JTLS

Version Description Document

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U.S. Joint Forces Command
Joint Warfighting Center
116 Lake View Parkway
Suffolk, VA 23435-2697

JOINT THEATER LEVEL SIMULATION
(JTLS 3.3.0.0)

ABSTRACT

This JTLS Version Description Document (VDD) describes Version 3.3.0.0 of the configured software suite identified as the Joint Theater Level Simulation (JTLS). JTLS 3.3.0.0 is a Major release.

As a Major release, JTLS 3.3.0.0 includes a modified and enhanced Standard Database, as well as extensive model functionality changes implemented as Enhancement Change Proposals (ECPs). These ECPs are described in Chapter 2. Chapter 3 of this document describes the code modifications that represent corrections to Software Trouble Reports (STRs). The remaining outstanding STRs are described in Chapter 4.

This publication is updated and revised for each version release of the JTLS model. User corrections, additions, or constructive recommendations for improvement must include justification and be referenced to specific sections, pages, and paragraphs. Submissions must be written in Model Change Request (MCR) format and forwarded to:

JTLS Configuration Management Agent
JFCOM/JWFC
116 Lake View Parkway
Suffolk, VA 23435-2697

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1.0 INTRODUCTION

1.1 SCOPE

This JTLS Version Description Document (VDD) describes Version 3.3.0.0 of the configured software suite identified as the Joint Theater Level Simulation (JTLS). JTLS 3.3.0.0 represents the follow-on capability to the JTLS 3.2 series of releases.

JTLS 3.3.0.0 is a Major release that includes the Web Hosted Interface Program (WHIP), as well as an updated Standard Database, named *sdboif33*, that includes a new and more realistic scenario based on Operation Iraqi Freedom. Database modifications that were accomplished to upgrade the previous JTLS Standard Database to this current version are summarized in this chapter. Detailed descriptions of Enhancement Change Proposals (ECPs) implemented for this release are provided in Chapter 2. The code maintenance modifications that represent corrections to Software Trouble Reports (STRs) are described in Chapter 3 of this document. The remaining outstanding STRs are described in Chapter 4.

The JTLS 3.3.0.0 release executes on the SUN/SPARC Solaris and the Red Hat Linux operating systems.

1.2 INVENTORY OF MATERIALS

This section lists documents and software relevant to JTLS. JTLS documents can be obtained by contacting the Configuration Management Agent (CMA) at the address listed in the Abstract on Page *iii* of this document. DoD Military Standards can be obtained through the appropriate military channels.

1.2.1 Obsolete/Outdated Documents

No documents have been removed from the JTLS documentation suite for this release.

1.2.2 Unchanged Documents

The model enhancements implemented for JTLS 3.2.0.0 are included in JTLS 3.3.0.0 and are incorporated within the documentation provided for this release:

a. *JTLS ATOG User's Guide* (JTLS Document 02, Version 3.2.0.0)
b. *JTLS ATOT User's Guide* (JTLS Document 03, Version 3.2.2.0)
c. *JTLS Director's Guide* (JTLS Document 07, Version 3.2.0.0)
d. *JTLS PPS User's Guide* (JTLS Document 13, Version 3.2.0.0)
e. *JTLS Executive Overview* (JTLS Document 08, Version 3.2.1.0)

1.2.3 Updated Documents

The documents listed in this section have been updated for JTLS 3.3.0.0 to reflect functional enhancements or requirements to the JTLS system.

a. *JTLS Analyst's Guide* (JTLS Document 01, Version 3.3.0.0)
b. *JTLS Controller's Guide* (JTLS Document 04, Version 3.3.0.0)
c. *JTLS Data Requirements Manual* (JTLS Document 05, Version 3.3.0.0)
d. *JTLS DDS User's Guide* (JTLS Document 06, Version 3.3.0.0)
e. *JTLS Installation Manual* (JTLS Document 09, Version 3.3.0.0)
f. *JTLS WHIP Training Manual* (JTLS Document 10, Version 3.3.0.0)
g. *JTLS Player's Guide* (JTLS Document 12, Version 3.3.0.0)
h. *JTLS Standard Database Description* (JTLS Document 14, Version 3.3.0.0)
i. *JTLS Software Maintenance Manual* (JTLS Document 15, Version 3.3.0.0)
j. *JTLS Technical Coordinator's Guide* (JTLS Document 16, Version 3.3.0.0)
k. *JTLS Entity Level Server User's Guide* (JTLS Document 19, Version 3.3.0.0
l. *JTLS Version Description Document* (JTLS Document 17, Version 3.3.0.0)

1.2.4 New Documents

JTLS 3.3.0.0 includes the Entity Level Server, a program designed to independently model the movement of entities represented by aggregate JTLS units. The *JTLS ELS User's Manual* (JTLS Document 19, Version 3.3.0.0), which describes the functional requirements and user procedures implemented for the JTLS Entity Level Server, is provided with this release. [Change this section: ELS is included from JTLS 3.2, but no new documents have been added.]

The JTLS Version 3.3.0.0 may be delivered either on a CD, or as a set of compressed tar files to be downloaded. Either method includes the complete suite of software executable code and command procedures. The following software components are included in this release:

a. Combat Events Program (CEP)
b. Information Management Tool (IMT)
c. Message Data Parser (MDP)
d. Scenario Initialization Program (SIP)
e. Interface Configuration Program (ICP)
f. Interface Configuration Program Login (IPCLogin)
g. Order Preprocessor Program (OPP)
h. Reformat Spreadsheet Program (RSP)
i. Database Development System (DDS)
j. Terrain Modification Utility (TMU)
k. Lanchester Development Tool (LDT)
l. ATO Generator Program (ATOG)
m. ATO Translator Program (ATOT)
n. ATO Retrieval Program (ATORET)

o. Convert Location Program (XCONVERT)
p. Count Critical Order Program (CCO)
q. Graphical Database Program (GDP)
r. HLA Interface Program (HIP)
s. After Action Review Client (AARC)
t. Scenario Data Client (SDC)
u. Order Entry Client (OEC)
v. Order Verification Tool (OVT)
w. JTLS Object Distribution Authority (JODA)
x. Web-Hosted Interface Program (WHIP) and its component programs:
    1. Apache Server (APACHE)
    2. JTLS XML Serial Repository (JXSR)
    3. Order Management Authority (OMA)
    4. Synchronized Authentication and Preferences Service (SYNAPSE)
    5. Web Services Manager (WSM)
    6. XML Message Service (XMS)
    7. Total Recall Interactive Playback Program (TRIPP)
y. Entity Level Server (ELS)
z. JTLS Operational Interface (JOI)

[v3.2 programs removed: Template Building Tool (TBT), Message Processor Program (MPP)]

Instructions for installing JTLS 3.3.0.0 are provided in the *JTLS Installation Manual*. It is not necessary to install any previous version of JTLS prior to installing JTLS 3.3.0.0. No other upgrade beyond installation of the compressed tar files (or CD) is required. The software that is provided is a complete release that includes all files and code required to execute JTLS.

1.2.5 Released Databases

This release includes two sample unclassified databases.

The scenario developed as *Standard Database Operation Iraqi Freedom* and named *sdboif* is a large-scale, seven-sided scenario database reflecting the approximate starting positions of units involved in the March 2003 invasion of Iraq. This example scenario was developed using unclassified data sources and as a result is not completely accurate. Discrepancies with actual units and their locations are not detrimental to the intended purpose of this database, which is to provide a recognizable and realistic scenario that demonstrates the simulation capabilities and supports JTLS training.

The scenario *blank32* is the *sdboif* database with all force structure data removed. It can be used as the foundation to build your own database.

1.3 INTERFACE COMPATIBILITY

1.3.1 Support Software

JTLS 3.3.0.0 requires the following versions of support software, including operating systems, compilers, scripting utilities, database tools, transfer protocols, and display managers.

a. Operating system for the model (one of the following):
   1. Solaris 8 for use on Sun/SPARC Workstations
   2. Solaris 9 for use on Sun/SPARC Workstations
   3. Red Hat Linux Enterprise Edition Version 4.0 (ES), 32-bit or 64-bit architecture.

> Some JTLS components will not execute under Red Hat Linux Enterprise Edition Version 3.0 (ES). Therefore, model support for this OS version has been discontinued. However, Linux Enterprise Edition 3.0 (WS) may be used on client workstations to execute the WHIP.

b. Operating system for workstations (one of the following):
   1. Solaris 8 for use on Sun/SPARC Workstations
   2. Solaris 9 for use on Sun/SPARC Workstations
   3. Red Hat Linux Enterprise Edition Version 3.0 (WS)
   4. Red Hat Linux Enterprise Edition Version 4.0 (WS), 32-bit or 64-bit architecture.
   5. Windows 2000, XP Professional, or Vista

> Although Solaris 8 and Solaris 9 are fully supported to operate JTLS workstations, the Java-based Web-Hosted Interface Program (WHIP) is noticeably more efficient on Linux-based or Windows-based operating system machines.

c. Operating system for Support Software, such as HIP, SIP, etc:
   1. Solaris 8 for use on Sun/SPARC Workstations (excepting all HLA programs)
   2. Solaris 9 for use on Sun/SPARC Workstations
   3. Red Hat Linux Enterprise Edition Version 4.0 (ES)

d. Java Version 1.5 or later is required for all platforms. *Java 1.5 or 1.6 may be used to support WHIP workstations.*

e. JTLS database tools require the use of an Oracle database server and the Oracle Form/ Reports Developer 6i client/server runtime (with patchset 18 or later). Refer to Section 1.6.2, Oracle Compatibility and Installation of this chapter for additional installation details.

f. Windows software, X11R5 server, Motif 1.2 Library, Motif Window Manager: These items are included as part of Solaris 8 or 9 and Linux 4.0.

g. Adobe Acrobat Reader Version 4.0.5 or later, is required to read the delivered JTLS documentation. The JTLS 3.3.0.0 tar file (or CD) includes the freeware version of Acrobat Reader.

h. TCP/IP is required for inter-process communication between the JODA data server and all user interface programs. The version of TCP/IP included with Solaris 8 or 9, and Red Hat Linux ES/WS 4.0 is sufficient.
i. The Perl script language is used by the JTLS system and game setup scripts. The version of Perl included with Solaris 8 or 9, or Red Hat Linux ES/WS 4.0 is sufficient. The Perl program is typically located in the /usr/bin directory. If Perl is installed in a another location, a link should be created from the /usr/bin directory to this program.
j. KDE Desktop support has been added to JTLS Version 3.3.0.0. Support of the GNOME desktop is continuing, and use of the KDE environment is optional. Details regarding the installation and use of KDE are provided in Section 4.4.3.2 of the *JTLS Installation Manual*.
k. SIMSCRIPT II.5 (SIMSCRIPT to C) translator/compiler: SIMSCRIPT is required for recompiling JTLS code. It is not necessary to have a SIMSCRIPT compiler to execute JTLS, because all JTLS software executables are statically linked with the SIMSCRIPT libraries. The compiler is needed only if you are a U.S. Government organization that can obtain source code and plan to re-compile JTLS SIMSCRIPT code. To obtain a SIMSCRIPT compiler, contact CACI Inc. The following SIMSCRIPT II.5 versions are recommended for each platform:
    1. 32-bit SUN Solaris: version 3.0.3
    2. 32-bit Red Hat Linux: version 3.4
    3. 64-bit Red Hat Linux: version 3.5
l. ANSI C Compiler: It is not necessary to use a C compiler to execute JTLS. This compiler is needed only if you are a U.S. Government organization that can obtain source code and plan to re-compile any JTLS software program. If you need a C compiler, the following versions will suffice:
    1. SUN Solaris: ANSI C 5.2 or later
    2. Linux: C Compiler as delivered with Red Hat Linux ES 4.0
m. C++ Compiler: It is not necessary to use a C++ compiler to execute JTLS. This compiler is needed only if you are a U.S. Government organization that can obtain source code and intend to re-compile any of the JTLS HLA software programs. If you need a C++ compiler, these versions are sufficient:
    1. SUN Solaris: ANSI C++ 5.2 or later
    2. Linux: C++ Compiler delivered with Red Hat Linux ES 4.0

1.3.2 HLA Compliance

The JTLS 3.3.0.0 release is fully High Level Architecture (HLA) compliant, and includes all the programs required to run JTLS in an HLA mode on any operating system listed in Item *c* of Section 1.3.1, Support Software.

The HLA RTI (Run Time Infrastructure) executive program (rtiexec) recommended for use with this release is RTI-NG-Pro-v4.0. However, this program is not included in the JTLS 3.3.0.0 delivery. Users may obtain a full installation package of this RTI software from the vendor, Raytheon Virtual

Technology Corporation, by contacting their Web site at http://www.virtc.com. For information about executing the HLA RTI Executive and other HLA-related software, refer to the appropriate HLA documentation and user guides.

1.3.3 JTLS Operational Interface (JOI)

JTLS exercises conducted by the United States Government have required data feeds to real-world Control, Communications, Computers, and Intelligence (C4I) systems. The JOI is designed to provide a configuration-managed capability to covey current JTLS force status information to these systems. This capability allows all JTLS Units and Air Missions to be passed via OTH-Gold message format to the US Global Command Control System (GCCS) or to any other system that accepts OTH-Gold messages by means of a TCP/IP socket connection.

The JOI is a JTLS Object Distribution Authority (JODA) client that has the capability to easily start and stop the feed of these OTH-Gold messages according to the status of the JTLS game and is able to alter the naming data passed to the real-world systems. Consequently, any database object naming errors can be corrected independently of the model to allow the exercise audience to view correct names while monitoring the real-world system that is populated by the JOI. The JOI has a complete checkpointing capability and can be restarted from any of its checkpoint files without losing information.

Chapter 15 of the *JTLS Technical Coordinator's Guide* describes procedures for using the JOI and how the program obtains information required to properly fill the OTH-Gold messages. Information about operating the Global Command and Control System (GCCS) is not included. The content and format specifications of each message file that the JOI accesses are described in Chapter 34 of the *JTLS Software Maintenance Manual*.

1.3.4 JTLS Air Tasking Order Translator (ATO-T)

The ATO-T executes in two modes, named basic and advanced for the purpose of this description. The ATO-T requires libraries from Simscript and Oracle to run in either mode. The basic mode of the ATO-T reads and processes Air Tasking Orders in USMTF format, as well as Air Mission data prepared using an Excel spreadsheet and delivered in comma-delimited format. The output from the the ATO-T at the basic level consists of ASCII order files that may be read into the CEP using the READ ORDER FILE order.

The advanced ATO-T mode reads Air Tasking Orders and Air Mission data in the same formats as the basic mode. However, this mode writes the orders directly to Oracle tables for error checking and for input directly to the CEP using the Order Entry Client (OEC). Each order written into the Oracle tables specifies a time the order is scheduled for submission to the CEP. The OEC continuously monitors the Oracle tables and performs a final error verification at this specified time before submitting the order.

The Simscript and Oracle library support required by both ATO-T modes are obtained separately. The Simscript support is now provided with each JTLS release. The necessary Simscript libraries are released in the bin_support directory for 32 bit Linux. To run the basic mode, users must obtain, install, and configure the most current Oracle Runtime client from Rolands & Associates Corporation. To run the advanced mode, users must have access to an Oracle server configured for iAS.

1.4 INSTALLATION CONSIDERATIONS

The procedures for installing JTLS 3.3.0.0 depend on the hardware configuration provided at the installation site. All installation considerations are addressed in *the JTLS Installation Manual*.

1.5 DATABASE MODIFICATIONS

This release includes a completely new demonstration database, named *sdboif*, that provides enhanced, realistic support of real-world operations. Additionally, significant database changes were implemented in conjunction with the upgrade from JTLS Version 3.1.0.0 to Version 3.2.0.0. The following sections provide a detailed description of these changes. Data parameter adjustments implemented for JTLS 3.3.0.0 are described in Appendix C, VERSION 3.3.0.0 STANDARD DATABASE CHANGES, Section C.6.

1.5.1 Graphic Symbols Update

Updating the graphic symbol definitions for your JTLS scenario is required before the database is upgraded to Version 3.2. To upgrade the symbol file for a scenario, use this procedure to run the JSyms application and resave the symbols:

1. Run JSyms for the scenario by typing this command: jsyms <scenario_name>.
2. Before JSyms starts, this dialog message appears: "Your symbol files need to be upgraded. Select File Save to upgrade." At this point, you will not need to make any modifications to the symbol file. JSyms will perform the upgrade when the symbols are saved. You can bypass the upgrade process by exiting JSyms without saving.
3. Select File > Save and exit JSyms.

Note: JTLS 3.2 graphic symbols have an Organization Type field that is not present in Version 3.1. After this required upgrade process is complete, each symbol will be assigned a default Organization Type of UNK.

1.5.2 Database Upgrade

The generic JTLS database upgrade feature of the Database Development System (DDS), known as the JTLS Database Modify process, is accessed by a sequence of three *JTLS Menu* options: *1. Prepare or Alter a Scenario Database > 1. Access the Database Development System Menu > 2. Access an Existing Database*. This upgrade feature must be used to upgrade the JTLS Standard Database from Version 3.1 to Version 3.2.0.0

> Oracle Database Server version 9.2.0.8 or later must be used to execute the Database Modify process while upgrading the JTLS Standard Database from any previous version to Version 3.3.0.0. The modification process will fail if performed using earlier Oracle DB versions.

When the user selects and accesses a database that does not conform to the Standard Database 3.2 format, a Warning dialog box (Figure 1.1) queries the JTLS user to begin the upgrade process.

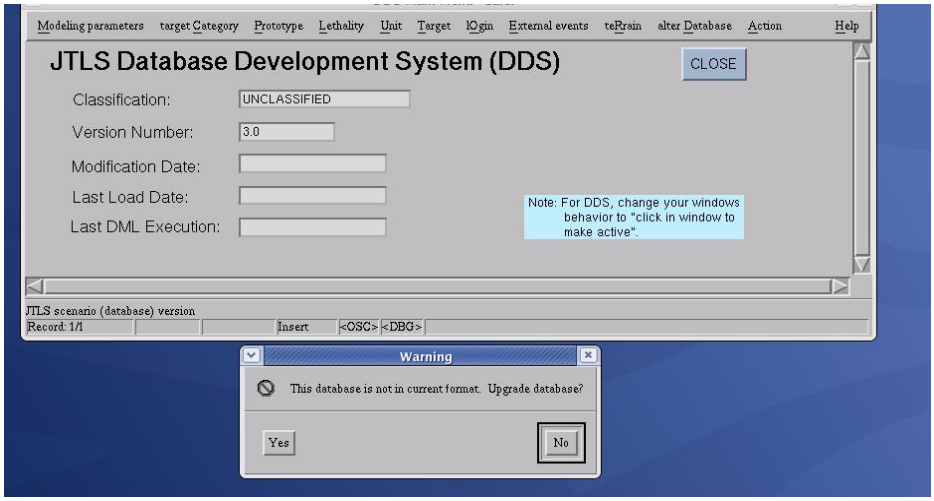


Figure 1.1 Starting the Database Upgrade

Selecting the *Yes* option executes a separate process, entitled *Modifying Your JTLS Database*, that determines the existing format of the selected database, begins the upgrade, and displays its progress

The database upgrade is successfully completed when the message shown in Figure 1.2 is displayed. The terminal window should then be closed.

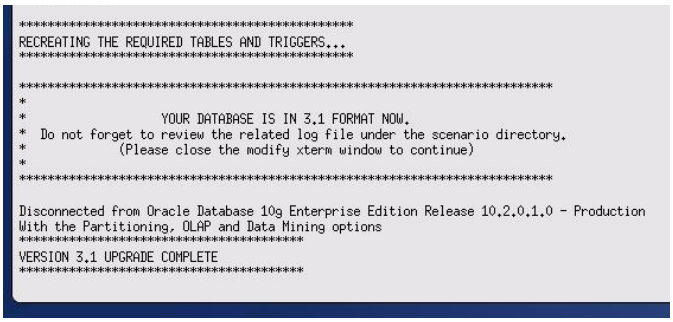


Figure 1.2 Database Upgrade Completed

The JTLS Database Modify process for the JTLS 3.1 series of releases includes an interactive feature that requires user input while the upgrade process executes. *This interactive upgrade process **must** be used to modify your scenario database from JTLS version 3.0 or earlier to JTLS Version 3.3.0.0*. Ensure that you review the corresponding database modification section of Chapter 1 of the *JTLS Version Description Document* for JTLS versions 3.1.0.0, 3.1.1.0, or 3.1.2.0, which describes the interactive modification process for the upgrade from Version 3.0 to 3.1. This process requires specific user input, which is described and illustrated in detail.

After your database has been modified from Version 3.0 or earlier to Version 3.3.0.0 and downloaded to ASCII files, *a successive scenario load is **required*** to properly create the check constraints in the database to include the new illegal character set (*space,* ", #, &, @, /, {, }, <, >, ’). Unit names, Target names, or other object names that contain any of these characters will be automatically removed from your database. These symbols are incompatible with the JTLS 3.3.0.0 WHIP.

1.5.3 Standard Database Data Elements

The ECPs implemented for JTLS 3.3.0.0 have required the addition, deletion, or modification of various data parameters in the JTLS Standard Database. The description and use of these variables to suppoer the functional changes are described in Chapter 2 of this document and summarized below in Table 1. Detailed descriptions of the new or modified data parameters are provided in Appendix B of the *JTLS Data Requirements Manual*.

Table 1.Summary of Standard Database OIF Data Elements

VARIABLE NAME	CHANGE	DESCRIPTION
JTLS-0097 Guided Missiles Close To Shore		
TW TERRAIN EFFECT PERCENT	Added	This parameter represents the percentage of the value of TT SHIP DETECTION MODIFIER that should be applied to the Targetable Weapon’s Probability of Hit when the weapon is aimed at a ship located close to shore.
JTLS-0126 Naval Mine Warfare		

Table 1.Summary of Standard Database OIF Data Elements (Continued)

VARIABLE NAME	CHANGE	DESCRIPTION
AC WATER MINEFIELD CLEAR TIME	Deleted	An aircraft's ability to clear mines will instead be determined by its AC MINE CLEAR CAPABILITY.
AC LAND MINEFIELD CLEAR TIME	Deleted	An aircraft's ability to clear mines will instead be determined by its AC MINE CLEAR CAPABILITY.
SUP TIME TO LAY MINEFIELD	Deleted	The time to lay a minefield will instead be a combination of SUP MINE LAY PREPARE TIME and the time required to emplace each individual mine.
SUP TIME TO CLEAR MINEFIELD	Deleted	No replacement concept.
SUP MFT NDT KILLS BY MINEFIELD	Deleted	Damage caused by minefields uses revised Naval Damage logic developed to support *JTLS-0239 Multiple Targetable Weapon Hull Hits*.
LOAD ASSIGNMENT ARRAY	Modified	A new Mine Laying row is added to this array and the former Mining row is designated as the Mine Clearing row. The database modification procedure copies the current Mining mission data to the new row of this table.
TW TIME PER ROUND	Modified	This attribute of the Targetable Weapon permanent entity has different meanings and relationships to other attributes for various types of Targetable Weapons.
TW DZ EMPLACE MODIFIER	Added	If Targetable Weapon I is a mine being laid or emplaced in Depth Zone J, this data parameter is used to modify or alter the TW TIME PER ROUND data used to represent the baseline time to emplace the Targetable Weapon.
MFT TERRAIN ELIGIBILITY	Added	This attribute of the Minefield Type permanent entity indicates whether the Minefield Type represents a LAND, WATER, or ANTI-INVASION minefield.
MFT DEPTH TYPE	Added	This attribute of the Minefield Type permanent entity indicates the depth setting options for this Minefield Type.
MFT MAX CABLE LENGTH	Added	This attribute of the Minefield Type permanent entity represents the maximum length that the attached mine can be positioned above its anchor or base.
MFT MINIMUM DEPTH	Added	This attribute of the Minefield Type permanent entity represents the minimum depth at which mines in the minefield can be placed.
MFT MAXIMUM DEPTH	Added	This attribute of the Minefield Type permanent entity represents is the maximum depth at which mines in the minefield can be placed.
MFT MAX PROB MINE DETECT	Added	This attribute of the Minefield Type permanent entity represents the maximum value, after all modifiers have been applied, that can be used to randomly determine whether a mine within a minefield of this type is detected.

Table 1.Summary of Standard Database OIF Data Elements (Continued)

VARIABLE NAME	CHANGE	DESCRIPTION
MFT MAX PROB MINE TRIGGER	Added	This attribute of the Minefield Type permanent entity represents the maximum value, after all modifiers have been applied, that can be used to randomly determine whether a mine within a minefield of this type is triggered and detonates.
MFT NO DETECT TIME	Added	This attribute of the Minefield Type permanent entity represents the maximum amount of time that can elapse between successful detections of mines in a minefield of this type during a reconnaissance search.
MFT LANE WIDTH	Added	This attribute of the Minefield Type permanent entity represents the width of a cleared lane through the minefield.
MFT DZ MINE TRIGGER MODIFIER	Added	This attribute of the compound Minefield Type, Depth Zone entity is used to modify the baseline probability of triggering an encountered mine in a minefield of Minefield Type I when the difference in the depth of the encountering Naval Unit and the mine is within Depth Zone J.
TG DEPTH	Added	This attribute of a Target temporary entity holds the depth of the explosive portion of the mine for WATER or ANTI-INVASION Minefield Targets.
TG TARGETABLE WEAPON	Added	This attribute of the Target temporary entity holds the name of the Targetable Weapon used to create the water Minefield Target.
EE TG TARGETABLE WEAPON	Added	This attribute of the a Create Target External Event temporary entity holds the name of the Targetable Weapon used to create the water Minefield Target.
MSC NAME	Added	This attribute of the Mine Search Capability permanent entity holds the text name of the capability.
MSC MFT DZ PROB DETECT	Added	This attribute of the Mine Search Capability, Minefield Type, and Depth Zone compound entity holds the probability that an object that uses Mine Search Capability I can detect a mine in Minefield Type J when the mine is located within Depth Zone K.
SSL NAME	Added	This attribute of the Ship Speed Level permanent entity holds the text name of the speed level
SSL MINIMUM SPEED	Added	This attribute of a record held by the Ship Speed Level permanent entity holds the slowest speed at which the other data held for this entity applies.
SSL MINE DETECT MODIFIER	Added	This variable attribute of a speed record held by a Ship Speed Level permanent entity holds the modifier to the probability of detecting a mine for a ship whose speed is within the Ship Speed Level.
SSL MINE TRIGGER MODIFIER	Added	This attribute of a speed record held by a Ship Speed Level permanent entity holds the modifier to the probability of triggering a mine for a ship whose speed is within the Ship Speed Level.

Table 1.Summary of Standard Database OIF Data Elements (Continued)

VARIABLE NAME	CHANGE	DESCRIPTION
SSL PROB HIT MODIFIER	Added	[A new SSL entity is introduced to support this design. JTLS-0239 Multiple Targetable Weapon Hull Hits uses the same SSL concept and describes the new speed record attribute SSL PROB HIT MODIFIER. The description of this new attribute is contained within JTLS-0239 Multiple Targetable Weapon Hull Hits.]
SUP MINE LAY PREPARE TIME	Added	This attribute of the Ship Unit Prototype permanent entity holds the time a ship of this SUP must remain after it has arrived in the mined hex, before it can begin to lay mines.
SUP MINE SEARCH CAPABILITY	Added	This attribute of the Ship Unit Prototype (SUP) permanent entity holds the MSC NAME of a Mine Search Capability that should be used for Naval Units that use this SUP.
SUP MINE CLEAR CAPABILITY	Added	This attribute of the Ship Unit Prototype (SUP) permanent entity holds the MCC NAME of the Mine Clear Capability that a Naval Unit using this SUP.
SUP SHIP SPEED LEVEL	Added	This attribute of the Ship Unit Prototype permanent entity holds the name of the SSL entity that is used to define the effect of speed on the probability that the ship will detect mines or trigger mines.
SUP MFT PROB MINE TRIGGER	Added	This attribute of the compound Ship Unit Prototype, Minefield Type entity is the baseline probability that a ship using Ship Unit Prototype I will trigger an encountered mine in Minefield Type J.
MC DEFAULT LAY MINE SPEED	Added	This attribute of the Mobility Counter-Mobility Prototype permanent entity holds the default speed that a ship will assume when in enters the hex where it has been ordered to lay mines, and is also the maximum speed at which a ship whose Faction uses the MCP may lay mines.
MCP DEFAULT EXPLORE MINE SPEED	Added	This attribute of the Mobility Counter-Mobility Prototype permanent entity holds the default speed that a ship will assume when in enters the hex where it has been ordered to perform an exploration search for mines.
MCP DEFAULT RECON MINE SPEED	Added	This attribute of the Mobility Counter-Mobility Prototype permanent entity holds the default speed that a ship will assume when in enters the hex where it has been ordered to perform a reconnaissance search for mines.
MCP DEFAULT CLEAR MINE SPEED	Added	This attribute of the Mobility Counter-Mobility Prototype permanent entity holds the default speed that a ship will assume when in enters the hex where it has been ordered to clear mines, whether a number of lanes or all mines.
MCC NAME	Added	This attribute of the Mine Clear Capability permanent entity holds the text name of the capability.

Table 1.Summary of Standard Database OIF Data Elements (Continued)

VARIABLE NAME	CHANGE	DESCRIPTION
MCC MFT DZ MINE CLEAR RATE	Added	This attribute of the compound Mine Clear Capability, Minefield Type, Depth Zone entity holds the number of mines that a ship whose Ship Unit Prototype uses Mime Clear Capability I can clear in one day in a minefield of Minefield Type J when the difference in the depth between the Naval Unit and the mine is within Depth Zone K.
IIP VISUAL MSC ENTITY	Added	This attribute of the Intel Information Prototype (IIP) permanent entity holds the MSC NAME of the default Mine Search Capability that will be used by objects that use this IIP when they are conducting visual detections of mines within a minefield.
SB MFT PROB MINE TRIGGER	Added	This attribute of the Small Boat, Minefield Type compound entity is the baseline probability that a Small Boat of type I will trigger an encountered mine (cause it to explode) in Minefield Type J.
SB SHIP SPEED LEVEL	Added	This attribute of the Small Boat permanent entity holds the name of the SSL entity that is used to define the effect of speed on the probability that the Small Boat will detect mines or trigger mines.
AC MINE SEARCH CAPABILITY	Added	This attribute of the Aircraft Class permanent entity holds the MSC NAME of a Mine Search Capability that should be used for Air Missions that have these type of aircraft.
AC MINE CLEAR CAPABILITY	Added	This attribute of the Aircraft Class permanent entity holds the MCC NAME of the Mine Clear Capability that an Air Mission with this type of aircraft should used when it is assigned a mine clearing mission.
AC MINE EXPLORE AREA	Added	This attribute of the Aircraft Class permanent entity holds the area that this aircraft can explore for mines per day.
AC MINE RECON AREA	Added	This attribute of the Aircraft Class (AC) permanent entity holds the area that this aircraft can recon for mines per day
JTLS-0132 Perceived Naval Course and Speed		
IIP SURFACE VECTOR TIME	Added	After a Naval surface vessel (or surfaced submarine) has been located, this duration represents the period of time that must elapse before the observing Faction can reliably perceive the vessel's Course and Speed.
IIP SUBSURFACE VECTOR TIME	Added	After a submerged submarine has been located, this duration represents the period of time that must elapse before the observing Faction can reliably perceive the vessel's Course, Speed and Depth.
JTLS-0239 Multiple Targetable Weapon Hull Hits		
TW AREA OR POINT WPN	Deleted	Targetable Weapon lethality data are currently held within a new Surface Kill Lethality entity. This attribute is not needed to distinguish area or point damage against surface objects.
TW MAX NUMBER HULL HITS	Added	This attribute of the Targetable Weapon permanent entity holds the maximum number of hull hits that can be caused by one submunition of this weapon.

Table 1.Summary of Standard Database OIF Data Elements (Continued)

VARIABLE NAME	CHANGE	DESCRIPTION
TW SEARCH RADIUS	Added	This attribute of the Targetable Weapon permanent entity represents the maximum distance that the Targetable Weapon can adjust its aimpoint location.
SURFACE KILL LETHALITY	Added	This variable holds the names of the three lethality sets to be used by a Targetable Weapon with this assigned Surface Kill Lethality.
SKL NAME	Added	This attribute of the SURFACE KILL LETHALITY permanent entity holds the text name of the specific SURFACE KILL LETHALITY.
SKL AREA KILL LETHALITY INDEX	Added	This variable holds the name of the AREA KILL LETHALITY set to be used by a Targetable Weapon with this assigned SURFACE KILL LETHALITY.
SKL POINT KILL LETHALITY INDEX	Added	This variable holds the PKL NAME of the POINT KILL LETHALITY set to be used by a Targetable Weapon with this assigned SURFACE KILL LETHALITY.
SKL PROB HIT LETHALITY INDEX	Added	This variable holds the PHL NAME of the PROB HIT LETHALITY set to be used by a Targetable Weapon with this assigned SURFACE KILL LETHALITY.
PHL NAME	Added	This attribute of the PROB HIT LETHALITY permanent entity holds the text name of the specific PROB HIT LETHALITY.
PHL TGC PROB HIT ARRAY	Added	This array is accessed using the PROB HIT LETHALITY INDEX of the SURFACE KILL LETHALITY of the Targetable Weapon that is being assessed and the Target Category of the targeted entity. The Probability of Hit is obtained from the array entry that corresponds to the Target Subcategory of the entity that is being hit.
PKL TGC PROB KILL ARRAY	Modified	This array is accessed using the POINT KILL LETHALITY INDEX of the SURFACE KILL LETHALITY of the Targetable Weapon that is being assessed and the Target Category of the targeted entity. The Probability of Hit is obtained from the array entry that corresponds to the Target Subcategory of the entity that is being hit.
AKL TGC LETHAL AREA ARRAY	Modified	This array is accessed using the AREA KILL LETHALITY INDEX of the SURFACE KILL LETHALITY of the Targetable Weapon that is being assessed and the Target Category of the targeted entity. The Lethal Area is then obtained from the entry in the array corresponding to the Target Subcategory of the entity that is being hit
SUP NUMBER COMPARTMENTS	Modified	This attribute of the Ship Unit Prototype entity holds the number of independent watertight compartments into which the ship is divided.

Table 1.Summary of Standard Database OIF Data Elements (Continued)

VARIABLE NAME	CHANGE	DESCRIPTION
TW LETHALITY INDEX	Modified	This attribute of the Targetable Weapon permanent entity and for air-to-air and surface-to-air weapons holds the index to the proper damage array that should be used when assessing the damage caused by weapon detonation. For air burst, surface burst, and sub-surface burst weapons it holds the name of a SURFACE KILL LETHALITY INDEX which points to the proper damage arrays AREA KILL LETHALITY, PROB HIT LETHALITY and POINT KILL LETHALITY.
TW RADIUS OF EFFECTS	Modified	This attribute of the Targetable Weapon permanent entity holds the distance from the weapon impact point at which objects are subject to the damage effects of the weapon after weapon impact, regardless of which damage algorithm is used.
TW NUMBER MUNITIONS	Modified	This attribute of the Targetable Weapon permanent entity holds the number of independent damage calculations that should be executed when assessing the damage from a single Targetable Weapon of this type.
TW PRECISION GUIDED	Modified	This attribute of the Targetable Weapon permanent entity is used to indicate whether a weapon is precision-guided.
TW WC FACTOR	Modified	This variable attribute of the Targetable Weapon, Weather condition compound entity holds the Targetable Weapon weather factors which are the multipliers applied to the probabilities of hit when the weapon is used during the specified weather condition.
TW DAY NIGHT FACTOR	Modified	This attribute of the Targetable Weapon permanent entity is a multiplicative factor designed to adjust probabilities of hit when the weapon is used during night conditions.
WDC DELIVERY FACTOR	Modified	This attribute of the WEAPON DELIVERY CAPABILITY entity holds the factor used to calculate the probability that the Weapon Delivery Capability has no effect on the delivery capability of the weapon.
JTLS-0245 Submarine Detection After Missile Firing		
IIP SUB FIRING LOCALIZATION TIME	Added	This attribute represents the remaining detection time required to localize a submarine after it fires a missile, if a passive sonar is within range of the firing location.
IIP SUB FIRING LOCALIZATION DIST	Added	This attribute represents the maximum distance allowed between a detecting passive sonar and the firing location of a submarine launched missile that results in a reduction in the amount of coverage time needed to detect the firing submarine.
IIP SUB DETECTION TIME REDUCTION	Added	This attribute holds the fraction by which a submarine's remaining required coverage time is reduced if a submarine launched cruise missile is detected at the launch location.

Table 1.Summary of Standard Database OIF Data Elements (Continued)

VARIABLE NAME	CHANGE	DESCRIPTION
IIP MAX RANGE FOR REDUCTION	Added	This attribute represents the maximum distance between a detected submarine-launched cruise missile and the submarine from which it is launched, within which the detecting force can estimate the approximate location of the submarine at the time of the launch.
TW DEPTH FIRING CAPABILITY	Added	This attribute represents the depth areas from which this submarine-launched weapon can be fired.
TW FIRING NOISE LEVEL	Added	This attribute represents amount of noise generated by the launching mechanism of the missile.
TW FIRING NOISE TIME	Added	This attribute represents amount of time that the noise generated by the launching mechanism of the missile affects the total noise made by the submarine that fired the missile
JTLS-2005-1480 Lifeboat Representation		
SUP LIFEBOAT HUP	Deleted	Multiple lifeboat types are possible for a single Ship Class.
SUP MEAN LIFEBOAT DEPLOY TIME	Deleted	Individual lifeboat type deployment time are held in a new Small Boat attribute, SB MEAN DEPLOY TIME.
SUP AVERAGE TIME TO SINK	Modified	The average time required to sink a ship of this SUP type. Formerly interpreted as the mean of an exponential distribution, this parameter represents the mean of a normal distribution with standard deviation equal to 0.25 of the specified mean.
SB AMPHIB CAPABLE	Added	Small Boats may be used during Amphibious Operations if this attribute is set to YES. If it is set to NO, boats of this type cannot be used for amphibious pickup or assault.
HUP LIFEBOAT TYPE	Added	When a ship is in the process of sinking, the Small Boat type (SB) specified by this data parameter is used along with the HUP to create lifeboats for the ship's personnel, personnel from embarked squadrons, and personnel from carried units.
SB MEAN DEPLOY TIME	Added	A random process determines the time interval between the deployments of individual lifeboats using Small Boats of this type. This deployment interval is selected from an exponential distribution with a mean equal to the value of this data parameter
SUP SIMULTANEOUS LIFEBOATS	Added	When a ship is in the process of sinking, this value determines the number of lifeboat deployment efforts that can be in progress at any specific time.
[*JTLS-2005-1537 ELS Scenario Data Construction*. These database parameters are added to the Combat System (CS) table in the DDS and are used to automatically create ELS templates.]		
CARRY_FLAG	Added	This Boolean value indicates whether this CS type can carry other CSs while moving.
LIFT_FLAG	Added	This Boolean value indicates whether this CS type must be carried while moving.

Table 1.Summary of Standard Database OIF Data Elements (Continued)

VARIABLE NAME	CHANGE	DESCRIPTION
PROTECTED_FLAG	Added	This Boolean value indicates whether this CS type is intended to be placed in protected positions.
PUBLISH_FLAG	Added	This enumerated value indicates the circumstances under which entities of this CS type are published by the ELS: ALWAYS, NEVER, DISMOUNTED, and DISMOUNTED.COLUMN
JTLS-2006-1646 Provide TADIL-J Data		
UT LINK-16 BLOCK START	Deleted	A Squadron is allowed to have a set of individual blocks of Link-16 Track Numbers to allocate to individual Aircraft in the missions that it launches. These are defined by the MISSION Link-16 BLOCK structure. Defining a single start and stop value for the Squadron is no longer appropriate.
UT LINK-16 BLOCK END	Deleted	Removed for the same reason.
AC USMTF NAME	Deleted	Replaced by the AC REAL WORLD DATA OBJECT attribute. The new attribute points to a new REAL WORLD DATA (RWD) entity. Each RWD has four attributes, one of which is the RWD USMTF NAME. The Aircraft obtains any defined USMTF Name from the referenced RWD data parameter.
AC LINK16 CAPABLE	Added	This flag specifies whether an Aircraft of this type is capable of providing Link-16 updates on air detections it performs.
UT JU NUMBER	Added	This text representation of an Octal Integer is converted to an integer when read by the CEP. It is the unit reference for Link-16 Air Track data reporting when air contacts are detected by an Air Search Radar operated by the unit.
TG LINK16 BLOCK START	Added	This is the first Track Name in a block of Link-16 Track Names allocated to an Air Search Radar Target
TG LINK16 BLOCK END	Added	This is the final Track Name in a block of Link-16 Track Names allocated to an Air Search Radar Target
MLB OCTAL TEXT	Added	This text representation of an Octal Integer is converted to an integer when read by the CEP. It is the unit reference for Link-16 Air Track data reporting when air contacts are detected by an Air Mission that is Link-16 capable and has received a block of Track Numbers from its parent Squadron.
MLB START TRACK	Added	This is the first Track Name in one of the blocks of Link-16 Track Names available for allocation by a Squadron to each Aircraft in its air search Air Missions.
MLB END TRACK	Added	This is the last Track Name in one of the blocks of Link-16 Track Names available for allocation by a Squadron to each Aircraft in its air search Air Missions.
TW TADIL ID	Added	This is the unique name of the Targetable Weapon that is used by certain U.S. and Allied C4I systems.

Table 1.Summary of Standard Database OIF Data Elements (Continued)

VARIABLE NAME	CHANGE	DESCRIPTION
AC REAL WORLD DATA OBJECT	Added	This name references one of the REAL WORLD DATA (RWD) entity objects defined in the database.
RWD NAME	Added	This is the name of one of the REAL WORLD DATA (RWD) objects defined in the database.
RWD USMTF NAME	Added	This is the United States Message Text Format (USMTF) text name of the AIRCRAFT CLASS entity that references this RWD.
RWD TADIL ID	Added	This is the TADIL-J/Link-16 text name of the AIRCRAFT CLASS entity that references this RWD.
RWD TADIL MODEL	Added	This is the TADIL-J/Link-16 text Model Number of the AIRCRAFT CLASS entity that references this RWD.
JTLS-2006-1654 Model Anti-Radiation Missiles		
TW GUIDANCE TYPE	Added	This attribute of the Targetable Weapon permanent entity represents the type of guidance used by the weapon.
ACP POST ATTACK SEARCH TIME	Added	This attribute of the AIR CONTROL PROTOTYPE entity represents the duration of time a fire control sensor will remain active after it is automatically Turned On as a result of a close weapon impact.
ACP POST DETECT SEARCH TIME	Added	This attribute of the AIR CONTROL PROTOTYPE entity represents the duration of time a fire control sensor will remain active after no Cruise Missiles or non-friendly detected Air Missions are present in its coverage area
ACP FIRE CONTROL RESPONSE TIME	Added	This attribute of the AIR CONTROL PROTOTYPE entity represents the average duration of time a fire control sensor achieves the TURNED ON state after it is automatically Turned On by the occurrence of events in the game, instead of being ordered to become active.
SLP EMISSION TEST DURATION	Added	This attribute of the SUSTAINMENT LOGISTICS PROTOTYPE entity represents the mean duration of time a SENSOR SITE target will turn on to confirm proper operation after completing repair or movement
ST SUPPRESSION TIME	Added	This attribute of the SENSOR TYPE entity is the average duration of time a SENSOR SITE target of this type will shut down if fired upon by a weapon with a TW GUIDANCE TYPE of ARM.
JT SUPPRESSION TIME	Added	This attribute of the JAMMER TYPE entity represents the average duration of time a JAMMER target of this type will shut down if fired upon at by a weapon with a TW GUIDANCE TYPE of ARM.
JTLS-2006-1658 Model Tactical TLAM		
TW PROB BDA	Deleted	Replaced by TW SENSOR TYPE, which holds the name of a valid Sensor Type.

Table 1.Summary of Standard Database OIF Data Elements (Continued)

VARIABLE NAME	CHANGE	DESCRIPTION
TW SENSOR TYPE	Added	This attribute of the Targetable Weapon permanent entity holds the ST NAME of the SENSOR TYPE that this weapon uses to perform BDA or RECCE.
TW SUBMUNITION TW	Added	This attribute of the Targetable Weapon permanent entity holds the TW NAME of the Targetable Weapon that represents the submunition for this weapon.
TW PROB LOSE GUIDANCE	Added	This attribute of the Targetable Weapon permanent entity holds the probability per 100 km traveled that this weapon will lose guidance control.
TW MAX SPREAD ALTITUDE	Added	This attribute of the Targetable Weapon permanent entity holds the maximum altitude that this weapon will use when determining weapon spread for damage calculations.
TW ADV CAPABILITY FLAG	Modified	This variable attribute of the Targetable Weapon permanent entity holds a series of text flags that indicate the advanced capabilities of this Targetable Weapon.
JTLS-2007-2177 Expand Command Level Representation		
UT COMMAND LEVEL	Deleted	This unit parameter was formerly specified for land-based units only and excluding Naval units. Command Level is instead assigned to units, ships and HRus by their unit prototypes.
TW LETHALITY INDEX	Deleted	This element is replaced by new TW AIR AIR LETHALITY, TW SURFACE AIR LETHALITY, and TW SURFACE KILL LETHALITY parameters.
HUP COMMAND LEVEL	Modified	This database parameter was formerly a Foreign Key to the hard-coded Command Level lookup table. The Foreign Key currently points to a new Command_Level table.
SMA ASSEMBLY TIME MEAN	Modified	The mean time required to assemble a single railcar if the type specified by the Supply Movement Asset (SMA) by the Faction that owns this SMA on the rail network specified for this SMA. Formerly an array, this single data value is Faction-specific.
SMA ASSEMBLY TIME STD DEV	Modified	The standard deviation of the time required to assemble a single railcar if the type specified by the Supply Movement Asset (SMA) by the faction that owns this SMA on the rail network specified for this SMA. Formerly an array, this single data value is Faction-specific.
CL NAME	Added	This attribute names a unit's Command Level entity.
CL OTH GOLD NAME	Added	This name of the Command Level or Command Echelon is required by Over The Horizon - Gold (OTH-GOLD) messages.
CL LOWER LEVEL	Added	The Command Level that a detached unit, created by detaching a percentage of a parent unit or detaching a specific list of Combat Systems and Supplies from a parent unit, should automatically assume.

Table 1.Summary of Standard Database OIF Data Elements (Continued)

VARIABLE NAME	CHANGE	DESCRIPTION
CL ICON ECHELON	Added	This Command Echelon parameter defines the echelon symbols to be placed in the icon as displayed on the Web Hosted Interface Program Map Component.
TUP COMMAND LEVEL	Added	A unit using this TUP will assume this name of the Command Level upon initialization
SUP COMMAND LEVEL	Added	A unit using this SUP will assume this name of the Command Level upon initialization.
AB FIRING OBJECT	Added	This attribute names the owner of the Combat System that fired the weapon.
AB FIRING SYSTEM	Added	This attribute references the Combat System that fired the weapon.
TW TYPE IMPACT	Modified	This attribute of the Targetable Weapon permanent entity holds the identifier of the primary warfare area for which this weapon is used.
TW AIR AIR LETHALITY	Added	This attribute of the Targetable Weapon permanent entity holds the identifier of the lethality data set that should be used if the weapon is fired as part of an Air-to-Air engagement.
TW SURFACE AIR LETHALITY	Added	This attribute of the Targetable Weapon permanent entity holds the identifier of the lethality data set that should be used if the weapon is fired by an Air Defense (SAM/AAA) site.
TW SURFACE KILL LETHALITY	Added	This attribute of the Targetable Weapon permanent entity holds the identifier of the lethality data set that should be used if the weapon is fired by a Surface-to-Surface Missile (SSM) site, dropped on a surface object by an Air Mission or fired at a surface by a High Resolution Unit (HRU).
TW NUMBER ROUNDS	Added	This attribute of the Targetable Weapon permanent entity holds the number of rounds or bullets to be represented by a single weapon of this Targetable Weapon type. This parameter is not used by JTLS and is of interest only for databases to be used for interaction with other external models.

1.5.4 Standard Database Changes

The new JTLS 3.3 Standard Database based on Operation Iraqui Freedom (*sdboif33*) includes extensive data item modifications implemented since the Standard Database (SDB) version 3.1 (*sdbv31*) release. If you have used *sdbv31* as a basis for your existing scenarios, evaluating the modifications included in *sdboif* is advised. A total of 99 Combat Systems, which are described in APPENDIX B. of this document, are represented in *sdboif*. Reviewing your existing SDB-derived databases and upgrading them to the new data standard is strongly recommended. The detailed procedures required to upgrade *sdbv30* or *sdbv31* to *sdboif* are provided in APPENDIX C.

JTLS 3.3 includes significant functional changes that affect data. Significant adjustments to your database are required to allow this model version to function properly. The Modify program that is applied when DDS is executed will coorectly structure your database structurally to be compatible with JTLS 3.3, but acceptable results will not be obtained from the model without changing your data. The algorithms for calculating damage against surface and subsurface objects have changed. Naval mine warfare has been completely modified with significant data requirements. New sets of Ship Unit Prototypes using the 99 Combat Systems and multiple TW SSMs have been added for the first five countries. Additional country sets will continue to be added and be available with the 3.3 interim releases.

Sdboif33 contains significant changes that include:

- New and revised Targetable Weapons (1082 total)
- Specific torpedo weapons
- New and more specific anti-ship missiles
- New and more specific anti-tank missiles

New anti-radiation missiles

- New artillery weapons
- New naval gun weapons (burst and single round)
- New surface-launched rockets and missiles
- New air-launched rockets
- New aerial gun bursts
- New cluster munitions
- New air-launched non-anti-ship bombs and missiles
- New water mines
- New Probability of Hit data and Probability of Kill data for all weapons used against all appropiate Target categories
- New Area Lethality sets that are based on the previous Area Lethality data sets
- New Supply Categories (249 total)
- New Combat Arms and Supply Type Target Subcategories
- New Unit Of Measure (UOM) data for new Targetable Weapons
- New Calibers
- New Combat System Can Fire data
- New Target Subcategories

- New and modified existing Target Type Groups (TTGs)
- New multi-use aerial guns and rockets (Air-to-Air and Air-to-Surface)
- Weapon load and load assignment changes for new weapons
- SSM and SSM-TW changes
- All of new data required to support the water mine capability
- NEW_NAVY_CSP replaced NAVY_CSP
- All previous Ship Unit Prototypes (SUP) are removed
- New SUPs for United States, United Kingdom, Australia, Iran-Iraq, and Russia
- New Lifeboat data with new SUPs

Additional data items to support other planned 3.3 Naval improvements (Submarines) have been postponed to an Interim release.

New data items were added to support the TADIL-J link to real-world Command and Control systems, but are typically not used within the model. Data items were also added to enhance the connection to JCATS through the Joint Multi-Resolution Model (JMRM). A separate section exists in the DDS for JMRM related data. Most of these data items do not affect JTLS as executed in a standalone mode.

Data development that remains to be accomplished includes:

- As new data is used and results are observed, adjustments and corrections will be required. Minimal testing has been accomplished to confirm the correctness of these new data.
- Completely new Area Lethality data sets
- New TW RADIUS OF EFFECTS based on new Area Lethality data
- New Area Lethality terrain modifiers by Combat System
- Lethality for runway-specific weapons, such as BAP100-9, JP233, BLU107.DURANDAL
- New lethalities for HRU weapons
- A complete revision of aircraft weapon loads and weapon load assignments, beginning with the most commonly used aircraft
- New TW weather modifier data

1.6 NSTALLATION NOTES

1.6.1 Installation Instructions

The *JTLS Installation Manual* (included in the *documents* compressed tar file that is part of this JTLS release) provides detailed instructions for installing a new version of JTLS.

1.6.2 Oracle Compatibility and Installation

This release of JTLS requires a complete installation of Oracle Forms/Reports Developer 6i client/server runtime.

Developer 6i is the final version of the client/server development and deployment of Oracle Forms, Reports, and Graphics. Oracle Corporation will provide only limited support for this Developer version until January 2008, and Oracle10g will become the final certified database server compatible with Developer 6i. Beginning with the release of JTLS 3.1.0.0, Oracle 10g iAS EE (Internet Application Server Enterprise Edition) has been implemented to deploy JTLS database applications, such as DDS Forms. The compatible database server version is Oracle 10gR2 Standard Edition One or newer. Database server requirements that are updated prior to a future JTLS release will be described in the appropriate *JTLS Version Description Document*.

Utilizing the framework of iAS EE, which includes Forms Services, Reports Services, Portal, Single Sign-On, Java, and other components, will enable the delivery of JTLS-specific data from a central location. This also allows the development of more scalable JTLS database applications, such as the SDR and AAR.

Currently, the following combinations of Forms 6i runtime and the Oracle Server are approved for use with JTLS:

a. Oracle Database Server 9.2.0.8 or later (10gR2 Standard Edition One is recommended)
b. Forms 6i client/server runtime (with patchset 18 or later) for Solaris and/or Linux
c. iAS EE 10.1.2.0.2 full stack (optional)

Refer to Chapter 6 of the *JTLS Installation Manual* for additional details regarding the Oracle Forms/Reports Developer 6i client/server custom runtime installation.

2.0 ENHANCEMENT CHANGE PROPOSALS

INTRODUCTION

JTLS 3.3.0.0 is a Major JTLS release that includes the implemented Enhancement Change Proposals (ECPs) summarized in this chapter.

2.1 JTLS-0030 Friendly Naval Gunfire Support

2.1.1 Summary of Model Change Request

Previous versions of this design addressed the limitation that Direct Support could be provided for a Supported Unit only if the user was allowed appropriate Command Authority. This problem was corrected, but the design was subsequently expanded to include the capability to provide Direct Support to units belonging to other Force Sides. This ECP properly implements the capability to provide Direct Support to any Friendly side land-based unit (ARU only) in the game.

2.1.2 Design Summary

This design modifies several basic aspects of the combat model logic, including:

- changing the acceptance criteria for the Direct Support (DS) Order,
- accounting for any Force Side Relationship (FSR) change that affects either unit in an existing DS relationship,
- accounting for a ROE change for either unit,
- accounting for any Side change by either unit, and
- ensuring that AAR records are correctly provided and maintained.

Providing the DS if and when the Supported Unit enters Lanchester Combat was not modified as part of this ECP.

The requirement that the Firing Unit must be either a Land Combat unit or a Naval unit, over which the ordering Player has command authority, was not changed. Most other characteristics of the order were unchanged. Examples include the ability to schedule the DS relationship in the future, the ability to cancel future scheduled DS relationships, and others.

The Supported Unit can now be either a same side unit or a unit on any Force Side that the Firing Side considers to be Friendly. The restriction that Naval Units and HRUs cannot be the Supported Unit remains in place. These two types of units do not participate in Lanchester Combat as do the other types of units. Additionally, since different Sides are now allowed, ROEs must be considered. An

ENEMY ROE behaves as expected, and prevents any DS relationship from being ordered, or from continuing if the ROE is changed after the order has been accepted.

Another unchanged restriction requires that a unit can provide Direct Support to only one Supported Unit at a time. However, a Supported Unit can benefit from the Direct Support of more than one Firing Unit. If a current supporting relationship is identified when the order is received, but must be canceled, the Player still receives a message describing the situation.

At the time that an ordered DS relationship is to begin (not the order receipt time), the model conducts a series of checks to assess the order's validity. These include:

- The Firing Unit's Side must have a Friendly relationship to the Supported Unit's Side.
- Neither unit can have a Ground ROE of Combat Approved against the other unit's Side.
- The Firing Unit cannot be supported by another unit.
- The Supported Unit cannot be supporting another unit.

Note that the Supported Unit's FSR is not checked, according to the concept that the ordering side knows its own FSR regarding the supported side, but does not know the actual FSR held by another side regarding the ordering Side. This is not true for the ROE.

The JTLS ROE order allows a wide range of flexibility. For, example, a single Side A unit can have Weapons Free ROE against Side B while Side A has a Friendly FSR to Side B. This allows representation of 'rogue' units and of other special tactical circumstances. Therefore, if a unit currently in Direct Support of a foreign unit has its Ground ROE changed to Combat Approved, the DS relationship will be terminated, regardless of the current FSR. The Air-to-Air and Surface-to-Air ROEs will not considered, since Direct Support is exclusively a ground operation.

Correspondingly, if a unit on Side B that supported by a unit on Side A has its Ground ROE changed to Combat Approved against Side A, the Side A unit will cancel its Direct Support. The Supporting Unit is assumed to have knowledge of such a serious action. This theater-level modeling assumption considers a situation that rarely occurs.

For both inappropriate ROE situations, the DS relationship will be terminated whether or not combat actually occurs. None of the scheduled future DS relationship startups will be canceled due to ROE changes. ROE will be verified at the time the relationship is scheduled to begin. The ROEs may change several times before the Supported Units enters any Lanchester combat.

If a unit providing Direct Support changes Sides, its DS is canceled, whether the Supported Unit is on the same Side as the defecting unit, or is on a Friendly Side. To establish a Direct Support relationship, the ordering Player must have Command Authority over the Firing Unit. When that unit changes Sides, this authority no longer resides with the original ordering Player and must be re-established by another Player who has received Command Authority over the unit.

If a Supported Unit changes Sides, no action immediately occurs. The Firing Side may not know that the Side change has occurred. If assistance to the Supported Unit is needed because it is in combat, the model will verify whether the current FSR allows the support.

Finally, AAR Record keeping will record initial DS orders, and also any changes to DS relationships or to scheduled DS relationships due to FSR or ROE changes. The complete design for this ECP lists all individual AAR items that are recorded and the circumstances under which each is recorded.

2.2 JTLS-0064 Knots As Naval Default Speed UOM

2.2.1 Summary of Model Change Request

Current JTLS versions use Kilometers Per Day as the default Unit of Measure (UOM) for Naval Speed in the Naval Move order and all orders that include this field. This design establishes Knots as the Naval Speed default UOM.

2.2.2 Design Summary

Modifying the default UOM specification for the speed field in the XML file that defines the structure of the Naval Move order template is not sufficient for a robust implementation of this design. A complete solution involves allowing greater flexibility for developers to specify Units of Measure (UOMs) for order fields of all types. These modifications will be consistent with the conversion requirements to support the CEP and other processes.

2.3 JTLS-0126 Naval Mine Warfare

2.3.1 Summary of Model Change Request

The intent of this ECP is to represent the capabilities of Naval Mines in greater detail, including modeling the laying, detecting, and clearing of mines in a more realistic manner. Specific issues to be addressed included making the time to lay and clear minefields dependent upon the minefield type and representing minefields deployed at different water depths.

JTLS represents both Land and Water Minefields. These are modeled as Targets that are created in various ways (2 Controller orders, 6 Players orders, and database entries) and interact with objects in the game (Ships, Land units, convoys, etc.). While the ECP specifically addressed Naval Mine Warfare, it was logical that the enhancements for Naval mines and minefields be applied to Land objects in order to achieve a consistent minefield representation.

2.3.2 Design Summary

To fully understand everything that was done under this complex ECP, refer to the Design Description Document. It required a large number of database changes. Almost 40 new data items were added, and 5 obsolete ones were deleted. The database changes affected 8 individual data structures: Minefield Type (MFT), Target (TG), Targetable Weapon (TW), Ship Unit Prototype (SUP), Mobility Counter-Mobility Prototype (MCP), Intelligence Info Prototype (IIP), Small Boat (SB), and Aircraft Class (AC). Also, 3 completely new data structures were added: Mine Search Capability (MSC), Mine Clear Capability (MCC), and Ship Speed Level (SSL). Finally, a new Air Mission Type, for which Aircraft Loads must be defined, was added. Mine Laying missions are now distinguished from Mine Clearing missions instead of both mission types being described as simply Mining Missions.

When a Minefield Target is created, it inherits most of the data defining it its database Minefield Type (MFT). The MFT data structure now allows the database builder to describe minefields in more detail and in a more realistic manner than was possible before the change. For example, a minefields is no longer simply a Land or Water minefield. It can now be an Anti-Invasion minefield, designed to hinder Amphibious Operations by attriting the invading forces, including their Small Boats.

Minefields Types (MFTs) now have a depth restriction attribute: Surface, Bottom, or Variable. Surface minefields are always at zero depth. Variable depth minefields deployed at a Player-ordered depth between the MFT Minimum and Maximum depth values. Finally, Bottom minefields can be laid from the bottom up to the MFT maximum cable length of the minefield type. The depth zone (DZ) within which a minefield exists affects the emplacement time, the probability of detecting each mine in it, the time it takes to clear it and finally the probability that a mine a ship encounters will be triggered (actually detonate). As a consequence of the addition of depth, it is now possible to have two minefields of the same type in the same hex, providing the two are deployed at different depths.

How minefields are detected, reported, updated, and swept have changed. A minefield is no longer either detected or not detected. Now, a Side's perception of a minefield includes how many mines have been detected, and how many mines in which Lanes of the minefield have been detected. The concept of a Minefield Target having Lanes that can be all or partially cleared, and can be used by ships traversing the minefield is implemented as part of this ECP. Every MFT has a defined Lane Width, and has six lanes, equating to the six Hex Side directions. Minesweepers can still be ordered to clear an entire hex of foreign mines. But now they can also be ordered to clear a path through a known minefield in the hex. Ships that have knowledge of the minefield and its lanes can then use cleared Lanes to traverse the minefield, and therefore have less chance of encountering a mine.

Minefields can be detected in various ways by various assets. Each asset that can detect a minefield or can update knowledge of individual mines in a known minefield now accesses one of the new Mine Search Capability (MSC) data structures. Each MSC has a list of individual mine probabilities of detection by Minefield Type and Depth Zone. Visual detection of Surface mines depends on the IIP Visual MSC accessed by the search platform. Similarly, Air Mission detection depends on the MSC used by the Aircraft Class. And finally Ships use the MSC accessed by their Ship Class (the SUP).

Analogous to the Mine Search Capability data is the Mine Clear Capability (MCC) data. For a Ship Class or Aircraft Class to be able to clear mines, it must access an MCC. Then, the MCC MFT DZ MINE CLEAR RATE specifies the number of mines per day (of the MFT and in the DZ) the ship or air mission can clear. Other new Aircraft Class (AC) data specify how big an area a mission can search when it is on an Exploration (look for new minefields) mission, and how large an area it can search when told to Recon (detect and report new mines in) known foreign Minefield Targets.

Another new data structure is the Ship Speed Level (SSL). Each Ship Class (the SUP) and Small Boat type (the SB data) points to an SSL in the database. The SSL data specifies how the speed of the ship or boat affects its ability to detect mines, the chance that it will encounter mines in a minefield it is transiting through, and finally the probability that a mine it does encounter will actually be triggered and damage the ship. In another part of the database, default mining operation speeds are held. The Mobility Counter-Mobility Prototype (MCP) data now has the default speeds for ships that are: Laying minefields, Exploring for new minefields, Recon of existing minefields, and Clearing mines. These defaults can, of course, be over-ridden by Player orders. A ship that triggers a mine in a previously unknown field will report the field, and then slow to its MCP-specified mine recon speed.

When a ship goes through the hex containing a minefield, it may "encounter" one or more of the mines in the minefield. Different algorithms are used depending upon whether or not the ship know about the minefields, and whether it knows about any cleared (completely or partially) lanes through the it. For example, a ship would encounter more mines when transiting North-South through an unknown field than it would if the field were know, and the North-South lanes were cleared. Finally, if a ship does encounter a mine, and the mine does detonate, then damage is assessed against the ship. This is done differently in this JTLS release, but the change is not covered by this ECP. Refer to ECP JTLS-0239, Multiple Targetable Weapon Hull Hits for descriptions of how that is now done.

2.4 JTLS-0132 Perceived Naval Course and Speed

2.4.1 Summary of Model Change Request

JTLS object attributes are displayed on Player WHIPs only as they are perceived by a particular Force Side and therefore may not reflect ground truth. For Naval units, such as ships and submarines, perceivable attributes are initially limited to location, strength, posture, and specific information pertaining to on-board targets, on-board squadrons, or lifted units.

For previous JTLS versions, Course, Speed, and Depth for detected Naval units were not perceivable by a foreign Force Side and, consequently, were not displayed. The detecting Side should be realistically capable of ascertaining these attributes after a suitable time has elapsed. This model enhancement expands the perceived attribute list for Naval units to include Course, Speed, and Depth, displays these vector attributes on the WHIP, and forwards them to C4I systems linked to JTLS.

2.4.2 Design Summary

Two new Intelligence Information Prototype (IIP) data parameters, IIP SURFACE VECTOR TIME and IIP SUBSURFACE VECTOR TIME, were established within the model to define when an observing object perceives Course, Speed, and Depth of a detected surface or subsurface Naval unit. Two vector times were required to represent the inherent differences in tracking surface and subsurface vessels. The existing Update Data entity, the data structure that holds perceived object attributes to be reported, was modified to include the Course, Speed, and Depth attributes. The CEP was modified to use the surface or subsurface IIP parameter as a mean of an exponential draw to determine when an Update Information event should be scheduled to report the vector attributes from the Update Data entity to the detecting Side. Refer to the *JTLS Analyst's Guide*, Section 9.4.2, for a detailed description of this process.

A new Depth field was added to the SITREP window displayed on the WHIP. The existing Course and Speed fields were previously not filled for foreign Side Naval units. A Current Depth column was added to the Naval Unit IMT. The CEP was modified to pass all three perceived vector attributes to the JODA for the SITREP, IMT, and to display a Course and Speed vector attached to the detected Naval unit's map icon. The vector attributes currently appear on the WHIP SITREP and map at a time after the Naval unit is detected or re-detected, based on the IIP vector times. Note that actual ground truth vector data are used for own-side Naval units.

To support this enhancement, all directional attributes passed to the JODA, such as course, heading, direction, and orientation, were reviewed across object types (Airbases, Ground units, Squadrons, Naval units, etc.) for consistency. The JODA and CEP were modified as appropriate to eliminate redundancy and confusion. Refer to Table 7 of the JTLS 3.3.0.0 design document *JTLS-0132 Perceived Naval Course and Speed* for a list of the revised direction attributes used by JODA objects.

2.5 JTLS-0239 Multiple Targetable Weapon Hull Hits

2.5.1 Summary of Model Change Request

This ECP provides significant enhancements to representing the damage caused by JTLS Targetable Weapons (TWs). The original specific situation addressed involved one TW hitting a ship to cause at most either one Hull Hit (for an Area TW), or at most one hit per TW NUMBER MUNITIONS (for a Point TW). This methodology created several issues, including:

- Inconsistent damage for a TW between Land and Sea victim objects. Multiple submunitions designed to cause multiple hull hits made some TWs unrealistically effective against land targets.
- Damage was not always accurately represented because each submunition was assessed separately. The Probability of Kill (PK) for a submunition is a combined Probability of Hit (PH) and PK value. The difference between modeling individual PH-PK assessments and

determining one PH followed by multiple PK assessments for weapon hits needed to be reevaluated. This is particularly important for representing powerful weapons, for which a hit, even with a low PH, would cause most submunitions to inflict damage.

- Area weapons did not use TW NUMBER MUNITIONS and could cause only one hull hit, regardless of warhead size and type. If these weapons were not precision-guided, all the weapons deployed in one pass could cause only one hull hit.

A new methodology, including numerous database structure changes, was required to allow the database developer to indicate the level-of-damage potential of a weapon used against a ship without causing negative affects on other aspects of the model. The multiple hull hit situation and the overall TW surface and subsurface damage algorithm was considered. Changes to Air-Air and Surface-Air TW algorithms were not included.

2.5.2 Design Summary

This major enhancement allows a TW to cause primary (Point effects) and secondary (Area effects) damage, which required many database structure changes and significant algorithm modifications. Refer to the corresponding JTLS design document for a complete description.

The SURFACE KILL LETHALITY (SKL) data structure provides the principal support for the design concept that all weapons capable of causing damage use a Primary Damage algorithm to inflict this damage. Additionally, a weapon that also has an assigned Area Kill Lethality data set also inflicts collateral damage to all objects within the area of effects by means of a Secondary Blast Damage algorithm. Targeting options include Land Units, Ships, Unowned Targets, Associated Targets, Land Unit Owned Targets, HRU Owned Targets, Ship Owned Targets, DMPIs, and Locations. Damage algorithms have unique characteristics for assessing each object type.

Each TW retains the characteristic of accessing a TW LETHALITY INDEX, which points to an AAL or SAL for Air-Air and Surface-Air weapons respectively. With this enhancement, the index also points to an SKL for sea/land weapons. The SKL subsequently specifies which PKL and possibly AKL data the TW uses. Thus, the data parameter TW AREA OR POINT WPN is no longer needed and has been removed.

All weapons that cause sea/land damage must have an SKL that has a specified PKL data set. Thus, all damage-causing weapons will apply a Primary Damage algorithm. If the weapon also has associated Area Kill data, a Secondary Blast Kill algorithm is also executed, which computes the secondary effects of the weapon on other objects within the area of impact. Specifying an SKL set but not an AKL set is allowed, but a specified AKL set without an SKL set is not allowed. Therefore, a weapon cannot be defined as causing collateral damage only. However, defining an SKL that has neither SKL nor AKL data, which causes no explicit damage on impact is possible. This SKL would be used, for example, for Nuclear, Chemical, and Leaflet weapons.

Each SKL also points to another new data structure, the PROBABILITY HIT LETHALITY (PHL), which holds PH data for victim Target Category and Subcategory combinations. Upon weapon impact, a single random number is drawn to determine whether a hit occurs, using PH data. A hit or miss also depends on whether the weapon is Precision Guided. Weather, Day/Night, and Weapon Delivery Capability now modify the PH, not the PK. Hit probability also depends upon the weapon's TW SEARCH RADIUS. Only objects within this distance of the aim point are vulnerable. If a hit occurs, each sub-munition is assessed separately, using the PK data.

After primary damage, if any, is processed and if the SKL has AKL, collateral damage is assessed. The algorithm for assessing collateral damage acts differently depending on whether the TW hit or missed. For a Hit, the impact point is the victim location; for a Miss, it is randomly determined within TW SEARCH RADIUS of the ordered aim point. In either case, eligible objects within TW EFFECTS RADIUS of the actual impact point are susceptible to collateral damage. Eligible objects for collateral damage are Combat Systems that have a CSP CS EQUIVALENT TARGET CATEGORY of Combat Arms or Supply Type, and Supplies that do not represent Combat Systems and have an SLP SC EQUIVALENT TARGET CATEGORY set to Combat Arms or Supply Type.

The ship damage algorithms behave differently. For a targeted Ship, the model uses the PH value for that unit's Ship Unit Prototype (SUP) to determine whether the weapon hit or missed it. For a hit, the model conducts TW MAX NUMBER HULL HITS random draws using the PK value for the SUP to determine the number of hull hits and the level of damage the ship received.

Ships have watertight compartments. Objects on the ship (Combat Systems, supplies, targets, small boats, catapults, assigned squadrons, and embarked units) are assigned to compartments. When a ship receives a hull hit, a compartment is automatically damaged. Damage is assessed against all objects determined to be in that compartment. Even if the PK for the SUP is zero, damage can occur to shipboard objects such as owned targets and embarked assets, depending upon TW TYPE IMPACT.

Due to the complexity of this enhancement, reviewing the complete JTLS design document is recommended.

2.6 JTLS-2005-1480 Lifeboat Representation

2.6.1 Summary of Model Change Request

High Resolution Units (HRUs) in JTLS have for quite a while had the capability to travel across water terrain as well as land terrain hexes. They can be deployed from ships and recover to different ships by using the Coalition Support order. Additionally, HRUs can be picked up from water hexes by helicopters that have been assigned an Insert / Extract mission. Using HRUs to represent personnel to be rescued when an air mission crashes was implemented a few years ago. The general data parameter DOWNED AIRCREW HUP determines the type of the High Resolution Unit Prototype (HUP) that is used to represent the downed aircrew. When an air mission is either shot down or crashes for some

other reason, the model randomly determines whether an aircrew HRU should be created. If the random draw is favorable, the model automatically creates the HRU. If the aircraft crashed over water and the assigned HUP has an organic small boat, the HUP is "magically" provided the small boat and the HRU is placed in the water. Once created, the HRU is an independent JTLS object and can move independently, be rescued by other ships, or be lifted to safety by Insert / Extract missions. It was a logical follow-on to this concept to use the HUP/HRU structures to model lifeboat generation for sinking ships.

JTLS-2005-1538 Improved Naval Damage was implemented for JTLS 3.1.0.0 provided the foundation necessary to represent the deployment of lifeboats. As a result of JTLS-2005-1538, ships in JTLS do not sink instantaneously. Rather, after suffering its last allowable hull breach a ship assumes an INCAPABLE posture, it stops moving, and a sinking event is scheduled for a random, database-dependent, time in the future. The purpose of this release's ECP, JTLS-2005-1480, is to deploy personnel, along with some supplies and combat systems, onto lifeboats while a ship is sinking in a manner similar the model creates a downed aircrew. Other ships or aircraft can then be ordered to move to the area and rescue these personnel. Although realistically personnel could be "rescued" by enemy or suspect assets, this is not provided for within this design. That capability must be postponed until a JTLS capture-and-surrender model is implemented. The same limitation exists for the current representation of downed aircrews.

2.6.2 Design Summary

This change allows a sinking ship to attempt to deploy lifeboats holding some or all of the people on board. These include ships company, personnel in embarked squadrons, and people in land units embarked for amphibious operations. The time it takes a ship to sink is random, as is the time to begin the abandon ship process and also the time for each lifeboat to be put in the water. The ship may have one or several types of lifeboats aboard, each with its own capacity and average deployment time. The ship's crew may have the ability to deploy boats one at a time, or several simultaneously.

When a ship does not have any small boats assigned to it in the database, no HRUs representing lifeboats can be created, and all hands are lost when it sinks. However, assigning small boats to the ship class is not sufficient to allow survivors of a sinking. To be used as a lifeboat, a carried boat type must be specified as the HUP LIFEBOAT TYPE for some HUP. The HUP structure now specifies both which small boat type it uses if an HRU is dispatched by Player order on a tactical mission, and also which small boat type is uses if it is to represent a lifeboat. Either or both of these can be NONE. Also, a new SUP parameter specifies the number of simultaneous deployments of lifeboats that a ship can conduct. If this parameter is set to zero, there will be no lifeboats, even if the ship has many small boats on board. The larger the value, the faster boats are deployed. So, if lifeboats are possible for the ship based on these criteria, then the model plays the role of the ship's Captain and determines when the abandon ship process should start. This decision may be a good or a bad one for the crew.

When the ship becomes INCAPABLE, the model randomly determines the actual sinking time based on a random draw using the SUP AVERAGE TIME TO SINK. It then uses the number of people on

board, the number of lifeboats along with their capacities and load times, the number of simultaneous launches allowed, and the value of the average time to sink for the ship class to compute when abandon ship should start. The abandon ship time is computed so that if everything goes on schedule, the last lifeboat leaves the ship just before it sinks. But since the time to start the abandon ship is based on the database average time to sink, and the actual time to sink comes from a random draw, some people may be left on board at sinking time and be lost, or alternatively all lifeboats may get into the water long before the sinking. Of course if there are insufficient boats aboard, then some people will always be lost when the ship sinks. Boats go into the water one at a time, represented by HRUs of the type determined by the HUP associated with the small boat type.

The Player has the option to override the model-generated time for the abandon ship process to begin. A new order, named ABANDON SHIP, allows the Player to specify exactly when the lifeboat generation will start. This can be used to start the process immediately after the ship starts to sink, or it can be used to delay the start of the process for as long as the Player desires. It can also be used after the abandon ship process has started to delay or completely prevent additional lifeboat launches.

Lifeboats are deployed in the vicinity of the sinking ship. They are usually automatically moved with the ship if the Controller Magic Move's the ship. The exception is that if a Player is in the process of rescuing them, they are not moved with the ship. Also, lifeboats automatically rejoin the ship if the hull damage is magically repaired by a Controller before the actual sinking happens. If however the ship stops sinking because a hull breach is automatically repaired by the model, the lifeboats stay in the water. The idea is that the ship is assumed to be still in danger. Players can tell them to rejoin the ship using the HRU REJOIN PARENT order, or leave them in the water until later.

Finally, lifeboats in the water of course stay in the game when the ship sinks. Their Parent Units become the HHQ of the sunk ship, just as is the case with any HRU whose parent is destroyed. But if the ship is resurrected with a REACTIVATE UNIT order, its lifeboats "jump" back on board. The exception to this is that lifeboats that are in the process of being rescued (airlifted or sent HRU MOVE orders, for example) do not jump back on board if the ship is reactivated.

2.7 JTLS-2005-1537 ELS Scenario Data Construction

2.7.1 Summary of Model Change Request

An extensive set of data files must be generated to utilize the JTLS Entity Level Simulation (ELS). These files include a subset of the data held within the JTLS Combat Events Program (CEP) database system, and a complete set of templates used exclusively by the ELS. The ELS requires these templates to spatially lay out the command hierarchy and place the associated Combat Systems (CSs) in geographic locations relative to their parent unit center. The ELS initiates the deaggregation of theater-level units by breaking them down at the Unit Prototype level. For a typical JTLS scenario, the number of Tactical Unit Prototypes, Ship Unit Prototypes, and High-resolution Unit Prototypes is too large for a database builder to create a complete set of ELS templates in a reasonable amount of time.

An automated and straightforward method of creating and modifying templates must be developed to support the simulation effort.

This design proposes a two-part method to construct the ELS-specific scenario data.

Part 1, Template Initialization, consists of a required subset of JTLS scenario data that will be downloaded from the Oracle database, and a complete set of ELS Template files that may be created using new options in the Scenario Verification and Initialization Program (SVP / SIP).

To construct Part 2,Template Customization, the ELS database builder may customize the Template Files created in Part 1 by utilizing an editor accessed by means of a graphical user interface. This graphical editor will provide the capability to manipulate the location, mounted status, and positional priority for Combat System entities represented within ELS templates.

2.7.2 Design Summary

Implementation of this design is accomplished in several steps which involve changes to some existing programs for Part 1, Template Initialization. A new component program must be created for Part 2, Template Customization.

Template Initialization

For entity-level purposes, the ELS uses a subset of the data which are held by the Database Development System (DDS) for the aggregate model. These data include the quantity and names of the TUPs, SUPs, and HUPs, as well as the generic and CSP-specific names of all the Combat Systems in the scenario. The DDS download of ELS data also contains Target information pertaining to the number and types of Air Defense Targets, Aircraft Shelters, Surface-to-Surface Missiles, Runway Targets (used for placing shelters), and Sensor Sites.

The ELS data subset is extracted from the DDS during the standard download from the system. They may also be requested using an ELS-specific download from the DDS. An initial set of template files may be created and verified for the ELS using portions of the Scenario Verification and Initialization Program (SVP / SIP). During the creation process, the Combat System positions for the templates are generated randomly to place all of the Combat System entities within the designated unit radius. Every aggregate level Unit Prototype in the JTLS scenario will have a one-to-one relationship with a single, top-level Template Object (TOB). The top-level TOB may be further deaggregated into subordinate command levels, with at least one TOB at each level.

The separation of an aggregate Unit Prototype into its associated templates may be accomplished in one of two ways. Database builders may directly specify a break-down of TUPs into subordinate unit TUPs using the normal methods for creating and modifying TUPs in the DDS. Alternatively, the templates may be automatically disaggregated into subordinates based on a specified number of entities that are allowed for a given unit. Regardless of the method for disaggregation, template files

will be stored in a manner that allows several ELS database builders to independently manipulate templates within a single scenario.

The consistency of templates and their associated database files may be verified using the SVP. For automatically generated templates this is not a required step. However, when a database has been changed such as changing the contents of a specific TUP, the associated templates may not be consistent with the scenario data unless the templates are regenerated. The verification process checks to see if all TUPs, SUPs, and HUPs have associated template files. It checks to see that the contents of the templates are consistent with the scenario files in both the type and quantity of combat systems.

Template Customization

The ELS Template Builder (ETB) provides users the capability to edit the location offsets (relative positions) of ELS template entities. This editor utilizes a graphical interface which allows the user to visually select and modify the layout of entities with respect to their unit center. The editor interface appears as three separate portions on the screen: a list of the template files with their breakdown into subordinate templates, a list of the immediate subordinates (either templates or combat systems) for the selected template, and a graphical layout editor for the selected template. In addition to the template selection, the user may also modify templates based on the posture of the unit. Because the ELS uses only four postures: Defend, Attack-Dismounted, Attack-Mounted, Move, the layout of combat systems may be arranged in four uniquely different ways for each template. This editor also allows the user to modify other attributes such as the mounting status of individual entities and the priority of each position within a template.

2.8 JTLS-2006-1646 Provide TADIL-J Data

2.8.1 Summary of Model Change Request

This change includes model improvements that allow Link 16/TADIL-J data to be provided to external programs via Network or Serial Feeds. The Maritime Working Group developed the original design proposal in September 2005. However, the Link 11 data requirements currently defined were transferred to a separate ECP.

The Global Command and Control System - Joint (GCCS-J) is designed to enable the command and control of joint and coalition forces. Its Common Operational Picture (COP) correlates and fuses data from multiple sensors and intelligence sources to provide warfighters the situational awareness required for decisive action and response. This system is fielded at multiple sites worldwide, which are networked within the Department of Defense classified private Intranet.

COP Master platforms on the GCCS-J and GCCS-M systems exchange track and other C2-related data, such as Overlays and Position of Intended Movement Tracks (PIMTRACKS). This interface is most often used within a Joint Task Force (JTF) environment in which the GCCS-M workstation is

used by the Maritime Component Commander (MCC) to exchange COP data with the Commander JTF (CJTF) using a GCCS-J workstation.

Link-16 is a communications, navigation, and identification system intended to exchange surveillance and C2 information among various C2 and weapons platforms. this system provides multiple access, high capacity, jam-resistant, digital data, and secure voice Communication, Navigation, and Identification (CNI) information to a variety of platforms. The Link-16/TADIL J segment allows GCCS-J users access to this data and information.

Data are held within Link-16 messages. These are a series of predefined format (J series) messages that can convey several types of data and voice transmissions. The messages are encrypted for transmission and decrypted upon receipt. JTLS search, detection, classification, and tracking algorithms accumulate data that can be utilized to develop Link-16 messages to update external systems, such as GCCS, with simulated track data. This change adds that capability to JTLS.

2.8.2 Design Summary

Partial implementation of this ECP was delivered within JTLS Version 3.2. The ECP is complete with this release. Foreign Air Tracks can be detected in JTLS and tracked by Air Missions carrying Air Search Radars, and also by ground or ship-based Air Search Radar targets. When these tracks are detected by Link-16 participants in JTLS, Link-16 track numbers are assigned, track data is maintained and passed upward for use by external programs, and appropriate messages are generated.

Several JTLS data items must be set correctly to enable Units and Air Missions to be Link-16 participants. Aircraft types must be designated as Link-16 capable, Squadron Factions must have their ACP AIR INFORMATION PROTOCOL set to "LINK-16", Squadrons must have blocks of Track Numbers assigned for their detecting aircraft to use, Units operating air search radars must have a UT JU NUMBER assigned, and the radar targets themselves must have blocks of track numbers.

The JTLS Operational Interface (JOI) is responsible for generating Link-16 messages in acceptable formats for GCCS. With this release, JOI provides the following types of TADIL-J messages: Air PPLI (Precise Participant Location and Identification, J2.2), Surface PPLI (J2.3), Air Track (J3.2), Drop Track (J7.0), Air Platform Surface (J13.2), and Emergency Point (J3.1).

Real world Link-16 tracks that are detected by either an AWACS or an Air Search Radar Site are assigned a Track Number from the detecting object’s available block of names. Track data are then updated to a JTIDS Terminal located at the reporting unit. This unit may be a ship owning the radar, the controlling unit for an Air Mission (its parent Squadron in JTLS) or a land unit owning a radar site. The data are then passed to the TADIL-J segment of the COP to be made available to all participants. In JTLS, the detecting object can be an AWACS Mission or a Target operated by a Unit in the game. The reporting unit is either the launching Squadron for the mission or the operating unit for the Air Search Radar target. JTLS track updates can be used to update the exercise COP while at the same time real world tracks are being shown.

A JTLS Link-16 capable Squadron must have a set of blocks of track numbers (MLBs) to provide to the mission aircraft. A detected aircraft is assigned a Track Name from the names between the start and end of a Squadron block. Assigned Track Names are held by the CEP in a data set, which is checked before assigning a new Track Name to ensure that the name is unique.

As the detected Air Track moves, its data are updated while remains detected. However, the track may be covered by more than one sensor. Also, the track may extend beyond radar coverage, and return to coverage range at a later time. The initially assigned name remains with the track until it escapes coverage completely, even if tracking is passed to another Link-16 capable sensor.

Recall that a track is not lost immediately in JTLS when it extends beyond coverage. The data parameter ACP DISTANCE TO LOSE AIR TRACK specifies the distance an air contact must travel after escaping radar coverage before the track is actually dropped. If another Link-16 sensor assumes the track before it has traveled this distance, then the Track Name remains the same, however, the track data is revised to reflect the new object (Radar or AWACS) that is responsible for updates.

Regarding Prototype Owned Targets (POTs), the decision was to not include the option to assign Link-16 Track Block Start and End values for POTs. However, the new MANAGE LINK-16 BLOCKS Order allows assignment, display, and/or changes to Track Block assignments and JU NUMBERs for Squadrons, Units owning Targets, and for the Targets themselves. It can be used to assign Link-16 participant data to targets created in the game from database POT definitions.

2.9 JTLS-2006-1889 Entity Viewer

2.9.1 Design Summary

This design describes a viewer for JTLS game entities. Originally named Java Virtual Battle Manager (JVBM), this viewer is renamed Entity Viewer Interface (ENVI) and will fall under JTLS configuration management. As such the ENVI will continue to be developed along with other JTLS utilities. It leverages the same 3rd party graphic display libraries and receives its game data through a connection to the EODA server. Additionally, this viewer is planned to incorporate an HLA interface, Latitude/Longitude positioning of objects, a port to Linux and many other enhancements.

2.10 JTLS-2007-2001 Magically Expend Weapons

2.10.1 Summary of Model Change Request

A recent CEP enhancement allows a Controller to magically increase the weapons or fuel of an active Air Mission. Specific weapons can be replenished, either individually or enmasse up to the original weapon load. As a follow-on enhancement, JTLS users requested the capability to remove weapons and/or fuel from an active Air Mission. Now, aircraft weapons and fuel can be magically expended as well as replenished on a mission.

2.10.2 Design Summary

The existing Magic Air Ops order was modified to allow weapon and fuel expenditures. Four options were added to the panel: Subtract Fuel, Deplete All Fuel, Subtract Weapons, and Expend All Weapons. The Subtract options allow the player to specify the amount of fuel or quantity of each weapon type to be removed (per aircraft) in the mission. The Deplete All and Expend All options remove all fuel or weapons currently on-board every aircraft in the mission.

The underlying CEP software was modified to implement these options. After any weapons are expended, the logic determines whether the mission should continue or not, based on the remaining weapons needed to accomplish the mission type. For example, a CAP mission that no longer has any air-to-air missiles will return home. If the fuel is reduced to near zero, the aircraft will crash (if fixed wing) or land (if rotary wing). Magically expended weapons are not counted as "used" (i.e. not considered dropped/fired). At the player's option, the magically expended fuel or weapons can be re-stocked at the home base (or other specified unit) to keep logistics tracking in the model consistent.

2.11 JTLS-2007-2048 Transparency Slider

2.11.1 Summary of Model Change Request

To change the terrain transparency on the Map, the user must open the Preferences dialog, select the Map node and then set the new transparency. It is desired to have this capability available on the Map window.

2.11.2 Design Summary

Preferences are currently available in only one location, preferences manager. The intent of the preferences manager is to provide a single consistent method for managing the preferences of the various what components. Each preference category is presented as a single panel that can be accessed by selecting the category in the preferences tree.

This design It is desirable to have preferences associated with a component accessible directly from that component. This can be done by embedding the preference editor on the component.

A terrain transparency control was added to the button bar on the map component and was anchored to the bottom. The slider is oriented vertically with a terrain icon and a label displaying the current value above it. The user moves the slider and the terrain transparency is adjusted accordingly..

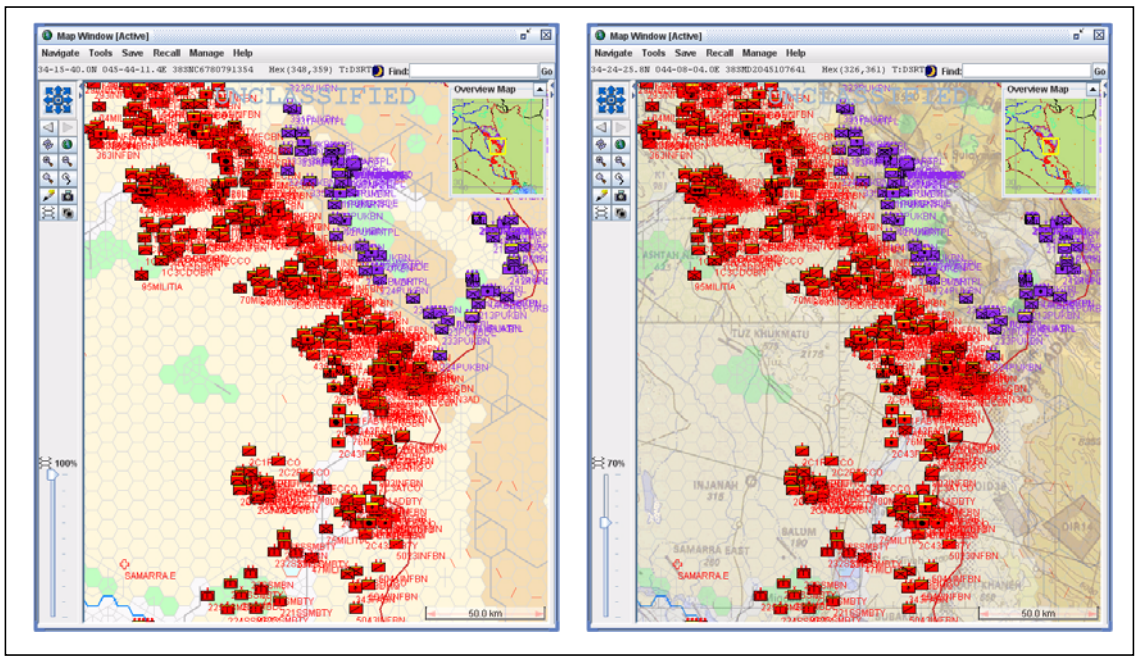


FIGURE 1. Terrain Transparency Slider

2.12 JTLS-2007-2050 Interactive Event Record and Replay

2.12.1 Summary of Model Change Request

Previous JTLS versions utilized the GENIS Data System (GDS) and the Graphical Interface Aggregate Control (GIAC) Analyst Workstation (GAWS) to review portion of a previously executed JTLS game. This capability was lost when JTLS evolved from this client-server system to the Web Enabled JTLS Object Data Authority (JODA) platform. This design is intended to implement a workstation recording and replay capability within this new system structure.

2.12.2 Design Summary

The event replay feature requires enhancements for most of the Web Services and the Web Hosted Interface Program (WHIP).

A dedicated Logging JODA (Logging JODA) is the proposed process engine. This specialized JODA saves information packets to various files as these packets arrive from the game's Primary JODA. Once the information is recorded, a JTLS user operating a specialized WHIP, named Total Recall Interactive Playback Program (TRIPP) may recall a specified time period to replay the associated

recorded information. The requested replay period is not re-executed within the model, but the saved data is instead resent to the TRIPP via the Replay Server, enabling users to review the recorded situation. **Figure 2** depicts this concept.

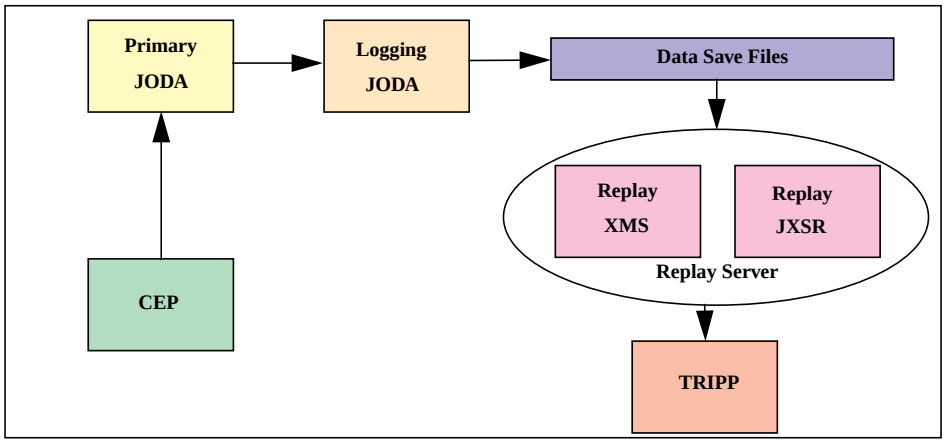
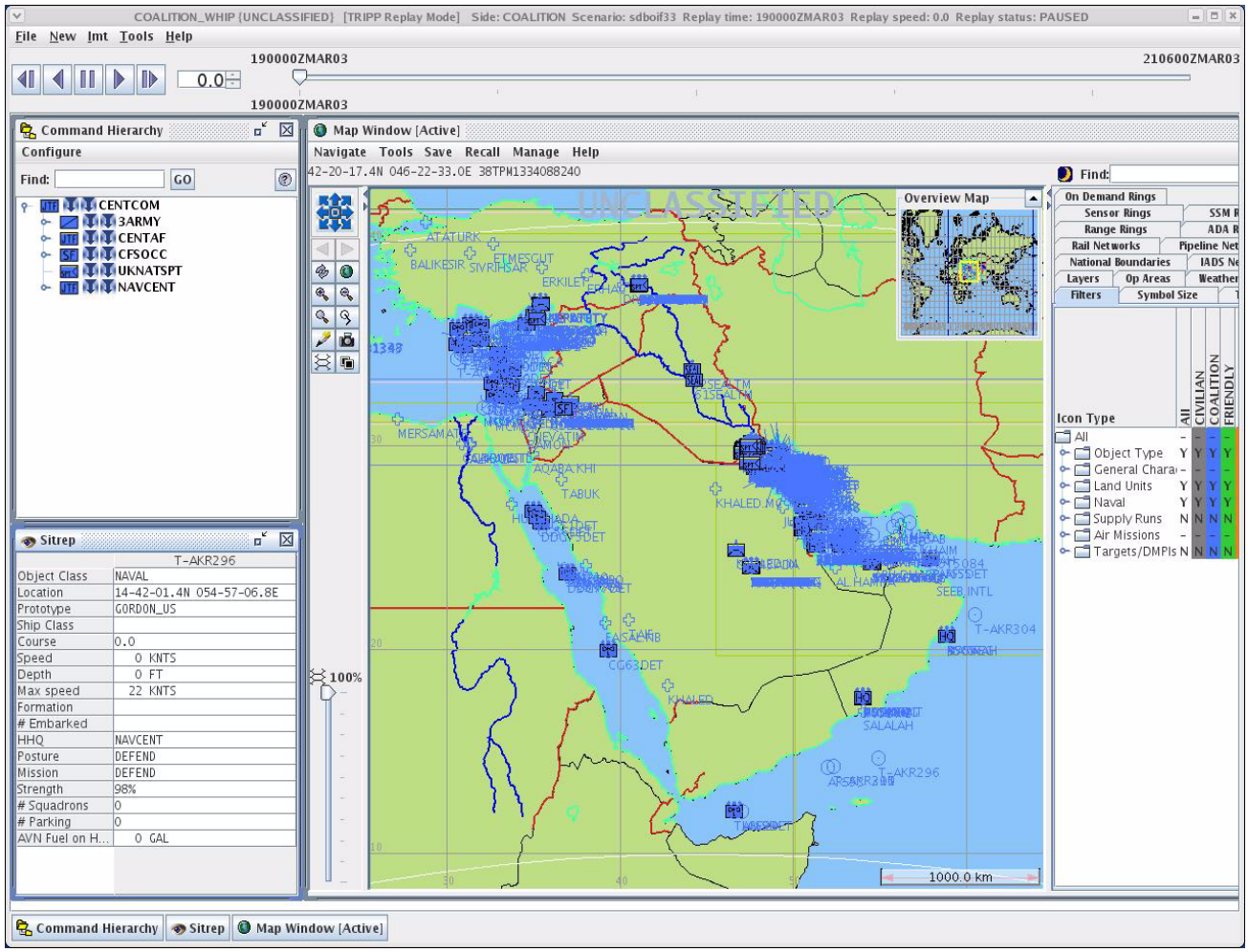


FIGURE 2. Replay System Concept



The TRIPP will appear much the same as a regular WHIP except that some functionality normally provided to communicate with the model will not be presented to the user. This functionality includes creating and sending orders, managing orders through the order group editor, and viewing messages with the message browser.

2.13 JTLS-2007-2069 Java 6.0 Support

2.13.1 Summary of Model Change Request

The Java platform version used for JTLS development and execution must be upgraded from Java 5.0 to Java 6.0.

2.13.2 Design Summary

Version 6.0 of the Java Runtime Environment (JRE) platform was released in November 2006. This release provides improvements that address several issues for the WHIP and GDP. Most notably, a font management problem exists for the WHIP under Java 5.0 that is not present under Java 6.0. This upgrade provides performance improvements and language features that will also be beneficial.

Java 6.0 will be delivered with JTLS 3.3 for Linux and Solaris.

Users will be required to install Java 6.0 in conjunction with the Microsoft Windows operating system on client workstations to execute the JTLS 3.3 WHIP. JTLS 3.2 will continue to use Java 5.0 and JTLS 3.3 will use Java 6.0. If both JTLS versions are used at an installation, each Windows workstation will require both Java versions to be installed. Installing multiple versions of Java on a single Windows machine is a common practice to support various Java programs that require different runtime environments.

2.14 JTLS-2007-2086 JTLS Symbol Database Integration

2.14.1 Summary of Model Change Request

The old procedure used to add object symbols to a scenario database was error-prone and cumbersome. Symbol loads to the database should be automatic and users' actions should be limited to creating a new symbol to be available to a database.

2.14.2 Design Summary

This enhancement was intended to solve problems that occurred when object symbols were created and integrated to a JTLS database:

- Saving the default symbols could overwrite one or more scenario symbols and the user had to remember which scenarios were affected. If the user did not edit the default symbols for a scenario, modifying symbols for multiple scenarios were difficult.
- Applying symbols to the database was difficult. Previously, users could add, rename, or delete symbols, which could create problems when symbols were loaded. A symbol that was removed had to be set to NONE in the database.

These issues are addressed by implementing the concept of a symbol set that can be shared by several scenarios and improving the symbol load scripts to automatically load when symbols have changed. Additionally, restrictions are placed on symbol sets that are in use on the system. If a symbol set is used by any scenario, symbols may not be deleted.

As part of the implementation, also the way the graphics symbol count read is modified. The symbol count is no longer written in the record count ascii table, but directly read in from the graphics symbol ASCII file.

2.15 JTLS-2007-2122 Change Combat System Maintenance Time

2.15.1 Summary of Model Change Request

A JTLS Controller can change the end-of-maintenance time for aircraft in a specific squadron using the Change Maintenance Aircraft Time order. This order allows the Controller to increase or decrease the duration of time one or more aircraft remain in maintenance at the squadron by specifying a new end maintenance time. The specified time to end maintenance can be the current game time (i.e., ASAP) to force aircraft out of maintenance immediately. During exercises, a requirement may arise to expedite other combat systems, as well as aircraft, through maintenance to meet mission tasking in support of training objectives.

For previous JTLS versions, the ability to adjust maintenance times was available only for aircraft. The Controller did not have the capability to change the repair times of other, non-aircraft Combat Systems that were in maintenance. This enhancement has expanded the existing aircraft capability to include all Combat System types within a unit.

2.15.2 Design Summary

The existing Change Maintenance Aircraft Time order was renamed as Change Maintenance Combat System Time and modified to allow any combat system type to be selected for a specific unit. Furthermore, two fields were added to the message generated by the Show Unit Combat Systems order: Next Repair Time and Next Failure Time. The software was modified to permit the end maintenance time to be changed for the selected Combat System type belonging to the selected unit.

Additional changes in the CEP were required to accommodate differences in the maintenance processes between aircraft and non-aircraft combat systems. Previously, a Unit Repair event was scheduled for each aircraft or group of aircraft that entered maintenance due to ground combat damage or non-combat failure. An End Maintenance event was scheduled for aircraft that entered post-flight maintenance only. The CEP was modified to allow aircraft to use the End Maintenance event exclusively, regardless of the reason for entering maintenance. This change was necessary to allow aircraft times to be adjusted independent of their maintenance source and to retain the existing logic that reschedules the End Maintenance event when the Change Maintenance Combat System Time order is sent.

Non-aircraft Combat Systems continue to use the Unit Repair event while only the next scheduled repair time for a given Combat System type is retained for computational efficiency. (Note: Several thousand Combat Systems are subject to maintenance in a typical JTLS scenario, and explicitly tracking each system's repair time is not feasible. Thus, only one Unit Repair event is scheduled for

each Combat System type per unit, regardless of the number in maintenance.) Unlike the aircraft End Maintenance event, the Unit Repair event applies to a single Combat System entity (i.e. the next individual tank scheduled to finish maintenance). Consequently, only one Combat System may be adjusted at a time, while multiple aircraft may be adjusted simultaneously. New CEP logic was added for non-aircraft Combat Systems to reschedule the Repair Unit event when the Change Maintenance Combat System Time order is sent.

Further logic changes were required to ensure agreement between the Combat Systems IMT and the Aircraft Availability IMT. The unit's Combat Systems Array is adjusted for aircraft entering or leaving maintenance, as well as other Combat Systems for any cause. The Multiple Maintenance Set for aircraft is utilized for aircraft entering or leaving post-flight maintenance, in addition to other maintenance causes, to ensure complete reporting to the JODA.

2.16 JTLS-2007-2177 Expand Command Level Representation

2.16.1 Summary of Model Change Request

JTLS previously represented 11 specific, Army-oriented, database independent, Command Levels; "Squad" through "Army Group". When information is passed to real-world Command Control, Communication, Computer Information (C4I) systems by the JTLS Operational Interface (JOI), a Command Level must be assigned to each non-Naval unit. However, some of these units are not Army units. This fixed set of Army-centric Command Levels did not satisfy C4I system requirements. This JTLS Command Level representation needed to be expanded. In addition, the ECP also requested that JTLS representations of the Army-centric "Branch" of a unit be reviewed and either removed or revised since C4I systems do not use that data either.

2.16.2 Design Summary

First, the portion of the ECP referring to JTLS "Branch" data no longer applies. Branch data was actually not a JTLS data parameter. The model used to determine the Branch based on the hard-coded GENIS symbols that previously existed in JTLS. Since JTLS no longer uses these hard-coded symbols, the data can no longer be linked to a unit's symbol assignment. The symbol generated Branch data parameter was previous used by the GENIS External Module (GEM) developed by the Joint Warfighting Center (JWFC) to feed real-world C4I systems. The GEM used this information to help determine the symbol required to display the aggregate unit on the Common Operational Picture (COP). Neither the JOI nor any other programs within JTLS currently use Branch data, so this portion of the ECP was not implemented.

As for Command Level, this data is now available for all Units and for HRUs. Each of these types of units now has a UT COMMAND LEVEL (or HRU COMMAND LEVEL) attribute. The Unit or HRU gets its command level from the TUP/SUP/HUP COMMAND LEVEL. However, the possible Command Levels are no longer a fixed set of 11.

Command Levels are now database items. The data structure COMMAND LEVEL (CL) is new to this release. As many as needed can be included in a specific scenario. Each CL has the following four attributes.

- · CL NAME - A unique name for the CL, 15 characters maximum
- · CL OTH GOLD NAME - for use in OTH GOLD messages, 5 characters
- · CL LOWER LEVEL - Another CL, for use by some unit Detachments
- · CL ICON ECHELON - For use by the WHIP, fixed set of 11 "echelon" symbols

The TUP, SUP, and HUP database parameters are not required. In other words, they are specified as "Null Allowed". If the prototype does not have a Command Level, the units initialized from the prototype will not have a command level and the JOI will not send the Command Level to the C4I systems that it feeds. The decision to allow no data was included since these data fields are not only related to United States (US) C4I systems and should not be required for other than US scenarios.

A Detached Unit's Command Level is determined by the circumstances of the detachment. A previously attached unit gets its original command level back. And a "Detach by TUP" unit gets the command level corresponding to the specified TUP. However if the detachment is by Percent or by specified Combat System quantities, then the ordering player has an option. An optional field on the order allows that Player to specify the command level of the new unit. If the field is left empty, the new unit gets the command level specified for the parent unit's CL LOWER LEVEL.

Note that there is NOT an attribute called CL HIGHER LEVEL indicating the next higher Command Level. This was envisioned for use with the Attach Order, but the Government decided there should not be any automatic Command Level changes as a result of the Attach order, so it was not added.

The CL ICON ECHELON now points to one of a fixed set of 11 symbols: X, XX, I, and so on. These correspond to the old fixed set of 11 command levels. The CL ICON SYMBOL that a unit accesses through its TUP COMMAND LEVEL is now only used by the WHIP display. The symbol that you see on a WHIP map actually consists of two parts. The bottom part (the main symbol) comes from the TUP GRAPHICS SYMBOL, while the top part comes from the TUP's COMMAND LEVEL CL ICON ECHELON.

Unit Size, which was defined for each unit in previous releases, is not related to either the COMMAND LEVEL or to the CL ICON ECHELON. A unit's size is based on the number of people in the unit. Any number of UNIT SIZE (US) structures can be defined in a database. Each has a US MINIMUM PERSONNEL attribute. As units gain or lose personnel, their UT SIZE can change, but their ICON ECHELON will not change.

Finally, the manner in which the Assembly Times for Rail and Barge assets are defined has changed. Recall that these assets are owned by Factions, not individual units. In previous versions, this data was held in an SMA ASSEMBLY TIME MEAN (or STD DEV) ARRAY. The array held data for

each SMA (e.g., FLATCAR), for each of the 11 command levels. The command level of the shipping unit dimensioned the array.

Since Command Levels are now database items, this methodology needed to be changed. Now, only one value, the SMA ASSEMBLY TIME MEAN (or STD DEV) is held for each SUPPLY MOVEMENT ASSET (SMA). Another SMA attribute is the SMA FACTION. So, the assembly time for a barge or rail asset (an SMA) is now the same throughout a given Faction, and is independent of any Command Level or Echelon data. In other words, within a given Faction a given type of Barge or Railcar takes the same amount of time to be made available for its loading to start, regardless of the command level or echelon of the unit requesting the assets.

2.17 JTLS-2007-2181 Properly Report JCATS-Owned Supplies

2.17.1 Summary of Model Change Request

In the JMRM federation, ownership of units may pass from JTLS to another model, i.e. JCATS. Regardless of whether a unit is owned by JCATS the JTLS model continues to provide to its users the usual set of status reports concerning all units in the game. Within these reports the JTLS user needs some indication that the unit's supplies are controlled externally.

2.17.2 Design Summary

This design implements criteria for supply reporting within JTLS that is sensitive to externally owned units. For example, ownership of a JTLS unit may be passed to JCATS. The JCATS model then controls nearly all aspects of the unit including supplies. The JCATS model is only concerned with supplies of type ammunition and fuel. These three categories of supplies are therefore treated with special consideration when the JTLS model issues reports on them for a unit owned by JCATS.

2.18 JTLS-2007-2188 Reflect External Air Weapon Expenditures

2.18.1 Summary of Model Change Request

This design provides an improvement to a CEP order and institutes HIP processing of an air mission attribute, which may be updated by an external model. The condition for this is the JCATS Bridge having ownership of an air mission and updating the count of weapons on the mission.

2.18.2 Design Summary

An air mission, as described in the JMRM FOM, has a Weapons_On_Hand attribute. The Weapons_On_Hand attribute holds the counts of each weapon currently on the air mission. Associated with another JTLS 3.3 design, **JTLS-2007-2219 JMRM Rounds Conversion**, the

JMRM FOM was modified to require the number of individual rounds rather than JTLS weapon counts for this attribute.

Also, the External Update, CEP order was modified to allow weapon expenditures to pass from the HIP to the CEP using whole JTLS weapon bursts. Again, by using design JTLS-2007-2219, the HIP then applies one of a group of rounding functions to resolve the number of weapon bursts and then updates the CEP by using the new External Update order. These enhancements allow the HIP to statistically reflect expenditures for JCATS-owned air missions.

2.19 JTLS-2007-2189 SSL and Authentication for Apache

2.19.1 Summary of Model Change Request

Use of Secure Sockets Layer (SSL) and Authentication is needed for some JTLS exercises due to network security requirements.

2.19.2 Design Summary

JTLS uses the Apache Web server to provide the WHIP access to the simulation data and scenario files. Access to the Apache Web server must be unrestricted because exercises are typically conducted on a closed (private) network.

This design presents an approach to implement Secure Socket Layer (SSL) communications for the Apache Web server. Secure Sockets Layer (SSL) is a cryptographic protocol that provides secure communications on the Internet for secure data transfers, such as Web browsing, e-mail, file transfers, and e-commerce transactions. SSL provides the Apache server the capability to support Secure HTTP connections that are similar to those used for online purchases or Internet banking. SSL configuration is a simple system administrator activity. Apache SSL configuration for JTLS is more complex because the Apache server is installed and executed from a user account. Configuration files are required for each host computer that is configured to serve JTLS scenarios.

This design proposes the use of X.509 certificate keys. X.509 is an Internet standard for public key cryptography and is supported by virtually all modern browsers, including Mozilla Firefox and Microsoft Internet Explorer that are also supported by JTLS.

This design also includes an approach to implement server-side authentication for access to a JTLS scenario Apache service. When an Apache server is configured for authentication, the server queries a Web site user for a username and password, which are required for access to files on the Web site.

2.20 JTLS-2007-2218 Dual Air-to-Air and Air-to-Ground Weapons

2.20.1 Summary of Model Change Request

Some weapons, especially guns, have air-to-ground and air-to-air capabilities. These previously had to be represented in JTLS as separate weapons, and Air Missions needed to have both weapons loaded to properly represent their fighting capability. The problem was particularly troublesome when JTLS participated in the Joint Multi-Resolution Model (JMRM) federation. This duplication had to be corrected to properly represent guns within JTLS and to properly participate in a JMRM exercise.

2.20.2 Design Summary

In JTLS the 3.2 series, the database parameter TW TYPE IMPACT and TW LETHALITY INDEX were two very closely related data elements. The TW TYPE IMPACT defined whether the weapon was a sea/land attack weapon (AIR BURST, SURFACE BURST, SUBSURFACE BURST) an air-air weapon (AIR TO AIR) or an air defense weapon (SURFACE TO AIR). This is still true. However, the TW LETHALITY INDEX, which pointed to a single AKL, PKL, SAL, or AAL data set for the weapon, was removed from the database. It was taken out as part of the JTLS-0239 Multiple Targetable Weapon Hull Hits ECP, which is also delivered with this release.

The JTLS-0239 ECP provided for TWs to have both POINT (primary targeted object) and AREA (collateral damage) effects. To do this, TW LETHALITY INDEX was replaced by the SURFACE KILL LETHALITY (SKL) data structure. Each sea/land TW now accesses an SKL that can point both to a PKL (Point damage) and also to an AKL (Area collateral damage) set of lethality data.

This JTLS-2007-2218 ECP is a logical and required extension of the JTLS-0239 ECP. Since the TW LETHALITY INDEX no longer existed, there needed to be a way to access the lethality data for air-air and surface-air weapons. This was done by adding two new Targetable Weapon (TW) attributes: TW AIR AIR LETHALITY (pointing to an AAL data set) and TW SURFACE AIR LETHALITY (pointing to an SAL data set).

Therefore, to implement this ECP it was necessary to allow a TW that should be both an air-to-air weapon and also be capable of being used in a sea/land attack to have both a TW AIR AIR LETHALITY and also a TW SURFACE KILL LETHALITY defined.

The change was not difficult to implement. SVP checks insure that Surface-to-Surface Missile (SSM) sites, High Resolution Unit (HRU) Combat Systems, and Surface-to-Air Missile / Anti-Aircraft Artillery (SAM/AAA) site each have weapons specified that have the required lethality data sets. For weapons carried on air missions, no TW AIR AIR LETHALITY specified means the weapon cannot be used to engage foreign aircraft, and no TW SURFACE KILL LETHALTY means the weapon cannot be used to attack sea/land targets.

No changes were made under this ECP regarding how weapons behave during engagements (pE, pH, pK, time between rounds, damage assessment, and so on). However the decision about when an Air

Mission should return home because of a lack of weapons had to be revised. The Return Home decision criteria used by the model, playing the role of the crew, needed be expanded to account for this change in weapon usage. The decision criteria is basically that if an Air Mission has no useful weapons, it will automatically be sent home. But that criteria is applied differently to different mission types. This is straightforward for some mission types, but a bit more complex for others.

- CAP. These missions logically, need Air-Air weapons aboard to continue.
- CAS and Armed Recce. These need air-ground weapons (TWs pointing to SKLs).
- Air Attack, SEAD, Orbiting OAS, and Combat Approved ROE Patrol Missions. These require weapons with a TW TYPE IMPACT set to AIR BURST, SURFACE BURST, or SUBSURFACE BURST. This is true even if the mission still has on board primary AIR AIR weapons that also access an SKL.
- Air Refuel, EC, RECCE, Mine Warfare, and Weapons_Hold/No_Fire ROE Patrol Missions. If these had Air-Air weapons in their original mission load, then they abort when the weapons are gone. If they had none in their load, they do not abort for lack of weapons.
- Airlift, Transport, Transfer, AWACS, and Insert/Extract. These missions do not abort for lack of weapons

Previously, users have also complained that some SSM sites also have an Air Defense capability. This duality is not being represented as part of this design and is a separate ECP. However, a single Targetable Weapon type can now be assigned to both a SAM/AAA site and an SSM site.

Any Targetable Weapons that can be fired from an SSM site, must have a TW IMPACT TYPE of AIR BURST, SURFACE BURST or SUBSURFACE BURST. On the other hand, the only requirement for weapons fired from a SAM/AAA site is that they point to an appropriate Surface Air Lethality data set held by the Targetable Weapon attribute TW SURFACE AIR LETHALITY. Thus a single weapon can be fired by an SSM site, a SAM/AAA site and even be placed on an Air Mission. Such a weapon would for example have: its TW IMPACT TYPE set to SURFACE BURST, its TW SURFACE AIR LETHALITY set to a valid SAL, its TW AIR AIR LETHALITY set to an AAL, and its TW SURFACE KILL LETHALITY pointing to an appropriate SKL.

Finally, some new SVP errors have been created. The SVP now checks the TW IMPACT TYPE to verify that air-air weapons access an AAL, surface-air weapons access an SAL, and that sea/land weapons access an SKL. It also checks that weapons assigned to SSM targets have a sea/land impact type, and that weapons fired by Air Defense targets access an SAL. Analogous checks are done by the model before accepting Controller SET TARGETABLE WEAPON PARAMETER orders.

2.21 JTLS-2007-2219 JMRM Rounds Conversion

2.21.1 Summary of Model Change Request

JTLS and JCATS each use different internal representations for gathering and reporting rounds of the same weapon. This is especially true during weapon fire interactions. This design addresses this problem.

2.21.2 Design summary

The weapon data for JTLS required an additional parameter to store the rounds devisor. This devisor is used by the HIP to convert rounds received from the JCATS Bridge into weapon bursts used by the CEP. The JCATS Bridge is responsible for the same conversions on its end. The HIP then uses a set of statistical rounding methods to apply the weapon updates to the CEP in the usual fashion. This method gives a reasonable accounting of weapons between the two models.

2.22 JTLS-2007-2286 Provide JOI Time Late Object Counts

2.22.1 Summary of Model Change Request

JTLS provides an accurate COP representation through the JOI that is based on the last detection time of tracks. However, as the game advances, the accuracy of some COP data deteriorates when based solely on the last detection time. If an object has not been redetected for a while, the time stamp on such object will get old and the object is considered "time-late". OPFOR ground tracks that were not in contact with Coalition forces were most severely affected when they were not redetected.

This ECP provides a JTLS Operational Interface (JOI) capability to display the "time-late" track counts on the JOI main window. Within the GCCS, COP operators can delete Time-Late tracks from the COP according to their time-late criteria. Furthermore, future GCCS may include a capability for automatic removal of the time late objects. Display of these "time-late" summary object counts are to be used to align with the track summary displayed on the Common Operational Picture (COP).

2.22.2 Design Summary

JOI provides summary counts for total, active, and filtered-off objects, and these summary counts are used by the JOI operators to compare them with the COP track summary. With this ECP, additional summary counts to specify the time-late object counts are added. In JTLS (and JOI), these time-late objects are still considered active and any updates will be sent to GCCS. When the object is redetected, the time stamp for object is also updated. Display of an additional summary counts for the "time-late" objects was requested so that the JOI operators can easily reconcile the differences when the time-late objects are removed from the COP.

Four setup parameters are added; 3 time-late cutoff criteria for each different track type (AIR, GND, and NAV), and time interval to indicate how often do we want to recalculate the time late object counts. These parameters will be set by the JOI operator during the setup process and cannot be changed once the JOI process is started.

At every update time interval, JOI will recalculate the difference between the current time and the object's last detection time for each object. If the difference is greater than the cutoff time, the object is considered as "time-late" and the summary counts are adjusted.

The JOI main window is modified to display the time-late object counts for each object class, the counts are updated every time the JOI recalculates the counts. These counts are used by the operators to match with the summary shown on the COP.

2.23 JTLS-2007-2289 SDC Improvements

2.23.1 Summary of Model change Request

The SDC was designed as a Relational Database Management System (RDMS) alternative to connecting as a JODA client. As such this SDR component was intended to provide all information available via the JDS Protocol in the SDC database tables. Updating this information is currently accomplished manually—the SDC code and the database table definitions are modified to reflect changes to the JDSP. This inefficient and error-prone method causes significant maintenance problems and increases SDC testing time.

Since the objects of the JDS Protocol are defined in an XML format, a code generator for the SDC that utilizes the XML definitions would minimize these problems. Therefore, this model enhancement creates an SDC code generator that produces the required source code as well as the database table definitions. This guarantees that changes in the JDSP XML Definition file will be reflected in the SDC and the database SQL file.

2.23.2 Design Summary

Since the SDC code and the database table definitions are now created directly from the JDSP XML file a naming scheme for tables and columns was derived. This naming scheme prepends "SDC_" to a JDSP object name to derive an SDC database table name. As an example, the JDSP object AIRBASE has a corresponding SDC database table named SDC_AIRBASE. SDC column names generally match the JDSP field names from which they are derived. The exceptions are compound fields, JEDIS and array fields. The compound fields result in numerous SDC columns that are based on the field name appended with an underscore followed by the field names of the compound object (for example the Location type field destination produces the columns destination_lat and destination_lon). JEDIS use a similar methodology to compound fields, except that any terminating "_id" is removed before appending on "_index" and "_type" for the two resultant columns. Thus the JEDI field lifting_formation_id results in two columns named lifting_formation_index and

lifting_formation_type. Lastly, array fields are represented as separate SDC tables where each entry in the array corresponds to a row in the SDC table.

Time fields were formerly treated as a compound field with a text Date-Time-Group (DTG) portion and the number of seconds since game start portion. This matched the JODA structure, but forced the developer to translate the value into a different format if the DTG format was not desired. The compound time fields have been compressed into a single SDC field that is now defined as a DATE type field. This allows the developer to instruct Oracle to format the field into the desired output on retrieval. These same changed were made for the OEC and AARC time fields. For applications that insert time values into the OEC, and do not wish to modify their code the Oracle instruction "ALTER SESSION SET NLS_DATE_FORMAT = 'DDHH24MI"Z"MONRR';" will create a mask so Oracle recognizes the old DTG format.

Due to this automatic code generation and naming scheme new tables have been added to the SDC (), some existing tables have had their names changed (), and numerous tables have had column name changes(). A complete list of the column name changes is available with the design document.

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TABLE 2. New SDC Tables

TABLE NAME	TABLE NAME	TABLE NAME
sdc_ada_target_subtype	sdc_ada_target_subtype_azr	sdc_aircraft_class
sdc_aircraft_load	sdc_altitude_zone	sdc_command_authority_tag
sdc_dsa	sdc_dsa_v	sdc_force_side
sdc_highres_unit_prototype	sdc_player_mip	sdc_sensor_target_subtype
sdc_ship_unit_prototype	sdc_ssm_target_subtype	sdc_ssm_target_subtype_swa
sdc_system_event	sdc_tactical_unit_prototype	sdc_target_s
sdc_target_l	sdc_targetable_weapon	sdc_weather_front

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TABLE 3. SDC Changes to Table Names

OLD TABLE NAME	NEW TABLE NAME
sdc_ac_maint	sdc_aircraft_maintenance
sdc_arc	sdc_network_arc
sdc_base	sdc_airbase
sdc_cruise	sdc_cruise_missile

TABLE 3. SDC Changes to Table Names

OLD TABLE NAME	NEW TABLE NAME
sdc_graphic	sdc_graphic_object
sdc_graphic_location_pts	sdc_graphic_object_v
sdc_model_status	sdc_simulation_state
sdc_node	sdc_network_node
sdc_supply_manifest	sdc_supply_manifest_item
sdc_ui_unit	sdc_unidentified_unit
sdc_ui_target	sdc_unidentified_target
sdc_weaponload	sdc_weapon_load

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TABLE 4. SDC Tables with Column Name Changes

SDC TABLE NAME	SDC TABLE NAME	SDC TABLE NAME
sdc_aircraft_maintenance	sdc_airbase	sdc_airmission
sdc_backorder	sdc_cas_request	sdc_combat_manifest_item
sdc_combat_system	sdc_convoy	sdc_cruise_missile
sdc_damage	sdc_dmpi	sdc_dmpi_target_link
sdc_earthquake	sdc_faction	sdc_farp
sdc_fire_mission	sdc_formation	sdc_graphic_object
sdc_formation	sdc_graphic_object	sdc_ground
sdc_hru	sdc_iads	sdc_naval
sdc_network_arc	sdc_network_node	sdc_pending_order
sdc_pipeline	sdc_port_event	sdc_railroad
sdc_refuel_chit	sdc_roe	sdc_runway_cut
sdc_side_relation	sdc_simulation_state	sdc_squadron
sdc_strategic_manifest	sdc_strategic_plan	sdc_strategic_stop
sdc_supply_category	sdc_supply_manifest_item	sdc_support
sdc_target	sdc_unidentified_target	sdc_unidentified_unit
sdc_weapon_load	sdc_weather	

To assist external developers to retrieve information from the SDC database, the C code structures that the SDC uses fulfill this requirement are delivered with JTLS. This header file contains a separate structure for each SDC database table with structure element names that match the database column names. It is generated by the SDC stylesheet in conjunction with the JDS Protocol XML File and therefore always reflects the current structure of the database. This file is delivered in the $JTLSHOME/include/sdr directory.

3.0 SOFTWARE TROUBLE REPORTS

3.1 INTRODUCTION

This chapter describes the software error corrections implemented for this release.

3.2 ERRORS CORRECTED FOR THIS RELEASE

No Software Trouble Reports (STRs), which describe discovered and corrected code errors, have been identified for this release. Code corrections completed for the previous JTLS 3.2 series of releases have been tested with the model enhancements delivered with JTLS 3.3.0.0 and are included.

STRs that remain outstanding from previous JTLS versions are listed and described in Chapter 4 of this document. Errors that are identified for JTLS 3.3.0.0 and corrected for future Maintenance releases in the JTLS 3.3 series will be described in this chapter.

4.0 REMAINING ERRORS

4.1 INTRODUCTION

Every effort has been made to correct known errors in the model. All reproducible errors that resulted in a CEP catastrophic software failure (Crash) have been corrected. Other corrections were prioritized and completed according to their resource cost-to-benefit relationship.

Correction of the remaining STRs, however, must be postponed to a later version due to time and resource constraints. These problems may be corrected prior to the next release of JTLS. If an immediate need arises for a code correction to any of these outstanding STRs (i.e., for an exercise planned to occur before the next release), contact the JTLS Configuration Management Agent. (Refer to the Abstract of this document for the current address.)

4.2 REMAINING ERRORS

The errors described in this section should be noted specifically because they affect the basic functionality of JTLS. Information is provided regarding the extent of the error, as well as suggestions to avoid or minimize the effects of the problem.

4.2.1 JTLS-0639 Error Determining When Engineering Task Completed

When a Unit starts a directed Engineering Task, the time to complete the task is based on the Unit being at 100%. The time to complete a task is adjusted for the Unit's COMBINED EFFECTIVENESS. Stronger units complete tasks faster than do weaker units. The task completion event is then scheduled at the computed time. At this scheduled completion time, the code checks whether enough time has actually elapsed to complete the task. If the Unit was at more than 100% COMBINED EFFECTIVENESS when the task started (meaning the task completed earlier than if the Unit were at 100%), it appears to the model that not enough time has passed and the task is not credited as complete.

4.2.2 JTLS-0695 Shadow Distance Of Zero Overriding Protection Radius

In the routine SEND INTERCEPTOR, the model is determining which interceptor to send. If this is a protection radius CAP mission, it gets the minimum of PROTECTION RADIUS and SHADOW DISTANCE. If this is zero, then the logic says there is really an infinite protection radius. This seems odd. If someone forgets to set SHADOW DISTANCE, then protection radius is ignored. As a minimum, this needs to be either documented or changed so that a zero SHADOW DISTANCE means ignore shadow, not make protection radius infinite.

4.2.3 JTLS-0696 Missions Ignoring Assigned Altitude on Egress

Why aren't missions observing their assigned altitudes on a egress path? Somewhere the posture of

the mission was changed to HEADING HOME when it is on its egress route. This causes the mission to automatically set its altitude to avoid air defense.

4.2.4 JTLS-0697 Missions On The Ground With Invalid Destination

Missions on strip alert report a next destination latitude/longitude on the IMT. The destination coordinates should be cleared for missions on strip alert.

4.2.5 JTLS-0698 Cannot Re-Activate Destroyed Targets

Some facility targets are 0% capable and not displayed on the GIAC. They need to be reactivated for the ATO. Activation cannot be done with Controller Change Target because their GDS active flag is set to zero.

4.2.6 JTLS-0699 Targets That Require An Owner Are Disassociated

Targets owned by an HRU that die in combat are disassociated from the HRU and from their associated unit. When a checkpoint is taken, both fields are written as NONE. On restart, this causes a crash for ADA targets.

4.2.7 JTLS-0700 GIAC Not Displaying Current Runway Length

A runway has 21% strength, but the GIAC displays the maximum length and current length as equal to the maximum length. In the GENIS, the percent capable is reduced, but the range and current length values are the same. The model does not appear to update the current length to the GDS when it changes.

4.2.8 JTLS-0701 Air Movement Report Does Not Consider Hold Points

When an air movement report is requested, it does not take into consideration scheduled delays in the delivery instructions. As a result, it indicates an earlier departure time at each point, and an earlier completion time for the mission.

4.2.9 JTLS-0702 Mission Waiting For Delayed Mission

An air mission package had an attack mission that went into weapons delay. The user told another attack mission to join the package, but did not cancel the old mission. The new mission launched, dropped its weapons, and then turned into an Escort and waited for the old Attack mission that was still in Weapons Delay. The logic needs to be improved.

4.2.10 JTLS-0703 Periodic Report Other Side Airbases Lists No Activity

The Periodic Report Other Side Airbase Summary lists all the airbases but for each one says there are no squadrons operating there. On the GIAC, you can click on the enemy airbase and see squadrons there. Click on the squadron and it says that the home base is the expected home base. Discrepancy is

that the periodic report in BUILD FOREIGN BASE SQUADRON REPORT looks for squadrons at the airbase, and perceived combat system aircraft for that squadron. If no aircraft have been perceived, then it does not count as an operational squadron. There is no check whether the squadrons are actually perceived to be associated with the airbase; truth is used instead. This provides free intelligence. The discrepancy is that GIAC reports the home base but it does not show on the periodic report.

4.2.11 JTLS-0704 Immediate Cancel Of Air Mission in Delay Status

During a recent exercise, the air cell sent an Air Transport Order in which the aircraft was directed to remain on the ground at its home base until a certain time. This was a error, and the controller cancelled the mission. The mission did not cancel immediately, but waited until the “holding posture” time was complete and then cancelled. The Controllers stated that the mission should have cancelled immediately.

4.2.12 JTLS-0705 Missions Launching With Fewer Aircraft Than Available

A mission that cannot get its resources goes into the UT AWAITING LAUNCH SET CAN YOU LAUNCH looks only at missions in this set. If CAN YOU LAUNCH assigns enough aircraft to meet the acceptable launch fraction, the mission is removed from the UT AWAITING LAUNCH SET and a launch event is scheduled. Thus, once a mission gets the aircraft to launch, it will not fill up to its full complement even if aircraft become available.

4.2.13 JTLS-0843 Error 427

When a ship and formation was in a dual capable hex, this error message appeared in the verify: “Error 427: Formation, <name>, has been placed at hex location ###,###. This location is not specified as water.” No error was recorded for the ship, which was located in a dual capable hex. An error message should not be generated if the ship and formation are in a water, dual capable, or small island hex.

4.2.14 JTLS-0846 Naval Unit Distance Calculation

A Player ordered naval Unit A to arrive at a point due west 100 nautical miles away at a time 12 hours later with a speed of 10 knots. Naval Unit B was ordered at the same speed and direction to a arrive 24 hours later at a destination 200 nautical miles away. Unit A arrived 1.5 hours late and Unit B arrived 3.0 hours late. The orders were repeated for both units to arrive at points 100 and 200 nautical miles due north. The units arrived within 15 minutes of their expected arrival time. Although a speed of 10 knots was ordered, the speed displayed for each unit in the SITREP window was 9.7 knots. The model appears to not calculate the additional distance required when a unit follows an irregular path from hex center to center. The problem does not appear when a unit follows a direct path from hex

center to center in any direction.

4.2.15 JTLS-0865 Incorrect External Program Order

If a non-GIAC program sends an incorrect order to the CEP, the CEP attempts to detect the error and generate a Player message reporting it. The model crashed generating this message while executing an order generated by the JTLS HLA Interface Program (JHIP).

The CEP code was modified to be stable under this specific circumstance. This does not guarantee that another erroneous order sent to the model will not cause a different problem in another portion of the code. Processing an order through the Order Verification Tool before submitting it to the model is the only procedure which assures that such errors and crashes will not occur.

The JHIP condition which initially caused the problem was not a code error, but a mismatch between the JHIP version in use and the version of the External Update order used by the CEP. The order version was updated to match the JHIP version. This problem is not considered an STR because it was discovered in a delivered non-official interim release of JTLS.

4.2.16 JTLS-0869 Continue Engage Determination

The A CONTINUE ENGAGE parameter is not used in JTLS 3.0. Due to the complete change of the air-to-air algorithm in this version, the determination of when and how an air mission decides to continue the engagement needed to be redone.This was not completed prior to the release of v3.0. It is the desire and intent of the design team to restore this capability to the model.

4.2.17 JTLS-0870 Number of Air-to-Air Combat Kills Allowed

The code allows the weapons from a firing aircraft to kill only one enemy aircraft. A specific aircraft should be able to target and kill multiple enemy aircraft up to its weapon control capability. This is calculated as the number of weapons fired by the aircraft divided by the maximum number of weapons allowed per enemy.

4.2.18 JTLS-0871 AC Mission Weapon Drop Determination

Currently, an air mission drops all of its air-to-ground weapons when an aircraft is killed in air-to-air combat if the AC Weapon Drop Flag is YES. This flag value should also allow a mission to drops non-precision guided weapons when it is fired upon in air-to-air combat.

4.2.19 JTLS-0906 Change ADA pE To Per-Element pE

An Air Defense Class has a Probability of Engagement (pE) against each of the Aircraft Target Classes. If detection by a sensor on an IADS network is prompting the engagement, then the pE is assumed to be 1. The following applies only to non-IADS detection and engagement attempts. Each time an air mission enters a hex within the SAM-AAA target altitude-range criteria, the SAM-AAA target attempts to detect the air mission with its fire control sensor. If the detection is successful then

the SAM-AAA target makes a pE attempt. It doesn't matter how many elements are in the target, only one detection attempt and one pE attempt are made per hex. But each element, by definition, has an independent fire control ability.

Each fire control sensor in the multi-element target should conduct a detection attempt. For each successful attempt, a separate pE attempt should be made. Assuming there is some form of command and control within the elements of a specific SAM-AAA target, the actual firing can still be limited to one element.

4.2.20 JTLS-0907 Scud-Like SSM Representation

It is difficult to represent the effects of long-range ballistic missiles. Different missile types have various levels of accuracy in the CEP. However, in JTLS the missile will always hit its aimpoint. To reflect the inaccuracy of these missiles, it is typical to assign them an unrealistically large TW Radius of Effects. This usually results in very low damage effects from these weapons.

A new measure of the missile's accuracy could be added to the CEP as a new database value, and used to randomly determine the impact point of the weapon in a region surrounding the aimpoint. Thus, the actual weapon impact effects could be properly represented within the model.

4.2.21 JTLS-0908 Naval IADS Link Representation

The IADS network for ship units is computed during the exercise as needed, based on the current location of ships which have Comm Sites. In some cases this can be CPU-intensive. Currently, all ship-owned Comm Sites can serve as hubs, i.e., these sites can send and receive all information. In reality, only a few ships serve as hubs or air defense control centers for the Task Force. The other ships' Comm Sites are used only to pass detection information to the hubs, and receive detection information and fire guidance.

A new Comm Site data parameter should be added to designate that a Comm Site subcategory is a hub. A ship with a Comm Site target that is not hub-capable can link only to a ship with a Comm Site target that is hub-capable. A ship with a hub-capable Comm Site target can link to any other ship with any Comm Site target, within current side and distance restrictions.

4.2.22 JTLS-0909 Display Moderate And Severe Attrition Level

There is no capability to query whether a unit is suffering Moderate or Severe Attrition Level effects. This capability should be added to the Unit Situation Report.

4.2.23 JTLS-0910 HRU Patrol Intel Reports

Typically, many HRUs are conducting intelligence gathering patrols simultaneously during an exercise. Too frequently, they are collecting on "ANY UNIT". These messages are all broadcast messages, controlled by the Intelligence selection of the Broadcast Options menu. A workstation operator has no capability to limit received intelligence reports to only those of interest. The HRU

Patrol Intelligence message should be modified from a Broadcast message to a Sending Workstation message.

4.2.24 JTLS-0911 Fire Artillery Wait Time Between Missions

Artillery can be fired continuously within the simulation. Ammo constraints can be played through supply category quantities, but frequently aren't because logistics is not a training objective. Artillery cannot realistically fire continuously without a cool-down period and maintenance time. The crew also needs to eat and rest at some point. The overuse of artillery during exercises has been an issue for several years.

Enforcing a minimum time between fire missions is a recommended capability. This could be accomplished with a fixed database value, a database percent of the previous fire mission time, or a FLP value. As a fixed value, 10 minutes would mean no new fire mission could start until at least 10 minutes after the completion of the previous fire mission. As a percentage, 25% would mean waiting 2.5 minutes if the previous fire mission time was 10 minutes, or waiting 15 minutes if the previous fire mission time was one hour. Fire missions that are broken up because of the combat assess or the max fire mission time should not be subject to the wait time between the split parts of the mission. Priority Counter-battery missions should not be subject to the wait time because they are priority missions and very time-dependent. Just as the number of hours a day that a unit can move is limited, a similar limit could be put on the number of hours a day that a unit can fire.

4.2.25 JTLS-0929 Ship Changes Sides

A Thailand ship changed sides when a Mandatory Transfer order was given to a US ship. The ship (FFG-456) was ordered to join an AOE-2.f formation. The Mandatory Transfer order to AOE-2 to give FFG-456 50,000 gal of Cl.III Navy was rejected for the reason that FFG-456 appeared to have changed sides.

4.2.26 JTLS-0934 HRU Overwatch

An HRU was created and assigned overwatch of a flying squadron. The model refused the overwatch and reported "Unit is already in land combat, and not eligible for new overwatchers." The flying squadron had been attacked by terrorist HRU, which was no longer present in the area, as shown on both U.S. and Controller views. Unit was at 84% strength. IMT showed flying squadron as being in combat. When HRU broke off, flying unit should have come out of "In Combat" posture. The HRU should have accepted overwatch responsibilities.

4.2.27 JTLS-0942 Air Transport Cannot Combine Wet And Dry Supplies

When both wet and dry supply categories are included in the same Transport Instructions List for an Air Transport mission, they will not be transported at the same time. The first supply category shipment type will be loaded, but the second will not. If both are included in the same Supply List, the wet category is preferred. The aircraft go through the motions as if loading and delivering the denied

category, including MISREP confirmation. No pickup or delivery is made, although an empty storage area may be created. There is no documentation to support this situation, and the user is not notified of the problem.

4.2.28 JTLS-0948 Lanchester Double Kills

When two opposing units' centers are within DECISIVELY ENGAGED DISTANCE of each other, 100% of the combat systems are eligible to kill each other. The combat power distribution of the units is used to determine which combat systems are eligible to kill units in the same or adjacent hexes that are not co-located. This can lead to some combat systems being allocated to kill twice in a single Assess Combat period.

4.2.29 JTLS-0949 Destroyed Target SITREP Strength Incorrect

When a target is destroyed, such as a bridge or pumper station, the GIAC SITREP still has the strength of the target as 100. GENIS also displays strength as 100. Apparently, the percent capable is being updated in GENIS from JTLS, but not the strength which is used to fill the GIAC SITREP. This is a problem in both 1.85B and the 2.0 versions

4.2.30 JTLS-0950 JTLS Radius Of Effects

The radius of effects for air missions is not being calculated correctly. The analyst guide states that the radius of effects is determined by the TW.RADIUS.OF.EFFECTS of the area weapons employed and the delivery altitude of the air mission. At the max altitude for the aircraft type, the covered area is the total area for all area weapons fired. Testing has shown that the max radius of effects occurs when the aircraft's mission altitude is anywhere between one half the max aircraft altitude and max aircraft altitude. In the routine, Determine Covered Radius, the area overlap calculation statement shows the max altitude multiplied by 0.5. As such, the radius of effects is not calculated correctly.

4.2.31 JTLS-0952 Air Report

JTLS 1.85 provided the ability to obtain the report for one squadron or all squadrons. JTLS 2.0 only provides capability to get one unit at a time.

4.2.32 JTLS-0953 All Sides Informed About Supply Dump Error

Created a supply dump using the Cache Order. Looking at the GDS shows that all sides are informed about the dump; they show up on all sides IMT. Only the controller and the side that created the dump should be initially informed about the dump.

4.2.33 JTLS-0954 Multiple Supply Storage Targets

A supply storage target should not be allowed to be created in the same hex as another one on the

same side. A user was able to create several open storage supply targets right on top of each other.

4.2.34 JTLS-0955 Air Lift Drop Report Message

The subject line of the message received when a player requests an air lift drop report for a mission that has completed the lift or drop, or is not conducting a lift or drop, reads “Air Order Received, <mission name>, Cannot Comply”. It should be titled, “Air Lift/Drop Report Cannot Comply”.

4.2.35 JTLS-0956 MPP Messages For Canceled Missions In Error

If an airbase is magic moved with several squadrons on active missions that need to be canceled or with squadrons in the middle of a self lift, the subsequent message generated for the situation has several errors. The changes required are too risky during the exercise. The problem will not cause a crash, but will cause the MPP to incorrectly display the message contents.

4.2.36 JTLS-0957 Can’t Take Control Of Unowned Runways

It is impossible for anyone to take control of an unowned runway in the hex it is already in. To do this the controller must enter the order, but the order is not on the controller’s menu. We have tested this on a sample menu, it doesn’t crash but the runway’s owner is not set.

4.2.37 JTLS-0958 Withdrawing Units Cannot Destroy Supply Targets

There appears to be an error in the interface between the CEP routines DESTROY CACHES ON LEAVING and IS TARGET SAFE. The first calls for supply targets that are another side or BLACK, but the second always says BLACK targets are safe. This means that a unit withdrawing will never destroy BLACK SUPPLY TARGETS, even if they could do so. The code needs to be updated, a complicated fix.

4.2.38 JTLS-0959 Logistics Report Problem

The Logistics Report will report amounts as single decimal points (e.g., “.”). This is caused by format D(8,0), and an amount smaller than 1 ton. To correct this situation, all of the Logrep files need to be checked to determine if it is feasible to change the D(N,0) format specifications to at least D(N,1).

4.2.39 JTLS-0960 Can’t Magic Move Airbase To Existing Airbase Location

One cannot Magic Move an airbase into a hex wherein there is a runway that is on the same side as the airbase, and is part of the initialization database. The airbase will not automatically assume control of the runway. If the runway is one that was created by Controller action, the airbase will assume control of it. If this error is causing problems for upcoming exercises, the Configuration

Manager should be contacted for a code fix to solve this problem

4.2.40 JTLS-0961 Group Ground Move Delayed To Lead Unit

There is a problem when a group ground move is sent. The directive is delayed to the lead unit. When the lead unit learns about the move, it immediately tells the units in the follow-on group. This could lead to directives being received out of order. Assume the user sends a directive at 0100 and the CEP determines the lead unit should receive the message at 0200. The lead unit cannot receive any other directives until after 0200. The CEP ensures that directive receipt is in the same order as the user sent the directives. This is not true for the follow-on units. If the user sent an order at 0115 directly to one of the follow-on units, the follow-on unit could receive the 0115 directive prior to the order sent at 0100. If this error is causing problems for upcoming exercises, the Configuration Manager should be contacted for a code fix to solve this problem.

4.2.41 JTLS-0962 Pass Unit Intelligence Does Not Include Update Information

Pass Unit Intelligence does not follow any of the Update Information logic, so we are not going through routines such as Alter Launch New Information procedure. This can cause Air Missions to head toward old perceived information locations if they rely totally on the information obtained through Pass Unit and Pass Target Intelligence capability. If your scenario involves a side which depends solely on this intelligence collection methodology and the side will be sending attack missions, the Configuration Management Agent should be contacted immediately to obtain a proper fix to this problem prior to your exercise.

4.2.42 JTLS-0963 IMT Supply Category Line Disappears When Value Is Zero

Recommend that a Unit's IMT On-Hand Supplies (OHS) specific category line remain when supplies are gone and no Due-Ins are established.

When a unit runs out of a supply category and no Due-Ins are scheduled, the unit's IMT On-Hand supply line for that specific category disappears from the menu. This makes it very difficult for a player who is controlling 40 or more unit icons and being overwhelmed at times with MPP messages to keep track of exactly what supply categories need his attention or thwarts his attempts to trouble-shoot a supply problem. The constant presence of the supply category line, even if empty, will save the Player wasted time either making early printed copies of all his unit OHS for later comparison or referring unnecessarily to the OPM TUP/SUP to determine what empty supply categories his units have that require resupply. Certain supplies (i.e. fuel/targetable weapons) are critical and unnecessarily impede game execution, if not maintained at required levels for play in an automated logistics scenario.

4.2.43 JTLS-0964 Reporting Bridge Damage

When an aircraft conducts an air-to-ground mission against a highway bridge, damage reporting is not consistent. When the aircraft returns and the mission report says the bridge is at 0% capability, the

IMT and SITREP still report the bridge capability as 100%. When another aircraft is sent against the bridge, it flies over and doesn't drop any munition because, according to the mission report, the target isn't there (it's destroyed). When this aircraft returns, the IMT and SITREP still report the bridge at 100%. Much later, although not consistently, the bridge status changes in the IMT and SITREP to 0%. If the bridge is destroyed, the IMT and SITREP should reflect the information provided in the Mission Report. The problem reported is being investigated. If this is causing a problem for an upcoming exercise, the Configuration Manager should be contacted to implement a fix to the problem as soon as possible.

4.2.44 JTLS-0965 Error In Time Report For SET SP CONVOY DELAYS

When a time value of 2 hours 0 minutes is entered into any field of the SET SP CONVOY DELAYS window and then sent to the CEP, the MPP returns a message that shows a time of 1 hour 0 minutes instead. This is a known round-off error. A solution is being investigated.

4.2.45 JTLS-0966 Incorrect Mission Report Locations

Some mission report locations appear to be incorrect. The ADA engagement location is an example. The problem is being investigated.

4.2.46 JTLS-0967 Fire Mission Not Deleted From GENIS

It appears that, in some circumstances, an Artillery Fire Mission that has been reported to the IMT is deleted from the CEP without the GENIS being informed. This happened in the case of a unit that was moving when it was supposed to fire the mission. The Fire Mission still showed on the IMT several hours later.

4.2.47 JTLS-0968 Inconsistency Between Regular Run And Pusher

There is a major inconsistency between a regular run and a run created using pusher. When an order with ASAP is sent, the READ KEYWORD routine sets the data parameter to TIME.V. When pusher reads in the order, TIME.V is much earlier than it was when the order arrived in the first place. For orbiting missions and alert missions, this alters when they will go off alert by a great deal. This must be fixed and made consistent. It appears that both TIME.V and order receipt time must be saved to the ci1 file to accomplish this task.

4.2.48 JTLS-0969 Changing Mission On Alert

When a ship moves, it changes the attributes of missions that are on alert. It also needs to change alert hex for those missions that are not currently on alert, but still have their alert hex pointing to the ship's

location.

4.2.49 JTLS-0970 Availability Of Aircraft

When a unit loses a fraction of an aircraft to Area Fire or Lanchester combat, the whole aircraft becomes unavailable for air missions. However, the report of Available Aircraft on the IMT is expressed in whole numbers. This may result in a unit incorrectly showing a damaged aircraft as available.

4.2.50 JTLS-0971 Ship Continuous Tracking Not Working

The new unidentified object design indicates that ships which are continuously tracked will not have unidentified objects created. A continuously tracked Naval unit and all of its targets are creating unidentified objects. They should not be doing this.

4.2.51 JTLS-0972 Air Mission Find In Middle Of Ocean

A user does a find on a pre-launched air mission that is home based on a moving Naval unit. The X marking the location of the pre-launch mission is where the Naval ship was when the order entered the system. As the ship is moving, the new location of the pre-launch mission is not being sent to GENIS and thus GIAC.

4.2.52 JTLS-0973 Periodic Report Air Supplies And Fuel Not Correct

The arrays which hold air supply usage are not being maintained correctly given the new MISSION RESOURCE ALLOCATION event.

4.2.53 JTLS-0974 Submarine Detection By Ground Sensors

A moving submarine does not get full credit for coverage time by sonars on board other ships or submarines. It gets full coverage time for airborne sensors but not ground based sensors.

4.2.54 JTLS-0975 GDS Target Update Error

When the CEP accomplishes a GDS Target Update, the GENIS ends up knowing about the re-initialized target, but the GIAC does not.

4.2.55 JTLS-0976 Manual Pairing And Protection Radius

The JTLS 2.1 Analyst's Guide, Section 8.4.8.2, second paragraph discusses the rules for manual pairing of CAP missions. The paragraph states that the manual pair order will only check to determine if the new interceptor has enough fuel and appropriate weapons before sending it.

In the model however, a manual paired mission will do the following if the intercepted mission is out of the protection radius of the interceptor. The interceptor will move one hex towards the intercepted

mission, and then return to its orbit location.

4.2.56 JTLS-0977 Slightly Inaccurate Runway Length Sometimes Used

When AIRCRAFT.CLASS data are read, the takeoff and landing lengths are read in integer format. These are then assigned to the double real attributes of AIRCRAFT.CLASS. However, sometimes the double attributes become values slightly larger than the actual version of the integer in the database.

4.2.57 JTLS-0978 Air Missions Don't Completely Comply With Egress

Each assigned point on an air route has an associated altitude. The mission should climb (or descend) to that altitude upon reaching the point and attempt to maintain that altitude until another altitude is assigned. Air missions that have egress routes should fly from the last egress route point to home base at the altitude assigned for the last egress route point. They are not doing so. Instead, they fly from the last egress route point home at their Most Efficient altitude.

4.2.58 JTLS-0979 Halted Helo Squadrons Show Mission As MOVING

A helicopter squadron can be ordered to conduct a ground move to a new location. A helicopter squadron that is moving will accept orders to launch aircraft. However, when it begins air operations, it stops. After the completion of air operations, the squadron does NOT resume its ordered movement. Its posture reverts to DEFEND, but its “Mission” remains “MOVING”. Since the squadron does not resume its move, its “Mission” should also revert to “DEFEND”.

4.2.59 JTLS-0980 SVP Warning 22

SVP Warning 22 reports aircraft loads whose extra fuel exceeds the aircraft’s wet carry capacity. I believe the check should be changed to see if the extra fuel (carried in pods/tanks) when added to the other weapons exceeds either the aircraft’s dry carry capacity or total dry/wet carry capacity. Granted, there are other supply loads that might carry wet supplies, but in the case of extra fuel, I don’t believe it should be considered wet weight.

4.2.60 JTLS-0981 Formation With No Posture

The model crashed when a formation reached a Destination Two hex and the formation no longer had a posture. Therefore it did not know what to do. A Destination Two hex indicates that the Formation should conduct its assigned Amphibious Operation, drop off its Sealifted supplies or clear mines from a minefield. The posture of the formation is used to tell the formation which of these three tasks should be accomplished.

When the formation reached its Destination Two hex, the posture of the formation was zero;

therefore, the formation did not know which of the three tasks should be accomplished.

4.2.61 JTLS-0982 GIAC Shows HRU Mission Moving After Move Complete

The GIAC Message Box Unit SITREP for an HRU continues to show a Mission of MOVING when movement is complete. Unit Posture changes to DEFEND. ARU SITREPs are displayed with both a Mission and Posture of DEFEND.

4.2.62 JTLS-0983 IMT/GIAC Show Insert/Extract Mission Flying

IMT and GIAC show Insert/Extract Mission flying at zero feet from Insert/Extract to next Transit Point. Also between some Transit points. Radar detection reports correct altitude.

4.2.63 JTLS-0984 IMT Doesn't Add Unit Names

IMT - Intelligence - Foreign Units will display the current list of identified Foreign Units and will update information about them while the Foreign Unit Information window remains open. However, if a new Foreign Unit is identified, that unit does not get added to the list in the open window. A new Foreign Unit Information Window must be selected to obtain the current list of identified units.

4.2.64 JTLS-0985 PSYOP Results Multiplier

The PSYOP Results Multiplier was referred to as the PSYOP Effects Multiplier four times in the Data Requirements Manual (DRM) and three times in the Analyst's Guide. Although listed in the DRM, the PSYOP Results Multiplier could not be accessed in the DDS. It appeared to default to 1.0 in the game for all units. Controller - Set Individual Unit Parameters permitted entries from 0.00 to 1.00, but all entries below 0.50 were converted to 0.50. The DRM showed a UT.PSYOP.RESULTS.MULTIPLIER range from 0.001 to 999999.99.

4.2.65 JTLS-0987 Set Periodic Report Times

The Controller has the ability to change both the frequency of Periodic Reports and the number of Periodic Reports between Summary Reports. However, there exists no ability to specify when the next Periodic Report should be, or which of the next reports should be a Summary Report. As an example, if the Controller wishes the blue side to receive Periodic Reports every 8 hours starting at 0600, and wants the Summary Report to be produced at 1400, then they must set the time between periodic reports to 6 hours, and reset it to 8 hours after the 0600 report. Additionally, the number of Periodic Reports between Summary Reports must be set to 2, and then reset to 3 after the 1400

reports. An easier method should exist to accomplish such a task.

4.2.66 JTLS-0988 Can't Repair Naval Catapults

Naval Units cannot repair their catapults because they do not know they have a repair capability.

4.2.67 JTLS-0989 Controller Damaged Aircraft Not In Periodic Reports

When a Controller kills an Aircraft, the model does not tally, therefore the current periodic report does not report the kill. The categories of kills do not logically cover the Controller killed aircraft. The Post Processor Reports do include the Controller killed aircraft. This improvement can be made in at least two ways. First the current Aircraft Kill Periodic and Summary Reports can be expanded to include a category for Controller killed aircraft. A second solution is to remove the Periodic and Summary Aircraft Kill Periodic and Summary reports, and get the data from the Post Processor.

4.2.68 JTLS-0993 Weapons Report on Mission Report

When a Player uses the Change Air Mission Parameter order to modify a mission's weapon load prior to takeoff and the order is implemented, the Mission Report does not always reflect the change. In at least one case, when the final Mission Report was received, the only weapon listed was the new weapon that was added. The report also incorrectly showed that zero of those weapons were returned when none were actually fired. The mission fired several weapons from the original load, but none of those weapons were listed in the final report, even though they were fired.

4.2.69 JTLS-0994 HRU Creation Target Requirements Assessed Incorrectly

If an HRU that is to be created and extract targets from its parent unit cannot find a target that is 100% capable, it will refuse creation, even if the parent has a 12-element target that is 97% capable and the HRU needs only one element.

4.2.70 JTLS-0999 Cancel Naval Mission Fails When A Unit Is Specified

The Cancel Naval Mission order allows either a unit or a formation to be entered. However, if anything other than a formation is entered, the order is rejected on the grounds that the formation does not exist.

4.2.71 JTLS-1010 Controller Cannot MM NEUTRAL Unit Onto Formation

The Controller cannot Magic Move a unit onto a Formation unless both FS FS RELATIONSHIPs are Friendly. A player can pick up a unit via AMPHIBIOUS PICKUP as long as the relationships are no worse than Neutral. The Controller should have the same capability. However, all implications must

be considered before implementing this solution.

4.2.72 JTLS-1017 Airlift Mission Problem

An airlift mission was created to pick up a NEO icon. The mission did not have the lift capacity to lift the entire icon, so a second mission was created to pick up the same icon. The second mission went into unit delay when it arrived at the pickup location. The first mission picked up then dropped off the first load, then returned for the second load. The second mission should not have gone into unit delay status.

4.2.73 JTLS-1260 EMCON Order Problem Subordinates of Embarked Units

If the primary Unit specified on an EMCON order is embarked on a ship, the CEP rejects the order, even if the order is supposed to apply to subordinates as well. A possible solution is to take the UNIT CHECKS off the order itself, and put them in the code that turns the emitter on and off. The only time that the order should be denied is for a unit that has been wiped out, and it has no subordinates, and is not in anyone's UT SUBORD SET. If this is done a possible problem is having the IMT show the sensor/jammer turned on while the unit is still not arrived, or is embarked on a formation. There appears to be no problem inside the CEP, but the IMT bit is the reason that it has not been fixed. The players have a work-around—Magic Move the unit ashore, send the order, and then MM back onto the formation.

4.2.74 JTLS-1328 SAM/AAA Initial Issue

Currently, when a SAM/AAA target comes into the game, either at game start, TPFDD arrival after game start, or target create; the owning unit or associated unit sends the initial issue of ammo to the target site by an implicit resupply action. This implicit resupply convoy requires time to dispatch, time to travel, and time to receive. In Standard Database this means it is 2.5 to 3.5 hours after a SAM/AAA target arrives in the game before it has any ammo and is able to engage an air object; even if it's in the same hex as the owning unit. There is no reason for this restriction. A SAM/AAA target should be given its initial issue of ammo instantaneously upon arrival in the game. The owning or associated unit should still have its supply levels decremented based on the supplies that it passes to the SAM/AAA target.

4.2.75 JTLS-1341 Assign Multi Attack Order

An OAS mission was assigned a set of targets using Assign Multi Attack order. After the order was sent, that set of targets was deleted and a new set was assigned. The mission proceeded to the area where the old targets were located, then headed toward the new targets. and not drop on either set of targets. The mission should have headed toward new target area immediately after targets were

assigned.

4.2.76 JTLS-1351 Air Missions Refuel And Fly At Zero Altitude

When specifying ingress and egress routes for an air mission, it is possible to specify refuel points and transit points. A transit point requires an altitude. A refuel point does not have an associated altitude. However, both types of points are filed with the air mission with their associated altitudes, which is zero for the refuel point. After a mission reaches a refuel point, it will adopt the altitude of the point, zero feet, for its next leg.

When a refuel point is filed in the air mission's route set, the Player should assign it the same altitude as the previous Player-designated route point. This is only useful if such a point exists. This is a partial solution only, and this STR should not be considered closed.

4.2.77 JTLS-1364 ROE Setting Unstable

During exercise TF05, nine Navy P3C squadrons were set to an ROE of HOLD FIRE. The first nine missions returned and reported launching all of their Harpoon missiles. The Player observed that the ROE appeared to reset itself to FIRE. The opposite change occurred when the Player set the ROE to FIRE, and used the IMT to confirm the setting. Thus, several attacks were required to cause the aircraft to launch a Harpoon or torpedo.

4.2.78 JTLS-1368 Orbiting OAS Assign Target

During exercise TF05, an Orbiting OAS mission was assigned to strike a SAM target. The Side perception was bad, and the SAM target was not in the hex indicated by the Blue side perception. Receiving an Assign Target order, the mission went to the hex and searched for the target. It remained in the hex until almost out of fuel, then went to a tanker. After refueling, the mission returned to the hex to search for the target again. This continued until the mission off-station time. The mission should have determined that the target was not in the hex and returned to its home squadron.

4.2.79 JTLS-1375 Orbit Location In Ingress Route

If an air mission is tasked by the ATOT and flies toward an orbit point, the mission cannot be diverted to a new location until the aircraft reaches its ATOT-assigned orbit point. Assigning a new orbit location should be possible at any time and the mission should immediately comply.

4.2.80 JTLS-1376 Fuel Chits

During exercise TF05, fuel chit data fields for individual receiver or supplier air missions were not populated. The fuel conversion factor is incorrect, and should be 6.5 pounds per gallon.

4.2.81 JTLS-1377 Attack Posture Heading Home

In several instances during exercise TF05, an air mission displayed an Attack posture while the

aircraft headed home. The aircraft received an Assign Target order, and either did not find the target and held its munitions, or released them and headed back to the base. The attack mission could not be re-flight planned, and should have displayed a Heading Home posture.

4.2.82 JTLS-1378 Mission Refuel Chit Retrieval Button Does Not Work

Refuel chits do not appear when the Refuel Chit retrieval button on the IMT screen is used. However, they appear when the user requests a retrieval of all refuel chits.

4.2.83 JTLS-1379 Improve Mission Splitting Capability

When the ATO-T splits missions automatically, the program changes the missions' Mode 2 and Mode 3 squawk, call sign number, and mission number. It is preferable to concatenate an alphabetic identifier to the original mission number. Also, we must develop a method to inform TBMCS that only a portion of the mission has returned to the base.

4.2.84 JTLS-1380 Intercept Stopped for Refuel Chit Time

An intercepting mission will break off its intercept to refuel from a tanker on time according to its refuel plan.

4.2.85 JTLS-1381 Mission Stops Moving After Break-off Intercept

An air mission stops moving after receiving a Break-off Intercept order. When a mission in this mode receives a change Orbit Location order, the missions bar points in the wrong direction.

4.2.86 JTLS-1382 TBMCS ATO ID Problems

These problems arise from assigning an air mission a specific ATO ID. ATO time round-off results cause many missions designated to start immediately at the beginning of an ATO period to be assigned to the wrong ATO period. Additionally, the ATO periods were not continuous within the model. For example, when an ATO period was designated to end at 1.333 days, the following period was started at 1.334 days. Any missions designated a mission time of 1.3335 days were not included in an ATO period.

4.2.87 JTLS-1383 Alert Missions Display On COP

Alert missions displayed on the GIAC causes them to display on the COP, which is inappropriate. The missions were placed on the GIAC display to solve another problem, but the implemented solution caused these unacceptable consequences.

4.2.88 JTLS-1384 Area, Target, And Unit Report Documentation

Some users have indicated that the documentation of Area Report, Unit Report, and Target Report

similarities and differences are incomplete or inaccurate. A review of this documentation is needed.

4.2.89 JTLS-1387 TBMCS Not Updating ATO Change Missions

If a mission exists in an ATO Change, the TBMCS Adaptor does not update the proper TBMCS record.

4.2.90 JTLS-1390 Orbiting OAS

During a recent training class, an Orbiting OAS was sent to an orbit point. En route to the orbit point, the mission was assigned a target to strike. Instead of proceeding directly to the target, the mission went to the orbit first, then to the target. When an mission receives an Assign Target or Assign Multi-Target order, it should immediately head toward the target.

4.2.91 JTLS-2005-1455 Changing Support Unit Via Naval Move Incorrect

A naval unit was ordered to move, and then ordered to change it's support unit to another boat. The orders were accepted and the boat moved, but the designated support unit did not change. If the same move and change-support orders were used, then it worked properly when the boat was ordered to use a ground unit as its new support unit.

4.2.92 JTLS-2005-1456 Improper Formation Arrive Time Message

A naval formation was ordered to follow a route to a location, and to arrive at a future time. The following message was received in reply: "Formation NAV.FORM has been ordered to move. It will start this move at Time format {15.926929} is wrong it does not contain with 'T' separator in order to comply with the specified arrival time." The message should properly report the time that the formation will depart in order to arrive at the specified time. Some message output errors were corrected in the CEP, and the WHIP message now gives the proper time, but the title of the message states that the formation cannot comply.

4.2.93 JTLS-2005-1457 Target Auto Assign Errors In Orbiting OAS

An Orbiting OAS mission was created with Auto Assigned allowed and search target category as SSM. An SSM was magic moved to the area of the orbit. Perception of the SSM was given to the mission's side using the controller Target Report order. The mission saw the target and immediately attacked it. When the OAS mission returned, the Mission Report said it was assigned to attack target UI011816U but the target could not be found. It appears that mission was previously holding the target as unidentified and it was not found after it was assigned a specific target number.

4.2.94 JTLS-2005-1458 CAS Damage Errors From Orbiting OAS

In this example, Ayland and Ceeland units were in combat. Ceeland attacked an Ayland Engineer unit. An order was sent for an Orbiting OAS mission with CAS allowed. This mission was ordered to

support the engineer unit that was under attack. The mission immediately attacked, but it only damaged the Ayland unit and not the Ceeland unit. In the ACP prototype, the fratricide was set to 10 percent. The fratricide was changed to 1 percent and re-tested. In this instance, it produced the same results, but another iteration of this test resulted in damage to Ceeland, but not to Ayland.

4.2.95 JTLS-2005-1459 Delay Order Not Executed Properly

A unit was given a delay order time of several days in the future and 70% strength. The unit delayed at contact with an attacking unit. Unit was still at 96% strength.

4.2.96 JTLS-2005-1460 Ship Heading Inconsistency

The IMT reports an incorrect ship Heading. The SITREP heading always indicates a value of 000. The Map heading is never correct; it is usually 180 degrees off.

4.2.97 JTLS-2005-1463 Units in Combat While Embarked

A ground unit was embarked on a naval formation via the database build. The IMT and Command Hierarchy lists this unit as “in combat”. The naval formation was moved away from any enemy ground units, but the status still indicates “in combat”. There are two issues: units embarked on naval formations cannot be “in combat”, and the “in combat” status is never cleared when the unit is moved away from any enemy units. The “in combat” status can be forcibly changed by magic moving the unit into a legitimate “in combat” position, and then magic moving it back aboard the boat.

4.2.98 JTLS-2005-1464 Location Fields Allow Invalid Location Formats

When sending or checking an order, the location fields allow invalid location formats. The user will click Send or Check and nothing will happen. The Lat/Lon class throws an error when parsing. This can be fixed by not allowing invalid formats or marking the order field as having an error.

4.2.99 JTLS-2005-1466 Incoming Messages Not In Correct Order

Messages do not always appear on the message browser in the correct order. Example: a mission of two aircraft were engaged and killed by SAMs. The messages appears as follows: Aircraft from AREC-010007 Lost (ID: 359) Mission Report AREC-010007 - Completed (ID: 369) Mission Commander Trouble Report - Mission AREC-010007 (ID: 363) Aircraft from AREC-010007 Lost (ID: 359) Mission Commander Trouble Report - Mission AREC-010007 (ID: 363) The Mission Report should appear last in the sequence. In the same manner, a fire missile order responded with a “complied” message prior to the order acknowledgement. A secondary sort on the message identification number is required to resolve this issue.

4.2.100 JTLS-2005-1468 Perceived Aircraft Vectors Point In Wrong Direction

The speed leaders on perceived aircraft do not point in the direction they are heading. This is true for

all sides. The controller WHIP shows all sides correctly.

4.2.101 JTLS-2005-1469 Shooting Side Has No Perception Of Shot Missile

An SSM was fired by red at a blue boat, but it was never seen by the red (shooting) side. The blue side did have perception of it. All sides, based on sensor capability, should see SSMs.

4.2.102 JTLS-2005-1471 Utilities Should Alter Group When Row Is Edited

When a row is selected, it is made available for editing in the utility fields. While the data is populated, the group configuration is not changed to match the row. For example, a row in an air route may be a route or refuel point. The group configuration may be changed by hand, so this has been assigned a lower priority.

4.2.103 JTLS-2005-1475 Improper Depiction Of Unit Transported By Convoy

When a convoy reaches the location of a unit that it is going to ship to another location, the strength of the unit that is going to be lifted goes to zero. The SITREP window shows the lifted unit with a strength of 0%, a speed of 0 KPH and a destination of 00-00-00n 00-00-00e with a mission and posture of defend. The strength of a unit should not change, the destination of the unit should be the drop-off location of the convoy. It is suggested that an additional posture should be added to inform IC that the unit is being moved via air, rail, barge, or truck.

4.2.104 JTLS-2005-1476 Aircraft Orders Allowed After JCATS Has Control

Control of an orbiting RECCE mission was transferred to JCATS. It was accepted by and was under the control of JCATS. The quick change orbit order was used to give the same mission a different orbit point after JCATS assumed control of it. JTLS accepted the order and the MPP delivered a message stating that the mission would optimize a route to the new location. The mission flew to its original orbit point and ignored the orbit point change. Also, missions transferred to JCATS still appeared in various pull-down lists. Authority should be removed from the controlling JTLS station once transferred and the IC should receive the same response as he does when he tries to give an order to a unit or mission he does not have authority over. When transferred back to JTLS, the sending JTLS station should be the one who gains authority over it.

4.2.105 JTLS-2005-1478 Order Lines Change Position on Map

When a route is built, the order lines will change position after the Player has added a new point. When a new point is added, the route erases itself and redraws all the points to where they should be, and then moves all the points again. This occurred on a Windows box, and has not been reproduced

under Netbeans.

4.2.106 JTLS-2005-1598 Strip Alert Missions Unusable In Quick Manual Pair

Request GIAC display of air tracks on the ground. This would allow the quick Manual Pair order to be used for strip alert missions, and include all launchable alert aircraft. Currently, a mission has a flag called the Active flag. This flag is set by the combat model and indicates to the GIAC whether the mission should be displayed on graphics or not. This flag is also used to inform the COP interface programs whether the mission is flying and should be displayed on the COP or not. Alert missions should not be displayed on the COP. This means that the single Active flag cannot be used. The Active flag should tell the COP whether the mission is flying or not. In addition, the user interface should be allowed to indicate whether Active missions and/or Alert missions should be displayed. This should be independent of the COP feed.

4.2.107 JTLS-2007-2053 Red Hat Linux 3.0 Does Not Execute JTLS Components

Some JTLS 3.2.1.0 model components do not execute under Red Hat Linux Enterprise Edition Version 3.0 (ES). Therefore, model support for Red Hat Linux 3.0 has been discontinued. However, this operating system may be used on client workstations to execute the WHIP.

APPENDIX A. ABBREVIATIONS AND ACRONYMS

AAA	Anti-Aircraft Artillery
AADC	Area Air Defense Commander
AAL	Air-to-Air Lethality
A/C	Aircraft
ACP	Air Control Prototype
ADA	Air Defense Artillery
AEW	Airborne Early Warning
AFB	Air Force Base
AG	Air Ground (Air-to-Ground)
AI	Air Interdiction
AIM	Air Intercept Missile
AIREF	Air Refueling
AKL	Area Kill Lethality
AMMO	Ammunition
AO	Area of Operations
AOC	Air Operations Center
Apache	Open-source Web server used by Web Enabled JTLS.
APC	Armored Personnel Carrier
ARECCE	Armed Reconnaissance
ARTE	Air Route
ARTY	Artillery
ASCII	American Standard Code for Information Interchange
ASW	Anti-Submarine Warfare
ATC	Aircraft Target Category
ATGM	Antitank Guided Missile
ATK	Attack
ATO	Air Tasking Order
ATOG	Air Tasking Order Generator

ATORET	Air Tasking Order Retrieve Program
ATOT	Air Tasking Order Translator
Attribute	Data item belonging to an entity, such as name, size, or number of subentities.
AWACS	Airborne Warning and Control System
AZ	Altitude Zone
BADGE	Bilateral Air Defense Ground Environment (Used by JDA)
BAI	Battlefield Air Interdiction
BDA	Battle Damage Assessment
BDE	Brigade
BN	Battalion
C3	Command, Control, & Communications
C3I	Command, Control, Communications, & Intelligence
C4I	Command, Control, Communications, Computers, & Intelligence
CA	Civil Affairs
CADRG	Compressed ARC Digitized Raster Graphics
CAP	Combat Air Patrol
CAS	Close Air Support
CAT	Category
CCF	Central Control Facility
CCP	Command Control Prototype
CCU	Controller Change Unit
CEP	Combat Events Program. The combat model in JTLS that simulates execution of ground, naval, air, logistics, and intelligence activities.
Checkpoint	A temporary halt in the game initiated either manually by the Controller or automatically by the CEP.
CMDR	Commander
COP	Common Operational Picture
CP	Combat Power
CS	Combat System
CSP	Combat System Prototype
CTAPS	Contingency Tactical Air Planning System

CTG	Commander Task Group
CTRL	Control. A keystroke as in “CTRL-C”.
DCA	Defense Counter Air
DCL	Digital Command Language. The standard operating system user interface for DEC computer systems.
DDS	Database Development System
DEC	Digital Equipment Corporation. The manufacturer of VAX/VMS computers.
DEMSDB	Demonstration Standard Database. A 5-sided database delivered with the current JTLS release.
DISA	Defense Information Systems Agency
DIV	Division
DMA	Defense Mapping Agency
DoD	Department of Defense
DOS	Days of Supply
DPICM	Dual Purpose Improved Conventional Munitions
DS	Direct Support
DSA	Directed Search Area
DTG	Date Time Group
EC	Electronic Combat
ECM	Electronic Counter Measures
ECP	Engineering Change Proposal
ELINT	Electronic Intelligence
ELS	Entity Level Server
EODA	Entity Level JTLS Object Data Authority server. Distributes data to ELS clients.
ETA	Estimated Time of Arrival
FARP	Forward Arming and Refueling Point
FLP	Fire Lethality Prototype
FOL	Forward Operating Location
FWL	Initials of Frederick W. Lanchester, generally credited with origination of the differential equation model of attrition, hence Lanchestrian attrition.
GAL	Gallon

GCCS	Global Command and Control System
GDP	Graphical Database Program
GRTE	Ground Route
GS	General Support
GSR	General Support Reinforcing
GUI	Graphical User Interface
HARM	High-speed Anti-Radiation Missile
HE	High Explosive
Hectare	10,000 square meters
HELO	Helicopter
Hex	Hexagon
HMMWV	High Mobility Multipurpose Wheeled Vehicle
HQ	Headquarters
HRU	High Resolution Unit
HTML	Hypertext Markup Language
HTT	HUP Target Type
HUP	High Resolution Unit Prototype
ICM	Improved Conventional Munitions
ICP	Interface Configuration Program. An interactive program that allows the user to define the specifications for each game process that can be started for a particular scenario.
ICPLogin	Interface Login Program
ID	Identifier
IFF	Identification Friend or Foe
IIP	Intel/Information Prototype
IMT	Information Management Tool. The JTLS program that provides real-time tabular scenario information.
INFO	Information
Initialization	Phase of game during which data sets are read and the game is configured for Players.
INTEL	Intelligence
JDA	Japan Defense Agency
JEDI	JODA Entity Data Identifier

JDS	JTLS Data System
JDSP	JTLS Data System Protocol
JRSG	Joint Rapid Scenario Generation (formerly JIDPS: Joint Integrated Database Preparation System)
JMCIS	Joint Maritime Combat Information System
JMEM	Joint Munitions Effectiveness Manuals
JODA	JTLS Object Distribution Authority server. Distributes data to JTLS Data System clients.
JOI	JTLS Operational Interface. Provides JTLS communication capability with C4I systems.
JPL	Jet Propulsion Laboratory
JSDF	Japanese Self-Defense Force
JTLS	Joint Theater Level Simulation
JWFC	Joint Warfighting Center
JXSR	JTLS XML Serial Repository. A Web service which obtains data from a JODA and provides it as XML to the Web Hosted Interface Program through the Apache Web Server.
KIA	Killed in Action (aka “Remains”)
KM	Kilometer
KNOTS	Nautical miles per hour
LA	Lethal Area
LAN	Local Area Network
LAT	Latitude
LB	Login Build. A JTLS order type.
LDT	Lanchester Coefficient Development Tool. This program assists in the development of Lanchester coefficients, which are used to assess the results of force-on-force land combat in JTLS.
LOG	Logistics
LOGIN	Logistics Input. Arrival of supplies in the theater.
LOGREP	Logistics Report
LONG	Longitude
LOTS	Logistics Over The Shore

LR	Long Range
M&S	Modeling and Simulation
MAPP	Modern Aids to Planning Program
MB	Megabyte
MCP	Mobility Counter; Mobility Prototype
MCR	Model Change Request. A form submitted by users and developers to report problems or desired enhancements to the JTLS model.
MG	Machine Gun
MHE	Materiel Handling Equipment
MIP	Model Interface Program. A generic term for MPP, IMT, etc.
MOGAS	Motor gasoline
MOPP	Mission-Oriented Protective Posture
MOSAIC	NCSA user interface software
MOTIF	An X-Window System graphical interface
MP	Maneuver Prototype
MPP	Message Processor Program. This message processing and display utility has been replaced by the XML Message Service and the WHIP Message Browser.
MSC	Major Subordinate Command
MSG	Message
MTF	Message Text Formats
MUREP	Munitions Report
NCSA	National Center for Supercomputing Applications (University of Illinois)
NEO	Noncombatant Evacuation Operations
NFS	Network File Server
NM	Nautical Mile
NTSC	Naval Telecommunications System Center
OAS	Offensive Air Support
OBS	Order of Battle Service (formerly UGU: Unit Generation Utility)
OCA	Offensive Counter-Air
OJCS	Organization of the Joint Chiefs of Staff

OMA	Order Management Authority. Provides an order verification and forwarding service to the WHIP.
ONC	Operational Navigation Chart
OPM	Online Players Manual
OPP	Order Preprocessing Program
Oracle	A relational database management system and name of the company.
OTH	Over the Horizon
OTH Gold	OTH Message Specification
OTH-T	Over the Horizon-Targeting
pD	Probability of Detection
pE	Probability of Engage
pH	Probability of Hit
pK	Probability of Kill
PKL	Point Kill Lethality
POL	Petroleum, Oil, and Lubricants
POSIX	International operating system standard based on System V and BSD.
PP	Postprocessor Program (a JTLS component)
PSYOPS	Psychological Operations
QRA	Quick Reaction Alert
QRA.DCA	Quick Reaction Alert, Defensive Counter Air
QRA.OAS	Quick Reaction Alert, Offensive Air Support
RAM	Random Access Memory
RDMS	Relational Database Management System
RECCE	Reconnaissance. Usually refers to Air Missions.
RECON	Reconnaissance. Usually refers to Ground Missions.
REGT	Regiment
RNS	Random Number Seed
ROE	Rules of Engagement
RPT	Report
RSP	Reformat Spreadsheet Program

SAL	Surface-to-Air Lethality
SAM	Surface-to-Air Missile
SAM/AAA	Surface-to-Air Missile/Anti-Air Artillery
SC	Supply Category
SCP	Simulation Control Plan
SDB	Standard Database
SEAD	Suppression of Enemy Air Defense
SIMSCRIPT	Computer programming language (product of CACI, Inc.). A multiple-pass compiler.
SIP	Scenario Initialization Program
SITREP	Situation Report
SLP	Sustainment Log Prototype
SOF	Special Operations Forces
Solaris	Sun Microsystems' proprietary operating system.
SP	Survivability Prototype
SQL	Structured Query Language
SR	Short Range
SRP	Start/Restart Program (a JTLS component)
SRTE	Sea Route
SSM	Surface-to-Surface Missile
STR	Software Trouble Report
SUN	Sun Microsystems, Inc.
SUP	Ship Unit Prototype
SVP	Scenario Verification Program. Verifies consistency of data entered for a given scenario.
SYNAPSE	Synchronized Authentication and Preferences Service. Provides a user data sharing service in a central location and allows a WHIP configuration to be independent of the local machine.
TADIL	Tactical Digital Interface Link
TCP/IP	Transmission Control Protocol/Internet Protocol. A set of computer networking standards that specify the protocol for two or more computers to communicate with each other. TCP/IP was developed by the Department of Defense to support its Defense Data Network.

TEL	Transporter Erector Launcher
TG	Prefix for Target entity attributes.
TGT	Target
TMU	Terrain Modification Utility. A utility program used to modify JTLS hex-based terrain files.
TOE	Table of Organization and Equipment
TOT	Time on Target
TOW	Tube-launched Optically-tracked Wire-guided missile
TPFDD	Time-Phased Force Deployment Data
TGS	Terrain Generation Service (formerly TPS:Terrain Preparation System)
TTG	Target Type Group
TTL	Target Types List
TUP	Tactical Unit Prototype
TW	Targetable Weapon
UBL	Unit Basic Load
UIM/X	GUI Builder Tool
UNIX	A computer operating system.
UNK	Unknown
UOM	Unit of Measure
USA	United States Army
USAF	United States Air Force
USCG	United States Coast Guard
USMC	United States Marine Corps
USMTF	U.S. Message Text Format
USN	United States Navy
UT	Prefix for Unit Attributes
UTM	Universal Transverse Mercator
VAX	A family of minicomputers developed by Digital Equipment Corporation.
VIFRED	Visual Forms Editor
VMS	Virtual Memory System

VTOL	Vertical Takeoff and Landing aircraft
WAN	Wide Area Network
WDRAW	Withdraw
WEJ	Web Enabled JTLS. Composed of several Web services which interface with the WHIP through an HTTP Web server.
WHIP	Web Hosted Interface Program. An integrated Web interface to JTLS.
WIA	Wounded in Action
WPC	Warrior Preparation Center
WPN	Weapon
WT	Weight
WW	Wild Weasel
XMS	XML Message Service. Provides a JTLS message indexing service.

APPENDIX B. COMBAT SYSTEM CATEGORY DEFINITIONS

This Appendix provides definitions of the 99 Combat System categories used in the Standard Database. Note that the C3I combat system has been removed due to the changes in Version 3.2.

INFANTRY

(INFANTRY)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Armed with pistols, rifles, submachine guns, 5.56mm squad automatic weapons, rifle grenade launchers, single round grenade launchers, LAWs, hand grenades, bayonets, hasty mines. Effective ranges 400m to 800m. These are soldiers primarily trained to fight dismounted or with a significant secondary mission of fighting as infantry. Includes dismount teams in mechanized infantry units. A significant portion (70%) of combat engineer units and a smaller portion (50%) of military police units should probably be counted as infantry. Artillery units might have a lesser portion (25%) counted as infantry. This is a personnel combat system.

ELITE INFANTRY

(ELITE-INF)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Armed with pistols, rifles, submachine guns, 5.56mm squad automatic weapons, rifle grenade launchers, LAWs, single round grenade launchers, hand grenades, bayonets, and hasty mines. Have more automatic weapons, grenade launchers and LAWs than INFANTRY. Effective ranges out to 400m to 800m. ELITE-INFANTRY are about 150 to 200% as effective in Lanchester combat as INFANTRY. These are well trained, highly motivated soldiers primarily trained to fight dismounted. These soldiers are primarily found in specialized units: SF, Ranger, Airborne, Commando, etc. This is a personnel combat system.

INFANTRY/ENGINEER SPECIAL WEAPONS

(INFENG-SPWPN)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Armed with a personal weapon such as pistols, rifles, submachine guns, hand grenades, and bayonets; but their primary lethality comes from the special weapon they operate. These weapons are primarily anti-fortification weapons although they may be used in the anti-armor role. These include SMAW, Wasp, Bunkerfaust, T67 and other flamethrowers, various short range recoilless rifles, 90mm M67 or TYPE 51; 82mm B10, M60A or M79; 89mm M69; 120mm M43; 107mm B11; 128mm M71, and satchel charges. Effective ranges out to 500m. These are soldiers primarily trained to fight using a special weapon. A portion (20%) of combat engineer units should probably be

counted as INFENG-SPWPN. HUPs which had explosives combat systems should replace an explosives combat system and a personnel combat system for one INFENG-SPWPN combat system. This is a personnel combat system.

OTHER TROOPS

(OTHER-TROOPS)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Armed with weapons similar to infantry, but not armed as extensively. OTHER-TROOPS are about 25 to 33% as effective in Lanchester combat as INFANTRY. These are soldiers whose primary role is other than fighting dismounted. Includes headquarters and support troops in infantry units. Generally all troops in units other than infantry, engineer or military police; however you may give any unit some percent of its troops as INFANTRY, based on your evaluation of the unit's ability (training) to engage in ground combat. This is a personnel combat system.

SNIPER

(SNIPER)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Armed with sniper rifles of various caliber, up to 12.7mm. Effective ranges out to 1500m. More effective in Lanchester combat than INFANTRY against most soft and lightly armored combat systems. More survivable than INFANTRY. These are soldiers specifically trained and armed as snipers. This is a personnel combat system.

CREW

(CREW)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms when not manning another combat system. Armed with weapons similar to infantry, but not armed as extensively. These are soldiers whose primary role is operating another combat system: vehicle drivers, gunners, loaders and commanders; gun crews and operators of any other crewed combat system. It is the specified Crew combat system. This means you must have enough combat system CREW to man all the combat systems that require crews. The Combat System Prototype (CSP) data identifies which combat systems require crews and how many of the Crew combat system are required.

CREW-SERVED WEAPONS

(CREW-WEAPON)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Machineguns of caliber 7.62mm or larger and automatic grenade launchers. Effective ranges 600m to 1500m. Examples: 7.62mm M60/E3/E4, M240B/G, FN MAG, RPD, PK/PKS/PKM,

RPK, RP46, Pecheneg, SG43/SGM/Type 57, Type 67/672C/74/80/81, WQ112, AAT F1, HK21/11, MG42/59, MG1/2/3, MG4, MGM1, M52, Model 62, Model 68, L4A4/L7A2, SS77, T74 and M53/M72/M77/M84; 12.7mm DShK-38/Type 54/59, NSV/NSW, Type 77/85, QJZ89, M2HB, 50MG, GAU19A; 14.5mm Type 75-1, KPV, Pirat; 30mm AGS17, AGS30; 35mm W87, QLZ87; 40mm MK19, GMG, and Striker. This is not a crewed combat system. Do not include weapons that are mounted on combat vehicles modeled separately as combat systems (i.e. coaxial or turret mounted machineguns).

MEDIUM ANTI-TANK WEAPON - LONG RANGE

(AT-MAW-LR)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Antitank rocket/missile launcher with max effective anti-tank ranges greater than 800m but less than 1500m. Armor penetration generally greater than 400mm but less than 800mm. These systems are used primarily in the anti-tank role. Examples: Dragon, Dragon 2, AT-7 (Saxhorn), AT-13, Shipon 2, Folgore 80mm, and Type 87 Chu-MAT. This is a crewed combat system. May be fired from vehicles, but usually employed from a ground mount.

MEDIUM ANTI-TANK WEAPON - SHORT RANGE - MEDIUM LETHALITY

(AT-MAW-SR-ML)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Antitank rocket/missile launcher with max effective anti-tank ranges greater than 500m but less than 800m. Armor penetration greater than 400mm but less than 800mm. These systems are used primarily in the anti-tank role. Examples: Dragon 2T, LAW 80, M2/M3 Carl Gustav, and RPG29. This is not a crewed combat system. May be fired from vehicles, but usually employed from a ground mount or shoulder launched.

MEDIUM ANTI-TANK WEAPON - SHORT RANGE - HIGH LETHALITY

(AT-MAW-SR-HL)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Antitank rocket/missile launcher with max effective anti-tank ranges greater than 500m but less than 800m. Armor penetration greater than or equal to 800mm. These systems are used primarily in the anti-tank role. Examples: Eryx, Alcotan 100, Bumble Bee and Shipon 1. This is not a crewed combat system. May be fired from vehicles, but usually employed from a ground mount or shoulder launched.

MEDIUM ANTI-TANK WEAPON - SHORT RANGE - TOP ATTACK

(AT-MAW-SR-TA)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Antitank rocket/missile launcher with max effective anti-tank ranges greater than 500m but less than 800m. Top attack capability allows it to defeat most armor. These systems are used primarily in the anti-tank role. Examples: Predator (SRAW) and MBT LAW. This is not a crewed combat system. May be fired from vehicles, but usually employed from a ground mount or shoulder launched.

HEAVY ANTI-TANK WEAPON - SHORT RANGE - MEDIUM LETHALITY

(AT-HAW-SR-ML)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Antitank gun or rocket/missile launcher with max effective anti-tank range of 2000m to 3000m. Armor penetration greater than 400mm but less than 700mm. Examples: Milan, SuperDragon, RAAD, AT-3(Sagger) (Malyutka) (Malyutka-M), AT-4(Spigot) (Fagot) and MAF. This is a crewed combat system. Crew should be modeled as combat system CREW. Do not include weapons that are mounted on combat vehicles modeled separately as combat systems (i.e. M2 Bradley, BRDM-2 Sagger). Do include non-armored vehicle mounted weapons (i.e. unarmored HMMWV/jeep mounted tow). The vehicle of the non-armored vehicle mounted weapons should be modeled separately as a combat system: UTIL-VEH-NA or EQUIP-OTH-SP as appropriate.

HEAVY ANTI-TANK WEAPON - SHORT RANGE - HIGH LETHALITY

(AT-HAW-SR-HL)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Antitank gun or rocket/missile launcher with max effective anti-tank range of 2000m to 3000m. Armor penetration greater than or equal to 700mm. Examples: Milan 2, Milan 2T/3, Flame, AT-3(Sagger) (Malyutka2) (Malyutka2M), Red Arrow 8A/C, Baktar Shikan and Gill. This is a crewed combat system. Crew should be modeled as combat system CREW. Do not include weapons that are mounted on combat vehicles modeled separately as combat systems (i.e. M2 Bradley, BRDM-2 Sagger). Do include non-armored vehicle mounted weapons (i.e. unarmored HMMWV/jeep mounted tow). The vehicle of the non-armored vehicle mounted weapons should be modeled separately as a combat system: UTIL-VEH-NA or EQUIP-OTH-SP as appropriate.

HEAVY ANTI-TANK WEAPON - SHORT RANGE - TOP ATTACK

(AT-HAW-SR-TA)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Antitank gun or rocket/missile launcher with max effective anti-tank range of 2000m to 3000m. Top attack capability allows it to defeat most armor. Examples: Javelin, TRIGAN, RBS 56 BILL 1/BILL 2 and MACAM. This is a crewed combat system. Crew should be modeled as combat system CREW. Do not include weapons that are mounted on combat vehicles modeled separately as combat systems (i.e. M2 Bradley, BRDM-2 Sagger). Do include non-armored vehicle mounted

weapons (i.e. unarmored HMMWV/jeep mounted tow). The vehicle of the non-armored vehicle mounted weapons should be modeled separately as a combat system: UTIL-VEH-NA or EQUIP-OTH-SP as appropriate.

HEAVY ANTI-TANK WEAPON - LONG RANGE - HIGH LETHALITY

(AT-HAW-LR-HL)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Antitank gun or rocket/missile launcher with max effective anti-tank range of 3500m or greater. Armor penetration greater than or equal to 600mm. Examples: TOW, ITOW, TOW2A, AT-5(Spandrel) (Konkurs) (Konkurs-M), Red Arrow 8E, Toophan 1 and 2, Spike-MR, MAPATS and Type 79 Jyu-MAT (KAM-9). This is a crewed combat system. Crew should be modeled as combat system CREW. Do not include weapons that are mounted on combat vehicles modeled separately as combat systems (i.e. M2 Bradley, BRDM-2 Sagger). Do include non-armored vehicle mounted weapons (i.e. unarmored HMMWV/jeep mounted tow). The vehicle of the non-armored vehicle mounted weapons should be modeled separately as a combat system: UTIL-VEH-NA or EQUIP-OTH-SP as appropriate.

HEAVY ANTI-TANK WEAPON - LONG RANGE - TOP ATTACK

(AT-HAW-LR-TA)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Antitank gun or rocket/missile launcher with max effective anti-tank range of 3500m or greater. Top attack capability allows it to defeat most armor. Although not a top attack weapon, the AT-14 is best modeled as this combat system because of its extremely high penetration ability. Examples: TOW2B and AT-14. This is a crewed combat system. Crew should be modeled as combat system CREW. Do not include weapons that are mounted on combat vehicles modeled separately as combat systems (i.e. M2 Bradley, BRDM-2 Sagger). Do include non-armored vehicle mounted weapons (i.e. unarmored HMMWV/jeep mounted tow). The vehicle of the non-armored vehicle mounted weapons should be modeled separately as a combat system: UTIL-VEH-NA or EQUIP-OTH-SP as appropriate.

ANTI-TANK GUN 73 TO 106MM - NOT MISSILE CAPABLE

(ATG73-106NMC)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Multi-purpose weapon used primarily in anti-tank role, but also in anti-bunker or anti-personnel role. Max effective anti-tank range greater than or equal to 700m. Examples: 73mm SPG-9, 100mm T12/MT12/Type 73 (CHI)/M87 (YUG), 90mm PV-1110 and 106mm M40/T126/T173. This is a crewed combat system. Crew should be modeled as combat system CREW. May be ground or

non-armored vehicle mounted. Armored vehicle mounted recoilless rifles are better modeled as an armored gun system or a tank. If non-armored vehicle mounted, the vehicle should be modeled separately as a combat system: UTIL-VEH-NA or EQUIP-OTH-SP as appropriate.

ANTI-TANK GUN 100 TO 125MM - MISSILE CAPABLE

(ATG100-125MC)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Used primarily in the anti-tank role. Capable of firing an anti-tank guided missile from the gun tube. Max effective anti-tank range greater than or equal to 4000m. Examples: 100mm T12/MT12 and 125mm 2A45M (Sprut-B). This is a crewed combat system. Crew should be modeled as combat system CREW. This is a ground mounted weapon; vehicle mounted variants are modeled as either tanks or armored gun systems.

MORTAR DISMOUNTED 50MM TO 60MM

(MTRDISM50-60)

Cause attrition via indirect fire Lanchester equations and point lethality high resolution combat algorithms. The standard database discourages explicit fire of light mortars, although the data is there to support the area lethality explicit fire algorithms. Includes 60mm and smaller mortars. Examples: 50mm M-8; 51mm L10A1, TN8111, E1; 52mm IMI 52 Cdo; 60mm commando: C6, M60D, Antos, Elis, Vammas, MO60C, FMK-1/2, HM12/13, C03, Model 87, M4/M4MK1, LM60K, M4L3, XT81, M70; 60mm standard: M2 (USA), M19, M1 (SAF), M6 (SAF), KM181, LM-60D, Soltam C576/C08/C06, M-57, M-90, M-94, HM14, Al-Jaleel, FMK-3, M6-111/M6-211 (AUS), Model L/LL-M86, Model 87, M224, M84, M/965, Vammas, TDA Proximity, NR 493, M60, MO 60L/LP, T75, Type M-83A, Type 63-1, Type WX90 and Type WW90L/M. This is not a crewed combat system. This is a ground mounted weapon. Ground mount systems may be transported in vehicles. If transported by vehicle the vehicle should be modeled as a separate combat system as appropriate: UTIL-VEH-LA, UTIL-VEH-NA or EQUIP-OTH-SP.

MORTAR DISMOUNTED 81MM TO 82MM

(MTRDISM81-82)

Cause attrition via indirect fire Lanchester equations and point lethality high resolution combat algorithms. The standard database discourages explicit fire of light mortars, although the data is there to support the area lethality explicit fire algorithms. Includes 81mm mortars and 82mm mortars. Examples: 81mm M29A1, M252, M29 (SWE), NR475A1, M8-111/211/522, 1MT81, E1/E1Imp, KM187, M81, Model 1972, Vammas STD/LR, FMK-2, AWPC, Type W87, Type W91, HP SB/LB Model LN/LL, Model LN-M86/LL-M86, M-68, M3 (SAF), MO81LC/LL/LP/LLR, E44, HM15, L16A2, MO81-61L, Soltam B433/B449/B455/B502, Otobreda 81, M1, T75, UT-1/NT-1, ZTS; 82mm M-36, M-37, M-41, 2B9, 2B14, M-69A/B (YUG), 1MT82, Model M69 (EGY), Model 77, Model 94, Al-Jaleel, M93, M96 LM/LRLM (CRO), Type 67, Type W84 and Type W99. This is a crewed combat

system. Crew should be modeled as combat system CREW. This is a ground mounted weapon. If transported by vehicle the vehicle should be modeled as a separate combat system as appropriate: UTIL-VEH-LA, UTIL-VEH-NA or EQUIP-OTH-SP.

MORTAR SELF PROPELLED LIGHT - LIGHT ARMOR - OPEN WEAPON

(MTRSPLT-LAO)

Cause attrition via indirect fire Lanchester equations and point lethality high resolution combat algorithms. The standard database discourages explicit fire of light mortars, although the data is there to support the area lethality explicit fire algorithms. Includes 81mm and 82mm mortars, generally mounted in lightly armored vehicles. Protected from small arms fire and shell splinters. May be dismounted, but generally fired from the vehicle mounting. The weapon is usually protected during movement but exposed while firing. Many vehicle types have been used to mount various mortars. Examples: 81mm M125 and LAV-M. This is a crewed combat system. Crew should be modeled as combat system CREW. Vehicle mounted machineguns should not be modeled separately; they are included in the lethality values of the MTRSPLT-LAO.

MORTAR DISMOUNTED HEAVY

(MTRDISMHVY)

Cause attrition via indirect fire Lanchester equations, point lethality high resolution combat algorithms, and area lethality explicit fire algorithms. Includes mortars larger than 82mm. Examples: 98mm M98, Model 1997; 100mm Type 71; 107mm M30, M38, M107; 120mm M-43, 2B11, Nona SVK-M, Type W86, XT86, Model L, Model M86SB/LB, M12-1111/2222/3222, M41D, Model 82, Model 87, M120, MO120AM50, UBM52, M74, M75, FMK-2, Al-Jaleel, Vammas STD/LR, Soltam K5/K6/A7A2/M-65/M66, Model UK2, HM16, E56, AWPC M132, MO 120 LT/RT, E1/E1Imp, HY12, Type 55; 160mm M1943, M160, M58, M66; and 240mm M240. This is a crewed combat system. Crew should be modeled as combat system CREW. This is a ground mounted weapon. Almost always transported or towed by vehicle. Prime movers should be modeled separately as a combat system: UTIL-VEH-LA, UTIL-VEH-NA or EQUIP-OTH-SP as appropriate.

MORTAR SELF PROPELLED HEAVY - LIGHT ARMOR - OPEN WEAPON

(MTRSPHVY-LAO)

Cause attrition via indirect fire Lanchester equations, point lethality high resolution combat algorithms, and area lethality explicit fire algorithms. Includes mortars larger than 82mm, generally mounted in lightly armored vehicles. Protected from small arms fire and shell splinters. May be dismounted, but generally fired from the vehicle mounting. The weapon is usually protected during movement but exposed while firing. Many vehicle types have been used to mount various mortars. Turreted 120mm mortars are modeled as combat system MTRSP120-LAT. Examples: 107mm M106;

120mm M12-2330, M121 (USA); and 240mm 2S4. This is a crewed combat system. Crew should be modeled as combat system CREW. Vehicle mounted machineguns should not be modeled separately; they are included in the lethality values of the MTRSPHVY-LAO.

MORTAR SELF PROPELLED 120MM - LIGHT ARMOR - TURRETED WEAPON

(MTRSP120-LAT)

Cause attrition via indirect fire Lanchester equations, point lethality high resolution combat algorithms, and area lethality explicit fire algorithms. Includes turreted 120mm mortars, generally mounted in lightly armored vehicles. Protected from small arms fire and shell splinters. Examples: 120mm 2S9, 2S23, 2S31, AMS, AMOS, WIESEL2, PRAM-S and WZ551. This is a crewed combat system. Crew should be modeled as combat system CREW. Vehicle mounted machineguns should not be modeled separately; they are included in the lethality values of the MTRSP120-LAT.

ARTILLERY TOWED - VERY LIGHT

(ARTYTOW-VLT)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Towed howitzers/guns of caliber up to and including 95mm. These guns are primarily used in the anti-tank role. Max effective anti-tank range greater than or equal to 1000m. Examples: 75mm M116; 76mm M1966 (RUS), M48 (YUG), M1943/ZIS-3/Type 54; 76.2mm Model 1984 (ROM); 85mm D44/M52 (CZ)/Type 56 (CHI) and D48. This is a crewed combat system. Crew should be modeled as combat system CREW. Prime movers should be modeled separately as a combat system: UTIL-VEH-LA, UTIL-VEH-NA or EQUIP-OTH-SP as appropriate.

ARTILLERY TOWED - LIGHT

(ARTYTOW-LT)

Cause attrition via indirect fire Lanchester equations and area lethality explicit fire algorithms. Do not cause attrition via high resolution combat. Towed howitzers/guns of caliber greater than 95mm but less than 125mm. Examples: 98mm Model 93; 100mm M1944, M53 (CZ), M1977 (ROM); 105mm Light Gun, LFG, KH178, M56, M101, M102, M119, M425; 120mm 2B16 (RUS); 122mm D-30, D-74, M1938/M-30 and Type 54-1 (CHI). This is a crewed combat system. Crew should be modeled as combat system CREW. Prime movers should be modeled separately as a combat system: UTIL-VEH-LA, UTIL-VEH-NA or EQUIP-OTH-SP as appropriate.

ARTILLERY SELF-PROPELLED - LIGHT - TURRETED WEAPON

(ARTYSP-LT-T)

Cause attrition via indirect fire Lanchester equations, point lethality high resolution combat algorithms and area lethality explicit fire algorithms. Self propelled howitzers/guns of caliber less than or equal to 125mm with the gun in an enclosed turret. 120mm combined howitzer/mortars are

modeled as combat system MTRSP120-LAT. Protected from small arms fire and shell splinters. Examples: 105mm M7, M52, M108, FV433, AMX MK51,Type 74;122mm 2S1, Model 89, SP122, Thunder-1, Type 89 and 122-T55. This is a crewed combat system. Crew should be modeled as combat system CREW. Vehicle mounted machineguns should not be modeled separately; they are included in the lethality values of the ARTYSP-LT-T

ARTILLERY SELF-PROPELLED - LIGHT - OPEN WEAPON

(ARTYSP-LT-O)

Cause attrition via indirect fire Lanchester equations, point lethality high resolution combat algorithms and area lethality explicit fire algorithms. Self propelled howitzers/guns of caliber less than or equal to 125mm with the gun in an open turret or un-turreted. Protected from small arms fire and shell splinters when not in action. Examples: 75mm DN5 Bufalo (MEX); 100mm M1944-T34; 122mm D30-T34, D30-T55, Type 54-1, Type 70-1, Type 85, M1981, M1985, M1991 and M1997. This is a crewed combat system. Crew should be modeled as combat system CREW. Vehicle mounted machineguns should not be modeled separately; they are included in the lethality values of the ARTYSP-LT-O.

ARTILLERY TOWED - MEDIUM LIGHT

(ARTYTOW-MLT)

Cause attrition via indirect fire Lanchester equations and area lethality explicit fire algorithms. Do not cause attrition via high resolution combat. Towed howitzers/guns of caliber greater than 125mm but less than 145mm. Examples: 130mm M46, M59-1M (EGY), M1982 (ROM) and Type 59-1 (CHI). This is a crewed combat system. Crew should be modeled as combat system CREW. Prime movers should be modeled separately as a combat system: UTIL-VEH-LA, UTIL-VEH-NA or EQUIP-OTH-SP as appropriate.

ARTILLERY SELF-PROPELLED - MEDIUM LIGHT

(ARTYSP-MLT)

Cause attrition via indirect fire Lanchester equations, point lethality high resolution combat algorithms, and area lethality explicit fire algorithms. All self propelled howitzers/guns of caliber greater than 125mm but less than 145mm regardless of turret. Protected from small arms fire and shell splinters. Examples: 130mm Catapult, Type 83 (CHI), M1975, M1991 and M1992. This is a crewed combat system. Crew should be modeled as combat system CREW. Vehicle mounted machineguns should not be modeled separately; they are included in the lethality values of the ARTYSP-MLT.

ARTILLERY TOWED- MEDIUM HEAVY

(ARTYTOW-MHV)

Cause attrition via indirect fire Lanchester equations and area lethality explicit fire algorithms. Do not cause attrition via high resolution combat. Towed howitzers/guns of caliber greater than 145mm but less than 170mm. Examples: 152mm D1/Type 54, D20/Type 66, 2A65(M1987), 2A36(M1976), 2A61, M1937/M1938, Model 1985 (ROM), M1981 (ROM), Type 83/Type 86 (CHI), M84; 155mm M114/T65, Model 50, M59, M65, M198, FH-70, FH-77A/B, FH-88, FH-2000, GM45, GC45, GHN45, EH52, HM41, KH179, WAC21(WA021), G5, M777, M83, TIG 2000, M68/M71, M46S, M46/84 (YUG), TR-F1, Model 845 and M139. This is a crewed combat system. Crew should be modeled as combat system CREW. Prime movers should be modeled separately as a combat system: UTIL-VEH-LA, UTIL-VEH-NA or EQUIP-OTH-SP as appropriate.

ARTILLERY SELF-PROPELLED - MEDIUM HEAVY- TURRETED WEAPON

(ARTYSP-MHV-T)

Cause attrition via indirect fire Lanchester equations, point lethality high resolution combat algorithms, and area lethality explicit fire algorithms. Self propelled howitzers/guns of caliber greater than 145mm but less than 170mm with the gun in an enclosed turret. Protected from small arms fire and shell splinters. Examples: 152mm 2S3, 2S19, Dana, Type 83; 155mm M109, M52T, GCT, AS90, FH-77, G6, PzH 2000, K9 Thunder, Palmaria, Bandkanon 1A, L33, Doher, Zuzana, Thunder-2, PLZ45, Type 75, Type 99 and VCA 155. This is a crewed combat system. Crew should be modeled as combat system CREW. Vehicle mounted machineguns should not be modeled separately; they are included in the lethality values of the ARTYSP-MHV-T.

ARTILLERY SELF-PROPELLED - MEDIUM HEAVY - OPEN WEAPON

(ARTYSP-MHV-O)

Cause attrition via indirect fire Lanchester equations, point lethality high resolution combat algorithms, and area lethality explicit fire algorithms. Self propelled howitzers/guns of caliber greater than 145mm but less than 170mm with the gun in an open turret or un-turreted. Protected from small arms fire and shell splinters when not in action. Examples: 152mm 2S5, M1974, M1977, M1991; 155mm MK F3, CAESAR, 155/52 APU SBT, M44T, 155 GH 52 APU, XT69 and XT69A1. This is a crewed combat system. Crew should be modeled as combat system CREW. Vehicle mounted machineguns should not be modeled separately; they are included in the lethality values of the ARTYSP-MHV-O.

ARTILLERY TOWED - HEAVY

(ARTYTOW-HVY)

Cause attrition via indirect fire Lanchester equations and area lethality explicit fire algorithms. Do not cause attrition via high resolution combat. Towed howitzers/guns of caliber 170mm and greater. Examples: 180mm S23 and 203mm M115. This is a crewed combat system. Crew should be modeled as combat system CREW. Prime movers should be modeled separately as a combat system: UTIL-VEH-LA, UTIL-VEH-NA or EQUIP-OTH-SP as appropriate.

ARTILLERY SELF-PROPELLED - HEAVY - OPEN WEAPON

(ARTYSP-HV-O)

Cause attrition via indirect fire Lanchester equations, point lethality high resolution combat algorithms, and area lethality explicit fire algorithms. Self propelled howitzers/guns of caliber 170mm and greater with the gun in an open turret or un-turreted. Protected from small arms fire and shell splinters when not in action. Examples: 170mm M1978 Koksan; 175mm M107, Romach; 203mm M110, 2S7 and NORINCO 203 SP. This is a crewed combat system. Crew should be modeled as combat system CREW. Vehicle mounted machineguns should be modeled separately; they are not included in the lethality values of the ARTYSP-HV-O.

MULTIPLE ROCKET LAUNCHER - SHORT RANGE - TOWED

(MRL-SR-TOWED)

Cause attrition via indirect fire Lanchester equations and area lethality explicit fire algorithms. Do not cause attrition via high resolution combat. Max range of 15 km or less. Examples: 60mm M91; 70mm M93A3, NDL40, RA7040; 107mm Type 63, FADGR1, RO107; 126mm Kung Feng 3; 128mm M63 and M91A3. This is a crewed combat system. Crew should be modeled as combat system CREW. Prime movers should be modeled separately as a combat system: UTIL-VEH-LA, UTIL-VEH-NA or EQUIP-OTH-SP as appropriate.

MULTIPLE ROCKET LAUNCHER - SHORT RANGE - VEHICLE

(MRL-SR-VEH)

Cause attrition via indirect fire Lanchester equations and area lethality explicit fire algorithms. Do not cause attrition via high resolution combat. Max ranges of 15 km or less. Contains a mix of lightly armored and unarmored vehicles. Examples: 60mm LOV M93A1; 70mm LAU97; 107mm M1992, M1992/2,Type 81, FADGR1; 117mm Kung Feng 6; 126mm Kung Feng 4; 128mm LOV RAK24, M85; 130mm Type 75 (JPN), Type82/Type 85(CHI); and 220mm TOS-1. This is a crewed combat system. Crew should be modeled as combat system CREW. Vehicle mounted machineguns should not be modeled separately; they are included in the lethality values of the MRL-SR-VEH.

MULTIPLE ROCKET LAUNCHER - MEDIUM RANGE - VEHICLE

(MRL-MR-VEH)

Cause attrition via indirect fire Lanchester equations, point lethality high resolution combat algorithms, and area lethality explicit fire algorithms. Minimum range less than 15 km and maximum range greater than 15km. Only a part of the full lethality of these systems is applied to Lanchester combat. Contains a mix of lightly armored and unarmored vehicles. Examples: 110mm LARS; 117mm RT2000 Thunder; 122mm BM11, Dr Khan, RM70, BM21 GRAD/GRAD1/GRAD-V, BM22(9P140), Type 81/83/89/90 (CHI), RL21, SR114, M96 Typhoon, HM20, ZIL Sakr, M1977/ M1985 (NKO), Firos30, T122, Valkiri MK2, APR40; 127mm SS30 Astros2, Valkiri MK1; 128mm

Teruel, M77 Oganj; 130mm Kooryong; and 180mm Type 71. This is a crewed combat system. Crew should be modeled as combat system CREW. Vehicle mounted machineguns should be modeled separately; they are not included in the lethality values of the MRL-MR-VEH.

MULTIPLE ROCKET LAUNCHER - LONG RANGE - VEHICLE

(MRL-LR-VEH)

Non-attritor, do not cause attrition via indirect fire Lanchester equations, since the minimum range of these systems is greater than the minimum range for Lanchester combat. Cause attrition via area lethality explicit fire algorithms. Minimum range greater than 15 km. Contains a mix of lightly armored and unarmored vehicles. Examples: 160mm LAROM; 214mm Pinacha, 227mm M270 MLRS; 230mm Oghab; 240mm FADJR3, M1985/M1989, M1991; 262mm M87 Orkan; 273mm WM80, Type 83; 300mm 9A52/A100 Smerch; 320mm WS1; and 333mm FADJR5. This is a crewed combat system. Crew should be modeled as combat system CREW. Vehicle mounted machineguns should be modeled separately; they are not included in the lethality values of the MRL-LR-VEH.

TANK 120MM - ADVANCED FIRE CONTROL - HIGH SURVIVABILITY

(TANK120-AFHS)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Tanks with main guns of caliber 120mm or 125mm, advanced fire control systems, and the highest level of survivability. Examples: M1A1/A2, T-90 (RUS), Challenger II, Type 90 (JPN), Leclerc, and Leopard2A5/2A6. Vehicle crew should be modeled as combat system CREW. Coaxial, bow and turret mounted machineguns should not be modeled separately; they are included in the lethality values of the TANK120-AFHS.

TANK 120MM - ADVANCED FIRE CONTROL - ENHANCED SURVIVABILITY

(TANK120-AFES)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Tanks with main guns of caliber 120mm or 125mm, advanced fire control systems, and an enhanced level of survivability. Examples: T-80U, T-64U, Challenger I, Leopard II, Merkava Mk3, Ariete, T-84/T84U (UKR), and K1A1. Vehicle crew should be modeled as combat system CREW. Coaxial, bow and turret mounted machineguns should not be modeled separately; they are included in the lethality values of the TANK120-AFES.

TANK 120MM - LIMITED FIRE CONTROL - ENHANCED SURVIVABILITY

(TANK120-LFES)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Tanks with main guns of caliber 120mm or 125mm, limited fire control systems, and an enhanced level of survivability. Examples: 125mm T72B/T72S, T72BM, T72M1V, T64BV, T80BV,

Type 90-2/Khalid (CHI) and Type 98 (CHI). Vehicle crew should be modeled as combat system CREW. Coaxial, bow and turret mounted machineguns should not be modeled separately; they are included in the lethality values of the TANK120-LFES.

TANK 120MM - LIMITED FIRE CONTROL - MEDIUM SURVIVABILITY

(TANK120-LFMS)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Tanks with main guns of caliber 120mm or 125mm, limited fire control systems, and a medium level of survivability. Examples: 120mm Chieftain MK5, Type 89 SPATG (CHI); 125mm Type 85-2M (CHI), T72A, T72M1, M84, T64B, T80B, Al Zarrar (PAK), Zulfiqar (IRN) and 2S25 SPATG. Vehicle crew should be modeled as combat system CREW. Coaxial, bow and turret mounted machineguns should not be modeled separately; they are included in the lethality values of the TANK120-LFMS.

TANK 105MM - ADVANCED FIRE CONTROL - ENHANCED SURVIVABILITY

(TANK105-AFES)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Tanks with main guns of caliber 105mm or 115mm, advanced fire control systems, and an enhanced level of survivability. Examples: 105mm Merkava MK1/MK2 and Magach7. Vehicle crew should be modeled as combat system CREW. Coaxial, bow and turret mounted machineguns should not be modeled separately; they are included in the lethality values of the TANK105-AFES.

TANK 105MM - ADVANCED FIRE CONTROL - MEDIUM SURVIVABILITY

(TANK105-AFMS)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Tanks with main guns of caliber 105mm or 115mm, advanced fire control systems, and a medium level of survivability. Examples: 105mm M60A3TTS and Leopard 1A5. Vehicle crew should be modeled as combat system CREW. Coaxial, bow and turret mounted machineguns should not be modeled separately; they are included in the lethality values of the TANK105-AFMS.

TANK 105MM - ADVANCED FIRE CONTROL - LOW SURVIVABILITY

(TANK105-AFLS)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Tanks with main guns of caliber 105mm or 115mm, advanced fire control systems, and a low level of survivability. Examples: 105mm AMX30B2, SK105[AFC] and Stingray2. Vehicle crew should be modeled as combat system CREW. Coaxial, bow and turret mounted machineguns should not be modeled separately; they are included in the lethality values of the TANK105-AFLS.

TANK 105MM - LIMITED FIRE CONTROL - ENHANCED SURVIVABILITY

(TANK105-LFES)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms Tanks with main guns of caliber 105mm or 115mm, limited fire control systems, and an enhanced level of survivability. Examples: 105mm M55S1 (YUG); and 115mm T-62MV (RUS). Vehicle crew should be modeled as combat system CREW. Coaxial, bow and turret mounted machineguns should not be modeled separately; they are included in the lethality values of the TANK105-LFES.

TANK 105MM - LIMITED FIRE CONTROL - MEDIUM SURVIVABILITY

(TANK105-LFMS)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Tanks with main guns of caliber 105mm or 115mm, limited fire control systems, and a medium level of survivability. Examples: M60A3, M48H (TAI), T-55AMV (RUS), AMX30EM2, Leopard 1A3/1A4, K1, Safir74 (IRN); and 115mm T-62M (RUS). Vehicle crew should be modeled as combat system CREW. Coaxial, bow and turret mounted machineguns should not be modeled separately; they are included in the lethality values of the TANK105-LFMS.

TANK 105MM - LIMITED FIRE CONTROL - LOW SURVIVABILITY

(TANK105-LFLS)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Tanks with main guns of caliber 105mm or 115mm, limited fire control systems, and a low level of survivability. Examples: 105mm M48A5[LFC], T-72Z (IRN), Type 74 (JPN), OF-40 MK2, Type 59-2[LFC] (CHI), Type 79 (CHI), Type 80 (CHI), Type 85 (CHI), Type 63A/Type 99 (CHI), and Stingray. Vehicle crew should be modeled as combat system CREW. Coaxial, bow and turret mounted machineguns should not be modeled separately; they are included in the lethality values of the TANK105-LFLS.

TANK 105MM - NO FIRE CONTROL - MEDIUM SURVIVABILITY

(TANK105-NFMS)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Tanks with main guns of caliber 105mm or 115mm, no fire control systems, and a medium level of survivability. Examples: 105mm M60A1 and Leopard 1A1A1. Vehicle crew should be modeled as combat system CREW. Coaxial, bow and turret mounted machineguns should not be modeled separately; they are included in the lethality values of the TANK105-NFMS.

TANK 105MM - NO FIRE CONTROL - LOW SURVIVABILITY

(TANK105-NFLS)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Tanks with main guns of caliber 105mm or 115mm, no fire control systems, and a low level of survivability. Examples: 105mm, AMX13, AMX30/AMX30S/AMX30ER, M48A5[NFC], SK105[NFC], Type 59-2[NFC] (CHI), Oliphant, Tariq, Vickers MK1; and 115mm T62. Vehicle crew should be modeled as combat system CREW. Coaxial, bow and turret mounted machineguns should not be modeled separately; they are included in the lethality values of the TANK105-NFLS.

TANK 85MM TO 100MM - LIMITED FIRE CONTROL - LOW SURVIVABILITY

(TANK100-LFLS)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Tanks with main guns of caliber 85mm to 100mm, limited fire control systems, and a low level of survivability. Example: 90mm M48A3; 100mm T-55AM (RUS) and Type 69-2 (CHI). Vehicle crew should be modeled as combat system CREW. Coaxial, bow and turret mounted machineguns should not be modeled separately; they are included in the lethality values of the TANK100-LFLS.

TANK 85MM TO 100MM - NO FIRE CONTROL - LOW SURVIVABILITY

(TANK100-NFLS)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Tanks with main guns of caliber 85mm to 100mm, no fire control systems, and a low level of survivability. Example: 85mm T34-85, Type 63 (CHI), Type 62 (CHI), and M1985(PT85) (NK), 90mm AMX13, M47, M48A1/A2, M24, M36, Scorpion90 and Tosan; 100mm TR-85, TR580, T54, T55, Type 59, and Type 69. Vehicle crew should be modeled as combat system CREW. Coaxial, bow and turret mounted machineguns should not be modeled separately; they are included in the lethality values of the TANK100-NFLS.

TANK 76MM - NO FIRE CONTROL - LOW SURVIVABILITY

(TANK76-NFLS)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. All vehicles with main guns of caliber 75 or 76mm, whether wheeled or tracked. Most have no fire control system and low survivability. Example: 75mm AMX13; 76mm Rooikat, Scorpion, Saladin, Cougar, M41, Type 74, PT76, and M18TD. Vehicle crew should be modeled as combat system CREW. Coaxial, bow and turret mounted machineguns should not be modeled separately; they are included in the lethality values of the TANK76-NFLS.

ARMORED GUN SYSTEM 105MM - LIGHT ARMOR

(AGS105-LF-HA)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Generally wheeled armored vehicles mounting 105mm tank guns, most with limited fire control systems. Protected across their frontal arc from heavy machineguns. Examples: NORINCO 105mm and 120mm TD, AMX10RC, Centauro B1, R400, Rooikat 105mm, VEXTRA, Piranha TML105, 105mm LPT AG and LAV-III MGS. Vehicle crew should be modeled as combat system CREW. Coaxial, bow and turret mounted machineguns should not be modeled separately; they are included in the lethality values of the AGS105-LF-HA.

ARMORED GUN SYSTEM 90MM - LIGHT ARMOR

(AGS90-LA)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Generally wheeled armored vehicles mounting 90mm tank guns, most with no fire control systems. Protected from small arms fire and shell splinters. Examples: AML90, ERC90, VBC90, EE9, Eland90, BMR-VEC 90, Simba CM90, Ratel FSV90, Piranha 90mm, LAV-150 90mm, Pandur 90mm, Dragoon LFV-90, Scorpion 90, LAV-AG and Pizarro 90. Vehicle crew should be modeled as combat system CREW. Coaxial, bow and turret mounted machineguns should not be modeled separately; they are included in the lethality values of the AGS90-LA.

ANTI-TANK GUIDED MISSILE SYSTEM SELF-PROPELLED - LONG RANGE - TOP ATTACK - LIGHT ARMOR - TURRETED WEAPON

(ATGMSP-LT-LT)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Tracked or wheeled armored vehicle mounting an ATGM but no gun and dedicated to the anti-tank role. Max effective anti-tank range of 3500m or greater. Some vehicles may have machineguns. Vehicles are generally lightly armored although some are more heavily armored. Top attack capability allows it to defeat most armor. Gunner protected while firing. Although not a top attack weapon, the AT-14 is best modeled as this combat system because of its extremely high penetration ability. Examples: VAB HOT[Mephisto], LAV-III TOW and BMP3-TD AT14. Vehicle crew should be modeled as combat system CREW. ATGM and machinegun should not be modeled separately; they are included in the lethality values of the ATGMSP-LT-LT.

ANTI-TANK GUIDED MISSILE SYSTEM SELF-PROPELLED - LONG RANGE - HIGH LETHALITY - LIGHT ARMOR - TURRETED WEAPON

(ATGMSP-LH-LT)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Tracked or wheeled armored vehicle mounting an ATGM but no gun and dedicated to the anti-tank role. Max effective anti-tank range of 3500m or greater. Some vehicles may have machineguns. Vehicles are generally lightly armored although some are more heavily armored. Armor penetration greater than or equal to 800mm. Gunner protected while firing. Examples: M901

TOW, M113 TOW[KE], AIFV TOW, BRDM-2 AT5B, AMX-10 HOT, VAB HOT[UTM800], Striker Swingfire, Jaguar1 HOT, Wiesel TOW/HOT, VCC TOW, Pandur TOW/HOT, VCAC HOT, VCR/TH HOT[UTM800], Piranha TOW[KE], V-150 TOW, BMP3-TD AT15, and WZ551 Red Arrow 8. Vehicle crew should be modeled as combat system CREW. ATGM and machinegun should not be modeled separately; they are included in the lethality values of the ATGMSP-LH-LT.

ANTI-TANK GUIDED MISSILE SYSTEM SELF-PROPELLED - LONG RANGE - HIGH LETHALITY - LIGHT ARMOR - OPEN WEAPON

(ATGMSP-LH-LO)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Tracked or wheeled armored vehicle mounting an ATGM but no gun and dedicated to the anti-tank role. Max effective anti-tank range of 3500m or greater. Some vehicles may have machineguns. Vehicles are generally lightly armored although some are more heavily armored. Armor penetration greater than or equal to 800mm. Gunner not protected while firing. Examples: M113 TOW, Jaguar2 TOW, VBL TOW/HOT, Bravia V-700 TOW/HOT, Pvrbv 551 TOW, BMR600 TOW and MTLB-TD AT9. Vehicle crew should be modeled as combat system CREW. ATGM and machinegun should not be modeled separately; they are included in the lethality values of the ATGMSP-LH-LO.

ANTI-TANK GUIDED MISSILE SYSTEM SELF-PROPELLED - LONG RANGE - MEDIUM LETHALITY - LIGHT ARMOR - TURRETED WEAPON

(ATGMSP-LM-LT)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Tracked or wheeled armored vehicle mounting an ATGM but no gun and dedicated to the anti-tank role. Max effective anti-tank range of 3500m or greater. Some vehicles may have machineguns. Vehicles are generally lightly armored although some are more heavily armored. Armor penetration less than 800mm. Gunner protected while firing. Examples: BRDM-2 AT4/AT5 mix, Ratel ZT-3 Swift, Type 92B Red Arrow 9 and MTLB-TD AT6. Vehicle crew should be modeled as combat system CREW. ATGM and machinegun should not be modeled separately; they are included in the lethality values of the ATGMSP-LM-LT.

ANTI-TANK GUIDED MISSILE SYSTEM SELF-PROPELLED - SHORT RANGE - HIGH LETHALITY - LIGHT ARMOR - TURRETED WEAPON

(ATGMSP-SH-LT)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Tracked or wheeled armored vehicle mounting an ATGM but no gun and dedicated to the anti-tank role. Max effective anti-tank range 2000m to 3000m. Some vehicles may have machineguns. Vehicles are generally lightly armored although some are more heavily armored. Armor penetration greater than or equal to 800mm. Gunner protected while firing. Examples:

BRDM-2 AT4, BRDM-2 AT3(Malyutka2), BOV AT3(Malyutka2), VAB Milan2, VBL Milan2, Spartan Milan2 and BMR-600 Milan2. Vehicle crew should be modeled as combat system CREW. ATGM and machinegun should not be modeled separately; they are included in the lethality values of the ATGMSP-SH-LT.

INFANTRY FIGHTING VEHICLE WITH ATGM - LONG RANGE - HIGH LETHALITY - EXTRA HEAVY ARMOR - TURRETED CANNON AND GUN

(IFV-ATLHXACG)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Armored vehicle mounting a 100mm gun, a 30mm cannon, heavy anti-tank missile system and coaxial/turret machineguns. Frontal protection up to 20 to 23mm. Max effective anti-tank range greater than 3500m. Armor penetration greater than 700mm. Example: BMP-3. Vehicle crew should be modeled as combat system CREW. Dismount team should be modeled as combat system INFANTRY. Gun, cannon, ATGM, and machineguns should not be modeled separately; they are included in the lethality values of the IFV-ATLHXACG.

INFANTRY FIGHTING VEHICLE WITH ATGM - LONG RANGE - HIGH LETHALITY - EXTRA HEAVY ARMOR - TURRETED CANNON

(IFV-ATLHXATC)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Armored vehicle mounting a 20mm to 40mm cannon or 73mm gun, heavy anti-tank missile system and coaxial/turret machineguns. Frontal protection up to 20 to 23mm. Max anti-tank range greater than 3500m. Armor penetration greater than 700mm. Examples: M2/M3 and Centauro VBC. Vehicle crew should be modeled as combat system CREW. Dismount team should be modeled as combat system INFANTRY. Cannon, ATGM, and machineguns should not be modeled separately; they are included in the lethality values of the IFV-ATLHXATC.

INFANTRY FIGHTING VEHICLE WITH ATGM - LONG RANGE - HIGH LETHALITY - HEAVY ARMOR - TURRETED CANNON

(IFV-ATLHHATC)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Armored vehicle mounting a 20mm to 40mm cannon or 73mm gun, heavy anti-tank missile system and coaxial/turret machineguns. Frontal protection from heavy machineguns. Max anti-tank range greater than 3500m. Armor penetration greater than 700mm. Examples: BMP1M, BMP1 AT5, BTR90, Desert Warrior, AF40-8-1[25mm] and VCC80. Vehicle crew should be modeled as combat system CREW. Dismount team should be modeled as combat system INFANTRY. Cannon, ATGM, and machineguns should not be modeled separately; they are included in the lethality values of the IFV-ATLHHATC.

INFANTRY FIGHTING VEHICLE WITH ATGM - LONG RANGE - HIGH LETHALITY - LIGHT ARMOR - TURRETED CANNON

(IFV-ATLHLATC)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Armored vehicle mounting a 20mm to 40mm cannon or 73mm gun, heavy anti-tank missile system and coaxial/turret machineguns. Frontal protection from small arms and shell splinters. Max anti-tank range greater than 3500m. Armor penetration greater than 700mm. Examples: BMP2 AT5, BMD2 AT5, BMD3 AT5, BMP30, Fahd30, Sarath and Type 89 (JPN). Vehicle crew should be modeled as combat system CREW. Dismount team should be modeled as combat system INFANTRY. Cannon, ATGM, and machineguns should not be modeled separately; they are included in the lethality values of the IFV-ATLHLATC.

INFANTRY FIGHTING VEHICLE WITH ATGM - SHORT RANGE - HIGH LETHALITY - EXTRA HEAVY ARMOR - TURRETED CANNON

(IFV-ATSHXATC)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Armored vehicle mounting a 20mm to 40mm cannon or 73mm gun, heavy anti-tank missile system and coaxial/turret machineguns. Frontal protection up to 20 to 23mm. Max anti-tank range 2000m to 3000m. Armor penetration greater than 700mm. Examples: M80/M80A, and Marder Milan2. Vehicle crew should be modeled as combat system CREW. Dismount team should be modeled as combat system INFANTRY. Cannon, ATGM, and machineguns should not be modeled separately; they are included in the lethality values of the IFV-ATSHXATC.

INFANTRY FIGHTING VEHICLE WITH ATGM - SHORT RANGE - HIGH LETHALITY - HEAVY ARMOR - TURRETED CANNON

(IFV-ATSHHATC)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Armored vehicle mounting a 20mm to 40mm cannon or 73mm gun, heavy anti-tank missile system and coaxial/turret machineguns. Frontal protection from heavy machineguns. Max anti-tank range 2000m to 3000m. Armor penetration greater than 700mm. Examples: BMP1 AT3(Malyutka2), WZ501 AT3(Malyutka2), MLI-84 AT3(Malyutka2), MLVM[IFV] AT3(Malyutka2), Warrior Milan2, and BMP23. Vehicle crew should be modeled as combat system CREW. Dismount team should be modeled as combat system INFANTRY. Cannon, ATGM, and machineguns should not be modeled separately; they are included in the lethality values of the IFV-ATSHHATC.

INFANTRY FIGHTING VEHICLE WITH ATGM - SHORT RANGE - MEDIUM LETHALITY - HEAVY ARMOR - TURRETED CANNON

(IFV-ATSMHATC)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Armored vehicle mounting a 20mm to 40mm cannon or 73mm gun, heavy anti-tank missile system and coaxial/turret machineguns. Frontal protection from heavy machineguns. Max anti-tank range 2000m to 3000m. Armor penetration less than 700mm. Examples: BMP1 AT3(Malyutka) and BMP1 AT4. Vehicle crew should be modeled as combat system CREW. Dismount team should be modeled as combat system INFANTRY. Cannon, ATGM, and machineguns should not be modeled separately; they are included in the lethality values of the IFV-ATSMHATC.

INFANTRY FIGHTING VEHICLE WITH ATGM - SHORT RANGE - MEDIUM LETHALITY - LIGHT ARMOR - TURRETED CANNON

(IFV-ATSMLATC)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Armored vehicle mounting a 20mm to 40mm cannon or 73mm gun, heavy anti-tank missile system and coaxial/turret machineguns. Frontal protection from small arms and shell splinters. Max anti-tank range 2000m to 3000m. Armor penetration less than 700mm. Examples: WZ501 AT3(Malyutka), BMP2 AT4, WZ551[IFV] AT3(Malyutka), Type85[IFV] AT3(Malyutka), BMD1 AT3(Malyutka) BMD1P AT4, BMD2 AT4 and BMD3 AT4. Vehicle crew should be modeled as combat system CREW. Dismount team should be modeled as combat system INFANTRY. Cannon, ATGM, and machineguns should not be modeled separately; they are included in the lethality values of the IFV-ATSMLATC.

INFANTRY FIGHTING VEHICLE - EXTRA HEAVY ARMOR

(IFV-XHA-TC)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Armored vehicle mounting a 20 to 40mm cannon or 73mm gun, and machineguns; but generally not mounting an integrated anti-tank missile system. Max effective anti-armor range 1500m to 2000m. Frontal protection up to 20mm to 23mm. Examples: Marder, Luchs, Kentaurus, Pizarro[EA], VCTP, BRM-3K, AB14 Temsah (JOR), CV9030 and CV9040. Vehicle crew should be modeled as combat system CREW. Dismount team should be modeled as combat system INFANTRY. Cannon and machineguns should not be modeled separately; they are included in the lethality values of the IFV-XHA.

INFANTRY FIGHTING VEHICLE - HEAVY ARMOR

(IFV-HA-TC)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Armored vehicle mounting a 20 to 40mm cannon or 73mm gun, and machineguns; but generally not mounting an integrated anti-tank missile system. Max effective anti-armor range 1500m to 2000m. Frontal protection from heavy machineguns. Examples: Warrior, AMX10P, Pizarro/ ASCOD, Pandur[25mm], Ratel20 IFV, Simba[25mm], Bionix, VBCI, VEC-2[25mm], BTR80A,

BTR94, Pbv501 and Pbv302[20mm]. Vehicle crew should be modeled as combat system CREW. Dismount team should be modeled as combat system INFANTRY. Cannon and machineguns should not be modeled separately; they are included in the lethality values of the IFV-HA.

INFANTRY FIGHTING VEHICLE - LIGHT ARMOR

(IFV-LA-TC)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Armored vehicle mounting a 20 to 40mm cannon or 73mm gun, and machineguns; but generally not mounting an integrated anti-tank missile system. Max effective anti-armor range 1500m to 2000m. Frontal protection from small arms and shell splinters. Examples: Sabre, Scimitar, Fox, Wiesel 20, AIFV[25mm], Fiat 6616, ASCOD, Cougar, AMX VCI[20], VAB-VCI, VEC[20/25mm], XA-185 LAV, XA203S, LAV-150[25mm], LAV-25, AV81[25mm], Cobra23-2, Dragoon[30mm], DN5 Toro, Type 87 (JPN), RN94[25mm], Nurol AIFV[20/30mm], Type 90[20/25/30mm] (CHI), Type 89-2[25mm] (CHI), WZ 551 (CHI). Vehicle crew should be modeled as combat system CREW. Dismount team should be modeled as combat system INFANTRY. Cannon and machineguns should not be modeled separately; they are included in the lethality values of the IFV-LA.

ARMORED PERSONNEL CARRIER - EXTRA HEAVY ARMOR - OPEN WEAPON

(APC-XHA-OW)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Armed with a machinegun on a pintle mount. Armor protection up to 20mm to 23mm. May be used either as infantry transport or reconnaissance vehicle. If used as command vehicle, ammo resupply vehicle, or prime mover, then model as combat system UTIL-VEH-LA. Examples: BMR-2, Leonidas, TABC79, Achzarit, and heavy armor class APCs that have enhanced armor protection added. Vehicle crew should be modeled as combat system CREW. If an infantry dismount team is carried, then the team should be modeled as combat system INFANTRY. Machineguns that stay with the vehicle when the infantry team dismounts should not be modeled separately; they are included in the lethality values of the APC-XHA-OW.

ARMORED PERSONNEL CARRIER - HEAVY ARMOR - OPEN WEAPON

(APC-HA-OW)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Armed with a machinegun on a pintle mount. Armor protection against heavy machineguns. May be used either as infantry transport or reconnaissance vehicle. If used as command vehicle, ammo resupply vehicle, or prime mover, then model as combat system UTIL-VEH-LA. Examples: Fuchs, Transportpanzer 1[EA], KIFV, Boragh, VCC1[EA], VCC2, AF40-8-1, Classical (ISR) and light armor class APCs that have enhanced armor protection added. Vehicle crew should be modeled as combat system CREW. If an infantry dismount team, is carried then the team should be

modeled as combat system INFANTRY. Machineguns that stay with the vehicle when the infantry team dismounts should not be modeled separately; they are included in the lethality values of the APC-HA-OW.

ARMORED PERSONNEL CARRIER - HEAVY ARMOR - TURRETED WEAPON

(APC-HA-TW)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Armed with a machinegun in a turret or on a stable mount. Armor protection against small arms and shell splinters. May be used either as infantry transport or reconnaissance vehicle. If used as command vehicle, ammo resupply vehicle, or prime mover, then model as combat system UTIL-VEH-LA. Examples: BMR-600, BTR80, B33 (ROM), AF40-8-1, MRAV/GTK, XA186 and light armor class APCs that have enhanced armor protection added. Vehicle crew should be modeled as combat system CREW. If an infantry dismount team is carried, then the team should be modeled as combat system INFANTRY. Machineguns that stay with the vehicle when the infantry team dismounts should not be modeled separately; they are included in the lethality values of the APC-HA-TW.

ARMORED PERSONNEL CARRIER - LIGHT ARMOR - OPEN WEAPON - ONE

(APC-LA-OW1)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Most are armed with a machinegun on a pintle mount, but some are unarmed. Armor protection against small arms and shell splinters. May be used either as infantry transport or reconnaissance vehicle. If used as command vehicle, ammo resupply vehicle, or prime mover, then model as combat system UTIL-VEH-LA. Examples: M113, M8, M20, MT-LB, BRDM1, BTR152, BTR40, BTR50, BTR60P/PA, OT62A, OT64A/B, OT65(FUG), LAV, BLR (SPN), Panhard M3, Panhard P4, Ferret MK1, Shorland S-55, FV432, Saxon, Sultan, BvS10, BV206S, AIFV/CM21, Transportpanzer1, Type 73 (JPN), Type SU 60 (JPN), Type 82 (JPN), Dragoon, UR416, Type 90 (CHI), Type 89/Type YW534 (CHI), Type 77/WZ211 (CHI), Type 63/YW531 (CHI), Type 85/ YW531H (CHI), WZ551 (CHI), WZ523 (CHI), WZ503 (CHI), VTT323/M1973 (NKO), Walid, VCC1, EE3, EE11, Pbv401, Bushmaster, S600, Bison, Panhard Buffalo, Pandur, Cashuat, XA180/ XA185, XA-230, TPK420 BL, TM-170, Armadillo, Gypsy, LOV OP, AMX VCI [w/o turret], VCC/ TT, VAB VTT, VBL, VXB-170, Fahd [w/o turret], BDX, Piranha w/o turret, Condor, Dingo, Fiat 6614 (ITA), Puma4x4, Puma6x6, MAV-5, M35 (JOR), Terrier LAU, BOV-M, BOV-VP, Casspir MK3, Kobra, Mamba MK2, RG31 Charger, RG32 Scout, Roland, Otokar, Cobra, Akrep, Alvis 4, Tactica, Hussar, LAV 150/150S, Ranger, Ram, RBY MK1, DN3 Sedena, DN4 Caballo, ABI, Aligator, Scarab, M60P and M1114/M1116 armored HMMWVs. Vehicle crew should be modeled as combat system CREW. If an infantry dismount team, is carried, then the team should be modeled as combat system INFANTRY. Machineguns that stay with the vehicle when the infantry team dismounts should not be modeled separately; they are included in the lethality values of the APC-LA-OW1.

ARMORED PERSONNEL CARRIER - LIGHT ARMOR - OPEN WEAPON - TWO

(APC-LA-OW2)

This combat system is basically the same as APC-LA-OW1. Since there are so many actual APC systems that fall in this combat system class, three combat systems are assigned to this class. This allows you to differentiate between real world systems based on combat system prototype - combat system (CSP-CS) characteristics: weight, range, mobility, armament; whatever is important for your scenario.

ARMORED PERSONNEL CARRIER - LIGHT ARMOR - OPEN WEAPON - THREE

(APC-LA-OW3)

This combat system is basically the same as APC-LA-OW1. Since there are so many actual APC systems that fall in this combat system class, three combat systems are assigned to this class. This allows you to differentiate between real world systems based on combat system prototype - combat system (CSP-CS) characteristics: weight, range, mobility, armament; whatever is important for your scenario.

ARMORED PERSONNEL CARRIER - LIGHT ARMOR - TURRETED WEAPON - ONE

(APC-LA-TW1)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Armed with a machinegun in a turret or on a stable mount, which gives it better lethality than an open weapon APC. Armor protection against small arms and shell splinters. May be used either as infantry transport or reconnaissance vehicle. If used as command vehicle, ammo resupply vehicle, or prime mover, then model as combat system UTIL-VEH-LA. Examples: BRDM2, BTR60PB, BTR70, PRP-4, OT62B/C, OT64C, OT65A, AMX VCI, VXB170 [w/MG turret], AML60, Fennek, Fahd [w/MG turret], Iranian 4x4 APC, Mohafiz (PAK), WZ 551B [w/MG turret] (CHI), WZ531/WZ523 [w/MG turret] (CHI), PSZH IV, MLVM, Grizzly (CAN), Ferret MK2, FV103 Spartan, FV432 [w/PEAK turret], Saracen, Shorland S52, Hornet, Cadillac Gage Scout, Bravia MK1, Bravia Commando MKIII, AAPC (TUR), TAB-71, TAB-77, Type 96 (JPN), HWK11, Simba, AV81, Dragoon LFV-40mm, DN4 Caballo [w/MG turret], Condor [w/MG turret], LAV150S [w/MG turret], Cobra [w/MG turret], LAV-III [w/MG turret], Pirahna [w/MG turret], Pandur [w/MG turret], Roland [w/MG turret], RN94 [w/MG turret], Tactica [w/MG turret], Hussar [w/MG turret], ASV-150, Eland60, Eagle, SPY, and Snezka. Vehicle crew should be modeled as combat system CREW. If an infantry dismount team is carried, then the team should be modeled as combat system INFANTRY. Machineguns that stay with the vehicle when the infantry team dismounts should not be modeled separately; they are included in the lethality values of the APC-LA-TW1.

ARMORED PERSONNEL CARRIER - LIGHT ARMOR - TURRETED WEAPON - TWO

(APC-LA-TW2)

This combat system is basically the same as APC-LA-TW1. Since there are so many actual APC systems that fall in this combat system class, two combat systems are assigned to this class. This allows you to differentiate between real world systems based on combat system prototype - combat system (CSP-CS) characteristics: weight, range, mobility, armament; whatever is important for your scenario.

AMPHIBIOUS VEHICLE - LIGHT ARMOR - TURRETED WEAPON (AMPHIB-LA-TW)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Very similar to APC, but if listed here the carry capacity of operational items of this combat system will be added to the carry capacity of the first wave in an amphibious assault conducted by a unit having these combat system. Frequently mounting a turreted machinegun or automatic grenade launcher, which gives it better lethality than an open weapon APC. Armor protection against small arms and shell splinters. Examples: AAV7A1, LVTP5, LVTP7 and Arisgator, Vehicle crew should be modeled as combat system CREW. Dismount team should be modeled as INFANTRY. Machineguns should not be modeled separately; they are included in the lethality values of the AMPHIB-LA-TW.

TRUCK CARGO

(TRUCK-CARGO)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Generally mounting only a machinegun on a pintle. The lethality values are based on 60% of cargo trucks having a machinegun. Generally based on a five ton cargo truck, but which Transportation Class asset is mapped to TRUCK-CARGO is determined by data in the SLP. Thus a ten ton truck might be modeled as two of combat system TRUCK-CARGO. This is not a crewed combat system. JTLS DEPOT type units use this combat system to send dry supplies via explicit convoys. DEPOT type units may also use this combat system to assist other non-NAVAL type units in conducting a unit move by truck. JTLS GROUND, FARP, SQUADRON, and AIRBASE type units do not create explicit convoys, but may use cargo trucks to assist themselves in a unit move by truck. NAVAL type units (ships) will never use combat system TRUCK-CARGO. Trucks with dedicated full time loads, such as maintenance vans or kitchen vans, should be modeled as EQUIP-OTH-SP rather than TRUCK-CARGO.

TRUCK TANKER

(TRUCK-TANKER)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Generally mounting only a machinegun on a pintle. The lethality values are based on 40% of tanker trucks having a machinegun. Generally based on a 5000 gallon tanker, but which Transportation Class asset is mapped to TRUCK-TANKER is determined by data in the SLP. Thus a 10,000 gallon tanker might be modeled as two of combat system TRUCK-TANKER. This is not a crewed combat system. JTLS DEPOT type units use this combat system to send wet supplies via

explicit convoys. JTLS GROUND, FARP, SQUADRON, and AIRBASE type units do not create explicit convoys, but may use tanker trucks to assist themselves in a unit move by truck. NAVAL type units (ships) will never use combat system TRUCK-TANKER.

TRUCK LIGHT CARGO

(TRUCK-LT-CGO)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Generally mounting a machinegun or an automatic grenade launcher. The lethality values are based on 40% of light cargo trucks having a crew served weapon. Generally based on a 2.5 ton truck, but which Transportation Class asset is mapped to TRUCK-LT-CGO is determined by data in the SLP. This is not a crewed combat system. JTLS DEPOT type units use this combat system to send dry supplies via explicit convoys. DEPOT type units may also use this combat system to assist other non-NAVAL type units in conducting a unit move by truck. JTLS GROUND, FARP, SQUADRON, and AIRBASE type units do not create explicit convoys, but may use TRUCK-LT-CGO to assist themselves in a unit move by truck. NAVAL type units (ships) will never use combat system TRUCK-LT-CGO. All SLPs currently use the transportation class data that specify TRUCK-LT-CGO as a general cargo carrier. A specific ambulance transportation variant that can only carry personnel and casualties has been added to SDB and the SLP utility transportation class variant can be changed to this.

TRUCK - HEAVY EQUIPMENT TRANSPORTER

(TRUCK-HET)

Non-attritor, cause no losses in Lanchester combat or high resolution combat. Survivability values of this combat system are based on a large truck type vehicle. This is not a crewed combat system. This combat system will not be used for explicit resupply convoys. JTLS DEPOT type units use this combat system to assist other non-NAVAL type units in conducting a unit move by truck. JTLS GROUND, FARP, SQUADRON, and AIRBASE type units may use heavy equipment transporters to assist themselves in a unit move by truck. NAVAL type units (ships) will never use combat system TRUCK-HET. The absence or presence of heavy equipment transporters has no impact in the game on the loss (breakdown) rates of systems being transported.

UTILITY VEHICLE - LIGHT ARMOR

(UTIL-VEH-LA)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Generally mounting a machinegun or an automatic grenade launcher. The lethality values are based on 50% of light armor utility vehicles having a crew served weapon. This is a crewed combat system. These are vehicles that would be classified as APCs if their primary role was infantry transport or reconnaissance. This combat system consists of APCs primarily performing other roles:

command vehicles, fire direction center, maintenance, ammo resupply, ambulances, prime movers, etc. The utility vehicle combat system is no longer used for explicit convoys; either for moving supplies or for moving a unit. Example: M577

UTILITY VEHICLE - NO ARMOR

(UTIL-VEH-NA)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Generally mounting a machinegun or an automatic grenade launcher. The lethality values are based on 25% of non-armored utility vehicles having a crew served weapon. This is a crewed combat system. The utility vehicle combat system is no longer used for explicit convoys; either for moving supplies or for moving a unit. Example: Jeep, HMMWV, Land Rover, GAZ-69, unarmored ambulances.

AIRCRAFT

(AIRCRAFT)

Non-attritor, cause no losses in Lanchester combat or high resolution combat. Used to represent the number of fixed wing aircraft in fixed wing squadrons, the number of rotary wing aircraft in rotary wing squadrons, or the number of UAV's in UAV squadrons. This is not a crewed combat system. Has no impact in any unit other than a JTLS SQUADRON type unit. Causes air to air and/or air to ground attrition through the air algorithms within the model.

EQUIPMENT - CHEMICAL

(EQUIP-CHEM)

Cause attrition via direct fire Lanchester equations. Do not cause attrition via high resolution combat. Some systems mount a machinegun on a pintle mount. The lethality values are based on 15% of chemical related equipment having a machinegun. Survivability values of this combat system are based on 80% truck type vehicles and 20% trailers. The absence or presence of chemical related equipment combat systems has no impact on the limited chemical play within the game. Examples: various decontamination vehicles. Crew should be modeled as combat system CREW. This combat system is primarily intended to enhance intelligence play.

EQUIPMENT - OTHER - SELF-PROPELLED

(EQUIP-OTH-SP)

Causes attrition via direct fire Lanchester equations and via point lethality high resolution combat algorithms. Generally mounting a machinegun on a pintle mount. The lethality values are based on 25% of other equipment having a machinegun. Survivability values of this combat system are based on 50% truck type vehicles and 50% lightly armored vehicles. This is a crewed combat system. Crew should be modeled as combat system CREW. Used to represent any piece of equipment that you may

want to track that doesn't match another combat system. Any truck that is not a general cargo carrier could be modeled as EQUIP-OTH-SP. Examples: kitchen trucks, recovery vehicles. This combat system is no longer used to represent explosives in the SOF_CSP or OTHER_SF_CSP. The combat system INFENG-SPWPN is now used to represent someone using hand placed explosive charges, C4, satchel charges, demolition devices, etc.

EQUIPMENT - OTHER - TOWED

(EQUIP-OTH-TO)

Non-attritor, causes no losses in Lanchester combat or high resolution combat. Survivability values of this combat system are based on unarmored trailers or vans. This is a not a crewed combat system. Used to represent any piece of towed or carried equipment that you may want to track that doesn't match another combat system. Any trailer, with or without equipment mounted in it. This combat system will not be used for explicit convoys. If you want to use the carry capacity of cargo trailers in the model they will have to be modeled as TRUCK-CARGO, TRUCK-LT-CGO, or TRUCK-TANKER. Examples: kitchen trailers, trailers with maintenance or parts vans, water or fuel trailers, trailers with signal or FDC vans, generators, radar equipment (if not modeled as a sensor target), etc. This combat system is no longer used to represent explosives in the SOF_CSP or OTHER_SF_CSP. The combat system INFENG-SPWPN is now used to represent someone using hand placed explosive charges, C4, satchel charges, demolition devices, etc.

EQUIPMENT - ENGINEER1

(EQUIP-ENG1)

Cause attrition via direct fire Lanchester equations and point lethality high resolution combat algorithms. Some systems mount a machinegun on a pintle mount. The lethality values are based on 30% of engineer equipment having a machinegun. Survivability values of this combat system are based on 55% truck type vehicles and 45% armored vehicles. Engineer squad vehicles should be counted as APC's unless they are significantly different. Dump trucks may be counted as cargo trucks, utility vehicles or as engineer equipment. Vehicle crew should be modeled as combat system CREW. The absence or presence of engineer equipment combat systems currently has no impact in the game on a unit's ability to conduct the limited engineering functions within the game. This will change in future versions of the model. Examples: bulldozers, plows, tractors, digging machines, mine laying equipment, mine clearing equipment, cranes, and combat engineer vehicles. Some mine laying and mine clearing equipment may be better represented by the SSM target types MCLC.TRAILER (Mine Clearing Line Charge), VOLCANO(APC), and VOLCANO(TRUCK).

EQUIPMENT - ENGINEER2

(EQUIP-ENG2)

This combat system is basically the same as EQUIP-ENG1. Since there are many different types of engineer systems, three combat systems are assigned to this class. This allows you to differentiate between real world systems based on combat system prototype - combat system (CSP-CS) characteristics: weight, range, mobility, armament and digging rate(future); whatever is important for your scenario.

EQUIPMENT - ENGINEER3

(EQUIP-ENG3)

This combat system is basically the same as EQUIP-ENG1. Since there are many different types of engineer systems, three combat systems are assigned to this class. This allows you to differentiate between real world systems based on combat system prototype - combat system (CSP-CS) characteristics: weight, range, mobility, armament and digging rate(future); whatever is important for your scenario. In future versions when digging rate becomes a CSP-CS characteristic, this combat system could be used to represent dozer blades mounted on other combat systems. In this case the CSP data should show that this combat system is a non-attritor and is not a crewed combat system.

ELDERLY CIVILIANS

(ELDERLY-CIVILNS)

Non-attritor, cause no losses in Lanchester combat or high resolution combat. Also suffer no losses in Lanchester combat. Are subject to area lethality and point lethality algorithms. This represents non-combatant men and women 65 years old or older. This is a personnel combat system.

CIVILIAN MEN - 15 YEARS AND UP

(MEN.15.UP)

Non-attritor, cause no losses in Lanchester combat or high resolution combat. Also suffer no losses in Lanchester combat. Are subject to area lethality and point lethality algorithms. This represents non-combatant men between 15 and 64 years old. This is a personnel combat system.

CIVILIAN WOMEN - 15 YEARS AND UP

(WOMEN.15.UP)

Non-attritor, cause no losses in Lanchester combat or high resolution combat. Also suffer no losses in Lanchester combat. Are subject to area lethality and point lethality algorithms. This represents non-combatant women between 15 and 64 years old. This is a personnel combat system.

CIVILIAN YOUTH - 6 TO 14 YEARS OLD

(YOUTH_6-14YO)

Non-attritor, cause no losses in Lanchester combat or high resolution combat. Also suffer no losses in Lanchester combat. Are subject to area lethality and point lethality algorithms. This represents non-combatant boys and girls between 6 and 14 years old. This is a personnel combat system.

CIVILIAN INFANTS 0 TO 5 YEARS OLD

(INFANTS_0-5YO)

Non-attritor, cause no losses in Lanchester combat or high resolution combat. Also suffer no losses in Lanchester combat. Are subject to area lethality and point lethality algorithms. This represents non-combatant boys and girls between birth and 5 years old. This is a personnel combat system.

APPENDIX C. VERSION 3.3 STANDARD DATABASE CHANGES

The JTLS 3.3 series Standard Database (SDB) named *sdboif33* includes extensive data item modifications implemented since the Version 3.2 releases. Items that have been changed, added, deleted, or renamed are described in this Appendix. Database changes implemented for JTLS 3.3.0.0 are described in Section C.6 .

C.1 GENERAL MODIFICATIONS

An inclusive listing of changes is not possible, due to the extensive revision of the database. Significant modifications include the following:

1. Most of the TUPs are new based on TO&E data researched for the specific units in the scenario.

2. Combat System Prototypes were built specifically for the forces in the scenario.

3. Air Control Prototypes were built specifically for the forces in the scenario.

4. A new Pumping Station subcategory, named PIPELINE_INT_PT, was added.

5. A new Sensor Site subcategory, named AN-MPQ64, was added.

6. Several new Aircraft Classes were added:

    - AERO.COMMNDR690
    - AEW.SEA.KING
    - AH1.GAZELLE
    - C140.JETSTAR
    - F33C.BONANZA
    - MFI-17.MUSHSHAK
    - MH6.LITTLE.BIRD
    - MQ1A.PREDATOR
    - PHOENIX.UAV
    - PR9.CANBERRA
    - RQ7A.SHADOW
    - TB200.TOBAGO
    - TB21.TRINIDAD

7. The High Explosive Targetable Weapons fired by naval guns were changed from a single round to a burst, due to the implementation of volley fire. New Area Kill Lethality sets were added for these weapons. Calibers were adjusted for the new weapons.

C.2 NEW sdboif SCENARIO

The release version of SDB includes a new scenario named Standard DataBase Operation Iraqi Freedom (*sdboif*). This scenario is based on the Coalition invasion of Iraq in March 2003. While this scenario contains most of the combat units available at the start of the war, it is not complete. Future versions of this scenario will be expanded with additional units and targets. The current target set includes only some of the existing targets in Iraq. A pipeline network and a rail network were built, but only within Iraq. Our goal was not 100% accuracy with this scenario, as only unclassified sources were used. Our goal was to present a workable scenario that was recognizable when used as a demonstration of the model's capabilities or when conducting training on the simulation.

This database is completely different than the ATLANTIS SDB.

C.3 COMBAT SYSTEM UPGRADES

This section provides instructions for upgrading from 43 to 99 Combat Systems if you haven't already done so.

1. Delete unused TUPs, unless:
    - you plan to use them eventually.
    - they will be used with Detach Unit By TUP.

2. SQL Airbase, Squadron, and Naval TUPs to remove Combat Systems with zero TOE.
    - Do not do this for Ground, Depot, or FARP units. Other units may be attached that own additional Combat Systems. These are required to support the CS Score value.

3. Take care of Combat Systems that are no longer specifically included in the 99 CS.
    - Any TUP that has BRIDGING-EQP Combat Systems should have them moved to the OTHER-EQUIP Combat System.
    - Any TUP that has SPE1-SPT-EQP Combat Systems should have them moved to the OTHER-EQUIP Combat System.
    - Delete these Combat Systems:

      BRIDGING-EQP, LAW, SPE1-SPT-EQP, C3I

4. Rename the 43 Combat Systems to their new 99 CS names.

Table C.1 Renamed SDB 31 Combat Systems

43 CS NAME	99 CS NAME
AIRCRAFT	AIRCRAFT
AMPHIB-VEH	AMPHIB-LA-TW
APC	APC-LA-OW1
ARMR-GUN-SYS	AGS90-LA
ATGM-AFV	ATGMSP-LT-LT
C3I	Delete - No longer used
CHEM-REL-EQP	EQUIP-CHEM
COMD-SIG-VEH	UTIL-VEH-LA
CREW-WEAPONS	CREW-WEAPON
ELDERLY-CIVILNS	ELDERLY
ENGINEER-EQP	EQUIP-ENG2
HAW-ATGM	AT-HAW-LR-HL
HV-HOWTZ-GUN	ARTYTOW-MHV
HV-SP-HOWTZ	ARTYSP-MHV-T
HVY-EQP-TRAN	TRUCK-HET
IFV	IFV-HA-TC
IFV-W-ATGM	IFV-ATLHXATC
INFANTRY	INFANTRY
INFANTS_0-5YO	INFANTS
LAV	IFV-LA-TC
LR-MLRS	MRL-LR-VEH
LT-HOWTZ-GUN	ARTYTOW-LT
LT-SP-HOWTZ	ARTYSP-LT-T
MAW	AT-MAW-LR
MD-HOWTZ-GUN	ARTYTOW-MLT
MEN.15.UP	MEN
LT-MORTARS	MTRDISM81-82
HV-MORTARS	MTRDISMHVY

Table C.1 Renamed SDB 31 Combat Systems (Continued)

43 CS NAME	99 CS NAME
OTHER-EQUIP	EQUIP-OTH-SP
OTHER-TROOPS	OTHER-TROOPS
RCL-RIFLE	ATG73-106NMC
SR-MRL	MRL-SR-VEH
TANKS-3	TANK100-LFLS
TANKS-1	TANK120-AFHS
TANKS-2	TANK105-AFMS
TRUCK-CARGO	TRUCK-CARGO
TRUCK-TANKER	TRUCK-TANKER
TRUCK-UTILTY	UTIL-VEH-NA
WOMEN.15.UP	WOMEN
YOUTH_6-14YO	YOUTH

5. Create the remaining 56 Combat Systems by cascade duplicating from the existing 42 Combat Systems. *Be sure to SAVE after each cascade duplicate.*

Table C.2 SDB 3.1 Cascade Duplicate CS Names

43 CS RENAMED	CASCADE DUPLICATE NAME
AGS90-LA	AGS105-LF-HA
APC-LA-OW1	APC-HA-OW
APC-LA-OW1	APC-HA-TW
APC-LA-OW1	APC-LA-OW2
APC-LA-OW1	APC-LA-OW3
APC-LA-OW1	APC-LA-TW1
APC-LA-OW1	APC-LA-TW2
APC-LA-OW1	APC-XHA-OW
APC-LA-OW1	MTRSPHVY-LAO
APC-LA-OW1	MTRSPLT-LAO
ARTYSP-LT-T	ARTYSP-LT-O

Table C.2 SDB 3.1 Cascade Duplicate CS Names (Continued)

43 CS RENAMED	CASCADE DUPLICATE NAME
ARTYSP-LT-T	ARTYSP-MLT
ARTYSP-LT-T	MTRSP120-LAT
ARTYSP-MHV-T	ARTYSP-HV-O
ARTYSP-MHV-T	ARTYSP-MHV-O
ARTYTOW-LT	ARTYTOW-VLT
ARTYTOW-LT	ATG100-125MC
ARTYTOW-MHV	ARTYTOW-HVY
ATGMSP-LT-LT	ATGMSP-LH-LO
ATGMSP-LT-LT	ATGMSP-LH-LT
ATGMSP-LT-LT	ATGMSP-LM-LT
ATGMSP-LT-LT	ATGMSP-SH-LT
AT-HAW-LR-HL	AT-HAW-LR-TA
AT-HAW-LR-HL	AT-HAW-SR-HL
AT-HAW-LR-HL	AT-HAW-SR-ML
AT-HAW-LR-HL	AT-HAW-SR-TA
AT-MAW-LR	AT-MAW-SR-HL
AT-MAW-LR	AT-MAW-SR-ML
AT-MAW-LR	AT-MAW-SR-TA
EQUIP-ENG2	EQUIP-ENG1
EQUIP-ENG2	EQUIP-ENG3
EQUIP-OTH-SP	EQUIP-OTH-TO
IFV-ATLHXATC	IFV-ATLHHATC
IFV-ATLHXATC	IFV-ATLHLATC
IFV-ATLHXATC	IFV-ATLHXACG
IFV-ATLHXATC	IFV-ATSHHATC
IFV-ATLHXATC	IFV-ATSHXATC
IFV-ATLHXATC	IFV-ATSMHATC
IFV-ATLHXATC	IFV-ATSMLATC
IFV-HA-TC	IFV-XHA-TC

Table C.2 SDB 3.1 Cascade Duplicate CS Names (Continued)

43 CS RENAMED	CASCADE DUPLICATE NAME
INFANTRY	ELITE-INF
INFANTRY	INFENG-SPWPN
INFANTRY	SNIPER
MRL-LR-VEH	MRL-MR-VEH
MRL-SR-VEH	MRL-SR-TOWED
MTRDISM81-82	MTRDISM50-60
OTHER-TROOPS	CREW
TANK100-LFLS	TANK100-NFLS
TANK100-LFLS	TANK76-NFLS
TANK105-AFMS	TANK105-AFES
TANK105-AFMS	TANK105-AFLS
TANK105-AFMS	TANK105-LFES
TANK105-AFMS	TANK105-LFLS
TANK105-AFMS	TANK105-LFMS
TANK105-AFMS	TANK105-NFLS
TANK105-AFMS	TANK105-NFMS
TANK105-AFMS	TANK120-LFES
TANK105-AFMS	TANK120-LFMS
TANK120-AFHS	TANK120-AFES
TRUCK-CARGO	TRUCK-LT-CGO

6. Complete a download of the Oracle database.

7. Save copies of the following files from your scenario directory to a safe location.

Table C.3 Scenario File Names

ORIGINAL NAME	VALID COPY CHECK
'scenarioname'.ccp_cs	Same CCP names as SDB?
'scenarioname'.ccp_cs_tt	Same CCP names as SDB?
'scenarioname'.csp_cs	Same CSP names as SDB?

Table C.3 Scenario File Names (Continued)

ORIGINAL NAME	VALID COPY CHECK
'scenarioname'.csp_cs_mft	Same CSP and Land Minefield names as SDB?
'scenarioname'.cs_tt	
'scenarioname'.cs_tw	Same Targetable Weapons as SDB?
'scenarioname'.eph	
'scenarioname'.flp_cs	Same FLP names as SDB?
'scenarioname'.flp_csp_cs	Same FLP and CSP names as SDB?
'scenarioname'.fwl	
'scenarioname'.fwl_cs	
'scenarioname'.sp_cs	Same SP names as SDB?
'scenarioname'.spec_cs	
'scenarioname'.up_up	

8. Copy the files in the list above from SDB to your scenario with your scenario name.

9. If your answer is NO to the question in the Valid Copy Check column, edit the SDB file to match your scenario.

10. Add data for additional CSPs needed for your scenario.

11. Make changes to each TUP's authorized Combat Systems to match the new 99 CS.

12. Make changes to each TUP's Supply Categories based on the Combat System changes.

13. Make adjustments to personnel Combat Systems to reflect crew requirements.

14. Copy the new_tup_cs_score.tbl file from the SDB alterdata directory to your alterdata directory.

15. From the DDS Alter Database menu, select TUP and reset TUP CS Score. Select Load and Modify TUP CS Score.

C.4 SUPPORTING EXISTING COMBAT SYSTEMS

This section provides instructions for users who choose to retain their existing set of Combat Systems.

1. Lanchester coefficient data are still reduced. Since they are no longer indexed by FLP and SP, you must use the FLP and SP FWL modifiers to account for those differences. Typically, the Opposing Force FLP and SP resulted in the Opposing Force causing less attrition to other forces while taking more attrition from other forces. Using the same FLP and SP FWL modifier values listed in Section C.1. is recommended.

2. The CSP-CS data now include a Killer FWL Modifier and a Victim FWL Modifier. You may prefer to change these MODIFIERS for less-capable systems in some CSPs. Note that a Victim FWL Modifier greater than 1.0 means that the associated Combat System will suffer more losses.

C.5 REMAINING ENHANCEMENTS

This section describes data that have not been added or updated for this release.

SUP Combat Systems have not been changed to the new 99 Combat Systems. Minimal changes were made to the NAVY_CSP that allow existing SUPs to function. SUP changes that include a new NAVY_CSP will be provided for a future JTLS release.

The ECP *JTLS-2005-1480 Lifeboat Representation* has not been fully implemented or tested for this release. Therefore, no SUP has been assigned a Lifeboat HUP. If you choose to use this functionality, you must assign a Lifeboat HUP to the SUP of interest and change the SUP Lifeboat Mean Time To Deploy, which is currently set to the default time of 1.0 minutes. Lifeboat HUPs have been addded; Lifeboat HUP names are identified by the inital characters LB.

SSM target subcategories are now able to fire an array of Targetable Weapons. New SSM subcategories have been built for use by ships, but the SUPs have not been updated to use the new subcategories. The current SUPs have the previous SSM subcategories, which are still functional. Since no caliber is defined for SSM targets, new Supply Categories for ship-launched torpedoes and missiles must be added to control Targetable Weapon selection. We expect to complete a major update of all SUPs in 2007, depending upon the priorities assigned by the Government.

C.6 VERSION 3.3.0.0 STANDARD DATABASE CHANGES

These database parameter and object changes were implemented for *sdboif* and its subset *demsdboif* forJTLS 3.3.0.0 :

1. Changed the CSP PROB REMAINS RECOVERED. All were set to 1 (100%) within the JTLS 3.2.0.0 version.

2. Changed the SLP ATM MIN UNIT SIZE data. Set the minimum unit size to the smallest possible unit size for Truck Convoys.

3. Reduced the FLP ALLOCATION data by 50% for all FLPs for all Combat Systems against the

INFENG-SPWPN Combat System.

4. Changed the CSP CS PROB SYSTEM RECOVERED for IRAQ_CSP and MILITIA_CSP. Multiplied vehicle Combat Systems by 0.75 and non-vehicle Combat Systems by 0.85. This adjustment will cause more of the losses to be catastrophically destroyed and fewer losses to be placed in maintenance.

5. Changed the CSP CS KILL PROB for IRAQ_CSP and MILITIA_CSP. Multiplied Tank Combat Systems by 4 and other Combat Systems by 3. This adjustment will cause more crew to be killed when a crewed Combat System is lost. CSP CS WIA PROB was not adjusted.

6. Deleted Targetable Weapon ASROC.MK50. Only the MK46 torpedo was used with the ASROC delivery system; the MK50 torpedo was nver used.

7. Changed the Targetable Weapon fired by the ASROC-MK50(MK41) SSM from ASROC.MK50 to ASROC.MK46. The ASROC-MK50(MK41) SSM should be deleted but is currently used by some SUPs. The SUP POT changes must be completed before the ASROC-MK50(MK41) SSM can be deleted.