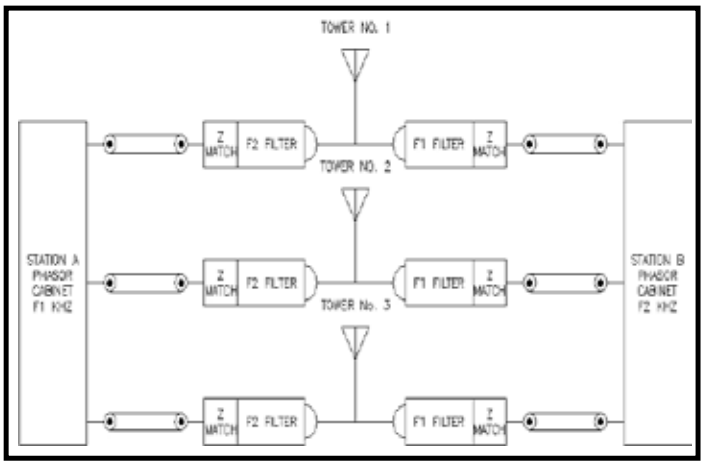
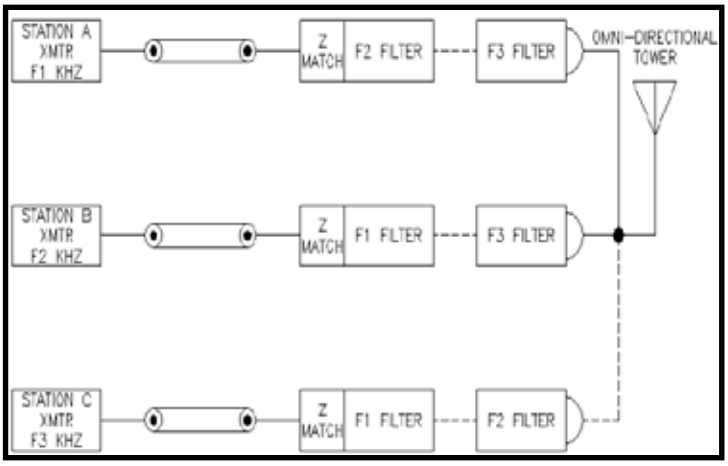
KINTRONIC LABORATORIES, INC.

CUSTOM AM/ MW HD OR DRM COMPATIBLE MULTIPLEXING SYSTEMS FOR OMNI-DIRECTIONAL OR DIRECTIONAL ANTENNA APPLICATIONS





KTL CAPABILITES INCLUDE

1. Site planning and building layouts
2. In-house developed CKTNET and ARRAYPAT computer modeling software to yield optimum isolation and bandwidth for Ibiquity HD or Digital Radio Mondiale (DRM) operation.
3. Complete RF system fabrication facilities.
4. Highly experienced personnel to supervise and assist in on-site equipment installation.
5. Well qualified technical staff and large component inventory to provide long-term maintenance support.
6. On site or factory training.

CUSTOM AM/ MW MULTIPLEXING SYSTEMS

The ability to multiplex two or more AM/MW stations into a single tower or into a multi-tower directional array provides a profitable vehicle for station owners having facilities on valuable property to move off of their property to enable a sale of the property while maintaining their market coverage by multiplexing with another station in the same market. With the introduction of Ibiquity AM HD radio as the digital standard in the US market, Kintronic labs (KTL) has invested heavily in the development of new software tools CKTNET and ARRAYPAT to facilitate the design of multiplexed antenna systems that yield HD compatible performance for all concerned stations.

KTL offers the AM/MW multiplexing systems in either an open panel and shelf configuration (See Photo), in enclosed aluminum cabinets (See Photo), in kit form to install in a customer-supplied tuning house or installed in a KTL-supplied aluminum, steel or concrete pre-fabricated tuning house (See Photo). KTL incorporates complete machine shop, sheet metal shop and painting facilities to permit the multiplexed system to be configured to meet the customer's specific requirements.

In addressing a potential AM/MW multiplexing application, several system considerations must be assessed:

I. Characteristics of Tower(s)
   - A. Type
     - a. Fixed cross section, guyed, series fed
     - b. Self supporting
     - c. Shunt fed
     - d. Unipole Skirt Fed
     - e. Other
   - B. Tower layout vs. pattern requirements for directional antennas
   - C. Base and guy wire insulator voltage ratings

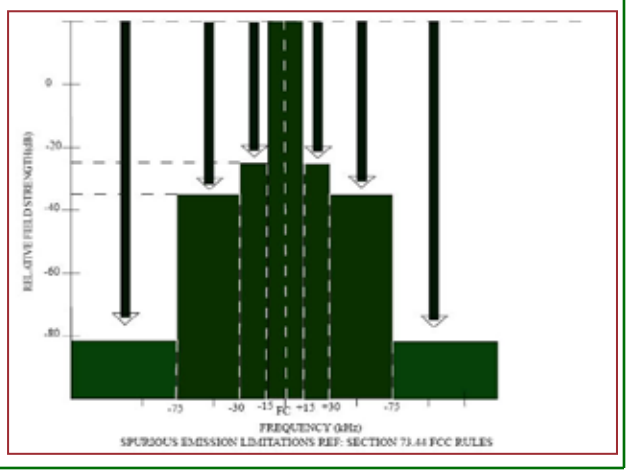
II. Transmitter Specifications
   - A. Transmitter power of each station
   - B. Frequency of each station
   - C. Transmitter type
     - a. Plate modulated
     - b. Solid state

For applications in the United States or its territories where Federal Communications Commission (FCC) regulations are enforced, the cross-modulation products that are produced in the output RF stages of the transmitters utilized in a multiplexed system must be limited in accordance with Section 73.44 of the FCC Rules as illustrated in the figure showing Spurious Emission Limitations to the right.

Open Panel and Shelf Diplexer

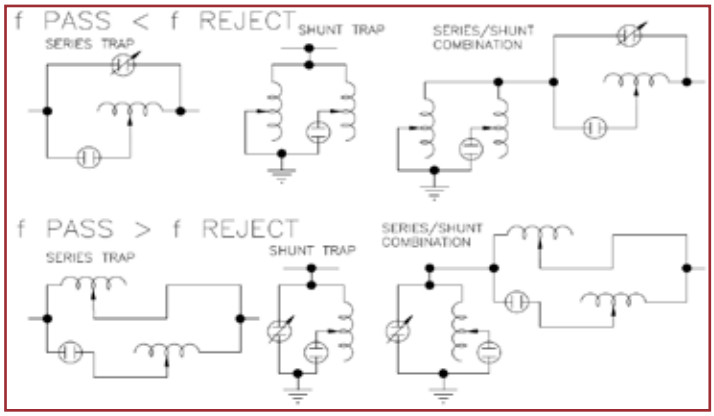
Diplexer in Aluminum Weatherproof Enclosures

Diplexer in Steel Pre-fabricated Building



CUSTOM AM/ MW MULTIPLEXING SYSTEMS

It is these spurious emission limitations that are a contributing factor in determining the required level of isolation between each of the radio stations multiplexed into a common antenna. An equally important parameter is the relative transmitted power and drive impedance of each station, which determines the base voltage produced by each transmitter at the common feed point of the omni-directional antenna or each of the elements in a directional array. To isolate the individual transmitters in a multiplexed application several different types of trap filter networks are utilized as shown in the isolation network configurations diagram below.



STANDARD FEATURES OF MULTIPLEXED SYSTEMS

- Wideband Design for Ibiquity HD or Digital Radio Mondiale (DRM) digital performance
- All Aluminum Metal Cabinetry With Partitioned Network Compartments and Supporting Frame work
- RF Ground Consisting of a Continuous Run of Copper Ground Strap in Each System Enclosure and Terminated in a Pigtail or an Interconnection Bracket
- Components Conservatively Rated in Voltage and Current Rating for 125% Positive Peak Modulation
- Silverplated Inductors and Interconnection Tubing and Strap
- Fixed or Variable Vacuum Capacitors or Fixed Mica Capacitors as Dictated by the Design. Vacuum Capacitors are Typically Used in Filter Networks to Yield High Temparature Stability.
- Custom Standoff Insulators for High Voltage Applications
- Toroidally Sampled RF Current Metering Systems or Thermocouple Meters on Meter Plugs
- Coaxial Cable Input Via EIA Flange or Cable Clamp Assembly
- Each Station Output Via Bowl Insulator Assembly or Insulated Feed Through Panel
- All Components Identified With Engraved Labels
- Networks Factory Pre-Tuned to Theoretical Design Parameters
- Light with Insulated Guard and Dual AC Receptacle in Each System Cabinet
- All Networks Tested With Hipot Non-Destructive Tester For Voltage Suitability
- Complete RF Schematic, Electrical Parts List and Installation Instructions

AN EXAMPLE OF THE OUTPUT OF THE KINTRONIC LABS DESIGN SOFTWARE

FURTHER MULTIPEXED SYSTEM CONSIDERATIONS

WHY MULTIPLEX?

FINANCIALLY ADVANTAGEOUS

- In the event that a broadcast group owns more than one AM station in the same market, it may be possible to sell one or more of the existing properties and consolidate on one common antenna site.

This accomplishes the following:

- Allows for the sale of valuable property to real estate developers
- Reduces maintenance and engineering costs by co-locating transmitter sites
- May permit more effective coverage of the target audience

POTENTIALLY ENHANCE AUDIO PERFORMANCE

- Replace old technology equipment with new RF technology that will enhance your competitive edge in the broadcast market.
- With improved design tools the replacement of old equipment to facilitate diplexed operation can potentially improve bandwidth.

KTL OFFERS TURNKEY MULTIPLEX SERVICES BACKED BY OVER 45 YEARS OF EXPERIENCE

- RF system design (KTL has multiplexed up to four stations on one tower)
- Site planning
- Fabrication of high-quality, high reliability RF hardware
- Installation services
- Final commissioning support under the supervision of the station's consulting engineer if required

Omni Directional

Kintronic Laboratories has developed state-of-the-art network synthesis tools to facilitate the design of multiplexed antenna systems that yield the wideband characteristics to pass the Ibiquity hybrid analog/digital waveform within the National Radio Systems Committee(NRSC) approved mask or the Digital Radio Mondiale(DRM) waveform within the specified mask. The systems typically involve transmitters ranging in power between 1 and 1,000 kilowatts. The range of transmitter power levels to be coupled into a common antenna, the frequency spacing between the transmitter RF feeds and the physical characteristics of the tower determine the feasibility of multiplexed operation.

ln order for two or more stations to operate simultaneously on a common omni-directional antenna, the voltages produced by each transmitter at the base of the antenna where the common feed occurs must be sufficiently converted to circulating current in the filter networks between the system common node and the output of each transmitter to constrain the occurrence of spurious emissions in the RF final amplifiers of each transmitter in accordance with the previously referenced FCC regulations.

To evaluate a potential AM/MW multiplexing application, KTL will model the tower and the complete RF feeder system between the combined amplifier output of each transmitter and the tower to optimize the bandwidth and isolation for each input port. KTL will fabricate the required multiplexing hardware to either a design supplied by the customer or to a KTL originated design. The engineering staff at KTL are available to provide telephone consultation or on-site assistance in support of the multiplexing system installation.

Directional

For the case of multiplexing two or more AM/MW directional antenna (DA) systems, consideration must not only be given to station frequencies and power levels, but also to tower array heights, orientation and spacing and the method for antenna monitor sampling of each station. As depicted in the block diagram on the front page, the multiplexing of two or more directional AM/MW stations requires the use of filter networks at the base of each tower. The filter networks will be uniquely designed for each tower based on the DA power division and drive point impedances. In the case of a multiple pattern DA, the filter networks will be designed to accommodate the worst case conditions.

To isolate the base current readings for each station, KTL will typically install the meters in the transmitter side of the filter networks. Also the sampling systems may be isolated by the use of toroidal sampling transformers, which may also be installed at the transmitter side of the filter network. Some antenna monitor manufacturers also offer filter options for the monitoring equipment to enable the sampled voltages from each station to be isolated. KTL has fabricated AM/MW multiplexed antenna systems that involved as many as three stations with a total of five patterns into a five-tower array.

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