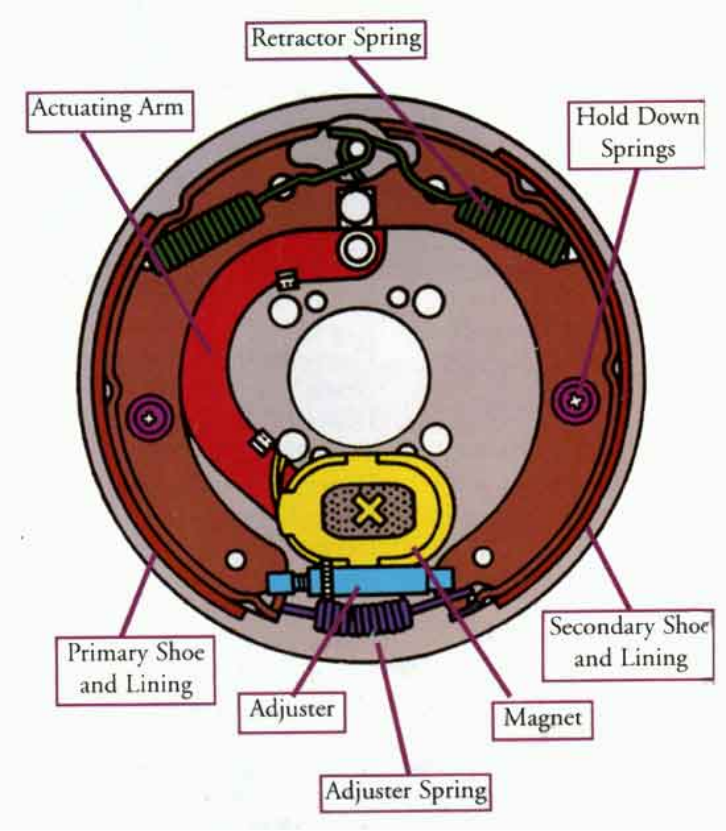
Electric Brakes For Civilian Trailers Pulled By Military Vehicles

Summary

How to operate electric brakes on a civilian trailer pulled behind a military vehicle is a common question. It can be done but several obstacles must be overcome.

How Electric Brakes Work

The parts of an Electric Brake System are mounted on a backing plate. The braking components consist of a magnet, actuating arm, brake shoes and springs. The brake drum covers this assembly.



The backing plate is fixed to the end of the axle tube and wired to the tow vehicle. When an electrical current is provided from the tow vehicle the magnet is energized and tries to stick to the face of the brake drum, which is mounted to the wheel hub. Due to rotation of the wheel, the magnet moves the actuating arm. This movement forces the primary brake shoe against the drum. The force of the primary shoe in turn pushes the secondary brake shoe against the drum to complete the braking sequence.

The amount of braking will depend upon the current flowing to the magnet; more current, more braking force. The brake controller fitted in the tow vehicle determines this.

There are several types of brake controllers, but all of them supply a varying amount of current to the trailer brakes. Depending on controller type, the amount of current supplied to the trailer brakes may be determined on how quickly you're stopping (inertia), how long you've had your foot on the brake pedal (time) or a combination of both. As a rule of thumb; the maximum current is 7 amps per axle.

The tow vehicle provides the brake controller with electrical power, a "trigger" signal from the brake light switch and a wire connected from the controller's output to the trailer's plug.

The Challenge With Civilian Electric Trailer Brakes and Military Tow Vehicles

The root of the problem is the military tow vehicle's 24-volt electrical system. With very rare exception, brake controllers operate on 12-volts. Both the electrical power AND trigger signal must be 12-volt. Furthermore, the 12-pin NATO trailer socket on military vehicles has no provision for an electric brake connection.

Ways to Overcome Military Tow Vehicle / Civilian Trailer Electric Brake Challenges

The first obstacle is providing 12-volt power to the electric brake controller. There are several ways, here are a few common options:

- Dual Output Alternator
- Secondary Alternator
- Tapping "Bottom" Battery
- DC-DC Voltage Converter

Either alternator option is a fine choice, but can be expensive. Tapping the bottom battery is easy and a good option too, but provisions must be made to deal with battery imbalance. Imbalance is an issue where pulling power from one battery causes it to be undercharged and the other battery to be overcharged, shortening battery life. Battery imbalance can be dealt with by installing a "battery balancer" but swapping the batteries around from time-to-time can be workable but not the best choice. DC-DC converters can work, but is the least desirable option. You must be sure that the DC-DC converter you choose can handle an electromagnetic load and associated surges.

The second obstacle is the trigger signal. Using a 24-volt relay that is triggered by the tow vehicles brake light circuit (wire #22) easily solves this issue. The relay switches the brake controllers trigger input to your 12-volt power source when the brake pedal is depressed.

The final issue is getting the brake controller's output signal to the trailers brakes. For Cables made after 1/1/2015, run a wire from the electric brake controller's output to pin "M" on your 12-Pin NATO socket (M is an unused pin). Inside the converter cable, pin "M" is connected to the 7-Way RV sockets brake pin. With a Frame Rail or Composite Light mounted converter, run a wire from the electric brake controller's output directly to the 7-Way RV sockets brake pin.

Cables made after 1/1/2015 have this symbol on the label: 

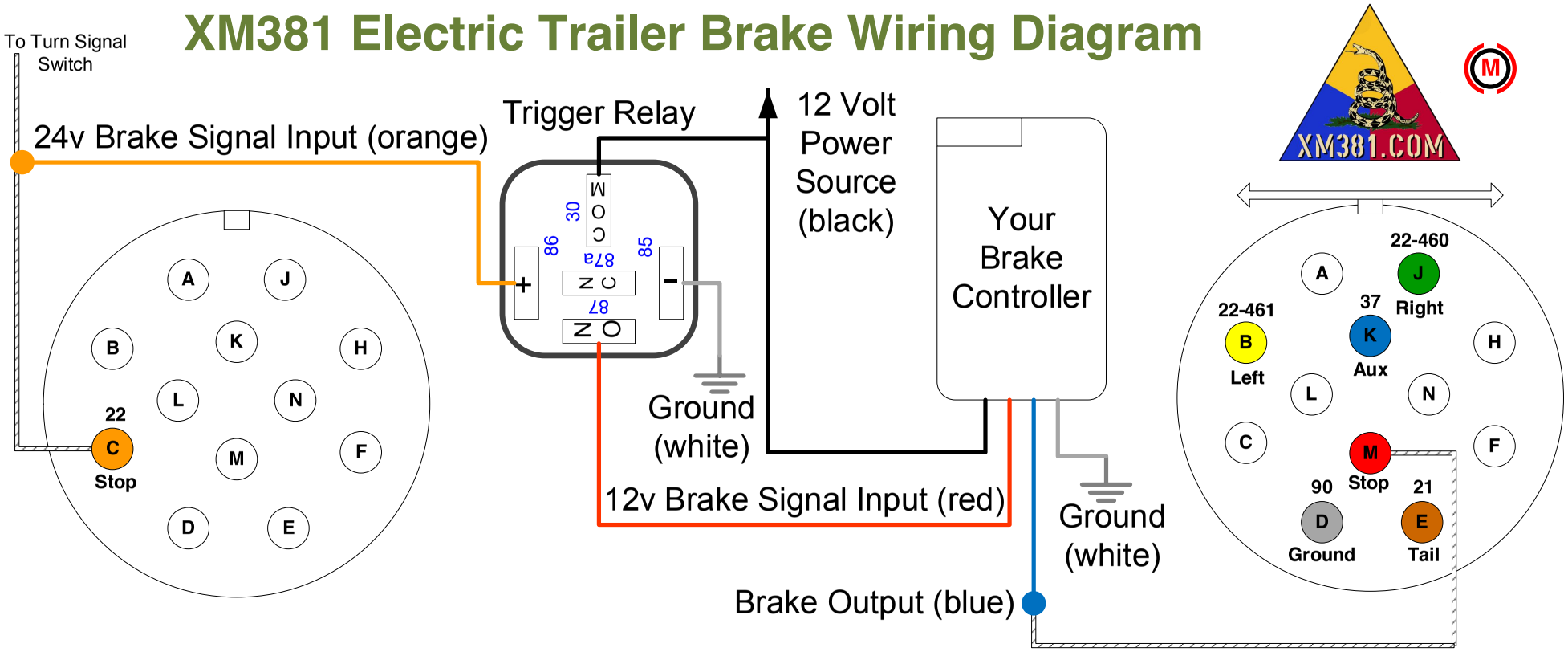
Cables purchased prior to 1/1/2015 used the 12-Pin NATO sockets pin "F" which is connected to the "Blackout Brake Light" circuit (wire #23) and inside of the converter cable's box is a RED jumper wire that connects the tow vehicle pin "F" to the trailer's electric brakes via the 7-Way RV socket. The Blackout Brake Light wire must be disconnected from the tow vehicles 3-Way Light Switch and connected to the electric brake controllers output wire and the lid on the converter cables box must be opened to connect the electric brake jumper wire (it's RED and shipped unplugged).

Electric Brake Controller Installation

Install your brake controller as per the manufacturers instructions, making the electrical connections as described in the previous section.

End

XM381 Electric Trailer Brake Wiring Diagram



3-Lever Light Switch Plug

A	75	Stop Light Switch Power. Runs to Brake Switch
B	40	Panel/Instrument Lights.
C	22	Stop Lights. Hot when brakes applied. Runs to Turn Signal Switch.
D	19	Black Out Driving Lamp.
E	20	Black Out Marker and Taillamps.
F	15	Battery Power.
H	21	Service Tail lamps.
J	467	Flasher Power. Runs to Turn Signal Switch
K	75	Stop Light Switch. From Brake Switch. Hot when brakes applied.
L	491	Parking Lights.
M	16	Headlamp Power. Runs to Highbeam Switch.
N	23	Black Out Stop Lamp.

Notes:

Brake Controller wire colors are typical, verify with your controllers documentation.

Switch plug and trailer socket in diagram viewed from female pin side (wires pointing away from you).

NATO 12-Pin Trailer Socket

A – 24 – B/O Tail Lamp
B – 22-461 – Left Service Stop/Turn Lamp
C - 24 – B/O Tail Lamp
D – 90 – Ground
E – 21 – Service Tail Lamp
F – 23 – B/O Stop Lamp
H - 24 – B/O Tail Lamp
J - 22-460 – Right Service Stop/Turn Lamp
K – 37 – Aux Power (Not Used On All Trucks)
L - 90 – Ground (Not Used On All Trucks)
M - Blank
N - Blank