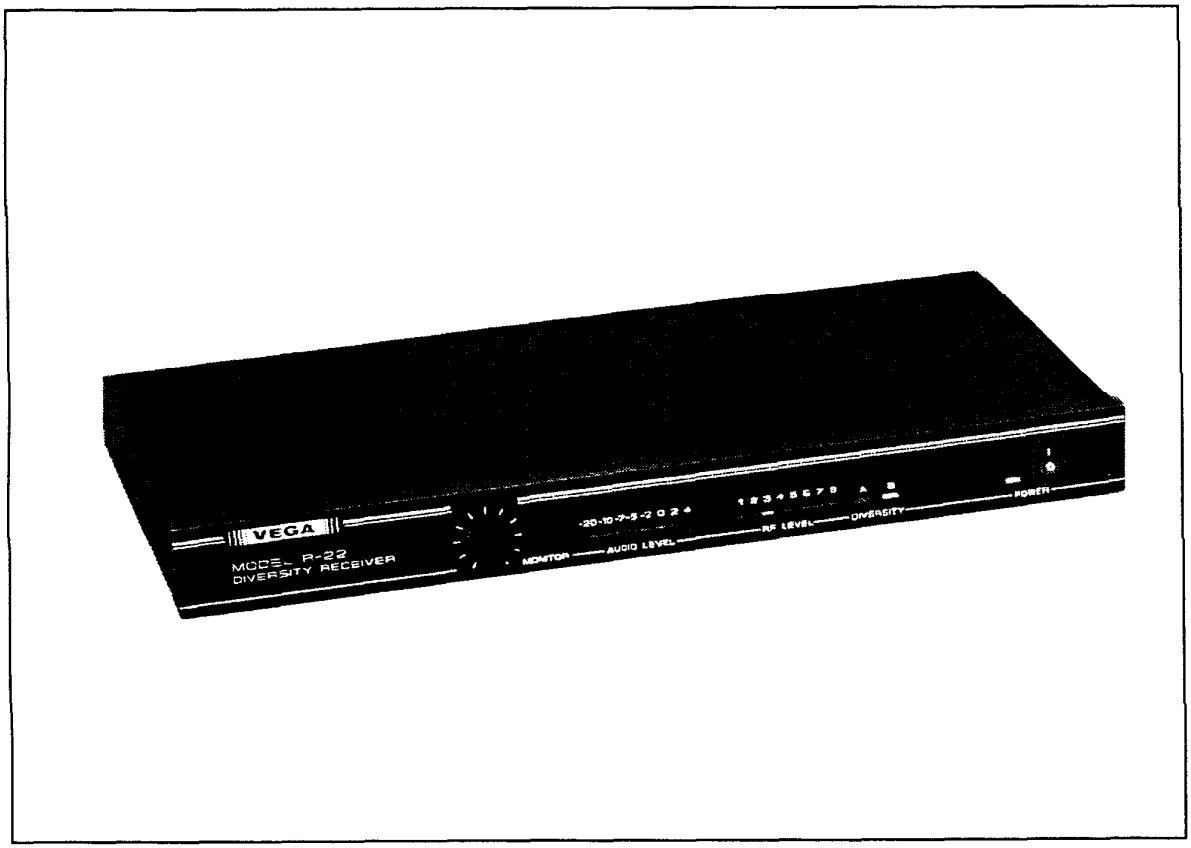
R-22
VHF Wireless-Microphone Receiver
Owner's Manual



099-0069A

A Word to Vega Users

In selecting Vega wireless microphones, you are in the company of audio professionals worldwide. Leadership for over 30 years has made "Vega" synonymous with wireless microphones. Our equipment provides superb sound quality, outstanding performance, and the durability needed for years of successful operation.

Unpacking

Verify the number of boxes shown as "shipped" has been received in good condition. Unpack and save cartons for storage or reshipping. If, for any reason, you do not find the equipment to be completely satisfactory, please immediately contact your Vega dealer or the Vega factory.

Should service ever be required, remember your authorized Vega service dealer knows your equipment best. They have the training and test equipment necessary to restore your equipment to its peak performance.

Please feel free to contact either your authorized Vega dealer or the Vega factory for information or assistance at any time.

Compatibility

The Vega model R-22 diversity receiver is designed to work with T-20 series transmitters, such as Vega T-24, T-28, and T-29 handhelds, and T-25 bodypack. This receiver incorporates the best in processing on the market today, Dynex III. Generally speaking, Vega receivers will not function properly with transmitters manufactured by other companies.

The R-22 works in the 169 to 216 MHz VHF range. The associated transmitter's frequency must precisely match the receiver's. The receiver's frequency is on the case's back panel. The transmitter's frequency is on the label on its side or in its battery compartment If the transmitter and receiver frequencies are not precisely the same, the frequency of one of the units must be changed. Because of the very high performance of these units and the specialized test equipment required to adjust them properly, users should not try to change frequency themselves. To ensure the best results, Vega advises you to return both units to the factory or authorized service location to have frequencies changed. If you are not certain that the receiver and transmitter are compatible, contact the Vega sales representative.

If more than one system is used at the same location, proper frequency selection and spacing of the respective systems are required to avoid possible interference. Vega offers a free frequency-coordination service for purchasers of its our equipment. Frequencies are selected by computer to avoid any possible interference from other wireless systems and broadcast stations. To take advantage of this free service, contact the Vega factory or your local sales representative.

Diversity Operation

The R-22 is a diversity receiver. It provides vastly improved performance as compared to a nondiversity receiver under difficult conditions and when long-range operation is needed. Either type of receiver will provide excellent performance when there is a clear, unobstructed outdoor line-of-sight path of several hundred feet or less between the receiver and the transmitter. However, wireless microphones are most often used indoors where many RF-reflective surfaces (air-conditioning ducts, equipment cabinets, sets and props, walls, furniture, etc.) are present. Under these conditions, which can cause a reflected signal to arrive out of phase with a direct signal, brief signal dropouts (phase cancellations) may occur when using single-channel receivers* With a true diversity receiver, however, almost total immunity from such dropouts is obtained and highly reliable operation is achieved. Many professional users employ diversity receivers even when a single-channel unit would suffice, because of the reduced setup time and greater reliability which can be obtained.

Controls, Connectors, and Indicators

The R-22 diversity receiver has numerous controls, connectors, and indicators. Although use of the receiver is not difficult, an understanding of the functions of these devices will al low better utilization of the system.

FRONT PANEL

LED Displays

Two LED bargraph-type displays to indicate the RF signal level available to the receiver and the audio output level of the unit. In order that the displays can be easily read from a distance, the RF signal level display is a moving-dot type and the audio display is a growing-bar type.

Audio Display

At the Audio Output "Line Level", "0" on the display is very close to -2 dBm with the output attenuator ("LVLADJ") set to maximum (minimum attenuation). For the "Mic Level" output, the level will be approximately 23 dB lower. The output attenuator varies the audio level for both the "Line" and "Mic" outputs and has about 36 dB of range. The metering point is prior to the attenuator, so the display lay reading is not reduced with increasing output attenuation. At the "0" point, approximately 14 dB of headroom is available. That is, the input to the wireless transmitter is approximately 14 dB below that which will cause the transmitter to begin soft gain compression. However, the gain compression circuitry in the transmitter does not respond instantaneously to short duration "spikes" and other transient peaks in voice energy. These peaks can cause the instantaneous peak deviation of the transmitter to reach values 3 to 4 dB above the normal steady-state maximum.

The R-22 will accommodate these brief transients without distortion due to its ability to provide in excess of+15 dBm of output without clipping. Accordingly, under many conditions, the system may be operated with less than normal allowances for headroom without concern for objectionable audio overload.

RF Signal Strength

This display indicates the level for the channel receiving the strongest RF signal. The display indicates the level for the currently selected receiver channel. Under normal conditions, this display should read well up into the green zone. A reading in the yellow zone indicates a very low signal level. While occasional brief dips into the lower green indicator should not be of concern, consistent readings in this range indicate that the system is nearing its maximum range and that steps should be taken to improve the signal to the receiver. Readings in the red zone indicate that loss of signal is imminent. In addition, the audio will be noticeably noisy under these conditions. When the RF signal level is absent or below the useful range of the R-32, al I indicators (RF level and audio) will go "off" and the receiver output will be squelched.

Power Switch and Indicator

AC power to the receiver is controlled by the power switch. The indicator to the left of the power switch will illuminate when the receiver is "on", (upper portion of the switch is depressed).

Monitor Jack

May be used with headphones to monitor the audio output of the receiver. A 1/4-inch (6.35 mm) female stereo phone jack. The output is set-up to drive stereo headphones. Monaural headphones can be used, but this will load the output of the driver. Therefore, with a mono plug, keep the volume control at low settings; otherwise if a stereo plug is used there is no problem. The signal-to-noise ratio of the monitor output will be slightly less than for the main audio output. Although the monitor output will drive loads as low as 8 ohms, use of headphones having impedances of 25 ohms or more is recommended in order to maintain low distortion. The monitor output is independent of the main audio output of the receiver.

Monitor Level Control

Adjusts the level of the monitor output of the receiver. At full I gain, the monitor output will clip well before the main audio output reaches its maximum, particularly for low-impedance loads.

DIV A/B Indicator

Indicates which receiver channel has been selected by the internal diversity circuitry. In the diversity mode of operation, these indicators can be expected to switch back and forth, indicating proper operation of the diversity circuitry. At very short ranges, one or the other of these indicators may stay on continuously, since the input RF level for bath channels will probably be above the region where the internal circuitry can detect small differences (and above the range where diversity switching would serve a useful purpose). When bath indicators are off the receiver is squelched.

Rear Panel

LVL Adj

Adjusts the line and mic level outputs of the receiver. When the Audio Level display reads "0", the Line Level output will be between approximately-2d dBm -38 d8m. For the Mic level output, levels will be between approximately -25 dBm and -61 dBm. Squelch: Adjusts the squelch point of both channels of the receiver. Factory set at 1.8 (V, minimum setting (fully CCW). At the maximum setting, the receiver will squelch at about 5.5 (V, reducing the receivers range to one third of normal. The primary reason for reducing the range is to decrease the probability of unwanted spurs breaking squelch and causing a blast of noise at the output audio. This problem could occur whenever the transmitter is turned off or at the edge of its range.

Rear-Panel Connectors

Antennas

BNC connectors for use with the whip antennas supplied.

XLR Audio Output

This standard, full-sized, three-pin XLR male connector provides the balanced mic level (program) audio output of the receiver.

Terminal Strip

The line-level output is available on this terminal strip ("L1", "L2", and "G"). This output is the main audio output of the receiver.

Fuse holder

A fuseholder is supplied for the AC line fuse. Different ratings, as shown on the panel marking, are required for 115-volt or 230 volt operation.

AC Power Jack

Used with the power cord provided to power the receiver. Is factory set for 115 VAC, but can be changed to operate form 230 VAC, see "AC Voltage Selector".

Internal Control

AC Voltage Selector

The voltage-selector switch (115/ 230 Vac) is located inside the receiver and may be accessed by carefully removing the cover of the unit (after disconnecting all power to the receiver). This switch (S2) is marked with the voltage range.

Operating Instructions

1. Verify that the transmitter you're planning to use has the same type of processing and frequency.

2. Plug the power cord into an appropriate AC power source. If operation on 230 Vac is required, be sure to set the internal voltage select switch to "230" and change the rear-panel fuse size.

3. Connect the antennas. Whip antennas are normally supplied with the R-22; they may be inserted either straight into its connector or at a right angle. An upright "V" orientation (similar to that used with the "rabbit ears" type TV antenna) is recommended. The antenna-to-antenna spacing will be less than optimum for maximum diversity performance, but good results will be obtained in most instances. For additional information in regards to antennas, see the section under "Antennas".

4. Attach your audio cable to the rear-panel audio-output connector. For line level use the terminal strip and for mic level use the XLR. Connect the opposite end to your audio equipment (mixer console, recorder, etc.) The receiver output is balanced; for single- ended (unbalanced) applications use only pins 1 (common) and 2 (L1). The output level in this mode will be 6 d B less than for the balanced mode. Do not connect either pin 2 (L1) or pin 3 (L2) to ground (common) at any time.

5. Turn "on" the receiver with the front-panel power switch to the "up" position. The power indicator should illuminate.

6. Verify that the transmitter has a fresh battery installed. Turn the transmitter "on", and position it in the approximate center of the area to be covered by the wireless system. Observe the RF-signal-level display. If it does not read well up into the green zone, difficulties are indicated {e.g., defective transmitter, receiver, or antenna, excessive operating range, or severe RF propagation problems). Refer to section "In Case of Difficulty".

7. If the transmitter is a bodypack type, connect the Lavalier microphone to be used. If the transmitter is a handheld type; turn "on" the microphone via the switch on the bottom. The audio levels should now be set for the system. With the microphone correctly positioned, speak loudly into it. Observe the modulation indication on the transmitter (see the transmitter user's manual). If necessary, turn the audio gain on the transmitter up or down. If necessary, adjust the receiver "Audio Output-LVL Adj" control.

8. Readjust the transmitter mic level control, if necessary. When speaking loudly, the "Batt Low" indicator (also serving as a mic overload indicator) on the T-25 bodypack transmitter or the audio-compression indicator on the handheld transmitter should flash on the loudest voice peaks. This indicates that the transmitter is at approximately the point where soft gain compression is occurring in the microphone preamplifier. If the system is correctly set up, the compression point will be reached only rarely. Setting the mic level correctly maximizes the system signal-to-noise ratio while ensuring optimum audio quality. If the mic level is set too high, thumps or pops due to overload may occur; if set too low, the system may "noise-up" at times.

9. Audiophasing, if important, should also be checked at this time. Because of differences in lavalier microphones, it is not possible to be sure that two different types of microphones have the same phase or that the phase will be the same as for a Vega handheld microphone. If the console or recorder does not have a phasing switch, it may be necessary to reverse the wiring in the audio cable from the receiver.

10. No adjustments should be made inside the transmitter or receiver for normal operation or use. Due to the great possibility of causing improper operation, or even damage to the transmitter, only qualified and experienced technicians should open the case Unauthorized adjustments or repairs inside the equipment case can void your warranty and cause unnecessary repair costs. If you believe that internal adjustments or repairs are needed, we recommend that you contact the factory or your nearest Vega authorized service center.

12. It is always advisable to "walk" the coverage area to ensure that there are no areas of poor coverage. Signal "dropouts" (little or no signal in small areas) are indicated by the RF-level and audio LED bargraph displays going "off" and by a brief "Fizzing" sound in the audio (which may or may not be followed by a silent period due to squelched audio). The audio may be conveniently monitored with headphones plugged into the front-panel "MONITOR" jack on the receiver. If a "dropout" are occurs, the antenna can usually be repositioned to eliminate the problem. Frequently, a change of just a few inches in location will solve the problem completely.

13. In normal operation, the "Diversity" LEDs on the front panel of the receiver should change back and forth from "A" to "8", indicating proper operation of the internal diversity circuitry. As described above, at very close ranges(15 feet, or 5 meters), the signal level may be too high for diversity switching. At longer ranges, failure of the LEDs to switch indicates some type of problem (bad antenna, poor placement of an antenna, transmitter too close to one antenna, etc.) which should be investigated and corrected.

Rack Mount Installation

1. Back-out the four screws holding the dust cover just enough so that the cover becomes loose.

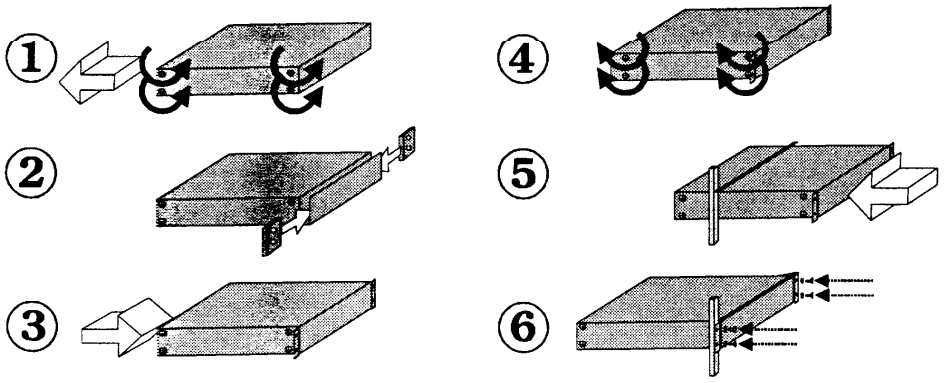
2. Slide the cover back away from the front panel, approximately 1/10-in. Insert the rack mount ears into the slot between t front panel and the cover on both sides. Push the ears in as far as they will go.

3. Push the cover back against the indented slot, in the middle section of the ear.

4. Working on one side, firmly push the cover forward against the ear and tighten the two screws on the same side.

5. Repeat the previous step for the other side.

6. Try to move the ears around and make sure that they are firmly held in place. If they work loose, repeat the procedure.



Antennas

The receiver antenna may be the most important single component in a wireless microphone system. However, this is the item most often overlooked in setting up a system. Proper placement of the receiver antenna(s) is vitally important in any wireless microphone system. Whip antennas connected directly to the wireless receiver are adequate for many installations. This type of antenna is provided with the R-22. When the distance between the receiver and the transmitter is 200 to 400 feet (60-120 m), or less, and the path between the receiver and transmitter is clear and unobstructed line-of sight, good results usually can be obtained. However, other types of antennas may be needed for unusual applications, such as operating at extreme ranges of 500 feet (150 m) or more. TV antennas (with an appropriate matching transformer) are often used for this purpose. A "high-band" wide- bandwidth yagi antenna (Winegard K5-713, or similar) works well in this application. VHF communications antennas are also sometimes used for specialized requirements. However, such antennas are usually narrow-band and must be modified to function properly in the 174 to 216 MHz range. Contact the Vega factory or your sales representative for assistance in selecting antennas for unusual applications.

In Case of Difficulty

Most users of Vega equipment enjoy years of trouble-free operation from their wireless microphones. However, as with all electronic devices, problems may be encountered eventually. If you have trouble with Vega equipment within the first year of operation, it will be repaired under warranty (see below). Service for older units may also be obtained from Vega; contact the factory or your sales representative for information.

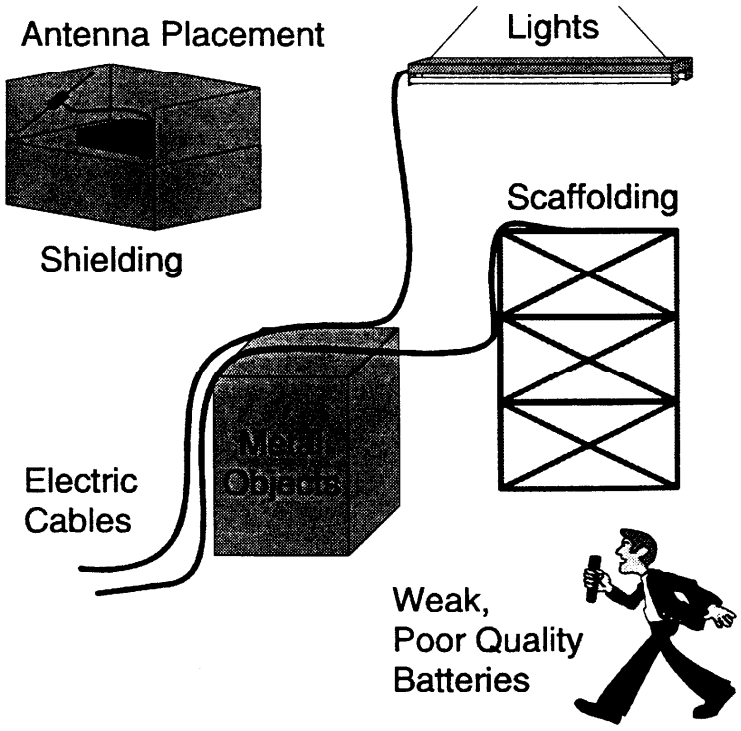
Most difficulties with Vega wireless microphones are not due to equipment failure. Vega equipment is fully tested before leaving the factory. Usually, problems are due to equipment application.

The following paragraphs describe the most common problems. If you are having difficulties, please review this information and take any necessary corrective action. If you still experience difficulties, contact the Vega factory or your sales representative.

Often, the problem can be resolved by phone, avoiding downtime for unnecessary returns. However, should repairs be necessary, Vega will promptly correct the problem and return the unit. Return of both transmitter and receiver is recommended, allowing us to perform a complete checkout and test of the entire system. This can be especially helpful for elusive or intermittent problems

Battery

The most common problems with wireless microphones are those related to the transmitter battery. Vega recommends only new, fresh Duracell MN1604 or Eveready alkaline batteries be used in the transmittefor, and Duracell or Eveready alkaline "D" cell batteries in the receiver, if the BATTERY POWER MODULE is installed. Despite advertising claims, no other batteries tested by Vega provide equal life and equivalent reliability. Others will work, but battery life may be short and current inadequate. Lithium 9-volt batteries may also be used when extended operating time is necessary.



The only acceptable rechargeable batteries known to Vega are Varta and Plainview batteries, which are true 9-volt designs. Even here, the usable life will be much less than for a Duracell (usually 1 to 1.5 hours).

Exhausted batteries will cause many problems, including distortion, audible squeals and howls, poor range, and off-frequency operation. Most Vega transmitters provide a means of checking battery condition prior to use. It is strongly recommended that the battery be checked prior to each use, and that it be replaced if there is any question about its condition.

It is also good practice to replace batteries with new ones when any system problems occur, since a low battery may affect system operation in subtle ways.

Receiver Noise

Vega wireless-microphone receivers are designed to be extremely sensitive. Although high-performance squelch circuits are provided, it is not unusual for the receiver squelch to open and let through audio noise when the transmitter is off. This is usually due to harmonic outputs of commercial radio and TV stations, spurious outputs from two-way radio transmitters, adjacent-channel leakage from TV transmitters, and, sometimes, RF noise from digital equipment such as audio and video effects generators, computers, and other industrial equipment near the antennas.

When the wireless transmitter is "on," this noise is suppressed and rarely causes any difficulties. However, if the audio channel is left "open" with the transmitter "off," loud blasts of noise may occur. Therefore, it is advisable to "fade" the receiver audio when the transmitter is not in use. Changing the placement of the antennas and, in some extreme cases, changing the operating frequency may be necessary to minimize these problems.

The receiver rear panel "SQUELCH" control may be adjusted to eliminate false squelch openings when the transmitter is off. This will be effective only in mild cases of interference. Adjustment of this control will directly affect the system's operating range, so considerable caution should be used.

Antennas/Cables

If there is a coverage problem, try moving the receiving antenna, particularly if there are nearby metallic materials. Antenna placement and mounting is vitally important. Shielding the antenna with metallic objects reduces the signal level available, and may result in creating locations within the coverage area where the receiving antenna is almost entirely ineffective (pattern "nulls").

Acoustic Feedback

Bodypack transmitters usually use lavalier electret microphones. Almost all such microphones are omnidirectional (equal sensitivity in all directions) and usually pick up much more ambient noise than handheld microphones.

In many sound systems, on-stage monitors are used. Often, the directional characteristics of handheld microphones provide the only protection from acoustic feedback. Omnidirectional lavalier microphones do not provide the same degree of protection, and acoustic feedback may occur when the wireless is used. However, this is an acoustic problem and is not directly related to the use of wireless transmission. There are several solutions to this problem: substituting a directional lavalier microphone (a few models are available), reducing the monitor level, relocating the monitor speakers, or careful adjustment of equalizers.

Interference

Vega wireless-microphone systems have been specifically designed to reject interference. However, interfering signals might fall directly on the receiver frequency, making it impossible to avoid problems completely. This can be a particular problem if the receiver audio is left open when the transmitter is turned off.

Problems with RF noise sources (fluorescent lights, digital effects generators, and industrial equipment, etc.) are quite rare. However, defective fluorescent lighting fixtures can generate astonishing amounts of RF energy. Usually, repairing the fixture will cure the problem. Normally functioning fixtures almost never cause trouble. Some digital audio and video signal processing equipment and effects generators also can generate substantial amounts of broadband noise. When this situation exists, nothing can be done to the wireless equipment to correct the problem that will not seriously degrade performance. The receive antennas must be positioned away from these sources of RF noise to minimize the effect of this interference. Fortunately, this type of problem is surprisingly rare.

A more serious problem is selection of wireless-microphone operating frequencies which are inherently subject to interference due to intermodulation. Fortunately, a proper initial selection or changing frequencies will usually correct any such problem. Vega offers a free computerized frequency-selection service to purchasers of our equipment. If the frequency of other wireless equipment to be used in a given area is known, interference-free frequencies can be chosen. However, if equipment is added later without frequency coordination, it is likely that an interference problem will occur. Should this happen, contact the Vega factory or your sales representative for assistance. Many wireless systems may be used in an area. However, careful frequency coordination is essential.

Microphone Problems

Almost all electret microphones are sensitive to RF energy and require special precautions to operate properly with wireless transmitters. If the sound quality of a microphone changes drastically when its position with respect to the transmitter changes, it is likely that RF susceptibility is the cause. Contact the Vega factory or your sales representative if assistance is required. Lavalier mics purchased from Vega are specially assembled with added components to avoid this problem.

The wires in lavalier electret microphone cables are usually very small. After a period of heavy use, the conductors may fray, resulting in intermittent failure or severe noise. The wire also may break. It is advisable to have a spare microphone available in good working condition (it does not need to be a high-quality unit). A spare microphone enables easy localizing of problems due to bad microphone cables by merely substituting the spare for the suspected unit.

Warranty (Limited)

All Vega wireless products are guaranteed against malfunction due to defects in materials and workmanship for one year, beginning at the date of original purchase. If such a malfunction occurs, the product will be repaired or replaced (at our option) without charge during the one-year period, if delivered to the Vega factory. Warranty does not extend to damage due to improper repairs, finish or appearance items, malfunction due to abuse or operation under other than the specified conditions, nor to incidental or consequential damages. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation may not apply to you. This warranty gives the customer specific legal rights, and there may be other rights which vary from state to state.

Vega authorized service centers enable Vega to give customers immediate service on repairs. These service centers are fully qualified and equipped to handle the servicing of Vega equipment, and turnaround time is excellent. To obtain the address of your nearest authorized warranty service center, contact your dealer or the factory.

If you should require service, pack the equipment carefully and return it to the factory service center or the nearest authorized service center.

Important: Be sure the exact return address and a description of the symptoms are enclosed inside the package with your equipment.

It is also advisable to return the transmitter and receiver for full system performance test when practical.

Factory Service Center

Vega
9900 E. Baldwin Place
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(818) 442-0782

Vega FaxBack

Information including more detailed procedures, schematics, and other Vega products is available 24 hours a day from Vega's FaxBack system. Simply call (818) 444-2017 or 800-274-2017, then follow the voice instructions.

Claims

No liability will be accepted for damages directly or indirectly arising from the use of our materials or from any other causes. Our liability shall be expressly limited to replacement or repair of defective materials.

Suggestions or Comments

If you have suggestions or comments concerning this manual, please fax (818-444-1324) or mail them to:

Vega
Documentation Manager
9900 East Baldwin Place
El Monte, CA 91731-2204

Specifications Checked w/ old hrdcopy, no need to recheck

Frequency Ranges:	169-174 MHz and 174-216 Mhz
Frequency Stability:	±0.005%
RF Input Impedance:	50 Ω, nominal
IF Frequency:	10.7 MHz (LO Low-side injection)
IF Filtering:	150 kHz, 7 poles ceramic and LC
RF Filtering:	5 MHz, 4 poles
Pre-expanded SNR:	70 dB SNR
Audio Processing:	Dynex III
Sensitivity:	Better than 1.6 μ V for 50 dB S/N, typical
Ultimate Quieting (S/N):	103 dB (20 kHz flat); 105 dB (A-weighted)
Squelch Quieting:	Greater than 103 dB (referenced to 15 kHz deviation)
Harmonic Distortion:	0.5% maximum; 0.25% typical at 1kHz
Deviation Acceptance:	±15 kHz
Image and Spurious Rejection:	72 d B, minimum (typically 80 dB)
Audio Output Impedance:	Line level, 600 Ω, nominal (approximately 75 Ω actual); mic level, 150 Ω, nominal
Audio Output (Adjustable):	Line level: +13 to –23 dBm (at full deviation), +16 dBm minimum at clipping. Mic level: –10 to –46 dBm at full deviation. Both rated for normal line and mic load impedances
Power Requirements:	115 or 230 V_{ac}. 50-60 Hz. 10W maximum.
Monitor Output:	+8 dBm (minimum) into 600-Ω load; 1.3 V_{rms} (minimum) into 50-Ω load, adjustable, unbalanced
Dimensions:	16.75 × 1.75 × 8.2 inches; 4.45 × 42.55 × 20.8 cm. (excluding connector/control protrusions)
Weight:	5 pounds, (2.3 kg)
Controls:	Power switch, output level adjust control, squelch, monitor volume
Indicators:	Audio-level bargraph, RF-level bargraph, Diversity display LEDs (A,B), ac power LED
Connectors:	XLR (3-pin male) audio mic output; three position audio line output terminal strip, standard 1/4- in stereo phone jack for monitor output; BNC coaxial antenna jacks. Detachable ac power cord
Operating Temperature Range:	–20 to + 50°C
Options:	Rack mount hardware VHF dipole antennas

Overall System Performnance*

Working Range:	Up to 1000 ft under ideal conditions; usually less in typical applications.
Modulation:	Direct FM, crystal controlled, 60KOF3E
System Frequency Response:	45 Hz to 15 kHz, ±1.5 dB; 100 Hz to 10 kHz, ±0.75 dB
System Harmonic Distortion:	0.5%, maximum, below transmitter limiting; 0.25% typical at 1 kHz
System Ultimate S/N:	103 dB (flat) minimum (105 dB typical A-weighted), excluding microphone electronics and/or element noise.
Dynamic Range:	105 dB typical. A-weighted (maximum deviation to noise floor); 129 d8 including transmitter gain adjustment range, 130 dB from input for maximum non-distorting transmitter gain compression to noise floor (microphone dynamic range is normally limiting factor, except at extreme working ranges)

*System level performance will vary with the type of transmitter in use, its operating mode, and the control settings. Performance values shown are representative only. Values shown are for Model T-25/DIII transmitters.

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