Engineering Exhibit in Support of
Class II Permissive Change Request
FCC Form 731

for the

T881 Exciter module of Tait's T88x 800 MHz base station

modulated with

8 FSK digital modulation from Dataradio's Base Data Link Controller (BDLC)

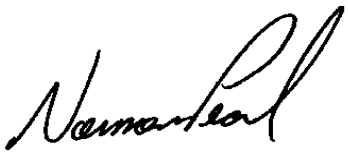
FCC ID: EOTBDD4T881S2

Trade Name: Paragon/PD

January 7, 2003

AFFIDAVIT

The technical data included in this report has been accumulated through tests that were performed by me or by engineers under my direction. To the best of my knowledge, all of the data is true and correct.



Norman D. Pearl
Vice-president Engineering, Dataradio Inc.

Dataradio Inc., Montreal, Canada

ENGINEERING STATEMENT
OF CONSTANTIN PINTILEI

The application consisting of the attached engineering exhibit and associated FCC form 731 has been prepared in support of a request for a Class II Permissive Change for EOTBDD4T881S2. All changes involved fall under Class II Permissive Change types and they are entirely detailed within the current report.

The certificate EOTBDD4T881-3 has been granted to Dataradio Inc. following a change in ID request from CASTEL0043 for the T881-10 Exciter module of the T88M-XY (see page 6 for part# description) 800 MHz base station manufactured by Tait Electronics Ltd. Dataradio Inc. buys this base station and uses it to build Paragon/PD, a wireless data base station. A base station data link controller feeds the exciter in order to build a digital frequency modulation scheme. Dataradio Inc does the final assembly and markets the finished Paragon/PD unit. Several Class II Permisive Changes were asked and granted, the last certificate EOTBDD4T881S2 was granted on 04/22/2002 having the following list of emission designators: 16K0F3E and 9K50, 11K0, 14K3 and 15K9F1D.

A Class II Permissive type of change is demonstrated with this filing. The change consists in the addition of new speed capabilities based on 8-FSK digital modulation source for which the compliance has been demonstrated for mask 90.210G or H as required. For this modulation source four new emission designators are required: 13K7,14K9,9K17 and 11K9F1D. This Class II permissive change involves the modulation source only and it is completely described in the current report. There are no hardware changes involved in either the radio or the modem/controller circuits. Also there are no changes in those modules of the firmware that control the transmitter.

EXISTING CONDITIONS

The unit utilized for these occupied bandwidth and mask-compliance measurements was a prototype built from pilot EOTBDD4T881S2 (in itself being a change in ID from production CASTEL0043) with beta-level firmware used to create the modulation scheme. The Exciter operates on frequencies ranging from 800.000 MHz to 870.000 MHz. The frequency tolerance of the exciter is .0001% or 1 parts per million and the output power is 5W as granted in EOTBDD4T881s2.

PROPOSED CONDITIONS

It is proposed to accept the Class II permissive change request for the EOTBDD4T881S2 certificate for operation in the band of frequencies previously outlined. The applicant anticipates marketing the device for use in wireless transmission of data.

PERFORMANCE MEASUREMENTS

All measurements for Occupied Bandwidth and mask compliance as per 2.1043 (b)(2) were conducted in accordance with the Rules and Regulations Section 2.1041and 2.1049 of Rules Service Co rev.2-154, Mar 15,2000. The measurements were made in the engineering laboratory located at 5500 Royalmount ave, Montreal, Canada. All measurements were made and recorded by myself or under my direction. The measurements were made between Dec 15, 2002 and Dec 24, 2002.

CONCLUSION

Given the results of the measurements contained herein, the applicant requests to be accepted the Class II Permissive Change for the Certificate EOTBDD4T881S2 and to append 13K7,14K9,9K17 and 11K9F1D to the emission designator list.

01/06/2003
Constantin Pintilei
R&D Test Engineer, Dataradio Inc.

TABLE OF CONTENTS

ANNEXES:

Annex A: Instruction Manual

Qualifications of Engineering Personnel

NAME:	**Norman Pearl**
TITLE:	Vice-president Engineering
TECHNICAL EDUCATION:	Bachelor of Engineering (Electrical) (1979) McGill University, Montreal, Canada
TECHNICAL EXPERIENCE:	Professional engineer since 1979 25 Years experience in radio communications

NAME:	**Constantin Pintilei**
TITLE:	R&D Test Engineer
TECHNICAL EDUCATION:	Bachelor of Science Degree in Radiotechnique Electronic Engineering (1993) Technical University of Iasi, Romania
TECHNICAL EXPERIENCE:	Professional engineer since September 2001 8 Years experience in radio frequency measurements.

Class II Permissive Change Information - Rule part 2.1043 (b)(2)

The certificate EOTBDD4T881S2 has been granted to Dataradio Inc. following an ID change request from CASTEL0043. The certificate CASTEL0043 has been granted to Tait Electronics Ltd. for its series II of T881 Exciter module. It belongs to the T88M-XY (see page bottom for part# description) 800 MHz base station. Dataradio Inc. buys this base station and uses it to build Paragon/PD, a base station for wireless data networks. In order to market it under Dataradio logo the change in ID was done.

Further, several data speeds using 4-FSK SRRC digital modulation were granted following two Class II permissive change requests. The emission designator list of the certificate granted on 04/22/2002 has the following values:

- 16K0F3E inherited from the original certificate CASTEL0043 when the change in ID to EOTBDD4T881S2 was granted on 02/16/2001 (EA 100077)
- 14K3, 15K9, 9K50 and 11K0F1D for accordingly 25.6, 19.2 (for 25kHz spaced channels), 16.0 and 14.4 (for 12.5 kHz spaced channels) kbps 4-FSK SRRC digital modulation granted on 05/30/2001 following a Class II permissive change request (EA100968)
- 15K9F1D for 32.0 kbps (for 25 kHz spaced channels) 4-FSK RC digital modulation granted on 01/14/2002 following a Class II permissive change request (EA 593852).
- 9K50 and 11K0F1D for accordingly 25.6, 19.2kbps (for 12.5 kHz spaced channels) 4-FSK SRRC digital modulation granted on 04/22/2002 following a Class II permissive change request (EA 257831)

The current Class II permissive change request asks that following digital modulation schemes comprised of data rates, pulse shaping and deviation index

data rate	Symbol rate	Pulse- shaping filter equation	Deviation	Occupied Bandwidth	Emission designator
48000 bps	16000 bauds	xRC8FSK –raised cosine family	± 4.14 KHz	13670Hz	13K7F1D
43200 bps	14400 bauds	xRC8FSK –raised cosine family	± 4.76 KHz	14830Hz	14K9F1D
28800 bps	9600 bauds	xRC8FSK –raised cosine family	± 2.69 KHz	9167Hz	9K17F1D
24000 bps	8000 bauds	xRC8FSK –raised cosine family	± 3.45 KHz	11830Hz	11K9F1D

are allowed for use in 800MHz band. The resulting emission designators should be appended to the existent list. The compliance is demonstrated for mask 90.210(G) or (H) as required for the new modulation schemes proposed.

The change above described involves the modulation source only therefore it fall under Class II Permissive Changes type as per 2.1043 (b)(2). No other changes occur elsewhere in the circuitry of the exciter module. The characteristics affected by the first modification of above are:

Digital Modulation Techniques - part 2.1033.(c)(13)
Type of emission and Emission designators list - part 2.1033 (c)(4), 90.209
Occupied bandwidth and mask compliance requirement - part 2.1049,90.210(g)(h)

They are entirely documented with the current report.

All this Class II permissive change data as per 2.1043 are completely described with the current report.

Part Number of the Tait 800 MHz base station T88M-XY

M	Module Type	X	Freq Range	Y	Channel Bandwidth
1	Exciter (5W)	1	800-870 MHz	0	25 kHz
5	Receiver	2	860-910 MHz	5	12.5 kHz
9	Power Amplifier	3	890-960 Mhz		

Part Number of the Paragon/PD 800 MHz data base station BDD4 -88XY PPPS

X	Freq Range	Y	Channel Bandwidth	PPP	Transmitted Power	S	Supply
1	800-870 MHz	0	25 KHz	005	5W	0	12VDC external
2	860-960 MHz	5	12.5 KHz	070	70W	2	dual 120V AC

EQUIPMENT IDENTIFICATION:

TRADE NAME	**DESCRIPTION**	**Dataradio Inc PART NUMBER**
T88x	800 Mhz Base Station	T88M-XY
D212	Base Data Link Controller (BDLC)	050-03330-00x
Paragon/PD	Assembly	BDD4-88XY PPPS

General Information about the Grantee and Certified Equipment -2.1043 (B)(2)
(as per Rule Part Number: 2.1033 (c).(1),(2),(5),(6),(7)

APPLICANT and GRANTEE of ID EOTBDD4T881S2	Dataradio Inc., 5500 Royalmount Ave, suite 200, Town of Mount Royal, Quebec, Canada, H4P 1H7
MANUFACTURER:	Tait Electronics Ltd., Burnside Christchurch 5, New Zealand (T88x 800 MHz Base station, original FCC ID:CASTEL0043) DATARADIO Inc., Town of Mount Royal, Quebec, Canada, H4P 1H7 (D212 BDLC and Paragon/PD- final assembly)
MODEL NUMBER: PART NUMBER:	Paragon/PD BDD4-88XY PPPS
SERIAL NUMBER (S):	D212 address 1.0 -prototype 8-level FSK BDLC T881-10-0200 s.n 13012185 Exciter module
FCC ID NUMBER:	EOTBDD4T881s2
FCC RULES AND REGS:	FCC Part (s) 90
FREQUENCY RANGE:	800 MHz -870 MHz as per EOTBDD4T881s2 certificate
MAXIMUM POWER RATING:	5Watts as per EOTBDD4T881s2 certificate. The output power is adjustable down to 1W.
NUMBER OF CHANNELS:	1 Channel selectable from 256 channels as per Tait's manual
OUTPUT IMPEDANCE:	50 ohms, Nominal
VOLTAGE REQUIREMENTS:	10.9-16.3VDC (13.6 VDC Nominal)

EQUIPMENT IDENTIFICATION:

TRADE NAME	DESCRIPTION	DRI PART NUMBER
T88x	800 MHz Base Station	T88M-XY
D212	Base Data Link Controller (BDLC)	050-03330-00x
Paragon/PD	Assembly	BDD4-88XY PPPS

Data And Characteristics Not Affected By The Change-Rule Part Number: 2.1033 (c)(8),(9),(10),(11),(12),(15),(16)

DC Voltages And Currents Into Final Amplifier (T881)	2.1033(c).(8)
Transmitter Tune Up Procedure	2.1033 (c) (9)
Description Of Circuitry, Schematics and Transistor, Diode, and IC Functions	2.1033 (C)(10)
FCC Label	2.1033 (c) (11)
Internal/External Photographs	2.1033 (c) (12)
Data addressing Rule Part Number	2.1033(c) (15),(16): this unit is not designed for the mentioned purposes
MPE limits compliance	2.1091
Test results not affected by the change	2.1033(c)(14), 2.1041

Test data according to:
Part 2: 2.1046, 2.1051, 2.1053, and 2.1055
Part 90, Subpart I: 90.213
as follows:

Transmitter Rated Power Output	2.1046
Transmitter Spurious and Harmonic Outputs	2.1051
Field Strength of Spurious Radiation	2.1053
Frequency Stability and Frequency Tolerance	2.1055,90.213

Data And Characteristics Affected By The Change - Rule Part Number: 2.1033(c) (3),(4),(13),(14)

INSTRUCTION BOOK 2.1033 (c) (3)
Annex A . The attached Technical Manual for the Paragon/PD data base station using SRRC8FSK is a preliminary version.

TYPE OF EMISSION: 2.1033(c)(4)

For Class II Permissive Change 8levelFSK	25kHz ch. (16000baud, 8 FSK)	**13K7F1D**
	25kHz ch. (14400baud, 8 FSK)	**14K9F1D**
	12.5kHz ch. (9600baud, 8 FSK)	**9K17F1D**
	12.5kHz ch. (8000baud, 8 FSK)	**11K9F1D**
Previously granted for EOTBDD4T885-3	25kHz ch.	**16K0F3E**
	25kHz ch. (12800baud, 4 FSK)	**14K3F1D**
	25kHz ch. (9600baud, 4 FSK)	**15K9F1D**
	25kHz ch. (16000baud, 4 FSK)	**15K9F1D – not changed**
	12.5kHz ch. (8000baud, 4 FSK)	**9K50F1D**
	12.5kHz ch. (7200baud, 4 FSK)	**11K0F1D**
	12.5kHz ch. (9600baud, 4 FSK)	**9K50F1D – not changed**
	12.5kHz ch. (12800baud, 4 FSK)	**11K0F1D – not changed**

DIGITAL MODULATION TECHNIQUES 2.1033 (c)(13)

The explanation provided with the previous Class II permissive change request (731 form number EA 100968) for the other speeds and 4-FSK SRRC digital modulation still applies.
The two differences refer to the symbol mapping which is 3-bit mapped into 8 FSK levels and to the bit rates, which are accordingly higher for the same approved symbol rates. The digital filter implemented belongs to Raised Cosine family, the cut-off frequencies of the RC digital filtering are half of the symbol rates.

TEST DATA Rule Part Number: 2.1033 (c)(14)

All applicable test data according to:
-Part 2: 2.1043 (b)(2), 2.1049
-Part 90, Subpart I: 90.209 and 90.210(h)
are provided in next section of this Engineering Report

Modulation Characteristic Part 2.1047 (d), 90.209 (b), 90.210(g)(h): Other types of equipment: this equipment is not provided with hardware audio low-pass filters, the filtering is entirely the result of DSP firmware.

The following reports have been generated for Class II Permissive Change request for EOTBDD4T881S2 Transmitter. Paragon/PD is comprised of the Tait Electronics Ltd. T88M Base station with the Dataradio Inc D212 Base Data Link Controller (BDLC). Dataradio Inc does the changes to fit the transmitter to digital modulation, does final assembly and markets the Paragon/PD unit

Unless otherwise noted, all of the measurements were conducted following the procedures set forth in the TIA/EIA-603 standards.

NAME OF TEST:
Transmitter Occupied Bandwidth

RULE PART NUMBER: 2.201, 2.202, 2.1033 c (14), 2.1049 (h), 2.1041

Emission Designator Determination

Necessary Bandwidth Measurement (90.209.(b))

This Exciter uses digital modulation signals, passing through a DSP implemented low-pass filter to an FM modulator. The necessary bandwidth calculation for this type of modulation (RC4FSK) is not covered by paragraphs (1), (2) or (3) from 2.202(c), the result exceeding by far the real necessary bandwidth obtained through simulations or measurement.

Therefore, the approach outlined in (2.202(c)(4)) is applicable in this case.

The results of 99% Occupied Bandwidth measurement are:

Bitrate	8-FSK Baud rate	SRRC filter 3dB cut-off	Deviation	Occupied Bandwidth	Authorized Bandwidth	Emission designator *
48000bps	16000 bauds	8000Hz	± 4.14 KHz	13670Hz	20000 Hz	13K7F1D
43200bps	14400 bauds	7200Hz	± 4.76 KHz	14830Hz	20000 Hz	14K9F1D
28800bps	9600bauds	4800Hz	± 2.69 KHz	9167Hz	20000 Hz	9K17F1D
24000bps	8000bauds	3600Hz	± 3.45 KHz	11830Hz	20000 Hz	11K9F1D

The measurement theory and set-up explanations follow.

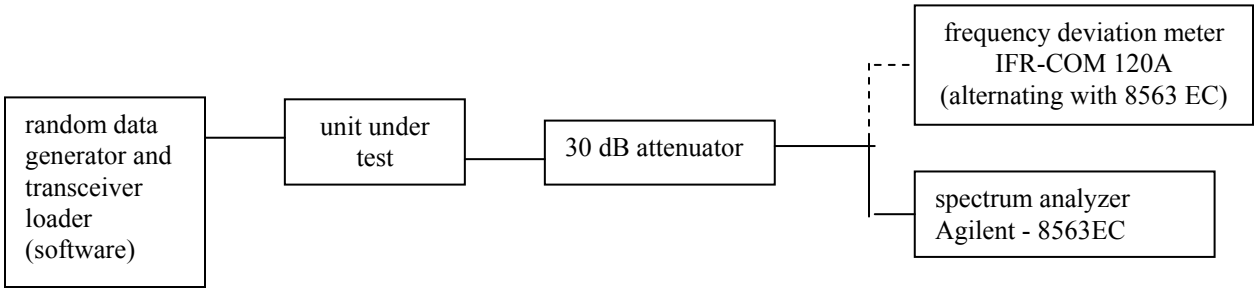
Occupied Bandwidth Measurement

The Occupied Bandwidth measurement option of the instrument (8563EC spectrum analyzer from Agilent) calculates and provides the values used above for the emission designator.

The percentage setting of the measurement has been set to 99% following the definition of the ***Occupied Bandwidth*** "the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission" (FCC 2.202)

The measurement has been performed preceding the tests for compliance with masks , the resulting value was recorded as Occupied Bandwidth.

The measurement set-up is:



NAME OF TEST: Transmitter Occupied Bandwidth
Paragon/PD Modem at 16000 baud 8FSK

Mask compliance data in support of Emission Designator **13K7F1D**

RULE PART NUMBER: 2.201, 2.202, 2.1033 c (14), 2.1049 (h), 2.1041, 90.209 (b)(5), 90.210 (g)

MINIMUM STANDARD: Mask G
Sidebands and Spurious [Rule 90.210 (g)]
Authorized Bandwidth = 20 kHz [Rule 90.209(b) (5)]

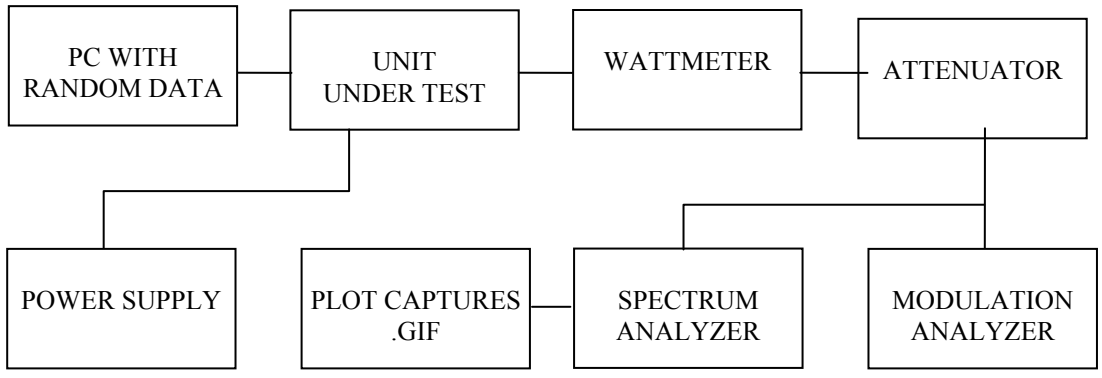
Fo to 5.0 kHz	Attenuation = 0 dB
>5.0 kHz to 10.0 kHz	Attenuation= $83*\log(f_d \text{ KHz} /5)$ dB
>10.0 kHz to 250% Auth BW	Attenuation = Lesser of: $116*\log(f_d \text{ KHz} /6.1)$ dB, $50+10\log_{10}(P)$ OR 70 dB
>250% Auth BW	$43 + 10*\log(P)$
Corner Points:	
f_0 to 5.0 kHz	Attenuation = 0 dB
>5.0 kHz to 10.0 kHz	Attenuation= 0 dB to 25 dB
>10.0 kHz to 25.0 KHz	Attenuation = 25 dB to 70 dB
>25.0 kHz to 50kHz	Attenuation = 70dB (minimum 57dB -5W)
>250% Auth BW	Attenuation = 50 dB (minimum 50 dB -5 W)

TEST RESULTS: Meets minimum standard (see data on the following pages)

TEST CONDITIONS: Standard Test Conditions, 25 C
TEST EQUIPMENT: Attenuator, BIRD Model / 150-A-MFN-30 / 30 dB / 150 Watt
Wattmeter Coaxial Dynamics model 81050
DC Power Source, Model Tait T808-10-00CA
Communication Analyzer, Model IFR COM120B for Modulation Analyzer
Spectrum Analyzer, Model HP E4401

PERFORMED BY: Constantin Pintilei DATE: 12/31/02

TEST SET-UP:



NAME OF TEST: Transmitter Occupied Bandwidth (Continued)
Paragon/PD Modem at 16000 baud 8FSK

MODULATION SOURCE DESCRIPTION:

TX Data Pattern:

The transmit data pattern is DBA protocol- type of "idle" packets data pattern as described in Annex E "Digital Modulation Techniques" of the application EA100968 granted on 05/30/2001. After this data follows the modulation process described, the resulting base band signal feed the modulator's input of the Exciter.

For 16000 baud rate, the deviation is set to 4.14 kHz. For deviation readings an IF filter of 30kHz has been used.

NECESSARY BANDWIDTH (Bn) CALCULATION

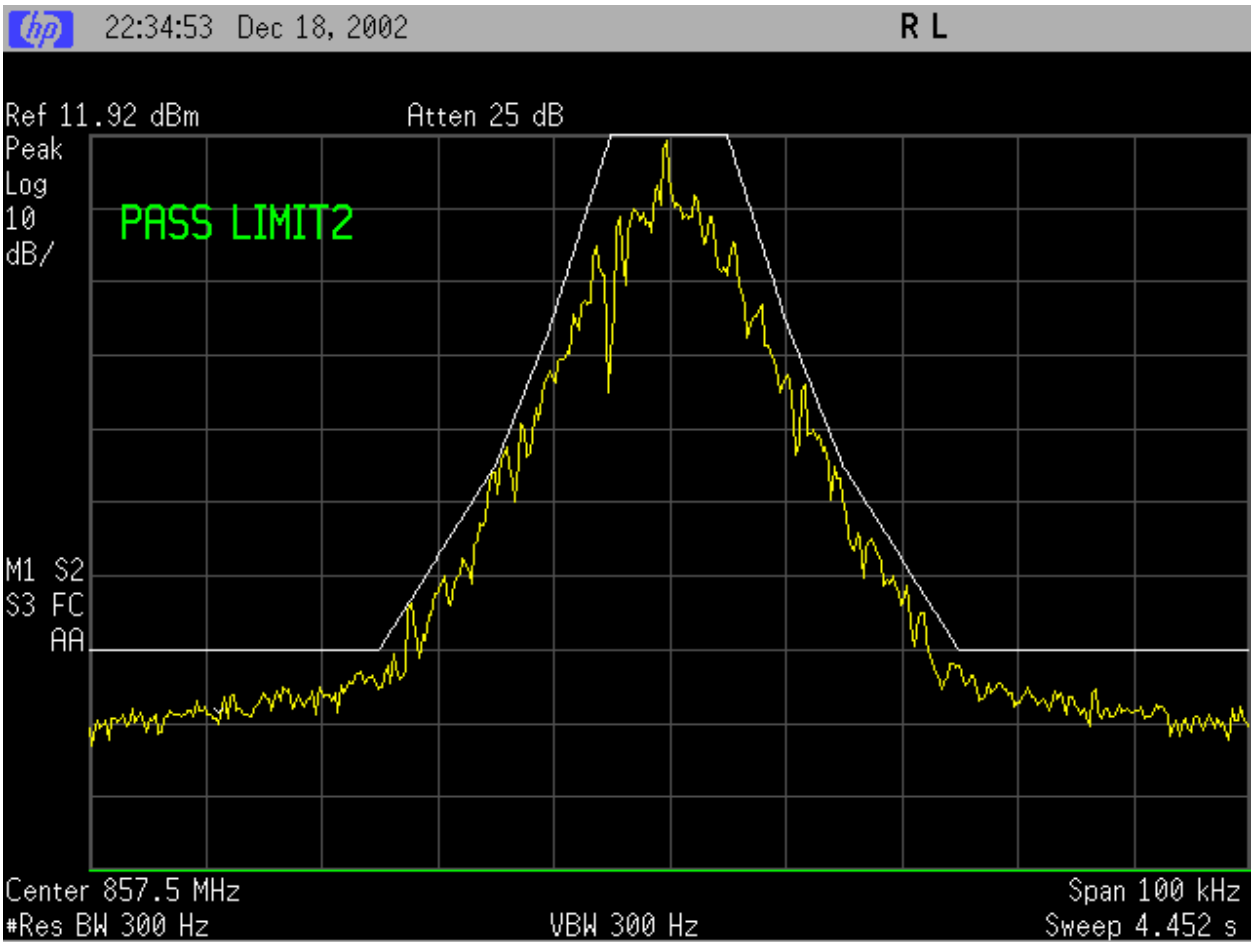
See Page 10 for emission designator determination.

The corresponding Necessary Bandwidth is 13670 Hz for 16000 baud rate, 4.14 kHz deviation and emission designator prefix for necessary bandwidth **13K7F1D**

TEST DATA: Refer to the following graphs:

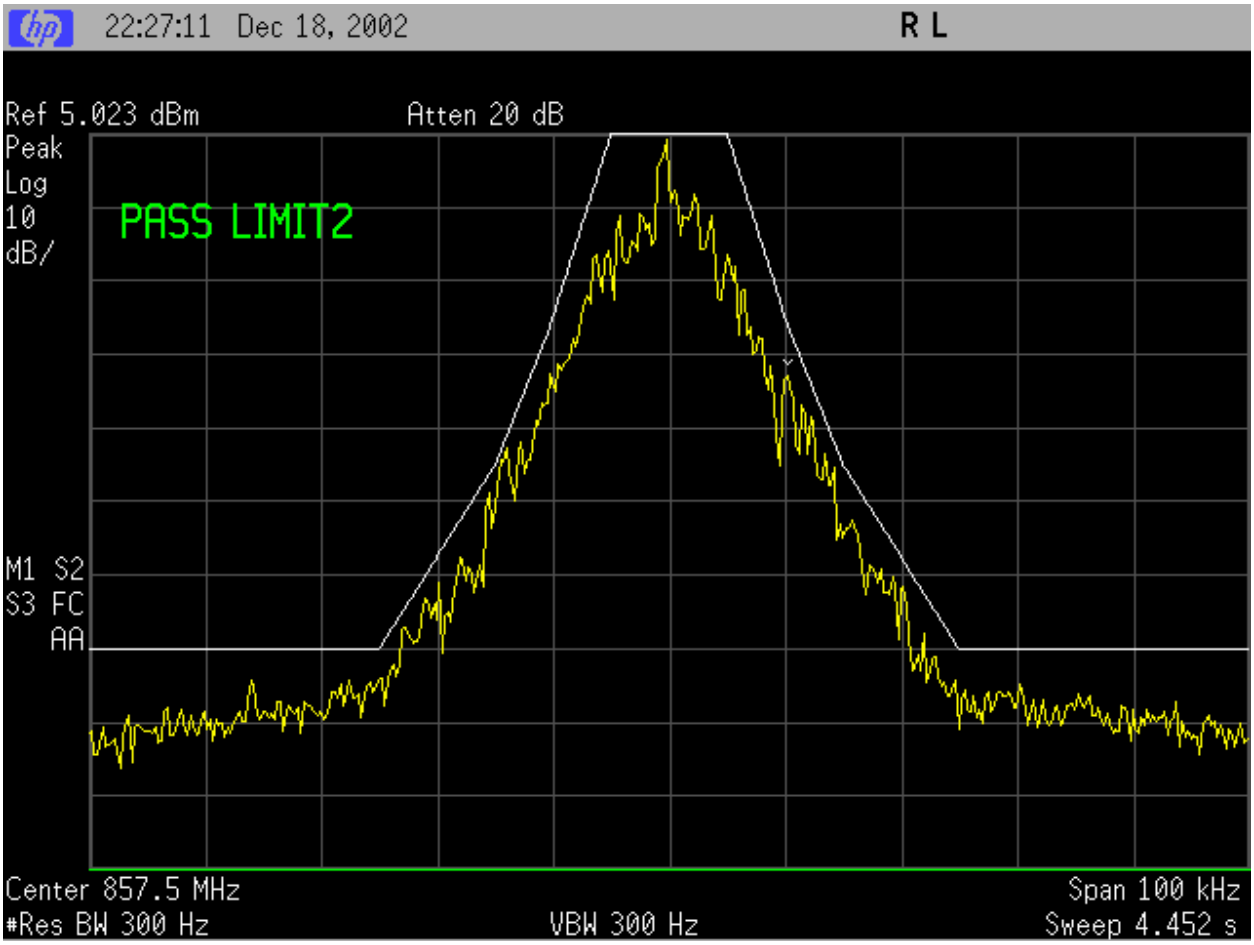
MASK: G, 5W – 13K7F1D 48.0kbps/16.0kbaud

OUTPUT POWER: 5 Watts
16000 bauds, 4 level FSK
PEAK DEVIATION = 4140 Hz
SPAN = 100 kHz



MASK: G, 1W– 13K7F1D 48.0kbps/16.0kbaud

OUTPUT POWER: 1 Watt
16000 bauds, 4 level FSK
PEAK DEVIATION = 4140 Hz
SPAN = 100 kHz



NAME OF TEST: Transmitter Occupied Bandwidth
Paragon/PD Modem at 14400 baud 8FSK

Mask compliance data in support of Emission Designator **14K9F1D**

RULE PART NUMBER: 2.201, 2.202, 2.1033 c (14), 2.1049 (h), 2.1041, 90.209 (b)(5), 90.210 (g)

MINIMUM STANDARD: Mask G
Sidebands and Spurious [Rule 90.210 (g)]
Authorized Bandwidth = 20 kHz [Rule 90.209(b) (5)]

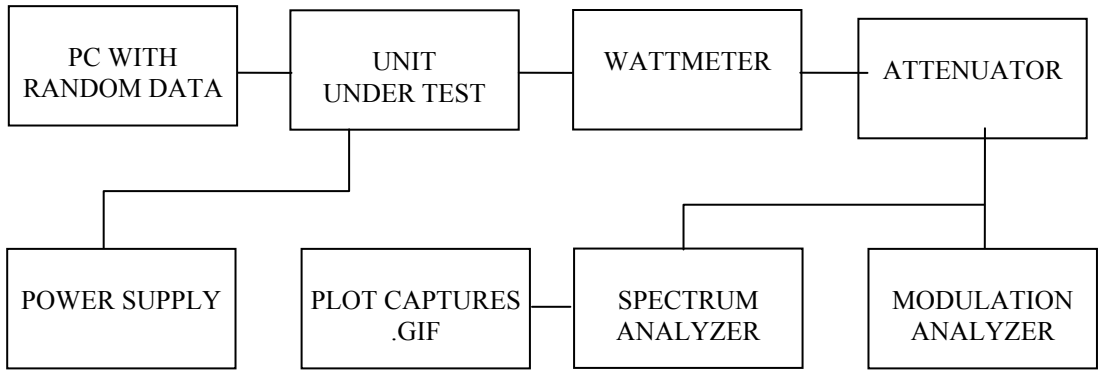
Fo to 5.0 kHz	Attenuation = 0 dB
>5.0 kHz to 10.0 kHz	Attenuation= $83*\log(f_d \text{ KHz} /5)$ dB
>10.0 kHz to 250% Auth BW	Attenuation = Lesser of: $116*\log(f_d \text{ KHz} /6.1)$ dB, $50+10\log_{10}(P)$ OR 70 dB
>250% Auth BW	$43 + 10*\log(P)$
Corner Points:	
f_0 to 5.0 kHz	Attenuation = 0 dB
>5.0 kHz to 10.0 kHz	Attenuation= 0 dB to 25 dB
>10.0 kHz to 25.0 KHz	Attenuation = 25 dB to 70 dB
>25.0 kHz to 50kHz	Attenuation = 70dB (minimum 57dB -5W)
>250% Auth BW	Attenuation = 50 dB (minimum 50 dB -5 W)

TEST RESULTS: Meets minimum standard (see data on the following pages)

TEST CONDITIONS: Standard Test Conditions, 25 C
TEST EQUIPMENT: Attenuator, BIRD Model / 150-A-MFN-30 / 30 dB / 150 Watt
Wattmeter Coaxial Dynamics model 81050
DC Power Source, Model Tait T808-10-00CA
Communication Analyzer, Model IFR COM120B for Modulation Analyzer
Spectrum Analyzer, Model HP E4401

PERFORMED BY: Constantin Pintilei DATE: 12/31/02

TEST SET-UP:



NAME OF TEST: Transmitter Occupied Bandwidth (Continued)
Paragon/PD Modem at 14400 baud 8FSK

MODULATION SOURCE DESCRIPTION:

TX Data Pattern:

The transmit data pattern is DBA protocol- type of "idle" packets data pattern as described in Annex E "Digital Modulation Techniques" of the application EA100968 granted on 05/30/2001. After this data follows the modulation process described, the resulting base band signal feed the modulator's input of the Exciter.

For 14400 baud rate, the deviation is set to 4.76 kHz. For deviation readings an IF filter of 30kHz has been used.

NECESSARY BANDWIDTH (Bn) CALCULATION

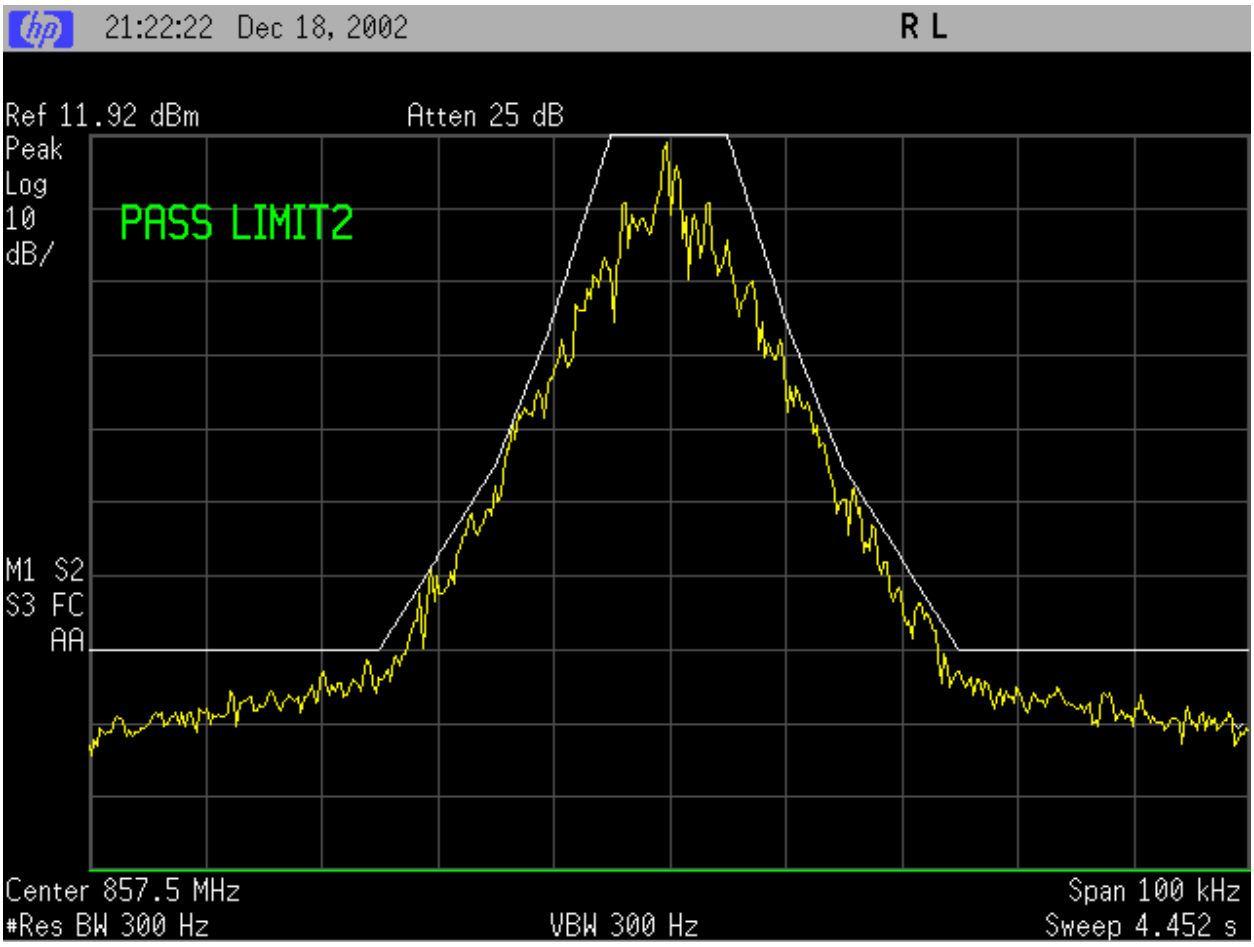
See Page 10 for emission designator determination.

The corresponding Necessary Bandwidth is 14830 Hz for 14400 baud rate, 4.76 kHz deviation and emission designator prefix for necessary bandwidth **14K9F1D**

TEST DATA: Refer to the following graphs:

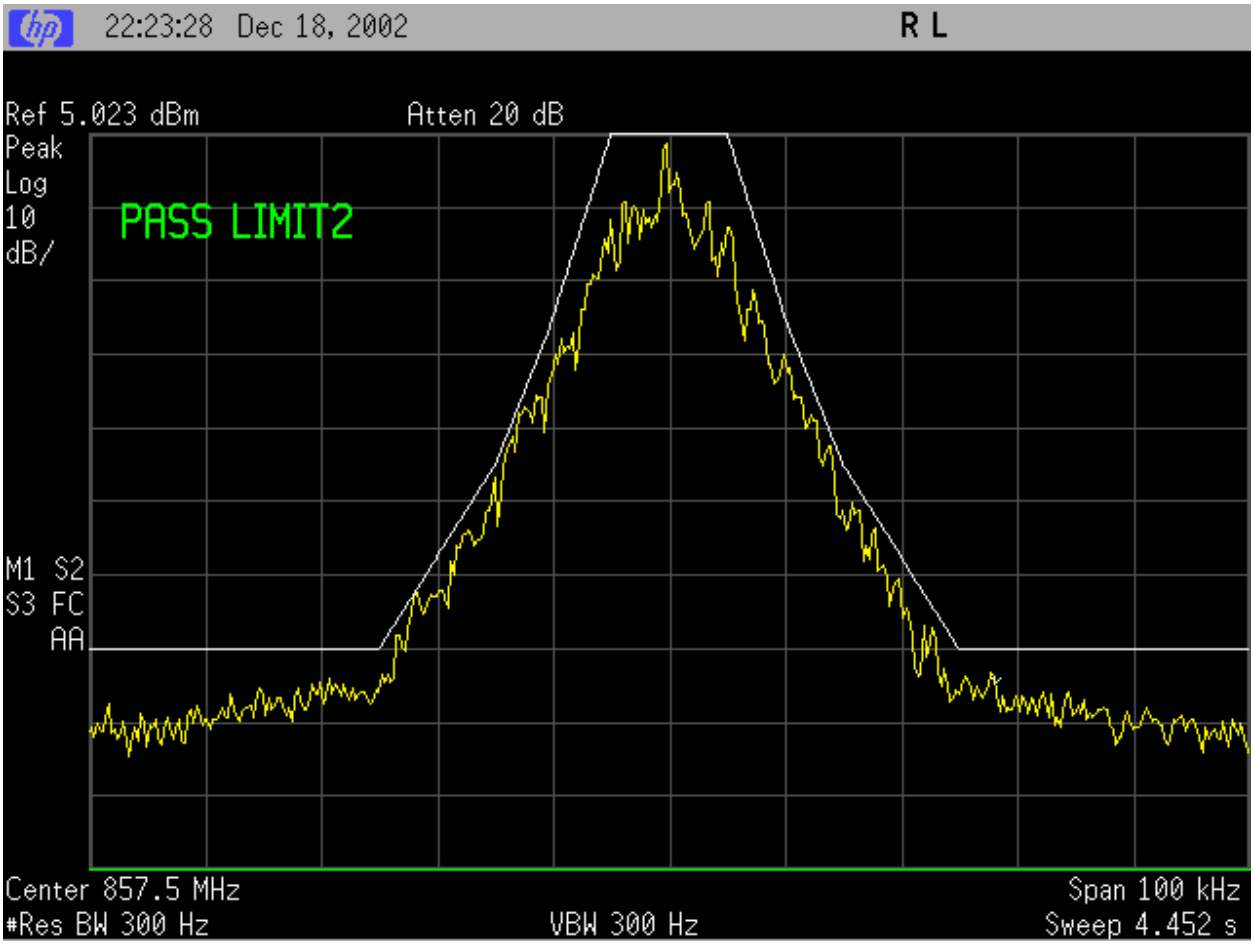
MASK: G, 5W – 14K9F1D 43.2kbps/14.4kbaud

OUTPUT POWER: 5 Watts
14400 bauds, 8 level FSK
PEAK DEVIATION = 4760 Hz
SPAN = 100 kHz



MASK: G, 1W – 14K9F1D 43.2kbps/14.4kbaud

OUTPUT POWER: 1 Watt
14400 bauds, 8 level FSK
PEAK DEVIATION = 4760 Hz
SPAN = 100 kHz



NAME OF TEST: Transmitter Occupied Bandwidth
Paragon/PD Modem at 9600 baud 8FSK

Mask compliance data in support of Emission Designator **9K17F1D**

RULE PART NUMBER: 2.201, 2.202, 2.1033 c (14), 2.1049 (h), 2.1041, 90.209 (b)(5), 90.210 (H)

MINIMUM STANDARD: Mask H
Sidebands and Spurious [Rule 90.210 (h)]
Authorized Bandwidth = 20 kHz [Rule 90.209(b) (5)]

Fo to 4.0 kHz	Attenuation = 0 dB
>4.0 kHz to 8.5 kHz	Attenuation= $107*\log(f_d/4)$ dB
>8.5 kHz to 15 kHz	Attenuation= $40.5*\log(f_d/1.16)$ dB
>15 kHz to 25kHz	Attenuation = $116*\log(f_d/6.1)$ dB
>25kHz	43 + 10*log(P) dB

Corner Points:

Fo to 4.0 kHz	Attenuation = 0 dB
>4.0 kHz to 8.5 kHz	Attenuation= 0 dB to 35 dB
>8.5 kHz to 15 kHz	Attenuation = 35 dB to 45 dB
>15 kHz to 25 kHz	Attenuation =45 dB to 71 dB
>25 kHz	Attenuation =53dB (10W-generic limit)

The limits would read 43dB for 1W and 50dB for 5W output.

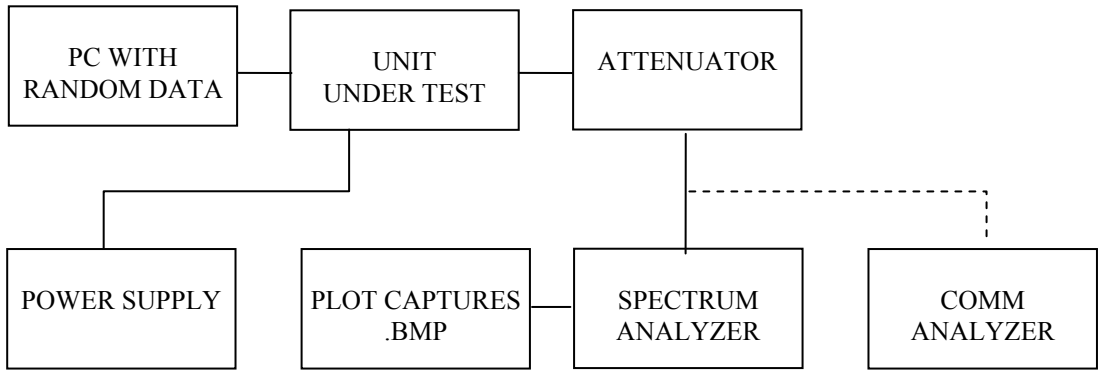
TEST RESULTS: Meets minimum standard (see data on the following pages)

TEST CONDITIONS: Standard Test Conditions, 25 C

TEST EQUIPMENT: Attenuator, BIRD Model / 50-A-MFN-30 / 30 dB / 50 Watt
DC Power Source, Model Astron VS 20M
Communication Analyzer, Model IFR COM120B (deviation meter)
Spectrum Analyzer, Model Agilent (HP) 8563EC

PERFORMED BY: Constantin Pintilei DATE: 12/31/02

TEST SET-UP:



NAME OF TEST: Transmitter Occupied Bandwidth (Continued)
Paragon/PD Modem at 9600 baud 8FSK
In Support of Emission Designator **9K17F1D**

MODULATION SOURCE DESCRIPTION:
TX Data Pattern:

The transmit data pattern is DBA protocol- type of "idle" packets data pattern as described in Annex E "Digital Modulation Techniques" of the application EA100968 granted on 05/30/2001. After this data follows the modulation process described, the resulting base band signal feed the modulator's input of the Exciter.

For 9600 baud rate, the deviation is set to 2.69 kHz. For deviation readings the IF filter of 30kHz has been used.

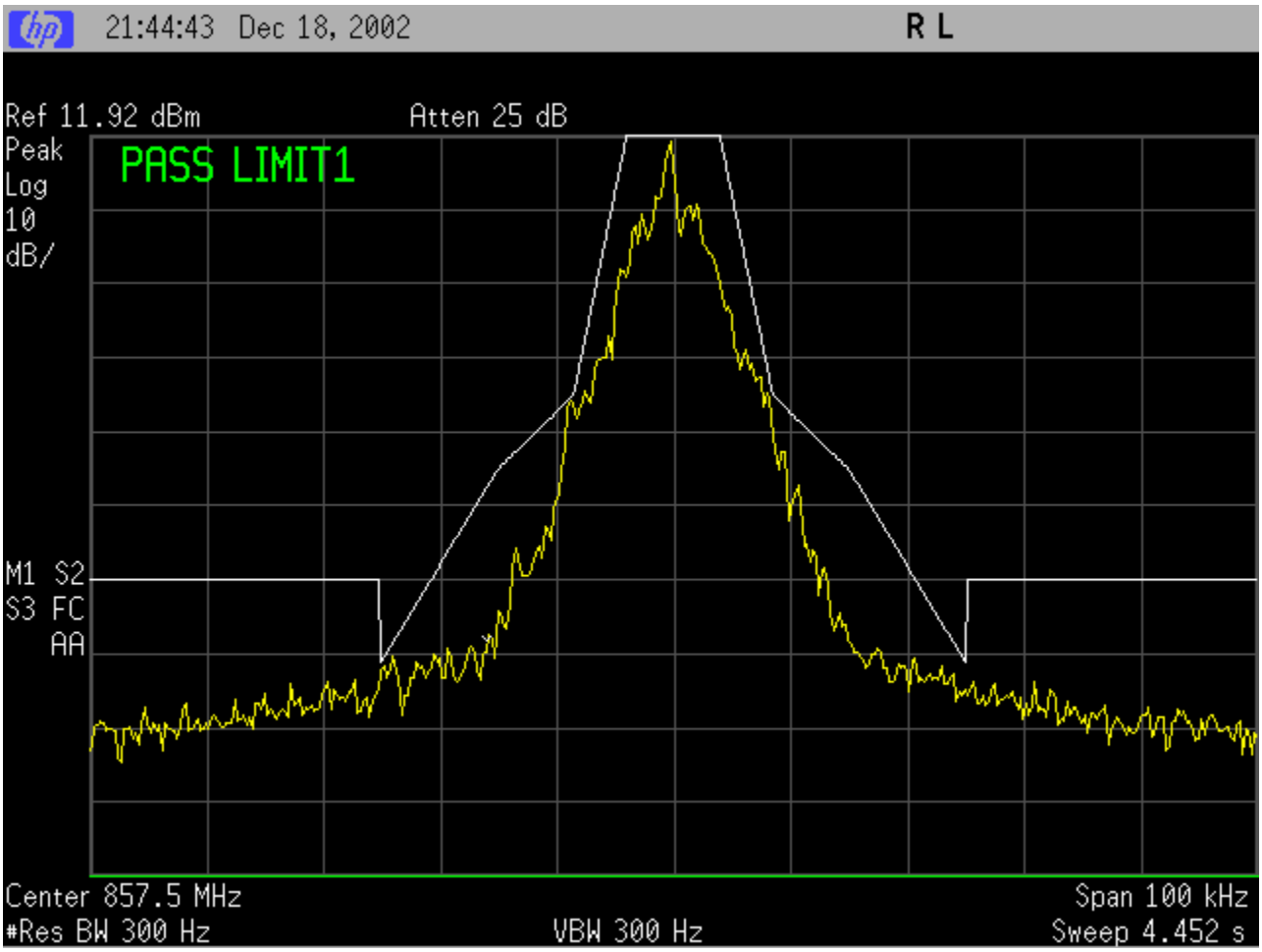
NECESSARY BANDWIDTH (Bn) CALCULATION

See Page 10 for emission designator determination.

The corresponding Necessary Bandwidth is 9167 Hz for 9600 baud rate, 2.69 kHz deviation and emission designator prefix for necessary bandwidth **9K17F1D**
TEST DATA: Refer to the following graphs:

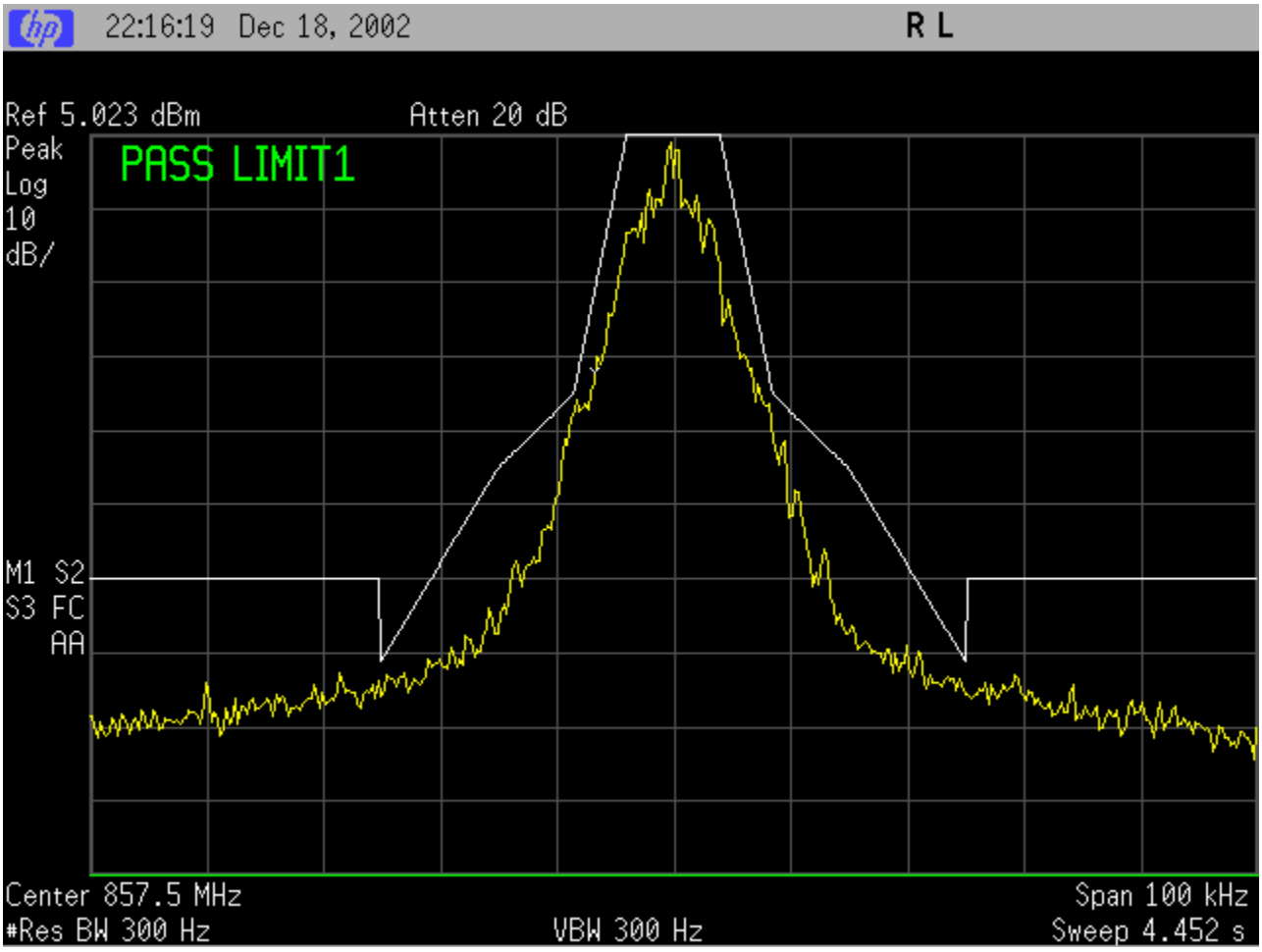
MASK: H, 5W – 9K17F1D 28.8kbps/9.6kbaud

SPECTRUM FOR EMISSION **9K17F1D**
OUTPUT POWER: 5 Watts
28800bps, 9600 bauds, 8 level FSK
PEAK DEVIATION = 2690 Hz
SPAN = 100 kHz



MASK: H, 1W – 9K17F1D 28.8kbps/9.6kbaud

SPECTRUM FOR EMISSION **9K17F1D**
OUTPUT POWER: 1 Watts
28800bps, 9600 bauds, 8 level FSK
PEAK DEVIATION = 2690 Hz
SPAN = 100 kHz



NAME OF TEST: Transmitter Occupied Bandwidth
Paragon/PD Modem at 8000 baud 8FSK

Mask compliance data in support of Emission Designator **11K9F1D**

RULE PART NUMBER: 2.201, 2.202, 2.1033 c (14), 2.1049 (h), 2.1041, 90.209 (b)(5), 90.210 (H)

MINIMUM STANDARD: Mask H
Sidebands and Spurious [Rule 90.210 (h)]
Authorized Bandwidth = 20 kHz [Rule 90.209(b) (5)]

Fo to 4.0 kHz	Attenuation = 0 dB
>4.0 kHz to 8.5 kHz	Attenuation= $107*\log(f_d/4)$ dB
>8.5 kHz to 15 kHz	Attenuation= $40.5*\log(f_d/1.16)$ dB
>15 kHz to 25kHz	Attenuation = $116*\log(f_d/6.1)$ dB
>25kHz	43 + 10*log(P) dB

Corner Points:

Fo to 4.0 kHz	Attenuation = 0 dB
>4.0 kHz to 8.5 kHz	Attenuation= 0 dB to 35 dB
>8.5 kHz to 15 kHz	Attenuation = 35 dB to 45 dB
>15 kHz to 25 kHz	Attenuation =45 dB to 71 dB
>25 kHz	Attenuation =53dB (10W-generic limit)

The limits would read 43dB for 1W and 50dB for 5W output.

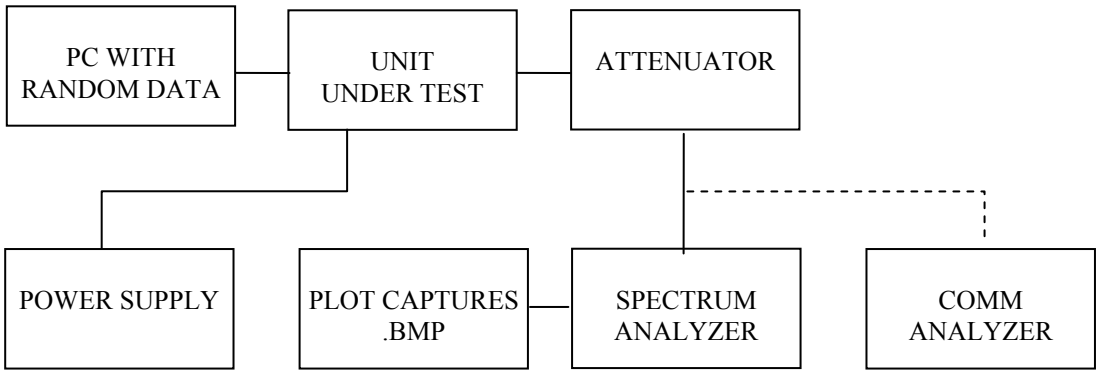
TEST RESULTS: Meets minimum standard (see data on the following pages)

TEST CONDITIONS: Standard Test Conditions, 25 C

TEST EQUIPMENT: Attenuator, BIRD Model / 50-A-MFN-30 / 30 dB / 50 Watt
DC Power Source, Model Astron VS 20M
Communication Analyzer, Model IFR COM120B (deviation meter)
Spectrum Analyzer, Model Agilent (HP) 8563EC

PERFORMED BY: Constantin Pintilei _____ DATE: 12/31/02

TEST SET-UP:



NAME OF TEST: Transmitter Occupied Bandwidth (Continued)
Paragon/PD Modem at 8000 baud 8FSK
In Support of Emission Designator **11K9F1D**

MODULATION SOURCE DESCRIPTION:
TX Data Pattern:

The transmit data pattern is DBA protocol- type of "idle" packets data pattern as described in Annex E "Digital Modulation Techniques" of the application EA100968 granted on 05/30/2001. After this data follows the modulation process described, the resulting base band signal feed the modulator's input of the Exciter.

For 8000 baud rate, the deviation is set to 3.45 kHz. For deviation readings the IF filter of 30kHz has been used.

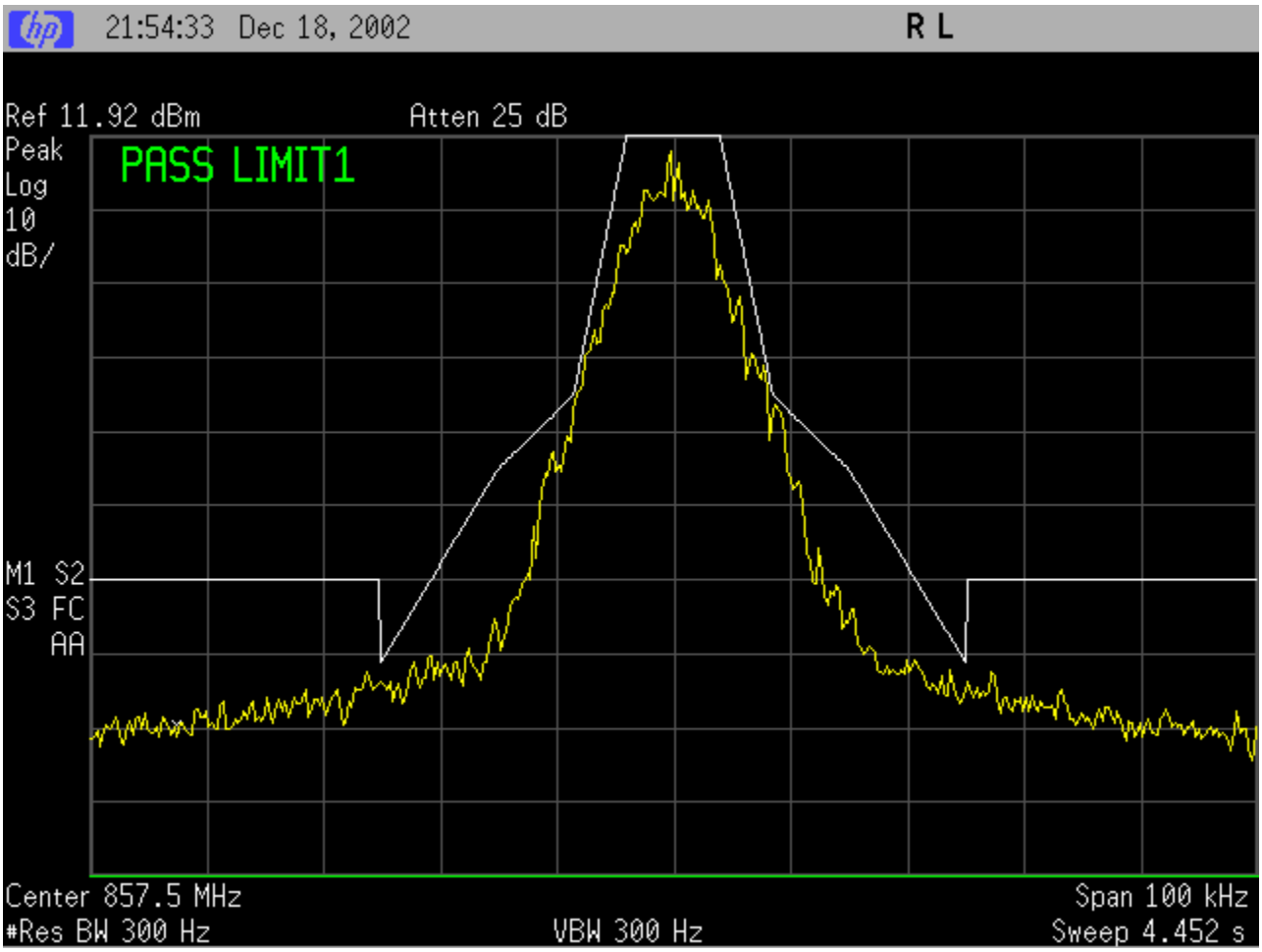
NECESSARY BANDWIDTH (Bn) CALCULATION

See Page 10 for emission designator determination.

The corresponding Necessary Bandwidth is 11830 Hz for 8000 baud rate, 3.45 kHz deviation and emission designator prefix for necessary bandwidth **11K9F1D**
TEST DATA: Refer to the following graphs:

MASK: H, 5W – 11K9F1D 24.0kbps/8.0kbaud

OUTPUT POWER: 5 Watts
24000bps,8000 bauds, 8 level FSK
PEAK DEVIATION = 3450 Hz
SPAN = 100 kHz



MASK: H, 1W – 11K9F1D 24.0kbps/8.0kbaud

OUTPUT POWER: 1 Watt
24000bps,8000 bauds, 8 level FSK
PEAK DEVIATION = 3.45 kHz
SPAN = 100 kHz