



**TEST REPORT TO FCC PART 15 SUBPART B
AND EN55022 FOR:**

GTCO CalComp Digitizer Model 36090

FCC ID: ECPDB2000

PREPARED FOR:

**GTCO CalComp
14555 North 82nd Street
Scottsdale, AZ 85260**

PREPARED BY:

**Kenneth B. Jacobson
Product Support Engineer
GTCO Calcomp
14555 North 82nd Street
Scottsdale, AZ 85260**

DATE OF REPORT:

04/13/00

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I. OVERVIEW OF TEST REPORT

The procedures used for the conducted and radiated tests were derived from the American National Standard ANSI C63.4-1991 as stated in FCC CFR 47, Part 15, Paragraph 15.31. The test site attenuation and layout was done in accordance with ANSI C63.4-1991 and is on file with the FCC as required in FCC CFR 47, Part 2, Paragraph 2.948.

PRODUCT TESTED: GTCO CalComp Digitizer Model 36090

TRADE NAME: ArtistPro or CADPro

APPLICANT: GTCO CalComp
14555 North 82nd Street
Scottsdale, AZ 85260

MANUFACTURER: Same as Applicant

TEST FACILITY LOCATION: Same as Applicant

TEST DATE: 03/09/00

The measurement data contained in this report reflects an accurate representation of the emission characteristics of the produce mentioned above.

REPORT PREPARED AND APPROVED BY: Kenneth B. Jacobson
Kenneth B. Jacobson
Product Engineer
GTCO CalComp

II. STATEMENT OF COMPLIANCE

Under the test configuration as described in this test report, the product tested has shown that it complies to the requirements of:

FCC RULES, PART 15, SUBPART B, CLASS B LIMITS

The product tested has shown that it also complies to the requirements of:

EC STANDARD EN55022/CISPR 22, CLASS B LIMITS

We, GTCO CalComp, assume full responsibility to manufacture the product as shown in the enclosed photographs to uphold compliance to the FCC rules.

SIGNED: Randy Crutchfield
Randy Crutchfield

TITLE: Manager of Engineering

III. DESCRIPTION OF TEST SAMPLE

The GTCO CalComp Digitizer Model 36090, is a microprocessor-based device that can convert graphic information into accurate digital information for entry into the host computer. The digitizer can be used for drawing, drafting, mapping, desktop publishing, animation, menuing and presentation graphics.

The basic operation of the digitizer is as follows:

An AC current flowing in the transducer electromagnetically induces voltages into precisely positioned conductors beneath the tablet's surface. The tablet electronics finds the tablet grid conductors with the largest signals and converts the grid signals into digital position data. The tablet sends the information out the communication port to the host. The data generated indicates the distance vertically and horizontally from the origin on the digitizer's surface.

The digitizer can support either RS-232 or USB interfaces. The digitizer comes with a 'universal cable' which has a 8 pin mini-din connector on the end. Depending which interface the end user wants to use, they will either plug in a RS-232 adapter or a USB adapter which is supplied with the digitizer into the 8 pin mini-din. The digitizers firmware will determine which interface it will support. Photo's of the adapters is included with the photos of the digitizer.

The digitizer receives it's power from the host computer and the transducer (mouse) is battery operated and is approve by the FCC under Part 15, Subpart C.

IV. **SUBASSEMBLIES OF TEST SAMPLE**

The GTCO CalComp Digitizer Model 36090 consists of a single PCB board and the only subassemblies would be a mouse or the I/O adapters. See attached photographs.

V. TEST EQUIPMENT AND CALIBRATION

The following is a list of equipment and calibration dates that are used at GTCO CalComp's test site.

TEST EQUIPMENT	MODEL	CALIBRATION DATE	FREQUENCY
Com-Power Log Periodic Antenna	CPAL-100	06/08/99	1 Year
Com-Power Biconical Antenna	AB-100	05/28/99	1 Year
Com-Power Loop Antenna	AL-130	06/26/99	1 Year
EMCO LISN	3825/2	09/25/99	1.5 Year
EMCO LISN	3825/2	09/25/99	1.5 Year
HP Spectrum Analyzer with Quasi-Peak Adapter	8568B 85650A	11/10/99	1 Year
HP Signal Generator	HP8656B	09/15/99	1 Year
EMCO Turntable	1060	N/A	N/A
HP Plotter	HP7470	N/A	N/A
Cable	RG-59/U	05/13/99	1 Year

VI. CABLE LOSS AND ANTENNA FACTORS



A.H. Systems Inc.

9710 Cozycroft Ave Chatsworth, CA 91311

Phone (818) 998-0223 Fax (818) 998-6892

E-mail Info@AHSystems.com

Web site <http://www.AHSystems.com>

Horizontal Polarization

3 Meter Calibration, Biconical Antenna

Model AB-100

Serial Number 14069

Date 06-Jul-99

Frequency (MHz)	Antenna Factor (dB)	Gain (dBi)	Gain (Numeric)
50	10.1	-5.90	0.26
60	9.3	-3.50	0.45
70	9.1	-1.99	0.63
80	9.4	-1.08	0.78
90	9.4	-0.06	0.99
100	10.2	0.06	1.01
110	10.8	0.32	1.08
120	11.8	0.08	1.02
130	11.9	0.62	1.15
140	12.3	0.88	1.22
150	12.8	0.97	1.25
160	13.2	1.10	1.29
170	13.7	1.14	1.30
180	14.4	0.92	1.24
190	15.2	0.66	1.16
200	15.8	0.48	1.12
210	15.4	1.31	1.35
220	15.8	1.32	1.36
230	15.5	1.96	1.57
240	16.7	1.11	1.29
250	17.8	0.42	1.10
260	17.9	0.64	1.16
270	18.5	0.35	1.08
280	19.1	0.08	1.02
290	19.9	-0.42	0.91
300	20.6	-0.80	0.83
310	21.4	-1.35	0.73
320	23.2	-2.88	0.52
330	24.1	-3.47	0.45

Add antenna factor plus cable loss to receiver reading in dBuV
to convert to field intensity in dBuV/meter Calibration per
SAE ARP-958 and/or ANSI C63.5 and/or IEEE 291



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Web site <http://www.AHSys.com>

Horizontal Polarization

3 Meter Calibration, Log Periodic Antenna

Model CPAL-100

Serial Number 1011

Date 06-Jul-99

Frequency (MHz)	Antenna Factor (dB)	Gain (dBi)	Gain (Numeric)
300	15.5	4.25	2.66
325	15.8	4.70	2.95
350	18.5	2.60	1.82
375	14.7	7.04	5.06
400	17.1	5.19	3.31
425	17.2	5.62	3.65
450	20.3	3.05	2.02
475	18.2	5.62	3.65
500	21.2	3.03	2.01
525	20.7	3.93	2.47
550	19.0	6.09	4.07
575	22.1	3.30	2.14
600	21.3	4.47	2.80
625	19.4	6.73	4.71
650	22.3	4.24	2.66
675	22.0	4.88	3.07
700	22.0	5.10	3.24
725	23.2	4.22	2.64
750	22.9	4.85	3.06
775	23.5	4.53	2.84
800	23.0	5.30	3.39
825	23.6	4.99	3.15
850	24.2	4.63	2.90
875	25.0	4.05	2.54
900	24.1	5.23	3.33
925	23.7	5.87	3.86
950	24.5	5.30	3.39
975	25.4	4.62	2.90
1000	26.7	3.57	2.28

Add antenna factor plus cable loss to receiver reading in dBuV
to convert to field intensity in dBuV/meter Calibration per
SAE ARP-958 and/or ANSI C63.5 and/or IEEE 291



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Calibration, Active Loop Antenna

Model AL-130

Serial Number 17000

Date 06-Jul-99

Frequency	Antenna Factor (dB)
10 KHz	76.5
20 KHz	71.4
50 KHz	64.1
100 KHz	57.7
200 KHz	54.0
500 KHz	47.0
1 MHz	40.0
2 MHz	33.7
5 MHz	23.5
10 MHz	15.0
15 MHz	1.6
18 MHz res	-19.9
20 MHz	9.5
25 MHz	12.2
30 MHz	15.6

Conversion Formulas $\text{dBuV/m} = \text{dBuV} + \text{AF}$
 $\text{dBuA/m} = \text{dBuV/m} - 51.5 \text{ dB}$



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 Web site http://www.AHSystems.com

Certificate Number 3244EA

Certificate of Calibration

The Antenna(s) has been individually calibrated using the following standard procedure(s)
 ARP-958 and/or IEEE 291 and/or ANSI C63.5

Calibration Traceability All measurement instrumentation traceable to the National Institute of Standards and Technology (NIST)
 Our "Calibration Measurement Procedures" are in complete compliance with MIL-STD-4662A/ANSI Z540

NIST Numbers DCV 811/24944-92, ACV 521/234615, Ω 811/250891
 Dimensional 821/253616-94, WWW Boulder, CO

Calibration Uncertainty ± 1 dB

Environment Temperature 82 Degrees Fahrenheit
 Humidity 38% (non-condensing)

Manufacturer	Model Number	Serial Number	Date of Calibration
Com Power	AB-100	14069	06-Jul-99
Com Power	CPAL-100	1011	6-Jul-99

Re-certification Date 1 year from calibration date

Calibration equipment used

Model Number	Serial Number	Calibration Due Date	Model Number	Serial Number	Calibration Due Date
TEK-TK502	B030879	17-Oct-99	TEK-DC508A	B020645	17-Oct-99
TEK-TM503	B130297	17-Oct-99	HP-86290A	1625A00598	14-Oct-99
TEK-7L18	B030712	17-Oct-99	HP-8620C	1604A00368	14-Oct-99
TEK-7L5	B093313	11-Oct-99	TEK-7603	B376651	14-Oct-99
TEK-L3	B023044	11-Oct-99	TEK-7L14	B010195	17-Oct-99

Antenna Condition

Pre Calibration
 In tolerance ☒
 Out of tolerance ☐
 Repair required ☐
 Repair performed ☐

Post Calibration
 Meets all specs ☒
 Limited specs ☐
 Other ☐

Special Limitations

Rit Sieng
 RF Technician

Travis P. Samuels
 Quality Control Manager

This certificate shall not be rep

the written approval of the A H Systems Inc



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Web site http://www.AHSystems.com

Certificate Number 3244RB

Certificate of Calibration

The Antenna(s) has been individually calibrated using the following standard procedure(s)
IEEE 291 and/or IEEE 302

Calibration Traceability All measurement instrumentation traceable to the National Institute of Standards and Technology (NIST)
Our "Calibration Measurement Procedures" are in complete compliance with MIL-STD-4662A/ANSI Z540

NIST Numbers DCV 811/24944-92, ACV 521/234615, Ω 811/250891
Dimensional 821/253616-94, WWW Boulder, CO

Calibration Uncertainty +/- 1 dB

Environment Temperature 82 Degrees Fahrenheit
Humidity 38% (non-condensing)

Manufacturer	Model Number	Serial Number	Date of Calibration
Com Power	AL-130	17000	06-Jul-99

Re-certification Date 1 year from calibration date

Calibration equipment used

Model Number	Serial Number	Calibration Due Date		Model Number	Serial Number	Calibration Due Date
TEK-7L14	B010195	17-Oct-99		TEK-7613	B377277	17-Oct-99
TEK-TR502	B030879	28-Sep-99		TEK-DC508A	B020645	28-Sep-99
TEK-TM503	B130297	28-Sep-99		HP-86290A	1625A00598	17-Oct-99
TEK-7L18	B030712	17-Oct-99		HP-8620C	1604A00368	17-Oct-99
TEK-7L5	B093313	11-Oct-99		TEK-7603	B376651	11-Oct-99
TEK-L3	B023044	11-Oct-99				

Antenna Condition

Pre Calibration		Post Calibration	
In tolerance	☒	Meets all specs	☒
Out of tolerance	☐	Limited specs	☐
Repair required	☐	Other	☐
Repair performed	☐		

Special Limitations

Rit Sieng
RF Technician

Travis P. Samuels
Quality Control Manager

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RG 59/U 3 METER CABLE LOSS

MHz	LOSS (db)	MHz	LOSS (db)
		280	1.30
30	.47	290	1.37
35	.31	300	1.61
40	.64	310	1.28
45	.77	320	1.53
50	.70	330	1.71
55	.69	340	1.99
60	.76	350	1.84
65	.67	360	2.11
70	.48	370	2.06
75	.36	380	1.82
80	.23	390	2.29
85	.16	400	2.02
90	.12	410	2.18
95	.19	420	2.12
100	.24	430	2.31
105	.31	440	2.43
110	.48	450	2.57
115	.71	460	2.62
120	.45	470	3.03
125	.46	480	3.04
130	.50	490	3.18
135	.61	500	3.21
140	.61	525	2.94
145	.46	550	2.54
150	.58	575	2.85
155	.87	600	3.18
160	.95	625	3.15
165	.48	650	3.54
170	.48	675	3.71
175	.75	700	3.93
180	1.23	725	4.08
185	1.07	750	3.70
190	.43	775	3.65
195	.38	800	3.52
200	.58	825	4.41
210	.46	850	4.51
220	.58	875	4.33
230	.61	900	4.29
240	.90	925	4.78
250	.80	950	4.91
260	1.17	975	4.93
270	1.13	990	4.87

VII. DESCRIPTION OF EQUIPMENT/CABLES USED FOR TESTING

The test sample was connected and tested to the following equipment:

PERIPHERAL	MAKE/MODEL	SERIAL NO.	FCC ID
PC	HP PAVILION 8190	US74751918	SELF DECLARE
Monitor	HP D5259A	SM74800713	SELF DECLARE
Keyboard	HP SK-2505	M971024502	SELF DECLARE
Printer	Epson FX-850	00C0042889	BKM9A8P82PA
Mouse	GENUIS PRO	97041240	FSUGMZFC
Transducer	GTCO CALCOMP	N/A	ECPLTP

DESCRIPTION OF CABLE

All cabling is shielded. See attached photographs.

VIII. RADIATED TEST PROCEDURE

Testing in the field as specified in ANSI C63.4, Section 8, the Digitizer was evaluated from the range of 30-1,000 MHz. The Digitizer was placed on a wooden turntable .8 meter above the groundplane and at a distance of 3 meters from the search antenna.

Maximum emissions were obtained by rotating the turntable and raising and lowering the search antenna while manipulating the cables which are bundled as specified. Appendix D in ANSI C63.4 was used for a reference. Both horizontal and vertical polarizations of the antenna were scanned and the position is noted on the radiated data sheet. Worst case configuration is shown in Photographs 1 and 2.

All emission levels were measured with a spectrum analyzer and represent peak readings at 100kHz bandwidth resolution. Converting the spectrum analyzer readings of dbm to dbμv/m proceeds as follows:

- A. Convert dbm to dbμv by adding 107db to the reading in dbm. This is derived from the voltage for a power level into a 50ohm load.
- B. Finally, adding the antenna factor with any cable loss to the dbμv reading yields dbμv/m.

By formula: $\text{db}\mu\text{v}/\text{m} = \text{dbm}(\text{reading}) + 107\text{db} + \text{AF} + \text{CL}$

Where: AF = Antenna Factor in db
 CL = Cable Loss in db

Note: No Emissions were noted from the Digitizer Model 36090 at 3 meters. Although the digitizer has two clock frequencies (two crystals) at 12MHz and 3.68MHz, the clock lines run directly to the micro and USB interface chips with very short traces. The crystal signals are not divided down.

IX. RADIATED TEST DATA/PHOTOGRAPHS

COMPANY NAME: GTCO CalComp

DATE: 03/09/00

TEST SAMPLE: GTCO CalComp Digitizer Model 36090

SERIAL NUMBER: N/A

ANTENNA TYPE: DIPOLE _____ BICONICAL **X** LOG PER. _____ LOOP _____

TEST DISTANCE: 3M

PEN: N/A

CURSOR: MOUSE

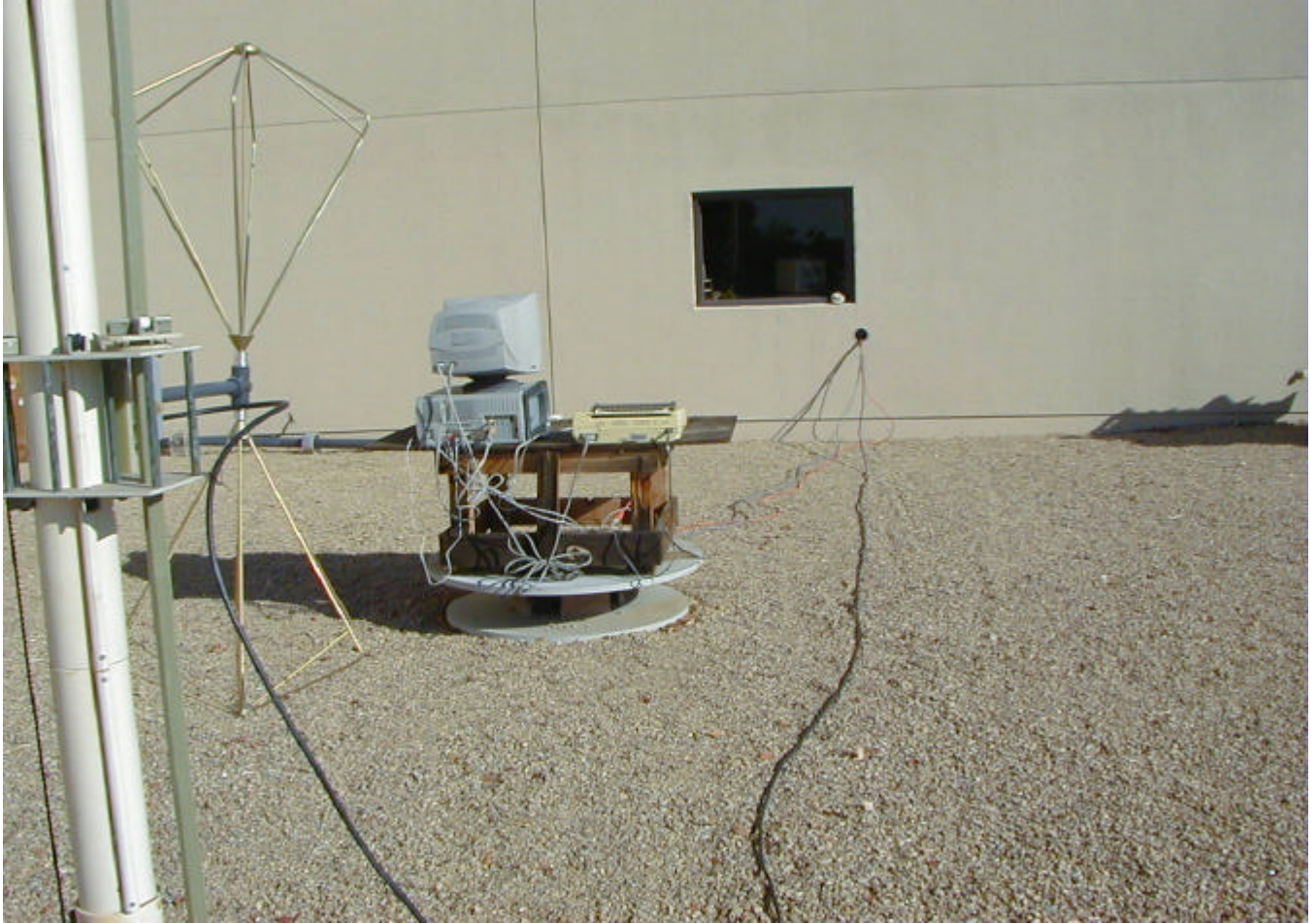
NOTES: As stated in Section VIII, Test Procedures, there were no emissions found at 3 meters.

(MHz) EMISSION FREQUENCY	ANT. POL.	ANT. HEIGHT (M)	AZIMUTH* DEGREES	METER READ db _m v	ANTENNA FACTOR & CABLE LOSS	FINAL READING db _m v/m	FCC LIMIT db _m v/m	MARGIN

* A 0-degree reading means the front of the EUT is facing the antenna. 180 degrees would mean the back of the EUT is facing the antenna. Rotation is clockwise from 0 degrees.



PHOTOGRAPH 1



PHOTOGRAPH 2

X. CONDUCTED TEST PROCEDURE

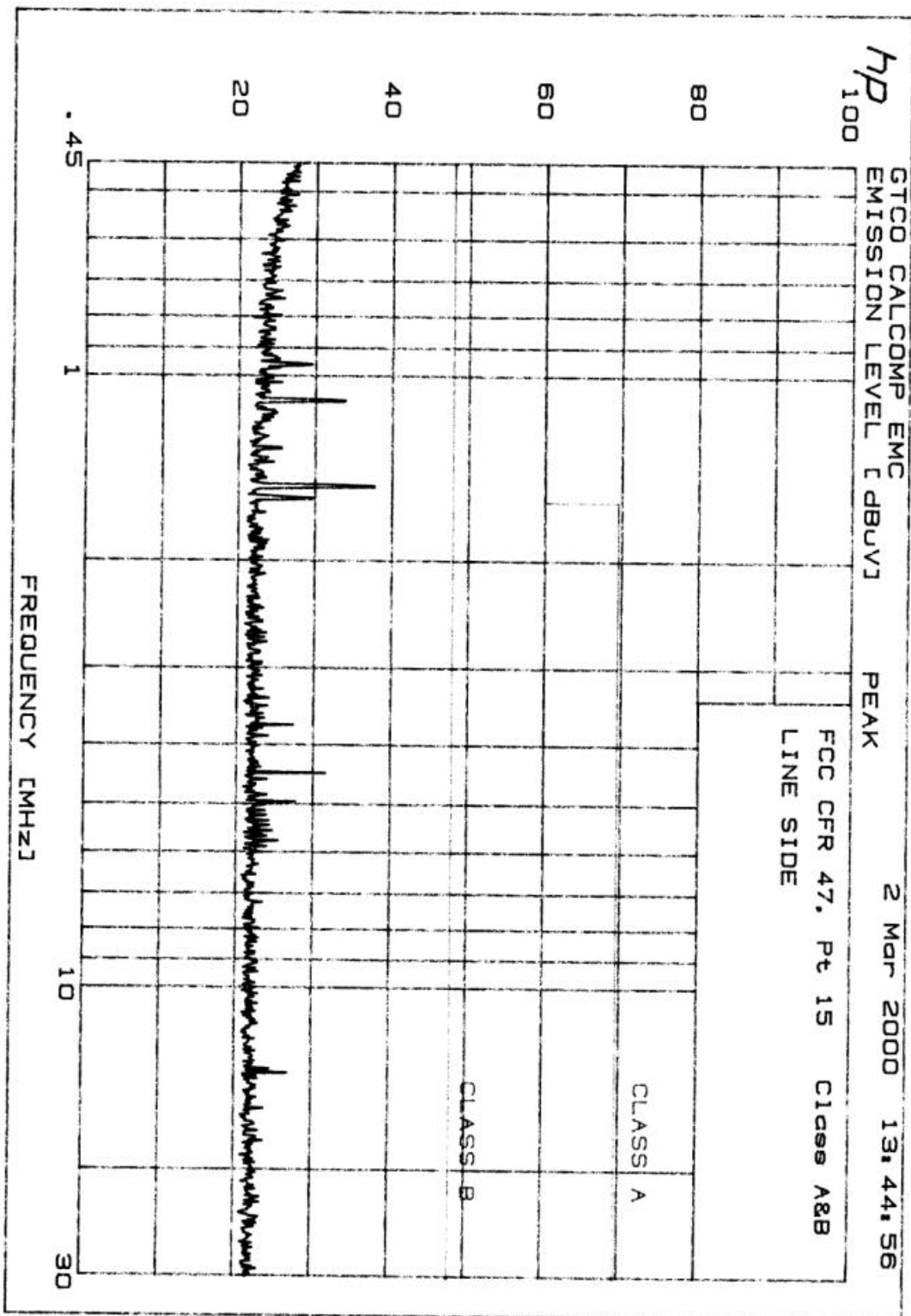
Since the Digitizer Model 36090 gets its power from the host as mentioned in the description, Section III, the computer and digitizer were attached to one LISN while the monitor and printer to a second LISN. The Digitizer was set up over a horizontal ground plane measuring approximately 2.5 x 3 meters and beside a vertical ground plane measuring about 2 x 2 meters as outlined in ANSI C63.4, Paragraphs 5.2.1 and 5.2.2. Any excess power cord between the LISN and Computer was folded back and forth to form a bundle not exceeding 40cm in length. All test procedures used ANSI C63.4, Paragraph 7.2.1 as a reference. Test configuration is shown in Photographs 3 and 4.

The following graphs show the resulting conducted tests and each graph shows the following:

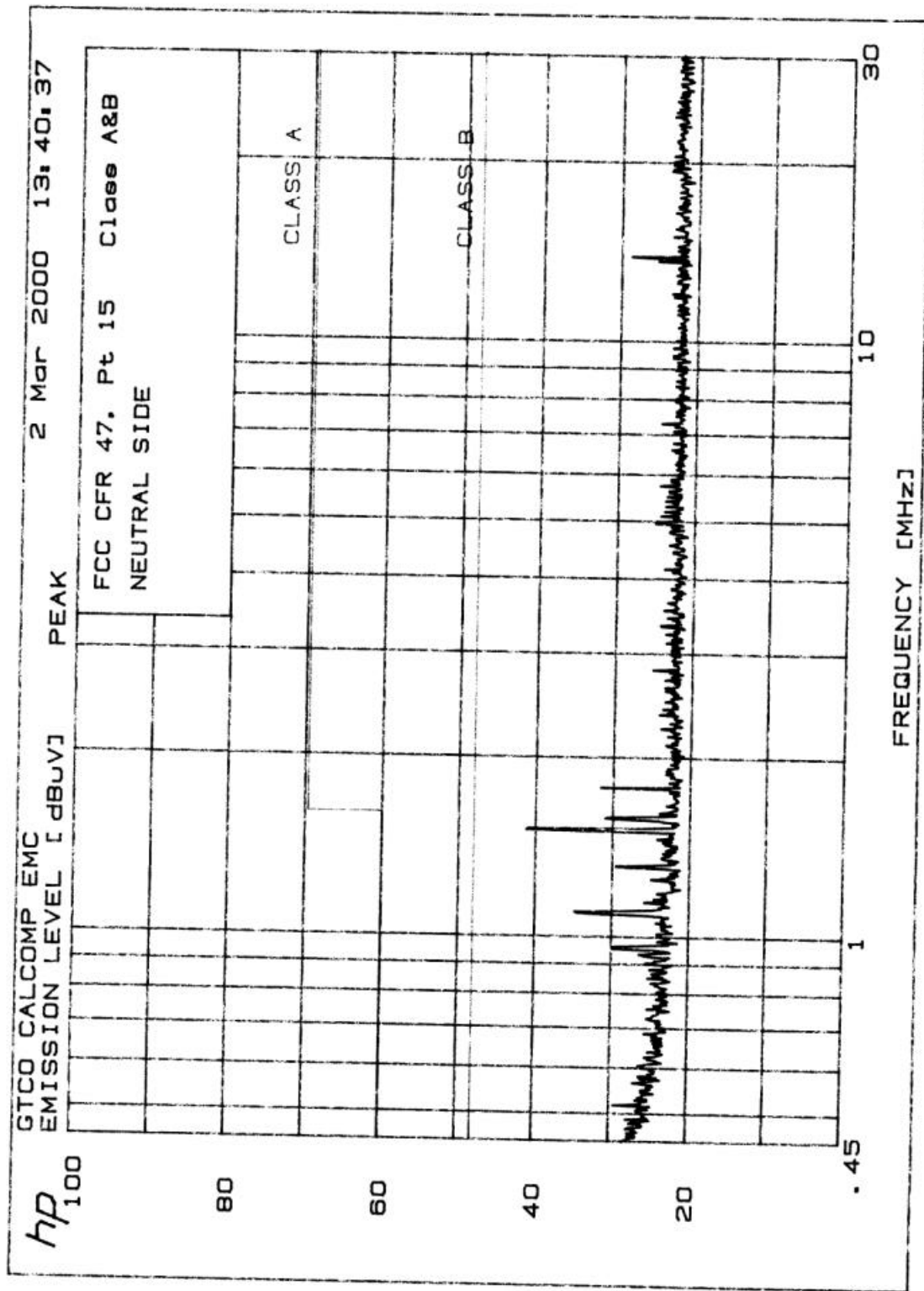
GRAPH NUMBER	FREQUENCY RANGE, MHz	POWER LINE SIDE	GROUNDING
1	.45-30	Line	Ungrounded
2	.45-30	Neutral	Ungrounded
3	.45-1	Line	Ungrounded
4	.45-1	Neutral	Ungrounded
5	.15-30	Line	Ungrounded
6	.15-30	Neutral	Ungrounded

On all graphs, the red horizontal line is the maximum FCC Class B Reference Level or EN55022 Class B Level.

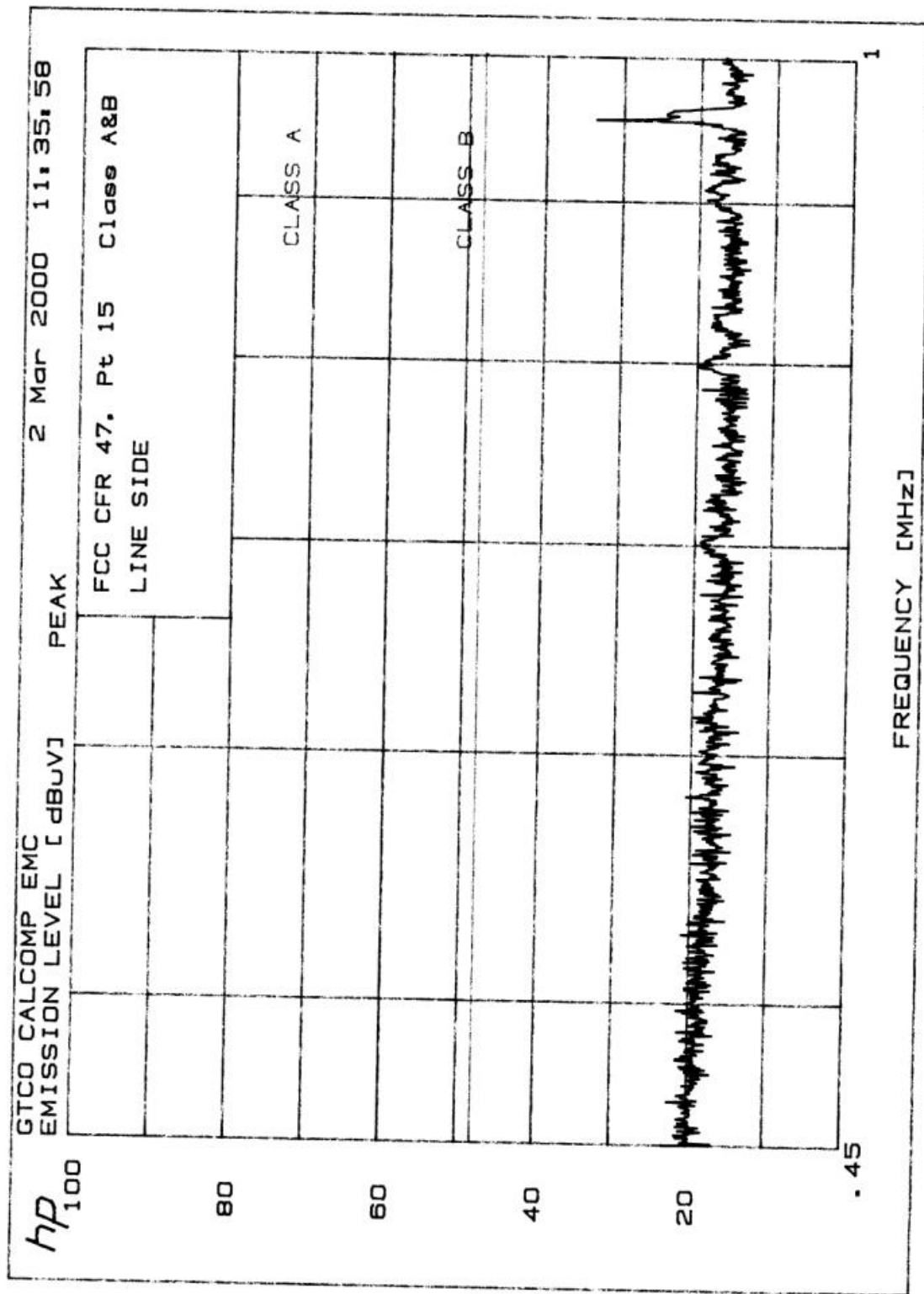
XI. CONDUCTED TEST DATA/PHOTOGRAPHS



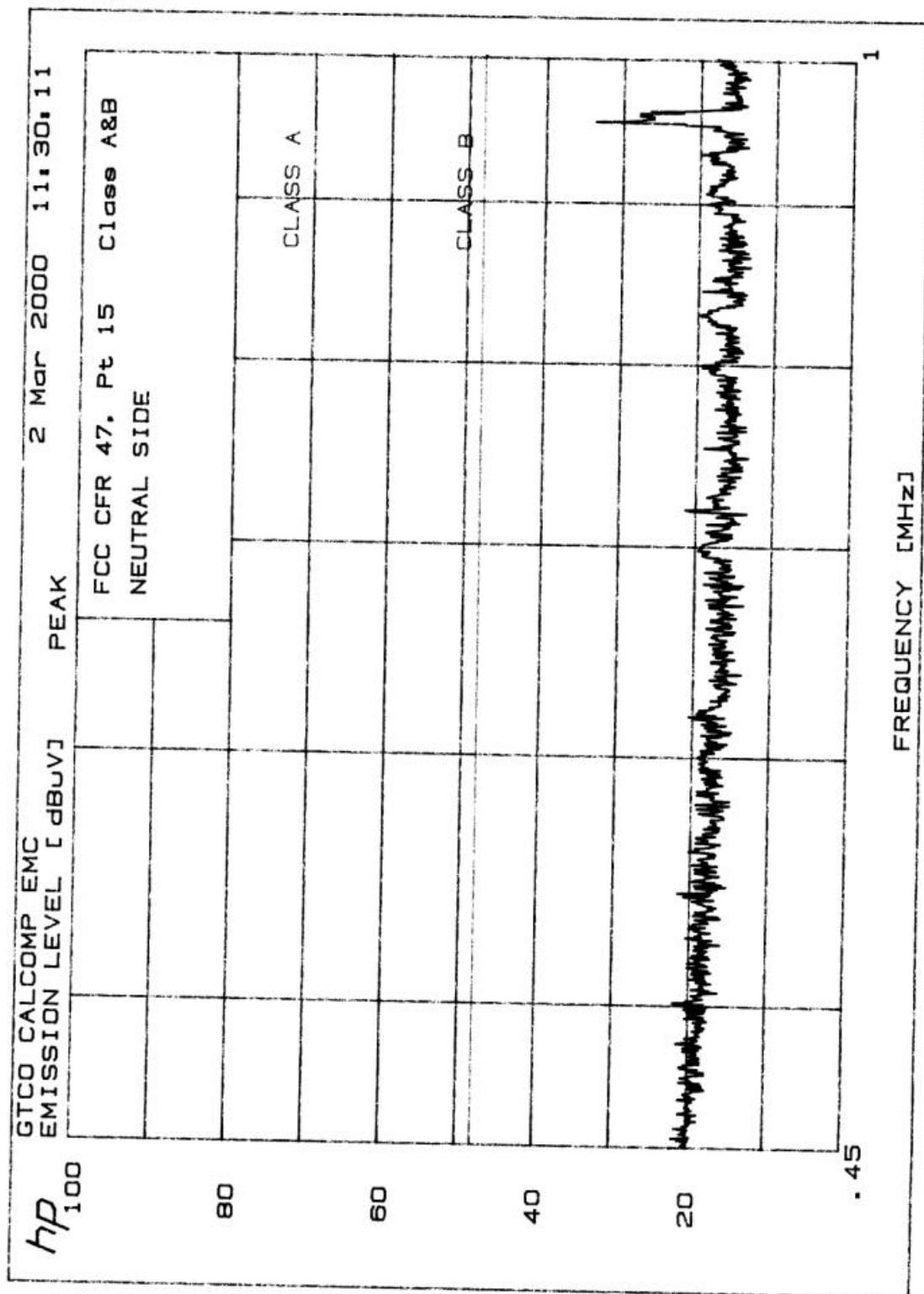
GRAPH 1



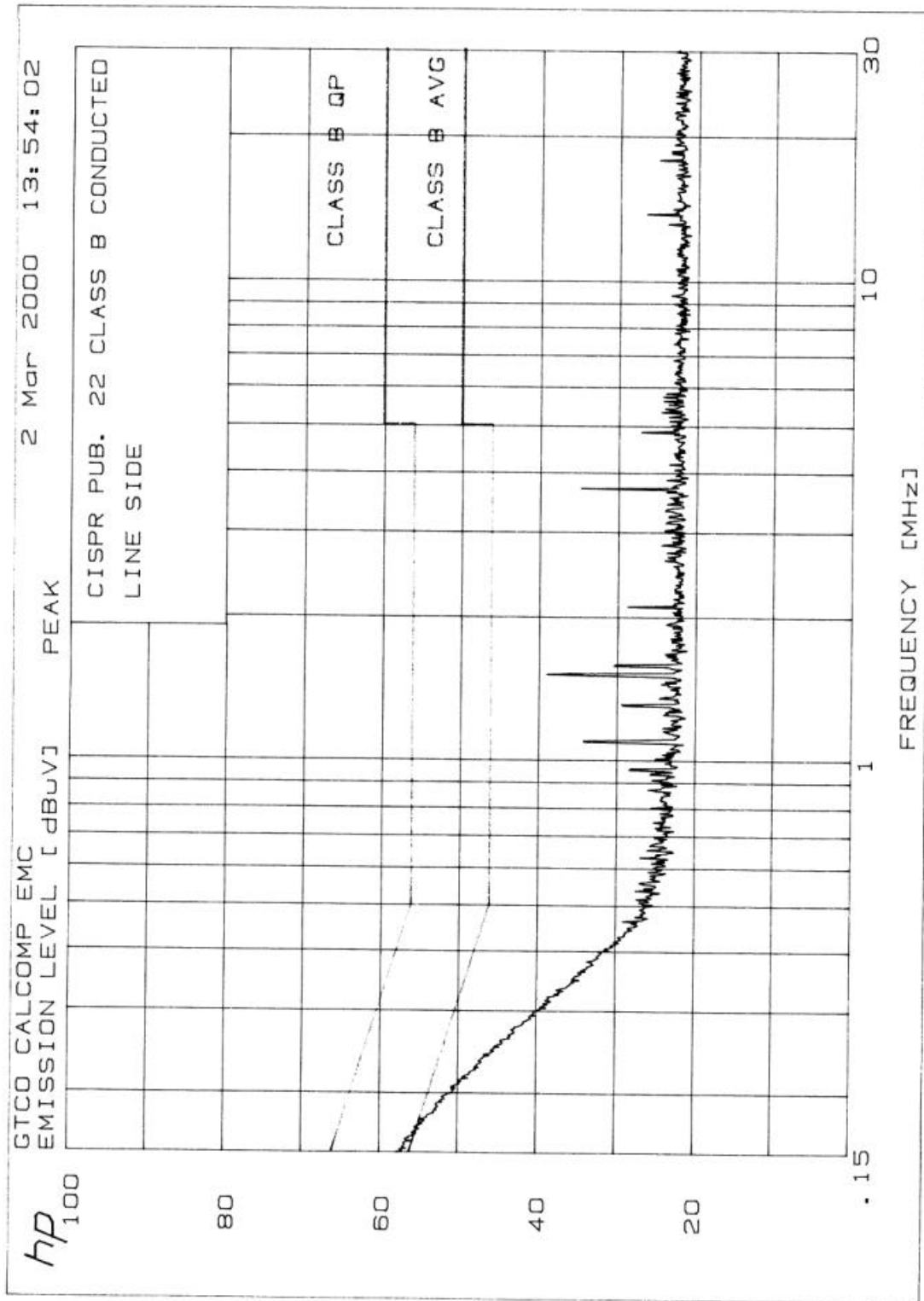
GRAPH 2



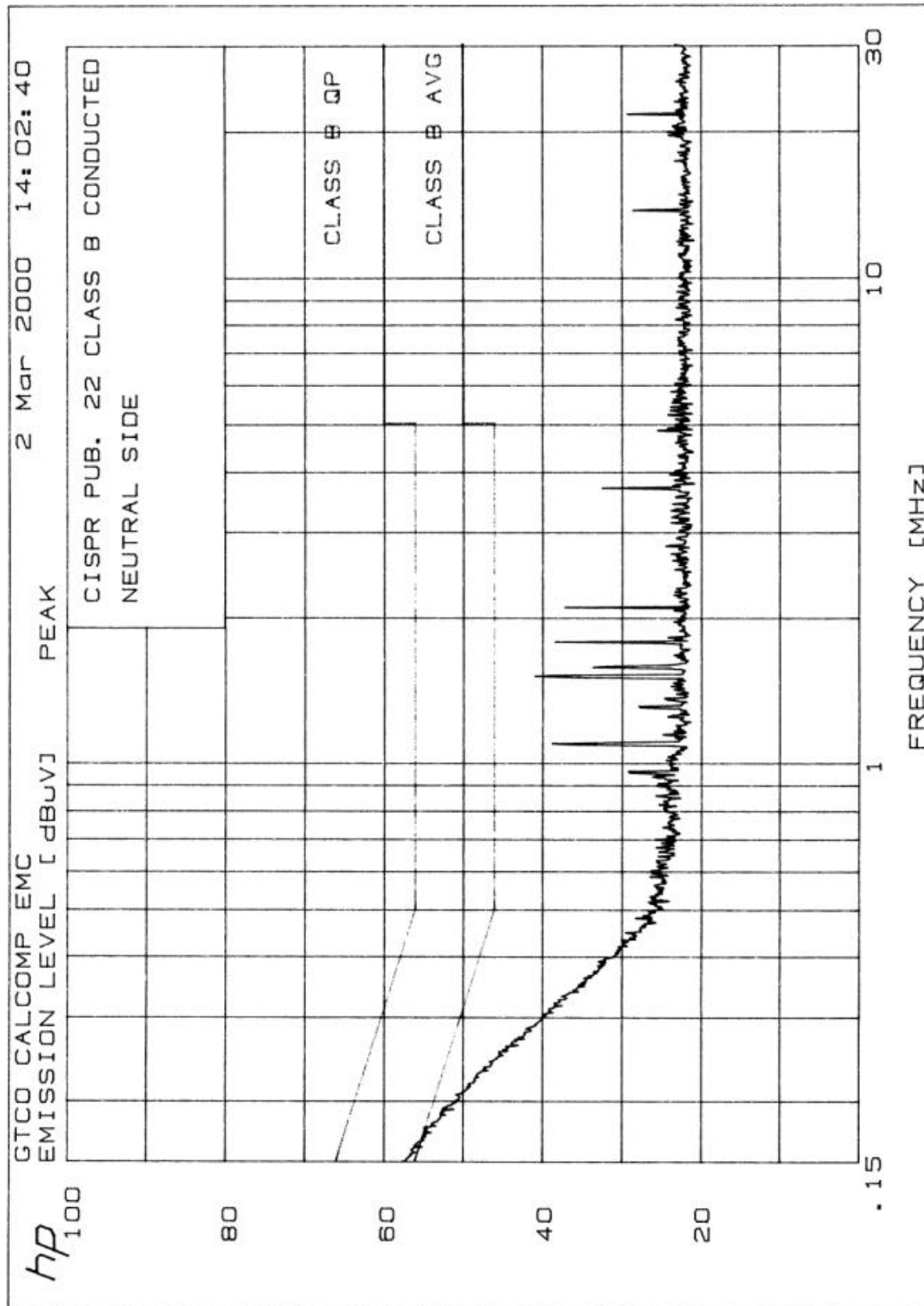
GRAPH 3



GRAPH 4



GRAPH 5



GRAPH 6



PHOTOGRAPH 3



PHOTOGRAPH 4

XII. SUMMARY OF RESULTS

The GTCO CalComp Digitizer Model 36090, has shown that it passes both radiated and conducted test limits for FCC Class B as noted in FCC's CFR 47, Part 15, Paragraphs 15.107 and 15.109. As stated in Section VIII, there were no emissions noted at 3 meters. This product has also shown that it passes the Class B limits as specified in CISPR 22/EN55022 standards as set in CISPR 22 Publication, Paragraphs 4 and 5.

The product tested had no specific modifications done to it to pass the above limits.