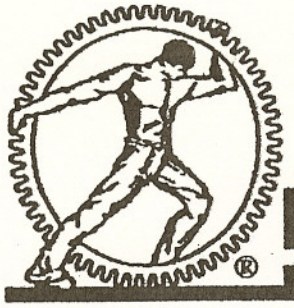


DYNAMIC
Suspensions

# Dynamic Suspensions

# FF-2000

# Damper Manual

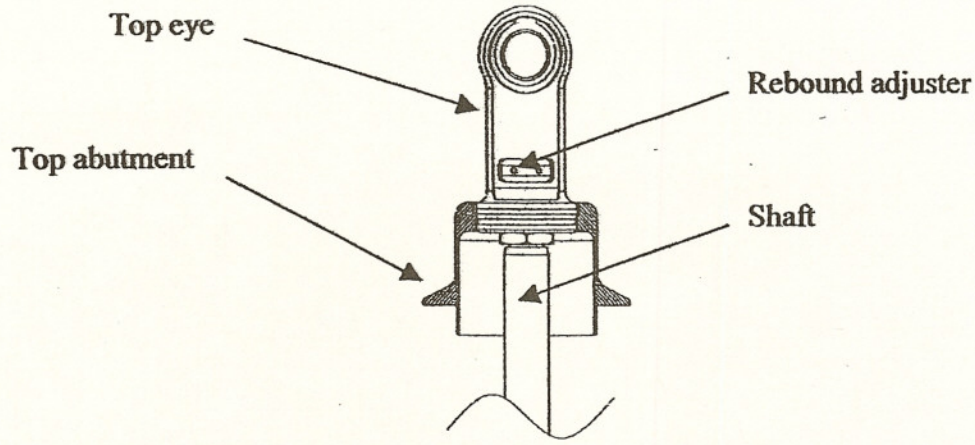
## V 1.01

Dynamic Suspensions
20, Fison Way
Thetford
Norfolk IP24 1HJ (UK)
Tel: (01842) 755 744
Fax: (01842) 752 626

# 2 - DAMPER ADJUSTMENT

## REBOUND DAMPING ADJUSTMENT

The rebound adjuster is located in the top eye of the damper shaft. The rebound adjuster is a red anodised thumb wheel. This adjuster can be turned by hand, or through the use of a Ø 1.9mm pin.

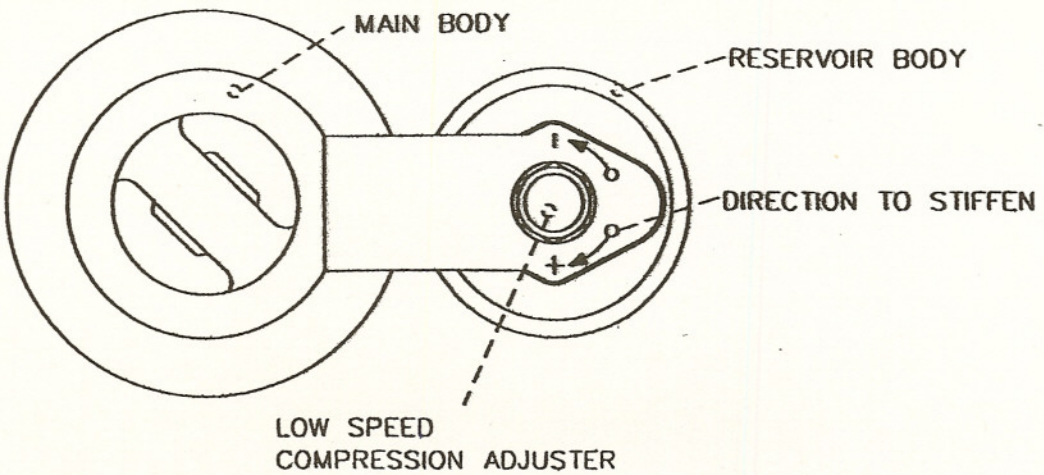



To adjust the rebound damping follow the instructions below:

1. Fully close the rebound adjuster turning clockwise, as viewed from the top eye end of the shaft looking towards the piston end of the shaft. The adjuster has a standard right-handed thread.
2. The rebound adjuster is fully closed when it is no longer possible to turn the adjuster. **Do not over tighten the adjuster**, as this will damage the needle face.
3. With the rebound adjuster fully closed the rebound damping will be at maximum. This position is called '0' (zero) and should be used as the starting position for all subsequent adjustments.
4. The rebound adjuster features detents that will be felt as 'clicks' as the adjuster is turned. The detents are spaced at 60° intervals. Each 'click' of the adjuster is intended to give small step changes in rebound damping until the minimum rebound damping is achieved.
5. To reduce rebound damping the adjuster is turned counter-clockwise.
6. There are twelve 'clicks' of adjustment from maximum (0) to minimum (12) rebound damping. The first 'click' position felt when reducing the rebound damping from fully closed is called '1', the second 'click' is '2' etc. When the twelfth 'click' is reached the rebound damping will be at a minimum.
   **Note:** Adjustments have a greater effect as the adjustment system approaches fully closed (setting 0), compared to the softer (setting 12) of the positions.

## COMPRESSION DAMPING ADJUSTMENT

The compression adjusters are located on the reservoir as shown:




The low speed and high-speed compression adjusters are both located on the reservoir body. The low speed compression adjuster is on top of the high-speed compression adjuster.

### Low Speed Compression Adjustment

To adjust the low speed compression damping use an 8mm A/F spanner and follow the instructions below:

1. Fully close the low speed adjuster by turning it clockwise, as viewed from the top of the adjuster. **Do not over tighten the adjuster**, as this will damage the valve face.
2. With the adjuster now closed, the low speed compression damping will be at its maximum. This position is called '0' (zero) and should be used as the starting position for all subsequent adjustments.
3. The low speed compression adjuster features detents that will be felt as 'clicks' as the adjuster is turned. The detents are spaced at 60° intervals. Each 'click' of the adjuster is intended to give small step changes in low speed compression damping until the minimum compression damping is achieved. The maximum soft setting this adjustment gives is 14 clicks.
4. To reduce low speed compression damping the adjuster is turned counter-clockwise.
5. There are fourteen 'clicks' of adjustment from maximum to minimum low speed compression damping. The first 'click' position felt when reducing the compression damping from fully closed is called '1', the second 'click' is '2' etc. When the fourteenth 'click' is reached the low speed compression damping will be at its minimum.
   **Note:** Adjustments have a greater effect as the adjustment system approaches full closed (setting 0), compared to the softer (setting 14) of the positions.

## High speed compression damping

To adjust the high-speed compression damping use an 11mm A/F spanner and follow the instructions below:

1. Fully open the high-speed adjuster by turning it counter-clockwise, as viewed from the top of the adjuster. **Do not over tighten the adjuster.** This adjuster has a left-handed thread. Turning counter-clockwise will have the adjuster going deeper into the housing.
2. With the adjuster now open, the high-speed compression damping will be at its minimum. This position is called '10' (ten) and should be used as the starting position for all subsequent adjustments.
3. The high-speed compression adjuster features detents that will be felt as 'clicks' as the adjuster is turned. The detents are spaced at 60° intervals. Each 'click' of the adjuster is intended to give small step changes in high-speed compression damping until the minimum compression damping is achieved. The full soft setting this adjustment gives is 10 clicks.
4. To reduce high-speed compression damping the adjuster is turned counter-clockwise.
5. There are ten 'clicks' of adjustment from maximum to minimum high-speed compression damping. The first 'click' position felt when increasing the high-speed compression damping from fully open is called '9', the second 'click' is '8' etc. When the tenth 'click' is reached the high-speed compression damping will be at its maximum.

## Recommended Settings

It is recommended that all adjusters be set to their mid-positions before the dampers are fitted to the vehicle. The mid-position settings will be as follows:

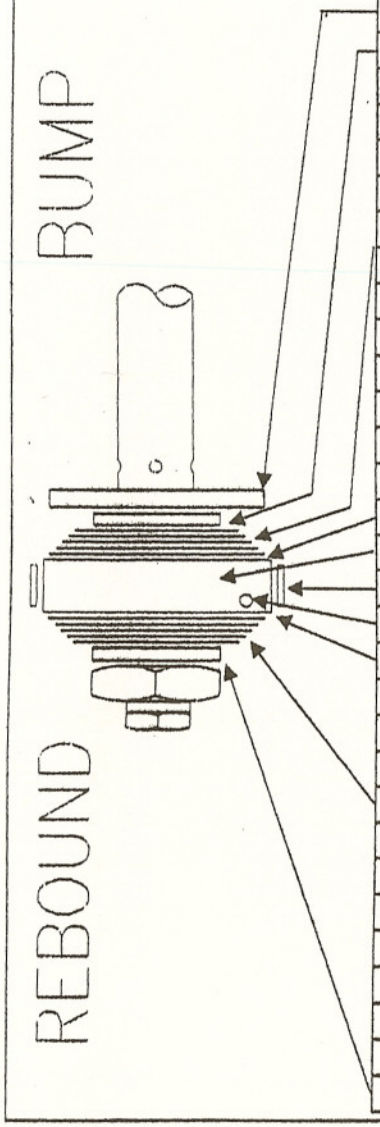
| | Front | Rear |
|---|---|---|
| **Rebound** | -P6 | -P6 |
| Low Speed Compression | -P8 | -P6 |
| High Speed Compression | +P6 | +P7 |

| | |
|---|---|
| TYPE | 3 Way 16-40 |
| SHAFT DIA. | 16 mm |
| ADJUSTER ROD | See GA |
| NEEDLE | See GA |
| JET | See GA |
| JET BALL TYPE | 4.0 Nylon P0605450 |
| NUT TORQUE | 25.5 Lbft |

NOTE:

| GRAPH SCALES | MIN | MAX |
|---|---|---|
| PEAK FORCE | -3000 | 2000 |
| PEAK VELOCITY | 0 | 300 |
| DISPLACEMENT | -11 | 11 |

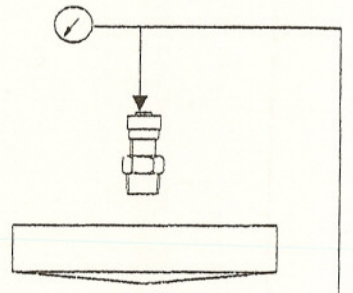
1/. TOLERANCE LIMIT +/- 3%, +/- 50N PRELOAD INCLUDED.




| <SHAFT> | | <PART No> |
|---|---|---|
| STOP PLATE | P6400250(32-14) | |
| SPACER | - | |
| - | - | |
| - | - | |
| - | - | |
| - | - | |
| - | - | |
| - | - | |
| 19 mm SHIM | 0.50 x 2 | P6202450 |
| 22mm SHIM | 0.15 | P6204550 |
| 26 mm SHIM | 0.15 | P6207750 |
| 31mm SHIM | 0.15 | P6211450 |
| 34mm SHIM | 0.15 | P6213850 |
| - | - | |
| BUMP DISH | 2 Deg | |
| PISTON TYPE | PN???? | P4513050 |
| SLYD RING | CONT | P6501750 |
| PISTON BLEED | 0.75mm | |
| REB. DISH | 2 deg | |
| - | - | |
| 34mm SHIM | 0.25 | P6214250 |
| 34 mm SHIM | 0.15 | P6213850 |
| - | - | |
| - | - | |
| - | - | |
| - | - | |
| - | - | |
| - | - | |
| - | - | |
| - | - | |
| TOP PLATE | 19mm x 2 | P7300650 |

<CV>

| | CV PISTON | CAGE |
|---|---|---|
| PLATE | 14 mm | TP0037 P7301650 |
| 18 mm SHIM | - | - |
| 20 mm SHIM | - | 0.30 P6203550 |
| 22 mm SHIM | - | - |
| 24 mm SHIM | - | - |
| 26 mm SHIM | - | - |
| 28 mm SHIM | - | - |
| 29 mm SHIM | 0.25 P6219850 | 0.30 P6210950 |
| 29 mm SHIM | - | - |
| 33 mm SHIM | - | - |
| 34 mm SHIM | - | 0.30 P6214450 |



| COMPRESSION VALVE DETAILS | |
|---|---|
| CV PISTON TYPE | CV0013 P1900350 |
| CV PISTON BLEED | - |
| CV NUT | - |
| CV PRESSURE | 10 BAR |
| CV BALL TYPE | 4.75 Nylon P0600450 |
| RESERVOIR PRESS. | 8 BAR |
| DAMPER FLUID | ULTRA LIGHT |

DYNAMIC Suspension

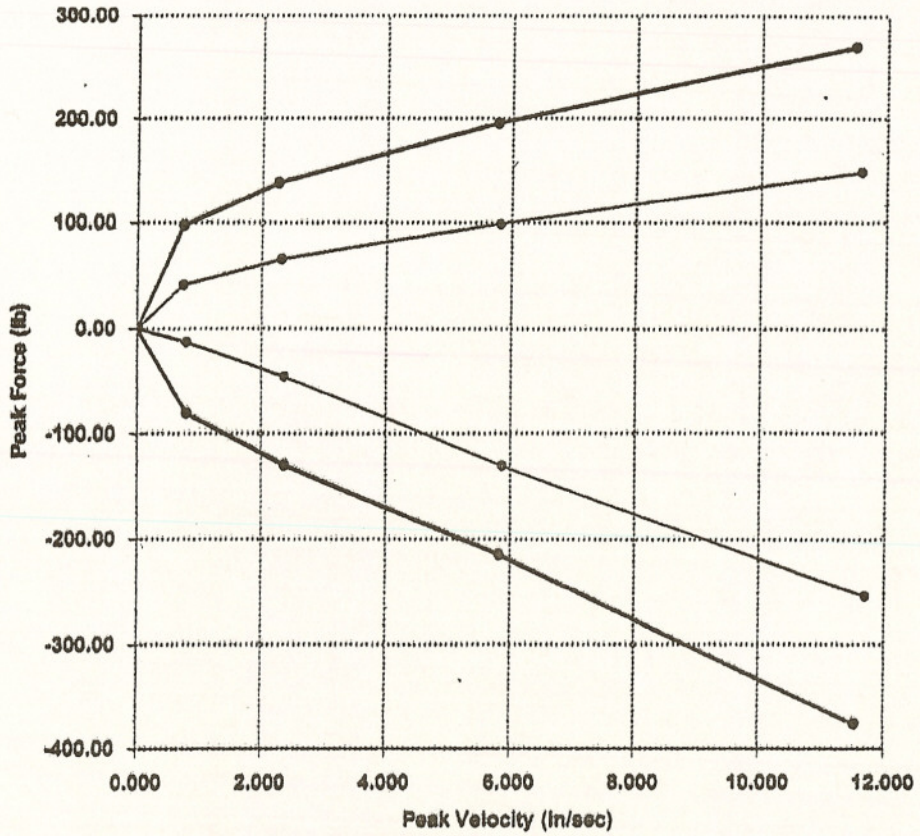
DAMPER SPECIFICATION SHEET

| GA No. | CUSTOMER | TECHNICIAN | DATE |
|---|---|---|---|
| GA 1224 | HAAS AUTOS | A. O'LEARY | 8/14/01 |

| GRAPH REF. | JOB No. |
|---|---|
| HAA\12240002.001 & 002 | 3061 |

| TITLE | SPEC NUMBER |
|---|---|
| HAAS AUTOS VAN DIEMEN F2000 FRONT | 1224-HAA-002 |

Bump




Rebound

| G:\HaasF2000\12240040.001 | | | | Run. | Freq Hz | B Vel. (in/sec) | Pk Bump (lb) | R Vel. (in/sec) | Pk. Reb.(lb) |
|---|---|---|---|---|---|---|---|---|---|
| Dataset | 5 | Stroke (in) | 0.788 | 1 | 0.31 | 0.734 | 98.31 | -0.787 | -80.52 |
| Mask | 3 Way Damper | Pre-Load (lb) | 37.29 | 2 | 0.94 | 2.255 | 138.99 | -2.360 | -128.82 |
| Type | Haa | Avg. Temp °F | Not Measured | 3 | 2.34 | 5.769 | 195.78 | -5.821 | -214.42 |
| ID | 12240040 | RL | 0 | 4 | 4.72 | 11.486 | 269.51 | -11.538 | -376.30 |
| Date | 10 Oct 2001 | BL | 0 | | | | | | |
| Time | 4:23 pm | BH | 0 | | | | | | |
| Dyno # | 6 | Reservoir Pressure (BAR) | 8 | | | | | | |
| Spec No. | 1224-HAA-002 | Customer | Carl Haas Automotive Inc | | | | | | |
| Location | Race Department | Technician | J. Chue-Sang | | | | | | |
| DS Ver. | Unknown | Position On Car | Rh/Front | | | | | | |

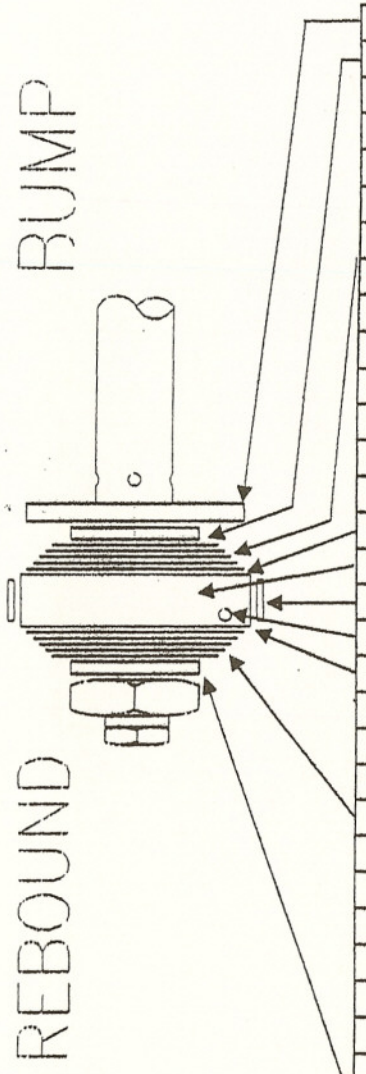
| G:\HaasF2000\12240048.002 | | | | Run. | Freq Hz | B Vel. (in/sec) | Pk Bump (lb) | R Vel. (in/sec) | Pk. Reb.(lb) |
|---|---|---|---|---|---|---|---|---|---|
| Dataset | 6 | Stroke (in) | 0.788 | 1 | 0.31 | 0.734 | 42.38 | -0.787 | -12.71 |
| Mask | 3 Way Damper | Pre-Load (lb) | 37.29 | 2 | 0.94 | 2.308 | 66.11 | -2.360 | -45.77 |
| Type | Haa | Avg. Temp °F | Not Measured | 3 | 2.37 | 5.821 | 99.16 | -5.874 | -129.67 |
| ID | 12240048 | RL | 12 | 4 | 4.82 | 11.591 | 149.17 | -11.695 | -254.26 |
| Date | 10 Oct 2001 | BL | 14 | | | | | | |
| Time | 2:20 pm | BH | 10 | | | | | | |
| Dyno # | 6 | Reservoir Pressure (BAR) | 8 | | | | | | |
| Spec No. | 1224-HAA-002 | Customer | Carl Haas Automotive Inc | | | | | | |
| Location | Race Department | Technician | J. Chue-Sang | | | | | | |
| DS Ver. | Unknown | Position On Car | Rh/Front | | | | | | |

| | |
|---|---|
| TYPE | 3 Way 16-40 |
| SHAFT DIA. | 16 mm |
| ADJUSTER ROD | See GA |
| NEEDLE | See GA |
| JET | See GA |
| JET BALL TYPE | 4.0 Nylon P0605450 |
| NUT TORQUE | 25.5 Lbft |

NOTE:

| GRAPH SCALES | MIN | MAX |
|---|---|---|
| PEAK FORCE | -3000 | 2000 |
| PEAK VELOCITY | 0 | 300 |
| DISPLACEMENT | -11 | 11 |

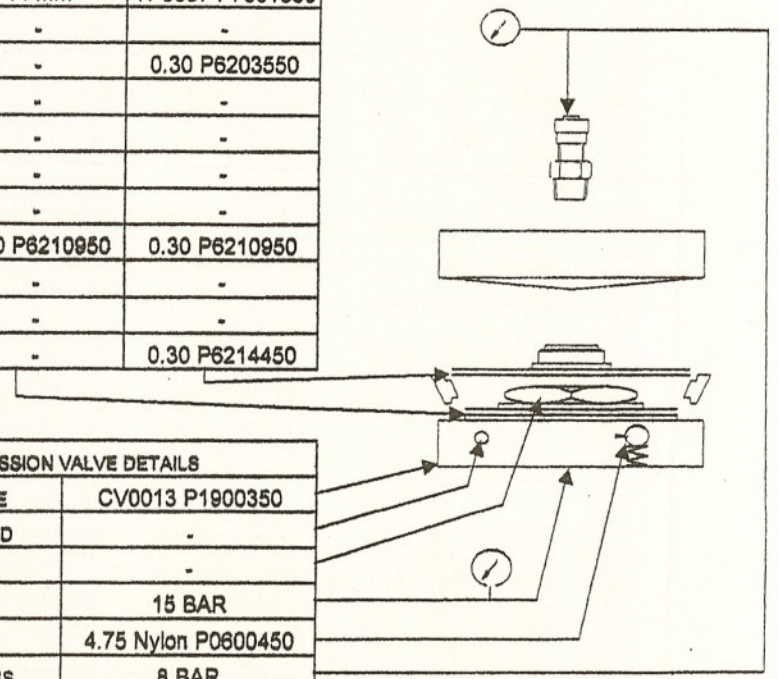
1/. TOLERANCE LIMIT +/- 3%, +/- 50N PRELOAD INCLUDED.




| <SHAFT> | | <PART No> |
|---|---|---|
| STOP PLATE | P6400250(32-14) | |
| SPACER | - | |
| - | - | |
| - | - | |
| - | - | |
| - | - | |
| - | - | |
| - | - | |
| 19 mm SHIM | 0.50 x 2 | P6202450 |
| 22mm SHIM | 0.15 | P6204550 |
| 26 mm SHIM | 0.15 | P6207750 |
| 31mm SHIM | 0.15 | P6211450 |
| 34mm SHIM | 0.15 | P6213850 |
| - | - | |
| BUMP DISH | 2 Deg | |
| PISTON TYPE | PN???? | P4513050 |
| SLYD RING | CONT | P6501750 |
| PISTON BLEED | 0.75mm | |
| REB. DISH | 2 deg | |
| - | - | |
| 34mm SHIM | 0.15 | P6213850 |
| 28 mm SHIM | 0.15 | P6209350 |
| 33 mm SHIM | 0.25 Annular | P6213050 |
| 34 mm SHIM | 0.15 | P6213850 |
| 31 mm SHIM | 0.30 | P6212050 |
| - | - | |
| - | - | |
| - | - | |
| - | - | |
| - | - | |
| TOP PLATE | 19mm x 2 | P7300650 |

<CV>

| | CV PISTON | CAGE |
|---|---|---|
| PLATE | 14 mm | TP0037 P7301650 |
| 18 mm SHIM | - | - |
| 20 mm SHIM | - | 0.30 P6203550 |
| 22 mm SHIM | - | - |
| 24 mm SHIM | - | - |
| 26 mm SHIM | - | - |
| 28 mm SHIM | - | - |
| 29 mm SHIM | 0.30 P6210950 | 0.30 P6210950 |
| 29 mm SHIM | - | - |
| 33 mm SHIM | - | - |
| 34 mm SHIM | - | 0.30 P6214450 |



| COMPRESSION VALVE DETAILS | |
|---|---|
| CV PISTON TYPE | CV0013 P1900350 |
| CV PISTON BLEED | - |
| CV NUT | - |
| CV PRESSURE | 15 BAR |
| CV BALL TYPE | 4.75 Nylon P0600450 |
| RESERVOIR PRESS. | 8 BAR |
| DAMPER FLUID | ULTRA LIGHT |

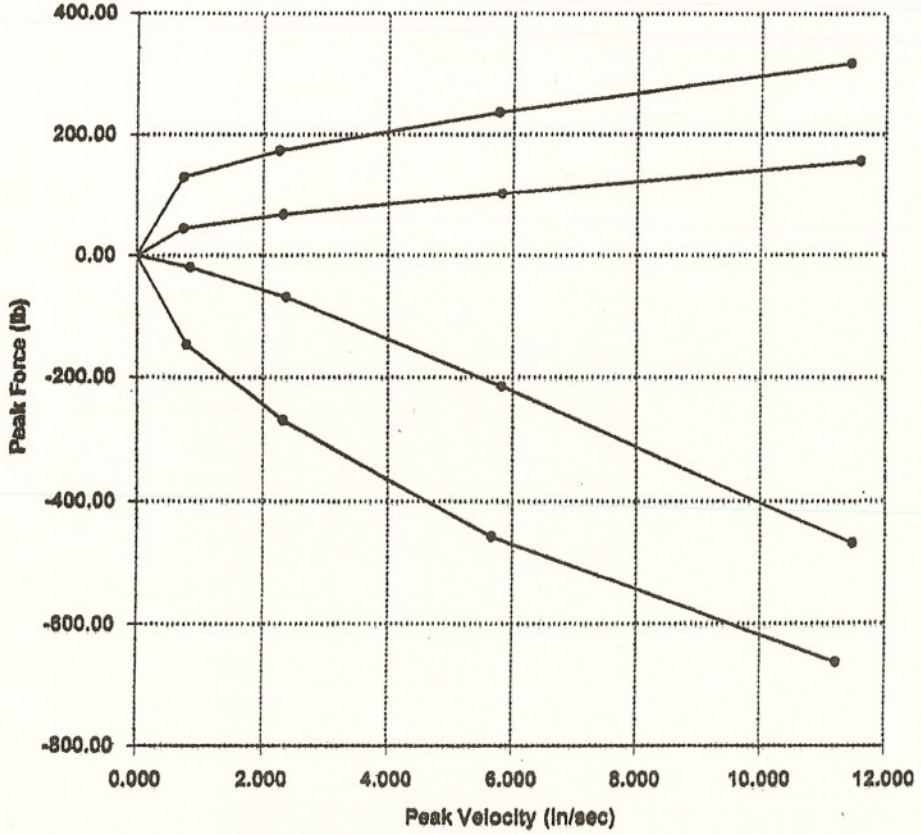
DYNAMIC Suspension

DAMPER SPECIFICATION SHEET

| GA No. | CUSTOMER | TECHNICIAN | DATE |
|---|---|---|---|
| GA 1223 | HAAS AUTOS | A. O'LEARY | 8/14/01 |

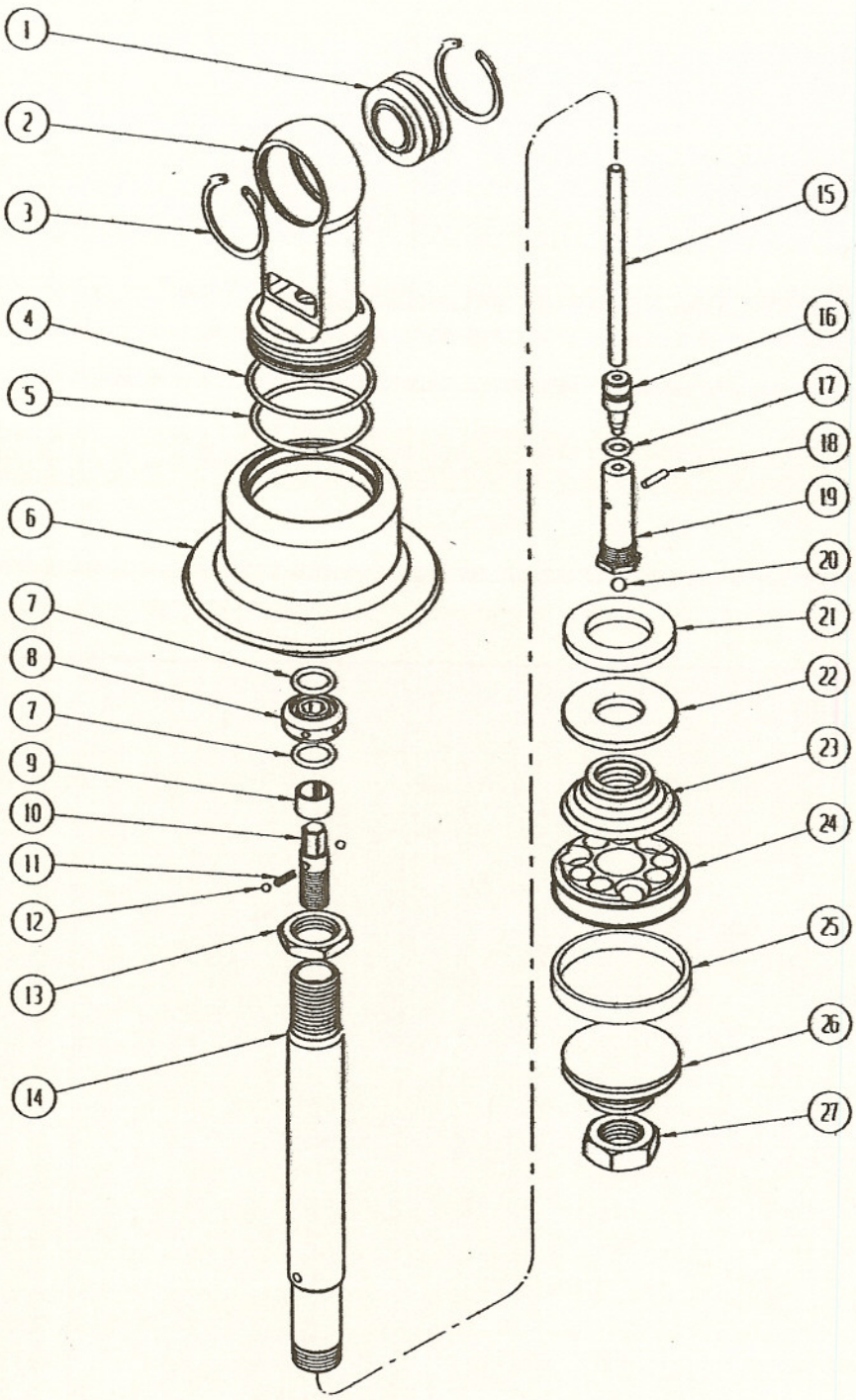
| GRAPH REF. | JOB No. |
|---|---|
| HAA\12230001.001 & 002 | 3061 |

| TITLE | SPEC NUMBER |
|---|---|
| HAAS AUTOS VAN DIEMEN F2000 REAR | 1223-HAA-002 |

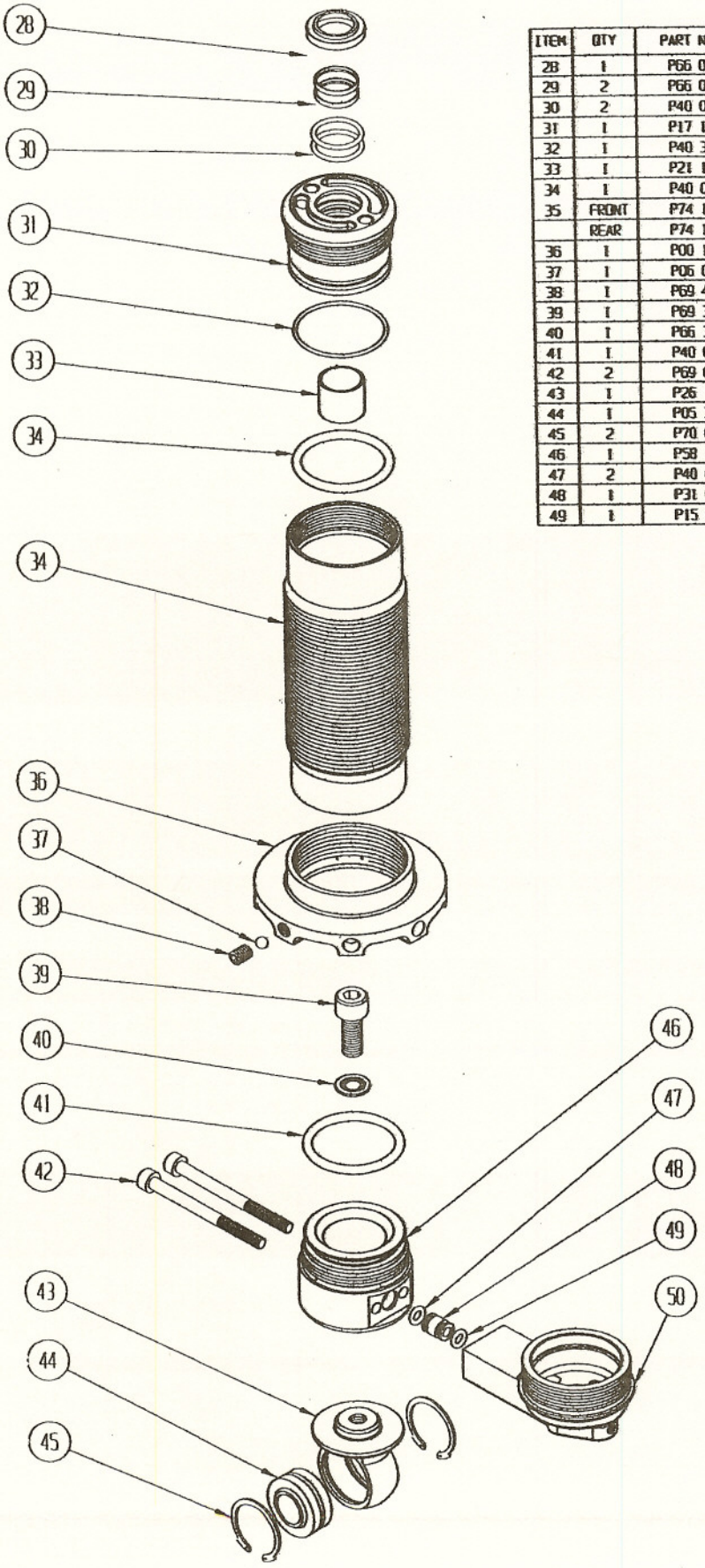



| F2000\12230020.002 | | | Run. | Freq Hz | B Vel. (in/sec) | Pk Bump (lb) | R Vel. (in/sec) | Pk. Reb.(lb) | |
|---|---|---|---|---|---|---|---|---|---|
| 3 | Stroke (in) | 0.789 | 1 | 0.31 | 0.734 | 44.92 | -0.839 | -18.65 | |
| 3 Way Damper | Pre-Load (lb) | 36.44 | 2 | 0.95 | 2.308 | 67.80 | -2.360 | -68.65 | |
| Haa | Avg. Temp °F | Not Measured | 3 | 2.37 | 5.821 | 102.55 | -5.821 | -214.42 | |
| 12230020 | RL | 12 | 4 | 4.77 | 11.591 | 155.95 | -11.486 | -469.53 | |
| 05 Oct 2001 | BL | 14 | | | | | | | |
| 2:49 pm | BH | 10 | | | | | | | |
| 6 | Reservoir Pressure (BAR) | 8 | | | | | | | |
| 1223-HAA-002 | Customer | Carl Haas Automotive Inc | | | | | | | |
| Race Department | Technician | J. Hardyman | | | | | | | |
| Unknown | Position On Car | Rh/Rear | | | | | | | |

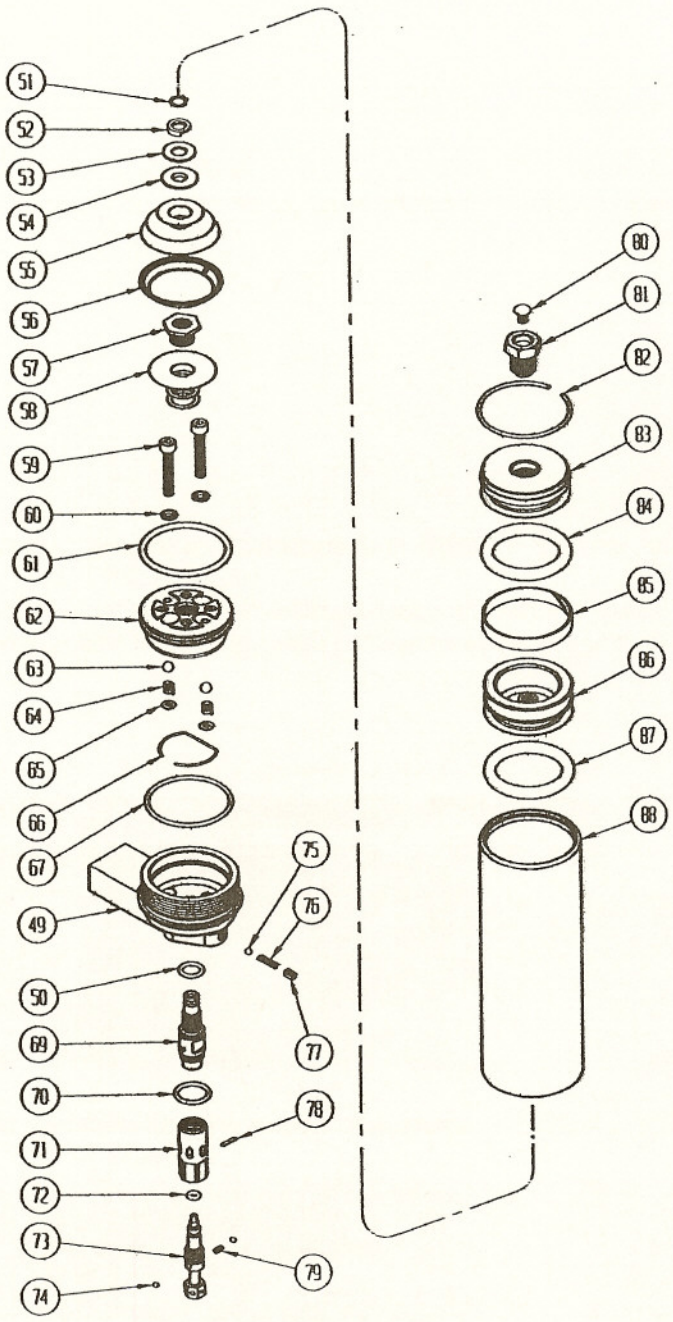
| F2000\12230020.003 | | | Run. | Freq Hz | B Vel. (in/sec) | Pk Bump (lb) | R Vel. (in/sec) | Pk. Reb.(lb) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| 4 | Stroke (in) | 0.788 | 1 | 0.31 | 0.734 | 129.67 | -0.787 | -145.77 | 2ND RUN/WARM |
| 3 Way Damper | Pre-Load (lb) | 35.60 | 2 | 0.93 | 2.255 | 173.74 | -2.308 | -269.51 | |
| Haa | Avg. Temp °F | Not Measured | 3 | 2.32 | 5.769 | 236.46 | -5.664 | -458.51 | |
| 12230020 | RL | 0 | 4 | 4.68 | 11.433 | 316.13 | -11.223 | -661.92 | |
| 09 Oct 2001 | BL | 0 | | | | | | | |
| 11:05 am | BH | 0 | | | | | | | |
| 6 | Reservoir Pressure (BAR) | 8 | | | | | | | |
| 1223-HAA-002 | Customer | Carl Haas Automotive Inc | | | | | | | |
| Race Department | Technician | J. Hardyman | | | | | | | |
| Unknown | Position On Car | Rh/Rear | | | | | | | |




| ITEM | QTY | PART No. | DESCRIPTION |
|---|---|---|---|
| 1 | 1 | P05 341 50 | SPHERICAL BEARING TOP EYE |
| 2 | 1 | P26 117 50 | TOP EYE |
| 3 | 2 | P70 037 50 | WIRE CLIP TOP EYE |
| 4 | 1 | P70 011 50 | WIRE CLIP |
| 5 | 1 | P40 105 50 | O-RING (ORV026) |
| 6 | 1 | P00 148 50 | UPPER ADJUSTMENT |
| 7 | 2 | P40 054 50 | O-RING (ORV012) |
| 8 | 1 | P49 055 50 | REBOUND ADJUSTER KNOB |
| 9 | 1 | P31 007 50 | DETENT INSERT |
| 10 | 1 | P49 036 50 | REBOUND ADJUSTER |
| 11 | 1 | P61 437 50 | DETENT SPRING |
| 12 | 2 | P05 055 50 | ø 2.50 STAINLESS STEEL BALL |
| 13 | 1 | P60 002 50 | LOCK NUT |
| 14 | FRONT | P67 329 50 | ø 16.00 SHAFT ( 105.0mm C/L ) |
| | REAR | P67 193 50 | ø 16.00 SHAFT ( 90.0mm C/L ) |
| 15 | FRONT | P02 204 50 | ADJUSTER ROD |
| | REAR | P02 201 50 | ADJUSTER ROD |
| 16 | 1 | P39 002 50 | NEEDLE REBOUND |
| 17 | 1 | P40 053 50 | O-RING (ORV008) |
| 18 | 1 | P47 331 50 | SILVER STEEL 2.0mm DIA - 8.6mm LG |
| 19 | 1 | P33 003 50 | JET REBOUND |
| 20 | 1 | SEE SPEC SHT | ø 5/32" CHECK BALL |
| 21 | FRONT | P56 045 50 | DROOP SPACER - 5mm |
| | REAR | P56 132 50 | DROOP SPACER - 4mm |
| 22 | 1 | P64 002 50 | STOP PLATE |
| 23 | 1 | SEE SPEC SHT | SHIM STACK (BUMP) |
| 24 | 1 | SEE SPEC SHT | PISTON |
| 25 | 1 | SEE SPEC SHT | SLYDRING |
| 26 | 1 | SEE SPEC SHT | SHIM STACK (REBOUND) |
| 27 | 1 | P60 004 50 | NUT |




| ITEM | QTY | PART No. | DESCRIPTION |
|---|---|---|---|
| 28 | 1 | P66 023 50 | SCRAPER SEAL |
| 29 | 2 | P66 059 50 | STEP SEAL |
| 30 | 2 | P40 055 50 | BACKING O-RING (ORV017) |
| 31 | 1 | P17 111 50 | COVER |
| 32 | 1 | P40 364 50 | O-RING Ø 38 x 1.02 |
| 33 | 1 | P21 135 50 | OU BUSH 1615 |
| 34 | 1 | P40 066 50 | O-RING (ORV219) |
| 35 | FRONT | P74 196 50 | TUBE |
| | REAR | P74 192 50 | TUBE |
| 36 | 1 | P00 106 50 | LOWER ABUTMENT |
| 37 | 1 | P06 004 50 | NYLON BALL 3/16 DIA. |
| 38 | 1 | P69 431 50 | GRUB SCREW M6 x 1.0 S.S. |
| 39 | 1 | P69 386 50 | SHCS M8 X 1.25 X 20.0 Lg (UNBRAKO) |
| 40 | 1 | P66 387 50 | M8 SELF CENTERING DOWTY SEAL |
| 41 | 1 | P40 066 50 | O-RING (ORV219) |
| 42 | 2 | P69 088 50 | SHCS M5 X 0.8 X 60.0 Lg (UNBRAKO) |
| 43 | 1 | P26 114 50 | STUD CAP EYE |
| 44 | 1 | P05 341 50 | SPHERICAL BEARING STUD CAP EYE |
| 45 | 2 | P70 037 50 | WIRE CLIP STUD CAP EYE |
| 46 | 1 | P58 158 50 | STUD CAP |
| 47 | 2 | P40 053 50 | O-RING (ORV008) |
| 48 | 1 | P31 003 50 | BRIDGE INSERT |
| 49 | 1 | P15 032 50 | COMPRESSION VALVE HOUSING |




| ITEM | QTY | PART NO. | DESCRIPTION |
|---|---|---|---|
| 49 | 1 | -- --- -- | SEE MAIN BODY ASSEMBLY |
| 51 | 3 | P70 008 SO | CIRCLIP |
| 52 | 1 | F73 012 SO | CIRCLIP COVER |
| 53 | 1 | P76 078 SO | WASHER |
| 54 | 1 | P73 016 SO | SHIM GUIDE |
| 55 | - | SEE SPEC SHT | SHIMS |
| 56 | 1 | P14 001 SO | COMPRESSION VALVE CAGE |
| 57 | 1 | P60 036 SO | COMPRESSION NUT |
| 58 | - | SEE SPEC SHT | SHIMS |
| 59 | 2 | P69 080 SO | SOCKET HEAD SCREW - M4.0 x 0.7 x 25.0 LONG |
| 60 | 2 | P66 065 SO | DOWTY BONDED SEAL |
| 61 | 1 | P40 046 SO | O-RING ORV126 |
| 62 | 1 | P19 003 SO | COMPRESSION VALVE |
| 63 | 2 | SEE SPEC SHT | BALL - Ø 3/16" |
| 64 | 2 | P61 443 SO | SPRING |
| 65 | 2 | P76 069 SO | WASHER - THICK |
| 66 | 1 | P70 006 SO | WIRE CLIP - "O" FORM |
| 67 | 1 | P40 056 SO | O-RING ORV028 |
| 68 | 1 | P40 067 SO | O-RING ORV0011 |
| 69 | 1 | P33 030 SO | COMPRESSION JET |
| 70 | 1 | P40 044 SO | O-RING ORV014 |
| 71 | 1 | P33 029 SO | COMPRESSION JET HEAD |
| 72 | 1 | P40 005 SO | O-RING ORV005 |
| 73 | 1 | P38 014 SO | ADJUSTER NEEDLE 3.0" |
| 74 | 2 | P06 055 SO | BALL - Ø 2.50 |
| 75 | 1 | P06 001 SO | BALL - Ø 3.0 |
| 76 | 1 | P61 110 SO | SPRING |
| 77 | 1 | P69 137 SO | GRUB SCREW - M4.0 x 0.7 x 5.0 LONG |
| 78 | 1 | P47 196 SO | ROLL PIN - Ø 1/16" x 5/16" LONG |
| 79 | 1 | P61 112 SO | SPRING |
| 80 | 1 | P36 156 SO | FILLER PORT |
| 81 | 1 | P69 548 SO | BHCS 8 - 32 |
| 82 | 1 | P70 019 SO | WIRE CLIP |
| 83 | 1 | P51 032 SO | RESERVOIR COVER - 7/16"-20 UNF PORT |
| 84 | 1 | P40 058 SO | O-RING ORV321 |
| 85 | 1 | P65 001 SO | SLYDRING - SPLIT |
| 86 | 1 | P53 001 SO | RESERVOIR PISTON |
| 87 | 1 | P40 058 SO | O-RING ORV321 |
| 88 | 1 | P50 034 SO | RESERVOIR BODY |