

g

GE Energy

Functional Testing Specification*Parts & Repair Services
Louisville, KY***LOU-GED DS200TCPS****Test Procedure for a TCPS card****DOCUMENT REVISION STATUS: Determined by the last entry in the "REV" and "DATE" column**

REV.	DESCRIPTION	SIGNATURE	REV. DATE
A	Initial Procedure – After Verification	D. Smith	3/12/2002
B	Added load resistors to outputs JC7 thru 16 (DS), Changed tolerance. On TP10 and 12 (DS), Changed polarity of lead on cap C9	D. Smith	11/13/2002
C	Added Jumper settings for older Revision Boards	D. Smith	4/15/2004
D	Adjusted tolerances in voltage chart. Numbered process steps. Revised grammar and formatting for consistency. Added specification for functional difference from the AEB revision level and all others. Revised references so as to clarify correlation between the listed test points within the procedure and the test fixture itself. Added references to clarify that the test points of the fixture DO NOT directly correlate with the test points on the card. (CE)	C. Edlin	12/06/2007
E	Section 6.1.2, Revision warning	C. Wade	6/9/2009
F	Transferred from old to new format and added step 6.2.28 (15 minute Burn-in)	C. Wade	6/28/2010
G	Removed references to testing older revision cards.	J. Hardin	8/12/2010
H	Added step 6.1.3, Special Note #2, Change out R36 & R37 if discolored or damaged.	J. Barton & C. Wade	10/1/2013
J	Added step 6.2.33, burn-in requirements for all TCPS cards in our local the Mark V System.	C. Wade	12/18/2013
K	Added section 6.3, detailing removal and installation instructions for TCPS cards in local Mark V System.	C. Wade	1/14/2014

L

© COPYRIGHT GENERAL ELECTRIC COMPANY

Hard copies are uncontrolled and are for reference only.

PROPRIETARY INFORMATION – THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION OF GENERAL ELECTRIC COMPANY AND MAY NOT BE USED OR DISCLOSED TO OTHERS, EXCEPT WITH THE WRITTEN PERMISSION OF GENERAL ELECTRIC COMPANY.

PREPARED BY D. Smith	REVIEWED BY C. Edlin	REVIEWED BY J. Hardin	QUALITY APPROVAL <i>Charlie Wade</i>
DATE 3/12/2002	DATE 12/06/2007	DATE 8/12/2010	DATE 6/28/2010

LOU-GED DS200TCPS REV. K	 GE Energy <i>Parts & Repair Services</i> <i>Louisville, KY</i>	Page 2 of 9
-------------------------------------	--	--------------------

<p>LOU-GED DS200TCPS REV. K</p>	<p>g</p> <p>GE Energy Parts & Repair Services Louisville, KY</p>	<p>Page 3 of 9</p>
--	--	---------------------------

1. SCOPE

1.1 This is a functional testing procedure for a TCPS power supply card.

2. STANDARDS OF QUALITY

2.1 Refer to the current revision of the IPC-A-610 standard for workmanship standards.

3. APPLICABLE DOCUMENTS

3.1 The following document(s) shall form part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue shall apply.

3.1.1 Check board's electronic folder for more information

4. ENGINEERING REQUIREMENTS

4.1 Equipment Cleaning

4.1.1 Equipment should be clean and free of debris prior to applying power unless performing an initial check. Refer to site specific SRA's for cleaning guidelines.

4.2 Equipment Inspection

4.2.1 Equipment should be visually inspected for any defects prior to applying power. This inspection should include the following as a minimum:

4.2.1.1 Wires - broken, cracked, or loosely connected

4.2.1.2 Terminal strips / connectors - broken or cracked

4.2.1.3 Components - visually damaged

4.2.1.4 Capacitors - bloated or leaking

4.2.1.5 Solder joints - damaged or cold

4.2.1.6 Circuit board - burned or de-laminated

4.2.1.7 Printed wire runs / Traces - burned or damaged

5. EQUIPMENT REQUIRED

5.1 The following equipment is required to perform the process requirements. Equipment may be substituted provided that all accuracy's and test ratios are equivalent or better.

Qty	Reference #	Description
1		Fluke 87 DMM (or Equivalent)
1	H033950	TCPS Test Fixture
1	H190117	Mark V System
1	H190115	HMI Computer for Mark V Turbine

6. TESTING PROCESS

6.1 Stand-Alone Tester operation process notes.

- 6.1.1 Unless otherwise specified, the following conditions apply throughout the test procedure.
- 6.1.2 **Special Note: Any cards that cannot be brought up to ARE revision should be scrapped or replaced.**
- 6.1.3 **Special Note #2: Many cards are coming in with R36 and R37 discolored or damaged, these are 6.81K ohm, 1%, ½ Watt, resistors. Changed them out if they are discolored or damaged. Part Number of the resistor is 68A7035P681E.**
- 6.1.4 References to the power switch pertain directly to the power switch of the test fixture itself.
- 6.1.5 Test point designations (TP*) of the test fixture do not directly correlate with the test point designations on the card itself.
- 6.1.6 Voltages are positive DC unless indicated with the minus symbol (-).
- 6.1.7 Any AC voltages are RMS (.707 x Peak)
- 6.1.8 Inputs are to be floating unless a signal is specifically applied.
- 6.1.9 Once an input is applied it should be left applied until specifically told to remove it.
- 6.1.10 Any pot setting should be adjusted as close to nominal as possible. Not just within tolerance.
 - 6.1.10.1 If anyone of Q6, Q7, Q10 and Q11 fails, you must change all four at the same time.

WARNING !!! THE HEAT SINKS ON THIS PRINTED CIRCUIT CARD ARE ELECTRICALLY AND THERMALLY HOT. EVERY PRECAUTION SHOULD BE TAKEN TO PREVENT CONTACT BETWEEN THE HEAT SINKS AND THE TEST OPERATOR OR ANY TEST EQUIPMENT BEING USED DURING THE TEST PROCEDURE.

Test Point Definition				
TP1	DCOM		TP13	N15BS
TP2	ICOMA		TP14	P125BS
TP3	BCOM		TP15	N125BS
TP4	P15A		TP16	P15B
TP5	N15A		TP17	N15B
TP6	P15S		TP18	0PSEN
TP7	N15S		TP19	P5
TP8	P24S		TP20	P15
TP9	N24S		TP21	N15
TP10	P15AS		TP22	P24
TP11	N15AS		TP23	N24
TP12	P15BS			

6.2 Stand-Alone Tester.

- 6.2.1 Verify that all LOAD/NO-LOAD switches are set to the NO-LOAD position.
- 6.2.2 Verify that the power switch (located on the top-right corner of the test fixture) is in the OFF position.
- 6.2.3 Connect the cables from the test fixture to the corresponding connectors of the card to be tested.
- 6.2.4 Connect DVM across cap C9, with the positive meter-lead (+) to the cap-lead closest to coil L1.
- 6.2.5 Turn the power switch to ON.
- 6.2.6 Verify that the voltage across C9 does not exceed 50V.
- 6.2.7 On the test fixture, connect DVM between DCOM (TP1) and P5 (TP19).
- 6.2.8 Verify that P5 measures 5.1V.
- 6.2.9 If P5 does not measure 5.1V, adjust pot R29 until it does.
- 6.2.10 Turn the power switch to OFF.
- 6.2.11 Connect DVM across cap C9, with the positive meter-lead (+) to the cap-lead closest to coil L1.
- 6.2.12 Remove FU3.
- 6.2.13 Turn the power switch to ON.
- 6.2.14 Verify that the voltage across C9 does not exceed 72V.
- 6.2.15 Turn the power switch to OFF.
 - 6.2.15.1 If voltage across C9 exceeded 72V, check Z3 and D5.
 - 6.2.15.2 Z3 and D5 are located just beneath the right-hand side of C9.
 - 6.2.15.3 If voltage across C9 did not exceed 72V, continue to step 17.
- 6.2.16 Replace FU3.
- 6.2.17 Turn the power switch to ON.
- 6.2.18 Push the LOAD/NO-LOAD switches to the LOAD positions one at a time in the following order.

SW1	(P5)	SW6	(P15A)
SW2	(P15)	SW7	(N15A)
SW3	(N15)	SW8	(P15B)
SW4	(P24)	SW9	(N15B)
SW5	(N24)		

- 6.2.19** On the test fixture, connect DVM between DCOM and P5.
- 6.2.20** Verify that P5 measures 5.1V.
- 6.2.21** If P5 does not measure 5.1V, adjust R29 until it does.
- 6.2.22** Connect DVM to the TEST-POINTS of the test fixture, which correspond to the TEST-POINTS of the chart below.
- 6.2.23** Verify that the voltages measured between the respective test-points are between the corresponding HI/LOW limits of the chart below.

FROM	TO	TOL. HI LIMIT	TOL. LO LIMIT
TP2	TP4	+17.75VDC	+12.75VDC
TP2	TP5	-12.75VDC	-17.75VDC
TP1	TP6	+2.68VDC	+2.37VDC
TP1	TP7	+2.68VDC	+2.37VDC
TP1	TP8	+5.0VDC	+4.0VDC
TP1	TP9	+5.0VDC	+4.4VDC
TP1	TP10	+2.68VDC	+2.09VDC
TP1	TP11	-2.64VDC	-2.39VDC
TP1	TP12	+2.68VDC	+2.09VDC
TP1	TP13	-2.64VDC	-2.39VDC
TP1	TP14	+1.37VDC	+1.19VDC
TP1	TP15	-1.26VDC	-1.15VDC
TP3	TP16	+17.75VDC	+12.75VDC
TP3	TP17	-17.75VDC	-12.75VDC
TP1	TP18	+ .05VDC	0VDC
TP1	TP19	+5.2VDC	+5.0VDC
TP1	TP20	+15.75VDC	+14.25VDC
TP1	TP21	-14.25VDC	-15.75VDC
TP1	TP22	+27VDC	+20VDC
TP1	TP23	-27VDC	-30.5VDC

- 6.2.24** Push the red momentary push button to verify P5 remains between 5.1V and 4.8V.
- 6.2.25** Turn the power switch to OFF.
- 6.2.26** Verify that the card will power up under full load by turning the power switch on and off about 5-10 times.
- 6.2.27** Allow card to burn in for 15 minutes and re-verify voltages in the above table (Step 6.2.24).
- 6.2.28** Turn the power switch to OFF.
- 6.2.29** Apply anti-sabotage inspectors' sealant to R29.
- 6.2.30** Push ALL of the LOAD/NO-LOAD switches to the NO-LOAD positions.
- 6.2.31** Disconnect the cables of the test fixture from the connectors of the card.

6.2.32 Verify continuity between the pins of connectors JP1 and JP2 in accordance with the chart below.

FROM PIN 1 OF	JP1	TO PIN 1 OF	JP2
FROM PIN 2 OF	JP1	TO PIN 2 OF	JP2
FROM PIN 3 OF	JP1	TO PIN 3 OF	JP2
FROM PIN 4 OF	JP1	TO PIN 4 OF	JP2
FROM PIN 5 OF	JP1	TO PIN 5 OF	JP2
FROM PIN 6 OF	JP1	TO PIN 6 OF	JP2
FROM PIN 7 OF	JP1	TO PIN 7 OF	JP2
FROM PIN 8 OF	JP1	TO PIN 8 OF	JP2

6.3 Mark V Functional Test for DS200TCPS

6.3.1 Burn-in Time.

6.3.1.1 Once card has gone through bench testing it shall be installed into the Mark V rack.

6.3.1.1.1 Burn-in time for Mark V cards normal repair

6.3.1.1.1.1 DS200TCPS 1 hour minimum in Mark V rack

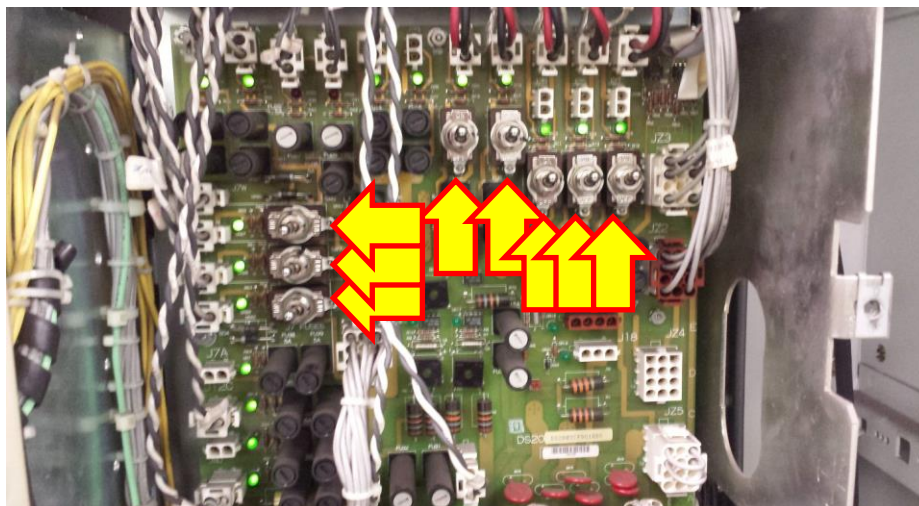
6.3.1.1.2 Burn-in time for Mark V cards **Revitalization Program**

6.3.1.1.2.1 DS200TCPS 3 hours minimum in Mark V rack

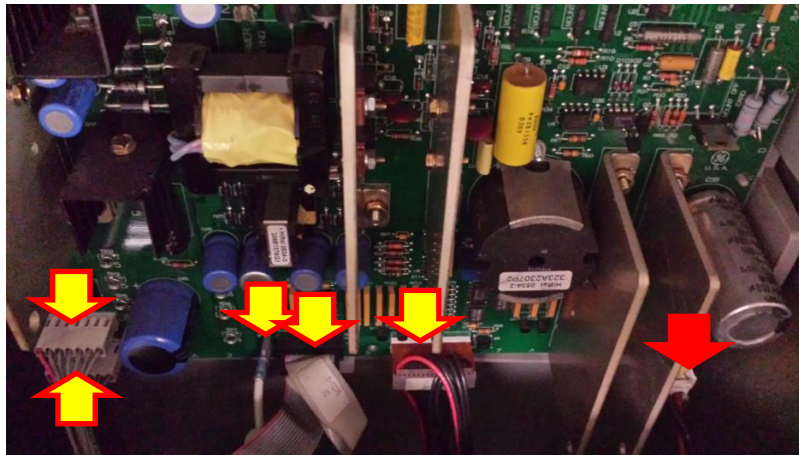
6.3.2 Removal of existing TCPS card.

6.3.2.1 Installing the replacement DS200TCPS into Mark V Turbine System

6.3.2.2 Remove Power to Respective Core:



6.3.2.3 After verifying the POWER has been removed, disconnect the POWER INPUT Connector to the TCPS FIRST! This is indicated by the RED ARROW in the picture below.



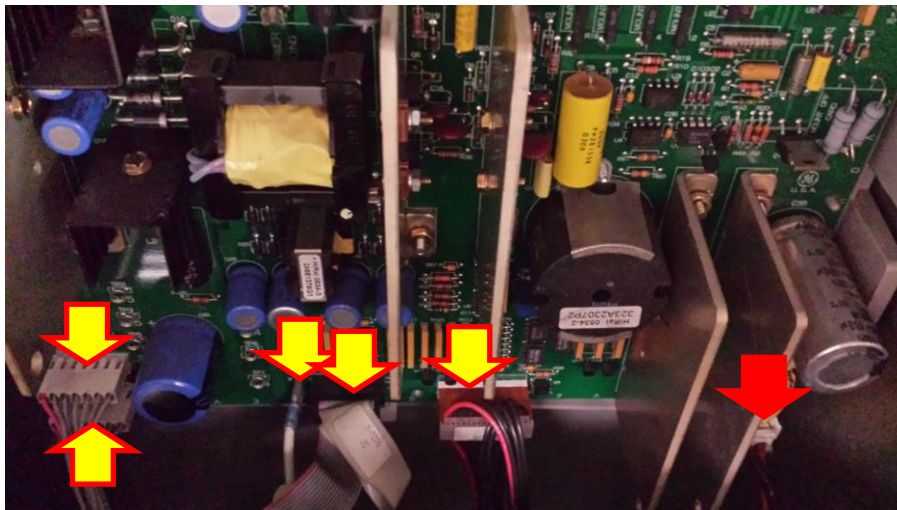
6.3.2.4 Disconnect remaining: Connectors, Chassis Ground and Ribbon Cable.

6.3.2.5 Keep in mind of the total connectors disconnected, some cores may have different amount of connectors. (ex. D Core)

6.3.2.6 Remove the TCPS by releasing the retaining clips on the card tray, 6 total, 3 located on the physical top of the card and 3 on the bottom.

6.3.3 Installation of replacement DS200TCPS card.

6.3.3.1 Re-install the board in panel



- 6.3.3.2 Install the TCPS by securing it with the retaining clips on the card tray, 6 total, 3 located on the physical top of the card and 3 on the physical bottom.
- 6.3.3.3 Connect the POWER INPUT Connector to the TCPS LAST! (Indicated by the RED ARROW above)
- 6.3.3.4 Connect remaining: Connectors, Chassis Ground and Ribbon Cable.
- 6.3.3.5 Keep in mind of the total connectors disconnected, some cores may have different amount of connectors. (ex. D Core)
- 6.3.3.6 Connect the POWER INPUT Connector to the TCPS.
- 6.3.3.7 Recheck ALL connectors to **verify none are misaligned** (off one pin), partially connected or orientated 180 degrees of what it should be.
- 6.3.3.8 Restore power to core via the TCPD
- 6.3.3.9 Verify that the core boots and condition is A7 is present via the SLCC display.



6.4 *TEST COMPLETE for DS200TCPS card*****

7. NOTES

- 7.1 Great care should be taken when removing capacitors from card. New desoldering tips and Chip Quik should be used when attempting this due to large internal ground plane.
- 7.2 Installing card into Mark V is important due to the internal trace problems we have experienced in the past. By pushing and twisting the card into position, simulates what the customer experiences in the field.

8. ATTACHMENTS

- 8.1 None at this time.