APPLICATION FOR FCC CERTIFICATION

BZ5MX1UX
HETERODYNE PROCESSOR INPUT
1 WATT UHF TRANSLATOR

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This application requests authorization for video/audio input to our 1 Watt UHF Translator, BZ5MX1UX (Certification applied for). The amplifier will be driven directly by a color television heterodyne processor.

The intended use of the BZ5MX1UX is to rebroadcast a television translator relay station or other legal source of video and audio.

A paragraph by paragraph reference is given herein, presenting the required additional data to that called for on FCC Form 731 for FCC Certification of BZ5MX1UX 1 Watt UHF Translator. Exhibits are attached to authenticate this application. If further data is required, it will be furnished on request.

The unit tested specifically for this application was operated on Channel 50. This channel was chosen to provide protection to and from existing radio services, and to facilitate the measurement of possible spurious products conducted or radiated from the 1 Watt UHF Translator.

The results noted here are "worse case" unless otherwise noted. The input signals used in the tests were generated by a color bar generator driving a Cadco Heterodyne Processor which is typically the processor used. However, due to varying customer requirements, other heterodyne processors are available on customer request. The published specification on any heterodyne processor used in this equipment will meet or exceed FCC specifications. The output of the 1 Watt UHF Translator was properly terminated with a resistive type RF load.

2.1033(b)(1): Applicant is the manufacturer of the equipment. See FCC Form 731
2.1033(b)(2): See FCC Form 731
2.1033(b)(3): Exhibit 2 (1W UHF Instruction Manual, Cadco P379 Operating Manual)
2.1033(b)(4): Exhibit 7 (Active Devices and Function List)
2.1033(b)(5,6,7): See also, the paragraph by paragraph summary of compliance with Part 74, Sub-part G of the FCC Commission Rules that follow.

PART 74.750(c)(1):
The frequency stability of this equipment as measured per Part 2.1055 of the rules is much better than required over the specified range of the input voltage and temperature.

The test equipment was set as shown in Exhibit 3. The translator was swept with a CW signal equivalent to 1 watt peak sync. The AGC circuit was defeated to facilitate the measurement. Three different input signal levels, (1000uV +15dB, 1000uV, 1000uV –15db), were introduced. The gain of the AGC amplifier was adjusted to 1 watt to demonstrate the output bandpass under different input signal conditions. Exhibits 6a, 6b, and 6c, are photos of the frequency response displayed on the oscilloscope. They show the bandpass to be flat ±1.5dB with no substantial change due to the input signal levels.

PART 74.761(a):
The frequency stability of the visual carrier is totally dependent upon the heterodyne processor. Exhibits 4a and 4b document the measurements made, including method and equipment. Processor output frequency can be, and is normally set to zero deviation at the output channel.

As shown in Exhibit 4a, the typical characteristic variation due to temperature is less than +.02%. This is true for all heterodyne processor channels.

PART 74.750(c)(2):
With the translator set up as in Exhibit 3 with a normal Channel 13 TV input signal, the following products, more that 2MHz from the channel edges, were measured at the output terminal relative to 1 watt peak sync.

FREQUENCY(MHz)	SOURCE	LEVEL MEASURED(dB)
1374.50	2ND HARMONIC	-68
700.75	Aural +9.0MHz	>-70
696.25	Aural +4.5MHz	>-70
682.75	Visual –4.5MHz	-68
678.25	Visual –9.0MHz	>-70

Observations were made on a properly operating translator Channel 13 to Channel 60 using a Hewlett-Packard 8591E Spectrum Analyzer with a cut to frequency dipole antenna at 10 meters from the translator and rotated to detect maximum radiation. The following signals were present:

		SPECIFICATION	
FREQUENCY(MHz)	SOURCE	LIMIT uV	MEASURED uV
1374.50	2nd Harmonic	700	50
733.00	LO	238133	10

Radiation from the heterodyne processor was nil. No spurious products could be detected at 10 meters that were less than 90dB down.

Antenna terminal measurements with the 8591E Spectrum Analyzer showed no change due to the heterodyne processor since the power amplifier stages are not affected by this modulation.

The above tests were performed using the same equipment hook up and methods described in Exhibit 3a. The translator test data compiled for this application was Channel 15 to Channel 60. Translator operating with a standard video test signal input (modulated stair step and color burst) and a modulated audio carrier at –10dB of peak visual. Results are typical of performance on all channels.

PART 74.750(c)(3)(I):
Variations of input voltage +15% (reference +24VDC or 120VAC) during the temperature tests resulted in no discernible frequency variation traceable to the power supply. This is reasonable due to the heterodyne processor’s internal regulation.

PART 74.750(c)(4):
With the equipment set as described in Exhibit 3, a CW signal at the visual carrier frequency was substituted for the normal input signal. After setting the translator output to 1 watt, the input signal was varied. Refer to Exhibits 6a, 6b, 6c. The output power may be set at 100% for any

average input signal (500uV to 5000uV recommended) with fear that the input signal change would result in the output power exceeding 100% at some point. The output will always track, even when the input level is far above or below recommended levels.

PART 74.750(c)(5):
This equipment meets all the requirements for unattended operation. A description of the automatic control circuitry can be found in Exhibit 2a.

PART 74.750(c)(6):
Measurements can be taken while the equipment is in operation. Normal operating constants of the power output stage average +24 volts at 0.85 amps.

PART 74.750(c)(7) AND PART 74.783(a)(2):
Station identification requirements will be supplied by the originating station.

PART 74.750(c)(8):
Wiring, shielding and construction are in accordance with accepted principles of good engineering practice. Apparatus is constructed on an aluminum chassis suitably protected to resist corrosion. Circuits are properly by-passed and RF shielded as appropriate. Power circuits are fused and overload protected by automatic shutdown.

PART 74.750(d)(1):
This equipment meets the requirements of Part 73.687(a)(1) and Part 73.687(b)(3) at the final RF output terminal.

It is anticipated that the translator will be driven directly by the demodulator output of an FM microwave repeater. No provision is made for tampering with or adjusting the composite video or audio signal, except depth of video modulation. Therefore, all aspects of the input video signal (Transmission Standard 73.682 and 73.687) are determined solely by the originating television station. This performance data has been obtained with an NTSC signal generator that produces standard video test signals. See Exhibits 10a, 10b, 10c and 10d.

Exhibit 10 shows photographs of various video test waveforms as seen on the translator, demonstrating that the transmitted waveform is substantially identical to the input. The typical envelope delay response of the heterodyne processor as required in Part 73.687(a)(5) will be made on each unit manufactured to ensure that readings meet the FCC specifications. The additional group delay in the translator is negligible. The test equipment and set-up used is described in Exhibit 3. Tabulated data is shown in Exhibit 11a and graphed in Exhibit 11b.

The graphs of Exhibit 10 show linearity of the translator between reference black and white levels.

PART 74.750(d)(2):
The heterodyne processor of this translator will accept audio from the television translator relay station. Frequency spacing, deviation, and other characteristics including distortion are therefore determined solely by the originating television station.

The sound carrier deviation was monitored while the frequency vs. temperature measurements were taken, see Exhibit 4a. The equipment meets the $\pm$ 1kHz requirement.

APPLICATION FOR FCC CERTIFICATION
BZ5MX1UX
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EXHIBIT 3

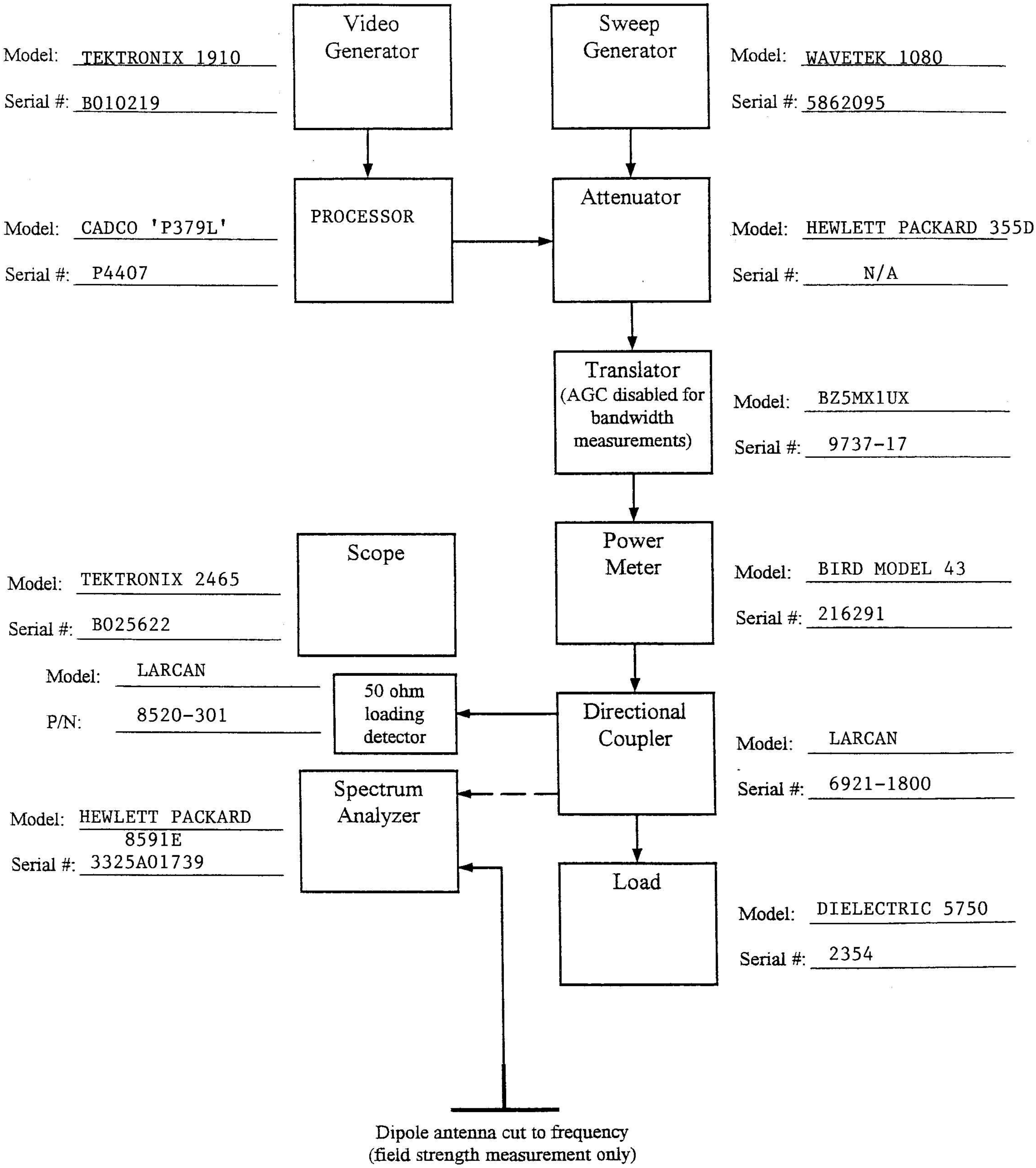

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EXHIBIT 4a

FREQUENCY DRIFT VS. TEMPERATURE
P379 HETERODYNE PROCESSOR

DEGREES C	MEASURED LO FREQUENCY(Hz)	DEVIATION(Hz)	DEVIATION(%)
+50	747,251,102	1802	0.000241
+40	747,250,350	1050	0.000141
+30	747,249,830	530	0.000071
+25	747,249,300	0	0.000000
+20	747,249,277	-23	-0.000003
+10	747,249,165	-135	-0.000018
00	747,249,135	-165	-0.000022
-10	747,248,220	-1080	-0.000145
-20	747,247,500	-1800	-0.000241
-30	747,243,800	-5500	-0.000736

APPLICATION FOR FCC CERTIFICATION
BZ5MX1UX
HETERODYNE PROCESSOR INPUT
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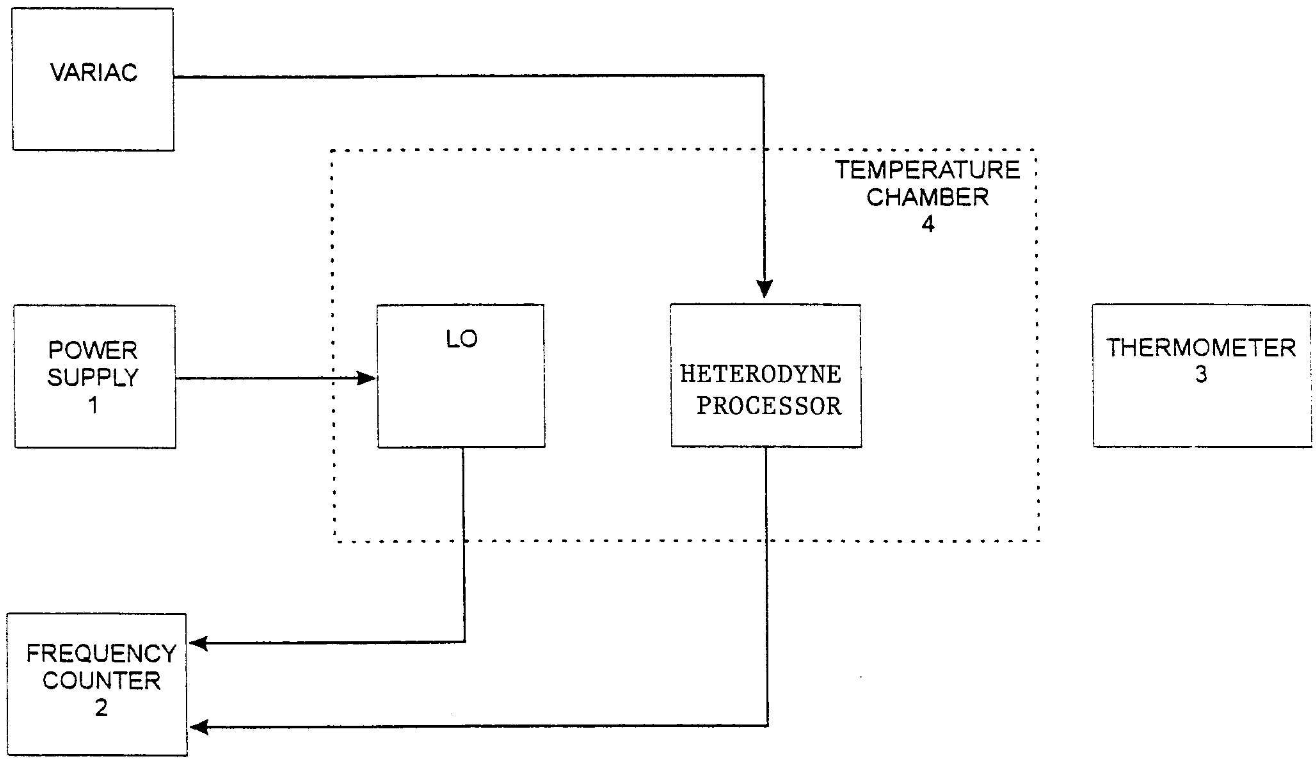
EXHIBIT 4b



NOTES AND EQUIPMENT LIST

1. POWER SUPPLY - HP6012A - SERIAL NUMBER 2329A-02181
2. FREQUENCY COUNTER - HP5334B - SERIAL NUMBER 2937A05503
3. THERMOMETER - FLUKE 77/80T-150U
4. THERMOSTATICALLY CONTROLLED TEMPERATURE CHAMBER, ASSOCIATED

APPLICATION FOR FCC CERTIFICATION
BZ5MX1UX
HETERODYNE PROCESSOR INPUT
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EXHIBIT 5

TABULATED AGC DATA

INPUT LEVEL(dB)	RELATIVE OUTPUT dB=100% OUTPUT POWER
-15	-0.1
-10	-0.1
-5	0
500uV=0dB	0.0
+5	0
+10	0
+15	0
+20	-0.1
-15	0
-10	0
-5	0
1000uV=0dB	0.0
+5	0
+10	0
+15	0
+20	-0.1
+25	-0.1
-15	0
-10	0
-5	0
5000uV=0dB	0.0
+5	0
+10	0
+15	-0.1
+20	-0.1

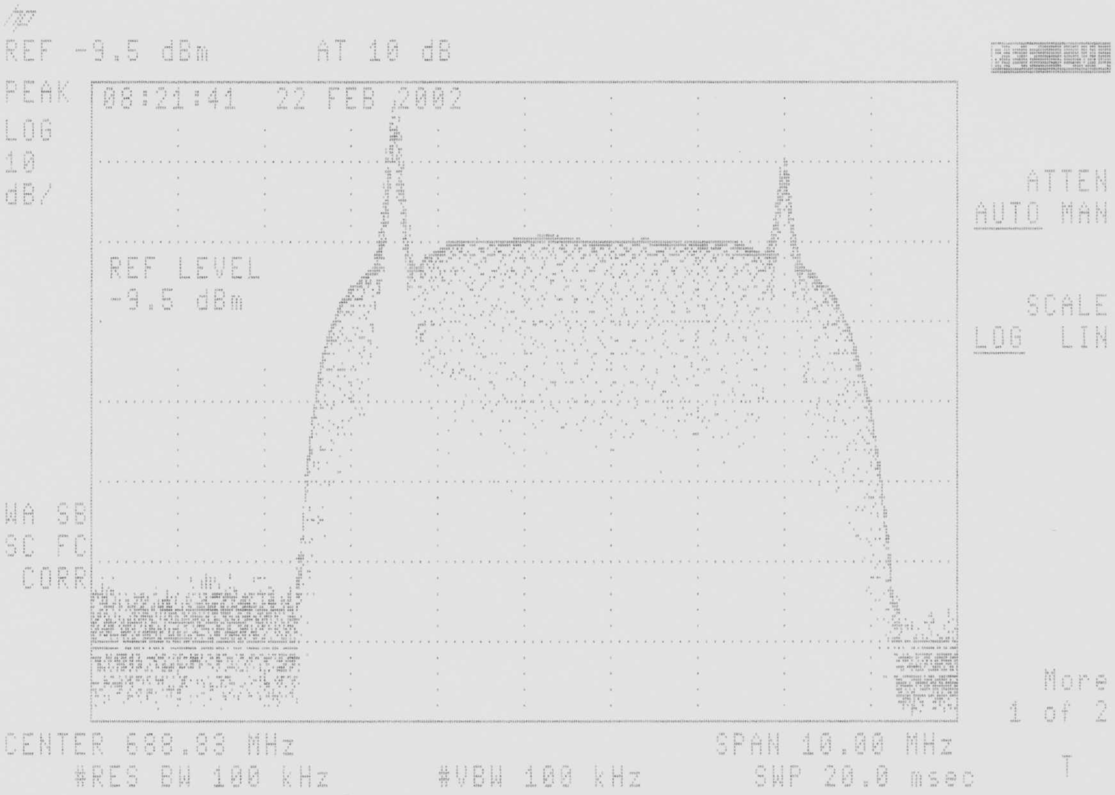
APPLICATION FOR FCC CERTIFICATION
BZ5MX1UX
HETERODYNE PROCESSOR INPUT
1 WATT UHF TRANSLATOR

EXHIBIT 6a

APPLICATION FOR FCC CERTIFICATION
BZ5MX1UX
HETERODYNE PROCESSOR INPUT
1 WATT UHF TRANSLATOR

EXHIBIT 6b

EXHIBIT 6c



APPLICATION FOR FCC CERTIFICATION
BZ5MX1UX
HETERODYNE PROCESSOR INPUT
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EXHIBIT 7

ACTIVE DEVICES AND FUNCTION LIST

MODULE: AMPLIFIER ASSEMBLY #40D2180G2

DEVICE	TYPE	FUNCTION
Q1, Q2	MRF181S	Power Mosfet

MODULE: INTERMEDIATE POWER AMPLIFIER #21B1334G1

DEVICE	TYPE	FUNCTION
HY1,HY2	1F1304-3	Hybrid Coupler
Q1, Q2	MRF181S	Power Mosfet
Q3	MMBT2907	Small Signal Transistor
U1	MC1723	Positive Voltage Regulator

MODULE: PHASE SHIFTER #10A1453G7

DEVICE	TYPE	FUNCTION
U2	MHW9182	Hybrid Amplifier

MODULE: METERING BOARD #20B1235G5

DEVICE	TYPE	FUNCTION
Q1	MPS8598	Amplifier
U1	LM358N	Operational Amplifier
VR1	78L12	Positive Voltage Regulator

APPLICATION FOR FCC CERTIFICATION
BZ5MX1UX
HETERODYNE PROCESSOR INPUT
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EXHIBIT 8

FCC IDENTIFICATION LABEL

APPLICATION FOR FCC CERTIFICATION
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HETERODYNE PROCESSOR INPUT
1 WATT UHF TRANSLATOR

EXHIBIT 9

Power requirements for the 1 Watt UHF Translator were determined as follows:

1. The translator's visual power meter measures the peak visual power by reading the average levels of a detected sample of the output. The meter is calibrated by multiplying the above visual power reading by 168%. The visual metering circuitry has a negligible response to the aural power due to the large (>10MHz) detector bandwidth. When the detector bandwidth is this large, the detector does not peak detect the intercarrier beat product.

2. The aural power is measured by reading the peak level of the detected 4.5MHz intercarrier product. The level of this product has a direct correspondence to the aural power and is independent of the visual power as long as the peak visual power exceeds the aural power. This is always true for normal operation.

BZ5MX1UX
POWER MEASUREMENTS

MEASURED VISUAL POWER NOTE 1	MEASURED AURAL POWER NOTE 2	SUPPLY CURRENT TO OUTPUT DEVICES VISUAL ONLY NOTE 3	SUPPLY CURRENT TO OUTPUT DEVICES VISUAL & AURAL NOTE 3
.595 WATTS	.100 WATTS	0.85 AMPS	0.85 AMPS

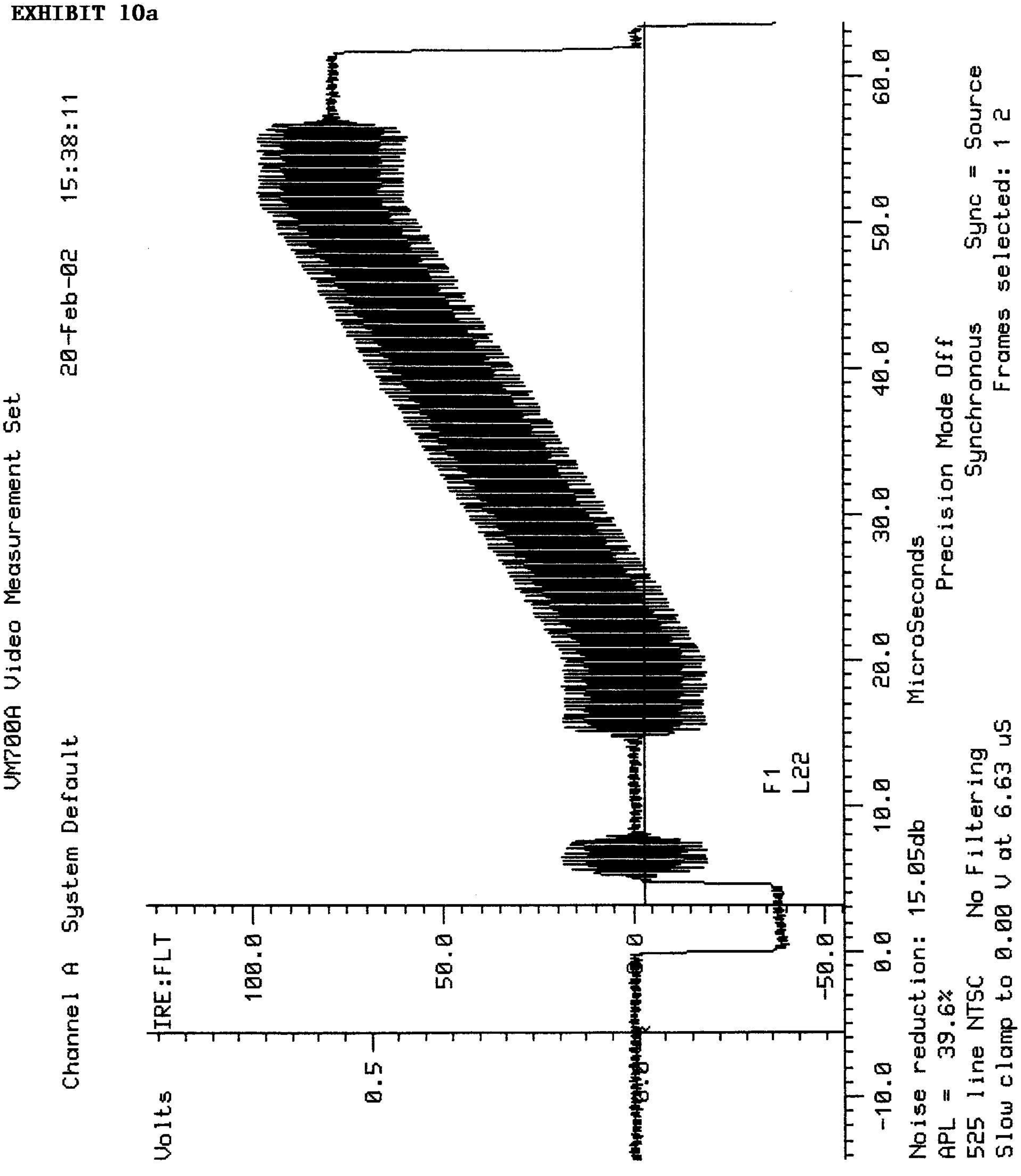
NOTE 1: Measured on the Model 43 Bird Wattmeter with the visual carrier modulated by the standard synchronizing signal at 75% of peak amplitude and the aural carrier disabled.

NOTE 2: Measured on the Model 43 Bird Wattmeter with the visual carrier disabled.

NOTE 3: The voltage across the output devices on all models is +24 volts. The output devices are operated Class A.

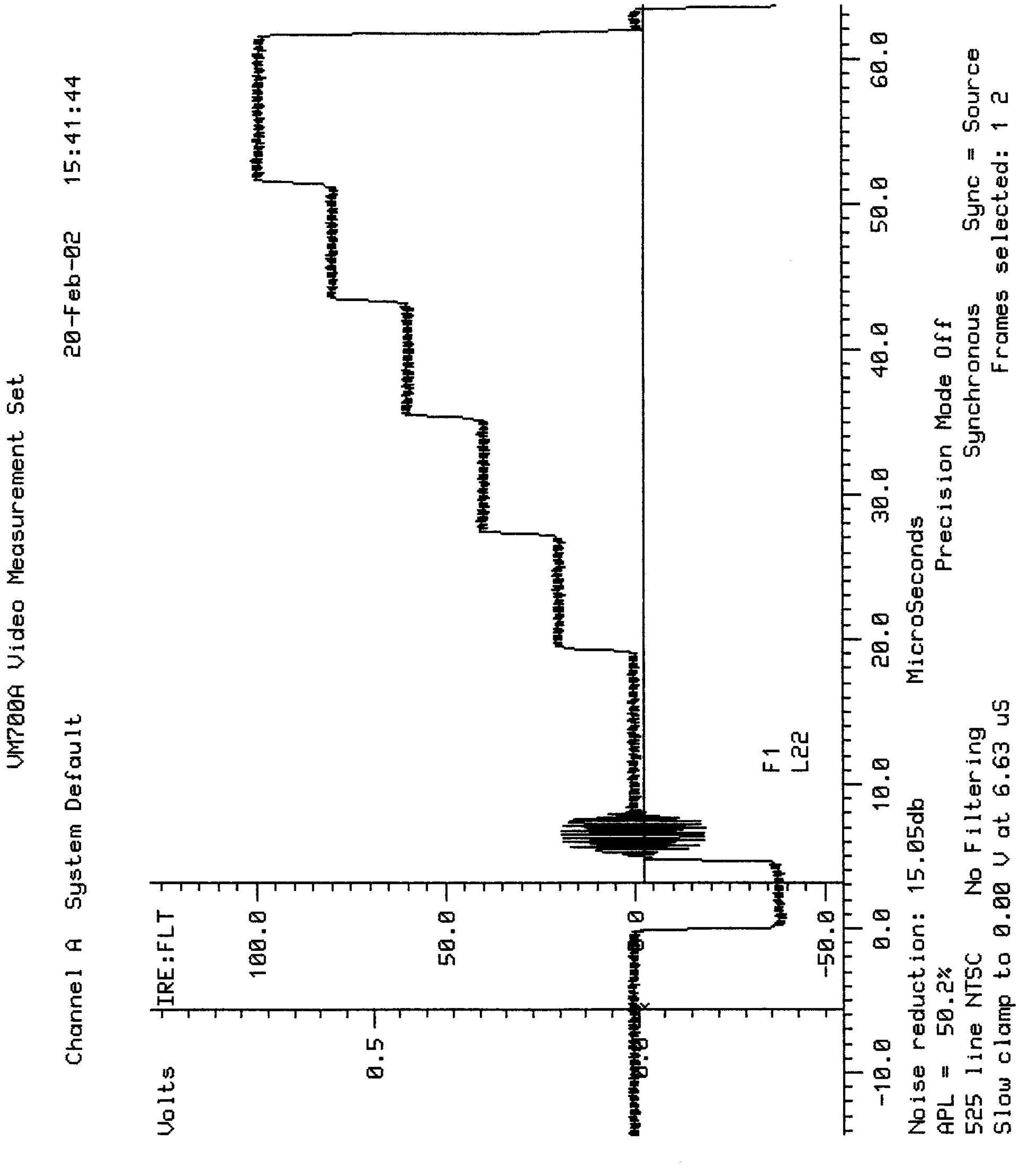
APPLICATION FOR FCC CERTIFICATION
BZ5MX1UX
HETERODYNE PROCESSOR INPUT
1 WATT UHF TRANSLATOR

EXHIBIT 10a



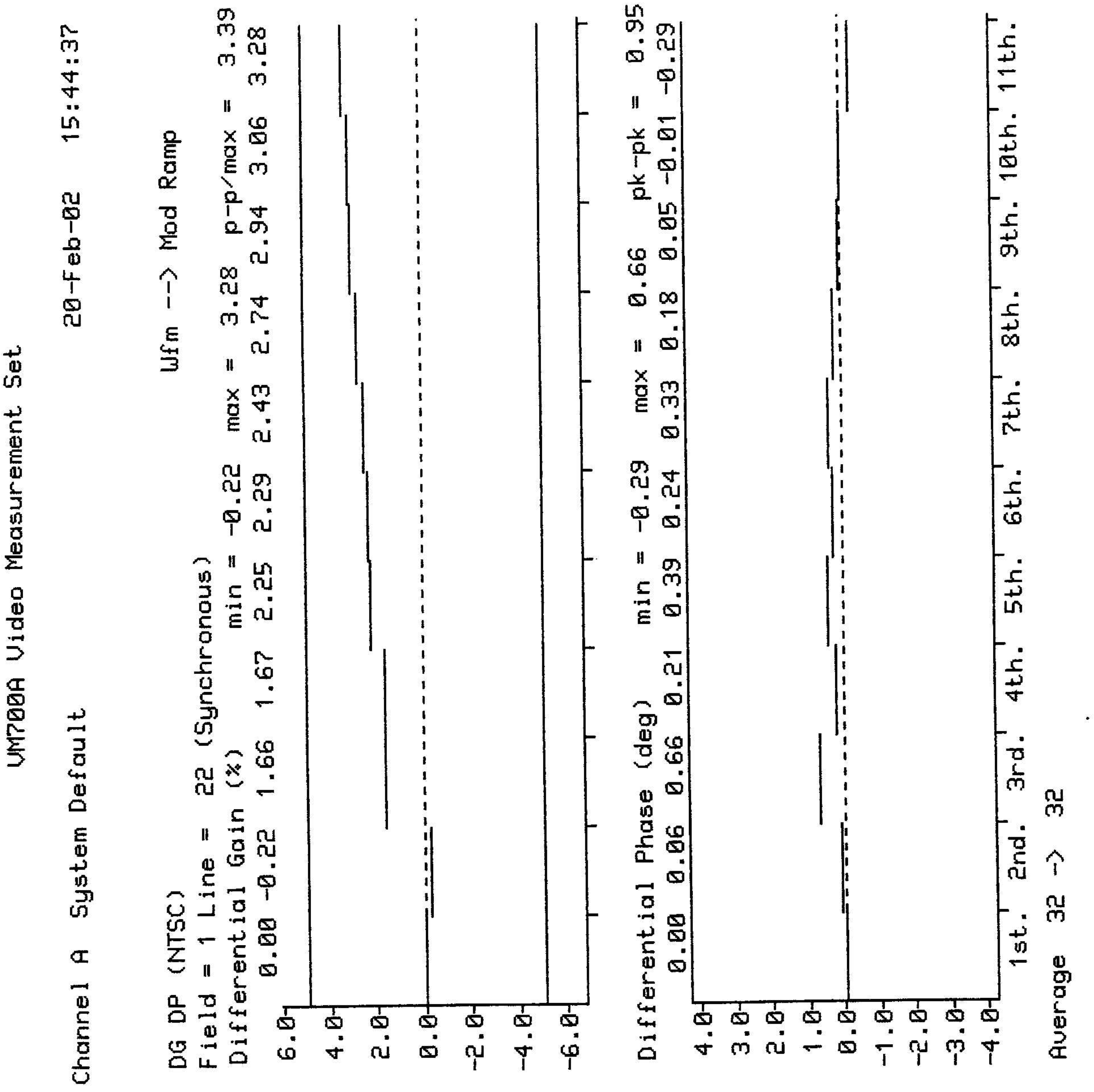
APPLICATION FOR FCC CERTIFICATION
BZ5MX1UX
HETERODYNE PROCESSOR INPUT
1 WATT UHF TRANSLATOR

EXHIBIT 10b



APPLICATION FOR FCC CERTIFICATION
BZ5MX1UX
HETERODYNE PROCESSOR INPUT
1 WATT UHF TRANSLATOR

EXHIBIT 10c **EXHIBIT 10d**



APPLICATION FOR FCC CERTIFICATION
BZ5MX1UX
HETERODYNE PROCESSOR INPUT
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EXHIBIT 11a

OVERALL GROUP DELAY

FREQUENCY(MHz)	OVERALL DELAY (nS)
0.20	0 (Reference)
0.40	0
0.60	+20
0.80	+10
1.00	+10
1.20	+20
1.40	+40
1.60	0
1.80	+10
2.00	+20
2.20	+10
2.40	+20
2.60	+20
2.80	+20
3.00	-10
3.20	-10
3.40	-120
3.58	-140
3.80	-220
4.00	-280
4.18	-300

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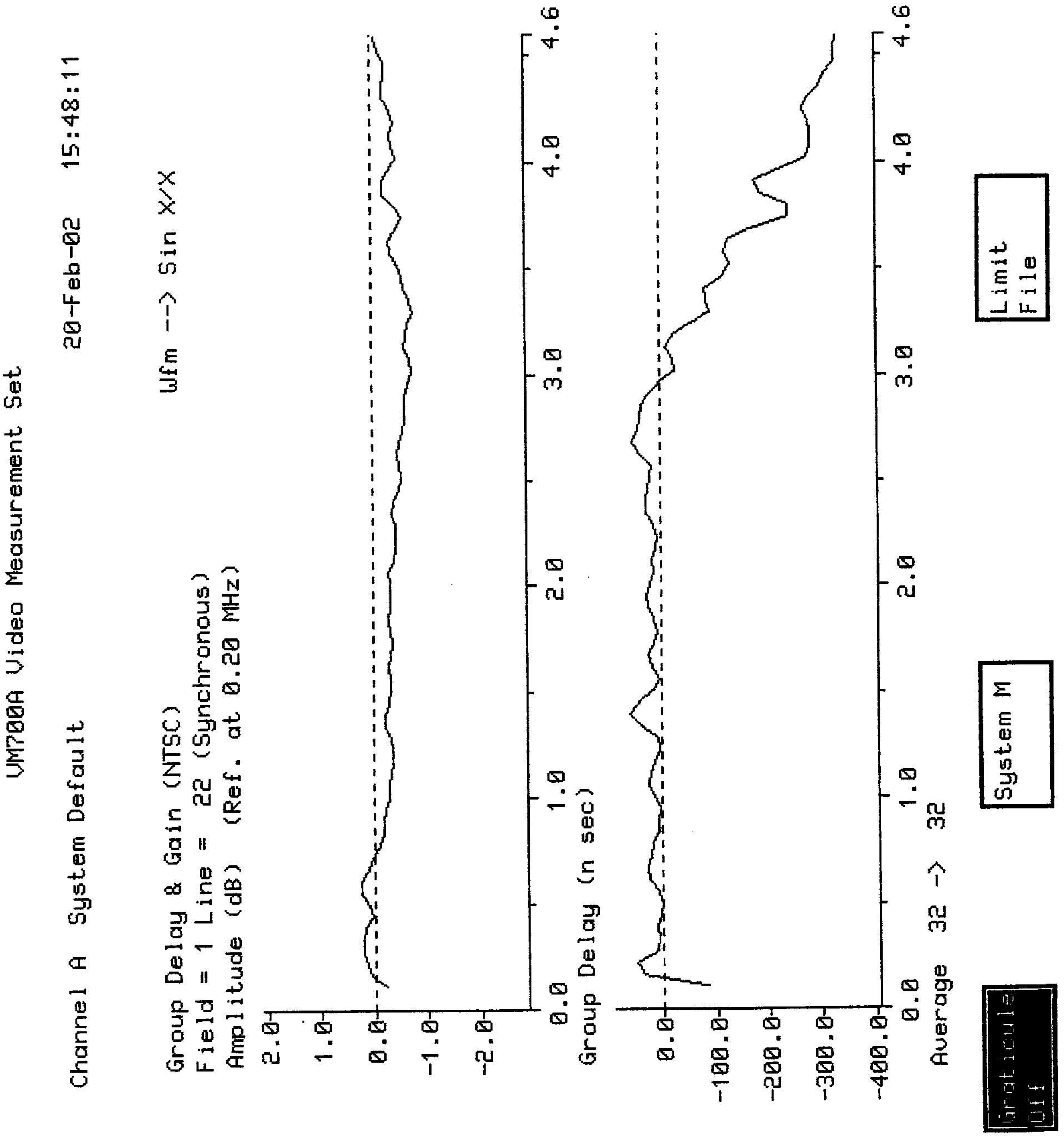
EXHIBIT 11b



APPLICATION FOR FCC CERTIFICATION
BZ5MX1UX
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EXHIBIT 12a

PHOTO, FRONT OVERALL VIEW OF BZ5MX1UX

APPLICATION FOR FCC CERTIFICATION
BZ5MX1UX
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EXHIBIT 12b

PHOTO, FRONT VIEW

APPLICATION FOR FCC CERTIFICATION
BZ5MX1UX
HETERODYNE PROCESSOR INPUT
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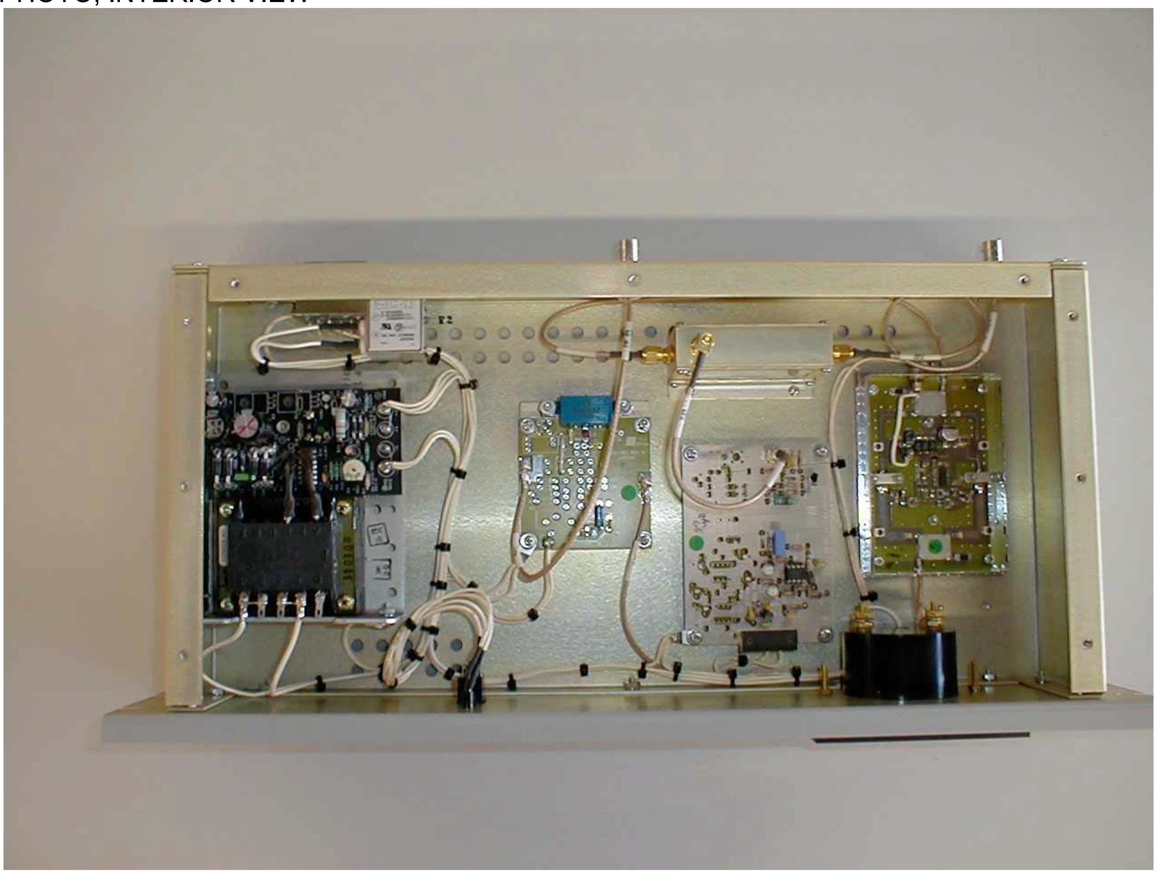
EXHIBIT 12c

PHOTO, INTERIOR VIEW



APPLICATION FOR FCC CERTIFICATION
BZ5MX1UX
HETERODYNE PROCESSOR INPUT
1 WATT UHF TRANSLATOR

EXHIBIT 12d

PHOTO, REAR VIEW WITH FCC LABEL

APPLICATION FOR FCC CERTIFICATION
BZ5MX1UX
HETERODYNE PROCESSOR INPUT
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EXHIBIT 13

ENGINEER'S STATEMENT

I, John Tremblay, do hereby certify that the attached information was prepared by me or under my direction.

John E. Tremblay, P. Eng.
Vice-President Engineering

27 Feb. 2002

Date