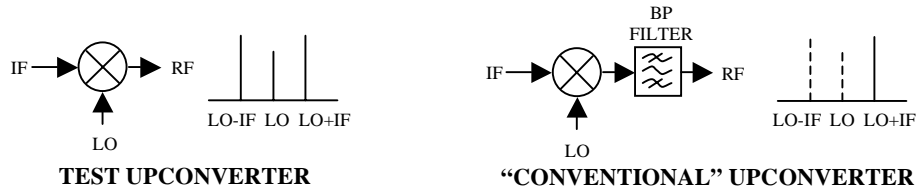


AN-200601 - USING TEST UP AND DOWN CONVERTERS
SOME PRACTICAL APPLICATIONS

Summary – Conventional frequency converters can be very expensive for many applications. There are some situations where a much simpler and less expensive device, called a Test Converter (Up or Down versions available), can be used quite satisfactorily. Cross Technologies uses the term “test converter” to indicate any converter that can only be used in a loop test situation because, in that case, the purity and filtering of a conventional up and down converter is often not required.



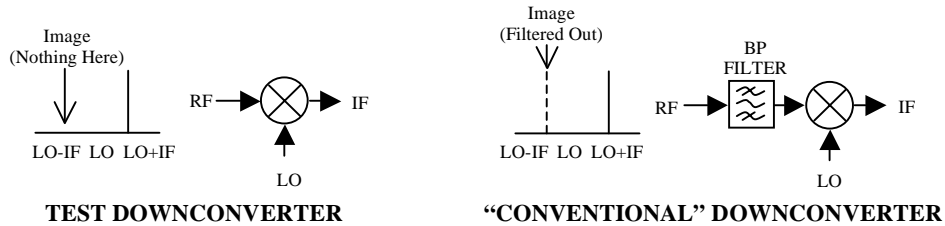
Test Up Converters, Explanation and Use – In frequency translation, there are three (3) primary signal ‘products’ of a mixer: these are the lower side band (= LO – IF), the local oscillator (= LO), and the upper side band (= LO + IF) frequencies, (see figure 1). In a conventional up converter or down converter, the desired side band (upper or lower) is filtered so that this is the only frequency remaining.

However, when converting an IF signal (at 70 or 140 MHz) to a frequency going directly into a receiver, it is not necessary to filter out all the other products because the receiver itself contains internal filtering that will select the desired carrier frequency. A typical application of this is where modulators operate at 70 MHz, but the receivers are L-band and you want to ‘loop’ the modulator to the receiver. This allows the frequency translator to be primarily a mixer and a good local oscillator frequency source, (what Cross calls a Test Upconverter.)

Cross Technologies manufactures a broad line of Test Upconverters. The 2006 series is a fixed frequency Test Upconverter where the frequency is pre-set at the factory and cannot be changed. This works in many applications where the receiver can be tuned to that specific frequency to test the functionality of the modulator. These are the least expensive models.

Cross also offers two versions of agile Test Upconverters where the user can tune the LO within a range of frequencies. The 2005 series uses BCD switches to adjust the frequency of the internal local oscillator. This is a good solution in cases where the frequency needs to be changed only occasionally. The 2003, 2004 Test Upconverters use push-button tuning or remote control to change frequencies. This solution is very useful if frequent changes of the LO frequency is required such as in a production receiver test facility.

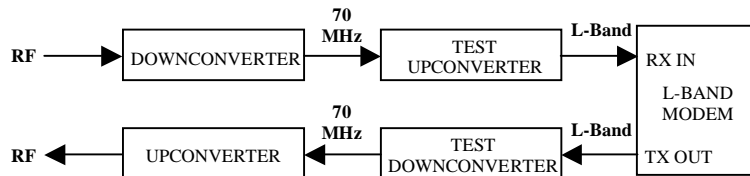
Test Down Converter, Explanation and Use - In the down conversion process, the mixer translates RF frequencies (that are plus and minus the IF from the LO) to the IF frequency. The unwanted portion of this translation is called the image frequency. In a situation where there is no image frequency, as when converting a signal from an up converter down to L-band for instance, the RF signal coming into the mixer from the up converter output is a clean signal with no energy at the image frequency. Therefore, the signal can be translated to another frequency without filtering of the signal, just by a simple mixing process. This is a classic application for a Test Downconverter.



Cross Technologies’ Test Downconverters go from L-band to 70 or 140 MHz either in a fixed equivalent to the 2006 series or a BCD switch tuning version such as the 2005 series. Cross Technologies also has the series 2009 test down converter which can take the RF output of an up converter or power amplifier and convert it to L-band for loop testing into an L-band receiver. These models cover RF frequencies to Ku-band.

Using Test Up and Down Converters – Some Practical Applications

Interfacing 70 MHz IF’s to L-Band Modems – There are some facilities that have a 70 MHz interface into the up converter and out of the down converter but need to translate these signals into L-band modems. This is an ideal application for the use of test up and down converters, either fixed or agile. The 70 MHz output out of a down converter goes into a test up converter to convert the signal to L-band for the receive side of the L-band modem. Similarly, the clean L-band output out of the L-band modem can be down converted with a test down converter to 70 MHz to go into the up converter. Since the modems can be tuned, the most economical way of doing this is using the series 2006 test up converters and down converters with fixed local oscillators. If tuning is desired, this can be accomplished with the 2005 Test Upconverter and Test Downconverter that can be mounted in a single RU rack panel. Due to limited gain adjustment range of the test converters, external attenuators or amplifiers may be required to provide the proper levels for the L-band modem. [Cross also offers the conventional series 2017 Up/Downconverter that offers a wide range of levels, frequency selection and high stability options should those be a requirement of the application.]



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