VK3YNG Sniffer 4 Instruction Manual
(For version 2.4 hardware and V2.1.20 or later firmware***)

The VK3YNG Foxhunt Sniffer is a specially designed synthesised VHF direction finding receiver covering 150MHz and 170MHz bands.

The receiver is designed for quickly finding the direction of beacons, hidden transmitters and radio dog collars. Anything from distant weak signals to very close "sniffing" of transmitters running many watts of output power can be pin pointed accurately without suffering "overload" problems that plague other designs. Full auto-ranging operation allows the operator to quickly and intuitively locate the source of a signal without twiddling knobs or watching meters. The operator is freed to concentrate on more important things such as negotiating terrain or reading maps.

***Note: This version of the manual is for the basic operation mode which is the factory default. The sniffer has a number of advanced features that are not normally made available. To make use of these features, see the section on "configuring the sniffer", but only do so after reading and fully understanding the advanced manual. If you don't need any of the features offered in the advanced manual then you will get better results using the sniffer in its factory default or basic mode.

Introduction

The VK3YNG sniffer is designed to allow quick, easy and accurate determination of the direction of a transmitted signal in either the 150-153MHz or 173-180MHz bands. The sniffer provides enough sensitivity to determine the direction of a signal from many kilometres or miles away. It also provides enough attenuation to accurately determine the direction of signals right up to the source of the signal without suffering from overload or compression effects.

Attenuation (signal reduction) is provided automatically in steps of approximately 12dB each time a particular signal strength threshold is reached. The number of 12dB steps of attenuation is shown on an LED display. For example, a display value of zero indicates maximum sensitivity, where a value of 9 indicates a close or very strong signal that requires approximately >100dB of attenuation.

Signal strength indication is provided by an audible tone that increases in frequency (pitch) with increasing signal level. This is done because the human ear is a much more sensitive to changes in pitch than sound level. There is also no inertia or overshoot problems as tend to occur with signal meters. A special software algorithm ensures that the received signal strength tone does not suffer from "compression" effects that occur at higher signal levels with some designs.

Auto Power Down

The sniffer will automatically power down if either of the following two conditions are met:
1) There has been no key pressed for at least 10 minutes.
2) There has been no "upward" progression in range for at least 10 minutes.
The sniffer will give five short beeps just before the unit powers down.

Low Battery Indication

The sniffer functions accurately to supply voltages down to approximately 2.5 volts. Below this the accuracy becomes compromised or the sniffer may power itself down.

When power has dropped to 2.5 volts or lower, the display decimal point is enabled to warn the user that batteries are in need of replacement.

Display Brightness

A high efficiency Seven Segment Red LED is used for the range display. It has two brightness settings, one for daytime use and a significantly reduced brightness level for night use. A light sensor located immediately above the display automatically determines the brightness level.

Quick Button Reference:

The following table gives quick index to key functions.

Button	Operation in Normal mode
1	Recall channel 1 (Hold to store frequency)
2	Recall channel 2 (Hold to store frequency)
3	Recall channel 3 (Hold to store frequency)
4	Recall channel 4 (Hold to store frequency)
5	Recall channel 5 (Hold to store frequency)
6	Recall channel 6 (Hold to store frequency)
7	Display firmware version number.
8	Show battery level (0-99%)
9	Volume Down
0	Volume Up
R	Reset range back to zero.
F	Frequency Entry (4 digits follow)
M	Power switch.

Detailed Button Operation

M   *Mode/Power switch:*

Power On:

Pressing this button once powers on the unit to the frequency and mode stored in memory channel 1.

Pressing the button a second time powers down the unit.

1 through 6

Memories

Buttons 1 through 6 allow storing and recalling of memory modes and frequencies.

Recall functions.

Pressing any of the buttons 1 through 6 in normal operation mode will recall the frequency and mode stored in non-volatile memory. In normal operation mode, the display will display the last 4 digits of the selected memories frequency in kilohertz. For example, a stored frequency of 151.425MHz will flash up the sequence "1 4 2 5". The first two (100 and 10) megahertz digits are inferred by first entered digit as per the following table:

Setting of "MHz" digit	Band selection
0, 1, 2	150-152.999MHz
3 through 9	173-179.999MHz

Store functions

Pressing and holding any of buttons 1 through 6 will result in the selected frequency being stored in the selected memory. The button must be pressed and held until two short beeps are heard in succession. This confirms that the data has been committed to memory.

7 *Sync Button*

Firmware version:
This button is used to display the version number of the units internal software. Four
digits are displayed which make up the version number.

In basic mode this button has no other active function.

8 *D-Set button*

Relative Battery Voltage indication:
Pressing the "D-Set" button will display two digits giving an indication of the relative
battery capacity in percentage terms. 99% indicates a full battery while 0% indicates
the point where sniffer operation is significantly compromised. The sniffer may power
itself off before reaching 0%.

9 0 *Volume Control*

During normal operation, the "9" and "0" buttons allow the setting of volume. The
display briefly shows the new level and reverts to displaying the current range when
the button is released.

R *Range Button*
Normally the sniffer automatically selects the best range for the currently received
signal. In some situations it may be necessary to override this temporarily.

When signal disappears, the sniffer will slowly work its way back down through the
ranges until the signal is received again. Pressing the "Range" button will
immediately reset the range to zero without having to wait.

F *Frequency Entry*

The "Narrowband" version of the sniffer can operate at any frequency in the range 150.000-152.999 and 173.000 -179.999MHz* in 1KHz steps. Pressing the "F" button initiates frequency entry. The display confirms this by displaying "F". The sniffer then expects four digits to be keyed in to set the desired frequency. If an error occurs while entering frequency, the letter "E" is briefly displayed and the sniffer then reverts to the previous operation frequency. The first digit sets both the 1MHz frequency and the band. 0 through 2 sets the 150MHz band. 3 through 9 set the 170MHz band.

Factory default frequencies

Memory	Frequency
1	151.500MHz
2	175.700MHz
3	174.250MHz
4	176.500MHz
5	151.500MHz
6	176.575MHz

(*Note: Earlier versions of the sniffer that are not set up as "narrowband" have to have the last digit entered as "0" or "5". Pick the closest digit to the frequency of the transmitter. For example if the last digit is "8","9","1" or "2" – pick "0" as the last frequency digit. If the last digit is "3","4","6" or "7" – pick "5" as the last digit.)

Configuring the Sniffer

The sniffer has a special "Advanced" mode that opens up many additional features. This mode should not be used unless you are technically proficient or have need to set up the sniffer in a special way. Before using this mode make sure you fully read and understand the advanced version of the operation manual.

To activate advanced mode, press and hold the "9" button while turning the power on. To cancel the advanced mode, press and hold the "0" button while turning the power on. This "basic" mode is the factory default.

Battery Selection and Maximising Battery Life

There are a number of solutions for extending battery life with the sniffer. The most critical one is the volume setting. Battery life is reduced considerably when using the internal speaker on a high volume level with a continuous signal. Use the lowest volume level possible when using the internal speaker or use external headphones. The display also operates at a higher intensity level for daytime use that puts more load on the battery. Typically night time only operation increases alkaline battery life by about 30%.

Users who would like to get the longest use between battery changes should consider using Lithium AA batteries. These batteries have a very long shelf life and capable of providing well over 14 hours of continuous daytime operation.

Zinc Carbon and General Purpose Manganese, or so called "Heavy Duty" batteries are not recommended. The internal resistance of these batteries is too high to get reliable operation from the sniffer.

The use of single cell NiCd or NiMh batteries is generally not recommended as their terminal voltage (1.2V) is normally too low. However, the capacity of modern NiMh batteries nowadays is rapidly approaching that of standard Alkalines. The power supply module in V2.4 of the sniffer is capable of operating off NiMh batteries and their use may be considered if the sniffer is used regularly. Keep in mind that the battery will always indicate as partially depleted, even when fully charged. Also when the batteries go flat the sniffer will stop operating abruptly with little or no warning. The sniffer also provides no means of charging these batteries. They must always be removed for charging.

NiMh rechargeable batteries are not recommended for infrequent use. The self discharge rate of these will mean that they will go flat after sitting unused in the sniffer for several months where Alkaline or Lithium batteries will otherwise still be usable.

It is always recommended to remove batteries of any type when the sniffer is not in use for extended periods.

Specifications:

Frequency Coverage	150-152.999MHz, 173-179.999MHz in 1kHz steps
Channel Bandwidth	4kHz (narrowband) 16kHz (older versions)
Sensitivity	Better than -120dBm
Maximum signal level	+30dBm
Power Supply	3VDC (2xAA Alkaline or Lithium penlight cells)
Battery Life*	Typically 6+ hours (alkaline), 14+ hours (Lithium)
Memories	6, programmable
Receive modes	Signal strength Tone (AM, FM in advanced mode)
Max RSSI frequency	8kHz
Size	76mm(W), 80mm(H), 25mm(D) not including BNC connector
Antenna Connection	BNC
Headphone Connection	3.5mm stereo

*Note: Battery life is dependant sound level and display intensity. See section on battery life.

VK3YNG Sniffer MK4 - Block Diagram
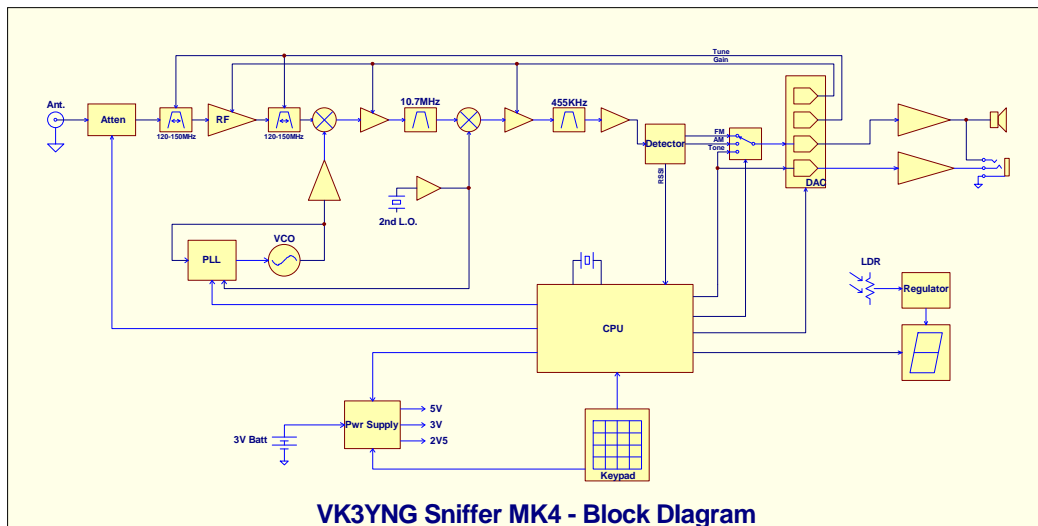
Links:

More information on foxhunting and techniques can be found on these web sites:

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