EMC
COMPLIANCE
MANAGEMENT GROUP
A Division of Turntech Scientific & Instrument, Inc.

Competent Body Approval #: 14082
NVLAP Lab code: 200068-0

EMC Compliance
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MODEL 32710

Prepared for Unical Enterprises, Inc.

According to FCC Part 15 Subpart C Requirements

FCC ID #: *LZX32710*

Prepared by: *Nancy T. Nguyen*

QC Manager: *Michael J. Azar*

ATTACHMENT J - FREQUENCY TOLERANCE
PART 15.233.g

CLIENT:	*Unical Enterprises, Inc.*	**TEST REFERENCE:**	*FCC Part 15 Subpart C1 §15.233g*
EUT MODEL:	*32710*	**PRODUCT:**	*Cordless Telephone*
SERIAL NO.:	*Engineering sample*	**EUT DESIGNATION:**	*Home and Office*
TEMPERATURE:	*23'C*	**HUMIDITY:**	*42%*
ATM PRESSURE:	*1017 Mbar*	**GROUNDING:**	*Through power cord*
TESTED BY:	*Paul F. Chen*	**DATE OF TEST:**	*03/28/98*
TEST METHOD:	CFR 47 *§15.233g*		
TEST PROCEDURE:	*Frequency Stability VS. Temperature:* Test performed in accordance with Appendix I5.2 of ANSI C63.4 1992. EUT was powered on, the readings were obtained for both base and handset frequencies. EUT was left on and readings taken after 2, 5, and 10 minutes. Thereafter the entire procedure was again repeated for each of the other channels. Ambient temperature varies from -20 to +50^{0}C. *Frequency Stability VS. Voltage Variation:* Test performed in accordance with Appendix I5.3 of ANSI C63.4 1992. Voltage test at 102VAC (85% input voltage) and 138VAC (115% of input voltage); a fresh charge battery use in handset		
RESULTS:	The EUT meets the requirements of CFR 15.233(g), temperature variation and voltage variation tests.		
M.U.:	Freq. ± 2x10^{-7} x Center Freq., Temperature ±0.02^{0}C, Voltage ±0.01VAC		

FREQUENCY STABILITY VS. TEMPERATURE

Frequency Measured at Room Temperature

Channel	BASE (MHz)	Reading BASE (MHz	HANDSET (MHz)	Reading HANDSET (MHz)	Deviation %
1	**43.720**	43.7198	**48.760**	48.7596	±0.01%
13	**44.400**	44.3999	**49.400**	49.3998	±0.01%
25	**46.970**	46.9697	**49.970**	49.9689	±0.01%

Frequency Measured at +50°C

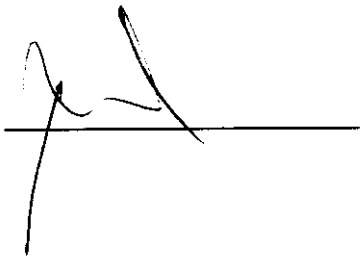
Channel	BASE (MHz)	Reading BASE (MHz	HANDSET (MHz)	Reading HANDSET (MHz)	Deviation %
1	**43.720**	43.7190	**48.760**	48.7596	±0.01%
13	**44.400**	44.3998	**49.400**	49.3987	±0.01%
25	**46.970**	46.9689	**49.970**	49.9696	±0.01%

Frequency Measured at -20°C

Channel	BASE (MHz)	Reading BASE (MHz	HANDSET (MHz)	Reading HANDSET (MHz)	Deviation %
1	**43.720**	43.7195	**48.760**	48.7596	±0.01%
13	**44.400**	44.3998	**49.400**	49.3987	±0.01%
25	**46.970**	46.9689	**49.970**	49.9696	±0.01%

FREQUENCY STABILITY VS. VOLTAGE VARIATION					
Channel	BASE Freq. (MHz)	Tested at 120VAC Base Freq. (MHz)	Tested at 102VAC Base Freq. (MHz)	Tested at 138VAC Base Freq. (MHz)	Deviation %
1	**43.720**	43.7198	43.7185	43.7194	±0.01%
13	**44.400**	44.3990	44.3992	44.3995	±0.01%
25	**46.970**	46.9690	46.9685	46.9692	±0.01%

FREQUENCY STABILITY VS. VOLTAGE VARIATION					
Channel	BASE Freq. (MHz)	Tested at 120VAC Handset Freq. (MHz)	Tested at 102VAC Handset Freq. (MHz)	Tested at 138VAC Handset Freq. (MHz)	Deviation %
1	**48.760**	48.7595	48.7599	48.7581	±0.01%
13	**49.400**	49.3995	49.3998	49.3992	±0.01%
25	**49.970**	49.9690	49.9682	49.9692	±0.01%

SIGNED:  **REVIEWED:** _____

ATTACHMENT I - OPERATING BANDWIDTH
PART 15.233.d

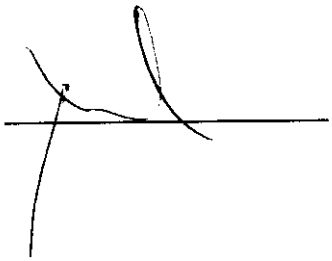
CLIENT:	*Unical Enterprises, Inc.*	**TEST REFERENCE:**	*FCC Part 15 Subpart C §15.233d*
EUT MODEL:	*32710*	**PRODUCT:**	*Cordless Telephone*
SERIAL NO.:	*Engineering sample*	**EUT DESIGNATION:**	*Home and Office*
TEMPERATURE:	*23°C*	**HUMIDITY:**	*43%*
ATM PRESSURE:	*1017 Mbar*	**GROUNDING:**	*Through power cord*
TESTED BY:	*Paul F. Chen*	**DATE OF TEST:**	*05/28/98*
TEST METHOD:	CFR 47 *§15.233d*		
TEST PROCEDURE:	*Operating Bandwidth Measurement* With the base or handset frequency monitored at the receiver , the 3dB bandwidths are measured using the receiver's bandwidth measurement function. Bandwidths are then evaluated for compliance to the 20Khz bandwidth requirement. *Modulated Bandwidth Measurements* A 2.5Khz sinewave from a function generator is fed into a speaker which directly interfaces with the handset mouthpiece. The signal is then increased until the phone reached its full modulation while monitoring the earpiece sound quality and the signal level noted. Test signal is then adjusted to 80% to full scale to achieve 80% modulation. Bandwidth measurements are then made 26dB below the reference peak of the channel frequency under test.		

Channel	BASE BAND WIDTH (kHz)	
	MODULATION (kHz)	UNMODULATION (kHz)
1	10.05	2.80
13	9.05	2.60
25	8.70	2.15

* All bandwidth within 20kHz bandwidth requirement.

Channel	HANDSET BAND WIDTH (kHz)	
	MODULATION (kHz)	UNMODULATION (kHz)
1	6.20	1.20
13	11.20	1.15
25	6.05	1.20

* All bandwidth within 20kHz bandwidth requirement.

SIGNED: 

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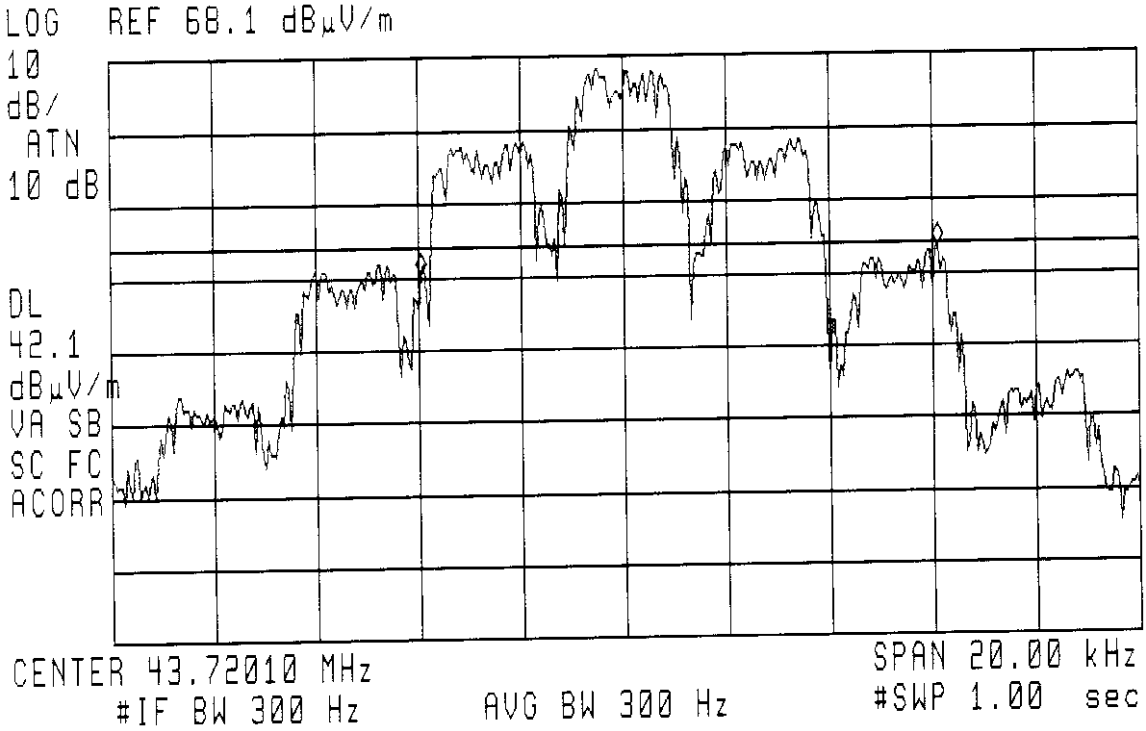
BASE

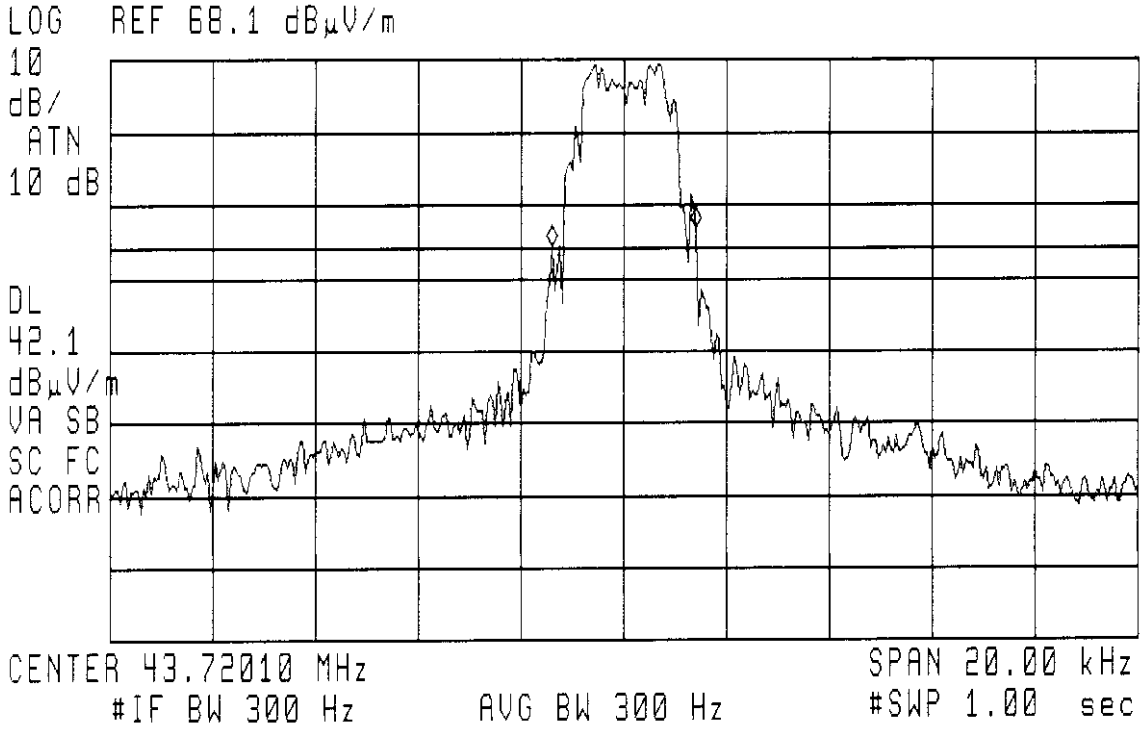
CHANNEL 1, MODULATION ON
UNICAL 32710 CORDLESS PHONE

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKRΔ 10.05 kHz
2.89 dB



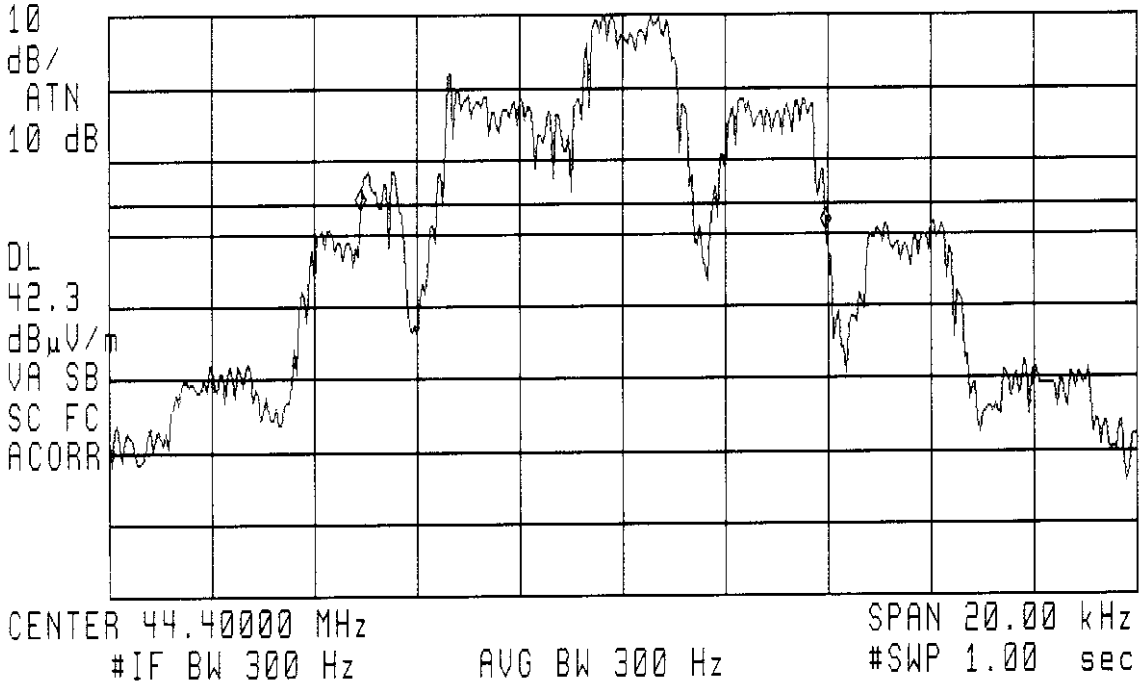
CHANNEL 1, MODULATION OFF BASE
UNICAL 32710 CORDLESS PHONE

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKRΔ 2.80 kHz
2.72 dB



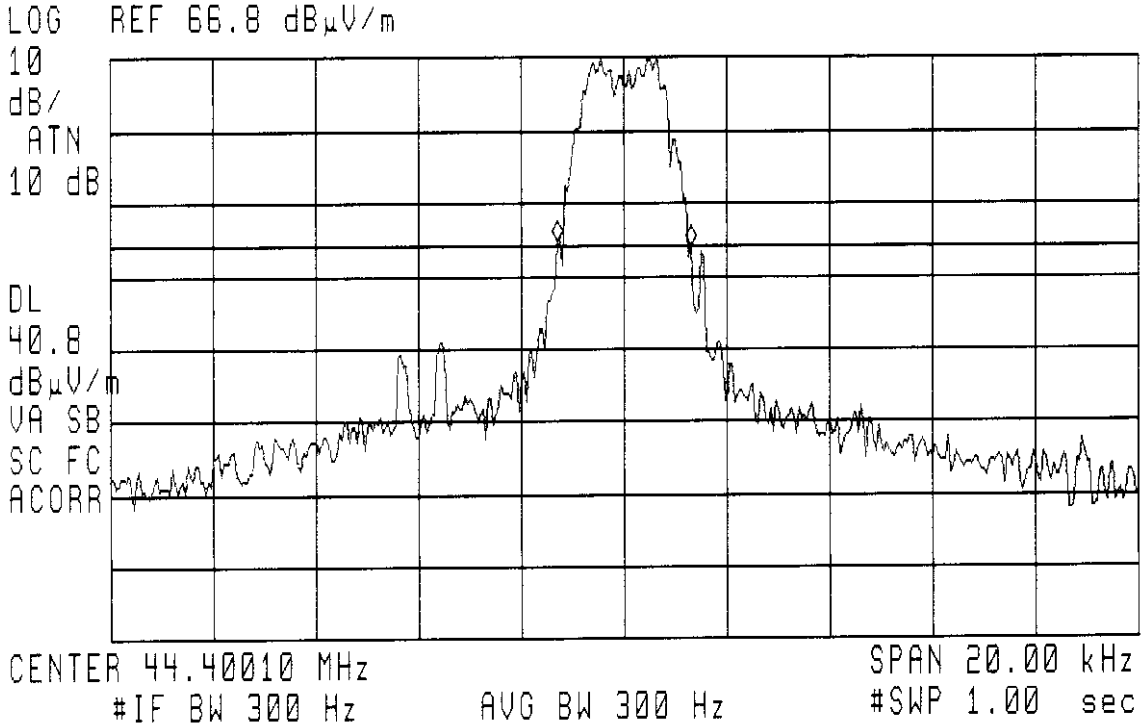
CHANNEL 13, 2.5 KHz MODULATION ON BASE
UNICAL 32710 CORDLESS PHONE

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKRΔ 9.05 kHz
-2.92 dB



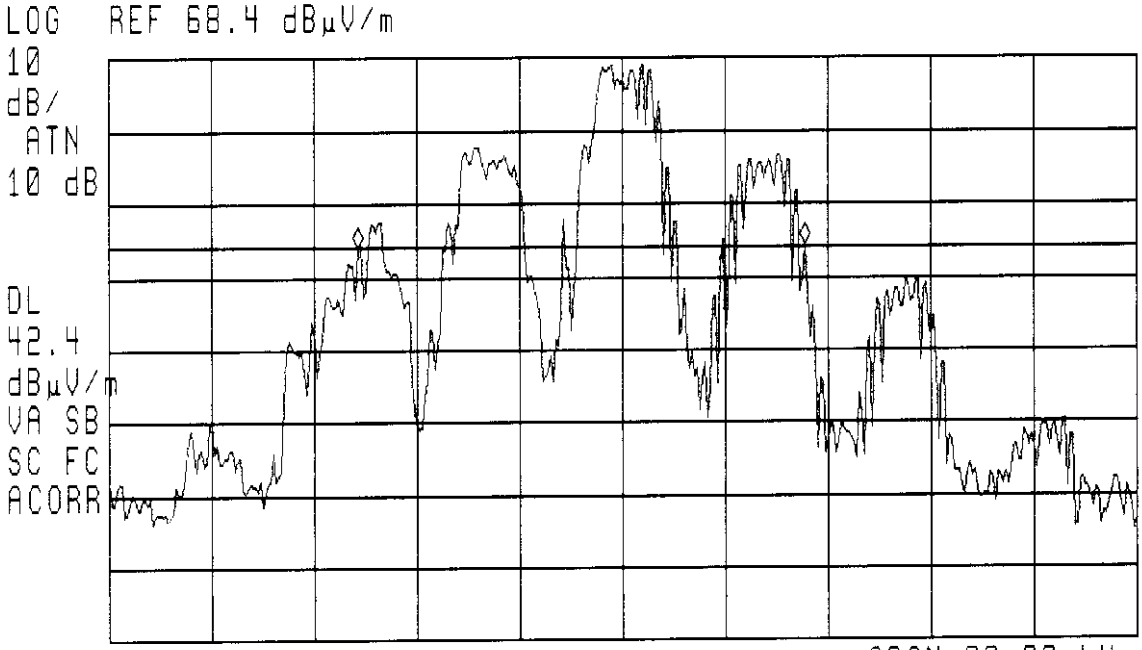
CHANNEL 13, 2.5 KHz MODULATION OFF BASE
UNICAL 32710 CORDLESS PHONE

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKRΔ 2.60 kHz
-.47 dB



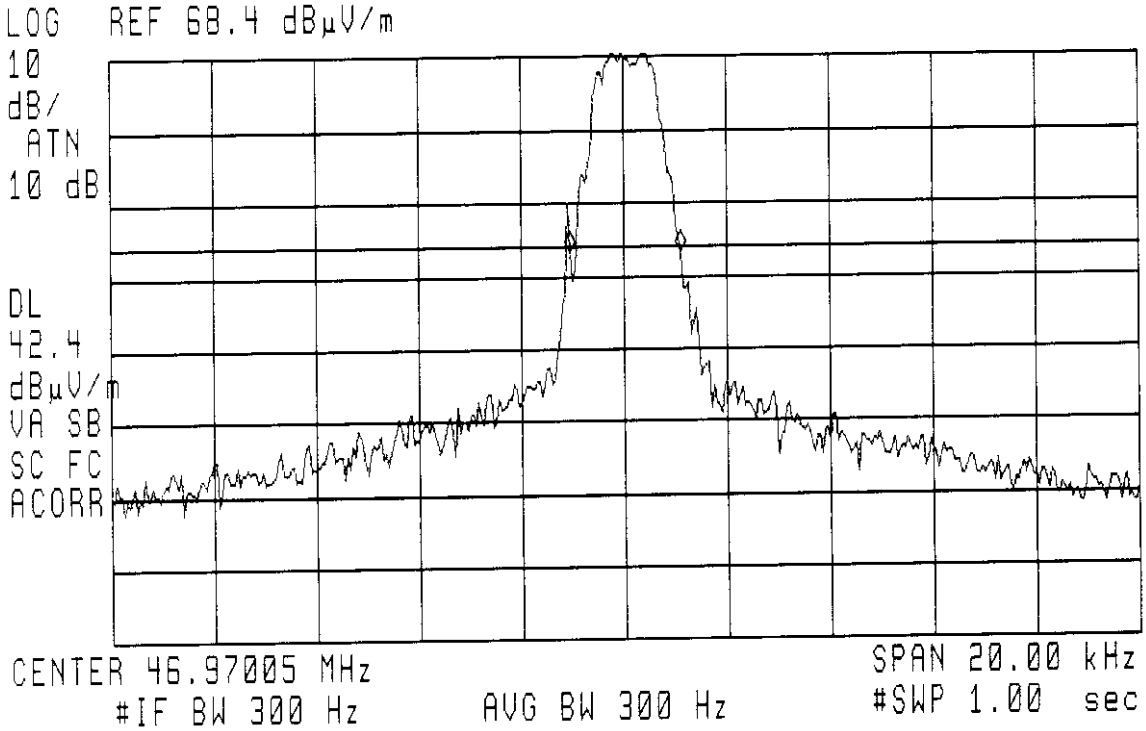
CHANNEL 25 MODULATION 2.5KHz, ON BASE
UNICAL 32710 CORDLESS PHONE

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKRΔ 8.70 kHz
.42 dB



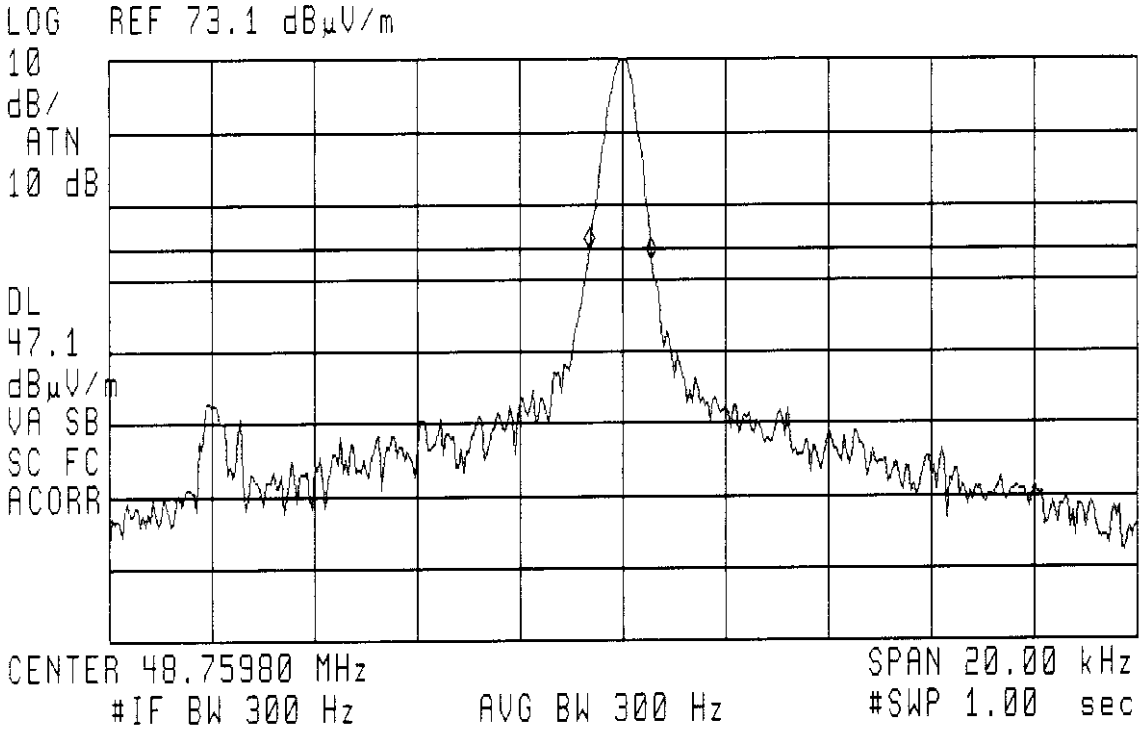
CHANNEL 25 MODULATION 2.5KHz, OFF BASE
UNICAL 32710 CORDLESS PHONE

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKRΔ 2.15 kHz
-.16 dB



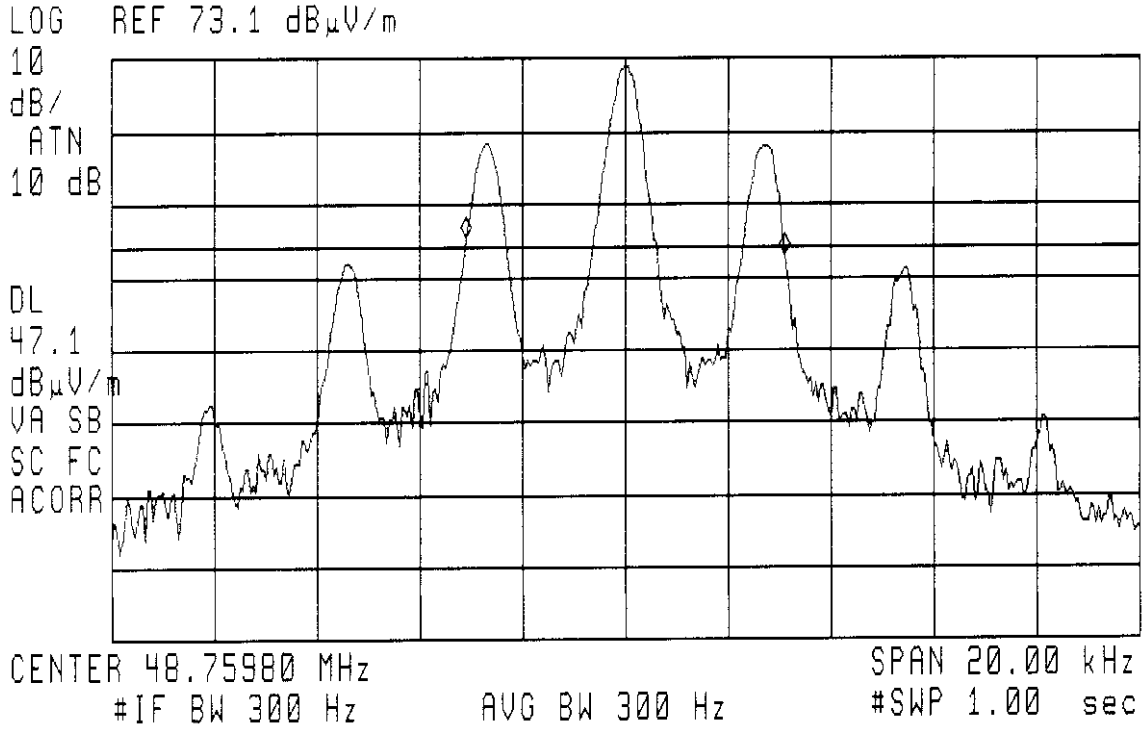
CHANNEL 1, MODULATION OFF HANDSET
UNICAL 32710 CORDLESS PHONE

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKRΔ 1.20 kHz
-1.52 dB



CHANNEL 1, MODULATION ON HANDSET
UNICAL 32710 CORDLESS PHONE

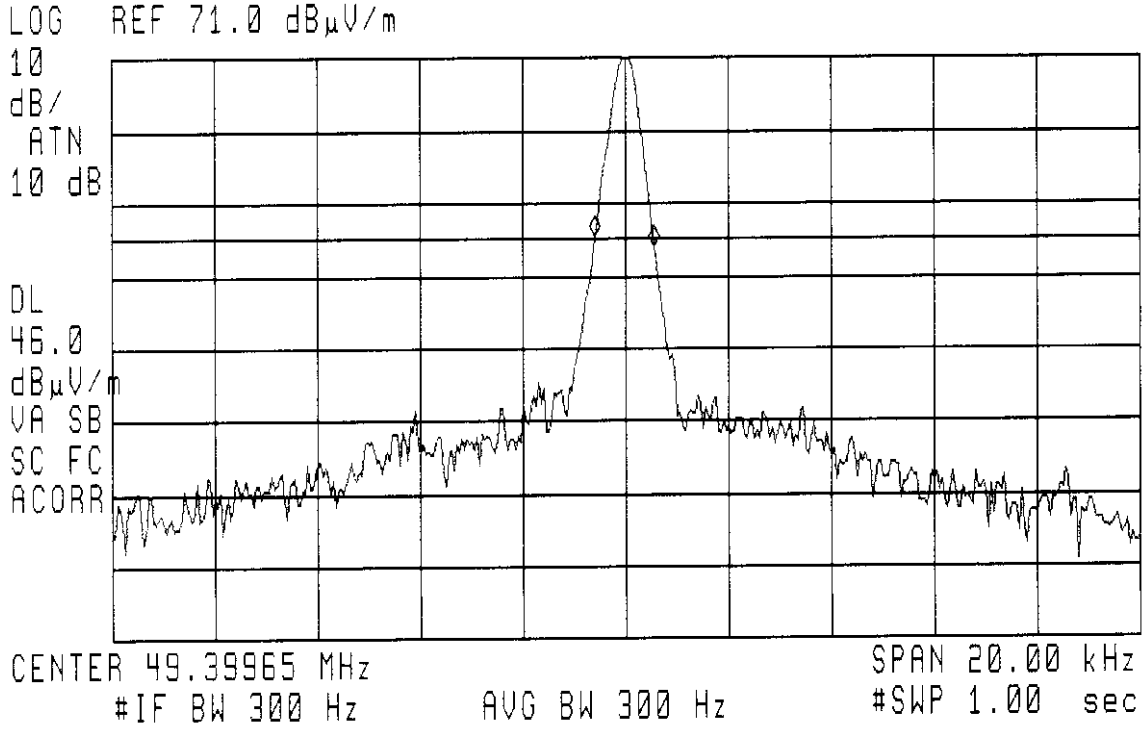
ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKRΔ 6.20 kHz
-2.39 dB



CHANNEL 13, 2.5 KHz MODULATION OFF HANDSET
UNICAL 32710 CORDLESS PHONE

MARKER Δ
1.15 kHz
-1.36 dB

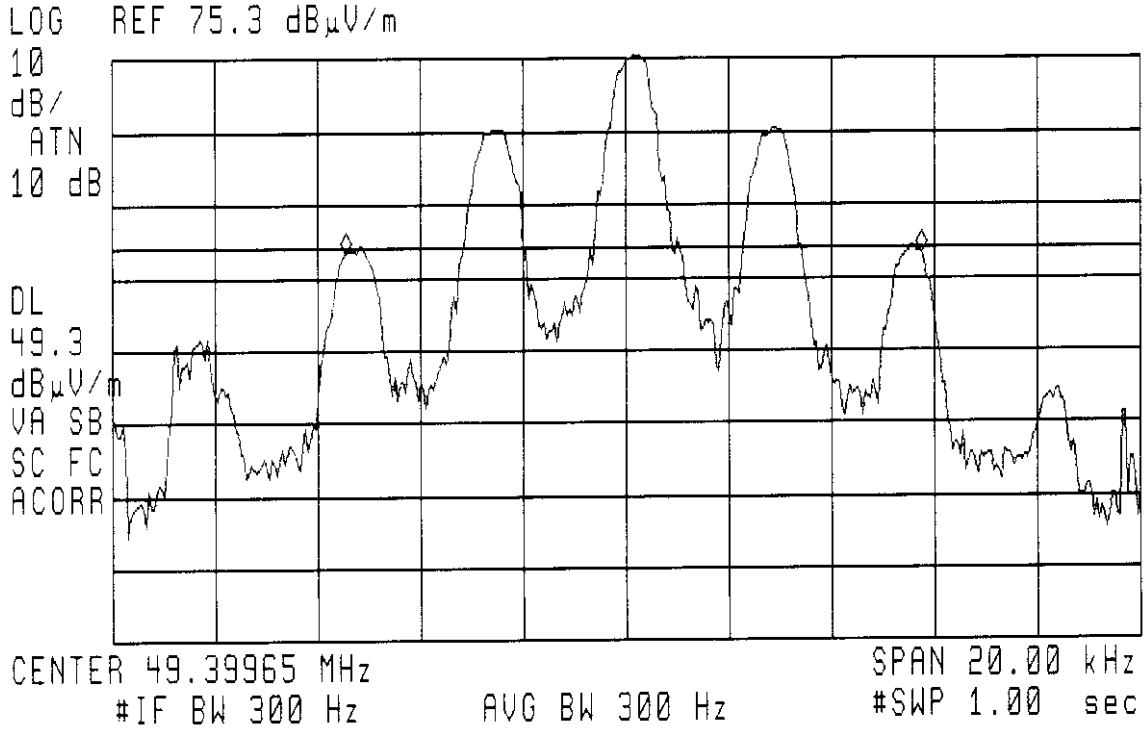
ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKRΔ 1.15 kHz
-1.36 dB



CENTER 49.39965 MHz
SPAN 20.00 kHz
#IF BW 300 Hz
AVG BW 300 Hz
#SWP 1.00 sec

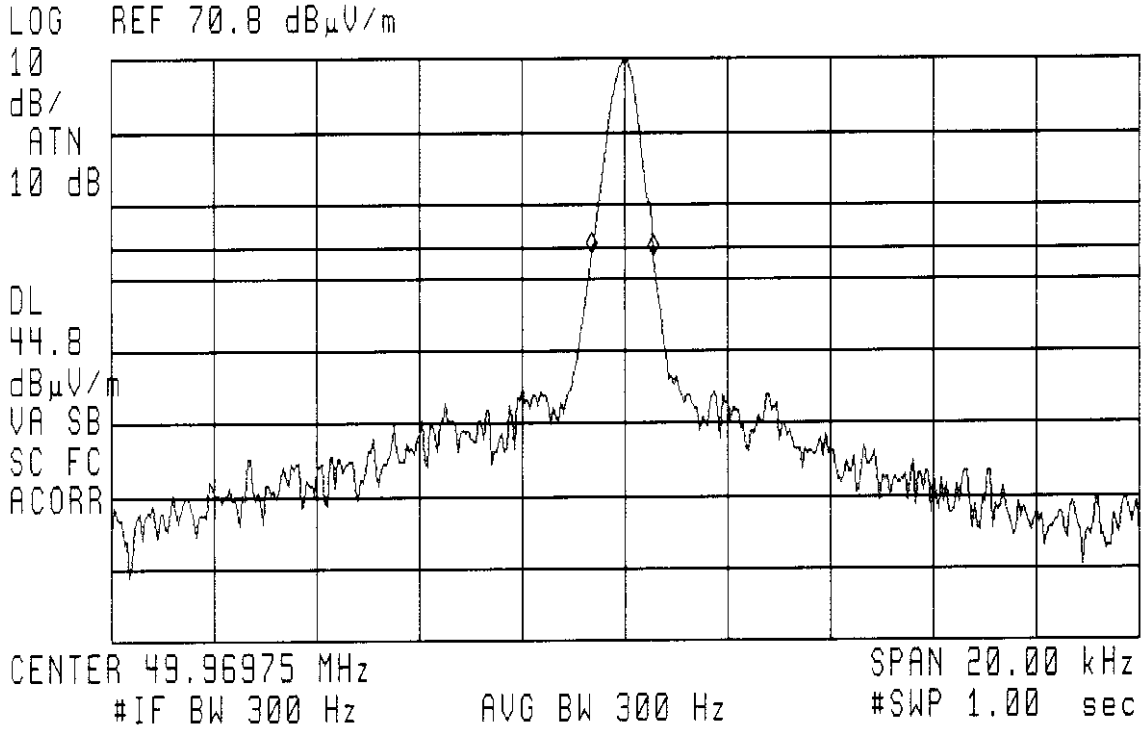
CHANNEL 13, 2.5 KHz MODULATION ON HANDSET
UNICAL 32710 CORDLESS PHONE

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKRΔ 11.20 kHz
.21 dB



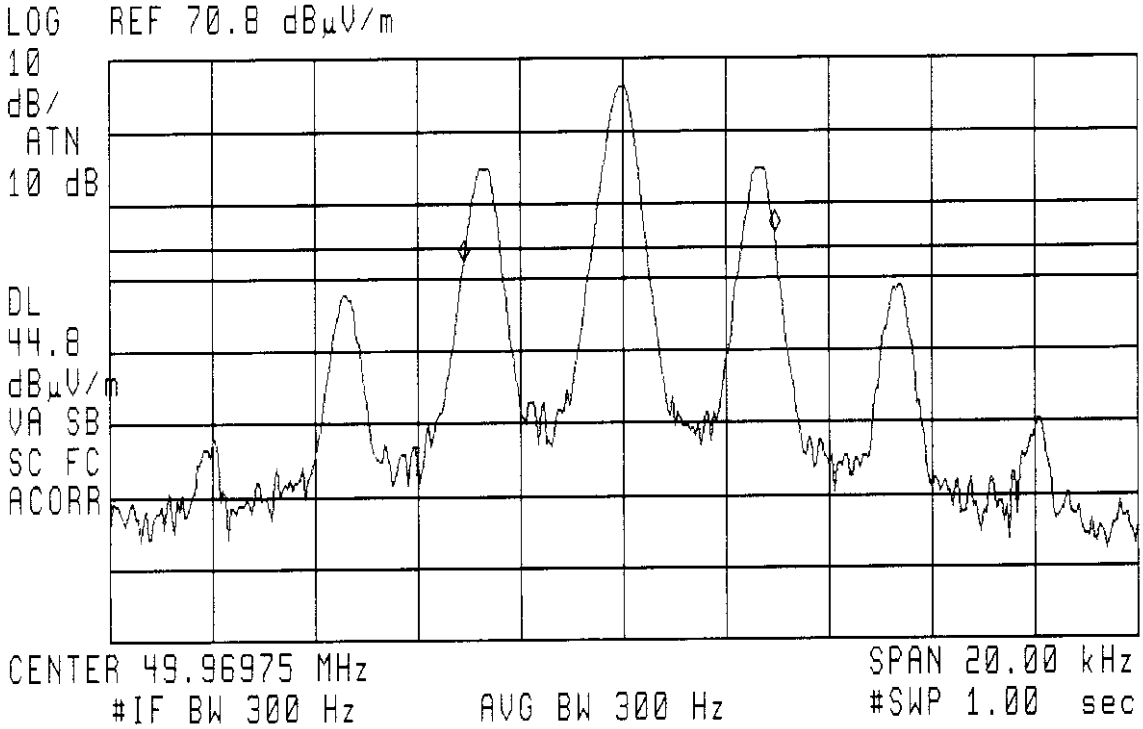
CHANNEL 25, MODULATION OFF HANDSET
UNICAL 32710 CORDLESS PHONE

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKRΔ 1.20 kHz
-.63 dB



CHANNEL 25, MODULATION ON HANDSET
UNICAL 32710 CORDLESS PHONE

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKRΔ 6.05 kHz
3.91 dB



ATTACHMENT H - FIELD STRENGTH OF THE FUNDAMENTAL EMISSION PART 15.233.c

CLIENT:	*Unical Enterprises, Inc.*	**TEST REFERENCE:**	*FCC Part 15 Subpart C*
EUT MODEL:	*32710*	**PRODUCT:**	*Cordless Telephone*
SERIAL NO.:	*Engineering sample*	**EUT DESIGNATION:**	*Home and Office*
TEMPERATURE:	*23°C*	**HUMIDITY:**	*42%*
ATM PRESSURE:	*1017 Mbar*	**GROUNDING:**	*Through power cord*
TESTED BY:	*Paul F. Chen*	**DATE OF TEST:**	*05/28/98*

TEST METHOD:	ANSI C63.4 1992
TEST PROCEDURE:	The EUT is set up according to the guidelines of ANSI C63.4 for radiated emissions. An EMI receiver peak scan is made at the frequency measurement range (prescan) in an anechoic chamber. Signal discrimination is then performed and the significant peaks marked. These peaks are then quasi-peaked for final test at the open area test site. The following data lists the significant emission frequencies, measured levels, correction factors (including cable and antenna correction factors), and the corrected readings against the limits. Explanation of the Correction Factor is given as follows: The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the measured reading. The basic equation with a sample calculation is as follows: FS= RA + AF + CF - AG Where: FS = Field Strength RA = Receiver Amplitude AF = Antenna Factor CF = Cable Attenuation Factor AG = Amplifier Gain
TEST VOLTAGE:	120VAC @ 60Hz
RESULTS:	The EUT meet the requirements of test reference for Radiated Emissions on both polarities by dB at MHz (BASE), and dB at MHz (HANDSET).
M.U.:	Freq. $\pm$ 2x10^{-7} x Center Freq., Amp $\pm$ 2.6 dB

BASE FUNDAMENTAL FREQUENCY				
Channels	Specifications Freq. (MHz)	Corrected Reading(dBuV/M)	Limits (dBuV/M @ 3M)	Margin (dB)
1	43.720	78.0	80.0	-2.0
2	43.740	76.0	80.0	-4.0
3	43.820	77.2	80.0	-2.8
4	43.840	76.9	80.0	-3.1
5	43.920	78.6	80.0	-1.4
6	43.960	76.2	80.0	-3.8
7	44.120	78.5	80.0	-1.5
8	44.160	78.2	80.0	-1.8
9	44.180	78.2	80.0	-1.8
10	44.200	76.8	80.0	-3.2
11	44.320	77.0	80.0	-3.0
12	44.360	77.4	80.0	-2.6
13	44.400	77.2	80.0	-2.8
14	44.460	77.2	80.0	-2.8
15	44.480	76.6	80.0	-3.4
16	46.610	73.1	80.0	-6.9
17	46.630	73.6	80.0	-6.4
18	46.670	72.2	80.0	-7.8
19	46.710	73.2	80.0	-6.8
20	46.730	71.8	80.0	-8.2
21	46.770	73.1	80.0	-6.9
22	46.830	73.0	80.0	-7.0
23	46.870	72.8	80.0	-7.2
24	46.930	72.0	80.0	-8.0
25	46.970	73.3	80.0	-6.7

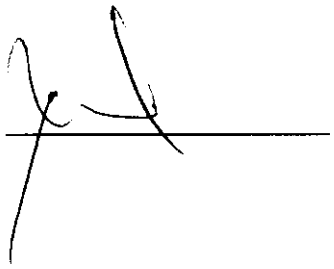
Automatic/Manual channel selection

* All harmonics of Base frequencies below 20dBμV/m
* No spurious emissions noticed
* All fundamental frequencies within 20 kHz band
* All modulated 26 dB bandwidth within 20 kHz band

HANDSET FUNDAMENTAL FREQUENCY				
Channels	Specifications Freq. (MHz)	Corrected Reading(dBuV/M)	Limits (dBuV/M @ 3M)	Margin (dB)
1	48.760	74.9	80.0	-5.1
2	48.840	74.8	80.0	-5.2
3	48.860	74.4	80.0	-5.6
4	48.920	75.2	80.0	-4.8
5	49.020	76.3	80.0	-3.7
6	49.080	75.6	80.0	-4.4
7	49.100	75.2	80.0	-4.8
8	49.160	76.9	80.0	-3.1
9	49.200	76.6	80.0	-3.4
10	49.240	75.8	80.0	-4.2
11	49.280	76.0	80.0	-4.0
12	49.360	75.9	80.0	-4.1
13	49.400	76.6	80.0	-3.4
14	49.460	76.1	80.0	-3.9
15	49.500	76.0	80.0	-4.0
16	49.670	74.8	80.0	-5.2
17	49.845	75.3	80.0	-4.7
18	49.860	74.9	80.0	-5.1
19	49.770	75.1	80.0	-4.9
20	49.875	74.2	80.0	-5.8
21	49.830	74.9	80.0	-5.1
22	49.890	74.8	80.0	-5.2
23	49.930	74.8	80.0	-5.2
24	49.990	73.2	80.0	-6.8
25	49.970	74.8	80.0	-5.2

* Automatic/Manual channel selection
* All harmonics of Base frequencies below 20dBμV/m
* No spurious emissions noticed
* All fundamental frequencies within 20 kHz band
* All modulated 26 dB bandwidth within 20 kHz band

Test Equipment	Manufacturer/ Model No.	Serial No.	Last Cal.
EMI Display	Rohde & Schwarz ESMI	825035/005	04/07/98
EMI Receiver	Rohde & Schwarz ESMI	849937/004	04/07/98
Function Generator	Goldstar FG-8002	5071750	N/A
Field Monitor	Amplifier Research FM5004	21414	N/A
Signal Generator	HP 8657A	N/A	N/A
Monitor	Viewsonic VCDTS21353-1M	JL72867152	N/A
Keyboard	IBM M	P52G9700	N/A
Mouse	HP M-S34	N/A	N/A
Amplifier	Instruments For Industry, Inc. CMX10001	A349-0497	N/A
Positioning Controller	EMCO 1060-2 511	9407-1748	N/A
Positioning Controller	EMCO 1051-12	9407-1827	N/A
PC	Gateway2000 BABY AT	4053494	N/A
Antenna	Chase CBL6112A	2274	11/15/97

SIGNED:  **REVIEWED:** _____

ATTACHMENT G - STATEMENT OF COMPLIANCE WITH PART 15.233.b

This device complies with Part 15 of the FCC Rules Operation is subject to the following two conditions: (1) This device may not cause harmful interference and (2) This device must accept any interference received including interference that may cause undesired operation. Privacy of communications may not be insured when using this phone.

Changes or modifications not expressly approved in writing by Northwestern Bell Phones may void the user's authority to operate this equipment.

This cordless phone model:32710 incorporates an automatic channel selection device that prevents establishment on any occupied frequency between channels 1-15.

Some cordless phones operate at frequencies that may cause interference to nearby TVs and VCRs; to minimize or prevent such interference, the base of the cordless phone should not be place near or on top of TV or VCR; and, if interference is experienced, moving the cordless telephone farther away from the TV or VCR will often reduce or eliminate the interference.

ATTACHMENT F - STATEMENT OF COMPLIANCE WITH PART 15.214.d

The Excursion® uses a digital coding security system to prevent unauthorized use of your telephone line by other cordless phones nearby. The Excursion® has 65,536 possible security code combinations, which is randomly generated every time that handset is picked up.

ATTACHMENT A - ANTENNA REQUIREMENT
PART 15.203

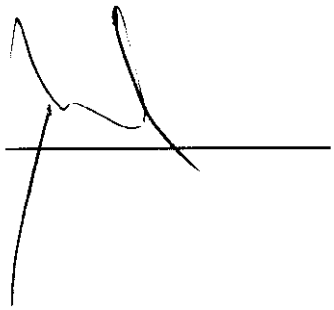
The transmitter uses a permanently connected antenna

ATTACHMENT B - CONDUCTED EMISSION TEST
PART 15.107 & 15.207

CLIENT:	*Unical Enterprises, Inc.*	**TEST REFERENCE:**	*FCC Part 15 Subpart B & C*
EUT MODEL:	*32710*	**PRODUCT:**	*Cordless Telephone*
SERIAL NO.:	*Engineering sample*	**EUT DESIGNATION:**	*Home and Office*
TEMPERATURE:	*23'C*	**HUMIDITY:**	*42%*
ATM PRESSURE:	*1017 Mbar*	**GROUNDING:**	*Through power cord*
TESTED BY:	*Paul F. Chen*	**DATE OF TEST:**	*05/28/98*
TEST METHOD:	ANSI C63.4 1992		
TEST PROCEDURE:	The EUT is set up according to the guideline of ANSI C63.4 for conducted emissions. The EUT is then plugged into a Line Impedance Stabilization Network (LISN) and an EMI receiver peak scan is made at the frequency measurement range. The six highest significant peaks are then marked, and these signals are then quasi-peaked and averaged. The frequency range investigated is from 150/450KHz to 30MHz.		
TEST VOLTAGE:	120VAC @ 60Hz		
RESULTS:	The EUT meet the requirements of test reference for Conducted Emissions on both line by 38.7 dB of Quasi-Peak detector.		
M.U.:	Freq. $\pm 2 \times 10^{-7}$ x Center Freq., Amp $\pm$ 2.6 dB		

Test Equipment	Manufacturer/ Model	Serial No.	Last Cal.
EMI Receiver	HP 8546A	3650A00363	11/04/97
RF Filter	HP 85460A	3704A00349	11/04/97
LISN	EMCO 3825/2	109804	04/12/97

Line	Frequency [MHz]	Corrected QP Reading [dB(μV)]	Delta QP [dB]	Limit [dB]
L1	0.682	0.5	-47.5	48.8
L1	0.811	3.8	-44.2	48.0
L1	1.169	-3.2	-51.2	48.0
L2	0.809	3.1	-44.9	48.0
L2	1.170	9.3	-38.7	48.0
L2	1.369	4.0	-44.0	48.0

SIGNED: 

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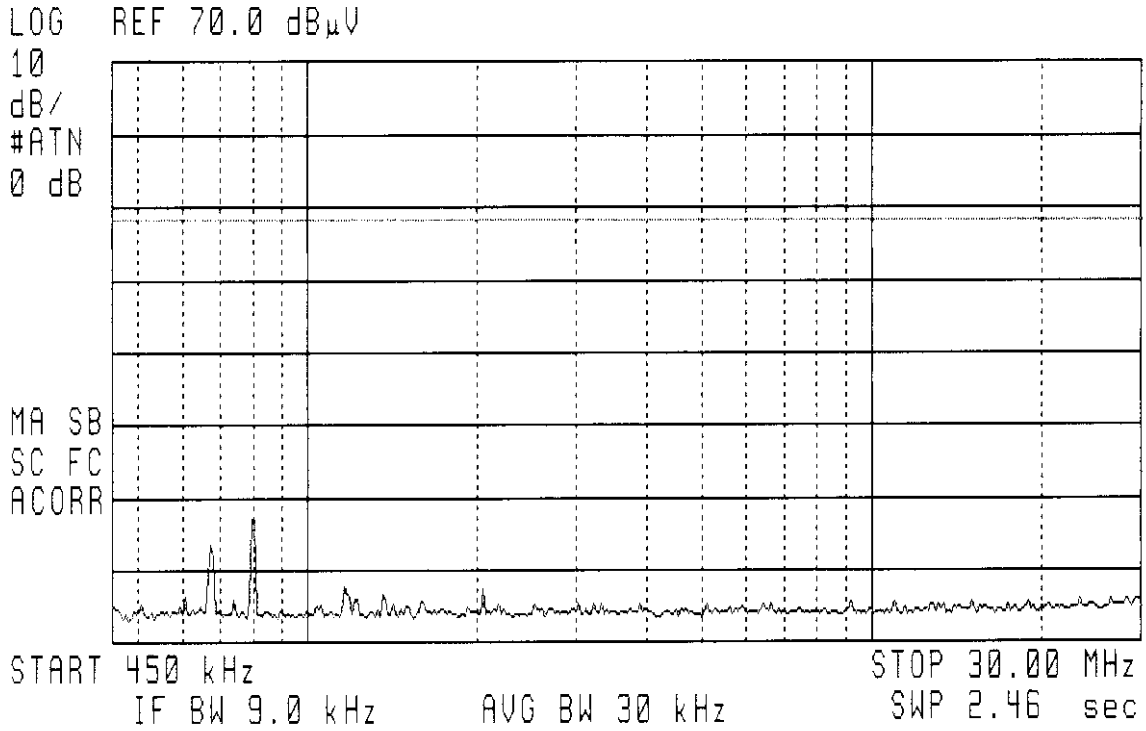
110 VAC/60 HZ L1
UNICAL 32710

ACTV DET: PEAK
MEAS DET: PEAK QP AVG

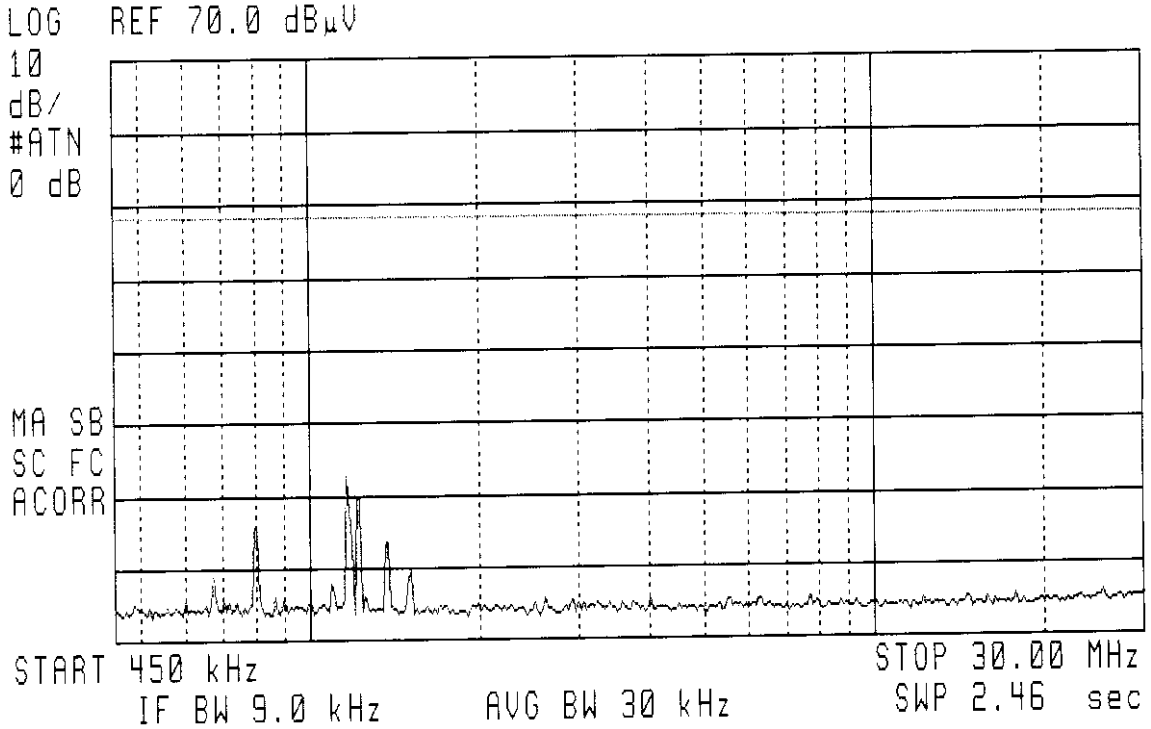


Signal Number	Frequency (MHz)	Peak (dBuV)	QP (dBuV)	QP Delta L 1 (dB)	Corr (dB)
1	0.681744	4.8	0.5	-47.5	0.1
2	0.811597	7.5	3.8	-44.2	0.1
3	1.169167	1.0	-3.2	-51.2	0.1

110 VAC/60 HZ L2
UNICAL 32710

STOP
30.00 MHz

ACTV DET: PEAK
MEAS DET: PEAK QP AVG



Signal Number	Frequency (MHz)	Peak (dBuV)	QP (dBuV)	QP Delta L 1 (dB)	Corr (dB)
1	0.809058	6.3	3.1	-44.9	0.1
2	1.169613	12.8	9.3	-38.7	0.1
3	1.369391	7.2	4.0	-44.0	0.1

Test Summary

The Electromagnetic Compatibility requirements on Model 32710 for this test are stated below.

Test Summary (CFR 15.247)			
Specifications	Requirement	Results	Attachments
CFR15.203	An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may designed the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.	Complied	A
CFR15.107.a and 15.207.a	For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 450 kHz to 30 MHz shall not exceed 250 microvolts. Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals.	Complied	B

<table>
<tr>
<td>CFR15.109.a and 15.209.a</td>
<td>Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:
<table>
<tr><th>Frequency (MHz)</th><th>Field strength (microvolts/meter)</th><th>Measurement distance (meters)</th></tr>
<tr><td>0.009-0.490.....</td><td>2400/F(kHz)</td><td>300</td></tr>
<tr><td>0.490-1.705.....</td><td>24000/F(kHz)</td><td>30</td></tr>
<tr><td>1.705-30.0.....</td><td>30</td><td>30</td></tr>
<tr><td>30-88.....</td><td>100**</td><td>3</td></tr>
<tr><td>88-216.....</td><td>150**</td><td>3</td></tr>
<tr><td>216-960.....</td><td>200**</td><td>3</td></tr>
<tr><td>Above 960.....</td><td>500</td><td>3</td></tr>
</table>
**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g. §§15.230 and 15.241.</td>
<td>Complied</td>
<td>C</td>
</tr>
<tr>
<td>CFR 15.214.a</td>
<td>For equipment authorization, a single application form, FCC Form 731, may be filed for a cordless telephone system, provided the application clearly identifies and provides data for all parts of the system to show compliance with the applicable technical requirements. When a single application form is submitted, both the base station and the portable handset must carry the same FCC identified. The application shall include a fee for certification of each type transmitter and notification or certification, if appropriate, for each type of receiver included in the system.</td>
<td>Complied</td>
<td>D</td>
</tr>
<tr>
<td>CFR 15.214.c</td>
<td>The label required under subpart A of this part shall also contain the following statement: "Privacy of communications may not be ensured when using this phone."</td>
<td>Complied</td>
<td>E</td>
</tr>
<tr>
<td>CFR 15.214.d</td>
<td>Cordless telephones shall incorporate circuitry which makes use of a digital security code to provide protection against unintentional access to the public switched telephone network by the base unit and unintentional ringing by the handset. These functions shall operate such that each access of the telephone network or ringing of the handset is preceded by the transmission of a code word. Access to the telephone network shall occur only if the code transmitted by the handset matches code set in the base unit. Similarly, ringing of the handset shall occur only if the code transmitted by the base unit matches the code set in the handset. The security code required by this section may also be employed to perform other communications functions, such as providing telephone billing information.</td>
<td>Complied</td>
<td>G</td>
</tr>
</table>

CFR 15.233.b	*An intentional radiator used as part of a cordless telephone system shall operate centered on one or more of the following frequency pairs.* *1) Frequency shall be paired as show in table in Section 15.233.b., except that channel pairing for channels one through fifteen may be accomplished by pairing any of the fifteen base transmitter frequencies with any of the fifteen handset transmitter frequencies.* *2) Cordless telephones operating on channels one through fifteen must:* *(i) Incorporate an automatic channel selection mechanism that will even establishment of a link on any occupied frequency; and* *(ii) The box or an instruction manual which is included within the box which the individual cordless telephone is to be marketed shall contain information indicating that some cordless telephones operate at frequencies that my cause interference to nearby TVs and VCRs; to minimized or prevent such interference, the base of the cordless telephone should be placed near or on the top of a TV or VCR; and, if interference is experienced, moving the cordless telephone farther away from the TV or VCR will often reduce or eliminate the interference. A statement describing the means of procedures used to achieve automatic channel selection shall be provided in any application for equipment authorization of a cordless telephone operating on channel one through fifteen.*	*Complied*	*H*
CFR 15.233.c	*The field strength of the fundamental emission shall not exceed 10,000 microvolts/meter at 3 meters. The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provision in 15.35 for limiting peak emission apply.*	*Complied*	*I*
CFR 15.233.d	*The fundamental emission shall be confined within a 20 kHz band and shall be centered on a carrier frequency, as adjusted by the frequency tolerance of the transmitter at the time testing is performed. Modulation products outside of this 20 kHz band shall be attenuated at least 26 dB below the level of the unmodulated carrier or to the general limits in 15.209, which ever permits the higher emission levels. Emissions on any frequency more than 20 kHz removed from the center frequency shall consist solely of unwanted emissions and shall not limits in 15.209.*	*Complied*	*J*

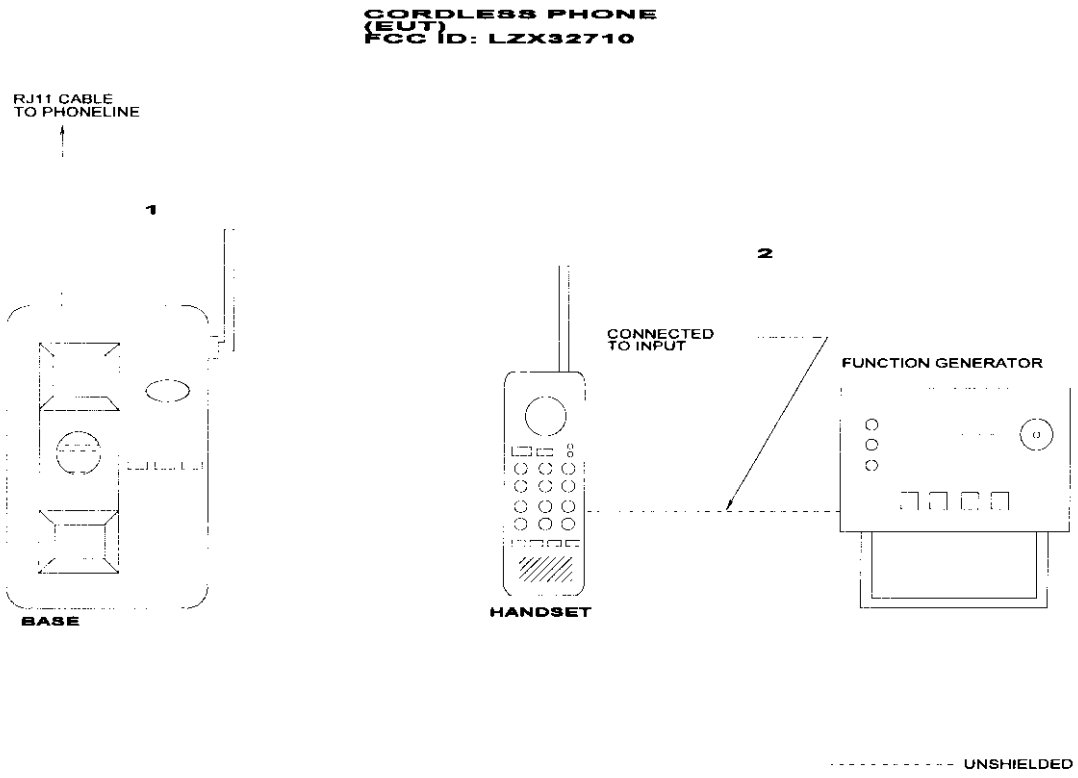
	Tests to determine shall be performed using an appropriate input signal as prescribed in 2.989 of this chapter.		
CFR 15.233.g	*The frequency tolerance of the carrier signal shall be maintained with ±0.01% of the operating frequency. The tolerance shall be maintained for a temperature variation of -20 degrees C to +50 degrees C at normal supply voltage, and for variation in the primary voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery*	*Complied*	*K*

Equipment Modifications

Any modification installed previous to testing by Unical Enterprises, Inc. will be incorporated in each production model sold or leased in United Stated of America.

No modification were installed by EMC Compliance Management Group.

Configuration of Tested System



Test Location

EMC Compliance Management Group is located at 670 National Ave., Mountain View, CA 94043, USA.

Accreditation Bodies

EMC Compliance Management Group is a fully accredited Test Laboratory for ITE, ISM and Telecommunications Products.

Laboratory Assessment #: 14082, Approved by Assessment Services, A U. K. Competent Body, as meeting the requirements of EN45001and ISO Guide 25.

In compliance with the site registration requirements of Section 2.948 of the FCC Rules to perform EMI measurements for the general public.

Accredited by the National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code # 200068-0.

Registered in accordance with Japanese VCCI Regulations.

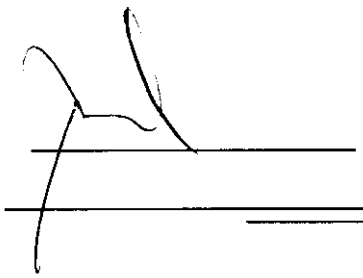
ATTACHMENT C - RADIATED EMISSION TEST RESULTS
PART 15.109 & 15.209

CLIENT:	*Unical Enterprises, Inc.*	**TEST REFERENCE:**	*FCC Part 15 Subpart B & C*
EUT MODEL:	*32710*	**PRODUCT:**	*Cordless Telephone*
SERIAL NO.:	*Engineering sample*	**EUT DESIGNATION:**	*Home and Office*
TEMPERATURE:	*23°C*	**HUMIDITY:**	*42%*
ATM PRESSURE:	*1017 Mbar*	**GROUNDING:**	*Through power cord*
TESTED BY:	*Paul F. Chen*	**DATE OF TEST:**	*05/28/98*

TEST METHOD:	ANSI C63.4 1992
TEST PROCEDURE:	The EUT is set up according to the guidelines of ANSI C63.4 for radiated emissions. An EMI receiver peak scan is made at the frequency measurement range (prescan) in an anechoic chamber. Signal discrimination is then performed and the significant peaks marked. These peaks are then quasi-peaked for final test at the open area test site in the range of 30 MHz through 2000 MHz. The following data lists the significant emission frequencies, measured levels, correction factors (including cable and antenna correction factors), and the corrected readings against the limits. Explanation of the Correction Factor is given as follows: The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the measured reading. The basic equation with a sample calculation is as follows: FS= RA + AF + CF - AG Where: FS = Field Strength RA = Receiver Amplitude AF = Antenna Factor CF = Cable Attenuation Factor AG = Amplifier Gain
TEST VOLTAGE:	120VAC @ 60Hz
RESULTS:	The EUT meet the requirements of test reference for Radiated Emissions on both polarities by 0.2 dB at 218.91 MHz in the range of 30MHz to 2000MHz.
M.U.:	Freq. $\pm 2 \times 10^{-7}$ x Center Freq., Amp $\pm$ 2.6 dB

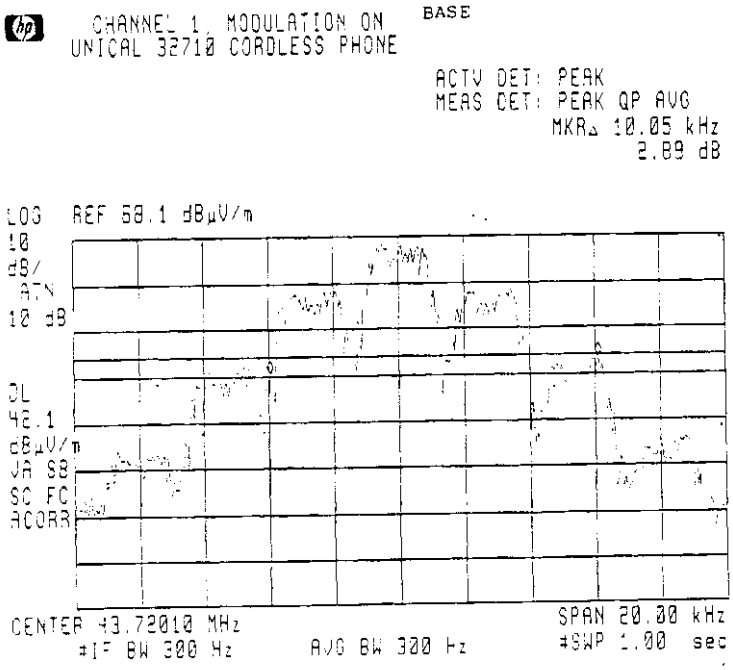
Frequency [MHz]	Polarity [V/H]	Corrected Reading [dB(μV)]	Delta, QP [dB]	3 Meters Limit [dB(μV)]	Correction Factor [dB]
218.91	V	45.8	-0.2	46.0	13.2
262.61	V	41.8	-4.2	46.0	14.9
87.721	V	35.6	-4.4	40.0	10.1
131.2	V	37.7	-5.8	43.5	13.9
487.88	V	40.1	-5.9	46.0	19.5
131.2	H	37.0	-6.5	43.5	13.9
Note: All reading are quasi-peak unless stated otherwise, using a QPA bandwidth of 120kHz, with a 30 ms sweep time. A video filter was not used.					

Test Equipment	Manufacturer/ Model No.	Serial No.	Last Cal.
EMI Display	Rohde & Schwarz ESMI	825035/005	04/07/98
EMI Receiver	Rohde & Schwarz ESMI	849937/004	04/07/98
Function Generator	Goldstar FG-8002	5071750	N/A
Field Monitor	Amplifier Research FM5004	21414	N/A
Signal Generator	HP 8657A	N/A	N/A
Monitor	Viewsonic VCDTS21353-1M	JL72867152	N/A
Keyboard	IBM M	P52G9700	N/A
Mouse	HP M-S34	N/A	N/A
Amplifier	Instruments For Industry, Inc. CMX10001	A349-0497	N/A
Positioning Controller	EMCO 1060-2 511	9407-1748	N/A
Positioning Controller	EMCO 1051-12	9407-1827	N/A
PC	Gateway2000 BABY AT	4053494	N/A
Antenna	Chase CBL6112A	2274	11/15/97

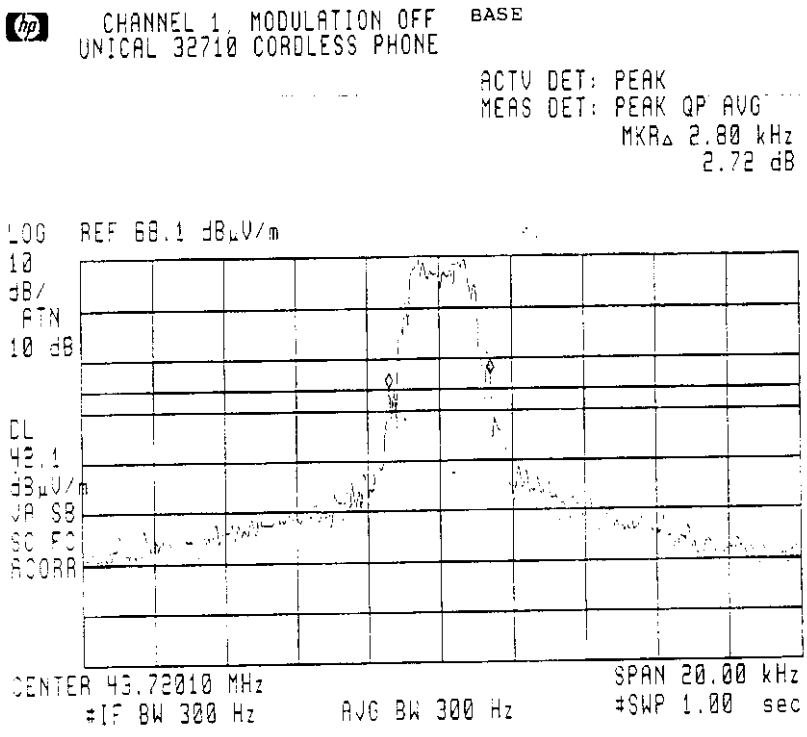
SIGNED:  **REVIEWED:** _____

1. Radiated emission test data on harmonic emissions from the base transmitter on two channels per Section 15.31(m) to show compliance with in Section 15.233(d).

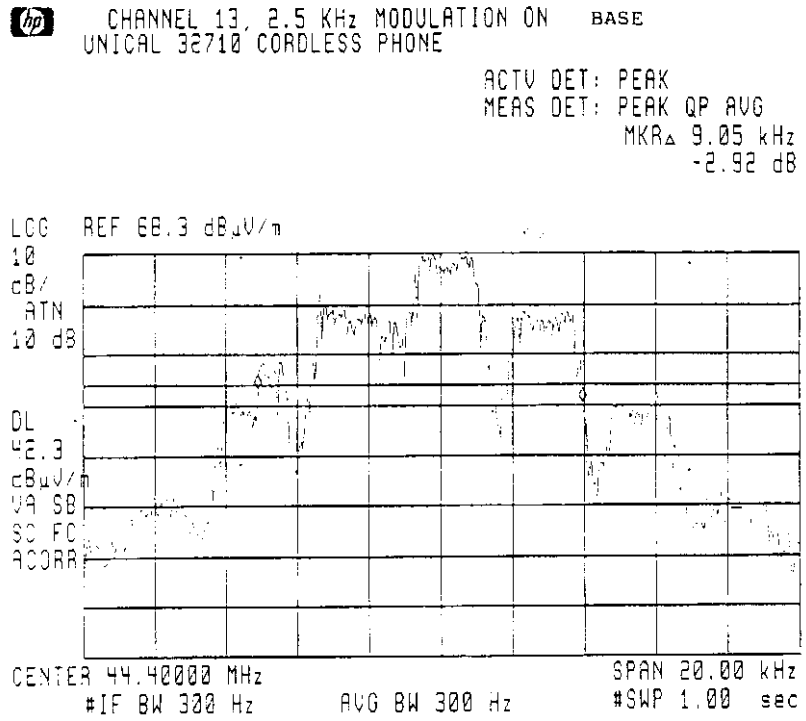
CHANNEL 1 BASE MODULATION



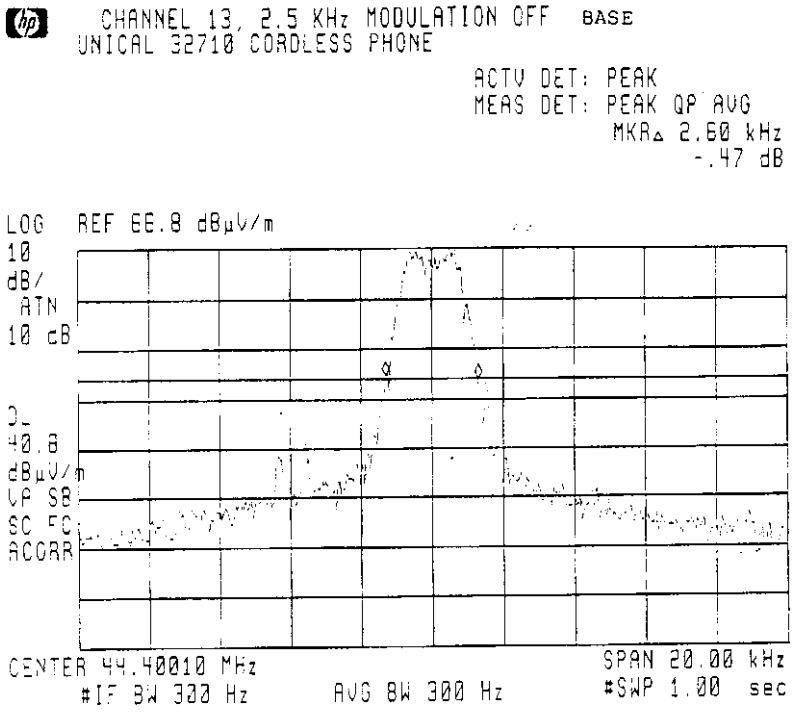
CHANNEL 1 BASE UNMODULATION



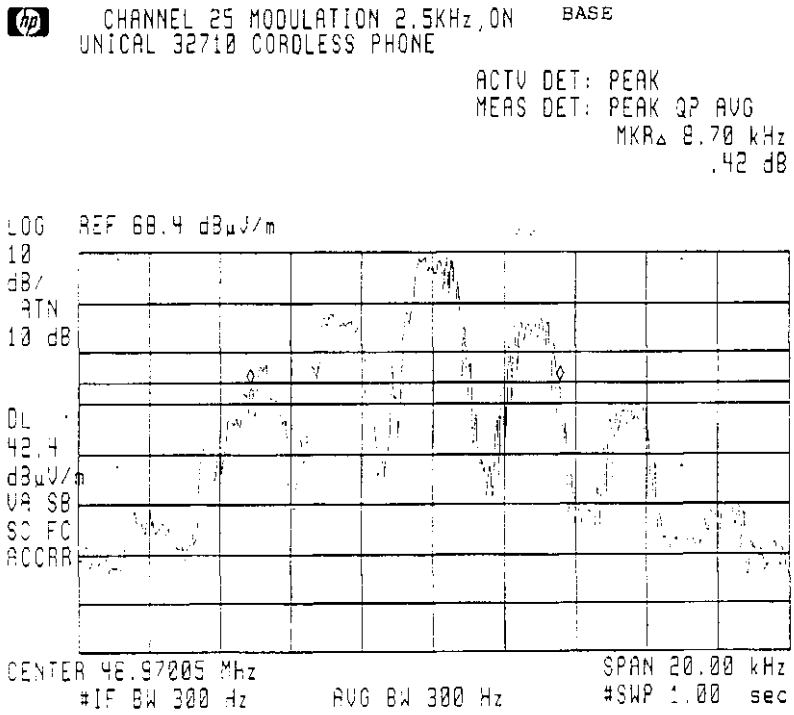
CHANNEL 13 BASE MODULATION



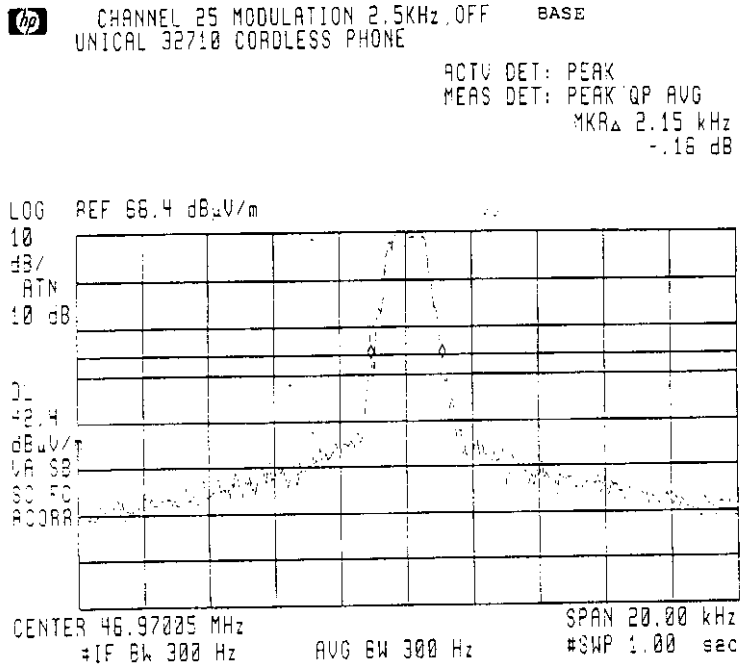
CHANNEL 13 BASE UNMODULATION



CHANNEL 25 BASE MODULATION

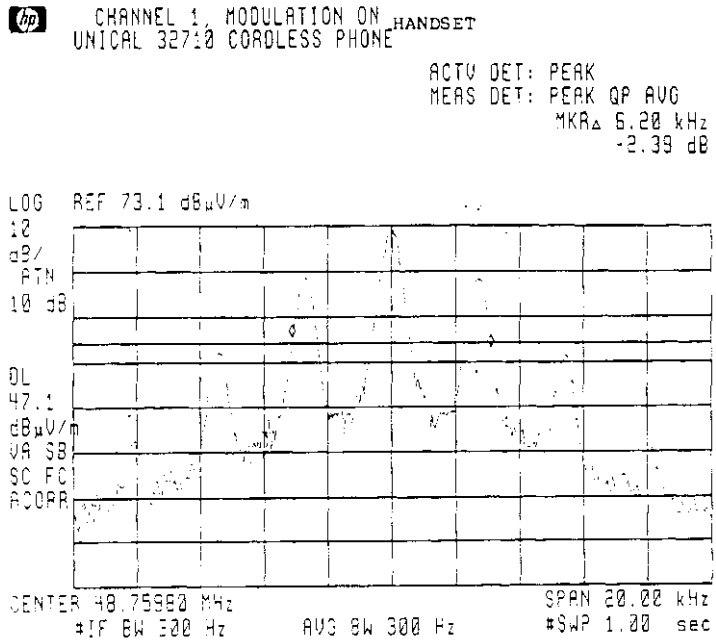


CHANNEL 25 BASE UNMODULATION

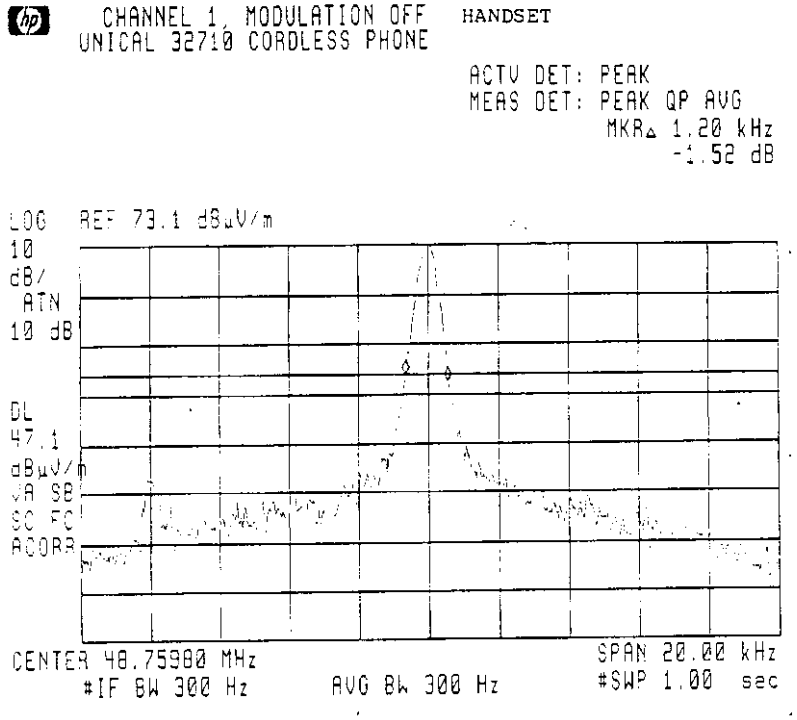


2. Radiated emission test data on harmonic emissions from the handset transmitter on two channels per Section 15.31(m) to show compliance with in Section 15.233(d).

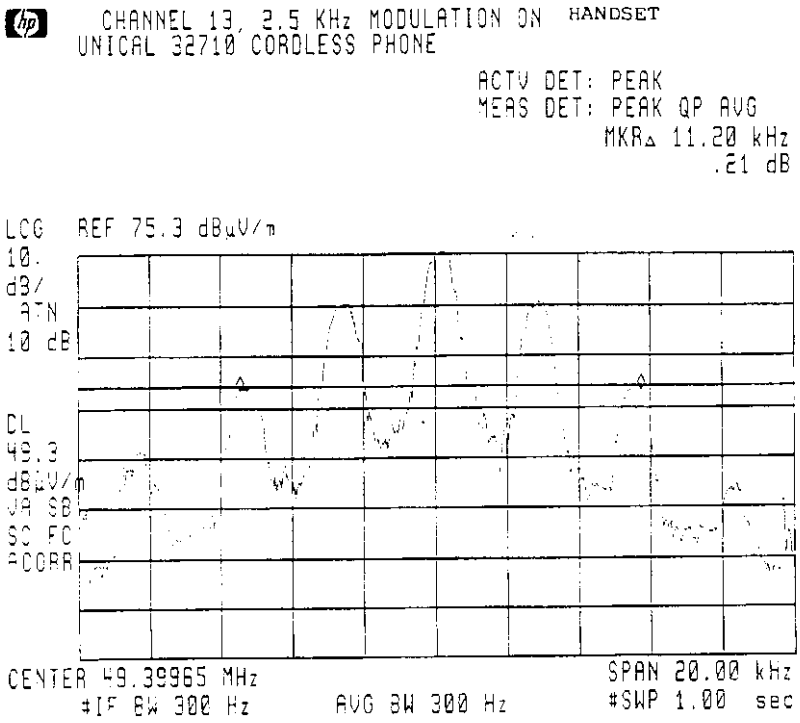
CHANNEL 1 HANDSET MODULATION



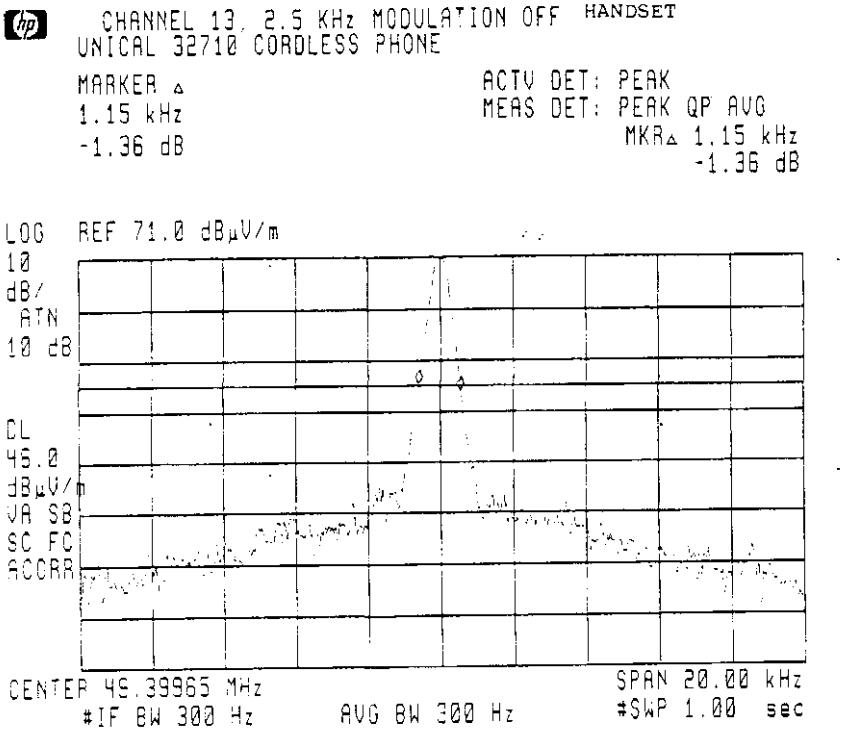
CHANNEL 1 HANDSET UNMODULATION



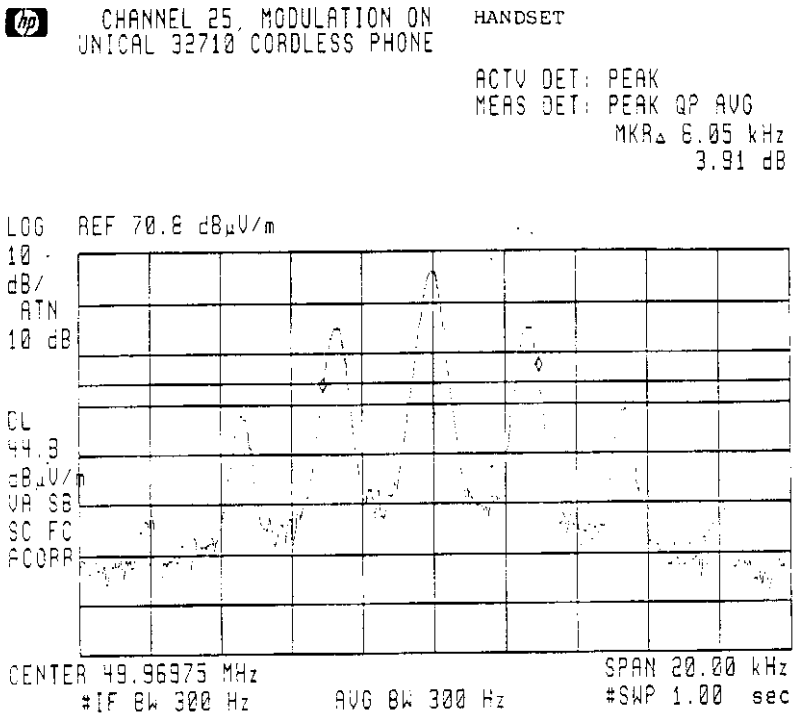
CHANNEL 13 HANDSET MODULATION



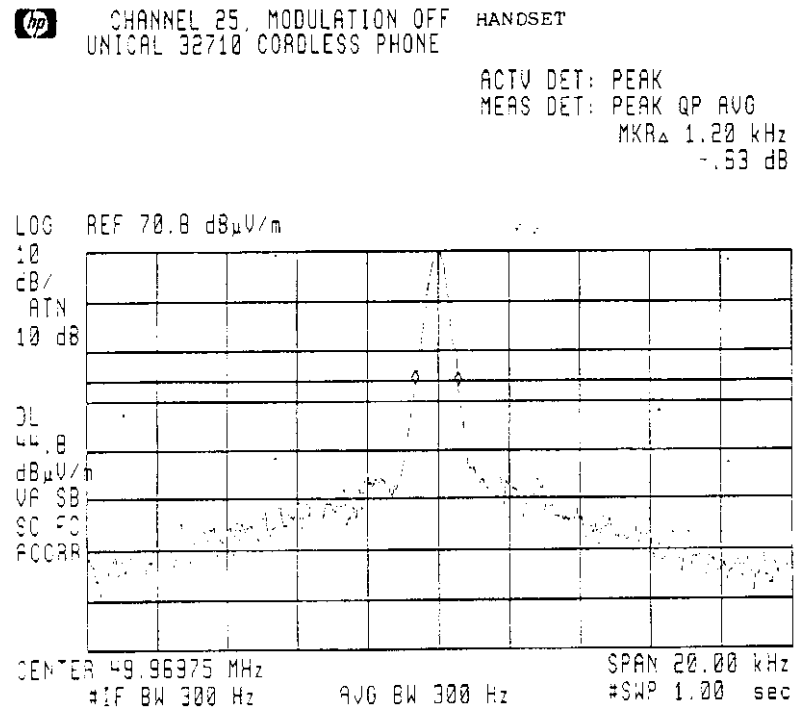
CHANNEL 13 HANDSET UNMODULATION



CHANNEL 25 HANDSET MODULATION



CHANNEL 25 HANDSET UNMODULATION



3. Radiated emission measurements between 30 - 1000 MHz

Frequency [MHz]	Polarity [V/H]	Corrected Reading [dB(μV)]	Delta, QP [dB]	3 Meters Limit [dB(μV)]	Correction Factor [dB]
218.91	V	45.8	-0.2	46.0	13.2
262.61	V	41.8	-4.2	46.0	14.9
87.721	V	35.6	-4.4	40.0	10.1
131.20	V	37.7	-5.8	43.5	13.9
487.88	V	40.1	-5.9	46.0	19.5
131.20	H	37.0	-6.5	43.5	13.9

Note: All reading are quasi-peak unless stated otherwise, using a QPA bandwidth of 120kHz, with a 30 ms sweep time. A video filter was not used.

4. The algorithm or program that is used to ensure that a link is not established on an occupied cordless telephone channel 1 through 15 are required by Section 15.333(b)(2)(i)

See the next page

25 CHANNEL • AUTOMATIC CHANNEL SELECTION MECHANISM

TALK MODE

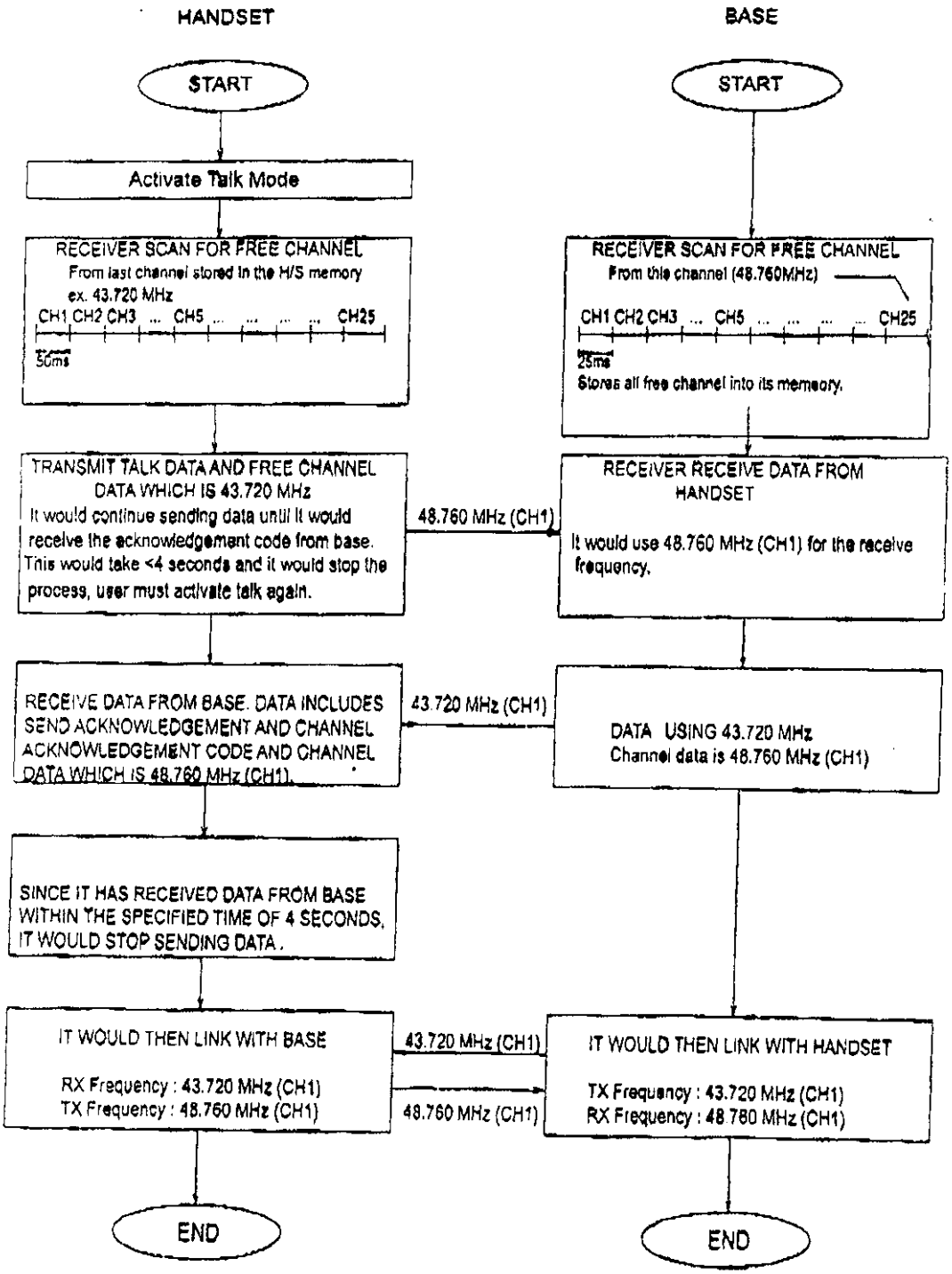
During the activation of talk, the handset receiver scan each channel from its last linked receiver channel for about 50ms, looking for free channel. Once a receiver found a free channel, the handset transmit talk instruction with receiver's free channel information to base to use this channel as a transmit channel.

Also, the base receiver scan for a clearest channel from channel 1 to 25 (25ms per channel). Once the base receiver received data from its handset during its scanning it will stop the scan and acknowledge data with its clearest receiver channel information then handset transmit and base receiver will change the channel to link. The handset and base unit's receiver scan and find separately their receiver's clearest channel. If all transmit channels of base and handset are occupied (all busy), handset and base will link at channel 16 (default channel).

Channel Number	Base Transmitter (MHz)	Handset Transmitter (MHz)
1	43.720	48.760
2	43.740	48.840
3	43.820	48.860
4	43.840	48.920
5	43.920	49.020
6	43.960	49.080
7	44.120	49.100
8	44.160	49.160
9	44.180	49.200
10	44.200	49.240
11	44.320	49.280
12	44.360	49.360
13	44.400	49.400
14	44.460	49.460
15	44.480	49.500
16	46.610	49.670
17	46.630	49.845
18	46.670	49.860
19	46.710	49.770
20	46.730	49.875
21	46.770	49.830
22	46.830	49.890
23	46.870	49.930
24	46.930	49.990
25	46.970	49.970

TALK MODE

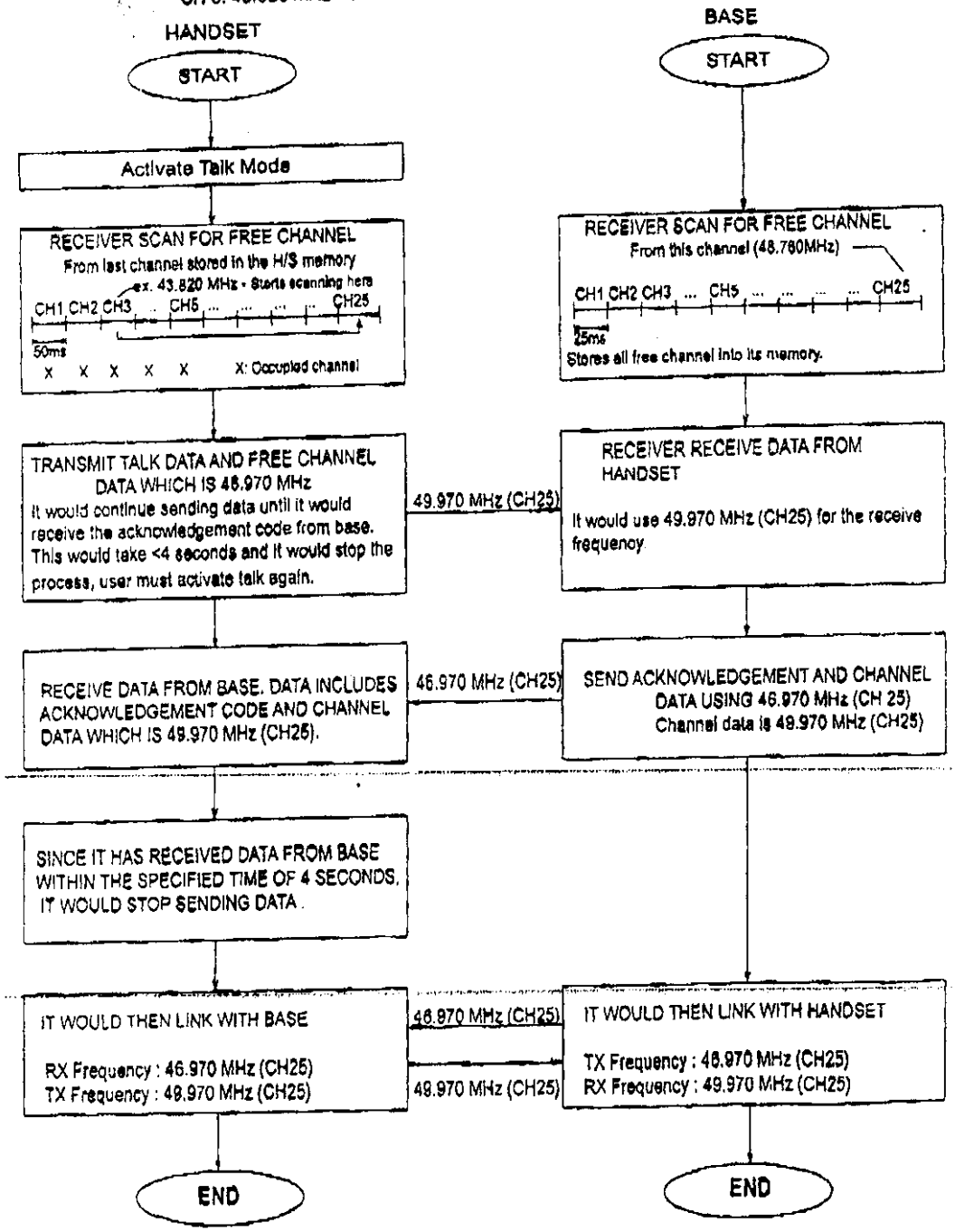
CONDITION 1 : All channels are unoccupied (Free channel)



TALK MODE

:ONDITION 2 : Multi channel on the base TX frequency are occupied.
Ex. CH 1 : 43.720 MHz CH 4 : 43.840 MHz
CH 2 : 43.740 MHz CH 5 : 43.920 MHz
CH 3 : 43.820 MHz

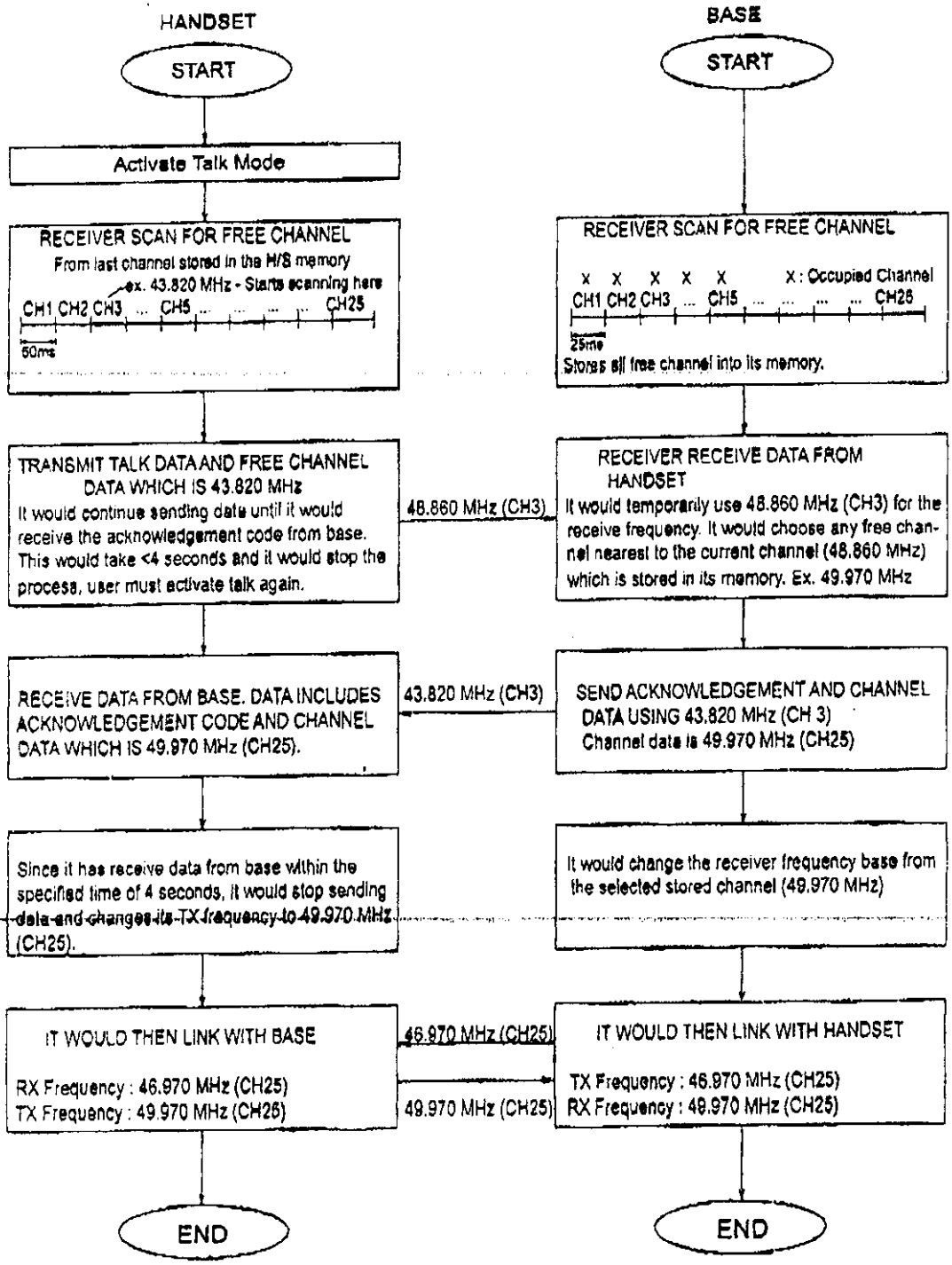
CH 3: 43.820 MHz - Stored channel during the last link in handset memory



TALK MODE

CONDITION 3 : Multi channel on the Handset TX frequency are occupied.
Ex. CH 1 : 48.760 MHz CH 4 : 48.920 MHz
CH 2 : 48.840 MHz CH 5 : 48.020 MHz
CH 3 : 48.860 MHz

CH 3 : 43.820 MHz - Stored channel during the last link in handset memory

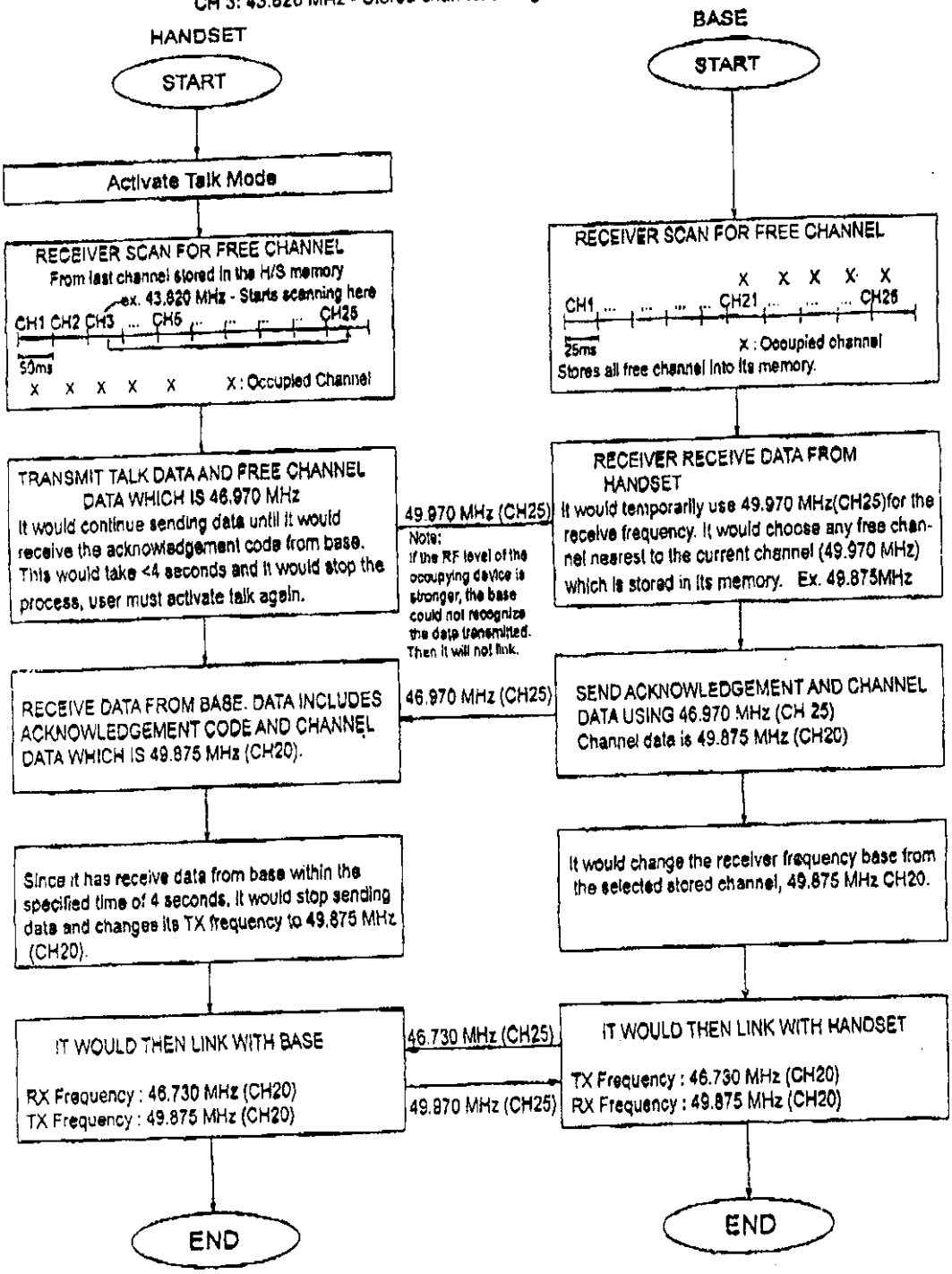


TALK MODE

CONDITION 4 : Multi channel on the Base TX and Handset TX frequency are occupied.

Ex. CH 1: 48.760 MHz CH 4 : 48.920 MHz CH 21: 49.830 MHz CH 24: 49.990 MHz
CH 2: 48.840 MHz CH 5 : 48.020 MHz CH 22: 49.890 MHz CH 25: 49.970 MHz
CH 3: 48.860 MHz CH 23: 49.930 MHz

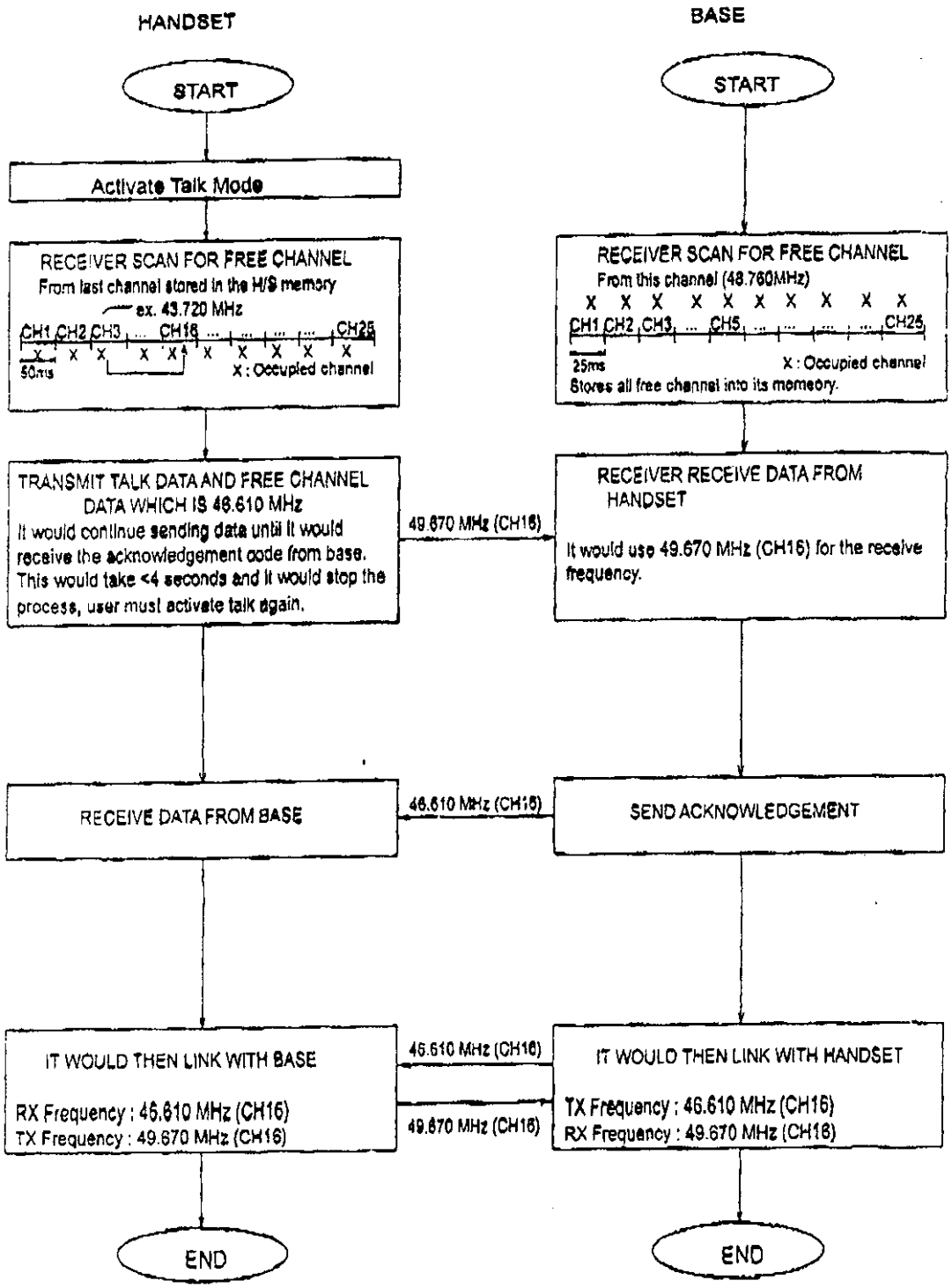
CH 3: 43.820 MHz - Stored channel during the last link in handset memory



TALK MODE

CONDITION 5 : All TX channels of Handset and Base are occupied (All Busy) -

CH3 : 43.820 MHz - Stored channel during the last link in Handset memory.



5. The test results demonstrating that this algorithm or program that is used to ensure that a link is not established on an occupied cordless telephone channel 1 through 15 are required by Section 15.333(b)(2)(i)

Test Results

INTERFERENCE CHANNEL AT	PHONE PRE-SET CHANNEL AT	PHONE AUTO-SCAN TO CHANNEL AT -13 dBm
1	1	2
2	2	3
3	3	4
4	4	5
5	5	7
6	6	7
7	7	8
8	8	9
9	9	10
10	10	11
11	11	12
12	12	14
13	13	14
14	14	15
15	15	16
16	16	17
17	17	18
18	18	19
19	19	20
20	20	22
21	21	22
22	22	23
23	23	24
24	24	25
25	25	1

Summary

The phone under test has an automatic selection mechanism that will prevent establishment of a link on any occupied frequency channel.

Section 15.31(m): The EUT was tested at low, mid and high channel for both handset and base unit.

BASE	
CHANNEL	**FREQUENCY (MHz)**
LOW	43.720 MHz
MID	44.400 MHz
HIGH	46.970 MHz
HANDSET	
CHANNEL	**FREQUENCY (MHz)**
LOW	48.760 MHz
MID	49.400 MHz
HIGH	49.970 MHz

Section 15.233(d): The low, mid and high channels were selected according to section 15.31(m). The fundamental emission is within a 20 kHz band shows as table below at 26 dB below the level.

MODULATION

BASE			
CHANNEL	**FREQUENCY (MHz)**	**WITHIN THE BAND, 26 dB BELOW THE LEVEL**	**REMARK**
LOW	43.720	10.05 kHz	Complied
MID	44.000	9.05 kHz	Complied
HIGH	46.970	8.70 kHz	Complied
HANDSET			
CHANNEL	**FREQUENCY (MHz)**	**WITHIN THE BAND, 26 dB BELOW THE LEVEL**	**REMARK**
LOW	48.760	6.20 kHz	Complied
MID	49.400	11.20 kHz	Complied
HIGH	49.970	6.05 kHz	Complied

UNMODULATION

BASE			
CHANNEL	**READING [dBμV/m]**	**WITHIN THE BAND, 26 dB BELOW THE LEVEL**	**REMARK**
LOW	43.720	2.80 kHz	Complied
MID	44.000	2.60 kHz	Complied
HIGH	46.970	2.15 kHz	Complied
HANDSET			
CHANNEL	**READING [dBμV/m]**	**WITHIN THE BAND, 26 dB BELOW THE LEVEL**	**REMARK**
LOW	48.760	1.20 kHz	Complied
MID	49.400	1.15 kHz	Complied
HIGH	49.970	1.20 kHz	Complied

ATTACHMENT : RADIATED EMISSION TEST RESULTS (204-R.01)

CLIENT:	Unical Enterprises, Inc.	**TEST REFERENCE:**	FCC PART 15 CLASS B Section 15.31(m) & 15.209
EUT MODEL:	32710	**PRODUCT:**	Cordless Telephone
SERIAL NO.:	Engineering	**EUT DESIGNATION:**	Home and Office Use
TEMPERATURE:	19°C	**HUMIDITY:**	55%
ATM PRESSURE:	1017 Mbar	**GROUNDING:**	Through Power Cord
TESTED BY:	Nancy T. Nguyen	**DATE OF TEST:**	11/25/98

SETUP METHOD:	ANSI 63.4 – 1992
TEST PROCEDURE:	The EUT is set up according to the guidelines of ANSI C63.4 for radiated emissions with a 10cm wood pallet raised above ground plane. An EMI receiver peak scan is made at the frequency measurement range (pre-scan) in an Anechoic chamber. Signal discrimination is then performed and the significant peaks marked. These peaks are then quasi-peaked for final test at the open area test site. The following data lists the significant emission frequencies, measured levels, correction factors (including cable and antenna correction factors), and the corrected readings against the limits. Explanation of the Correction Factor is given as follows: The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the measured reading. The basic equation with a sample calculation is as follows: FS= RA + AF + CF - AG Where: FS = Field Strength RA = Receiver Amplitude AF = Antenna Factor CF = Cable Attenuation Factor AG = Amplifier Gain
TEST VOLTAGE:	120VAC / 60Hz
CHANGES OR MODIFICATIONS:	There is no modification installed by EMC Compliance Management Group test personnel.
M.U.:	Freq. $\pm 2 \times 10^{-7}$ x Center Freq., Amp $\pm$ 2.6 dB

BASE

CHANNEL 1					
Frequency [MHz]	Antenna Polarization [V/H]	Corrected Reading [dB(µV)]	Delta, QP [dB]	3Meters Limits [dB(µV)/m]	Correction Factors [dB]
Set-up/Configuration: ANSI C63.4 1992					
262.325	H	44.9	-1.1	46.0	14.6
218.603	H	44.7	-1.3	46.0	12.8
633.878	V	40.8	-5.2	46.0	21.4
87.440	V	34.5	-5.5	40.0	9.6
487.595	V	39.9	-6.1	46.0	19.3
585.115	V	38.8	-7.2	46.0	20.9
CHANNEL 25					
Frequency [MHz]	Antenna Polarization [V/H]	Corrected Reading [dB(µV)]	Delta, QP [dB]	3Meters Limits [dB(µV)/m]	Correction Factors [dB]
Set-up/Configuration: ANSI C63.4 1992					
93.943	V	41.7	-1.8	43.5	10.8
657.585	H	43.5	-2.5	46.0	21.6
234.850	H	42.7	-3.3	46.0	13.7
234.855	V	41.7	-4.3	46.0	13.7
281.825	H	41.3	-4.7	46.0	14.7
399.760	V	41.1	-4.9	46.0	18.1
Comments: None					
Note: All readings are quasi-peak unless stated otherwise, using a QPA bandwidth of 120kHz, with a 30 ms sweep time. A video filter was not used.					

SIGNED: _____ REVIEWED: _____

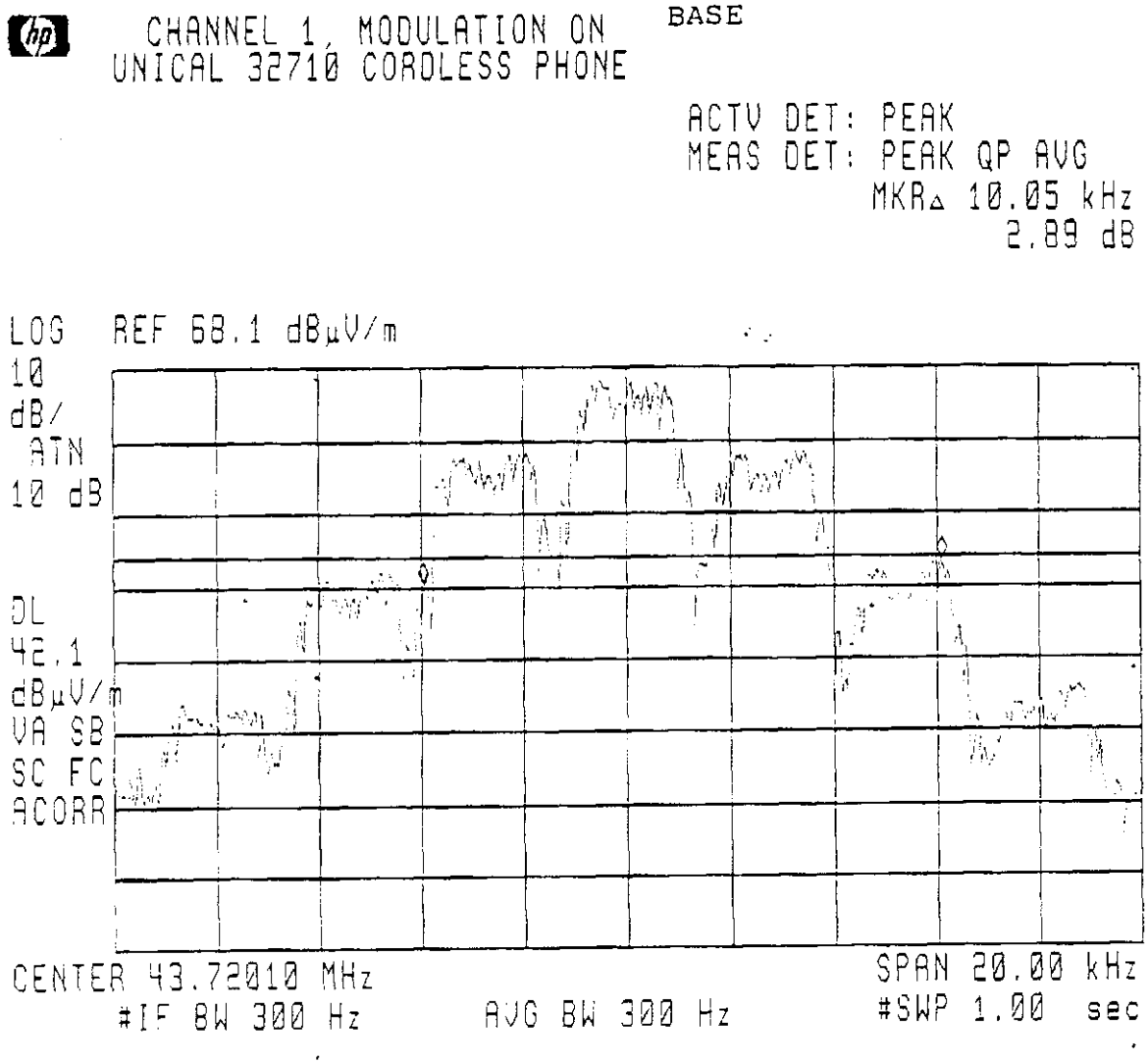
HANDSET

CHANNEL 1					
Frequency [MHz]	Antenna Polarization [V/H]	Corrected Reading [dB(µV)]	Delta, QP [dB]	3Meters Limits [dB(µV)/m]	Correction Factors [dB]
Set-up/Configuration: ANSI C63.4 1992					
731.395	H	45.1	-0.9	46.0	22.4
218.600	H	44.7	-1.3	46.0	12.8
195.050	H	42.2	-1.3	43.5	11.7
438.838	H	44.4	-1.6	46.0	18.6
341.320	H	42.4	-3.6	46.0	16.2
438.840	V	42.3	-3.7	46.0	18.6
CHANNEL 25					
Frequency [MHz]	Antenna Polarization [V/H]	Corrected Reading [dB(µV)]	Delta, QP [dB]	3Meters Limits [dB(µV)/m]	Correction Factors [dB]
Set-up/Configuration: ANSI C63.4 1992					
449.713	H	45.3	-0.7	46.0	18.8
140.908	V	42.2	-1.3	43.5	13.3
549.668	H	44.7	-1.3	46.0	20.3
93.943	V	42.1	-1.4	43.5	10.8
199.883	H	41.2	-2.3	43.5	20.3
499.703	H	43.6	-2.4	46.0	11.9
Comments: None					
Note: All readings are quasi-peak unless stated otherwise, using a QPA bandwidth of 120kHz, with a 30 ms sweep time. A video filter was not used.					

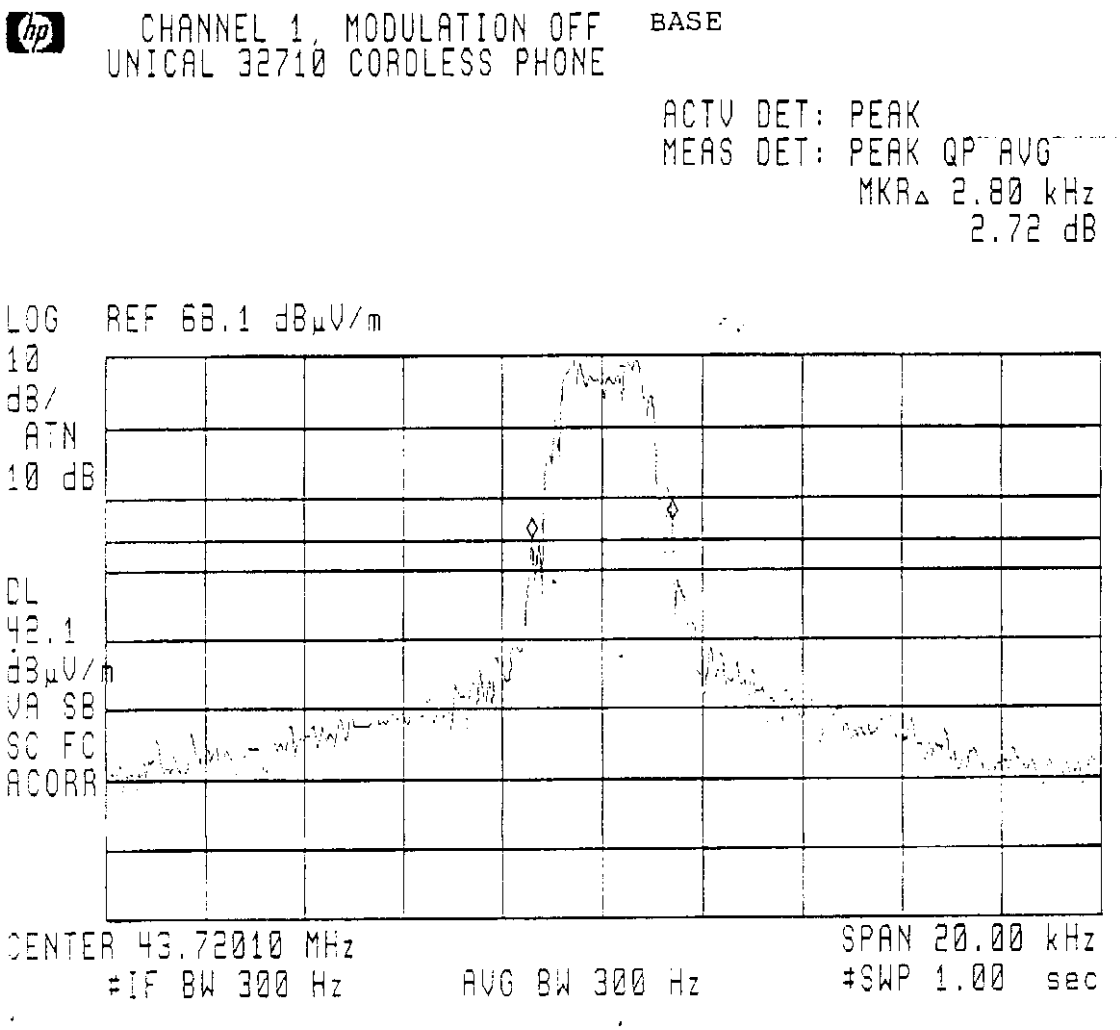
SIGNED: REVIEWED:

1. Radiated emission test data on harmonic emissions from the base transmitter on two channels per Section 15.31(m) to show compliance with in Section 15.233(d).

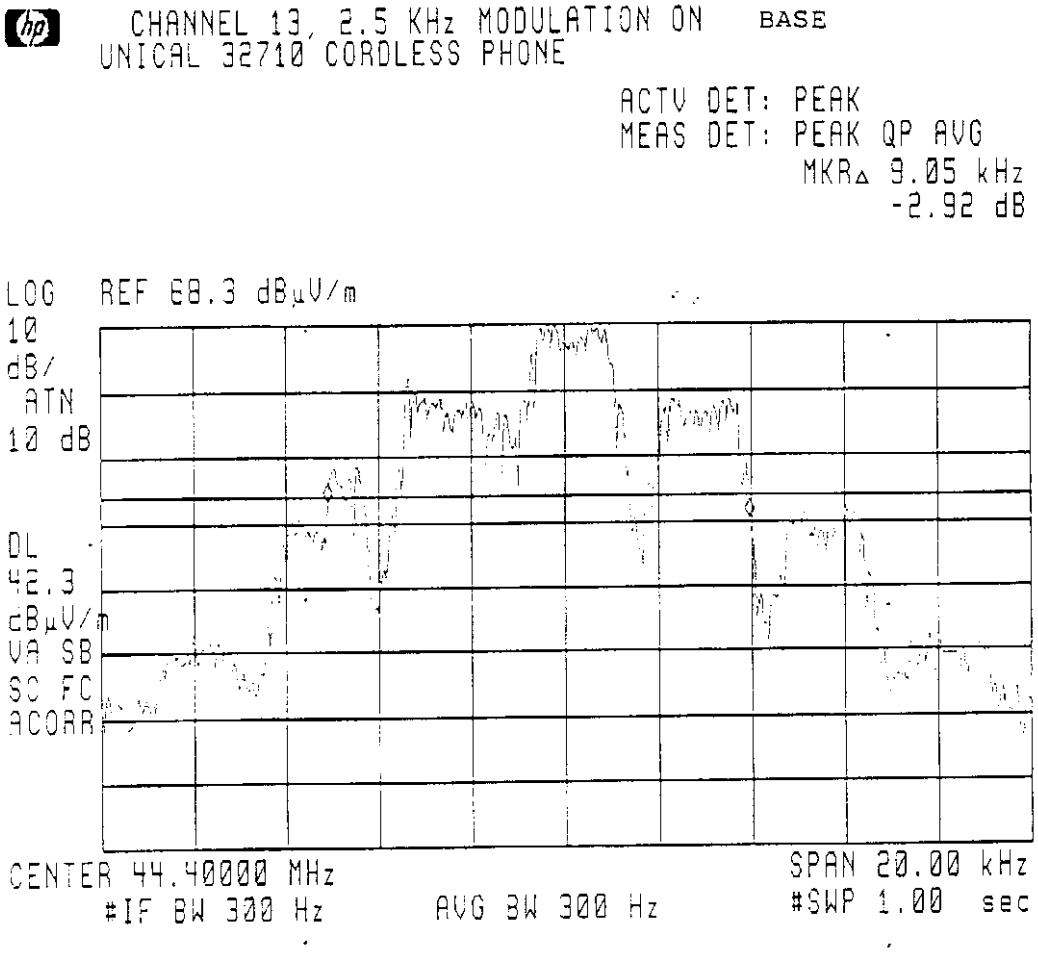
CHANNEL 1 BASE MODULATION



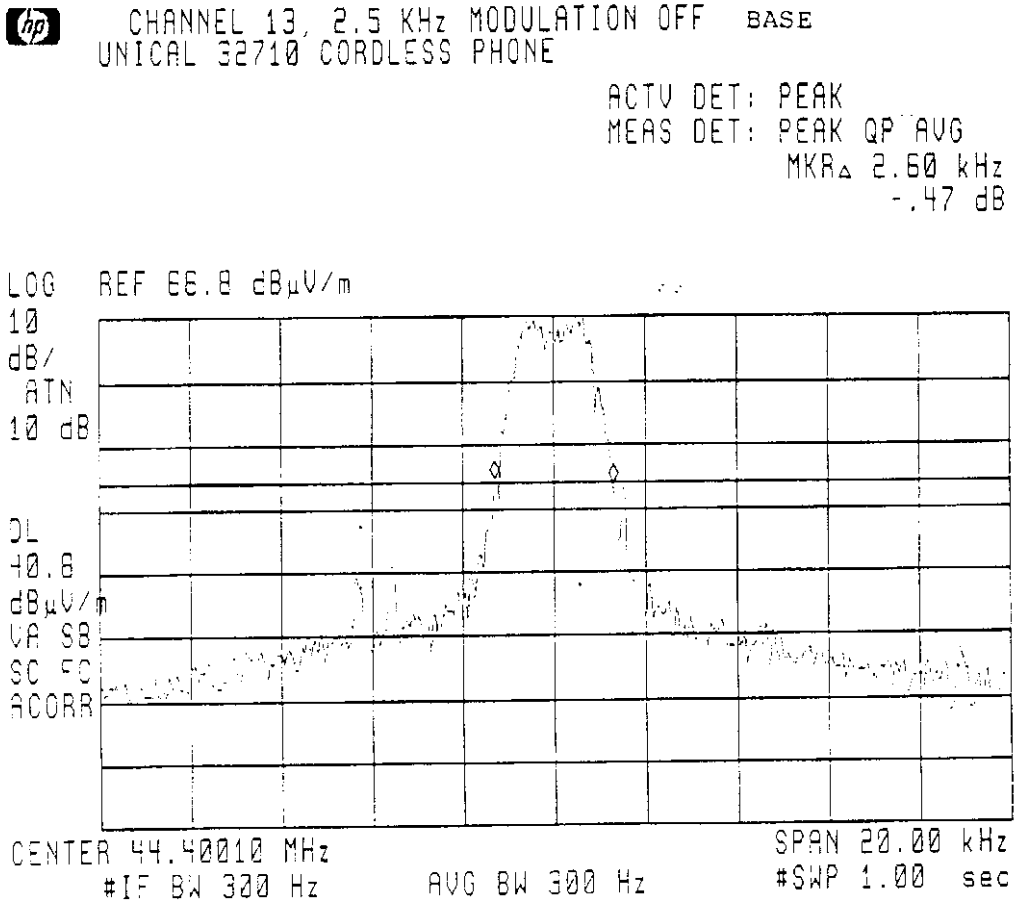
CHANNEL 1 BASE UNMODULATION



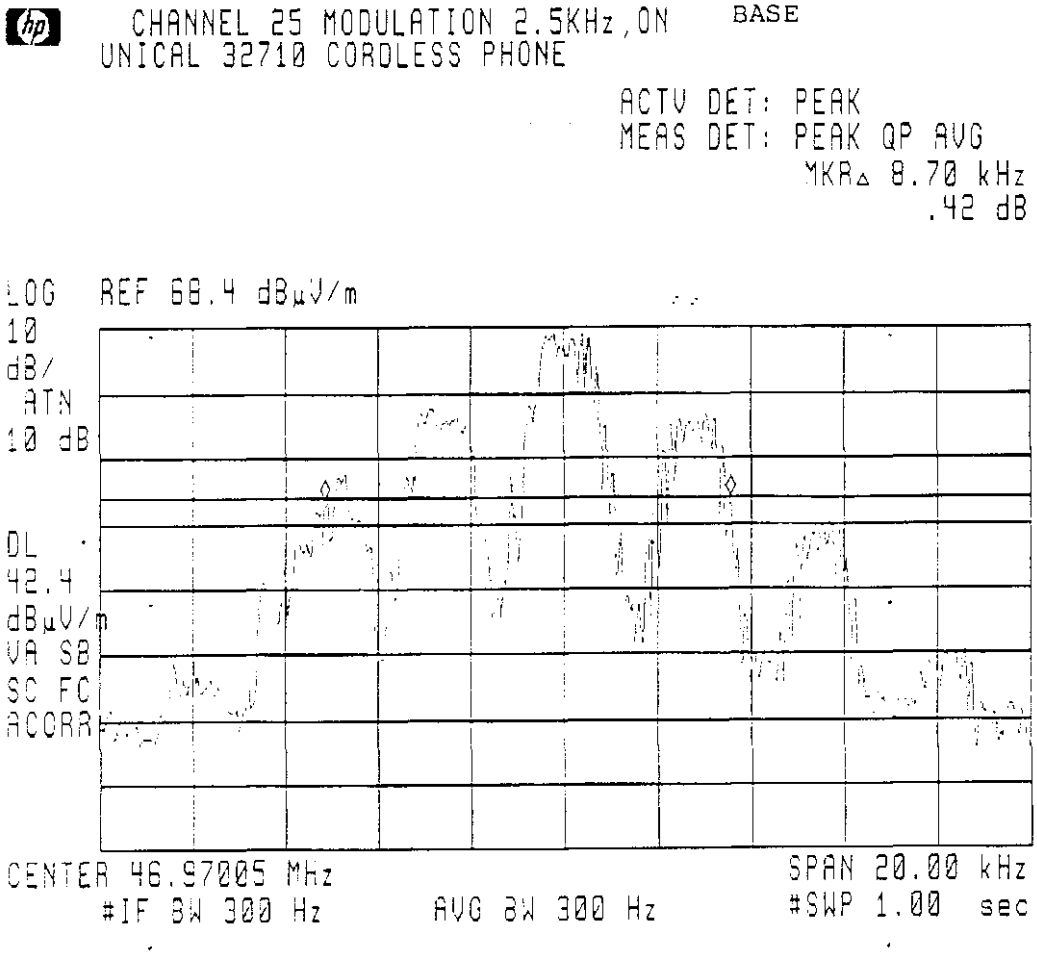
CHANNEL 13 BASE MODULATION



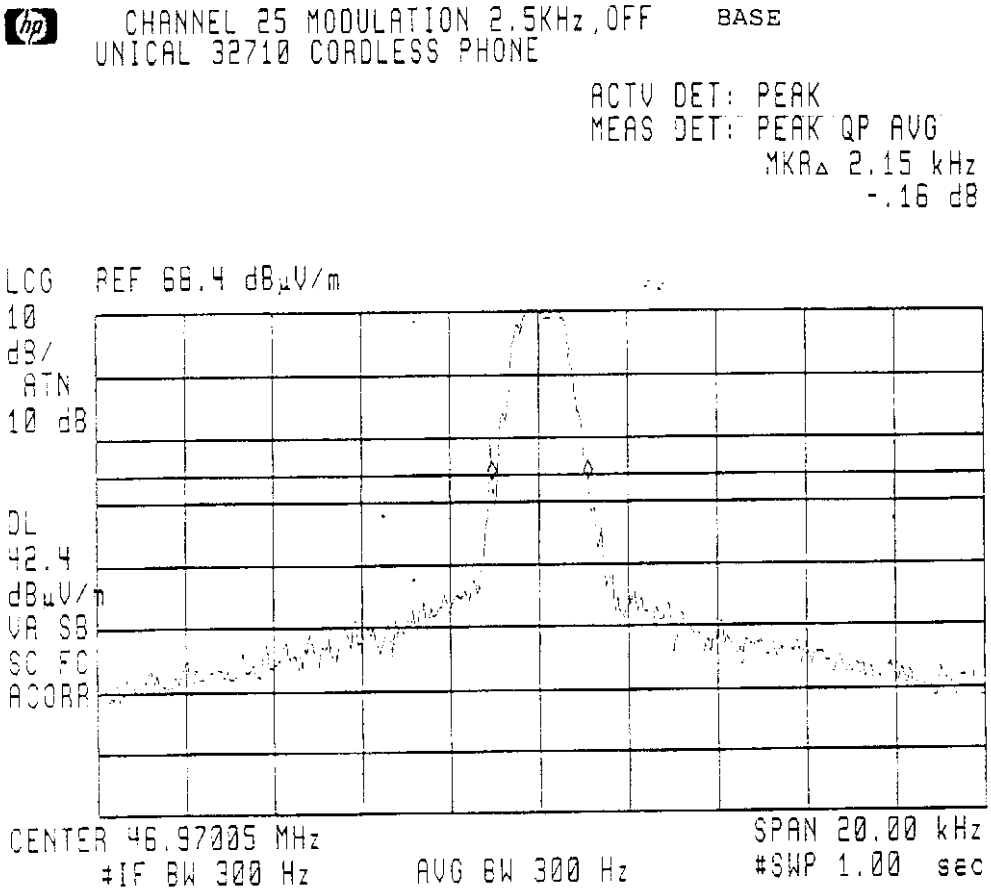
CHANNEL 13 BASE UNMODULATION



CHANNEL 25 BASE MODULATION

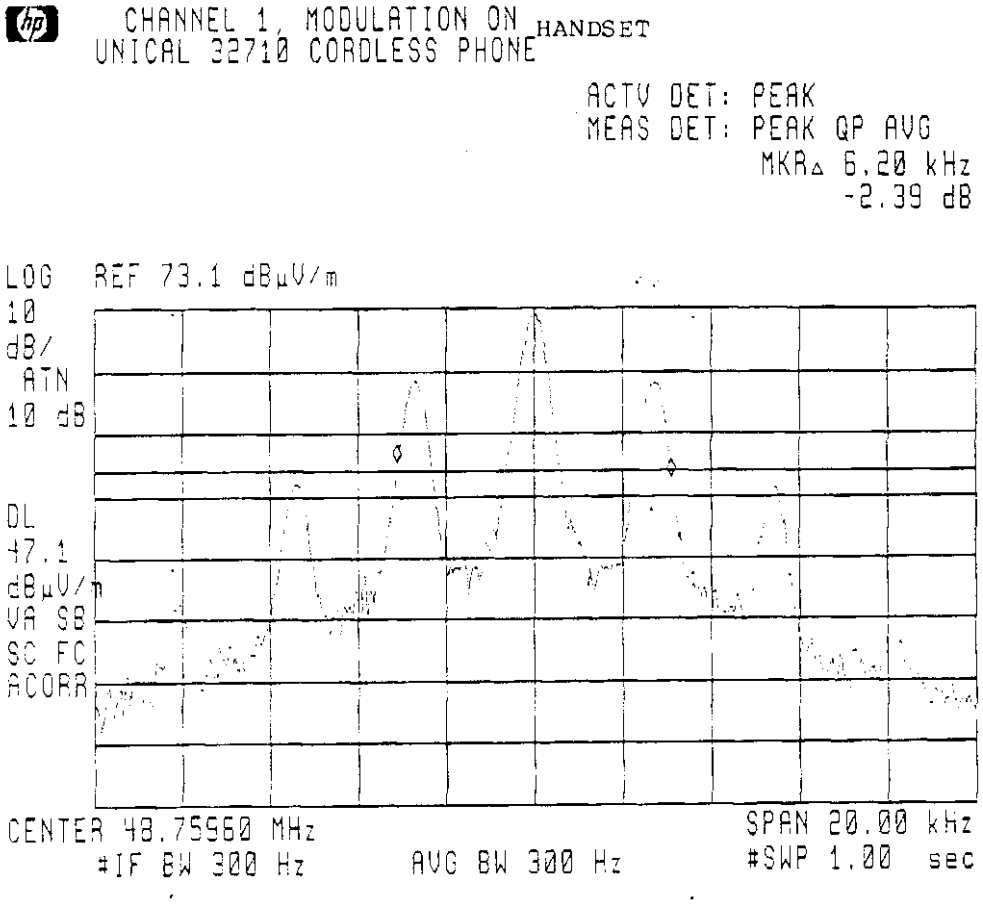


CHANNEL 25 BASE UNMODULATION

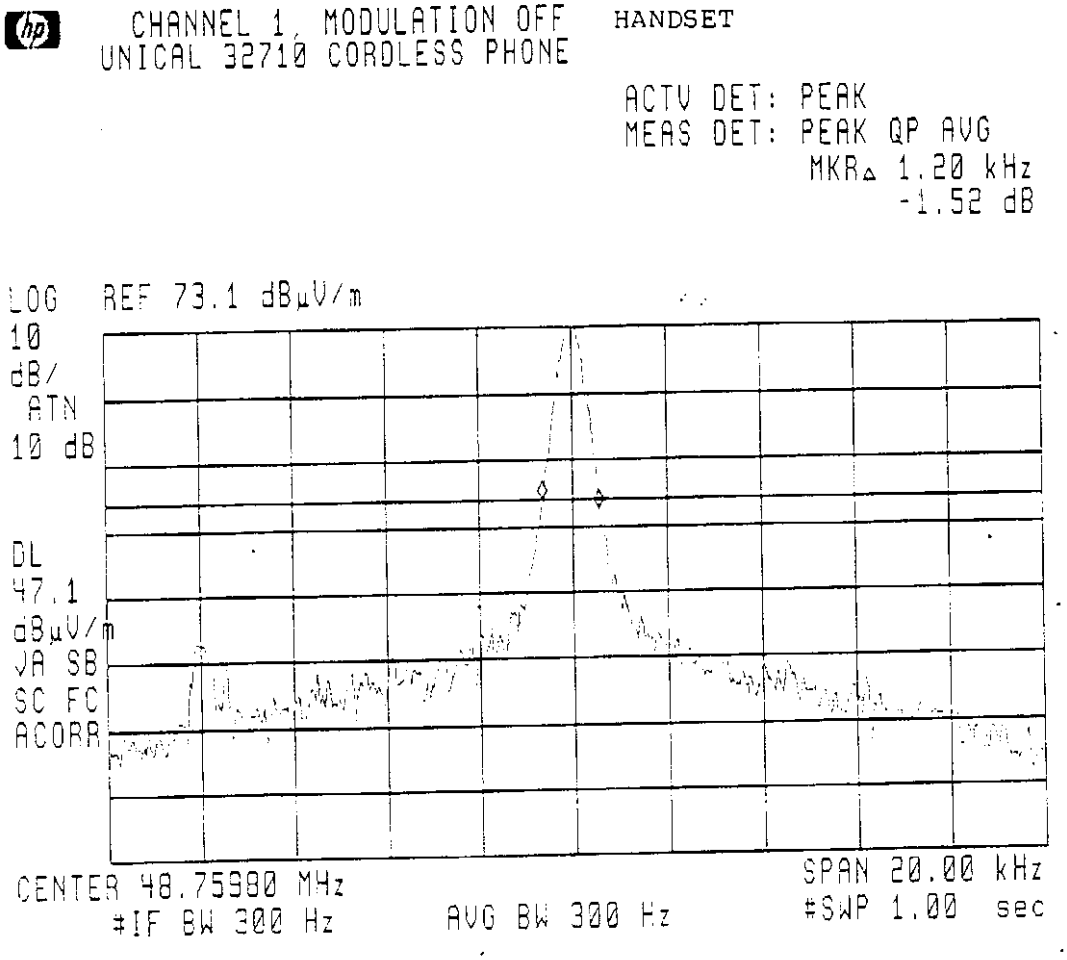


2. Radiated emission test data on harmonic emissions from the handset transmitter on two channels per Section 15.31(m) to show compliance with in Section 15.233(d).

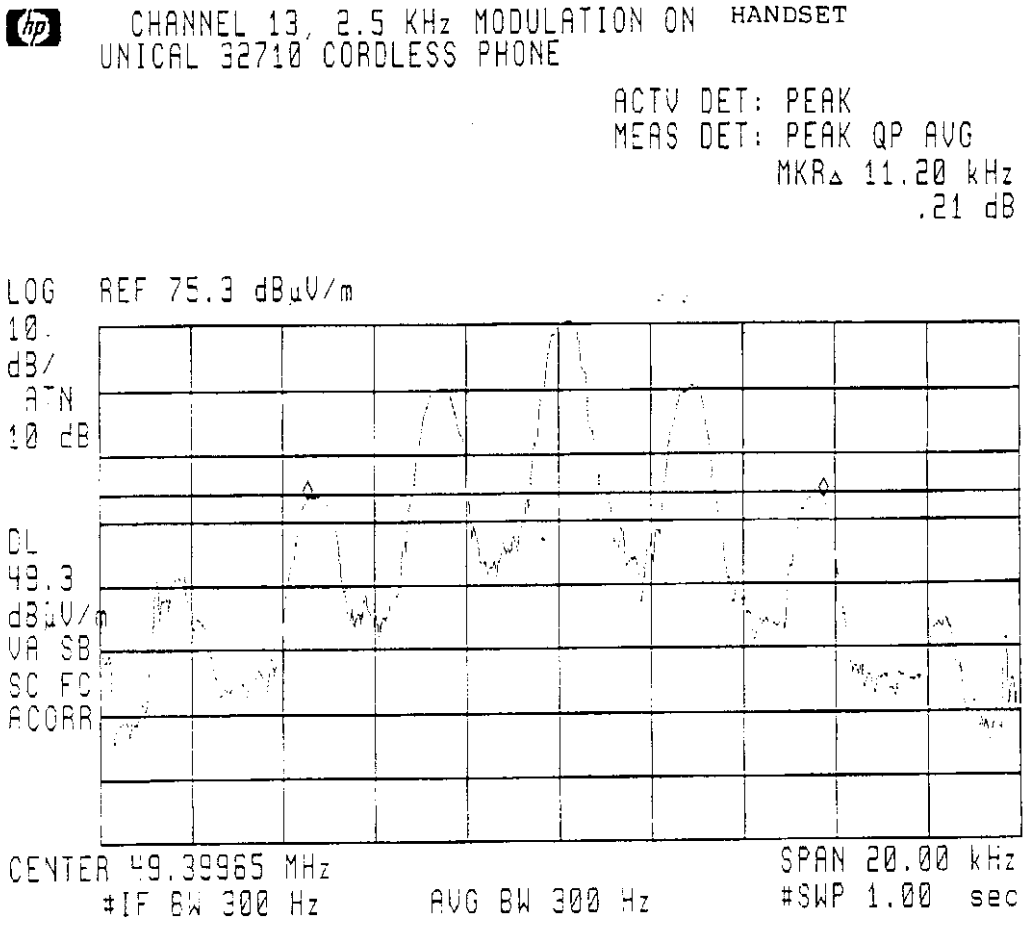
CHANNEL 1 HANDSET MODULATION



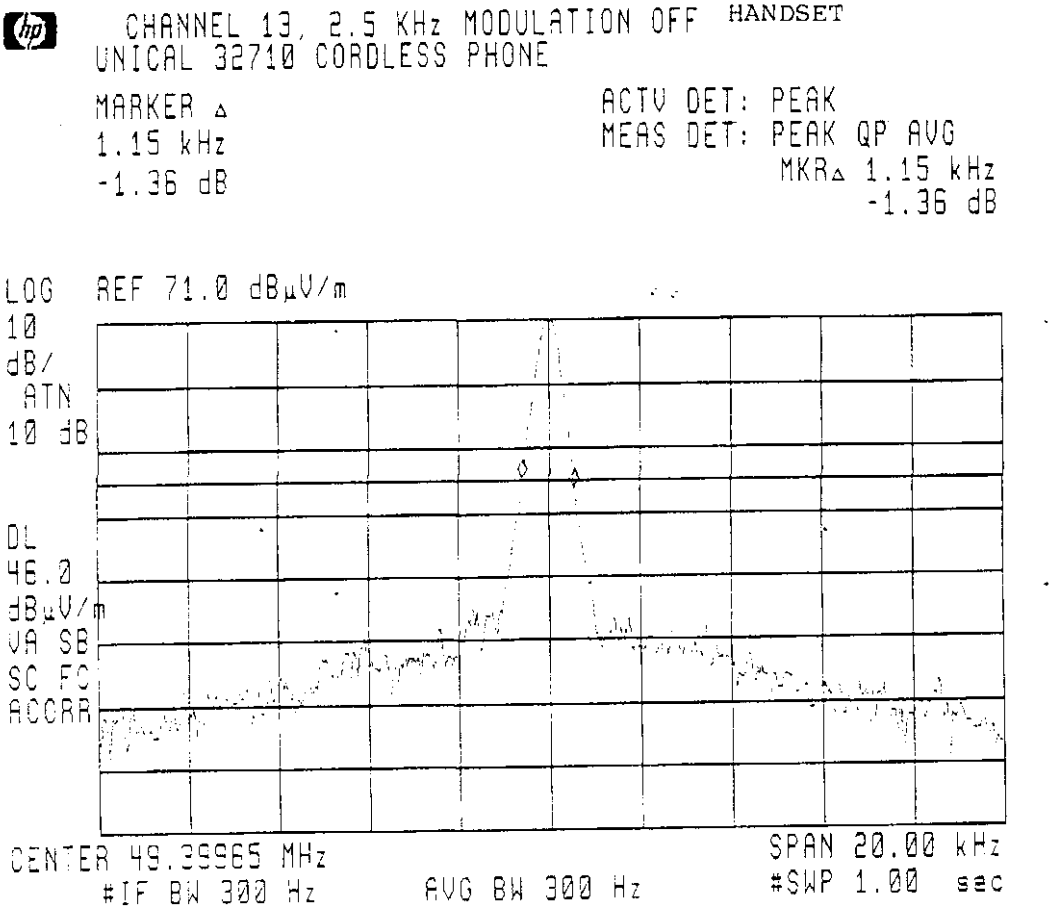
CHANNEL 1 HANDSET UNMODULATION



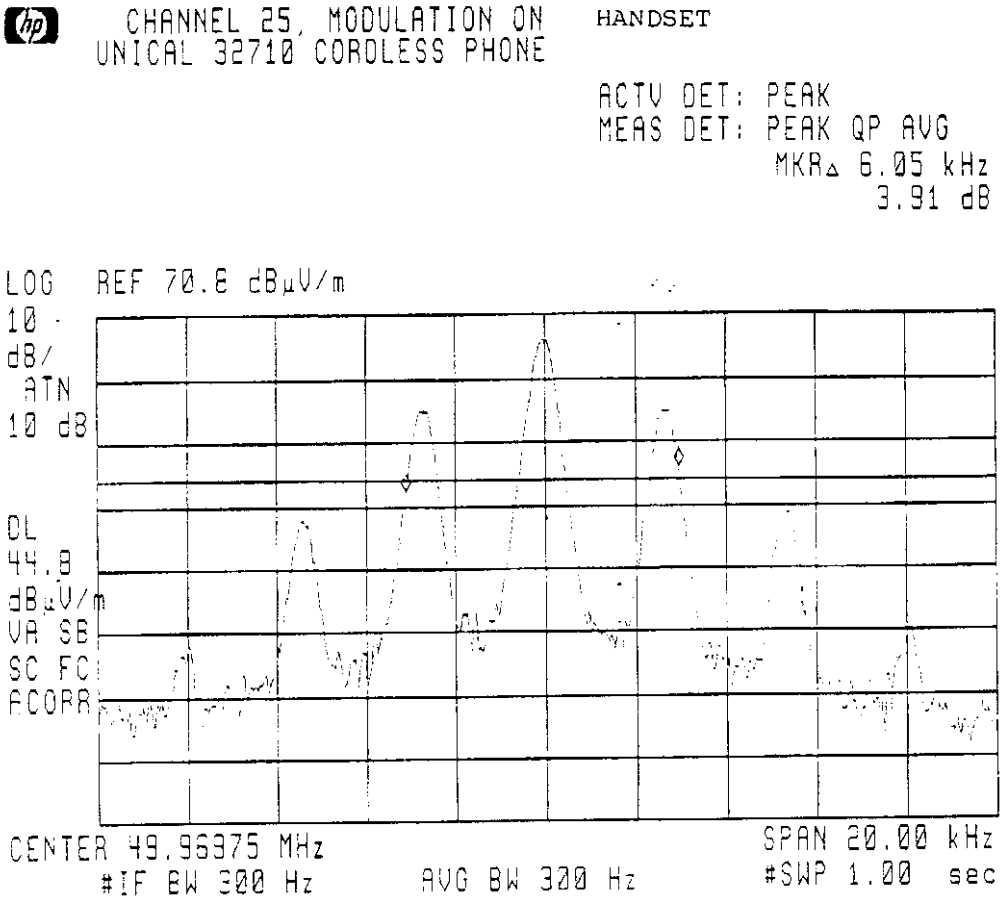
CHANNEL 13 HANDSET MODULATION



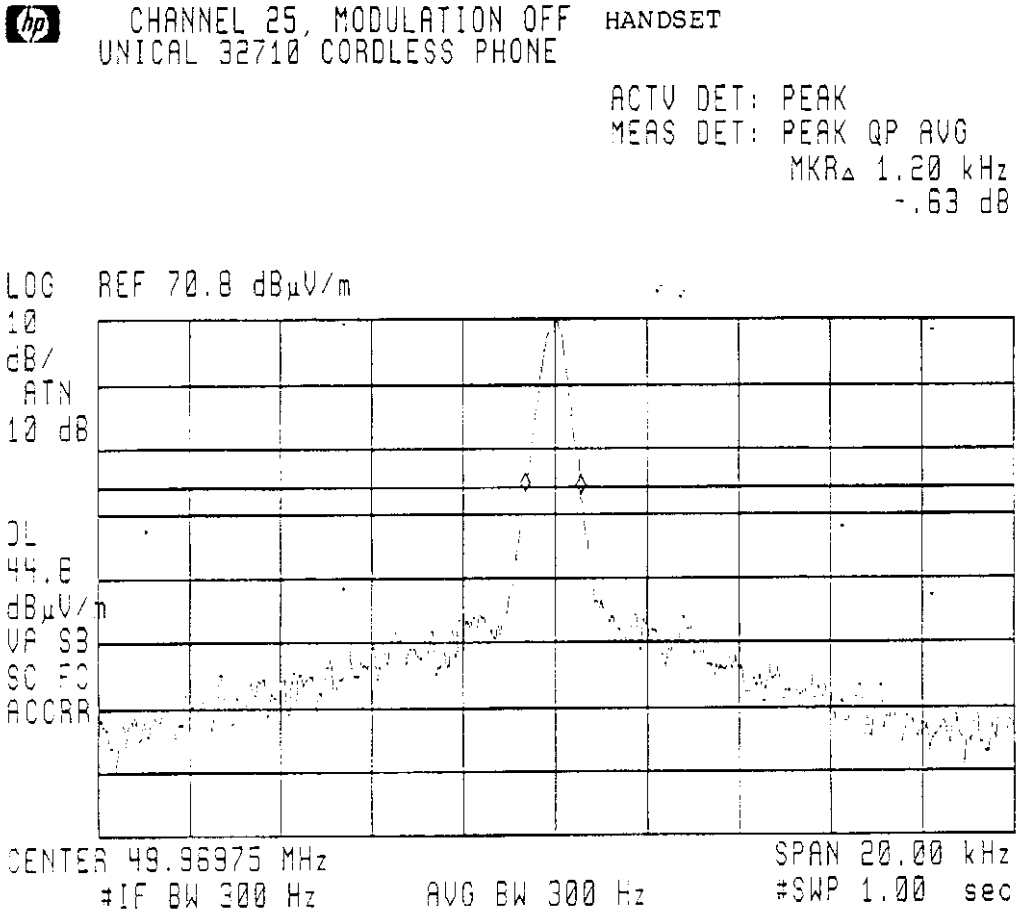
CHANNEL 13 HANDSET UNMODULATION



CHANNEL 25 HANDSET MODULATION



CHANNEL 25 HANDSET UNMODULATION



3. Radiated emission measurements between 30 - 1000 MHz

Frequency [MHz]	Polarity [V/H]	Corrected Reading [dB(μV)]	Delta, QP [dB]	3 Meters Limit [dB(μV)]	Correction Factor [dB]
218.91	V	45.8	-0.2	46.0	13.2
262.61	V	41.8	-4.2	46.0	14.9
87.721	V	35.6	-4.4	40.0	10.1
131.20	V	37.7	-5.8	43.5	13.9
487.88	V	40.1	-5.9	46.0	19.5
131.20	H	37.0	-6.5	43.5	13.9

Note: All reading are quasi-peak unless stated otherwise, using a QPA bandwidth of 120kHz, with a 30 ms sweep time. A video filter was not used.

4. The algorithm or program that is used to ensure that a link is not established on an occupied cordless telephone channel 1 through 15 are required by Section 15.333(b)(2)(i)

See the next page

25 CHANNEL • AUTOMATIC CHANNEL SELECTION MECHANISM

TALK MODE

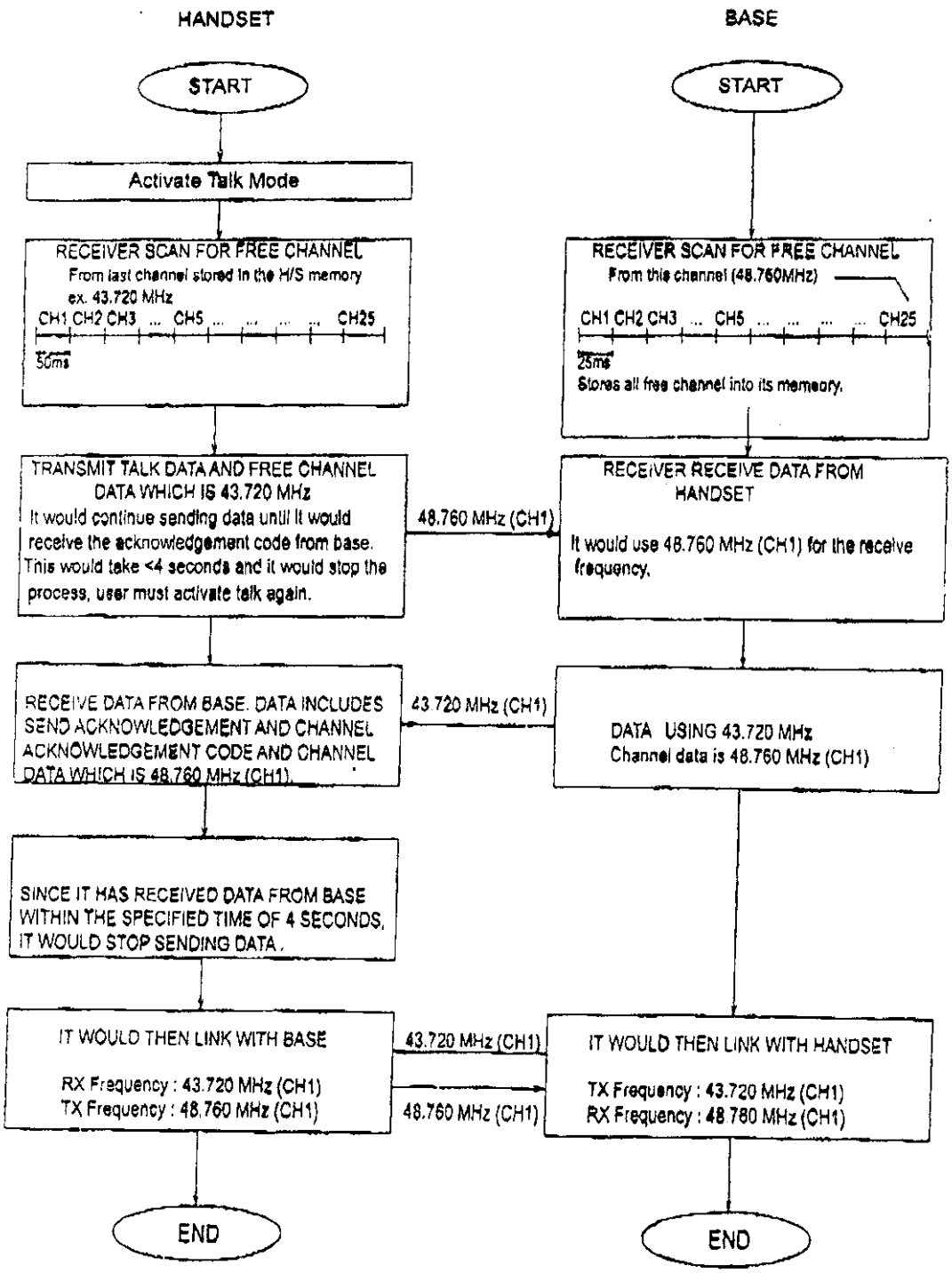
During the activation of talk, the handset receiver scan each channel from its last linked receiver channel for about 50ms, looking for free channel. Once a receiver found a free channel, the handset transmit talk instruction with receiver's free channel information to base to use this channel as a transmit channel.

Also, the base receiver scan for a clearest channel from channel 1 to 25 (25ms per channel). Once the base receiver received data from its handset during its scanning it will stop the scan and acknowledge data with its clearest receiver channel information then handset transmit and base receiver will change the channel to link. The handset and base unit's receiver scan and find separately their receiver's clearest channel. If all transmit channels of base and handset are occupied (all busy), handset and base will link at channel 16 (default channel).

Channel Number	Base Transmitter (MHz)	Handset Transmitter (MHz)
1	43.720	48.760
2	43.740	48.840
3	43.820	48.860
4	43.840	48.920
5	43.920	49.020
6	43.960	49.080
7	44.120	49.100
8	44.160	49.160
9	44.180	49.200
10	44.200	49.240
11	44.320	49.280
12	44.360	49.360
13	44.400	49.400
14	44.460	49.460
15	44.480	49.500
16	46.610	49.670
17	46.630	49.845
18	46.670	49.860
19	46.710	49.770
20	46.730	49.875
21	46.770	49.830
22	46.830	49.890
23	46.870	49.930
24	46.930	49.990
25	46.970	49.970

TALK MODE

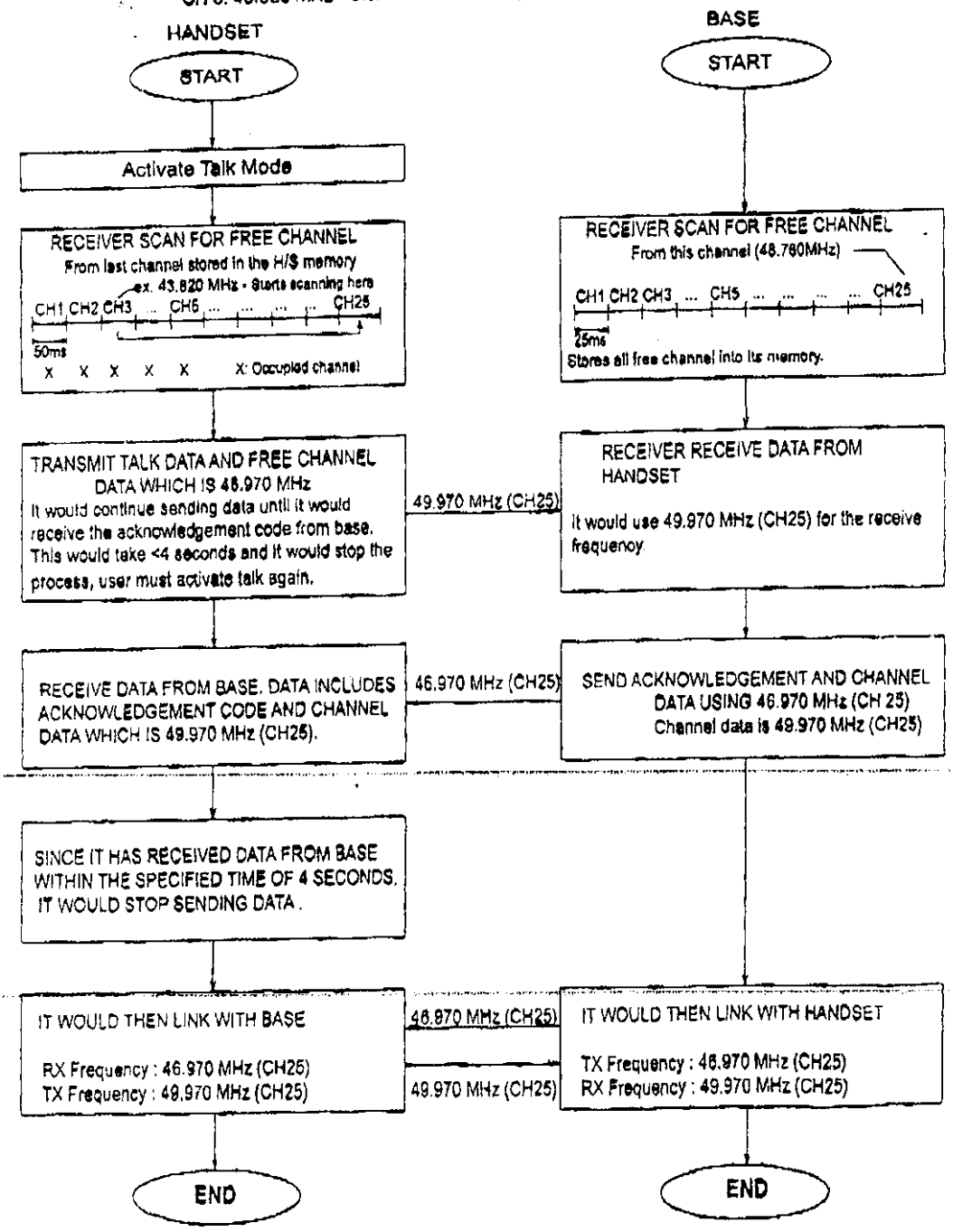
CONDITION 1 : All channels are unoccupied (Free channel)



TALK MODE

:ONDITION 2 : Multi channel on the base TX frequency are occupied.
Ex. CH 1 : 43.720 MHz CH 4 : 43.840 MHz
CH 2 : 43.740 MHz CH 5 : 43.920 MHz
CH 3 : 43.820 MHz

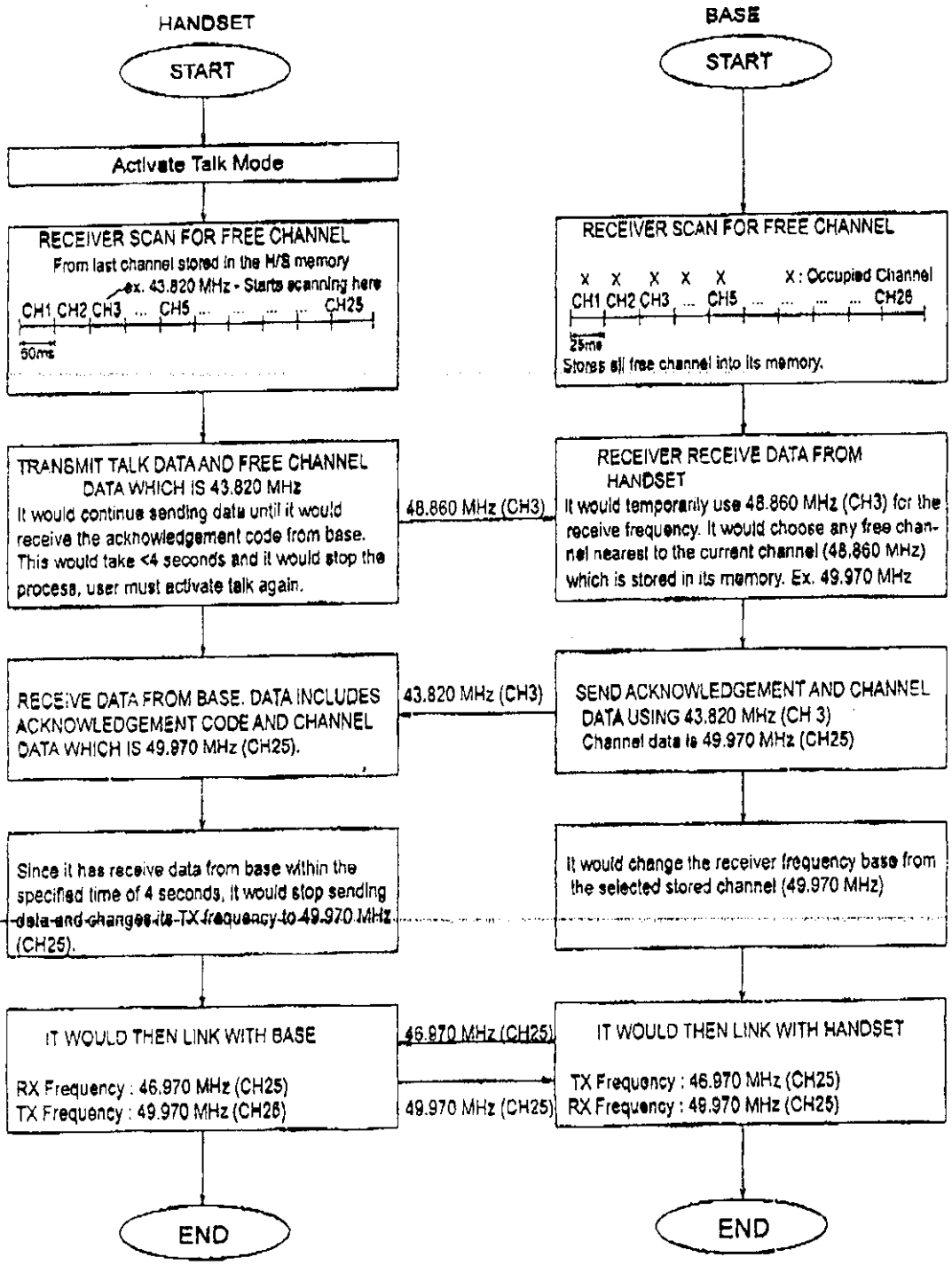
CH 3: 43.820 MHz - Stored channel during the last link in handset memory



TALK MODE

CONDITION 3 : Multi channel on the Handset TX frequency are occupied.
Ex. CH 1 : 48.760 MHz CH 4 : 48.920 MHz
CH 2 : 48.840 MHz CH 5 : 48.020 MHz
CH 3 : 48.860 MHz

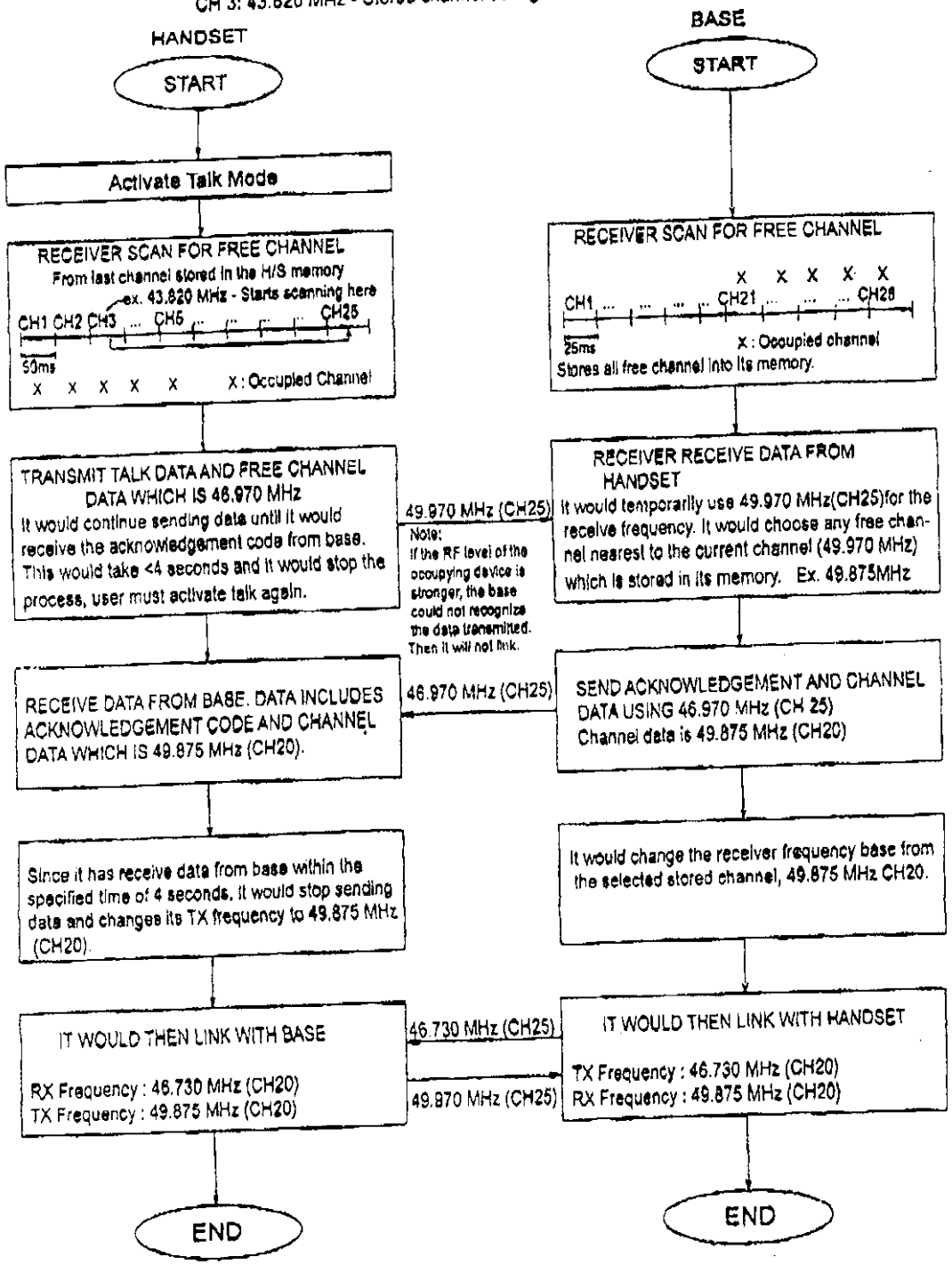
CH 3 : 43.820 MHz - Stored channel during the last link in handset memory



TALK MODE

CONDITION 4 : Multi channel on the Base TX and Handset TX frequency are occupied.
Ex. CH 1: 48.760 MHz CH 4 : 48.920 MHz CH 21: 49.830 MHz CH 24: 49.990 MHz
CH 2: 48.840 MHz CH 5 : 48.020 MHz CH 22: 49.890 MHz CH 25: 49.970 MHz
CH 3: 48.880 MHz CH 23: 49.930 MHz

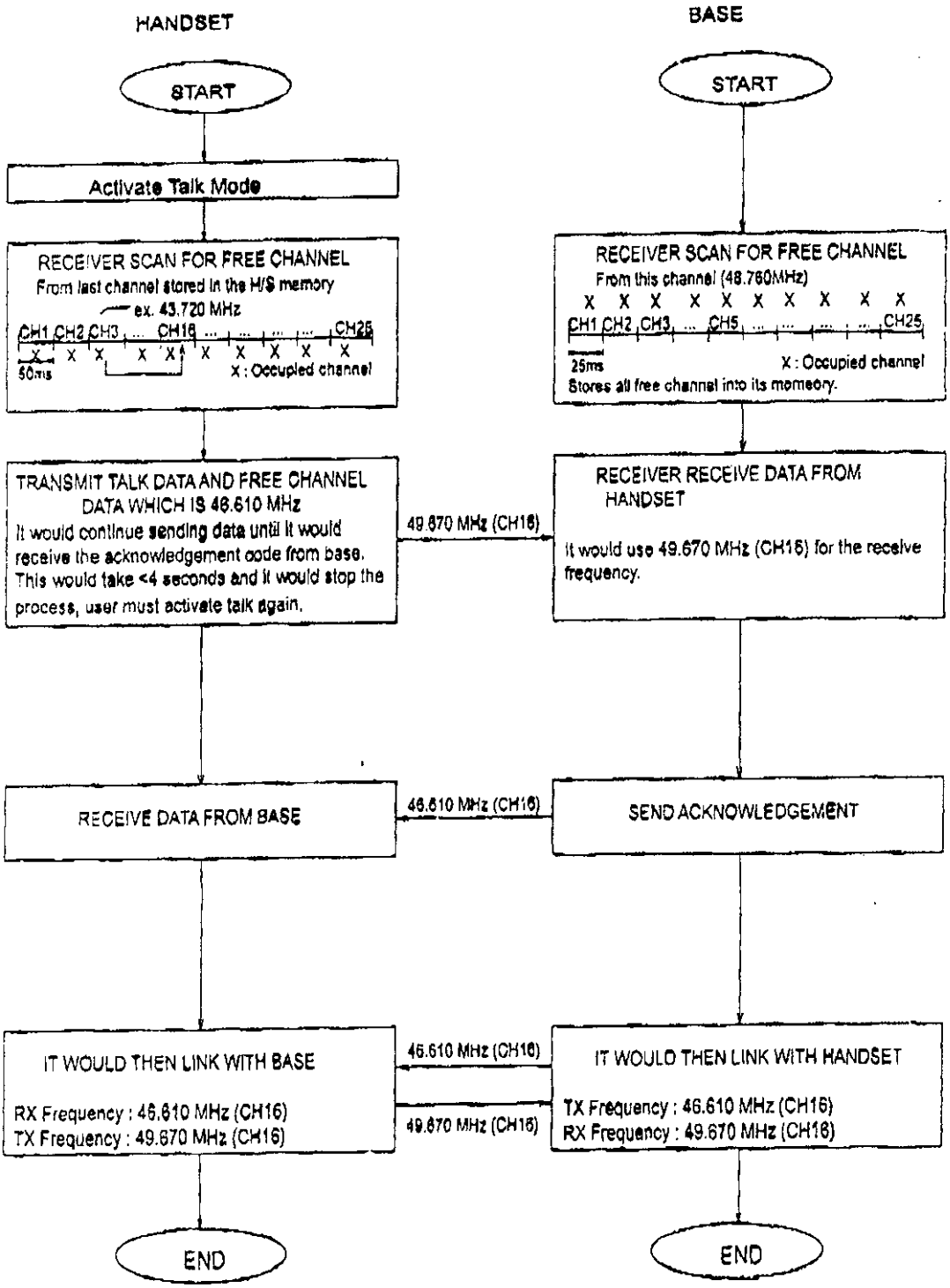
CH 3: 43.820 MHz - Stored channel during the last link in handset memory



TALK MODE

CONDITION 5 : All TX channels of Handset and Base are occupied (All Busy) -

CH3 : 43.820 MHz - Stored channel during the last link in Handset memory.



5. The test results demonstrating that this algorithm or program that is used to ensure that a link is not established on an occupied cordless telephone channel 1 through 15 are required by Section 15.333(b)(2)(i)

Test Results

INTERFERENCE CHANNEL AT	PHONE PRE-SET CHANNEL AT	PHONE AUTO-SCAN TO CHANNEL AT -13 dBm
1	1	2
2	2	3
3	3	4
4	4	5
5	5	7
6	6	7
7	7	8
8	8	9
9	9	10
10	10	11
11	11	12
12	12	14
13	13	14
14	14	15
15	15	16
16	16	17
17	17	18
18	18	19
19	19	20
20	20	22
21	21	22
22	22	23
23	23	24
24	24	25
25	25	1

Summary

The phone under test has an automatic selection mechanism that will prevent establishment of a link on any occupied frequency channel.

PHOTOGRAPHS & ILLUSTRATIONS