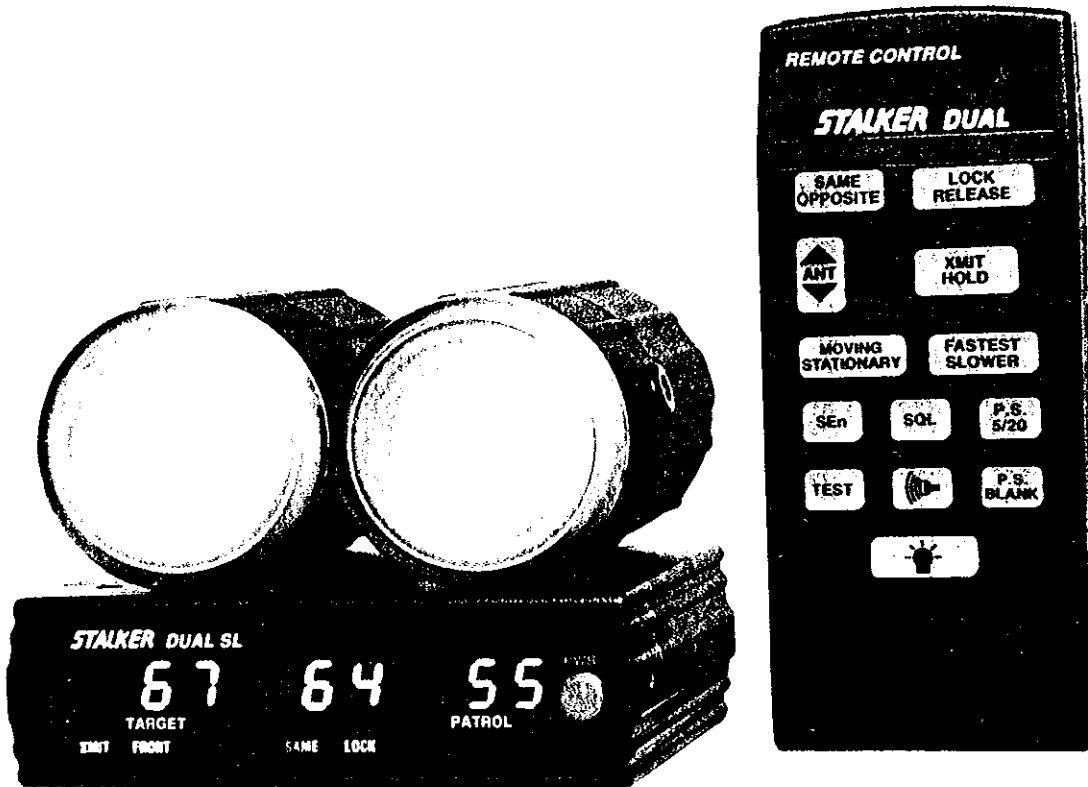


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# ***STALKER DUAL SL* MOVING RADAR**



## **OPERATOR MANUAL**

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## INTRODUCTION

**STALKER DUAL SL** is a K-band or Ka-band, four direction speed-measuring radar that can be mounted in a variety of ways, and is operational with one or two antennas. The radar can consist of any combination of K-band and Ka-band antennas. Utilizing a state-of-the-art Digital Signal Processor (DSP), **STALKER DUAL SL** provides a level of performance, convenience, and accuracy previously unavailable. The DSP performs the critical filtering and timing functions required for speed measurement in its software, as opposed to its hardware. This provides less unit-to-unit variation, more reliable performance, and easier maintenance. The unique features of **STALKER DUAL SL** can be upgraded in the future by simply replacing the software memory chip, preventing obsolescence!

**STALKER DUAL SL** operates in K-band at 24.15 Ghz or Ka-band from 33.4 to 36.0 GHz and provides a hold mode. Both Ka-band operation and the hold feature reduce the possibility of detection by radar detectors. Target-speed locking, track-thru-lock speed, and Doppler audio capability assist the operator in positive target identification and provide operating convenience.

## INSTALLATION

**STALKER DUAL SL** consists of a dash-mounted display unit; a counting unit that can be mounted with the display unit, or separately using the optional Remote Cabling Kit (P.N.200-0247-00); one or two antenna units; and a wireless or wired remote control unit. **STALKER DUAL SL** is powered from the 12-volt, vehicle power system using a Power Cable from the counting unit. Each system component should be installed in a location that provides good operator visibility and convenience, but does not obscure the road or interfere with air bag operation. Both the K-band and the Ka-band antenna units are fully waterproof and may be installed outside the vehicle, if desired. The display and counting units are not waterproof and must be installed in a location sheltered from the weather. However, a waterproof Switch Display and waterproof hand controller are available for motorcycle installations. Longer cables are available from the factory for specific installations, if needed.

**Display/Counting Unit** - To mount the combined display/counting units, connect the Power Cable to the power jack on the back of the counting unit. Plug the front and/or rear antenna cables into the back of the counting unit. If using only one antenna, plug it into the front jack. After attaching the mounting bracket to the selected mounting surface with Velcro or screws, insert the combined display/counting unit into the mount and secure with thumbscrews (provided) into the threaded holes located on each side of the counting unit.

**Display Unit** - To mount the display unit only, separate the counting unit from the display unit by unscrewing the two screws on the back panel. Connect the 15-pin cable, supplied in the Remote Cabling Kit, to the connector on the back of the display unit. Attach the display unit to the mounting bracket using one thumbscrew on each side. After mounting, make sure the mount will not dislodge during high speed maneuvers.

**Counting Unit** - To mount the counting unit separately from the display unit, select an out-of-the-way mounting location, such as under the dash or under the front seat. Connect the Power Cable to the power jack located on the back of the counting unit. Plug the front and/or rear antenna cables into the back of the counting unit. If using only one antenna, plug it into the front jack. Connect the 15-pin cable, supplied in the Remote Cabling Kit, to the connector on the front of the counting unit. Secure the mounting bracket to a suitable mounting surface with Velcro or screws. Install the counting unit into the bracket using a thumbscrew on each side.

**Antenna Unit** - The radar can consist of any combination of K-band and Ka-band antennas. The counting unit automatically senses whether each antenna is K-band or Ka-band and performs correct speed computations accordingly. Before proceeding with the final installation, check the intended mounting locations for fan interference on both antennas. See the section on fan interference, page 16. Find a suitable location and attach the antenna mounting bracket to the selected mounting surface. Attach the antenna unit to the bracket. Connect the antenna cable to the antenna. Repeat these steps for the second antenna, if desired.

**Remote Control** - The only installation required for the remote control is to install the two AA batteries. Remove the battery compartment cover by sliding it away from the case. Install the two batteries, paying attention to the polarity markings. Replace the battery cover by sliding it onto the case until it snaps in place.

**Wired Remote Control** - The Wired Remote Control requires that the Standard Power Cable (P.N. 155-2058-00) be replaced with the Power Cable with Serial Port (P.N. 155-2058-01). This provides the connector needed to plug in the Wired Remote.

## THEORY OF OPERATION

**Stationary Mode - STALKER DUAL SL** uses the Doppler frequency shift technique to measure the speed of moving vehicles. This technique is based on the Doppler Theory, which states that a radar signal reflected from a moving target will experience a frequency shift that is proportional to the speed of the target relative to the radar. Circuitry in **STALKER DUAL SL** processes the reflected signal to obtain the frequency shift. The Digital Signal Processor (DSP) then measures the frequency shift to obtain the target speed. In stationary mode, the transmitted signal strikes a moving target and is reflected back to the antenna. **STALKER DUAL SL** processes the signal to obtain the target speed. Targets, both approaching and receding, generate the same Doppler frequency shift; therefore, targets traveling both directions can be measured.

**Opposite Lane Moving Mode** - In opposite lane moving mode, two (2) signals must be processed to determine target speed. The first signal, patrol speed, results from the radar signal reflecting from passing stationary objects. Since the Doppler shift is proportional to the relative velocity between the radar and the passing reflecting objects, the Doppler shift of this signal will be proportional to the speed of the patrol vehicle. The second signal, closing speed, results from the radar signal reflecting from an approaching or retreating opposite lane moving target and then returning to the patrol vehicle. The Doppler shift of this signal will be proportional to the sum of the patrol speed and target speed, or closing speed. To determine the target speed, **STALKER DUAL SL** subtracts the patrol speed from the closing speed.

**Same Lane Moving Mode** - In same lane moving mode, 2 signals must be processed to determine target speed. The first signal, patrol speed, results from the radar signal reflecting from passing stationary objects. Since the Doppler shift is proportional to the relative velocity between the radar and the passing reflecting objects, the Doppler shift of this signal will be proportional to the speed of the patrol vehicle.

The second signal, difference speed, results from the radar signal reflecting from an approaching or retreating same lane moving target and then returning to the patrol vehicle. The Doppler shift of this signal will be proportional to the difference speed between the patrol and target vehicles. If the target vehicle is moving faster than the patrol vehicle, the difference speed will be added to patrol speed to obtain target speed. If the target vehicle is moving slower than the patrol vehicle, the difference speed will be subtracted from the patrol speed to obtain target speed. For more detailed information, see the section on SAME LANE THEORY, page 14.

**Fastest Mode - STALKER DUAL SL** offers a new feature called *fastest*. *Fastest* is installed in all units manufactured after October, 1994. *Fastest* is a field selectable feature and can be easily disabled, if desired. Contact the factory for details or to install this software upgrade into any **STALKER DUAL SL** that was manufactured prior to October, 1994.

The addition of the *fastest* mode allows, for the first time, the ability to track small high speed targets that normally could not be tracked because a stronger target shields the weaker target from normal speed measurement. The classic example is where a speeding sports car passes a slower moving eighteen wheeler: The *fastest* sports car, although clearly speeding, previously could not be measured because the strongest truck target captures the target display window. **STALKER DUAL SL**, in this example, will display the speed of the strongest truck in the target window, while the speed of the *fastest* sports car will appear in the middle *fastest* window. Tracking of both targets may be performed. (see page 11)

# OPERATION

## Display Front Panel

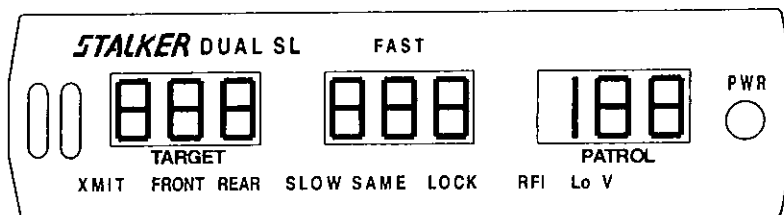


Fig 1

## Display Unit Functions

- PWR:** The **PWR** switch is the main On/Off power switch. *STALKER DUAL SL* has a jumper in its power-supply circuit that selects one of the two following options:
1. When vehicle power is applied, the unit must be turned on by pressing the **PWR** switch. This is the normal factory setting.
  2. When vehicle power is applied, the unit always powers on automatically, but may be turned off by pressing the **PWR** switch. If this setting is desired, call the factory.
- TARGET WINDOW:** The left, three-digit LED window is the target window. This window displays the speed of targets entering the radar beam. While in stationary mode, the target window will show the speed of the strongest approaching or the strongest receding target relative to the radar. In opposite lane moving mode, the target window will show the speed of the strongest opposite lane approaching target or the strongest opposite lane receding target. In same lane moving mode, the target window will show the speed of the strongest same lane faster (front or rear) target or the strongest same lane slower (front or rear) target. See SAME LANE THEORY, page 14.
- MIDDLE WINDOW:** The middle, three-digit LED window is a dual purpose window. First, it is used for locking the strongest target shown in the left window. In addition, the middle window is used to display the *fastest* target in the radar beam. The **LOCK** and **FAST** icons are used to indicate the current use of the window.
- The middle window is used to store target speeds that the operator chooses to "lock" using the **LOCK** key. The presence of the **LOCK** icon indicates that the middle window contains a "locked" target speed.
- When the *fastest* mode is selected and when no **LOCK** target is present, the middle window is used to track the *fastest* target in the radar beam. *Fastest* mode is turned on and off by alternately pressing the **FASTEST** key. The presence of the **FAST** icon indicates that the *fastest* mode is selected. The default condition for *fastest* mode is OFF. Any power off event will reset the *fastest* mode to OFF. Pressing the **FASTEST** key will again enable it.
- PATROL WINDOW:** The right, three-digit LED window is the patrol window. In moving mode, the operator must verify that the patrol window is tracking the patrol vehicle's speedometer. After locking a target speed, the patrol window may be "blanked" by pressing the P.S. **BLANK** key. Restore the patrol speed by pressing the P.S. **BLANK** key a second time.
- XMIT:** The **XMIT** icon indicates that *STALKER DUAL SL* is transmitting.

- FRONT:** The **FRONT** icon indicates the front antenna is selected for use. The icon will light with a steady indication if the antenna is operational, or a blinking indication if the antenna is missing or inoperative.
- REAR:** The **REAR** icon indicates the rear antenna is selected for use. The icon will light with a steady indication if the antenna is operational, or a blinking indication if the antenna is missing or inoperative.
- SLOW:** The **SLOW** icon indicates that the radar is in *slow target* same lane mode. Conversely, *fast target* same lane mode is indicated by the absence of the **SLOW** icon. See SAME LANE THEORY, page 14.
- SAME:** The **SAME** icon indicates that the radar is in same lane mode. Conversely, opposite lane mode is indicated by the absence of the **SAME** icon. See SAME LANE THEORY, page 14.
- LOCK:** The **LOCK** icon indicates that the operator has locked a target speed in the center window.
- RFI:** The **RFI** icon indicates the presence of an interfering signal. Operation is inhibited during an **RFI** indication.
- Lo V:** The **Lo V** icon illuminates when the input voltage falls below 9.0 volts. Operation is inhibited while this icon is displayed, but normal operation will resume automatically when the input voltage is restored to a normal voltage.

### **Audible Indicators**

***Antenna tones*** - Different audio tones are used when switching between the front and rear antenna. A 1-beep tone corresponds to the front antenna, while a 2-beep tone corresponds to the rear antenna.

***Fastest tone*** - Different audio tones are used when turning the *fastest* mode on and off. A high pitched beep tone (for fast) indicates that *fastest* mode is selected. A normal beep tone indicates that *fastest* mode is turned off. Any power off event will reset the *fastest* mode to OFF. Pressing the **FASTEST** key will again enable it.

***Self-Test tones*** - A 4-beep "happy" tone indicates the successful completion of a self-test operation. A 15-beep tone indicates a failed self-test.

***Automatic Self-Test*** - An automatic self-test (indicated by a 4-beep "happy" tone) is performed every 10 minutes while **STALKER DUAL SL** is transmitting. Switching antennas will reset the 10 minute timer.

## Remote Control Functions

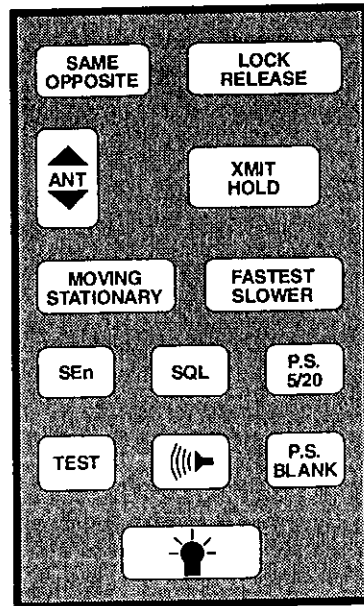








Fig 2

- SAME/OPPOSITE:** The **SAME/OPPOSITE** key is used to alternate between same lane moving mode and opposite lane moving mode. The **SAME** icon toggles on and off to indicate same lane mode.
- LOCK/RELEASE:** The **LOCK/RELEASE** key is a dual function key. This key alternates between the lock and the release functions. **LOCK** is used to transfer the contents of the target window to the lock window. **RELEASE** clears the locked contents of the lock window and the patrol window. During lock, the patrol window will lock the present patrol speed and the **LOCK** icon will light. The target window and Doppler audio remain active after locking.
- ANT:** The **ANT** key is used to switch between the front and rear antenna, unless the radar was factory set for only one antenna. The **FRONT** or **REAR** icon will light. The display unit can sense the presence or absence of the front or rear antenna. A steady icon indicates an operational antenna and cable, while a blinking icon indicates a missing antenna and/or cable, or a malfunction of the antenna unit.
- XMIT/HOLD:** The **XMIT/HOLD** key toggles between xmit (transmit) and hold (standby). The **XMIT** icon will light for transmitting and extinguish for hold.
- MOVING/STATIONARY:** The **MOVING/STATIONARY** key toggles between moving and stationary modes. A speed or a [ ] in the patrol window indicates moving mode, while a blank patrol window indicates stationary mode.
- FASTEST:**  
(opposite lane and stationary)
- In opposite lane and stationary modes, the **FASTEST** key is used to select *fastest* mode. A high pitched beep tone (for fast) indicates that *fastest* mode is selected. A normal beep tone indicates that *fastest* mode is turned off. Any power off event will reset the *fastest* mode to OFF. Pressing the **FASTEST** key will again enable it.
- When the *fastest* mode is selected and when no **LOCK** target is present, the middle window is used to track the *fastest* target in the radar beam. *Fastest* mode is turned on and off by alternately pressing the **FASTEST** key. The presence of the **FAST** icon indicates that the *fastest* mode is selected. The default condition for *fastest* mode is OFF. Any power off event will reset the *fastest* mode to OFF. Pressing the **FASTEST** key will again enable it.

- SLOWER (same lane):** In same lane mode, the **SLOWER** key is used to toggle between *fast target* same lane mode and *slow target* same lane mode. See SAME LANE THEORY section, page 14.
- SEn :** The **SEn** key is used to adjust the range up or down at any time. Maximum range (sensitivity) is **SEn 4**, minimum range (sensitivity) is **SEn 1**. The range (or sensitivity) must be set for same lane moving mode and opposite lane moving mode separately. While in each mode, (same lane and opposite lane), indicated by the presence or absence of the **SAME** icon, set each sensitivity as described above.
- SQL:** The **SQL** key toggles the squelch override on and off. In the normal position, audio will be heard only when a target is being tracked.
- P.S. 5/20:** The **P.S. 5/20** key is used to select a low end patrol speed of either 5 or 20 mph. For example: a patrol window indication of **20** tracks patrol speed from 20 to 70 mph, while a patrol window indication of **5** tracks patrol speed from 5 to 70 mph.
- TEST:** The **TEST** key performs a diagnostic check on the display/counting unit and antenna. The display/counting unit will first complete a processor check, memory check, and crystal check; followed by the display of speeds of 10, 35, and 65; and ending with a display of the display/counting unit internal operating temperature in degrees Fahrenheit (e.g., 110 °F), and input battery voltage (e.g., bAt 13.8). A comprehensive test is also performed on the selected antenna by the display/counting unit to ensure the integrity of the antenna cable and antenna electronics. **PASS** or **FAIL** is indicated on the display unit after all tests have been completed.
-  The  key is used to adjust the volume of the Doppler audio up or down: **Aud 0** is off; **Aud 4** is the loudest.
- P.S. BLANK:** This is a dual function key. If the patrol window indicates an incorrect patrol speed, the **P.S. BLANK** key blanks the patrol speed window and acquires a new patrol speed. The **P.S. BLANK** key also blanks the patrol speed after the target speed and patrol speed are locked. Press **P.S. BLANK** again to restore the blanked speeds.
-  This is a dual function key. With a single depression, the  key activates the keyboard backlight for six (6) seconds. Two rapid depressions of the  key activate the display unit's brightness control. Additional depressions of the  key toggle the display intensity through six levels of brightness, ranging from **bri 1** (low) to **bri 6** (high).

## Stationary Mode Speed Measurement

Perform the tuning fork test on the radar before using for traffic measurements. See page 18 for instructions on this procedure.

Select stationary mode by pressing the **MOVING/STATIONARY** key on the remote control, then select the desired antenna by pressing the **ANT** key. To transmit, press the **XMIT/HOLD** key. The **XMIT** icon should appear on the display unit (Fig 3) indicating that a radar signal is being transmitted.

If a target is in range, such as one traveling 54 mph, the speed will appear in the target window of the display unit (Fig 4); and a Doppler audio tone, which is proportional to the target speed, will be heard from the speaker. The target speed is continually measured and displayed, and the Doppler audio tone is heard as long as the target is present.

Hold mode can be selected by pressing the **XMIT/HOLD** key on the remote control. In hold mode, The **XMIT** icon will be off (Fig 5) and no signal will be transmitted, preventing detection by radar detectors.

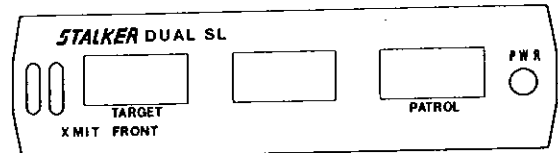


Fig 3

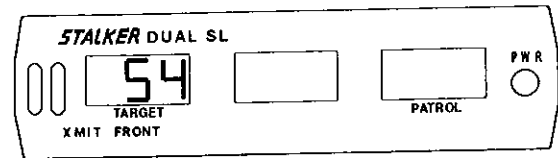


Fig 4

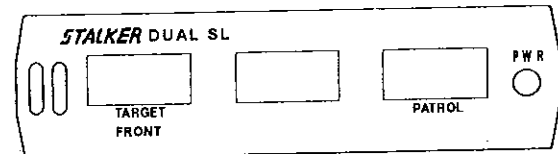


Fig 5

## Opposite Lane Moving Mode Speed Measurement

Perform the tuning fork test on the radar before using for traffic measurements. See page 18 for instructions on this procedure.

Select moving mode by pressing the **MOVING/STATIONARY** key on the remote control. When **STALKER DUAL SL** is in moving mode, the patrol window will contain either the patrol speed or a [ ]. The [ ] (Fig 6) indicates that **STALKER DUAL SL** is in moving mode, but has no ground speed. Select opposite lane mode by pressing the **SAME/OPPOSITE** key until the **SAME** icon is not visible. To transmit, press the **XMIT/HOLD** key. The **XMIT** icon should appear on the display unit (Fig 6) indicating that a radar signal is being transmitted. Be sure the patrol speed indicated corresponds to the speedometer of the patrol vehicle. If an approaching target is in the radar beam, its speed will appear in the target window and a Doppler audio tone will be heard from the speaker. Fig 7 is an example in which the patrol speed is 50 and the approaching target speed is 68. The target speed is continually measured and displayed and the Doppler audio tone is heard while the **STALKER DUAL SL** is in transmit mode and a target is present.

Hold mode can be selected by pressing the **XMIT/HOLD** key on the remote control. In hold mode, the **XMIT** icon will be off (Fig 8) and no signal will be transmitted. This prevents detection by radar detectors. When in hold, **STALKER DUAL SL** remembers the last patrol speed and looks for that speed first when changing from hold back to transmit.

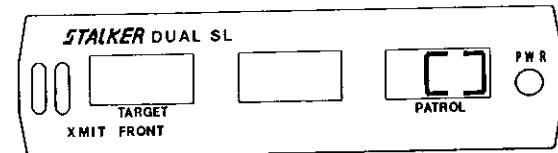


Fig 6

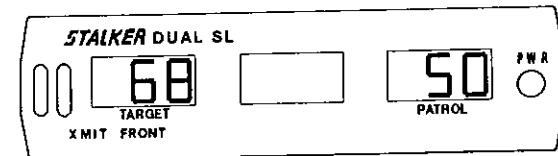


Fig 7

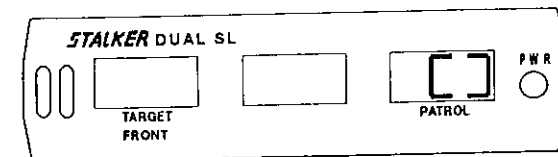


Fig 8

## Same Lane Moving Mode Speed Measurement

Perform the tuning fork test on the radar before using for traffic measurements. See page 18 for instructions on this procedure.

Patrol speed is especially important while operating in the same lane moving mode. The patrol vehicle should be traveling slower or faster than all targets in the radar beam. Normally, traveling slower than all same lane targets is recommended.

To transmit, press the XMIT/HOLD key. Select same lane moving mode by pressing the MOVING/STATIONARY key, then select same lane mode by pressing the SAME/OPOSITE key. Same lane mode is selected when the SAME icon is visible (Fig 9).

If a same lane target is in the radar beam, its speed will appear in the target window and the difference speed audio will be heard from the speaker. The target speed is obtained by adding the difference speed to the patrol speed. Fig 10 is an example of a patrol speed of 50 and a faster same lane target in front of the patrol vehicle traveling at 68. The target speed is continually measured and displayed and the Doppler audio tone is heard while the **STALKER DUAL SL** is in transmit mode and a target is present.

For targets in the radar beam that are traveling slower than the patrol vehicle, it is necessary to press the SLOWER key. Fig 11 is an example of a patrol speed of 50 and a slower same lane target in front of the patrol vehicle traveling at 48.

*NOTE: To verify that the SLOWER key is in the right position, change the speed of the patrol vehicle by 2 - 3 mph, observing that the displayed target speed does not change.*

## Patrol Speed Shadowing Effect

Traditional radar units exclude patrol speed lock-on and tracking below 20 mph. One of the unique features of **STALKER DUAL SL** is that it allows patrol speed lock-on and tracking below 5 mph, when the low-end patrol speed is set to 5. This feature is very popular and is excellent for enforcing school zones. However, with this setting, **STALKER DUAL SL** is more prone to "shadowing." Shadowing occurs when a strong same lane target in the radar beam captures the patrol speed, instead of the weaker passing ground reflection.

The following is an example of the shadowing effect: A patrol vehicle traveling 30 mph is following a pickup traveling 42 mph. The pickup is pulling away from the patrol vehicle at 12 mph. The radar, in error, thinks this 12 mph speed is the correct ground speed and displays 12 mph in the patrol window, instead of the correct value of 30 mph.

**STALKER DUAL SL** has two options for eliminating the shadowing effect: (1) make the unit re-acquire the correct patrol speed by pressing the P.S. BLANK key, and (2) change the low-end patrol speed from 5 mph to 20 mph (see following paragraph for instructions). To eliminate the shadowing effect in the city, option (1) is recommended. Option (2) is recommended for highway radar use.

## Low-End Patrol Speed Selection

The P.S. 5/20 key is used to set the low-end patrol speed. The right two digits of the patrol window refer to the current low-end patrol speed of either 5 mph or 20 mph. For example, sensitivity 1 with 5 mph low-end patrol speed would be indicated by: SE n 1 5 (Fig 12). Sensitivity 1 with 20 mph low-end patrol speed would be: SE n 1 20 (Fig 13).

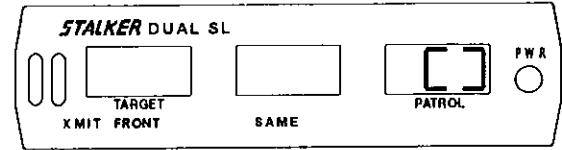


Fig 9

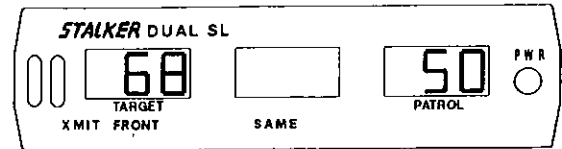


Fig 10

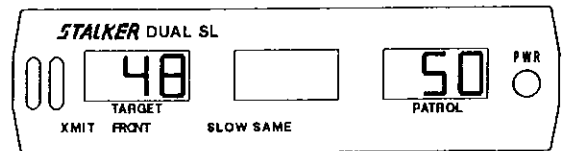


Fig 11

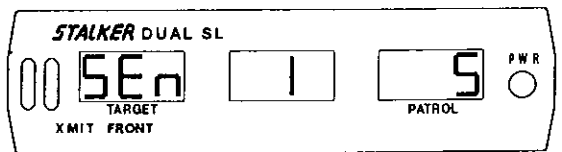


Fig 12

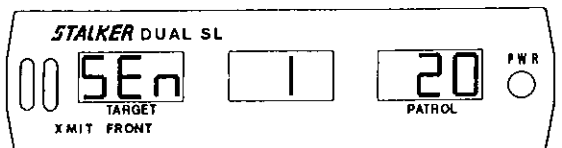


Fig 13

## Range (Sensitivity) Adjustment

The range (or sensitivity) of *STALKER DUAL SL* is adjusted by pressing the **SEn** key. This key cycles through the four (4) sensitivity levels; **SEn 1**, **SEn 2**, **SEn 3**, and **SEn 4** (Fig 14 - Fig 17, respectively). In each case, the center display refers to the current sensitivity setting. The shortest range is **SEn 1** (Fig 14), and the longest range is **SEn 4** (Fig 17). The range (or sensitivity) must be set for same lane moving mode and opposite lane moving mode separately. While in each mode, (same lane and opposite lane), indicated by the presence or absence of the **SAME** icon, set each sensitivity as described above.

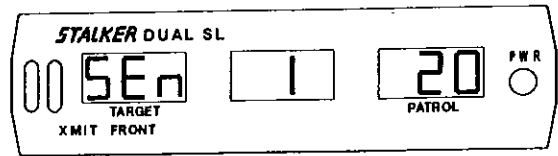


Fig 14

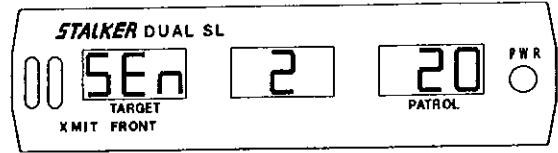


Fig 15

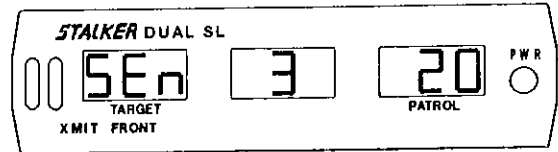


Fig 16

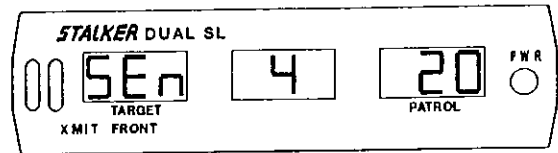


Fig 17

## Doppler Audio

When a target is being tracked, a Doppler audio tone can be heard from the speaker. The pitch of this tone is a precise indication of target speed. The tone quality is useful for judging possible interfering or multiple targets.

In opposite lane moving mode, *STALKER DUAL SL* compensates for patrol speed variations when generating the Doppler audio. Since the audio tones do not vary with patrol speed, the operator soon learns to correlate the Doppler audio with the target speed. This eliminates the need of constantly watching the display to determine target speed. In same lane moving mode, *STALKER DUAL SL* generates difference audio instead of the true audio described above. The difference audio gives a direct indication of the difference in speed between the patrol vehicle and the target vehicle.

The speaker volume can be adjusted through five levels by pressing the **Aud** key on the remote control. Maximum audio volume is indicated by **Aud 4** (Fig 18), and audio off is indicated by **Aud 0** (Fig 19).

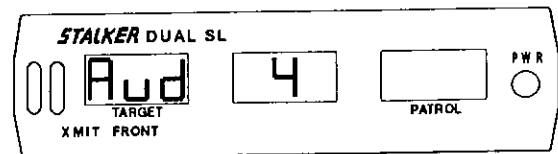


Fig 18

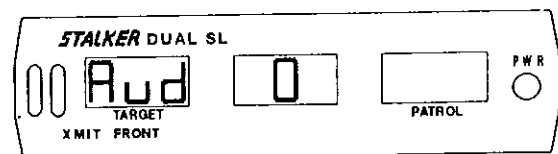


Fig 19

## Display Lighting

The display unit can be adjusted for brightness by using the **bri** key. A single depression of the **bri** key activates the keyboard backlight for 6 seconds. Two rapid depressions of the **bri** key activate the display unit's brightness control, and additional depressions of the **bri** key toggle the display intensity through six levels of brightness, ranging from low (**bri 1**) to high (**bri 6**) (Fig 20).

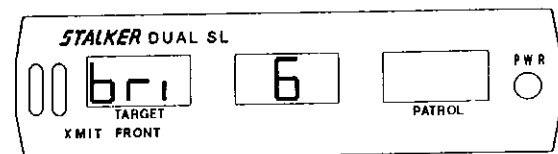


Fig 20

### Patrol Speed Blanking

After locking a target and patrol speed (Fig 21), the patrol speed window may be "blanked" by pressing the P.S. **BLANK** key (Fig 22). The patrol speed can be restored by pressing the P.S. **BLANK** key a second time. When the lock window is not occupied by a "locked" target speed, the P.S. **BLANK** key is used to blank the patrol window and re-acquire patrol speed.

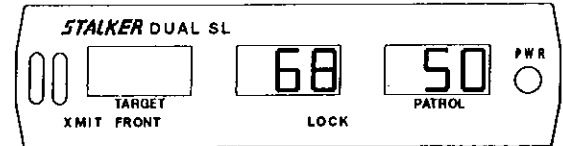


Fig 21

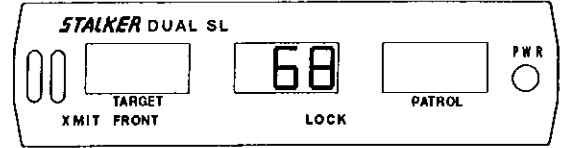


Fig 22

### Software Version

While all segments are illuminated (Fig 38), press the **TEST** key to display the installed software version. Figure 23 indicates that software version 25 SL is installed. Check with the factory for the availability of an updated software version, if desired.

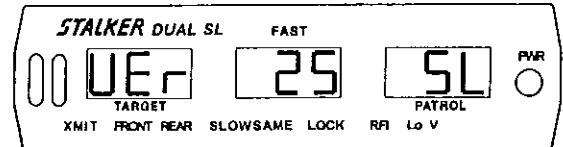


Fig 23

### Transmitter Frequency

Immediately after the software version is shown (Fig 23), the transmitter frequency is displayed. Figure 24 indicates a transmitter frequency of 34.7 GHz.

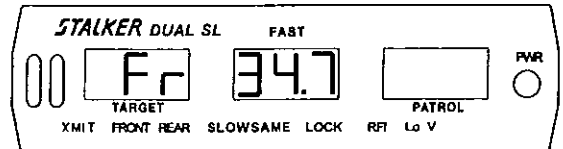
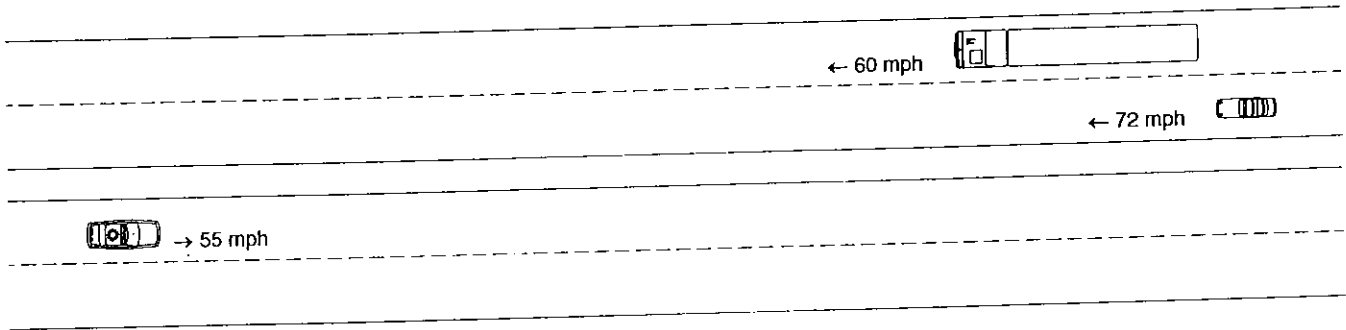


Fig 24

## Fastest Examples

The following examples are *fastest* targets under various conditions. The *fastest* mode has to be toggled "ON" by pressing the FASTEST key. In addition to the speeds displayed in each window, carefully note the icons illuminated.

### Moving Mode Example:



A Patrol vehicle is cruising at 55 mph.

Two opposite lane targets are approaching from in front. A 60 mph truck and a 72 mph sports car behind the truck. The 60 mph strongest out-front target (truck) appears in the target window and the 72 mph *fastest* target (sports car) appears in the middle window (Fig 25). The *fastest* target cannot be locked unless it becomes the strongest target and appears in the left window.

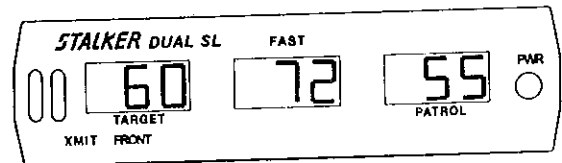


Fig 25

The 60 mph strongest target can be locked, by pressing the **LOCK** key (Fig 26). Note how the middle window changes from a *fastest* window to a lock window. The middle window is defined by the icon that is associated with it. The **FAST** icon has been replaced by the **LOCK** icon.

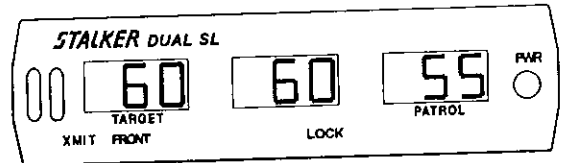
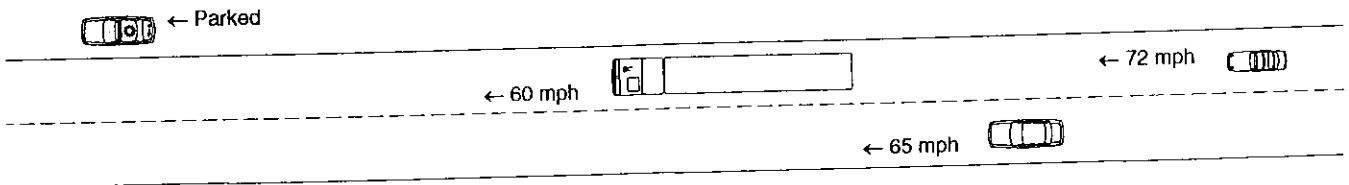


Fig 26

### Stationary Mode Example:



A Patrol vehicle is parked at the top of a hill monitoring approaching traffic with his rear antenna.

The first target, a 60 mph truck is the strongest out-front target and appears in the target window (Fig 27). The third target, the 72 mph *fastest* sports car, can be tracked in the middle *fastest* window.

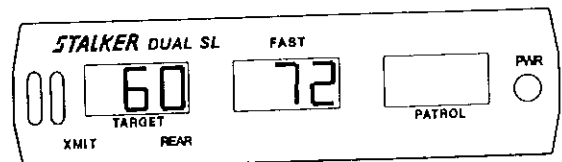


Fig 27

# SAME LANE THEORY

## Same Lane Operation

1. To transmit, press the **XMIT/HOLD** key. The **XMIT** icon should appear on the display indicating a radar signal is being transmitted.
2. Select moving mode by pressing the **MOVING/STATIONARY** key on the remote control. When **STALKER DUAL SL** is in moving mode, the patrol window will contain either the patrol speed or a [ ]. The [ ] indicates that **STALKER DUAL SL** is in moving mode, but has no ground speed. Be sure the patrol speed indicated corresponds to the speedometer of the patrol vehicle.
3. Then select same lane mode by pressing the **SAME/OPPOSITE** key. Same lane mode is selected when the **SAME** icon is visible.
4. If a target is in the radar beam, its speed will appear in the target window and a Doppler audio tone will be heard from the speaker.
5. Patrol speed is especially important while operating in the same lane moving mode. The patrol vehicle should be traveling *slower or faster* than all targets in the radar beam. Normally, traveling slower than all same lane targets is recommended. After visually estimating the speed of the targets in the radar beam, press the **SLOWER** key to correspond to whether the observed targets are traveling faster or slower than the patrol vehicle. The **SLOW** icon indicates that the *target* is traveling slower.
6. To verify that the **SLOWER** key is in the right position, change the speed of the patrol vehicle by 2-3 mph, observing that the displayed target speed does not change.

## Doppler Signal Processing

Two signals must be processed to determine target speed. The first signal, patrol speed, results from the radar signal reflecting from passing stationary objects. The Doppler shift of this signal will be proportional to the speed of the patrol vehicle, since Doppler shift is proportional to the relative velocity between the radar and the passing reflecting objects.

The second signal, difference speed, results from the radar beam reflecting from a slower or faster same lane moving target and then returning to the patrol vehicle. The Doppler shift of this signal will be proportional to the difference speed between the patrol and target vehicles. The audio tones heard while in same lane mode are directly related to this difference speed.

The radar is unable to distinguish between a difference speed resulting from a faster or slower target. The operator must tell the radar how to process this signal by pressing the **SLOWER** key. If the target vehicle is moving faster than the patrol vehicle, the difference speed must be added to patrol speed to obtain target speed. If the target vehicle is moving slower than the patrol vehicle, the difference speed must be subtracted from the patrol speed to obtain target speed.

The operator selects either addition or subtraction by pressing the **SLOWER** key on the remote control while observing the **SLOW** icon on the display. When the **SLOW** icon is off, the counting unit adds the difference speed to the patrol speed to obtain target speed. When the **SLOW** icon is on, the counting unit subtracts the difference speed from the patrol speed to obtain target speed.

## Example

Patrol Speed = 55 mph

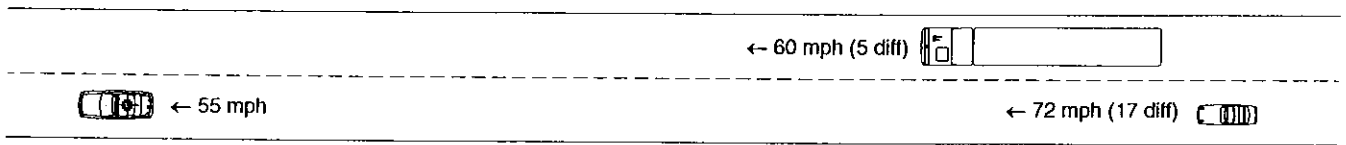
Difference Speed = 10 mph

For faster target:  
Target =  $55+10 = 65$   
For slower target:  
Target =  $55-10 = 45$

For faster target:  
**SLOW** icon is OFF  
For slower target:  
**SLOW** icon is ON

## Same Lane Examples

The following examples are same lane targets under various conditions. In addition to speeds displayed in each window, carefully note the icons illuminated.



A Patrol vehicle is cruising at 55 mph.

Two *faster* same lane targets are approaching from behind. A 60 mph ( $55+5=60$ ) truck and a 72 mph ( $55+17=72$ ) sports car behind the truck. The strongest out-front target (the truck) appears in the target window (Fig 28).

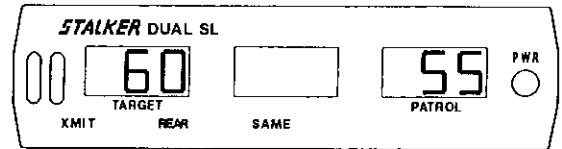


Fig 28

The 60 mph strongest target can be locked, by pressing the **LOCK/RELEASE** key (Fig 29).

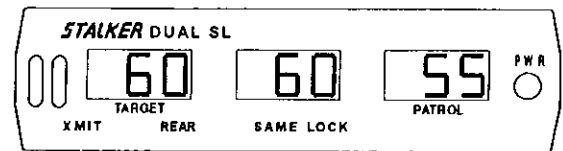
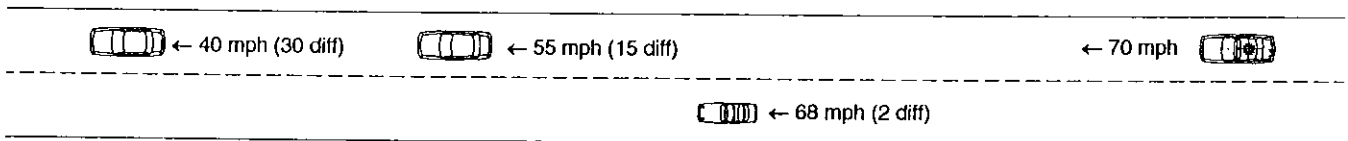


Fig 29



This is an example of pacing *slower* targets in same lane mode. Notice that the **SLOW** icon is visible. The 70 mph patrol vehicle is following the 68 mph ( $70-2=68$ ) sportscar. The 68 mph target (sportscar) appears in the target window.

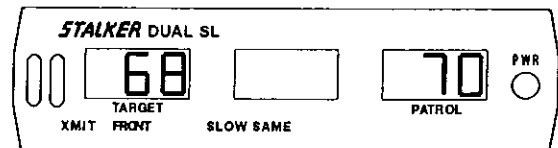
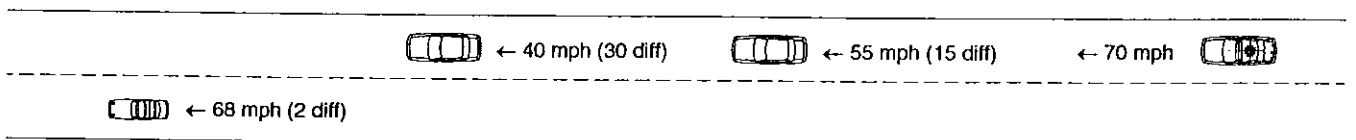


Fig 30



Once the 68 mph sportscar passes the other two targets, it will be blocked out by them. The strongest 55 mph target is now in the target window.

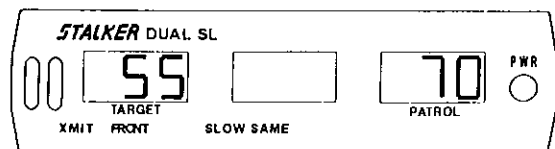


Fig 31

## INTERFERENCE SOURCES AND REMEDIES

A variety of sources, both natural and man-made, can cause misleading indications or poor performance. The operator should note the symptoms described below, and take appropriate steps to avoid the cause of the problem, or ignore the misleading indications.

### **Terrain**

Radar signals will not pass through most solid objects, including tree foliage. Make certain the path between the radar and target vehicle is unobstructed. A glass window is a partial reflector of radar; therefore, some reduction in range will be experienced when aiming through patrol vehicle windows.

### **Rain**

Rain absorbs and scatters the radar signal. This reduces the range and increases the possibility of obtaining readings from the speed of the raindrops.

### **Electrical Noise**

Electrical noise sources include neon signs, radio transmitters, power lines, and transformers. These influences may cause reduced range, intermittent readings, or false readings (although very rarely).

### **Fan Noise**

As you will discover, the *STALKER DUAL SL* that you have purchased is extremely sensitive resulting in longer range. This extra sensitivity may allow you to pick up fan noise when operating the radar from inside the patrol vehicle.

Fan noise is a common Doppler radar problem when aiming the antenna through a window from inside the patrol vehicle. A small amount of the radar beam is reflected off the glass back into the vehicle. This may allow the radar to pick up fan noise from within the patrol vehicle.

The problem is not a problem with the radar, but rather with the location of the radar's antenna. Doppler radar is designed to detect moving or vibrating objects; therefore, it may detect any moving or vibrating surfaces inside the patrol vehicle, such as the fan or a dashboard that is vibrating from the fan. Fan interference can be verified by turning off or changing the speed of the fan.

Most fans generate speeds of 30 mph or less. As a result, fan noise is normally a problem when operating in stationary mode or when operating in moving mode with patrol speeds less than 30 mph. Example: a radar operating at a patrol speed of 55 mph ignores all Doppler speeds less than 55 mph; therefore fan noise is not a problem at highway speeds.

### **To eliminate fan noise, try the following steps in numerical order:**

1. Find a location (by moving the antenna) inside the vehicle that is free of fan noise; such as a corner of the dash away from the fan.
2. Insure that the antenna beam is not deflected back into the vehicle by anything in its path such as wipers, window trim, or anything mounted on the dash. Do not mount the counting/display unit or antenna/power cables in front of the antenna on the dash.
3. Locate the antenna as close to the inside glass as possible (preferably less than 1/2 inch).
4. Turn the fan off while operating the radar in stationary mode or moving mode with patrol speed under 30 mph.
5. Install an optional Antenna Port on the glass surfaces directly in front of the antenna. The specially designed Antenna Port consists of two white discs, 3 1/2 inches in diameter, with double-sided tape on one side. Attach one disc on the inside glass surface, and the other disc on the outside glass surface. Due to interference with windshield wipers, the Antenna Port can only be installed on the rear window.
6. If the above suggestions fail, mount the antenna completely outside the vehicle.

### Interference From Other Transmitters

Strong signals from nearby radio transmitters may interfere with operation of *STALKER DUAL SL*. The **RFI** indicator (Fig 32) signals that an interference source has been detected. Speed readings are inhibited when this occurs to prevent the possibility of false readings. The interference source may be the vehicle's two-way radio, another nearby transmitter, or an illegal radar-jamming device.

### Power Supply

A low voltage condition from the vehicle's electrical system will cause a **Lo V** indication (Fig 33), and will inhibit speed readings. An extremely noisy vehicle electrical system may result in false readings or erratic operation. If this condition occurs, a two-conductor, shielded cable should be connected directly from the vehicle battery to the cigarette-plug on the dash. This should eliminate any problems from vehicle electrical noise.

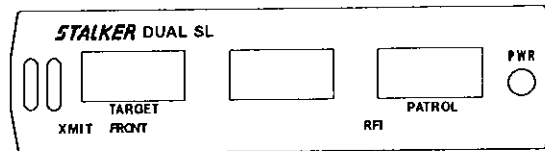


Fig 32

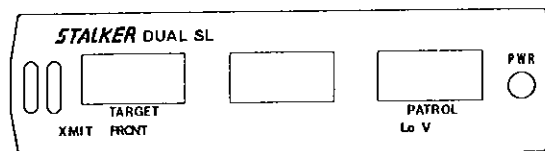


Fig 33

## TESTING

In order to ensure continued compliance with FCC rules, meet legal requirements for admissibility of radar speed measurements, and verify full operating performance, the following test procedures are recommended. If the unit fails any of the tests, it should be removed from service until the cause of the problem is corrected.

### Periodic Calibration

We recommend, on an annual basis, that the following performance characteristics should be verified:

1. Transmitter frequency is within specification on licensed operating frequency.
2. Unit indicates correct speed ( $\pm 1$  mph) when reading a target of known speed, traveling in the range of 50 to 60 mph.
3. Unit detects targets of good reflectivity over unobstructed, flat terrain at distances of 1/2 mile, or more, when set for highest sensitivity (SEN 4).

### Opposite Lane Mode Tuning Fork Test

Two (2) tuning forks are supplied for **STALKER DUAL SL**. The tuning forks are calibrated for 25 mph and 40 mph (40 and 64 kph). To perform the tuning fork test, power the unit ON (press **PWR** switch), select moving mode (press **MOVING/STATIONARY** key), select the front antenna (press **ANT** key), and place the unit in transmit mode (press **XMIT** key). Strike both tuning forks against a hard nonmetallic surface, such as the heel of a shoe. Quickly hold the lower speed fork approximately two (2) inches in front of the antenna, with the narrow edge of the fork facing the antenna. The patrol window should indicate  $25 \pm 1$  mph (40 kph) (Fig 34). Now move the higher speed fork in front of the antenna with the narrow edge facing the antenna. The target window should register 15 mph  $\pm 2$  (24 kph) (Fig 35), which is the difference in speed of the two forks. Repeat the above test with the rear antenna selected, if installed. *Note: We recommend that the tuning fork test be performed on each antenna, at least twice daily -- once prior to using the unit for speed measurement, and again when no further usage is intended. Some departments perform this test both before and after each citation. Check your department policy.*

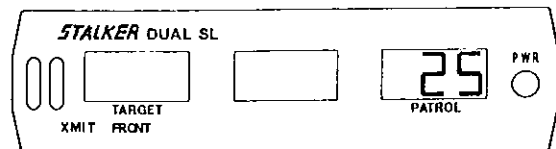


Fig 34

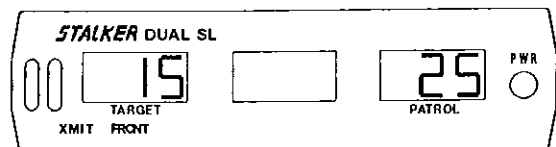


Fig 35

### Same Lane Mode Tuning Fork Test

Two (2) tuning forks are supplied for **STALKER DUAL SL**. The tuning forks are calibrated for 25 mph and 40 mph (40 and 64 kph). To perform the tuning fork test, power the unit ON, select moving mode, and same lane mode. Select the front antenna, and place the unit in transmit mode. Strike both tuning forks against a hard nonmetallic surface, such as the heel of a shoe. Quickly hold the higher speed fork approximately two (2) inches in front of the antenna, with the narrow edge of the fork facing the antenna. The patrol window should indicate  $40 \pm 1$  mph (64 kph) (Fig 36). Move the lower speed fork in front of the antenna with the narrow edge facing the antenna. The target window should register 65 mph  $\pm 2$  (104 kph) (Fig 37), which is the sum of the speed of the two forks. Repeat the above test with the rear antenna selected, if installed.

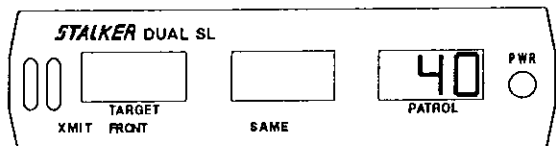


Fig 36

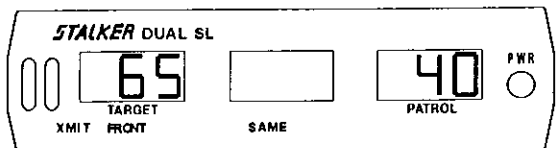


Fig 37

### Power-On Self-Test

Each time the unit is powered on, an automatic self-test is performed to verify that the unit functions. The display indicates 888 888 188 (Fig 38) during the test. A 4-beep "happy" tone indicates the successful completion of this test. If a problem is detected, FAIL will be displayed along with a 15-beep tone.

Immediately after power-on, and while all display segments are illuminated, pressing the **TEST** key will display the software version followed by the transmitter frequency (see page 12).

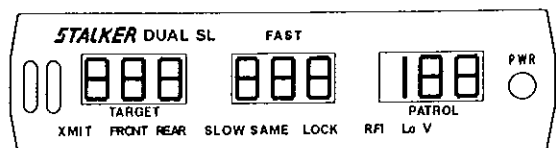


Fig 38

## Automatic Self-Test

An automatic self-test (indicated by a 4-beep "happy" tone) is performed every 10 minutes while **STALKER DUAL SL** is transmitting. Switching antenna will reset the 10 minute timer.

## Internal Circuit- Test

An internal circuit test can be performed at any time by pressing the **TEST** key. This performs a diagnostic check on the display/counting unit, the selected antenna, and antenna cable. Since only the selected antenna is tested, it is necessary to perform this test twice -- once with the front antenna selected, and once with the rear antenna selected.

The display/counting unit will first complete a processor check, memory check, and crystal accuracy check; followed by the display of speeds of 10, 35, and 65 (Figures 39, 40, and 41); and ending with a display of the display/counting unit internal operating temperature in degrees Fahrenheit (e.g., 110 °F), and input battery voltage (e.g., bAt 13.8) (Fig 42 and Fig 43, respectively).

A comprehensive test is also performed on the selected antenna by the display/counting unit to ensure the integrity of the selected antenna cable and antenna electronics. After all the tests are completed, **PASS** (Fig 44) along with a 4-beep "happy" tone indicate successful test completion. **FAIL** (Fig 45) along with a 15-beep tone indicates a failed self-test.

**Note: Note:** We recommend that the internal circuit test be performed on each antenna, at least twice daily -- once prior to using the unit for speed measurement, and again when no further usage is intended.

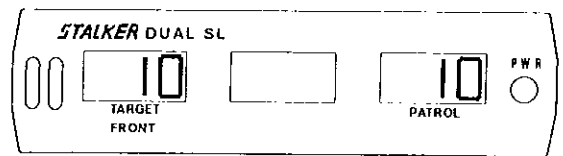


Fig 39

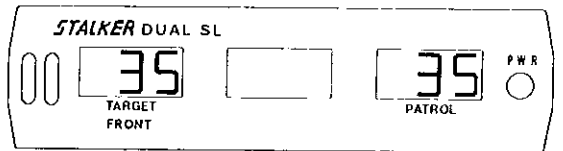


Fig 40

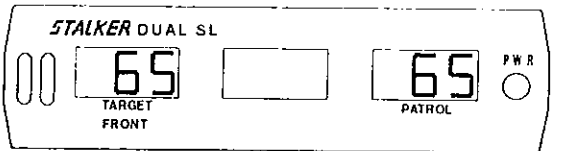


Fig 41

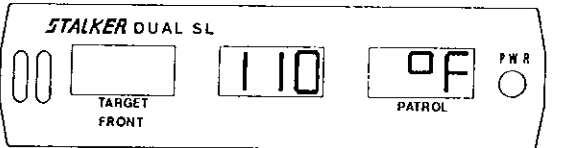


Fig 42

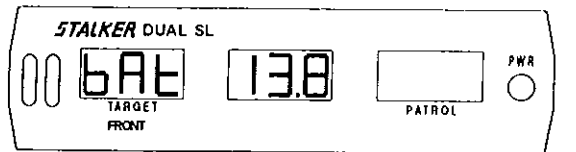


Fig 43

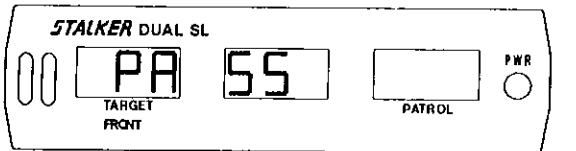


Fig 44

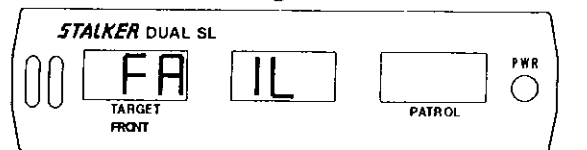


Fig 45

## Moving-Vehicle Test

A moving-vehicle test can be performed as an additional check of performance and accuracy. While driving a patrol vehicle, with an accurately calibrated speedometer, aim the unit down an empty highway directly in front of the vehicle. The speed indicated by **STALKER DUAL SL** should match the speedometer indication to within a small error (depending on speedometer accuracy). This test is optional and is not a substitute for the tuning fork test, but is a good overall indication of proper operation of the unit.

# LEGAL REQUIREMENTS

## FCC Requirements

The Federal Communications Commission requires that all transmitting equipment carry a Grant of Type Acceptance. **STALKER DUAL SL** is Type Accepted by the FCC under Type Acceptance numbers IBQACMI002 (Ka-band) and IBQACMI004 (K-band). The FCC also requires that an operating license be obtained by the user of the equipment. In the case of local government agencies already licensed under part 90 in the Public Safety Radio Service, the requirement for a separate authorization for radar speed detection devices was eliminated, effective February 1, 1983, and licensees may operate speed detection devices as part of their base/mobile communications systems. As part of this rule change, licensees are required to list the number of speed detection units, and the frequencies on which they operate upon renewal of their land mobile authorizations.

## Case Law

Legal precedent has clearly established the accuracy, and admissibility of Doppler speed radar evidence. This section on case law is included so the radar operator can familiarize himself with the more important legal cases involving the use of Doppler speed radar, and be aware of the guidelines concerning admissibility established by these cases. Much of the referenced material may be obtained at your local law library or prosecutor's office.

Reference A -- State v. Dantonio (N.J.), 115 A2d 35, 49 ALR 2d 460 The landmark case on the use of traffic radar. This case sets precedent of the following:

1. Judicial notice has been taken of accuracy of radar.
2. A few hours training is sufficient to qualify an operator.
3. The operator need not understand or be able to explain internal workings of the radar.

Reference B -- Everight v. Little Rock, ARK., 326 SW2d 796: Establishes that the court may take judicial notice of the reliability of radar.

Reference C -- State v. Graham (Mo.), 322 SW2d 188: Establishes that the court may take judicial notice of the ability of radar to measure speed.

Reference D -- State v. Tomanelli (Conn.), 216 A2d 625: Reviews the matter of judicial notice; recognizes the ability of Doppler radar to measure the speed of a motor vehicle; and acknowledges that the tuning fork is a reliable accuracy test.

Reference E -- Honeycut v. Commonwealth (Ky.), 408 SW2d 421: In this appeal, the court rejects, one by one, the arguments of the appellant that the evidence should not have been admitted; and again establishes the following: (1) A properly constructed, and operated radar device is capable of measuring accurately the speed of a motor vehicle. (2) The tuning fork test is an accurate method of determining accuracy of the radar. (3) It is sufficient to qualify an operator that has such knowledge, and training that enables him to properly set up, test, and read the radar. (4) The operator is not required to understand the scientific principles of radar, nor explain its inner workings; in addition, the operator may be qualified to operate the radar after receiving a few hours of instruction. (5) The officer's estimate of excessive speed, from visual observation, when confirmed by the reading of the radar device and when the offending vehicle is out-front, by itself, nearest the unit, is sufficient to identify the vehicle, if the officer's visual observations support the radar evidence.

From the case law above, a successful prosecution may depend on the officer's ability to testify to the following points:

1. The qualifications and training of the officer.
2. The time, place and location of the radar device at the time the offense occurred.
3. The location of the offending vehicle at the time the offense occurred.
4. The identification of the offending person as the operator of the vehicle.
5. The identification of the offending person's vehicle.
6. The visual observation of its apparent, excessive speed.
7. The vehicle was out-front, by itself, nearest the radar when the reading was obtained.

# MICROWAVE RADIATION

The following section has been supplied courtesy of the Food and Drug Administration (FDA).  
UPDATE ON POSSIBLE HAZARDS  
OF TRAFFIC RADAR DEVICES

July 20, 1992

TO: CITY, COUNTY, STATE, AND FEDERAL POLICE OFFICIALS

Recent stories in the news media have focused attention on the possibility that the traffic radar devices used by police officers might increase their risk of cancer, particularly testicular cancer. The Food and Drug Administration (FDA) has prepared the following information to inform police officers about what is known--and what remains unknown--about this question. **We urge you to make this Update available to the officers under your jurisdiction. Feel free to photocopy this Update as needed.**

## **What kind of radiation is emitted by traffic radar units?**

These devices emit microwave radiation similar to the type produced inside microwave ovens, but at a power level more than 10,000 times lower. The radiation travels from the front of the radar device in a narrow, cone-shaped beam, although some of it may be reflected back from hard surfaces such as metal and glass. The amount of radiation decreases rapidly with distance from the source, so that the farther the devices are kept from the body, the lower the exposure.

## **Is there any experimental evidence that the levels of microwave radiation from a traffic radar device can be dangerous?**

Although it is known that very high levels of microwave radiation can be harmful, there is no firm experimental evidence at present that the much lower levels of radiation emitted by traffic radar devices can be hazardous. There are some animal studies that suggest that low levels of radar can cause biological changes, but it is not known whether these results apply to humans. Also, most of these studies were done with a different type of microwave radiation than that produced by traffic radar devices.

## **What about the cancers that have occurred in police officers who used traffic radar devices for long periods of time?**

It is true that some officers who have used these devices have experienced cancer. But it is important to understand that these types of cancers also occur among people who haven't used radar devices. That's why it is not possible to tell whether any individual officer's cancer arose because of the radar, or whether it would have happened anyway. **The key question is whether the risk of getting a particular form of cancer is greater among people who work with the radar devices than among the rest of the population.** And the only way to answer that question is to compare the cancer rates among radar- using police officers with people who don't work with radar, or with the cancer rates that would be expected in the general population.

FDA has made a preliminary comparison between the number of cancers reported in police officers who use traffic radar devices and cancer rates in the general population. Based on case reports we have so far, the comparison does not appear to show a greater cancer rate among the police, but it is too soon to conclude that there is no risk.

## **What's FDA doing to address the question of cancer risk?**

FDA will continue to evaluate the research performed by microwave scientists around the world to see if their results apply to traffic radar devices. In addition, FDA will work with police organizations to collect more data about the cancer experience of police officers, to see whether they are developing more than the expected number of cancers. To assist us in this effort, any known cases of cancer in police officers using radar should be reported to FDA by calling 1-800-638-6725. Be sure to provide as much information as possible, including the type of radar unit used, how long the individual worked with radar devices, and the specific type of cancer.

## **In the meantime, what can be done to reduce the risk, if there is one?**

Although it is not known for sure whether traffic radar devices can produce health problems, police officers can take some simple steps which will sharply reduce their exposure to the low-level microwave radiation which these devices emit.

1. Always point the device away from your body, or your partner's body, while it is turned on.
2. Mount fixed radar antennas so that the beam is not pointed at any occupant of the patrol car.
3. Whenever possible, turn off a hand-held unit when it is not in use. If your unit has a "standby" mode, always use it when not measuring the speed of a vehicle. Never rest the unit against your body when it is turned on.
4. When it is on, try to avoid pointing the device toward metal surfaces inside your car, such as the floor or a door, to avoid microwave reflection. (Measurements have shown that the radiation reflected from nonmetallic surfaces, such as glass in the car's windows, is much less intense than that reflected from metal surfaces.)

Again, there is no proof at this point that traffic radar devices can be harmful to the police officers who use them. Future information may reveal that these devices are indeed harmless. But until the question is settled, taking the simple precautions outlined above should reduce any possible risk. In the meantime, FDA will continue to provide updates as more information becomes available.

# STALKER DUAL SL EMISSIONS

The **STALKER DUAL SL** Radar operates with a maximum of 50 mw of power output and emits low level, non-ionizing radio frequency electromagnetic radiation. The American National Standards Institute (ANSI) has the responsibility for establishing standards with respect to human exposure to radio frequency electromagnetic radiation. The current ANSI C95.1 standard in effect, for frequencies from 1500 MHz to 100,000 MHz, specifies a maximum exposure power density of 5.0 mw/cm<sup>2</sup> (.05 Watt/cm<sup>2</sup>) on any part of the body. The **STALKER DUAL SL** has a maximum power density of 2.0 mw/cm<sup>2</sup> that is well below the ANSI standard.

## REQUIRED MAINTENANCE


No user maintenance is required on the **STALKER DUAL SL**. However, if any problems are experienced during testing procedures or normal operation, the unit should be taken immediately to your department's radar specialist to determine the extent of the problem. If a malfunction has occurred, the unit will require servicing. Normal care should be taken by the user in handling the **STALKER DUAL SL** to preserve the life and usefulness of the equipment.

## TROUBLESHOOTING

### *PWR key does not function*

Make sure all cables are mated correctly with their connectors. Check the vehicle cigarette-plug connector for dirty contacts. Check for a blown fuse in the **STALKER DUAL SL** cigarette-plug.

### *Low or no speaker volume*

Press the  key on the remote control to adjust the volume. **Aud 1** (lowest level) to **Aud 4** (highest level).

### *Radar has short range*

Set range (sensitivity) control to **SEn 4** (longest range).

### *Radar suffers from patrol speed shadowing*

If the patrol window indicates an incorrect patrol speed, the **P.S. BLANK** key blanks the patrol speed window and acquires a new patrol speed. See *Patrol Speed Shadowing Effect, page 10*.

Press the **P.S. 5/20** key to change the low-end patrol speed from 5 mph to 20 mph, thus preventing a patrol speed lock below 20 mph. It is not possible to allow patrol speed locking less than 20 mph and to eliminate patrol speed shadowing simultaneously. See *Low-End Patrol Speed Selection, page 10*.

### *Radar will not lock onto patrol speeds below 20 mph*

Press the **P.S. 5/20** key to change the low-end patrol speed from 20 mph to 5 mph. See *Low-End Patrol Speed Selection, page 10*. The radar will now be susceptible to patrol speed "shadowing," which can be easily corrected by pressing the **P.S. BLANK** key.

### *Radar has trouble maintaining patrol speed*

Mount the antenna higher above the dash and/or point antenna slightly down toward the ground. Make sure the wipers are not in the radar beam path. Make sure the windshield does not have paint/mask around the perimeter.

### *Radar picks up vehicle fan and reads 5 to 30 mph in stationary mode*

Check for proper aiming of antenna. Make sure that the paint/mask or metallic objects are not deflecting the radar beam down into defroster vents. If so, raise antenna above obstruction. See *Fan Noise, page 16*.

### *Radar displays LO V icon*

Make sure the cigarette-plug is securely installed and the contacts are clean.

### *Radar flashes Hot in display*

The radar is overheating. Move radar out of direct sun. **Do not** leave radar operating in a closed vehicle.

## WARRANTY

Manufacturer warrants this traffic speed radar to the original purchaser to be free of defects. At its discretion, the manufacturer agrees to repair or replace all radar components, with the exception of the K-band antenna, that fail due to defective materials or workmanship for a period of three (3) years from the date of purchase.

Any K-band antenna that fails due to defective materials or workmanship will be repaired or replaced for a period of two (2) years from the date of purchase.

During the warranty period, there will be no charge for repair labor or parts. Purchaser shall return the failed unit to the factory or authorized service center, freight prepaid. The manufacturer will pay return shipping.

This warranty applies only to internal electronic components and circuitry. Warranty excludes normal wear-and-tear such as frayed cords, broken connectors, scratched or broken cases, or physical abuse. Manufacturer reserves the right to charge for defects and/or damages resulting from abuse or extraordinary environmental damage to the unit during the warranty period at rates normally charged for repairing such units not covered under warranty.

Seller warrants the radar devices manufactured by Applied Concepts, Inc. are designed to perform the function of determining the speed of motor vehicles. The foregoing warranty is exclusive, in lieu of all other warranties, of quality, fitness, or merchantability, whether written, oral, or implied.

As a further limit on warranty, and as an expressed warning, the user should be aware that harmful personal contact may be made with seller's radar devices in the event of violent maneuvers, collisions, or other circumstances, even though said radar devices are installed and used according to instructions. Applied Concepts, Inc. specifically disclaims any liability for injury caused by the radar devices in all such circumstances.

## General Specifications

<b>Type:</b>	Dual Antenna Moving/Stationary Doppler Radar
<b>Operating Frequency:</b>	24.15 Ghz (K-band) or 33.4 Ghz - 36.0 Ghz (Ka-Band)
<b>Stability:</b>	±45 Mhz (K-band), ±100 Mhz (Ka-band)
<b>Power Requirements:</b>	9.0 to 16.0 VDC. 12.0 VDC; standby with no display: 0.7A typical 12.0 VDC; XMIT with no display : 1.1A typical 12.0 VDC; XMIT with display: 1.4A typical
<b>Environmental:</b>	-30 to +70 C, 90% Relative Humidity Operating -40 to +85 C, non-operating
<b>Display:</b>	Triple 3-digit Light Emitting Diode (LED) for target, lock, and patrol, plus LED icons
<b>Mechanical:</b>	<b>Display Unit</b> Wt. - 0.5 lb. 1.65" Height, 1.05" Depth, and 5.50" Width <b>Counting unit</b> Wt. - 1.6 lbs. 1.65" Height, 3.90" Depth, and 5.50" Width <b>Antenna</b> Wt. - .82 lbs (K), 1.4 lbs. (Ka) 3.25" Dia X 3.5" (K), 2.50" Dia. X 4.60" (Ka) <b>Remote</b> Weight - 0.4 lb. .80" Height, 6.50" Length, and 2.70" Width
<b>Accuracy:</b>	± 1 mph stationary, ± 2 mph moving ± 1 kmh stationary, ± 2 kmh moving
<b>Automatic Self-Test:</b>	Performed every 10 minutes while transmitting
<b>Stationary Speed Range:</b>	12 mph to 200 mph Standard 2 mph to 200 mph (set-up menu selectable)
<b>Moving Speed Range:</b>	<b>Patrol speed</b> - Selectable with P.S. 5/20 key: 5 in patrol window for speeds of 5 to 70 mph 20 in patrol window for speeds of 20 to 70 mph <u>Same lane patrol speed</u> must be greater than 15 mph <b>Opposite lane target speed</b> - 200 mph Max closing For 5 mph patrol speed: 20 mph to 195 mph For 70 mph patrol speed: 35 mph to 130 mph. <b>Same lane target speed</b> - Related to patrol speed: ±70% of patrol speed to within 5 mph of patrol speed i.e. For 50 mph: 15 → 44 mph and 55 → 85 mph <b>Fastest Speed</b> - Same speed range as opposite lane speed

## Microwave Specifications

<b>Antenna:</b>	Conical horn with corrective lens
<b>Polarization:</b>	Circular
<b>3 db Beam width:</b>	12° nominal (both K-band and Ka-band)
<b>Microwave Source:</b>	Gunn-Effect diode
<b>Receiver Type:</b>	Direct Conversion Homodyne using low-noise Schottky barrier mixer diode
<b>Power Output:</b>	5 mw min (K-band), 10 mw min (Ka-band) 10 mw nom (K-band), 25 mw nom (Ka-band) 15 mw max (K-band), 50 mw max (Ka-band)
<b>Power Density:</b>	2 mw/cm <sup>2</sup> maximum at 5 cm from lens

## Display Messages

<b>PASS:</b>	PASS spelled out in display with a 4-beep "happy" tone indicates the unit has just passed self-test.
<b>FAIL:</b>	FAIL spelled out in display with a 15-beep tone indicates a circuit malfunction has been detected, in which case speed readings are inhibited. Remove the unit from service and repair. FAIL will remain on the display until reset by being powered off.
<b>SEn 1, SEn 2, SEn 3 or SEn 4:</b>	SEn 1 thru SEn 4 is used to indicate the current range (sensitivity) setting. SEn 1 is minimum; SEn 4 is maximum. Opposite lane sensitivity is independent of same lane sensitivity. They are separately set.
<b>5 or 20:</b>	5 or 20 spelled out in the patrol window indicates the low-end patrol speed is set to either 5 mph or 20 mph
<b>Aud 0, Aud 1, Aud 2, Aud 3, or Aud 4:</b>	Aud 0 thru Aud 4 spelled out on the display unit indicates the current speaker volume setting. Aud 0 is off; Aud 4 is loudest.

bri 1, bri 2 bri 3, bri 4, bri 5, or bri 6:

Used to indicate display brightness. bri 1 is the dimmest; bri 6 is the brightest.

**Hot:**

The display flashes Hot and powers down when the internal temperature exceeds specifications. Automatically resumes operating when the temperature drops.

## Remote Control Functions

**SAME/OPPOSITE:**

The SAME/OPPOSITE key is used to alternate between same lane moving mode and opposite lane moving mode. The SAME icon toggles on and off to indicate same lane mode.

**LOCK/RELEASE:**

The LOCK/RELEASE key is a dual function key. This key alternates between the lock and the release functions. LOCK is used to transfer the contents of the target window to the lock window. RELEASE clears the locked contents of the lock window and the patrol window. During lock, the patrol window will lock the present patrol speed and the LOCK icon will light. The target window and Doppler audio remain active after locking.

**ANT:**

Used to switch between the front and rear antenna. The FRONT or REAR icon will light. A 1-beep tone corresponds to the front antenna while a 2-beep tone corresponds to the rear antenna. The counting unit can sense the presence or absence of either antenna.

**XMIT/HOLD:**

Toggles between xmit and hold (standby). The XMIT icon will light.

**MOVING/STATIONARY:**

Toggles between moving and stationary modes.

**FASTEST:**

Used to select *fastest* mode. A high pitched tone indicates that *fastest* mode is selected. Any power off event will reset the *fastest* mode to OFF.

**SLOWER:**

The SLOWER key is used to toggle between *fast target* same lane mode and *slow target* same lane mode. The SLOW icon is on for a slower target.

**SEn :**

Used to adjust the range (sensitivity) at any time. Maximum sensitivity is SEn 4; minimum sensitivity is SEn 1. Opposite lane sensitivity is independent of same lane sensitivity. They are separately set.

**SQL:**

Toggles the squelch override off and on. In the normal (off) position, audio will only be heard when a target is being tracked.

**P.S. 5/20:**

Used to select a low-end patrol speed of either 5 mph or 20 mph. For example:  
5 in patrol window for speed of 5 to 70 mph  
20 in patrol window for speed of 20 to 70 mph

**TEST:**

Performs a complete self-test on display/counting unit and the selected antenna. The display unit shows speeds of 10, 35, and 65; temperature inside the display/counting unit in °F (e.g., 110 °F); and input battery voltage (e.g., bAt 13.8); followed by "PASS" and a 4-beep "happy" tone or "FAIL" and a 15-beep tone..



Used to adjust the volume of the Doppler audio up or down. Aud 0 is off; Aud 4 is loudest.

**P.S. BLANK:**

Dual function key. Used to re-acquire patrol speed. Also, blanks the patrol speed after a target speed and patrol speed are locked. Pressing the P.S. Blank key again restores the blanked speed.



Dual function key. A single depression of the key activates the keyboard backlight for six (6) seconds. Two rapid depressions of the key activates the display brightness control. Additional depressions of the key toggles the display unit's brightness from bri 1 (low) to bri 6 (high).