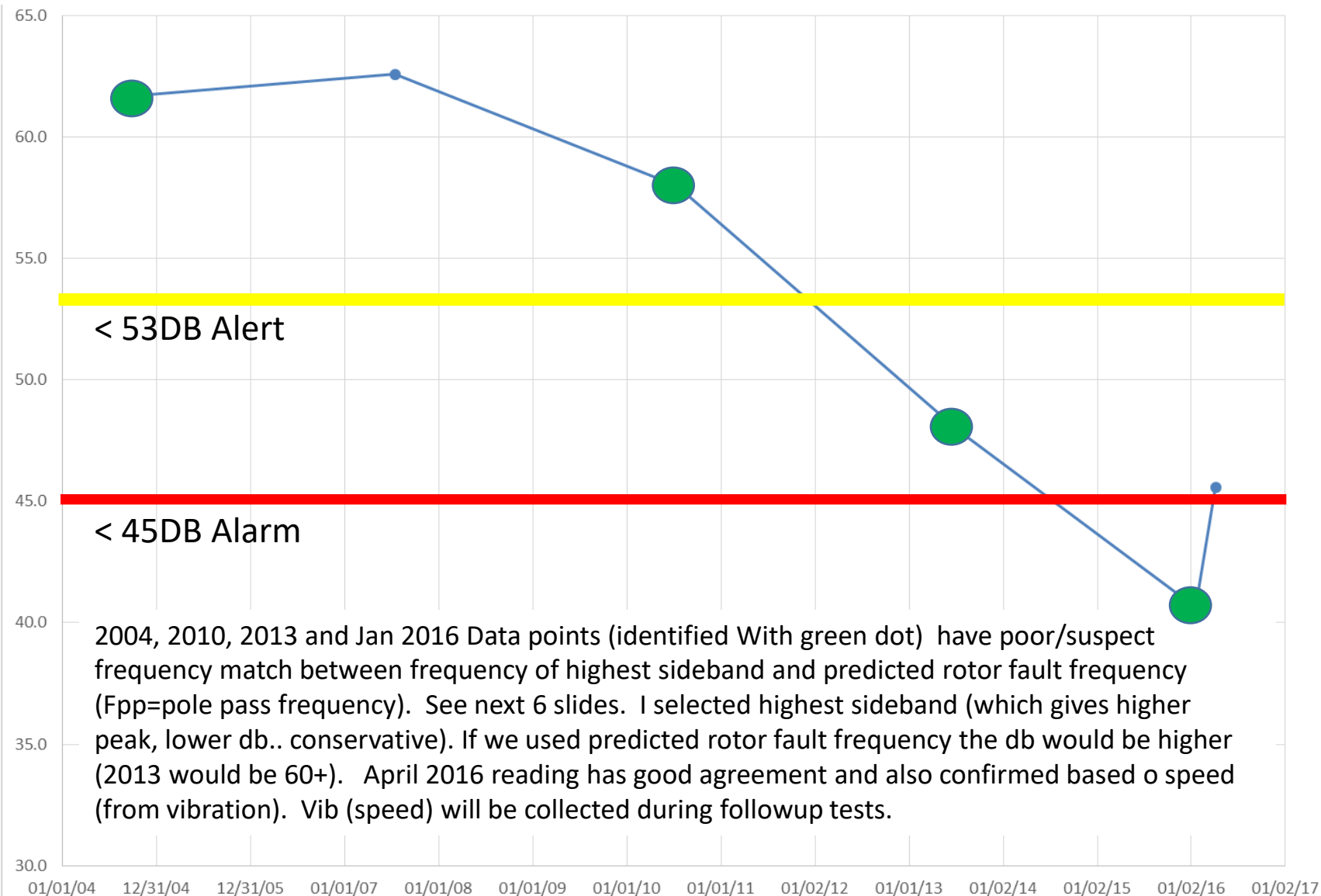


Current Signature Trend 12C

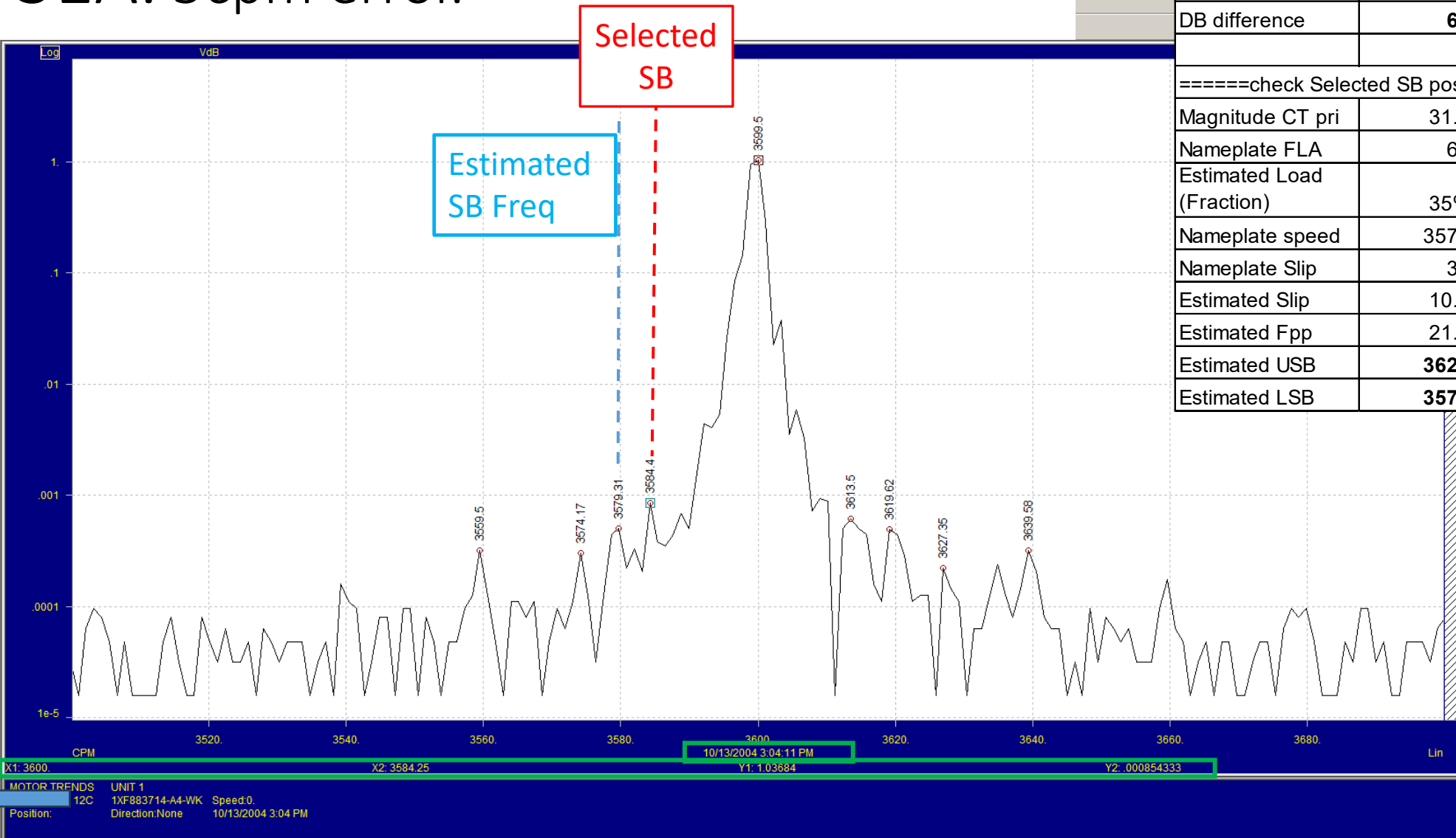
DB

$20 \log (\text{Amps}_{60} / \text{Amps}_{\text{Sb}})$

12C Amps Sideband magnitude (DB below main peak)

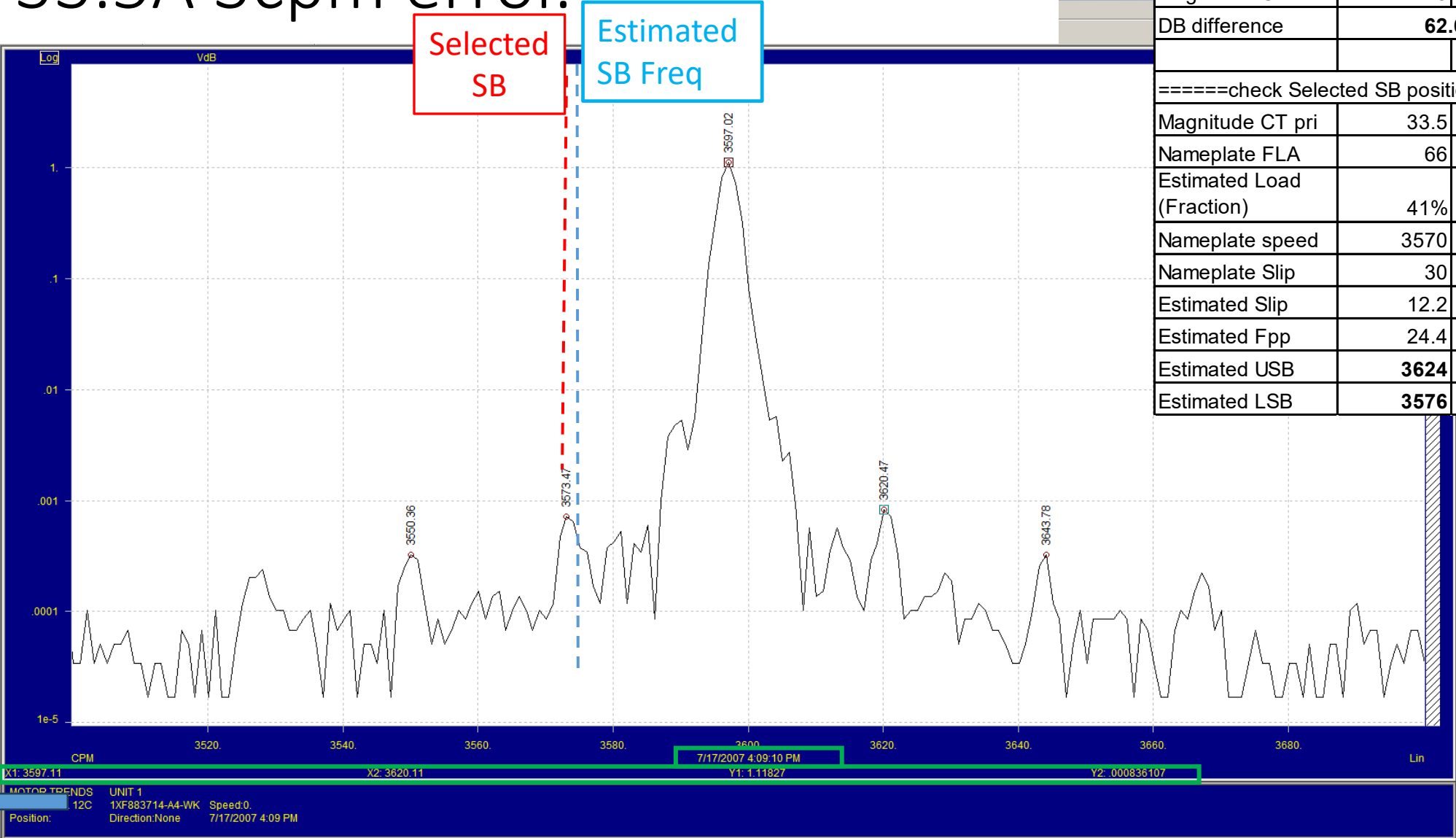


12C 10/13/2004 62db or higher
31A. 5cpm error.



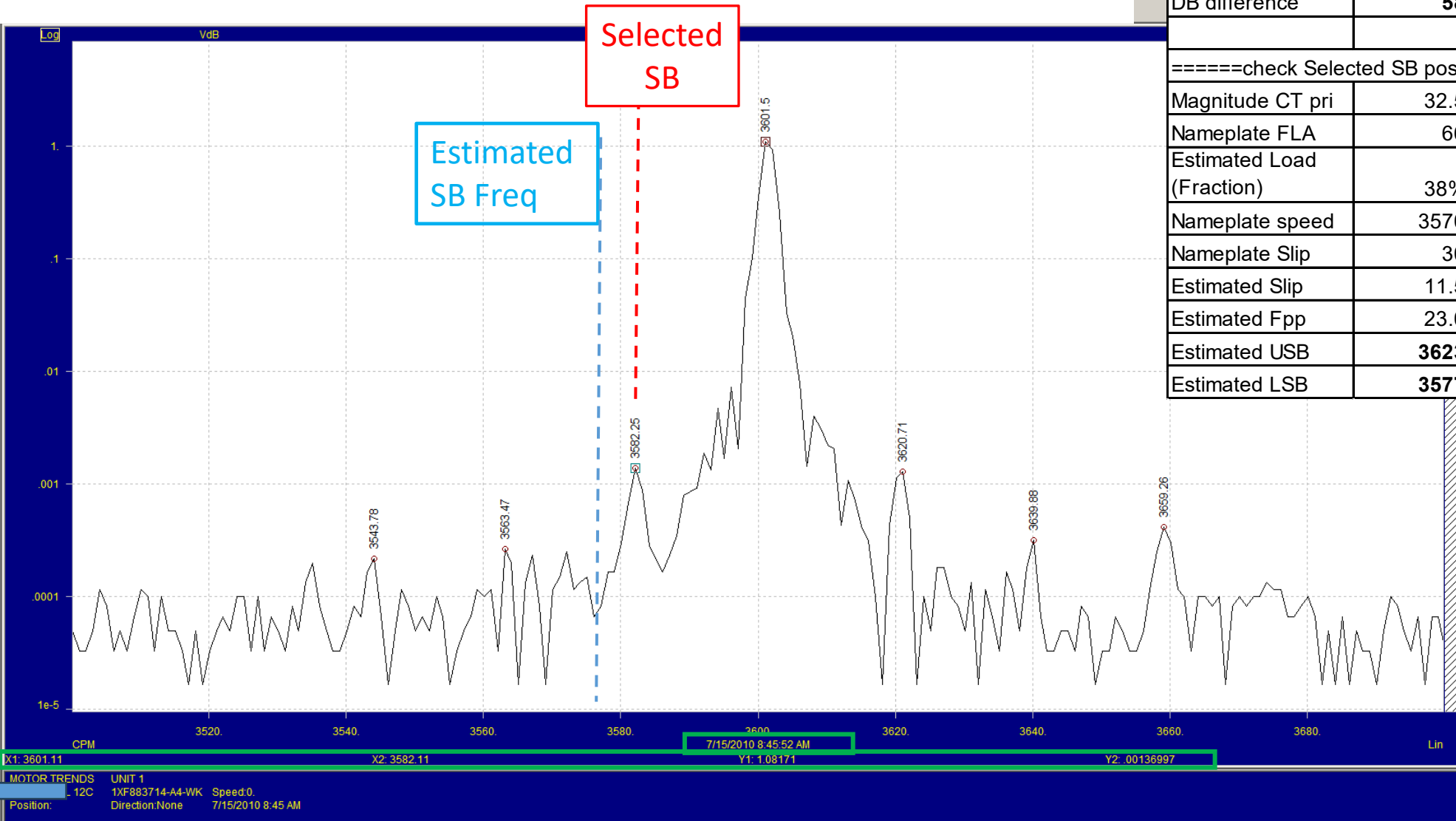
Test Date	10/13/04		
===Calc DB from observed/selected spectral data =====			
Parameter	Main Peak	Sideband	Comment / Formula
Freq (cpm)	3599.5	3584.4	From spectrum
Magnitude CT sec	1.037	0.00085	From spectrum
DB difference	61.7		DB = 20 LOG10 (Main / Sideband)
=====check Selected SB position vs posn est. from AMPs=====			
Magnitude CT pri	31.1		Use 30/1 CT ratio per 9EPKAA-01
Nameplate FLA	66		From nameplate
Estimated Load (Fraction)	35%		$\sqrt{\text{Current}^2 - 22^2} / \sqrt{\text{FLA}^2 - 22^2}$ note 22 is no-load amps from EC5027 DS
Nameplate speed	3570		From nameplate
Nameplate Slip	30		3600 - NP speed
Estimated Slip	10.6		NP Slip x Est Load (Fraction)
Estimated Fpp	21.2		Estimated Slip x poles (2)
Estimated USB	3621		3600 + Est Fpp
Estimated LSB	3579		3600 - Est Fpp

12C 7/17/2007 63db
33.5A 3cpm error.



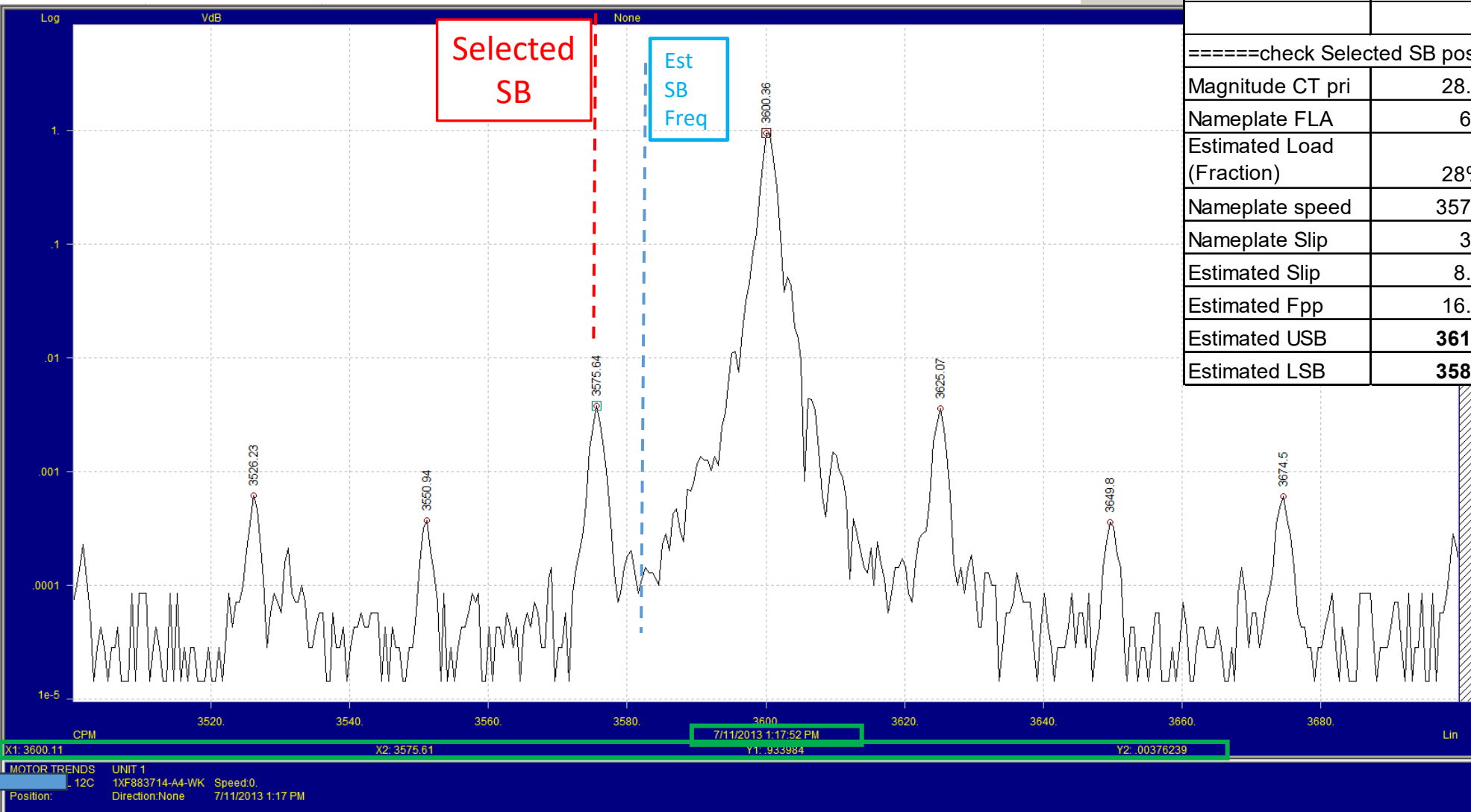
Test Date	07/17/07		
===Calc DB from observed/selected spectral data =====			
Parameter	Main Peak	Sideband	Comment / Formula
Freq (cpm)	3597	3573.5	From spectrum
Magnitude CT sec	1.118	0.00083	From spectrum
DB difference	62.6		DB = 20 LOG10 (Main / Sideband
=====check Selected SB position vs posn est. from AMPs=====			
Magnitude CT pri	33.5		Use 30/1 CT ratio per 9EPKAA-01
Nameplate FLA	66		From nameplate
Estimated Load (Fraction)	41%		$\sqrt{\text{Current}^2 - 22^2} / \sqrt{\text{FLA}^2 - 22^2}$ note 22 is no-load amps from EC5027 DS
Nameplate speed	3570		From nameplate
Nameplate Slip	30		3600 - NP speed
Estimated Slip	12.2		NP Slip x Est Load (Fraction)
Estimated Fpp	24.4		Estimated Slip x poles (2)
Estimated USB	3624		3600 + Est Fpp
Estimated LSB	3576		3600 - Est Fpp

12C 7/15/2010 58db or higher.
32.5A 5cpm error.



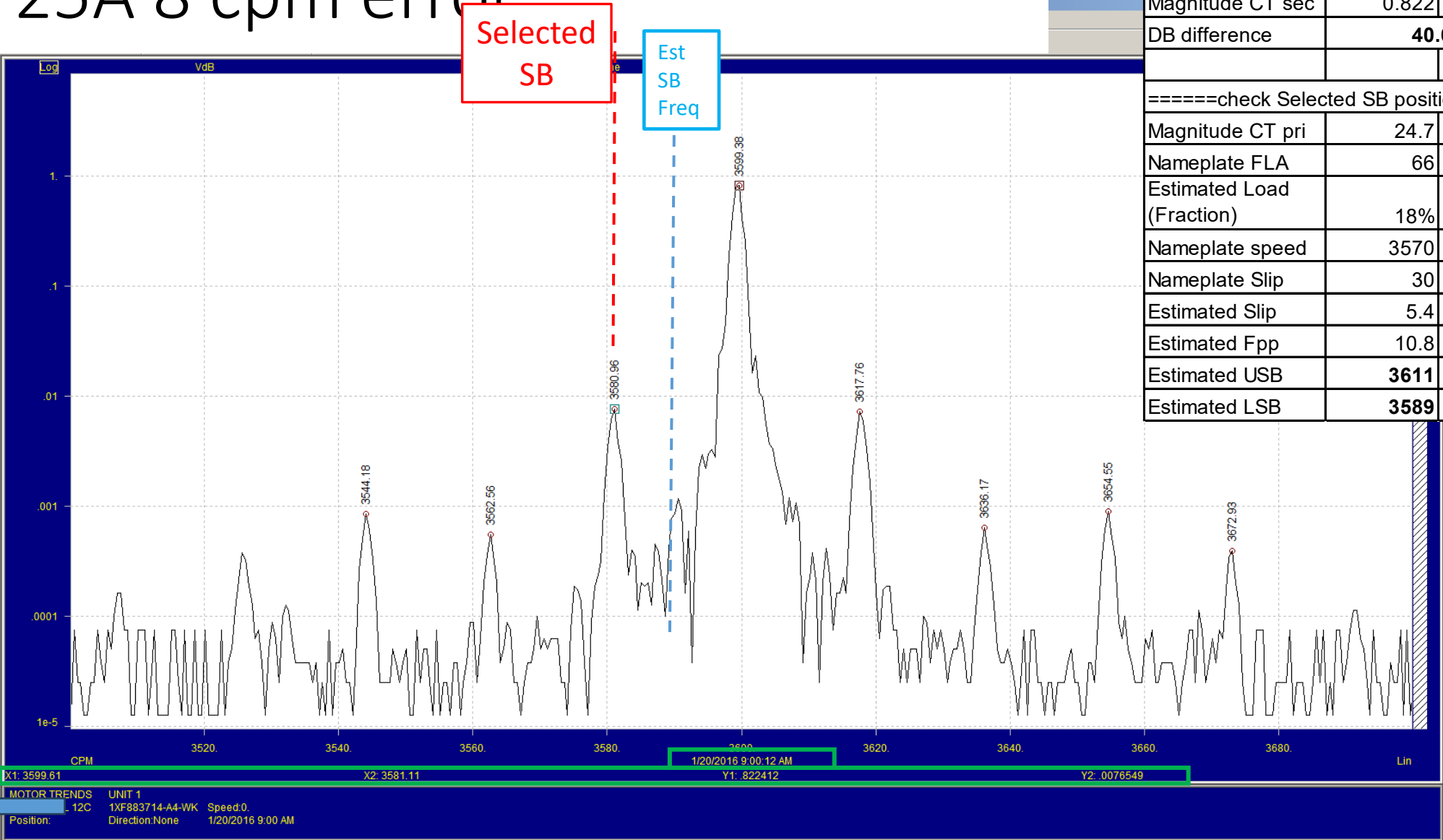
Test Date	07/15/10		
===Calc DB from observed/selected spectral data =====			
Parameter	Main Peak	Sideband	Comment / Formula
Freq (cpm)	3601.5	3582.3	From spectrum
Magnitude CT sec	1.082	0.00137	From spectrum
DB difference	58.0		DB = 20 LOG10 (Main / Sideband)
=====check Selected SB position vs posn est. from AMPs=====			
Magnitude CT pri	32.5		Use 30/1 CT ratio per 9EPKAA-01
Nameplate FLA	66		From nameplate
Estimated Load (Fraction)	38%		$\sqrt{\text{Current}^2 - 22^2} / \sqrt{\text{FLA}^2 - 22^2}$ note 22 is no-load amps from EC5027 DS
Nameplate speed	3570		From nameplate
Nameplate Slip	30		3600 - NP speed
Estimated Slip	11.5		NP Slip x Est Load (Fraction)
Estimated Fpp	23.0		Estimated Slip x poles (2)
Estimated USB	3623		3600 + Est Fpp
Estimated LSB	3577		3600 - Est Fpp

12C 7/11/13 47.9 db down
28A. 7 cpm error.



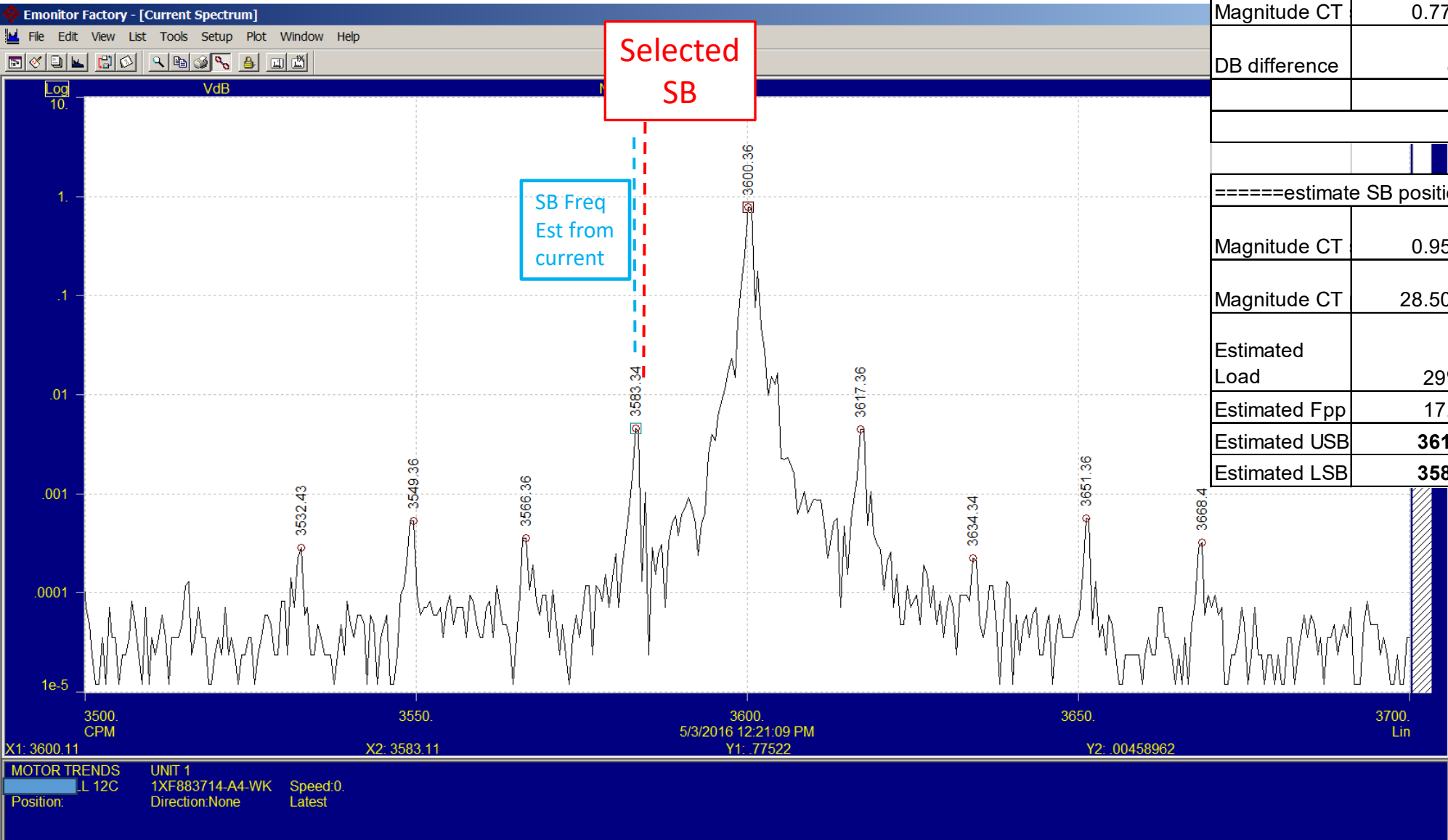
Test Date	07/11/13		
===Calc DB from observed/selected spectral data =====			
Parameter	Main Peak	Sideband	Comment / Formula
Freq (cpm)	3600.4	3575.6	From spectrum
Magnitude CT sec	0.934	0.00376	From spectrum
DB difference	47.9		DB = 20 LOG10 (Main / Sideband)
=====check Selected SB position vs posn est. from AMPs=====			
Magnitude CT pri	28.0		Use 30/1 CT ratio per 9EPKAA-01
Nameplate FLA	66		From nameplate
Estimated Load (Fraction)	28%		$\sqrt{\text{Current}^2 - 22^2} / \sqrt{\text{FLA}^2 - 22^2}$ note 22 is no-load amps from EC5027 DS
Nameplate speed	3570		From nameplate
Nameplate Slip	30		3600 - NP speed
Estimated Slip	8.4		NP Slip x Est Load (Fraction)
Estimated Fpp	16.7		Estimated Slip x poles (2)
Estimated USB	3617		3600 + Est Fpp
Estimated LSB	3583		3600 - Est Fpp

12C 1/20/16 40.6db
25A 8 cpm error



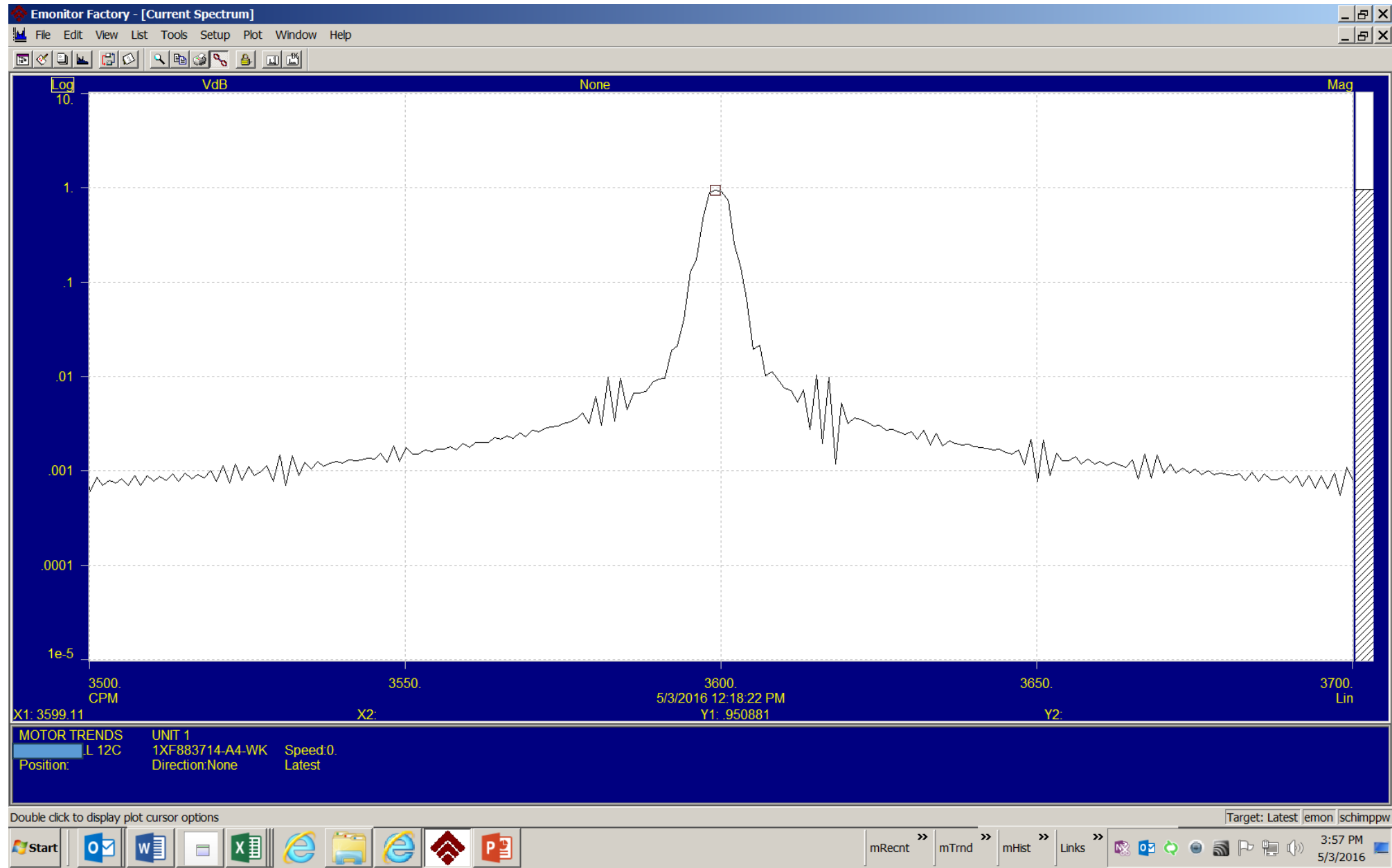
Test Date	01/20/16		
===Calc DB from observed/selected spectral data =====			
Parameter	Main Peak	Sideband	Comment / Formula
Freq (cpm)	3599.38	3581.0	From spectrum
Magnitude CT sec	0.822	0.00765	From spectrum
DB difference	40.6		DB = 20 LOG10 (Main / Sideband
=====check Selected SB position vs posn est. from AMPs=====			
Magnitude CT pri	24.7		Use 30/1 CT ratio per 9EPKAA-01
Nameplate FLA	66		From nameplate
Estimated Load (Fraction)	18%		$\sqrt{\text{Current}^2 - 22^2} / \sqrt{\text{FLA}^2 - 22^2}$ note 22 is no-load amps from EC5027 DS
Nameplate speed	3570		From nameplate
Nameplate Slip	30		3600 - NP speed
Estimated Slip	5.4		NP Slip x Est Load (Fraction)
Estimated Fpp	10.8		Estimated Slip x poles (2)
Estimated USB	3611		3600 + Est Fpp
Estimated LSB	3589		3600 - Est Fpp

12C 5/3/16 44.6 DB

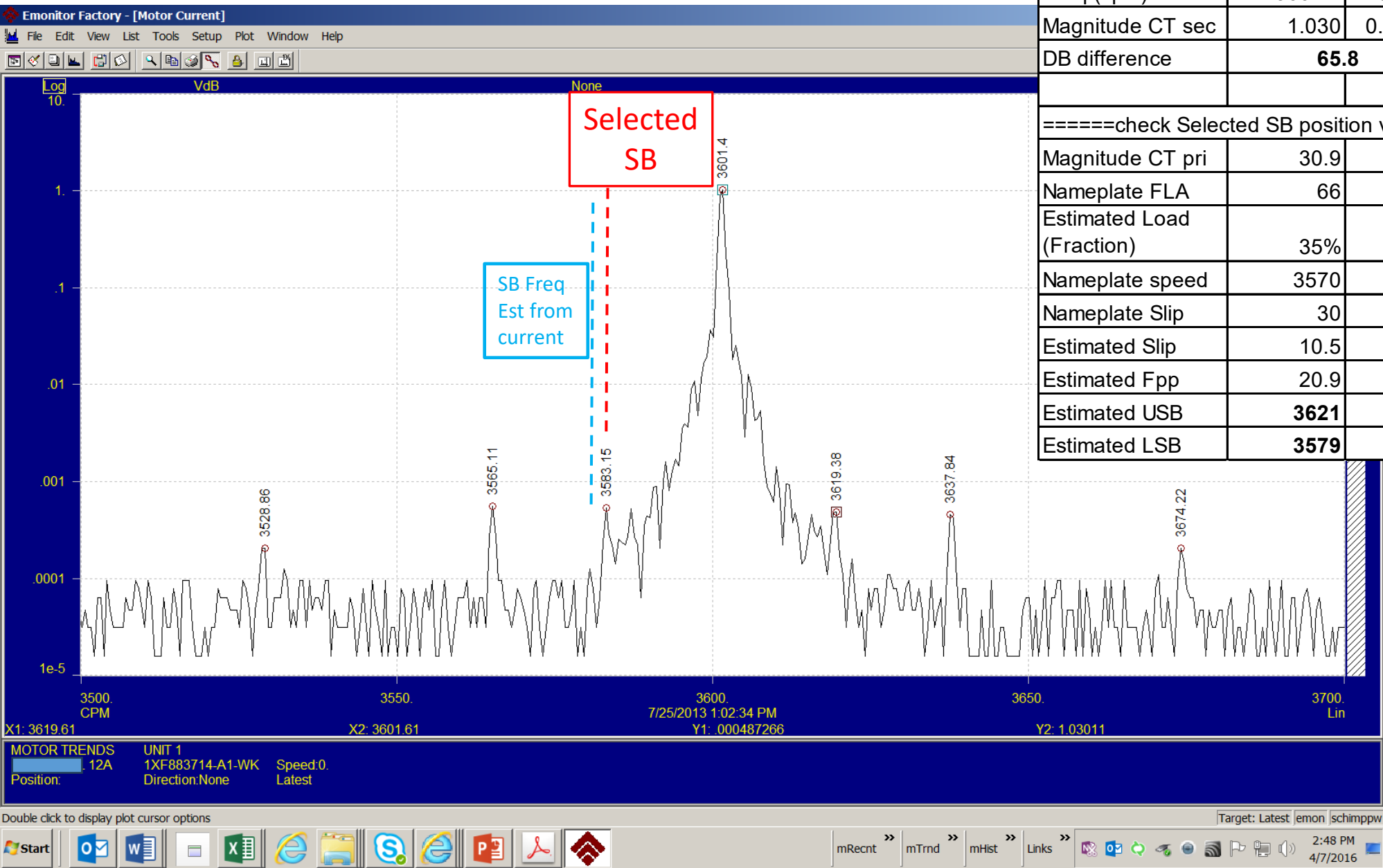


Test Date	05/03/16	
===Calc DB from observed/selected spectral data =====		
<u>Parameter</u>	<u>Main Peak</u>	<u>Sideband</u>
Freq (cpm)	3600.1	3583.3
Magnitude CT	0.775	0.00459
		From Hanning spectrum
		From Hanning spectrum
DB difference	44.6	DB = 20 LOG10 (Main / Sideband)
=====estimate SB position from Flattop Spectrum AMPs=====		
Magnitude CT	0.950	From flattop spectrum (next slide)
Magnitude CT	28.500	Use 30/1 CT ratio per 9EPKAA-01
Estimated Load	29%	$\sqrt{\text{Current}^2 - 22^2} / \sqrt{66^2 - 22^2}$ note 22 is no-load amps from EC5027 DS
Estimated Fpp	17.5	2*30*LoadFraction
Estimated USB	3617	3600 + Est Fpp
Estimated LSB	3583	3600 - Est Fpp

12C 5/3/16 Flattop CT sec current magnitude 0.95

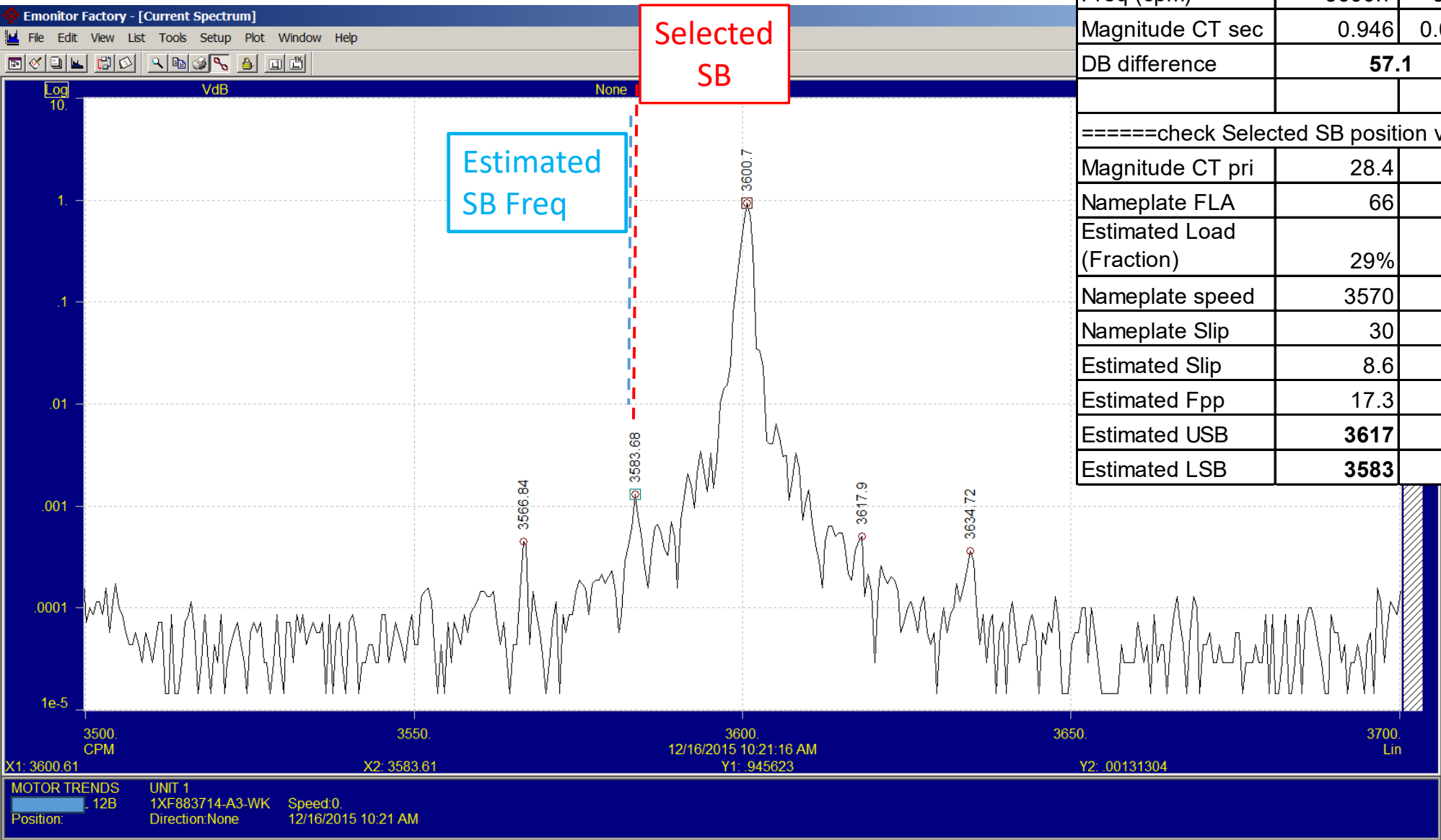


Sister: 12A (sister). 66db. 4cpm



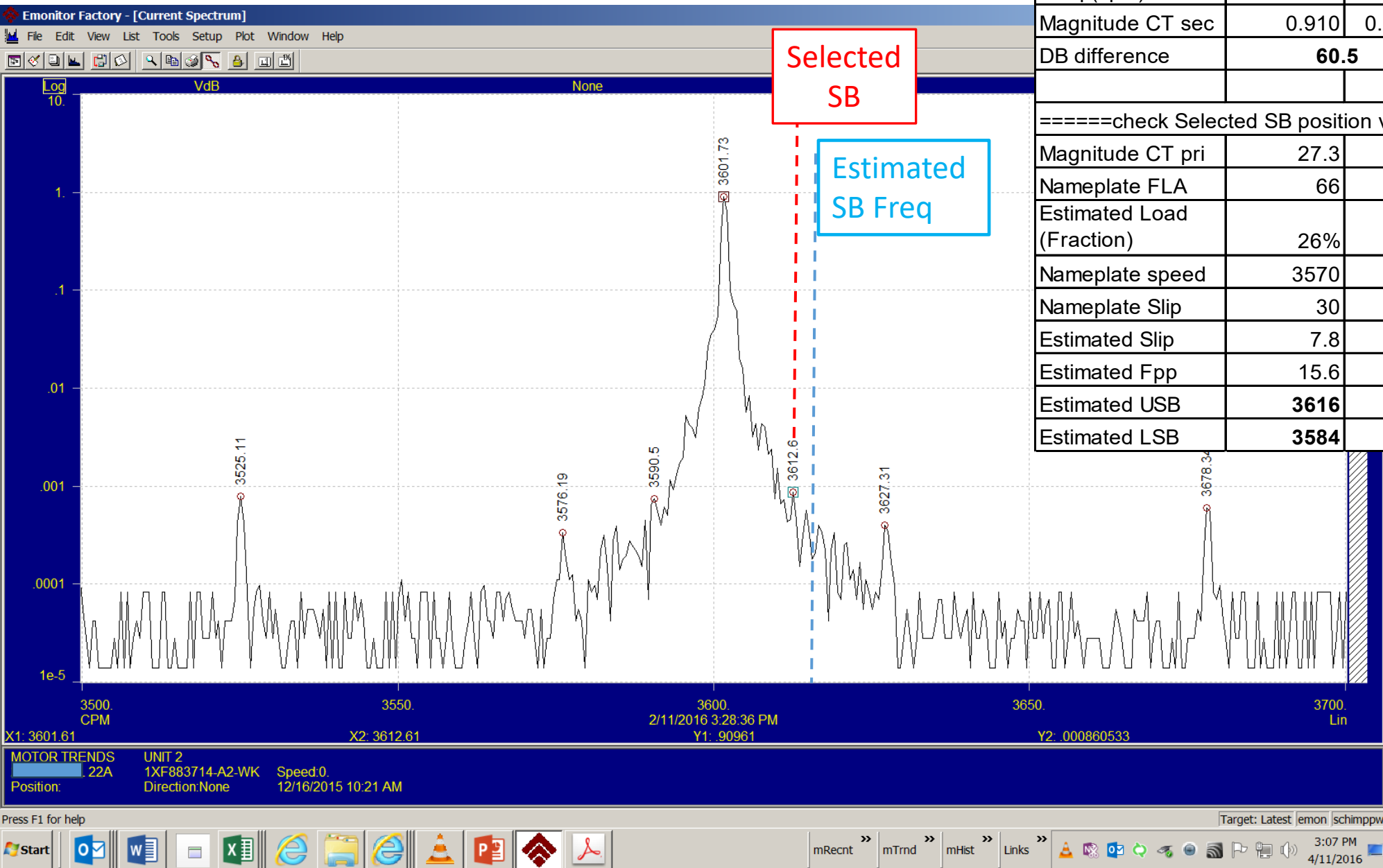
Test Date	07/25/13		
===Calc DB from observed/selected spectral data =====			
<u>Parameter</u>	<u>Main Peak</u>	<u>Sideband</u>	<u>Comment / Formula</u>
Freq (cpm)	3601.4	3583.1	From spectrum
Magnitude CT sec	1.030	0.00053	From spectrum
DB difference	65.8		DB = 20 LOG10 (Main / Sideband
=====check Selected SB position vs posn est. from AMPs=====			
Magnitude CT pri	30.9		Use 30/1 CT ratio per 9EPKAA-01
Nameplate FLA	66		From nameplate
Estimated Load (Fraction)	35%		sqrt(Current^2 - 22^2) / sqrt(FLA^2 - 22^2) note 22 is no-load amps from EC5027 DS
Nameplate speed	3570		From nameplate
Nameplate Slip	30		3600 - NP speed
Estimated Slip	10.5		NP Slip x Est Load (Fraction)
Estimated Fpp	20.9		Estimated Slip x poles (2)
Estimated USB	3621		3600 + Est Fpp
Estimated LSB	3579		3600 - Est Fpp

Sister: 12B 12B 57db. 0cpm error



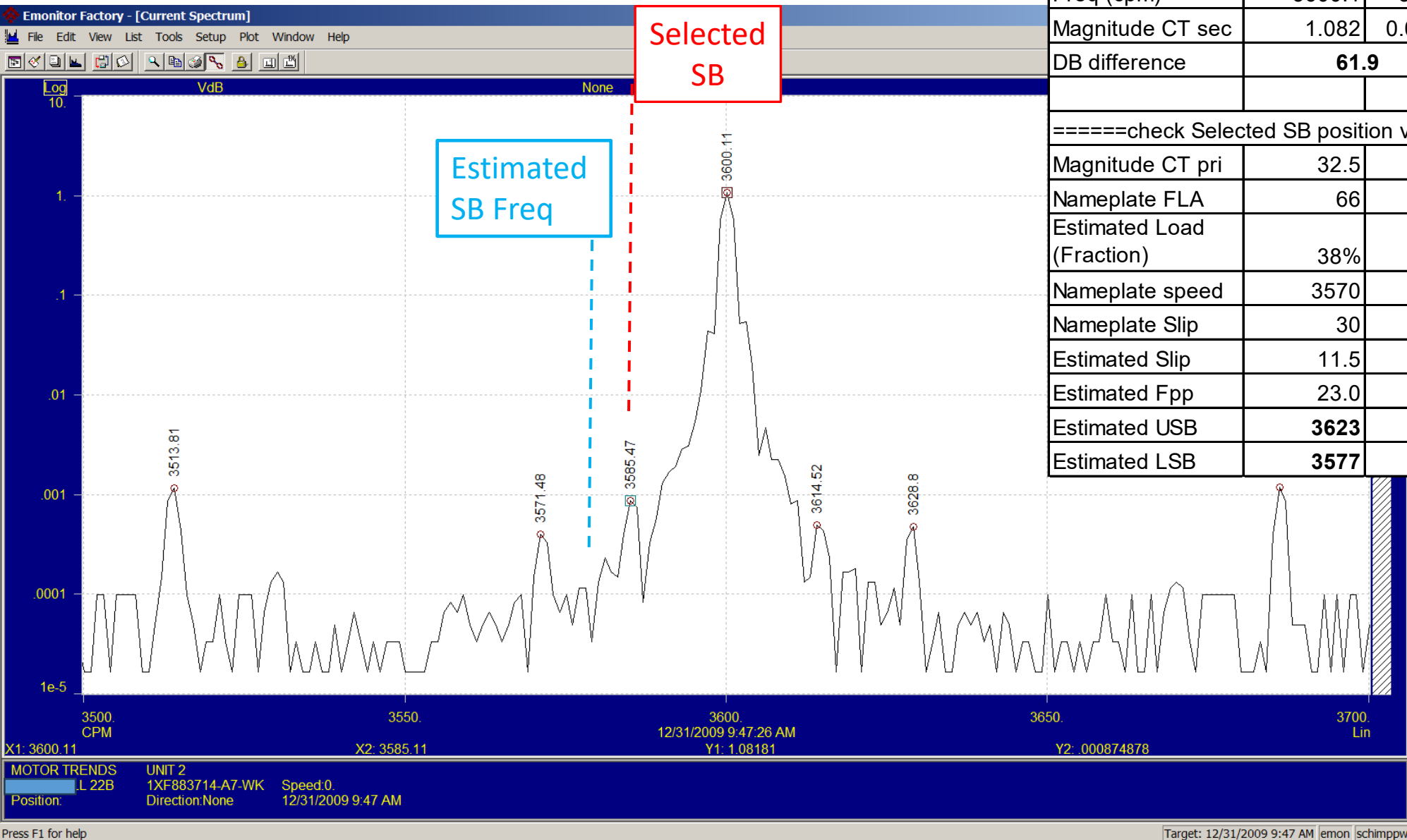
Test Date	12/16/15		
===Calc DB from observed/selected spectral data =====			
<u>Parameter</u>	<u>Main Peak</u>	<u>Sideband</u>	<u>Comment / Formula</u>
Freq (cpm)	3600.7	3583.7	From spectrum
Magnitude CT sec	0.946	0.00131	From spectrum
DB difference	57.1		DB = 20 LOG10 (Main / Sideband
=====check Selected SB position vs posn est. from AMPs=====			
Magnitude CT pri	28.4		Use 30/1 CT ratio per 9EPKAA-01
Nameplate FLA	66		From nameplate
Estimated Load (Fraction)	29%		sqrt(Current^2 - 22^2) / sqrt(FLA^2 - 22^2) note 22 is no-load amps from EC5027 DS
Nameplate speed	3570		From nameplate
Nameplate Slip	30		3600 - NP speed
Estimated Slip	8.6		NP Slip x Est Load (Fraction)
Estimated Fpp	17.3		Estimated Slip x poles (2)
Estimated USB	3617		3600 + Est Fpp
Estimated LSB	3583		3600 - Est Fpp

Sister 22A 60db 3cpm error



Test Date	02/11/16		
===Calc DB from observed/selected spectral data =====			
Parameter	Main Peak	Sideband	Comment / Formula
Freq (cpm)	3601.73	3612.6	From spectrum
Magnitude CT sec	0.910	0.00086	From spectrum
DB difference	60.5		DB = 20 LOG10 (Main / Sideband
=====check Selected SB position vs posn est. from AMPs=====			
Magnitude CT pri	27.3		Use 30/1 CT ratio per 9EPKAA-01
Nameplate FLA	66		From nameplate
Estimated Load (Fraction)	26%		sqrt(Current^2 - 22^2) / sqrt(FLA^2 - 22^2) note 22 is no-load amps from EC5027 DS
Nameplate speed	3570		From nameplate
Nameplate Slip	30		3600 - NP speed
Estimated Slip	7.8		NP Slip x Est Load (Fraction)
Estimated Fpp	15.6		Estimated Slip x poles (2)
Estimated USB	3616		3600 + Est Fpp
Estimated LSB	3584		3600 - Est Fpp

Sister 22B 62db. 8cpm error

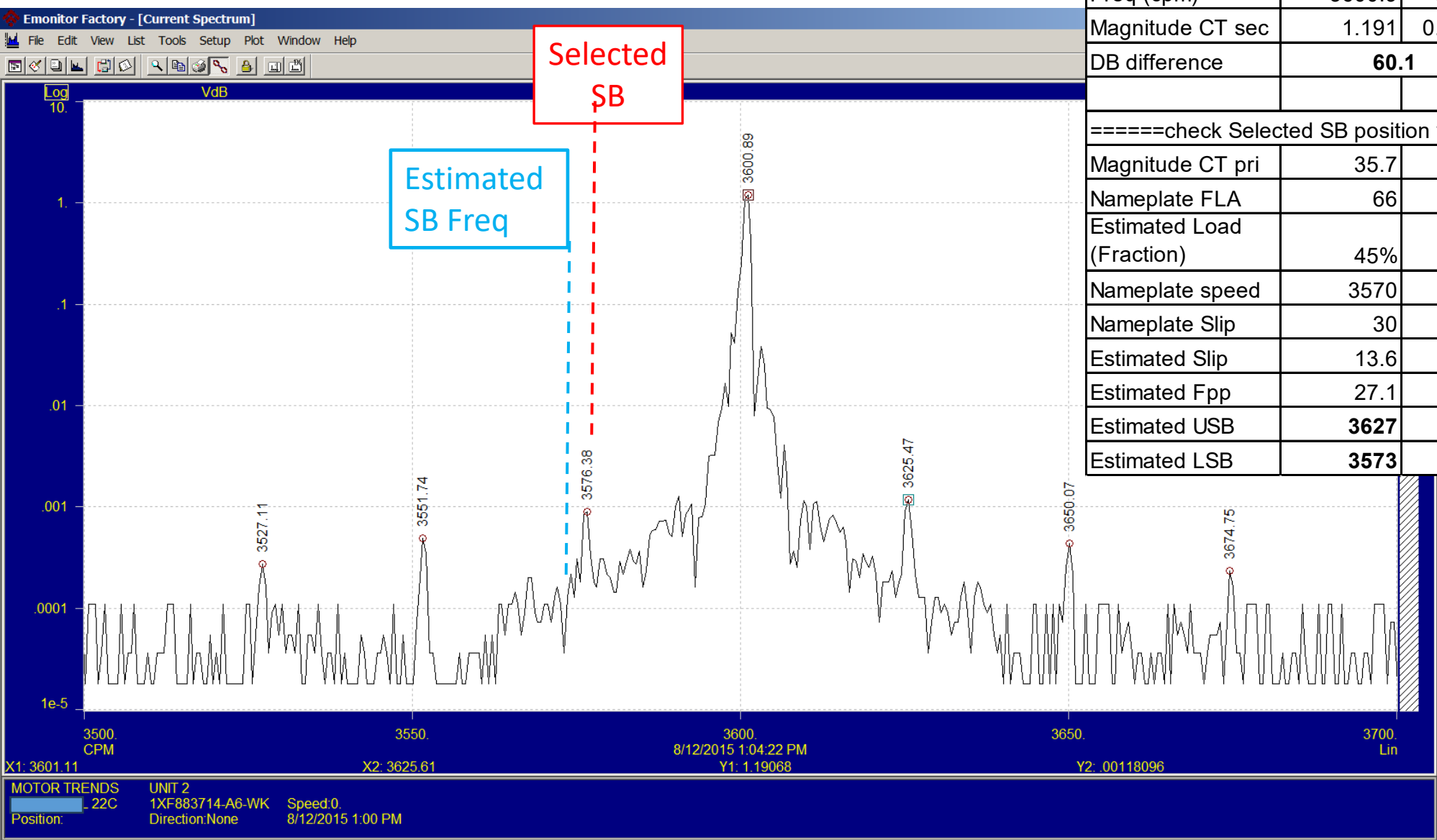


Test Date	12/31/09		
===Calc DB from observed/selected spectral data =====			
<u>Parameter</u>	<u>Main Peak</u>	<u>Sideband</u>	<u>Comment / Formula</u>
Freq (cpm)	3600.1	3585.5	From spectrum
Magnitude CT sec	1.082	0.00087	From spectrum
DB difference	61.9		DB = 20 LOG10 (Main / Sideband)
=====check Selected SB position vs posn est. from AMPs=====			
Magnitude CT pri	32.5		Use 30/1 CT ratio per 9EPKAA-01
Nameplate FLA	66		From nameplate
Estimated Load (Fraction)	38%		$\sqrt{\text{Current}^2 - 22^2} / \sqrt{\text{FLA}^2 - 22^2}$ note 22 is no-load amps from EC5027 DS
Nameplate speed	3570		From nameplate
Nameplate Slip	30		3600 - NP speed
Estimated Slip	11.5		NP Slip x Est Load (Fraction)
Estimated Fpp	23.0		Estimated Slip x poles (2)
Estimated USB	3623		3600 + Est Fpp
Estimated LSB	3577		3600 - Est Fpp

2015 – bad data
2012 – load too low
to distinguish pole
Pass sidebands

4/18/16 – No current
Oscillation on mete
(suggests healthy)

22C. 60db. 3cpm difference

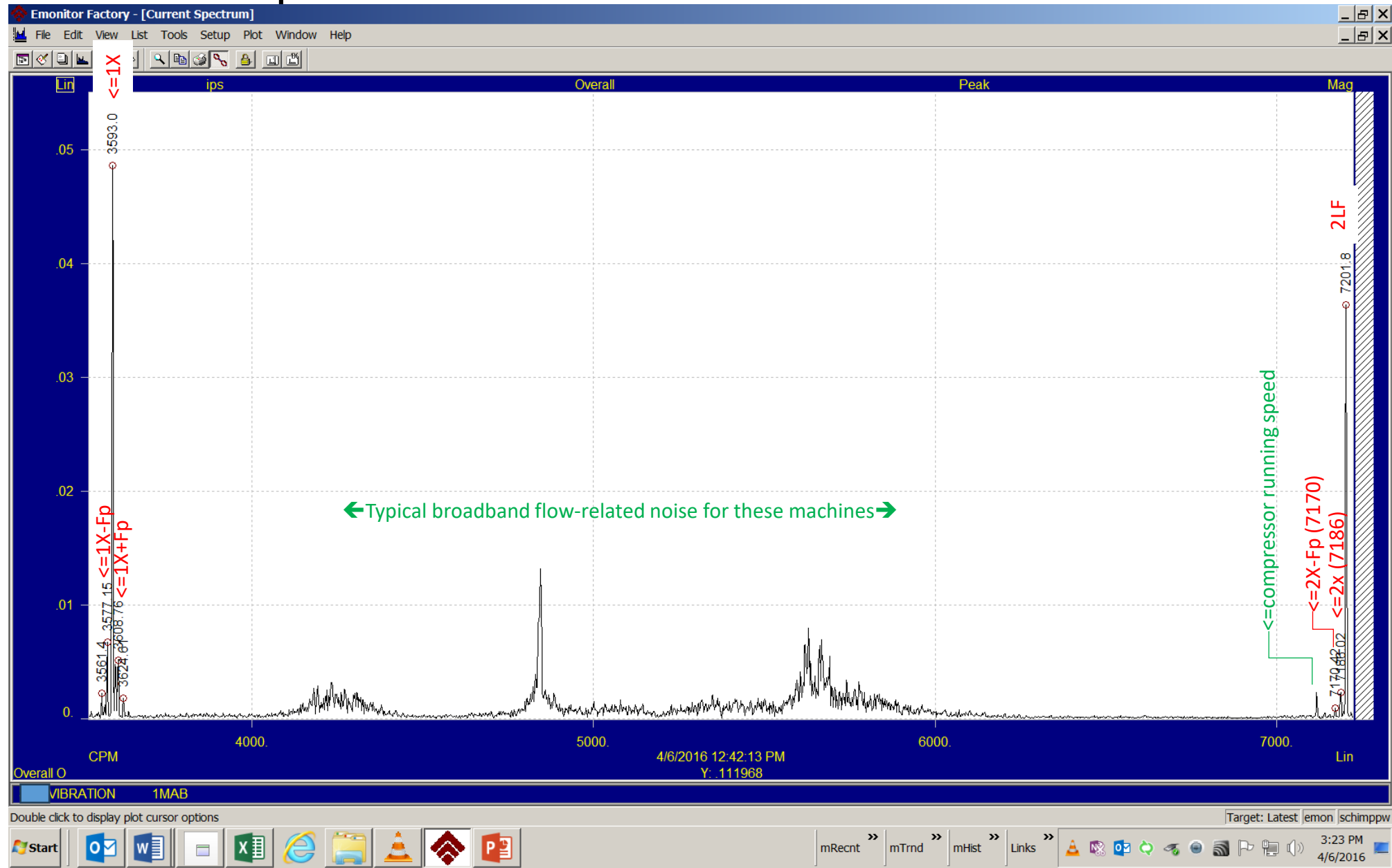


Test Date	08/12/15		
===Calc DB from observed/selected spectral data =====			
<u>Parameter</u>	<u>Main Peak</u>	<u>Sideband</u>	<u>Comment / Formula</u>
Freq (cpm)	3600.9	3625.5	From spectrum
Magnitude CT sec	1.191	0.00118	From spectrum
DB difference	60.1		DB = 20 LOG10 (Main / Sideband
=====check Selected SB position vs posn est. from AMPs=====			
Magnitude CT pri	35.7		Use 30/1 CT ratio per 9EPKAA-01
Nameplate FLA	66		From nameplate
Estimated Load (Fraction)	45%		$\sqrt{\text{Current}^2 - 22^2} / \sqrt{\text{FLA}^2 - 22^2}$ note 22 is no-load amps from EC5027 DS
Nameplate speed	3570		From nameplate
Nameplate Slip	30		3600 - NP speed
Estimated Slip	13.6		NP Slip x Est Load (Fraction)
Estimated Fpp	27.1		Estimated Slip x poles (2)
Estimated USB	3627		3600 + Est Fpp
Estimated LSB	3573		3600 - Est Fpp

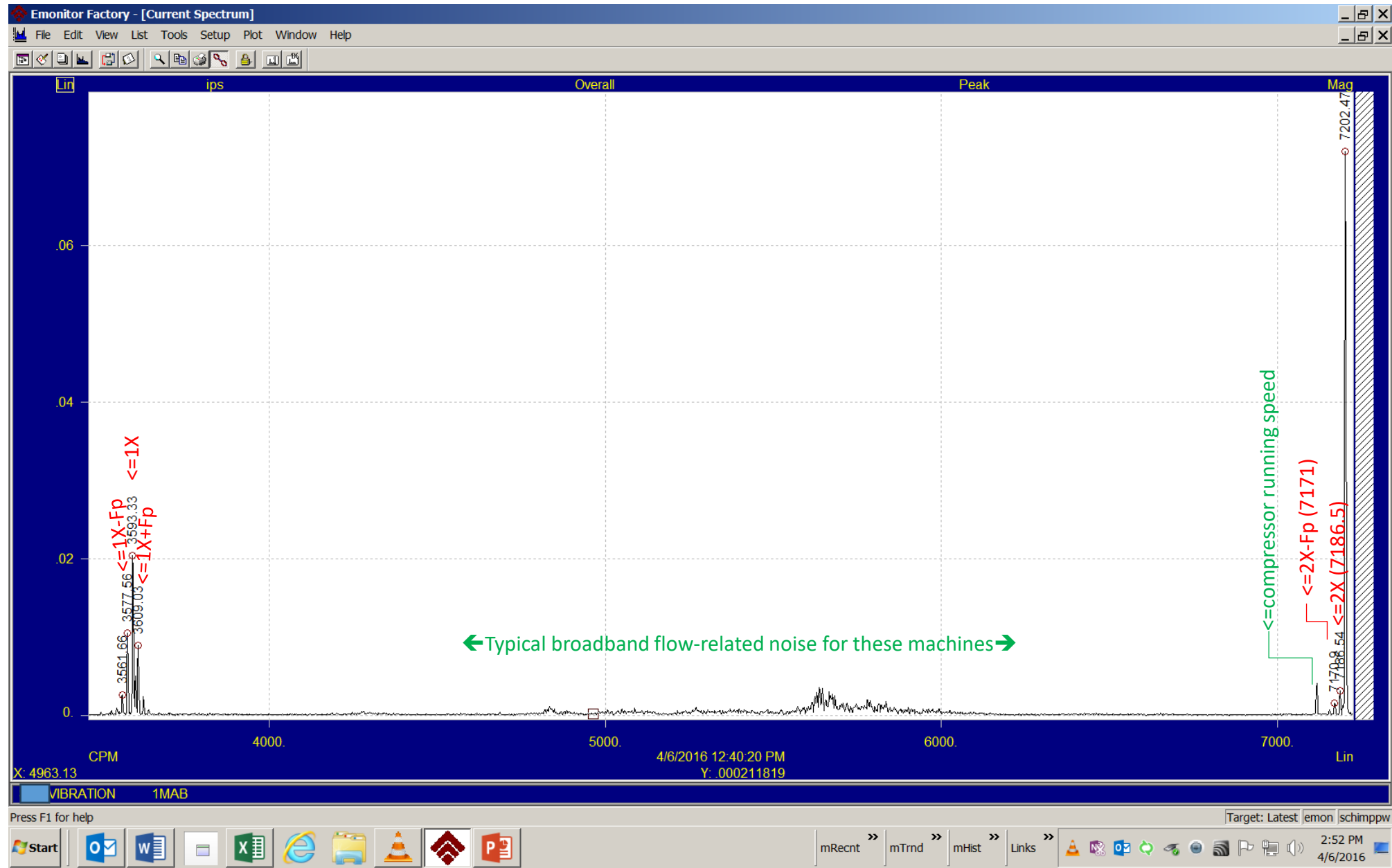
Vibration Overalls - steady

Date	Loc:	1A	1H	1V	2H	2V	3H	3V	4A	4H	4V
	Units:	ips	ips	ips	ips	ips	ips	ips	ips	ips	ips
	Alert:	0.1	0.18	0.14	0.16	0.12	0.12	0.08	0.14	0.1	0.1
	Alarm:	0.15	0.27	0.21	0.24	0.18	0.18	0.12	0.21	0.15	0.15
7/28/2004		0.06	0.15	0.09	0.09	0.12	0.13	0.06	0.15	0.09	0.09
10/18/2004		0.04	0.11	0.09	0.08	0.05	0.04	0.04	0.07	0.04	0.04
4/8/2005		0.11	0.14	0.09	0.09	0.05	0.08	0.05	0.10	0.05	0.06
9/19/2005		0.06	0.14	0.10	0.11	0.03	0.05	0.04	0.06	0.04	0.05
4/26/2006		0.05	0.12	0.07	0.10	0.09	0.08	0.05	0.08	0.05	0.05
2/1/2007		0.07	0.07	0.09	0.11	0.06	0.04	0.04	0.05	0.03	0.04
7/24/2007		0.05	0.11	0.08	0.12	0.08	0.16	0.07	0.16	0.07	0.06
1/7/2008		0.05	0.10	0.08	0.10	0.06	0.06	0.05	0.07	0.05	0.05
6/25/2008		0.06	0.10	0.09	0.11	0.08	0.05	0.05	0.06	0.05	0.05
12/8/2008		0.05	0.10	0.09	0.11	0.08	0.04	0.04	0.06	0.05	0.06
9/22/2009		0.05	0.11	0.09	0.10	0.05	0.04	0.04	0.06	0.05	0.05
4/26/2010		0.06	0.12	0.09	0.11	0.06	0.05	0.05	0.06	0.05	0.05
10/11/2010		0.05	0.11	0.08	0.11	0.05	0.05	0.05	0.06	0.05	0.06
1/3/2011		0.05	0.10	0.08	0.11	0.06	0.05	0.05	0.06	0.06	0.04
9/12/2011		0.05	0.10	0.08	0.11	0.08	0.05	0.05	0.06	0.04	0.05
5/8/2012		0.05	0.11	0.08	0.11	0.08	0.11	0.06	0.10	0.07	0.09
11/18/2012		0.05	0.09	0.08	0.10	0.06	0.05	0.05	0.06	0.06	0.04
1/27/2013		0.05	0.10	0.09	0.07	0.06	0.04	0.05	0.07	0.06	0.04
7/15/2013		0.05	0.10	0.08	0.07	0.06	0.04	0.05	0.07	0.05	0.05
2/25/2014		0.04	0.10	0.09	0.09	0.05	0.04	0.05	0.08	0.05	0.06
6/16/2014		0.04	0.09	0.07	0.08	0.06	0.05	0.04	0.06	0.04	0.04
10/22/2014		0.04	0.07	0.06	0.09	0.06	0.05	0.04	0.07	0.04	0.04
3/19/2015		0.04	0.09	0.07	0.09	0.04	0.05	0.04	0.07	0.04	0.04
6/15/2015		0.05	0.10	0.07	0.11	0.07	0.07	0.07	0.09	0.06	0.05
1/27/2016		0.05	0.08	0.09	0.12	0.08	0.06	0.04	0.06	0.06	0.04

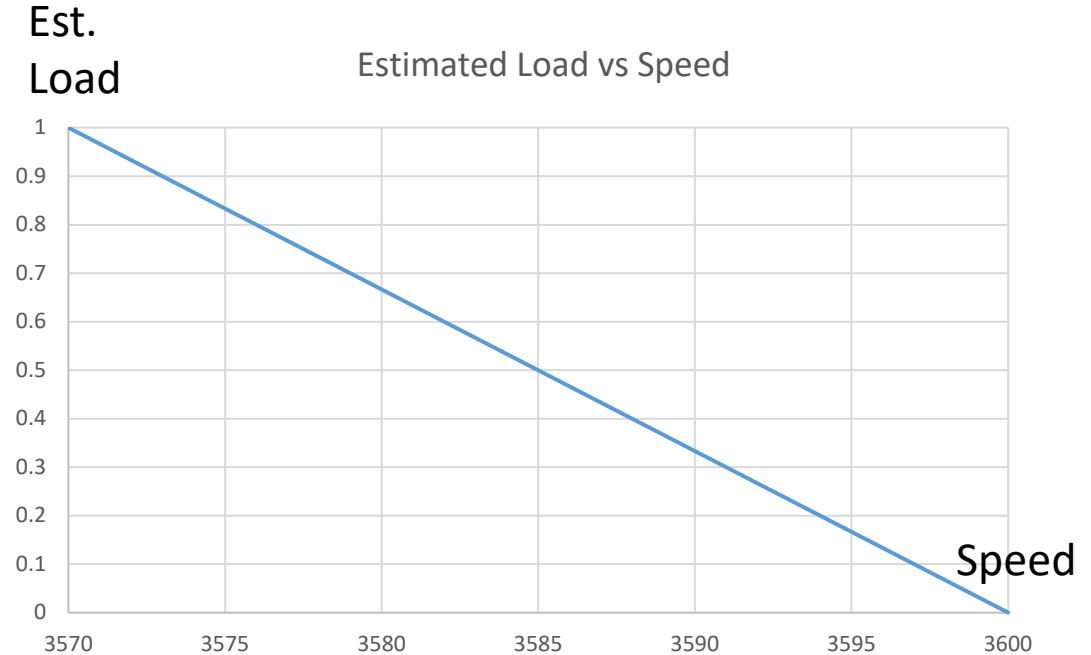
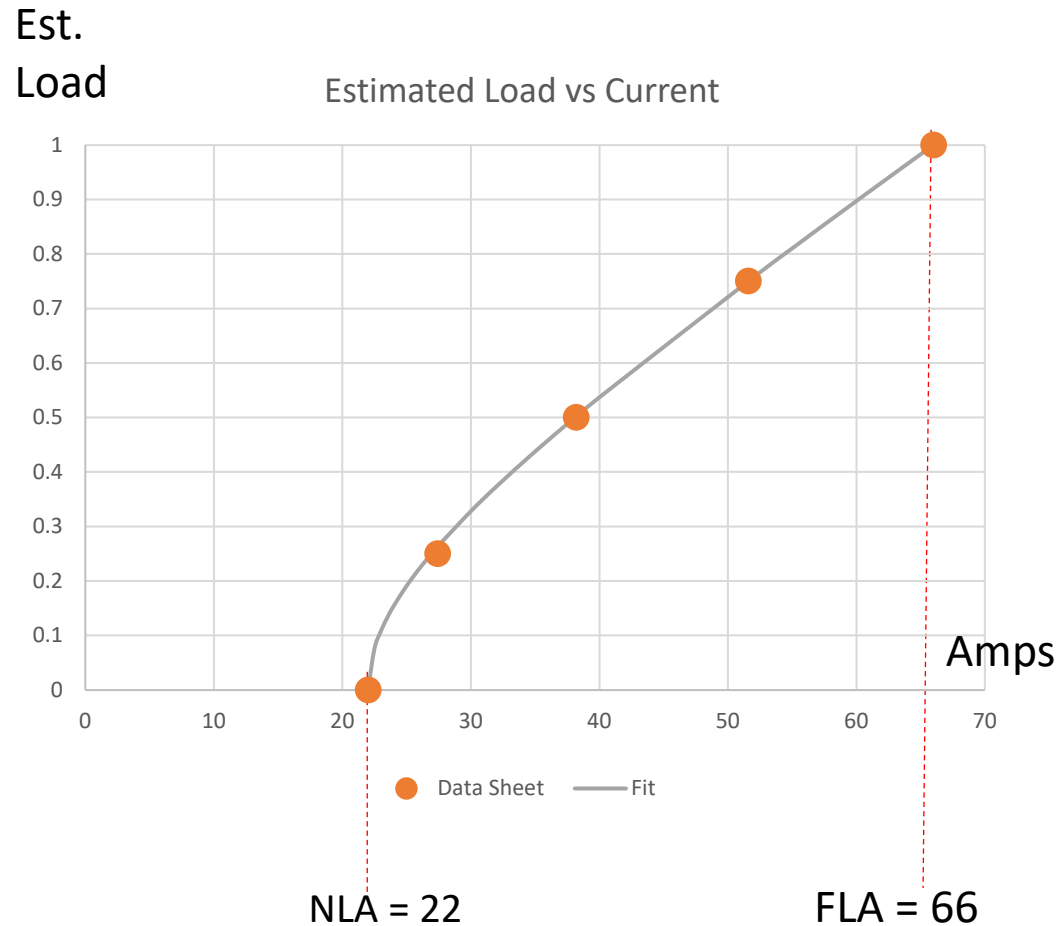
1V vibration – pole pass sidebands around 1x and 2x.
5-10% of main peak



1H – pole pass sidebands around 1x and 2x.

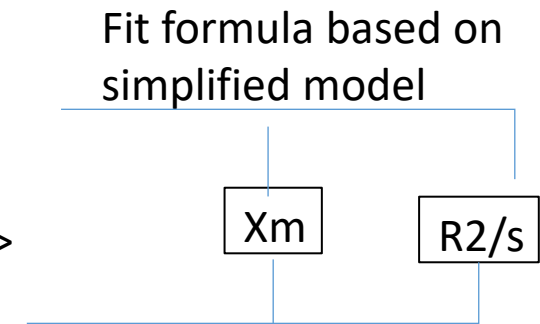


Estimated Load (Fraction) vs Amps and vs speed



Data Sheet: From data sheet in EC 5029 (slide 19)

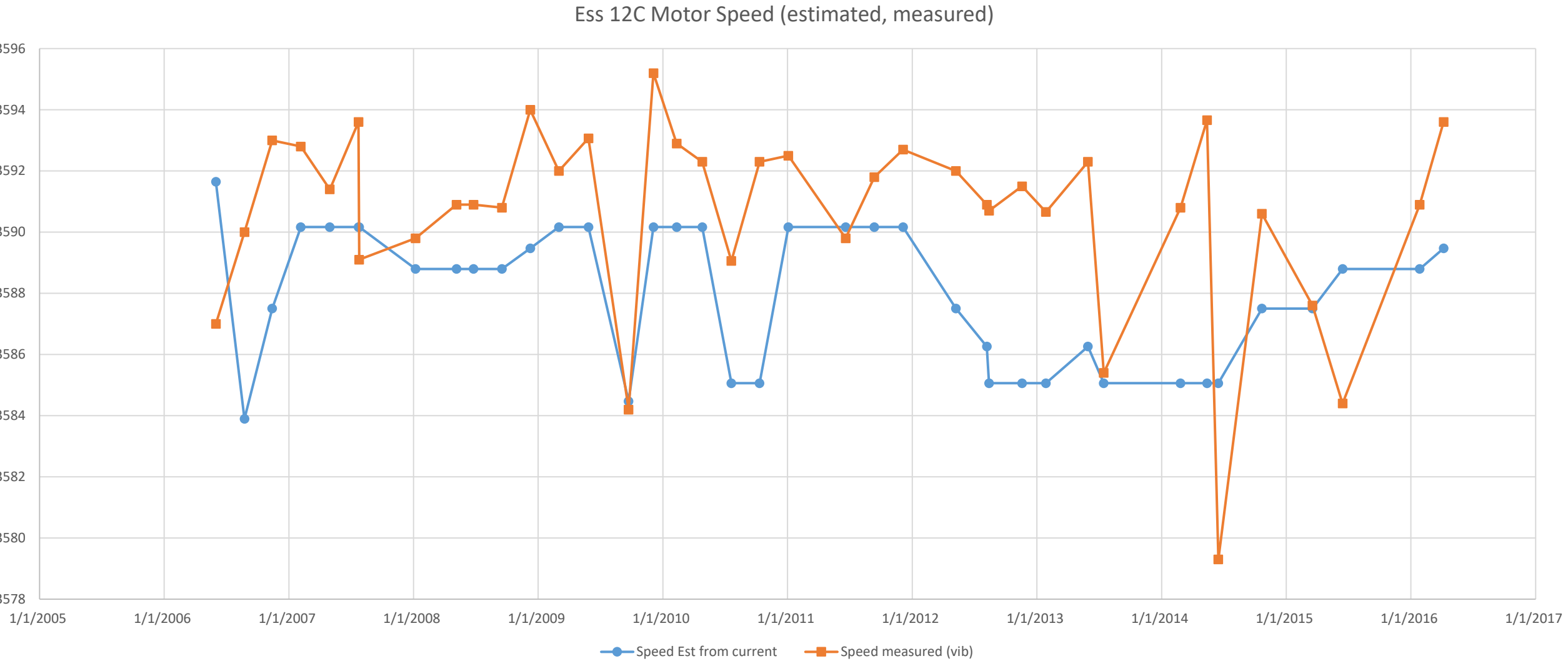
Fit: $\text{Load} = \sqrt{\text{Amps}^2 - 22^2} / \sqrt{66^2 - 22^2}$ based on simplified model=>



12C Measured speed and estimated speed (est from panel current as collected during periodic vib measurements)

1 - Estimates of speed based on panel current generally do not match measured speed.
(Presumably due to voltage above nameplate and variable)

2 – Neither estimated nor actual speed shows a decreasing long-term trend. Assuming long-term average of load does not change, this indicates that any rotor condition has not had effect on motor torque/speed characteristics.



Rotor photo (sister motors). Cast rotor construction, confirmed by OEM.
Different failure mechanisms than fab rotor, and more difficult to repair










22A

Motor Data

Adobe Acrobat Pro


ow Help



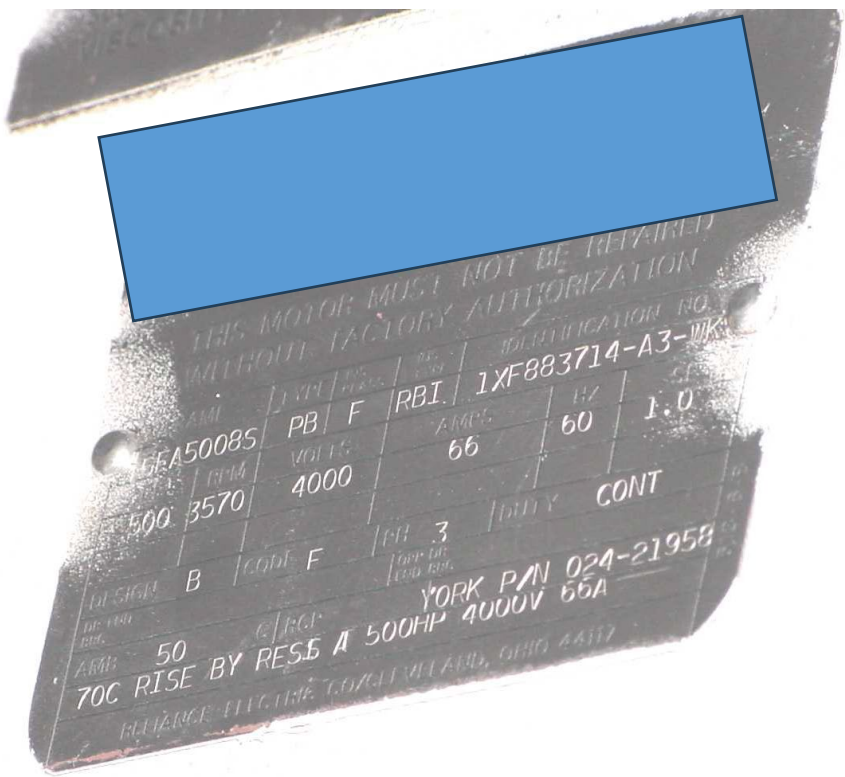
 150% 

REL. S.O.	FRAME	HP	TYPE	PHASE/ HERTZ	RPM	VOLTS
	E500BS	500	PB	3/60	3570	4000
AMPS	DUTY	AMB°C/ INSUL.	S.F.	NEMA DESIGN	CODE LETTER	ENCL.
66	CONT.	50/F*	1.0	B	F	DPP
E/S	ROTOR	TEST S.O.	TEST DATE	STATOR RES. @ 25°C OHMS (BETWEEN LINES)		
569299-SM	--	CALCULATED	N/A	.7613		
PERFORMANCE						
LOAD	HP	AMPERES	RPM	% POWER FACTOR	% EFFICIENCY	
NO LOAD	0	22.0	3599	6.83	0	
1/4	125	27.4	3593	54.8	89.5	
2/4	250	38.2	3586	75.2	93.6	
3/4	375	51.6	3578	82.8	94.5	
4/4	500	66.0	3570	85.8	94.6	
5/4	625	82.0	3561	87.0	94.3	

SAFETY RELAY



mRecnt » mTrnd » mHist » Links »



DB

20 log (Amps60/AmpsSb)

Essential Chiller 12C Amps Sideband magnitude (DB below main peak)

