Technalogix Ltd.

Ph: (403) 347-5400
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drtx@technalogix.ca

#4 – 8021 Edgar Ind. Place, Red Deer, AB T4P 3R3

August 17, 2004

This report is in support of an application by Technalogix Ltd. for certification of transmitting equipment used for VHF Band III television systems (170-230 MHz). Specifically, Technalogix is requesting certification of the Technalogix TXV-1000 VHF Band III television transmitter.

The TXV-1000 Band III supplies a 1000-watt peak video signal in addition to 10% aural power on any of the VHF television channels 7 through 13. Additionally, the control system allows the user to run 110% of rated power (1,100-watts peak) before the overdrive monitor shuts the system down. The video and audio are amplified with a common amplifier chain.

Tests were conducted on production models of the equipment on location at Technalogix:

#4, 8021 Edgar Industrial Place
Red Deer, Alberta
Canada T4P 3R3
403.347.5400 ph
403.347.7444 fx

All tests were carried out on representative channels in the VHF Band III in accordance with FCC Part 74. The results in the attached documentation show that the equipment meets or exceeds the required specifications.

Included with the documentation is:

- Drawing of the FCC label that will be attached to the equipment
- Attestation statement
- Test report
- RF exposure statements
- Technalogix user manual. The user manual includes block diagrams of the various systems and sub-systems, schematics and printed circuit board component outlines for the amplification and control sections, specifications, and construction photos.

The emission designators for Part 74 transmitters are 5M75C3F (for visual) and 250KF3E (for aural).

Should you have any questions, please do not hesitate to contact Technalogix:

Bob Gullon, President and CEO
bob@technalogix.ca

____
Signature: Robert C Gullon

Richard Luddick, Testing Manager
richard@technalogix.ca

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Signature: Richard Luddick

Aaron Sivacoe, Engineering Manager
aaron@technalogix.ca

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Signature: Aaron Sivacoe

TECHNALOGIX LTD.

Made in Red Deer, AB Canada

FCC # QG5
Model No:
Serial No:

Actual Size: 2" x 3 1/4"

Please note that the following sections are included in the instruction manual and are not separate sections:

a. Tune-up Procedure

b. Block Diagrams

c. Schematics

d. Specifications

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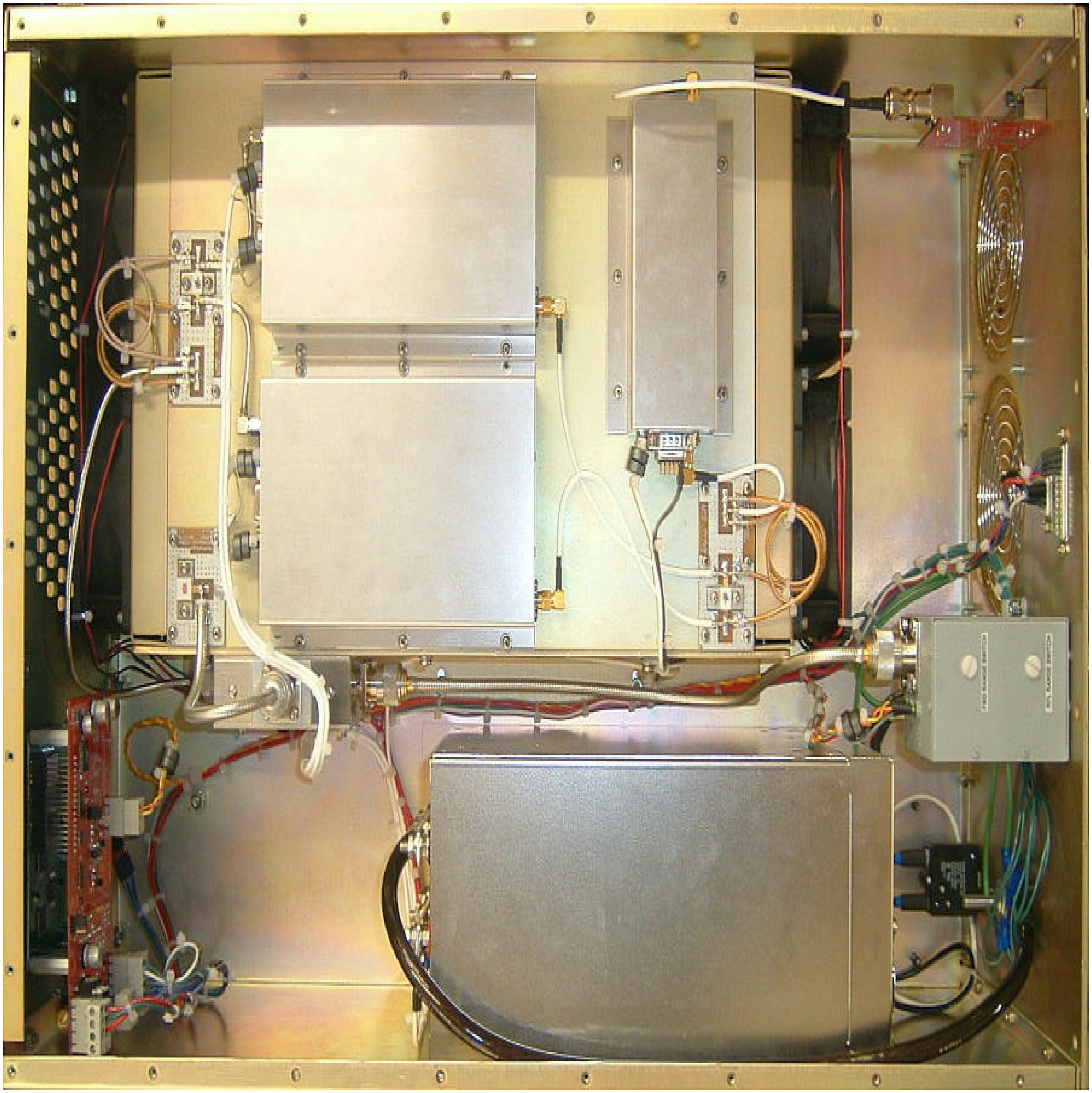
RF EXPOSURE STATEMENT

A Narda 8616 radiation Meter with suitable probes was used and there was NO measurable radiation even at a distance of 0.5 meters from the transmitter cabinet

____

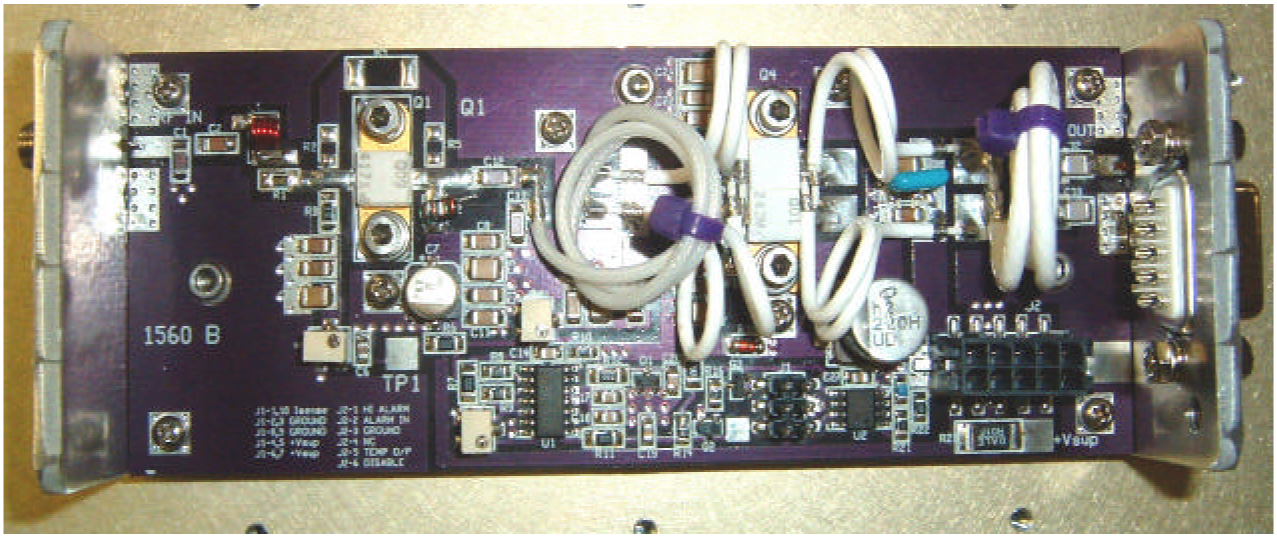
Signature of the Testing Manager
Richard Luddick

Power Amplifier

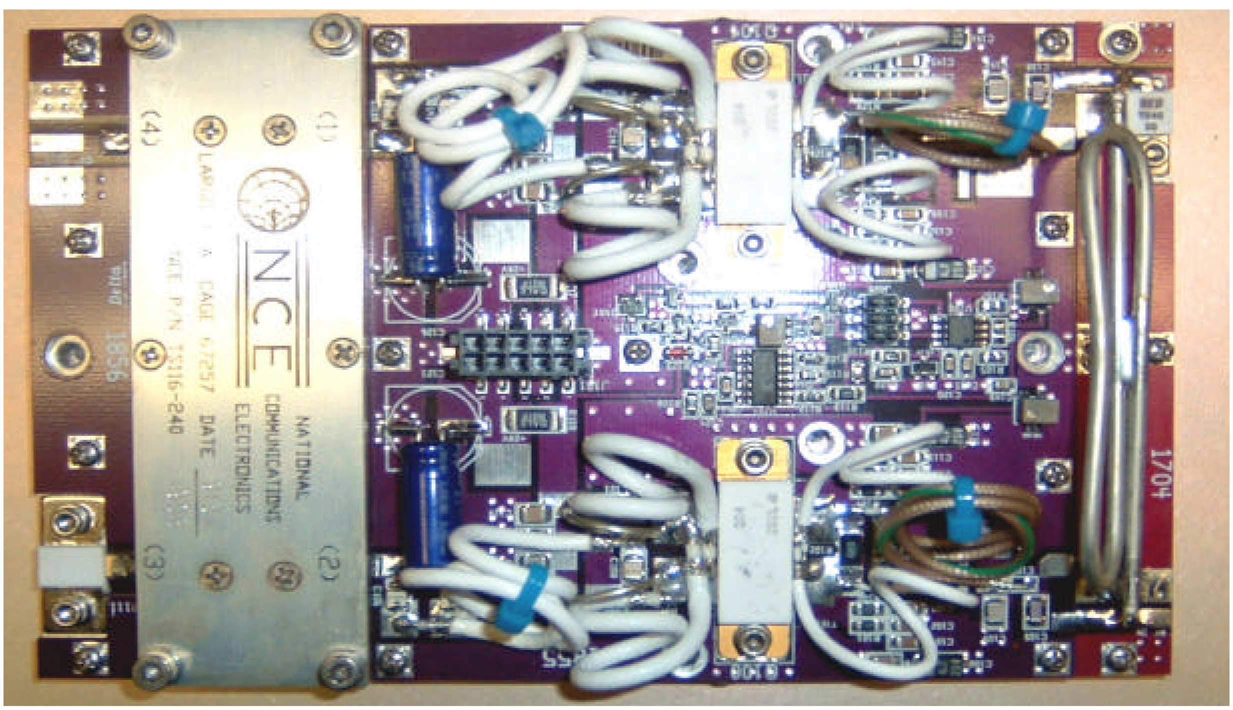


Combiner

Pallets



PA-25-VHF-H



P400-VHF-H

TXV-1000 FCC TEST REPORT

Prepared by:	Aaron Sivacoe
Tested by:	R. Luddick

Contents

Test Equipment

Equipment	Manufacturer	Model Number	Serial Number
Test Signal Generator	Tektronix	TSG95	B025497
Test Signal Generator	Tektronix	1910	B022706
Spectrum Analyzer	Advantest	R3162	110301419
Spectrum Analyzer	Tektronix	2710	B021677
Waveform Analyzer/Monitor	Tektronix	VM700A	B020283
Radiation Meter	Narda		
Network Analyzer	HP	8753ET	39170436
Frequency Counter	HP	5343A	2428A01747
Audio Generator	HP	209A	1045A06481
Noise and Distortion Meter	HP	334A	1551U00970
Coaxial Attenuator (30 dB)	Bird	8329-310	258
Coaxial Attenuator (30 dB)	Bird	8323	2221
Coaxial Attenuator (6 dB)	Weinschel	58-6-43	
RF Wattmeter	Bird	4304A	0811
RF Wattmeter	Coaxial Dynamics	81060A	1034
RF Load (1200 W)	Microwave Devices	611.11	
Variable Autotransformer	Staco Energy Products	3PN1010	122-0003 8645
True RMS clamp on meter	Tenma	72-6131	96082691
Digital Multi-meter	Hung Chang	HC-5010EC	15003374
Oscilloscope (150 MHz)	Tektronix	2445	B021074
Television Demod	Tektronix	1450-1	BO21566
Tunable Down Converter	Tektronix	TDC-10	BO10435
Digital Camera	Olympus	D-340R	42528591

Performance Specifications

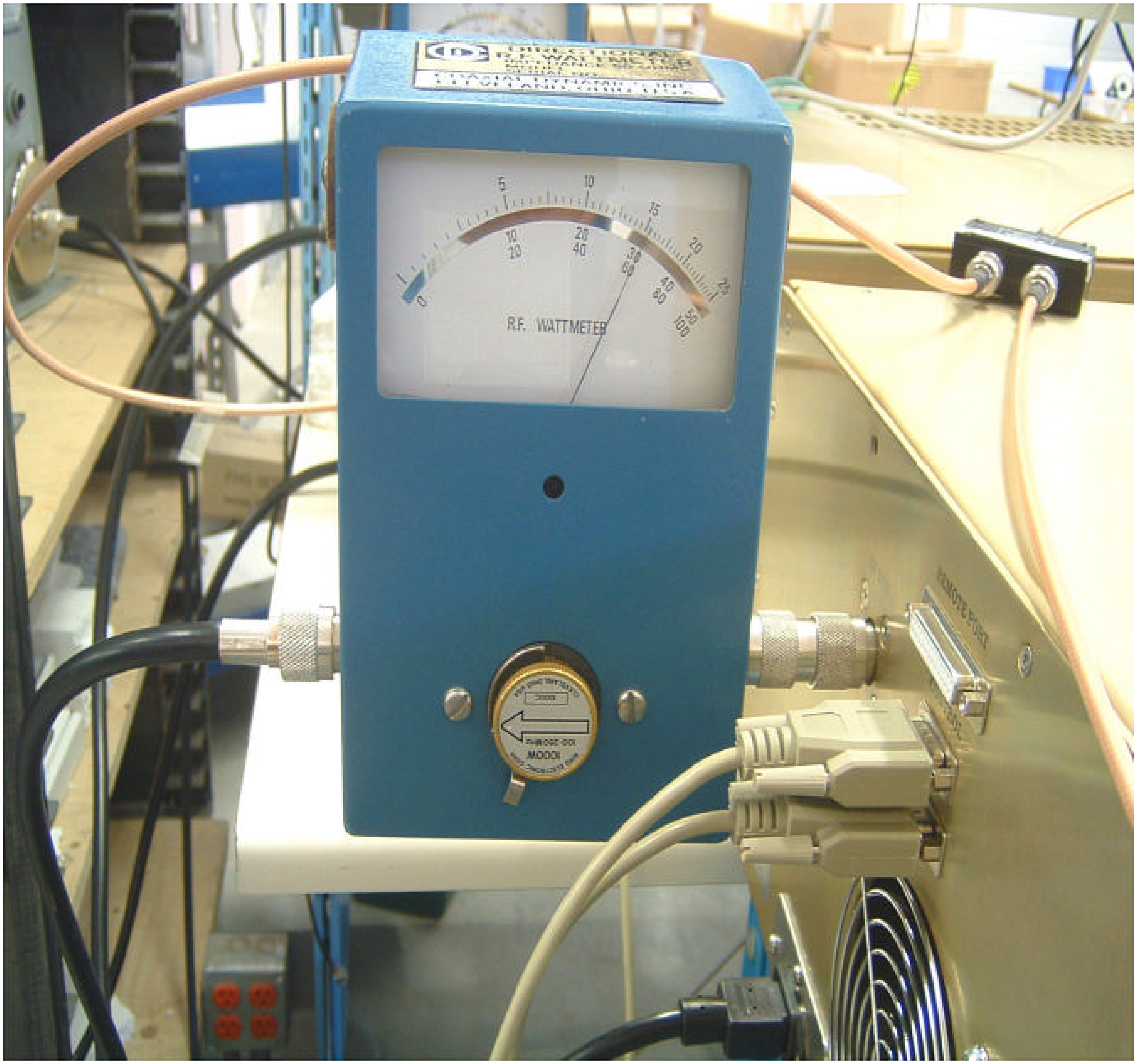
Visual Power Output Rating

Definition: The visual power output rating of the television transmitting equipment shall be the peak envelope power. This is also the average power measured during a synchronizing pulse.

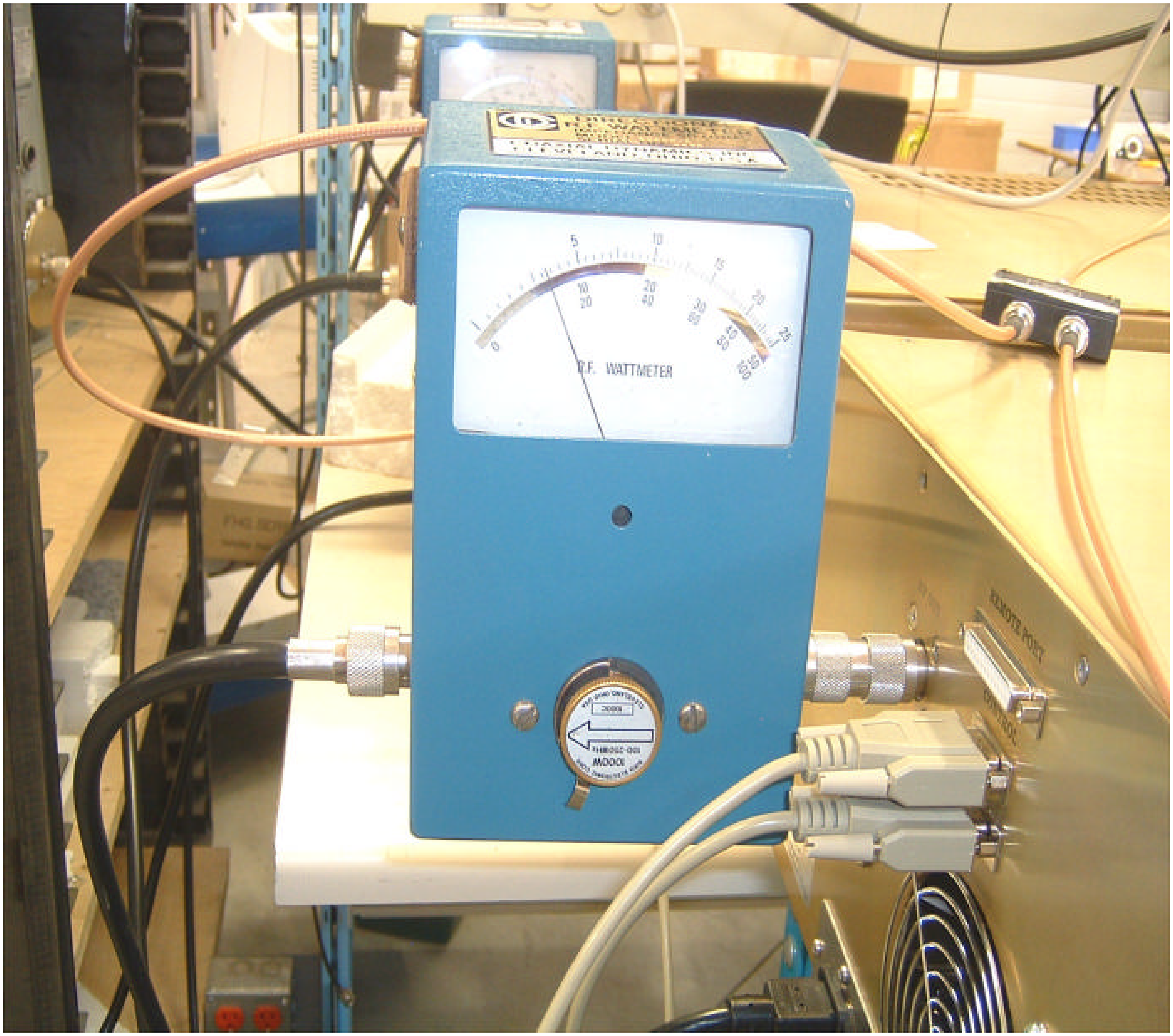
Requirement: Specified by the manufacturer as __________1,000__ watts peak.

Method: The visual carrier is modulated with a sync and blanking signal. The aural carrier is not present. An average reading RF wattmeter is placed between the transmitter output (directly on the directional coupler's N connector on the back panel) and the 50 Ù dummy load. The peak visual power is the measured average power multiplied by a factor of 1.68.

Measurement: The rated visual output power is __1,000________________ watts peak.



TXV 1000 - Full Power



TXV 1000 – Quarter Power

Visual Power Adjustment Capability

Definition:	The peak output power adjustment capability is the manual range by which the peak visual output power can be maintained within predetermined limits.
Requirement:	FCC – The transmitter shall be adjustable to 80%, 100%, and 110% of peak visual power simply for the calibration of meters [section 73.663]. Except as operated in a reduced power operation, the visual output power of a TV transmitter or translator must be maintained as near as practicable to the authorized transmitter output power and may not be less than 80% nor more than 110% of authorized power [section 73.1560(c)]
Method:	The visual carrier is modulated with a sync and blanking signal. The aural carrier is not present. An average reading RF wattmeter is placed between the transmitter output (directly on the directional coupler's N connector on the back panel) and the 50 Ù dummy load. The peak visual power is the measured average power multiplied by a factor of 1.68. While observing the external wattmeter, the output power is varied to ensure that is adjustable over the proper ranges.
Measurement:	Upper limit of visual output power adjustment ___110___ % Lower limit of visual output power adjustment ___0___ %

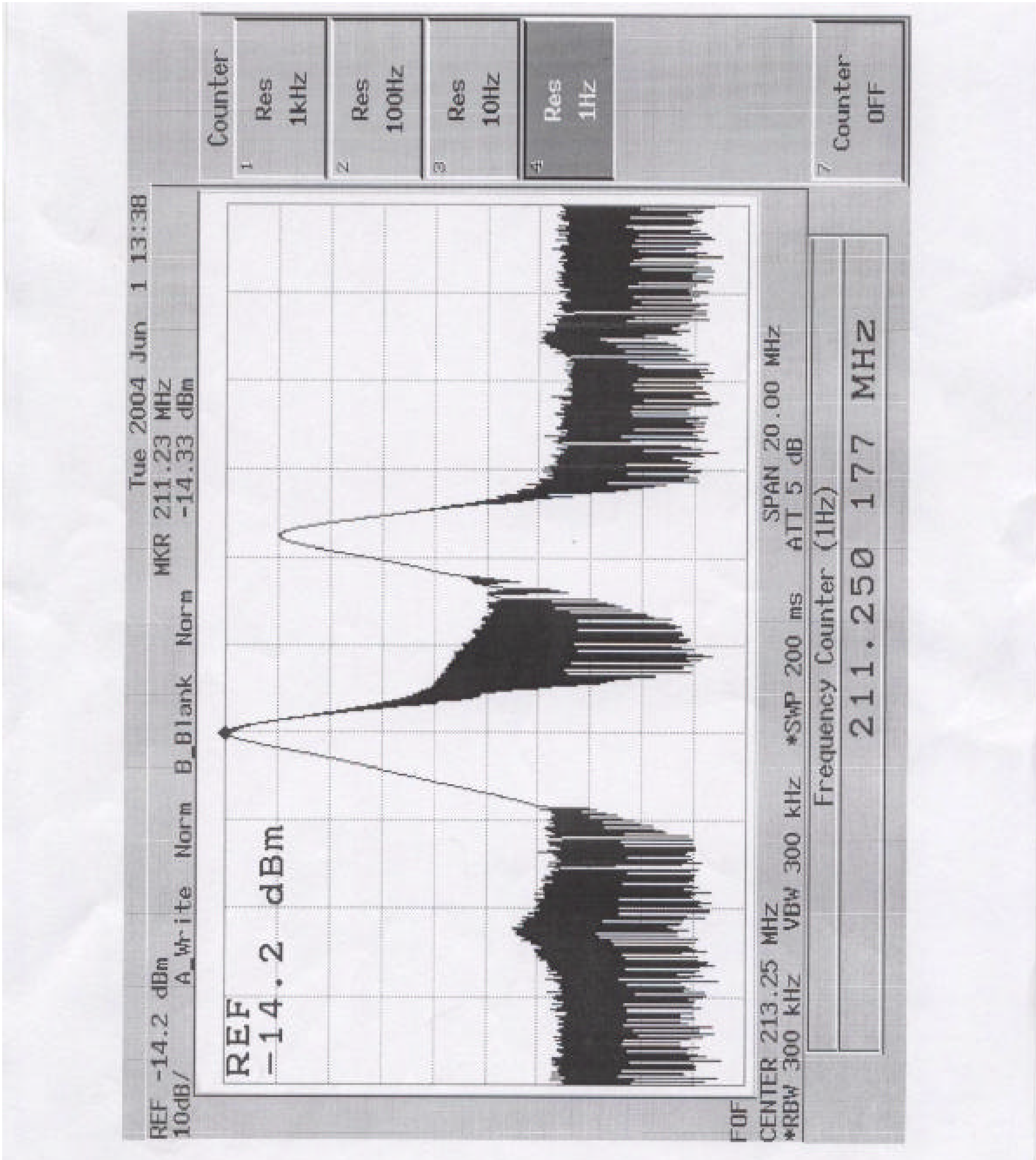
Aural Power Output Rating

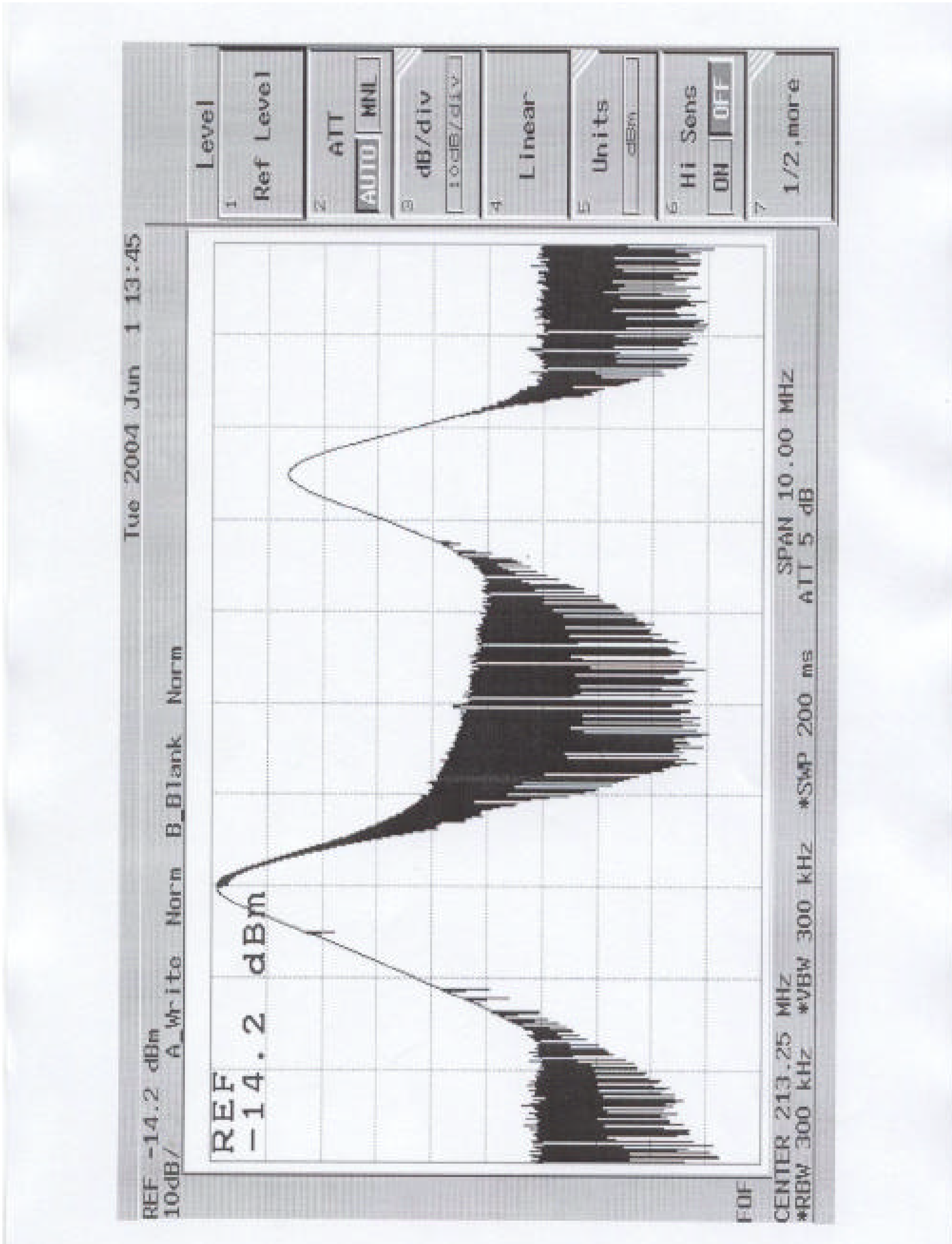
Definition: The aural carrier power output is the power of the aural transmission section available at the output terminals of the equipment when connected to the standard test load.

Requirement: FCC – Aural carrier must be at least 6.6 dB below visual carrier power [sections 73.682(a)(15) and 73.1560(c)(2)].

Method: The average power output of the unmodulated aural carrier is measured while operating into the standard test load either by using a power measuring device or by a calorimetric method.

Measurement: The aural carrier is 13.0 dB below the tip of sync of visual carrier.


REF -14.2 dBm
10dB/
A_Write Norm B_Blank Norm
Tue 2004 Jun 1 13:38
MKR 211.23 MHz
-14.33 dBm
REF
-14.2 dBm
CENTER 213.25 MHz
*RBW 300 kHz VBW 300 kHz *SWP 200 ms
SPAN 20.00 MHz
ATT 5 dB
Frequency Counter (1Hz)
211.250 177 MHz
Counter
Res 1kHz
Res 100Hz
Res 10Hz
Res 1Hz
Counter OFF


REF -14.2 dBm
10dB/
A_Write Norm B_Blank Norm
Tue 2004 Jun 1 13:45
REF
-14.2 dBm
CENTER 213.25 MHz
*RBW 300 kHz *VBW 300 kHz *SWP 200 ms
SPAN 10.00 MHz
ATT 5 dB
Level
Ref Level
ATT
AUTO MNL
dB/div
10dB/div
Linear
Units
dBm
Hi Sens
ON OFF
1/2,more

Carrier Frequency Tolerance

Definition: Frequency tolerance is a measure of the maximum permissible departure of the characteristic frequency of an emission from its assigned frequency.

Requirement: FCC – The departure of the visual carrier frequency of a TV station may not exceed ± 1,000 Hz from the assigned visual carrier frequency. The departure of the aural carrier frequency of a TV station may not exceed ± 1,000 Hz from the actual visual carrier frequency plus exactly 4.5 MHz. The chrominance subcarrier frequency is 63/68 times precisely 5 MHz. The tolerance is ± 10 Hz and the rate of frequency drift must not exceed 0.1 Hz per second [section 73.1545(c)].

Method: After a warm up period of at least one hour at rated power, the frequency of the visual and aural carriers is measured at one-minute intervals during a period of fifteen minutes. From these measurements, the mean test frequency is determined of each carrier as well as inter-carrier separation. The operating frequencies are measured at ambient temperatures from –30°C to +50°C (in 10°C steps) and at the following three values of power supply voltage for each of these temperatures; 85%, 100%, and 115% of nominal AC supply voltage.

Measurement: Visual Carrier Frequency

TEMP (.C)	AC VOLTAGE	VISUAL FREQUENCY (MHz)	VISUAL DEVIATION (Hz)
-30	100	211.249591	-807
	118	211.249581	-817
	136	211.249594	-804
-20	100	211.249822	-576
	118	211.249817	-581
	136	211.249827	-571
-10	100	211.249985	-414
	118	211.249972	-426
	136	211.249992	-406
0	100	211.250124	-274
	118	211.250114	-284
	136	211.250129	-269
10	100	211.250274	-124
	118	211.250261	-137
	136	211.250284	-114
20	100	211.250406	8
	118	211.250398	0
	136	211.250414	15
30	100	211.250523	124
	118	211.250520	122
	136	211.250525	127
40	100	211.250566	167
	118	211.250558	160
	136	211.250579	180
50	100	211.250764	365
	118	211.250738	340
	136	211.250789	391

Measurement: Aural Carrier Frequency

TEMP (.C)	AC VOLTAGE	AURAL FREQUENCY (MHz)	AURAL DEVIATION (Hz)
-30	100	215.750443	15
	118	215.750433	5
	136	215.750440	12
-20	100	215.750570	143
	118	215.750565	138
	136	215.750570	143
-10	100	215.750615	187
	118	215.750612	184
	136	215.750610	182
0	100	215.750524	96
	118	215.750521	93
	136	215.750524	96
10	100	215.750511	84
	118	215.750509	81
	136	215.750506	79
20	100	215.750418	-10
	118	215.750428	0
	136	215.750408	-20
30	100	215.750120	-307
	118	215.750125	-302
	136	215.750103	-325
40	100	215.749956	-472
	118	215.749973	-455
	136	215.749943	-484
50	100	215.749840	-588
	118	215.749848	-580
	136	215.749803	-625

Measurement: Chrominance frequency tolerance

Deviation from standard frequency:__ < 1 ___Hz

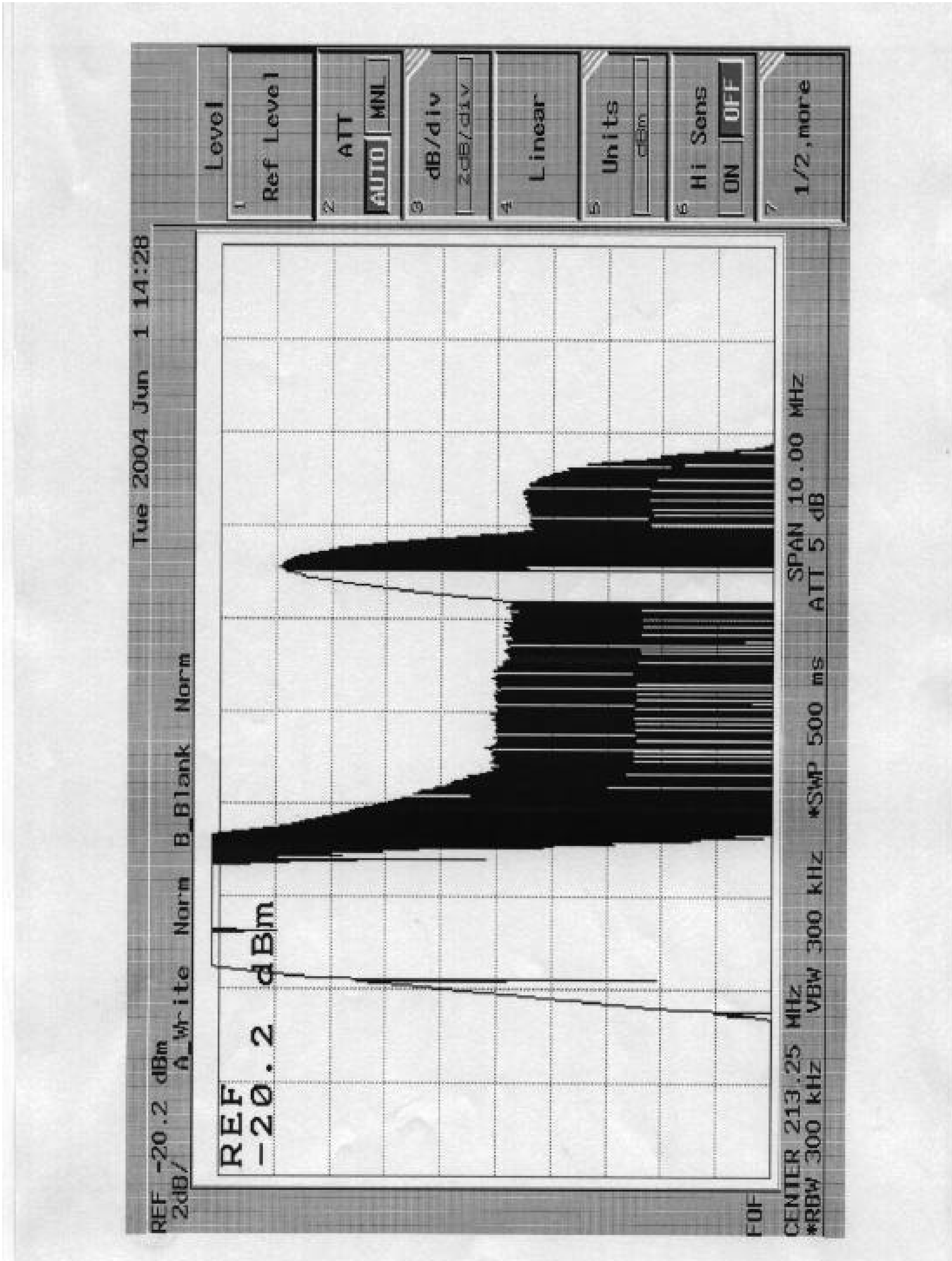
Visual Frequency Response

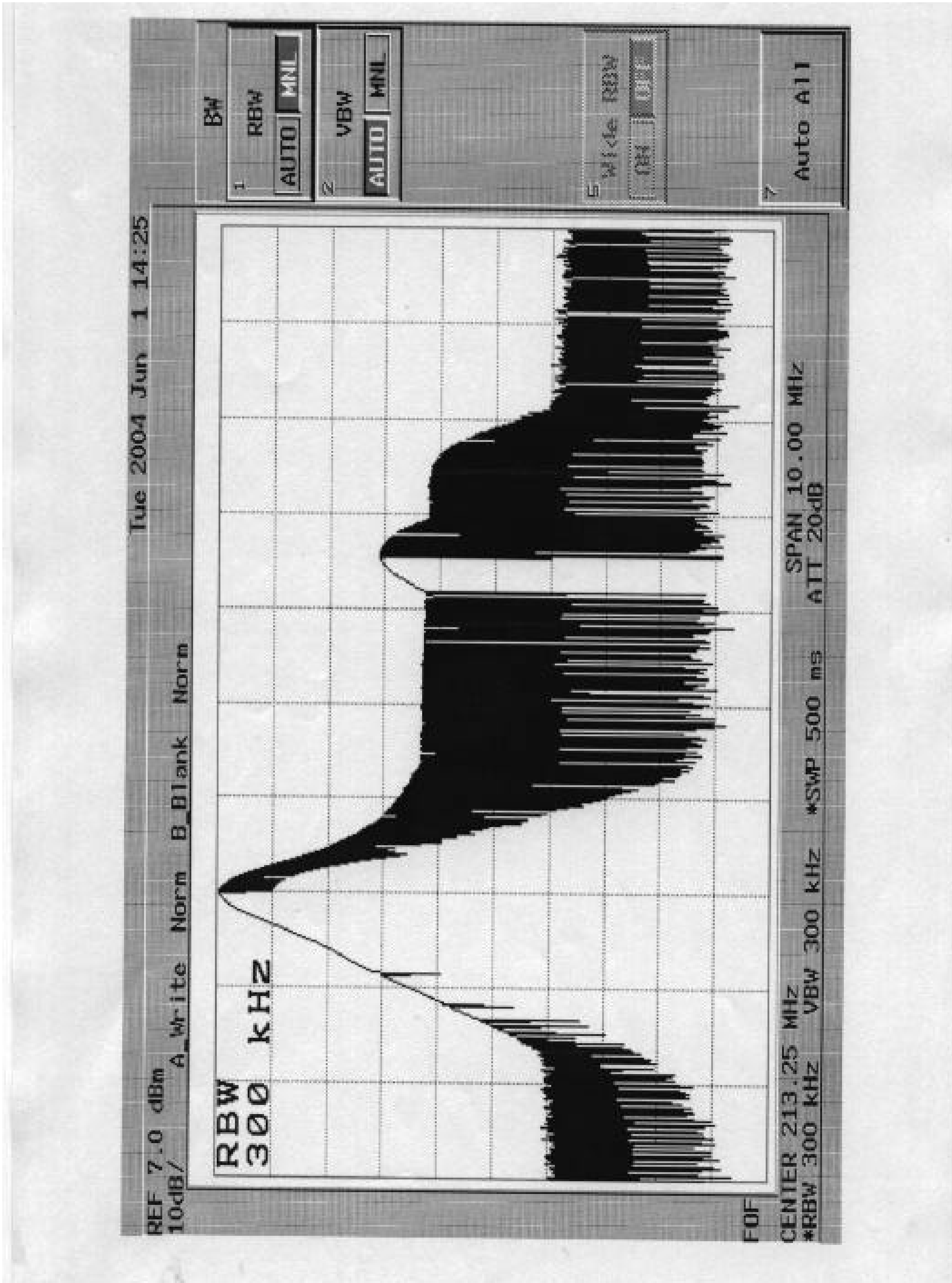
Definition: The visual frequency response provides a measure of the linearity of the channel passband. This test is completed with just the visual transmitter powered.

Requirement: FCC – From -1.25 to +4.75 MHz, the visual frequency response should be within a 4 dB window to meet the 4dB window specification. The -3.58 MHz color subcarrier must be -42 dB down. Outside the -1.25 MHz and +4.75 MHz window, the response must be -20 dB.

Method: The visual carrier is modulated with a (sin x)/x test signal with a test signal generator or with a Tektronix 1405 sideband adaptor with 50% APL and 50% sweep amplitude. The aural carrier is removed temporarily. Measure the visual passband frequency response across the channel using a spectrum analyzer in no more than a 2 dB per division scale and also using a 10 dB per division scale.

Measurement: 2 dB and 10 dB responses are plotted on the following pages.


REF -20.2 dBm
2dB/
A_Write Norm B_Blank Norm
Tue 2004 Jun 1 14:28
REF
-20.2 dBm
Level
Ref Level
ATT
AUTO MNL
dB/div
2dB/div
Linear
Units
dBm
Hi Sens
ON OFF
1/2,more
CENTER 213.25 MHz
SPAN 10.00 MHz
*RBW 300 kHz VBW 300 kHz *SWP 500 ms ATT 5 dB



REF 7.0 dBm
10dB/
A_Write Norm B_Blank Norm
Tue 2004 Jun 1 14:25
RBW
300 kHz
FOF
CENTER 213.25 MHz
*RBW 300 kHz VBW 300 kHz *SWP 500 ms
SPAN 10.00 MHz
ATT 20dB
BW
1 RBW
AUTO MNL
2 VBW
AUTO MNL
5 Wide RBW
ON OFF
7 Auto All

Intermodulation Distortion

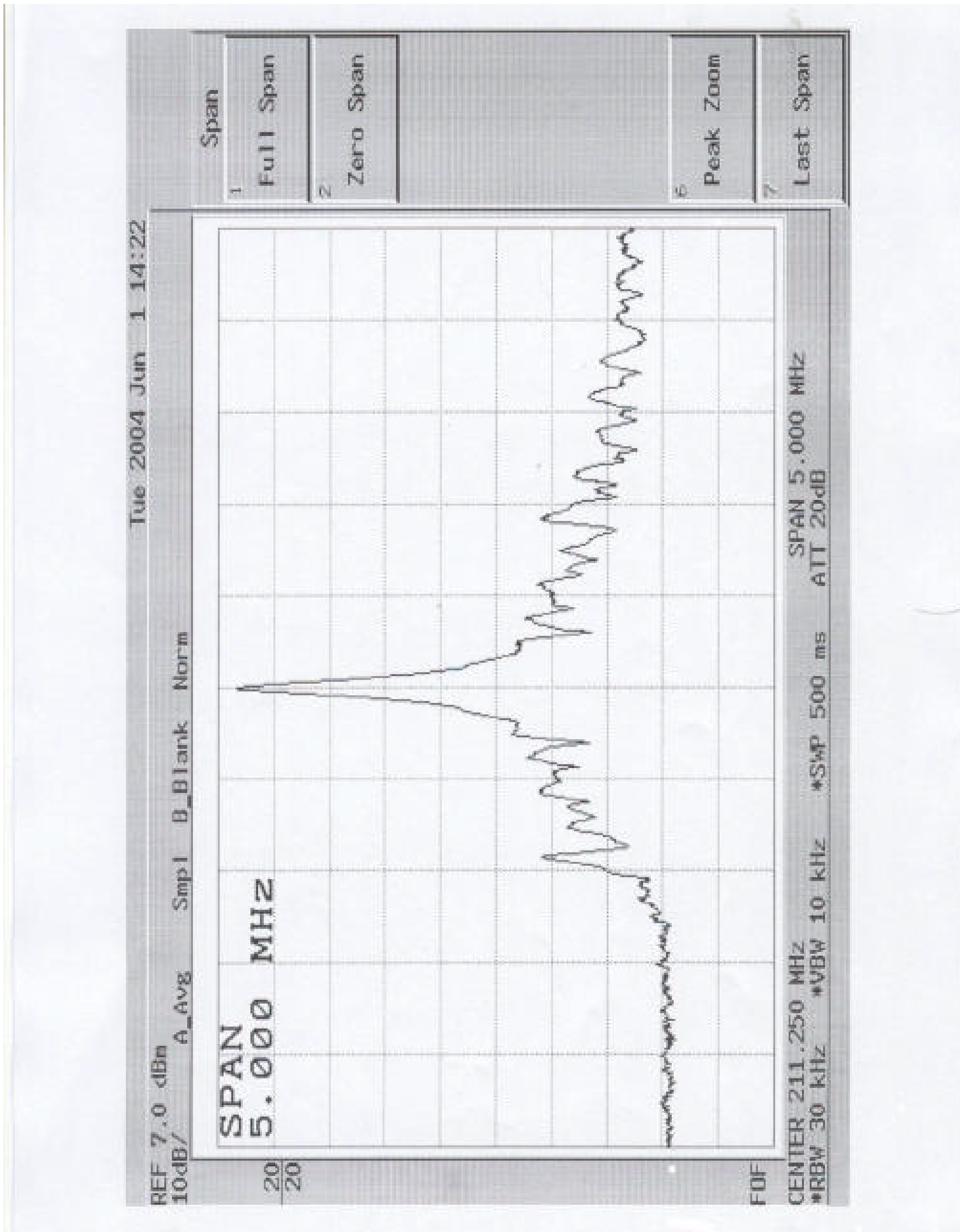
Definition: Intermodulation distortion (IMD) products are beat signals generated by various combinations of carriers of the nature mf1 ± nf2 ± pf3 where m, n, and p are integers. The visual and aural carriers and color sub-carrier can combine to form IMD products. Six predominant products, with respect to visual carrier, are at ± 920 kHz, ± 2.66 MHz, + 5.42 MHz, and + 7.16 MHz.

Requirement: FCC – No FCC requirement.

Method: The visual carrier is modulated with a sync and blanking signal. The aural carrier is removed temporarily. An average reading RF wattmeter is placed between the transmitter output (directly on the directional coupler's N connector on the back panel) and the 50 Ù dummy load. The output power is set to the output power rating. With the power output set, an unmodulated aural carrier applied, the visual carrier is then modulated with a test signal, full field red with 50% APL. The resultant IMD products are measured with respect to the visual carrier.

Measurement:

	100% Rated Power	**25% Rated Power**
+ 920 kHz	-54 dBc	-60 dBc
- 920 kHz	-55 dBc	-57 dBc
+ 2.66 MHz	-63 dBc	-70 dBc
- 2.66 MHz	-63 dBc	-67 dBc
-3.58 MHz	-67 dBc	-67 dBc
+ 5.42 MHz	-70 dBc	<-70 dBc
+ 7.16 MHz	-67 dBc	-70 dBc


REF 7.0 dBm
10dB/
A_Avg
Smpl
B_Blank
Norm
Tue 2004 Jun 1 14:22
SPAN
5.000 MHz
CENTER 211.250 MHz
*RBW 30 kHz
*VBW 10 kHz
*SWP 500 ms
SPAN 5.000 MHz
ATT 20dB
Span
Full Span
Zero Span
Peak Zoom
Last Span

Spurious Emissions

Definition: Spurious emissions are unwanted emissions occurring at the output terminals of the transmitting equipment, at frequencies other than those of the predominant IMD products.

Requirement: FCC – Harmonics and lower/upper sideband spurious signals that are below/above 3 MHz of the channel edge shall be at least 60 dB below peak visual carrier [section 73.687(e)(1)].

Method: The visual carrier is modulated with a normal black level (with or without sync). The aural carrier is present and unmodulated. The 0 dB reference is established on the spectrum analyzer with the resolution bandwidth initially set to 3 MHz per division. The display is adjusted such that the tip of sync is on the first horizontal graticule line. Once the 0 dB reference is established, all spurious emissions are measured up to the tenth harmonic of the aural carrier frequency.

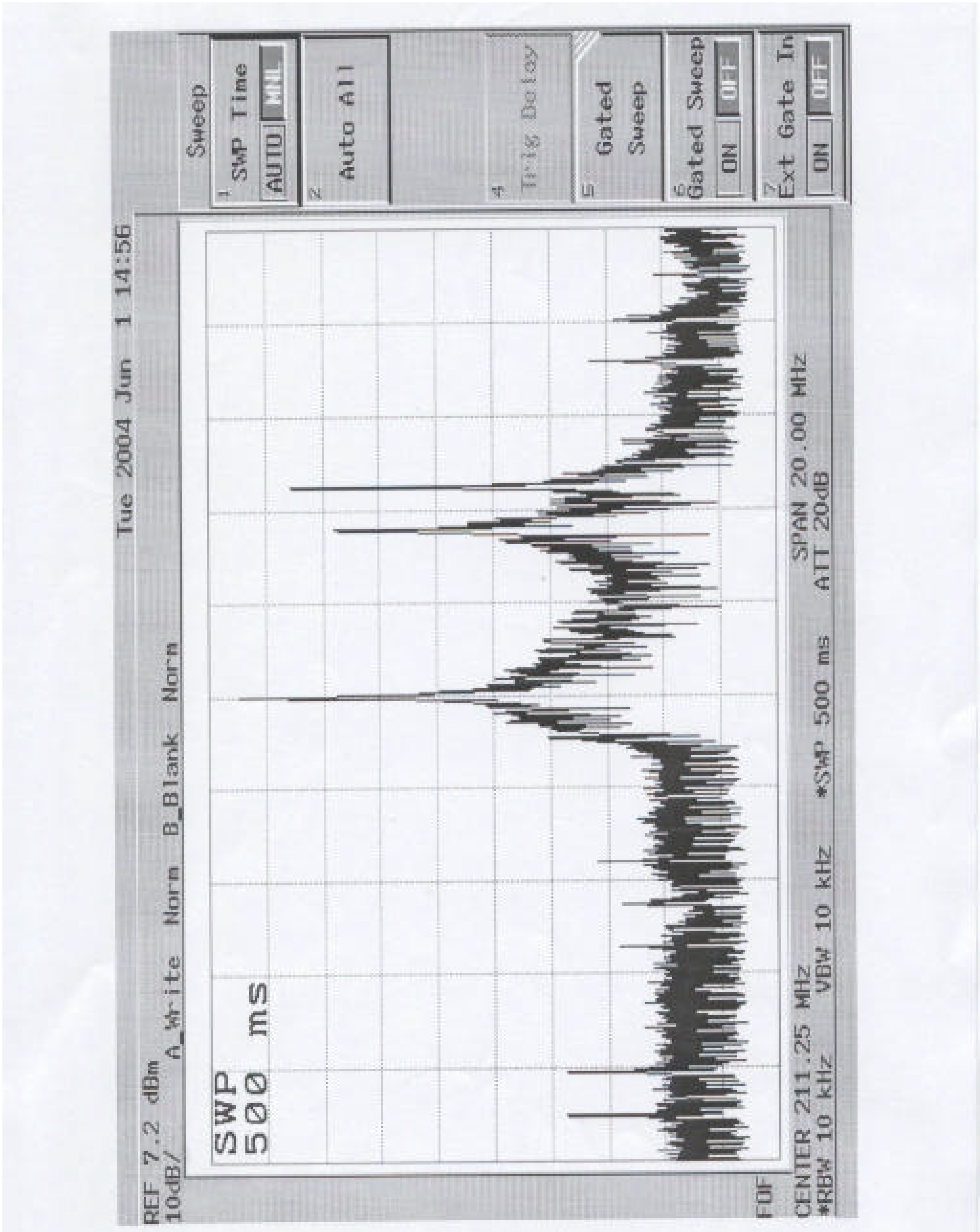
Measurement:

Spurs

	100% Rated Power		25% Rated Power	
-45.0 MHz	-70	dBc	<-70	dBc
+ 9.0 MHz	-78	dBc	-78	dBc
All others	-62	dBc	-62	dBc

Harmonics

	100% Rated Power		25% Rated Power	
2nd	-78	dBc	-80	dBc
3rd	-80	dBc	-80	dBc
4th	-80	dBc	-80	dBc
5th	-80	dBc	-80	dBc
6th	-80	dBc	-80	dBc
7th	-80	dBc	-80	dBc
8th	-80	dBc	-80	dBc
9th	-80	dBc	-80	dBc
10th	-80	dBc	-80	dBc


REF 7.2 dBm
10dB/
A_Write Norm B_Blank Norm
Tue 2004 Jun 1 14:56
SWP
500 ms
CENTER 211.25 MHz
*RBW 10 kHz VBW 10 kHz *SWP 500 ms
SPAN 20.00 MHz
ATT 20dB
Sweep
SWP Time
Auto All
Gated
Sweep
Gated Sweep
ON OFF
Ext Gate In
ON OFF

Modulation

Definition:	Depth of modulation measurements indicate whether or not video signal levels are properly represented in the RF signal. The NTSC modulation scheme yields an RF signal that reaches its maximum peak-to-peak amplitude at sync tip (100%). In a properly adjusted signal, blanking level corresponds to 75%, and peak white to 12.5%. The zero carrier reference level corresponds to 0%.
Requirement:	FCC – The reference white level shall be at 12.5% ± 2.5% of peak carrier level [section 73.682(a)(13)]. The blanking level shall be at 75% ± 2.5% of the peak carrier level [section 73.682(a)(12)]. The setup interval shall be at 7.5% ± 2.5% of the video range from the blanking level to the reference white level [section 73.682(a)(17)].
Method:	Modulation depth is measured at the output of a precision demodulator by verifying that the ratios between the parts of the signal are correct. Overall amplitude is not critical, but it should be adjusted in the system to be approximately 160 IRE from sync tip to zero carrier at 100% transmitter or translator power. This will minimize the effects of nonlinearities in the measurement system.
Measurement:	The blanking level is at _____75_____%. The reference white level is at ____12.5_________%. The sync tip is at ___90______%.

K Pulse to Bar (Kpb) Rating

Definition: K factor is one method used to measure the transmitting equipment's ability to reproduce step functions or pulses to check for linear waveform distortion. Specifically, K factor describes the transmitter's or translator's ability to reproduce the 2T pulse and bar measurement signal.

Requirement: FCC – No FCC requirement.

Method: A full field composite test signal (FCC Composite on the Tektronix TSG-95) is applied to the video input of the transmitter under test and the demodulated video output (using synchronous detection) is connected to a calibrated waveform monitor or video measurement system. The 2T pulse is centered on the Kpb scale and the vertical gain is adjusted to put the bar center point at 100 IRE and the blanking level at 0 IRE. The K pulse to bar rating is then measured on the graticule using the "Kpb" lines at the top center of the graticule. To extend the range of the measurement, set the vertical sensitivity of the waveform monitor so that the center point of the bar waveform has an amplitude of 100 IRE. Measure the peak amplitude of the 2T pulse and read the K pulse to bar rating from an industry standard nomogram designed for K factor. If the 2T pulse is greater than 120 IRE in amplitude, move the display down to put the blanking level at –40 IRE.

Alternatively, a video measurement system is used to complete this measurement. Using the VM700A video measurement system, select K Factor in measure mode to obtain a measurement of K Pulse to Bar.

Measurement: The Kpb rating is at __0.2________%.

2T Pulse K (K2T) Rating

Definition: To evaluate the change in shape of the 2T pulse, the K2T measurement is used. The K2T rating is a time weighted measurement of the subjective impairments caused by close-in ratios on the TV signal and is measured with the standard NTSC type B graticule and expressed in percentage K.

Requirement: FCC – No FCC requirement.

Method: The visual carrier is modulated with a full field composite test signal and the demodulated output of the transmitting equipment is connected to a calibrated waveform monitor or video measurement system. To use 'graticule B' to measure K2T, the waveform monitor is set with a sweep rate of 0.2 µsec/div and the vertical sensitivity is adjusted to set the pulse height to 100 IRE. The lobe that most closely approaches the dotted K2T = 5% outline defines the K2T rating for the transmitter or translator under test. For small values of K2T, the vertical sensitivity is increased by a factor of 2 to increase the resolution of the measurement. In this case, the dotted outline becomes K2T = 2.5%. The K2T rating is estimated by subdividing an imaginary vertical line through the lobe peak into convenient units and expressing the lobe amplitude as a fraction of the distance between the blanking level reference line and the dotted K2T line.

Alternatively, a video measurement system is used to complete this measurement. Using the VM700A video measurement system, select K Factor in measure mode to obtain a measurement of 2T Pulse.

Measurement: The K2T rating is at 1.3 %K.

Chrominance-Luminance Gain Inequality

Definition: The luminance and chrominance of a television signal should be transferred through a system with their relative amplitudes undistorted. The chrominance-luminance gain inequality is defined as the change in level of the chrominance component of the test signal relative to the luminance component and is measured with the modulated 12.5T pulse.

Requirement: FCC – No FCC requirement.

Method: The chrominance-luminance gain inequality is measured by setting the waveform monitor so that the modulated pulse amplitude goes from blanking to the 100 IRE level. If only a gain inequality is present, the baseline of the pulse will describe a continuous curve. The peak amplitude is taken of this curve and is plotted against the vertical axis of a modulated sin^2 pulse application nomograph for measuring this gain inequality. Then the chrominance-luminance gain inequality, or relative chroma level can be determined.

Alternatively, a video measurement system is used to complete this measurement. Chrominance-luminance gain distortion can be measured by selecting CHROM/LUM GAIN DELAY with the Tektronix VM700A in measure mode. The graph plots error with respect to zero and the numeric results are displayed at the top of the screen.

Measurement: The chrominance-luminance relative amplitude is 89.7 % when using the VM700A.

Chrominance-Luminance Delay Inequality

Definition: At the time of signal origination, the chrominance and luminance components of the television signal are correctly timed with respect to one another. If any delay is introduced in one component without an equal delay being introduced in the other, when the signal gets to a picture monitor, both components will be misregistered. This is most often noticed on red letters smeared to the right into a white or neutral background, or as bad as to make the received picture appear to have color ghosts.

Requirement: FCC – No FCC requirement.

Method: The chrominance-luminance delay inequality is measured with the 12.5T pulse. This signal consists of equal peak amplitudes of chrominance and luminance, and is usually transmitted as part of a composite test signal. The test signal is positioned as it was in chrominance-luminance gain measurements. The baseline of the waveform is observed. A sinusoidal shape on the baseline of the pulses indicates the presence of chrominance to luminance delay. The peak-to-peak excursions of the sinusoid are measured and plotted on the same nomograph as used for gain inequality. The intersection of these points indicates the chrominance-luminance delay.

Alternatively, a video measurement system is used to complete this measurement. Chrominance-luminance delay distortion can be measured by selecting CHROM/LUM GAIN DELAY with the Tektronix VM700A in measure mode. The graph plots error with respect to zero and the numeric results are displayed at the top of the screen.

Measurement: The chrominance-luminance delay inequality is ___10_________ nsec.

Differential Gain Distortion

Definition: Differential gain distortion refers to a change in chrominance amplitude with changes in luminance level. The vividness of a colored object changes with variations in scene brightness.

Requirement: FCC – The angles of the subcarrier measured with respect to the burst phase, when reproducing saturated primaries and their complements at 75% of full amplitude, shall be within ± 10° and their amplitudes be within ±20% of the values specified in 73.682(a)(20) [section 73.682(a)(20)(vii)].

Method: The video signal is modulated with a full field five-riser modulated staircase signal (includes 3.58 MHz color subcarrier). The transmitting equipment is run to the specified visual output power level. The output of the transmitter or translator is then demodulated and run into the input of a calibrated vectorscope or video measurement system to observe the 3.58 MHz color subcarrier component of the test signal. Any deviation from a constant amplitude display of the 3.58 MHz signal, when viewed at the line rate frequency, is the differential gain variation. The differential gain is the difference between the maximum and minimum 3.58 MHz signal amplitude divided by the maximum amplitude. The differential gain is observed at 10%, 50%, and 90% APL conditions and the worse case result is recorded.

To make an automatic measurement of differential gain with the VM700A, select DG/DP in the measure mode. Both differential phase and differential gain are shown on the same display (the upper graph is differential gain.

Measurement: The differential gain distortion is 3.7 %.

Differential Phase Distortion

Definition: Differential phase distortion occurs if a change in luminance level produces a change in the chrominance phase. If the distortion is severe, the hue of an object will change as its brightness changes. Differential phase distortion can change with changes in APL.

Requirement: FCC – No FCC requirement (only cable systems Part 76 at 10 degrees)

Method: The video signal is modulated with a full field five-riser modulated staircase signal (includes 3.58 MHz subcarrier). The transmitting equipment is run to the specified visual output power level. The output of the transmitter or translator is then demodulated and run into the input of a calibrated vectorscope or video measurement system suitable for measuring differential phase. The differential gain is observed at 10%, 50%, and 90% APL conditions and the worse case result is recorded.

To make an automatic measurement of differential phase with the VM700A, select DG/DP in the measure mode. Both differential phase and differential gain are shown on the same display (the lower graph is differential phase.

Measurement: The differential phase distortion is ________1.8____ degrees.

Group Delay Response

Definition: The group delay of a transmitter or translator is defined as the relationship between the variation of group delay and the frequency of the sideband signal for frequencies within the limits of the output channel bandwidth; the sideband signal being produced by a sinusoidal input signal of given constant amplitude and variable frequency.

Requirement:

	FCC [section 73.687(a)(3)]
1.00 MHz	0 ± 100 nsec relative to 200 kHz
2.00 MHz	0 ± 100 nsec relative to 200 kHz
3.00 MHz	0 ± 35 nsec relative to 200 kHz
3.58 MHz	- 170 ± 25 nsec relative to 200 kHz
4.18 MHz	- 346 ± 50 nsec relative to 200 kHz

Method: The transmitting equipment is operated at rated visual power into the standard test load. The measurement is made either on the transmitting equipment's output signal detected by the standard demodulator, or on the separate sideband signals as detected on a synchronous sweep receiver. The aural carrier is turned off and the video input consists of sync, blanking, and a variable pedestal, initially set to 25 IRE units. Composite video signals may be used if they are without a vertical interval since it obscures the measurement on some types of delay measurement equipment. The equipment output is sampled and is fed into a tracking receiver (sideband analyzer or spectrum analyzer). The 0 dB reference is set to the output level at visual carrier + 200 kHz. High rate group delay ripples as a result of saw filter triple transit effect are excluded.

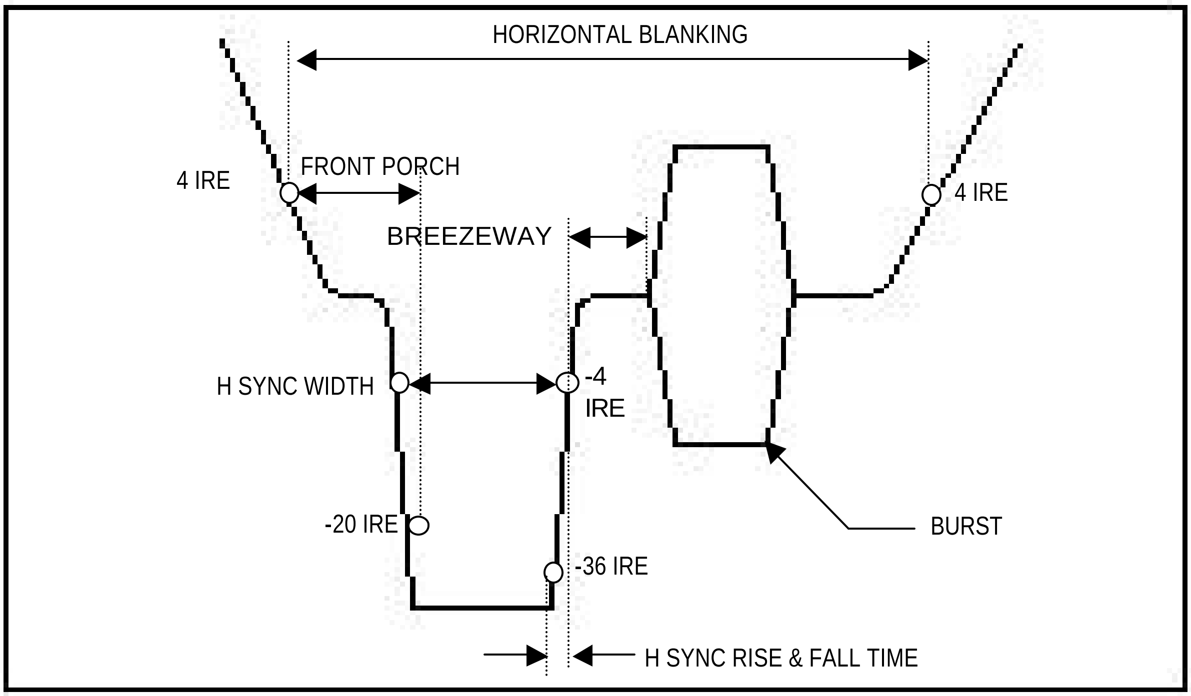
Alternatively, group delay is measured using the (sin x)/x test signal from the TSG-95 generator and the automatic measurement system in the VM700A. Select Group Delay and Gain in the VM700A measure mode.

Measurement:

1 MHz:	-20	nsec relative to 200 kHz
2 MHz:	-15	nsec relative to 200 kHz
3 MHz:	- 7	nsec relative to 200 kHz
3.58 MHz:	-160	nsec relative to 200 kHz
4.18 MHz:	-320	nsec relative to 200 kHz

Horizontal Timing

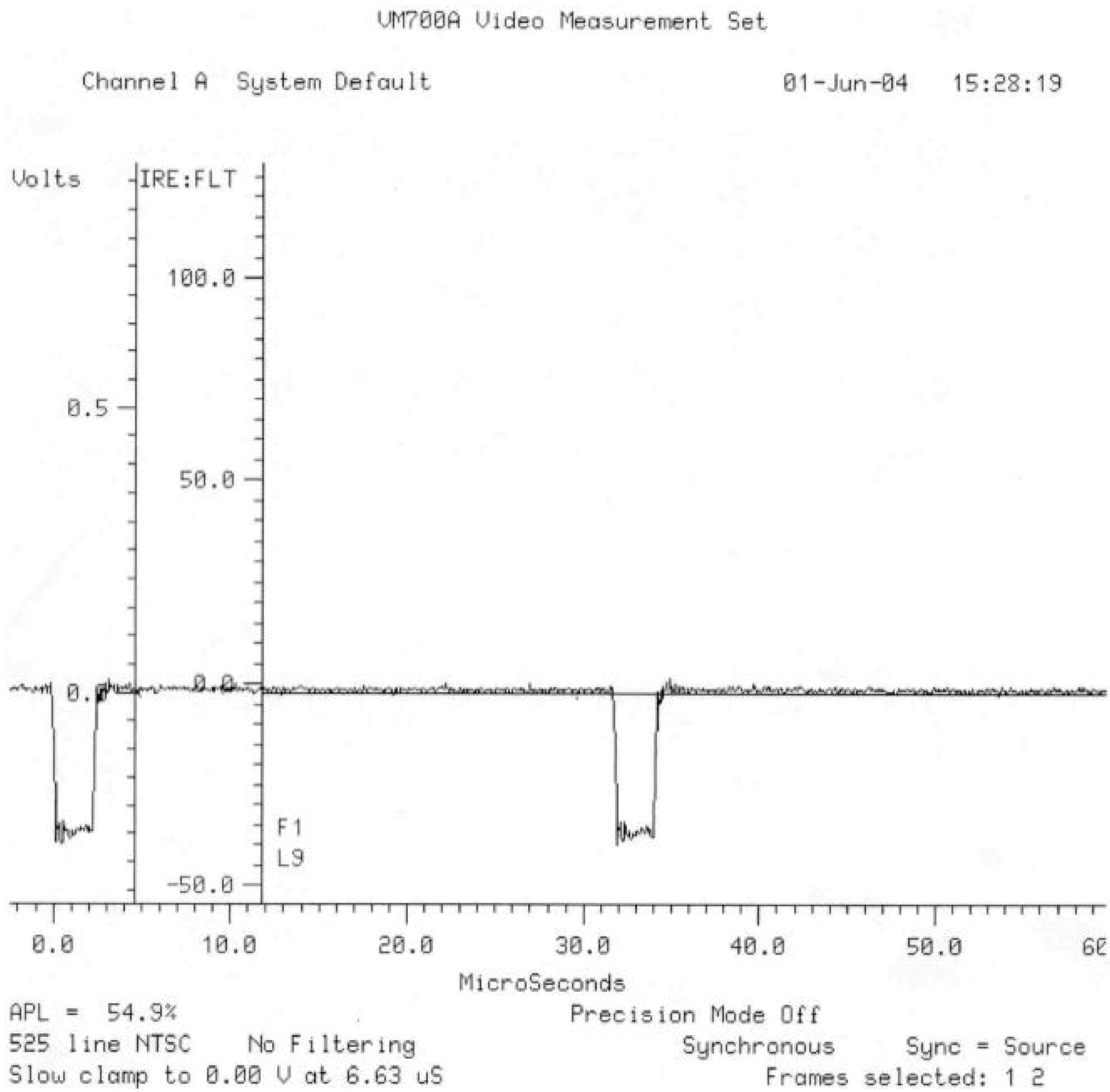
Definition:



Requirements:

	EIA [RS-170A]	FCC [section 73.699, fig.6]
Front Porch	1.5 ìsec ± 0.1 ìsec	1.27 ìsec min
H Sync Pulse	4.7 ìsec ± 0.1 ìsec	4.45 to 5.08 ìsec
H Sync Rise/Fall Time	Not specified	0.254 ìsec max
Breezeway	0.6 ìsec	0.38 ìsec min
Burst Duration	2.5 ìsec	8 to 11 cycles of chrominance subcarrier
Burst Amplitude	40 IRE reference	90% to 110% of H sync
Horizontal Blanking	10.9 ìsec ± 0.2 ìsec	10.49 to 11.49 ìsec recommended

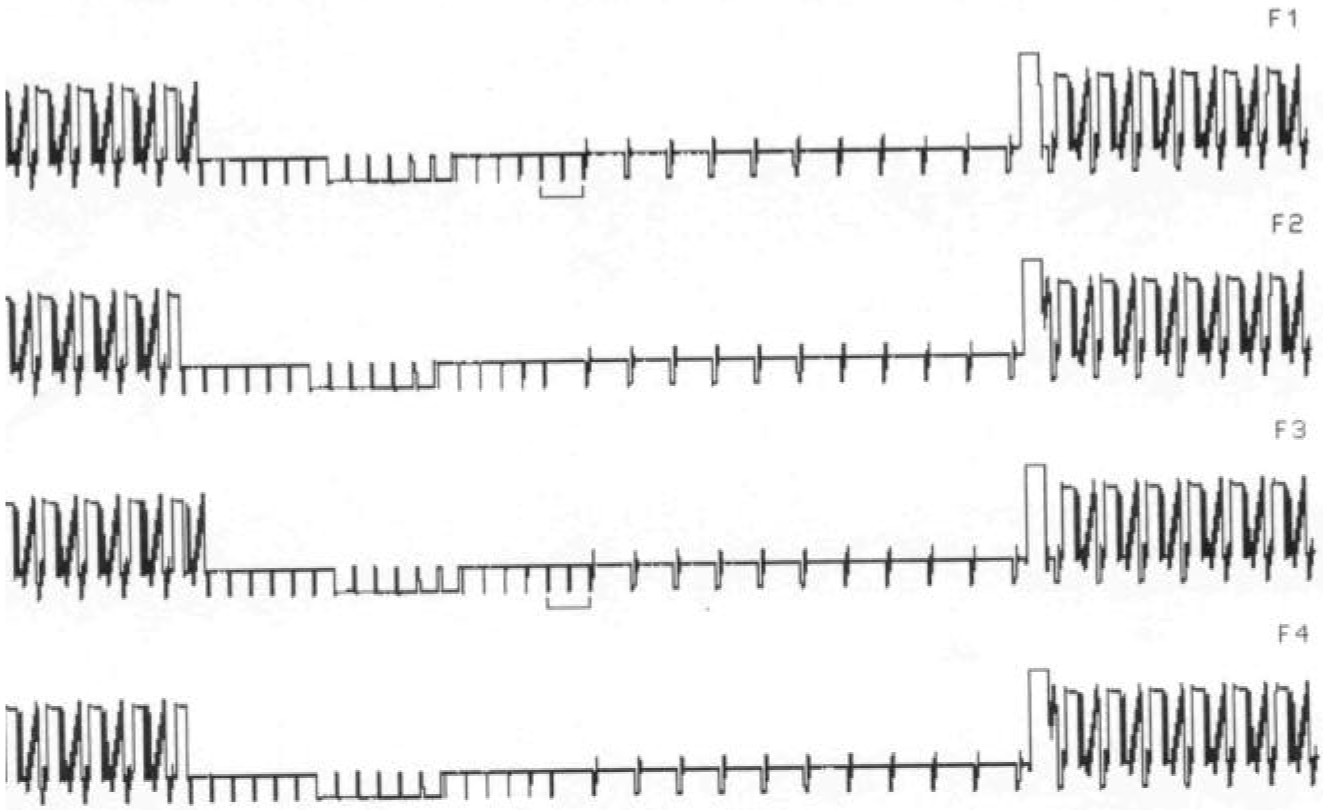
Meets FCC Requirements. Data on file at Technalogix Ltd.


VM700A Video Measurement Set
Channel A System Default
01-Jun-04 15:28:19
Volts
IRE:FLT
100.0
0.5
50.0
0.0
0.
F1
L9
-50.0
0.0
10.0
20.0
30.0
40.0
50.0
60
MicroSeconds
APL = 54.9%
Precision Mode Off
525 line NTSC
No Filtering
Synchronous
Sync = Source
Slow clamp to 0.00 V at 6.63 uS
Frames selected: 1 2

VM700A Video Measurement Set

Channel A System Default 01-Jun-04 15:32:45

Vertical Blanking
Field = 1 Line = 9



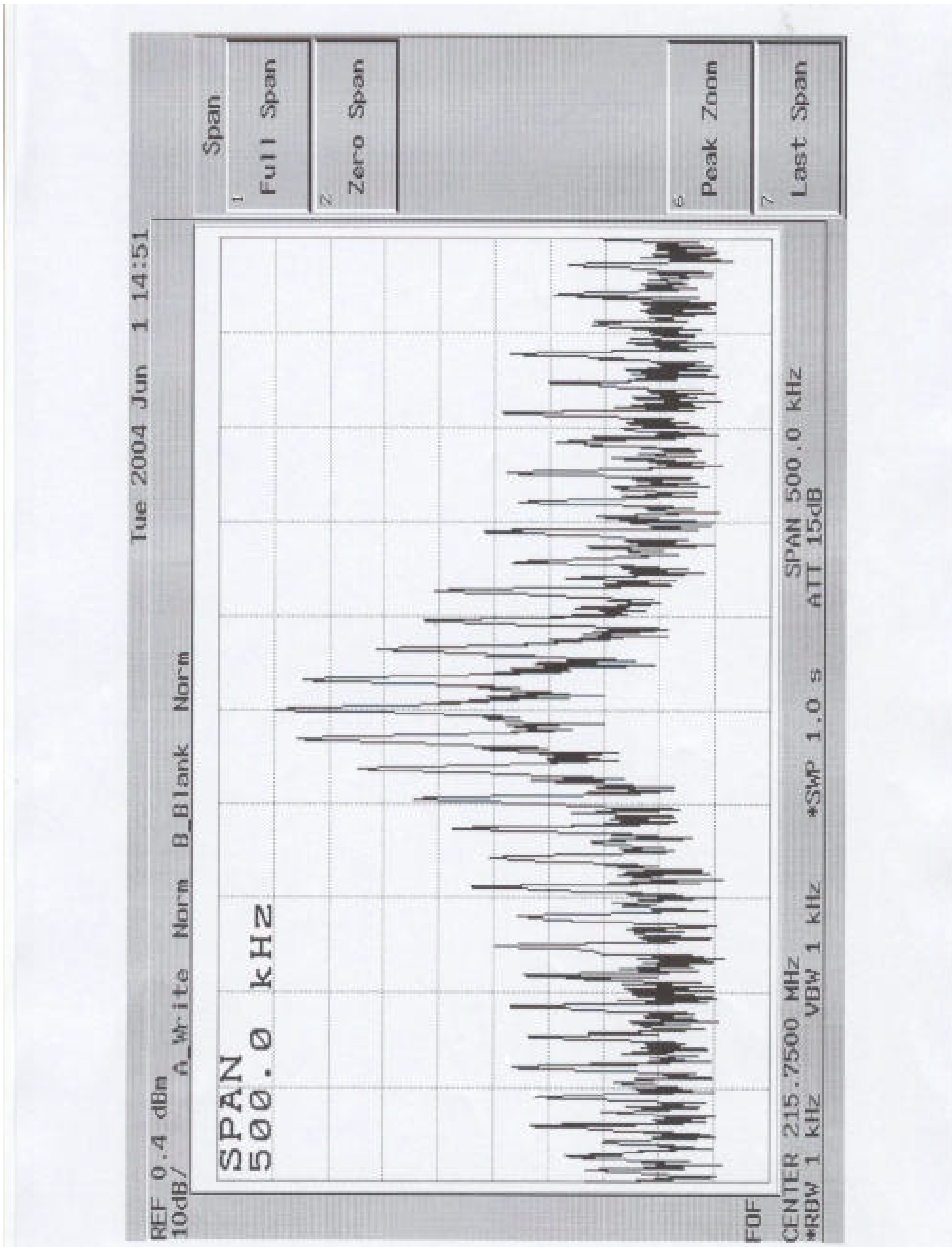
Full Display

Audio Amplitude Frequency Response

Definition: For the audio input channel, the audio amplitude frequency response of a television transmitter or translator is defined as the ratio of the input voltages at specific frequencies, referenced to a 400 Hz test tone of sufficient amplitude to result in 100% modulation required to obtain a constant percentage of modulation. The input voltages at specific frequencies are within the range from 30 Hz to 15 kHz and the ratio is expressed in dB.

Requirement: FCC – Pre-emphasis shall be employed as closely as practicable in accordance with the impedance-frequency characteristic of a series inductance-resistance network having a time constant of 75 µsec [section 73.687(b)(1) and 73.699, figure 12].

Method: The visual carrier is unmodulated and turned on. A 400 Hz sinusoidal signal from a calibrated audio oscillator is applied to the audio input terminals at a level sufficient to produce 100% modulation. The aural section of the transmitter has the pre-emphasis turned on and a sample from the output is applied to the input of a modulation monitor. The audio oscillator's output level at 400 Hz is adjusted to achieve a + 25 kHz deviation. This level is recorded and used as a reference. The audio output level of the audio oscillator is adjusted at 30, 100, 200, 500, 1000, 2500, 5000, 7500, 10000, 12000, and 15000 Hz to retain the ± 25 kHz deviation and the change in audio output level of the audio oscillator compared to the reference is recorded.


REF 0.4 dBm
10dB/
A_Write Norm B_Blank Norm
Tue 2004 Jun 1 14:51
SPAN
500.0 kHz
FOF
CENTER 215.7500 MHz
*RBW 1 kHz VBW 1 kHz *SWP 1.0 s
SPAN 500.0 kHz
ATT 15dB
Span
1 Full Span
2 Zero Span
6 Peak Zoom
7 Last Span

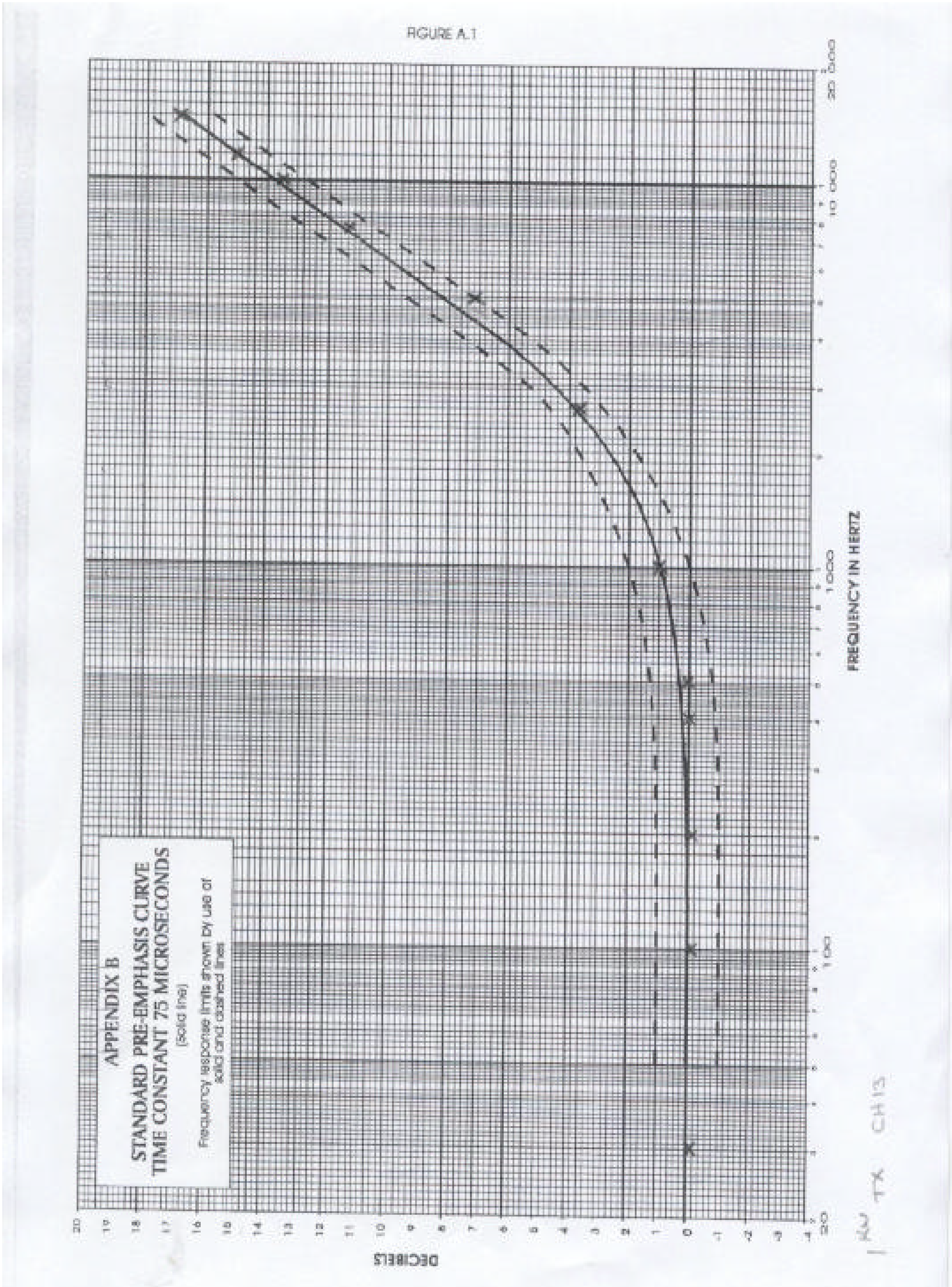


FIGURE A.1
APPENDIX B
STANDARD PRE-EMPHASIS CURVE
TIME CONSTANT 75 MICROSECONDS
(Solid line)
Frequency response limits shown by use of solid and dashed lines
FREQUENCY IN HERTZ
DECIBELS