

X3T9.2/90-72

Madison Cable Corporation

Date: 5/4/90

To: SCSI Cable Working Group

From: Chuck Grant

Subject: Capacitance and Time Delay Testing

Attached is test data for the 16 cable assemblies provided by Kurt Chan. This data is for Single Ended Capacitance and Time Delay. The capacitance measurements were performed on a Hewlett Packard 4192A Impedance Analyzer, the time delay measurements on a Hewlett Packard 3577A Network Analyzer. If anyone would like further details on the test method, please contact me.



Chuck Grant
Design Engineer

CG/sd

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MANUF: FURUKAWA SAMPLE: A
PART NO. DT-882814

MANUF: MADISON SAMPLE: B
PART NO. 4084

LENGTH 16.79

LENGTH 16.83

SAMPLE NO.	TIME ns/ASY	DELAY ns/FT	CAPACITANCE pf/ASY	CAPACITANCE pf/FT	SAMPLE NO.	TIME ns/ASY	DELAY ns/FT	CAPACITANCE pf/ASY	CAPACITANCE pf/FT
26	25.454	1.516	439.39	26.17	26	26.243	1.563	359.31	21.40
27	25.538	1.521	435.70	25.95	27	26.108	1.555	366.69	21.84
28	25.437	1.515	440.91	26.26	28	26.192	1.560	366.36	21.82
29	25.353	1.510	441.07	26.27	29	26.075	1.553	366.69	21.84
30	25.538	1.521	438.89	26.14	30	26.058	1.552	367.20	21.87
31	26.159	1.558	399.94	23.82	31	26.008	1.549	358.80	21.37
32	26.159	1.558	397.59	-23.68	32	25.907	1.543	372.07	22.16
33	26.260	1.564	397.42	23.67	33	26.075	1.553	362.33	21.58
34	26.108	1.555	404.30	24.08	34	25.941	1.545	368.37	21.94
35	25.521	1.520	441.58	26.30	35	25.386	1.512	366.86	21.85
36	25.353	1.510	441.58	26.30	36	25.370	1.511	379.29	22.59
37	25.588	1.524	440.40	26.23	37	25.504	1.519	393.56	23.44
38	25.504	1.519	443.09	26.39	38	25.638	1.527	390.37	23.25
39	25.454	1.516	443.59	26.42	39	25.605	1.525	370.22	22.05
40	25.638	1.527	442.92	26.38	40	25.252	1.504	393.39	23.43
41	26.025	1.550	401.62	23.92	41	25.722	1.532	380.97	22.69
42	25.504	1.519	443.26	26.40	42	25.554	1.522	391.37	23.31
43	26.881	1.601	412.87	24.59	43	25.638	1.527	369.38	22.00
44	26.058	1.552	397.76	23.69	44	26.260	1.564	369.88	22.00
45	26.864	1.600	414.55	24.69	45	25.924	1.544	367.37	21.8
46	26.293	1.566	403.80	24.05	46	25.655	1.528	395.40	23.55
47	26.982	1.607	412.36	24.56	47	25.504	1.519	391.54	23.32
48	25.638	1.527	439.23	26.16	48	25.504	1.519	394.40	23.49
49	25.672	1.529	441.58	26.30	49	26.142	1.557	370.22	22.05
50	26.226	1.562	402.29	23.96	50	25.605	1.525	388.86	23.16
	ns/ASY	ns/FT	pf/ASY	pf/FT		ns/ASY	ns/FT	pf/ASY	pf/FT
AVG.	25.888	1.542	424.71	25.30	AVG.	25.795	1.536	376.04	22.40
MAX.	26.982	1.607	443.59	26.42	MAX.	26.260	1.564	395.40	23.55
MIN.	25.353	1.510	397.42	23.67	MIN.	25.252	1.504	358.80	21.37
DIFF.	1.629	0.097	46.17	2.75	DIFF.	1.007	0.060	36.60	2.18

MANUF: BELDEN SAMPLE: F
 PART NO. PD1309

MANUF: MONTROSE SAMPLE: G
 PART NO. SCSI-2

LENGTH 16.83

LENGTH 16.81

SAMPLE NO.	TIME ns/ASY	DELAY ns/FT	CAPACITANCE		SAMPLE NO.	TIME ns/ASY	DELAY ns/FT	CAPACITANCE	
			pf/ASY	pf/FT				pf/ASY	pf/FT
26	28.241	1.678	358.65	21.31	26	22.805	1.355	291.16	17.30
27	27.786	1.651	339.12	20.15	27	22.956	1.364	294.02	17.47
28	28.375	1.686	360.16	21.40	28	22.788	1.354	302.60	17.98
29	28.544	1.696	362.18	21.52	29	23.259	1.382	286.78	17.04
30	28.426	1.689	358.98	21.33	30	23.225	1.380	282.24	16.77
31	28.207	1.676	352.08	20.92	31	23.175	1.377	283.42	16.84
32	28.173	1.674	408.46	24.27	32	23.242	1.381	285.94	16.99
33	28.173	1.674	407.62	24.22	33	22.855	1.358	276.35	16.42
34	28.106	1.670	354.78	21.08	34	23.276	1.383	285.61	16.97
35	28.123	1.671	406.61	24.16	35	22.889	1.360	290.32	17.25
36	28.258	1.679	403.25	23.96	36	22.771	1.353	297.05	17.65
37	28.325	1.683	409.31	24.32	37	22.754	1.352	301.93	17.94
38	28.207	1.676	413.18	24.55	38	22.754	1.352	294.53	17.50
39	28.190	1.675	409.98	24.36	39	22.636	1.345	297.22	17.66
40	28.207	1.676	409.98	24.36	40	22.687	1.348	290.15	17.24
41	28.611	1.700	369.42	21.95	41	23.259	1.382	280.05	16.64
42	28.258	1.679	410.48	24.39	42	22.754	1.352	289.14	17.18
43	28.392	1.687	357.64	21.25	43	23.276	1.383	289.48	17.20
44	28.140	1.672	391.13	23.24	44	23.192	1.378	287.96	17.11
45	28.140	1.672	401.23	23.84	45	23.461	1.394	287.46	17.00
46	28.173	1.674	387.43	23.02	46	22.821	1.356	295.87	17.50
47	28.308	1.682	398.37	23.67	47	22.855	1.358	304.29	18.08
48	28.426	1.689	404.93	24.06	48	22.821	1.356	298.73	17.75
49	28.173	1.674	401.56	23.86	49	22.855	1.358	310.01	18.42
50	28.258	1.679	400.55	23.80	50	22.838	1.357	295.03	17.53
	ns/ASY	ns/FT	pf/ASY	pf/FT		ns/ASY	ns/FT	pf/ASY	pf/FT
AVG.	28.249	1.678	387.08	23.00	AVG.	22.968	1.365	291.89	17.34
MAX.	28.611	1.700	413.18	24.55	MAX.	23.461	1.394	310.01	18.42
MIN.	27.786	1.651	339.12	20.15	MIN.	22.636	1.345	276.35	16.42
DIFF.	0.825	0.049	74.05	4.40	DIFF.	0.825	0.049	33.66	2.00

MANUF: C & M SAMPLE: H
 PART NO.62327

LENGTH 16.75

SAMPLE NO.	TIME ns/ASY	DELAY ns/FT	CAPACITANCE	
			pf/ASY	pf/FT
26	24.606	1.469	319.59	19.08
27	23.969	1.431	314.73	18.79
28	24.036	1.435	319.26	19.06
29	24.053	1.436	314.23	18.76
30	23.936	1.429	306.36	18.29
31	23.852	1.424	311.38	18.59
32	24.405	1.457	325.96	19.46
33	23.953	1.430	299.99	17.91
34	23.618	1.410	288.10	17.20
35	23.634	1.411	312.39	18.65
36	23.785	1.420	298.82	17.84
37	24.472	1.461	313.06	18.69
38	23.400	1.397	265.82	15.87
39	24.237	1.447	280.73	16.76
40	23.785	1.420	310.71	18.55
41	23.249	1.388	301.00	17.97
42	23.869	1.425	312.72	18.67
43	24.623	1.470	296.64	17.71
44	23.551	1.406	268.00	16.00
45	24.489	1.462	318.59	19.02
46	24.003	1.433	273.86	16.35
47	23.768	1.419	274.20	16.37
48	23.768	1.419	272.69	16.28
49	23.534	1.405	267.00	15.94
50	23.182	1.384	254.60	15.20
AVG.	23.911	1.428	296.82	17.72
MAX.	24.623	1.470	325.96	19.46
MIN.	23.182	1.384	254.60	15.20
DIFF.	1.441	0.086	71.36	4.26

MANUF: C & M SAMPLE: J
 PART NO.NO P/N

LENGTH 16.79

SAMPLE NO.	TIME ns/ASY	DELAY ns/FT	CAPACITANCE	
			pf/ASY	pf/FT
26	23.199	1.385	263.81	15.75
27	23.936	1.429	277.88	16.59
28	23.618	1.410	277.88	16.59
29	24.405	1.457	311.05	18.57
30	23.819	1.422	277.38	16.56
31	23.752	1.418	277.04	16.54
32	24.020	1.434	283.08	16.90
33	23.869	1.425	302.84	18.08
34	24.120	1.440	284.58	16.99
35	23.500	1.403	313.56	18.72
36	23.551	1.406	303.85	18.14
37	24.522	1.464	325.79	19.45
38	23.685	1.414	315.24	18.82
39	24.187	1.444	316.41	18.89
40	23.886	1.426	314.57	18.78
41	23.869	1.425	312.22	18.64
42	24.087	1.438	314.57	18.78
43	23.718	1.416	301.67	18.01
44	23.668	1.413	274.53	16.39
45	24.053	1.436	280.73	16.76
46	23.417	1.398	303.34	18.11
47	24.137	1.441	302.84	18.08
48	23.986	1.432	310.88	18.56
49	23.601	1.409	297.15	17.74
50	24.321	1.452	311.55	18.60
AVG.	23.877	1.425	298.18	17.80
MAX.	24.522	1.464	325.79	19.45
MIN.	23.199	1.385	263.81	15.75
DIFF.	1.323	0.079	61.97	3.70

MANUF: C & M SAMPLE: K
 PART NO. 62523

MANUF: BERK TEK SAMPLE: M
 PART NO. 270288

LENGTH 16.83

LENGTH 16.79

SAMPLE NO.	TIME ns/ASY	DELAY ns/FT	CAPACITANCE		SAMPLE NO.	TIME ns/ASY	DELAY ns/FT	CAPACITANCE	
			pf/ASY	pf/FT				pf/ASY	pf/FT
26	24.572	1.460	300.92	17.88	26	23.629	1.404	254.81	15.14
27	24.605	1.462	293.52	17.44	27	23.495	1.396	245.04	14.56
28	24.892	1.479	293.35	17.43	28	23.478	1.395	250.94	14.91
29	24.858	1.477	288.47	17.14	29	23.478	1.395	246.90	14.67
30	24.690	1.467	296.88	17.64	30	23.427	1.392	251.61	14.95
31	24.589	1.461	298.40	17.73	31	23.663	1.406	240.16	14.27
32	25.043	1.488	304.79	18.11	32	26.524	1.576	358.98	21.33
33	24.774	1.472	291.33	17.31	33	23.528	1.398	252.62	15.01
34	24.993	1.485	288.30	17.13	34	23.310	1.385	252.45	15.00
35	24.498	1.456	299.07	17.77	35	23.394	1.390	251.78	14.96
36	24.589	1.461	300.58	17.86	36	23.209	1.379	248.58	14.77
37	24.774	1.472	313.37	18.62	37	23.427	1.392	252.62	15.01
38	24.504	1.456	307.99	18.30	38	23.764	1.412	239.83	14.25
39	25.329	1.505	323.81	19.24	39	23.427	1.392	251.78	14.96
40	24.690	1.467	306.98	18.24	40	23.528	1.398	253.12	15.04
41	24.841	1.476	292.34	17.37	41	23.629	1.404	256.83	15.26
42	26.002	1.545	311.86	18.53	42	23.528	1.398	256.83	15.26
43	24.471	1.454	296.71	17.63	43	23.680	1.407	252.28	14.99
44	24.555	1.459	288.97	17.17	44	23.865	1.418	246.39	14.61
45	24.824	1.475	280.22	16.65	45	23.831	1.416	239.66	14.21
46	24.841	1.476	292.00	17.35	46	23.612	1.403	240.33	14.28
47	24.437	1.452	287.12	17.06	47	23.562	1.400	253.96	15.09
48	25.363	1.507	290.99	17.29	48	23.966	1.424	244.88	14.55
49	24.824	1.475	287.46	17.08	49	23.848	1.417	239.83	14.25
50	24.942	1.482	289.14	17.18	50	23.899	1.420	241.34	14.34
	ns/ASY	ns/FT	pf/ASY	pf/FT		ns/ASY	ns/FT	pf/ASY	pf/FT
AVG.	24.820	1.475	296.98	17.65	AVG.	23.708	1.409	252.94	15.03
MAX.	26.002	1.545	323.81	19.24	MAX.	26.524	1.576	358.98	21.33
MIN.	24.437	1.452	280.22	16.65	MIN.	23.209	1.379	239.66	14.24
DIFF.	1.565	0.093	43.59	2.59	DIFF.	3.316	0.197	119.32	7.09

MANUF: HELIX SAMPLE: P
PART NO.#28 AWG

MANUF: HITACHI SAMPLE:HIT-1
PART NO.1 REV F-SD

LENGTH 16.79

LENGTH 17.25

SAMPLE NO.	TIME ns/ASY	DELAY ns/FT	CAPACITANCE		SAMPLE NO.	TIME ns/ASY	DELAY ns/FT	CAPACITANCE	
			pf/ASY	pf/FT				pf/ASY	pf/FT
26	25.974	1.547	394.40	23.49	26	23.808	1.418	291.81	17.38
27	25.957	1.546	390.37	23.25	27	23.120	1.377	277.87	16.55
28	26.025	1.550	385.67	22.97	28	23.707	1.412	292.99	17.45
29	25.957	1.546	388.35	23.13	29	22.885	1.363	276.70	16.48
30	26.041	1.551	391.88	23.34	30	23.019	1.371	276.53	16.47
31	25.957	1.546	388.02	23.11	31	22.599	1.346	306.75	18.27
32	25.857	1.540	385.50	22.96	32	22.583	1.345	306.59	18.26
33	25.252	1.504	403.80	24.05	33	23.137	1.378	275.86	16.43
34	25.487	1.518	398.09	23.71	34	22.700	1.352	304.07	18.11
35	25.252	1.504	399.77	23.81	35	22.683	1.351	303.40	18.07
36	25.840	1.539	388.18	23.12	36	23.086	1.375	275.36	16.40
37	25.823	1.538	388.18	23.12	37	23.103	1.376	276.70	16.48
38	25.957	1.546	390.20	23.24	38	22.482	1.339	304.40	18.13
39	25.353	1.510	398.09	23.71	39	22.667	1.350	305.75	18.21
40	25.252	1.504	400.27	23.84	40	22.532	1.342	305.58	18.20
41	25.235	1.503	394.23	23.48	41	22.952	1.367	278.04	16.56
42	25.554	1.522	400.78	23.87	42	22.834	1.360	304.74	18.15
43	25.235	1.503	399.43	23.79	43	22.902	1.364	307.42	18.31
44	25.420	1.514	403.80	24.05	44	22.851	1.361	304.07	18.11
45	25.353	1.510	397.42	23.67	45	22.885	1.363	276.20	16.4
46	25.336	1.509	400.27	23.84	46	22.549	1.343	303.06	18.05
47	25.286	1.506	394.57	23.50	47	22.532	1.342	304.23	18.12
48	25.235	1.503	405.14	24.13	48	22.633	1.348	306.08	18.23
49	25.336	1.509	400.95	23.88	49	23.002	1.370	280.56	16.71
50	25.319	1.508	409.34	24.38	50	22.431	1.336	303.56	18.08
	ns/ASY	ns/FT	pf/ASY	pf/FT		ns/ASY	ns/FT	pf/ASY	pf/FT
AVG.	25.572	1.523	395.87	23.58	AVG.	22.867	1.362	293.93	17.51
MAX.	26.041	1.551	409.34	24.38	MAX.	23.808	1.418	307.42	18.31
MIN.	25.235	1.503	385.50	22.96	MIN.	22.431	1.336	275.36	16.40
DIFF.	0.806	0.048	23.84	1.42	DIFF.	1.377	0.082	32.07	1.91

MANUF: HITACHI SAMPLE:HIT - 2 *
 PART NO. #8212 *

MANUF: HITACHI SAMPLE:HIT - 3 *
 PART NO. #8199 *

LENGTH 19.00 *

LENGTH 19.15 *

SAMPLE NO.	TIME ns/ASY	DELAY ns/FT	CAPACITANCE	
			pf/ASY	pf/FT
26	26.258	1.382	307.04	16.16
27	25.840	1.360	306.09	16.11
28	26.125	1.375	306.09	16.11
29	26.087	1.373	313.88	16.52
30	26.106	1.374	307.42	16.18
31	25.954	1.366	316.73	16.67
32	25.840	1.360	287.85	15.15
33	25.745	1.355	309.51	16.29
34	25.973	1.367	312.93	16.47
35	26.543	1.397	319.58	16.82
36	25.498	1.342	286.52	15.08
37	25.802	1.358	287.85	15.15
38	25.441	1.339	285.76	15.04
39	25.992	1.368	289.94	15.26
40	26.106	1.374	314.45	16.55
41	25.992	1.368	291.65	15.35
42	26.524	1.396	295.45	15.55
43	26.239	1.381	318.63	16.77
44	26.106	1.374	292.98	15.42
45	25.954	1.366	311.41	16.39
46	25.992	1.368	296.59	15.61
47	26.049	1.371	294.69	15.51
48	26.068	1.372	293.17	15.43
49	26.562	1.398	287.85	15.15
50	25.745	1.355	312.36	16.44
AVG.	26.022	1.370	301.86	15.89
MAX.	26.562	1.398	319.58	16.82
MIN.	25.441	1.339	285.76	15.04
DIFF.	1.121	0.059	33.82	1.78

SAMPLE NO.	TIME ns/ASY	DELAY ns/FT	CAPACITANCE	
			pf/ASY	pf/FT
26	26.638	1.391	344.89	18.01
27	26.331	1.375	345.66	18.05
28	27.002	1.410	341.83	17.85
29	26.312	1.374	345.66	18.05
30	26.408	1.379	301.80	15.76
31	26.714	1.395	342.02	17.86
32	26.389	1.378	344.13	17.97
33	26.465	1.382	341.64	17.84
34	26.944	1.407	349.10	18.23
35	26.465	1.382	341.83	17.85
36	26.408	1.379	337.23	17.61
37	26.197	1.368	288.21	15.05
38	26.810	1.400	298.17	15.57
39	26.523	1.385	338.00	17.65
40	26.695	1.394	336.47	17.57
41	26.063	1.361	329.57	17.21
42	26.523	1.385	337.04	17.60
43	26.427	1.380	288.21	15.05
44	26.733	1.396	299.51	15.64
45	26.255	1.371	294.53	15.38
46	26.619	1.390	311.19	16.25
47	27.002	1.410	301.04	15.72
48	26.906	1.405	301.04	15.72
49	26.733	1.396	306.40	16.00
50	26.887	1.404	301.61	15.75
AVG.	26.578	1.388	322.67	16.85
MAX.	27.002	1.410	349.10	18.23
MIN.	26.063	1.361	288.21	15.05
DIFF.	0.938	0.049	60.90	3.18