Ingersoll-Rand
Assembly Solutions

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Technical Bulletin No. 070704 AH

Robot Handshaking

To all IR customers with AutoStream PC systems using “Dispense Fault” or “High / Low Volume Fault”

Potential problem:
Parts made without adhesive or sealer and NO faults issued to robot.

Cause:
- Communication to robot damaged (i.e. unplugged, cable or wire broken etc.)
- Internal I/O bus failure (i.e. inputs and outputs not updated)
- Handshaking to robot not fail safe

Internal errors on the AutoStream system are captured and recorded, but since the dispenser is a slave to the robot it is unaware of what is going on without solid communications. If the dispenser does not receive a cycle start due to hardware communication failures the dispenser does not respond. Therefore, a dispense cycle is not started and no faults are generated. The robot will assume that no faults imply a good part produced and will continue with normal production.

Solution:
IR suggests that a better handshaking scheme be used by the robot, to validate that the dispenser is in fact doing what it is told to do. See attach timing chart.

First: Change from “Dispense Fault” or “High / Low Volume Fault” to “Volume OK’. This is positive affirmation that the part is made correctly at the end of each cycle.

Second: Validate that the cabling is intact, and communication is working. This is accomplished by looking for the “Volume OK’ bit to be low prior to the robot sending the “Dispensing Complete” signal. Then looking for the “Volume OK” bit to be high after the “Dispensing Complete” signal is sent. AutoStream sets the “Volume OK’ signal low upon cycle start (i.e. “Style Strobe” or “Body ID bit”, Device Net I/O or Discrete I/O, respectfully)

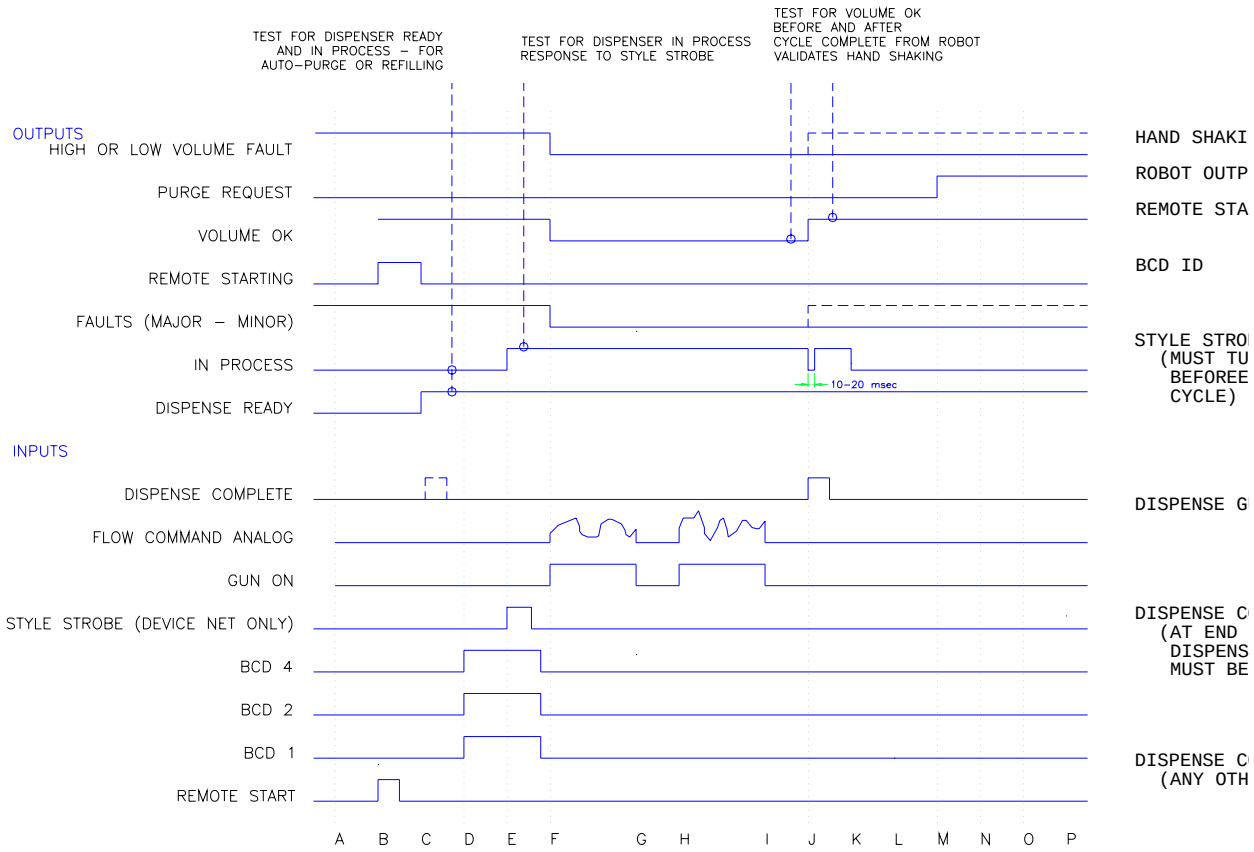
Low – High	volume OK
Low – Low	volume fault, or hardware communication failure
High – Low	hardware communication failure, not probable combination
High – High	hardware communication failure

Third: Do not start a dispense cycle until BOTH “Dispenser Ready” is high and “Dispenser In Process” is low. This insures that the dispenser is not refilling, or auto purging, if required.

Fourth: OPTIONAL – The dispenser turns on the “Dispenser In Process” bit when the “Style Strobe” or “Body ID bit” is received (Device Net I/O or Discrete I/O, respectfully). The robot could look for this response to validate that information is received by the dispenser.

These signals are currently available in all AutoStream PC systems software version 3.00 and above. Upgrades are available for older versions.

SUGGESTED HANDSHAKING VALIDATION



A DISCONNECT POWER ON
B MAIN POWER ON OR REMOTE START
C ROBOT CHECK FOR DISPENSE READY AND IN PROCESS OR PURGE IN PROCESS
D ROBOT IDENTIFY PART (BODY ID)
E ROBOT START MOTION
F ROBOT TURN GUN ON
G ROBOT TURN GUN OFF MULTI DISP
H ROBOT TURN GUN ON
I ROBOT TURN GUN OFF LAST DISP

J ROBOT TURN ON DISP COMPLETE (START PURGE TIME)
K END OF REFILL CYCLE (1K 2K)
L END OF DISPENSE CYCLE
M PURGE TIME OUT

PULSES SHALL BE 100MSEC MINIMUM

THIS LISTING SHOWS ONLY BASIC AND REQUIRED I/O
ADDITIONAL I/O AVAILABLE FOR DIAGNOSTICS