



Farming Ahead May, 2018

Page: 17
Section: General News
Region: National, AU
Circulation: 10000
Type: Rural
Size: 1,961.00 sq.cms.



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FROM THE WORKSHOP MOBILE REPEATER FOR FARM VEHICLES

Repeat after me: A vehicle equipped with a mobile repeater can make a huge difference to phone reception and mobile data. The main components of the Cel-Fi GO mobile repeater from left to right: High-gain broomstick antenna; Cel-Fi GO repeater unit; internal broadcast antenna; power adaptor.

TOOLMART
"The Complete Tool Centre"

Boosting phone reception with a Cel-Fi GO

Poor mobile phone reception continues to plague many farmers across the country and continues to be one of the most complained-about items of technology. By **Josh Giumelli**

A simple lack of reception, call drop-outs, and others that go straight to message bank are all daily occurrences for people who live in rural and remote areas of the country. Unreliable coverage is more than just an inconvenience – it is a safety issue in an emergency situation. It also holds back farmers from adopting new technology that depends on a reliable signal.

Often the situation can be improved simply by using a more sensitive handset which is able to access a signal from further away from a mobile phone tower. But many of us find the poor selection of sensitive phone handsets does not offer us the kind of phone we are looking for. See our research report on page 21 for more information.

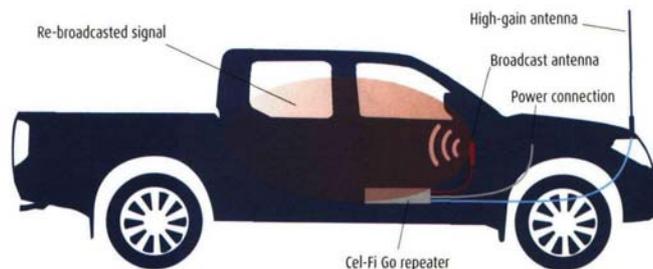
One thing we can do is use a high gain external antenna, which can be connected directly to our phone handset using a patch lead, or through an inductive connection via a suitable cradle.

The drawback is that most phones have no antenna plug, and phone cradles lose much of the antenna's gain through the inductive connection.

CEL-FI IS THE GO

Fortunately, there is another way. A mobile repeater can be hooked to a high-gain antenna to amplify the signal. It then re-

Figure 1. Cel-Fi GO installation



broadcasts this signal inside the vehicle, where it supplies a phone handset with a far stronger signal. No physical connection between the phone and the repeater is required.

The beauty of the system is it means any phones and mobile broadband devices (on a particular network) inside the vehicle can benefit from the boosted signal. Also, the system works perfectly in conjunction with in-built Bluetooth phone handsfree systems fitted to most vehicles.

While we usually shy away from recommending any one product over another, the Cel-Fi GO is the only mobile

repeater which is authorised and approved by Telstra to operate on its NextG 850MHz 700/1800MHz 4G bands. Kondinin Group trialed the Cel-Fi GO when it first arrived on the market, and now use one as part of our test gear when testing 3G/4G phone antennas.

While the system is expensive at a tad over \$1000 (inc GST), it does save having to upgrade hands-free car kit phone cradles every time you change handset. ▶

Acknowledgments: Powertec Telecommunications, Ph: 07 5577 0500 www.powertec.com.au. All tools sourced from Toolmart where possible.



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1 The choice and position of antenna makes a massive difference to the performance of the Cel-Fi GO. In general, choose a dual band 3G/4G antennas with the highest gain possible. See our test of high gain antennas on page 34 for more information.



2 While the centre of the roof or headboard is the best location for reception, it is hardly practical in reality. Most antennas will be mounted to bullbars where they are less likely to catch on low tree branches, low shed roofs or city carparks. If your bulbar does not have a mounting tab, there are plenty of bolt-on options. Choose a stainless steel one if possible. Run the cable through the hole and attach using a nut and spring washer.



3 Route the antenna cable neatly through the grille, along the side of the engine bay and through the firewall. Here we have been able to pass it through an existing wiring harness grommet, but if none exists, drill a hole and fit a grommet.



4 As we decided to locate the Cel-Fi GO under the front passenger's seat, we have run the antenna cable under the scuff plate to the side of the seat. When choosing a location for the repeater unit, make sure it has good airflow to allow sufficient cooling. Another option is to mount it under the dash. Be sure not to interfere with airbag locations and functionality.



5 Now find a suitable place to mount the internal antenna. It must not be mounted in direct line-of-sight to the external antenna, otherwise feedback interference will occur. Mounting to the dash in the centre is ideal as there is plenty of vehicle body between the two antennas. However, mounting to the rear-vision mirror, for example, may not work as the internal antenna can "see" the external antenna through the windscreen. See the mounting location in figure 1. Simply peel the adhesive and stick the antenna to a suitable spot, after cleaning any grease or dust off the surface.



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Now attach the power cord to a suitable 12V accessory outlet. Do not plug it into the repeater unit yet. This location means both cables can be easily routed back to the repeater under the passenger's seat by securing under the centre console trim as shown. Alternatively, locate an ignition-switched power source and wire directly into that. This is especially important if the accessory power supply does not switch off with the key, which will flatten the battery. Note it is important the broadcast antenna faces the vehicle occupants, or at least the location where the phone handset is stored when in use (in this case, the centre-console cup holder). If there is interference between the internal and external antenna, you may need to mount the broadcast antenna further down in the footwell.



Attach the broadcast antenna to the Cel-Fi GO unit to the terminal marked with a phone symbol. Note we have left enough slack in the cables to allow the unit to be slid out from under the seat for installation and testing purposes.



Now attach the external antenna to the unit on the port marked with the antenna symbol. If you are using an antenna supplied with the Cel-Fi GO unit, it should screw straight on to the terminal.



If you are using an external antenna from another supplier, it is most likely have a female FME connector (top). The exception is the supplied Blackhawk antennas which come with a male SMA connector (bottom) that matches the Cel-Fi GO SMA female connection. A male FME to male SMA adapter can be purchased for a few dollars to connect antennas from other suppliers to the Cel-Fi GO.



One option is to use a male SMA to male FME adapter, which can be purchased from any communications specialist or electronics store.



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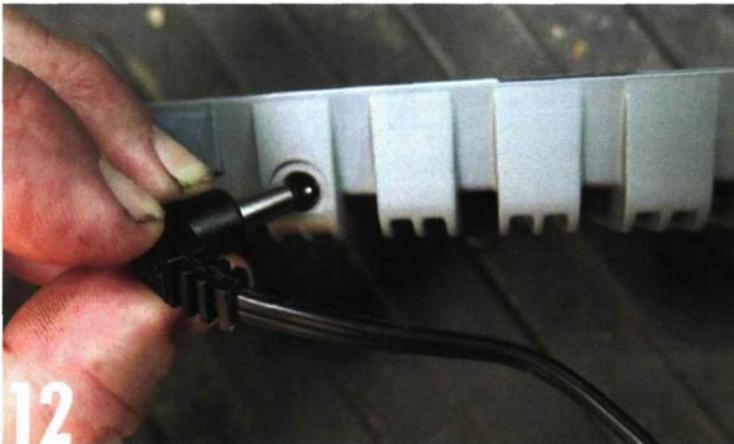


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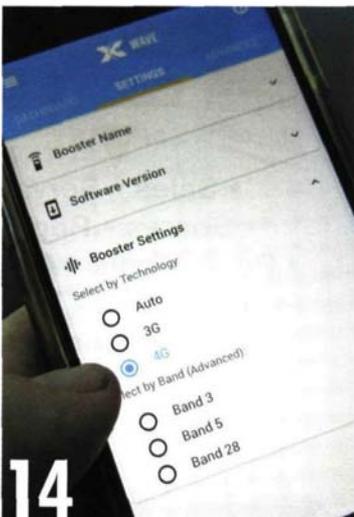
Another option is to replace the plug on the antenna cable with a male SMA fitting. This makes a lot of sense if there is a lot of spare cable when connecting to the unit, as gain will be improved if the antenna cable is shortened. Just make sure everything is in place when you decide where to cut the cable. To crimp a new plug on the antenna, you will need a pair of crimping pliers and a new SMA male connector. See our workshop back in *Farming Ahead* 281, June 2015 for more information on terminating coaxial cables.



With all cables installed, plug in the power cable and power-up the unit.



The unit should light up, and the status indicator will start blinking (small round light). Select the boost mode by pressing the grey button. While you can select between 3G and 4G/4GX, we recommend leaving it on auto to take advantage of any 4G reception available. Note the status indicator will display the signal being boosted; an orange-yellow colour for 3G and a green colour for 4G/4GX. If it is red, there is an error. Check the troubleshooting guide at www.Cel-Fi.com/support.



You may be wondering how the mode can be adjusted in use if the Cel-Fi GO is installed under the seat or dash. Fortunately there is a free app for both iPhone and Android operating systems (search for "Cel-Fi Wave"). There is also a desktop version that can be used on an internet browser for non-compatible devices. This can control the unit wirelessly through Bluetooth. Follow the instructions on screen to pair the phone with the Cel-Fi unit.



You can also monitor the network strength and boost levels through the app. A low level of network strength will result in a high level of boost.



Conversely, if the network strength is high, the unit may not boost the signal at all. Low boost can also be in indication of poor antenna separation, so if both network strength and boost are reading low, adjust relative antenna placement.