3-NOV-2011

GRIPPER SAFETY CIRCUIT (GSC) ADJUSTMENT PROCEDURE FOR MACHINES WITH METERING VALVE CONTROL

Prior to adjustment, be sure machine is level. Observe good safety practices and never have any portion of your body under the suspended payload. Only those deemed qualified by the customer are to do adjustments to this machine. Improper adjustments could render this safety circuit inoperable or unreliable.

METERING VALVE CONTROL (Standard GSC). Before the payload will be released, it must be supported sufficiently so the air pressure in the lift cylinder is lower than the preset **"GSC"** (adjustable) pressure. When the release/release proof pushbutton is pushed and held, the arm will lower **"BLEED DOWN SPEED"** (rate is customer adjustable) until the load is down and supported. Then, the payload will be released. Note: The arm will stop moving down when the pushbutton is released if the load is not yet supported. ***(all machines have a minimum GSC rating)***

⚠WARNING

The gripper will also release if something or the operator holds the arm up or if the arm reaches its full down position before the load is supported unless an optional arm full down position release prevention limit switch has been installed.

⚠WARNING

If improperly adjusted or the operator or something other than the lift cylinder is supporting the payload, the gripper may open and drop the part. The GSC circuitry does not eliminate the need for a well trained, safety conscious operator.

NOTE: The circuitry will allow the gripper to be closed at any time if the jaws are open. This allows the "GSC ADJ." (lift cylinder pressure sensing valve) to be adjusted for lighter weight parts. The GSC ADJ. valve can be adjusted to required part of the tooling weight's to be supported in addition to the part before allowing release.

Procedure:

A. The initial settings will be for the machine and empty tooling, so remove any payload and position the arm in mid-stroke.

B. Remove the cover of the control box (typically a 4" X 6" by 12" to 16" long box mounted on the manipulator) and locate the flow control valve tagged as **"Bleed Down Speed"** and the valve tagged as **"GSC Adj."**. *(reference photo Pg 2)*

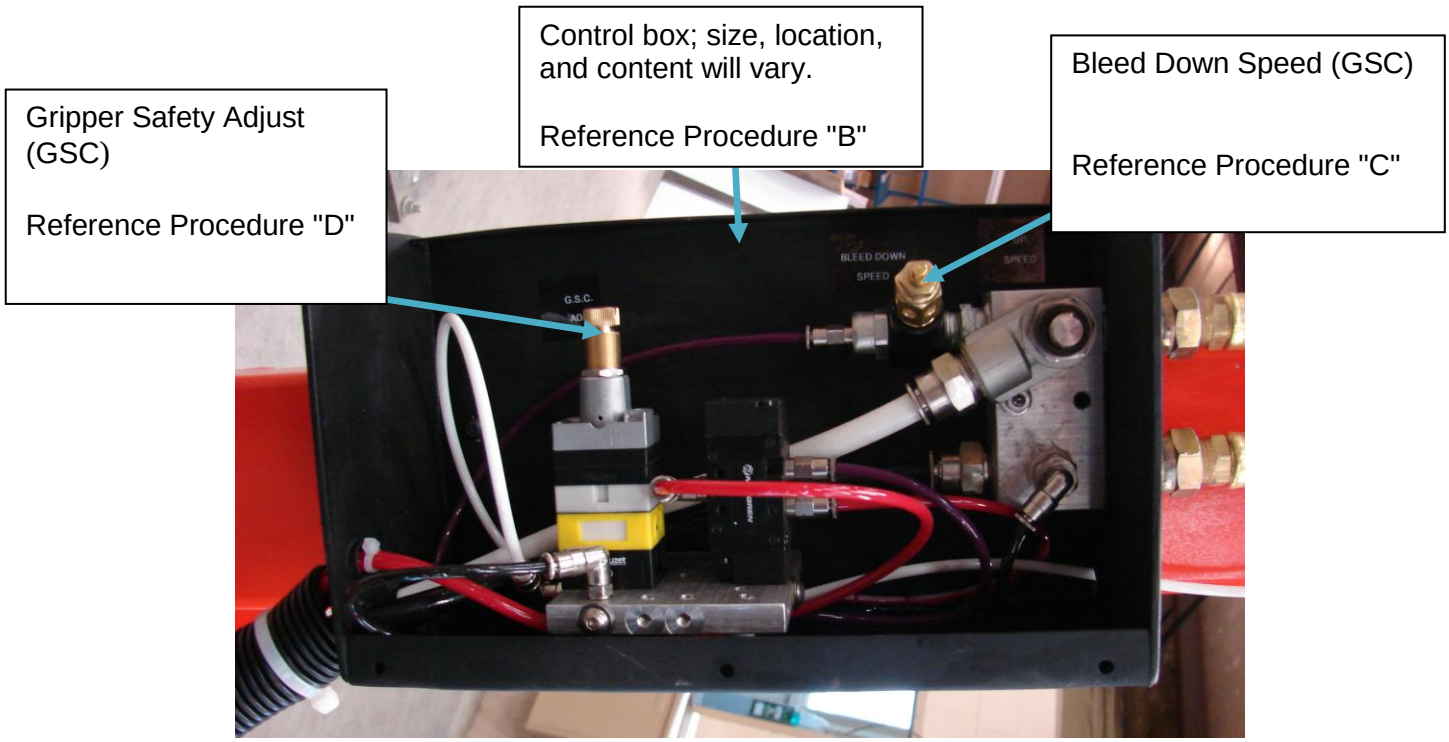
C. Find the flow control valve tagged as "Bleed Down Speed", which is located with the valves in the control box.
CAUTION: The "Bleed Down Speed" flow control valve must never be fully open because this valve must create a pressure differential (back pressure) which is sensed by the (GSC). The flow control should not be more than about 1/2 open; less usually gives a satisfactory lowering speed with a gripped load. *(reference photo Pg 2)*

D. Loosen the locknut on the (GSC Adj.). With the arm in mid-stroke, supporting only itself and tooling, unscrew the adjusting stem until the valve pops.(CCW, but not completely out) Screw the stem in until it pops again (CW), then turn in, 1/4 to 1/2 turn more. Finger tighten the locknut.
(reference photo Pg 2)

NOTE: 1. When this valve is properly adjusted, the empty gripper should open or close (or the vacuum should turn on or off) each time the release/release proof push button is operated when the machine is at rest and there is no external force applied.

2. Without touching the controls, push the arm (tool) down until the (GSC) valve pops.(simulated payload) Remove the down force on the arm, GSC should pop again.(simulated no payload)

3. If the "GSC" valve pops just before all the down force is removed, it will be the most sensitive; i.e., it will sense a fairly light payload.



E. Mechanically attach a payload (test weight) which is close to the minimum *GSC rating of your machine*.

⚠CAUTION

F. Make sure the area around the arm **(tooling)** is unobstructed when you move the mechanical payload **(test weight)** to about 6 inches above a suitable set-down surface. Push and hold the RELEASE/RELEASE PROOF pushbutton. The arm should lower, but the gripper should not release until the payload is down and supported. If the lowering speed is not satisfactory, adjust the flow control **(Bleed Down Speed)** so the arm and gripped load lower at a satisfactory rate when you push and hold the release/release proof pushbutton. If the gripper opens before the load is adequately supported, unscrew the stem on the **(GSC Adj.)** a small amount to change the sensitivity. Repeat as much as necessary, but you will reach a point where the gripper will not function when it is empty. Therefore, you need to make your final adjustment so the gripper operates when in mid-air and empty and doesn't operate when the arm is moving down with a gripped load. Once you verify that the gripper won't drop a load in mid-stroke, you can test with the gripped load higher than 6 inches above the support surface.

REMINDER: If the release/release proof pushbutton is released and the load is not yet supported, the arm should stop moving down.

COMMENTS: (1) You will find that the slower the arm moves down (" Bleed Down Speed" flow control more closed) when the pushbutton is held, the lighter the payload can be without the gripper opening before the load is supported.

(2) If tooling weights change, GSC will need to be adjusted accordingly. Tooling weight change is a heavier tool, (adjust GSC screw CW in to find "audible valve pop"). Tooling weight change is a lighter tool, (adjust GSC screw CCW out to find "audible valve pop").

G. Once the valves are satisfactorily adjusted, gently lock them, but be sure the setting doesn't change while they are being locked. Recheck for proper operation after the valves are locked.

H. Replace the cover on the control box.

4-NOV-2011

GRIPPER SAFETY CIRCUIT (GSC) ADJUSTMENT PROCEDURE
FOR MACHINES WITH BALANCE CONTROL

Prior to adjustment, be sure machine is level. Observe good safety practices and never have any portion of your body under the suspended payload. Only those deemed qualified by the customer are to do adjustments to this machine. Improper adjustments could render this safety circuit inoperable or unreliable.

BALANCE CONTROL (Standard GSC). Before the payload will be released, it must be supported sufficiently so the air pressure in the lift cylinder is lower than the preset **"GSC"** (adjustable) pressure. When the release/release proof pushbutton is pushed and held, the arm will lower **"BLEED DOWN SPEED"** (rate is customer adjustable) until the load is down and supported. Then, the payload will be released. Note: The arm will stop moving down when the pushbutton is released if the load is not yet supported. ***(all machines have a minimum GSC rating)***

The gripper safety circuit with balance controls is the most beneficial when *automatic activation* of the balance circuit is also installed. (*which is usually the case*) Please refer to the pneumatic schematic for the location and description of the adjustable controls.

⚠WARNING

The arm (**tooling**) will move **upward rapidly** if the grip push button/load toggle is activated and there is no payload in the gripper. (*exception to this rapid upward movement when there is a part present valve on the tooling or gripper*)

⚠WARNING

Although not considered normal operation, the arm will **lower rapidly** with a suspended gripped payload if the balance control toggle switch is moved to the **NO LOAD** position. (*if equipped*) The payload will not be released until the release/release proof push button is activated.

⚠WARNING

The gripper will also release if something or the operator holds the arm up or if the arm reaches its full down position before the load is supported unless an optional arm full down position release prevention limit switch has been installed.

⚠WARNING

If improperly adjusted or the operator or something other than the lift cylinder is supporting the payload, the gripper may open and drop the part. The GSC circuitry does not eliminate the need for a well trained, safety conscious operator.

NOTE: The circuitry will allow the gripper to be closed at any time if the jaws are open. This allows the "GSC ADJ." (lift cylinder pressure sensing valve) to be adjusted for lighter weight parts. The GSC ADJ. valve can be adjusted to required part of the tooling weight's to be supported in addition to the part before allowing release.

Procedure:

A. The initial settings will be for the machine and empty tooling, so remove any payload and position the arm in mid-stroke.

B. Remove the cover of the control box (typically a 4" X 6" by 12" to 16" long box mounted on the manipulator) and locate the flow control valve tagged as **"Bleed Down Speed"** and the valve tagged as **"GSC Adj."** and the regulator tagged **NO LOAD**, and regulator tagged **LOAD**. *(reference photo Pg 2 & 3)*

C. Set the **NO LOAD** balance regulator to properly support the arm and empty tooling. *Any time the no load regulator is changed or adjusted, the GSC valve needs to be reset as well.* (*reference photos Pg 2 & 3*)

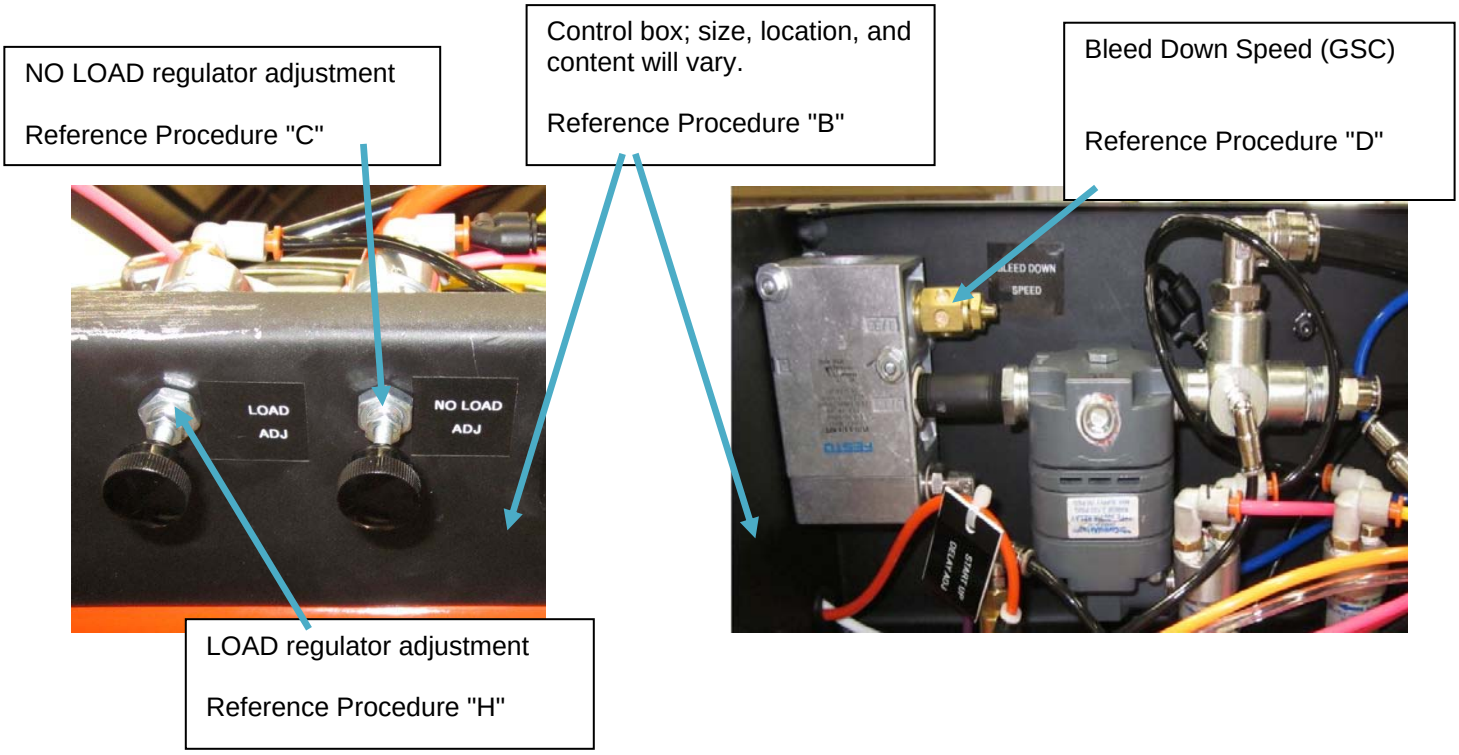
D. Find the flow control valve tagged as "Bleed Down Speed", which is located with the valves in the control box. **CAUTION:** The "Bleed Down Speed" flow control valve must never be fully open because this valve must create a pressure differential (back pressure) which is sensed by the (GSC). The flow control should not be more than about 1/2 open; less usually gives a satisfactory lowering speed with a gripped load. *(reference photo Pg 2)*

E. Loosen the locknut on the (**GSC Adj**.). With the arm in mid-stroke, and the **NO LOAD** regulator properly set, supporting only itself and tooling, unscrew the adjusting stem until the valve pops.(CCW, but not completely out) Screw the stem in until it pops again (CW), then turn in (CW), 1/4 to 1/2 turn more. Finger tighten the locknut. *(reference photo Pg 3)*

NOTE: 1. When this valve is properly adjusted, the empty gripper should open or close (or the vacuum should turn on or off) each time the release/release proof push button is operated when the machine is at rest and there is no external force applied.

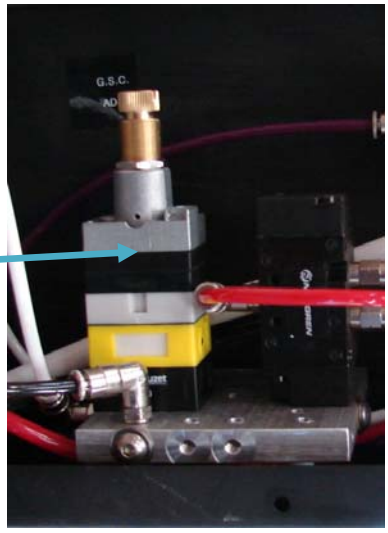
2. Without touching the controls, push the arm (tool) down until the (GSC) valve pops.(simulated payload) Remove the down force on the arm, GSC should pop again.(simulated no payload)

3. If the "GSC" valve pops just before all the down force is removed, it will be the most sensitive; i.e., it will sense a fairly light payload.



Gripper Safety Adjust (GSC)

Reference Procedure "E"



F. Mechanically attach a payload (*test weight*) which is close to the minimum *GSC rating of your machine*.

⚠CAUTION

G. Grip test weight and activate the LOAD toggle switch (*if equipped*), or activate part present valve (*if equipped*)

H. Set the **LOAD** balance regulator to properly support a test weight which will be close to the minimum *GSC rating of your machine.* (*reference photos Pg 2*)

You can use your actual payload for the ***test weight***, but if the gripper should release the load before it is supported, the arm (**tooling**) may move rapidly upward, which can be dangerous.

⚠CAUTION

I. Make sure the area around the arm **(tooling)** is unobstructed when you move the mechanical payload **(test weight)** to about 6 inches above a suitable set-down surface. Push and hold the RELEASE/RELEASE PROOF pushbutton. The arm should lower, but the gripper should not release until the payload is down and supported. If the lowering speed is not satisfactory, adjust the flow control **(Bleed Down Speed)** so the arm and gripped load lower at a satisfactory rate when you push and hold the release/release proof pushbutton. If the gripper opens before the load is adequately supported, unscrew the stem on the **(GSC Adj.)** a small amount to change the sensitivity. Repeat as much as necessary, but you will reach a point where the gripper will not function when it is empty. Therefore, you need to make your final adjustment so the gripper operates when in mid-air and empty and doesn't operate when the arm is moving down with a gripped load. Once you verify that the gripper won't drop a load in mid-stroke, you can test with the gripped load higher than 6 inches above the support surface.

REMINDER: If the release/release proof pushbutton is released and the load is not yet supported, the arm should stop moving down.

COMMENTS: (1) You will find that the slower the arm moves down (" Bleed Down Speed" flow control more closed) when the pushbutton is held, the lighter the payload can be without the gripper opening before the load is supported.

(2) If tooling weights change, NO LOAD regulator and GSC will need to be adjusted accordingly. Tooling weight change is a heavier tool, *(adjust GSC screw CW in to find "audible valve pop").* Tooling weight change is a lighter tool, *(adjust GSC screw CCW out to find "audible valve pop").*

J. Once the valves are satisfactorily adjusted, gently lock them, but be sure the setting doesn't change while they are being locked. Recheck for proper operation after the valves are locked.

K. Replace the cover on the control box.