



M-150 Plus

Service Manual

.

Model No: M150 Plus

Customer: INTEK

Rev No: A



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SPECIFICATIONS

1. GENERAL

Channels.....400 Ch AM/FM 4W
Frequency Range.....25.615 to 30.105 MHz
FrequencyControl.....PLL
Operating Temperature Range.....-10° / +55°C
DC Input Voltage.....13.2 V DC $\pm$ 15%
Size.....180(L) X 35(H) X 140(D) mm
Weight.....0.850 kg

2. RECEIVER

Receiving System.....Dual Conversion Super Heterodyne Intermediate
Frequency.....1st IF: 10.695 MHz, 2nd IF: 455 MHz
Sensitivity.....0.5 μ V for 20 db SINAD in FM mode Audio
Distortion.....Less Than 8% @ 1 KHz
ImageRejection.....65 dB
Adjacent ChannelRejection.....65 dB
Signal/ Noise Ratio.....45 dB
Current Drain at standby.....325 mA

3. TRANSMITTER

Output Power.....4W @ 13.2 V DC
Modulation.....FM: 1.8 KHz $\pm$ 0.2 KHz
Frequency response.....From 400 Hz to 2.5 KHz
Output impedance.....RF 50 ohm
Unbalance Signal/ Noise Ratio.....40 dB
MIN Current Drain.....1300 mA



OPERATION INSTRUCTIONS

Having properly installed your batteries and hooked-up the antenna, you are now ready to operate your radio for optimum reception and voice transmission.

Turn the power "ON" with ON/OFF switch.

Set the desired channel.

Adjust the squelch control knob to reduce any undesirable background noise when no signal is being received. To do this, select a channel where no signal are present, or wait until signals cease on your channel. Then, rotate the squelch control knob clockwise to a point where the background noise disappears.

Note: When the squelch is set properly, the speaker will remain quiet until a signal is received. In order to receive weak signals, do not set the squelch too high.

Adjust the volume to the desired listening level.

To Transmit

Press and hold the push-to-talk button. Speak slowly and clearly in a normal voice two to three inches from the microphone. A built-in modulation control circuit will automatically adjust the microphone input level. There is no need to speak loudly.

To Receive

Release the push-to-talk button.



THEORY OF OPERATIONS

TRANSMITTER

A. RF Amplification

The output of double AMP Q14 is fed through tuning IFT L8 to the base of pre driver AMP Q15. The output is then supplied through tuning circuit L9 to RF driver AMP Q16. The output of Q16 is supplied with tuning circuit L10 and C116,C67,C95 and goes to the base of final RF AMP Q17. The output of Q17 is supplied to the antenna through L-C tuning circuit.

B. Circuit for Suppression of Spurious Radiation

The tuning circuit between the output of final AMP Q17 and antenna, 4-stage "PHI" network L13, C142,C71,C72,L14,C74,C75,L15,C77,C78,L16,C79,C80,L24 serves as a spurious radiation suppressor . This network also serves to match the impedance between TX power AMP Q17 and the antenna.

C. Circuit for Limiting Power

After finished all alignment, the constant voltage supply circuit limits the available power 4 W or slightly less. RV4 and corresponding three transistors control supply voltage of RF amplifier and other circuits.

Tune all the trimmer parts for maximum indication of RF power meter and adjust RV4 to make 4 w indication of RF power meter.

The tuning is adjusted so that the actual power is from 3.5 to 4.0 W. There are no other additional controls for adjusting the TX output power.

D. Modulation Control

a. FM

The mic input is fed to mic audio amplifier IC KIA324 which drives modulation varicap diode D403 in the VCO circuit. RV1 limits the incoming modulation audio levels to inhibit over modulation. While reading the modulation factor on the modulation analyzing equipment, adjust RV1 shall not exceed ± 1.7 KHz/Dev. After 20 dB up from 1.25 KHz/1.2 KHz/Dev. Audio level

b. AM

Modulation signals are filtered with RC network and goes to the audio power AMP IC IC103 to make nominal signal level to achieve wanted modulation. To control incoming audio signal, diode D7 and corresponding ALC circuit limits the modulation shall not exceed $\pm 90\%$ adjust RV3 $\pm 90\%$ modulation under 1.0 KHz AF 60% mod plus 20 dB of audio signal.



E. Receiver

CB receiver is dual conversion super-heterodyne type with the first IF 10.695 MHz and second IF 455 KHz. Receiver is separated two blocks, 1st IF section and 2nd IF section. The PLL synthesizer supplies first local frequency 16.270 ~ 16.710 MHz.(for EU) and 16.90625 MHz ~ 17.29625 MHz (for UK) With the provided first local frequencies to Q2,Q3 mixes the incoming RF signal to generate first IF signal. Mixed signals were filtered with the XF1 (10.695 MHz) crystal filter and other tuning circuits. Output signal of mixer is filtered with CF1(455 KHz ceramic filter). The 455 KHz signal from the 2nd IF filter was amplified and limits internally. After amplification the signals fed the quadrature detector loop L20. Then we can see the recovered audio signals on Pin 9 for FM of IC7. With the amplitude of recovered signals, Q10 serves as an audio amplifier. For AM signal Will be pass filter CF1 and induced to Q6, Q7 respective and detected to voice signal by D5.

TROUBLESHOOTING HINTS

Symptom	Probable Cause	Remedy
Unit does not work at all	• Defective power switch VR1. • Blown fuse. • Broken DC power cord. • Defective IC5.	• Replace • Replace • Replace • Replace
No output from speaker at all	• Defective external speaker jack. • Poor connection on microphone connector • Defective push switch on microphone. • Defective internal speaker. • Defective VR1, IC8 other components.	• Repair or replace • Repair or replace • Repair or replace • Replace • Replace the defective components.
No noise on speaker	• Measure all the voltage of IC7 with voltage chart • Defective squelch circuit components (RV5,RV7,VR2 IC7)	• Replace • Replace
Squelch does not work	• Defective VR2, RV5,RV7, IC3-D.	• Replace the defective components. • Re-adjust

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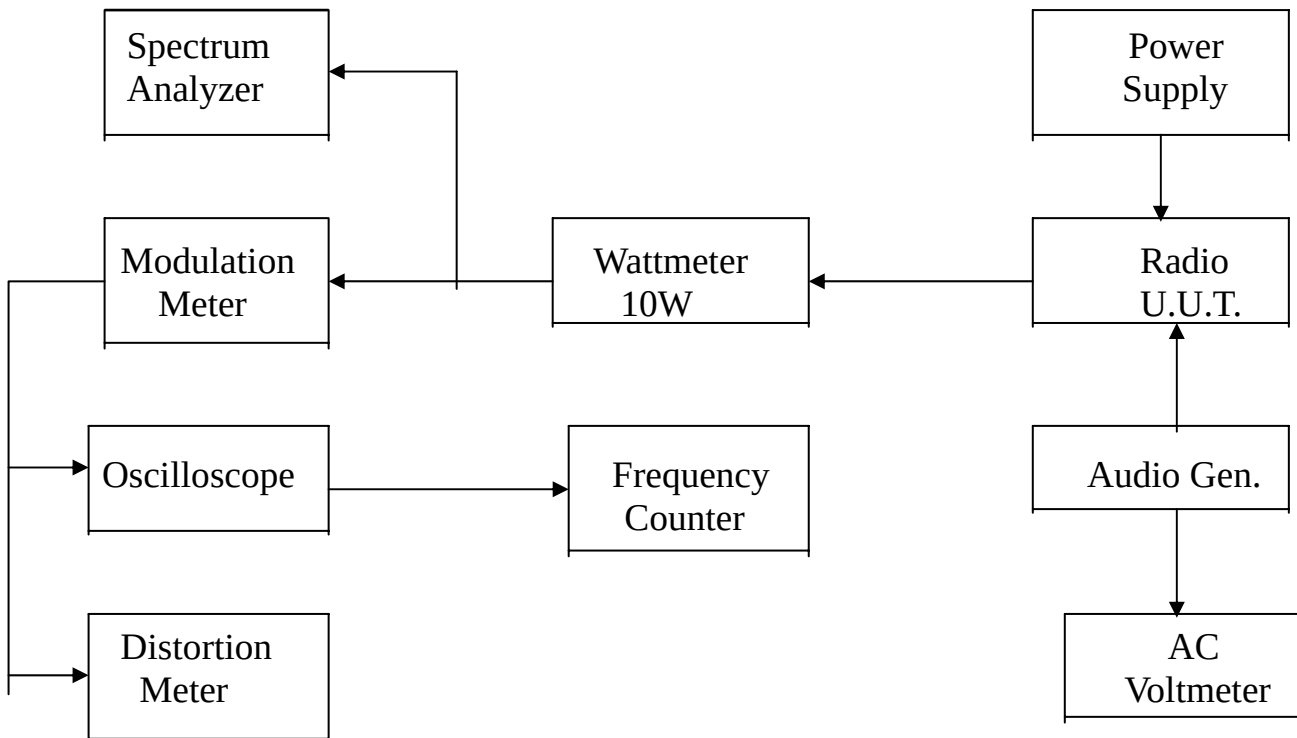
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No modulation	• Defective microphone. • Poor audio output and defective modulation microphone amplifier components (IC3). • Defective microphone connector components. • Defective ALC circuit D8,D9	• Replace • Replace the defective components. • Replace • Replace the defective components.
LCD meter does not work	• Defective D11,D22 • Defective IC5. • Defective RV2.RV6	• Replace • Replace • Replace
LCD display does not work	• Defective RED wire fuse. • Defective IC5, .	• Replace • Replace
Channel selector does not work	• Defective IC5.	• Replace
EMG CH9.19 does not work	• Defective EMG SW. • Defective IC5.	• Replace • Replace

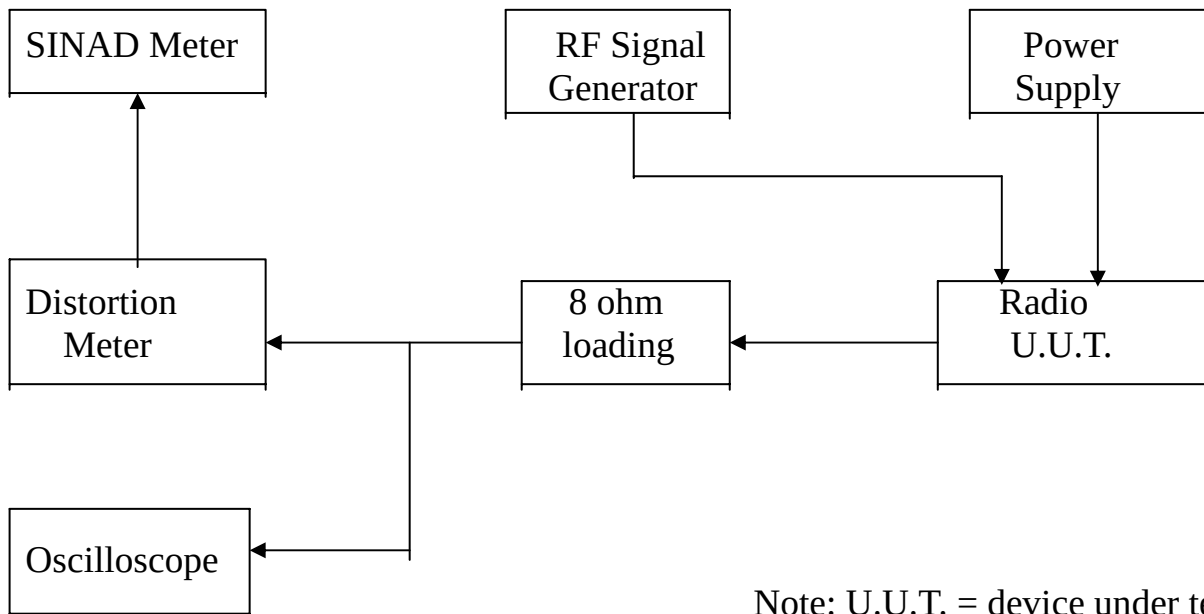
TEST EQUIPMENT SETUP

A. TX test equipment setup:





B. RX test equipment setup:



Alignment Procedure.

4.1 VCO Adjust.

4.1.1 VCO Voltage Adjust:

Test point TP1 connect to the multi-meter, set UUT enter test mode. Press channel “UP” key to select CH01A of Poland Band in FM mode.

1. Adjust IFT L17 for $1.0 \pm 0.1V$ on the Multi-meter read, and then checking CH40L of RU Band should be less than 3.8V, and then check AM mode **CH01A $\geq 0.8V$, CH40L $\leq 3.8V$**
2. Set UUT for TX MODE: Check **CH01A $\geq 0.8V$, CH14D $\leq 3.8V$; CH15D $\geq 0.8V$, CH21G $\leq 3.8V$; CH22G $\geq 0.8V$, CH40L $\leq 3.8V$.**
3. Turn to AM mode and repeat above item 2.

4.2 RX Section Alignment . (FM and AM)

4.2.1 Audio Distortion Adjust:

1. UUT set to FM mode CH19, output of RF signal generator connect to **TP2**. Audio dummy load connect to **EXT. Speaker.** (@8Ω load)
2. Set RF S.S.G Freq.: 10.695MHz, Mod.: $\pm 1.2KHz$, Fmod.: 1KHz, Output level: 1mV.
3. Squelch Volume set to minimum position, volume control set to around middle position.
4. Adjust IFT L20 for maximum audio output and minimum distortion at the distortion meter. (distortion less than 5%).
5. Set volume control to maximum position, audio output power shall be more than 3 Watts.
6. UUT set to AM mode CH19, output of RF signal generator connect to **TP2**. Audio dummy load connect to **EXT. Speaker.** (@8Ω load)



7. Set RF S.S.G Freq.: 10.695MHz, Mod.: 60%, Fmod.: 1KHz, Output level:1mV.
8. Squelch Volume set to minimum position, volume control set to around middle position.
9. Adjust IFT L5 for maximum audio output and minimum distortion at the distortion meter. (distortion less than 5%).
10. Set volume control to maximum position, audio output power shall be more than 3 Watts.

4.2.2 Sensitivity Adjust:

1. RX RF bandwidth alignment: Apply Spectrum analyzer's Track Gen. Output connect to the UUT antenna terminal and input connect to the UUT TP3 (Q26 Emitter), center frequency set 27MHz, span set 30MHz, adjust IFT L4, L21 & L22 refer to attached table curve, then short TP3 & TP4.
2. UUT set to FM mode CH22, output of RF signal generator connect to **TP5 (Antenna)**.
3. Set RF S.S.G Freq.: 27.225MHz, Mod.: ± 1.2 KHz, Fmod.: 1KHz, Output level:0.5uV.
4. Adjust the volume control for 2V output on distortion meter read.
5. Adjust L2 & L3 for more than 12dB at SINAD meter.
6. Repeat as needed. Check all channels sensitivity must met the D.T.S. specifications.
7. UUT set to AM mode CH22, output of RF signal generator connect to **TP5 (Antenna)**.
8. Set RF S.S.G Freq.: 27.185MHz, Mod.: 60%, Fmod.: 1KHz, Output level:0.5uV.
9. Adjust the volume control for 2V output on distortion meter read.
10. Adjust L2 & L3 for more than 12dB at SINAD meter.
11. Repeat as needed. Check all channels sensitivity must met the D.T.S. specifications.

4.2.3 T- Squelch Sensitivity Adjust:

1. UUT set to AM CH22, output of RF signal generator to the antenna input terminal.
2. Set RF S.S.G Freq.: 27.225MHz, Mod.: 60%, Fmod.: 1KHz, Output level: -47dBm.
3. Volume control and Squelch control set to maximum position, (Full C.W)
4. Adjust the **RV5** to mute the speaker, then turn the RF S.S.G. output level to -47dBm.
5. Slowly turn **RV5** to a position that the audio output on the speaker just appears from no output. Turn the RF S.S.G. output level to -57dBm, the audio must be off from the speaker.

Auto Squelch Adjust:

6. UUT set to AM CH22, output of RF signal generator to the antenna input terminal.
7. Set RF S.S.G Freq.: 27.225MHz, Mod.: 60%, Fmod.: 1KHz, Output level: -104dBm.
8. Squelch volume control set to minimum and Off position (Full C.C.W).
9. Adjust the **RV7** to mute the speaker, Slowly turn **RV7** to a position that the audio output on the speaker just appears from no output. Turn the RF S.S.G. output level to -107dBm, the audio must be off from the speaker.

4.2.4 RX Signal Meter Display Adjust: (For M-760 Only)

1. UUT set to AM CH22, output of RF signal generator to antenna input terminal. RF Gain volume at maximum. Power switch turn on.



2. Turn the RF S.S.G output for 100uV without modulation.
3. Adjust RV6 for 9 characters displayed at the RX signal strength of the LCD.
4. Turn the RF S.S.G level output increase 30dB, the RX signal strength should up to +30 position.

4.2.5 Maximum S/N Detector & ANL detection:

1. UUT set to FM CH22, output of RF signal generator to antenna input terminal. RF Gain set to maximum, Squelch set to minimum, compander set off. (M-150 W/O Compander)
2. Set RF S.S.G Freq.: 27.225MHz, Mod.: $\pm 1.2\text{KHz}$, Fmod.: 1KHz, Output level: 1mV.
3. The Volume control turn to 0.5 watts audio output for reference A dB.
4. Then off the Modulation, here the audio output for reference B dB. A-B for $S/N \geq 35\text{dB}$.
5. Compander set to On, repeat above item 3 and 4, A-B for $S/N \geq 50\text{dB}$. (M-760 only)
6. UUT set to AM CH22, set RF S.S.G Mod. for 60%. Compander set Off. Repeat above item 3 and 4, A-B for $S/N \geq 35\text{dB}$; Compander set to On, repeat above item 3 and 4, A-B for $S/N \geq 50\text{dB}$. (M-760 only)
7. UUT set to AM CH22, set RF S.S.G mod for 30%. RF level set 5.0uV. ESP set off. RF Gain set to maximum, Squelch set to minimum. ANL set off, Noise generator (pulse 1us; width 100ms; output level 1.0Vrms) set to on and connect to the antenna socket with network combinator.
8. Set audio output level for 0.8Vrms for 0dB reference, RF S.S.G MOD. turn off, set ANL to ON, the audio output should be drop 6dB or below.

4.3 TX Section Alignment.

4.3.1 TX output power and Frequency Alignment:

1. UUT set to FM EU CH19, Antenna connect to the RF power-meter input terminal.
2. Set UUT to TX mode, adjust the IFT L8 and L9 for TX power output maximum, and then adjust the RV4 check the output TX power for 4.0W.
3. Set UUT turn to AM mode, check the TX power output for 0.7 to 1.3W.
4. Change to channel to UK band "U40" (27.99125MHz), Adjust the trimmer capacitor CT1 to $27.99125\text{MHz} \pm 50\text{Hz}$ on frequency counter. The UUT turn to EU CH19, check the TX carrier frequency should $27.185000 \pm 300\text{Hz}$.
5. TX harmonics adjust and checking, turn to FM CH19, adjust L24 for 2nd harmonic -36dBm below.

4.3.2 TX Signal Meter Indicator Alignment.

1. UUT set to AM CH19, input of power-meter to antenna input terminal.
2. Set UUT to TX mode, adjust the RV2 for "4" characters displayed at the TX signal strength of the LCD display.

4.3.3 TX modulation Deviation Alignment:



1. UUT set to FM I2 CH19, input of power-meter to antenna input terminal. Input of MIC socket to the audio frequency signal generator output terminal. Mic Gain set to maximum. Comander set to Off.
2. Set audio frequency signal generator @ FREQ.: 1000Hz Output level: 50mVrms. Note: Should be add one 10uF capacitor in series between the AF signal O/P and UUT input.
3. Set UUT to TX mode, adjust RV1 for 1.6KHz deviation on modulation meter.
4. Decrease the AF output level. Check the 1.2KHz deviation modulation sensitivity should be between 8 -15 mV; Comander set On, Check the 1.2KHz deviation modulation sensitivity should be between 3-8 mV.
5. Turn the AF output level for 1.2KHz deviation on modulation meter, check the modulation distortion must be less than 5.0% on the audio distortion meter for Comander On and Off..
6. Set UUT to AM mode; Set audio frequency signal generator @ FREQ.: 1000Hz Output level: 50mVrms.
7. Set UUT to TX mode, adjust RV3 for 90% deviation on modulation meter.
8. Decrease the AF output level. Check the 50% deviation modulation sensitivity should be between 8-15 mV; Comander set On, Check the 50% deviation modulation sensitivity should be between 3-8 mV.
9. Turn the AF output level for 60% deviation on modulation meter, check the modulation distortion must be less than 5.0% on the audio distortion meter for Comander On and Off..

4.3.4 PA audio output checking:

1. The UUT enter PA mode after long press the “ANL” key, Volume set maximum position for M-150, and the MIC gain set maximum position for M-760. 1KHz audio input.
2. Turn to TX mode, the PA output must meet the DTS.

5.0 TEST MODE DESCRIPTION, Model Selection and International Band Select:

1. For M-760, Press both keys of “ANL” & “Scan” synchronously, then turn on the DC power enter test mode. Press the “ENG” key for Software version checking, press the Channel “Down” key for LCD segments scanning checking.
2. For M-150, Press both keys of “ANL” & “DN” synchronously, then turn on the DC power enter test mode. Press the “ENG” key for Software version checking, press the Channel “Down” key for LED segments scanning checking.
3. RX & TX parameter test: Press the “channel up” key can select Germany CH41 (26.565MHz), CH19(27.185MHz), EU CH22(27.225MHz) and UK CHU40(27.99125MHz), PO CH01A and RU CH40L.
4. EEPROM control for VCO alignment for Channel RU 14D, RU 15D, RU 21G and RU 22G.
5. VCO Alignment Channel: PO band CH01A(25.610MHz) ---- Low channel; RU band channel CH40L(30.105MHz) ---- High channel.
6. Model selection and European band and International band selection.

Model select: M-150 R146 = N/A and R145 = 10K; M-760 R146 = 47K and R145 = N/A. (CPU PIN64 pull high for M-150; CPU PIN64 pull low for M-760)

International Band select: “IB” pad open for European band only, International band disable; “IB” PAD shorting that the International band enable and the European band enable also. (CPU pin 21 pull high for International Band)



7. BAND SELECTION:

- M-150: 1) switch ON radio while pressing the UP key
 2) display will show the current band ID code (blinking)
 3) select band using the UP or DN keys
 4) shortly press the DN key to confirm
 5) display will show the selected band ID code for 2-3 seconds, then it will show the channel number

- M-760: 1) switch ON radio while pressing the EMG key
 2) display will show the current band ID code (blinking)
 3) select band using the UP or DN keys
 4) shortly press the EMG key to confirm
 5) display will show the selected band ID code for 2-3 seconds, then it will show the channel number

6.0 Factory Setting of Band for Shipment

FACTORY SETTING

All radios must be shipped from factory set as follows :

BAND SETTING : EUROPEAN BANDS ONLY

RADIO SWITCH ON : **CE BAND**

Step	Setting	Connection	Adjuster	Adjust for
1	Frequency adjustment MIC : Receive Volume : optional Squelch : optional CH selector : 19 EU CH9 : off	Frequency counter to dummy load (Figure 1).	CT1	27.185MHz±300Hz
2	VCO Voltage adjustment MIC : Receive Volume : optional Squelch : optional CH selector : 1A CH9 : OFF	Connect DC voltmeter between R97, C112and GND. (Figure 2).	L17	1V at RX.



PLL CIRCUIT BLOCK DIAGRAM

1. INTRODUCTION

The frequencies for transmitter and receiver first local frequencies are all derived from a single 4.0 MHz crystal by means of a phase locked loop. The first local oscillator frequencies are 26.965 MHz (CH 1) to 27.405MHz (CH 40) for EU and 27.60125 MHz (CH 1) to 27.99125 MHz (CH 40) for UK . The second local frequency is fixed at 10.240 MHz to generate second IF 455 KHz.

The VCO operating frequency for the receiver is 37.660 MHz (CH 1) to 37.560 MHz (CH 40) as the first local oscillator, injected through the buffer AMP Q411 into the first fed balanced mixer Q2 and Q3.

2. BASIC SYNTHESIZER SCHEME

The crystal frequency (4.000 MHz) is divided by 800 times to make 5 KHz which is fed to one side of the phase detector. The VCO output is divided by a programmable divider, and fed to other side of the phase detector of IC4. The feedback loop is closed by passing the phase detector output through an active low pass filter and using the output to control the VCO frequency through varicap diode D402,D403

Under locked conditions, both of phase detector input signal must be identical at 5 KHz. The VCO frequency is then given by:

$$FVCO / N = 0.005 \text{ MHz or } FVCO = 0.005 \times N \text{ MHz}$$

Since “N” is an integer, the VCO frequency can be stepped up with 5 KHz increments. By suitable choice of “N” the desired output frequency can be obtained.

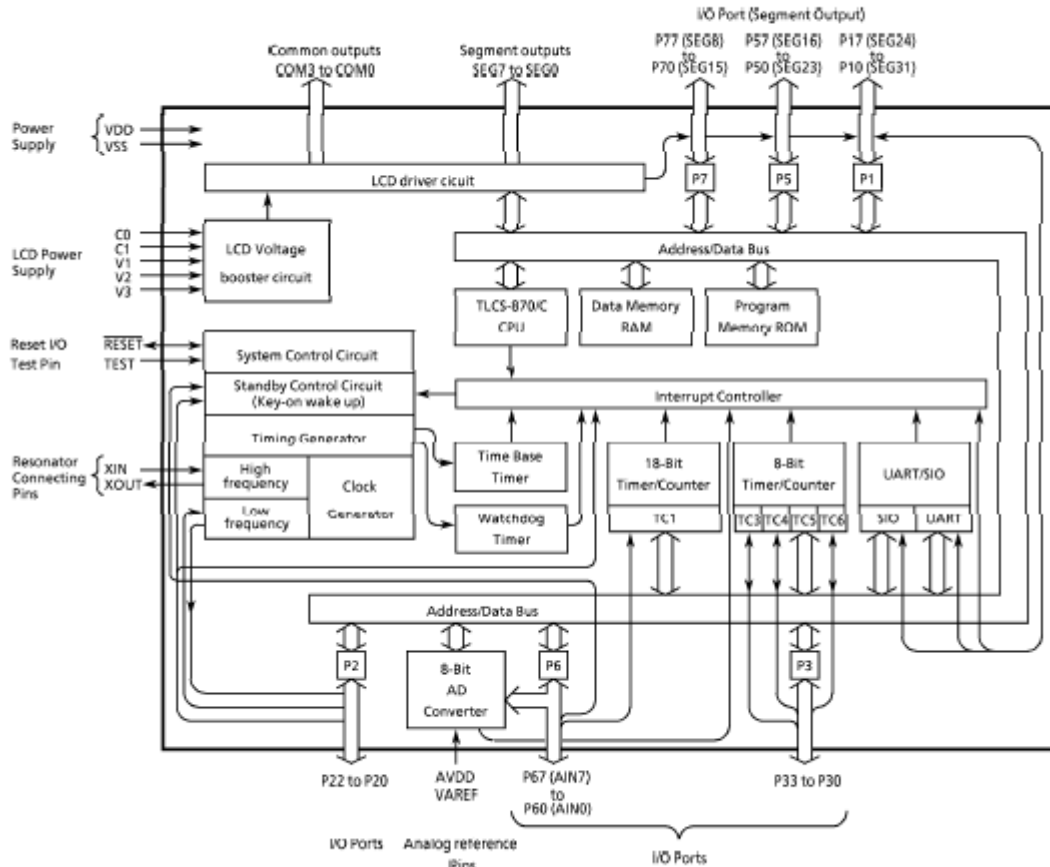
	Channel 1		Channel 40		FUNCTION
	N	FVCO	N	FVCO	
Transmit	5393	26.965	5481	27.405	EU
Receive	7532	37.660	7620	38.100	
Transmit	5520.25	27.60125	5598.25	27.99125	UK
Receive	7659.2	38.296	7737.25	38.68625	

Since all frequencies are obtained from the crystal controlled PLL oscillator, all outputs are coherent with the crystal oscillator frequency and maintaining the same percentage accuracy.



INTERNAL BLOCK DIAGRAM

Block Diagram



3. DESCRIPTIONS OF EACH BLOCK

A. Introduction

The synthesizer is implemented with the following

Components:

PLL IC (IC4)
X-TAL (X2)
VCO, VARICAP DOIDE (D402,D403)



IC5 is a cmos LSI that includes most of PLL block and driver, the Q403-Q406, Q408, C412, C421, C416, C417 and L17, Varicap diode D402, D403 are clapp oscillator circuit to operate as a VCO. Q406 is a switching transistor to connect or disconnect the tuning capacitor in the VCO oscillator tank circuit for transmitter or receiver. Q411 works as a buffer AMP for RX local frequencies (38MHz) and TX generating frequencies (26 MHz).

B. Reference frequency

The crystal, X2 (4.000 MHz) and other components at IC4 can make a reference frequency oscillator with internal amplifier.

C. VCO

Q408 and surrounding parts are consisting a clapp oscillator works as a VCO . the VCO can be oscillate over the required of 25.610MHz to 41.115 MHz

D. Phase detector and VCO control

The detector is a digital phase comparator which compares the phase of the reference signal with programmable divider output square waves and develops a series of pulses whose DC level depends on the phase error of each signal.

E. Transmitter/Receiver buffer AMP

Output signal of Q408 is fed into buffer AMP Q411,

F. Switching of tuning capacitor in VCO

The VCO circuit must tune with a wide rang of frequencies 25.610MHz to 30.15MHz for transmitter and 36.305~41.115 MHz for receiver. To comply above rang of VCO, the tuning capacitance should switched for transmission or reception.

G. Receiver local oscillator outputs

First Mixer:

The secondary output signals is injected to the sources of 1st mixer Q2, Q3 in the 1st IF mixer section

Second Mixer:

The output of 10.24 MHz oscillator circuit with XF1 is injected into the IF IC internally. Incoming IF signal and 10.24 MHz are mixed inside the IF IC to extract 2nd IF signal 455 KHz. FM, AM audio signals are recovered with the way of quadrature detector, AM signals are recovered with envelope detector.



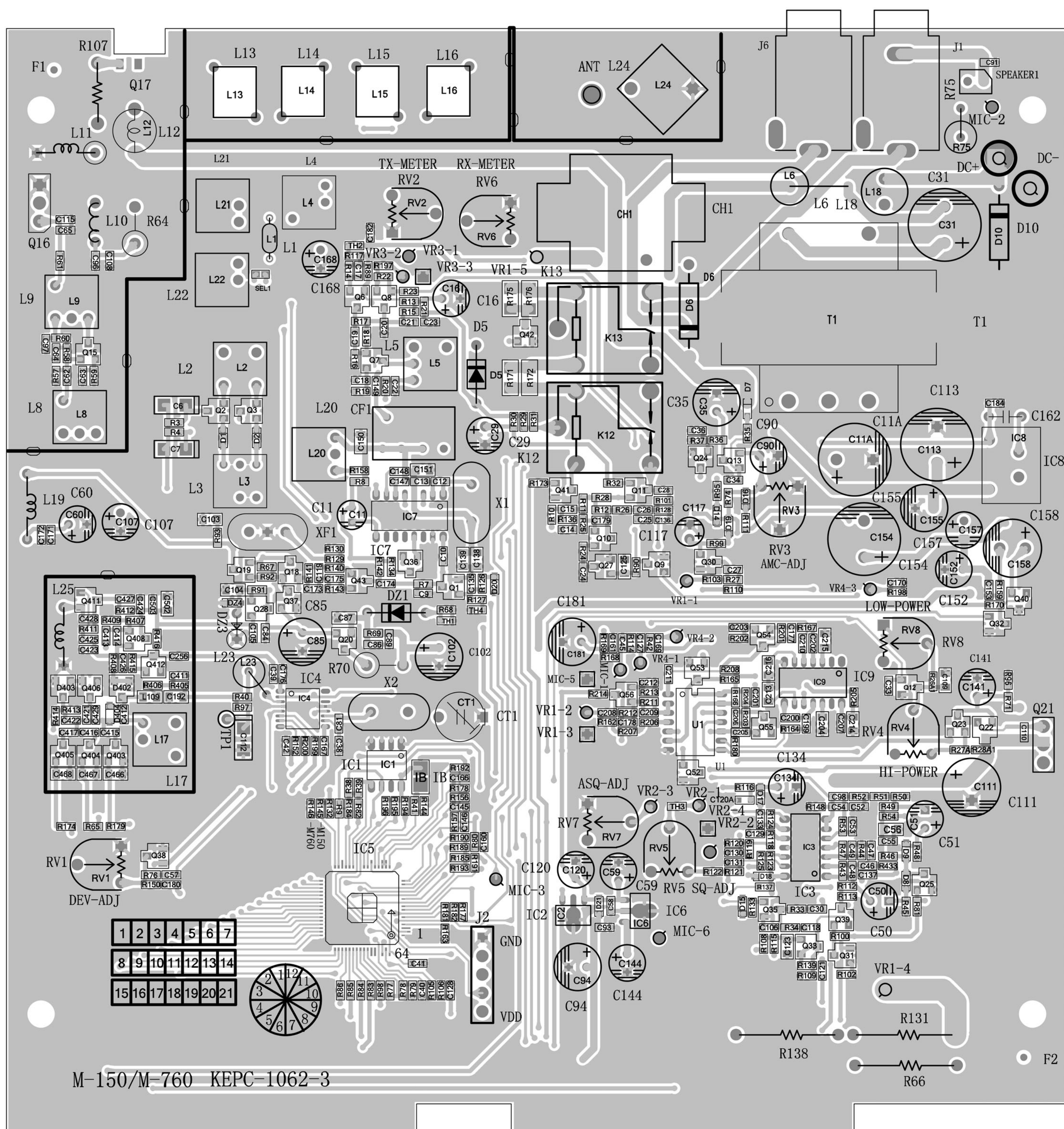
4. FREQUENCY STABILITY

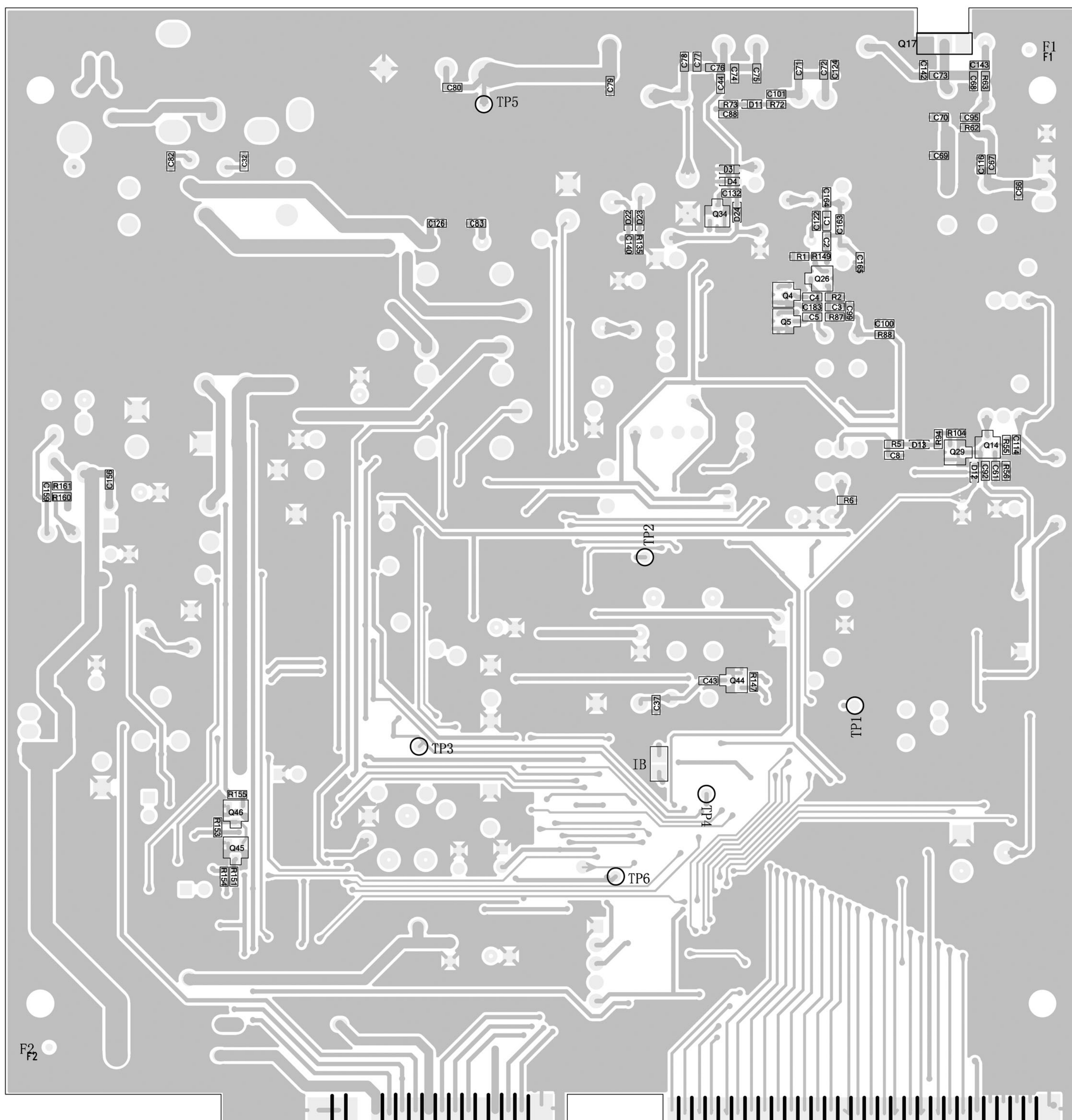
LET : F_o = Crystal oscillator frequency
 F_r = Phase detector reference frequency
 F_{vco} = VCO frequency
 F_t = Transmit frequency
 Then : $F_r = F_o/800$
 And under locked conditions : $F_r = F_{vco} / N$

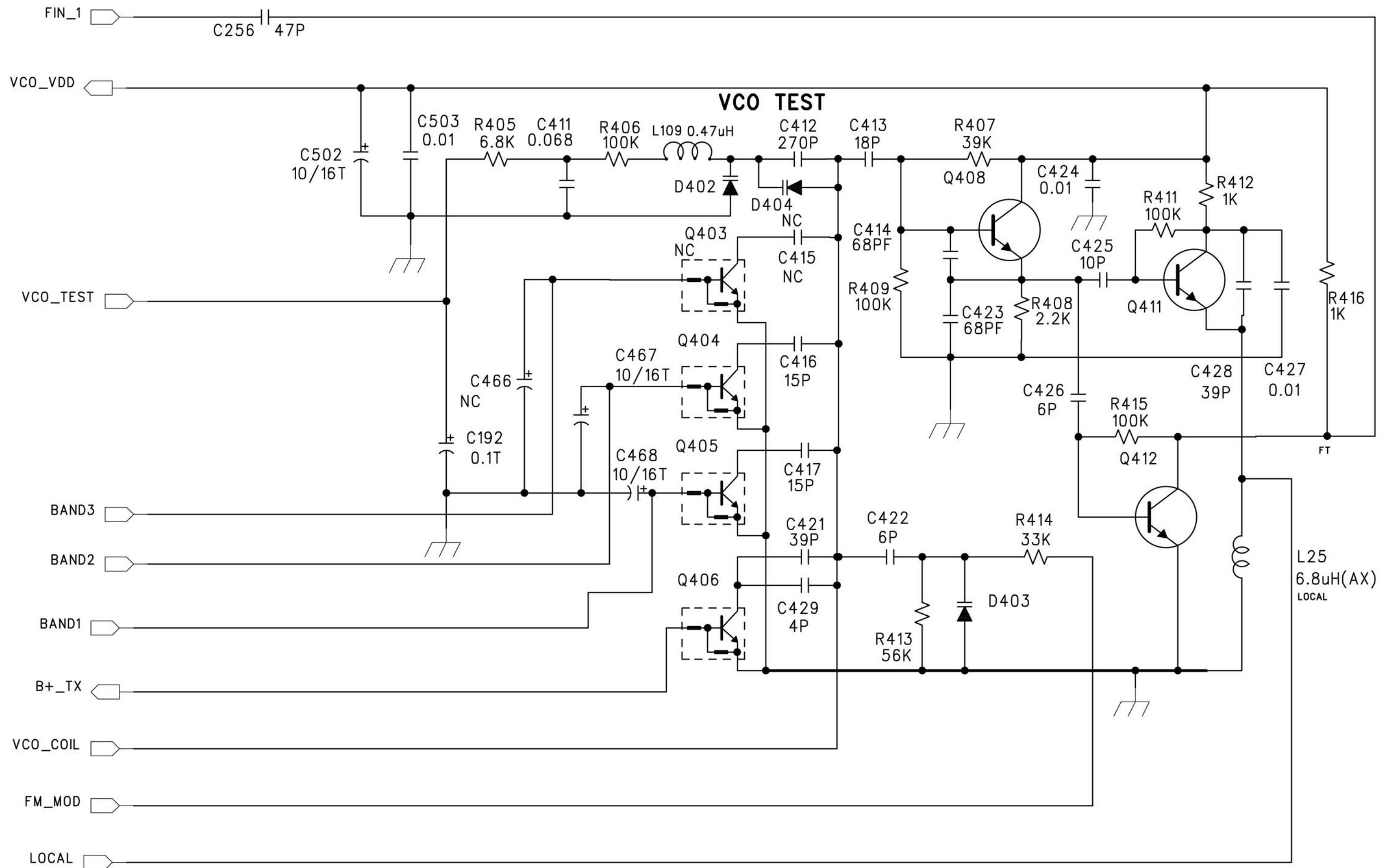
WHERE, "N" is the programmable divider divide ratio.

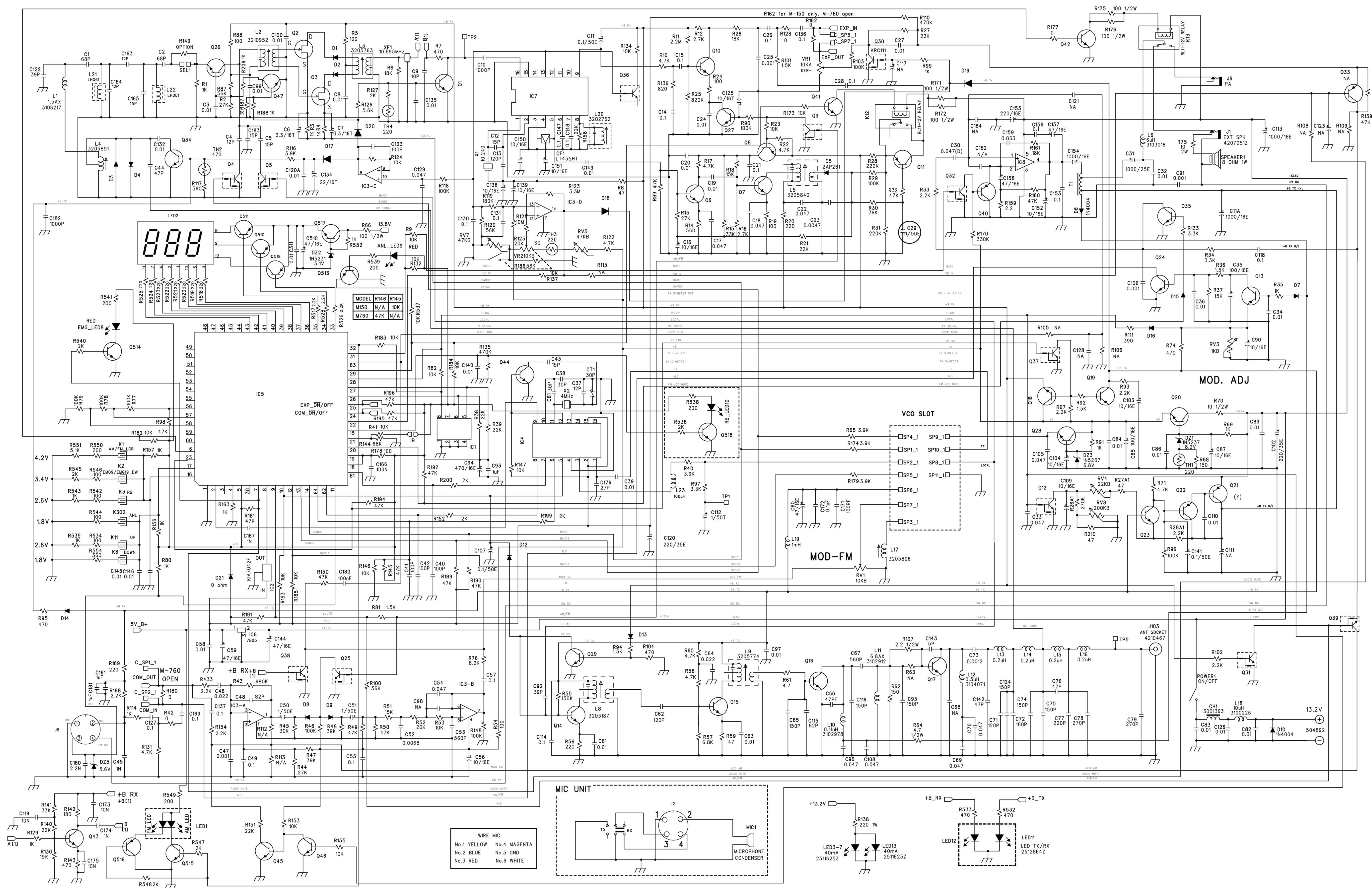
THEN : $F_{vco} = N \times F_r$

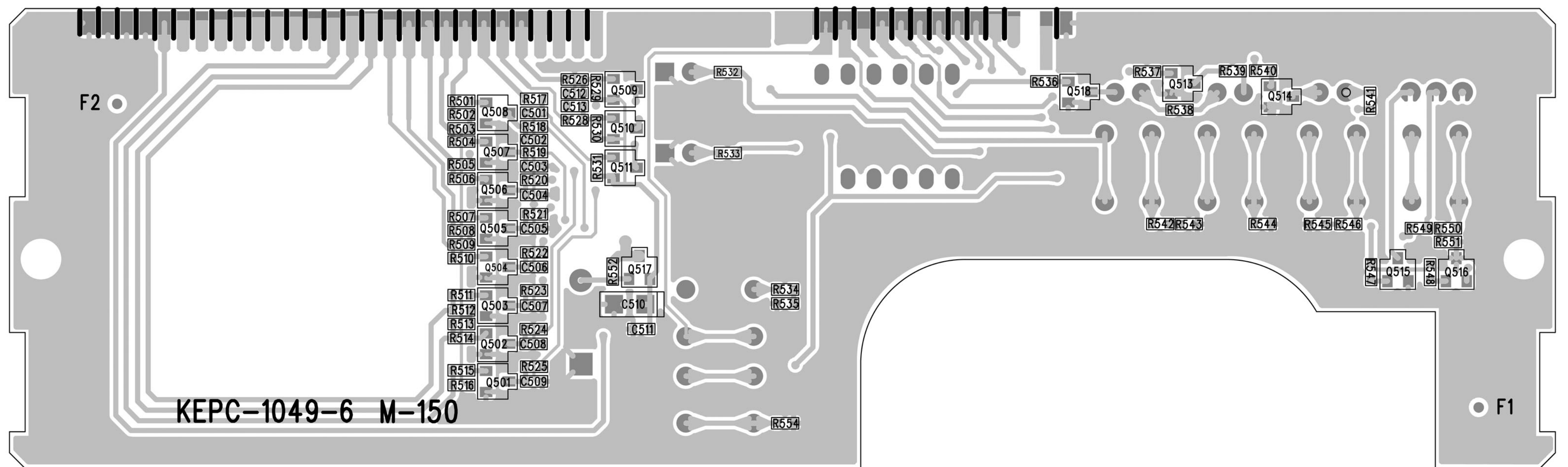
From which it can be seen, the percentage error in F_t is the same as the percentage error in F_o . The stability of the crystal oscillator is determined primarily by the crystal itself and having lesser deviation by the active and passive components of the oscillator. The choice of crystal and component is such that the required frequency stability is maintained over the required voltage and temperature rang.

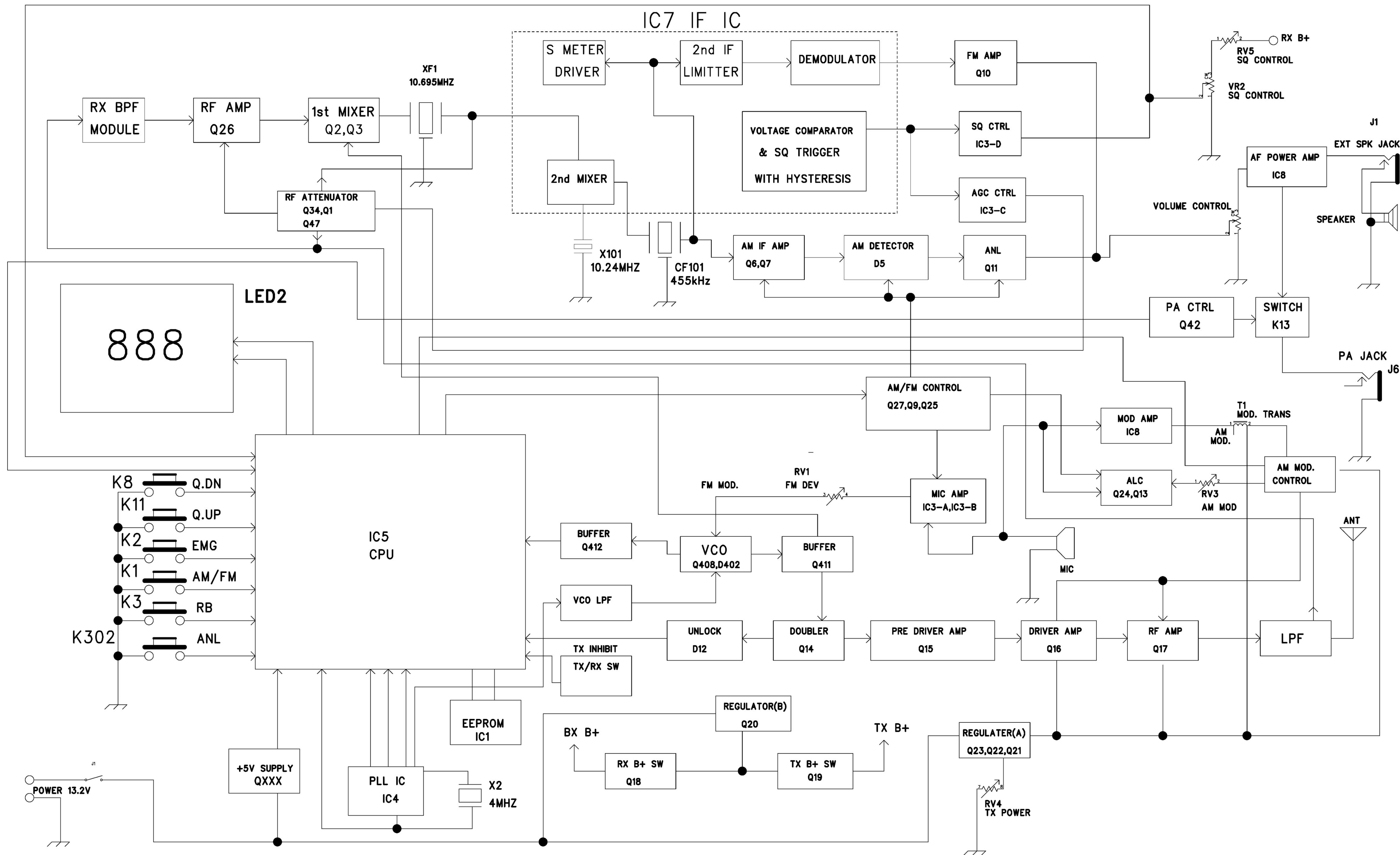


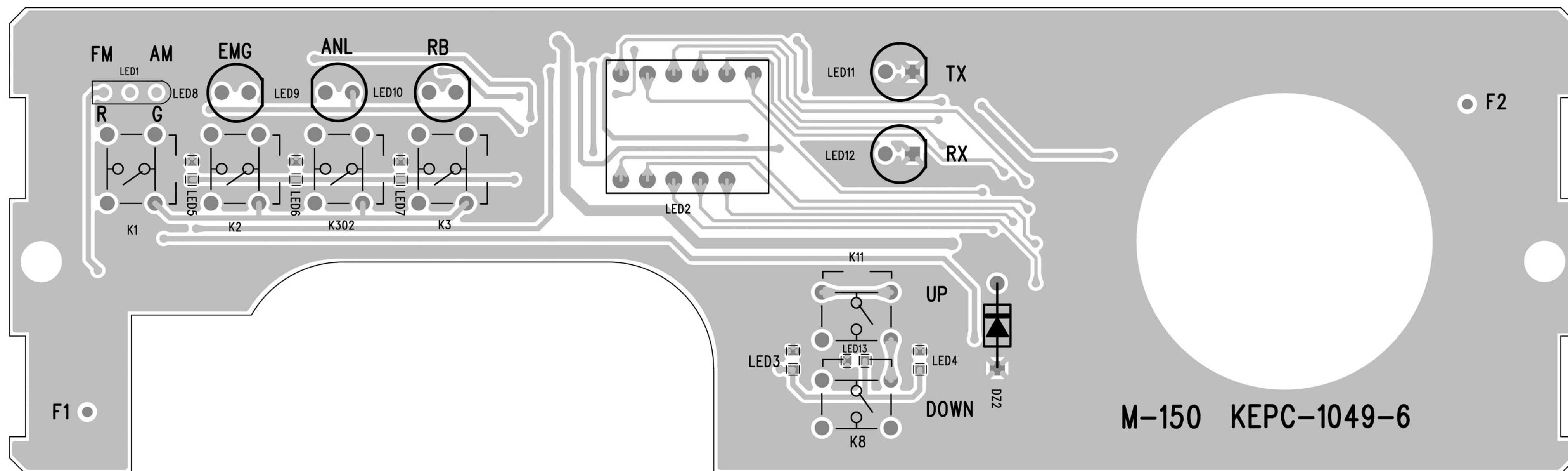














Frequencies Tables for M-760 Plus

Specification	LCD Display
Legal Bands	
Italy 40CH AM / FM 4W	EI
Italy 36CH AM / FM 4W	I2
Germany 80CH FM 4W 12CH AM 1W	DE
Germany 40CH FM 4W 12CH AM 1W	D2
Europe 40CH FM 4W 40CH AM 1W	EU
CEPT 40CH FM 4W	CE
England 40CH FM 4W English Frequencies + EC 40CH FM 4W CEPT	U
Poland 40CH AM / FM 4W Polish Frequencies –5kHz	PL
Illegal Bands	
Russia 400CH AM / FM 4W	RU
Poland 400CH AM / FM 4W Polish Frequencies –5kHz	PO
Private Channels AM / FM 4W	PC

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Frequencies for EI band (Italy 40CH AM / FM 4W)

CH	Frequency (MHz)	Modulation
1	26.965	AM / FM
2	26.975	AM / FM
3	26.985	AM / FM
4	27.005	AM / FM
5	27.015	AM / FM
6	27.025	AM / FM
7	27.035	AM / FM
8	27.055	AM / FM
9	27.065	AM / FM
10	27.075	AM / FM
11	27.085	AM / FM
12	27.105	AM / FM
13	27.115	AM / FM
14	27.125	AM / FM
15	27.135	AM / FM
16	27.155	AM / FM
17	27.165	AM / FM
18	27.175	AM / FM
19	27.185	AM / FM
20	27.205	AM / FM
21	27.215	AM / FM
22	27.225	AM / FM
23	27.255	AM / FM
24	27.235	AM / FM
25	27.245	AM / FM
26	27.265	AM / FM
27	27.275	AM / FM
28	27.285	AM / FM
29	27.295	AM / FM
30	27.305	AM / FM
31	27.315	AM / FM
32	27.325	AM / FM
33	27.335	AM / FM
34	27.345	AM / FM
35	27.355	AM / FM
36	27.365	AM / FM
37	27.375	AM / FM
38	27.385	AM / FM
39	27.395	AM / FM
40	27.405	AM / FM

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Frequencies for I2 band (Italy 34CH AM / FM 4W)

CH	Frequency (MHz)	Modulation
1	26.965	AM / FM
2	26.975	AM / FM
3	26.985	AM / FM
4	27.005	AM / FM
5	27.015	AM / FM
6	27.025	AM / FM
7	27.035	AM / FM
8	27.055	AM / FM
9	27.065	AM / FM
10	27.075	AM / FM
11	27.085	AM / FM
12	27.105	AM / FM
13	27.115	AM / FM
14	27.125	AM / FM
15	27.135	AM / FM
16	27.155	AM / FM
17	27.165	AM / FM
18	27.175	AM / FM
19	27.185	AM / FM
20	27.205	AM / FM
21	27.215	AM / FM
22	27.225	AM / FM
23	27.255	AM / FM
24	27.245	AM / FM
25	27.265	AM / FM
26	26.875	AM / FM
27	26.885	AM / FM
28	26.895	AM / FM
29	26.905	AM / FM
30	26.915	AM / FM
31	26.925	AM / FM
32	26.935	AM / FM
33	26.945	AM / FM
34	26.955	AM / FM
35	26.855	AM / FM
36	26.865	AM / FM

Model No: M150 Plus

Customer: INTEK

Rev No: A



Frequencies for DE band (Germany 80CH FM 4W 12CH AM 1W)

CH	Frequency (MHz)	Modulation	CH	Frequency (MHz)	Modulation
1	26.965	FM	41	26.565	FM
2	26.975	FM	42	26.575	FM
3	26.985	FM	43	26.585	FM
4	27.005	AM / FM	44	26.595	FM
5	27.015	AM / FM	45	26.605	FM
6	27.025	AM / FM	46	26.615	FM
7	27.035	AM / FM	47	26.625	FM
8	27.055	AM / FM	48	26.635	FM
9	27.065	AM / FM	49	26.645	FM
10	27.075	AM / FM	50	26.655	FM
11	27.085	AM / FM	51	26.665	FM
12	27.105	AM / FM	52	26.675	FM
13	27.115	AM / FM	53	26.685	FM
14	27.125	AM / FM	54	26.695	FM
15	27.135	AM / FM	55	26.705	FM
16	27.155	FM	56	26.715	FM
17	27.165	FM	57	26.725	FM
18	27.175	FM	58	26.735	FM
19	27.185	FM	59	26.745	FM
20	27.205	FM	60	26.755	FM
21	27.215	FM	61	26.765	FM
22	27.225	FM	62	26.775	FM
23	27.255	FM	63	26.785	FM
24	27.235	FM	64	26.795	FM
25	27.245	FM	65	26.805	FM
26	27.265	FM	66	26.815	FM
27	27.275	FM	67	26.825	FM
28	27.285	FM	68	26.835	FM
29	27.295	FM	69	26.845	FM
30	27.305	FM	70	26.855	FM
31	27.315	FM	71	26.865	FM
32	27.325	FM	72	26.875	FM
33	27.335	FM	73	26.885	FM
34	27.345	FM	74	26.895	FM
35	27.355	FM	75	26.905	FM
36	27.365	FM	76	26.915	FM
37	27.375	FM	77	26.925	FM
38	27.385	FM	78	26.935	FM
39	27.395	FM	79	26.945	FM
40	27.405	FM	80	26.955	FM

Model No: M150 Plus

Customer: INTEK

Rev No: A



Frequencies for D2 band (Germany 40CH FM 4W 12CH AM 1W)

CH	Frequency (MHz)	Modulation
1	26.965	FM
2	26.975	FM
3	26.985	FM
4	27.005	AM / FM
5	27.015	AM / FM
6	27.025	AM / FM
7	27.035	AM / FM
8	27.055	AM / FM
9	27.065	AM / FM
10	27.075	AM / FM
11	27.085	AM / FM
12	27.105	AM / FM
13	27.115	AM / FM
14	27.125	AM / FM
15	27.135	AM / FM
16	27.155	FM
17	27.165	FM
18	27.175	FM
19	27.185	FM
20	27.205	FM
21	27.215	FM
22	27.225	FM
23	27.255	FM
24	27.235	FM
25	27.245	FM
26	27.265	FM
27	27.275	FM
28	27.285	FM
29	27.295	FM
30	27.305	FM
31	27.315	FM
32	27.325	FM
33	27.335	FM
34	27.345	FM
35	27.355	FM
36	27.365	FM
37	27.375	FM
38	27.385	FM
39	27.395	FM
40	27.405	FM

Model No: M150 Plus

Customer: INTEK

Rev No: A



Frequencies for EU band (Europe 40CH FM 4W 40CH AM 1W)

CH	Frequency (MHz)	Modulation
1	26.965	AM / FM
2	26.975	AM / FM
3	26.985	AM / FM
4	27.005	AM / FM
5	27.015	AM / FM
6	27.025	AM / FM
7	27.035	AM / FM
8	27.055	AM / FM
9	27.065	AM / FM
10	27.075	AM / FM
11	27.085	AM / FM
12	27.105	AM / FM
13	27.115	AM / FM
14	27.125	AM / FM
15	27.135	AM / FM
16	27.155	AM / FM
17	27.165	AM / FM
18	27.175	AM / FM
19	27.185	AM / FM
20	27.205	AM / FM
21	27.215	AM / FM
22	27.225	AM / FM
23	27.255	AM / FM
24	27.235	AM / FM
25	27.245	AM / FM
26	27.265	AM / FM
27	27.275	AM / FM
28	27.285	AM / FM
29	27.295	AM / FM
30	27.305	AM / FM
31	27.315	AM / FM
32	27.325	AM / FM
33	27.335	AM / FM
34	27.345	AM / FM
35	27.355	AM / FM
36	27.365	AM / FM
37	27.375	AM / FM
38	27.385	AM / FM
39	27.395	AM / FM
40	27.405	AM / FM

Model No: M150 Plus

Customer: INTEK

Rev No: A



Frequencies for CE band (CEPT 40CH FM 4W)

CH	Frequency (MHz)	Modulation
1	26.965	FM
2	26.975	FM
3	26.985	FM
4	27.005	FM
5	27.015	FM
6	27.025	FM
7	27.035	FM
8	27.055	FM
9	27.065	FM
10	27.075	FM
11	27.085	FM
12	27.105	FM
13	27.115	FM
14	27.125	FM
15	27.135	FM
16	27.155	FM
17	27.165	FM
18	27.175	FM
19	27.185	FM
20	27.205	FM
21	27.215	FM
22	27.225	FM
23	27.255	FM
24	27.235	FM
25	27.245	FM
26	27.265	FM
27	27.275	FM
28	27.285	FM
29	27.295	FM
30	27.305	FM
31	27.315	FM
32	27.325	FM
33	27.335	FM
34	27.345	FM
35	27.355	FM
36	27.365	FM
37	27.375	FM
38	27.385	FM
39	27.395	FM
40	27.405	FM

Model No: M150 Plus

Customer: INTEK

Rev No: A



Frequency For UK Band(England 40CH FM 4W + CEPT 40CH 4W)

England Frequency			CEPT Frequency		
CH	Frequency (MHz)	Modulation	CH	Frequency (MHz)	Modulation
1	27.60125	FM	1	26.965	FM
2	27.61125	FM	2	26.975	FM
3	27.62125	FM	3	26.985	FM
4	27.63125	FM	4	27.005	FM
5	27.64125	FM	5	27.015	FM
6	27.65125	FM	6	27.025	FM
7	27.66125	FM	7	27.035	FM
8	27.67125	FM	8	27.055	FM
9	27.68125	FM	9	27.065	FM
10	27.69125	FM	10	27.075	FM
11	27.70125	FM	11	27.085	FM
12	27.71125	FM	12	27.105	FM
13	27.72125	FM	13	27.115	FM
14	27.73125	FM	14	27.125	FM
15	27.74125	FM	15	27.135	FM
16	27.75125	FM	16	27.155	FM
17	27.76125	FM	17	27.165	FM
18	27.77125	FM	18	27.175	FM
19	27.78125	FM	19	27.185	FM
20	27.79125	FM	20	27.205	FM
21	27.80125	FM	21	27.215	FM
22	27.81125	FM	22	27.225	FM
23	27.82125	FM	23	27.255	FM
24	27.83125	FM	24	27.235	FM
25	27.84125	FM	25	27.245	FM
26	27.85125	FM	26	27.265	FM
27	27.86125	FM	27	27.275	FM
28	27.87125	FM	28	27.285	FM
29	27.88125	FM	29	27.295	FM
30	27.89125	FM	30	27.305	FM
31	27.90125	FM	31	27.315	FM
32	27.91125	FM	32	27.325	FM
33	27.92125	FM	33	27.335	FM
34	27.93125	FM	34	27.345	FM
35	27.94125	FM	35	27.355	FM
36	27.95125	FM	36	27.365	FM
37	27.96125	FM	37	27.375	FM
38	27.97125	FM	38	27.385	FM
39	27.98125	FM	39	27.395	FM
40	27.99125	FM	40	27.405	FM

Model No: M150 Plus

Customer: INTEK

Rev No: A



Frequencies for PL band (Poland 40CH AM / FM 4W Polish Frequencies –5kHz)

CH	Frequency (MHz)	Modulation
1	26.960	AM / FM
2	26.970	AM / FM
3	26.980	AM / FM
4	27.000	AM / FM
5	27.010	AM / FM
6	27.020	AM / FM
7	27.030	AM / FM
8	27.050	AM / FM
9	27.060	AM / FM
10	27.070	AM / FM
11	27.080	AM / FM
12	27.100	AM / FM
13	27.110	AM / FM
14	27.120	AM / FM
15	27.130	AM / FM
16	27.150	AM / FM
17	27.160	AM / FM
18	27.170	AM / FM
19	27.180	AM / FM
20	27.200	AM / FM
21	27.210	AM / FM
22	27.220	AM / FM
23	27.250	AM / FM
24	27.230	AM / FM
25	27.240	AM / FM
26	27.260	AM / FM
27	27.270	AM / FM
28	27.280	AM / FM
29	27.290	AM / FM
30	27.300	AM / FM
31	27.310	AM / FM
32	27.320	AM / FM
33	27.330	AM / FM
34	27.340	AM / FM
35	27.350	AM / FM
36	27.360	AM / FM
37	27.370	AM / FM
38	27.380	AM / FM
39	27.390	AM / FM
40	27.400	AM / FM

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PART LIST

Item	Part Number	Description	QTY	Ref
1	KEJ-010	ANTENNA RECEPTACLE 89713-0013	1	
2	KEJ-512	MIC SOCKET 6PIN N- 16-6R QIINGXI NG	1	
3	KEJW-TA24BK	TINNED WIRE UL1007 #24 BLACK	1	SPMIC (L=0. 11), VR1, VR2 VR3, VR4SW
4	KEJW-TA24BL	TINNED WIRE UL1007 #24 BLUE	0. 2	MIC (L=0. 16), VR1 (L=0. 08)
5	KEJW-TA24GR	TINNED WIRE UL1007 #24 GREEN	0. 5	MIC, VR1, VR2, VR3 VR4 (L=0. 1), SW (L=0. 03)
6	KEJW-TA24RD	TINNED WIRE UL1007 #24 RED	0. 4	VR1, VR2, VR4, MIC
7	KEJW-TA24WE	TINNED WIRE UL1007 #24 WHITE	0. 5	MIC, VR1, VR2, VR3
8	KEOE-OT513	DC POWER CORD UL10 15 20AWG	1	
9	KESP-253	80HM 2W L3050AE-8- 7B05R ASAHI	1	SPEAKER1
10	KET-C2078D	TRANSISTOR NPN 2SC 2078 (D)	1	Q17
11	KEC-E104HRMU	CAP. ELECT. 50V M 0. 1UF	3	C107, C141, C168
12	KEC-E105HRMU	CAP. ELECT. 50V M% 1UF	3	C29, C50, C51
13	KEC-E106ERMU	CAP. ELECT. 16V M% 10UF	3	C16, C90, C152
14	KEC-E107ERMU	CAP. ELECT. 16V M% 100UF	3	C35, C85, C181
15	KEC-E108FRMU	CAP. ELECT. 25V M% 1000UF	4	C31, C113, C154, C11A
16	KEC-E226ERMU	CAP. ELECT. 16V M% 22UF	2	C134, C158
17	KEC-E227ERMU	CAP. ELECT. 16V M% 220UF	3	C120, C155, C60
18	KEC-E227FRMU	CAP. ELECT. 25V M% 220UF	1	C102
19	KEC-E476ERMKS	CAP. ELECT. 16V M% 47UF	1	C157
20	KEC-E476ERMU	CAP. ELECT. 16V M% 47UF	2	C59, C144
21	KEC-E477ERMU	CAP. ELECT. 16V M% 470UF	2	C94, C185
22	KEC-TR031-A	CAP. TRIMMER JTC06 E300 30PF	1	CT1
23	KECF-0070-A	CRYSTAL FILTER 10. 695MHZ QUARTZ	1	XF1
24	KECF-0216	CERAMIC FILTER LT4 55HTW FRONTER	1	CF1
25	KED-ZS8V2BSCST	8V2BSCST SEMTECH Z ENER DIODE	1	DZ1
26	KED-1K261	DIODE GERMANIUM 1K261	1	D5
27	KED-4004-A	DIODE IN4004	2	D6, D10
28	KEI-061LH	IFT 7X7MM 27MHZ KS 2295R	2	L22, L21
29	KEI-265LH	5840 LAIHENG IFT	1	L5
30	KEI-266LH	KS2641 LIKHANG LH	1	L17
31	KEI-267LH	2762 CAIHENG IFT	1	L20
32	KEI-268LH	320-5763 LAIHENG IFT	1	L3
33	KEI-269LH	73C-359 LAIHENG IFT	1	L8
34	KEI-270LH	321-0952 LAIHENG I FT	1	L2
35	KEI-271LH	320-5774 LAIHENG I ET	1	L9
36	KEI-272LH	3205851Z LAIHENG I FT	1	L4
37	KEIC-TDA2003	IC TDA2003 10W AUD IO AMP YD	1	IC8
38	KEJ-012	SPEAKER JACK JC-30 4B	2	J1, J6
39	KEL-S147	0. 8X6. 0X5. 5 TS-P	4	L13, L14, L15, L16
40	KEL-S148	0. 8*2. 5*7TS-P-B AI R CORE COIL	1	L10
41	KEL-S149	0. 6*5. 0*13. 5TS-P-B AIR CORE COIL WFD	1	L12

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42	KEL-V208AD	COIL VARIABLE 0.20	UH 20%	1	L24
43	KEL-V308WFD	COIL VARIABLE 0.3U	H 20%	1	L24
44	KEL-101MA-1	COIL FIXED 100UH	10%	1	L23
45	KEL-102K-LF	FIXED COIL 1MH 10%	AL0307-102K-LF	1	L19
46	KEL-159CL-4	COIL FIXED 1.5UH A	70704029	1	L1
47	KEL-689CL-4	COIL FIXED 6.8UH		1	L25
48	KEL-689MA-2	COIL FIXED 6.8UH		1	L11
49	KEL-752WF	INDUCTOR LGA0415#7	R5M-B 7.5UH	2	L6, L18
50	KER-MX120FBB	RES MX-FILM 2W 5%	12 OHM	1	R75
51	KER-MX471EBB	RES. MX-FILM 1W 5%	S 470 OHM	1	R138
52	KER-100DBB	RES. C-FILM 1/2W 5	% S 10 OHM	1	R70
53	KER-102KVSF637A	RES. SEMI KVSF637A	1KOHM	1	RV3
54	KER-103KVSF637A	RES. SEMI. KVSF637	A 10K	2	RV1, RV4
55	KER-104KVSF637A	RES. SEMI. KVSF637	A 100K	1	RV2
56	KER-223KVSF637A	RES. SEMI. KVSF637	A 22KOHM	1	RV7
57	KER-229CBB	RES. C-FILM 1/4W 5	% S 2.2 OHM	1	R107
58	KER-302CBB	RES. C-FILM 1/4W 5	% S 3K	1	R71
59	KER-471CFB	RES. C-FILM 1/4W 5	% F 470 OHM	1	R8
60	KER-473KVSF637A	RES. SEMI. KVSF637	A 47K	2	RV6, RV5
61	KER-479DBB	RES. C-FILM 1/2W 5	% S 4.7 OHM	1	R64
62	KER-751DBB	RES C-FILM 1/2W 5%	750 OHM	1	R66
63	KERY-039	RELAY TRKM(78F) D-	12VDC-S-Z	2	K12, K13
64	KET-2SC2314F	TRANSISTOR 2SL2314	(F) NPN	1	Q16
65	KETR-011-A	TRANSFORMER CHOKE	EI19KY-226	1	CH1
66	KETR-067	BW-0903 BAN WO TRA	NSFORMER	1	T1
67	KEX-0318	CRYSTAL 10.24DMHZ	CL=30PF	1	X1
68	KEX-0474	CRTAL 4MZ-20PPM-HC		1	X2
69	M-760B1S	BASE MAIN PCB SMT		1	
70	M-760B1SB	BASE MAIN PCB SMT	BOTTOM	1	
71	KCC-102FRJNPOB	CAP. CER CHIP 50V	CH J 0.001UF	1	C67
72	KCC-103FRKBB	CAP. CER. CHIP 50V	B K% 0.01UF	11	C3, C61, C83, C99, C126, C140, C8, C32, C82, C100, C132
73	KCC-104DRKBB	CAP. CER. CHIP 16V	B K% 0.1uF	2	C114, C156
74	KCC-120FRJNPOB	CAP. CER. CHIP 50V	CH J% 12PF	2	C164, C163
75	KCC-122FRKBB	CAP. CER. CHIP 50V	B K% 0.0012UF	1	C73
76	KCC-150FRJNPOB	CAP. CER. CHIP 50V	CH J% 15PF	2	C165, C183
77	KCC-151FRJNPOB	CAP. CER. CHIP 50V	CH J% 150PF	3	C124, C116, C75
78	KCC-200FRJNPOB	CAP. CER. CHIP 50V	CH J% 20PF	1	C43
79	KCC-201FRJNPOB	CAP. CER. CHIP 50V	NPO J% 200P	1	C77
80	KCC-271FRJNPOB	CAP. CER. CHIP 50V	CH J% 270PF	2	C79, C78
81	KCC-333DRKBB	CAP. CER. CHIP 16V	B K% 0.033UF	1	C159
82	KCC-390FRJNPOB	CAP. CER. CHIP 50V	CH J% 39PF	2	C92, C122
83	KCC-409FRCNPOB	CAP. CER. CHIP 50V	CH C% 4PF	1	C101
84	KCC-470FRJNPOB	CAP. CER. CHIP 50V	CH J% 47PF	7	C44, C142, C80, C76, C66, C95, C71
85	KCC-473DRKBB	CAP. CER. CHIP 16V	B K% 0.047uF	1	C88
86	KCC-473FRKBB	CAP. CER. CHIP 50V	B K% 0.047uF	2	C69, C70
87	KCC-509FRCNPOB	CAP. CER. CHIP 50V	CH C 5PF	1	C143
88	KCC-680FRJNPOB	CAP. CER. CHIP 50V	CH J% 68PF	3	C1, C2, C74
89	KCD-KDS160	DIODE CHIP KDS160	KEC	8	D3, D4, D11, D12, D13, D22, D23, D24
90	KCR-000B	RES. CHIP 1/16W 0	OHM	1	R149

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91	KCR-101B	RES. CHIP 1/16W 100	2	R88, R5
92	KCR-102B	RES. CHIP 1/16W 1K	1	R1
93	KCR-103B	RES. CHIP 1/16W 10K	5	R72, R147, R153, R155, R161
94	KCR-151B	RES. CHIP 1/16W 150	1	R62
95	KCR-152B	RES. CHIP 1/16W 1.5K	1	R94
96	KCR-154B	RES. CHIP 1/16W 150K	1	R55
97	KCR-183B	RES. CHIP 1/16W 18K	1	R6
98	KCR-221B	RES. CHIP 1/16W 220	1	R56
99	KCR-222B	RES. CHIP 1/16W 2.2K	3	R73, R151, R160
100	KCR-273B	RES. CHIP 1/16W 27K	1	R2
101	KCR-471B	RES. CHIP 1/16W 470	1	R104
102	KCR-474B	RES. CHIP 1/16W 470K	1	R135
103	KCR-563B	RES. CHIP 1/16W 56K	1	R87
104	KCT-KTC3875S	TR. CHIP NPN KTC38 75S (GR)	3	Q44, Q45, Q46
105	KCT-KTC3880S	TR. CHIP NPN KTC38 80S SOT-23	2	Q14, Q26
106	KCT-MMBTSC3265Y	TRANSISTOR MMBTSC3 265Y SOT23	2	Q29, Q34
107	M-760B1ST	BASE MAIN PCB SMT TOP	1	
108	KCC-T105EAM	CAP. TANT. CHIP 16 V M% 1uF	1	C112
109	KCC-T335DK3216	CAP TANTALUM 3.3U 10V 10% A	2	C6, C7
110	KCC-100FRJNPOB	CAP. CER. CHIP 50V CH J% 10PF	2	C9, C425
111	KCC-101FRJNPOB	CAP. CER. CHIP 50V CH J% 100PF	7	C40, C41, C42, C133, C171, C38, C81
112	KCC-102FRJNPOB	CAP. CER. CHIP 50V CH J 0.001UF	3	C10, C182, C121
113	KCC-102FRKBB	CAP. CER. CHIP 50V B K% 0.001UF	8	C25, C45, C47, C91, C106, C167C170,
114	KCC-103FRKBB	CAP. CER. CHIP 50V B K% 0.01UF	27	C19, C20, C24, C27, C34, C36, C58, C110, C135, C145, C146, C120A C173, C203, C212, C39, C149 C503, C175, C119, C86, C89, C97 C63, , C424, C174, C427, C84,
115	KCC-104DRKBB	CAP. CER. CHIP 16V B K% 0.1uF	24	C15, C21, C26, C28, C49, C55, C57, C136, C147, C153, C166, C169, C148 C172, C180, C192, C127, C130 C118, C207, C21, C131, C208, C209
116	KCC-105BRZFB	CAP. CER. CHIP 10V Y5V Z% 1UF	6	C93, C161, C200, C201, C202, C210
117	KCC-106BRZFF	CAP CER CHIP 10V F Z 10UF	16	C87, C103, C104, C109, C138, C139, C466, C467, C468, C502, C213 C150, C151, C125, C56, C214
118	KCC-120FRJNPOB	CAP. CER. CHIP 50V CH J% 12PF	1	C417
119	KCC-121FRJNPOB	CAP. CER. CHIP 50V CH J% 120PF	2	C13, C62
120	KCC-150FRJNPOB	CAP. CER. CHIP 50V CH J% 15PF	1	C416
121	KCC-151FRJNPOB	CAP. CER. CHIP 50V CH J% 150PF	1	C65
122	KCC-153DRKBB	CAP. CER. CHIP 16V B K 0.015UF	1	C14
123	KCC-180FRJNPOB	CAP. CER. CHIP 50V CH J% 18PF	1	C413
124	KCC-222FRKBB	CAP. CER. CHIP 50V B K% 0.0022UF	1	C160
125	KCC-223DRKBB	CAP. CER. CHIP 16V B K% 0.022uF	1	C46
126	KCC-223FRKBB	CAP. CER. CHIP 50V B K% 0.022UF	1	C64
127	KCC-225BKBMUM	CAP. CHIP 10V +/-10 % X7R 2.2UF	3	C215, C204, C216
128	KCC-270FRJNPOB	CAP. CER. CHIP 50V CH J% 27PF	1	C176
129	KCC-271FRJNPOB	CAP. CER. CHIP 50V CH J% 270PF	1	C412
130	KCC-390FRJNPOB	CAP. CER. CHIP 50V CH J% 39PF	2	C428, C421
131	KCC-409FRCNPOB	CAP. CER. CHIP 50V CH C% 4PF	1	C429

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132	KCC-470FRJNPOB	CAP. CER. CHIP 50V	CH J% 47PF	3	C256, C39, C12
133	KCC-472FRKBB	CAP. CER. CHIP 50V	B K% 0.0047UF	1	C23
134	KCC-473DRKBB	CAP. CER. CHIP 16V	B K% 0.047uF	6	C17, C18, C22, C30, C105, C129
135	KCC-473FRKBB	CAP. CER. CHIP 50V	B K% 0.047uF	4	C33, C54, C96, C108
136	KCC-561FRJNPOB	CAP. CER. CHIP 50V	CH J% 560PF	1	C53
137	KCC-609FRDNPOB	CAP CER CHIP 50V C	H D 6PF	2	C422, C426
138	KCC-680FRJNPOB	CAP. CER. CHIP 50V	CH J% 68PF	2	C414, C423
139	KCC-682FRKBB	CAP. CER. CHIP 50V	B K% 0.0068UF	1	C52
140	KCC-683FRKBB	CAP. CER. CHIP 50V	B K% 0.068UF	1	C411
141	KCC-820FRJNPOB	CAP. CER. CHIP 50V	CH J% 82PF	2	C48, C115
142	KCD-KDS160	DIODE CHIP KDS160	KEC	13	D1, D2, D7, D8, D9, D14, D15, D16, D17, D18, D19, D20, D25
143	KCD-KDV251S	DIODE VARICAP CHIP	KDV251S 12V	2	D402, D403
144	KCL-478TD	TND CHIP 0.47uH		1	L109
145	KCR-T018	NTC THERMISTORS NC	P18X471J03RB	1	TH2
146	KCR-T019	NTC THERMISTOR NCP	18X221J03 RB	3	TH1, TH3, TH4
147	KCR-000B	RES. CHIP 1/16W 0	OHM	4	D21, R128, R203, C205
148	KCR-101B	RES. CHIP 1/16W 100		5	R19, R54, R205, R213, R178
149	KCR-101D	RES. CHIP 1/4W 100		4	R171, R172, R175, R176
150	KCR-102B	RES. CHIP 1/16W 1K		16	R3, R4, R35, R69, R80, R99, R114, R412, R416, R207, R91, R163 R156, R157, R197, R129
151	KCR-103B	RES. CHIP 1/16W 10K		22	R9, R23, R53, R82, R124, R134, R211, R182, R184, R185, R193 R187, R165, R166, R41, R192, R191 R137, R173, R208, R132, R177
152	KCR-104B	RES. CHIP 1/16W	100K	15	R46, R77, R78, R79, R90, R96, R118 R148, R32, R103, R210, R409, R411 R406, R415
153	KCR-106B	RES. CHIP 1/16W 10	M	1	R121
154	KCR-122B	RES. CHIP 1/16W 1K2		1	R206
155	KCR-123B	RES. CHIP 1/16W 12K		1	R188
156	KCR-124B	RES. CHIP 1/16W 12	OK	1	R112
157	KCR-151B	RES. CHIP 1/16W 150		1	R68
158	KCR-152B	RES. CHIP 1/16W 1.5K		4	R36, R81, R92, R101
159	KCR-153B	RES. CHIP 1/16W 15	K	5	R18, R37, R51, R130, R164
160	KCR-156B	RES CHIP 1/16W 15M		1	R123
161	KCR-181B	RES. CHIP 1/16W 180		1	R142
162	KCR-182B	RES. CHIP 1/16W 1.8K		1	R113
163	KCR-183B	RES. CHIP 1/16W 18	K	5	R26, R83, R84, R85, R86
164	KCR-184B	RES. CHIP 1/16W 18	OK	1	R119
165	KCR-202B	RES. CHIP 1/16W 2K		3	R199, R200, R152
166	KCR-203B	RES. CHIP 1/16W 20	K	2	R52, R125
167	KCR-221B	RES. CHIP 1/16W 220		2	R20, R169
168	KCR-222B	RES. CHIP 1/16W 2.2K		7	R33, R67, R93, R102, R168, R28A1 R408
169	KCR-223B	RES. CHIP 1/16W 22	K	6	R21, R27, R38, R39, R158, R140
170	KCR-225B	RES. CHIP 1/16W 2M2		1	R11
171	KCR-229B	RES. CHIP 1/16W 2R	2 0603	1	R159
172	KCR-272B	RES. CHIP 1/16W 2.	7K	3	R12, R16, R117

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173	KCR-273B	RES. CHIP 1/16W 27	K	2	R13, R44
174	KCR-303B	RES. CHIP 1/16W 30	K	1	R45
175	KCR-332B	RES. CHIP 1/16W 3.	3K	3	R34, R133, R97
176	KCR-333B	RES. CHIP 1/16W 33	K	4	R15, R141, R414, R30
177	KCR-334B	RES. CHIP 1/16W 33	OK	1	R170
178	KCR-391B	RES. CHIP 1/16W 390		1	R111
179	KCR-392B	RES. CHIP 1/16W 3.	9K	5	R40, R116, R65, R179, R174
180	KCR-393B	RES. CHIP 1/16W 39	K	4	R29, R47, R48, R407
181	KCR-470B	RES. CHIP 1/16W 47	R	3	R59, R198, R27A1
182	KCR-471B	RES. CHIP 1/16W 470		5	R7, R74, R95, R143, R24
183	KCR-472B	RES. CHIP 1/16W 4.	7K	8	R10, R17, R22, R58, R60, R106, R122, R127
184	KCR-473B	RES. CHIP 1/16W 47	K	12	R49, R50, R89, R139, R98, R189, R194, R195, R196, R146, R190,
185	KCR-474B	RES. CHIP 1/16W 47	OK	6	R43, R201, R212, R105, R26A1, R28
186	KCR-479B	RES. CHIP 1/16W 4.7		1	R61
187	KCR-561B	RES. CHIP 1/16W 560		2	R14, R214
188	KCR-562B	RES. CHIP 1/16W 5K6		1	R126
189	KCR-563B	RES. CHIP 1/16W 56	K	3	R100, R120, R413
190	KCR-681B	RES. CHIP 1/16W 680		1	R202
191	KCR-682B	RES. CHIP 1/16W 6.	8K	3	R57, R405, R433
192	KCR-683B	RES. CHIP 1/16W 68	K	1	R144
193	KCR-821B	RES. CHIP 1/16W 820		1	R136
194	KCR-822B	RES. CHIP 1/16W 8.	2K	2	R76, R209
195	KCR-823B	RES. CHIP 1/16W 82	K	2	R31, R167
196	KCR-824B	RES. CHIP 1/16W 82	OK	1	R25
197	KCT-KTA1504S	TR. CHIP PNP KTA15	04S SOT-23	6	Q8, Q11, Q13, Q19, Q22, Q40
198	KCT-KTC3875S	TR. CHIP NPN KTC38	75S (GR)	5	Q1, Q54, Q55, Q56, Q47
199	KCT-KTC3880S	TR. CHIP NPN KTC38	80S SOT-23	7	Q6, Q7, Q15, Q43, Q408, Q411, Q412
200	KCT-MMBTRC101SS	TRANSISTOR MMBTRC1	01SS SOT23	3	Q404, Q405, Q406
201	KCT-MMBTRC102SS	TRANSISTOR MMBTRC1	02SS SOT23	2	Q12, Q23
202	KCT-MMBTRC104SS	TRANSISTOR MMBTRC1	04SS SOT23	9	Q9, Q31, Q32, Q37, Q38, Q39, Q52, Q53, Q25
203	KCT-MMBTRC111SS	TRANSISTOR MMBTRC1	11SS SOT23	1	Q30
204	KCT-MMBTRC112SS	TRANSISTOR MMBTRC1	12SS SOT23	1	Q36
205	KCT-MMBTSC3265Y	TRANSISTOR MMBTSC3	265Y SOT23 SE	9	Q10, Q18, Q20, Q24, Q27, Q28, Q35, Q41, Q42
206	KCT-2SK211-Y	FET 2SK211-Y TOSHI	BA	2	Q2, Q3
207	KED-ZSMM5Z6V8	MM5Z6V8 SEMTECH ZE	NER DIODE	2	DZ4, DZ5
208	KEIC-AT24C04	IC AT24C04N-10SI-2	.7 EEPROM 4K	1	IC1
209	KEIC-AZ324M	IC AZ324 SOIC-14 Q	UAD OP AMP	1	IC3
210	KEIC-DBL5020V	IC DBL5020V COMPAN	DOR SOP	1	IC9
211	KEIC-KIA7042F	IC KIA7042F VOLTAGE	E DETECTOR	1	IC2
212	KEIC-KIA78L05F	IC KIA78L05F REGUL	ATOR SOT-89	1	IC6
213	KEIC-SL5019	IC SL5019 IF SYSTE	M	1	IC7
214	KEIC-TB31202FN	IC TB31202FN PLL		1	IC4
215	KEIC-TC4066BF	IC TC4066BF-EL ANA	SW	1	U1
216	KEIC-385	MCU TMP86CH21AUG-6	UK2	1	IC5
217	KEPC-1062-A1	PCB 151.5*145.5*1.	6MM DS FR-4	1	
218	KED-LC124	LCD SDM8B4359B-HPB		1	

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219	KED-L111A	CTTL-0201A-48X21-L	D CTT AMBER	1	
220	KED-L204R	DIODE LED EL204HD	RED	1	LED4
221	KESW-015	SWITCH TACT EVQ-JA	C-04M	8	K1, K2, K3, K4, K8, K9, K10, K11
222	M-760B2S	FRONT PCB SMT		1	
223	KCD-L23A-LT	LED CHIP AMBER LT8	AA2-54-UR91-T5	3	LED1, LED2, LED3
224	KCR-101B	RES. CHIP 1/16W 100		4	R335, R336, R342, R343
225	KCR-102B	RES. CHIP 1/16W 1K		2	R345, R338
226	KCR-201B	RES. CHIP 1/16W 200		2	R337, R344
227	KCR-202B	RES. CHIP 1/16W 2K		2	R339, R346
228	KCR-512B	RES. CHIP 1/16W 5.	1K	2	R340, R347
229	KCR-561B	RES. CHIP 1/16W 560		3	R333, R334, R341
230	KEPC-1050-A	PCB 149*44*1.6MM D	S FR-4	1	
231	KEPC-1054-A	PCB 65*25*1.6MM SS	94V-0	1	
232	KER-D103B502A	RD12BF-20C2-38.5K-	042-1 ALPHA	1	
233	KER-103RD123SF	RD123SF-20BC-29K-B	10K-1002 ALP	1	
234	KER-503RD123SF	RD123SF-20BC-29K-A	50K-1002 ALPH	1	
235	KEJ-513	MIC PLUG 6PIN N-16	-6P QIINGXING	1	
236	KESP-041-C	MIC ELEC CI034		1	
237	KESW-018-1	SWITCH PUSH 2P2T P	S-22I01-RP	1	SW1
238	KETC-159	PVC 6C ROUND COIL	000 BLK 50R	1	
239	KEPC-1058-A	PCB 35*17*1.6MM SS	94V-0	1	
240	KER-101JBB	RES. C-FILM 1/8W 5	% S 100	2	R357, R356
241	KER-102JBB	RES. C-FILM 1/8W 5	% S 1K	1	R359
242	KER-201DBB	RES. C-FILM 1/2W 5	% S 200	1	R354
243	KER-202JBB	RES. C-FILM 1/8W 5	% S 2K	1	R358
244	KER-512JBB	RES. C-FILM 1/8W 5	% S 5.1K	1	R355
245	KESW-015	SWITCH TACT EVQ-JA	C-04M	3	K18, K19, K20

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Voltage Chart

TRANSISTOR

Ref.	Pin	TX	RX	Ref.	Pin	TX	RX
Q2	E	0	0	Q32	E	0	0
2SK211-Y	C	0	0.8	MMBTRC104SS	C	0	6.0
	B	0	6.7		B	3.5	0
Q2	E	0	0	Q37	G	0	0
2SK211-Y	C	0	0.8	MMBTRC104SS	S	0.5	7.9
	B	0	6.7		D	2.8	0
Q14	E	1.2	0	Q40	G	0.7	0.9
KCT3880S	C	8.0	0	KTA1504S	S	0	0
	B	2.0	0		D	0	6.1
Q16	E	0	0		E		
2SC2314F	C	8.5	3.0		C		
	B	1.0	0		B		
Q17	E	0	0		E		
C2078	C	13.2	2.0		C		
	B	13.0	0		B		
Q18	E	0	7.3		E		
MMBTSC3265Y	C	0	0		C		
	B	0.5	7.9		B		
Q19	E	8.1	8.10		E		
KTA1504S	C	7.9	0		C		
	B	7.3	7.9		B		
Q28	E	6.1	6.1		E		
MMBTSC3265Y	C	8.1	8.1		C		
	B	6.8	6.8		B		

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DIODE

Ref.	Pin	TX	RX	Ref.	Pin	TX	RX
D1	A	0.5	7.1	DZ1	A	0.4	0.4
KDS160	K	0	6.1	8V2BSCST	K	8.7	8.7
D2	A	0.5	7.1		A		
KDS160	K	0	6.1		K		
D5	A	0	0		A		
1K261	K	0	0		K		
D6	A	10.6	2.8		A		
1N4004	K	9.7	2.8		K		
D10	A	0	0		A		
1N4004	K	12.8	13.2		K		
D14	A	7.9	0		A		
KDS160	K	7.2	0.6		K		
D16	A	2.5	0		A		
KDS160	K	2.2	2.2		K		
D19	A	7.9	0		A		
KDS160	K	7.3	0		K		

IC4 TB31202F

PIN	TX	RX	PIN	TX	RX
1	4.2	4.2	9	3.6	3.6
2	4.7	4.7	10	4.0	4.0
3	1.0	1.7	11	4.5	4.5
4	0	0	12	0.7	0.7
5	5.0	5.0	13	0	0
6	0	0	14	0	0
7	0	0	15	4.7	4.7
8	0	0	16	4.1	4.1

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IC3 AZ324M

PIN	TX	RX	PIN	TX	RX
1	3.2	3.2	8	0	1.8
2	3.2	3.2	9	0	1.8
3	3.2	3.2	10	0	1.8
4	7.9	7.9	11	0	0
5	3.7	3.7	12	0	0
6	3.9	3.9	13	0	1.7
7	3.9	3.9	14	0	0

IC8 TDA2003

PIN	TX	RX	PIN	TX	RX
1	1.0	1.0	4	6.3	6.3
2	0.8	0.8	5	13.2	13.2
3	0	0			

IC6 KIA78L05F

PIN	TX	RX	PIN	TX	RX
1	5	5	3	13.2	13.2
2	0	0	-	-	-

IC7 SL5019

PIN	TX	RX	PIN	TX	RX
1	0	5.0	9	0	1.6
2	0	4.5	10	0	0
3	0	4.5	11	0	5.0
4	0	4.5	12	0	0
5	0	4.0	13	0	1.8
6	0	4.0	14	0	0
7	0	4.0	15	0	0
8	0	5.0	16	0	1.8

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IC5 TMP86CH21

PIN	TX	RX	PIN	TX	RX
1	0	0	33	3.0	3.0
2	1.4	1.4	34	3.5	3.5
3	2.3	2.3	35	3.5	3.5
4	0	0	36	0	0
5	4.9	4.9	37	1.2	1.2
6	0.1	0.1	38	1.2	1.2
7	0	0	39	0	0
8	4.2	4.2	40	1.2	1.2
9	3.2	3.2	41	1.5	1.5
10	5.00	5.0	42	1.5	1.5
11	0	0	43	1.5	1.5
12	0	0	44	2.6	2.6
13	0	0	45	2.6	2.6
14	4.9	0	46	2.6	2.6
15	0	0	47	2.6	2.6
16	5.0	5.0	48	2.6	2.6
17	5.0	5.0	49	2.6	2.6
18	5.0	5.0	50	2.6	2.6
19	5.0	5.0	51	2.6	2.6
20	0	0	52	2.6	2.6
21	0	0	53	2.6	2.6
22	5.0	5.0	54	2.6	2.6
23	2.0	0	55	2.6	2.6
24	0	0	56	4.5	4.5
25	0	0	57	3.2	3.2
26	4.8	4.8	58	1.8	1.8
27	0.3	4.8	59	1.8	1.8
28	0.4	0	60	2.6	2.6
29	0	0	61	0.1	0.1
30	0	0	62	0	0
31	3.5	0	63	0	0
32	3.5	3.5	64	0	0