

Research Note 86-74

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SYMBOLY SOURCEBOOK FOR MILITARY APPLICATIONS

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item #20 Abstract - continuation

←
The second research stage was a survey of user's symbology needs. It revealed two major issues: (1) symbols did not exist for many concepts, and (2) therefore, users developed their own personalized illustrations for the concepts, resulting in a myriad of symbols representing the same concept. The third research stage was to experimentally investigate how to best develop and portray military symbols. Symbol characteristics such as perceptual discriminability, associative value, and configuration have been found to affect symbol detection. A systematic technique for choosing among alternative symbols was developed and procedures for designing new ones are presently being investigated.



FOREWORD

Military symbology is a widespread communication system used by the Army to convey battlefield information. For a number of years, the U.S. Army Research Institute has been oriented toward developing better methods of displaying symbols. Because new weapons are being developed at a rapid pace, the Army Field Manual FM 21-30 does not contain symbols for many new concepts. Research efforts have concluded that FM 21-30 needs to be updated so that new symbols are standardized, hence facilitating communication throughout the Army. This document summarizes recent ARI research in symbology and catalogs many available sets of military symbols.

The U.S. Army Research Institute has been actively investigating the best methods of graphically portraying military symbols. Research has identified specific factors that either improve or degrade symbol detection and subsequent performance. Methods of designing and evaluating new symbols are being studied, and a method for selecting among alternative symbols has already been found. The ongoing efforts at ARI will ultimately lead to a more clear understanding of visual battlefield information.

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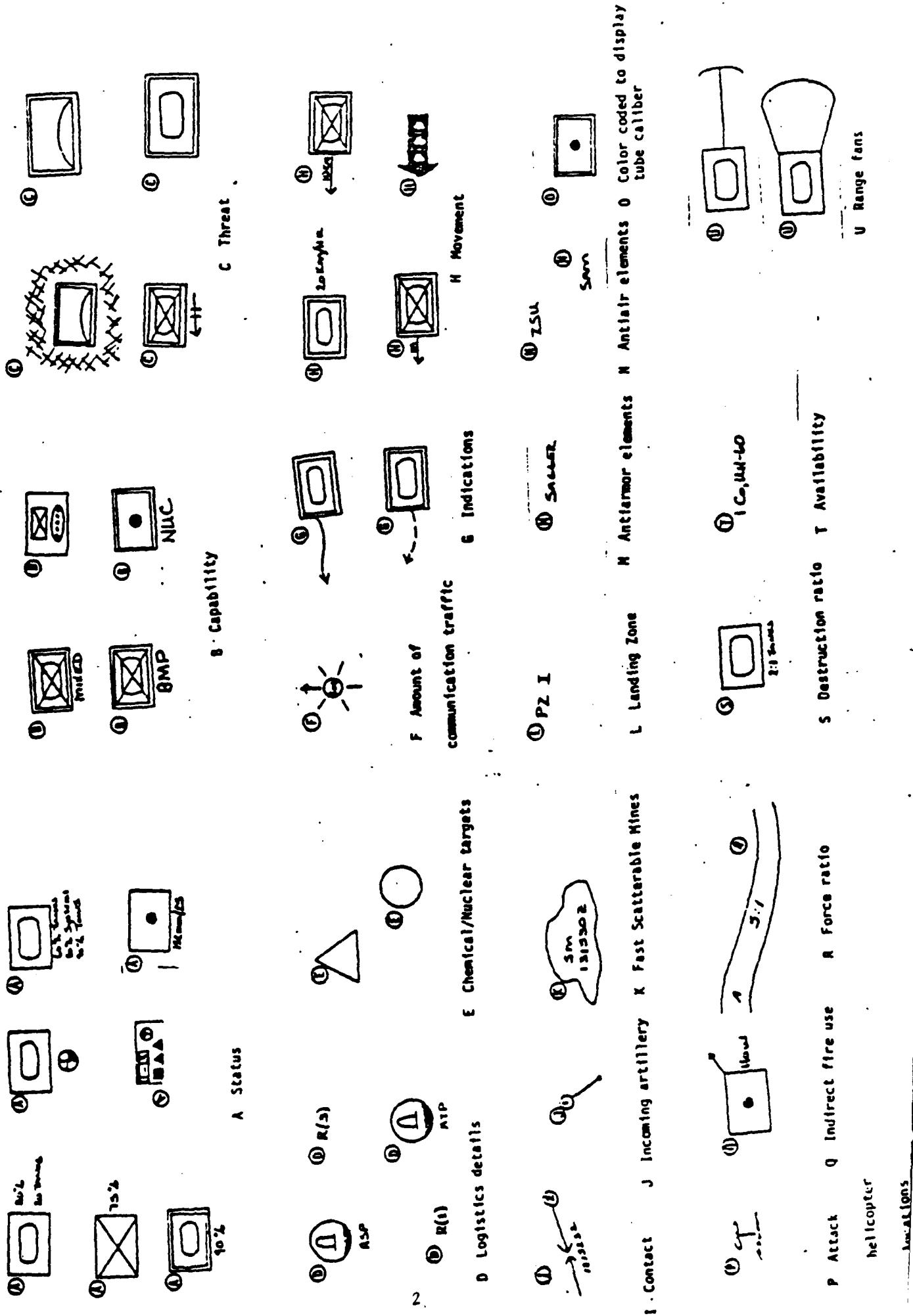
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General Introduction and Research on Design and Use of Symbols

Military symbols are an integral part of conveying information pertinent to the battlefield. Symbols are used to identify and summarize important unit information of all kinds. Because they are used so frequently, symbols have become a language, specified in Army Field Manual 21-30, Military Symbols. Unfortunately, the needs and usefulness of symbols have advanced beyond that specified by the FM and there are many cases in which two or more different symbols are used to portray the same concept. Furthermore, individual units have often found it necessary to develop their own specialized symbols to convey information specific to their needs. See Figure 1. With the increased deployment of distributed C2 and automation, these practices may give rise to numerous problems, including errors, time delays, confusion, and misunderstandings about the intended message. Therefore the overall quality of communication may be degraded.

Researchers at the Battlefield Information Systems Technical Area of The Army Research Institute developed a three-step program to investigate the above-mentioned problems and issues in military symbology and to offer remedial steps and guidelines for using symbols. The first stage involved collecting and indexing many military symbols and compiling them into a single database. The product of this research stage was an automated

FIGURE 1. EXAMPLES OF PERSONALIZED PORTRAYAL METHODS



catalog of military symbols (TACSYM). The development of TACSYM induced a second stage of research in which the symbolic needs of the military community were surveyed. The third stage of research was a series of experiments aimed at determining the best methods of symbolic portrayal. The current sourcebook includes a summary of ARI research completed at each of the three stages and a comprehensive hard copy listing of available military symbols.

The first stage of research was to compile military symbols in a cataloguing effort. The result of such efforts was TACSYM, an automated symbol database. The database contains over 1000 military tactical symbols (including the Army Standard FM 21-30) which are catalogued by concept, category, and symbol source.

The completion of TACSYM highlighted the mismatches between symbols such as those included in FM 21-30 and those actually used. This was the basis for initiating the second research stage, which was a survey of the users' symbology needs (Landee, Geiselman, & Clark, 1981). The purpose of the survey was to a) identify military concepts that did not have a standard method (in FM 21-30) of graphic portrayal, and b) examine the existing non-standard, personalized ways. It was therefore concluded that FM 21-30 needed to be updated so that new concepts could be represented.

A number of research efforts for resolving symbol conflicts comprised stage 3: a method for generating new symbols for FM 21-30 proposed by Knapp (1983). The method required concepts to be identified which were either represented by too many symbols or were not represented at all. Eight such concepts were presented to military personnel, who were asked to illustrate each one by a drawing. The elicited drawings were then clustered according to obvious visual similarities. The method thus provides a systematic means of eliciting likely candidates for future use. Once the candidates are generated and clustered, experts are then presented with clear-cut options from which to determine a standard.

Symbol structure. Geiselman, Landee, and Christen (1982) addressed the problem of selecting among alternative graphic symbols by developing a prototype index of perceptual discriminability. Regression analysis of inter-symbol similarity indicated that judged similarity was based on the number of shared versus unique configural attributes (e.g., an X, a triangle) as opposed to primitive symbol attributes (e.g., number of lines, arcs). These results were used to derive the prototype discriminability-index formula, which was tested in a subsequent experiment. The formula can be adapted for general use to decide among alternative symbols.

The distinction between primitive and configural attributes is conceptually similar to a distinction between local (detailed) and global (general) features. Using a detection-task paradigm, Knapp (1985) found that speed and accuracy of target symbol detection declined when the target and distractor symbols were both from the same global category. Consistent with a serial model of perceptual processing, speed and accuracy of target symbol detection were better when the target was presented alone than when the target was presented with the distractor.

Symbol meaning. Once a symbol set has been chosen, the best method of portraying each symbol must be determined. In an early study (Bersh, Moses, & Maisano, 1978), enlisted men rank ordered the strength of association between simple graphic codes or symbols and military concepts. Results indicated that half of all associations were classified as high or medium and the other half were classified as minimal or insignificant, suggesting that high associations may be "natural" and that low associations may be "unnatural".

Earl (1982) examined the ability to learn symbols as a function of symbol type (U.S., Soviet, or "pictographic"). Both learning and detection performance were found to be significantly better for the

ARI-developed pictographic symbols than for the U.S. and Soviet symbols. These findings support the use of pictographic images for ease of learning.

More recently, Knapp (1984) compared two techniques for evaluating symbol meaningfulness. One group of military personnel was given a paired-comparison task in which two symbols were presented; participants chose the one that best represented a given concept. A second group was presented with a single symbol and was asked to rate how well it represented a given concept. Results indicated that abstract symbols - those with a meaningful shape and outline, but little detail - were more meaningful than either "picture" type images or arbitrary images which had to be learned. The meaningfulness of a symbol is a critical factor when detailed map study is required; and abstract symbols are desirable for use on computer generated displays.

Ciccone, Samet, and Channon (1979) developed a query-based methodology for eliciting tactical requirements for constructing military symbols. Experienced officers were asked to generate task-related tactical questions and their answers. The question and answer sets were organized according to tactical theme and level of detail. These data sets represented information requirements which could form the basis for a dynamic, flexible database for tactical symbology. Ciccone et al. also analyzed

the effectiveness of symbol design based on behaviors such as symbol discrimination, display search, and symbol learnability. Guidelines for improving symbol effectiveness, such as eliminating unnecessary detail/complexity and maximizing symbol discriminability, were suggested.

In summary, the Army Research Institute has taken steps toward resolving symbol conflicts and developing techniques for creating new symbols:

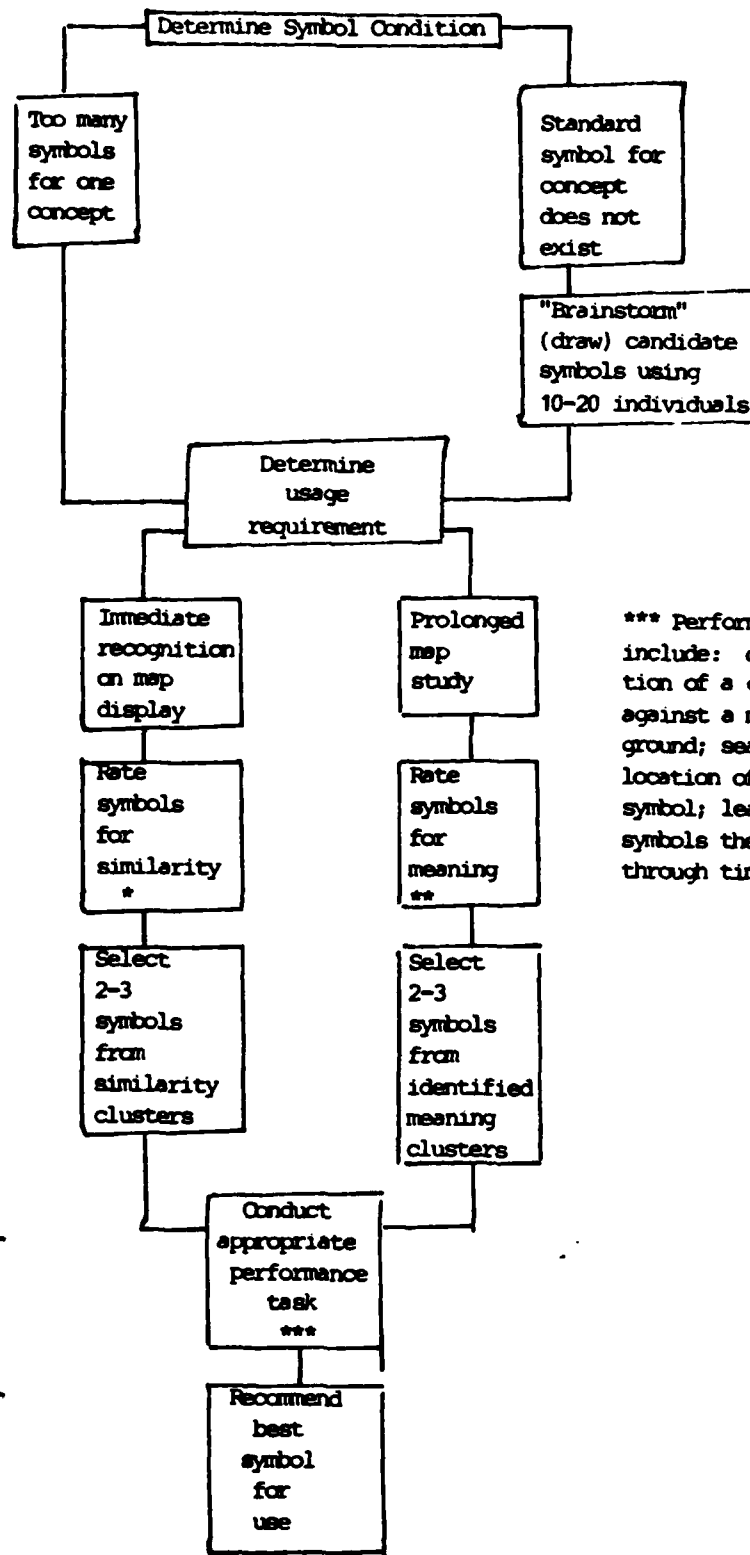
(1) Survey of user needs for symbology. Officers with field unit experience and familiarity with current doctrine were surveyed to produce an inventory of user needs for symbols to portray battlefield information. In matching the needs cited with current symbols available for use (FM 21-30), it was shown that over 60% of user requirements are not symbolized.

(2) Step-wise procedure for designing new symbols. ARI has developed a method for isolating the components of "good" (easily located and identified in a display) symbols based on the geometric and primitive structures of the symbol, the associative value ("meaning") of the symbol, and the understandability of the symbol. The technique used symbols selected from the TACSYM automated catalogue and compared them using experimental means.

(3) Development of an algorithm to resolve symbol conflicts. A formula has been developed which allows discrimination between two or more symbols which portray the same concept. The formula assigns a numerical rating to each symbol based on the user's perception of various configural aspects of the symbol. A higher value indicates a more highly discriminable (more recognizable) symbol.

The research has clearly identified several recommendations for using military symbology. These recommendations are summarized in a flow chart (next page, followed by specific examples), which suggests courses of action for choosing or designing symbols. Other recommendations include incorporating the production and selection techniques used in ARI research to update FM 21-30 to include previously unsymbolized concepts. New symbols should be empirically investigated prior to being implemented because some lead to inadequate performance. Once good symbol candidates have been selected, they should be standardized so that widespread communication is facilitated (see Landee & Geiselman, 1984).

Procedures for Design and Use of Tactical Symbols



Notes

* Similarity is scaled according to a 5-point scale: 1-very similar, 5-very dissimilar where 10-15 individuals rate all possible symbol pairs. Simple tallies or statistical analysis reveal symbol clusters.

** Meaning is scaled by presenting all possible pairs of symbols to a group (10-15 persons), and for each pair, asking which symbol best portrays the intended concept. Simple tallies or statistical techniques reveal clusters of meaningful/non-meaningful symbols.

*** Performance tasks include: quick detection of a given target against a map background; search and location of meaningful symbol; learning of symbols then retention through time.

General Guidelines - Design and Use of Tactical Symbols

o For decisions regarding conflicts among 5 or fewer symbols, user judgments are sufficient to select a standard symbol.

o Selecting symbols for associative meaning:

1. Symbols which carry a lot of associative meaning (rated high in terms of relationship to intended concept relevant) are best used in tasks which require prolonged map study and need to be remembered through time.

2. Symbols with abstract (outline) shapes that highlight the concept, are just as meaningful as symbols which are more pictorial in nature. The abstract ones are thus recommended for use since they are easy to identify and learn, and will be more amenable for use in computer generated displays.

Example: Concept HELICOPTER



Abstract

Recommended



Pictorial

Not Recommended

o Selecting symbols for immediate recognition value: The structure of symbols (shapes, lines, orientation, etc.), is important in tasks where it is necessary to search for and locate a particular symbol quickly.

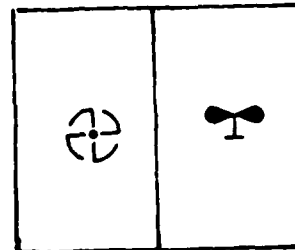
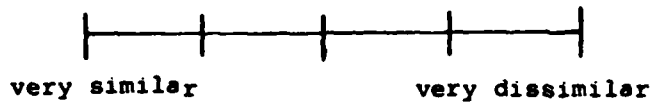
In selecting a symbol for use in this application, particular attention must be paid to the symbol structure to insure that it is not too similar to other symbols to be used on the map display.

Procedure for Design and Use of Tactical Symbols: Example

Symbol Condition: Too many symbols for one concept (helicopter)



1. Determine usage requirement: immediate recognition on map display
2. Rate symbols for similarity: use 15-20 individuals



3. Select top 2-3 symbols for similarity/dissimilarity.



4. Conduct performance task: devise map display task using 15-20 individuals.



ask each individual to find predetermined target symbol after brief map exposure.

5. Recommend best (easiest to detect) symbols for use; have task force finalize selection of one symbol.

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SYMBOL SETS

Introduction

This section of the sourcebook presents sets of symbols for military applications.

It is divided into subsections based on the source of the symbol collection. Part 1 contains over 900 symbols from 17 current standard or proposed military systems compiled as TACSYM - the automated tactical symbology catalog-produced for the Army Research Institute. This catalog, in its automated version, allows personnel to call up the TACSYM program on a computer display terminal and view symbols by indexing them according to selected categories or concepts. The user has control over which symbols may be viewed by selecting from a menu of categories and concepts. A hard copy print out of these categories in Part 1. Part 2 contains Air Defense symbols from 7 sources. Part 3 contains radar symbols used in various experimental activities. Part 4 contains symbols currently available for printing on the digital plotter map of the TACFIRE system. Part 5 are examples of symbols in a wargaming application. Part 6 contains symbols used in various experimental programs with a military scenario. All of the symbols contained in parts 2 - 6 are planned for eventual inclusion in the TACSYM automated catalog of symbols, so that they may be categorized and thus available for viewing and indexing. Each collection of symbols is preceded by a brief introduction explaining its nature and background.

Part 1. TACSYM Automated Symbol Catalog

An automated catalog of tactical symbols has been compiled and designated "TACSYM" (tactical symbology). Over 900 military symbols are catalogued by concept, category, and symbol source (see lists of each on pages to follow). TACSYM is accessed by interacting with a computer terminal, so that in realtime a user may index and view symbols by any of the three parameters (source, category concept). TACSYM also contains a tutorial of overall TACSYM structure, methods for constructing and inputting new symbols, and text describing current studies in symbology.

The TACSYM catalog highlights the facts that (1) There are a vast quantity of unique symbols in existence, many of which portray the same concept: (2) That there are no current available symbols to portray certain types of battlefield information projected as critical for future needs (e.g., unit status, threat, mobility, etc.).

TACSYM is currently deployed at the computer graphics facility at CASAA, Ft. Leavenworth, KS, and is soon to be installed at the laboratory facility at HQ ARI, Alexandria, VA.

Symbology Sources currently contained in TACSYM

1. DIVRAS - DARCOM Division Realtime Applications Study
2. NATO D-49 - NATO Standard (1970)
3. TCO - Marine Corps Tactical Control Operations
4. FM 31-30 - Army Standard Symbols (1970)
5. TOS - Tactical Operations System
6. CPS - Combat Power Symbology
7. BETA Test Bed - Battlefield Exploitation/Target Acquisition
8. MIFASS - Marine Integrated Fire and Air Support System
9. TAOC-85 - Marine Tactical Air Operations Center - 1985
10. TACC - Marine Tactical Command Center
11. ITAOC - Marine Improved Tactical Air Operations Center
12. AF-E-3A PPI - Air Force Tactical Air Control Systems
13. AF 407L/485 LT - Air Force Tactical Air Control Systems
14. PLRS - Position Location/Reporting System
15. AFR 55-25 - Air Force Tactical Air Control Systems
16. FM 101-5-1 - Staff Officer's Field Manual
17. CDEC-VIDS - Combat Developments Experimentation Center -
Vehicle Integrated Defense System

Symbol Categories in TACSYM

1. Activity
2. Aviation
3. Communication
4. Vehicles
5. Tactical Unit
6. Measle
7. Combat Service Support
8. Nuclear-Bio-Chemical
9. Obstacles and Fort
10. Installations
11. Weapon










Symbol Concepts in TACSYM










1 Action	45 Boat	89 CBR
2 Bridging	46 C-Cube	90 Chemical
3 Ferrying	47 Cargo	91 Combined Arms Army
4 Movement	48 Engine	92 CEWI
5 Destroyed	49 Ferry	93 C2 Element
6 Phoney	50 Air Cavalry	94 Decontamination
7 Propoganda	51 Hovercraft	95 Command
8 Responsibility	52 Operational	96 Electronic
9 Snorkeling	53 Communication	97 Electronic Warfare
10 Aerial	54 Over-snow	98 Engineer
11 Antisubmarine	55 Personnel	99 Food
12 Aviation	56 Missile	100 Infantry
13 Bomber	57 Railway	101 Fuel
14 Close Air Support	58 Shooter	102 Irregular Forces
15 Drone Aircraft	59 Sledge/sled	103 Maneuver Unit
16 Fighter	60 Vehicle	104 Marines
17 Fixed Wing Aircraft	61 Ship	105 Brigade
18 Helicopter	62 Airfield	106 Military
19 Marine	63 Submarine	107 Mortar Fire Unit
20 High Performance	64 Tracked	108 Motor Rifle
21 Medevac	65 Landing Site	109 Mountain
22 Rescue	66 Train	110 Movers
23 Seaplane	67 Wheeled	111 Navy
24 Transport	68 Unspecified	112 Ordnance
25 Emit	69 Landing Zone	113 Parachute
26 Message Center	70 Vehicles	114 Reinforcement
27 Signal	71 Surface	115 Shooters
28 Nuclear	72 Seaplane Station	116 Special Forces
29 Formation	73 Landing Vehicle	117 Bio or Chem Event
30 Reconnaissance	74 MICV	118 Contamination
31 Jamming	75 Air Defense	119 Radioactive Area
32 Radar	76 Ammunition	120 Radioactive
33 Radio	77 Air Mobile	121 Targets
34 Telephone	78 Air Transportable	122 Booby Trap
35 Teleprinter	79 Air Naval Ground	123 Bridge
36 Television	80 Airborne	124 Demolition
37 ADP Central	81 Antiaircraft	125 Fence
38 Elec. Navig. Aid	82 Antitank	126 Data Processing Unit
39 Microphones	83 Armour	127 Dental
40 Target Designator	84 Army Security Agcy	128 Maintenance
41 Visual Station	85 Artillery	129 Major End Items
42 Amphibious	86 Collecting Point	130 Medical
43 Animal	87 FA	131 Hospital
44 Armoured	88 Construction	132 Medical Supply


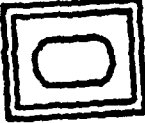
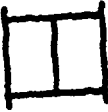
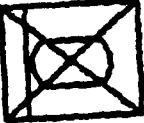
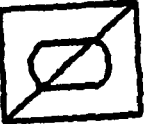




SYMBOL CONCEPTS










133 Mines
134 Missile Supply
135 Multi-Class
136 Multirole
137 Nuclear Storage
138 Personal Demand
139 Repair Parts
140 Wire
141 Obstacle
142 Subsistence
143 Traffic Control
144 Unknown Logistic
145 Water
146 Force
147 Headquarters
148 Landing
149 Logistics Unit
150 Marine Amphibious
151 Aero Medical
152 Motor Transport
153 Petroleum Supply
154 Shore Party Team
155 Support
156 Rear Area Operations
157 Service
158 Trains
159 Ground Attack
160 ICV
161 Tank
162 Clothing
163 Plane
164 Flame Thrower
165 Gun
166 Mortar
167 Naval Gunfire
168 Rifle
169 Rocket
170 Rocket Launcher
171 Weapon
172 Smoke Generator
173 Tracks
174 Vegetation
175 Toxic Agent
176 Trenches
177 Zone
178 Commo Site
179 Howitzer








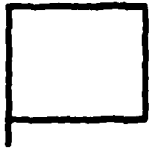

CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
1.1.1 TACTICAL UNIT/ Air Cavalry/		FM 21-30 DI = 1.68
1.1.2 TACTICAL UNIT/ Air Cavalry/		NATO D-49(1980) DI = 3.53
1.1.3 TACTICAL UNIT/ Air Cavalry/		TCO
1.2.1 TACTICAL UNIT/ Air Defense/ (AD)		NATO D-49(1980), TOS , BETA TEST BED
1.2.2 TACTICAL UNIT/ Air Defense/ artillery		FM 21-30, BETA TEST BED DI = 1.63
1.2.3 TACTICAL UNIT/ Air Defense/ artillery		BETA TEST BED ADA unknown, or Rgt or Btry. DI = 2.13
1.2.4 TACTICAL UNIT/ Air Defense/ artillery target		MIFASS Unit size is noted below symbol.
1.2.5 TACTICAL UNIT/ Air Defense/ missile		BETA TEST BED See Missile for related symbols.
1.2.6 TACTICAL UNIT/ Air Defense/ missile (enemy)		CPS










CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
1.2.7 TACTICAL UNIT/ Air Defense/ tube enemy		CPS
1.3.1 TACTICAL UNIT/ Air Mobile/		FM 21-30, NATO D-49(1980) DI = 0.73
1.3.2 TACTICAL UNIT/ Air Mobile/		TOS DI = 2.63
1.3.3 TACTICAL UNIT/ Air Mobile/		TCO has sufficient air mob helos to conduct air mob operations
1.4.1 TACTICAL UNIT/ Air Transportable/		NATO D-49(1980)
1.5.1 TACTICAL UNIT/ Air Naval Ground/ liaison		TCO
1.6.1 TACTICAL UNIT/ Airborne/		FM 21-30, TOS DI = 0.73
1.6.2 TACTICAL UNIT/ Airborne/		BETA TEST BED symbol same as NATO D-49 parachute symbol. DI = 1.63
1.6.3 TACTICAL UNIT/ Airborne/ CP		BETA TEST BED

CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
1.6.4 TACTICAL UNIT/ Airborne/ Infantry		FM 21-30, TOS
1.7.1 TACTICAL UNIT/ Amphibious/		TCO
1.7.2 TACTICAL UNIT/ Amphibious/		FM 21-30, NATO D-49(1980)
1.8.1 TACTICAL UNIT/ Antiaircraft/		AF E-3A PPI
1.9.1 TACTICAL UNIT/ Antitank/		FM 21-30, NATO D-49(1980) , TOS DI = 1.63
1.9.2 TACTICAL UNIT/ Antitank/		CPS DI = 4.28
1.9.3 TACTICAL UNIT/ Antitank/ helicopter		NATO D-49(1980)
1.9.4 TACTICAL UNIT/ Antitank/ missile		NATO D-49(1980) See Missile for related symbols.
1.10.1 TACTICAL UNIT/ Armour/		FM 21-30, NATO D-49(1980) , TOS, BETA TEST BED










CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
1.10.2 TACTICAL UNIT/ Armour/ enemy		OPS DI = 5.18
1.10.3 TACTICAL UNIT/ Armour/ enemy		FM 21-30 DI = 1.68
1.10.4 TACTICAL UNIT/ Armour/ target		MIFASS Unit size is noted below symbol.
1.10.5 TACTICAL UNIT/ Armour/ infantry		NATO D-49(1980) See Infantry for related symbol.
1.10.6 TACTICAL UNIT/ Armour/ recco or cav		FM 21-30, TOS, BETA TEST BED
1.11.1 TACTICAL UNIT/ Army Security Agcy/		FM 21-30
1.11.2 TACTICAL UNIT/ Army Security Agcy/		TOS
1.12.1 TACTICAL UNIT/ Artillery/		NATO D-49(1980) , BETA TEST BED
1.12.2 TACTICAL UNIT/ Artillery/ D/S		MIFASS Immediate request symbol, size noted below symbol.










CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
1.12.3 TACTICAL UNIT/ Artillery/ GS		MIFASS Immediate request symbol, size noted below symbol.
1.12.4 TACTICAL UNIT/ Artillery/ target		MIFASS Size noted below symbol.
1.12.5 TACTICAL UNIT/ Artillery/ field (FA)		FM 21-30, TOS
1.12.6 TACTICAL UNIT/ Artillery/ rocket		NATO D-49(1988)
1.12.7 TACTICAL UNIT/ Artillery/ rocket (enemy)		OPS
1.12.8 TACTICAL UNIT/ Artillery/ MRL		BETA TEST BED See weapons section for other mult rocket launcher symbols.
1.13.1 TACTICAL UNIT/ FA/ tube (enemy)		OPS
1.14.1 TACTICAL UNIT/ CBR/		FM 21-30 DI = 2.63
1.14.2 TACTICAL UNIT/ CBR/		NATO D-49(1988) DI = 1.28










CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
1.15.1 TACTICAL UNIT/ Chemical/		TOS Symbol represents chemical or chemical decontamination unit
1.15.2 TACTICAL UNIT/ Chemical/ defense		BETA TEST BED
1.16.1 TACTICAL UNIT/ Combined Arms Army/		TOS DI = 0.73
1.16.2 TACTICAL UNIT/ Combined Arms Army/		BETA TEST BED DI = 0.73
1.17.1 TACTICAL UNIT/ CEWI/		NATO D-49(1980) , BETA TEST BED
1.18.1 TACTICAL UNIT/ C2 Element/		AF E-3A PPI
1.19.1 TACTICAL UNIT/ Command/ HQ		AF E-3A PPI
1.19.2 TACTICAL UNIT/ Command/ post		FM 21-30, NATO D-49(1980) , TOS, BETA TEST BED DI = 1.63
1.19.3 TACTICAL UNIT/ Command/ post		CPS DI = 5.18

CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
1.20.1 TACTICAL UNIT/ Electronic Warfare/ (EW)		FM 21-30 See signal for related symbols. DI = 1.63
1.20.2 TACTICAL UNIT/ Electronic Warfare/ (EW)		NATO D-49(1980) See Signal for related symbols. DI = 1.63
1.21.1 TACTICAL UNIT/ Engineer/		FM 21-30, NATO D-49(1980) , TOS DI = 0.73
1.21.2 TACTICAL UNIT/ Engineer/		CPS DI = 4.28
1.21.3 TACTICAL UNIT/ Engineer/ bridging		NATO D-49(1980) DI = 2.13
1.21.4 TACTICAL UNIT/ Engineer/ bridging		FM 21-30, BETA TEST BED DI = 2.13
1.21.5 TACTICAL UNIT/ Engineer/ pipeline bridge		BETA TEST BED
1.22.1 TACTICAL UNIT/ Infantry/		FM 21-30, TOS, BETA TEST BED
1.22.2 TACTICAL UNIT/ Infantry/ armoured		FM 21-30

CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
1.22.3 TACTICAL UNIT/ Infantry/ armoured		NATO D-49(1980) DI = 0.93
1.22.4 TACTICAL UNIT/ Infantry/ mechanized		NATO D-49(1980), TOS
1.22.5 TACTICAL UNIT/ Infantry/ motorized		NATO D-49(1980)
1.23.1 TACTICAL UNIT/ Irregular Forces/		FM 21-30, NATO D-49(1980)
1.24.1 TACTICAL UNIT/ Maneuver Unit/		BETA TEST BED
1.25.1 TACTICAL UNIT/ Marines/		NATO D-49(1980)
1.26.1 TACTICAL UNIT/ Military/ intelligence		FM 21-30, TOS , NATO D-49(1980) also refers to security and interrogation
1.26.2 TACTICAL UNIT/ Military/ police		FM 21-30, NATO D-49(1980) , TOS
1.27.1 TACTICAL UNIT/ Missile/ friendly		TAOC-85

CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
1.27.2 TACTICAL UNIT/ Missile/ enemy		TAOC-ES
1.27.3 TACTICAL UNIT/ Missile/ rocket and guided		FM 21-30 For related symbols see AD unit and AD weapon symbols.
1.27.4 TACTICAL UNIT/ Missile/		NATO D-49(1980)
1.27.5 TACTICAL UNIT/ Missile/		AF E-3A PPI
1.27.6 TACTICAL UNIT/ Missile/		AF E-3A PPI
1.27.7 TACTICAL UNIT/ Missile/		NATO D-49(1980) For related symbols see A-T weapons symbols. DI = 1.63
1.27.8 TACTICAL UNIT/ Missile/		BETA TEST BED DI = 2.13
1.27.9 TACTICAL UNIT/ Missile/ tactical		TOS
1.28.1 TACTICAL UNIT/ Mortar Fire Unit/		MIFASS Size is noted on top of symbol with size symbols.

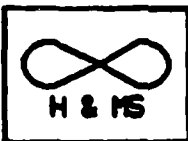
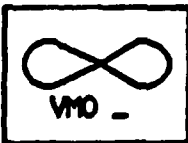
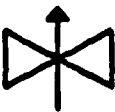






CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
1.29.1 TACTICAL UNIT/ Motor Rifle/		CPS
1.30.1 TACTICAL UNIT/ Mountain/		FM 21-30, NATO D-49(1980)
1.31.1 TACTICAL UNIT/ Movers/		BETA TEST BED DI = 5.18
1.31.2 TACTICAL UNIT/ Movers/		DIVRAS DI = 3.83
1.32.1 TACTICAL UNIT/ Navy/		NATO D-49(1980)
1.33.1 TACTICAL UNIT/ Ordnance/		FM 21-30 DI = 1.63
1.33.2 TACTICAL UNIT/ Ordnance/		NATO D-49(1980) DI = 1.63
1.34.1 TACTICAL UNIT/ Parachute/		FM 21-30 DI = 1.18
1.34.2 TACTICAL UNIT/ Parachute/		NATO D-49(1980) See Airborne unit symbol - BETA TEST BED.

CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
1.35.1 TACTICAL UNIT/ Reconnaissance/		FM 21-30, NATO D-49(1980) , TOS, BETA TEST BED, MIFASS
1.36.1 TACTICAL UNIT/ Reinforcement/ holding unit		NATO D-49(1980)
1.37.1 TACTICAL UNIT/ Shooters/		BETA TEST BED unknown shooters
1.37.2 TACTICAL UNIT/ Shooters/ artillery		DIVRAS
1.37.3 TACTICAL UNIT/ Shooters/ missile/rocket		DIVRAS
1.38.1 TACTICAL UNIT/ Signal/		FM 21-30, NATO D-49(1980) , BETA TEST BED
1.38.2 TACTICAL UNIT/ Signal/ intelligence		BETA TEST BED See electronic warfare
1.39.1 TACTICAL UNIT/ Special Forces/		NATO D-49(1980)
1.40.1 TACTICAL UNIT/ Vehicle/ light assault		TCO

CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
2.1.1 AVIATION/ Aerial/ Reconnaissance		TCO
2.2.1 AVIATION/ Antisubmarine/ Aircraft (AF)		FM 21-30
2.4.1 AVIATION/ Aviation/		CPS
2.4.2 AVIATION/ Aviation/		FM 21-30, NATO D-49(1988) , TCO
2.4.3 AVIATION/ Aviation/ Army		FM 21-30, DIVRAS DI = 3.83
2.4.4 AVIATION/ Aviation/ Army		NATO D-49(1988) DI = 5.18
2.4.5 AVIATION/ Aviation/ Army		TOS DI = 5.18
2.4.6 AVIATION/ Aviation/ Combat		BETA TEST BED symbol also represents attack helicopter
2.5.1 AVIATION/ Bomber/ Air Force		FM 21-30 this symbol represents trans- port aviation in NATO D-49


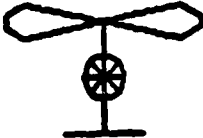
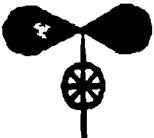





CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
2.5.2 AVIATION/ Bomber/ Air Force		NATO D-49(1980)
2.6.1 AVIATION/ Close Air Support/		MIFASS
2.7.1 AVIATION/ Drone Aircraft/ Air Force		FM 21-30
2.8.1 AVIATION/ Fighter/ Air Force		FM 21-30, NATO D-49(1980)
2.8.2 AVIATION/ Fighter/ Air Force all weather		FM 21-30
2.8.3 AVIATION/ Fighter/ bomber Air Force		FM 21-30
2.8.4 AVIATION/ Fighter/ Air Force tactical light weight strike		FM 21-30
2.8.5 AVIATION/ Fighter/ F10 (AF)		CDEC-VIDS NTC test
2.8.6 AVIATION/ Fighter/ enemy		AFR 55-25



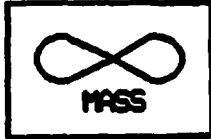
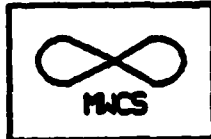
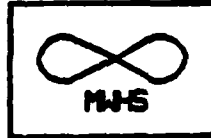

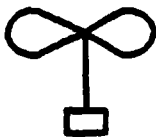


CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
2.8.7 AVIATION/ Fighter/ enemy		TOS
2.8.8 AVIATION/ Fighter/ Interceptor unpaired		AF E3A PPI Air Track
2.8.9 AVIATION/ Fighter/ Inteceptor paired		AF E3A PPI Air Track
2.9.1 AVIATION/ Fixed Wing Aircraft/ Air Force		NATO D-49(1988)
2.9.2 AVIATION/ Fixed Wing Aircraft/ light-Air Force		FM 21-38
2.9.3 AVIATION/ Fixed Wing Aircraft/ Army		NATO D-49(1988)
2.9.4 AVIATION/ Fixed Wing Aircraft/		MIFASS Air Track
2.9.5 AVIATION/ Fixed Wing Aircraft/ attack squadron		TCO VMA plus three numbers
2.9.6 AVIATION/ Fixed Wing Aircraft/ fighter attack		TCO VFA plus 3 numbers

CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
2.9.7 AVIATION/ Fixed Wing Aircraft/ HQ and Maintenance		TCO
2.9.8 AVIATION/ Fixed Wing Aircraft/ observation		TCO
2.10.1 AVIATION/ Ground Attack/ aircraft		BETA TEST BED
2.10.2 AVIATION/ Ground Attack/ aircraft A10		CDEC-VIDS NTC Test
2.11.1 AVIATION/ Helicopter/		BETA TEST BED note Army helicopter symbol- NATO
2.11.2 AVIATION/ Helicopter/		BETA TEST BED symbol represents helos or helo lz
2.11.3 AVIATION/ Helicopter/		MIFASS Air Track
2.11.4 AVIATION/ Helicopter/		PLRS rotary wing or low performance aircraft
2.11.5 AVIATION/ Helicopter/ Air Force		FM 21-30, NATO D-49(1980) , TCO

CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
2.11.6 AVIATION/ Helicopter/ Army		FM 21-30 DI = 4.33
2.11.7 AVIATION/ Helicopter/ Army		NATO D-49(1980) DI = 5.68
2.11.8 AVIATION/ Helicopter/ antitank		NATO D-49(1980)
2.11.9 AVIATION/ Helicopter/ attack		TOS DI = 5.68
2.11.10 AVIATION/ Helicopter/ attack		BETA TEST BED also represents combat aviation DI = 1.63
2.11.11 AVIATION/ Helicopter/ attack		CDEC-VIDS
2.11.12 AVIATION/ Helicopter/ attack		TCO
2.11.13 AVIATION/ Helicopter/ combat		NATO D-49(1980)
2.11.14 AVIATION/ Helicopter/ enemy		TOS sighted enemy helicopter

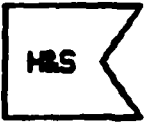

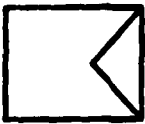

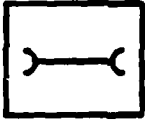




CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
2.11.15 AVIATION/ Helicopter/ air track enemy		TAOC-ES unknown helo/transport-enemy or friend
2.11.16 AVIATION/ Helicopter/ enemy		TAOC-ES Air Track symbol for hostile, general, helo/transport
2.11.17 AVIATION/ Helicopter/ enemy		TACC, ITAOC Air Track symbol for unknown, assumed enemy helo
2.11.18 AVIATION/ Helicopter/ enemy		MIFASS Air Target Symbol
2.11.19 AVIATION/ Helicopter/ friend		AF E-3A PPI Air Track for unpaired friendly helo
2.11.20 AVIATION/ Helicopter/ friend		AF E-3A PPI Air Track for paired friendly helo
2.11.21 AVIATION/ Helicopter/ friend		AF 487L/485 L T Air Track for unpaired friendly helo
2.11.22 AVIATION/ Helicopter/ friend		AF 487L/485 L T Air Track for paired friendly helo
2.11.23 AVIATION/ Helicopter/ friend		TACC, ITAOC, TAOC-ES Air Track for friendly helo, general, no statement










CATEGORY/CONCEPT	SYMBOL	SOURCE AND REMARKS
2.11.24 AVIATION/ Helicopter/ friend		TACC, ITAC Air Track for unknown, assumed friendly helo/transport
2.11.26 AVIATION/ Helicopter/ heavy		TOS see also transport helo symbol
2.11.27 AVIATION/ Helicopter/ heavy army		FM 21-30 see also transport helo symbol
2.11.28 AVIATION/ Helicopter/ OH-58		CDEC-VIDS
2.11.29 AVIATION/ Helicopter/ pickup		MIFASS
2.11.30 AVIATION/ Helicopter/ delivery		MIFASS
2.11.31 AVIATION/ Helicopter/ transport Air Force		FM 21-30
2.12.1 AVIATION/ High Performance/ aircraft		PLRS



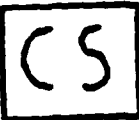






CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
2.13.1 AVIATION/ Marine/ Air Control Group		TCO
2.13.2 AVIATION/ Marine/ Air Control		TCO
2.13.3 AVIATION/ Marine/ Air Support		TCO
2.13.4 AVIATION/ Marine/ Wing Command		TCO
2.13.5 AVIATION/ Marine/ Wing HQ Squadron		TCO
2.13.6 AVIATION/ Marine/ Wing Support Group		TCO
2.14.1 AVIATION/ Medevac/		MIFASS unit size is noted below symbol
2.15.1 AVIATION/ Plane/		TOS sighted enemy plane with cargo characteristics
2.16.1 AVIATION/ Reconnaissance/ Air Force		FM 21-30, NATO D-49(1980)









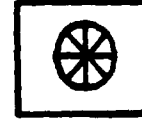
CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
2.16.2 AVIATION/ Reconnaissance/ light weight Air Force		FM 21-30
2.17.1 AVIATION/ Rescue/ Air Force		FM 21-30 note similarity to Medevac symbol
2.18.1 AVIATION/ Seaplane/		FM 21-30
2.19.1 AVIATION/ Transport/		NATO D-49(1980) this symbol represents an AF bomber in FM 21-30
2.19.2 AVIATION/ Transport/ Air Force		FM 21-30
2.20.1 AVIATION/ Airfield/		FM 21-30, TCO
2.20.2 AVIATION/ Airfield/		BETA TEST BED
2.21.1 AVIATION/ Landing Site/		FM 21-30, TCO
2.21.2 AVIATION/ Landing Site/		NATO D-49(1980)










CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
2.21.3 AVIATION/ Landing Site/ helicopter		FM 21-30, TCO
2.21.4 AVIATION/ Landing Site/ helicopter		NATO D-49(1980)
2.22.1 AVIATION/ Landing Zone/ helicopter		BETA TEST BED
2.23.1 AVIATION/ Seaplane Station/		FM 21-30, TCO
3.1.1 COMBAT SER. SUPPORT/ Brigade/ service support group		TCO
3.2.1 COMBAT SER. SUPPORT/ Data Processing/ Unit		NATO D-49(1980)
3.3.1 COMBAT SER. SUPPORT/ Dental/		TCO
3.4.1 COMBAT SER. SUPPORT/ Engineer/		TCO
3.5.1 COMBAT SER. SUPPORT/ Force/ service support group		TCO

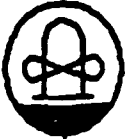
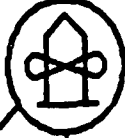







CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
3.6.1 COMBAT SER. SUPPORT/ Headquarters/ and service		TCO
3.7.1 COMBAT SER. SUPPORT/ Landing/ support		TCO
3.8.1 COMBAT SER. SUPPORT/ Logistics Unit/		NATO D-49(1980) unspecific or multirole DI = 1.63
3.8.2 COMBAT SER. SUPPORT/ Logistics Unit/		NATO D-49(1980) unspecified multirole for some nations DI = 0.73
3.9.1 COMBAT SER. SUPPORT/ Maintenance/		FM 21-30, NATO D-49(1980) , BETA TEST BED
3.9.2 COMBAT SER. SUPPORT/ Maintenance/ aviation		TOS note symbol for maintenance transportation - 3.9.4
3.9.3 COMBAT SER. SUPPORT/ Maintenance/ signal		TOS note symbol 3.9.5
3.9.4 COMBAT SER. SUPPORT/ Maintenance/ transportation		FM 21-30 note symbol 3.9.2
3.9.5 COMBAT SER. SUPPORT/ Maintenance/ and supply		FM 21-30 note symbol 3.9.3

CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
3.10.1 COMBAT SER. SUPPORT/ Marine Amphibious/ unit service support grp.		TCO
3.11.1 COMBAT SER. SUPPORT/ Medical/		FM 21-30, NATO D-49(1980) , TOS, BETA TEST BED DI = 1.63
3.11.2 COMBAT SER. SUPPORT/ Medical/		NATO D-49(1980) specific to Turkey DI = 1.63
3.12.1 COMBAT SER. SUPPORT/ Aero Medical/		TOS
3.13.1 COMBAT SER. SUPPORT/ Motor Transport/		TCO
3.14.1 COMBAT SER. SUPPORT/ Personnel & Admin./		FM 21-30, TOS
3.15.1 COMBAT SER. SUPPORT/ Petroleum Supply/		TOS
3.16.1 COMBAT SER. SUPPORT/ Shore Party Team/		TCO
3.17.1 COMBAT SER. SUPPORT/ Supply/		TCO





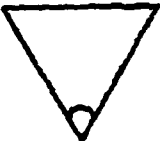
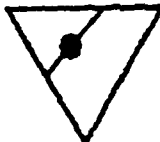
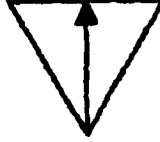

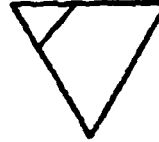
CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
3.18.1 COMBAT SER. SUPPORT/ Support/		OPS DI = 5.18
3.18.2 COMBAT SER. SUPPORT/ Support/		FM 21-30, TOS DI = 8.73
3.18.3 COMBAT SER. SUPPORT/ Support/ combat		TOS, BETA TEST BED
3.18.4 COMBAT SER. SUPPORT/ Support/ combat service		BETA TEST BED
3.18.5 COMBAT SER. SUPPORT/ Support/ command		BETA TEST BED
3.18.6 COMBAT SER. SUPPORT/ Support/ corps		TOS DI = 8.73
3.18.7 COMBAT SER. SUPPORT/ Support/ corps		FM 21-30 DI = 4.78
3.18.8 COMBAT SER. SUPPORT/ Support/ general		TOS
3.19.1 COMBAT SER. SUPPORT/ Rear Area Operations/ center		TOS

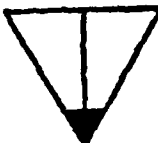
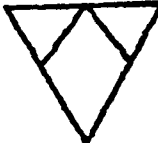
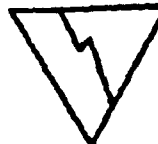
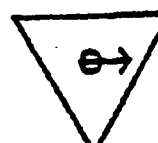





CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
3.20.1 COMBAT SER. SUPPORT/ Service/		FM 21-30, TOS
3.21.1 COMBAT SER. SUPPORT/ Supply/		FM 21-30 DI = 0.28
3.21.2 COMBAT SER. SUPPORT/ Supply/		NATO D-49(1980) note symbol 3.22.1 DI = 1.63
3.21.3 COMBAT SER. SUPPORT/ Supply/		TOS DI = 1.63
3.21.4 COMBAT SER. SUPPORT/ Supply/ class V		TOS
3.21.5 COMBAT SER. SUPPORT/ Supply/ and transportation		TOS
3.22.1 COMBAT SER. SUPPORT/ Trains/		BETA TEST BED DI = 1.63 note symbol 3.21.2
3.22.2 COMBAT SER. SUPPORT/ Trains/		FM 21-30 DI = 2.13
3.23.1 COMBAT SER. SUPPORT/ Transportation/		FM 21-30, NATO D-49(1980) , TOS, BETA TEST BED


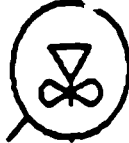







CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
4.1.1 INSTALLATIONS/ Ammunition/		FM 21-30, TCO DI = 4.38
4.1.2 INSTALLATIONS/ Ammunition/		NATO D-49(1980) DI = 4.33
4.1.3 INSTALLATIONS/ Ammunition/ air defense		NATO D-49(1980)
4.1.4 INSTALLATIONS/ Ammunition/ air defense missiles		NATO D-49(1980)
4.1.5 INSTALLATIONS/ Ammunition/ armoured		NATO D-49(1980)
4.1.6 INSTALLATIONS/ Ammunition/ artillery		FM 21-30
4.1.7 INSTALLATIONS/ Ammunition/ artillery gun		NATO D-49(1980)
4.1.8 INSTALLATIONS/ Ammunition/ artillery missile		NATO D-49(1980)
4.1.9 INSTALLATIONS/ Ammunition/ artillery rocket		NATO D-49(1980)



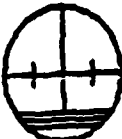






CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
4.1.10 INSTALLATIONS/ Ammunition/ aviation Air Force		FM 21-30, TCO DI = 5.78
4.1.11 INSTALLATIONS/ Ammunition/ aviation Air Force		NATO D-49(1980) DI = 5.73
4.1.12 INSTALLATIONS/ Ammunition/ aviation Army		FM 21-30 DI = 5.78
4.1.13 INSTALLATIONS/ Ammunition/ aviation Army		NATO D-49(1980) DI = 5.73
4.1.14 INSTALLATIONS/ Ammunition/ conventional		FM 21-30, TCO
4.1.15 INSTALLATIONS/ Ammunition/ rocket and guided missile		FM 21-30, TCO
4.1.16 INSTALLATIONS/ Ammunition/ small arms		FM 21-30, TCO DI = 5.78
4.1.17 INSTALLATIONS/ Ammunition/ small arms		NATO D-49(1980) DI = 3.48
4.1.18 INSTALLATIONS/ Ammunition/ special		FM 21-30







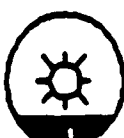


CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
4.1.19 INSTALLATIONS/ Ammunition/ storage		BETA TEST BED DI = 5.23
4.1.20 INSTALLATIONS/ Ammunition/ storage		TOS DI = 5.73
4.2.1 INSTALLATION/ Clothing/ class II		FM 21-30 Letters B,E,F,M or T below symbol show subclassification
4.3.1 INSTALLATIONS/ Collecting Point/ civilian		FM 21-30, TCO
4.3.2 INSTALLATIONS/ Collecting Point/ maintenance		FM 21-30, TCO
4.3.3 INSTALLATIONS/ Collecting Point/ prisoners of war		FM 21-30, TCO
4.3.4 INSTALLATIONS/ Collecting Point/ salvage		FM 21-30, TCO
4.3.5 INSTALLATIONS/ Collecting Point/ stragglers		FM 21-30, TCO
4.4.1 INSTALLATIONS/ Construction/		FM 21-30










CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
4.4.2 INSTALLATIONS/ Construction/ bridging		NATO D-49(1980)
4.4.3 INSTALLATIONS/ Construction/ bridging		BETA TEST BED
4.4.4 INSTALLATIONS/ Construction/ engineers		NATO D-49(1980)
4.5.1 INSTALLATIONS/ Decontamination/		NATO D-49(1980)
4.6.1 INSTALLATIONS/ Electronic/ air defense radar		NATO D-49(1980) see also COMMUNICATIONS symbols
4.6.2 INSTALLATIONS/ Electronic/ artillery locating		NATO D-49(1980)
4.6.3 INSTALLATIONS/ Electronic/ emitting		NATO D-49(1980)
4.6.4 INSTALLATIONS/ Electronic/ electronic warfare		NATO D-49(1980)
4.6.5 INSTALLATIONS/ Electronic/ ground sensor surveillance		NATO D-49(1980)








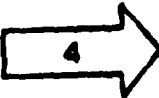

CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
4.6.6 INSTALLATIONS/ Electronic/ intercepting		NATO D-49(1980)
4.6.7 INSTALLATIONS/ Electronic/ jamming		NATO D-49(1980)
4.6.8 INSTALLATIONS/ Electronic/ signal communication		NATO D-49(1980)
4.6.9 INSTALLATIONS/ Electronic/ target designator		NATO D-49(1980)
4.6.10 INSTALLATIONS/ Electronic/ unknown		NATO D-49(1980)
4.7.1 INSTALLATIONS/ Food/		NATO D-49(1980) see also 4.28.1
4.8.1 INSTALLATIONS/ Fuel/		NATO D-49(1980) DI = 5.23
4.8.2 INSTALLATIONS/ Fuel/		BETA TEST BED DI = 5.23
4.8.3 INSTALLATIONS/ Fuel/		TOS DI = 5.73

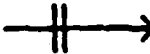
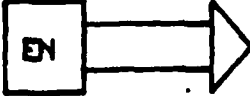

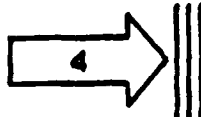




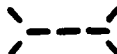
CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
4.8.4 INSTALLATIONS/ Fuel/ aviation Air Force		FM 21-30, TCO DI = 6.68
4.8.5 INSTALLATIONS/ Fuel/ aviation Air Force		NATO D-49(1988) DI = 6.63
4.8.6 INSTALLATIONS/ Fuel/ aviation Air Force		FM 21-30 Inconsistent with 4.1.12 DI = 5.33
4.8.7 INSTALLATIONS/ Fuel/ aviation Army		NATO D-49(1988) DI = 6.63
4.8.8 INSTALLATIONS/ Fuel/ ground		FM 21-30, TCO
4.8.9 INSTALLATIONS/ Fuel/ solid		FM 21-30
4.9.1 INSTALLATIONS/ Maintenance/		NATO D-49(1988)
4.10.1 INSTALLATIONS/ Major End Items/		FM 21-30
4.11.1 INSTALLATIONS/ Medical/		NATO D-49(1988) DI = 5.23

CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
4.11.2 INSTALLATIONS/ Medical/		TOS DI = 4.33
4.11.3 INSTALLATIONS/ Medical Supply/		Fm 21-38, TCO DI = 4.38
4.11.4 INSTALLATIONS/ Medical Supply/		TOS DI = 5.73
4.12.1 INSTALLATIONS/ Hospital/ or aid station		FM 21-38, TOS, TCO DI = 4.33
4.12.2 INSTALLATIONS/ Hospital/ or aid station		NATO D-49(1980) DI = 4.33
4.13.1 INSTALLATIONS/ Mines/ explosives		NATO D-49(1980)
4.14.1 INSTALLATIONS/ Missile Supply/		TCO, BETA TEST BED
4.15.1 INSTALLATIONS/ Multi-Class/ supply		FM 21-38, TCO classes available placed below symbol
4.15.2 INSTALLATIONS/ Multi-Class/ supply		TOS






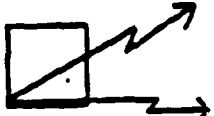
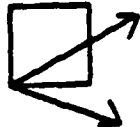

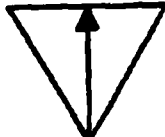
CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
4.15.3 INSTALLATIONS/ Multi-Class/ aviation supply		TOS
4.16.1 INSTALLATIONS/ Multirole/		NATO D-49(1988) also represents unspecified role
4.17.1 INSTALLATIONS/ Nuclear Storage/		NATO D-49(1988)
4.18.1 INSTALLATIONS/ Ordnance/		TOS DI = 5.73
4.18.2 INSTALLATIONS/ Ordnance/		NATO D-49(1988) DI = 6.18
4.19.1 INSTALLATIONS/ Personal Demand/ items		FM 21-38
4.20.1 INSTALLATIONS/ Repair Parts/		FM 21-38
4.21.1 INSTALLATIONS/ Subsistence/		FM 21-38 subclassification shown with letters R, S, C below symbol
4.22.1 INSTALLATIONS/ Supply/		NATO D-49(1988)





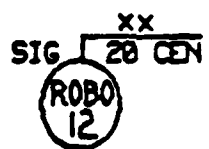

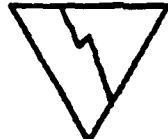

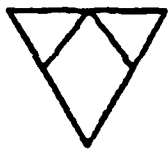
CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
4.23.1 INSTALLATIONS/ Traffic Control/		FM 21-30
4.23.2 INSTALLATIONS/ Traffic Control/		NATO D-49(1980)
4.24.1 INSTALLATIONS/ Unknown Logistic/ Installation		NATO D-49(1980)
4.25.1 INSTALLATIONS/ Water/		NATO D-49(1980)
5.1.1 MEASLE/ Communication/		DIVRAS
5.2.1 MEASLE/ Helicopter/		TCO
5.3.1 MEASLE/ Missile/ (SAM)		TCO
5.3.2 MEASLE/ Missile/ or rocket		DIVRAS
5.4.1 MEASLE/ Radar/		DIVRAS

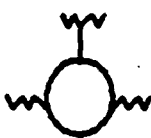





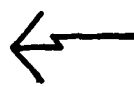

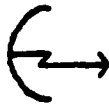
CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
5.4.2 MEASLE/ Radar/		TCO, BETA TEST BED
5.5.1 MEASLE/ Radio/		TCO, BETA TEST BED
5.6.1 MEASLE/ Shooter/		TCO, BETA TEST BED
5.6.2 MEASLE/ Shooter/		DIVRAS
5.7.1 MEASLE/ Vehicle/ tracked		TCO, BETA TEST BED, DIVRAS
5.7.2 MEASLE/ Vehicle/ wheeled		BETA TEST BED
5.7.3 MEASLE/ Vehicle/ wheeled		TCO
6.1.1 ACTIVITY/ Action/ threat force advancing		DIVRAS Numerals indicate count of manuever battalion
6.1.2 ACTIVITY/ Action/ delaying, enemy		NATO D-49(1988)

CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
6.1.3 ACTIVITY/ Action/ delaying friend		NATO D-49(1980) non-static
6.1.4 ACTIVITY/ Action/ direction enemy		NATO D-49(1980) non-static
6.1.5 ACTIVITY/ Action/ direction friend		NATO D-49 non-static
6.1.6 ACTIVITY/ Action/ blocked		DIVRAS numerals indicate count of maneuver battalion
6.1.7 ACTIVITY/ Action/ ambush		TCO, FM 21-30 Point of arrow at map location.
6.1.8 ACTIVITY/ Action/ firefights		TCO, FM 21-30 point of arrow at map location
6.1.9 ACTIVITY/ Action/ harrassing fire		TCO, FM 21-30 point of last arrow at map location
6.2.1 ACTIVITY/ Bridging/ enemy		TOS
6.3.1 ACTIVITY/ Ferrying/ enemy		TOS


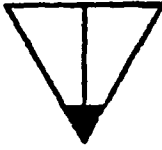
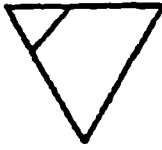





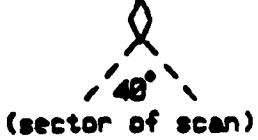
CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
6.4.1 ACTIVITY/ Movement/		TCO, FM 21-38 solid arrow=unit position broken arrow=possible mmt.
6.4.2 ACTIVITY/ Movement/ air force friendly		NATO D-49(1980) non-static
6.4.3 ACTIVITY/ Movement/ army air friendly		NATO D-49(1980) non-static
6.4.4 ACTIVITY/ Movement/ air, enemy		NATO D-49(1980) Symbol in center of arrow line indicates unit type.
6.4.5 ACTIVITY/ Movement/ ground		NATO D-49 (1980) non-static
6.4.6 ACTIVITY/ Movement/ reconnaissance		NATO D-49(1980) non-static
6.5.1 ACTIVITY/ Formation/ artillery		NATO D-49(1980) static
6.5.2 ACTIVITY/ Formation/ defense enemy		NATO D-49(1980), static
6.5.3 ACTIVITY/ Formation/ defense friend		NATO D-49(1980) static









CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
6.5.4 ACTIVITY/ Formation/ reserve stationary		DIVRAS
6.5.5 ACTIVITY/ Formation/ blocking		DIVRAS numeral indicates amount of force
6.6.1 ACTIVITY/ Destroyed/		TCO, FM 21-30 superimposed over referred symbol
6.7.1 ACTIVITY/ Phoney/		TCO, FM 21-30 normally placed over referred symbol
6.8.1 ACTIVITY/ Propoganda/		TCO, FM 21-30 mouthpiece of megaphone at map location
6.9.1 ACTIVITY/ Reconnaissance/ area		NATO D-49(1988) static
6.10.1 ACTIVITY/ Responsibility/ arc of		TOS
6.11.1 ACTIVITY/ Snorkeling/		TOS
7.1.1 COMMUNICATION/ Exit/ Exiting		NATO D-49(1988)







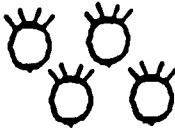


CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
7.1.2 COMMUNICATION/ Emit/ Emitters		DIVRAS ⋮
7.1.3 COMMUNICATION/ Emit/ emitter - radar		DIVRAS see also Radar
7.2.1 COMMUNICATION/ Message Center/		FM 21-30
7.3.1 COMMUNICATION/ Signal/		CPS
7.3.2 COMMUNICATION/ Signal/ center signal area		FM 21-30 sig. ctr. not at CP post or HQ (unit code inside circle)
7.3.3 COMMUNICATION/ Signal/ center		FM 21-30 see also INSTALLATIONS, Electronic (4.6)
7.3.4 COMMUNICATION/ Signal/ communication		NATO D-49(1980)
7.4.1 COMMUNICATION/ Commo Site/		BETA TEST BED
7.5.1 COMMUNICATION/ Jamming/		NATO D-49(1980)










CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
7.5.2 COMMUNICATION/ Jamming/ communication		TCO, FM 21-38
7.5.3 COMMUNICATION/ Jamming/ radar		TCO
7.5.4 COMMUNICATION/ Jamming/ surface		TCO, BETA TEST BED
7.6.1 COMMUNICATION/ Radar/ antenna		BETA TEST BED
7.6.2 COMMUNICATION/ Radar/		BETA TEST BED, DIVRAS letters placed below symbol indicate type ie AD, GCI
7.6.3 COMMUNICATION/ Radar/		NATO D-49(1988)
7.6.4 COMMUNICATION/ Radar/		CPS
7.6.5 COMMUNICATION/ Radar/ fan		CPS
7.6.6 COMMUNICATION/ Radar/ intercept and DF station		TCO

CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
7.6.7 COMMUNICATION/ Radar/ station		TCO, FM 21-30 : letters placed below symbol indicate type
7.6.8 COMMUNICATION/ Radar/ site - enemy		AF E-3A PPI
7.6.9 COMMUNICATION/ Radar/ site - friendly		AF E-3A PPI
7.6.11 COMMUNICATION/ Radar/ air defense		NATO D-49(1980)
7.6.12 COMMUNICATION/ Radar/ artillery locating		NATO D-49(1980)
7.6.13 COMMUNICATION/ Radar/ electronic warfare		NATO D-49(1980)
7.6.14 COMMUNICATION/ Radar/ electronic warfare below 5,000 ft.		AFR 55-25
7.6.15 COMMUNICATION/ Radar/ electronic warfare above 5,000 ft.		AFR 55-25
7.6.16 COMMUNICATION/ Radar/ GCS below 5,000 ft.		AFR 55-25

CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
7.6.17 COMMUNICATION/ Radar/ GCS above 5,000 ft.		AFR 55-25
7.6.18 COMMUNICATION/ Radar/ intercept		NATO D-49(1980)
7.6.19 COMMUNICATION/ Radar/ ground sensor surveillance		NATO D-49(1980)
7.6.20 COMMUNICATION/ Radar/ sensor commandable		TCO
7.6.21 COMMUNICATION/ Radar/ sensor monitor station		TCO
7.6.22 COMMUNICATION/ Radar/ sensor monitor receiving only		TCO
7.6.23 COMMUNICATION/ Radar/ sensor monitor with mast antenna		TCO extended range receiving & controlling capabilities
7.6.24 COMMUNICATION/ Radar/ sensor relay station		TCO
7.6.25 COMMUNICATION/ Radar/ sensor systems	 (sector of scan)	TCO

CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
9.9.1 OBSTACLES AND FORT/ Vegetation/ swamp or marsh		DIVRAS green
9.9.2 OBSTACLES AND FORT/ Vegetation/		DIVRAS
9.10.1 OBSTACLES AND FORT/ Toxic Agent/	HD ▼▼▼ HD	FM 21-30 type shown on outside of symbol
9.11.1 OBSTACLES AND FORT/ Trenches/ dug-out		FM 21-30
9.11.2 OBSTACLES AND FORT/ Trenches/ fortified		FM 21-30
9.11.3 OBSTACLES AND FORT/ Trenches/ fortified area		FM 21-30
9.11.4 OBSTACLES AND FORT/ Trenches/ foxhole, weapons, emplacement		TCO
9.11.5 OBSTACLES AND FORT/ Trenches/ pillbox or casement		TCO, FM 21-30
9.11.6 OBSTACLES AND FORT/ Trenches/ surface strong point		FM 21-30 may be combined with unit size symbol



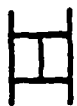




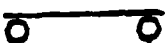

CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
9.11.7 OBSTACLES AND FORT/ Trenches/ shelter surface (above ground)		FM 21-30
9.11.8 OBSTACLES AND FORT/ Trenches/ shelter underground		FM 21-30
9.11.9 OBSTACLES AND FORT/ Trenches/ any trench system		FM 21-30
9.11.10 OBSTACLES AND FORT/ Trenches/ trench with firing bays		FM 21-30
9.11.11 OBSTACLES AND FORT/ Trenches/ weapon slit, foxhole or emplacement		FM 21-30 Other symbols and numbers may be added.
9.12.1 OBSTACLES AND FORT/ Zone/ air attack		DIVRAS
9.12.2 OBSTACLES AND FORT/ Zone/ artillery fire		DIVRAS
10.1.1 VEHICLES/ Amphibious/ armoured		FM 21-30 body type
10.1.2 VEHICLES/ Amphibious/ light assault wheeled		TCO










CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
10.1.3 VEHICLES/ Amphibious/ cargo		FM 21-30 body type
10.2.1 VEHICLES/ Animal/		FM 21-30 means of mobility
10.3.1 VEHICLES/ Armoured/ assault gun - light		FM 21-30, TCO
10.3.2 VEHICLES/ Armoured/ assault gun - medium		FM 21-30, TCO
10.3.3 VEHICLES/ Armoured/ assault gun - heavy		FM 21-30, TCO
10.3.4 VEHICLES/ Armoured/ personnel carrier		NATO D-49(1988)
10.3.5 VEHICLES/ Armoured/ personnel carrier light		TCO , FM 21-30
10.3.6 VEHICLES/ Armoured/ personnel carrier medium		TCO, FM 21-30
10.3.7 VEHICLES/ Armoured/ personnel carrier heavy		TCO, FM 21-30










CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
10.3.8 VEHICLES/ Armoured/ reconnaissance vehicle, light		FM 21-30, TCO
10.3.9 VEHICLES/ Armoured/ reconnaissance vehicle, medium		FM 21-30, TCO
10.3.10 VEHICLES/ Armoured/ reconnaissance vehicle, heavy		FM 21-30, TCO
10.4.1 VEHICLES/ Boat/ or barge		TCO, FM 21-30 means of mobility
10.5.1 VEHICLES/ C-Cube/		BETA TEST BED
10.6.1 VEHICLES/ Cargo/ wheeled vehicle		TCO
10.7.1 VEHICLES/ Engine/ locomotive		FM 21-30 body types
10.8.1 VEHICLES/ Ferry/		TCO
10.9.1 VEHICLES/ Hovercraft/		NATO D-49(1980)

CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
10.10.1 VEHICLES/ ICV/ threat vehicle 73mm		CDEC-VIDS armval
10.11.1 VEHICLES/ Landing Vehicle/ TC		TCO
10.11.12 VEHICLES/ Landing Vehicle/ TE		TCO
10.11.13 VEHICLES/ Landing Vehicle/ TP		TCO
10.11.14 VEHICLES/ Landing Vehicle/ TR		TCO
10.12.1 VEHICLES/ MICV/		NATO D-49(1980)
10.13.1 VEHICLES/ Marine/ surrogate, LCV		CDEC-VIDS armval
10.14.1 VEHICLES/ Operational/ armoured		FM 21-30 body types (see also 12.23.2 and 12.25.1)
10.14.2 VEHICLES/ Operational/ unarmoured		FM 21-30 body types





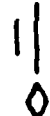


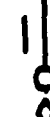

CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
10.15.1 VEHICLES/ Over-snow		FM 21-30 means of mobility
10.16.1 VEHICLES/ Personnel/ and/or cargo carrying		FM 21-30 body types see also 10.26.2
10.17.1 VEHICLES/ Railway		FM 21-30 means of mobility
10.18.1 VEHICLES/ Reconnaissance		BETA TEST BED
10.18.2 VEHICLES/ Reconnaissance/ threat BRDM		CDEC-VIDS armval
10.18.3 VEHICLES/ Reconnaissance		NATO D-49(1988)
10.19.1 VEHICLES/ Ship/ Navy		NATO D-49(1988)
10.20.1 VEHICLES/ Sledge/sled/ towed		FM 21-30 means of mobility
10.21.1 VEHICLES/ Submarine		NATO D-49(1988)










CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
10.22.1 VEHICLES/ Tank/ M1-i		CDEC-VIDS NTC
10.22.2 VEHICLES/ Tank/ light		NATO D-49(1980), FM 21-30 , TCO, BETA TEST BED
10.22.3 VEHICLES/ Tank/ medium		NATO D-49(1980), FM 21-30 , TCO, BETA TEST BED
10.22.4 VEHICLES/ Tank/ heavy		NATO D-49(1980), FM 21-30 , TCO, BETA TEST BED
10.23.1 VEHICLES/ Tracked/ self-propelled		FM 21-30 means of mobility
10.23.2 VEHICLES/ Tracked/ or half-tracked		FM 21-30 means of mobility
10.24.1 VEHICLES/ Train/		BETA TEST BED
10.25.1 VEHICLES/ wheeled/		FM 21-30 means of mobility
10.25.2 VEHICLES/ wheeled/ cross country		FM 21-30 means of mobility

CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
10.25.3 VEHICLES/ Wheeled/ self-propelled		FM 21-30 means of mobility
10.26.1 VEHICLES/ Unspecified/ armoured		NATO D-49(1988) see also 10.23.2
10.26.2 VEHICLES/ Unspecified/ unprotected		NATO D-49(1988) see also 10.16.1
10.27.1 VEHICLES/ Vehicles/		BETA TEST BED
10.27.2 VEHICLES/ Surface/		PLRS
11.1.1 WEAPON/ Artillery/		MIFASS target symbol
11.1.2 WEAPON/ Artillery/ light or unknown		BETA TEST BED, TOS
11.1.3 WEAPON/ Artillery/ medium		BETA TEST BED, TOS
11.1.4 WEAPON/ Artillery/ heavy		BETA TEST BED, TOS

CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
11.1.5 WEAPON/ Artillery/ D/S		MIFASS immediate request
11.1.6 WEAPON/ Artillery/ G/S		MIFASS immediate request
11.1.7 WEAPON/ Artillery/		BETA TEST BED
11.1.8 WEAPON/ Artillery/		BETA TEST BED
11.1.9 WEAPON/ Artillery/		BETA TEST BED
11.1.10 WEAPON/ Artillery/ air defense		AFR 55-25 L, M or H may be placed below to specify lt, med or hv AAA.
11.1.11 WEAPON/ Artillery/ air defense		MIFASS target symbol
11.1.12 WEAPON/ Artillery/ air defense		TOS see also Gun
11.1.13 WEAPON/ Artillery/ air defense/ light or unknown		BETA TEST BED








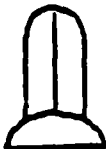
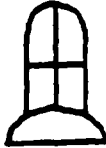
CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
11.1.14 WEAPON/ Artillery/ air defense/medium		BETA TEST BED
11.1.15 WEAPON/ Artillery/ air defense/heavy		BETA TEST BED
11.1.16 WEAPON/ Artillery/		BETA TEST BED
11.1.17 WEAPON/ Artillery/		BETA TEST BED
11.1.18 WEAPON/ Artillery/		BETA TEST BED
11.2.1 WEAPON/ Flame Thrower/ portable		FM 21-30, NATO D-49(1980) , TCO
11.2.2 WEAPON/ Flame Thrower/ vehicle mounted		FM 21-30, NATO D-49(1980) , TCO
11.3.1 WEAPON/ Gun/ howitzer, light		FM 21-30, NATO D-49(1980) , TCO, TOS
11.3.2 WEAPON/ Gun/ howitzer, medium		FM 21-30, NATO D-49(1980) , TCO, TOS

CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
11.3.3 WEAPON/ Gun/ howitzer, heavy		FM 21-30, NATO D-49(1980) , TCO, TOS
11.3.4 WEAPON/ Howitzer/ light		FM 21-30, TOS, TCO
11.3.5 WEAPON/ Howitzer/ medium		FM 21-30, TOS, TCO
11.3.6 WEAPON/ Howitzer/ heavy		FM 21-30, TOS, TCO
11.3.7 WEAPON/ Gun/ SP/light		TCO
11.3.8 WEAPON/ Gun/ SP/medium		TCO
11.3.9 WEAPON/ Gun/ SP/heavy		TCO
11.3.10 WEAPON/ Howitzer/ SP/122mm light		TOS, TCO
11.3.11 WEAPON/ Howitzer/ SP/155mm medium		TOS, TCO

CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
11.3.12 WEAPON/ Howitzer/ SP/160mm-203mm heavy		TOS, TCO
11.3.13 WEAPON/ Gun/ air defense/light		FM 21-30, NATO D-49(1980) , TCO
11.3.14 WEAPON/ Gun/ air defense/medium		FM 21-30, NATO D-49(1980) , TCO
11.3.15 WEAPON/ Gun/ air defense/heavy		FM 21-30, TCO
11.3.16 WEAPON/ Gun/ air defense artillery/low		TOS
11.3.17 WEAPON/ Gun/ air defense artillery/md, S-60		TOS
11.3.18 WEAPON/ Gun/ air defense artillery/high		TOS
11.3.19 WEAPON/ Gun/ air defense/ machine, light		FM 21-30, TCO
11.3.20 WEAPON/ Gun/ air defense/ machine, medium		FM 21-30, TCO

CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
11.3.21 WEAPON/ Gun/ air defense/ machine, heavy		FM 21-30, TCO
11.3.22 WEAPON/ Gun/ air defense/ SP, light		TCO
11.3.23 WEAPON/ Gun/ air defense/ SP, medium		TCO
11.3.24 WEAPON/ Gun/ air defense/ SP, heavy		TCO
11.3.25 WEAPON/ Gun/ air defense/ Soviet-ZSU		CDEC-VIDS armval test
11.3.26 WEAPON/ Gun/ air defense/ Soviet-ZSU-234		CDEC-VIDS armval test
11.3.27 WEAPON/ Gun/ air defense/ Soviet-ZSU		CDEC-VIDS armval test
11.3.28 WEAPON/ Gun/ air defense/ 234-vulcan		TOS
11.3.29 WEAPON/ Gun/ air defense/ chaparrel-vulcan		TOS


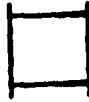







CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
11.3.30 WEAPON/ Gun/ anti-tank/light		TOS
11.3.31 WEAPON/ Gun/ anti-tank/light		NATO D-49(1988), TCO
11.3.32 WEAPON/ Gun/ anti-tank/medium		NATO D-49(1988), TCO
11.3.33 WEAPON/ Gun/ anti-tank/heavy		NATO D-49(1988), TCO
11.3.34 WEAPON/ Gun/ anti-tank role/ light		FM 21-38, NATO D-49(1988) , BETA TEST BED
11.3.35 WEAPON/ Gun/ anti-tank role/ medium		FM 21-38, NATO D-49(1988) , BETA TEST BED
11.3.36 WEAPON/ Gun/ anti-tank role/ heavy		FM 21-38, NATO D-49(1988) , BETA TEST BED
11.3.37 WEAPON/ Gun/ anti-tank, SP/ light or unknown		BETA TEST BED
11.3.38 WEAPON/ Gun/ anti-tank, SP/ medium		BETA TEST BED


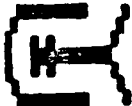







CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
11.3.39 WEAPON/ Gun/ anti-tank, heavy		BETA TEST BED
11.4.1 WEAPON/ Missile/ light		FM 21-30, TCO, MIFASS see also Rocket
11.4.2 WEAPON/ Missile/ medium		FM 21-30, TCO see also Rocket
11.4.3 WEAPON/ Missile/ heavy		FM 21-30, TCO see also Rocket
11.4.4 WEAPON/ Missile/ air defense light		FM 21-30
11.4.5 WEAPON/ Missile/ air defense medium		FM 21-30
11.4.6 WEAPON/ Missile/ air defense heavy		FM 21-30
11.4.7 WEAPON/ Missile/ surface to air light		NATO D-49(1980)
11.4.8 WEAPON/ Missile/ surface to air medium		NATO D-49(1980)










CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
11.4.9 WEAPON/ Missile/ surface to air heavy		NATO D-49(1988)
11.4.10 WEAPON/ Missile/ surface to air light		TCO
11.4.11 WEAPON/ Missile/ surface to air medium		TCO
11.4.12 WEAPON/ Missile/ surface to air heavy		TCO
11.4.13 WEAPON/ Missile/ surface to air, SP light		TCO
11.4.14 WEAPON/ Missile/ surface to air		TCO
11.4.15 WEAPON/ Missile/ surface to air		TCO
11.4.16 WEAPON/ Missile/ surface to air/ enemy		CDEC-VIDS NTC test
11.4.17 WEAPON/ Missile/ surface to air/ friendly		CDEC-VIDS NTC test

CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
11.4.18 WEAPON/ Missile/ surface to air unknown		BETA TEST BED numerals placed beneath show size.No numerals mean unk.
11.4.19 WEAPON/ Missile/ surface to air light		FM 21-30, TOS
11.4.20 WEAPON/ Missile/ surface to air medium		FM 21-30, TOS
11.4.21 WEAPON/ Missile/ surface to air heavy		FM 21-30, TOS
11.4.22 WEAPON/ Missile/ surface to air chaparral		TOS
11.4.23 WEAPON/ Missile/ surface to air/ chaparral-vulcan		AFR 55-25
11.4.24 WEAPON/ Missile/ surface to air		TOS
11.4.25 WEAPON/ Missile/ surface to air enemy		AF E-3A PPI
11.4.26 WEAPON/ Missile/ surface to air friendly		AF E-3A PPI

CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
11.4.27 WEAPON/ Missile/ surface to surface light or unknown		FM 21-30, BETA TEST BED, TOS , NATO D-49(1988)
11.4.28 WEAPON/ Missile/ surface to surface medium		FM 21-30, BETA TEST BED, TOS , NATO D-49(1988)
11.4.29 WEAPON/ Missile/ surface to surface heavy		FM 21-30, BETA TEST BED, TOS , NATO D-49(1988)
11.4.30 WEAPON/ Missile/ surface to surface wheeled, light		TCO
11.4.31 WEAPON/ Missile/ surface to surface wheeled, medium		TCO
11.4.32 WEAPON/ Missile/ surface to surface wheeled, heavy		TCO
11.4.33 WEAPON/ Missile/ surface to surface		TCO
11.4.34 WEAPON/ Missile/ surface to surface		TCO
11.4.35 WEAPON/ Missile/ surface to surface		TCO

CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
11.4.36 WEAPON/ Missile/ anti-tank		NATO D-49(1980)
11.4.37 WEAPON/ Missile/ anti-tank light		TOS
11.4.38 WEAPON/ Missile/ anti-tank light		FM 21-30, TCO
11.4.39 WEAPON/ Missile/ anti-tank medium		FM 21-30, TCO
11.4.40 WEAPON/ Missile/ anti-tank heavy		FM 21-30, TCO
11.4.41 WEAPON/ Missile/ anti-tank SP/gd		BETA TEST BED
11.4.42 WEAPON/ Missile/ anti-tank SP, light		TCO
11.4.43 WEAPON/ Missile/ anti-tank SP, medium		TCO
11.4.44 WEAPON/ Missile/ anti-tank SP, heavy		TCO

CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
11.4.45 WEAPON/ Missile/		CDEC-VIDS NTC test
11.4.46 WEAPON/ Missile/ tow, APC mounted		CDEC-VIDS NTC test
11.4.47 WEAPON/ Missile/ tow, ground		CDEC-VIDS hellfire test
11.4.48 WEAPON/ Missile/ U.S. Dragon		CDEC-VIDS armval test
11.5.1 WEAPON/ Mortar/		BETA TEST BED
11.5.2 WEAPON/ Mortar/ undifferentiated		TOS
11.5.3 WEAPON/ Mortar/		MIFASS immediate request
11.5.4 WEAPON/ Mortar/		MIFASS target
11.5.5 WEAPON/ Mortar/ light		FM 21-30, NATO D-49(1988) , TCO

CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
11.5.6 WEAPON/ Mortar/ medium		FM 21-30, NATO D-49(1980) , TCO
11.5.7 WEAPON/ Mortar/ heavy		FM 21-30, NATO D-49(1980) , TCO
11.6.1 WEAPON/ Naval Gunfire/ (DSS)		TCO, MIFASS
11.6.2 WEAPON/ Naval Gunfire/ (GSS)		TCO, MIFASS
11.6.3 WEAPON/ Naval Gunfire/ unassigned ship		TCO, MIFASS
11.7.1 WEAPON/ Rifle/ recoilless, light		FM 21-30, TCO
11.7.2 WEAPON/ Rifle/ recoilless, medium		FM 21-30, TCO
11.7.3 WEAPON/ Rifle/ recoilless, heavy		FM 21-30, TCO
11.8.1 WEAPON/ Rocket/ undifferentiated		TOS

CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
11.8.2 WEAPON/ Rocket/ light		FM 21-30, NATO D-49(1980) , TCO
11.8.3 WEAPON/ Rocket/ medium		FM 21-30, NATO D-49(1980) , TCO
11.8.4 WEAPON/ Rocket/ heavy		FM 21-30, NATO D-49(1980) , TCO
11.8.5 WEAPON/ Rocket/ manheld, laser guided		CDEC-VIDS NTC test
11.8.6 WEAPON/ Rocket/ light		FM 21-30, MIFASS See also Missile and 6.B.2.
11.8.7 WEAPON/ Rocket/ medium		FM 21-30, MIFASS See also Missile and 6.B.3
11.8.8 WEAPON/ Rocket/ heavy		FM 21-30, MIFASS See also Missile and 6.B.4.
11.9.1 WEAPON/ Rocket Launcher/ SP/light, tracked		TCO
11.9.2 WEAPON/ Rocket Launcher/ SP/medium, tracked		TCO

CATEGORY/CONCEPT/	SYMBOL	SOURCE AND REMARKS
11.9.3 WEAPON/ Rocket Launcher/ SP/heavy, tracked		TCO
11.9.4 WEAPON/ Rocket Launcher/ SP/light, wheeled		TCO
11.9.5 WEAPON/ Rocket Launcher/ SP/medium, wheeled		TCO
11.9.6 WEAPON/ Rocket Launcher/ SP/heavy, wheeled		TCO
11.9.7 WEAPON/ Rocket Launcher/ multi-barrel		BETA TEST BED
11.9.8 WEAPON/ Rocket Launcher/ multi-barrel, artillery, light		FM 21-30, NATO D-49(1980) , TOS
11.9.9 WEAPON/ Rocket Launcher/ multi-barrel, artillery, medium		FM 21-30, NATO D-49(1980) , TOS
11.9.10 WEAPON/ Rocket Launcher/ multi-barrel, artillery, heavy		FM 21-30, NATO D-49(1980) , TOS
11.10.1 WEAPON/ Weapon/		MIFASS

Part 2. Air Defense Symbols

Included in this section are symbology sets from the following systems:

AN/TSQ-51
AN/TSQ-73
Improved Hawk
Nike-Hercules
PATRIOT
ROLAND
DIVAD GUN

The symbols with explanations are taken from technical manuals associated with the specific system.

w/1-1-5

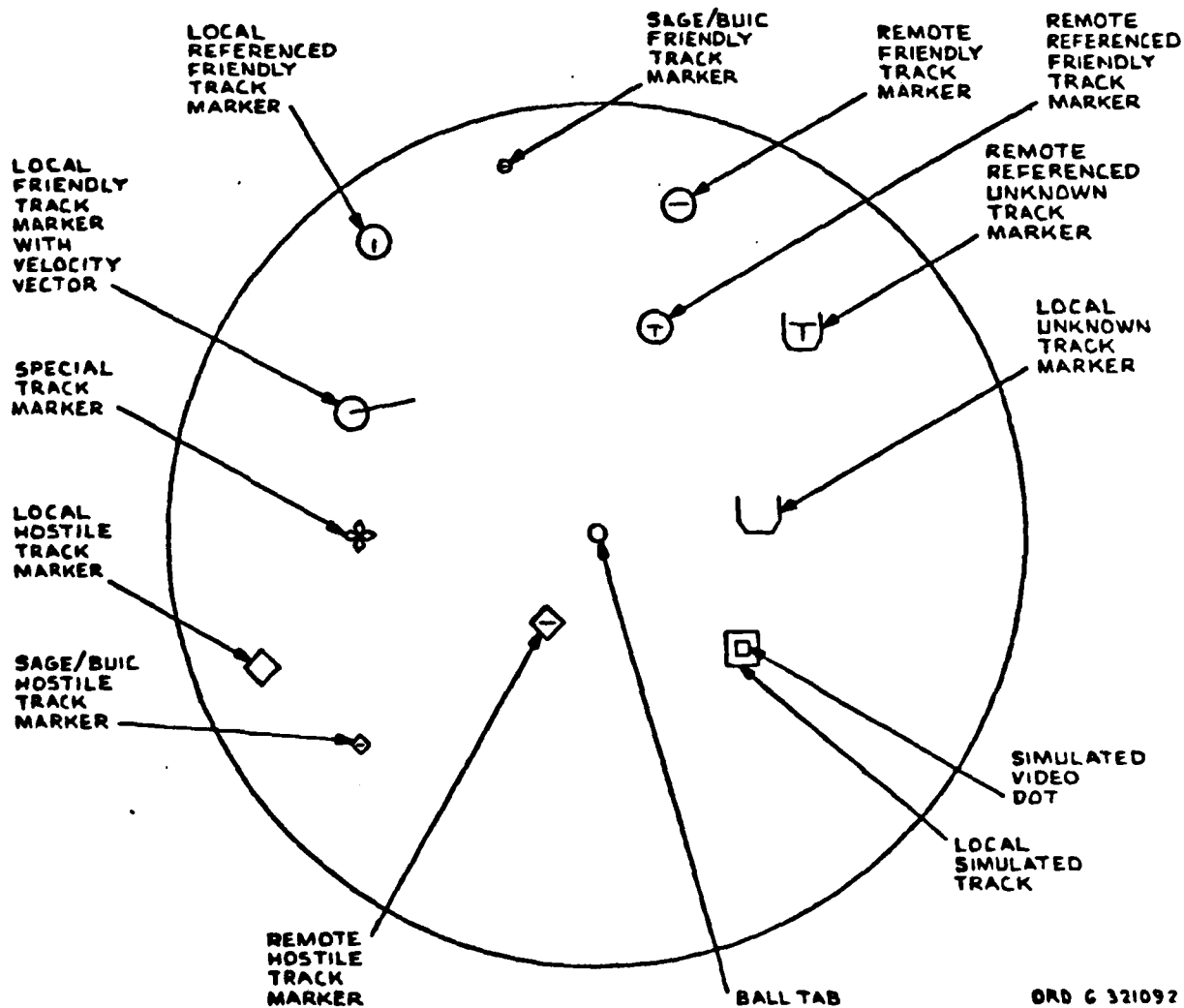
a. **Ball Tab.** The ball tab marker (fig. 1-4) is a 1/8-inch diameter circle. This marker indicates the position of the track ball.

b. **Hook.** The hook marker (fig. 1-5) is a 1/2-inch diameter circle. A hook marker surrounds the track marker symbol or target video that is in close control of a console. It also surrounds the fire unit site or tracking marker when the console is paired with the fire unit or when a command is transmitted to the fire unit.

c. **Jam Strobe.** A jam strobe (fig. 1-5) is a straight line that originates at the position of the generating site and points toward the source of an interference signal.

1-16 . Alphanumeric Data
(Fig. 1-5 and 1-6)

Each letter of the alphabet and each digit, zero through nine, can be displayed on the ppi. Alphanumeric data accompanies its related symbol and consists of two lines of four characters each (fig. 1-7). This data can be associated with track markers, fire unit site markers, and fire unit tracking markers. Fire unit site markers and special track markers are always accompanied by an alphanumeric data display; a fire unit tracking marker has its data displayed only when the marker is in close control. Unknown, friendly, and hostile track markers are displayed with their associated alphanumeric data when track data is selected for ppi display.



ORD G 321092

Figure 1-4 . Track marker symbols

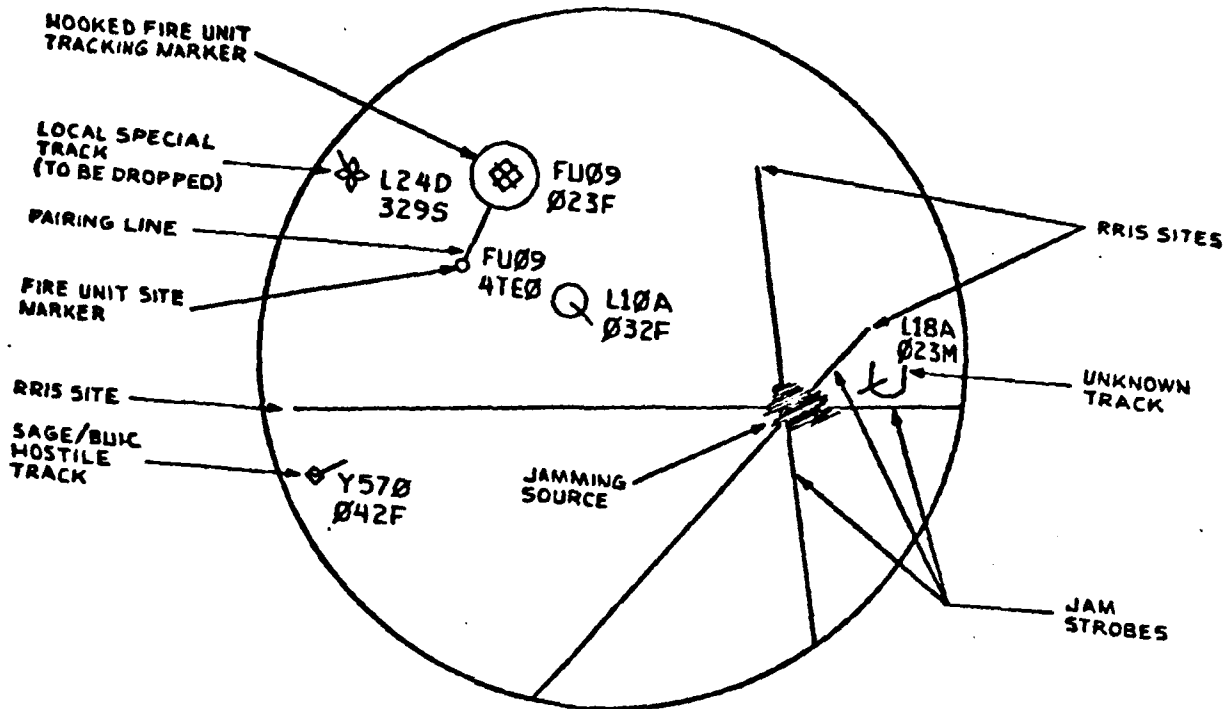


Figure 1-5 . Tactical mode ppi display

ORD G 321093

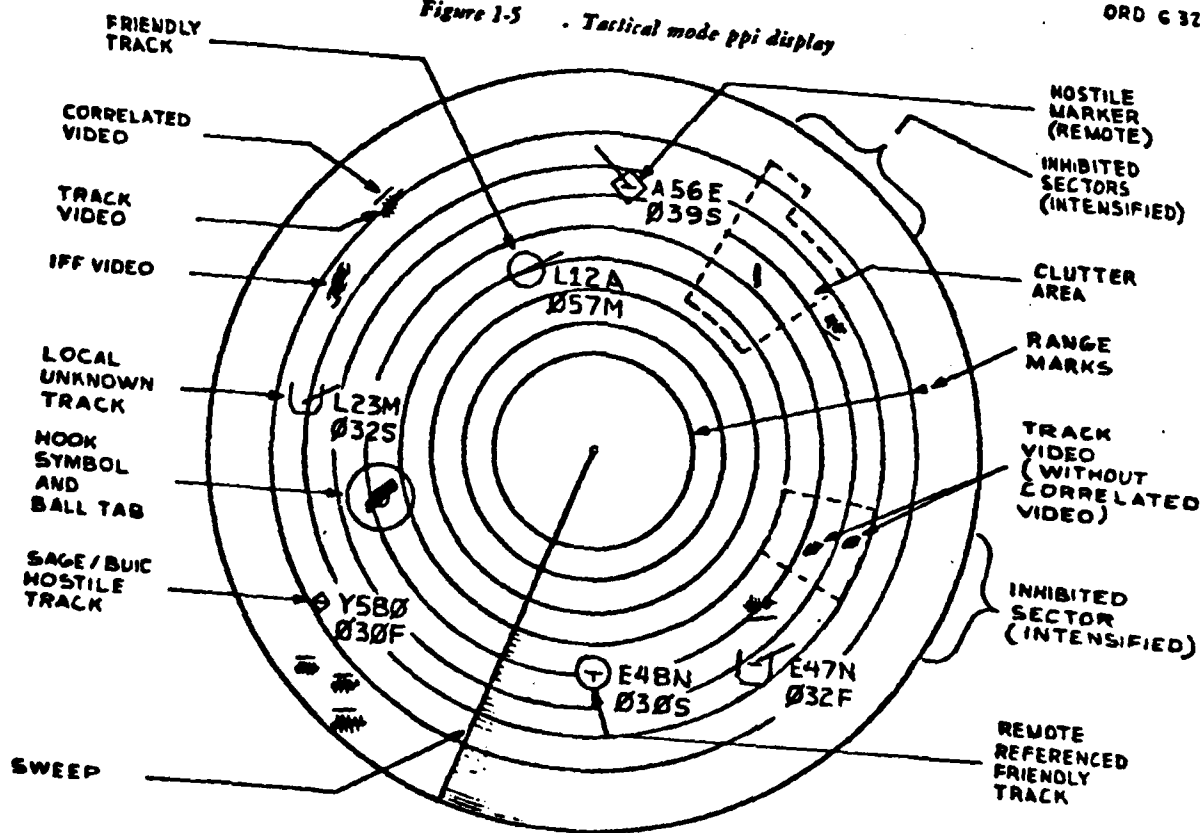


Figure 1-6 . Tracking mode ppi display

ORD G 321094

a. *Local Track Displays.* Information contained in the alphanumeric display for local friendly, unknown, and hostile track markers is shown in figure 1-8. The type of alphanumeric data displayed for local special track markers is shown in figure 1-9. A local simulated track display is shown in figure 1-10.

b. *Remote Track Displays.* Information contained in the alphanumeric display for remote friendly, unknown, and hostile track markers is shown in figures 1-11 through 1-11.3. The type of alphanumeric data displayed for remote special track markers is shown in figure 1-12.

c. *SAGE/BUIC Track Displays.* Information contained in the alphanumeric data display for friendly and hostile track markers is shown in figure 1-13. There is no display of unknown SAGE/BUIC tracks and, therefore, no alphanumeric data display. The type of alphanumeric data displayed for special SAGE/BUIC track markers is shown in figure 1-14.

d. *Fire Unit Displays.* Information contained in the alphanumeric data display for fire unit site markers is shown in figure 1-15. The type of alphanumeric data displayed when a fire unit tracking marker is hooked is shown in figure 1-16.

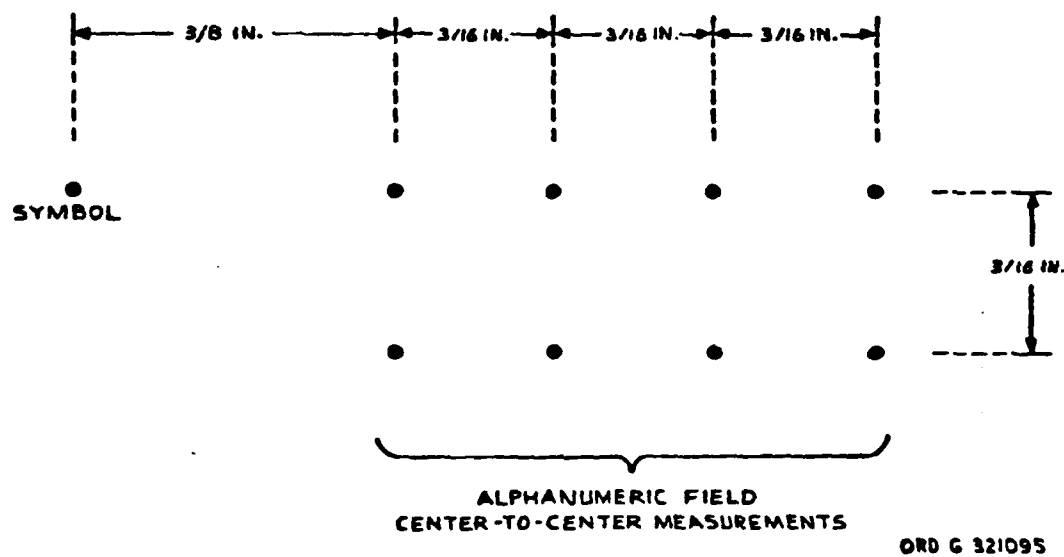


Figure 1-7. Data display field.

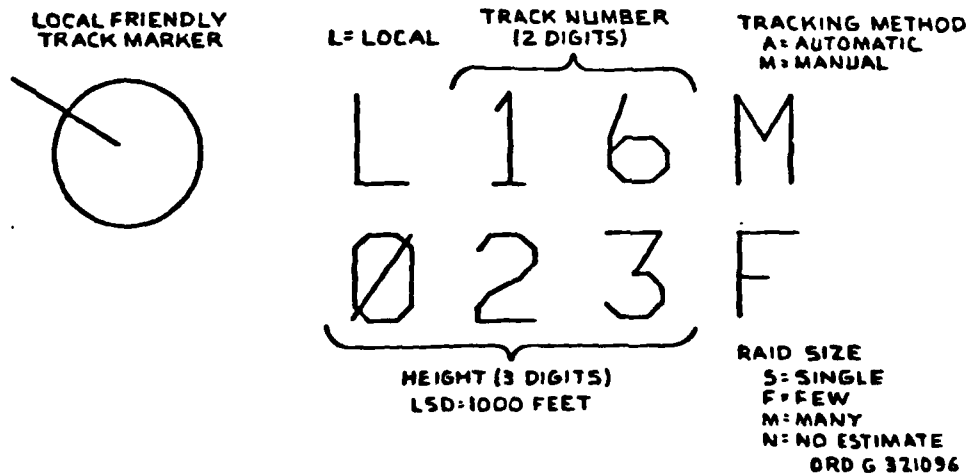


Figure 1-8. Local track display.

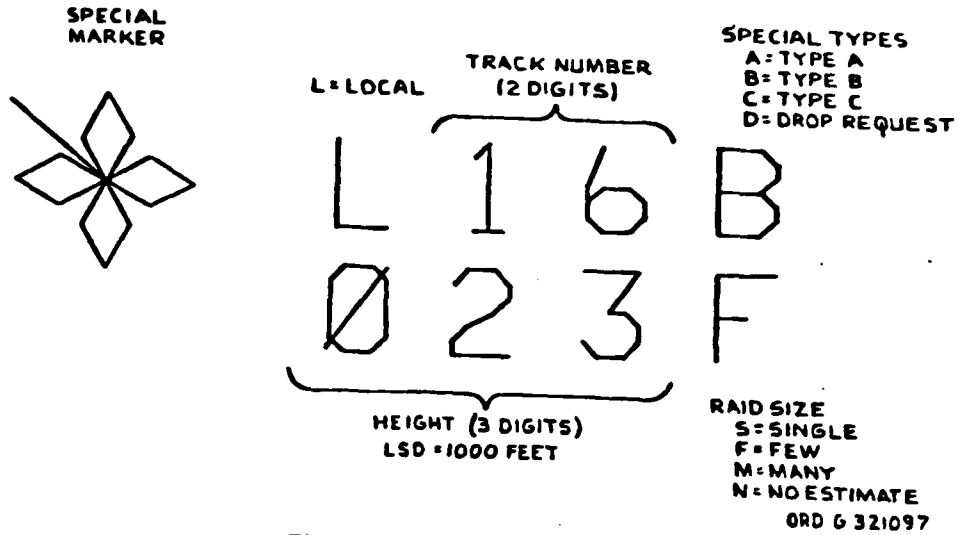


Figure 1-9. Local special track display.

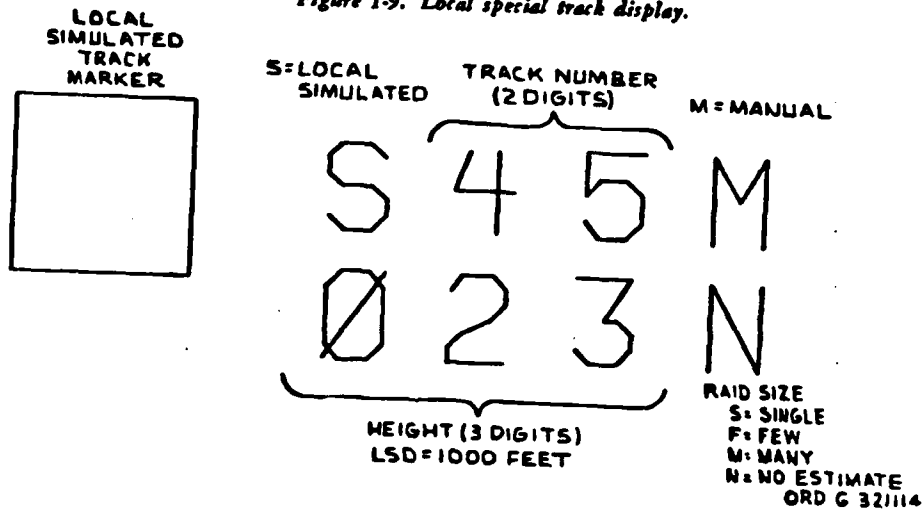


Figure 1-10. Local simulated track display.

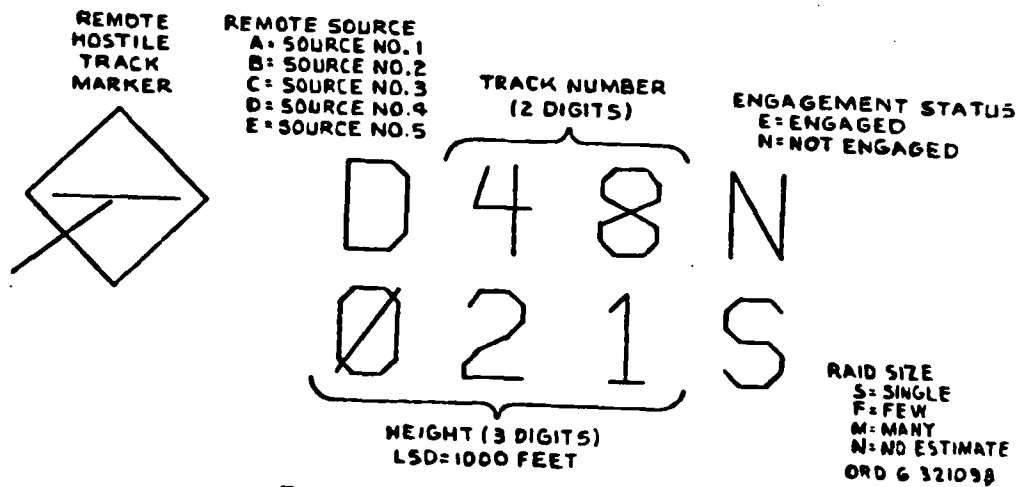


Figure 1-11. AADCP remote track display.

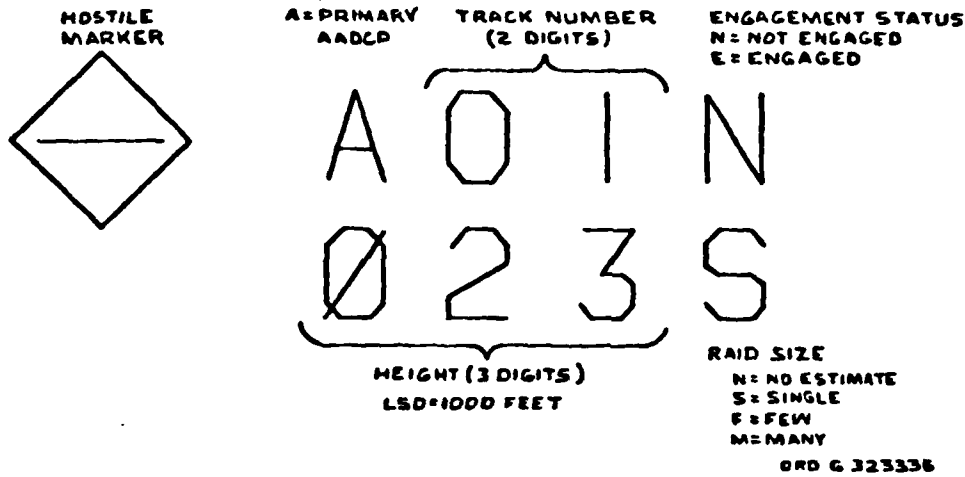


Figure 1-11.1. RRIS remote track with parent AADCP selected.

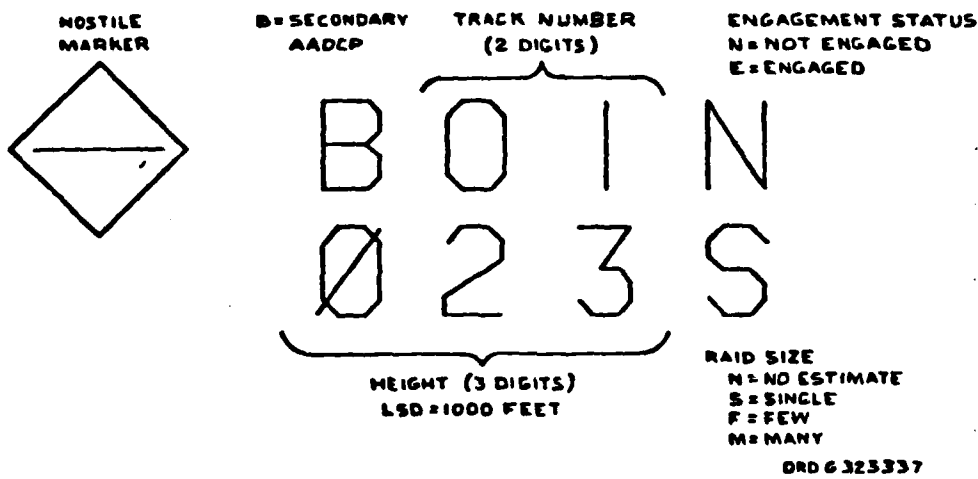


Figure 1-11.2. RRIS remote track with alternate AADCP selected.

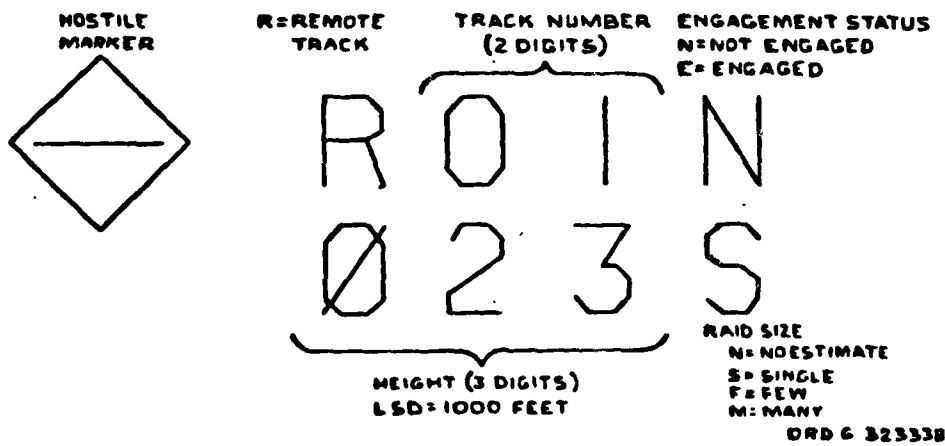


Figure 1-11.3. RRIS remote track from source other than parent or alternate AADCP.

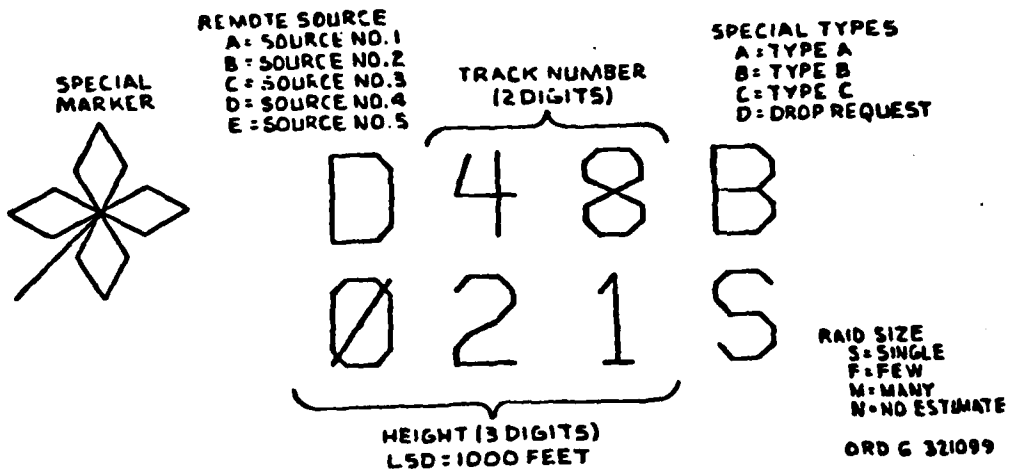


Figure 1-12 . Remote special track display

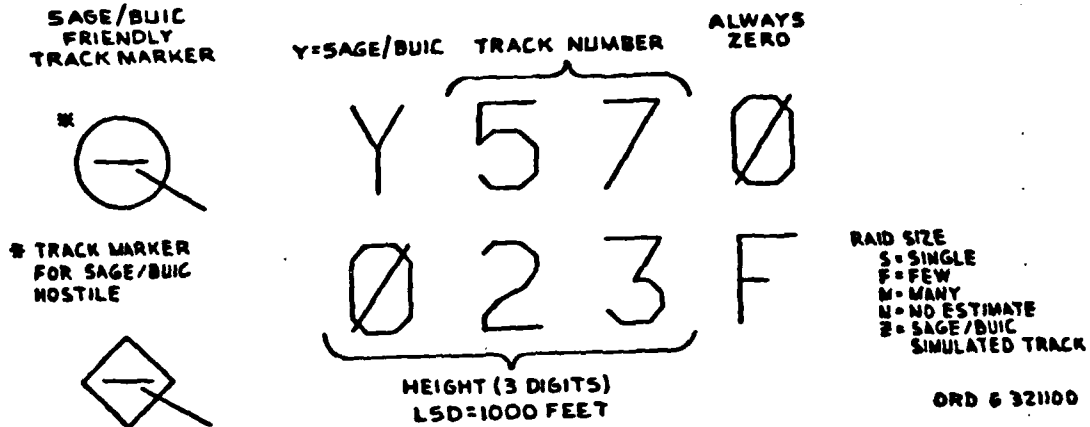


Figure 1-13 SAGE/BUIC track display

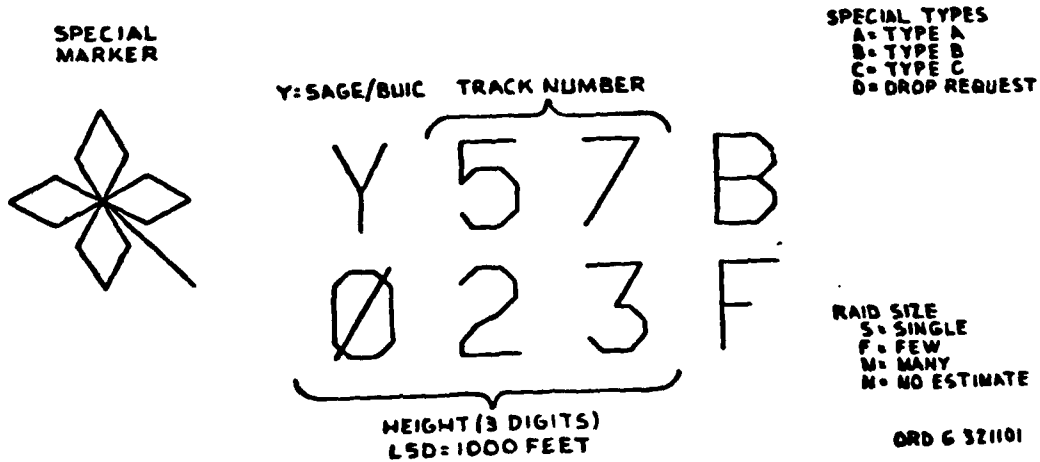
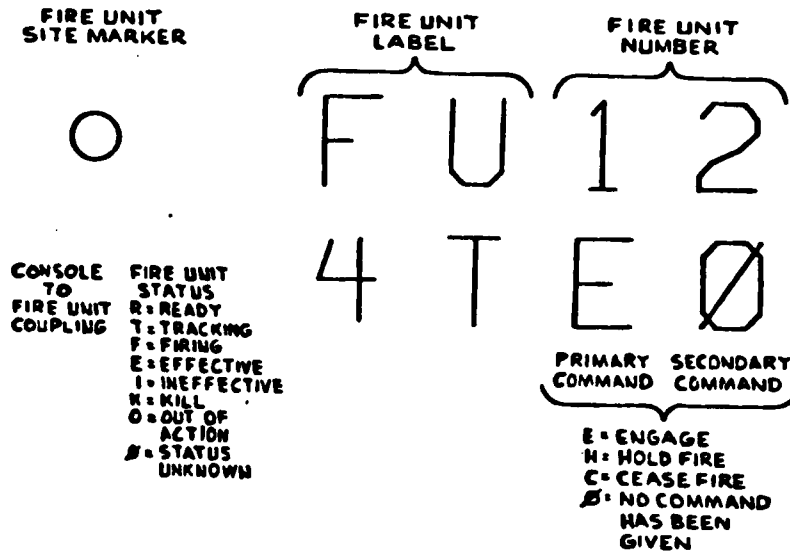
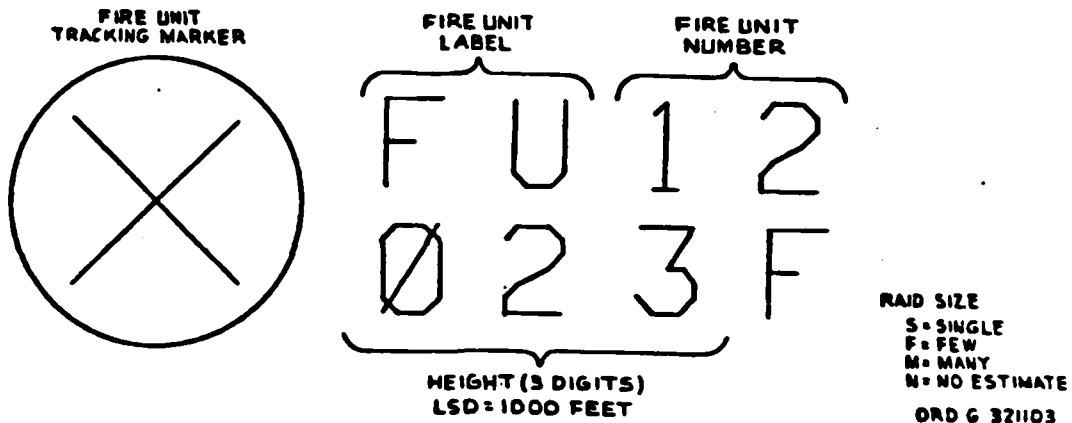


Figure 1-14 . SAGE/BUIC special track display



ORD G 32102

Figure 1-15 . Fire unit site display (U).



RAID SIZE
S= SINGLE
F= FEW
M= MANY
N= NO ESTIMATE
ORD G 32103

Figure 1-16 . Fire unit tracking display

Section IV . CONTROLS AND INDICATORS

1-17 . General

The operating controls and information display indicators for the AN/TSQ-51 system are those located on the back-lighted panels and on the shelf of the console (fig. 1-17) and the fire unit status board. Controls on the shelf are the track ball and the TRACK BALL ENABLE pushbutton. The panel marking and function of all other operator's controls except those on the communications panel are listed in paragraphs 1-18 through 1-21 and in tables 1-1 through 1-7.

1-18 . Crt Control Panel (Fig. 1-18)

The controls on this panel, used to establish the overall crt display characteristics, are listed in table 1-1.

Table 1-1 . Crt Control Panel Controls

Control	Function
SWEEP FOCUS	In conjunction with SWEEP ASTIG, controls sharpness of radar sweep.
SWEEP ASTIG	In conjunction with SWEEP FOCUS, controls sharpness of radar sweep.
SWEEP INT	Controls brightness of sweep.
SYM FOCUS	In conjunction with SYM ASTIG, controls sharpness of symbols.
SYM ASTIG	In conjunction with SYM FOCUS, controls sharpness of symbols.
SYM INT	Controls brightness of symbols.
CENTER: W-E	Positions beam horizontally.
S-N	Positions beam vertically.
RANGE MARK INT	Controls brightness of range marks.

to facilitate console operator interpretation and decision making. Figures 1-7 thru 1-17 show the format of the alphanumeric block associated with each type of symbol and define the meaning of each character in the block.

1-14. Symbol Flash Characteristics. Various symbology used in the system will flash to call the attention of the operator to some specific condition. Table 1-3 provides this information.

TYPE	SYMBOL	SIZE (INCH)	
		LOCAL	REMOTE
TAB SYMBOL (SEE NOTES 1 AND 2)	⊙	1/8	N/A
HOOK SYMBOL (SEE NOTES 1, 2, AND 3)	○	1/2	N/A
POINTER (SEE NOTE 4)	∇	N/A	1/4
NOTES:			
<ol style="list-style-type: none"> 1. THE TAB AND HOOK SYMBOLS ARE UNDER THE OPERATOR'S CONTROL THROUGH USE OF THE CONSOLE POSITION TAB. THE OPERATOR POSITIONS THE TAB SYMBOL OVER THE OBJECT TO BE HOOKED AND THEN PUSHES THE POSN HOOK BUTTON IN THE TASK FUNCTIONS SECTION OF THE DISPLAY CONSOLE. 2. THE TAB AND HOOK SYMBOLS ARE LOCAL FOR AN INDIVIDUAL CONSOLE AND ARE NOT TRANSMITTED. NO ALPHANUMERIC DATA BLOCK APPEARS WITH THEM. 3. THE OPERATOR USES THE HOOK ACTION TO REQUEST INFORMATION FROM THE COMPUTER ON THE SYMBOL HE HAS HOOKED. THE COMPUTER DISPLAYS THE APPROPRIATE DATA ON BOTH THE PPI AND ARO SECTIONS OF THE DISPLAY CONSOLE CRT. 4. THE POINTER SYMBOL IS USED TO DESIGNATE A SPECIFIC LOCATION OR SYMBOL ON THE SITUATION DISPLAY. THE POINTER IS SENT BY ANY OTHER ATDL-1 OR TADIL-B SITE. ONLY ONE POINTER SYMBOL MAY BE DISPLAYED AT A TIME. THE POINTER IS DISPLAYED WITH ALPHANUMERICS REPRESENTING THE TRACK NUMBER/ADDRESS OF THE SENDING SITE. THE POINTER IS USED TO FACILITATE VOICE COORDINATION BETWEEN TWO SITES. 			











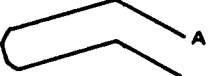
MS 202140

Figure 1-2. Designation and Control Symbols

TYPE	SYMBOL	SIZE (INCH) (SEE NOTE 2)	
		LOCAL	REMOTE
UNKNOWN	U	1/4	1/8
FRIEND	○	1/4	1/8
INTERCEPTOR	⊕	1/4	1/8
HOSTILE	◇	1/4	1/8
PRIORITY	◌	1/4	1/8
SPECIAL	✻	1/4	1/8
COMMAND TRANSMITTED	◊	1/4	1/8
COMMAND RECEIVED	◊	1/4	1/8
<p>NOTES:</p> <p>1. EACH AIR TRACK SYMBOL HAS AN ASSOCIATED ALPHANUMERIC DATA BLOCK CONSISTING OF TWO LINES OF FIVE CHARACTERS EACH.</p> <p>2. SYMBOL SIZE MAY VARY SO THAT ALL SYMBOLS HAVE THE SAME APPARENT SIZE.</p>			

MS 195740A

Figure 1-3. Air Track Symbols



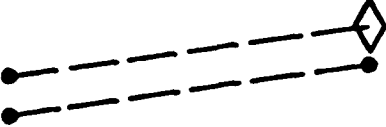


TYPE (SEE NOTE 1)	SYMBOL/LINE	SIZE (INCH) (SEE NOTE 3)	
		LOCAL	REMOTE
DEFENDED POINT (SEE NOTE 4)		1/8	N/A
COMMAND POST SITE (SEE NOTE 2)		1/8	N/A
TRUCK PARK SITE (SEE NOTE 2)		1/8	N/A
ORDNANCE STORAGE SITE (SEE NOTE 2)		1/8	N/A
POL STORAGE SITE (SEE NOTE 2)		1/8	N/A
AIR FIELD SITE (SEE NOTE 2)		1/8	N/A
RADAR SITE (SEE NOTE 2)		1/8	N/A
ECM FIX (SITE)		1/8	N/A
GEOREF MARKER		1/4	N/A
MAP LINES		N/A	N/A
SAFE CORRIDOR (LINES) (SEE NOTE 5)		N/A	N/A

NOTES:

1. THESE SYMBOLS AND LINES MAY BE ENTERED AT THE KPU AND DISPLAYED AS PART OF A MAP. SYMBOLS ENTERED AS PART OF A MAP ARE NEITHER HOOKABLE NOR TRANSMITTABLE OVER ADL. IF ENTERED DURING MAP GENERATION, ALL SYMBOLS MAY BE ACCOMPANIED BY A TWO-CHARACTER DISRIPTOR.
2. THESE SYMBOLS MAY BE ENTERED FROM AND DISPLAYED AT THE DISPLAY CONSOLE. DISPLAY CONSOLE ENTERED SITE SYMBOLS ARE HOOKABLE BUT NOT TRANSMITTABLE OVER ADL (EXCEPT ECM FIX). DISPLAY CONSOLE ENTERED SITES ARE ACCOMPANIED BY ONE OR TWO ROWS OF UP TO FOUR ALPHANUMERIC CHARACTERS EACH, IF THE CHARACTERS ARE ENTERED AT THE DISPLAY CONSOLE.
3. SYMBOL SIZE MAY VARY SO THAT ALL MARKERS HAVE THE SAME APPARENT SIZE.
4. DEFENDED POINTS MAY BE ENTERED DURING MAPGEN OR BY A CC121. IF ENTERED DURING PROGRAM DATA ENTRY (CC121), DEFENDED POINTS ARE ACCOMPANIED BY TWO ROWS OF THREE ALPHANUMERICS EACH.
5. THE LETTERS A THRU L, AS LABELED BY THE OPERATOR, IDENTIFY THE END POINT OF EACH SAFE CORRIDOR.

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Figure 1-5. Fixed Point, Site and Map Symbols, and Lines

TYPE	LINE	SIZE	
		LOCAL	REMOTE
JAM STROBE (SEE NOTE 1)		N/A	N/A
PAIRING LINES: PRIMARY ASSIGNMENT		N/A	N/A
SECONDARY ASSIGNMENT (SEE NOTE 2)		N/A	N/A
VECTORS: VELOCITY		N/A	N/A
TIME-TO-GO (SEE NOTE 3)		N/A	N/A

NOTES:

1. A JAM STROBE IS A STRAIGHT LINE ORIGINATING AT THE SITE, FU, OR TRACK BEING JAMMED AND EXTENDING THROUGH THE JAMMING SOURCE TO THE EDGE OF THE DISPLAY.
2. PAIRING LINES ARE USED TO INDICATE ASSIGNMENTS TO AND ENGAGEMENTS BY FIRE UNITS. PRIMARY ASSIGNMENT PAIRING LINES INDICATE THAT AN ASSIGNMENT HAS BEEN MADE TO A FIRE UNIT. A SECONDARY ASSIGNMENT PAIRING LINE INDICATES THE NEXT ASSIGNMENT TO BE MADE TO THE FIRE UNIT WHEN THE CURRENT PRIMARY ASSIGNMENT IS COMPLETED. PAIRING LINES INDICATING ENGAGEMENTS AGAINST JAM STROBES TERMINATE WITH A HOOKABLE POINT. THIS HOOKABLE POINT EXPANDS AND BLINKS IF THERE IS AN OUTSTANDING ALERT TO THE JAM STROBE. SECONDARY ASSIGNMENT PAIRING LINES ARE DISPLAYED ONLY AT THE BATTALION LEVEL.
3. VECTORS ARE USED TO INDICATE AIRCRAFT SPEED AND DIRECTION OR THE DISTANCE TRAVELED BY AN AIRCRAFT IN A SPECIFIED TIME. A VELOCITY VECTOR IS A LINE EXTENDING OUTWARD FROM THE AIR TRACK SYMBOL IN THE DIRECTION OF FLIGHT, THE LENGTH OF WHICH INDICATES THE SPEED OF THE AIRCRAFT (1 INCH = 1800 DATA MILES PER HOUR). A TIME-TO-GO VECTOR IS A LINE EXTENDING OUTWARD FROM THE AIR TRACK SYMBOL IN THE DIRECTION OF FLIGHT. THE OUTWARD END OF THE LINE INDICATES THE EXPECTED POSITION OF THE AIRCRAFT AT A SPECIFIED FUTURE TIME, ASSUMING THE AIRCRAFT MAINTAINS ITS CURRENT SPEED AND HEADING.

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Figure 1-6. Lines Used with Air Track and Defense System Symbols

Table 5-1. Composite Symbol Generation

SYMBOL NAME	X AMP		Y AMP		1ST SYMBOL	COMPOSITE SYMBOL	BLANKING	SYMBOL DISPLAYED
	1ST SYM	2ND SYM	1ST SYM	2ND SYM	2ND SYMBOL			
ADP REQUEST SYMBOLS					OSVA - MOST THREATING TARGET			
LOCAL HOSTILE	FULL		HALF		○	⊕	NONE	⊕
	OFF		FULL					
LOCAL UNKNOWN	FULL		HALF		○	⊕	1ST SYM POSITIVE	⊕
	OFF		FULL					
PLATOON THREAT								
LOCAL HOSTILE	FULL		HALF		○	⊗	NONE	⊗
	HALF		FULL		○			
LOCAL UNKNOWN	FULL		HALF		○	⊗	1ST SYM POSITIVE	⊗
	HALF		FULL		○			
COMMAND/TRACK/POINTER SYMBOLS								
HOOK	FULL		FULL		○	⊙	NONE	⊙
	OFF		OFF		•			
COMMAND TRACK	FULL		FULL		○	○	NONE	○
	NONE		NONE		NONE			
HPI TRACK	FULL		FULL		□	□	NONE	□
	NONE		NONE		NONE			
HPI TRACK & PIV	FULL		FULL		□	◻	NONE	◻
	OFF	PIV	OFF		/			
AADCP POINTER	OFF		FULL			+	NONE	+
	FULL		OFF		—			
I HAWK POINTER / JOYSTICK	OFF		HALF			+	NONE	+
	HALF		OFF		—			
QUEUE COMMAND	FULL		FULL		○	○	1ST SYM NEGATIVE	⌒
	NONE		NONE		NONE			
ENGAGED TRACK	FULL		OFF		—	—	NONE	—
	NONE		NONE		NONE			

Table 5-1. Composite Symbol Generation—Continued

SYMBOL NAME	X AMP 1ST SYM	Y AMP 1ST SYM	1ST SYMBOL	COMPOSITE SYMBOL	BLANKING	SYMBOL DISPLAYED
	X AMP 2ND SYM	Y AMP 2ND SYM	2ND SYMBOL			
TARGET IDENTIFICATION SYMBOLS						
LOCAL HOSTILE	FULL	HALF	○	○	NONE	○
	NONE	NONE	NONE			
REMOTE HOSTILE	HALF	HALF	◦	○	NONE	○
	NONE	NONE	NONE			
LOCAL FRIEND	FULL	HALF	○	○	1ST SYM NEGATIVE	⌋
	NONE	NONE	NONE			
REMOTE FRIEND	HALF	HALF	◦	○	1ST SYM NEGATIVE	⌋
	NONE	NONE	NONE			
LOCAL UNKNOWN	FULL	HALF	○	○	1ST SYM POSITIVE	⌋
	NONE	NONE	NONE			
REMOTE UNKNOWN	HALF	HALF	◦	○	1ST SYM POSITIVE	⌋
	NONE	NONE	NONE			
IDENTIFICATION CONFLICT SYMBOLS					1ST/2ND SYM	
LOCAL HOSTILE/ REMOTE FRIEND	FULL	HALF	○	⊙	NONE	⊙
	HALF	HALF	◦		NEGATIVE	
LOCAL HOSTILE/ REMOTE UNKNOWN	FULL	HALF	○	⊙	NONE	⊙
	HALF	HALF	◦		POSITIVE	
LOCAL FRIEND/ REMOTE HOSTILE	FULL	HALF	○	⊙	NEGATIVE	⊙
	HALF	HALF	◦		NONE	
LOCAL FRIEND/ REMOTE UNKNOWN	FULL	HALF	○	⊙	NEGATIVE	⊙
	HALF	HALF	◦		POSITIVE	
LOCAL UNKNOWN/ REMOTE HOSTILE	FULL	HALF	○	⊙	POSITIVE	⊙
	HALF	HALF	◦		NONE	
LOCAL UNKNOWN/ REMOTE FRIEND	FULL	HALF	○	⊙	POSITIVE	⊙
	HALF	HALF	◦		NEGATIVE	
RIPPLE FIRE	OFF	FULL	—	F	NONE	F
	FULL	OFF	—			
	HALF	OFF	—			

symbol: generat via the

5-19. The operati produc networ for ar sistor fier. I oscilla degree gener:

5-20. The ampli analo ident: TRA high, age 20-K an is is an the swit allel imp 50 j sign circ sist gro Wh twe ere

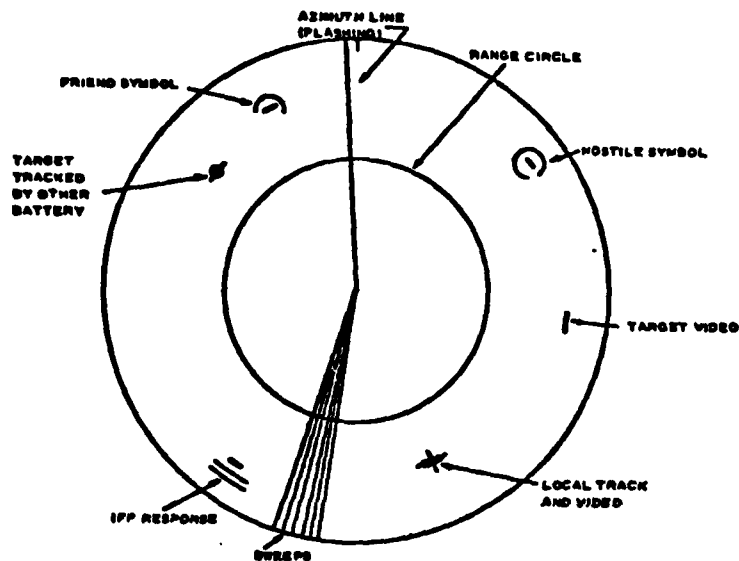


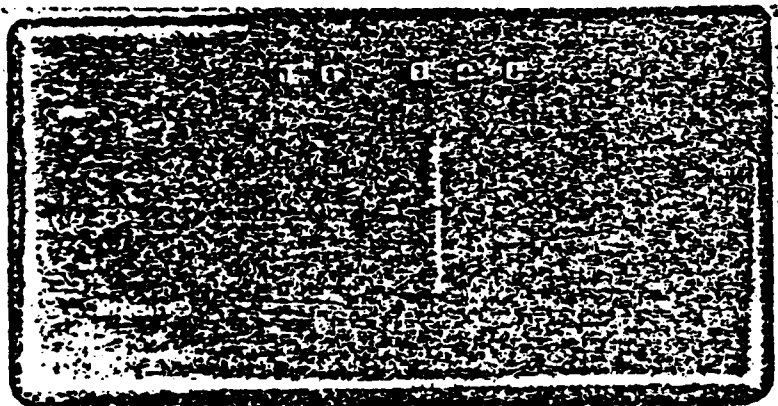
Figure 22. PPI display.

(f) The flashing azimuth line appears as a brightened radial line once per rotation of the radial sweep. The line is positioned in azimuth by a knob on the target designate control-indicator. In target designation, the flashing azimuth line and range circle are positioned to intersect the designated target video.

(g) The electronic cross (local track) is formed by bisecting range and azimuth marks that represent the range and azimuth, respectively, of the TTR system. When the TTR is tracking a target, the cross appears superimposed on the tracked target video. Appearance of the electronic cross on the PPI is controlled by the TRACK CROSS switch on the target designate control-indicator.

(h) Portions of the PPI display may be expanded according to range or sector. When a particular sector is selected, that sector occupies the whole area of the PPI with the origin of the sweep at the edge of the display instead of the center. Range and sector expansions are controlled by switches on the PPI (fig 17).

(2) The PI on the battery control console displays an expanded portion of the PPI presentation centered about the intersection of the acquisition range circle and flashing azimuth line (fig 23). Thereby, targets can be more accurately distinguished and located in range and azimuth. The PI displays a vertical sweep, which represents a portion of the PPI sweep and acquisition and IFF video. The PPI range circle and flashing azimuth line are represented by horizontal and vertical lines, respectively, etched in the protective face of the PI.



- | | |
|--------------------------------------|----------------------|
| 1 - Range line (etched) | 4 - Electronic cross |
| 2 - Target video (designated target) | 5 - Sweep |
| 3 - Azimuth line (etched) | |

Figure 23. PI display.

Table 3-30. Basic Track and Ground Point Symbols
























Symbol/name/description	Symbol
Null symbol	No symbol
Hostile, single	
Hostile, multiple	
Hostile, single (not eligible for engagement)	
Hostile, multiple (not eligible for engagement)	
Unknown, single	
Unknown, multiple	
Unknown, single (not eligible for engagement)	
Unknown, multiple (not eligible for engagement)	
Friendly, single	
Friendly, multiple	
Defended point	
Intercept point	
Firing platoon (FP)	
Digital Display Communication Set (DDCS)	
Communication Relay Group (CRG)	
Pointer	
Ambiguous Jammer Position	
Cursor (situation display)	
Special	
Jammer	
Probable kill	
<i>NON ABT-1</i>	
<i>NON ABT-2</i>	

Table 3-31. Modifier Symbols




Modifier name	Modifier
Null	NO MODIFIER
Engaged	
To-Be-Engaged (TBE) <i>PROCESS FOR ENGAGEMENT</i> Special (PFE)	 P s
True	T
Jammer	~
Probable kill	#
Engage hold	

Table 3-32. Speed/Heading Symbol Selection - Velocity

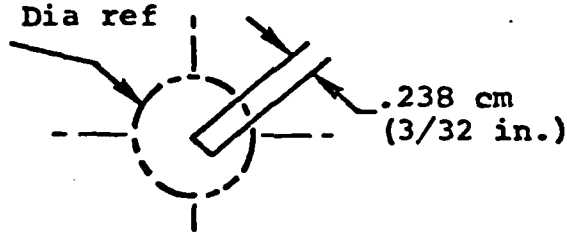

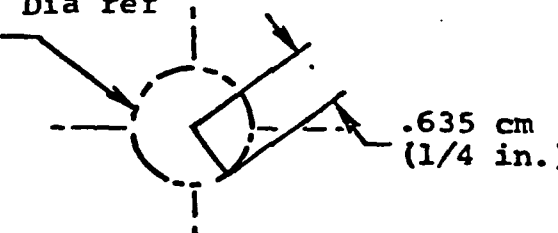

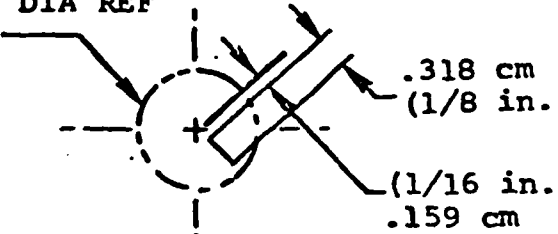




























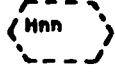
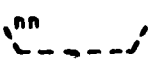
Speed	Symbol length	CRT Display (example)
Null	No speed/heading symbol shown	
Low	<p>(1/2 in.) Dia ref 1.27 cm</p>  <p>.238 cm (3/32 in.)</p>	
High	<p>(1/2 in.) Dia ref 1.27 cm</p>  <p>.635 cm (1/4 in.)</p>	
Medium	<p>(1/2 in.) DIA REF 1.27 cm</p>  <p>.318 cm (1/8 in.)</p> <p>(1/16 in.) .159 cm</p>	

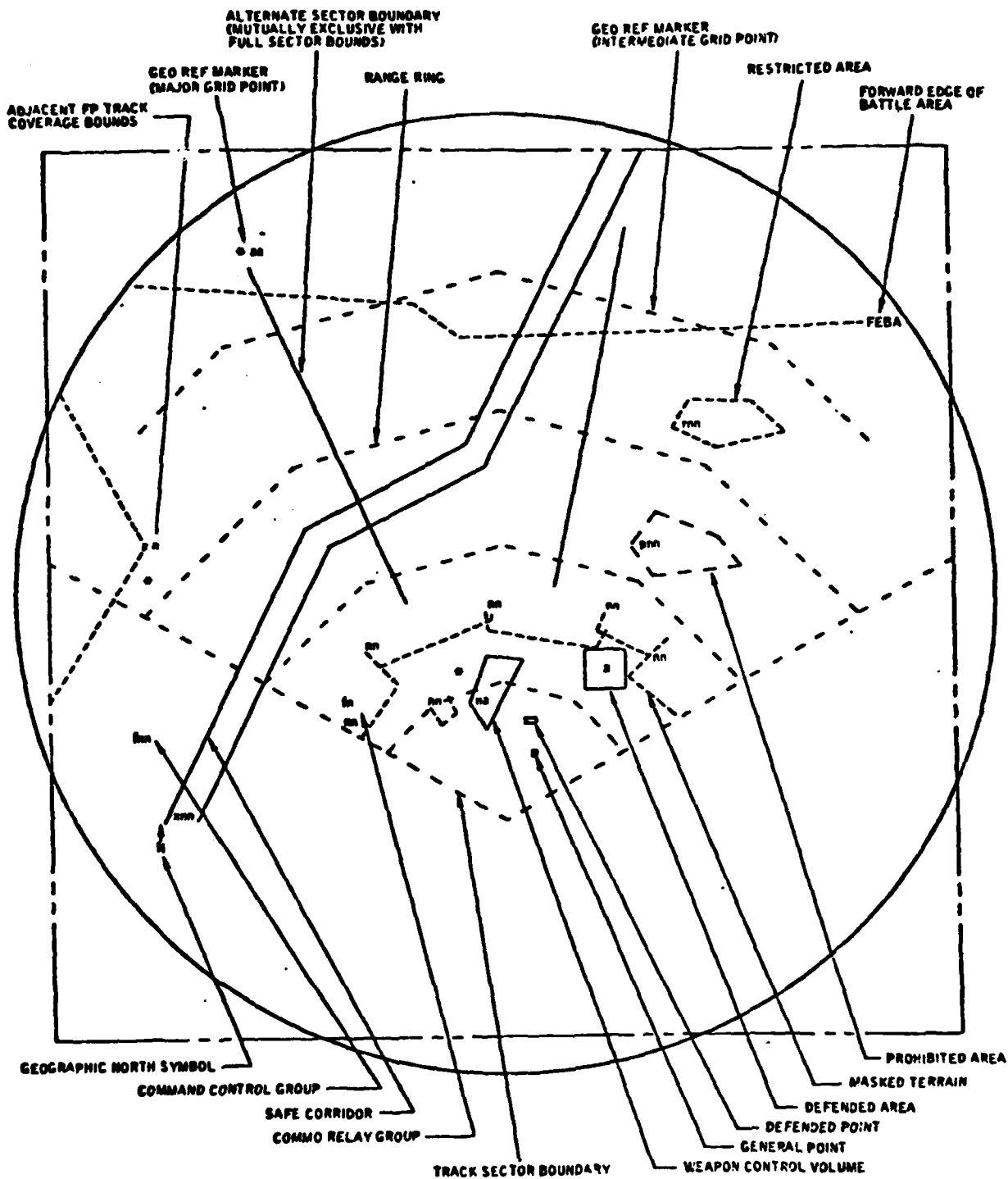
Table 3-33. Speed/Heading Symbol Selection - Heading

Vector reference	Symbol heading (deg)*	Range of target heading (deg)
1. 	0	349 < Heading ≤ 11
2. 	22.5	11 < Heading ≤ 34
3. 	45.0	34 < Heading ≤ 56
4. 	67.5	56 < Heading ≤ 79
5. 	90.0	79 < Heading ≤ 101
6. 	112.5	101 < Heading ≤ 124
7. 	135.0	124 < Heading ≤ 146
8. 	157.5	146 < Heading ≤ 169
9. 	180.0	169 < Heading ≤ 191
10. 	202.5	191 < Heading ≤ 214
11. 	225.0	214 < Heading ≤ 236
12. 	247.5	236 < Heading ≤ 259
13. 	270.0	259 < Heading ≤ 281
14. 	292.5	281 < Heading ≤ 304
15. 	315.0	304 < Heading ≤ 326
16. 	337.5	326 < Heading ≤ 349

*Relative to Y axis of FP or DDCS coordinate system.

Table 3-34. Static Data Symbology

Category	Symbology	Coding	Remarks
MAP SELECT			
Subordinate FP		Basic symbol plus one numeric	n = 1 to 6
Battalion HQ (DDCS)		Basic symbol plus two alphas	Includes 3 Adj BNs aa - AA to ZZ
Commo Relay Group (CRG)		Basic symbol plus one numeric	n = 1 to 6
General point	aaaa	Basic symbol plus three alphas	aaa = AAA to ZZZ
DEFEND AREAS			
Defended point		Basic symbol plus one alpha	a = A to Z
Defended area		Solid lines plus one alpha	Squares
Forward Edge of Battle Area (FEBA)		Short dash - short space lines plus FEBA	Average 4 line segments
WPN CONTR AREAS			
Weapon control volumes		Solid lines plus one numeric and one alpha	Average of 6 sides n = 1 to 9 a = F (Free) H (Hold), or T (Tight)
ID AREAS			
Restricted volume		Short dash - short space lines plus R and two numerics	Average of 4 sides n = 1 to 99
Prohibited volume		Long dash - long space lines plus P and two numerics	Average of 5 sides nn = 1 to 99
Safe passage		Solid paired lines plus C and two numerics	Average of 4 paired parallel line segments nn = 1 to 99
ORIGIN VOLS			
Friendly point of origin volume		Short dash - short space lines plus F and two numerics	Average of 6 sides nn = 1 to 99
Hostile point of origin volume		Long dash - long space lines plus H and two numerics	Average of 6 sides nn = 1 to 99
GEOREF GRID			
Major grid point	*aa	Asterisk or asterisk plus 2 alphas at high brightness	aa = Major Grid ID
Intermediate grid point	*	Asterisk at low brightness	aa = Major Grid ID
MASK TERR			
Masked terrain		Short dash - short space line plus four characters	nn = 1 to 25 (km)



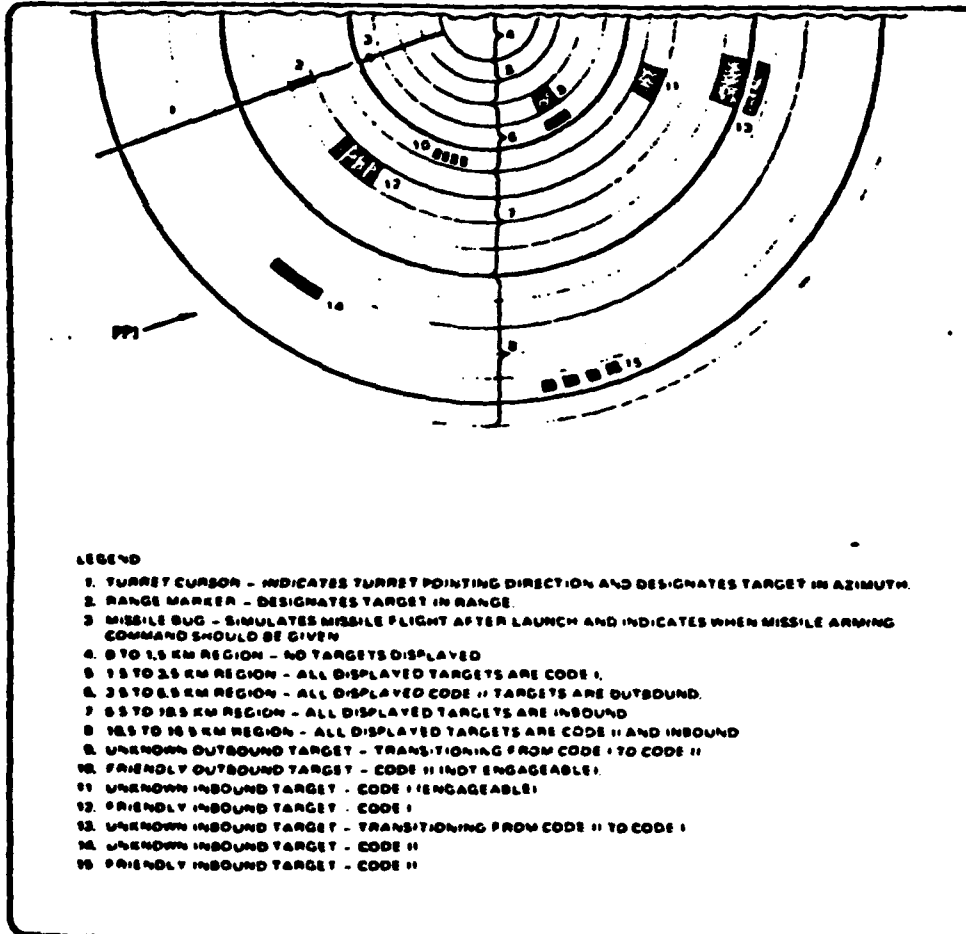
MS182051

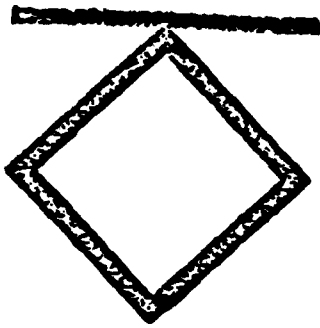
Figure 3-30. Static Data Symbology

2-10. Radar Surveillance - Continued

b. Surveillance - Continued

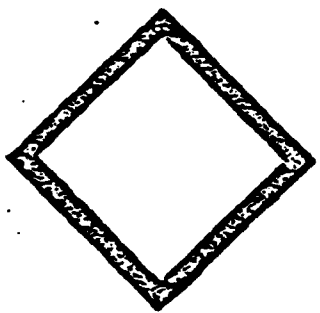
- (1) Determine meaning of PPI display as follows:





Lower than second priority.
No dots inside.

6



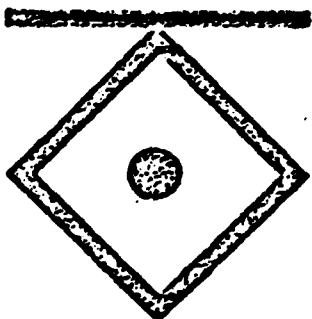
Lower than second priority.
No dots inside.

3



Radar being jammed and
sector affected. Spans
outer 10Km range ring.
■ Radar pointer mark to
command track radar
search of sector.

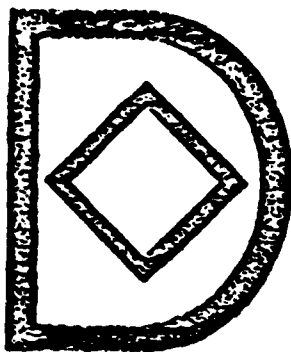
29



Target being tracked.

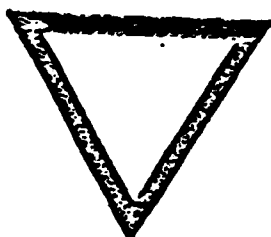
30

Blinking



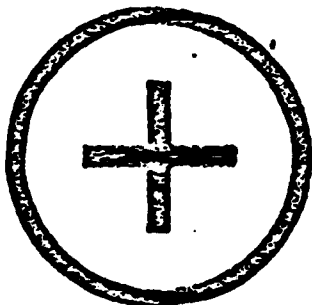
**Unengageable fixed wing
aircraft deleted.**

31



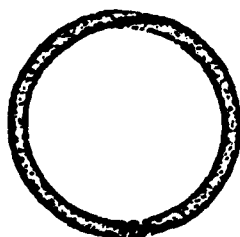
**Lower than second priority
missile. No dots inside.
Engageable.**

9



**Gunsight line-of-sight with
respect to north. Outside
10Km range ring.**

24



Friendly aircraft

108

14



Confidence block.
Indicates a fair chance
of achieving an early
hit.

26



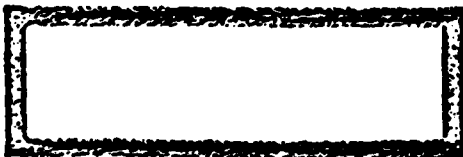
Confidence block.
Indicates a good chance
of achieving an early hit.

27

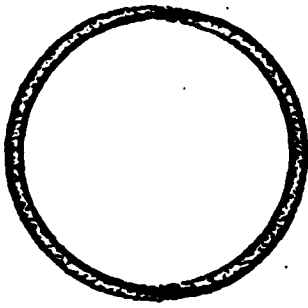


Confidence block.
Indicates an excellent
chance of achieving
an early hit.

28



**Ground vehicle. Fixed
orientation. One size for
engageable or unengageable.
Only range priority
indicated.**



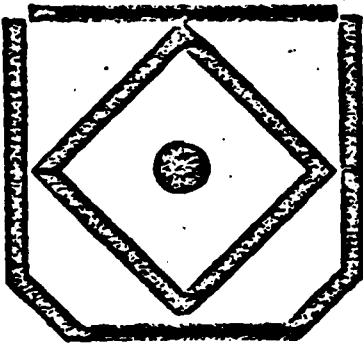
Commander's periscope
line-of-sight with respect to
north. Outside 10Km range
ring.

25



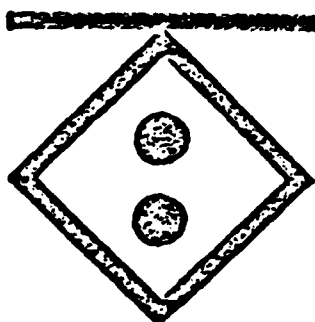
Second priority Missile.
Engageable.

8

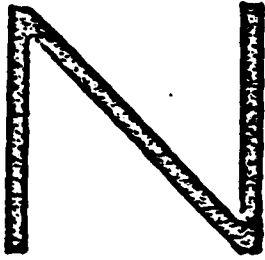


Hostility unknown.
Symbol surrounds
helicopter.

13

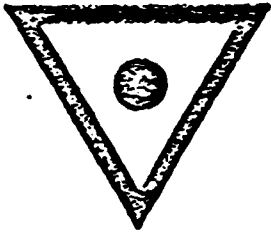


Second priority Helicopter
target. Engageable.



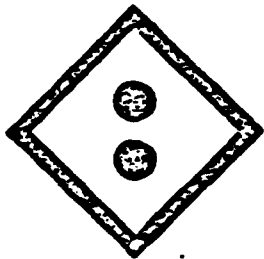
North on display. Positioned at top of 8Km range circle.

21



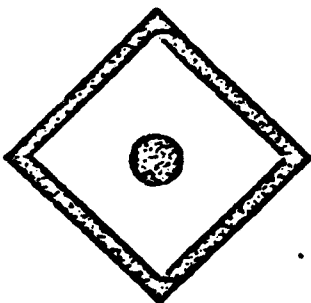
Top priority Missile. Engageable.

7



Second priority "Unengageable" Fixed-wing target, or object of unknown classification. Dot pattern same as engageable target, only smaller.

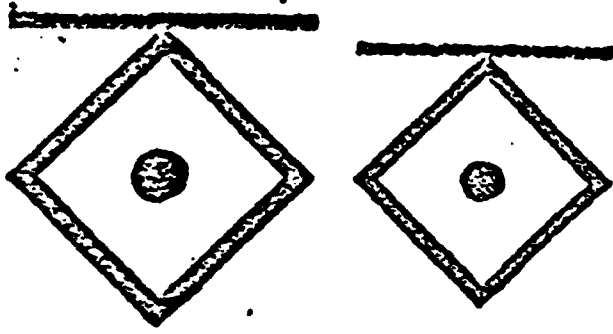
10



Top priority Fixed-wing Aircraft. Target, or object of unknown classification. Engageable.

111

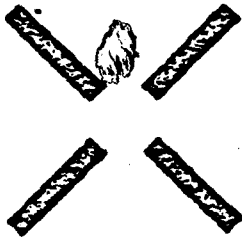
1



On left;
Top priority helicopter
target, engageable.

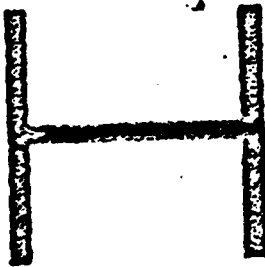
On right;
Helicopter, NOT engageable.

16



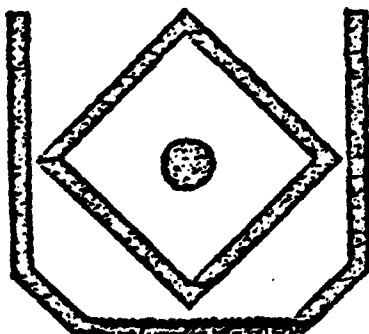
Pointer to manually select
engageable and unengageable
targets.

20



Hull heading with respect
to north.

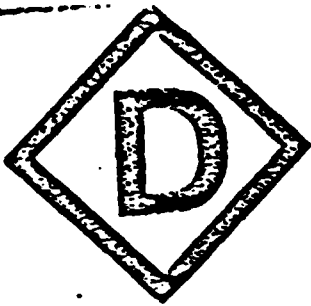
27



Hostility unknown,
Symbol surrounds fixed-
wind aircraft.

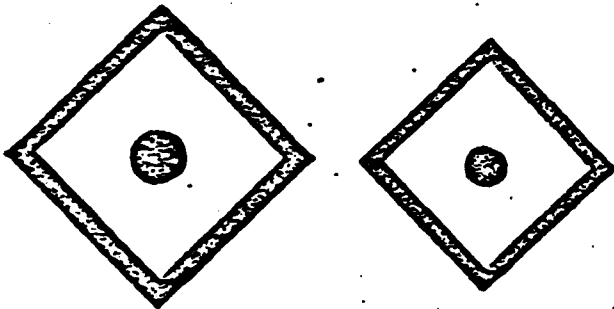
112

12



Engageable helicopter target deleted.

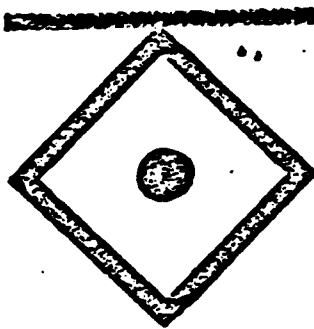
18



On left;
Top priority fixed-wing aircraft target, engageable.

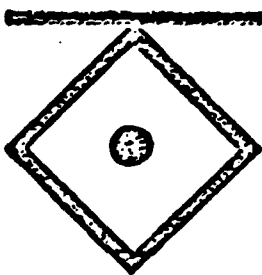
On right;
Fixed-wing aircraft, NOT engageable.

15



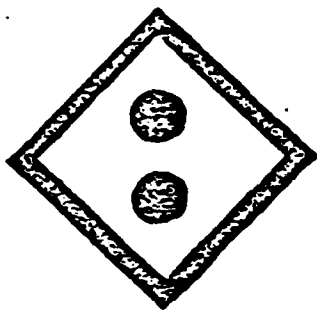
Top priority Helicopter target. Engageable.

4



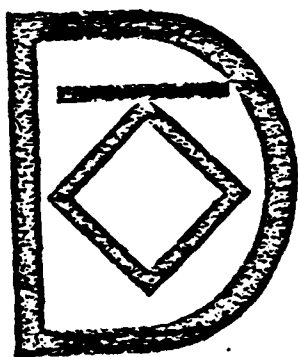
Top priority "Unengageable" Helicopter target. Dot pattern same as engageable target, only smaller.

11



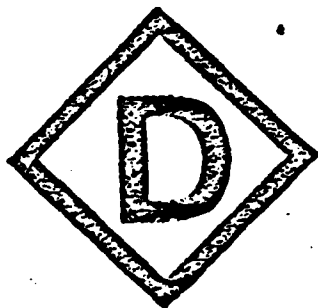
Second priority Fixed-wing Aircraft. Target, or object of unknown classification. Engageable.

2



Unengageable helicopter target deleted.

32



Engageable fixed-wing target deleted.

17

Short-range line-of-sight indicator at 2Km range ring.

Part 3. Radar Symbols.

Many perceptual studies have used radar-like symbols to derive standard symbols for use by radar operators. The following sets have been part of experimental programs to attempt radar symbol standardization. These sets are from the following source:

Honigfeld, A. Radar Symbology: A Literature Review. Technical Memorandum 14-64, Human Engineering Laboratories, 1964.

The symbols portrayed represent a wide range of experimental work. A complete reference list and discussing of the implications of the work performed is contained in the above review.































FORMS						
	ELLIPSE	RECTANGLE	TRIANGLE	DIAMOND	CROSS	STAR
1.						
2.						
3.						
4.						
5.						

Fig. 10. FORMS USED BY CASPERSON (1950)

Airplane



Heart



Shield



Circle



Heptagon



Ship



Crescent



Hexagon



Square



Cross



Octagon



Star



Diamond



Pentagon



Swastika



Double
Concave



Rectangle



Trapezoid



Ellipse



Semicircle



Triangle



Fig. 11. FORMS USED BY SLEIGHT (1952)






















 ROCKET	 GUN	 PROPELLER	 ANCHOR	 FLAG	 OPEN UP	 OPEN DOWN
 PLUS	 STAR	 DOUBLE CROSS	 BLOCK	 OPEN SQUARE	 SOLID UP	 SOLID DOWN
 RING	 CHECKER	 BULLSEYE	 O-BAR	 LARGE DOT	 SMALL DOT	 DIAMOND

Fig. 12. FORMS USED FOR CHARACTER TUBE

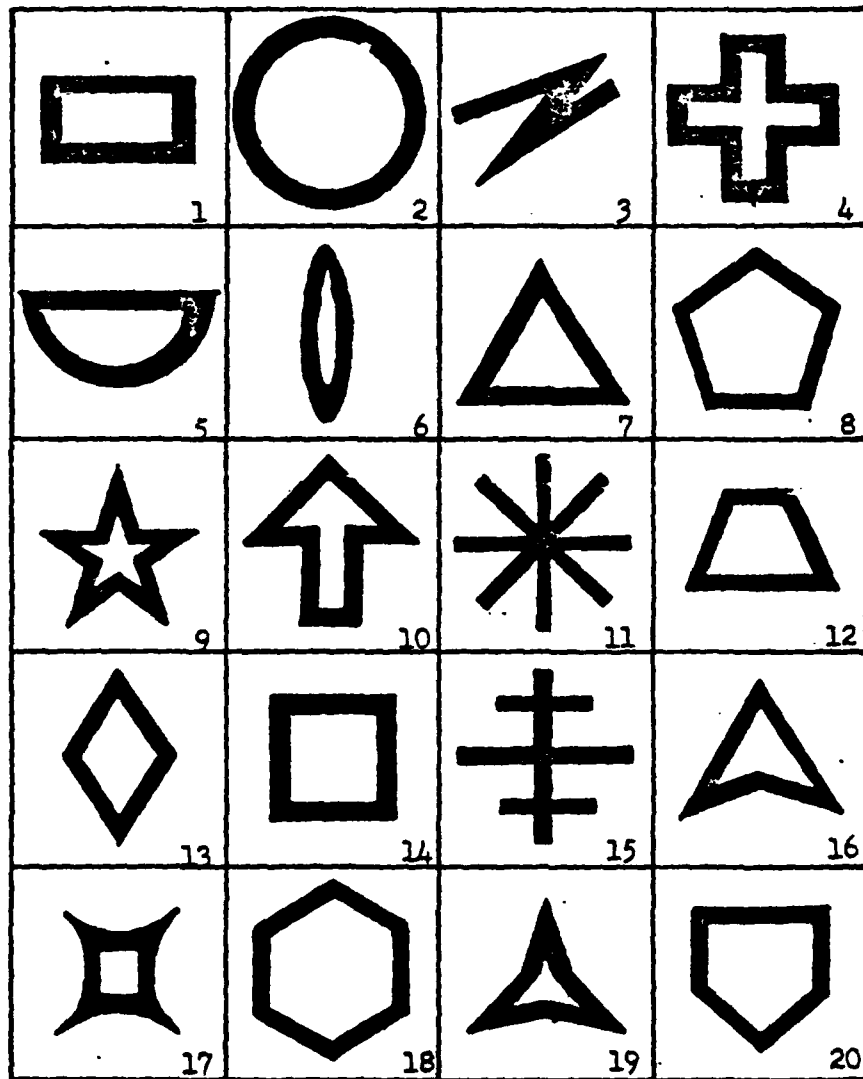

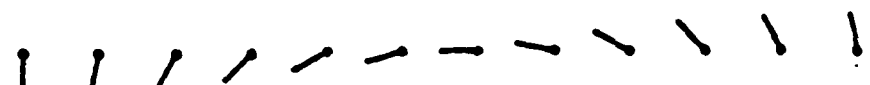



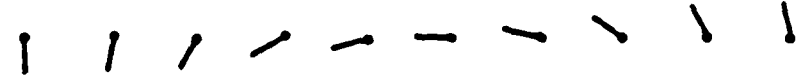
Fig. 14. SYMBOLS USED BY BOWEN et al. (1959)

Symbol : 
 Inclination : 0° 10° 27° 45° 63° 80° 90° 100° 117° 135° 153° 170

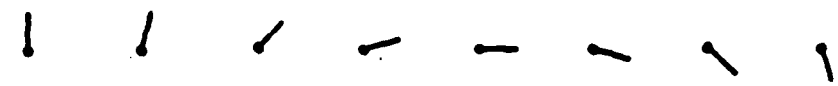
Symbol : 
 Inclination : 180° 190° 207° 225° 243° 260° 270° 280° 297° 315° 333° 350

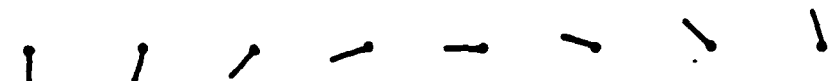
24-Symbol Alphabet

Symbol : 
 Inclination : 0° 12° 30° 60° 78° 90° 102° 120° 150° 168°


Symbol : 
 Inclination : 180° 192° 210° 240° 258° 270° 282° 300° 330° 348°


20-Symbol Alphabet

Symbol : 
 Inclination : 0° 15° 45° 75° 90° 105° 135° 165°

Symbol : 
 Inclination : 180° 195° 225° 255° 270° 285° 315° 345°

16-Symbol Alphabet

Symbol : 
 Inclination : 0° 20° 70° 90° 110° 160°

Symbol : 
 Inclination : 180° 200° 250° 270° 290° 340°

12-Symbol Alphabet

Fig. 16. INCLINATION CODES

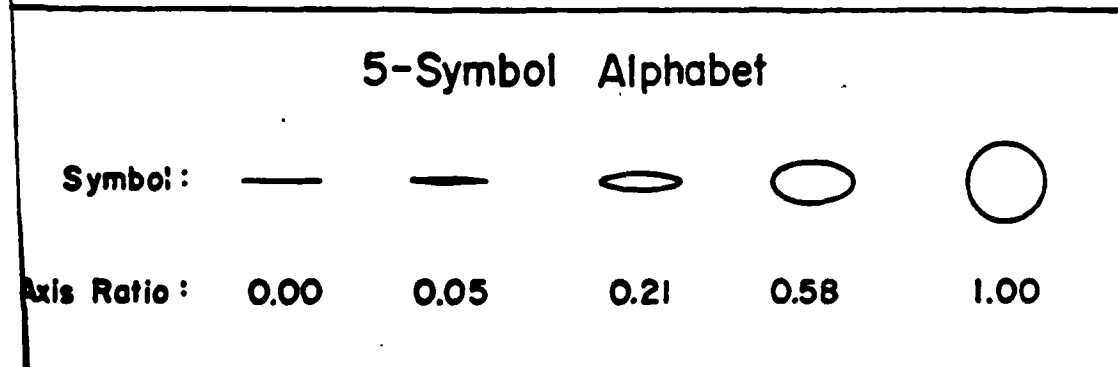
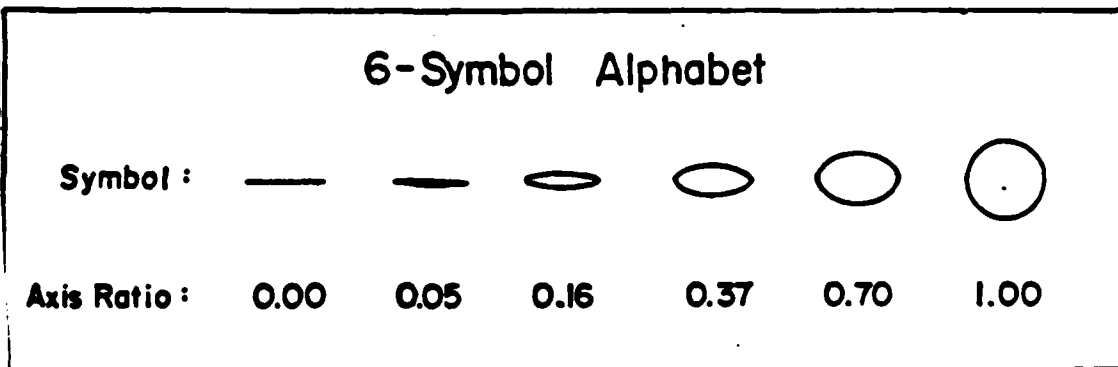
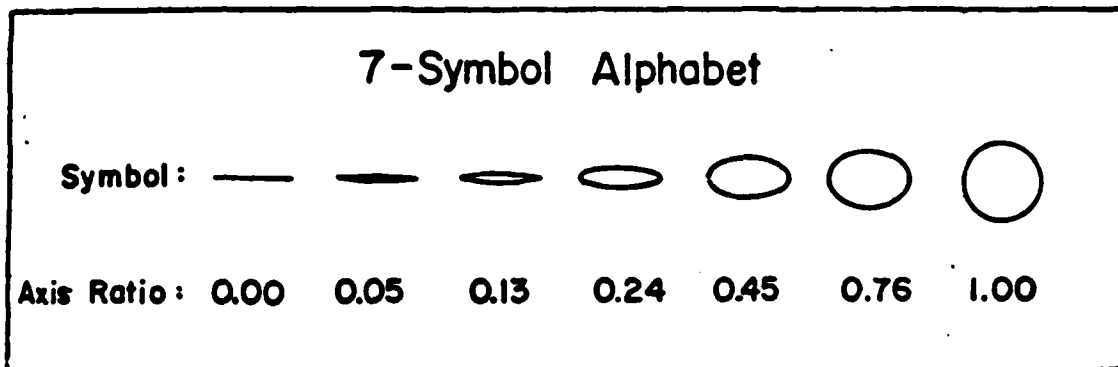
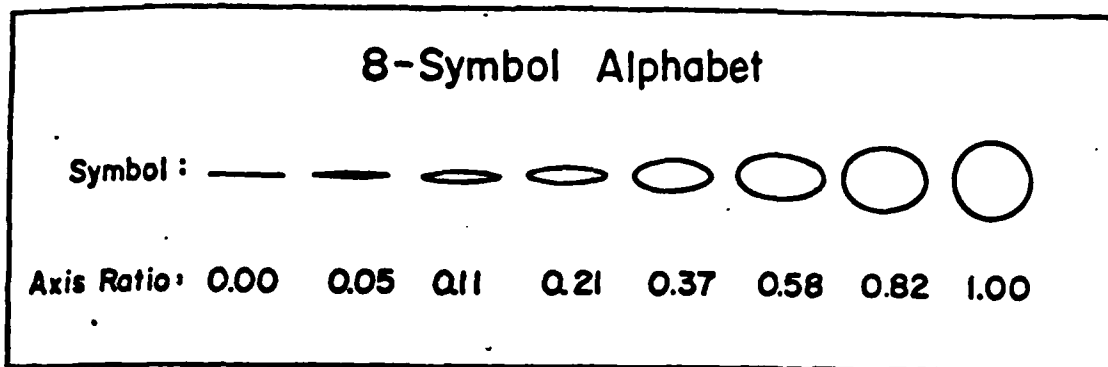


Fig. 22. ELLIPSE CODES

BASIC SYMBOLS

GENERAL

FRIENDLY

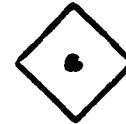
UNKNOWN

HOSTILE

Air



Surface



Sub-Surface



Fig. 25. BASIC SYMBOL DESIGNS

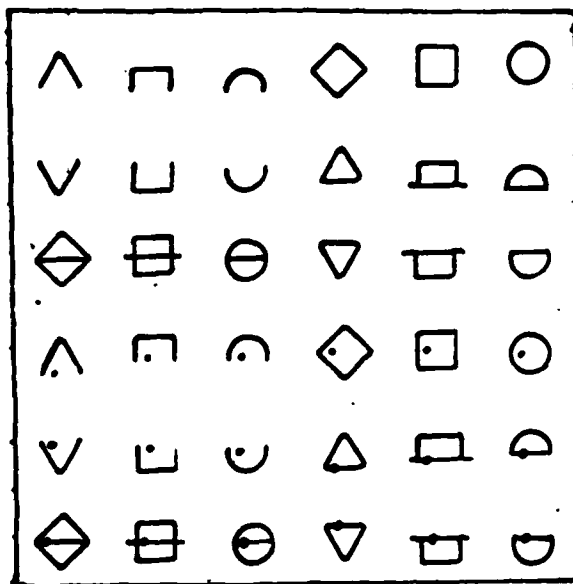
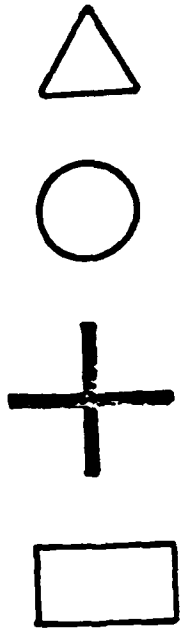


Fig. 26. FORMS USED BY NEWMAN AND DAVIS (1961)

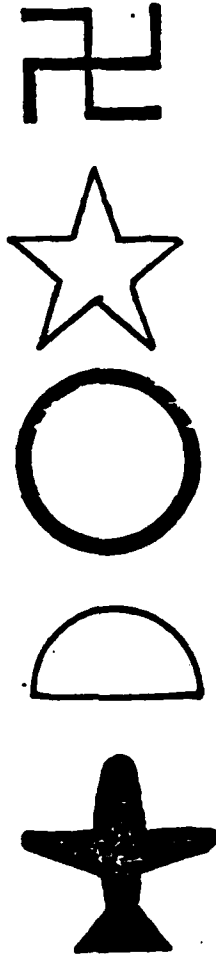
APPENDIX C

Rank Orders of Geometric Symbols Studied

Highest ranking symbols used in four or more studies




Highest ranking symbols used in fewer than four studies



Symbols used deserving more intensive study




gun · I

rocket 


O-bar 

flag 

ball 

radar · 

post 

plane 

Part 4. TACFIRE DPM Symbols.

The following symbols and symbol primitives are from the digital plotter map of the tactical fire direction system (TACFIRE). This is a printer overlay to a large map board where characters and symbols may be transferred to the hard copy map posted on the board.

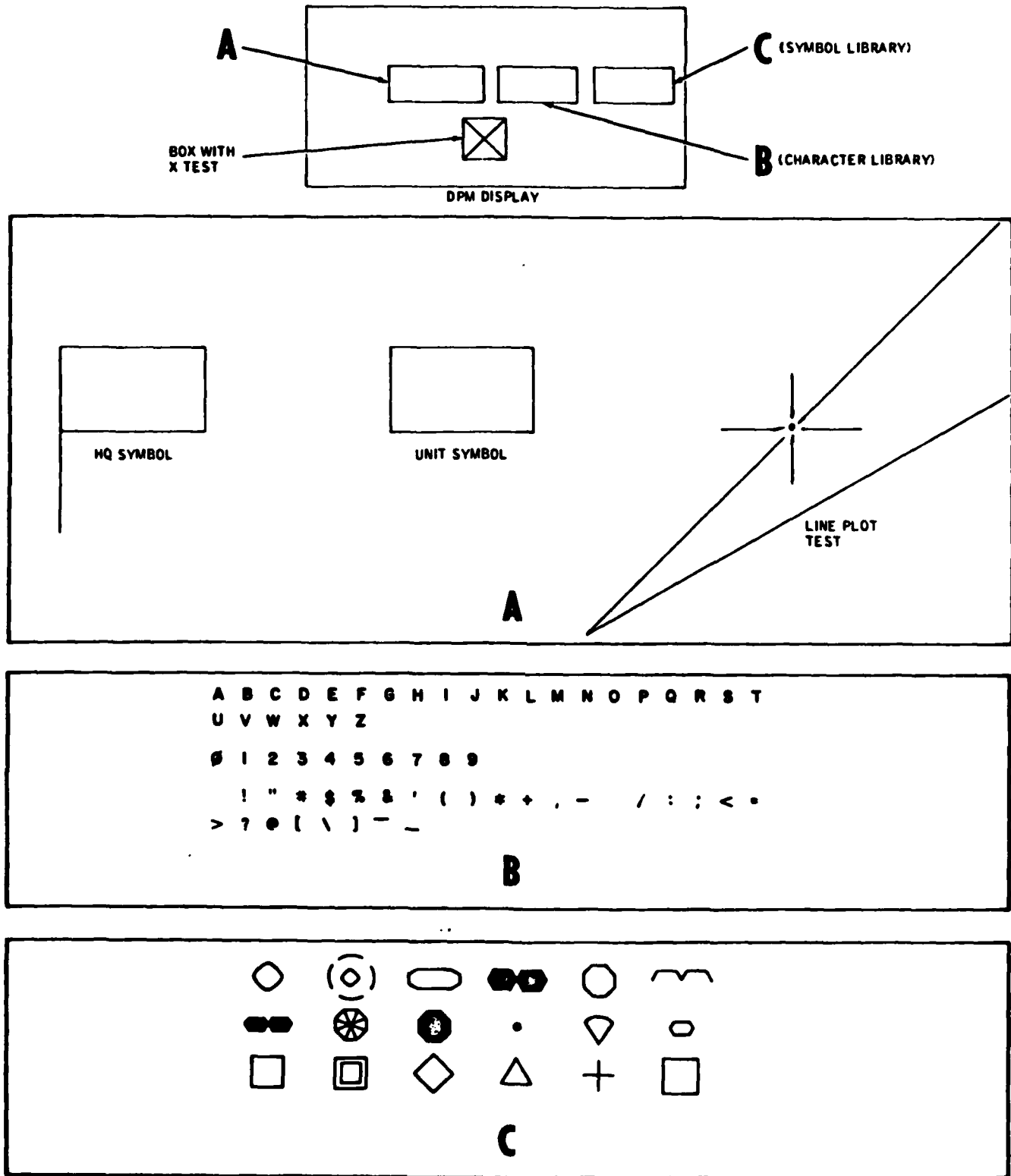


Figure 14-2. DPM Test Pattern Display

Part 5. Wargaming Symbols.

The following symbols are examples of the kinds of information portrayed in a battlefield wargame exercise. The important thing to note is the need to summarize information and condense it into a small square area.

EXAMPLES OF PLAYING PIECES (from various SPI games)

Land Units



Naval Units

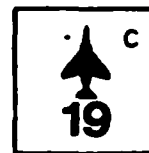
Gunnery Strength at: 0 thru 2 hex range, 3 thru 5 hex range, 6 thru 7 hex range, 8 thru 10 hex range

Defense Strength

44 24
24 13
13 4
4 120

Identity Code Rating (total guns)

Air Units



Type Abbreviation: M60 301

Unit ID No.

Silhouette

Attack Strength: 16 M 12

Defense Strength: (17)

Hard Targets: 6

Weapons Class

Attack Strength: 61

Defense Strength: 20

Nationality: GE

Name: Bismarck

Range Allowance: 20

Movement Allowance: 7

ID Code: 741

Air Combat Strength

Ground Combat Strength

6 2

IS F4

Nationality: U

Aircraft Type

Range Allowance

Class: IB

Fire Strength: 2

Melee Strength: ●

Identity code: 3

Range Allowance: 3

Movement Allowance: Ff 5

Fleet Nationality and ID number

Anti-Air Strength: 9

Anti-Surface Strength: 9

Anti-Submarine Strength: 9

US 4
6 2
CG 4

Ship Type and Silhouette

Nationality and ID number

Anti-Air Strength: 8

Anti-Surface Strength: 12

Anti-Submarine Strength: 0

So 7
42 3
F C

Range Allowance

Defense Strength

ECM Value

Type and Silhouette and Carrier-based Indication

Division nr.: III

Regiment nr.: 5

Combat Strength: 4-10

Movement Allowance

Anti-Aircraft Strength (at indicated ranges): 0 to 2, 3 to 4, 5 to 6

Surface Attack Strength: 19-12-2

Ship Type: CV

ID Number: 503

Name: Akagi

Defense Strength: 2

Nationality: ESC

Unit Type: LRB

Combat Strength: 7

Range: 6

Movement Allowance: 4

Nationality: FRANCE

Unit Type Symbol: [Symbol]

Combat Strength: 1

Nationality: USSR

Type Abbrev: Surf-B

Type Symbol: [Symbol]

Attack Strength: 4/2

Fleet Quantity: 1

Defense Strength

Nationality: USA

Type Abbrev: LRB

Type Symbol: [Symbol]

Attack Strength: 2/4

Fleet Quantity: 1

Defense Strength

The above samples are arranged in three columns (by general type) and in ascending order of scale reading down the columns (i.e., from tactical level games through strategic). Land column: *Patrol, MechWar 77, Prestags, Panzergruppe Guderian, Global War*. Naval column: *Frigate, Dreadnought, Sixth Fleet, Fast Carriers, Global War*. Air Column: *Foxbat & Phantom, Oil War, Sixth Fleet, Invasion America, Global War*. Note that in general, the low level and high level counters are relatively simple, whereas the middle level tactical counters are more complex. Note that the naval units are something of an exception to this, since on all levels except the highest, they represent individual ships.

Part 6. Experimental Symbologies.

Each of the following symbol sets has been selected from studies of symbols using a military scenario, or from new systems ideas. The references for each are as follows:

1. Smith, S. L. and Thomas, D. W. Display Color Coding Compared with Three Shape Codes for a Class Counting Task. MITRE Technical Series Report No. 12, 1963.
2. Howell, W. C., and Fuchs, A. H. Population Sterotyping in Code Design. Organizational Behavior and Human Performance, 1968, (3), 310-339.
3. Earl, W. K. Learning and Recognition of U.S., Soviet, and Pictographic Military Symbology. US ARI Technical Report, Dec 1981.
4. Moses, F. M. More Efficient Symbols for Present and Future Needs. Paper presented at the Symposium on Computer Graphics in Support of Tactical Command and Control, HQ, TCATA, Ft. Hood, 1977.
5. MICROFIX Symbols for the Microprocessors for the Tactical Intelligence Community. Prepared by U.S. Army FORSCOM and the George Institute of Technology, 1982.
















MILITARY SYMBOLS	GEOMETRIC FORMS	AIRCRAFT SHAPES
RADAR 	TRIANGLE 	C-54 
GUN 	DIAMOND 	C-47 
AIRCRAFT 	SEMICIRCLE 	F-100 
MISSILE 	CIRCLE 	F-102 
SHIP 	STAR 	B-52 

Fig. 1 Shape codes used in display slides. For consistency, military designations are used to denote the aircraft shapes. As actually projected, the diameter of the circle was 1/2" on the screen, with the other symbols in proportion as shown.

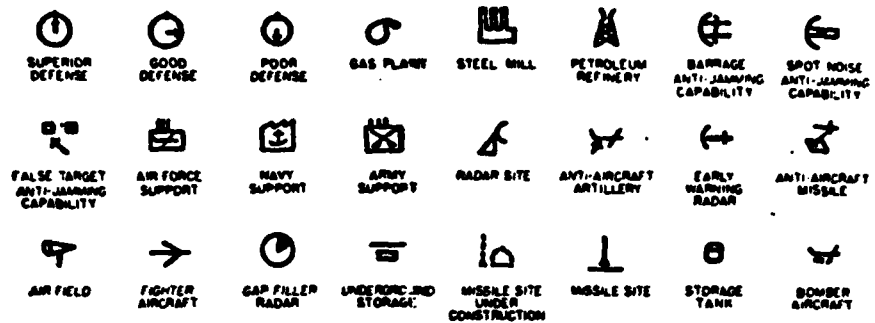


FIG. 3. The intelligence terms and symbols used in Experiment V.

control condition was included. This condition consisted of 14 nonsense symbols (*nonsense code*)⁶ to which the unique concepts of both codes were assigned. Ten subjects learned the 24-item military code and 14-item nonsense code with *military concept responses*. Ten more subjects learned the intelligence code and the 14-item nonsense code with *intelligence concept*

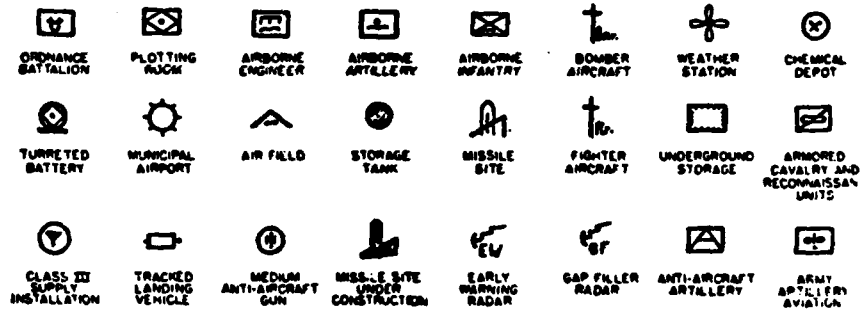


FIG. 4. The military terms and symbols used in Experiment V.

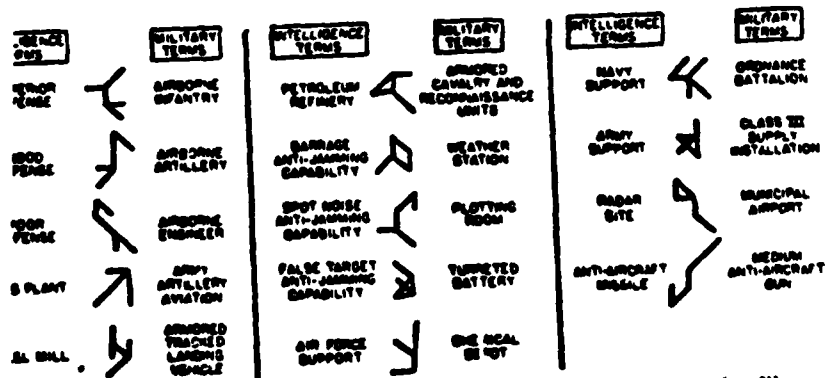


FIG. 5. The stimuli (nonsense symbols) and responses (military or intelligence terms) used as a control condition in Experiment V.

each sign in turn with one of the intelligence concepts. Signs were chosen to represent the extremes of stereotype values obtained in the earlier studies; for each concept the sign ranked highest in applicability (high stereotypy) and that ranked lowest (low stereotypy)² were used.

CONCEPT	LOW STEREOPTYPY	HIGH STEREOPTYPY	NUMBER	CONCEPT	LOW STEREOPTYPY	HIGH STEREOPTYPY	NUMBER	CONCEPT	LOW STEREOPTYPY	HIGH STEREOPTYPY	NUMBER
MOBILE SITE BEACH-HEAD				FIELD OF LABORATORY STORAGE				SECURE CAPABILITY			
CONSTRUCTION COMPLETED	⊥	⊞	05	WALL	⊙	⊙	42	POSS	⊙	—	72
WORKS UNDER CONSTRUCTION	⊞	⊥	06	NEW TRENCH	⊞	⊞	43	SEA	⊙	✓	75
NEVER TESTED	⊙	⊙	07	FIELD	⊞	⊞	45	GOOD	⊙	+	76
READY TO FIRE	⊞	⊞	08	WALL	⊞	⊞	47	CHELLERY	⊙	+	77
BEING FIRED	⊞	⊞	09	WALLS	⊞	⊞	49	SUPPER	⊙	+	79
TYPE OF SURFACE				ANTI-AIRCRAFT CAPABILITY				TYPE OF SURFACE			
SURFACE TO SURFACE	⊞	⊞	10	SEA SUR	⊞	⊞	52	GAS PLANT	⊙	⊙	81
SURFACE TO AIR	⊞	⊞	11	WALL	⊞	⊞	53	SEA PLANT	⊙	⊙	83
AIR TO AIR	⊞	⊞	12	SEA SUR	⊞	⊞	55	PETROLEUM REFINERY	⊙	⊙	85
SURFACE TO AIR AND AIR TO AIR	⊞	⊞	13	SEA SUR	⊞	⊞	57	ALUMINUM PLANT	⊙	⊙	87
AIR TO SURFACE	⊞	⊞	14	SPOT WIRE	⊞	⊞	58	STEEL MILL	⊙	⊙	88
ARMY INSTALLATIONS				SEA SUR				URGENT			
ANTI-AIRCRAFT ARTILLERY	⊞	⊞	22	WALL SUR	⊞	⊞	60	TANKER	⊙	⊙	90
ICBM	⊞	⊞	23	SEA SUR	⊞	⊞	62	FIGHTER	⊙	⊙	92
ANTI-AIRCRAFT MISSILE	⊞	⊞	25	SURFACE TO AIR	⊞	⊞	64	SHORT RANGE BOMBER	⊙	⊙	93
ICBM	⊞	⊞	28	SEA	⊞	⊞	65	TRANSPORT	⊙	⊙	94
ANTI-MISSILE MISSILE	⊞	⊞	29	SEA FILLER	⊞	⊞	67	LONG RANGE BOMBER	⊙	⊙	95
SELECT SUPPORTIVE SERVICES				LONG RANGE	⊞	⊞	69	AIR FIELD	⊙	⊙	96
ALL MILITARY	⊞	⊞	30								
INDUSTRY	⊞	⊞	32								
ARMY	⊞	⊞	33								
NAVY	⊞	⊞	35								
AIR FORCE	⊞	⊞	37								

Signs and number codes used in Experiments



















































CONCEPT		SYMBOL CODE		
Name	Abbreviation	US Code	Soviet Code	Pictographic Code
Artillery Unit	(Arty)		ATR	
Artillery Gun	(FA-Gun)			
Self Propelled Gun	(SP-Gun)			
Anti-Tank Gun	(AT-Gun)			
Anti-Tank Rocket	(AT-Rkt)			
Anti-Aircraft Gun	(AA-Gun)			
Anti-Aircraft Missile	(AA-MSL)			
Artillery Missile	(FA-MSL)			
Mortar	(None)			
Machine Gun	(MG)			
Armored Personnel Carrier	(APC)			
Mechanized Inf. Unit	(Mech Inf)		MI	
Helicopter	(Heli)			
Airmobile Inf. Unit	(Airmo Inf)		AMI	
Airborne Inf. Unit	(Airbrn Inf)		AI	
Motorized Inf. Unit	(Motor Inf)		MTI	
Infantry Unit	(Inf)		DI	
Tank	(None)			
Armor Unit	(Armor)		A	

FIGURE 1. The three 19-item symbol codes used in the experiment.



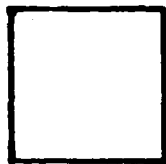
FIGURE 1 TCS - Tactical Capability Symbology

<u>Unit Capability</u>	<u>Capability Level</u>	<u>UNIT SIZE</u>	<u>Unit Type</u>
THREAT			INF
FIREPOWER		CO.	MECH AIRBORNE INF
TERRAIN		BATT.	ARMOR
MOBILITY		REG.	ANTI-TANK GUN
LOGISTICS		BRIGADE	ANTI-TANK RKT
EFFECTIVENESS		DIV.	FA GUN
DENSITY			ADA GUN
SUPPORT			ADA RKT

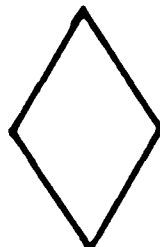
To give you a feel for what the initial MICROFIX symbols will look like, the following description is provided.

Symbology:

Shape represents the following:

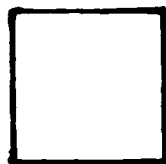


Control Headquarters or Combat Units

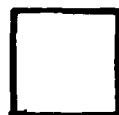


Combat Support or Combat Service Support Units

Hierarchy is represented by size:



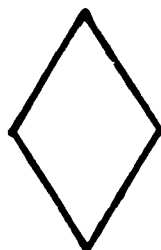
Army, Front



Division



Battalion



Regiment, Brigade



Battalion



Company

Color association by major category:

- Blue - Motorized Rifle
- Violet - Tank
- Red - Artillery and Air Defense
- White - Chemical
- Green - Engineer

Multiple color association by type unit in diamond figure:

- Solid Red ----- Artillery.
- Red with Green base ---- Surface to surface missile.
- Red base with Violet --- Free Rockets over Ground (FROG).
- Solid Green ----- Engineer.
- Green base with White -- River Crossing.
- Solid White ----- Chemical.
- Solid Violet ----- Anti Tank.
- Violet base with White - Reconnaissance.

Detailed list of Players and Symbols:

- FR FRONT ----- Large Blue Box.
- AR CA ----- Large Box, Blue base with White.
- AR TK ----- Large Box, Violet base with White.
- DV ABN ----- Medium Box, Blue base with White.
- DV MR ----- Medium Box, Blue.
- DV TK ----- Medium Box, Violet.
- RG ARTY-A ---- Large Diamond, Red.
- BN SSM ----- Large Diamond, Red base with Green.
- BD SAM-A ---- Large Diamond, Red base with White.
- BD ENGR ----- Large Diamond, Green.
- RG PONBR ---- Large Diamond, Green base with White.
- BN CHEM-A ---- Large Diamond, White.
- RG MR ----- Medium Box, Blue base with White.
- RG TK ----- Medium Box, Red.
- RG ARTY-T ---- Medium Box, Red.
- RG ARTY-M ---- Medium Box, Red.
- RG AAA ----- Medium Diamond, Red base with White.
- BN MRL ----- Medium Diamond, Red base with Green.
- BN FROG ---- Medium Diamond, Red base with Violet.
- BN AT-M ----- Medium Diamond, Violet.
- BN RECN-T ---- Medium Diamond, Violet base with White.
- BN RECN-M ---- Medium Diamond, Violet base with White.
- BN ENGR ----- Medium Diamond, Green.
- BN CHEM ----- Medium Diamond, White.
- BN MR ----- Small Box, Blue.
- BN TK ----- Small Box, Violet.
- CO AAA ----- Small Diamond, Red base with White.
- CO ARTY ----- Small Diamond, Red.
- CO ANTK ----- Small Diamond, Violet.