THEORY OF OPERATION

The Panasonic KX-TG210 Cordless Telephone utilizes direct sequence spread spectrum modulation techniques. The base unit transmits in the frequency range of 2402.08 MHz to 2481.44 MHz and receives between 909.64 MHz to 920.8 MHz. The handset transmits between 909.64 MHz and 920.8 MHz. The base unit can be used as a stand alone entity by utilizing the built in microphone.

EXHIBIT E

DESCRIPTION OF ELECTRICAL CIRCUITRY

1. BASE UNIT:

A) WHEN A BELL SIGNAL ENTERS FROM TEL LINE

1) The bell detection circuit, i.e., the photocoupler(PC11) begins to operate and its output is inputted to pin 12 of IC301(CPU).

2) To obtain a display synchronized with the bell signal, an IN USE signal is output from pin 55 of IC301(CPU) and INUSE LED(LED302) is lighted up.

3) To obtain a bell signal monitor, the bell monitor signal is output from pin 52 of IC301.
This bell monitor signal is amplified by IC201, and is output from speaker.

4) A portable phone receives a bell from the base station.
When the portable phone is switched from the STANDBY to TALK, the base station receives a carrier modulated by data indicating the switch from STANDBY to TALK.
The data demodulated at the base station is inputted to pin 8 of IC301, and passes through PC13 to make the circuit relay, then, release the muting and enables talk.

B) WHEN A LINE LOOP IS MADE BY A PORTABLE PHONE

1) When the operator of the portable phone switches STANDBY to TALK, the TALK mode data enters the base station and is demodulated at the RF Unit of the base station, and is inputted to pin 8 of IC301.

2) When a code of the base station matches a code of the portable phone, pin 25 of IC301 becomes the transmission mode "L".
The muting is released through Q702.

3) In this time, an IN USE signal is output from pin 55 of IC301, and the IN USE LED (LED302) is lighted up.

C) RECIEVER UNIT OPERATION

1) A signal is received by the antenna, and passes through the 909.64~920.8MHz band pass filter FL601, and is inputted to the RF AMP Q601.

2) The received signal and local signal made by VCO (857.88~869.04MHz) are mixed by IC601 to obtain 1st IF signal.
This signal goes out from pin 13 of IC601.

3) The base band signal is fed to pins 16 of IC613, and is demodulated by IC613 to control data and audio signal.

4) This audio signal is transmitted to the telephone line by IC101.

D) TRANSMISSION UNIT OPERATION

1) An audio signal from the line passes through the interface transformer(T1) and is amplified by IC101.

2) The audio signal goes out from pin 13 of IC131 is inputted to pin 2 of TxVCO.

3) TxVCO modulates this signal and output to pin 4 of IC601.
The modulated signal goes out from pin 2 of IC601 and output to antenna through Tx AMP (IC604, 603, 602).

EXHIBIT E

DESCRIPTION OF ELECTRICAL CIRCUITRY

2. PORTABLE UNIT:

A) RECEIVER UNIT OPERATION

1) A signal from the base unit is received by the antenna, and passes through the 2402.08~2481.44MHz band pass filter F301.
And the signal is amplified by the Rx AMP(Q301).

2) An received signal and 1st local signal made by VCO(2350.32~2429.68) are mixed by Q303 to obtain 1st IF signal.
And this signal goes out from pin 6 of IC311.

3) This 1st IF signal is fed to pin 16 of IC313, and is demodula by IC313 to control data and audio signal.

4) This audio signal goes to pin 53 of IC202, and output to speaker.

B) TRANSMISSION UNIT OPERATION

1) When selected TALK switch to TALK, the detect switch of IC200 becomes ON and get into TALK mode.

2) The audio signal from microphone is inputted to pin 25 of IC202.

3) This audio signal is modulated by TxVCO and output from pin 2 to IC301.

4) This modulated signal goes through Tx AMP (IC303, 305, 302), and outputs to the antenna.