



August 22, 2013

L-2013-257
10 CFR 50.4
10 CFR 50.55a

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

Re: St. Lucie Unit 1
Docket No. 50-335
Inservice Inspection Plan
Second RAI Reply to Fourth Ten-Year Interval Unit 1
Relief Request No. 5, Revision 0

References:

1. FPL Letter L-2013-044 dated February 4, 2013, "Inservice Inspection Plan Fourth Ten-Year Interval Unit 1 Relief Request No. 5, Revision 0," ML Accession No. ML13046A101.
2. NRC email from Siva Lingam to Ken Frehafer dated May 29, 2013, "Request for Additional Information for Relief Request No. 5, "Examination of Cold Leg Dissimilar Metal Welds," at St. Lucie Unit 1 (TAC NO. MF-0675).
3. FPL Letter L-2013-232 dated July 30, 2013, "RAI Reply to Fourth Ten-Year Interval Unit 1 Relief Request No. 5, Revision 0," Accession No. ML13219A254.
4. NRC email from Siva Lingam to Ken Frehafer dated August 9, 2013 St. Lucie, Unit 1 Relief Request No. 5 - 2nd Round of Requests for Additional Information (RAIs) (TAC No. MF0675), Accession No. ML13221A205.

In Reference 1 above, Florida Power & Light (FPL), requested relief from the 10CFR50.55a(g)(6)(ii)(F)(4) exception to ASME Code Case N-770-1 that essentially 100% coverage be achieved for the baseline required volumetric examinations. In Reference 2 above, the NRC submitted a request for additional information (RAI) on the relief request. FPL replied to that RAI via Reference 3. The NRC developed an additional RAI via Reference 4. The reply to this RAI is provided in the attachment to this letter.

Please contact Ken Frehafer at (772) 467-7748 if there are any questions about this submittal.

Sincerely,

Eric S. Katzman
Licensing Manager
St. Lucie Plant

Attachment
ESK/KWF

A047
NRC

Response to Second Round of NRC Request For Additional Information (RAI) for St. Lucie Unit 1-Fourth Ten-Year Interval (ML13221A205), Relief Request No. 5 Revision 0.

By letter dated February 4, 2013 (Agencywide Documents and Access Management System (ADAMS) Accession No. ML13046A101) with supplement dated July 30, 2013, Florida Power & Light Company (the licensee) requested relief from Title 10, Code of Federal Regulations, Part 50 (10 CFR 50), paragraph 10 CFR 50.55a(g)(6)(ii)(F)(3) and 10 CFR 50.55a(g)(6)(ii)(F)(4) which impose a condition on American Society of Mechanical Engineers (ASME) Code Case N-770-1 requiring essentially 100 percent coverage be achieved for the baseline volumetric examinations of dissimilar metal welds (DMW). The licensee proposed an alternative to the required examination coverage for the eight DMWs at reactor coolant pump (RCP) nozzles at St Lucie Unit 1 as documented in Relief Request Number 5, Revision 0. To complete its review, the Nuclear Regulatory Commission (NRC) staff requests the following additional information.

NRC RAI-1

In response to RAI-3A (page 5) in the July 30, 2013, submittal, the licensee performed flaw analyses using dissimilar metal weld thickness of 3.2 inches. The licensee stated that this thickness was conservative. However, in response to RAI-3B (page 9), the licensee used a pipe thickness of 2.9 inches. Discuss how the weld thickness was determined (e.g. weld profile taken using zero degree probe, etc.) and why the thickness used is considered to be conservative. Also, are these weld thickness values used in response to RAI 3A and 3B conservative for both welds (RC-121-6-504 or RC-124-7-504)?

Response to RAI-1

The "DMW weld thickness" for RC-121-6-504 or RC-124-7-504 were measured or "as built" as 3.2" – 3.25" for the two DM welds using a zero degree UT probe. Therefore, using 3.2" as the thickness for flaw growth by PWSCC in the response to RAI-3A (page 5) is conservative. The response to RAI-3B (Page 9) indicated that the "pipe thickness" of 2.9" was used to scale the OD measured length of the missed coverage to an ID length since the UT scanning for axial flaws was primarily on the pipe. Note that the DM weld is thicker than the pipe because the weld transitions to a thicker stainless steel safe end section. The smaller thickness of the pipe was used since the scaling of missed coverage would result in a longer ID missed coverage length. Scaling 3.2" DM weld thickness yields 7.296" missed coverage length, shorter than the 7.416" missed coverage length calculated using the 2.9" pipe thickness. Therefore, it is conservative to use the 2.9" pipe thickness for the missed coverage length calculation.

NRC RAI-2

(a) Discuss whether the crack face pressure is included in the flaw growth calculation. If not, provide justification. (b) Provide axial stresses and bending stresses that were used to calculate the growth of the circumferential flaw.

Response to RAI-2 (a)

The flaw growth evaluation assumed 2.5ksi as the crack face pressure.

Response to RAI-2 (b)

The PWSCC flaw evaluation used the St. Lucie Plant bounding axial membrane and bending stresses taken from WCAP-16925-P, Table 3-6 (ADAMS ML092740085). The through wall axial bending stresses are calculated using the maximum bending stress at OD (2.052 ksi) and the ID and OD of the DM weld. The axial bending and membrane stresses are listed in the table below.

Normalized through-wall Ratio (a/t)	Axial Bending Stress (ksi)	Axial membrane Stress (ksi)
0.00	1.691	0.286
0.05	1.709	0.286
0.10	1.727	0.286
0.15	1.745	0.286
0.20	1.763	0.286
0.25	1.781	0.286
0.30	1.799	0.286
0.35	1.817	0.286
0.40	1.836	0.286
0.45	1.854	0.286
0.50	1.872	0.286
0.55	1.890	0.286
0.60	1.908	0.286
0.65	1.926	0.286
0.70	1.944	0.286
0.75	1.962	0.286
0.80	1.980	0.286
0.85	1.998	0.286
0.90	2.016	0.286
0.95	2.034	0.286
1.00	2.052	0.286

NRC RAI-3

Explain why the weld residual stresses used to calculate the growth of the axial flaw and circumferential flaws did not use the same assumptions for the depth of the internal repair and heat treatment? Specifically, the axial flaw growth calculation used weld residual stresses based on the "50% ID repair with no heat treatment", whereas the circumferential flaw growth calculation used weld residual stresses based on the "25% ID repair with heat treatment".

Response to RAI-3

The axial and circumferential flaw evaluations used the same weld residual stress (WRS) cases, including the "25% ID repair with heat treat" and "50% ID repair with no heat treatment". Although all cases were evaluated for both the axial and circumferential flaw evaluations, only the limiting cases are presented for the RAI response, i.e., 50% repair with no heat treatment case for axial flaw; 25% repair with heat treat for circumferential flaw. Hoop WRS for the axial flaws are all tensile, and heat treatment relaxes the tensile stress. Therefore, 50% ID repair with no heat treatment case is limiting. The axial WRS through-wall profiles for circumferential flaws are either slightly compressive or tensile at the ID. Heat treatment relieves the beneficial compressive stress at the ID, therefore, it is the more limiting case.

NRC RAI-4

In RAI-5 A, the licensee was asked for the "as-built" weld geometry. This information is necessary to accurately determine volumetric coverage and beam intensities in the model. The licensee responded by stating that the sketches (included in the initial submittal) are scaled, and that further dimensional information is located in response to question RAI-4 D. However, in the response to RAI-4 D, the information in the table provided by the licensee describes "minimum design thickness," thus it is unclear whether the actual as-built thickness is the value stated in this table. Please clarify and provide the actual (as-built) thicknesses and other as-built geometrical information (such as inside and outside diameter taper and pipe cross sectional dimensions).

Response to RAI-4

The scaled as-built geometry is reflected in the drawings from one circumferential location for each item (the "b" sketch for each configuration). The inside diameter is identified in the both the original submittal and the 1st RAI response (30" ID). The outside circumference that was measured with a tape measure is identified in the table below.

RCP Inlet/Outlet	Measured Circumference
1A1 Suction	114.25
1A2 Suction	114.5
1B1 Suction	114.38
1B2 Suction	113.5
1A1 Outlet	113.0
1A2 Outlet	113.0
1B1 Outlet	112.75
1B2 Outlet	112.5

NRC RAI-5

In RAI-5 B(1), the licensee states that three (3) elements from each probe were tested per ASTM E-1065 for frequency, bandwidth, and pulse duration for the GEIT 115-000-545, 2 x 16 element matrix array probes. Further, the licensee states that center frequencies of 1.59 to 1.65 MHz were found during these tests. The manufacturers design center frequency for this probe is 1.5 MHz. Please explicitly state the pulse excitation type and duration used during the examinations of Welds RC-121-6-504 and RC-124-7-504.

Response to RAI-5

The pulse excitation type was square wave. The pulse duration was 330 ns.

NRC RAI-6

In RAI-5 B(2), the licensee states that both longitudinal and shear wave modes of sound propagation were used during the examinations. When using phased array techniques, in order to properly set the nominal angles for each of these modes of examination, it is standard to apply two different sets of wedges, one set for longitudinal and one for shear wave modes. However, two sets of wedges (along with their dimensions) have not been included in the response. Please clarify which mode (longitudinal or shear) of propagation was being used for the one set of wedges described in the RAI response. Further, clarify and state if the same wedges were being used for the second mode of propagation, or if a second set of wedges was applied. If a second set of wedges was used, please provide dimensional information (similar to that originally requested) for the second set of wedges.

Response to RAI-6

Only one wedge was used for both the longitudinal and shear wave propagation consistent with the qualified procedure. Only one wedge was used in the examination.

NRC RAI-7

In RAI-5 D(3), the licensee was asked for transmit and receive delay values for each of the elements in the phased array probe in order for PNNL to simulate proper beam formation in the component. The licensee responded:

“Not available. These examinations were performed using the WesDyne Intraphase instrument. The Intraphase has an internal proprietary focal law generator based on the essential input parameters defined in the qualified EPRI-DMW-PA-1 procedure.”

The time delays for element firing are controlled by software and must be validated to ensure the beams are steered and focused correctly. These values are necessary for PNNL to complete the simulation of the examinations using CIVA. The licensee should submit the delay law values as requested. If these are considered WesDyne proprietary, PNNL will treat them as such, and not release this information to any outside party.

Response to RAI-7

The spreadsheets below provide the focal law delays for the longitudinal and shear search units. The transducer is 16 x 2 design, so there are 16 transmitter elements and 16 receive. A “-1” value means the channel is disabled for that function and the “0” value is the reference element for each of the transmit and receive elements. All values (except -1 for “off”) are in nanoseconds.

L Wave Focal Law Delays
Wedge Model : 360-151-057
Delays are the same for Axial and Circ Scans

P/R Channel	25L		26L		27L		28L		29L	
	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay
0	2735.78186	-1	2655.65832	-1	2575.98512	-1	2496.78875	-1	2418.09577	-1
1	2599.71481	-1	2524.31884	-1	2449.31814	-1	2374.73813	-1	2300.6043	-1
2	2457.7267	-1	2387.17069	-1	2316.95701	-1	2247.10984	-1	2177.65346	-1
3	2309.64022	-1	2244.03293	-1	2178.71754	-1	2113.71684	-1	2049.05376	-1
4	2155.28138	-1	2094.72725	-1	2034.41745	-1	1974.37327	-1	1914.61616	-1
5	1994.48054	-1	1939.07894	-1	1883.87736	-1	1828.89546	-1	1774.15308	-1
6	1827.07342	-1	1776.91795	-1	1726.9218	-1	1677.1029	-1	1627.47933	-1
7	1652.90221	-1	1608.07997	-1	1563.38032	-1	1518.81932	-1	1474.41322	-1
8	1471.81657	-1	1432.4075	-1	1393.08856	-1	1353.87386	-1	1314.77772	-1
9	1283.67467	-1	1249.75092	-1	1215.88937	-1	1182.10213	-1	1148.40149	-1
10	1088.34415	-1	1059.96945	-1	1031.63381	-1	1003.34729	-1	975.120121	-1
11	885.702998	-1	862.932167	-1	840.18223	-1	817.461176	-1	794.777146	-1
12	675.640476	-1	658.518952	-1	641.405271	-1	624.305356	-1	607.225254	-1
13	458.057755	-1	446.621212	-1	435.184665	-1	423.752001	-1	412.327197	-1
14	232.868624	-1	227.142675	-1	221.414117	-1	215.684852	-1	209.956834	-1
15	0	-1	0	-1	0	-1	0	-1	0	-1
16	-1	2735.78186	-1	2655.65832	-1	2575.98512	-1	2496.78875	-1	2418.09577
17	-1	2599.71481	-1	2524.31884	-1	2449.31814	-1	2374.73813	-1	2300.6043
18	-1	2457.7267	-1	2387.17069	-1	2316.95701	-1	2247.10984	-1	2177.65346
19	-1	2309.64022	-1	2244.03293	-1	2178.71754	-1	2113.71684	-1	2049.05376
20	-1	2155.28138	-1	2094.72725	-1	2034.41745	-1	1974.37327	-1	1914.61616
21	-1	1994.48054	-1	1939.07894	-1	1883.87736	-1	1828.89546	-1	1774.15308
22	-1	1827.07342	-1	1776.91795	-1	1726.9218	-1	1677.1029	-1	1627.47933
23	-1	1652.90221	-1	1608.07997	-1	1563.38032	-1	1518.81932	-1	1474.41322
24	-1	1471.81657	-1	1432.4075	-1	1393.08856	-1	1353.87386	-1	1314.77772
25	-1	1283.67467	-1	1249.75092	-1	1215.88937	-1	1182.10213	-1	1148.40149
26	-1	1088.34415	-1	1059.96945	-1	1031.63381	-1	1003.34729	-1	975.120121
27	-1	885.702998	-1	862.932167	-1	840.18223	-1	817.461176	-1	794.777146
28	-1	675.640476	-1	658.518952	-1	641.405271	-1	624.305356	-1	607.225254
29	-1	458.057755	-1	446.621212	-1	435.184665	-1	423.752001	-1	412.327197
30	-1	232.868624	-1	227.142675	-1	221.414117	-1	215.684852	-1	209.956834
31	-1	0	-1	0	-1	0	-1	0	-1	0

L Wave Focal Law Delays
Wedge Model : 360-151-057
Delays are the same for Axial and Circ Scans

30L		31L		32L		33L		34L		35L
Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay
2339.93274	-1	2262.32631	-1	2185.30313	-1	2108.88988	-1	2033.1133	-1	1958.00012
2226.94218	-1	2153.77743	-1	2081.13571	-1	2009.04278	-1	1937.52445	-1	1866.60656
2108.61225	-1	2040.0107	-1	1971.87338	-1	1904.22493	-1	1837.09011	-1	1770.49373
1984.75138	-1	1920.83288	-1	1857.32156	-1	1794.24084	-1	1731.61424	-1	1669.46541
1855.16773	-1	1796.04973	-1	1737.28404	-1	1678.89271	-1	1620.89786	-1	1563.3218
1719.67023	-1	1665.46706	-1	1611.5639	-1	1557.98126	-1	1504.73976	-1	1451.86021
1578.06937	-1	1528.89149	-1	1479.96431	-1	1431.30665	-1	1382.93749	-1	1334.87598
1430.17846	-1	1386.13167	-1	1342.28965	-1	1298.66941	-1	1255.28813	-1	1212.16318
1275.81462	-1	1236.99926	-1	1198.34653	-1	1159.8715	-1	1121.58943	-1	1083.51576
1114.79995	-1	1081.31017	-1	1047.94501	-1	1014.7175	-1	981.640878	-1	948.72856
946.962714	-1	918.885647	-1	890.899673	-1	863.015724	-1	835.244906	-1	807.598503
772.138454	-1	749.55351	-1	727.030933	-1	704.579485	-1	682.20808	-1	659.925796
590.171136	-1	573.149299	-1	556.166167	-1	539.228294	-1	522.342362	-1	505.515188
400.914315	-1	389.51751	-1	378.141028	-1	366.789209	-1	355.466486	-1	344.177388
204.232059	-1	198.512575	-1	192.800478	-1	187.097912	-1	181.407073	-1	175.730211
0	-1	0	-1	0	-1	0	-1	0	-1	0
-1	2339.93274	-1	2262.32631	-1	2185.30313	-1	2108.88988	-1	2033.1133	-1
-1	2226.94218	-1	2153.77743	-1	2081.13571	-1	2009.04278	-1	1937.52445	-1
-1	2108.61225	-1	2040.0107	-1	1971.87338	-1	1904.22493	-1	1837.09011	-1
-1	1984.75138	-1	1920.83288	-1	1857.32156	-1	1794.24084	-1	1731.61424	-1
-1	1855.16773	-1	1796.04973	-1	1737.28404	-1	1678.89271	-1	1620.89786	-1
-1	1719.67023	-1	1665.46706	-1	1611.5639	-1	1557.98126	-1	1504.73976	-1
-1	1578.06937	-1	1528.89149	-1	1479.96431	-1	1431.30665	-1	1382.93749	-1
-1	1430.17846	-1	1386.13167	-1	1342.28965	-1	1298.66941	-1	1255.28813	-1
-1	1275.81462	-1	1236.99926	-1	1198.34653	-1	1159.8715	-1	1121.58943	-1
-1	1114.79995	-1	1081.31017	-1	1047.94501	-1	1014.7175	-1	981.640878	-1
-1	946.962714	-1	918.885647	-1	890.899673	-1	863.015724	-1	835.244906	-1
-1	772.138454	-1	749.55351	-1	727.030933	-1	704.579485	-1	682.20808	-1
-1	590.171136	-1	573.149299	-1	556.166167	-1	539.228294	-1	522.342362	-1
-1	400.914315	-1	389.51751	-1	378.141028	-1	366.789209	-1	355.466486	-1
-1	204.232059	-1	198.512575	-1	192.800478	-1	187.097912	-1	181.407073	-1
-1	0	-1	0	-1	0	-1	0	-1	0	-1

L Wave Focal Law Delays
Wedge Model : 360-151-057
Delays are the same for Axial and Circ Scans

iL	36L		37L		38L		39L		40L				
	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay			
	-1	1883.5771	-1	1809.871	-1	1736.90861	-1	1664.7167	-1	1593.32205	-1		
	-1	1796.31501	-1	1726.67575	-1	1657.71473	-1	1589.45797	-1	1521.9315	-1		
	-1	1704.46068	-1	1639.01591	-1	1574.18446	-1	1509.9914	-1	1446.46186	-1		
	-1	1607.81805	-1	1546.69602	-1	1486.12321	-1	1426.12363	-1	1366.72137	-1		
	-1	1506.18693	-1	1449.51581	-1	1393.33108	-1	1337.6555	-1	1282.51196	-1		
	-1	1399.36354	-1	1347.27086	-1	1295.6034	-1	1244.38249	-1	1193.62963	-1		
	-1	1287.14143	-1	1239.75333	-1	1192.73132	-1	1146.0952	-1	1099.86491	-1		
	-1	1169.3121	-1	1126.75262	-1	1084.50263	-1	1042.5802	-1	1001.00357	-1		
	-1	1045.66613	-1	1008.05637	-1	970.702464	-1	933.620612	-1	896.827172	-1		
	-1	915.994146	-1	883.451421	-1	851.114356	-1	818.997106	-1	787.114009	-1		
	-1	780.087976	-1	752.724963	-1	725.52128	-1	698.488919	-1	671.640052	-1		
	-1	637.741865	-1	615.665686	-1	593.706813	-1	571.874967	-1	550.180029	-1		
	-1	488.753747	-1	472.065067	-1	455.456392	-1	438.935078	-1	422.508617	-1		
	-1	332.926543	-1	321.718677	-1	310.558614	-1	299.451282	-1	288.40171	-1		
	-1	170.069624	-1	164.427669	-1	158.806753	-1	153.209342	-1	147.637956	-1		
	-1	0	-1	0	-1	0	-1	0	-1	0	-1		
1958.00012		-1	1883.5771		-1	1809.871		-1	1664.7167		-1	1593.32205	
1866.60656		-1	1796.31501		-1	1726.67575		-1	1589.45797		-1	1521.9315	
1770.49373		-1	1704.46068		-1	1639.01591		-1	1509.9914		-1	1446.46186	
1669.46541		-1	1607.81805		-1	1546.69602		-1	1426.12363		-1	1366.72137	
1563.3218		-1	1506.18693		-1	1449.51581		-1	1337.6555		-1	1282.51196	
1451.86021		-1	1399.36354		-1	1347.27086		-1	1244.38249		-1	1193.62963	
1334.87598		-1	1287.14143		-1	1239.75333		-1	1146.0952		-1	1099.86491	
1212.16318		-1	1169.3121		-1	1126.75262		-1	1042.5802		-1	1001.00357	
1083.51576		-1	1045.66613		-1	1008.05637		-1	933.620612		-1	896.827172	
948.72856		-1	915.994146		-1	883.451421		-1	818.997106		-1	787.114009	
807.598503		-1	780.087976		-1	752.724963		-1	698.488919		-1	671.640052	
659.925796		-1	637.741865		-1	615.665686		-1	571.874967		-1	550.180029	
505.515188		-1	488.753747		-1	472.065067		-1	438.935078		-1	422.508617	
344.177388		-1	332.926543		-1	321.718677		-1	299.451282		-1	288.40171	
175.730211		-1	170.069624		-1	164.427669		-1	153.209342		-1	147.637956	
	0		-1		0		-1		0		-1		0

L Wave Focal Law Delays
Wedge Model : 360-151-057
Delays are the same for Axial and Circ Scans

41L		42L		43L		44L		45L		46L
Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay
1522.75143	-1	1453.0316	-1	1384.1893	-1	1316.25124	-1	1249.2441	-1	1183.19454
1455.16136	-1	1389.17361	-1	1323.99432	-1	1259.64955	-1	1196.16538	-1	1133.56784
1383.62102	-1	1321.49411	-1	1260.10637	-1	1199.48309	-1	1139.64957	-1	1080.63113
1307.94058	-1	1249.80549	-1	1192.34038	-1	1135.5696	-1	1079.51755	-1	1024.20865
1227.92341	-1	1173.91294	-1	1120.50369	-1	1067.71891	-1	1015.58192	-1	964.116109
1143.36646	-1	1093.6147	-1	1044.39623	-1	995.733004	-1	947.647096	-1	900.160674
1054.06055	-1	1008.70241	-1	963.810777	-1	919.406213	-1	875.509356	-1	832.140968
959.791141	-1	918.961476	-1	878.533298	-1	838.525483	-1	798.957054	-1	759.847224
860.338685	-1	824.171866	-1	788.3436	-1	752.87094	-1	717.771104	-1	683.061469
755.479582	-1	724.108522	-1	693.015705	-1	662.21618	-1	631.725171	-1	601.55807
644.987027	-1	618.542366	-1	592.318769	-1	566.329109	-1	540.586432	-1	515.103956
528.632045	-1	507.241223	-1	486.017936	-1	464.972717	-1	444.116266	-1	423.459443
406.184642	-1	389.970923	-1	373.875374	-1	357.906048	-1	342.07114	-1	326.378987
277.415069	-1	266.496524	-1	255.651454	-1	244.885311	-1	234.203653	-1	223.612149
142.095173	-1	136.58363	-1	131.106022	-1	125.665106	-1	120.263744	-1	114.904724
0	-1	0	-1	0	-1	0	-1	0	-1	0
-1	1522.75143	-1	1453.0316	-1	1384.1893	-1	1316.25124	-1	1249.2441	-1
-1	1455.16136	-1	1389.17361	-1	1323.99432	-1	1259.64955	-1	1196.16538	-1
-1	1383.62102	-1	1321.49411	-1	1260.10637	-1	1199.48309	-1	1139.64957	-1
-1	1307.94058	-1	1249.80549	-1	1192.34038	-1	1135.5696	-1	1079.51755	-1
-1	1227.92341	-1	1173.91294	-1	1120.50369	-1	1067.71891	-1	1015.58192	-1
-1	1143.36646	-1	1093.6147	-1	1044.39623	-1	995.733004	-1	947.647096	-1
-1	1054.06055	-1	1008.70241	-1	963.810777	-1	919.406213	-1	875.509356	-1
-1	959.791141	-1	918.961476	-1	878.533298	-1	838.525483	-1	798.957054	-1
-1	860.338685	-1	824.171866	-1	788.3436	-1	752.87094	-1	717.771104	-1
-1	755.479582	-1	724.108522	-1	693.015705	-1	662.21618	-1	631.725171	-1
-1	644.987027	-1	618.542366	-1	592.318769	-1	566.329109	-1	540.586432	-1
-1	528.632045	-1	507.241223	-1	486.017936	-1	464.972717	-1	444.116266	-1
-1	406.184642	-1	389.970923	-1	373.875374	-1	357.906048	-1	342.07114	-1
-1	277.415069	-1	266.496524	-1	255.651454	-1	244.885311	-1	234.203653	-1
-1	142.095173	-1	136.58363	-1	131.106022	-1	125.665106	-1	120.263744	-1
-1	0	-1	0	-1	0	-1	0	-1	0	-1

L Wave Focal Law Delays
 Wedge Model : 360-151-057
 Delays are the same for Axial and Circ Scans

5L	47L		48L		49L		50L		51L	
	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay
	-1	1118.12913	-1	1054.07444	-1	991.056895	-1	929.103015	-1	868.239087
	-1	1071.88298	-1	1011.13679	-1	951.355186	-1	892.56419	-1	834.789617
	-1	1022.4531	-1	965.140801	-1	908.719487	-1	853.214559	-1	798.651228
	-1	969.667376	-1	915.918228	-1	862.985659	-1	810.894296	-1	759.668605
	-1	913.344924	-1	863.29187	-1	813.980445	-1	765.43434	-1	717.677116
	-1	853.295993	-1	807.075394	-1	761.521234	-1	716.656094	-1	672.502455
	-1	789.321927	-1	747.073218	-1	705.415872	-1	664.371172	-1	623.960325
	-1	721.215208	-1	683.080485	-1	645.462558	-1	608.38121	-1	571.856172
	-1	648.759565	-1	614.883074	-1	581.449766	-1	548.477761	-1	515.984993
	-1	571.730433	-1	542.25798	-1	513.156531	-1	484.442222	-1	456.131171
	-1	489.895064	-1	464.973306	-1	440.352342	-1	416.046146	-1	392.068692
	-1	403.013267	-1	382.788921	-1	362.797685	-1	343.051158	-1	323.560932
	-1	310.838067	-1	295.457001	-1	280.244493	-1	265.209547	-1	250.36115
	-1	213.116573	-1	202.722813	-1	192.436808	-1	182.264769	-1	172.212858
	-1	109.59103	-1	104.325664	-1	99.111637	-1	93.952184	-1	88.850446
	-1	0	-1	0	-1	0	-1	0	-1	0
1183.19454	-1	1118.12913	-1	1054.07444	-1	991.056895	-1	929.103015	-1	868.239087
1133.56784	-1	1071.88298	-1	1011.13679	-1	951.355186	-1	892.56419	-1	834.789617
1080.63113	-1	1022.4531	-1	965.140801	-1	908.719487	-1	853.214559	-1	798.651228
1024.20865	-1	969.667376	-1	915.918228	-1	862.985659	-1	810.894296	-1	759.668605
964.116109	-1	913.344924	-1	863.29187	-1	813.980445	-1	765.43434	-1	717.677116
900.160674	-1	853.295993	-1	807.075394	-1	761.521234	-1	716.656094	-1	672.502455
832.140968	-1	789.321927	-1	747.073218	-1	705.415872	-1	664.371172	-1	623.960325
759.847224	-1	721.215208	-1	683.080485	-1	645.462558	-1	608.38121	-1	571.856172
683.061469	-1	648.759565	-1	614.883074	-1	581.449766	-1	548.477761	-1	515.984993
601.55807	-1	571.730433	-1	542.25798	-1	513.156531	-1	484.442222	-1	456.131171
515.103956	-1	489.895064	-1	464.973306	-1	440.352342	-1	416.046146	-1	392.068692
423.459443	-1	403.013267	-1	382.788921	-1	362.797685	-1	343.051158	-1	323.560932
326.378987	-1	310.838067	-1	295.457001	-1	280.244493	-1	265.209547	-1	250.36115
223.612149	-1	213.116573	-1	202.722813	-1	192.436808	-1	182.264769	-1	172.212858
114.904724	-1	109.59103	-1	104.325664	-1	99.111637	-1	93.952184	-1	88.850446
0	-1	0	-1	0	-1	0	-1	0	-1	0

L Wave Focal Law Delays

Wedge Model : 360-151-057

Delays are the same for Axial and Circ Scans

52L		53L		54L		55L		56L		57
Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay
808.491361	-1	749.885987	-1	692.449005	-1	636.206329	-1	581.183737	-1	527.406854
778.057267	-1	722.392862	-1	667.822035	-1	614.370316	-1	562.063122	-1	510.925734
745.054718	-1	692.4502	-1	640.86278	-1	590.317485	-1	540.839251	-1	492.452904
709.33309	-1	659.912232	-1	611.430469	-1	563.912193	-1	517.381724	-1	471.863303
670.7324	-1	624.623821	-1	579.375001	-1	535.009536	-1	491.550984	-1	449.022846
629.082892	-1	586.42001	-1	544.536437	-1	503.454803	-1	463.19773	-1	423.787816
584.204663	-1	545.125578	-1	506.744509	-1	469.082931	-1	432.16234	-1	396.004238
535.907325	-1	500.554637	-1	465.818153	-1	431.717982	-1	398.274282	-1	365.507245
483.989725	-1	452.510278	-1	421.565078	-1	391.172636	-1	361.351543	-1	332.120452
428.23969	-1	400.784279	-1	373.781382	-1	347.247731	-1	321.200096	-1	295.655339
368.43415	-1	345.156834	-1	322.25119	-1	299.731792	-1	277.613397	-1	255.910666
304.338799	-1	285.396691	-1	266.746681	-1	248.400971	-1	230.371888	-1	212.671874
235.708472	-1	221.260816	-1	207.027615	-1	193.018426	-1	179.242924	-1	165.710898
162.287396	-1	152.49481	-1	142.841633	-1	133.334498	-1	123.980139	-1	114.785386
83.809678	-1	78.833201	-1	73.924396	-1	69.086705	-1	64.323634	-1	59.638745
0	-1	0	-1	0	-1	0	-1	0	-1	0
-1	808.491361	-1	749.885987	-1	692.449005	-1	636.206329	-1	581.183737	-1
-1	778.057267	-1	722.392862	-1	667.822035	-1	614.370316	-1	562.063122	-1
-1	745.054718	-1	692.4502	-1	640.86278	-1	590.317485	-1	540.839251	-1
-1	709.33309	-1	659.912232	-1	611.430469	-1	563.912193	-1	517.381724	-1
-1	670.7324	-1	624.623821	-1	579.375001	-1	535.009536	-1	491.550984	-1
-1	629.082892	-1	586.42001	-1	544.536437	-1	503.454803	-1	463.19773	-1
-1	584.204663	-1	545.125578	-1	506.744509	-1	469.082931	-1	432.16234	-1
-1	535.907325	-1	500.554637	-1	465.818153	-1	431.717982	-1	398.274282	-1
-1	483.989725	-1	452.510278	-1	421.565078	-1	391.172636	-1	361.351543	-1
-1	428.23969	-1	400.784279	-1	373.781382	-1	347.247731	-1	321.200096	-1
-1	368.43415	-1	345.156834	-1	322.25119	-1	299.731792	-1	277.613397	-1
-1	304.338799	-1	285.396691	-1	266.746681	-1	248.400971	-1	230.371888	-1
-1	235.708472	-1	221.260816	-1	207.027615	-1	193.018426	-1	179.242924	-1
-1	162.287396	-1	152.49481	-1	142.841633	-1	133.334498	-1	123.980139	-1
-1	83.809678	-1	78.833201	-1	73.924396	-1	69.086705	-1	64.323634	-1
-1	0	-1	0	-1	0	-1	0	-1	0	-1

L Wave Focal Law Delays
Wedge Model : 360-151-057
Delays are the same for Axial and Circ Scans

7L	58L		59L		60L		61L		62L	
	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay
-1	474.901138	-1	423.691858	-1	373.80408	-1	325.262643	-1	278.092136	-1
-1	460.983286	-1	412.260745	-1	364.782891	-1	318.574296	-1	273.659301	-1
-1	445.183144	-1	399.054527	-1	354.091443	-1	310.318095	-1	267.758476	-1
-1	427.381066	-1	383.959034	-1	341.621084	-1	300.390931	-1	260.292103	-1
-1	407.448553	-1	366.851441	-1	327.254735	-1	288.681522	-1	251.15473	-1
-1	385.247613	-1	347.599612	-1	310.866218	-1	275.069733	-1	240.232326	-1
-1	360.630111	-1	326.061414	-1	292.319553	-1	259.425854	-1	227.401547	-1
-1	333.437084	-1	302.084007	-1	271.468205	-1	241.609826	-1	212.528952	-1
-1	303.498063	-1	275.503106	-1	248.154322	-1	221.470441	-1	195.470163	-1
-1	270.630391	-1	246.142244	-1	222.207926	-1	198.844491	-1	176.068989	-1
-1	234.638553	-1	213.812026	-1	193.446117	-1	173.555906	-1	154.156503	-1
-1	195.313548	-1	178.309411	-1	161.672254	-1	145.414869	-1	129.550097	-1
-1	152.432242	-1	139.41695	-1	126.675099	-1	114.216931	-1	102.052506	-1
-1	105.757158	-1	96.902461	-1	88.228381	-1	79.742075	-1	71.450764	-1
-1	55.035658	-1	50.518049	-1	46.089644	-1	41.754219	-1	37.515592	-1
-1	0	-1	0	-1	0	-1	0	-1	0	-1
527.406854	-1	474.901138	-1	423.691858	-1	373.80408	-1	325.262643	-1	278.092136
510.925734	-1	460.983286	-1	412.260745	-1	364.782891	-1	318.574296	-1	273.659301
492.452904	-1	445.183144	-1	399.054527	-1	354.091443	-1	310.318095	-1	267.758476
471.863303	-1	427.381066	-1	383.959034	-1	341.621084	-1	300.390931	-1	260.292103
449.022846	-1	407.448553	-1	366.851441	-1	327.254735	-1	288.681522	-1	251.15473
423.787816	-1	385.247613	-1	347.599612	-1	310.866218	-1	275.069733	-1	240.232326
396.004238	-1	360.630111	-1	326.061414	-1	292.319553	-1	259.425854	-1	227.401547
365.507245	-1	333.437084	-1	302.084007	-1	271.468205	-1	241.609826	-1	212.528952
332.120452	-1	303.498063	-1	275.503106	-1	248.154322	-1	221.470441	-1	195.470163
295.655339	-1	270.630391	-1	246.142244	-1	222.207926	-1	198.844491	-1	176.068989
255.910666	-1	234.638553	-1	213.812026	-1	193.446117	-1	173.555906	-1	154.156503
212.671874	-1	195.313548	-1	178.309411	-1	161.672254	-1	145.414869	-1	129.550097
165.710898	-1	152.432242	-1	139.41695	-1	126.675099	-1	114.216931	-1	102.052506
114.785386	-1	105.757158	-1	96.902461	-1	88.228381	-1	79.742075	-1	71.450764
59.638745	-1	55.035658	-1	50.518049	-1	46.089644	-1	41.754219	-1	37.515592
0	-1	0	-1	0	-1	0	-1	0	-1	0

L Wave Focal Law Delays
 Wedge Model : 360-151-057
 Delays are the same for Axial and Circ Scans

63L		64L		65L		66L		67L		68L
Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay
232.316875	-1	187.960879	-1	145.047835	-1	103.601074	-1	63.643434	-1	25.197624
230.06199	-1	187.806163	-1	146.91531	-1	107.412574	-1	69.320623	-1	32.662007
226.436342	-1	186.375185	-1	147.598204	-1	110.12827	-1	73.987797	-1	39.199099
221.347916	-1	183.581441	-1	147.015482	-1	111.672537	-1	77.574663	-1	44.743843
214.6971	-1	179.331156	-1	145.079179	-1	111.963169	-1	80.004713	-1	49.225344
206.376008	-1	173.522605	-1	141.693726	-1	110.91073	-1	81.194592	-1	52.566259
196.267737	-1	166.045374	-1	136.755221	-1	108.417829	-1	81.053392	-1	54.682112
184.245573	-1	156.779559	-1	130.150632	-1	104.378331	-1	79.481879	-1	55.480542
170.17213	-1	145.5949	-1	121.756919	-1	98.676489	-1	76.371633	-1	54.860459
153.898448	-1	132.34985	-1	111.440099	-1	91.185997	-1	71.604106	-1	52.711115
135.263026	-1	116.890578	-1	99.054222	-1	81.768957	-1	65.049583	-1	48.911074
114.090816	-1	99.049915	-1	84.44028	-1	70.274763	-1	56.56606	-1	43.327081
90.192176	-1	78.646249	-1	67.425049	-1	56.538901	-1	45.998007	-1	35.812818
63.361812	-1	55.482367	-1	47.819862	-1	40.381664	-1	33.175043	-1	26.207549
33.377622	-1	29.3442	-1	25.419341	-1	21.6068	-1	17.910517	-1	14.334643
0	-1	0	-1	0	-1	0	-1	0	-1	0
-1	232.316875	-1	187.960879	-1	145.047835	-1	103.601074	-1	63.643434	-1
-1	230.06199	-1	187.806163	-1	146.91531	-1	107.412574	-1	69.320623	-1
-1	226.436342	-1	186.375185	-1	147.598204	-1	110.12827	-1	73.987797	-1
-1	221.347916	-1	183.581441	-1	147.015482	-1	111.672537	-1	77.574663	-1
-1	214.6971	-1	179.331156	-1	145.079179	-1	111.963169	-1	80.004713	-1
-1	206.376008	-1	173.522605	-1	141.693726	-1	110.91073	-1	81.194592	-1
-1	196.267737	-1	166.045374	-1	136.755221	-1	108.417829	-1	81.053392	-1
-1	184.245573	-1	156.779559	-1	130.150632	-1	104.378331	-1	79.481879	-1
-1	170.17213	-1	145.5949	-1	121.756919	-1	98.676489	-1	76.371633	-1
-1	153.898448	-1	132.34985	-1	111.440099	-1	91.185997	-1	71.604106	-1
-1	135.263026	-1	116.890578	-1	99.054222	-1	81.768957	-1	65.049583	-1
-1	114.090816	-1	99.049915	-1	84.44028	-1	70.274763	-1	56.56606	-1
-1	90.192176	-1	78.646249	-1	67.425049	-1	56.538901	-1	45.998007	-1
-1	63.361812	-1	55.482367	-1	47.819862	-1	40.381664	-1	33.175043	-1
-1	33.377622	-1	29.3442	-1	25.419341	-1	21.6068	-1	17.910517	-1
-1	0	-1	0	-1	0	-1	0	-1	0	-1

L Wave Focal Law Delays
 Wedge Model : 360-151-057
 Delays are the same for Axial and Circ Scans

3L	69L		70L	
Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay
-1	0	-1	0	-1
-1	9.172938	-1	10.802721	-1
-1	17.498165	-1	20.834096	-1
-1	24.915752	-1	30.039196	-1
-1	31.360314	-1	38.358028	-1
-1	36.760427	-1	45.724974	-1
-1	41.037973	-1	52.06817	-1
-1	44.107405	-1	57.3088	-1
-1	45.874934	-1	61.360314	-1
-1	46.237617	-1	64.127544	-1
-1	45.082349	-1	65.505716	-1
-1	42.28473	-1	65.379349	-1
-1	37.707829	-1	63.621019	-1
-1	31.200811	-1	60.089991	-1
-1	22.597433	-1	54.630705	-1
-1	11.714402	-1	47.071097	-1
25.197624	-1	0	-1	0
32.662007	-1	9.172938	-1	10.802721
39.199099	-1	17.498165	-1	20.834096
44.743843	-1	24.915752	-1	30.039196
49.225344	-1	31.360314	-1	38.358028
52.566259	-1	36.760427	-1	45.724974
54.682112	-1	41.037973	-1	52.06817
55.480542	-1	44.107405	-1	57.3088
54.860459	-1	45.874934	-1	61.360314
52.711115	-1	46.237617	-1	64.127544
48.911074	-1	45.082349	-1	65.505716
43.327081	-1	42.28473	-1	65.379349
35.812818	-1	37.707829	-1	63.621019
26.207549	-1	31.200811	-1	60.089991
14.334643	-1	22.597433	-1	54.630705
0	-1	11.714402	-1	47.071097

S Wave Focal Law Delays
Wedge Model : 360-151-057
Delays are the same for Axial and Circ Scans

P/R Channel	35S		36S		37S		38S		39S	
	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay
0	0	-1	0	-1	0	-1	0	-1	0	-1
1	118.610054	-1	126.962049	-1	135.197277	-1	143.31348	-1	151.308436	-1
2	227.250589	-1	244.184959	-1	260.889197	-1	277.358508	-1	293.588165	-1
3	325.570065	-1	351.312585	-1	376.715742	-1	401.771926	-1	426.473627	-1
4	413.219452	-1	447.989952	-1	482.31673	-1	516.189095	-1	549.59657	-1
5	489.854406	-1	533.86541	-1	577.333949	-1	620.245987	-1	662.587627	-1
6	555.136712	-1	608.592045	-1	661.412504	-1	713.580473	-1	765.078475	-1
7	608.736598	-1	671.829999	-1	734.203156	-1	795.83465	-1	856.7032	-1
8	650.33466	-1	723.248419	-1	795.364266	-1	866.656789	-1	937.100693	-1
9	679.623782	-1	762.527414	-1	844.563783	-1	925.703321	-1	1005.91655	-1
10	696.311443	-1	789.360435	-1	881.48169	-1	972.641356	-1	1062.80564	-1
11	700.121115	-1	803.455735	-1	905.811504	-1	1007.1502	-1	1107.43361	-1
12	690.794442	-1	804.538659	-1	917.26268	-1	1028.92388	-1	1139.47955	-1
13	668.092774	-1	792.353291	-1	915.562357	-1	1037.67293	-1	1158.63783	-1
14	631.799028	-1	766.664474	-1	900.457527	-1	1033.12679	-1	1164.62061	-1
15	581.718613	-1	727.258837	-1	871.716171	-1	1015.03494	-1	1157.15913	-1
16	-1	0	-1	0	-1	0	-1	0	-1	0
17	-1	118.610054	-1	126.962049	-1	135.197277	-1	143.31348	-1	151.308436
18	-1	227.250589	-1	244.184959	-1	260.889197	-1	277.358508	-1	293.588165
19	-1	325.570065	-1	351.312585	-1	376.715742	-1	401.771926	-1	426.473627
20	-1	413.219452	-1	447.989952	-1	482.31673	-1	516.189095	-1	549.59657
21	-1	489.854406	-1	533.86541	-1	577.333949	-1	620.245987	-1	662.587627
22	-1	555.136712	-1	608.592045	-1	661.412504	-1	713.580473	-1	765.078475
23	-1	608.736598	-1	671.829999	-1	734.203156	-1	795.83465	-1	856.7032
24	-1	650.33466	-1	723.248419	-1	795.364266	-1	866.656789	-1	937.100693
25	-1	679.623782	-1	762.527414	-1	844.563783	-1	925.703321	-1	1005.91655
26	-1	696.311443	-1	789.360435	-1	881.48169	-1	972.641356	-1	1062.80564
27	-1	700.121115	-1	803.455735	-1	905.811504	-1	1007.1502	-1	1107.43361
28	-1	690.794442	-1	804.538659	-1	917.26268	-1	1028.92388	-1	1139.47955
29	-1	668.092774	-1	792.353291	-1	915.562357	-1	1037.67293	-1	1158.63783
30	-1	631.799028	-1	766.664474	-1	900.457527	-1	1033.12679	-1	1164.62061
31	-1	581.718613	-1	727.258837	-1	871.716171	-1	1015.03494	-1	1157.15913

S Wave Focal Law Delays
Wedge Model : 360-151-057
Delays are the same for Axial and Circ Scans

40S		41S		42S		43S		44S		45
Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay
0	-1	0	-1	0	-1	0	-1	0	-1	0
159.179956	-1	166.92589	-1	174.544123	-1	182.032577	-1	189.389213	-1	196.612032
309.573508	-1	325.30995	-1	340.792969	-1	356.01812	-1	370.981028	-1	385.677397
450.813427	-1	474.78401	-1	498.37816	-1	521.58876	-1	544.408803	-1	566.831388
582.528514	-1	614.974687	-1	646.924881	-1	678.369015	-1	709.297141	-1	739.699445
704.345104	-1	745.50479	-1	786.053201	-1	825.976996	-1	865.262986	-1	903.898253
815.889178	-1	865.995391	-1	915.380077	-1	964.026349	-1	1011.91748	-1	1059.03693
916.787662	-1	976.067036	-1	1034.52047	-1	1092.12726	-1	1148.86688	-1	1204.71894
1006.67081	-1	1075.34211	-1	1143.08968	-1	1209.88876	-1	1275.71473	-1	1340.54314
1085.1741	-1	1163.44668	-1	1240.70515	-1	1316.92056	-1	1392.06376	-1	1466.10607
1151.94079	-1	1240.01315	-1	1326.98911	-1	1412.83514	-1	1497.5178	-1	1581.00375
1206.62352	-1	1304.68174	-1	1401.57007	-1	1497.25036	-1	1591.68449	-1	1684.83438
1248.88695	-1	1357.10326	-1	1464.08562	-1	1569.79114	-1	1674.17688	-1	1777.19987
1278.40973	-1	1396.94117	-1	1514.18456	-1	1630.09218	-1	1744.61633	-1	1857.70884
1294.88713	-1	1423.87423	-1	1551.5296	-1	1677.80069	-1	1802.63474	-1	1925.97877
1298.0324	-1	1437.59804	-1	1575.79904	-1	1712.57805	-1	1847.87741	-1	1981.6391
-1	0	-1	0	-1	0	-1	0	-1	0	-1
-1	159.179956	-1	166.92589	-1	174.544123	-1	182.032577	-1	189.389213	-1
-1	309.573508	-1	325.30995	-1	340.792969	-1	356.01812	-1	370.981028	-1
-1	450.813427	-1	474.78401	-1	498.37816	-1	521.58876	-1	544.408803	-1
-1	582.528514	-1	614.974687	-1	646.924881	-1	678.369015	-1	709.297141	-1
-1	704.345104	-1	745.50479	-1	786.053201	-1	825.976996	-1	865.262986	-1
-1	815.889178	-1	865.995391	-1	915.380077	-1	964.026349	-1	1011.91748	-1
-1	916.787662	-1	976.067036	-1	1034.52047	-1	1092.12726	-1	1148.86688	-1
-1	1006.67081	-1	1075.34211	-1	1143.08968	-1	1209.88876	-1	1275.71473	-1
-1	1085.1741	-1	1163.44668	-1	1240.70515	-1	1316.92056	-1	1392.06376	-1
-1	1151.94079	-1	1240.01315	-1	1326.98911	-1	1412.83514	-1	1497.5178	-1
-1	1206.62352	-1	1304.68174	-1	1401.57007	-1	1497.25036	-1	1591.68449	-1
-1	1248.88695	-1	1357.10326	-1	1464.08562	-1	1569.79114	-1	1674.17688	-1
-1	1278.40973	-1	1396.94117	-1	1514.18456	-1	1630.09218	-1	1744.61633	-1
-1	1294.88713	-1	1423.87423	-1	1551.5296	-1	1677.80069	-1	1802.63474	-1
-1	1298.0324	-1	1437.59804	-1	1575.79904	-1	1712.57805	-1	1847.87741	-1

S Wave Focal Law Delays
 Wedge Model : 360-151-057
 Delays are the same for Axial and Circ Scans

iS	46S		47S		48S		49S		50S		
	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	
	-1	0	-1	0	-1	0	-1	0	-1	0	
	-1	203.699074	-1	210.648422	-1	217.458115	-1	224.126497	-1	230.651704	
	-1	400.103008	-1	414.253724	-1	428.125404	-1	441.71426	-1	455.016335	
	-1	588.849728	-1	610.457151	-1	631.647022	-1	652.413093	-1	672.748993	
	-1	769.566257	-1	798.888051	-1	827.655368	-1	855.859171	-1	883.490336	
	-1	941.869696	-1	979.164726	-1	1015.77073	-1	1051.67554	-1	1086.86694	
	-1	1105.36829	-1	1150.89537	-1	1195.60208	-1	1239.47279	-1	1282.49182	
	-1	1259.66326	-1	1313.67982	-1	1366.74873	-1	1418.85056	-1	1469.96584	
	-1	1404.34971	-1	1467.1103	-1	1528.80091	-1	1589.398	-1	1648.87797	
	-1	1539.01885	-1	1610.77359	-1	1681.34188	-1	1750.69576	-1	1818.80718	
	-1	1663.25975	-1	1744.25267	-1	1823.94944	-1	1902.31753	-1	1979.32388	
	-1	1776.66199	-1	1867.12937	-1	1956.19853	-1	2043.83186	-1	2129.99158	
	-1	1878.81714	-1	1978.98571	-1	2077.66252	-1	2174.80479	-1	2270.36952	
	-1	1969.32177	-1	2079.407	-1	2187.91624	-1	2294.8014	-1	2400.01406	
	-1	2047.77963	-1	2167.98397	-1	2286.53816	-1	2403.38868	-1	2518.48158	
	-1	2113.80485	-1	2244.31602	-1	2373.11365	-1	2500.1387	-1	2625.33163	
	0	-1	0	-1	0	-1	0	-1	0	-1	
	196.612032	-1	203.699074	-1	210.648422	-1	217.458115	-1	224.126497	-1	230.651704
	385.677397	-1	400.103008	-1	414.253724	-1	428.125404	-1	441.71426	-1	455.016335
	566.831388	-1	588.849728	-1	610.457151	-1	631.647022	-1	652.413093	-1	672.748993
	739.699445	-1	769.566257	-1	798.888051	-1	827.655368	-1	855.859171	-1	883.490336
	903.898253	-1	941.869696	-1	979.164726	-1	1015.77073	-1	1051.67554	-1	1086.86694
	1059.03693	-1	1105.36829	-1	1150.89537	-1	1195.60208	-1	1239.47279	-1	1282.49182
	1204.71894	-1	1259.66326	-1	1313.67982	-1	1366.74873	-1	1418.85056	-1	1469.96584
	1340.54314	-1	1404.34971	-1	1467.1103	-1	1528.80091	-1	1589.398	-1	1648.87797
	1466.10607	-1	1539.01885	-1	1610.77359	-1	1681.34188	-1	1750.69576	-1	1818.80718
	1581.00375	-1	1663.25975	-1	1744.25267	-1	1823.94944	-1	1902.31753	-1	1979.32388
	1684.83438	-1	1776.66199	-1	1867.12937	-1	1956.19853	-1	2043.83186	-1	2129.99158
	1777.19987	-1	1878.81714	-1	1978.98571	-1	2077.66252	-1	2174.80479	-1	2270.36952
	1857.70884	-1	1969.32177	-1	2079.407	-1	2187.91624	-1	2294.8014	-1	2400.01406
	1925.97877	-1	2047.77963	-1	2167.98397	-1	2286.53816	-1	2403.38868	-1	2518.48158
	1981.6391	-1	2113.80485	-1	2244.31602	-1	2373.11365	-1	2500.1387	-1	2625.33163

S Wave Focal Law Delays
Wedge Model : 360-151-057
Delays are the same for Axial and Circ Scans

51S		52S		53S		54S		55S		56S
Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay
0	-1	0	-1	0	-1	0	-1	0	-1	0
237.032002	-1	243.265714	-1	249.351319	-1	255.287041	-1	261.071474	-1	266.70317
468.027854	-1	480.745145	-1	493.164643	-1	505.282894	-1	517.096561	-1	528.602431
692.648575	-1	712.105841	-1	731.114948	-1	749.670217	-1	767.766141	-1	785.397394
910.54	-1	936.99949	-1	962.860332	-1	988.11426	-1	1012.75323	-1	1036.76944
1121.333	-1	1155.062	-1	1188.04247	-1	1220.26318	-1	1251.71318	-1	1282.38178
1324.64397	-1	1365.91383	-1	1406.2867	-1	1445.748	-1	1484.28345	-1	1521.87908
1520.07544	-1	1569.16046	-1	1617.20231	-1	1664.18267	-1	1710.08368	-1	1754.88738
1707.21755	-1	1764.39372	-1	1820.38375	-1	1875.16517	-1	1928.71587	-1	1981.01405
1885.64841	-1	1951.19196	-1	2015.41058	-1	2078.27731	-1	2139.76548	-1	2199.84877
2054.93612	-1	2129.12194	-1	2201.84927	-1	2273.08625	-1	2342.80131	-1	2410.96318
2214.64013	-1	2297.74011	-1	2379.25425	-1	2459.14568	-1	2537.3772	-1	2613.91239
2364.31386	-1	2456.59502	-1	2547.17031	-1	2635.99715	-1	2723.03309	-1	2808.23586
2503.50589	-1	2605.2285	-1	2705.13351	-1	2803.17258	-1	2899.29737	-1	2993.45961
2631.76304	-1	2743.17859	-1	2852.67416	-1	2960.19539	-1	3065.68784	-1	3169.09702
2748.63268	-1	2869.98188	-1	2989.31895	-1	3106.58343	-1	3221.71458	-1	3334.65148
-1	0	-1	0	-1	0	-1	0	-1	0	-1
-1	237.032002	-1	243.265714	-1	249.351319	-1	255.287041	-1	261.071474	-1
-1	468.027854	-1	480.745145	-1	493.164643	-1	505.282894	-1	517.096561	-1
-1	692.648575	-1	712.105841	-1	731.114948	-1	749.670217	-1	767.766141	-1
-1	910.54	-1	936.99949	-1	962.860332	-1	988.11426	-1	1012.75323	-1
-1	1121.333	-1	1155.062	-1	1188.04247	-1	1220.26318	-1	1251.71318	-1
-1	1324.64397	-1	1365.91383	-1	1406.2867	-1	1445.748	-1	1484.28345	-1
-1	1520.07544	-1	1569.16046	-1	1617.20231	-1	1664.18267	-1	1710.08368	-1
-1	1707.21755	-1	1764.39372	-1	1820.38375	-1	1875.16517	-1	1928.71587	-1
-1	1885.64841	-1	1951.19196	-1	2015.41058	-1	2078.27731	-1	2139.76548	-1
-1	2054.93612	-1	2129.12194	-1	2201.84927	-1	2273.08625	-1	2342.80131	-1
-1	2214.64013	-1	2297.74011	-1	2379.25425	-1	2459.14568	-1	2537.3772	-1
-1	2364.31386	-1	2456.59502	-1	2547.17031	-1	2635.99715	-1	2723.03309	-1
-1	2503.50589	-1	2605.2285	-1	2705.13351	-1	2803.17258	-1	2899.29737	-1
-1	2631.76304	-1	2743.17859	-1	2852.67416	-1	2960.19539	-1	3065.68784	-1
-1	2748.63268	-1	2869.98188	-1	2989.31895	-1	3106.58343	-1	3221.71458	-1

S Wave Focal Law Delays
Wedge Model : 360-151-057
Delays are the same for Axial and Circ Scans

iS	57S		58S		59S		60S		61S		
	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	
	-1	0	-1	0	-1	0	-1	0	-1	0	-1
	-1	272.180747	-1	277.502891	-1	282.668355	-1	287.675968	-1	292.524633	-1
	-1	539.797539	-1	550.678699	-1	561.243219	-1	571.488434	-1	581.411832	-1
	-1	802.558842	-1	819.245548	-1	835.452784	-1	851.176043	-1	866.41118	-1
	-1	1060.15532	-1	1082.90358	-1	1105.00717	-1	1126.45937	-1	1147.25372	-1
	-1	1312.25859	-1	1341.33354	-1	1369.59687	-1	1397.0392	-1	1423.6515	-1
	-1	1558.52126	-1	1594.19672	-1	1628.89255	-1	1662.59625	-1	1695.29574	-1
	-1	1798.5766	-1	1841.13442	-1	1882.54433	-1	1922.79025	-1	1961.85655	-1
	-1	2032.03828	-1	2081.76771	-1	2130.1814	-1	2177.25936	-1	2222.98193	-1
	-1	2258.5012	-1	2315.69718	-1	2371.41154	-1	2425.61957	-1	2478.29701	-1
	-1	2477.5409	-1	2542.50387	-1	2605.82189	-1	2667.46516	-1	2727.40434	-1
	-1	2688.7149	-1	2761.74869	-1	2832.97805	-1	2902.36765	-1	2969.88251	-1
	-1	2891.56335	-1	2972.97389	-1	3052.42545	-1	3129.87685	-1	3205.28703	-1
	-1	3085.61114	-1	3175.70384	-1	3263.68978	-1	3349.52113	-1	3433.15027	-1
	-1	3270.36836	-1	3369.44726	-1	3466.27911	-1	3560.80927	-1	3652.98314	-1
	-1	3445.33316	-1	3553.69789	-1	3659.68428	-1	3763.2306	-1	3864.2749	-1
	0	-1	0	-1	0	-1	0	-1	0	-1	0
	266.70317	-1	272.180747	-1	277.502891	-1	282.668355	-1	287.675968	-1	292.524633
	528.602431	-1	539.797539	-1	550.678699	-1	561.243219	-1	571.488434	-1	581.411832
	785.397394	-1	802.558842	-1	819.245548	-1	835.452784	-1	851.176043	-1	866.41118
	1036.76944	-1	1060.15532	-1	1082.90358	-1	1105.00717	-1	1126.45937	-1	1147.25372
	1282.38178	-1	1312.25859	-1	1341.33354	-1	1369.59687	-1	1397.0392	-1	1423.6515
	1521.87908	-1	1558.52126	-1	1594.19672	-1	1628.89255	-1	1662.59625	-1	1695.29574
	1754.88738	-1	1798.5766	-1	1841.13442	-1	1882.54433	-1	1922.79025	-1	1961.85655
	1981.01405	-1	2032.03828	-1	2081.76771	-1	2130.1814	-1	2177.25936	-1	2222.98193
	2199.84877	-1	2258.5012	-1	2315.69718	-1	2371.41154	-1	2425.61957	-1	2478.29701
	2410.96318	-1	2477.5409	-1	2542.50387	-1	2605.82189	-1	2667.46516	-1	2727.40434
	2613.91239	-1	2688.7149	-1	2761.74869	-1	2832.97805	-1	2902.36765	-1	2969.88251
	2808.23586	-1	2891.56335	-1	2972.97389	-1	3052.42545	-1	3129.87685	-1	3205.28703
	2993.45961	-1	3085.61114	-1	3175.70384	-1	3263.68978	-1	3349.52113	-1	3433.15027
	3169.09702	-1	3270.36836	-1	3369.44726	-1	3466.27911	-1	3560.80927	-1	3652.98314
	3334.65148	-1	3445.33316	-1	3553.69789	-1	3659.68428	-1	3763.2306	-1	3864.2749

S Wave Focal Law Delays
 Wedge Model : 360-151-057
 Delays are the same for Axial and Circ Scans

62S		63S		64S		65S	
Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay	Xmit Delay	Rcv Delay
0	-1	0	-1	0	-1	0	-1
297.21333	-1	301.741118	-1	306.107136	-1	310.310607	-1
591.011058	-1	600.283916	-1	609.228376	-1	617.842575	-1
881.153876	-1	895.400461	-1	909.147381	-1	922.391337	-1
1167.38409	-1	1186.84483	-1	1205.63016	-1	1223.73509	-1
1449.42509	-1	1474.35175	-1	1498.42361	-1	1521.63326	-1
1726.97938	-1	1757.63598	-1	1787.25485	-1	1815.8258	-1
1999.7281	-1	2036.39027	-1	2071.829	-1	2106.03076	-1
2267.32995	-1	2310.2848	-1	2351.82847	-1	2391.94351	-1
2529.42035	-1	2578.96603	-1	2626.91166	-1	2673.23527	-1
2785.61059	-1	2842.0556	-1	2896.71182	-1	2949.55171	-1
3035.48813	-1	3099.15046	-1	3160.83596	-1	3220.51163	-1
3278.61526	-1	3349.82119	-1	3418.86487	-1	3485.70679	-1
3514.52998	-1	3593.61262	-1	3670.35145	-1	3744.69983	-1
3742.74611	-1	3830.04364	-1	3914.82124	-1	3997.02472	-1
3962.75503	-1	4058.60868	-1	4151.77332	-1	4242.18622	-1
-1	0	-1	0	-1	0	-1	0
-1	297.21333	-1	301.741118	-1	306.107136	-1	310.310607
-1	591.011058	-1	600.283916	-1	609.228376	-1	617.842575
-1	881.153876	-1	895.400461	-1	909.147381	-1	922.391337
-1	1167.38409	-1	1186.84483	-1	1205.63016	-1	1223.73509
-1	1449.42509	-1	1474.35175	-1	1498.42361	-1	1521.63326
-1	1726.97938	-1	1757.63598	-1	1787.25485	-1	1815.8258
-1	1999.7281	-1	2036.39027	-1	2071.829	-1	2106.03076
-1	2267.32995	-1	2310.2848	-1	2351.82847	-1	2391.94351
-1	2529.42035	-1	2578.96603	-1	2626.91166	-1	2673.23527
-1	2785.61059	-1	2842.0556	-1	2896.71182	-1	2949.55171
-1	3035.48813	-1	3099.15046	-1	3160.83596	-1	3220.51163
-1	3278.61526	-1	3349.82119	-1	3418.86487	-1	3485.70679
-1	3514.52998	-1	3593.61262	-1	3670.35145	-1	3744.69983
-1	3742.74611	-1	3830.04364	-1	3914.82124	-1	3997.02472
-1	3962.75503	-1	4058.60868	-1	4151.77332	-1	4242.18622