



DEPARTMENT OF THE AIR FORCE  
WASHINGTON, DC

Office Of The Assistant Secretary

27 FEB 2003

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Serial Number Tracking and Product Markings CONOPS

Serial Number Tracking and Product Marking is one of the Air Force's most important initiatives, and one that is long overdue. Your staffs were very instrumental in helping us develop the attached CONOPS. We are now ready for implementation.

The CONOPS provides the framework and identifies requirements to track selected assets individually throughout information systems from cradle-to-grave. We plan to use automatic identification technology (AIT), which provides the ability to mark on a label or embed in a device certain data elements to distinguish similar or unique characteristics of assets.

This capability has been widely used throughout the aviation and technology industries to improve management practices and track significant assets throughout their life and through the supply management chain. Specifically, this will enable more precise configuration control of weapons systems and enhance the level of support to the warfighter. We will also be able to identify poor performing items, decrease premature disposal of items, drive reliability improvements and manage specific warranty requirements.

Currently, we are partnering with the C-17 Program Office and the Ogden Air Logistics Center Logistics Directorate as initial pilots on this initiative along with the Standard Systems Group and the AIT Program Office. We will also use the Integrated Logistics System-Supply as the first information system to work out the "bugs" before deploying to other programs and information systems.

We look forward to working with you and your staffs. Our POC's are Lt Col Colquitt Lawrence, AF/ILGP, DSN 225-2274 and Mr. Milton Dillard, SAF/AQCK, 703-588-7014.

  
SUSAN A. O'NEAL  
Asst DCS/Installations & Logistics

  
MARVIN R. SAMBUR  
Assistant Secretary of the Air Force  
(Acquisition)

Attachment:  
Serial Number Tracking and Product Marking  
Concept of Operations

DISTRIBUTION:

AFMC/CV

ASC/CC

ESC/CC

AFMC/EN

AFMC/DR

AFMC/LG

OO-ALC/CC/LG/LH

WR-ALC/CC/LG/LH

OC-ALC/CC/LG/LH

ALMAJCOM/LG

SSG/IL

AIT PMO

AFLMA/CC

# **AIR FORCE CONCEPT FOR SERIAL NUMBER TRACKING AND PRODUCT MARKING**



**Matériel Management and Policy Division  
Directorate of Logistics Readiness  
DCS Installations and Logistics  
Headquarters United States Air Force**

**27 February 2003**

## **A Concept for Serial Number Tracking (SNT) and Product Marking**

### **Introduction**

1. The capability to track significant logistics items individually throughout their life and throughout the Logistics Management Chain has the potential to improve AF asset management practices. Commercial airlines and the automotive industry have demonstrated improved management practices with the introduction of Serial Number Tracking (SNT). Recent Army and Navy projects, although in early stages of development, have also identified significant advantages in logistics management by introducing SNT capability. For the Air Force, introduction of SNT will enable more precise configuration control of weapon systems and enhance the level of support to the warfighter.

### **Definitions.**

2. SNT is defined as cradle-to-grave tracking throughout the Air Force logistics systems of reparable, selected consumables, engines, equipment and other designated property to provide asset and item information and status. SNT is enabled by automatic identification technology (AIT). Product markings are permanent markings applied directly to the asset or item. They could be marked on a label, directly marked on the item or embedded in an AIT device. This will ensure certain data elements provide the ability to distinguish similar or unique serially controlled items, configuration items, and numbered or lot controlled items.

### **Benefits of SNT and Product Markings**

3. SNT can provide the Air Force a mechanism to more efficiently manage its inventory of high cost spares or other items important to the warfighter. By identifying and managing significant reparable as individual items, Inventory Managers are able to improve the efficiency and effectiveness of management decisions. A recent survey of current weapon system managers and Project offices (C-17, C-130J, F-22, and GATM ) identified the following need for serial number tracking:

- a. **Identify poor performing items.** By having visibility of individual items rather than groups of like items, IM's are able to gain visibility of trends in items that fail, and develop management metrics to better monitor Mean Time Between Failures, patterns of similar repair work, item quality issues, etc...
- b. **Decrease premature disposal of items.** Individual item visibility allows more informed decisions on individual item retention rather than 'fleet based' decisions that can lead to the disposal of useful items.
- c. **Drive reliability improvement.** Visibility of items can enable the capture of data that will more accurately determine reliability and maintainability metrics and policies.
- d. **Manage specific warranty requirements.** Many newer weapon systems have industry logistics support arrangements that require the Air Force to specifically manage the use, repair and storage of items subject to a commercial warranty.

Product Marking is the foundation of an asset management system that can provide total asset visibility and knowledge based on individual items. This is in addition to production lots of items or items produced under one contract number. Without product markings there can be no effective tracking system for items entering the inventory.

5. The introduction of SNT for reparable spares would also provide the following general logistics advantages:

### **Maintenance**

- a. Assist configuration control and thereby improve reliability by tracking failure rates.
- b. Identify latent defects in specific items and enable improved predictive maintenance measures that allow the development of efficiencies such as more widespread use of Condition Based Maintenance practices.
- c. Assist engineering investigations by enabling the collection of maintenance history by individual items.

### **Supply**

- a. Increased asset visibility;
- b. Provide more accurate data on depot turn-around times, reliability and maintainability that lead to more accurate requirements determination methods and improved procurement decisions;
- c. Decrease misidentification of items; and
- d. Enable improved management of warranty agreements for Air Force spares and equipment.
- e. SNT can enable item managers to reduce inventories since assets will be visible, accurately tracked and controlled.

### **Transportation**

- a. Provide improved In Transit Visibility (ITV) of high cost, mission critical items; and
- b. Enable improved flexibility and management decisions on cargo movement and priorities.

### **Logistics Statement of Requirements for Serial Number Tracking Concept Overview**

6. In developing a logistics system that is capable of tracking items by a unique serial number, the Air Force will create the capacity to cross-reference and data share item specific critical information such as maintenance, transportation and supply data elements. To achieve this, items need to be uniquely identified using existing government and commercial data. Minimum identification data includes manufacture identification (i.e. Commercial and Government Entity code (CAGE, Dunn and Bradstreet Number (DUNS), or UCC.EAN member company prefix), part number, date of manufacture and traceability number (serial number/LOT number). The combination of these three data elements is sufficient to uniquely identify items in the inventory and allow individual

management as required. Other conditional data elements can be applied by the manufacture and/or required by the acquiring activity.

7. Logistics information systems need to be modified to incorporate the capacity to identify individual spares and equipment. Item data records in current and future logistics systems need to include the minimum identification data and be capable of accessing information pertinent to that specific item from any other logistics information system. By uniquely identifying an item and entering these details into a logistics system, users can on request, access specific logistics information such as transportation data, inventory management data and maintenance information from the relevant existing information system.

8. This vision requires that the basic identification data (manufacture identification, part number and traceability number) will be the key for logistics systems to provide specific logistics item data and that this data be sourced from existing data bases from a web based browser. Using data on existing systems is preferable to creating additional logistics data records that travel with the item, as this latter arrangement limits data visibility and access. Therefore existing logistics information systems must develop a capability to uniquely identify an item and then 'point' users to specific information that may be resident in other information systems, such as last maintenance record or latest inventory management data. With use, a series of standard inquiries could be developed to accommodate the majority of user standard information requirements. The vision also requires that many logistics functions need to be reengineered to incorporate electronic data capture to give visibility, timeliness and accuracy to logistics information.

### **Concept Detail**

9. The conceptual solution for introducing Serial Number Tracking includes the following aspects:

- a. Identification of Items suitable for SNT
- b. Protocols and standards for marking of items;
- c. Modification of Information Systems;
- d. System Architecture requirements; and
- e. Modification of Business Processes.

### **Items Subject to SNT.**

10. SNT is not necessary for all items in the Air Force inventory. Maximum value is achieved by providing unique identification for high cost and critical spares and equipment. SNT should be limited to items where a high level of asset visibility and/or management decision making is required. Items to be subject to SNT therefore include weapon system related Depot Level Repairables (LRUs and SRUs), consumable items with a coding of XF, equipment items, munitions and missiles. Both classified and unclassified items are included.

Items subject to product markings are all serially controlled, configuration items, numbered or lot controlled items or other items described in MIL-STD-130.

## **Identification and Markings.**

Items are to be identified by a combination of manufacture identification, part number and traceability number. Other elements such as national stock number, contract number, warranty information, etc. . . may be important to AF business processes but are not required for unique identification of an item. This information should be maintained in a data warehouse accessible through web based technology. Standards for marking items and item containers will be prescribed by DoD policy and procedures. The DoD is institutionalizing international, national and commercial standards into its part marking policies. Using these standards will simplify the electronic movement of items into and out of the AF logistics system. AIT provides several options in identifying and marking assets. Several industries have standardized on a DataMatrix Two-Dimensional (2D) barcode symbol for product identification. These same industries, including Telecommunications and Aviation have also selected manufacture identification, part number and traceability number as their minimum data elements for SNT. In support of the DoD AIT policy, the AF will use ISO 15418 semantics encoding when using linear bar codes and ISO 15418 semantics and ISO 15434 syntax encoding when using 2D bar codes symbols. The use of a highly survivable barcode system is one of the keys to ensuring the integrity of data accuracy and timeliness within the system. Using AIT automates the transcription of complex serial numbers, part numbers, etc. A “one-touch” scan in conjunction with the automated interface between the AIT and logistics systems will achieve transcription-free interaction between serialized item and associated logistics records. Details of item identification and marking are at Annex A.

## **Modifications of Information Systems.**

11. Data fields and reports currently used by logistics systems will need to be modified to enable property to be identified, tracked and reported as individual items as opposed to the current groupings of items (i.e. Interchangeable and Substitute groups). Current logistics chain processes also need to be reviewed to identify data elements that are unique to a particular system but are needed in a related business process and will need to be shared. The intent is to have logistics systems that are responsible for a particular logistics chain process to ‘populate’ associated links and systems with common information so as to reduce the need to manually capture the data at each step of the logistics chain. The chart at Annex B attempts to capture the major nodes of a generic logistics chain and current Air Force Logistics Information Systems (LIS’s).

## **System Architecture.**

12. SNT consists of three basic processes; data collection, storage and retrieval. For SNT to provide improved business processes, its architecture must be based on two fundamental principals of operation:

a. Data collection must be located where the status of assets, with respect to their maintenance plan, location or where basic item data is changing. This means it must be where usage accrual is taking place, where maintenance is taking place, and at transportation nodes. This is essential because a large component of the business process improvement of SNT is its capability to receive quality, constrained data from the source; not post-processed data that is prone to errors due to backlogs, etc.

b. The SNT infrastructure must support the timely electronic movement of data to enable data sharing between LIS's and where appropriate preloading of information to other LIS's within the Air Force Supply Chain.

These guidelines require Air Force LIS's to have an open operating system architecture capable of providing timely, world-wide visibility of asset status and location changes. Additionally, the architecture must allow direct interface with all applicable Air Force and DOD maintenance, transportation and supply information systems, and it must provide easy access via a single web-enabled inquiry for all potential users.

### **Modification of Business Processes.**

13. The concept of operations for SNT must encompass the enterprise-wide handling of assets within the Air Force and key agencies and support/contractor organizations. Consequently, SNT must operate in each of the following primary business processes:

a. Process for registration of "new" inventory into the system. New inventory assets must be registered with SNT information and labeling. Ideally this will be done by the OEM at time of entry to the Air Force and needs to be a part of the contract requirement for new acquisitions. This process involves the attachment of the Barcode onto the component and protective containers in a controlled and predetermined location with the basic 'birth record' data of manufacture identification, part number, traceability number and date of manufacture (equipment items). This information also needs to be preloaded or electronically sent to Air Force LIS's.

b. Process for managing and moving assets within the Air Force logistics system. At the business level Air Force and approved contractors must have the capacity to capture movement, modification, location and status information at key nodes within the logistics chain and those LIS's must have the interfaces to transfer this data to other users. Annex B depicts the generic Air Force logistics chain and identifies the key nodes.

### **SUMMARY**

14. The power of having SNT and standardized product marking for the Air Force becomes evident when considered in conjunction with configuration control, total life-cycle management, asset visibility, inventory management and warranty management concerns. These capabilities offer the Air Force a system that increases the granularity of information on key weapon systems components beyond that offered by the current group/class management system. They also provide the logistics managers a capacity to better manage predetermined critical commodities. This improvement is achieved by increasing the visibility of key asset data such as location, status and history. By using AIT in this process, improvements in data accuracy, timeliness and exchange can also result in process improvements and cost reductions.

Annexes

A. IDENTIFICATION AND MARKING

B. GENERIC AF LOGISTICS CHAIN

## **Annex A**

### **IDENTIFICATION AND MARKING** (Proposed standards and data storage fields)

The item and its protective container must be bar-coded on initial entry to the AF logistics system. Normally this should be an acquisition responsibility and requires the compliance and contract enforcement of OEMs. To assist with interoperability within Defense and the commercial community, AF bar-coding standards are to conform to DoD bar code standards. Apart from initial acquisition organizations and initial entry points, provision within AF depots, repair facilities and storage areas will require the ability to update/replace barcodes as required.

The barcode is used to encapsulate birth record data specifically, manufacture identification (i.e., Commercial and Government Entity Code (CAGE, Dunn code), part number, traceability number and Bradstreet Number (DUNS), or UCC.EAN member company prefix), part number, date of manufacture and tracability code (serial number/Lot number). This is the “only” data that is mandatory for the barcode. The minimum marking information shall include both the machine-readable marking and human-readable text, including nomenclature (in English). When space is available, the three mandatory data elements should be encoded in both linear and 2D bar code formats. The linear bar code shall be a Code 39 or Code 128 symbol. Use of ISO 15418 DIs is required for linear bar codes. The 2D bar code symbol shall be DataMatrix. Use of ISO 15418 DIs and ISO 15434 syntax is required for all DataMatrix symbols.