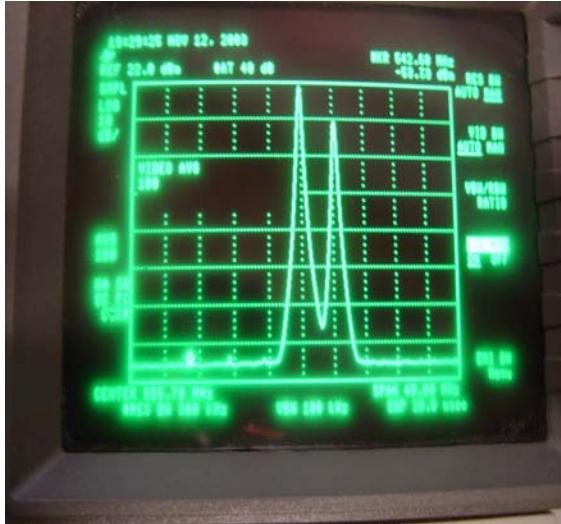


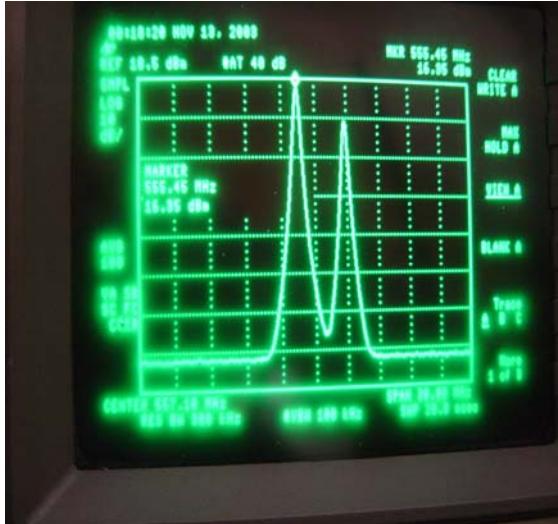
CONDUCTED SPURIOUS AND HARMONICS

The following photographs indicate the spurious performance ($> +/- 3$ MHz) from the designated TV channel. As can be seen from the photos (one taken at high power and the other taken at low power), the spurious levels are below 60 dB relative to the peak of sync of the visual carrier. The scan width is 30 MHz on the left hand picture and 20 MHz on the right hand picture.

POWER OUTPUT = 4.7 kWatts



POWER OUTPUT = 1.34 kWatts

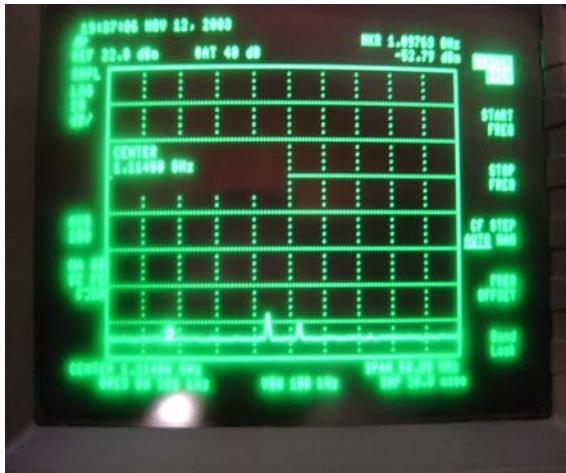


CONDUCTED HARMONIC OUTPUTS

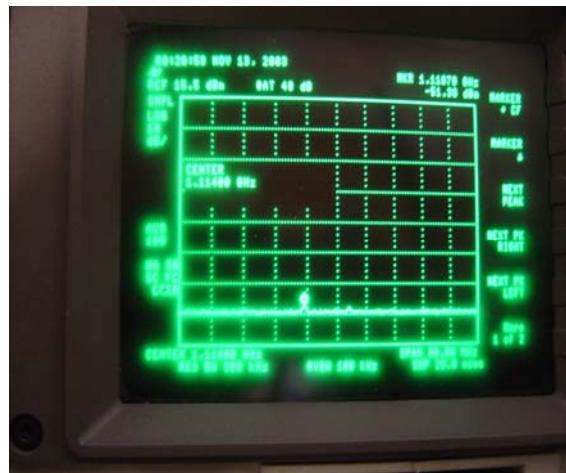
The following data indicate the harmonic performance of the UTX5KW. Only the 2nd harmonics were visible. The following table displays the actual value of the harmonic that takes into account the coupling factor of the directional coupler and loss of the cable used for the measurement. There was no value recorded when the instrument measured value was <-75 dB relative to the visual peak of sync value as this was below the noise floor of the spectrum analyzer with the bandwidth used. Photographs of the spectrum containing the second harmonic are shown below. The pictures indicate that the harmonic levels are below 60 dB.

HARMONIC LEVELS VERSUS FREQUENCY AT 4.7 KW	
FREQUENCY OF HARMONIC (MHz)	AMPLITUDE (Relative to visual Peak Sync at fundamental frequency (dB))
1114 (2 nd harmonic)	-68
1671 (3 rd harmonic)	-75
2228 (4 th harmonic)	<-75
2783 (5 th harmonic)	<-75
3342 (6 th harmonic)	<-75
3899 (7 th harmonic)	<-75
4456 (8 th harmonic)	<-75
5013 (9 th harmonic)	<-75
5570 (10 th harmonic)	<-75

POWER OUTPUT = 4.7 kWatts



POWER OUTPUT = 1.34 kWatts



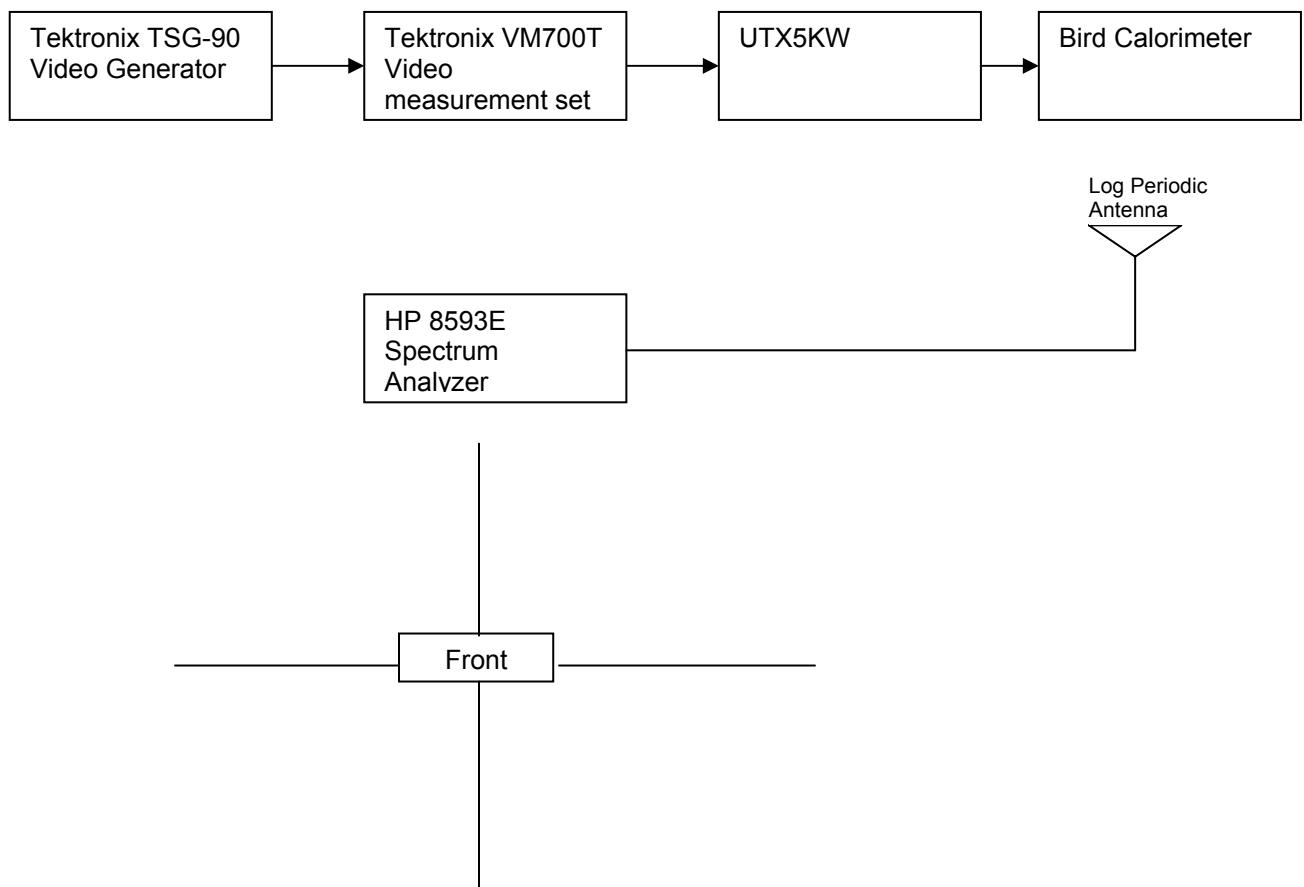
Both Photographs are centered at the 2nd Harmonic because only those harmonics were visible. The fundamental frequency visual peak of sync reference value is located at the top of the screen on these photographs. The values indicate a maximum harmonic level of -68 dB when corrected for coupling and cable loss at 4.7 kW.

HARMONIC LEVELS VERSUS FREQUENCY AT 1.34 KW	
FREQUENCY OF HARMONIC (MHz)	AMPLITUDE (Relative to visual Peak Sync at fundamental frequency (dB))
1114 (2 nd harmonic)	-69
1671 (3 rd harmonic)	-75
2228 (4 th harmonic)	<-75
2783 (5 th harmonic)	<-75
3342 (6 th harmonic)	<-75
3899 (7 th harmonic)	<-75
4456 (8 th harmonic)	<-75
5013 (9 th harmonic)	<-75
5570 (10 th harmonic)	<-75

CABINET RADIATION

The transmitter and test equipment were configured as shown below including the angles of measurement with respect to the transmitter cabinet. The photo on the subsequent page also shows the physical set-up of the test equipment and equipment under test. The transmitter was operated at 4.7 kW peak sync power with a 10 dB visual/aural ratio with the video input signal being a sync signal and 50 IRE "set-up" level. The free space path loss, cable loss, and antenna gain characteristics were obtained at the fundamental frequency and at each of the harmonics of the visual carrier frequency in order to accurately assess the level of the signal radiated from the cabinet. The cabinet was measured at a distance of 30 feet in 4 different physical rotation angles: 0, 90, 180, and 270 degrees (0 degrees being the front of the cabinet). All spectral components above -80 dB referenced to peak sync power radiated from the cabinet were recorded. Their orientation that included the highest values are tabulated in the table on the next page following the photos.

TEST EQUIPMENT CONFIGURATION



PHYSICAL CABINET RADIATION TEST CONFIGURATION

The photograph on the following page shows the actual laboratory environment in which the cabinet radiation tests were conducted. The log periodic antenna, cable and spectrum analyzer is shown in the foreground and the UTX5KW is shown in the background. The transmitter was rotated 90 degrees for each of the measurement orientations.



CABINET RADIATION SPREADSHEET

UTX 5KW Left side View

5 kW = 67 dBm

Corrected level must be less than 6.7
dBm

Distance is 30 feet

Harmonic	Frequency MHz	Measured Level	Cable Loss	Antenna Gain	Path Loss	Corrected Level dBm	Required Level	Comparison to transmit level dB
2nd	1114	-45	0.8	7.6	52.6	0.8	7 dBm	66.2
3rd	1671	-81	1.2	7.4	56.1	-31.1	7 dBm	98.1
4th	2228	-66	1.6	7.1	58.6	-12.9	7 dBm	79.9
5th	2785	-80	1.7	6.4	60.6	-24.1	7 dBm	91.1
6th	3342	-82	1.8	5.5	62.2	-23.5	7 dBm	90.5
7th	3899	-82	1.9	5.2	63.5	-21.8	7 dBm	88.8
8th	4456	-82	2	3.1	64.7	-18.4	7 dBm	85.4
9th	5013	-82	2.8	2.1	65.7	-15.6	7 dBm	82.6
10th	5570	-82	3.2	2	66.6	-14.2	7 dBm	81.2

As indicated in the spreadsheet data, the worst case measurement was 66 dB at the second harmonic. (This photo above shows this particular measurement). The measurement tables for the remaining views of the transmitter are shown below.

CABINET RADIATION SPREADSHEET
 UTX 5KW Front View

5 kW = 67 dBm

Corrected level must be less than 7 dBm

Distance is 30 feet

Harmonic	Frequency MHz	Measured Level	Cable Loss	Antenna Gain	Path Loss	Corrected Level	Required Level	Comparison to transmit level dB
2nd	1114	-48	0.8	7.6	52.6	-2.2	7 dBm	69.2
3rd	1671	-62	1.2	7.4	56.1	-12.1	7 dBm	79.1
4th	2228	-64	1.6	7.1	58.6	-10.9	7 dBm	77.9
5th	2785	-74	1.7	6.4	60.6	-18.1	7 dBm	85.1
6th	3342	-80	1.8	5.5	62.2	-21.5	7 dBm	88.5
7th	3899	-80	1.9	5.2	63.5	-19.8	7 dBm	86.8
8th	4456	-80	2	3.1	64.7	-16.4	7 dBm	83.4
9th	5013	-80	2.8	2.1	65.7	-13.6	7 dBm	80.6
10th	5570	-80	3.2	2	66.6	-12.2	7 dBm	79.2

CABINET RADIATION SPREADSHEET

UTX 5KW Rear View

5 kW = 67 dBm

Corrected level must be less than 7 dBm

Distance is 30 feet

Harmonic	Frequency MHz	Measured Level	Cable Loss	Antenna Gain	Path Loss	Corrected Level	Required Level	Comparison to transmit level dB
2nd	1114	-52	0.8	7.6	52.6	-6.2	7 dBm	73.2
3rd	1671	-60	1.2	7.4	56.1	-10.1	7 dBm	77.1
4th	2228	-68	1.6	7.1	58.6	-14.9	7 dBm	81.9
5th	2785	-79	1.7	6.4	60.6	-23.1	7 dBm	90.1
6th	3342	-82	1.8	5.5	62.2	-23.5	7 dBm	90.5
7th	3899	-82	1.9	5.2	63.5	-21.8	7 dBm	88.8
8th	4456	-82	2	3.1	64.7	-18.4	7 dBm	85.4
9th	5013	-82	2.8	2.1	65.7	-15.6	7 dBm	82.6
10th	5570	-82	3.2	2	66.6	-14.2	7 dBm	81.2

CABINET RADIATION SPREADSHEET
 UTX 5KW Right Side View

5 kW = 67 dBm

Corrected level must be less than 7 dBm

Distance is 30 feet

Harmonic	Frequency MHz	Measured Level	Cable Loss	Antenna Gain	Path Loss	Corrected Level	Required Level	Comparison to transmit level dB
2nd	1114	-48	0.8	7.6	52.6	-2.2	7 dBm	69.2
3rd	1671	-81	1.2	7.4	56.1	-31.1	7 dBm	98.1
4th	2228	-68	1.6	7.1	58.6	-14.9	7 dBm	81.9
5th	2785	-78	1.7	6.4	60.6	-22.1	7 dBm	89.1
6th	3342	-82	1.8	5.5	62.2	-23.5	7 dBm	90.5
7th	3899	-82	1.9	5.2	63.5	-21.8	7 dBm	88.8
8th	4456	-82	2	3.1	64.7	-18.4	7 dBm	85.4
9th	5013	-82	2.8	2.1	65.7	-15.6	7 dBm	82.6
10th	5570	-82	3.2	2	66.6	-14.2	7 dBm	81.2

VOLTAGES AND CURRENTS TO FINAL AMPLIFIERS

Final amplifier DC voltage and current measurements were made with the transmitter operating at 4.70 kWatts power output and at 1.34 kWatts output power. A video input signal of sync and 0 IRE "setup" level was used. Voltage measurements were made using a Fluke 77 meter and current measurements were made using the same meter with measurement across a shunt for each of the 10 power amplifiers operating in parallel. The shunt resistance value is 1 milliohm. The power supply voltage was 31.0 volts for each measurement. The values from each amplifier were summed to get the total DC current at both operating points of 4.7kW and 1.34 kW.

Peak Output Power = 4700 Watts

Voltage = 31.0 volts

Total DC Current = 510 amps

Final amplifier DC power input = $31 \times 510 = 15810$ watts

Peak Output Power = 1340 Watts

Voltage = 31.0 volts

Total DC Current = 292 amps

Final amplifier DC power input = $31 \times 292 = 9050$ watts

EQUIPMENT LIST

The following test equipment was used in the various test equipment configurations or to create calibration of equipment at various frequencies. All equipment was known to be in good working order and the supplier of the equipment stipulated the equipment was within the calibration period.

EQUIPMENT MODEL	SERIAL NUMBER
Tektronix 1410 Video generator	B020216
Modulation Sciences MSI320 demodulator	390128364
HP 8595E Spectrum Analyzer	3523A01399
VM-700T Video Analyzer	B010396
HP 3525A Signal Generator	2846A01312
HP 200 CD Audio Generator	0960A86012
Tektronix TSG90 Video signal generator	B022622
Tektronix 1750 Waveform Monitor	B033351
ETS 3147 Log Periodic Antenna	9703-1288
Fluke 77 meter	54810424
Wavetek 8003 Scalar Analyzer	1813961
HP 54601 Oscilloscope	3134A02137
Bird 8656-602A Calorimeter	301
HP 8903B Modulation Monitor	2920A02167
HP 53181 Frequency Counter	3736A05957