

# *Advanced Communication Systems*

## **KVT 8000**

## **VOTING RECEIVER SELECTOR**

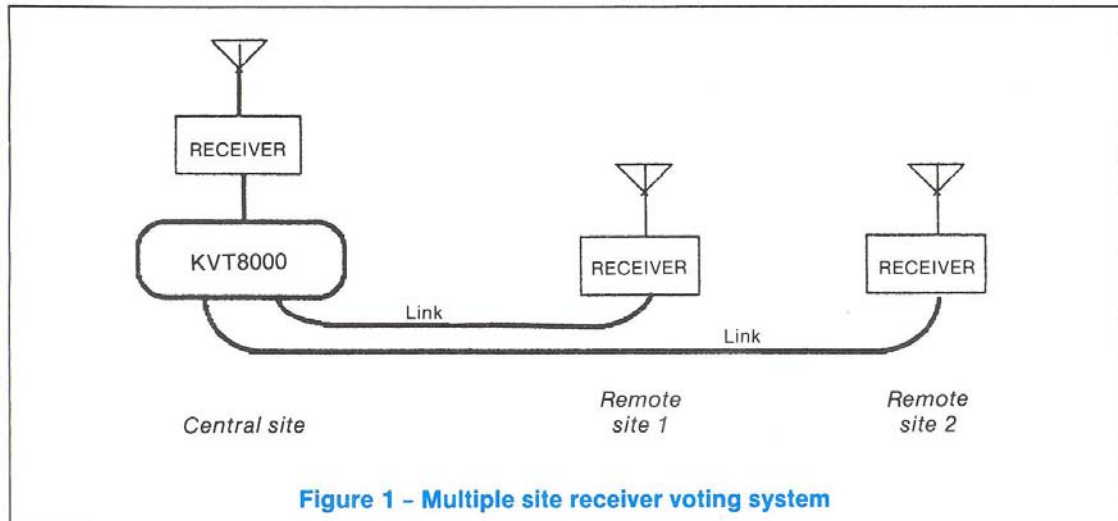


**Weak signals and poor coverage problems are not a law of nature. There is a solution—and the solution is the KVT8000 automatic voting receiver selector.**

- **the technique is selection among signals from several receivers based on precise and continuous measurement of signal quality.**
- **the result is enhanced communications range for low powered portable and mobile units.**

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**Figure 1 - Multiple site receiver voting system**

### Why Receiver Voting?

Radio systems typically consist of a high power base station or repeater and many low power portable and mobile units. The high power base station can easily cover a large area with a strong high-quality signal. But due to their relatively low power, the mobile units simply cannot reach the base station with a high quality signal from everywhere within the desired coverage area.

Communication with mobile units operating in weak signal areas is unreliable at the very least. In severe cases when there are "dead spots" in the desired coverage area communication becomes impossible. The penalties for operating with unreliable and "spotty" coverage are costly—wasted time, frustration, mistaken information, and complaints.

Fortunately, there are ways to overcome these problems, and a very effective way to improve coverage and avoid weak signal problems is multiple receiver voting. Multiple receiver voting systems use several receivers so that at least one receiver always receives a high quality signal from portable and mobile units operating anywhere within the desired coverage area.

The key to maximizing performance in multiple receiver systems is an automatic voting receiver selector, such as the Kendecom KVT8000, which can monitor all receivers in the system and continuously select the receiver having the best signal quality. As mobile units travel through the desired coverage area the KVT8000 instantly switches from one receiver to another to insure that the best possible signal is always 'on-line.'

### Multiple Site Systems

Multiple receiver systems can be either single-site or multiple-site systems. Multiple site systems use remote receivers located throughout the desired coverage area so that at least one receiver always hears a high quality signal from every portable and mobile unit. The remote receivers are linked to a KVT8000 automatic voting receiver selector at the central site where the KVT8000 listens to all receivers and automatically selects the receiver having the best audio quality.

Figure 1 illustrates a multiple site system having a main receiver at the central site and two remote receivers located in weak signal areas. Each remote receiver covers only a small portion of the total coverage area. System costs are controlled because premium high-elevation sites and expensive antenna towers are usually not required at the remote sites.

The versatile KVT8000 also controls costs by interfacing to a wide range of link arrangements—VHF/UHF radio, microwave, and wirelines. In addition, its built-in test capability allows the performance of all receivers and links to be monitored readily at the central site.

In figure 1 the KVT8000 votes among three receivers: the central site receiver and two remote receivers. In general, the number of receivers used depends on how many weak signal zones there are in the desired coverage area. The KVT8000 is ideally suited to a wide range of applications from small systems, having as few as two receivers, to super-large systems having as many as 32 receivers.

## Single Site Systems

Single site systems are a *very cost effective* way to get the advantages of multiple receiver voting. Figure 2 shows a single site system using three receivers with one receiver connected to an omni-directional antenna and the remaining receivers connected to high gain directional antennas. The three receivers are directly connected to the KVT8000. By using high gain antennas the effective signal received from handheld portables can make them sound like high powered mobiles and mobile units can sound like base stations.

## Why the KVT8000?

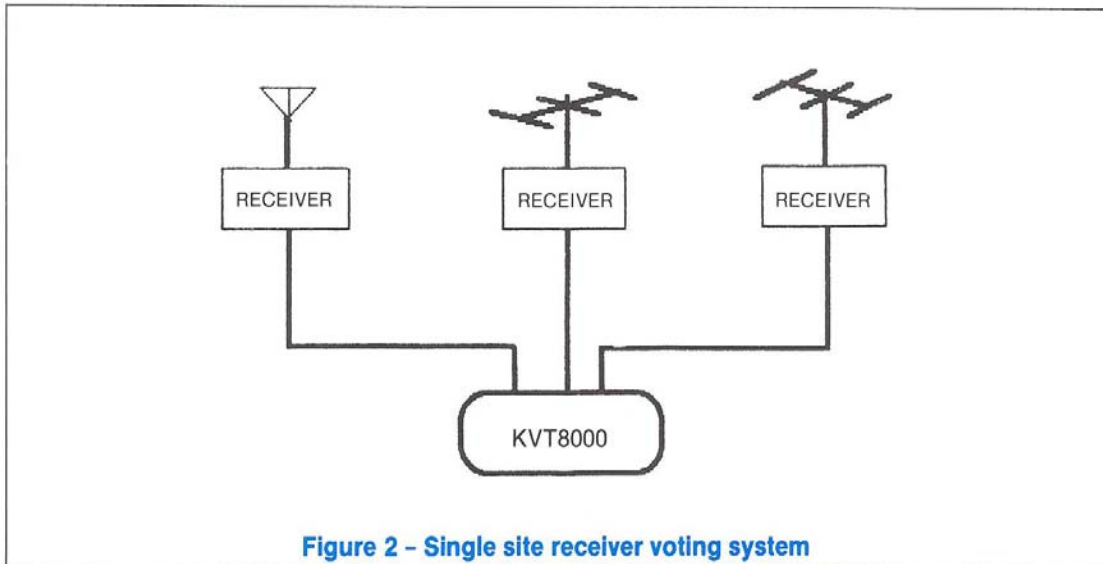
In many applications multiple receiver voting is the best way, if not the only way, to improve system coverage. In the past there were two choices available in receiver voting selectors: high cost voters which delivered high performance because they used signal-to-noise ratio as an accurate criterion for voting, and low cost voters which gave poor performance because they relied only on simple signal level measurements. Now there is a better choice, the Kendecom KVT8000, which delivers high performance based on precise signal-to-noise evaluations at modest cost.

Taking the best of the past—high performance and low cost—is good, but not good enough so the KVT8000 goes even further. It raises performance to a new level by including full monitoring and metering for rapid installation and system maintenance. And it adds versatility through options which let the KVT8000 adapt easily to a wide variety of applications. Yes, *the outstanding performance and versatility* combined in the Kendecom KVT8000 make multiple receiver voting the preferred *cost-effective* way to obtain reliable coverage.

- **Quiet channel lockout.** Separate activity detectors are included on each channel. In the event of a receiver or link equipment failure, the detectors automatically disable the failed channel and give a visual status indication.
- **Built-in alignment and self test features.** Front panel indicators and metering allow monitoring of the audio level on any channel. The metering plus built-in speaker and self test features enable precise alignment and diagnosis of link or receiver problems.
- **Expansion capability.** The KVT8000 is available in 8-channel and 4-channel versions to economically match the needs of large and small systems. In addition, provision exists for interconnecting several units together to vote as many as 32 receivers in very large systems.
- **Interconnection flexibility.** The standard high impedance audio inputs are ideal for connecting to VHF/UHF radio links, microwave links, or directly to receivers. Low impedance inputs and 1950 Hz idle channel tone detectors are provided on channels equipped with the low impedance wireline option. Channels may be configured individually for high or low impedance operation for use in systems using both radio and wireline links.
- **Logic control.** Logic inversion switches are provided on all control (COS) inputs to match various link and receiver arrangements. In addition, per channel inputs are provided for remote disabling of individual channels. Logic inversion and optional relay switched output control is available.
- **Construction.** The KVT8000 is mounted in a handsome 19-inch rack mount cabinet with front panel metering, speaker, and indicator lamps. Audio jacks and logic terminals are conveniently accessible on the rear panel. Active voter circuitry is contained on a high quality, silk screened, solder masked, epoxy fiberglass printed circuit board. Access to all active components and adjustments is readily gained by removing the unit top cover.  
Included within the cabinet is a rugged AC power supply and provision for DC backup power. Space is provided within the cabinet to contain two Kendecom MR-4 receivers.
- **Voting based on signal-to-noise ratio.** The KVT8000 uses separate peak and valley detectors on each input channel to calculate signal-to-noise ratio so it always votes the channel having the highest audio quality—it's never fooled like simple voters which rely on RF or audio level.
- **Continuous voting.** Fully independent detection circuitry on each channel monitors all receivers continuously without gaps like those which can occur in sampled systems.
- **Per-channel gain equalization.** Per channel gain adjustments allow every channel to be set to the same identical level to obtain truly transparent switching between receivers.

## Specifications

Input channels	4 or 8 internal, expandable to 32 external
Audio inputs	unbalanced high-impedance (600 Ohm balanced on channels equipped with T option)
Input audio levels	250mv to 4 v p-p
Frequency response	+/- 1 dB, 400Hz to 3KHz (except at 1950 Hz notch frequency on channels equipped with T option)
Audio output	unbalanced high-impedance
Output audio level	adjustable 0.5 to 4 v p-p
Input control	protected CMOS individually switch selectable to active high or active low operation
Output control	active low discrete driver [30V, 30mA max] (relay control with KO or K+ options)
Voting sampling rate	continuous [not sampled]
Failed channel protection	per channel 15-sec quiet channel detection/lockout
Unselected channel rejection	40dB min
Front panel indicators	channel active and channel voted LEDs, switchable audio level meter, voted audio local loudspeaker, AC power lamp, AC power switch
Power	50 watts @ 117 VAC +/- 10% with provision for 13.6 VDC, 1/2A backup
Temperature range	-30° to +60° C
Enclosure	19-inch rack mount cabinet, 5-1/2 inches high



**Figure 2 - Single site receiver voting system**

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