

TECHNICAL BULLETIN

AIR SUSPENSIONS



AUTO LIFT AXLE CONTROL VALVE

Installation / Calibration Instructions

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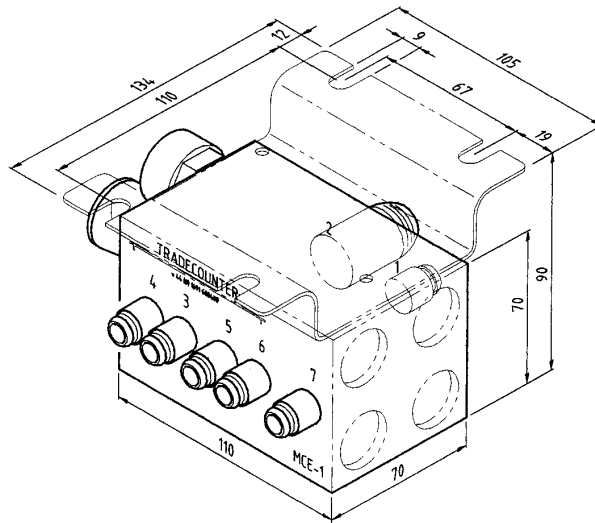
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TECHNICAL BULLETIN

TRAILER AIR SUSPENSION AUTO LIFT AXLE CONTROL VALVE

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Description and Operation

The Hendrickson Aceval Lift Axle Control Valves (LALACV) are used for the control of the lift axle on an air suspended multi-axle truck or trailer.

Two valves are available. A fully automatic raise and lower system (covered in Section One of this Bulletin), or a manual raise and automatic lowering system (outlined in Section Two of this Bulletin).

Tyre, brake and bearing life are all improved in situations where the trailer is unloaded or partially loaded. This is achieved by using one of the HALACV's to control lifting the "non required" axle off the ground and lifting that axle. The axle group ground load at which

time the lift axle should lift is predetermined and adjusted by the installer.

Legislation requires that all axles should be on the ground as the vehicle becomes loaded. Again, ***the axle group ground load at which time the lift axle should lower is pre-determined and adjusted by the installer.***

IMPORTANT SAFETY NOTICE

IT IS THE RESPONSIBILITY OF THE INSTALLER TO KNOW, UNDERSTAND AND ADHERE TO ALL APPLICABLE STATE AND FEDERAL REGULATIONS GOVERNING THE USE OF LIFTABLE AXLES AND SUSPENSIONS.

WARNING

HENDRICKSON REMINDS USERS TO ADHERE TO THE PUBLISHED CAPACITY RATINGS FOR SUSPENSIONS. DO NOT MODIFY OR REWORK PARTS OTHER THAN OUTLINED IN THIS PUBLICATION. USE OF A MODIFIED OR SUBSTITUTE PART IS NOT RECOMMENDED BECAUSE THE PART MAY NOT MEET HENDRICKSON'S SPECIFICATIONS, WHICH COULD LEAD TO FAILURE OF THE PART, LOSS OF VEHICLE CONTROL AND POSSIBLE PERSONAL INJURY OR DAMAGE OF PROPERTY.

DO NOT USE A CUTTING TORCH TO REMOVE ANY ATTACHING FASTENERS. THE USE OF HEAT ON SUSPENSION COMPONENTS WILL ADVERSELY AFFECT THE STRENGTH OF THESE PARTS. A COMPONENT DAMAGED IN THIS MANNER MAY RESULT IN LOSS OF VEHICLE CONTROL AND POSSIBLE PERSONAL INJURY OR DAMAGE OF PROPERTY.

Section 1
Auto Raise/Lower

FEATURES

- ? Suitable for vehicles with tandem or tridem suspensions.
- ? Suitable for vehicles with two liftable suspensions (tandem lift).
- ? Manual lifting and lowering override.
- ? Automatic lowering and lifting operation.
- ? Adjustable automatic drop pressure.
- ? Adjustable automatic lifting pressure.
- ? All push-in fittings with locking clip to suit 3/8" nylon tube.
- ? Easy to install by means of a mounting bracket included in the assembly kit.

- ? Isolation from dynamic overloads produced by the vehicle running due to an anti-surge feature for the signal to activate the automatic drop and the automatic lifting.

OPERATING SPECIFICATIONS

- Fluid to use: Filtered Air
- Maximum pressure: 203 psi
- Temperature range: -35°C to 80 °C
- Pressure range to activate the automatic drop: 33 psi to 84 psi
- Differential range between the drop & lifting pressure: 17.5 psi to 36 psi

ADJUSTMENT

Initial Set-up

Since many vehicle configurations exist and laws vary, the HALACV's are not supplied adjusted. Each installer must either calibrate the HALACV on the vehicle to each customer's demands or simulate in-vehicle conditions / pressures on a test bench.

In configuring a test bench ensure the following details (see Figure 1):

- ? In the port "P1" of the valve, normal vehicle air system pressure must exist (85-120psi).
- ? The pressure signal used to pilot the valve must be taken from port "P4".

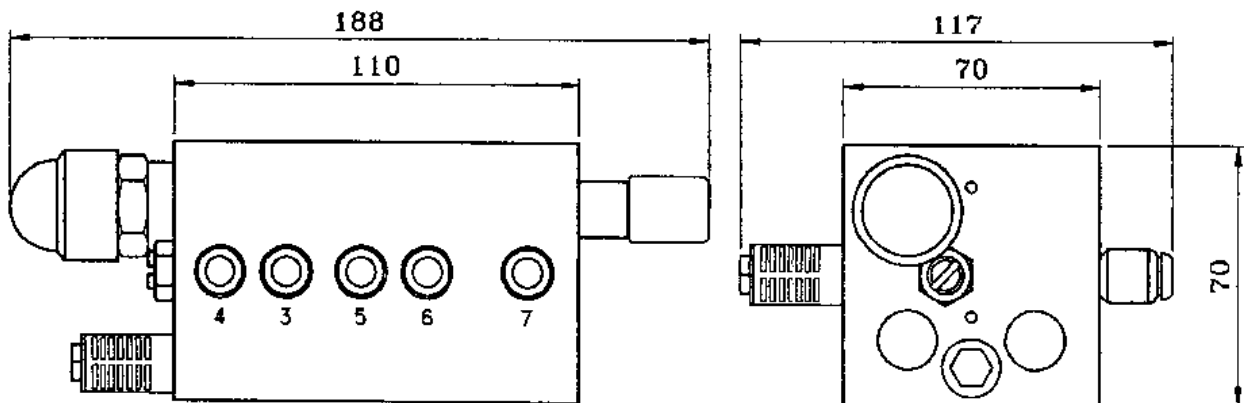


Figure 1

A full system plumbing schematic is shown at the end of this Section as Figure 4.

Automatic Drop Pressure Adjustment

1. The pressure at which the lift axle must lower (**PL**) is dependent on the axle lowering transition mass (**TM**) required. The transition mass is a function of the vehicle configuration, suspension geometry, and legislation. The first step is to determine the automatic drop pressure. See Annex A for a summary of lowering transition mass/load pressure relationships for current Hendrickson trailer suspensions.

*e.g. A triaxle trailer fitted with HT230 and a single lift axle with a transition mass of 13,000kg will have automatic drop pressure (**PL**) of 60psi.*

2. The automatic drop pressure adjustment screw is shown below (Figure 2). With the regulation screw in the minimum pressure position (nut level, 12mm screw inside), the automatic drop pressure will be adjusted to approximately 33psi.

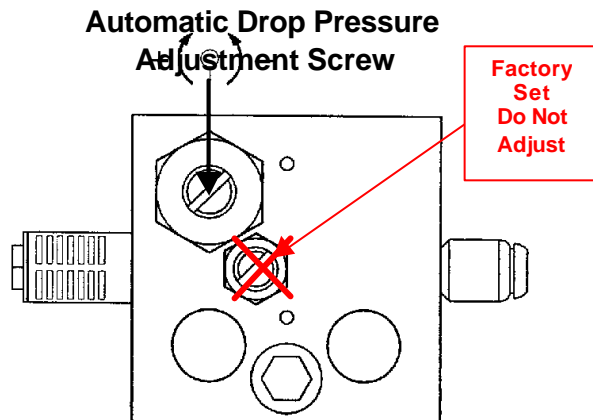


Figure 2

3. To increase the automatic drop pressure, turn the regulation screw clockwise, approximately 3psi each turn.

Note: This is an approximate only. The actual drop pressure should be measured on either a vehicle or test bench.

4. The maximum automatic drop pressure that can be adjusted is approximately 84psi. The number of turns from the initial position to this maximum is 18 turns.

Automatic Lift Pressure Adjustment

1. The pressure at which the lift axle must automatically raise is dependent on the air spring pressure (**P2**) when the liftable axle lowers at the transition mass.
2. This is calculated by first taking the transition mass (**TM**) and dividing that mass by the total number of axles (**NA**). This will give us the mass per axle (**MPA**).

$$\text{MPA} = \text{TM} / \text{NA}$$

$$\text{e.g. MPA} = 13,000 / 3 = 4,300\text{kg}$$

3. Since we now know the mass per axle, the pressure in the air springs can be determined by making reference to the load/ pressure relationship of the suspension. See Annex B and C for a summary of load pressure relationships for current Hendrickson trailer suspensions.

e.g.: At 4,300kg/axle, for an HT230 triaxle configuration, $P_2 = 38\text{psi}$.

4. The automatic raise pressure (**PR**) is calculated by determining what the air system pressure would be immediately after the lift axle lowered at the transition mass then subtracting 10%.

$$\text{e.g. PR} = P_2 \times 0.9 = 38 \times 0.9 = 34\text{psi}$$

5. The automatic raise adjustment feature on the ALACV is controlled by altering the margin (**PM**) between the automatic lower pressure (**PL**) and the required automatic raise pressure (**PR**).

$$\text{PM} = \text{PL} - \text{PR}$$

$$\text{e.g. PM} = \text{PL} - \text{PR} = 60 - 34 = 26\text{psi}$$

6. The automatic raise pressure margin adjustment screw is shown below (Figure 3). With the regulation screw in the minimum pressure position (nut level), the automatic raise pressure margin will be adjusted to approximately the minimum margin, 17.5psi.

Automatic Raise Pressure Margin Adjustment Screw (under cap)

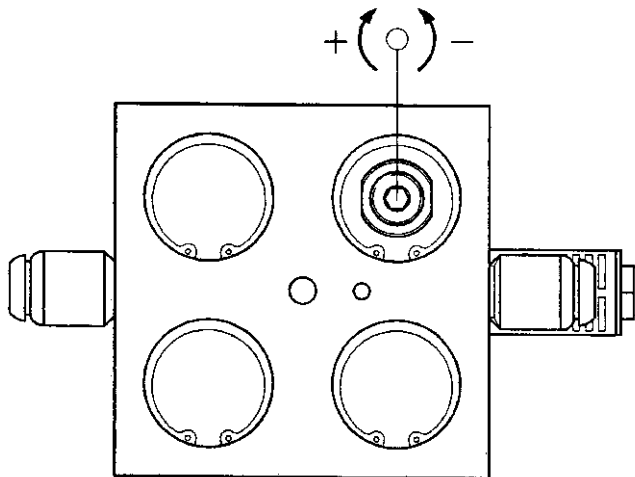


Figure 3

7. To increase the automatic drop pressure margin, turn the automatic raise pressure margin adjustment screw clockwise, approximately 2.5psi each turn.

Note: This is an approximate only. The actual raise pressure should be measured on either a vehicle or test bench.

MANUAL OVERRIDE

The Hendrickson ALACV has a manual override valve which is shown schematically in Figure 4.

To override the automatic functions of the ALACV, the valve control must be pulled out. To function in fully automatic mode, the valve control must be fully depressed.

Section 2

Manual Raise / Auto Lower

FEATURES

- ? Suitable for vehicles with tandem or tridem suspensions.
- ? Suitable for vehicles with two liftable suspensions (tandem lift).
- ? Manual lifting and lowering override.
- ? Automatic lowering operation.
- ? Adjustable automatic drop pressure.
- ? All push-in fittings with locking clip to suit 3/8" nylon tube.
- ? Easy to install by means of a mounting bracket included in the assembly kit.
- ? Isolation from dynamic overloads produced by the vehicle running due to an anti-surge feature for the signal to activate the automatic drop and the automatic lifting.

OPERATING SPECIFICATIONS

| | |
|--|------------------|
| Fluid to use: | Filtered Air |
| Maximum pressure: | 203 psi |
| Temperature range: | -35°C to 80 °C |
| Pressure range to activate the automatic drop: | 31 psi to 55 psi |

ADJUSTMENT

Initial Set-up

Since many vehicle configurations exist and laws vary, the HALACV's are not supplied adjusted. Each installer must either calibrate the HALACV on the vehicle to each customer's demands or simulate in-vehicle conditions / pressures on a test bench.

In configuring a test bench ensure the following details (see Figure 1):

- ? In the port "P1" of the valve, normal vehicle air system pressure must exist (85-120psi).
- ? The pressure signal used to pilot the valve must be taken from port "P4".

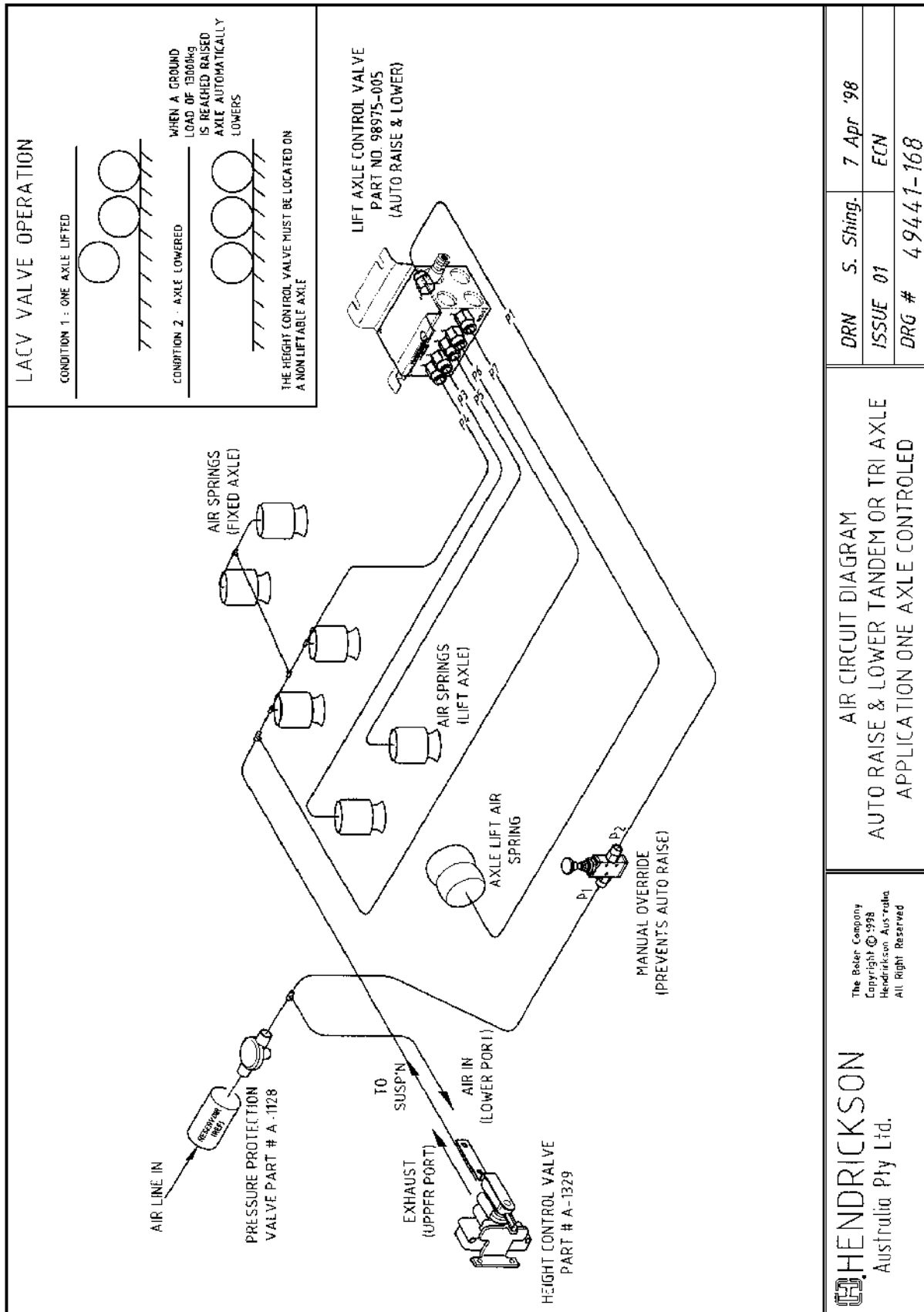


Figure 4

A full system plumbing schematic is shown at the end of this Section as Figure 6.

Automatic Drop Pressure Adjustment

1. The pressure at which the lift axle must lower (**PL**) is dependent on the axle lowering transition mass (**TM**) required. The transition mass is a function of the vehicle configuration, suspension geometry and legislation. The first step is to determine the automatic drop pressure. See Annex A for a summary of lowering transition mass / load pressure relationships for current Hendrickson trailer suspensions.

*e.g.: A triaxle trailer fitted with HT230 and a single lift axle with a transition mass of 13,000kg will have automatic drop pressure (**PL**) of 60psi.*

2. The automatic drop pressure adjustment screw is shown below (Figure 5). With the regulation screw in the minimum pressure position (nut level, 12mm screw inside), the automatic drop pressure will be adjusted to approximately 31psi.

3. To increase the automatic drop pressure, turn the regulation screw clockwise, approximately 1.5psi each turn.

Note: This is an approximate only. The actual drop pressure should be measured on either a vehicle or test bench.

4. The maximum automatic drop pressure that can be adjusted is approximately 60psi. The number of turns from the initial position to maximum is 18 turns.

Automatic Drop Pressure Adjustment Screw

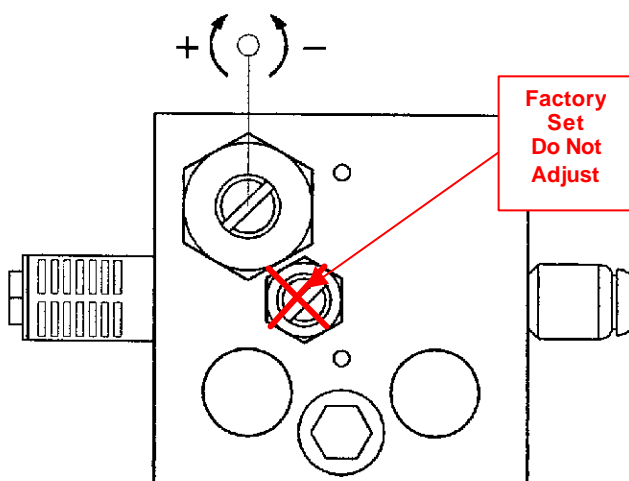


Figure 5

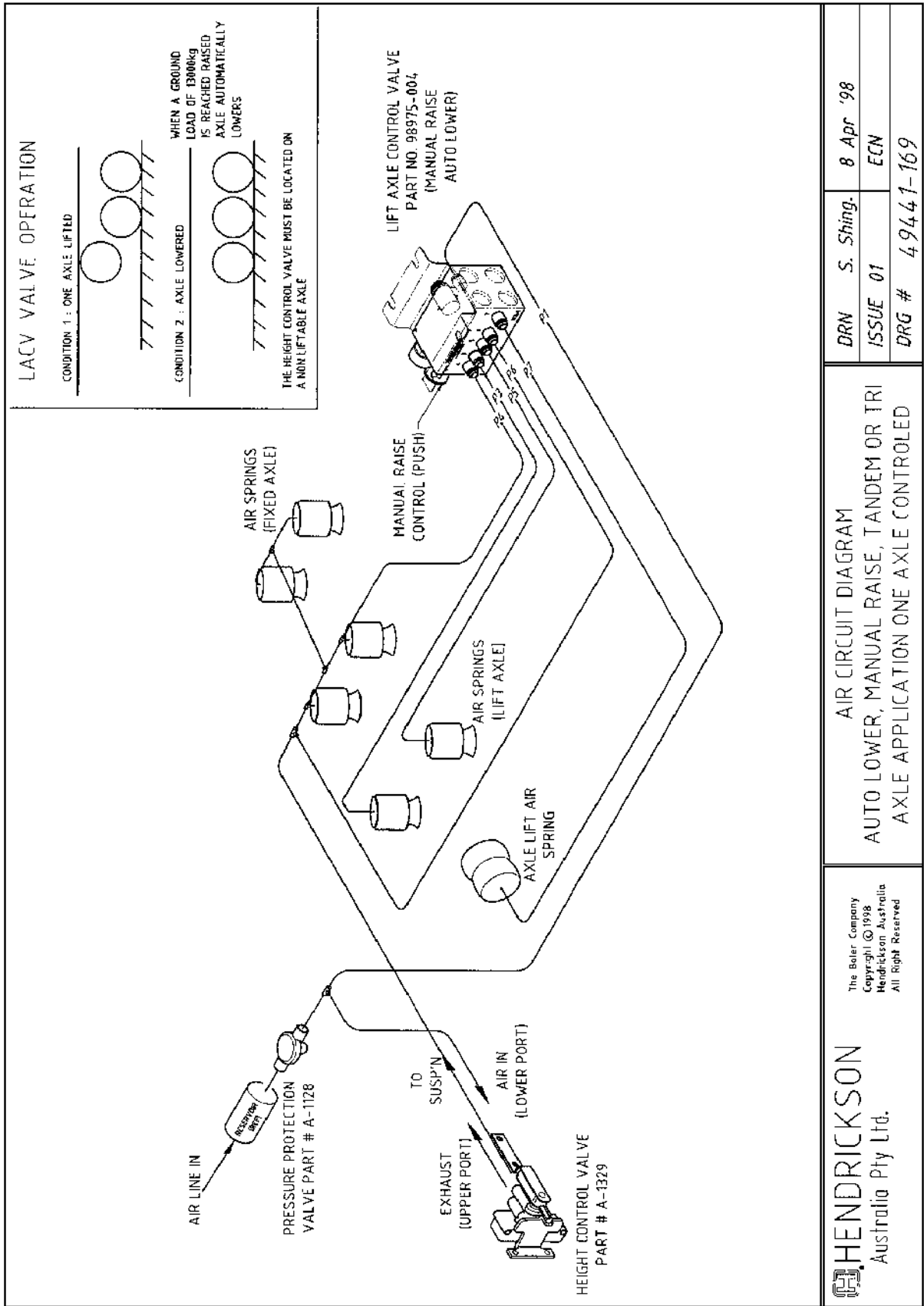


Figure 6

Annex A: Intraax Load Scale Charts

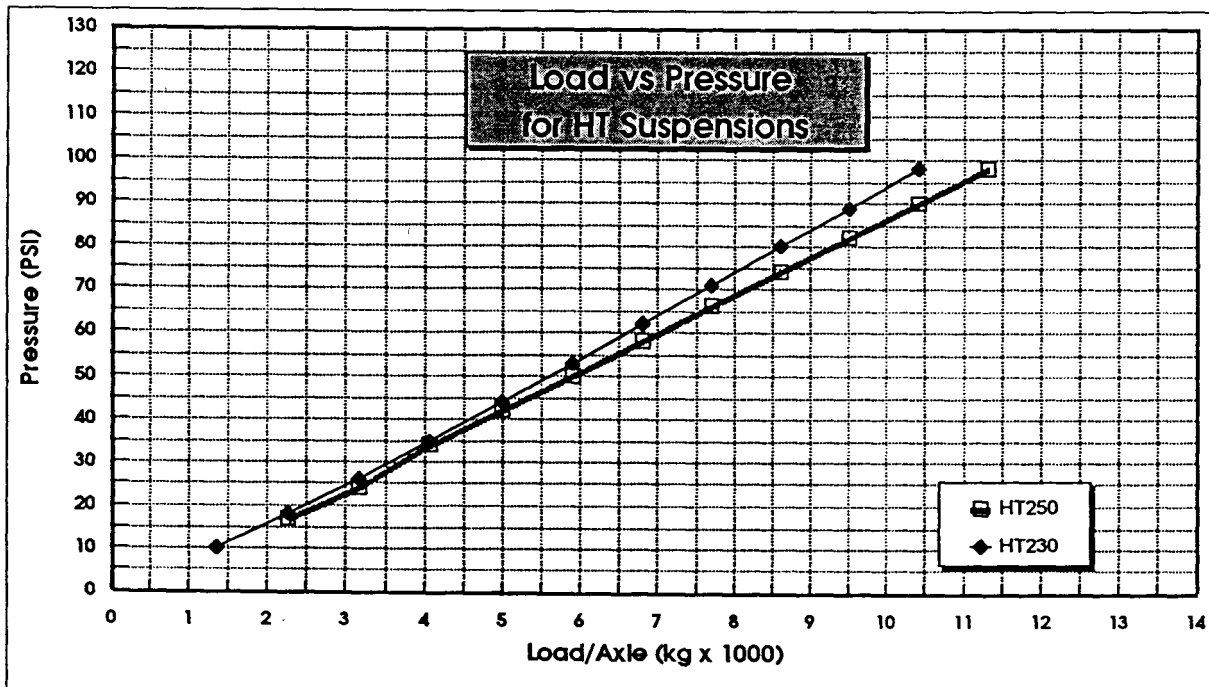
The tables below show the latest pressure to suspension load ratings for Hendrickson's AA230 and AA250 axle/suspension systems. The values apply to both the "AAL" and the "AAT" versions of the suspensions along with the "HKA" slider models. The values represent a nominal relationship based partially on typical axle, wheel and tire weights. Each installation arrangement should be measured if a more accurate reading is required.

| AA230, HKA180 & HKA200 | |
|--|--------------|
| LOAD PER AXLE | REQUIRED PSI |
| 23,000 | 95 |
| 21,000 | 87 |
| 19,000 | 80 |
| 17,000 | 71 |
| 15,000 | 61 |
| 13,000 | 52 |
| 11,000 | 43 |
| 9,000 | 34 |
| 7,000 | 25 |
| 5,000 | 16 |
| Air Spring Part Numbers: C-21800, C-21966, C-22948, C-23720, C-23613 & C-23614 | |

| AA250 & HKA250 | |
|--|--------------|
| LOAD PER AXLE | REQUIRED PSI |
| 25,000 | 95 |
| 23,000 | 87 |
| 21,000 | 82 |
| 19,000 | 73 |
| 17,000 | 65 |
| 15,000 | 55 |
| 13,000 | 47 |
| 11,000 | 39 |
| 9,000 | 31 |
| 7,000 | 23 |
| 5,000 | 14 |
| Air Spring Part Numbers: C-20901, C-23611, C-23612, C-23721& C-23748 | |

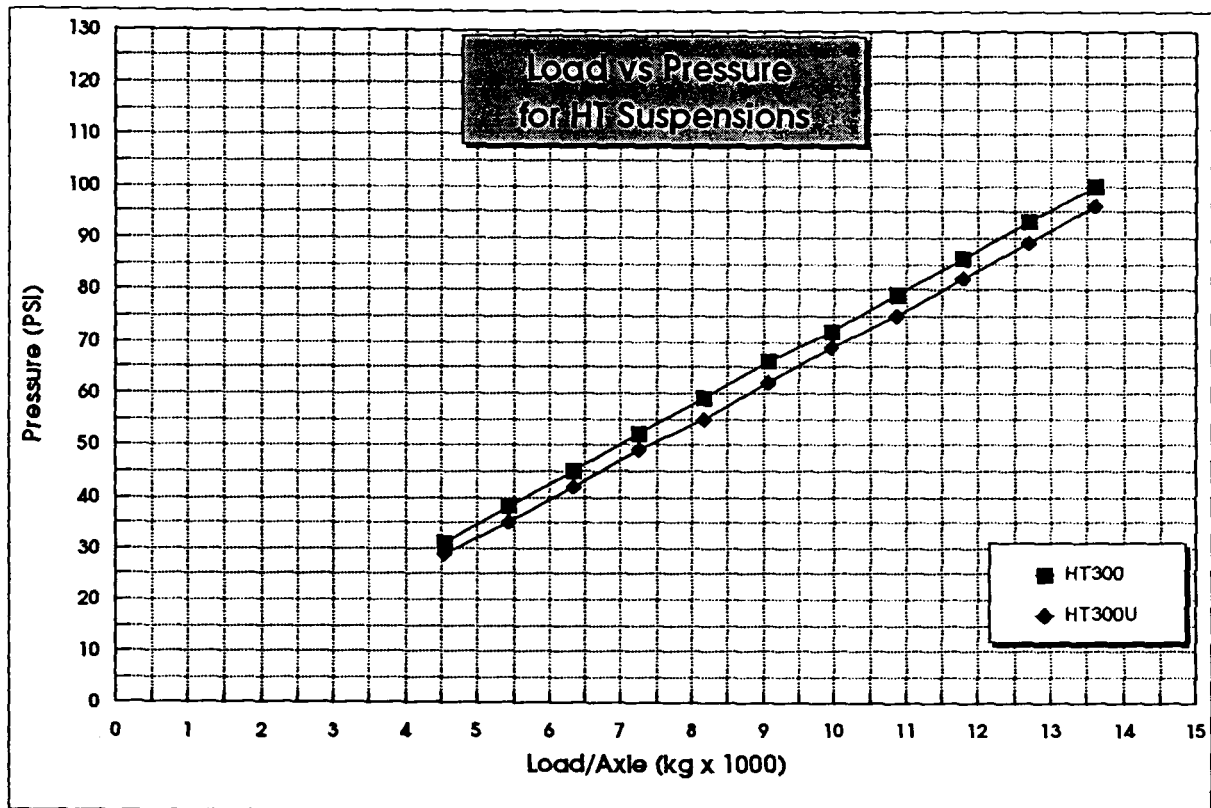
Load - Pressure relationship

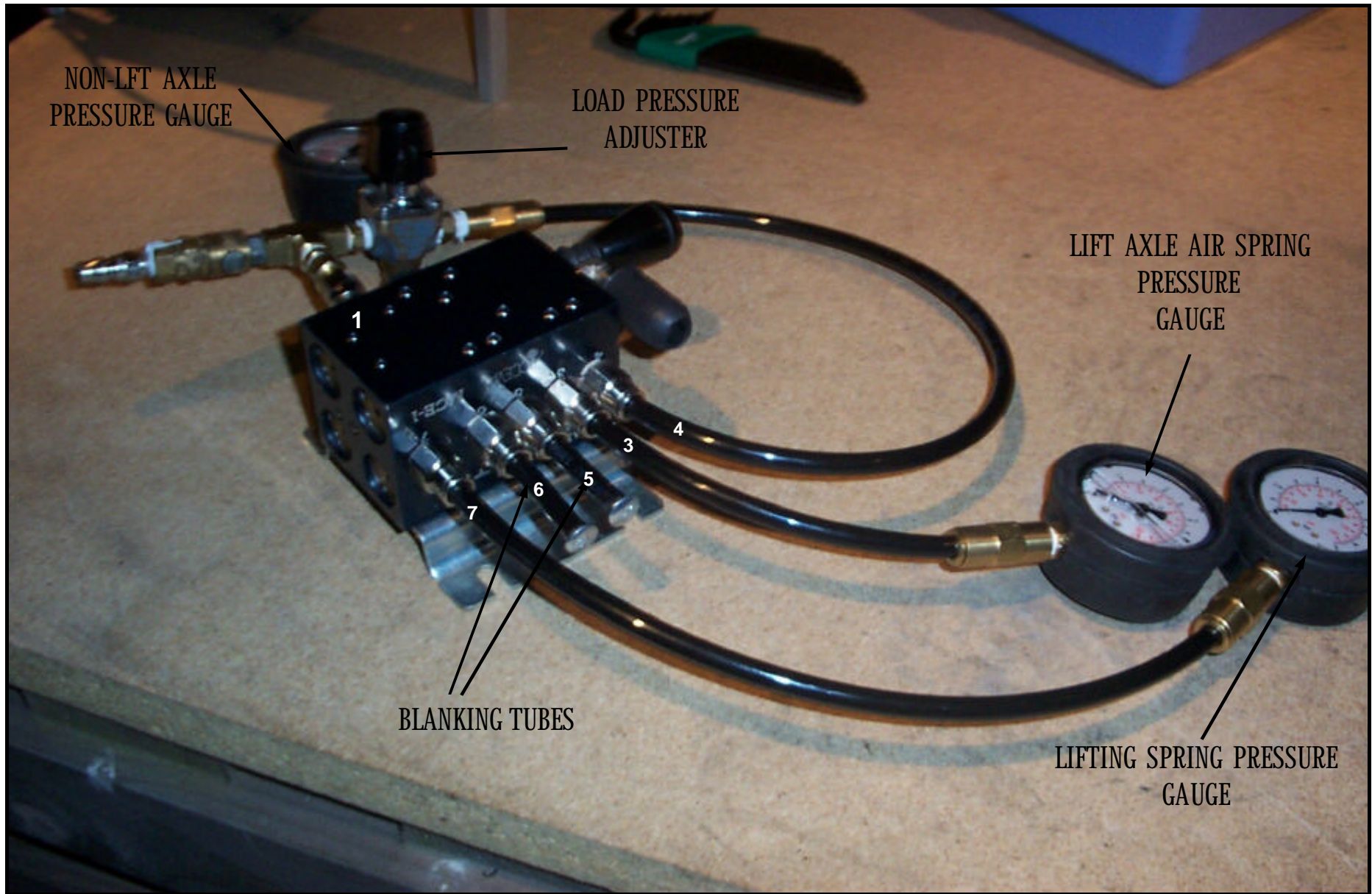
| Load Per Axle lbs | Load per axle (kg) | Pressure HT250(PSI) | Pressure HT230(PSI) |
|-------------------|--------------------|---------------------|---------------------|
| 29000 | 13154 | | |
| 27000 | 12247 | | |
| 25000 | 11340 | 98 | |
| 23000 | 10433 | 90 | 98 |
| 21000 | 9525 | 82 | 89 |
| 19000 | 8618 | 74 | 80 |
| 17000 | 7711 | 66 | 71 |
| 15000 | 6804 | 58 | 62 |
| 13000 | 5897 | 50 | 53 |
| 11000 | 4990 | 42 | 44 |
| 9000 | 4082 | 34 | 35 |
| 7000 | 3175 | 24 | 26 |
| 5000 | 2268 | 17 | 18 |
| 3000 | 1361 | | 10 |



Load - Pressure relationship

| Load Per Axle lbs | Load per axle (kg) | Pressure HT300(PSI) | Pressure HT300U(PSI) |
|----------------------|-----------------------|------------------------|-------------------------|
| 30000 | 13608 | 100 | 96 |
| 28000 | 12701 | 93 | 89 |
| 26000 | 11793 | 86 | 82 |
| 24000 | 10886 | 79 | 75 |
| 22000 | 9979 | 72 | 69 |
| 20000 | 9072 | 66 | 62 |
| 18000 | 8165 | 59 | 55 |
| 16000 | 7257 | 52 | 49 |
| 14000 | 6350 | 45 | 42 |
| 12000 | 5443 | 38 | 35 |
| 10000 | 4536 | 31 | 29 |





AUTO LOWER / MANUAL RAISE TEST GAUGE SET UP