GKH-1011
Automatic Under Vehicle Inspection System

(Mobile)
Product Summary:

The GKH-1011 Automatic Under Vehicle Inspection Systems (AUVIS) is the dual view, mobile solution for the fully automatic identification of foreign objects or modifications to a vehicle’s undercarriage. Vehicles drive over the environmentally sealed scanner at speeds up to 35 KPH while Gatekeeper’s system scans and compiles two high-resolution images of a vehicle’s undercarriage to create the vehicle’s digital “fingerprint”. The patented dual view of 60° forward and 60° backward looking makes the search of a vehicle much more comprehensive. In addition the GKH-2011 is not limited by vehicle length or width. An overview/driver camera captures the normal view of the vehicle/driver and displays this on the high-resolution touch screen.

After the vehicle has cleared the scanner, it will take 2 – 3 seconds for Gatekeeper’s Automatic Foreign Object Detection software to automatically compare the subject vehicle’s undercarriage to a safe vehicle (stored in the database) and display both on the screen. The system then immediately identifies any foreign object or modifications to the undercarriage by circling them with a red ring as shown below, and at the same time activates an audio and/or visual alarm.

The system can be integrated with other access control technologies such as automatic license plate reader (LPR) & RFID reader, bollards and barriers of many types along with additional CCTV cameras etc. The GKH-1011 has the Gatekeeper standard features of a system traffic light, Watch List, automatic verification of license plate against vehicle undercarriage (providing LPR is integrated), vehicle make and model identification, activity reports and all GKH-1011’s are network enabled requiring only to connect the systems to a common network to allow a central operator to either observe or operate any scanner on the network simply by clicking on a lane icon. The GKH-1011 is also able to be integrated with other database systems enabling regular updating of vehicles on a government or police watch list for example.
Overview of Technology

Below are the primary features & capabilities that separate Gatekeeper from all other under vehicle inspection systems. In combination with these is the actual performance record of the Gatekeeper systems gained from deployment worldwide from the cold of Northern Russia to the heat of the Middle East.

Core Technology – Gatekeeper’s technology uses Area Scan Image Processing technology which allows vehicle images to be normalized regardless of the speed of the vehicle as it crosses the scanning platform. Image capture and processing technologies such as recorded video streams, or line scanning processing are not capable of automatic identification and searching because they require the human operator to view/compare the images and decide if there is any object or modifications that could pose a threat. Live/recorded video and line scanning systems have been proven to be unreliable as an inspection technology due to poor performance and that they rely heavily on human knowledge, attention span and intervention.

Two Views of the Vehicle Under Carriage (virtual 3D images) – Gatekeeper’s systems compile two high resolution digital images of a vehicle under carriage and create a virtual “finger print” of the vehicle. Two independent views are necessary to provide the maximum amount of visual information to permit automatic identification and automatic searching. The two views or virtual 3D image makes it more difficult to hide objects, explosives etc on top of an axel or cross beam under a vehicle.

Automatic Vehicle Identification – Gatekeeper’s system uses the vehicle finger print to automatically identify the vehicle by matching the image against a data base of vehicle finger prints. The system does not rely on license plates etc to recall the vehicle from the database it is done via Gatekeeper’s patented pattern recognition algorithms. The two images are converted into a digital computer file and stored in a SQL data base where they can be matched against the entire data base. When a match is found the identity of the vehicle make & model can be (user defined) displayed on the operator terminal.

Automatic Foreign Object Detection – Gatekeeper’s system use Area Scan Digital Image Processing technology to convert vehicle under carriage digital images into computer files that are matched against a data base of known safe vehicle images. The Gatekeeper software automatically compares the subject vehicle to a safe vehicle and immediately identifies any foreign objects or modifications to the under carriage that may pose a threat. When a difference between the reference image and new scanned image is identified by the system it automatically places a red ring around the difference i.e. explosive or change to undercarriage etc and activates an audio and/or visual alarm to alert the operator of the threat.

System Performance Requirements

- Maximum Vehicle Speed – 20 Kilometers per hour
- Vehicle length: cars to very large/long trucks
- Decision Response Time – (the length of time from when the vehicle clears the scanning platform until the system automatically identifies the vehicle, automatically searches the under carriage and displays the decision results on the operator terminal)
  - 2 – 3 seconds
Gatekeeper 1011 Specifications

Software Operating System

Automatic Foreign Object Detection System (AFODS)

- *Patented* digital “stitching” of continuous motion vehicle image to create high-resolution digital image regardless of vehicle speed up to 20 KPH
- *Patented* digital image algorithms automatically match scanned vehicle “fingerprint” with vehicle database, detect foreign objects and provide audible and visual alerts to the operator terminal.
- *Patented* bi directional (contemporaneous dual inspection view – forward and backward) scanner providing a virtual 3D view of the undercarriage of a vehicle

- **Operating System**: Windows XPE
- **Database**: Windows SQL (250,000 vehicle records)
- **System Architecture**: Open
- **Online Assistance**: Global Reach™

- **Features**: Patent Pending ability to identify Vehicle makes and models based on under vehicle image only. System contains a Watch List for wanted vehicles, Vehicle Verification vs. License Plate and numerous database features.

- System automatically distinguishes between vehicle types (bus, truck, SUV, car etc) without operator assistance and produces composite stitched images of identical high quality without the need to adjust scanner or lighting.

**Language**: User Defined/multi language GUI, Keyboard and LPR

SYSTEM PHYSICAL PROPERTIES

**Mobile Platform**

- **Dimensions**: 3 meters long x 10 cm high x 2.75 meters wide and breaks down into either 9 or 13 pieces. 13 piece platform Packs onto a single pallet.
- **Weight**: 550 kg (approx)
- **Environmental**: Galvanized steel
- **Assembly time**: 15 minutes (4 people)

**Scanner**

- **Dimensions**: 70 cm wide x 12 cm high x 1 meter long, 1 piece
- **Weight**: 14 kg (approx)
- **Power Source**: 24 VDC from Junction Box
- **Environmental**: Sealed unit to protect against heat, dust, water and vibration.
- **Temperature range**: -35c to 70c
- **Humidity range**: 0 to 98% relative, non-condensing
Operating Environment

Environmental: Sealed unit to protect against heat/cold, moisture, sand, dust, oil, humidity and vibration.

Temperature range: -35°C to 70°C

Humidity range: 0 to 95% relative, non-condensing

Viewing Angle: Patented 2 high resolution images at 60 degree angles for maximum visibility into hard to see areas of a vehicle undercarriage. One looking forward and one looking backward producing a virtual 3D view of the undercarriage.

Undercarriage illumination: 2 x 178cm strip of High Performance programmable LEDs-lighting matched to scanner optimal light frequency.

Scanning Camera
Type: Area Scan – high-resolution monochrome
Frame Rate: 300 - 350 FPS
Connection: Gigabit
Filters: Band-pass

Operator Terminal
Indoor Operator Terminal:
Screen Type: 48.26 cm Flat, Color Screen
Resolution: 1280 x 1024
Brightness: >850 CD/m²
Weight: 3.62 Kg (approx)
Temperature range: 30c to 50c
Humidity range: 0 to 90% relative, non-condensing.
Processor: Intel Core Duo 1.8 GHz
Memory: 2.0 GB of SDRAM250 - 4.0 GB Optional
Storage: 250GB HD
Connections: 2 Ethernet, 4 USB, DVI and printer ports.
Overview/Driver Cameras
Type: IP camera – Color VGA - Optional 3 Megapixel IP Camera (not included in price quoted)
Sensor: Sony CCD Image Sensor
Lens: Auto Iris, 5/50mm lens
Filter: IR Cut
Video Compression: M-JPEG
Resolution: 720 x 480 NTSC
Frame Rate: 30 fps at 720 x 480
Protocol: TCP/IP
Enclosure: Optional environmental controls for temperature in extreme climates.

Traffic Light
Vehicles/drivers are controlled by a traffic light that indicates when a vehicle may drive forward or when the vehicle should stop and wait to be inspected.
Type: Green Arrow and Red Cross
Power: 24 VDC
Control: Automatic via Ground Loop and Operator Terminal GUI.

System Trigger
Type: actuator pad attached to platform.

Cabling
Communication between Operator Terminal and:
Scanner: Ruggedized CAT6
Overview Camera: Ruggedized CAT6
Power: 110 – 240 VAC

SYSTEM PERFORMANCE PROPERTIES

Max Vehicle Length: 25 meters standard – longer vehicles can be scanned requires setup.

Vehicle Width: 2.75 meters standard – wider vehicles w/optional settings.

Vehicle Weight: <10 ton axel weight: Optional heavier platforms are available to cater for heavier vehicles.

Max Vehicle Speed: 30 Km/hr

Lighting: High output LED arrays
Scan Viewing Angle: *Patented* two views one forward and one backward looking, providing two high-resolution stitched composite images of a vehicle undercarriage.

Vehicle Scanning: Vehicles are required to drive across the scanning platform to capture images of the undercarriage. However, in the normal flow of vehicle traffic should a vehicle stop on top of the scanner at any time for up to 10 seconds this will not affect the quality of the scanned images.

Overview/Driver Camera: Provides picture of driver and/or view of vehicle. Image is presented on screen along with under vehicle images.

On Screen Video display: displays live video feed from overview camera on operator terminal screen.

License Plate Reader Camera: Optional - IR Camera captures license plate via Gatekeeper’s License Plate Reading software and automatically presents license plate on screen.

Operator Terminal: Flat screen with image zooming down to 5mm details and coordinated zoom feature with database image. Additional Vehicle data input via keyboard. Achieve retrieval and search function based on several input criteria.

Operational Range: 100 meters stand off from roadbed scanning unit to remote operator terminal with CAT6 cable - 15 KM with Fiber Optic or Wireless options.

Vehicle License Tag: Optional operator tag number input – manual or automatic if equipped with LPR (does not require license plate recognition system, RFID tag reader or similar external identifier to perform automatic foreign object detection).

Networking: Two operational modes – stand alone or networked. Networking via CAT6 Ethernet local area network or wide area via Internet connection. Optional fiber optic cable connection for longer distance. Server(s) and additional data storage required for larger networked applications. All Gatekeeper systems are network enabled and can be configured to operate or observe other Gatekeeper systems on the network by simply clicking on the desired unit.

Automatic Alerts: visual alert on the operator terminal when system detects foreign object. Watch List can be created to automatically alert the operator when a vehicle of interest image is detected.

System Maintenance: The system is designed for fast, simple replacement of components and remote diagnostics via Internet connection to facilitate a low level of down time.

System Manuals: The system comes complete with assembly/installation and operating manuals.

Training: Full training is available to all staff operating the equipment at the quoted rates.

Warranty: 1 year warranty on all system electronics. *(Extension of warranty to 4 years in below schedule).*
Optional Control Pole:

SYSTEM INTEGRATION & ADDITIONAL CAPABILITIES

The system can be integrated with weigh-in-motion scales, biometric systems (finger print etc), facial recognition, license plate reader, RFID identifier, Smart card reader, barriers (road blockers, Cats claw, bollards or similar) and many other entry control point technologies.
Operator Screen (note the automatic alarm circles generated by system in RED)

System Layout
Vehicle Images (note the virtual 3D images)

Large Truck (image compressed due to page size)

Light Weight Truck
Galvanized Steel Platform (note platform clips together - no bolts and can be provided in either a 9 or 13 piece platform – depending on use and mobility)