CKC LABORATORIES, INC.
Testing the Future
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EMC/SAFETY

GTCO CALCOMP ADDENDUM TO FC01-015

FOR THE

JUNCTION BOX FOR HOST COMPUTER

FCC PART 15 SUBPART B SECTION 15.109 CLASS B, FCC PART 15 SUBPART C SECTIONS 15.207, 15.209 & 15.249

COMPLIANCE

DATE OF ISSUE: MAY 2, 2001

PREPARED FOR:

GTCO CalComp
14555 N. 82nd Street
Scottsdale, AZ 85260

P.O. No.: JD10684
W.O. No.: 75747

PREPARED BY:

Joyce Walker
CKC Laboratories, Inc.
5473A Clouds Rest
Mariposa, CA 95338

Date of test: February 6-15, 2001
& May 1, 2001

Report No.: FC01-015A

TABLE OF CONTENTS

ADMINISTRATIVE INFORMATION

DATE OF TEST:	February 6-15 and May 1, 2001
DATE OF RECEIPT:	February 6, 2001
PURPOSE OF TEST:	To demonstrate the compliance of the Junction Box for Host Computer with the requirements for FCC Part 15 Subpart B Section 15.109 Class B, FCC Part 15 Subpart C Sections 15.207, 15.209 & 15.249 devices. This addendum is to add 9 kHz- 30 MHz test data in order to show compliance to FCC Section 15.33.
TEST METHOD:	ANSI C63.4 1992
MANUFACTURER:	GTCO CalComp 14555 N. 82nd Street Scottsdale, AZ 85260
REPRESENTATIVE:	Ken Jacobson
TEST LOCATION:	CKC Laboratories, Inc. 22105 Wilson River Hwy Tillamook, OR 97141

SUMMARY OF RESULTS

As received, the GTCO CalComp Junction Box for Host Computer was found to be fully compliant with the following standards and specifications:

United States

- FCC Part 15 Subpart B Class B Section 15.109
- FCC Part 15 Subpart C Sections 15.207, 15.209 & 15.249
- ANSI C63.4 (1992) method

The results in this report apply only to the items tested, as identified herein.

Test Overview

Section	Test Type	Results
15.33	Frequency Ranges	Pass
15.35	Bandwidth Settings	Pass
15.203	Antenna Requirements	Pass
15.205	Restricted Band	Pass
15.207	Mains Conducted Emissions	Pass
15.215(c)	Additional Provisions to the General Radiated Emissions Limitations (Bandwidth)	Pass
15.249(a)	Field Strength of Fundamental Frequency	Pass
15.249(c)/15.209	Field Strength of Radiated Spurious Emissions	Pass

MODIFICATIONS REQUIRED FOR COMPLIANCE

No modifications to the EUT were necessary to comply.

APPROVALS

QUALITY ASSURANCE:

Dennis Ward, Quality Manager

Pat Andre, Corp. Technical Advisor/
EMC Consultant

TEST PERSONNEL:

Mike Wilkinson, Test Engineer

EQUIPMENT UNDER TEST (EUT) DESCRIPTION

The EUT tested by CKC Laboratories was a production unit.

Tranceiver for host computer.

5246

The following additional models are indentical electronically to the one which was tested, or any differences between them to do no affect their EMC characteristics, and therefore they comply to the level of testing equivalent to the tested models.

Model numbers 5246 and 5648 do not exist, they are typo errors. The model number to be used should be Model 4256 for FCC ID: ECPRFDBI.

EQUIPMENT UNDER TEST

Junction Box for Host Computer
Manuf: GTCO CalComp
Model: Junction Box
Serial: None
FCC ID: ECPJUNCTIONBOX (pending)

Power Supply 120V
Manuf: Ault
Model: P48091000C0X06
Serial: None
FCC ID: NA

DrawingBoard Interactive 4256
Manuf: GTCO CalComp
Model: DrawingBoard Interactive 4256
Serial: None
FCC ID: ECPRFDBI (pending)

PERIPHERAL DEVICES

The EUT was tested with the following peripheral devices:

Host Computer
Manuf: Compaq
Model: 2890A
Serial: 6746BRT11773
FCC ID: DoC

Mouse
Manuf: HP
Model: 5182-8864
Serial: LZE01505537
FCC ID: DoC

Keyboard
Manuf: HP
Model: 5129
Serial: B01634962
FCC ID: DoC

Stylus
Manuf: GTCO CalComp
Model: CTW-DMS
Serial: None
FCC ID: DoC

Printer
Manuf: HP
Model: 895Cxi
Serial: MY97G1924Z
FCC ID: DoC

Monitor
Manuf: Mitsubishi
Model: FFF8705SKTK
Serial: 605501823
FCC ID: DoC

Computer
Manuf: HP
Model: 6730
Serial: KR02407056
FCC ID: DoC

Printer
Manuf: HP
Model: 895Cxi
Serial: US8AM2Q0BK
FCC ID: DoC

MODE OF OPERATION

The EUT was set up to continuously transmit data. This data can be monitored via a computer connected to the junction box.

15.33 FREQUENCY RANGE TESTED

15.249(a)(c) Radiated Emissions:	9 kHz – 10 GHz
15.207 Conducted Emissions:	450 kHz – 30 MHz
15.109/15.209 Radiated Emissions:	9 kHz – 5 GHz

EUT OPERATING FREQUENCY

The fundamental is 916 MHz, operating in the 902-928 MHz range.

TEMPERATURE AND HUMIDITY DURING TESTING

The temperature during testing was within +15°C and + 35°C.
The relative humidity was between 20% and 75%.

REPORT OF MEASUREMENTS

The following tables report the worst case emissions levels recorded during the tests performed on the Junction Box for Host Computer. All readings taken were peak readings unless otherwise stated. The data sheets from which the emissions tables were compiled are contained in Appendix C.

Table 1: 15.209/15.249(a)(c) Six Highest Radiated Spurious Emission Levels - Transmitter

FREQUENCY MHz	METER READING dBµV	CORRECTION FACTORS Ant dB	Amp-A dB	Cable dB	Dist dB	CORRECTED READING dBµV/m	SPEC LIMIT dBµV/m	MARGIN dB	NOTES
916.520	72.1	22.2	-27.6	7.5		74.2	94.0	-19.8	HF
1833.036	46.5	27.2	-42.0	6.4		38.1	54.0	-15.9	V
1833.043	45.2	27.2	-42.0	6.4		36.8	54.0	-17.2	H
4582.586	28.0	32.3	-40.0	13.1		33.4	54.0	-20.6	V
5499.042	27.8	33.9	-39.0	16.1		38.8	54.0	-15.2	H
6415.635	27.8	33.7	-38.9	13.7		36.3	54.0	-17.7	H

Test Method: ANSI C63.4 1992
Spec Limit: FCC Section 15.209/15.249(a)(c)
Test Distance: 3 Meters

NOTES: H = Horizontal Polarization
V = Vertical Polarization
F = Fundamental Frequency

COMMENTS: EUT is transmitting continuously at 916 MHz with modulation. The EUT PS2 port is connected to the host computer serial and PS2 ports via a 5-foot GTCO cable assembly. The support printer is connected to the host computer LTP1 port via a 1.5-meter shielded parallel cable. The EUT serial and USB ports have unterminated 1.5-meter cables attached. The temperature was 70°F and the humidity was 40%. AC input was 120 V, 60 Hz. Frequency range investigated was 9 kHz to 10 GHz.

Table 2: 15.207 Six Highest Mains Conducted Emission Levels – Transmitter

FREQUENCY MHz	METER READING dBµV	CORRECTION FACTORS T1co dB	dB	Cable dB	dB	CORRECTED READING dBµV	SPEC LIMIT dBµV	MARGIN dB	NOTES
0.533580	44.4	0.1		0.0		44.5	48.0	-3.5	B
0.533580	44.4	0.1		0.0		44.5	48.0	-3.5	W
0.669398	39.9	0.1		0.1		40.1	48.0	-7.9	W
21.517500	43.2	0.5		1.3		45.0	48.0	-3.0	B
26.343750	38.1	0.2		1.4		39.7	48.0	-8.3	W
27.026250	37.3	0.9		1.5		39.7	48.0	-8.3	B

Test Method: ANSI C63.4 1992
Spec Limit: FCC Section 15.207

NOTES: B = Black Lead
W = White Lead

COMMENTS: EUT is transmitting continuously at 916 MHz with modulation. The EUT PS2 port is connected to the host computer serial and PS2 ports via a 5-foot GTCO cable assembly. The support printer is connected to the host computer LTP1 port via a 1.5-meter shielded parallel cable. The EUT serial and USB ports have unterminated 1.5-meter cables attached. The temperature was 70°F and the humidity was 40%. AC input was 120 V, 60 Hz.

Table 3: 15.109/15.209 Six Highest Radiated Emission Levels - Receiver

FREQUENCY MHz	METER READING dBµV	CORRECTION FACTORS Ant dB	Amp-A dB	Cable dB	Dist dB	CORRECTED READING dBµV/m	SPEC LIMIT dBµV/m	MARGIN dB	NOTES
74.238	52.2	6.9	-27.2	2.2		34.1	40.0	-5.9	HQ
88.500	48.8	8.6	-27.0	2.5		32.9	43.5	-10.6	V
144.040	46.5	11.2	-26.9	3.1		33.9	43.5	-9.6	V
261.400	46.8	12.6	-26.5	4.1		37.0	46.0	-9.0	H
298.384	46.6	13.1	-26.5	4.4		37.6	46.0	-8.4	V
299.900	43.9	13.1	-26.5	4.4		34.9	46.0	-11.1	H

Test Method: ANSI C63.4 1992
Spec Limit: FCC Section 15.109/15.209
Test Distance: 3 Meters

NOTES: H = Horizontal Polarization
V = Vertical Polarization
Q = Quasi Peak Reading

COMMENTS: Data in this table is comprised from several test data sheets. See Appendix C for individual test conditions.

MEASUREMENT UNCERTAINTY

Associated with data in this report is a ± 4dB measurement uncertainty.

EUT SETUP

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the photographs in Appendix A. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables. The corrected data was then compared to the applicable emission limits to determine compliance.

The cables were routed consistent with the typical application by varying the configuration of the test sample. Interface cables were connected to the available I/O ports of the test unit. The effect of varying the position of the cables was investigated to find the configuration that produced maximum emissions. I/O cables were of the type and length specified in the individual requirements. The length of cable that produced maximum emissions was selected. The interval between different pieces of equipment was approximately 10 centimeters. All excessive interconnecting cable was bundled in 30-40 centimeter lengths.

The radiated and conducted emissions data of the Junction Box for Host Computer was taken with the HP Spectrum Analyzer. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in Table A.

Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in dBµV/m, the spectrum analyzer reading in dBµV was corrected by using the following formula in Table A. This reading was then compared to the applicable specification limit to determine compliance.

TABLE A: SAMPLE CALCULATIONS

	Meter reading	(dBµV)
+	Antenna Factor	(dB)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dBµV/m)

A typical data sheet will display the following in column format:

#	Freq	Rdng	Amp-A	Bicon	Cbl-2	Cable	Corr	Spec	Margin	Polar
		Mag L	Bilog	Horn	T114b	L13W	1.5G	26.5	T1co	

means reading number.
Freq is the frequency in MHz of the obtained reading.
Rdng is the reading obtained on the spectrum analyzer in dBµV.
26.5, Pre-Amp is the preamplifier factor or gain in dB.
Bicon is the biconical antenna factor in dB.
Bilog is the biconilog antenna factor in dB.
Mag L is the magnetic loop antenna factor in dB.
Horn is the horn antenna factor in dB.
T1co, Cbl-2, Cable is the cable loss in dB of the coaxial cable on the OATS.
1.5G is the cable loss in dB of the high frequency coaxial cable on the OATS.
Corr is the corrected reading in dBµV/m (field strength).
Spec is the specification limit (dB) stated in the FCC regulations.
Margin is the closeness to the specified limit in dB; + is over and - is under the limit.
Polar is the polarity of the antenna with respect to earth.
L13W, L14b is the line impedance stabilization network factor in dB for conducted emissions.

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed in Appendix B were used to collect both the radiated and conducted emissions data for the Junction Box for Host Computer. Measurments made below 30 MHz were performed using the magnetic loop antenna. For radiated measurements from 30 to 1000 MHz, the biconilog antenna was used. The horn antenna was used for frequencies above 1000 MHz. Conducted emissions tests required the use of the FCC type LISNs.

The HP spectrum analyzer was used for all measurements. Table B shows the analyzer bandwidth settings that were used in designated frequency bands. For conducted emissions, an appropriate reference level and a vertical scale size of 10 dB per division were used. A 10 dB external attenuator was also used during conducted tests, with internal offset correction in the analyzer. During radiated testing, the measurements were made with 0 dB of attenuation, a reference level of 97 dBµV, and a vertical scale of 10 dB per division.

FCC SECTION 15.35:
TABLE B: ANALYZER BANDWIDTH SETTINGS PER FREQUENCY RANGE

TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
CONDUCTED EMISSIONS	450 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	9 kHz	150 kHz	200 Hz
RADIATED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz
RADIATED EMISSIONS	1000 MHz	10 GHz	1 MHz

SPECTRUM ANALYZER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in the Tables indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "Peak" mode. Whenever a "Quasi-Peak" or "Average" reading is listed as one of the six highest readings, this is indicated as a "Q" or an "A" in the appropriate table. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data for the Junction Box for Host Computer.

Peak

In this mode, the Spectrum Analyzer or test engineer recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature of the analyzer called "peak hold," the analyzer had the ability to measure transients or low duty cycle transient emission peak levels. In this mode the analyzer made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

Quasi-Peak

When the true peak values exceeded or were within 2 dB of the specification limit, quasi-peak measurements were taken using the HP Quasi-Peak Adapter for the HP Spectrum Analyzer. The detailed procedure for making quasi peak measurements contained in the HP Quasi-Peak Adapter manual were followed.

Average

For certain frequencies, average measurements may be made using the spectrum analyzer. To make these measurements, the test engineer reduces the video bandwidth on the analyzer until the modulation of the signal is filtered out. At this point the analyzer is set into the linear mode and the scan time is reduced.

EUT TESTING

Radiated Emissions

The EUT was mounted on a nonconductive, rotating table 80 cm above the conductive grid. The nonconductive table dimensions were 1 meter by 1.5 meters.

During the preliminary radiated scan, the host PC was powered up and operating in its defined FCC test mode. For frequencies below 30 MHz the magnetic loop antenna was used. The frequency range of 30 MHz to 1000 MHz was scanned with the biconilog antenna located about 1.5 meter above the ground plane in the vertical polarity. During this scan, the turntable was rotated and all peaks at or near the limit were recorded. A scan of the FM band from 88 to 110 MHz was then made using a reduced resolution bandwidth and frequency span. The biconilog antenna was changed to the horizontal polarity and the above steps were repeated. For frequencies exceeding 1000 MHz, the horn antenna was used. Care was taken to ensure that no frequencies were missed within the FM and TV bands. An analysis was performed to determine if the signals that were at or near the limit were caused by an ambient transmission. If unable to determine by analysis, the equipment was powered down to make the final determination if the EUT was the source of the emission.

A thorough scan of all frequencies was made manually using a small frequency span, rotating the turntable as needed. The test engineer maximized the readings with respect to the table rotation and configuration of EUT. Maximizing of the EUT was achieved by monitoring the spectrum analyzer on a closed circuit television monitor. Photographs showing the final worst case configuration of the EUT are contained in Appendix A.

Mains Conducted Emissions

During conducted emissions testing, the EUT was located on a wooden table measuring approximately 80 cm high, 1 meter deep, and 1.5 meters in length. One wall of the room where the EUT was located has a minimum 2 meter by 2 meter conductive plane. The EUT was mounted on the wooden table 40 cm away from the conductive plane, and 80 cm from any other conductive surface.

The vertical metal plane used for conducted emissions was grounded to the earth. Power to the EUT was provided through a LISN. The LISN was grounded to the ground plane. All other objects were kept a minimum of 80 cm away from the EUT during the conducted test.

For conducted emissions testing, a 30 to 50 second sweep time was used for automated measurements in the frequency bands of 450 kHz to 1.705 MHz, 1.705 MHz to 3 MHz, and 3 MHz to 30 MHz. All readings within 20 dB of the limit were recorded. At frequencies where the recorded emissions were close to the limit, further investigation was performed manually at a slower sweep rate.

TRANSMITTER CHARACTERISTICS

15.203 Antenna Requirements

Antenna Type: Integral
Connection to EUT: Integral, non-removable

The antenna is an integral part of the EUT and is NON-Removable; therefore the EUT complies with Section 15.203 of the FCC rules.

15.205 Restricted Bands

Operating frequency: 916 MHz.

The fundamental operating frequency lies outside the restricted bands and therefore complies with the requirements of Section 15.205 of the FCC rules.

Any spurious emission coming from the EUT was investigated to determine if any portion lies inside the restricted band. If any portion of a spurious emissions signal was found to be within a restricted band, investigation was performed to ensure compliance with Section 15.209.

15.215 Additional Provisions to the General Radiated Emission Limitations

The fundamental frequency was kept within the central 80% of the permitted band in order to minimize the possibility of out-of-band operation. Refer to Appendix B for the test equipment used and Appendix C for the occupied bandwidth plot(s).

15.249(a) Power Output

The maximum field strength of the fundamental was measured to be 74.2 dBµV/m when measured at a test distance of three meters. This measurement was made with the EUT's integral antenna, as there is no provision for connecting an external antenna.

APPENDIX A

INFORMATION ABOUT THE EQUIPMENT UNDER TEST

INFORMATION ABOUT THE EQUIPMENT UNDER TEST	
Test Software/Firmware:	
CRT was displaying:	X-Y Data
Power Supply Manufacturer:	NA
Power Supply Part Number:	NA
AC Line Filter Manufacturer:	NA
AC Line Filter Part Number:	NA
Line voltage used during testing:	120V, 60 Hz

I/O PORTS	
Type	#
RS-232, 9 Pin D-Sub	1
USB	2
RS-232, 8 Pin Mini Din	3

CRYSTAL OSCILLATORS	
Type	Freq In MHz
Crystal	12

PRINTED CIRCUIT BOARDS				
Function	Model & Rev	Clocks, MHz	Layers	Location
Main Board	35-902536, Rev 04 (Dom.), Rev. 01 (Int.)	12 and 4	2	Inside

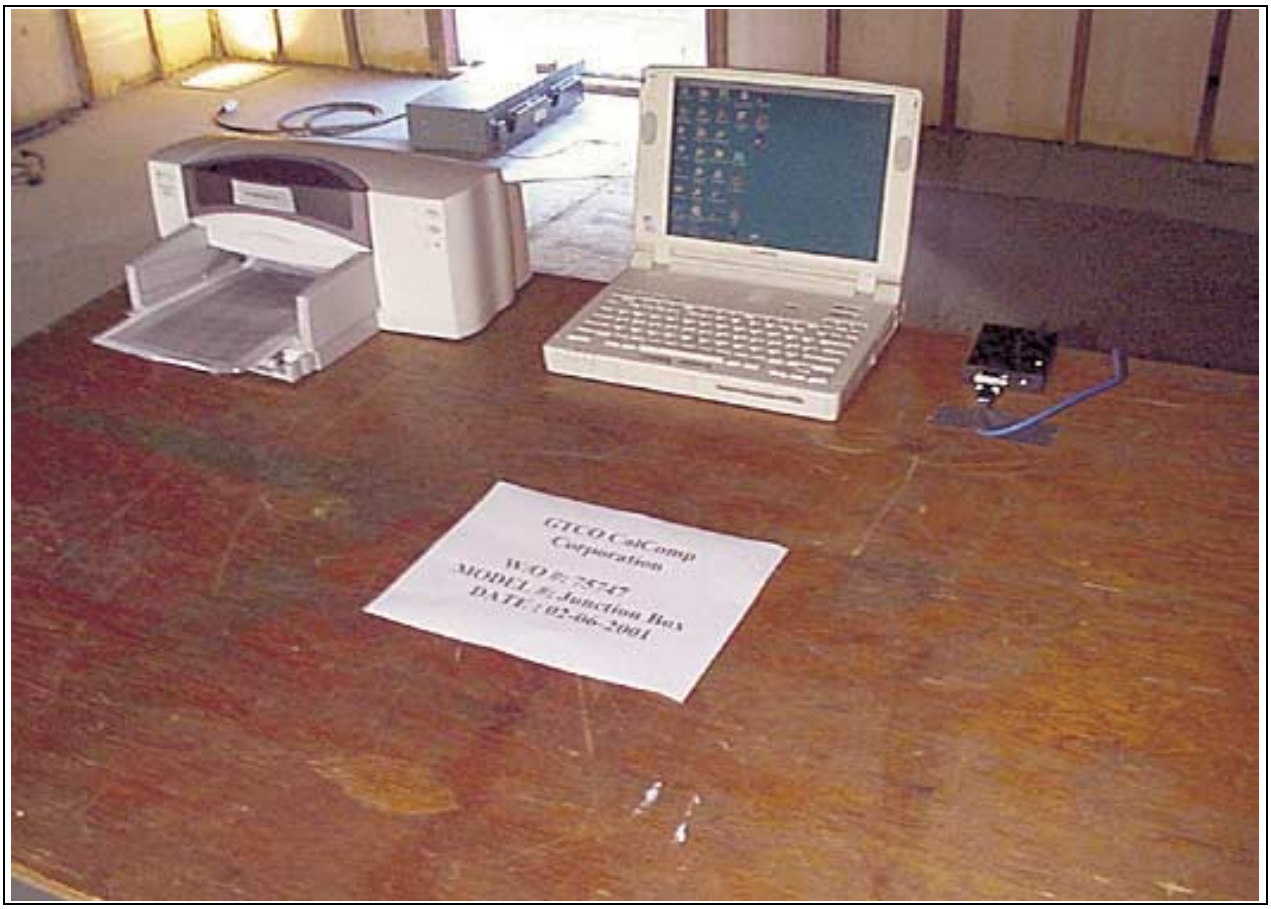
CABLE INFORMATION

Cable #:	1	Cable(s) of this type:	1
Cable Type:	RS-232	Shield Type:	Spiral
Construction:		Length In Meters:	2
Connected To End (1):	Junction Box	Connected To End (2):	Dbi
Connector At End (1):	9 Pin D-Sub	Connector At End (2):	9 Pin D-Sub
Shield Grounded At (1):	Chassis	Shield Grounded At (2):	Chassis
Part Number:		Number of Conductors:	8
Notes and/or description:	**Not supplied with product**		

Cable #:	2	Cable(s) of this type:	1
Cable Type:	USB	Shield Type:	Spiral
Construction:		Length In Meters:	1
Connected To End (1):	Junction Box	Connected To End (2):	Dbi
Connector At End (1):	4 Pin Upstream	Connector At End (2):	4 Pin Downstream
Shield Grounded At (1):	Chassis	Shield Grounded At (2):	Chassis
Part Number:		Number of Conductors:	4
Notes and/or description:	**Not supplied with product**		

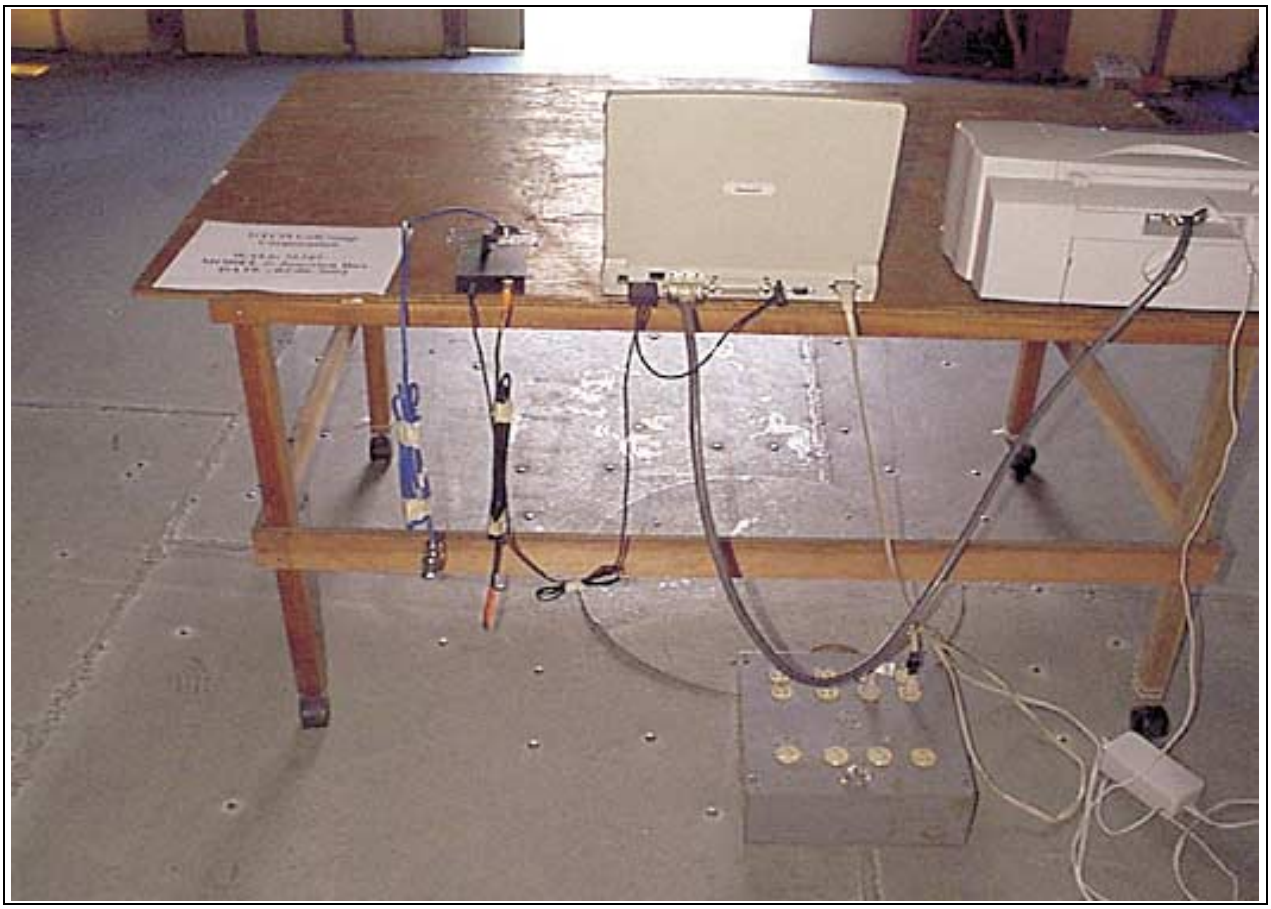
Cable #:	3	Cable(s) of this type:	1
Cable Type:	RS-232	Shield Type:	Spiral
Construction:		Length In Meters:	2
Connected To End (1):	Junction Box	Connected To End (2):	Computer
Connector At End (1):	8 Pin Mini Din	Connector At End (2):	9 Pin D-Sub
Shield Grounded At (1):	Chassis	Shield Grounded At (2):	Chassis
Part Number:		Number of Conductors:	8
Notes and/or description:			

PHOTOGRAPH SHOWING RADIATED EMISSIONS - TRANSMITTER



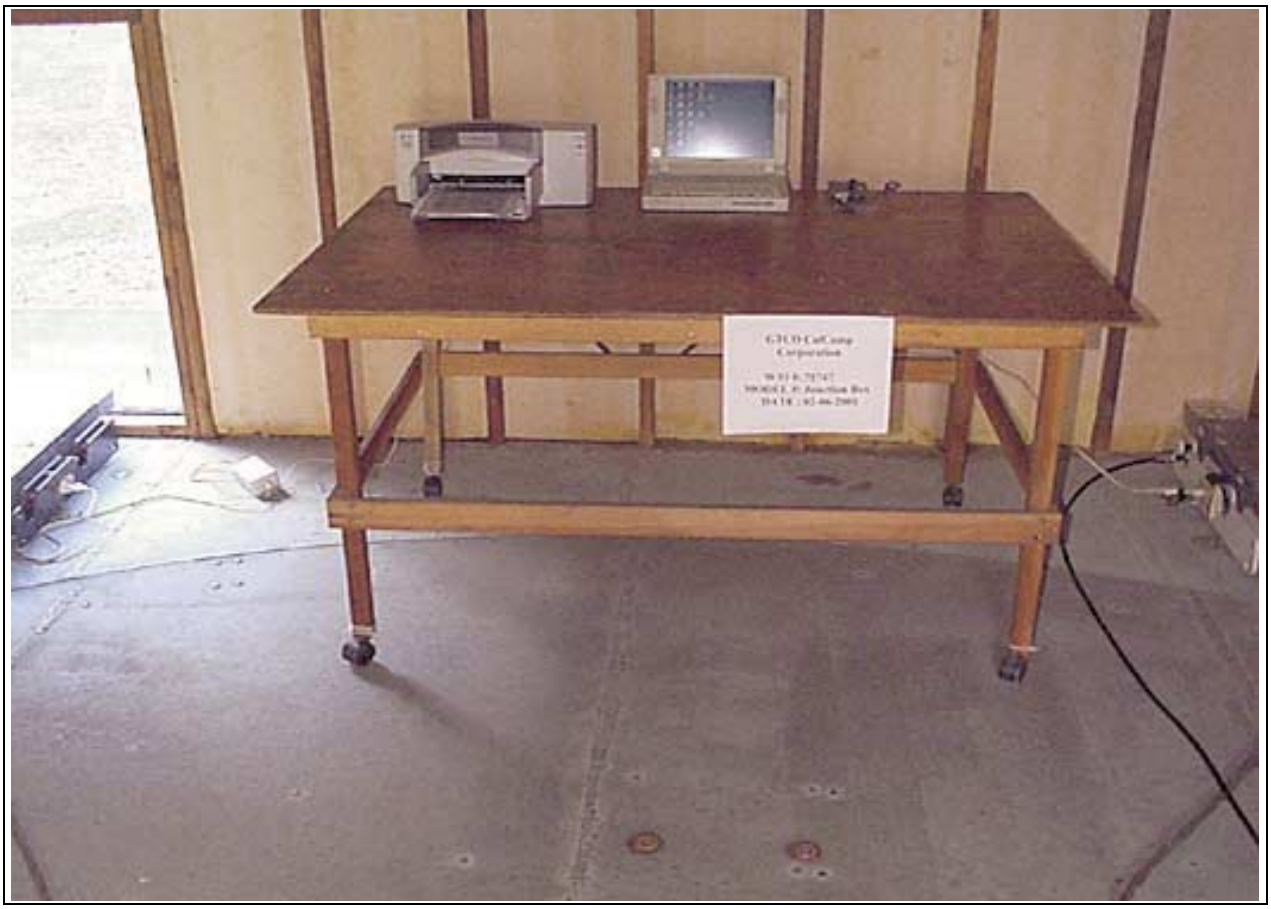
Transmitter Radiated Emissions - Front View

PHOTOGRAPH SHOWING RADIATED EMISSIONS - TRANSMITTER



Transmitter Radiated Emissions - Back View

PHOTOGRAPH SHOWING MAINS CONDUCTED EMISSIONS - TRANSMITTER

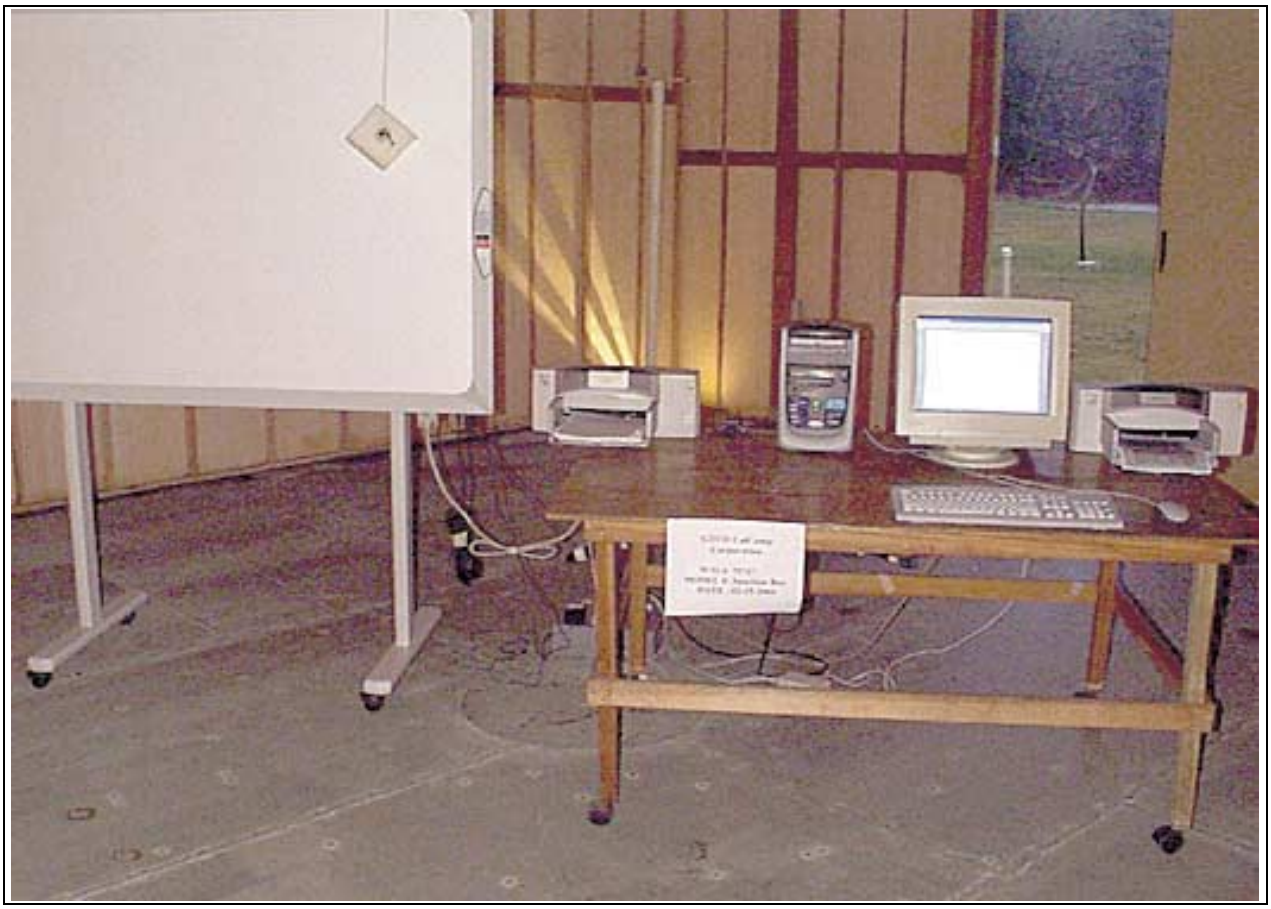


Transmitter Conducted Emissions - Front View

PHOTOGRAPH SHOWING MAINS CONDUCTED EMISSIONS - TRANSMITTER

Transmitter Conducted Emissions - Side View

PHOTOGRAPH SHOWING RADIATED EMISSIONS - RECEIVER



Receiver Radiated Emissions - Front View

PHOTOGRAPH SHOWING RADIATED EMISSIONS - RECEIVER

Receiver Radiated Emissions - Back View

APPENDIX B

TEST EQUIPMENT LIST

Bandwidth and Band Edge - Transmitter

Function	S/N	Calibration Date	Cal Due Date	Asset #
HP 8593EM EMC Analyzer	3624A00159	09/21/2000	09/21/2001	2111

Radiated Spurious Emissions - Transmitter

Function	S/N	Calibration Date	Cal Due Date	Asset #
HP 8593EM EMC Analyzer	3624A00159	09/21/2000	09/21/2001	2111
HP 8447D Amplifier	2727A05392	02/14/2000	02/14/2001	10
Chase CBL6111C Bilog Antenna	2455	06/17/2000	06/17/2001	1992
HP 84300-80037 1.5 GHz High Pass Filter	3643A00027	03/02/2000	03/02/2001	2116
HP 83017A Amplifier 26GHz	0000009002	01/18/2001	01/18/2002	2114
EMCO 3115 1-18 GHz Horn Antenna	9006-3413	05/02/2000	05/02/2001	327
HP 8574A EMI Receiver	3010A01076	07/25/2000	07/25/2001	42
EMCO 6502 Mag Loop Antenna	2156	01/16/2001	01/16/2002	52

Mains Conducted Emissions – Transmitter

Function	S/N	Calibration Date	Cal Due Date	Asset #
HP 8593EM EMC Analyzer	3624A00159	09/21/2000	09/21/2001	2111
Fischer LISN	None	01/04/2001	01/04/2002	11
Fischer LISN	None	01/04/2001	01/04/2002	12
Fischer LISN	None	01/04/2001	01/04/2002	13
Fischer LISN	None	01/04/2001	01/04/2002	14

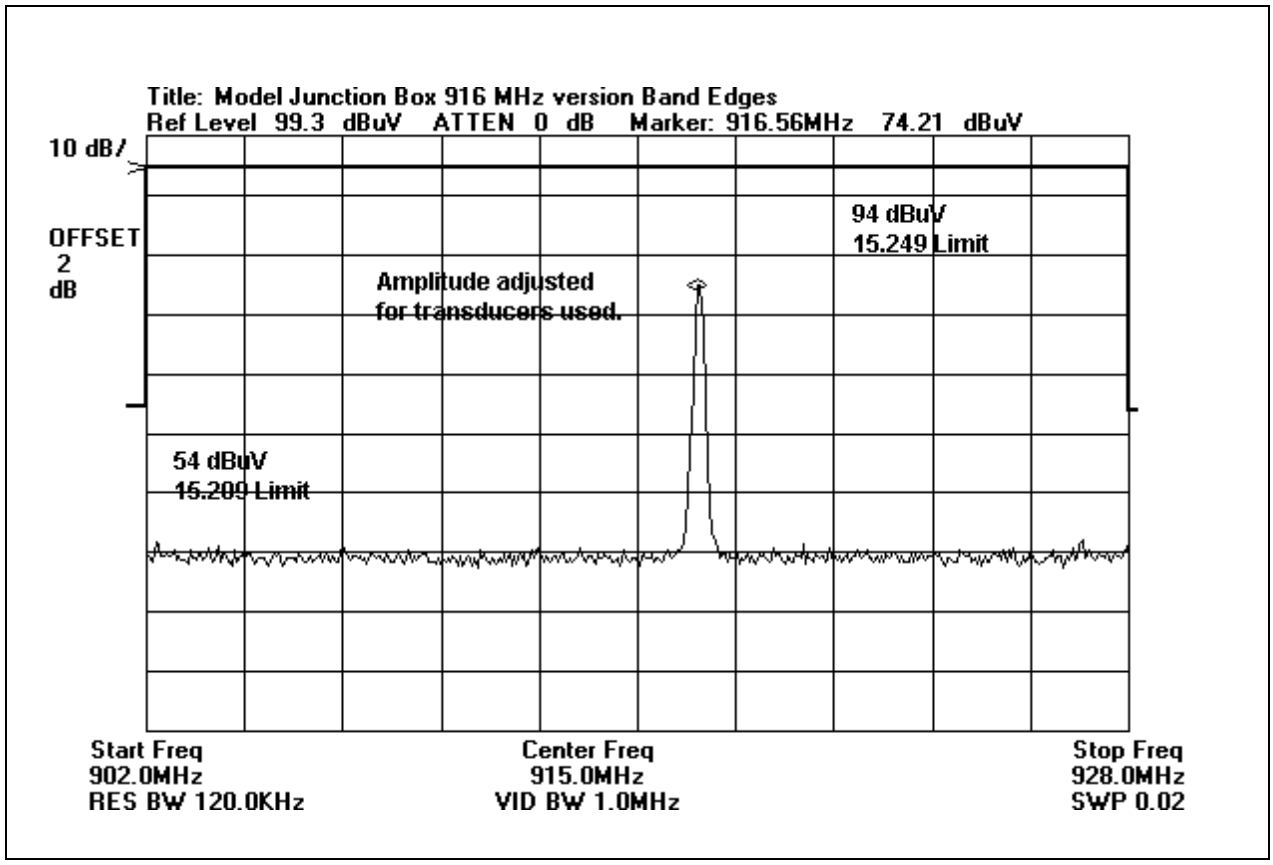
Radiated Spurious Emissions -Receiver

Function	S/N	Calibration Date	Cal Due Date	Asset #
HP 8593EM EMC Analyzer	3624A00159	09/21/2000	09/21/2001	2111
HP 8447D Amplifier	2727A05392	09/26/2000	09/26/2001	10
Chase CBL6111C Bilog Antenna	2455	06/17/2000	06/17/2001	1992
HP 83017A Amplifier 26GHz	0000009002	01/18/2001	01/18/2002	2114
EMCO 3115 1-18 GHz Horn Antenna	9006-3413	05/02/2000	05/02/2001	327
HP 8574A EMI Receiver	3010A01076	07/25/2000	07/25/2001	42
EMCO 6502 Mag Loop Antenna	2156	01/16/2001	01/16/2002	52

APPENDIX C

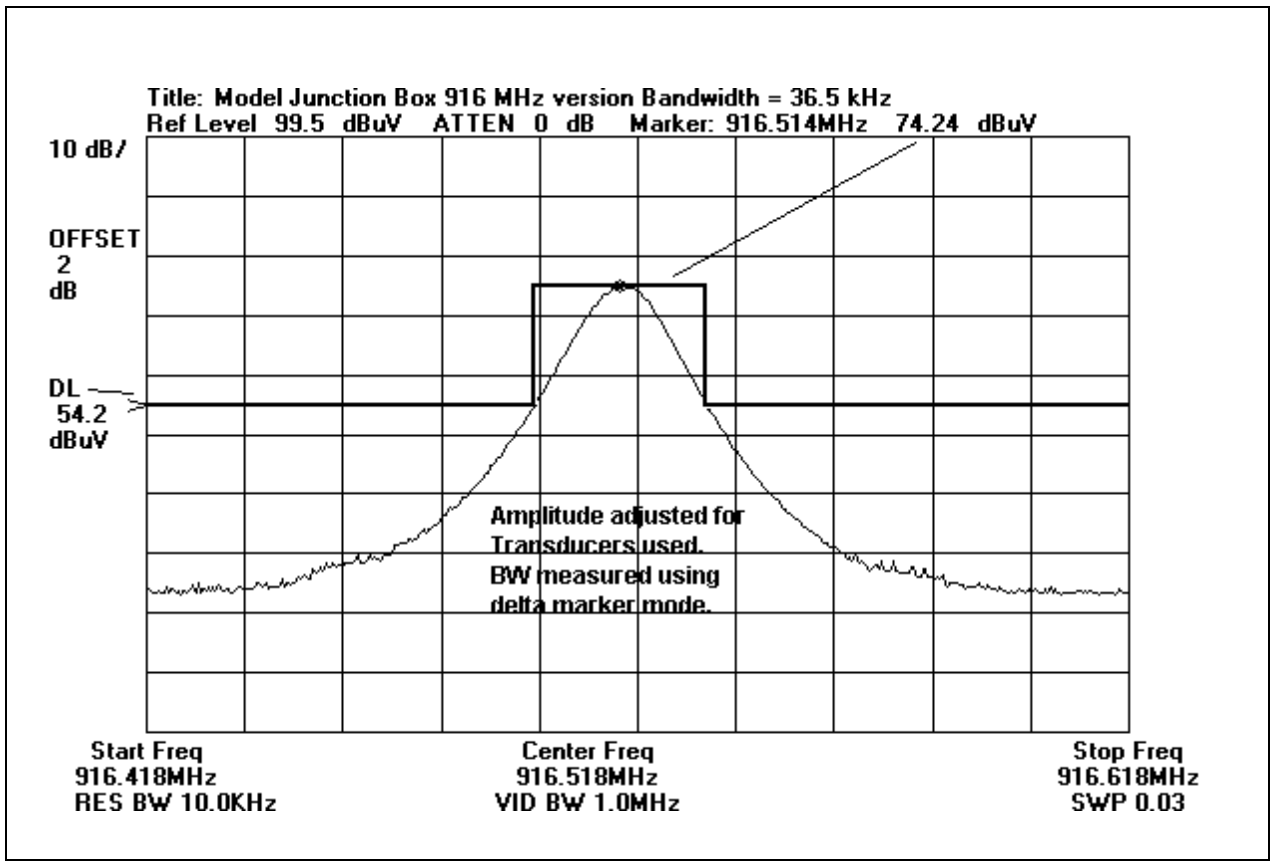
MEASUREMENT DATA SHEETS

15.215(c) BAND EDGE PLOT



Band Edge Plot

15.215(c) OCCUPIED BANDWIDTH PLOT – 916 MHz



Occupied Bandwidth Plot

Test Location: CKC Laboratories, Inc. • 22105 Wilson River Hwy • Tillamook, Or 97141 • 503 842-5577

Customer: **GTCO CalComp Corporation**
Specification: **FCC15.209**
Work Order #: **75747** Date: 05/01/2001
Test Type: **Maximized Emissions** Time: 11:08:33
Equipment: **Junction Box** Sequence#: 36
Manufacturer: GTCO CalComp Tested By: Mike Wilkinson
Model: Junction Box
S/N: none

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Junction Box*	GTCO CalComp	Junction Box	none

Support Devices:

Function	Manufacturer	Model #	S/N
Host Computer	Compaq	2890A	6746BRT11773
Printer	HP	895Cxi	MY97G1924Z

Test Conditions / Notes:

EUT is transmitting continuously at 916 MHz with modulation. The EUT PS2 port is connected to the Host Computer serial and PS2 ports via a 5 foot GTCO cable assembly. The support printer is connected to the Host Computer LTP1 port via a 1.5 meter shielded parallel cable. The EUT Serial and USB ports have unterminated 1.5 meter cables attached. The temperature was 70°F and the humidity was 40%. AC input was 120 V, 60 Hz. Frequency range investigated was 9 kHz to 30 MHz. All readings are ambient readings.

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	Mag L dB	Cable dB	dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	800.000k	36.4	+10.8	+0.6			+0.0	47.8	69.6	-21.8	Horiz
2	21.510M	30.7	+10.1	+1.4			+0.0	42.2	70.0	-27.8	Horiz
3	1.750M	28.3	+10.7	+0.7			+0.0	39.7	70.0	-30.3	Horiz
4	3.950M	25.3	+10.6	+0.8			+0.0	36.7	70.0	-33.3	Horiz
5	9.000M	23.9	+11.0	+1.1			+0.0	36.0	70.0	-34.0	Horiz
6	209.040k	44.7	+10.9	+0.4			+0.0	56.0	101.2	-45.2	Horiz
7	366.900k	38.5	+10.8	+0.5			+0.0	49.8	96.3	-46.5	Horiz
8	56.640k	48.8	+12.8	+0.3			+0.0	61.9	112.5	-50.6	Horiz
9	21.500k	50.3	+15.1	+0.3			+0.0	65.7	120.9	-55.2	Horiz
10	9.000M	0.0	+11.0	+1.1			+0.0	12.1	70.0	-57.9	Horiz
11	113.480k	36.5	+11.2	+0.3			+0.0	48.0	106.5	-58.5	Horiz

Test Location: CKC Laboratories, Inc. • 22105 Wilson River Hwy • Tillamook, OR 97141 • 800 500-4EMC

Customer: **GTCO CalComp Corporation**
Specification: **FCC15.249**
Work Order #: **75747** Date: 02/06/2001
Test Type: **Maximized Emissions** Time: 09:55:38
Equipment: **Junction Box** Sequence#: 10
Manufacturer: GTCO CalComp Tested By: Mike Wilkinson
Model: Junction Box
S/N: None

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Junction Box*	GTCO CalComp	Junction Box	None

Support Devices:

Function	Manufacturer	Model #	S/N
Host Computer	Compaq	2890A	6746BRT11773
Printer	HP	895Cxi	MY97G1924Z

Test Conditions / Notes:

EUT is transmitting continuously at 916 MHz with modulation. The EUT PS2 port is connected to the host computer serial and PS2 ports via a 5-foot GTCO cable assembly. The support printer is connected to the host computer LTP1 port via a 1.5-meter shielded parallel cable. The EUT serial and USB ports have unterminated 1.5-meter cables attached. The temperature was 70°F and the humidity was 40%. AC input was 120 V, 60 Hz. Frequency range investigated was 30 MHz to 10 GHz. No emissions were found in the restricted bands per 15.209.

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	Horn 1.5 G dB	Amp-A Cable dB	Cable Cbl-2 dB	Bilog 26.5 dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	5499.042M	27.8	+33.9	+0.0	+0.0	+0.0	+0.0	38.8	54.0	-15.3	Horiz
			+1.0	+4.7	+10.4	-39.0					
2	1833.036M	46.5	+27.2	+0.0	+0.0	+0.0	+0.0	38.1	54.0	-15.9	Vert
			+0.7	+0.6	+5.1	-42.0					
3	1833.043M	45.2	+27.2	+0.0	+0.0	+0.0	+0.0	36.8	54.0	-17.2	Horiz
			+0.7	+0.6	+5.1	-42.0					
4	6415.635M	27.8	+33.7	+0.0	+0.0	+0.0	+0.0	36.3	54.0	-17.7	Horiz
			+0.7	+1.6	+11.4	-38.9					
5	916.520M	72.1	+0.0	-27.6	+7.5	+22.2	+0.0	74.2	94.0	-19.8	Horiz
			+0.0	+0.0	+0.0	+0.0			Fundamental		
6	4582.586M	28.0	+32.3	+0.0	+0.0	+0.0	+0.0	33.4	54.0	-20.6	Vert
			+0.6	+3.0	+9.5	-40.0					
7	916.520M	70.8	+0.0	-27.6	+7.5	+22.2	+0.0	72.9	94.0	-21.1	Vert
			+0.0	+0.0	+0.0	+0.0			Fundamental		
8	2749.536M	33.3	+29.2	+0.0	+0.0	+0.0	+0.0	29.3	54.0	-24.7	Vert
			+0.3	+0.9	+6.6	-41.0					
9	3666.086M	26.4	+31.4	+0.0	+0.0	+0.0	+0.0	28.8	54.0	-25.2	Vert
			+0.4	+1.5	+8.1	-39.0					
10	2749.542M	31.2	+29.2	+0.0	+0.0	+0.0	+0.0	27.2	54.0	-26.8	Horiz
			+0.3	+0.9	+6.6	-41.0					

Test Location: CKC Laboratories, Inc. • 22105 Wilson River Hwy • Tillamook, OR 97141 • 800 500-4EMC

Customer: **GTCO CalComp Corporation**
Specification: **FCC 15.207 COND**
Work Order #: **75747** Date: 02/06/2001
Test Type: **Conducted Emissions** Time: 10:29:16
Equipment: **Junction Box** Sequence#: 11
Manufacturer: GTCO CalComp Tested By: Mike Wilkinson
Model: Junction Box
S/N: None

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Junction Box*	GTCO CalComp	Junction Box	None

Support Devices:

Function	Manufacturer	Model #	S/N
Host Computer	Compaq	2890A	6746BRT11773
Printer	HP	895Cxi	MY97G1924Z

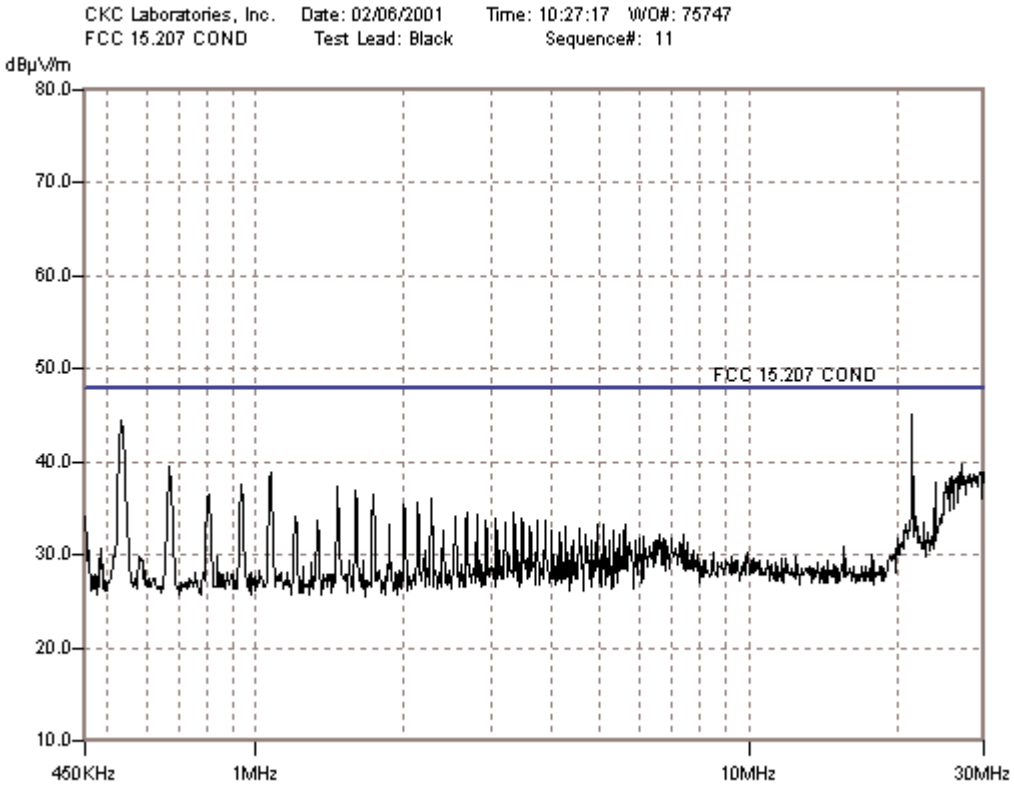
Test Conditions / Notes:

EUT is transmitting continuously at 916 MHz with modulation. The EUT PS2 port is connected to the host computer serial and PS2 ports via a 5-foot GTCO cable assembly. The support printer is connected to the host computer LTP1 port via a 1.5-meter shielded parallel cable. The EUT serial and USB ports have unterminated 1.5-meter cables attached. The temperature was 70°F and the humidity was 40%. AC input was 120 V, 60 Hz. Frequency range investigated was 30 MHz to 10 GHz.

Measurement Data: Reading listed by margin. Test Lead: Black

#	Freq MHz	Rdng dBµV	T1 co dB	dB	L14b dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	21.518M	43.2	+1.3		+0.5		+0.0	45.0	48.0	-3.0	Black
2	533.580k	44.4	+0.0		+0.1		+0.0	44.5	48.0	-3.5	Black
3	27.026M	37.3	+1.5		+0.9		+0.0	39.7	48.0	-8.3	Black
4	667.308k	39.3	+0.1		+0.1		+0.0	39.5	48.0	-8.5	Black
5	29.951M	36.2	+1.5		+1.3		+0.0	39.0	48.0	-9.0	Black
6	29.805M	36.1	+1.5		+1.3		+0.0	38.9	48.0	-9.1	Black
7	1.073M	38.5	+0.3		+0.1		+0.0	38.9	48.0	-9.1	Black
8	28.196M	36.1	+1.5		+1.1		+0.0	38.7	48.0	-9.3	Black
9	28.733M	36.0	+1.5		+1.1		+0.0	38.6	48.0	-9.4	Black
10	27.270M	36.2	+1.5		+0.9		+0.0	38.6	48.0	-9.4	Black

11	29.025M	35.8	+1.5	+1.2	+0.0	38.5	48.0	-9.5	Black
12	27.514M	36.0	+1.5	+1.0	+0.0	38.5	48.0	-9.5	Black
13	26.051M	36.3	+1.4	+0.8	+0.0	38.5	48.0	-9.5	Black
14	26.588M	36.2	+1.4	+0.8	+0.0	38.4	48.0	-9.6	Black
15	26.344M	36.1	+1.4	+0.8	+0.0	38.3	48.0	-9.7	Black
16	25.661M	36.2	+1.4	+0.7	+0.0	38.3	48.0	-9.7	Black
17	25.125M	35.8	+1.4	+0.6	+0.0	37.8	48.0	-10.2	Black
18	24.004M	35.9	+1.3	+0.6	+0.0	37.8	48.0	-10.2	Black
19	934.764k	37.2	+0.2	+0.1	+0.0	37.5	48.0	-10.5	Black
20	1.471M	37.0	+0.3	+0.1	+0.0	37.4	48.0	-10.6	Black
21	25.369M	35.2	+1.4	+0.7	+0.0	37.3	48.0	-10.7	Black
22	1.602M	36.6	+0.3	+0.1	+0.0	37.0	48.0	-11.0	Black
23	24.979M	34.8	+1.3	+0.6	+0.0	36.7	48.0	-11.3	Black
24	1.734M	36.1	+0.2	+0.1	+0.0	36.4	48.0	-11.6	Black
25	803.126k	36.1	+0.2	+0.1	+0.0	36.4	48.0	-11.6	Black
26	2.271M	35.6	+0.4	+0.0	+0.0	36.0	48.0	-12.0	Black
27	2.140M	35.3	+0.3	+0.1	+0.0	35.7	48.0	-12.3	Black
28	2.002M	35.1	+0.3	+0.1	+0.0	35.5	48.0	-12.5	Black
29	2.677M	34.1	+0.5	+0.0	+0.0	34.6	48.0	-13.4	Black
30	3.352M	34.0	+0.5	+0.0	+0.0	34.5	48.0	-13.5	Black


CKC Laboratories, Inc. Date: 02/06/2001 Time: 10:27:17 WO#: 75747
FCC 15.207 COND Test Lead: Black Sequence#: 11
dBµV/m
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
FCC 15.207 COND
450KHz
1MHz
10MHz
30MHz

Test Location: CKC Laboratories, Inc. • 22105 Wilson River Hwy • Tillamook, OR 97141 • 800 500-4EMC

Customer: **GTCO CalComp Corporation**
Specification: **FCC 15.207 COND**
Work Order #: **75747** Date: 02/06/2001
Test Type: **Conducted Emissions** Time: 10:33:44
Equipment: **Junction Box** Sequence#: 12
Manufacturer: GTCO CalComp Tested By: Mike Wilkinson
Model: Junction Box
S/N: None

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Junction Box*	GTCO CalComp	Junction Box	None

Support Devices:

Function	Manufacturer	Model #	S/N
Host Computer	Compaq	2890A	6746BRT11773
Printer	HP	895Cxi	MY97G1924Z

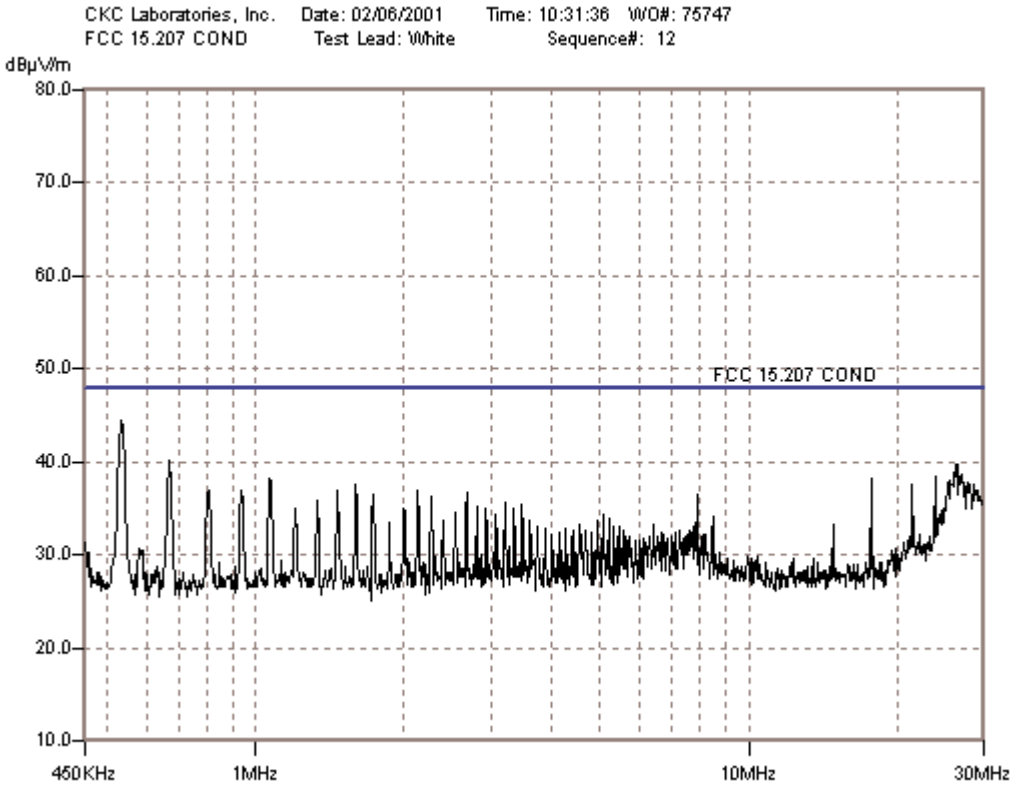
Test Conditions / Notes:

EUT is transmitting continuously at 916 MHz with modulation. The EUT PS2 port is connected to the host computer serial and PS2 ports via a 5-foot GTCO cable assembly. The support printer is connected to the host computer LTP1 port via a 1.5-meter shielded parallel cable. The EUT serial and USB ports have unterminated 1.5-meter cables attached. The temperature was 70°F and the humidity was 40%. AC input was 120 V, 60 Hz. Frequency range investigated was 30 MHz to 10 GHz.

Measurement Data: Reading listed by margin. Test Lead: White

#	Freq MHz	Rdng dBµV	T1 co dB	L13w dB	dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	533.580k	44.4	+0.0	+0.1			+0.0	44.5	48.0	-3.5	White
2	669.398k	39.9	+0.1	+0.1			+0.0	40.1	48.0	-7.9	White
3	26.588M	38.1	+1.4	+0.2			+0.0	39.7	48.0	-8.3	White
4	26.344M	38.1	+1.4	+0.2			+0.0	39.7	48.0	-8.3	White
5	26.978M	37.0	+1.4	+0.2			+0.0	38.6	48.0	-9.4	White
6	24.004M	37.0	+1.3	+0.2			+0.0	38.5	48.0	-9.5	White
7	17.715M	37.1	+1.2	+0.0			+0.0	38.3	48.0	-9.7	White
8	1.071M	37.8	+0.3	+0.1			+0.0	38.2	48.0	-9.8	White
9	25.661M	36.4	+1.4	+0.2			+0.0	38.0	48.0	-10.0	White
10	27.904M	36.1	+1.5	+0.1			+0.0	37.7	48.0	-10.3	White

11	25.515M	36.1	+1.4	+0.2		+0.0	37.7	48.0	-10.3	White
12	1.602M	37.2	+0.3	+0.1		+0.0	37.6	48.0	-10.4	White
13	28.733M	35.9	+1.5	+0.1		+0.0	37.5	48.0	-10.5	White
14	28.196M	35.9	+1.5	+0.1		+0.0	37.5	48.0	-10.5	White
15	21.518M	36.1	+1.3	+0.1		+0.0	37.5	48.0	-10.5	White
16	27.660M	35.8	+1.5	+0.1		+0.0	37.4	48.0	-10.6	White
17	1.471M	36.6	+0.3	+0.1		+0.0	37.0	48.0	-11.0	White
18	936.854k	36.7	+0.2	+0.1		+0.0	37.0	48.0	-11.0	White
19	803.126k	36.7	+0.2	+0.1		+0.0	37.0	48.0	-11.0	White
20	29.415M	35.3	+1.5	+0.1		+0.0	36.9	48.0	-11.1	White
21	2.140M	36.5	+0.3	+0.1		+0.0	36.9	48.0	-11.1	White
22	2.677M	36.3	+0.5	+0.0		+0.0	36.8	48.0	-11.2	White
23	7.888M	35.7	+0.8	+0.1		+0.0	36.6	48.0	-11.4	White
24	1.734M	36.1	+0.2	+0.1		+0.0	36.4	48.0	-11.6	White
25	2.271M	35.8	+0.4	+0.0		+0.0	36.2	48.0	-11.8	White
26	1.334M	35.6	+0.2	+0.1		+0.0	35.9	48.0	-12.1	White
27	3.214M	35.2	+0.5	+0.0		+0.0	35.7	48.0	-12.3	White
28	3.483M	34.8	+0.6	+0.0		+0.0	35.4	48.0	-12.6	White
29	2.808M	34.8	+0.5	+0.0		+0.0	35.3	48.0	-12.7	White
30	1.204M	34.6	+0.2	+0.1		+0.0	34.9	48.0	-13.1	White


CKC Laboratories, Inc. Date: 02/06/2001 Time: 10:31:36 WO#: 75747
FCC 15.207 COND Test Lead: White Sequence#: 12
dBµV/m
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
FCC 15.207 COND
450KHz
1MHz
10MHz
30MHz

Test Location: CKC Laboratories, Inc. • 22105 Wilson River Hwy • Tillamook, Or 97141 • 503 842-5577

Customer: **GTCO CalComp Corporation**
Specification: **FCC15.209**
Work Order #: **75747** Date: 05/01/2001
Test Type: **Maximized Emissions** Time: 11:14:41
Equipment: **Junction Box** Sequence#: 37
Manufacturer: GTCO CalComp Tested By: Mike Wilkinson
Model: Junction Box
S/N: none

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Junction Box*	GTCO CalComp	Junction Box	none

Support Devices:

Function	Manufacturer	Model #	S/N
Host Computer	Compaq	2890A	6746BRT11773
Printer	HP	895Cxi	MY97G1924Z

Test Conditions / Notes:

EUT is in receive only mode at 916 MHz. The EUT PS2 port is connected to the Host Computer serial and PS2 ports via a 5 foot GTCO cable assembly. The support printer is connected to the Host Computer LTP1 port via a 1.5 meter shielded parallel cable. The EUT Serial and USB ports have unterminated 1.5 meter cables attached. The temperature was 70°F and the humidity was 40%. AC input was 120 V, 60 Hz. Frequency range investigated was 9 kHz to 30 MHz. All readings are ambient readings.

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	Mag L dB	Cable dB	dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	800.000k	36.4	+10.8	+0.6			+0.0	47.8	69.6	-21.8	None
2	1.750M	29.5	+10.7	+0.7			+0.0	40.9	70.0	-29.1	None
3	3.950M	25.3	+10.6	+0.8			+0.0	36.7	70.0	-33.3	None
4	21.250M	24.5	+10.1	+1.4			+0.0	36.0	70.0	-34.0	None
5	9.000M	23.6	+11.0	+1.1			+0.0	35.7	70.0	-34.3	None
6	214.260k	46.4	+10.9	+0.4			+0.0	57.7	101.0	-43.3	None
7	355.200k	40.7	+10.8	+0.5			+0.0	52.0	96.6	-44.6	None
8	113.250k	35.7	+11.2	+0.3			+0.0	47.2	106.5	-59.3	None
9	24.100k	45.1	+14.9	+0.3			+0.0	60.3	119.9	-59.6	None
10	55.000k	33.3	+12.8	+0.3			+0.0	46.4	112.8	-66.4	None

Test Location: CKC Laboratories, Inc. • 22105 Wilson River Hwy • Tillamook, OR 97141 • 800 500-4EMC

Customer: **GTCO CalComp Corporation**
Specification: **FCC 15.109**
Work Order #: **75747** Date: 02/15/2001
Test Type: **Maximized Emissions** Time: 17:10:48
Equipment: **Junction Box** Sequence#: 25
Manufacturer: GTCO CalComp Tested By: Mike Wilkinson
Model: Junction Box
S/N: None

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
DrawingBoard Interactive 5648	GTCO CalComp	Drawing Board Interactive 5648	None
Power Supply 120V	Ault	P48091000C0X06	None
Junction Box*	GTCO CalComp	Junction Box	None

Support Devices:

Function	Manufacturer	Model #	S/N
Stylus	GTCO CalComp	CTW-DMS	None
Printer	HP	895Cxi	MY97G1924Z
Printer	HP	895Cxi	US8AM2Q0BK
Computer	HP	6730	KR02407056
Keyboard	HP	5129	B01634962
Mouse	HP	5182-8864	LZE01505537
Monitor	Mitsubishi	FFF8705SKTK	605501823

Test Conditions / Notes:

EUT is in receive only mode at 916 MHz. The stylus is in contact with the writing surface of the EUT. The DBi4256 is connected to the Junction Box via a serial cable and the Junction Box is connected to the computer serial port via a GTCO supplied cable assembly. The computer is running "InterWrite" software. The non-functional USB port of the Junction Box has a unterminated 1.5-meter USB cable attached. The DBi4256 USB port has a unterminated USB cable attached (DBi4256 is functioning in the serial mode) A printer is connected to the DBi4256 printer port via a parallel cable 1.5 meters long A printer is connected to the computer LPT1 port via a parallel cable 1.5 meters long. The temperature was 70°F and the humidity was 40%. DBi4256 is powered by 120 V, 60 Hz. The Junction Box is powered from the computer keyboard port. Frequency range investigated was 30 MHz to 5 GHz.

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	Bilog dB	dB	Amp-A dB	Cable dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	74.238M QP	52.2	+6.9		-27.2	+2.2	+0.0	34.1	40.0	-5.9	Horiz
2	298.384M	46.6	+13.1		-26.5	+4.4	+0.0	37.6	46.0	-8.4	Vert
3	261.400M	46.8	+12.6		-26.5	+4.1	+0.0	37.0	46.0	-9.0	Horiz
4	144.040M	46.5	+11.2		-26.9	+3.1	+0.0	33.9	43.5	-9.6	Vert
5	88.500M	48.8	+8.6		-27.0	+2.5	+0.0	32.9	43.5	-10.6	Vert

6	299.900M	43.9	+13.1	-26.5	+4.4	+0.0	34.9	46.0	-11.1	Horiz
7	240.054M	45.0	+11.7	-26.5	+3.9	+0.0	34.1	46.0	-11.9	Vert
8	204.065M	45.5	+9.1	-26.7	+3.7	+0.0	31.6	43.5	-11.9	Vert
9	163.000M	43.4	+10.3	-26.8	+3.3	+0.0	30.2	43.5	-13.3	Vert
10	336.170M	40.6	+13.9	-26.6	+4.5	+0.0	32.4	46.0	-13.6	Vert
11	111.400M	42.4	+10.7	-27.1	+2.7	+0.0	28.7	43.5	-14.8	Vert
12	501.800M	35.5	+17.7	-27.8	+5.6	+0.0	31.0	46.0	-15.0	Vert
13	1095.000M	31.7	+24.1	-27.0	+8.5	+0.0	37.3	54.0	-16.7	Vert