

Talon

Traffic Safety Radar

OPERATOR'S MANUAL



KUSTOM SIGNALS, INC.
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1. INTRODUCTION

The Kustom Signals Talon radar system comes from a long standing commitment to the law enforcement community to provide quality, state-of-the-art speed measuring equipment. The Talon offers features never before available on a moving/stationary handheld Ka-Band radar system, yet allows easy operation and simple one button mode changes.

Since the Talon radar system uses Digital Signal Processing (DSP), it has available options which allow same direction speed detection and fastest vehicle mode, showing the operator the speeds of the strongest and fastest vehicles' returns detected. Along with the above features, the Talon offers Kustom Signals proven quality, and service to the customer.

This is the smallest handheld, battery operated radar Kustom Signals has produced. While small size was an important feature during the design of the Talon, durability was another key issue. We know police radar equipment, having built the first digital traffic radar unit in 1970. Our history of firsts has never overshadowed the need for durability and a strong case. Things do get dropped. Our Falcon, HR-12 and other handheld products are designed to meet these demanding needs. The Talon is no exception and its one-piece extruded aluminum case protects the electronics not only from shock and vibration, but from rain and moisture.

All these features and performance standards are packed into this small, lightweight, battery operated unit, a unit that must be seen to be believed.

2. SPECIFICATIONS

2.0 GENERAL

Type:	One-piece, Moving/Stationary True Doppler radar system
Frequency:	Ka-Band 33.4-36.0 GHz \pm 100 MHz
Tuning Forks	Forks stamped "KSI Ka-Band" are for units with microwave frequency 35.5 GHz. Forks for any other Ka-Band frequency will have that frequency clearly labeled on the fork.
System Accuracy:	Stationary \pm 1 mph (\pm 2km/h) Moving +1/-2 mph (+2/-3 km/h)
Operating Voltage:	Corded: 10.8 to 16.5 VDC, 800 mA max

There are conditions when the Talon will operate normally and not display a low voltage alert when the external battery voltage drops substantially below the specified 10.8 VDC.

Cordless: 6.5 to 9.0 VDC
7.2 VDC nominal NiMH

Low Voltage Threshold	Corded: Approximately 10.8 VDC Cordless: Approximately 6.5 VDC
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Section 2—Specifications

Nominal Power
Requirements:

	Voltage (VDC)	Current (mA)
Without target present:	13.6	510
With target present:	13.6	560
Without target & backlight:	13.6	520
With target & backlight:	13.6	570
Standby (HOLD):	13.6	100

Reverse Voltage Protection: Diode protection. No damage if supply leads reversed.

Electronic Components: 100% solid state; integrated circuits, microprocessor and Digital Signal Processor.

Operating Temperature: -22°F to +140°F (-30°C to +60°C)
90% relative humidity at 37°C, non-condensing.

Dimensions:

Unit:

Height:	3.56" (9.04 cm)
Width:	3.0" (7.62 cm)
Depth:	7.25" (18.42 cm)
Weight:	1 lb. 12 oz. (.79 kg)

Handle:

Height:	5.75" (14.6 cm)
Width:	2.17" (5.51 cm)
Depth:	3.61" (9.16 cm)
Weight:	
Cordless:	13 oz (.37 kg)
Corded:	6 oz (.17 kg)

2.1 OPERATIONAL

Speed Processor:	Digital Signal Processing (DSP) performs all signal analysis.
Operational Processor:	All functions are microprocessor controlled.
Manual Test:	All display segments checked; checks internal calibration and performs a cross check of quartz crystals for accuracy.
Automatic self-test:	Comparison of quartz crystals done periodically (5 minutes maximum), upon every mode change and at the time of lock. "Err 4" displayed if an error is found.
Lock Time:	Instantaneous.
PATROL window:	Displays Doppler patrol speed.
Target window:	Displays truncated target speed.
Lock/Fast Window:	Displays locked target speed or fastest vehicle in Fast mode.
Display Type:	Active matrix Liquid Crystal Display (LCD).
Back Lighting:	Fiberoptic, single Light Emitting Diode (LED).
Automatic Clear:	All locked displays are cleared when mode of operation changes.

Speed Range:	Meets IACP/NHTSA specifications. Stationary: Target channel sensitivity of 10 dB from 35 to 90 mph (56 to 144 km/h); 5 dB from 60 to 90 mph (96 to 144 km/h). Moving (Opposite direction): within 10 dB for targets between 40 to 90 mph (64 to 144 km/h). Maximum closing rate 210 mph (336 km/h). Moving (Same direction): 10 dB for target difference speeds of 5 to 25 mph (8 to 40 km/h).
Stationary:	10 to 210 mph (16 to 255 km/h).
Moving:	
Patrol:	10 to 80 mph (16 to 128 km/h) Typical patrol speeds to 120 mph (193 km/h).
Target	
Opposite Dir.:	Maximum target speed is a function of combined patrol and target speeds to 210 mph (336 km/h).
Same Direction:	Minimum difference: 3 mph (5 km/h) Maximum difference: 0.65 x Patrol Speed
Indicators:	
Stationary:	“TARGET” window displayed.
Moving:	“PATROL” and “TARGET” both displayed in window.

Low Battery	Flashing “BATT” displayed and an audio warning tone sounds every 2 minutes when internal battery voltage falls below approximately 6.6 VDC. Operator is prompted that approximately 15 minutes of transmitter operation remains.
Low Voltage:	Steady “BATT” displayed when internal battery voltage falls below approximately 6.2 VDC (minimum transmitter operating voltage). The transmitter is disabled, but locked speeds will remain. At approximately 6.0 VDC, the Talon shuts itself off.
Radio Frequency Interference:	“RFI” displayed during strong radio frequency interference. Active speed displays will blank during this condition. Locked speeds will remain.
Error:	“ERR x ” (where x is a number) displayed when an internal error in the operating system is detected. Active speed displays will blank. Locked speeds will remain.
Hold:	“HOLD” is displayed when the system is not transmitting. Controlled by the trigger in stationary mode or remote control in moving mode.

Opposite:	“OPP” displayed when in moving-opposite direction mode.
Same:	“SAME” displayed when in moving-same direction mode.
Lock:	“LOCK” displayed and flashing indicating locked target speed.
Fastest:	“FAST” displayed when fastest mode (stationary or moving-opposite) selected. Flashes in locked fastest mode.
Slower:	“SLOWER” displayed in moving-same direction mode when operator-selected (if target is moving slower than patrol vehicle). Flashes in locked slower mode.
Microwave Source:	Gunn-Effect diode.
Beam Width:	$12^{\circ} \pm 1^{\circ}$.
Polarization:	Circular.
Power Density:	Less than 5 mW/cm^2 at aperture.
Power Output:	25 mW max, 15 mW typ.
Side Lobes:	25 dB below main lobe.
Receiver:	Low Noise Schottky diode.
Weather Resistant:	For use outside vehicle.

3. INSPECTION AND INSTALLATION

3.0 INITIAL INSPECTION

Before installing your Talon, please take a moment to carefully inspect the shipping carton for damage. Contact the shipping carrier at once if you notice any damage.

Remove the unit from the shipping carton and check the packing list against your original purchase order. If the shipment is incomplete or parts are missing, please contact Kustom Signals Customer Service Department at 1-800-835-0156, or (620) 431-2700.

3.1 MATERIALS SUPPLIED

The following equipment is normally included:

- Antenna/Display Unit
- Corded Handle
- Dash Mount
- Mounting Pod
- Remote Control
- 55 mph Tuning Fork
- 30 mph Tuning Fork
- Speedometer Pulse Cable
- Operator's Manual

OPTIONAL

- Fastest Vehicle Mode
- Same Direction Mode
- Battery Handle
- 110V Trickle Charger
- Fast Charger with 12VDC Charging Cord
- AC Adapter for Fast Charger (110V or 220V)
- Battery Pack w/charger
- Heavy Duty Carrying Case
- Auxiliary Power Receptacle Cable

3.2 CABLE INSTALLATION

3.2.1 AUXILIARY POWER RECEPTACLE

Cigarette lighter receptacles have been the traditional source of power for traffic radar over the years. In newer vehicles, it is possible that poor grounding of this receptacle and electrical noise from various sources can combine to create an unacceptably high level of electronic interference.

This interference can affect the radar's performance in several ways: decreased range, no target speeds being displayed, or abnormal tones or noise in the audio. An auxiliary power receptacle and cable, which mounts under the dashboard and wires directly to the battery, is available from Kustom.

1. Mount the receptacle in the desired location using the hardware provided.
2. Connect the black wire to the receptacle's mounting bracket. Connect the white wire (with Faston terminal) to the rear plug of the receptacle. Route the cable through the firewall and up to the battery.
3. Connect the white wire of the power cable to the battery (+) positive terminal and the black wire to the (-) negative terminal.
4. The auxiliary power receptacle is supplied with a 2 amp fuse to protect the wiring and battery should the cable become shorted.

3.2.2 SPEEDOMETER PULSE CABLE

This cable sends information about patrol speed from the vehicle speedometer cable to the processing circuitry. The radar then can find and display patrol speed faster.

1. The speedometer pulse cable has a connector at one end which plugs into the mounting pod of the Talon, next to the remote control connector.
2. The red wire (inner conductor) of the cable will be connected to the patrol vehicle's electrical speedometer input cable using the splice connector provided. Due to the vast amount of models, makes and years of vehicles we have moved access to specific vehicle diagrams online, where information can be better maintained and distributed.

Installation details can be accessed at:

<http://www.kustomsignals.com>
(select: radar fixed mount)

If your vehicle year, make and/or model is not listed or you need hard copies, please contact Kustom's Customer Service Department at (800) 835-0156. If you are outside of the US and Canada, please call (620) 431-2700.

NOTE: Only the inner conductor of the speedometer pulse cable is used. The outer shield is not connected.

3. The speedometer interface will be set up later, in Section 6.6.

3.3 RADAR INSTALLATION

1. The Talon is shipped with the handle (corded or cordless) attached. For dash mounting, remove the handle by pressing the blue release button (latch) on the bottom of the indicator and sliding the handle backwards.
2. Locate the dash bracket and mounting pod. Fasten the mounting pod to the dash bracket, then slide the Talon onto the pod by placing it in front of the pod and sliding backwards. The mounting pod may be turned 90° on the mount and the Talon slid onto it from the side. Position the radar and mount in a suitable location on the dash within view of the driver and in a safety zone during airbag deployment. Normally this will be to the left or right of the steering wheel as space permits.
3. Connect the Talon's power cable to the proper power source. See Section 3.2.1.
4. Momentarily press the PWR switch on the rear panel of the Talon. (Refer to Section 4.1 for location and function of the switches.) The Talon will proceed through an indicator test, internal test and several other reliability tests. Select the Stationary mode of operation by pressing the MODE switch, if required. (If "PATROL" is displayed, press the MODE switch.) Only "TARGET" will be displayed in the stationary mode.
5. Momentarily press the AUD (audio) switch. The TARGET window will display "Aud" and a number from 0 to 5 indicating the audio level. With "Aud" displayed, press the RNG (range) switch until level 4 or 5 is displayed. Also, with "Aud" displayed, press the MODE switch, which will unquiet the audio.

6. Start the patrol vehicle and position the A/C-heater fan to a mid-range speed. Move the Talon left or right of its initial location and listen for any raspy sound (fan interference) in the audio. Position the Talon to minimize the amount of interference.

CAUTION: Review the airbag warning statement shown earlier in this manual before securing the dash bracket.

7. When a suitable location is found, secure the dash bracket to the windshield using the suction cups and Velcro, or permanently mount the bracket to the windshield.
8. Position of the antenna:
 - Moving: Aim the antenna parallel to the ground and straight down the roadway.
 - Stationary: Unit may be moved on the mount or handheld to achieve maximum performance and pointed directly toward the vehicles being monitored.

4. UNIT DESCRIPTION

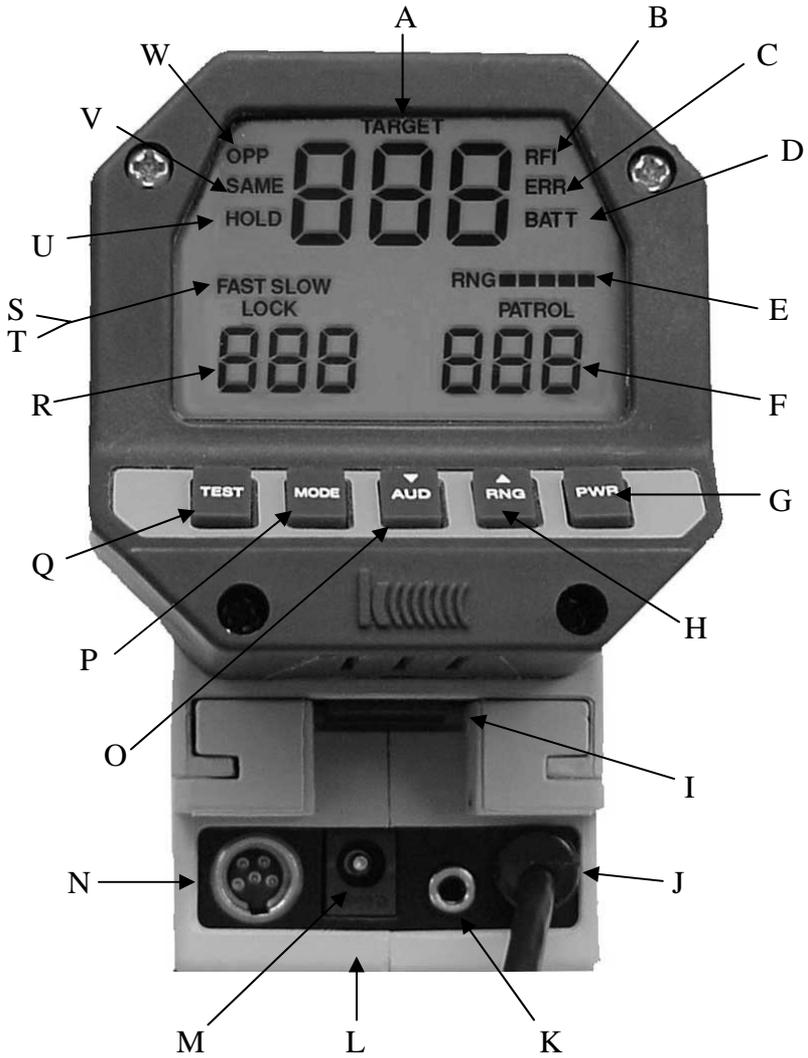
4.0 SIDE VIEW



When the handle is attached, the Talon operates in Stationary Mode only. The trigger is used to:

- Activate the transmitter
- Lock the active target speed
- Control the optional fastest vehicle feature

4.1 REAR PANEL



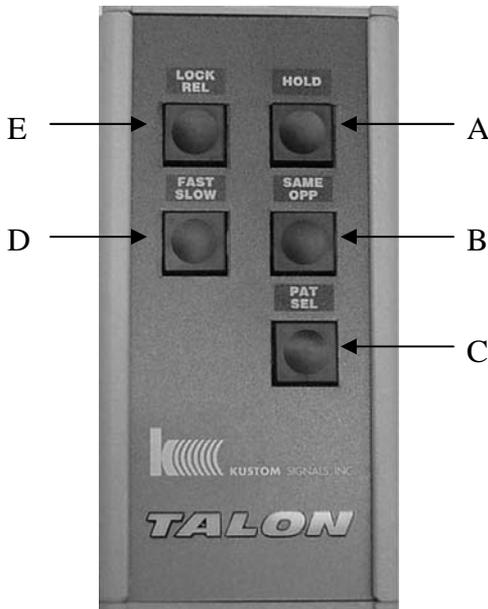
Section 4--Unit Description

A. TARGET	Displays target vehicle speeds in stationary and moving modes.
B. RFI Indicator	Lights when an excessive amount of RF interference is present.
C. ERR Indicator	Lights when an internal error has occurred.
D. BATT Indicator	Indicates when the battery or external power source is below the minimum operating voltage.
E. RNG (Range) Indicator	Bar graph display shows set level of range control.
F. PATROL	Displays the patrol vehicle speed.
G. PWR	Turns radar on or off.
H. RNG (Range)	Places the Talon in the range set mode. Secondary function is the increment (up) control.
I. Latch	Press to unlock radar from pod or handle.
J. Power Cable	Permanently attached to the pod.
K. Remote Control	Accepts the remote control jack.
L. Mounting Pod	Allows attaching the Talon to a dash mount and contains circuitry for the moving mode and for interfacing to other equipment.

Section 4—Unit Description

M. Speedometer Input	Accepts Speedometer Cable connector.
N. Data Port	RS232 I/O port which provides patrol and target speed information to an Eyewitness in-car video system or other equipment.
O. AUD (Audio)	Displays the audio level currently selected. Secondary function is the decrement (down) control.
P. MODE	Selects moving or stationary operating modes. Also used to turn the backlight feature on or off.
Q. TEST	Used to test the internal accuracy and to light all indicators. Also used to access the Backlight feature.
R. LOCK/Fast Display	Displays locked and fastest vehicle targets.
S. FAST Indicator	Lights when the fastest vehicle mode has been activated.
T. SLOW Indicator	Lights when in moving - same direction, slower mode selected.
U. HOLD Indicator	Indicates when the Talon is in the non-transmit mode.
V. SAME Indicator	Lights when in the moving - same direction mode.
W. OPP (Opposite) Indicator	Lights when in the moving—opposite direction mode.

4.2 REMOTE CONTROL



The remote control operates through the mounting pod. The unit plugs into the pod and allows direct control of the following functions:

- | | |
|-------------------------------|---|
| A. HOLD | Turns the microwave transmitter on and off. |
| B. SAME/OPP | Switch selects either the (target) same or opposite direction modes. |
| C. PAT SEL
(Patrol Select) | This switch will blank and recall a locked patrol speed. It is also used for setting minimum patrol speeds and synchronizing the speedometer input. |

D. FAST/SLOW 1) In stationary or moving/opposite direction modes, turns fastest vehicle mode on or off. 2) In moving/same direction mode, tells the processor the patrol vehicle is traveling slower than the target vehicle.

NOTE: Fastest can be operated one of two ways. See Sec. 13, Options, for details.

E. LOCK/REL Locks and releases target and patrol speeds.

5. GENERAL THEORY OF OPERATION

5.0 GENERAL

The Talon radar system transmits a radio frequency on Ka-Band, in compliance with the Federal Communications Commission (FCC) regulations. In stationary mode, a portion of the transmitted signal strikes a moving target, traveling toward or away from the transmitter, and the reflected signal is received at the antenna. From the antenna, the signal travels to the Digital Signal Processing (DSP) where it is used to compute the speed of the target.

In the moving mode, a portion of the transmitted signal strikes the surface of the roadway and surrounding terrain and reflects back to the antenna. The returning signal is the “low” Doppler. From the antenna, the signal travels to the Digital Signal Processing (DSP) where the speed of the patrol vehicle (groundspeed) is derived and displayed in the PATROL window.

With speedometer pulse input, the DSP compares the indicated patrol speed from the vehicle’s speedometer and is directed to “look” for the microwave low Doppler signal in an area around this speed. If a low Doppler signal is found, it is counted and displayed in the PATROL window. The Talon does not use the speedometer input other than to direct the DSP toward the desired area.

A portion of the transmitted signal strikes an oncoming vehicle (target vehicle) and returns to the antenna at a higher frequency because the two objects (patrol vehicle and target vehicle) are converging. This returning signal is the “high” Doppler. Then the Talon measures the speed of convergence, or combined speed, of the patrol vehicle and target vehicle.

After receiving the “high” Doppler signal, the Talon automatically computes the difference between the speed of the patrol vehicle and the target vehicle. The speed of the approaching vehicle registers in the TARGET display. If for example, a patrol vehicle is traveling at 50 and an approaching vehicle is traveling at 70, the Talon would process the groundspeed of 50 and combined speed of 120. The DSP would subtract the patrol speed from the combined speed to determine the target speed ($120-50=70$). The PATROL display would indicate 50 and the TARGET display would indicate 70.

In the Same Direction mode, the “low” Doppler and the “difference” Doppler signals are received and sent to the DSP. The Difference Doppler is the speed difference between the patrol vehicle and the vehicle traveling in the same direction. The Talon will display the patrol speed then add or subtract the “difference” speed to the patrol speed for the target speed.

Assume the patrol vehicle’s speed was 50, and the target was traveling in the same direction at 70. The Talon would display the patrol speed as 50 and add the “difference” Doppler signal (20) to the patrol speed and display 70 in the TARGET display. ($50+20=70$)

5.1 MICROWAVE RF EMISSIONS

Traffic radar operators may have some questions about the biological effects of exposure to the microwave energy produced by traffic radar devices. According to all credible evidence, the emission levels resulting from traffic radar use pose no threat whatsoever, either to the radar operator or to target vehicle occupants.

One widely recognized authority for safe limits of nonionizing radiation exposure is the American National Standards Institute, which recommends maximum exposure levels for the frequencies on which the Kustom Signals traffic radar systems operate (ANSI/IEEE C95.1-1992, "Standard for Safety Levels With Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz"). These exposure levels, expressed in terms of power density, are 7 mW/cm^2 for X-Band radar, and 10 mW/cm^2 for K-Band and Ka-Band radar units. Similarly, the Occupational Safety and Health Administration (OSHA), a division of the U.S. Department of Labor, recommends a 10 mW/cm^2 exposure limit for all three frequency bands ("Radiation Protection Guide", 29 CFR, Chapter XVII, Subpart G, Part 1910.97). This limit is clearly accepted by most reputable scientific and medical authorities.

Kustom Signals radar systems utilize microwave transmitters which produce aperture power densities, measured directly at the face of the antenna, in the range of approximately 0.3 to 2.3 mW/cm^2 . Typical levels for the vast majority of units are in the 0.4 to 1.0 mW/cm^2 range, which is but a small fraction of the recognized safe limits. Bear in mind that these are level measurements taken directly in the main beam of the antenna, and that the power densities produced at the sides and rear of the unit are typically at least one hundred times lower than in the main beam.

Another reference document on this topic is a DOT publication entitled “Field Strength Measurements of Speed Measuring Radar Units” (NHTSA Technical Report #DOT-HS-805 928). This report documents a series of tests performed by the National Institute of Standards (formerly the National Bureau of Standards) on twenty-two (22) commonly used models of traffic radar units, from six different manufacturers including Kustom Signals. Aperture power density levels measured were from 0.25 to 2.82 mW/cm², while back-lobe power density values ranged from 0.001 to 0.02 mW/cm². These measurements were obtained with the radars mounted inside vehicles, as in normal operating conditions. Since the NIST study, other laboratories have duplicated these types of measurements, producing consistently similar results.

For a free copy of the latest information regarding the safe human exposure standards, please call or write Kustom Signals to request the “RF Emissions Packet.” You may contact us at our corporate headquarters:

Kustom Signals, Inc.
9325 Pflumm Road
Lenexa, KS 66215-3347
(913)492-1400
(913)492-1703 FAX

While traffic radar devices do emit microwave energy, the levels are so low that there are no probable harmful effects. You may use your Kustom Signals radar unit with complete confidence in its safety, as well as in its accuracy.

6. TESTING PROCEDURES

6.0 GENERAL

The internal test and tuning fork tests explained below should be conducted at the beginning and end of each patrol shift to ensure the accuracy and functionality of the unit. The results of these tests may be recorded in a radar log, or officers shift log.

6.1 POWER ON

Press and release the PWR switch. The unit will light all display segments and perform a crystal cross check to verify the accuracy of the speed processing circuitry.

If these tests pass, the unit will display “32” in the TARGET display window, stationary mode, or both target and PATROL display windows in the moving mode. This will remain for approximately one (1) second. The displays will clear and the unit will be operational.

6.2 AUTOMATIC SELF-TEST

As long as the unit is turned on, the Talon performs an internal accuracy test every 5 minutes or whenever the unit’s mode of operation is changed, such as moving to stationary, and each time the target speed is locked.

This test is automatic and will not interfere with any radar speed readings being taken. The test does not appear in the displays, but if an error is detected, the ERR indicator will be turned on and no further speed readings will be displayed.

6.3 MANUAL TEST

The operator can manually perform the indicator and internal tests at any time during normal radar operation—just press and release the Test switch. The indicator test will be performed followed by the display of “32” in the TARGET window in Stationary Mode and in both Target and PATROL windows in Moving Mode, indicating the internal crystal cross-check has been successfully completed. The unit will then return to normal operation.

If either the manual or automatic internal test fails, the ERR indicator will be turned on and no further speed readings will be displayed. The unit should be removed from service and sent to an authorized service center for repair.

INTERNAL TEST TOLERANCE: 0

6.4 TUNING FORK TESTING

Supplied with the Talon are two tuning forks, 30 and 55 mph (45 and 80 km/h). These tuning forks will simulate targets in the stationary, moving opposite and moving same direction modes.

The tuning fork tests should be conducted in an area with no traffic. If this is not possible, point the Talon upward to avoid reflections from moving vehicles.

6.4.1 STATIONARY TUNING FORK TEST

1. Place the Talon in the stationary mode of operation.
2. Verify the range level is set to maximum. Press the RNG switch to display “rnG”, then use the UP arrow to increase the range level to maximum.
3. Lightly strike the lower speed tuning fork on a hard, nonmetallic surface. Place the fork in front of the antenna and pull the trigger, if the unit is attached to the handle. If it is mounted on the pod, make sure the HOLD light is not on. Verify a target speed display of the value stamped on the tuning fork, ± 1 mph (± 1 km/h).
4. Repeat for the higher speed tuning fork.

6.4.2 MOVING-OPPOSITE DIRECTION TUNING FORK TEST

1. Attach the unit to the mounting pod and select moving mode, opposite direction. (Press the SAME/OPP switch on the remote, if necessary, to select opposite direction. The OPP indicator will be lit.)
2. Ensure the HOLD indicator is off.
3. If the speedometer pulse input is being used, press the TEST switch to momentarily bypass the speedometer input. This will allow the PATROL window to ignore the speedometer input and display the tuning fork speed. When the radar once again detects speedometer pulses, the unit will automatically use the speedometer input again.

4. Lightly strike the lower speed tuning fork on a hard, nonmetallic surface and place it in front of the antenna. The PATROL window should read the speed stamped on the tuning fork, ± 1 mph (± 1 km/h).
5. While holding the lower speed fork in front of the antenna, lightly strike the higher speed tuning fork and place it in front of the antenna. The TARGET window should display the difference between the lower fork and the higher fork.

TARGET display tolerance is ± 1 mph (1 km/h).

6.4.3 MOVING--SAME DIRECTION TUNING FORK TEST

1. From the moving mode, press the SAME/OPP switch on the remote control and place the unit in the Same Direction mode. The SAME indicator will be lit.
2. Lightly strike the higher speed tuning fork on a hard, nonmetallic surface and hold it in front of the antenna. The PATROL window should display the speed stamped on the fork, ± 1 mph (± 1 km/h).
3. While holding the high speed tuning fork in front of the antenna, lightly strike the lower speed tuning fork and hold it in front of the antenna. The TARGET window should display the sum of the higher and lower speed tuning forks.

TARGET display tolerance is ± 1 mph (± 1 km/h).

6.4.4 TUNING FORK TEST FAILURE

If the proper speed readings are not obtained during the previous tests, check the following:

1. Verify that the tuning forks are the proper tuning forks supplied with the unit.
2. Striking the tuning fork too hard or on a metallic surface will cause spurious overtones from the tuning fork. This may cause the speed readings to be double the specified speed. Also, moving the tuning fork while in front of the antenna may cause the speed reading to be slightly lower or higher than specified. These readings are only momentary and the proper readings should appear as the false overtones dissipate.
3. Ensure that the Talon is in the transmit mode and the range control is set to maximum.
4. If the proper readings cannot be obtained, remove the unit from service and send to an authorized service center for repair.

6.5 SPEEDOMETER VERIFICATION

Before the Talon can be used with the speedometer pulse input, the radar unit must be synchronized with the speedometer.

1. After installation and initial testing with tuning forks, the Talon should be driven at a constant speed, between 30 and 70 mph (48 and 112 km/h). Press the PAT SEL switch on the remote control twice. “Snc” will appear in the TARGET window and patrol speed will appear in the PATROL window.

2. Verify the patrol speed displayed matches the speedometer reading, and press the LOCK/REL switch. This tells the DSP processor that the current speedometer reading and the low Doppler patrol speed reading agree, within speedometer tolerance limits.
3. After approximately two (2) seconds, a synchronization number will appear in the LOCK window. Typically this number will be around 35 for Ford products. This indicates the Talon is reading and comparing the speedometer speed input and the true low Doppler patrol speed.

NOTE: ONLY THE ACTUAL DOPPLER SIGNAL IS USED FOR PATROL SPEED. THE SPEEDOMETER INPUT IS USED ONLY TO STEER OR GUIDE THE DSP TO “LOOK” FOR THE PATROL DOPPLER SIGNAL IN A SPECIFIC AREA, IGNORING OTHER SIGNALS.

4. During normal operation, at patrol speeds below the minimum limit of 10 mph, 16 km/h, or when a “low” Doppler signal cannot be found, the PATROL window will display two dashes (--), indicating that the speedometer speed is being received but a patrol speed cannot be found or displayed. As an example, when a patrol vehicle is slowing down and the speed drops below the minimum speed, dashes will be displayed.

6.6 MINIMUM PATROL SPEED SET

1. When the speedometer input feature is not used, the Talon allows the operator to set a minimum patrol speed of 10, 20, 30 or 40 mph (16, 32, 48 or 64 km/h).
2. To activate this feature, place the unit in the moving mode and press the PAT SEL switch one (1) time. The unit will display “Pat” and the last selected minimum patrol speed will be displayed. Default is the lowest value (10 mph/16 km/h).

To change the value, immediately press the remote’s LOCK/REL switch. Repeat until the desired value appears. Once the desired minimum value is selected, the unit will time out in 2 seconds and the last displayed value will be accepted as the new minimum patrol speed.

3. To display the existing minimum patrol speed, press the PAT SEL switch one (1) time. The current minimum patrol speed will be displayed in the PATROL window. After two (2) seconds, the Talon will return to normal operation.

6.7 MOVING MODE TEST

Drive at a constant speed and compare the patrol vehicle’s speedometer and the Talon’s patrol speed display. These readings should be the same, or within reasonable limits, allowing for minor speedometer error.

If a discrepancy is found, the radar unit should be removed from service until the error can be corrected.

7. SYSTEM OPERATION

7.0 OPERATING MODES

The Talon radar system offers the operator one of the most versatile Ka-Band traffic radar systems available today. Use it as a handheld or dash-mounted stationary radar. Use it with the battery handle or corded handle. Use it dash-mounted as a moving radar, with same or opposite direction options.

NOTE: The following guide to operating the Talon radar system is not intended to be a training program. Before operating this unit or any other traffic radar system, Kustom Signals recommends that all operators have prior training in radar speed monitoring devices. Such courses are offered by Kustom Signals, various state and local agencies and either IPTM (Institute of Police Technology and Management) or Northwestern University.

7.1 SETUP

For hand-held stationary operation, use the corded or cordless handle. The corded handle requires external power from a portable battery pack, auxiliary power receptacle (see Sec. 3.2.1), or the patrol vehicle's cigarette lighter receptacle. For complete portability, use the optional battery handle.

For dash-mounted operation, attach the Talon to the mounting pod, plug in the remote control and speedometer cable (if used), and plug the power cord in (see Sec. 3.3 and 3.2.1).

7.1.1 BATTERY CHARGING

For cordless operation, the Talon battery handle must be charged before use. Remove the battery handle by turning the unit upside down, and press the blue handle release button (latch) located directly behind the handle. Slide the handle off the unit and connect the battery charging cable to the bottom of the handle. The charging time will vary depending upon the amount of discharge, but typically overnight will completely charge the Talon's battery.

The standard charger supplied with units sold in the United States is a trickle (timed) charger, which will recharge the Talon's battery in 14-16 hours then shut itself off. Please note—any interruption in the 110V power supplied to the charger will cause it to reset and begin the charging cycle again.

The optional fast charger allows charging directly from the vehicle's cigarette lighter receptacle. The Talon may be used during charging with no decrease in the radar's effectiveness. Charging will take less than 2 hours, even with the radar in normal use. The optional AC adapter allows charging from standard AC current (110V or 220V). Charging will take approximately 1 hour, and is shown by a steady green LED. Full charge is shown by a flashing green LED. Once full charge has been reached, the charger ceases charging and goes into a maintenance mode, protecting the battery against overcharging. A red LED indicates the battery is out of temperature tolerance and cannot be charged until its temperature falls within the proper range.

7.1.2 BATTERY OPERATION

The Talon has an onboard battery monitor that notifies the operator when battery voltage (internal or external) is approaching or has fallen below the Talon regulation threshold. First the monitor senses the condition where 15 minutes of transmitting battery life remains. A flashing “BATT” indicator and an audio warning tone every two minutes notifies the operator that only 15 minutes of battery life remains. Speed data can still be taken until the internal battery voltage level drops below the minimum operating level. When minimum operating voltage is sensed, the transmitter is disabled, last locked speed is preserved and the “BATT” indicator becomes steady. When the voltage falls further, the Talon shuts off.

7.1.3 LOCATION

1. For stationary operation, select an area that provides a good view of the traffic to be monitored.
2. Check the immediate area for potential interference sources, such as large reflecting signs in the direct path of the radar’s microwave beam, power substations and other potential sources of electrical interference.
3. Position the patrol vehicle in a safe location, with easy access to the roadway.

NOTE: Cosine effect, the angle between the target’s direction of travel and the path to the radar, in the stationary mode, will ALWAYS be in the driver’s favor. Refer to the National Highway Traffic Safety Administration’s “Basic Training Program in RADAR Speed Measurement” for speed reduction information due to cosine angle.

7.1.4 ADJUSTING AUDIO

Adjust the Doppler audio for the desired listening level. Press the AUD switch. The TARGET window will display “Aud” and the PATROL window will display the current audio level. This display will remain for approximately two (2) seconds unless another switch is pressed.

While “Aud” is displayed, press either the down arrow (Audio) or up arrow (Range) to decrease or increase the audio level. The displays will return to their normal mode two (2) seconds after the last switch is released.

7.1.5 AUDIO UNSQUELCH

To unquench the audio, press AUD then press MODE while “Aud” is showing in the TARGET window. “Un” will be displayed, and the audio will be unquenced. To return to quenced audio, repeat this step.

7.1.6 RANGE

Set the range control to the desired level. Press the RNG switch and “rnG” will be displayed, along with the current level (0-5). Also, the range bar graph will indicate the current level. The range can be increased or decreased by pressing the up arrow (Range) or down arrow (Audio). The Talon will return to normal operation with the new range level approximately two (2) seconds after the last switch activation.

Range level 5 is the maximum range, and range level 1 reduces the Talon’s range to its minimum distance, typically 250 feet (90 meters). Some states or departments require a minimum range level of “0”. The Talon may be ordered with the minimum set level of “0” instead of “1”.

7.1.7 BACKLIGHT

For low light operation, press and hold the TEST switch for approximately 1 second, then press the MODE switch to turn the backlight on. Repeat to turn off.

7.2 OPERATION - HANDHELD

7.2.1 SETUP

1. Attach the corded or battery handle. Turn the unit on. It should come on in Stationary Mode. If not, press the Mode switch once.
2. Set the range and audio levels as needed.
3. Point the Talon at the intended target vehicle and pull and hold the trigger to complete the tracking history.
4. Complete a tracking history on the target vehicle.
 - A. Observe the target and surrounding traffic.
 - B. Estimate the speed of the target vehicle.
 - C. Listen to the audio pitch and compare the pitch to the estimate of speed in B.
 - D. Observe the speed reading shown on the Talon's TARGET window. It should correspond with B and C above. Continue tracking the target vehicle as required for proper target identification.
 - E. If any of the above elements do not agree, the reading must be disregarded.

7.2.2 TARGET LOCK

1. To lock the target speed reading, release the trigger. A short audio alert tone will be heard in the speaker and the target speed will be locked and flash in the LOCK window.
2. To allow additional tracking of the target vehicle, the Talon will continue to transmit and display the Target speed for 5 seconds after the trigger is released. At the end of that time, the TARGET display will blank.
3. To release a locked speed, pull and release the trigger. The LOCK window will blank. No speeds can be recalled.

NOTE: Some models, due to state or local law, require an automatic unlock feature. The Talon software has a feature that, when enabled, will unlock all locked speeds when 15 minutes has elapsed.

7.2.3 FASTEST VEHICLE MODE - (OPTIONAL FEATURE)

1. To display the speed of the fastest vehicle in the radar's range, pull the trigger twice within $\frac{1}{4}$ second, holding it pulled the second time,. As long as the trigger is held, the Talon will remain in fastest vehicle mode. The FAST indicator will light.
2. Releasing the trigger will lock the speed in the LOCK window. An alert tone will sound, the FAST indicator will flash, and the TARGET window will continue to track the fastest vehicle for five (5) seconds then the TARGET window will blank.

7.3 OPERATION—DASH MOUNTED

7.3.1 SETUP

1. Turn unit off; unplug power cord. Remove the handle from the Talon by pressing the handle release button (latch) on the bottom of the indicator.
2. Slide the indicator onto the mounting pod, pushing rearward until the release button clicks, indicating the unit is securely in place.
3. Connect the remote control and speedometer input cables as required. Plug the unit in, turn on.
4. Set the range and audio levels as needed; select operating mode.
5. Aim antenna directly at vehicles being monitored.

7.3.2 STATIONARY MODE

1. Complete a tracking history as described in Sec. 7.2.1 Step 4.
2. To lock a speed, press LOCK/REL on the remote control. To release a locked-in speed, press again. See Sec. 7.2.2 for details.
3. To shut off the transmitter, press HOLD on the remote. The HOLD indicator will light, and the TARGET display will blank (locked speeds will remain). To return to normal radar operation, press HOLD again.
4. To access the Fastest Vehicle mode, press and hold FAST/SLOW on the remote control. The FAST indicator will light, the fastest speed will be displayed in the LOCK window, and the strongest signal speed will be displayed in the TARGET window.

7.4 MOVING MODE—OPPOSITE DIRECTION

1. Place the Talon in the moving mode by pressing the Mode switch, if needed, so that both the TARGET and PATROL windows' indicators are lit. Select Opposite Direction mode by pressing SAME/OPP if necessary on the remote control (the OPP indicator will be lit).
2. While driving, observe traffic and complete a tracking history as described in Section 7.2.1 Step 4 and verify the radar's patrol speed reading with the patrol vehicle's speedometer. When all elements agree, enforcement action may be taken.

NOTE: If an incorrect Patrol speed is obtained, the operator can go in and out of HOLD quickly. This will clear all previous speeds, and a new patrol speed search will be initiated.

7.4.1 HOLD MODE

The Talon may be placed in the Hold mode (non-transmit) by pressing HOLD on the remote control. The HOLD indicator on the rear panel of the Talon will light and the displays will blank (locked speeds will remain). To return to normal radar operation, press HOLD again.

7.4.2 MOVING MODE – TARGET LOCK

1. To lock the target speed reading, press the LOCK switch. A short alert tone will be heard and the LOCK window will display the speed of the target vehicle.
2. The Talon will continue to track the target and patrol speeds.

3. When the patrol vehicle's speed has dropped 10 mph (16 km/h) below the speed when lock was activated, or the Talon is placed in Hold, the patrol vehicle's speed, at the time of lock, will flash in the PATROL window.

NOTE: This allows the operator to continue to track the target while monitoring the patrol vehicle's speed and still retain the locked patrol speed.

4. The locked speeds may be unlocked by:
 - A. Pressing the remote's LOCK/REL switch.
 - B. Auto-unlock after 15 minutes, if activated.
 - C. Changing the mode of operation, moving to stationary.

7.4.3 MOVING MODE – PATROL SELECT

To blank the flashing locked patrol speed display, press the "PAT SEL" switch on the remote control. Pressing the switch again will return the PATROL display.

7.4.4 MOVING MODE – FASTEST VEHICLE (OPTIONAL FEATURE)

1. With the unit operating in the moving mode, observe traffic.
2. The Talon allows two methods of fastest vehicle mode (Push and Hold or Toggle control). See Sec. 13, Options, for selecting the preferred method.
3. The FAST indicator will be lit, the fastest speed will be displayed in the LOCK window and the strongest signal speed will be displayed in the TARGET window, and the patrol speed will continue to track.

7.4.5 MOVING MODE – FASTEST VEHICLE LOCK

1. To lock the fastest vehicle speed, momentarily press the LOCK/REL switch on the remote control.
2. After a short alert tone, the Fast display will indicate Lock, the TARGET window will track the fastest speed and the PATROL window will track patrol speed.
3. The Talon will continue to track the speeds as in Section 7.4.1.

7.5 MOVING MODE – SAME DIRECTION (OPTIONAL FEATURE)

1. Select the moving mode, same direction by pressing the SAME/OPP switch on the remote control. The SAME indicator will be lit.
2. While driving, observe traffic traveling the same direction as the patrol vehicle.
3. Complete a tracking history, and verify the patrol speed agrees with the speedometer speed reading.

NOTE: If an incorrect Patrol speed is obtained, the operator can go in and out of HOLD quickly. This will clear all previous speeds, and a new patrol speed search will be initiated.

NOTE: The minimum difference in speed between the patrol vehicle and the target vehicle is 3 mph (5 km/h). The maximum difference is 0.65 x Patrol Speed (65% of Patrol Speed). (For a patrol speed of 50 mph, the maximum difference speed would be 32. For a patrol speed of 65, the maximum difference speed would be 42.)

4. If the target vehicle is traveling slower than the patrol vehicle, the operator should press and hold the FAST/SLOW switch on the remote control. The SLOW indicator will be lit.
5. When the switch is released, it will remain active for approximately two (2) seconds. This will allow the operator time to lock the target speed reading.

8. INFLUENCES AND INTERFERENCE

Interferences from external sources may affect the standard operation of any radar device, including the Talon. These influences can be natural or man-made, however the Digital Signal Processing circuitry will eliminate most of these influences and a knowledgeable operator should be able to determine the nature of the influences and their effect, if any, on the performance of the Talon.

8.0 NATURAL INFLUENCES

1. Heavy rain and blowing dust can cause a scattering effect which may reduce the effective range of the Talon. The patrol speed can also be affected by driving rain. It is recommended that the operator compare the patrol speed reading and the speedometer reading frequently during rainy periods.
2. Terrain can affect the range of the Talon. Improper aiming of the antenna can cause the radar to appear to have short range. If the target vehicle were on a slight incline, the antenna could be shooting short of the intended target vehicle.
3. Strong reflections from roadside objects, such as large signs, parked cars and buildings can cause double bounce reflections which are the same as the patrol speed. These “harmonics” are detected by the DSP, which inhibits their display.

The TARGET window will display “- -“ until this condition no longer exists.

8.1 MAN-MADE INFLUENCES

1. Radar units may display incorrect speed readings from various sources. These include shadowing, combined speeds, moving cosine and fan interferences (splitting speeds).

Unlike other radar, the DSP processor in the Talon can sense and eliminate most of the interferences that other radar might see as speeds during normal operation.

2. Patrol speed shadowing may occur when the radar unit receives a stronger signal from a large vehicle traveling the same direction than the groundspeed return signal of the patrol vehicle. This difference speed may be placed in the PATROL window and used instead of the proper patrol speed. See 8.2 below.
3. The combined speed effect can occur when the patrol vehicle and the target vehicle are approaching each other at low speeds, usually in the 25 to 35 mph (40 to 56 km/h) range each, and at relative short distances, usually less than 300 feet. The radar unit sees a strong reflection from the combined speed signal and analog radar units may display this speed instead of the true patrol speed. The Talon with speedometer input will eliminate this effect, and the unit will display the proper patrol and target speeds.
4. The Talon has an onboard battery monitor to alert the operator when internal voltage nears the minimum operating voltage. See Sec. 7.1.1 for details.

5. Radio Frequency Interference (RFI) exists when there are strong RF transmitters in the immediate area of the radar unit, such as the patrol vehicle's transmitting radio, high power radio or television stations. The Talon will detect these sources of interference, the RFI indicator will light, and all speed readings will be blanked, except for locked speeds, until the source of interference is reduced or eliminated.
6. Heater and A/C fan motors can cause a radar unit to display the fan's speed, rather than a weaker target vehicle's speed. A trained operator should not be confused by intermittent fan readings and the distorted audio. Proper antenna mounting, placement, and aiming will eliminate most of the potential fan interferences.
5. Vehicle ignition interference, See Section 3.3 for further details.

NOTE: Refer to the National Highway Traffic Safety Administration's Basic Training Program in RADAR Speed Measurement, June 1991, for further information on interferences and training guides.

8.2 GROUNDSPPEED

True groundspeed of the patrol vehicle is required by all moving traffic radar systems before a target vehicle's speed can be accurately computed. If the Talon loses correct groundspeed, the operator can recapture groundspeed by quickly activating and then deactivating the HOLD mode.

If the speedometer input is being used with the Talon, the DSP will accurately track even a weak patrol speed return due to the small tracking window, unlike radar without speedometer input.

The Talon will always look for and display groundspeed before displaying any targets. The groundspeed radar signature is unlike any target or interference signal. The DSP can identify this pattern, which is helpful in situations such as shadowing or combined speeds. While the speedometer input and DSP technology will eliminate most of the influences found in moving radar, it is still the responsibility of the operator to complete a tracking history on the target vehicle and verify the patrol speed with the patrol vehicle's speedometer. Close observation of the patrol vehicle's speed reading is recommended to avoid possible confusion.

NOTE: The Talon will not display patrol speeds below 10 mph (16 km/h).

Operating moving radar in the rain and snow requires the operator to pay close attention to the patrol speed. Since rain, fog and snow may affect the ability of the radar system to find groundspeed, the operator must verify the displayed patrol speed reading is correct.

9. CARE OF THE TALON

The Talon radar system is designed for long reliable use by law enforcement agencies. Following basic care guidelines will ensure the unit gives many years of trouble-free service.

9.0 ROUTINE CARE

1. Use a damp cloth to clean the outside of the radar unit if it becomes dirty. **DO NOT** use excessive water or any cleaners or sprays on the outer surface of the Talon's mounting pod or remote control.
2. As with all electrical or electronic equipment, protect the unit from water. While the Talon is a sealed radar unit, the mounting pod and remote control are not considered waterproof and if any liquid should get inside, remove power immediately and send the unit in to a repair facility. Prompt action can minimize any damage.
3. If the Talon is used outside in rain or snow, it should be wiped dry with a clean cloth as soon as practical.
4. There are no user serviceable parts in the Talon. The internal battery handle is protected by an automatic resettable fuse. The fuse for the mounting pod is located in the end of the cigarette lighter plug. Simply unscrew the tip and replace with the same size fuse.
5. Do not pick up or carry the Talon by the power or remote control cables. Broken power and remote control cables are a common cause of intermittent operation.

6. If the Talon exhibits decreased range over a period of time, the unit should be examined by an authorized service center for possible receiver diode degradation. Receiver diode degradation has no effect on the unit's accuracy, but will result in unsatisfactory target range.
7. Kustom Signals recommends periodic maintenance of the Talon radar system. Check with your local service center and judicial district for requirements.

9.1 EQUIPMENT REPAIR/RETURN

Should the Talon need repair or calibration from Kustom Signals Customer Service, the following information is required:

1. Department name, return shipping address, contact name at owning department, and phone number.
2. Complete description of failure or problem with unit. Please describe, in detail, what the failure is and when it is observed. **EXAMPLE:** In moving mode, targets are close to patrol vehicle before being displayed. Target speeds are not multiples of patrol speed.
3. Method of return shipment.

NOTE: Kustom Signals will return the unit via Ground transportation unless otherwise directed.

4. For further information, please contact Customer Service at: 1-800-835-0156, (620) 431-2700, or e-mail cs@kustomsignals.com

9.2 BATTERY DISPOSAL

It is a violation of Federal regulations to dispose of rechargeable batteries in a landfill. They must be recycled at an appropriate facility or otherwise disposed of in accordance with local ordinances, or they may be shipped back to Kustom Signals for disposal. For more information on disposal facilities near you, contact the Rechargeable Battery Recycling Corp. (RBRC) at 1-800-8-BATTERY, e-mail rbrc@rbrc.com, web page www.rbrc.com.

10. CASE LAW

This section is included so radar operators and those individuals responsible for prosecuting traffic arrests can familiarize themselves with the more important legal cases involving the use of traffic radar. To obtain additional information on the referenced material, consult your community's local law library or the prosecutor's office.

Since the Talon is a Doppler based traffic radar system, some older case law is presented because of its significance to the acceptance of the Doppler principles as well as the basic requirements of the tuning fork test and operator training.

Reference A – *State vs. Dantonio* (N.J.) 1955 115 A2d35, 49 ALR 2d 460. Landmark case on the acceptance of the Doppler principles as used in traffic radar.

Reference B – *State vs. Shelt* (Ohio) 1975 75-D O-3682, L-75-166. Establishes that the courts may take judicial notice of the reliability of moving radar.

Reference C – *Honeycutt vs. Commonwealth* (Ky) 1966 408 SW 2d 421. Court establishes that a tuning fork test is an accurate method of testing the accuracy of a radar unit and along with the visual observations of a trained operator, is an accurate means of determining the speed of vehicles.

Reference D – *Krueger, Pantos and Payne vs. State of California* 1986 (class action suit – suppression hearing on radar) 887092, DP44339 and DP54571. Court ruled that a properly built and tested radar used by a trained operator can accurately determine the speed of vehicles. The judge dismissed each of the defendant's claims that outside influences render the radar readings inaccurate in the moving mode of operation. He ruled that proper classroom and field training enables an officer to avoid any false or inaccurate readings due to outside influences.

The court held and took judicial notice of the accuracy of Doppler radar in both the stationary and moving modes of operation.

Reference E – Samuel Knight vs State of New York Superior Court. 72 N.Y. 2d 481, 530 N.E. 2d 1273 (1988). The court ruled that a trained operator, who properly tested the radar, observed the traffic and checked the patrol speed against the patrol vehicle's speedometer, can accurately determine the speed of vehicles while the patrol vehicle is moving. The court affirmed the lower court's ruling and accepted judicial notice of the radar in the moving mode of operation.

11. FCC RULES

11.0 TRANSMITTER RULES AMENDED

The Federal Communications Commission (FCC) has amended its rules to eliminate the required annual measurement of transmitter power, frequency and modulation and to specify transmitter power in terms of output power for licensees in the Public Safety, Industrial and Land Transportation Radio Services. The action was the result of a rule making procedure initiated October 29, 1976, on the request of HT&B Electronics.

Under the rules, which amend Part 89, 91 and 93, licensees are required to operate their transmitters within the specified technical parameters.

Each licensee must take effective measures to ensure the integrity of his communications system, including periodic evaluation of receiver performance in order that undue air time not be consumed in repeating messages lost through poor effective receiver sensitivity, the FCC said.

For the sake of convenience and simplicity of transmitter power measurement, the FCC specified that in the future, transmitter output power, rather than the direct current input power to the final radio frequency stage, be the standard parameter used to indicate transmitter power. The FCC defined transmitter output power as that power measured at the transmitter output terminals when connected to a load of the impedance recommended by the equipment manufacturer.

11.1 RADAR UNIT LICENSING AMENDED (PART 90)

The Commission has eliminated the requirement for local governmental entities licensed in the Public Safety Radio services to obtain a separate authorization for radar speed detection devices.

This change reduces paperwork for the Commission's licensing staff and for police and other local government units, which no longer have to apply for new radar authorizations or modify or renew existing licenses and may operate speed detection devices as part of their base/mobile communications systems.

To provide the Commission with a record of such units in use, the licensees are required to list the number of speed detection units and the frequencies on which they operate at the time of renewal of their land mobile authorization. Ordinarily, this would be once every five years and would not be a significant addition to the renewal process, the Commission noted.

This action became effective February 1, 1983.

If the owning department does not hold a Public Safety Radio license, but is dispatched by another agency, the owning department will need to obtain a Public Safety Radio license from the FCC. Filing FCC form 574 and obtaining a separate license will be required before placing the radar into service.

12. TROUBLESHOOTING

If an operating difficulty is encountered, check the following list of possible problems and solutions before returning the unit to the factory or local Service Center.

Problem	Possible Solution
No Power Indication	Check for proper voltage at cigarette plug. Reseat cigarette plug in the socket. Check fuses if using vehicle's cigarette socket.
Unit will not complete test cycle or shows ERR	Verify the power plug is secure. If the ERR message indicator is lit, power the unit off, then back on. If the problem persists, remove unit from service and record the error code.
No target speed reading during tuning fork test	Verify that unit is set for maximum range. Verify unit is not in HOLD Unsquench audio. Listen for Doppler tone. Lightly strike tuning fork to avoid harmonics.
No patrol speed during tuning fork test	Verify that the unit is not in HOLD. If speedometer input is used, press TEST switch before beginning tuning fork test.

No patrol speed during tuning fork test (cont.)

Verify the proper tuning forks are being used.

Lightly strike the tuning forks and retest.

Remove unit from service if above tests fail.

No target readings in stationary mode.

Verify unit is not in HOLD.

Verify range control is set properly.

Verify unit is aimed properly and the target is within range of the radar.

Unsquench audio and verify that a Doppler tone is heard when targets are present. If no Doppler tone is heard, remove unit from service.

No patrol speed

Verify unit is not in HOLD

Verify the unit is aimed parallel to the ground and straight down the roadway.

Verify there are no obstructions directly in front of the unit.

Weather conditions (heavy rain, snow or fog) may affect the unit's ability to pick up groundspeed.

- No patrol speed (cont.) Verify speedometer input is synchronized properly.
- Verify the patrol speed is above 10 mph (16 km/h) and below 100 mph (160 km/h).
- Place unit in stationary mode and drive patrol vehicle. Verify TARGET window displays proper groundspeed. If no speed readings, remove unit from service.
- Speedometer verification shows “0” Check speedometer input cable. Verify it is connected to unit and to proper input wire.
- Synchronize unit.
- If above tests fail, disconnect speedometer input cable, press TEST switch and continue using radar.
- No target readings in moving mode. Verify unit is not in HOLD.
- Verify the range control is set properly.
- Verify proper patrol speed is displayed.
- Verify proper moving mode is selected.
- Target speed may be a harmonic of patrol speed. Speed up or slow down patrol vehicle.

Short range

Remove unit from service if above tests fail.

Verify the range control is properly set for the desired distance to target vehicles.

Verify the unit is aimed properly.

Verify there are no obstructions between the unit and the target.

Weather conditions (heavy rain, snow and fog) may affect the unit's range.

Check for electrical interferences.

Strong fan interference will reduce the operating range of the unit.

NOTE: Use a shielded power cable (KSI p/n 155-2127-00) to eliminate the vehicle's electrical noise problems.

Remove the unit from service if the above tests fail.

13. OPTIONS

13.0 OPTIONS SETUP

The TALON radar unit allows the operator to change certain operating parameters of the unit. The following is a list of the available parameters. Each has a number after the option. An example will be given to instruct the operator how to change the unit.

<u>Option</u>	<u>Add</u>
No AUTO UNLOCK	0
Automatic UNLOCK	1
Track through Lock (5 seconds)	0
HOLD immediately after lock	2
Minimum Audio (level 0)	0
Minimum Audio (level 1)	4
Patrol Speed Blank	0
No Patrol Speed Blank	8
Fastest - Push and Hold	0
Fastest – Toggle	16
KSI Video Output	0
Gateway Output	32
DRU Style Output	64
Direct Video Output	96
MPH	0
KPH	128

13.1 OPTIONS DESCRIPTIONS

The following is a description of the function of each one of the Options the operator can set.

13.1.1 AUTOMATIC UNLOCKING OF LOCKED SPEEDS

The Talon defaults to not automatically unlocking speeds the officer has locked. If automatic unlocking is required, add 1 to the Options total.

NOTE: Due to state regulations, if this option has been turned on at the factory, it cannot be turned off in the field.

13.1.2 TRACK THROUGH LOCK (TRIGGER OPERATION)

The Talon defaults to transmitting for 5 seconds after the trigger is released when locking a target. This allows the target to be tracked after lock during this time. If preferred, the transmitter can be shut off immediately upon trigger release. To select that option, add 2 to the Options total.

13.1.3 MINIMUM AUDIO LEVEL

The Talon defaults to allow the audio level to be to 0 (audio off). If it is required that the audio cannot be turned off, add 4 to the Options total.

NOTE: Due to state regulations, if this option has been turned on at the factory, it cannot be turned off in the field.

13.1.4 PATROL BLANK

The Talon defaults to allow the operator to blank the locked patrol speed. If it is required that the lock patrol speed cannot be blanked, add 8 to the Options total.

NOTE: Due to international regulations, if this option has been turned on at the factory, it cannot be turned off in the field.

13.1.5 FASTEST OPERATION

The Talon offers two modes of fastest operation. The default mode is to push and hold the FAST switch. Fastest mode is active for as long as the operator holds down the FAST switch and for 2 seconds after it is released. The alternate mode is toggle; in this mode fastest is alternately turned on or off by pressing the FAST switch. If fastest toggle mode is desired, add 16 to the Options total.

13.1.6 INTERFACE OUTPUT PROTOCOL

The Talon defaults to allow the radar unit to interface the KSI Eyewitness video or giant display equipment. Contact Kustom's Customer Service Department at (800)-835-0156 or (620) 431-2700, before changing the output protocol option.

13.1.7 SPEED READING UNITS

The Talon defaults to displaying the speed-readings in miles per hour. If kilometers per hour reading are required, add 128 to the Options total.

13.2 OPTIONS EXAMPLES

Using the above options list, add all the numbers for the options you want active. NOTE: default options, such as MPH and Patrol Blank, have a value of zero (0). To enter the Options Menu mode, power the unit off, then press and hold the POWER switch until the power-on sequence stops. Press the TEST switch until OPT appears in the TARGET window and a number appears in the LOCK/E.T. window. This number may be zero.

Using the UP and DOWN arrows (AUDIO and RANGE switches), increase or decrease the number for the value needed. To make these changes permanent (until changed again), depress the MODE switch once. When the options have been accepted, the unit will automatically return to radar mode.

EXAMPLE: The operator wishes to permanently change the operation of the unit to the following: Automatic Unlock = 1, no Patrol Blank = 8, toggle Fastest function = 16, Gateway (unencrypted) output = 32 and MPH = 0. These numbers are added for a total of 57. When the menu function is entered (see above), use the UP and DOWN arrows to adjust the number shown in the LOCK/E.T. window until 57 is shown. The operator would then depress the MODE switch one time and the changes would be accepted and used every time the radar is powered up.

14. WARRANTY

1. Warranty Coverage.

The Kustom Signals Radar and Laser System (“Equipment”) is guaranteed to be free of defects in materials and workmanship for a period of two (2) years from date of shipment to the Owner or Lessee. This Warranty applies only to the original registered Owner or Lessee on file at Kustom Signals, Inc., and cannot be assigned or transferred to a third party.

2. Limitations.

Items covered under this Limited Warranty for the Equipment are any parts needed to replace/repair Equipment and/or alleviate issues with Equipment. Items that are excluded from this Limited Warranty are mounting hardware and consumable items such as non-rechargeable and rechargeable batteries. This Limited Warranty is not intended to supplant normal care and service by the Owner or Lessee, as specified in the Operator’s Manual, and shall not apply to Equipment which has been defaced or damaged through normal usage. The Owner or Lessee shall use the Equipment in accordance with the manufacturer’s operational instructions and failure to do so shall void this Limited Warranty.

3. Exclusive Remedy.

The Owner’s or Lessee’s exclusive remedy under this Limited Warranty is limited to repair to the manufacturer’s operational specifications or replacement of Equipment, at the sole discretion of Kustom Signals, Inc. or its agent, of the Equipment as (i) is covered by this Limited Warranty; (ii) is delivered to Kustom Signals, Inc. or its agent at the Owner’s or Lessee’s expense within the term of this Limited Warranty; and (iii) upon examination thereof discloses to the exclusive satisfaction of Kustom Signals, Inc. or its agent to have been defective in material or workmanship. Warranty service and repairs must be performed by an Authorized Kustom Signals Warranty Service Center or the Factory Customer Service Center or this Limited Warranty is void.

Failure of the Owner or Lessee to observe any conditions set forth in this warranty; or Equipment damage arising from flood, fire, vehicle collision, act of God or similar event or catastrophe; or tampering, abuse, or misuse of the Equipment by Owner, Lessee or third party will render the Owner or Lessee responsible for the cost of bringing the system within the manufacturer's operational specifications.

THE LIABILITY OF KUSTOM SIGNALS, INC., IF ANY, WITH RESPECT TO THE EQUIPMENT, SHALL BE LIMITED AS PROVIDED IN THIS LIMITED WARRANTY. KUSTOM SIGNALS, INC. DISCLAIMS ANY OBLIGATION OR LIABILITY FOR THE LOSS OF USE OF THE EQUIPMENT WARRANTED, LOSS OF TIME, INCONVENIENCE, COMMERCIAL LOSS OR OTHER DIRECT, CONSEQUENTIAL, SPECIAL OR INCIDENTAL DAMAGES. KUSTOM SIGNALS, INC. MAKES NO WARRANTIES OF ANY KIND OTHER THAN AS HEREIN EXPRESSLY PROVIDED, EXPRESSED OR IMPLIED, AND SPECIFICALLY DISCLAIMS THE IMPLIED WARRANTIES OF MERCHANTABILITY AND OF FITNESS FOR A PARTICULAR PURPOSE.

SOME STATES DO NOT ALLOW DISCLAIMING AN IMPLIED WARRANTY OR THE LIMITATION OR EXCLUSION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATIONS OR EXCLUSIONS MAY NOT APPLY. THIS LIMITED WARRANTY GIVES YOU SPECIFIC RIGHTS AND YOU MAY HAVE ADDITIONAL RIGHTS UNDER THIS WARRANTY THAT VARY FROM STATE TO STATE.

NO ACTION FOR BREACH OF THIS LIMITED WARRANTY MAY BE COMMENCED MORE THAN ONE YEAR AFTER THE DATE OF ALLEGED BREACH.

AIRBAG CAUTION

Equipment mounted in 1994 or later series police vehicles may interfere with the operation of passenger side airbags. Information is available directly from the automobile manufacturers regarding areas for safe mounting of equipment such as police radar.

Since this information will vary by vehicle make and model year, Kustom Signals recommends contacting the vehicle manufacturer and following their instructions with respect to mounting of radar units and other equipment.

For additional mounting suggestions, please contact the Kustom Signals Customer Service Department.

Kustom Signals cannot accept any liability for equipment, which has been mounted in conflict with the vehicle manufacturer's recommendation for proper airbag deployment.

