Virtual Tactical Bridge Embarked Synthetic Radio (VTBeSR) T-Junction Test Manual

Prepared for:
NAVSEA PEO IWS

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1 T-Junction Test Description

The test will consist of continuity testing of all wiring on the circuit card including relay contact connections, ground fault detection in case any circuits have been shorted to ground, and exercise of the individual relay armature circuits. A test box facilitates rapid testing of the T-Junction in a production environment as well for troubleshooting in a shipboard installation.

1.1 T-Junction Test Box

Appendix A contains a drawing to facilitate construction of the VTBeSR T-Junction Test Set and Cables.

The test box performs the following functions:
Test 1.) Normally Closed Relay Circuit Path Test (Test Buttons "Relays 1-4" and "Relays 5-8" are un-pressed) – This test confirms continuity of all connector pins, circuit board lands and relay contacts in the normally closed (NC) (all relays de-energized) circuit pathways on the T-Junction board. The test box supplies +5Volts to a daisy chain of all NC pathways into one continuous circuit. At the end of the circuit, a green LED indicates if continuity exists on the path. If the green light is NOT lit, there is a break in the normally closed circuits somewhere on the board.

Test 2.) Relay Bank 1-4 Test (Test Button Relays 1-4" pressed and Test Button "Relays 5-8" is un-pressed) – This test confirms the operation of relays 1 through 4 armatures. When button "Relays 1-4" is pressed, relays 1-4 will audibly "click", and the green test lamp will extinguish indicating that the normally closed (NC) relay contacts are open, and the first half of the normally closed daisy chained path also is open.

Test 3.) Relay Bank 5-8 Test (Test Button "Relays 1-4" un-pressed and "Relays 5-8" is pressed) – This test confirms the operation of relays 5 through 8 armatures. When button "Relays 5-8" is pressed, relays 5-8 will audibly "click", and the green test lamp will extinguish indicating that the normally closed (NC) relay contacts are open, and the second half of the normally closed daisy chained path also is open.

Test 4.) Normally Open Relay Circuit Path Test (Test Buttons "Relays 1-4" and "Relays 5-8" are both pressed) – This test confirms continuity of all connector pins, circuit board lands and relay contacts in the normally open (NO) (all relays energized) circuit pathways on the T-Junction board. The test box supplies +5 Volts to a daisy chain of all NO pathways into one continuous circuit. At the end of the circuit, a green LED indicates if continuity exists on the path. If the green light is NOT lit, there is a break in the normally open circuits somewhere on the board.

Test 5.) Ground Fault Test – If at any time the red or green lights are at a state other than hard OFF or ON, such as half state winking, or certainly if the fuse blows during a test, some kind of a short to ground has occurred and the board is defective. If the test box fuse is blown, replace it before using it further.

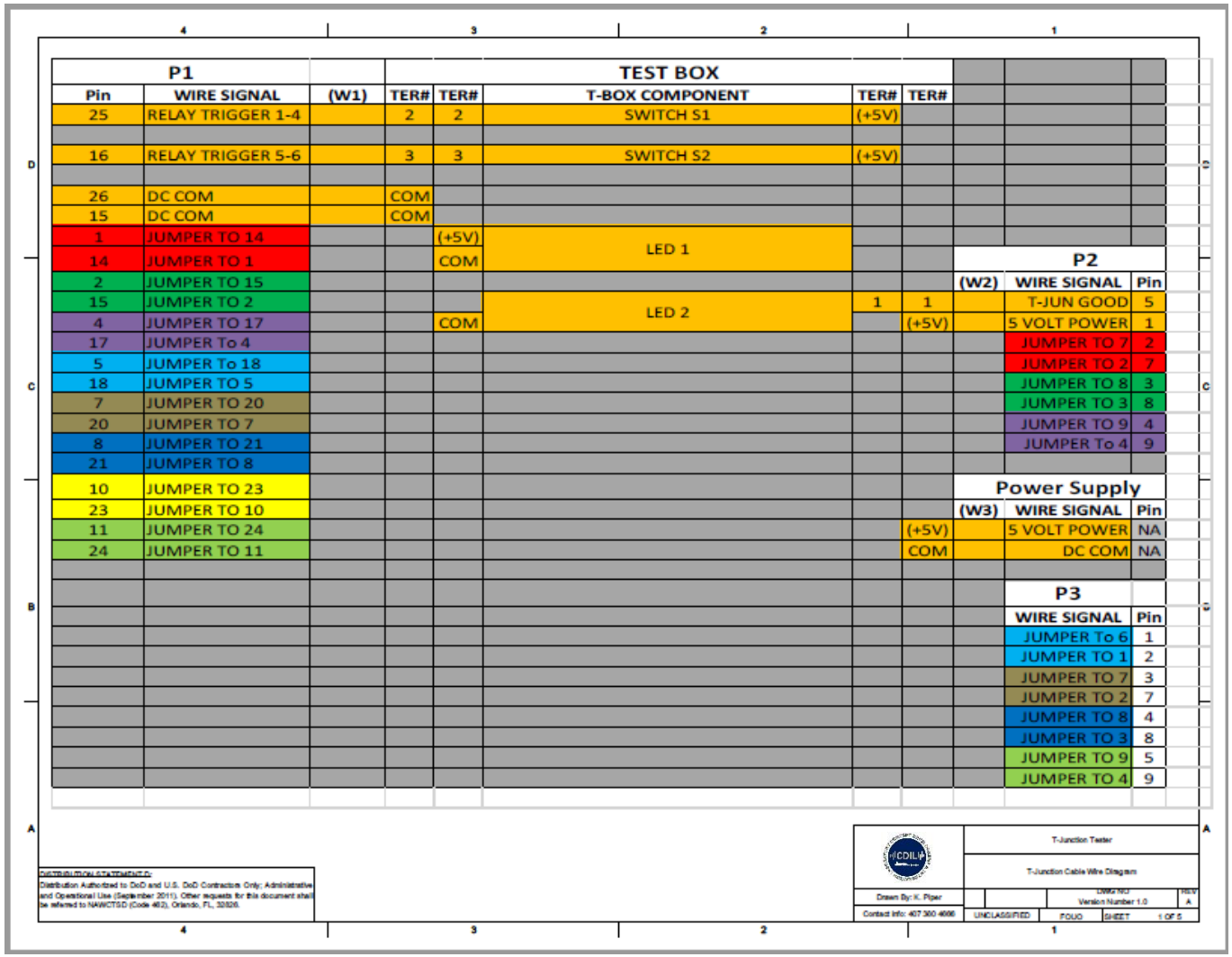
1.2 T-Junction Test Procedures

Perform the following steps to test a T-Junction Circuit Card:

Step #	Action	Expected Result	Pass/Fail
1	Connect T-Junction to Test Box Cable harness connectors P1, P2, and P3.	Test Setup	
2	Plug the Power Supply to 115VAC Wall Power. NOTE: Immediately cease testing and investigate if the fuse blows.	Test 1 and Test 5 (first part) – RED Power On Lamp Illuminated. GREEN T-Junction Good Lamp Illuminated. Fuse – Intact, no signs of winking of the red or green test lamps or shorting of any wiring.	
3	Press and hold the “Relays 1-4” Test Switch.	Test 2 – RED Power On Lamp Illuminated. GREEN T-Junction Good Lamp Extinguished. Relays 1 through 4 audibly click. You may be able to also feel the cases of the relays to confirm actuation of relays 1-4.	
4	Release the “Relays 1-4” Test Switch.	Test 2 – RED Power On Lamp Illuminated. GREEN T-Junction Good Lamp Illuminated. Relays 1 through 4 audibly click. You may be able to also feel the cases of the relays to confirm release of relays 1-4.	
5	Press and hold the “Relays 5-8” Test Switch.	Test 3 – RED Power On Lamp Illuminated. GREEN T-Junction Good Lamp Extinguished. Relays 5 through 8 audibly click. You may be able to also feel the cases of the relays to confirm actuation of relays 5-8.	

6	Release the “Relays 5-8” Test Switch.	Test 3 – RED Power On Lamp Illuminated. GREEN T-Junction Good Lamp Illuminated. Relays 5 through 8 audibly click. You may be able to also feel the cases of the relays to confirm release of relays 5-8.	
7	Press and hold the “Relays 1-4” and “Relays 5-8” Test Switches together.	Test 4 and Test 5 (second part) – RED Power On Lamp Illuminated. GREEN T-Junction Good Lamp Illuminated. Fuse – Intact, no signs of winking of the red or green test lamps or shorting of any wiring.	

2 Appendix A – VTBeSR T-Junction Test Set



P1			TEST BOX					P2		
Pin	WIRE SIGNAL	(W1)	TER#	TER#	T-BOX COMPONENT	TER#	TER#	(W2)	WIRE SIGNAL	Pin
25	RELAY TRIGGER 1-4		2	2	SWITCH S1	(+5V)				
16	RELAY TRIGGER 5-6		3	3	SWITCH S2	(+5V)				
26	DC COM		COM							
15	DC COM		COM							
1	JUMPER TO 14			(+5V)	LED 1					
14	JUMPER TO 1			COM						
2	JUMPER TO 15									
15	JUMPER TO 2				LED 2	1	1		T-JUN GOOD	5
4	JUMPER TO 17			COM			(+5V)		5 VOLT POWER	1
17	JUMPER To 4								JUMPER TO 7	2
5	JUMPER To 18								JUMPER TO 2	7
18	JUMPER TO 5								JUMPER TO 8	3
7	JUMPER TO 20								JUMPER TO 3	8
20	JUMPER TO 7								JUMPER TO 9	4
8	JUMPER TO 21								JUMPER To 4	9
21	JUMPER TO 8									
10	JUMPER TO 23							Power Supply		
23	JUMPER TO 10							(W3)	WIRE SIGNAL	Pin
11	JUMPER TO 24						(+5V)		5 VOLT POWER	NA
24	JUMPER TO 11						COM		DC COM	NA
								P3		
									WIRE SIGNAL	Pin
									JUMPER To 6	1
									JUMPER TO 1	2
									JUMPER TO 7	3
									JUMPER TO 2	7
									JUMPER TO 8	4
									JUMPER TO 3	8
									JUMPER TO 9	5
									JUMPER TO 4	9

Parts List				
Item	Qty	Part No.	Mfr.	Description
1	1	1757823-8	TE Conn	P1, CONN D-SUB HD PLUG 26POS CRIMP
1	1	8655MH1511LF	AMP/FCI	P1, CONN BACKSHELL 15POS 180DEG SHLD
2	1	A34454-ND	Digikey	P2, CONN D-SUB HD FEMALE RECEPTACLE 9 POS CRIMP
2	1	970-09NE-ND	Digikey	P2, CONN BACKSHELL 180DEG SHLD
3	1	A34455-ND	Digikey	P3, CONN D-SUB HD MALE PLUG 9 POS CRIMP
3	1	970-09NE-ND	Digikey	P3, CONN BACKSHELL 180DEG SHLD
4	1	PSM03A-050(ID)-R	Phihong USA	AC/DC External Wall Mount Adapter +5Volt Output
5.1	1	159XXTFLBK	Digikey	Box, ABS BLACK, 4.85"L x 3.28"W
5.2	1	L60D-R5-W	Digikey	LED Panel Indicator, RED, 5Volts
5.3	1	L60D-G5-W	Digikey	LED Panel Indicator, GREEN, 5Volts
5.4	2	PV5S64011	Digikey	Pushbutton Switch, SPST-NO
5.5	1	WM5765-ND	Digikey	Conn, Barrier Strip, 8 Circuit, Molex
6	A/R	9983 009100	Belden	Hook-up Strnd 22AWG White (or similar)
7	A/R	C2677A.18.01	Carol	W1, W2, W3 Cable, 2 Conductor, 22 AWG, BLK, SHLD

Note: These parts are for reference, other similar parts may be substituted at builder discretion.

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T-Junction Tester

T-Junction Cable Wire Diagram

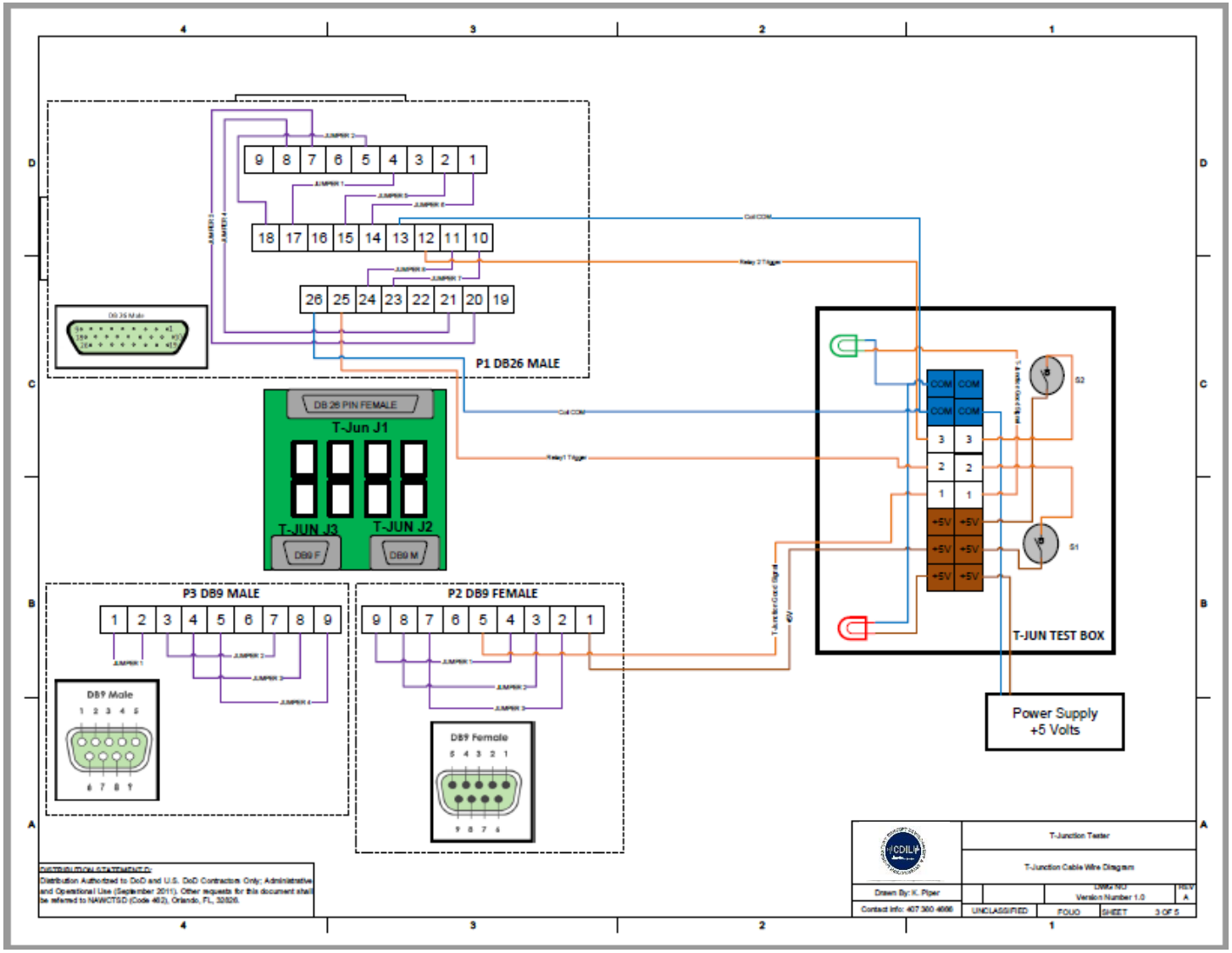
Drawn By: K. Piper

Contact info: 407 380 4006

Version Number 1.0

REV A

UNCLASSIFIED | FOUO | SHEET 2 OF 5


9 8 7 6 5 4 3 2 1
18 17 16 15 14 13 12 11 10
26 25 24 23 22 21 20 19
P1 DB26 MALE
DB 26 PIN FEMALE
T-Jun J1
T-JUN J3
T-JUN J2
DB9 F
DB9 M
P3 DB9 MALE
1 2 3 4 5 6 7 8 9
DB9 Male
P2 DB9 FEMALE
9 8 7 6 5 4 3 2 1
DB9 Female
COM COM
COM COM
3 3
2 2
1 1
+5V +5V
+5V +5V
+5V +5V
T-JUN TEST BOX
Power Supply
+5 Volts
T-Junction Tester
T-Junction Cable Wire Diagram
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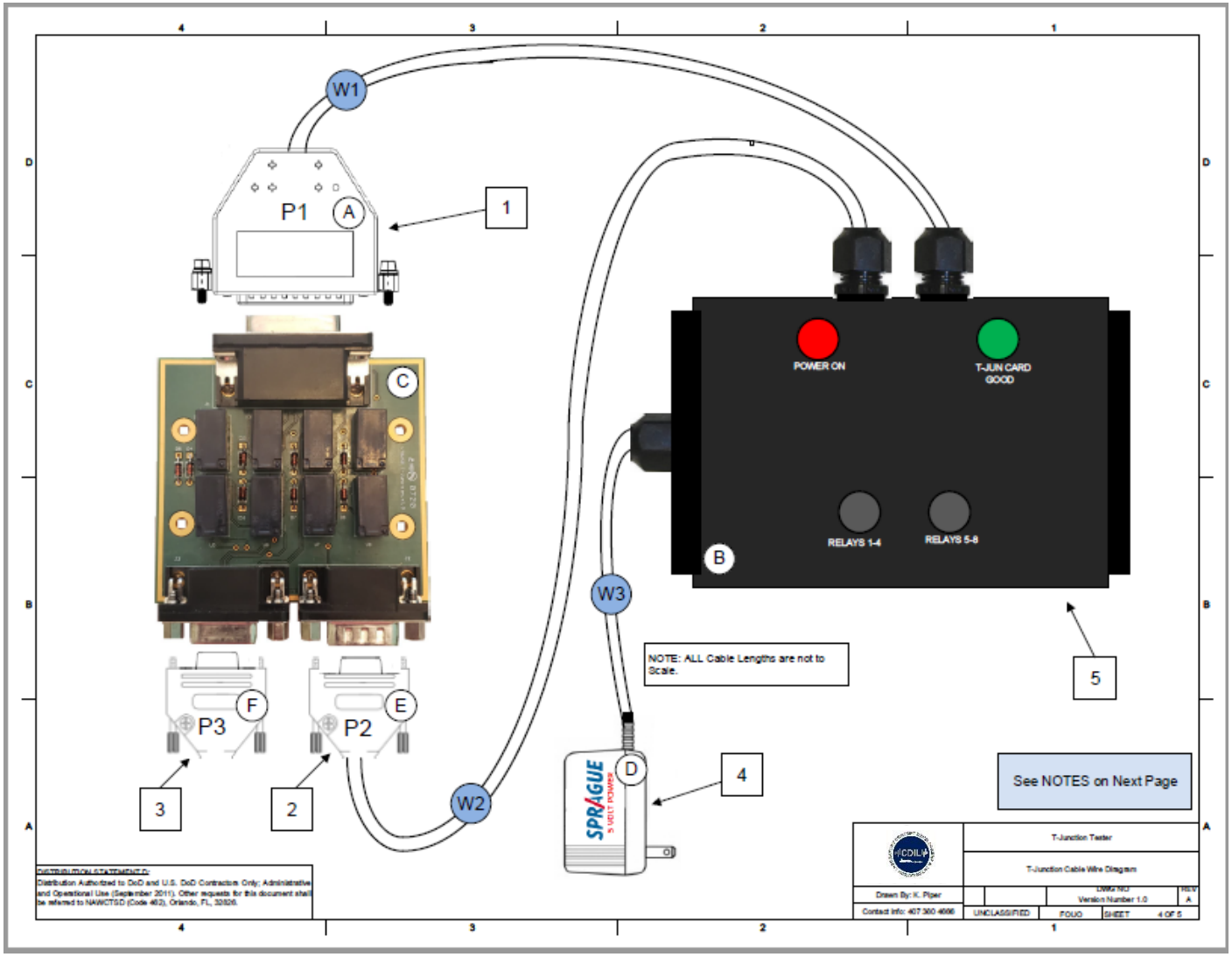
SHEET 3 OF 5


W1
P1
A
1
C
POWER ON
T-JUN CARD GOOD
RELAYS 1-4
RELAYS 5-8
B
W3
NOTE: ALL Cable Lengths are not to Scale.
5
F
P3
E
P2
3
2
W2
D
SPRAGUE
4
See NOTES on Next Page
T-Junction Tester
T-Junction Cable Wire Diagram
Drawn By: K. Piper
Contact Info: 407 380 4666
Version Number 1.0
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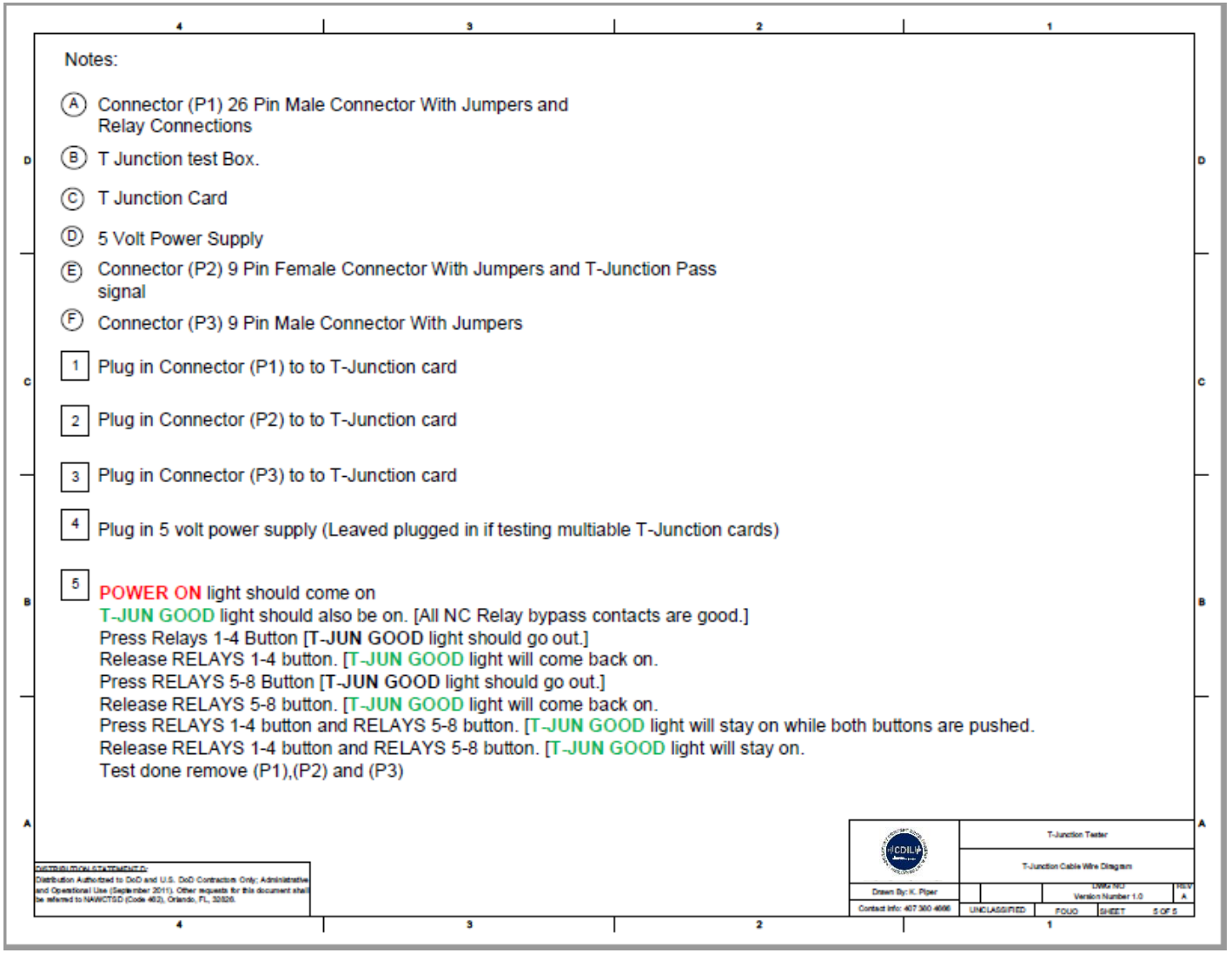
SHEET 4 OF 5



Notes:

(A) Connector (P1) 26 Pin Male Connector With Jumpers and Relay Connections

(B) T Junction test Box.

(C) T Junction Card

(D) 5 Volt Power Supply

(E) Connector (P2) 9 Pin Female Connector With Jumpers and T-Junction Pass signal

(F) Connector (P3) 9 Pin Male Connector With Jumpers

1 Plug in Connector (P1) to to T-Junction card

2 Plug in Connector (P2) to to T-Junction card

3 Plug in Connector (P3) to to T-Junction card

4 Plug in 5 volt power supply (Leaved plugged in if testing multiable T-Junction cards)

5 POWER ON light should come on
T-JUN GOOD light should also be on. [All NC Relay bypass contacts are good.]
Press Relays 1-4 Button [**T-JUN GOOD** light should go out.]
Release RELAYS 1-4 button. [T-JUN GOOD light will come back on.
Press RELAYS 5-8 Button [**T-JUN GOOD** light should go out.]
Release RELAYS 5-8 button. [T-JUN GOOD light will come back on.
Press RELAYS 1-4 button and RELAYS 5-8 button. [T-JUN GOOD light will stay on while both buttons are pushed.
Release RELAYS 1-4 button and RELAYS 5-8 button. [T-JUN GOOD light will stay on.
Test done remove (P1),(P2) and (P3)

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T-Junction Tester
T-Junction Cable Wire Diagram
Version Number 1.0
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Release Notes: This is a preliminary DRAFT release for shock testing planning purposes.