Antenna System Field Report

KQTP-FM

102.9 Mhz

Topeka, Kansas

Cumulus Broadcasting

Antenna - Dielectric DCRM-6-ED
Transmission Line - Andrew 3" Heliax x 501'

prepared for:

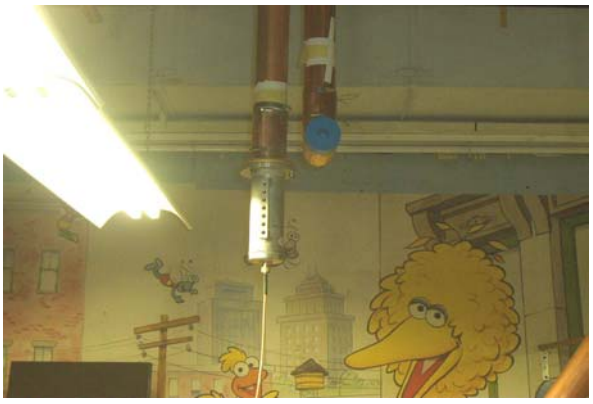
Dielectric Communications, Inc.
MSO#72849
March 2003

D. L. Markley & Associates, Inc.
2104 West Moss Avenue
Peoria, Illinois 61604
(309)673-7511
Prepared By: Richard Wood

Antenna System Field Report

This report has been prepared for Dielectric Communications, Inc. and contains tests and measurements performed at the KQTP-FM transmitter site located in Topeka, Kansas. The data contained herein was recorded on March 3, 2003, between the hours of 3:00 and 6:00 PM, central standard time.

For measurements performed on-site, a Hewlett-Packard 8753-E Network Analyzer was utilized. This instrument was calibrated on-site in accordance with the manufacturer's instructions for the frequencies specific to KQTP-FM, and established the reference plane at the input to the 3" to Type 'N' test transition. This test transition was attached to the 3" transmission line in the FM transmitter room, see attached photo. The test transition was manufactured by Dielectric and provided by this office. To ensure maximum data plot clarity and accuracy the Analyzer was set to the 1601 point mode.



The next section of this report contains the initial and final data plots and a discussion of each plot. The initial plots were taken with the tuner plungers for the antenna input variable transformer plungers pulled out. The final measurements were recorded after the variable transformer was adjusted for minimum system VSWR. The last pages contain the summary and conclusion for the field service visit, and the Directional Antenna Affidavit.

Discussion of Individual Plots

Plot #1 is the first of six initial measurements performed with the antenna input matcher probes fully disengaged. This plot is a VSWR test in the Frequency Domain with a 1 Mhz Frequency Span. Marker One was set to the station's carrier and had a reading of 1.18 to 1. Marker Two detailed the frequency 100 Khz below Marker One and had a value of 1.19 to 1. Marker Three was set 100 Khz above Marker One and had an initial VSWR of 1.18 to 1.

Plot #2 is a Log Magnitude test in the Frequency Domain. The Markers are set as shown in Plot #1, and had Return Loss readings of 20.8 db, 21.0 db, and 21.3 db, respectively.

The 3rd Plot is a Smith Impedance Chart with a 1 Mhz Frequency Span. Marker One, at the station's carrier frequency, had an initial impedance of 58.7 +j 2.57 Ω. Marker Two was set to 102.8 Mhz, and had a reading of 53.7 +j 8.09 Ω. The Third Marker detailed the frequency of 57.4 –j 5.04 Ω.

Plot #4 is a VSWR measurement in the Time Domain. Marker One was placed at the antenna-end of the system and had an average initial VSWR of 1.18 to 1. Marker Two was set approximately 3' from the test connection and had a value of 1.05 to 1.

Plot #5 is a Frequency Domain/VSWR plot with a 10 Mhz Frequency Span. Marker One had a value of 1.18 to 1. Marker Two was set 100 Khz below Marker One and had a reading of 1.19 to 1. The Third Marker detailed the frequency 100 Khz above the carrier frequency and had a reading of 1.18 to 1.

The last initial plot, #6, is a Time Domain measurement in the VSWR format with a 10 Mhz Frequency Span. Marker One showed an average VSWR at the antenna-end of the system to have been 1.22 to 1. Marker Two was placed below the antenna and had a

reading of 1.04 to 1. Marker Three was set 26' from the reference plane and had a value of 1.0063 to 1.

Plot #7 is the first of nine measurements performed after tuning the antenna's fine matcher. Marker One of this Frequency Domain/VSWR plot was set to the station's carrier and had a final reading of 1.01 to 1. Markers Two and Three showed the VSWR value at the minus and plus 100 Khz frequencies, and had readings of 1.01 and 1.02 to 1 respectively.

The 8th Plot is a Log Magnitude measurement in the Frequency Domain. The Markers were set as in Plot #7, and had Return Loss readings of 40.3 db, 40.1 db, and 37.9 db, sequentially.

A Smith Impedance Chart is shown in Plot #9. The impedance at 102.9 Mhz was 48.9 –j 56.6 mΩ, as shown at Marker One. Marker Two detailed the frequency of 102.8 Mhz and had a value of 48.9 –j 103.5 mΩ. The Third Marker was placed to 103.0 Mhz and had a reading of 48.6 +j 0.3 Ω.

Plot #10 is a Time Domain test in the VSWR format. Marker One was placed at the antenna-end of the system, and had an average VSWR of 1.01 to 1 over the 1 Mhz Frequency Span of this test. Marker Two was set approximately 389' from the reference plane and had a value of 1.028 to 1. The Third Marker was located at the test transition connection and had a value of 1.02 to 1.

Plot #11 is a VSWR measurement in the frequency Domain with a 10 Mhz span. Marker One was set to the station's carrier and had a VSWR of 1.02 to 1. Marker Two detailed the frequency 100 Khz below Marker One and had a reading of 1.019 to 1. Marker Three was set 100 Khz above the center frequency and had a value of 1.025 to 1.

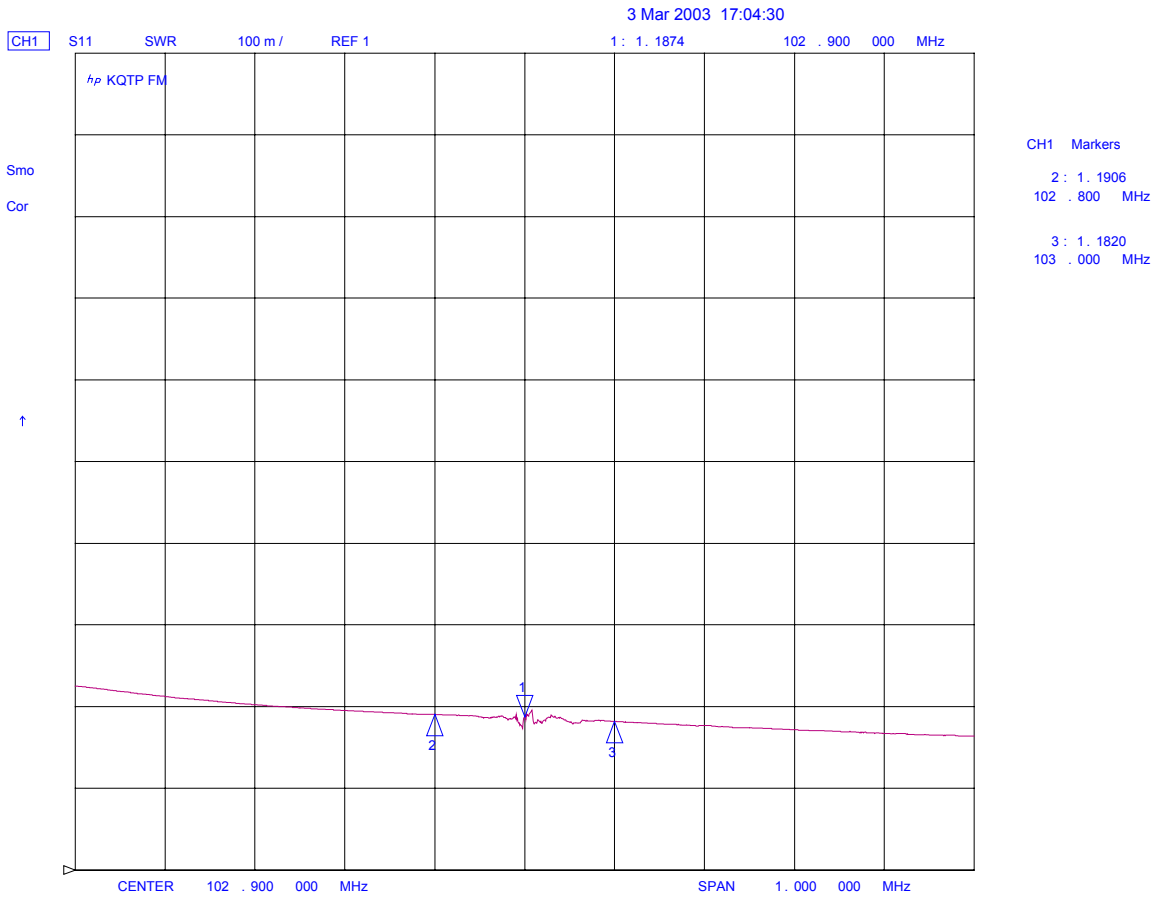
In Plot #12 a Log Magnitude test in the Frequency Domain is shown. Markers One to Three are placed as shown in Plot #11 and had Return Loss values of 41.1 db, 39.9 db, and 38.2 db, respectively.

Next is the final Smith Impedance Chart with a 10 Mhz span. Marker One was placed on 102.9 Mhz and had an impedance of 48.4 –j 753.9 mΩ. Marker Two was set to 102.8 Mhz and showed a value of 48.3 –j 822.2 mΩ. The Third Marker detailed the frequency of 103.0 Mhz with a final impedance of 48.0 –j 443.3 mΩ.

The 14th Plot is a Time Domain/VSWR measurement with a 10 Mhz span. Marker One was set at the antenna-end of the system and had an average VSWR of 1.19 to 1 over the 10 Mhz span. Marker Two was placed on the antenna fine-matcher and had a reading of 1.17 to 1. Marker Three detailed the point in the line vertical run 195' from the test connection with a reading of 1.0013 to 1. Marker Four was located 27.3' from the reference plane with a value of 1.006 to 1.

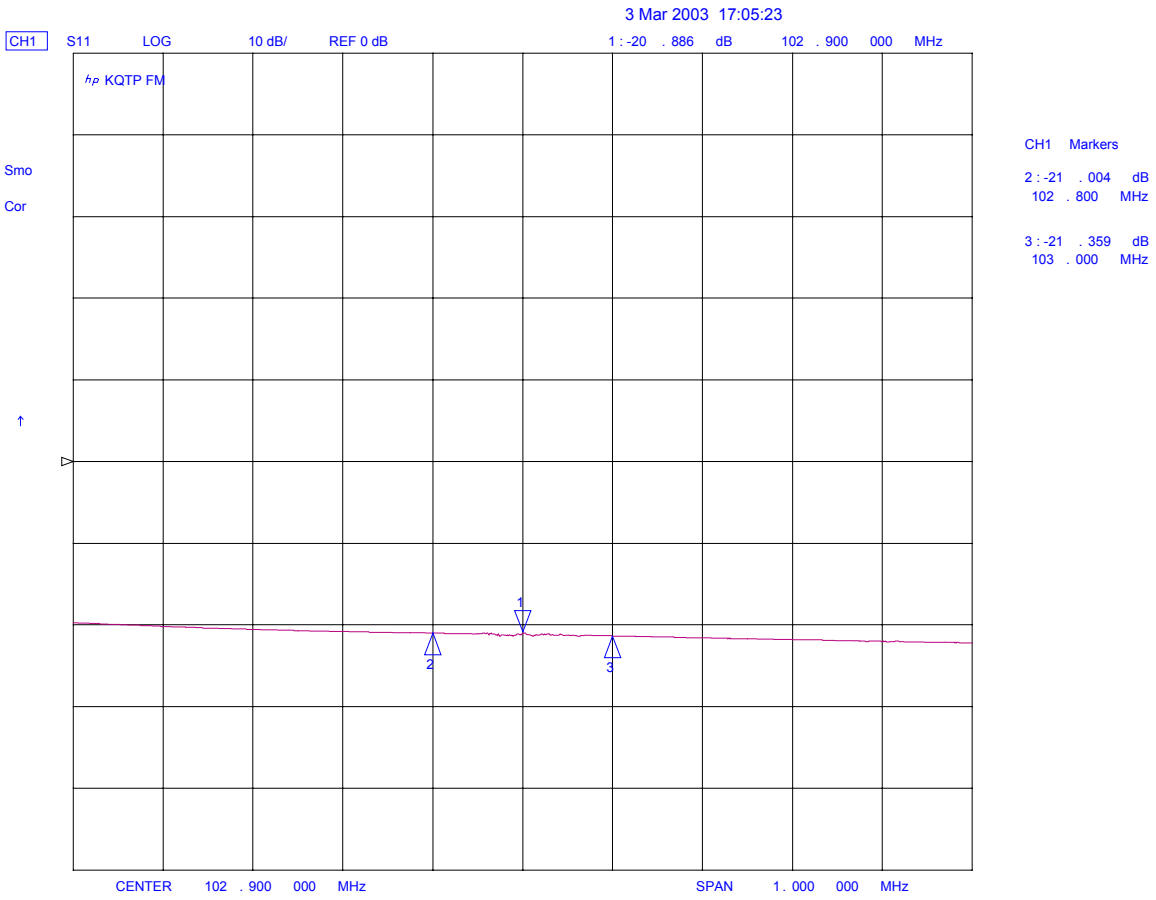
The last measurement, Plot #15, shows a Time Domain/VSWR test with a 100 Mhz Frequency Span to provide greater detail of the transmission line portion of the system. Marker One was set at the antenna input and had a reading of 1.0021 to 1. Marker Two showed the typical reflection present in the Heliax line with a value of 1.0007 to 1. Marker Three was placed at an elbow and had an average VSWR of 1.0065 to 1. Marker Four was set 4' from the reference plane in a short piece of rigid line, and had a reading of 1.0052 to 1.

KQTP-FM Antenna System
Cumulus Broadcasting



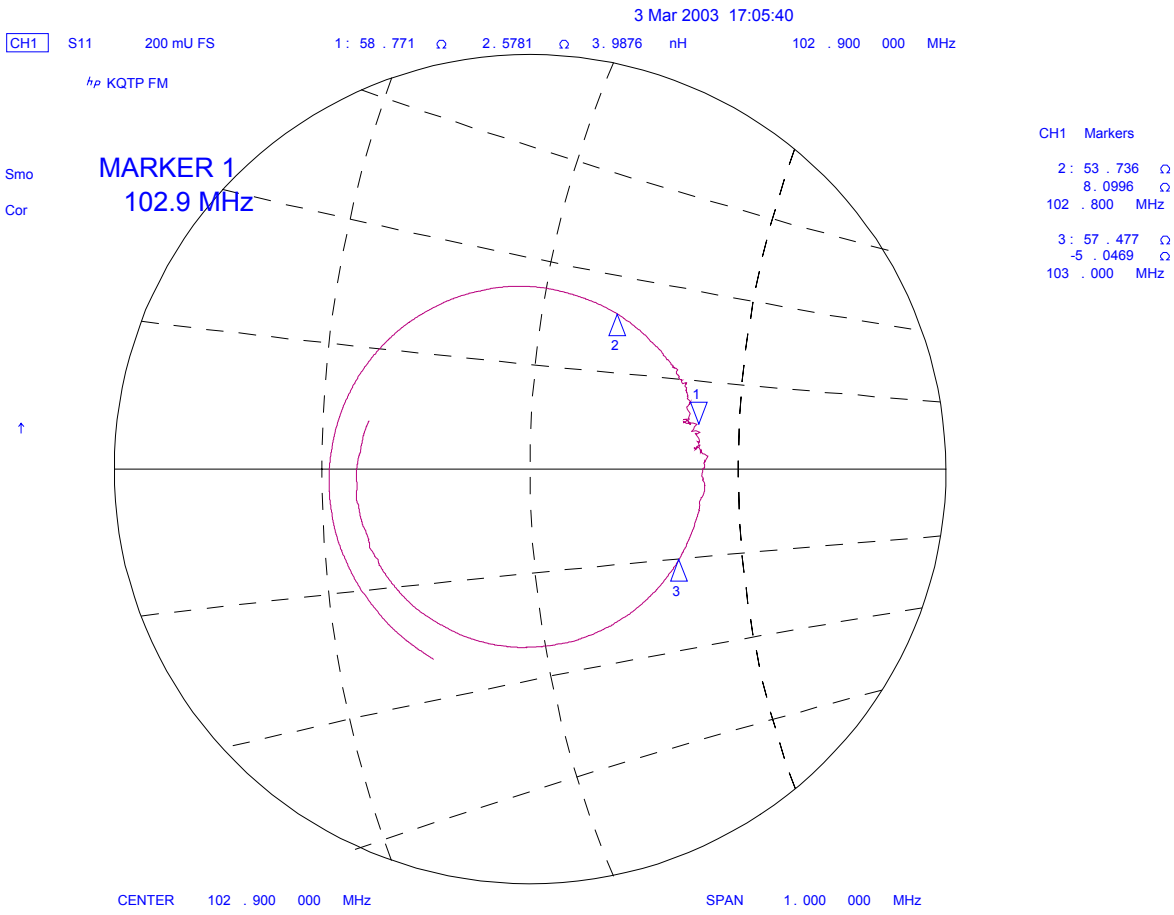
Plot #1 Initial Frequency Domain VSWR
1 Mhz Frequency Span

KQTP-FM Antenna System
Cumulus Broadcasting



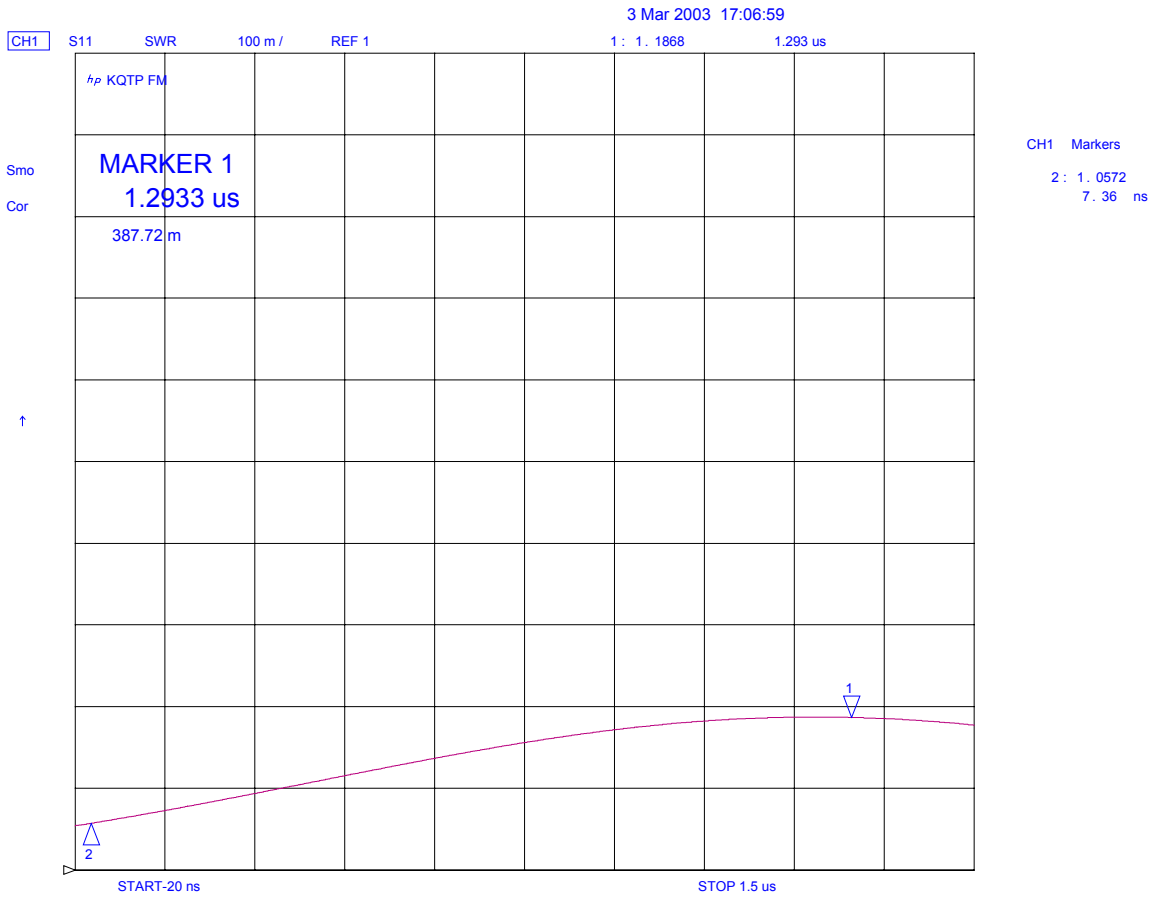
Plot #2 Initial Frequency Domain Log Magnitude
1 Mhz Frequency Span

KQTP-FM Antenna System
Cumulus Broadcasting



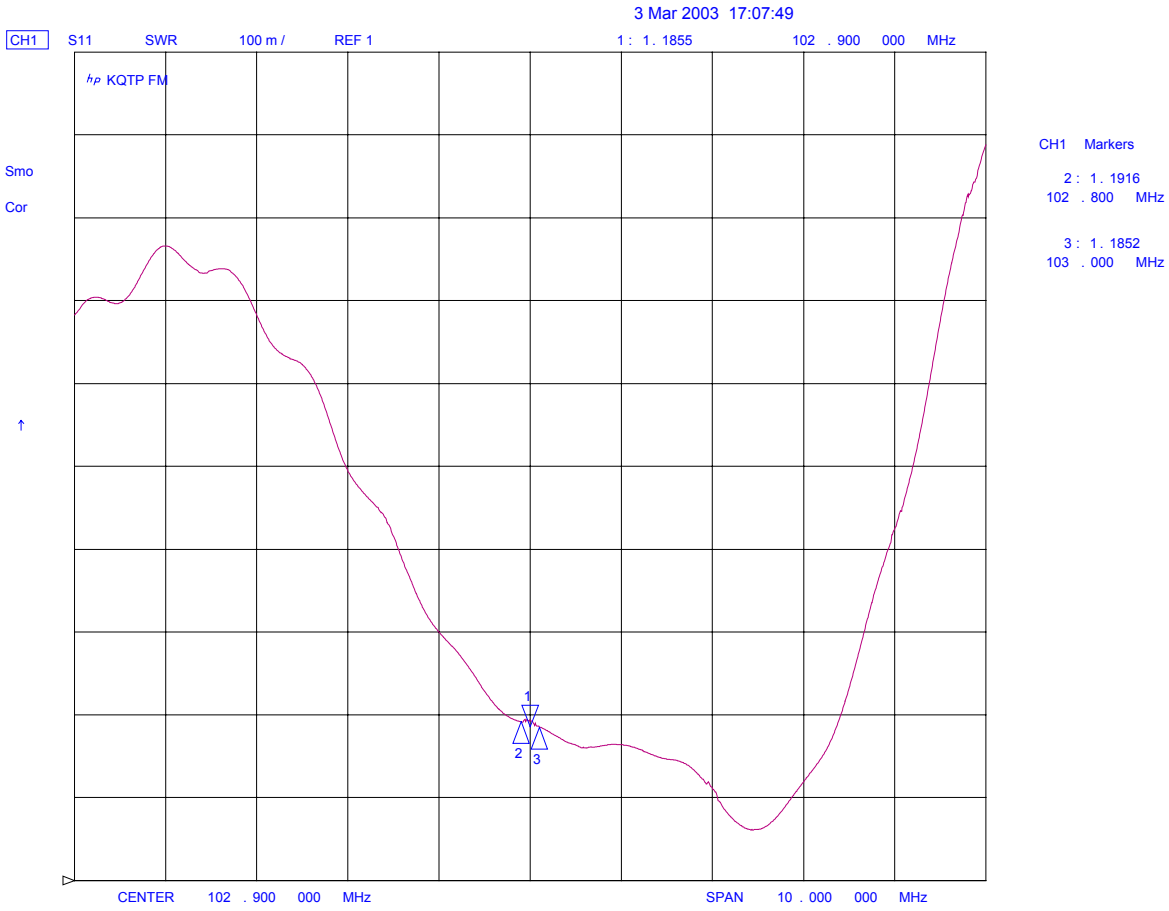
Plot #3 Initial Frequency Domain Smith Chart
1 Mhz Frequency Span

KQTP-FM Antenna System
Cumulus Broadcasting



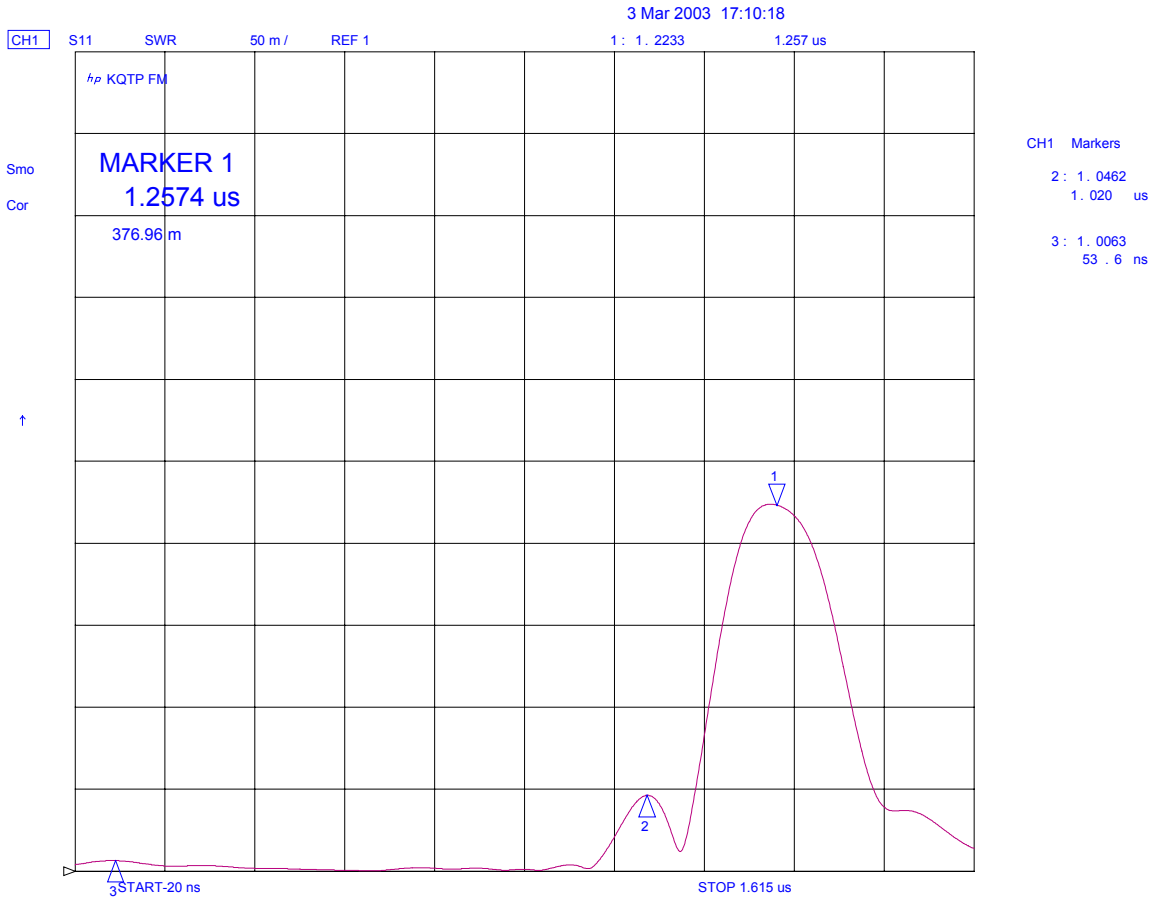
Plot #4 Initial Time Domain VSWR
1 Mhz Frequency Span

KQTP-FM Antenna System
Cumulus Broadcasting



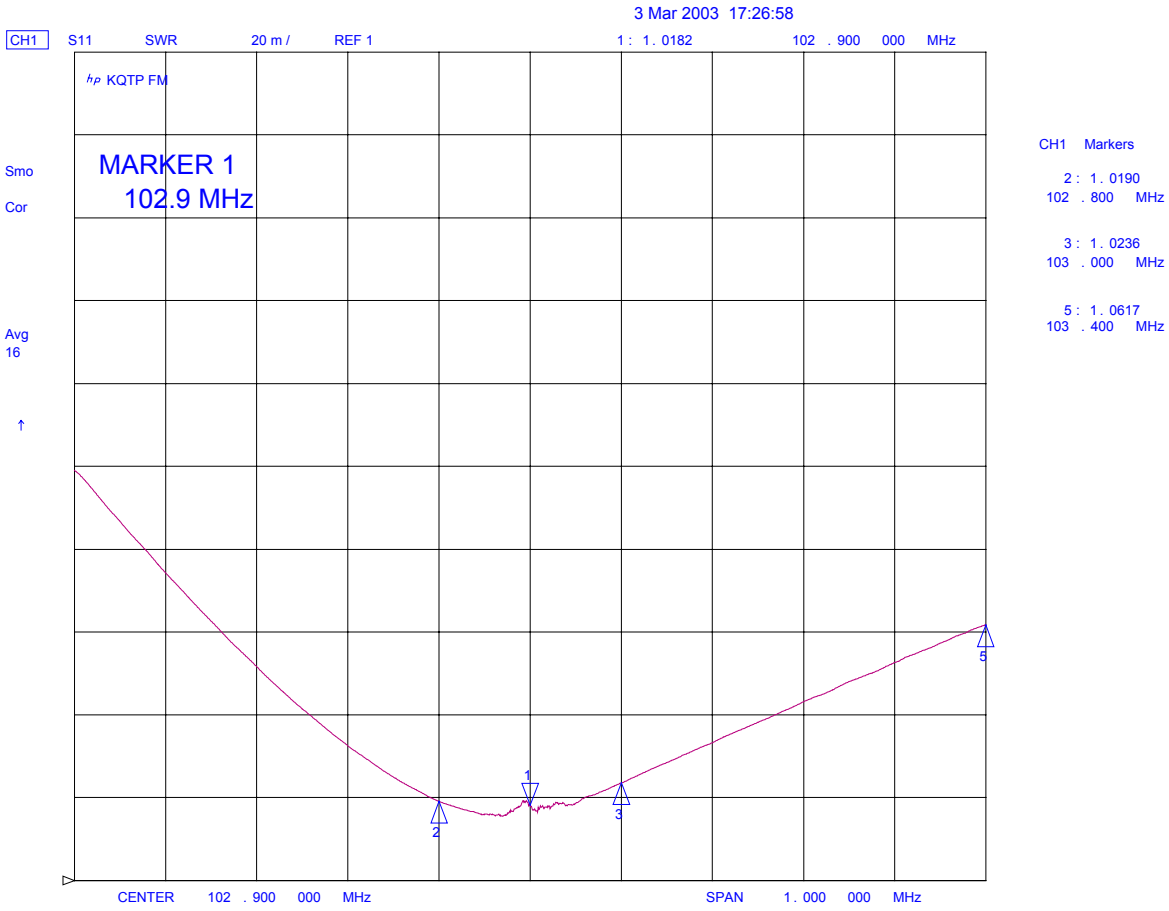
Plot #5 Initial Frequency Domain VSWR
10 Mhz Frequency Span

KQTP-FM Antenna System
Cumulus Broadcasting



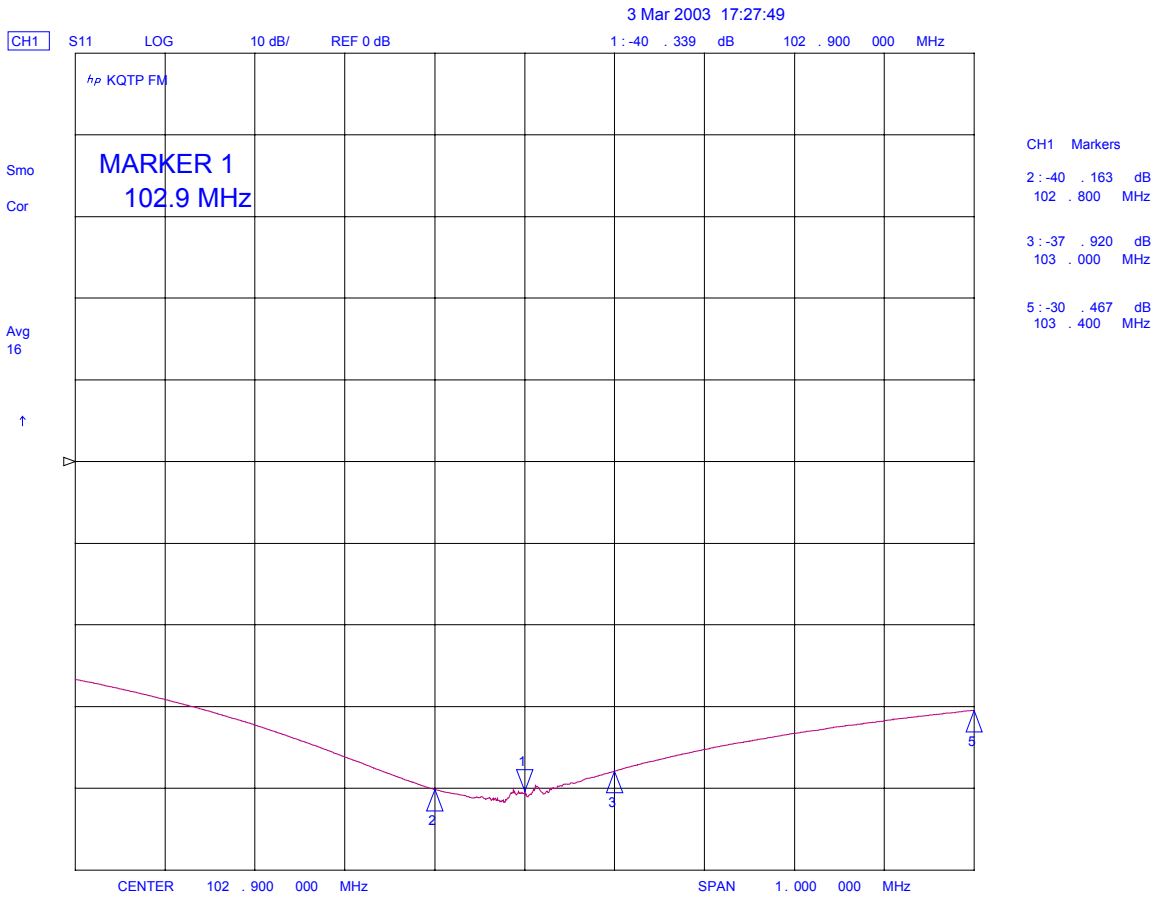
Plot #6 Initial Time Domain VSWR
10 Mhz Frequency Span

KQTP-FM Antenna System
Cumulus Broadcasting



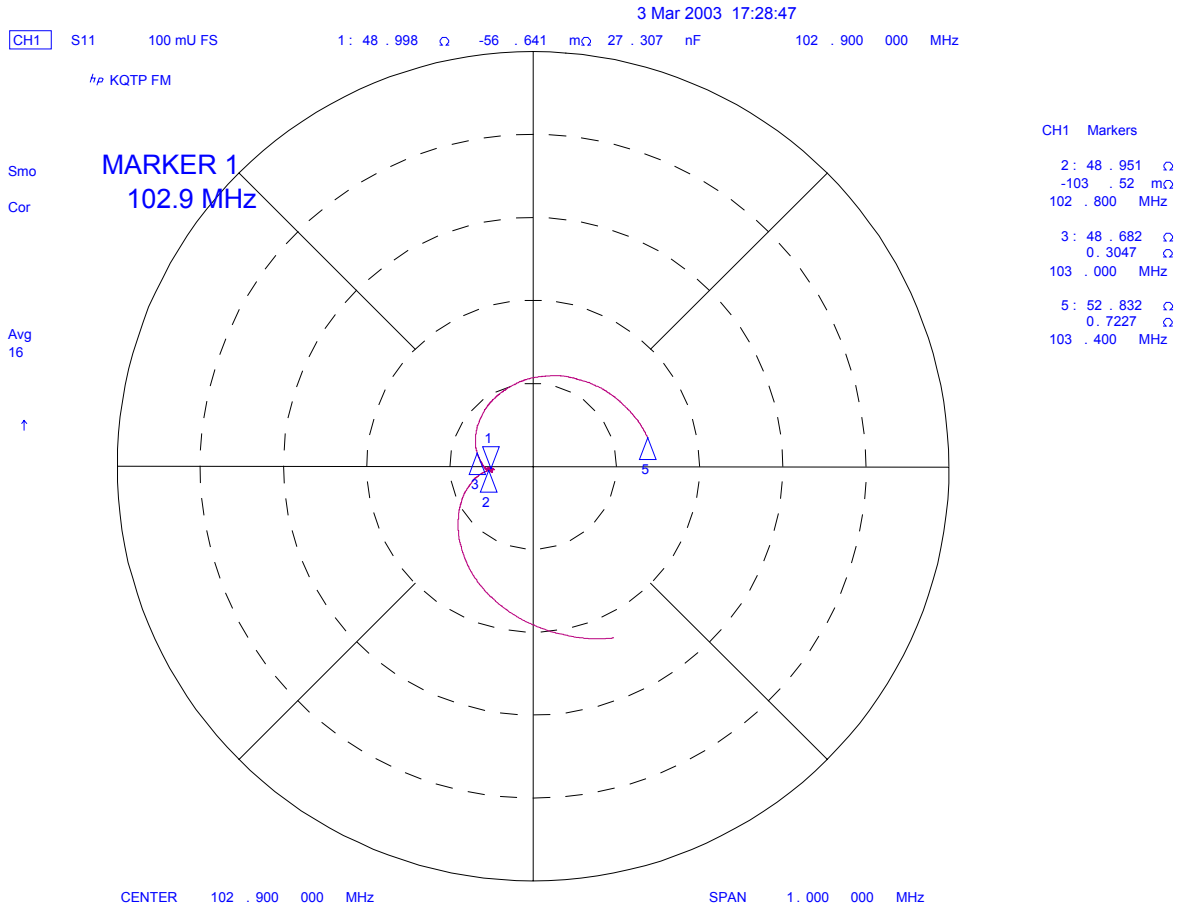
Plot # 7 Final Frequency Domain VSWR
1 Mhz Frequency Span

KQTP-FM Antenna System
Cumulus Broadcasting



Plot #8 Final Frequency Domain Log Magnitude
1 Mhz Frequency Span

KQTP-FM Antenna System
Cumulus Broadcasting



Plot #9 Final Frequency Domain Smith Chart
1 Mhz Frequency Span

KQTP-FM Antenna System
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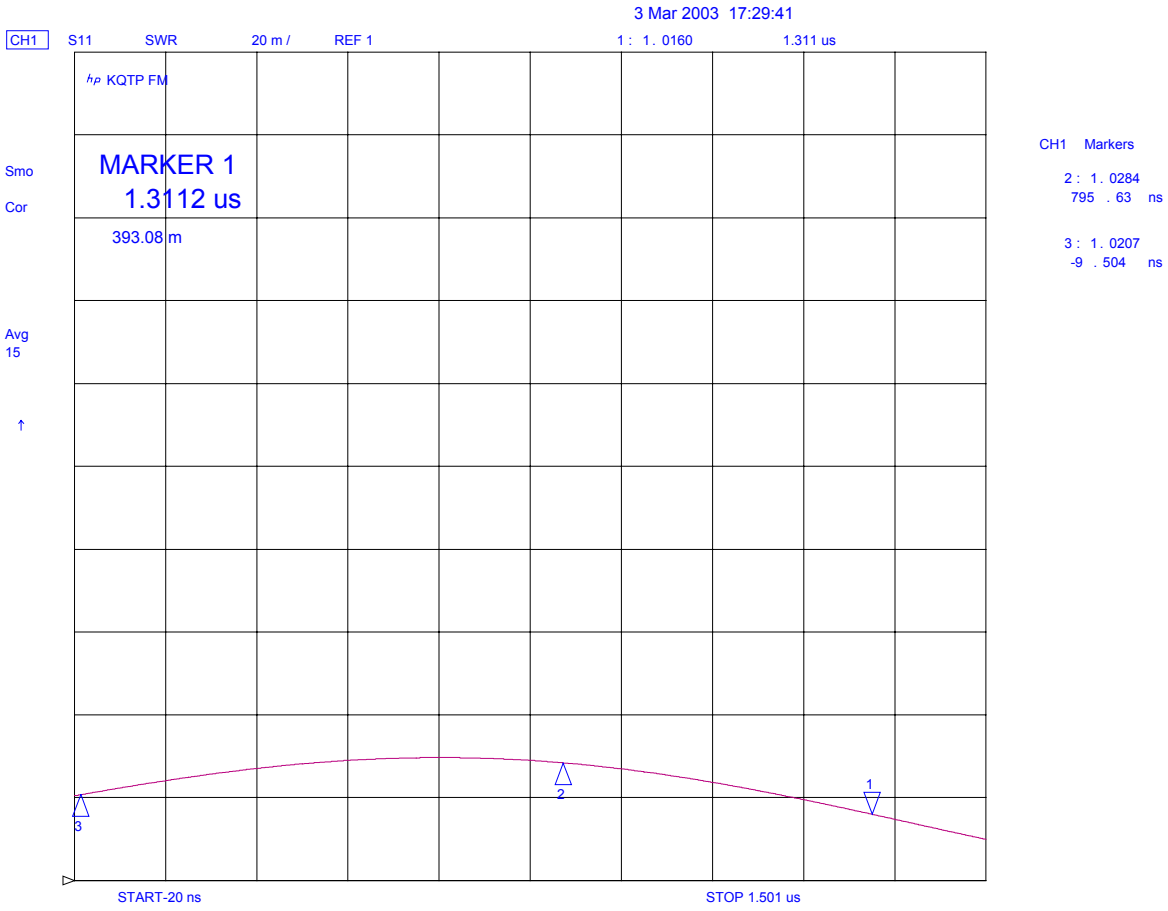
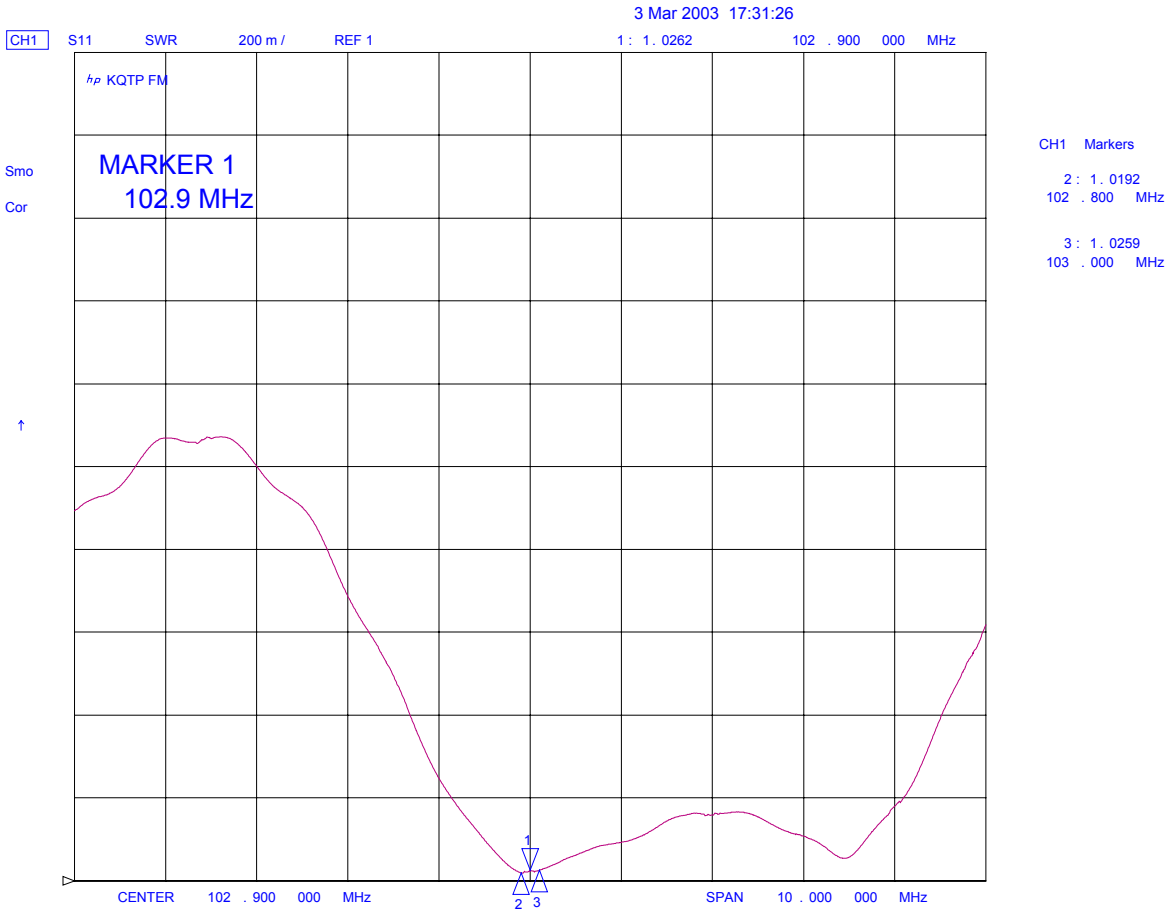


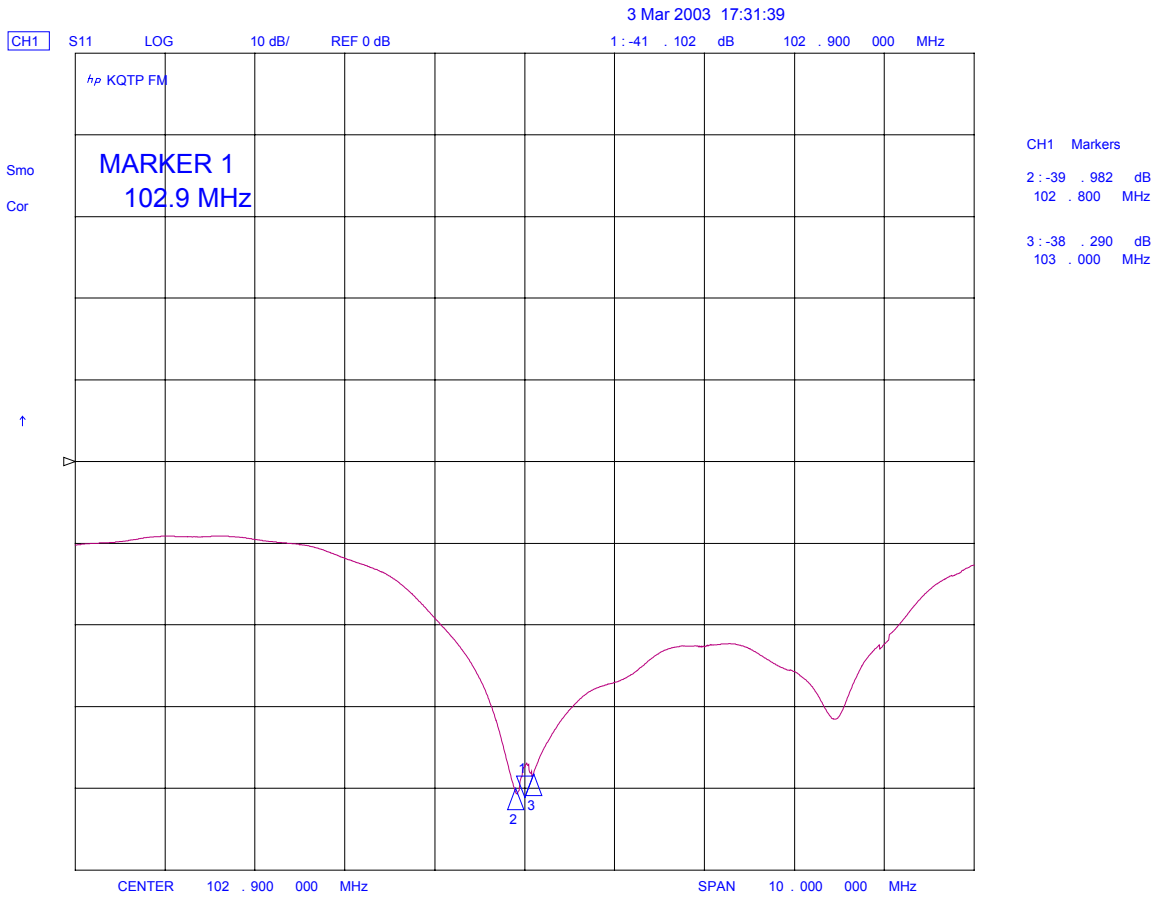
Plot #10 Final Time Domain VSWR
1 Mhz Frequency Span

KQTP-FM Antenna System
Cumulus Broadcasting



Plot #11 Final Frequency Domain VSWR
10 Mhz Frequency Span

KQTP-FM Antenna System
Cumulus Broadcasting



Plot #12 Final Frequency Domain Log Magnitude
10 Mhz Frequency Span

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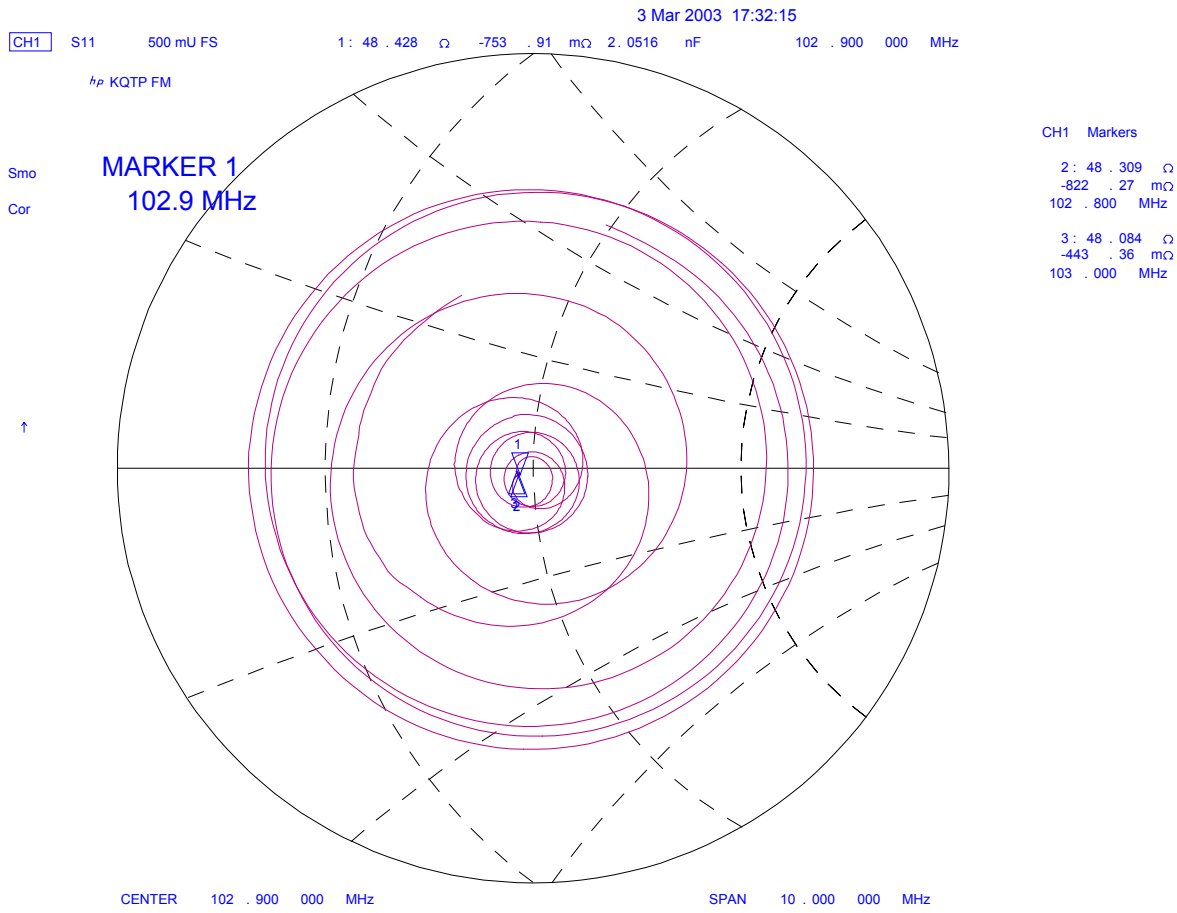
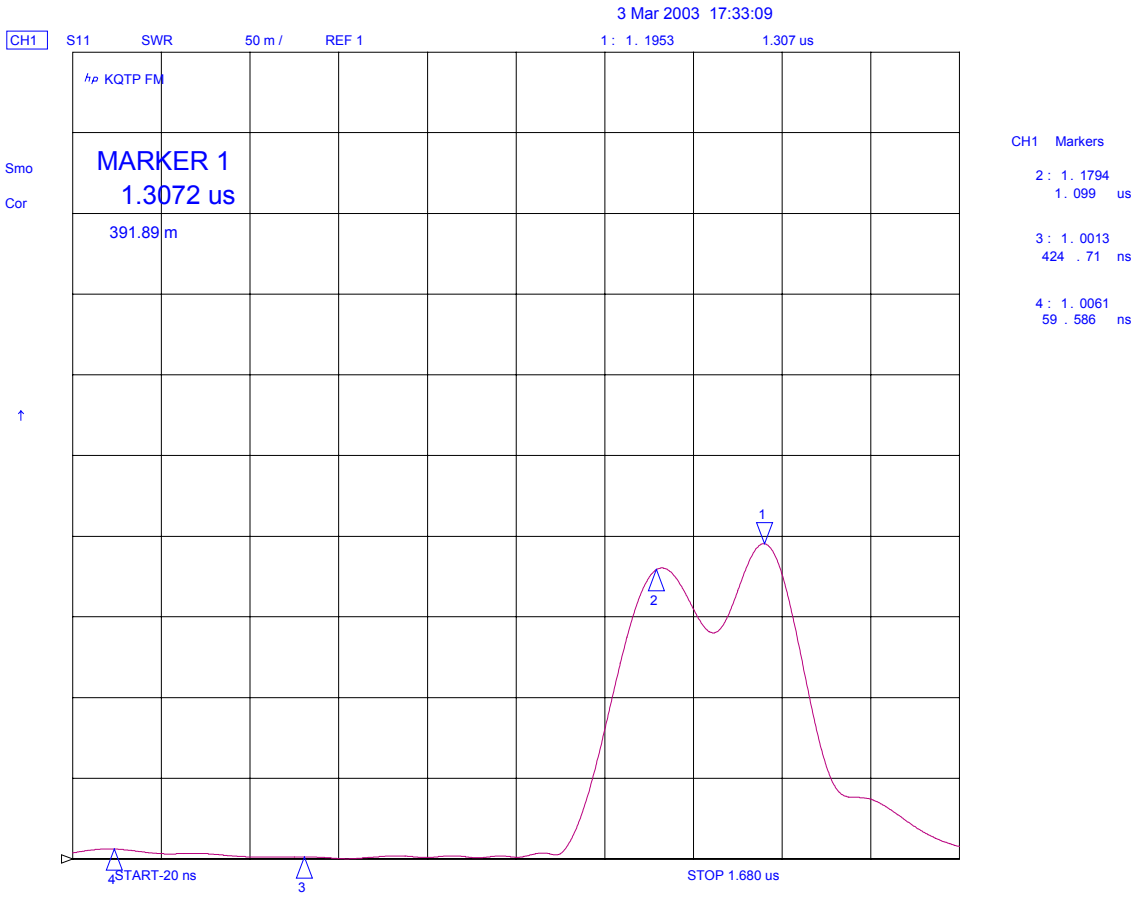


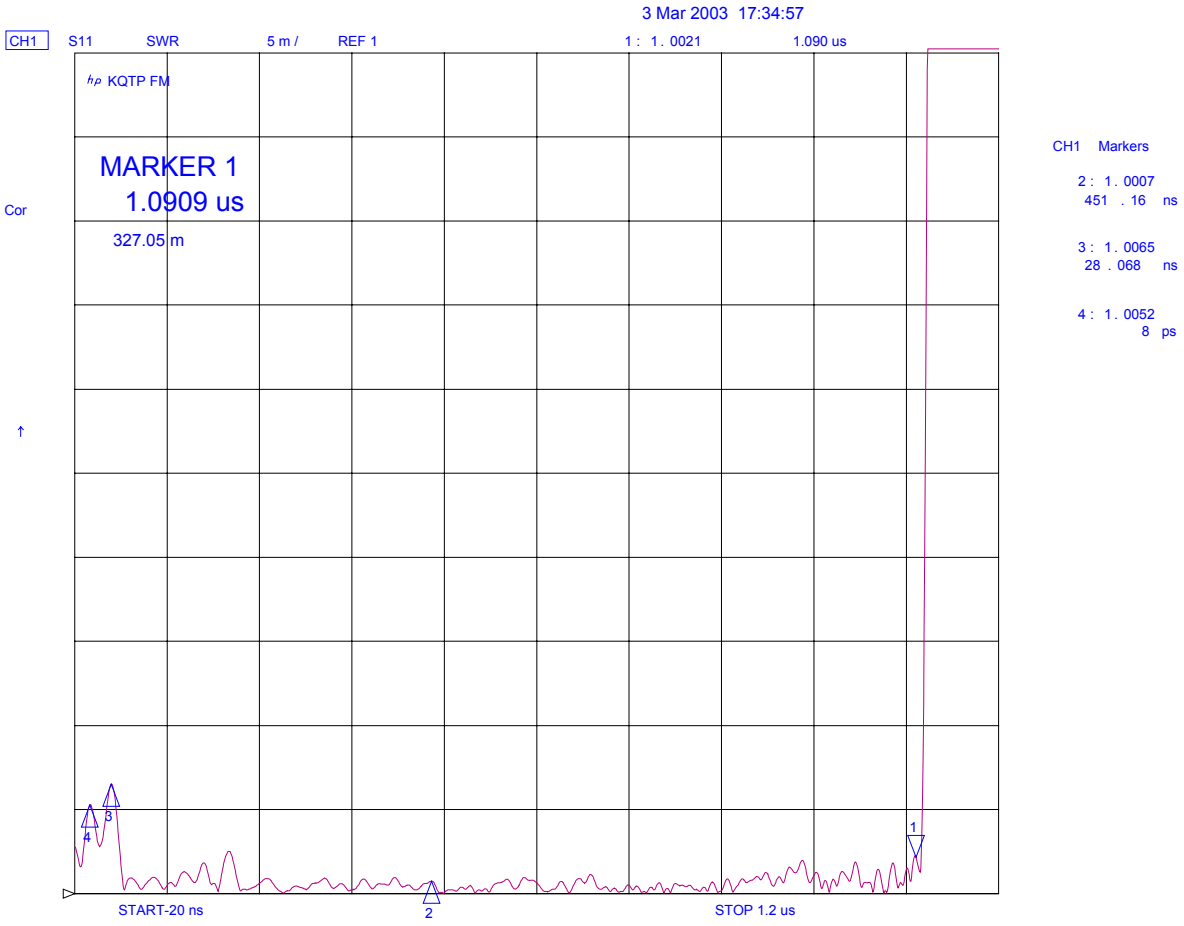
Plot # 13 Final Frequency Domain Smith Chart
10 Mhz Frequency Span

KQTP-FM Antenna System
Cumulus Broadcasting



Plot # 14 Final Time Domain VSWR
10 Mhz Frequency Span

KQTP-FM Antenna System
Cumulus Broadcasting



Plot #15 Final Time Domain VSWR
100 Mhz Frequency Span

Summary & Conclusion

By the tests and measurements performed on the KQTP-FM antenna system, the reflections that were present appeared to be within acceptable limits. The tuned system had a VSWR of 1.018 to 1, as shown in Plot #7. The system also measured a VSWR of 1.02 to 1 for 100 Khz above and below the assigned frequency, see Plot #7. The proceedings described in this report were witnessed by the station's contract engineer, Tom Toerjes, and met with his approval. The transmitter was energized to full power and the VSWR meter indicated a system reflection of 1.02 to 1.

This report has been prepared by myself or under my direction and the statements contained herein are true and accurate to the best of my belief and knowledge.

Richard Wood
Staff Engineer
D. L. Markley & Associates, Inc.
March 5, 2003

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FAX 673-8128

Directional Antenna Installation Affidavit

Station-KQTP-FM

Frequency- 102.9 Mhz

Channel- 275

Directional Antenna- Dielectric Inc. Model DCR-M –6 ED

Sirs:

I have inspected the Directional FM antenna installation for the above listed station and found it to be pursuant with the manufacturer's instructions and installation drawings.

Richard H. Wood
FCC General Class Radio Telephone License # PG-18-28010
Staff Engineer
D. L. Markley & Associates, Inc.
March 7, 2003