

Decatur Electronics, Inc.



GENESIS Handheld Stationary

User's Manual

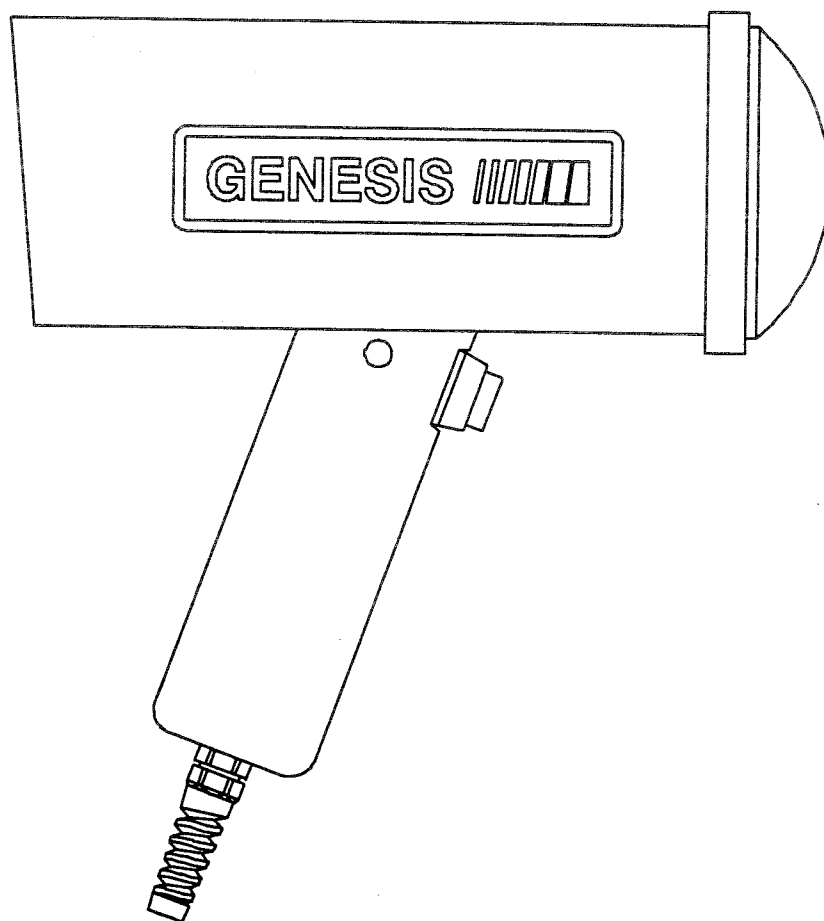


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0 FDA Notice



DEPARTMENT OF HEALTH AND HUMAN SERVICES

Public Health Service

Food and Drug Administration
Rockville, MD 20857

Update on Possible Hazards of Traffic Radar Devices

July 20, 1992

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

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

What kind of radiation is emitted by traffic radar units?

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

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

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

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

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

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



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Update on Possible Hazards of Traffic Radar Devices (continued)

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

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

In the meantime, what can be don to reduce the risk, if there is one?

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

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

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

1 Specifications

1.1 Antenna Parameters

K-Band

IACP Type	III
Transmission Frequency	24.150 GHz
Horizontal Beamwidth	12°
Polarization	Circular
Nominal Microwave Power Output	15 mW
Maximum Aperture Power Density	$\leq 1 \text{ mW/cm}^2$

Environment

Ambient Operating Temperatures	-30°C to +60°C
Maximum Humidity	90% relative humidity at 37°C

1.2 FCC/ISC Documents

FEDERAL COMMUNICATIONS COMMISSION

WASHINGTON, D.C. 20554

GRANT OF EQUIPMENT AUTHORIZATION

Certification

Decatur Electronics Inc.
715 Bright Street
Decatur, IL 62522

Date of Grant: February 17, 1994

File No: 31010/EQU 4-3 3

Application dated: January 7, 1994

Attention: Robert James Sanner, President

NOT TRANSFERABLE

EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and is VALID ONLY for the equipment identified hereon for use under the Commission's Rules and Regulations listed below.

FCC IDENTIFIER

Name of Grantee

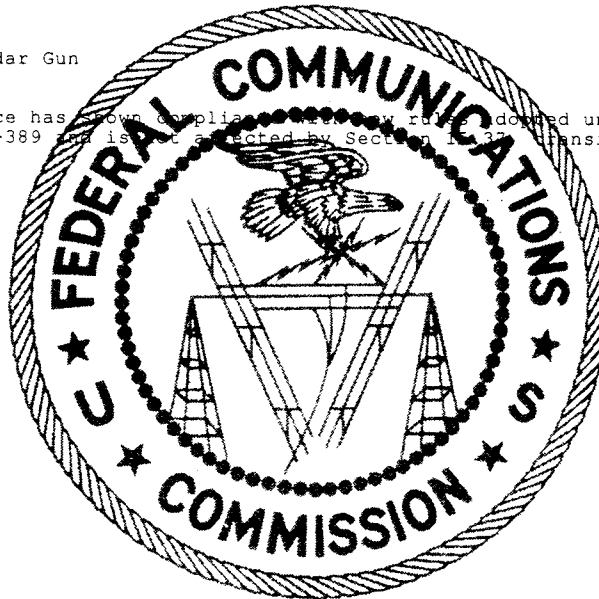
FCC Rule Part(s): 15

Frequency (MHz) : 24114

Equipment Class : Field Disturbance Sensor

Police Radar Gun

This device has been approved under Docket 87-389 and is not affected by Section 1.37 transition rule.



In correspondence concerning this grant, please refer to the FCC IDENTIFIER, File No., and date of grant.

me 8315348001

FCC 731A
October 1991



Industry Industrie
Canada Canada

No. ▷ 4970A

CERTIFICATE OF TECHNICAL ACCEPTABILITY FOR RADIO EQUIPMENT

CERTIFICAT D'ACCEPTABILITÉ TECHNIQUE DE MATÉRIEL RADIO

CERTIFICATION No. No. DE CERTIFICATION	▷ 1270 B237		
ISSUED TO DÉLIVRÉ À	▷ DECATUR ELECTRONICS INC.		
TYPE OF EQUIPMENT GENRE DE MATÉRIEL	▷ POLICE RADAR		
TRADE NAME AND MODEL MARQUE ET MODÈLE	▷ GENESIS HANDHELD STATIONARY		
FREQUENCY RANGE BANDE DE FRÉQUENCES	▷ 24.05 GHz TO 24.25 GHz		
EMISSION DESIGNATION DESIGNATION D'ÉMISSION	▷ 6OHONON		
R.F. POWER RATING PUISSANCE NOMINALE H.F.	▷ 15 mWATT		
CERTIFIED TO CERTIFIÉ SELON LE	▷ SPECIFICATION CAHIER DES CHARGES	RSS210	ISSUE ÉDITION

-FAMILY APPROVAL WITH MODEL GENESIS, REFERENCE
CERTIFICATE NO. 2590.
-EXPANSION OF THE MODEL DESCRIPTION.

Certification of equipment means only that the equipment has met the requirements of the above noted specification. License applications, where applicable to use certified equipment, are acted on accordingly by the issuing office and will depend on the existing radio environment, service and location of operation.

La certification du matériel signifie seulement qu'il est conforme aux exigences du cahier des charges mentionné ci-dessus. Les demandes de licence, le cas échéant en vue de l'utilisation de matériel certifié seront traitées en conséquence par le bureau chargé de délivrer lesdites licences, en tenant compte du milieu radioélectrique ambiant, du service radio existant et de l'emplacement de la station.

This certificate is issued on condition that the holder complies and will continue to comply with the requirements of the radio standards specifications and procedures issued by the department.

Le présent certificat est délivré à condition que le détenteur se conforme et continue à se conformer aux cahiers des charges et procédures sur les normes radioélectriques publiées par le ministère

ISSUED UNDER THE AUTHORITY OF MINISTER OF COMMUNICATIONS
DÉLIVRÉ AVEC L'AUTORISATION DU MINISTRE DES COMMUNICATIONS

DATE March 30, 1995

Canada

FOR
DIRECTOR GENERAL
ENGINEERING
PROGRAMS
BRANCH

DIRECTEUR GÉNÉRAL
DIRECTION
DES PROGRAMMES
TECHNIQUES

1.3 Speed Range Parameters

Speed Display Ranges	Minimum	Maximum
Target: mph Option	15	200
kph Option	24	321

1.4 Power Consumption Parameters

Supply Voltage Range 10.8 to 16.5 VDC with a 2A Fast Blow Fuse

Low Voltage Threshold 10.8 VDC with Visual Indicator

Nominal Current Draw with a Supply Voltage of 13.6 VDC

Situation	Current with Antenna OFF	Current with Antenna ON
Segment Check ("888 888 888")	0.580	0.580
No Target Present	0.232	0.442
Target Present (Target=55)	0.232	0.484

Current Requirements for GENESIS Handheld Stationary, in Amperes

2 Controls

When pressing a button on the front panel, the computer acknowledges a command with a beep.

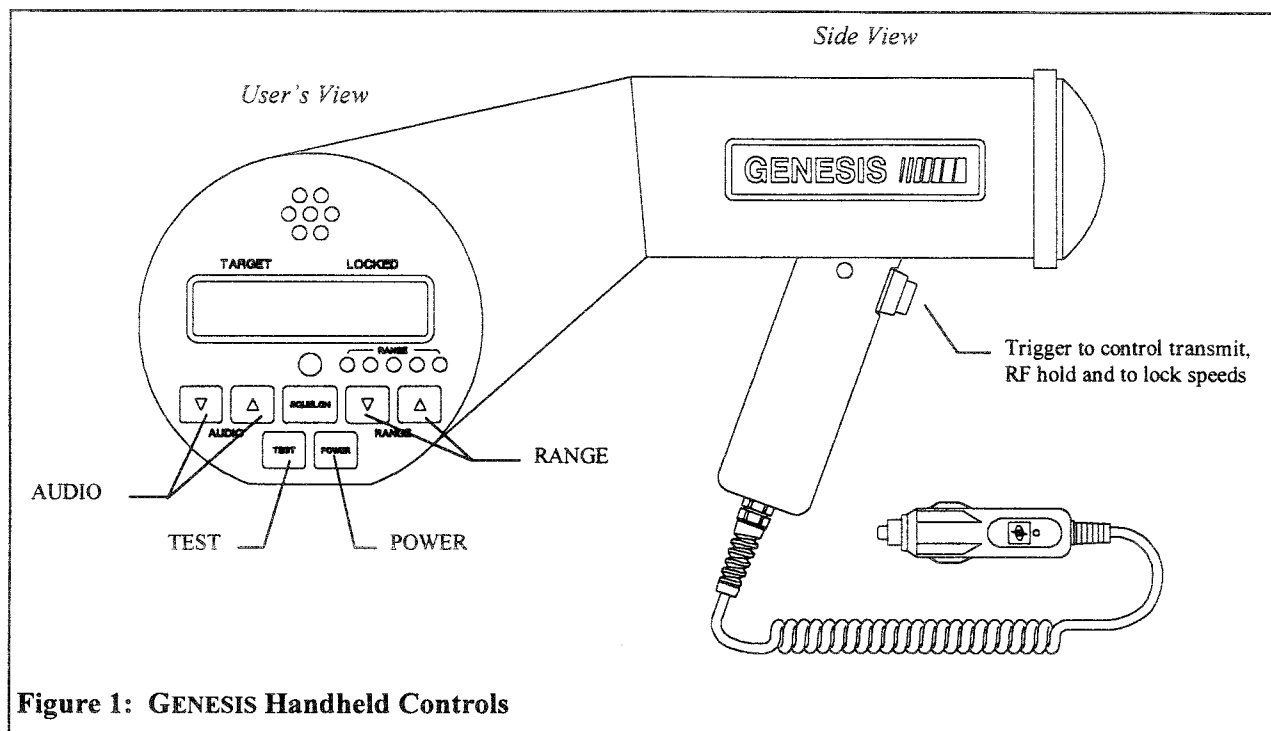


Figure 1: GENESIS Handheld Controls

2.1 Front Panel

POWER

The POWER button turns on the GENESIS Handheld. When depressed, there is a "beep." The GENESIS Handheld activates all of the RANGE indicators and displays "888" in the TARGET and LOCKED windows. The computer then initiates a self test of the time base, memory, and display. When first turned on, the system is set to maximum range, one-half and squelched audio. Once the self-test sequence is complete, there are three tones to indicate that the system has passed the self-test and is ready for use.

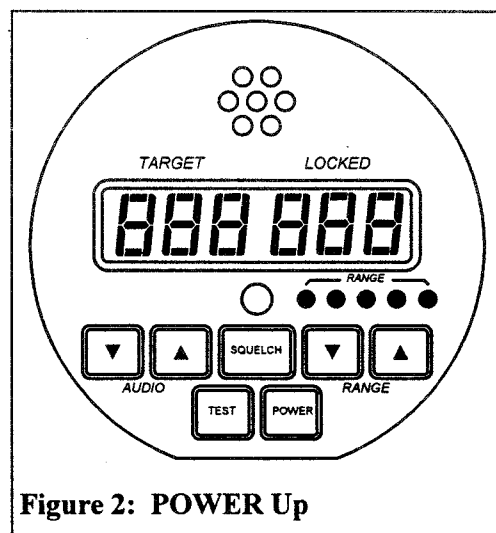


Figure 2: POWER Up

TEST

The TEST button starts an operator self-test of the system. This test checks the display and Doppler processing circuitry. If there are any errors with the system, the computer unit indicates a system fault and no longer processes Doppler signals.

AUDIO

The AUDIO buttons control the volume of the Doppler audio. The left hand arrow decreases the volume while the right hand button raises the volume level (there are sixteen possible volume levels). Regardless of the volume level selected, the Doppler tones will always be heard.

SQUELCH

The SQUELCH button determines the type of Doppler audio heard. When powered up, the GHS has the SQUELCHED mode activated. In SQUELCHED mode, the only sound heard is the Doppler tone for the displayed target. When UNSQUELCHED, the operator hears all of the Doppler tones -- targets, interference, and noise -- received by the antenna.

RANGE

The RANGE buttons control the maximum acquisition distance, in five (5) levels¹. The left arrow decreases the RANGE, until the first indicator is lit, meaning minimum range. The right arrow increases the RANGE until the fifth indicator is lit, indicating maximum range. Initially, start with maximum RANGE and decrease the RANGE until attaining the desired performance.

2.2 Trigger

The trigger for the GENESIS Handheld controls the RF-hold and LOCK features.

When the trigger is depressed, the system is transmitting and receiving microwave energy. Once the trigger is fully released, the system is in RF-hold status.

To transfer a TARGET speed into the LOCKED window, quickly release and depress the trigger². Before the system transfers the speed to the LOCKED window, the computer performs a self-test to verify the accuracy of the TARGET reading. A beep informs the user that the TARGET is successfully locked. After LOCKING, the unit still processes and displays target speeds in the TARGET window, as long as the trigger is depressed. To clear the LOCKED window, use one of the following methods

- Depress the trigger twice, in quick succession, when a target is not present.
- Turn the system off (this method is not recommended).

¹ Under the recommendation of the Michigan Radar Task Force, the GENESIS Handheld has a minimum range level of zero feet. For systems sold in the state of Michigan, the system indicates zero range by flashing the leftmost range indicator.

² For systems sold in the state of Florida, the LOCKED window is cleared approximately 15 minutes after the TARGET speed is LOCKED.

3 System Status Lights

The GENESIS Handheld has a variety of status indicators on the front panel. There are two (2) speed display windows and five (5) range indicators.

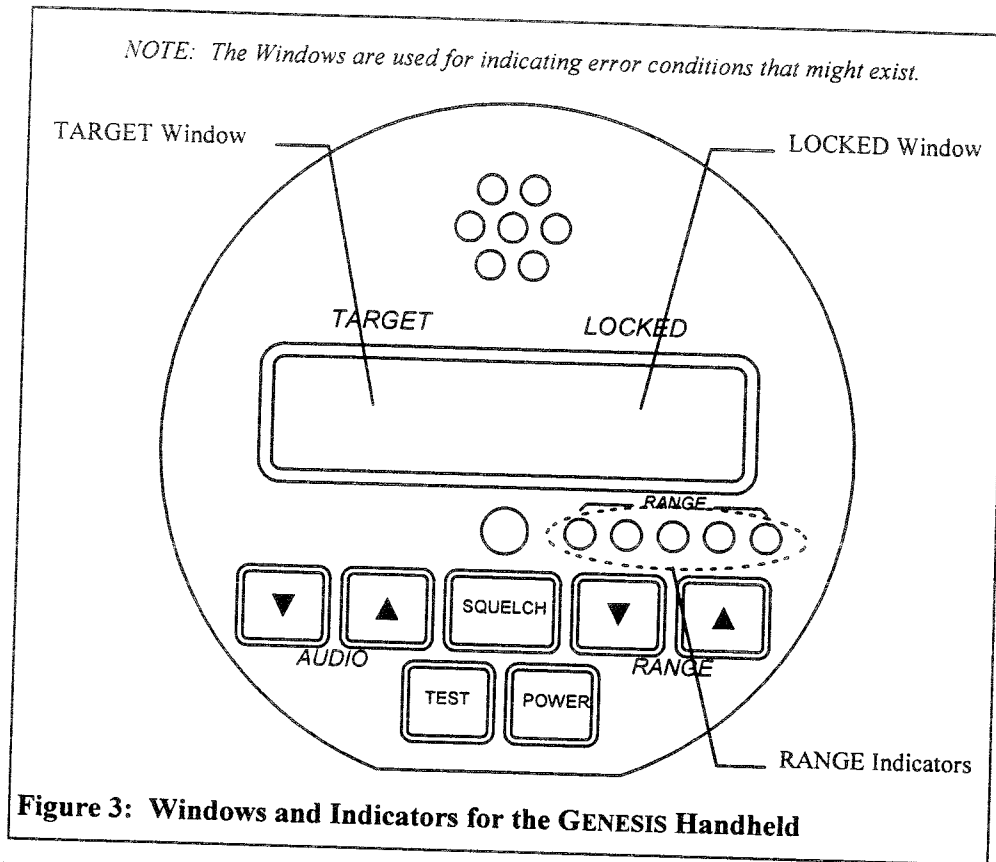


Figure 3: Windows and Indicators for the GENESIS Handheld

3.1 Windows

TARGET

This window displays the speed of the target vehicle. The system updates the speed display continuously, as long as a valid target is present in the beamwidth of the antenna and in range of the unit.

LOCKED

When the operator double clicks the trigger, to request a LOCK, this window holds the speed of the target vehicle at that instant. The system also runs a self-test of the internal clock to verify the accuracy of the displayed speed. The speed will remain displayed until the operator clears the display³.

Error Messages

The system indicates a fault with the unit by displaying a short message in the windows. These messages notify the operator of a condition that could affect proper operation of the GENESIS Handheld. When the messages are on, the system will not process and display speeds until the problem ceases.

³ GHS systems, sold in the state of Florida, automatically clear the LOCKED window approximately 15 minutes after the TARGET speed is LOCKED.

Radio Frequency Interference

When the TARGET window displays **rFI**, there is a source of radio-frequency interference inhibiting the proper operation of the unit. Typically, patrol vehicle FM communication systems may cause this condition. Other possible causes are proximity to radio stations and other broadcast equipment. If the user has LOCKED a speed, and the computer displays **rFI**, the system retains the LOCKED speed, but will not display the speed. The system redispays the LOCKED speed once the interference ends.

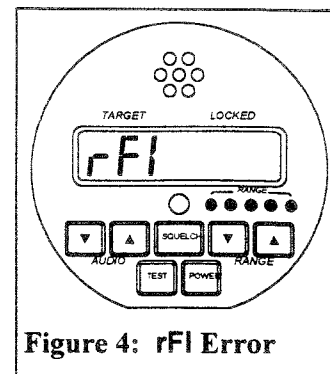


Figure 4: rFI Error

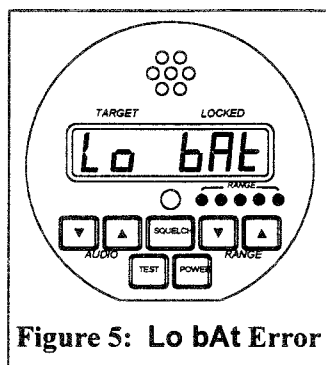


Figure 5: Lo bAt Error

Low Voltage

The computer indicates a low voltage problem by displaying **Lo bAt** in the display windows. The **Lo bAt** message notifies the operator that the supply voltage is below 10.8 VDC. The correct operating voltage for the GENESIS Handheld is 10.8 to 16.5 VDC. Check the cigar plug, and verify that the plug is firmly inserted into the lighter socket

System Error

When the message **SyS**, and a unique number, is active, the computer found an internal problem with the system. If this message appears, remove the unit for repairs.

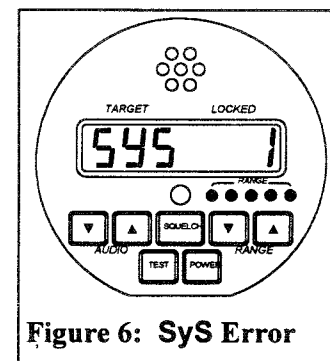


Figure 6: SyS Error

3.2 RANGE Indicators

The RANGE lights indicate the relative maximum range that the unit is detecting targets. When the leftmost light is lit, the range is at the minimum setting. The system indicates maximum range by lighting all five (5) indicators⁴.

⁴ GHS systems, sold for use in the state of Michigan, have a zero feet minimum range setting. When the leftmost range indicator is flashing, the effective range is zero feet. However, the microwave transmitter is still active and may be detected.

4 Field Tests

There are two field tests to verify the accuracy of the GENESIS Handheld.

4.1 Operator TEST

Pressing the TEST button on the display initiates a self test⁵. This test checks the numeric displays of the two speed windows and runs a simulation of the target speeds. While the computer unit is executing a test, the system will not power down until the completion of the test. During the test, the system will display the **Sys** error message and no longer process Doppler signals IF ANY PART OF THE TEST FAILED.

Display Test

The display test allows the operator to check the range indicators and speed windows. During a display test, the system will initiate the following steps.

- Activate all of the TEST indicators.
- The “ones,” “tens,” and “hundreds” positions, in the TARGET and LOCKED speed windows, count from 1 to 8, leaving the number 8 displayed.
- The system displays “888” in both windows. Verify none of the segments are burnt out.

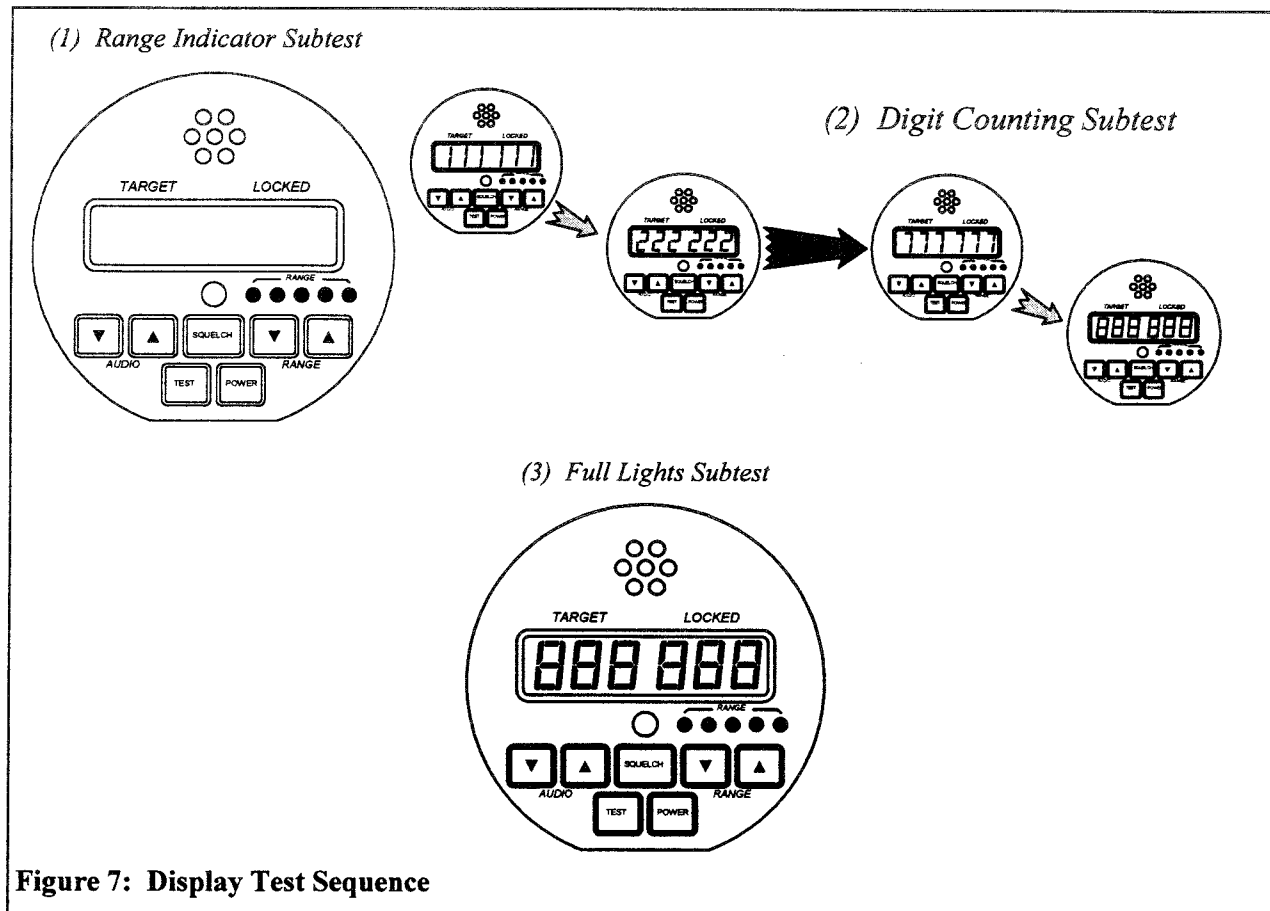


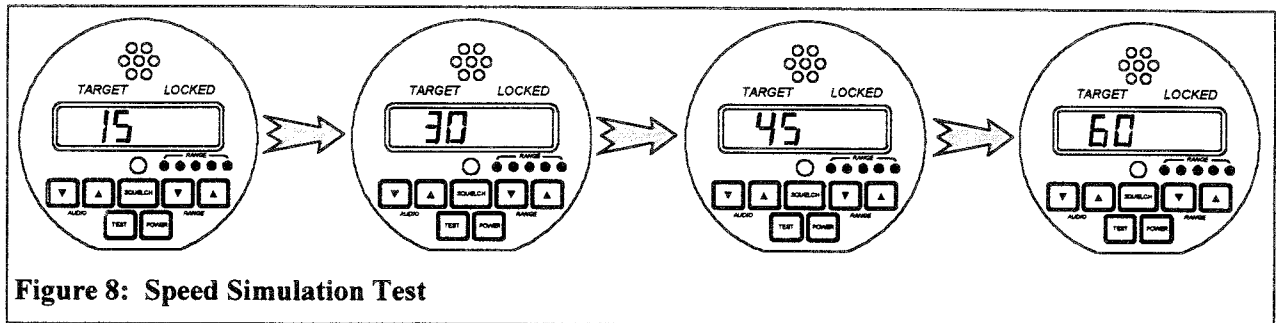
Figure 7: Display Test Sequence

⁵ For systems sold in the state of Florida, the GHS displays “888” in both windows. The system then simulates a TARGET speed of 60 mph or 100 kph (see the Speed Simulation Test section). This test is performed every 15 minutes. The LOCKED window is cleared at the end of the test.

Speed Simulation Test

The system verifies target acquisition using synthesized Doppler frequencies corresponding to 15, 30, 45, and 60 mph (or 25, 50, 75, and 100 kph). The computer unit tests the target acquisition system, using the following sequence:

- The TARGET window displays 15, 30, 45, 60 (sequentially) when the system locks onto the synthesized Doppler signal.



- The corresponding Doppler audio is heard as each speed is processed.
- If the system passed the test, three (3) rapid beeps are heard and normal operation resumes.

4.2 Tuning Fork Test

In addition to the system test, the operator can verify the overall system accuracy by using a tuning fork.

After tapping one of the tines of a tuning fork, the fork vibrates at the frequency stamped on the handle. When the operator places the tuning fork in front of the antenna, the system detects the fork and displays a speed. Compare the speed displayed to the speed stamped on the fork. The displayed speed must be within one (1) mph of the speed stamped on the fork.

Tapping the tines against surfaces like metal and concrete MAY DAMAGE THE TINES AND INVALIDATE THE FORK FOR FUTURE TESTS. Tap the tines against hard plastics or wood to avoid unnecessary damage. Using the fork at temperature extremes may also affect the readings.

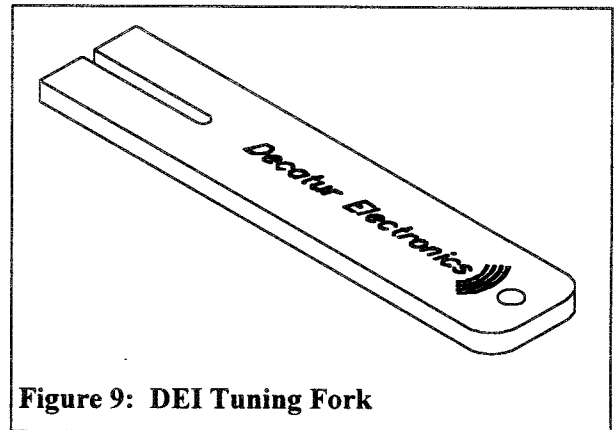


Figure 9: DEI Tuning Fork

The tuning fork test consists of the following steps.

- Grasp the tuning fork by the handle and tapping one of the tines against a firm surface.
- Hold the vibrating tuning fork approximately three (3) inches from the front of the antenna
- Verify that the TARGET display and speed marked on the tuning fork are within one (1) mph of each other. If there is a large difference between the display and the fork, check the tuning fork for damage. Repeat the procedure with another, certified tuning fork. If the error is still greater than one (1) mph, remove the unit from service.

NOTE: Keep trigger pressed during entire test.

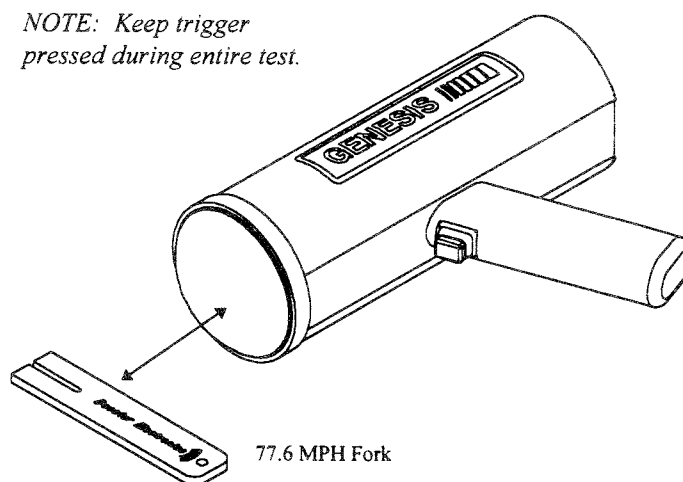


Figure 10: Tuning Fork Placement

- Verify that the Doppler audio is correct for the speed displayed and not corrupted by noise.
- The TARGET display should return to “___” when the fork is not in front of the antenna or the vibrations have ceased.

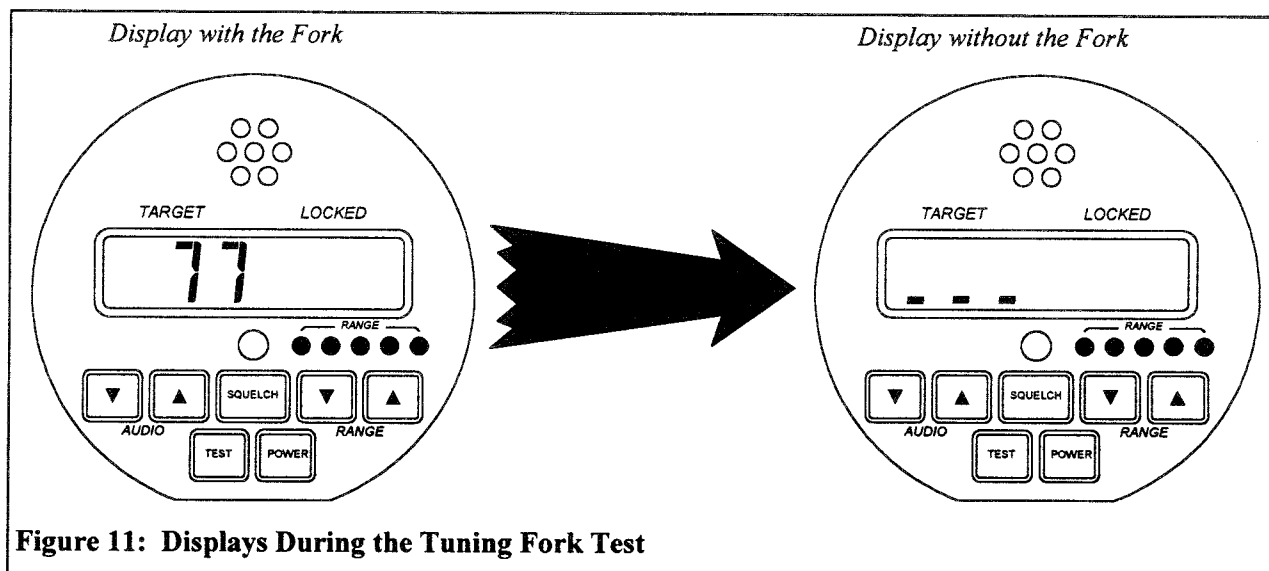


Figure 11: Displays During the Tuning Fork Test

5 Care, Cleaning, and Storage

The GENESIS Handheld can withstand wide variations in temperature. DO NOT SPILL FOOD, BEVERAGES, OR OTHER LIQUIDS AND SUBSTANCES ON THE SYSTEM.

DO NOT ATTEMPT TO REMOVE THE POWER CORD. The power cord is permanently mounted to the trigger housing. Other than replacing the fuse in the cigar plug, DO NOT ALTER THE CIGAR PLUG. **YOUR WARRANTY WILL NOT COVER UNAUTHORIZED MODIFICATIONS TO THE SYSTEM.**

When the GENESIS Handheld is not in use, store the unit in the original packaging. Also, store the unit in the original packaging during transport to and from the patrol vehicle.

To clean the components, dust them lightly with a soft, clean cloth - free of any cleaning solutions.

6 Limitations to Doppler RADAR

When properly used, the Doppler radar system is extremely accurate and reliable. However, the variations in the environment can cause situations and circumstances which may create speeds that appear incorrect.

6.1 Cosine Effect

The cosine effect causes the system to display a target's speed lower than actual. This condition exists whenever the target vehicle's path is not parallel to the antenna, including curves and hills. In all uses of police radar, there is always a slight angle between the patrol and target vehicle to avoid collisions.

Whenever the angle between the beam of the antenna and the target increases, the displayed speed decreases. Ideally, an angle of zero (0) degrees is preferable, since the displayed speed will be the actual target speed. The following table shows the effects that an increasing angle can have on the speed displayed.

At angles less than 10°, there is not much difference between the target and actual speed. As the angle increases, the error increases. At 90°, the TARGET speed is zero mph - grossly incorrect.

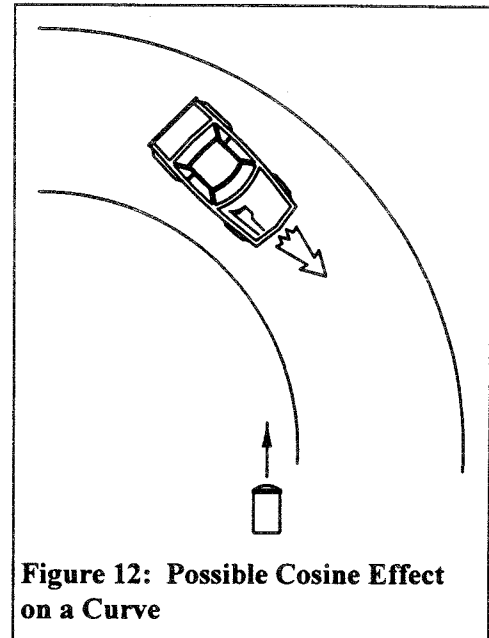


Figure 12: Possible Cosine Effect on a Curve

Actual Speed	Angle, in degrees										
	0	1	3	5	10	15	20	30	45	60	90
30 mph	30	29	29	29	29	28	28	26	21	15	0
40 mph	40	39	39	39	39	38	37	34	28	20	0
50 mph	50	49	49	49	49	48	46	43	35	25	0
60 mph	60	59	59	59	59	57	56	51	31	30	0
70 mph	70	69	69	69	68	67	65	60	49	35	0
80 mph	80	79	79	79	78	77	75	69	57	40	0

Table 1: Actual and Displayed Speeds at Different Antenna-to-Target Angles

6.2 Interference

Radar systems, like any other radio system, are subject to external interference. There are many kinds of interference. The two most common kinds are radio frequency and undesired moving objects.

Radio Frequency

The system may inadvertently process radio frequency energy from airport radar, street lights, high-tension power lines, microwave transmission towers, CB radio transmitters, and AM/FM transmission towers as Doppler speeds. The GENESIS unit has a radio frequency interference (RFI) detection circuit, designed to detect excess radio frequency energy. When stray radio frequency energy reaches an excessive level, the system will display **rFI** in the TARGET window. Once the source of radio interference ends, the system will resume normal operation. Also, any LOCKED speeds will return to the LOCKED window.

Moving Objects

The system may also detect other moving objects in the antenna's beam. Fan blades and alternators, in the patrol vehicle, can generate an undesired Doppler signals.

Since these signals are similar to moving cars, the operator needs to discern between a valid target and a source of interference. Usually, a source of moving interference exhibits the following characteristics:

- A reading when there is not a target vehicle in the operational range of the antenna.
- A target vehicle, upon entering the operational range, will override the interference signal-causing the TARGET speed to change suddenly.
- The Doppler audio will be corrupted with noise, unlike a good, clear Doppler tone.
- Interference is irregular and does not provide a valid tracking history.
- If the TARGET window changes speed proportionally to the engine speed of the patrol vehicle, the alternator is causing interference to the system. Shut down less critical accessories until the problem desists. If the problem continues, with all other accessories disconnected, connect the power for the radar directly to the battery, or to an auxiliary 12 VDC power supply.

6.3 Multi-path Beam Cancellation

When multi-path beam cancellation occurs, the TARGET speed will sporadically blank and reappear. This occurs when the radar loses track of a target at semi-random intervals. The target is reflecting two signals that are interfering with one another. When the phase of the two signals is 180°, maximum interference occurs and the signals cancel, causing the system to ignore the target. When there is only one target vehicle, the system will reacquire the speed of the target. However, when more targets are present, the system could lock onto another vehicle. The operator can minimize the confusion of multi-path beam cancellation with an accurate tracking history of the original target.

6.4 Scanning

All radar antennas, for police applications, are designed to be operated from a fixed mounting or to be hand-held in a steady position. Moving or "scanning" the antenna past stationary objects can cause the system to detect the motion. A speed reading obtained from scanning requires DELIBERATE MISUSE.

7 Warranty

7.1 Terms

TWO YEAR RADAR WARRANTY

Decatur Electronics, Inc. guarantees their radar to be free from defects in workmanship and material, and to operate within specifications for a period of two years. During this period, Decatur Electronics, Inc. will repair or replace, at its option, any component found to be defective, without cost to the owner, provided the unit is returned to the factory.

The full warranty on parts and workmanship does not include normal wear and tear, crushing, dropping, fire, impact, immersion, or damage from attempted repair or modifications by unauthorized service agents, or improper voltage and fusing (including removal of the cigar plug).

Simply return the unit (transportation prepaid) directly to the factory or to an Authorized Decatur Electronics Warranty Service Center near you.

If you have any questions, or want a quick problem diagnosis, please call our customer service hot-line and ask for the service department:



TWO YEAR WARRANTY EXCEPTION

If the unit was purchased under a special buying program (state purchase contract, etc.), then the above warranty may not apply. Please refer to the buying program contract for the appropriate warranty terms or contact Decatur Electronics, Inc. at the above phone number.

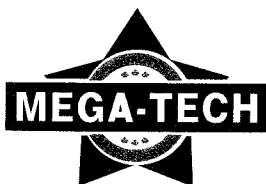
EXTENDED WARRANTY OPTIONS

If you are interested in an extended warranty, contact your sales representative to discuss extended warranty options.

7.2 Service Return Procedure

If it becomes necessary to return the GHS to the factory, please follow the procedure below:

- Return ALL pieces of the GENESIS Handheld in the original packaging
- Include a note describing the malfunction of the system, or the incident that resulted in a malfunction. Failure to do so may delay the return of the system.
- Telephone the Customer Service Department, at Decatur Electronics: [REDACTED], to obtain a return authorization (RA) number. Write the RA number on the note and shipping label.
- Return the system via UPS to:



MEGA-TECH

1-800-700-7937

Phone: (403) 438-9330

Fax: (403) 435-7606

B.C.: (250) 359-7024

Fax: (250) 359-5949

10370 - 65 Ave.

The s www.mega-technical.com
customer.

Edmonton, AB T6H 1T9

Decatur Electronics, Inc., is the responsibility of the

If a system, still under warranty, is received COD from a customer, the customer will be charged for the amount of the COD freight charges plus an additional 10% for handling, after the system is repaired. The COD and 10% handling fee will be added to the repair bill as out-of-warranty repairs.

Decatur Electronics, Inc. will pay the freight (up to \$10.00 US) for shipment of the system from the repair facility to the customer, provided that the system is still under warranty. Any shipping charges, above the initial \$10.00, will be charged to the customer. If Express or Next Day Air is desired, the customer will be invoiced for the freight charges, even if the system is still under warranty.

An estimate can be furnished for repairs that are out-of-warranty, at the customer's request, for \$50.00 US. Even if the customer decides to not have the repairs completed, they will be invoiced for the \$50.00, plus return freight. If Decatur Electronics proceeds with the repairs, there will be no charge for the estimate.

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