Electric Brakes -Features

Electrically actuated brakes have several advantages over other brake actuation systems.

1. They can be manually adjusted to provide the correct braking capability for varying road and load conditions.
2. They can be modulated to provide more or less braking force, thus easing the brake load on the towing vehicle.
3. They have very little lag time from the moment the tow vehicle's brakes are actuated until the trailer brakes are actuated.
4. In an emergency situation, they can provide some braking independent of the tow vehicle.

Operation

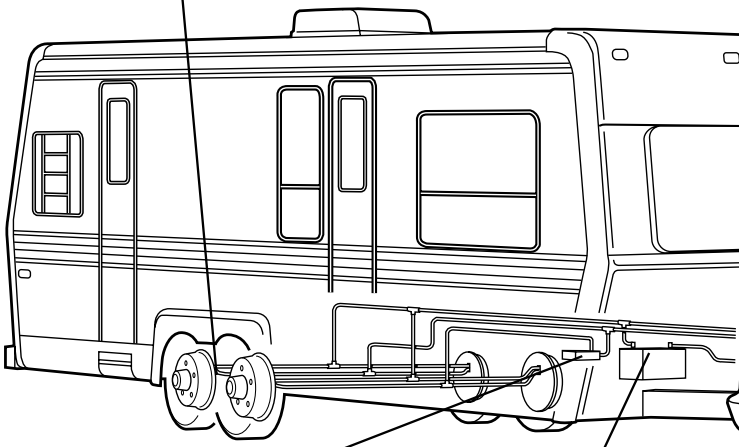
The electric brakes on your trailer are similar to the drum brakes on your automobile. The basic difference is that your automotive brakes are actuated by hydraulic pressure while your electric trailer brakes are actuated by an electromagnet. With all of the brake components connected into the system, the brake will operate as follows: (see electric brake assembly illustration on page 10)

When the electrical current is fed into the system by the controller, it flows through the electromagnets in the brakes. The high capacity electromagnets are energized and are attracted to the rotating armature surface of the drums which moves the actuating levers in the direction that the drums are turning.

The resulting force causes the actuating cam block at the shoe end of the lever to push the primary shoe out against the inside surface of the brake drum. The force generated by the primary shoe acting through the adjuster link then moves the secondary shoe out into contact with the brake drum.

Increasing the current flow to the electromagnet causes the magnet to grip the armature surface of the brake drum more firmly. This results in increasing the pressure against the shoes and brake drums until the desired stop is accomplished.

Dexter Electric Brakes
Wired in parallel



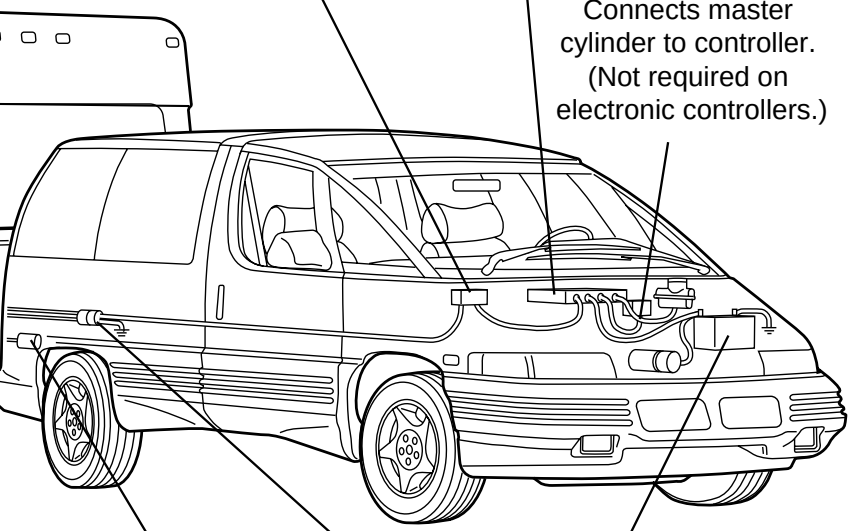
Front Axle Resistor
(Optional)
Helps eliminate front wheel lockup and front axle bounce if problem occurs with tandem axle trailers.

Breakaway Battery
Provides power to actuate trailer brakes in the event of trailer breakaway.

Controller
Controls the set point
at which the trailer brakes
are energized during braking.

(Optional)
System Resistor
Permits adjustment of
trailer braking power for
varying driving or load conditions.

Hydraulic Line
Connects master
cylinder to controller.
(Not required on
electronic controllers.)



Breakaway Switch
Switches battery power
to brakes if
breakaway occurs.

Battery
Connect controller directly.

Connector
Used to connect and disconnect
trailer and tow vehicle.
(Always ground trailer brakes
through connector.)

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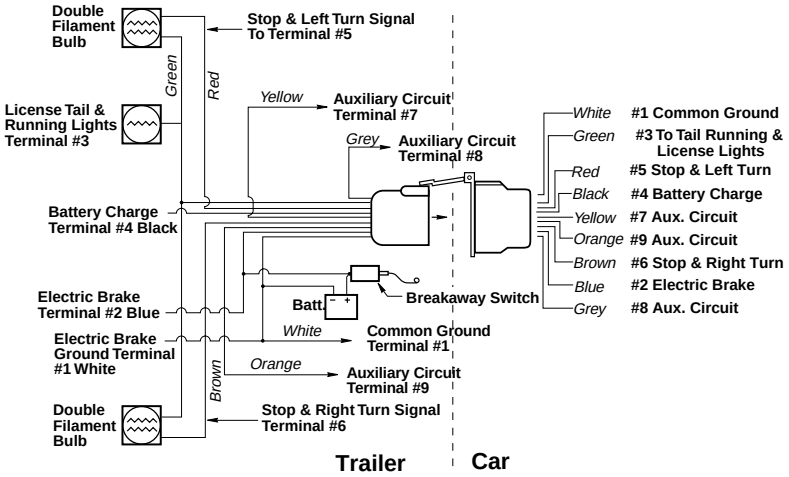
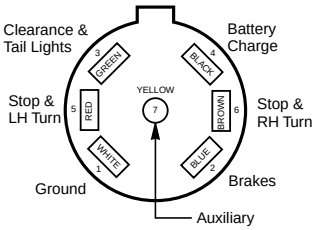
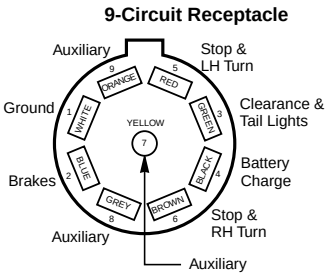
Typical Connector Wiring







View Looking into Tow Vehicle Receptacle

Parking Brake Option ***(not available on all sizes)***

Dexter electric brakes with parking brake option, are mechanically operated by cable means. The cable attachment occurs outside of the brake backing plate. Cable force applied to the parking lever creates a torque through the pivot pin and cam assembly. Torque transferred to the parking cam results in a spreading force between the primary and secondary shoes. The shoes in turn, move towards the drum until contact is made. Friction generated between the drum and lining contact surface results in parking brake capability.

Trailer Wire Size Chart

Number of Brakes	Hitch-to-Axle Distance in Feet	Recommended Minimum Hookup Wire Size (Copper)
2		12 AWG
4	Under 30	12 AWG
4	30-50	10 AWG
6	Under 30	10 AWG
6	30-50	8 AWG

How To Use Your Electric Brakes Properly

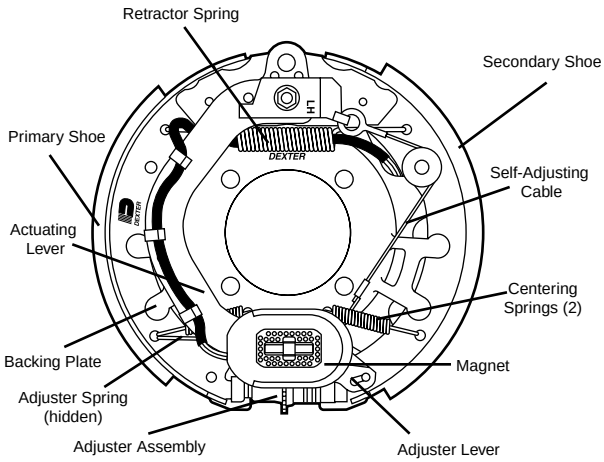
Your trailer brakes are designed to work in synchronization with your tow vehicle brakes. Never use your tow vehicle or trailer brakes alone to stop the combined load.

Your trailer and tow vehicle will seldom have the correct amperage flow to the brake magnets to give you comfortable, safe braking unless you make proper brake system adjustments. Changing trailer load and driving conditions as well as uneven alternator and battery output can mean unstable current flow to your brake magnets. It is therefore imperative that you maintain and adjust your brakes as set forth in this manual, use a properly modulated brake controller, and perform the synchronization procedure noted below.

In addition to the synchronization adjustment detailed below, electric brake controllers provide a modulation function that varies the current to the electric brakes with the pressure on the brake pedal or amount of deceleration of the tow vehicle. It is important that your brake controller provide approximately 2 volts to the braking system when the brake pedal is first depressed and gradually increases the voltage to 12 volts as brake pedal pressure is increased. If the controller “jumps” immediately to a high voltage output, even during a gradual stop, then the electric brakes will always be fully energized and will result in harsh brakes and potential wheel lockup.

Proper synchronization of tow vehicle to trailer braking can only be accomplished by road testing. Brake lockup, grabbiness, or harshness is quite often due to the lack of synchronization between the tow vehicle and the trailer being towed, too high of a threshold voltage (over 2 volts), or under adjusted brakes.

Before any synchronization adjustments are made, your trailer brakes should be burnished-in by applying the brakes 20-30 times with approximately a 20 m.p.h. decrease in speed, e.g. 40 m.p.h. to 20 m.p.h. Allow ample time for brakes to cool between application. This allows the brake shoes and magnets to slightly “wear-in” to the drum surfaces.



Electric brake assembly

To Synchronize

To insure safe brake performance and synchronization, *read the brake controller manufacturer's instructions completely before attempting any synchronization procedure.*

CAUTION:

Before making road tests, make sure the area is clear of vehicular and pedestrian traffic.

Make several hard stops from 20 m.p.h. on a dry paved road free of sand and gravel. If the trailer brakes lock and slide, decrease the gain setting on the controller. If they do not slide, slightly increase the gain setting. Adjust the controller just to the point of impending brake lockup and wheel skid.

Note: *Minimum vehicle stopping distances are achieved when wheels approach lock up. Brake lock up should be avoided as it results in poor vehicle stability and control. Depending on load, brake type, wheels and tires, not all trailer brakes are capable of wheel lockup.*

If the controller is applying the trailer brakes before the tow vehicle brakes, then the controller level adjustment should be adjusted so the trailer brakes come on in synchronization with the tow vehicle brakes. For proper braking performance, it is recommended that the controller be adjusted to allow the trailer brakes to come on just slightly ahead of the tow vehicle brakes. When proper synchronization is achieved there will be no sensation of the trailer “jerking” or “pushing” the tow vehicle during braking.

CAUTION:

Do not adjust this control outside the parameters outlined by the brake controller manufacturer's instructions.

Controllers

Start by making sure the trailer brakes are properly adjusted. (see page 12 & 27) Some controllers have a gain control to vary the amount of current to the brakes, and a level control which sets the controller's inertia sensor to sense deceleration. The

level adjustment also can be used to vary when the trailer braking is felt. The gain or output control adjustment usually controls the maximum amount of amperage available to the brakes. This can be adjusted for varying trailer loads. The chart below details adjustments available for different brake controllers.

Controller*	Adjustment to control brake timing	Adjustment for brake force
Tekonsha 9030,9035, 9040,9045,9055	Level	Gain
Kelsey 81741A	Level	Gain
Draw-Tite 5100	Sync	Output

*See manufacturers instructions

General Maintenance

Brake Adjustment

Brakes should be adjusted (1) after the first 200 miles of operation when the brake shoes and drums have “seated,” (2) at 3000 mile intervals, (3) or as use and performance requires. The brakes should be adjusted in the following manner:

1. Jack up trailer and secure on adequate capacity jack stands. Follow trailer manufacturers recommendations for lifting and supporting the unit. Check that the wheel and drum rotate freely.

⚠ CAUTION:

Do not lift or support trailer on any part of the axle or the suspension system.

2. Remove the adjusting hole cover from the adjusting slot on the bottom of the brake backing plate.
3. With a screwdriver or standard adjusting tool, rotate the starwheel of the adjuster assembly to expand the brake shoes. Adjust the brake shoes out until the pressure of the linings against the drum makes the wheel very difficult to turn.

Note: *With drop spindle axles, a modified adjusting tool with about an 80 degree angle should be used.*

4. Then rotate the starwheel in the opposite direction until the wheel turns freely with a slight lining drag.
5. Replace the adjusting hole cover and lower the wheel to the ground.
6. Repeat the above procedure on all brakes.

⚠ CAUTION:

Never crawl under your trailer unless it is resting on properly placed jack stands

Follow the trailer manufacturers recommendations for lifting and supporting the unit. Do not lift or place supports on any part of the suspension system.

Brake Cleaning and Inspection

Your trailer brakes must be inspected and serviced at yearly intervals or more often as use and performance requires. Magnets and shoes must be changed when they become worn or scored thereby preventing adequate vehicle braking.

Clean the backing plate, magnet arm, magnet, and brake shoes. Make certain that all the parts removed are replaced in the same brake and drum assembly. Inspect the magnet arm for any loose or worn parts. Check shoe return springs, hold down springs, and adjuster springs for stretch or deformation and replace if required.

⚠ CAUTION:

ASBESTOS DUST HAZARD!

Since some brake shoe friction materials contain asbestos, certain precautions need to be taken when servicing brakes:

1. Avoid creating or breathing dust.
2. Avoid machining, filing or grinding the brake linings.
3. Do not use compressed air or dry brushing for cleaning. (Dust can be removed with a damp brush.)

Brake Lubrication

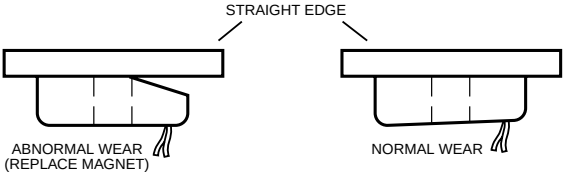
Before reassembling, apply a light film of Lubriplate or similar grease, or anti-seize compound on the brake anchor pin, the actuating arm bushing and pin, and the areas on the backing plate that are in contact with the brake shoes and magnet lever arm. Apply a light film of grease on the actuating block mounted on the actuating arm.

⚠ CAUTION:

Do not get grease or oil on the brake linings, drums or magnets.

Magnets

Your electric brakes are equipped with high quality electromagnets that are designed to provide the proper input force and friction characteristics. Your magnets should be inspected and replaced if worn unevenly or abnormally. As indicated below a straightedge should be used to check wear.



Even if wear is normal as indicated by your straightedge, the magnets should be replaced if any part of the magnet coil has become visible through the friction material facing of the magnet. It is also recommended that the drum armature surface be re-faced when replacing magnets. (See Brake Drum Inspection on page 32.) Magnets should also be replaced in pairs - both sides of an axle. Use only genuine Dexter replacement parts when replacing your magnets. Noted on the next page are the magnet replacement kits which will include the necessary specific instruction for replacement.

Brake Size	Magnet Kit No. (one magnet per kit)	Wire Color
7 x 1 1/4	K71-057-00 Since 4/90	White
7 x 1 1/4	K71-056-00 Prior to 4/90	Yellow
10 x 1 1/2	K71-057-00 Prior to 9/88	White *
10 x 1 1/2	K71-177-00 Since 9/88	Yellow
10 x 2 1/4	K71-104-00	Green
12 x 2	K71-105-00	White
12 x 2	K71-125-00 (7K)	Black
12 1/4 x 2 1/2	K71-441-00	Red
12 1/4 x 3 3/8	K71-375-00 oval magnet	White

** Slight actuating arm magnet tab modification required.*

Shoes and Linings

A simple visual inspection of your brake linings will tell if they are usable. Replacement is necessary if the lining is worn (to within 1/16" or less), contaminated with grease or oil, or abnormally scored or gouged. Hairline heat cracks are normal in bonded linings and should not be a cause for concern. It is important to replace both shoes on each brake and both brakes of the same axle. This is necessary to retain the “balance” of your brakes. Contained in the chart on the next page are the Dexter replacement shoe and lining kits which will contain the specific instructions necessary for proper replacement.

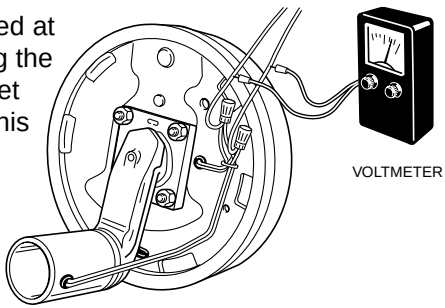
Brake Size	Shoe and Lining Replacement (1 Brake)	
	Electric	***Hydraulic***
7 x 1¼	K71-045-00	N/A
7 x 1¾	N/A	K71-466-00
10 x 2¼	K71-047-00	K71-267-00
Free Backing		K71-393-00
Corrosion Resistant		K71-423 -00
12 x 2 (5.2K)	K71-048-00	K71-268-00
12 x 2 (6K)		K71-269-00 LH K71-270-00 RH
Free Backing		K71-394-00 LH K71-395-00 RH
Free Backing, Corrosion Resistant		K71-427-00 LH K71-428-00 RH
12 x 2 (7K)	K71-127-00	
12¼ x 2½	K71-410-00	N/A
12¼ x 3⅜	K71-049-00 LH K71-050-00 RH	K71-165-00 LH K71-166-00 RH

Troubleshooting

Most electric brake malfunctions that cannot be corrected by either brake adjustments or synchronization adjustments can generally be traced to electrical system failure. Mechanical causes are ordinarily obvious, i.e. bent or broken parts, worn out linings or magnets, seized lever arms or shoes, scored drums, loose parts, etc. Voltmeter and ammeter are essential tools for proper troubleshooting of electric brakes.

How to Measure Voltage

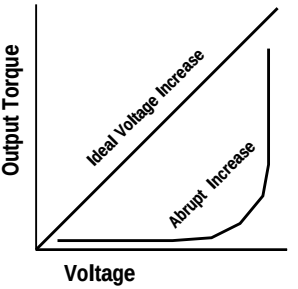
System voltage is measured at the magnets by connecting the voltmeter to the two magnet lead wires at any brake. This may be accomplished by using a pin probe inserted through the insulation of the wires dropping down from the chassis or by



.6-6K SM

cutting the wires. The engine of the towing vehicle should be running when checking the voltage so that a low battery will not affect the readings.

Voltage in the system should begin at 0 volts and, as the controller bar is slowly actuated, should gradually increase to about 12 volts. This is referred to as modulation. No modulation means that when the controller begins to apply voltage to the brakes it applies an immediate high voltage, which causes the brakes to apply instantaneous maximum power.

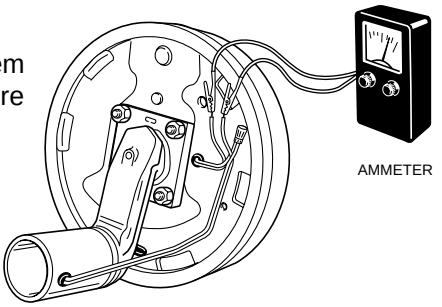


The threshold voltage of a controller is the voltage applied to the brakes when the controller first turns on. The lower the threshold voltage the smoother the brakes will operate. Too high of a threshold voltage (in excess of 2 volts as quite often found in heavy duty controllers) can cause grabby, harsh brakes.

How to Measure Amperage

System amperage is the amperage being drawn by all brakes on the trailer. The engine of the towing vehicle should be running when checking amperage.

One place to measure system amperage is at the BLUE wire of the controller which is the output to the brakes. The BLUE wire must be disconnected and the ammeter put in series into the line. System amperage draw should be as noted in the following table. Make sure your ammeter has sufficient capacity and note polarity to prevent damaging your ammeter.



If a resistor is used in the brake system, it must be set at zero or bypassed completely to obtain the maximum amperage reading.

Individual amperage draw can be measured by inserting the ammeter in the line at the magnet you want to check. Disconnect one of the magnet lead wire connectors and attach the ammeter between the two wires. Make sure that the wires are properly reconnected and sealed after testing is completed.

By far, the most common electrical problem is low or no voltage and amperage at the brakes. Common causes of this condition are:

1. Poor electrical connections
2. Open circuits
3. Insufficient wire size
4. Broken wires
5. Blown fuses (Fusing of brakes is not recommended.)
6. Improperly functioning controllers or resistors

Another common electrical problem is shorted or partially shorted circuits (indicated by abnormally high system amperage). These are occasionally the most difficult to find. Possible causes are:

1 Shorted magnet coils
2. Defective controllers
3. Bare wires contacting a grounded object

Finding the system short is a matter of isolation. If the high amperage reading drops to zero by unplugging the trailer, then the short is in the trailer. If the amperage reading remains high with all the brake magnets disconnected, the short is in the trailer wiring.

All electrical troubleshooting procedures should start at the controller. Most complaints regarding brake harshness or malfunction are traceable to improperly adjusted or non-functioning controllers. See your controller manufacturer's data for proper adjustment and testing procedures. If the voltage and amperage is not satisfactory, proceed on to the connector and then to the individual magnets to isolate the problem source. 12 volts output at the controller should equate to 10.5 volts minimum at each magnet. Nominal system amperage at 12 volts with magnets at

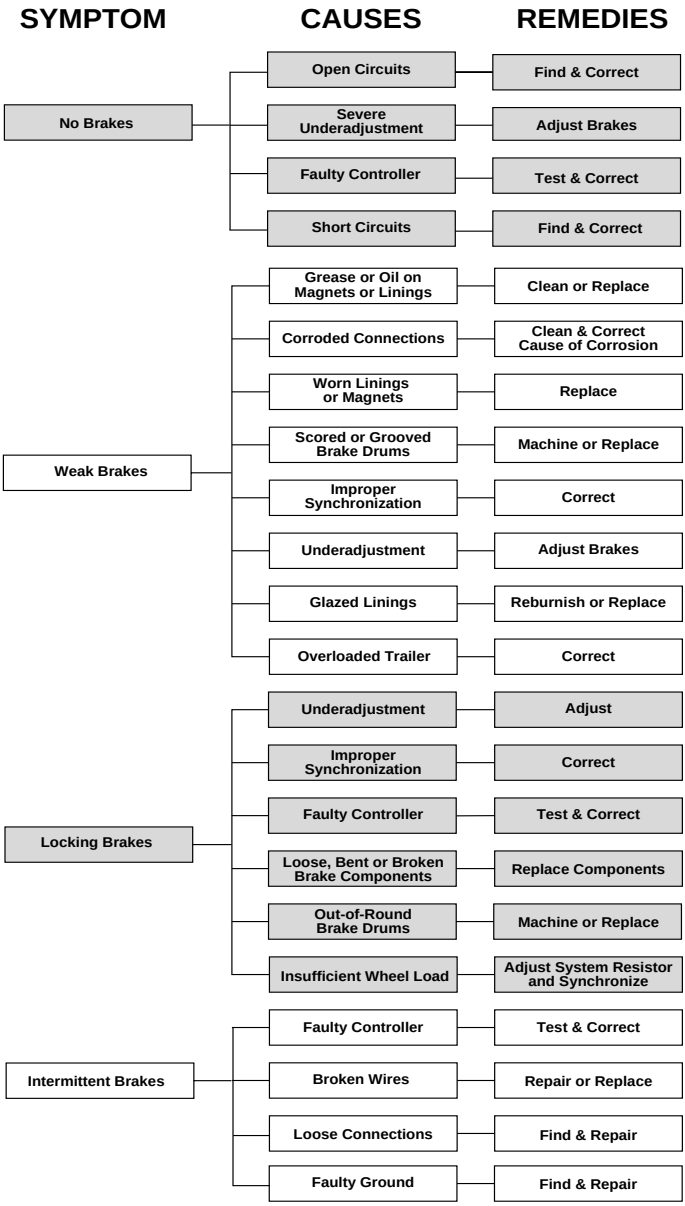
.6-8K. SM

normal operating temperatures, i.e. not cold, system resistor at zero and controller at maximum gain should be as detailed in the following chart:

Magnet Amperes Chart

Brake Size	Amps/ Magnet	Two Brakes	Four Brakes	Six Brakes
7 x 1 1/4	2.5	5.0	10.0	15.0
10 x 1 1/4	3.0	6.0	12.0	18.0
10 x 2 1/4	3.0	6.0	12.0	18.0
12 x 2	3.0	6.0	12.0	18.0
12 1/4 x 2 1/4	3.0	6.0	12.0	18.0
12 1/4 x 3 3/8	3.0	6.0	12.0	18.0

Troubleshooting



Troubleshooting