

COMMON MODE SERVO

Table 1

COMPUTER SCREEN		EtherCAT -COMMON MODE SERVO TESTER				
Step	NAME	FRONT PANEL LED	D No:	REMARKS	CM A P/F	CM B P/F
1	GAIN IN 1 Slider	"-32"	D5	Step 1,2 and 23:  Starting with "Gain IN 1" slider click on computer screen "Gain Slider 1" and monitor the CM tester "Gain Slider 1" LED's. Each LED shall be "ON" according to slider setting. Repeat the same procedure for "Gain IN 2" and "Gain Fast" slider.	OK	OK
		"+16"	D4			
		" +8"	D3			
		" +4"	D2			
		" +2"	D1			
		" +1"	D0			
2	GAIN IN 2 Slider	"-32"	D11			
		"+16"	D10			
		" +8"	D9			
		" +4"	D8			
		" +2"	D7			
		" +1"	D6			
3	Input 1 Enable	"Enable"	D12	Step 3 to 5, 8 to 22 and 24 to 29:  Test each binary output ,one at a time. Select each listed tab on the computer screen monitoring tester LED's. Each LED shall be "ON" when the associated tab is selected.  Step 6,7: Select "Boost Stage" gain slider on computer screen and monitor the Boost Off" LED's on CM Tester front panel. LED's" shall be "ON" according to slider setting.		
4	Input 2 Enable	"Enable"	D13			
5	Output Switch	Enable IN 2/IN1	D14			
6	Boost Stage	"Boost +1"	D15			
7	Boost Stage	"Boost +2"	D16			
8	Common Comp.	"Comp."	D17			
9	Com. Exc. Enable	"Exc." D47	D18			
10	Com. Option	"Option" D48	D19			
11	Slow Polarity	"Sign + -" D20	D11			
12	Com. Filter	"Filter"	D21			
13	Fast Enable	"Enable"	D22			
14	Fast Polarity	"Sign + -"	D23			
15	Slow Option	"Option"	D24			
16	Slow Bypass	"Bypass"	D25			
17	Slow 5V Offset	"Fixed"	D26			
18	Slow Ofs. Enable	"Enable"	D27			
19	Slow Comp.	"Comp."	D28			
20	Slow Boost	"Boost"	D29			
21	Slow Filter	"Filter"	D30			OK

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COMPUTER SCREEN		EtherCAT -COMMON MODE SERVO TESTER					
Step	NAME	FRONT PANEL LED	D No:	REMARKS	CM A P/F	CM B P/F	
22	Fast Limiter	"Limiter"	D31		OK	OK	
23	GAIN FAST	"-32"	D46				
		"+16"	D45				
		"+8"	D44				
		"+4"	D43				
		"+2"	D42				
		"+1"	D41				
24	Split Exc. Enable	"Excitation" <i>DR</i>	D47				
25	Fast Option	"Option" <i>DI9</i>	D48				
26	Slow Exc.	"Fast-Slow"	D49				
27	Polarity IN 1	"Sign + -"	D50				
28	Polarity IN 2	"Sign + -"	D51				
29	Latch enable	"LE"	LE		OK	OK	
Step	DISPLAYED	FRONT PANEL SWITCH	D No:				
30	Fast Limit	"Limiter"	35	Step 30,31: Test each binary input one at a time. Turn the listed tester switches on and off, monitoring the computer screen. "Fast Limit" and "OK" LED's on computer screen shall switch on and off according to each switch setting. <i>OUT to meter</i>	OK	OK	
31	OK	"OK"	OK			OK	OK
Step	DISPLAYED	FRONT PANEL BNC	D No:				
32	-	Common Offset	36	Step 32 to 34: Test each analog input, one at a time. Connect a DVM to the BNC connectors. Type 9.00V then press "Enter". The DVM shall read 9.00V DC +/- 1%. Type -9.00V then press "Enter". The DVM shall read -9.00V DC +/- 1%. Type 0.00V and press "Enter". The DVM shall read 0.00V.	OK	OK	
33	-	Slow Offset	37			OK	OK
34	-	Slow Output Offset	38			OK	OK

COMMON MODE SERVO

Table 1

**EtherCAT SLOW CONTROLS SYSTEM TEST  
PROCEDURE FOR CM CHASSIS**

E1100469-v1

COMPUTER SCREEN		EtherCAT -COMMON MODE SERVO TESTER				
Step	DISPLAYED	FRONT PANEL LED	D No:	REMARKS	CM A P/F	CM B P/F
35	(-9.00V), 9.00V	Input Mon	32	<b>Step 35 to 39:</b> Test each analog output one at a time. Apply -9.00V DC to each BNC connector. The voltage applied shall be displayed on the computer screen. Apply 9.00 V DC to each BNC connector. The voltage applied shall be displayed on the computer screen. Remove the input voltage. On computer screen shall be displayed 0.00V. The voltage tolerance shall be +/- 1%.	OK	OK
36	(-9.00V), 9.00V	Split Mon	33		OK	OK
37	(-9.00V) 9.00V	Fast Mon	34		OK	OK
38	(-9.00V) 9.00V	Slow FB Monitor	39		OK	OK
39	(-9.00V) 9.00V	Slow Mon	40		OK	OK

**VOLTAGE CONTROLLED OSCILLATOR**

Table 1

COMPUTER SCREEN		EtherCAT LOW NOISE VCO TESTER		
Step	Displayed	FRONT PANEL BNC	D No:	REMARKS
40	9.00V, (-9.00V)	RF Pwr Mon. M1	✓ - ✓	Step 40 to 46: Apply 9.00V DC to each BNC connector. 9.00 V DC shall be displayed on the computer screen. Apply -9.00V DC. The applied voltage shall be displayed on the computer screen. The tolerance shall be +/- 1%. Step 47:
41	9.00V, (-9.00V)	RF Pwr Mon. M2	✓ - ✓	
42	9.00V, (-9.00V)	RF Pwr Mon. M3	✓ - ✓	
43	9.00V, (-9.00V)	Temp. Mon. M1	✓ - ✓	
44	9.00V, (-9.00V)	Temp. Mon. M2	✓ - ✓	
45	9.00V, (-9.00V)	Temp. Mon. M3	✓ - ✓	
46	9.00V, (-9.00V)	VCO Tune Mon.	✓ - ✓	
47	-	Man.Freq.Tuning	✓ - ✓	Connect a DVM to the "Man. Freq. Tuning" BNC connector. Type 9.00V and press "ENTER". DVM shall read 9.00V +/- 1%. Type -9.00V and press "ENTER". DVM shall read -9.00V +/- 1%. Type 0.00V and press "Enter" DVM shall read 0.00 V.
Step	COMPUTER SCREEN	FRONT PANEL SWITCH	D No:	REMARKS
48	EXCSW	"Exc Readback"	✓ - ✓	Step 48,49: Turn the listed switches on and off monitoring computer screen. "EXCSW" and "OK" on computer screen shall switch between on and off according to each switch setting.
49	OK	"OK"	✓ - ✓	
Step	COMPUTER SCREEN	FRONT PANEL LED	D No:	REMARKS
50	Exc. Enable	"Exc Enable"	✓ - ✓	Select "Exc Enable" on the computer screen monitoring "Exc Enable" LED on the tester front panel. LED shall be ON when "Exc Enable" is selected.

**DELAY LINE PHASE SHIFTER**

Table 1

COMPUTER SCREEN		EtherCAT -DELAY LINE PHASE SHIFTER TESTER		
Step	NAME	FRONT PANEL LED	D No:	REMARKS
51	Delay A	"1/16"	✓ - ✓	Click on the "Delay Line A" gain slider on computer screen and monitor tester front panel LED's. Each LED shall be "ON" according to gain slider setting.  Select "LE A" tab on computer screen. "LE" LED shall be ON when tab is selected.
		"1/8"	✓ - ✓	
		"1/4"	✓ - ✓	
		"1/2"	✓ - ✓	
		"1"	✓ - ✓	
		"2"	✓ - ✓	
		"4"	✓ - ✓	
		"8"	✓ - ✓	
		"16"	✓ - ✓	
52	LE A	"LE"	✓ - ✓	
53	Delay B	"1/16"	✓ - ✓	Click on the "Delay Line B" gain slider on computer screen and monitor tester front panel LED's. Each LED shall be "ON" according to gain slider setting.  Select "LE B" tab on computer screen. "LE" LED shall be ON when tab is selected.
		"1/8"	✓ - ✓	
		"1/4"	✓ - ✓	
		"1/2"	✓ - ✓	
		"1"	✓ - ✓	
		"2"	✓ - ✓	
		"4"	✓ - ✓	
		"8"	✓ - ✓	
		"16"	✓ - ✓	
54	LE B	"LE"	✓ - ✓	

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Table 1

COMPUTER SCREEN		EtherCAT -COMMON MODE SERVO TESTER				
Step	NAME	FRONT PANEL LED	D No:	REMARKS	CM A P/F	CM B P/F
1	GAIN IN 1 Slider	"-32"	D5	Step 1,2 and 23:  Starting with "Gain IN 1" slider click on computer screen "Gain Slider 1" and monitor the CM tester "Gain Slider 1" LED's. Each LED shall be "ON" according to slider setting. Repeat the same procedure for "Gain IN 2" and "Gain Fast" slider.	✓	✓
		"+16"	D4		✓	✓
		"+8"	D3		✓	✓
		"+4"	D2		✓	✓
		"+2"	D1		✓	✓
		"+1"	D0		✓	✓
2	GAIN IN 2 Slider	"-32"	D11		✓	✓
		"+16"	D10		✓	✓
		"+8"	D9		✓	✓
		"+4"	D8		✓	✓
		"+2"	D7		✓	✓
		"+1"	D6		✓	✓
3	Input 1 Enable	"Enable"	D12	Step 3 to 5, 8 to 22 and 24 to 29:  Test each binary output ,one at a time. Select each listed tab on the computer screen monitoring tester LED's. Each LED shall be "ON" when the associated tab is selected.  Step 6,7: Select "Boost Stage" gain slider on computer screen and monitor the Boost Off" LED's on CM Tester front panel. LED's" shall be "ON" according to slider setting.	✓	✓
4	Input 2 Enable	"Enable"	D13		✓	✓
5	Output Switch	Enable IN 2/IN1	D14		✓	✓
6	Boost Stage	"Boost +1"	D15		✓	✓
7	Boost Stage	"Boost +2"	D16		✓	✓
8	Common Comp.	"Comp."	D17		✓	✓
9	Com. Exc. Enable	"Exc." D47	D18		✓	✓
10	Com. Option	"Option" D48	D19		✓	✓
11	Slow Polarity	"Sign + -" D20	D11		✓	✓
12	Com. Filter	"Filter"	D21		✓	✓
13	Fast Enable	"Enable"	D22		✓	✓
14	Fast Polarity	"Sign + -"	D23		✓	✓
15	Slow Option	"Option"	D24		✓	✓
16	Slow Bypass	"Bypass"	D25		✓	✓
17	Slow 5V Offset	"Fixed"	D26		✓	✓
18	Slow Ofs. Enable	"Enable"	D27		✓	✓
19	Slow Comp.	"Comp."	D28		✓	✓
20	Slow Boost	"Boost"	D29		✓	✓
21	Slow Filter	"Filter"	D30		✓	✓

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COMPUTER SCREEN		EtherCAT -COMMON MODE SERVO TESTER				
Step	NAME	FRONT PANEL LED	D No:	REMARKS	CM A P/F	CM B P/F
22	Fast Limiter	"Limiter"	D31		✓	✓
23	GAIN FAST	"-32"	D46		✓	✓
		"+16"	D45			
		" +8"	D44			
		" +4"	D43			
		" +2"	D42			
		" +1"	D41			
24	Split Exc. Enable	"Excitation" <i>DR</i>	D47		✓	✓
25	Fast Option	"Option" <i>DI9</i>	D48		✓	✓
26	Slow Exc.	"Fast-Slow"	D49		✓	✓
27	Polarity IN 1	"Sign + -"	D50	✓	✓	
28	Polarity IN 2	"Sign + -"	D51	✓	✓	
29	Latch enable	"LE"	LE	✓	✓	
Step	DISPLAYED	FRONT PANEL SWITCH	D No:	Step 30,31: Test each binary input one at a time. Turn the listed tester switches on and off, monitoring the computer screen. "Fast Limit" and "OK" LED's on computer screen shall switch on and off according to each switch setting. <i>OUT TO meter</i>		
30	Fast Limit	"Limiter"	35		✓	✓
31	OK	"OK"	OK		✓	✓
Step	DISPLAYED	FRONT PANEL BNC	D No:	Step 32 to 34: Test each analog input, one at a time. Connect a DVM to the BNC connectors. Type 9.00V then press "Enter". The DVM shall read 9.00V DC +/- 1%. Type -9.00V then press "Enter". The DVM shall read -9.00V DC +/- 1%. Type 0.00V and press "Enter". The DVM shall read 0.00V.		
32	-	Common Offset	36		✓	✓
33	-	Slow Offset	37		✓	✓
34	-	Slow Output Offset	38		✓	✓

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EtherCAT SLOW CONTROLS SYSTEM TEST  
PROCEDURE FOR CM CHASSIS

E1100469-v1

COMPUTER SCREEN		EtherCAT -COMMON MODE SERVO TESTER				
Step	DISPLAYED	FRONT PANEL LED	D No:	REMARKS	CM A P/F	CM B P/F
35	(-9.00V), 9.00V	Input Mon	32	Step 35 to 39: Test each analog output one at a time. Apply -9.00V DC to each BNC connector. The voltage applied shall be displayed on the computer screen. Apply 9.00 V DC to each BNC connector. The voltage applied shall be displayed on the computer screen. Remove the input voltage. On computer screen shall be displayed 0.00V. The voltage tolerance shall be +/- 1%.	✓	✓
36	(-9.00V), 9.00V	Split Mon	33		✓	✓
37	(-9.00V) 9.00V	Fast Mon	34		✓	✓
38	(-9.00V) 9.00V	Slow FB Monitor	39		✓	✓
39	(-9.00V) 9.00V	Slow Mon	40		✓	✓



**VOLTAGE CONTROLLED OSCILLATOR**

Table 1

COMPUTER SCREEN		EtherCAT LOW NOISE VCO TESTER		
Step	Displayed	FRONT PANEL BNC	D No:	REMARKS
40	9.00V, (-9.00V)	RF Pwr Mon. M1	✓ - ✓	Step 40 to 46: Apply 9.00V DC to each BNC connector. 9.00 V DC shall be displayed on the computer screen. Apply -9.00V DC. The applied voltage shall be displayed on the computer screen. The tolerance shall be +/- 1%. Step 47:
41	9.00V, (-9.00V)	RF Pwr Mon. M2	✓ - ✓	
42	9.00V, (-9.00V)	RF Pwr Mon. M3	✓ - ✓	
43	9.00V, (-9.00V)	Temp. Mon. M1	✓ - ✓	
44	9.00V, (-9.00V)	Temp. Mon. M2	✓ - ✓	
45	9.00V, (-9.00V)	Temp. Mon. M3	✓ - ✓	
46	9.00V, (-9.00V)	VCO Tune Mon.	✓ - ✓	
47	-	Man.Freq.Tuning	✓ - ✓	Connect a DVM to the "Man. Freq. Tuning" BNC connector. Type 9.00V and press "ENTER". DVM shall read 9.00V +/- 1%. Type - 9.00V and press "ENTER". DVM shall read -9.00V +/- 1%. Type 0.00V and press "Enter" DVM shall read 0.00 V.
Step	COMPUTER SCREEN	FRONT PANEL SWITCH	D No:	REMARKS
48	EXCSW	"Exc Readback"	✓ - ✓	Step 48,49: Turn the listed switches on and off monitoring computer screen. "EXCSW" and "OK" on computer screen shall switch between on and off according to each switch setting.
49	OK	"OK"	✓ - ✓	
Step	COMPUTER SCREEN	FRONT PANEL LED	D No:	REMARKS
50	Exc. Enable	"Exc Enable"	✓ - ✓	Select "Exc Enable" on the computer screen monitoring "Exc Enable" LED on the tester front panel. LED shall be ON when "Exc Enable" is selected.

**DELAY LINE PHASE SHIFTER**

Table 1

COMPUTER SCREEN		EtherCAT -DELAY LINE PHASE SHIFTER TESTER		
Step	NAME	FRONT PANEL LED	D No:	REMARKS
51	Delay A	"1/16"	✓	Click on the "Delay Line A" gain slider on computer screen and monitor tester front panel LED's. Each LED shall be "ON" according to gain slider setting.  Select "LE A" tab on computer screen. "LE" LED shall be ON when tab is selected.
		"1/8"	✓	
		"1/4"	✓	
		"1/2"	✓	
		"1"	✓	
		"2"	✓	
		"4"	✓	
		"8"	✓	
52	LE A	"LE"	✓	
53	Delay B	"1/16"	✓	Click on the "Delay Line B" gain slider on computer screen and monitor tester front panel LED's. Each LED shall be "ON" according to gain slider setting.  Select "LE B" tab on computer screen. "LE" LED shall be ON when tab is selected.
		"1/8"	✓	
		"1/4"	✓	
		"1/2"	✓	
		"1"	✓	
		"2"	✓	
		"4"	✓	
		"8"	✓	
54	LE B	"LE"	✓	

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Table 1

COMPUTER SCREEN		EtherCAT -COMMON MODE SERVO TESTER					
Step	NAME	FRONT PANEL LED	D No:	REMARKS	CM A P/F	CM B P/F	
1	GAIN IN 1 Slider	"-32"	D5	Step 1,2 and 23:  Starting with "Gain IN 1" slider click on computer screen "Gain Slider 1" and monitor the CM tester "Gain Slider 1" LED's. Each LED shall be "ON" according to slider setting. Repeat the same procedure for "Gain IN 2" and "Gain Fast" slider.	/	/	
		"+16"	D4		X	/	
		"+8"	D3		X	/	
		"+4"	D2		X	/	
		"+2"	D1		X	/	
		"+1"	D0		X	/	
2	GAIN IN 2 Slider	"-32"	D11			X	/
		"+16"	D10			X	/
		"+8"	D9			X	/
		"+4"	D8			X	/
		"+2"	D7	X		/	
		"+1"	D6	X		/	
3	Input 1 Enable	"Enable"	D12	Step 3 to 5, 8 to 22 and 24 to 29:  Test each binary output ,one at a time. Select each listed tab on the computer screen monitoring tester LED's. Each LED shall be "ON" when the associated tab is selected.	X	/	
4	Input 2 Enable	"Enable"	D13		X	/	
5	Output Switch	Enable IN 2/IN1	D14		X	/	
6	Boost Stage	"Boost +1"	D15		X	/	
7	Boost Stage	"Boost +2"	D16		X	/	
8	Common Comp.	"Comp."	D17		X	/	
9	Com. Exc. Enable	"Exc." <i>D47</i>	D18		X	/	
10	Com. Option	"Option" <i>D48</i>	D19		X	/	
11	Slow Polarity	"Sign + -" <i>D20</i>	D11		Step 6,7: Select "Boost Stage" gain slider on computer screen and monitor the Boost Off" LED's on CM Tester front panel. LED's" shall be "ON" according to slider setting.	X	/
12	Com. Filter	"Filter"	D21			X	/
13	Fast Enable	"Enable"	D22	X		/	
14	Fast Polarity	"Sign + -"	D23	X		/	
15	Slow Option	"Option"	D24	X		/	
16	Slow Bypass	"Bypass"	D25	X		/	
17	Slow 5V Offset	"Fixed"	D26	X		/	
18	Slow Ofs. Enable	"Enable"	D27	X		/	
19	Slow Comp.	"Comp."	D28	X		/	
20	Slow Boost	"Boost"	D29	X		/	
21	Slow Filter	"Filter"	D30	X		/	

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COMPUTER SCREEN		EtherCAT -COMMON MODE SERVO TESTER				
Step	NAME	FRONT PANEL LED	D No:	REMARKS	CM A P/F	CM B P/F
22	Fast Limiter	"Limiter"	D31		✓	✓
23	GAIN FAST	"-32"	D46		✓	✓
		" +16"	D45		✓	✓
		" +8"	D44		✓	✓
		" +4"	D43		✓	✓
		" +2"	D42		✓	✓
		" +1"	D41		✓	✓
24	Split Exc. Enable	"Excitation" <i>DIR</i>	D47		✓	✓
25	Fast Option	"Option" <i>DI9</i>	D48		✓	✓
26	Slow Exc.	"Fast-Slow"	D49		✓	✓
27	Polarity IN 1	"Sign + -"	D50	✓	✓	
28	Polarity IN 2	"Sign + -"	D51	✓	✓	
29	Latch enable	"LE"	LE	✓	✓	
Step	DISPLAYED	FRONT PANEL SWITCH	D No:	<b>Step 30,31:</b> Test each binary input one at a time. Turn the listed tester switches on and off, monitoring the computer screen. "Fast Limit" and "OK" LED's on computer screen shall switch on and off according to each switch setting. <i>OUT TO meter</i>		
30	Fast Limit	"Limiter"	35		✓	✓
31	OK	"OK"	OK		✓	✓
Step	DISPLAYED	FRONT PANEL BNC	D No:	<b>Step 32 to 34:</b> Test each analog input, one at a time. Connect a DVM to the BNC connectors. Type 9.00V then press "Enter". The DVM shall read 9.00V DC +/- 1%. Type -9.00V then press "Enter". The DVM shall read -9.00V DC +/- 1%. Type 0.00V and press "Enter". The DVM shall read 0.00V.		
32	-	Common Offset	36		✓	✓
33	-	Slow Offset	37		✓	✓
34	-	Slow Output Offset	38		✓	✓

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**EtherCAT SLOW CONTROLS SYSTEM TEST  
PROCEDURE FOR CM CHASSIS**

E1100469-v1

COMPUTER SCREEN		EtherCAT -COMMON MODE SERVO TESTER				
Step	DISPLAYED	FRONT PANEL LED	D No:	REMARKS	CM A P/F	CM B P/F
35	(-9.00V), 9.00V	Input Mon	32	Step 35 to 39: Test each analog output one at a time. Apply -9.00V DC to each BNC connector. The voltage applied shall be displayed on the computer screen. Apply 9.00 V DC to each BNC connector. The voltage applied shall be displayed on the computer screen. Remove the input voltage. On computer screen shall be displayed 0.00V. The voltage tolerance shall be +/- 1%.	✓	✓
36	(-9.00V), 9.00V	Split Mon	33		✓	✓
37	(-9.00V) 9.00V	Fast Mon	34		✓	✓
38	(-9.00V) 9.00V	Slow FB Monitor	39		✓	✓
39	(-9.00V) 9.00V	Slow Mon	40		✓	✓

**VOLTAGE CONTROLLED OSCILLATOR**

Table 1

COMPUTER SCREEN		EtherCAT LOW NOISE VCO TESTER		
Step	Displayed	FRONT PANEL BNC	D No:	REMARKS
40	9.00V, (-9.00V)	RF Pwr Mon. M1	-	Step 40 to 46: Apply 9.00V DC to each BNC connector. 9.00 V DC shall be displayed on the computer screen. Apply -9.00V DC. The applied voltage shall be displayed on the computer screen. The tolerance shall be +/- 1%. Step 47:
41	9.00V, (-9.00V)	RF Pwr Mon. M2	-	
42	9.00V, (-9.00V)	RF Pwr Mon. M3	-	
43	9.00V, (-9.00V)	Temp. Mon. M1	-	
44	9.00V, (-9.00V)	Temp. Mon. M2	-	
45	9.00V, (-9.00V)	Temp. Mon. M3	-	
46	9.00V, (-9.00V)	VCO Tune Mon.	-	
47	-	Man.Freq.Tuning	-	Connect a DVM to the "Man. Freq. Tuning" BNC connector. Type 9.00V and press "ENTER". DVM shall read 9.00V +/- 1%. Type - 9.00V and press "ENTER". DVM shall read -9.00V +/- 1%. Type 0.00V and press "Enter" DVM shall read 0.00 V.
Step	COMPUTER SCREEN	FRONT PANEL SWITCH	D No:	REMARKS
48	EXCSW	"Exc Readback"	✓ - ✓	Step 48,49: Turn the listed switches on and off monitoring computer screen. "EXCSW" and "OK" on computer screen shall switch between on and off according to each switch setting.
49	OK	"OK"	✓ - ✓	
Step	COMPUTER SCREEN	FRONT PANEL LED	D No:	REMARKS
50	Exc. Enable	"Exc Enable"	✓ - ✓	Select "Exc Enable" on the computer screen monitoring "Exc Enable" LED on the tester front panel. LED shall be ON when "Exc Enable" is selected.

**DELAY LINE PHASE SHIFTER**

Table 1

COMPUTER SCREEN		EtherCAT -DELAY LINE PHASE SHIFTER TESTER		
Step	NAME	FRONT PANEL LED	D No:	REMARKS
51	Delay A	"1/16"	✓ - ✓	Click on the "Delay Line A" gain slider on computer screen and monitor tester front panel LED's. Each LED shall be "ON" according to gain slider setting.  Select "LE A" tab on computer screen. "LE" LED shall be ON when tab is selected.
		"1/8"	✓ - ✓	
		"1/4"	✓ - ✓	
		"1/2"	✓ - ✓	
		"1"	✓ - ✓	
		"2"	✓ - ✓	
		"4"	✓ - ✓	
		"8"	✓ - ✓	
		"16"	✓ - ✓	
52	LE A	"LE"	✓ - ✓	
53	Delay B	"1/16"	✓ - ✓	Click on the "Delay Line B" gain slider on computer screen and monitor tester front panel LED's. Each LED shall be "ON" according to gain slider setting.  Select "LE B" tab on computer screen. "LE" LED shall be ON when tab is selected.
		"1/8"	✓ - ✓	
		"1/4"	✓ - ✓	
		"1/2"	✓ - ✓	
		"1"	✓ - ✓	
		"2"	✓ - ✓	
		"4"	✓ - ✓	
		"8"	✓ - ✓	
		"16"	✓ - ✓	
54	LE B	"LE"	✓ - ✓	

EtherCAT SLOW CONTROLS SYSTEM TEST  
PROCEDURE FOR CM CHASSIS

S11026/14

E1100469-v1

COMMON MODE SERVO

Table 1

COMPUTER SCREEN		EtherCAT -COMMON MODE SERVO TESTER				
Step	NAME	FRONT PANEL LED	D No:	REMARKS	CM A P/F	CM B P/F
1	GAIN IN 1 Slider	"-32"	D5	<p>Step 1,2 and 23:</p> <p>Starting with "Gain IN 1" slider click on computer screen "Gain Slider 1" and monitor the CM tester "Gain Slider 1" LED's. Each LED shall be "ON" according to slider setting. Repeat the same procedure for "Gain IN 2" and "Gain Fast" slider.</p>	OK	OK
		"+16"	D4			
		" +8"	D3			
		" +4"	D2			
		" +2"	D1			
		" +1"	D0			
2	GAIN IN 2 Slider	"-32"	D11			
		"+16"	D10			
		" +8"	D9			
		" +4"	D8			
		" +2"	D7			
		" +1"	D6			
3	Input 1 Enable	"Enable"	D12	<p>Step 3 to 5, 8 to 22 and 24 to 29:</p> <p>Test each binary output ,one at a time. Select each listed tab on the computer screen monitoring tester LED's. Each LED shall be "ON" when the associated tab is selected.</p>		
4	Input 2 Enable	"Enable"	D13			
5	Output Switch	Enable IN 2/IN1	D14			
6	Boost Stage	"Boost +1"	D15			
7	Boost Stage	"Boost +2"	D16			
8	Common Comp.	"Comp."	D17			
9	Com. Exc. Enable	"Exc." D47	D18			
10	Com. Option	"Option" D48	D19			
11	Slow Polarity	"Sign + -" D20	D11			
12	Com. Filter	"Filter"	D21			
13	Fast Enable	"Enable"	D22			
14	Fast Polarity	"Sign + -"	D23			
15	Slow Option	"Option"	D24			
16	Slow Bypass	"Bypass"	D25			
17	Slow 5V Offset	"Fixed"	D26			
18	Slow Of. Enable	"Enable"	D27			
19	Slow Comp.	"Comp."	D28			
20	Slow Boost	"Boost"	D29			
21	Slow Filter	"Filter"	D30			



COMMON MODE SERVO

Table 1

COMPUTER SCREEN		EtherCAT -COMMON MODE SERVO TESTER				
Step	NAME	FRONT PANEL LED	D No:	REMARKS	CM A P/F	CM B P/F
					OK	OK
22	Fast Limiter	"Limiter"	D31			
23	GAIN FAST	"-32"	D46			
		" +16"	D45			
		" +8"	D44			
		" +4"	D43			
		" +2"	D42			
		" +1"	D41			
24	Split Exc. Enable	"Excitation" <i>DR</i>	D47			
25	Fast Option	"Option" <i>DI9</i>	D48			
26	Slow Exc.	"Fast-Slow"	D49			
27	Polarity IN 1	"Sign + -"	D50			
28	Polarity IN 2	"Sign + -"	D51			
29	Latch enable	"LE"	LE		OK	OK
Step	DISPLAYED	FRONT PANEL SWITCH	D No:			
30	Fast Limit	"Limiter"	35	Step 30,31: Test each binary input one at a time. Turn the listed tester switches on and off, monitoring the computer screen. "Fast Limit" and "OK" LED's on computer screen shall switch on and off according to each switch setting. <i>OUT TO meter</i>	OK	OK
31	OK	"OK"	OK		OK	OK
Step	DISPLAYED	FRONT PANEL BNC	D No:			
32	-	Common Offset	36	Step 32 to 34: Test each analog input, one at a time. Connect a DVM to the BNC connectors. Type 9.00V then press "Enter". The DVM shall read 9.00V DC +/- 1%. Type -9.00V then press "Enter". The DVM shall read -9.00V DC +/- 1%. Type 0.00V and press "Enter". The DVM shall read 0.00V.	OK	OK
33	-	Slow Offset	37		OK	OK
34	-	Slow Output Offset	38		OK	OK

COMMON MODE SERVO

Table 1

EtherCAT SLOW CONTROLS SYSTEM TEST  
 PROCEDURE FOR CM CHASSIS

E1100469-v1

COMPUTER SCREEN		EtherCAT -COMMON MODE SERVO TESTER				
Step	DISPLAYED	FRONT PANEL LED	D No:	REMARKS	CM A P/F	CM B P/F
35	(-9.00V), 9.00V	Input Mon	32	Step 35 to 39: Test each analog output one at a time. Apply -9.00V DC to each BNC connector. The voltage applied shall be displayed on the computer screen. Apply 9.00 V DC to each BNC connector. The voltage applied shall be displayed on the computer screen. Remove the input voltage. On computer screen shall be displayed 0.00V. The voltage tolerance shall be +/- 1%.	OK	OK
36	(-9.00V), 9.00V	Split Mon	33		OK	OK
37	(-9.00V) 9.00V	Fast Mon	34		OK	OK
38	(-9.00V) 9.00V	Slow FB Monitor	39		OK	OK
39	(-9.00V) 9.00V	Slow Mon	40		OK	OK

**VOLTAGE CONTROLLED OSCILLATOR**

Table 1

COMPUTER SCREEN		EtherCAT LOW NOISE VCO TESTER		
Step	Displayed	FRONT PANEL BNC	D No:	REMARKS
40	9.00V, (-9.00V)	RF Pwr Mon. M1	/ - /	Step 40 to 46: Apply 9.00V DC to each BNC connector. 9.00 V DC shall be displayed on the computer screen. Apply -9.00V DC. The applied voltage shall be displayed on the computer screen. The tolerance shall be +/- 1%.
41	9.00V, (-9.00V)	RF Pwr Mon. M2	/ - /	
42	9.00V, (-9.00V)	RF Pwr Mon. M3	/ - /	
43	9.00V, (-9.00V)	Temp. Mon. M1	/ - /	
44	9.00V, (-9.00V)	Temp. Mon. M2	/ - /	
45	9.00V, (-9.00V)	Temp. Mon. M3	/ - /	
46	9.00V, (-9.00V)	VCO Tune Mon.	/ - /	
47	-	Man.Freq.Tuning	/ - /	Step 47:  Connect a DVM to the "Man. Freq. Tuning" BNC connector. Type 9.00V and press "ENTER". DVM shall read 9.00V +/- 1%. Type -9.00V and press "ENTER". DVM shall read -9.00V +/- 1%. Type 0.00V and press "Enter" DVM shall read 0.00 V.
Step	COMPUTER SCREEN	FRONT PANEL SWITCH	D No:	REMARKS
48	EXCSW	"Exc Readback"	/ - /	Step 48,49: Turn the listed switches on and off monitoring computer screen. "EXCSW" and "OK" on computer screen shall switch between on and off according to each switch setting.
49	OK	"OK"	/ - /	
Step	COMPUTER SCREEN	FRONT PANEL LED	D No:	REMARKS
50	Exc. Enable	"Exc Enable"	/ - /	Select "Exc Enable" on the computer screen monitoring "Exc Enable" LED on the tester front panel. LED shall be ON when "Exc Enable" is selected.

**DELAY LINE PHASE SHIFTER**

Table 1

COMPUTER SCREEN		EtherCAT -DELAY LINE PHASE SHIFTER TESTER		
Step	NAME	FRONT PANEL LED	D No:	REMARKS
51	Delay A	"1/16"	/ - /	Click on the "Delay Line A" gain slider on computer screen and monitor tester front panel LED's. Each LED shall be "ON" according to gain slider setting.  Select "LE A" tab on computer screen. "LE" LED shall be ON when tab is selected.
		"1/8"	/ - /	
		"1/4"	/ - /	
		"1/2"	/ - /	
		"1"	/ - /	
		"2"	/ - /	
		"4"	/ - /	
		"8"	/ - /	
		"16"	/ - /	
52	LE A	"LE"	/ - /	
53	Delay B	"1/16"	/ - /	Click on the "Delay Line B" gain slider on computer screen and monitor tester front panel LED's. Each LED shall be "ON" according to gain slider setting.  Select "LE B" tab on computer screen. "LE" LED shall be ON when tab is selected.
		"1/8"	/ - /	
		"1/4"	/ - /	
		"1/2"	/ - /	
		"1"	/ - /	
		"2"	/ - /	
		"4"	/ - /	
		"8"	/ - /	
		"16"	/ - /	
54	LE B	"LE"	/ - /	

S1102615

COMMON MODE SERVO

Table 1

COMPUTER SCREEN		EtherCAT -COMMON MODE SERVO TESTER				
Step	NAME	FRONT PANEL LED	D No:	REMARKS	CM A P/F	CM B P/F
1	GAIN IN 1 Slider	"-32"	D5	<b>Step 1,2 and 23:</b>  Starting with "Gain IN 1" slider click on computer screen "Gain Slider 1" and monitor the CM tester "Gain Slider 1" LED's. Each LED shall be "ON" according to slider setting. Repeat the same procedure for "Gain IN 2" and "Gain Fast" slider.	OK	OK
		"+16"	D4			
		" +8"	D3			
		" +4"	D2			
		" +2"	D1			
		" +1"	D0			
2	GAIN IN 2 Slider	"-32"	D11			
		"+16"	D10			
		" +8"	D9			
		" +4"	D8			
		" +2"	D7			
		" +1"	D6			
3	Input 1 Enable	"Enable"	D12	<b>Step 3 to 5, 8 to 22 and 24 to 29:</b>  Test each binary output ,one at a time. Select each listed tab on the computer screen monitoring tester LED's. Each LED shall be "ON" when the associated tab is selected.		
4	Input 2 Enable	"Enable"	D13			
5	Output Switch	Enable IN 2/IN1	D14			
6	Boost Stage	"Boost +1"	D15			
7	Boost Stage	"Boost +2"	D16			
8	Common Comp.	"Comp."	D17			
9	Com. Exc. Enable	"Exc." D47	D18			
10	Com. Option	"Option" D49	D19			
11	Slow Polarity	"Sign + -" D20	D11			
12	Com. Filter	"Filter"	D21			
13	Fast Enable	"Enable"	D22			
14	Fast Polarity	"Sign + -"	D23			
15	Slow Option	"Option"	D24			
16	Slow Bypass	"Bypass"	D25			
17	Slow 5V Offset	"Fixed"	D26			
18	Slow Ofs. Enable	"Enable"	D27			
19	Slow Comp.	"Comp."	D28			
20	Slow Boost	"Boost"	D29			
21	Slow Filter	"Filter"	D30		OK OK	

COMMON MODE SERVO

Table 1

COMPUTER SCREEN		EtherCAT -COMMON MODE SERVO TESTER				
Step	NAME	FRONT PANEL LED	D No:	REMARKS	CM A P/F	CM B P/F
22	Fast Limiter	"Limiter"	D31		OK	OK
23	GAIN FAST	"-32"	D46			
		"+16"	D45			
		"+8"	D44			
		"+4"	D43			
		"+2"	D42			
		"+1"	D41			
24	Split Exc. Enable	"Excitation" DR	D47			
25	Fast Option	"Option" D19	D48			
26	Slow Exc.	"Fast-Slow"	D49			
27	Polarity IN 1	"Sign + -"	D50			
28	Polarity IN 2	"Sign + -"	D51			
29	Latch enable	"LE"	LE	OK	OK	
Step	DISPLAYED	FRONT PANEL SWITCH	D No:	Step 30,31: Test each binary input one at a time. Turn the listed tester switches on and off, monitoring the computer screen. "Fast Limit" and "OK" LED's on computer screen shall switch on and off according to each switch setting. <i>OUT to meter</i>		
30	Fast Limit	"Limiter"	35		OK	OK
31	OK	"OK"	OK		OK	OK
Step	DISPLAYED	FRONT PANEL BNC	D No:	Step 32 to 34: Test each analog input, one at a time. Connect a DVM to the BNC connectors. Type 9.00V then press "Enter". The DVM shall read 9.00V DC +/- 1%. Type -9.00V then press "Enter". The DVM shall read -9.00V DC +/- 1%. Type 0.00V and press "Enter". The DVM shall read 0.00V.		
32	-	Common Offset	36		OK	OK
33	-	Slow Offset	37		OK	OK
34	-	Slow Output Offset	38		OK	OK

COMMON MODE SERVO

Table 1

**EtherCAT SLOW CONTROLS SYSTEM TEST  
PROCEDURE FOR CM CHASSIS**

E1100469-v1

COMPUTER SCREEN		EtherCAT -COMMON MODE SERVO TESTER				
Step	DISPLAYED	FRONT PANEL LED	D No:	REMARKS	CM A P/F	CM B P/F
35	(-9.00V), 9.00V	Input Mon	32	<b>Step 35 to 39: Test each analog output one at a time.</b> Apply -9.00V DC to each BNC connector. The voltage applied shall be displayed on the computer screen. Apply 9.00 V DC to each BNC connector. The voltage applied shall be displayed on the computer screen. Remove the input voltage. On computer screen shall be displayed 0.00V. The voltage tolerance shall be +/- 1%.	OK	OK
36	(-9.00V), 9.00V	Split Mon	33		OK	OK
37	(-9.00V) 9.00V	Fast Mon	34		OK	OK
38	(-9.00V) 9.00V	Slow FB Monitor	39		OK	OK
39	(-9.00V) 9.00V	Slow Mon	40		OK	OK

**VOLTAGE CONTROLLED OSCILLATOR**

Table 1

COMPUTER SCREEN		EtherCAT LOW NOISE VCO TESTER		
Step	Displayed	FRONT PANEL BNC	D No:	REMARKS
40	9.00V, (-9.00V)	RF Pwr Mon. M1	✓ - ✓	<b>Step 40 to 46:</b> Apply 9.00V DC to each BNC connector. 9.00 V DC shall be displayed on the computer screen. Apply -9.00V DC. The applied voltage shall be displayed on the computer screen. The tolerance shall be +/- 1%. <b>Step 47:</b> Connect a DVM to the "Man. Freq. Tuning" BNC connector. Type 9.00V and press "ENTER". DVM shall read 9.00V +/- 1%. Type - 9.00V and press "ENTER". DVM shall read -9.00V +/- 1%. Type 0.00V and press "Enter" DVM shall read 0.00 V.
41	9.00V, (-9.00V)	RF Pwr Mon. M2	✓ - ✓	
42	9.00V, (-9.00V)	RF Pwr Mon. M3	✓ - ✓	
43	9.00V, (-9.00V)	Temp. Mon. M1	✓ - ✓	
44	9.00V, (-9.00V)	Temp. Mon. M2	✓ - ✓	
45	9.00V, (-9.00V)	Temp. Mon. M3	✓ - ✓	
46	9.00V, (-9.00V)	VCO Tune Mon.	✓ - ✓	
47	-	Man.Freq.Tuning	✓ - ✓	
Step	COMPUTER SCREEN	FRONT PANEL SWITCH	D No:	REMARKS
48	EXCSW	" Exc Readback"	✓ - ✓	<b>Step 48,49:</b> Turn the listed switches on and off monitoring computer screen. "EXCSW" and "OK" on computer screen shall switch between on and off according to each switch setting.
49	OK	"OK"	✓ - ✓	
Step	COMPUTER SCREEN	FRONT PANEL LED	D No:	REMARKS
50	Exc. Enable	"Exc Enable"	✓ - ✓	Select "Exc Enable" on the computer screen monitoring "Exc Enable" LED on the tester front panel. LED shall be ON when "Exc Enable" is selected.



**DELAY LINE PHASE SHIFTER**

Table 1

COMPUTER SCREEN		EtherCAT -DELAY LINE PHASE SHIFTER TESTER		
Step	NAME	FRONT PANEL LED	D No:	REMARKS
51	Delay A	"1/16"	✓ - ✓	Click on the "Delay Line A" gain slider on computer screen and monitor tester front panel LED's. Each LED shall be "ON" according to gain slider setting.  Select "LE A" tab on computer screen. "LE" LED shall be ON when tab is selected.
		"1/8"	✓ - ✓	
		"1/4"	✓ - ✓	
		"1/2"	✓ - ✓	
		"1"	✓ - ✓	
		"2"	✓ - ✓	
		"4"	✓ - ✓	
		"8"	✓ - ✓	
		"16"	✓ - ✓	
52	LE A	"LE"	✓ - ✓	
53	Delay B	"1/16"	✓ - ✓	Click on the "Delay Line B" gain slider on computer screen and monitor tester front panel LED's. Each LED shall be "ON" according to gain slider setting.  Select "LE B" tab on computer screen. "LE" LED shall be ON when tab is selected.
		"1/8"	✓ - ✓	
		"1/4"	✓ - ✓	
		"1/2"	✓ - ✓	
		"1"	✓ - ✓	
		"2"	✓ - ✓	
		"4"	✓ - ✓	
		"8"	✓ - ✓	
		"16"	✓ - ✓	
54	LE B	"LE"	✓ - ✓	

COMMON MODE SERVO

Table 1

COMPUTER SCREEN		EtherCAT -COMMON MODE SERVO TESTER					
Step	NAME	FRONT PANEL LED	D No:	REMARKS	CM A P/F	CM B P/F	
1	GAIN IN 1 Slider	"-32"	D5	<p>Step 1,2 and 23:</p> <p>Starting with "Gain IN 1" slider click on computer screen "Gain Slider 1" and monitor the CM tester "Gain Slider 1" LED's. Each LED shall be "ON" according to slider setting. Repeat the same procedure for "Gain IN 2" and "Gain Fast" slider.</p>	OK	OK	
		"+16"	D4				
		"+8"	D3				
		"+4"	D2				
		"+2"	D1				
		"+1"	D0				
2	GAIN IN 2 Slider	"-32"	D11				
		"+16"	D10				
		"+8"	D9				
		"+4"	D8				
		"+2"	D7				
		"+1"	D6				
3	Input 1 Enable	"Enable"	D12	<p>Step 3 to 5, 8 to 22 and 24 to 29:</p> <p>Test each binary output ,one at a time. Select each listed tab on the computer screen monitoring tester LED's. Each LED shall be "ON" when the associated tab is selected.</p>			
4	Input 2 Enable	"Enable"	D13				
5	Output Switch	Enable IN 2/IN1	D14				
6	Boost Stage	"Boost +1"	D15				
7	Boost Stage	"Boost +2"	D16				
8	Common Comp.	"Comp."	D17				
9	Com. Exc. Enable	"Exc." D47	D18				
10	Com. Option	"Option" D48	D19				
11	Slow Polarity	"Sign + -" D20	D11		<p>Step 6,7: Select "Boost Stage" gain slider on computer screen and monitor the Boost Off" LED's on CM Tester front panel. LED's" shall be "ON" according to slider setting.</p>		
12	Com. Filter	"Filter"	D21				
13	Fast Enable	"Enable"	D22				
14	Fast Polarity	"Sign + -"	D23				
15	Slow Option	"Option"	D24				
16	Slow Bypass	"Bypass"	D25				
17	Slow 5V Offset	"Fixed"	D26				
18	Slow Ofs. Enable	"Enable"	D27				
19	Slow Comp.	"Comp."	D28				
20	Slow Boost	"Boost"	D29				
21	Slow Filter	"Filter"	D30				

COMMON MODE SERVO

Table 1

COMPUTER SCREEN		EtherCAT -COMMON MODE SERVO TESTER				
Step	NAME	FRONT PANEL LED	D No:	REMARKS	CM A P/F	CM B P/F
22	Fast Limiter	"Limiter"	D31		OK	OK
23	GAIN FAST	"-32"	D46			
		" +16"	D45			
		" +8"	D44			
		" +4"	D43			
		" +2"	D42			
		" +1"	D41			
24	Split Exc. Enable	"Excitation" DR	D47			
25	Fast Option	"Option" DI9	D48			
26	Slow Exc.	"Fast-Slow"	D49			
27	Polarity IN 1	"Sign + -"	D50			
28	Polarity IN 2	"Sign + -"	D51			
29	Latch enable	"LE"	LE		OK	OK
Step	DISPLAYED	FRONT PANEL SWITCH	D No:			
30	Fast Limit	"Limiter"	35	Step 30,31: Test each binary input one at a time. Turn the listed tester switches on and off, monitoring the computer screen. "Fast Limit" and "OK" LED's on computer screen shall switch on and off according to each switch setting. <i>OUT to meter</i>	OK	OK
31	OK	"OK"	OK		OK	OK
Step	DISPLAYED	FRONT PANEL BNC	D No:			
32	-	Common Offset	36	Step 32 to 34: Test each analog input, one at a time. Connect a DVM to the BNC connectors. Type 9.00V then press "Enter". The DVM shall read 9.00V DC +/- 1%. Type -9.00V then press "Enter". The DVM shall read -9.00V DC +/- 1%. Type 0.00V and press "Enter". The DVM shall read 0.00V.	OK	OK
33	-	Slow Offset	37		OK	OK
34	-	Slow Output Offset	38		OK	OK

COMMON MODE SERVO

Table 1

EtherCAT SLOW CONTROLS SYSTEM TEST  
PROCEDURE FOR CM CHASSIS

E1100469-v1

COMPUTER SCREEN		EtherCAT -COMMON MODE SERVO TESTER				
Step	DISPLAYED	FRONT PANEL LED	D No:	REMARKS	CM A P/F	CM B P/F
35	(-9.00V), 9.00V	Input Mon	32	<b>Step 35 to 39:</b> Test each analog output one at a time. Apply -9.00V DC to each BNC connector. The voltage applied shall be displayed on the computer screen. Apply 9.00 V DC to each BNC connector. The voltage applied shall be displayed on the computer screen. Remove the input voltage. On computer screen shall be displayed 0.00V. The voltage tolerance shall be +/- 1%.	OK	OK
36	(-9.00V), 9.00V	Split Mon	33		OK	OK
37	(-9.00V) 9.00V	Fast Mon	34		OK	OK
38	(-9.00V) 9.00V	Slow FB Monitor	39		OK	OK
39	(-9.00V) 9.00V	Slow Mon	40		OK	OK

**VOLTAGE CONTROLLED OSCILLATOR**

Table 1

COMPUTER SCREEN		EtherCAT LOW NOISE VCO TESTER		
Step	Displayed	FRONT PANEL BNC	D No:	REMARKS
40	9.00V, (-9.00V)	RF Pwr Mon. M1	✓ - ✓	<p>Step 40 to 46: Apply 9.00V DC to each BNC connector. 9.00 V DC shall be displayed on the computer screen.</p> <p>Apply -9.00V DC. The applied voltage shall be displayed on the computer screen.</p> <p>The tolerance shall be +/- 1%.</p> <p>Step 47:</p> <p>Connect a DVM to the "Man. Freq. Tuning" BNC connector. Type 9.00V and press "ENTER". DVM shall read 9.00V +/- 1%. Type -9.00V and press "ENTER". DVM shall read -9.00V +/- 1%. Type 0.00V and press "Enter" DVM shall read 0.00 V.</p>
41	9.00V, (-9.00V)	RF Pwr Mon. M2	✓ - ✓	
42	9.00V, (-9.00V)	RF Pwr Mon. M3	✓ - ✓	
43	9.00V, (-9.00V)	Temp. Mon. M1	✓ - ✓	
44	9.00V, (-9.00V)	Temp. Mon. M2	✓ - ✓	
45	9.00V, (-9.00V)	Temp. Mon. M3	✓ - ✓	
46	9.00V, (-9.00V)	VCO Tune Mon.	✓ - ✓	
47	-	Man.Freq.Tuning	✓ - ✓	
Step	COMPUTER SCREEN	FRONT PANEL SWITCH	D No:	REMARKS
48	EXCSW	"Exc Readback"	✓ - ✓	<p>Step 48,49: Turn the listed switches on and off monitoring computer screen. "EXCSW" and "OK" on computer screen shall switch between on and off according to each switch setting.</p>
49	OK	"OK"	✓ - ✓	
Step	COMPUTER SCREEN	FRONT PANEL LED	D No:	REMARKS
50	Exc. Enable	"Exc Enable"	✓ - ✓	<p>Select "Exc Enable" on the computer screen monitoring "Exc Enable" LED on the tester front panel. LED shall be ON when "Exc Enable" is selected.</p>

**DELAY LINE PHASE SHIFTER**

Table 1

COMPUTER SCREEN		EtherCAT -DELAY LINE PHASE SHIFTER TESTER		
Step	NAME	FRONT PANEL LED	D No:	REMARKS
51	Delay A	"1/16"	✓ - ✓	Click on the "Delay Line A" gain slider on computer screen and monitor tester front panel LED's. Each LED shall be "ON" according to gain slider setting.  Select "LE A" tab on computer screen. "LE" LED shall be ON when tab is selected.
		"1/8"	✓ - ✓	
		"1/4"	✓ - ✓	
		"1/2"	✓ - ✓	
		"1"	✓ - ✓	
		"2"	✓ - ✓	
		"4"	✓ - ✓	
		"8"	✓ - ✓	
		"16"	✓ - ✓	
52	LE A	"LE"	✓ - ✓	
53	Delay B	"1/16"	✓ - ✓	Click on the "Delay Line B" gain slider on computer screen and monitor tester front panel LED's. Each LED shall be "ON" according to gain slider setting.  Select "LE B" tab on computer screen. "LE" LED shall be ON when tab is selected.
		"1/8"	✓ - ✓	
		"1/4"	✓ - ✓	
		"1/2"	✓ - ✓	
		"1"	✓ - ✓	
		"2"	✓ - ✓	
		"4"	✓ - ✓	
		"8"	✓ - ✓	
		"16"	✓ - ✓	
54	LE B	"LE"	✓ - ✓	

COMMON MODE SERVO

Table 1

COMPUTER SCREEN		EtherCAT -COMMON MODE SERVO TESTER					
Step	NAME	FRONT PANEL LED	D No:	REMARKS	CM A P/F	CM B P/F	
1	GAIN IN 1 Slider	"-32"	D5	Step 1,2 and 23:  Starting with "Gain IN 1" slider click on computer screen "Gain Slider 1" and monitor the CM tester "Gain Slider 1" LED's. Each LED shall be "ON" according to slider setting. Repeat the same procedure for "Gain IN 2" and "Gain Fast" slider.	OK	OK	
		"+16"	D4				
		"+8"	D3				
		"+4"	D2				
		"+2"	D1				
		"+1"	D0				
2	GAIN IN 2 Slider	"-32"	D11				
		"+16"	D10				
		"+8"	D9				
		"+4"	D8				
		"+2"	D7				
		"+1"	D6				
3	Input 1 Enable	"Enable"	D12	Step 3 to 5, 8 to 22 and 24 to 29:  Test each binary output ,one at a time. Select each listed tab on the computer screen monitoring tester LED's. Each LED shall be "ON" when the associated tab is selected.			
4	Input 2 Enable	"Enable"	D13				
5	Output Switch	Enable IN 2/IN1	D14				
6	Boost Stage	"Boost +1"	D15				
7	Boost Stage	"Boost +2"	D16				
8	Common Comp.	"Comp."	D17				
9	Com. Exc. Enable	"Exc." D47	D18				
10	Com. Option	"Option" D48	D19				
11	Slow Polarity	"Sign + -" D20	D11		Step 6,7: Select "Boost Stage" gain slider on computer screen and monitor the Boost Off" LED's on CM Tester front panel. LED's" shall be "ON" according to slider setting.		
12	Com. Filter	"Filter"	D21				
13	Fast Enable	"Enable"	D22				
14	Fast Polarity	"Sign + -"	D23				
15	Slow Option	"Option"	D24				
16	Slow Bypass	"Bypass"	D25				
17	Slow 5V Offset	"Fixed"	D26				
18	Slow Ofs. Enable	"Enable"	D27				
19	Slow Comp.	"Comp."	D28				
20	Slow Boost	"Boost"	D29				
21	Slow Filter	"Filter"	D30				

COMMON MODE SERVO

Table 1

COMPUTER SCREEN		EtherCAT -COMMON MODE SERVO TESTER				
Step	NAME	FRONT PANEL LED	D No:	REMARKS	CM A P/F	CM B P/F
22	Fast Limiter	"Limiter"	D31		OK	OK
23	GAIN FAST	"-32"	D46			
		"+16"	D45			
		" +8"	D44			
		" +4"	D43			
		" +2"	D42			
		" +1"	D41			
24	Split Exc. Enable	"Excitation" DR	D47			
25	Fast Option	"Option" D19	D48			
26	Slow Exc.	"Fast-Slow"	D49			
27	Polarity IN 1	"Sign + -"	D50			
28	Polarity IN 2	"Sign + -"	D51			
29	Latch enable	"LE"	LE	OK	OK	
Step	DISPLAYED	FRONT PANEL SWITCH	D No:	Step 30,31: Test each binary input one at a time. Turn the listed tester switches on and off, monitoring the computer screen. "Fast Limit" and "OK" LED's on computer screen shall switch on and off according to each switch setting. <i>OUT TO meter</i>		
30	Fast Limit	"Limiter"	35		OK	OK
31	OK	"OK"	OK		OK	OK
Step	DISPLAYED	FRONT PANEL BNC	D No:	Step 32 to 34: Test each analog input, one at a time. Connect a DVM to the BNC connectors. Type 9.00V then press "Enter". The DVM shall read 9.00V DC +/- 1%. Type -9.00V then press "Enter". The DVM shall read -9.00V DC +/- 1%. Type 0.00V and press "Enter". The DVM shall read 0.00V.		
32	-	Common Offset	36		OK	OK
33	-	Slow Offset	37		OK	OK
34	-	Slow Output Offset	38		OK	OK

COMMON MODE SERVO

Table 1



**EtherCAT SLOW CONTROLS SYSTEM TEST  
PROCEDURE FOR CM CHASSIS**

E1100469-v1

COMPUTER SCREEN		EtherCAT -COMMON MODE SERVO TESTER				
Step	DISPLAYED	FRONT PANEL LED	D No:	REMARKS	CM A P/F	CM B P/F
35	(-9.00V), 9.00V	Input Mon	32	<b>Step 35 to 39: Test each analog output one at a time.</b> Apply -9.00V DC to each BNC connector. The voltage applied shall be displayed on the computer screen. Apply 9.00 V DC to each BNC connector. The voltage applied shall be displayed on the computer screen. Remove the input voltage. On computer screen shall be displayed 0.00V. The voltage tolerance shall be +/- 1%.	OK	OK
36	(-9.00V), 9.00V	Split Mon	33		OK	OK
37	(-9.00V) 9.00V	Fast Mon	34		OK	OK
38	(-9.00V) 9.00V	Slow FB Monitor	39		OK	OK
39	(-9.00V) 9.00V	Slow Mon	40		OK	OK

**VOLTAGE CONTROLLED OSCILLATOR**

Table 1

COMPUTER SCREEN		EtherCAT LOW NOISE VCO TESTER		
Step	Displayed	FRONT PANEL BNC	D No:	REMARKS
40	9.00V, (-9.00V)	RF Pwr Mon. M1	✓ - ✓	<p><b>Step 40 to 46:</b> Apply 9.00V DC to each BNC connector. 9.00 V DC shall be displayed on the computer screen.</p> <p>Apply -9.00V DC. The applied voltage shall be displayed on the computer screen.</p> <p>The tolerance shall be +/- 1%.</p> <p><b>Step 47:</b></p> <p>Connect a DVM to the "Man. Freq. Tuning" BNC connector. Type 9.00V and press "ENTER". DVM shall read 9.00V +/- 1%. Type - 9.00V and press "ENTER". DVM shall read -9.00V +/- 1%. Type 0.00V and press "Enter" DVM shall read 0.00 V.</p>
41	9.00V, (-9.00V)	RF Pwr Mon. M2	✓ - ✓	
42	9.00V, (-9.00V)	RF Pwr Mon. M3	✓ - ✓	
43	9.00V, (-9.00V)	Temp. Mon. M1	✓ - ✓	
44	9.00V, (-9.00V)	Temp. Mon. M2	✓ - ✓	
45	9.00V, (-9.00V)	Temp. Mon. M3	✓ - ✓	
46	9.00V, (-9.00V)	VCO Tune Mon.	✓ - ✓	
47	-	Man.Freq.Tuning	- -	
Step	COMPUTER SCREEN	FRONT PANEL SWITCH	D No:	REMARKS
48	EXCSW	"Exc Readback"	✓ - ✓	<p><b>Step 48,49:</b> Turn the listed switches on and off monitoring computer screen. "EXCSW" and "OK" on computer screen shall switch between on and off according to each switch setting.</p>
49	OK	"OK"	✓ - ✓	
Step	COMPUTER SCREEN	FRONT PANEL LED	D No:	REMARKS
50	Exc. Enable	"Exc Enable"	✓ - ✓	<p>Select "Exc Enable" on the computer screen monitoring "Exc Enable" LED on the tester front panel. LED shall be ON when "Exc Enable" is selected.</p>

**DELAY LINE PHASE SHIFTER**

Table 1

COMPUTER SCREEN		EtherCAT -DELAY LINE PHASE SHIFTER TESTER		
Step	NAME	FRONT PANEL LED	D No:	REMARKS
51	Delay A	"1/16"	-	Click on the "Delay Line A" gain slider on computer screen and monitor tester front panel LED's. Each LED shall be "ON" according to gain slider setting.  Select "LE A" tab on computer screen. "LE" LED shall be ON when tab is selected.
		"1/8"	-	
		"1/4"	-	
		"1/2"	-	
		"1"	-	
		"2"	-	
		"4"	-	
		"8"	-	
		"16"	-	
52	LE A	"LE"	-	
53	Delay B	"1/16"	-	Click on the "Delay Line B" gain slider on computer screen and monitor tester front panel LED's. Each LED shall be "ON" according to gain slider setting.  Select "LE B" tab on computer screen. "LE" LED shall be ON when tab is selected.
		"1/8"	-	
		"1/4"	-	
		"1/2"	-	
		"1"	-	
		"2"	-	
		"4"	-	
		"8"	-	
		"16"	-	
54	LE B	"LE"	-	

COMMON MODE SERVO

Table 1

COMPUTER SCREEN		EtherCAT -COMMON MODE SERVO TESTER					
Step	NAME	FRONT PANEL LED	D No:	REMARKS	CM A P/F	CM B P/F	
1	GAIN IN 1 Slider	"-32"	D5	<p>Step 1,2 and 23:</p> <p>Starting with "Gain IN 1" slider click on computer screen "Gain Slider 1" and monitor the CM tester "Gain Slider 1" LED's. Each LED shall be "ON" according to slider setting. Repeat the same procedure for "Gain IN 2" and "Gain Fast" slider.</p>	✓	✓	
		"+16"	D4		/	/	
		"+8"	D3		/	/	
		"+4"	D2		/	/	
		"+2"	D1		/	/	
		"+1"	D0		/	/	
2	GAIN IN 2 Slider	"-32"	D11			/	/
		"+16"	D10			/	/
		"+8"	D9			/	/
		"+4"	D8			/	/
		"+2"	D7	/		/	
		"+1"	D6	/		/	
3	Input 1 Enable	"Enable"	D12	<p>Step 3 to 5, 8 to 22 and 24 to 29:</p> <p>Test each binary output ,one at a time. Select each listed tab on the computer screen monitoring tester LED's. Each LED shall be "ON" when the associated tab is selected.</p> <p>Step 6,7: Select "Boost Stage" gain slider on computer screen and monitor the Boost Off" LED's on CM Tester front panel. LED's" shall be "ON" according to slider setting.</p>	/	/	
4	Input 2 Enable	"Enable"	D13		/	/	
5	Output Switch	Enable IN 2/IN1	D14		/	/	
6	Boost Stage	"Boost +1"	D15		/	/	
7	Boost Stage	"Boost +2"	D16		/	/	
8	Common Comp.	"Comp."	D17		/	/	
9	Com. Exc. Enable	"Exc." D47	D18		/	/	
10	Com. Option	"Option" D48	D19		/	/	
11	Slow Polarity	"Sign + -" D20	D11		/	/	
12	Com. Filter	"Filter"	D21		/	/	
13	Fast Enable	"Enable"	D22		/	/	
14	Fast Polarity	"Sign + -"	D23	/	/		
15	Slow Option	"Option"	D24	/	/		
16	Slow Bypass	"Bypass"	D25	/	/		
17	Slow 5V Offset	"Fixed"	D26	/	/		
18	Slow Ofs. Enable	"Enable"	D27	/	/		
19	Slow Comp.	"Comp."	D28	/	/		
20	Slow Boost	"Boost"	D29	/	/		
21	Slow Filter	"Filter"	D30	/	/		

COMMON MODE SERVO

Table 1

COMPUTER SCREEN		EtherCAT -COMMON MODE SERVO TESTER				
Step	NAME	FRONT PANEL LED	D No:	REMARKS	CM A P/F	CM B P/F
22	Fast Limiter	"Limiter"	D31		/	/
23	GAIN FAST	"-32"	D46		/	/
		"+16"	D45		/	/
		"+8"	D44		/	/
		"+4"	D43		/	/
		"+2"	D42		/	/
		"+1"	D41		/	/
24	Split Exc. Enable	"Excitation" <i>DIR</i>	D47		/	/
25	Fast Option	"Option" <i>DI9</i>	D48		/	/
26	Slow Exc.	"Fast-Slow"	D49		/	/
27	Polarity IN 1	"Sign + -"	D50	/	/	
28	Polarity IN 2	"Sign + -"	D51	/	/	
29	Latch enable	"LE"	LE	/	/	
Step	DISPLAYED	FRONT PANEL SWITCH	D No:	Step 30,31: Test each binary input one at a time. Turn the listed tester switches on and off, monitoring the computer screen. "Fast Limit" and "OK" LED's on computer screen shall switch on and off according to each switch setting. <i>OUT TO meter</i>		
30	Fast Limit	"Limiter"	35		/	/
31	OK	"OK"	OK			
Step	DISPLAYED	FRONT PANEL BNC	D No:	Step 32 to 34: Test each analog input, one at a time. Connect a DVM to the BNC connectors. Type 9.00V then press "Enter". The DVM shall read 9.00V DC +/- 1%. Type -9.00V then press "Enter". The DVM shall read -9.00V DC +/- 1%. Type 0.00V and press "Enter". The DVM shall read 0.00V.		
32	-	Common Offset	36		/	/
33	-	Slow Offset	37		/	/
34	-	Slow Output Offset	38			

COMMON MODE SERVO

Table 1

EtherCAT SLOW CONTROLS SYSTEM TEST  
PROCEDURE FOR CM CHASSIS

E1100469-v1

COMPUTER SCREEN		EtherCAT -COMMON MODE SERVO TESTER				
Step	DISPLAYED	FRONT PANEL LED	D No:	REMARKS	CM A P/F	CM B P/F
35	(-9.00V), 9.00V	Input Mon	32	<b>Step 35 to 39: Test each analog output one at a time.</b> Apply -9.00V DC to each BNC connector. The voltage applied shall be displayed on the computer screen. Apply 9.00 V DC to each BNC connector. The voltage applied shall be displayed on the computer screen. Remove the input voltage. On computer screen shall be displayed 0.00V. The voltage tolerance shall be +/- 1%.	/	/
36	(-9.00V), 9.00V	Split Mon	33		/	/
37	(-9.00V) 9.00V	Fast Mon	34		/	/
38	(-9.00V) 9.00V	Slow FB Monitor	39		/	/
39	(-9.00V) 9.00V	Slow Mon	40		/	/

**VOLTAGE CONTROLLED OSCILLATOR**

Table 1

COMPUTER SCREEN		EtherCAT LOW NOISE VCO TESTER		
Step	Displayed	FRONT PANEL BNC	D No:	REMARKS
40	9.00V, (-9.00V)	RF Pwr Mon. M1	✓ - /	<p>Step 40 to 46: Apply 9.00V DC to each BNC connector. 9.00 V DC shall be displayed on the computer screen.</p> <p>Apply -9.00V DC. The applied voltage shall be displayed on the computer screen.</p> <p>The tolerance shall be +/- 1%.</p> <p>Step 47:</p> <p>Connect a DVM to the "Man. Freq. Tuning" BNC connector. Type 9.00V and press "ENTER". DVM shall read 9.00V +/- 1%. Type - 9.00V and press "ENTER". DVM shall read -9.00V +/- 1%. Type 0.00V and press "Enter" DVM shall read 0.00 V.</p>
41	9.00V, (-9.00V)	RF Pwr Mon. M2	/ - /	
42	9.00V, (-9.00V)	RF Pwr Mon. M3	/ - /	
43	9.00V, (-9.00V)	Temp. Mon. M1	/ - /	
44	9.00V, (-9.00V)	Temp. Mon. M2	/ - /	
45	9.00V, (-9.00V)	Temp. Mon. M3	/ - /	
46	9.00V, (-9.00V)	VCO Tune Mon.	/ - /	
47	-	Man.Freq.Tuning	-	
Step	COMPUTER SCREEN	FRONT PANEL SWITCH	D No:	REMARKS
48	EXCSW	" Exc Readback"	/ - /	<p>Step 48,49: Turn the listed switches on and off monitoring computer screen. "EXCSW" and "OK" on computer screen shall switch between on and off according to each switch setting.</p>
49	OK	"OK"	/ - /	
Step	COMPUTER SCREEN	FRONT PANEL LED	D No:	REMARKS
50	Exc. Enable	"Exc Enable"	/ - /	<p>Select "Exc Enable" on the computer screen monitoring "Exc Enable" LED on the tester front panel. LED shall be ON when "Exc Enable" is selected.</p>

**DELAY LINE PHASE SHIFTER**

Table 1

COMPUTER SCREEN		EtherCAT -DELAY LINE PHASE SHIFTER TESTER		
Step	NAME	FRONT PANEL LED	D No:	REMARKS
51	Delay A	"1/16"	/ - /	Click on the "Delay Line A" gain slider on computer screen and monitor tester front panel LED's. Each LED shall be "ON" according to gain slider setting.  Select "LE A" tab on computer screen. "LE" LED shall be ON when tab is selected.
		"1/8"	/ - /	
		"1/4"	/ - /	
		"1/2"	/ - /	
		"1"	/ - /	
		"2"	/ - /	
		"4"	/ - /	
		"8"	/ - /	
		"16"	/ - /	
52	LE A	"LE"	/ - /	
53	Delay B	"1/16"	/ - /	Click on the "Delay Line B" gain slider on computer screen and monitor tester front panel LED's. Each LED shall be "ON" according to gain slider setting.  Select "LE B" tab on computer screen. "LE" LED shall be ON when tab is selected.
		"1/8"	/ - /	
		"1/4"	/ - /	
		"1/2"	/ - /	
		"1"	/ - /	
		"2"	/ - /	
		"4"	/ - /	
		"8"	/ - /	
		"16"	/ - /	
54	LE B	"LE"	/ - /	



5/10/26/19

**COMMON MODE SERVO**

Table 1

COMPUTER SCREEN		EtherCAT -COMMON MODE SERVO TESTER				
Step	NAME	FRONT PANEL LED	D No:	REMARKS	CM A P/F	CM B P/F
1	GAIN IN 1 Slider	"-32"	D5	Step 1,2 and 23:  Starting with "Gain IN 1" slider click on computer screen "Gain Slider 1" and monitor the CM tester "Gain Slider 1" LED's. Each LED shall be "ON" according to slider setting. Repeat the same procedure for "Gain IN 2" and "Gain Fast" slider.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
		"+16"	D4		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
		"+8"	D3		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
		"+4"	D2		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
		"+2"	D1		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
		"+1"	D0		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	GAIN IN 2 Slider	"-32"	D11		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
		"+16"	D10		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
		"+8"	D9		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
		"+4"	D8		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
		"+2"	D7		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
		"+1"	D6		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3	Input 1 Enable	"Enable"	D12	Step 3 to 5, 8 to 22 and 24 to 29:  Test each binary output ,one at a time. Select each listed tab on the computer screen monitoring tester LED's. Each LED shall be "ON" when the associated tab is selected.  Step 6,7: Select "Boost Stage" gain slider on computer screen and monitor the Boost Off" LED's on CM Tester front panel. LED's" shall be "ON" according to slider setting.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4	Input 2 Enable	"Enable"	D13		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
5	Output Switch	Enable IN 2/IN1	D14		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
6	Boost Stage	"Boost +1"	D15		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
7	Boost Stage	"Boost +2"	D16		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
8	Common Comp.	"Comp."	D17		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
9	Com. Exc. Enable	"Exc." D47	D18		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
10	Com. Option	"Option" D48	D19		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
11	Slow Polarity	"Sign + -" D20	D11		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
12	Com. Filter	"Filter"	D21		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
13	Fast Enable	"Enable"	D22		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
14	Fast Polarity	"Sign + -"	D23		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
15	Slow Option	"Option"	D24		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
16	Slow Bypass	"Bypass"	D25		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
17	Slow 5V Offset	"Fixed"	D26		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
18	Slow Ofs. Enable	"Enable"	D27		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
19	Slow Comp.	"Comp."	D28		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
20	Slow Boost	"Boost"	D29		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
21	Slow Filter	"Filter"	D30		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

COMMON MODE SERVO

Table 1

COMPUTER SCREEN		EtherCAT -COMMON MODE SERVO TESTER				
Step	NAME	FRONT PANEL LED	D No:	REMARKS	CM A P/F	CM B P/F
22	Fast Limiter	"Limiter"	D31			
23	GAIN FAST	"-32"	D46			
		"+16"	D45			
		"+8"	D44			
		"+4"	D43			
		"+2"	D42			
		"+1"	D41			
24	Split Exc. Enable	"Excitation" DR	D47			
25	Fast Option	"Option" DI9	D48			
26	Slow Exc.	"Fast-Slow"	D49			
27	Polarity IN 1	"Sign + -"	D50			
28	Polarity IN 2	"Sign + -"	D51			
29	Latch enable	"LE"	LE			
Step	DISPLAYED	FRONT PANEL SWITCH	D No:	Step 30,31: Test each binary input one at a time. Turn the listed tester switches on and off, monitoring the computer screen. "Fast Limit" and "OK" LED's on computer screen shall switch on and off according to each switch setting. <i>OUT TO meter</i>		
30	Fast Limit	"Limiter"	35			
31	OK	"OK"	OK			
Step	DISPLAYED	FRONT PANEL BNC	D No:	Step 32 to 34: Test each analog input, one at a time. Connect a DVM to the BNC connectors. Type 9.00V then press "Enter". The DVM shall read 9.00V DC +/- 1%. Type -9.00V then press "Enter". The DVM shall read -9.00V DC +/- 1%. Type 0.00V and press "Enter". The DVM shall read 0.00V.		
32	-	Common Offset	36			
33	-	Slow Offset	37			
34	-	Slow Output Offset	38			

COMMON MODE SERVO

Table 1

**EtherCAT SLOW CONTROLS SYSTEM TEST  
PROCEDURE FOR CM CHASSIS**

E1100469-v1

COMPUTER SCREEN		EtherCAT -COMMON MODE SERVO TESTER				
Step	DISPLAYED	FRONT PANEL LED	D No:	REMARKS	CM A P/F	CM B P/F
35	(-9.00V), 9.00V	Input Mon	32	<b>Step 35 to 39: Test each analog output one at a time.</b> Apply -9.00V DC to each BNC connector. The voltage applied shall be displayed on the computer screen. Apply 9.00 V DC to each BNC connector. The voltage applied shall be displayed on the computer screen. Remove the input voltage. On computer screen shall be displayed 0.00V. The voltage tolerance shall be +/- 1%.	/	/
36	(-9.00V), 9.00V	Split Mon	33		/	/
37	(-9.00V) 9.00V	Fast Mon	34		/	/
38	(-9.00V) 9.00V	Slow FB Monitor	39		/	/
39	(-9.00V) 9.00V	Slow Mon	40		/	/

**VOLTAGE CONTROLLED OSCILLATOR**

Table 1

COMPUTER SCREEN		EtherCAT LOW NOISE VCO TESTER		
Step	Displayed	FRONT PANEL BNC	D No:	REMARKS
40	9.00V, (-9.00V)	RF Pwr Mon. M1	/ - /	<p>Step 40 to 46: Apply 9.00V DC to each BNC connector. 9.00 V DC shall be displayed on the computer screen.</p> <p>Apply -9.00V DC. The applied voltage shall be displayed on the computer screen.</p> <p>The tolerance shall be +/- 1%.</p> <p>Step 47:</p> <p>Connect a DVM to the "Man. Freq. Tuning" BNC connector. Type 9.00V and press "ENTER". DVM shall read 9.00V +/- 1%. Type - 9.00V and press "ENTER". DVM shall read -9.00V +/- 1%. Type 0.00V and press "Enter" DVM shall read 0.00 V.</p>
41	9.00V, (-9.00V)	RF Pwr Mon. M2	/ - /	
42	9.00V, (-9.00V)	RF Pwr Mon. M3	/ - /	
43	9.00V, (-9.00V)	Temp. Mon. M1	/ - /	
44	9.00V, (-9.00V)	Temp. Mon. M2	/ - /	
45	9.00V, (-9.00V)	Temp. Mon. M3	/ - /	
46	9.00V, (-9.00V)	VCO Tune Mon.	/ - /	
47	-	Man.Freq.Tuning	/ - /	
Step	COMPUTER SCREEN	FRONT PANEL SWITCH	D No:	REMARKS
48	EXCSW	" Exc Readback"	/ - /	<p>Step 48,49: Turn the listed switches on and off monitoring computer screen.</p> <p>"EXCSW" and "OK" on computer screen shall switch between on and off according to each switch setting.</p>
49	OK	"OK"	/ - /	
Step	COMPUTER SCREEN	FRONT PANEL LED	D No:	REMARKS
50	Exc. Enable	"Exc Enable"	/ - /	<p>Select "Exc Enable" on the computer screen monitoring "Exc Enable" LED on the tester front panel. LED shall be ON when "Exc Enable" is selected.</p>

**DELAY LINE PHASE SHIFTER**

Table 1

COMPUTER SCREEN		EtherCAT -DELAY LINE PHASE SHIFTER TESTER		
Step	NAME	FRONT PANEL LED	D No:	REMARKS
51	Delay A	"1/16"	/ - /	Click on the "Delay Line A" gain slider on computer screen and monitor tester front panel LED's. Each LED shall be "ON" according to gain slider setting.  Select "LE A" tab on computer screen. "LE" LED shall be ON when tab is selected.
		"1/8"	/ - /	
		"1/4"	/ - /	
		"1/2"	/ - /	
		"1"	/ - /	
		"2"	/ - /	
		"4"	/ - /	
		"8"	/ - /	
		"16"	/ - /	
52	LE A	"LE"	/ - /	
53	Delay B	"1/16"	/ - /	Click on the "Delay Line B" gain slider on computer screen and monitor tester front panel LED's. Each LED shall be "ON" according to gain slider setting.  Select "LE B" tab on computer screen. "LE" LED shall be ON when tab is selected.
		"1/8"	/ - /	
		"1/4"	/ - /	
		"1/2"	/ - /	
		"1"	/ - /	
		"2"	/ - /	
		"4"	/ - /	
		"8"	/ - /	
		"16"	/ - /	
54	LE B	"LE"	/ - /	