

THE SCANLOCK HANDBOOK °

Scanlock® Mark V B

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OPERATING INSTRUCTIONS

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Principles of Operation

The Scanlock® is a sensitive and selective radio receiver. Its secret of success lies in its ability to differentiate between r.f. signals of slightly different strengths and to lock to the strongest one that it encounters. While locked to one signal however, it continues to scan and will swing over to a new signal when it appears, if it is stronger than the one previously acquired.

Eavesdropping transmitters frequently operate at very low power levels and this fact would lead one to believe that they would be ignored by Scanlock® in the presence of signals from broadcasting stations, which are more powerful.

In fact however, when dealing with practical transmitting devices, it will be found that as one moves away from the powerful signal source (such as a broadcast transmitter) in the direction of a weaker signal source (a "bug" for example), a point will be reached where the two signals are of equal strength. The frequencies of the signals involved is not a significant factor in this discussion.

For our discussion, we shall call the distance between the weaker signal source (the "bug") and the point of equal signal strength mentioned above, the X distance.

If the Scanlock® is placed within this X distance, it will acquire the signal from the weaker source. In other words, if it is in the vicinity of a "bug" it can acquire the signal from the "bug".

In practical situations, there will of course be a myriad of signals present in any given location. Nevertheless, the signal from the "bug" will usually be the strongest within certain limits.

To have a successful eavesdropping installation, one must obviously have a signal from the "bug" that is strong enough to carry to the listening post (LP). At the same time, for security purposes it is desirable to have no more signal radiated from the "bug" than is absolutely necessary. As eavesdropping transmitters are rarely designed for a specific signal path they will usually be more powerful than needed and thus will be detectable at reasonable distances with the Scanlock®. Nevertheless, if a potential LP site exists very close to the area to be protected, the transmitter used might be of quite low power. If at the same time, the ambient r.f. level is high, it will be necessary to move the Scanlock® about in the room to get it as close as possible to possible "bug" locations or it should be

tuned manually while listening for the signal from a "bug". In the latter case, the Scanlock® does not depend on relative signal strengths and the signal that it tunes to is controlled by the operator.

Condensed Operating Instructions

The Scanlock® can be operated very effectively by following these steps. First, move to the center of the room to be checked. Then:

1. Begin with All buttons out and all controls at minimum.
2. Pull the antenna up to full height.
3. Push in the FM button.
4. Push in the POWER button.
5. Turn up the AUDIO control.

At this point you will probably hear a broadcasting station. DO NOT WORRY! THE SCANLOCK® IS OPERATING EFFECTIVELY. YOU SIMPLY ARE NOT WITHIN THE RANGE OF AN OPERATING EAVESDROPPING TRANSMITTER.

6. If the Scanlock® is quiet when you turn up AUDIO control, push in the S/C AUTO button.

You will know when you have found a "bug" because you will hear yourself or some other room sound during steps (5) or (6) above.

The foregoing is deceptively simple. By carrying out these six steps you have actually swept all of the frequencies commonly used by eavesdropping transmitters. A prudent person would also carry the Scanlock® around the room while it is operating to bring it closer to possible "bug" locations. In a great many situations however, the above-listed steps will suffice.

More detailed discussions on procedures and techniques are contained in the following pages.

General Operating Procedures

When a search is begun, the telescoping antenna is fully extended. The SQUELCH and AUDIO controls are set fully counter-clockwise and the POWER button is pushed in. Ensure that all other selector buttons are up. The receiver automatically tunes to the strongest signal that it picks up in this mode.

The reading observed on the field strength meter indicates the average level of all the signals that appear within the tuning range of the Scanlock®. Therefore, it provides an indication of the ambient r.f. level, not the strength of any one signal. A reading in the green portion of the scale indicates that the signal from an eavesdropping transmitter will probably stand out above the background level and therefore be easily acquired by the Scanlock® (when it is tuning itself). In a typical urban environment, where many broadcast and communications signals may be present, the meter reading will normally be in the yellow portion of the scale. Readings in the red portion of the scale indicate an extremely high ambient signal level and clearly tell the operator that he will have to be careful in making his search of the area. In such cases, the eavesdropping signal may not stand out in strength from the background.

The signal level in any particular situation will depend on many factors including the power and the distance from the Scanlock® of each transmitter. A high reading on the field strength meter of the Scanlock® could be due to a single high power transmitter at some distance away, several such transmitters at a somewhat greater distance, or an eavesdropping transmitter within a few feet of the Scanlock®. It should be emphasized that the meter reading itself is of no particular value in locating or identifying an eavesdropping signal. Its value lies in its ability to show the operator how high the background is and therefore how obvious an eavesdropping signal is likely to be.

AND EAVESDROPPING SIGNAL IS IDENTIFIED BY LISTENING TO IT USING THE PROPER DEMODULATOR (AM, FM, S/C AUTO, or S/C MAN).

As the majority of eavesdropping transmitters employ frequency modulation (FM), it is usual practice to first listen to the signal acquired by the Scanlock® with the FM button pushed in. In that mode, both FM and AM signals can be heard although an AM signal will normally be heard more clearly with the AM button in.

In situations where an eavesdropping signal is not present, the first signal that will be acquired as the

Scanlock® tunes itself usually will be from an FM broadcast station. It will be easily recognized as such and can generally be accepted as being innocuous. At other times, a buzzing or humming sound may be heard. Such a sound usually indicates the presence of a TV video signal. This again can usually be considered as innocuous.

If however, the sounds existing in the room in which the search is taking place are heard, or sounds from a nearby room are heard, the Scanlock® will have acquired a signal from an eavesdropping device. It is extremely important at that time to do as little as possible that might alert the eavesdropper that his signal has been discovered.

The best procedure is to move about in the room as quietly as possible to determine where the signal can be heard. Headphones should be used at all times in such cases and the volume level should be kept as low as reasonably possible to prevent the eavesdropper from hearing the sounds from them and to prevent them from causing acoustic feedback (usually characterized by a squealing sound).

IF COMPLETE SILENCE OR JUST A LOW LEVEL OF BACKGROUND SOUND IS HEARD WITH THE FM OR AM BUTTON PUSHED IN, IT IS IMPERATIVE THAT THE S/C AUTO BUTTON BE PUSHED IN.

This connects the sub-carrier demodulator to the system. If a sub-carrier transmitter signal has been acquired, room sounds should be heard quite clearly. (Sub-carrier transmitters are more sophisticated types of "bugs" than the more common FM types).

If instead of room sounds, a loud 'rushing' sound is heard, there is not a sub-carrier signal present and the signal heard with the FM or AM button pushed in simply did not have modulation on its carrier.

In automatic operation, that is with the MAN TUNE button up, the Scanlock® will lock to the strongest signal present. If the Scanlock® is to lock to a "bug" it must be sufficiently close to the "bug" so that the signal from the "bug" is stronger than the signals from other sources. Although in typical conditions, the Scanlock® will lock to a "bug" at distances in tens of feet, in extreme cases where the ambient signal level is very high, and the power of the "bug" is very low, it may be necessary for the "bug" to be very close before automatic lock is achieved.

In such a situation, a search using automatic tuning alone is of limited use. The Scanlock® should then be manually tuned (done by pushing in the MAN TUNE button and manipulating the MANUAL TUNING control). Some identifiable sound that will not be alerting to the eavesdropper should

be present as the tuning knob is turned throughout its range. The operator should listen carefully for the room sounds present during the process. As the Scanlock® tunes through its entire range in 10 turns of the control, this can actually be done rather rapidly.

A quicker and easier method of ascertaining the presence of an eavesdropping signal is to use the S/W (stands for Sound Wave) mode of operation. This mode is of assistance to the operator because he can tune more quickly and stop only if the "BEEP...BEEP...BEEP..." sound described previously occurs. This is of course potentially alerting to an eavesdropper and should only be used when other tests have not revealed anything. It is possible to mask the S/W tone signal to some extent by playing music through a radio, etc., while the test is made. In this test, the S/W and MAN TUNE buttons are pushed in and the MANUAL TUNING knob is slowly tuned throughout its range. When there is an interruption in the tone signal, tuning should be stopped and the knob turned very slowly back and forth to attempt to get the "BEEP...BEEP..." sound. Then the FM button should be pushed in and the tuning knob should be slowly turned back and forth in an effort to hear room sounds.

It should be noted that sporadic interruptions in the tone signal in the S/W mode are normal and should not be a source of concern. The distinct "BEEP...BEEP..." sound is the significant one to listen for.

The S/W mode of operation can be used with the MAN TUNE button up. In that mode, the Scanlock® will automatically tune in the strongest signal and if it is from an eavesdropping transmitter in the vicinity, the "BEEP...BEEP...BEEP..." will be heard.

Function Of Controls

AUTOMATIC TUNING

With the MAN TUNE (MANUAL TUNING) button out, the Scanlock® tunes itself and locks to the strongest signal within its tuning range and with a lock sensitivity of better than 1 mV up to 1.5 GHz. (100uV is typical). Somewhat reduced sensitivity will be experienced at frequencies between 1.5 and 2 GHz.

MANUAL TUNING (MAN TUNE)

With the MAN TUNE button in, the reception of weak signals in the presence of strong interference is possible. In the manual mode of operation, Scanlock® sensitivity is typically -70 dBm up to 1 GHz.

DEMODULATOR SELECTORS

The demodulator to be employed is selected by pushing in the appropriate button. Either an AM, FM, Sub-carrier (automatically tuned), or Sub-carrier (manually tuned) demodulator can be selected using the appropriately marked buttons.

SOUNDWAVE MODE (S/W)

With the S/W button pushed in, the Scanlock® emits a continuous tone signal which changes to a repetitive "BEEP...BEEP...BEEP..." if that tone is detected on a received signal. I.e., if the tone is picked up by a "bug" and is re-broadcast to the Scanlock. The AM, FM and automatic sub-carrier demodulators are all active in this mode.

LOCATE

With the LOCATE button in, the Scanlock® provides an audible tone signal whose pitch is proportional to the strength of the signal acquired. As the signal source is approached, the pitch increases from a low frequency ticking sound to a high pitched squeal.

FREQUENCY INDICATOR (FREQ)

With the FREQ button pushed in, the panel meter indicates the level of the voltage applied to the tuning varactor in the receiver. This is an indirect indication of the frequency to which the

Scanlock® is tuned. If the FREQ button is pushed, in after a signal has been automatically acquired, the operator will be able to observe the tuning voltage required to tune in that signal. By pushing in the MAN TUNE button, he can manipulate the MANUAL TUNING control until the meter shows the same voltage as it had before. The same signal should be audible as when he was in the automatic tuning mode. The Scanlock® will stay tuned to that frequency if the signal should disappear.

SQUELCH

When the squelch control is used, the loudspeaker is muted and the 'LOCK' indicator light is extinguished if the signal level is lower than the threshold established by the squelch control setting. When a signal presents itself that is above the threshold level established by the squelch setting, the 'LOCK' indicator light will come on and the signal will be heard through the loudspeaker or headphones.

Auxiliary Outputs

I.F. OUT

Provides a 2 MHz output signal for use with an ancillary spectrum analyzer thereby enabling a visual analysis of the received signal.

HEADPHONES

The loudspeaker is muted with the headphones connected. The sound level from the headphones can be quite high. Always turn the AUDIO control to minimum when putting the headphones over the ears. Then increase the volume setting gradually until the sound from the headphones is at the desired level.

RECORDER

Provides an audio output signal with a level independent of the volume control setting.

LOCK REMOTE

Relay contacts inside the Scanlock® are accessible through this jack. The contacts close when the 'LOCK' light is illuminated. They can be used to operate an alarm, tape recorder, etc. It should be noted that the relay contacts may not be able to control some types of loads. TSA, Inc.

should be consulted if there is any doubt on this point.

POWER SOURCE OPTIONS

Before making connection to an a.c. mains supply, ensure that the a.c. input module is set to the correct voltage. (Scanlocks shipped to users in the USA have this module set for 110 volt operation). To check this setting or to change it for 220 volt operation, examine the selector card located below the fuse in the compartment to the right of the power line socket. The figure '240' should be visible for operation from 220 volt to 250 volt supplies and '120' for supplies between 110 volts and 125 volts. To change the selector card, slide aside the plastic window, pull the fuse lever fully to the left and remove the card with small pliers or a screwdriver. Re-insert it in the correct orientation so that the voltage desired is then properly displayed. Mains power can be used to operate the Scanlock® and to charge the battery pack or to do both simultaneously.

To install a battery pack, unfasten the leather flap below the mains input socket, slide open the battery door and insert a battery pack in the way indicated by the label on the battery. The compartment in the leather case below the battery door provides storage space for the spare battery.

Each battery pack provides 5 to 6 hours of continuous operation when fully charged. During battery operation the green indicator light remains illuminated until the battery is fully discharged. At that time, a flashing of the green light will warn that the battery is about to run out of energy. It is strongly recommended that the battery not be operated after the green light begins to flash. The flashing green light means that the battery pack must be recharged.

Battery Charging

There are two methods of charging a battery pack in the Scanlock®. They are:

Normal Charge This occurs when the mains supply is connected regardless of whether the unit is in operation. I.e., both POWER and CHARGE buttons may be up. This charge will also take place if the POWER button is depressed and the Scanlock® is operating. A fully discharged battery will be fully recharged in 12 hours. The battery can be left in this mode of charge indefinitely without damage to the battery.

Fast Charge Fully discharged battery packs may be charged in 5 hours by depressing the CHARGE button. The CHARGE indicator will light if a

Specific Operating Steps

The Non-Alerting Phase

It is important to move quickly and quietly when starting a search for eavesdropping microphone/transmitter installations. By doing so, it may be possible to catch the eavesdropping signal on the air before the eavesdropper becomes aware that his installation is in danger and before he can de-activate his transmitter.

Therefore, it is good practice to set up the Scanlock® outside the room to be searched and to have some kind of innocuous sound inside the room, such as background music or a business conversation on a subject not connected in any way with the search.

It is also a good idea to use headphones with the Scanlock® during the early phases of the search. In lieu of that, the volume control (AUDIO) can be kept very low initially and then handled with care when it has to be turned up to identify signals that the Scanlock® has acquired.

Most eavesdropping transmitters operate at very high or ultra high frequencies (VHF or UHF). As the sensitivity of the Scanlock® varies somewhat with antenna length and frequency, it is good practice to start the search with the antenna fully extended and then to repeat it with the antenna length reduced by about one-half.

To begin the search, the Scanlock® controls should be set up as follows with the headphones connected:

POWER	-	ON
FM Button	-	IN
SQUELCH	-	Set at 1
AUDIO	-	To suit individual needs
ANTENNA	-	As noted above

All other buttons out

One then merely enters the room of interest and walks around with the Scanlock® and listens for room sounds.

It is likely that a number of different signals will be heard as the receiver is moved around the room. Each should be identified as it is acquired.

When a signal is acquired, if it is not obviously from a broadcasting station, some kind of identifiable sound should be made in the room if there is no sound there already. If the same sound is heard through the headphones, there is a "bug" present. If the sounds created are not heard, the S/C AUTO button should be pushed in and the sounds continued to see if they can be heard through the headphones. The same thing can also be done with the S/C MAN button pushed in, but in that mode, the red knob (SUB-CARRIER TUNING) must be slowly turned from one extreme to the other while listening for identifiable sounds.

The sub-carrier demodulators are designed for the demodulation of signals from sophisticated eavesdropping transmitters that might be used by professionals. It is most likely that the S/C AUTO mode of operation would be entirely effective against such transmitters (it tunes sub-carriers up to 150 kHz). If a sub-carrier signal is acquired, the audio output from the receiver will be rather quiet with the modulation clearly audible when the S/C AUTO button is pushed in. If there is no sub-carrier modulation, the audio output will be very noisy.

LOCATING THE BUG

When there are indications that an eavesdropping transmitter has been detected, there are two possible ways of finding where it is hidden. It should be remembered that it is useful to remain in the non-alerting mode of search at this time. This is because it may be possible to entrap the eavesdropper when he attempts to retrieve or service the "bug". It may also be desirable to feed the eavesdropper disinformation through his "bug". If he is alerted because of sounds made by the sweeper, he will probably abandon his device and the listening site. Therefore, the headphones should be kept in use, thus keeping the loudspeaker of the Scanlock® disabled. One can then move about the room making innocuous sounds and listening to determine when he is getting close to the microphone.

Because of the potential risk of alerting the eavesdropper through that method, it is probably best to use the LOCATE feature of the Scanlock® instead. When the Scanlock® operates in this mode, it produces a clicking sound in the headphones that will increase in frequency until the sound becomes a squeal as the Scanlock® antenna gets near to the signal source. This mode is selected simply by pushing the LOCATE button down. If the clicking initially occurs at a rapid rate, it is best to reduce the length of the antenna somewhat until it occurs at a slower rate. Then the changes in the rate of clicking will be more apparent as the signal source is approached.

It should be noted that there will be places in a room

where there may be false indications of signal energy. because the signal from the "bug" may be picked up by a piece of metal, such as the wire holding a picture to a nail in the wall and then be re-radiated by the wire. This may appear to be a signal source but actually will not be. When the Scanlock® antenna is in close proximity to the "bug" there will be no question that it is the real thing because there will be a very marked change in the pitch of the signal in the headphones.

The controls are set up as follows for this type of operation:

POWER	-	ON
LOCATE	-	IN
SQUELCH	-	Set at 1
AUDIO	-	To suit individual needs
ANTENNA	-	Set as before when the "bug" was detected-then shortened as necessary to home in on the source

All other buttons out

The Scanlock® should be taken into the area where the "bug" was previously detected and moved about as the change in pitch of the clicking indicates. If the results are inconclusive, the FM button should be pushed in to be sure that the signal is still on the air. The LOCATE button should be pushed in again and the search resumed. The hand held antenna is often found more convenient for this search where there is a possibility that the "bug" might be in a ceiling or some other somewhat inaccessible place.

It should be mentioned that a considerable amount of time can be saved by using the acoustic rangefinder (available from TSA, Inc) to locate the microphone.

MANUAL TUNING

In areas where the ambient r.f. level as indicated by the field strength meter on the Scanlock® is very high (80 and above), it is advisable to make a search using manual tuning. This is done simply by pushing in the MAN TUNE button. The tuning knob (MANUAL TUNING) is turned slowly throughout its full range. This requires that an identifiable sound source be operating in the room.

The controls are set up as follows:

POWER	-	ON
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SQUELCH	-	Set at 1
AUDIO	-	To suit individual needs
MAN TUNE	-	IN
ANTENNA	-	Fully extended
FM	-	IN

All other buttons out

THE ALERTING PHASE

A very fast check can be made for the presence of transmitters with any of the 3 types of modulation popular with eavesdroppers. This involves the use of the sound wave S/W feature of the Scanlock®. This is actually an acoustic feedback loop detector and as such it is necessary that the Scanlock® emit a sound signal from its loudspeaker. In this mode however, the AM, FM, and S/C AUTO demodulators are all working simultaneously and as a result the presence of an operating "bug" will usually be apparent in about 5 seconds. When an acoustic feedback path exists between a transmitter and the Scanlock® will emit a beeping sound (an interrupted tone at about 800 Hz). When there is no such feedback path, the tone will not be interrupted.

The controls are set up as follows for this test:

POWER	-	ON
SQUELCH	-	Set at 1
AUDIO	-	Not used
ANTENNA	-	Fully extended
S/W Button	-	In

All other buttons out

One leaves the Scanlock® turned off but otherwise ready for operation as indicated above. Once inside the room, the power is turned on for 5 seconds and turned off again. The Scanlock® is then moved to various places in the room and the test is repeated.

During this type of testing, music can be played in the room to partially mask the sound emitted by the Scanlock®.

If the tone is interrupted so that the Scanlock® produces the beeping sound, there is definitely an open microphone connected to a transmitter in the room. When

occurs, the headphones should be plugged in and the
dulator buttons pushed in one at a time while listening
the signal from the "bug".

MANUAL TUNING IN THE SOUND WAVE MODE

The most sensitive test for the detection of low power "bugs" is to manually tune the Scanlock® while it is in the sound wave mode. The Scanlock® is tuned slowly throughout its tuning range and any interruption in the tone signal is noted. When that occurs, the Scanlock® should be tuned slowly back and forth across that point until the beeping sound occurs. Occasional sporadic interruptions in the tone are normal and only the regular beeping sound indicates the presence of a microphone. When that is heard, the demodulator buttons should be pushed in (FM first) and the signal should become audible. Note that it may be necessary to move the tuning control slightly to get a clear signal. Also note that the signal may be quite weak and difficult to hear even through the beeping sound was quite pronounced. In such a case, it will be necessary to move closer to the "bug" to hear it well.

UNATTENDED OPERATION FOR REAL-TIME CONFERENCE PROTECTION

The time when an eavesdropping detection system is most valuable is during the time that the conversation to be protected occurs. A technical security inspection before a conversation or conference can be useful but it could also be useless if the area is not well protected after the inspection. A "bug" might be introduced into the room after it has been searched. In addition, unless the search is very detailed and thorough, a dormant eavesdropping transmitter very probably would not be discovered. The dormant transmitter might be activated after the conference is underway.

The Scanlock® can be left in operation in a conference area to automatically detect the signal from a "bug" if one comes on the air. When such a signal occurs, an accessory signalling system can be used to warn a security officer or guard outside the room that there is a problem. Several signalling systems for this type of application are available from TSA, Inc.

Use of the Scanlock® and a signalling system in this way is very cost effective as it reduces the number of man-hours required to create and operate a very effective eavesdropping defense.

SCANLOCK® MARK V B RECEIVER

LIMITED WARRANTY

Technical Services Agency, Inc. (Warrantor) warrants your Scanlock® receiver against all defects in material and workmanship for a period of 365 days (1 year) from the date of purchase. This warranty extends only to the original consumer purchaser. Defective units will be either repaired or replaced (at the discretion of Technical Services Agency, Inc.) upon their being returned to the Warrantor at 13214 L'Enfant Drive, Ft. Washington, Maryland 20022, postage or freight charges prepaid together with proof of purchase.

No implied warranty on the unit created by state law shall extend beyond the term of this warranty, and Technical Services Agency, Inc. shall not be liable for any incidental or consequential damages in the event of any defect in material or workmanship of the unit during the term of this warranty, or thereafter.

In the event that a unit must be returned for repair, TSA, Inc. must be contacted BEFORE shipment is made for specific instructions and approval.

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