g GE Industrial Systems	**Functional Testing Specification**
Renewal Services ***Louisville, KY***	**LOU–GE-S21DRIVE**

Test Procedure for the S21 Drive

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John Madden			Robert Dwall
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Functional test procedure for the S21 Drive

1. SCOPE

1.1 This is a functional testing procedure for the S21 Drive and installed cards.

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 36C764906CA & CC, Elementary diagrams for Non-Reversing Driver**
- **3.1.2 Documentation Folder for card being tested.**

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 the local documented procedures 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 or cracked
  - **4.2.1.2** Terminal strips / connectors broken or cracked
  - **4.2.1.3** Loose wires
  - **4.2.1.4** Components visually damaged
  - **4.2.1.5** Capacitors leaking
  - **4.2.1.6** Solder joints damaged or cold
  - **4.2.1.7** Circuit board burned or de-laminated
  - **4.2.1.8** Printed wire runs 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 85 DMM (or Equivalent)
1	H033954	S21 DRIVE FIXTURE
1		Oscilloscope (not required on all cards)

6. TESTING PROCESS

6.1 Setup

6.1.1 Plug unit into 3 Phase 240V outlet.

Note: This test procedure covers several cards. Each of those individual cards may have specific tasks not yet covered in this test. If such a situation arises, be sure to add that data to this test procedure as we encounter those cards.

6.2 Testing Procedure

6.2.1 For most cards, plugging them into the slot allotted for them and operating the drive according to this procedure will be sufficient.

6.2.2 Insert card into drive. Turn fixture on by rotating the red e-stop knob clockwise. Observe that no faults are indicated on the monitor card. If there are, and this isn't the particular card under test, address the fault before proceeding.

6.2.3 193X741xx Dual Output power supply card

6.2.3.1 Verify that the "power on" lamp is lit.

6.2.3.2 Turn selector switch to position 1.

6.2.3.3 Plug meter into Test card, and you should read +20Vdc +/-.1V.

6.2.3.4 Turn selector switch to position 2. You should have a reading of –20Vdc +/-.1V.

6.2.3.5 Then turn the speed reference pot ("speed ref") up and observe that the output voltmeter (the one mounted permanently to the top of the fixture) runs up to approx. 230V. This simulates an output to a motor.

6.2.4 193X737 Monitor card

6.2.4.1 First, turn the aforementioned speed reference pot up so that you read an output on the fixture's output meter. It doesn't have to be up all the way, just so you can observe the output drop to zero when a fault is registered.

6.2.4.2 Turn the "over current" pot up until the monitor card clicks and the "over current" lamp lights up. Output should drop to zero.

6.2.4.3 Push the "control reset " button and everything should return to normal. There are three other functions to this card, and they test the same way. The controls for them are the red and black pushbuttons next to the "speed ref" pot, and the "phase loss" switch above the e-stop switch. Test each, one at a time, resetting after each. They should all cause the unit to

drop out when a fault is registered. Also, there is an oscillator daughter card on this card that the drive will not function properly without.

6.2.5 193X728 Signal Isolator card

6.2.5.1 Perform a component test on the card.

6.2.5.2 Install the card into the drive.

6.2.5.3 Power up the drive to see if it runs the output up and down with operation of "speed ref" pot. Drive will not function properly if this card is bad.

6.2.6 193X233 Test card

6.2.6.1 Perform a component test on the card.

6.2.6.2 This card just switches the red jack between 19 different channels for a signal output to a meter or o-scope. Refer to sheet 36C764906CC or 36C764906CC to see what each channel shows. For testing in the drive, follow the chart printed on either of these sheets. The switch on this card is obsolete, so you will have to see if we have any meter cards in legacy stock to pull this switch from should you encounter one that is bad.

6.2.7 193X725 Gate Pulse Generator cards

6.2.7.1 Insert into the drive and apply power.

6.2.7.2 Take scope measurements on corresponding Test card channels listed on chart on 36C764906CA or CC while running the drive fixture. Refer to the 193X725 folder for particular specifications and performance requirements.

6.2.8 193X740 Driver Coordination card

6.2.8.1 Insert into the drive and apply power.

6.2.8.2 Varying the "Current Limit" pot on card should change the fault setting that is controlled by the "over current" pot at top of drive. You will notice the drive drops out before the over current fault lights up on our monitor card. That is due to the monitor card and not the coordination card. What you are looking for is a change in when the drive drops out. For example, in the current limit pot is turned full CCW, the over current pot will drop the drive out around 5, and when current limit pot is turned full CW, drop out occurs somewhere nearer to 8 on the over current pot. Refer to the 193X740 folder for particular specifications, performance requirements, and any additional steps that need to be taken (depending on revision).

6.2.9 193X208 Multi-Purpose Coordination Card

6.2.9.1 Perform a component test on the card.

6.2.9.2 Insert into the drive and apply power.

6.2.9.3 Once in drive, operate drive to verify proper operation. Refer to the 193X208 folder for particular specifications and performance requirements.

6.3 ***TEST COMPLETE ***

7. NOTES

This test is intended to be a general overview of operation for the S21 Drive test fixture. Each card that is tested in this drive has revisions and variations that need to be taken into account when testing. You should refer to each card's folder, factory test instructions, schematics, old test procedures (kept for reference), and any other reference data available to you when repairing and testing. When you come across variations that should be included in either the procedure or test fixture, contact QA and/or R&D so that they might be incorporated into later revisions of this test procedure.

8. Oscilloscope Verification Examples:

Fig. 1 See each card's reference material.

Fig. 2