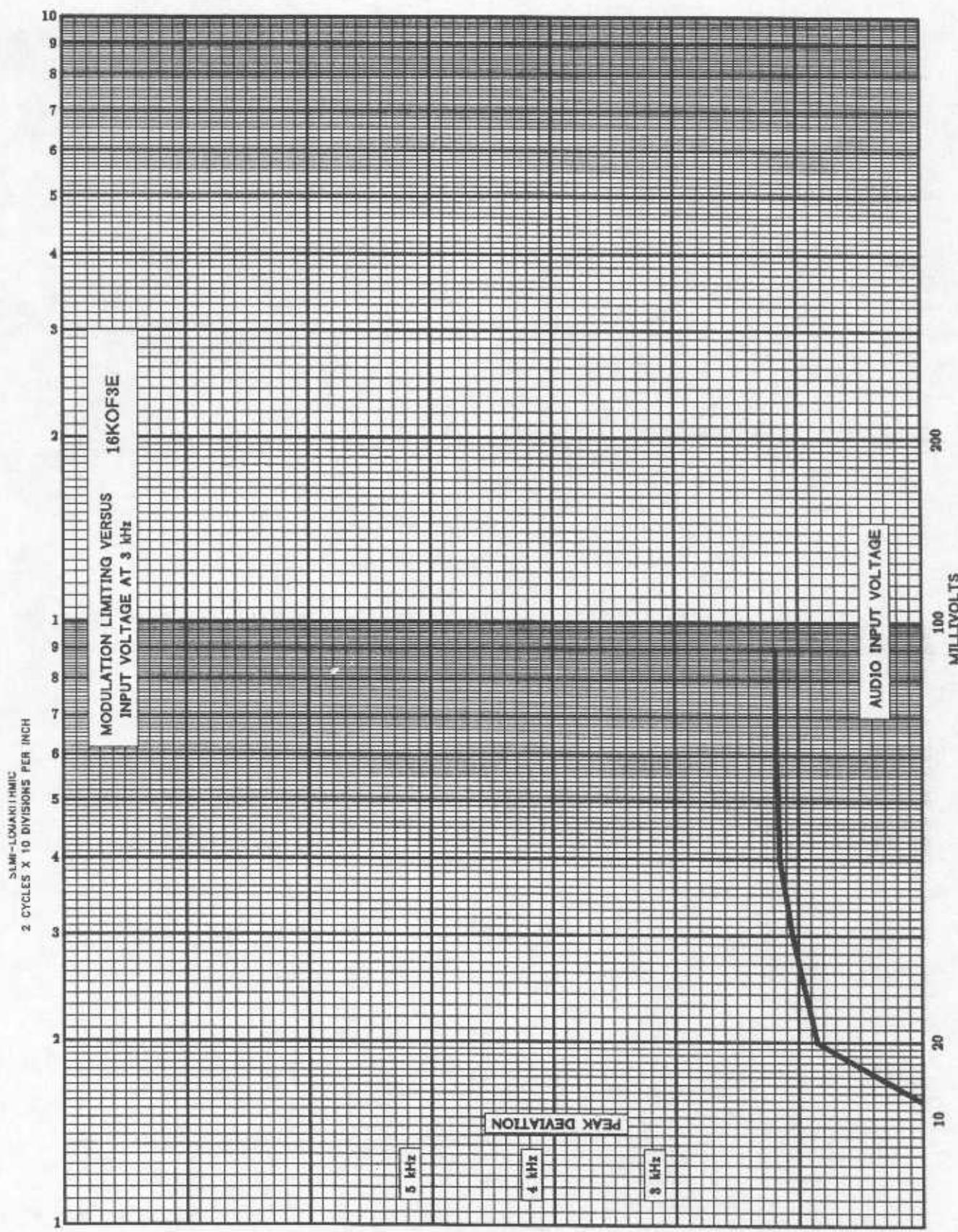


NAME OF TEST: Percentage Modulation Versus Input Voltage at 3 kHz

16KOF3E

TEST DATA:	Input Voltage (mV)	Deviation (kHz)
	12	1.00
	20	1.84
	30	2.06
	40	2.15
	50	2.16
	60	2.19
	70	2.19
	80	2.19
	90	2.19

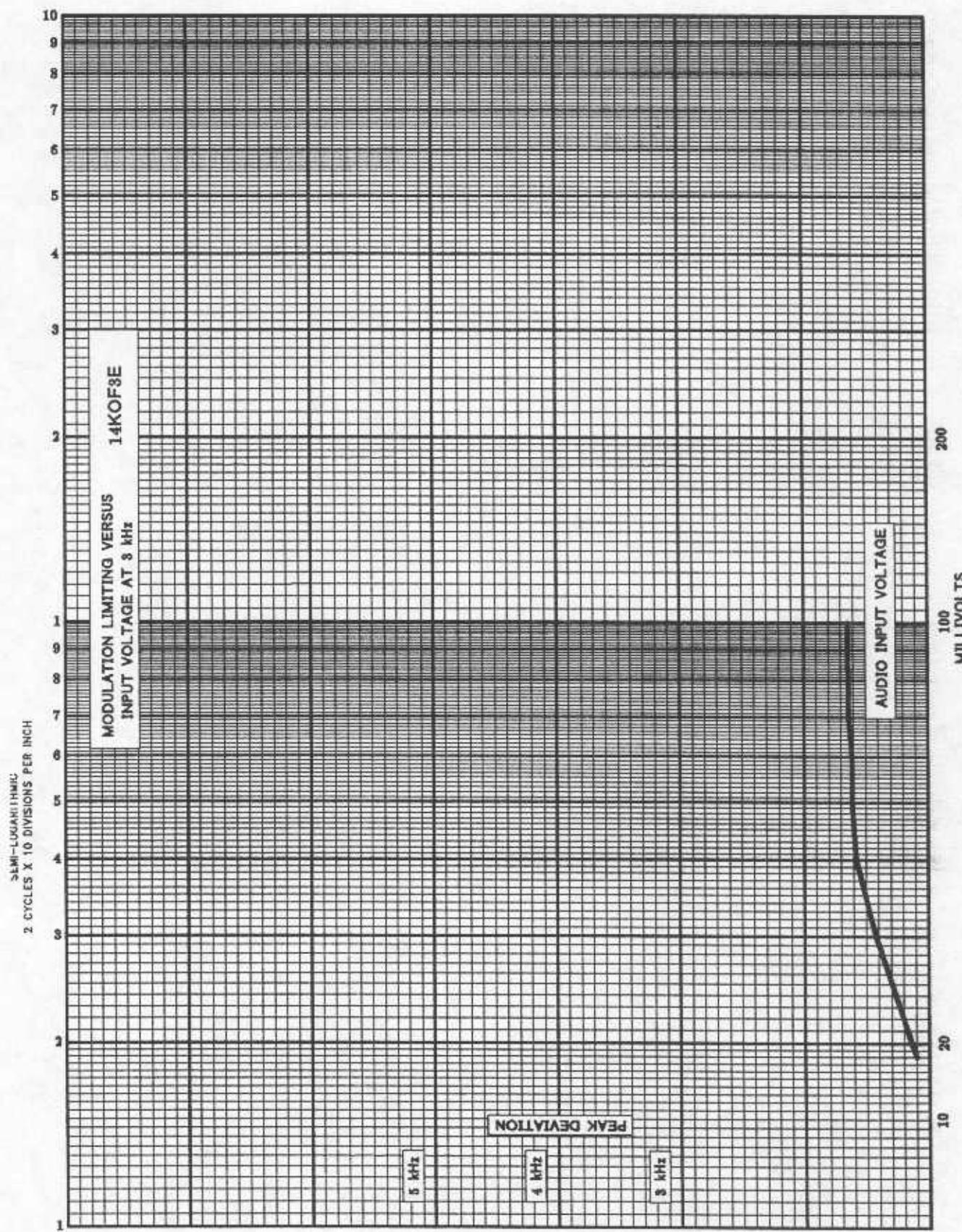


MODULATION LIMITING (3 kHz) 16KOF3E

NAME OF TEST: Percentage Modulation Versus Input Voltage at 3 kHz

14KOF3E

TEST DATA:	Input Voltage (mV)	Deviation (kHz)
	18	1.10
	30	1.42
	40	1.49
	50	1.51
	60	1.51
	70	1.53
	80	1.53
	90	1.53
	100	1.53



MODULATION LIMITING (3 kHz) 14KOF3E

NAME OF TEST: Transmitter Occupied Bandwidth 25 Watts

RULE PART NO.: 2.989 (c) (1)

MINIMUM STANDARD: Sidebands and Spurious From 10 kHz thru 20 kHz down 25 dB minimum. From 20 kHz thru 50 kHz down 35 dB minimum. Greater than 50 kHz down 64 dB minimum.

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

TEST CONDITIONS: Prevailing room conditions
Multiple Voltage Switching Power Supply, Tectrol Inc.
TC47S-1047

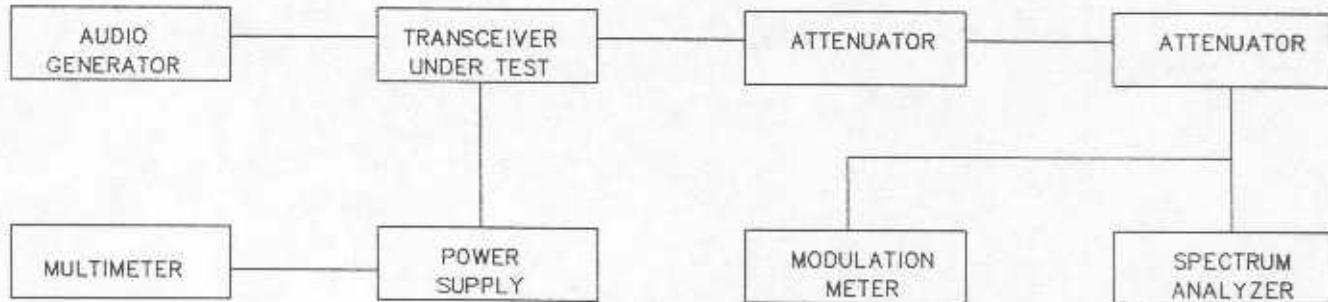
TEST EQUIPMENT: Audio Generator, Model HP 8903A
Attenuator, Tenuline Model 8340-200
Attenuator, Tenuline Model 8323
Multimeter, Model 8012A Fluke
Spectrum Analyzer, Model HP 8563E
Power Supply, Tectrol Inc. TC47S-1047
Modulation Analyzer, Model HP 8901A

PERFORMED BY:

DATE: 5-27-93

William M. Jungo

TEST SET-UP:



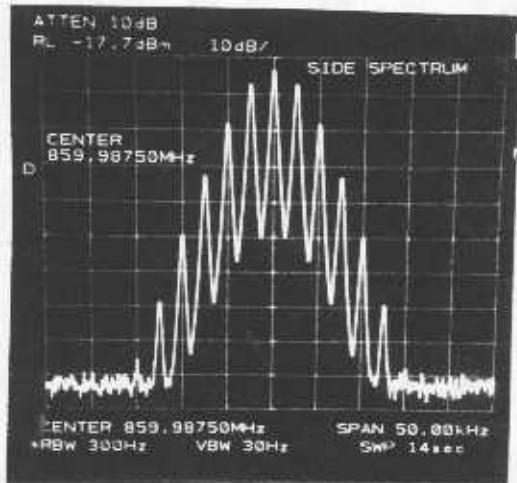
TEST SET-UP

NAME OF TEST:

Transmitter Occupied Bandwidth 25 Watts
(Continued) In Support of Emission Designator 16KOF3E

MEASUREMENTS:

1. Audio input adjusted for 16 dB greater than required for 50% of rated deviation.
2. Audio modulation frequency: 2,500 Hz
3. $F_0 = 859.9875$ MHz.



0 dB Reference

Unmodulated Carrier = 0 dB
Horizontal = 5 kHz/Div.
Vertical = 10 dB/Div.
Bandwidth = .3 kHz
Scan Time = 1.4 Sec./Div.

The spectrum was checked to ± 60 kHz.

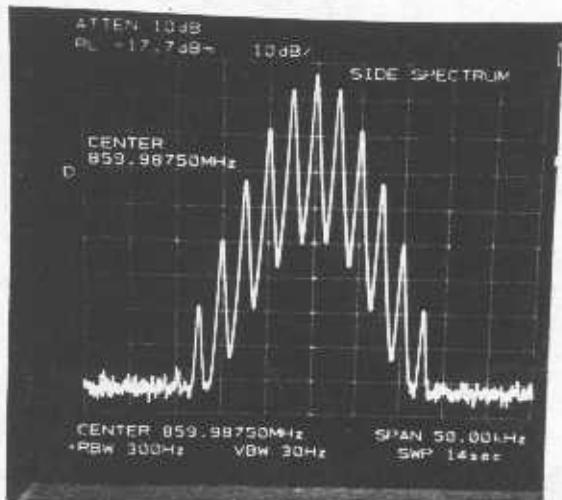
All other sidebands are less than -65 dBc.

NAME OF TEST:

Transmitter Occupied Bandwidth 25 Watts
(Continued) In Support of Emission Designator 14KOF3E

MEASUREMENTS:

1. Audio input adjusted for 16 dB greater than required for 50% of rated deviation.
2. Audio modulation frequency: 2,500 Hz
3. $F_0 = 859.9875$ MHz.



0 dB Reference

Unmodulated Carrier = 0 dB
Horizontal = 5 kHz/Div.
Vertical = 10 dB/Div.
Bandwidth = .3 kHz
Scan Time = 1.4 Sec./Div.

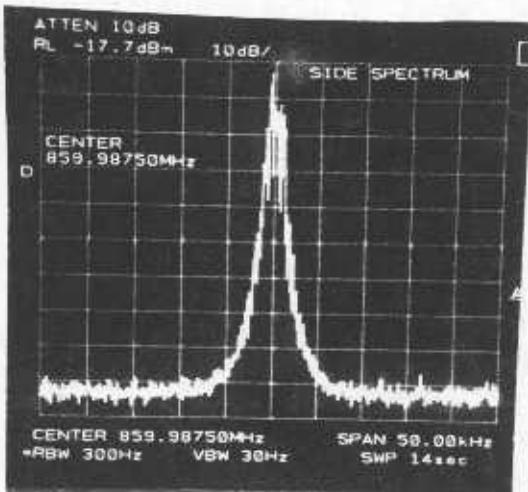
The spectrum was checked to ± 60 kHz.

All other sidebands are less than -65 dBc.

NAME OF TEST: Transmitter Occupied Bandwidth 25 watts
(Continued) In Support of Emission Designator 16K0F3D

MEASUREMENTS: 1. Audio input adjusted for 16 dB greater than required
for 50% of rated deviation.

2. Audio modulation frequency: 2,500 Hz
3. $F_0 = 859.9875$ MHz.



The spectrum was checked to ± 60 kHz.

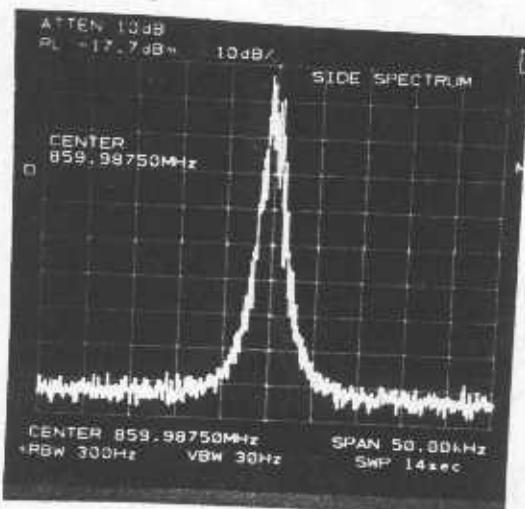
All other sidebands are less than -65 dBc.

NAME OF TEST:

Transmitter Occupied Bandwidth 25 watts
(Continued) In Support of Emission Designator 14K0F3D

MEASUREMENTS:

1. Audio input adjusted for 16 dB greater than required for 50% of rated deviation.
2. Audio modulation frequency: 2,500 Hz
3. $F_0 = 859.9875$ MHz.



0 dB Reference

Unmodulated Carrier = 0 dB
Horizontal = 5 kHz/Div.
Vertical = 10 dB/Div.
Bandwidth = .3 kHz
Scan Time = 1.4 Sec./Div.

The spectrum was checked to ± 60 kHz.

All other sidebands are less than -65 dBc.

NAME OF TEST: Transmitter Occupied Bandwidth 85 Watts

RULE PART NO.: 2.989 (c) (1)

MINIMUM STANDARD: Sidebands and Spurious From 10 kHz thru 20 kHz down 25 dB minimum. From 20 kHz thru 50 kHz down 35 dB minimum. Greater than 50 kHz down 64 dB minimum.

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

TEST CONDITIONS: Prevailing room conditions
Multiple Voltage Switching Power Supply, Tectrol Inc.
TC47S-1047

TEST EQUIPMENT:

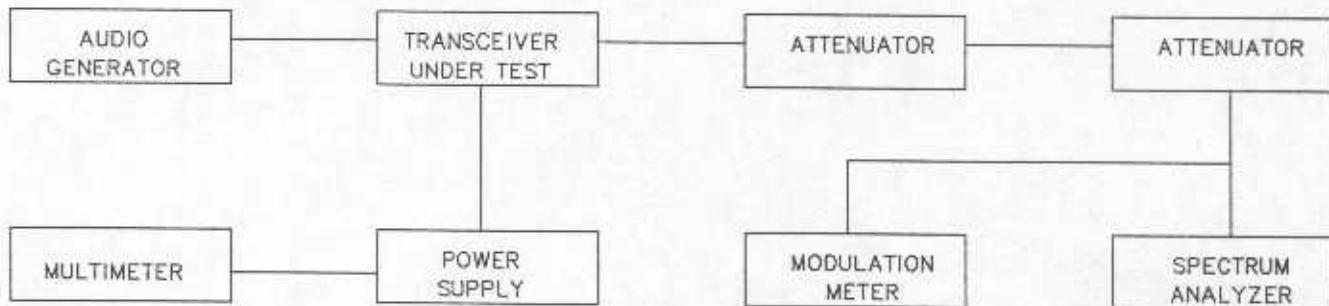
Audio Generator, Model HP 8903A
Attenuator, Tenuline Model 8340-200
Attenuator, Tenuline Model 8323
Multimeter, Model 8012A Fluke
Spectrum Analyzer, Model HP 8563E
Power Supply, Tectrol Inc. TC47S-1047
Modulation Analyzer, Model HP 8901A

PERFORMED BY:

DATE: 5-27-93

William M. Junge

TEST SET-UP:



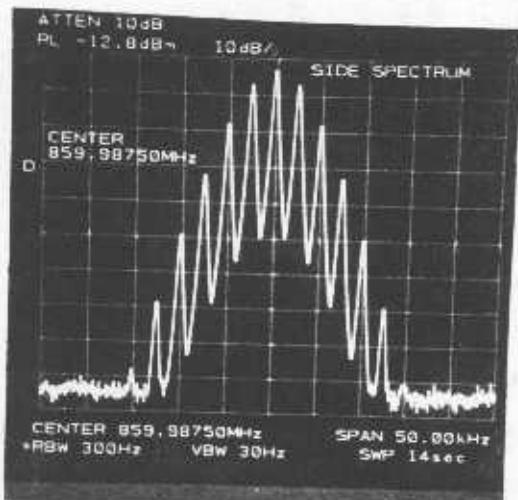
TEST SET-UP

NAME OF TEST:

Transmitter Occupied Bandwidth 85 Watts
(Continued) In Support of Emission Designator 16KOF3E

MEASUREMENTS:

1. Audio input adjusted for 16 dB greater than required for 50% of rated deviation.
2. Audio modulation frequency: 2,500 Hz
3. $F_0 = 859.9875$ MHz.



0 dB Reference

Unmodulated Carrier = 0 dB
Horizontal = 5 kHz/Div.
Vertical = 10 dB/Div.
Bandwidth = .3 kHz
Scan Time = 1.4 Sec./Div.

The spectrum was checked to ± 60 kHz.

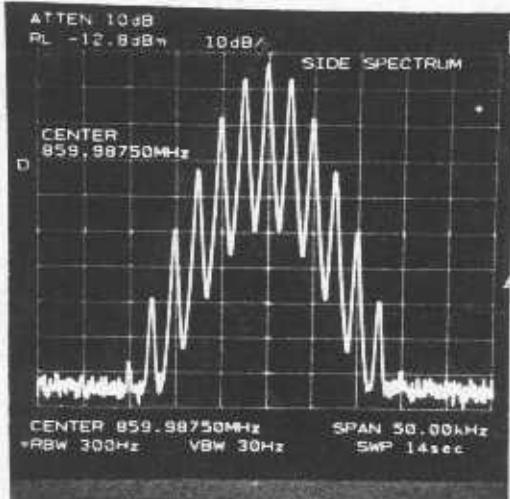
All other sidebands are less than -65 dBc.

NAME OF TEST:

Transmitter Occupied Bandwidth 85 Watts
(Continued) In Support of Emission Designator 14KOF3E

MEASUREMENTS:

1. Audio input adjusted for 16 dB greater than required for 50% of rated deviation.
2. Audio modulation frequency: 2,500 Hz
3. $F_0 = 859.9875$ MHz.



0 dB Reference

Unmodulated Carrier = 0 dB
Horizontal = 5 kHz/Div.
Vertical = 10 dB/Div.
Bandwidth = .3 kHz
Scan Time = 1.4 Sec./Div.

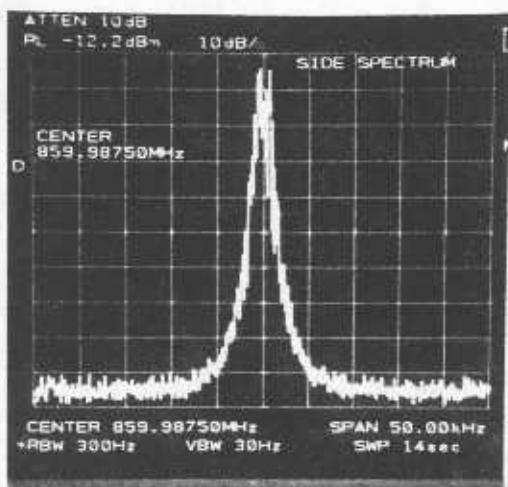
The spectrum was checked to ± 60 kHz.

All other sidebands are less than -65 dBc.

NAME OF TEST: Transmitter Occupied Bandwidth 85 watts
(Continued) In Support of Emission Designator 16K0F3D

MEASUREMENTS: 1. Internal subaudible data generator enabled,
data deviation set for 1 khz deviation.

2. $F_0 = 859.9875$ MHz,



0 dB Reference
Unmodulated Carrier = 0 dB
Horizontal = 5 kHz/Div.
Vertical = 10 dB/Div.
Bandwidth = .3 kHz
Scan Time = 1.4 Sec./Div.

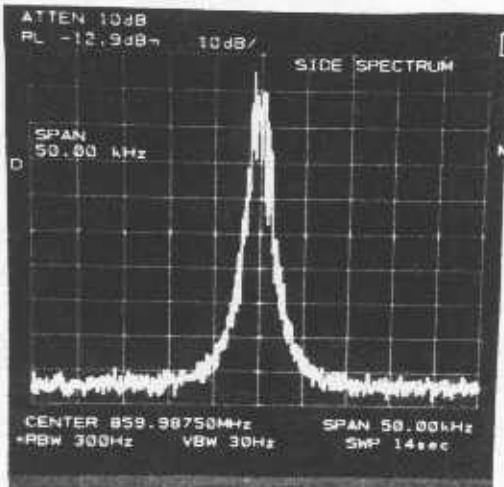
The spectrum was checked to ± 60 kHz.

All other sidebands are less than -65 dBc.

NAME OF TEST: Transmitter Occupied Bandwidth 85 watts
(Continued) In Support of Emission Designator 14K0F3D

MEASUREMENTS:

1. Internal subaudible data generator enabled,
data deviation set for 1 khz deviation.
2. $F_0 = 859.9875$ MHz.



0 dB Reference

Unmodulated Carrier = 0 dB
Horizontal = 5 kHz/Div.
Vertical = 10 dB/Div.
Bandwidth = .3 kHz
Scan Time = 1.4 Sec./Div.

The spectrum was checked to ± 60 kHz.

All other sidebands are less than -65 dBc.

NAME OF TEST: Transmitter Occupied Bandwidth 25 Watts
LTR Data Interface Modem as Modulation Source
In Support of Emission Designator 16K0F1D

RULE PART NUMBER: 2.989(h), 90.209(b)(4), 90.209(c), and 90.209(g)

MINIMUM STANDARD Sidebands and Spurious [Rule 90.209(g), P=25 Watts]

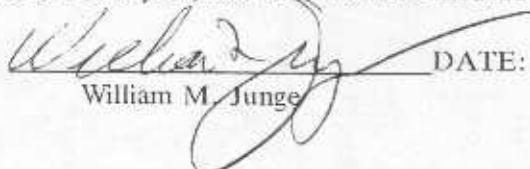
Greater than 5kHz up to and including 10 kHz Down 83 Log (f/5) db
greater than 10 kHz up to and including 250% of the authorized
bandwidth: At least 116 Log (f/6.1) db or $50 + 10 \log (P)$
or 70 dB whichever is lesser attenuation.

greater than 5kHz to 10 kHz:	Down	83 Log (f/5) db
greater than 10 kHz to 21.7 kHz:	Down	116 Log (f/6.1) db
greater than 21.7 to 50 kHz:	Down	50 + 10 Log P minimum
Greater than 50 kHz:	Down	43 + 10 Log P minimum

TEST RESULTS: Meets minimum standard. See test results on following
page.

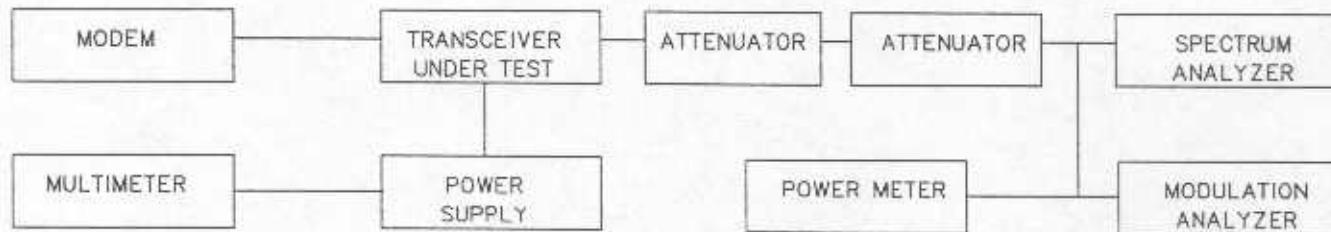
TEST EQUIPMENT:
Audio Generator, Model HP 8903A
Attenuator, Tenuline Model 8340-200
Attenuator, Tenuline Model 8323
Multimeter, Model 8012A Fluke
Spectrum Analyzer, Model HP 8563E
Power Supply, Tectrol Inc. TC47S-1047
Modulation Source, E.F. Johnson LTR Data Modem
Modulation Analyzer, Model HP 8901A
Spectrum Analyzer, Hewlett-Packard HP1411T

PERFORMED BY:


DATE: 5-27-93

William M. Junge

TEST SETUP:



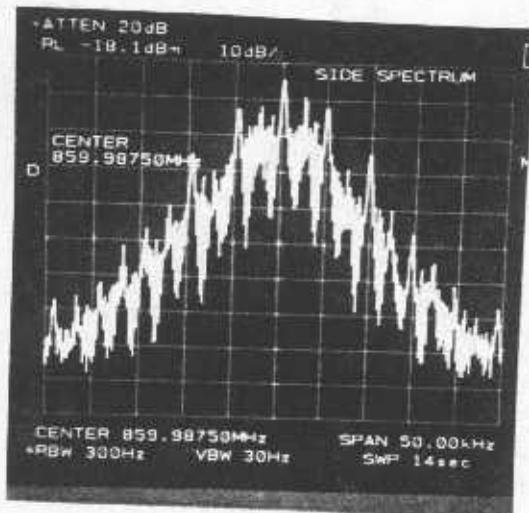
TEST SET-UP

NAME OF TEST:

Transmitter Occupied Bandwidth 25 Watts
 LTR Data Interface Modem as modulation source
 In Support of Emission Designator 16K0F1D

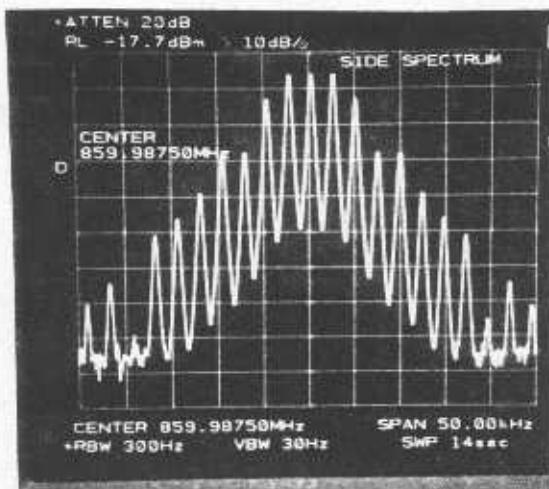
MEASUREMENTS TAKEN:

1. Subaudible supervisory signaling data generator adjusted for 1kHz deviation.
2. Data modulation level adjusted for peak total deviation (high speed data plus subaudible supervisory data) of 4 kHz.
3. $F_0 = 859.9875$ MHz
4. Two conditions recorded to cover range of operating conditions [per section 2.989(h)]:
 - a. Representative high speed (4848 baud) data stream generated by modem alphabetic sequence).
 - b. "Dotting pattern" consisting of alternating 0's and 1's, Manchester encoded (looks like 2424 Hz tone).



Case I: High Speed Data

Unmodulated Carrier Reference 0 db.
 Vertical: 10 db/division
 Horizontal: 5 kHz/division
 Video Filter: 10 kHz
 All other sidebands < -70 db



Case II: Dotting Pattern

Unmodulated Carrier Reference 0 db
 Vertical: 10 db/division
 Horizontal: 5 kHz/division
 Video Filter: 10 kHz
 All other sidebands < -70db

NAME OF TEST: Transmitter Occupied Bandwidth 25 Watts
LTR Data Interface Modem as Modulation Source
In Support of Emission Designator 14K0F1D

RULE PART NUMBER: 2.989(h), 90.209(b)(4), 90.209(c), and 90.209(i)

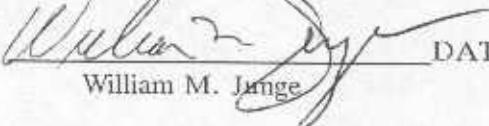
MINIMUM STANDARD Sidebands and Spurious [Rule 90.209(i), P=25 Watts]

> 4 kHz or less	0 dB
> 4 kHz up to and including 8.5 kHz:	Down 107 Log (f/4)db
> 8.5 kHz up to and including 15 kHz:	Down 40.5 Log (f/1.16)db
> 15 kHz up to and including 25 kHz:	Down 116 Log (f/6.1)db
Greater than 25 kHz:	Down 43 + 10 Log P or 80 dB whichever is lesser attenuation

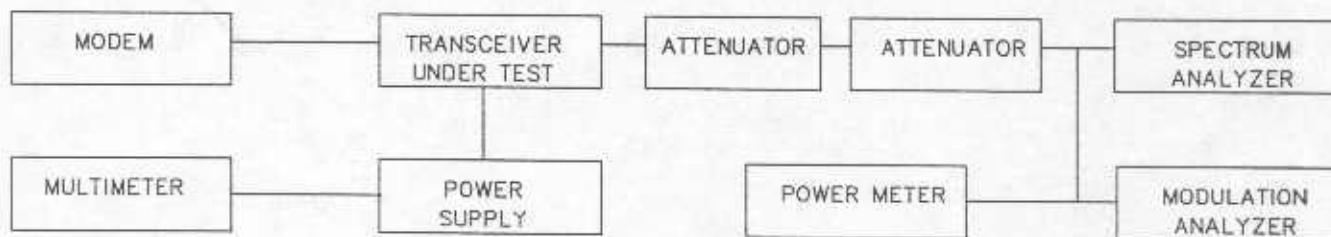
TEST RESULTS: Meets minimum standard. See test results on following
page

TEST EQUIPMENT: Audio Generator, Model HP 8903A
Attenuator, Tenuline Model 8340-200
Attenuator, Tenuline Model 8323
Multimeter, Model 8012A Fluke
Spectrum Analyzer, Model HP 8563E
Power Supply, Tectrol Inc. TC47S-1047
Modulation Source, E.F. Johnson LTR Data Modem
Modulation Analyzer, Model HP 8901A
Spectrum Analyzer, Hewlett-Packard HP1411T

PERFORMED BY:


William M. Junge DATE: 5-27-93

TEST SETUP:



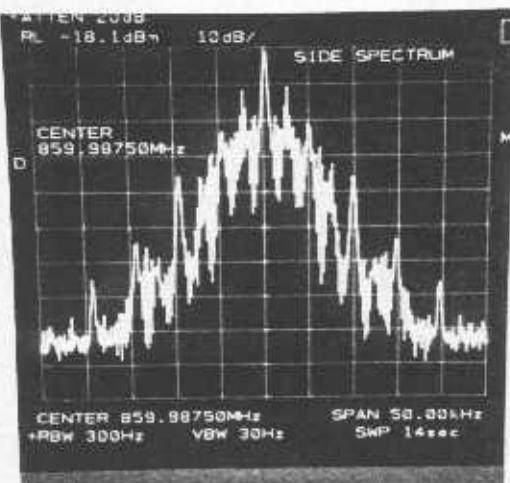
TEST SET-UP

NAME OF TEST:

Transmitter Occupied Bandwidth 25 Watts
 LTR Data Interface Modem as modulation source
 In Support of Emission Designator 14K0F1D

MEASUREMENTS TAKEN:

1. Subaudible supervisory signaling data generator adjusted for 1kHz deviation.
2. Data modulation level adjusted for peak total deviation (high speed data plus subaudible supervisory data) of 2 kHz.
3. $F_0 = 859.9875 \text{ MHz}$
4. Two conditions recorded to cover range of operating conditions [per section 2.989(h)]:
 - a. Representative high speed (4848 baud) data stream generated by modem alphabetic sequence).
 - b. "Dotting pattern" consisting of alternating 0's and 1's, Manchester encoded (looks like 2424 Hz tone).

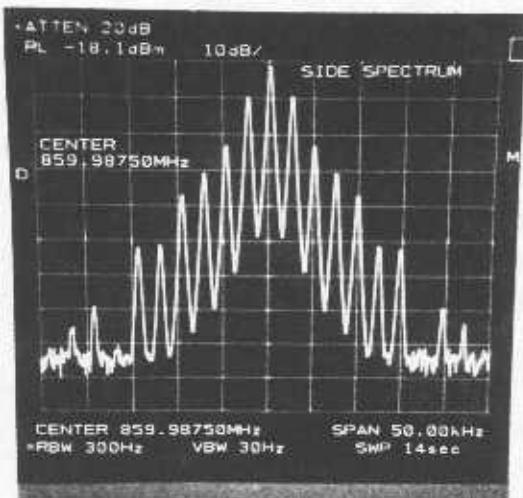


Case I: High Speed Data

Unmodulated Carrier Reference 0 db.
 Vertical: 10 db/division
 Horizontal: 5 kHz/division
 Video Filter: 10 kHz
 All other sidebands < -70 db

Case II: Dotting Pattern

Unmodulated Carrier Reference 0 db
 Vertical: 10 db/division
 Horizontal: 5 kHz/division
 Video Filter: 10 kHz
 All other sidebands < -70db



NAME OF TEST: Transmitter Occupied Bandwidth 85 Watts
LTR Data Interface Modem as Modulation Source
In Support of Emission Designator 16K0F1D

RULE PART NUMBER: 2.989(h), 90.209(b)(4), 90.209(c), and 90.209(g)

MINIMUM STANDARD Sidebands and Spurious [Rule 90.209(g), P=85 Watts]

Greater than 5kHz up to and including 10 kHz Down 83 Log (f/5) db
greater than 10 kHz up to and including 250% of the authorized
bandwidth: At least 116 Log (f/6.1) db or 50 + 10 Log (P)
or 70 dB whichever is lesser attenuation.

greater than 5kHz to 10 kHz:	Down	83 Log (f/5) db
greater than 10 kHz to 24.2 kHz:	Down	116 Log (f/6.1) db
greater than 24.2 to 50 kHz:	Down	50 + 10 Log P minimum
Greater than 50 kHz:	Down	43 + 10 Log P minimum

TEST RESULTS: Meets minimum standard. See test results on following
page.

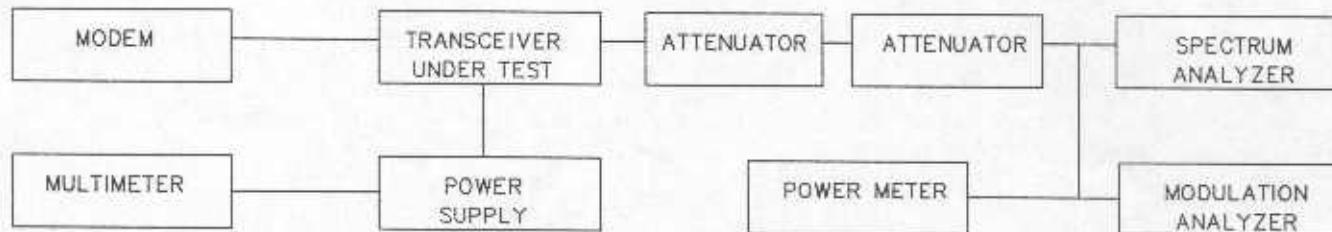
TEST EQUIPMENT:
Audio Generator, Model HP 8903A
Attenuator, Tenuline Model 8340-200
Attenuator, Tenuline Model 8323
Multimeter, Model 8012A Fluke
Spectrum Analyzer, Model HP 8563E
Power Supply, Tectrol Inc. TC47S-1047
Modulation Source, E.F. Johnson LTR Data Modem
Modulation Analyzer, Model HP 8901A
Spectrum Analyzer, Hewlett Packard HP1411T

PERFORMED BY:

DATE: 5-27-93

William M. Junge

TEST SETUP:



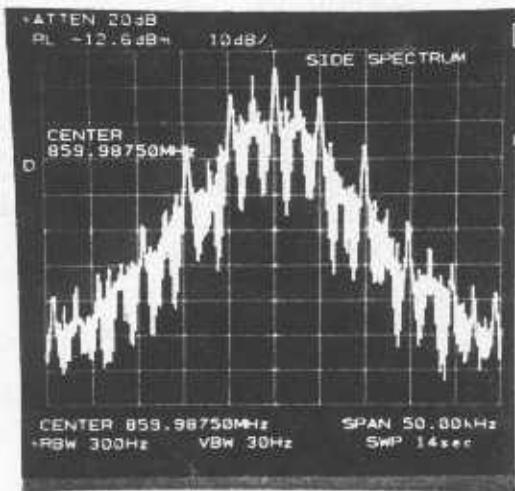
TEST SET-UP

NAME OF TEST:

Transmitter Occupied Bandwidth 85 Watts
LTR Data Interface Modem as modulation source
In Support of Emission Designator 16K0F1D

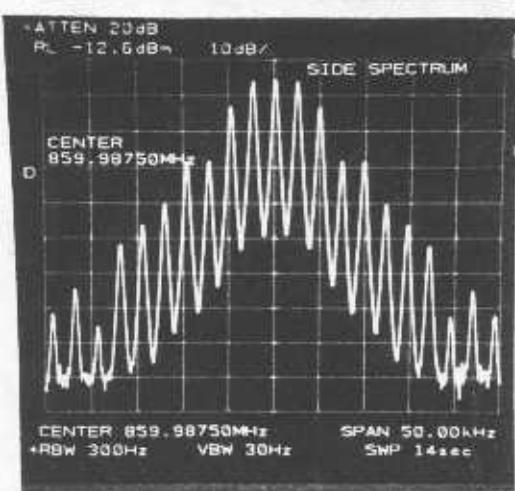
MEASUREMENTS TAKEN:

1. Subaudible supervisory signaling data generator adjusted for 1kHz deviation.
2. Data modulation level adjusted for peak total deviation (high speed data plus subaudible supervisory data) of 4 kHz.
3. $F_0 = 859.9875$ MHz
4. Two conditions recorded to cover range of operating conditions [per section 2.989(h)]:
 - a. Representative high speed (4848 baud) data stream generated by modem alphabetic sequence).
 - b. "Dotting pattern" consisting of alternating 0's and 1's, Manchester encoded (looks like 2424 Hz tone).



Case I: High Speed Data

Unmodulated Carrier Reference 0 db.
Vertical: 10 db/division
Horizontal: 5 kHz/division
Video Filter: 10 kHz
All other sidebands < -70 db



Case II: Dotting Pattern

Unmodulated Carrier Reference 0 db
Vertical: 10 db/division
Horizontal: 5 kHz/division
Video Filter: 10 kHz
All other sidebands < -70db

NAME OF TEST: Transmitter Occupied Bandwidth 85 Watts
LTR Data Interface Modem as Modulation Source
In Support of Emission Designator 14K0F1D

RULE PART NUMBER: 2.989(h), 90.209(b)(4), 90.209(c), and 90.209(i)

MINIMUM STANDARD Sidebands and Spurious [Rule 90.209(i), P=85 Watts]

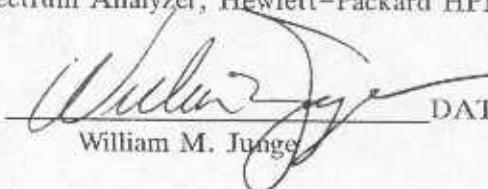
> 4 kHz or less	0 dB
> 4 kHz up to and including 8.5 kHz:	Down 107 Log (f/4)db
> 8.5 kHz up to and including 15 kHz:	Down 40.5 Log (f/1.16)db
> 15 kHz up to and including 25 kHz:	Down 116 Log (f/6.1)db
Greater than 25 kHz:	Down 43 + 10 Log P or 80 dB whichever is lesser attenuation

TEST RESULTS: Meets minimum standard. See test results on following
page

TEST EQUIPMENT:

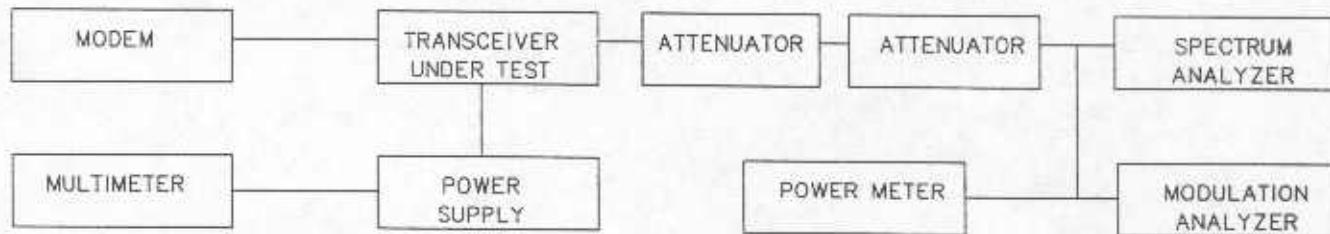
Audio Generator, Model HP 8903A
Attenuator, Tenuline Model 8340-200
Attenuator, Tenuline Model 8323
Multimeter, Model 8012A Fluke
Spectrum Analyzer, Model IIP 8563E
Power Supply, Tectrol Inc. TC47S-1047
Modulation Source, E.F. Johnson LTR Data Modem
Modulation Analyzer, Model HP 8901A
Spectrum Analyzer, Hewlett-Packard HP141T

PERFORMED BY:


DATE: 5-27-93

William M. Junge

TEST SETUP:



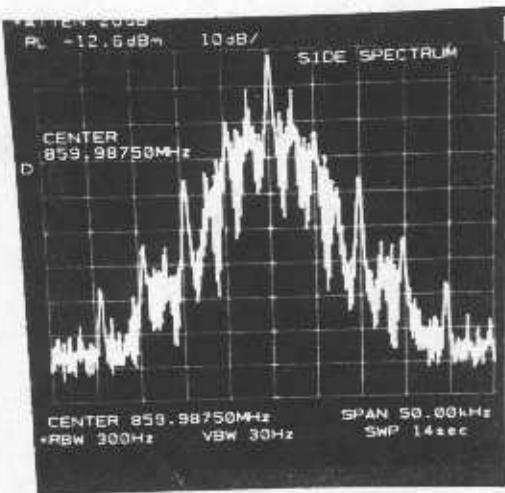
TEST SET-UP

NAME OF TEST:

Transmitter Occupied Bandwidth 85 Watts
LTR Data Interface Modem as modulation source
In Support of Emission Designator 14K0F1D

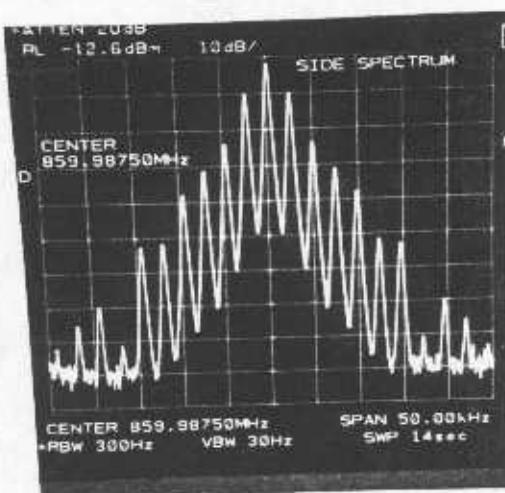
MEASUREMENTS TAKEN:

1. Subaudible supervisory signaling data generator adjusted for 1kHz deviation.
2. Data modulation level adjusted for peak total deviation (high speed data plus subaudible supervisory data) of 2 kHz.
3. $F_0 = 859.9875$ MHz
4. Two conditions recorded to cover range of operating conditions [per section 2.989(h)]:
 - a. Representative high speed (4848 baud) data stream generated by modem alphabetic sequence).
 - b. "Dotting pattern" consisting of alternating 0's and 1's, Manchester encoded (looks like 2424 Hz tone).



Case I: High Speed Data

Unmodulated Carrier Reference 0 db.
Vertical: 10 db/division
Horizontal: 5 kHz/division
Video Filter: 10 kHz
All other sidebands < -70 db



Case II: Dotting Pattern

Unmodulated Carrier Reference 0 db
Vertical: 10 db/division
Horizontal: 5 kHz/division
Video Filter: 10 kHz
All other sidebands < -70db

NAME OF TEST: Transmitter Spurious and Harmonic Outputs 25 Watts

RULE PART NO.: 2.991

MINIMUM STANDARD FOR 25 W: $43 + 10 \log_{10} (25W) = -57.0 \text{ dBc}$

TEST RESULTS: Meets minimum standard. See data.

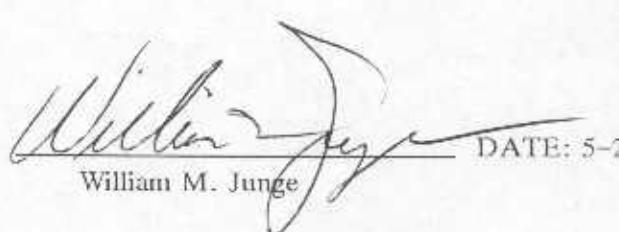
TEST CONDITIONS: RF voltage measured at antenna terminals.
Prevailing room conditions, temperature 26 C

Multiple Voltage Switching Power Supply, Tectrol Inc.
TC47S-1047

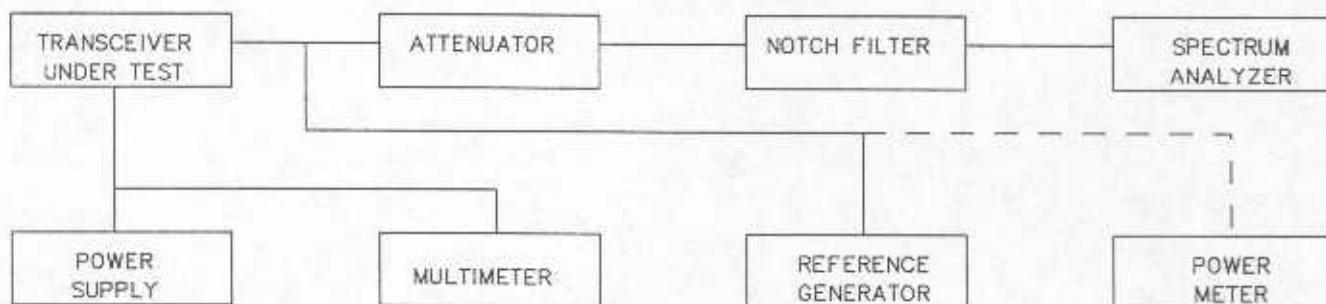
TEST EQUIPMENT:

Attenuator, Tenuline Model 8323
Multimeter, Model 8012A Fluke
Spectrum Analyzer, Model HP 8563E
Power Supply, Tectrol Inc. TC47S-1047
Power Meter, Model HP436A
Reference Generator, Model HP-8350A

PERFORMED BY:


William M. Junge DATE: 5-27-93

TEST SET-UP:



TEST SET-UP

NAME OF TEST: Transmitter Spurious and Harmonic Outputs 25 Watts
(Continued)

1. The transmitter carrier output frequencies F_c is 859.9875 MHz. The reference oscillator frequency F_{osc} is 17.50 MHz.
2. After carrier reference was established on spectrum analyzer, the notch filter was adjusted to null the carrier F_c to extend the range of the spectrum analyzer for harmonic measurements.
3. At each spurious frequency a 0 dBm reference was established using a reference generator and power meter.
4. Spectrum was scanned to the tenth harmonic.

Test data on next page.

NAME OF TEST: Transmitter Spurious and Harmonic Outputs 25 Watts
(Continued)

MEASUREMENTS TAKEN:

Radio #FEP 304 25 Watts Transmitter spurious and harmonics44.0 dBm

Frequency	Relation	Level (dBm)	Level Relative to Carrier (dBc)
1719.978500	2 fc	-58.7	-108
2579.996250	3 fc	-50.7	-100
3439.950000	4 fc	-46.7	-96
4299.993750	5 fc	-31.7	-81
5159.992500	6 fc	-47.7	-97
6019.912500	7 fc	>-63	>-112
6879.900000	8 fc	>-63	>-112
7739.887500	9 fc	>-63	>-112
8599.875000	10 fc	>-63	>-112

All other responses are less than -112 dBc.

NAME OF TEST: Transmitter Spurious and Harmonic Outputs 85 Watts

RULE PART NO.: 2.991

MINIMUM STANDARD FOR 85 W: $43 + 10 \log_{10} (85W) = -62.3 \text{ dBc}$

TEST RESULTS: Meets minimum standard. See data.

TEST CONDITIONS: RF voltage measured at antenna terminals.
Prevailing room conditions, temperature 26 C

Multiple Voltage Switching Power Supply, Tectrol Inc.
TC47S-1047

TEST EQUIPMENT:

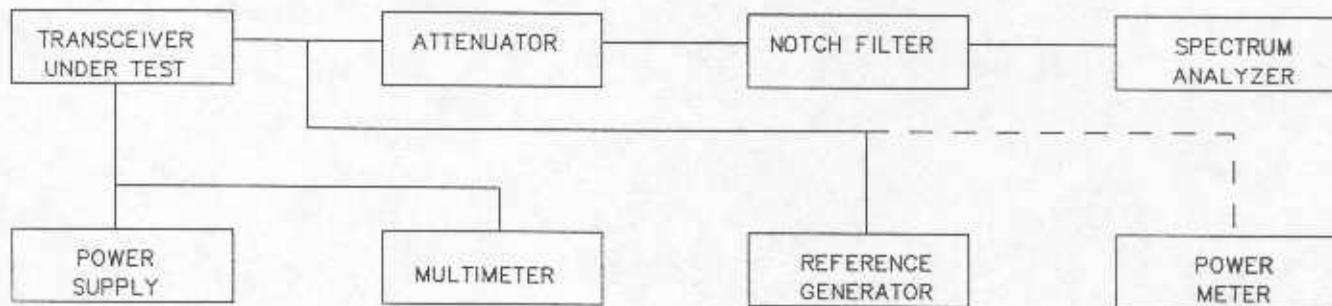
Attenuator, Tenuline Model 8323
Multimeter, Model 8012A Fluke
Spectrum Analyzer, Model HP 8563E
Power Supply, Tectrol Inc. TC47S-1047
Power Meter, Model HP436A
Reference Generator, Model HP-8350A

PERFORMED BY:

DATE: 5-27-93

William M. Junge

TEST SET-UP:



TEST SET-UP

NAME OF TEST: Transmitter Spurious and Harmonic Outputs 85 Watts
(Continued)

1. The transmitter carrier output frequencies F_c is 859.9875 MHz. The reference oscillator frequency F_{osc} is 17.50 MHz.
2. After carrier reference was established on spectrum analyzer, the notch filter was adjusted to null the carrier F_c to extend the range of the spectrum analyzer for harmonic measurements.
3. At each spurious frequency a 0 dBm reference was established using a reference generator and power meter.
4. Spectrum was scanned to the tenth harmonic.

Test data on next page.

NAME OF TEST: Transmitter Spurious and Harmonic Outputs 85 Watts
(Continued)

MEASUREMENTS TAKEN:

Radio #5 85 Watts Transmitter spurious and harmonics49.3 dBm

Frequency	Relation	Level (dBm)	Level Relative to Carrier (dBc)
1719.978500	2 fc	-51.7	-101
2579.996250	3 fc	-45.7	-95
3439.950000	4 fc	-42.7	-92
4299.993750	5 fc	-30.7	-80
5159.992500	6 fc	-46.7	-96
6019.912500	7 fc	-62.7	-112
6879.900000	8 fc	>-63	>-112
7739.887500	9 fc	>-63	>-112
8599.875000	10 fc	>-63	>-112

All other responses are less than -112 dBc.

NAME OF TEST: Spurious Radiation Attenuation 25 Watts

RULE PART NUMBER: 2.993

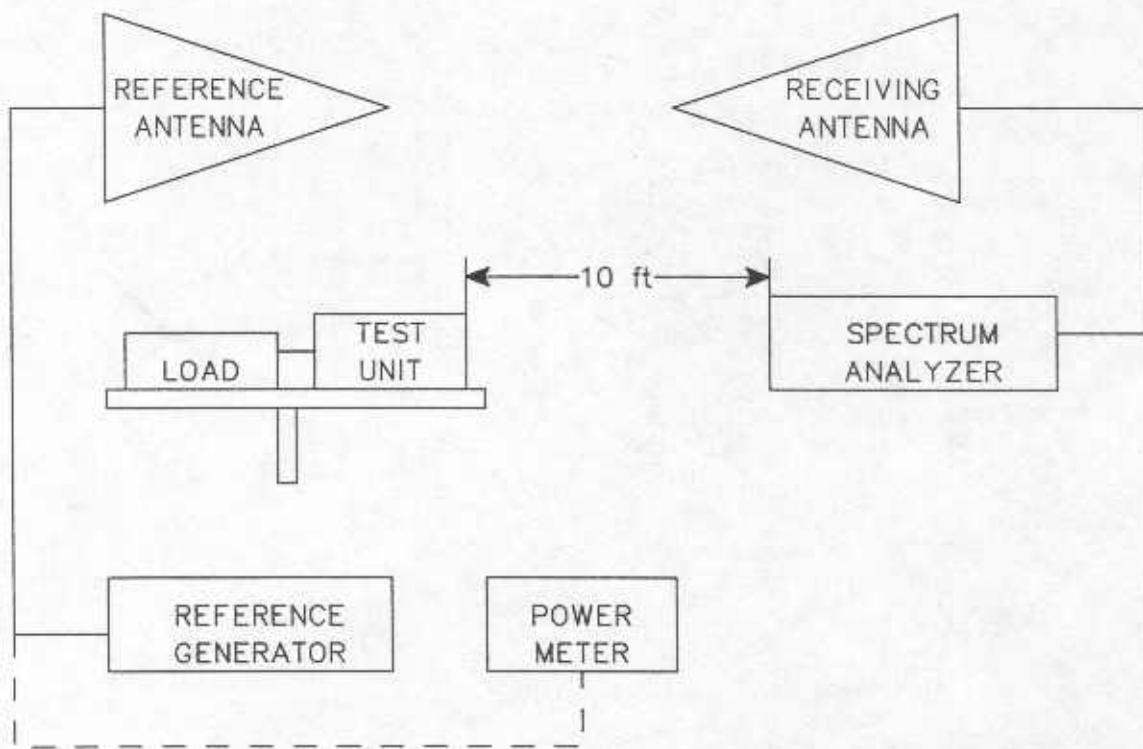
MINIMUM STANDARD: $(43 + 10 \log_{10} P_0)$, P_0 at 25W
 $43 + 10 \log_{10} 25 = 43 + 14.0 = 57.0$ dB

TEST RESULTS: Meets minimum standard, see data.

TEST CONDITIONS: Standard

TEST EQUIPMENT: Dipole Antenna Kits, Model KT-105D
Log Spiral Antenna, Model 93491-2
Log Periodic Antenna, Model LPA-112
Reference Generator, Model HP-8350B
Power Meter, Model HP-436A
Load, Lucas Weinschel 40-10-33
Spectrum Analyzer, Model HP 8563E
Power Supply, Tectrol Inc. TC47S-1047

TEST SET-UP:



TEST SET-UP

NAME OF TEST: Spurious Radiation Attenuation 25 Watts
(Continued)

TEST PROCEDURE: Radiated spurious attenuation was measured according to
TIA/EIA Standard 603 Section 2.2.12

TEST PERFORMED BY:

William M. Junge

DATE: 5-27-93

William M. Junge

Douglas A. Knoll

DATE: 5-27-93

Douglas A. Knoll

NAME OF TEST:

Spurious Radiation Attenuation 25 Watts
(Continued)
Raw Spurious Data

Carrier Frequency = 859.9875 MHz

Power Output = 25.0 Watts = 44.0 dBm

Spurious Frequency, MHz	Spurious Level dB	Reference Level dB	Antenna Gain Referenced to A Dipole dB	Circular Polarization Correction dB	Spurious Attenuation dB
1719.978500	-84.4 -90.3	-36.0 -35.8	1.2 1.2	3.0 3.0	-94.20 H -100.3 V
2579.996250	-84.3 -92.9	-37.5 -37.0	1.2 1.2	3.0 3.0	-92.60 H -101.7 V
3439.950000	-80.0 -80.1	-39.5 -39.0	1.2 1.2	3.0 3.0	-86.30 H -86.90 V
4299.993750	-85.0 -84.8	-45.3 -45.4	1.2 1.2	3.0 3.0	-85.50 H -85.20 V
5159.992500	-98.0 -97.0	-42.8 -42.5	1.2 1.2	3.0 3.0	-101.0 H -100.3 V
6019.912500	-105 -103	-50.6 -49.3	1.2 1.2	3.0 3.0	-100.2 H -99.50 V
6879.900000	-103 -100	-48.6 -48.3	1.1 1.1	3.0 3.0	-100.3 H -97.60 V

V = Vertical Polarization

H = Horizontal Polarization

NAME OF TEST: Spurious Radiation Attenuation 25 Watts
(Continued)
Raw Spurious Data

Carrier Frequency = 859.9875 MHz

Power Output = 25.0 Watts = 44.0 dBm

Spurious Frequency, MHz	Spurious Level dB	Reference Level dB	Antenna Gain Referenced to A Dipole dB	Circular Polarization Correction dB	Spurious Attenuation dB
7739.887500	-113	-59.8	0.90	3.0	-99.30 H
	-112	-55.5	0.90	3.0	-102.6 V
8599.875000	-108	-67.0	0.50	3.0	-87.50 H
	-112	-64.4	0.50	3.0	-94.10 V

V = Vertical Polarization

H = Horizontal Polarization

NAME OF TEST: Spurious Radiation Attenuation 85 Watts

RULE PART NUMBER: 2.993

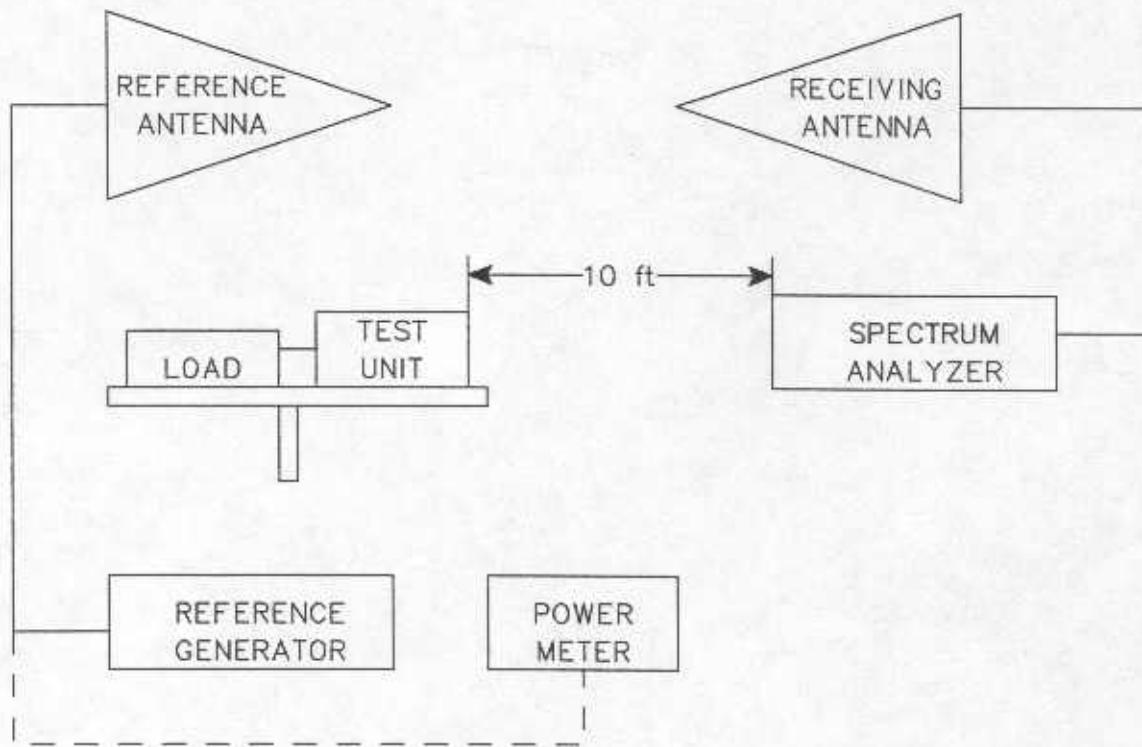
MINIMUM STANDARD: $(43 + 10 \log_{10} P_0)$, P_0 at 85W
 $43 + 10 \log_{10} 85 = 43 + 19.3 = 62.3$ dB

TEST RESULTS: Meets minimum standard, see data.

TEST CONDITIONS: Standard

TEST EQUIPMENT: Dipole Antenna Kits, Model KT-105D
Log Spiral Antenna, Model 93491-2
Log Periodic Antenna, Model LPA-112
Reference Generator, Model HP-8350B
Power Meter, Model HP-436A
Load, Lucas Weinschel 40-10-33
Spectrum Analyzer, Model HP 8563E
Power Supply, Tectrol Inc. TC47S-1047

TEST SET-UP:

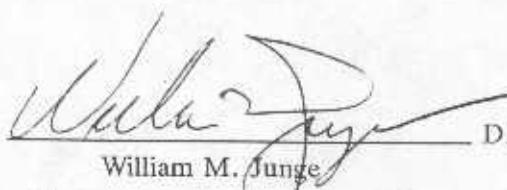


TEST SET-UP

NAME OF TEST: Spurious Radiation Attenuation 85 Watts
(Continued)

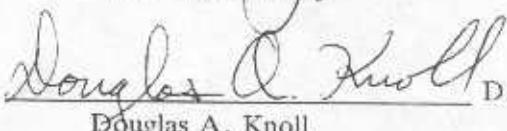
TEST PROCEDURE: Radiated spurious attenuation was measured according to
TIA/EIA 603.
Measurements were made for both horizontal and vertical
antenna orientation. The spectrum was searched from 14
MHz to 10 GHz.

TEST PERFORMED BY:



DATE: 5-27-93

William M. Junge



DATE: 5-27-93

Douglas A. Knoll

NAME OF TEST:

Spurious Radiation Attenuation 85 Watts
(Continued)
Raw Spurious Data

Carrier Frequency = 859.9875 MHz

Power Output = 85.0 Watts = 49.3 dBm

Spurious Frequency, MHz	Spurious Level dB	Reference Level dB	Antenna Gain Referenced to A Dipole dB	Circular Polarization Correction dB	Spurious Attenuation dB
1719.975000	-77.3	-36.0	1.2	3.0	-92.40 H
	-82.3	-35.8	1.2	3.0	-97.60 V
2579.962500	-88.5	-37.5	1.2	3.0	-102.1 H
	-83.3	-37.0	1.2	3.0	-97.40 V
3439.950000	-76.8	-39.5	1.2	3.0	-88.40 H
	-76.6	-39.0	1.2	3.0	-88.70 V
4299.937500	-83.8	-45.3	1.2	3.0	-89.60 H
	-83.9	-45.4	1.2	3.0	-89.60 V
5159.925000	-98.0	-42.8	1.2	3.0	-106.3 H
	-97.0	-42.5	1.2	3.0	-105.6 V
6019.912500	-103	-50.6	1.2	3.0	-103.5 H
	-100	-49.3	1.2	3.0	-101.8 V
6879.900000	-109	-48.6	1.1	3.0	-111.6 H
	-108	-48.3	1.1	3.0	-110.9 V

V = Vertical Polarization

H = Horizontal Polarization

NAME OF TEST: Spurious Radiation Attenuation 85 Watts
(Continued)
Raw Spurious Data

Carrier Frequency = 859.9875 MHz

Power Output = 85.0 Watts = 49.3 dBm

Spurious Frequency, MHz	Spurious Level dB	Reference Level dB	Antenna Gain Referenced to A Dipole dB	Circular Polarization Correction dB	Spurious Attenuation dB
7739.887500	-110	-59.8	0.90	3.0	-101.6 H
	-110	-55.5	0.90	3.0	-105.9 V
8599.875000	-110	-67.0	0.50	3.0	-94.80 H
	-111	-64.4	0.50	3.0	-98.40 V

V = Vertical Polarization

H = Horizontal Polarization

CALCULATIONS:

Because the antennas used above 1 GHz were not flat in gain and differed from a dipole, the generator output was corrected for antenna gain at each spurious frequency. The power was measured directly at the reference antenna and therefore requires no coaxial cable loss correction. An additional 3 dB correction was made above 1 GHz to correct for the 3 dB polarization loss in the reference path.

EXAMPLE:

At 1719.975000 MHz and 85 Watts

R - Reference Generator (dBm) -36.0

S - Analyzer Level (dB) -77.3

A - Antenna Gain (dB) 1.2

P - Polarization Correction Factor 3.0

R" - Corrected Reference (dBm)

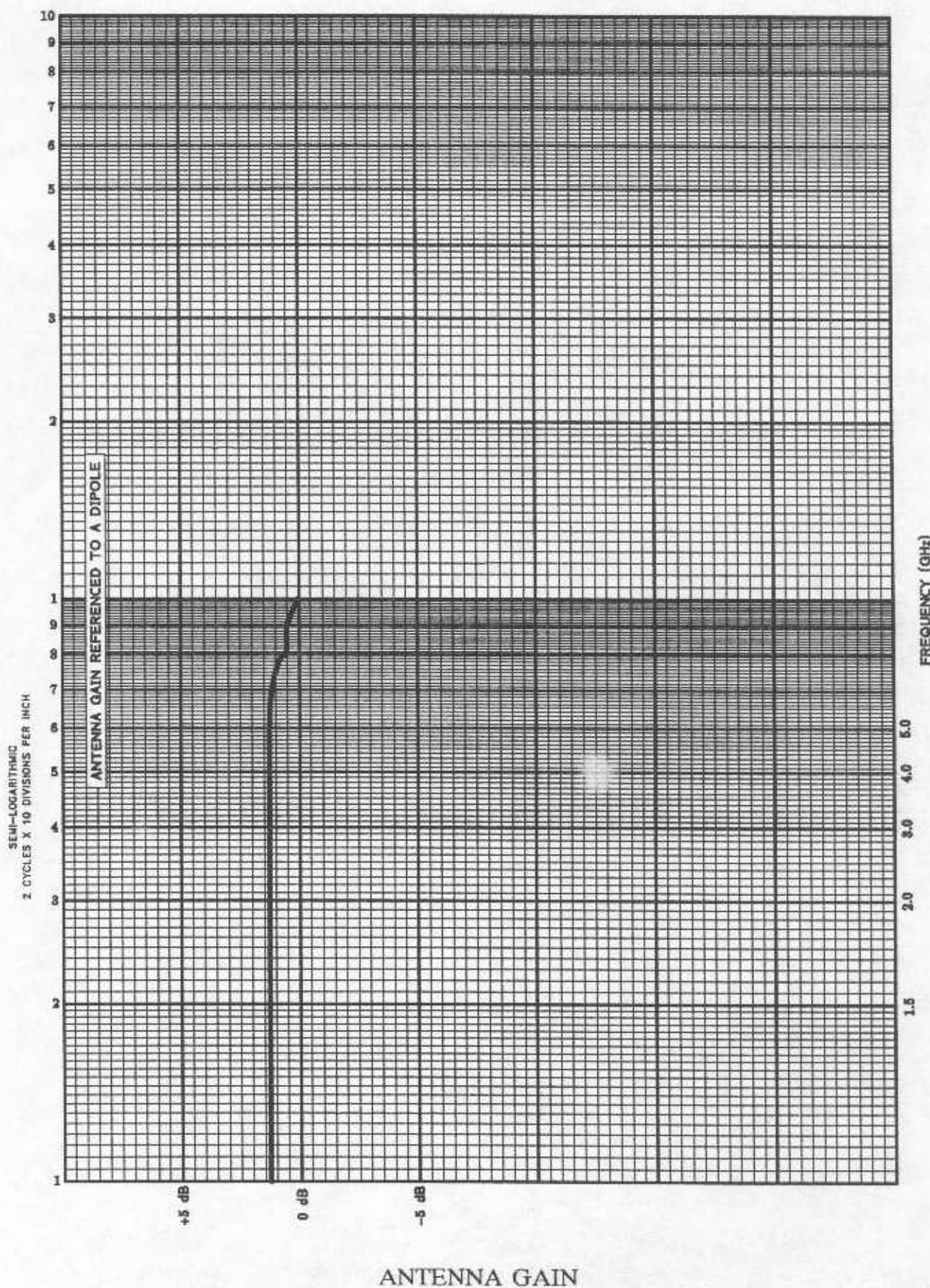
Po - Carrier Power Output (dBm) 49.3

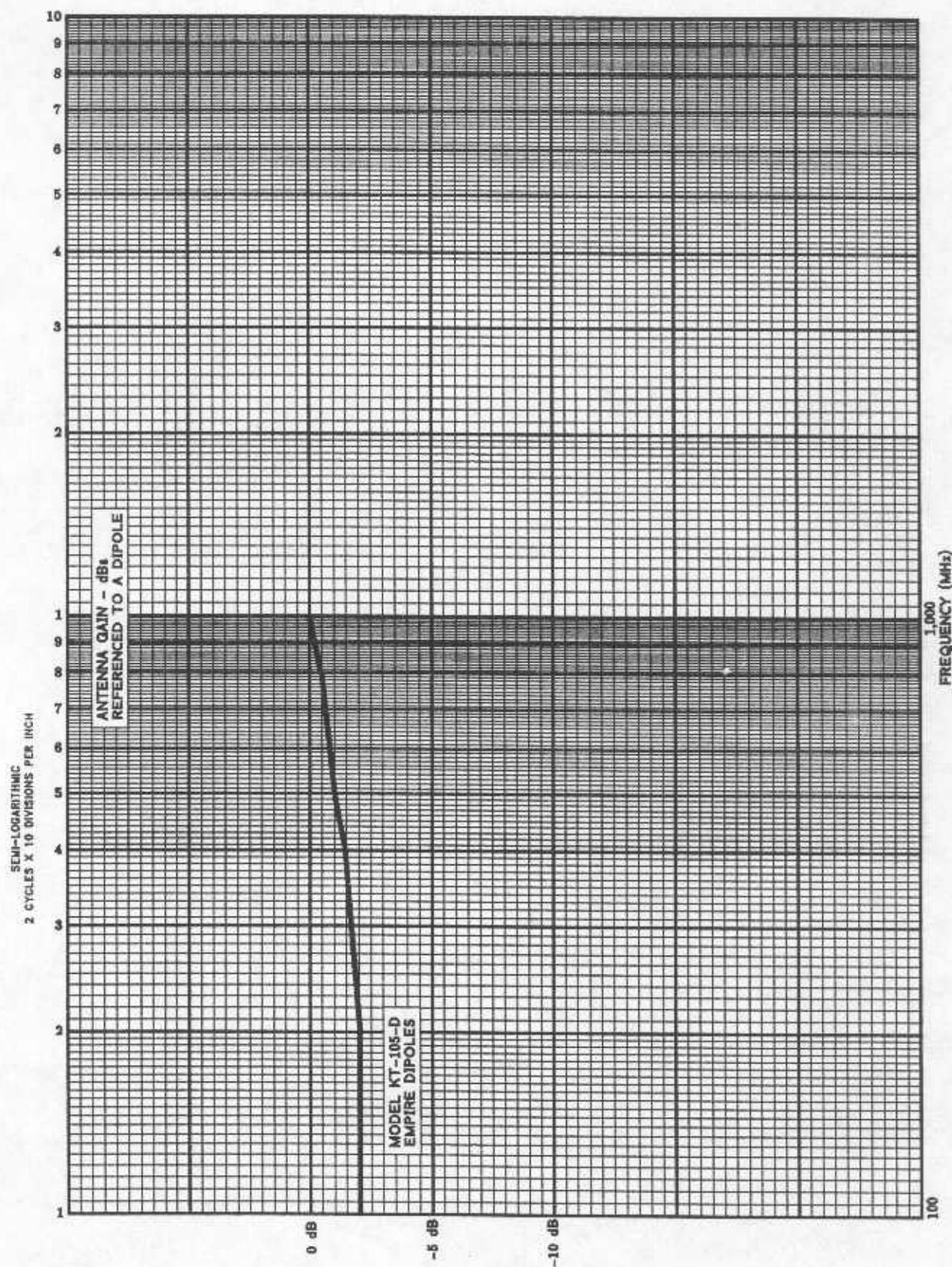
R' - Observed Spurious Level (dBm)

$$R' = S - R = -77.3 - (-36) = -41.3 \text{ dBm}$$

$$R'' = R' + A - P = -41.3 + 1.2 - 3.0 = -43.1 \text{ dBm}$$

$$\text{Spurious Attenuation} = R'' - Po = -43.1 - 49.3 = -92.4 \text{ dB}$$





ANTENNA GAIN-dBs

NAME OF TEST: Frequency Stability with Variation in Ambient Temperature

RULE PART NUMBER: 2.995 (a) (1)

MINIMUM STANDARD: +/-0.000100% from test frequency, 1.00 ppm

TEST RESULTS: Meets minimum standard, see data on the following page.

Maximum deviation +/- 850 Hz from test

Maximum deviation of 0000988% for .988 ppm

TEST CONDITIONS:

Multiple Voltage Switching Power Supply, Tectrol Inc.
TC47S-1047

TEST EQUIPMENT:

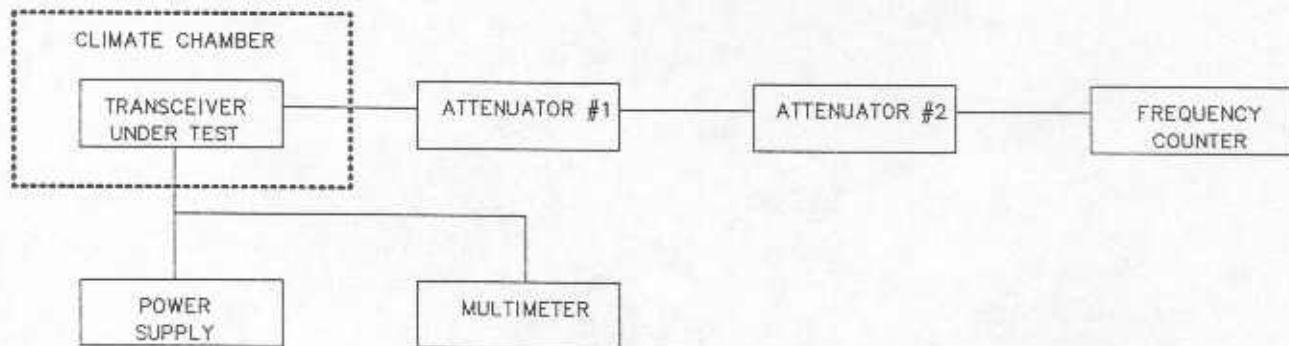
Attenuator #1, Tenuline Model 8323
Attenuator #2, Tenuline Model 8340-200
Frequency Counter, Fluke 7220A
Multimeter, Model 8012A Fluke
Power Supply, Tectrol Inc. TC47S-1047
Thermometer, Model 412A Doric
Voltmeter, Model 8012A Fluke
Climate Chamber, Model Tenney Jr.

PERFORMED BY:

DATE: 5-27-93

William M. Junge

TEST SET-UP:



TEST SET-UP

NAME OF TEST: Frequency Stability with Variation in Ambient Temperature
(Continued)

MEASUREMENTS TAKEN:

1.00 PPM Oscillator

Temperature (C)	Frequency (MHz)	PPM from Channel Frequency
+60	859.986650	-.988
+50	859.987030	-.547
+40	859.987390	-.128
+30	859.987490	-.016
+25	859.987500	-0.00
+20	859.987530	+.035
+10	859.987400	-.151
0	859.987320	-.209
-10	859.987360	-.163
-20	859.987480	-.023
-30	859.988350	-.988

1.0 PPM Oscillator

Channel Frequency	859.987500 MHz
Tolerance Requirements	.000100%
Highest Variation	.0000988%

NAME OF TEST: Frequency Stability with Variation in Supply Voltage

RULE PART NUMBER: 2.995 (d)

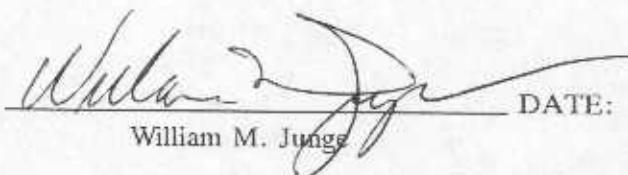
MINIMUM STANDARD: $\pm 0.000100\%$ from test frequency, 1.00 ppm for $\pm 15\%$ change in supply voltage

TEST RESULTS: Meets minimum standard, see measurements on next page.
Maximum deviation 0 Hz from test
Frequency = .00000% for, 0 ppm

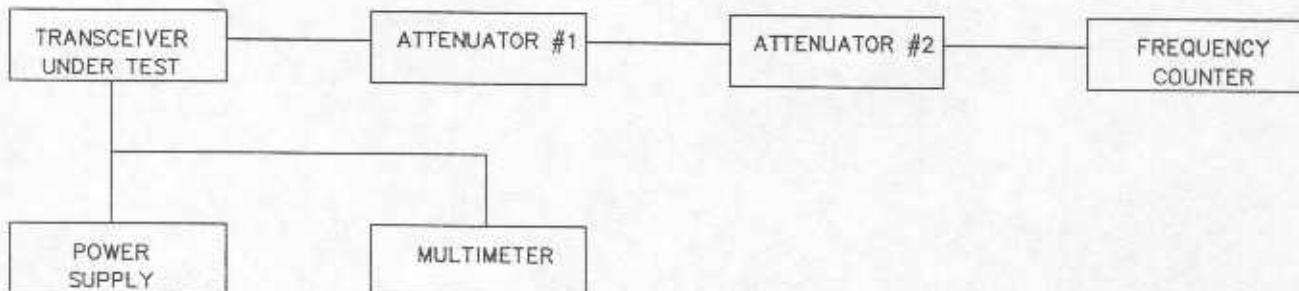
TEST CONDITIONS: Standard test conditions, room temperature 26 C.
Multiple Voltage Switching Power Supply, Tectrol Inc.
TC47S-1047.

TEST EQUIPMENT: Attenuator #1, Tenuline Model 8323
Attenuator #1, Tenuline Model 8340-200
Frequency Counter, Fluke 7220A
Power Supply, HHP 6284A
Multimeter, Model 8012A Fluke

PERFORMED BY:


William M. Jung DATE: 5-27-93

TEST SET-UP:



TEST SET-UP

NAME OF TEST: Frequency Stability with Variation in Supply Voltage

MEASUREMENTS TAKEN: 25 Watts

1.00 PPM				
	Voltage (VDC)	Frequency (MHz)	Change in PPM	Frequency (Hz)
STD	26.5	859.987500	0	0
+15%	30.5	859.987500	0	0
-15%	22.5	859.987500	0	0
Tolerance Requirements		+/- .000100%		
Highest Variation (from channel frequency)		0 Hz = + .000000%		

Approximately ten minutes between cycles

Transmitter keyed one minute during test

NAME OF TEST: Frequency Stability with Variation in Supply Voltage

MEASUREMENTS TAKEN: 85 Watts

1.00 PPM				
	Voltage (VDC)	Frequency (MHz)	Change in PPM	Frequency (Hz)
STD	26.5	859.987500	0	0
+15%	30.5	859.987500	0	0
-15%	22.5	859.987500	0	0
Tolerance Requirements		+/- .000100%		
Highest Variation (from channel frequency)		0 Hz = + .00000%		

Approximately ten minutes between cycles

Transmitter keyed one minute during test

FCC LABEL

FCC ID: ATH2422888
E.P.JOHNSON CO. U.S.A.
MODEL 242-2888
MADE IN WASECA MN. USA

Serial No20001A197A 00304