

G M R S

[HKP-2003]

INSTRUCTION MANUAL

2-WAY HANDHELD RADIO

1. GENERAL

1-1 Introduction

The HKP Corp. HKG -2003 is GMRS handheld tow -way radio UHF transceiver.

The transceiver has 15 Channels and 10 weathers. Weather channels can also be accessed immediately by pressing the Function key.

The radio is the newest generation in personal two way communications.

The radio is a lightweight, compact two way communication device that can be used to communicate with family or friends at parks, shopping malls, sporting events, concerts -any indoor or activity!

1-2 CHARACTERISTIC

- 1) All active devices in the radio is composed of semiconductor and high density IC.
- 2) To design the radio in compact and weight approximately 120g with out battery.
- 3) Mi-com of the radio is Upd789418A by NEC
- 4) It s DC supply power can operate by use of alkaline 4 Cell (1.5V AAA) battery.

1-3 COMPOSITION

The radio is composed of following.

- 1) Transceiver (W/Antenna)
- 2) Belt clip
- 3) Manual

2. SPECIFICATIONS

General

Frequency Range	462.5625 ~ 462.725Mhz
Channels	15CH
Privacy Codes	38 for each main channel
Dimensions (W x H x D)	63mm x 120mm x 35mm

Power Supply

Power Source	Alkaline Batteries, AA(4), 6VDC
Operating Time	26 Hours (Alkaline Batteries; 5:5:90) 70 Hours (Standby)

Receiver

Useable Sensitivity	> -120 dBm
Maximum Audio Output Power	> 0.3 Watts (8 Ohm)
Modulation Distortion	< 5% (1khz 60%)
SNR	35dB

Transmitter

RF Output Power	1.4 / 0.3 Watts [ERP]
Range	Up to 5miles
Maximum Deviation	± 2.5khz
Modulation Distortion	< 5% (1khz 60%)
SNR	35 dB

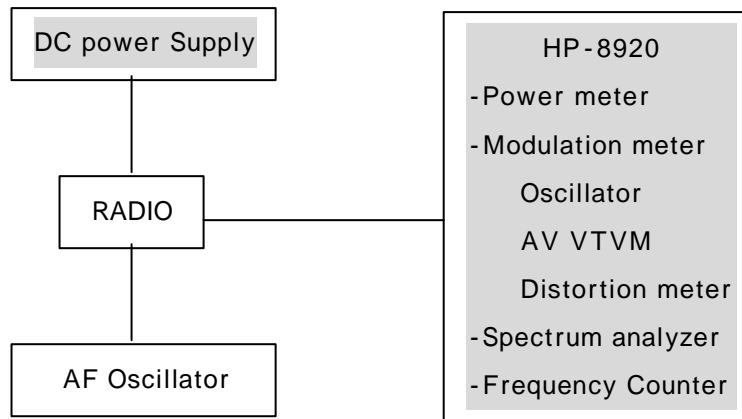
3. ADJUSTMENT

3-1. Frequency synthesizer

- After connecting the RF power meter and dummy load (50 ohm), join the antenna connector of HP8920 with above equipment.
- Check the voltage between TP and GND in digital Voltage meter.
- The set low channel(CH1, 462.56250Mhz) of HP8920 the lowest frequency.
- After pressed PTT key of HP8920, check if the lowest frequency of Tx channel to DC 1.2V in the voltage of test point (VT)
- After releasing the PTT key of HP8920, check if the highest frequency (CH15,462.72500Mhz) of Rx channel is within DC 1.2V in the voltage of test point (VT).

3-2. Transmitter

- Connect the RADIO and measure equipment according to block diagram below.



- Connect DC 6.0V voltage preset to the RADIO.
- Connect HP8920.
- Adjust Transmit frequency (CH1, 462.5625Mhz) according to trimming trimmer capacitor X201.
- Connect AF Oscillator to MIC terminal for conform modulation degree.
- Set the frequency of AF Oscillator to 1khz and adjust AF level. Should be 100mV.
- Checking Oscilloscope and Modulation meter. Max deviation should be in $\pm 2.5\text{khz}$.

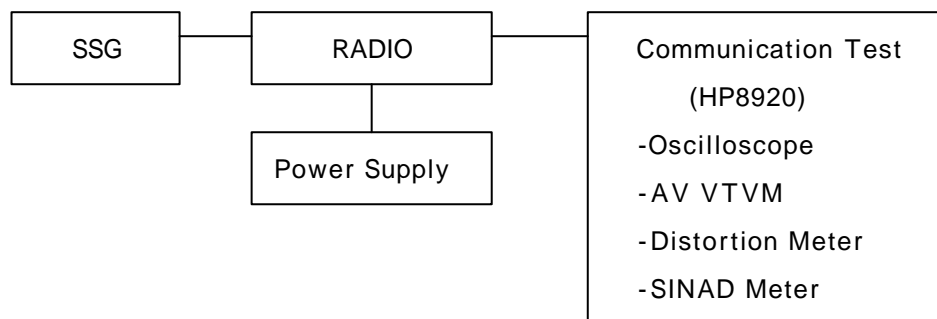
3-3. Transmitter Test

- Output RF power Test
DC Power (6.0V) should be Max. 1.4 / 0.3Watts (ERP) and in -50% range.
- Audio Response
Connect AF oscillator to MIC terminal and then firm the audio level that doesn't distortion the wave of Oscilloscope in the frequency range, 300hz~3,000hz. Check the audio level for 300hz~3,000hz based on frequency standard, 1khz.
- Modulation degree Test.
 - 1) Connect AF oscillator to the MIC terminal and then adjust the level to 100mV.
 - 2) Measure the Oscillator wave and the point needle of Modulation Meter after pressing PTT key.
 - 3) Sweep gradually the frequency of AF Oscilloscope from 300hz~3,000hz.

- 4) At this time, the point needle of Modulation Meter should be in $\pm 2.5\text{kHz}$.
- Tx Spurious Test
 - 1) Antenna is 50 Ω and attenuation degree should be 20dB more.
 - 2) Observe the Spectrum with pressing PTT key. The harmonics should be less $-27 \sim -22\text{dBm}$ than carrier.

3-4. Receiver

- Preparation
 - 1) Set the power supply to DC 6.0V.
 - 2) Adjust Voltage level (AF) to 0.7Vrms(8 Ω load) after power on.
- Connection method



- The Conform of Rx sensitivity
 - 1) Set SSG to 1channel(462.5625Mhz) frequency.
 - 2) Adjust modulation frequency, 1khz to modulation degree, 1.5khz.
 - 3) After adjusting the frequency of SSG to channel frequency, RF level sets to -47dBm .
- The Conform of Squelch sensitivity
 - 1) Set the standard channel (CH1, 462.5625Mhz)
 - 2) In squelch mode, SQ variable resister VR101 must be turned counterclockwise.
 - 3) After adjusting SSG to channel frequency, the RF level of SSG is set On SINAD 12~0dB.

3-5. Receiver Test

- Rx sensitivity test

SSG should be adjusted to 12dB of SINAD point needle seeing wave of Oscilloscope as SSG sets in 1khz frequency deviation.

At this time, normal RF level is $-122 \sim -124\text{dBm}$.
- Audio Distortion Test
 - 1) SSG should be adjusted like way of point "Rx sensitivity test" and

RF level sets to -47dBm.

- 2) Adjust to 0.7Vrms (8 Ω load) seeing Audio wave.
- 3) Read the needle of Distortion Meter (Normal condition would be less than 5% Distortion)

- Squelch Test

After RF level of SSG should be set to the least

4. CIRCUIT DESCRIPTION

4-1 PLL Block

The Phase-Locked Loop(PLL) is comprised of a VCO circuit (Q202,Q203), reference oscillator X201(21.25Mhz), PLL IC201 and PLL Loop filter (C220,R226,C217,R227,C203). Oscillation from the VCO circuit is output from the collector of buffer amplifier Q203.

4-2 Voltage -Controlled Oscillator (VCO)

The VCO circuit is comprised of C204,L202,C205 and D203 is varactor diode which change capacitance with different bias levels applied (determined by error voltage from the PLL filter). The change in capacitance cause D203 to change oscillation frequency. D201 switches the VCO output between the first local signal during receive(LO=RX frequency -21.7Mhz) and the transmission frequency during transmit.

4-3 Bufer Amplifier (TX mode)

The modulated transmit signal is output from Q203 of the VCO circuit and applied to buffer amplifier Q301. The amplified signal passes through C224 and is applied to a second buffer amplifier comprised of Q302 which will amplify the signal from 10mW to 200mW. The amplified signal is then applied to the final power amplifier Q305(MRF9482)

4-4 Final Power Amplifier (Q305)

The transmit RF signal supplied by Q302 is further amplified to the desired level by final power amplifier Q305. The transmit RF signal output from Q305 passes through a low pass filter comprised of C314 – C320 and L311- L312 to eliminate harmonics and spurious signals. The RF signal then passes through antenna terminal and is output through the antenna.

5. Troubleshooting

Problem	Solution
No Power	Recharge or Replace Battery
Message Not received	Make sure the PTT button is completely pressed as you transmit. Reposition or replace batteries
Message Not received	Confirm transceivers have the same channel and privacy codes settings. Increase Volume level Release PTT Button
Reception of unwanted signals	Turn on the Codes mode and set code number to match the setting of the target transceiver.
Cannot change channel and codes settings	Make radio is unlocked. See page for more information.
Low batteries	Replace batteries.

GMRS License

Use of GMRS radios within the United States require a FCC GMRS license. An individual 18 years of age or older, who is not a representative of a foreign government, is eligible to apply for a GMRS system license. You will need two forms from the FCC, FCC Form 159 and FCC Form 605 Main Form and Schedule F. You can find the forms online at <http://www.fcc.gov/formpage.html>, or call 1-800-418-3676.