

Stationary RF Antenna Combining

Overview:

In multiple channel applications, it is often desirable to use one antenna for multiple LT-800 transmitters. This may be the preferred method, rather than mounting multiple antennas within an area due to space limitations or aesthetics. The purpose of this document is to assist in determining if antenna combining is a viable option for a multiple channel application.

Considerations:

It is important to note that there is a maximum number of channels or transmissions, limited by the bandwidth at each frequency band. The maximum numbers of channels are:

- 72 MHz: 6 Channels
- 216 MHz: 3 Channels

The main disadvantage of combining signals is the loss of power and range. For every two signals that are combined, generally half the power is lost (3dBm). This can equal a loss in transmission range between 25 and 50%. The table below shows the typical loss for different frequencies and number of channels.

Frequency Band	Number of Channels Combined				
	2	3	4	5	6
72 MHz Loss	3dBm	6dBm	6dBm	9dBm	9dBm
216 MHz Loss	4dBm	7dB	N/A	N/A	N/A

NOTE: Variances in loss between +/- 1dBm are expected.

If this loss in range is acceptable for the intended application, combining multiple signals for the use of one antenna is an option. There are still considerations to note that will ensure that the combined system will work efficiently as possible without any intermodulation problems or other undesired results. The following points should be kept in mind:

- Verify that all the transmitters are on the same RF power level setting. This power level setting is on the rear of the transmitter. If the power for one channel is greater than another, you are more likely to hear intermodulation artifacts and two transmissions on the same channel.
- Verify that the coaxial cable from each transmitter to the combiner is kept equal in length. This is needed so the RF power level is the same for each input to the combiner.

- If combining an odd number of transmitters, it will be necessary to terminate the unused combiner input. A 50-ohm terminating resistor is included with the 4 and 6-way combiners for this purpose. An unterminated connection is susceptible to noise which can be induced on to the antenna coaxial line and heard on the receiving end.
- Choose channels that are spaced evenly apart in the frequency band and at least 300 kHz apart from one another. This should be done whether a combiner is being used or not. See table below for recommended channels.

Frequency Band	Channel Recommendations
72 MHz	A, C, E, I, J, H
216 MHz	2A, 2K, 2V

It is important to determine how many transmitter outputs are to be combined prior to ordering. Use a combiner that is appropriate for the amount of transmitters installed. For example, if a 6-way combiner is used with only 2 transmitter inputs to the combiner, the loss would still be equivalent to combining 6 transmitters.

Listen Technologies sells three models of RF antenna combiners for 72 and 216 MHz. The available combiners are:

- [LA-80 2-Way RF Antenna Combiner](#)
- [LA-81 4-Way RF Antenna Combiner](#)
- [LA-82 6-Way RF Antenna Combiner](#)

Should you have any further questions or concerns, please contact Listen Technologies' technical services team at 801.233.8992 or support@listentech.com for further assistance.