Getting The Most From Your TPAS™ RX-100™

TPAS

Traffic Proximity Alert System RX-100

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SureCheck TPAS RX-100 User's Guide

SureCheck Aviation, Inc.

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Colophon

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Setting Up TPAS

Thank You!

Congratulations on your recent purchase of our TPAS™ RX-100™, or Traffic Proximity Alert System.

With the tremendous increase in air travel, the skies have become less than friendly to the general aviation community. Most airports in the world are commonly uncontrolled by ATC, leaving pilots to fend for themselves when it comes to the safety of maneuvering in, through, and out of terminal areas. Our primary mission is the improvement of collision avoidance technology.

Airlines have long since realized the importance of traffic awareness, and are now required to use systems, such as TCAS, which clearly illuminate to the pilot a real time situation of air traffic locations, and tell them what to do. Unfortunately, these units, while a great asset to the general public safety, come with a less than affordable price to the average pilot. Some units may range to over $200,000, which exceeds the value of many aircraft flying today! General aviation aircraft make up far more of the population, and have the least protection against a collision.

Our design goal presented a challenge of balancing affordability with performance and functions. The RX-100 is an outstanding example of our devotion to safety in aviation by bringing state-of-the-art protection into an affordable price range for everyone.

After painstaking engineering and rigorous testing, we are pleased to present to you the latest in electronic technology, designed to protect you. We hope that you find this unit to far exceed your expectations in increasing traffic awareness and overall air safety.

Sincerely,

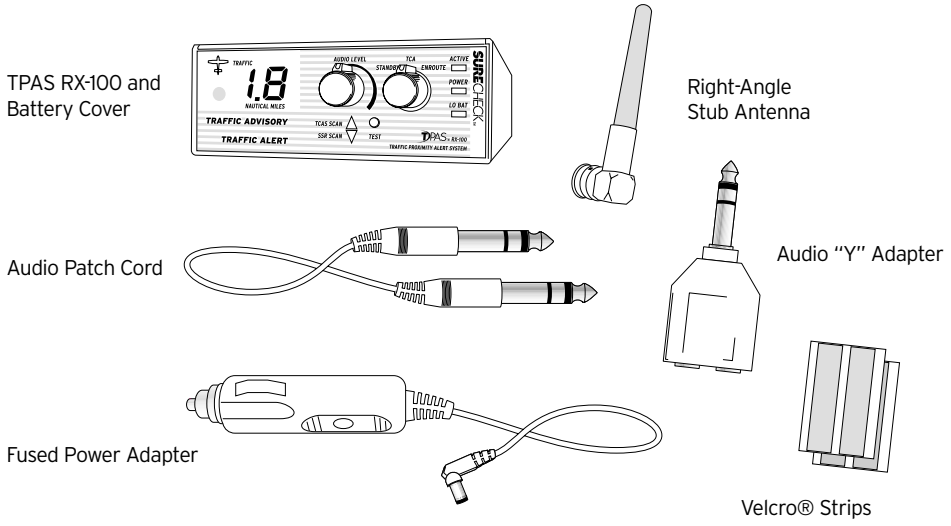
SureCheck Aviation, Inc.
Engineering / R&D Team

Basic Description

The TPAS unit is a stand alone, passive reception traffic proximity detector. It utilizes the transponder equipped on almost every aircraft flying today. TPAS contains dual microwave receivers which decode transponder signals and display target proximity with a phase averaging amplitude comparison technology. A digital display system converts this information to mileage distance for the display.

Unpacking TPAS

Your TPAS kit contains everything you need for basic operation. Be sure you received all of the components listed below. If you are missing any of these items, please contact SureCheck Aviation for a replacement.



TPAS Placement

The preferable placement for TPAS is on the dash of your aircraft, with the antenna angled vertically. This gives TPAS the best "view". If your dash is not deep enough to support this configuration, an antenna extender can be purchased from SureCheck or from your Authorized SureCheck Dealer. This 6' cable plugs into the back of your TPAS unit and allows you to mount the antenna by suction cups to your windshield or side window.

Cessna 182 Setup showing optimum placement.

The TPAS display was designed to be bright enough to be visible in direct sunlight.

Piper Cherokee Setup with optional antenna extender. This 6' extension enables you to mount the antenna out of the way, such as on the side window, for optimum sensitivity. Antenna configuration may vary from this setup. If your antenna has a right-angle connector, the extender can be positioned horizontally, keeping the antenna vertical.

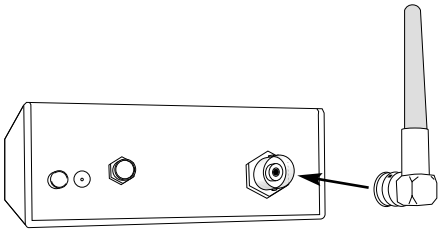
Please note that TPAS is not designed to operate properly on the ground.

Position TPAS at least 2" away from any magnetic compass to avoid magnetic interference.

Again, be sure the antenna is positioned vertically. This is the optimum angle for the best reception. Use Velcro® strips (included) to secure your TPAS unit yet allow for quick removal.

Using the Antenna

The included antenna was specifically designed and tuned to your TPAS unit. Be sure to position the antenna in a vertical orientation. If needed, attach the BNC "L" connector to the stub antenna. Connect right-angle antenna assembly to the BNC connector on the back of your TPAS unit.



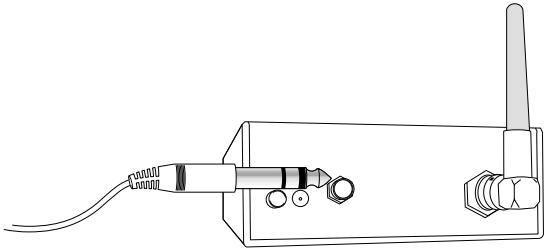
Connect antenna to the back of your TPAS unit. Once in place, twist inner ring to lock onto connector.

The antenna must be positioned in a vertical orientation (90° angle to your TPAS) for proper reception.

Hooking Up The Audio

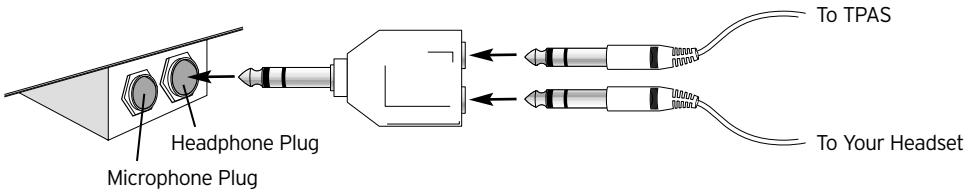
The standard audio hookup scenario provides voice alerts for the pilot that do not interfere with intercom transmissions or passengers.

1 Plug in the audio patch cable and route to your intercom jacks.



2 Plug in the audio "Y" adapter into the headset jack, giving you two jacks. One jack is for your headset; the other is for the TPAS audio patch cord.

3 Plug your headset into one side of the "Y" adapter. Plug the TPAS audio patch cord into the other.



Audio connection is optional, and not connecting the audio will not affect TPAS operation. For best volume results, increase the volumes on both TPAS and your intercom first, then adjust your radio volume for acceptable radio levels. For more tips on audio hookup, including In-Dash installation, refer to the chapter, "Mounting TPAS."

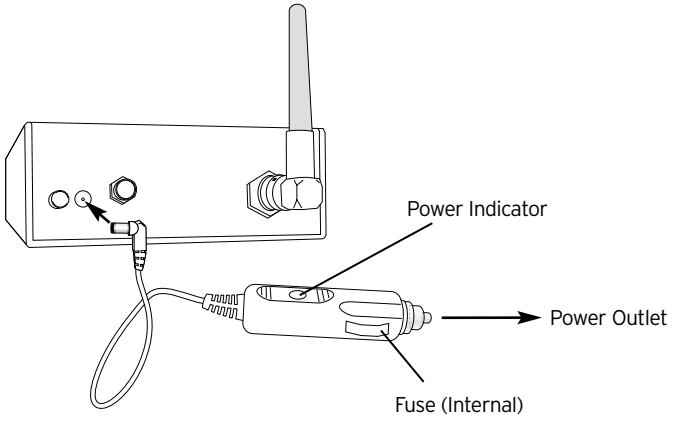
Using Battery Power

TPAS has a dual power system. To operate TPAS using the on-board battery bay, install 6 "AA" alkaline batteries. Battery life is between 3 and 10 hours, depending on use. Using TPAS at night where traffic is less and the display is dimmed conserves power and will increase battery life.

Using External Power

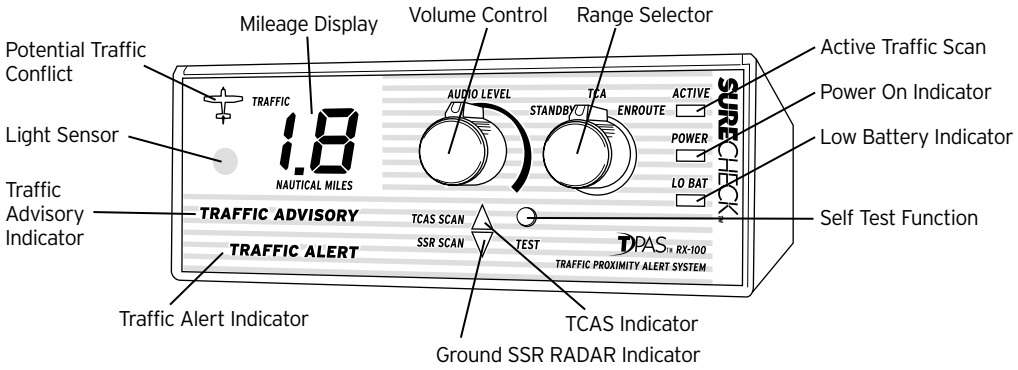
TPAS can also be powered using your aircraft's cigarette-lighter outlet and the included fused power adapter. Be sure to route any cables in a way as to not interfere with the operation of the aircraft, including the yoke and instruments.

To use, plug the power adapter into your aircraft's power outlet. Your outlet needs to supply 8-35V with a negative ground.



Getting Started With TPAS

TPAS Traffic Indicators



Active Traffic Scan

A yellow LED will indicate that the TPAS system is in active scan.

Potential Traffic Conflict

Should another aircraft come within 5 miles in Enroute mode, or 2.5 miles in TCA Mode, a blue LED light will illuminate to indicate a potential traffic conflict.

Mileage Display

The 2-digit display shows the distance to the closest traffic. In Enroute mode, TPAS scans out to 10 nautical miles and displays distance in 1 mile increments. In TCA mode, TPAS limits scanning to 5 miles and displays distance in .1 mile increments. The 2-digit display is designed to display in direct sunlight and will automatically dim for night viewing.

Traffic Advisory / Traffic Alert

If the intruder continues closer, a yellow "TRAFFIC ADVISORY" along with audio alert will indicate range within 2 miles in Enroute mode, or 1/2 mile in TCA mode. Closer presence of an intruder will trigger the red "TRAFFIC ALERT" and audio warning. This will occur at a range of 1 mile in Enroute mode and within 2000 feet with TCA Mode.

Other Indicators

TCAS / SSR Ground Radar indicator

Other computations include decoding various transponder signals to determine if the host aircraft is being interrogated by a ground Secondary Surveillance Radar or TCAS equipped aircraft which may be in the area. This information is useful to a pilot in many ways. While flying in remote areas it may not be clearly known if RADAR coverage is available. When a Mode C or Mode A Interrogation is performed by a ground facility, a red SSR light will illuminate with a down arrow. A green up arrow indicates that a TCAS equipped aircraft may be in proximity and interrogating your aircraft for position. Knowing this, it is likely that the TCAS aircraft is also monitoring you.

Power Indicator

When TPAS is turned on and properly powered, this indicator will light.

Low Battery indicator

TPAS will operate on either a 12 or 28 volt DC system or an optional 2 "AA" battery system. A red LED will indicate a battery low condition.

Controls

Range Selector

TPAS contains a mode option to select either TCA (Terminal Area) or Enroute. This function will change range options and the rate at which audio alerts are heard.

Test Function

An on-board TEST function is activated with a momentary switch, and it is recommended to be performed before EACH Flight. However, the TEST function can be performed at any time during flight.

Tips for First-Time Flying

When testing TPAS for the first time, it is very important to note the following tips for getting accurate results.

TPAS Performance In A Car, Or On The Ground

TPAS was designed to be used in the cockpit of an aircraft. Many things disrupt signal reception on the ground or in a car, such as metal objects, noise, and microwave propagation. Many people have told us they tried to test our unit in their car with weird results. This is because your car has unknown noise sources and signal shadows and will not yield accurate results. On the ground, microwave signals bounce, reflect and distort, making ground testing inaccurate. The best place for testing TPAS is in the air... that's what it was designed for!

Calling ATC To Test Range Of TPAS (Verification Of Targets)

This may or may not be a good way to test our unit in the air. Many times ATC utilizes multiple screens for viewing traffic. Some screens may display all traffic in your vicinity, and some may have blocks which only allow limited views, whereas the next controller will have a completely different screen. This means TPAS may show traffic which YOUR controller can't see; it may be picking up traffic in another sector which the controller is not currently viewing. Additionally, controllers may say there is no traffic in your area, when there may be someone a few miles away on another frequency and another screen. Military traffic, depending on their mode of operation, may not be shown to ATC, but our unit detects multichannel military aircraft.

Using TPAS On Airport Ground

Detecting airport traffic is tricky. TPAS was designed to be used primarily in the air, especially around airports. In TCA mode we ensured that only viable targets meeting certain criteria would be used for giving alerts and warnings. However, on the ground during taxi, do not take TPAS off Standby until you are ready for take off or, preferably, once you are airborne. Since TPAS will pick up any transponder signal, any idle aircraft sitting on the line can cause false alerts. Even an avionics shop testing a transponder has been known to activate TPAS. This is why we highly recommend that you place TPAS in STANDBY MODE until you are ready for departure. If an alert or warning does come up, check to make sure someone is NOT on final or turning to final before departure.

Constant Alerts In The Air

Every transponder is different, and we design TPAS to handle many different brands. However, wide variances can be found and may require an adjustment to your unit, which we will gladly do free of charge. Simply call the SureCheck avionics department and we will be happy to help. Most of the time problems are due to a low power output of a transponder, which is a quick solution and repair. TPAS works within an envelope of power ranges. However, variances can occur, and a SureCheck technician can determine and make adjustments to your unit should you have problems. SINCE WE DO NOT PLAY A ROLL IN INSTALLATION, WE DEPEND ON YOU AS THE PILOT TO GIVE US FEEDBACK TO MAKE TPAS WORK FOR YOU.

Range Drops Or Jumps Suddenly

TPAS monitors traffic vertically within ±1800 feet of your altitude, and if traffic climbs or descends out of this band it no longer considers them a threat and will switch to the next closest target. Sometimes one aircraft leaves your altitude and another gets closer, prompting TPAS to switch priority. This is normal, and it prevents aircraft of a lesser threat from being the displayed target. A question we get often is how our unit detects traffic when it turns and shadows the antenna. This is a two part answer. First of all, TPAS can track an aircraft during a turn however it may loose a lock. When the aircraft rolls out it will regain a lock and many times the pilot is none the wiser. The second part is that the frequency at which TPAS operates allows signal diffraction, which is much more pronounced at these microwave frequencies. Diffraction causes signals to bend around objects

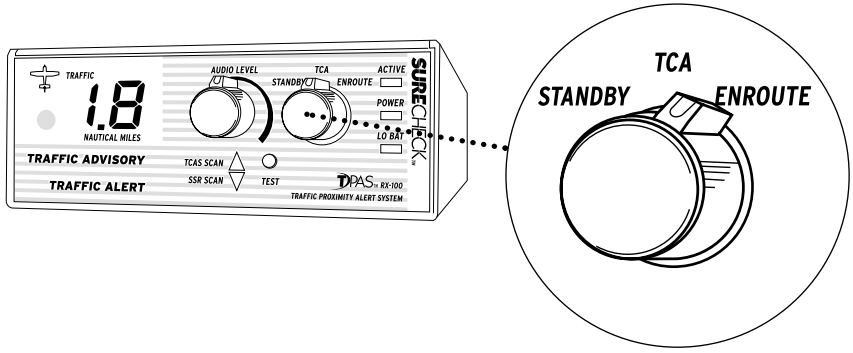
If TPAS Does Not Fit On Your Dash

If the depth of your dash does not allow for vertical extension of your TPAS antenna, call (888) 340-8055 for an "antenna extender." This will also allow you to place TPAS anywhere in the cockpit. The extender includes a 6' cable with a suction cup mount that allows you to attach the antenna out of the way on any window.

Flying In Enroute Mode

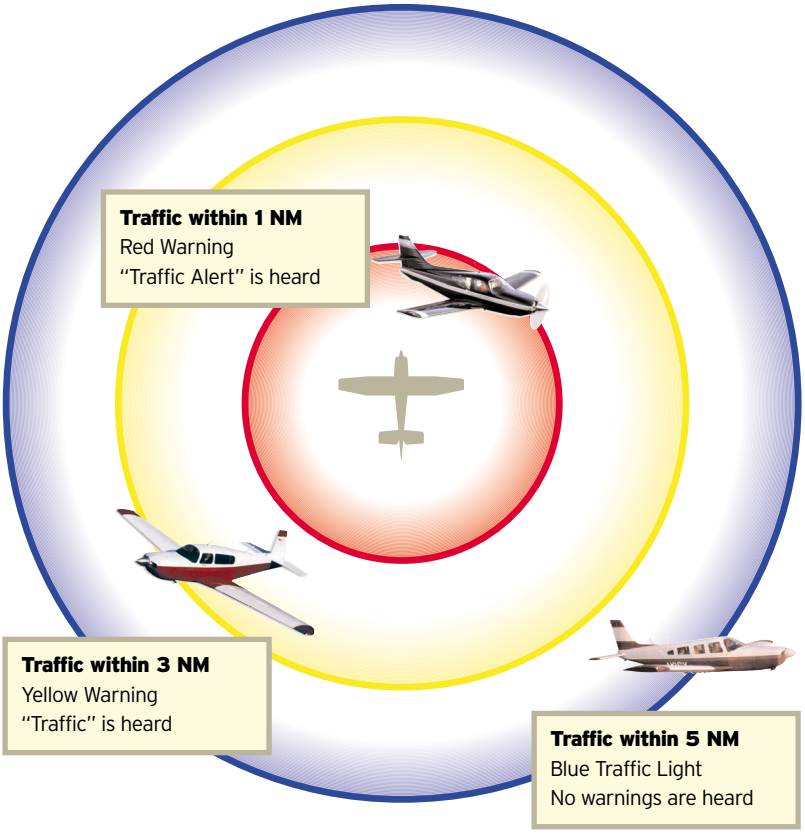
Enroute Mode Operation

When operating your TPAS unit in Enroute mode, the range will extend to approximately 10 nm. This function should be selected once you have established an enroute climb, and continued through cruise. This range will allow you to notice any aircraft which may be on an airway or collision path where aircraft may have extreme closure rates.



Flying in Enroute Mode

With practice you will learn to judge bearing by the rate at which the distance decreases or increases. A fast closure rate will show mileage decreasing rapidly, whereas a trailing aircraft may show a consistent distance which may or may not change. If operating on a VFR flight following service in RADAR coverage, or IFR flight plan, it is advisable to notify ATC you have an aircraft which is rapidly approaching you. ATC will be able to provide information regarding a possible altitude conflict. Many times ATC will instruct you to follow traffic in a phrase such as "Follow traffic 12 o'clock 4 miles." Your TPAS unit should indicate this traffic and allow you to monitor its progress toward the airport. When tracking inbound on an IFR or VFR flight, TPAS will be a great asset to indicate if there is VFR or other IFR traffic already in the pattern or possibly flying an approach along side of you.



Traffic	Visible	Audio Alert
Intruder within 5 NM	Blue LED will illuminate	None
Intruder within 2 NM	"Traffic Advisory"	Yes
Intruder within 1 NM	"Traffic Alert"	Yes

In situations where parallel approaches are being used, you may have traffic as close as 1/4 mile on either side. To avoid constant alerts, simply reduce volume or switch to standby mode. It is recommended that when traffic falls below 4-5 miles you switch to TCA mode for a better scan.

Aircraft at altitudes other than yours should show closure then and increase in range never reaching less than 2 to 3 miles, much like a VOR receiver never reaches "0" as it is flying over the station. This indicates traffic at different altitudes which should not be a conflict with your aircraft. For example, an airline jet passing overhead at FL 330 would never reach below 6 miles, thus preventing any unneeded alerts. The same applies while your aircraft is in cruise, and aircraft below you are at traffic pattern altitude.

Sensitivity

In enroute mode, TPAS sensitivity is at its maximum, therefore distant transponders at various power levels may or may not be received due to various reasons. Aircraft with lower power outputs may not be detected until 7-8 miles depending on terrain, weather, and other traffic in your area.

The main purpose of TPAS in the enroute mode is to provide situational awareness of other aircraft you may be flying near. It is recommended that you work with ATC to increase safety margins and reduce the chances of a mid-air collision. Avoid abrupt maneuvers until you have either sighted traffic, or have been informed by ATC to do so.

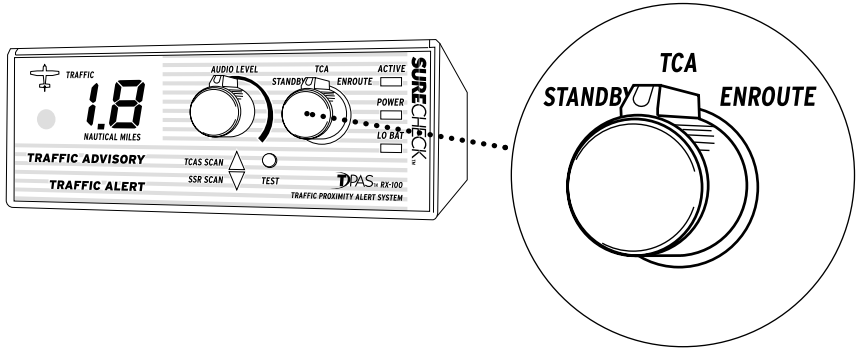
When flying around or near military training routes, you should closely monitor changes in aircraft closure speeds, as military aircraft can exceed 500 kts! This means an aircraft at 10 nm may be a conflict in under 1 minute!

Flying In TCA Mode

TCA Mode Operation

TCA flying, or Terminal Area, is the portion of your flight which makes up 90% of the risk of mid-air collisions. TCA Mode should be selected anytime you are flying within 5-6 miles of your departure or arrival airport. When operating your TPAS unit within this airspace, the range is selected between 5 nm and approximately 1800-2000 feet. Traffic outside of 5 nm will not be shown to avoid alerting the pilot of unneeded information during the landing phase of flight.

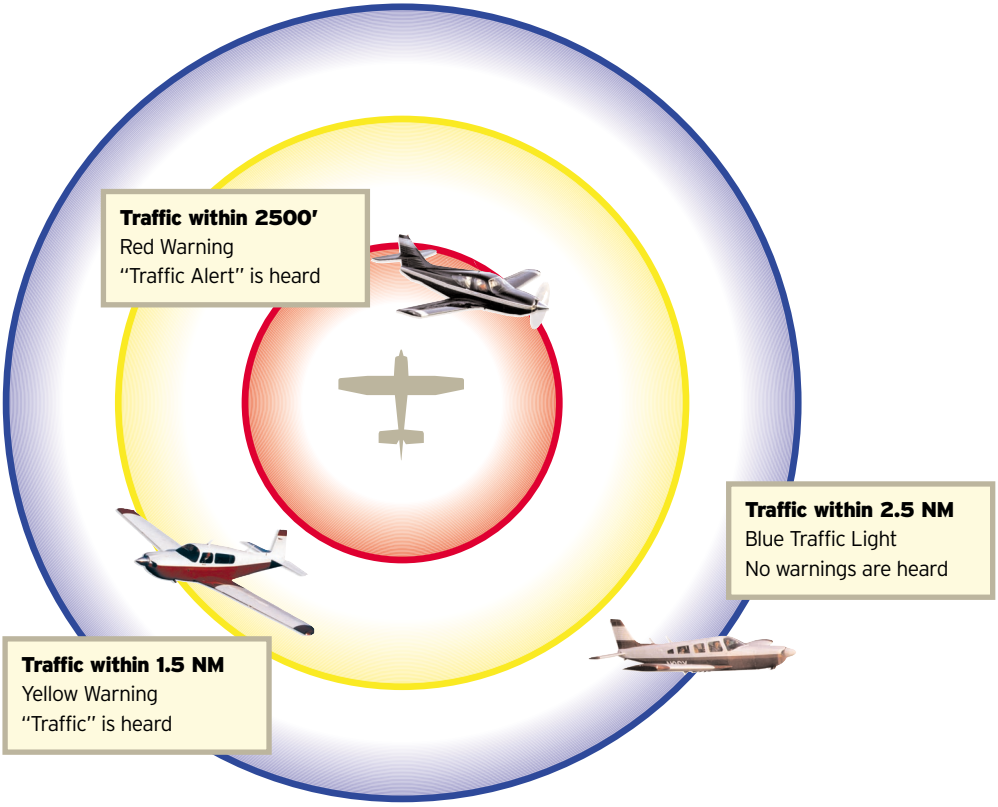
When operating within Class B,C, and D airspace, TPAS will greatly enhance your awareness of aircraft which may be overlooked by tower, or alert you to aircraft which stray from tower commands. When traffic is dense, your TPAS unit will only alert you to the closest aircraft that poses any threat to you.



Flying In TCA Mode

If your TPAS unit alerts you of a "Traffic Advisory," you should closely monitor whether or not the distance decreases or increases. If distance decreases and becomes a "Traffic Alert," you might want to contact ATC to investigate intruder intentions. With experience using TPAS, you will learn how ATC and TPAS work together to dramatically increase safety in controlled airspace.

When operating in uncontrolled airspace, aircraft should be broadcasting their locations within the traffic pattern. If your TPAS indicates a presence of an intruder, monitor spacing closely. If a "Traffic Advisory" is shown, and traffic in the pattern that is broadcasting intentions and location does not agree, you should ask if there are additional aircraft in the pattern.



Traffic	Visible	Audio Alert
Intruder within 2.5 NM	Blue LED will illuminate	None
Intruder within 1.5 NM	"Traffic Advisory"	Yes
Intruder within 2500'	"Traffic Alert"	Yes

If traffic is sighted close to you, but no indication on TPAS is indicated, you should ask aircraft in the pattern to check if their transponder is in the ALT mode or position. Occasionally pilots may forget to turn on their transponders, and TPAS will not be able to detect them. Allow a few seconds after this announcement for their transponder to begin working correctly.

If your TPAS unit alerts you to a "Traffic Alert" you should query intentions of aircraft in the pattern if you do not have the traffic in sight. If no response is heard, and the alert continues over 10 seconds, this is a serious condition! You MUST immediately find the intruder visually and make the appropriate correction.

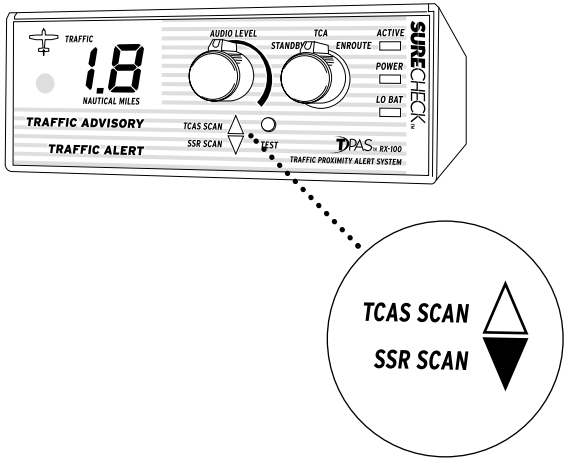
The key to safe operation using TPAS in a controlled or uncontrolled airport area is a combination of closely monitoring changes in TPAS indications, good communication with tower or other pilots, and good visual scanning techniques.

When switching from Enroute Mode to TCA allow 4 seconds for TPAS to update correct distance.

TCAS and SSR Indications

RADAR Indication

When operating in areas of sparse population or possible lack of RADAR coverage, your TPAS will indicate whether or not RADAR service is available to you. SSR, or Secondary Surveillance RADAR is a beam which rotates with the main RADAR beam to collect information from your aircraft such as squawk code and altitude. Most SSR RADAR facilities are found scattered around the world and are utilized by ATC, Military bases, ships, FAA center control, and Airports such as Class B and C. The red LED down arrow will illuminate when your aircraft is being interrogated by ground RADAR or Terminal RADAR facilities. This is a valuable tool when flying IFR. Pilots MUST increase situational awareness because YOU are not being monitored on their screen when the red LED is not illuminated. Therefore, ATC will not know your altitude or ID unless you report it.

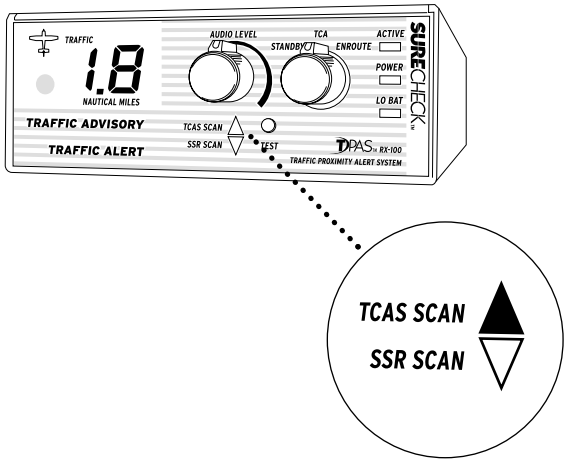


Ground ATC RADAR "ATCRBS", Terminal RADAR, and local airport or military RADAR signals are detected by TPAS and interpreted as a ground RADAR scan and indicated as such.

TCAS Indication

When aircraft are equipped with TCAS-type equipment, or Traffic Collision Avoidance System, your TPAS unit will indicate to you they are flying in your nearby airspace. TCAS displays the bearing, altitude, and location relative to their aircraft. When the Green LED up arrow is illuminated, your aircraft is sending information to update their display, and letting you know that they can see you. If the TCAS equipped aircraft is beyond 10 nm, no mileage information will be shown. The effective range of the TCAS interrogation indicator is approximately 5-10 nm, although TCAS may be tracking your aircraft beyond this point. All FAR part 121 airlines are required to have a traffic avoidance unit on board, and some GA aircraft may also have this type of equipment. Most military aircraft utilize a similar system as well.

TCAS equipped aircraft will indicate to the pilot which actions to take in order to avoid a collision. When in close proximity to this type of aircraft you should make visual contact, but avoid making dramatic changes in altitude or heading unless needed to avoid a collision. The more predictable your actions, the better the TCAS-equipped aircraft can evaluate the situation and instruct the pilot to respond appropriately.



A TCAS-equipped aircraft emits a signal that is detected by TPAS and interpreted as a TCAS scan and indicates as such.

When Both indicators Are Inactive

If both the TCAS and SSR indicators are not lit, this is an indication that transponders in your area may not be transmitting. In this case, TPAS cannot display traffic information. Although rare, some very remote areas may not be in adequate reception range for transponders to be triggered. The effective range is approximately 100-200 miles from the nearest Ground-based Secondary RADAR (ASR-9, -11, etc.), or 35-60 miles from TCAS equipped aircraft. Even some of the most remote areas often have remarkable reception, and with the increase of air travel, RADAR coverage is extended frequently. It is important to realize that TPAS operations are NOT limited to large cities.

NOTE: Some PCS and digital cell phones or two-way pagers may interfere with this features operation. Use care when operating such devices and learn about possible problems which could occur before flying. Also note that if interference is observed from TPAS by the use of such devices on board, it is likely that it will also cause problems with the Transponder and DME as well.

Before flying in a Class C or Class B airspace you can check the operation of the SSR scan system by placing TPAS to the TCA mode, and observe the SSR LED. The LED should illuminate every 4-5 seconds or less.

Explanations and Limitations

DME And Local Transponder Suppression

The TPAS unit will indicate traffic range when the "Scan Active" light is ON. TPAS will not always be in active mode, such as during transmissions of either the local transponder, or when DME is transmitting on nearby frequencies. TPAS is designed to maximize active time during times of heavy transmissions by both on-board avionics, however in a busy traffic environment and with DME on, active scan is limited to 90% of the time. You can help maximize active mode while flying by turning off your DME when you are not using it. This will increase active scan time to 97-100%. "Scan Active" may be off at times even though TPAS is still detecting aircraft, typically while DME is on. There are breaks in DME transmission in which TPAS can go active, but won't indicate to you that scanning is activated. This will not affect ranging functions or alerts.

Military Aircraft

Most military aircraft today are equipped with virtually the same type of response generating equipment as civilian aircraft. There is, however, a difference in code names and functions. Civilian aircraft use Mode A and Mode C, and on some aircraft Mode S to link various bits of information. Military aircraft use Mode 3 and Mode 4 for basic civilian responses, but reserve other modes for DOD purposes. When operating on any code other than mode 3 or 4, TPAS may or may not detect code similarities which are needed to sample ranging information.

Auto Light Intensity Control

TPAS contains a sensor which automatically adjusts brightness of indicator lights and the display. This improves visibility by increasing the intensity by day and decreasing the intensity at night. At night battery life will improve significantly if the internal battery power supply is used.

Erroneous Traffic Indications

Due to the vast selection of avionics installed today, some may have anomalies which worsen as they age, and some may have equipment which was designed and built in the 1950's! This could possibly exceed the lifetime of many critical parts used by avionics. TPAS is designed to recognize such transmissions, and ignore them, however, If your TPAS unit suddenly alerts you to a Traffic Advisory or Alert this may be an error caused by a faulty transponder or DME which is unpredictable to TPAS. If this should occur, the Transponder or DME may need servicing. When selecting different frequencies on your DME, or pushing "TEST" mode on your transponder, older models may "short-out" momentarily during transmissions resulting in a garbled mess being broadcasted. Older transponders may also fall victim to faulty parts, and can be recognized by ATC informing you of such problems. Some problems, however, will not show up on ATC screens, but may cause problems for TCAS equipped aircraft or reduce scan time by TPAS. The most common problem is stray transponder transmissions. In some cases these can be triggered by DME transmissions in the frequency range of 112.0 - 113.0 MHz. When on the ground, you may want to test your transponder by setting these frequencies momentarily in the DME and watching the transponder "reply light" If you set a frequency and the transponder reply light begins to rapidly illuminate or stays lit, you may want to have the transponder checked out. While we have taken incredible steps to ensure false indications do not occur, it cannot be completely eliminated. Even high ticket equipment used in airlines often produces false traffic warnings in which the pilots must decide upon the appropriate course of action to take. Although traffic detection of any type is not 100% perfect due to countless situations, it does add a safety margin which might not otherwise have existed.

High-Power Microwave Transmitters

Airports are filled with RF (Radio Frequency) Transmitters operating in the L band and above region. Care should be taken to avoid high level exposure when on the ground. To avoid damage to sensitive receiver components, set unit to Standby during ground run-ups near aircraft which may have weather RADAR or ground proximity RADAR operating in close proximity to military aircraft. Many of these aircraft may transmit several hundred kilowatts of power that can damage TPAS in extended durations.

Keep unit and antenna at least 6 feet from all antennas.

Temperature And Storage

TPAS is designed to accommodate a vast range of environmental conditions. Great care was taken to choose parts which exceed typical standards of many modern electronics, to ensure the highest level of accuracy available. The temperature range however can change performance characteristics when operated beyond its limitations. (See Specifications) During the summer months TPAS should be stored out of direct sunlight to prevent damage to housing, and provide reliable indications when ready to use. TPAS is constructed with solid state components which are designed to work in an extended range of environments. However, exceeding the temperature limitations set forth can cause deviations in indications.

Aircraft Installation And Wiring

TPAS was originally designed for portable use, and therefore has no current FAA certification for installation. However, if you are interested in installing TPAS into your aircraft on a permanent basis, or would like to install an external antenna to improve reception, please call our engineering staff who would be glad to assist either you or your mechanic with technical questions.

If you would like to improve reception by installing external antennas to your aircraft, make sure to keep a minimum of 6 feet distance from any DME or transponder antenna. Failure to do so will void any warranty and could cause irreversible damage to your unit.

Troubleshooting

Since we at SureCheck do not play a roll in installation, we depend on you as the pilot to assess the situation, and, if needed, give us the feedback needed to make TPAS work for you. If you do not see a solution to your situation below, please call Technical Support.

Power Light Off / Power Connected Or Batteries Installed

- Check the cable and connections to the power adapter. Ensure the red LED light is on at the connection to the adapter. If using the power adapter, your aircraft must supply between 7.5 VDC to 35 VDC negative ground.
- Check aircraft MASTER and BATTERY are on.
- Check circuit breakers are not blown or pulled.
- If TPAS fails to show a power indication, power may not be reaching the unit from the aircraft. Try using batteries instead.

No Response When "Self Test" Is Run

- Check Power Light is on.
- Turn off Transponder and DME, try test again. If test is ok, recycle power and reset Transponder and DME. If test fails to respond with a positive result, unit may need servicing.

No Audio

- Check "Y" adapter is set up correctly and is plugged into the aircraft securely.
- Check Volume on the front panel.
- Place range selection to another selection and run self test.

If TPAS Does Not Fit On Your Dash

If the depth of your dash does not allow for vertical extension of your TPAS antenna, call (888) 340-8055 for an "antenna extender." This will also allow you to locate TPAS anywhere in the cockpit. The extender includes a 6' cable with a suction cup mount that allows you to attach the antenna out of the way on any window. There is a charge for the antenna extender.

Constant Alerts In The Air

Every transponder is different, and we design TPAS to handle many different brands. However, wide variances can be found and may require and adjustment to your unit, which we will gladly do free of charge. Simply call our toll free number 888-340-8055 and we will be happy to investigate a solution. Most of the time problems are due to a low power output of a transponder, which is a quick solution and repair.

TPAS works within an envelope of power ranges, however, variances can occur, and a SureCheck technician can determine and make adjustments to your unit should you have problems.

Range Drops Or Jumps Suddenly

TPAS monitors traffic vertically within ±1800 feet of your altitude, and if traffic climbs or descends out of this band it no longer considers them a threat and will switch to the next closest target. Sometimes one aircraft leaves your altitude and another gets closer, prompting TPAS to switch priority. This is normal, and it prevents aircraft of a lesser threat from being the displayed target.

A question we get often is how are unit detects traffic when it turns and shadows the antenna. This is a two part answer. First of all, TPAS can track an aircraft during a turn however it may loose a lock. When the aircraft rolls out it will regain a lock and many times the pilot is none the wiser. The second part is that the frequency at which TPAS operates allows signal diffraction, which is much more pronounced at these microwave frequencies. Diffraction causes signals to bend around objects.

TCAS / SSR Light Constantly Lit

- Turn off DME. If TCAS/SSR lights go out, DME may need recalibration. Ranging functions will still operate properly but detection time will be reduced.
- Turn off transponder. If TCAS/SSR lights go out, DME may need recalibration. (See erroneous indications) Ranging functions will still operate properly but detection time will be reduced.
- Gyros within the aircraft including the heading indicator and/or the attitude indicator may be faulty. The revolutions within these units may pose resistance on power supply in the aircraft resulting in stray RF transmissions which can interfere with TPAS, Transponder and DME.

Sudden Traffic Alert Or Sudden Increase In Proximity

A dramatic increase in proximity may indicate a false warning caused by interference. Although rare, some instances such as faulty avionics can trigger a false indication. TPAS is designed to minimize these false indications. However, there are infinite ways RF signals can be generated, either intentionally or naturally. If this occurs try the following:

- Turn off DME.
- Check Ammeter (if using aircraft to power unit).
- Move TPAS to a new location, even a few inches may make a large difference.
- Try using battery power. Interference resulting from the power supply can be an indication of a serious electrical problem with the aircraft.
- Reposition or rotate the antenna.

Traffic Visible, But No Indication On TPAS

The most likely cause of this situation is when the other aircraft has not turned on their transponder. TPAS will detect aircraft with transponders operating in the ON mode or ALT mode. Other possible solutions:

- Carefully observe RADAR scan indicators. If either one does not illuminate traffic will most likely not be observed unless they reach an altitude which triggers their transponder.
- Check that the Low Bat indicator is not on if using battery power.
- Turn off DME.
- Recycle power on TPAS.
- Ensure temperature limitations are not exceeded. Although this will not cause permanent damage, it can limit scan time until temperature has reached operable levels.

"Active Scan" Light Fails To Light

It is possible for TPAS to collect data from transponders faster than the light can be shown to a human eye while the DME is turned on. However, an absence of ranging information from TPAS over an extended period of time in an area with known traffic can be an indication of an underlying problem. Try the following:

- Momentarily turn transponder to STBY. If Scan becomes active the on board transponder may be defective.
- Turn off DME or select a different frequency.
- Check that the Low Bat indicator is not on if using battery power.

Specifications

Microwave Receiver A Selectivity	1088 MHz - 1091 MHz
Microwave Receiver B Selectivity	850 MHz - 1.3 GHz
Signal Modes	X, Y, A, C, S, 3, 4a
Scan Rate	32.000 KHz
MTL Sensitivity	-70.5 dBm
MAX Peak Power	+21 dBm
Range Accuracy @ 10 nm	± 3/4 nm
Range Accuracy @ .5 nm	± 350 feet
Supply Voltage	+7.5 VDC to +35 VDC
Supply Current	130 mA (90 mA nominal)
Battery Life	3-10 Hours (depending on use)
Temperature Range	-18°C to +40.6°C
Temperature Range	0°F to +105°F
MAX Altitude	FL 250
MINIMUM Altitude	-1500 feet
Stability	± 4.75 G's
Audio Output	600 Ohms
Display	2-Digit Super Bright LED
Emissions	Greater than - 70 dB above 100 MHz
Emissions	Greater than - 50 dB below 100 MHz

Dimensions:

Case:	Length	8.50"	215.9 mm
	Width	4.39"	111.6 mm
	Height	1.67"	42.4 mm
Total:	Length	8.76"	222.6 mm
	Width	4.39"	111.6 mm
	Height	1.67"	42.4 mm

EMI / RFI shielded; will not interfere with avionics installed in aircraft.

Mounting TPAS

TPAS was developed as a stand-alone completely portable device that can be temporarily placed on the dash, glare shield, or in a pocket. However, permanent installation is easy to do, providing a few criteria are met. TPAS has not received TSO certification from the FAA. However, one-time approvals from the FAA are routinely granted and are fairly easy to obtain. Contact your local avionics shop for more details.

It should be noted that the pilot in command is responsible for meeting all federal regulations and FAR requirements when installing any non-TSO item into your aircraft.

Mounting Suggestions

In most cases, TPAS can be attached with Velcro to the bottom of the throttle quadrant, or under the dash, depending on the aircraft. "L" brackets can be used, but please follow the guidelines below under "Drilling" if you need to screw into your TPAS unit. Double-sided tape is also very effective.

In-dash installation was also considered in the design of the TPAS case. The 1.75" height of the unit is the same size as you transponder or ADF, and TPAS will fit nicely into an unused slot in your instrument panel.

Please keep in mind that all of these suggestions will require the use of our antenna extender, which can be purchased from SureCheck or from your Authorized SureCheck Dealer. This 6' cable plugs into the back of your TPAS unit and allows you to route the cable out of the instrument panel and mount the antenna by suction cups to your windshield or side window.

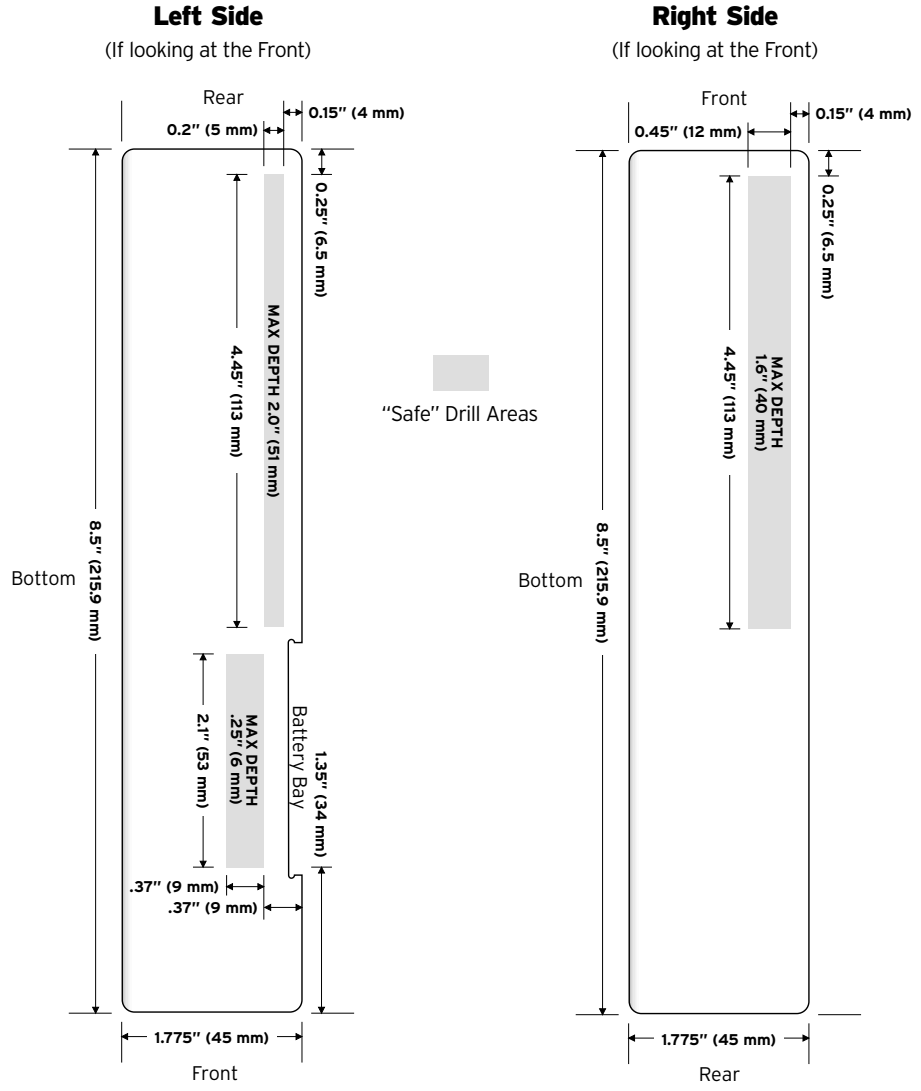
Installation Assistance

If you have any questions or comments, please don't hesitate to call our tech help line. Refer to the Customer Care chapter of this manual for phone numbers and times.

Drilling

The TPAS case is made out of a high-density, high-temperature ABS plastic with a nickel EMI/RFI conductive interior coating. The ABS thickness is 3 mm (±0.015 mm), and the nickel coating thickness is 0.15 mm (±0.01 mm). The density should allow for self-tapping screws with a predrilled hole. DO NOT USE self-drilling screws. Always pre-drill. The diagram below shows the "safe" drilling areas on TPAS and the proper drilling depths. Angled drilling and drilling too deep will damage internal components AND WILL VOID YOUR WARRANTY.

SureCheck will continue to warranty your unit against defects as long as you follow these guidelines. however, any drilling or modification of the case outside of these "safe areas" will VOID YOUR WARRANTY.



Audio Hookup

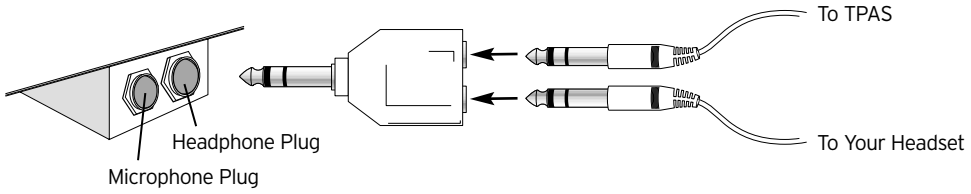
The TPAS audio system is designed to work with most intercom systems. However, there are a variety of intercom systems that do not allow a good interface to our audio system without some degree of modification. Below are suggestions to achieve a better volume output for these systems. If, after hooking up your TPAS, the audio volume at maximum is not acceptable, following these suggestions will remedy the situation.

TPAS Audio Out is a 600 ohm system at 2.9 volt Peak to Peak output. While this provides enough volume for open shunt 600 ohm systems, some systems greatly impede the ability for TPAS to mix effectively with the output of the intercom. The best remedy is to route the Audio Out from TPAS into an open channel of your intercom system. However, it is important that you read your intercom manual to determine the maximum allowable power IN. If your intercom system has a limit below TPAS output, a series resistor may be needed to reduce the output. Please call our avionics division for more details.

It is important that you read your intercom manual to determine the maximum allowable power IN. If your intercom system has a limit below TPAS output, a series resistor may be needed to reduce the output.

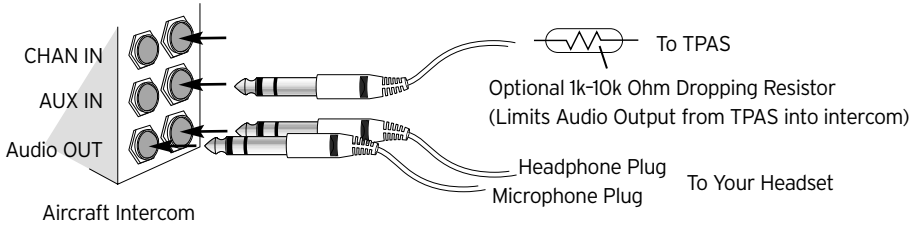
Generally, TPAS can only be heard by the headset in which TPAS is plugged into. however, when routing the audio through an intercom system, all headsets should be able to hear the audio alerts. Again, results may vary based on your intercom specifics.

Typical Audio Setup



Optional In-Dash Setup

This is the best setup for all pilots to be able to hear TPAS audio.



SureCheck CustomerCare

With the purchase of your TPAS unit, you get SureCheck's legendary customer service and peace of mind that comes from knowing your investment is well protected. To help you get the most out of your purchase, SureCheck offers CustomerCare™ service and support to answer any questions or concerns you may have.

For Service And Support

Call our Avionics Division, Monday through Friday, 8 am to 5 pm Central, at:

(817) 868-9935
or email **avionics@surecheck.net**
or visit **www.surecheckaviation.com/tpas**

To Return Your Unit To SureCheck For Repair

1. Call us at 1-888-340-8055 to receive a Returned Merchandise Authorization (RMA) number.

NO REPAIRS OR REFUNDS WILL BE PROCESSED WITHOUT AN RMA NUMBER.

2. The RMA number MUST BE DISPLAYED CLEARLY on the outside of the shipping box. Shipments will be refused if no RMA number is clearly indicated on the outside. We cannot track shipments internally, or match up products and customers without an RMA number.
3. Include a detailed description of the problems you are having.
4. Be sure to include your return address.
5. Send back your avionics unit ONLY. Do not send the shipping box, accessories, manual, or any other non-defective parts.
6. Remove any batteries, if applicable.

To Return Your Unit To SureCheck For A Refund

1 Call us at 1-888-340-8055 to receive a Returned Merchandise Authorization (RMA) number.

NO REPAIRS OR REFUNDS WILL BE PROCESSED WITHOUT AN RMA NUMBER.

2 The RMA number MUST BE DISPLAYED CLEARLY on the outside of the shipping box. Shipments will be refused if no RMA number is clearly indicated on the outside. We cannot track shipments internally, or match up products and customers without an RMA number.

3 Include a detailed description of the problems you are having.

4 Please send back the complete avionics package, including any accessories and documentation. Incomplete returns will not be refunded

Warranty information

For warranty information, including specific coverages, please refer to the warranty card that came with your TPAS unit.

Opening your avionics unit voids the Three-Year Service Warranty. There are no user-serviceable parts inside your TPAS unit. Opening the unit will destroy the case, change the individually-tuned internal circuitry and WILL VOID THE WARRANTY.

Glossary of Terms

Active Scan	When the yellow Scan light is illuminated, TPAS is passively listening for aircraft. If this light blinks off momentarily, it is because your own transponder is replying, and the TPAS system ignores the transmission.
ATCRBS	Air Traffic Control Radar Beacon System.
ARS-4	Air Route Surveillance Radar Version 4. This radar system monitors air traffic between airports and across the country with an effective range of 250 nm.
ASR	Airport Surveillance Radar.
ASR-9	Airport Surveillance Radar Version 9. The ASR-9 is a modular, solid-state, dual-channel, dual-beam, S-band surveillance radar designed to meet the requirements of the Federal Aviation Administration for safe, efficient control of air traffic in the terminal area. The ASR-9 is the replacement to older ASRs at high density sites and has been in service since the mid-seventies.
DME	Distance Measuring Equipment. A pulse-type system of electronic navigation equipment that allows a pilot to see by an instrument panel indication, the number of nautical miles between the aircraft and the ground station. DME transmits a pulse of electrical energy. This pulse is received by the ground station and retransmitted on another frequency. When this pulse is received in the aircraft, the time used for its travel to the ground station and back is converted into terms of nautical miles to the station. DME is a portion of the military TACAN (Tactical Air navigation) system.
Impedance	The total opposition to the flow of alternating current that is caused by the combined effect of the resistance, capacitance, and inductance in the circuit.
Impedance Matching	The process of matching the impedance of a source of electrical power with the impedance of the load that uses the power. For maximum transfer of power to occur, the impedance of the source and the impedance of the load should be the same.
L Band	A radio frequency band from 390 to 1,550 MHz with a corresponding wavelength of between 19 to 77 centimeters.
Microwave	A general classification of electromagnetic radiation that has a wavelength of between 0.3 and 30 centimeters. This wavelength corresponds to a frequency of between one and 100 gigahertz.

Mode S	A transponder format to allow discrete interrogation and data link capability. Operation using Mode S protocols improves the detection of beacon replies from Secondary Surveillance Radars (SSRs) and allows for the transfer of greater amounts of information, including unique identifiers for aircraft.
NM	Nautical Miles. Equivalent to 6,076.1 feet, or approximately 1.15 statute miles.
RF	Radio Frequency. Electromagnetic energy whose frequency is between about 10 kilohertz and 100 gigahertz, used for various types of communications.
RFI	Radio Frequency Interference. Interference with the operation of radios and other types of avionics that is caused by electromagnetic radiations. RFI is caused by spurious (unwanted or unintentional) radiation of electromagnetic energy. Improperly filtered or tuned radio transmitters, transponders, and distance measuring equipment (DME) can cause radio-frequency interference. TPAS is heavily shielded and finely tuned to prevent RFI emissions.
SSR	Secondary Surveillance Radar, a radar-type system that requires a transponder to transmit a reply signal. The SSR light indicates an SSR signal was received and decoded.
TCA	Terminal Control Area.
TCAS	Traffic Alert Collision Avoidance System
TCAS I	A baseline system that provides a warning (TA) to the flight crew of the presence of another aircraft (potential collision threat) within the surveillance area. no avoidance maneuver is suggested.
TCAS II	A collision avoidance system providing traffic information (within approximately 30 nm of the aircraft) to the flight crew, in addition to the resolution advisories (RA) (for vertical maneuvers only). A TCAS II-equipped aircraft will coordinate with TCAS II-equipped intruder aircraft to provide complementary maneuvers.
TPAS	Traffic Proximity Alert System.
Transponder	An instrument used in aircraft for the purpose of providing a recognizable pattern on the traffic control radar screen. The transponder consists of a receiver and a transmitter that transmits pulses of electrical energy when it is triggered by a signal received from an interrogator on the ground. An encoding altimeter sends a signal into the transponder to show the altitude the aircraft is flying. This altitude is transmitted in code and shows the altitude on the radar screen.

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