ABB	**Functional Testing Specification**
Parts & Repair Services ***Louisville, KY***	**LOU-GED-304A6045-xx**

Test Procedure for a

DOCUMENT REVISION STATUS: Determined by the last entry in the "REV" and "DATE" column

REV.	DESCRIPTION	SIGNATURE	REV. DATE
A	Initial release	Scott Cash	9-26-2018
B			
C			

PREPARED BY	REVIEWED BY	REVIEWED BY	QUALITY APPROVAL
Scott Cash			L. GROVES
DATE **9-19-2018**	**DATE**	**DATE**	**DATE** 9-27-2018

1. SCOPE

1.1 This is a functional testing procedure for a 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		Tektronix Scope
2		Tenma power supply
1		44C Connector Box
1		44 C Breakout Box and switch box
1		Function generator-need 10Vac RMS

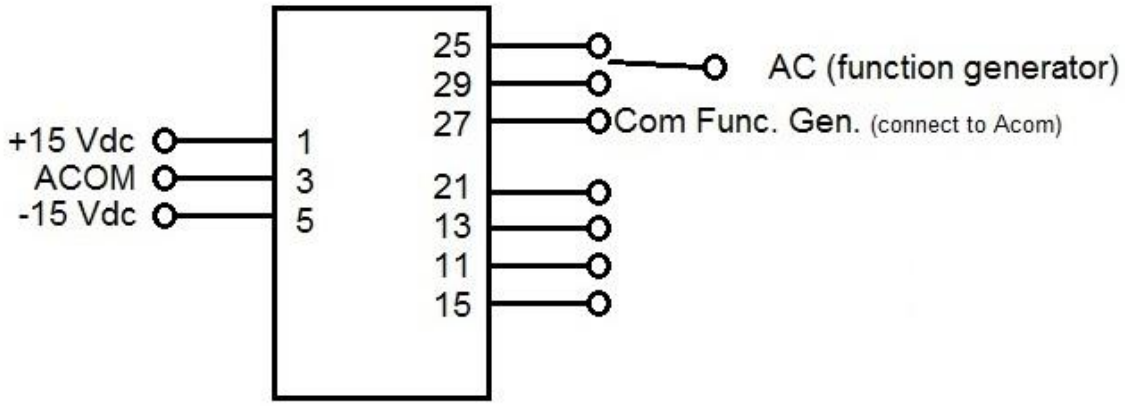
6. Modifications/Upgrades

6.1 Change glass bead diodes.

7. Testing Process

7.1 Setup

7.1.1 Connect per diagram. Be sure to connect the commons.



Note:

7.2 Testing Procedure-See below…

THESE INSTRUCTIONS ARE FOR 304A6045 PRINTED CIRCUIT BOARD.

9.1.0 SCOPE

This document establishes the performance requirement and recommended tests for the Synchronizer III Card. This specification will test analog transfer functions and component tolerances.

9.2.0 TEST EQUIPMENT

Digital voltmeter with VAC and VDC settings Oscilloscope.
Sine wave generator, adjustable from 14.4 to 67Hz, 1 to 10 volts RMS.

9.3.0 POWER SUPPLY REQUIREMENTS AND PIN CONNECTIONS

NOMINAL VOLTAGE	MAXIMUM CURRENT MILLIAMPS	MINIMUM ADJ. RANGE	% REG.	MAXIMUM VOLTAGE (VDC)	PINS
P15	50	±10%	1%	+17	1-2
N15	50	±10%	1%	-17	5-6
COM	-	-	-	-	3-4

9.4.0 INITIAL SETUP

1. Adjust all pots (R1-R7) fully clockwise.
2. Adjust R4 5 turns counter-clockwise.

9.5.0 SIGNAL LEVELS

0 to +15 VDC, 0 to 12VAC RMS, as required for analog tests.

9.6.0 TEST PROCEDURE

9.6.1 Preliminary Inspection

The element shall be inspected prior to application of power to verify that it is assembled according to the assembly drawing.

9.6.2 Digital Tests

None

REV. 1	REV. 4	REV. 7	PRINTS TO DL109	ENGINEER S.C. Nolan	GENERAL ELECTRIC	TestSpecifications Synchronizer III
REV. 2	REV. 5	ISSUED December 8, 1981			DSD	304A6080
REV. 3	REV. 6	MADE BY D. C. Nolan			SALEM, VA. U.S.A.	CONT. ON SH. 2 SH. NO. 1

DSD 0151 (09-76)

7.2.1

9.6.0 TEST PROCEDURE (CONTINUED)
9.6.3 HYBRID INTERFACE TESTS
NONE
9.6.4 ANALOG TESTS
ENSURE THAT BERG JUMPERS ON THE BOARD ARE SET TO THE NORMAL POSITION AS SHOWN ON THE BOARD.

1. CONNECT SINE WAVE GENERATOR TO PINS (29,30), COMMON TO PINS (27,28). THIS SOURCE SHALL BE REFERED TO AS "VAC". ALL PHASE MEASUREMENTS WILL BE REFERENCED TO VAC SO AT THIS TIME CONNECT THE REFERENCE INPUT ON THE PHASE METER TO THIS SIGNAL.
2. ADJUST VAC TO 10.0V +/- 0.1V RMS AT 60.0 +/- .05HZ.
3. VERIFY THAT ESYN (TP2) IS A SQUARE WAVE WITH PEAKS AT PLUS AND MINUS 7.7V +/- .8V, PERIOD 16.6 MSEC., AND THE SIGNAL IS FREE OF JITTER.
4. DEPRESS AND HOLD 1PB FOR STEPS 5 THROUGH 7.
5. ADJUST R2 COUNTERCLOCKWISE UNTIL ESYN (TP2) IS 4.00 +/- 0.1VRMS.
6. VERIFY THAT ESYN (TP2) IS A 60.0 +/- .05HZ SINE WAVE.
7. ADJUST R1 CONTERCLOCKWISEW UNTIL ESYN (TP2) IS 2.0 +/- 0.1VRMS.
8. RELEASE PB1, ADJUST R7 FOR PEAK AMPLITUDE AS SEEN ON A SCOPE, VIEWING (13,14).
9. ADJUST R4 FOR 0.00 +/- .001 VDC AT PQA(11,12).
10. ADJUST R3 FOR 6.36V +/-.01VRMS AT PIA(13,14).
11. ADJUST R7 SO THAT PIA (13,14) AND VAC ARE IN PHASE 0.0 +/- .5 DEGREES.
12. ADJUST R5 FOR 6.36V +/- 0.01VRMS AT PQA(11,12).
13. REPEAT STEPS 9-12 UNTIL ALL CONDITIONS ARE MET. THIS WILL USUALLY TAKE THREE PASSES. THE BETTER THE CONDITIONS ARE MET THE BETTER THE REST OF THE TEST WILL RUN. THE REMAINDER OF THE TEST WILL MOSTLY BE VERIFYING THAT THE SETUP HERE WAS CORRECT.
14. VERIFY THAT PIA (13,14) IS 6.36 +/- 0.01 VRMS.
15. VERIFY THAT PIA (13,14) IS 0.0 +/- .5 DEGREES PHASE SHIFTED FROM VAC (29,30)
16. VERIFY THAT MIA (15,16) IS 6.36 +/- 0.01 VRMS.
17. VERIFY THAT MIA (15,16) IS 180 +/- .5 DEGREES PHASE SHIFTED FROM VAC (29,30)
18. VERIFY THAT PQA (11,12) IS 6.36 +/- .1 VRMS.
19. VERIFY THAT PQA (11,12) IS -90 +/- 2.0 DEGREES PHASE SHIFTED FROM VAC (29,30)
20. VERIFY THAT MQA (21,22) IS 6.36 +/- .1 VRMS.
21. VERIFY THAT MQA (21,22) IS +90 +/- 2.0 DEGREES PHASE SHIFTED FROM VAC (29,30)
22. ADJUST R6 FOR 10.0 +/- 0.01VDC AT VPHZ (17,18).

REV. 1 SES 841002	REV. 4	REV. 7	PRINTS TO DL109	ENGINEER DCN	GENERAL ELECTRIC	Test Specification Synchronizer III
REV. 2	REV. 5	ISSUED R2- 3/10/83			DSO SALEM, VA. U.S.A.	3 0 4 A 6 0 8 0
REV. 3	REV. 6	MADE BY D. Nolan				CONT. ON SH. 3 SH. NO. 2

DSO 0151 (09-76)

7.2.2

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9.6.4 ANALOG TESTS CONTINUED

23. ADJUST VAC FOR 10.0V ± .1V RMS AT 14.4 ± 0.1 Hz. NOW THAT THE BOARD PASSES AT 60HZ, TRY IT AT IT'S MINIMUM OPERATING FREQUENCY OF 14.4 HZ. NOTE THAT THE PHASE METER MAY BE DIFFICULT TO READ AT THIS LOW OF AN INPUT FREQUENCY. USE YOUR BEST JUDGEMENT WHEN READING IT.
24. VERIFY THAT PIA (13,14) IS 6.36 ± 0.25 VRMS.
25. VERIFY THAT PIA (13,14) IS 0.0 ± 4.0 DEGREES PHASE SHIFTED FROM VAC (29,30)
26. VERIFY THAT POA (11,12) IS 6.36 ± .25 VRMS.
27. VERIFY THAT POA (11,12) IS -90 ± 4.0 DEGREES PHASE SHIFTED FROM VAC (29,30)
28. VERIFY THAT VPHZ (17,18) IS 2.4 ± 0.1 VDC.
29. ADJUST VAC TO 10.0V ± 0.1V RMS AT 67.0 ± .1 HZ. NOW TEST THE BOARD AT ITS TOP OPERATING FREQUENCY.
30. REPEAT TESTS 24 THROUGH 27.
31. VERIFY THAT VPHZ (17,18) IS 11.17 ± 0.1 VDC.
32. ADJUST VAC TO 1.0V ± .1V RMS AT 60.0HZ ± .1 HZ. NOW TEST THE BOARD FOR SENSITIVITY TO INPUT AMPLITUDE.
33. REPEAT TESTS 24 THROUGH 27.
34. VERIFY THAT VPHZ (17,18) IS AT 10.0 ± 0.1 VDC.
35. MOVE VAC FROM PINS (29,30) TO PINS (25,26). LEAVE THE COMMON ON VAC WHERE IT IS. (27,28).
36. ADJUST VAC (25,26) FOR 5.1 ± 0.1 VRMS AT 60.0 ± 0.1 HZ.
37. VERIFY THAT ESYN (TP2) IS A SQUARE WAVE WITH PEAKS AT ± 7.7 ± .8 VOLTS AND FREE FROM JITTER. VERIFY THAT THE FRONT PANEL TEST POINTS ARE CORRECTLY WIRED BY DOING THE FOLLOWING STEPS:
38. CHECK THAT R31,43,50,51 AND 56 ARE 10K OHM RESISTORS.
39. CHECK THAT THE SIGNAL ON TP3 IS THE SIGNAL ON (13,14).
40. CHECK THAT THE SIGNAL ON TP4 IS THE SIGNAL ON (15,16).
41. CHECK THAT THE SIGNAL ON TP5 IS THE SIGNAL ON (11,12).
42. CHECK THAT THE SIGNAL ON TP6 IS THE SIGNAL ON (17,18).
43. CHECK THAT THE SIGNAL ON TP7 IS THE SIGNAL ON (21,22).
44. MOVE VAC FROM PINS (25,26) TO PIN (29,30) AND SET AT 10.0 ± .1 VRMS. LEAVE THE COMMON ON VAC WHERE IT IS (27,28).
45. MOVE JUMPERS J4 AND J5 TO THE "HYDRO" POSITION. (Left Position)
46. VERIFY THAT PIA (13,14) IS 6.36 ± .1 VRMS.
47. VERIFY THAT PIA (13,14) IS 0.0 ± .5 DEGREES PHASE SHIFTED FROM VAC (29,30).
48. VERIFY THAT POA (11,12) IS 6.55 ± .1 VRMS.
49. VERIFY THAT POA (11,12) IS -90 ± 2.0 DEGREES PHASE SHIFTED FROM VAC (29,30).
50. REDUCE FREQUENCY OF VIN (29,30) TO 28.8 HZ.
51. VERIFY THAT PIA (13,14) IS 0.0 ± 4 DEGREES PHASE SHIFTED FROM VAC (29,30).
52. VERIFY THAT POA (11,12) IS -90 ± 4 DEGREES PHASE SHIFTED FROM VAC (29,30).
53. INCREASE FREQUENCY OF VIN (29,30) TO 140 HZ.
54. REPEAT STEPS 51 AND 52.
55. MOVE J4 AND J5 TO "NORMAL" POSITION AND CHECK THAT J1-J3 ARE IN "NORMAL" POSITIONS.
56. END OF TEST.

REV. 1 SES 841002	REV. 4	REV. 7	PRINTS TO DL109	ENGINEER	GENERAL ELECTRIC	Test Specification Synchronizer III
REV. 2 940428 JJW	REV. 5	ISSUED Re- 3/10/83				
REV. 3	REV. 6	MADE BY D. Nolan			SALEM, VA. U.S.A.	3 0 4 A 6 0 8 0 CONT. ON SH. FL SH. NO. 3

DIETZGEN 138-4

DSD 0131 (09-76)

7.2.3

7.3 ***TEST COMPLETE ***

8. Notes

8.1 None at this time?

9. Attachments

9.1 None at this time?