2.983(e)   Test Data

Refer to 2.983(e) (1) through 2.983(e) (7).

2.983(e)(1)   Measurement of RF Power Output per 2.985

Definition: For RF Power Amplifiers.

Test Method: See FIGURE 2.

Output Power Is measured across a precision 50 ohm load with a wide band sampling RF Voltmeter.

Test Results:

POWER OUTPUT

FREQUENCY	NOMINAL VOLTAGE 13.8 VDC	85% VOLTAGE 11.73 VDC	115% VOLTAGE 15.87 VDC
158 MHz	30 Watts	30 Watts	30 Watts

2.983(e)(2)   Measurement of Modulation Characteristics per 2.987(b) (1)

This EUT is a Power Amplifier and contains no circuitry to modify the RF signal provided by the driver except to raise the power level.

2.983(e)(3) Measurement of Occupied Bandwidth per 2.989

Definition:
Occupied Bandwidth, that is the frequency bandwidth such that, below its upper frequency limits, the mean power radiated by a given emission.

Test Method: Connect the Equipment per FIGURE 3.
Measurements were made with the modulating signal at 2.5 kHz with 5 kHz of FM deviation.

Test Results: See Plots following FIGURE 3.

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

2.983(e)(4) Measurement of Antenna Conducted Spurious Emissions per 2.991

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

$= 43 + 10 \log_{10} (50)$

$= 60$ dB

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

Connect the equipment as shown in FIGURE 4.

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 10th harmonic of the carrier frequency.
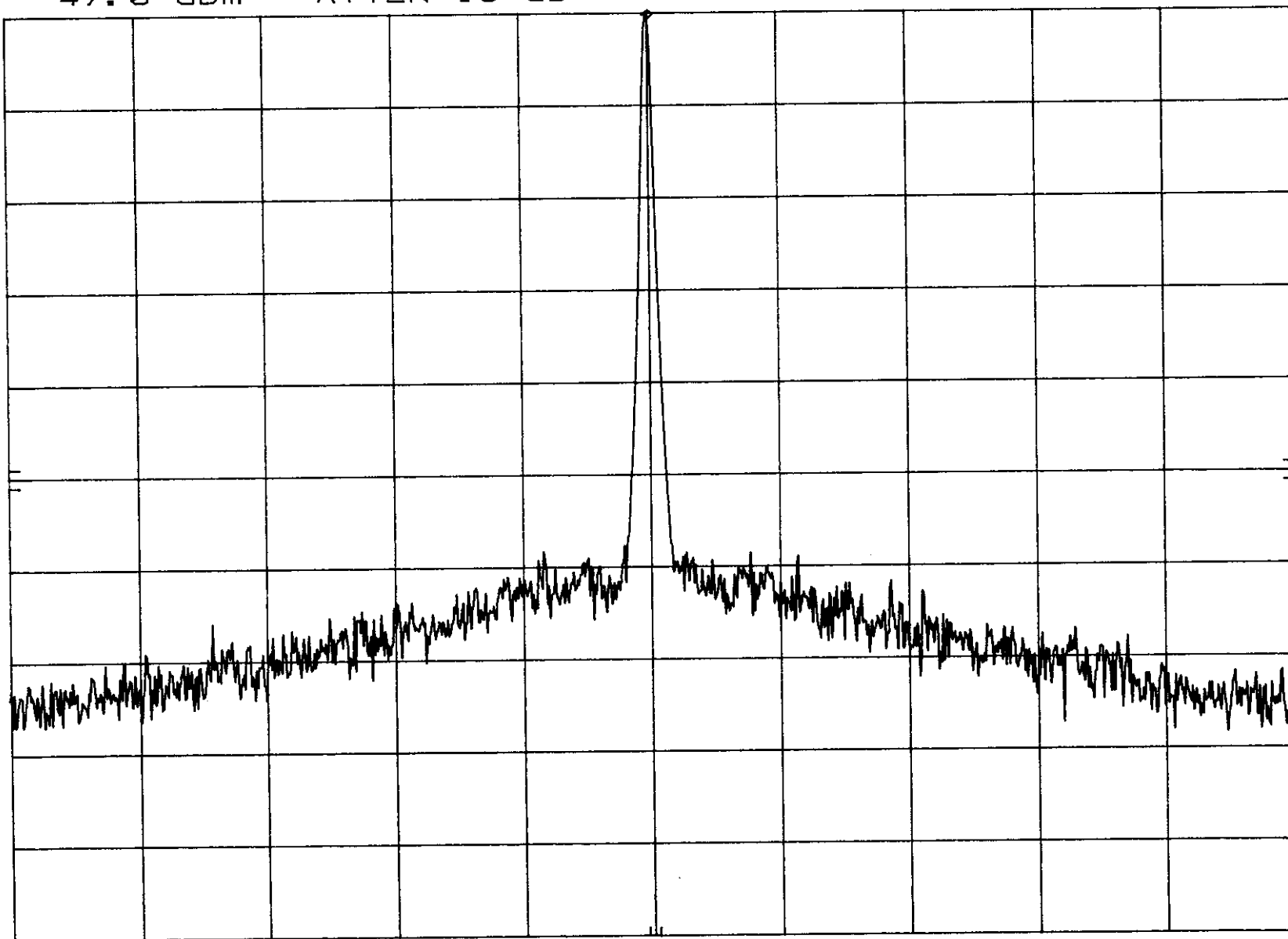
Test Results: See Plots following FIGURE 4.

All spurious antenna conducted emissions are below the FCC Specifications.

PA3-1AB-M UNMODULATED CARRIER   MKR 158.000 0 MHz

REF 47.0 dBm   ATTEN 10 dB   46.90 dBm

10 dB/

POS PK

OFFSET
61.0
dB

SHEET 12

FCC ID: BBD3-1AB-M

CENTER 158.000 MHz   SPAN 100 kHz

RES BW 300 Hz   VBW 1 kHz   SWP 3.00 sec

PA3-1AB-M OCCUPIED BANDWIDTH PART 90   MKR 158.000 0 MHz
REF   47.0 dBm   ATTEN 10 dB   33.80 dBm

hp

10 dB/

POS PK

OFFSET
61.0
dB

FCC LIMIT

SHEET 13

50 dBC

CENTER 158.000 MHz   SPAN 100 kHz
RES BW 300   Hz   VBW 1 kHz   SWP 3.00   sec
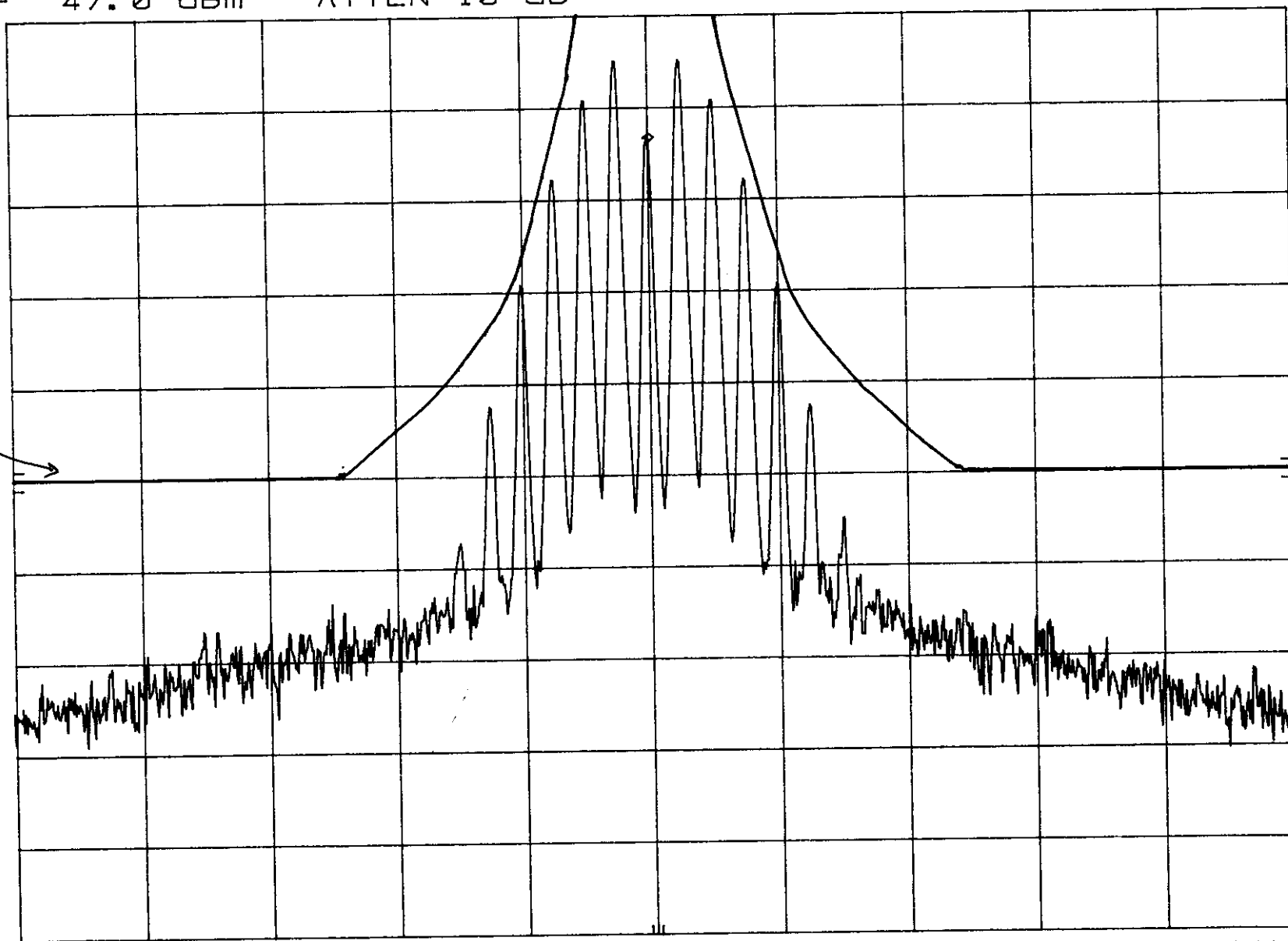
FCC ID: BBD3-1AB-M

PA3-1AB-M OCCUPIED BANDWIDTH PART 22   MKR 158.000 0 MHz
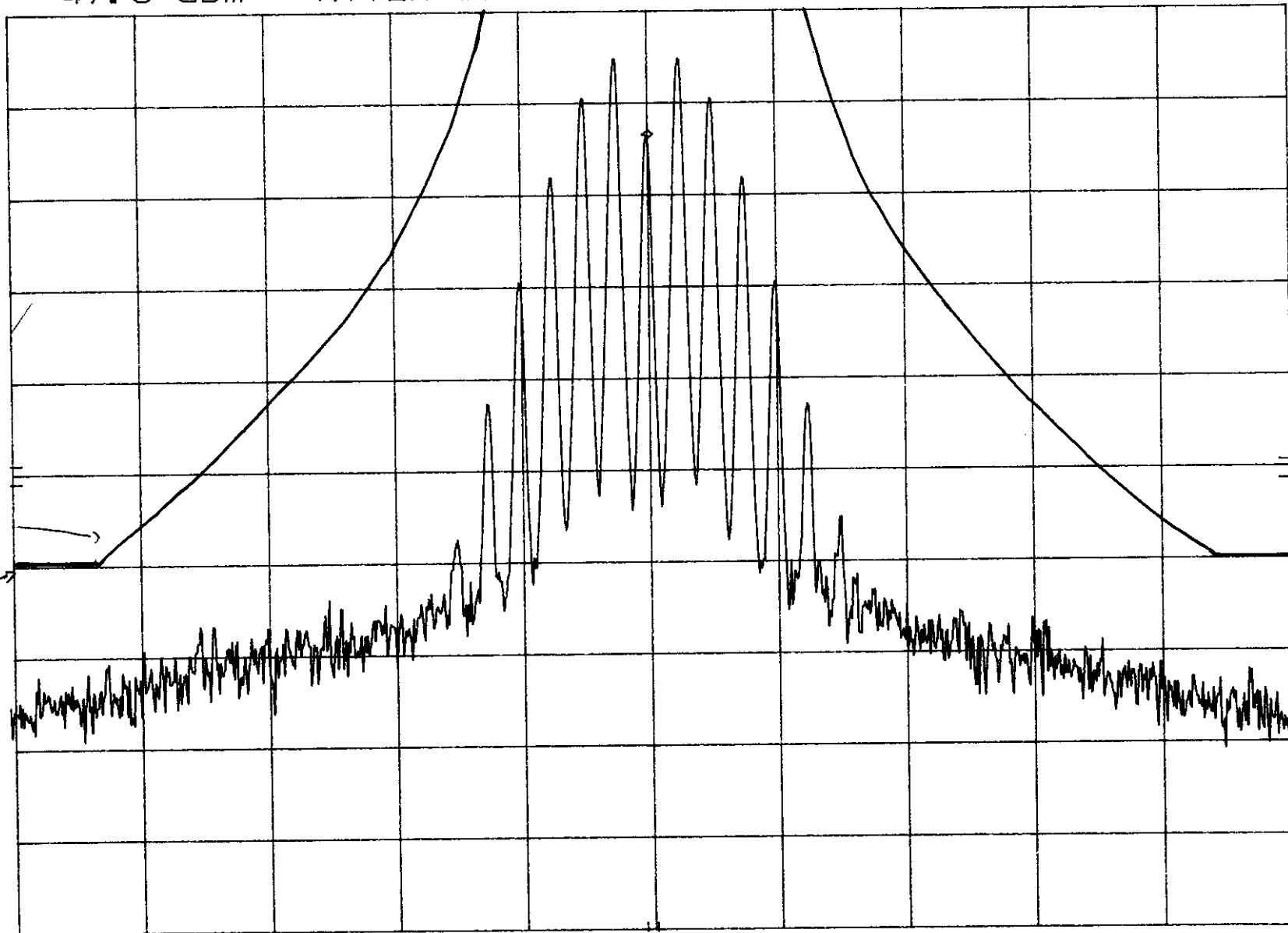REF 47.0 dBm   ATTEN 10 dB   33.80 dBm

10 dB/

POS PK

OFFSET
61.0
dB

SHEET 14

FCC LIMIT

60 dBC

CENTER 158.000 MHz   SPAN 100 kHz
     RES BW 300 Hz   VBW 1 kHz   SWP 3.00 sec

FCC ID: BBD3-1AB-M

PA3-1AB-M   ANT. CONDUCTED SPURIOUS   MKR △ 158.4 MHz
REF   47.0 dBm   ATTEN 10 dB   -69.50 dB

hp

10 dB/

POS PK

OFFSET
61.0
dB

DL
-13.0
dBm

SHEET 17 FCC LIMIT

60 dBC →

START 100 MHz   STOP 1.000 GHz
         RES BW 30 kHz   VBW 100 kHz   SWP 2.70 sec

FCC ID: BBD3-1AB-M

PA3-1AB-M   ANT. CONDUCTED SPURIOUS
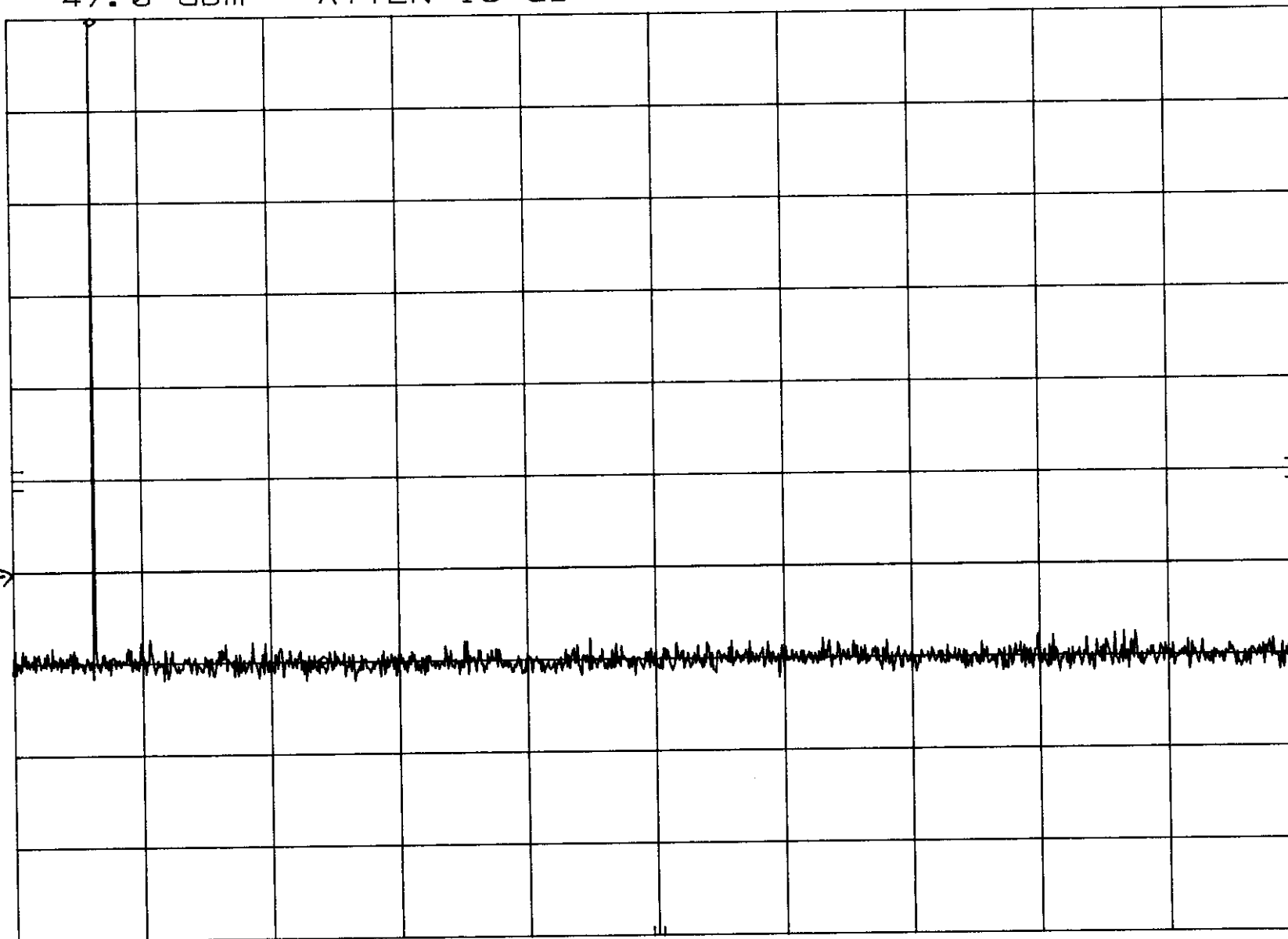REF   47.0 dBm   ATTEN 10 dB
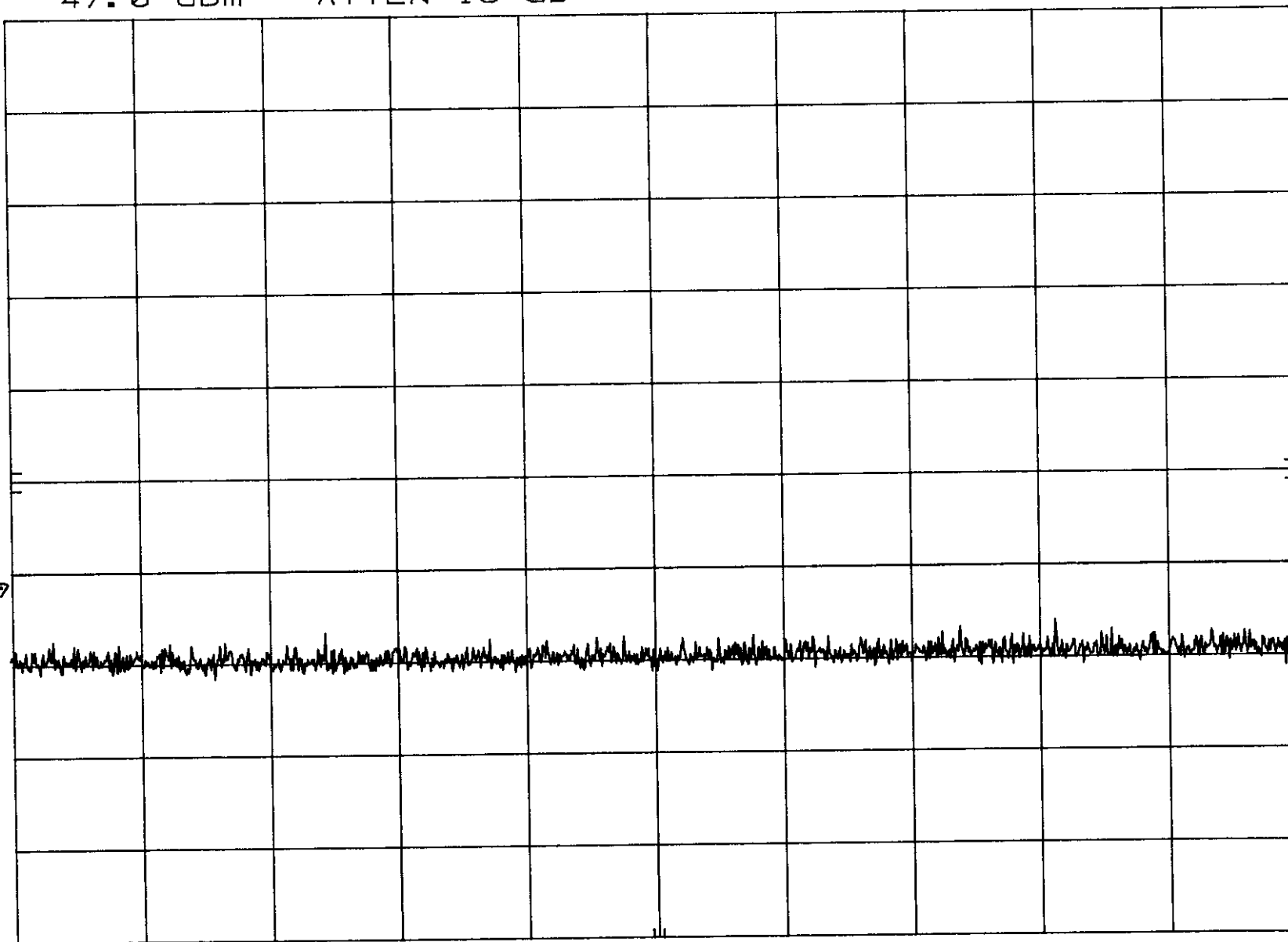
hp

10 dB/

POS PK

OFFSET
61.0
dB

DL
-13.0
dBm

SHEET 18

FCC LIMIT

60 dBC

START 1.00 GHz
RES BW 30 kHz   VBW 100 kHz

STOP 2.00 GHz
SWP 3.00 sec

FCC ID: BBD3-1AB-M

2.983(e)(5) Measurement of Radiated Spurious Emissions per 2.993

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 10th harmonic. The level in dBuV/m is
calculated on the following page. The spurious signals are then measured
on the 3 meter range.

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

Test Results: See TABLE I on following Page.

All radiated spurious emissions are below the FCC Specifications.

SPURIOUS RADIATED SIGNAL MEASUREMENTS

(Ref: Part 2, Subpart J, 2.991 & 2.993)

Date __7-23-99__   Pass __✓__ Fail _____ (at Freq. _____)

EUT __RF POWER AMPLIFIER__   Operating Power __50 WATTS__

Part No. __PA3-1AB-M__   Operating Mode __SATURATED__

Serial No. __0001__   Test Engineer _____

FREQUENCY TUNED TO __158__ MHz

ANT POL	FREQ MHz	SPECTRUM ANALYZER (dBµV)	ANT FACTOR (dB)	CABLE LOSS (dB)	AMP GAIN (dB)	dBµV/m	FUND FIELD STRENGTH dBµV/m	SPUR BELOW CARRIER (dBc)
H	316	53.50	14	1.5	22	47	144.4	97.4
H	474	53.63	17.7	1.5	22	50.8	↑	93.6
H	632	52.9	19.7	2.0	22	52.6		91.8
H	790	49.8	22	2.0	22	50.8		93.6
H	948	55.5	23.3	3.0	22	54.8		84.6
H	1106	45.7	25.5	3.5	22	52.7		91.7
H	1264	50.7	26.5	5.0	22	60.2		84.2
H	1422	34.7	27.5	6.0	22	46.2	↓	79.2
H	1580	43.5	29.9	6.5	22	57.9	144.4	86.5

Fundamental Field Strength (V/m) = $\frac{1}{3}(Ro \times Po)^{\frac{1}{2}}$ = $\frac{1}{3}(50 \times 50)^{\frac{1}{2}}$ = 16.6 V/m

Ro = Amplifier Output Impedance (Ohms) = 50Ω

Po = Amplifier Output Power (Watts) = 50W

= 144.4 dBµV/m

Conversion from µV/m to dBµV/m = (µV/m) log x 20

= 144.4 dBµV/m

FCC LIMIT = 43 + 10 log (50) = 60 dBc

SPURIOUS RADIATED SIGNAL MEASUREMENT

(Ref: Part 2, Subpart J, 2.991 & 2.993)

Date 7-23-99

EUT RF POWER AMPLIFIER   Pass ✓   Fail ____ (at Freq. ____)

Part No. PA3-1AB-M   Operating Power 50 WATTS

Serial No. 0001   Operating Mode SATURATED

Test Engineer CHI CAI

FREQUENCY TUNED TO __158__ MHz

ANT POL	FREQ MHz	SPECTRUM ANALYZER (dBµV)	ANT. FACTOR (dB)	CABLE LOSS (dB)	AMP GAIN (dB)	dBµV/m	FUND FIELD STRENGTH dBµV/m	SPUR BELOW CARRIER (dBc)
V	316	51.2	14	1.5	22	44.7	144.4	99.7
V	474	51.6	17.7	1.5	22	48.8	↗	95.6
V	632	53.4	19.7	2.0	22	53.1		91.3
V	790	46.9	22	2.0	22	48.9		95.5
V	948	55.6	23.3	3.0	22	54.9		84.5
V	1106	51.1	25.5	2.5	22	58.1		86.3
V	1264	48.8	26.5	5.0	22	58.3		86.1
V	1422	34.1	27.5	6.0	22	45.6		98.8
V	1580	51.1	24.9	6.5	22	65.5	144.4	78.9

Fundamental Field Strength (V/m) = $\frac{1}{3}$ (Ro x Po)$^{1/2}$ = $\frac{1}{3}$(50 x 50)$^{1/2}$

Ro = Amplifier Output Impedance (Ohms) = 50Ω   = 16.6 V/m

Po = Amplifier Output Power (Watts) = 50W   = 144.4 dBµV/m

Conversion from µV/m to dBµV/m = (µV/m) log x 20

FCC LIMIT = 43 + 10 log (50) = 60 dBc

SHEET 21

2.983(e)(6) Measurement of Frequency Stability per 2.995

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.

2.983(e)(7) Frequency Spectrum to be investigated per 2.997

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

2.983(h)   Description and Test Data for Encoding Device(s)

This section does not apply to the EUT.

2.983(i)   **Type Acceptance Data for an External Power Amplifier used in Amateur Radio Service – Part 97**

This section does not apply to the EUT.

APPENDIX A
TEST EQUIPMENT

TEST EQUIPMENT LOG

TYPE OF TEST : FCC TYPE ACCEPTANCE

DATE **8-3-99**   TEST PROCEDURE **PART 2, 22, & 90**

EUT **RF AMP**   OTHER _____

MODEL # / SERIAL # **PA3-1AB-M**

TEST ENGINEER **CH1 CA1**

DESCRIPTION	MANUFACTURER	MODEL # / SERIAL #	CAL. DUE DATE
SIGNAL GEN.	MARCONI	2024 / 112236-002	3-17-2000
SPEC. ANALYZER	HP	8566B/2403A063078&2407A03212	2-10-2000
PLOTTER	HP	7070A	N/R
DUAL DIR. COUPLER	HP	778D	CAL @ TIME OF TEST
50 OHM LOAD	ELECTRO IMPULSE LAB.	DA-242A/4/7940097	CAL @ TIME OF TEST
50 OHM LOAD	TERMALINE	8053 / 8945	CAL @ TIME OF TEST
50 OHM LOAD	INMET	IN020M-100W	CAL @ TIME OF TEST
40 Db ATT.	INMET	18N50W-40Db	CAL @ TIME OF TEST
POWER SUPPLY	ACOPIAN	28PT10AFHP / 6	N/R
MULTI-VOLTMETER	GOLDSTAR	DM-333 / S6I004151	4-1-2000
LOG PERIODIC ANT.	A.H. SYSTEMS.	SAA-200-512 / 347	10-10-1999
DRG ANT.	EMCO	3115 / 2280	1-8-2000
WIDEBAND AMP.	IFI	5500	N/R
PREAMP.	MINI-CIRCUITS	ZFL-2000 / 001	5-7-2000
PREAMP.	AVANTEK	SWL88-6176 / 1847	5-7-2000

FCCTA

APPENDIX B
OPERATING/SERVICE/INSTRUCTION MANUAL