

# ***KLEIN BROADCAST ENGINEERING***

*dedicated to improving the science and technology of radio & television communications*

## **ENGINEERING EVALUATION & REPORT**

**RE: KPEB(FM) COALVILLE , UTAH  
EQUIPMENT PERFORMANCE  
MEASUREMENTS  
(FCC RF Proof of Performance)**

**PREPARED FOR:**

**MILLCREEK BROADCASTING**

**MARCH 2004**

COMPUTERIZED ENGINEERING REPORTS/ALLOCATIONS STUDIES  
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# ***KLEIN BROADCAST ENGINEERING, L.L.C.***

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## **ENGINEERING / EVALUATION REPORT**

### **EQUIPMENT PERFORMANCE MEASUREMENTS FM RF PROOF OF PERFORMANCE**

**K P E B (FM)  
FM CHANNEL 276 C / 103.1mHz.  
COALVILLE, UT  
MAIN TRANSMISSION FACILITY**

### **INTRODUCTION and ENGINEERING STATEMENT**

**This Engineering Evaluation Report, RF Proof of Performance Measurements, was prepared in support of certification of the operations of the specified transmitting systems herein as being in compliance with 47 C.F.R. Section 73.1590 of the Rules and Regulations of the Federal Communications Commission and in compliance with 47 C.F.R. 73.317 of the Rules and Regulations of the Federal Communications Commission.**

**In the case of the KPEB Main Transmission System, the measurement equipment was set up according to Good Engineering Practice. The calibration of the Tektronix 2795 Spectrum Analyzer was checked according to the manufacturer's instructions. The point of measurement in the system was a directional coupler at the output port of a Shivley Laboratories, Inc., four station combiner. Station KPEB is combined into a common antenna with three other FM Broadcast Stations.**

## **INTRODUCTION and ENGINEERING STATEMENT cont'd page two: KPEB**

Measurements were made on the station's carrier frequency for reference purposes and to look at occupied bandwidth for any unusual spurious emission. The assigned carrier frequency reference level was recorded and photographed. All other harmonic, intermodulation product or spurious emission levels were referenced to this initial carrier frequency reference level. The radio spectrum from 50mHz. up to this station's 10<sup>th</sup> carrier frequency harmonic was tuned to look for any unusual emissions. Any deviation from the FCC prescribed limits will be noted in this report.

The intermodulation products measured in this report were calculated as the common  $2 \times A - B =$  Intermodulation product. As in the case herein the carrier frequency of the station under test was multiplied times 2 and then the carrier frequency of each of the combined individual stations was subtracted one at a time from the 2X sum to find the common intermodulation product.

No unusual spurious emissions, carrier frequency harmonics or intermodulation products were noted on the Main Transmission System for Station KPEB. Harmonic products were measured up to and including the 10<sup>th</sup> order. The spectrum analyzer measurements were adjusted by a factor of -6dB per octave as prescribed by Good Engineering Practice. The measurement levels found in this report have been adjusted by this octave factor.

**INTRODUCTION and ENGINEERING STATEMENT cont'd page three: KPEB**

The input amplifiers of the spectrum analyzer were protected from overload by using a calibrated set of tunable band-pass filters that cover the radio spectrum from 50mHz to 1.4GHz. This practice prevents level compression and false readings from occurring by keeping the input amplifiers of the spectrum analyzer in their linear range of operation. This measurement set up is common to Good Engineering Standards and Practice. All cables used in the test set up were RG-223 double shielded coaxial cables to insure no stray fields were induced into the measurement cables.

Unless otherwise noted the FM transmission system under test and documented in this report complied with all the provisions of 47 C.F.R. Section 73.317 of the Rules and Regulations of the Federal Communications Commission.

The measurements found herein were made on March 23, 2004 between the hours of 9:57am M.S.T. and 2:45pm M.S.T.

Respectfully submitted,

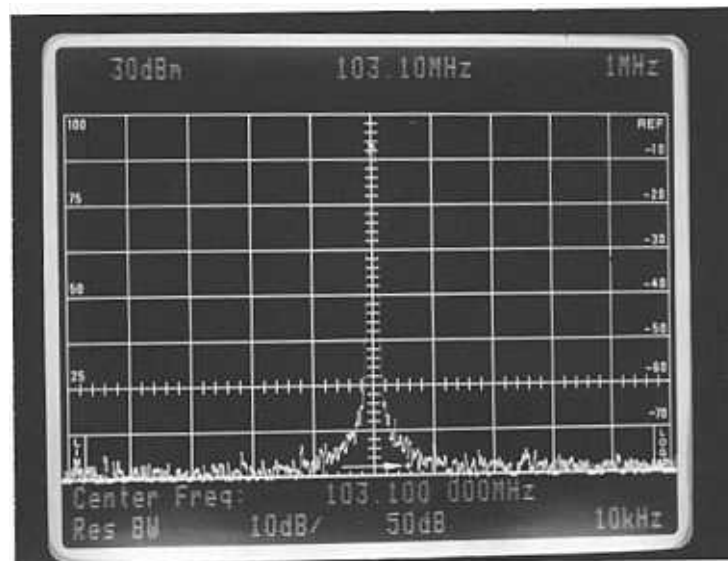
A handwritten signature in black ink, appearing to be 'EK Klein', with a long horizontal line extending to the right.

**Elliott Kurt Klein,  
Consulting Broadcast Engineer**

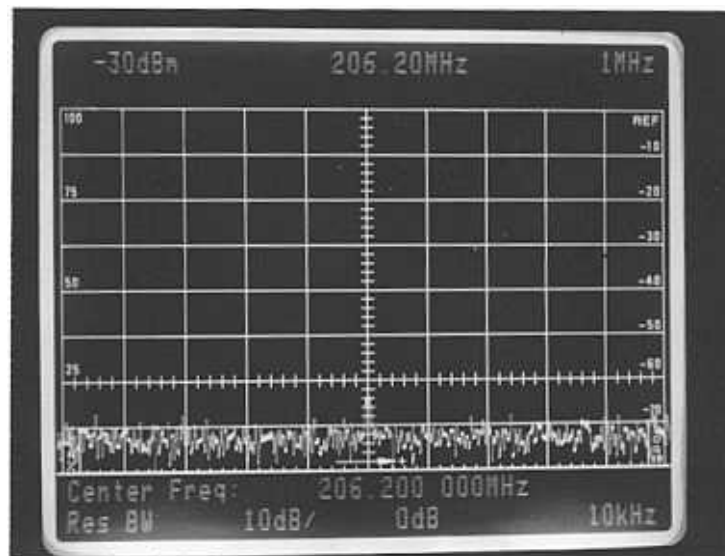
**24 March 2004**

**TABLE of READINGS and SPECTRUM ANALYZER PHOTOGRAPHS**

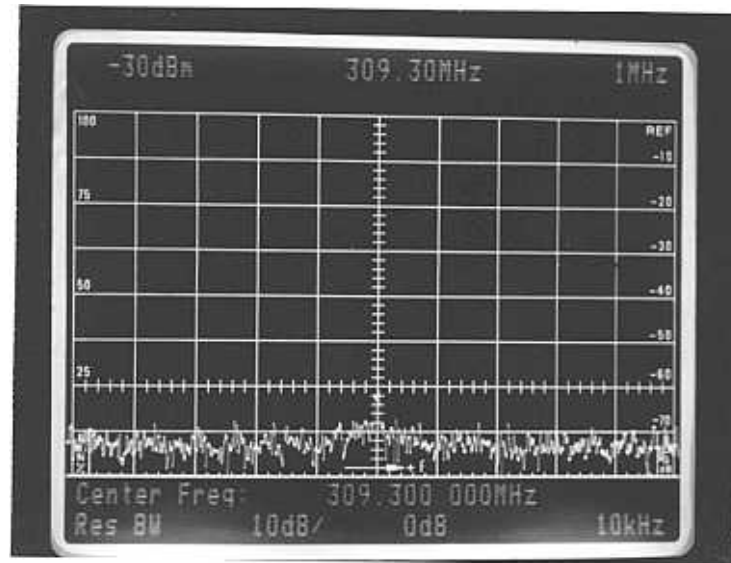
**Main Transmission System Reference Level 103.1mHz. +24.0dBm**



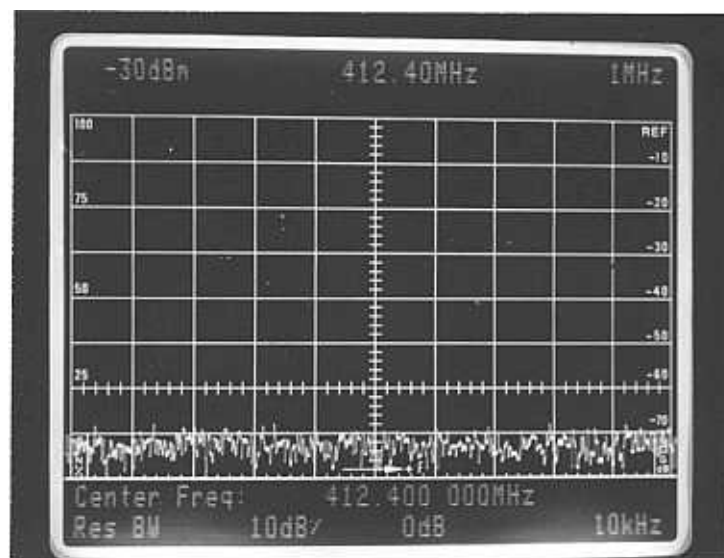
**Main Transmission System 2<sup>nd</sup> Harmonic 206.2mHz. -124.0dBc**



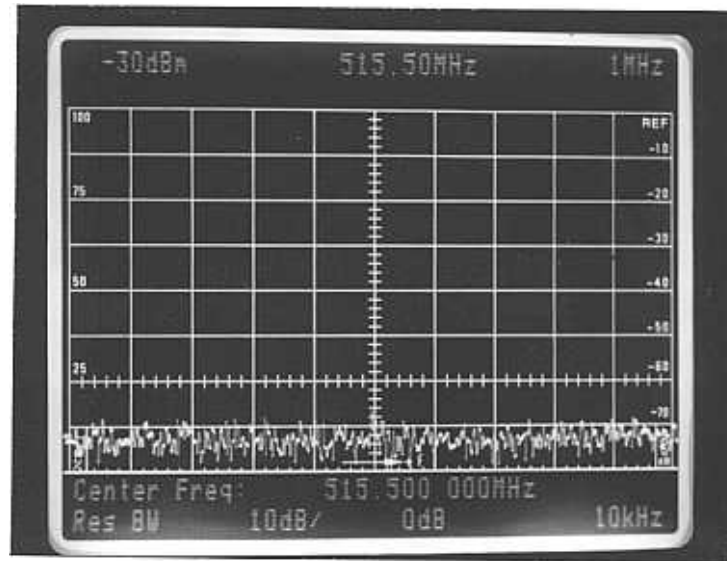
**Main Transmission System 3<sup>rd</sup> Harmonic 309.3mHz. -125.0dBc**



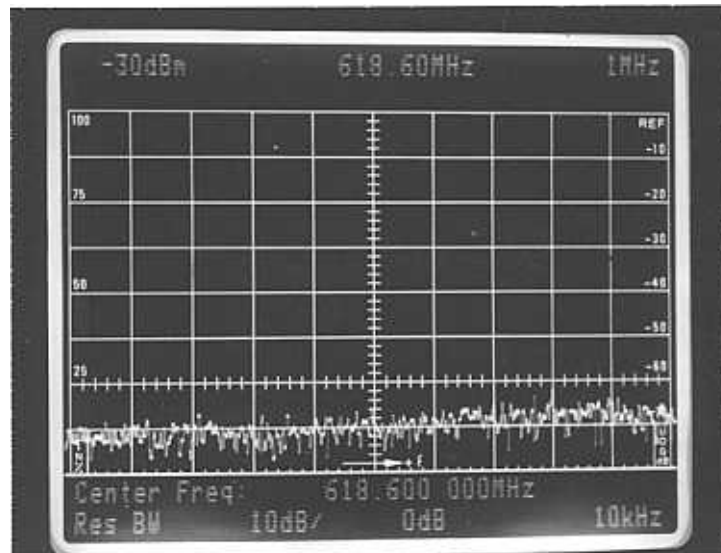
**Main Transmission System 4<sup>th</sup> Harmonic 412.4mHz. -125.0dBc**



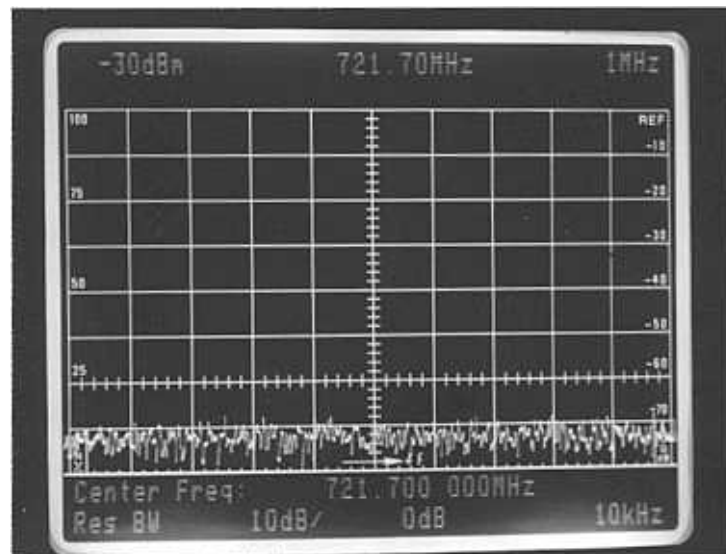
**Main Transmission System 5<sup>th</sup> Harmonic 515.5mHz. -125.0dBc**



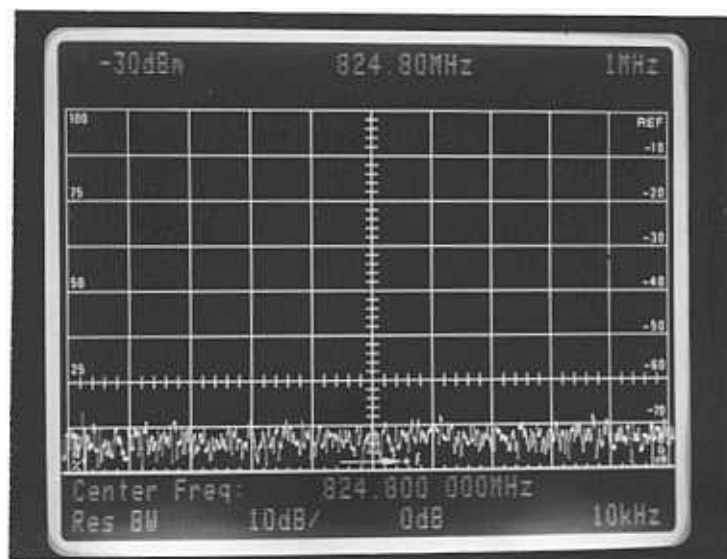
**Main Transmission System 6<sup>th</sup> Harmonic 618.6mHz. -125.0dBc**



**Main Transmission System 7<sup>th</sup> Harmonic 721.7mHz. -125.0dBc**

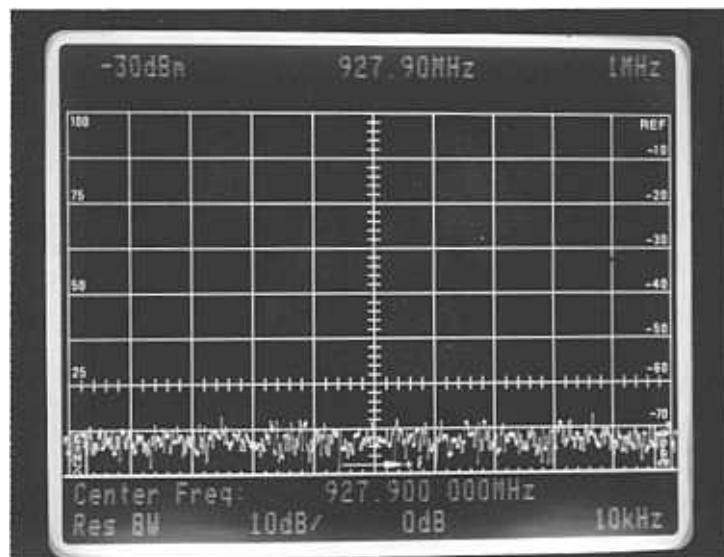


**Main Transmission System 8<sup>th</sup> Harmonic 824.8mHz. -125.0dBc**

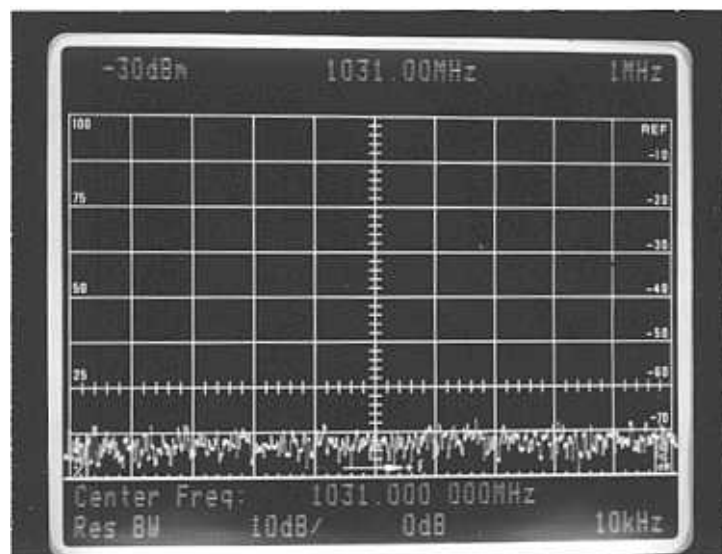




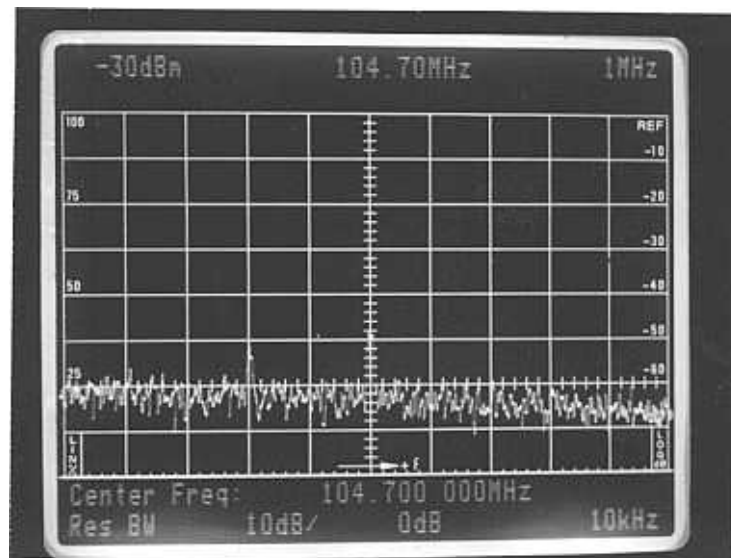
**Main Transmission System 9<sup>th</sup> Harmonic 927.9mHz. -125.0dBc**



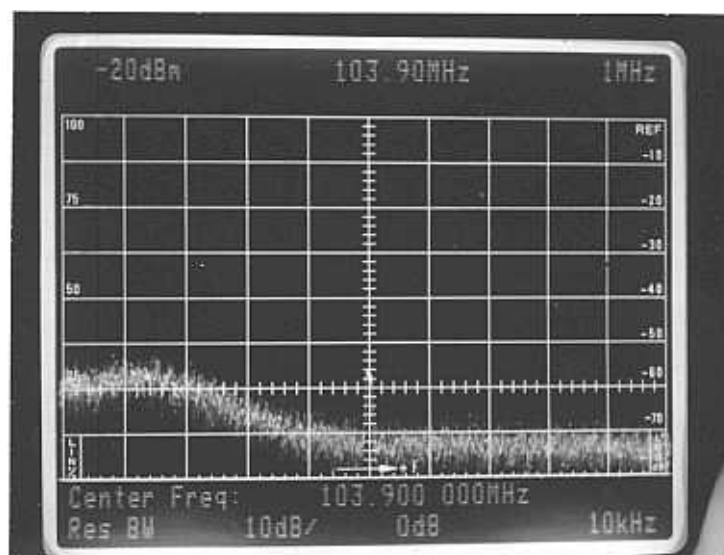
**Main Transmission System 10<sup>th</sup> Harmonic 1.031GHz. -125.0dBc**



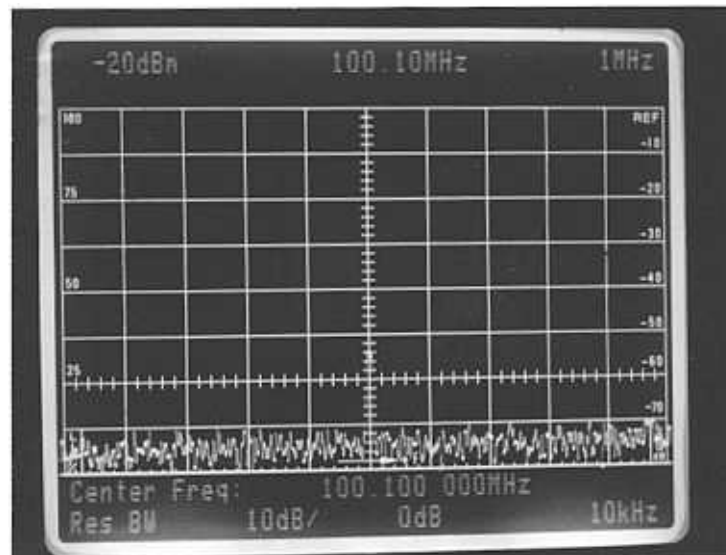
**Measured Intermodulation Product with KEGA(FM) 101.5mHz  
 $2 \times 103.1\text{mHz} - 101.5\text{mHz} = 104.7\text{mHz}$ . Measured -103.0 dBc**



**Measured Intermodulation Product with KDUT(FM) 102.3mHz  
 $2 \times 103.1\text{mHz} - 102.3\text{mHz} = 103.9\text{mHz}$  Measured -100.0 dBc**



**Measured Intermodulation Product with KOTB(FM) 106.1mHz  
2 X 103.1mHz -106.1mHz = 100.1mHz Measured -108.0dBc**



### **Measurement Equipment Listing**

- 1. Tektronix Spectrum Analyzer model 2795, serial #B010221, calibrated NBS tracable 21 December 2000**
  - 2. Trilithic Series VF-40003, serial #9711119, Custom Tunable Band-Pass Filter set 50mHz. to 1.4gHz.**
  - 3. Tektronix C-5A Scope Camera with Polaroid 667 3000ASA Film**
  - 4. Test Cables RG223 Double Shielded Coaxial Cable**
  - 5. Hewlett-Packard RF Frequency Counter, model 53181A, serial # 3710A02728, calibrated NBS traceable, 25 January 2004**
  - 6. Bird Electronics RF BNC Sniffer Slug**
  - 7. Bird Electronics 2watt RF Termination -47dB return loss @ 100mHz.**
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