Application for Certification
For an RF Power Amplifier

TPL Communications
3370 San Fernando Rd. #206
Los Angeles, CA 90065

RF Power Amplifier:

Part # KVC-8A

FCC ID: BBD3-KVC8A

REPORT # RA054890/10076

This report was prepared in accordance with the requirements of the FCC Rules and Regulations Part 2, Subpart J, 2.1031 through 2.1057, Part 22, Part 90 and other applicable sections of the rules as indicated herein.

Prepared By:

Fred Gurule

DNB Engineering, Inc.
3535 W. Commonwealth Ave.
Fullerton, CA 92833

12 JANUARY 2000

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1.0 ADMINISTRATIVE DATA

1.1 Certifications and Qualifications

I certify that DNB Engineering, Inc conducted the tests performed in order to obtain the technical data presented in this application. Also, based on the results of the enclosed data, I have concluded that the equipment tested meets or exceeds the requirements of the Rules and Regulations governing this application.

1.2 Measurement Repeatability Information

The test data presented in this report has been acquired using the guidelines set forth in FCC Part 2.1031 through 2.1057, Part 22, and Part 90. The test results presented in this document are valid only for the equipment identified herein under the test conditions described. Repeatability of these test results will only be achieved with identical measurement conditions. These conditions include: The same test distance, EUT Height, Measurement Site Characteristics, and the same EUT System Components. The system must have the same Interconnecting Cables arranged in identical placement to that in the test set-up, with the system and/or EUT functioning in the identical mode of operation (i.e. software and so on) as on the date of the test. Any deviation from the test conditions and the environment on the date of the test may result in measurement repeatability difficulties.
All changes made to the EUT during the course of testing as identified in this test report must be incorporated into the EUT or identical models to ensure compliance with the FCC regulations.

Bryan Broaddus (Para. 1.1)
Manager, Test Dept.
DNB Engineering, Inc.
Tel. (714) 870-7781 FAX (714 870-5081

2.1033 (C) (1) Application for Certification

Name of Applicant:		TPL Communications 3370 San Fernando Rd. #206 Phoenix, AZ 85027
Applicant is:	X	Manufacturer Vendor Licensee Prospective Licensee Other
Description:		Mobile Vehicle Amplifier
Part Number:		KVC-8A
Anticipated Production Quantity:		Multiple Units

2.1033 (C) (2) FCC Identifier

FCC ID: BBD3-KVC8A

2.1033 (C) (3) Installation and Operating Instructions

See the Service Manual Included in Appendix A herein for the complete description.

2.1033 (C) (4) Type of Emission

F3E

2.1033 (C) (5) Frequency Range

150 MHz to 174 MHz

2.1033 (C) (6) Operating Power

35 Watts

2.1033 (C) (7) Maximum Power Allowed in Applicable Part(s) of theRules

RULES PART	MAXIMUM POWER (WATTS)
Part 22.757	500 Watts
Part 90.205	500 Watts (ERP)

2.1033 (C) (8) Final RF Amplifier Input Power Characteristics

Input Voltage:	13.6 Vdc Nominal
Input Current:	6.0 Adc Nominal 8.0 Adc Max.

2.1033 (C) (9) Tune Up Procedure

Refer to Figure in Appendix A.

2.1033 (C) (10) Schematic Diagram and Circuit Description

Refer to Figure in Appendix A.

2.1033 (C) (11) Equipment Identification Plate

CANADA

KENWOOD VEHICULAR ADAPTER

MODEL NO. KVC-8A

VOLTAGE 13.6VDC-8A PWR OUTPUT: 35W

FCC ID: BBD3-KVC8A SERIAL NO.

KENWOOD CORPORATION MADE IN USA

NOTES:
Label will be constructed of 0.02 inch aluminum as shown on the equipment with permanent adhesive.

All information on the label will be etched or stamped. Both methods will exceed the expected lifetime of the equipment.

The label will be large enough to allow all information to be legible.

2.1033 (C) (12) Equipment Photographs

Note: The Main Circuit Board shown in these photos has no components on the reverse side.

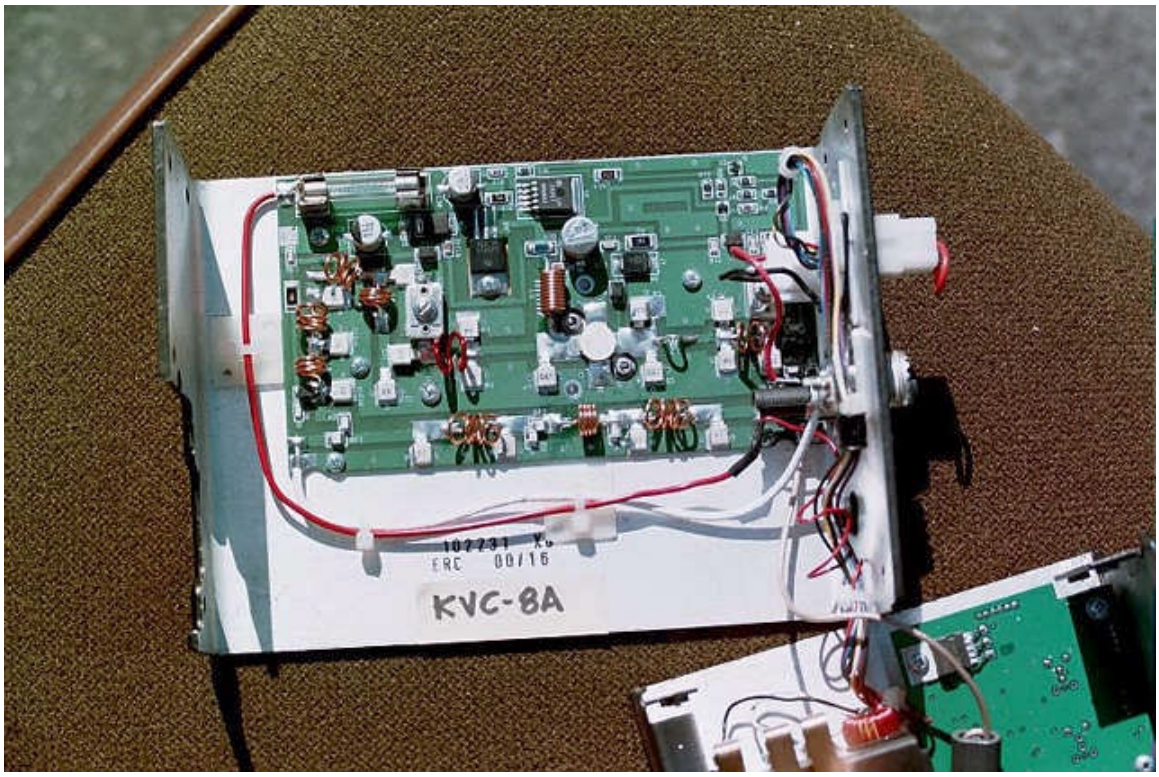
Photo 1 Main Circuit Board (Overall View)

Photo 2 Main Circuit Board (Detail)

Photo 3 External Front View

Photo 4 External ¾ View

Photo 1 Main Circuit Board (Overall View)



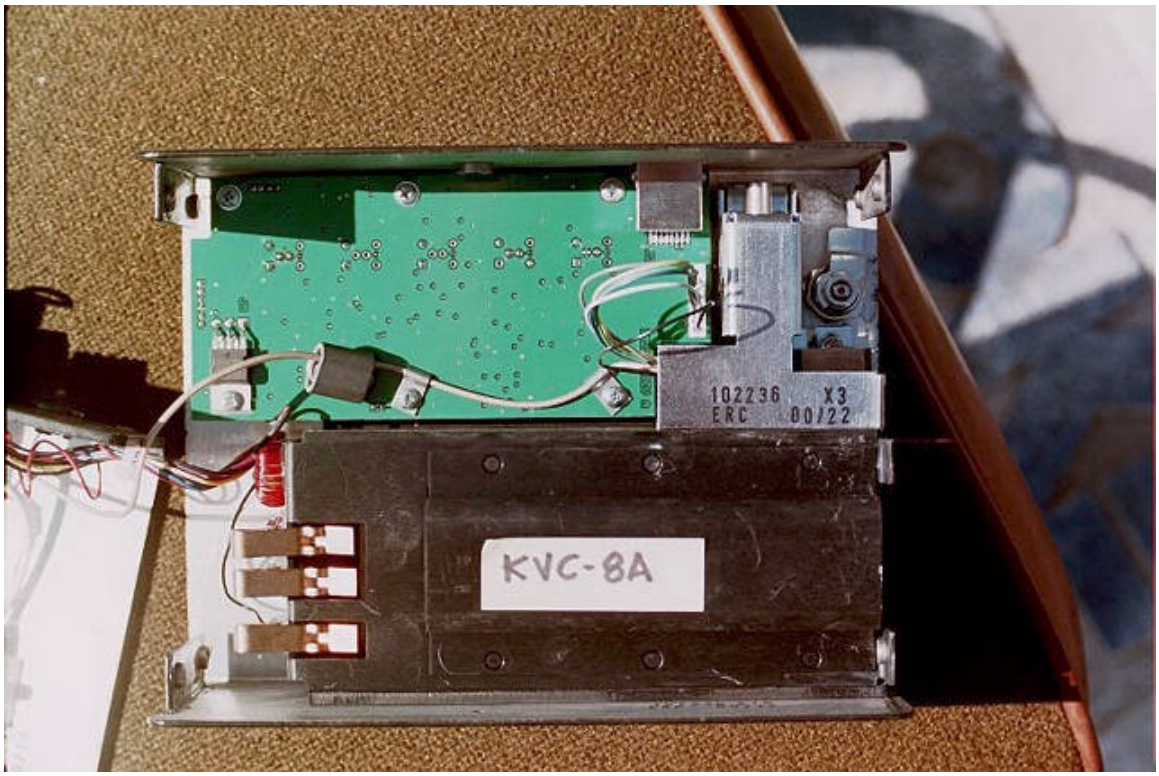
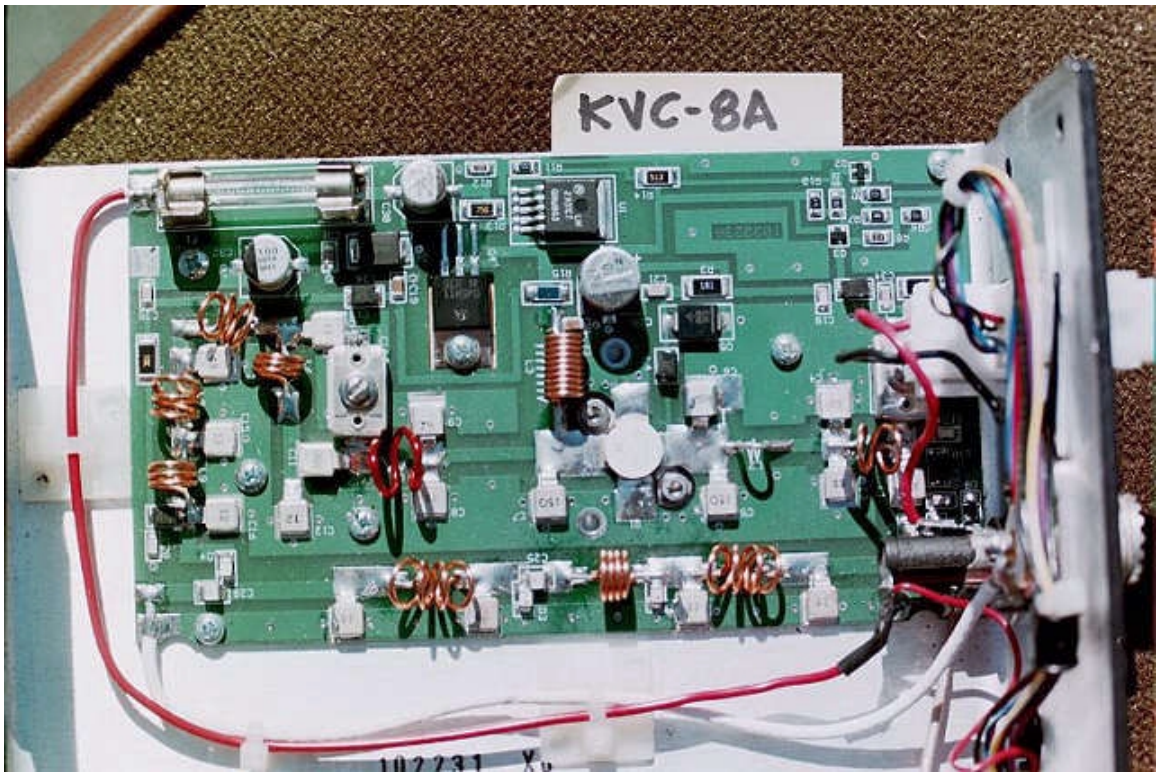


Photo 2 Main Circuit Board (Detail)



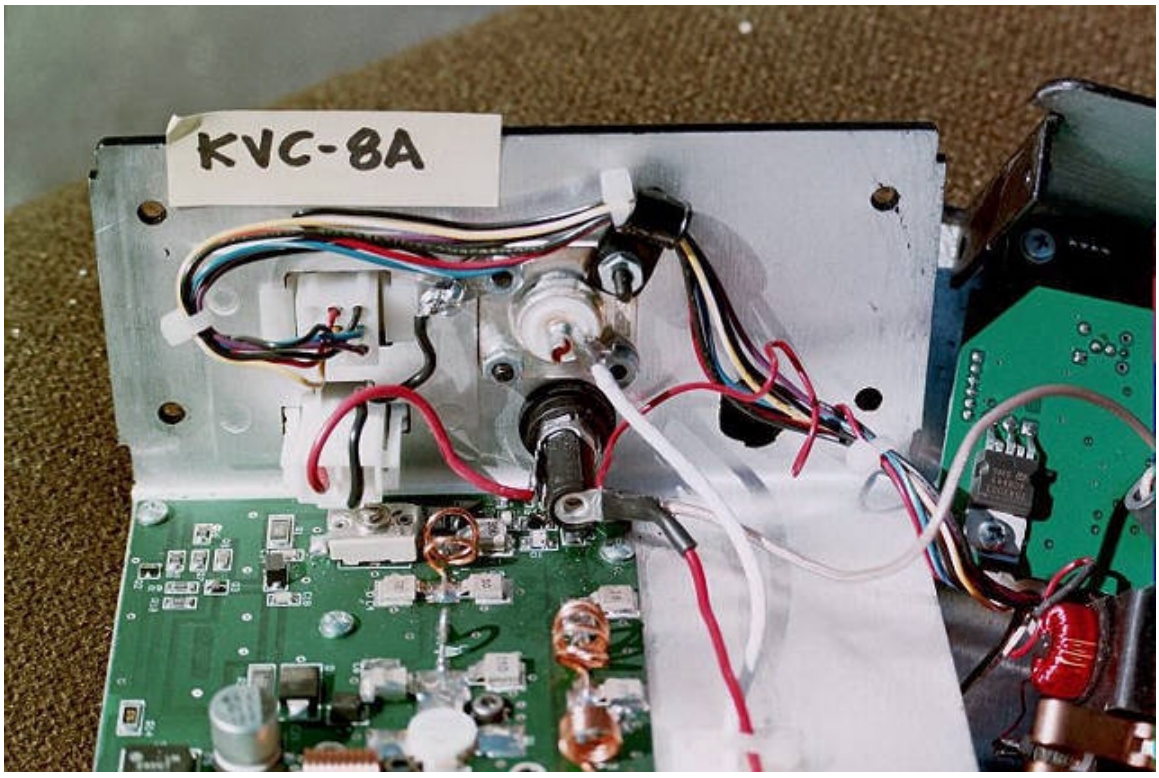


Photo 3 External Front View

Photo 4 External ¾ View

2.1033 (C) (13) Digital Modulation Techniques

Not Applicable

2.1033 (c) (14) Test Data

Refer to 2.1046 through 2.1057

2.1046 Measurement of RF Power Output

Definition: For RF Power Amplifiers.

Test Method: See Figure 1.

Output Power is measured across a precision 50 ohm load with a Spectrum Analyzer

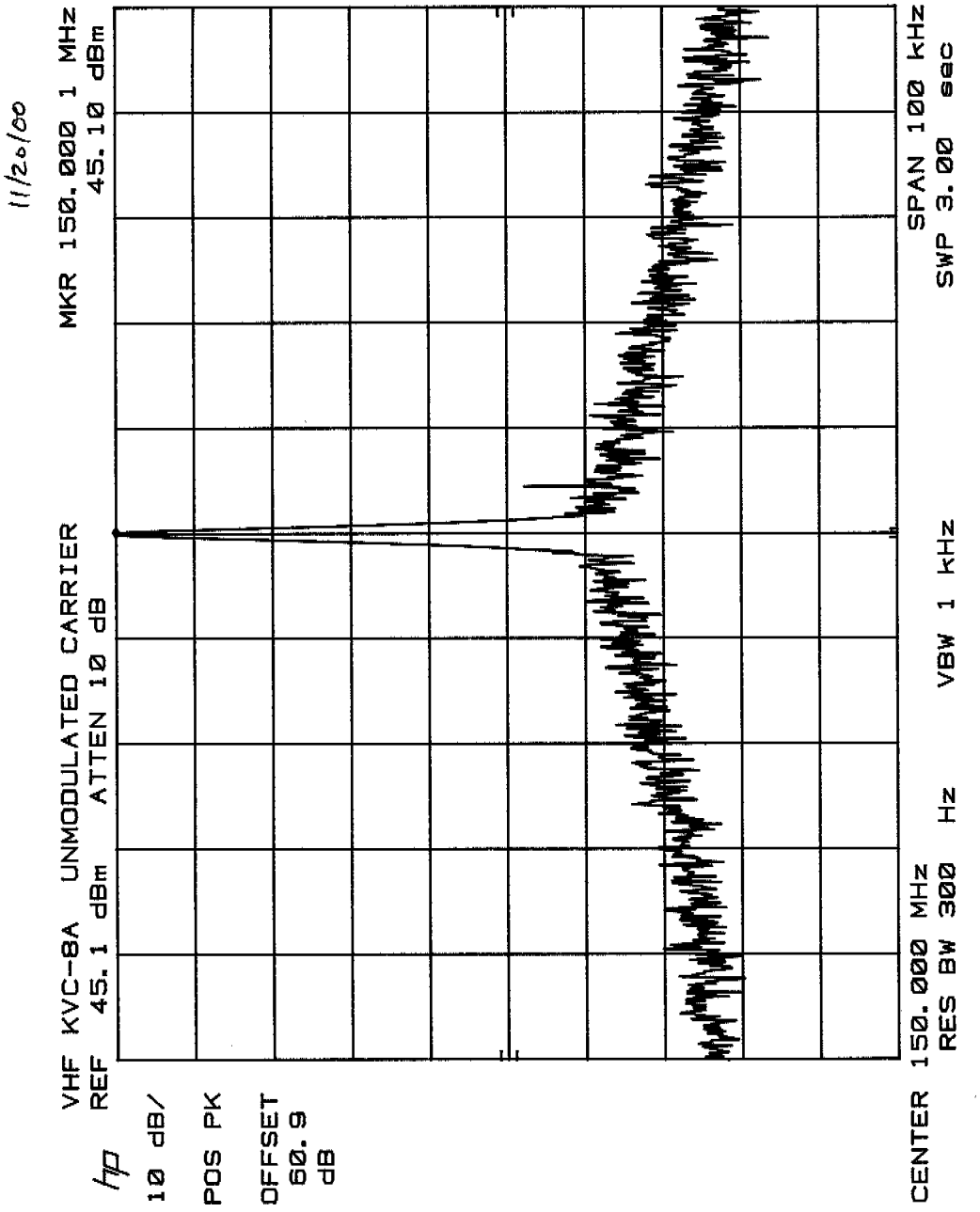
Test Results:

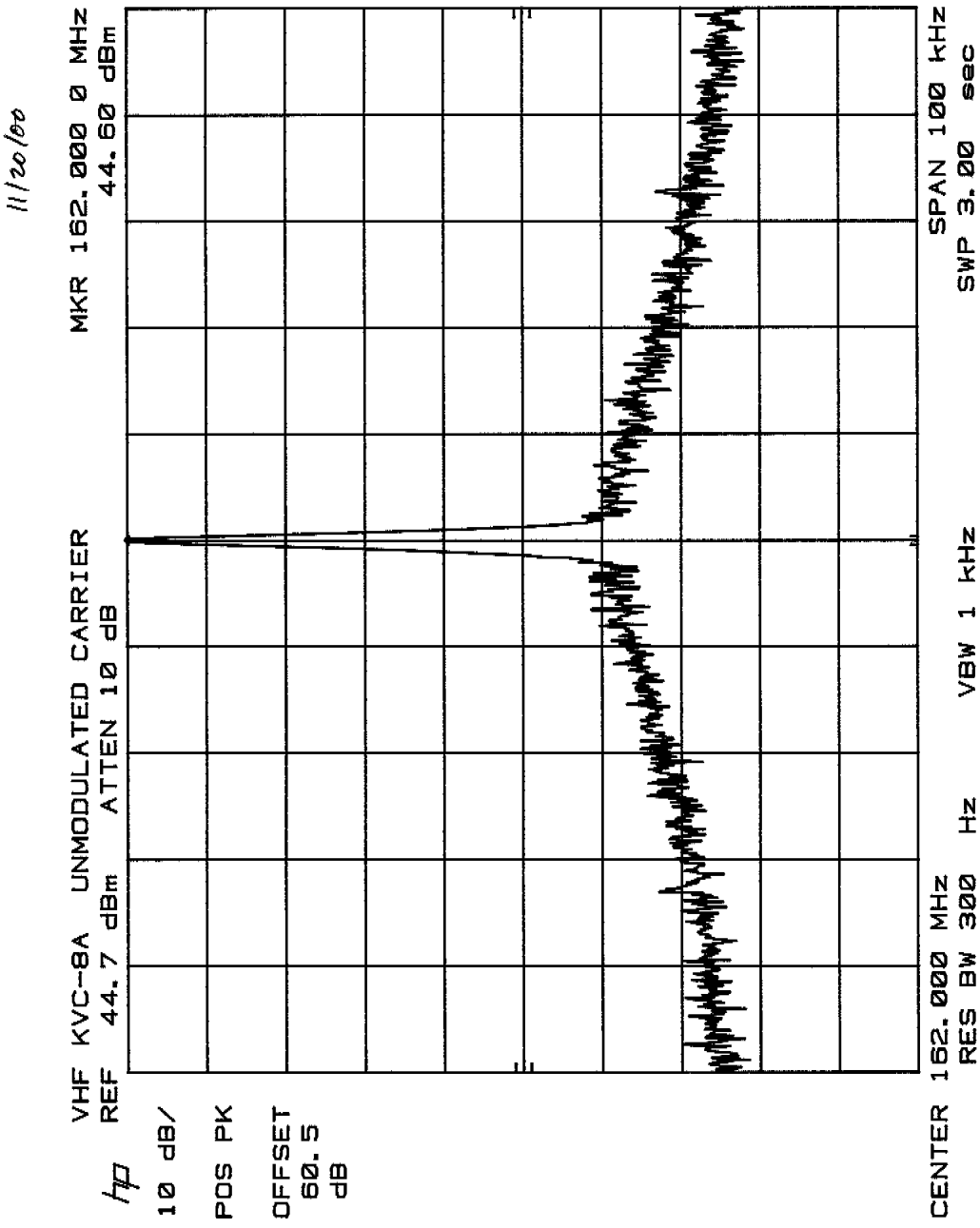
POWER OUTPUT (Published)

FREQUENCY	NOMINAL VOLTAGE 13.8 VDC	85% VOLTAGE 11.73 VDC	115% VOLTAGE 15.87 VDC
150-174 MHz	35 Watts	30 Watts	40 Watts

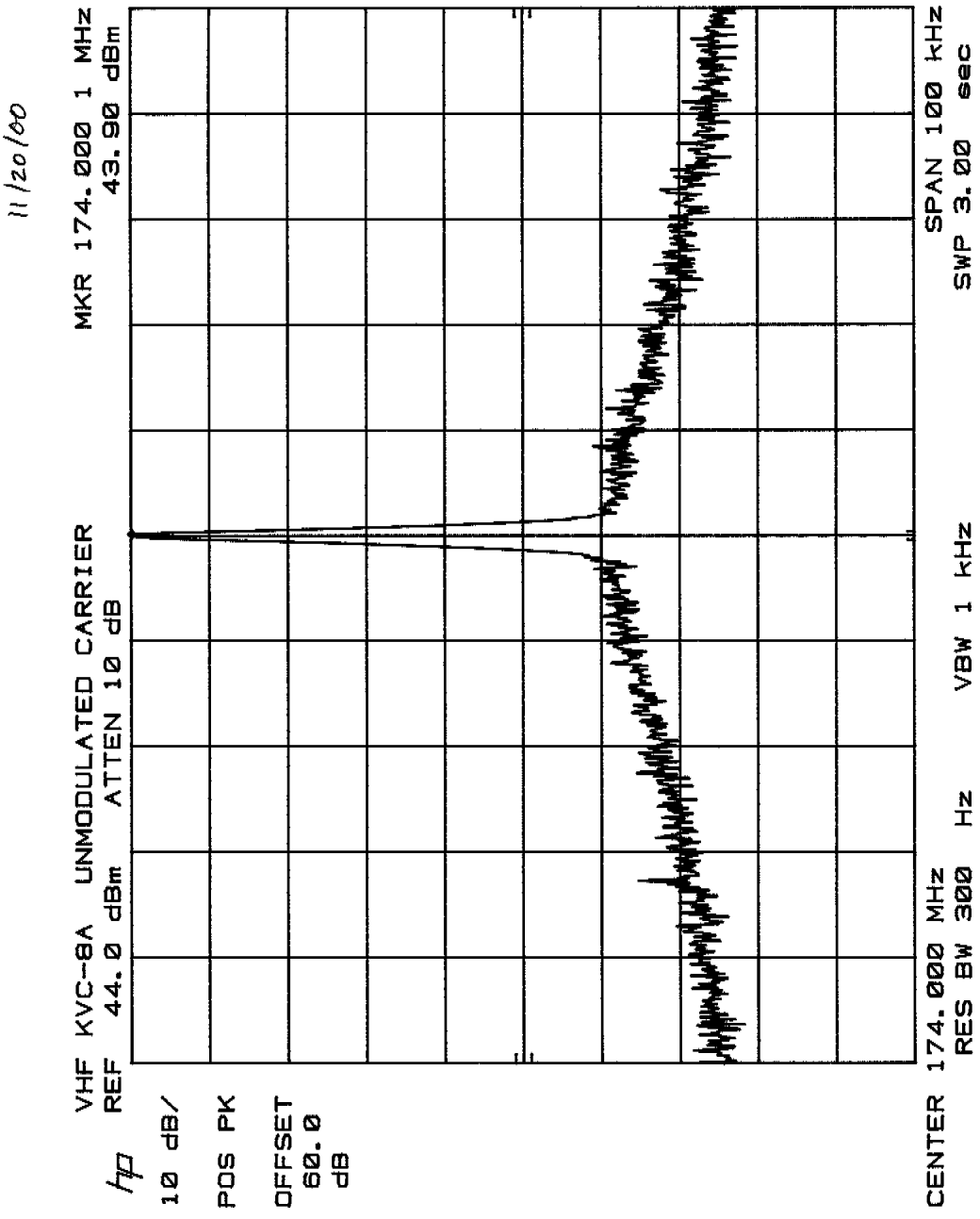
POWER OUTPUT MEASURED AT NOMINAL VOLTAGE WAS:

Frequency (MHz)	Power (dBm)	Power (Watts)
150	45.1	32.4
162	44.6	28.8
174	43.9	24.5


11/20/00
VHF KVC-8A UNMODULATED CARRIER
REF 45.1 dBm ATTEN 10 dB
MKR 150.000 1 MHz
45.10 dBm
10 dB/
POS PK
OFFSET
60.9
dB
CENTER 150.000 MHz
RES BW 300 Hz
VBW 1 kHz
SPAN 100 kHz
SWP 3.00 sec


11/20/00
VHF KVC-8A UNMODULATED CARRIER
REF 44.7 dBm ATTEN 10 dB
MKR 162.000 0 MHz
44.60 dBm
10 dB/
POS PK
OFFSET
60.5
dB
CENTER 162.000 MHz
RES BW 300 Hz
VBW 1 kHz
SPAN 100 kHz
SWP 3.00 sec

11/20/00


VHF KVC-8A UNMODULATED CARRIER
REF 44.0 dBm ATTEN 10 dB
MKR 174.000 1 MHz
43.90 dBm
10 dB/
POS PK
OFFSET
60.0
dB
CENTER 174.000 MHz
RES BW 300 Hz
VBW 1 kHz
SPAN 100 kHz
SWP 3.00 sec

2.1049 Measurement of Occupied Bandwidth

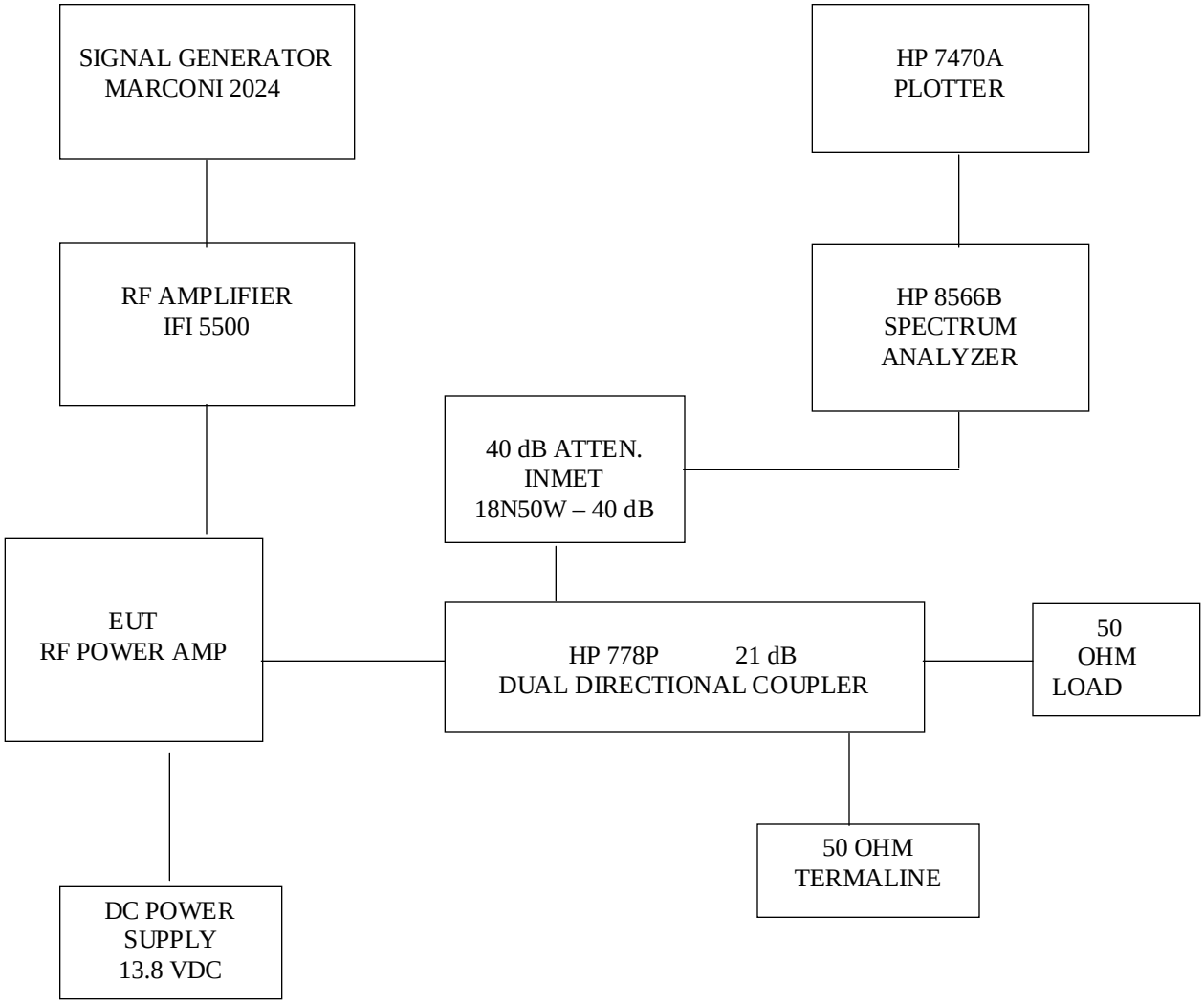
Definition:
Occupied Bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are equal to 0.5 percent of the total mean power radiated by a given emission.

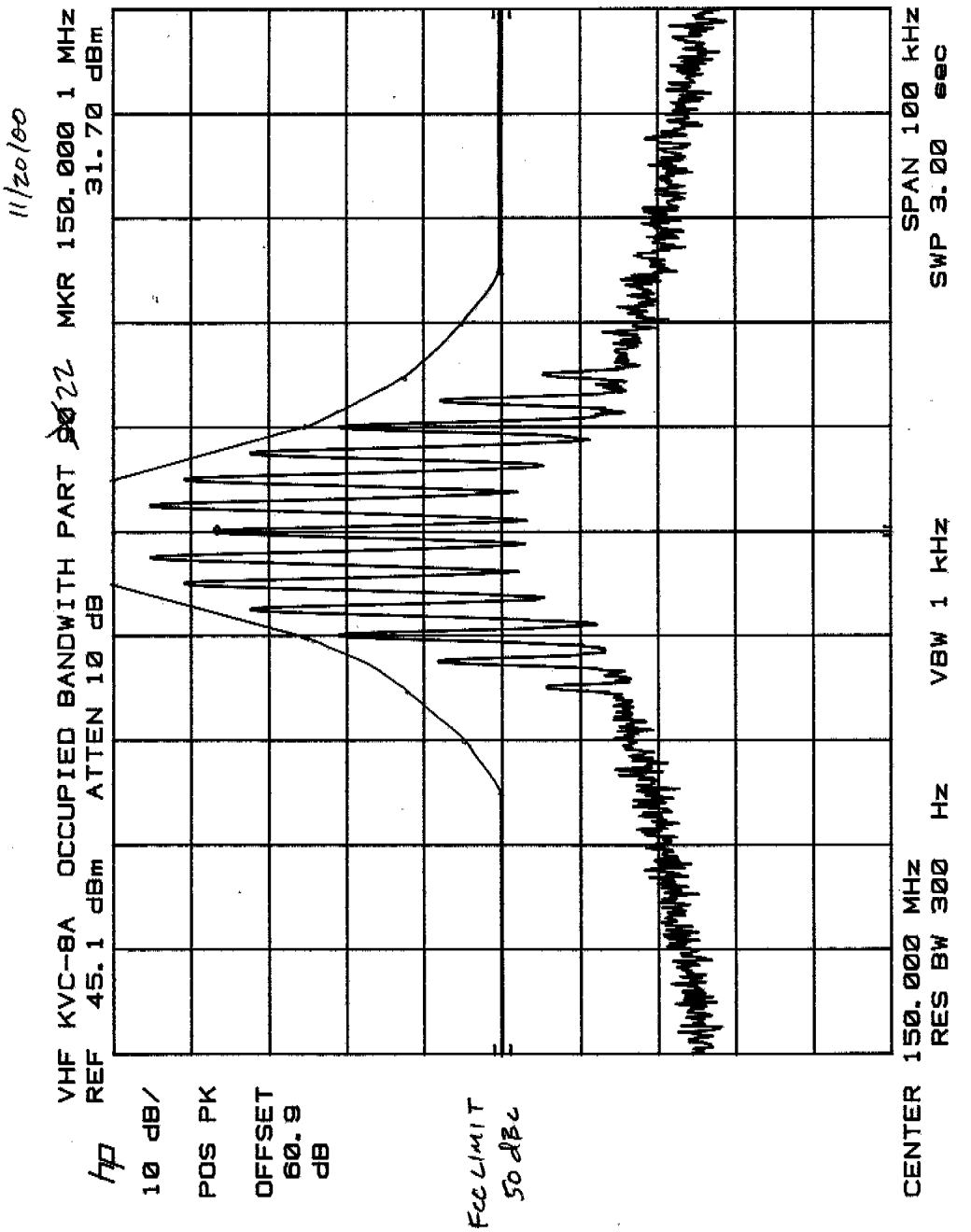
Test Method: Connect the Equipment per Figure 1.
Measurements were made with the modulating signal at 2.5 kHz with 5 kHz of FM deviation.

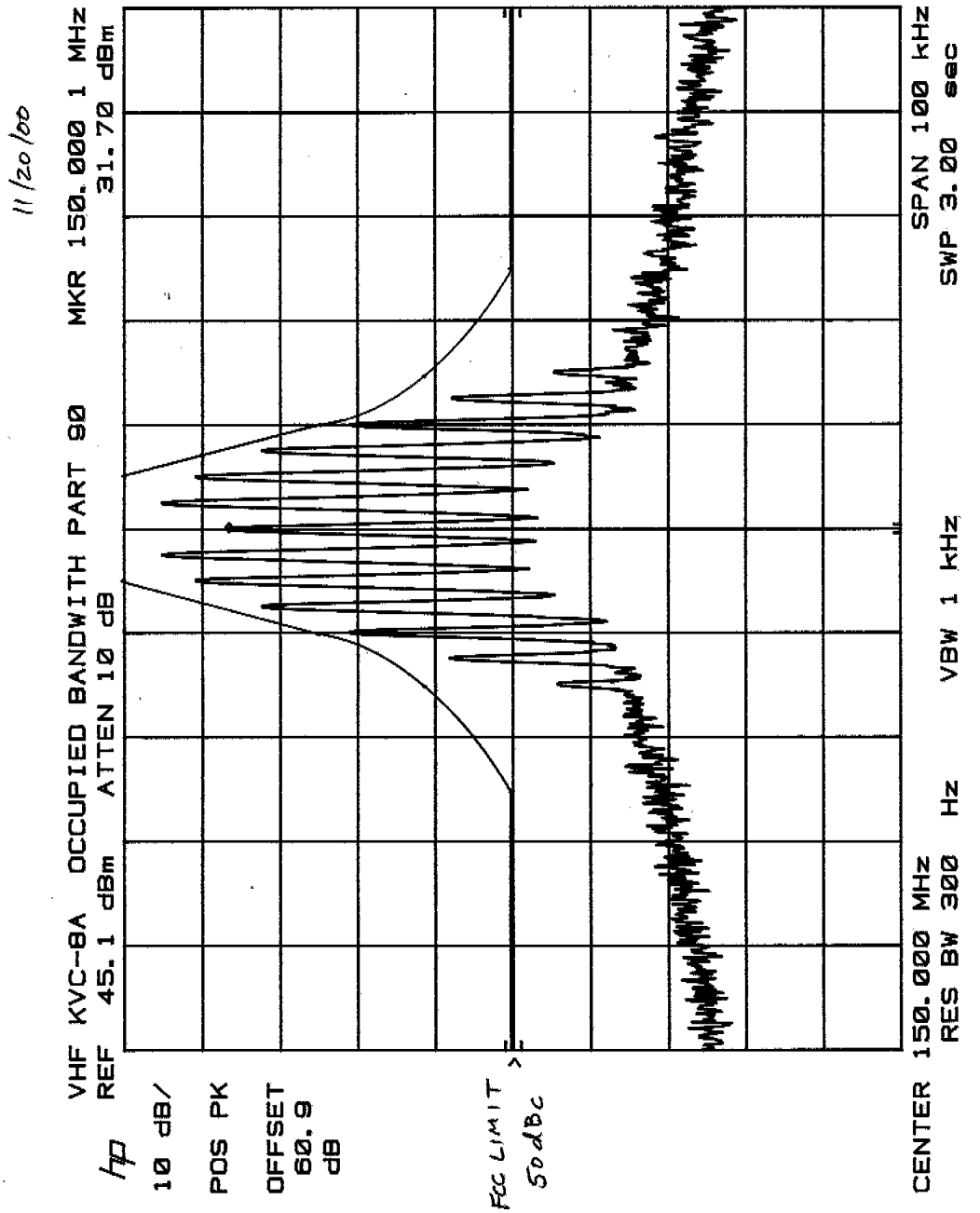
Test Results: See Plots following Figure 1.

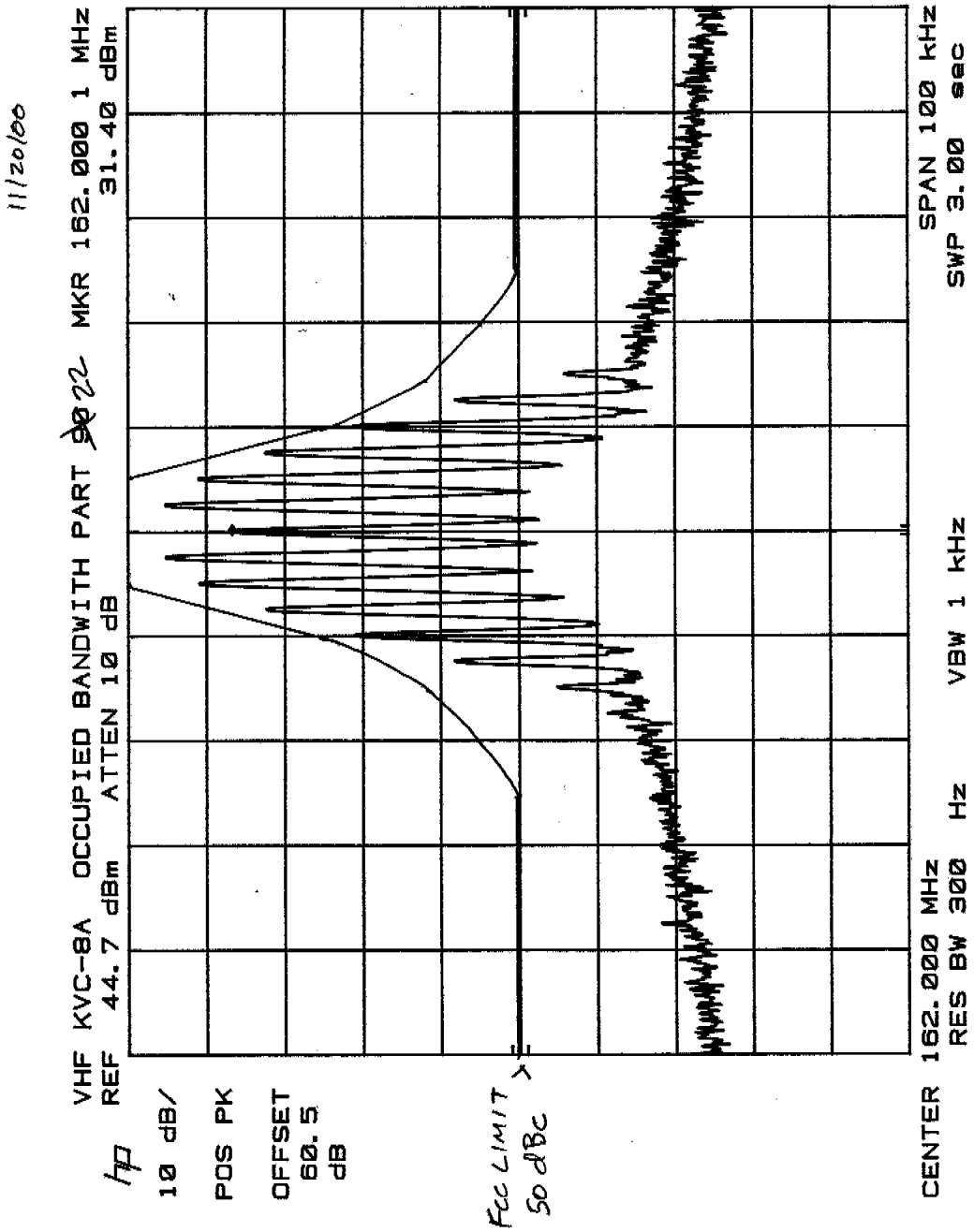
The center frequency of the signal did not shift with modulation. The Spectrum Bandwidth was well within the limits specified in the FCC Regulations.

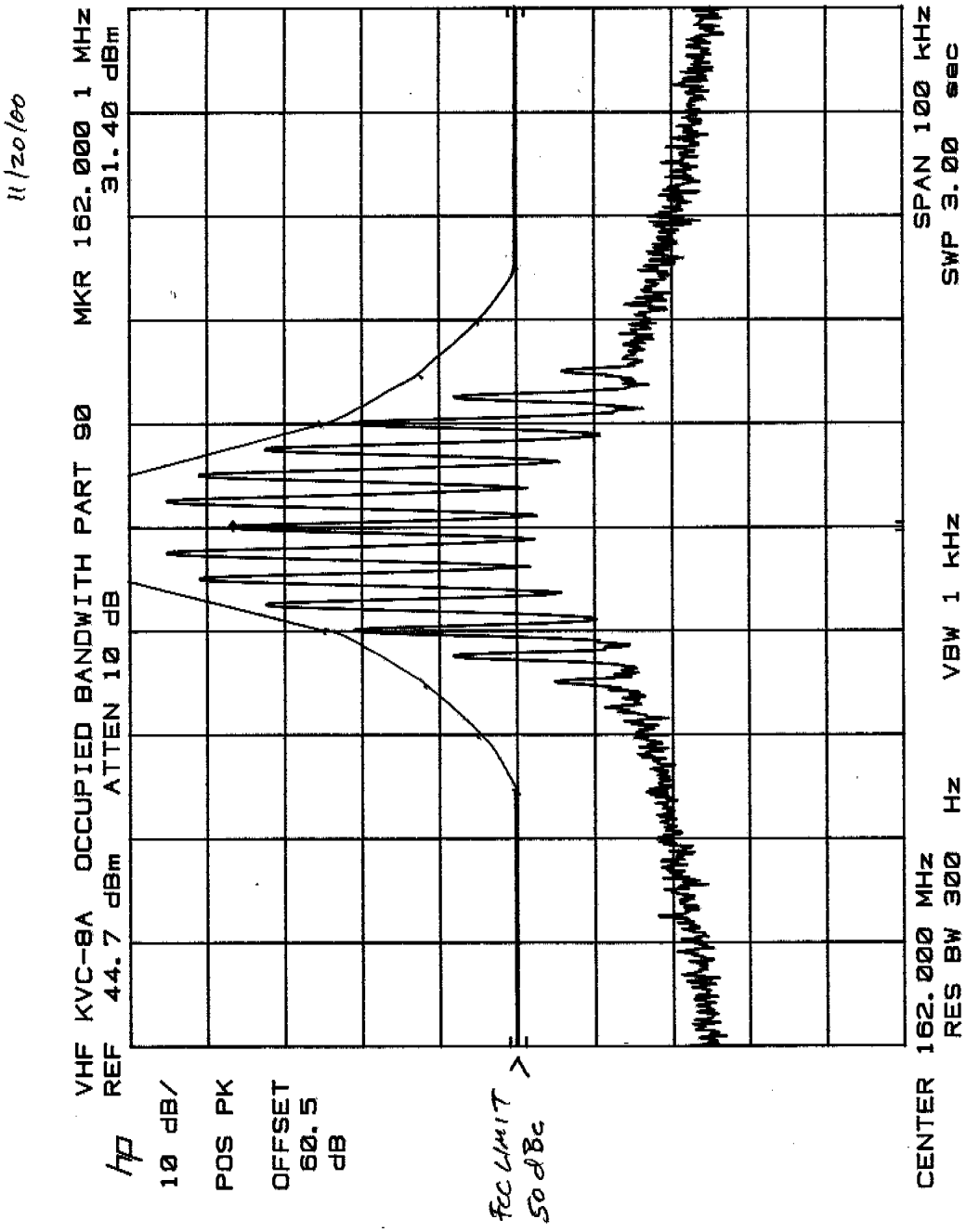
Figure 1: Block Diagram
(Occupied Bandwidth tests)

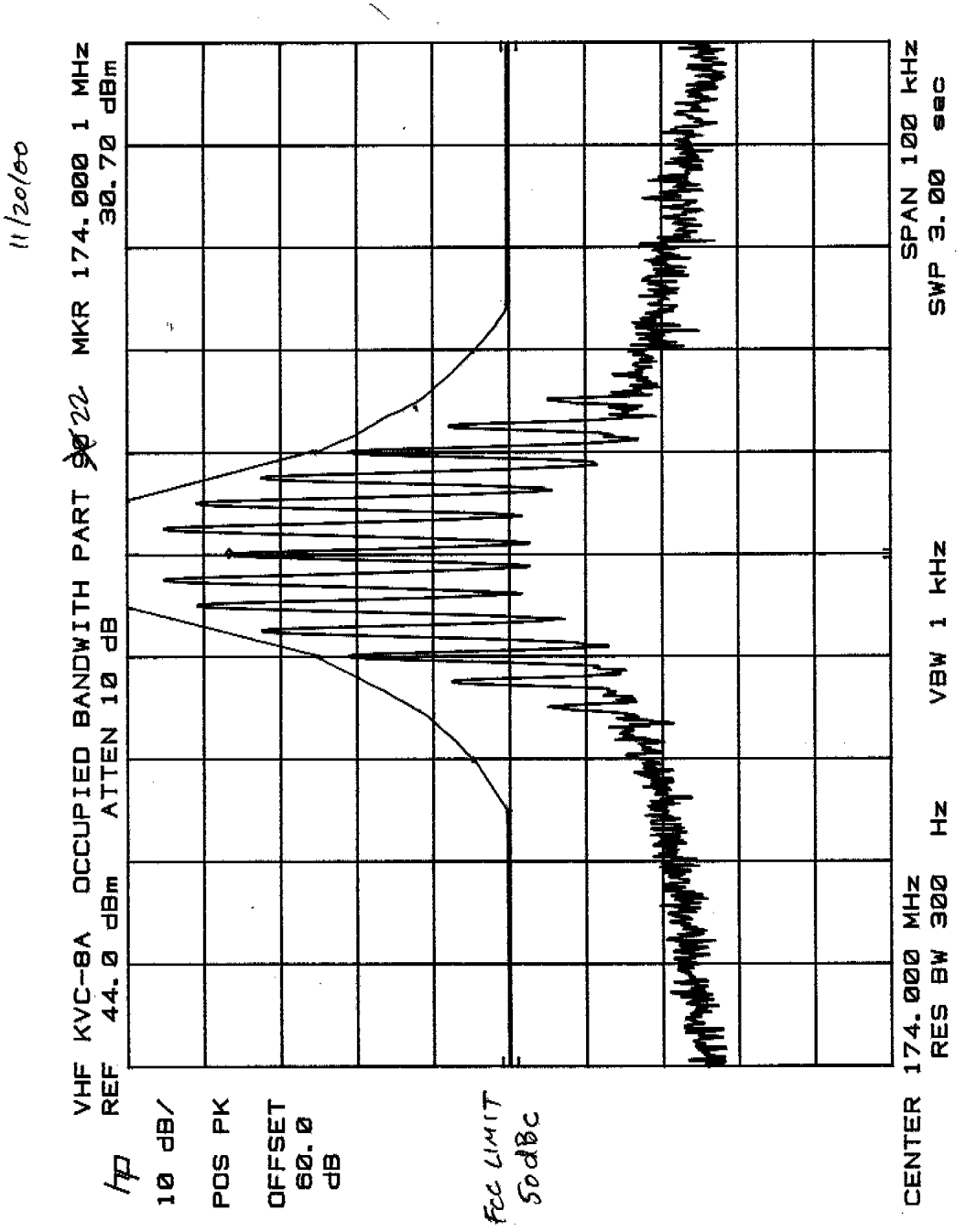


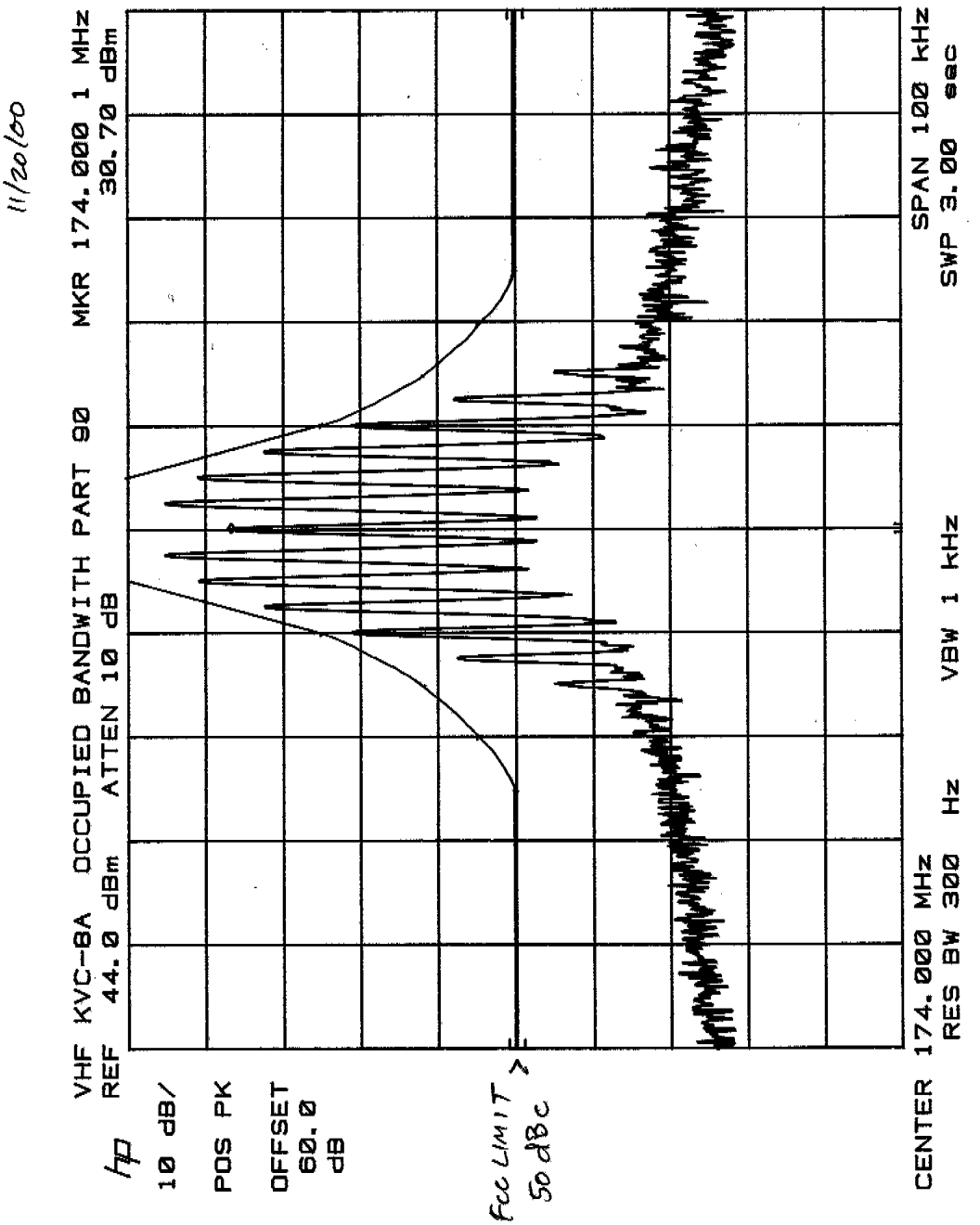

11/20/00
VHF KVC-8A OCCUPIED BANDWITH PART 90.22
REF 45.1 dBm ATTEN 10 dB MKR 150.000 1 MHz 31.70 dBm
10 dB/
POS PK
OFFSET 60.9 dB
FCC LIMIT 50 dBc
CENTER 150.000 MHz SPAN 100 kHz
RES BW 300 Hz VBW 1 kHz SWP 3.00 sec


11/20/00
VHF KVC-8A OCCUPIED BANDWITH PART 90
MKR 150.000 1 MHz
31.70 dBm
REF 45.1 dBm
ATTEN 10 dB
10 dB/
POS PK
OFFSET
60.9
dB
FCC LIMIT
50dBc
SPAN 100 kHz
SWP 3.00 sec
CENTER 150.000 MHz
RES BW 300 Hz
VBW 1 kHz


11/20/00
VHF KVC-8A OCCUPIED BANDWITH PART 22
REF 44.7 dBm ATTEN 10 dB
MKR 162.000 1 MHz
31.40 dBm
10 dB/
POS PK
OFFSET
60.5
dB
FCC LIMIT
50 dBc
CENTER 162.000 MHz
RES BW 300 Hz
VBW 1 kHz
SPAN 100 kHz
SWP 3.00 sec


11/20/00
VHF KVC-8A OCCUPIED BANDWITH PART 90
MKR 162.000 1 MHz
31.40 dBm
REF 44.7 dBm
ATTEN 10 dB
10 dB/
POS PK
OFFSET
60.5
dB
fcc LIMIT
50 dBc
CENTER 162.000 MHz
RES BW 300 Hz
VBW 1 kHz
SPAN 100 kHz
SWP 3.00 sec


11/20/00
VHF KVC-8A OCCUPIED BANDWITH PART 90 22
MKR 174.000 1 MHz
30.70 dBm
REF 44.0 dBm
ATTEN 10 dB
10 dB/
POS PK
OFFSET
60.0
dB
FCC LIMIT
50dBc
SPAN 100 kHz
SWP 3.00 sec
CENTER 174.000 MHz
RES BW 300 Hz
VBW 1 kHz


11/20/00
VHF KVC-8A OCCUPIED BANDWITH PART 90
REF 44.0 dBm ATTEN 10 dB
MKR 174.000 1 MHz
30.70 dBm
10 dB/
POS PK
OFFSET
60.0
dB
FCC LIMIT
50 dBc
CENTER 174.000 MHz
RES BW 300 Hz
VBW 1 kHz
SPAN 100 kHz
SWP 3.00 sec

2.1051 Spurious Emissions at Antenna Terminals

Definition:
Conducted Spurious Emissions are emissions at the antenna terminals on a frequency or frequencies which are outside an occupied band sufficient to ensure transmission of information of required quality for the class of communication desired. The reduction in the level of these spurious emissions will not affect the quality of the information being transmitted.

Conducted Spurious Emissions shall be attenuated below the maximum level of the carrier frequency in accordance with the following formula:

Spurious attenuation in dB = $43 + 10 \log_{10} Po$

Where Po = Output in Watts

= $43 + 10 \log_{10} (35)$

= 63 dB

Test Method: Per EIA RS 152-B, Paragraph 4.

Connect the equipment as shown in Figure 2.

Adjust the Audio Oscillator so that the frequency deviation of the transmitter is a 5 kHz at a modulation frequency of 2.5 kHz. Adjust the Spectrum Analyzer to display the Modulated Carrier.

Scan the frequency spectrum from the lowest radio frequency generated in the equipment through the 10^{th} harmonic of the carrier frequency.

Test Results: See Plots following Figure 2.

All spurious emissions at the antenna terminals are below the FCC specifications

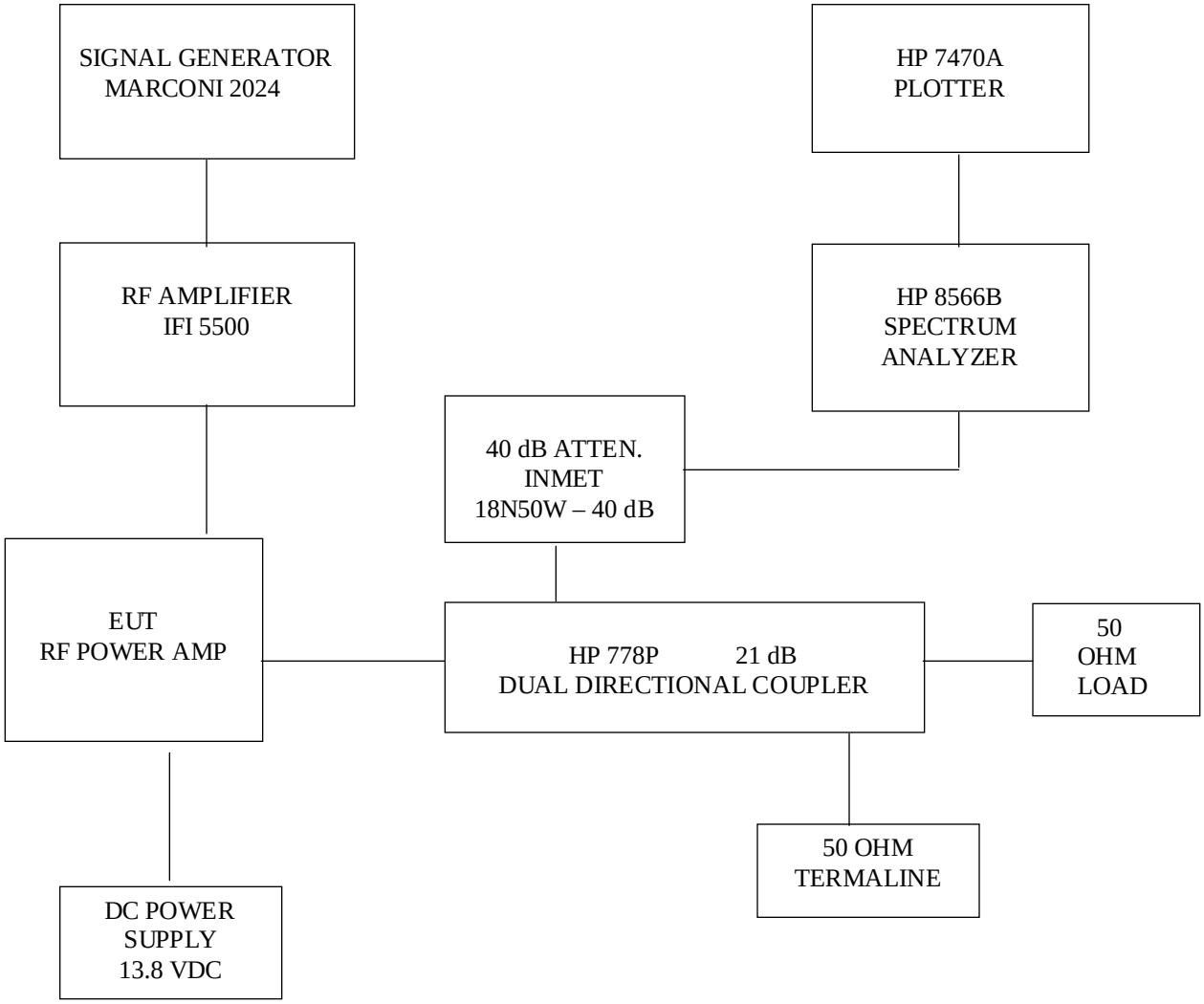
TEST EQUIPMENT LOG 11/20/00

Customer: TPL Communications
EUT: VHF Amplifier, 136 – 174 MHz
Model / Part #: KVC-8A
Serial #: N/A
Test Procedure: FCC, Part 90, 2, 22
Test Specification: Conducted Spurious
Test Engineer: John Stanford
Customer Rep: Jim Briggs

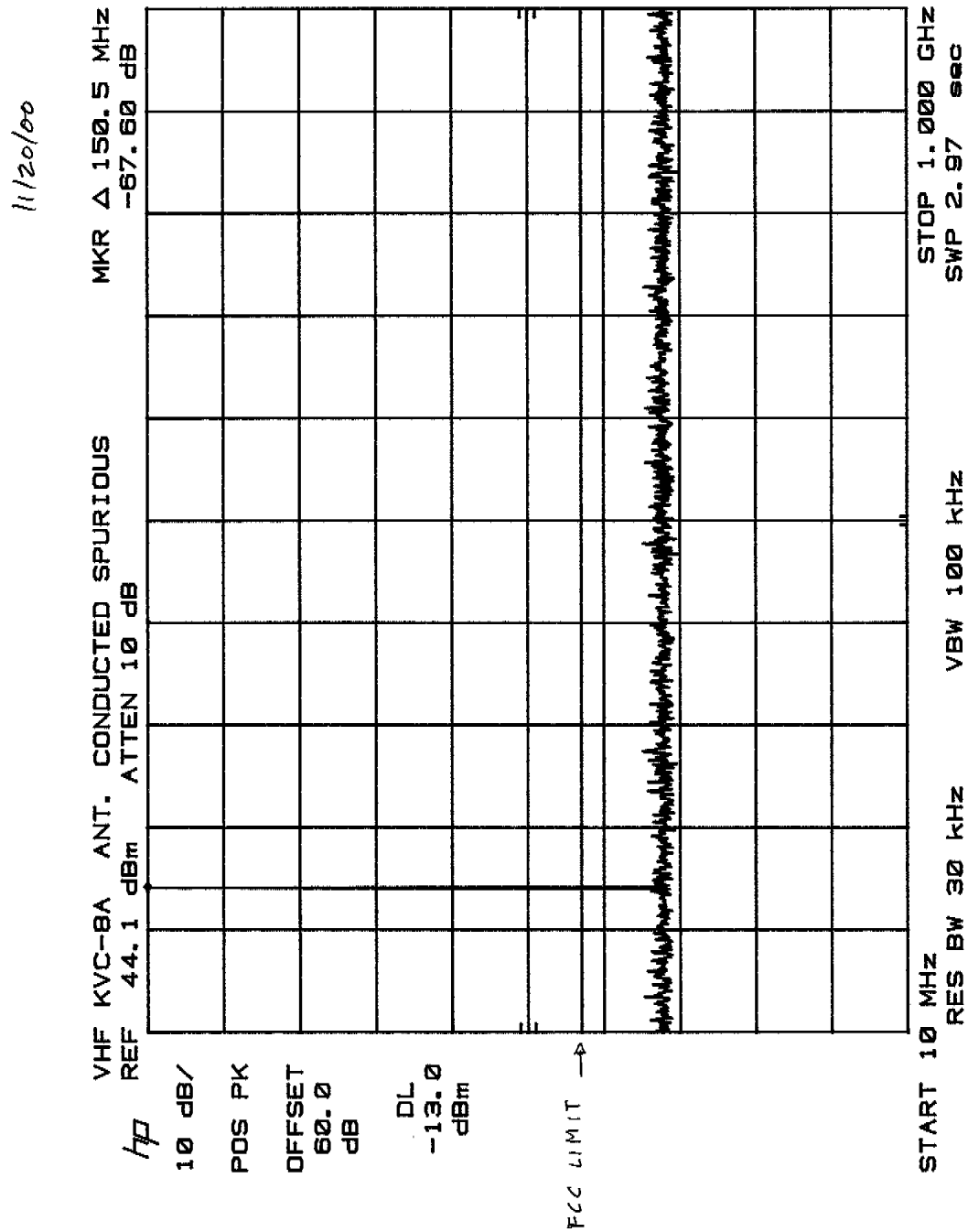
DESCRIPTION	MANUFACTURER	MODEL # / SERIAL #	CAL. DUE
Spectrum Analyzer	Hewlett-Packard	8566B/2673A03865	05/25/01
Directional Coupler	HP	778D	Cal prior to test
Directional Coupler	HP	11691	Cal prior to test
Attenuator (6 dB)	JFW	50FH-006-100	Cal prior to test
Attenuator (20 dB)	Inmet	18N50W/64671	Cal prior to test
Signal Generator	Marconi	2024, 112236/202	04/28/01
Amplifier	Eaton	3552B	Cal prior to test
50 ohm load (500W)	Electro Impulse Labs	DA-242A/U, 7940097	Reference
50 ohm load (5W)	Narda	370BNM	Reference
Wattmeter	Bird	43P	Reference
Coaxial Cable	RG-214/U	N/A	Cal prior to test
Power Supply (0-36 Vdc, 24A)	Lambda	LES-F-03-DB	Reference

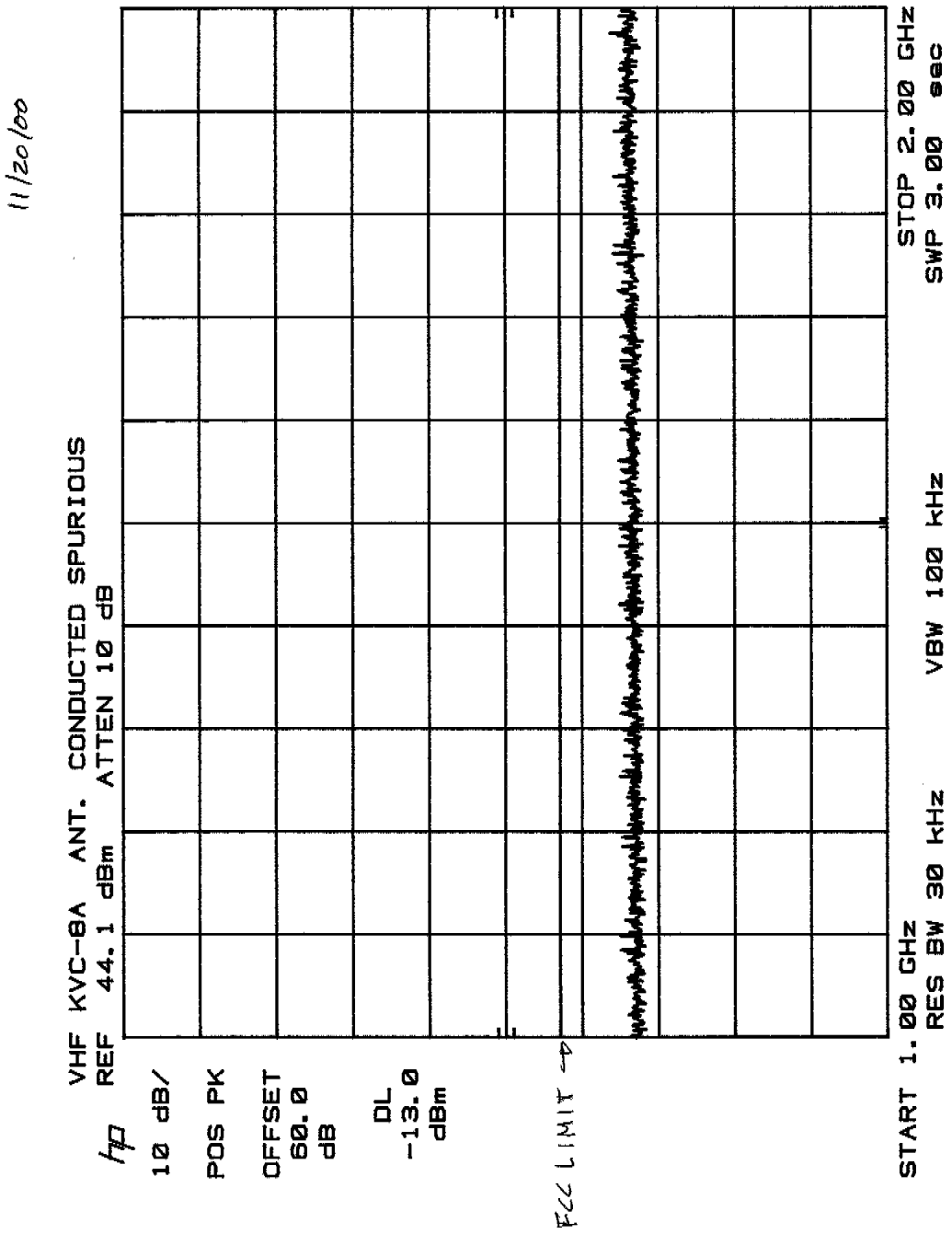
FORM 0010

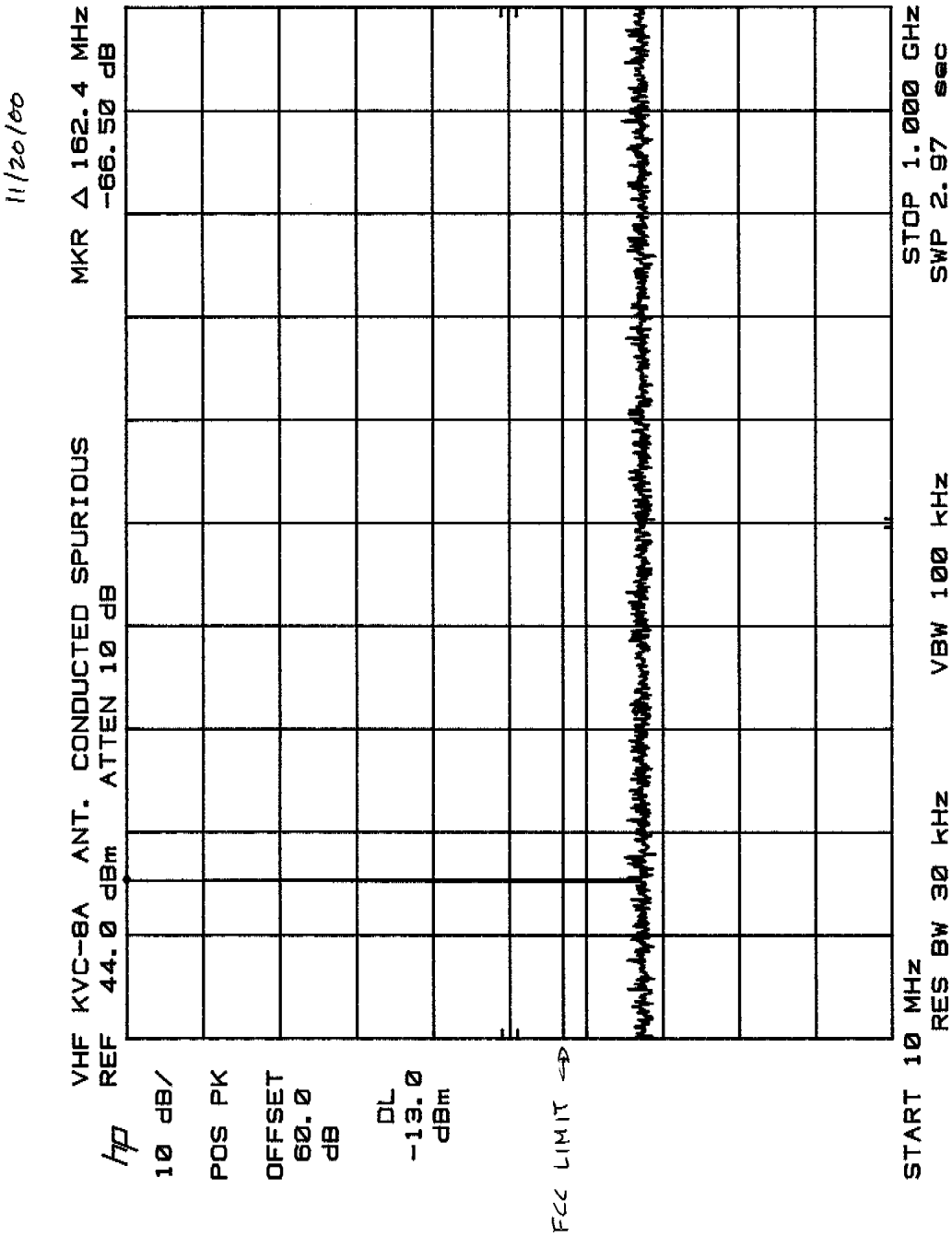
Figure 2: Block Diagram
(Spurious Emissions tests)

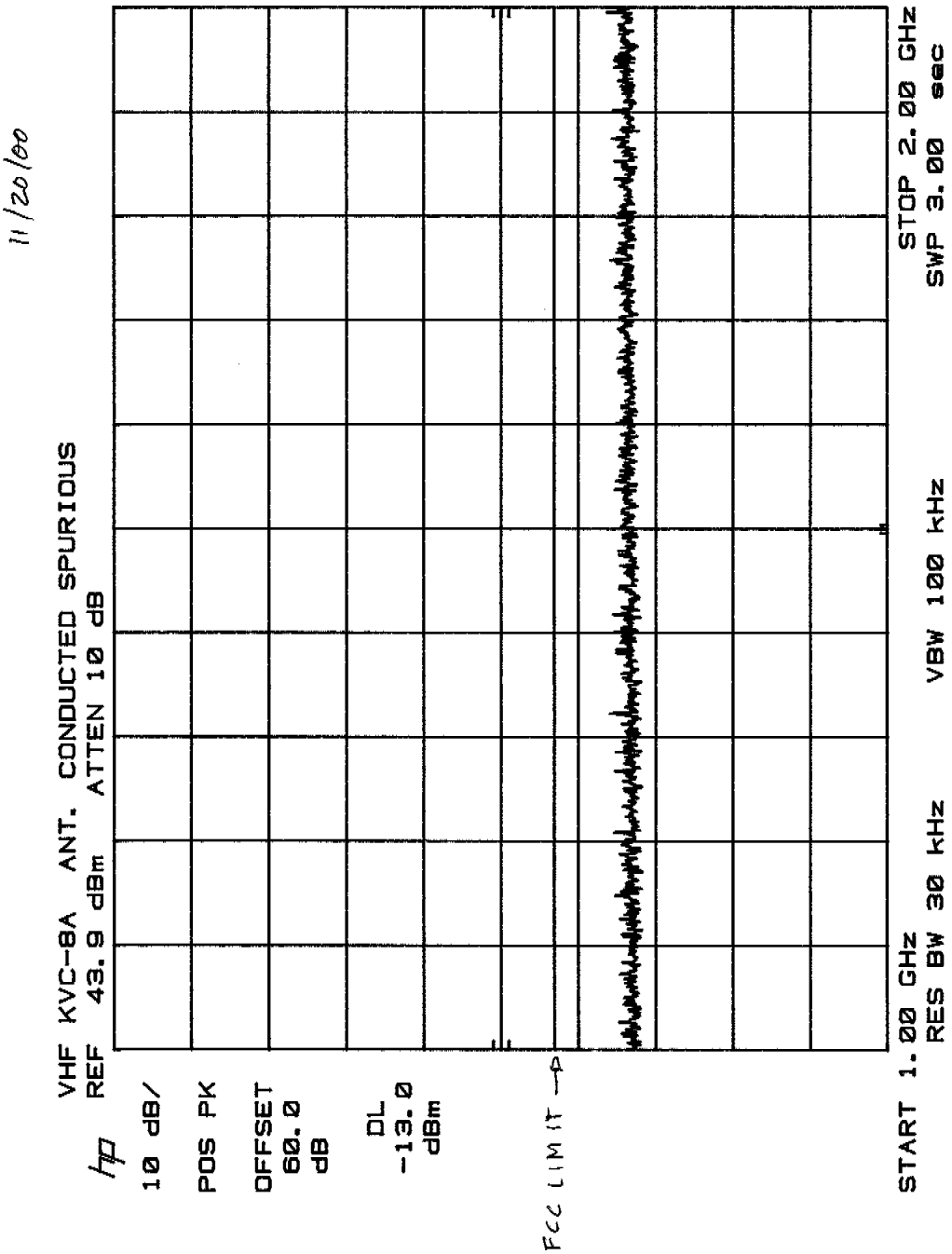


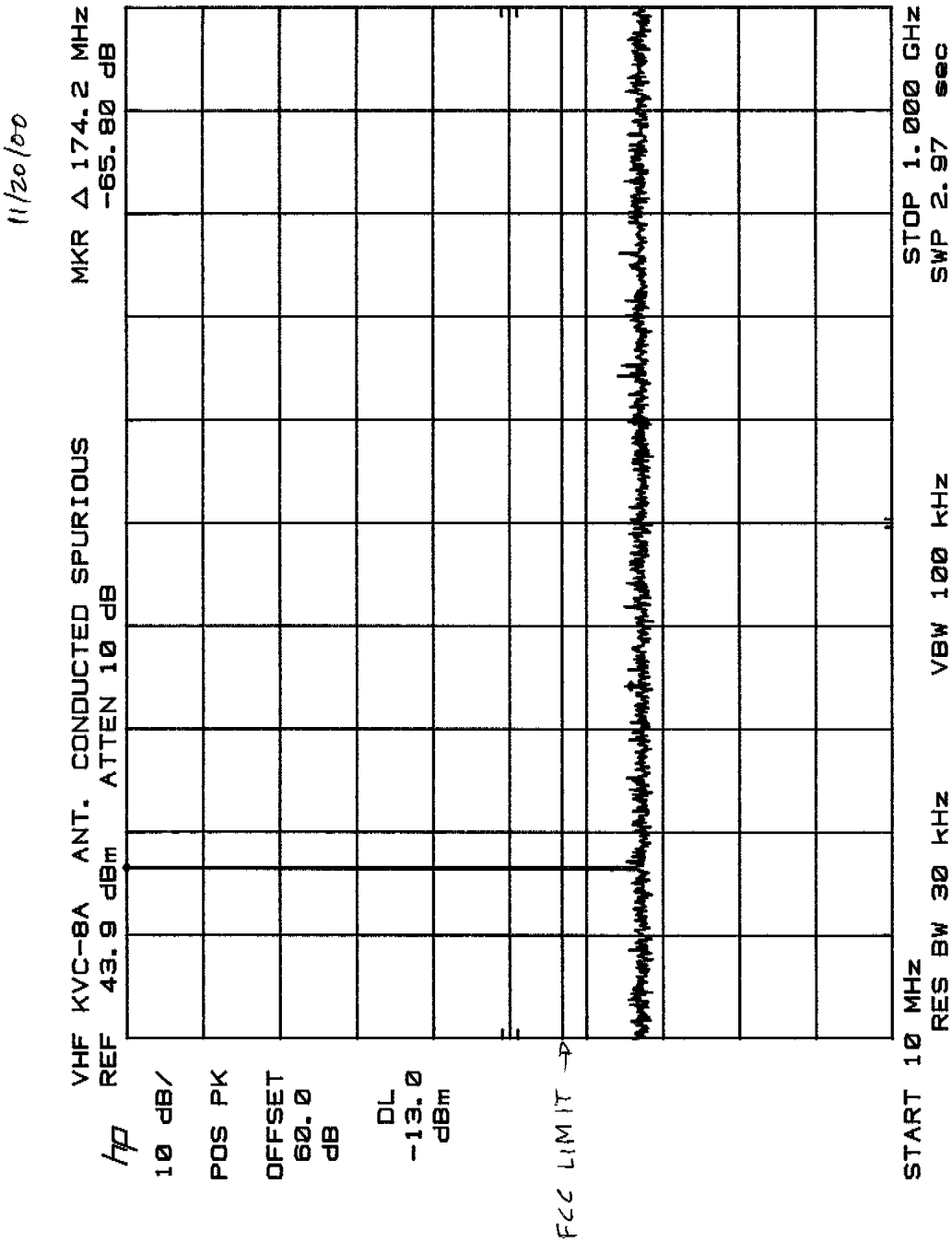
11/20/00

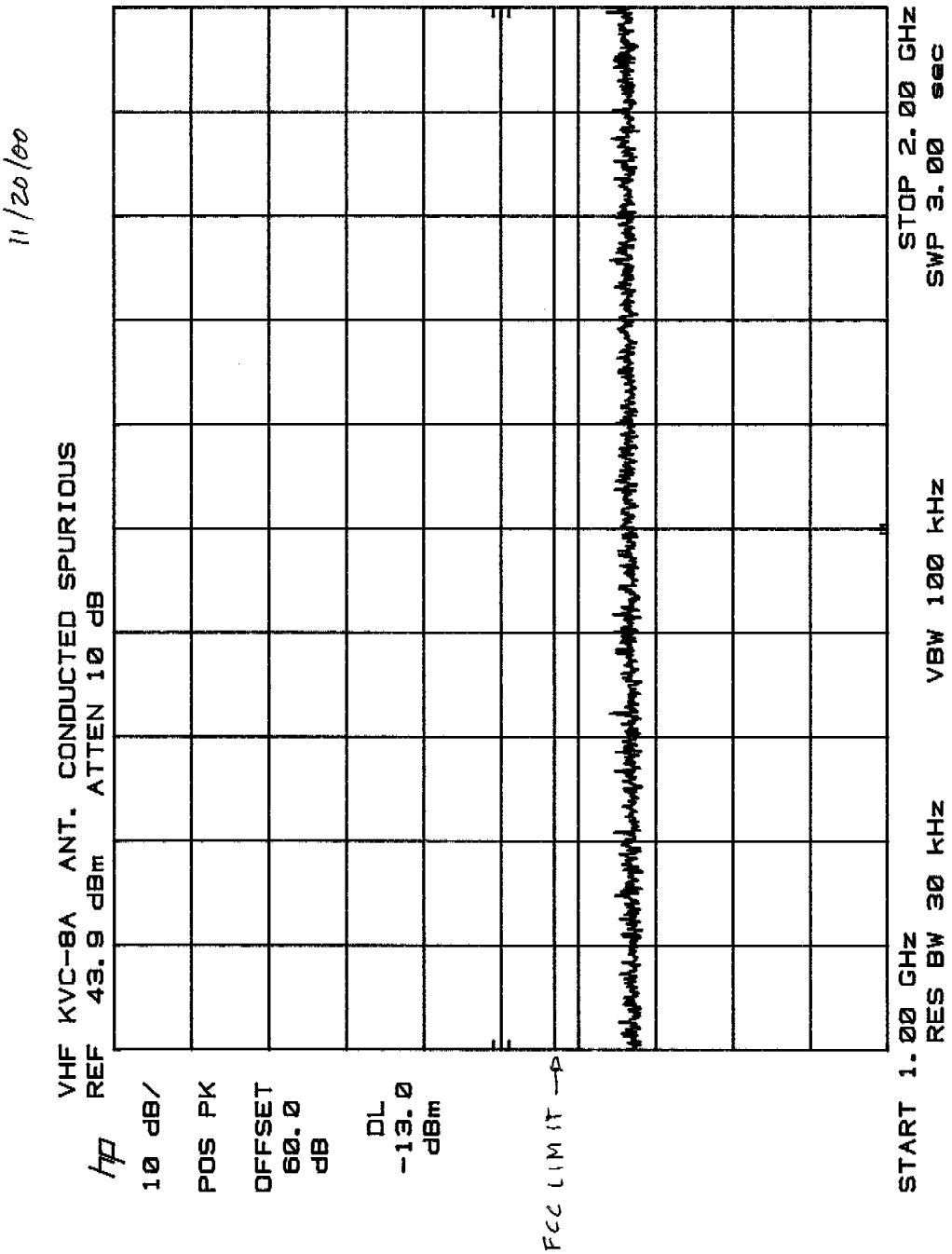

VHF KVC-8A ANT. CONDUCTED SPURIOUS
REF 44.1 dBm
ATTEN 10 dB
MKR Δ 150.5 MHz
-67.60 dB
10 dB/
POS PK
OFFSET
60.0
dB
DL
-13.0
dBm
FCC LIMIT
START 10 MHz
RES BW 30 kHz
VBW 100 kHz
STOP 1.000 GHz
SWP 2.97 sec


11/20/00
VHF KVC-8A ANT. CONDUCTED SPURIOUS
REF 44.1 dBm ATTEN 10 dB
10 dB/
POS PK
OFFSET
60.0
dB
DL
-13.0
dBm
FCC LIMIT
START 1.00 GHz
RES BW 30 kHz
VBW 100 kHz
STOP 2.00 GHz
SWP 3.00 sec


11/20/00
VHF KVC-8A ANT. CONDUCTED SPURIOUS
REF 44.0 dBm ATTEN 10 dB
MKR Δ 162.4 MHz
-66.50 dB
10 dB/
POS PK
OFFSET
60.0
dB
DL
-13.0
dBm
FCC LIMIT
START 10 MHz
RES BW 30 kHz
VBW 100 kHz
STOP 1.000 GHz
SWP 2.97 sec


11/20/00
VHF KVC-8A ANT. CONDUCTED SPURIOUS
REF 43.9 dBm ATTEN 10 dB
10 dB/
POS PK
OFFSET
60.0
dB
DL
-13.0
dBm
FCC LIMIT
START 1.00 GHz
RES BW 30 kHz
VBW 100 kHz
STOP 2.00 GHz
SWP 3.00 sec


11/20/00
VHF KVC-8A ANT. CONDUCTED SPURIOUS
MKR Δ 174.2 MHz
-65.80 dB
REF 43.9 dBm
ATTEN 10 dB
10 dB/
POS PK
OFFSET
60.0
dB
DL
-13.0
dBm
FCC LIMIT
START 10 MHz
RES BW 30 kHz
VBW 100 kHz
STOP 1.000 GHz
SWP 2.97 sec


11/20/00
VHF KVC-8A ANT. CONDUCTED SPURIOUS
REF 43.9 dBm ATTEN 10 dB
10 dB/
POS PK
OFFSET
60.0
dB
DL
-13.0
dBm
FCC LIMIT
START 1.00 GHz
RES BW 30 kHz
VBW 100 kHz
STOP 2.00 GHz
SWP 3.00 sec

2.1053 Field Strength of Spurious Radiation

Definition:
Emissions from the equipment when connected into a non-radiating load on a frequency or frequencies which are outside an occupied band sufficient to ensure transmission of information of required quality for the class of communication desired. The reduction in the level of these spurious emissions will not affect the quality of the information being transmitted.

Test Method: Per EIA RS 152-B.

Connect the equipment and follow the procedure described in paragraph 2.2.1.1 and paragraph 5.0. Measure the amplitude of each spurious radiated signal through the 10^{th} harmonic. The level in dBuV/m is calculated on the following page. The spurious signals are then measured on the 3 meter range.

$$\text{Spurious attenuation dB} = 10 \log \frac{\text{Po Watts}}{\text{Calc. Spurious power}}$$

Test Results: See TABLE on following Page.

All radiated spurious emissions are below the FCC Specifications.

Maximum Permitted Exposure (MPE) Exhibit

The MPE distance for this amplifier connected to a typical 6 dBd gain antenna is:

MPE distance = SQRT (P/4*PI*GPUE Limit)

Where: P = EIRP Effective Isotropic Radiated Power (in mW)
PI = 3.1416
GPUE = General Population/Uncontrolled Exposure limit for 3 – 300 MHz frequency range = 27.5 V/m

In this case, P = 35,000 mW * Numerical Antenna Gain

Numerical Antenna Gain for a 6dBd or 8.15 dBi antenna = 6.53

Hence . . . MPE = SQRT ((35,000*6.53)/4*PI*27.5)
MPE = 25.7 cm

TEST EQUIPMENT LOG 12/8/00

Customer: TPL Communications
EUT: VHF Amplifier, 136 – 174 MHz
Model / Part #: KVC-8A
Serial #: N/A
Test Procedure: FCC, Part 90, 2, 22
Test Specification: Radiated Spurious
Test Engineer: Mike Green
Customer Rep: Jim Briggs

DESCRIPTION	MANUFACTURER	MODEL # / SERIAL #	CAL. DUE
Spectrum Analyzer	Hewlett-Packard	8566B/2407A13212	03/08/01
Signal Generator	Marconi	2024, 112231/034	Reference
Amplifier	Eaton	3552B	Reference
Antenna, Log-Periodic	Electro-Metrics	3146/1284	01/31/01
Antenna, DRG Horn	EMCO	3115/2280	01/31/01
50 ohm load (500W)	Electro Impulse Labs	DA-242A/U, 7940097	Reference
Power Supply (0-36 Vdc, 24A)	Lambda	LES-F-03-DB	Reference
Coaxial Cable	RG-214/U	10 feet	Cal prior to test
Coaxial Cable	RG-214/U	Random length	Reference

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SPURIOUS RADIATED SIGNAL MEASUREMENTS
(Ref: Part 2, Subpart J, 2.1053 and 2.1057)

Date	8-Dec-00	
Customer	TPL Communications	
EUT	RF Power Amplifier	
P/N	KVC-8A	
S/N	NA	
Pass/Fail	PASS	
Operating Mode	FM, 2.5 kHz	
Test Engineer	Mike Green	
Fund. Freq.	162	MHz
Output Power	35	W
Output Impedance	50	ohms
Fund. Field Strength	13.9	V/m
Fund. Field Strength	142.9	dBuV/m
FCC Limit	58.4	dBc

Antenna Polarization	Freq (MHz)	Measured Signal (dBuV)	AF (dB/m)	Cable Loss (dB)	Amp Gain (dB)	Corrected Measurement (dBuV/m)	Fundamental Field Strength (dBuV/m)	Spurious Below Carrier (dBc)	FCC Limit (dBc)
H	324	60.1	16.3	0.42	0	76.82	142.9	66.1	58.4
H	486	49.4	21.8	0.53	0	71.73	142.9	71.2	58.4
H	648	33.9	23.7	0.64	0	58.24	142.9	84.6	58.4
H	810	32.9	24.8	0.75	0	58.45	142.9	84.4	58.4
H	972	36.1	25.7	0.87	0	62.67	142.9	80.2	58.4
H	1134	24.2	24.9	0.92	0	50.02	142.9	92.9	58.4
H	1296	24.7	25.3	1.00	0	51.00	142.9	91.9	58.4
H	1458	25.2	25.7	1.20	0	52.10	142.9	90.8	58.4
H	1620	21.1	26.5	1.40	0	49.00	142.9	93.9	58.4

2.1055 Measurement of Frequency Stability

The EUT is a power amplifier and contains no circuitry for generating or stabilizing the RF signal. The driver will be responsible for this task.

2.1057 Frequency Spectrum to be investigated

The Frequency was searched from the lowest radio frequency generated in the equipment through the 10^{th} harmonic of the carrier frequency.