



# HYDRAULIC INSTALLATION INSTRUCTIONS

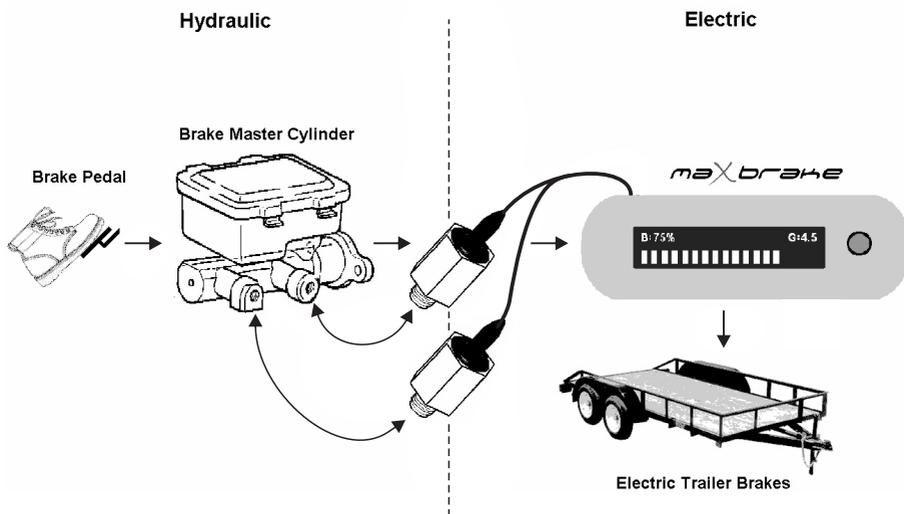
April 2012



COMPLIES WITH BRAKE RULE 32015 FOR NZ CLASS TC TRAILERS

**cm** trailer  
equipment

## HOW THE MAXBRAKE3 WORKS



**Thank you for buying a MaxBrake3, once installed we are confident you will be happy with the performance. All components used in this controller are SAE rated. This controller was developed exclusively for the NZ market and complies with the current NZTA Brake Rule 32015/2 that states the following are not permitted for Class TC trailers;**

### **Variable Proportioning Devices**

The rule requires that no device is fitted which enables the driver to adjust the brake force distribution between axles or vehicles used in a combination [2.3(1)(b)]. So, any of these devices, which may be used by the engineer when setting up the brakes for the combination, must be permanently set or removed on certification.

### **Inertia/Timer operated Brakes**

The rule requires that the service brake of a heavy vehicle, whether in combination or not, must be able to be applied from the driver's normal driving position in a controlled and progressive manner using one control only, [2.3(1)(a) and 2.3(2)]. This means that any Inertia or timer service brake controls fitted to a TC trailer must be replaced by a progressive control operated from the same control as the service brake of the towing vehicle.

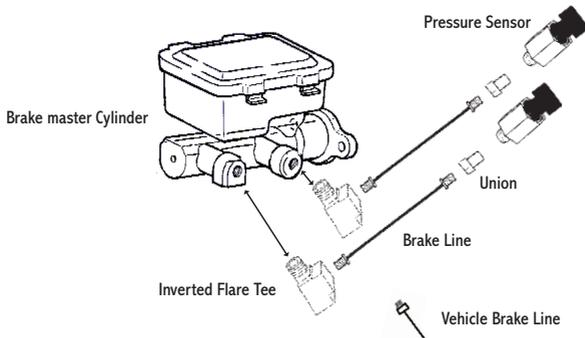
## 1. HYDRAULIC DUAL PRESSURE SENSOR INSTALLATION

Note: Installation must only be carried out by a qualified brake technician

Do not contaminate the brake system by allowing moisture or debris to enter.

1. Park vehicle on level, flat ground. Turn engine off. Ensure that vehicle will not move.
2. Locate brake master cylinder. (See vehicle owner's manual) and always use proper tools.
3. Carefully disconnect brake lines from brake master cylinder (Front & back port)
4. Note: Different vehicles have different hydraulic fittings. Connect the hydraulic Tee adaptors as shown on the appropriate figure for your vehicles. You may need to gently bend the brake lines to better fit your application. Be careful to prevent damage to your brake system. Due to room constraints on some vehicles it may be necessary to tee into the brake lines further away from the master cylinder. CM Trailer Equipment have brass tees to fit most sizes of brake line.
5. Reconnect the vehicle brake line to the Tee adapters.
6. Attach the supplied brake pipes and pressure sensors to the remaining port on the Tee adapters.
7. Bleed air out at the pressure sensors. (see bleeding instructions note 2)
8. Connect sensor cable to both sensors and feed sensor cable through vehicle firewall. Caution: Do not pinch, crush, or damage the sensor cable. (If sensor cable is not long enough, we recommend that you make a longer brake pipe between the tee and the sensors, DO NOT cut and lengthen the sensor cable)
9. Connect sensor cable to MaxBrake brake controller.
- 10 You will need to calibrate MaxBrake one time for your vehicle, unless you change the pressure sensor. See calibration instruction 4.
11. Be sure to check the brake fluid level in the reservoir after bleeding the pressure sensors. Add fluid as necessary.

If you have trouble please contact **CM TRAILER EQUIPMENT LTD PH 03 308 9918**



## 2. BLEEDING THE SENSOR

Once MaxBrake sensors are installed

1. Turn off the engine and allow to cool. Ensure that vehicle will not roll or move.
2. Take foot completely off the brake pedal. Note: Do not twist cable at the back of the pressure sensor, unplug the pressure sensor cable.
3. Loosen the pressure sensor with a slight 1/4" turn. Be ready to collect brake fluid.
4. Have assistant very slowly begin to press brake pedal. Instruct the assistant in advance not to release the brakes until instructed to do so.
5. Look for brake fluid to begin escaping at the threads of the pressure sensor. As soon as brake fluid is observed, have assistant hold brake pedal steady.
6. Close the pressure sensor by tightening it. Plug in the pressure sensor cable.
7. Instruct the assistant to release the brakes. Note: Do NOT release the brake pedal while the pressure sensor is open (not tightened), as this will suck air back into the system.
8. Be sure to check the brake fluid level in the reservoir after bleeding the pressure sensor. Add fluid as necessary to keep the level above the fill line. Do not contaminate system.
9. Be sure to inspect the pressure sensor and other fittings for signs of leakage. Do not operate a leaking or malfunctioning brake system. Correct leaks as necessary.

NOTE: Air bubbles in the brake lines can sometimes cause strange results.

## 3. ELECTRICAL WIRING

The MaxBrake controller is only to be used with 12 volt, negative ground systems. Do not reverse polarity. (Not all vehicles use the same wire colours)

15 Amps current limit

**BLACK** + 12v supply from tow vehicle battery, hot at all times, fuse or circuit breaker protected, 30 amps maximum.

**WHITE** - Negative ground return.

**BLUE** Output to trailer brakes.

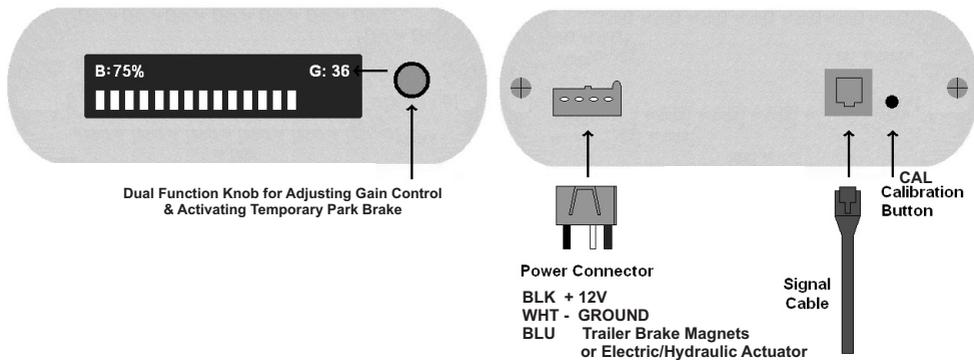
**CAUTION:** When charging or removing and replacing batteries, it is a necessary requirement to disconnect the power supply from your Maxbrake controller. This can be done simply by removing the 4 pin power plug from the rear of the unit. Disconnecting the power won't affect any of your settings as the Maxbrake retains this in the memory. Disconnecting your Maxbrake will limit the possibility of any damage being done to the electronic circuitry by way of; accidental reverse polarity, charging spikes or short circuit. Any damage caused by these scenarios is clearly visible on the circuitry and is not covered by Maxbrake's extensive warranty.

**NOTE A** Electric/hydraulic trailer brake systems use the MaxBrake output as a very low amperage power control signal, (a separate high current auxiliary supply wire to power the electric pump motor must be installed). Refer to brake actuator installation manual.

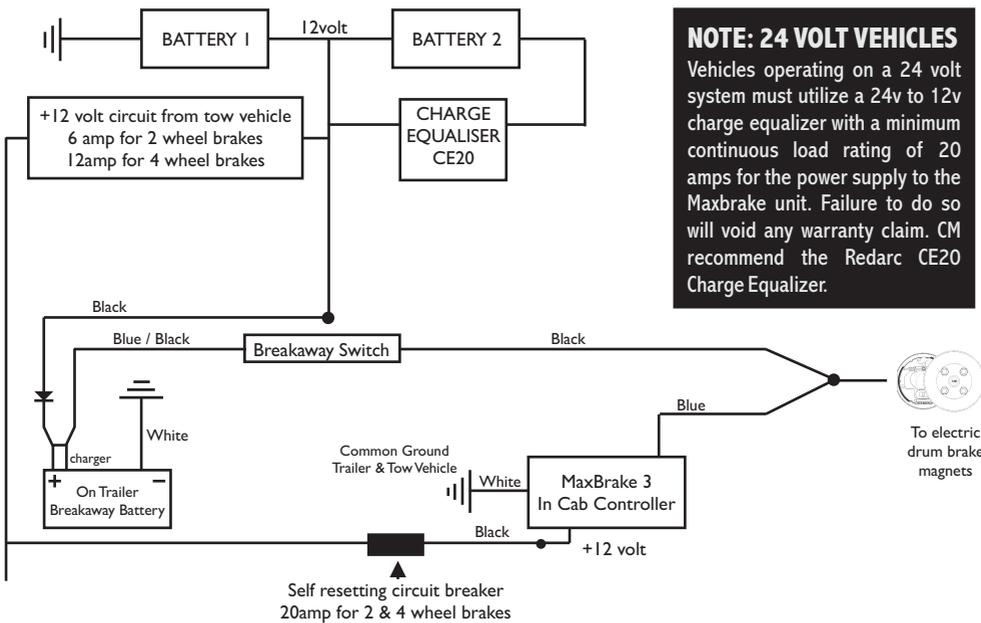
**NOTE B** Be very cautious about electrical connections with different colour codes, as wire colours may vary from vehicle to vehicle.

**NOTE C** Solder all joints.

### MAXBRAKE3 FRONT & REAR VIEW



### 24 VOLT - 12 VOLT ELECTRIC BRAKES SCHEMATIC FOR MAXBRAKE 3



## 4. CALIBRATION

- 1 Make sure vehicle is at a complete stop.
- 2 Vehicle engine must be running.
- 3 Take foot completely off brake pedal.
- 4 Push & hold CAL button, wait until after the 5 second countdown is finished before releasing the CAL button. You will see a message “Cal Mode”.
- 5 Dial up Gain G to specified rate between G1 & G100. Lower settings are soft, higher settings are hard brake response. For initial set up & controller testing set between G40 & G45 until you can discuss calibration with your HVEK certifying engineer.
- 6 Slowly press brake pedal until A & B on left side of screen increases to a maximum reading of between 30 & 35. A & B readings are the pressure sensors and this is the recommended setting.

NOTE: There will often be a difference between A & B, this is normal as the vehicle brake system has a bias with more pressure to the front brakes.

- 7 Take foot completely off brake pedal.
- 8 Push & hold CAL button until message says “release Cal button”. Release Cal button.
- 9 Rotate Gain knob counter clockwise, never leave Gain knob rotated fully clockwise.
- 10 MaxBrake is now trained. Test to ensure that MaxBrake tracks with the brake pedal.

**NOTE 1:** If the brake pedal is not pressed there should be no figure at the top left corner of the screen. If there is a figure please recalibrate. Numbers of between 1 & 999 should only appear if the brake pedal is pressed. Refer to section 5 for brake output and screen readings.

### NOTE 2: RESIDUAL HYDRAULIC LINE PRESSURE

Please note that on some applications of the Maxbrake3 it is required to be fitted to vehicles equipped with air operated hydraulic brakes. This type of braking system is usually found on the heavier types of trucks.

The Maxbrake3 sensors are still fitted in the normal manner to the hydraulic master cylinder.

However these types of braking systems are known to have residual hydraulic line pressure. This means that when the brakes are inactive they still contain a small amount of pressure in the brake lines.

The most important procedure to follow here when calibrating the Maxbrake3 is to make sure that the vehicles air system is up to full operating pressure. Next step is to depress the brake pedal a couple of times before you start your calibration mode. This will help charge the brake lines. Now when you start calibration, the Maxbrake3 will zero the sensors, thus eliminating this residual pressure reading.

If you fail to do this, the Maxbrake3 may pickup this residual line pressure and keep the trailer brakes partially on when not using the tow vehicle brakes.

## 5. TESTING THE CONTROLLER OUTPUT VOLTAGE

### A. WITH NO TRAILER CONNECTED

MaxBrake controllers transmit a very weak “ghost” detection Voltage, this is to detect trailer plugged/unplugged. With trailer disconnected and no brake pedal pressure a voltmeter will read approximately 4.5 Volts. “Check Trailer Wiring” appears on the screen. With any amount of brake pedal pressure the output will read full battery Voltage, remember this is a “false” value because the trailer is disconnected, MaxBrake will display between 1 – 999 in the top left corner to indicate how hard the brake pedal is pressed. To test the controller requires an electrical load of either a trailer with electric magnetic brakes or electric/hydraulic actuated brakes otherwise a car horn will suffice. Once the controller detects sufficient resistance the output Voltage is:

**NO PEDAL PRESSURE** = 0 Volts (zero)

**FULL PEDAL PRESSURE** = 12 Volts/full battery Voltage with “G” gain set @ G100 or part thereof depending on “G” setting. The higher the “G” gain setting the easier to test to full Voltage.

### B. WITH TRAILER CONNECTED

To test controller voltage output connect to a trailer with an electric or electric/hydraulic brake system; the controller requires a resistance load (see 5A above). Output voltage is;

**NO PEDAL PRESSURE** = 0 volts (zero)

**FULL PEDAL PRESSURE** = 12 volts/full battery voltage with “G” gain set @ G100 or part thereof depending on “G” setting. The higher the “G” gain setting the easier to test to full Voltage.

## 6. HOW TO OPERATE YOUR MAXBRAKE3

Once installed there are no further adjustments required. MaxBrake3 is calibrated and operated in a controlled and progressive manner from the service brake of the towing vehicle and complies with Heavy Vehicle Brake Rule 32015/2.

After a few minutes of inactivity, the MaxBrake display will turn off to save power. MaxBrake is always on and ready when you need maximum braking power. Even with the display lit up, MaxBrake only uses a trickle of only 0.05 Amps with the brakes off/inactive. With the display off, MaxBrake draws about 0.02 Amps, so there is very little chance of draining your battery flat.

For all on-screen reporting “What Information Does MaxBrake3 Show On Each Screen” please refer to section 8 below.

The only manual function of MaxBrake3 is the Temporary Park Brake Mode, please read operating instructions below.

## 7. TEMPORARY PARK BRAKE MODE

Park Brake Mode lets the driver temporarily “lock” the trailer brakes from the driver seat before getting out and applying the trailer’s mechanical park brake. This is required to meet the new Brake Rule amendment 32015/2 for Class TC trailers.

**NOTE:** Disconnecting the trailer electrical cable from the tow vehicle will release the trailer park brake.

**NOTE:** Also, electric powered magnetic drum brakes will release if the vehicle battery runs down.

### TO USE THE PARK BRAKE FEATURES, FOLLOW THESE STEPS

1. With the tow vehicle engine running, set/lock the tow vehicle parking brake.
2. Press the brake pedal all the way down until brake output reads 999 and hold.
3. Rotate the gain knob fully clockwise.
4. The 6 second countdown will begin. The on-screen message shows “Setting Park Brake in 6...5...4...3...2...1...0”.
5. After countdown reaches 0 (zero), rotate gain knob counter-clockwise and release brake pedal. On-screen message shows “Park Brake is ON”. If you release the brake pedal or rotate the gain knob counter-clockwise before the countdown reaches 0 (zero), the temporary park brake will not engage.

MaxBrake will display the approximate battery Voltage and how many minutes and hours have elapsed with the park brake on.

If the battery Voltage drops below 11.5 Volts, MaxBrake will show “Low Battery” message.

If the battery Voltage drops below 10.0 Volts, MaxBrake will release the park brake to prevent excessive battery drain.

MaxBrake will also release the park brake in the event of sensor cable unplugged, check trailer wiring, or self test fail.

If the park brake releases immediately when attempting to set the park brake, watch for any error messages to determine the cause.

### TO RELEASE PARK BRAKE

1. On-screen message shows “Park Brake is ON”.
2. Press the brake pedal all the way down and hold.
3. Rotate the gain knob fully clockwise.
4. On-screen message shows “Releasing Park Brake in 6...5...4...3...2...1...0”.
5. Rotate the gain knob counter-clockwise and release the brake pedal.
6. When the countdown reaches 0 (zero), the park brake will release.

If the park brake doesn't release the probable cause is insufficient brake pedal pressure. Try the above step again but with more brake pedal pressure.

**NOTE:** When used with electric/hydraulic actuators this park brake mode should not be left running for more than 10 minutes as it may damage the actuator.

## 8. WHAT INFORMATION SHOWS ON EACH SCREEN?

### NORMAL OPERATION

1. Top Left Corner shows brake output level from 1 to 999 when the brake pedal is pressed.  
When the brake pedal is not pressed, no number should be displayed in the top left corner.  
If the brake pedal is not pressed AND a number is displayed in the top left corner, please recalibrate MaxBrake.
2. "P" appears if the brake pedal switch is pressed, if connected.
3. Top Center show "MaxBrake".
4. Top Right show the Gain setting G0 (minimum) to G100 (maximum).
5. After 5 minutes of inactivity, MaxBrake will automatically switch off the display screen light to save energy. This is normal.
6. A built in electronic eye will dim the display screen light during low light or night conditions.
7. Error Messages are shown on the second line during normal operation.

**"CHECK SENSOR CABLE"** indicates that the sensor cable is damaged or unplugged from the MaxBrake box

\*Max Brake will not apply the trailer brakes when "Check Sensor Cable" is shown

**"CHECK TRAILER WIRING"** indicates an open circuit in the wiring between the MaxBrake box and the trailer brakes.

The cause could be ... The trailer electrical cable is unplugged from the tow vehicle (no trailer connected) .... Or a poor electrical connection between the MaxBrake box and the trailer brakes, .... Or unexpected stray voltages (such as trailer lighting circuits) due to improper wiring, .... Or a poor electrical return path (bad earth) between the truck and the trailer,

**"TRAILER SHORT"** indicates an electrical short circuit with unsafe current levels (approximately 25 or more Amps) which can permanently damage smaller electrical wires and potentially cause an electrical fire.

MaxBrake will not apply the trailer brakes when "Trailer Short" is shown, but will monitor to see if this fault condition is corrected.

**“HIGH CURRENT”** indicates that the trailer brakes are drawing too much current. This MaxBrake product will limit the output current to about 15 Amps maximum in compliance with New Zealand regulations, more than adequate for most trailer applications.

**“BAD CALIBRATION”** indicates that calibration was not done properly. The A or B number is greater than 500 “ticks”. This could result in very low or weak trailer brake response. Please follow the calibration instructions in the owner's manual.

**“LOW BATTERY”** indicates that the vehicle supply battery to the brake controller is below 10.0 Volts.

**“SELF TEST FAIL”** indicates an internal circuit failure inside the MaxBrake box.

**“DUAL SENSOR ERROR”** indicates that the two pressure sensors are not tracking together.

See the troubleshooting steps in the text above titled “Dual Pressure Sensors”

### **Calibration “CAL” Mode**

Cal mode is used to train the pressure sensors with the brake pedal, and to set the gain value. Cal mode has nothing to do with trailer errors, trailer disconnected, trailer connected, or “Check Trailer Wiring”

When properly set, MaxBrake will operate very smoothly over a wide range of trailer braking scenarios.

## **9. GENERAL INFORMATION**

The MaxBrake brake controller is able to sense when the electric current loop is completed through the vehicle body wiring, the trailer connector plug, the trailer wiring, and the trailer brakes. If any part of this loop is broken, weak, or intermittent then the error message will alert the driver on the MaxBrake display screen. MaxBrake cannot tell you exactly where the problem is, but can alert you to potential problems that may limit your trailer brakes. If you see the Trailer Unplugged / Check Trailer Wiring error message, you may need a qualified electrician or service technician to troubleshoot and find the actual wiring problem in your vehicle or trailer. Even with this error message displayed, MaxBrake will still make every attempt to operate the trailer brakes, but no brake controller can operate the trailer brake system that is disconnected or inoperative. This means the current loop is complete, but it may be weak. Sometimes, other wires may be connected to the trailer brake wires by mistake. 99.9% of the time, the problem is not the MaxBrake brake controller. Try a different “known good” trailer if possible to determine if it's the truck or trailer at fault. Because there are various parts to this system, it can be difficult to pinpoint the exact cause of a wiring problem, but it can be fixed by eliminating the most common causes.

After spending your hard earned money, it is very frustrating to have problems, but we have actually seen brand new trucks, brand new trailers, and brand new wiring adapters that plug in,

but do not work correctly with any brake controller. Most quality trucks, trailers, and wiring adapters work great without any problems. If you do the wiring yourself, be sure to take pride and care in your work. Proper wiring connections make a big difference. Trailer manufacturers may use different wiring methods and you cannot always rely on all color codes to use the same colors between all different trailers. Electricity does not care what color the wires are, just that a reliable electrical loop is completed to the right places. Remember that vehicle batteries and wiring are “live” and can cause more damage if not handled carefully. Other brake controllers may indicate that there is no problem, but they might miss wiring problems that MaxBrake detects. Our goal is to provide you with a quality product that works well, gives you a lifetime of service, and detects faults early for your safety.

**NOTE:** After a few minutes of inactivity, the MaxBrake display will turn off to save power. MaxBrake is always on and ready when you need maximum braking power. Even with the display lit up, MaxBrake only uses a trickle of only 0.05 Amps with the brakes off/inactive. With the display off, MaxBrake draws about 0.02 Amps, so there is very little chance of draining your battery flat

## **10. MAXBRAKE LEGAL INFORMATION**

### **MAXBRAKE LIMITED 5 YEAR WARRANTY**

Mac's Classic Muscle Cars, LLC (hereafter referred to as “Mac's”) warrants the MaxBrake brake controller to be free of defects in material and workmanship, under normal use for a period of five (5) years from the original consumer purchase date. At Mac's sole option, Mac's will repair or replace the defective product with a like product. Replacement product or parts may include remanufactured or refurbished parts or components. This warranty applies only to the first consumer purchase, is nontransferable and limited to components supplied with the MaxBrake brake controller product. The purchase or use of the MaxBrake brake controller constitutes acceptance of the conditions stated in this document. Mac's makes no guarantee, warranty, or representation regarding the suitability or legality of this product. It is the consumer's responsibility to ensure regulatory compliance before purchasing or using this product. The consumer agrees to operate this product in keeping with all laws governing its use. Under no conditions will Mac's Classic Muscle Cars, LLC be responsible for anything other than the repair or replacement of the original product.

### **LIMITATION OF LIABILITY AND WARRANTY EXCLUSIONS**

Mac's liability is limited to the cost of repair or replacement of the MaxBrake brake controller. This limited warranty excludes, but is not limited to, damage, deterioration, or malfunction due to negligence, abuse, accident, improper use, misuse, improper installation, failure to follow supplied instructions, alteration, modification, unauthorized repair or attempted repair,

external causes, normal wear and tear, or any other cause which does not relate to a product defect. This limited warranty also excludes any incidental, consequential, or other claims, damages, or losses, even if advised of the possibility of such, including against the consumer by any party. There are no other warranties, express or implied, including implied warranty of merchantability and fitness for a particular purpose. All disputes will be handled through neutral arbitration.

**For assistance with your MaxBrake controller, please call:**

**CM trailer  
equipment**

**03 308 9918**

**For more information about MaxBrake please visit our website at  
[www.cmtrailer.co.nz](http://www.cmtrailer.co.nz)**

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