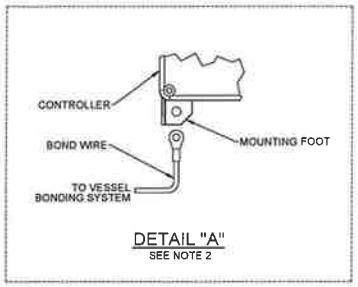
ELECTRONIC PROPULSION CONTROLS FOR :
M/V "SPIRIT OF NORFOLK" O.N. 982944, 169'x38'x12', SMALL PASSENGER VESSEL (K EXISTING)

SYSTEM FEATURES

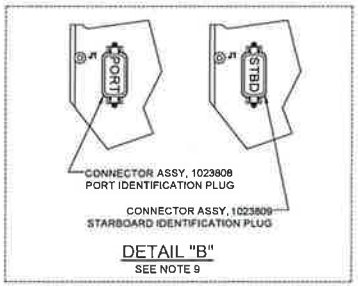
3 CONTROL STATIONS
2 ENGINES

NOTES:

1. ALL POWER CONNECTIONS (BATTERY AND NEUTRAL START) SHOULD BE MADE USING #14 AWG WIRE.
2. A #14 AWG BOND WIRE, TERMINATED AT ONE OF THE MOUNTING FEET OF THE CONTROLLER, MUST BE CONNECTED TO EITHER THE VESSEL BONDING SYSTEM (SEE DETAIL "A") OR BATTERY COMMON. REFER TO THE INSTALLATION MANUAL FOR MORE INFORMATION.
3. HARNESSES TO BE INSTALLED AND MAINTAINED PER TWIN DISC STANDARD S822A UNLESS SUPERCEDED BY SURVEY SOCIETY REQUIREMENTS.
4. ALL CUSTOMER SUPPLIED WIRING TO BE 18 AWG UNLESS OTHERWISE SPECIFIED.
5. REFER TO THE INSTALLATION MANUAL FOR CONNECTOR PINOUTS WHEN SHORTENING OR SERVICING WIRING HARNESSES.
6. COMMUNICATION BUSSES, IF PRESENT, MAY HAVE OTHER POSSIBLE CONNECTION CONFIGURATIONS. REFER TO THE INSTALLATION MANUAL FOR MORE INFORMATION.
7. THE NEUTRAL START AND THROTTLE WIRING CAN BE ROUTED FROM EITHER THE TRANSMISSION OR THE EC300 CONTROLLER. USE THE CONNECTOR HARDWARE AND 1024969 INSTALLATION DRAWING PROVIDED WITH THE 1025035 SERIES HARNESS IF ROUTING FROM THE EC300 CONTROLLER.
8. THE AUXILIARY BATTERY CONNECTIONS ARE OPTIONAL UNLESS REQUIRED FOR SURVEY SOCIETY APPROVAL. RMRS REQUIRES AN AUXILIARY BATTERY FOR EACH EC300 CONTROLLER. EC300 CONTROLLERS CAN ONLY BE USED ON 24 VDC SYSTEMS IN RMRS APPLICATIONS.
9. A PORT CONTROLLER IDENTIFICATION PLUG IS INCLUDED AS CONNECTOR ASSY P/N 1023808. THE PLUG IS MARKED "PORT" AND MUST BE INSTALLED IN J1 OF THE EC300 PORT CONTROLLER. A STARBOARD CONTROLLER IDENTIFICATION PLUG IS INCLUDED AS CONNECTOR ASSY P/N 1023809. THE PLUG IS MARKED "STBD" AND MUST BE INSTALLED IN J1 OF THE EC300 STARBOARD CONTROLLER.
10. SEE INSTALLATION DRAWING 1026605 IF THE 1026234 SERIES HARNESS IS SUPPLIED AS 46720 KIT AND 1028100 SERIES CABLE.



DETAIL "A"
SEE NOTE 2



DETAIL "B"
SEE NOTE 9

FORWARD FACING DUAL LEVER CONTROL HEAD PART NUMBER	CONFIGURATION	STAINLESS STEEL FINISH
1024955	CRUISE 1, CRUISE 2, CRUISE 3	POLISHED
1024955A	SYNC, CRUISE 1, CRUISE 2, CRUISE 3	POLISHED
1024955B	CRUISE 1, CRUISE 2, TROLL 1, TROLL 2	POLISHED
1024955C	CRUISE 1, CRUISE 2, SYNC, TROLL 1, TROLL 2	POLISHED
1024955D	CRUISE 1, CRUISE 2, EXPRESS	POLISHED
1024955E	CRUISE, CRUISE SYNC, EXPRESS SYNC, EXPRESS	POLISHED
1024955F	CRUISE, EXPRESS, TROLL	POLISHED
1024955G	CRUISE, CRUISE SYNC, EXPRESS SYNC, EXPRESS, TROLL	POLISHED
1027801	CRUISE 1, CRUISE 2, CRUISE 3	BLACK POWDER COATED
1027801A	SYNC, CRUISE 1, CRUISE 2, CRUISE 3	BLACK POWDER COATED
1027801B	CRUISE 1, CRUISE 2, TROLL 1, TROLL 2	BLACK POWDER COATED
1027801C	CRUISE 1, CRUISE 2, SYNC, TROLL 1, TROLL 2	BLACK POWDER COATED
1027801D	CRUISE 1, CRUISE 2, EXPRESS	BLACK POWDER COATED
1027801E	CRUISE, CRUISE SYNC, EXPRESS SYNC, EXPRESS	BLACK POWDER COATED
1027801F	CRUISE, EXPRESS, TROLL	BLACK POWDER COATED
1027801G	CRUISE, CRUISE SYNC, EXPRESS SYNC, EXPRESS, TROLL	BLACK POWDER COATED

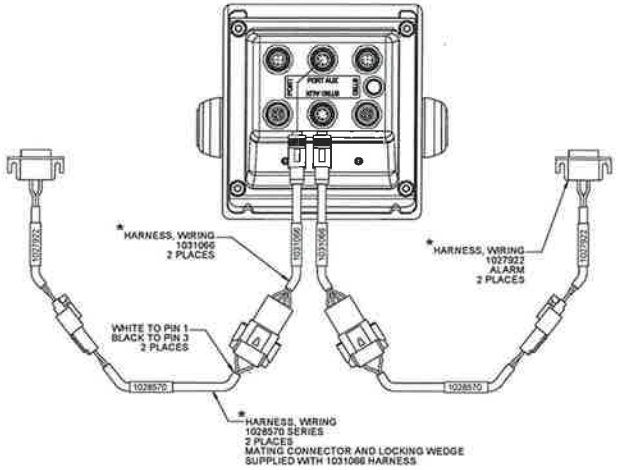
STANDARD HARNESS LENGTHS AVAILABLE		
DESCRIPTION	PART NUMBER	LENGTH
STATION HARNESS (DIGITAL)	1028234	3M
	1028234K	6M
	1028234L	9M
	1028234M	12M
	1028234B	15M
	1028234N	18M
	1028234AA	24M
	1028234C	30M
SINGLE POINT TRANSMISSION HARNESS	1025035A	3M
	1025035B	5.4M
	1025035C	6M
	1025035E	7.9M
	1025035D	16.2M
CONTROLLER COMMUNICATION HARNESS	1020615BQ	1M
	1020615BJ	2M
	1020615C	3M
	1020615H	6M
	1020615N	9M
	1020615T	12M
	1020615Y	15M
	1020615AC	17.4M
	1020615AN	23.4M
	1020615BK	30M

LEGEND:
- • = JUNCTION
- ~ = UNUSED CONTACTS NOT SHOWN
- ★ = TWIN DISC SUPPLIED COMPONENT
- = CHASSIS OR FRAME CONNECTION
- = SHIELD
- = TWISTED LEADS
- AMP = AMP CONNECTOR
- CH = CINCH CONNECTOR
- CPC = CIRCULAR PLASTIC CONNECTOR
- DH = DEUTSCH CONNECTOR
- D-SUB = D-SUB MINIATURE CONNECTOR
- MB = MOLDED BULLET CONNECTOR
- MP = METRI-PACK CONNECTOR
- MS = MIL SPEC. CONNECTOR
- WP = WEATHER PACK CONNECTOR
- HM = HIRSHMAN CONNECTOR
- HT = HARTING TERMINAL
- PPR = PULSES PER REVOLUTION
- ECM = ENGINE CONTROL MODULE
- = IF NEEDED, SHORTEN THIS END
- X = NO CONNECTION

METRIC	THIRD ANGLE PROJECTION	DATE: 01/06/2020	1 NDWF-011319 01/16/2020
TWIN DISC, INCORPORATED	UNLESS OTHERWISE SPECIFIED MACHINED EDGES .X ±0.5 .XX ±0.13 ALL ANGULAR TOLERANCES ±1 GEOMETRIC TOLERANCING PER ASME Y14.5M 1994	DESCRIPTION: SYSTEM, CONTROL EC300	DRAWN BY: RW
			1028543AV
			SIZE A1 SHEET 1 OF 8 REV 1

F E D C B A

AUXILIARY OPTIONS

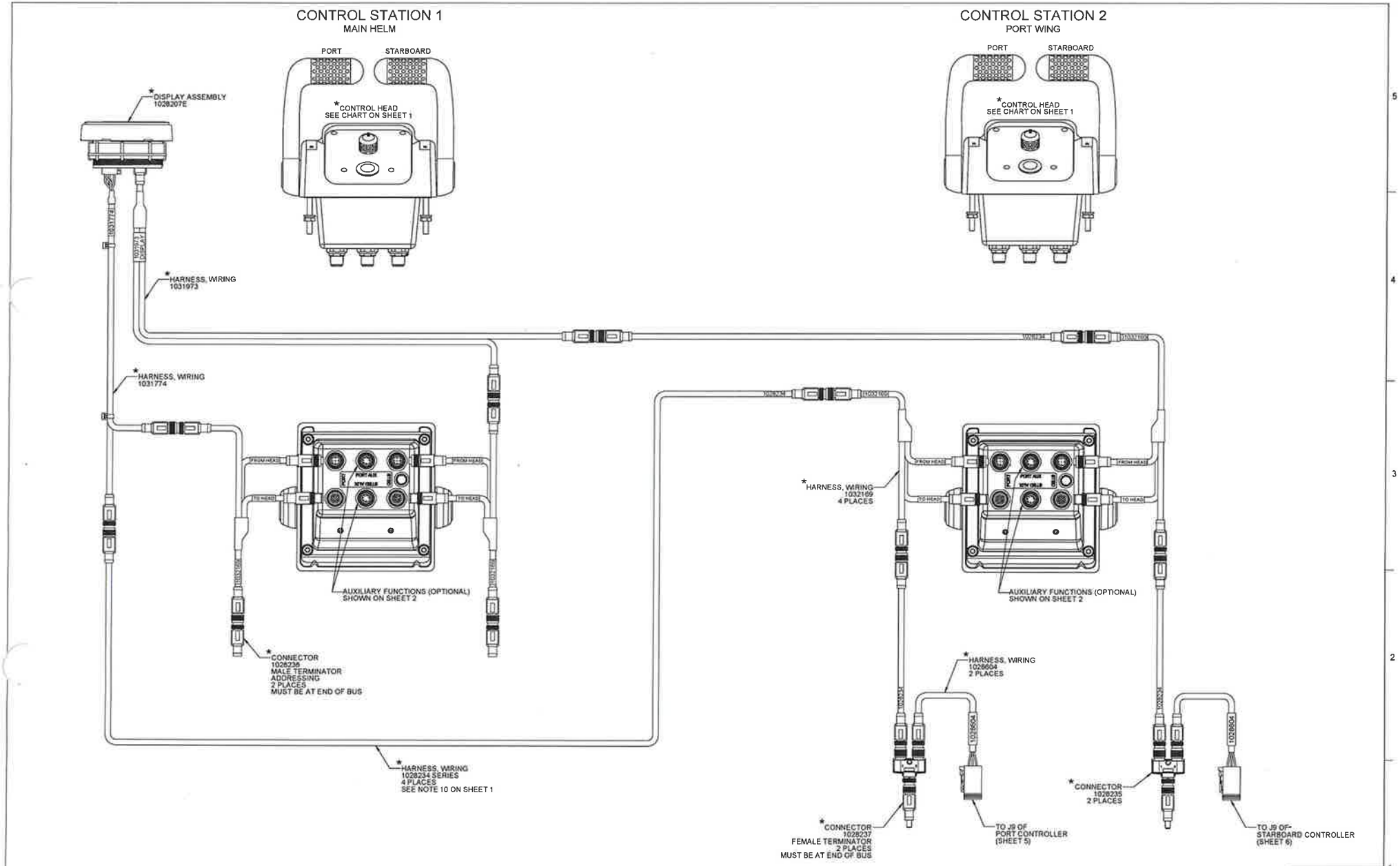


ALARM FUNCTION

METRIC	THIRD ANGLE PROJECTION	MATERIAL	DATE 01/08/2020	TWIN DISC RACINE, WI 53403 - USA
TWIN DISC, INCORPORATED	UNLESS OTHERWISE SPECIFIED MACHINED DIMENSIONS ALL ANGULAR TOLERANCES ±1° GEOMETRIC TOLERANCING PER ASME Y14.5M-1994	HEAT TREAT	SCALE NONE	1028543AV
		DESCRIPTION SYSTEM, CONTROL EC300	DRAWN BY PUM CHECKED BY WEC APPROVED BY RW	SIZE A1 SHEET 2 OF 8 REV 1

REV	CHANGE NO	DATE
1	NDWF-011319	01/15/2020

F E D C B A



				1	NOWF-011319 01/16/2020
				REV	DRAWING NO. DATE
					TWIN DISC RACINE, WI 53403 - USA
				DATE	01/08/2020
				HEAT	NONE
				DRAWN BY	PJM
				CHECKED BY	WPC
				APPROVED BY	RW
				SIZE	A1
				SHEET	3 OF 8
				REV	1

METRIC

TWIN DISC, INCORPORATED

MATERIAL

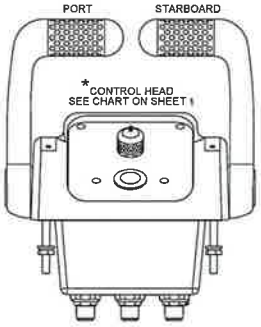
HEAT TREAT

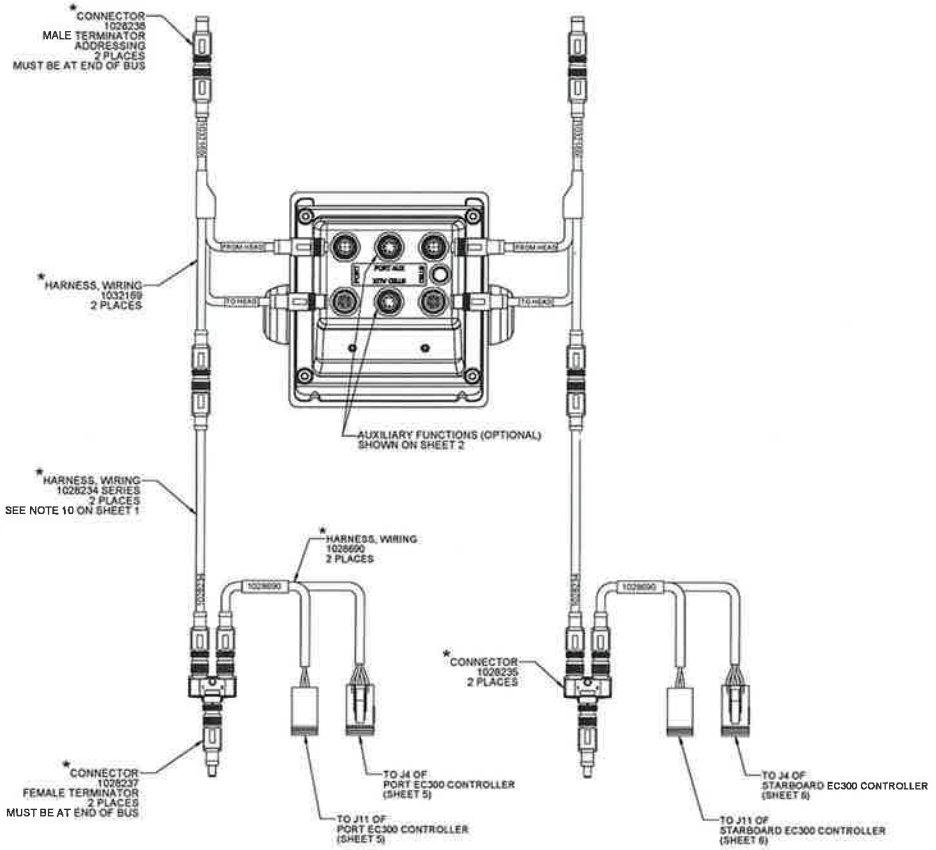
DESCRIPTION: SYSTEM, CONTROL EC300

1028543AV

CONTROL STATION 3

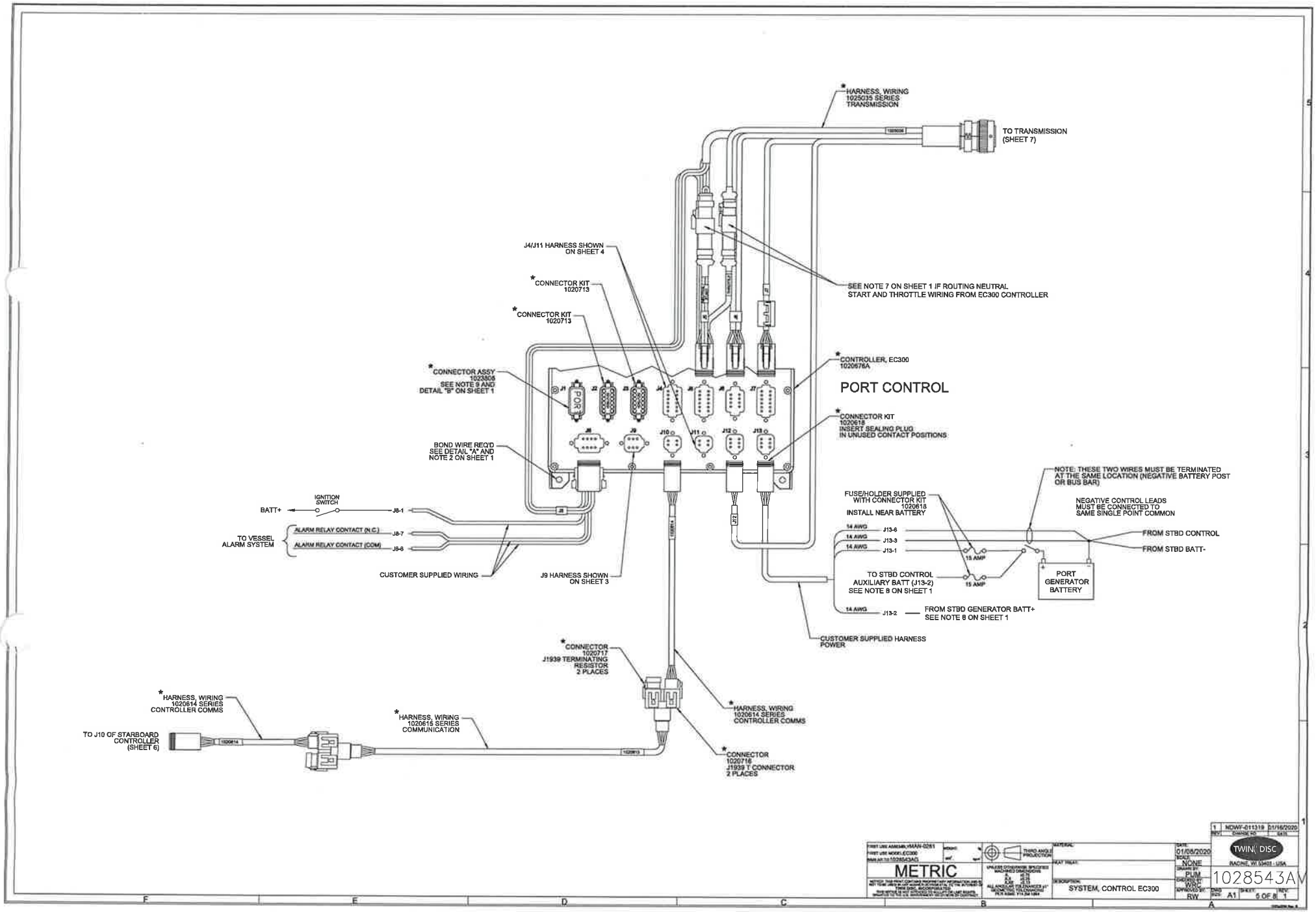
STARBOARD WING





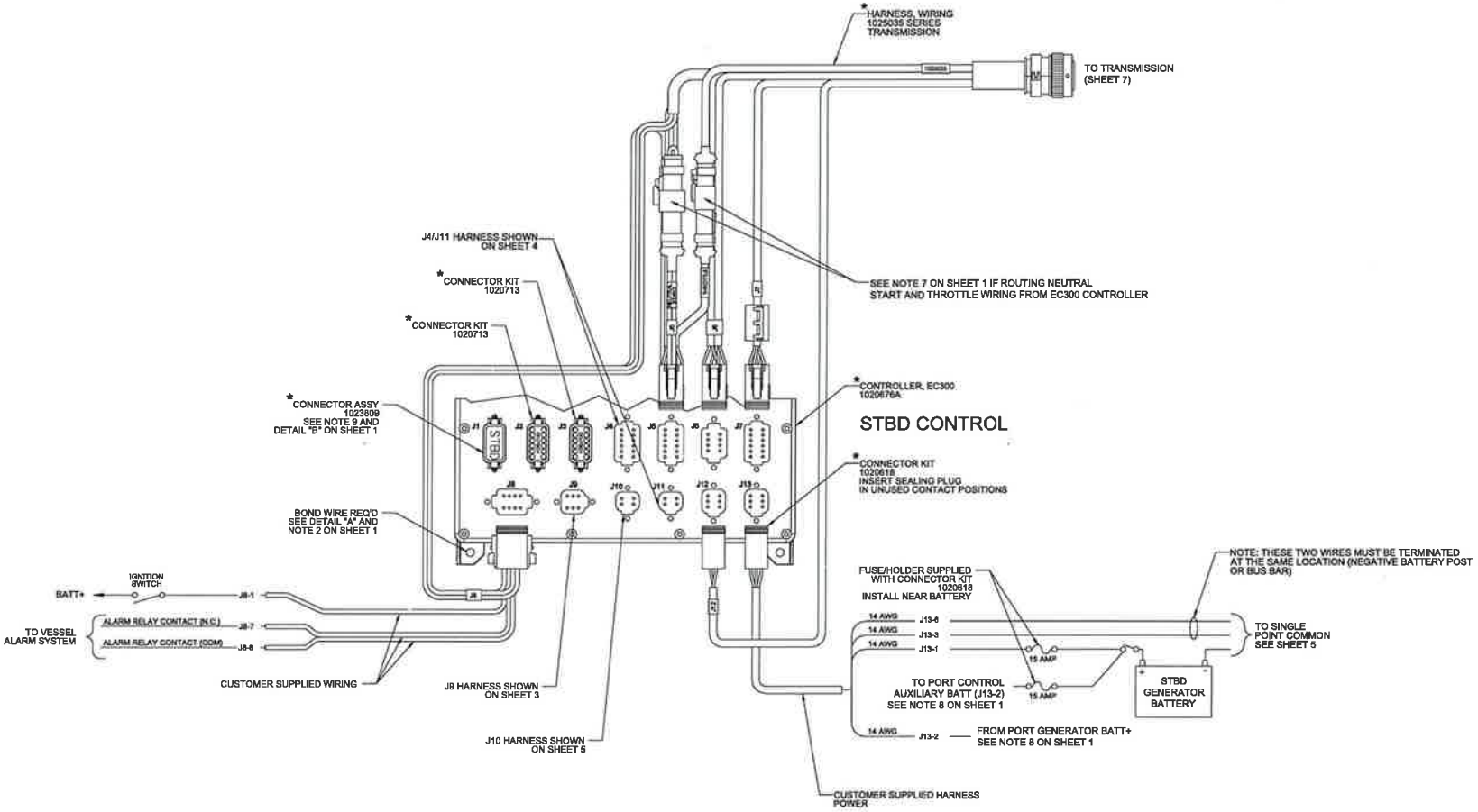
				1	NDWF-011319 01/16/2020
				REV	ENGINEERING NO. DATE
					TWIN DISC RACINE, WI 53403 - USA
	METRIC		SYSTEM, CONTROL EC300	DRAWN BY PUM	1028543AV
				CHECKED BY MRC	
				APPROVED BY RW	DWG SIZE A1 SHEET 4 OF 8 REV 1

F E D C B A



METRIC		SYSTEM, CONTROL EC300	
		DATE: 01/06/2020	TWIN DISC RACINE, WI 53403 - USA
		BOAT: NONE	
		DRAWN BY: PUM	1028543AV
		CHECKED BY: WHC	
		APPROVED BY: RW	SIZE: A1 SHEET: 5 OF 8 REV: 1

1 MDWF-011319 01/16/2020



REV	CHANGE NO	DATE
1	NDWF-011319	01/16/2020

METRIC

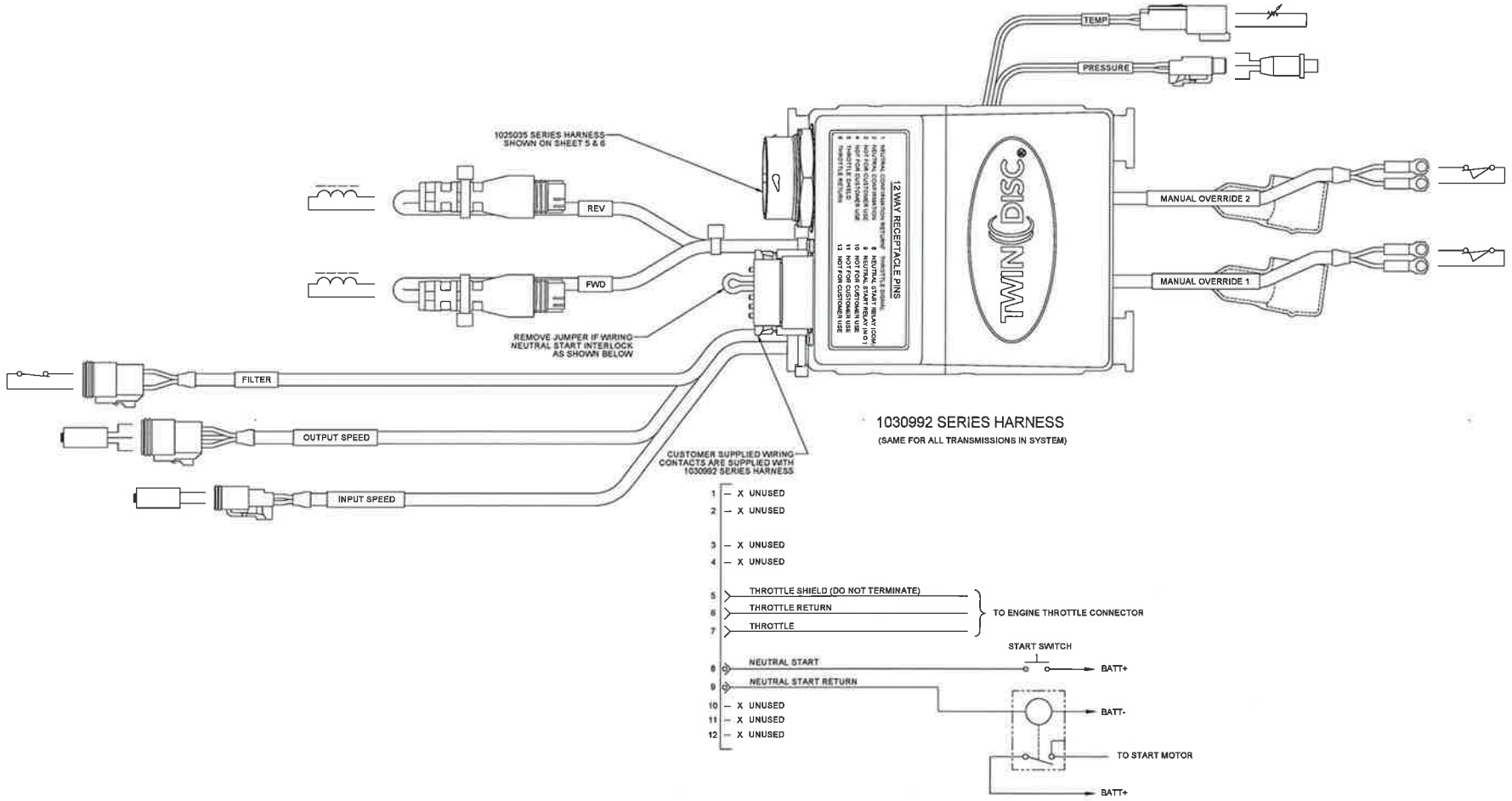
DATE: 01/08/2020
SCALE: NONE
DRAWN BY: PUM
CHECKED BY: WHO
APPROVED BY: RW

DESCRIPTION: SYSTEM, CONTROL EC300

TWIN DISC
RACINE, WI 53405 - USA

1028543AV

SIZE: A1 | SHEET: 6 OF 8 | REV: 1



NOTE:
EXCEPT FOR THROTTLE AND NEUTRAL START CIRCUIT, THIS SHEET IS FOR REFERENCE ONLY.
TRANSMISSION HARNESS AND SENSORS ARE SUPPLIED AS PART OF THE TRANSMISSION.

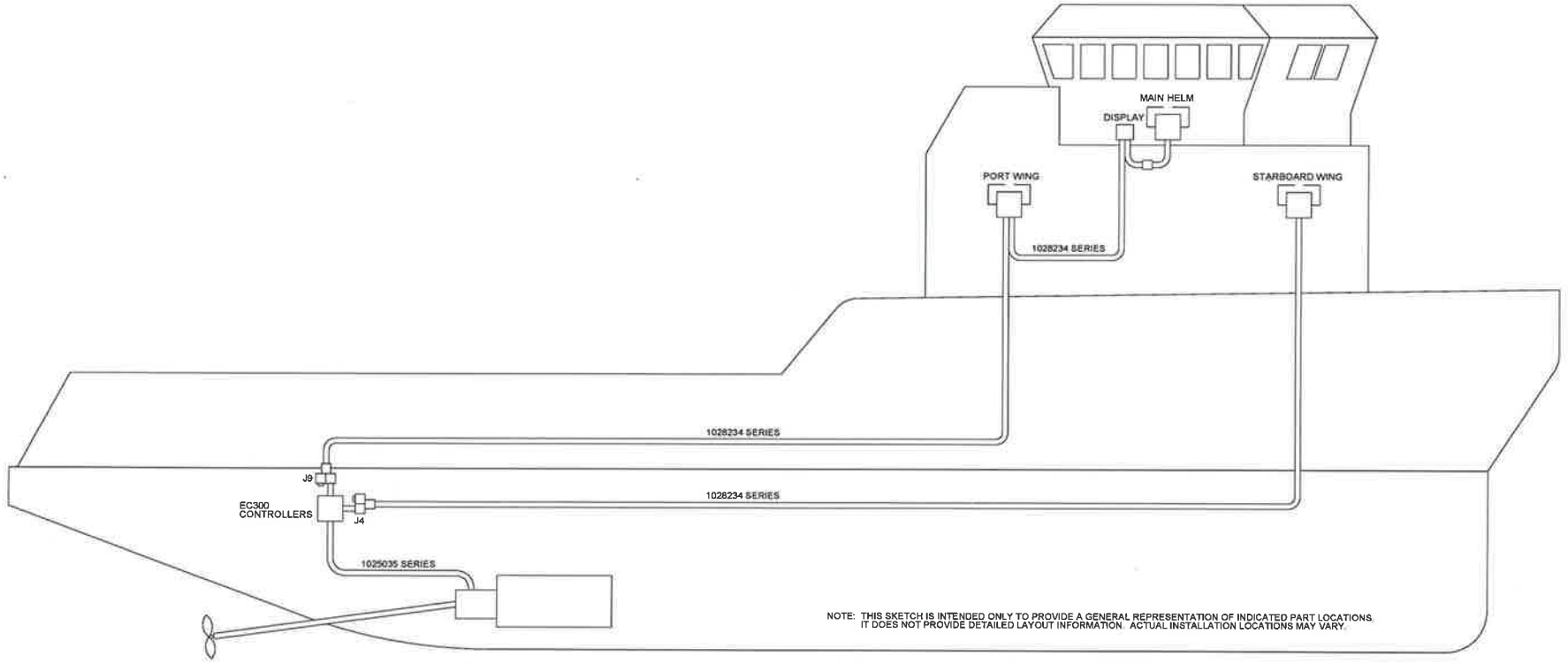
METRIC	THIRD ANGLE PROJECTION	SYSTEM, CONTROL EC300	1028543AV
		DATE 01/08/2020	SCALE NONE
		DRAWN BY PJM	
		CHECKED BY VARC	
		APPROVED BY RW	SIZE A1 SHEET 7 OF 8 REV 1

1 NDWF-011319 01/16/2020
REV CHANGE NO DATE

TWIN DISC RACINE, WI 53403 - USA

PULL LIST			
HARNESS P/N	LOCATION	CABLE P/N	KIT P/N
1028234 SERIES	PORT EC300 (J4, J11) TO CONTROL STATION 3 PORT LEVER	1028100 SERIES	46720
1028234 SERIES	STARBOARD EC300 (J4, J11) TO CONTROL STATION 3 STARBOARD LEVER	1028100 SERIES	46720
1025035 SERIES	PORT EC300 (J5, J6, J7, J8, J12) TO PORT TRANSMISSION	N/A	N/A
1025035 SERIES	STARBOARD EC300 (J5, J6 J7, J8, J12) TO STARBOARD TRANSMISSION	N/A	N/A
N/A	PORT EC300 (J8) TO IGNITION SWITCH AND ALARM (CUSTOMER SUPPLIED)	N/A	N/A
N/A	STARBOARD EC300 (J8) TO IGNITION SWITCH AND ALARM (CUSTOMER SUPPLIED)	N/A	N/A
1028234 SERIES	PORT EC300 (J9) TO CONTROL STATION 2 PORT LEVER	1028100 SERIES	46720
1028234 SERIES	CONTROL STATION 2 PORT LEVER TO CONTROL STATION 1 PORT LEVER AND DISPLAY	1028100 SERIES	46720
1028234 SERIES	STARBOARD EC300 (J9) TO CONTROL STATION 2 STARBOARD LEVER	1028100 SERIES	46720
1028234 SERIES	CONTROL STATION 2 STARBOARD LEVER TO CONTROL STATION 1 STARBOARD LEVER AND DISPLAY	1028100 SERIES	46720
1020615 SERIES	PORT EC300 (J10) TO STARBOARD EC300 (J10)	N/A	N/A
N/A	PORT EC300 (J13) TO PORT BATTERIES (CUSTOMER SUPPLIED)	N/A	1020618
N/A	STARBOARD EC300 (J13) TO STARBOARD BATTERIES (CUSTOMER SUPPLIED)	N/A	1020618

PORT AND STARBOARD HARNESSES TO BE ROUTED IN SEPARATE WIRE WAYS TO MAXIMIZE DAMAGE TOLERANCE



NOTE: THIS SKETCH IS INTENDED ONLY TO PROVIDE A GENERAL REPRESENTATION OF INDICATED PART LOCATIONS. IT DOES NOT PROVIDE DETAILED LAYOUT INFORMATION. ACTUAL INSTALLATION LOCATIONS MAY VARY.

METRIC	THIRD ANGLE PROJECTION	DESCRIPTION: SYSTEM, CONTROL EC300	DATE: 01/08/2020
			DRAWN BY: RW
			APPROVED BY: RW

1 NDWF-011319 01/16/2020 (REV | DESCRIPTION | DATE)

TWIN DISC RACINE, WI 53403 - USA

1028543AV

SIZE A1 SHEET 8 OF 8 REV 1

F E D C B A

1-SCOPE:	The purpose of this document is to outline the QFA for a **Twin Engine Three Digital station** EC300 Propulsion Control System on "Fail to Neutral" transmissions, for use with associated DVTP to verfiy the system responds as designed to fault conditions outlined in 46CFR for vessels classed under subchapter K and H.
2-Cautions:	**Caution!** Unexpected vessel movement may occur if the proplusion package is not installed properly. Take proper precautions before and during the DVTP tests. A general understanding of the EC300 Propulsion Control System is required for processing these tests. The person(s) performing these tests should be familiar with the associated installation and operational specifications listed in section 3 below.
	The DVTP procedure should ONLY be processed after the EC300 Propulsion Control System has been fully tested and checked for operational performance particular to the vessel configuration.

3-Reference Documents	1025567 Installation Manual 1024221 Operation Manual 1025568 Configuration and Troubleshooting Manual	**APPLICATION DRAWING: 1028543AV**

4-Contents:	DISCRIPTION: Devices Connected to 1020676A EC300 Control Box	SHEET
	J9-J1939 CAN BUS-DIGITAL STATION 1-MAIN HELM, STATION 2-PORT WING	2
	J4-J1939 CAN BUS-DIGITAL STATION 3-STARBOARD WING	2
	J5-ENGINE INTERFACE AND MONITORING	3
	J6-TRANSMISSION MONITORING	4
	J7-TRANSMISSION INTERFACE	5
	J8-IGNITION/ALARM	6
	J10-RS485 INTER-CONTROLLER COMMUNICATIONS	7
	J13-PRIMARY AND SECONDARY POWER	8

Revision :0	Released	1-7-2020RDL
Revision 1	Clarify J9/J4	2-19-2020DJR

SPIRIT OF NORFOLK
O.N.982944

APPLICATION:_____

TEST DATE:_____

OPERATING CONDITIONS: FAILURE MODES AND FAULT INDICATION ASSUMES SYSTEM IS POWERED UP, A STATION IS SELECTED AND ACTIVE WHEN THE DVTP IS PROCESSED; SEE DVTP SETUP AND TEST INSTRUCTIONS FOR SPECIFIC DETAILS

J9-J1939 CAN BUS FOR DIGITAL CONTROL HEAD STATIONS: STATION 1-MAIN HELM, STATION 2-PORT WING			
FUNCTIONAL DESCRIPTION	FAILURE MODE	INDICATION OF FAULT	ALTERNATIVE OPERATION
J9 provides the primary J1939 CAN bus for digital command messages to/from digital display and control head stations. DVTP Test done at individual station termination points (ref 1032169) to simulate a lost connection.	Disconnected side of control head will no longer function, engine returns to idle/neutral; the other side and other stations will remain operational	Alarm output triggered; Active Station lights will go out on the side disconnected. Active station will indiate a 321 or 322 fault code, and display indicates "Station X Missing"	Change to other Station

J4-J1939 CAN BUS FOR DIGITAL CONTROL HEAD STATIONS: STATION 3-STARBOARD WING			
FUNCTIONAL DESCRIPTION	FAILURE MODE	INDICATION OF FAULT	ALTERNATIVE OPERATION
J4 provides a secondary J1939 CAN bus for digital command messages to/from digital display and control head stations. DVTP Test done at individual station termination points (ref 1032169) to simulate a lost connection.	Disconnected side of control head will no longer function, engine returns to idle/neutral; the other side and other stations will remain operational	Alarm output triggered; Active Station lights will go out on the side disconnected. Active station will indiate a 323 or 341 fault code, and display indicates "Station X Missing"	Change to other Station

OPERATING CONDITIONS: FAILURE MODES AND FAULT INDICATION ASSUMES SYSTEM IS POWERED UP, A STATION IS SELECTED AND ACTIVE WHEN THE DVTP IS PROCESSED; SEE DVTP SETUP AND TEST INSTRUCTIONS FOR SPECIFIC DETAILS

J5-ENGINE INTERFACE AND MONITORING			
FUNCTIONAL DESCRIPTION	FAILURE MODE	INDICATION OF FAULT	ALTERNATIVE OPERATION
J5 Provides analog Throttle Demand signal to engine ECM, as well as Neutral Start Interlock; engine speed sensor signal comes in through J5. DVTP tests are processed by removing J5 from the 1020676A Control Box, and connection at Speed Sensor	Disconnected J5 results in Throttle Demand cannot be commanded and engine cannot be cranked; engine goes to idle.	Alarm output triggered, Engine system indicates Throttle Position Sensor fault, and holds at an idle level. Active station will indicate a 222 fault code. Display will indicate "Trans Input Speed Sensor Open Circuit/Throttle Circuit Voltage Low"	Operate Engine via Local Operating Panel
	Disconnected speed sensor inhibits clutch slip and sync modes	Alarm output triggered. Active station indicates 222 fault code and display indicates "Trans Input Speed Sensor Open Circuit"	Operate in Cruise Mode

OPERATING CONDITIONS: FAILURE MODES AND FAULT INDICATION ASSUMES SYSTEM IS POWERED UP, A STATION IS SELECTED AND ACTIVE WHEN THE DVTP IS PROCESSED; SEE DVTP SETUP AND TEST INSTRUCTIONS FOR SPECIFIC DETAILS

J6-TRANSMISSION MONITORING			
FUNCTIONAL DESCRIPTION	FAILURE MODE	INDICATION OF FAULT	ALTERNATIVE OPERATION
J6 connects to transmission Oil Temp sensor. DVTP tests are processed by disconnecting the individual sensor which connect to J6 of the 1020676A Control Box.	Loss of Oil Temp sensor does not affect operation; loss of data on display.	Alarm output triggered. Active station will indicate 233 fault code and display indicates "TRAN SYS FAULT OIL TEMP OPEN"	None required
	Loss of shaft speed sensor does not affect operation; loss of data on display	Alarm output triggered. Active station will indicate 224 fault code and display indicates "TRAN SYS FAULT PROP SPEED OPEN"	None required

OPERATING CONDITIONS: FAILURE MODES AND FAULT INDICATION ASSUMES SYSTEM IS POWERED UP, A STATION IS SELECTED AND ACTIVE WHEN THE DVTP IS PROCESSED; SEE DVTP SETUP AND TEST INSTRUCTIONS FOR SPECIFIC DETAILS

J7-TRANSMISSION INTERFACE			
FUNCTIONAL DESCRIPTION	FAILURE MODE	INDICATION OF FAULT	ALTERNATIVE OPERATION
J7 Provides analog Ahead and Astern signals to transmission solenoids. DVTP tests are processed by removing J7 from the 1020676A Control Box while commanding Ahead/Astern.	Transmission engagement cannot be commanded and goes to Neutral. Affected side goes to "Controller Neutral", inhibiting signals to transmission Ahead and Astern solenoids.	Alarm output triggered; Transmission goes to Neutral. Active station will indicate a 241 (or 242) fault code. Display will indicate "TRAN SYS FAULT" "CONTROLR NEUTRAL" "FORWARD CIRCUIT" (REVERSE CIRCUIT)	Operate Transmission via local MANUAL OVERRIDE valve

OPERATING CONDITIONS: FAILURE MODES AND FAULT INDICATION ASSUMES SYSTEM IS POWERED UP, A STATION IS SELECTED AND ACTIVE WHEN THE DVTP IS PROCESSED; SEE DVTP SETUP AND TEST INSTRUCTIONS FOR SPECIFIC DETAILS

J8-IGNITION/ALARM			
FUNCTIONAL DESCRIPTION	FAILURE MODE	INDICATION OF FAULT	ALTERNATIVE OPERATION
J8 connects to an ignition or other power switch to turn the control box on; J8 also provides the alarm output to ship board monitoring system. DVTP test is processed by disconnecting J8 from the 1020676A Control Box	Disconnected side of all control heads will no longer function; engine returns to Idle/Neutral. The other side will remain operational.	Alarm output triggered; active station lights will go out. Loss of "ignition" is a normal power down so no fault codes.	Operate one side only, or operate transmission via local Manual Override valve and Engine via local operating panel.

OPERATING CONDITIONS: FAILURE MODES AND FAULT INDICATION ASSUMES SYSTEM IS POWERED UP, A STATION IS SELECTED AND ACTIVE WHEN THE DVTP IS PROCESSED; SEE DVTP SETUP AND TEST INSTRUCTIONS FOR SPECIFIC DETAILS

J10-RS485 INTER-CONTROLLER COMMUNICATIONS			
FUNCTIONAL DESCRIPTION	FAILURE MODE	INDICATION OF FAULT	ALTERNATIVE OPERATION
J10 Provides an RS485 digital interface between port and stbd 1020676A Control Boxes for speed messages during Sync Mode. DVTP Test is processed by disconnecting J10 at Port Control Box	Sync Mode can no longer synchronize Port and Stbd speeds	Engine/Prop speeds no longer sync; display indicates "Inhibit Active RS485 Fault" when requesting Sync Mode	Operate in Cruise Mode

OPERATING CONDITIONS: FAILURE MODES AND FAULT INDICATION ASSUMES SYSTEM IS POWERED UP, A STATION IS SELECTED AND ACTIVE WHEN THE DVTP IS PROCESSED; SEE DVTP SETUP AND TEST INSTRUCTIONS FOR SPECIFIC DETAILS

J13- PRIMARY AND SECONDARY POWER SUPPLY INPUTS			
FUNCTIONAL DESCRIPTION	FAILURE MODE	INDICATION OF FAULT	ALTERNATIVE OPERATION
Primary Battery power for the control box and its peripheral devices; DVTP test done at power distribution/breaker panel and J13 removal	None. If complete loss of power, engine will return to an idle speed and transmission to neutral	Alarm output triggered and 532 Fault Code. Lights go out at active station if complete loss of power	If both primary and secondary power is lost, affected transmission can be operated via local MANUAL OVERRIDE valve, and Engine via Local Operating Panel
Secondary Battery power for the control box and its peripheral devices; DVTP test done at power distribution/breaker panel and J13 removal	None. If complete loss of power, engine will return to an idle speed and transmission to neutral	Alarm output triggered and 542 Fault Code. Lights go out at active station if complete loss of power	

1-SCOPE:	The purpose of this document is to outline the procedure for testing a **twin-screw Three Digital station** EC300 Propulsion Control System on "Fail to Neutral" transmissions, to verfiy the system responds as designed (per associated QFA) to fault conditions outlined in 46CFR Subchapter F for vessels classed under subchapter H/K.
2-Cautions:	**Caution!** Unexpected vessel movement may occur if the proplusion package is not installed properly. Take proper precautions before and during the following tests. A general understanding of the EC300 Propulsion Control System is required for processing these tests. The person(s) performing these tests should be familiar with the associated installation and operational specifications listed in section 3 below.
	This procedure should ONLY be processed after the EC300 Propulsion Control System has been fully tested and checked for operational performance particular to the vessel configuration.

3-Reference Documents	1025567 Installation Manual 1024221 Operation Manual 1025568 Configuration and Troubleshooting Manual	**APPLICATION DRAWING: 1028543AV**

4-Contents:	DISCRIPTION	SHEET
	TEST 1 PRIMARY AND SECONDARY POWER	2
	TEST 2 LOSS OF STATION 1-MAIN HELM-(J9)	3
	TEST 3 LOSS OF STATION 2-PORT WING-(J9)	4
	TEST 4 LOSS OF STATION 3-STARBOARD WING-(J4)	5
	TEST 5 LOSS OF ENGINE CONNECTION-J5	6,7
	TEST 6 LOSS OF TRANSMISSION SENSOR CONNECTION J6	8,9
	TEST 7 LOSS OF TRANSMISSION CONNECTION-J7	10,11
	TEST 8 LOSS OF IGNITION/ALARM-J8	12
	TEST 9 LOSS OF COMMUNICATIONS BETWEEN PORT AND STBD CONTROL BOXES-J10	13
	TEST 10 LOSS OF J4 J1939 CAN BUS POWER (STATION 3)-J11	14
	TEST 11 LOSS OF TRANSMISSION OIL FILTER SENSOR-J12	15
	TEST 12 LOSS OF BOX LOSS OF POWER-J13	16

Revision	Released	1-7-2020RDL
Revision 1	Clarified J9/J4 tests 2-4	2-19-2020DJR

APPLICATION: _____

VESSEL NAME: SPIRIT OF NORFOLK

VESSEL NUMBER: O.N.982944

TEST DATE: _____

TEST 1 PRIMARY AND SECONDARY POWER

PURPOSE: Confirmation of two sources of power for each EC300 Propulsion Control

SETUP: Ensure power is on to the EC300 Control Boxes; activate a PRIMARY HELM

PRECAUTIONS: If both Primary and Secondary power sources are NOT properly supplying power to the EC300 Control Box, loss of control may occur.

STEP	COMPONENT(s)	ACTION	RESULT	FAULT INDICATION	ALARM PANEL	VERIFIED
1	PORT Control Box Ship supply breaker panel	Shut off Primary Breaker (EC300 J13-1)	No change to Control Station Operation	Display indicates Main Power Low: 532 Code	Ship Alarm	
2		Turn On Primary Breaker & cycle power to J8-1	No change to Control Station Operation	none		
3	PORT Control Box Ship supply breaker panel	Shut off Secondary Breaker (EC300 J13-2)	No change to Control Station Operation	Display indicates Auxiliary Power Low: 542 Code	Ship Alarm	
4		Turn On Secondary Breaker & cycle power to J8-1	No change to Control Station Operation	none		
5	STBD Control Box Ship supply breaker panel	Shut off Primary Breaker (EC300 J13-1)	No change to Control Station Operation	Display indicates Main Power Low: 532 Code	Ship Alarm	
6		Turn On Primary Breaker & cycle power to J8-1	No change to Control Station Operation	none		
7	STBD Control Box Ship supply breaker panel	Shut off Secondary Breaker (EC300 J13-2)	No change to Control Station Operation	Display indicates Auxiliary Power Low: 542 Code	Ship Alarm	
8		Turn On Secondary Breaker & cycle power to J8-1	No change to Control Station Operation	none		

TEST 2 LOSS OF STATION 1-MAIN HELM-(J9)

PURPOSE: Confirm that loss of one side of Control Station doesn't result in increased shaft speed, or affect other side

SETUP: Activate Control Station to be tested

PRECAUTIONS: If testing while underway, loss of control will occur on the side of the Control Station that is disconnected

STEP	COMPONENT(s)	ACTION	RESULT	FAULT INDICATION	EC300 ALARM	VERIFIED
1	Station 1 PORT Harness (1032169 at Control Head	Disconnect "To Head" from Control Head connector (J9)	PORT side of station will no longer operate. Clutch goes to Neut/Idle	PORT lights will go out.	YES	
			STBD side of active station will remain operational	Display indicates "TRAN SYS FAULT STATION 1 MISSING"		
2		Reconnect harness to Control Head connector	PORT side will return operational	PORT Light will flash 321	Head Alarm Beeps	
3	Ignition/Breaker	Cycle power to J8-1	Fault indication is removed	none		
4	Station 1 STBD Harness (1032169 at Control Head	Disconnect "To Head" from Control Head connector (J9)	STBD side of station will no longer operate. Clutch goes to Neut/Idle	STBD lights will go out.	YES	
			PORT side of active station will remain operational	Display indicates "TRAN SYS FAULT STATION 1 MISSING"		
5		Reconnect harness to Control Head connector	STBD side will return operational	STBD Light will flash 321	Head Alarm Beeps	
6	Ignition/Breaker	Cycle power to J8-1	Fault indication is removed	none		

TEST 3 LOSS OF STATION 2-PORT WING-(J9)

PURPOSE: Confirm that loss of one side of Control Station doesn't result in increased shaft speed, or affect other side

SETUP: Activate Control Station to be tested

PRECAUTIONS: If testing while underway, loss of control will occur on the side of the Control Station that is disconnected

STEP	COMPONENT(s)	ACTION	RESULT	FAULT INDICATION	EC300 ALARM	VERIFIED
1	Station 2 PORT Harness (1032169 at Control Head	Disconnect "To Head" from Control Head connector (J9)	PORT side of station will no longer operate. Clutch goes to Neut/Idle	PORT lights will go out.	YES	
			STBD side of active station will remain operational	Display indicates "TRAN SYS FAULT STATION 2 MISSING"		
2		Reconnect harness to Control Head connector	PORT side will return operational	PORT Light will flash 322	Head Alarm Beeps	
3	Ignition/Breaker	Cycle power to J8-1	Fault indication is removed	none		
4	Station 2 STBD Harness (1032169 at Control Head	Disconnect "To Head" from Control Head connector (J9)	STBD side of station will no longer operate. Clutch goes to Neut/Idle	STBD lights will go out.	YES	
			PORT side of active station will remain operational	Display indicates "TRAN SYS FAULT STATION 2 MISSING"		
5		Reconnect harness to Control Head connector	STBD side will return operational	STBD Light will flash 322	Head Alarm Beeps	
6	Ignition/Breaker	Cycle power to J8-1	Fault indication is removed	none		

TEST 4 LOSS OF STATION 3-STARBOARD WING-(J4)

PURPOSE: Confirm that loss of one side of Control Station doesn't result in increased shaft speed, or affect other side

SETUP: Activate Control Station to be tested

PRECAUTIONS: If testing while underway, loss of control will occur on the side of the Control Station that is disconnected

STEP	COMPONENT(s)	ACTION	RESULT	FAULT INDICATION	EC300 ALARM	VERIFIED
1	Station 3 PORT Harness (1032169 at Control Head	Disconnect "To Head" from Control Head connector (J4)	PORT side of station will no longer operate. Clutch goes to Neut/Idle	PORT lights will go out.	YES	
			STBD side of active station will remain operational	Display indicates "TRAN SYS FAULT STATION 3 MISSING"		
2		Reconnect harness to Control Head connector	PORT side will return operational	PORT Light will flash 323	Head Alarm Beeps	
3	Ignition/Breaker	Cycle power to J8-1	Fault indication is removed	none		
4	Station 3 STBD Harness (1032169 at Control Head	Disconnect "To Head" from Control Head connector (J4)	STBD side of station will no longer operate. Clutch goes to Neut/Idle	STBD lights will go out.	YES	
			PORT side of active station will remain operational	Display indicates "TRAN SYS FAULT STATION 3 MISSING"		
5		Reconnect harness to Control Head connector	STBD side will return operational	STBD Light will flash 323	Head Alarm Beeps	
6	Ignition/Breaker	Cycle power to J8-1	Fault indication is removed	none		

TEST 5A LOSS OF ENGINE CONNECTION-J5

PURPOSE: Confirm that loss of Control Box to Engine doesn't result in increased shaft speed, or affect other side

SETUP: Ensure power is on to the EC300 Control Boxes; activate PRIMARY HELM Control Station and select Cruise Mode

PRECAUTIONS: If testing while underway, loss of Throttle control will occur on the side of the Control Station that is disconnected from Engine

STEP	COMPONENT(s)	ACTION	RESULT	FAULT INDICATION	EC300 ALARM	VERIFIED
1	PORT Control Box	Disconnect J5	PORT Engine will respond as a loss of valid throttle signal; clutch will respond to lever position	PORT light will flash 222. Display indicates "Trans Input Speed Sensor Open Circuit/Throttle Circuit Voltage Low"	YES	
			STBD side will remain operational	none		
2		Reconnect J5 and cycle power to J8-1	PORT side will return operational	none		
3	STBD Control Box	Disconnect J5	STBD Engine will respond as a loss of valid throttle signal; clutch will respond to lever position	STBD light will flash 222. Display indicates "Trans Input Speed Sensor Open Circuit/Throttle Circuit Voltage Low"	YES	
			PORT side will remain operational	none		
4		Reconnect J5 and cycle power to J8-1	STBD side will return operational	none		

TEST 5B LOSS OF ENGINE CONNECTION-J5-(ENGINE SPEED SENSOR ON ENGINE FLYWHEEL)

PURPOSE: Confirm that loss of Control Box to Engine doesn't result in increased shaft speed, or affect other side

SETUP: Ensure power is on to the EC300 Control Boxes; activate PRIMARY HELM Control Station and select Cruise Mode

PRECAUTIONS: If testing while underway, no operational changes expected except engine speeds cannot be synchronized

STEP	COMPONENT(s)	ACTION	RESULT	FAULT INDICATION	EC300 ALARM	VERIFIED
1	PORT Control Box	At Engine Disconnect Sensor connnected to J5-11/12 (REF: 1020706 harness)	PORT side will remain operational-Sync Mode Inhibited	PORT light will flash 222. Display indicates "Trans Input Speed Sensor Open Circuit"	YES	
			STBD side will remain operational	none		
2		Reconnect Sensor and cycle power J8-1	Removes Flash Code and Displayed Fault	none		
3	STBD Control Box	At Engine Disconnect Sensor connnected to J5-11/12 (REF: 1020706 harness)	STBD side will remain operational-Sync Mode inhibited	STBD light will flash 222. Display indicates "Trans Input Speed Sensor Open Circuit"	YES	
			PORT side will remain operational	none		
4		Reconnect Sensor and cycle power J8-1	Removes Flash Code and Displayed Fault	none		

TEST 6A LOSS OF TRANSMISSION SENSOR CONNECTION-J6 (OIL TEMPERATURE SENSOR ON TRANSMISSION)

PURPOSE: Confirm that loss of Control Box to Sensor doesn't result in increased shaft speed, or affect other side

SETUP: Ensure power is on to the EC300 Control Boxes; activate PRIMARY HELM Control Station and select Cruise Mode

PRECAUTIONS: If testing while underway, no operational changes expected

STEP	COMPONENT(s)	ACTION	RESULT	FAULT INDICATION	EC300 ALARM	VERIFIED
1	PORT Control Box	Disconnect J6	PORT side will remain operational	PORT light will flash 233. Display indicates "TRAN SYS FAULT OIL TEMP OPEN"	YES	
			STBD side will remain operational	none		
2		Reconnect Sensor and cycle power to J8-1	Removes Flash Code and Displayed Fault	none		
3	STBD Control Box	Disconnect J6	STBD side will remain operational	STBD light will flash 233. Display indicates "TRAN SYS OIL TEMP OPEN"	YES	
			PORT side will remain operational	none		
4		Reconnect Sensor and cycle power to J8-1	Removes Flash Code and Displayed Fault	none		

TEST 6B LOSS OF TRANSMISSION SENSOR CONNECTION-J6 (OUTPUT SPEED SENSOR ON TRANSMISSION)

PURPOSE: Confirm that loss of Control Box to Sensors doesn't result in increased shaft speed, or affect other side

SETUP: Ensure power is on to the EC300 Control Boxes; activate PRIMARY HELM Control Station and select Cruise Mode

PRECAUTIONS: If testing while underway, no operational changes expected

STEP	COMPONENT(s)	ACTION	RESULT	FAULT INDICATION	EC300 ALARM	VERIFIED
1	PORT Control Box	At Transmission Disconnect Sensor connnected to J6-6-8	PORT side will remain operational	PORT light will flash 224. Display indicates "TRAN SYS FAULT PROP SPD OPEN"	YES	
			STBD side will remain operational	none		
2		Reconnect Sensor and cycle power to J8-1	Removes Flash Code and Displayed Fault	none		
3	STBD Control Box	At Transmission Disconnect Sensor connnected to J6-6-8	STBD side will remain operational	STBD light will flash 224. Display indicates "TRAN SYS FAULT PROP SPD OPEN"	YES	
			PORT side will remain operational	none		
4		Reconnect Sensor and cycle power to J8-1	Removes Flash Code and Displayed Fault	none		

TEST 7A LOSS OF TRANSMISSION CONNECTION-J7-(AHEAD)

PURPOSE: Confirm that loss of Control Box to Transmission doesn't result in increased shaft speed, or affect other side

SETUP: Ensure power is on to the EC300 Control Boxes; activate PRIMARY HELM Control Station and select Cruise Mode and Clutch AHEAD

PRECAUTIONS: If testing while underway, loss of Clutch control will occur on the side of the Control Station that is disconnected from Trans.

STEP	COMPONENT(s)	ACTION	RESULT	FAULT INDICATION	EC300 ALARM	VERIFIED
1	PORT Control Box	Disconnect J7	PORT transmission will return to Neutral; engine will respond to lever position	PORT light will flash 241. Display indicates "TRAN SYS FAULT CONTROLR NEUTRAL FORWARD CIRCUIT"	YES	
			STBD side will remain operational	none		
2		Reconnect J7 and cycle power to J8-1	PORT side will return operational	none		
3	STBD Control Box	Disconnect J7	STBD transmission will return to Neutral; engine will respond to lever position	STBD light will flash 241. Display indicates "TRAN SYS FAULT CONTROLR NEUTRAL FORWARD CIRCUIT"	YES	
			PORT side will remain operational	none		
4		Reconnect J7 and cycle power to J8-1	STBD side will return operational	none		

TEST 7B LOSS OF TRANSMISSION CONNECTION-J7-(ASTERN)

PURPOSE: Confirm that loss of Control Box to Transmission doesn't result in increased shaft speed, or affect other side

SETUP: Ensure power is on to the EC300 Control Boxes; activate PRIMARY HELM Control Station and select Cruise Mode and Clutch ASTERN

PRECAUTIONS: If testing while underway, loss of Clutch control will occur on the side of the Control Station that is disconnected from Trans.

STEP	COMPONENT(s)	ACTION	RESULT	FAULT INDICATION	EC300 ALARM	VERIFIED
1	PORT Control Box	Disconnect J7	PORT transmission will return to Neutral; engine will respond to lever position	PORT light will flash 242. Display indicates "TRAN SYS FAULT CONTROLR NEUTRAL REVERSE CIRCUIT"	YES	
			STBD side will remain operational	none		
2		Reconnect J7 and cycle power to J8-1	PORT side will return operational	none		
3	STBD Control Box	Disconnect J7	STBD transmission will return to Neutral; engine will respond to lever position	STBD light will flash 242. Display indicates "TRAN SYS FAULT CONTROLR NEUTRAL REVERSE CIRCUIT"	YES	
			PORT side will remain operational	none		
4		Reconnect J7 and cycle power to J8-1	STBD side will return operational	none		

TEST 8 LOSS OF IGNITION/ALARM-J8

PURPOSE: Confirm that loss of one Propulsion Control Box doesn't result in increased shaft speed, or affect other side

SETUP: Ensure power is on to the EC300 Control Boxes; activate PRIMARY HELM Control Station

PRECAUTIONS: If testing while underway, loss of control will occur on the side of the Control Station that is disconnected from Power

STEP	COMPONENT(s)	ACTION	RESULT	FAULT INDICATION	ALARM PANEL	VERIFIED
1	PORT Control Box	Disconnect J8	PORT side of station will no longer operate. Clutch goes to Neut/Idle	PORT lights will go out and display will no longer operate	Ship Alarm	
			STBD side of active station will remain operational			
2		Reconnect J8	PORT side of station will return operational	none		
3	STBD Control Box	Disconnect J8	STBD side of station will no longer operate. Clutch goes to Neut/Idle	STBD lights will go out and display will no longer indicate STBD	Ship Alarm	
			PORT side of active station will remain operational	PORT side display will remain operational		
4		Reconnect J8	STBD side of station will return operational	none		

TEST 9 LOSS OF COMMUNICATIONS BETWEEN PORT AND STBD CONTROL BOXES-J10

PURPOSE: Confirm that loss of Box to Box communication doesn't result in increased shaft speed, or affect other side

SETUP: Ensure power is on to the EC300 Control Boxes; activate PRIMARY HELM Control Station and select Cruise Mode

PRECAUTIONS: Only operational result should be the loss of synchronizing engine speeds

STEP	COMPONENT(s)	ACTION	RESULT	FAULT INDICATION	ALARM	VERIFIED
1	PORT Control Box	Disconnect J10 (harness connecting port to stbd)	No change in operation	none		
2	Active Station	Select Cruise Sync Mode	Loss of Communications prevents engine sync	Display indicates "INHIBIT ACTIVE RS485 FAULT"		
3	PORT Control Box	Reconnect J10	Sync is no longer inhibited	none		

TEST 10 LOSS OF J4 J1939 CAN BUS POWER -J11

PURPOSE: Confirm that loss of one side of Control Station doesn't result in increased shaft speed, or affect other side

SETUP: Ensure power is on to the EC300 Control Boxes; activate PRIMARY HELM Control Station

PRECAUTIONS: If testing while underway, loss of control will occur on the side of the Control Station that J11 is disconnected

STEP	COMPONENT(s)	ACTION	RESULT	FAULT INDICATION	EC300 ALARM	VERIFIED
1	PORT Control Box	Disconnect J11	PORT side of station will no longer operate. Clutch goes to Neut/Idle	PORT lights will go out and display will no longer operate	YES	
			STBD side of active station will remain operational			
2		Reconnect J11	PORT side will return operational	PORT Light will flash 342	Head Alarm Beeps	
3	Ignition/Breaker	Cycle power to J8-1	Fault indication is removed	none		
4	STBD Control Box	Disconnect J11	STBD side of station will no longer operate. Clutch goes to Neut/Idle	STBD lights will go out and display will no longer indicate STBD	YES	
			PORT side of active station will remain operational			
5		Reconnect J11	STBD side will return operational	STBD Light will flash 342	Head Alarm Beeps	
6	Ignition/Breaker	Cycle power to J8-1	Fault indication is removed	none		

TEST 11 LOSS OF TRANSMISSION OIL FILTER SENSOR-J12

PURPOSE: Confirm that loss of Control Box to Sensor doesn't result in increased shaft speed, or affect other side

SETUP: Ensure power is on to the EC300 Control Boxes; activate PRIMARY HELM Control Station and select Cruise Mode

PRECAUTIONS: If testing while underway, no operational changes expected

STEP	COMPONENT(s)	ACTION	RESULT	FAULT INDICATION	EC300 ALARM	VERIFIED
1	PORT Control Box	Disconnect J12	PORT side will remain operational	PORT light will flash 421. Display indicates "Trans Oil Filter Bypass"	YES	
			STBD side will remain operational	none		
2		Reconnect J12 and cycle power to J8-1	Removes Flash Code and Displayed Fault	none		
3	STBD Control Box	Disconnect J12	STBD side will remain operational	STBD light will flash 421. Display indicates "Trans Oil Filter Bypass"	YES	
			PORT side will remain operational	none		
4		Reconnect J12 and cycle power to J8-1	Removes Flash Code and Displayed Fault	none		

TEST 12 CONTROL BOX LOSS OF POWER-J13

PURPOSE: Confirm that loss of one Propulsion Control Box doesn't result in increased shaft speed, or affect other side

SETUP: Ensure power is on to the EC300 Control Boxes; activate PRIMARY HELM Control Station

PRECAUTIONS: If testing while underway, loss of control will occur on the side of the Control Station that is disconnected from Power

STEP	COMPONENT(s)	ACTION	RESULT	FAULT INDICATION	ALARM PANEL	VERIFIED
1	PORT Control Box	Disconnect J13	PORT side of station will no longer operate. Clutch goes to Neut/Idle	PORT lights will go out and display will no longer operate	Ship Alarm	
			STBD side of active station will remain operational			
2		Reconnect J13 and cycle power to J8-1	PORT side of station will return operational	none		
3	STBD Control Box	Disconnect J13	STBD side of station will no longer operate. Clutch goes to Neut/Idle	STBD lights will go out and display will no longer indicate STBD	Ship Alarm	
			PORT side of active station will remain operational	PORT side display will remain operational		
4		Reconnect J13 and cycle power to J8-1	STBD side of station will return operational	none		