Jeff Welton
Sales Manager, Central USA
Nautel

Mike Pappas
VP Business Development
Orban Labs

TRANSMISSION TALK TUESDAY

Episode #57

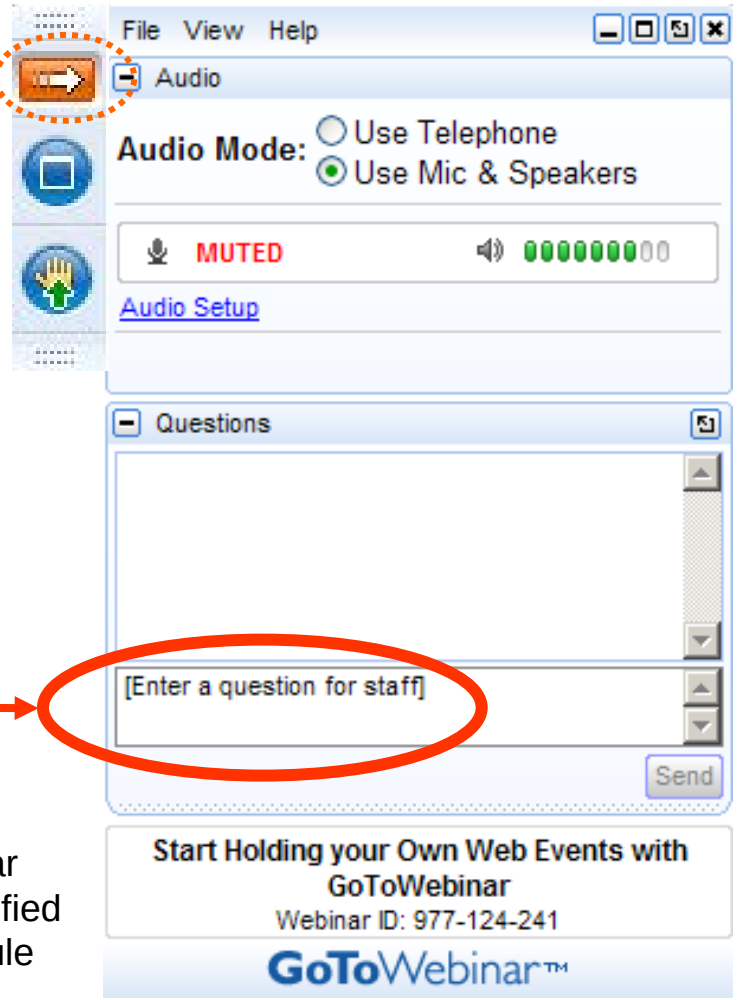
Doing More with Less

nautel
AM/FM Radio Transmitters

Your questions please?

(if you don't see the control panel, click on the orange arrow icon to expand it)

Please enter your questions in the text box of the webinar control panel (remember to press send)

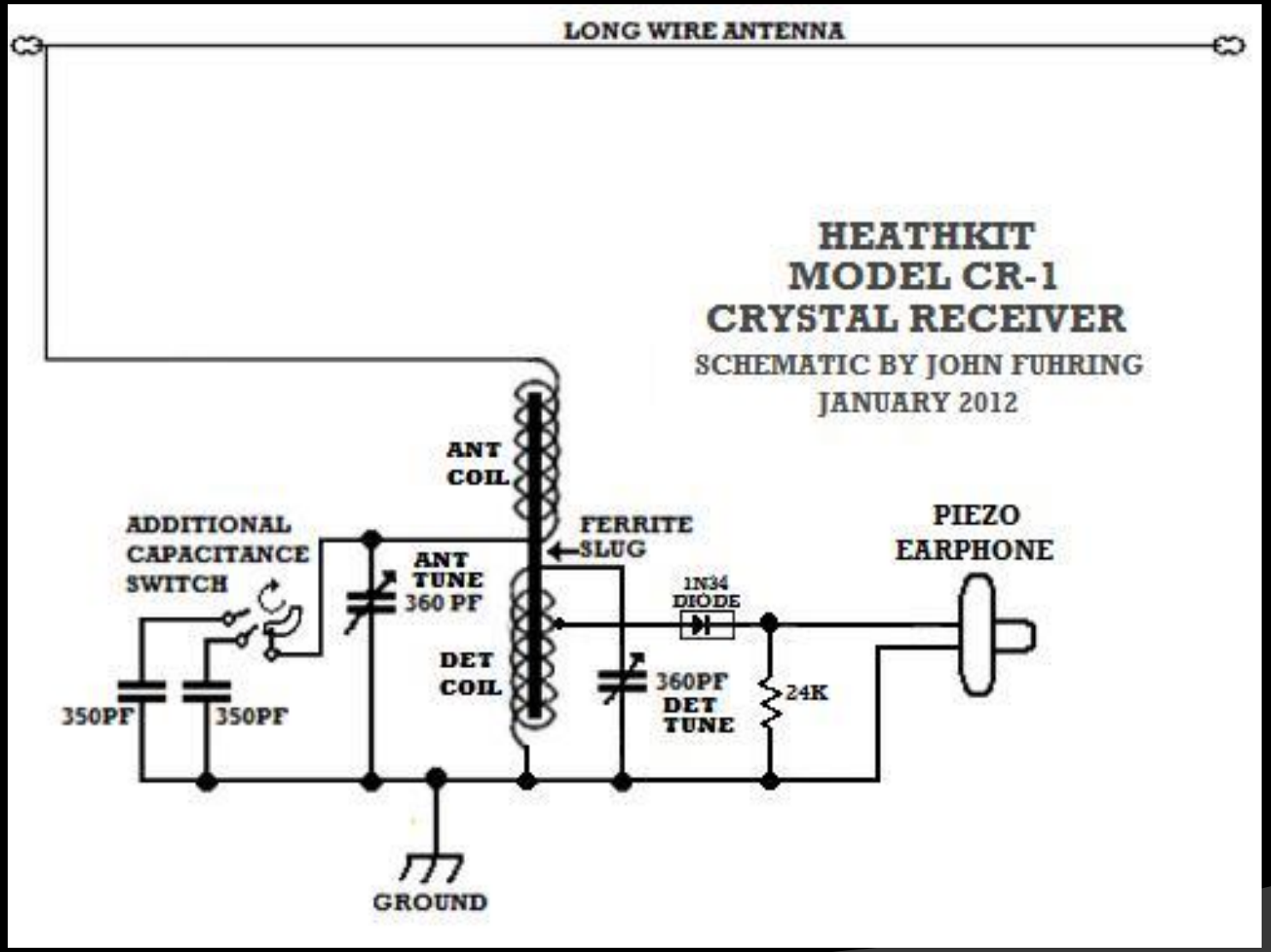


Remember: The completion of a Nautel webinar qualifies for ½ SBE re-certification credit, identified under Category I of the Re-certification Schedule for SBE Certifications.

AM Radio

- Outside of Spark-Gap and CW it’s the oldest form of modulation
- Take a carrier and modulate it with audio!
- Simple and easy to implement and it’s been on the air for 100 years

AM Modulation



AM Efficiency

- The downside to AM
  - Very inefficient to transmit
  - The AM carrier uses 66% of the transmitter power
    - Yet delivers no useful information!
    - Even with modern PWM AM transmitters the power consumption for a 50 kW AM station is substantial
  - So how do we make AM more efficient?

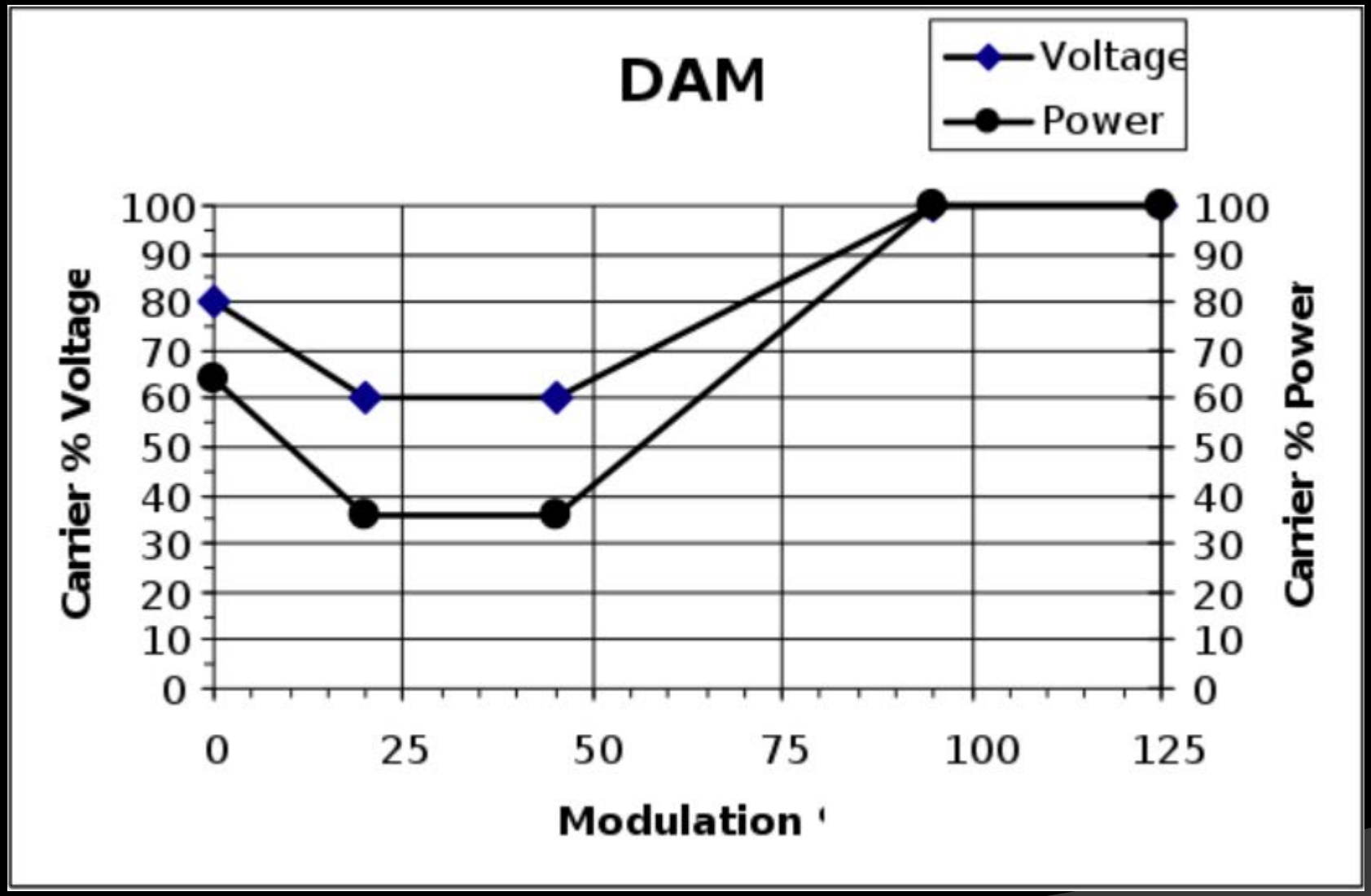
AM MDCL

- This is referred to as Modulation Dependent Carrier Level (MDCL)
- There are two ways of achieving MDCL
  - DAM, which reduces the carrier level when audio is low
  - AMC, which maintains the carrier at maximum when no audio is present and reduces the carrier and the modulation together by up to 6 dB when modulation is at a maximum

AM MDCL DAM

- With DAM the carrier is decreased the most at moderate modulation levels
- Received loudness is increased when carrier is reduced
- The carrier is increased at higher modulation levels so that distortion does not occur
- As modulation density has substantially increased with modern audio processing the efficiency improvement with DAM is reduced

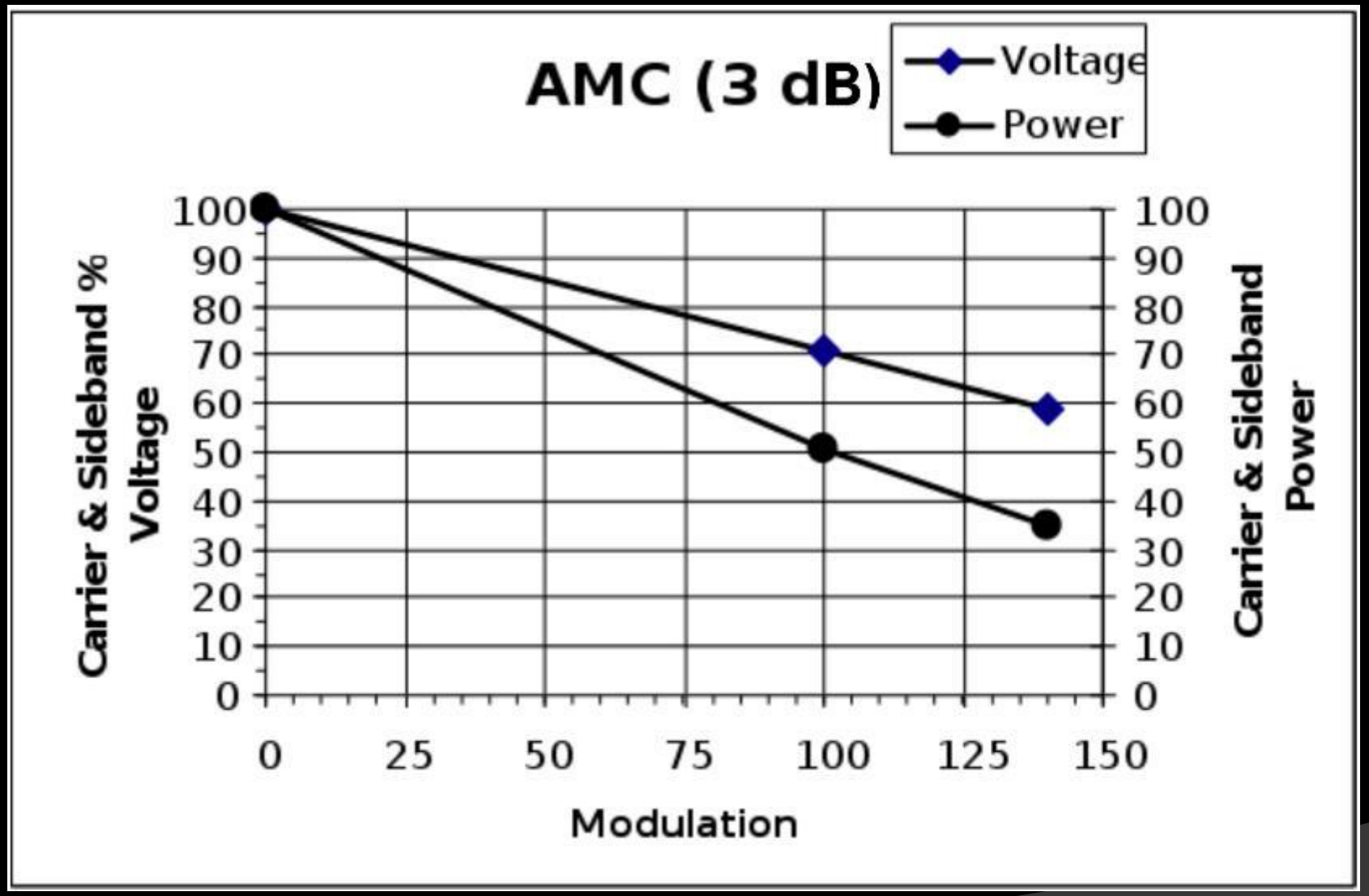
AM MDCL DAM Gain Function



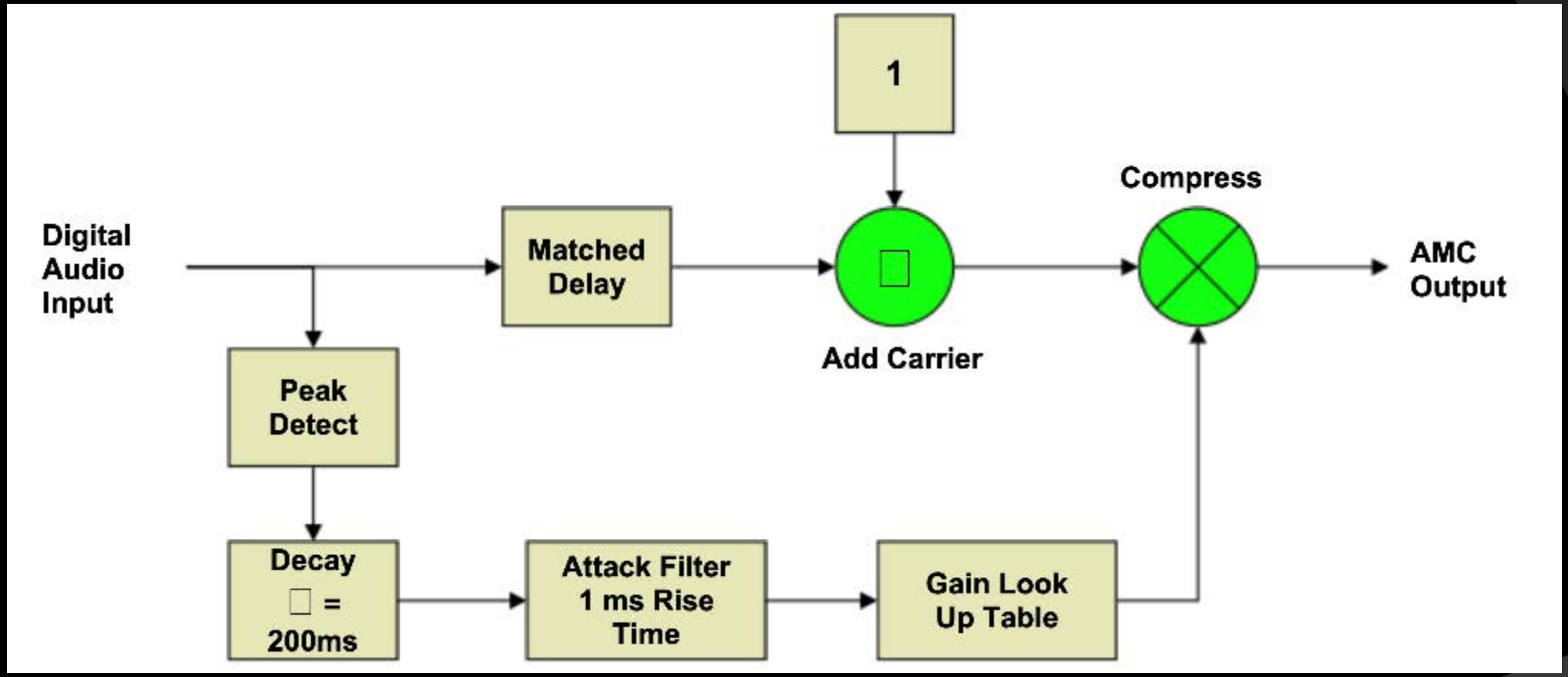
AM MDCL AMC

- Carrier and modulation together are decreased with increasing audio modulation
- The carrier is increased to full power during quiet periods when noise is most easily perceived
- As modulation density has substantially increased with modern audio processing AMC can generate greater efficiency

AM MDCL AMC Gain Function



AM MDCL AMC Transmitter Block



AM MDCL AMC In The Field Testing

At the 0.5 mV/m location

AM 100% Symmetrical Field Strength uV/m	dBm	AC Power kW	MDCL AMC 125%	Field Strength uV/m	dBm	Delta dBm	AC Power kW	Delta AC kW	Reduction in power consumption
610	-51.28	5.26	3 dB	436	-54.20	-2.92	2.74	-2.52	-47.83%
			4 dB	386	-55.28	-4.00	2.21	-3.05	-57.98%
			5 dB	349	-56.13	-4.85	1.96	-3.30	-62.74%
			6 dB	325	-56.75	-5.47	1.18	-4.08	-77.51%

AM MDCL AMC Testing Results

- Higher modulation density gives the MDCL system the ability to suppress the carrier to a much greater extent for longer periods of time
- At 6dB of AMC a 77% reduction in transmitter power consumption was observed
- Slight degradation in fringe coverage at AMC levels greater than 3 dB
- Townsquare & Bonneville are running 6 dB AMC on their stations that have transmitters that can do that with zero listener complaints since 2020 and significant power savings

AM MDCL

Calculate your energy savings with Nautel's MDCL technology

Enter values into the green cells to estimate your savings.

Assumption: 30% savings in energy consumption when using MDCL

	Select Modulation Density		Mild
	Current	NX Power 3	With MDCL
Cost per kW/h (US cents)	19	19	19
Power of Transmitter in kW	2.5	2.5	2.5
Rated Efficiency	73%	73%	73%
Modulation Factor	1.1	1.1	1.1
Consumption in kW/H	3.8	3.4	2.3
Hours of Operation / Day	24	24	24
Days of Operation / Year	365	365	365
Total Yearly Consumption in kW/H	33,000	29,378	20,565
Total Transmitter Energy Cost (USD)	$6,270	$5,582	$3,907
Transmitter Power Savings / Year		$688	$2,363
A/C Costs may add 10-15%	$941	$837	$586
Total Energy Cost	$7,211	$6,419	$4,493
Total Energy Savings / Year		**$791**	**$2,717**
Total Carbon Footprint Savings (Tons)		3	11

https://www.nautel.com/am-mdcl-savings/

TRANSMISSION TALK TUESDAY

CJLI AM is running a Nautel NX50 at 50 kilowatt day and 20 kilowatt night

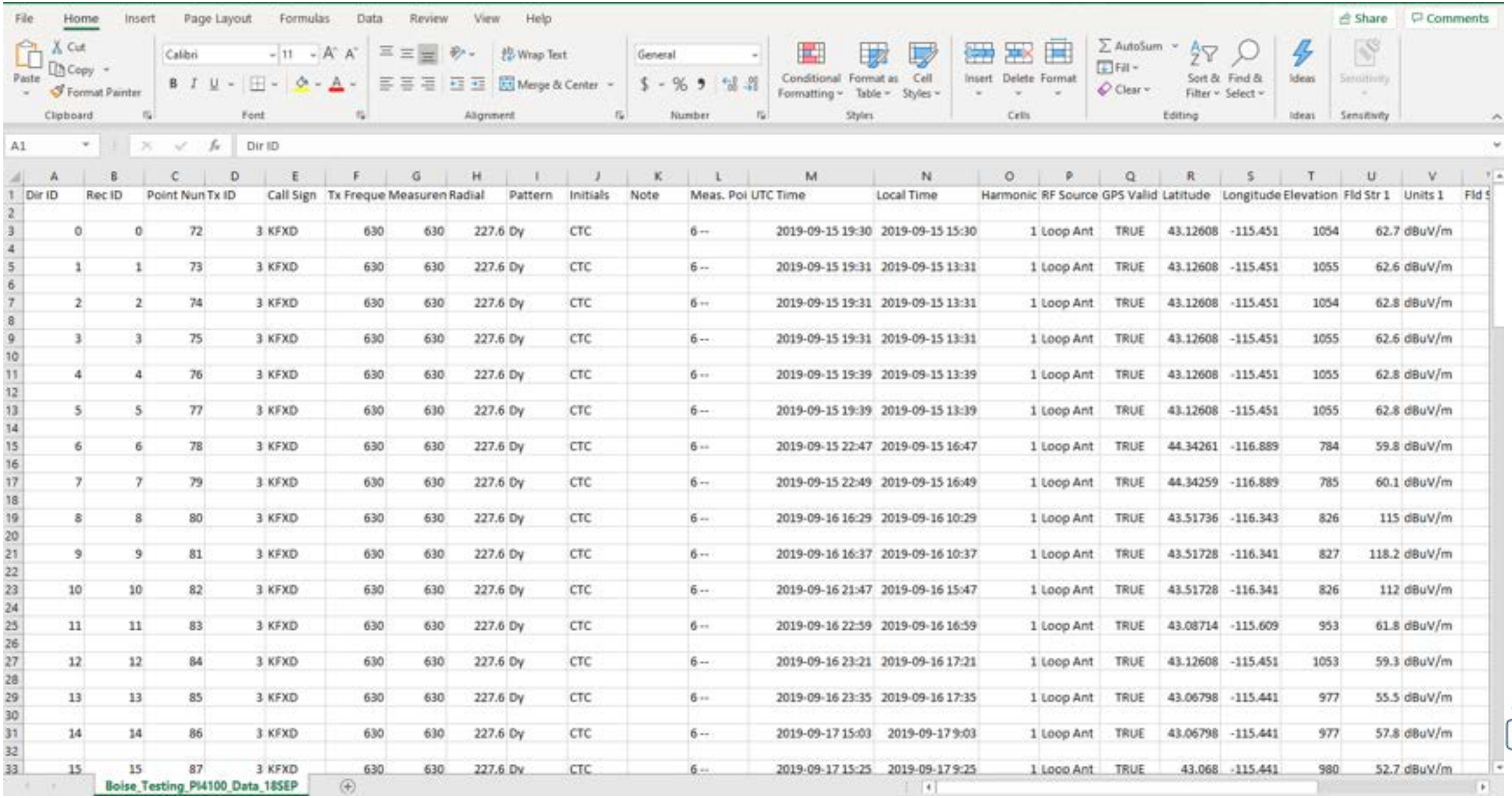
	Consumption kWh		Consumption kWh	Difference kWh	$ Saving
Jul-15	44779.384	Jul-16	23884.484	20894.9	1274.5889
Aug-15	50750.622	Aug-16	23580.889	27169.733	1657.353713
Sep-15	35083.258	Sep-16	21870.333	13212.925	805.988425
Oct-15	32424.265	Oct-16	21935.383	10488.882	639.821802
Nov-15	28886.104	Nov-16	20139.711	8746.393	533.529973
Dec-15	30224.039	Dec-16	20759.523	9464.516	577.335476
Jan-16	29855.579	Jan-17	19940.055	9915.524	604.846964
Feb-16	31116.847	Feb-17	20137.595	10979.252	669.734372
Mar-16	33739.007	Mar-17	22999.591	10739.416	655.104376
Apr-16	35060.207	Apr-17	23820.054	11240.153	685.649333
May-16	38863.99	May-17	23789.018	15074.972	919.573292
Jun-16	33611.845	Jun-17	24576	9035.845	551.186545
Totals	424395.147		267432.636	156962.511	9574.713171 Total Savings
					36.98499196 % Less kWh

Touch Canada Broadcasting Limited Partnership owns CJCA AM in Edmonton, Alberta and CJLI AM in Calgary, Alberta. These are Touch Canada Broadcasting LP actual invoices comparison of kilowatt hours consumption from the previous year without running MDCL.

The NX50 ran for 13 months without MDCL running, before the feature was turned on. The NX50 has the MDCL feature built into the transmitter.

A field modification needed to be purchased for the XL60 transmitter. It cost us $11,000 plus for the field modification kit. It took about six hours to install and set up FM12005 kit on the XL60. We are running AMC algorithm at 3dB compression at both sites. We pay 6.1 cents per kWh

AM MDCL



Dir ID	Rec ID	Point Num	Tx ID	Call Sign	Tx Freque	Measuren	Radial	Pattern	Initials	Note	Meas. Poi	UTC Time	Local Time	Harmonic	RF Source	GPS Valid	Latitude	Longitude	Elevation	Fld Str 1	Units 1	Fld S
0	0	72	3	KFXD	630	630	227.6	Dy	CTC		6 --	2019-09-15 19:30	2019-09-15 15:30	1	Loop Ant	TRUE	43.12608	-115.451	1054	62.7	dBuV/m	
1	1	73	3	KFXD	630	630	227.6	Dy	CTC		6 --	2019-09-15 19:31	2019-09-15 13:31	1	Loop Ant	TRUE	43.12608	-115.451	1055	62.6	dBuV/m	
2	2	74	3	KFXD	630	630	227.6	Dy	CTC		6 --	2019-09-15 19:31	2019-09-15 13:31	1	Loop Ant	TRUE	43.12608	-115.451	1054	62.8	dBuV/m	
3	3	75	3	KFXD	630	630	227.6	Dy	CTC		6 --	2019-09-15 19:31	2019-09-15 13:31	1	Loop Ant	TRUE	43.12608	-115.451	1055	62.6	dBuV/m	
4	4	76	3	KFXD	630	630	227.6	Dy	CTC		6 --	2019-09-15 19:39	2019-09-15 13:39	1	Loop Ant	TRUE	43.12608	-115.451	1055	62.8	dBuV/m	
5	5	77	3	KFXD	630	630	227.6	Dy	CTC		6 --	2019-09-15 19:39	2019-09-15 13:39	1	Loop Ant	TRUE	43.12608	-115.451	1055	62.8	dBuV/m	
6	6	78	3	KFXD	630	630	227.6	Dy	CTC		6 --	2019-09-15 22:47	2019-09-15 16:47	1	Loop Ant	TRUE	44.34261	-116.889	784	59.8	dBuV/m	
7	7	79	3	KFXD	630	630	227.6	Dy	CTC		6 --	2019-09-15 22:49	2019-09-15 16:49	1	Loop Ant	TRUE	44.34259	-116.889	785	60.1	dBuV/m	
8	8	80	3	KFXD	630	630	227.6	Dy	CTC		6 --	2019-09-16 16:29	2019-09-16 10:29	1	Loop Ant	TRUE	43.51736	-116.343	826	115	dBuV/m	
9	9	81	3	KFXD	630	630	227.6	Dy	CTC		6 --	2019-09-16 16:37	2019-09-16 10:37	1	Loop Ant	TRUE	43.51728	-116.341	827	118.2	dBuV/m	
10	10	82	3	KFXD	630	630	227.6	Dy	CTC		6 --	2019-09-16 21:47	2019-09-16 15:47	1	Loop Ant	TRUE	43.51728	-116.341	826	112	dBuV/m	
11	11	83	3	KFXD	630	630	227.6	Dy	CTC		6 --	2019-09-16 22:59	2019-09-16 16:59	1	Loop Ant	TRUE	43.08714	-115.609	953	61.8	dBuV/m	
12	12	84	3	KFXD	630	630	227.6	Dy	CTC		6 --	2019-09-16 23:21	2019-09-16 17:21	1	Loop Ant	TRUE	43.12608	-115.451	1053	59.3	dBuV/m	
13	13	85	3	KFXD	630	630	227.6	Dy	CTC		6 --	2019-09-16 23:35	2019-09-16 17:35	1	Loop Ant	TRUE	43.06798	-115.441	977	55.5	dBuV/m	
14	14	86	3	KFXD	630	630	227.6	Dy	CTC		6 --	2019-09-17 15:03	2019-09-17 9:03	1	Loop Ant	TRUE	43.06798	-115.441	977	57.8	dBuV/m	
15	15	87	3	KFXD	630	630	227.6	Dy	CTC		6 --	2019-09-17 15:25	2019-09-17 9:25	1	Loop Ant	TRUE	43.068	-115.441	980	52.7	dBuV/m	

Boise_Testing_PI4100_Data_18SEP

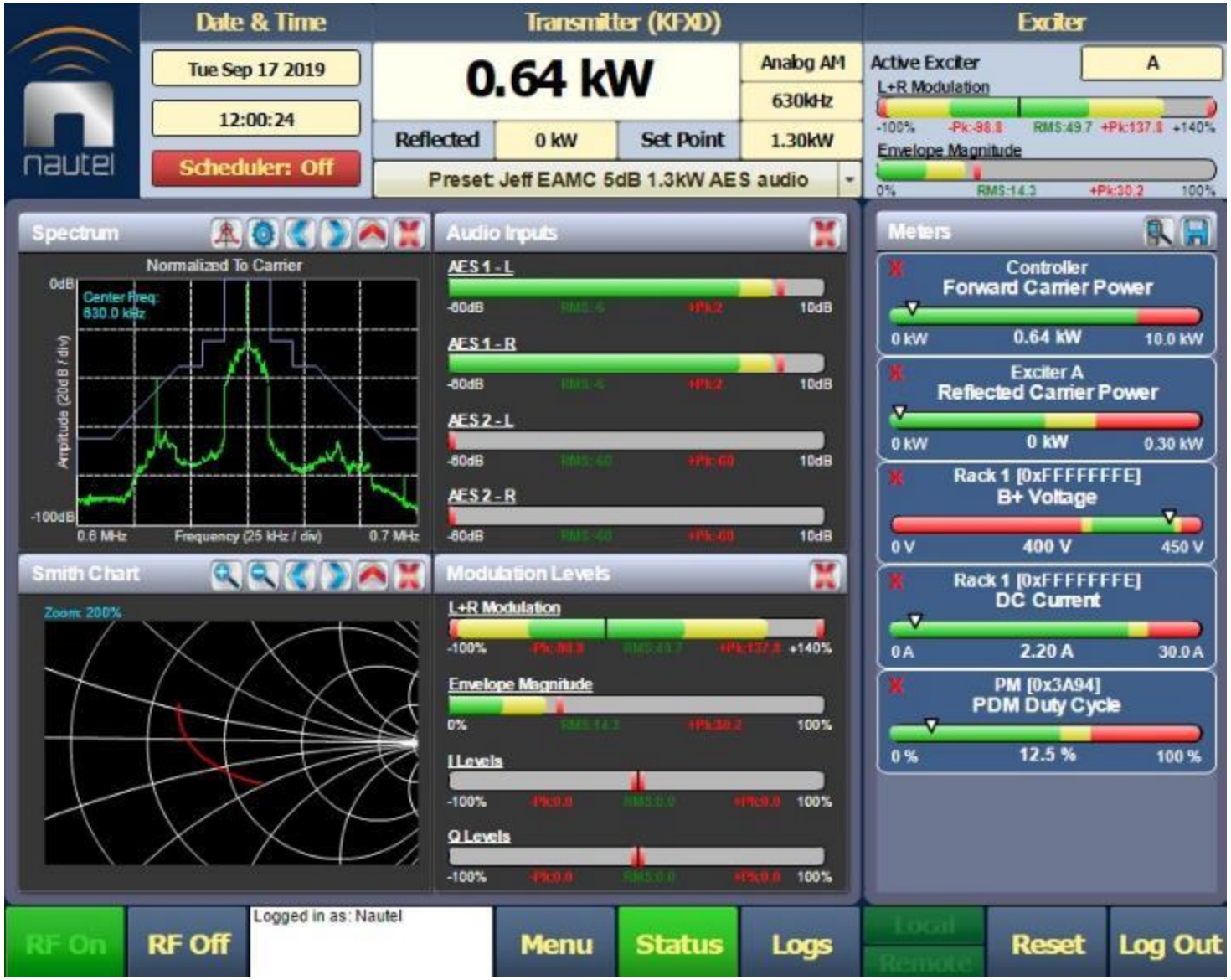
AM MDCL

R3 | S(SUM)

	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG
1	Date	Time	V12	Unit	V23	Unit	V31	Unit	A1	Unit	A2	Unit	A3	Unit	P(SUM)	Unit	S(SUM)	Unit	Q(SUM)	Unit	PF(SUM)	Unit	PFH	Unit	WH	Unit	SH	Unit	QH	Unit	FREQ	Unit
2	2019-09-16	19:26:10	209.9	ACV	209	ACV	210.3	ACV	12.33	ACA	12.1	ACA	11.87	ACA	3.757	KW	4.392	KVA	2.275	KVAR	0.85		0.86		0.78	KWH	0.904	KVAH	0.471	KVARH	60	Hz
3	Date	Time	V12	Unit	V23	Unit	V31	Unit	A1	Unit	A2	Unit	A3	Unit	P(SUM)	Unit	S(SUM)	Unit	Q(SUM)	Unit	PF(SUM)	Unit	PFH	Unit	WH	Unit	SH	Unit	QH	Unit	FREQ	Unit
4	2019-09-17	8:33:47	207.6	ACV	207.2	ACV	208.6	ACV	16.23	ACA	15.8	ACA	15.7	ACA	5.017	KW	5.724	KVA	2.755	KVAR	0.87		0.88		0.287	KWH	0.324	KVAH	0.161	KVARH	60	Hz
5	2019-09-17	8:33:51	207.5	ACV	207.1	ACV	208.8	ACV	15.45	ACA	17.3	ACA	15.04	ACA	5.046	KW	5.732	KVA	2.717	KVAR	0.88		0.88		0.292	KWH	0.33	KVAH	0.164	KVARH	60	Hz
6	2019-09-17	8:33:55	207.8	ACV	207.3	ACV	208.7	ACV	14.11	ACA	15.36	ACA	13.46	ACA	4.511	KW	5.149	KVA	2.484	KVAR	0.87		0.88		0.297	KWH	0.336	KVAH	0.167	KVARH	60	Hz
7	2019-09-17	8:33:59	207.6	ACV	207.2	ACV	208.5	ACV	15.31	ACA	15.67	ACA	14.55	ACA	4.783	KW	5.458	KVA	2.628	KVAR	0.87		0.88		0.303	KWH	0.342	KVAH	0.17	KVARH	60	Hz
8	2019-09-17	8:34:03	207.5	ACV	207.3	ACV	208.6	ACV	14.84	ACA	15.77	ACA	14.2	ACA	4.689	KW	5.374	KVA	2.627	KVAR	0.87		0.88		0.308	KWH	0.349	KVAH	0.173	KVARH	60	Hz
9	2019-09-17	8:34:07	207.5	ACV	207.1	ACV	208.6	ACV	15.61	ACA	15.95	ACA	15.09	ACA	4.912	KW	5.59	KVA	2.669	KVAR	0.87		0.88		0.314	KWH	0.355	KVAH	0.176	KVARH	60	Hz
10	2019-09-17	8:34:11	207.5	ACV	207	ACV	208.5	ACV	15.61	ACA	14.34	ACA	13.7	ACA	4.476	KW	5.089	KVA	2.421	KVAR	0.87		0.88		0.319	KWH	0.361	KVAH	0.179	KVARH	60	Hz
11	2019-09-17	8:34:15	207.6	ACV	206.9	ACV	208.6	ACV	16.12	ACA	15.7	ACA	15.53	ACA	4.969	KW	5.676	KVA	2.742	KVAR	0.87		0.88		0.324	KWH	0.367	KVAH	0.182	KVARH	60	Hz
12	2019-09-17	8:34:19	207.5	ACV	207	ACV	208.6	ACV	16.66	ACA	14.67	ACA	13.35	ACA	4.696	KW	5.356	KVA	2.575	KVAR	0.87		0.88		0.33	KWH	0.373	KVAH	0.184	KVARH	60	Hz
13	2019-09-17	8:34:23	207.5	ACV	207.2	ACV	208.6	ACV	15.31	ACA	15.69	ACA	14.78	ACA	4.796	KW	5.488	KVA	2.666	KVAR	0.87		0.88		0.335	KWH	0.379	KVAH	0.188	KVARH	60	Hz
14	2019-09-17	8:34:27	207.8	ACV	207.2	ACV	208.7	ACV	15.14	ACA	15.86	ACA	14.7	ACA	4.81	KW	5.482	KVA	2.628	KVAR	0.87		0.88		0.34	KWH	0.385	KVAH	0.191	KVARH	60	Hz
15	2019-09-17	8:34:31	207.7	ACV	207.1	ACV	208.8	ACV	15.72	ACA	14.28	ACA	15.21	ACA	4.747	KW	5.423	KVA	2.623	KVAR	0.87		0.88		0.346	KWH	0.391	KVAH	0.194	KVARH	60	Hz
16	2019-09-17	8:34:35	207.6	ACV	207.1	ACV	208.9	ACV	15.76	ACA	15.17	ACA	14.64	ACA	4.78	KW	5.469	KVA	2.657	KVAR	0.87		0.88		0.35	KWH	0.396	KVAH	0.197	KVARH	60	Hz
17	2019-09-17	8:34:39	207.8	ACV	207.2	ACV	208.5	ACV	15.85	ACA	15.79	ACA	15.21	ACA	4.933	KW	5.614	KVA	2.681	KVAR	0.87		0.88		0.357	KWH	0.404	KVAH	0.2	KVARH	60	Hz
18	2019-09-17	8:34:43	207.7	ACV	207.3	ACV	208.7	ACV	14.77	ACA	15.85	ACA	14.3	ACA	4.714	KW	5.389	KVA	2.611	KVAR	0.87		0.88		0.362	KWH	0.41	KVAH	0.203	KVARH	60	Hz
19	2019-09-17	8:34:47	207.7	ACV	207.2	ACV	209.1	ACV	14.71	ACA	15.63	ACA	14.39	ACA	4.708	KW	5.372	KVA	2.588	KVAR	0.87		0.88		0.367	KWH	0.416	KVAH	0.206	KVARH	60	Hz
20	2019-09-17	8:34:51	207.7	ACV	207	ACV	208.9	ACV	16.44	ACA	16.18	ACA	16.09	ACA	5.104	KW	5.842	KVA	2.842	KVAR	0.87		0.88		0.373	KWH	0.422	KVAH	0.209	KVARH	60	Hz
21	2019-09-17	8:34:55	207.6	ACV	207.3	ACV	208.7	ACV	16.08	ACA	16.05	ACA	15.58	ACA	4.98	KW	5.72	KVA	2.813	KVAR	0.87		0.88		0.378	KWH	0.429	KVAH	0.212	KVARH	60	Hz
22	2019-09-17	8:34:59	207.7	ACV	207.1	ACV	208.7	ACV	15.76	ACA	16.85	ACA	15.32	ACA	5.02	KW	5.749	KVA	2.802	KVAR	0.87		0.88		0.384	KWH	0.435	KVAH	0.215	KVARH	60	Hz
23	2019-09-17	8:35:03	207.8	ACV	207	ACV	208.9	ACV	15.04	ACA	16.15	ACA	14.59	ACA	4.825	KW	5.489	KVA	2.618	KVAR	0.87		0.88		0.389	KWH	0.441	KVAH	0.218	KVARH	60	Hz
24	2019-09-17	8:35:07	207.6	ACV	207.1	ACV	208.8	ACV	14.91	ACA	16.52	ACA	14.5	ACA	4.849	KW	5.507	KVA	2.61	KVAR	0.88		0.88		0.395	KWH	0.447	KVAH	0.221	KVARH	60	Hz
25	2019-09-17	8:35:11	207.7	ACV	206.9	ACV	208.9	ACV	15.23	ACA	15.79	ACA	14.58	ACA	4.791	KW	5.471	KVA	2.641	KVAR	0.87		0.88		0.4	KWH	0.454	KVAH	0.224	KVARH	60	Hz
26	2019-09-17	8:35:15	207.8	ACV	207	ACV	208.8	ACV	15.87	ACA	15.87	ACA	15.37	ACA	4.94	KW	5.652	KVA	2.746	KVAR	0.87		0.88		0.406	KWH	0.46	KVAH	0.227	KVARH	60	Hz
27	2019-09-17	8:35:19	207.8	ACV	207	ACV	208.8	ACV	15.76	ACA	17.75	ACA	15.21	ACA	5.126	KW	5.845	KVA	2.809	KVAR	0.87		0.88		0.411	KWH	0.466	KVAH	0.23	KVARH	60	Hz
28	2019-09-17	8:35:23	207.8	ACV	207.3	ACV	208.7	ACV	14.29	ACA	15.2	ACA	13.83	ACA	4.552	KW	5.194	KVA	2.501	KVAR	0.87		0.88		0.416	KWH	0.472	KVAH	0.233	KVARH	60	Hz
29	2019-09-17	8:35:27	207.7	ACV	207.3	ACV	208.5	ACV	16.35	ACA	15.86	ACA	15.72	ACA	5.044	KW	5.744	KVA	2.749	KVAR	0.87		0.88		0.422	KWH	0.478	KVAH	0.236	KVARH	60	Hz
30	2019-09-17	8:35:31	207.6	ACV	207.1	ACV	208.8	ACV	15.5	ACA	16.38	ACA	14.97	ACA	4.924	KW	5.62	KVA	2.709	KVAR	0.87		0.88		0.427	KWH	0.485	KVAH	0.239	KVARH	60	Hz
31	2019-09-17	8:35:35	207.6	ACV	207.1	ACV	208.7	ACV	16.6	ACA	15.96	ACA	16.14	ACA	5.114	KW	5.839	KVA	2.818	KVAR	0.87		0.88		0.433	KWH	0.491	KVAH	0.242	KVARH	60	Hz
32	2019-09-17	8:35:39	207.6	ACV	207	ACV	208.5	ACV	15.89	ACA	16.32	ACA	15.31	ACA	4.993	KW	5.692	KVA	2.733	KVAR	0.87		0.88		0.439	KWH	0.498	KVAH	0.245	KVARH	60	Hz
33	2019-09-17	8:35:43	207.6	ACV	207.1	ACV	208.6	ACV	15.86	ACA	16.07	ACA	15.34	ACA	4.974	KW	5.668	KVA	2.718	KVAR	0.87		0.87		0.444	KWH	0.504	KVAH	0.248	KVARH	60	Hz
34	2019-09-17	8:35:47	207.6	ACV	207.1	ACV	208.6	ACV	15.64	ACA	15.9	ACA	14.97	ACA	4.873	KW	5.575	KVA	2.707	KVAR	0.87		0.88		0.45	KWH	0.51	KVAH	0.251	KVARH	60	Hz
35	2019-09-17	8:35:51	207.5	ACV	207.2	ACV	208.5	ACV	16.43	ACA	15.27	ACA	15.77	ACA	4.947	KW	5.69	KVA	2.81	KVAR	0.86		0.88		0.455	KWH	0.516	KVAH	0.254	KVARH	60	Hz
36	2019-09-17	8:35:55	207.6	ACV	207.2	ACV	208.7	ACV	15.54	ACA	15.6	ACA	14.96	ACA	4.834	KW	5.531	KVA	2.688	KVAR	0.87		0.88		0.461	KWH	0.523	KVAH	0.257	KVARH	60	Hz
37	2019-09-17	8:35:59	207.6	ACV	207	ACV	208.7	ACV	16.12	ACA	16.76	ACA	15.56	ACA	5.099	KW	5.807	KVA	2.778	KVAR	0.87		0.87		0.466	KWH	0.529	KVAH	0.26	KVARH	60	Hz
38	2019-09-17	8:36:03	207.7	ACV	206.5	ACV	208.6	ACV	16.73	ACA	15.69	ACA	16.28	ACA	5.145	KW	5.832	KVA	2.745	KVAR	0.88		0.88		0.472	KWH	0.535	KVAH	0.263	KVARH	60	Hz
39	2019-09-17	8:36:07	207.6	ACV	207.4	ACV	207.7	ACV	16.66	ACA	16.19	ACA	16.18	ACA	5.175	KW	5.872	KVA	2.775	KVAR	0.88		0.87		0.477	KWH	0.542	KVAH	0.266	KVARH	60	Hz
40	2019-09-17	8:36:11	207.2	ACV	207.4	ACV	208.8	ACV	15.86	ACA	15.26	ACA	15.28	ACA	4.863	KW	5.565	KVA	2.706	KVAR	0.87		0.88		0.483	KWH	0.548	KVAH	0.269	KVARH	59.9	Hz
41	2019-09-17	8:36:15	207.4	ACV	207.5	ACV	208.2	ACV	15.79	ACA	16.12	ACA	15.5	ACA	5	KW	5.685	KVA	2.705	KVAR	0.87		0.88		0.488	KWH	0.554	KVAH	0.272	KVARH	60	Hz
42	2019-09-17	8:36:19	207.6	ACV	207.1	ACV	208.6	ACV	15.51	ACA	15.91	ACA	14.95	ACA	4.887	KW	5.559	KVA	2.651	KVAR	0.87		0.88		0.494	KWH	0.56	KVAH	0.275	KVARH	60	Hz
43	2019-09-17	8:36:23	207.7	ACV	207	ACV	208.7	ACV	16.05	ACA	16	ACA	15.52	ACA	4.957	KW	5.701	KVA	2.816	KVAR	0.86		0.88		0.499	KWH	0.566	KVAH	0.278	KVARH	60	Hz
44	2019-09-17	8:36:27	207.5	ACV	207.2	ACV	208.8	ACV	14.56	ACA	15.54	ACA	14.21	ACA	4.661	KW	5.311	KVA	2.546	KVAR	0.87		0.88		0.504	KWH	0.572	KVAH	0.281	KVARH	60	Hz
45	2019-09-17	8:36:31	207.6	ACV	207.3	ACV	208.6	ACV	15.78	ACA	15.18	ACA	15.24	ACA	4.868	KW	5.54	KVA	2.644	KVAR	0.87		0.88		0.51	KWH	0.579	KVAH	0.284	KVARH	60	Hz

TRANSMISSION TALK TUESDAY

AM MDCL


Date & Time
Tue Sep 17 2019
12:00:24
Scheduler: Off
Transmitter (KFXD)
0.64 kW
Analog AM
630kHz
Reflected
0 kW
Set Point
1.30kW
Preset: Jeff EAMC 5dB 1.3kW AES audio
Exciter
Active Exciter
A
L+R Modulation
Envelope Magnitude
Spectrum
Normalized To Carrier
Center Freq: 630.0 kHz
Amplitude (20dB / div)
Frequency (25 kHz / div)
Audio Inputs
AES 1 - L
AES 1 - R
AES 2 - L
AES 2 - R
Meters
Controller
Forward Carrier Power
0 kW
0.64 kW
10.0 kW
Exciter A
Reflected Carrier Power
0 kW
0 kW
0.30 kW
Rack 1 [0xFFFFFFFE]
B+ Voltage
0 V
400 V
450 V
Rack 1 [0xFFFFFFFE]
DC Current
0 A
2.20 A
30.0 A
PM [0x3A94]
PDM Duty Cycle
0 %
12.5 %
100 %
Smith Chart
Zoom: 200%
Modulation Levels
L+R Modulation
Envelope Magnitude
I Levels
Q Levels
RF On
RF Off
Logged in as: Nautel
Menu
Status
Logs
Local
Remote
Reset
Log Out


SHURE

Online Information

Webinars
https://www.nautel.com/resources/webinars/

Nautel Waves Newsletter
https://www.nautel.com/newsletters/

YouTube
http://www.youtube.com/user/NautelLtd

Online Info, such as the Broadcasters' Desktop Resource
https://www.thebdr.net/

TRANSMISSION TALK TUESDAY

THANK YOU!

nautel
AM/FM Radio Transmitters