



**Microwave Perimeter Protection Detector
RADIY-2 series**



USER MANUAL

US Toll Free: 1-886-534-2STR

Phone: +1-416-657-4434

Fax: +1-416-650-9012

www.STRsecurity.com

support@STRsecurity.com

Contents

1. Description of detector's functions
 - 1.2 Technical specifications
 - 1.3 Detector operation
 - 1.4 Detector design
 - 1.5. Marking and sealing
2. Installation, adjustment and running in of the detector
 - 2.1 Security measures
 - 2.2. Installation site requirements
 - 2.3. Detector installation
 - 2.3.1 General adjustment requirements
 - 2.3.2 Pre-installation operations
 - 2.3.3 Detector installation
 - 2.3.4. Electrical connections
 - 2.4 Normal operation preparations
 - 2.5 Running in the detector
 - 2.6. List of possible defects and troubleshooting
 - 2.7 Technical support
- 3.1 General instructions
 - 3.2. Instruction # 1- Checking a buffer zone sector
 - 3.2.2 Instruction # 2- External examination of the detector

This operating manual has information regarding the purpose, design, operation, technical specifications and structure of the microwave protection

device “Radiy 2” and other modifications (further “detector”), as well as installation and usage instructions necessary for providing the most effective application of its technical potential.

Attention! We are constantly working towards upgrading the detector, reserving the right to make modifications, which would improve, but not affect the normal operation of the device.

The abbreviations used in the manual are the following:

RC – remote control

PSU- power supply unit

DZ- detection zone

IAK- installation assembly kit

IS- initial settings

TMR- transmitter

RCR- receiver

CP- control panel

1. General description and functions of the detector

1.1. Detector functions

1.1.1 The core function of the detector is to protect a perimeter and detect walking or crawling intruders.

1.1.2 The detector is designed to operate 24/7/365 in open field conditions with temperatures from -40°C up to +65°C and 100% relative humidity with +25°C air temperature.

1.1.3 Power is supplied by a DC circuit with 12-27 V voltage. Power can also be supplied by an AC circuit using a 0.5 A, 24V power supply.

1.2 Technical specifications

1.2.1 The detector will not generate false alarms and is resistant to the following:

-precipitation (rain, snow)

-solar radiation

-wind speeds of 30m/s and less

- surface irregularities of +/- 3m and less
- grass height of up to 0.3m
- snow height of up to 0.5 m (without additional adjustments)

1.2.2 The protected zone length is from 10 up to 200 m with at least a 9 dB signal (depending on the model).

1.2.3 The height of the protected zone is at least 2 m at maximum length.

1.2.4 The speed limits of a human crossing the protected zone are:

- 1) High -10 m/s
- 2) Low - 0.1 m/s

1.2.5 An alarm signal is generated by the detector when:

- 1) a walking or crawling human crosses the protected zone;
- 2) An impulse of 5-30 V power with a duration of more than 0.5 s is sent to the transmitter remote control input (RC);
- 3) The power supply is off or less than 10 V
- 4) The receiver is broken
- 5) Any detector unit malfunctions
- 6) A receivers' normal functioning is sabotaged by an external electromagnetic field

Notice The detector might not generate an alarm when being affected by an external electromagnetic field when requirements outlined in 1.2.3.4 are met.

1.2.6 Alarm signal duration is at least 2 s.

1.2.7 Output circuits of detector provide switching of up to 0.1 A, 72 V.

1.2.8 RC input resistance switching is 10 kOhm

1.2.9 The detector is able to operate with a 10.2-30 V DC power supply unit.

1.2.10 Power consumption at 24 V is no more than 70 mA

1.2.11 Detector size without initial assembly kit(IAK) is 160/115/45 mm

1.2.12 Detector weight without IAK is 0.5 kg

1.2.13 Working frequency is 9500+200 MHz

1.2.14 Self-diagnostics -7 levels

- 1) "Alarm"- the indicator is flashing and contacts of output relay are open for at least 2s, but no more than 30s, with the tamper circuit switch closed
- 2) "Protection"- the indicators are not flashing, contacts of output relay and tamper circuit switch are closed
- 3) "Power supply deficit"- the indicator blinks intermittently every 2s (1s on, 1s off), output relay contacts are open (for more than 30s), the tamper circuit switch is closed.
- 4) "Inadmissible IS parameters" (the receiving signal is less than 9 dB) - the indicator blinks intermittently every 2 s (0.25s on, 1.75s is off), output relay contacts are open (for more than 30s), the tamper circuit switch is closed.
- 5) "Defect" - the indicator on the control panel is flashing, output relay contacts are open (for more than 30s), the tamper circuit switch is closed.

- 6) "Tamper" - the tamper circuit switch is closed.
 - 7) 'Normal" - supplying a 5-30 V pulse for more than 0.5s to the RC input, the indicator is flashing and output relay contacts are open (for 2-3s), the tamper circuit switch is closed.
- 1.2.15 The detector is ready for operation after power is up in 30s. The detector does not output alarm signal before switching to stand-by mode.
- 1.2.16 The detector can be adjusted to an angle of +/- 15 degrees on any surface
- 1.2.17 The detectors' casing protection is IP55
- 1.2.18 The detector functions normally and does not output false alarm signals if affected by any of the following interferences:
- 1) impulse noise in power supply circuits and alarm zones
 - 2) conducted interference caused by electromagnetic radio fields
 - 3) electromagnetic radio fields
 - 4) electrostatic categories
 - 5) moving humans at the following distances from protected zone :
 - at least 3 m in a 300 m sector
 - at least 2 m in a 200m sector
 - at least 1,5 m in a 100 m sector
 - 6) moving transport at the following distances from protected zone :
 - at least 4,5 m in a 300 m sector
 - at least 3,2 m in a 200m sector
 - at least 1,8 m in a 100 m sector
 - 7) moving subjects in the protected zone , such as a small animal or a bird, at least 5 meters apart from detector units.
 - 8) ultra short wave radio stations broadcasting in 150-175 MHz frequency range with up to 40 W output at least 5 m apart from detector units.
- 1.2.19 The detector is protected from incorrect positive and negative power supply connections, due to installation mistakes and 1000 V impulses in connection lines for duration of up to 1ms caused by storms.
- 1.2.20 Average life time of the detector is at least 8 years.

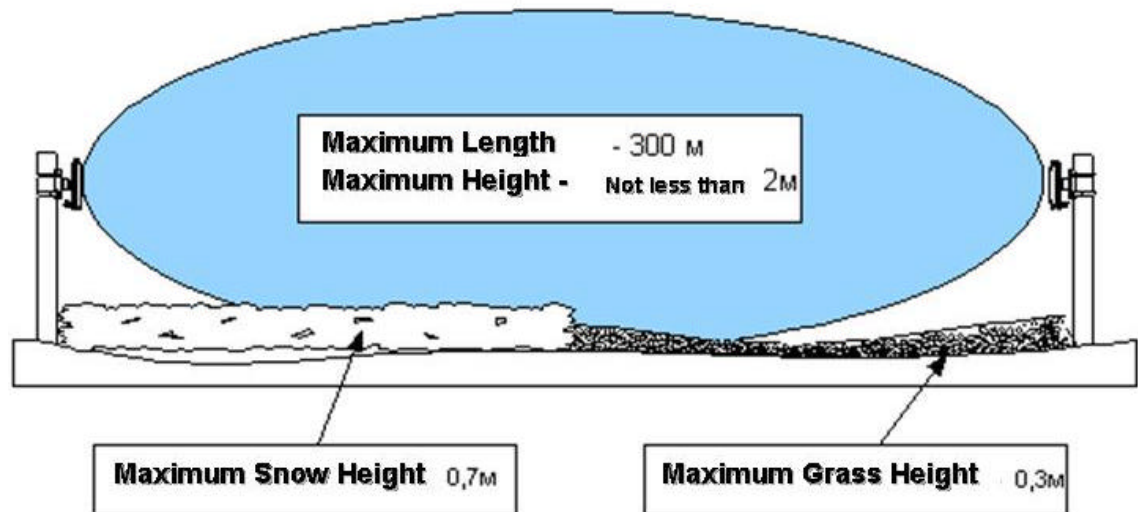
1.3 Operation of detector

1.3.1 Principle of operation

The TMR sends electromagnetic impulses to the RCR. The RCR analyzes the amplitude and temporary characteristics of the received signal and if these characteristics match the "intruder" algorithm model, the detector outputs an alarm signal.

Attention! A "Radiy" series detector is a perimeter protection system. Unlike volumetric systems, which detect every movement in the protected zone, the "Radiy" is able to output an alarm signal only in case of crossing the protected zone. Therefore, when measuring the detector' zone width, the buffer zone should be counted and not the actual protected zone width.

The shape of a protected zone is shown in diagram 1.1.



1.3.2. Description of the detectors' functional scheme

1.3.2.1 The functional scheme of the detector is shown in diagram 1.2

The TMR and RCR are located on opposite corners of the protected area and are connected via cable. **DO NOT** connect the TMR and RCR with a cable, if they are powered from different power sources.

1.3.2.2 All external TMR and RCR circuits have built-in lightning conductors. These devices and the power supply units and circuits are not shown on the functional scheme.

1.3.2.3. The TMR includes a modulator, a transmitting microwave module and a remote control switch (RC). The grid creates impulses which supply the microwave module. The RC switch measures signal voltage on the RCR input and provides signal and interference selection.

1.3.2.4. The RCR consists of a receiving microwave module, an execution unit processor, an indicator and frame breakage sensor.

The microwave module receives an electromagnetic signal, identifies and then amplifies it.

The processor has the following functions:

- controls the microwave module in order to determine the signal features on its input;
- determines optimal threshold detection parameters and tests input signal according to the determined parameters;

- controls and stores IS parameters in the memory, tests input signal according to these parameters;
- controls power voltage
- controls execution unit and indicator

The execution unit is based on a solid-state relay which is, unlike mechanical relays, is more reliable and has practically unlimited resources.

The indicator is a service device and provides indication of the detectors' modes

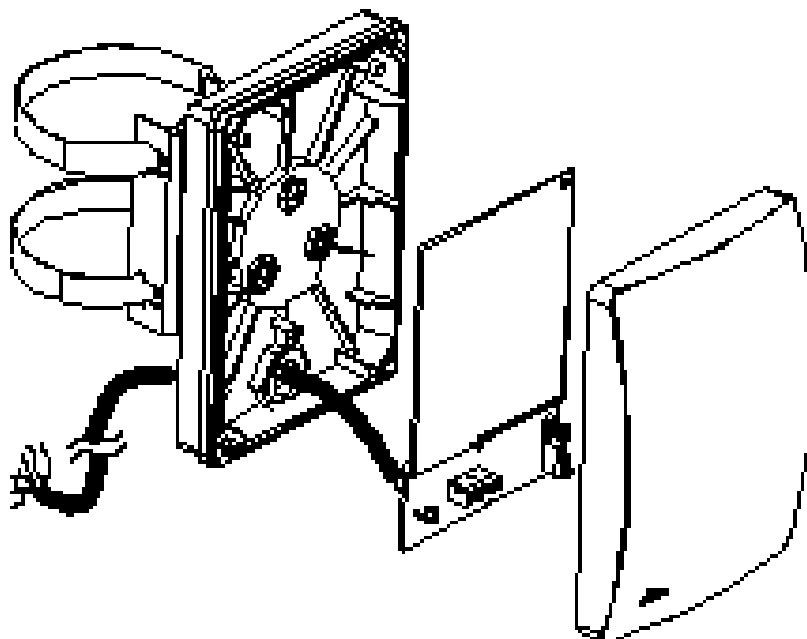
1.3.2.5 When a signal is received from the remote control to the TMR, the modulator stops creating power supplying impulses to the microwave module and the RCR starts functioning.

1.4 Detector design

1.4.1. The detector consists of two similar units which have a water-proof and anti-dust coating.

1.4.2.1 Receiver design (diagram 1.3)

The major element of the RCR is its basis. Microwave module, PBC of the processor are stationed on the basis. Control panel, indication and clamps are accessed when the cover is off. The RC and the RCR are ported with cable from the detector's delivery kit. The RCR is installed on the pipe with the bracket and two buckles from ISA.



The location and markings of the wires, control panel and indication are shown in diagram 1.4. Functions of the RCR clamps are listed in table 1.1

Table 1.1

#	Marking of wires	Function of wires
1	+	Positive power
2	-	Negative power
3,4	OUT	Output relay
5	TAMPER	Tamper switch

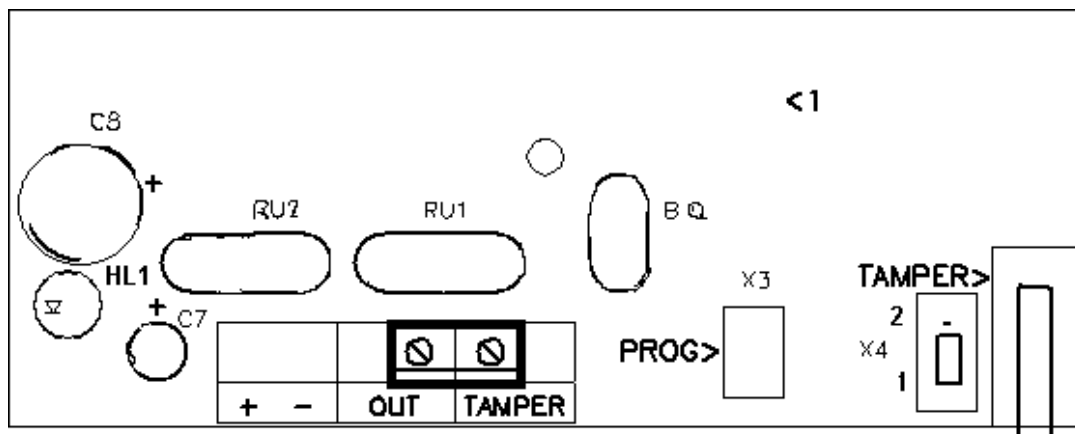
Control panel and indicator functions:

HL1 – indicator

LOCK- ISA button

TAMPER- tamper switch

X4- sensitivity change contacts (starting position is "1" - the lowest sensitivity).



1.4.2.2 Transmitter design

The TMR design is similar to the RCR design. The only difference is that instead of a processor PCB, there is modulator a PCB, which has no controls and indication. **DO NOT OPEN THE TRANSMITTER!**

Functions of the TMR wires are listed in table 1.2

#	Marking of clamps	Functions of wires
1	+	Positive power
2	-	Negative power
3	TEST	RC contact

2 Installation, starting, adjustment and running in the detector.

2.1. Security measures

Safety measures applicable to using electrical devices with voltage up to 1000 V should be taken into consideration when running the detector. The detectors' level of radiation allows running the system without any time restrictions.

2.2 Installation site requirements

ATTENTION! NORMAL DETECTOR OPERATION DEPENDS ON MEETING THE INSTALLATION REQUIREMENTS!

2.2.1. Determine the buffer zone, based on the detector operating under normal conditions. The following conditions should be taken into consideration:

- the maximum height of the ground surface irregularities should be less than +/- 0.3m;
- bushes, trees, big objects and buildings are not allowed;
- acceptable grass level is 0.3m;
- acceptable snow level should be less than 0.5m;

(The detector is able to operate when the snow level is more than 0,5m, however it may not detect a human moving in the snow).

- No moving humans, transport and animals are allowed in the protected zone.

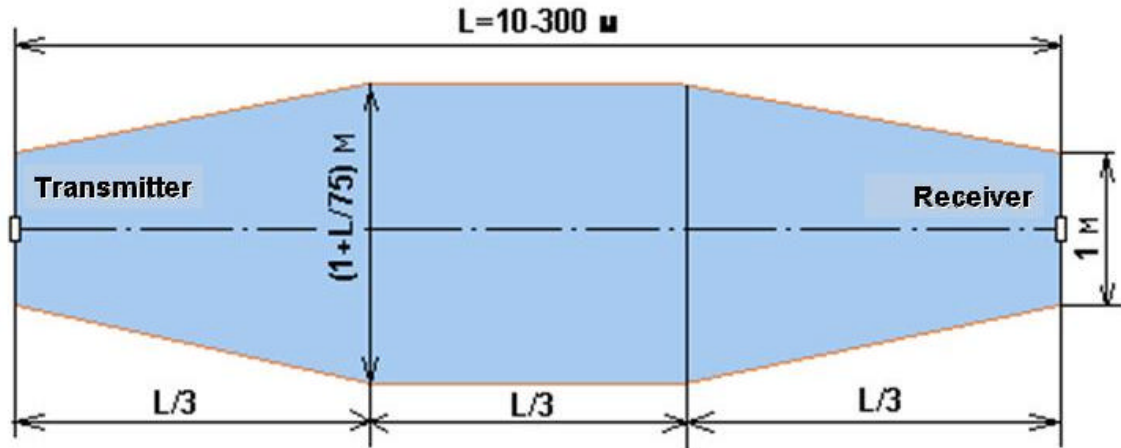
Notice 1) The detector can be installed along walls or blocks. Acceptable irregularities in the field should be less than 0.3m. The distance from the surface of the irregularity to the installation site should be 0.7 -1.3 m. Make sure there is no water near the detector.

The detector can be installed on top of wall blocks for climb over detection where the height of the detector unit installation should be at least 0.2m from the top of the barrier and at least 2m from the ground, with a maximum sector length of 100m, and the distance between the top of the barrier and detector units of at least 0.2 m.

- 2) There are no particular requirements to the sector outside blocks (metal, concrete) non transparent to radio signal.

The buffer zone shape and size in accordance with the distance between TMR and RCR are shown in diagram 2.1

2.1



2.2.2 In case of installing the device near railroad tracks, in order to eliminate possible interference, it is recommended to extend the distance mentioned in 1.2.18 by about 1.5-2 times.

2.2.3 Installation sites should be located at least 20m to 30 m away from power lines, with voltage of 35kV to 500kV. If wiring installed parallel to power lines, it should be laid underground.

2.2.4 To exclude possibilities of crossing the protected zone above or under the microwave beam, it is recommended to ensure "overlapping" of adjacent sectors for at least 2m along the axis of the protected zone, when several detectors are installed consecutively.

2.3. Detector adjustment

2.3.1 General adjustment requirements

2.3.1.1 Detector location on site should be determined based on the requirements and recommendations of the installation project.

2.3.1.2 When installing the detector, make sure to leave the control panel and fixing elements accessible.

2.3.1.3 It is recommended to lay connection cables underground. Cables may be laid along walls and blocks in metal pipes or ducts.

2.3.1.4 The connectors, control panel and indicator are accessed by removing the four screws on the base and removing the cover.

2.3.2 Pre-installation operations

2.3.2.1 Pre-installation operations include:

- selection and preparation of the installation site according to 2.2
- installation of a pole(if needed)

- Connection cable marking and laying

2.3.2.2 In snowy areas (snow level more than 0,5m) the aboveground part of the pole should be no less than 1,5m. In less snowy areas the length of the aboveground part of the pole may be 1m

2.3.3 Installation of detector

2.3.3.1 Detector units should be installed at 0.8-0.9 m height from the ground to the unit front cover center. The bracket should be situated on the pole so, that the detectors' cover is directed towards the second unit.

2.3.3.2 The bracket and two additional buckles from the IAK should be used when detector units are installed on round base.

2.3.4 Electrical connection of the detector

2.3.4.1 Detector units should be connected in accordance with tables 1.1 and 1.2

2.3.4.2 The example of RCR connection with a common line connecting the output relay and tamper switch circuit and installation of control panel end cap (resistor etc.) is shown on picture 2.5.

2.3.4.3 Measuring the resistance of circuits and isolation of connection cables' threads should be performed only after power supply is off and the circuits are disconnected.

2.4. Detector activation

2.4.1 Apply power to the detector and check voltage on the respective contact. Measured value should be in the 11.5 -28 V range (the margin should be in accordance with 1.2.9 values).

2.4.2. Remove the cover, and after 20-30 s push the IS button ("LOCK"). Then, during 1-2 min period check the indicator. The indicator should not be on, which means the detector is in stand-by mode.

2.4.3 Examine the protected area, paying attention to hollows and mounds and control proper detector functioning using the indicator on the RCR. When done, close the RCR cover.

2.5 Running in the detector

2.5.1 Running -in the detector means that a 24-hour testing period should be implemented after the installation, preferably running for at least 3 days, while registering all detection and follow-up analysis. During running-in the detectors' normal operation should be checked twice a day by performing test crossings of the detection zone.

In case of false detection registration the cause of it should be eliminated according to instructions in 2.4

The buffer zone sector should also be under control according to the requirements in 2.2.1

2.6. List of possible defects and troubleshooting

Table 2.1

Defect	Possible reasons for defect	Troubleshooting
1. Detections are registered, status light is not glowing	Power supply voltage below normal value or off	Check power supply voltage. On absence or incompliance with 1.1.3 check power supply connection cable and PSU.
	Detector is defective	Detector should be replaced
2. Detections are generated, the indicator on the control panel is glowing, but flashing for 2 sec while the protected zone is being crossed.	The alarm (relay) circuit is broken/incomplete	Disconnect the circuit and check wiring with closed RCR contacts. Check if the control panel cover was installed properly
	Incorrect installation of RCR cover	Check if the cover was installed correctly. By connecting the tamper switch to a circuit check if the circuit is functioning.
	RCR is	RCR should be

	defective	replaced
3. Detector does not generate alarm signal during detection zone cross test.	Detector has not been used in accordance with operating manual requirements.	Visually check the compliance of installation and usage conditions with 2.2 requirements. When the sector cannot be brought in accord with 2.2 switch detector sensitivity to '1" and perform a test crossing.
	RCR is defective	RCR should be replaced

defect	Possible reasons of defect	troubleshooting
4. False alarms are generated too often	Detector has not been used in accordance with operating manual requirements.	Visually check the compliance of installation and usage conditions with 2.2 and 1.2.1 requirements.
	Unstable power supply or ripple amplitude too high.	Check the reliability of connections and correct installation of power supply circuits according to 2.2. and 1.4 Check PSU operation - perform test running of the

		detector using a different PSU
	Defective RC circuit	Disconnect RC circuit from detector and perform test running without RC
	Defective RCR or TMR	Replace defective unit.

3 Technical support.

3.4 General instructions

Regular technical support is crucial for proper detector functioning. Table 3.1 shows how it should be performed.

Table 3.1

List of technical support operations	Monthly	Annually	Instruction # (see below)
1. Checking buffer zone sectors	+		1
2. Checking the external condition of the detector		+	2

Notice 1. Maintenance should be performed monthly. After winter storms, heavy showers, hurricanes, and also in case of intense growth of vegetation it is recommended to perform extra maintenance operations.

Electrical contacts check up should be performed according to the general alarm systems maintenance operations.

3.1.3 Time and resources inputs are given without taking into consideration transportation.

3.2. Technical support instructions

3.2.1 Technical support instruction #1- Checking of a sector in alienation zone

Tools: axe, scythe, spade for snow (in winter)

Man-hour: 2 men, 20 minutes

Order of operations:

- Visually check if the sector condition is in accordance with 2.2. Cut tree branches and bushes where necessary, cut the grass (taking into account the possible growth of the grass up to the next check up) and clean the sector from unnecessary objects.
- In wintertime change the units' height above ground (if necessary) or remove snowdrifts along the sector.
- Check the tightness of the detector units' fastening elements.
- Check if there is any dust or dirt on the detector
- Eliminate determined defects;
- Adjust detector according to 2.3 instructions.

3.2.2 Technical support instruction#2- External examination of detector

Tools: screwdriver 0,6/155,brush.

Materials: solvent, white enamel, tissue, rag.

Man-hour:1 man, 15 minutes.

Order of operations:

- a) check the fastening elements of detector units.
- b) Check if there is any dust or dirt on the detector
- c) Eliminate determined damages
- d) Determine spots on IAK where the lacquer coating is chipped.
- e) Clean these spots with a wet rag.
- f) Degrease the surface with a solvent soaked tissue
- g) Paint the surface in two coats(the first coat should be dried for least 5 minutes)

Notice: painting should be performed when the air temperature is at least +18C. Plastic details should be protected against paint splashes.

Warranty Information / Terms & Conditions

STR International Inc herein referred to as "STR."

LIMITED WARRANTY

STR hereby warrants, subject to the conditions here in below, that should this product become defective by reason of improper workmanship or material defect during the specified warranty period, STR will repair the same, effecting all necessary parts without charge for either parts or labor, or replace the unit at STR option.

Labor: ONE (3) Years from the date of original purchase from authorized Re-seller unless otherwise specified.

Parts: ONE (1) Year from the date of original purchase from authorized Re-seller unless otherwise specified.

Void Warranty

Purchaser warranty will be void and purchaser waves any rights to make warranty claim if product has been opened, altered or modified, repaired or serviced by anyone, other than the service facilities authorized by STR to render such services. Further, the seal/serial number on the unit must not have been altered or removed. The unit must not have been subject to accident, misuse, and abuse or operated contrary to the instructions provided.

The opinion of STR with respect to this matter shall be final. This warranty does not include and is not extended to broken and damaged accessories, batteries and to parts wearing out due to normal wear and tear.

Proper Delivery:

Returned products will not be accepted for warranty repair unless accompanied with a valid Return Merchandise Authorization (RMA) number issued by STR. RMA numbers issued by STR are valid for 15 days. Shipments received after 15 days will be refused. The unit must be shipped, freight prepaid or delivered to the STR service facility, in either its original package or similar package, affording an equal degree of protection and with instructions indicating the location within Canada or the United States to which the unit will be returned. The repaired unit will be returned to the customer freight prepaid unless the warranty claim is deemed void or invalid. All accessories included with the unit must be listed individually on the packing slip for the shipping documentation. STR will not accept any liability, for loss or damage to such accessories if they are not listed.

Proof of Purchase Date:

This warranty applies and commences to STR products, from the original date of purchase from an Authorized Re-seller. Proof of purchase (i.e.: photocopy of invoice), must be included with product when submitting for warranty repair.

Warranty Limitations:

This warranty does not cover maintenance or check-ups, if required. This warranty gives you specific legal rights and you may also have other rights, which vary from state/province to state/province. Some states/provinces do not allow the exclusion or limitation of incidental or consequential damages or limitations on how long an implied warranty lasts, therefore the above exclusions or limitations may not apply to you. STR is not responsible or liable for indirect, special, incidental or consequential damages arising out of or in connection with, the use or performance of the product or other damages with respect to loss of property, loss of revenues or profit, or cost of removal, installation or reinstallation.

PRODUCT RETURNS

30 Day Product Return Policy ** If you are not satisfied with a product, you may return it to STR within 30 days from original date of shipment within the following conditions:

? Original shipping charges are not refundable unless deemed that STR shipped incorrect item(s), incorrect quantity (ies) or original manufacturers defective product (subject to STR validation).

? Returned products will not be accepted unless accompanied with a valid Return Merchandise Authorization number (RMA).

? RMA numbers issued by STR are valid for 15 days. Shipments received after 15 days will be refused.

? Returns must include a copy of original invoice, the completed STR packing slip, and a detailed statement of reason for return.

? Customer is responsible for all freight charges, duties and taxes, if applicable. Product must be properly packaged and shipped, Prepaid to STR in its original packaging, or similar packaging that offers an equal degree of protection. STR will charge the full replacement cost for any missing components or parts. STR is not responsible for lost or damaged merchandise. We strongly recommend insuring products for return shipping.

? Return claims are void if manufacturer's seal is broken and/or products are altered or modified, subjected to an accident, improper handling, improper installation, misuse and abuse or operated contrary to the operating instructions. Products returned that are not in "re-saleable" condition will be returned to customer at their expense.

? Discontinued items, special or custom-made equipment items (items not carried as stock even though they may appear on price lists) may not be returned. Returned products will be evaluated at the original purchase price and not at any subsequent price increase or decrease.

** Subject to the conditions stated above, the following re-stocking fees will apply to products returned for credit/refund.

STR reserves the right to determine the validity of the product returned and / or refuse to accept product for credit.

0 % Re-Stocking Fee (less original shipping charges): If product is returned within 30 days from original STR ship date.

25% Re-Stocking Fee (less original shipping charges): If product is returned within 60 days from original STR ship date.

50% Re-Stocking Fee (less original shipping charges): If product is returned within 90 days from original STR ship date.

100% Re-Stocking Fee (0% credit) : If product is returned after 90 days from original STR ship date.

DISCLAIMER

In no event will STR or any of its affiliates be liable for any indirect, special, punitive, consequential liability, or incidental damages upon any basis of liability whatsoever even if advised of the possibility of such damages. In addition, STR does not take any responsibility or assume any liability for the wiring, installation or placement of the equipment Customer purchases, or for the activities of any other individual or entity such as Customer's Company, those who prepare the specifications or any local Authorities who inspect or approve Customer's installation.

PRIVACY POLICY

STR does not collect personally identifying information about you except when you specifically provide it to us. Forms you may fill out that request personal information such as your mailing address, telephone number, e-mail address, etc. will not be disclosed to any third party companies.

www.STRsecurity.com is for information purposes. Distribution, duplication, modification or revision of the contents of this site is strictly prohibited without the explicit written permission of STR.

STR is committed to safeguarding your privacy online. We only use your personal information to service your account, to provide you with the products you inquire about and request, and to inform you of additional products or services that may benefit you.

Copyright © 2004 STR International Inc.