

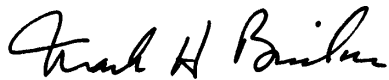
July 5, 2000

FEDERAL COMMUNICATIONS COMMISSION
Authorization and Evaluation Services
7435 Oakland Mills Road
Columbia, MD 21046

Dear Sirs:

Enclosed is a submission for type certification of an ACRODYNE NH6050E television transmitter.

Regards

A handwritten signature in black ink, appearing to read "Mark H. Bricker". The signature is fluid and cursive, with the first name "Mark" and last name "Bricker" clearly distinguishable.

Mark H. Bricker
Sr. Systems Engineer

Enclosures

Type Acceptance Submission For Acrodyne Model NH6050E Television Transmitter

LIST OF EXHIBITS

<u>PARAGRAPH</u>	<u>TITLE</u>
1. 2.983(a)	Name of Applicant
2. 2.983(b)(c)	Identification of Equipment
3. 2.983(d) (1-12)	Technical Description
4. 2.983(e)	Data Required
5. 2.983(f)	Equipment Identification Plate
6. 2.983(g)	Photographs
7. 2.983(h)	EBS Attention Signal Encoder
8. 2.985	RF Power Output
9. 2.987(d)	Modulation Characteristics
10. 2.989(e)(6)	Occupied Bandwidth
11. 2.991	Spurious Emissions
12. 2.993	Field Strength of Spurious Emissions
13. 2.995	Frequency Stability
14. 2.997	Spectrum Investigation
15. 74.750(c)(1)	Frequency Response
16. 74.750(c)(2)	Spurious and Harmonic Outputs
17. 74.750(c)(3)	Carrier Frequency Stability
18. 74.750(c)(4)	AGC Operation
19. 74.750(c)(5)	Automatic On/Off Operation
20. 74.750(c)(6)	Power Tube (device) Rating

- | | | |
|-----|--------------|----------------------------------|
| 21. | 74.750(c)(7) | Automatic Station Identification |
| 22. | 74.750(c)(8) | Wiring and Shielding |
| 23. | 74.750(d)(1) | Visual Transmitter |
| 24. | 74.750(d)(2) | Aural Transmitter |

APPLICATION FOR TYPE ACCEPTANCE

FCC IDENTIFICATION NUMBER:	BQMNH6050E
DATE:	MAY 24, 2000
APPLICABLE FCC PARAGRAPH:	2.983
SUB-PARAGRAPH:	(a)
PARAGRAPH TITLE:	NAME OF APPLICANT
.....	

This application is submitted by Acrodyne Industries, Inc., 516 Township Line Rd. Blue Bell PA, 19422

APPLICATION FOR TYPE ACCEPTANCE

FCC IDENTIFICATION NUMBER: **BQMNH6050E**
DATE: **MAY 24, 2000**
APPLICABLE FCC PARAGRAPH: **2.983**
SUB-PARAGRAPH: **(b)(c)**
PARAGRAPH TITLE: **IDENTIFICATION OF EQUIPMENT**
.....

The following is the description of the Acrodyne model number NH6050E equipment for which type acceptance is sought:

INPUT: Baseband video and audio.

OUTPUT: Any single TV channel between 470 and 806 MHz (channels 14 to 69).

POWER: 5000 watts peak of sync visual power maximum, 500 watts average aural power.

The equipment identification plate is shown in paragraph section 2.983(f) in this application. The location of the identification plate is shown in paragraph section 2.983(g) in this application.

Quantity production of the NH6050E is planned.

APPLICATION FOR TYPE ACCEPTANCE

FCC IDENTIFICATION NUMBER: BQMNH6050E
DATE: MAY 24, 2000
APPLICABLE FCC PARAGRAPH: 2.983
SUB-PARAGRAPH: (d)
PARAGRAPH TITLE: TECHNICAL DESCRIPTION

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1. The NH6050E television transmitter is used to broadcast C3F visual and F3E aural emissions.
2. The output frequency range of the NH6050E is from 470 to 806 MHz.
3. The power rating of the output of the NH6050E is between 2,500 and 5,000 watts peak of sync visual, and 250 and 500 watts average aural. Varying the output level is accomplished by varying the output power of the exciter section.
4. The maximum power rating of the NH6050E is 5000 watts peak of sync visual power and 500 watt average aural. Proper operation is excess of 100 percent is limited by final power amplifier non-linearities.
5. The NH6050E final amplifier section is made up of three visual amplifier modules and one aural amplifier module. Each of these modules contains eight LDMOS RF power transistors operating in parallel. Power supply voltage is 30 VDC, provided by a power supply integrated into the module. A device data sheet is included in section 75.750(c)(6).
- 6.7.8. The function of each active circuit device is explained in the technical description sections of the instruction manual included.
9. The transmitter tune up procedure is contained in the NH6050E technical manual supplied. No tuning is required for the RF stages as they are all broadband stages.
10. The output frequency of the NH6050E is determined by the stability of the synthesizer reference oscillator. Both the visual IF oscillator and the IF-to RF conversion oscillator are phase locked to the same reference oscillator. The aural IF is phase locked to the visual IF carrier. The description of these circuits is contained in the instruction manual supplied.
11. The linearity of the output amplifier RF devices requires the use of a output harmonic filter to suppress spurious radiation below that required by the applicable section of the rules.
12. This section requiring a description of any digital modulation techniques is not applicable to the type acceptance sought.

APPLICATION FOR TYPE ACCEPTANCE

FCC IDENTIFICATION NUMBER:	BQMNH6050E
DATE:	MAY 24, 2000
APPLICABLE FCC PARAGRAPH:	2.983
SUB-PARAGRAPH:	(e)
PARAGRAPH TITLE:	DATA REQUIRED
.....	

The data required by sections 2.985 through 2.997 inclusive will be found under the appropriate paragraph listings following.

APPLICATION FOR TYPE ACCEPTANCE

FCC IDENTIFICATION NUMBER: BQMNH6050E
DATE: MAY 24, 2000
APPLICABLE FCC PARAGRAPH: 2.983
SUB-PARAGRAPH: (f)
PARAGRAPH TITLE: EQUIPMENT IDENTIFICATION PLATE
.....

FCC ID: BQMNH6050E
NH6050E
ACRODYNE INDUSTRIES, INC

APPLICATION FOR TYPE ACCEPTANCE

FCC IDENTIFICATION NUMBER: BQMNH6050E
DATE: MAY 24, 2000
APPLICABLE FCC PARAGRAPH: 2.983
SUB-PARAGRAPH: (g)
PARAGRAPH TITLE: PHOTOGRAPHS

.....

Equipment Identification Label placed here



BQMNH6050E
Television Transmitter
front view

APPLICATION FOR TYPE ACCEPTANCE

FCC IDENTIFICATION NUMBER: BQMNH6050E
DATE: MAY 24, 2000
APPLICABLE FCC PARAGRAPH: 2.983
SUB-PARAGRAPH: (h)
PARAGRAPH TITLE: EBS ATTENTION SIGNAL ENCODER
.....

This section does not apply to the type acceptance requested.

APPLICATION FOR TYPE ACCEPTANCE

FCC IDENTIFICATION NUMBER: **BQMNH6050E**
DATE: **MAY 24, 2000**
APPLICABLE FCC PARAGRAPH: **2.985**
SUB-PARAGRAPH:
PARAGRAPH TITLE: **RF POWER OUTPUT**

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The output power rating of the NH6050E is 5000 watts peak of sync visual. The aural carrier power rating is 500 watts.

The following is a list of equipment used to determine output power.

1. Precision directional coupler integrated into transmitter cabinet.
2. Rohde & Schwarz model NRVS Power Meter.
3. Rohde & Schwarz model FSEA Spectrum Analyzer.

With a sync and blanking only video test signal applied, the visual carrier only power was measured using the power meter. The directional coupler coupling value is fed into the power meter for calibration. The power meter provides a direct readout of power in watts. The meter reading, in watts, is the peak output power rating of the transmitter multiplied by the peak-to-average conversion factor of 0.595. The aural carrier is then applied and the spectrum analyzer is used to establish at minus 10dB aural to visual power ratio.

APPLICATION FOR TYPE ACCEPTANCE

FCC IDENTIFICATION NUMBER:	BQMNH6050E
DATE:	MAY 24, 2000
APPLICABLE FCC PARAGRAPH:	2.987
SUB-PARAGRAPH:	(d)
PARAGRAPH TITLE:	MODULATION CHARACTERISTICS
.....	

The modulation characteristics are addressed in paragraph 74.750(c)(1) and (d)(1).

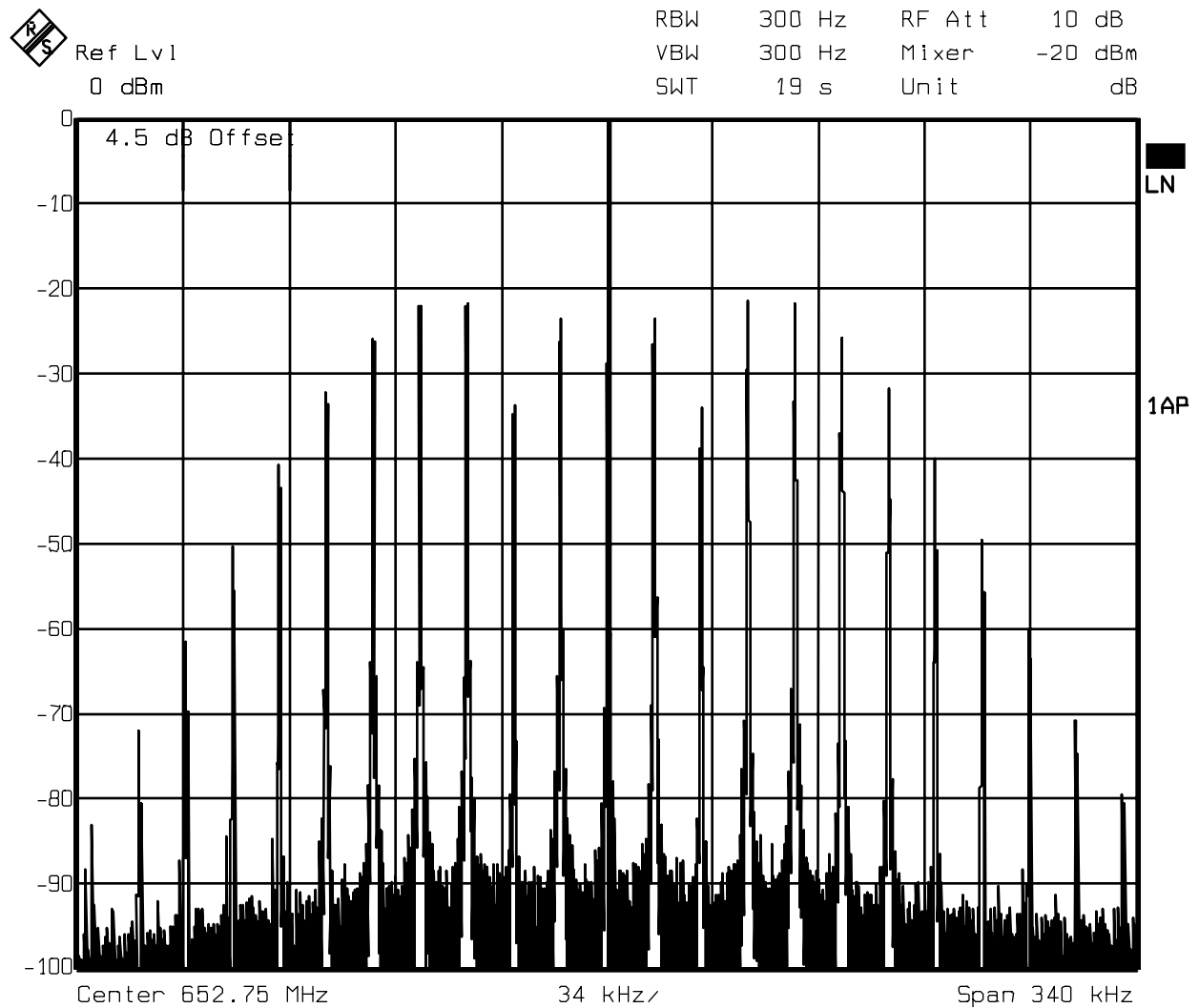
Various photographs showing the basic transmitter linearity are provided.

APPLICATION FOR TYPE ACCEPTANCE

FCC IDENTIFICATION NUMBER: BQMNH6050E
DATE: MAY 24, 2000
APPLICABLE FCC PARAGRAPH: 2.989
SUB-PARAGRAPH: (e)(6)
PARAGRAPH TITLE: OCCUPIED BANDWIDTH

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The photograph shows the occupied bandwidth of the aural carrier modulation at a modulating frequency of 15 kHz at 21.25 kHz deviation.



Date: 30.MAR.00 11:28:48

APPLICATION FOR TYPE ACCEPTANCE

FCC IDENTIFICATION NUMBER: BQMNH6050E
DATE: MAY 24, 2000
APPLICABLE FCC PARAGRAPH: 2.991
SUB-PARAGRAPH:
PARAGRAPH TITLE: SPURIOUS EMISSIONS
.....

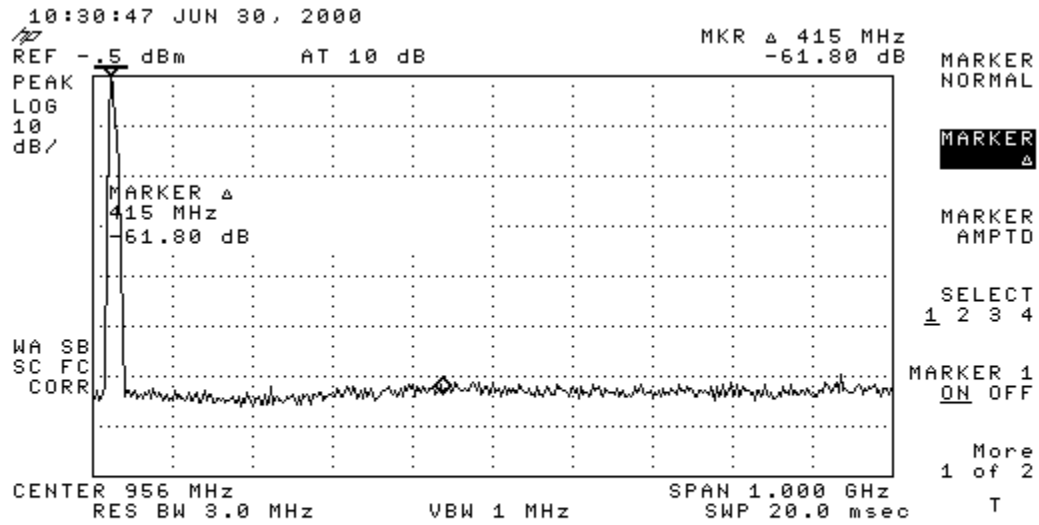
The out-of-band spurious signals measured are listed in the table below. The photographs provided display peak visual power at the top graticule line. Vertical scale factor is 10 dB per major division. A 75% color bar video test signal was used. All other spurious signals were greater than 80 dB below the peak of sync reference.

SPURIOUS EMISSION FREQUENCY MHZ, REL. TO F VISUAL	AMPLITUDE, DB, REL. TO PEAK VISUAL
-9.00	-69
-5.35	-66
-4.50	-64
+9.00	-65

APPLICATION FOR TYPE ACCEPTANCE

FCC IDENTIFICATION NUMBER: BQMNH6050E
DATE: MAY 24, 2000
APPLICABLE FCC PARAGRAPH: 2.991
SUB-PARAGRAPH:
PARAGRAPH TITLE: SPURIOUS EMISSIONS

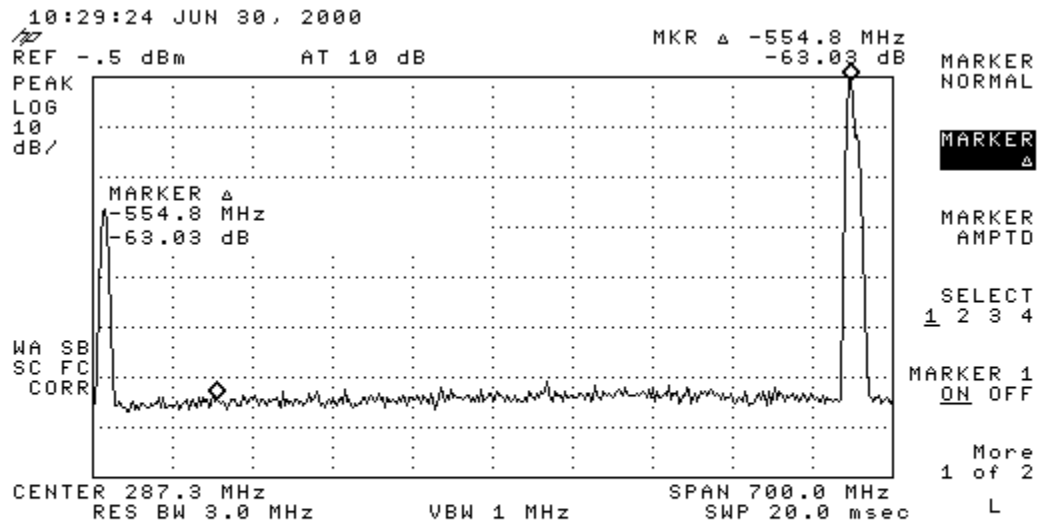
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APPLICATION FOR TYPE ACCEPTANCE

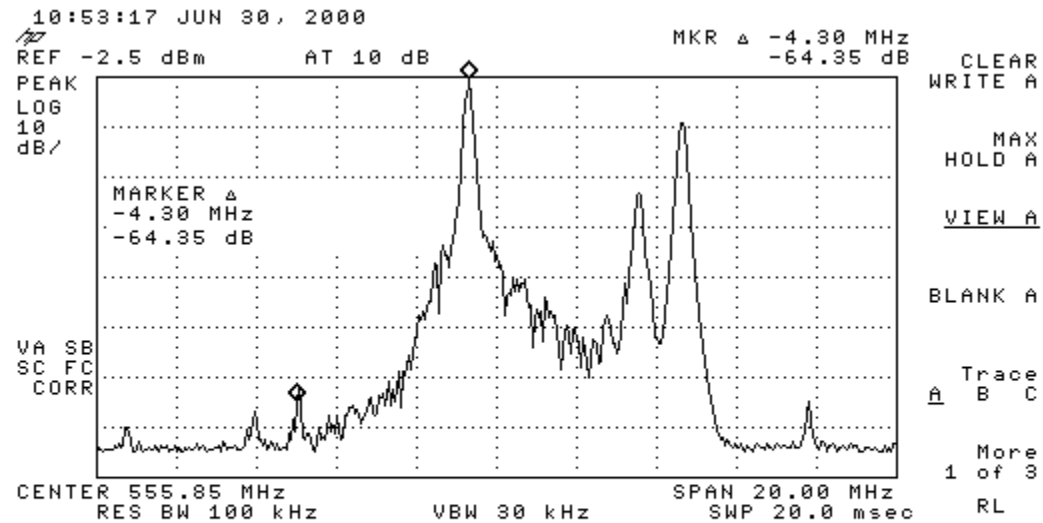
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DATE: MAY 24, 2000
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SUB-PARAGRAPH:
PARAGRAPH TITLE: SPURIOUS EMISSIONS

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APPLICATION FOR TYPE ACCEPTANCE

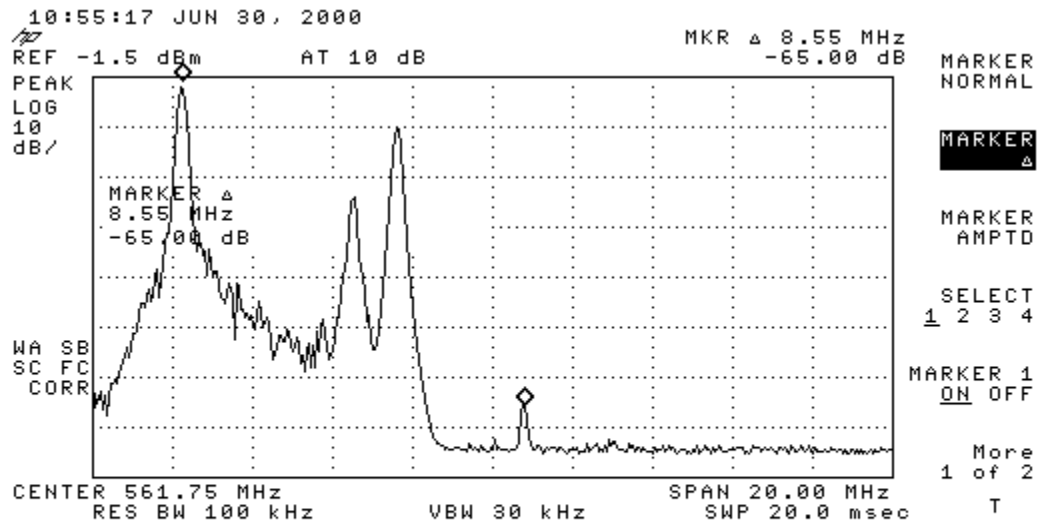
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DATE: MAY 24, 2000
APPLICABLE FCC PARAGRAPH: 2.991
SUB-PARAGRAPH:
PARAGRAPH TITLE: SPURIOUS EMISSIONS



APPLICATION FOR TYPE ACCEPTANCE

FCC IDENTIFICATION NUMBER: BQMNH6050E
DATE: MAY 24, 2000
APPLICABLE FCC PARAGRAPH: 2.991
SUB-PARAGRAPH:
PARAGRAPH TITLE: SPURIOUS EMISSIONS

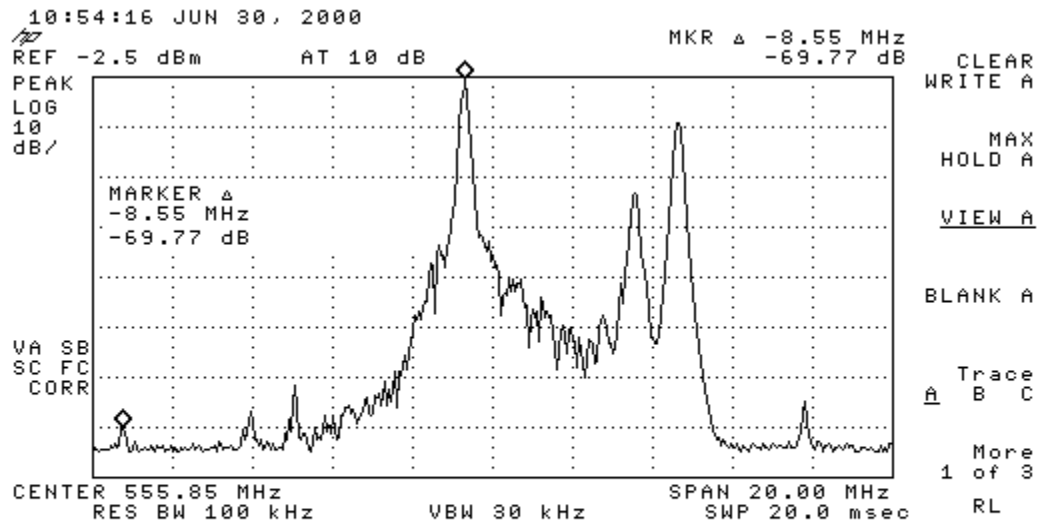
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APPLICATION FOR TYPE ACCEPTANCE

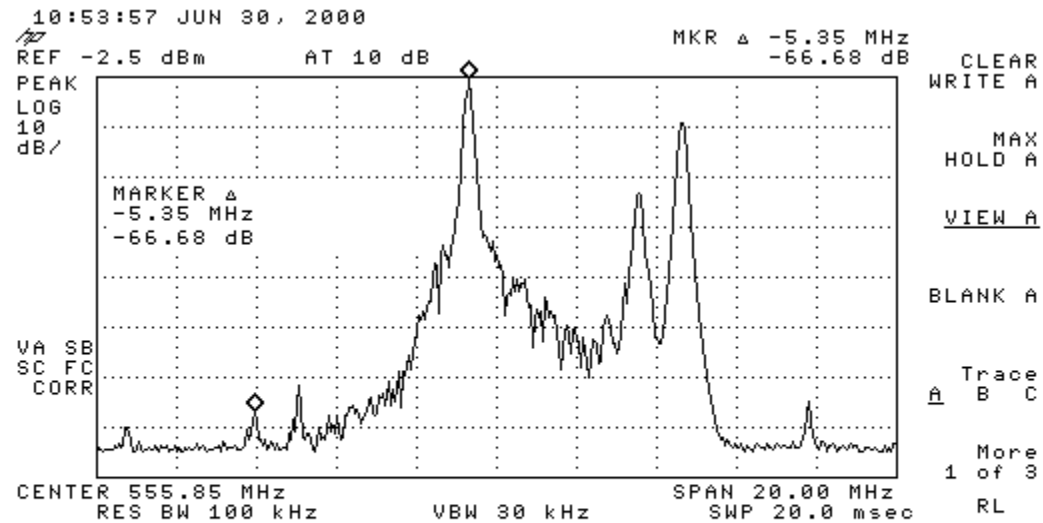
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DATE: MAY 24, 2000
APPLICABLE FCC PARAGRAPH: 2.991
SUB-PARAGRAPH:
PARAGRAPH TITLE: SPURIOUS EMISSIONS

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APPLICATION FOR TYPE ACCEPTANCE

FCC IDENTIFICATION NUMBER: BQMNH6050E
DATE: MAY 24, 2000
APPLICABLE FCC PARAGRAPH: 2.991
SUB-PARAGRAPH:
PARAGRAPH TITLE: SPURIOUS EMISSIONS



APPLICATION FOR TYPE ACCEPTANCE

FCC IDENTIFICATION NUMBER:	BQMNH6050E
DATE:	MAY 24, 2000
APPLICABLE FCC PARAGRAPH:	2.993
SUB-PARAGRAPH:	
PARAGRAPH TITLE:	FIELD STRENGTH OF SPURIOUS EMISSIONS

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Cabinet radiation was checked with the transmitter operating at full rated visual and aural power into a dummy load. A calibrated antenna and spectrum analyzer was used to measure the radiation. The receiving antenna was located approximately three meters from the transmitter cabinet. All emissions were greater than 80dB below 5000 watts.

Power line radiation was checked by lightly coupling a spectrum analyzer to the AC line. No spurious signals attributable to the transmitter were observed. The frequency range from 0.01 to 6.5 GHz was investigated during the preceding test.

APPLICATION FOR TYPE ACCEPTANCE

FCC IDENTIFICATION NUMBER:	BQMNH6050E
DATE:	MAY 24, 2000
APPLICABLE FCC PARAGRAPH:	2.995
SUB-PARAGRAPH:	
PARAGRAPH TITLE:	FREQUENCY STABILITY
.....	

Information pertaining to the frequency stability of the NH6050E is contained in section 74.750 (c) (3) of this application.

APPLICATION FOR TYPE ACCEPTANCE

FCC IDENTIFICATION NUMBER: BQMNH6050E
DATE: MAY 24, 2000
APPLICABLE FCC PARAGRAPH: 2.997
SUB-PARAGRAPH:
PARAGRAPH TITLE: SPECTRUM INVESTIGATION
.....

The information required by this paragraph is covered in section 2.991.

APPLICATION FOR TYPE ACCEPTANCE

FCC IDENTIFICATION NUMBER: **BQMNH6050E**
DATE: **MAY 24, 2000**
APPLICABLE FCC PARAGRAPH: **74.750**
SUB-PARAGRAPH: **(c)(1)**
PARAGRAPH TITLE: **FREQUENCY RESPONSE**
.....

The transmitter for which type acceptance is sought has baseband video as its input. The frequency response of the transmitter is demonstrated in the photographs of section 74.750(d)(1).

The transfer characteristics of the transmitter are demonstrated in the following photographs.

APPLICATION FOR TYPE ACCEPTANCE

FCC IDENTIFICATION NUMBER: **BQMNH6050E**
DATE: **MAY 24, 2000**

APPLICABLE FCC PARAGRAPH: **74.750**
SUB-PARAGRAPH: **(c)(1)**
PARAGRAPH TITLE: **FREQUENCY RESPONSE**
.....

The transmitter for which type acceptance is sought has baseband video as its input. The frequency response of the transmitter is demonstrated in the photographs of section 74.750(d)(1).

The transfer characteristics of the transmitter are demonstrated in the following photographs.

APPLICATION FOR TYPE ACCEPTANCE

FCC IDENTIFICATION NUMBER: **BQMNH6050E**
DATE: **MAY 24, 2000**
APPLICABLE FCC PARAGRAPH: **74.750**
SUB-PARAGRAPH: **(c)(2)**
PARAGRAPH TITLE: **SPURIOUS AND HARMONICS OUTPUTS**
.....

The information required by this section is covered in section 2.991.

APPLICATION FOR TYPE ACCEPTANCE

FCC IDENTIFICATION NUMBER: BQMNH6050E
DATE: MAY 24, 2000
APPLICABLE FCC PARAGRAPH: 74.750
SUB-PARAGRAPH: (c)(3)
PARAGRAPH TITLE: CARRIER FREQUENCY STABILITY
.....

The transmitter visual carrier operating frequency is dependent on the stability of the synthesizer circuitry 10 MHz reference oscillator. The reference oscillator feeds both the visual IF frequency synthesizer and the channel conversion frequency synthesizer. The visual IF and conversion oscillators are thus phase locked to the 10 MHz reference oscillator.

The transmitter aural carrier operating frequency is dependent on the stability of the synthesizer circuitry 10 MHz reference oscillator. The reference oscillator feeds the visual IF frequency synthesizer which is in turn used as the reference for the aural IF modulated oscillator. The aural carrier is thus phase locked to the visual carrier which is phase locked to the 10 MHz reference oscillator.

Reference oscillator frequency stability data is presented on the following page. A regulated dc supply provides power to the oscillator and as a result changes in frequency over the 85% to 115% ac input voltage range are immeasurable.

Maximum 10 MHz reference frequency variation occurred at minus 25 degrees Celsius. The magnitude of the variation was 0.040 parts per million (ppm). 0.040 ppm error calculated at the 45.75 MHz visual IF is 1.83 Hz. 0.040 ppm error calculated at the highest conversion oscillator frequency of 847 MHz is 33.9 Hz. Assuming that the two errors sum to create the largest possible frequency deviation, the total maximum frequency error is 35.7 Hz.

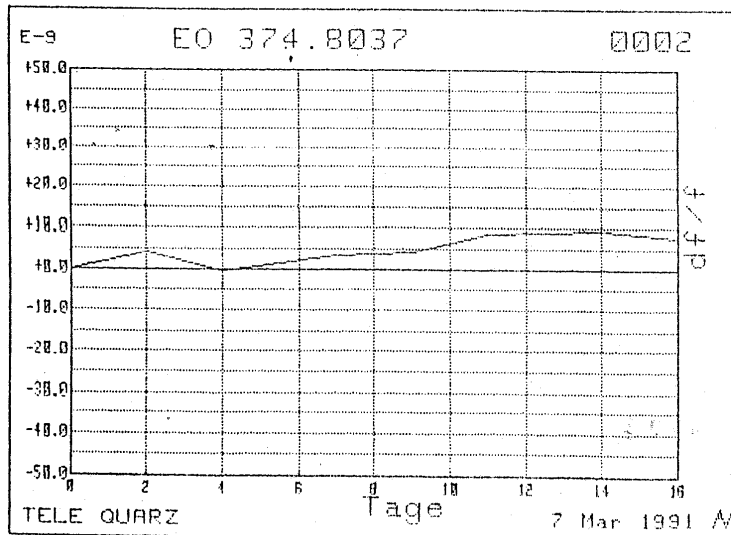
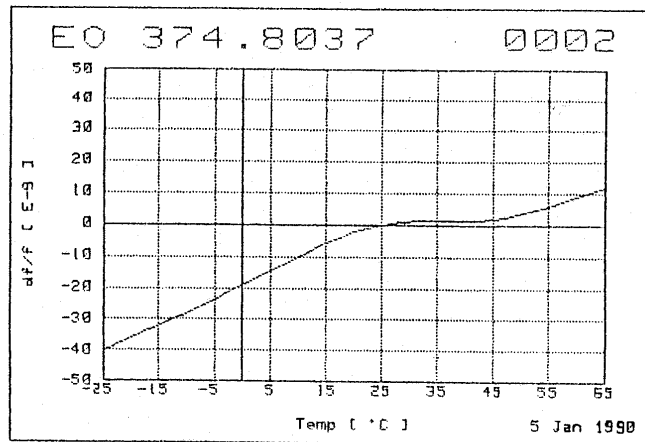
APPLICATION FOR TYPE ACCEPTANCE

FCC IDENTIFICATION NUMBER: BQMNH6050E
DATE: MAY 24, 2000
APPLICABLE FCC PARAGRAPH: 74.750
SUB-PARAGRAPH: (c)(3)
PARAGRAPH TITLE: CARRIER FREQUENCY STABILITY

.....

Measurement:

-25.0 °C	-40.0 E-9
-20.0 °C	-36.0 E-9
-10.0 °C	-28.0 E-9
+10.0 °C	-10.0 E-9
+25.0 °C	+0.0 E-9
+45.0 °C	+2.0 E-9
+65.0 °C	+12.0 E-9



APPLICATION FOR TYPE ACCEPTANCE

FCC IDENTIFICATION NUMBER: BQMNH6050E
DATE: MAY 24, 2000
APPLICABLE FCC PARAGRAPH: 74.750
SUB-PARAGRAPH: (c)(4)
PARAGRAPH TITLE: AGC OPERATION

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The transmitter has as its input signal baseband video. Variation in the amplitude of its input baseband video signal will result a change in the depth of modulation of the visual output signal, but not in peak output power

APPLICATION FOR TYPE ACCEPTANCE

FCC IDENTIFICATION NUMBER: BQMNH6050E
DATE: MAY 24, 2000
APPLICABLE FCC PARAGRAPH: 74.750
SUB-PARAGRAPH: (c)(5)
PARAGRAPH TITLE: AUTOMATIC ON/OFF OPERATION
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Automatic on/off operation is accomplished by sensing the presence of video applied to the transmitter. The video fault that is generated by the loss of video controls a relay which causes the removal of RF drive within the Exciter section.

APPLICATION FOR TYPE ACCEPTANCE

FCC IDENTIFICATION NUMBER: BQMNH6050E
DATE: MAY 24, 2000
APPLICABLE FCC PARAGRAPH: 74.750
SUB-PARAGRAPH: (c)(6)
PARAGRAPH TITLE: POWER TUBE (DEVICE) RATING
.....

The final output stage of the NH6050E consists of multiple amplifier modules operating in parallel. A copy of the transistor device data sheet is included as a separate document.

APPLICATION FOR TYPE ACCEPTANCE

FCC IDENTIFICATION NUMBER: **BQMNH6050E**
DATE: **MAY 24, 2000**
APPLICABLE FCC PARAGRAPH: **74.750**
SUB-PARAGRAPH: **(c)(7)**
PARAGRAPH TITLE: **AUTOMATIC STATION IDENTIFICATION**
.....

Station identification of the NH6050E is accomplished by amplitude modulating the aural FM carrier. A modulating tone frequency of 500 Hz is used. The output from the 500 Hz oscillator is fed to a trap tuned to the aural intermediate frequency which causes 40 % modulation of the carrier. The oscillator is controlled by a solid state encoder which repeats the proper code sequence every 20 minutes. The stations call sign is transmitted twice every time the encoder is activated.

APPLICATION FOR TYPE ACCEPTANCE

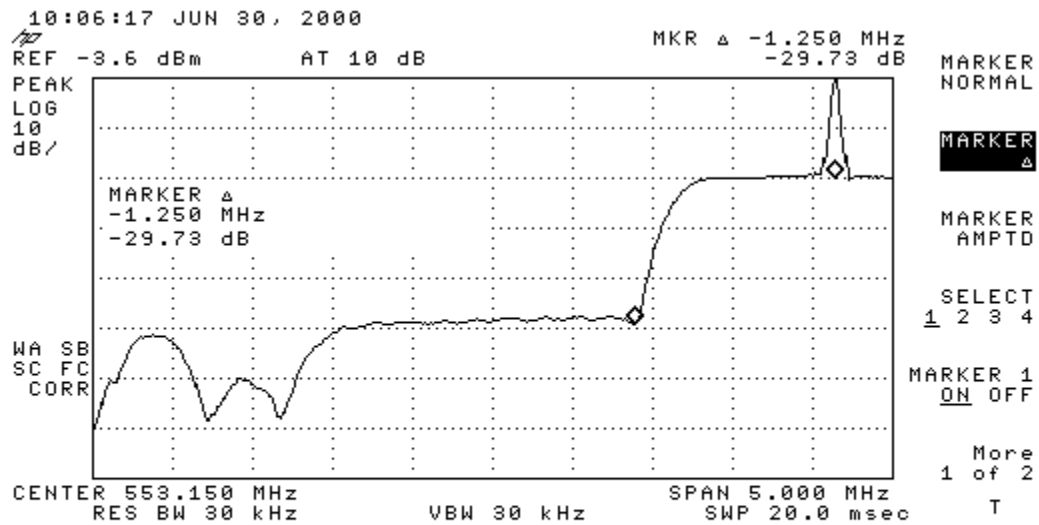
FCC IDENTIFICATION NUMBER: BQMNH6050E
DATE: MAY 24, 2000
APPLICABLE FCC PARAGRAPH: 74.750
SUB-PARAGRAPH: (c)(8)
PARAGRAPH TITLE: WIRING AND SHIELDING
.....

The NH6050E is wired in accordance with good electrical and mechanical engineering practice. The entire unit is self contained in a cabinet 25 inches wide by 47 inches deep that is completely enclosed.

APPLICATION FOR TYPE ACCEPTANCE

FCC IDENTIFICATION NUMBER: BQMNH6050E
DATE: MAY 24, 2000
APPLICABLE FCC PARAGRAPH: 74.750
SUB-PARAGRAPH: (d)(1)
PARAGRAPH TITLE: VISUAL TRANSMITTER
.....

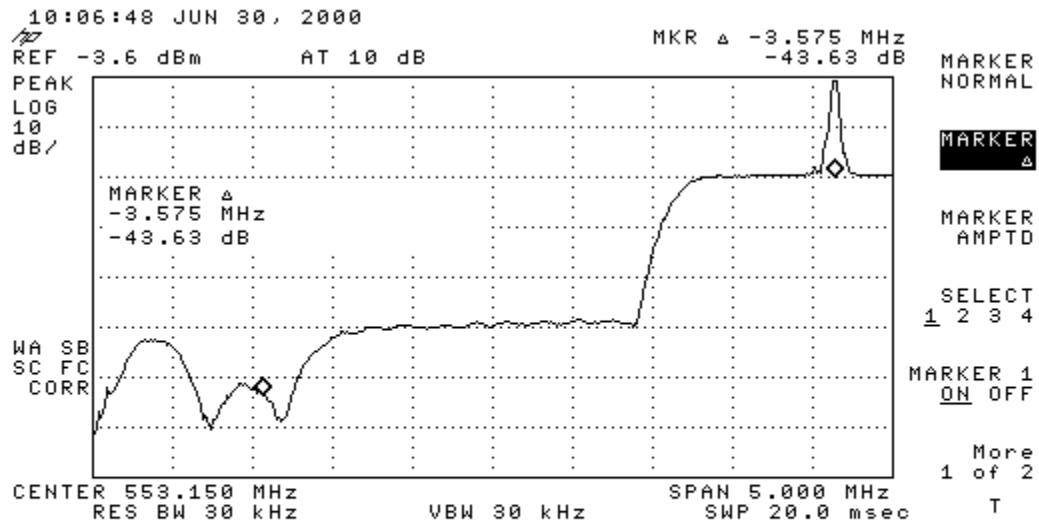
The following photographs show the in-channel visual modulation characteristics as produced at the output of the transmitter operating at 5000 watts peak of sync.



APPLICATION FOR TYPE ACCEPTANCE

FCC IDENTIFICATION NUMBER: BQMNH6050E
DATE: MAY 24, 2000
APPLICABLE FCC PARAGRAPH: 74.750
SUB-PARAGRAPH: (d)(1)
PARAGRAPH TITLE: VISUAL TRANSMITTER
.....

The following photographs show the in-channel visual modulation characteristics as produced at the output of the transmitter operating at 5000 watts peak of sync.

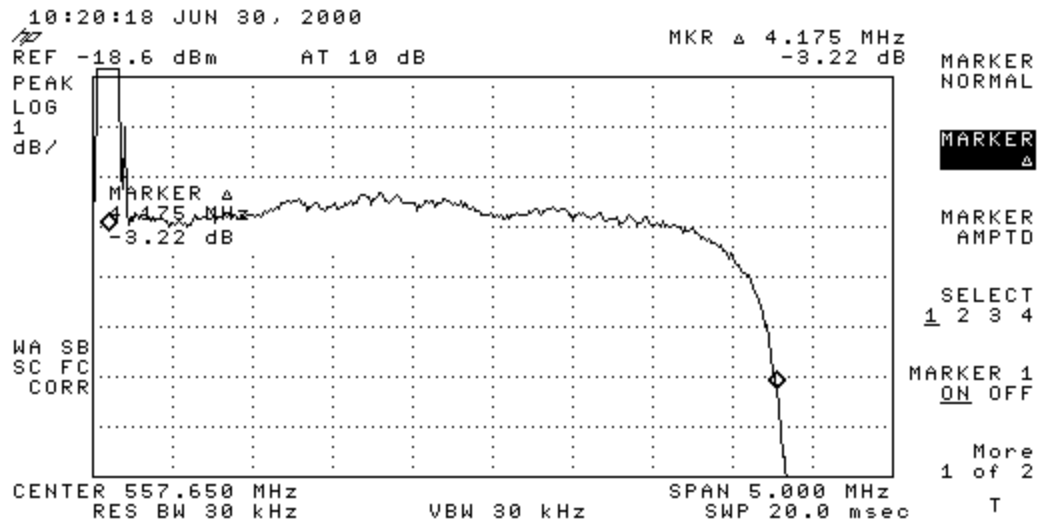


APPLICATION FOR TYPE ACCEPTANCE

FCC IDENTIFICATION NUMBER: BQMNH6050E
DATE: MAY 24, 2000
APPLICABLE FCC PARAGRAPH: 74.750
SUB-PARAGRAPH: (d)(1)
PARAGRAPH TITLE: VISUAL TRANSMITTER

.....

The following photographs show the in-channel visual modulation characteristics as produced at the output of the transmitter operating at 5000 watts peak of sync.

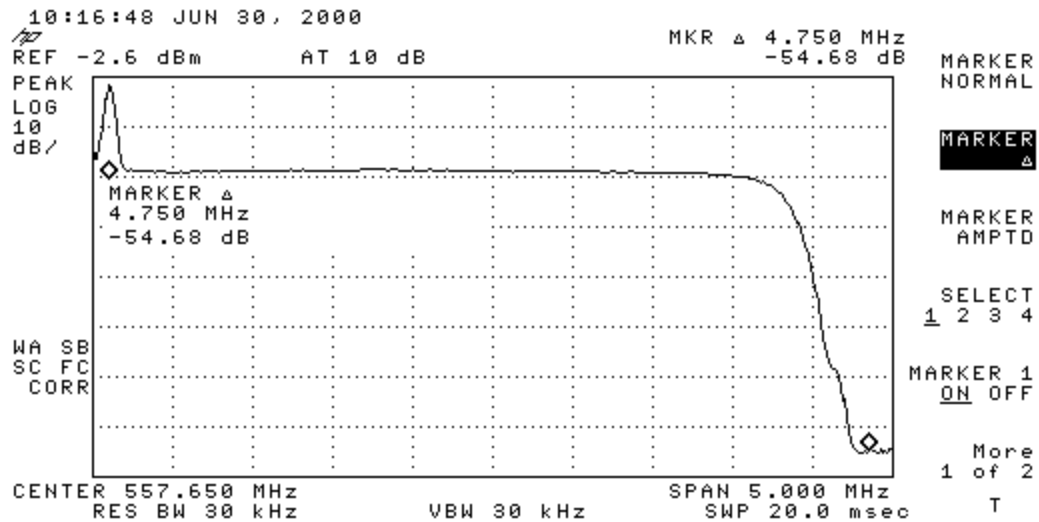


APPLICATION FOR TYPE ACCEPTANCE

FCC IDENTIFICATION NUMBER: BQMNH6050E
DATE: MAY 24, 2000
APPLICABLE FCC PARAGRAPH: 74.750
SUB-PARAGRAPH: (d)(1)
PARAGRAPH TITLE: VISUAL TRANSMITTER

.....

The following photographs show the in-channel visual modulation characteristics as produced at the output of the transmitter operating at 5000 watts peak of sync.

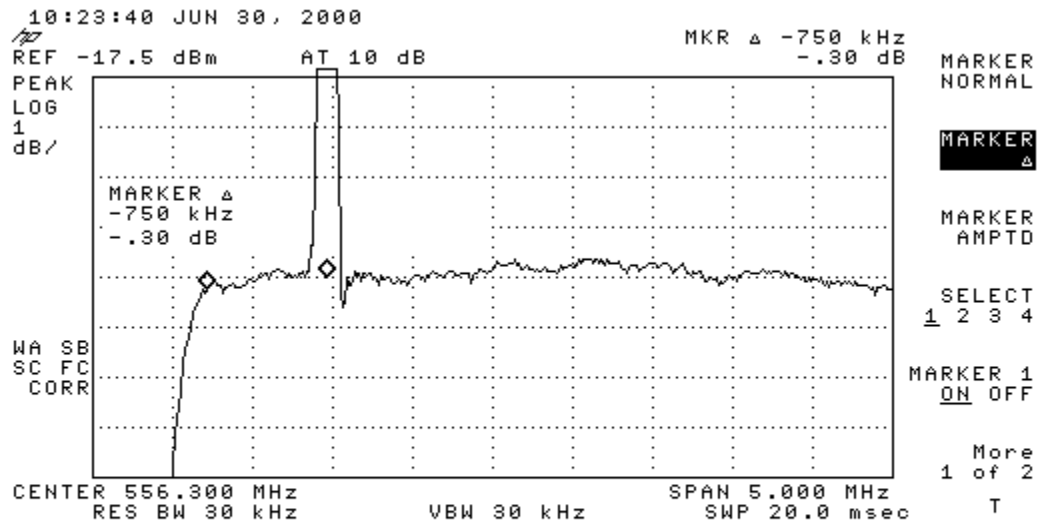


APPLICATION FOR TYPE ACCEPTANCE

FCC IDENTIFICATION NUMBER: BQMNH6050E
DATE: MAY 24, 2000
APPLICABLE FCC PARAGRAPH: 74.750
SUB-PARAGRAPH: (d)(1)
PARAGRAPH TITLE: VISUAL TRANSMITTER

.....

The following photographs show the in-channel visual modulation characteristics as produced at the output of the transmitter operating at 5000 watts peak of sync.



APPLICATION FOR TYPE ACCEPTANCE

FCC IDENTIFICATION NUMBER: BQMNH6050E
DATE: MAY 24, 2000
APPLICABLE FCC PARAGRAPH: 74.750
SUB-PARAGRAPH: (d)(1)
PARAGRAPH TITLE: VISUAL TRANSMITTER
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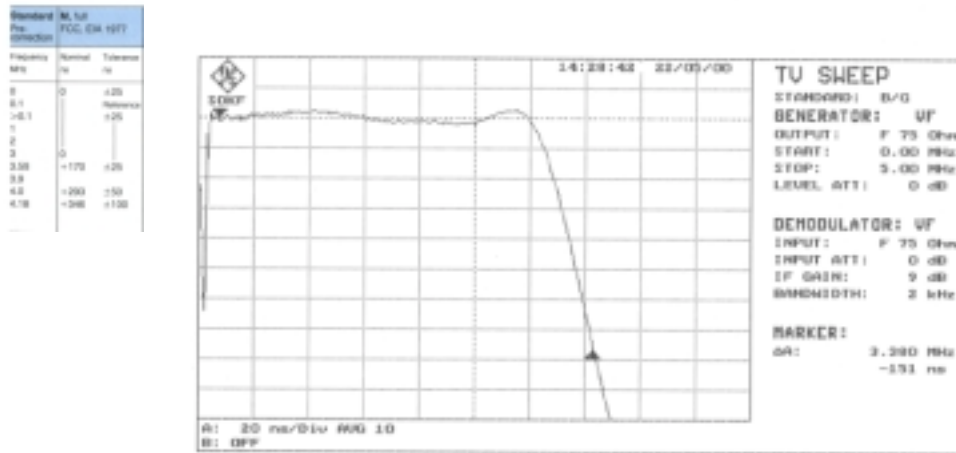
The following page shows the envelope delay characteristic of the transmitter.

APPLICATION FOR TYPE ACCEPTANCE

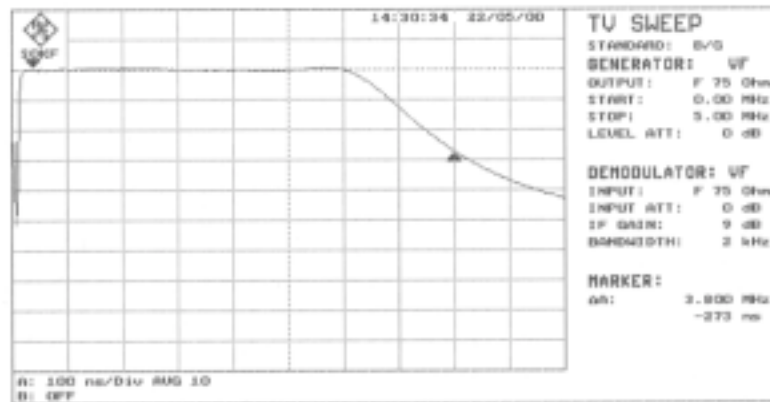
FCC IDENTIFICATION NUMBER: BQMNH6050E
DATE: MAY 24, 2000
APPLICABLE FCC PARAGRAPH: 74.750
SUB-PARAGRAPH: (d)(1)
PARAGRAPH TITLE: VISUAL TRANSMITTER

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The following displays the envelope delay characteristic of the transmitter.



Receiver-Precorrection 20ns/Div. Marker 3.58 MHz / -151 ns



Receiver-Precorrection 100ns/Div. Marker 4 MHz / -272 ns

APPLICATION FOR TYPE ACCEPTANCE

FCC IDENTIFICATION NUMBER:	BQMNH6050E
DATE:	MAY 24, 2000
APPLICABLE FCC PARAGRAPH:	74.750
SUB-PARAGRAPH:	(d)(2)
PARAGRAPH TITLE:	AURAL TRANSMITTER
.....	

The aural IF carrier frequency is phase locked to the visual IF carrier frequency within the exciter section.