TRANSMITTER ENVIRONMENTAL TESTS

FREQUENCY TOLERANCE OF CARRIER

MINIMUM PERFORMANCE STANDARD: The stability of the carrier frequency shall be maintained within +0.01 percent over a range of:

a) Temperature from -20 to +50 degrees Celsius at normal supply voltage;
b) Voltages that vary from 85 percent to 115 percent of the rated supply voltage at a temperature of +20 degrees Celsius.

TEST RESULTS:

Channel 1:

Handset: The largest deviation from the authorized carrier frequency of 48,760,000 Hz was +246 Hz ±10Hz at 0 degrees Celsius and 3.6 VDC. The test limit is ±4876 Hz.

Base Station: The largest deviation from the authorized carrier frequency of 43,720,000 Hz was -423 Hz ±10Hz at +50 degrees Celsius and 120 VAC. This was within the ±4372 Hz limit.

Channel 25:

Handset: The largest deviation from the authorized carrier frequency of 49,970,000 Hz was +246 Hz ±10Hz at 0 degrees Celsius and 3.6 VDC. The test limit is ±4997 Hz.

Base Station: The largest deviation from the authorized carrier frequency of 46,970,000 Hz was -446 Hz ±10Hz at +50 degrees Celsius and 120 VAC. This was within the ±4697 Hz limit.

TEST CONDITIONS:

Supply Voltages:	85%, 100% and 115% of 120VAC, ±2%
Stabilization Time:	60 minutes
Temperature:	-20, -10, 0, +10, +20, +30, +40 and +50, ±3 degrees Celsius
Modulation:	Both transmitters were unmodulated.

METHOD OF MEASUREMENT:

Both the base and handset components were placed individually in a thermal chamber. The frequency was monitored by a spectrum analyzer and recorded at 1 minute intervals.

The base station was powered from a variable AC transformer. The handset battery was disconnected to enable external DC power operation. The antennae of both transmitters were replaced with short lengths of miniature 50Ω cable fitted with BNC connectors, for shielded connections to the frequency counter.

At +20 degrees Celsius, after the chamber had stabilized for at least 60 minutes and the samples had been turned off for 15 minutes, the transmitters were operated continuously for 5 minutes at each voltage condition. At the temperature extremes, each transmitter was operated for 5 minutes following stabilization. The frequencies were recorded at 1 minute intervals. The temperature was monitored by a thermocouple on the enclosure.

ENVIRONMENTAL TEST RESULTS FCC 15

CHANNEL 1

		BASE		HANDSET
+50°C		120V		3.6V
		43719593		48759963
		43719585		48759965
		43719589		48759962
		43719578		48759956
		43719577		48759950
+40°C		120V		3.6V
		43719624		48760003
		43719617		48759988
		43719608		48759989
		43719601		48759979
		43719595		48759970
+30°C		120V		3.6V
		43719715		48760081
		43719689		48760064
		43719675		48760044
		43719658		48760036
		43719646		48760021
+20°C	102V	120V	138V	3.6V
	43719735	43719739	43719740	48760128
	43719733	43719734	43719736	48760126
	43719733	43719733	43719734	48760135
	43719736	43719732	43719730	48760125
	43719740	43719734	43719735	48760125
+10°C		120V		3.6V
		43719815		48760179
		43719812		48760179
		43719812		48760186
		43719814		48760216
		43719815		48760193

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0°C	120V	3.6V
	43719840	48760244
	43719842	48760239
	42719858	48760245
	43719850	48760245
	43719847	48760246

-10°C	120V	3.6V
	43719839	48760239
	43719831	48760234
	43719830	48760235
	43719825	48760231
	43719822	48760230

-20°C	120V	3.6V
	43719767	48760233
	43719764	48760227
	43719759	48760222
	43719753	48760223
	43719750	48760196

MODEL NO.:	26700XXX-C
DATE:	January 21, 2000
BASE FREQ:	**43,720,000 Hz**
HANDSET FREQ:	**48,760,000 Hz**

ENVIRONMENTAL TEST RESULTS FCC 15

CHANNEL 25

		BASE		HANDSET
+50°C		120V		3.6V
		46969574		49969986
		46969567		49969979
		46969582		49969975
		46969557		49969967
		46969554		49969962
+40°C		120V		3.6V
		46969668		49970106
		46969665		49970090
		46969645		49970082
		46969630		49970071
		46969620		49970055
+30°C		120V		3.6V
		46969768		49970194
		46969754		49970188
		46969733		49970167
		46969712		49970155
		46969702		49970138
+20°C	102V	120V	138V	3.6V
	46969723	46969718	46969716	49970130
	46969717	46969714	46969719	49970130
	46969715	46969713	46969718	49970132
	46969716	46969714	46969721	49970131
	46969720	46969714	46969713	49970134
+10°C		120V		3.6V
		46969790		49970186
		46969789		49970201
		46969793		49970192
		46969793		49970194
		46969796		49970194

0°C	120V	3.6V
	46969809	49970235
	46969812	49970240
	46969817	49970238
	46969815	49970246
	46969814	49970241

-10°C	120V	3.6V
	46969813	49970239
	46969815	49970237
	46969812	49970235
	46969807	49970239
	46969804	49970220

-20°C	120V	3.6V
	46969785	49970225
	46969780	49970210
	46969764	49970217
	46969753	49970197
	46969741	49970192

MODEL NO.:	26700XXX-C
DATE:	January 21, 2000
BASE FREQ:	**46,970,000 Hz**
HANDSET FREQ:	**49,970,000 Hz**

CLEAR CHANNEL DETECTION

Test Procedure

Setup the equipment as per figure 1.

Verification of Base Unit Detector

1. Connect the base unit to an AC source and place the handset in the off hook mode and select channel 1.

2. Using the spectrum analyzer verify the base and handset frequencies are on channel 1 using the RX antenna.

3. Put the handset on hook.

4. Set the signal generator to channel 1 modulated at 1KHz dev., approx. 20KHz, to produce approximately -30dBM to -40dBM on the analyzer from the RX antenna when feeding this signal to the TX antenna several seconds.

5. Turn the handset on and go off hook.

6. Re-measure the base and handset frequencies. They must be other than the initial ones.

7. Busy the resulting frequency and repeat the above steps.

Verification of Handset Unit Detector

1. Connect the base unit to an AC source and place the handset in the off hook mode and select channel 1.

2. Using the spectrum analyzer verify the base and handset frequencies are on channel 1 using the RX antenna.

3. Put the handset on hook.

4. Set the signal generator to channel 1 modulated at 1KHz dev., approx. 20KHz, to produce approximately -30dBM to -40dBM on the analyzer from the RX antenna when feeding this signal to the TX antenna for several seconds.

5. Place the handset off hook.

6. Re-measure the base and handset frequencies. They must be other than the initial ones.

7. Busy the resulting frequency and repeat the above steps.

TESTS RESULTS

Model: 26700XXX-C

Date: January 20, 2000

Base Unit Detector

Step 2 - Check initial channel

43,719,730 Hz (Base) — Channel 01

Step 6 - Recheck channel frequencies

44,399,729 Hz (Base) — Channel 13

Step 7 - Recheck channel frequencies

46,709,709 Hz (Base) — Channel 19

Step 7 - Recheck channel frequencies

43,959,730 Hz (Base) — Channel 14

Step 7 - Recheck channel frequencies

46,669,711 Hz (Base) — Channel 18

Step 7 - Recheck channel frequencies

46,929,716 Hz (Base) — Channel 24

Step 7 - Recheck channel frequencies

43,919,732 Hz (Base) — Channel 5

Step 7 - Recheck channel frequencies

44,319,728 Hz — Channel 11

Base

Step 7 - Recheck channel frequencies

46,629,715 Hz Channel 20
Base

Step 7 - Recheck channel frequencies

46,869,711 Hz Channel 23
Base

Results: Satisfactory

Handset Unit Detector

Step 2 - Check initial channel

48,760,087 Hz Channel 01
Handset

Step 6 - Recheck channel frequencies

49,100,394 Hz Channel 07
Handset

Step 7 - Recheck channel frequencies

49,400,123 Hz Channel 13
Handset

Step 7 - Recheck channel frequencies

49,770,092 Hz Channel 19
Handset

Step 7 - Recheck channel frequencies

49,970,094 Hz Channel 25
Handset

Step 7 - Recheck channel frequencies

49,080,097 Hz Channel 06
Handset

Step 7 - Recheck channel frequencies

49,360,098 Hz Channel 12
Handset

Step 7 - Recheck channel frequencies

49,860,102 Hz Channel 03
Handset

Step 7 - Recheck channel frequencies

49,020,099 Hz Channel 05
Handset

Step 7 - Recheck channel frequencies

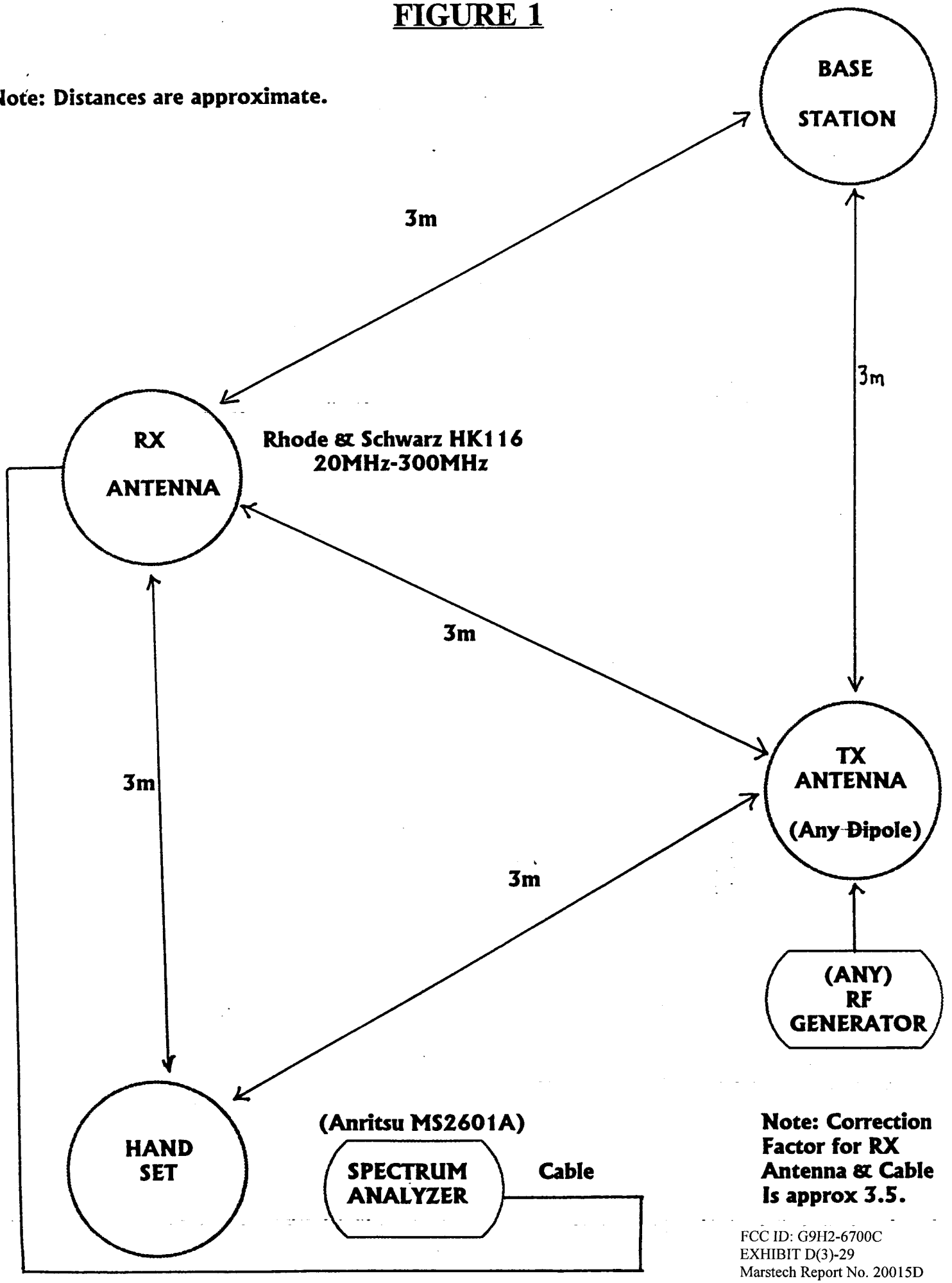
49,280,110 Hz Channel 11
Handset

Results: Satisfactory

Technician: Hiran De Silva

FIGURE 1

Note: Distances are approximate.



Note: Correction Factor for RX Antenna & Cable Is approx 3.5.

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Data and Voice Channels Definition

The communication between handset and base unit is defined and handled by two channels. They are data channel and voice channel.

All command codes communicates are though data channel during the data handshake process. This channel generates from security code, that is, different security code has different data channel number. Since the security code changes in a random manner whenever the handset puts onto cradle, the data channel is always random. As soon as the handshake process is completed in the data channel, the system will switched to voice channel. Once the voice channel is established, both base and handset are in talk mode.

Channel Scanning Sequence

During base stand-by mode or channel changing mode. It follows a programmed sequence to search an unoccupied channel.

1=>5=>9=>13=>17=>21=>25=>2=>6=>10=>14=>18=>22=>3=>7=>11=>15=>19

=>23=>4=>8=>12=>16=>20=>24

Channel Scanning at Stand-by Mode

When base is first time power up, the voice channel is set to CH1. The signal strength detection circuit is designed in base unit such that the MCU scan every channel in order to search for idle channel for voice communication and then store each channel information to separate register. To mark sure the data code receive more frequently at stand-by mode, the idle channel and data code scan will be alternated as following sequence:

CH1=>Data CH=>CH5=>Data CH=>CH9=>Data CH=>.....=>CH20=>Data CH=> CH24..... Since each channel uses 150ms to identify the occupation, the total time to take one cycle is equal to 7.5sec.

Whenever the base unit power up all channel register is set to 4. If a channel find that no carrier exist, then it will add minus one to it own register. The minimum value of a register is equal to zero. If a channel is occupied, then it will plus one to it own register. The maximum value of a register is equal to eight.

The threshold value of channel register is 4. The definition is that if it is equal to or less then 4 then this channel is classified as no jamming. If it is register than 4, then this channel is being jammed.

As a result, the maximum time to make a channel from jammed to not jam is 30 sec. When channel register is 8. The minimum time to mark a channel to become jammed is 37.5sec when channel register is 0.

During Handset Talk On request Period

After handset and base handshake all information at data channel including ID code, ring command or talk on request command, base MCU will make a decision about which channel for voice communication (i.e. voice channel). At that moment, base MCU will firstly look for the value inside last voice channel register. If it is classified as not jammed channel, base then send an acknowledge code to handset and both side will be linked at that voice channel. Even though this voice channel may really be jammed by other signal because the channel register is still less than or equal to 4.

If voice channel is classified as jammed channel (even this voice channel haven't any jamming signal because the channel register is still greater then 4), it will look for current channel plus 4 (e.g. current channel = 7, then next channel is 11). If it is classified as non-jamming channel, then it becomes the voice channel, otherwise, it look for next channel (i.e. CH15 according to above example) and so on. Unit all channel are jammed, it will be enforced last channel as voice channel.

Change Channel during Handset Talk Mode

Handset sends " channel change" command code to base with information of next channel number. (e.g. current channel is 7, next channel is 11) Base receives the " channel change " command code and then change to that specified channel. After the handshaking or the " channel change " command is completed, the handset will switch to that next channel. So, both base and handset are looking to the same next channel.

Then the handset sends an "ACK" command to base. If the handshaking of this command is completed, the handset and base will stay in this new channel. If not completed, the handset will return to the previous channel.

If the next channel is not ready, the handset will poll another next channel as the sequence defined on above. For example, it will poll in sequence from 7, 11, 15, ..., If all channel are blocked, then both handset and base will stay back on current channel.