ITS Intertek Testing Services

4317-A Park Drive NW
Norcross, GA 30093
Phone: (770) 925-2444
Fax: (770) 925-7294

Measurement Report
In suppor of
APPLICATION FOR TYPE ACCEPTANCE

Astronet
Model: Wireless Base Station

FCC ID: D8T1900MTDMABASE

This report is under a confidentiality agreement

TABLE OF CONTENTS

EXHIBIT 1: Statement of Certification

The technical data supplied with this application, having been taken under my supervision is hereby duly certified. The following is a statement of my qualifications:

1) BSEE from Auburn University, Alabama

2) 3 years of experience in the field of electromagnetic emissions testing

David J. Schramm

Position: Technical Supervisor
ITS Norcross, GA

Date: June 5, 1998

I certify that the above application was prepared under my direction and that to the best of my knowledge and belief, the facts set forth in the application and accompanying technical data are true and correct.

David C. Dennis

Position: Team Leader
ITS Norcross, GA

Date: June 5, 1998

EXHIBIT 3: General Information

Production plans following 2.981 (c)

Quantity Production of this device is planned.

Application References following 2.1061

Reference is made to the following

1. PCS1900 Air Interface Specification - JCT (AIR)/94.08.04-231R4
2. Intertek Testing Services Open Area Test Site, Norcross, GA.

Data Submittal Procedure:

Data is supplied according to Part 2, Sub-part J of CFR 47.

General Description:

The TDMA system is the medium for linking calls between PBX and non-public systems users and mobile users. The system also enables a moble user to communicate with other mobiles.

This Wireless Basestation Unit (WBSU) is the distributed radio component of a 1.9 GHz PCS System that is being developed for operation in the licensed PCS license holder. The WBSU is being developed as a subsystem component.

The WBSU provides the IS-136A air interfece to handheld mobiles operating as a privite in-building or campus system. The WBSU is connected to the centralized system controller via a proprietary PBX adjunct Interface. This interface utilizes a RJ 45 physical connector. This dedicated (hard-wired) connection provides external power, control communications for the WBSU, and the digital traffic (voice) channels from the WBSU to the controller. The controller component is responsible for providing the clock source used by the WBSU for the frequency control and synchronization and external 24 to 48 vdc operating power. An interal power supply within the WBSU converts the 24 to 48 vdc input into the internal working voltages of 5 and 3.3 vdc.

The WBSU is approximately 12" x 12" x 3". The unit weighs approximately 2.5 kilograms. A security screw is provided which requires a special tool for removal. The antenna are integral to the WBSU and are contained within the assembly.

The operating range of the WBSU is the standard licensed bands within the PCS spectrum. The output level of the transceiver is from –10dBw to –40dBw and is software controlled.

The network connections provided to provide voice or data connections through the WBSU to the PSTN or PABX are provided by the central controller and are not part of thr WBSU.

The TDMA system is the medium for linking calls between PBX and non-public systems users and mobile users. The system also enables a mobile user to communicate with other mobiles.

The WBSU is wall mounted on exposed interior walls. The basic office environment is air conditioned, normally at 75°F. This temperature will generally fluctuate -5° to +10°F. The humidity is usually low. In an office environment, the equipment is in view but placed in locations that are out of the general traffic areas.

EXHIBIT 4: Description

Transmitter Technical Characteristics - Pursuant 2.983 (d)

A.	RF Power Output -	100 milliwatts
B.	Number of Simultaneous Channels -	5
C.	Tunable Channel (not user tunable) -	1997
D.	Frequency Range -	1930.08 to 1989.96 MHz
E.	Frequency Stability -	0.21 ppm
F.	Emission Designations -	33K3X7W
G.	Spurious Emissions -	47.1dBc
H.	Power Supply -	-48 vdc
I.	TX Antenna Gain -	1.5 dBd
J.	RX Antenna Gain -	1.0 dBd
K.	MX 1 Antenna Gain -	1.0 dBd
L.	MX 2 Antenna Gain -	2.0 dBd

EXHIBIT 5: Function of Active Devices

This list is attached in a sealed envelope labeled EXHIBIT 5. Astronet is withholding this exhibit from public inspection under the confidentiality agreement as outlined in CFR 47 §0.459.

EXHIBIT 6: Circuit Diagrams

Transceiver schematics

The following schematics, RF Block diagram, and pcb artwork are attached in a sealed envelope labeled EXHIBIT 6. Astronet is withholding this exhibit from public inspection under the confidentiality agreement as outlined in CFR 47 §0.459.

EXHIBIT 6-1:	TX1
EXHIBIT 6-2:	TX2
EXHIBIT 6-3:	RX_1.2 / SNI1.2
EXHIBIT 6-4:	RX1.2(RF/IF)
EXHIBIT 6-5:	RX1(DEM)
EXHIBIT 6-6:	RX2(DEM)
EXHIBIT 6-7:	TRXLO1.2 / MODLO1.2
EXHIBIT 6-8:	2ndLO1.2 / SNILO1.2
EXHIBIT 6-9:	ISDN/POWERSUPPLY/BASE CLOCK I/F & RS232C I/F
EXHIBIT 6-10:	ISDN TRANSCEIVER
EXHIBIT 6-11:	CPU
EXHIBIT 6-12:	MDSP
EXHIBIT 6-13:	MDSP2
EXHIBIT 6-14:	QDSP
EXHIBIT 6-15:	QDSP2
EXHIBIT 6-16:	INFQ1
EXHIBIT 6-17:	INFQ2

EXHIBIT 7: Tune-up Procedure

Frequency

The Wireless base station unit comes tuned from factory, there are no user adjustments.

EXHIBIT 8: Circuit Description

This section provides the description of circuits required by CFR 47 subpart 2.983.

The following descriptions are included: (1) Means for Frequency Stabilization, (2) Means for Suppression of spurious radiation, (3) Means for Limiting Power, (4) Means for modulation systems.

Means for Frequency Stabilization

This base station is provided a clock of 128 kHz from network. Stability of this clock is within 0.21ppm. The transmitter uses 19.2 MHz primary signal which is generated by a VCXO. Frequency of the VCXO is divided by 150 and phase of it is compared with that of 128 kHz clock. The result of comparison determined control voltage of the VCXO.

Means for suppression of spurious radiation

Major spurious are occurred as follows. A mixing circuit employed occurs an image of a carrier and leakage of a local. A power amplifier occurs harmonics due to the non-linearity. A band pass filter, which is located next to a power amplifier, attenuates harmonics 30dB at least. Furthermore, each blocks on TRX board are shielded against spread of spurious.

Means for Limiting Power

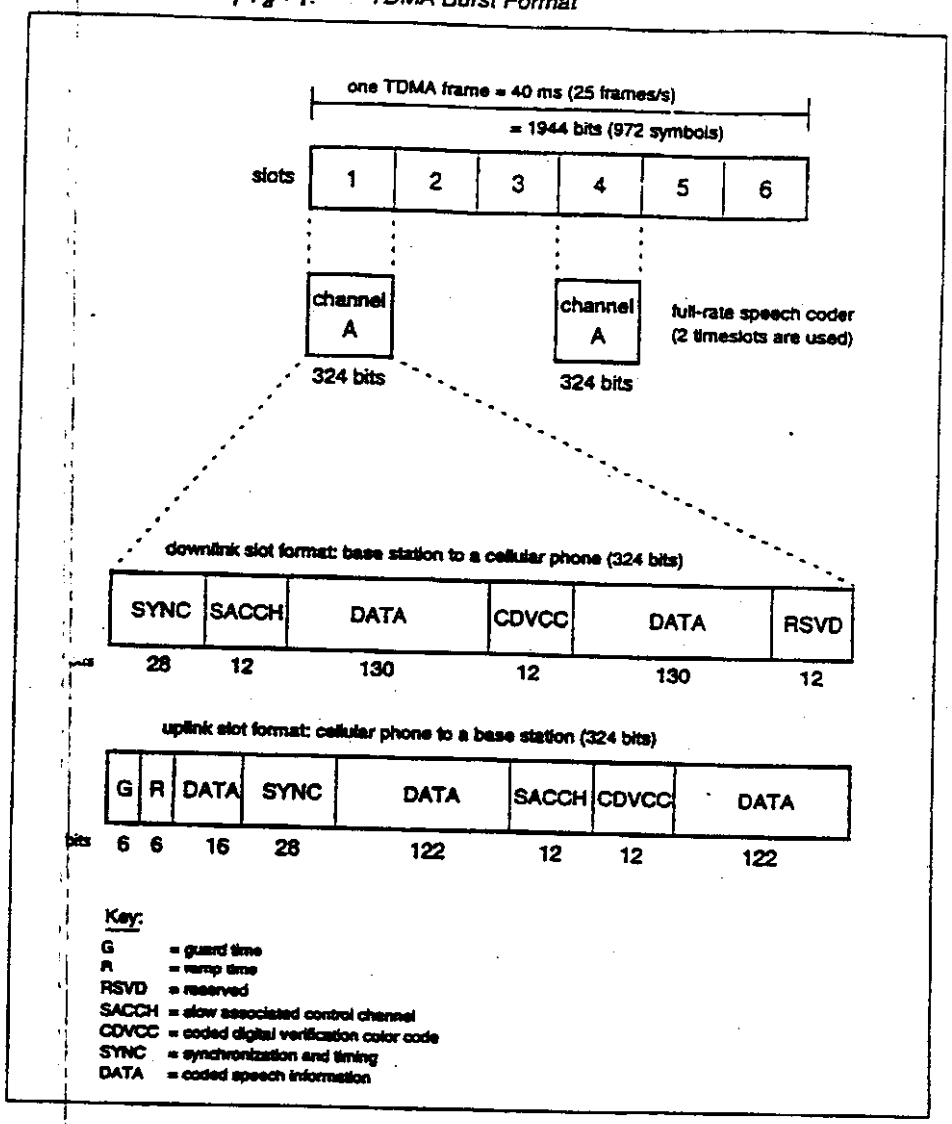
An auto power controller (APC) circuit employing regulates transmitter power in a range of +2 dB to –4 dB of its nominal power. An APC circuit compares detected power with nominal power and adjusts a gain of an amplifier. These procedures are done by MPU with digital data. When an excessive adjustment occurred by a certain disturbance, it is neglected according to a given threshold. So transmitter power does not excess the nominal too much.

Means for modulation system

The transmitter is capable of generating $\pi/4$-DQPSK signals. The baseband wave generator have a square root raised cosine Nyquist filter with roll off factor of 0.35 for the pulse shaping. The symbol rate is 24.3k symbols per second.

TDMA Information

Fig. 1. TDMA Burst Format



Low Pass Filter Response

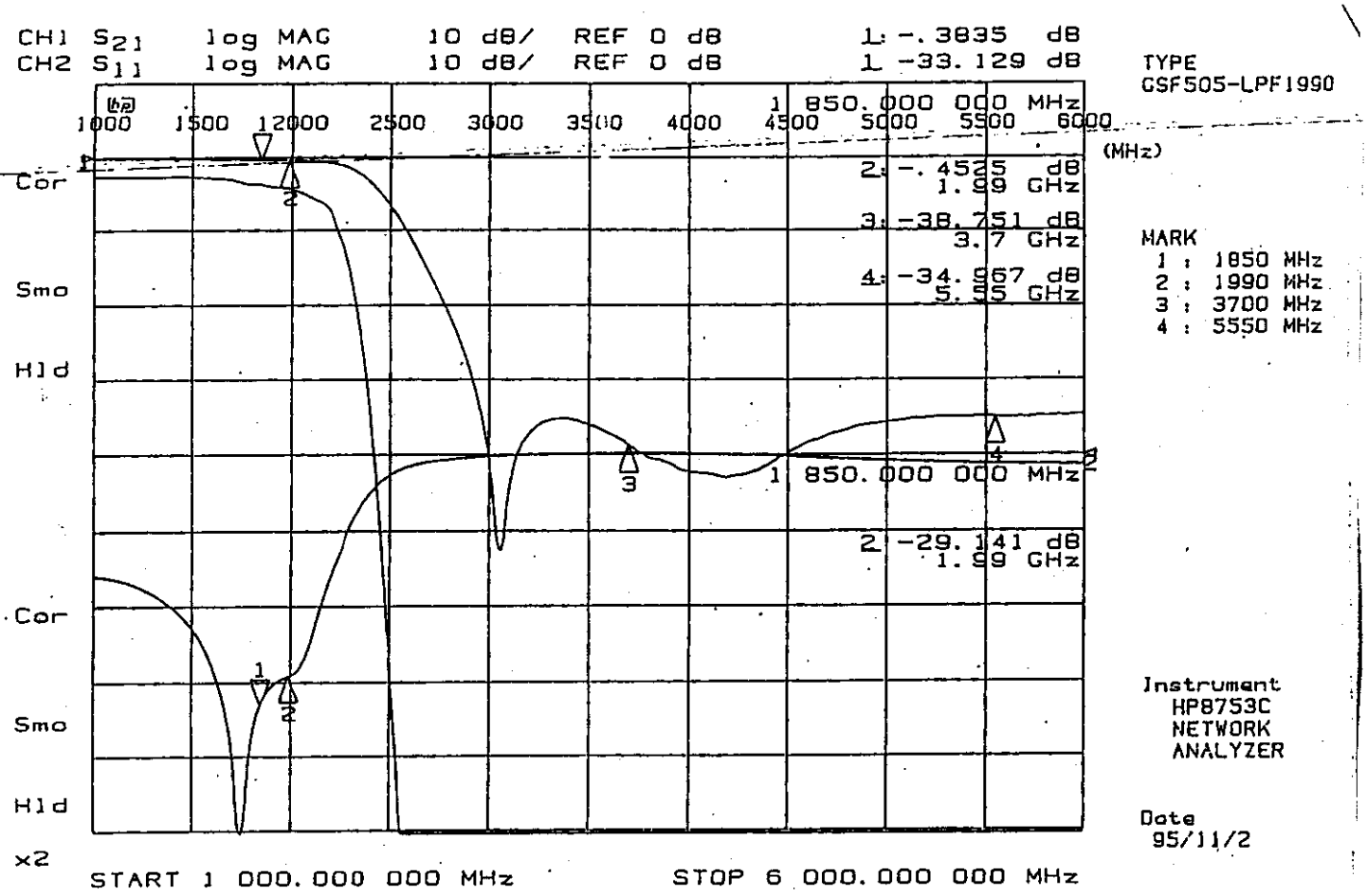


Fig.2. Frequency Response of Low Pass Filter

EXHIBIT 9: Measured Data

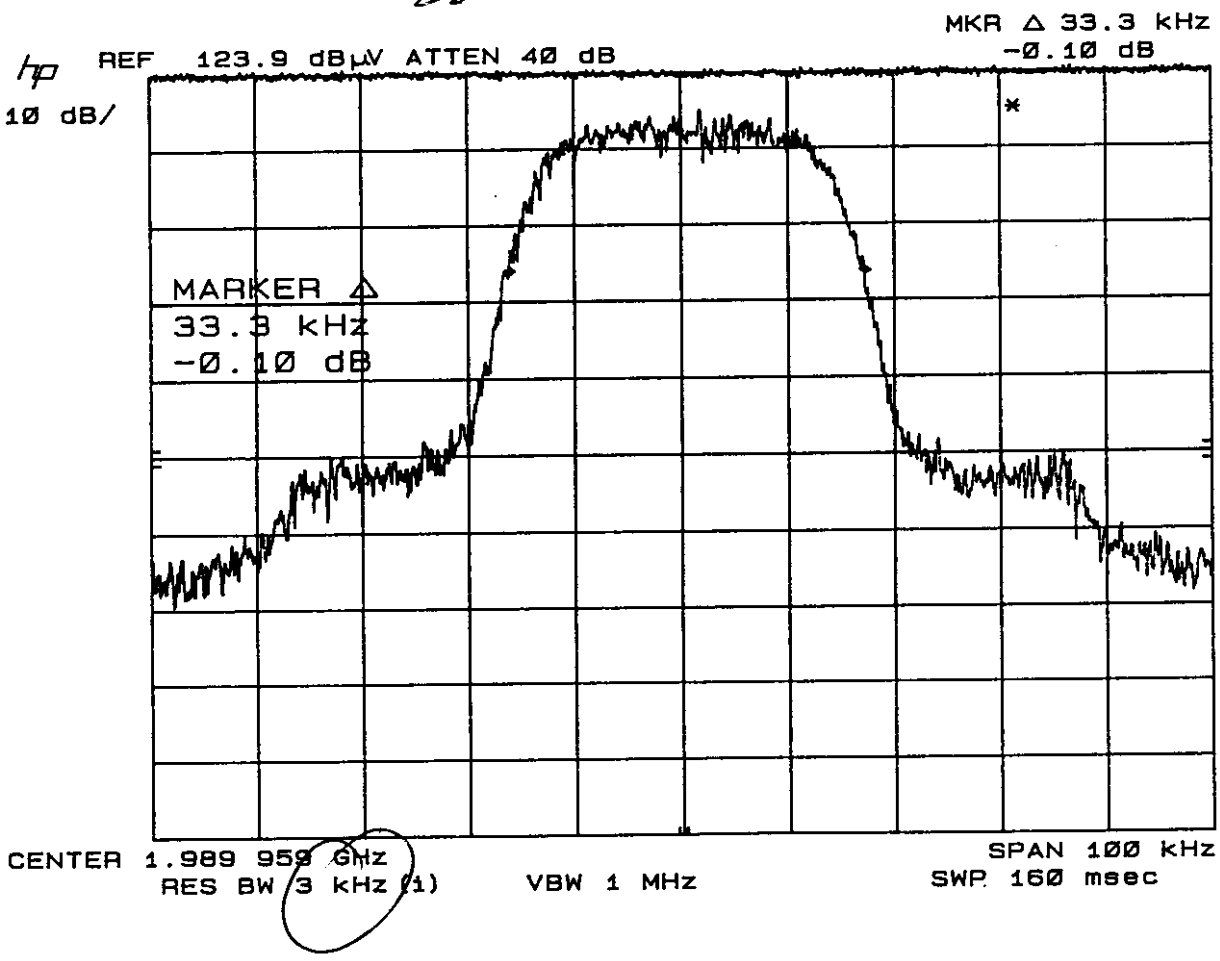
9.1 RF Power output data

The RF power output was measured with the peak power meter. The output for carrier one was directly connected to peak power meter through a short, low loss cable. The power was measured to be 19.8dBm.

9.2 Occupied Bandwidth

The bandwidth for this device is 33.3 kHz. The following page(s) show bandwidth plot(s). This measurement was taken with direct connection from the output of antenna to the spectrum analyzer. The wave shape was captured in trace A using a Resolution Bandwidth of 1 MHz a Video Bandwidth of 1 MHz. The reference was adjusted to be equal trace A. Then for trace B the Resolution Bandwidth was adjusted to 3 kHz which is approximately 1% of occupied bandwidth. The occupied Bandwidth is the width of the Emission in trace B measured 26 dB below Reference level.

NO! Should use 300 Hz!



9.3 Emissions at edge of Frequency Block

The following plots show the emissions at the edge of the upper and lower frequency blocks.

Figure 9.3.1: Band Edge Plot

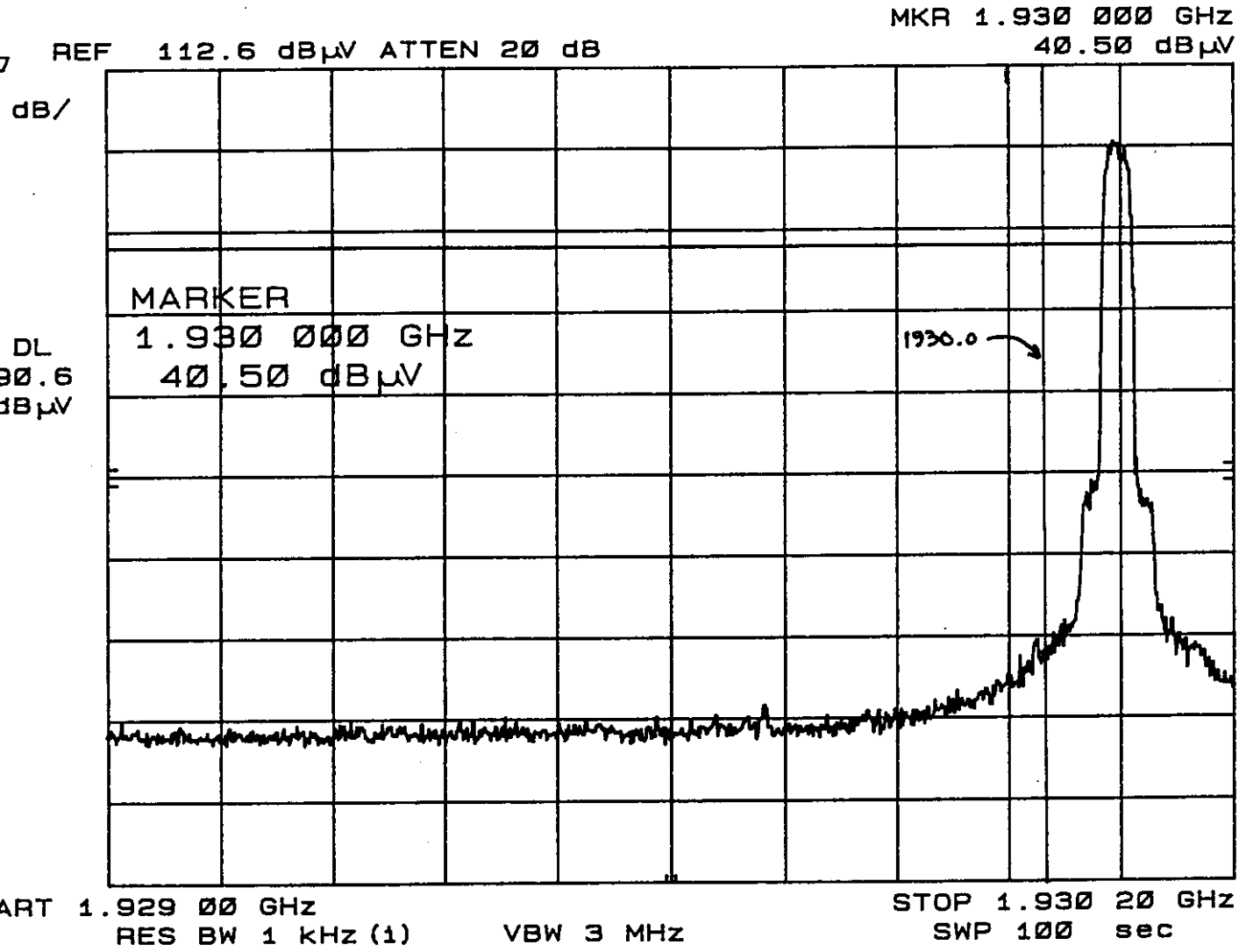
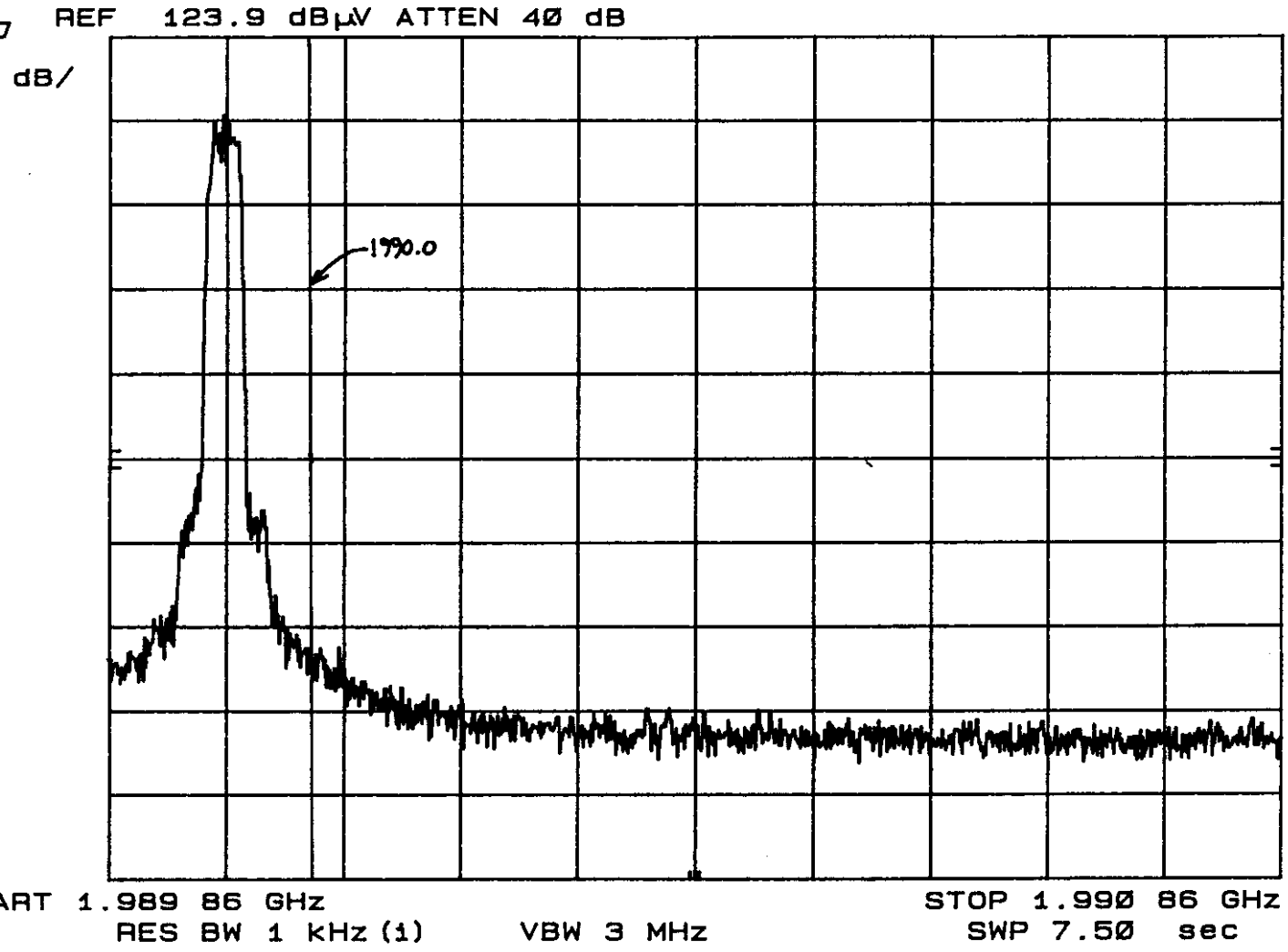


Figure 9.3.2: Band Edge Plot



9.4 Antenna Conducted Spurious Emissions

The following data table and figures show the conducted spurious emissions for the WBSU. All measurements above 1 GHz were made with a RBW of 1 MHz and a VBW of 1 MHz. All measurements below 1 GHz were made with a quasi-peak detector, a RBW of 120 kHz, a VBW of 1 MHz. Due to the internal high pass filter of the HP8566B, external attenuation was not required for emissions measured above 2.5 GHz. Below 2.5 GHz, 20 dB of external attenuation was used to prevent overload in the front end of the spectrum analyzer.

Table 9.4.1: Conducted Spurious Emissions

Company: Astronet
Model: Wireless Base Station

Date: 06/04/98
Tested by: Greg A. Thompson

Notes: Initial Results

Job Number: J98-10883

Standard: FCC Part 24
Conducte

	Frequency (MHz)	Reading (dBuV)	Ext. Attn. (dB)	Cable Loss (dB)	Pre-amp Factor (dB)	(dB)	Net (dBuV[illegible])	Limit (dBuV[illegible])	Margin (dB)
1930 MHz									
	1720.019	57.7	10.0	0.9	0.0	0.0	68.6	93.8	-25.2
	1930.079	115.8	10.0	1.0	0.0	0.0	126.8		
	2140.019	55.5	10.0	1.0	0.0	0.0	66.5	93.8	-27.3
	3860.127	46.9	10.0	1.5	0.0	0.0	58.4	93.8	-35.4
	5790.200	24.0	10.0	1.9	0.0	0.0	35.9	93.8	-57.9
	7720.290	20.6	10.0	2.5	0.0	0.0	33.1	93.8	-60.7
1990 MHz									
	1779.869	59.6	10.0	0.9	0.0	0.0	70.5	91.3	-20.8
	1989.690	113.3	10.0	1.0	0.0	0.0	124.3		
	3979.889	46.5	10.0	1.5	0.0	0.0	58.0	91.3	-33.3
	5969.849	26.0	10.0	1.9	0.0	0.0	37.9	91.3	-53.4
	7959.809	20.9	10.0	2.5	0.0	0.0	33.4	91.3	-57.9
1960 MHz									
	1749.959	57.1	10.0	0.9	0.0	0.0	68.0	92.1	-24.1
	1960.019	114.1	10.0	1.0	0.0	0.0	125.1		
	2170.019	49.2	10.0	1.0	0.0	0.0	60.2	92.1	-31.9
	3919.978	47.4	10.0	1.5	0.0	0.0	58.9	92.1	-33.2
	5880.057	25.7	10.0	1.9	0.0	0.0	37.6	92.1	-54.5
	7840.076	21.9	10.0	2.5	0.0	0.0	34.4	92.1	-57.7
Conducted Power meter reading.									
		(dBm)					(dBm)		
	1960.019	18.8	0.0	1.0	0.0	0.0	19.8		

9.5 Radiated Spurious Emissions

The following data tables and figures show the radiated spurious emissions for each amplifier tested in the AirSite Remote Radio. All measurements above 1 GHz were made with a RBW of 1 MHz and a VBW of 1 MHz. All measurements below 1 GHz were made with a quasi-peak detector, a RBW of 120 kHz, a VBW of 1 MHz. Due to the internal high pass filter of the HP8566B, external attenuation was not required for emissions measured above 2.5 GHz. Below 2.5 GHz, 20 dB of external attenuation was used to prevent overload in the front end of the spectrum analyzer.

Table 9.5.1: Radiated Spurious Emissions

Company: Astronet
Model: Wireless Base Station

Notes: Initial Results

Standard: FCC Part 24

Date: 06/03/98
Tested by: Greg A. Thompson
Test Distance: 3
Job Number: J98-10883

Antenna Polarity	Frequency (MHz)	Reading (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Pre-amp Factor (dB)	Distance Factor (dB)	Net (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1930 MHz									
z	1720.000	33.7	27.8	1.9	0.0	0.0	63.3	83.8	-20.4
z	1930.070	86.1	28.7	2.0	0.0	0.0	116.8		
y	2140.000	33.2	29.3	2.0	0.0	0.0	64.5	83.8	-19.3
z	3860.148	25.1	33.6	3.0	0.0	0.0	61.7	83.8	-22.1
z	5790.227	27.3	35.4	3.9	0.0	0.0	66.6	83.8	-17.2
1990 MHz									
y	1779.918	38.7	28.0	1.9	0.0	0.0	68.6	83.8	-15.2
z	1989.959	85.4	28.9	2.0	0.0	0.0	116.3		
z	2186.370	33.3	29.3	2.0	0.0	0.0	64.6	83.8	-19.2
y	3979.900	32.3	33.9	3.0	0.0	0.0	69.2	83.8	-14.6
z	5969.870	21.3	35.4	3.9	0.0	0.0	60.6	83.8	-23.2
1960 MHz									
y	1749.959	36.9	27.9	1.9	0.0	0.0	66.7	88.0	-21.3
y	1959.959	90.2	28.8	2.0	0.0	0.0	121.0		
z	2186.340	33.3	29.3	2.0	0.0	0.0	64.6	88.0	-23.4
y	3920:038	35.3	33.9	3.0	0.0	0.0	72.2	88.0	-15.8
z	5880.063	22.2	35.4	3.9	0.0	0.0	61.5	88.0	-26.5

9.6 Frequency Stability

Table 9.6.1: Frequency Stability vs. Temperature, Center frequency 1930.08

Company: Astronet Engineer: Candy Campbell
Model: Wireless Base Station Date: 5/13/98
Center Frequency: 1930.08

Temperature degrees C	Frequency MHz	Deviation ppm	Limit ppm
-30	1930.0799	0.05	2.00
-20	1930.0799	0.03	2.00
-10	1930.0802	0.09	2.00
0	1930.0801	0.07	2.00
10	1930.0800	0.01	2.00
20	1930.0798	0.13	2.00
30	1930.0797	0.13	2.00
40	1930.0799	0.06	2.00
50	1930.0797	0.13	2.00

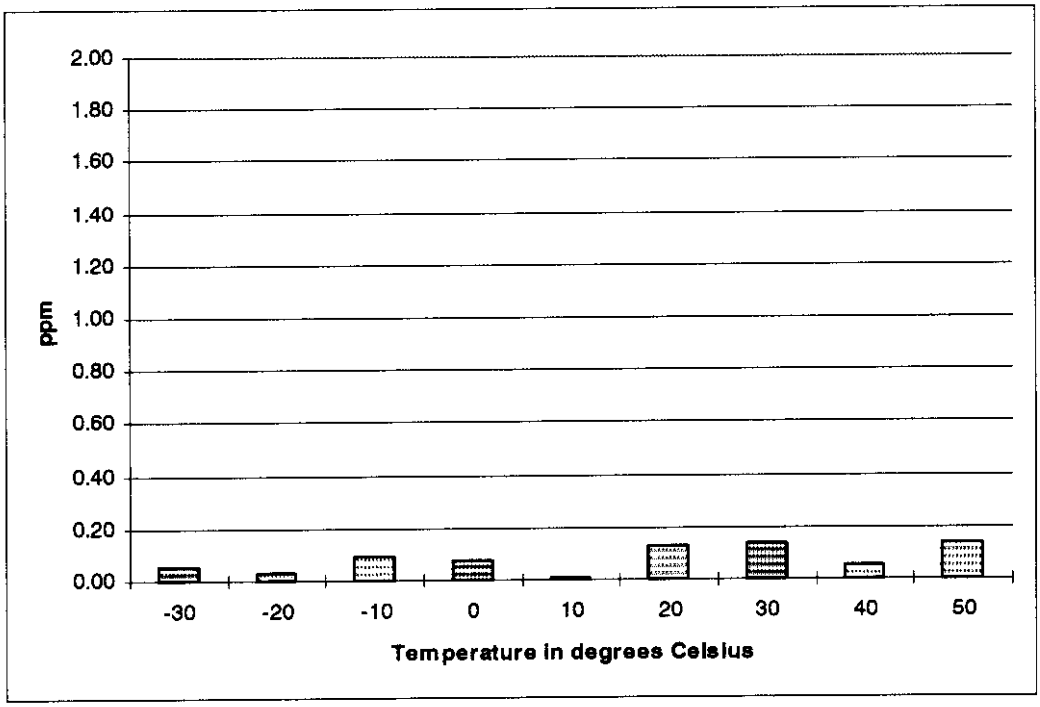


Table 9.6.2: Frequency Stability vs. Temperature, Center frequency 1989.96

Model: Wireless Base Station Date: 5/13/98
Center Frequency: 1989.96

Temperature degrees C	Frequency MHz	Deviation ppm	Limit ppm
-30	1989.9597	0.14	2.00
-20	1989.9596	0.20	2.00
-10	1989.9597	0.17	2.00
0	1989.9597	0.14	2.00
10	1989.9599	0.08	2.00
20	1989.9599	0.05	2.00
30	1989.9601	0.05	2.00
40	1989.9596	0.21	2.00
50	1989.9601	0.03	2.00

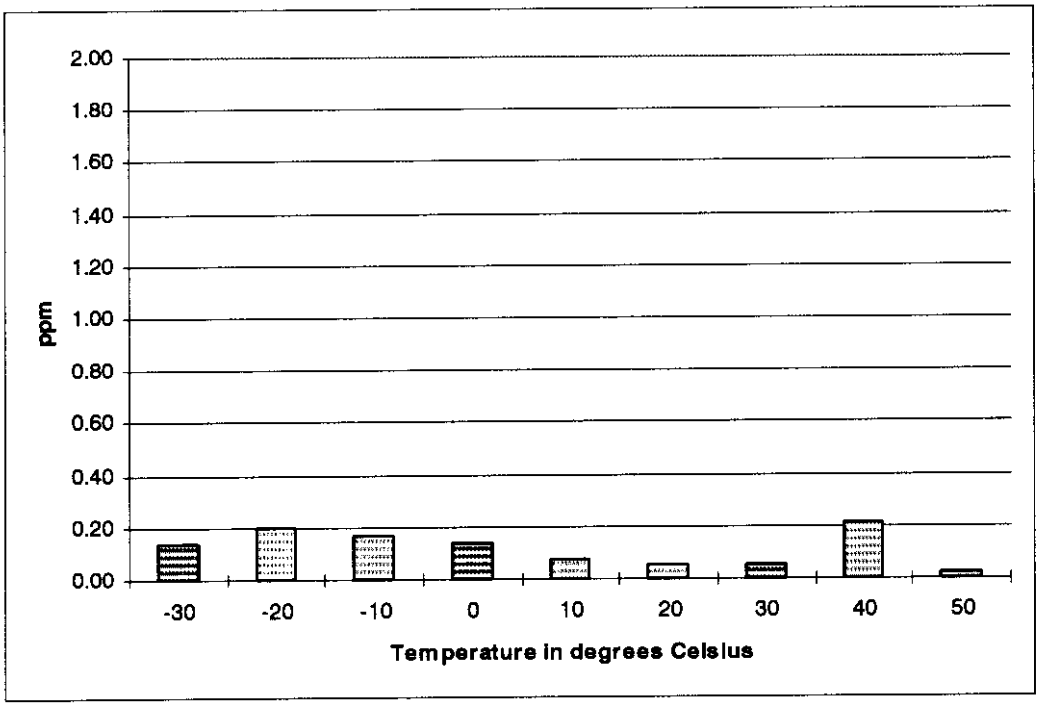


Table 9.6.3: Frequency Stability vs. Input Voltage, Center frequency 1930.08

Company: Astronet Engineer: David J. Schramm
Model: Wireless Base Station Date: 6/10/98
Center Frequency: 1930.08

Temperature Degrees C	Frequency MHz	Deviation ppm	Limit ppm
-24	N/A		2.00
-26	N/A		2.00
-28	1930.0800	0.01	2.00
-30	1930.0800	0.01	2.00
-36	1930.0800	0.01	2.00
-42	1930.0800	0.01	2.00
-48	1930.0800	0.01	2.00
-54	1930.0800	0.01	2.00
-55.2	1930.0800	0.01	2.00

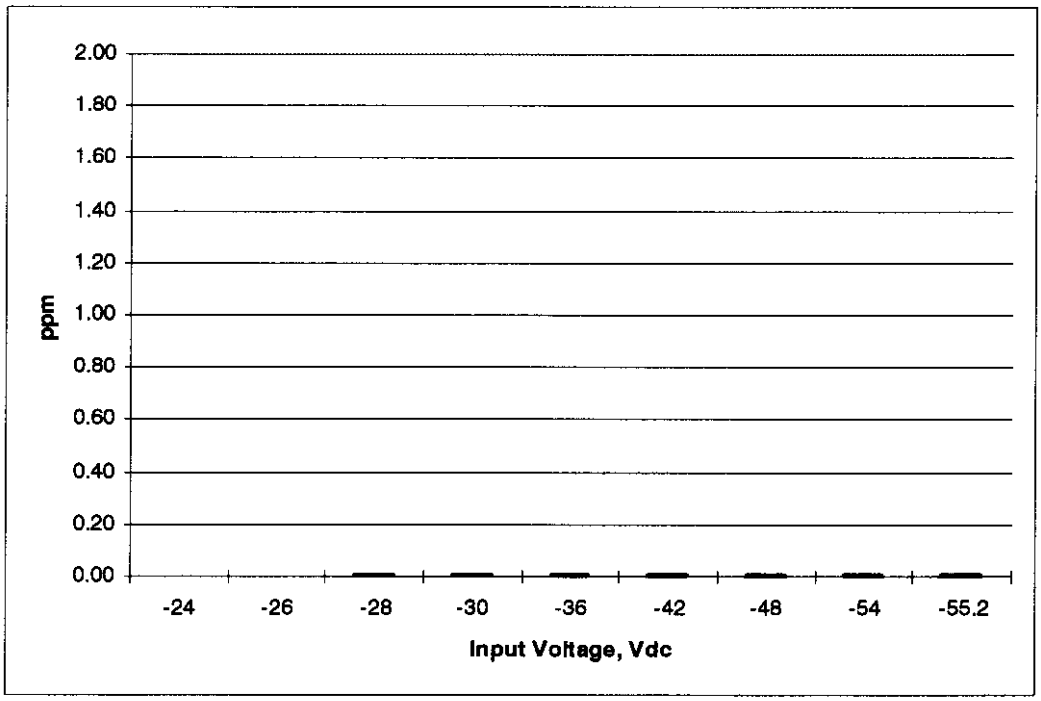
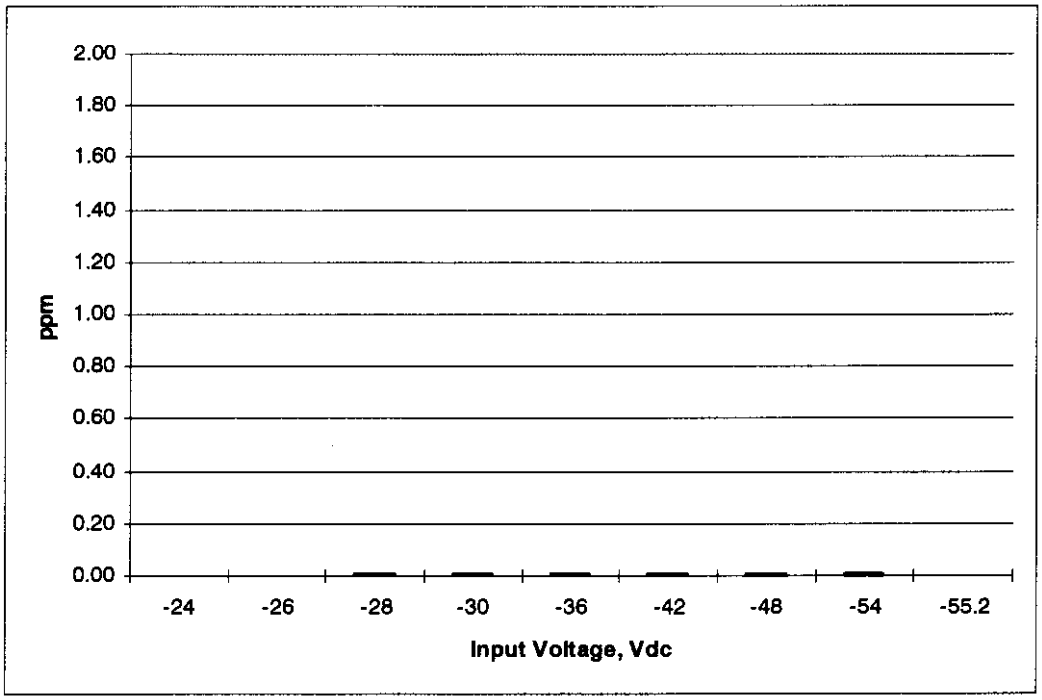


Table 9.6.3: Frequency Stability vs. Input Voltage, Center frequency 1989.96

Company: Astronet Engineer: David J. Schramm
Model: Wireless Base Station Date: 6/10/98
Center Frequency: 1989.96

Temperature degrees C	Frequency MHz	Deviation ppm	Limit ppm
-24	N/A		2.00
-26	N/A		2.00
-28	1989.9600	0.01	2.00
-30	1989.9600	0.01	2.00
-36	1989.9600	0.01	2.00
-42	1989.9600	0.01	2.00
-48	1989.9600	0.01	2.00
-54	1989.9600	0.01	2.00
-55.2	N/A		2.00



17-011-770-921-1889

FAX Transmission

TO: Harada san

We have re-tested the same device which was examined in ITS-Atl from June 3 to 4. The device's serial number is "1776008". Attached six plots are result of the occupied bandwith. Each plots are measured in the setting as follow.

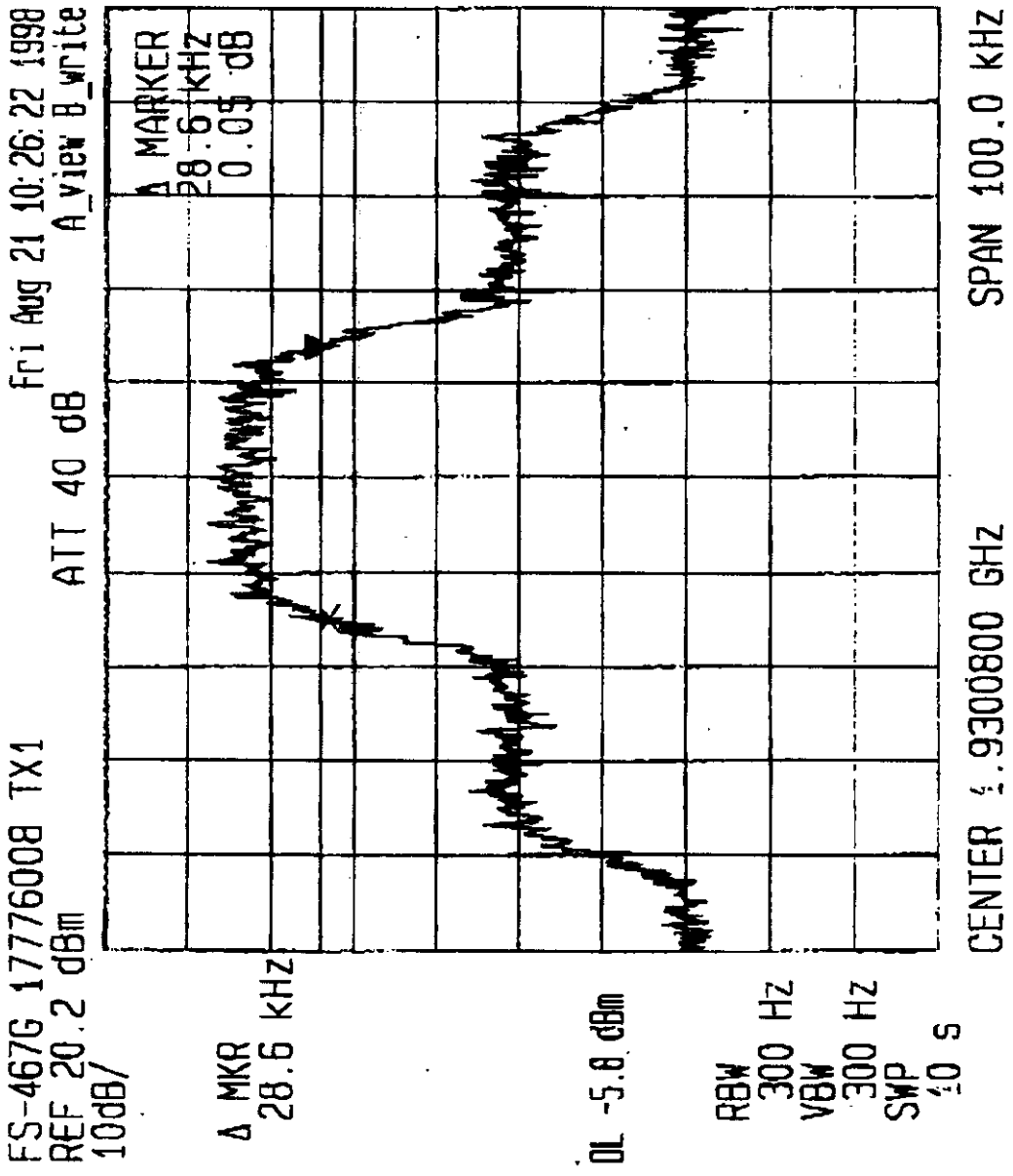
1. TX 1 channel 2 (1930.08MHz)
2. TX 1 channel 1000 (1960.02MHz)
3. TX 1 channel 1998 (1989.96MHz)
4. TX 2 channel 2 (1930.08MHz)
5. TX 2 channel 1000 (1960.02MHz)
6. TX 2 channel 1998 (1989.96MHz)

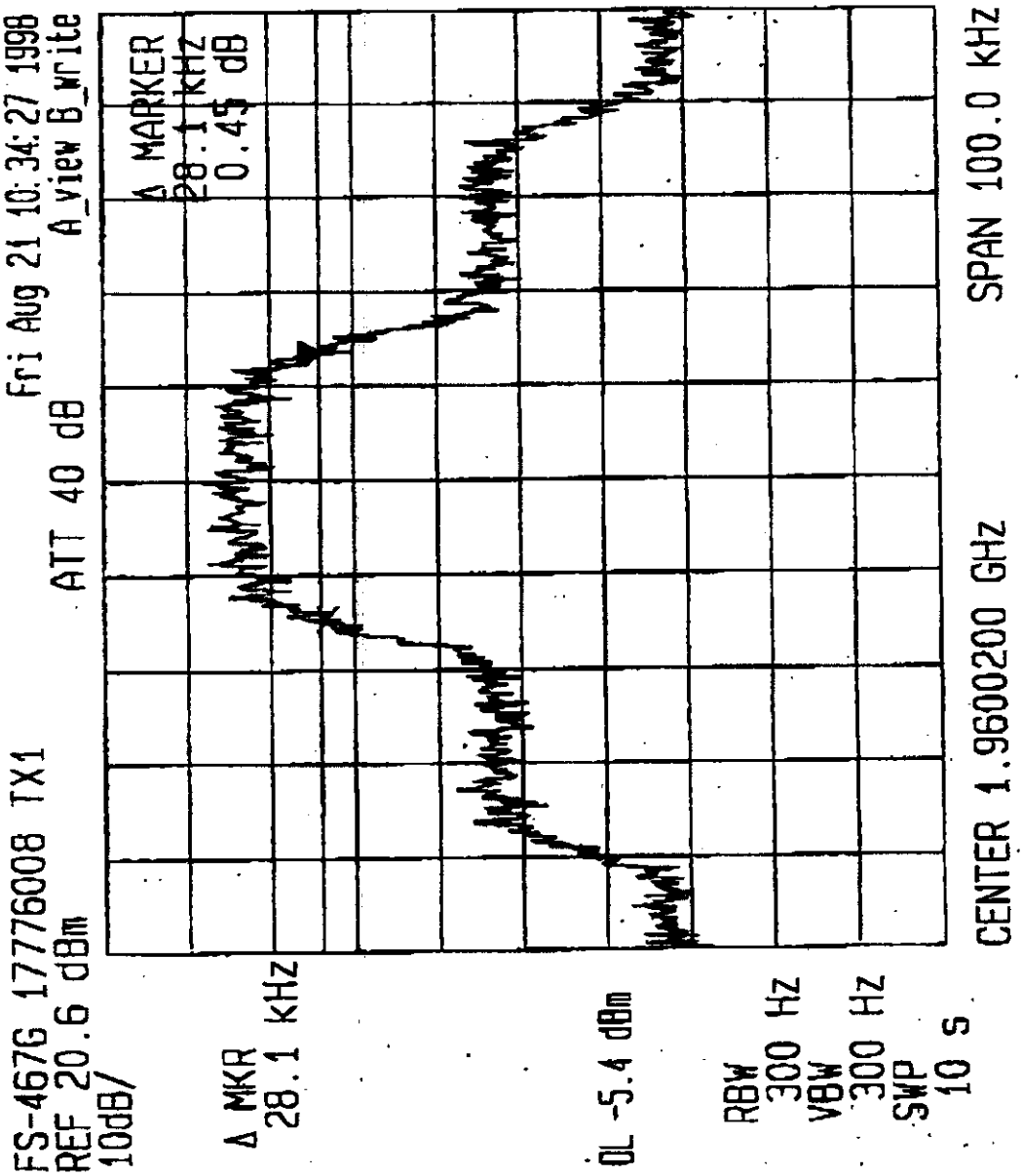
Would you send these results to ITS with ASC's letterhead, they may need it to verify the correspondence of the device.

Thank you

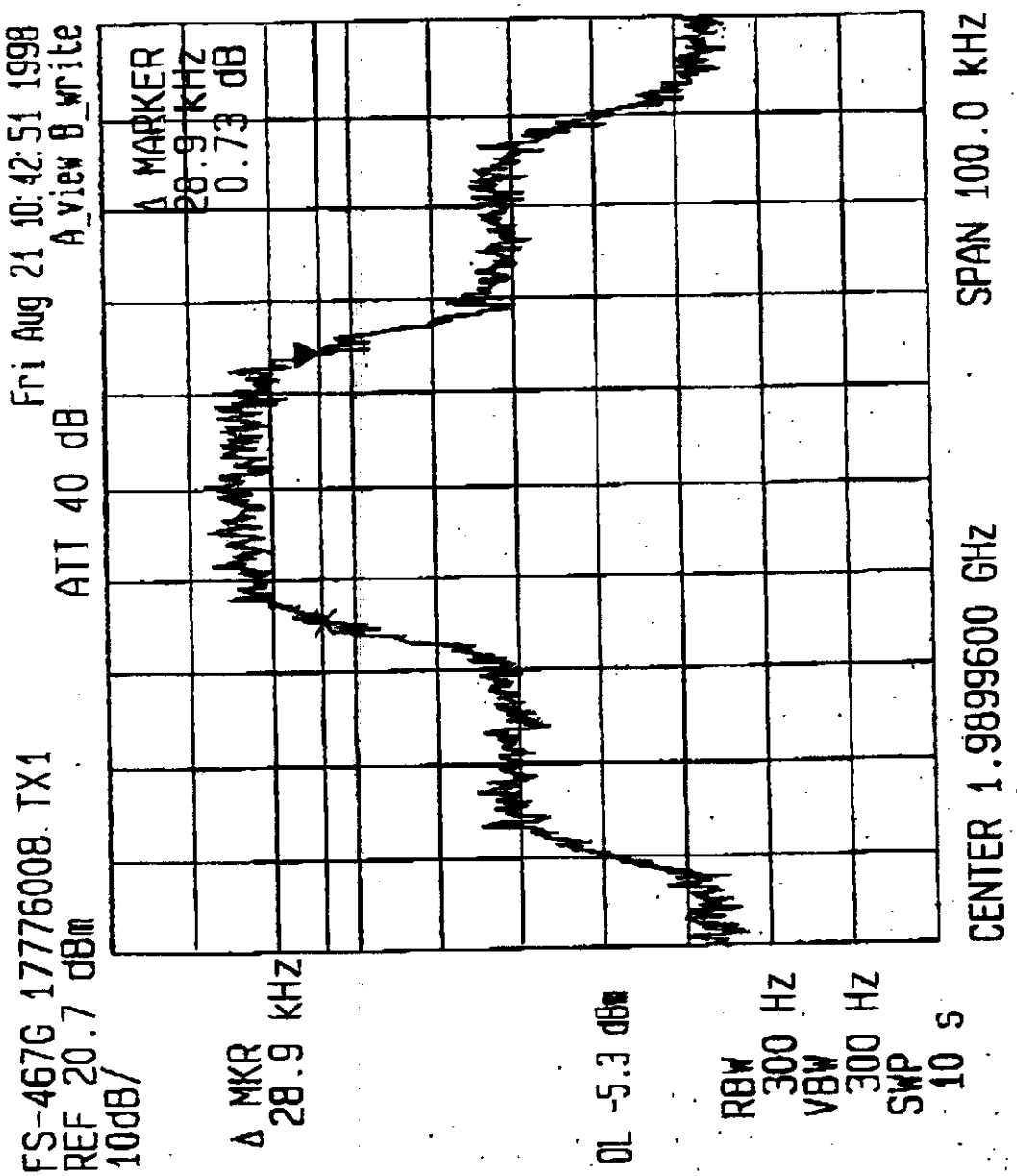
Mitsubishi
小島 浩
(H. Kojima)

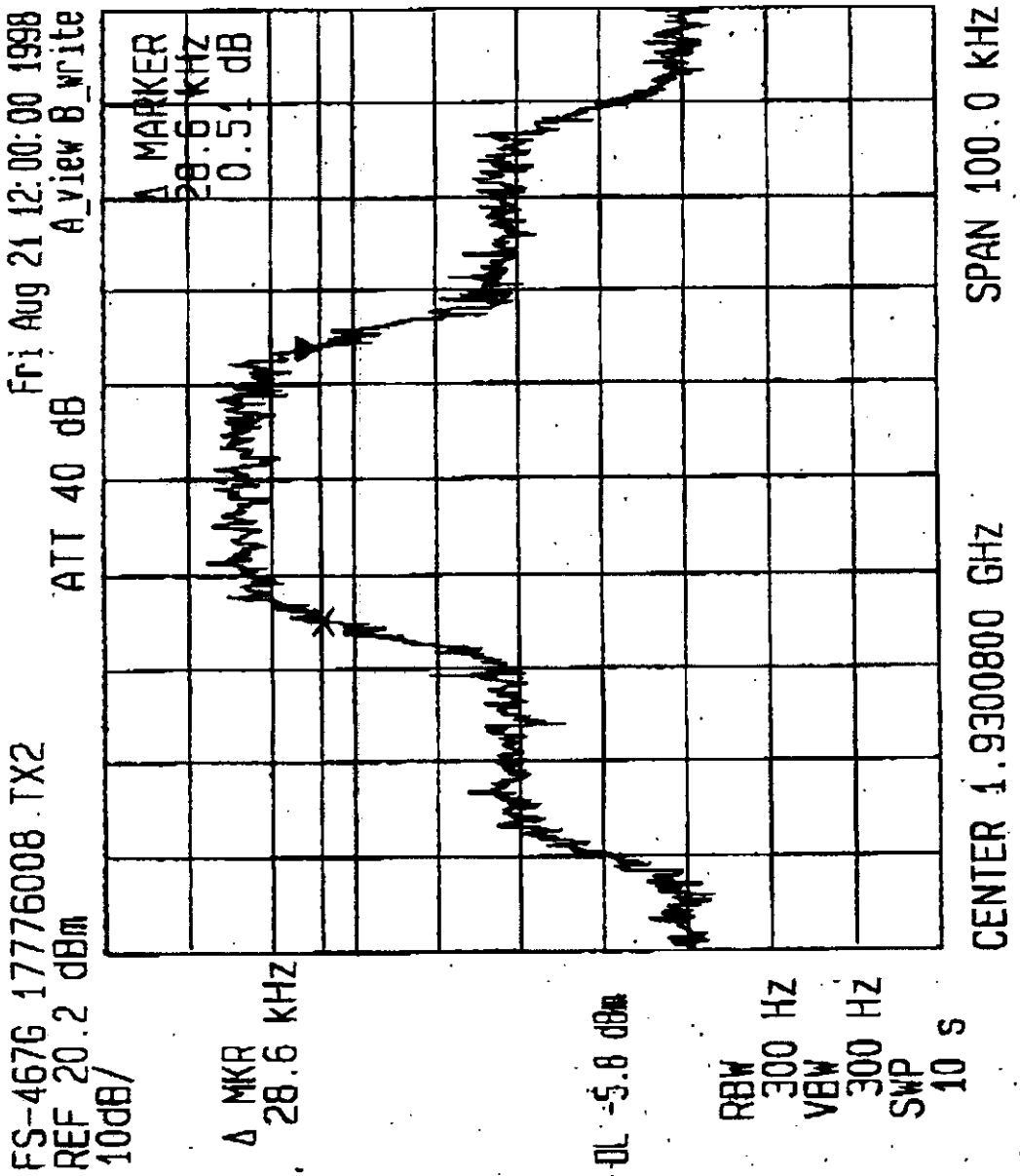
2nd page is missing.
I will confirm that it is.


FS-467G 17776008 TX1
REF 20.2 dBm
10dB/
ATT 40 dB
Fri Aug 21 10:26:22 1998
A_view B_write
Δ MARKER
28.6 kHz
0.05 dB
Δ MKR
28.6 kHz
OL -5.8 dBm
RBW
300 Hz
VBW
300 Hz
SWP
10 s
CENTER 4.9300800 GHz
SPAN 100.0 kHz

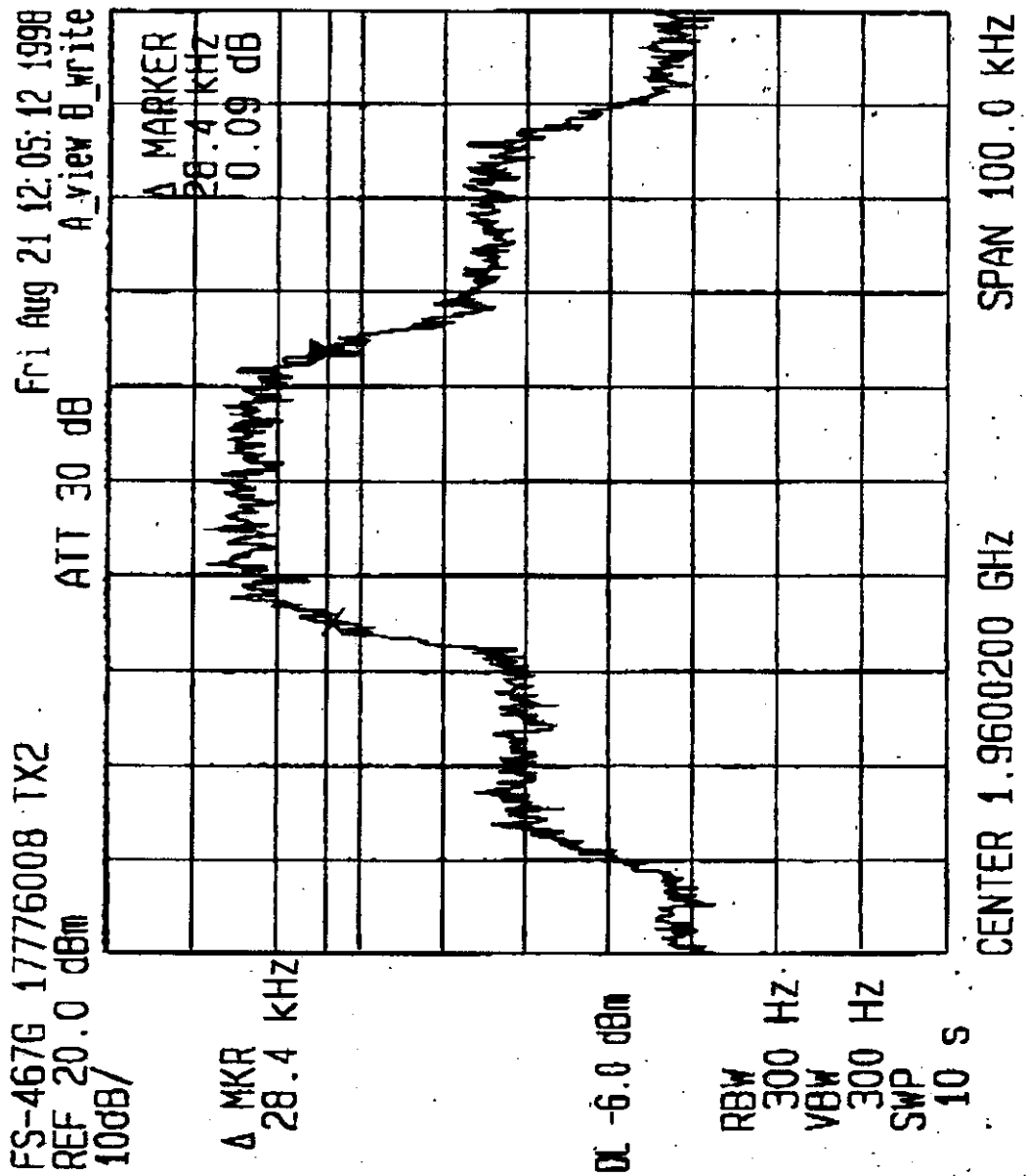

FS-467G 17776008 TX1
REF 20.6 dBm
10dB/
ATT 40 dB
Fri Aug 21 10:34:27 1998
A_view B_write
Δ MARKER
28.1 kHz
0.45 dB
Δ MKR
28.1 kHz
OL -5.4 dBm
RBW
300 Hz
VBW
300 Hz
SWP
10 s
CENTER 1.9600200 GHz
SPAN 100.0 kHz

3/

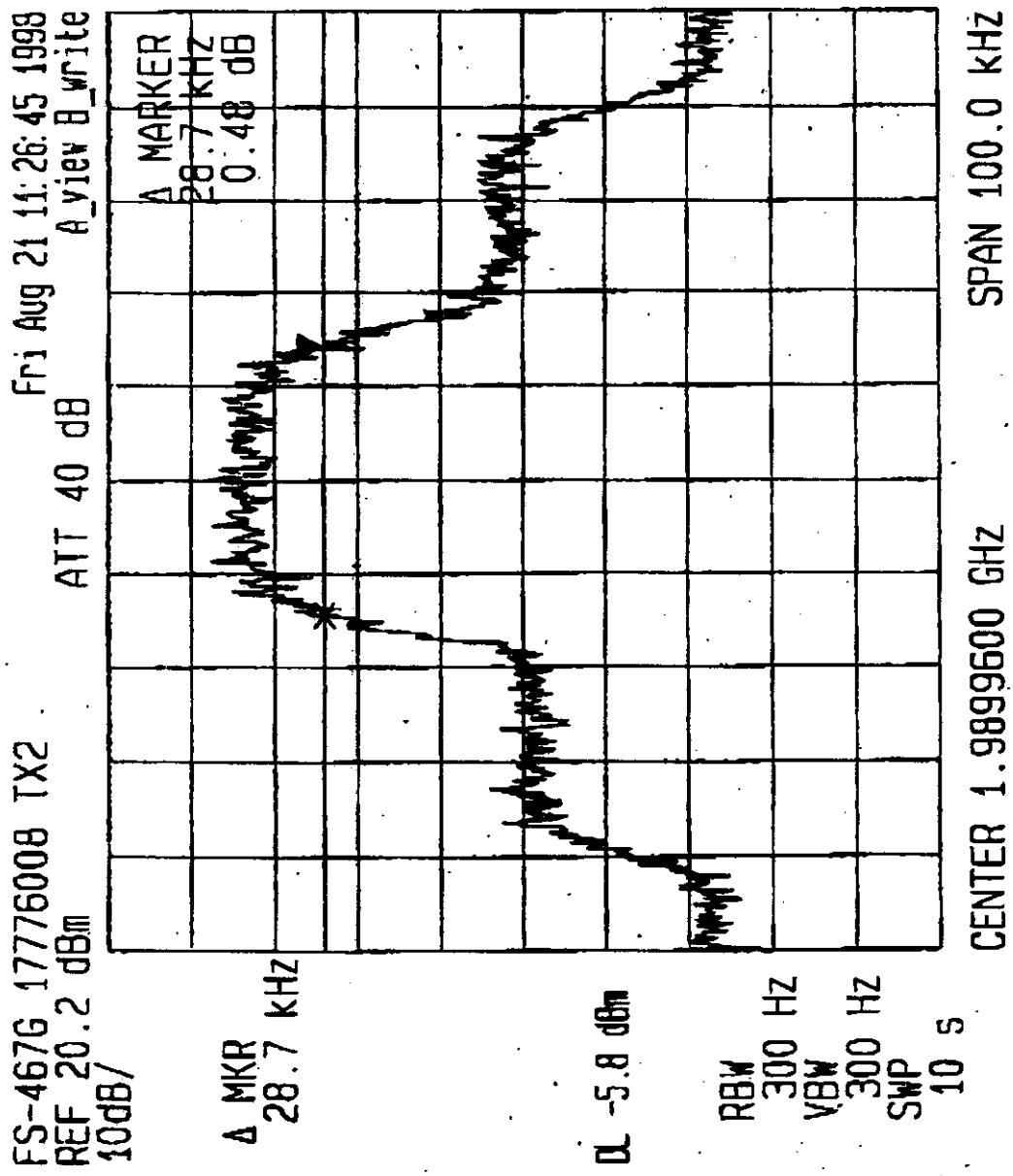

FS-467G 17776008.TX1
REF 20.7 dBm
10dB/
ATT 40 dB
Fri Aug 21 10:42:51 1998
A_view B_write
Δ MARKER
28.9 kHz
0.73 dB
Δ MKR
28.9 kHz
OL -5.3 dBm
RBW
300 Hz
VBW
300 Hz
SWP
10 s
CENTER 1.9899600 GHz
SPAN 100.0 kHz


FS-4676 17776008 TX2
REF 20.2 dBm
10dB/
ATT 40 dB
Fri Aug 21 12:00:00 1998
A_view B_write
Δ MARKER
28.6 kHz
0.51 dB
Δ MKR
28.6 kHz
-DL -5.8 dBm
RBW
300 Hz
VBW
300 Hz
SWP
10 s
CENTER 1.930800 GHz
SPAN 100.0 kHz

5/


FS-467G 17776008 TX2
REF 20.0 dBm
10dB/
ATT 30 dB
Fri Aug 21 12:05:12 1998
A_view B_write
Δ MARKER
28.4 kHz
0.09 dB
Δ MKR
28.4 kHz
OL -6.0 dBm
RBW
300 Hz
VBW
300 Hz
SWP
10 s
CENTER 1.9600200 GHz
SPAN 100.0 kHz

6/


FS-467G 17776008 TX2
REF 20.2 dBm
10dB/
ATT 40 dB
Fri Aug 21 11:26:45 1998
A_view B_write
Δ MARKER
28.7 kHz
0.48 dB
Δ MKR
28.7 kHz
OL -5.8 dBm
RBW 300 Hz
VBW 300 Hz
SWP 10 s
CENTER 1.9899600 GHz
SPAN 100.0 kHz