

7310 & 7610 TROUBLESHOOTING GUIDE

Listed below are some of the problems that you may encounter in maintenance and repair of 7310/7610 family of instruments. To use the guide, first look up the specific problem in the "Problem List". There may be more than one specific problem for the unit. The number(s) that follow the problem correspond to possible answers in the "Solution List".

PROBLEM LIST

- A. Controller does not generate pressure.
7610: 1, 2, 3, 4, 5, 6, 10 7310: 2, 5, 6, 7, 8, 9, 10
- B. Pump position error.
7610: 6, 10, 11 7310: 6, 10, 11
- C. Slow pressure increase.
7610: 1, 4, 5 7310: 2, 7, 8, 9
- D. Poor control characteristics
7610: 1, 5, 12, 13 7310: 2, 7, 8, 9, 12, 13, 14

SOLUTION LIST

1. Air in system
2. Low control air supply pressure
3. Blown rupture disc
4. No or low fluid level in reservoir
5. Leak
6. Sheared drive nut
7. Low supply air pressure
8. Proportion air failure
9. Tescom regulator failure
10. Electronics failure
11. Lost calibration coefficients
12. SCR drive motor board not set correctly
13. Incorrect settings in control menus
14. Improper external system volume

DETAILED SOLUTION LIST

- 1. Air in system.** The 7610 should be isolated from the rest of the test system and bled of all air using the Ruska suggested procedure. A good indication of an air free system is if, with the test port capped, opening and closing the system valve (with the reservoir valve closed) causes a pressure change. After the 7610 is free of ALL air, then bleed the test fixture. If a problem occurs after hooking up the added test fixtures, the problem is in the fixtures. Air in the system is the most common problem! Fluids with poor compressibility (Florinert, Silicon oils...) are also the hardest to remove air from. Air in the system can cause the pump to work excessively and can lead to premature failures.
- 2. Low control air supply pressure.** This supply pressure actuates the valves in the controller. These valves are of a normally open configuration with no air applied. If supply pressure is low, the valves can leak or stick. If the controller is operated with control supply pressure that is too high, the valve seats may become damaged and then not seal correctly when the proper pressure is applied. **The 7310 has special pressure source requirements.** This is the source for the proportion air, which then drives the Tescom regulator. If this supply connection is close to the drive supply of the pressure intensifier, or a supply line is too small or long, a surging or scavenging of the air supply can take place when the intensifier is pumping. A supply regulator or line on the 7310 of insufficient flow will also cause problems.
- 3. Blown rupture disc.** The 7610 burst disc installed as a safety device. This is so the system cannot be excessively over pressurized. The pressure to burst the disc is typically around 110% of the range being protected (some dual range units use a relief valve instead of a burst disc). To locate the disc assembly, follow the reservoir's upper fluid line back into the 7610. This line connects to the top of the assembly. If the disc is blown, fluid will flow towards the reservoir when attempting to pressurize the system. Normally there should be no fluid in this line. (tipping over during shipment or over filling the reservoir can sometimes get fluid in the line) If blown refer to the procedure on replacing rupture disc.
- 4. No or low fluid level in reservoir.** The 7610 fluid level should be well above the reservoir's lower fluid supply connection. The 7610 normally will give a low reservoir error if the level drops too low. If the

connection to the float switch becomes unplugged or the customer uses a different external reservoir, the error will not be displayed. The fluid supply line should be free of air bubbles, as they can get sucked into the 7610 and cause problems.

5. **Leaks.** This at first seems quite obvious, but often can be the cause of many problems and can lead to wasting of time to troubleshooting systems, which really have no problem. The easiest way to see if the system leaks is to pressurize it, allow it to stabilize thermally (a minimum of 10 minutes), then go to the **MEASURE** mode and observe the systems stability. The system should hold pressure. There are two types of leaks: internal and external. External leaks on the 7610 are usually obvious and result in fluid dripping or building up around connections. Leaks can also occur at the packing on valve assemblies or at the pump plunger seal. External leaks on the 7310 can be harder to find because even a tiny leak can pour out lots of gas. Non-corrosive leak soap and an ultrasonic leak detector are the best way to find external pneumatic leaks. Sometimes internal leaks can develop in valves (especially if the supply is overpressurized), or in the 7310 regulator, causing pressure to bleed through the system. **CARE SHOULD BE TAKEN WHEN WORKING WITH ANY PRESSURIZED SYSTEM! FITTINGS SHOULD NEVER BE TIGHTENED WITH PRESSURE ON THEM !!!**

6. **Sheared drive nut.** The drive nut is threaded and rotates to move the plunger in and out. This is how the pump controls pressure. If the gear rotates, but the plunger does not move, the drive nut has sheared. The pump must be removed, disassembled and repaired. Inspect limit switches and adjust to ensure proper operation within range of travel. (Refer to the procedure.)

7. **Low supply pressure.** The supply air to the 7310 needs to be at least 110% of the commanded **CONTROL** pressure to achieve set point. Check the intensifier's supply and drive pressures, and any regulatory devices installed in the supply system for proper pressures.

8. **Failed proportion air.** This device supplies the pressure to control the dome of the Tescom regulator. For a voltage of 0-10 volts it outputs 0-100 psi. A 100 psi pressure gauge can be inserted between it and the dome of the Tescom and voltage applied through the **SHOP 1** menu. Press **COARSE** and then enter the voltage desired. (1 volt = 10 psi, 2 volts

= 20 psi...etc.) The relation between voltage and pressure need not be exact, but must be proportional (reading at 2 volts should be twice of what the pressure was at 1 volt...etc.) There is an offset adjustment, but no span or linearity adjustment. If the voltage/pressure relations are not proportional, replace the unit.

9. Tescom regulator failure. The Tescom uses the pressure supplied to it from the proportion air and outputs pressure in a direct ratio to this input. There are two different regulator assemblies, one for 3000 psi & 6000 psi, and one for 10000 psi. The one for the lower pressures uses a ratio of 75 to 1 and the high pressure regulator uses 125 to 1. This means for 10 psi into the dome of Tescom, the low pressure regulator will output 750 psi, and the high pressure will output 1250 psi. As with the proportion air, the exact numbers are not as important as an even relationship throughout the range. (20 psi in should result in twice the output as 10 psi in) The regulator is self bleeding and with 0 psi input the output is vented. With a 0 psi input there should be no pressure going through the regulator to the output, and after the output has bled off, no gas coming through the vent. If either of these conditions exists, or the pressures are not proportional, replace the regulator. If the regulator acts slow, sticks or is sluggish, replace it.

10. Electronics failure. The 7610/7310 use electronics similar to that used in the 7010. The troubleshooting techniques used in the 7010 can be employed in the 7610/7310. The differences are in the conditioner board; fill pump assembly and motor controls. These are explained in other sections. (see the 7010 manual for details)

11. Lost calibration coefficients. The coefficients for calibration of the pump location and pressure transducers may be changed or erased. If this happens, everything must be recalibrated. Use the same procedure as an initial startup, and compare coefficients in the CAL menu with those on the calibration report for the transducers. If this happens again, there is an electronics problem.

12. SCR drive board not set correctly. Vent output pressure and set the SCR drive board according to the procedure. (As with all electronic assemblies, the board should be given time to warm up properly before any adjustments are made.)(See procedure for board setup)

13. Incorrect settings in control menus. Inspect all values entered in user accessible parameters for numbers of excessively high or low values, and compare with factory defaults.

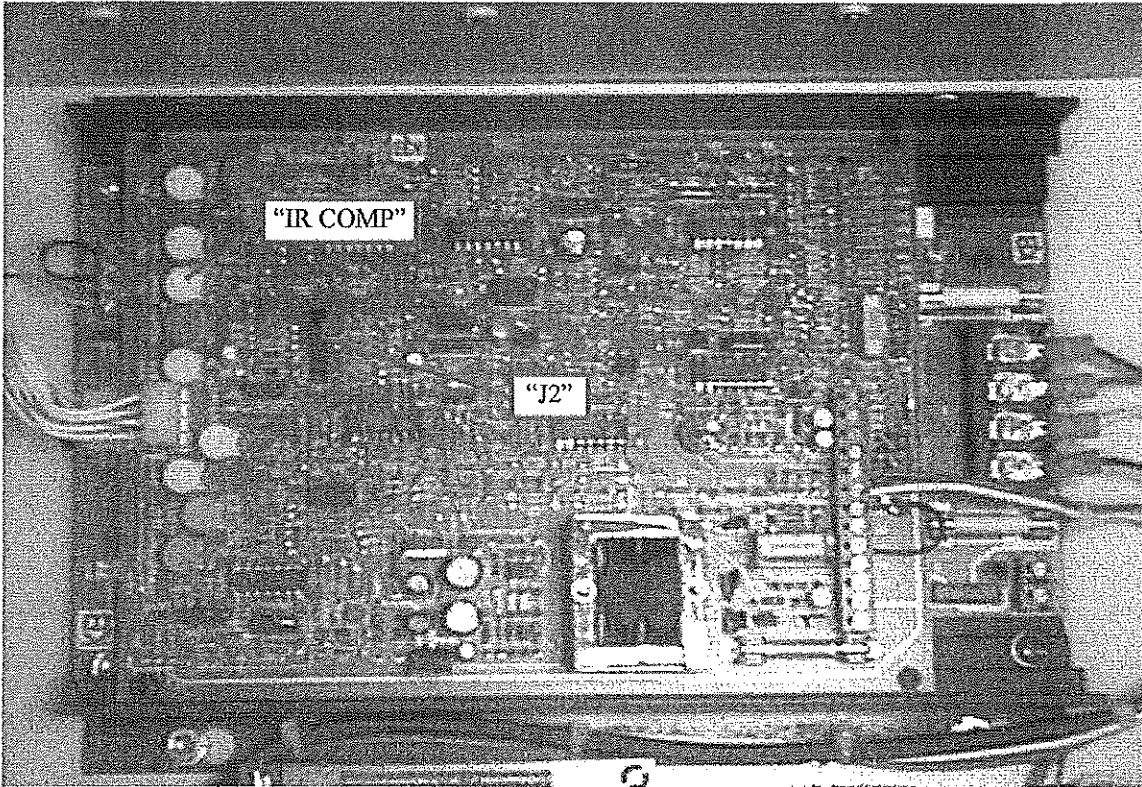
14. Improper external system volume. External system volumes, which are too small, can cause oscillations, overshoot and control noise at set point. External system volumes, which are too large, can cause slow controller response, and wear out pump assemblies prematurely. Some combinations of volumes and fluids can also cause problems. If there are questions regarding volume/fluid relationships and minimum/maximum volume requirements contact Ruska for details.

7610 MENU TREE

MENU (enter menu status)

- DISPLAY (Display Transducer Values)
 - BLANK (Scrolls the pressure across the screen)
 - TEST1
 - TEST2
 - TEST (Enter Test Menu)
 - PUMP (The automatic pump position calibration is in this menu)
 - SWEEP (Sweep pressure between two points a specified number of times)
 - SELF (Perform Self Test)
 - REMOTE (Displays Remote Status, IEEE command input and output)
 - SHOP1 (Manually operate valves, Test keypad, Displays pressure and position, Manually operate pump)
 - PURGE (Displays a visual on the system, Fill pump, Valves, Pump, Pressures of Pump and System)
 - PROGRAM (Enter Program Menu)
 - RUN (Runs selected test routine)
 - DELETE (Deletes selected program)
 - CONFIG (Sets Limits for program other than system limits)
 - EDIT (Edits existing program or input "NEW" program)
 - LOAD (Loads program from memory card)
 - SAVE (save program from card onto system)
 - CAL. (Enter Calibration Menu)
 - ZERO (Auto Zero to system transducer)
 - CALIBRATE BUTTON (Pressed from front panel)
 - ZERO
 - OTHER (Calibrate Secondary Transducers)
 - PUMP PRESSURE (stored coefficients)
 - PUMP POSITION (stored coefficients)
 - LOAD
 - SAVE
 - SETUP (enter setup menu)
 - LIMIT (sets operating limits: high, low, slew)
 - ACCESS (9750547)
 - (WIPEOUT) *CAUTION:* This function is used to "CLEAR ALL" set-up variables.
 - Pressure Range (Sets full scale pressure of unit)
 - Serial Number (Input unit serial number)
 - Low Range (If unit is dual range: input lower range full scale pressure)
 - Switch to Low (If dual range: set point at witch system switches from high to low)
 - Switch to High (If dual range: set point at witch system switches from low to high)
 - Limited Units (YES or NO) (Yes for units shipped to Japan; Units must be set to Mpa)
 - Factory Menus (Turn ON and OFF the shop factory menus)
 - (MORE) Cal. Direction (Sets calibration curve and direction)
 - Motor (Select between SCR Drive or Stepper Drive)
 - Fill Pump (Unit equipped with fill pump YES or NO)
 - Triple Range (YES or NO)
 - (YES) (MORE) Range 1 (Full scale pressure of range 1)
 - Range 2 (Full scale pressure of range 2)
 - Range 3 (Full scale pressure of range 3)
 - USER (User defined: Head Corrections, Specific gravity, Step Size, Bar Graph, Display Digits)
 - UNIT (Selectable unit conversions)
 - REMOTE (Sets Addresses, Baud, parity, data bits, stop bits, GPIB)
 - SYSTEM (Latest Revision Software, Date, Time, Reset)
- MODE
- TARE (set tare mode)
 - RANGE (When triple range is activated: manually switch between ranges)

7310(7610 SCR Drive) CURRENT COMPENSATION "IR COMP"



The "IR Comp" is used to stabilize motor speed under varying loads. When properly adjusted, the control will compensate so minimal motor speed change will occur over a wide range of motor loads.

NOTE: If the "IR Comp" is adjusted too high, the motor will display an unstable oscillatory operation.

The nominal setting for use with the Ruska 7310(7610 SCR Drive) of the IR Comp trimpot is midway (50%). At times it becomes necessary to adjust the trimpot slightly. The range of adjustment for 7310(7610 SCR Drive) application is 30% to 60%. If proper operation at higher pressures (greater motor load) cannot be obtained with this range then it may be necessary to change the current limiting setting at J2 from 2.5A to 5.0A, then retry tuning the IR Comp trimpot.

7310 MENU TREE

MENU (enter menu status)

DISPLAY (Display Transducer Values)

BLANK (Scrolls the pressure across the screen)

TEST1

TEST2

TEST (Enter Test Menu)

PUMP (The automatic pump position calibration is in this menu)

SWEEP (Sweep pressure between two points a specified number of times)

SELF (Perform Self Test)

REMOTE (Displays Remote Status)

SHOP1 (Manually operate valves, Test keypad, Displays pressure and position, Manually operate pump,
Manually operate the Proportion Air controller)

PROGRAM (Enter Program Menu)

RUN (Runs selected test routine)

DELETE (Deletes selected program)

CONFIG (Sets Limits for program other than system limits)

EDIT (Edits existing program or input "NEW" program)

LOAD (Loads program from memory card)

SAVE (save program from card onto system)

CAL. (Enter Calibration Menu)

ZERO (Auto Zero to system transducer, Displays the last time the unit was zeroed)

CALIBRATE BUTTON (Pressed from front panel)

ZERO

OTHER (Calibrate Secondary Transducers)

PUMP PRESSURE (stored coefficients)

PUMP POSITION (stored coefficients)

LOAD

SAVE

SETUP (enter setup menu)

LIMIT (sets operating limits: high, low, slew)

ACCESS (9750547)

(WIPEOUT)

CAUTION: This function is used to "CLEAR ALL" set-up variables

Pressure Range (Sets full scale pressure of unit)

Regulator Ratio (6,000 psi = 75:1, 10,000 psi = 125:1)

Low Range (If unit is dual range: input lower range full scale pressure)

Switch to Low (If dual range: set point at witch system switches from high to low)

Switch to High (If dual range: set point at witch system switches from low to high)

Serial Number (Input unit serial number)

Factory Menus (Turn ON and OFF the shop factory menus)

(MORE) Cal. Direction (Sets calibration curve and direction)

Limited Units (YES or NO) (Yes for units shipped to Japan; Units must be set to Mpa)

Triple Range (YES or NO)

(YES) (MORE) Range 1 (Full scale pressure of range 1)

Range 2 (Full scale pressure of range 2)

Range 3 (Full scale pressure of range 3)

USER (User defined: Head Corrections, Gas Medium, Step Size, Bar Graph, Display Digits)

UNIT (Selectable unit conversions)

REMOTE (Sets Addresses, Baud, parity, data bits, stop bits, GPIB)

SYSTEM (Latest Revision Software, Date, Time, Reset)

MODE

TARE (set tare mode)

RANGE (When triple range is activated: manually switch between ranges)