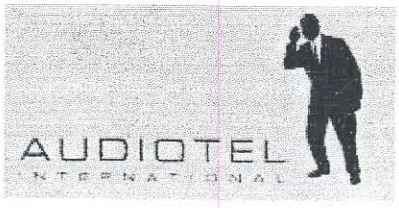
SCANLOCK MARK VB

OPERATING INSTRUCTION MANUAL



SCANLOCK MARK VB

OPERATING INSTRUCTIONS

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SCANLOCK® Mark V B

INDEX

SPECIFICATIONS

Frequency Range	10 mHz to 2 gHz
Sensitivity	-65 dB or better with 300 kHz IF bandwidth
	-70 dB or better with 50 kHz IF bandwidth
	100 uV for automatic lock in signal-seeking mode
Demodulation	AM, FM and Sub-carrier to 150 kHz
Tuning	Manual tuning through front panel control
	Automatic signal-seeking
	Computer controlled
Power Input Requirements	Operates from internal rechargeable battery pack and/or from 110 or 220 volt ac mains
Battery Life	5 hours of continuous use
Charging Time	5 or 14 hours from internal charging
Size	13.75 X 9.75 X 3.25 inches
Weight	9.25 lbs (without carrying case and spare battery pack

INTRODUCTION

The Scanlock® Mark VB is a sensitive and selective radio receiver that tunes through the parts of the r.f. spectrum that have most often been used for electronic eavesdropping.

Although quite simple and fast to operate, it is unusual in some respects. The following operating instructions should make the methods of using it quite clear. Please note that at points throughout these instructions certain conditions (such as, "the green LED should come on) will be mentioned. If they do not occur as predicted, go to the FAULTS section of this manual for an explanation and ways of correcting the problem.

The Scanlock® can be operated in either of 3 different ways:

A. The Signal-Seeking Mode

In this mode, the receiver tunes itself to the strongest signal in existence at that time. In rooms where a "bug" is not operating, the signal from an FM or TV broadcasting station will usually be acquired. The signal is identified simply by listening to it. If sounds from the room being checked are heard, there is a "bug" present and operating. If, on the other hand, music or some other form of entertainment is heard, the signal is probably from a broadcasting station. This can be confirmed if desired by tuning from station to station on an FM radio or TV set to locate the same signal.

B. The Manually Tuned Mode

In this mode, the receiver is tuned by the operator from signal to signal throughout its tuning range. As each signal is brought into tune, it is identified (by listening to it) and a decision is made as to whether it is innocuous or not. This method of operation is slower and requires more effort by the operator but is advisable in situations where there are very strong signals from nearby transmitters such as those from broadcasting stations.

C. The Computer Controlled Mode

In this mode, the tuning of the receiver is taken over by the Compuscan® computer, which is an optional accessory. The Compuscan® performs most of the functions of the human operator. That is, it tunes the receiver from signal to signal and compares each signal that it encounters with those which it has stored in its memory. The signals stored in the memory are those that have previously been identified as innocuous. When a signal is encountered that is not represented in the memory it calls the operator's attention to it so that he can make attempts to identify it. This operation is quite fast and can take place over extended periods of time without the need for continuous

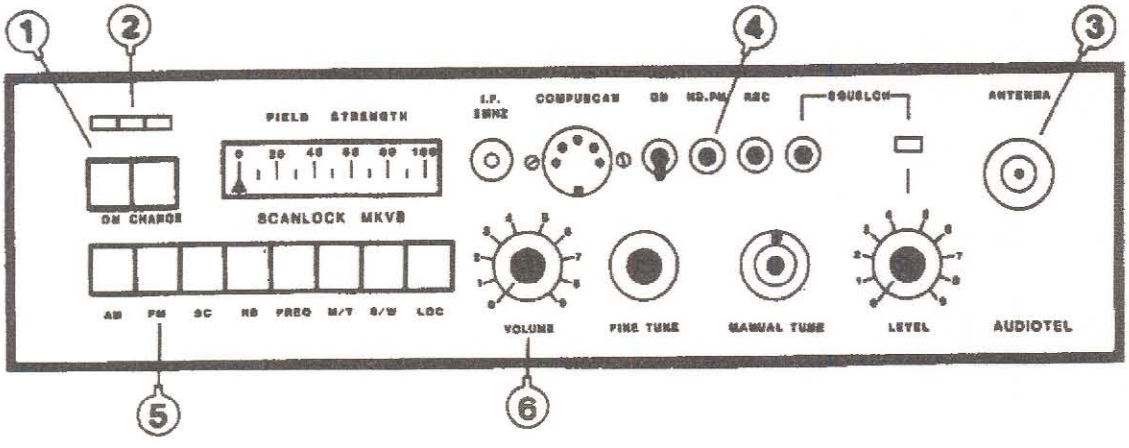
attention by a human operator.

Whatever the mode of operation, the skill and dedication of the operator are important factors in the defense against eavesdropping. The eavesdropper may have been able to employ sophisticated types of "bugs" and to hide them in a very professional manner. BUT, when those "bugs" begin to radiate a signal, they become vulnerable to detection. They produce energy that will exist at a detectable level all the way to the eavesdropper's listening post. The energy is likely to be quite strong in the vicinity of the "bug" and therefore more easy to detect than at the listening post. The sweep receiver should be able to detect that radiated energy. The operator's problem is to identify it.

As the Scanlock® tunes through the spectrum, it will encounter many different types of signals (i.e., signals that exist to convey information in many different forms) and it may be difficult to identify each and every one. Nevertheless, the operator should do what he can to satisfy himself that the unknown signal does not emanate from within the area that he is checking. The obvious way of identifying a "bug" is by listening to it to determine if it is modulated by room sounds (i.e., sounds from the room being checked). If that is not the case and he does not hear any other identifiable sound, such as broadcast entertainment, he can manipulate controls on the Scanlock® , examine the signal visually (if a spectrum monitor is employed), and he can pick up the Scanlock® and move around the room with it to see if the signal gets stronger in any particular area.

The procedures for using the Scanlock® are described in the following pages. It can be used effectively for very quick "sweeps" of a room or it can be used in a slower more methodical way for a detailed examination of the spectrum in the area. Whatever the method, the eavesdropper's system is put into jeopardy and he is at a severe disadvantage when it is used. The operator should approach each application of the unit with that attitude and treat each situation as though there is something to be found.

SIGNAL-SEEKING OPERATION



Operation is started by first setting all controls to 0 (zero) and putting all push button switches up.

1. Push in the ON button.

2. The green LED should come on. If the power cord is connected to the AC mains, the red LED will also be on.

3. Screw on the antenna and pull it up about half way. The exact length is not critical at this point.

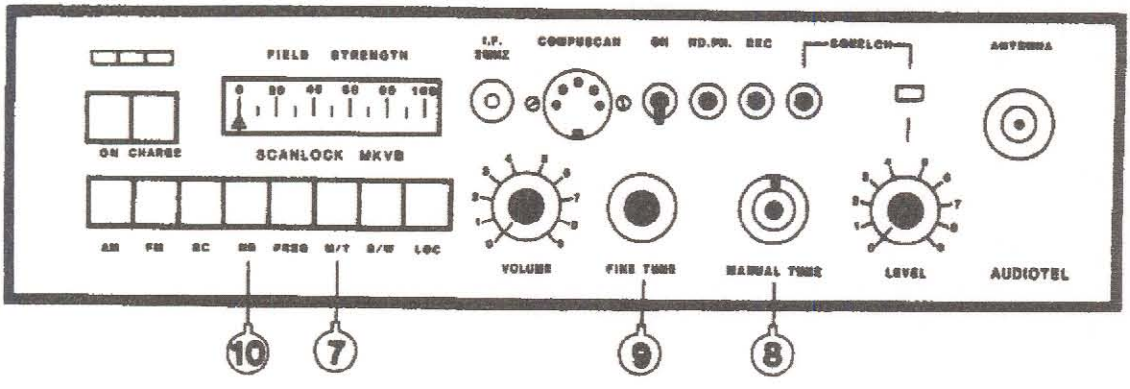
4. Plug in the headphones, if they are to be used, and put them on. The loudspeaker is disabled when the headphones are plugged in.

5. Push in the FM button.

6. Slowly advance the volume control. At this time, sound should be heard through the headphones or loudspeaker.

If a "bug" is operating nearby, room sounds will be heard. Otherwise, a radio or television broadcast or a buzzing sound will usually be heard. The buzzing sound is indicative of a video (picture) signal from a TV broadcast station.

MANUAL TUNING



In order to manually tune the Scanlock® , first set up the receiver as instructed for signal-seeking operation. Then:

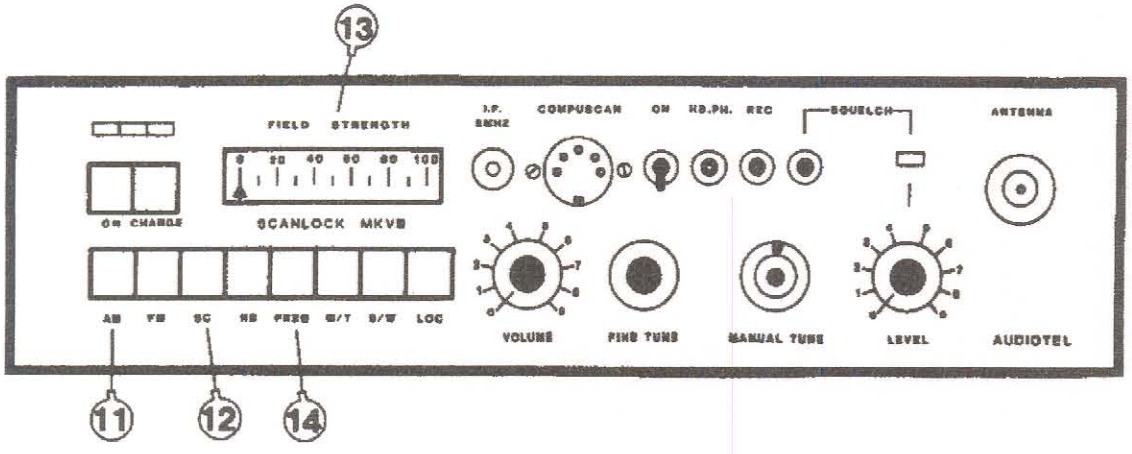
7. Push in the M/T button. This allows the receiver to be tuned using the MANUAL TUNE and FINE TUNE controls.

8. Turn the MANUAL TUNE control slowly and carefully throughout its range of 10 turns. As each signal is encountered, tune carefully until it can be heard clearly. (See the following discussion on selection of demodulators).

9. The FINE TUNE control can be used to tune in certain signals that are very narrow band and that might require extreme care with the MANUAL TUNE control. One complete turn of the FINE TUNE control is equal to about 10 divisions on the MANUAL TUNE control.

10. Some transmitters produce signals that are modulated lightly (i.e., occupy a very small part of the spectrum) and therefore do not produce much audio output from the receiver. When such is encountered, the NB (stands for Narrow Band) button may be pushed in to make the signal louder and clearer.

SELECTION OF DEMODULATORS



There are a number of different ways that radio waves are modulated with information. The basic wave is called a carrier wave and it is modulated (changed in some way) to carry information. It can be varied in frequency in accordance with voice sounds and in that case the signal is said to be frequency modulated or to be an FM signal. If the carrier is varied a lot with a given voice sound (for example), it is said to be a wide band signal because it moves about more (in frequency) in the spectrum. If it is varied very little in frequency it is called a narrow band signal. FM is used in many parts of the spectrum. Signals in the FM broadcast band are frequency modulated as are the signals generated by most mobile radios and handie-talkies.

When the FM button is pushed in on the Scanlock, the wide band (300 kHz wide) demodulator is connected into the circuit. Wide band FM signals such as those from FM broadcast signals will be heard clearly in this case and other signals (from many types of "bugs") as well from narrow band FM transmitters will be heard but sometimes less clearly.

When the NB (10) button is pushed in, a narrow band FM demodulator is connected into the circuit. FM broadcast signals will be heard with some distortion but narrow band signals will be louder and clearer. Tuning (when done manually) will be somewhat more critical and more signals will be detectable because the receiver is more sensitive and selective when the NB demodulator is used.

When the AM (11) button is pushed in, the AM demodulator is connected into the circuit. AM stands for amplitude modulation and means that the carrier signal is varied in strength (amplitude) with voice sounds (for example) instead of in frequency as in the case of FM. Aircraft and ground control stations use AM signal in the VHF part of the spectrum to communicate and short wave broadcast signals are always AM. If a signal is being received that is reasonably intelligible but cannot be made clear through careful tuning, the AM button may be pushed in to improve the clarity of the signal. If it has the desired effect the signal is probably amplitude modulated. IT SHOULD BE NOTED that nearly all AM signals will be heard and be intelligible when either the FM or NB buttons are pushed in. The AM button is needed primarily when an AM signal is to be heard with greatest clarity. It is NOT necessary to scan, either manually or automatically, with the AM button pushed in.

12. There is a somewhat more sophisticated type of "bug" than those employing simply FM or AM. It uses a system of modulation on modulation to produce a signal that is difficult to demodulate and thus identify on conventional receivers. The method is known as sub-carrier modulation. The carrier wave of the "bug" is modulated by an ultrasonic carrier wave (50 kHz is a typical frequency for this sub-carrier). The sub-carrier is then modulated with room sounds, etc. The "bug" is known as a sub-carrier bug.

To properly demodulate such a signal. The carrier signal is demodulated to recover the ultrasonic signal. Then the ultrasonic (sub-carrier) signal is demodulated to recover the room sounds.

When the SC (12) button of the Scanlock is pushed in, that is what occurs.

Whenever a signal is acquired but nothing is heard from the headphones or loudspeaker with the FM, NB or AM buttons pushed in, the SC button should be used. If, when the SC button is pushed in there is a loud rushing noise, there is not a sub-carrier signal present. On the other hand, if the audio is quiet, there may be a sub-carrier signal and the signal should be examined carefully.

FIELD STRENGTH (METER)

13. The FIELD STRENGTH meter provides an indication of the level of r.f. energy at the receiver antenna. This is actually the total of the energy level of all the signals picked up by the Scanlock.

The indication is useful because it provides the operator with an indication of the background level of signals present. In the signal-seeking mode, the signal from a "bug" must exceed the background level to be detected. Therefore, if the operator finds the background level of energy is high, he knows from that that

he must get close to the "bug" so that its signal will be strong enough to be detected. On the other hand, if the background level is low, the signal from the "bug" would not have to be so strong to be detected (that is, the receiver would not have to be so close to the "bug").

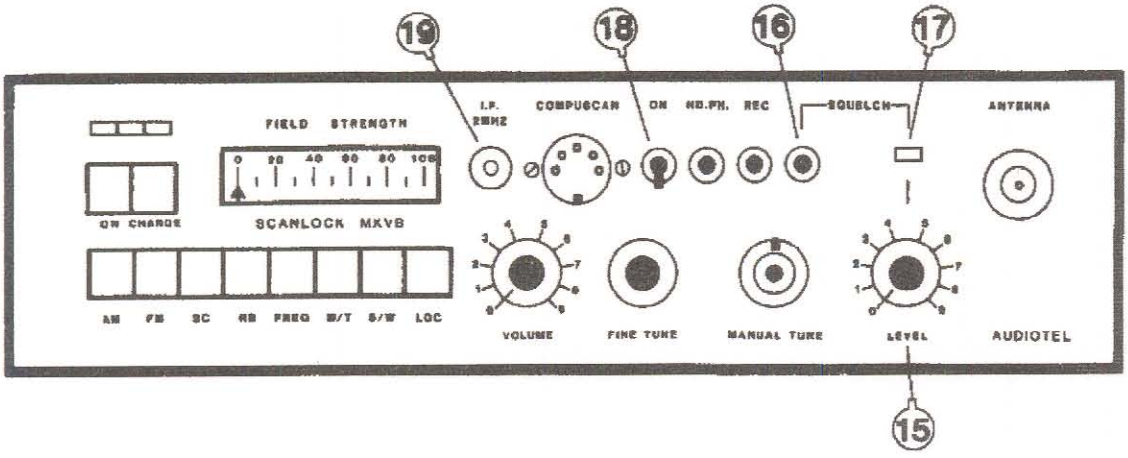
In addition, the FIELD STRENGTH meter can reveal a loss of sensitivity in the receiver. For example, if the meter has always read 60 in a certain location and then reads only 20 at the same place, it may be an indication that the Scanlock has lost sensitivity and should be tested and repaired.

When the FREQ (14) button is pushed in, the meter indicates the tuning voltage in the receiver. This provides an indirect indication of the frequency to which the recevier is tuned. That is, if the meter reads 50 when a certain signal is acquired that signal will be found whenever the receiver is tuned so that the meter reads 50.

If a signal is acquired in the signal-seeking mode and the meter reads 50, for example, the M/T button can be pushed in and the MANUAL TUNE control manipulated until the meter reads 50. The same signal should then be heard and kept in tune by the operator.

The meter reading does not give precise information but can be quite useful.

MISCELLANEOUS



The SQUELCH circuit disables the audio output until the level of the signal acquired exceeds a certain level established by the setting of the LEVEL (15) control.

For example, if the the LEVEL control is set to 4, the LED (17) will be off and the relay contacts that are accessible through jack (16) open until the signal level at the antenna rises above a certain threshold level. When that level is exceeded the LED will come on, the relay contacts will close and the audio output will be enabled. The higher the LEVEL control is set, the higher the signal level must be to exceed the threshold and vice versa.

The Compuscan® ON (18) switch must <u>always</u> be in the off (down) position when the Compuscan is not used.

The REC jack provides an audio output that may be connected to a tape recorder. The audio output level is not controlled by the VOLUME (6) control.

The I.F. 2 MHZ jack (19) provides an output signal from the IF amplifier to a spectrum monitor, if one is used. The output is from the 300 kHz B/W IF amplifier.

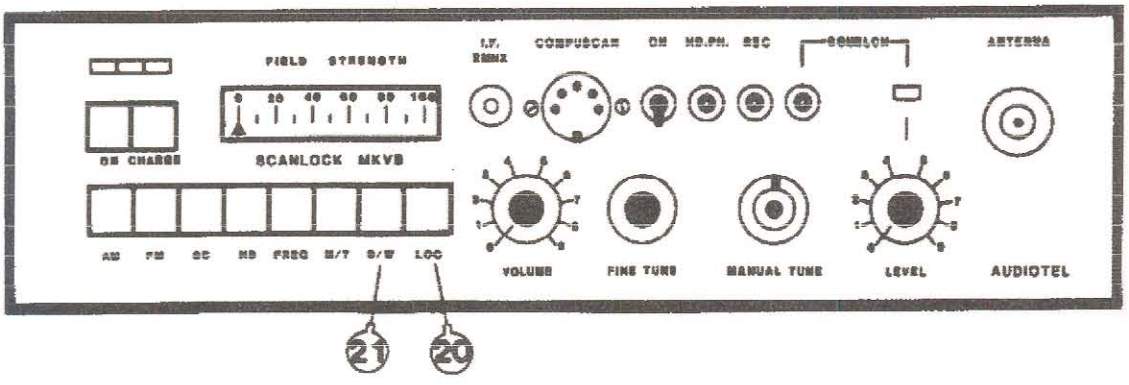
An antenna extension cord is supplied with the unit. One end is connected to the ANTENNA connector on the receiver and the other end is connected to the bottom end of the antenna. The antenna can then be used as a wand when the receiver is moved about in a room to get it as close to potential "bug" locations as possible.

A shoulder strap is supplied with the unit. This strap can be attached to the receiver and used when the receiver is moved about in a room during a search.

LOCATE

20. If a signal has been identified as coming from an eavesdropping device or there is a suspect signal that cannot be identified, the Locate circuit can be used to aid in determining if the signal is emanating from within the room being examined. In this mode, the receiver will produce a series of clicks in the headphones and as the receiver antenna is brought close to a source of r.f. energy, the clicks will occur more rapidly until they result in a high-pitched squeal. This circuit is put into use by pushing in the LOC button. Tuning of the receiver is not required and the demodulators are not used in this mode of operation.

SOUND-WAVE



21. This circuit is more properly called an acoustic feedback loop detector in that it indicates if the signal that has been detected is being modulated by sounds picked up by a microphone within the room. The circuit is put into use by pushing in the S/W button. At first thought it might seem that this is the ideal way to search for a "bug" but the tone signal that is generated by the Scanlock® loudspeaker into the room can alert the eavesdropper to the activity and he might then deactivate the "bug" by remote control. The headphones cannot be used for this operation.

The Sound-Wave system is employed by first tuning in a suspect signal. This can be done through signal-seeking or manual tuning. then the S/W button is pushed in. A tone signal will be heard and if that tone signal is repeatedly interrupted so that it sounds like a "BEEP, BEEP, BEEP, etc" it means that there is an acoustic path between the Scanlock® and the transmitter radiating that signal. In other words, there is a microphone in the room with the Scanlock® . If, on the other hand, the tone remains constant or only occasionally interrupts, there is not acoustic feedback loop. The Sound-Wave system operates using the audio output of all the demodulators (AM, FM, and S/C) simultaneously when the S/W button is in.

BATTERY INSTALLATION AND CHARGING

The battery packs are installed in the Scanlock by removing the cover over the battery compartment in the end panel of the receiver. The end panel is held in place by a screw with a larg head. The screw is loosed (but not removed), the cover is removed and the battery inserted WITH THE TERMINALS IN and with the label that says, "THIS SIDE UP" on top. If the battery is improperly installed, no harm will be done but the unit will not operate.

The battery is charged (after it is installed in the receiver) by plugging the power cord into an AC mains outlet. Nothing else is necessary and the battery will be fully charged in about 14 hours. It can be left connected to the AC mains indefinitely as the charge rate is low enough to prevent damage to the battery. The receiver can be operated at the same time.

If it is necessary to charge the battery more rapidly, the CHARGE button (2) should be pushed in. The battery will be fully charged in 5 hours and the unit will then automatically revert to a trickle charge and can be left connected to the AC mains indefinitely. The CHARGE button should ONLY be used if the battery is very nearly exhausted. A partially charged battery will be overcharged and if this is done repeatedly it will reduce the life of the battery.

A NiCad battery (which is the type used in the Scanlock) will lose about 50% of its charge each 2 weeks that it is left unused. Therefore, it cannot be assumed that a fully charged battery will be ready for operation if it has been left unused for an extended period of time. An occasional charge (with the CHARGE button UP) is a good idea. This is just to keep the unit ready for use. The battery is not damaged by leaving it on the shelf.

It is not a good idea to let the battery become completely exhausted during use. When the green LED (2) begins to blink, immediately change batteries or re-charge the one that is in use.

FAULTS

The numbers used below correspond to those associated with those on the front panel drawings.

The red LED (2) does not come on when the power cord is connected to the AC mains.

> The power cord is defective. The power cord (and the AC outlet) can be tested by using the cord like an extension cord. Plug the cord into an AC outlet and then plug a table lamp or other appliance into the female end of the cord. If the lamp, etc., works, the cord is good. If not, the cord or the outlet may be bad. Plug the lamp, etc., into the outlet and if it works, the outlet is good and the cord must be bad.
>
> The fuse in the end panel of the Scanlock has blown. Replace it with a 1 amp type 312 fuse. A spare is provided with the receiver.

The green LED (2) does not come on with the power ON button is pushed in.

> The battery is dead and needs re-charging. Re-charge the battery.

The battery contacts are dirty. Take out the battery and inspect the contacts. If they look dirty, rub them with a pencil eraser and re-install the battery.

The green LED (2) blinks when the power ON button is pushed in.

This is an indication that the battery is nearly discharged and should be re-charge prior to further use.

The yellow LED does not come on when the CHARGE button is pushed in.

The battery is not in place in the receiver.

The AC mains supply is defective.

The AC power cord is defective.

The fuse is blown.

The battery contacts are defective. Clean them.

110V - 220V AC MAINS CHANGEOVER

Before making connection to an AC mains supply, ensure that the AC input module is set to the correct voltage. Scanlocks shipped to users in the USA have this module set for 110 volt operation. (Others are set for 220 volts).

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 to 250 volt lines and '120' for lines supplying 100 to 125 volts. To change the selector card, slide aside the plastic window, pull the fuse lever fully to the left and remove the fuse. Pull out the card with small pliers or a screwdriver. Rotate it horizontally (don't turn it over) and re-insert it so that the proper voltage for the line involved is visible at the left side of the card.

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 20744, 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.