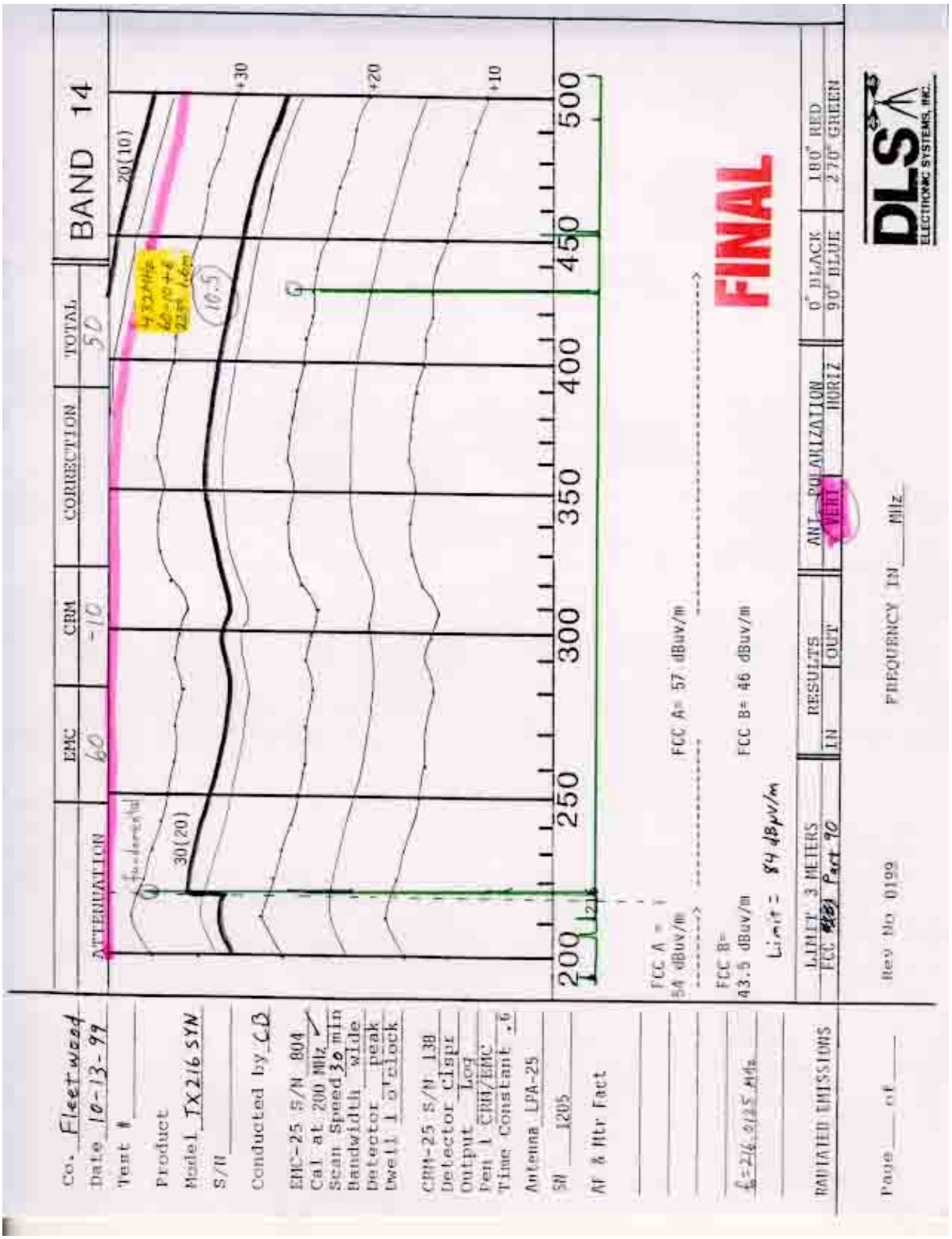
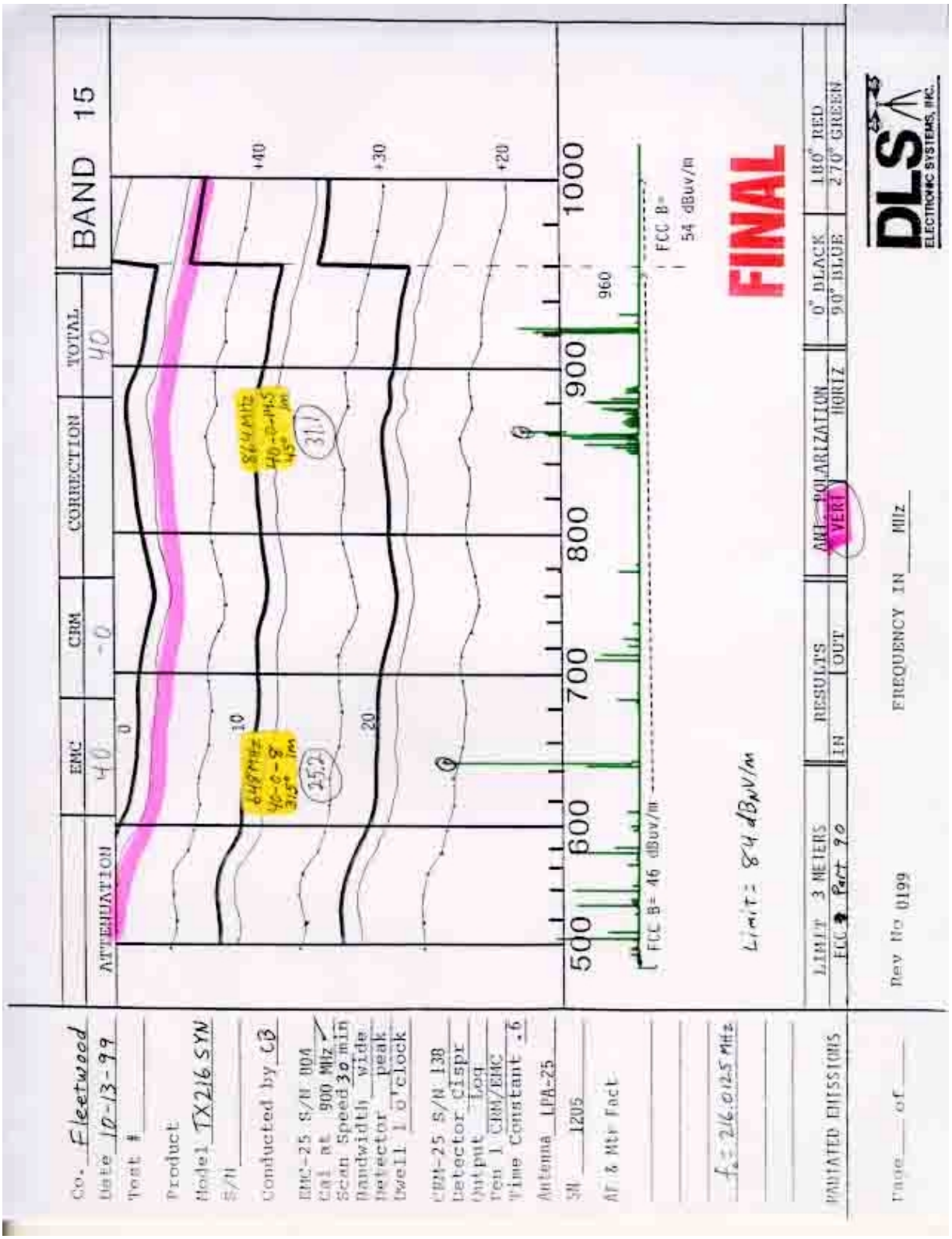
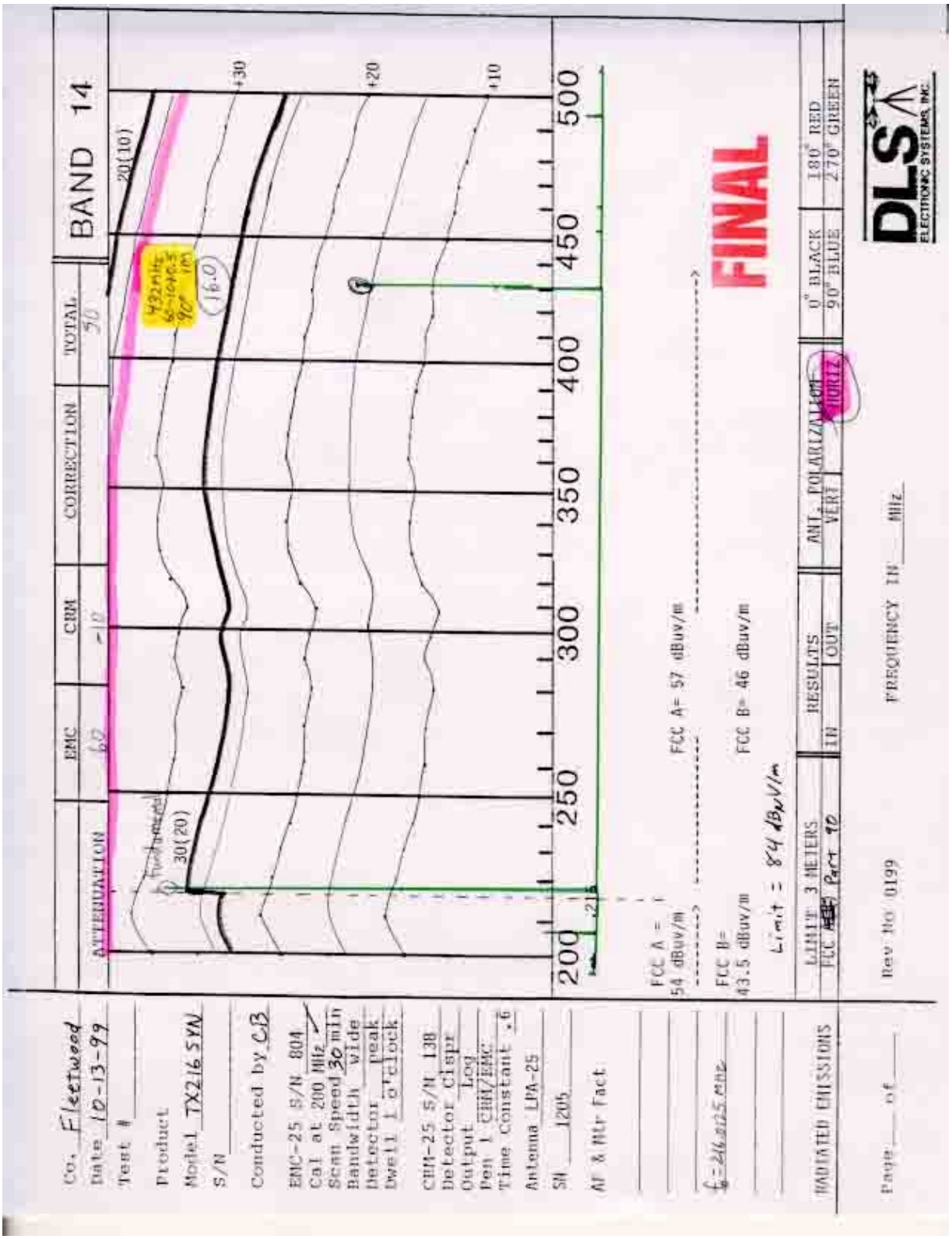
RADIATED GRAPHS TAKEN FOR FIELD STRENGTH

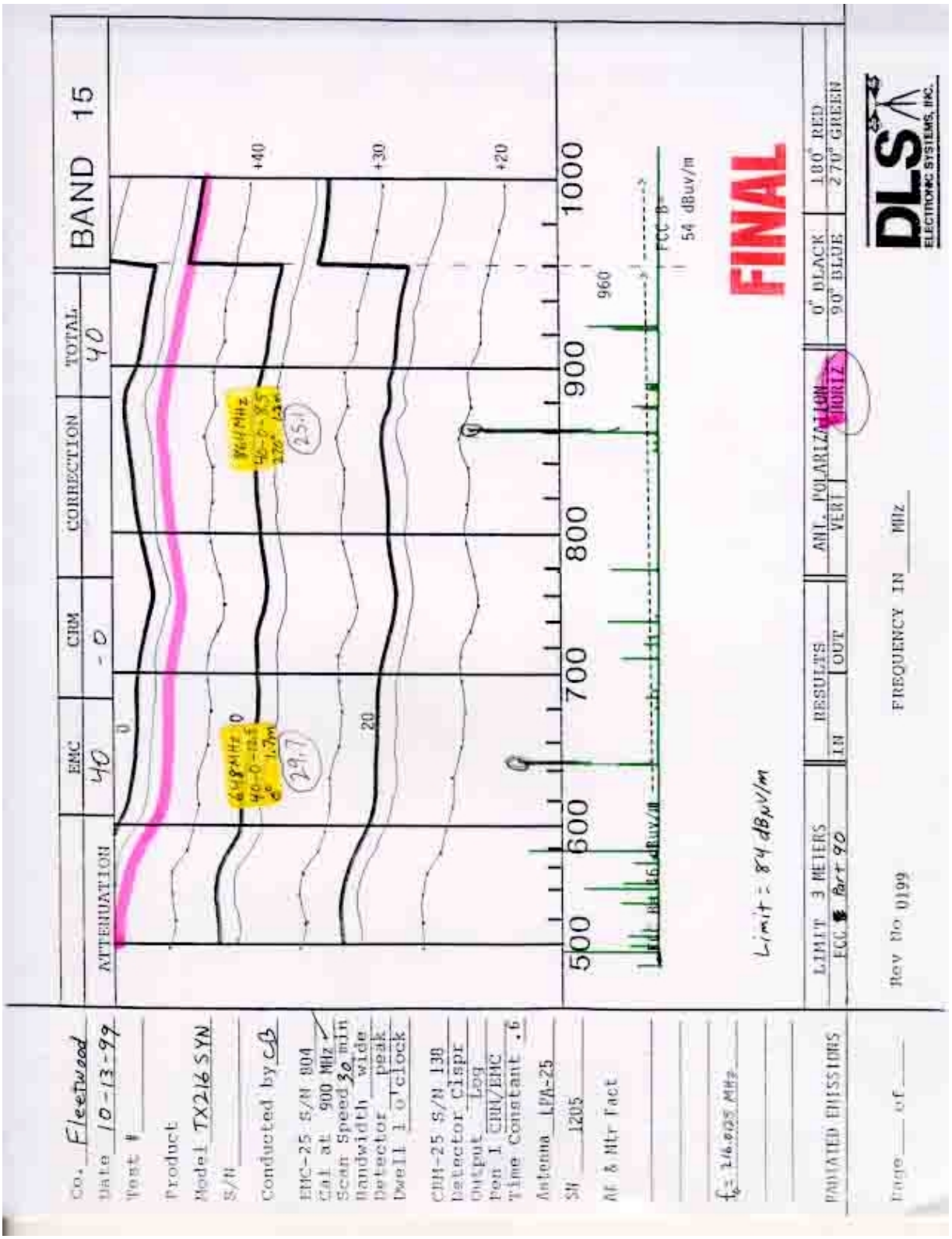
SPURIOUS EMISSION MEASUREMENTS

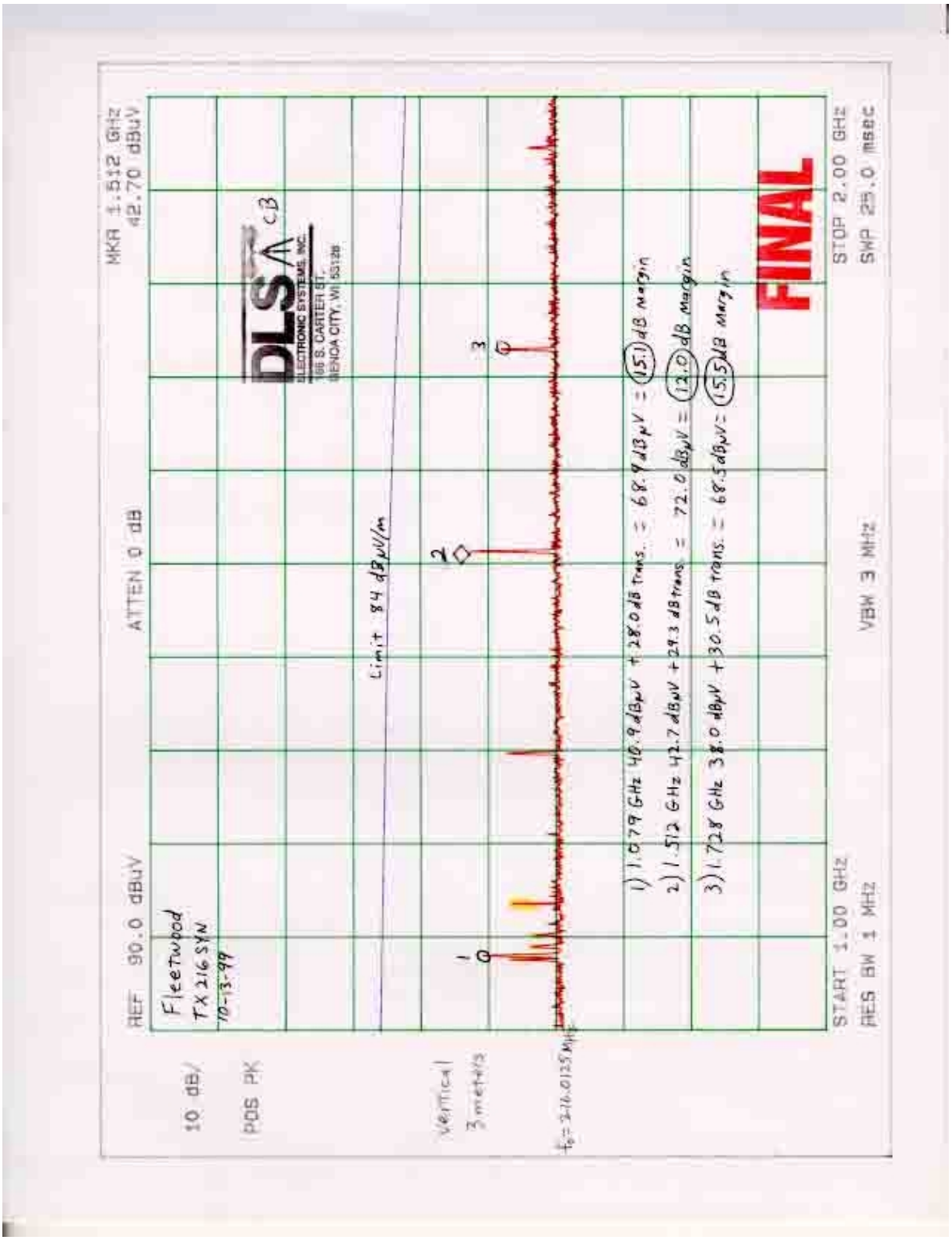
PART 2.1053

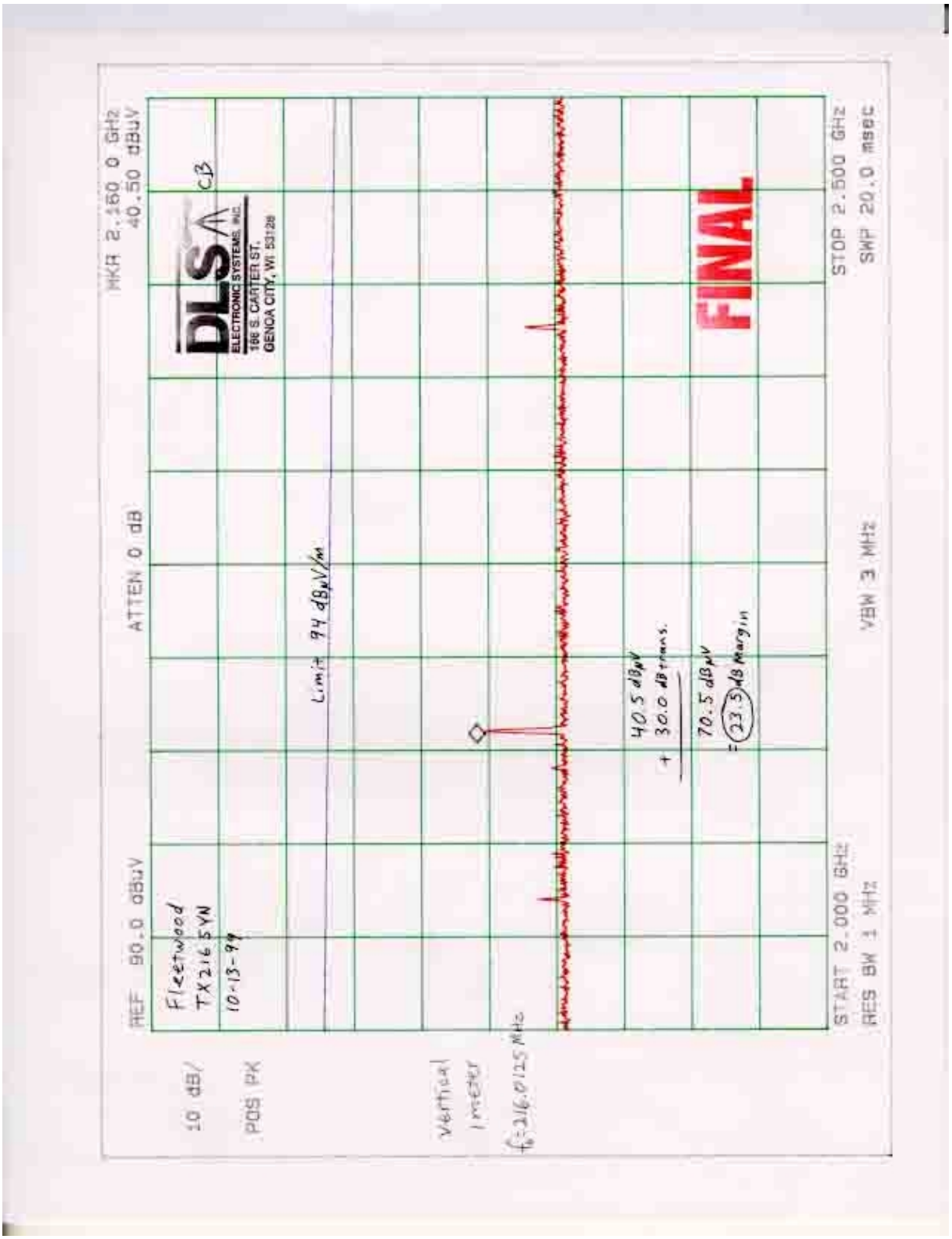

Co. Fleetwood
Date 10-13-99
Test #
Product
Model TX216 SYN
S/N
Conducted by CB
EMC-25 S/N 804
Cal at 200 MHz
Scan Speed 30 min
Bandwidth wide
Detector peak
Dwell 1 o'clock
CHM-25 S/N 138
Detector Disp
Output Log
Pen 1 CHM/EMC
Time Constant .6
Antenna LPA-25
SN 1205
AF & Attr Fact
EMC
CHM
CORRECTION
TOTAL
BAND 14
ATTENUATION
60
-10
50
20(10)
30(20)
10.5
+30
+20
+10
200
250
300
350
400
450
500
FCC A = 57 dBuv/m
FCC B= 46 dBuv/m
FCC B=
43.5 dBuv/m
Limit = 84 dBuv/m
FINAL
RADIATED EMISSIONS
LIMIT 3 METERS
FCC #15 Part 90
RESULTS
IN
OUT
ANT POLARIZATION
VERT
HORIZ
0° BLACK
90° BLUE
180° RED
270° GREEN
Page ___ of ___
Rev No 0199
FREQUENCY IN ___ MHz

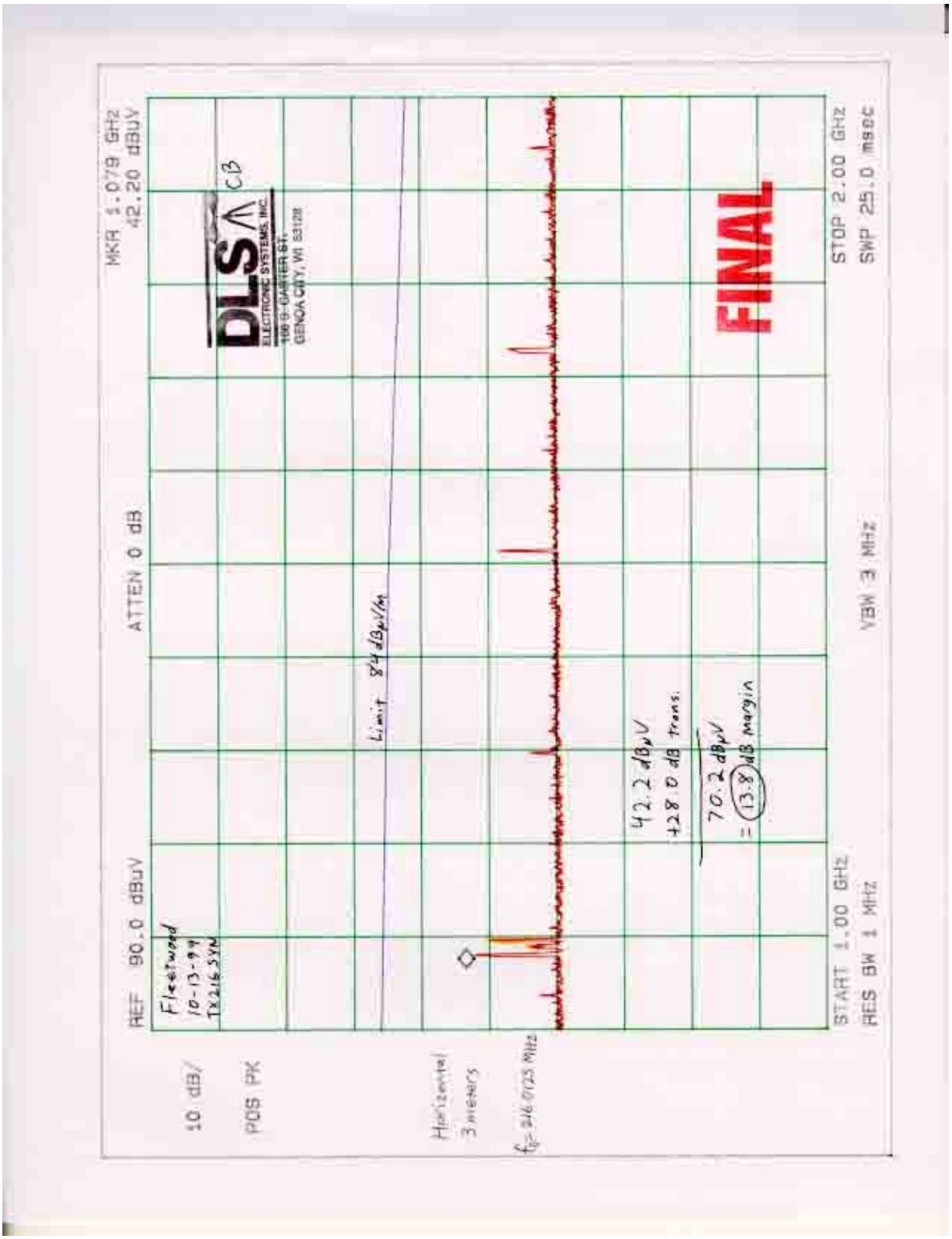

BAND 15
TOTAL 40
CORRECTION
CRM -0
EMC 40
ATTENUATION
Co. Fleetwood
Date 10-13-99
Test #
Product
Model TX216 SYN
S/N
Conducted by CB
EMC-25 S/N: 004
Cal at 900 MHz
Scan Speed 30 min
Bandwidth wide
Detector peak
Swell 1 o'clock
CBM-25 S/N: 138
Detector disp
Output log
Ten 1 CBM/EMC
Time Constant .6
Antenna LPA-25
SN 1205
AF & Mir Fact
f = 216.0125 MHz
RADIATED EMISSIONS
LIMIT 3 METERS
FCC Part 90
RESULTS
IN
OUT
ANT POLARIZATION
VERT
HORIZ
0° BLACK
90° BLUE
180° RED
270° GREEN
FREQUENCY IN MHz
Rev No 0199
Page of
FCC B= 46 dBuv/m
FCC B=
54 dBuv/m
Limit= 84 dBuV/m
FINAL
500
600
700
800
900
960
1000
10
20
+40
+30
+20
DLS
ELECTRONIC SYSTEMS, INC.

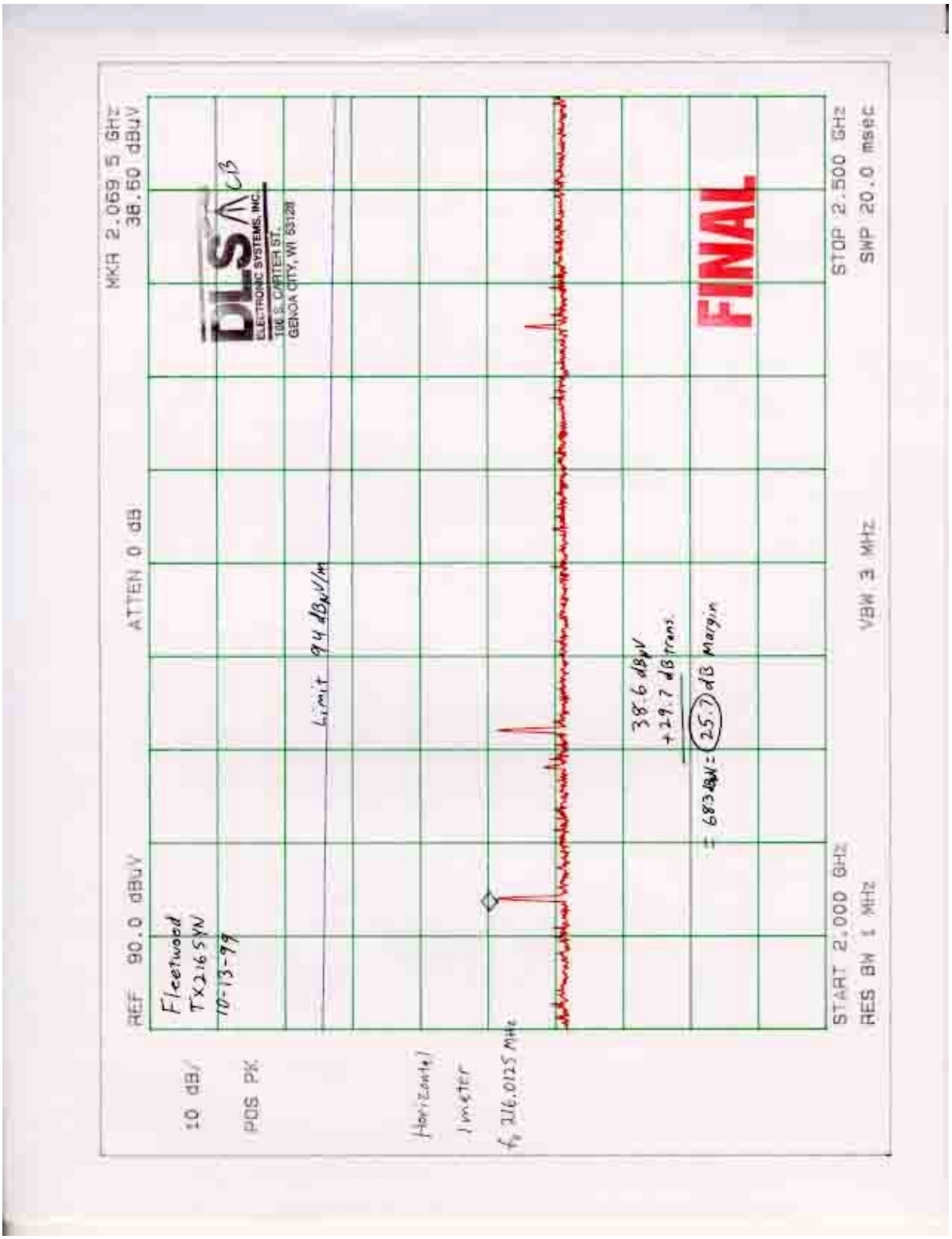

Co. Fleetwood
Date 10-13-99
Test #
Product
Model TX216 SYN
S/N
Conducted by CB
EMC-25 S/N 804
Cal at 200 MHz
Scan Speed 30 min
Bandwidth wide
Detector peak
Dwell 1 o'clock
CBM-25 S/N 138
Detector Disp
Output Log
Pen 1 CHI/EMC
Time Constant .6
Antenna LPA-25
SN 1205
AF & Mtr fact
f=446.025 mhz
RADIATED EMISSIONS
ATTENUATION
EMC
CBM
CORRECTION
TOTAL
BAND 14
LIMIT 3 METERS
FCC Part 15
RESULTS
IN
OUT
ANT. POLARIZATION
VERT
HORIZ
0° BLACK
90° BLUE
180° RED
270° GREEN
FCC A = 54 dBuv/m
FCC A= 57 dBuv/m
FCC B= 43.5 dBuv/m
FCC B= 46 dBuv/m
Limit = 84 dBuV/m
FINAL
FREQUENCY IN MHz
Page of
Rev No 0199
DLS ELECTRONIC SYSTEMS, INC.

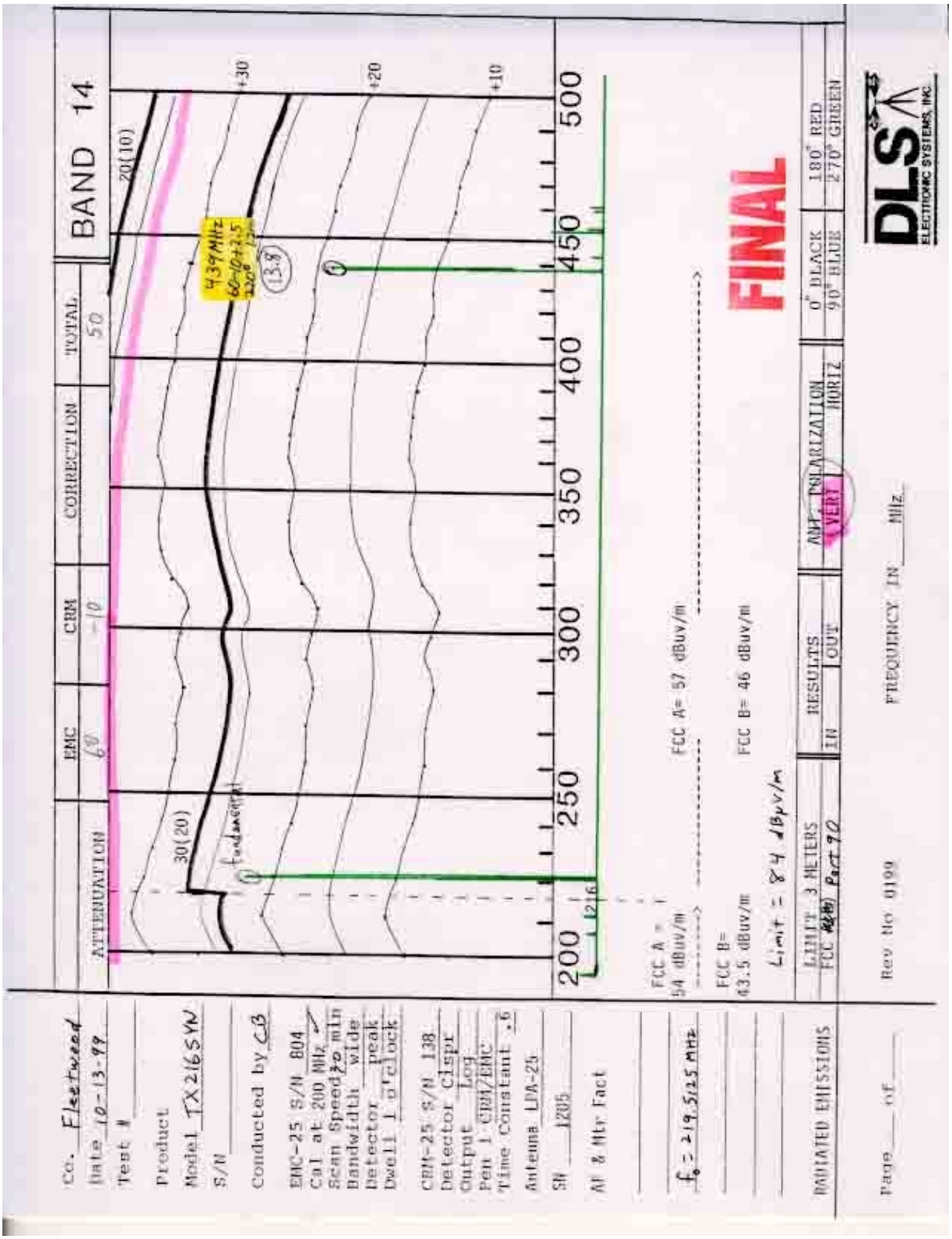

Co. Fleetwood
Date 10-13-99
Test #
Product
Model TX216 SYN
S/N
Conducted by CB
EMC-25 S/N 804
Cal at 900 MHz
Scan Speed 30 min
Bandwidth wide
Detector peak
Dwell 1 o'clock
CHM-25 S/N 138
Detector Clspr
Output log
Pen 1 CHM/EMC
Time Constant .6
Antenna LPA-25
SN 1205
RF & Mtr Face
f= 146.025 MHz
PAINTED EMISSIONS
LIMIT 3 METERS
FCC Part 90
RESULTS
IN
OUT
ANT. POLARIZATION
VERT
HORIZ
0° BLACK
90° BLUE
180° RED
270° GREEN
ATTENUATION
EMC
40
CHM
-0
CORRECTION
TOTAL
40
BAND 15
0
20
+40
+30
+20
500
600
700
800
900
1000
960
FCC B
54 dBuv/m
Limit = 84 dBµV/m
FINAL
FREQUENCY IN MHz
Rev 10 0199
DLS
ELECTRONIC SYSTEMS, INC.

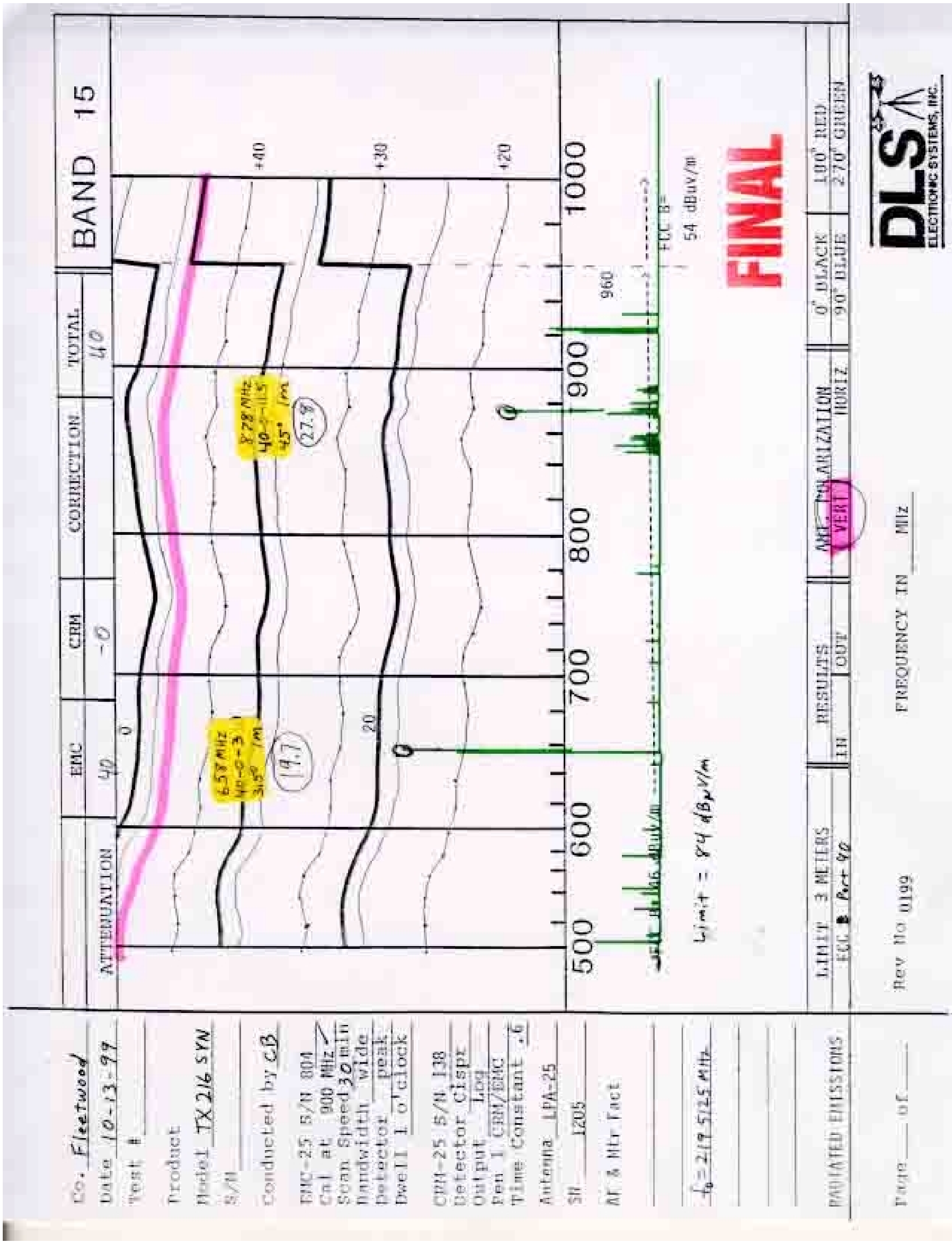

REF 90.0 dBuV
ATTEN 0 dB
MKR 1.512 GHz
42.70 dBuV
10 dB/
POS PK
Fleetwood
TX 216 SYN
10-3-99
Limit 84 dBuV/m
Vertical
3 meters
DLS
ELECTRONIC SYSTEMS, INC.
166 S. CARTER ST.
GENOA CITY, WI 53128
1) 1.079 GHz 40.9 dBuV + 28.0 dB trans. = 68.9 dBuV = (15.1) dB margin
2) 1.512 GHz 42.7 dBuV + 29.3 dB trans. = 72.0 dBuV = (12.0) dB margin
3) 1.728 GHz 38.0 dBuV + 30.5 dB trans. = 68.5 dBuV = (15.5) dB margin
FINAL
START 1.00 GHz
RES BW 1 MHz
VBW 3 MHz
STOP 2.00 GHz
SWP 25.0 msec

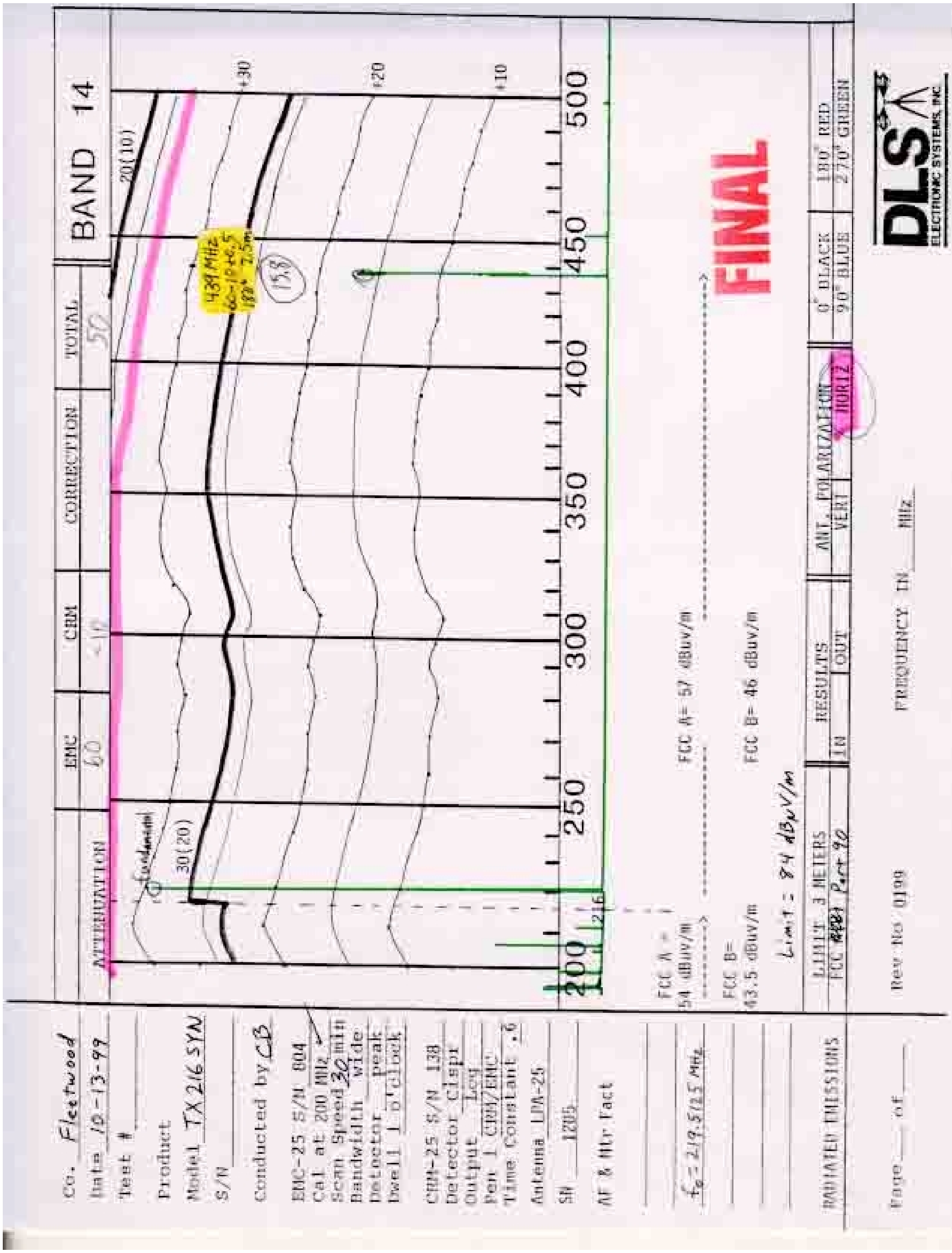

MKR 2.160 0 GHz
40.50 dBuV
REF 90.0 dBuV
ATTEN 0 dB
10 dB/
POS PK
Fleetwood
TX2165YN
10-13-99
Limit 94 dBuV/m
Vertical
1 meter
fc=2160.0125 MHz
DLS
ELECTRONIC SYSTEMS, INC.
166 S. CARTER ST.
GENOA CITY, WI 53128
CB
40.5 dBuV
+ 30.0 dB trans.
70.5 dBuV
= (23.5) dB Margin
FINAL
START 2.000 GHz
RES BW 1 MHz
VBW 3 MHz
STOP 2.500 GHz
SWP 20.0 msec

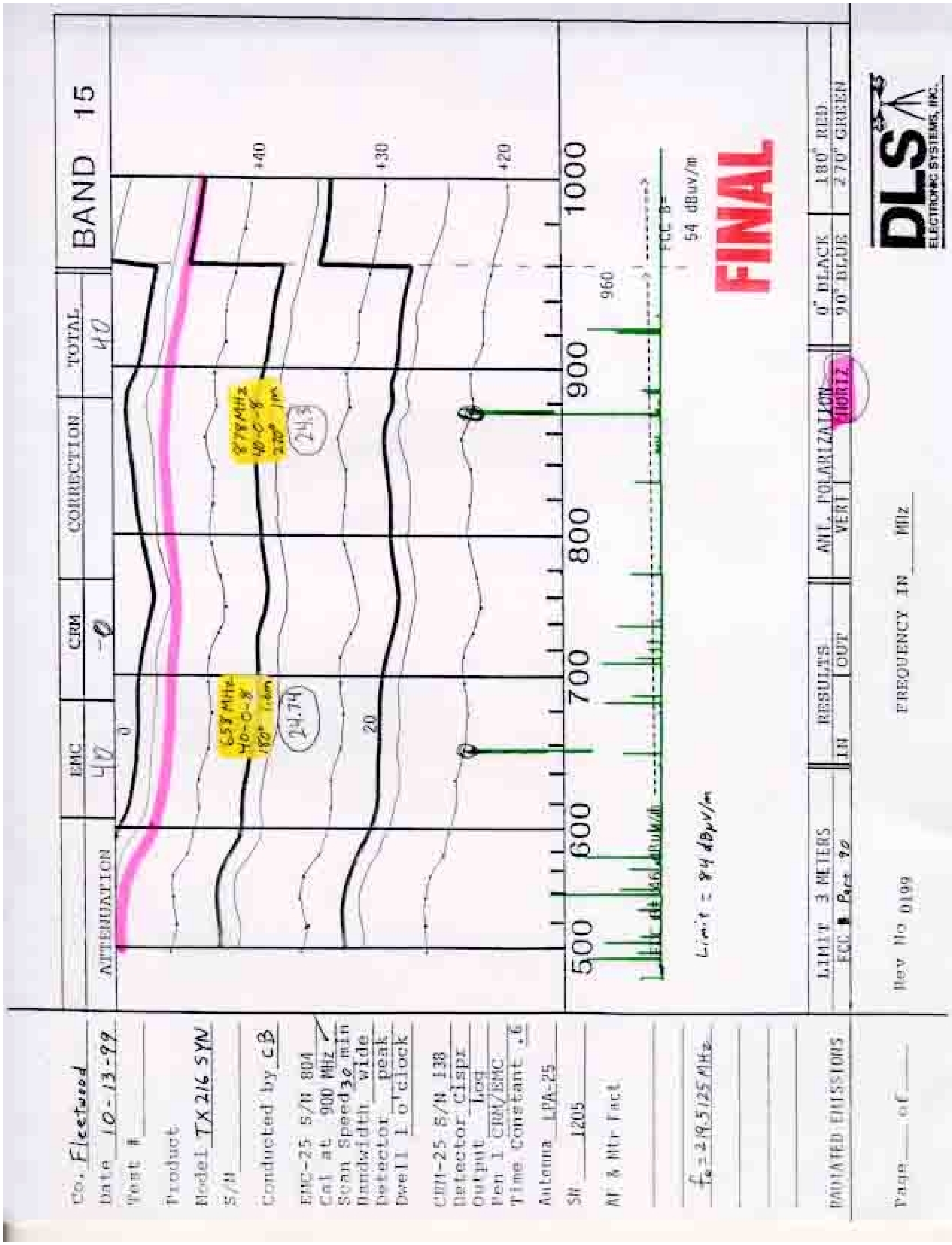

REF 90.0 dBuV
ATTEN 0 dB
MKR 1.079 GHz
42.20 dBuV
10 dB/
POS PK
Fleetwood
10-13-99
TX216.SYN
Limit 84 dBuV/m
Horizontal
3 meters
fo= 916.0125 MHz
42.2 dBuV
+28.0 dB trans.
70.2 dBuV
= (13.8) dB margin
FINAL
START 1.00 GHz
RES BW 1 MHz
VBW 3 MHz
STOP 2.00 GHz
SWP 25.0 msec

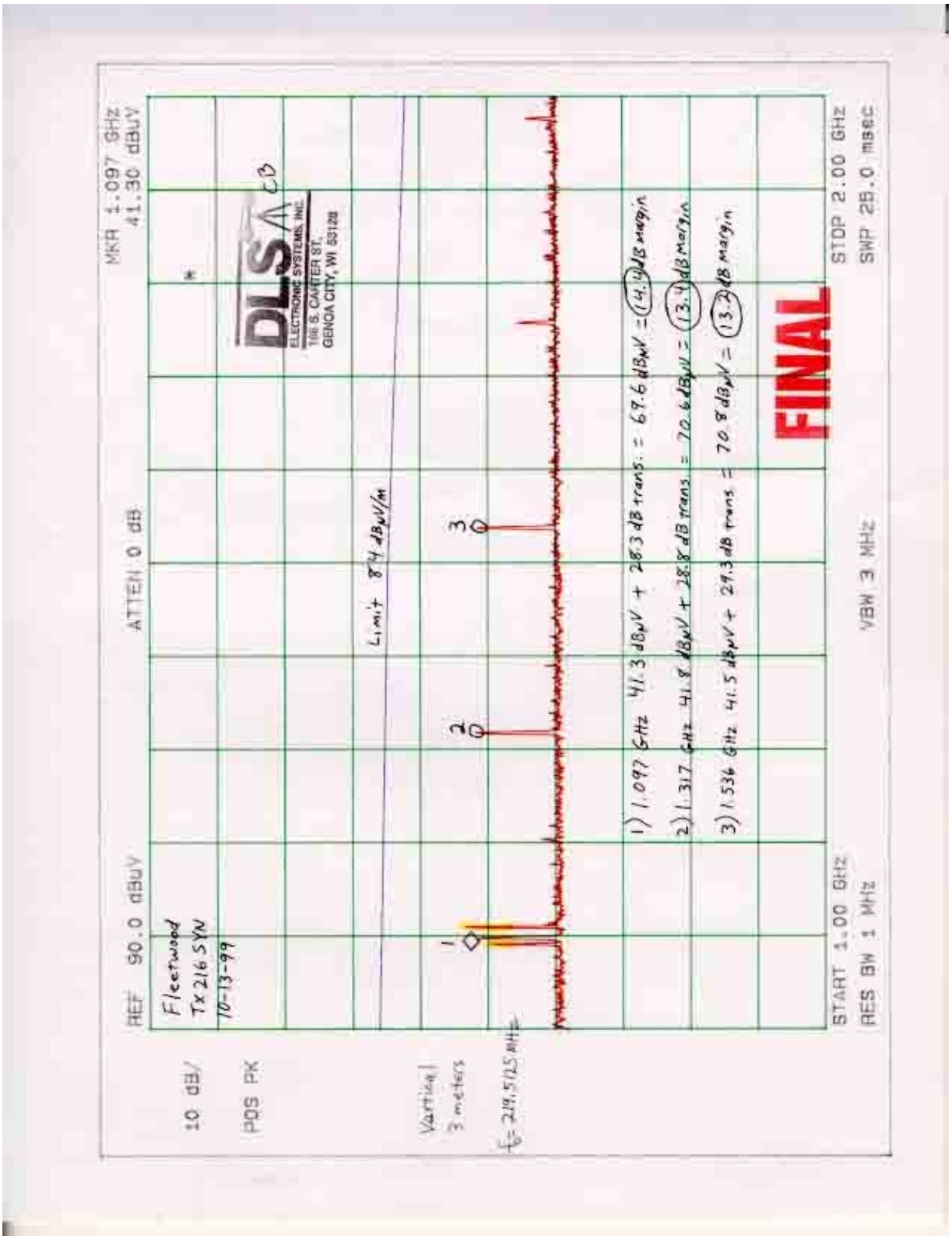

MKR 2.069 5 GHz
38.60 dBuV
REF 90.0 dBuV
ATTEN 0 dB
10 dB/
POS PK
Fleetwood
TX2165YW
10-13-99
Limit 94 dBuV/m
Horizontal
1 meter
f0 216.0125 MHz
DLS
ELECTRONIC SYSTEMS, INC.
106 S. CARTER ST.
GENOA CITY, WI 53128
38.6 dBuV
+29.7 dB trans.
= 68.3 dBuV = (25.7) dB margin
FINAL
START 2.000 GHz
RES BW 1 MHz
VBW 3 MHz
STOP 2.500 GHz
SWP 20.0 msec

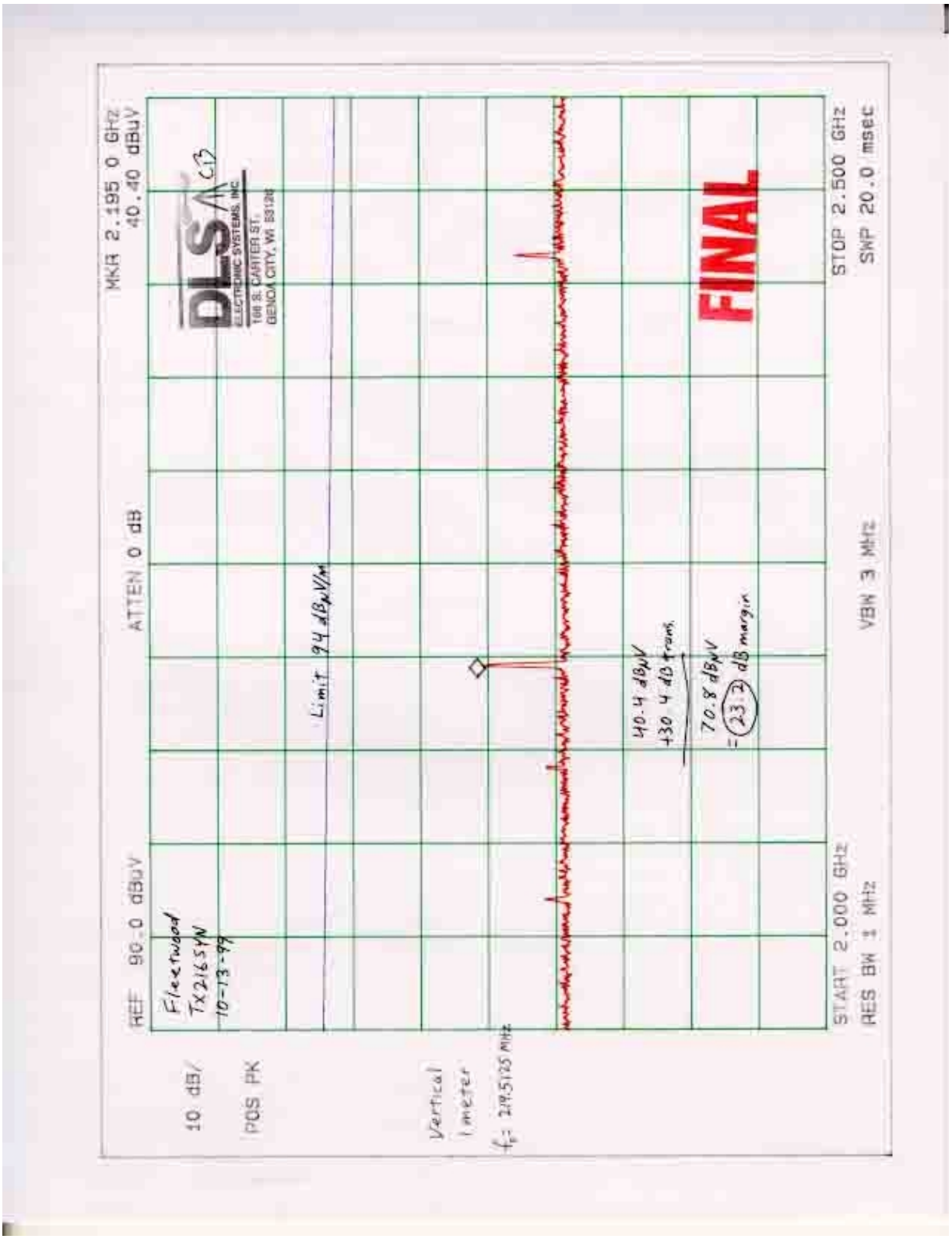

Co. Fleetwood
Date 10-13-99
Test #
Product
Model TX2165YN
S/N
Conducted by CB
EMC-25 S/N 804
Cal at 200 MHz
Scan Speed 30 min
Bandwidth wide
Detector peak
Dwell 1 orblock
CBM-25 S/N 138
Detector Clspr
Output Log
Pen 1 CBM/EMC
Time Constant .6
Antenna LPA-25
SN 1205
AT & Mtr Fact
fo = 219.5125 MHz
RADIATED EMISSIONS
Page ___ of ___
Rev No 0199
ATTENUATION
EMC
CBM
CORRECTION
TOTAL
BAND 14
30(20)
20(10)
fundamental
439 MHz
60+10+2.5
120° 12m
13.8
+30
+20
+10
200
250
300
350
400
450
500
1216
FCC A = 54 dBuv/m
FCC A= 57 dBuv/m
FCC B=
53.5 dBuv/m
FCC B= 46 dBuv/m
Limit = 84 dBuv/m
FINAL
LIMIT 3 METERS
FCC Part 90
RESULTS
IN
OUT
ANT POLARIZATION
VERT
HORIZ
0° BLACK
90° BLUE
180° RED
270° GREEN
FREQUENCY IN ___ MHz
DLS ELECTRONIC SYSTEMS, INC.

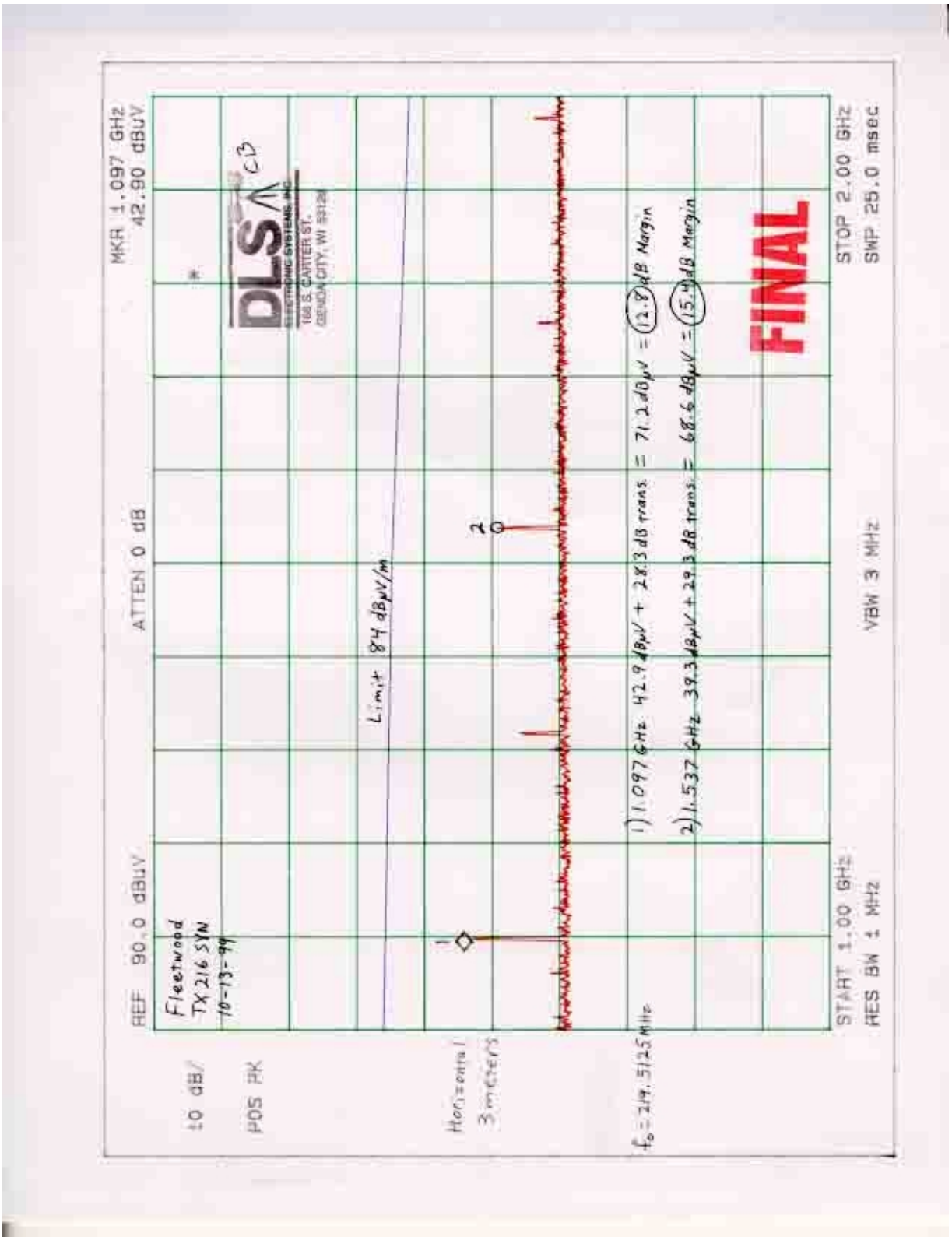

BAND 15
ATTENUATION
EMC 40
CRM -0
CORRECTION
TOTAL 40
500
600
700
800
900
1000
FINAL
Co. Fleetwood
Date 10-13-99
Model TX216 SYN
Conducted by CB
LIMIT 3 METERS
54 dBuV/m
ANT. POLARIZATION VERT HORIZ
FREQUENCY IN MHz
RADIATED EMISSIONS

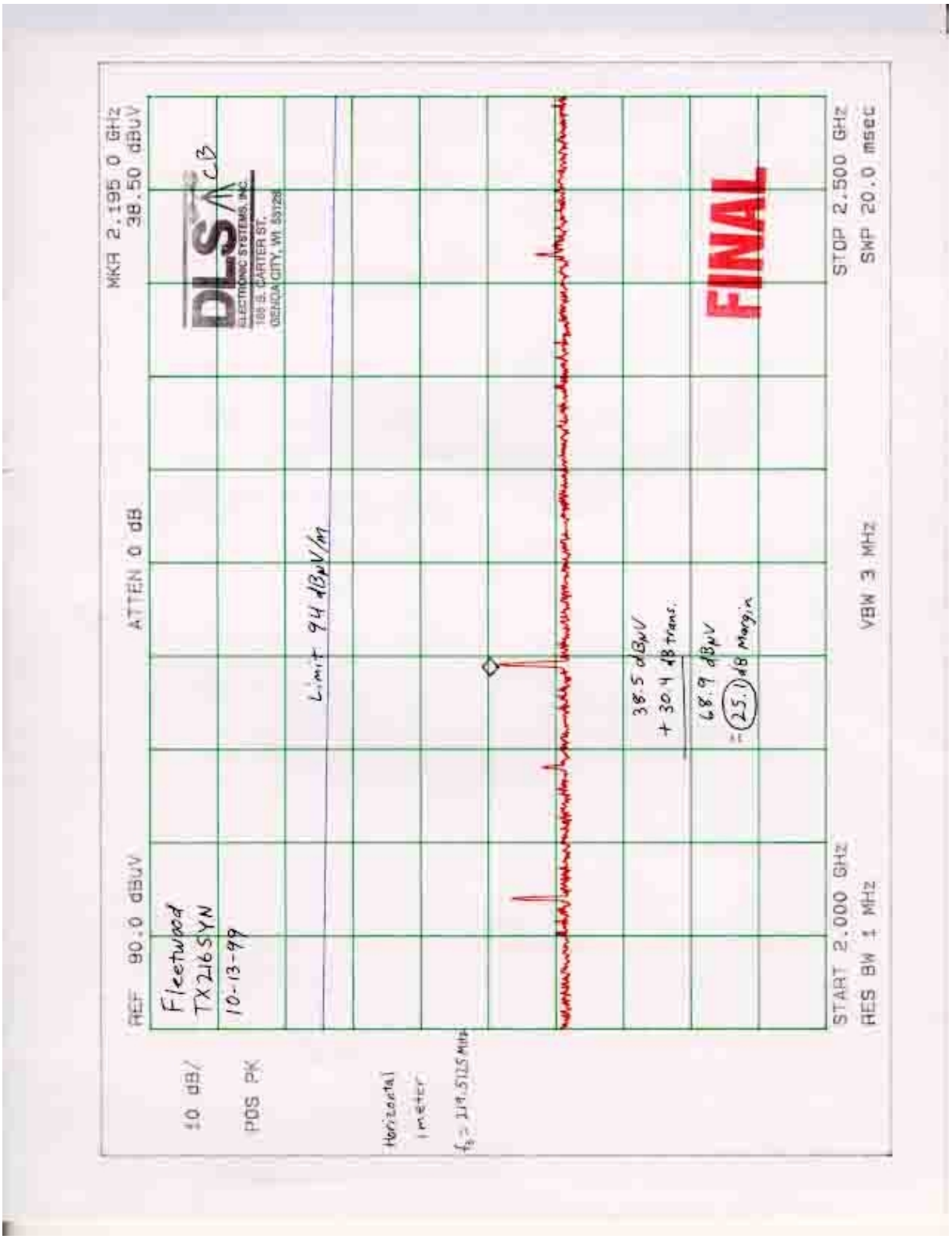

BAND 14
ATTENUATION
EMC
CRM
CORRECTION
TOTAL
200
250
300
350
400
450
500
FREQUENCY IN MHz
RADIATED EMISSIONS
FINAL


BAND 15
ATTENUATION
CORRECTION
TOTAL
500
600
700
800
900
1000
FINAL
54 dBuV/m
LIMIT 3 METERS
RESULTS
ANT. POLARIZATION
FREQUENCY IN MHz
RADIATED EMISSIONS


REF 90.0 dBuV
ATTEN 0 dB
MKR 1.097 GHz
41.30 dBuV
10 dB/
POS PK
Fleetwood
Tx 216 SYN
10-13-99
Limit 84 dBuV/m
Vertical
3 meters
Fo= 219.5/125 MHz
1
2
3
DLS
ELECTRONIC SYSTEMS, INC.
7166 S. CARTER ST.
GENOA CITY, WI 53128
C3
1) 1.097 GHz 41.3 dBuV + 28.3 dB trans. = 69.6 dBuV = (14.4) dB margin
2) 1.317 GHz 41.8 dBuV + 28.8 dB trans. = 70.6 dBuV = (13.4) dB margin
3) 1.536 GHz 41.5 dBuV + 29.3 dB trans = 70.8 dBuV = (13.2) dB margin
FINAL
START 1.00 GHz
RES BW 1 MHz
VBW 3 MHz
STOP 2.00 GHz
SWP 25.0 msec


REF 90.0 dBuV
ATTEN 0 dB
MKR 2.195 0 GHz
40.40 dBuV
10 dB/
POS PK
Flextwand
TX21659W
10-13-99
Limit 94 dBuV/m
Vertical
1 meter
f= 219.5125 MHz
40.4 dBuV
+30.4 dB trans.
70.8 dBuV
=(23.2) dB margin
FINAL
START 2.000 GHz
RES BW 1 MHz
VBW 3 MHz
STOP 2.500 GHz
SWP 20.0 msec


REF 90.0 dBuV
ATTEN 0 dB
MKR 1.097 GHz
42.90 dBuV
10 dB/
POS PK
Fleetwood
TX 216 SYN
10-13-99
Limit 84 dBuV/m
Horizontal
3 meters
1
2
1) 1.097 GHz 42.9 dBuV + 28.3 dB trans = 71.2 dBuV = (12.8) dB Margin
2) 1.537 GHz 39.3 dBuV + 29.3 dB trans = 68.6 dBuV = (15.4) dB Margin
FINAL
START 1.00 GHz
RES BW 1 MHz
VBW 3 MHz
STOP 2.00 GHz
SWP 25.0 msec


REF 90.0 dBuV
ATTEN 0 dB
MKR 2.195 0 GHz
38.50 dBuV
10 dB/
POS PK
Fleetwood
TX216SYN
10-13-99
Limit 94 dBuV/m
Horizontal
1 meter
38.5 dBuV
+ 30.4 dB trans.
68.9 dBuV
= (25.1) dB Margin
FINAL
START 2.000 GHz
RES BW 1 MHz
VBW 3 MHz
STOP 2.500 GHz
SWP 20.0 msec

12.0 FREQUENCY STABILITY - PART 2.1055a **(Temperature)**

The frequency stability was measured from -30° to +50° centigrade at intervals of 10° centigrade throughout the range. Prior to each frequency measurement, the equipment was left alone for a sufficient period of time (approximately 30 minutes or more) to allow the components of the Transmitter 216-220 MHz oscillator circuitry to stabilize. The following information was taken:

FREQUENCY STABILITY FOR TEMPERATURE VARIATION IN MHz:

This test was not performed at D.L.S. Electronic Systems, Inc.

GRAPHS TAKEN FOR FREQUENCY

STABILITY WHEN VARYING THE TEMPERATURE

PART 2.1055A

NOTE:

This test was not performed at D.L.S. Electronic Systems, Inc.

13.0 FREQUENCY STABILITY - PART 2.1055d **(Voltage)**

The frequency stability of Transmitter 216-220 MHz was measured by varying the primary supply voltage from 85% to 115% of nominal value for all equipment other than hand carried battery equipment.

FREQUENCY STABILITY FOR VOLTAGE VARIATION:

85%	0
100%	0
115%	0

This test was not performed at D.L.S. Electronic Systems, Inc.

FREQUENCY STABILITY FOR HAND HELD DEVICES:

For hand carried, battery powered equipment, the supply voltage was reduced to the battery operating end point specified by the manufacturer. Readings were taken at the reduced end point and with a fresh battery:

Fresh Battery verses Battery end point:

This test was not performed at D.L.S. Electronic Systems, Inc.

.

GRAPHS TAKEN FOR FREQUENCY

STABILITY WHEN VARYING THE

PRIMARY SUPPLY VOLTAGE

PART 2.1055d

NOTE:

This test was not performed at D.L.S. Electronic Systems, Inc.

14.0 PHOTO INFORMATION AND TEST SET-UP

The test set-up can be seen on the accompanying photo page.

Item 0 Transmitter 216-220 MHz
FCC ID#: FBR-TX216SYN-2 SN: 001

Item 1 HP Omni Book 5700 CT Personal Computer
SN: TW75100068

Item 2 NADY Power Supply
Model No: AD-1540

Item 3 Non-shielded RJ45 Cable with Plastic Shells. 35'

Item 4 Shielded RS-232 Cable with Metal Shells. 2.5m

Item 5

Item 6

Item 7

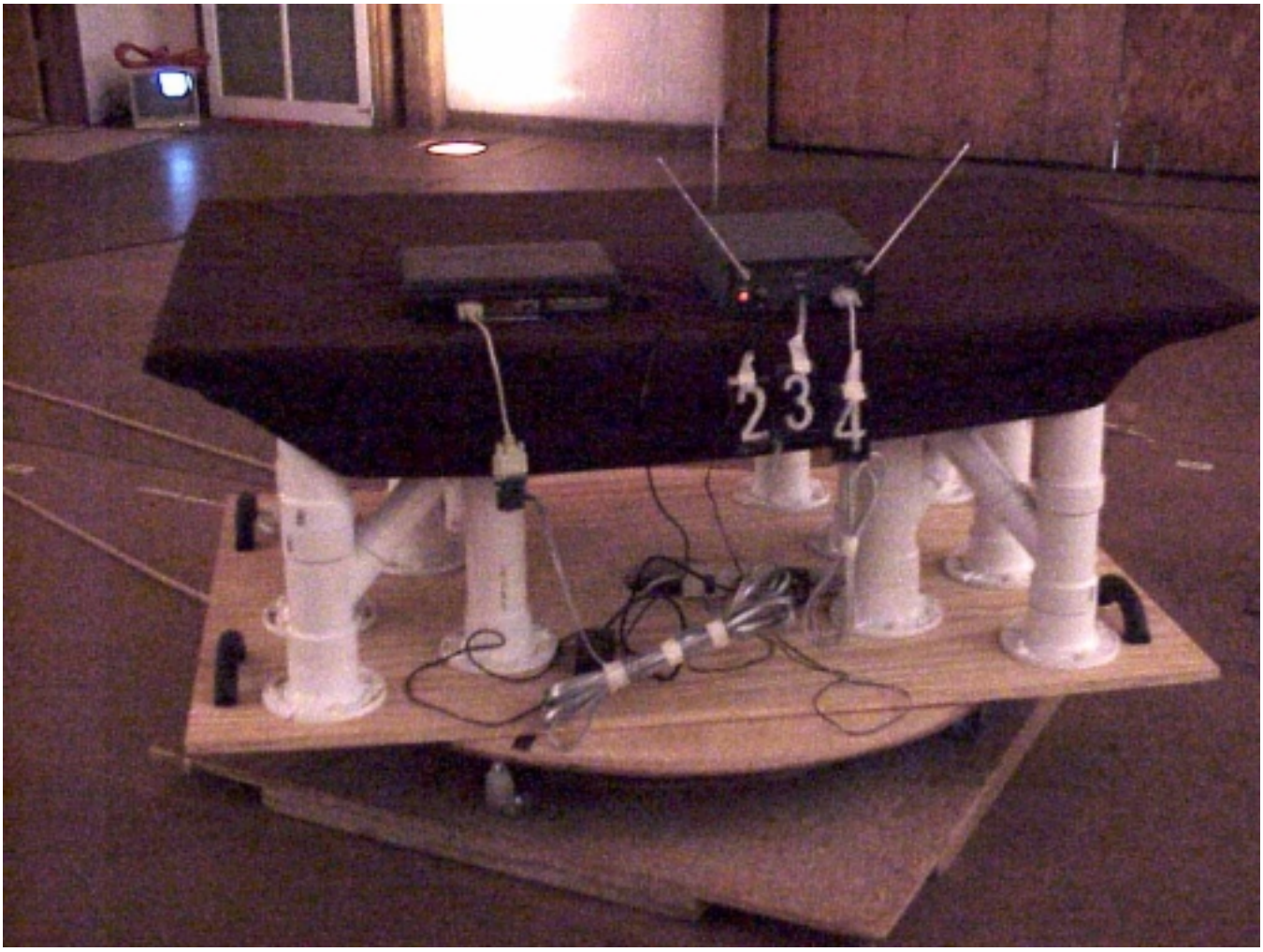
Item 8

Item 9

Item 10

15.0 RADIATED PHOTOS TAKEN DURING TESTING.

15.0 RADIATED PHOTOS TAKEN DURING TESTING



16.0 CHANGE INFORMATION

The following changes were implemented during the testing and must be incorporated into the production units to ensure compliance.

Change 1. Added 3.3 pF cap in parallel with L10.

Change 2.

Change 3.

Change 4.

Change 5.

16.0 CHANGE INFORMATION (CON'T)

Change 6.

Change 7.

Change 8.

Change 9.

Change 10.

The responsibility of implementing the changes listed in this report is accepted or I certify that no changes were made

by _____ _____
Signature Title

for _____ _____
Company Name Date

17.0 RESULTS OF TESTS

The emission test results can be seen on pages at the end of this report. Data sheets indicating the open field radiated measurements can also be found with this report. Those points on the radiated charts shown with a yellow mark are background frequencies that were verified during the test.

18.0 CONCLUSION

It was found that the FSK Transmitter, Model Number TX216SYN, S/N 001 **meets** the radio interference emission requirements of the FCC "Rules and Regulations", Part 90, Subpart I, Sections 90.205 to 90.209, 90.217 & 90.259 for Low Power Auxiliary Stations operating in the 216 MHz to 220 MHz Frequency Band. This test report relates only to the items tested.

This report contains the following number of pages.

Text:	32 pages
Data Summary:	10 pages
Charts:	28 pages

TABLE 1 - EQUIPMENT LIST

Test Equipment	Manufacturer/ Description	Model Number	Serial Number	Frequency Range	Cal Due Date
*Spectrum Analyzer	Hewlett/ Packard	8566B	2240A 02041	25 Hz –22 GHz	11/99
Quasi-Peak Adapter	Hewlett/ Packard	85650A	2043A 00121	10 kHz – 1 GHz	11/99
***Spectrum Analyzer	Hewlett/ Packard	8591A	3009A 00700	9 kHz- 1.8 GHz	3/00
Receiver	Electrometrics	EMC-25 Mark-III	772	.01-1000 MHz	9/00
Meter Module	Electrometrics	CRM-25	162	.01-1000 MHz	9/00
Receiver	Electrometrics	EMC-25 Mark-III	804	.01-1000 MHz	10/99
Meter Module	Electrometrics	CRM-25	138	.01-1000 MHz	10/99
Receiver	Electrometrics	EMC-25 Mark-III	645	.01-1000 MHz	9/00
Meter Module	Electrometrics	CRM-25	116	.01-1000 MHz	9/00
Receiver	Electrometrics	EMC-30 Mark-III	44168	.01-1000 MHz	7/00
Antenna	Electrometrics	BIA-25	2453	20 - 200 MHz	4/00
Antenna	Electrometrics	LPA-25	1114	200 - 1000 MHz	4/00
Antenna	Electrometrics	BIA-25	2614	20 - 200 MHz	4/00
Antenna	Electrometrics	LPA-25	1205	200 - 1000 MHz	4/00
Antenna	Electrometrics	BIA-25	4785	20 - 200 MHz	4/00
Antenna	Electrometrics	LPA-25	4895	200 - 1000 MHz	4/00
Antenna	EMCO	3115	2479	1 – 18 GHz	4/00

*Firmware Version 29.9.86 Software Version 85864C Rev A
**Firmware Version 14.1.85 Software Version 85864C Rev A
***Firmware Version 5.1.3 Software Version 82301-12029 Rev C

I/O Initial Calibration Only