g GE Industrial Systems	Test and Operating Procedure	
	DATE :03/22/99	PAGE 1 OF 6
QUALITY REP: Robert Dwell		
TITLE: Testing Instructions for Winder Control Unit	PROCEDURE: LOU – TUNGSRAM - F082-1000	

1. INTRODUCTORY DESCRIPTION

A. This procedure establishes the methods for testing a.
B. Environmental ranges: 70 +/- 10 Deg. F. with 20-75% R.H.
C. Unit warm-up/stabilization period requirement: None
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

A. All equipment clean will be performed as instructed in the GE T&IC SOP Sec. 14.0

4. EQUIPMENT INSPECTION

A. The following criteria should be used as a guideline or basis for the inspection process of the 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 or otherwise inadequate.
    7. Circuit board discolored or burned.
    8. Printed wire runs burned or damaged.

5. REVISION HISTORY

Revision	Date	Reason for Revision
A	3/22/99	Initial Procedure – After Verification
B		
C		
D		
E		
F		
G		
H		
I		
J		
K		

6. REFERENCE DOCUMENTATION

- Reference:

7. THEORY OF OPERATION

This unit is made in Hungary and is designed to control a filament-winding machine used to make filaments for incandescent light bulbs. It is a Z80 microprocessor-based unit and basically controls two stepper motors that wind filament wire around a mandrel. It also controls electronic valves going to pneumatic mechanisms which load the filament wire and chop it off to programmable lengths. The unit is fully programmable by way of thumb wheels on the front panel that allow many different types of filaments to be wound. This unit is powered by 220 VAC even though it has what looks like a standard receptacle for a 110 VAC power cord. The unit contains four main boards and a daughter card. The CPU board controls most of the unit's functionality and carries the daughter board called the Oscillator board. The Oscillator board synchronizes most of the timing for the winding process. Its adjustment is critical and many of the units in for repair have the problem of this board being out of adjustment or just plain defective. The Tungsram stepper driver board controls the stepper motor that winds the filament wire around the mandrel. The Berger Lahr stepper driver board controls the stepper motor that sets the pitch for the wind. The digital output card is used to control the electronic valves going to the pneumatic mechanisms.

Two Fluke programs have been written to test and repair these units. The first program called TungOsc.h is used to repair and adjust the oscillator daughter card. The second program is called Tung.h and is used to test and repair the unit as a whole. A small metal box with two circles of lights is used with this test to simulate the windings of the stepper motors. The large schematic page labeled F082-1000/k is an overall interconnection diagram of what's in the unit and is probably the most helpful one for troubleshooting.

8. TEST EQUIPMENT TO BE USED

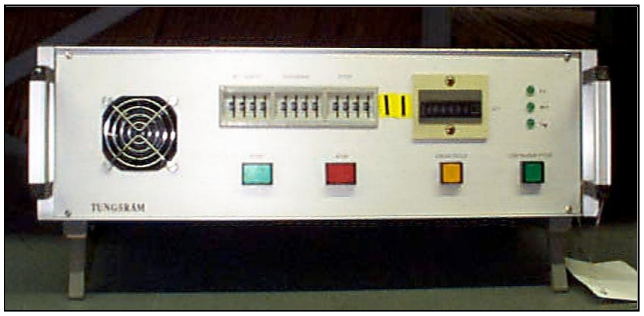
- Fluke 9010 Micro-system Troubleshooter
- Z80 Pod for Fluke
- Sync probe for Fluke
- Tung.h Test program for Fluke
- TungOsc.h Test program for Fluke
- Tektronix 2215 Oscilloscope or equivalent
- DC power supply +5volts @ 2amps
- Stepper motor simulation box # ***H033800***
- 110 to 220 Step-up Transformer

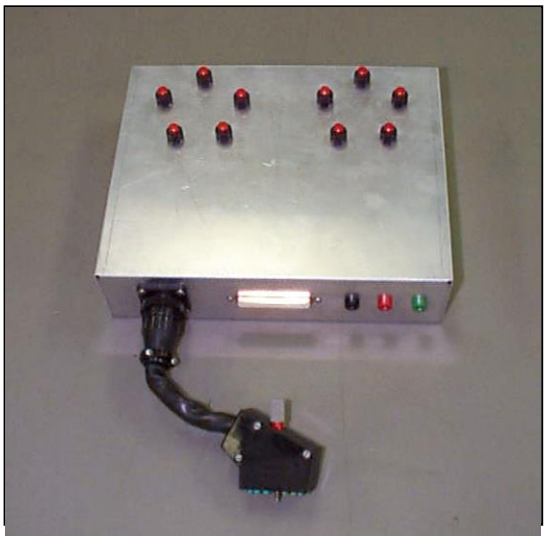
9. FINAL TEST AND OPERATION PROCESS

- Disassemble the unit by removing the front panel and the top and bottom covers. You may have to cut tie wraps that hold the four main boards in their slots which is why you will have to remove the top and bottom covers to get to them. Leave the top and bottom covers off until all testing is complete.
- ***VERY IMPORTANT!*** *Make sure to label each board and the corresponding slot from which it came when removing them. This is because different units will not always have the same type of board inserted into a particular slot. Also be aware that the front panels are often wired differently from unit to unit and serious damage can occur from swapping them.*
- It is usually necessary to completely wash the entire unit in the spray booth because they come in so dirty. Make sure you let the unit bake in the oven overnight before attempting to power it up.

- Thoroughly inspect all the modifications that have been made to the CPU and Oscillator boards. These modifications are usually done very poorly and need to be re-worked to meet our workmanship standards. Pay close attention to the two rows of header pins that attach the Oscillator board to the CPU board. Make sure the Oscillator board is well mounted and will not easily fall off.
- Lay the CPU/Oscillator board pair down on the bench and insert the Z80 Fluke pod in the processor socket of the CPU board.
- Download the TungOsc.h program into the Fluke and run it to adjust the oscillator board to the proper specifications. You will need the Sync probe and Power supply for this test.
- Slide the CPU/Oscillator board pair back into the unit with the Z80 pod still attached. Do not scrape the ribbon cable of the Z80 pod up against the bottom of the digital output board because this will tear the insulation.
- Use the 110 to 220 VAC step-up-transformer to power the unit up.
- Download and run the Tung.h program to test and repair the entire unit. You will need the Scope and stepper motor simulation box to complete this step.
- Detach the Stepper Motor Simulation Box
- Remove the Z80 Pod and re-insert the regular Z80 processor chip back into the CPU card. Power the unit back up to verify that the Start, Stop and Continuous Cycle buttons light up once and then go out followed by the Stop button continually blinking on and off. The continuos cycle light may or may not be illuminated.
- Tie wrap the 4 main boards into their slots before replacing the top and bottom covers. Re-attach the front panel and re-label it if necessary.
- Power the unit up one more time to check for the proper light sequence.
- You are finished!

10. SPECIAL INFORMATION





Stepper Motor Simulation Box

TEST WRITTEN BY: **ERIC ROUSE** **DATE:** 3/22/99

TEST VERIFIED BY: _____ **DATE:** _____