HR-12

HAND-HELD
TRAFFIC RADAR

OPERATOR'S MANUAL

KUSTOM SIGNALS, INC.
1010 W Chestnut/Chanute, KS 66720

KPN 006-0420-00
REV 2

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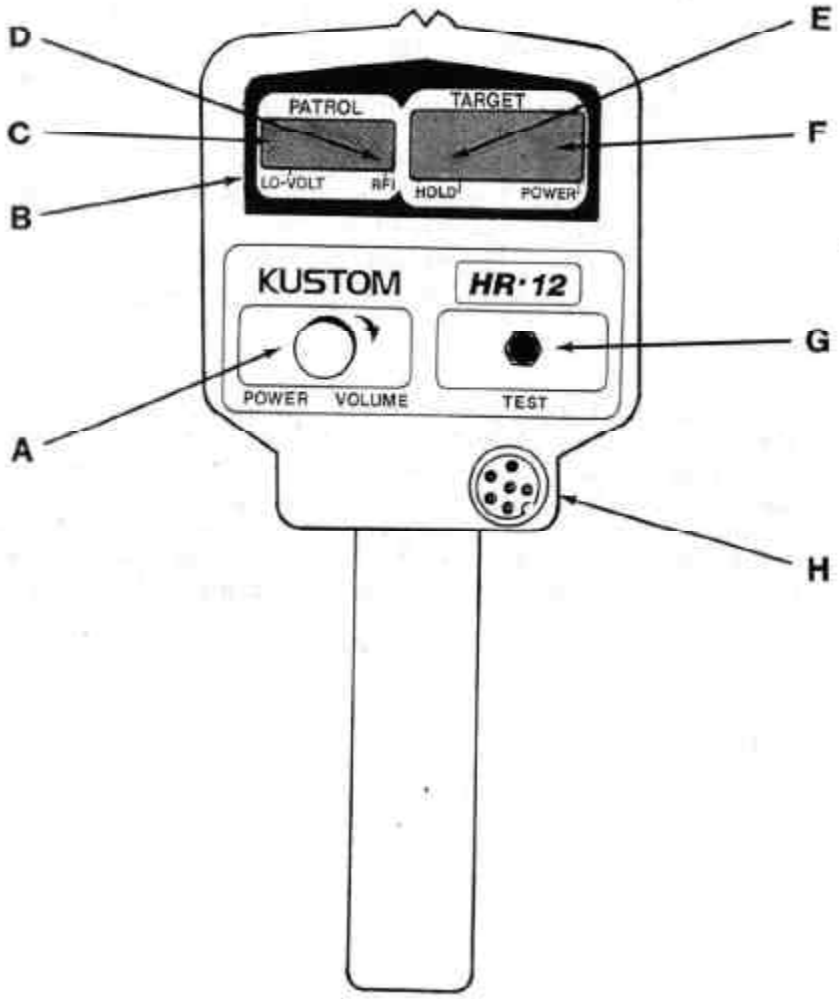
REAR VIEW



A. POWER/VOLUME. Dual purpose control for ON/OFF and target Doppler audio volume. Turn the control clockwise (past the "click") to turn the unit on and to increase the level of the Doppler audio. The pilot light (lower right corner of TARGET display) will light to indicate the radar is receiving power.

B. LOW VOLTAGE INDICATOR (LO VOLT). When lit, indicates battery voltage has dropped below 10.8 Volts. Displays will be forced blank unless in Lock Mode.

C. PATROL DISPLAY. Registers speed of the patrol vehicle in the Moving Mode.

D. RFI INDICATOR. When lit, indicates the presence of strong RF interference. Displays will be forced blank in the presence of strong RF unless in the Lock Mode.

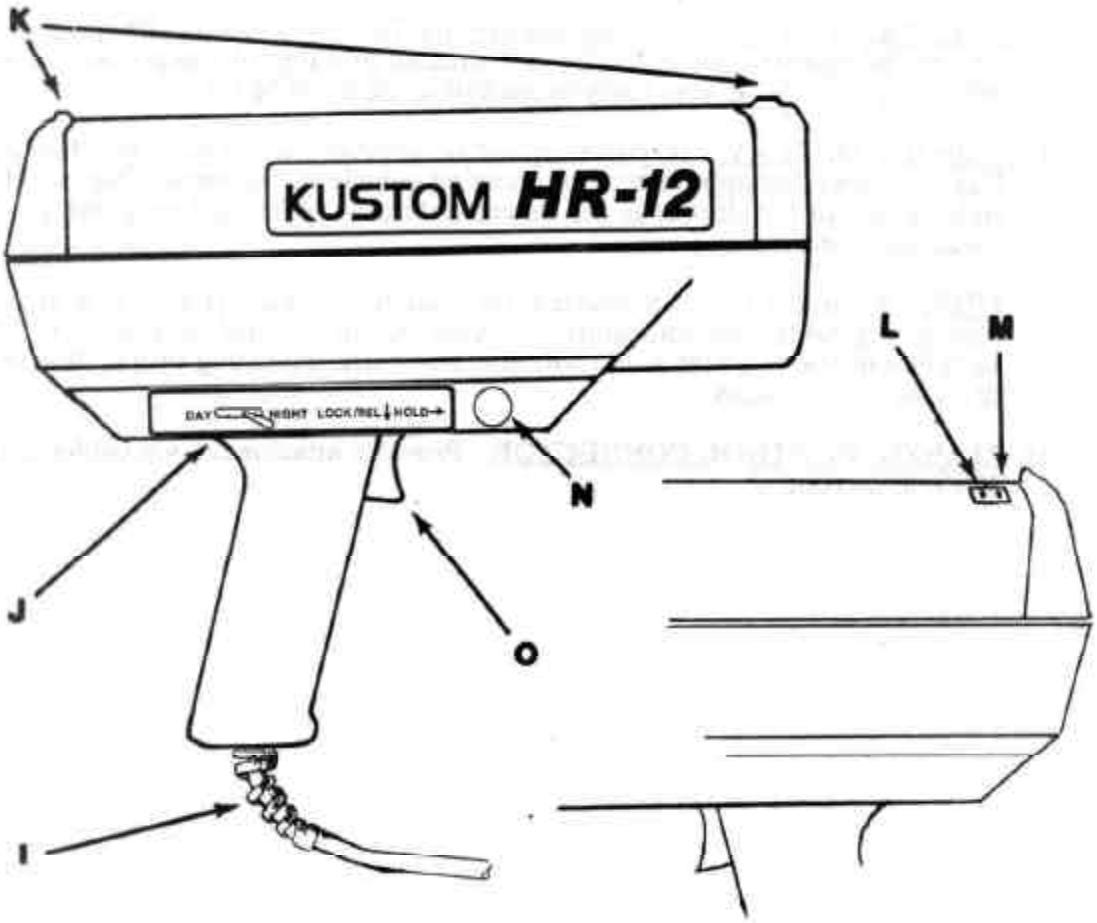
E. HOLD INDICATOR. When lit, indicates the HOLD switch on either the side of the unit or the remote control has been depressed and the microwave source is turned off. Audio will be automatically squelched in the Hold Mode.

F. TARGET DISPLAY. Registers speed of approaching vehicle in Moving Mode. Registers speed of approaching or receding vehicle in Stationary Mode. The lower right corner of the display is the Power Indicator, which will be glowing whenever the radar is receiving power.

G. TEST. When this button is pressed, the system will conduct a brief light test of all display segments and indicators followed by an internal circuit test. A short sampling of the Doppler audio will also be heard, indicating proper functioning of the audio components.

H. REMOTE CONTROL CONNECTOR. Provides attachment, via cable, to the HR-12's remote control.

SIDE VIEW



NOTE: Some localities do not permit the use of any locking function. For this reason, your unit may not be equipped with the LOCK-REL function. (The trigger will be present but will not be functional, and there will be no LOCK-REL button on the remote control.)

I. POWER CORD. Permanently attached to the radar unit, this cord supplies power to the system from the patrol vehicle's power receptacle, or from a portable battery pack. The fuse is located in the tip of the power plug.

J. DAY/NIGHT. Allows the operator to adjust brightness of the TARGET and PATROL displays to suit ambient light conditions.

K. AIMING SIGHTS. Enables the operator to correctly aim the HR-12 antenna to obtain maximum effective range.

L. STATIONARY/MOVING (STA-MOV). By sliding the switch on the top panel to the desired position, the operator can choose either Stationary or Moving Mode.

M. SQUELCH/UNSQUELCH (SQ-UNSQ). By sliding the switch on the top panel to desired position, the operator can choose either squelched or unsquelched (continuous) audio. In the Unsquelched Mode, audio will be heard whether or not a target vehicle is present.

N. HOLD. Pressing the HOLD switch will shut off microwave transmission to avoid detection by traffic radar detectors. This button also releases the system from the Hold Mode. (This function is also available on the remote control.)

O. TRIGGER. Pulling the trigger once will lock a target vehicle's speed into the TARGET display. Pulling the trigger a second time will release a locked-in speed. (This function is also performed by the LOCK-REL button on the remote control.)

REMOTE CONTROL

The remote control unit allows the operator to maintain visual contact with the target while performing the normal Lock/Release and Hold functions.

The LOCK/RELEASE (LOCK-REL) button, on the face of the remote control, is used to lock and release target vehicle speeds. This button is not present on units without lock.

The HOLD button, on the top of the remote control unit, is used to place the system in the Hold Mode (sometimes referred to as Standby). This button also releases the system from the Hold Mode.

A dash mount is provided to allow you to mount your HR-12 on the dashboard of the car. To install the dash mount:

1. Place the bracket on top of the dashboard. Slide the HR-12 into the U-shaped holding bracket until the radar is securely locked into the bracket.

2. Start the vehicle's engine, then turn the PWR-VOL control to the ON position. Switch the SQ-UNSQ control to the UNSQ position. Adjust the audio to a comfortable listening level above the engine noise.

3. With the HR-12 and mount sitting in the middle of the dashboard, and the antenna aimed straight ahead, adjust the heater/air conditioner fan motor to a mid-range fan speed.

4. Listen for fan noise in the audio; adjust the position of the radar/mount left or right as needed for a NULL or no fan noise.

5. Moisten the bracket's suction cups; slide the bracket toward the windshield, keeping it level. Push the suction cups firmly against the windshield. Attach the stretch cords to the mount and hook into defroster vents.

6. Use the aiming sights on top of the radar to make sure the radar is aimed correctly. Due to the highly directional beam transmitted by the HR-12, both the horizontal and vertical aiming is important to the effective operation of the unit.

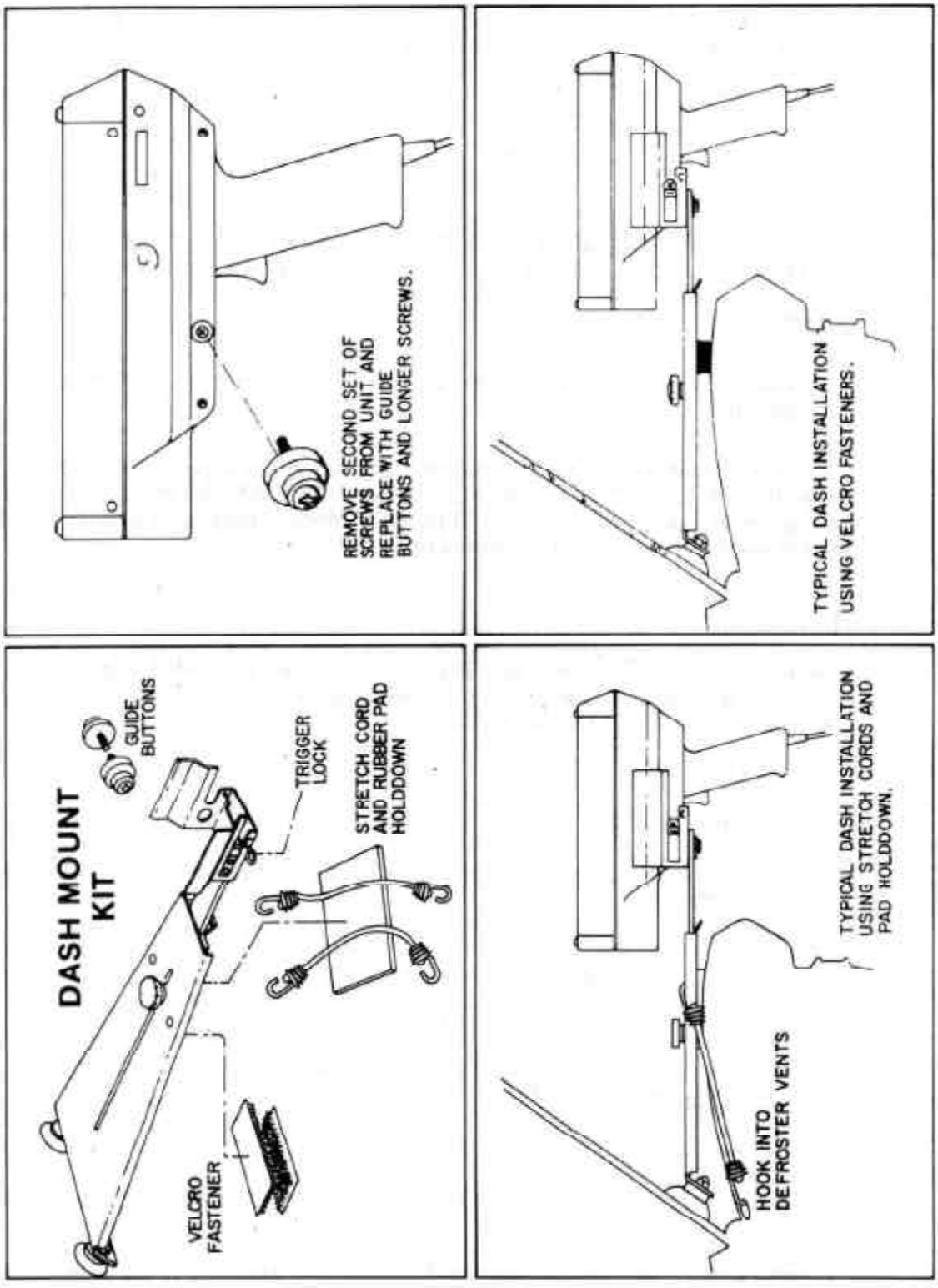
An optional kit is available from Kustom Signals to allow permanent mounting to the dashboard to eliminate the possibility of the radar flying about the vehicle in the event of a sudden stop or change of direction.

Plug the remote control into the 6-pin connector on the rear of the radar unit. Do not force the connection--if the two connectors are not matched, broken or bent pins will result and the remote will not work.

Insert the HR-12's power plug into the vehicle's cigarette lighter receptacle, auxiliary power receptacle, or portable battery pack.

NOTE: Ignition systems in certain vehicles sometimes interfere with the proper operation of any traffic radar system. Therefore, an auxiliary power receptacle and shielded cable, which can be mounted under the dashboard and wired directly to the battery, is available for your HR-12.

To install the auxiliary receptacle and cable: Mount the receptacle in the desired location and ground the black wire to the receptacle bracket. Run the cable to the battery; attach the white wire to the positive terminal, and the black wire to the negative terminal. Ensure all attachments are firm and will not easily vibrate loose.


DASH MOUNT KIT
GUIDE BUTTONS
TRIGGER LOCK
STRETCH CORD AND RUBBER PAD HOLDDOWN
VELCRO FASTENER
REMOVE SECOND SET OF SCREWS FROM UNIT AND REPLACE WITH GUIDE BUTTONS AND LONGER SCREWS.
TYPICAL DASH INSTALLATION USING VELCRO FASTENERS.
TYPICAL DASH INSTALLATION USING STRETCH CORDS AND PAD HOLDDOWN.
HOOK INTO DEFROSTER VENTS

To assure accuracy and functionality, we recommend that the circuit/lamp test and the complete tuning fork test be conducted at the beginning and end of each patrol shift. Record the results in a radar log, such as the one shown at the rear of this manual. If the unit fails any of these tests, remove it from service immediately and take it to an authorized service center for repair.

POWER ON

Turn the POWER/VOLUME knob clockwise (past the "click"). Check to ensure the power indicator is glowing. If the indicator does not come on when the POWER/VOLUME knob has been turned past the "ON" point, recheck the connection to the power source.

NOTE: Battery voltage must be between 10.8 VDC and 16.5 VDC for proper operation of the HR-12.

When first turned on, the HR-12 automatically conducts a power-on self test. The PATROL and TARGET displays will register "188" "188", followed by "64" "64" in Moving Mode and " " "64" in the Stationary Mode, along with a brief sample of Doppler audio (volume must be turned up).

CIRCUIT/LAMP TEST

Press and hold the TEST button. The PATROL and TARGET displays will read "188" "188" followed by "64" "64" in the Moving Mode, " " "64" in the Stationary Mode, and a sample of Doppler audio.

TUNING FORK TEST

STATIONARY MODE

1. Place the system in the Stationary Mode by setting the MOV-STA switch to the STA position.

2. A 35 MPH and a 65 MPH tuning fork are supplied with the HR-12. Strike the 35 MPH tuning fork on a hard, non-metallic surface, such as the rubber heel of a shoe. Hold the vibrating tuning fork approximately one inch in front of the antenna. The TARGET display should register "35".

3. Repeat the procedure with the 65 MPH tuning fork. The TARGET display should register "65".

MOVING MODE

1. Place the system in the Moving Mode by setting the MOV-STA switch to the MOV position.

2. Lightly strike both the 35 and 65 MPH tuning forks on a hard, non-metallic surface. Hold the 35 MPH tuning fork approximately one inch in front of the

antenna until the PATROL display registers "35". Then place the 65 MPH tuning fork approximately one inch in front of the antenna (both forks should be in front of the antenna at this time). The TARGET display should register "30".

IF THE PROPER READING IS NOT OBTAINED:

1. Make sure that Kustom Signals K-Band tuning forks have been used ("K-Band" is stamped plainly on each fork). X-Band tuning forks, or tuning forks designed for use with other manufacturers' radar, will not give the proper readings.

2. Striking the tuning forks too hard may produce false overtones which may be read as speeds slightly above or below those specified. These possible false readings are momentary, and the proper readings should appear as the false overtones dissipate. Do not move the tuning forks after placing in front of the antenna.

3. Ensure the system is not in the Hold Mode.

4. Extremely cold or extremely hot tuning forks may give readings slightly above or below those specified, due to the effect of extreme temperature on the metal. If this is the case, warm or cool the forks to normal room temperature before use.

NOTE: If correct readings are not obtained after Points 1-4 have been rechecked, the system should be shut down and taken out of service.

MOVING TEST

For an additional check of the Moving Mode, drive the patrol vehicle and compare the reading in the PATROL display with the vehicle's calibrated speedometer. The speed registered in the PATROL display and speedometer should coincide, or be within reasonable limits (allowing for minor speedometer error). These comparisons, on a day-by-day basis, are a reliable way to check the accuracy of your radar. If there are major discrepancies between the PATROL speed registered and the vehicle speedometer, the system should be taken out of service until the discrepancies are resolved. (This check is one of the best ways to verify the proper operation of your radar.)

DOPPLER AUDIO

To receive Doppler audio, set the POWER/VOLUME control past the Power-Off position. Volume of the audio can be increased by turning the control clockwise. The audio pitch will correspond to the speed being displayed; that is, the greater the speed, the higher the pitch. While in the Stationary Mode, audio will be present from approaching or receding vehicles. In the Moving Mode, audio will be present from approaching vehicles only. The audio presentation is especially useful in the case of multiple targets, when target identification is more difficult. The operator has the option of squelched or unsquelched audio in either Stationary or Moving Modes by setting the SQ-UNSQ switch to the desired position. When no target is present, selecting the Unsquelched mode allows the operator to listen for possible interference in the operating area.

CONTROL AND FUNCTION SELECTION

Select Moving or Stationary Mode by sliding the MOV-STA switch to the desired position. Use Moving Mode when the patrol vehicle is cruising and monitoring approaching target vehicles and Stationary Mode when at a fixed position and monitoring approaching or receding target vehicles.

Adjust the volume control for comfortable listening to the Doppler audio level. To select unsquelched (continuous) audio, slide the SQ-UNSQ switch to the UNSQ position.

MONITORING TARGET SPEEDS

Once the radar has been properly set up and tested (see preceding sections), it is ready for use. Acquiring and displaying valid target (and patrol) speeds requires obtaining a proper tracking history, as described below:

1. Visually observe target vehicle and estimate its speed.

   Recheck antenna aim and MOV-STA selection.

   Observe other vehicles which may be in the radar beam and which are potential targets (or may block the radar's "view" of the selected target), especially those which are larger, closer, or much faster than the selected target.

   Be alert to terrain or roadside features which can cause interference, incorrect readings, or display blanking. (Such features include power lines, radio/TV transmitters, bridges, guardrails, and other large reflectors, etc.)

2. Listen to the Doppler audio. The pitch of the tone should correspond to the visual estimate made above. The tone should be clear and strong; scratchy, "buzzy", or garbled tones could indicate interference of some sort.

3. Check the radar TARGET display. The reading should closely match the visual estimate and the pitch of the audio tone.

4. If you are operating in Moving Mode, check your speedometer against the PATROL display. The readings should correspond. Discrepancies indicate the radar is reading the PATROL speed incorrectly, and thus displaying an incorrect TARGET speed. Common causes of incorrect PATROL readings are large reflectors (such as trucks) immediately ahead of the patrol vehicle or at the roadside. If this is the case, passing or putting more distance between the patrol vehicle and the reflector should clear up the discrepancy. Proper antenna aiming will help eliminate cosine error in the PATROL speed. After obtaining a proper groundspeed reading, repeat steps 1-4.

LOCKING AND RELEASING TARGETS

NOTE: To comply with various state and local requirements, your unit may not be equipped with the lock feature. References to the lock function do not apply to these units.

The Moving Mode and the Stationary Mode of locking and releasing targets are the same, except no PATROL display will register if in Stationary Mode. The hand-held remote control LOCK-REL button or the trigger is used to manually lock or release a target

To aid in positive identification of a target, the HR-12 automatically unsquelches the audio as soon as the target is locked in. This means that audio will continue to be heard and the antenna will continue to transmit RF energy and may thus be detected by radar detection devices. Should you wish to escape detection in the Lock Mode, you can use the Hold Mode (no RF energy will be transmitted in the Hold Mode). The unit will remain in the Hold Mode until manually deactivated by depressing the HOLD button again.

To lock a target:

1. Observe target vehicle and obtain proper tracking history.
2. Press and hold the LOCK-REL button on the remote control or pull the trigger until the locked-in speeds flash in the displays and the unit has beeped.
3. To release a target in either mode of operation, press the LOCK-REL button or pull the trigger again after completion of the alarm beep.

NOTE: Prior to locking, the HR-12 performs a brief, internal accuracy test. (This test will not appear in either display.) If the system passes the test, it will allow locking of target and patrol speeds. If the self-test fails, the TARGET display will register "0". Release any locked-in speed and try again. If the unit continues to display "0", remove from service and take to an authorized service center for repair.

HOLD MODE

The advanced electronics in the HR-12 enable it to completely escape detection by traffic radar detectors by eliminating all microwave transmission in the Hold Mode. To activate the HOLD function in either Moving or Stationary Mode:

1. Press the HOLD button on the remote control or the side of the HR-12.

2. Both displays will become blank and the HOLD indicator will light.

3. Visually acquire the target to begin tracking history.

4. Press the **same** HOLD button a second time to release the system from the Hold Mode. When released from the Hold Mode, the HR-12 recaptures groundspeed (if in Moving Mode) and acquires target vehicle speed almost instantaneously.

NOTE: You must use the same HOLD switch to release the unit from the Hold Mode as you used to place it into the Hold Mode--that is, if you *placed* the radar in Hold with the remote control, you must *release* it from Hold with the remote control. Use of one HOLD switch (either on the remote or on the unit) will lock out the other HOLD switch.

After a complete tracking history is obtained, you may now perform the locking function by pressing the LOCK-REL button on the remote control or by pulling the trigger.

THEORY OF OPERATION

The HR-12 moving radar transmits a radio frequency of 24.150 Gigahertz, in compliance with Federal Communications Commission (F.C.C.) regulations. A portion of the transmitted signal strikes the surface of the roadway and surrounding terrain and is reflected back to the antenna. This returning signal is referred to as the "low" Doppler. From the antenna, it travels to the processor where the signal is translated into the speed of the patrol vehicle (groundspeed) and registered in the PATROL display.

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

After receiving the "high" Doppler signal, the processor automatically computes the difference between the speed of the patrol vehicle ("low" Doppler) and the speed of convergence ("high" Doppler. The speed of the approaching vehicle is then registered in the TARGET display.

If, for example, a HR-12 equipped patrol car is traveling 55 MPH, the "low" Doppler frequency returned to the antenna is translated into 55 MPH and is registered in the PATROL display. An oncoming vehicle is traveling 65 MPH. The "high" Doppler frequency returned to the antenna is translated into 120 MPH, or the combined speed of both vehicles. The processor automatically subtracts the "low" Doppler 55 MPH of the patrol car from the 120 MPH "high" Doppler speed of convergence. The 65 registered in the TARGET display is the speed of the approaching vehicle.

INTERFERENCE

Interference from any external event can influence the operation of the HR-12. These influences can be natural or man-made. A knowledgeable operator will not be confused by these external influences.

Natural events such as driving rain or blowing dust can cause a scattering effect, or diffusion, which can decrease the effective range of the radar. The PATROL display can be affected by a driving rain storm. Close observation of the patrol vehicle speed is recommended.

Terrain can also affect the HR-12's range. Should the patrol car be on a slight decline, the antenna could be shooting short of the target vehicle. If on a slight incline, it could be shooting over the target vehicle. Range will be shortened in either case.

Man-made influences are by far the most troublesome, because they generally involve electronic signals which may cause spurious displays. Electronic noises can be generated by: power transformers, radio transmitters (especially those in the patrol vehicle), neon lights, etc. These influences generate a phenomenon called "harmonics", which can cause a radar to display a false reading. The HR-12 is equipped with an RFI (Radio Frequency Interference) detector that will cause the display to blank in the presence of strong RF fields. No target speed measurement can be made when the RFI indicator is on to prevent possible readings caused by the interference.

Intermittent readings need not be confusing if the officer is familiar with the operation of the HR-12. For example, if the antenna is pointed at the dashboard of the patrol vehicle, it may be reading the speed of the heater/defroster fan because most dashboards are now made of plastic. A specially designed dashboard mount is available which will help to eliminate this intermittent reading.

If the power supply voltage to the radar unit drops below the level required for proper operation, the "LO VOLT" indication will appear and speed displays will be inhibited as long as the low voltage condition persists. This prevents false readings from occurring during periods of low voltage.

POWER SOURCE FOR THE HR-12

Cigarette lighter receptacles have been the traditional power source for traffic radar. However, poor grounding, electronic ignition bleedover, and alternator noise in newer cars can combine to create an unacceptably high level of ambient electronic interference. Symptoms of such interference include abnormal tones or noise heard in the audio and/or decreased range.

If radar operation is degraded by the electrical interference present in the vehicle, it is recommended that a two-conductor, shielded cable be run from the battery directly to an auxiliary receptacle installed at the dash or on the console. This should effectively eliminate the power source problems.

GROUNDSPEED

All moving radar systems must compute true groundspeed before a target vehicle speed can be accurately computed. If the unit loses groundspeed, you can force the HR-12 to recapture groundspeed by activating and then deactivating the Hold Mode. To avoid possible confusion, closely observe the patrol vehicle speed.

NOTE: The HR-12 typically will not display groundspeeds lower than 15 MPH.

RECOMMENDED CARE AND MAINTENANCE

The HR-12 is a sturdy, reliable piece of equipment designed and built to give trouble-free service. Following certain basic care guidelines will help ensure it gives you that trouble-free service.

1. As with all electrical or electronic equipment, protect from moisture. Should liquid of any kind get inside the unit, remove power immediately and send for repair. Prompt action can minimize damage.

2. Other than the fuse, there are no user-serviceable parts in the HR-12. Replace fuses with the correct size and type (2A Slo Blo)--excessive current due to oversize fuses will cause serious damage not covered by warranty. NEVER wire directly into AC current!! Damage caused in this way may not be repairable.

3. Do not pick up or carry the HR-12 by the power cord. Do not yank or twist the power cord, especially near the handle of the unit--broken wires inside the power cord are a common cause of intermittent operation.

If the radar exhibits decreasing 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 range.

MICROWAVE EMISSION

Traffic radar operators may have some questions about the biological effects of exposure to the microwave energy produced by the 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 Kustom 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 units, and 10 mW/cm^2 for K-band and K_a-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 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 Bureau of Standards on twenty-two commonly used models of traffic radar units, from six different manufacturers including Kustom. Aperture power density levels measured were from 0.25 to 2.82 mW/cm^2, while back-lobe power density values ranged from 0.001 to 0.02 mW/cm^2. These measurements were obtained with the radars mounted inside vehicles, as in normal operating conditions. Since the NBS 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 to request the "RF Emissions Packet." You may contact us at our corporate headquarters:

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

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 radar unit with complete confidence in its safety, as well as in its accuracy.

TROUBLESHOOTING GUIDE

If you are having operating difficulty, recheck the operating information in this manual, then check the following before notifying your Kustom Signals representative of a problem.

Problem	Possible Solution
Unit will not turn on or no pilot light	Check fuse. For access to fuse, remove tip of power plug by turning counterclockwise. NOTE: Replace fuse ONLY with 2A Slo-Blo! Check for dirty cigarette lighter receptacle, dirty battery cables, or dead battery. use auxiliary receptacle connected directly to battery, or portable battery pack, or switch vehicles.
Intermittent readings (TARGET readings that temporarily blank)	Often caused by interference from the vehicle's electrical system. Use auxiliary receptacle connected directly to the battery. If this fails, use a battery pack or switch vehicles. If the problem clears up, the vehicle's electrical system needs attention
Lack of Range	Check antenna aim and ensure the beam is not being obstructed. Check for interference from the heater/defroster/air conditioner fan. Switch vehicles (electrical system interference sometimes affects performance).
Random, obviously incorrect readings (PATROL display)	Usually occurs if unit is set to Moving Mode but is sitting still (such as at a stoplight) or is just accelerating from a stop. If everything else is normal, these can be ignored. If random readings persist after patrol vehicle is moving faster than 15-20 MPH, activate then deactivate Hold Mode to force radar to acquire correct groundspeed and target speed.
No TARGET readings (PATROL readings may be present)	Range may be adversely affected if patrol car's speed greatly exceeds the speed of the oncoming target. Check indicator lights on rear panel--no readings will be displayed if any of these indicators is lit. Check that MOV-STA switch is set to STA if operating in Stationary Mode.
No PATROL readings (TARGET readings may be present)	Ensure system is in Moving Mode while patrol vehicle is cruising.

Problem	Possible Solution
Displays are blank, power indicator is on	Check indicator lights on rear panel. No readings will be displayed if any of these (except POWER) are lit. If a remote control is being used, unplug from rear of unit. If readings appear, the remote control should be taken out of service.
TEST sequence fails to work	Make sure TEST button has been pressed for 2-3 seconds before releasing.

MICROWAVE

Frequency:	24.15 ± .1 GHz (K-Band)
Output Power:	12 mW typical, 40 mW max
Source:	Gunn-effect diode
Antenna Type:	Conical horn
Polarization:	Circular
3 dB Beamwidth:	12° ± 1°
Antenna Gain:	Approx. 23 dBi
Power Density:	< 5 mW/cm² (measured at face of antenna)
Receiver Type:	Low-noise Schottky barrier diode

COUNTING UNIT

Operating Voltage Range:	10.8-16.5 VDC, 13.6 VDC nominal

Nominal Power Reqm'ts:

	Voltage (VDC)	Current (A)
With displays illum:	13.6	0.8
Without displays illum:	13.6	1.2
With target present:	13.6	1.4
Without target present:	13.6	1.3
Standby (HOLD):	13.6	0.4

Environmental:	-30°C to +65°C; 90% relative humidity at +37°C, non-condensing
Target Speed Range:	Typically 15 to 155 MPH over a broad sensitivity range. This unit complies with IACP/NHTSA specifications for target channel sensitivity (DOT HS-806-191, rev. May, 1989).
Patrol Speed Range:	20-80 MPH (combined Patrol and Target speeds will not exceed 210 MPH)
Accuracy:	±1 MPH stationary, ±2 MPH moving