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BUYERS GUIDE

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SPECIAL REPORT

## Kintronic Assembles a Portable Trio

*Engineer Reports on a 3 by 12 kW Mobile AM*

*Triplexer Built by Kintronic Labs for International Broadcaster*

**by Bobby Cox, Ph.D.**  
**Staff Engineer**  
**Kintronic Laboratories Inc.**

**BRISTOL, Tenn.** As an engineer in AM (MW) broadcasting, encountering unique customer requirements is not an unusual occurrence. However, an international customer approached me with a requirement that topped most of my previous unusual system requests.

The customer has a number of stations that are operating on aging towers that need refurbishing. The sites are all



Photo 1: Antenna trailer loaded for travel

diplexed and triplexed and operate on a subset of five distinct frequencies.

The customer wanted to operate three separate 12-kW AM stations onto a single mast. The triplexer had to accommodate any set of three frequencies chosen out of the set of five possible station frequencies. This would require a large degree of flexibility in the triplexer design due to the various combinations of possible frequencies involved.

Both matching networks and filtering networks would have to work no matter which three frequencies were chosen.

The final kicker was that the whole system had to be mobile, mounted on small trailers that could be towed by the company Range Rover SUVs. This was not going to be an everyday job.

### Surmount the mast

The first challenge was to select a suitable tower. It would have to accommodate being set up on a relatively level field without the requirement of grading or concrete work.

We chose a 170-foot standard Rohn 25G mast. The mast would be stacked by trained tower riggers on a heavy, four-foot-square steel base plate placed on the ground. A ball-and-socket base fixture was custom-fabricated for use on a tapered base section per-

mitting installation on slightly uneven soil. Screw anchors are used to anchor the tower guys.

The five selectable frequencies were in the 650-1250 kHz portion of the AM band. With this in mind, a variation on a folded unipole antenna was designed for installation on the tower.

The skirt kit was custom-designed to give broadband performance of the 170-foot grounded mast.

The antenna has a slowly varying impedance sweep with respectable base impedances over the required frequency range. A ground radial system placed on the surface is used to ensure reasonable efficiency and stability with weather variations. A pair of tower riggers can erect the mast and antenna kit in approximately two days.

The next challenge was to design the triplexer and make it mobile. The



Photo 2: Mobile triplexer installed at tower base

design arrived at uses a common “L” prematching network across the mast, series and shunt trap filter networks for each station and a full matching “T” network for each station. The triplexer was built in seven separate aluminum cabinets, which were mounted on two separate flatbed trailers.

The cabinets were tied together and all internal component mountings were constructed of fiberglass to make the system sturdy enough for road travel. Interconnects between cabinets and between the two trailers were flexible straps.

The outputs were all placed in the top to satisfy a safety requirement that all hot RF conductors be no less than about eight feet above ground level. The interior of one of the triplexer units is shown in Photo 4. Photo 2 shows the cabinets installed at the base of the antenna.



Photo 3: Hand crane lifting custom aluminum cargo boxes

The next challenge was to package the tower for mobility. A 20-foot by seven-and-a-half-foot flatbed trailer was fabricated for the tower package.

The tower trailer stores the 17 tower sections in a storage rack, the tower



Photo 4: Interior of one triplexer unit

base plate on the deck, all tower hardware in a pair of custom aluminum crates and the guy cables and AM skirt kit cables on a custom aluminum spool. The trailer also contains the three 1-1/4-inch foam Heliacx feeder cables on a custom aluminum spool, the ground radial spools and antenna skirt tensioning winches, etc.

A small hydraulic hand crane was included to help in the loading and off-loading of the heavier items. Photos 1 and 3 depict the tower trailer being loaded and ready to move out.

The system was fabricated and fully constructed on the Kintronic Labs antenna test range. The customer and I performed the field tuning of the triplexer in two modes of operation (that is, two separate sets of three frequencies). The system performed as anticipated with more than 50 dB of port-to-port isolation between any two stations and good input bandwidth.

For the first mode, the plus-or-minus 6 kHz sideband input VSWR figures ranged from 1.15/1 to 1.32/1. For the second mode, the VSWR figures ranged from 1.48/1 to 1.62/1. The results were well within what was required for operation with the three Nautel XL12 transmitters.

The customer was particularly pleased in that he was able to tune the triplexer himself in approximately one day's time having never tuned an AM multiplexer of any sort previously.

*Bobby Cox can be reached at [bcox@kintronic.com](mailto:bcox@kintronic.com)*

*For further information contact Kintronic in Tennessee at (423) 878-3141, fax (423) 878-4224 or visit the Web site at [www.kintronic.com](http://www.kintronic.com)*