ELSAG Plate Hunter **M7** LPR System

License Plate Recognition

1: M7 Camera

Figure 2: Roof Mounted M7 Camera

Figure 3: Trunk Mount 3Camera M7 System

The M7 Camera System can be deployed as a permanent or transportable plate reader system.

The product is suitable for:

- All vehicle makes and models.
- Compact design allows the ALPR to fit in front of light bars on top of patrol cars or as a standalone unit attached by magnetic clips. Unit is easily and rapidly transferable to a variety of police vehicles.
- Processor unit is the size of a small box for easy storage in trunk of a vehicle.
- The EPHM7 2 camera License Plate Reader requires less than 20W of 12V DC to function.

The all-weather enclosure contains two cameras: a B/W camera (with one IR illuminator) and one color overview camera. The B/W camera connected with an IR illuminator is designed to tackle variations of lighting conditions, from night to full sunlight.

For each plate read, the ELSAG Plate Hunter system provides:

- Black & white close-up photo of plate (from which the OCR Optical Character Recognition is done)
- Color overview photo of car and surrounding scene
- GPS Coordinates and mapping to show location that the plate was scanned
- Time and Date stamp

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EPHM7 Camera Specifications

Figure 4: M7 Camera Views

ELSAG / 140032 - Plate Hunter™ M7 – 2Camera

M7 CAMERA SYSTEM SPECIFICATIONS	
B/W CAMERA	1280 x 1024 Monochrome CMOS Sensor (1/1.8")
Color Camera	1280 x 1024 Color CMOS Sensor (1/1.8")
Optics Interface	C Mount B&W, S Mount Color
IR Illumination	740nm LED illuminator synchronized with camera shutter, (870nm optional)
Camera Interface	Proprietary 8 pin Military grade connector IP67 rated
Camera Communication Protocol	LVDS Digital Interface
Optics	25mm, 16mm, 12mm (Black/White reading camera)
Operating Temperature	-40 – 60'C (-40 – 140'F)
Housing Protection	IP67
Operating Humidity	10-90% non condensing
Overall Size	53mm x 145mm x 160mm (without base) 2.09" x 5.75" x 6.31" inches (without base)
Camera Weight	2.5 lbs/1.14 kg (without base)
Camera Base Options	Magnet Mount, Hedley Mount, Clicker Base Mount, Permanent Bulkhead Mount, Whelan Lightbar Interface Mount, Explorer Roof Mount
Safety Feature	Class 1 Illuminator, EN60825-1

ELSAG / 412811 Multi Mount

Madden & Associates / LABOR - Hourly rate for installation

EPHM7 Processor Unit

Figure 6: Two Camera M7 Processor

M7 PROCESSOR SPECIFICATONS	
Processing Board	LINUX based RISC processor
Input Power	12 VDC from vehicle battery with 12VDC ignition key signal 2 Camera System: <20W
Interfaces	2 Camera, 1 Power, 2 Ethernet Mil-spec IP67
Housing Protection	IP67
Network Switch	100 Mbit fast Ethernet adapter
Data packet	For each Read system generates; - Read License Plate String - Date-Time Stamp - GPS Coordinates - Camera Identifier - JPEG compressed Grayscale and color overlay JPEG of the plate
Optical Character Recognition Training	Regionalized OCR optimization
Operating Temperature	-40 – 60'C (-5 – 140'F)
Operating Humidity	10-90%
Processor Dimensions	165 x 298mm x 70mm 6.5" x 11.75" x 2.75" inches
Weight	2.2kg (4.9 lbs.)
Vanity and Special Plates	A special algorithm allows reading non-

	structured vanity and special plates.
Non-reflective plates	An enhanced power illuminator and special low-contrast algorithms allow system to achieve accurate results where non-reflective plates are in use.
Red ink character plates	IR Illumination unique wavelength allows the system to have accurate results on red ink plates where higher wavelength IR cameras fail to get the necessary contrast.
Software Suite	CD ROM includes 1. Touch screen enabled on-board User Interface with live display of plate reads, alarms management, Hot List management, shift reporting, and data export. 2. Fast bulk-loading hot list software (from USB thumb drive)
Documentation	Software Installation Manuel and User Manual

EPHM7 Camera Cables

Cable SPECIFICATIONS	
Connector	8 Pin Military Grade, IP67 rated
Cable	Proprietary 8 Conductor Composite Cable, Jacket-Black Poly Urethane
Dimensions	Connector: 1 dia." (30.4mm) (both ends) Cable: .35" diameter (9mm) multiple lengths available

EPHM6 Global Positioning System Antenna

ANTENNAE SPECIFICATIONS	
Interface	USB
Datum	WGS-84
GPS protocol	NMEA or Garmin
Data Rate	4800 bps

EPHM7 CarSystem 6.0 Software Suite

CARSYSTEM SOFTWARE SPECIFICATONS	
Operating System Capability	All released versions of Microsoft Windows 7/8 operating systems.
Connectivity	The system is capable downloading Hot-List data files and uploading LPR Detection and Hot records via the following methods: • 802.11 Wi-Fi • Cellular
Buffering	All records are buffered if connectivity to the server is interrupted. Once connection is restored, all data transactions that occurred during the interruption are updated in the order of their priority.
Comprehensive Search Utility	Search mechanism enables the operator to search manually: all vehicle detection records, all Hot List records, and/or all Hit activities. Searches can be performed using partial license plate entries
Custom Note Capabilities	The system allows operators to add customized notes to all records and upload them to the server for use by all other operators
System Integrity and Change Tracking	Each record is dealt with as precious information that should never be lost under reasonable operating conditions. The database engine allows for data changes to be made as an atomic operation, which protects against any data corruption as a result of sudden power loss or temporary storage hardware failure. Protection for committed data will also be

	provided by the database page checksums. Changes are tracked via history tables in the database. This is done for replication to the server database, for auditing purposes, and for record integrity. Changes/audits are searchable on the server and maintain their own retention logic settings.
Data Transmission	The central server has a persistent connection to all in-car systems. Immediately on any change applicable to a particular system, the server transmits updates to Hot Lists and receives all new Reads and Alarm records generated by the in-car system. The communication uses history tables in the in-car system's database to determine what changes must be transmitted between the two systems.
Alarm Notification	While the in-car system is communicating with the server, it transmits all Alarms and Reads to the server. When the server receives an Alarm, and as it processes each Alarm, it checks to see if the Alarm is of a type that requires an email address for notification. If it is, it generates and transmits an email with the Alarm information to that email address. Additionally, whenever an alarm occurs, if the ELSAG Tactical Operations System is running in conjunction with CarSystem, it will send a simultaneous notification to the dispatcher and to other vehicles that are subscribed to that event.
Filtering	Hot lists can be filtered by location (geo-fencing) or by any other search parameter. Hit visibility is determined based on access levels to the particular agency containing that list and the user's current agency
Data Queuing	All data records in queue waiting for transmittal are prioritized by type. A hit's text data, followed shortly by its image data, is always sent before anything else, except confirmations of data received (when in full duplex operation). Additionally, large objects like images, are sent in chunks so that they can be interrupted immediately in case of very high priority data such as hits to be sent. Interrupted transfers will continue where they were left off once network connectivity returns and/or the critical priority data has completed transmission.
Log-In Credentials/Authentication/Privileges	The system allows any number of operators to

	log into the in-vehicle system. The system administrator controls login credentials. The administrator can set a user's privileges in such a way that they may or may not customize the default settings of certain in-car system features. The system provides each user a unique account. Each account has a user-modifiable profile associated with it. The profile allows the operator to choose the default settings for things like type of alarms that will sound, display language, volume settings, etc. After completing operator authentication, the in-car system will communicate with the central server and synchronize the Hot Lists on the car so that the in-car database contains data only for those Hot Lists that the operator has access to.
Collection and Retention of LPR Data	The system currently captures the following information when a license plate is read: • The date/time the image was taken; • The date/time the read was recorded in the database; • The ID of the user who was operating the vehicle; • The ID of the organization that owns the record; • The license plate as read by the camera; • The state of the license plate, as determined by the camera; • The country of the license plate, as determined by the camera; • The camera's confidence in the read, on a scale of 1 to 100; • The ID of any Alarm group that was generated from this read; • The latitude of the car's position at the time the read was generated; • The longitude of the car's position at the time the read was generated; • The error radius associated with the car's position; • The car's east to west speed; • The car's north to south speed; • The ID of the group associated with the

	data owner Each license plate read occupies up to 140 bytes, plus the images. A color overview image occupies about 40K bytes on average while a black and white plate image occupies about 12K on average. That gives a total of about 53K bytes on average per read. The individual read records are maintained in the in-car system's database for a period of time that is set by the system administrator. The retention period can be set to any length desired. Removal of data from the server takes place in the order of oldest records first.
Connection Between CarSystem and Servers	The in-car software periodically connects to the central server automatically and checks for updates to Hot Lists. The update frequency can be configured by the system administrator. The in-car system connection to the server is constantly being monitored and displayed to the user. It also allows the operator to send test messages to the server at any time to ensure proper communication.
Alarm Stacking	After receiving a read from one or more cameras, the in-car system checks for Hot List matches automatically, no matter what the operator is doing with the front-end software. Each match raises an Alarm; all alarms are "stacked" until the operator acknowledges them or they time-out.
Camera Displays	The in-car system can display up to four (4) camera views on the same screen at once. Each view can be toggled between color and IR images and will display a live stream of the reads and data coming from that particular camera.
Alarm/Hit Screen Display	The system Alarm or 'Hit' Screen includes: • Hot-List alert name or type • The Hot-List source name (i.e. US-NCIC, CA-DOJ, etc.) • Includes date the Hot-List record was created or made active • Two images – color overview of vehicle & infrared of license plate • Each image shall allow user to view in full screen via double click • OCR interpretation of plate • GPS coordinates for location

	• Narrative comment text, Hot-List notes available • Registered Owner • Vehicle parameters (i.e. make, model, color, etc.) • Camera designated name that scanned matching vehicle • Detection rating to allow the User to: • Designate if read is correct/incorrect • Correct plate read if incorrect
GUI Operation Indicators	The system GUI provides the following operational status indicators to alert the operator when an error or failure has occurred within the system. • Wireless connectivity status between system and ALPR server is either connected or not connected with reason code • GPS satellite signal status indicating if properly receiving with live coordinate display or if not receiving signal with reason code • ALPR camera status of both color and infrared cameras indications if system is receiving video or not receiving video with reason code • ALPR processor status indicating if ALPR processor is properly functioning or if not functioning with reason code
Manual Hot-List Entry	Assuming the administrator has given the necessary permissions, an operator can enter a Hot List record that includes: • License plate number • State of registration • Alert Name w/ priority status • Up to three custom note fields with titles • Up to 255 character vehicle comment with subject • Set an expiration time period for the Hot-List record to remain active. Subsequent to the expiration date, the Hot-List record shall automatically be rendered as inactive • Distribution to all ALPR systems, server, recorded in the database (and made available to Users with appropriate

	permissions) and then automatically redistributed through the ALPR network to allow all ALPR systems to receive the Hot-List record as an active target vehicle in which to alert upon. • Notify (via an alert) the user who entered the record prior to the expiration date.
System Response Time	The system compares a captured plate against multiple large databases comprising of more than 3,000,000 records with a less than 2-second response time.
GUI Light Setting Modes	The system GUI is available in both a daytime and nighttime modes that is selectable by the operator if permission is granted by the system Administrator. Nighttime viewing mode decreases the light emitted from the screen during dark nighttime conditions.

ELSAG / 140032 - Plate Hunter™ M7 – 2 Camera
ELSAG / 140033 - Plate Hunter™ M7 – 3 Camera
ELSAG / 413352-22 - M7 Transp. Cam Cable W/90-4:30 22FT
ELSAG / 413353-22 - M7 Transp. Cam Cable W/90-7:30 22FT
ELSAG / 510322-5.X - EOC Operation Center License 5.X
ELSAG / 412811 Multi Mount
Madden & Associates / LABOR - Hourly rate for installation

View of Camera

Camera Size:

- Standard 12mm (covers 12 feet wide by 15 feet long or 3.6 meters by 4.5 meters) and 16mm (covers 12 feet wide by 24 feet long or 3.6 meters by 7.3 meters). Only one camera on the right is required to perform all plate reading missions including adjacent lanes or parked vehicles (90° or diagonal or parallel parked).

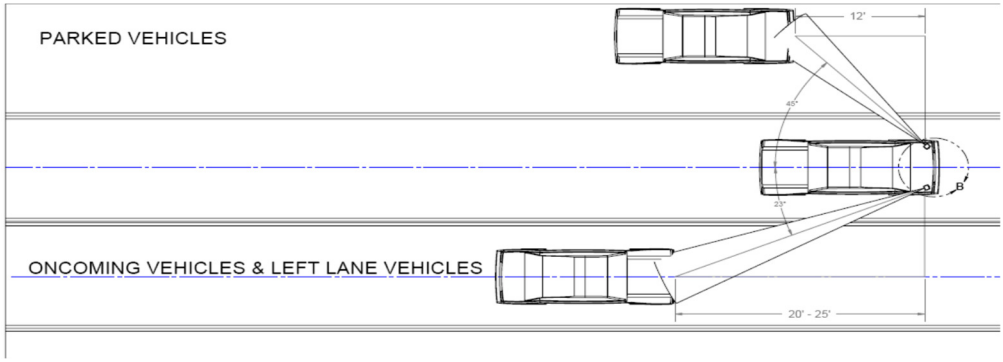


Figure 7 – Camera Range

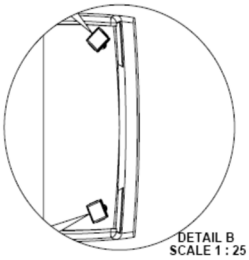
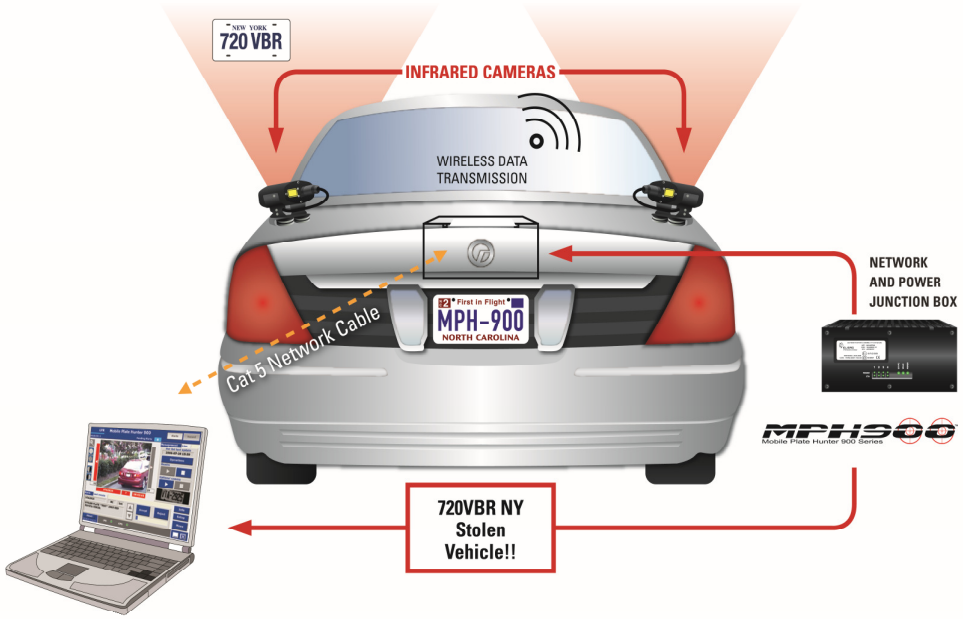


Figure 8- A two camera configuration with trunk mount

Figure 9 – Camera Snapshot comparable to competition.

How It Works



- Infrared cameras read plates of parked and moving vehicles across 4 lanes of traffic.
- Processor Box compares data with Hot List records of suspect vehicles
- Wireless connectivity sends images to software uploaded on Mobile Data Terminal (MDT).
- Alarm sounds when suspect vehicle is passed.

MDT

Compatibility with on-board PC or Mobile Data Terminals
The LPR cameras need an on-board PC to host the user interface. It is usually possible to utilize existing Mobile Data Terminals (MDT) if they comply with the following minimal requirements The computer on which you install Car System must meet the following requirements at a minimum: ○ Intel® Core™2 Duo CPU with at least 2 GB RAM ○ 800X600 minimal display Resolution ○ 5 GB hard disk space available (more HD space is required for longer retention locally on the PC) ○ LAN data port for connecting the PC to the Processing Unit (the Unit must have STATIC IP addresses); if an on-board LAN is already present, a switch port must be available and the IP address of the unit can be adapted for the existing IP class. If a firewall is present, UDP and TCP traffic shall be enabled between the PC and the Unit. ○ 1 open USB 2.0 port ○ Windows 7 or higher • The Hot List is a standard TXT file and must be generated by the User. The hot list file is the database of the wanted plates and shall be downloaded onto the on-board PC by means of a USB memory stick. It is also possible to download the Hot List wirelessly by means of Wi-Fi or cellular broadband. • The on-board MDT may be optionally touch screen enabled • GPS devices, compliant with NMEA 0183 version 2.0 or later, can be installed on any serial (COM) or USB port; if available all the read license plate could be associated to a location for further analysis.

Operations Center Software Suite – Enterprise Operations Center (EOC)
(to be ordered as a separate item)
When a fleet of cars are equipped with MPH™900 or if it is preferable to have a separate workstation placed in an office environment for after action analysis, the optional Operation Center software is the right solution. Wireless communication capability allows automatic Hot List download and mission data upload. An LPR unit that maintains a wireless connection to the EOC will receive an automatic data download to include the most up to date hot list.
The EOC provides archiving of all the collected data (both alarms and normal reads) as well as database search functions. An included mapping module allows the system to display alarms and reads on a map.
Cellular high-speed networks are supported.
Wireless network deployment and installation is not included. The design of the wireless network can be provided as a separate service.

Not included:

OP-Center Server PC with the following minimal requirements.
This Server configuration example below is for less than 5 mobile units and data storage for up to 6 months.
If the requirements exceed these constraints the Server specification must be evaluated on a case by case basis and a hardware sizing guide is available.

SERVER	
Functions	Aggregator, Trans DB, Staging DB, Web Service, Image Storage
Minimum	Intel i7 Quad Core
Recommended	Intel Xeon Dual Core
RAM	
Minimum	16 GB
Recommended	32 GB
Hard Drive	
OS	7.5k RPM, 100GB (page.sys located here)
IMAGES	7.5k RPM, 100GB to 750GB/yr *See Capacity Planning Worksheet
SQL	7.5k RPM, *See Capacity Planning Worksheet (meta data storage - no images)
Software	
OS	
Minimum	Windows Server 2008 R2 64bit version, Windows 7 Professional 64bit
Recommended	Windows Server 2012 R2 64bit version
SQL	Microsoft SQL Server 2008 R2, or 2012 or 2014 (any version) 64bit versions
.NET	
Minimum	.NET 4.6 required
Recommended	.NET 4.6.2

Custom Hot List Input Format

Adaptation software will be provided to convert any kind of input text file into the proprietary system format.

Maintenance and Support

Warranty Year 1	Included
On Site Training	Included
Phone Support	Included