# Pick & Mix Self Tune

**Manitou McLeod & Mara Inline (McMara)**

**Installation Instructions**

serious bicycle suspension
shockcraft

## *Introduction*

Shockcraft McMara Pick & Mix Self Tune Kits enable technically minded riders and bike shops to install Shockcraft engineered and tested tunes in Manitou McLeod and Mara Inline rear shocks with only normal service tools.

## *Kit Contents*

- Genuine Manitou Piston, special type
- Shim kit, which covers the required tune range. Shim sizes and thicknesses have been chosen so you usually don't need to accurately measure them.
- A paper tune drawing to scale. This shows your specific tunes for rebound and compression and lays out the shims required for each tune. The drawing also shows 1-2 optional softer/firmer tunes for compression and 1-2 optional sticky/poppy tunes for rebound damping.

## *Safety*

Rear shocks are pressurised. Air-cans up to 300 psi and dampers up to 500 psi. It is very important to vent pressure safely and totally before opening the air-can or the damper.

If a damper has ingested air and foamed up then it may still be pressurised after deflating the IFP chamber. Wear eye protection if necessary and use hand compression to check air-cans and dampers are fully depressurised.

## *Tools Recommended*

- Phillips #2 screwdriver
- Manitou Keychain IFP tool (83-2694)
- 21 mm spanner, wrench or crows-foot
- Adjustable spanner (crescent wrencth)
- Shock pump 300 psi minimum
- Bench vise with soft-jaws
- 1.5 mm hex key (allen wrench) of good quality
- M3 bleeding tools optional (required for vacuum bleed)
- Digital or Vernier calipers
- Torque wrench (optional but recommended)
- Oil syringe and needle (recommended for manual bleed)
- Valve core removal tool (optional - Keychain tool has one)

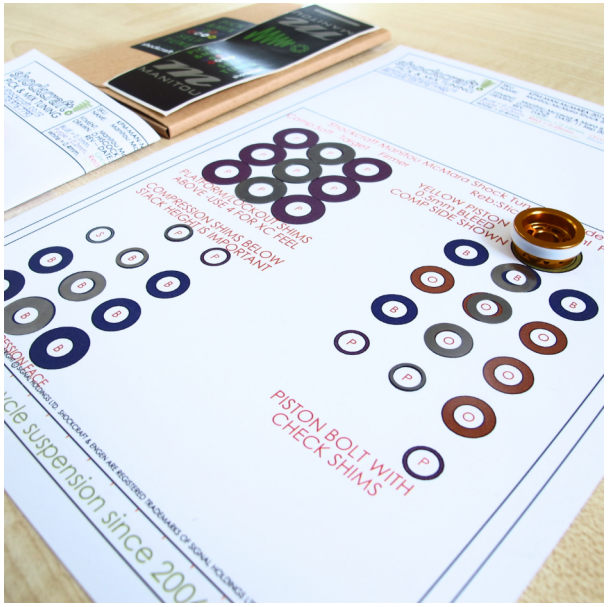


**Figure 1.** McMara Pick & Mix Self Tune Kit.

## *Fluids & Grease*

- Stock shock oil – Maxima 5wt fork oil – 15 cSt
- Shockcraft recommended shock oil:
  - Standard - Motorex 2.5 wt (15 cSt)
  - Heavy duty - Shockcraft Hot Oil Green (19 cSt)
  - Highest performance & widest temperature range - Shockcraft Hot Oil Pink (14 cSt)
- Grease - Slickoleum & Motorex Grease 2000 (aka Bike Grease)





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Fluids and grease can be purchased with the McMara Pick & Mix Self Tune Kit or separately at Shockcraft using the links above.

### *Supplies*

- Gloves
- Lint free rags
- Beakers or cups to collect drained oil
- Safety glasses
- Clean work space

### *Torque Settings*

- Damper cap (seal head) – 25 Nm
- Piston bolt – 4 Nm
- 5 point IFP cap – 1 Nm (finger tight)
- Valve cores – 0.5 Nm (finger-tip tight only)
- Knob screws (1.5 mm hex) – 0.5 Nm
- Bleed screw – 2 Nm (screw-driver tight)
- Air can – hand tight
- Shaft head locknut – 10 Nm (do not disturb unless necessary)

**Figure 2.** Manitou McLeod eyelet shock.

### *Shock Details*

The Manitou McLeod and Mara Inline shock is an inline air sprung rear MTB shock with internal damper. Externally it has Low Speed Rebound (LSR - Blue) and Independent Platform Adjust (IPA - Black) dials on the top of the damper (Figure 2). It has an air valve on the top-cap to pressurise the air-can and a 5 point cap on the bottom of the damper protecting the IFP valve.

Internally (Figure 3) it uses a single tube hydraulic damper with a gas charged internal floating piston (IFP) to provide positive damper pressure, compensate for shaft volume and prevent cavitation. The main piston has two compression shim stacks, one rebound shim stack and one check-valve shim stack.

Rebound is controlled by a needle valve in the centre of the shaft via the external blue knob, compression is adjusted by adding preload on the top "platform" shim stack. Manitou call this Independent Platform Adjust (IPA) and the IPA lever is the black one around the blue rebound knob.

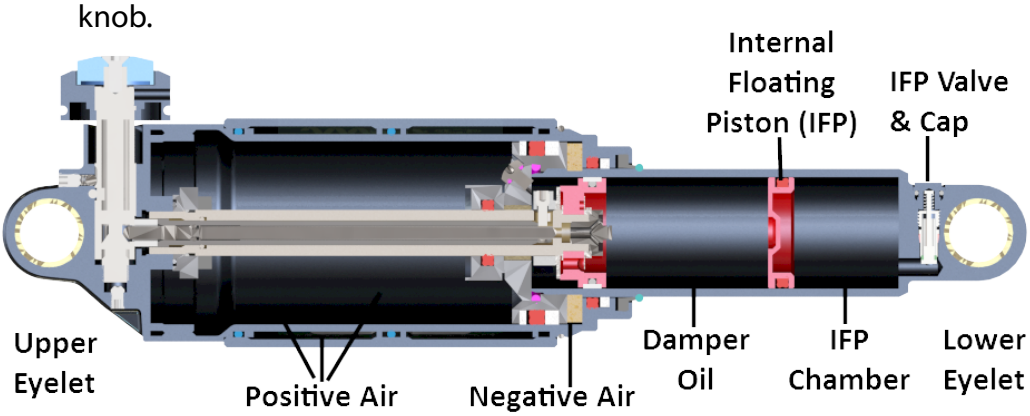


**Figure 3.** McLeod shock section view.





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The air-can can be single tube or twin tube (King Can) type to give three different volumes depending on the progression required (Figure 4).

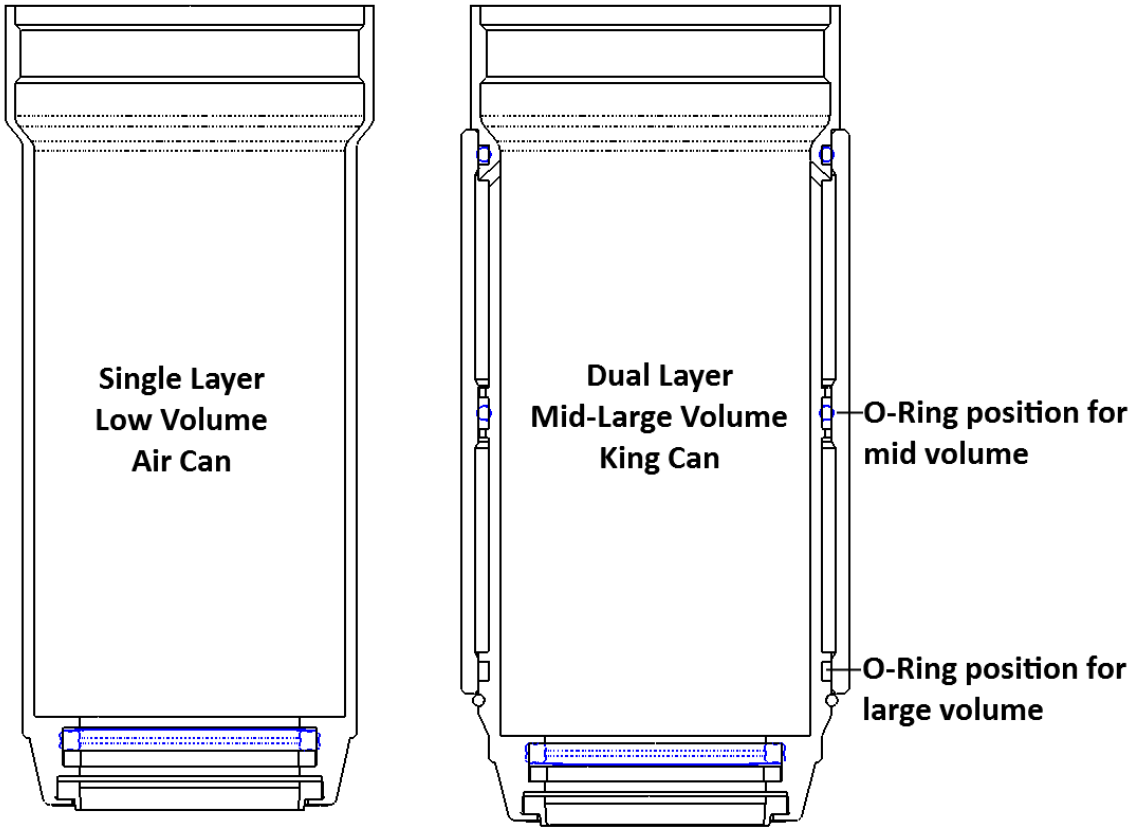


**Figure 4.** Air can configurations.

The King Can (right, Figure 4) has two layers to provide additional positive air volume. The outer sleeve can be set at half or full volume by moving an o-ring seal from the end position to middle groove position. Generally bikes running more than 55 mm stroke are better matched with the larger volume King Can but this depends on the shape of the frames leverage curve.

King Cans often use different size negative chamber, bumpers and spacers too, affecting total can length.

Positive air pressure is adjusted via the air-valve and has a useable range from ~120-300 psi. Negative air volume and pressure is fixed and is captured when the air-can is installed. It can be necessary to "reset" the negative air at 3-6 month intervals. This is because it is gradually lost with use and time, meaning the shock will feel firm off the top, ride too high and rebound will feel to fast. Resetting the air-can will resolve this. To reset, fully remove, clean & relube the air can, before reinstalling. Quad-ring and o-ring seals can be replaced as needed. If the backup rings are contaminated with dirt then a full service kit should be installed.

## *Fitting & Lengths*

These shocks are available in legacy (imperial) sizes and current (metric) sizes. The Metric size range includes Trunnion style shocks which are attached via the shock head by 2 x M10 bolts. This makes for a more compact arrangement than the alternative (eyelet) style.





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The length and stroke of the McLeod and Mara Inline shocks can be adjusted due to the trapped negative air design.

Length and stroke are both reduced by installing spacers in the air-can. Shockcraft have these spacers in 1.25 mm thickness. 5 of 1.25 mm spacers will reduce a shock in length and stroke by 6.25 mm. E.g. Turning a 7.5 x 2.0" (190 x 50 mm) shock into a 7.25 x 1.75" (184 x 44 mm) shock.

Stroke can be reduced without reducing length by installing travel spacers on the shaft. Metric shocks use this to provide different strokes in the same shock size.

### *Sizes*

6 x 1.0" Imperial Eyelet (aka 152 x 25 mm)
6.5 x 1.5" Imperial Eyelet (aka 165 x 38 mm)
7.5 x 2.0" Imperial Eyelet (aka 190 x 50 mm)
7.875 x 2.0" Imperial Eyelet (aka 200 x 50 mm)
7.875 x 2.25" Imperial Eyelet (aka 200 x 56 mm)
8.5 x 2.5" Imperial Eyelet (aka 216 x 63 mm)

170 x 35 mm Metric Eyelet (also 32.5 and 30 mm with stroke limiting spacers)
190 x 45 mm Metric Eyelet (also 42.5 and 40 mm with stroke limiting spacers)
210 x 55 mm Metric Eyelet (also 52.5 and 50 mm with stroke limiting spacers)
230 x 65 mm Metric Eyelet (also 62.5 and 60 mm with stroke limiting spacers)

145 x 35 mm Metric Trunnion (also 32.5 and 30 mm with stroke limiting spacers)
165 x 45 mm Metric Trunnion (also 42.5 and 40 mm with stroke limiting spacers)
185 x 55 mm Metric Trunnion (also 52.5 and 50 mm with stroke limiting spacers)
205 x 65 mm Metric Trunnion (also 62.5 and 60 mm with stroke limiting spacers)

### *Disassembly*

**Do not remove the shock head from the shaft or disturb the locknut underneath unless absolutely necessary. The joint is adjustable and sets IPA preload with a tolerance <0.1 mm.**

Remove shock hardware pins and any protruding bushings (flush DU bushings can stay).

Open (counterclockwise) all adjusters and note position if important. (This makes bleeding easier later).

Depressurise the air valve and remove the valve core (to be sure).

Hold the shock upside down in the vise soft-jaws by the eyelet or across the trunnion flats.

Use a air-can wrench or large adjustable spanner (crescent wrench) to loosen the air-can.

Unscrew it by hand and pull it off.





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Remove the shock from the vise, use the end-piece of the IFP keychain tool to unscrew and remove the 5 point cap covering the IFP valve core (Figure 5). Depressurise and remove the valve core. Note this is a short one with different design to the air-can valve core.

**Figure 5.** Lower eyelet showing IFP 5 Pointed cap and short valve core.

Invert the shock. Place it in the vise using the lower eyelet flats to clamp.

Push on the shaft to see if the shock is still pressurised. This can happen if the oil is badly foamed.

Crack the bleed screw (Figure 6) and open carefully with a Phillips screwdriver. Let any pressure and foamed oil vent. Wear safety glasses.

Once pressure is all released, remove the bleed screw entirely. Use a 21 mm wrench to open the damper cap and draw out the shaft assembly with piston and cap.

Pour out and discard the oil.

Use an air-gun or the Keychain IFP tool centre piece and pump to blow the IFP out of the shock body. Note, imperial shocks all use a flat red aluminium IFP. Metric shocks use the green rubber flexible SKF IFP.

Remove the shock body from the vise, clamp the shaft assembly by the eyelet and loosen the piston bolt.

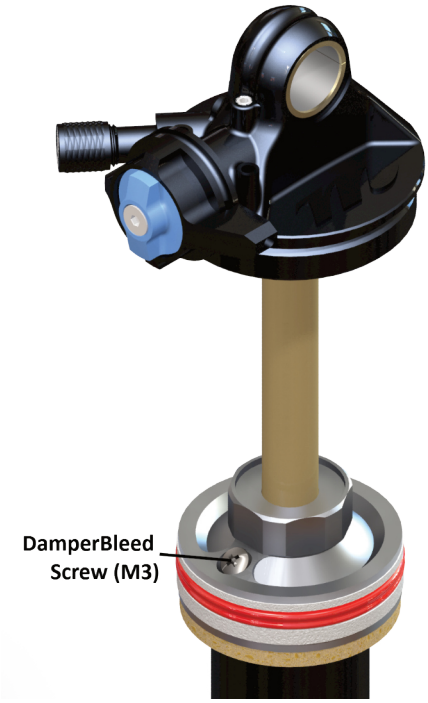


**Figure 6.** McLeod shock with air can removed, showing damper bleed screw.

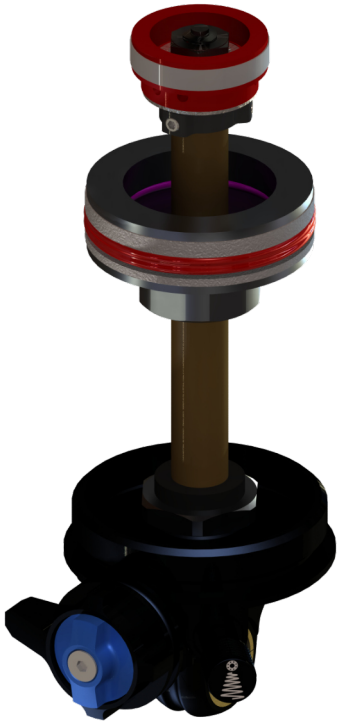

**Figure 7.** McLeod shock shaft assembly inverted, showing red damper piston.

Carefully remove the damper shims and piston (Figure 7). Retain the order if important.

If changing main shaft seal (recommended) then use the 1.5 mm hex key to remove the three pins holding the IPA plate to the shaft; remove that noting orientation and the damper cap will slide off.

Change seals as required and reassemble with damper cap, then IPA plate.





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## *New Valving Assembly*

Your new valving includes three new shim-stacks and a new piston. Even if your existing piston looks the same, it isn't and isn't going to perform the samem so don't mix them up. There are small differences in piston dish, bleed hole size and port finish that make big differences in damping force (Figure 8).

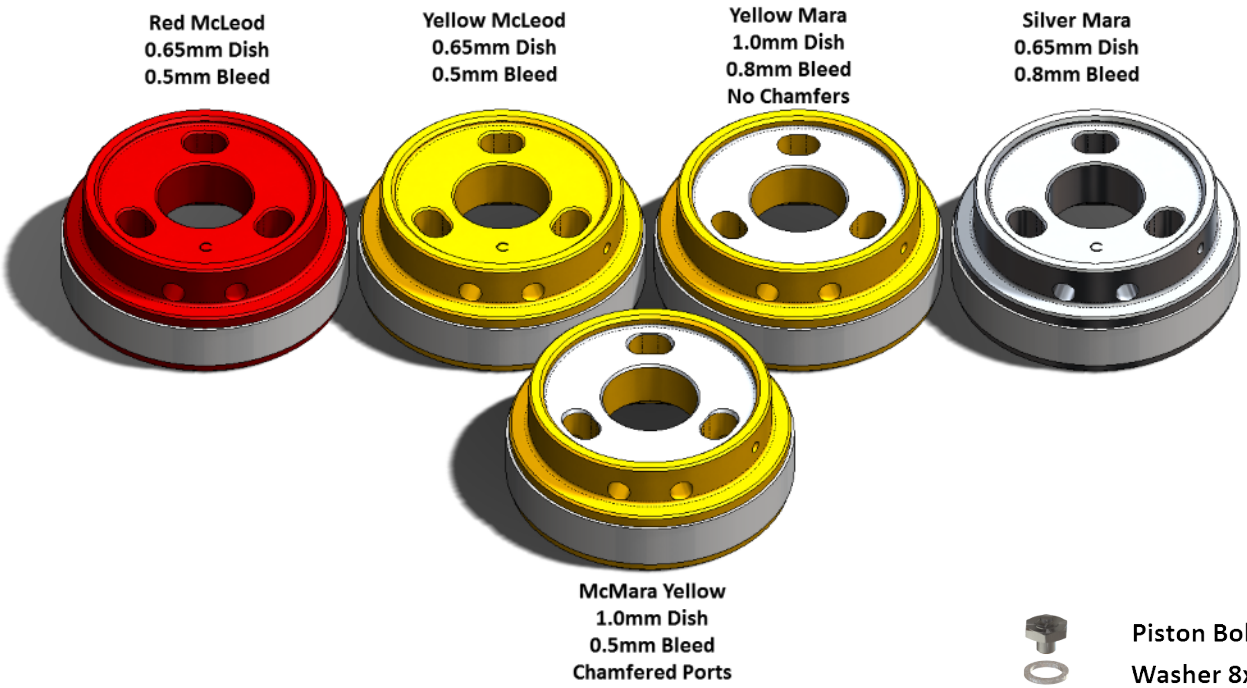


**Figure 8.** McLeod and McMara pistons.

The valving and piston are best installed Inverted with the shock head held gently in a vise with soft-jaws. Orientation as per Figure 9.

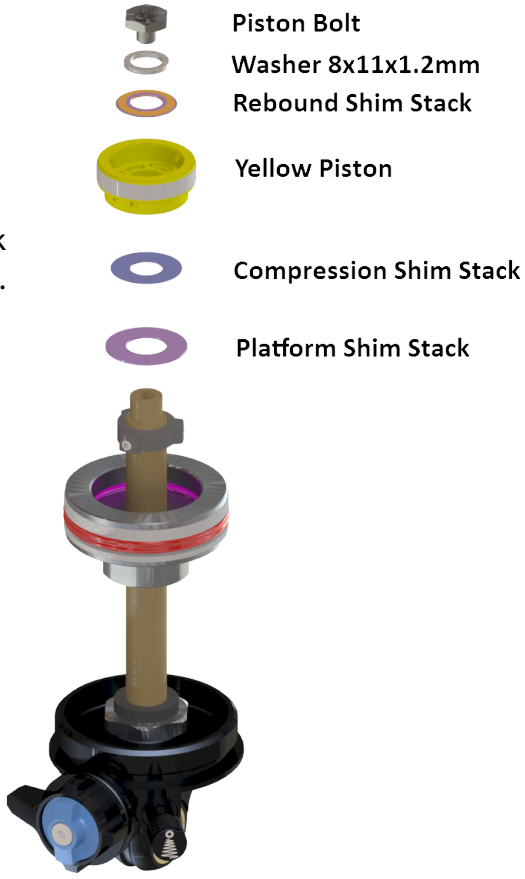


**Figure 9.** Installation of new piston and shims.





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## *Tune Drawing & Tuning Options*

Your paper McMara Tuning Drawing shows three arrangements for compression and rebound shims (Figure 10).

- Compression is the bottom left side showing three optional tunes and their shim stacks.
- Rebound is the right side showing three optional tunes and their shim stacks.
- Platform shims are top left and shows the same shim stack for all three tunes.

Centre tune is the target for your application. Left is softer, right is firmer.

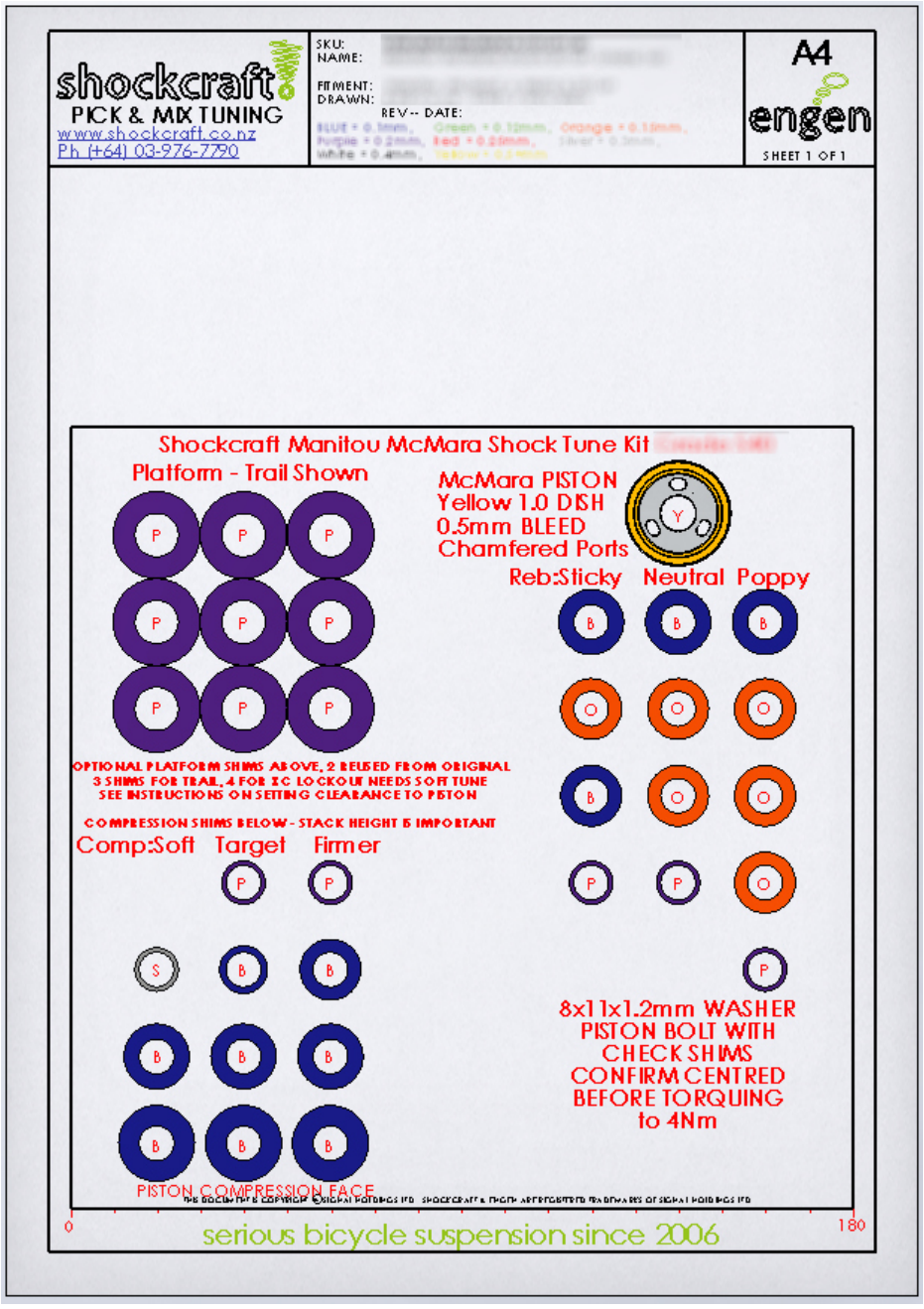


**Figure 10.** Example McMara Tune Drawing.

Valving needs organised in three stages: compression, rebound and lockout.

**You have tuning options and three platform options (A, B & C). Select from below Platform Options then proceed to matching option on following page.**

**Platform Options:**

**Option A: No Platform Shims**
Simplest setup. IPA lever won't change compression.

**Option B: Trail Setup**
Complex setup. Gives a compliant ride with IPA lever adding maximum ~30% more compression damping in 3 stages as required. This is shown on the drawing in Figure 10.

**Option C: XC Lockout**
Complex setup. Gives a firmer ride with IPA lever more than doubling compression damping to give a lockout feel when required.

**Option A: Simplest, no compression adjust**

1. Select your compression and rebound tune shim stacks:
   - Target compression unless you've already tried it.
   - Neutral rebound unless you've already tried it.
2. Install compression and rebound as per the McMara Tune Drawing. Do not install Platform shims.
3. Check all shims are centred and hand tight before torquing piston bolt to 4 Nm
4. Proceed to Bleed Instructions.

**Option B: Trail tune with compression adjust**

1. Select your compression, rebound and platform tune shim stacks:
   - Target compression unless you've already tried it.
   - Neutral rebound unless you've already tried it.
   - 3 large shims for platform.
2. Install compression, rebound and platform as per the McMara Tune Drawing.
3. Set IPA lever stop screw (Figure 11) so it stops nicely on the first click.
4. Check platform shim preload/float. Correct float will allow a 0.1 mm shim to fall out but will trap a 0.2 mm shim against the piston with the IPA lever in open position.
5. If shims are too tight then install 8 x 10 x 0.2 mm or 8 x 10 x 0.3 mm shim between platform and compression shims then recheck float.
6. If shims are too loose then install 10 x 14 x 0.1 mm shims (2) between platform and compression shims and recheck float.
7. Repeat 4/5/6 above until float is correct.
8. Check all shims are centred and hand tight before torquing piston bolt to 4 Nm.
9. Proceed to Bleed Instructions.

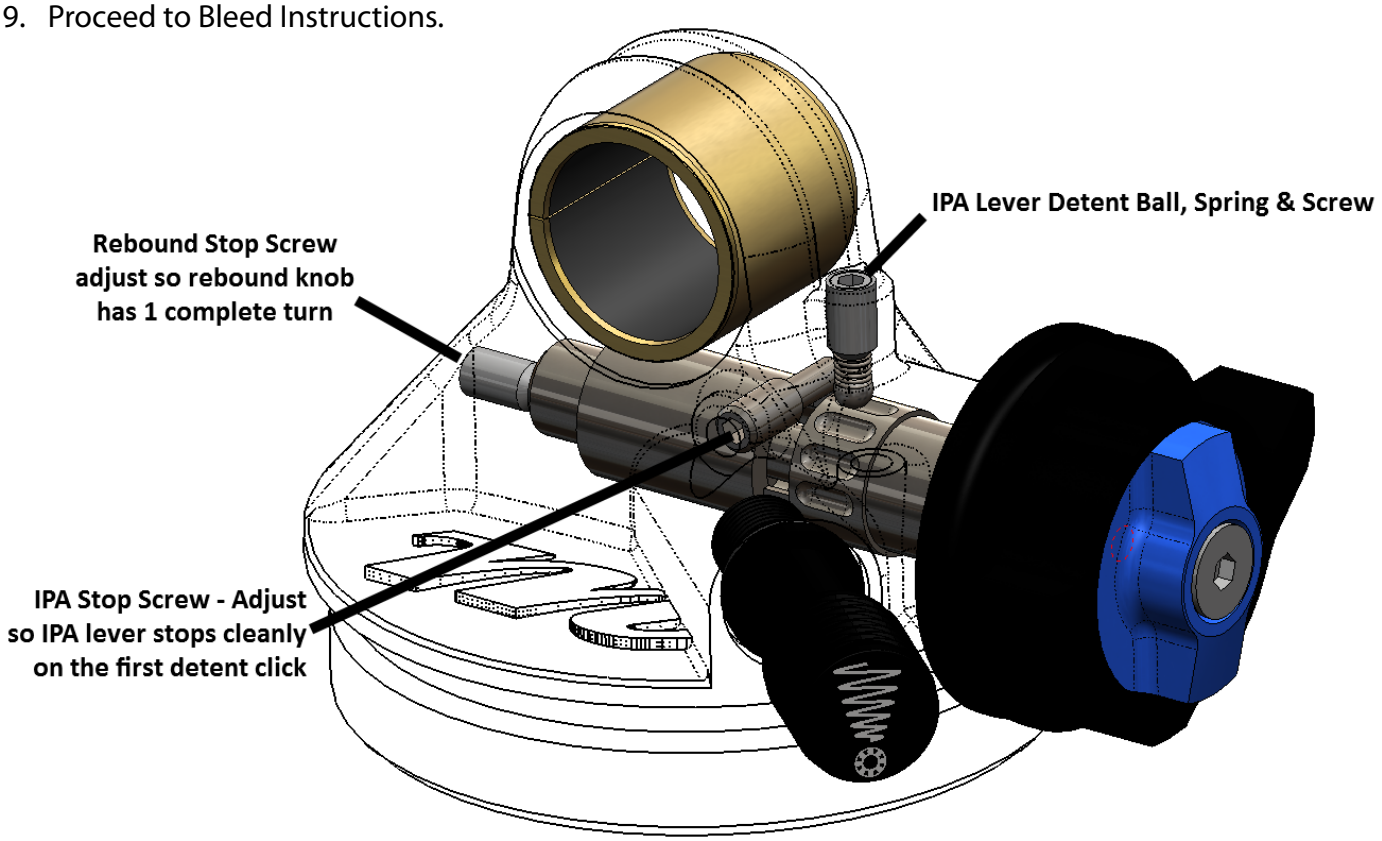


**Figure 11.** Shock head adjustments.





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**Option C: XC tune with Lockout**

You should use the softest compression shim-stack in your grade with XC lockout as the lockout shims give additional compression damping.

1. Select your compression, rebound and platform tune shim stacks:
   - Soft compression unless you've already tried it.
   - Neutral rebound unless you've already tried it.
   - 3 large shims for platform.
2. Install compression, rebound and platform as per the McMara Tune Drawing.
3. Set IPA lever stop screw (Figure 11) so it stops nicely on the first click.
4. Check platform shim preload/float. Correct float will allow a 0.1 mm shim to fall out but will trap a 0.2 mm shim against the piston with the IPA lever in open position.
5. If shims are too tight then install 8 x 10 x 0.2 mm or 8 x 10 x 0.3 mm shim between platform and compression shims then recheck float.
6. If shims are too loose then install 10 x 14 x 0.1 mm shims (2) between platform and compression shims and recheck float.
7. Repeat 4/5/6 above until float is correct.
8. Remove shim stack and install an additional 20 mm platform shim for a total of 4.
9. Check all shims are centred and hand tight before torquing piston bolt to 4 Nm.
10. Proceed to Bleed Instructions.

## *Bleed Instructions*

Once piston and shim stacks are carefully installed and torqued you are good to reassemble and bleed the damper. Damper cap (seal head) requires 25 Nm torque.

**There are various methods:**

1. Vacuum bleed. This is the cleanest and most solid bleed but requires specialised equipment and fittings. It also requires calculation of final fill volumes.
2. Manual bleed with degassed oil. This gives a more solid bleed than a normal manual bleed and requires less equipment than a vacuum bleed.
3. Manual bleed process with calculated IFP depth.
4. Manual bleed processes to overfill and bleed off excess.

Hayes have a manual bleed process to overfill and bleed off excess oil in this video.




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I prefer to manually bleed with calculated IFP depth.

**Manual Bleed with Calculated IFP Depth**

1. Leave the shaft, piston and shaft/seal heads all assembled.
2. Calculate IFP travel & calculate IFP position so it'll clear the damper piston by X mm where X depends on the shock and how much free space it has internally.
3. IFP Depth = Shock Stroke x 0.83 + 17
    - 32 mm Stroke = 43.5 mm Depth
    - 35 mm Stroke = 46 mm Depth
    - 38 mm Stroke = 48.5 mm Depth
    - 40 mm Stroke = 50 mm Depth
    - 45 mm Stroke = 54.5 mm Depth
    - 50 mm Stroke = 58.5 mm Depth
    - 55 mm Stroke = 62.5 mm Depth
    - 56 mm Stroke = 63.5 mm Depth
    - 60 mm Stroke = 67 mm Depth
    - 63 mm Stroke = 69.5 mm Depth
    - 65 mm Stroke = 71 mm Depth
4. Remove the IFP valve core and set the IFP edge at the calculated depth for full extension.
    - Imperial shocks use the red aluminium IFP. Metric shocks use the green flexible IFP. Both install with the flat side towards the oil.
5. Replace the valve core to hold the IFP loosely in position.
6. Fill up the shock body with oil.
7. Hold the damper piston upside down and fill any open ports with oil. Remove the bleed screw.
8. Place the piston into the oil slowly, let oil bleed up through the ports and displace the air.
9. When the shaft is at full extension position, screw the top-cap down.
10. Using a syringe and needle inject oil through the bleed port to chase out any remaining air bubbles.
11. Replace bleed screw, tighten top-cap, pressurize IFP and check how it feels.

**Bleed Checking**

Pressurise IFP to 50-100 psi using shock pump and IFP keychain tool mid section. Now stroke the shock by hand.

A good bleed will be quiet, a bad bleed will be very squelchy.

If the shock stops with a knock before full stroke then IFP position was too high (not enough oil) and you will need to rebleed.

If the shock gets too progressive to fully compress before full stroke then the IFP position was too low (too much oil). You can carefully bleed out ~20 drips of oil from the bleed screw and test again.





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## *IFP Pressure*

Once shock is stroking well you must fully pressurize the IFP. IFP pressure depends on the damping forces the shock experiences as these drive internal pressures.

Higher pressure is required to prevent air ingress and cavitation under high damping forces.

Lower pressure loads the seals up less and minimises friction if only low load is experienced.

**IFP pressure is based on your McMara Pick & Mix grade (see Tune Drawing):**

- Grade 30 Pick & Mix Tune - use 200 psi for extra sensitivity.
- Grade 35-45 Pick & Mix Tune use 300 psi.
- Grade 50+ Pick & Mix Tune use 400 psi for extra cavitation preventation.

**XC Lockout Tunes** require an additional 100 psi (max 500 psi) to prevent cavitation under lockout forces.

If you feel knocking under high compression forces or inconsistent rebound (from air intrusion) then increase IFP pressure (500 psi max).

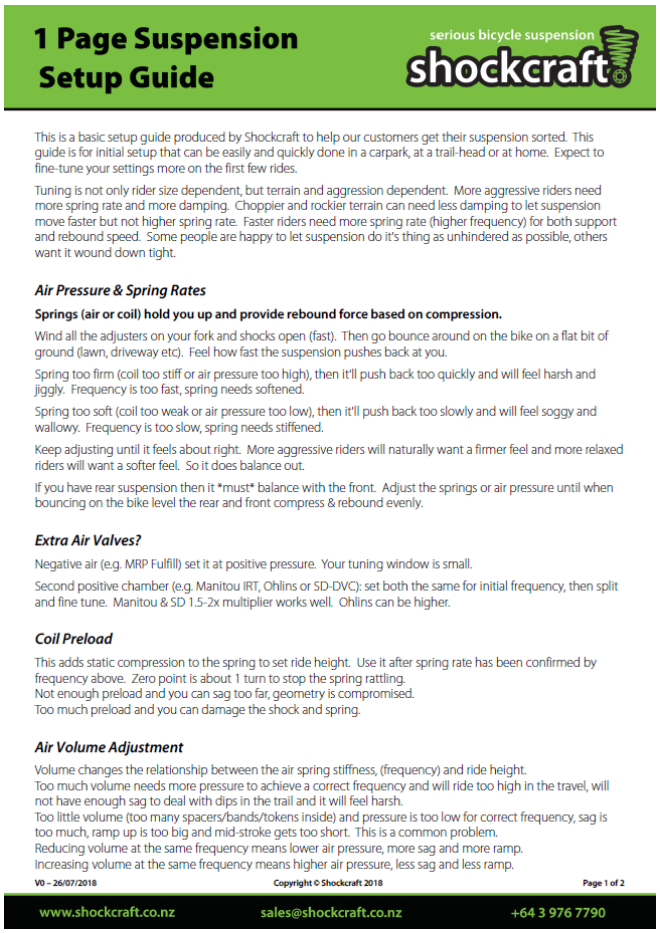
When the damper is pressurised and stroking well, check rebound adjuster range and IPA lever function.
**Option A:** Without platform shims the IPA lever will do nothing. This is normal.
**Option B:** With trail platform the first notch (second position) of IPA lever will also do nothing.
Further increments will give you increasing damping but no firm platform.
**Option C:** With XC lockout platform the damper will be firmed up right across the range.

## *Initial Setup*

Start your setup with IPA open and LSR 1/4 turn from closed.

Set air pressure to suit using bounce-tests as described in the Shockcraft 1 Page Suspension Setup Guide here.

Fine-tune rebound on the trail.



**1 Page Suspension Setup Guide**

serious bicycle suspension shockcraft

This is a basic setup guide produced by Shockcraft to help our customers get their suspension sorted. This guide is for initial setup that can be easily and quickly done in a carpark, at a trail-head or at home. Expect to fine-tune your settings more on the first few rides.

Tuning is not only rider size dependent, but terrain and aggression dependent. More aggressive riders need more spring rate and more damping. Choppier and rockier terrain can need less damping to let suspension move faster but not higher spring rate. Faster riders need more spring rate (higher frequency) for both support and rebound speed. Some people are happy to let suspension do it's thing as unhindered as possible, others want it wound down tight.

***Air Pressure & Spring Rates***

**Springs (air or coil) hold you up and provide rebound force based on compression.**

Wind all the adjusters on your fork and shocks open (fast). Then go bounce around on the bike on a flat bit of ground (lawn, driveway etc). Feel how fast the suspension pushes back at you.

Spring too firm (coil too stiff or air pressure too high), then it'll push back too quickly and will feel harsh and jiggly. Frequency is too fast, spring needs softened.

Spring too soft (coil too weak or air pressure too low), then it'll push back too slowly and will feel soggy and wallowy. Frequency is too slow, spring needs stiffened.

Keep adjusting until it feels about right. More aggressive riders will naturally want a firmer feel and more relaxed riders will want a softer feel. So it does balance out.

If you have rear suspension then it *must* balance with the front. Adjust the springs or air pressure until when bouncing on the bike level the rear and front compress & rebound evenly.

***Extra Air Valves?***

Negative air (e.g. MRP Fulfill) set it at positive pressure. Your tuning window is small.

Second positive chamber (e.g. Manitou IRT, Ohlins or SD-DVC): set both the same for initial frequency, then split and fine tune. Manitou & SD 1.5-2x multiplier works well. Ohlins can be higher.

***Coil Preload***

This adds static compression to the spring to set ride height. Use it after spring rate has been confirmed by frequency above. Zero point is about 1 turn to stop the spring rattling.
Not enough preload and you can sag too far, geometry is compromised.
Too much preload and you can damage the shock and spring.

***Air Volume Adjustment***

Volume changes the relationship between the air spring stiffness, (frequency) and ride height.
Too much volume needs more pressure to achieve a correct frequency and will ride too high in the travel, will not have enough sag to deal with dips in the trail and it will feel harsh.
Too little volume (too many spacers/bands/tokens inside) and pressure is too low for correct frequency, sag is too much, ramp up is too big and mid-stroke gets too short. This is a common problem.
Reducing volume at the same frequency means lower air pressure, more sag and more ramp.
Increasing volume at the same frequency means higher air pressure, less sag and less ramp.

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