

# Marstech Limited

11 Kelfield Street, Etobicoke, Ontario, Canada, M9W 5A1  
Telephone (416) 246-1116, Fax (416) 246-1020

## TEST REPORT

|                       |                                                                                                                                                      |                               |                                |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|--------------------------------|
| REPORT DATE:          | 7 July 1999                                                                                                                                          | REPORT NO:                    | 99270D                         |
| CONTENTS:             | See Table of Contents                                                                                                                                |                               |                                |
| SUBMITTOR:            | THOMSON CONSUMER ELECTRONICS, INC.<br>Audio & Communications Product Dev.<br>101 West 103 <sup>rd</sup> Street<br>Indianapolis, IN<br>46290-1102 USA |                               |                                |
| SUBJECT:              | Model No: 26980XXX-A<br>FCC ID: G9H26980                                                                                                             |                               |                                |
| TEST SPECIFICATION    | FCC CFR 47 15.233 AND 2.989<br>Sections: 15.35, 15.107, 15.109, 15.207 and 15.209<br>NOTE: Tests Conducted Are "Type" Tests.                         |                               |                                |
| DATE SAMPLE RECEIVED: | 31 May 1999                                                                                                                                          | DATE TESTED:                  | 28 June 1999                   |
| RESULTS:              | Equipment tested complies with referenced specification.                                                                                             |                               |                                |
| ALTERATIONS           | None.                                                                                                                                                |                               |                                |
| Tested by:            | Original signed by:<br>Jim Sims                                                                                                                      | Approved and<br>Certified by: | <i>Robert G. Marshall</i>      |
|                       | <i>Ed. Chang</i>                                                                                                                                     | R. G. MARSHALL                | Robert G. Marshall,<br>P. Eng. |
|                       | Edward Chang                                                                                                                                         | Date:                         | 15 July 99                     |

**THIS REPORT SHALL NOT BE REPRODUCED, EXCEPT IN FULL, WITHOUT THE WRITTEN APPROVAL OF MARSTECH LIMITED.** This report was prepared by Marstech Limited for the account of the "Submitter". The material in it reflects Marstech's judgement in light of the information available to it at the time of preparation. Any use which a Third Party makes of this report, or any reliance on decisions to be made based on it, are the responsibility of such Third Parties. Marstech accepts no responsibility for damages, if any, suffered by any Third Party as a result of decisions made or actions based on this report.

Authorized by:  
Professional Engineer  
Ontario

Engineering &  
Administrative



Testing For FCC  
Submissions/Verifications

Approved Test Facility



*MARSTECH LIMITED*

---

TECHNICAL REPORT - FCC 2.1033(b)

Applicant

Thomson Consumer Electronics, Inc.  
Audio & Communications Product Dev.  
101 West 103<sup>rd</sup> Street  
Indianapolis, IN  
46290-1102 USA

FCC Identifier

Manufacturer

Integrated Display Technology Telecommunications (Shenzhen) Co. Ltd.  
Block 21, Chentian Industrial Village  
Xixian Town, Bao An District, Shenzhen City  
China

TABLE OF CONTENTS

| <u>Exhibit</u> | <u>Description</u>                                                                                   | <u>FCC Ref.</u> | <u>Page</u>                                                                 |
|----------------|------------------------------------------------------------------------------------------------------|-----------------|-----------------------------------------------------------------------------|
| A              | Installation and Operating Instructions<br>Furnished to the User.                                    | 2.1033(b)(3)    | Exhibit A<br>Exhibit A(1)                                                   |
| B              | Description of Circuit Functions                                                                     | 2.1033(b)(4)    | Exhibit B<br>Exhibit B(1)-1 to -2                                           |
| C              | Block Diagram<br>Schematic Diagram                                                                   | 2.1033(b)(5)    | Exhibit C<br>Exhibit C(1)-1 to -2<br>Exhibit C(2)-1 to -4                   |
| D              | Report of Measurements<br>Device Measured<br>Test Facility and Equipment<br>Test Results and Methods | 2.1033(b)(6)    | Exhibit D<br>Exhibit D(1)-1<br>Exhibit D(2)-1 to -3<br>Exhibit D(3)-1 to -9 |
| E              | Photographs<br>Label<br>Equipment                                                                    | 2.1033(b)(7)    | Exhibit E<br>Exhibit E(1)-1 to -2<br>Exhibit E(2)-1 to -7                   |

EXHIBIT D

(FCC Ref. 2.1033(b)(6))

"Report of Measurements"

EXHIBIT D(1)

DEVICE MEASURED

(FCC Ref. 2.1033(b)(6))

APPLICANT: Thomson Consumer Electronics, Inc.  
Audio & Communications Product Dev.  
101 West 103<sup>rd</sup> Street  
Indianapolis, IN  
46290-1102 USA

MANUFACTURER: Integrated Display Technology Telecommunications (Shenzhen) Co. Ltd.  
Block 21, Chentian Industrial Village  
Xixian Town, Bao An District, Shenzhen City  
China

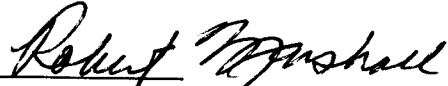
FCC IDENTIFIER: G9H26980

MODEL NUMBER: 26980XXX-A

SERIAL NO.: Not Marked

Marstech Limited  
11 Kelfield Street  
Etobicoke, Ontario  
M9W 5A1 CANADA

TECHNICIANS:  
Jim Sims - Com-Serve Corp.

  
Robert G. Marshall, P. Eng.

Date: July 15/99

EXHIBIT D(2)

TEST FACILITY AND EQUIPMENT LIST

FACILITIES

Radiated      ANSI C63.4 (FCC OET/55) open field 3 meter test range. This test range is protected from the cold and moisture by a non-conductive enclosure.

Conducted     2.5m Anechoic Chamber

EQUIPMENT

Anritsu 2601 A spectrum analyzer.  
Hewlett-Packard RF generator # 8640 B with an 002 doubler  
Hewlett-Packard 8449B Preamp. (30 dB)      1.0 MHz to 26.5 GHz  
A.H. Systems biconical antenna;              20 MHz to 330 MHz  
A.H. Systems log periodic antenna;          300 MHz to 1.8 GHz  
Eaton dipole antennas; T1, T2, T3            25 MHz to 1.0 GHz  
Roberts dipole antennas; T1, T2, T3 & T4    25 MHz to 1.0 GHz  
Compliance Design P950 Preamp (16 dB)    25 MHz to 1.0 GHz  
Notch Filter; Model FIL01605001            30 dB at 920 MHz  
M/A-COM High Frequency Cable Assembly; No. 2026-0600

NOTE:

The Anritsu 2601 A spectrum analyzer, the Hewlett-Packard spectrum analyzer and the Advantest R3261A spectrum analyzer are calibrated annually, and that calibration is directly traceable to the National Research Council of Canada (NRC). This equipment is only used by qualified technicians and only for the purpose of EMI measurements. The three meter test range has been carefully evaluated to the ANSI document C63.4 and will be remeasured for reflections and losses every three years.

# FEDERAL COMMUNICATIONS COMMISSION

7435 Oakland Mills Road  
Columbia, MD 21046  
Telephone: 301-725-1585 (ext-218)  
Facsimile: 301-344-2050

September 23, 1997

IN REPLY REFER TO  
31040/SIT  
1300F2

Electrohome Electronics Ltd  
809 Wellington Street, North  
Kitchener, Ontario N2G 4J6, Canada

Attention: Gerry Gallagher

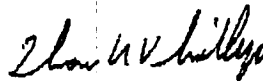
Re: Measurement facility located at Roseville  
(3 meter site)

Gentlemen:

Your submission of the description of the subject measurement facility has been reviewed and found to be in compliance with the requirements of Section 2.948 of the FCC Rules. The description has, therefore, been placed on file and the name of your organization added to the Commission's list of facilities whose measurement data will be accepted in conjunction with applications for certification or notification under Parts 15 or 18 of the Commission's Rules. Our list will also indicate that the facility complies with the radiated and AC line conducted test site criteria in ANSI C63.4-1992. Please note that this filing must be updated for any changes made to the facility, and at least every three years the data on file must be certified as current.

Per your request, the above mentioned facility has been also added to our list of those who perform these measurement services for the public on a fee basis. This list is published periodically and is also available on the Laboratory's Public Access Link as described in the enclosed Public Notice.

Sincerely,



Thomas W. Phillips  
Electronics Engineer  
Customer Service Branch

EXHIBIT D(2)

SPECTRUM ANALYZER -

ANRITSU MS2601A S/N MT64544 - NEXT  
CALIBRATION APRIL 2000

**SUMMARY OF RESULTS**COMPLIANCE  
(yes) (no)**FIELD STRENGTH OF THE CARRIER FREQUENCIES**

|                             |         |
|-----------------------------|---------|
| Handset, Low Channel:       | (X) ( ) |
| Handset, High Channel:      | (X) ( ) |
| Base Station, Low Channel:  | (X) ( ) |
| Base Station, High Channel: | (X) ( ) |

**SPURIOUS RADIATED EMISSIONS (15.109)**

|               |         |
|---------------|---------|
| Handset:      | (X) ( ) |
| Base Station: | (X) ( ) |

**SPURIOUS RADIATED EMISSIONS (15.209/15.249)**

|                             |         |
|-----------------------------|---------|
| Handset, Low Channel:       | (X) ( ) |
| Handset, High Channel:      | (X) ( ) |
| Base Station, Low Channel:  | (X) ( ) |
| Base Station, High Channel: | (X) ( ) |

**LINE CONDUCTED SPURIOUS EMISSIONS**

|                                      |         |
|--------------------------------------|---------|
| Base Station: <u>Telephone mode:</u> | (X) ( ) |
|--------------------------------------|---------|

**EQUIPMENT REQUIREMENTS AND IDENTIFICATION**

|                                      |           |
|--------------------------------------|-----------|
| a) Manufacturers or applicants name: | (X) ( )   |
| b) FCC Id:                           | (X) ( )   |
| c) Serial number:                    | (N/A) ( ) |
| d) Antenna:                          | (X) ( )   |
| e) Operator controls:                | (X) ( )   |
| f) Security Coding                   | (X) ( )   |
| g) Equipment/Packaging Marking       | (X) ( )   |

## CARRIER FIELD STRENGTH

### RESULTS

#### Handset:

Low Channel: **Maximum field strength of 40,702 IV/M; at 925.300 MHz.**

High Channel: **Maximum field strength of 40,082 IV/M; at 927.250 MHz.**

Note: *The remote headset was attached to the handset during carrier level tests.*

#### Base Station:

Low Channel: **Maximum field strength of 49,922 IV/M; at 902.850 MHz.**

High Channel: **Maximum field strength of 40,438 IV/M; at 904.750 MHz.**

Note: *All other channels were checked for carrier frequency field strength levels.*

### TEST CONDITIONS

#### Equipment Positioning:

Handset: vertical or upright  
Base Station: standing on its back with the antenna extended in the vertical plane.

#### Antenna Polarization:

Handset: vertical  
Base Station: vertical

Antenna Type: T.4; tuned half wave dipole

Measurement Bandwidth: 100 KHz

#### Supply Voltages:

Handset: 3.6 VDC from an internal battery.  
Base Station: 120 VAC/60 Hz to 12 VDC (adaptor)

### METHODS OF MEASUREMENT

The cordless phone components were placed in turn on a one metre high, non-metallic turntable and set at maximum output level. Measurements were made in a minimum of 3 positions for the handset and 2 for the base station. If adjustable, the whip antennas were fully extended.

For each of the above conditions the turntable was rotated through 360 degrees while the receiving antenna, at three (3) metres from the EUT, was varied in height from 1 to 4 metres and set in both planes of polarization to find the maximum signal strength. The level was measured using a spectrum analyzer. The measured level was converted to a field strength using the antenna correction factors and cable losses.

All base station measurements were made with the equipment under test connected to an artificial telephone line network, with 48 VDC applied.

## SPURIOUS RADIATED EMISSIONS

### RESULTS

The maximum field strength of any harmonic or spurious emission with respect to the applicable limit, while transmitting or receiving was:

**Handset:**                      **Maximum field strength of: 134.9 IV/M at 894.00 MHz**  
                                         **Maximum field strength of: NONE FOUND ABOVE 1.0 GHz**  
**Note:**                              *The remote headset was attached to the handset during all tests.*

**Base Station:**                      **Maximum field strength of: 122.8 IV/M at 936.96 MHz**  
                                         **Maximum field strength of: NONE FOUND ABOVE 1.0 GHz**

### TEST CONDITIONS

**Equipment Positioning:**

Handset:                              laying on its side  
Handset, above 1 GHz              standing vertically and on its side  
Base Station:                        standing on its back with the antenna extended in the vertical plane.

**Antenna Polarization:**

Handset:                              horizontal  
Handset, above 1 GHz              vertical and horizontal  
Base Station:                        horizontal  
Base Station, above 1 GHz        vertical and horizontal

**Measurement Bandwidth:**      100/120 KHz(IF) & 1 MHz(IF) for frequencies above 1.0 GHz.

**Supply Voltages:**

Handset:                              3.6 VDC from an internal battery.  
Base Station:                        120 VAC/60 Hz to 12 VDC (adaptor)

### METHODS OF MEASUREMENT

The cordless phone components were placed in turn on a one metre high, non-metallic turntable. Measurements were made in a minimum of 3 positions for the handset and 2 for the base station. If adjustable, the whip antennas were fully extended.

For each of the above conditions the turntable was rotated through 360 degrees while the receiving antenna, at three (3) metres from the EUT, was varied in height from 1 to 4 metres and set in both planes of polarization to find the maximum signal strength. The level was measured using a spectrum analyzer. The measured level was converted to a field strength using the antenna correction factors and cable losses.

All base station measurements were made with the equipment under test connected to an artificial telephone line network, with 48 VDC applied.

**RADIATED EMISSION RESULTS**

BW: 100/120 KHz and 1.0 MHz

Span: 5 to 50 MHz

**HANDSET**

| TEST<br># MODE | FREQ MHz<br>BAND | LEVEL<br>$\mu$ V | ANT.<br>TYPE (PZ) | ANT.<br>FACT. | F.S.<br>$\mu$ V/M | LIMIT<br>$\mu$ V/M | DIFF. TO<br>LIMIT; dB |
|----------------|------------------|------------------|-------------------|---------------|-------------------|--------------------|-----------------------|
| CARRIER        | 925.300          | 866.00           | RT.4 V            | 47.0          | 40702.0           | 50,000             | -1.79                 |
|                |                  |                  |                   |               |                   |                    |                       |
| CARRIER        | 927.250          | 851.00           | RT.4 V            | 47.1          | 40082.1           | 50,000             | -1.92                 |
|                |                  |                  |                   |               |                   |                    |                       |
| 01 TX          | 894.00           | 03.9             | L/P H             | 34.6          | 134.9             | 200                | -3.42                 |

**BASE STATION**

| TEST<br># MODE | FREQ Mhz<br>BAND | LEVEL<br>$\mu$ V | ANT.<br>TYPE (PZ) | ANT.<br>FACT. | F.S.<br>$\mu$ V/M | LIMIT<br>$\mu$ V/M | DIFF. TO<br>LIMIT; dB |
|----------------|------------------|------------------|-------------------|---------------|-------------------|--------------------|-----------------------|
| CARRIE<br>R    | 902.850          | 1090.00          | RT.4 V            | 45.8          | 49922.0           | 50,000             | -0.01                 |
|                |                  |                  |                   |               |                   |                    |                       |
| CARRIER        | 904.750          | 881.00           | RT.4 V            | 45.9          | 40437.9           | 50,000             | -1.84                 |
|                |                  |                  |                   |               |                   |                    |                       |
| 01 RX          | 936.96           | 03.3             | L/P H             | 37.2          | 122.8             | 200                | -4.24                 |

## POWER LINE CONDUCTED EMISSIONS

### RESULTS

The largest RF voltages on the AC power lines, over the frequency range of 450 KHz to 30 MHz, was **7.57 IV (17.58 dBIV) at 2.40 MHz** from the base station while transmitting and/or receiving. (B side of the line in the telephone mode) Refer to the attached results.

### TEST CONDITIONS

Measurement Bandwidth: 9 KHz Q.P. (IF)  
AC Test Voltage: 120 VAC (filtered and stabilized)  
Mode of Operation: Telephone

### METHODS OF MEASUREMENT

The base station portion of the cordless phone was placed on a wooden table directly above a 50 ohm line impedance stabilization network.(LISN) If adjustable, the whip antenna was fully extended vertically and the AC power attachment cord went directly down to the LISN. The LISN is grounded directly to the floor of the test facility. Excess AC cord was coiled in a figure eight pattern before connecting directly to the 50 micro-henry LISN.

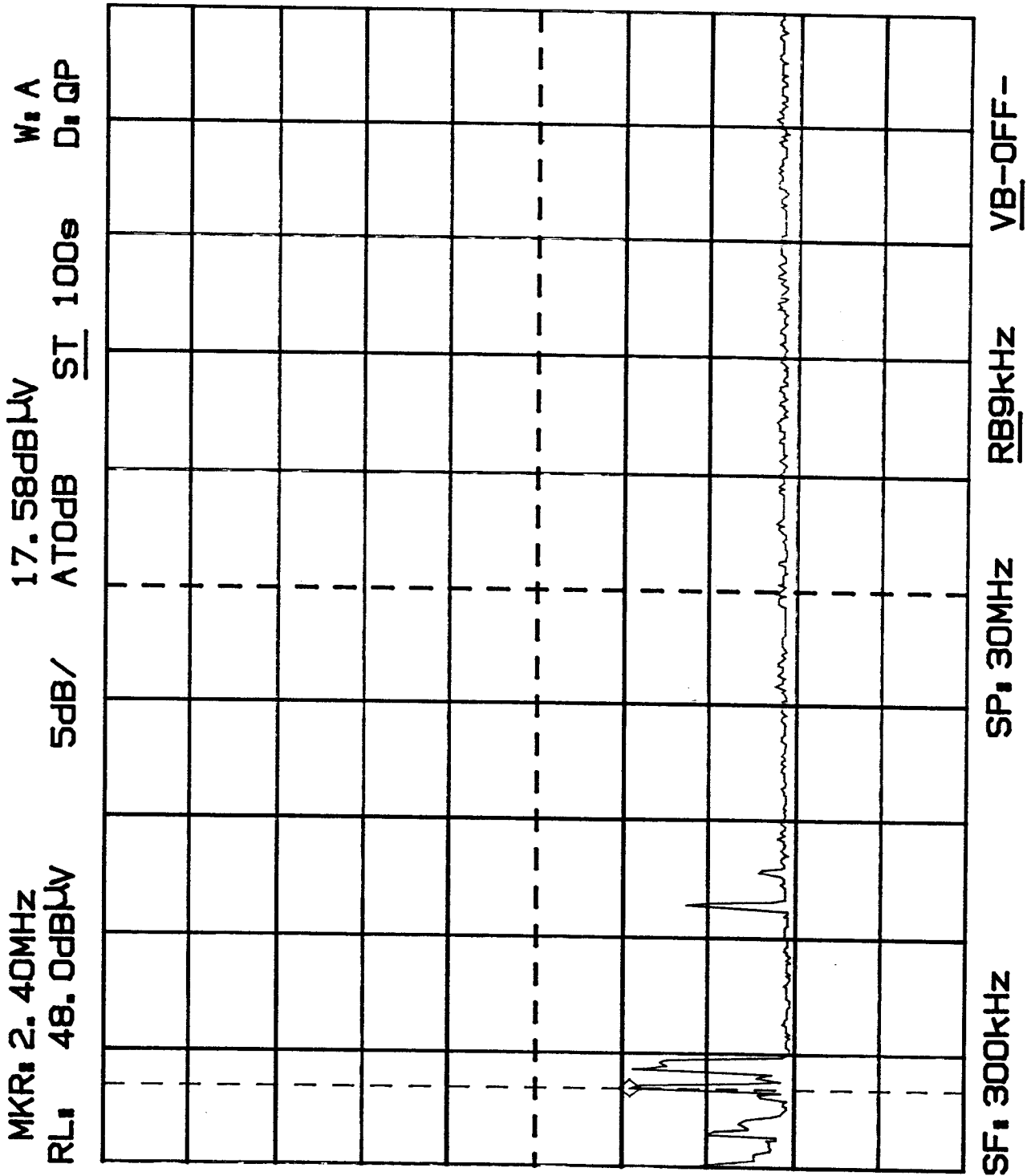
The base station was connected to a simulated 9,000 foot phone line and 48 VDC was applied. The 9,000 foot phone line network was grounded to the nearest AC outlet with a test lead.

A length of low loss RF foam cable was used to couple the RF voltages from the LISN to the spectrum analyzer. The base station transmitter was keyed on by the handset transmitting nearby. All of the RF voltages were recorded and are attached.

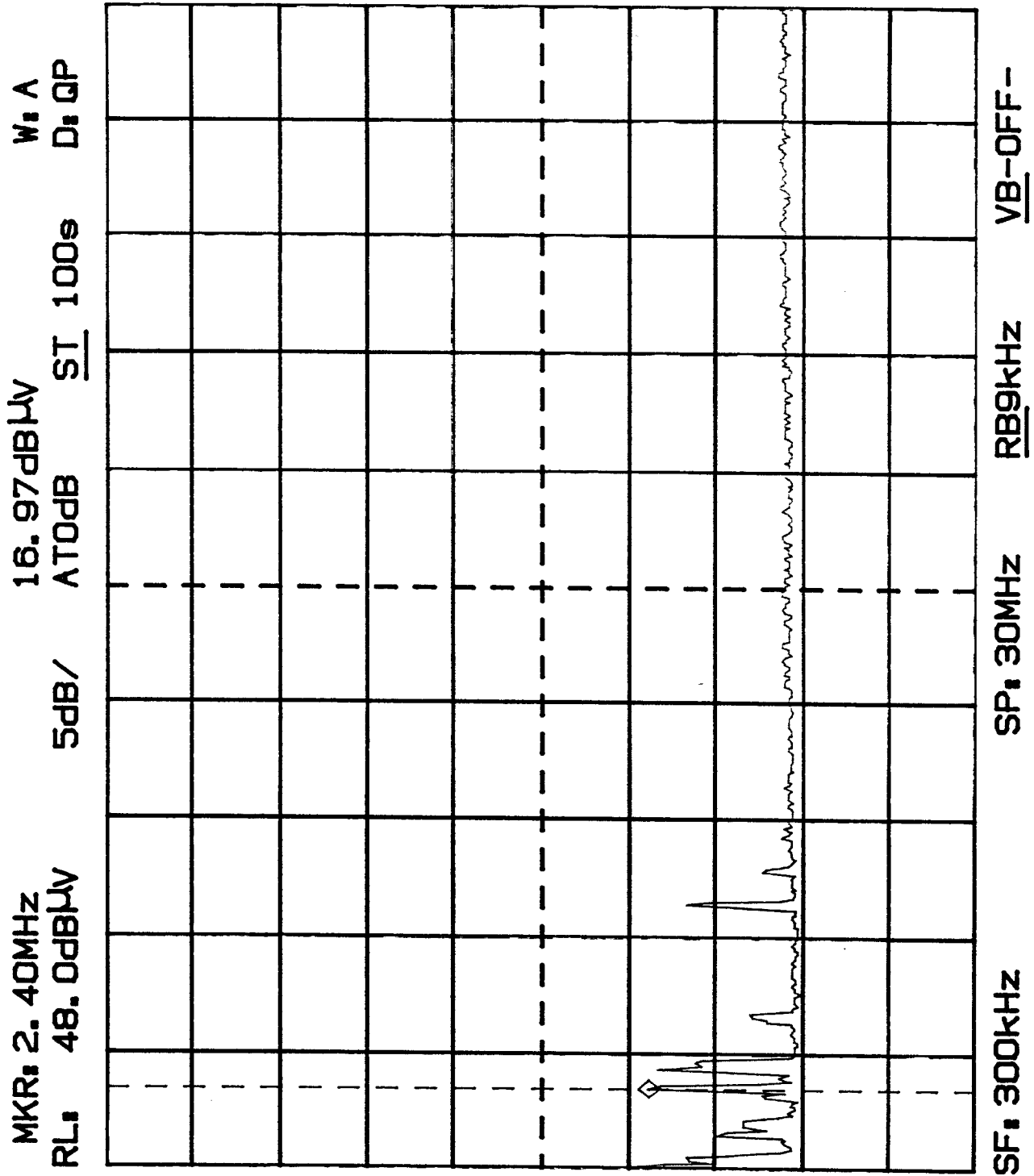
The base station was tested in all modes of operation which were applicable to the specific equipment under test. This included operating modes such as "calling/paging", quiescent or receive mode and standard telephone/transmit operation.

If the cordless phone contained an intercom mode of operation, then this test was repeated in that mode. The attached results represent the **worst case results** in each test condition.

POWER LINE CONDUCTED EMISSIONS  
MODEL 26980XXX-A; SIDE: A



POWER LINE CONDUCTED EMISSIONS  
MODEL 26980XXX-A; SIDE: B



BAND EDGE  
MODEL 26980XXX-A

08:48:36 JUL 12. 1999

MARKER  
902.803 MHz  
69.02 dBμV

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 902.803 MHz  
69.02 dBμV

MARKER  
NORMAL

MARKER  
Δ

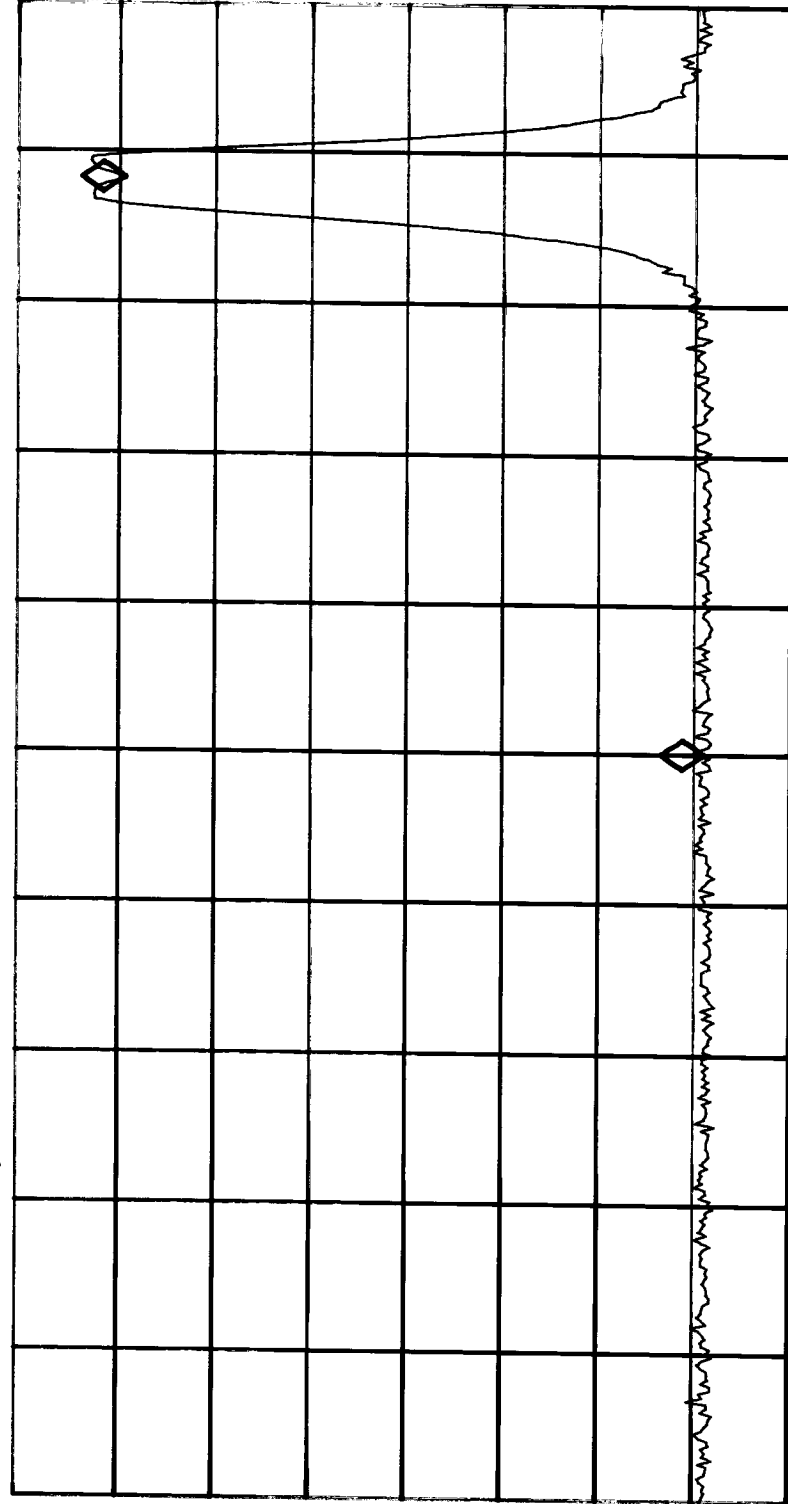
MARKER  
AMPTD

SELECT  
1 2 3 4

MARKER 2  
ON OFF

More  
1 of 3

LOG REF 80.0 dBμV



10  
dB/  
#ATN  
0 dB

WA SB  
SC FS  
CORR

CENTER 902.000 MHz  
#IF BW 10 kHz  
#AVG BW 1 MHz  
SPAN 2.009 MHz  
#SWP 20.0 sec

BAND EDGE  
MODEL 26980XXX-A

09:11:16 JUL 12. 1999

MARKER  
927.240 MHz  
70.48 dBμV

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 927.240 MHz  
70.48 dBμV

MARKER  
NORMAL

MARKER  
Δ

MARKER  
AMPTD

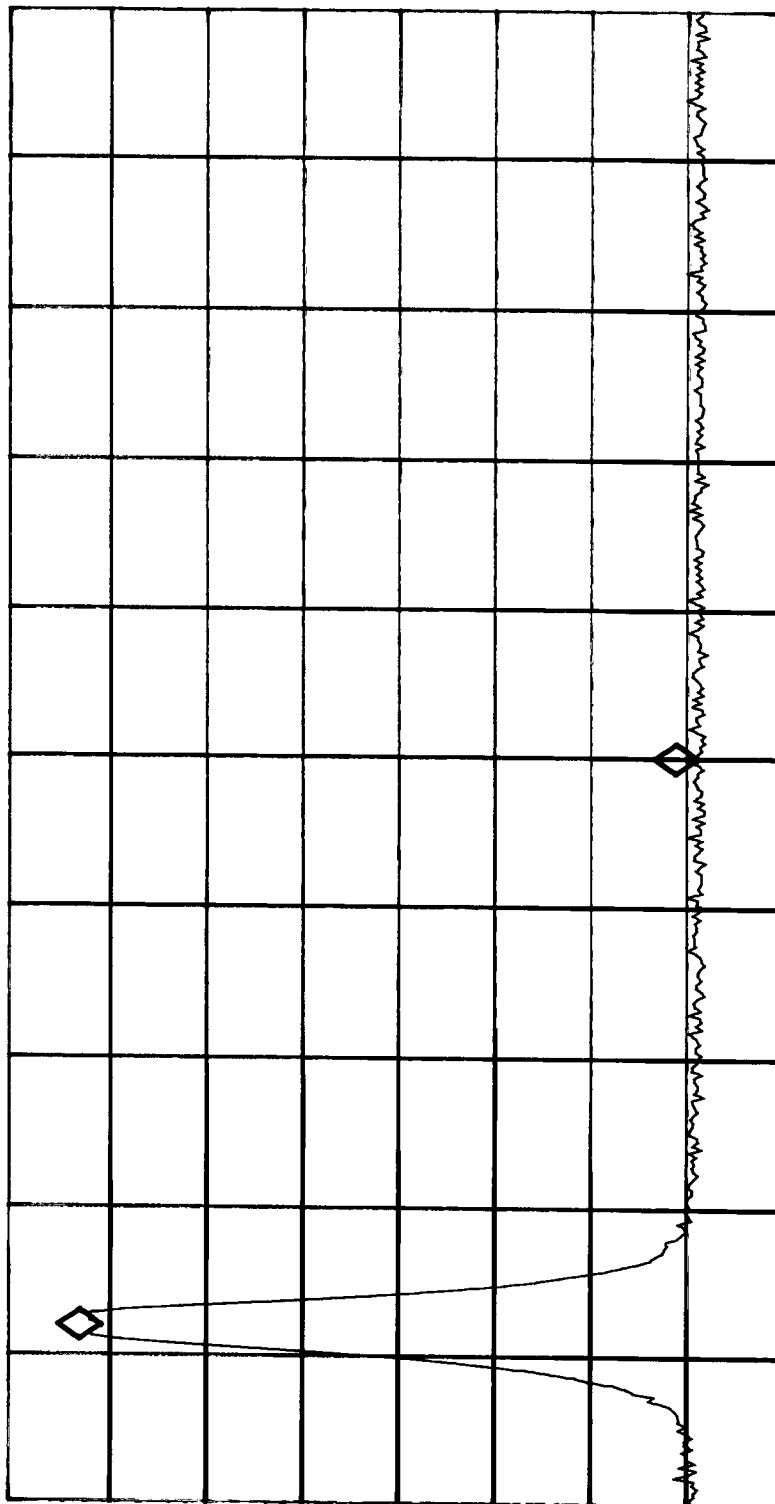
SELECT  
1 2 3 4

MARKER 2  
ON OFF

More  
1 of 3

LOG REF 80.0 dBμV

10  
dB/  
#ATN  
0 dB



WA SB  
SC FS  
CORR

CENTER 928.000 MHz  
#IF BW 10 KHz  
SPAN 2.000 MHz  
#SWP 20.0 sec