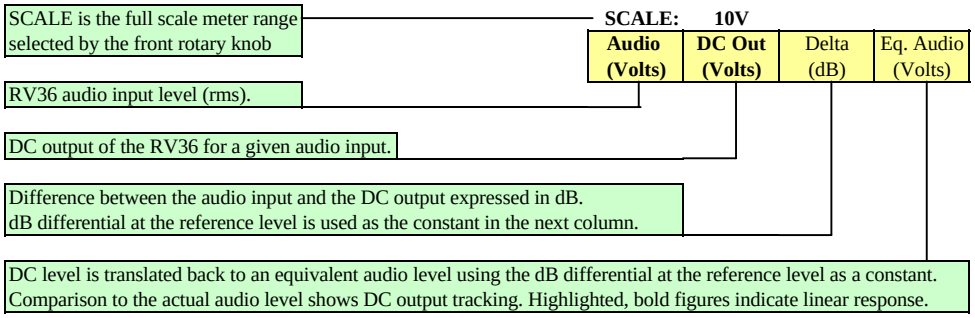
DTV Channel 6 Interference to FM Band Reception

Laboratory Test Report

RMS Meter and Analog to Digital Converter Calibration

Objective: To provide a fast responding DC signal from a true rms detector to the A/D converter card for quantization of the test radio noise floor.
Meter: RV36 AF Millivoltmeter - rms detector DC output characterization
Date: 29-Mar
By: RMc

Chart 1
For a given range, the DC output is recorded as the audio level is changed.
Calculations and comparisons are made.



A comparison of Audio (dBV) Vs DC Output (dBV) at the 1V range where 1Vrms = 0dB

	SCALE:	10V			3V			1V					
	Audio (Volts)	**DC Out (Volts)**	Delta (dB)	Eq. Audio (Volts)	**DC Out (Volts)**	Delta (dB)	Eq. Audio (Volts)	**DC Out (Volts)**	Delta (dB)	Eq. Audio (Volts)	**DC dBV**	**Audio dBV**	**Audio (Volts)**
Ref	**10**	0.532	25.482	**10.000**	1.357	17.348	8.078	1.722	15.279	3.255	10.25	20.00	**10**
	9	0.480	25.460	**9.023**	1.297	16.826	7.720	1.700	14.476	3.214	10.14	19.08	**9**
	8	0.427	25.453	**8.027**	1.227	16.285	7.304	1.680	13.556	3.176	10.04	18.06	**8**
	7	0.374	25.445	**7.030**	1.138	15.779	6.774	1.647	12.568	3.113	9.86	16.90	**7**
	6	0.321	25.433	**6.034**	1.010	15.477	**6.012**	1.610	11.427	3.044	9.67	15.56	**6**
	5	0.267	25.449	**5.019**	0.843	15.463	**5.018**	1.558	10.128	2.945	9.38	13.98	**5**
	4	0.212	25.523	**3.981**	0.670	15.520	**3.988**	1.463	8.736	2.766	8.84	12.04	**4**
Ref	**3**	0.158	25.569	**2.970**	0.504	15.494	**3.000**	1.325	7.098	2.505	7.98	9.54	**3**
	2	0.107	25.457	**2.006**	0.339	15.417	**2.018**	1.065	5.474	**2.013**	6.08	6.02	**2**
Ref	**1**	0.051	25.849	**0.959**	0.166	15.598	**0.988**	0.529	5.531	**1.000**	0.00	0.00	**1**
	0.9	0.047	25.588	**0.889**	0.151	15.505	**0.899**	0.482	5.433	**0.910**	-0.82	-0.92	**0.9**
	0.8	0.042	25.597	**0.789**	0.134	15.520	**0.798**	0.428	5.433	**0.809**	-1.84	-1.94	**0.8**
	0.7	0.036	25.776	**0.677**	0.117	15.538	**0.696**	0.374	5.445	**0.707**	-3.01	-3.10	**0.7**
	0.6	0.031	25.652	**0.588**	0.100	15.563	**0.595**	0.321	5.433	**0.607**	-4.34	-4.44	**0.6**
	0.5	0.026	25.580	**0.494**	0.084	15.494	**0.500**	0.268	5.417	**0.507**	-5.91	-6.02	**0.5**
	0.4	0.021	25.638	**0.393**	0.067	15.572	**0.396**	0.213	5.494	**0.402**	-7.92	-7.96	**0.4**
	0.3	0.016	25.736	**0.291**	0.049	15.703	**0.293**	0.158	5.569	**0.299**	-10.50	-10.46	**0.3**
	0.2	0.0109	25.2721	**0.2049**	0.0323	15.837	**0.192**	0.1047	5.622	**0.198**	-14.07	-13.98	**0.2**
	0.1	0.0069	23.2230	0.1297	0.0162	15.810	**0.096**	0.0514	5.781	**0.097**	-20.25	-20.00	**0.1**
	0.09	0.0066	22.6940	0.1241	0.0148	15.680	**0.088**	0.0469	5.661	**0.089**	-21.05	-20.92	**0.09**
	0.08	0.0063	22.0750	0.1184	0.0134	15.520	**0.080**	0.0419	5.618	**0.079**	-22.02	-21.94	**0.08**
	0.07	0.0061	21.1954	0.1147	0.0118	15.464	**0.070**	0.0366	5.632	**0.069**	-23.20	-23.10	**0.07**
	0.06	0.0058	20.2945	0.1090	0.0103	15.306	**0.061**	0.0312	5.680	**0.059**	-24.59	-24.44	**0.06**
	0.05	0.0056	19.0156	0.1053	0.0090	14.895	**0.054**	0.0261	5.647	**0.049**	-26.14	-26.02	**0.05**
	0.04	0.0055	17.2339	0.1034	0.0077	14.311	0.046	0.0207	5.722	**0.039**	-28.15	-27.96	**0.04**
	0.03	0.0054	14.8945	0.1015	0.0067	13.021	0.040	0.0156	5.680	**0.029**	-30.61	-30.46	**0.03**
	0.02	0.0053	11.5351	0.0996	0.0059	10.604	0.035	0.0108	5.352	**0.020**	-33.80	-33.98	**0.02**
	0.01	0.0520	-14.3201	0.9775	0.0540	-14.648	0.321	0.0068	3.350	0.013	-37.82	-40.00	**0.01**

Calibration Notes

Chart 1 was generated to determine the linear range of the RV 36 Millivoltmeter DC output for a given meter range.
The difference between the audio input and the DC output is calculated (in dB) and is displayed in the Delta (dB) column.
This dB Delta figure (at the reference level) is then used in the next column to convert the DC level back to an equivalent audio level figure.
The reference level is equal to the full scale voltage of the selected range. (1V is the Reference level when the 1V scale is selected)
Comparison of the "Equivalent Audio Lev" figure and the actual audio input level may be made to check the linearity of the DC Output.
Enough data was taken to show that there is a 40dB linear range to work with in any one scale of the RV36.
Checks at the 300mV and 100mV ranges agreed with the response shown in Chart 1.

Calibration of the RV36 to the measurement system (A/D card and CVI software) was then performed in the following manner;

* The test radio (Delco auto radio) was set to give 2Vrms audio output as 0dB (standard output) with 100% stereo modulation (1kHz @ 91%, L=R, Pilot @ 9%)
* The RV36 was set to the 1V range. (1.065Vdc resultant output)
* The CVI software was then calibrated for 1.07Vdc = 0dB.
* For noise measurements the RV36 was set to the 100mV range (+20dB amplification) for better resolution of the noise floor.
* The analog to digital converter has 12 bit resolution and the sample rate was programmed at 2 kHz.
* Data was taken at a 10 kHz sample rate and compared to the 2 kHz data with no significant differences detected.