

# GLAMDRING 3

## SOFTWARE FOR REAL-TIME RADAR CLASSIFICATION IN ESM SYSTEMS



### GLAMDRING 3 deinterleaving and identification software

#### Overview

GLAMDRING 3 is a development of ESROE's unique GLAMDRING embedded deinterleaving and identification software. GLAMDRING 3 adds long term emitter tracking capability to the ability of GLAMDRING 1 and 2 to deinterleave and identify known and unknown emitters.

#### Application

GLAMDRING 3 is targeted at low SWAP (Size, Weight And Power) ESM and RWR systems that have limited computing resources available for deinterleaving and identification software, but is also applicable to a range of other applications from conventional ESM to ELINT analysis systems.

#### GLAMDRING 1 & 2

GLAMDRING 1 performs deinterleaving and identification of known radar emitters using pulse by pulse correlation with a library of radar 'waveforms' as shown in Figure 1.

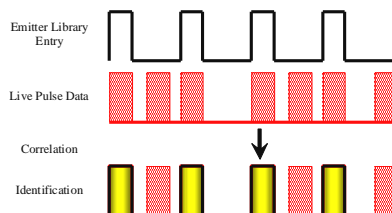


Figure 1 - Waveform correlation technique

GLAMDRING 1 can only identify those emitters which are present in its library but can do this very efficiently.

GLAMDRING 2 incorporates GLAMDRING 1 library driven functionality, but adds a data driven capability to identify radar emitters that are not present in its library. The GLAMDRING 2 data driven capability operates on the radar pulses left over from the library driven processing. Pulses from new emitters that are found by this process are used to automatically create new library entries that can be used by the library driven functionality.

#### GLAMDRING 3

GLAMDRING 3 adds track management, including the determination of scan period as shown in Figure 2.

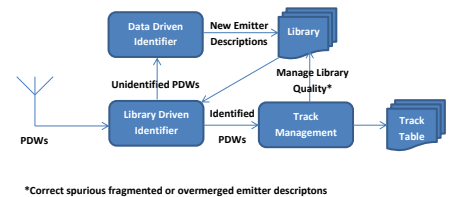


Figure 2 -GLAMDRING 3 architecture

#### Features

Small code size and highly efficient algorithm well suited to small, low cost systems.

Provides accurate identification with a small set of parameter measurements – well suited to limited capability ESM receiver systems.

Can process realistic radar signal environments on small, low cost COTS processor cards, including Smartphones.

*A priori* libraries for library driven processing can be easily created from collected radar pulse sequences, or PRI sequences in EW databases.

Simple text based library format.

Data driven processing is highly configurable through integrator supplied configuration file.

Full API (Application Programming Interface) provides integrator with flexible dynamic control of GLAMDRING 2 operation.



Figure 3 - Smartphone based implementation of GLAMDRING 2

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# ESROE

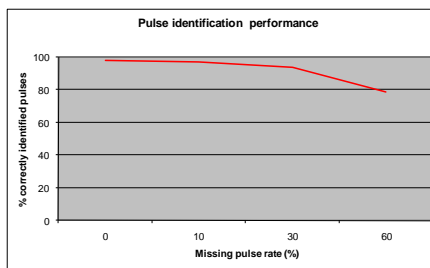
identifying the spectrum

### Performance

Real-time processing of up to 100 Kpps environments on single Intel Atom processor, and up to 1 Mpps on a single Intel i7 processor.

A full range of radar emitter types can be recognised.

Algorithm is robust to low quality signal information – library driven processing performs particularly well against missing pulse data as shown in Figure 4.



**Figure 4 – Library driven processing robust to missing pulses**

### Package

Currently delivered as a shared library for embedding into customer software.

Versions available for Windows, Linux and Android.

Provided with comprehensive documentation of the API and integration guide.

Comprehensive integration support can be provided.

### Upgrades

GLAMDRING 3 is constantly evolving in response to customer requirements and licencing can include a maintenance package that provides regular upgrades.



**Figure 5 – ESROE’s software is suitable for UAV systems**

### ESROE LIMITED

ESROE LIMITED is a UK-based, Electronic Warfare company specialising in Electronic Surveillance software and solutions. ESROE’s origins are in the Defence Science and Technology Laboratory (Dstl), where the software was originally created.

ESROE’s software products have been created to protect and defend naval, airborne and land based systems, vehicles and formations against radar and radio threats. ESROE continues to develop state of the art software to meet ever changing requirements.



**Figure 6 – ESROE’s software is suited to small, low cost systems for armoured vehicles**

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