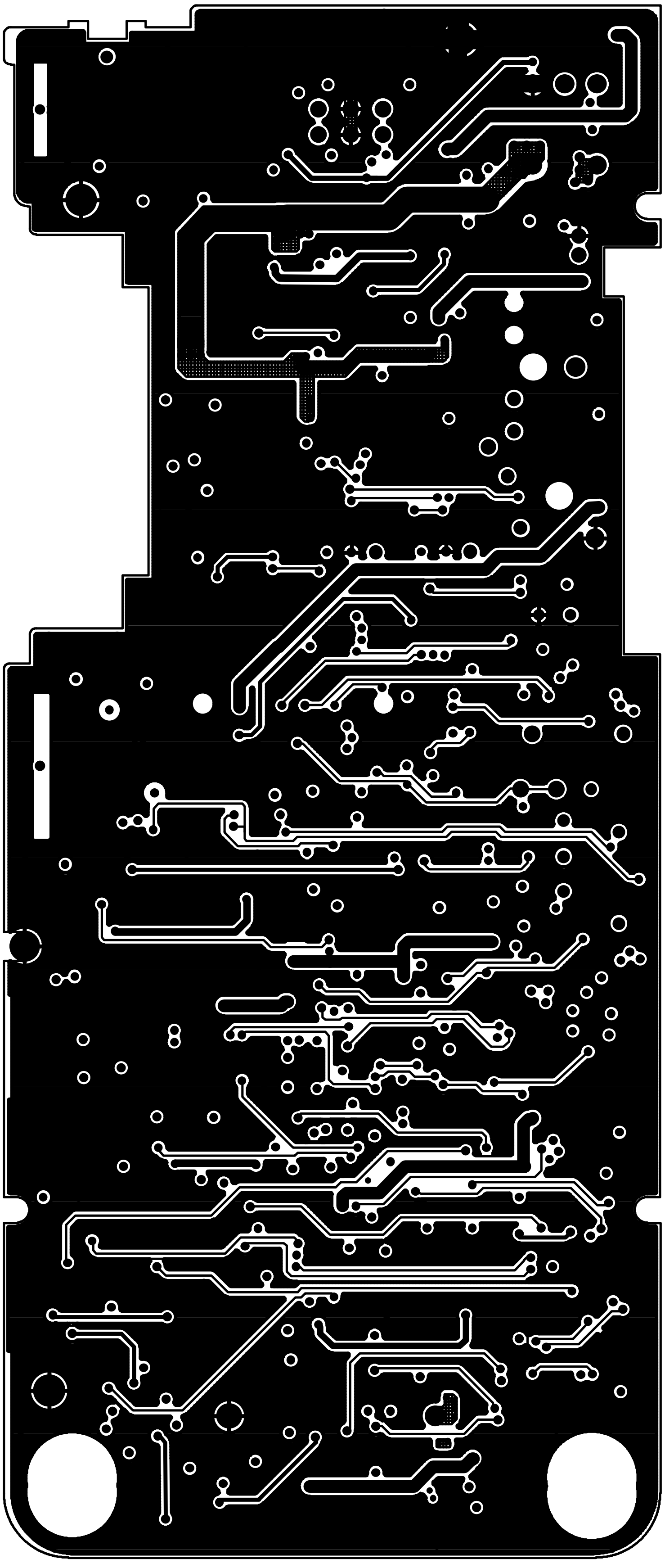


2_LAYER_PATTERN

MODEL : HP-406

PCB. Size : 51X120.6X1.0T

MATERIAL : FR-4 4LAYER GOLD

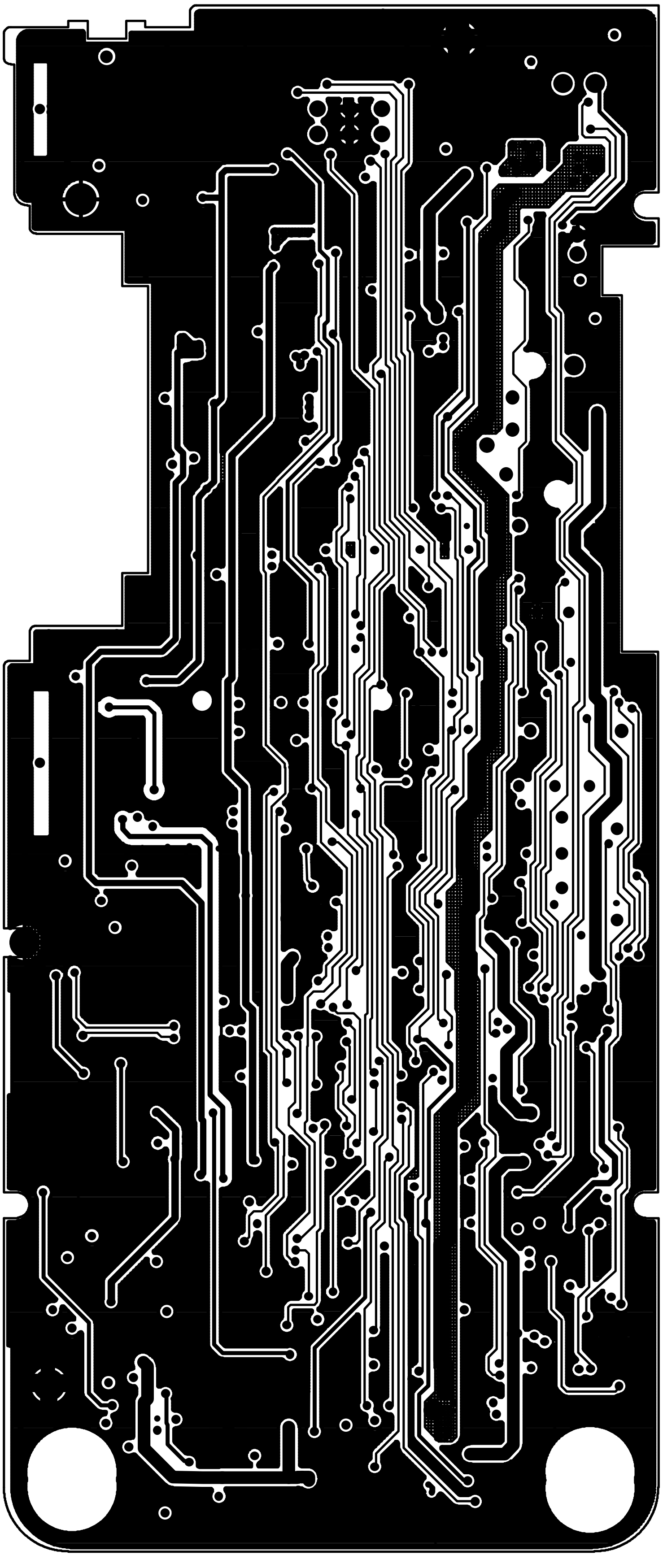


3_LAYER_PATTERN

MODEL : HP-406

PCB. Size : 51X120.6X1.0T

MATERIAL : FR-4 4LAYER GOLD



2_LAYER_PATTERN

MODEL : HP-406

PCB. Size : 51X120.6X1.0T

MATERIAL : FR-4 4LAYER GOLD

ALAN HP 106/HP 406

PROGRAMMING MANUAL

HP106/HP406
VHF/UHF Handheld Transceiver

Programmer Software Guide

Ver. 1.0 issued on June 15th 2003

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1 ABOUT THIS MANUAL

1.1 Warning notes

Every effort has been made to ensure that the information in this document is complete, accurate, and up-to-date. CTE International assumes no responsibility for the results of errors beyond its control. The manufacturer of this equipment also cannot guarantee that changes in software and equipment made by non authorized people and referred to in this guide will not affect the applicability of the information in it.

Only authorized and qualified technicians should be allowed to follow the operation described into this manual.

This manual has been written for use by CTE International dealers and distributors who are programming the HP106 handheld transceivers for customers. You should be familiar with conventional radio systems, radio system and radio network settings parameters as well as general PC operation.

This programming guide is subject to change without notification. This booklet is referred to the current software version ***1.08***. If you own a later one please surf on www.cte.it or contact CTE International for the most recent updates by sending an email at **webmaster@cte.it**.

1.2 Conventions and Symbols in this Book

1.2.a Notes and warnings

🗎 *This symbol marks a 'note'. Notes are hints or tips which offer additional information to help you.*

✋ ***This symbol marks a 'warning'. Warnings are special notices which you should read and follow carefully to avoid possible damage to your equipment, potential danger to yourself or others.***

1.2.b Font format

- Window names and screen buttons will be highlighted in **bold**
- Important sentences and words are highlighted in *Italic*

1.2.c Screenshots

All the screenshots are referred to Windows XP

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2 INSTALLATION

2.1 Unpacking

The following items are in the programmer's package:

(a) CD with the programming software
(b) Programming operating instructions (this book!)
(c) Connection cable (serial to transceiver's service port)

If something is missing please promptly advise your supplier.

2.2 System requirements

To use the CTE Programming Software for HP106 you need the following hardware and software:

(a) IBM®-compatible personal computer with Pentium (I) processor or higher (basically depending on the operating system)
(b) Operating system Windows® 95 or higher.
(c) Hard drive - at least 2MB of free disk space and CD drive
(d) Random access memory (RAM) - basically depending on the O.S. (at least 32 MB; 64 MB recommended)

2.3 Installing programming Software

Setting up your programming software is easy and fast, thanks to the *Installing Wizard*, a step-by-step installing program. Just please follow these steps.

🗎 *Steps can be slightly different according to the O.S. you are using*

1) Start Windows, if it is not already running.
2) Insert the CD with the software in your drive.
3) Click the **Start** button, click **Run**: you will see the "Run" dialog box.
4) Type **D:\setup.exe** (where **D:** indicates your CD drive) or click the **Browse** button and use the "Browse" commands in order to select the said path and the executable (**.exe**) file.
5) Click **OK** and then follow the instructions which appear.
6) While installing, you will see a window asking you to read the software license agreement. Click **YES** button to accept them and continue installing.

🗎 *Should you want to use the software, you should accept the license agreement by clicking **Yes** button, otherwise, if you click **No,** the set-up will be automatically interrupted.*

7) Several windows will ask you to insert your user's information, choose a destination location for the program and finally select the program folder. To accept the default information and go ahead with the next window click **NEXT>** button.
8) When installation is complete, the **HPx06** programmer's icon appears in **Start** – **Programs** – **HPx06** folder

HP106
HPx06

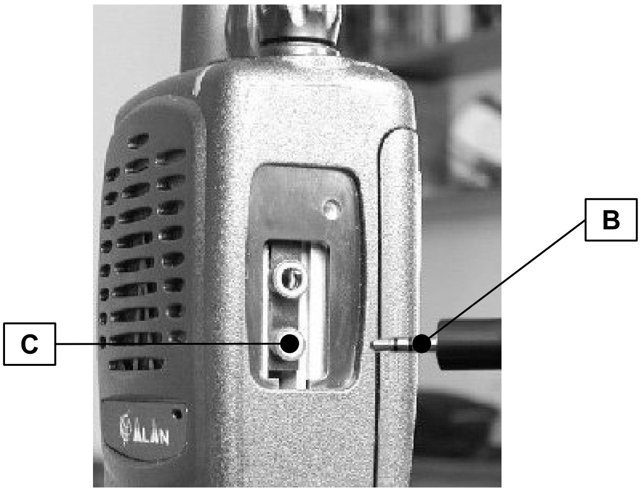
🗎 *If in the installing procedure you'll get error messages, copy the software in a temporary directory on your hard disk (e.g. **C:\temp**), then retry installing the software from the hard disk instead from the CD*

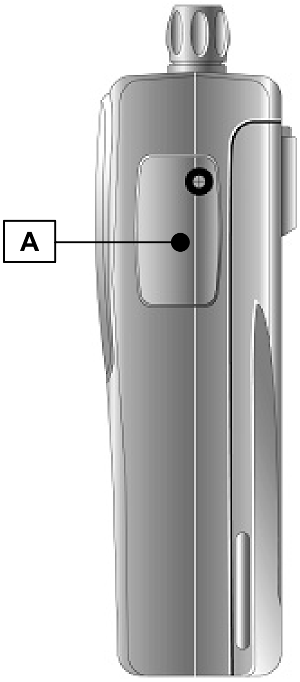
🗎 *Please see your computer's operating instructions if you need help.*

2.4 Connecting to your computer

This section explains how to connect the transceiver to your computer's serial port. You will need to use the supplied serial cable (item C previously described in "Unpacking").

1) Make sure that the transceiver is turned off.
2) Locate the connectors protection cover in the transceiver's right side **[A]**
3) With a suitable screwdriver, unscrew the screw which locks the protection cover and remove it in order to access the connectors
4) Insert the end of the supplied serial cable provided with 2,5 mm stereo jack plug **[B]** in the 2,5 mm jack socket of the transceiver **[C]**





5) Push gently the cable's 2,5 mm stereo jack into the transceiver's one until it is firmly in place.
6) Connect the other end of the serial cable to your computer's serial port and make sure it's firmly in place.

✋ ***Do not force the jack plug into the socket.***

✋ ***If you need to remove the connector, pull it by grasping the connector itself (not the cable)***

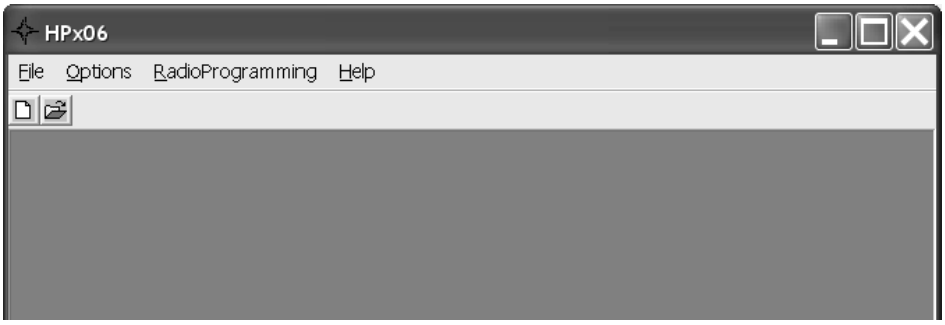
✋ ***Store the transceiver's protection cover in a safe place. It must be replaced after the programming is completed***

🗎 *Please see your computer's operating instructions if you need help.*

3 PROGRAMMING

3.1 Running HPx06 programmer software

1) Make sure that the transceiver's battery is properly charged and the radio is turned off
2) Keep the **MON** button pressed and switch the radio on by rotating clockwise the **On-Off/Volume** knob provided in its top panel. After the mechanical click, the status LED will steadily glow orange, showing that the radio is switched on in programming mode
3) Click the **Start** button, point to **Programs** and then to **HPx06** folder.
4) Click **HPx06** icon: the HPx06 programmer window will open (blank gray window)

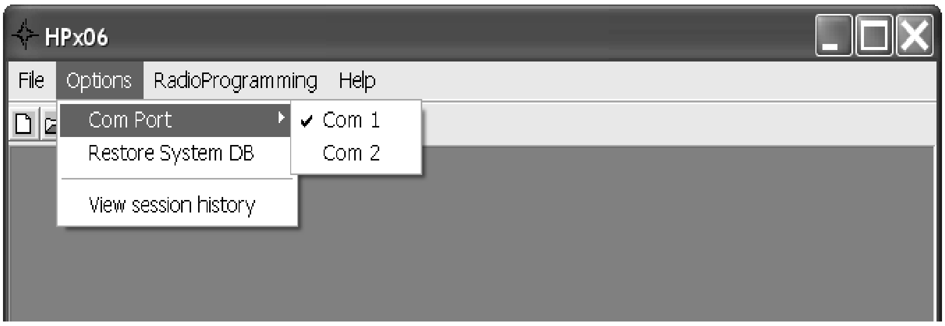


🗎 *The figure shows the blank window under Windows XP*

3.2 Selecting the proper COM (serial) port

The serial port **COM1** is automatically preset as default port. However, should you need to toggle between COM 1 and COM 2:

1) From the menu **Options** select **Com Port**: you will see the tick sign on **Com 1**.
2) Select **Com 2**: the tick will be moved on **Com 2** and this port will be switched as default.



3.3 Checking the software version

If you want to see the software version and other additional info, from the menu **Help** select **About**. The **About** window will open showing you the said data.

3.4 New or already stored data?

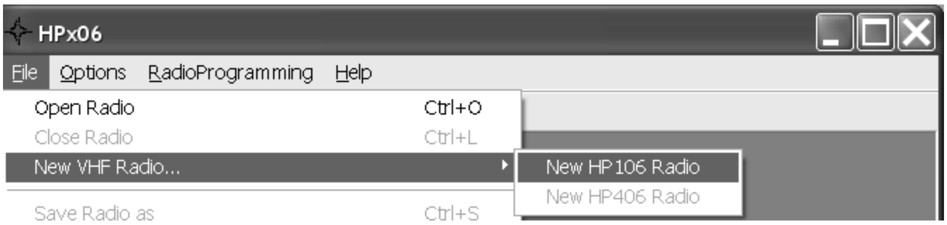
Now that you have properly run the software, and connected the programming cable to your PC, you can choose either the first or the second following procedures depending if you want to create a new programming data set or you need to use a previously stored one:

- ⇨ *If you need to create a new programming data set* (because you haven't previously stored same/similar programming data in your PC or in a transceiver) please start from the following paragraph 3.5.
- ⇨ If you want to *use a data set previously stored in a transceiver* (you will download the data from it) or *in your PC* (you will use a data file), because either of them contain same/similar programming data, we recommend to "jump" to the chapter 8.1, follow it, and then go back to the chapter 3.6 below described (i.e. skipping the next 3.5 paragraph).

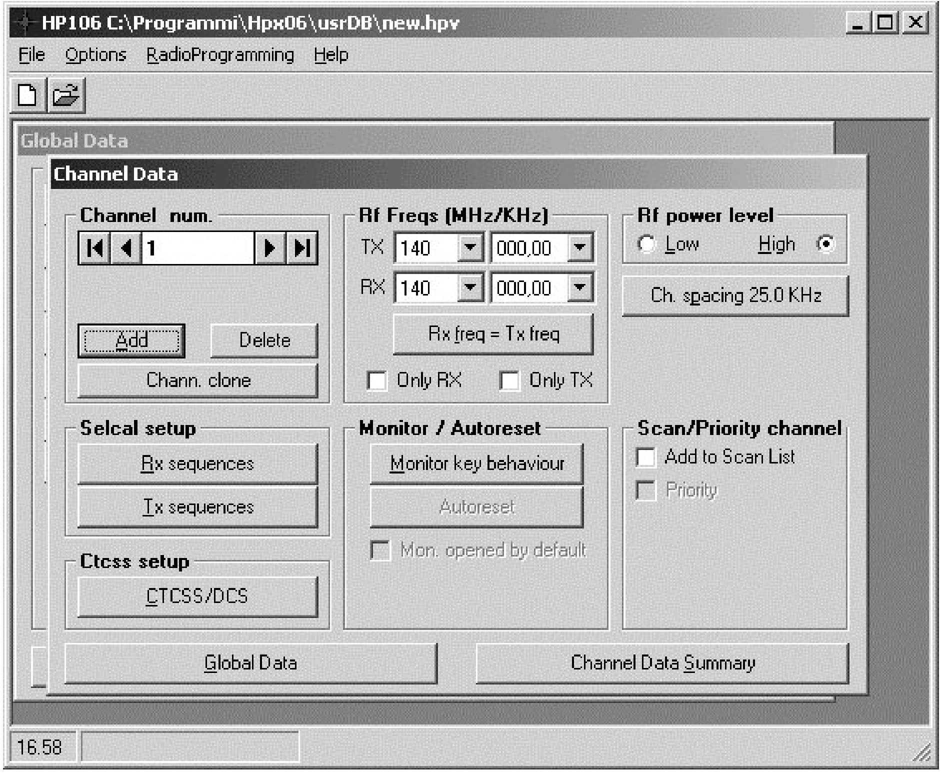
3.5 Create a new programming filename

IMPORTANT! If this is the first time you are using the programming software, or it is the first time you are going to create a new file, you must restore the default signal database as explained in the par. 7.3 before going on with the following steps.

1) If you have just started the programmer software in your PC you will see a blank window.
2) From the menu **File** select **New radio…**, then click one of the **New HPx06 Radio…** (depending on the operating band of the radio to be programmed).

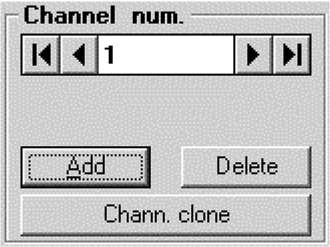

HPx06
File
Options
RadioProgramming
Help
Open Radio Ctrl+O
Close Radio Ctrl+L
New VHF Radio...
New HP106 Radio
New HP406 Radio
Save Radio as Ctrl+S

3) A new file creation will open. Type the database name you want to create (any name will do, anyway we recommend to type the customer's name), then press the **Save** button: the **Channel Data** window will open.


HP106 C:\Programmi\Hpx06\usrDB\new.hpv
File
Options
RadioProgramming
Help
Global Data
Channel Data
Channel num.
1
Add
Delete
Chann. clone
Rf Freqs (MHz/KHz)
TX 140 000,00
RX 140 000,00
Rx freq = Tx freq
☐ Only RX
☐ Only TX
Rf power level
○ Low
High ●
Ch. spacing 25.0 KHz
Selcal setup
Rx sequences
Tx sequences
Monitor / Autoreset
Monitor key behaviour
Autoreset
☐ Mon. opened by default
Scan/Priority channel
☐ Add to Scan List
☐ Priority
Ctcss setup
CTCSS/DCS
Global Data
Channel Data Summary
16.58

***Important:** we'll always refer this window as "**Channel Data** window". You will see in Chap 4 that this is one of the two main windows in this program (**Channel data** and **Global Data**).*

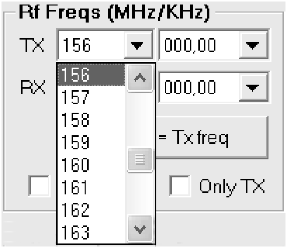
3.6 Basic parameters: TX/RX frequency, channel spacing, power monitor and group scanning


Channel num.
1
Add
Delete
Chann. clone

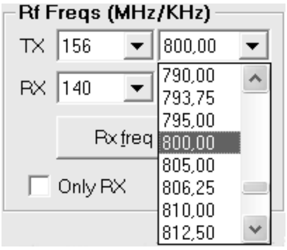
1) Make sure that the **Channel num** dialog box is displaying the channel number you are going to setup (if it is the first channel you are programming, only **1** is available).

If the channel number is not the one you want to program, press the ◀ or ▶ buttons in order to select the needed one. You can also use the ⏮ or ⏭ buttons in order to quickly jump, respectively, to the first or to the last programmed channels

2) Go to the **Rf Freqs (MHz/KHz)** dialog box and select the TX frequency in MHz in the upper box **TX** by clicking its left drag down button, then click the hundreds MHz you require (e.g. **156** for 156 MHz)



3) Select now the decimal TX frequency in KHz by clicking the right drag down button, then point the decimal frequency you need (e.g. **800,00** will select 156,800.00 MHz)

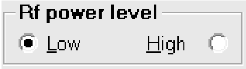


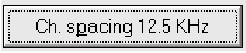
4) Now that you have selected the whole TX frequency, you have three choices:
   - ⇨ *If you are programming a simplex channel* (same RX and TX frequency), click the **Rx freq = Tx freq** button: The RX frequency will be immediately set to the just programmed TX one
   - ⇨ *If you are programming a duplex channel* (RX frequency different than the TX one), go to RX box and set up the hundreds MHz and the decimal RX frequency performing the same operation described in steps 2) and 3)
   - ⇨ *If you are programming a one way channel* (only RX or only TX), tick either **Only RX** or **Only TX** checkboxes. The TX or the RX frequency will disappear accordingly

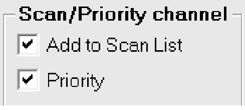
🗎 *You can't check both the **Only RX** and **Only TX** checkboxes. If you don't want to program a particular channel, just skip its programming as explained in the note in step 1).*

5) To select the TX output power go to **RF power level** box and select either the **Low** or **High** radio button for that channel depending on your choice (in the example we have chosen **Low**).
6) Select the channel bandwidth (either 25 or 12.5 KHz) by clicking the **Ch. spacing** button until you'll see your choice on it (the figure shows 12.5 KHz)
7) If you want to add the channel to the scan list, go to **Scan/Priority channel** box and tick the **Add to Scan List** checkbox. In this case, the **Priority** checkbox will be immediately available. Tick it if you want to designate the channel as priority one

🗎 *Obviously, you can designate only one priority channel. If you already did that with another channel, a message will warn you until you won't remove the checkbox from the former priority channel*



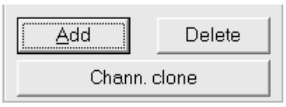




🗎 *If you don't tick the priority checkbox in all the programmed channels, the user has the possibility to define the priority channel with the channel knob as described in the user's manual*

8) You have now programmed the basic channel specifications in the transceiver. However, depending on your customer's requirements, you may need to program other channels and/or add CTCSS/DCS and/or Selective Call facilities and/or other options. You have three options:
   - ⇨ *If you need to program the basic parameters of additional channels*, go to step 9) (CTCSS/DCS, Selective Call and other options will be further added as we'll describe).
   - ⇨ *If you already have programmed the basic parameters of all the needed channels, but you still need to add the CTCSS/DCS and/or Selective Call facilities and/or other options,* go to the appropriate paragraph/chapter: 3.7 for CTCSS/DCS and/or Chapters 4 & 5 (the whole chapters) for Selective call and/or chapters 4 & 6 (the whole chapters) for other options
   - ⇨ *If you already have programmed the basic parameters of all the needed channels and you don't need to add any CTCSS/DCS and/or Selective Call facilities and/or other options* (i.e. you have complete the programming), go to chapter 7.1 in order to transfer the program to the unit.

9) If you need to add/modify/delete new channels, you have two convenient options:
   - ⇨ *If you need to create a new channel which has completely different parameters*, press **Add** and go back to step 1)
   - ⇨ *If you need to program a new channel that only slightly differs between the current one*, you can save time by pressing the **Chann. Clone**. You'll create a new channel with the



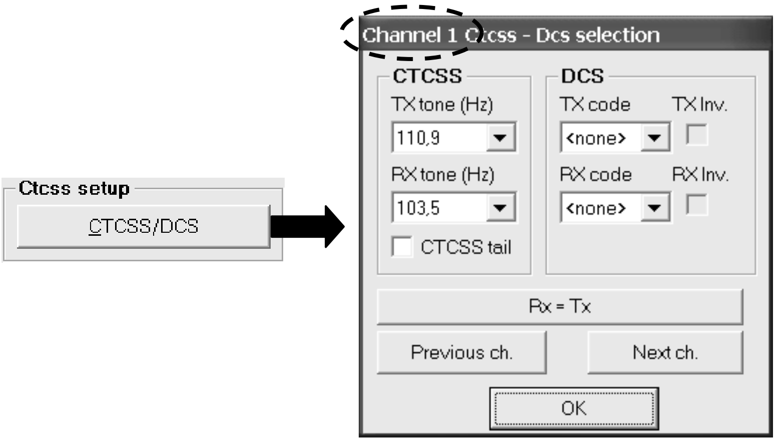
same parameters. Just go back to the step(s) related to the parameter(s) you need to modify

⇨ *If you need to delete a channel* (in case of total mistake), select it with the |◀◀ or ▶▶| buttons, then click the **Delete** button.. The selected channels will be immediately deleted.

3.7 CTCSS/DCS Tx Rx Setup (CTCSS/DCS button)

As you may know CTCSS (continuous tone code squelch system) is a system which uses a sub audio frequency TX tone as an access "key" to work a repeater (encoder) or to unlock the party's sub audio tone sensitive squelch. On the other side you may want to receive only signals provided with a proper sub audio tone, in this case you'll select the decoder (tone squelch) features as well. DCS (Digital Coded Squelch) works in a similar way, but using a code instead of a fixed frequency.

1) *Make sure you are programming the CTCSS/DCS in the right channel* by checking the **Channel num.** box located in the upper left most position of the window.
2) Click on **CTCSS/DCS** button in the **CTCSS setup** area: the window **Channel x Ctcss – Dcs selection** will open



TX tone (Hz): 110.9
RX tone (Hz): 103.5
☐ CTCSS tail
TX code: <none> TX Inv. ☐
RX code: <none> RX Inv. ☐

3) If you need to activate the CTCSS *encoder* click on the **TX tone (Hz)** drag down button and select the tone encoding frequency you need (e.g. 110.9 Hz)
4) If you need to activate the CTCSS *decoder* as well, click on the **RX tone (Hz)** drag down button and select the tone decoding frequency you need (e.g. 103.5 Hz)

*If in you need to set up the same RX and TX tone frequency, just click on the **TX = Rx** button: the **RX tone** will be copied from the **TX tone***

5) If you want to leave the radio in TX for 150 ms after each release of the PTT *without transmitting* the *sub audio tone*, tick the checkbox **CTCSS tail**. It is useful to avoid that the repeater to be used could make its tail noise heard by the receiving party at the end of each transmission.
6) If you need to activate the DCS codes repeat steps 3) and 4) in the DCS area with **TX code** and **RX code** drag down buttons. Should you have code compatibility problems with an existing radio network, you can try by activating the TX and/or the RX code inversion by ticking the **TX Inv.** and/or **RX Inv.** checkboxes.
7) Now, *if you want to program CTCSS/DCS in the next or previously programmed channel*, click respectively on either **Next ch.** or **Previous ch.** button: you will see the window's name **Channel x Ctcss – Dcs selection** showing the selected channel. Go back to step 3).

*If you click either on **Next ch** or **Previous ch**. buttons, but you won't obtain any effect, it means that there are no adjacent preprogrammed channels (higher or lower respectively). In this case click the **OK** button and check the programmed channels.*

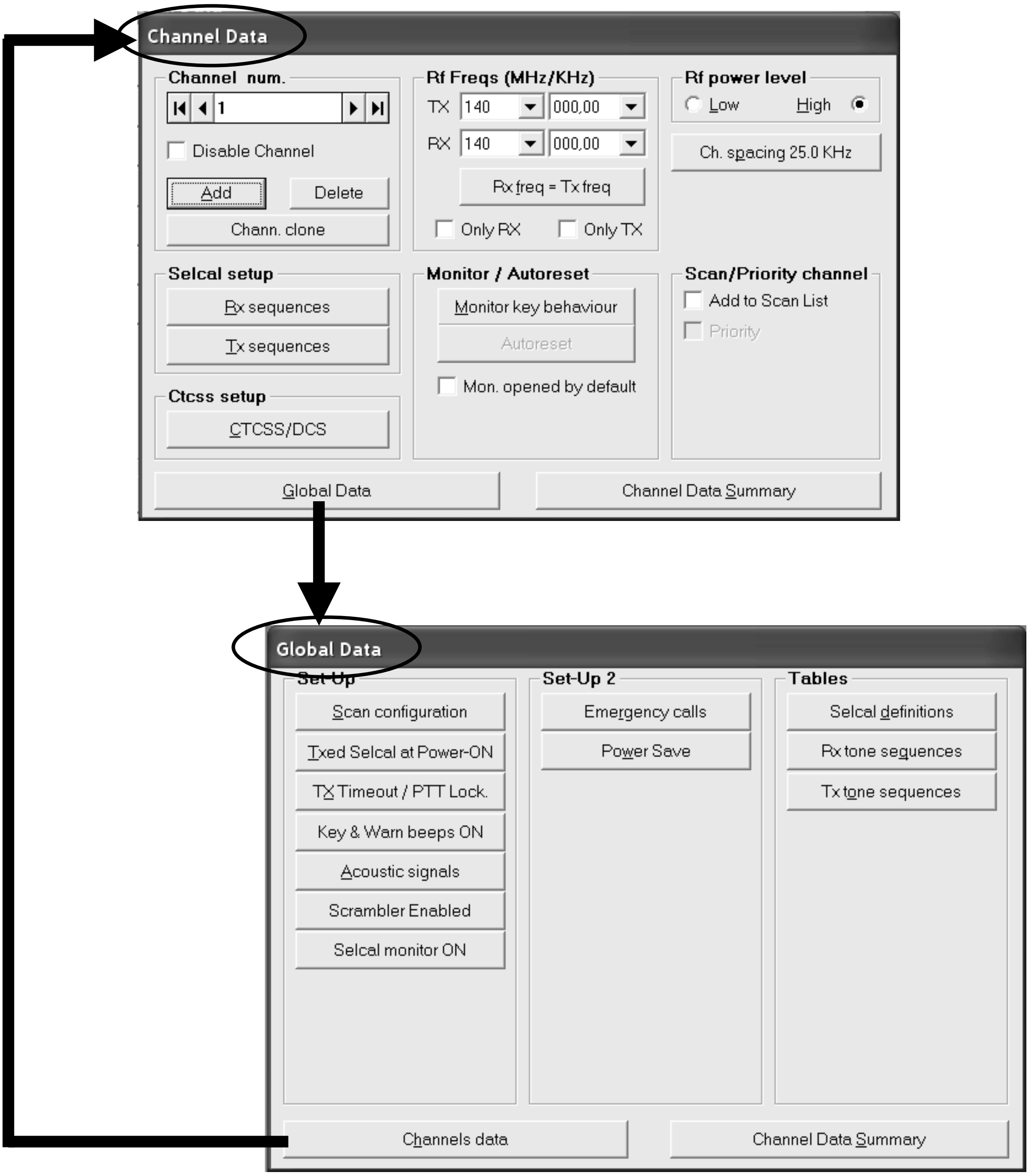
8) *If you have* finished *to program CTCSS/DCS,* click on the **OK** button: the **CTCSS – Dcs selection** window will close.

4 CHANNEL DATA AND GLOBAL DATA WINDOWS

IMPORTANT! Don't skip this chapter, otherwise you will loose an important information to keep on programming

4.1 Switching between Channel Data and Global Data windows

Starting from now, we'll need to switch between **Channel Data** and **Global data** Windows. **Global data** window can be recalled at any time by clicking the **Global Data** *button* from the **Channel Data** *window*.



Channel num.: 1

TX: 140 000,00

RX: 140 000,00

Rf power level: ○ Low ● High

Ch. spacing 25.0 KHz

☐ Disable Channel

☐ Only RX ☐ Only TX

☐ Add to Scan List

☐ Priority

☐ Mon. opened by default

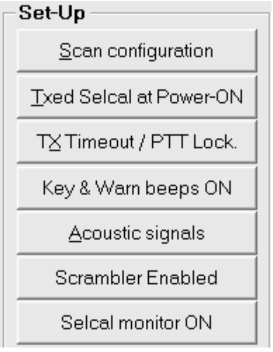
Channel Data
Rf Freqs (MHz/KHz)
Add
Delete
Chann. clone
Rx freq = Tx freq
Selcal setup
Rx sequences
Tx sequences
Monitor / Autoreset
Monitor key behaviour
Autoreset
Scan/Priority channel
Ctcss setup
CTCSS/DCS
Global Data
Channel Data Summary
Global Data
Set-Up
Scan configuration
Txed Selcal at Power-ON
TX Timeout / PTT Lock.
Key & Warn beeps ON
Acoustic signals
Scrambler Enabled
Selcal monitor ON
Set-Up 2
Emergency calls
Power Save
Tables
Selcal definitions
Rx tone sequences
Tx tone sequences
Channels data
Channel Data Summary

Alternatively, you can switch back at any time to the **Channel Data** *window* by clicking the **Channels data** *button* from the **Global data** *window (please see the diagram):*

4.2 Structure of Global Data window

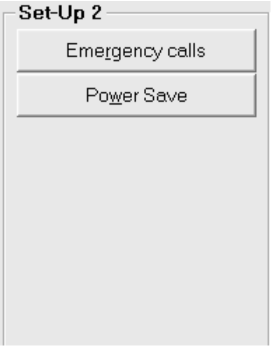
As you can see, **Global Data** window is divided into three areas: **Set-Up**, **Set-Up 2** and **Tables**

Set-Up


Set-Up
Scan configuration
Txed Selcal at Power-ON
TX Timeout / PTT Lock.
Key & Warn beeps ON
Acoustic signals
Scrambler Enabled
Selcal monitor ON

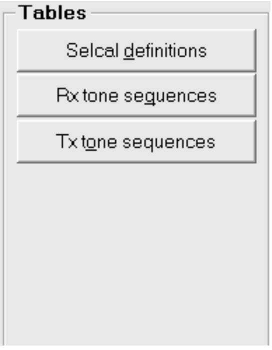
The **Set-Up** area allows you to adjust or enable/disable various radio's parameters, such as the scan configuration, the TX timeout and PTT lock condition, set up the acoustic signals, switch the scrambler on/off and many other customizations. For further information please see the Chapter 6

Set-Up 2


Set-Up 2
Emergency calls
Power Save

The **Set-Up 2** area is useful to set up additional parameters, such as the emergency call and the power save ones. For further information please see the paragraphs 6.9 and 6.10

Tables


Tables
Selcal definitions
Rx tone sequences
Tx tone sequences

The **Tables** area allows you to define the parameters for the Selective Calls and setup RX and TX tone sequences. For further information please see the Chapter 5

Moreover, there are two buttons at the window's bottom:

Channels data
Channel Data Summary

- The **Channels data** button, which allows to quickly recall the Channel data window as described in the par. 4.1
- The **Channel Data Summary** button, which allows to quickly see a channel data summary which includes the main parameters of all the programmed channels. For further information please see the par. 5.7

5 SELECTIVE CALL SETUP

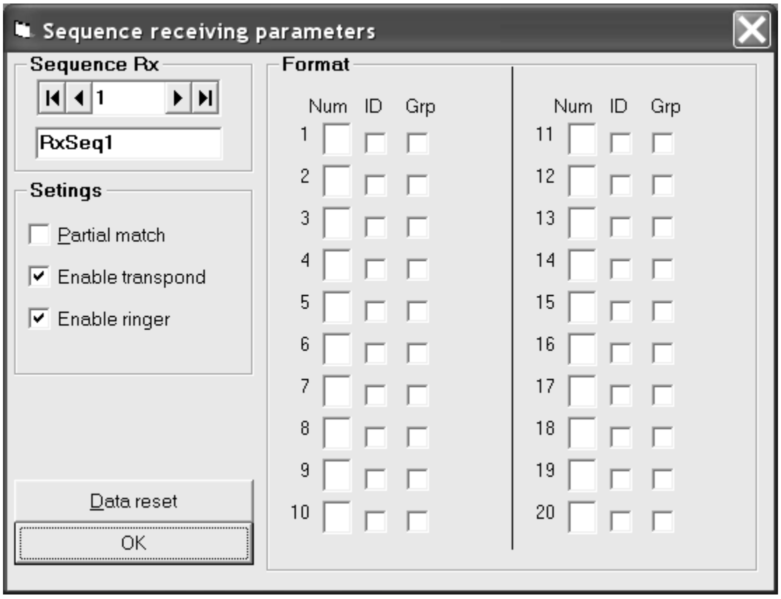
You can define two separate databases for selective calls: one is for TX and the other for RX. Each database can store up to 15 tone sequences, each of them can be programmed up to 20 tones. HP106 can be programmed in order to:

- **RX** - decode up to two RX sequences (**Seq. I** and **Seq. II**) per RF channel.
- **TX** - transmit up to four TX sequences per RF channel, to be set as **Call1** and **Call2**, **Emergency** and **ANI** as you will see later on. The first two sequences are transmitted by keeping pressed, respectively, the **MON** or **FUNC** keys as stated in the user's manual. Moreover, if both keys are kept pressed together, the emergency call is transmitted in the currently tuned channel or in a preset one

For further details about setting Call1, Call2, Emergency and ANI calls please see the par. 5.4

5.1 Defining Selcal RX parameters

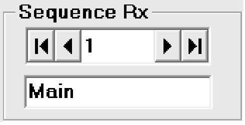
1) From the **Channel Data** window, press **Global Data** button: the **Global Data** window will open.
2) From the area **Tables** press **RX tone sequences** button: the **Sequence receiving parameters** window will open.



Sequence Rx: 1
RxSeq1

Setings:
☐ Partial match
☑ Enable transpond
☑ Enable ringer

3) Go to **Sequence Rx** area and press the ◀ or ▶ button to select the Rx sequence you need to setup. In the following example we selected the sequence **1**.



Sequence Rx: 1
Main

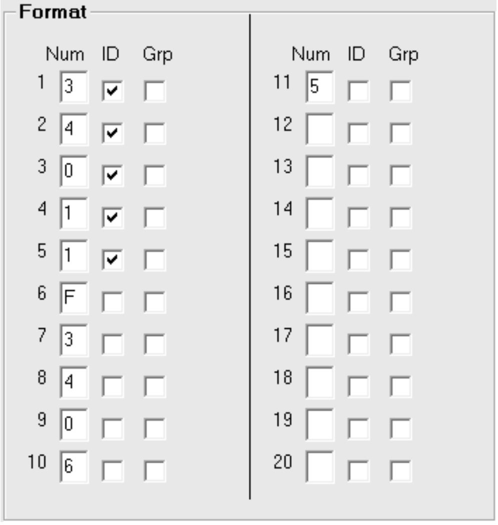
4) If you want to assign an alphanumeric name to the selected Rx sequence, just type the new name over the existing one **RxSeq.x** (in the example we renamed the sequence 1 as **Main**).
5) Now you have 20 decode events (from box 1 to box 20) available, in which of them you can define the decoded tone. Type the related numbers (or letters) in each box and then enable the *identification* **ID** of the required tones by checking the related checkbox.

*In the example we typed the format **3 4 0 1 1 F**(pause tone) **3 4 0 6 5,** however we enabled the ID of the first five tones only by ticking only the related check boxes. We'll explain later the meaning of this operation.*

6) If you like, you can add some additional capability to each event by checking the related boxes:

- **ID** means *Identification*. It is useful to recognize a selective call even if it doesn't completely match with the programmed sequence. Please have a look to *Partial Match* at the next step.
- **Grp** is the *group* checkbox, which allow you to define the related tone as a group one.

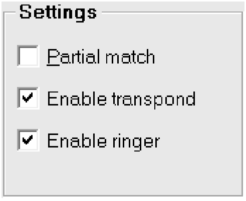
Obviously, GRP checkbox should be ticked only after the last ID digits, because there is no reason to define the first tones to be decoded as group ones.



	Num	ID	Grp		Num	ID	Grp
1	3	☑	☐	11	5	☐	☐
2	4	☑	☐	12		☐	☐
3	0	☑	☐	13		☐	☐
4	1	☑	☐	14		☐	☐
5	1	☑	☐	15		☐	☐
6	F	☐	☐	16		☐	☐
7	3	☐	☐	17		☐	☐
8	4	☐	☐	18		☐	☐
9	0	☐	☐	19		☐	☐
10	6	☐	☐	20		☐	☐

7) You have now other available options:

- if you check **Partial Match** you will enable to decode the sequence if it partially matches as well. In other words receiving just the tones with a tick in the ID checkbox are sufficient for a full decode operation. With the over stated example, you will accept any sequence beginning with **3 4 0 1 1**.
- **Enable transpond** *is checked by default.* It enables the transpond function (emission of a sequence that will be defined later on) at the reception of the appropriate selective call. *Remove the tick if you don't need it.*
- **Enable ringer** *is checked by default*. It will make the ringer sounding every time a selective call is properly decoded. *Remove the tick if you don't need it.*



Settings

☐ Partial match

☑ Enable transpond

☑ Enable ringer

🗎 *You can set up different rings (acoustic signals) according to the decoded Selcall. For further detail please the par. 6.6*

8) You can now:

⇨ *Keep on setting up new Rx sequences* in this case go back to step 4).

⇨ *Enter the settings and close the Rx sequence set up*. In this case click the **OK** button and go straight to the next paragraph

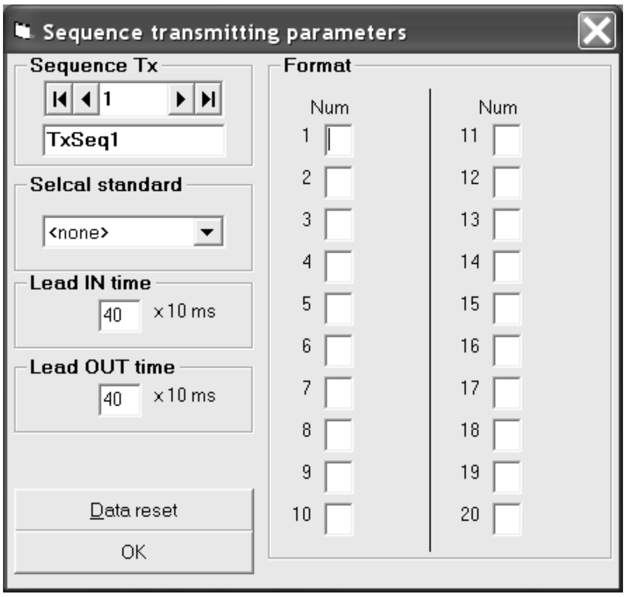
⇨ *Close the Rx sequence set up without entering all the settings (in case of big mistakes).* In this case click the ☒ button (located in the uppermost right corner) and start from the beginning of this paragraph.

🗎 *If you composed a completely wrong sequence set up, you can also reset the screen by clicking the **Data reset** button: all the settings of the selected sequence will be canceled.*

5.2 Defining Selcal TX parameters

You can define 15 Tx sequences (up to 20 tones each) and rename them with alphanumeric labels. The setup of the Tx sequences is similar to the one described for the Rx ones.

1) From the **Channel Data** window, press **Global Data** button: the **Global Data** window will open.
2) From the **Global Data** window press the **Tx tone sequences** button: the **Sequences transmitting parameters** window will open.



Sequence transmitting parameters

Sequence Tx: 1

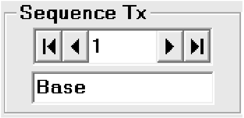
TxSeq1

Selcal standard: <none>

Lead IN time: 40 x10 ms

Lead OUT time: 40 x10 ms

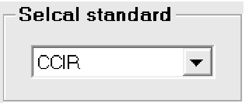
3) Go to **Sequence Tx** area and press the ◄ or ► button to select the Tx sequence you need to setup.
4) If you want to assign an alphanumeric name to the selected Tx sequence go to the *bottom* box of the **Sequence Tx** area and type the new name over the **TxSeq.x** one (in the example we renamed the sequence **1** as **Base** call).



Sequence Tx: 1

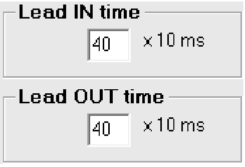
Base

5) Select the TX selcall standard by clicking on the **Selcal standard** drag down button and clicking again on the standard you need (we choose CCIR in the example). If you like, you can select **PERSONAL** in order to later set a non-standard Selective call (we'll describe how to set it up in the chapter 6.1).



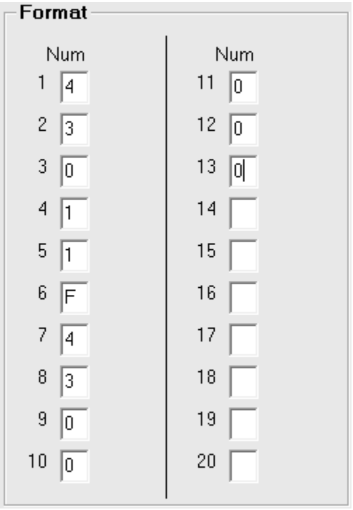
Selcal standard: CCIR

6) Now you have 20 events (from box 1 to box 20) in which you can define the tone sequence you need. Type the related numbers or letters related to the tones you want to send. In the example we typed the format **4 3 0 1 1 F**(pause tone) **4 3 0 0 0 0 0**.
7) If necessary you can adjust the *Lead IN time*. This allows to adjust the delay between the beginning of carrier and the beginning of the transmitted sequence in order to allow a proper operation in the other party's decoders (for example some old decoders need more time to start decoding after receiving a carrier). In this case go to the **Lead IN time** area and type the time length you need.


Lead IN time
40 x10 ms
Lead OUT time
40 x10 ms

8) Similarly, you might need to set the Lead OUT time. This allows to adjust the delay between the end of the transmitted sequence and the end of the carrier. In this case go to the **Lead OUT time** area and type the time length you need.

Lead IN time and Lead OUT time are expressed in x 10 ms, so if you type 40 you will obtain 400 ms.


Format

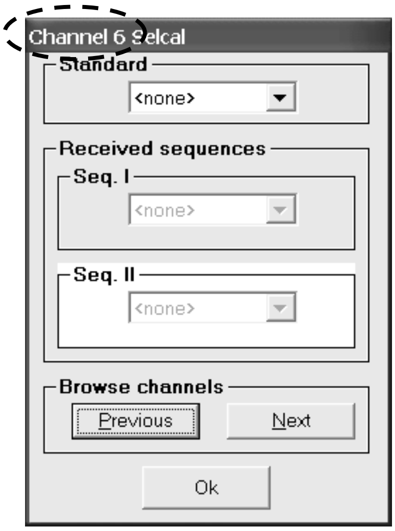
Num		Num	
1	4	11	0
2	3	12	0
3	0	13	0
4	1	14	
5	1	15	
6	F	16	
7	4	17	
8	3	18	
9	0	19	
10	0	20	

9) You can now:
   - ⇨ *Keep on setting up new Tx sequences* in this case go back to step 4).
   - ⇨ *Enter the settings and close the Tx sequence set up*. In this case click the **OK** button and go straight to the next paragraph
   - ⇨ *Close the Tx sequence set up without entering all the settings (in case of big mistakes).* In this case click the ☒ button (located in the uppermost right corner) and start from the beginning of this paragraph.

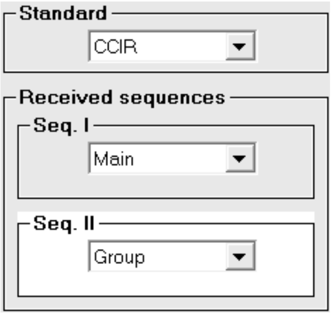
If you composed a completely wrong sequence set up, you can also reset the screen by clicking the ***Data reset*** *button: all the settings of the selected sequence will be canceled.*

5.3 Defining RX Standard and sequences

1) Press the **Channel Data** button: you will go back to the **Channel Data** window.
2) Make sure to be on the right RF channel and, from the **Channel Data** window, click on **RX sequences** button: the **Channel x Selcal** window will open.

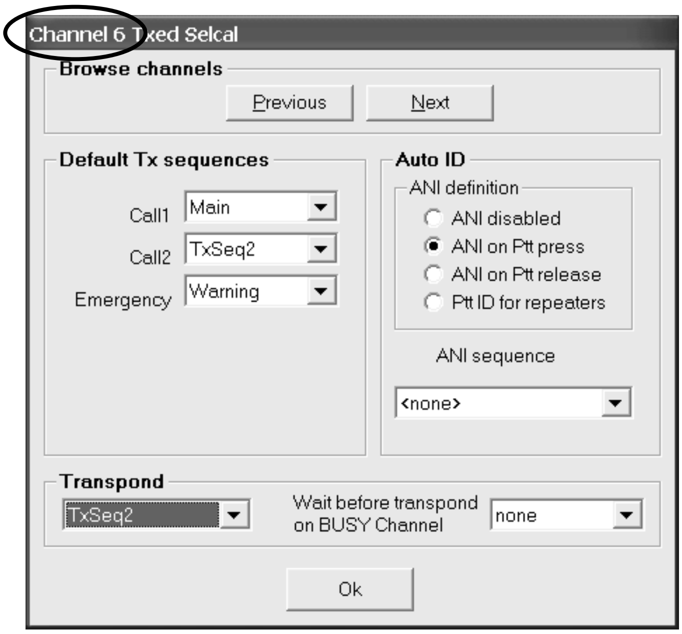

Channel 6 Selcal
Standard: <none>
Received sequences
Seq. I: <none>
Seq. II: <none>

3) *Be sure you are selecting parameters on the proper channel* (shown in the heading of the window - **Channel 6** in the example). If you want to set up another channel, in the **Browse Channels** area click **Previous** or **Next** buttons to select the appropriate channel.
4) Select the RX selcal standard you need to use *for the selected channel* by clicking on the drag down **Standard** and clicking again on the standard you need (we choose the CCIR in the example).
5) Select the received sequence(s) you may want to decode: in the **Received sequences** area click on either **Seq. I** and/or **Seq. II** drag down button (in the example we have chosen **Main** and **Group** respectively).
6) Now you have two choices:
   - ⇨ *If you need to program RX standard and sequences for another channel* go back to step 3).
   - ⇨ *If you don't need to program RX standard and sequences for other channels* click the **Ok** button to enter the programmed data.


Standard: CCIR
Received sequences
Seq. I: Main
Seq. II: Group

5.4 Defining Call1, Call2, Emergency default TX calls and Auto ID (ANI)

1) Make sure to be on the right RF channel and, from the **Channels Data** window, click on **TX sequences** button: the **Channel X Txed Selcal** window will open.



Channel 6 Txed Selcal

Browse channels

Default Tx sequences

Call1 Main

Call2 TxSeq2

Emergency Warning

Auto ID

ANI definition

○ ANI disabled
● ANI on Ptt press
○ ANI on Ptt release
○ Ptt ID for repeaters

ANI sequence <none>

Transpond

TxSeq2

Wait before transpond on BUSY Channel none

2) *Be sure you are selecting parameters on the proper channel* (shown in the heading of the window - Channel 6 in the example). If you want to set up another channel click **Previous** or **Next** buttons to select the appropriate channel.
3) Select the TX Sequence you want to send when **MON** button (located over the PTT) is kept pressed by clicking the **Call1** drag down button in the **Default Tx sequences** area and then click the appropriate sequence (in the example we have chosen **Main**).
4) Select the TX Sequence you want to send when **FUNC** button (located below the PTT) is kept pressed by clicking the **Call2** drag down button in the **Default Tx sequences** area and then click the appropriate sequence (in the example we have chosen **TxSeq2**).

*To avoid confusion, **MON** and **FUNC** buttons act as Call1 and Call2 send buttons when kept pressed. If they are briefly pressed, their function is different.*

5) Select the TX Sequence you want to send with **Emergency** button (by keeping pressed together **MON** and **FUNC** buttons) by clicking the **Emergency** drag down button in the **Default Tx sequences** area and then click the appropriate sequence (in the example we have chosen the sequence **Warning**).
6) You can now define one of the previously programmed sequences to be sent when a selcall is recognized. Click the drag down button in the **Transpond** area and then click the appropriate sequence (in the example we have chosen the sequence **TxSeq2**). You can also set the time which the radio has to wait before sending the transpond sequence just set if the channel is busy. Just go to the **Wait before transpond on BUSY Channel** drag down button and select the time you need which is available in 2.5 sec. steps
7) Select the condition in which you want the transceiver be sending the ANI by activating the related radio button in the **Auto ID** area: **ANI disabled**, **ANI on Ptt press**, **ANI on Ptt release** or **Ptt ID for repeaters**.
8) Unless you have left **ANI disabled**, the **ANI sequence** drag down button will be activated: click it and select the TX Sequence you want to use as ANI.

ANI (Automatic Number Identification), is a tone sequence transmitted before or after normal voice transmissions in order to identify the radio in use. These last two steps allows you to set the condition in which the transceiver will automatically send it as well as the sequence to be transmitted.

9) Now you have two choices:
   - ⇨ *If you need to program the said parameters for another channel* go back to step 2).
   - ⇨ *If you don't need to program the said parameters for other channels* press the **OK** button and go to the next paragraph.

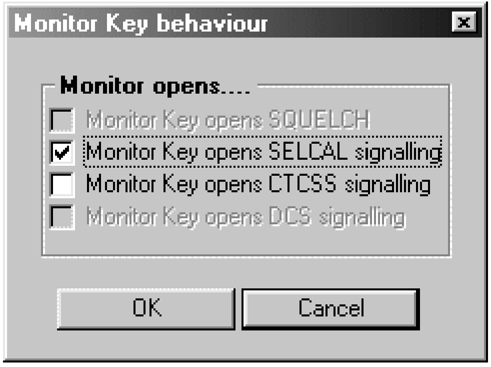
5.5 Monitor Key Behaviour

You can define the behaviour of the **MON** (monitor) key located in the left side of the transceiver (over the PTT) when briefly pressed. Normally, only **Monitor key opens SQUELCH** is available. However, *depending on the previous settings you have made for Selcal and CTCSS/DCS in that channel, you will find different active options*. For example, if you have activated CTCSS in the channel, the **Monitor key opens CTCSS signalling** checkbox will be available as well.

*If **MON** is briefly pressed a second time, it restores the previous monitor condition.*

1) *Be sure you are selecting parameters on the right channel*, if not please select the right one by clicking on either the ◀ or ▶ button in the **Channel num.** area in **Channel Data** window

2) From the **Channel Data** window – **Monitor / Autoreset** area - click the **Monitor key behaviour** button: the **Monitor key behaviour** window will open.
3) in the **Monitor opens...** area, tick the available ckeckbox(es) you need to activate (not available checkboxes will be shaded in gray). In the example we activated **Monitor key opens SELCAL signalling**.
4) Click the **OK** button to confirm or **Cancel** to leave this window without changing the settings.
5) Now you have two choices:
   - ⇨ *If you need to program the monitor key behaviour for another channel,* go back to step 1)
   - ⇨ *If you don't need to program the monitor key behaviour for other channels go to the next paragraph.*



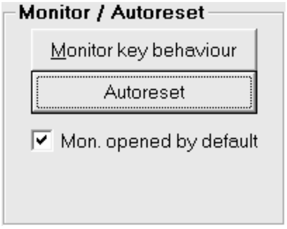
Monitor Key behaviour

Monitor opens....

☐ Monitor Key opens SQUELCH
☑ Monitor Key opens SELCAL signalling
☐ Monitor Key opens CTCSS signalling
☐ Monitor Key opens DCS signalling

5.6 Manual/Autoreset for selective calls

This option allows to define if the reset of the selective call should be made only manually (by the **MON** button) or automatically after a certain time. In this last option you can define the autoreset time.

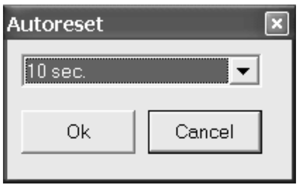


☑ Mon. opened by default

1) *Be sure you are selecting parameters on the right channel*. If not, in **Channel Data** window - **Channel num.** area - please select the right one by clicking on either ◀ or ▶ button.
2) If you want the radio starting with monitor active (open squelch) every time is switched on and at every channel switching, in the **Channel Data** window – **Monitor / Autoreset** area – you can tick the checkbox **Mon. opened by default** in order to enable it, then go to step 5.

*Obviously, to manually reset the monitor (close the squelch) the users has top press briefly **MON***

3) Differently, if you need the automatic reset (i.e. you haven't ticked the **Mon. opened by default** checkbox), click the **Autoreset** button: the **Autoreset** window will open.
4) Select the autoreset time you need by clicking the **Autoreset** drag down button and then click the needed time. You can select a time from **5** to **155** sec. in 5 sec steps or leave **<disabled>** if you need the manual reset only. In the example we have chosen an automatic reset time of **10 sec.**



Autoreset

10 sec.

*If in step 2) you have previously ticked the checkbox **Mon. opened by default**, and in step 3) you have selected any time (i.e. not **<disabled>**), the **Mon. opened by default** checkbox will be automatically unavailable and the tick will be deleted*

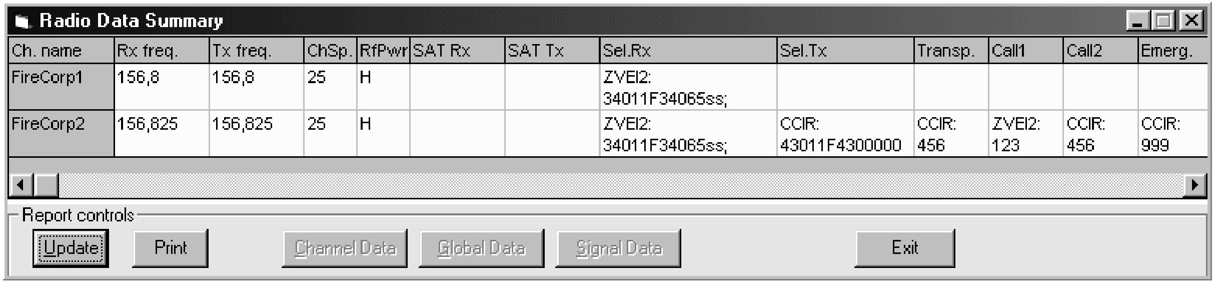
*The kind of reset action provided by the **MON** key depends by the settings described at chap. 5.5*

5) Click the **OK** button to confirm or **Cancel** to leave this window without changing the settings.
6) Now you have two choices:
   - ⇨ *If you need to program the autoreset for another channel* go back to step 1).
   - ⇨ *If you don't need to program the autoreset for other channels go to the next paragraph.*

5.7 Overviewing a Channel Data Summary

This smart feature allows you to overview a channel data summary which includes the channel parameters (e.g. Rx/Tx frequency, channel spacing, sub audio tone/CTCSS etc.). You may decide to print this report as record for future references and/or steadily leave it on the screen during the programming operations in order to avoid mistakes.

1) From the **Channel Data** window click the **Channel Data Summary** button: the **Radio Data Summary** window will open and you will see the overview of the programmed channels.



Radio Data Summary

Ch. name	Rx freq.	Tx freq.	ChSp.	RfPwr	SAT Rx	SAT Tx	Sel.Rx	Sel.Tx	Transp.	Call1	Call2	Emerg.
FireCorp1	156,8	156,8	25	H			ZVEI2: 34011F34065ss;					
FireCorp2	156,825	156,825	25	H			ZVEI2: 34011F34065ss;	CCIR: 43011F4300000	CCIR: 456	ZVEI2: 123	CCIR: 456	CCIR: 999

Report controls

2) You can decide to see the data in compact or in extended way. In this last case just expand the window as you do with the other software windows: go to the border, click on it with the mouse and extend the windows area in the direction you need by dragging it out. The over stated picture shows a slightly extended summary window.

3) You have two options:
   - ⇨ *if you want to use the summary as a programming monitor*, click the **Update** button. It will remain on the screen providing an useful programming monitor. In fact, it can be manually updated every time you press the **Update** button or automatically after any programming operation you will make as described in par. 7.1.
   - ⇨ *if you need to print the summary* click the **Print** button.
4) To escape the **Radio Data Summary** window click the **Exit** button.

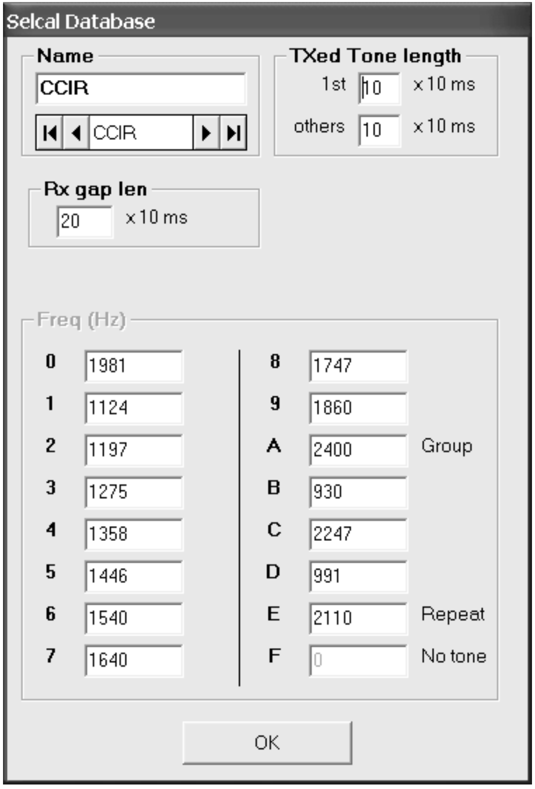
6 CUSTOMIZATIONS

In this section we'll explain how to define personal (non-standard) Selcall parameters. Moreover you can define the availability of the basic controls to the end user and boost the customization in order to make the radio better matching with your needs. You can configure the scanning, set up some controls such as the transmission timeout, the PTT lock and enabling/disabling the key and warn beeps as well as setting the acoustic signals, enabling/disabling the scrambler and many others.

6.1 Selcal database (Selcal definitions button)

If necessary, you can change some parameters of the standard Selcals. Moreover, if you don't want to use the standard Selcal tone frequencies, you can totally define your own Selcal standard called **PERSONAL**.

1) From the **Global Data** window – **Tables** area - press the **Selcal Definitions** button: the **Selcal database** window will open.



Name: CCIR (|◄ ◄ CCIR ► ►|)

TXed Tone length: 1st 10 x10 ms; others 10 x10 ms

Rx gap len: 20 x10 ms

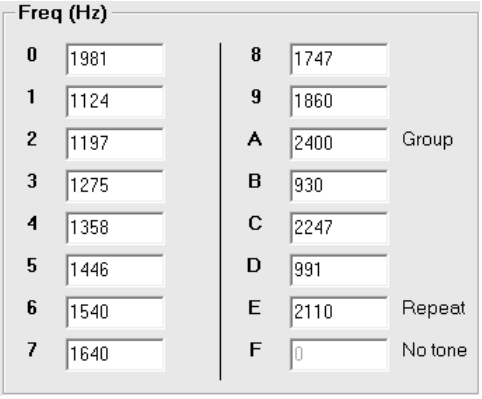
Freq (Hz)

0	1981	8	1747	
1	1124	9	1860	
2	1197	A	2400	Group
3	1275	B	930	
4	1358	C	2247	
5	1446	D	991	
6	1540	E	2110	Repeat
7	1640	F	0	No tone

2) By means of the ◄ or ► buttons of the **Name** area, select the Selcal standard you need to modify. You have two choices:

   - ⇨ if you need to completely define a new Selcal standard, select |◄ ◄ PERSONAL ► ►| and go on with step 3)
   - ⇨ *if you need to modify some allowed parameters of existing Selcal standards,* just select it (e.g. **CCIR**) and go to step 7)

3) If necessary, in the **Name** box, type a new name over **PERSONAL** (e.g. **FireCorp**)
4) You can set the *Minimum Tone Spacing.* It's the minimum frequency space between the various tones in order to avoid interferences between them if decoded by a old (and too wide) decoder. Go to **Min. Tone spacing** box and type 10 or 100 Hz.
5) Go directly to the proper **Freq (Hz)** box (from 0 to F) and type the new tone frequency or modify the preset ones.



Freq (Hz)

0	1981	8	1747	
1	1124	9	1860	
2	1197	A	2400	Group
3	1275	B	930	
4	1358	C	2247	
5	1446	D	991	
6	1540	E	2110	Repeat
7	1640	F	0	No tone

6) The **Two-tone paging** checkbox enables the said paging standard which is used in the U.S.A. *This option is not normally supported* in the standard HP106/406 versions and needs to be implemented upon specific request. For further information please contact your dealer. If you are sure that your radio supports it and you need to enable this option tick the **Two-tone paging** checkbox.

*The settings described till now are available only in the **PERSONAL** standard.*

7) Now you can set the *Maximum Rx gap length*. It's the maximum time in which the received selective call is assumed as over. Go to **Rx gap len** box and type the maximum accepted Rx gap length.

***Rx gap len** parameter is expressed in x 10 ms, so if you type 20 you will obtain 200 ms.*

8) If necessary, you can adjust now the *tone length* both for the *first* one and for *other* ones. Go to the **TXed Tone length** area and type the tone lengths you need respectively in the **1st** and **others** boxes

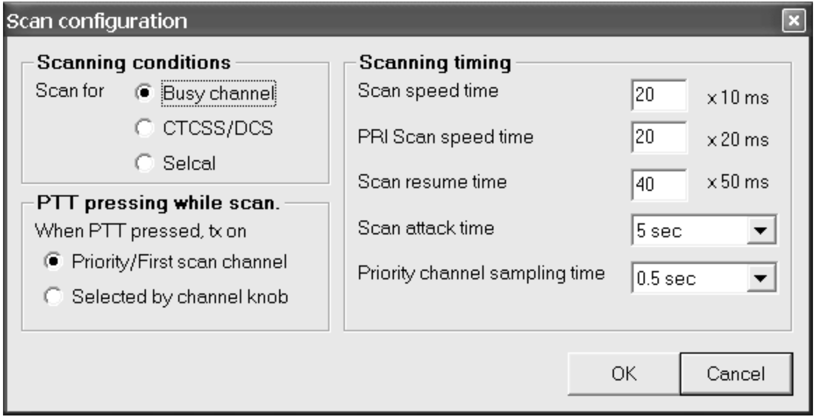
***TXed Tone length** parameters are expressed in x 10 ms, so if you type 20 you will obtain 200 ms.*

9) Click on the **OK** button to close the database window and return to **Global Data** window.

6.2 Scanning Configuration (Scan configuration button)

This button allows to define which condition the scan should stop in, as well as the scan speed, the priority scan speed and scan wait time.

1) From the **Global Data** window - **Set-Up** area - click the **Scan configuration** button: the **Scan configuration** window will open.



Scan configuration

Scanning conditions

Scan for ● Busy channel ○ CTCSS/DCS ○ Selcal

PTT pressing while scan.

When PTT pressed, tx on
● Priority/First scan channel
○ Selected by channel knob

Scanning timing

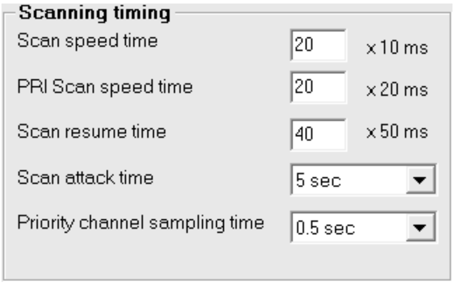
Scan speed time 20 x10 ms
PRI Scan speed time 20 x20 ms
Scan resume time 40 x50 ms
Scan attack time 5 sec
Priority channel sampling time 0.5 sec

2) In the **Scanning conditions** area, you can define the condition in which the scan should stop:
    - ⇨ If you need the scanning should stop *when a busy channel is detected* (carrier presence) click the **Busy channel** radio button.
    - ⇨ If you need the scanning should stop *when the proper CTCSS/DCS is detected*, select the **CTCSS/DCS** radio button.
    - ⇨ If you need the scanning should stop *when the proper Selcal is detected*, select the **Selcal** radio button.

3) In the **PTT Pressing while scan.** area, you can define the channel in which the radio should transmit if PTT is pressed during scan:
    - ⇨ Select the **Priority/First scan channel** radio button if you need the transmission on the priority channel or the first scanned channel (the one which the user sets with the channel knob before starting the scan). The first or the second condition is selected depending if you have ticked the checkbox **Priority** described at step 7) in chap. 3.6)
    - ⇨ Select the **Selected by channel knob** radio button to allow the transmission on the channel currently selected by the channel knob.

4) In the **Scanning timing** area, you can define your preferred scan timings. Go to each box and type/select your preferred values:

- **Scan speed time** – It's the time which the radio stays on each channel checking the condition defined at step 2)
- **PRI scan speed time** – It's the time which the radio stays on the Priority channel, checking the condition defined at step 2)
- **Scan resume time** – defines the time to wait before automatically restart the scan when the radio is stopped on a channel and the condition defined at step 2) ceases
- **Scan attack time** – defines the maximum time which the radio can stay on a channel before automatically restart the scan even if the condition defined at step 2) is not ceased. If this timer is set to **OFF**, the radio stays on the channel all the time in which the said condition (which stopped the scan) is present
- **PRI channel sampling time** – It's the time after that the radio switches on the priority channel (Dual watch)



Scanning timing

Scan speed time 20 x10 ms
PRI Scan speed time 20 x20 ms
Scan resume time 40 x50 ms
Scan attack time 5 sec
Priority channel sampling time 0.5 sec

The over stated parameters are expressed, respectively, in x10, x20 and x50 ms. so if you type, for example 30 in the priority scan speed box, the time you will obtain will be: 30 x 20 = 600 ms.

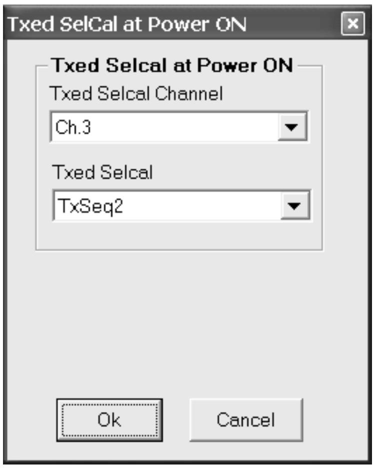
*The scan attack timer is useful to avoid that the scan could uselessly stop too much on a channel (e.g. with long-timed noise or non modulated carriers). However ensure to set it with a sufficient time (or to **OFF**) in order to avoid the risk to loose the end of long messages due to an anticipated scan restart*

5) Click the **OK** button to confirm or **Cancel** to exit without changing the previous settings.

6.3 Power-ON Selcal auto sending

You can define a selective call to be automatically transmitted every time the radio is switched on and which channel the radio should send it.

1) From the **Global Data** window - **Set-Up** area - click the **Txed Selcal at Power-ON** button: the **Txed Selcal at Power-ON** window will open.



Txed Selcal Channel: Ch.3

Txed Selcal: TxSeq2

2) Click the **Txed Selcal channel** drag down button and select the required channel. You can also select **Selected by knob** if you want to send the Selcal in the channel currently selected by the channel knob
3) Click the **Txed selcal** drag down button and select the required selcal you need to automatically send *every time the radio is switched on*.
4) Click the **OK** button to confirm or **Cancel** to exit without changing the previous settings

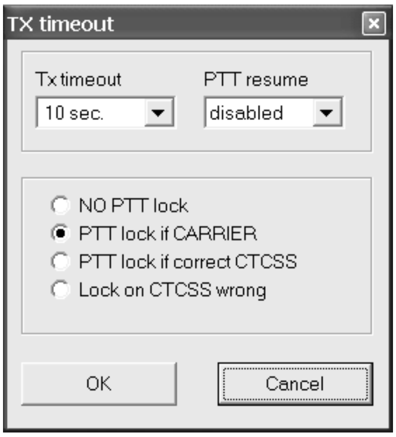
If you don't want to automatically send a selective call every time the radio is switched on, at step 3 leave ***Txed selcal*** *on* ***<none>***

6.4 Transmission timeout / PTT lock (Tx Timeout / PTT Lock button)

This window allows you to reduce the risks of accidental /excessive transmissions on the operating channel, even by non expert users:

- *TX timeout* - defines the maximum transmission time available for the end user for every message. If he/she continuously presses the PTT and reaches a certain preset time, the TX will be momentarily disabled and an error beep is emitted. The TX is automatically restored when the end user releases the PTT or, if needed, after a certain time with the PTT released (*PTT resume time*).
- *PTT lock* – locks the transmission if the channel shown some activities. You can configure this setting in order to lock the PTT in several activity conditions: just if a carrier is detected or if a correct/wrong CTCSS is detected. When the preset activity is detected, the TX will be momentarily disabled and an error beep is emitted.

To access this settings, From the **Global Data** window - **Set-Up** area - click the **Tx Timeout / PTT Lock button**: the **Tx timeout** window will open.



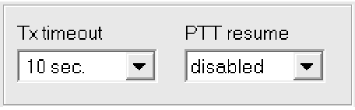
Tx timeout: 10 sec.

PTT resume: disabled

○ NO PTT lock
● PTT lock if CARRIER
○ PTT lock if correct CTCSS
○ Lock on CTCSS wrong

6.4.a Setting the Transmission timeout

1) Click the **Tx timeout** drag down button and select the *maximum transmission time available for the user*.
2) Obviously, as soon as you will select a **Tx timeout** value *different than* ***disabled***, you will also automatically activate the **PTT resume** drag down button. Leave it to **disabled** if you want to restore the transmission just after the PTT has been released or set the time which the user has to wait with the PTT released.

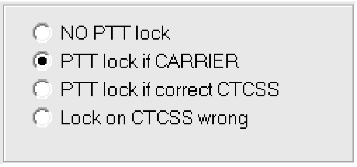


Tx timeout: 10 sec.

PTT resume: disabled

6.4.b Setting the PTT lock

3) You have now three choices to lock the PTT in certain conditions:
    - *If you don’t want to lock the PTT,* even when the channel is busy or the correct CTCSS tone is present, leave the **NO PTT Lock** radio button active.
    - *If you need the Tx inhibited when a carrier is detected* (busy channels), use the **PTT lock if CARRIER** radio button.
    - *If you need the Tx inhibited when the correct CTCSS tone is detected,* use the **PTT lock if correct CTCSS** radio button.
    - *If you need the Tx inhibited when a wrong CTCSS tone is detected,* use the **Lock on CTCSS wrong** radio button.



○ NO PTT lock
● PTT lock if CARRIER
○ PTT lock if correct CTCSS
○ Lock on CTCSS wrong

4) Click the **OK** button to confirm or **Cancel** to exit without changing the previous settings.

6.5 Enabling/disabling the key and warn beeps (Key & Warn beeps button)

Normally, when you press any key or rotate the channel switch, you hear a short beep as a confirmation in the loudspeaker. Moreover, in case of mistakes or particular events, different beeps are emitted. If your customer requires a very silent use, you can disable the said acoustic signals as follows:

Key & Warn beeps ON

From the **Global Data** window - **Set-Up** area - click the **Key & Warn beeps** button: you will toggle it **OFF** or **ON** depending on the times you press the button.

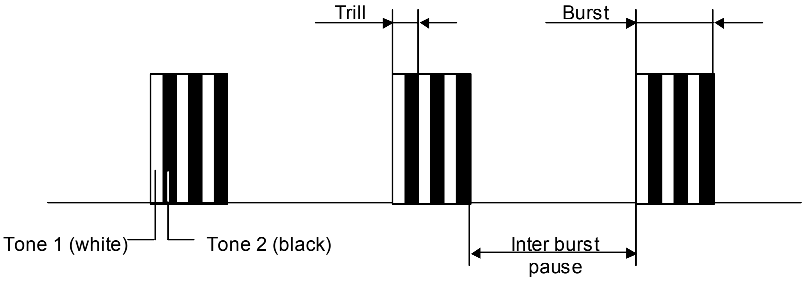
We recommend, when possible, to leave the acoustic signals ON in order to improve the transceiver's ease of use.

6.6 Setting the acoustic signals (rings)

You can set up and configure the acoustic warning signals which the radio emits when a Selcall is received in order to obtain the audio effect you prefer. Independent settings are available for each kind of received Selcall, i.e. *Primary (Seq I)*, *Secondary (Seq II)* or *Group (Group call)*. Before doing that, have a look to the following paragraph in order to know how each ring is composed.

6.6.a Format of rings (acoustic signals)

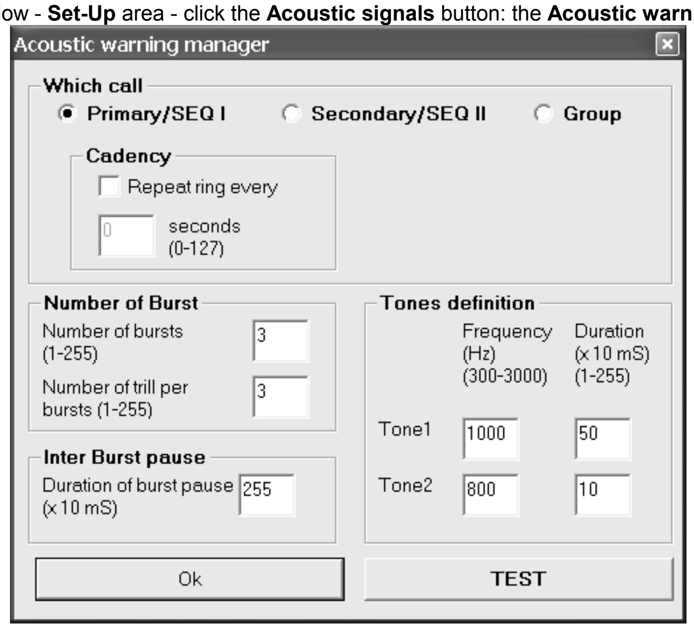
Each *ring* is composed by a preset number of *bursts* (from 1 to 255). Each burst is obtained by alternating two tones (Tone *1* and *Tone 2*) a preset number of times. Let's call each alternation as *trill*. In other words, a *ring* is composed by a preset number of *bursts* which are composed by a preset number of *trills* which are composed by two tones. You can set not only the frequency and duration of each tone, but also the number of trill per burst, the number of bursts which make each ring, the pause between each burst and the cadency (repetition of each ring). The following diagram shows a ring made by 3 burst, each of them made by 3 trills



A good management of burst, trills etc. allow you to create a wide range of sounds in the rings which can imitate a lot of situations (e.g. alarm tones) or well known rings (e.g. your Country's typical phone ring when a Selcall is received). This additionally improves the ease of use.

6.6.b Setting procedure

1) From the **Global Data** window - **Set-Up** area - click the **Acoustic signals** button: the **Acoustic warning manager** window opens.



Which call
● Primary/SEQ I ○ Secondary/SEQ II ○ Group

Cadency
☐ Repeat ring every
0 seconds (0-127)

Number of Burst
Number of bursts (1-255): 3
Number of trill per bursts (1-255): 3

Inter Burst pause
Duration of burst pause (x 10 mS): 255

Tones definition

	Frequency (Hz) (300-3000)	Duration (x 10 mS) (1-255)
Tone1	1000	50
Tone2	800	10

2) Select the event which you want to change the acoustic signal using the related radio button in the **Which call** area:
   - **Primary (Seq I)** – When primary selcal (with Sequence I) is properly received

- **Secondary (Seq II)** – When secondary selcal (with Sequence II) is properly received
- **Group** – When group selcal (with group sequence) is properly received

3) Press the **TEST** button in order to check the current ring for the selected event. Now you have three choices:
    - ⇨ If you need to change it, go on with the following step(s)
    - ⇨ If you want to check another ring, go back to the step 2)
    - ⇨ If you don't want to change any ring, go to step 9)
4) If you need to continuously repeat the ring, go to the **Cadency** area, tick the **Repeat ring every** checkbox in order to make available the **seconds (0-127)** box (normally disabled), then type in it the time interval (in seconds) between each repeating
5) If you want to change the number of bursts to be emitted for each ring, go to the **Number of burst** area, then type the number of burst you need in the **Number of burst (1-255)** box, then type the number of trills (alternations of Tone 1 and Tone 2) per burst in the **Number of trill per burst** box
6) If you have selected more than one burst for each ring, you can set the pause time between each burst. Go to the **Inter burst pause** area and type the duration of the pause between each burst (1 to 255) in the **Duration of burst pause** box.

This parameter is expressed in x 10 ms, so if you type 20 you will obtain 200 ms.

7) If you want to change the frequency and/or the duration of Tone 1 or Tone 2 which compose each burst, go to the **Tones definition area**, then type the **frequency** (from 300 to 3000 Hz) and **duration** (from 1 to 255) of each tone in the proper boxes

The tone duration is expressed in x 10 ms, so if you type 20 you will obtain 200 ms

8) When finished, press the **TEST** button in order to check the new ring obtained. You have several choices:
    - ⇨ If you need to provide other modifications to the current ring, go back to step 4)
    - ⇨ If you need to change another ring, go back to step 2
    - ⇨ If you want to exit without any modification (in case of big mistakes). Press X in the upper right corner of the **Acoustic warning manager** window
9) Exit by pressing **OK**

6.7 Enabling/disabling the scrambler

You can enable/disable the possibility to activate the scrambler by the end user. To do that, from the **Global Data** window - **Set-Up** area - click the **Scrambler Enabled/Disabled** button: the button itself shows the current setting. If the scrambler is enabled, the end user can activate or deactivate it by briefly pressing **MON** and **FUNC** keys together as explained in the user's manual.

Scrambler Enabled

6.8 Enabling/disabling the selective call audio monitor (Selcal monitor button)

Normally, when you send a selective call, you hear the related tones in the loudspeaker as an audio monitor. If your customer requires a silent use, you can disable this monitor as follows:

From the **Global Data** window - **Set-Up** area - click the **Selcal monitor** button: you will toggle it **OFF** or **ON** depending on the times you press the button.

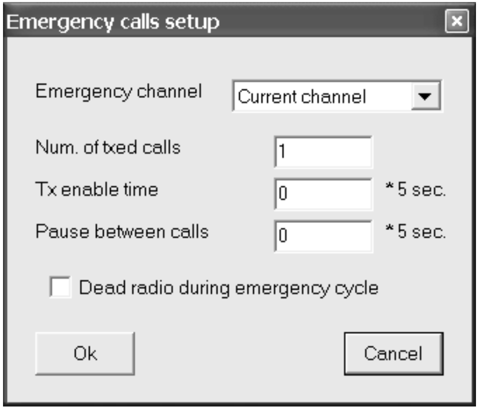
Selcal monitor ON

We recommend, when possible, to leave the monitor ON in order to improve the transceiver's ease of use.

6.9 Emergency call setup

You can better define the radio behavior in emergency state, for example design a fixed emergency channel, how many calls must be transmitted, the pause between calls etc.

1) From the **Global Data** window - **Set-Up 2** area - click the **Emergency calls** button: the **Emergency calls setup** window will open.



Emergency channel: Current channel

Num. of txed calls: 1

Tx enable time: 0 *5 sec.

Pause between calls: 0 *5 sec.

☐ Dead radio during emergency cycle

2) Use the **Emergency channel** drag down button to define the channel in which you want the emergency call should be sent. *You can chose a fixed channel* among one of the previously programmed ones, *or leave the emergency selective call transmitted in the currently selected channel* by selecting **Current channel**.

3) Type the number of selective calls which must be transmitted in the **Num. of txed calls** box.
4) Type the time to allow free Tx after the selective call has been transmitted in the **Tx enable time** box.

The time can be selected in multiple of 5 seconds, e.g. if you need to select 10 seconds type 2.

5) Type the pause time between each calls in the **Pause between calls** box.

The time can be selected in multiple of 5 seconds, e.g. if you need to select 10 seconds type 2.

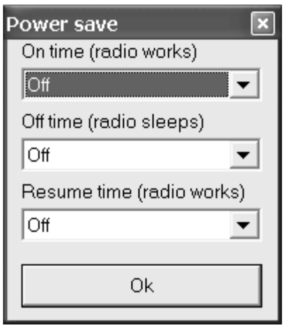
6) If you want to deactivate all the functions during the emergency cycle, tick the **Dead radio during emergency cycle** checkbox.
7) Click the **OK** button to confirm or **Cancel** to exit without changing the previous settings

6.10 Power save function

HP106 is equipped with a power save function which switches off (sleep state) and on (work state) the radio's receiver at regular times during stand by (no signals received). If a signal is received during work state, the power save cycle is interrupted and will be resumed again after a certain time in which the signal is terminated. You can set up this function in order to save the maximum energy without risking to loose calls, depending on the type of network and applications.

1) From the **Global Data** window - **Set-Up 2** area - click the **Power Save** button: the **Power save** window will open.
2) Use the **On time (radio works)** drag down button to select the *time (in ms.) in which the radio's receiver is normally powered* during stand by (squelch closed).
3) Use the **Off time** drag down button to select *the time (in ms.) in which the radio's receiver* *is not* *normally powered* during stand by.
4) Use the **Resume time (radio works)** drag down button to select *the time (in ms.) in which the radio's receiver must be kept powered* after a call has been received and terminated.
5) Click the **OK** button to confirm your settings.

If you want to totally disable the power save function, leave all the settings to ***Off***



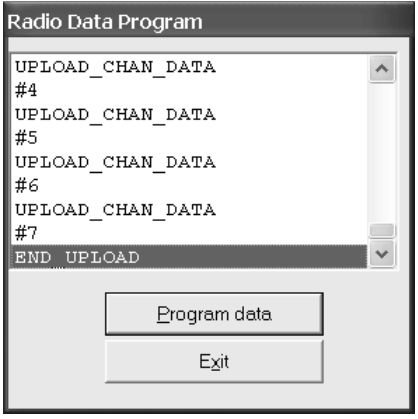
On time (radio works): Off
Off time (radio sleeps): Off
Resume time (radio works): Off

7 FINAL OPERATIONS

7.1 Uploading programming data to the radio

Once you are sure to have properly programmed all the radio's data (at least one TX/RX frequency with basic parameters) you can transfer the said data to its memory and terminate the programming. Do as follows:

1) From the menu **Radio Programming** select **Program radio**: the **Radio Data Program** window will open (or use the shortcut Ctrl+R)
2) Make sure the radio has been properly connected as described in par. 2.4.
3) Switch off the radio (if switched on), then keep the **MON** pressed and switch the radio on: the status LED should be steadily lit in orange color, showing that the radio is in programming mode. In this case you can release the **MON** key
4) Click the **Program data** button (or press **Exit** to escape the programming in case of mistakes): a writing sequence will start.



```
UPLOAD_CHAN_DATA
#4
UPLOAD_CHAN_DATA
#5
UPLOAD_CHAN_DATA
#6
UPLOAD_CHAN_DATA
#7
END UPLOAD
```

5) The program window will show the following simultaneous messages:

PROGRAM WINDOW MESSAGES	NOTES
(blank)	(idle state before clicking on Program data button)
Performing data channel check	First message after clicking on **Program data** button
WHICH RADIO **Radio type – HPx06**	
START_UPLOAD	
UPLOAD_SYS_RADIO_DATA	
UPLOAD_RX_SEQ_DEF	These two messages are repeated for each RX channel (x is the number of the uploaded RX channel)
#x	
UPLOAD_TX_SEQ_DEF	These two messages are repeated for each TX channel (x is the number of the uploaded TX channel)
#x	
UPLOAD_CHAN_DATA	These two messages are repeated for each <u>programmed</u> channel (x is the number of the uploaded TX channel)
#x	
END UPLOAD	If the programming will fail an error message will be shown

6) Press the **Exit** button
7) Disconnect the programmer cable from the transceiver
8) Switch off and on the radio in order to exit the programming mode and restore its normal use
9) Check if all the parameters work properly

7.2 Saving programming data

It's recommended to save all the programmed data in the hard disk of your PC or diskette(s) in order to obtain a programming archive containing the data of all the radios you have programmed. This will be useful in case your customer would like to add new radios to the existing network or if you have to create new networks which have similar programming.

1) From the menu **File** select **Save Radio as**: the **Save Radio database as** window will open.
2) Type the file name in the appropriate box (file name usually).
3) Define the directory in which you want to store the file (default is **C:\Programs\HPx06\usrDB**), then press **Save**

7.3 Restoring the default signal database

This option is basically useful in two conditions:

- When a software upgrade has been performed. The Programmer software is in continuous development in order to add new features to the radio and make your programming operations easier. So if you have just upgraded your software by substituting the ".exe" main file with a new updated one, restoring the default signal database is mandatory.
- If you have set up your own signaling standard (i.e. **PERSONAL** selcal) or you have modified the default ones and you want to restore all of them to the default values.

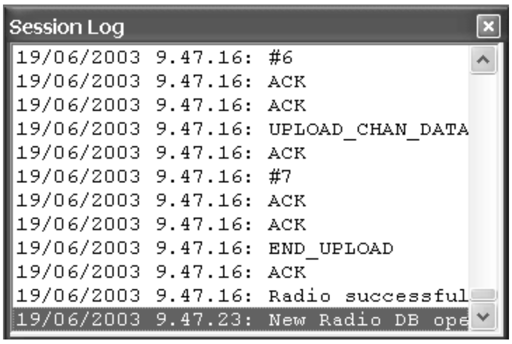
To restore the signal default database:

1) From the menu **Options** select **Restore System DB**. A window will open with the message "Restore the SYSTEM DB (Default Public Data, CTCSS Definition and Selcal Definition)?"
2) Press **OK** to restore the System DB. A window will confirm that the system DB has been restored successfully.

*In case of mistakes, you can press **Cancel** at step 2) in order to exit without restoring the System DB*

7.4 Viewing session history

If you want to see the history of the various programming sessions, from the menu **Options** select **View session history**. The **Session log** window will open showing the log of the various programming sessions as per the following example:



```
19/06/2003 9.47.16: #6
19/06/2003 9.47.16: ACK
19/06/2003 9.47.16: ACK
19/06/2003 9.47.16: UPLOAD_CHAN_DATA
19/06/2003 9.47.16: ACK
19/06/2003 9.47.16: #7
19/06/2003 9.47.16: ACK
19/06/2003 9.47.16: ACK
19/06/2003 9.47.16: END_UPLOAD
19/06/2003 9.47.16: ACK
19/06/2003 9.47.16: Radio successful
19/06/2003 9.47.23: New Radio DB ope
```

You can scroll them using the vertical scrolling bar.

7.5 Exit the programmer Software

From the menu **File** select **Exit**: the programmer software will close.

8 ADDITIONAL OPTIONS

8.1 Modifying previously programmed parameters

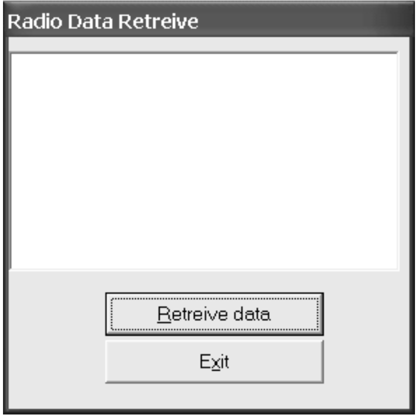
If you already have saved programming data in a transceiver unit or in a PC file *and you need to "clone" them to other transceiver(s),* or the said programming data are very close to a new programming data you have to set up, you can download previously stored programming data from a HPx06 transceiver or open a programming file previously stored in your PC as follows:

8.1.a Open a programming data file in the PC

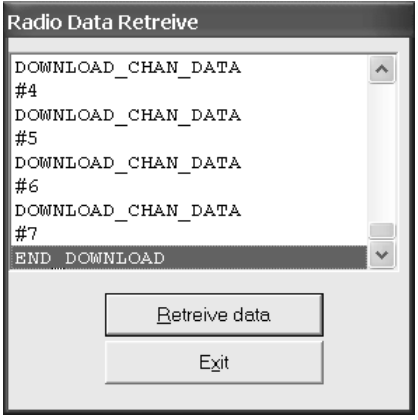
1) Connect the programming cable to the radio and start the programmer software (as previously described in paragraphs 2.4 and 3.1).
2) From the menu **File** select **Open Radio** (ore use the 📂 button): the **Select radio** window will open.
3) Use the **File type:** drag down button to select either **HP VHF radio (*.hpv)** or **HP UHF radio (*.hpu)** depending if you are programming respectively a VHF or UHF radio of the HPx06 series.
4) In the **Filename:** box, type the name of the file containing the required programming data or browse it using the directory tree in folder box (programming files use the extension **.hpv** or **.hpu** and are usually placed in the directory **C:\Programs\HPx06\usrDB**).
5) As soon as you have selected the appropriate file name, click the **OK** button: the **Channel Data** window will open and will show the parameters previously programmed in the file.

8.1.b Modifying data previously stored in a radio

1) Create a new radio database as explained in the par. 3.5
2) From **RadioProgramming** menu select **Retrieve radio data** (or use the shortcut Ctrl+R): the **Radio data retrieve** dialog box will open



3) *Make sure that the radio is properly connected to the PC and switched on in programming mode*, then click on **Retrieve data** button (or press **Exit** in case of mistakes): a dialog box will ask you to type a PC file name for the data to be stored
4) In the **Filename** box type a file name (we recommend to use the customer's name).
5) Click the **Save** button: the transceiver's data will be copied into the file showing some messaging similar to the table stated in par. 7.1 (DOWNLOAD instead of UPLOAD). If the operation will be successful you will see the message **End download**



```
DOWNLOAD_CHAN_DATA
#4
DOWNLOAD_CHAN_DATA
#5
DOWNLOAD_CHAN_DATA
#6
DOWNLOAD_CHAN_DATA
#7
END_DOWNLOAD
```

6) Click the **Exit** button: **Channel Data** window will open and will show the parameters previously programmed in the radio.

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- selcal received sequencies II & II 15
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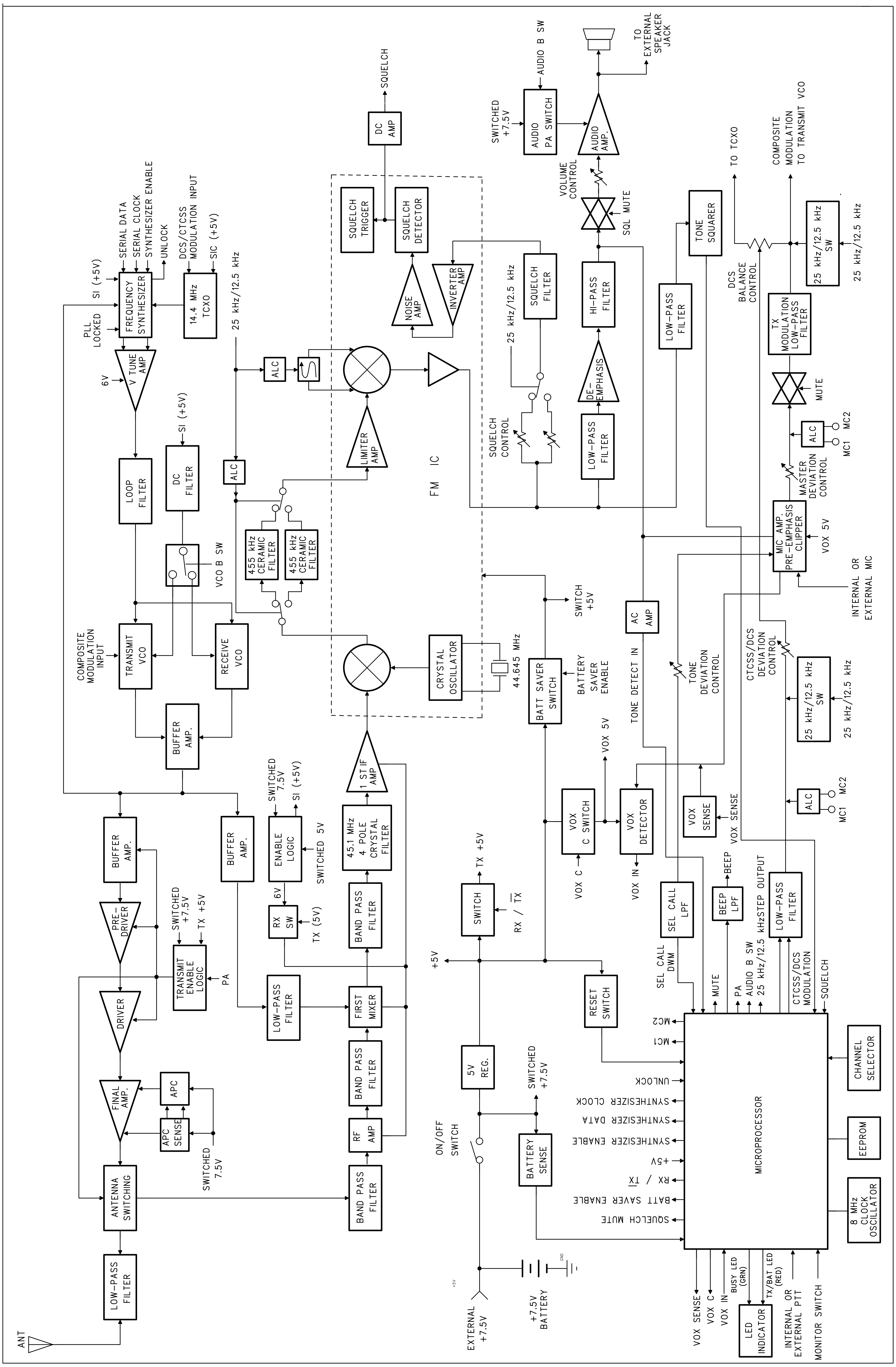
ALAN HP 106

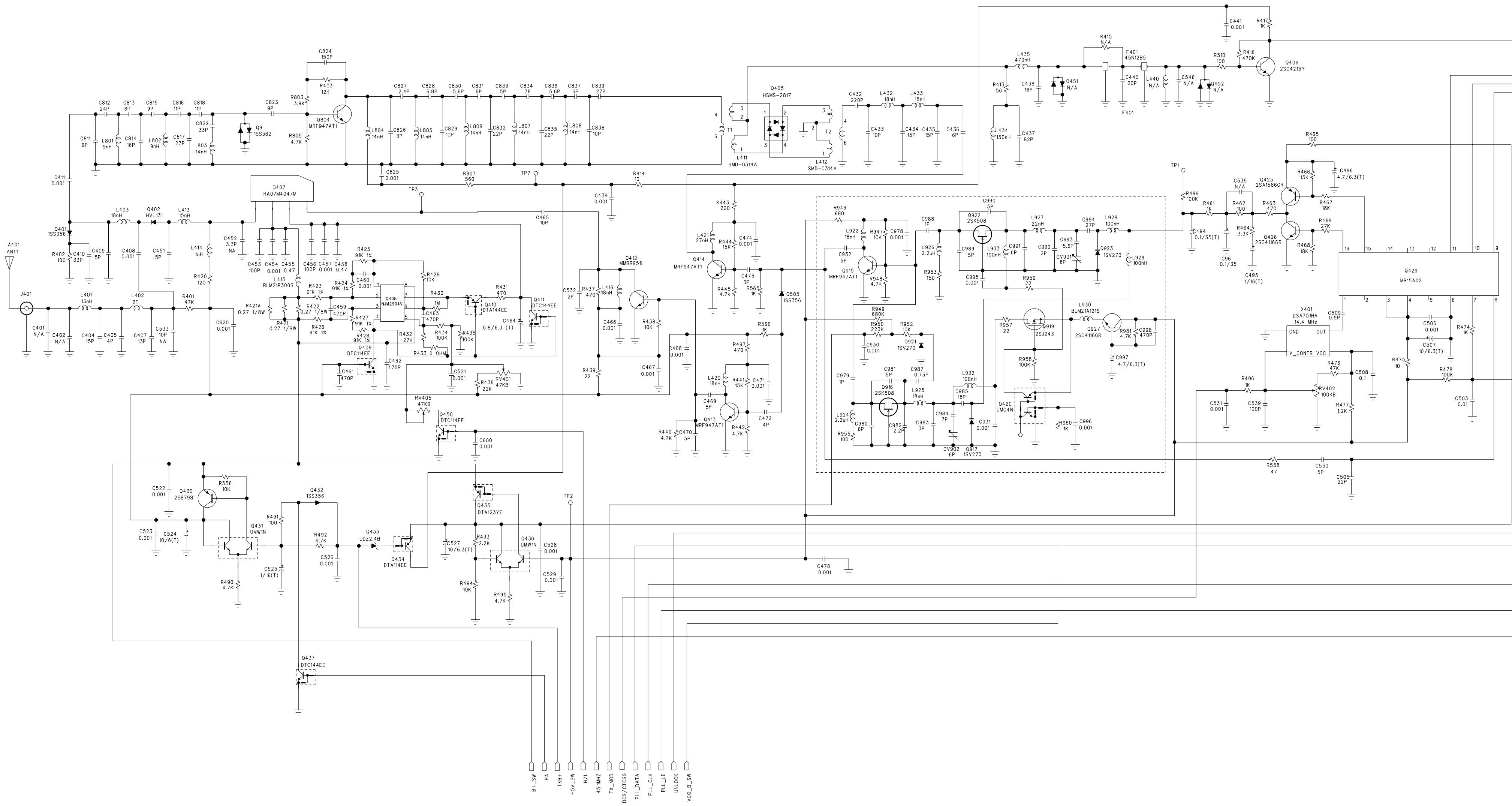
ELECTRICAL DIAGRAMS

ALAN HP 406

ELECTRICAL DIAGRAMS

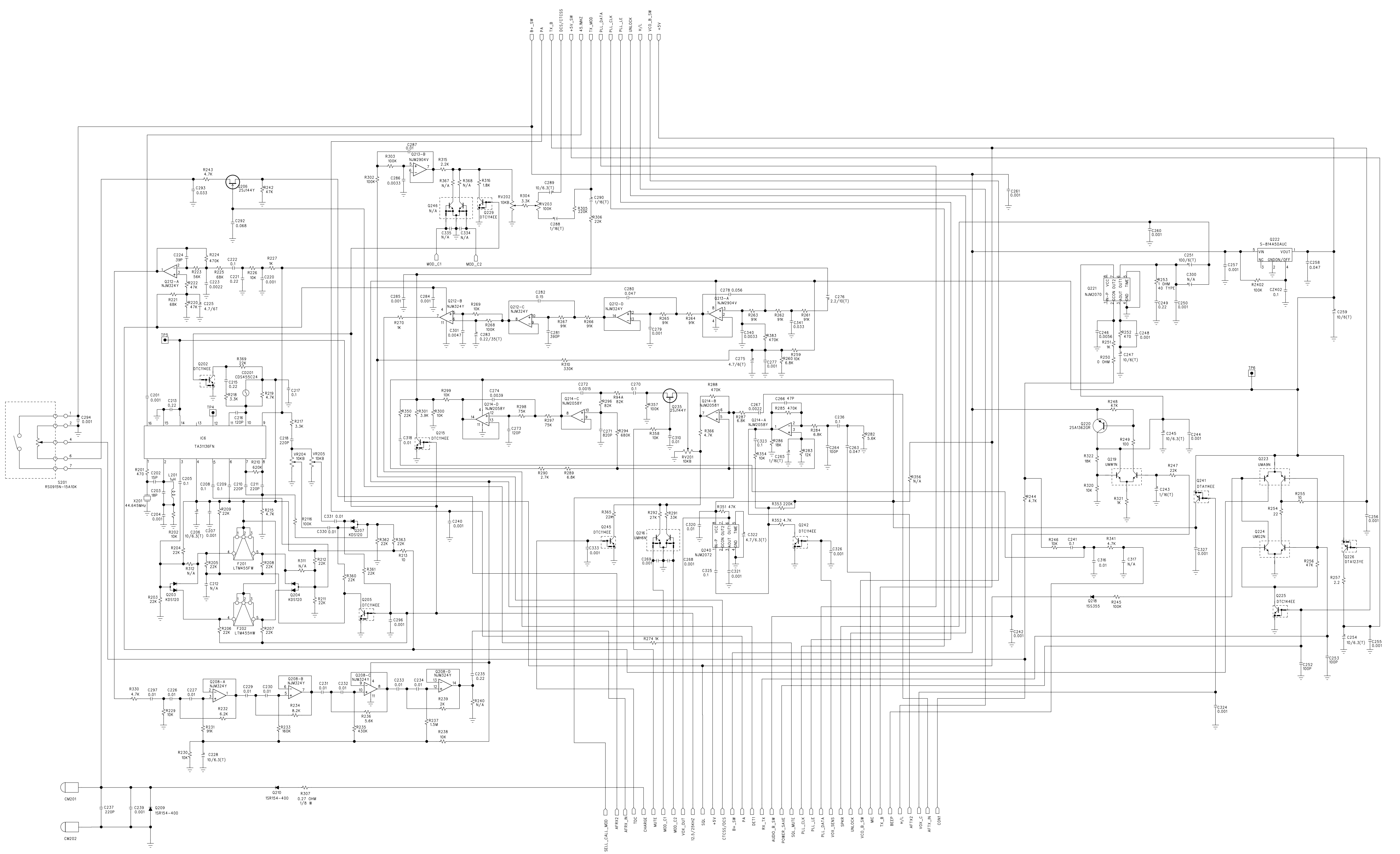

ANT
LOW-PASS FILTER
ANTENNA SWITCHING
FINAL AMP.
APC
APC SENSE
SWITCHED 7.5V
DRIVER
PRE-DRIVER
BUFFER AMP.
TRANSMIT ENABLE LOGIC
SWITCHED +7.5V
TX +5V
PA
BAND PASS FILTER
RF AMP
BAND PASS FILTER
FIRST MIXER
LOW-PASS FILTER
BAND PASS FILTER
45.1 MHz 4 POLE CRYSTAL FILTER
1 ST IF AMP
BUFFER AMP.
RX SW
6V
TX (5V)
ENABLE LOGIC
SWITCHED 7.5V
SI (+5V)
SWITCHED 5V
BUFFER AMP.
TRANSMIT VCO
RECEIVE VCO
COMPOSITE MODULATION INPUT
VCO B SW
LOOP FILTER
DC FILTER
SI (+5V)
V TUNE AMP
6V
FREQUENCY SYNTHESIZER
PLL LOCKED
SI (+5V)
SERIAL DATA
SERIAL CLOCK
SYNTHESIZER ENABLE
UNLOCK
14.4 MHz TCXO
DCS/CTCSS MODULATION INPUT
SIC (+5V)
25 kHz/12.5 kHz
ALC
ALC
455 kHz CERAMIC FILTER
455 kHz CERAMIC FILTER
LIMITER AMP
FM IC
CRYSTAL OSCILLATOR
44.645 MHz
NOISE AMP
INVERTER AMP
SQUELCH TRIGGER
SQUELCH DETECTOR
DC AMP
SQUELCH
SQUELCH FILTER
25 kHz/12.5 kHz
SQUELCH CONTROL
LOW-PASS FILTER
DE-EMPHASIS
HI-PASS FILTER
SQL MUTE
VOLUME CONTROL
AUDIO AMP.
AUDIO PA SWITCH
SWITCHED +7.5V
AUDIO B SW
TO EXTERNAL SPEAKER JACK
LOW-PASS FILTER
TONE SQUARER
TO TCXO
DCS BALANCE CONTROL
COMPOSITE MODULATION TO TRANSMIT VCO
25 kHz/12.5 kHz SW
25 kHz/12.5 kHz
TX MODULATION LOW-PASS FILTER
MUTE
ALC
MC1
MC2
MASTER DEVIATION CONTROL
MIC AMP. PRE-EMPHASIS CLIPPER
VOX 5V
INTERNAL OR EXTERNAL MIC
SWITCH +5V
BATT SAVER SWITCH
BATTERY SAVER ENABLE
AC AMP
TONE DETECT IN
TONE DEVIATION CONTROL
CTCSS/DCS DEVIATION CONTROL
25 kHz/12.5 kHz SW
25 kHz/12.5 kHz
VOX 5V
VOX C SWITCH
VOX DETECTOR
VOX C
VOX IN
VOX SENSE
VOX SENSE
ALC
MC1
MC2
SWITCH
TX +5V
RX / TX
+5V
RESET SWITCH
5V REG.
SWITCHED +7.5V
ON/OFF SWITCH
BATTERY SENSE
EXTERNAL +7.5V
+7.5V BATTERY
SEL CALL LPF
BEEP LPF
BEEP
LOW-PASS FILTER
SEL CALL DWM
MUTE
PA
AUDIO B SW
25 kHz/12.5 kHzSTEP OUTPUT
CTCSS/DCS MODULATION
SQUELCH
MC2
MC1
UNLOCK
SYNTHESIZER CLOCK
SYNTHESIZER DATA
SYNTHESIZER ENABLE
+5V
RX / TX
BATT SAVER ENABLE
SQUELCH MUTE
MICROPROCESSOR
CHANNEL SELECTOR
EEPROM
8 MHz CLOCK OSCILLATOR
VOX SENSE
VOX C
VOX IN
BUSY LED (GRN)
TX/BAT LED (RED)
LED INDICATOR
INTERNAL OR EXTERNAL PTT
MONITOR SWITCH

REVISION RECORD			
LTR	ECO NO.	APPROVED:	DATE:

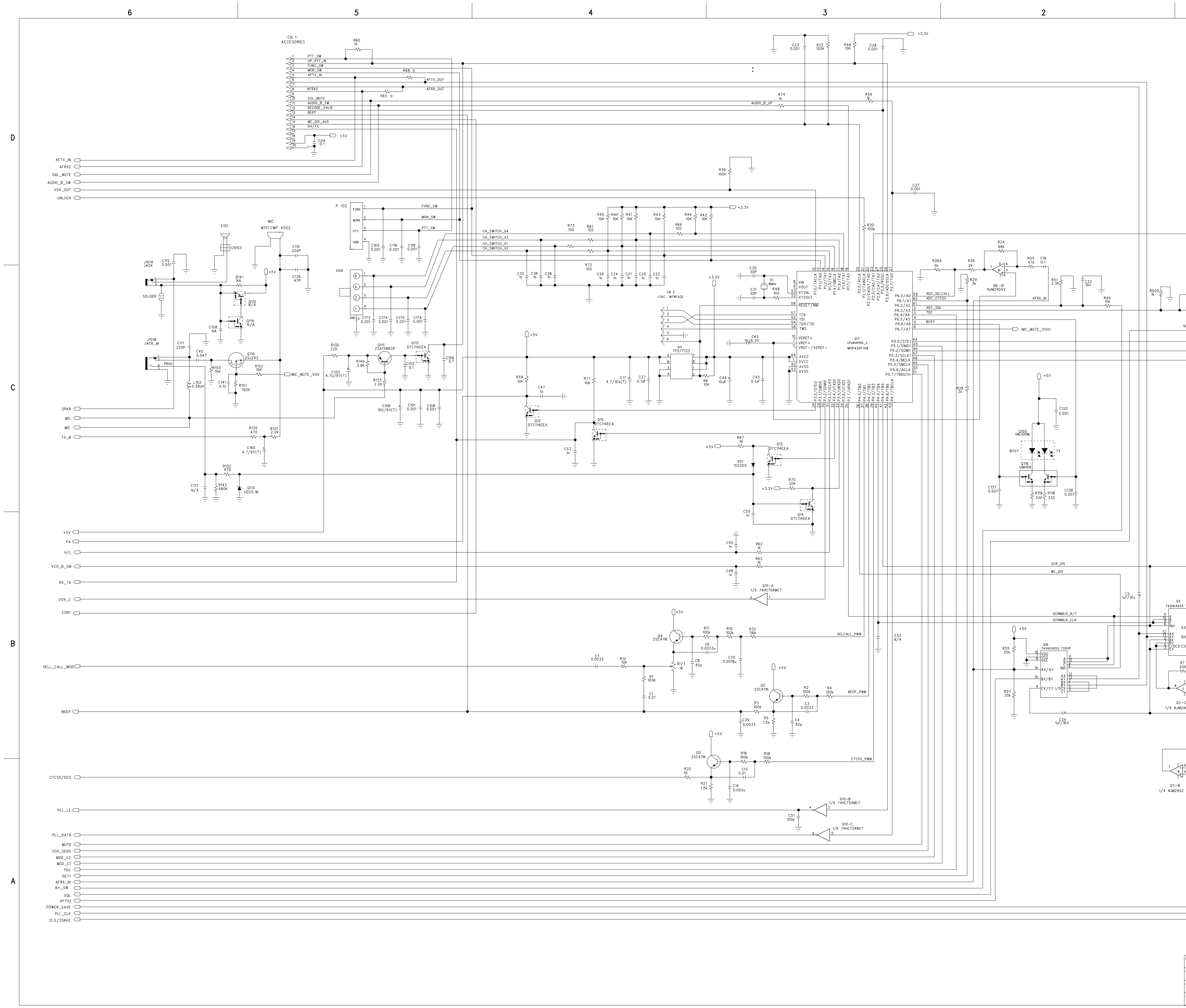

A401 ANT1
J401
C401 N/A
C402 N/A
L401 13nH
C404 15P
C405 4P
L402 2T
C407 13P
C533 10P NA
R401 47K
C620 0.001
R402 100
C410 33P
C409 5P
Q401 1SS356
C411 0.001
L403 18nH
Q402 HVU131
L413 15nH
C408 0.001
C451 5P
L414 1uH
R420 120
C452 3.3P NA
Q407 RA07M4047M
C453 100P
C454 0.001
C455 0.47
C456 100P
C457 0.001
C458 0.47
L415 BLM21P300S
R421A 0.27 1/8W
R421 0.27 1/8W
R422 0.27 1/8W
R423 91K 1%
R424 91K 1%
R425 91K 1%
R426 91K 1%
R427 91K 1%
R428 91K 1%
C459 470P
C460 0.001
Q408 NJM2904V
R429 10K
R430 1M
C463 470P
R432 27K
R433 0 OHM
R434 100K
R435 100K
Q409 DTC114EE
C461 470P
C462 470P
C521 0.001
R436 22K
RV401 47KB
Q410 DTA144EE
R431 470
C464 6.8/6.3 (T)
Q411 DTC144EE
RV405 47KB
Q450 DTC114EE
C600 0.001
C811 9P
C812 24P
L801 9nH
C813 6P
C814 16P
C815 9P
L802 9nH
C816 11P
C817 27P
C818 11P
C822 33P
L803 14nH
Q9 1SS362
C823 9P
R803 3.9K
R805 4.7K
R403 12K
C824 150P
Q804 MRF947AT1
L804 14nH
C825 0.001
C826 3P
C827 2.4P
C828 6.8P
L805 14nH
C829 10P
C830 5.6P
C831 6P
L806 14nH
C832 22P
C833 5P
C834 7P
L807 14nH
C835 22P
C836 5.6P
C837 6P
L808 14nH
C838 10P
C839 27P
R807 560
TP3
TP7
R414 10
C439 0.001
C465 10P
T1
Q405 HSMS-2817
T2
L411 SMD-0314A
L412 SMD-0314A
C432 220P
L432 18nH
L433 18nH
C433 10P
C434 15P
C435 15P
C436 6P
C532 2P
R437 470
L416 18nH
Q412 MMBR951L
C466 0.001
R438 10K
C467 0.001
R439 22
C468 0.001
R443 220
L421 27nH
R444 15K
C474 0.001
Q414 MRF947AT1
R445 4.7K
C475 3P
R565 1K
Q505 1SS356
R566 1K
R497 470
L420 18nH
R441 15K
C471 0.001
C469 8P
Q413 MRF947AT1
R440 4.7K
C470 5P
R442 4.7K
C472 4P
R946 680
L922 18nH
R947 10K
C978 0.001
C932 5P
Q915 MRF947AT1
R948 4.7K
C988 1P
L926 2.2uH
R953 150
C990 5P
Q922 2SK508
C989 5P
L933 100nH
C991 6P
C995 0.001
L927 22nH
C992 2P
C993 5.6P
CV901 6P
C994 27P
Q923 1SV270
L928 100nH
L929 100nH
R959 22
R949 680K
R950 220K
C930 0.001
R952 10K
Q921 1SV270
C979 1P
C981 5P
C987 0.75P
Q916 2SK508
L924 2.2uH
C980 6P
C982 2.2P
R955 100
L925 18nH
C983 3P
L932 100nH
C985 18P
C984 7P
CV902 6P
Q917 1SV270
C931 0.001
R957 22
Q919 2SJ243
R958 100K
Q420 UMC4N
R960 1K
C996 0.001
L930 BLM21A121S
Q927 2SC4116GR
R981 4.7K
C998 470P
C997 4.7/6.3(T)
C478 0.001
R413 56
L435 470nH
C438 16P
Q451 N/A
R415 N/A
F401 45N12B5
F401
C440 20P
L440 N/A
C546 N/A
Q452 N/A
L434 150nH
C437 82P
C441 0.001
R417 1K
R510 100
R416 470K
Q406 2SC4215Y
TP1
R499 100K
C494 0.1/35(T)
R461 1K
C96 0.1/35
C535 N/A
R462 100
R464 3.3K
C495 1/16(T)
R463 470
Q425 2SA1586GR
Q426 2SC4116GR
R465 100
R466 15K
C496 4.7/6.3(T)
R467 18K
R469 27K
R468 18K
Q429 MB15A02
16
15
14
13
12
11
10
9
1
2
3
4
5
6
7
8
X401 DSA751HA 14.4 MHz
GND
OUT
V_CONTR VCC
C509 0.5P
C506 0.001
C507 10/6.3(T)
R474 1K
R475 10
R478 100K
C503 0.01
R476 47K
C508 0.1
RV402 100KB
R477 1.2K
R496 1K
C531 0.001
C539 100P
R558 47
C530 5P
C505 22P
C522 0.001
Q430 2SB798
R556 10K
C523 0.001
C524 10/6(T)
Q431 UMW1N
R490 4.7K
R491 100
Q432 1SS356
R492 4.7K
C525 1/16(T)
C526 0.001
Q433 UDZ2.4B
Q434 DTA114EE
Q435 DTA123YE
C527 10/6.3(T)
R493 2.2K
R494 10K
Q436 UMW1N
R495 4.7K
C528 0.001
C529 0.001
TP2
Q437 DTC144EE
B+_SW
PA
TXB+
+5V_SW
H/L
45.1MHZ
TX_MOD
DCS/CTCSS
PLL_DATA
PLL_CLK
PLL_LE
UNLOCK
VCO_B_SW

DRAWN:	DATED:	COMPANY:	
CHECKED:	DATED:	TITLE:	HP-406 RF
QUALITY CONTROL:	DATED:	CODE: 7766	SZE: A3
RELEASED:	DATED:	DRAWING NO:	REV: B
		SCALE:	SHEET: 1 OF 3

REVISION RECORD			
LTR	ECO NO.	APPROVED:	DATE:


B+_SW
PA
TX_B
DCS/CTCSS
+5V_SW
45.1MHZ
TX_MOD
PLL_DATA
PLL_CLK
PLL_LE
UNLOCK
H/L
VCO_B_SW
+5V
SELL_CALL_MOD
AFRX2
AFRX_IN
TDC
CHARGE
MUTE
MOD_C1
MOD_C2
VOX_OUT
12.5/25KHZ
SQL
+5V
CTCSS/DCS
B+_SW
PA
DET1
RX_TX
AUDIO_B_SW
POWER_SAVE
SQL_MUTE
PLL_CLK
PLL_LE
PLL_DATA
VOX_SENS
SPKR
UNLOCK
VCO_B_SW
MIC
TX_B
BEEP
H/L
AFTX2
VOX_C
AFTX_IN
CON1
IC6
TA31136FN
X201
44.645MHz
F201
LTM455FW
F202
LTM455HW
Q221
NJM2070
Q222
S-81450AUC
Q240
NJM2072
S201
RS091N-15A10K
CM201
CM202
TP4
TP5
TP6
MOD_C1
MOD_C2

		COMPANY:	
		TITLE: HP-406 RECEIVER	
DRAWN:	DATED:	CODE: 7766	SZE: A3
CHECKED:	DATED:	DRAWING NO:	REV: B
QUALITY CONTROL:	DATED:		
RELEASED:	DATED:	SCALE:	SHEET: 2 OF 3

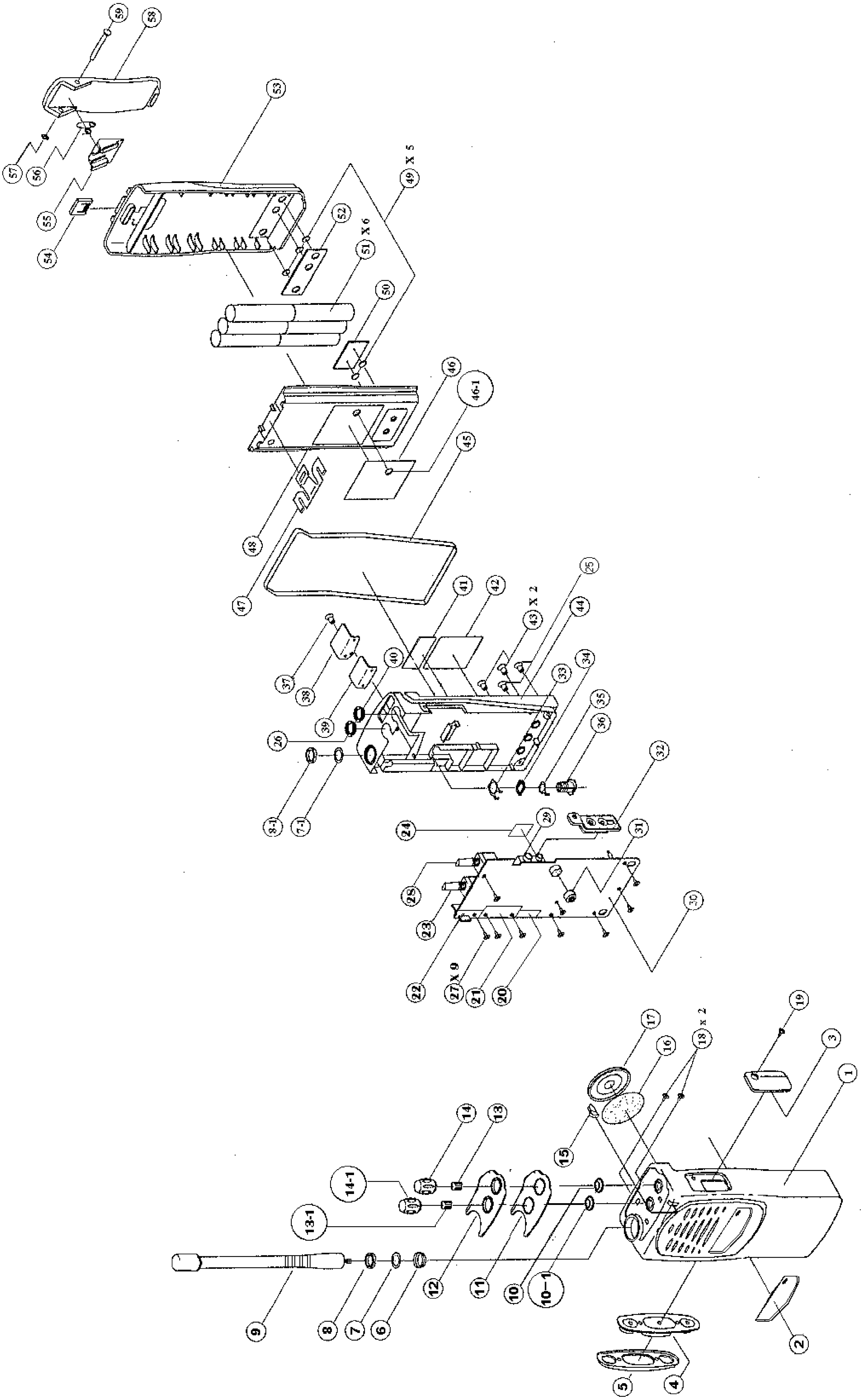

6
5
4
3
2
1
D
C
B
A
CN 1
ACCESORIES
PTT_SW
UP_PTT_IN
FUNC_SW
MON_SW
AFTX_IN
AFTX_OUT
AFRX2
AFRX_OUT
SQL_MUTE
AUDIO_B_SW
DECODE_VALID
BEEP
MC_DIS_AUX
RX/TX
AFTX_IN
AFRX2
SQL_MUTE
AUDIO_B_SW
VOX_OUT
UNLOCK
P 102
FUNC
MON
PTT
GND
FUNC_SW
MON_SW
PTT_SW
CH_SWITCH_X4
CH_SWITCH_X3
CH_SWITCH_X1
CH_SWITCH_X2
AUDIO_B_UP
CN 3
JTAG INTFACE
MIC
M101CMP 4502
E101
CN103
J101A
JACK
SOLDER
J101B
JACK_M
PROG
SPKR
MIC
MIC
TX_B
MIC_MUTE_VOX
+5V
PA
H/L
VCO_B_SW
RX_TX
VOX_C
CON1
SELL_CALL_MOD
BEEP
CTCSS/DCS
PLL_LE
PLL_DATA
MUTE
VOX_SENS
MOD_C2
MOD_C1
TDC
DET1
AFRX_IN
B+_SW
SQL
AFTX2
POWER_SAVE
PLL_CLK
12.5/25KHZ
Q17
CPU64PINS_2
MSP430F148
X1
8MHz
XIN
XOUT
XT2IN
XT2OUT
RESET/NMI
TCK
TDI
TDO/TDI
TMS
VEREF+
VREF+
VREF-/VEREF-
AVCC
DVCC
AVSS
DVSS
P1.0/TACLK
P1.1/TA0
P1.2/TA1
P1.3/TA2
P1.4/SMCLK
P1.5/TA0
P1.6/TA1
P1.7/TA2
P2.0/ACLK
P2.1/TAINCLK
P2.2/CAOUT/TA0
P2.3/CA0/TA1
P2.4/CA1/TA2
P2.5/ROSC
P2.6/ADC12CLK
P2.7/TA0
P6.0/A0
P6.1/A1
P6.2/A2
P6.3/A3
P6.4/A4
P6.5/A5
P6.6/A6
P6.7/A7
P5.0/STE1
P5.1/SIMO1
P5.2/SOMI1
P5.3/UCLK1
P5.4/MCLK
P5.5/SMCLK
P5.6/ACLK
P5.7/TBOUTH
P3.0/STE0
P3.1/SIMO0
P3.2/SOMI0
P3.3/UCLK0
P3.4/UTXD0
P3.5/URXD0
P3.6/UTXD1
P3.7/URXD1
P4.0/TB0
P4.1/TB1
P4.2/TB2
P4.3/TB3
P4.4/TB4
P4.5/TB5
P4.6/TB6
P4.7/TBCLK
ADC_SELCALL
ADC_CTCSS
ADC_SQL
TDC
BUSY
MIC_MUTE_VOX1
AFRX_IN
Q1
TPS77133
Q6-A
NJM2904V
Q6-B
NJM2904V
Q8
2ALC64/S08
Q7
DTC114EEA
Q10-D
1/6 74HCT04MCT
Q10-F
1/6 74HCT04MCT
Q10-E
1/6 74HCT04MCT
Q10-A
1/6 74HCT04MCT
Q10-B
1/6 74HCT04MCT
Q10-C
1/6 74HCT04MCT
Q105
SML020ML
BUSY
TX
Q16
UMH9N
POWER_SAVE
PLL_CLK
12.5/25KHZ
SCR_DIS
MC_DIS
SCRMBLR_R/T
SCRMBLR_CLK
Q19
DTA144EE
Q3
74HC4053 TSSOP
Q18
74HC4053 TSSOP
Q1-A
1/4 NJM2902
Q1-B
1/4 NJM2902
Q1-C
1/4 NJM2902
Q1-D
1/4 NJM2902
Q4
2SC4116
Q2
2SC4116
Q5
2SC4116
SELCALL_PWM
BEEP_PWM
CTCSS_PWM
Q11
2SA1586GR
Q12
DTC114EEA
Q13
DTC114EEA
Q14
DTC114EEA
Q15
DTC114EEA
Q110
2SJ243
Q113
UDZ3.1B
Q114
N/A
Q115
N/A
VD1
1SS355
+3.3V
+5V

REVISION RECORD	
LTR	ECO NO:	APPROVED:	DATE:

DRAWN:	DATED:	COMPANY:			
CHECKED:	DATED:	TITLE: HP-406 CPU			
QUALITY CONTROL:	DATED:	CODE: 7766	SZE: A3	DRAWING NO:	REV: B
RELEASED:	DATED:	SCALE:		SHEET: 3 OF 3	

ALAN HP 106

EXPLODED VIEW AND PART LIST


10-1
13-1
14-1
18 x 2
27 X 9
43 X 2
46-1
49 X 5
51 X 6
7-1
8-1

HP-106/406 EXPLODED VIEW PART'S LIST.

NO.	PART NO.	PART NAME	DESCRIPTION	Q'TY	Remark	codice cte
1	719-896	Cov Front	PC	1		
2	795-920	Name Plate	PC Clear T0.3	1		
3	719-894	Cov Spk/Mic	ABS	1		
4	895-789	PTT Button	Silicone Rubber	1		
5	733-005A	Holder PTT	PC	1		
6	853-223	Ring GND	BSBM CR Plate	1		
7	753-127	Spacer Ant	Acetel CR-Plate	1		
8	650-358	Nut Ant	M8x0.75 BSBM CR-Plat	1		
9	420-420-2	Ant	NSB97-H100-CI2	1	420-420-0 (HP-405)	
10	895-787	Gasket (Vol)	Silicone Rubber	1		
10-1	895-788	Gasket Ch	Silicone Rubber	1		
11	907-023	Sheet Tapping	PE T0.15	1		
12	702-483	Top Panel	ABS	1		
13	881-672	Spring "D" Volum	SK5 T0.2	1		
13-1	881-609A	Spring Ch	BECU T0.2	1		
14	826-450	Knob Vol	ABS	1		
14-1	826-449	Knob Ch	ABS	1		
15	895-793	Lens LED	Silicone Rubber	1		
16	907-020	Felt (Speaker)	FELT T0.3	1		
17	420-127-6	Speaker	40-8BB-24F	1		
18	600-814	Screw	(PH) M2x5 Blk (H=T1.1)	2		
19	632-006	Screw	(BH) BLK T2.4	1		
20	772-516	Shield can C	SPTE TO.3	1		
21	772-514	Shield can A	SPTE TO.3	1		
22	772-515	Shield can B	SPTE TO.3	1		
23	430-068 5A	SW Rotary Code	EC10SP16-31	1		
24	772-517	Shield can D	SPTE TO.3	1	For HP-405 only	
25	611-391	Screw	M2.6x10 (+) BH Ni-Plat	2		
26	650-357	Nut (Volume) For Ch	M7x0.75 BSBM Ni-plate	1		
27	632-005	Tapping Screw	(+) PH Ni-Plate T2x5	9		
28	480-064-6	Potentiometer	10K MVR22 HX BR N13	1		
29	420-8501	Jack	HSJ1468-01-030	1		
30	416-128-B	Main PCB	FR4 2/S	1		
31	895-786	Bushing Mic	Silicone Rubber	1		
32	895-791	Gasket SP/MIC Jack	Silicone Rubber	1		
33	753-125	Terminal Gnd	NSS To.2	1		
34	853-225	Insulator Ant	PC CR Plate	1		
35	753-126	Terminal Ant	NSS To.2	1		
36	853-224	Connector Ant	BSBM CR Plate	1		
37	611-392	Screw	M2.6x6 (+) BH SUS BLK	1		
38	719-895	Cover Ant Flxer	PC	1		

HP-106/406 EXPLODED VIEW PART'S LIST.

NO.	PART NO.	PART NAME	DESCRIPTION	Q'TY	Remark	codice cte
39	895-796	Gasket	Poron T0.8	1		
40	650-357	Nut (Volume)	M7x0.75 BSBM Ni-plate	1		
41	895-836	Cushion (Main Frame)	Poron T2.0	1		
42	95A-872B	Label Product	Polyester 44x 34.5	1	95A-872C (HP-405)	
43	895-785	Bushing Terminal	Silicone Rubber	2		
44	702-484	Frame Main	AL Ni-Plate	1		
45	895-790	Gasket Main	Silicone Rubber	1		
46	95A-820C	Label Battery	Polyester 39.5x 34.5	1		
46-1	895-833	Gasket Battery	Gore Tex T0.2	1		
47	733-004	Battery Holder	SUS T0.4	1		
48	719-897	Cover Top (Batt)	PC	1		
49	753-124	Terminal Charger	BSBM Gold Plate	5		
50	406-825 A	PCB Battery B	FR4 1/1	1		
51	420-516-5	Batterry Cell	GP130AAM 6Sx 2	6		
52	406-824 A	PCB Battery A	FR4 1/1	1		
53	719-898	Cover Bottom (Batt)	PC	1		
54	826-451	Button Battery	PC	1		
55	753-128	Hinge	PC	1		
56	881-673	Spring (Belt Clip)	Nico-Sus	1		
57	665-126	"E" Ring	SUS 1.5	1		
58	753-129	Belt clip	PC	1		
59	853-226	Shaft (Belt Clip)	BSBM Niplate	1		

HP-106 5WATT V2 PORTABLE RADIO BOM

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SEQ	LEVEL	PART-NO.	NAME & DESCRIPTION	Q'TY	UT	REFERENCE-NO
1	2	577-59A-NT	ANTENNA ASS'Y	1	EA	
	3	650-358	NUT(ANT) M8X0.75 BSBM CR-PLAT	2	EA	
	3	660-A00-2	WASHER GROUND 0.3T SPTE	1	EA	
	3	660-985-A	WASHER ANT 0.3T SPTE	1	EA	
	3	732-948	HOLDER (ANT MTG) BSBM &11 NI-PLATING	1	EA	
	3	753-127	SPACER ANT ACETAL CR-PLATE	2	EA	
	3	853-223-A	RING GND BSBM CR PLATE	1	EA	
	3	853-225	INSULATOR ANT PC CR PLATE	1	EA	
2	2	577-59B-A	BATTERY ASS'Y	1	EA	
	3	097-104-3	THERMISTOR DISK 10K 103AT-2 1%	1	EA	RB101
	3	130-172-2Y	CHIP CERAMIC 0.01UF GRM40 X7R103K 50V PT	1	EA	CB101
	3	130-187-7	AXIAL CERAMIC 0.001UF UP050B102MK 50V	1	EA	CB999
	3	243-159-0	DIODE SWITCHING DSA3A	1	EA	D(QB101)
	3	4A6-101-B	P.C.B ASS'Y 55 X119 X0.6 FR4 1/1	1	EA	
	4	406-824-A	P.C.B BATT"A" 30 X10 X0.6 FR4 1/1	1	EA	
	4	406-825-A	P.C.B BATT"B" 25 X10 X0.6 FR4 1/1	1	EA	
	3	420-516-5	BATTERY NI-MH GP130AAM6SXZ	1	EA	BATT
	3	719-897-A	COVER TOP(BATT) PC	1	EA	
	3	719-898-A	COVER BOTTOM(BATT) PC	1	EA	
	3	733-004-A	HOLDER BATTERY SUS T0.4	1	EA	
	3	753-124-A	TERMINAL CHARGE BSBM GOLD PLATE	5	EA	
	3	826-451-A	BUTTON BATTERY PC	1	EA	
	3	895-833	GASKET BATTERY GORE TEX T0.2	1	EA	
	3	906-253	INSULATION PLATE 14X8XT1.0 FIBER	2	EA	
	3	906-560	INSULATOR 12.7X10.3XT0.25 FIBER	2	EA	
	3	906-857	DOUBLE TAPE 34X10XT0.16 3M	1	EA	
	3	907-043	DOUBLE TAPE(FOR BATT3M 26X10XT0.16	1	EA	
3	2	577-59B-A1	BATTERY ASS'Y	1	EA	
	3	95A-820	LABEL BATTERY POLYESTER 39.5X34.5	1	EA	
6	2	577-59B-CA	BELT CLIP ASS'Y	1	EA	
	3	665-126	E RING &1.5 SUS	1	EA	
	3	753-128-A	HINGE PC	1	EA	
	3	753-129-A	BELT CLIP PC	1	EA	
	3	853-226	SHAFT(BELT CLIP) BSBM NI PLATE	1	EA	
	3	881-673	SPRING(BELT CLIP) NICO-SUS	1	EA	
7	2	577-59F-C	FRONT COVER ASS'Y	1	EA	
	3	600-814	SCREW(PH) M2X5 BLK (H=T1.1)	2	EA	
	3	611-392	(+)MACHINE SCREW(BH)M2.6X6 (+)BH SUS BLK	1	EA	
	3	719-894-A	COVER SPK/MIC ABS	1	EA	
	3	826-449-A	KNOB CHANNEL ABS BLACK	1	EA	
	3	826-450-A	KNOB VOLUME ABS	1	EA	
	3	881-609-A	SPRING(CHANNEL) BECU T0.2	1	EA	
	3	881-672	SPRING"D"(VOLUME) SK5 T0.25 HEAT TREATING	1	EA	
	3	895-266	RING(VOL) CR BLACK	1	EA	FOR HOLDER MIC
	3	895-787	GASKET VOLUME SILICONE RUBBER	1	EA	
	3	895-788	GASKET CHANNEL SILICONE RUBBER	1	EA	
	3	895-789-A	PTT BUTTON SILICONE RUBBER	1	EA	
	3	895-791	GASKET SP/MIC JACK SILICONE RUBBER	1	EA	
	3	895-793	LENS LED SILICONE RUBBER	1	EA	
	3	895-868	SPONGE SPONGE &12	1	EA	
	3	907-020	FELT(SPEAKER) FELT T0.3	1	EA	
	3	907-023	SHEET TAPING PE T0.15	1	EA	
8	2	577-59F-C1	FRONT COVER ASS'Y	1	EA	
	3	508-790-F	PTT HOLDER ASS'Y 75-440BP	1	EA	
	4	733-005-E	HOLDER PTT PC PANTONE 433	1	EA	
	4	853-227	INSERT(PTT HOUSING) BSBM NI PLATE	2	EA	
	3	508-792-F	FRONT COVER ASS'Y ALAN HP-106	1	EA	

	4	719-896-E	COVER FRONT	PC PANTONE 202U	1	EA	
	4	853-228	INSERT(FRONT COVER)	BSBM NI PLATE	2	EA	
	3	702-483-B	PANEL TOP	ABS PANTONE 202U	1	EA	
	3	795-920-D	NAME PLATE	PC 41.8X9.8 T0.3 BLK	1	EA	
11	2	577-59M-BMA	MAIN BOARD MANUAL AS		1	EA	
	3	06K-027-3Z	CHIP RESISTOR	0.27 1/ 8W 10% T 3216	1	EA	R567
	3	221-728-8	POWER MODULE RF	RA07M1317M(135~175MHZ)5W	1	EA	U407
	3	263-469-6	CRYSTAL(UM-6S)	44.645M -30 15PM 13.8P	1	EA	X201
	3	263-470-6	CRYSTAL	4.194304M-25 30PM 16P	1	EA	X101
	3	263-477-3	CRYSTAL	8MHZ -20 30PM 15PF C1-301	1	EA	IX202
	3	270-342-2Y	FILTER CERAMIC	LTM455HW	1	EA	XF202
	3	270-343-3Y	FILTER CERAMIC	LTM455FW	1	EA	XF201
	3	271-203-5	FILTER CRYSTAL	45N12B5 (45.1MHZ)	1	EA	XF401
	3	420-127-6Z	SPEAKER	8 OHM 2W 11/2INCH NR-040-B0X31	1	EA	E101
	3	420-290-5Z	CONDENSER MIC	YCM 9745-P50-006	1	EA	N101
	3	420-850-1	JACK	HSJ1468-01-030	1	EA	J101
	3	421-311-6	HEADER	53047-0210	1	EA	CN103
	3	422-931-1	SPRING CONNECTOR	GW201006	2	EA	CN201.202
	3	430-092-6	SW ROTARY	EC10SP16-82A0	1	EA	S108
	3	436-057-5	SW TACT	SKQYAB	3	EA	S104.105.106
	3	450-458-9X	VARIABLE RESISTOR	10KA:PK093VS-1 15F A10K	1	EA	S201
	3	505-039	2P HOUSING ASS'Y	SH400502(WC-013)	1	EA	
12	2	577-59M-BSA	MAIN BOARD SMD ASS'Y		1	EA	
	3	05B-000-5Z	CHIP RESISTOR	0 1/16W 5% T 1608	8	EA	R22.27.250.433.457.459.a4.Q18
	3	05B-100-2Z	CHIP RESISTOR	10 1/16W 5% T 1608	8	EA	R20.54.58.60.213.255.414.475
	3	05B-101-3Z	CHIP RESISTOR	100 1/16W 5% T 1608	10	EA	R48.61.66.72.73.249.455.465.491.51
	3	05B-102-4Z	CHIP RESISTOR	1K 1/16W 5% T 1608	19	EA	R31.56.62.63.67.74.227,51,70, 4.321.417,60,2,74,96.500,65,6
	3	05B-103-5Z	CHIP RESISTOR	10K 1/16W 5% T 1608	40	EA	R6.8.12.40.41.42.43.44.45.46 47.49.50.53.59.71.150,2.202,6 ,26,9,30,8,46,59,69,84,92,99. 320,54,8.429,38,44,7,52,94.556
	3	05B-104-6Z	CHIP RESISTOR	100K 1/16W 5% T 1608	28	EA	R1.2.3.10.11.13.14.16.17.18.19 .30.33.39.151.210,45,68.302, 3,7,57.434,5,58,78,99.RZ402
	3	05B-105-7Z	CHIP RESISTOR	1M 1/16W 5% T 1608	1	EA	R430
	3	05B-121-1Z	CHIP RESISTOR	120 1/16W 5% T 1608	1	EA	R420
	3	05B-122-2Z	CHIP RESISTOR	1.2K 1/16W 5% T 1608	2	EA	R461.477
	3	05B-123-3Z	CHIP RESISTOR	12K 1/16W 5% T 1608	3	EA	R283.466.468
	3	05B-124-4Z	CHIP RESISTOR	120K 1/16W 5% T 1608	1	EA	R305
	3	05B-152-9Z	CHIP RESISTOR	1.5K 1/16W 5% T 1608	2	EA	R5.21
	3	05B-153-0Z	CHIP RESISTOR	15K 1/16W 5% T 1608	1	EA	R291
	3	05B-155-2Z	CHIP RESISTOR	1.5M 1/16W 5% T 1608	1	EA	R237
	3	05B-164-0Z	RESISTOR CHIP	160K 1/16W 5% T 1608	1	EA	R233
	3	05B-181-5Z	CHIP RESISTOR	180 1/16W 5% T 1608	1	EA	R453
	3	05B-182-6Z	CHIP RESISTOR	1.8K 1/16W 5% T 1608	1	EA	R316
	3	05B-183-7Z	CHIP RESISTOR	18K 1/16W 5% T 1608	4	EA	R368.441.467.469
	3	05B-202-1Z	CHIP RESISTOR	2K 1/16W 5% T 1608	4	EA	R26.26A.28.239
	3	05B-203-2Z	CHIP RESISTOR	20K 1/16W 5% T 1608	9	EA	R7.23.35.36.37.55.57.70.166
	3	05B-220-7Z	CHIP RESISTOR	22 1/16W 5% T 1608	2	EA	R254.439
	3	05B-221-8Z	CHIP RESISTOR	220 1/16W 5% T 1608	2	EA	R130.443
	3	05B-222-9Z	CHIP RESISTOR	2.2K 1/16W 5% T 1608	8	EA	R131.133.287.315.431.454.493.492
	3	05B-223-0Z	CHIP RESISTOR	22K 1/16W 5% T 1608	21	EA	R203-205.207-209.211,2,47,82 300.306.350.360-363.365.367.369.436
	3	05B-224-1Z	CHIP RESISTOR	220K 1/16W 5% T 1608	2	EA	R353.450
	3	05B-229-6Z	CHIP RESISTOR	2.2 1/16W 5% T 1608	3	EA	R253.257.406
	3	05B-272-4Z	CHIP RESISTOR	2.7K 1/16W 5% T 1608	1	EA	R290
	3	05B-273-5Z	CHIP RESISTOR	27K 1/16W 5% T 1608	1	EA	R432
	3	05B-302-8Z	CHIP RESISTOR	3K 1/16W 5% T 1608	1	EA	R29
	3	05B-331-4Z	CHIP RESISTOR	330 1/16W 5% T 1608	3	EA	R118.119.407
	3	05B-332-5Z	CHIP RESISTOR	3.3K 1/16W 5% T 1608	6	EA	R51.217.218.219.304.405
	3	05B-334-7Z	CHIP RESISTOR	330K 1/16W 5% T 1608	1	EA	R310

3	05B-392-9Z	CHIP RESISTOR	3.9K 1/16W 5% T 1608	1	EA	R140
3	05B-434-4Z	RESISTOR CHIP	430K 1/16W 5% T 1608	1	EA	R235
3	05B-470-6Z	CHIP RESISTOR	47 1/16W 5% T 1608	3	EA	R201.402.480
3	05B-471-7Z	CHIP RESISTOR	470 1/16W 5% T 1608	4	EA	R132.135.252.437
3	05B-472-8Z	CHIP RESISTOR	4.7K 1/16W 5% T 1608	15	EA	R215,43,4.330,41,52,66.440,2 5,8,56,81,90,5
3	05B-473-9Z	CHIP RESISTOR	47K 1/16W 5% T 1608	10	EA	R25.216.220.222.242.248.256 351.401.476
3	05B-474-0Z	CHIP RESISTOR	470K 1/16W 5% T 1608	6	EA	R224.258.285.288.416.A5
3	05B-560-4Z	CHIP RESISTOR	56 1/16W 5% T 1608	1	EA	R413
3	05B-562-6Z	CHIP RESISTOR	5.6K 1/16W 5% T 1608	2	EA	R236.301
3	05B-563-7Z	CHIP RESISTOR	56K 1/16W 5% T 1608	2	EA	R32.223
3	05B-622-7Z	CHIP RESISTOR	6.2K 1/16W 5% T 1608	1	EA	R232
3	05B-623-8Z	CHIP RESISTOR	62K 1/16W 5% T 1608	1	EA	R15
3	05B-681-0Z	CHIP RESISTOR	680 1/16W 5% T 1608	3	EA	R446.463.497
3	05B-682-1Z	CHIP RESISTOR	6.8K 1/16W 5% T 1608	4	EA	R9.260.289.403
3	05B-683-2Z	CHIP RESISTOR	68K 1/16W 5% T 1608	3	EA	R24.221.225
3	05B-684-3Z	CHIP RESISTOR	680K 1/16W 5% T 1608	3	EA	R142.294.449
3	05B-753-2Z	CHIP RESISTOR	75K 1/16W 5% T 1608	2	EA	R297.298
3	05B-821-0Z	CHIP RESISTOR	820 1/16W 5% T 1608	2	EA	R404.464
3	05B-822-1Z	CHIP RESISTOR	8.2K 1/16W 5% T 1608	1	EA	R234
3	05B-823-2Z	CHIP RESISTOR	82K 1/16W 5% T 1608	2	EA	R293.296
3	05B-913-0	CHIP RESISTOR	91K 1/16W 5% T 1608	8	EA	R231.261.262.263.264.265.266.267
3	05C-913-0Z	RESISTOR CHIP	91K 1/16W 1% T 1608	6	EA	R423-428
3	06K-027-3Z	CHIP RESISTOR	0.27 1/ 8W 10% T 3216	3	EA	R307.421.422
3	130-A02-0Y	CHIP CERAMIC	0.15UF GRM40 Y5V154Z 16V PT	1	EA	C282
3	130-A48-4Y	CHIP CERAMIC	0.0015UF GRM39 X7R152K 50V PT	1	EA	C272
3	130-A49-5Y	CHIP CERAMIC	0.0018UF GRM39 X7R182K 50V PT	2	EA	C20.279
3	130-A73-6Y	CHIP CERAMIC	0.01UF GRM39 X7R103K 25V	19	EA	C13.32.226,7,9.230-234.287,97 310,6,8,20,30,1.53
3	130-A75-8Y	CHIP CERAMIC	0.001UF GRM39 X7R102K 50V PT	72	EA	C101,8,12,18-20,36-8,56,65,73- 76.201,4,7,20,39,40,2,4,8,50, 5,6,7,60,1,8,9,77,84,5,93,4,6. 321,4,7,33,4,5.408,11,23,32,41 ,54,7,60,6,7,8,71,4,6,8,9,82,7 ,92.506,21,2,3,6,8,9,31.600
3	130-A75-8Y	CHIP CERAMIC	0.001UF GRM39 X7R102K 50V PT	18	EA	C15.21.22.23.24.25.26.28.35.36 .37.38.46.47.48.50.53.55
3	130-B09-9Y	CHIP CERAMIC	0.1UF GRM39 X7R104K 16V AT	19	EA	C16.27.29.45.54.141.155.205.20 8,9,17,22,36,41,70.323,5.508.cz402
3	130-249-9	CHIP CERAMIC	0.0022UF GRM39 X7R222J 50V PT	1	EA	C223
3	130-290-5Y	CHIP CERAMIC	0.22UF GRM40 X7R224K 16V	5	EA	C213.215.221.235.249
3	130-298-3Y	CHIP CERAMIC	0.002UF GRM39 X7R202J 25V	2	EA	C14.267
3	130-333-1Y	CHIP CERAMIC	0.0039UF GRM39 X7R392K 50V PT	2	EA	C10.274
3	130-340-7Y	CHIP CERAMIC	0.0033UF GRM39 X7R332K 50V PT	6	EA	C1.6.7.39.286.340
3	130-341-8Y	CHIP CERAMIC	0.033UF GRM39 X7R333K 16V PT	1	EA	C341
3	130-360-1Y	CHIP CERAMIC	0.0036UF CL10 X7R362J 25V	1	EA	C12
3	130-432-7Y	CHIP CERAMIC	0.0047UF GRM39 X7R472K 50V PT	1	EA	C301
3	130-440-4Y	CHIP CERAMIC	0.047UF GRM39 Y5V473Z 25V PT	4	EA	C151.258.263.280
3	130-443-7	CHIP CERAMIC	0.47UF GRM40 Y5V474Z 16V PT	2	EA	C455.458
3	130-515-9Y	CHIP CERAMIC	0.5PF GRM39 COG0R5C 50V PT	1	EA	C509
3	130-517-1Y	CHIP CERAMIC	0.0056UF GRM39 X7R562K 50V PT	1	EA	C246
3	130-529-2	CHIP CERAMIC	0.056UF GRM39 X7R563K 16V	1	EA	C278
3	130-616-7	CHIP CERAMIC	0.0068UF GRM39 X7R682J 50V PT	1	EA	C9
3	130-630-9Y	CHIP CERAMIC	0.068UF GRM39 X7R683K 16V	1	EA	C292
3	131-093-9Y	CHIP CERAMIC	100PF GRM39 COG101J 50V PT	12	EA	C33.51.52.216.252.253.264.428 453.456.480.539
3	131-138-7Y	CHIP CERAMIC	10PF GRM39 COG100C 50V	5	EA	C469.475.489.530.532
3	131-240-5Y	CHIP CERAMIC	12PF GRM39 COG120J 50V PT	1	EA	C412
3	131-241-6Y	CHIP CERAMIC	120PF GRM39 COG121J 50V PT	1	EA	C273
3	131-306-2Y	CHIP CERAMIC	13PF GRM39 COG130J 50V PT	1	EA	C402
3	131-563-7Y	CHIP CERAMIC	1.5PF GRM39 COG1R5C 50V PT	2	EA	C477.486

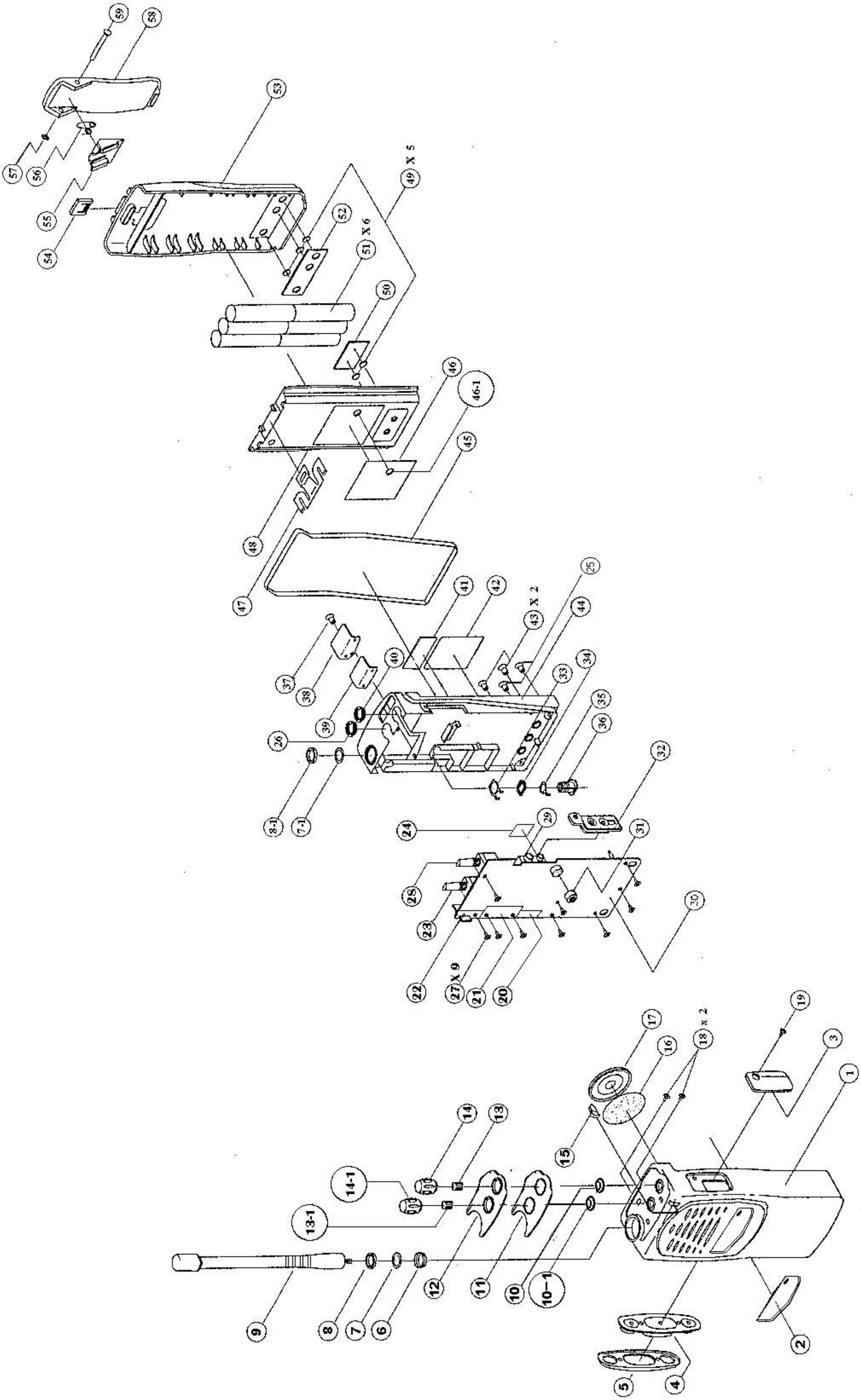
3 131-564-8Y	CHIP CERAMIC	15PF	GRM39 COG150J 50V PT	4	EA	C202.452.484.505
3 131-610-7Y	CHIP CERAMIC	160PF	CL10 X7R161J 50V	1	EA	C18
3 131-834-2Y	CHIP CERAMIC	18PF	GRM39 COG180J 50V PT	3	EA	C203.419.424
3 132-024-2Y	CHIP CERAMIC	2PF	GRM39 COG020C 50V PT	1	EA	C481
3 132-025-3Y	CHIP CERAMIC	20PF	GRM39 COG200J 50V PT	2	EA	C404.440
3 132-259-8Y	CHIP CERAMIC	22PF	GRM39 COG220J 50V PT	4	EA	C409.415.438.465
3 132-260-8Y	CHIP CERAMIC	220PF	GRM39 COG221J 50V PT	4	EA	C110.111.218.237
3 132-410-7Y	CHIP CERAMIC	24PF	GRM39 COG240J 50V PT	1	EA	C405
3 132-734-0Y	CHIP CERAMIC	27PF	GRM39 COG270J 50V PT	2	EA	C427.451
3 132-735-1Y	CHIP CERAMIC	270PF	GRM39 COG271J 50V PT	2	EA	C210.211
3 133-102-4Y	CHIP CERAMIC	3PF	GRM39 COG030C 50V PT	2	EA	C406.436
3 133-103-5Y	CHIP CERAMIC	30PF	GRM39 COG300J 50V PT	2	EA	C30.31
3 133-349-1Y	CHIP CERAMIC	33PF	GRM39 COG330J 50V PT	4	EA	C429.430.485.490
3 133-616-2Y	CHIP CERAMIC	36PF	GRM39 COG360J 50V	1	EA	C407
3 133-930-5Y	CHIP CERAMIC	39PF	GRM39 COG390J 50V PT	4	EA	C224.421.422.491
3 133-936-1Y	CHIP CERAMIC	390PF	GRM39 COG391J 50V PT	2	EA	C281.410
3 134-012-1Y	CHIP CERAMIC	4PF	GRM39 COG040C 50V PT	2	EA	C417.472
3 134-306-7Y	CHIP CERAMIC	43PF	GRM39 COG430J 50V PT	1	EA	C11
3 134-757-1Y	CHIP CERAMIC	47PF	GRM39 COG470J 50V PT	4	EA	C139.266.433.434
3 134-770-2Y	CHIP CERAMIC	470PF	GRM39 X7R471K 50V PT	6	EA	C426.459.461.462.463.501
3 135-021-4Y	CHIP CERAMIC	5PF	GRM39 COG050C 50V PT	1	EA	C470
3 135-632-6Y	CHIP CERAMIC	56PF	GRM39 COG560J 50V PT	1	EA	C414
3 136-014-3Y	CHIP CERAMIC	6PF	GRM39 COG060D 50V PT	3	EA	C403.435.483
3 136-839-2Y	CHIP CERAMIC	68PF	GRM39 COG680J 50V PT	1	EA	C413
3 138-232-3Y	CHIP CERAMIC	82PF	GRM39 COG820J 50V PT	6	EA	C3.8.420.425.431.437
3 138-233-4	CHIP CERAMIC	820PF	GRM39 X7R821J 50V PT	1	EA	C271
3 140-114-3Y	CHIP TANTALUM	0.1UF	TCM1V104ASSR 35V	2	EA	C493.494
3 140-204-1	CHIP TANTALUM	0.22UF	293D224X0035A2T35V	1	EA	C283
3 141-036-1	CHIP TANTALUM	1UF	293D105X0016A2T16V	7	EA	C2.34.243.265.288.290.525
3 141-059-2	CHIP TANTALUM	10UF	293D106X06R3A2T6.3V	2	EA	C43.44
3 141-059-2Y	CHIP TANTALUM	10UF	TSM0J106ASSR 6.3V	11	EA	C106.206.228.245.247.254.259 289.507.524.527
3 141-073-4	CHIP TANTALUM	TSM0J 107CSSR (100/6.3 C TYPE)		1	EA	C251
3 142-215-1	CHIP TANTALUM	2.2UF	TESVA1A225M1-8R10V	1	EA	C276
3 144-722-2Z	CHIP TANTALUM	4.7UF	293D475X0010A2T10V	4	EA	C5.17.19.495
3 144-737-6Y	CHIP TANTALUM	4.7UF	TSM0J475ASSR 6.3V	6	EA	C150.160.225.275.322.496
3 144-748-6	CHIP TANTAL	4.7UF	TESVSP0J475M8R 6.3V	1	EA	C500
3 146-808-7Y	CHIP TANTALUM	6.8UF	TSM0J685ASSR 6.3V	1	EA	C464
3 176-016-7	CHIP TRIMMER	6PF	TZV02Z060A100	2	EA	CV401.402
3 200-057-4	TRANSISTOR	MRF947		3	EA	Q413.414.415
3 200-169-2	TR	2SC3356-T1B(R25)(SOT-23)		1	EA	Q404
3 200-237-0	TRANSISTOR	UMC4N TR		1	EA	Q420
3 200-238-1	TRANSISTOR	DTC114EETL		14	EA	Q7.12.13.14.15.112.202.205.215 .229.242.245.409.450
3 200-239-2	TRANSISTOR	DTA144EETL		2	EA	Q19.410
3 200-240-2	TRANSISTOR	DTA114EETL		2	EA	Q241.434
3 200-241-3	TRANSISTOR	DTC144EETL		3	EA	Q225.411.437
3 200-248-0	TRANSISTOR	DTA123YE	(EMT3)	2	EA	Q226.435
3 200-249-1	TRANSISTOR	UMW1N	(UMT5)	3	EA	Q219.431.436
3 200-250-1	TRANSISTOR	UMG2N	(UMT5)	1	EA	Q224
3 200-251-2	TRANSISTOR	UMA9N	(UMT5)	1	EA	Q223
3 200-252-3	TRANSISTOR	UMH6N	(UMT6)	3	EA	Q116.216.246
3 200-254-5	TRANSISTOR	2SC4215Y		1	EA	Q406
3 200-255-6	TRANSISTOR	2SA1586GR		2	EA	Q111.425
3 200-256-7	TRANSISTOR	2SC4116GR		5	EA	Q2.4.5.426.427
3 200-257-8	FET P CHANNEL	2SJ144Y		2	EA	Q206.235
3 200-258-9	TRANSISTOR	2SB798	(SOT-89)	1	EA	Q430
3 200-259-0	FET P CHANNEL	2SJ243	(SC-70)	2	EA	Q110.419
3 200-260-0	FET	2SK508-T1B K52		2	EA	Q416,422
3 200-261-1	TRANSISTOR	2SA1362GR-TE85L		1	EA	Q220
3 203-181-7Z	TRANSISTOR	PBR951		1	EA	Q412
3 220-520-1	I.C IF DETECT	TA31136FN		1	EA	U201

	3	221-542-6	I.C DUAL OP AMP NJM2904V-TE1/2(SSOP8)	3	EA	U6.213.408
	3	221-544-8	I.C LOW VOLT.PWR AMPNJM2070M-TE1/2(DMP8)	1	EA	U221
	3	221-545-9	I.C SING.LEVEL SENS.NJM2072M-TE1/2(DMP8)	1	EA	U240
	3	221-546-0	I.C OP AMP NJM324V-TE1/2(SSOP14)	3	EA	U1.208.212.
	3	221-547-1	I.C OP AMP NJM2058V-TE1/2(SSOP14)	1	EA	U214
	3	221-555-8	I.C PLL MB15A02PFV1 (FPT-16P-M05)	1	EA	U429
	3	221-568-0	I.C S-814A50AUC-BD0-T2	1	EA	IC(U222)
	3	221-800-9	I.C HEX INVERTER MM74HCT04	1	EA	U10
	3	221-801-0	I.C E2PROM 24LC64 SOIC TYPE	1	EA	U8
	3	221-802-1	I.C LDO REGULATOR TPS77133	1	EA	U11
	3	221-803-2	I.C ANALOG MULTIDLEX74VHC4053	2	EA	U3.16
	3	221-847-2	I.C MICRO CONTROLLERMSP430F149IPM	1	EA	U9
	3	241-252-0	DIODE UDZTE-175.1B	1	EA	D113
	3	241-255-3	DIODE ZENER UDZ 2.4B TE-17(UMD2)	1	EA	D433
	3	242-031-2	DIODE VARICAP 1SV239(TPH3)	1	EA	D421
	3	242-044-4	DIODE VARICAP HVU356	2	EA	D417.418
	3	242-045-5	DIODE VARICAP 1SV270	2	EA	D423.424
	3	243-089-0	DIODE SWITCHING CHIP1SS355 TE-17	3	EA	D1.218.432
	3	243-090-0	DIODE SI KDS120	3	EA	D203.204.207
	3	243-122-6	SCHOTTKY DIODE HSMS-2817 #L31	1	EA	D405
	3	243-154-5	DIODE SWITCHING 1SS356 TW11 (UMD2)	2	EA	D401.505
	3	243-155-6	DIODE 1SS362	1	EA	D403
	3	243-156-7	DIODE HVU131TRF	1	EA	D402
	3	245-049-4	DIODE RECTIFIER 1SR154-400	2	EA	D209.211
	3	251-234-7	LED CHIP SML-020MLTT86 SMD	1	EA	LED105
	3	269-032-4	VCTCXO DSA751HA 14.4MHZ	1	EA	X401
	3	270-336-7	DISCRIMINATOR CERAM.CDS455C24	1	EA	X(CD201)
	3	300-259-1	TRANSFORMER SMD-0314A	2	EA	L411.412
	3	311-306-8Z	COIL CHIP 22NH CIH10T22NJNC	1	EA	L432
	3	311-377-2Z	COIL CHIP 100NH CIH10TR10JNC	4	EA	L416.420.421.422
	3	311-797-8	COIL CHIP 39NH LQN21A39NJ04	2	EA	L425.427
	3	312-018-3	COIL AIR WOUND LE-017 2.5D 4T 0.5	2	EA	L401.402
	3	312-019-4	COIL AIR WOUND LE-019 2.5D 5T 0.5	1	EA	L413
	3	312-044-6	COIL CHIP 68NH LL1608-FH68NJ	1	EA	L433
	3	312-046-8Z	COIL CHIP 390NH FCI2520-R39K	1	EA	L102
	3	312-047-9Z	COIL CHIP 1UH FCI2520-1R0J	1	EA	L414
	3	312-052-3	COIL AIRWOUND E2-0.30-1.7-6TL	1	EA	L403
	3	312-053-4Z	COIL SPRING E2-0.30-1.7-7TL	7	EA	L404.405.406.407.408.409.410
	3	312-055-6	COIL CHIP 2.2UH MLF1608A2R2KT	2	EA	L424.426
	3	312-056-7	COIL CHIP 4.7UH MLF1608A4R7KT	2	EA	L428.429
	3	312-057-8	COIL CHIP 150NH MLF1608DR15KT	1	EA	L434
	3	312-058-9	COIL CHIP 470NH MLF1608DR47KT	1	EA	L435
	3	312-064-4	COIL CHIP BLM21PG300SN1D	1	EA	L415
	3	312-070-9	COIL BEAD BLM21A121SPT	1	EA	L430
	3	312-073-2	COIL CHIP 1UF LK1608 1R0K-T	1	EA	L201
	3	406-823-A	P.C.B PTT 59.6 X10 X0.6 FR4 1/1	1	EA	
	3	416-152-A	P.C.B MAIN 51 X120.6X1.0 FR42/S	1	EA	
	3	421-401-7	CONNECTOR WIRE TO BO1254SMB-20 1.25MM	1	EA	ICN2
	3	421-404-1	CONNECTOR MMS-103-02-L-DV	1	EA	ICN1
	3	480-064-6	POTENTIOMETERS 10K MVR22 HXBR N103	4	EA	RV201.202.204.205
	3	480-065-7	POTENTIOMETERS 47K MVR22 HXBR N473	3	EA	RV203.401.405
	3	480-066-8	POTENTIOMETERS 100K MVR22 HXBR N104	1	EA	RV402
	3	480-068-0	POTENTIOMETER 1K MVR22 HXBR N102	1	EA	RV1
13	2	577-59M-FA	MAIN FRAME ASS'Y	1	EA	
	3	611-393	(+)MACHINE SCREW(BH)M2.6X8 (+)BH NI-PLAT	2	EA	
	3	632-005	(+)TAPTITE SCREW(PH)T2X5 (+)PH NI-PLAT	9	EA	
	3	632-006	(+)TAPTITE SCREW(BH)T2X4 (+)BH BLK	1	EA	
	3	650-357	NUT(VOLUME) M7X0.75 BSBM NI-PLAT	2	EA	
	3	702-484	FRAME MAIN AL NI-PLATE	1	EA	
	3	719-895-A	COVER ANT FIXER PC	1	EA	
	3	771-500	COPPER PLATE COPPER(CUP) 15X15XT0.05	1	EA	ATTACH SHIELD CAN for P/W
	3	895-790	GASKET MAIN SILICONE RUBBER	1	EA	

	3	895-796	GASKET	PORON T0.8	1	EA	
	3	895-836	CUSHION(MAIN FRAME)	PORON T2.0	1	EA	
	3	895-925-A	GASKET	PET T0.15+3M	1	EA	
	3	896-006	CUSHION(FOR LCD)	PORON 23X3.5 T0.1	1	EA	
	3	907-029	INSULATION PLATE	INSULATION PAPER T0.15	1	EA	
	3	95B-129-A	LABEL NAME	POLYESTER 44X35	1	EA	
14	2	577-59M-FA1	MAIN FRAME ASS'Y		1	EA	
	3	772-543	SHIELD CAN-E	SPTE T0.3	1	EA	
	3	772-544	SHIELD CAN-F	SPTE T0.3	1	EA	
17	2	577-59M-PA	MAIN PCB ASS'Y		1	EA	
	3	895-785	BUSHING TERMINAL	SILICONE RUBBER	2	EA	
	3	895-786	BUSHING MIC	SILICONE RUBBER BLK	1	EA	
	3	895-794	CUSHION(X'TAL)	CR SPONGE 5X5XT1.0	1	EA	
	3	895-795	CUSHION-B	CR SPONGE 5X5XT1.0	3	EA	
18	2	577-59P-A	PACKING ASS'Y		1	EA	
	3	420-424-7	ANTENNA	SXB-165MX BLACK (162-174MHZ)	1	EA	
	3	91C-002	PAD (TRC-439)	SW1S 268X21	1	EA	
	3	91D-012	BOX INNER(UK)	SW1S 230(W)X210(D)X102(H)	1	EA	
	3	91D-020	PAD"A"	SW1E 399X381	1	EA	
	3	91D-021	PAD"B"	SW1E 612X243	1	EA	
	3	91D-136-E	BOX OUT	DW1E 423(W)X308(D)X237(H)	0,167	EA	
	3	921-530-E	POLYBAG	P.E 150X300XT0.05	2	EA	FOR RADIO & MANUAL
	3	943-244-C	WARRANTY CARD	WOOD PAPER 350X92	1	EA	
	3	943-845	CARD CERTIFICATE	ARTPAPER 120X210	1	EA	
	3	95A-767	SERIAL LABEL	ART PAPER 45X10	1	EA	
	3	95A-768	SERIAL LABEL	ART PAPER 45X20	1	EA	
	3	95B-102	LABEL RTTE COUNTRY	ARTPAPER 90X15	1	EA	
	3	95B-130	LABEL BOX INNER	ARTPAPER 180X82	1	EA	
	3	95B-131	LABEL CE	ARTPAPER 33X8	1	EA	
19	2	577-59W-A	WIRE ASS'Y		1	EA	
	3	427-023-6	WIRE	1007 AWG 24(11/0.16) RED	0,08	ME	0.5:0.5
	3	427-041-2	WIRE	1007 AWG 26 (7/0.16) BLK	0,05	ME	0.5:0.5
	3	427-044-5	WIRE	1007 AWG 26(7/0.16) ORG	0,16	ME	0.5:0.5

ALAN HP 406

EXPLODED VIEW AND PART LIST


10-1
13-1
14-1
18 x 2
27 X 9
43 X 2
46-1
49 X 5
52 X 6
7-1
8-1

HP-106/406 EXPLODED VIEW PART'S LIST.

NO.	PART NO.	PART NAME	DESCRIPTION	Q'TY	Remark	codice cte
1	719-896	Cov Front	PC	1		
2	795-920	Name Plate	PC Clear T0.3	1		
3	719-894	Cov Spk/Mic	ABS	1		
4	895-789	PTT Button	Silicone Rubber	1		
5	733-005A	Holder PTT	PC	1		
6	853-223	Ring GND	BSBM CR Plate	1		
7	753-127	Spacer Ant	Acetel CR-Plate	1		
8	650-358	Nut Ant	M8x0.75 BSBM CR-Plat	1		
9	420-420-2	Ant	NSB97-H100-Cl2	1	420-420-0 (HP-405)	
10	895-787	Gasket (Vol)	Silicone Rubber	1		
10-1	895-788	Gasket Ch	Silicone Rubber	1		
11	907-023	Sheet Tapping	PE T0.15	1		
12	702-483	Top Panel	ABS	1		
13	881-672	Spring "D" Volum	SK5 T0.2	1		
13-1	881-609A	Spring Ch	BECU T0.2	1		
14	826-450	Knob Vol	ABS	1		
14-1	826-449	Knob Ch	ABS	1		
15	895-793	Lens LED	Silicone Rubber	1		
16	907-020	Felt (Speaker)	FELT T0.3	1		
17	420-127-6	Speaker	40-8BB-24F	1		
18	600-814	Screw	(PH) M2x5 Blk (H=T1.1)	2		
19	632-006	Screw	(BH) BLK T2.4	1		
20	772-516	Shield can C	SPTE TO.3	1		
21	772-514	Shield can A	SPTE TO.3	1		
22	772-515	Shield can B	SPTE TO.3	1		
23	430-068 5A	SW Rotary Code	EC10SP16-31	1		
24	772-517	Shield can D	SPTE TO.3	1	For HP-405 only	
25	611-391	Screw	M2.6x10 (+) BH Ni-Plat	2		
26	650-357	Nut (Volume) For Ch	M7x0.75 BSBM Ni-plate	1		
27	632-005	Tapping Screw	(+) PH Ni-Plate T2x5	9		
28	480-064-6	Potentiometer	10K MVR22 HX BR N13	1		
29	420-8501	Jack	HSJ1468-01-030	1		
30	416-128-B	Main PCB	FR4 2/S	1		
31	895-786	Bushing Mic	Silicone Rubber	1		
32	895-791	Gasket SP/MIC Jack	Silicone Rubber	1		
33	753-125	Terminal Gnd	NSS To.2	1		
34	853-225	Insulator Ant	PC CR Plate	1		

HP-106/406 EXPLODED VIEW PART'S LIST.

NO.	PART NO.	PART NAME	DESCRIPTION	Q'TY	Remark	codice cte
35	753-126	Terminal Ant	NSS To.2	1		
36	853-224	Connector Ant	BSBM CR Plate	1		
37	611-392	Screw	M2.6x6 (+) BH SUS BLK	1		
38	719-895	Cover Ant Flxer	PC	1		
39	895-796	Gasket	Poron T0.8	1		
40	650-357	Nut (Volume)	M7x0.75 BSBM Ni-plate	1		
41	895-836	Cushion (Main Frame)	Poron T2.0	1		
42	95A-872B	Label Product	Polyester 44x 34.5	1	95A-872C (HP-405)	
43	895-785	Bushing Terminal	Silicone Rubber	2		
44	702-484	Frame Main	AL Ni-Plate	1		
45	895-790	Gasket Main	Silicone Rubber	1		
46	95A-820C	Label Battery	Polyester 39.5x 34.5	1		
46-1	895-833	Gasket Battery	Gore Tex T0.2	1		
47	733-004	Battery Holder	SUS T0.4	1		
48	719-897	Cover Top (Batt)	PC	1		
49	753-124	Terminal Charger	BSBM Gold Plate	5		
50	406-825 A	PCB Battery B	FR4 1/1	1		
51	420-516-5	Batterry Cell	GP130AAM 6Sx 2	6		
52	406-824 A	PCB Battery A	FR4 1/1	1		
53	719-898	Cover Bottom (Batt)	PC	1		
54	826-451	Button Battery	PC	1		
55	753-128	Hinge	PC	1		
56	881-673	Spring (Belt Clip)	Nico-Sus	1		
57	665-126	"E" Ring	SUS 1.5	1		
58	753-129	Belt clip	PC	1		
59	853-226	Shaft (Belt Clip)	BSBM Niplate	1		

DEVELO P M ENT : FINAL
DESIGN : FINAL
TECHNI Q U E : FINAL
S/W VE R S ION : UNDEFINED
MODEL C O DE : 7766 ALAN HP-406 4W UHF W IDE BAND ( ) 5/01/12 10.45.01 4 1

P A R T S L I S T

RIR610B
Rev.: 028

SEQ	L E VEL	PART-NO.	NAME & DESCRIPTION		Q'TY	UT	G	KON	OPT	REFERENCE-NO	ECO-DATE		ECO-NO.
1	2	577-66A-NT	ANTENNA ASS'Y		1	EA	A				03/03/26	A	CS-MYJUNG
	3	650-358	NUT(ANT)	M8X0.75 BSBM CR-PLAT	2	EA	B	SUB			03/03/26		
	3	660-A00-2	WASHER GROUND	0.3T SPTE	1	EA	B	SUB			03/03/26		
	3	660-985-A	WASHER ANT	0.3T SPTE	1	EA	B	SUB			03/03/26		
	3	732-948	HOLDER (ANT MTG)	BSBM &11 NI-PLATING	1	EA	B	SUB			03/03/26		
	3	753-127	SPACER ANT	ACETAL CR-PLATE	2	EA	B	SUB			03/03/26		
	3	853-223-A	RING GND	BSBM CR PLATE	1	EA	B	SUB			03/03/26		
	3	853-225	INSULATOR ANT	PC CR PLATE	1	EA	B	SUB			03/03/26		
2	2	577-66B-A	BATTERY ASS'Y		1	EA	A				03/03/26	A	CS-MYJUNG
	3	097-104-3	THERMISTOR DISK	10K 103AT-2 1%	1	EA	B	SUB		RB101	04/01/06		
	3	130-172-2Y	CHIP CERAMIC	0.01UF GRM40 X7R103K 50V PT	1	EA	B	SUB		CB101	04/01/06		
	3	130-187-7	AXIAL CERAMIC	0.001UF UP050B102MK 50V	1	EA	B	SUB		CB999	04/01/06		
	3	243-159-0	DIODE SWITCHING	DSA3A	1	EA	B	SUB		D(QB101)	04/01/06		
	3	4A6-101-B	P.C.B ASS'Y	55 X119 X0.6 FR4 1/1	1	EA	B	SUB			04/01/06		
	4	406-824-A	P.C.B BATT"A"	30 X10 X0.6 FR4 1/1	1	EA	B	SUB			02/06/19	C	AT02-KATHI
	4	406-825-A	P.C.B BATT"B"	25 X10 X0.6 FR4 1/1	1	EA	B	SUB			02/06/19	C	AT02-KATHI
	3	420-516-5	BATTERY NI-MH	GP130AAM6SXZ	1	EA	B	SUB		BATT	04/01/06		
	3	719-897-A	COVER TOP(BATT)	PC	1	EA	B	SUB			03/03/26		
	3	719-898-A	COVER BOTTOM(BATT)	PC	1	EA	B	SUB			03/03/26		
	3	733-004-A	HOLDER BATTERY	SUS T0.4	1	EA	B	SUB			03/04/11	C	CT03-0362
	3	753-124-A	TERMINAL CHARGE	BSBM GOLD PLATE	5	EA	B	SUB			03/03/26		
	3	826-451-A	BUTTON BATTERY	PC	1	EA	B	SUB			03/03/26		
	3	895-833	GASKET BATTERY	GORE TEX T0.2	1	EA	B	SUB			03/03/26		
	3	906-253	INSULATION PLATE	14X8XT1.0 FIBER	2	EA	B	SUB			03/03/26		
	3	906-560	INSULATOR	12.7X10.3XT0.25 FIBER	2	EA	B	SUB			03/03/26		
	3	906-857	DOUBLE TAPE	34X10XT0.16 3M	1	EA	B	SUB			03/03/26		
	3	907-043	DOUBLE TAPE(FOR BATT	3M 26X10XT0.16	1	EA	B	SUB			03/03/26		
3	2	577-66B-A1	BATTERY ASS'Y		1	EA	A		MC35		03/03/26	C	CS-MYJUNG
	3	95A-820	LABEL BATTERY	POLYESTER 39.5X34.5	1	EA	B	FIN			03/03/26	A	CS-MYJUNG
4	2	577-66B-CA	BELT CLIP ASS'Y		1	EA	A				03/03/26	A	CS-MYJUNG
	3	665-126	E RING	&1.5 SUS	1	EA	B	SUB			03/03/26		
	3	753-128-A	HINGE	PC	1	EA	B	SUB			03/03/26		
	3	753-129-A	BELT CLIP	PC	1	EA	B	SUB			03/03/26		
	3	853-226	SHAFT(BELT CLIP)	BSBM NI PLATE	1	EA	B	SUB			03/03/26		
	3	881-673	SPRING(BELT CLIP)	NICO-SUS	1	EA	B	SUB			03/03/26		
5	2	577-66F-C	FRONT COVER ASS'Y		1	EA	A				03/03/26	A	CS-MYJUNG
	3	611-392	(+)MACHINE SCREW(BH)	M2.6X6 (+)BH SUS BLK	1	EA	B	SUB			03/03/26		
	3	612-250	(+)MACHINE SCREW(FH)	M2X4 (+)FH NI-PLAT	2	EA	B	SUB			04/07/07	C	CT04-0603
	3	719-894-A	COVER SPK/MIC	ABS	1	EA	B	SUB			03/03/26		
	3	826-449-A	KNOB CHANNEL	ABS BLACK	1	EA	B	SUB			03/03/26		
	3	826-450-A	KNOB VOLUME	ABS	1	EA	B	SUB			03/03/26		
	3	881-609-A	SPRING(CHANNEL)	BECU T0.2	1	EA	B	SUB			03/03/26		

		3	881-672	SPRING"D"(VOLUME)	SK5 T0.25 HEAT TREATING	1	EA	B	SUB			03/03/26		
		3	895-266	RING(VOL)	CR BLACK	1	EA	B	SUB		FOR HOLDER MIC	03/03/26		
		3	895-787	GASKET VOLUME	SILICONE RUBBER	1	EA	B	SUB			03/03/26		
		3	895-788	GASKET CHANNEL	SILICONE RUBBER	1	EA	B	SUB			03/03/26		
		3	895-789-A	PTT BUTTON	SILICONE RUBBER	1	EA	B	SUB			03/03/26		
		3	895-791	GASKET SP/MIC JACK	SILICONE RUBBER	1	EA	B	SUB			03/03/26		
		3	895-793	LENS LED	SILICONE RUBBER	1	EA	B	SUB			03/03/26		
		3	895-868	SPONGE	SPONGE &12	1	EA	B	SUB			03/03/26		
		3	907-020	FELT(SPEAKER)	FELT T0.3	1	EA	B	SUB			03/03/26		
		3	907-023	SHEET TAPING	PE T0.15	1	EA	B	SUB			03/03/26		
6	2		577-66F-C1	FRONT COVER ASS'Y		1	EA	A		MC35		03/03/26	C	CS-MYJUNG
		3	508-790-F	PTT HOLDER ASS'Y	75-440BP	1	EA	B	SUB			03/03/26		
		4	733-005-E	HOLDER PTT	PC PANTONE 433	1	EA	B	SUB			02/08/09	C	AT02-PAT
		4	853-227	INSERT(PTT HOUSING)	BSBM NI PLATE	2	EA	B	SUB			02/08/09	C	AT02-PAT
		3	508-792-F	FRONT COVER ASS'Y	ALAN HP-106	1	EA	B	SUB			04/10/27	C	CT04-0963
		4	719-896-E	COVER FRONT	PC PANTONE 202U	1	EA	B	SUB			03/08/04	A	CT03-0822
		4	853-228	INSERT(FRONT COVER)	BSBM NI PLATE	2	EA	B	SUB			03/08/04	A	CT03-0822
		3	702-483-B	PANEL TOP	ABS PANTONE 202U	1	EA	B	SUB			03/03/26		
		3	795-920-D	NAME PLATE	PC 41.8X9.8 T0.3 BLK	1	EA	B	SUB			03/03/26		
7	2		577-66M-BMA	MAIN BOARD MAN. ASSY		1	EA	A				04/01/06		
		3	05B-104-6Z	CHIP RESISTOR	100K 1/16W 5% T 1608	1	EA	B	SUB		R567	04/12/25	A	CT04-1094
		3	130-A01-7Y	CHIP CERAMIC	0.015UF GRM39 X7R153K 25V PT	1	EA	B	SUB		C601	04/12/25	A	CT04-1094
		3	130-A73-6Y	CHIP CERAMIC	0.01UF GRM39 X7R103K 25V	1	EA	B	SUB		C602	04/12/25	A	CT04-1094
		3	130-A75-8Y	CHIP CERAMIC	0.001UF GRM39 X7R102K 50V PT	16	EA	B	SMD		C506,21,2,3,6,8,9,31.600,20.82 5.930,1,78,95,6	04/06/21	A	CT04-0544
		3	221-777-2	POWER MODULE	RA07M4047M	1	EA	B	SUB		U(Q407)	04/01/14	C	CT04-PAT
		3	263-469-6	CRYSTAL(UM-6S)	44.645M -30 15PM 13.8P	1	EA	B	SUB		X201	04/01/06		
		3	263-477-3	CRYSTAL	8MHZ -20 30PM 15PF C1-301	1	EA	B	SUB		X1	04/01/14	A	CT04-PAT
		3	270-342-2Y	FILTER CERAMIC	LTM455HW	1	EA	B	SUB		X(F202)	04/01/14	C	CT04-PAT
		3	270-343-3Y	FILTER CERAMIC	LTM455FW	1	EA	B	SUB		X(F201)	04/01/14	C	CT04-PAT
		3	271-203-5	FILTER CRYSTAL	45N12B5 (45.1MHZ)	1	EA	B	SUB		X(F401)	04/01/14	C	CT04-PAT
		3	420-127-6Z	SPEAKER	8 OHM 2W 11/2INCH NR-040-B0X31	1	EA	B	SUB		E101	04/01/06		
		3	420-290-5Z	CONDENSER MIC	YCM 9745-P50-006	1	EA	B	SUB		MIC1	04/01/14	C	CT04-PAT
		3	420-424-8	ANTENNA	SXD-450MX WHITE (440-470MHZ)	1	EA	B	SUB		A401	04/01/06		
		3	420-850-1	JACK	HSJ1468-01-030	1	EA	B	SUB		J101	04/01/06		
		3	421-311-6	HEADER	53047-0210	1	EA	B	SUB		CN103	04/01/06		
		3	422-931-1	SPRING CONNECTOR	GW201006	2	EA	B	SUB		CM201.202	04/01/14	C	CT04-PAT
		3	430-092-6	SW ROTARY	EC10SP16-82A0	1	EA	B	SUB		S109	04/06/09	C	CT04-0509
		3	436-057-5	SW TACT	SKQYAB	3	EA	B	SUB		S104.105.106	04/01/06		
		3	450-458-9X	VARIABLE RESISTOR	10KA:PK093VS-1 15F A10K	1	EA	B	SUB		S201	04/01/06		
		3	505-039	2P HOUSING ASS'Y	SH400502(WC-013)	1	EA	B	SUB			04/10/01	A	CT04-0911
8	2		577-66M-BSA	MAIN BOARD SMD ASS'Y		1	EA	A				04/01/06		
		3	05B-000-5Z	CHIP RESISTOR	0 1/16W 5% T 1608	4	EA	B	SMD		R65.68.250.433	04/06/11	C	CT04-0520
		3	05B-100-2Z	CHIP RESISTOR	10 1/16W 5% T 1608	10	EA	B	SMD		R20.38.54.58.60.213.255.270. 414,475	04/12/25	C	CT04-1094
		3	05B-101-3Z	CHIP RESISTOR	100 1/16W 5% T 1608	12	EA	B	SMD		R48.61.66.72.73.249.402.462.46 5.491.510.955	04/08/23	C	CT04-0748
		3	05B-102-4Z	CHIP RESISTOR	1K 1/16W 5% T 1608	18	EA	B	SMD		R31.56.62.63.67.74.227,51,4. 321.417,61,74,96.500,65,6.960	04/12/25	C	CT04-1094
		3	05B-103-5Z	CHIP RESISTOR	10K 1/16W 5% T 1608	37	EA	B	SMD		R6.8.12.40.41.42.43.44.45.46.	04/12/25	C	CT04-1094

3	05B-104-6Z	CHIP RESISTOR	100K 1/16W 5% T 1608	27	EA	B	SMD	47.49.50.53.59.71.150.152.202+ ,26,9,30,8,46,59,68,99.300,20, 54,8.429,38,94.556.947,52 R1.2.3.4.10.11.13.14.16.17.18. 19.30.33.39.151.245.302.303. + 357.434.435.478.499.958.2116. RZ402	04/12/25	C	CT04-1094
3	05B-105-7Z	CHIP RESISTOR	1M 1/16W 5% T 1608	1	EA	B	SMD	R430	04/06/09	C	CT04-0509
3	05B-121-1Z	CHIP RESISTOR	120 1/16W 5% T 1608	1	EA	B	SMD	R420	04/01/06		
3	05B-122-2Z	CHIP RESISTOR	1.2K 1/16W 5% T 1608	1	EA	B	SMD	R477	04/01/06		
3	05B-123-3Z	CHIP RESISTOR	12K 1/16W 5% T 1608	2	EA	B	SMD	R283.403	04/01/14	C	CT04-PAT
3	05B-151-8Z	CHIP RESISTOR	150 1/16W 5% T 1608	1	EA	B	SMD	R953	04/01/06		
3	05B-152-9Z	CHIP RESISTOR	1.5K 1/16W 5% T 1608	2	EA	B	SMD	R5.21	04/01/14	A	CT04-PAT
3	05B-153-0Z	CHIP RESISTOR	15K 1/16W 5% T 1608	3	EA	B	SMD	R441.444.466	04/01/14	C	CT04-PAT
3	05B-155-2Z	CHIP RESISTOR	1.5M 1/16W 5% T 1608	1	EA	B	SMD	R237	04/01/06		
3	05B-164-0Z	RESISTOR CHIP	160K 1/16W 5% T 1608	1	EA	B	SMD	R233	04/01/06		
3	05B-182-6Z	CHIP RESISTOR	1.8K 1/16W 5% T 1608	1	EA	B	SMD	R316	04/01/06		
3	05B-183-7Z	CHIP RESISTOR	18K 1/16W 5% T 1608	5	EA	B	SMD	R35.286.322.467.468	04/10/01	C	CT04-0909
3	05B-202-1Z	CHIP RESISTOR	2K 1/16W 5% T 1608	4	EA	B	SMD	R26.26A.28.239	04/01/14	C	CT04-PAT
3	05B-203-2Z	CHIP RESISTOR	20K 1/16W 5% T 1608	7	EA	B	SMD	R7.23.36.55.57.70.166	04/08/23	C	CT04-0748
3	05B-220-7Z	CHIP RESISTOR	22 1/16W 5% T 1608	4	EA	B	SMD	R254.439.957.959	04/01/06		
3	05B-221-8Z	CHIP RESISTOR	220 1/16W 5% T 1608	2	EA	B	SMD	R130.443	04/01/06		
3	05B-222-9Z	CHIP RESISTOR	2.2K 1/16W 5% T 1608	4	EA	B	SMD	R131.133.315.493	04/08/23	C	CT04-0748
3	05B-223-0Z	CHIP RESISTOR	22K 1/16W 5% T 1608	19	EA	B	SMD	R203-209.211.212.247.306.350. 360.361.362.363.365.369.436	04/01/14	C	CT04-PAT
3	05B-224-1Z	CHIP RESISTOR	220K 1/16W 5% T 1608	3	EA	B	SMD	R305.353.950	04/08/23	C	CT04-0748
3	05B-229-6Z	CHIP RESISTOR	2.2 1/16W 5% T 1608	1	EA	B	SMD	R257	04/01/14	C	CT04-PAT
3	05B-272-4Z	CHIP RESISTOR	2.7K 1/16W 5% T 1608	1	EA	B	SMD	R290	04/01/06		
3	05B-273-5Z	CHIP RESISTOR	27K 1/16W 5% T 1608	3	EA	B	SMD	R292.432.469	04/01/06		
3	05B-302-8Z	CHIP RESISTOR	3K 1/16W 5% T 1608	1	EA	B	SMD	R29	04/01/14	A	CT04-PAT
3	05B-331-4Z	CHIP RESISTOR	330 1/16W 5% T 1608	2	EA	B	SMD	R118.119	04/01/06		
3	05B-332-5Z	CHIP RESISTOR	3.3K 1/16W 5% T 1608	5	EA	B	SMD	R51.217.218.304.464	04/01/14	C	CT04-PAT
3	05B-333-6Z	CHIP RESISTOR	33K 1/16W 5% T 1608	1	EA	B	SMD	R291	04/01/06		
3	05B-334-7Z	CHIP RESISTOR	330K 1/16W 5% T 1608	1	EA	B	SMD	R310	04/01/14	C	CT04-PAT
3	05B-392-9Z	CHIP RESISTOR	3.9K 1/16W 5% T 1608	3	EA	B	SMD	R149.301.803	04/01/14	C	CT04-PAT
3	05B-434-4Z	RESISTOR CHIP	430K 1/16W 5% T 1608	1	EA	B	SMD	R235	04/01/06		
3	05B-470-6Z	CHIP RESISTOR	47 1/16W 5% T 1608	1	EA	B	SMD	R558	04/08/23	C	CT04-0748
3	05B-471-7Z	CHIP RESISTOR	470 1/16W 5% T 1608	8	EA	B	SMD	R132.135.201.252.431.437.463. 497	04/08/23	C	CT04-0748
3	05B-472-8Z	CHIP RESISTOR	4.7K 1/16W 5% T 1608	16	EA	B	SMD	R219,43,4.330,41,52,66.440,2,5 ,90,2,5.805.948,81	04/08/23	C	CT04-0748
3	05B-473-9Z	CHIP RESISTOR	47K 1/16W 5% T 1608	9	EA	B	SMD	R25.220.222.242.248.256.351.40 1,476	04/01/14	C	CT04-PAT
3	05B-474-0Z	CHIP RESISTOR	470K 1/16W 5% T 1608	6	EA	B	SMD	R224.269.285.288.383.416	04/12/25	C	CT04-1094
3	05B-560-4Z	CHIP RESISTOR	56 1/16W 5% T 1608	1	EA	B	SMD	R413	04/01/06		
3	05B-561-5Z	CHIP RESISTOR	560 1/16W 5% T 1608	1	EA	B	SMD	R807	04/08/23	A	CT04-0748
3	05B-562-6Z	CHIP RESISTOR	5.6K 1/16W 5% T 1608	2	EA	B	SMD	R236.282	04/01/06		
3	05B-563-7Z	CHIP RESISTOR	56K 1/16W 5% T 1608	2	EA	B	SMD	R32.223	04/01/14	C	CT04-PAT
3	05B-622-7Z	CHIP RESISTOR	6.2K 1/16W 5% T 1608	1	EA	B	SMD	R232	04/01/06		
3	05B-623-8Z	CHIP RESISTOR	62K 1/16W 5% T 1608	1	EA	B	SMD	R15	04/01/14	C	CT04-PAT

3	05B-681-0Z	CHIP RESISTOR	680 1/16W 5% T 1608	1	EA	B	SMD	R946	04/01/06		
3	05B-682-1Z	CHIP RESISTOR	6.8K 1/16W 5% T 1608	6	EA	B	SMD	R9.37.260.284.287.289	04/08/23	C	CT04-0748
3	05B-683-2Z	CHIP RESISTOR	68K 1/16W 5% T 1608	3	EA	B	SMD	R24.221.225	04/01/14	C	CT04-PAT
3	05B-684-3Z	CHIP RESISTOR	680K 1/16W 5% T 1608	3	EA	B	SMD	R142.294.949	04/01/06		
3	05B-753-2Z	CHIP RESISTOR	75K 1/16W 5% T 1608	2	EA	B	SMD	R297.298	04/01/06		
3	05B-822-1Z	CHIP RESISTOR	8.2K 1/16W 5% T 1608	1	EA	B	SMD	R234	04/01/06		
3	05B-823-2Z	CHIP RESISTOR	82K 1/16W 5% T 1608	2	EA	B	SMD	R94A.296	04/01/14	C	CT04-PAT
3	05B-913-0	CHIP RESISTOR	91K 1/16W 5% T 1608	8	EA	B	SMD	R231.261.262.263.264.265.266.267	04/01/06		
3	05C-624-1Z	CHIP RESISTOR	620K 1/16W 1% T 1608	1	EA	B	SMD	R210	04/07/05	A	CT04-0599
3	05C-913-0Z	RESISTOR CHIP	91K 1/16W 1% T 1608	6	EA	B	SMD	R423-428	04/01/14	C	CT04-PAT
3	06B-007-9	TCXO CHIP RESISTOR	4.64K 1/10W 1% T 2012	1	EA	B	SMD	R215	04/07/05	A	CT04-0599
3	06K-027-3Z	CHIP RESISTOR	0.27 1/ 8W 10% T 3216	4	EA	B	SMD	R307.421.421A.422	04/01/14	C	CT04-PAT
3	060-109-4Z	CHIP RESISTOR	1 1/10W 5% T 2012	1	EA	B	SMD	R253	04/01/14	A	CT04-PAT
3	130-A44-0Y	CHIP CERAMIC	0.015UF GRM40 X7R153K 50V PT	1	EA	B	SMD	C282	04/12/25	C	CT04-1094
3	130-A48-4Y	CHIP CERAMIC	0.0015UF GRM39 X7R152K 50V PT	1	EA	B	SMD	C272	04/01/06		
3	130-A49-5Y	CHIP CERAMIC	0.0018UF GRM39 X7R182K 50V PT	1	EA	B	SMD	C20	04/08/23	C	CT04-0748
3	130-A73-6Y	CHIP CERAMIC	0.01UF GRM39 X7R103K 25V	20	EA	B	SMD	C1.13.32.226,7,9.230-234.287,97.310,6,8,20,30,1.503	04/08/23	C	CT04-0748
3	130-A75-8Y	CHIP CERAMIC	0.001UF GRM39 X7R102K 50V PT	72	EA	B	SMD	C15.21,2,3,4,5,6,8,35,6,7,8.46,7,8.50,3,5.101,8,12,18-20,37+,38,65,73-76.201,4,7,20,39,40,2,4,8,50,5,6,7,60,1,8,9,77,9,84,5,94,6.321,4,6,7,33.408,11,39,41,54,7,60,6,7,8,71,4,8	04/08/23	C	CT04-0748
3	130-B09-9Y	CHIP CERAMIC	0.1UF GRM39 X7R104K 16V AT	21	EA	B	SMD	C16.27.29.45.54.141.155.156.205.208.209.217.222.236.241.270+.301.323.325.508.CZ402	04/12/25	C	CT04-1094
3	130-249-9	CHIP CERAMIC	0.0022UF GRM39 X7R222J 50V PT	2	EA	B	SMD	C223.267	04/08/23	C	CT04-0748
3	130-290-5Y	CHIP CERAMIC	0.22UF GRM40 X7R224K 16V	5	EA	B	SMD	C213.215.221.235.249	04/01/06		
3	130-298-3Y	CHIP CERAMIC	0.002UF GRM39 X7R202J 25V	1	EA	B	SMD	C14	04/01/14	A	CT04-PAT
3	130-333-1Y	CHIP CERAMIC	0.0039UF GRM39 X7R392K 50V PT	2	EA	B	SMD	C10.274	04/01/14	C	CT04-PAT
3	130-340-7Y	CHIP CERAMIC	0.0033UF GRM39 X7R332K 50V PT	6	EA	B	SMD	C3.6.7.39.286.340	04/08/23	C	CT04-0748
3	130-341-8Y	CHIP CERAMIC	0.033UF GRM39 X7R333K 16V PT	2	EA	B	SMD	C293.341	04/01/14	C	CT04-PAT
3	130-360-1Y	CHIP CERAMIC	0.0036UF CL10 X7R362J 25V	1	EA	B	SMD	C12	04/01/14	A	CT04-PAT
3	130-440-4Y	CHIP CERAMIC	0.047UF GRM39 Y5V473Z 25V PT	4	EA	B	SMD	C40.258.263.280	04/08/23	C	CT04-0748
3	130-443-7	CHIP CERAMIC	0.47UF GRM40 Y5V474Z 16V PT	2	EA	B	SMD	C455.458	04/01/06		
3	130-515-9Y	CHIP CERAMIC	0.5PF GRM39 COG0R5C 50V PT	1	EA	B	SMD	C509	04/08/23	C	CT04-0748
3	130-517-1Y	CHIP CERAMIC	0.0056UF GRM39 X7R562K 50V PT	1	EA	B	SMD	C246	04/01/06		
3	130-529-2	CHIP CERAMIC	0.056UF GRM39 X7R563K 16V	1	EA	B	SMD	C278	04/01/06		
3	130-616-7	CHIP CERAMIC	0.0068UF GRM39 X7R682J 50V PT	1	EA	B	SMD	C9	04/01/14	A	CT04-PAT
3	130-630-9Y	CHIP CERAMIC	0.068UF GRM39 X7R683K 16V	1	EA	B	SMD	C292	04/08/23	C	CT04-0748
3	130-704-3Y	CHIP CERAMIC	0.75PF GRM39 COG0R75C50V PT	1	EA	B	SMD	C987	04/08/23	A	CT04-0748
3	131-091-7Y	CHIP CERAMIC	1PF GRM39 COG010C 50V PT	2	EA	B	SMD	C979.988	04/01/06		
3	131-093-9Y	CHIP CERAMIC	100PF GRM39 COG101J 50V PT	8	EA	B	SMD	C33.51.252.253.264.453.456.539	04/08/23	C	CT04-0748
3	131-105-7Y	CHIP CERAMIC	11PF GRM39 COG110J 50V PT	2	EA	B	SMD	C816.818	04/08/23	C	CT04-0748
3	131-138-7Y	CHIP CERAMIC	10PF GRM39 COG100C 50V	4	EA	B	SMD	C433.465.829.838	04/08/23	C	CT04-0748
3	131-241-6Y	CHIP CERAMIC	120PF GRM39 COG121J 50V PT	2	EA	B	SMD	C216.273	04/08/23	C	CT04-0748
3	131-306-2Y	CHIP CERAMIC	13PF GRM39 COG130J 50V PT	1	EA	B	SMD	C407	04/01/14	A	CT04-PAT
3	131-564-8Y	CHIP CERAMIC	15PF GRM39 COG150J 50V PT	4	EA	B	SMD	C202.404.434.435	04/08/23	C	CT04-0748

3	131-575-8Y	CHIP CERAMIC	150PF GRM39 COG151J 50V PT	1 EA	B	SMD	C824	04/01/06		
3	131-604-1Y	CHIP CERAMIC	16PF GRM39 COG160J 50V PT	2 EA	B	SMD	C438.814	04/01/06		
3	131-610-7Y	CHIP CERAMIC	160PF CL10 X7R161J 50V	1 EA	B	SMD	C18	04/01/14	A	CT04-PAT
3	131-834-2Y	CHIP CERAMIC	18PF GRM39 COG180J 50V PT	2 EA	B	SMD	C203.985	04/01/06		
3	132-024-2Y	CHIP CERAMIC	2PF GRM39 COG020C 50V PT	2 EA	B	SMD	C532.992	04/01/06		
3	132-025-3Y	CHIP CERAMIC	20PF GRM39 COG200J 50V PT	1 EA	B	SMD	C440	04/01/06		
3	132-258-7Y	CHIP CERAMIC	2.2PF GRM39 COG2R2C 50V PT	1 EA	B	SMD	C982	04/08/23	A	CT04-0748
3	132-259-8Y	CHIP CERAMIC	22PF GRM39 COG220J 50V PT	3 EA	B	SMD	C505.832.835	04/08/23	C	CT04-0748
3	132-260-8Y	CHIP CERAMIC	220PF GRM39 COG221J 50V PT	7 EA	B	SMD	C110.111.210.211.218.237.432	04/08/23	C	CT04-0748
3	132-410-7Y	CHIP CERAMIC	24PF GRM39 COG240J 50V PT	1 EA	B	SMD	C812	04/01/06		
3	132-417-4Y	CHIP CERAMIC	2.4PF GRM39 COG2R4C 50V	1 EA	B	SMD	C827	04/01/06		
3	132-734-0Y	CHIP CERAMIC	27PF GRM39 COG270J 50V PT	3 EA	B	SMD	C817.839.994	04/08/23	C	CT04-0748
3	133-102-4Y	CHIP CERAMIC	3PF GRM39 COG030C 50V PT	3 EA	B	SMD	C475.826.983	04/01/14	C	CT04-PAT
3	133-103-5Y	CHIP CERAMIC	30PF GRM39 COG300J 50V PT	2 EA	B	SMD	C30.31	04/01/14	A	CT04-PAT
3	133-349-1Y	CHIP CERAMIC	33PF GRM39 COG330J 50V PT	2 EA	B	SMD	C410.822	04/01/14	C	CT04-PAT
3	133-930-5Y	CHIP CERAMIC	39PF GRM39 COG390J 50V PT	1 EA	B	SMD	C224	04/01/06		
3	133-936-1Y	CHIP CERAMIC	390PF GRM39 COG391J 50V PT	1 EA	B	SMD	C281	04/01/06		
3	134-012-1Y	CHIP CERAMIC	4PF GRM39 COG040C 50V PT	2 EA	B	SMD	C405.472	04/01/14	C	CT04-PAT
3	134-306-7Y	CHIP CERAMIC	43PF GRM39 COG430J 50V PT	1 EA	B	SMD	C11	04/01/14	A	CT04-PAT
3	134-757-1Y	CHIP CERAMIC	47PF GRM39 COG470J 50V PT	2 EA	B	SMD	C139.266	04/08/23	C	CT04-0748
3	134-770-2Y	CHIP CERAMIC	470PF GRM39 X7R471K 50V PT	5 EA	B	SMD	C459.461.462.463.998	04/01/06		
3	135-021-4Y	CHIP CERAMIC	5PF GRM39 COG050C 50V PT	9 EA	B	SMD	C409.451.470.530.833.932.981. 989,99	04/01/14	C	CT04-PAT
3	135-631-5Y	CHIP CERAMIC	5.6PF GRM39 COG5R6C 50V PT	3 EA	B	SMD	C830.836.993	04/01/14	C	CT04-PAT
3	136-014-3Y	CHIP CERAMIC	6PF GRM39 COG060D 50V PT	6 EA	B	SMD	C436.813.831.837.980.991	04/09/07	C	CT04-0816
3	136-838-1Y	CHIP CERAMIC	6.8PF GRM39 COG6R8D 50V PT	1 EA	B	SMD	C828	04/08/23	A	CT04-0748
3	137-013-7Y	CHIP CERAMIC	7PF GRM39 COG070D 50V PT	2 EA	B	SMD	C834.984	04/09/07	C	CT04-0816
3	138-011-0Y	CHIP CERAMIC	8PF GRM39 COG080D 50V PT	1 EA	B	SMD	C469	04/08/23	C	CT04-0748
3	138-232-3Y	CHIP CERAMIC	82PF GRM39 COG820J 50V PT	3 EA	B	SMD	C4.8.437	04/01/14	C	CT04-PAT
3	138-233-4	CHIP CERAMIC	820PF GRM39 X7R821J 50V PT	1 EA	B	SMD	C271	04/01/06		
3	139-005-0Y	CHIP CERAMIC	9PF GRM39 COG090D 50V PT	3 EA	B	SMD	C811.815.823	04/08/23	C	CT04-0748
3	140-114-3Y	CHIP TANTALUM	0.1UF TCM1V104ASSR 35V	1 EA	B	SMD	C494	04/01/14	C	CT04-PAT
3	140-114-3Z	CHIP TANTALUM	0.1UF 293D104X0035A2T35V	1 EA	B	SMD	C96	04/08/23	A	CT04-0748
3	141-036-1	CHIP TANTALUM	1UF 293D105X0016A2T16V	8 EA	B	SMD	C2.34.243.265.288.290.495.525	04/01/14	C	CT04-PAT
3	141-059-2Y	CHIP TANTALUM	10UF TSM0J106ASSR 6.3V	13 EA	B	SMD	C43.44.106.206.228.245.247.254 .259.289.507.524.527	04/01/15	C	CT04-PAT
3	141-073-4	CHIP TANTALUM	TSM0J 107CSSR (100/6.3 C TYPE)	1 EA	B	SMD	C251	04/01/06		
3	142-215-1	CHIP TANTALUM	2.2UF TESVA1A225M1-8R10V	1 EA	B	SMD	C276	04/01/06		
3	144-722-2Z	CHIP TANTALUM	4.7UF 293D475X0010A2T10V	3 EA	B	SMD	C5.17.19	04/01/14	A	CT04-PAT
3	144-737-6Y	CHIP TANTALUM	4.7UF TSM0J475ASSR 6.3V	7 EA	B	SMD	C150.160.225.275.322.496.997	04/01/14	C	CT04-PAT
3	146-808-7Y	CHIP TANTALUM	6.8UF TSM0J685ASSR 6.3V	1 EA	B	SMD	C464	04/01/06		
3	176-016-7	CHIP TRIMMER	6PF TZV02Z060A100	2 EA	B	SMD	CV901.902	04/01/06		
3	200-057-4Z	TRANSISTOR	BFS520	4 EA	B	SMD	Q413.414.804.915	04/06/11	C	CT04-0527
3	200-237-0	TRANSISTOR	UMC4N TR	1 EA	B	SMD	Q420	04/01/14	C	CT04-PAT
3	200-238-1	TRANSISTOR	DTC114EETL	14 EA	B	SMD	Q7.12.13.14.15.112.202.205.215 .229.242.245.409.450	04/01/14	C	CT04-PAT
3	200-239-2	TRANSISTOR	DTA144EETL	2 EA	B	SMD	Q19.410	04/01/14	C	CT04-PAT
3	200-240-2	TRANSISTOR	DTA114EETL	2 EA	B	SMD	Q241.434	04/01/06		
3	200-241-3	TRANSISTOR	DTC144EETL	3 EA	B	SMD	Q225.411.437	04/01/06		
3	200-248-0	TRANSISTOR	DTA123YE (EMT3)	2 EA	B	SMD	Q226.435	04/01/06		

3	200-249-1	TRANSISTOR	UMW1N (UMT5)	3	EA	B	SMD	Q219.431.436	04/01/06		
3	200-250-1	TRANSISTOR	UMG2N (UMT5)	1	EA	B	SMD	Q224	04/01/06		
3	200-251-2	TRANSISTOR	UMA9N (UMT5)	1	EA	B	SMD	Q223	04/01/06		
3	200-252-3	TRANSISTOR	UMH6N (UMT6)	2	EA	B	SMD	Q116.216	04/01/06		
3	200-254-5	TRANSISTOR	2SC4215Y	1	EA	B	SMD	Q406	04/01/06		
3	200-255-6	TRANSISTOR	2SA1586GR	2	EA	B	SMD	Q111.425	04/01/06		
3	200-256-7	TRANSISTOR	2SC4116GR	5	EA	B	SMD	Q2.4.5.426.927	04/01/14	C	CT04-PAT
3	200-257-8	FET P CHANNEL	2SJ144Y	2	EA	B	SMD	Q206.235	04/01/06		
3	200-258-9	TRANSISTOR	2SB798 (SOT-89)	1	EA	B	SMD	Q430	04/01/06		
3	200-259-0	FET P CHANNEL	2SJ243 (SC-70)	2	EA	B	SMD	Q110.919	04/01/06		
3	200-260-0	FET	2SK508-T1B K52	2	EA	B	SMD	Q916.922	04/01/06		
3	200-261-1	TRANSISTOR	2SA1362GR-TE85L	1	EA	B	SMD	Q220	04/01/06		
3	203-181-7Z	TRANSISTOR	PBR951	1	EA	B	SMD	Q412	04/01/06		
3	220-520-1	I.C IF DETECT	TA31136FN	1	EA	B	SMD	IC6	04/01/14	C	CT04-PAT
3	221-542-6	I.C DUAL OP AMP	NJM2904V-TE1/2(SSOP8)	3	EA	B	SMD	U(Q6.213.408)	04/01/14	C	CT04-PAT
3	221-544-8	I.C LOW VOLT.PWR AMP	NJM2070M-TE1/2(DMP8)	1	EA	B	SMD	U(Q221)	04/01/14	C	CT04-PAT
3	221-545-9	I.C SING.LEVEL SENS.	NJM2072M-TE1/2(DMP8)	1	EA	B	SMD	U(Q240)	04/01/14	C	CT04-PAT
3	221-546-0	I.C OP AMP	NJM324V-TE1/2(SSOP14)	3	EA	B	SMD	U(Q1.208.212)	04/01/14	C	CT04-PAT
3	221-547-1	I.C OP AMP	NJM2058V-TE1/2(SSOP14)	1	EA	B	SMD	U(Q214)	04/01/14	C	CT04-PAT
3	221-555-8	I.C PLL	MB15A02PFV1 (FPT-16P-M05)	1	EA	B	SMD	U(Q429)	04/01/14	C	CT04-PAT
3	221-568-0	I.C	S-814A50AUC-BD0-T2	1	EA	B	SMD	IC(Q222)	04/01/14	C	CT04-PAT
3	221-800-9	I.C HEX INVERTER	MM74HCT04(MCT14)	1	EA	B	SMD	IC(Q10)	04/01/14	A	CT04-PAT
3	221-801-0	I.C E2PROM	24LC64 SOIC TYPE	1	EA	B	SMD	IC(Q8)	04/01/14	A	CT04-PAT
3	221-802-1	I.C LDO REGULATOR	TPS77133	1	EA	B	SMD	IC(Q11)	04/01/16	C	CT04-PAT
3	221-803-2	I.C ANALOG MULTIDLEX	74VHC4053	2	EA	B	SMD	IC(Q3.16)	04/01/14	A	CT04-PAT
3	221-847-2	I.C MICRO CONTROLLER	MSP430F149IPM	1	EA	B	SMD	IC(Q17)	04/06/30	C	CT04-0581
3	241-252-0	DIODE	UDZTE-175.1B	1	EA	B	SMD	D(Q113)	04/01/14	C	CT04-PAT
3	241-255-3	DIODE ZENER	UDZ 2.4B TE-17(UMD2)	1	EA	B	SMD	D(Q433)	04/01/14	C	CT04-PAT
3	242-045-5	DIODE VARICAP	1SV270	3	EA	B	SMD	D(Q917.921.923)	04/01/14	C	CT04-PAT
3	243-089-0	DIODE SWITCHING CHIP	1SS355 TE-17	2	EA	B	SMD	D(Q218).VD1	04/01/16	C	CT04-PAT
3	243-090-0	DIODE SI	KDS120	3	EA	B	SMD	D(Q203.204.207)	04/01/14	C	CT04-PAT
3	243-122-6	SCHOTTKY DIODE	HSMS-2817 #L31	1	EA	B	SMD	D(Q405)	04/01/14	C	CT04-PAT
3	243-154-5	DIODE SWITCHING	1SS356 TW11 (UMD2)	3	EA	B	SMD	D(Q401.432.505)	04/01/14	C	CT04-PAT
3	243-155-6	DIODE	1SS362	1	EA	B	SMD	D(Q9)	04/06/11	A	CT04-0520
3	243-156-7	DIODE	HVU131TRF	1	EA	B	SMD	D(Q402)	04/01/14	C	CT04-PAT
3	245-049-4	DIODE RECTIFIER	1SR154-400	2	EA	B	SMD	D(Q209.210)	04/01/14	C	CT04-PAT
3	251-234-7	LED CHIP	SML-020MLTT86 SMD	1	EA	B	SMD	Q105	04/01/14	C	CT04-PAT
3	269-032-4	VCTCXO	DSA751HA 14.4MHZ	1	EA	B	SMD	X401	04/01/06		
3	270-336-7	DISCRIMINATOR CERAM.	CDS455C24	1	EA	B	SMD	X(CD201)	04/01/06		
3	300-259-1	TRANSFORMER	SMD-0314A	2	EA	B	SMD	L411.412	04/01/06		
3	311-324-4Z	COIL CHIP	27NH CIH10T27NJNC	1	EA	B	SMD	L421	04/08/02	C	CT04-0680
3	311-377-2Z	COIL CHIP	100NH CIH10TR10JNC	4	EA	B	SMD	L928.929.932.933	04/01/06		
3	311-762-6	COIL CHIP	18NH LL1608-FH18NJ	5	EA	B	SMD	L416.420.432.433.922	04/01/06		
3	311-790-1	COIL CHIP	18NH LQN21A18NK04	1	EA	B	SMD	L925	04/01/06		
3	311-792-3	COIL CHIP	22NH LQN21A22NK04	1	EA	B	SMD	L927	04/01/06		
3	312-020-4	COIL AIR WOUND	LE-037 2.1D 3T 0.8	1	EA	B	SUB	L401	04/01/06		
3	312-021-5	COIL AIR WOUND	LE-005 2.5D 2T 0.5	1	EA	B	SUB	L413	04/01/06		
3	312-046-8Z	COIL CHIP	390NH FCI2520-R39K	1	EA	B	SMD	L102	04/01/06		
3	312-047-9Z	COIL CHIP	1UH FCI2520-1R0J	1	EA	B	SMD	L414	04/01/06		
3	312-049-1	COIL AIRWOUND	E2-0.30-1.0-4TL	6	EA	B	SMD	L803.804.805.806.807.808	04/01/06		

	3	312-050-1Z	COIL SPRING	E2-0.30-1.7-4TL	1 EA	B	SMD		L403	04/01/06		
	3	312-051-2Z	COIL SPRING	E2-0.30-1.0-3TL	2 EA	B	SMD		L801.802	04/01/06		
	3	312-055-6	COIL CHIP	2.2UH MLF1608A2R2KT	2 EA	B	SMD		L924.926	04/01/06		
	3	312-057-8	COIL CHIP	150NH MLF1608DR15KT	1 EA	B	SMD		L434	04/01/06		
	3	312-058-9	COIL CHIP	470NH MLF1608DR47KT	1 EA	B	SMD		L435	04/01/06		
	3	312-064-4	COIL CHIP	BLM21PG300SN1D	1 EA	B	SMD		L415	04/01/06		
	3	312-070-9	COIL BEAD	BLM21A121SPT	1 EA	B	SMD		L930	04/01/06		
	3	312-073-2	COIL CHIP	1UF LK1608 1R0K-T	1 EA	B	SMD		L201	04/01/06		
	3	312-248-4	COIL SPRING	2.7X0.8X2T:L	1 EA	B	SUB		L402	04/01/06		
	3	401-914-A	P.C.B SUB	59.6 X10 X1.6 FR4 1/1	1 EA	B	SUB			04/07/26	C	AT04-PAT
	3	416-163-B	P.C.B MAIN	51 X120.6X1.6 FR4 2/S	1 EA	B	SMD			04/09/01	C	CT04-0790
	3	421-401-7	CONNECTOR WIRE TO BO	1254SMB-20 1.25MM	1 EA	B	SMD		CN1	04/06/11	A	CT04-0520
	3	421-404-1	CONNECTOR	MMS-103-02-L-DV	1 EA	B	SMD		CN2	04/06/11	A	CT04-0520
	3	480-064-6	POTENTIOMETERS	10K MVR22 HXBR N103	4 EA	B	SMD		RV201.202.204.205	04/01/06		
	3	480-065-7	POTENTIOMETERS	47K MVR22 HXBR N473	2 EA	B	SMD		RV401.405	04/01/14	C	CT04-PAT
	3	480-066-8	POTENTIOMETERS	100K MVR22 HXBR N104	2 EA	B	SMD		RV203.402	04/01/14	C	CT04-PAT
	3	480-068-0	POTENTIOMETER	1K MVR22 HXBR N102	1 EA	B	SMD		RV1	04/01/14	A	CT04-PAT
9	2	577-66M-FA	MAIN FRAME ASS'Y		1 EA	A				03/03/26	A	CS-MYJUNG
	3	611-393	(+)MACHINE SCREW(BH)	M2.6X8 (+)BH NI-PLAT	2 EA	B	SUB			03/03/26		
	3	632-005	(+)TAPTITE SCREW(PH)	T2X5 (+)PH NI-PLAT	9 EA	B	SUB			03/03/26		
	3	632-006	(+)TAPTITE SCREW(BH)	T2X4 (+)BH BLK	1 EA	B	SUB			03/03/26		
	3	650-357	NUT(VOLUME)	M7X0.75 BSBM NI-PLAT	2 EA	B	SUB			03/03/26		
	3	702-484	FRAME MAIN	AL NI-PLATE	1 EA	B	SUB			03/03/26		
	3	719-895-A	COVER ANT FIXER	PC	1 EA	B	SUB			03/03/26		
	3	895-790	GASKET MAIN	SILICONE RUBBER	1 EA	B	SUB			03/03/26		
	3	895-796	GASKET	PORON T0.8	1 EA	B	SUB			03/03/26		
	3	895-836	CUSHION(MAIN FRAME)	PORON T2.0	1 EA	B	SUB			03/03/26		
	3	895-925	GASKET	PORON RUBBER	1 EA	B	SUB			03/03/26		
	3	896-006	CUSHION(FOR LCD)	PORON 23X3.5 T1.0	1 EA	B	SUB			03/05/10	A	CT03-0450
	3	907-029	INSULATION PLATE	INSULATION PAPER T0.15	1 EA	B	SUB			03/03/26		
10	2	577-66M-FA1	MAIN FRAME ASS'Y		1 EA	A		MC35		03/03/26	C	CS-MYJUNG
	3	772-543	SHIELD CAN-E	SPTE T0.3	1 EA	B	SUB			04/07/10	A	CT04-0609
	3	772-544	SHIELD CAN-F	SPTE T0.3	1 EA	B	SUB			04/01/09	A	CT04-PAT
	3	772-548	SHIELD PLATE	CU PLATE T0.1	1 EA	B	SUB			03/03/26		
	3	772-549	SHIELD BRACKET	SPTE T0.3	2 EA	B	SUB			03/03/26		
	3	907-078	INSULATION PLATE	INSULATION PAPER T0.15	1 EA	B	SUB			03/03/26		
11	2	577-66M-PA	MAIN PCB ASS'Y		1 EA	A				03/03/26	A	CS-MYJUNG
	3	895-785	BUSHING TERMINAL	SILICONE RUBBER	2 EA	B	SUB			03/03/26		
	3	895-786	BUSHING MIC	SILICONE RUBBER BLK	1 EA	B	SUB			03/03/26		
	3	895-794	CUSHION(X'TAL)	CR SPONGE 5X5XT1.0	1 EA	B	SUB			03/03/26		
	3	895-795	CUSHION-B	CR SPONGE 5X5XT1.0	3 EA	B	SUB			03/03/26		
12	2	577-66P-A	PACKING ASS'Y		1 EA	A				03/03/26	A	CS-MYJUNG
	3	518-149-A	RUBBER GASKET ASS'Y	HP-446	1 EA	B	SUB			04/04/02	A	CT04-0317
	4	665-130	ERING	SUS T0.5	1 EA	B	SUB			04/04/02	A	CT04-0317
	4	896-357	RUBBER GASKET	SILICONE RUBBER BLACK	1 EA	B	SUB			04/04/02	A	CT04-0317
	4	925-067-E	POLYBAG	P.E 40X55	1 EA	B	FIN			04/04/02	A	CT04-0317
	3	91C-002	PAD (TRC-439)	SW1S 268X21	1 EA	B	FIN			04/07/21	A	CT04-0639
	3	91D-012	BOX INNER(UK)	SW1S 230(W)X210(D)X102(H)	1 EA	B	FIN			04/07/21	A	CT04-0639
	3	91D-020	PAD"A"	SW1E 399X381	1 EA	B	FIN			04/07/21	A	CT04-0639
	3	91D-021	PAD"B"	SW1E 612X243	1 EA	B	FIN			04/07/21	A	CT04-0639

			3	91D-136-E	BOX OUT	DW1E 423(W)X308(D)X237(H)	0,167	EA	B	FIN		04/08/27	A	CT04-0787
			3	921-530-E	POLYBAG	P.E 150X300XT0.05	2	EA	B	FIN		04/07/21	A	CT04-0639
			3	937-802	MANUAL OWNER'S	MANUAL OWNER'S	1	EA	B	FIN		04/07/21	A	CT04-0639
			3	943-244-C	WARRANTY CARD	WOOD PAPER 350X92	1	EA	B	FIN		04/07/21	A	CT04-0639
			3	943-862	BOOKLET RTTE	WOODFREEPAPER 210X120	1	EA	B	FIN		04/11/01	A	CT04-0977
			3	943-863	CARD CERTIFICATE	ARTPAPER 210X120	1	EA	B	FIN		04/11/01	A	CT04-0977
			3	95A-767	SERIAL LABEL	ART PAPER 45X10	1	EA	B	FIN		04/07/21	A	CT04-0639
			3	95A-768	SERIAL LABEL	ART PAPER 45X20	1	EA	B	FIN		04/07/21	A	CT04-0639
			3	95B-102	LABEL RTTE COUNTRY	ARTPAPER 90X15	1	EA	B	FIN		04/07/21	A	CT04-0639
			3	95B-131	LABEL CE	ARTPAPER 33X8	1	EA	B	FIN		04/07/21	A	CT04-0639
			3	95B-157-A	LABEL EU-COUNTRY	ARTPAPER 46X33	1	EA	B	FIN		04/07/21	A	CT04-0639
			3	95B-205	LABEL ALAN SPAIN	ARTPAPER 80X30	1	EA	B	FIN		04/11/01	A	CT04-0976
			3	95B-206	LABEL NAME	POLYESTER 34.5X44XT0.2	1	EA	B	FIN		04/11/01	A	CT04-0977
			3	95B-207	LABEL GIFT BOX	ARTPAPER 180X82	1	EA	B	FIN		04/11/01	A	CT04-0977
	13	2		577-66W-A	WIRE ASS'Y		1	EA	A			04/01/06		
			3	427-023-6	WIRE	1007 AWG 24(11/0.16) RED	0,08	ME	B	SUB	0.5:0.5	04/01/06		
			3	427-041-2	WIRE	1007 AWG 26 (7/0.16) BLK	0,05	ME	B	SUB	0.5:0.5	04/01/06		
			3	427-044-5	WIRE	1007 AWG 26(7/0.16) ORG	0,16	ME	B	SUB	0.5:0.5	04/01/06		

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* TOTAL RECORD = 334