


<b>g</b>  <i>GE Industrial Systems</i>	<b>Test and Operating Procedure</b>	
	<b>DATE : 10/17/1996</b>	<b>PAGE 1 OF 11</b>
<b>QUALITY REP:</b> 		
<b>TITLE:</b> <b>Steam Line Resonance Compensator Card Test</b>		<b>PROCEDURE:</b> <b>LOU- GED-118D1302-D</b>

## **1. INTRODUCTORY DESCRIPTION**

- A. This procedure establishes the methods for testing:  
118D1302G0001 thru G0006 Steamline Resonance Compensator Circuit Card.
- B. Environmental ranges: 70 +/- 10 Deg. F. with 20-75% R.H.
- C. Unit warm-up/stabilization period requirement: 5 minutes
- D. Personnel using this procedure are expected to have a high degree of confidence and expertise in related testing and calibration procedures.
- E. Procedures not explained here are considered to be understood as common practice.

## **2. TEST EQUIPMENT VERIFICATION**

- A. Verify the accuracy of the standard(s) used in the repair/calibration process by evidence of recent calibration labeling affixed to the test equipment.
- B. All measurement standards used in this procedure shall be traceable to the NATIONAL INSTITUTE of STANDARDS and TECHNOLOGY (N.I.S.T.) and shall have the accuracy, stability, range and resolution required for the intended use.
- C. Unless otherwise specified, the collective uncertainty of the Measurement Standard(s) shall not exceed twenty five percent of the acceptable tolerance for each characteristic being calibrated.
- D. All deviations shall be documented.

## **3. EQUIPMENT CLEANING**

All equipment clean will be performed as instructed in the GEES SOP Sec. 14.0

## **4. EQUIPMENT INSPECTION**

- A. The following criteria should be used as a guideline or basis for the inspection process of this unit:
  1. Wires broken or cracked.
  2. Terminal strips / connectors broken or cracked.
  3. Loose wires.
  4. Components visually damaged.
  5. Capacitors leaking.
  6. Solder joint, cold.
  7. Circuit board discolored or burned.
  8. Printed wire runs burned or damaged.

g	<b>Test and Operating Procedure</b>	
	<i>GE Industrial Systems</i>	
	DATE : 10/17/1996	PAGE 2 OF 11
QUALITY REP: <i>Robert D. Dault</i>		
TITLE: Steam Line Resonance Compensator Card Test		PROCEDURE: LOU- GED-118D1302-D

## 5. REVISION HISTORY

Revision	Date	Reason for Revision
A	10/17/96	Initial Procedure – After Verification
B	3/24/99	Added information for G5 and G6 cards. [BKP]
C	06/10/02	Changed procedure number to match standard.
D	3/23/2012	Updated test with line numbers and changed db to voltage values in steps, 9.33, 9.39, 9.43, 9.45, 9.47, 9.49, 9.51.
E		
F		
G		
H		

## 6. REFERENCE DOCUMENTATION

- Reference: P3K-AL-0231

## 7. THEORY OF OPERATION

### Function

The Steamline Resonance Compensator Circuit Card (SLRC) accepts a signal from a Pressure Amplifier Circuit Card in the BWR Pressure Control system. This signal is the total steam flow demand signal. The SLRC card is a low pass filter with minimal phase shift. The DC unity gain.

### Operation

An active notch filter and lag circuit are combined to give frequency response characteristics as shown on the SLRC schematic drawing. The notch depth, width, center frequency and lag time constant are adjustable via 10 turn panel mounted dial potentiometers.


g	<b>Test and Operating Procedure</b>	
	<i>GE Industrial Systems</i>	
	DATE : 10/17/1996	PAGE 3 OF 11
QUALITY REP: <i>Robert D. Dault</i>		
TITLE: <b>Steam Line Resonance Compensator Card Test</b>		PROCEDURE: <b>LOU- GED-118D1302-D</b>

## 8. TEST EQUIPMENT TO BE USED


- +30 Volt Power Supply
- -22 Volt Power Supply
- 0-20 Volt variable supply
- 1K $\Omega$  load resistor
- Misc Jumpers
- Sine Wave Function Generator
- Dual channel chart recorder
- Digital Multimeter
- Oscilloscope
- Test Fixture # H033641

## 9. FINAL TEST AND OPERATION PROCESS

- 9.1** The dual ganged potentiometers (R35-A, R35-B) and (R36-A, R36-B) must be checked for tracking between the wipers. Turn pots all the way CCW. The wipers should read within 0.1% a start of CW travel (after dead zone) and be within 1% at full CW travel (before dead zone). Reposition A with respect to B if necessary.
- 9.2** Mechanically position the four panel mounted pots with respect to the dials so that the zero dial position coincides with beginning of active portion of potentiometer travel.
- 9.3** Apply +30V, -22V, and ground to pins 17, 21, and 19 respectively.
- 9.4** Connect a 1K $\Omega$  resistor load between pin 29 and ground.
- 9.5** Check TP1 and TP2 for +15.7 and -15.7 volts respectively.
- 9.6** Adjust T<sub>0</sub> potentiometer to dial setting 5.0.
- 9.7** Adjust VR4 approximately 4 turns from full CCW end.

<b>g</b>  <b>GE Industrial Systems</b>	<b>Test and Operating Procedure</b>	
	<b>DATE : 10/17/1996</b>	<b>PAGE 4 OF 11</b>
<b>QUALITY REP:</b> 		
<b>TITLE:</b> <b>Steam Line Resonance Compensator Card Test</b>		<b>PROCEDURE:</b> <b>LOU- GED-118D1302-D</b>

- 9.8 Zero adjust the four operational amplifier amplifiers to within plus or minus one millivolt as follows. Place jumpers across C7, C13, and C16.
- 9.9 Connect pin 10 to ground.
- 9.10 Adjust VR1 and VR50 for 0.00 volts at TP4.
- 9.11 Adjust VR52 for 0.00 volts at TP6.
- 9.12 Adjust VR3 and VR51 for 0.00 volts at TP5
- 9.13 Adjust VR6 and VR53 for 0.00 volts at TP10.
- 9.14 Remove jumpers from C7, C13, and C16
- 9.15 After the voltage at TP6 stabilizes adjust VR52 for 0.00 volts at TP5. Check TP10 for 0.00 volts  $\pm 2\text{mV}$ .
- 9.16 Remove ground from pin 10 and apply +0.500 volts.
- 9.17 Adjust VR5 for +0.500 volts at TP10.
- 9.18 Apply -0.500 volts at pin 10.
- 9.19 Check TP10 for -0.500 volts.
- 9.20 Increase pin 10 to -2.00 volts  $\pm 10\text{mV}$ .
- 9.21 Check TP10 for -2.00 volts  $\pm 10\text{mV}$ .
- 9.22 Apply +2.00 volts at pin 10.
- 9.23 Check TP10 for +2.00 volts  $\pm 10\text{mV}$ .
- 9.24 Remove voltage source from pin 10.
- 9.25 Disconnect wire to wiper of R38, TR2 pot.

<b>g</b> <u>GE Industrial Systems</u>	<b>Test and Operating Procedure</b>	
	DATE : 10/17/1996	PAGE 5 OF 11
QUALITY REP: 		
TITLE: <b>Steam Line Resonance Compensator Card Test</b>		PROCEDURE: <b>LOU- GED-118D1302-D</b>

**9.26** Adjust panel mounted dials as follows:

<u>Potentiometer</u>	<u>Dial Setting</u>
C1/C2	0.00
C2	1.78
T <sub>0</sub>	3.88
T <sub>R2</sub>	1.55

**9.27** Connect a Sine wave function generator to pin 10.

**9.28** Monitor pins 10 and 29 with two channels of a scope

**9.29** Adjust the function generator as follows

Group	Function Generator	Voltage
G1 - G5	0.8V P-P @ 1.5 Hz	.2828 RMS
G6	0.8V P-P @ 15.0 Hz	.2828 RMS

**9.30** Adjust VR4 for minimum amplitude at pin 29. { *DC Off-Set of wave form* }

**9.31** Adjust VR2 to further minimize the amplitude at pin 29.


**9.32** Reiterate adjustment of VR4 and VR2 for minimum possible amplitude at pin 29. { *DC Off-Set of wave form* }

**9.33** Adjust C1/C2 dial to 2.00 setting.

**9.34** Further adjustment (if necessary), C1/C2 dial to obtain 160mV P-P down from zero at pin 29.

**9.35** Mechanically reposition C1/C2 dial (if necessary) to read 2.00 with potentiometer in position established in step 9.34.

**9.36** Reconnect R38 wiper.

<b>g</b>  <i>GE Industrial Systems</i>	<b>Test and Operating Procedure</b>	
	<b>DATE : 10/17/1996</b>	<b>PAGE 6 OF 11</b>
<b>QUALITY REP:</b> 		
<b>TITLE:</b> <b>Steam Line Resonance Compensator Card Test</b>		<b>PROCEDURE:</b> <b>LOU- GED-118D1302-D</b>

**9.37** Adjust the function generator as follows

Group	Function Generator
G1 - G4	1.5 Hz
G5	15.0 Hz
G6	150 Hz

**9.38** Adjust C1/C2 dial to 10.0

**9.39** Further adjustment (if necessary),  $T_{R2}$  dial to obtain 250mV P-P down from zero at pin 29.

**9.40** Mechanically reposition  $T_{R2}$  dial (if necessary) to read 1.55 with potentiometer in position established in step 9.39. Note: When changing frequencies, readjust for .800 mV P-P.

**9.41** Adjust C1/C2 dial to 2.00

**9.42** Adjust the function generator as follows


Group	Function Generator
G1 - G4	0.55 Hz
G5	0.86 Hz
G6	8.65 Hz

**9.43** Verify pin 29 amplitude should be between 360 and 450 mV P-P.

**9.44** Adjust the function generator as follows

Group	Function Generator
G1 - G4	0.9 Hz
G5	1.25 Hz
G6	12.5 Hz

**9.45** Verify pin 29 amplitude should be between 180 and 230 mV P-P

<b>g</b>  <u>GE Industrial Systems</u>	<b>Test and Operating Procedure</b>	
	<b>DATE : 10/17/1996</b>	<b>PAGE 7 OF 11</b>
<b>QUALITY REP:</b> 		
<b>TITLE:</b> <b>Steam Line Resonance Compensator Card Test</b>		<b>PROCEDURE:</b> <b>LOU- GED-118D1302-D</b>

**9.46** Adjust the function generator as follows

Group	Function Generator
G1 - G5	1.5 Hz
G6	15.0 Hz

**9.47** Verify pin 29 amplitude should be as follows


Group	Amplitude - Min	Amplitude - Max
G1 - G4	0.04 V P-P	0.06 V P-P
G5 - G6	0.14 V P-P	0.17 V P-P

**9.48** Adjust the function generator as follows

Group	Function Generator
G1 - G5	3 Hz
G6	30 Hz

**9.49** Verify pin 29 amplitude should be as follows

Group	Amplitude - Min	Amplitude - Max
G1 - G4	0.07 V P-P	0.09 V P-P
G5 - G6	0.37 V P-P	0.47 V P-P

<b>g</b>  <i>GE Industrial Systems</i>	<b>Test and Operating Procedure</b>	
	<b>DATE : 10/17/1996</b>	<b>PAGE 8 OF 11</b>
<b>QUALITY REP:</b> 		
<b>TITLE:</b> <b>Steam Line Resonance Compensator Card Test</b>		<b>PROCEDURE:</b> <b>LOU- GED-118D1302-D</b>

**9.50** Adjust the function generator as follows

Group	Function Generator
G1 - G4	10 Hz
G5	15 Hz
G6	100 Hz

**9.51** Verify pin 29 amplitude should be as follows

Group	Amplitude - Min	Amplitude - Max
G1 - G4	0.03 V P-P	0.05 V P-P
G5 - G6	0.23 V P-P	0.28 V P-P

**9.52** Remove 1K load resistor from pin 29 and disconnect all test equipment.



g

GE Industrial Systems

## Test and Operating Procedure

DATE : 10/17/1996

PAGE 9 OF 11

QUALITY REP:

*Robert D. Dault*

TITLE:

Steam Line Resonance Compensator Card Test

PROCEDURE:

LOU- GED-118D1302-D

**10. SPECIAL INFORMATION**

10.1 Data sheets for G0004 and G0005 cards are attached to this instruction.

Job # _____						Burn-in Start _____		
Serial # _____								
Date _____								
Data Sheet for 118D1302G0003						Burn-in Stop _____		
Test Procedure LOU-GED-118D1302-D						Technician _____		
Test Procedure Step	Nominal	Lower Limit	Pre-Burn in Results	Post Burn in Results	Upper Limit	Pot Values If applicable CW CCW		Pass/Fail
R35A		CCW 0.1%						
R35B		CCW 0.1%						
R36A		CCW 0.1%						
R36B		CCW 0.1%						
9.5A	+15.7V	+14.915V			+16.485V			
9.5B	-15.7V	-14.915V			-16.485V			
9.15	0.00V							
9.19	-0.500V							
9.21	-2.00V	-1.990V			-2.010V			
9.23	+2.00V	+1.990V			+2.010V			
9.43	.40 Vpp	.36 Vpp			.45 Vpp			
9.45	.20 Vpp	.18 Vpp			.23 Vpp			
9.47	.05 Vpp	.04 Vpp			.06 Vpp			
9.49	.08 Vpp	.07 Vpp			.09 Vpp			
9.51	.04 Vpp	.03 Vpp			.05 Vpp			
VR5								
VR1 @ TP4								
VR50 @ TP4								
VR52 @ TP6								
VR3 @ TP5								
VR51 @ TP5								
VR6 @ TP10								
VR53 @ TP10								
Pot 2								
Pot 4								

g

## Test and Operating Procedure

GE Industrial Systems

DATE : 10/17/1996

PAGE 10 OF 11

QUALITY REP:

*Robert D. Dault*

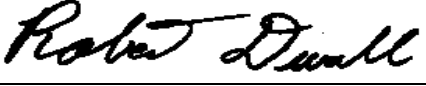
TITLE:

Steam Line Resonance Compensator Card Test

PROCEDURE:

LOU- GED-118D1302-D

Job # _____						Burn-in Start _____		
Serial # _____								
Date _____						Burn-in Stop _____		
Data Sheet for <u>118D1302G0005</u>						Technician _____		
Test Procedure <u>LOU-GED-118D1302-D</u>								
Test Procedure Step	Nominal	Lower Limit	Pre-Burn in Results	Post Burn in Results	Upper Limit	Pot Values If applicable CW      CCW		Pass/Fail
R35A		CCW 0.1%						
R35B		CCW 0.1%						
R36A		CCW 0.1%						
R36B		CCW 0.1%						
9.5A	+15.7V	+14.915V			+16.485V			
9.5B	-15.7V	-14.915V			-16.485V			
9.15	0.00V							
9.19	-0.500V							
9.21	-2.00V	-1.990V			-2.010V			
9.23	+2.00V	+1.990V			+2.010V			
9.43	.40 Vpp	.36 Vpp			.45 Vpp			
9.45	.20 Vpp	.18 Vpp			.23 Vpp			
9.47	.155 Vpp	.14 Vpp			.17 Vpp			
9.49	.42 Vpp	.37 Vpp			.47 Vpp			
9.51	.255 Vpp	.23 Vpp			.28 Vpp			
VR5								
VR1 @ TP4								
VR50 @ TP4								
VR52 @ TP6								
VR3 @ TP5								
VR51 @ TP5								
VR6 @ TP10								
VR53 @ TP10								
Pot 2								
Pot 4								

<b>g</b> <i>GE Industrial Systems</i>	<b>Test and Operating Procedure</b>	
	<b>DATE : 10/17/1996</b>	<b>PAGE 11 OF 11</b>
<b>QUALITY REP:</b> 		
<b>TITLE:</b> Steam Line Resonance Compensator Card Test		<b>PROCEDURE:</b> LOU- GED-118D1302-D

**TEST WRITTEN BY: GE Steam Turbine**  
 Procedure # P3K-AL-0231

**DATE:** 05/23/76

**TEST COPIED BY: Robert Duvall**

**DATE:** 10/17/96

**TEST VERIFIED BY: G. Chandler**

**DATE:** 3/23/2012