SIMNET Combat Vehicle Command and Control (CVC2) System User's Guide

December 1990

Bolt Beranek and Newman, Inc.

SIMNET

DARPA
MAJ JAMES WARGO
INFORMATION SCIENCE AND TECHNOLOGY OFFICE
DEFENSE ADVANCED RESEARCH PROJECTS AGENCY
1400 WILSON BLVD., ARLINGTON, VA 22209-2308

BOLT BERANEK AND NEWMAN, INC.
DR. CHARLOTTE HOLLISTER
BBN SYSTEMS AND TECHNOLOGIES
10 MOULTON STREET, CAMBRIDGE, MA 02238
(617) 873-3886
FAX: (502) 873-3776

CONSULTANT
CHARLES K. HEIDEN, MG, USA (Ret.)
10500 BROOKHILL COURT, LOUISVILLE, KY 40223
(502) 244-0515
FAX: (502) 942-1696

USARI
DR. BARBARA BLACK
US ARMY RESEARCH INSTITUTE
FOR THE SOCIAL AND BEHAVIORAL SCIENCES
FORT KNOX FIELD UNIT
PERI-IK, FORT KNOX, KY 40121
(502) 624-3450

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Paul G. Smith

December 1990

Prepared by:

Bolt Beranek and Newman, Inc.
BBN Systems and Technologies Division
2021 Black Horse Regiment Avenue, P.O. Box 39
Fort Knox, KY 40121

Foreword

This document is intended for use by persons with an interest in the operational procedures associated with the Simulation Network Developmental (SIMNET-D) based implementation of Combat Vehicle Command and Control (CVC2). CVC2 is a research and development program in support of automated and interoperable command, control, and communication (C3) systems for ground combat vehicles. The program is funded by the Balanced Technology Initiative (BTI) program, tech base funds and, for NATO interoperability, funds from the Nunn Agreement.

This User's Guide is not intended to reflect the final functionality and operational procedures for a fielded automated C3 system, rather it represents a test bed containing an evolving system of proposed functions which will change and improve based on soldier utilization and soldier recommendations from experiments conducted in the SIMNET-D facility.

The SIMNET-D based CVC2 system was initially implemented by BBN Systems and Technologies from functional specifications prepared by the Army Research Institute Fort Knox Field Unit in cooperation with the Directorate of Combat Developments at Fort Knox, KY. Your comments and insights regarding simulation of automated command and control functionality are welcome and should be directed in writing to the Chief, USARI Attn: PERI-IK, Fort Knox, KY 40121.

The findings in this report are not to be construed as an official Department of the Army position, unless so designed by other authorized documents.

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SIMNET and the CVC2 System

SIMNET is an advanced research project sponsored by the Defense Advanced Research Projects Agency (DARPA) in partnership with the United States Army. SIMNET technology permits soldiers to occupy crew positions in armored tanks, infantry fighting vehicles, fixed-wing aircraft, helicopters, and air defense systems to fight force-on-force engagements against opposing units of similar composition in real time. SIMNET also includes artillery units, close-air-support, and combat service support. All of the elements that can effect the outcome of a combined arms tactical engagement are represented, with victory likely to go the the unit which is able to plan, orchestrate, and execute their combined arms battle operations better than their opponents.

SIMNET-Developmental is an application of SIMNET technology to support evaluations of potential combat developments and weapon system acquisitions. By applying SIMNET in the context of "selective fidelity" and "rapid prototyping" design philosophies, it may be possible to evaluate potential weapon system enhancements early in their development cycle in the tactical environment in which they will be used.

The Combat Vehicle Command and Control (CVC2) system is a proposed enhancement for the M1 Abrams Main Battle Tank. It has been designed to support tank commanders in their performance of critical command and control tasks. The CVC2 system described in this guide is part of an ongoing research effort examining enhancements to the M1 tank sponsored by the U.S. Army's CVC2 Program with the assistance of the U.S. Army Research Institute for the Social and Behavioral Sciences (ARI). Previous ARI research in the SIMNET test bed has examined soldier performance using a Position Navigation (POSNAV) system, an InterVehicular Information System (IVIS), and a Commander's Independent Thermal Viewer (CITV). The current prototype CVC2 system possesses the combined capabilities of these three subsystems. ARI's ongoing research program is examining the impact of this integrated computer system on the tactical performance of Armor battalions, companies, platoons, and crews.

Using this Guide

The tank simulators you will be using are equiped with a prototype device to help you perform critical command and control tasks: the **Combat Vehicle Command and Control (CVC2) System**. The CVC2 system combines and integrates three separate proposed systems: (1) an **InterVehicular Information System (IVIS)**, (2) a **Position Navigation (POSNAV) System**, and (3) a **Commander's Independent Thermal Viewer (CITV)**.

In this guide you will find the instructions necessary to operate the SIMNET CVC2 system. It is organized into 8 chapters, each containing step-by-step hands-on instructions and graphic illustrations to help you learn to operate the SIMNET CVC2 system.

Section I provides a general overview of the CVC2 system, the available experimental modes, and describes the basic procedures for starting and operating your SIMNET CVC2 M1 simulator.

Chapter 1: Getting Started

This section provides a general overview of the prototype CVC2 system, and shows the layout of your SIMNET CVC2 M1 simulator.

Chapter 2: Experimental Modes

This section reviews the available configuration modes, and shows you where you can find information about the diferent functions and features found in each mode.

Chapter 3: Starting the CVC2 System

In this section you will learn how to start each element of the CVC2 simulation, and how to operate the basic controls of your simulator.

Section II examines the functions and features of the Command and Control Display (CCD). In this section, you will find a review of the major functions and features available from your CCD.

Chapter 4: CCD Tactical Map Manipulation

In this section you will learn how to use basic map tools, such as changing the map scale or moving your vehicle icon on the tactical map display

Chapter 5: Combat Reports

This section describes the different types of reports you can create, save, send, receive, delete, and relay using the CCD. You will learn how old or saved messages can be reviewed, deleted or relayed.

Chapter 6: CCD Overlays and Posted Icons

In this section you will learn how to display graphic overlays and to post report icons on your tactical map. In addition, this chapter shows you how to delete posted icons from the map.

Chapter 7: Navigation

In this section we will show you how to enter a series of waypoints to define a route. This chapter also shows you how to save, send, and receive routes files. You will also learn how to relay or delete old files.

Section III examines the functions and features available with your CITV.

Chapter 8: CITV Modes and Functions

In this section you will learn how to operate the CITV simulation. It explains how the different CITV modes operate, including the target stack, and the Identification Friend or Foe (IFF) system.

Section I

CVC2 Overview

Chapter 1: Getting Started

OVERVIEW OF THE SIMNET CVC2 SYSTEM

The SIMNET CVC2 System provides the tank commander an integrated workstation from which he can monitor, direct, and control the various subsystems built into his M1 simulator. The system contains separate displays for the tank commander, gunner, and driver.

The SIMNET CVC2 system has three major subsystems:

- A **Command and Control Display** (CCD)
- A **Position Navigation** (POSNAV) system embedded into the CCD and coupled with a driver's steer-to display
- A **Commander's Independent Thermal Viewer** (CITV)

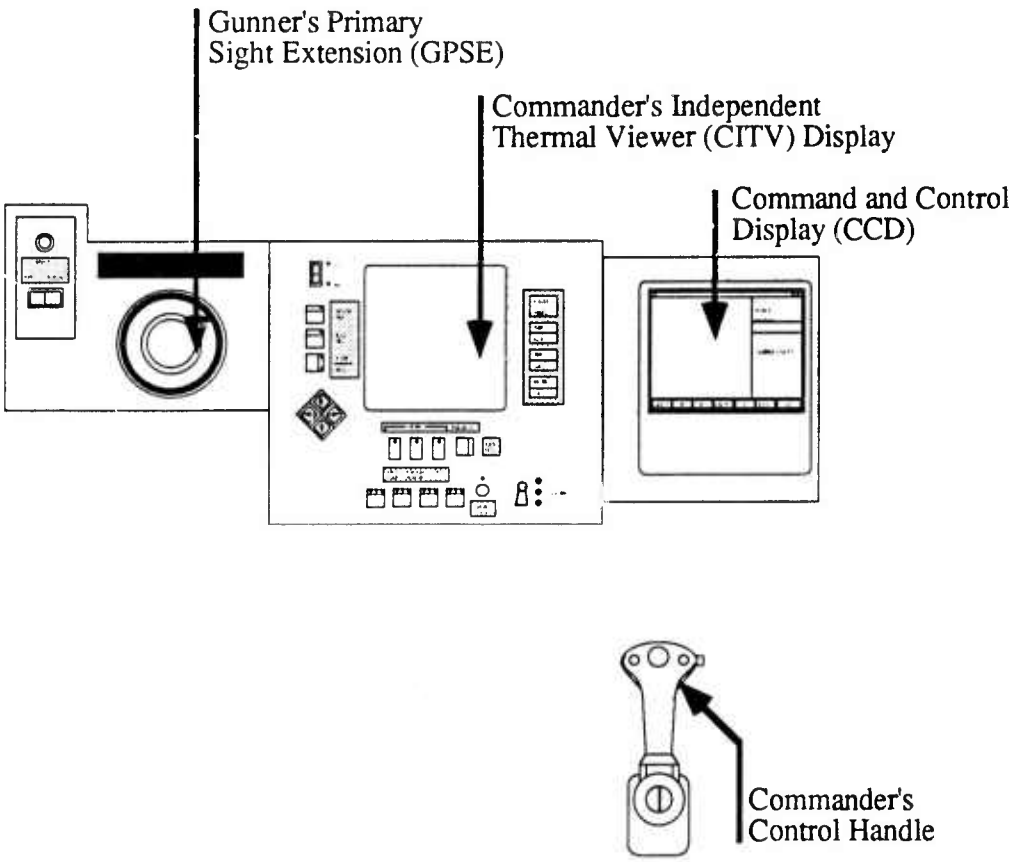


Figure 1 The SIMNET-D CVC2 Tank Commander's Integrated Display

Using the CCD, the tank commander can:

- Create, send, and receive, critical battlefield reports
- Receive, display, and relay Fragmentary Orders (FRAGOs) and tactical overlays
- See his vehicle location and heading
- Create, send, receive reports and routes
- See the locations and headings of other friendly vehicles
- Pass critical navigation information to the driver
- Display digital terrain features on the tactical map
- Save copies of all reports, FRAGOs, and routes created, received or sent
- See the orientation of his main gun and CITV

Using the CITV the tank commander can:

- Scan the battlefield and acquire targets
- See thermal images as white hot or black hot
- Change from a 3X to 10X sight
- See what appears in the gunner's sight
- Set a sector for auto scan
- Immediately designate critical enemy targets
- Stack up to 4 enemy targets in a target queue
- Identify targets as friend or foe (IFF)

The tank gunner can:

- Change from a 3X to 10X sight
- See images in daylight or thermal mode
- Select targets from the target queue

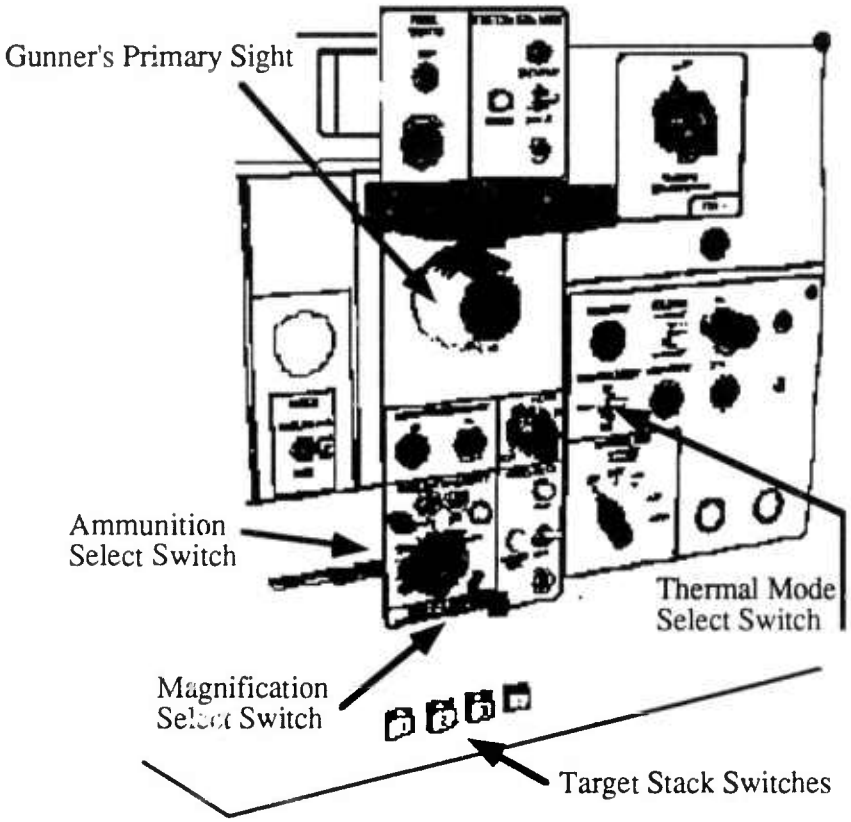


Figure 2 The CVC2 Tank Gunner's Control Panel

The tank driver can:

- Use the Steer-to display to get to the next waypoint
- Read the distance to the selected waypoint

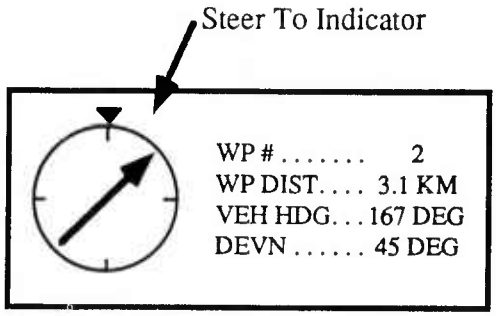


Figure 3 The SIMNET-D CVC2 Driver's Display

It is also possible to initialize the SIMNET CVC2 system in one of two other experimental modes or configurations, described in Chapter 2. The particular configuration will be set before you enter your simulator, and can only be changed by a technician.

LAYOUT OF THE SIMNET CVC2 M1

The SIMNET CVC2 M1 module is divided into two compartments: a driver's compartment and a crew compartment. The simulator does not contain every button, knob, or dial, you might expect in an actual CVC2 M1, but only those controls necessary to fight and operate using the CVC2 system.

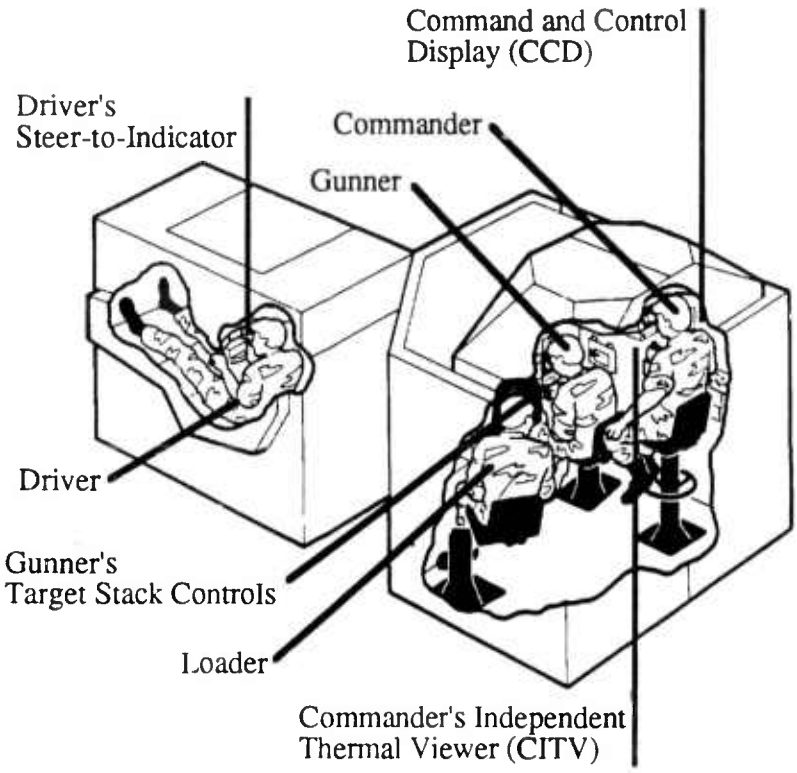


Figure 4 The SIMNET-D CVC2 M1 Simulator

STARTING THE SIMNET CVC2 M1

This section describes the routine procedures used to operate the SIMNET CVC2 M1. Many of the basic procedures are identical to those required to operate the SIMNET M1. For more information see the SIMNET M1 Crew Manual (Perceptronics, SIMNET Manual No. PTUM 001-1250-89-10 (rev. 2)).

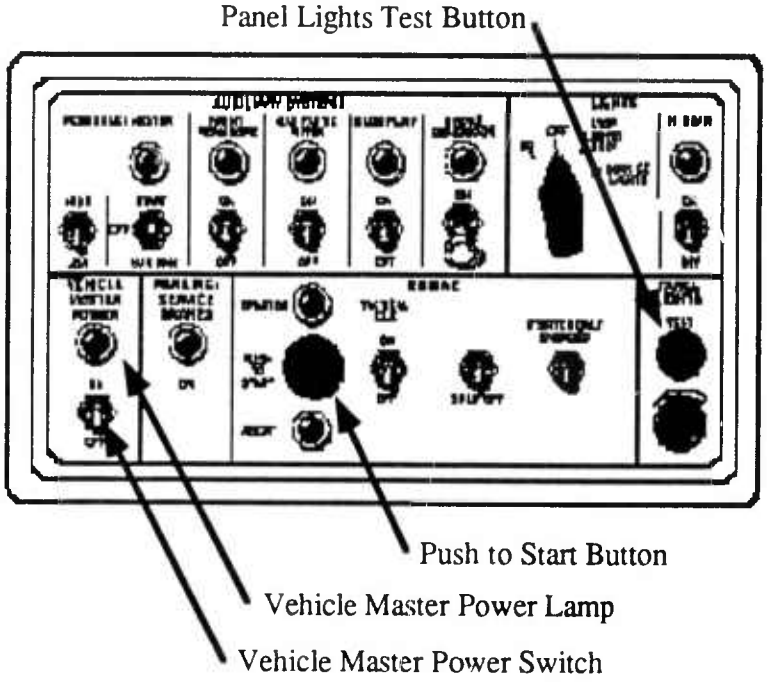


Figure 5 M1 Driver's Control Panel

In the CVC2 Driver's Compartment:

	What You Do	What Happens
1.	Make sure the transmission selector is in the Neutral position.	
2.	Set the Parking Brake.	
3.	Move the Vehicle Master Power switch (Driver's Master Panel) to ON.	The Vehicle Master Power lamp is lit.
4.	Press the Panel Lights Test Button (Driver's Master Panel).	All warning, caution, and panel lamps light.
5.	Press and hold the button labeled PUSH TO START for (Driver's Master Panel) several seconds.	The Started lamp will be lit, and you will hear the engine whine. The tachometer will indicate engine RPM.

The SIMNET CVC2 M1 should now be started.

OPERATING THE COMMANDER'S CUPOLA

	What You Do	What Happens
1.	Move the Vehicle Master Power switch to ON.	The Vehicle Master Power lamp will be lit.
2.	Move the Turret Power switch (Commander's Panel) to ON.	The Turret Power lamp will be lit.
3.	Grasp the Commander's Power Control Handle, depress the palm switch, and move the red thumb switch right or left.	The cupola will move in the same direction as the thumb switch.
4.	Release the thumb switch to stop rotation of the cupola.	The cupola will stop moving.

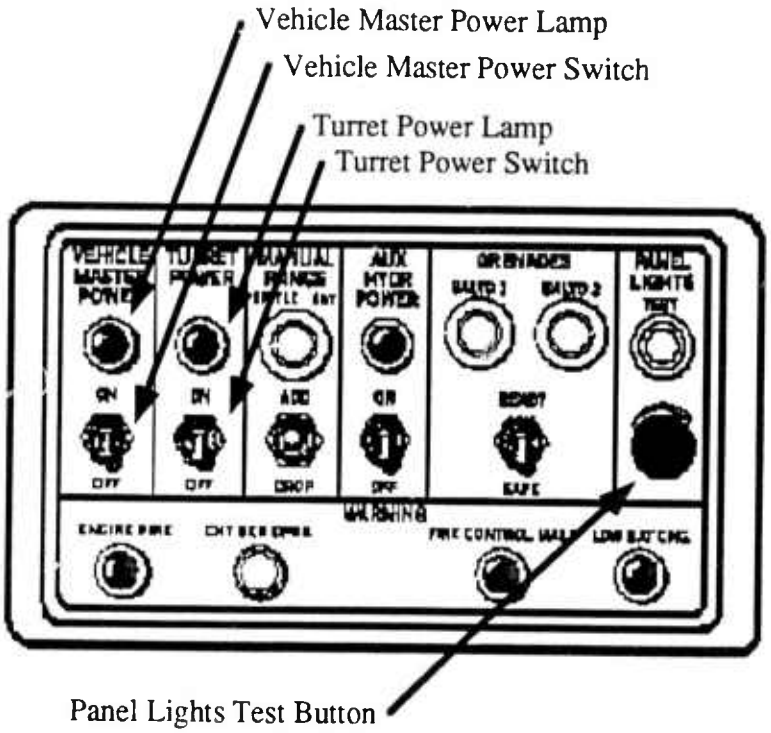


Figure 6 M1 Commander's Panel

USING THE SIMNET SINCGARS RADIOS

Your SIMNET CVC2 M1 is also equiped with a radio/intercom system which simulates anticipated SINCGARS radios currently being developed by the Army. For most experiments all necessary frequencies are preset.

Each crewmember in the CVC2 M1 simulator has a commo switch, which enables him to transmit over the radio and intercom.

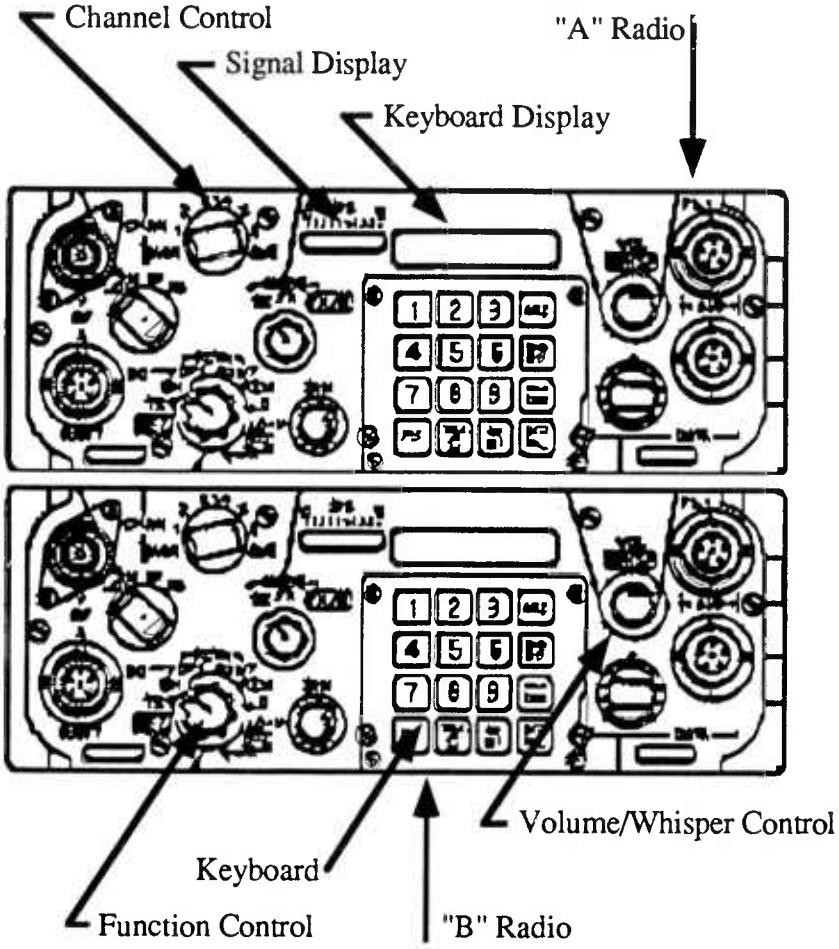


Figure 7a SIMNET SINCGARS Radios

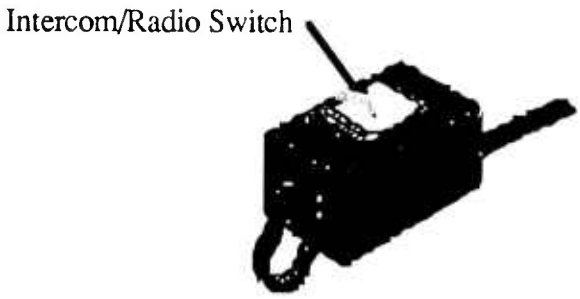


Figure 7b Radio Commo Switch

USING THE COMMANDER'S CONTROL HANDLE

The CVC2 M1 simulator is equiped with a modified commander's control handle. In addition to the palm switch, Laser Range Finder (LRF), and trigger found on an actual M1, the CVC2 Commander's Control handle has a 3X/10X toggle and a cursor control (used with the CCD) and a target designate switch (used with the CITV). Detailed instructions for the use of the cursor control appears in Chapter 3. Instructions for the target designate switch appears in Chapter 8.

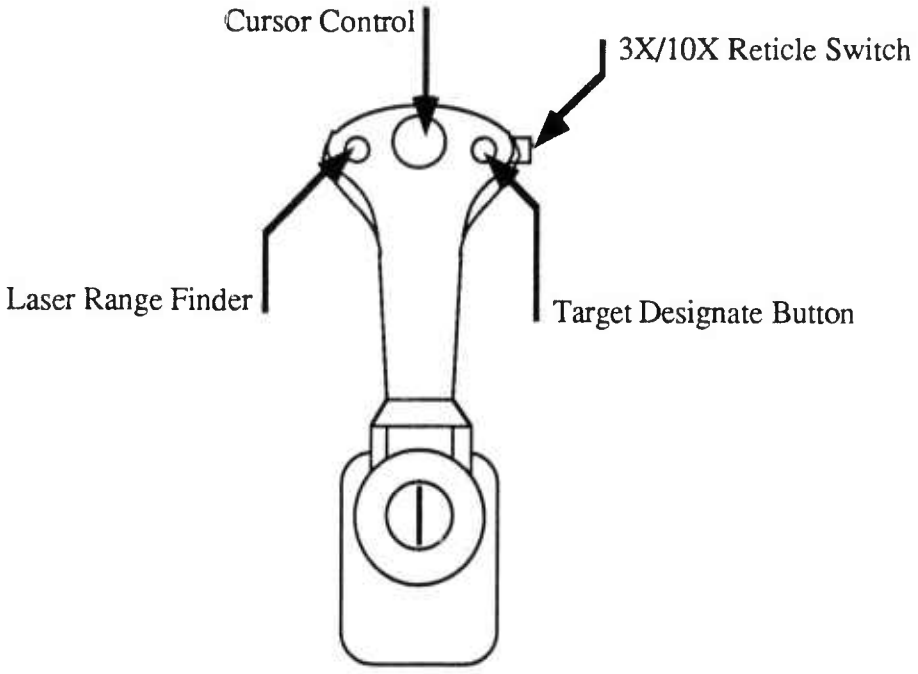


Figure 8 CVC2 Commander's Control Handle

LOADING AND UNLOADING THE MAIN GUN

Your SIMNET CVC2 M1 is equiped with an autoloader.which eliminates many of the normal tasks required to load the main gun. However, there are some new functions included which permit the gunner to select the desired ammunition type and to remove a round from the main gun.

Selecting the Main Gun Ammo Type

When you first enter your SIMNET CVC2 M1 your main gun will already be loaded. The type of ammunition in the main gun will be determined by the position of the Ammunition Select switch located in the gunner's station.

Once you have fired a main gun round, the gunner has 3 seconds to choose a new ammo type for the next round. After the 3 seconds has passed a new round will be loaded.

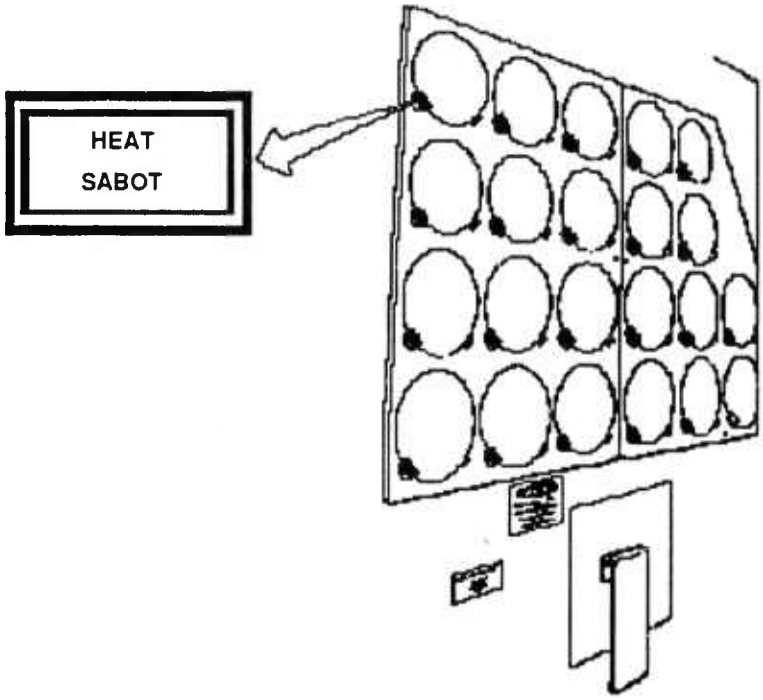


Figure 9a SIMNET M1 Ammo Ready Rack

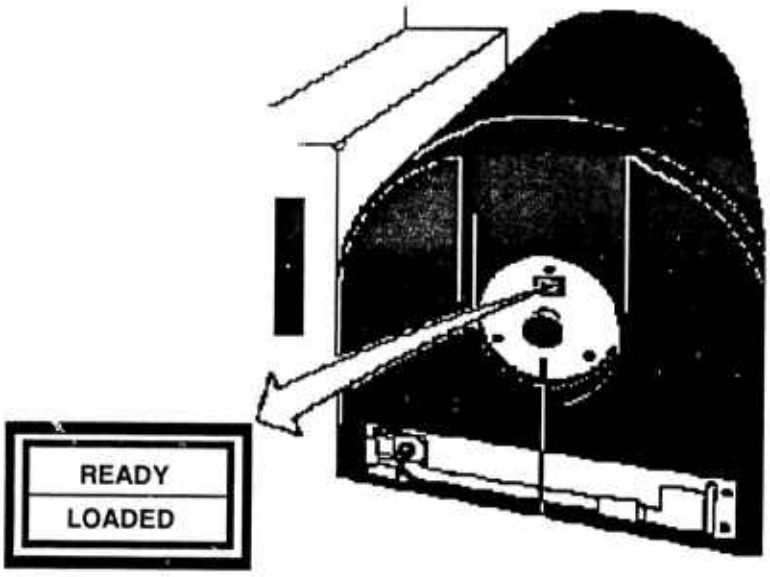


Figure 9b SIMNET M1 Breech

Changing the Ammo Type of a Loaded Main Gun

To change the ammo type of round already loaded into the main gun, you must first remove the current round and reload the main gun with the new round. The following procedure will change the type of ammunition in the main gun.

What You Do	What Happens
Move the Ammunition Select switch to the new ammo type.	You will hear the current round being removed from the main gun, and a new round will be loaded. This entire cycle takes approximately 8 seconds.

AMMO REDISTRIBUTION

The SIMNET CVC2 M1 is equiped with an Ammo Redistribute and Ammo Transfer Panel. The procedures for this function are the same as in the SIMNET M1 Crew Manual (SIMNET Manual No. PTUM 001-1250-89-10 (rev. 2)).

Chapter 2: Experimental Modes

The SIMNET CVC2 M1 can be configured in one of three basic experimental modes. The particular mode in which your simulator is operating will be set by a technician before you enter.

INTRAVEHICULAR COMMAND AND CONTROL (IVC2) MODE

- The CCD is black and amber
- The CCD tactical map does not show terrain features
- The CCD **cannot** send or receive combat reports
- The cursor control on the commander's control handle must be used to operate the CCD

ENHANCED IVC2 MODE

- The CCD is black and amber
- The CCD tactical map does not show terrain features
- The CCD **can** send and receive combat reports
- The cursor control on the commander's control handle must be used to operate the CCD

CVC2 MODE

- The CCD is in color
- The CCD tactical map can show selected terrain features
- The CCD can send and receive combat reports
- The cursor control on the commander's control handle **OR** the touch screen can be used to operate the CCD
- The CITV target stack and identification friend or foe (IFF) system are operational

The following table lists the major functions and features of the CVC2 system. It also indicates which function or feature is available in each mode, and where specific information may be found.

System/Function	IVC2 Mode	Enhanced IVC2 Mode	CVC2 Mode
1. CCD Map Tools			
a. Touch Screen	n/a	n/a	Page 17
b. Cursor Control	Page 18	Page 18	Page 18
c. Scaling Map	Page 26-27	Page 26-27	Page 26-27
d. Terrain Features	n/a	n/a	Page 26
e. Scrolling Map	Page 28-29	Page 28-29	Page 28-29
f. Centering tank icon	Page 30	Page 30	Page 30
g. Off-centering tank icon	Page 31-32	Page 31-32	Page 31-32
2. Combat Reports			
a. Creating reports	Page 33-44	Page 33-44	Page 33-44
b. Posting icons	Page 44-45	Page 44-45	Page 44-45
c. Sending reports	n/a	Page 44-45	Page 44-45
d. Receiving reports	n/a	Page 46-49, 52	Page 46-49, 52
e. Old report files	Page 50-51	Page 50-51	Page 50-51
f. Receiving FRAGOs	n/a	Page 52	Page 52
g. Changing Overlays	n/a	Page 53-54	Page 53-54

System/Function	IVC2 Mode	Enhanced IVC2 Mode	CVC2 Mode
3. Navigation			
a. Own location	Page 23	Page 23	Page 23
b. Mutual POSNAV	n/a	n/a	Page 24
c. Creating routes	Page 63-65	Page 63-65	Page 63-65
d. Receiving routes	n/a	Page 62	Page 62
e. Saving routes	Page 68	Page 68	Page 68
f. Sending routes	n/a	Page 68-69	Page 68-69
f. Auto updating	n/a	Page 66	Page 66
g. Manual updating	Page 67	Page 67	Page 67
h. Using route files	Page 72-73	Page 72-73	Page 72-73
4. CITV			
a. Modes	Page 85-86	Page 85-86	Page 85-86
b. Static icon	Page 77	n/a	n/a
c. Moving icon	n/a	Page 77	Page 77
d. Identifying Friend or Foe (IFF)	n/a	n/a	Page 80
e. Stacking targets	n/a	n/a	Page 81-83

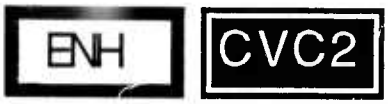
Throughout the remainder of this guide, the following convention will be adopted to help you readily identify features which are available in your CVC2 mode. Before each important paragraph you will find a symbol or symbols which indicate which CVC2 mode or modes to which the section applies.

This symbol will be used when the following discussion applies to the **IVC2** mode.

This symbol will be used when the following discussion applies to the **ENHANCED IVC2** mode.

This symbol will be used when the following discussion applies to the **CVC2** mode.

In addition it is also possible to see several of these symbols preceding sections when the discussion relates to two or three modes.



This is an example of what you would see if the discussion applies to the **ENHANCED IVC2** and **CVC2** modes.

Chapter 3: Starting the CVC2 System

STARTING THE COMMAND AND CONTROL DISPLAY (CCD)

When you first enter the SIMNET CVC2 M1 the CCD should be on. If this display is not on, the simulator has not been properly configured or initialized.

The prototype CCD in your tank is divided into four important areas: (1) a digital map display, (2) dedicated menu keys, (3) an own location area, and (4) an information center. Initially, an icon representing your own tank will be visible in the center of the screen. The top of the map display is always north. Your tank icon will be oriented in the direction of your tank hull. You will also see the orientation of your main gun (solid line) and your CITV (dashed line).

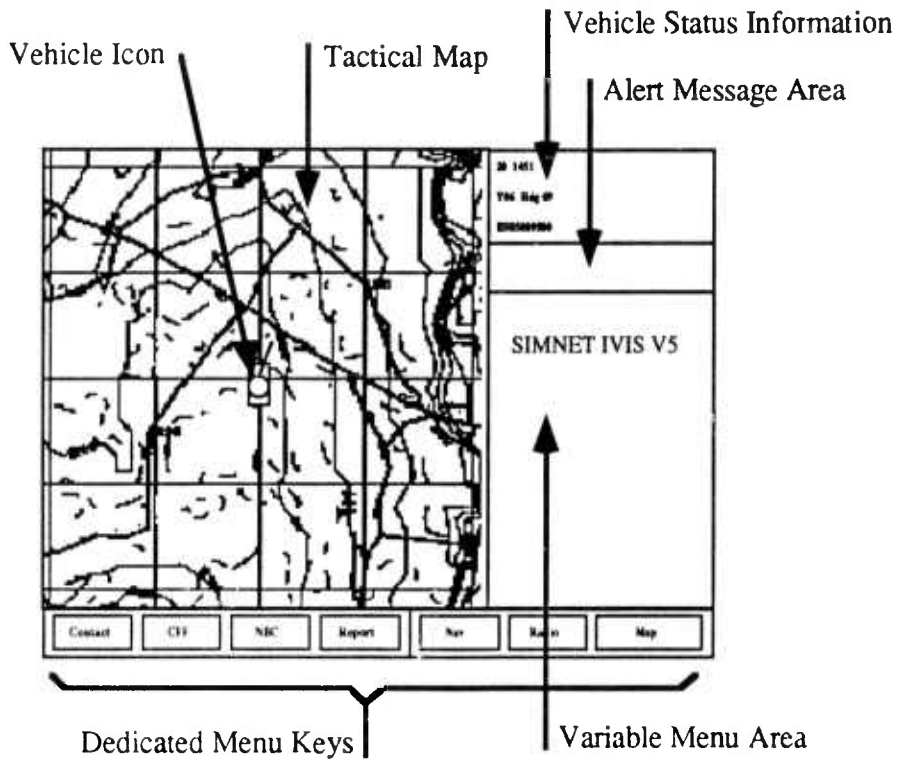


Figure 10 The CVC2 Command and Control Display (CCD)

STARTING THE CITV

Initially, the CITV will be OFF. To turn the CITV ON, turret power must also be ON.

	What You Do	What Happens
1.	Move the CITV Power Switch (below and to the right of the CITV display) to the STANDBY position.	The standby light will flash on and off for about 8 sec while the CITV detection element is cooling down.
2.	Move the CITV Power Switch to ON.	The thermal CITV display should appear.

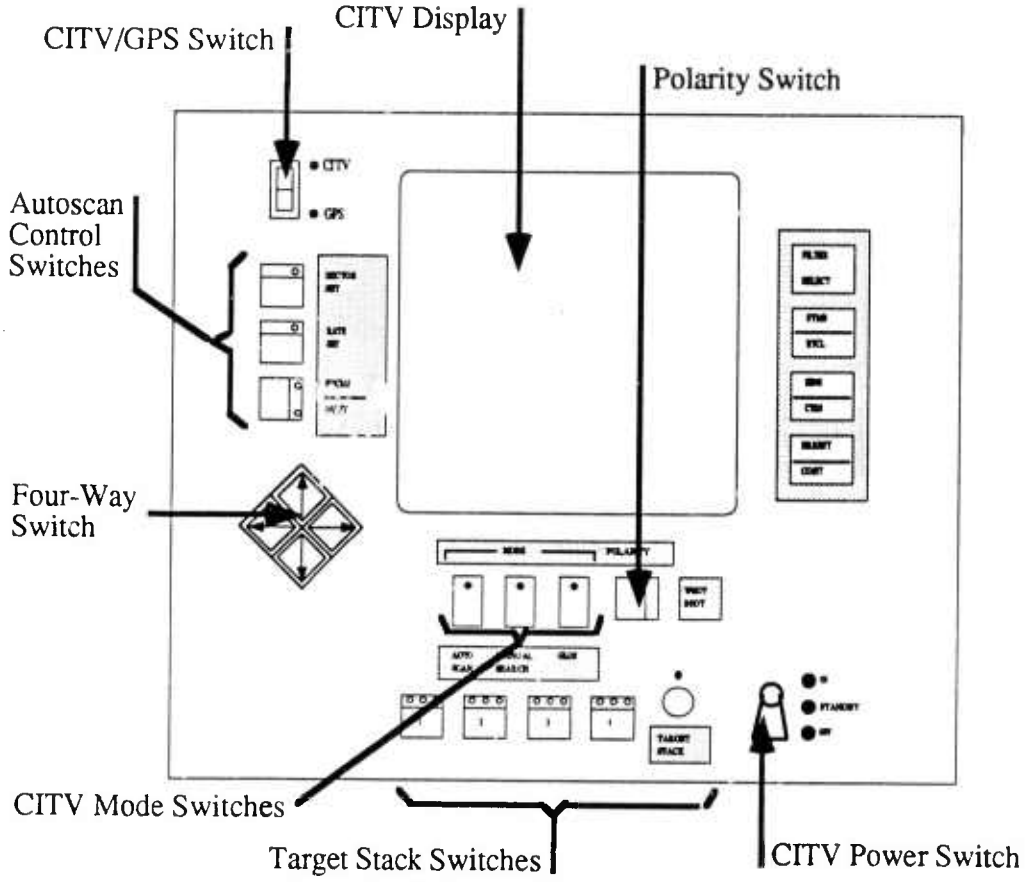


Figure 11 The SIMNET-D CVC2 Commander's Independent Thermal Viewer

CVC2

USING THE TOUCH SCREEN

The prototype CCD in your tank has a touch sensitive device called a **touch screen** display. You can press buttons or enter information by touching the display with your finger or with the cursor control, located on the commander's control handle (See the cursor control section following). The touch screen tracks the movement of your finger wherever it touches the display surface. A crosshair (+) moves with your finger (or cursor control) showing you where the touch screen thinks you are pointing.

To select a button or map icon on the display, touch the display and move your finger until the crosshair is over the button or icon. At that moment, the object will highlight to indicate that your finger is on it. When you lift your finger, your selection will be entered, and the system will respond to the selection mode.

Some menus have toggle switches (box). When you select a toggle switch, the box is filled and backlit. When they are not active they appear as a hollow box. To change the toggle switch, press your finger on the touch screen and drag your finger over the switch or the word next to it. The fill of the box should change causing the display to respond to the toggle.

To make an input on the map display, touch your finger to the map area.

Here are some tips for using the touch screen:

- If you accidentally touch the wrong button, just slide your finger off the button before lifting it off the touch screen.
- Be careful not to rest any other part of your hand on the touch screen while trying to select something - this confuses the system.

IVC2 ENH CVC2

USING THE COMMANDER'S CONTROL HANDLE

The CVC2 is equiped with a modified commander's control handle. These modifications include a cursor control, a 3X/10X button, and a target designate button. In addition, to these functions the Laser Range Finder button operates either the main gun LRF or the CITV LRF (see Chapter 8).

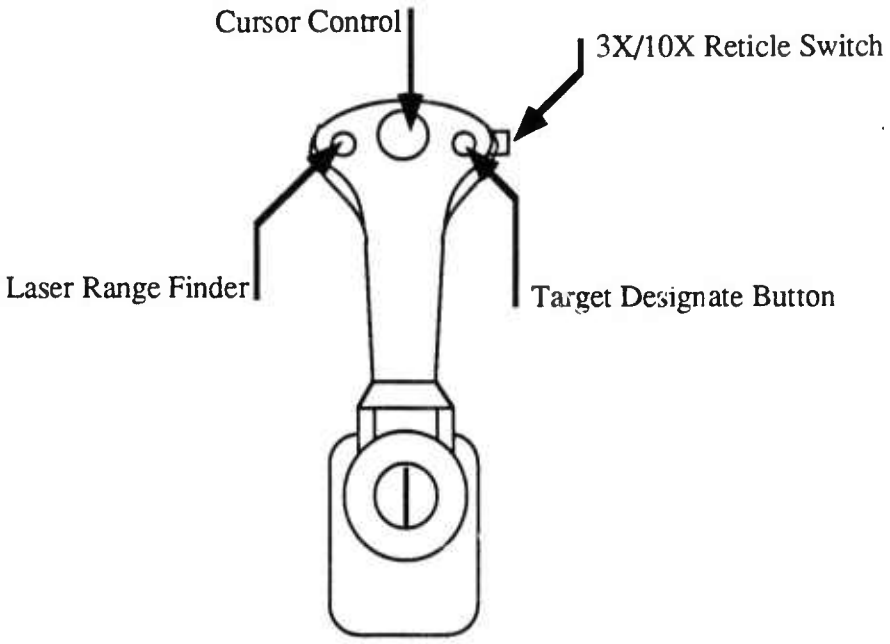


Figure 12 The CVC2 Commander's Control Handle

IVC2 ENH CVC2

Cursor Control

The cursor control is used to move the cursor on the CCD. You can move the cursor on the CCD by placing your thumb on the cursor control, and pushing the cursor control in the desired direction. To activate the buttons and switches on the CCD:

	What You Do	What Happens
1.	Move the cursor over the button or switch.	
2.	Press down on the cursor control with your thumb.	The button or switch will highlight.
3.	Lift your thumb.	The button or switch will activate.

In the **CVC2 MODE**, you may use the cursor control or touch screen to operate the CCD.

In the **IVC2** and **ENHANCED IVC2** modes ONLY the cursor control is available.

3X/10X Button

When using the CITV, the 3X/10X button switches the view in the CITV display between the 3-power or 10-power reticle. The 3X reticle appears as a small box around the center of the display, the 10X reticle appears centered on the display. The area in the 3X box represents the entire area which will be visible when you switch to the 10X vie w. More information on the 3X/10X reticle can be found in Chapter 8.

Target Designate

The target designate button is also used with the CITV. When you press the designate button, the tank main gun slews to the location in the center of the CITV display. Releasing the target designate button before the main gun and the turret have completed traversing stops this movement. More information on the target designate button appears in Chapter 8.

Section II

Command and Control Display (CCD)

Chapter 4: CCD Tactical Map Manipulation

The CVC2 System Tactical Map can be changed to meet your specific needs. By selecting particular options you can change the scale of the map, what features are displayed, and where your tank appears on the map. You can also move the map so that you can look at an area in which your tank is not visible.

IVC2 | ENH | CVC2

YOUR TANK ICON

Your tank appears on the CCD as a large icon, initially in the center of your tactical display. One side of this icon is thicker and corresponds to the front slope of your tank. It is oriented the same as your vehicle. For example, if the tank icon is facing the top of the tactical map, your tank is oriented toward the north.

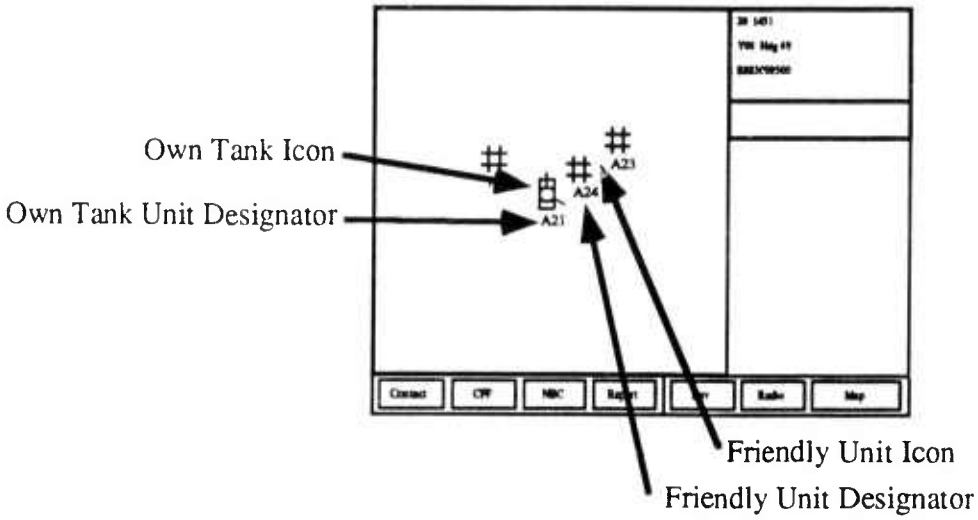


Figure 13 CCD Tank Icons

IVC2 ENH CVC2

FRIENDLY AND ENEMY SYMBOLS

In addition to your own tank icons, some combat reports will display additional friendly and enemy symbols on your map. In the **ENHANCED IVC2** mode, friendly symbols will be solid, and enemy symbols will be dashed. In the **CVC2** mode, friendly symbols will be blue, and enemy symbols will be red.

CVC2

Mutual POSNAV

If mutual POSNAV is enabled, you will see the tank icons for other vehicles in your unit on the tactical display. These icons will be located and oriented appropriately.

IVC2 ENH CVC2

Friendly Symbols

At different times other friendly symbols may appear on your tactical display. These symbols correspond to information in combat reports you have created or received. In some cases these icons may be flashing, which tells you they belong to newly arrived combat reports. Receiving combat reports is discussed in a later section of this manual.

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Enemy Symbols

Enemy symbols may also appear on your tactical display. These symbols will be dashed (red in **CVC2** mode), and correspond to information in combat reports you have created or received. In some cases these icons may be flashing, which tells you they belong to newly arrived combat reports. Receiving combat reports is discussed in a later section of this manual.

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USING THE MAP FUNCTIONS

Your CCD provides a variety of Map Functions which allow you to adjust the appearance of your tactical display to best support your current needs. To use the Map Functions you must first select this option from the Map Main Menu following these steps:

What You Do	What Happens
1. Press the **Map** key from the dedicated menu keys at the bottom of the CCD.	The **Map Functions** menu will be visible in the variable menu area.
2. Choose the **Map Functions** you wish to use.	The **variable menu** for the function you chose will become visible.

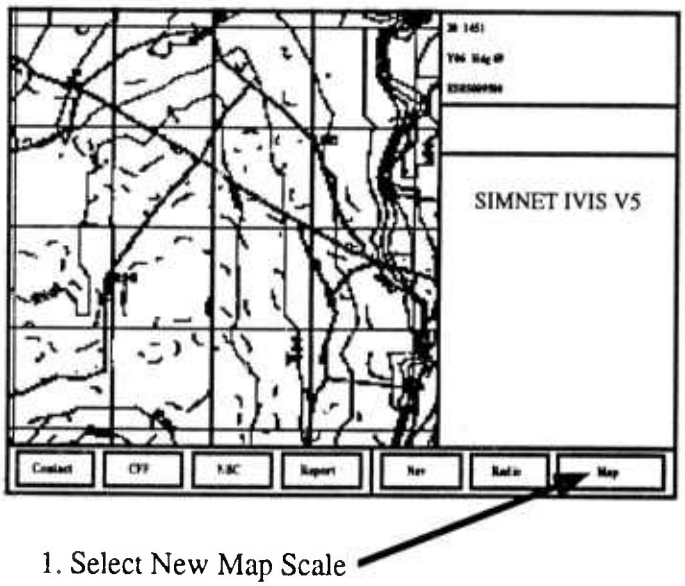

Figure 14 CCD Map Functions Menu

Changing Map Features

You may configure your tactical map to display one or more of the following features:

- Contour Lines
- Grid Lines
- Rivers
- Roads
- Vegetation

To change the features displayed on your tactical map:

	What You Do	What Happens
1.	Press the **Map** key from the dedicated menu keys located along the bottom of the CVC2 display.	The **Map Functions** menu should be visible in the variable menu area.
2.	Press the **Features** buton.	The Variable menu area will display a list of the available features.
3.	Select the features you wish displayed.	The features you select will be visible on your tactical map.

Changing Map Scales

Your tactical map can be displayed in one of four scales:

- 1:25000
- 1:50000
- 1:125000
- 1:2~0000

To change the current scale of your tactical map:

	What You Do	What Happens
1.	Press the **Map** key from the dedicated menu keys located along the bottom of the CVC2 display.	The **Map Functions** menu should be visible in the variable menu area.
2.	Move the cursor to the desired scale.	The tactical map will update to the new scale in approximately 15-20 sec. You will also see the message **Rescaling Map** in the message area.

You can change this scale as often as desired by repeating these steps.

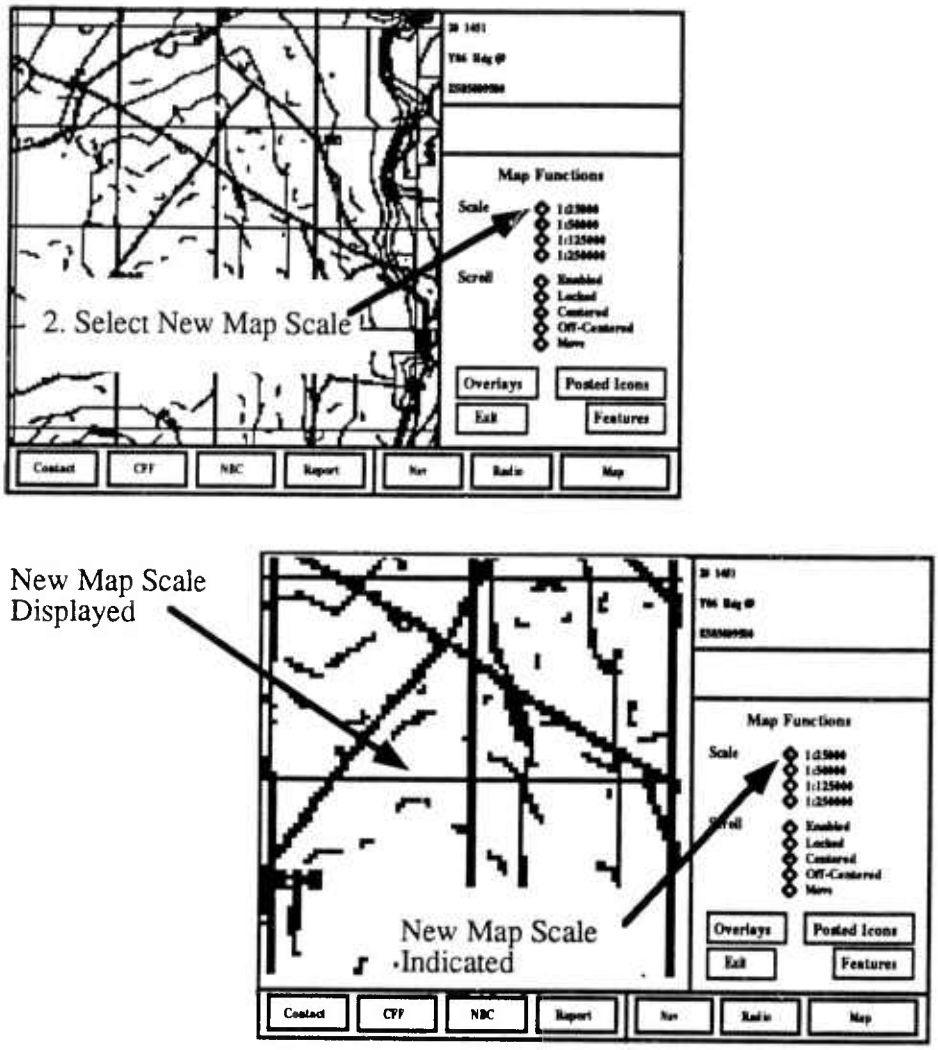

Figure 15 Changing Map Scales

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Scrolling the Map

You can change the area displayed on the tactical map, so that your tank icon is no longer centered on the map. This feature permits you to take a detailed look at areas far from your current location, by "dragging" the map to the new location. You can scroll the map in this manner, using the following steps:

	What You Do	What Happens
1.	Select **Enabled** under **Scroll** from the **Map Functions**.	The box next to **Enabled** will be filled.
2.	Place your finger or press the cursor on the tactical map.	The crosshairs will be visible on the tactical map.
3.	Drag the map with your finger or the cursor.	A line between your start and end points will appear on the map.
4.	Lift your finger (or release the cursor control) when you have completed the scroll.	The map will be redrawn and centered in a new location, where the start point of the line your finger traces is placed at the end point of the line.
5.	Steps 2 through 4 can be repeated until you are satisfied with the location of the map display.	
5.	To retain the map area being displayed, select **Locked** under **Scroll** from the **Map Functions** menu.	The box next to **Locked** will be filled, and the tactical map will remain in its current location.

Note: If the tactical map is locked, it will not scroll with the moving tank. To resume scrolling you must select one of the following scroll modes.

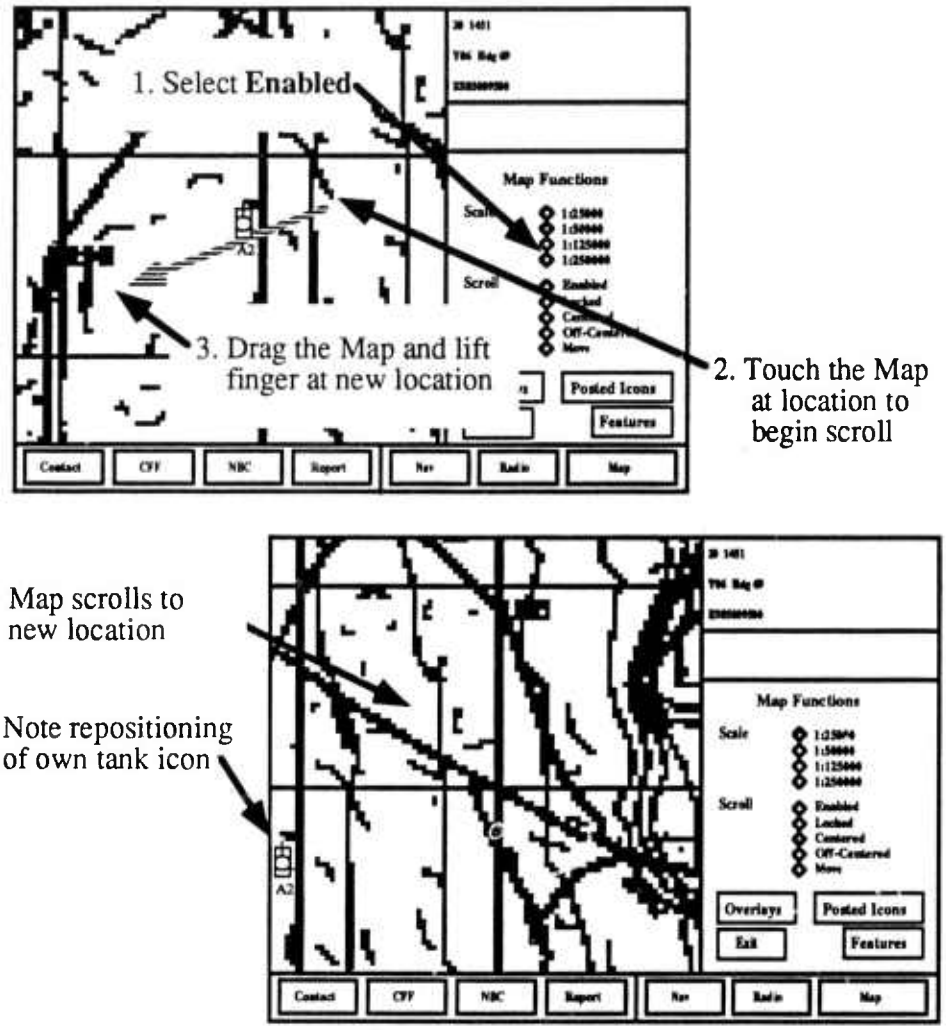

Figure 16 Scrolling the Tactical Map

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Centering Your Tank Icon

You can quickly return your tank icon to the center of the tactical display. To do this complete the following steps:

What You Do	What Happens
Select **Centered** (beneath Scroll) from the **Map Functions** menu.	The box next to **Centered** will be filled, and the tactical map will be repositioned with your tank icon in the center of the map.

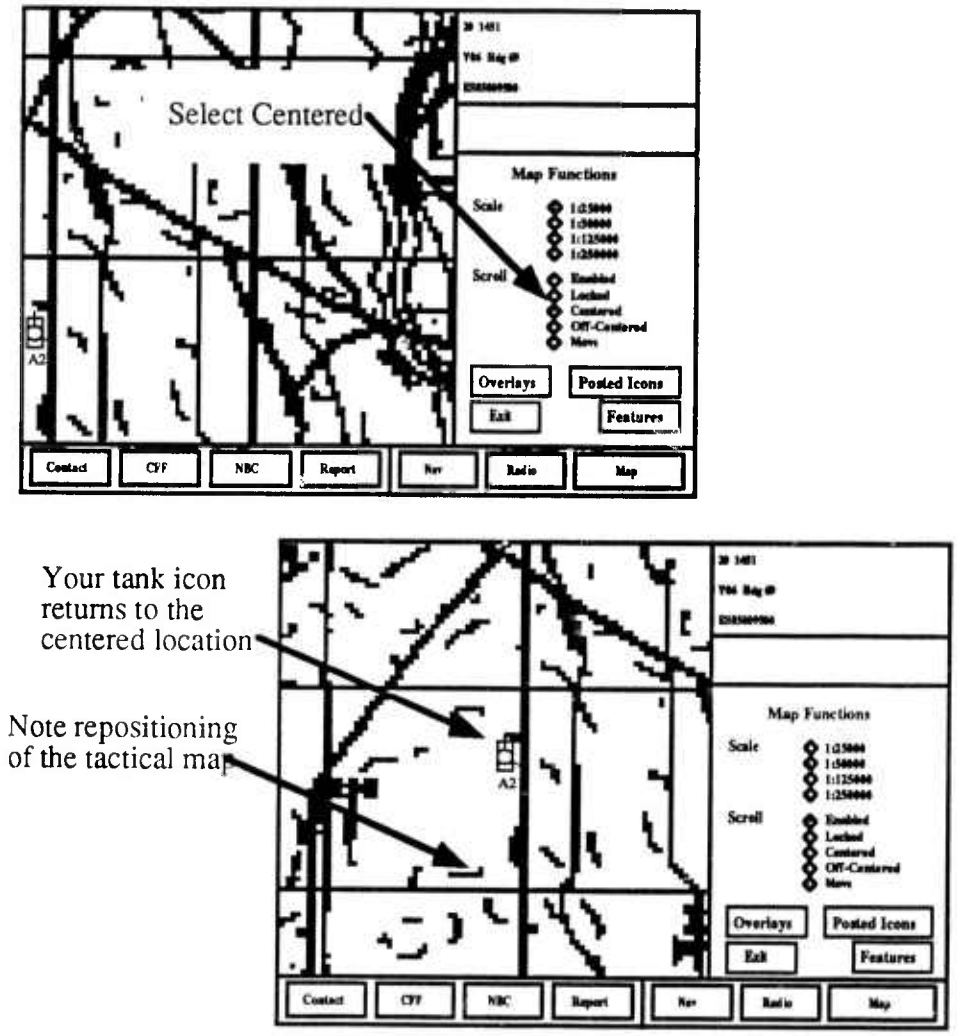

Figure 17 Centering the Tactical Map

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Moving Your Tank Icon Off-Center

There may be times when you want the tactical map to scroll as you move, but do not want your tank icon in the center of the screen. For instance, you may prefer to display the area to the front of your tank. Positioning your tank icon Off-Center is different from scrolling the map. When you scroll the map your map display becomes locked. As your tank continues to move your icon will also move. When you select Off-Center your tank icon will be relocated to a new position, but the as you move your tank the **tactical map** will move, and not your tank icon. To position your tank off-center, complete the following steps:

	What You Do	What Happens
1.	From the **Scroll** menu select **Off-Centered**.	The box next to **Off-centered** will be filled.
2.	Select **Move** from the **Scroll** functions.	The box next to **Move** will be filled.
3.	Touch the **Tactical Map** at the new location for your tank icon.	The **Tactical Map** will update with your tank icon in the new location. The **Tactical Map** will resume scrolling while your icon stays in the new location.
4.	Select **Off-Centered** from the **Scroll** functions.	The box next to **Off-Centered** will be filled.

Note: The CVC2 system will maintain the last off-centered location in memory. Selecting off-centered again will move your tank icon to this off-centered location.

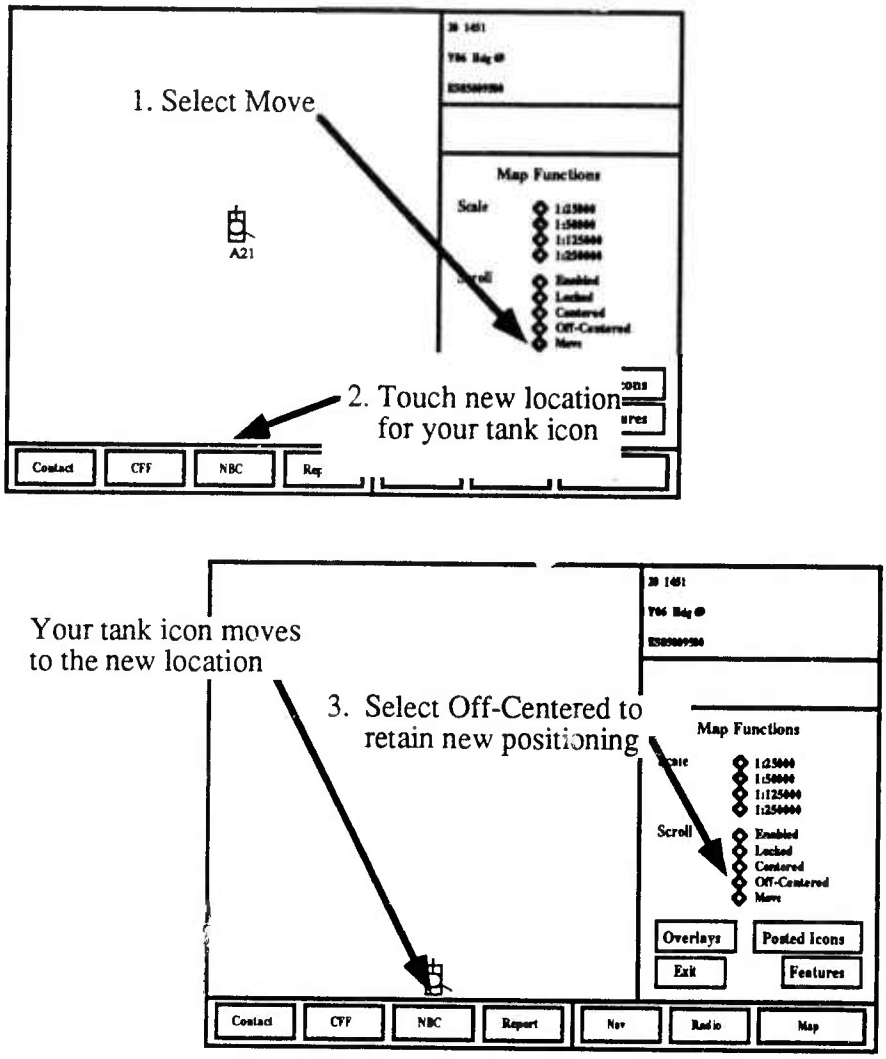


Figure 18 Moving Your Tank Icon Off-Center

Note: When you press Move or Off-Center, your tank icon will reposition to the point last entered as the off-center location.

Chapter 5: Combat Reports

The Command and Control Display (CCD) is designed to help the tank commander prepare, send, and receive critical battlefield reports. Using the CCD, the tank commander can select a report from a menu of available report types. The CCD then displays the report format screen(s) containing blank information fields. The tank commander can fill in the necessary information, and send the report over the appropriate communication network. The CCD also saves copies of these reports for the tank commander. The tank commander can receive reports from other commanders or units. These reports can also be read, saved, or relayed to other unit commanders.

Many combat reports contain **icons** or symbols which represent elements in a report. These icons are displayed on the tactical map when reports are prepared, received, or read. When a previously saved or received report is selected, any icons that are a part of that report appear on the tactical map and are surrounded by a white box. Reports can also be selected using the cursor control or by touching the report icon. This causes the icon to be surrounded by a white box and highlights the report in which the report icon appears.

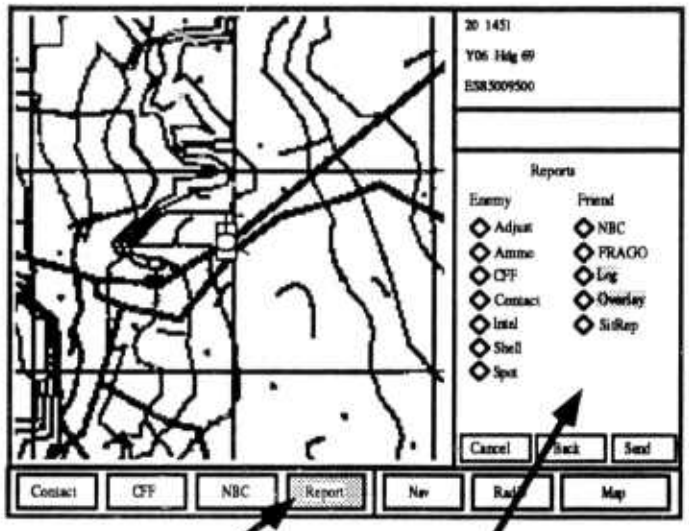
CREATING REPORTS

Using CCD it is possible to create the following combat reports:

- Contact Reports (**CONTACT**)
- Spot Reports (**SPOTREP**)
- Call for Fire Reports (**CFF**)
- Adjust Fire Reports (**ADJUST**)
- Shell Reports (**SHELL**)
- Intelligence Reports (**INTEL**)
- Nuclear, Biological, or Chemical Reports (**NBC**)
- Fragmentary Orders (**FRAGO**)
- Situation Reports (**SITREP**)
- Ammo Status Reports (**AMMO**)

When you press the **REPORT** dedicated menu key, the **Reports Menu** will appear in the variable menu area. This menu shows the available report types. You can then choose the specific report by touching the box next to that type of report and pressing the **NEW** key in the lower right corner of the variable menu with your finger or cursor control.

A specific report format will appear in the variable menu area with blank or empty boxes called **report fields**. These fields are located to the right of a **field title** which prompts you for particular information to be included in the report. Once the report menu appears, you can then begin to enter the specific information.



1. Press the **Report** Dedicated Menu key

2. The Map variable menu will be displayed

Figure 19 CCD Reports Menu

Report Fields

There are several different types of information which can be entered into a different report field. These fields include:

- Object types (such as tanks, troops, mines)
- Locations (such as ES850977)
- Event time (such as Now, -5 (min), -10, or -15)

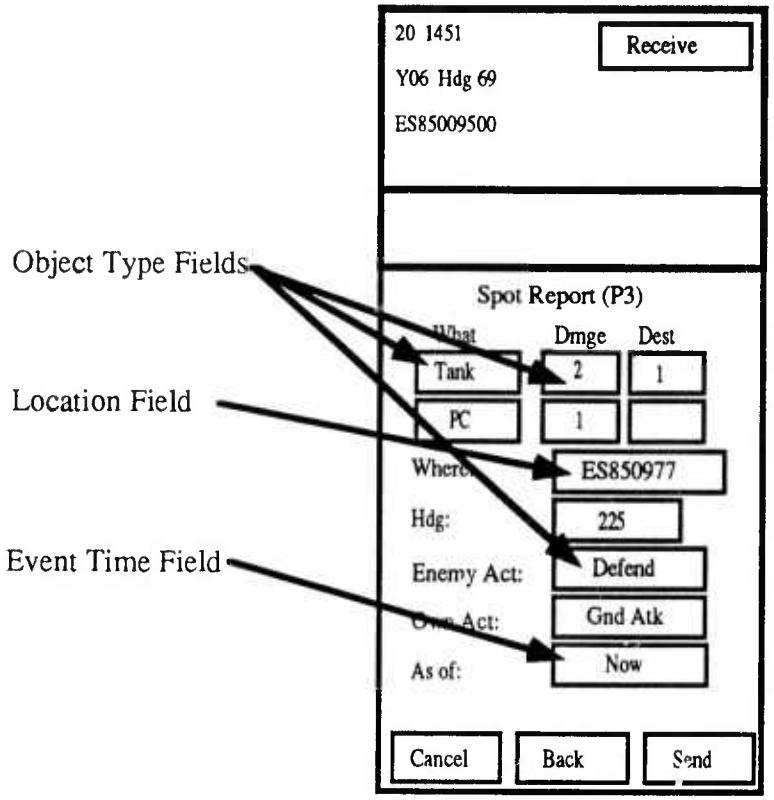


Figure 20 Example Report Field Types in a Report Format (SPOT)

Some reports require you to enter two locations, which the computer uses to draw a line. An example of this is be found in the **SITREP** which uses two locations to draw a symbol representing the Forward line of troops (FLOT).

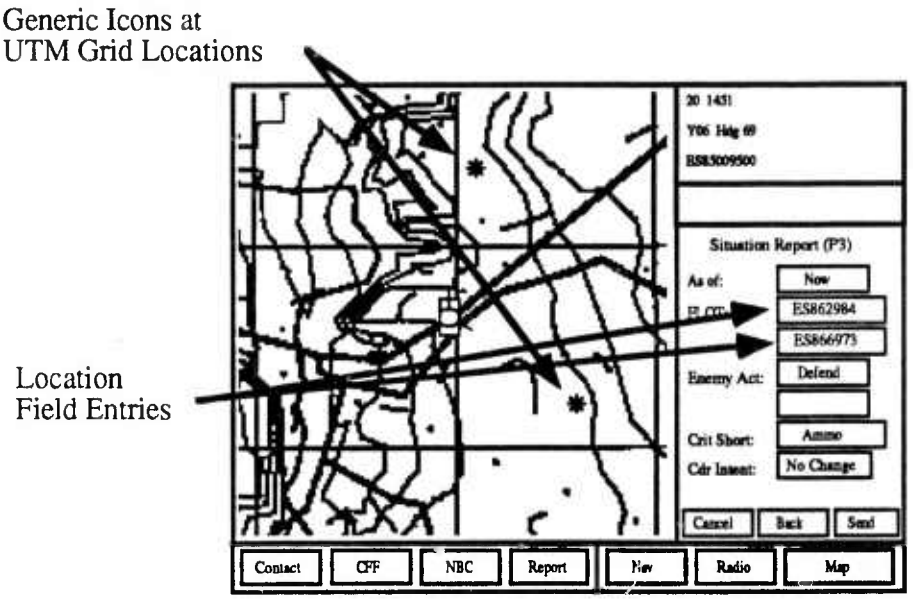


Figure 21 FLOT Entries in the SITREP

ENH One report, the **FRAGO** contains a graphic overlay and text describing a mission or change in orders. The **FRAGO** is a special report, which cannot be created in a simulator (since there is no way to draw or type in the tank). The **FRAGO** must be created in a command post, but can be received, read, or forwarded by a tank commander.

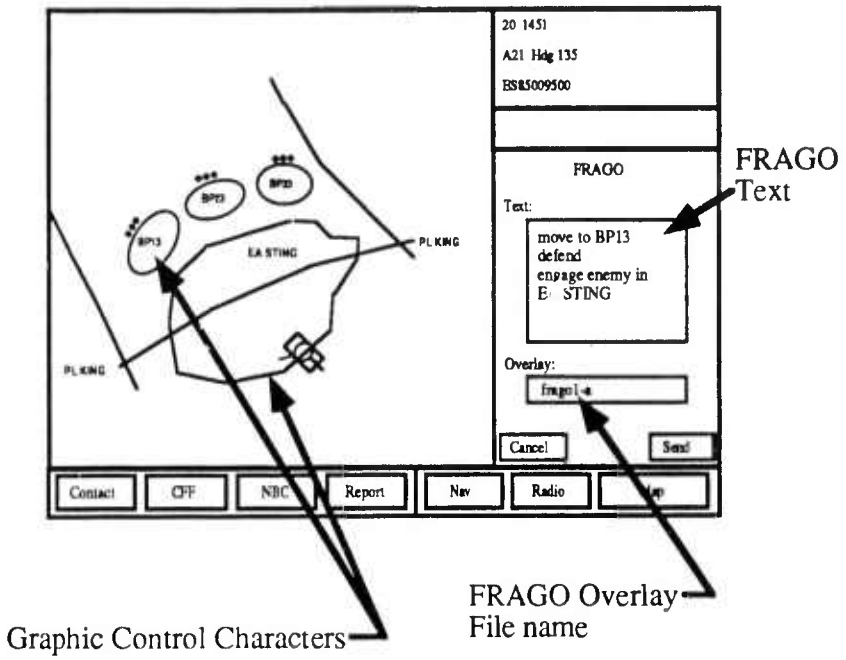


Figure 22 FRAGO with Overlay Displayed

Entering Information in Report Fields

When the report format first appears, you see the first page of that report with one or two report fields brightly lit. The computer is prompting you to enter information into those fields. If there are two fields, one of these is a location. Locations may be entered at any time in several different ways. Locations may be entered by:

- Placing the cursor over the map location and lifting your thumb off of the cursor control
- Placing your finger over the map location and lifting your finger
- Lasing to the target with your CITV LRF (**ENHANCED IVC2** or **CVC2** modes only)
- Lasing to the target with the Gunner's LRF (GLOS mode only)

If an Object Field is brightly lit, the possible choices for this field will appear near the bottom of the report format in the variable menu area.

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Report Actions

If the report you are using has only one page, you will see two more keys at the bottom of the variable menu. These report action keys are:

the **Cancel** key,
and the **Send** key.

Pressing the **Cancel** key, causes the report format to disappear from the screen and the system. Pressing the **Send** key allows you to send the report .

Once you have selected **Send**, an additional menu of report actions will appear. The purpose of this menu is to confirm your intent to send the message. It also permits you to post the report icons to your tactical map. Both **Send** and **Post to Map** will be discussed later in this manual.

IVC2 In the **IVC2** mode, pressing the **Send** key allows you to complete the report.

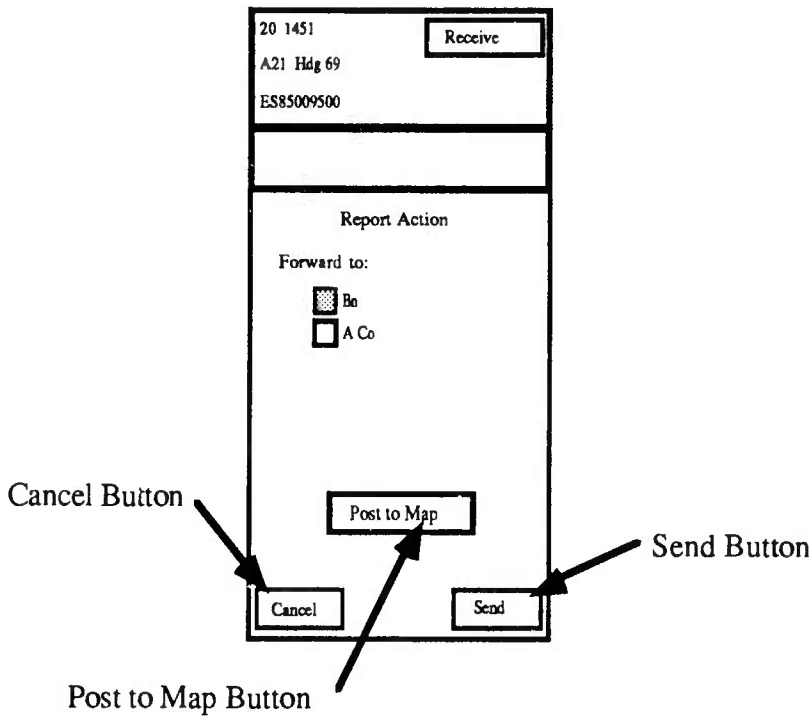

Figure 23 Report Format Screen Showing Report Actions

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Incomplete Reports

It is possible to move to another report or map tool without selecting a report action. You can leave the report you are working on to do something else at any time, simply by pressing one of the dedicated menu keys along the bottom of the CCD. If you choose to leave a report in this manner, the report you were working on is saved by the CVC2 system in the exact state in which it was left. This feature lets you respond to critical situations using the CCD, and return to the incomplete report when you have more time.

It is important to note the difference between leaving an incomplete report and pressing the **Cancel** button. When you cancel a report, the information you have entered into that report is erased. If you want to complete this report later, you should NOT select **Cancel**.

Warning: If you want to exit a combat report and complete it later, do NOT select Cancel.

Pressing Cancel permanently deletes the information you have entered.

IVC2 ENH CVC2 **Reports with More than One Page.**

In reports with more than one page, you will see two other buttons:

the **Next** button,
and the **Back** button.

Pressing the **Next** key causes the next page of the report format to appear. The page number will appear next to the report title. On all pages other than the first page, you will see a **Back** key. Pressing the **Back** key returns you to the last page you were working on. On the last page of the report the **Next** key will be replaced by the **Send** key.

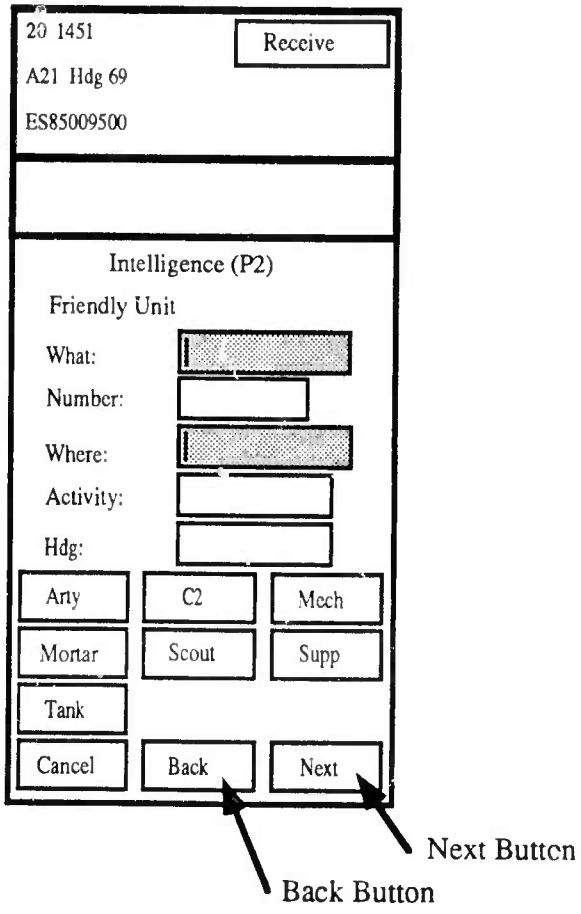

Figure 24 Report Formats Screen Showing Back and Next Buttons

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Correcting an Entry

If incorrect information has been entered into a report field, you can quickly edit the field and correct its content. While entering information in a report screen, you can always select a different report field by touching the incorrect field. The selected field will be highlighted, and the available choices will appear in the lower part of the display. In the case of a location field, entry of a new grid coordinate (by touching or lasing) will replace the incorrect entry.

Prior to completion of multiple page reports, a summary screen will appear. It is possible to correct entries on this summary page, by selecting and touching the field you wish to change. Once the report page containing the incorrect field appears, touch the field you wish to change. The selected field will be highlighted, and the available choices will appear in the lower part of the display. In the case of a location field, entry of a new grid coordinate (by touching or lasing) will replace the incorrect entry.

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Example 1: Creating a Contact Report

In the following example you will create a CONTACT report. This example will be continued in the next section to illustrate the posting of report icons and sending a report.

	What You Do	What Happens
1.	Press the **Report** dedicated menu key.	The **Report** variable menu will appear.
2.	Select **Contact** from the variable menu.	The small box next to **Contact** will be filled.
3.	Press **New**.	The first page of the contact report will appear; the WHAT and WHERE fields will be highlighted; several choice buttons will be located in the lower portion of the format page.
4.	Press **Tank**.	**Tank** will appear in the WHAT field.
5.	Touch the tactical display (or use the LRF) to enter a location for the tank.	A UTM grid coordinate will appear in the WHERE field, and a tank icon will appear on the tactical display.
6.	Press Send.	The Send menu will appear.

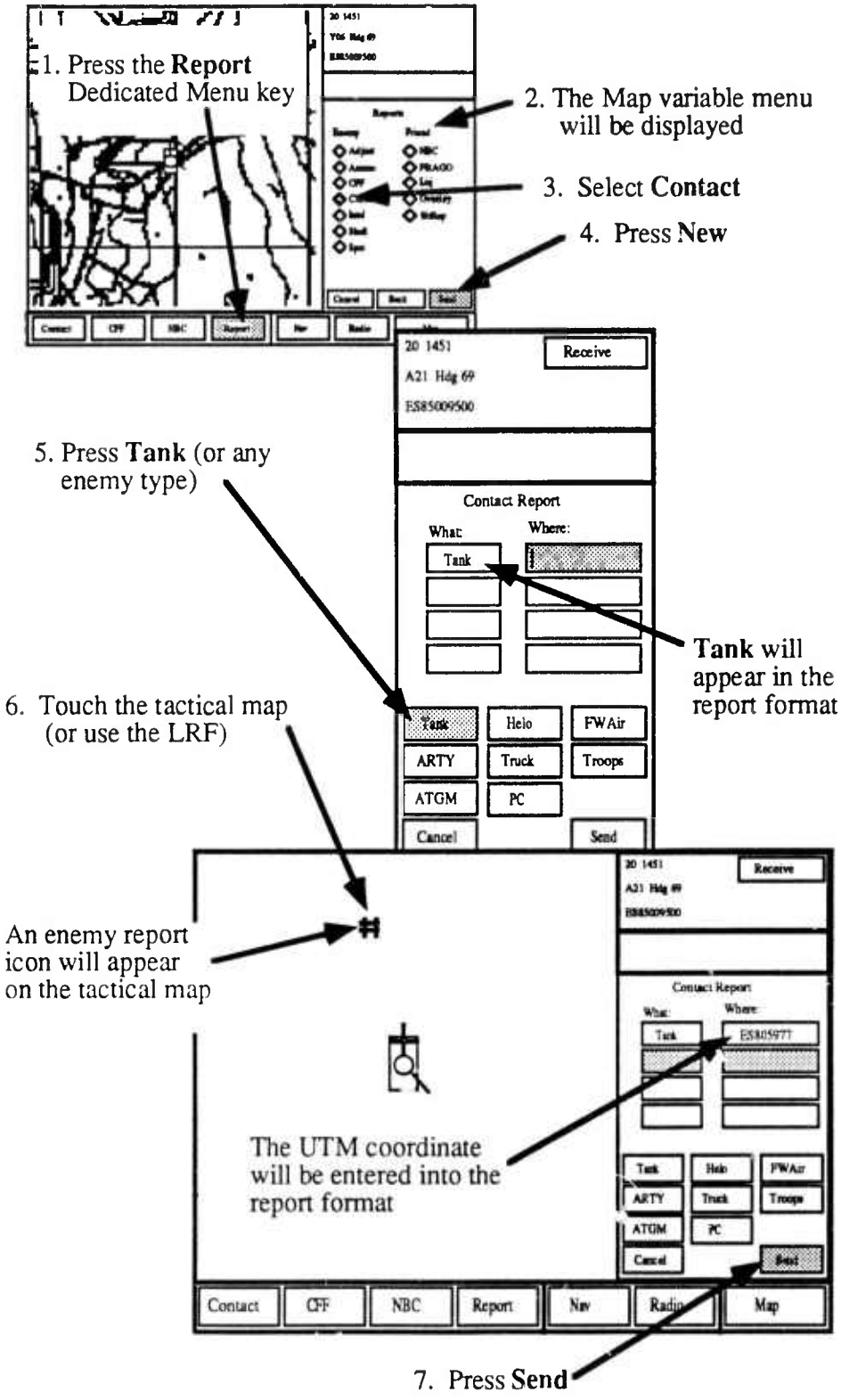

Figure 25 Creating a Contact Report

After you have created a combat report, you are now ready to send that report. In sending a report you will select a combat radio network on which to send the report, just as you choose a voice radio network to transmit a voice message. In addition, a copy of the report you send will be automatically saved in your OLD files (see Using OLD Files), and you will be given an opportunity to post the report icons from that report permanently on your tactical map.

POSTING REPORT ICONS

Once you have created a report and press the Send button, you may post the report icon to the tactical display.

What You Do	What Happens
Press **POST TO MAP**.	The tank icon is posted permanently to the tactical map.

Once report icons have been posted to the map, they can only be removed using the **Delete Posted Icons** function described in the next chapter.

Note: You are not required to post the report icon to the tactical map. Only do so when you wish retain a reminder of the report after the report is sent.

SENDING REPORTS

At this time you are ready to send the CONTACT report. A default radio net for the report will be specified. INTEL and FRAGO reports will be routed to the higher network (up the chain of command), while all other reports are routed to the lower nets (down in the chain of command), in those cases where more than one radio net is available. In the CVC2 M1 CCD reports are sent over the SINCGARS radios. If your tank has been configured as a Platoon Leader or Company Commander, different radio nets will be available. It is possible to send a report on more than one radio net at the same time. To do this simply select the box next to the desired nets.

What You Do	What Happens
Press **Send**.	A prompt informing you that the report has been sent will appear in the message center.

Note: Reports are immediately sent over the network. There is no time delay between the sending of the report and its arrival in any tank with access to the correct radio net.

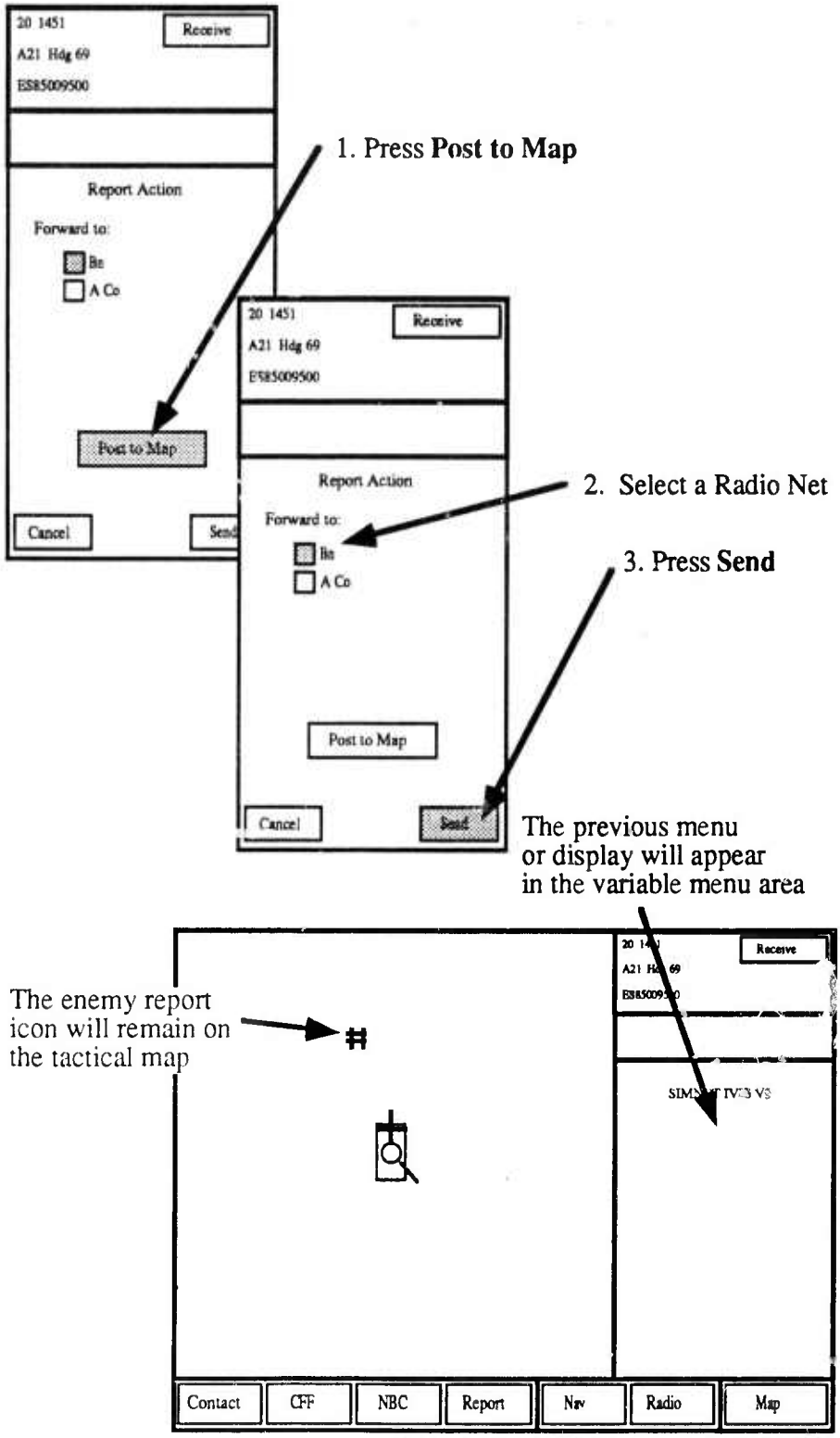

Figure 26 Posting and Sending a Contact Report

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SAVING REPORTS

ENH CVC2 When you press the second send button (in **ENHANCED IVC2** or **CVC2** mode) a copy of that report is saved for you in the OLD FILE for that report. Selecting and viewing saved reports in the OLD FILEs will be discussed later.

IVC2 In **IVC2** mode, reports are saved when you press the complete button.

ENH CVC2

RECEIVING REPORTS

In addition to sending combat reports, you may also receive reports which are sent on a frequency your SINCGARS radio is monitoring. When a report is received, a BEEP or series of BEEPS will be heard in your radio headset, the RECEIVE button will be highlighted (alerting you to the incoming message), and any report icons will appear on the screen and flash for 5 seconds. The number of BEEPS you hear depends on the priority of the incoming message. Message priorities appear in the table below:

High Priority "3 BEEPS"	**Low Priority** "1 BEEP"
CONTACT CFF ADJUST INTEL NBC FRAGO	SPOTREP SHELL SITREP AMMO

When you press RECEIVE, the RECEIVED MESSAGE QUEUE will appear in the variable menu area. This queue contains all messages which are waiting to be processed. The queue shows a message header with the date time group when the message was received, the identity of the commander who first created the report, and the type of report.

Flashing Icons

Any icons contained in newly received reports will flash on the tactical display for approximately 10 seconds. After this time the icons will remain on your display as long as the report is in the RECEIVED MESSAGE QUEUE.

Selecting and Showing Reports

There are two ways to select a report to be viewed.

- Selecting by Report
- Selecting by Icon

To select by report, do the following:

	What You Do	What Happens
1.	Place your finger or move the cursor over the desired message header.	This highlights the message header, and any tactical display icons contained in the report.
2.	Press SHOW.	The report contents now appear in the variable menu area.

To select by icon, do the following:

	What You Do	What Happens
1.	Selecting an icon on the tactical display.	If the icon is a message icon, the message header will be highlighted in the RECEIVE QUEUE. If the report is a posted icon, a message will appear in the message center telling you which report file contains the report.
2.	Press SHOW.	The report contents now appear in the variable menu area.

Received Report Actions

Once you have received a combat report and read its contents, you can dispose of the reports in several ways. These are called report actions. Combat reports actions include: DELETE (removed from your tank's CCD), Send (forwarded to another tank commander, or **Cancel** (exit the report without doing anything).

Example 2: Receiving a Report

In the following example you will receive a **Contact** report. When the message has arrived, you then:

	What You Do	What Happens
1.	Press the **Receive** key located in the upper right corner of the CCD.	The **Receive Queue** will appear in the variable menu area.
2.	Select a message header labeled **Contact** from the message queue.	The message header will be highlighted and the report icon(s) will appear on the tactical display and also be highlighted. If the icons are not located on a visible part of the tactical display a red filled arrow will appear pointing to the icon(s).
3.	Press **Show**.	The contents of the **Contact** report will appear in the variable message area.

After you have received a combat report, you have several report actions available. You can **delete** the report if you do not wish to retain a copy. You can **Cancel** and do nothing to the report (in about 5 minutes the report will transfer to the old report file described below). Or you can **Send** report to another commander over another radio network.

Note: It is not necessary to send another copy of a combat report to a commander using the same radio network on which you received the report. All commanders on the network receive reports sent over that network.

In addition, a copy of the report you resend will be automatically saved in your OLD files, and you will be given an opportunity to post the report icons from that report permanently on your tactical map.

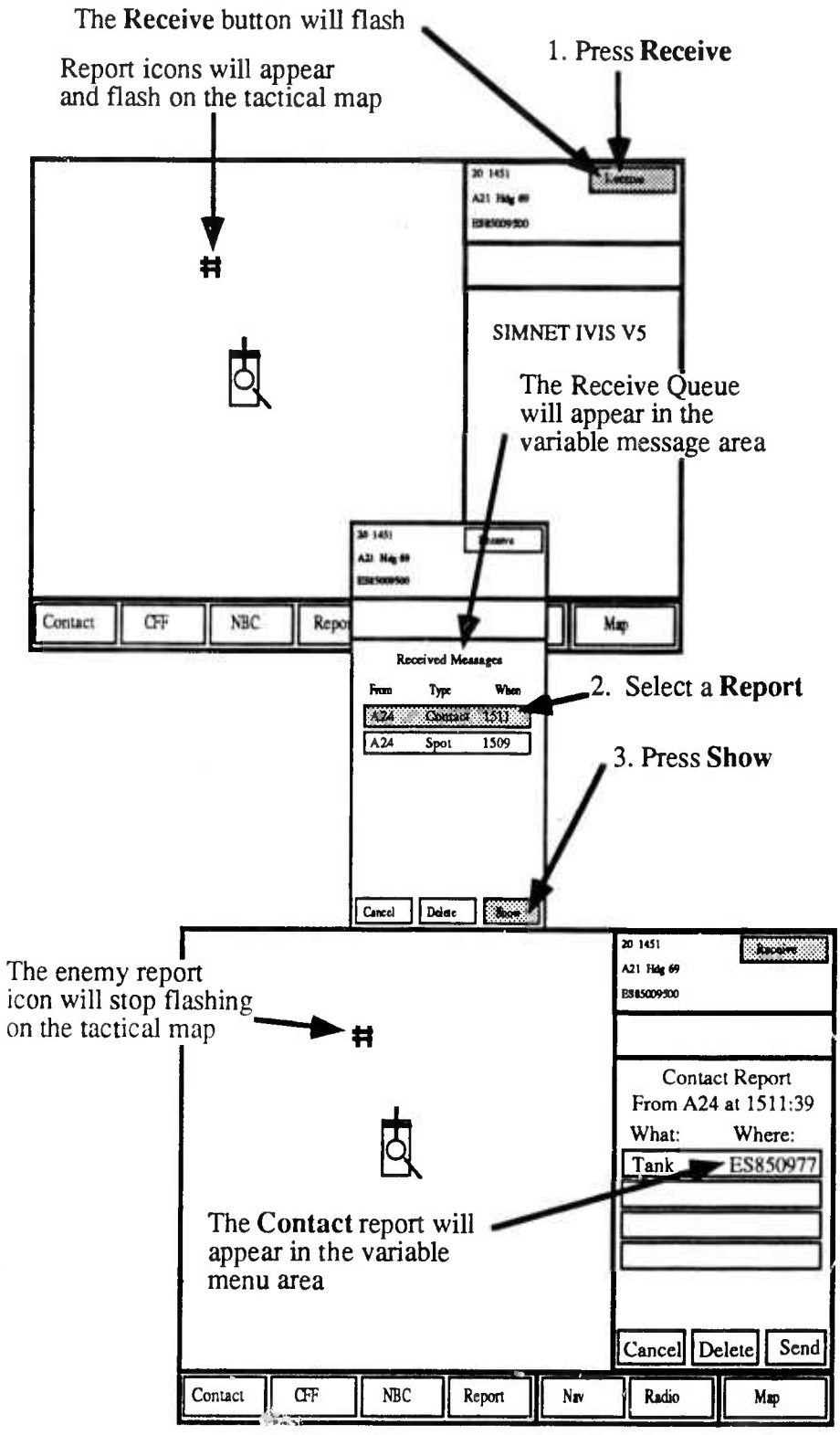

Figure 27 Receiving and Showing a Contact Report

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USING THE OLD FILE

Each report type has an **OLD FILE**, used to store copies of the reports you send, and many which you have received from other commanders. The CVC2 system does not, however, retain copies of reports you have deleted. To see the old files:

	What You Do	What Happens
1.	Press the **Reports** dedicated menu key.	The Reports menu will appear in the variable menu area.
2.	Select a report type.	The small box next to the report type will be highlighted.
3.	Press **OLD**.	The old files for that report type will appear.
4.	Select the report you wish to view.	The selected report will be highlighted, and any icon(s) in the report will appear highlighted on the tactical map.
5.	Press **Show**.	The contents of the report will appear in the variable menu area.

When you examine the list of old files, all reports of that type which you have received (those which you did not immediately delete) or have sent will appear. A variety of actions are possible with old reports:

- You can **Delete** old reports
- You can **Send** old reports
- You can **Post to Map** old report icons.

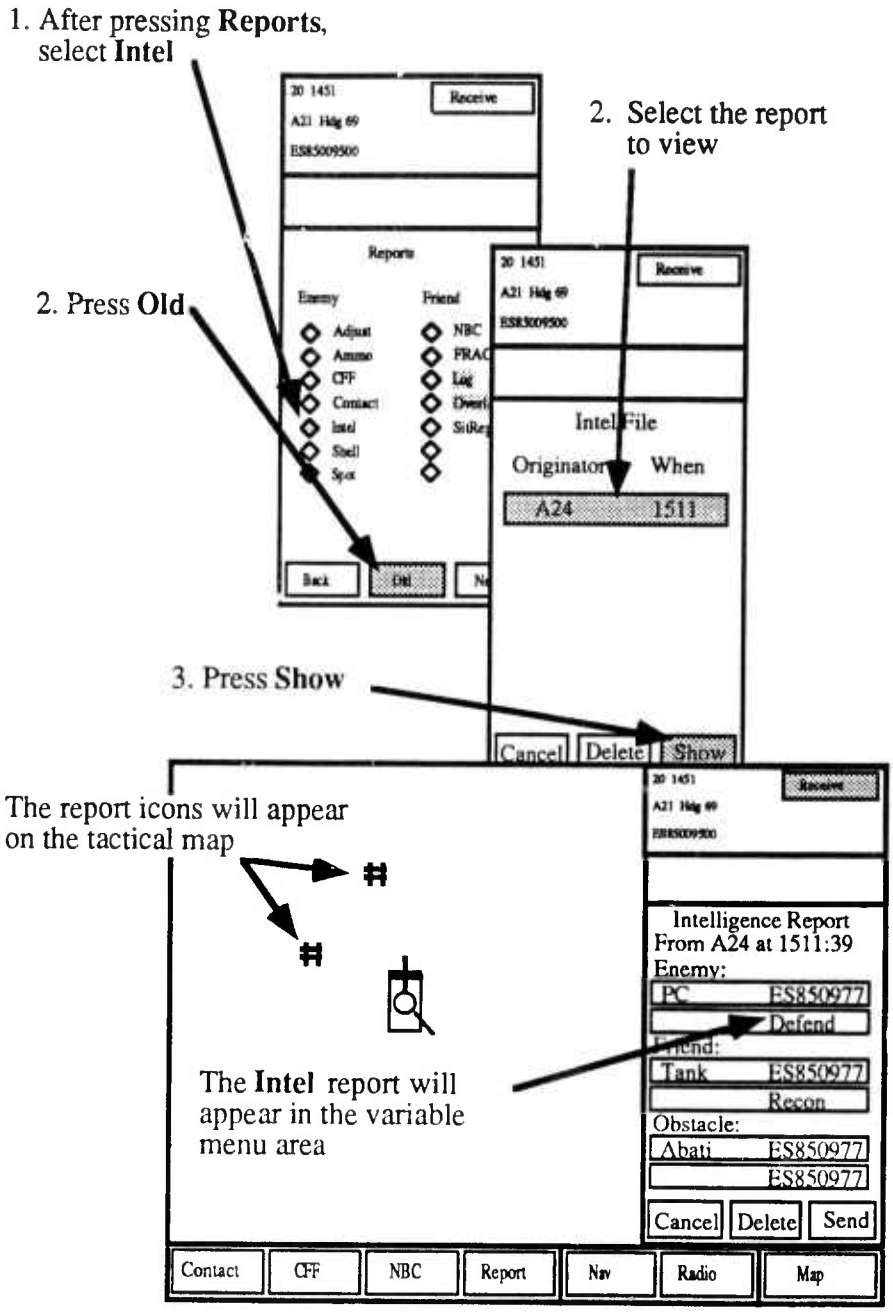


Figure 28 Selecting and Showing an Intel Report From the OLD FILE

IVC2 **CVC2**

RECEIVING A FRAGO

One special type of report you can receive is the **FRAGO**. The FRAGO can only be received, deleted, or resent using the CVC2 system. FRAGO reports cannot be created in a tank, but must be prepared in a command post. The FRAGO report consists of two parts: (1) a short description of up to 52 characters, and (2) a graphic overlay. The text of the FRAGO is not meant to be self explanatory, but is expected to be supplemented with radio instructions. The graphical overlay can be quite detailed.

A FRAGO is received just like any other combat report, except that it contains a graphic overlay. This graphic overlay replaces any overlay currently being displayed on the tactical map. Retreiving previous overlays will be discussed in the next chapter.

Chapter 6: CCD Overlays and Posted Icons

Most of the combat reports created using the CVC2 System contain graphic overlays or message icons which appear on the tactical map. In addition to viewing these as you read the reports, it is possible to manipulate these using the CCD. For example, you can permanently post important icons from combat reports to help alert you to critical battlefield information. Also, as you receive FRAGO reports you will collect a number of graphic overlays which the CVC2 system will maintain. Using the CVC2 system you can select which overlay you wish to view.

CHANGING THE VISIBLE OVERLAY

To change the graphic overlay currently being displayed on the tactical map, you must have received at least two FRAGOs with different overlay files. To view the map overlay menu, complete the following steps:

	What You Do	What Happens
1.	Press the **MAP** dedicated menu key.	The Map menu will appear in the variable menu area.
2.	Press the **OVERLAY** button.	A list of available overlays will appear. The **current** overlay is the one being displayed on the tactical map.

If more than one overlay appears in this list, you can change which one is currently visible. To do this:

What You Do	What Happens
Select the new overlay you wish to view.	The new overlay will appear on the tactical map.

***Note:** When you receive a FRAGO and select SHOW, the new graphic overlay appears on the screen, and replaces any previously appearing overlay. To retreive the old overlay you must use the OVERLAYS function.*

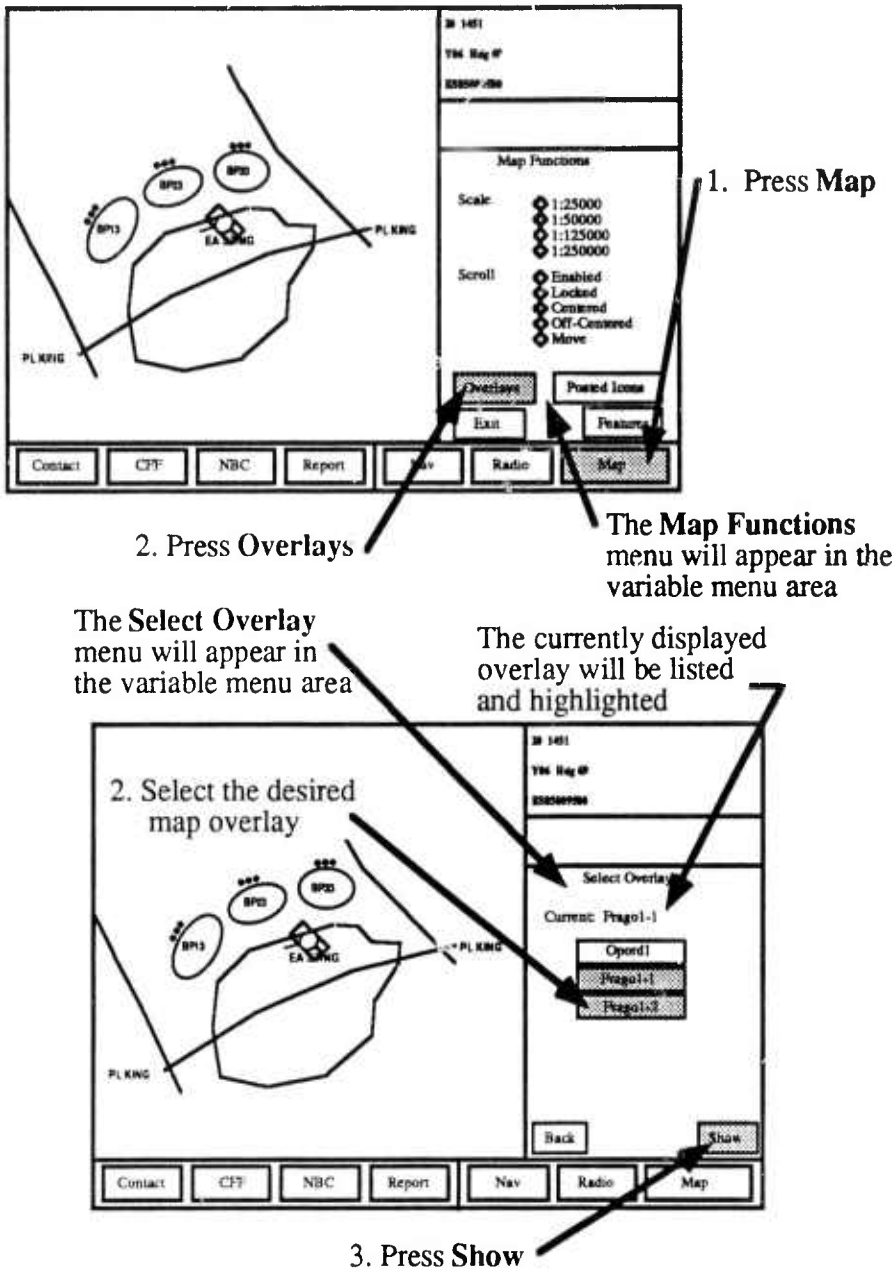


Figure 29a Changing the Displayed Map Overlay

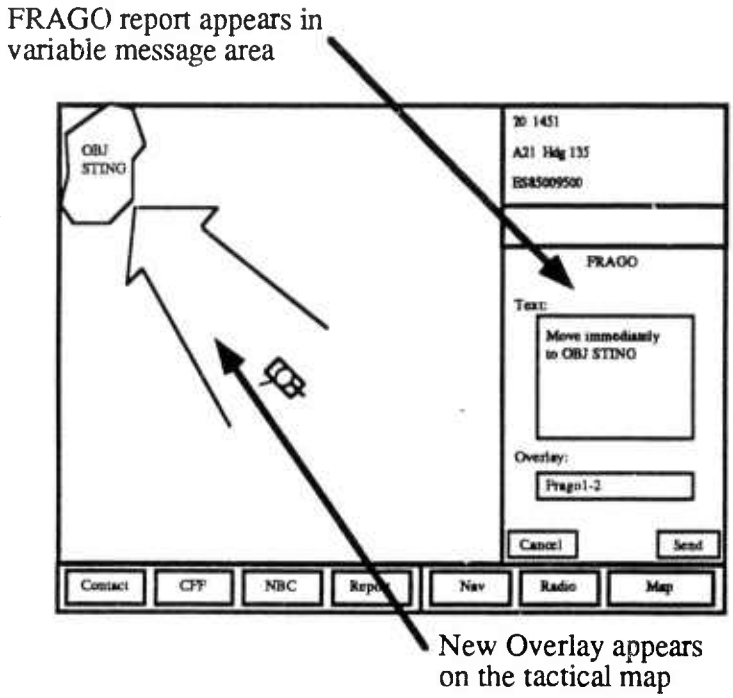


Figure 29b Changing the Displayed Map Overlay

IVC2 ENH CVC2

POSTING REPORT ICONS

If a combat report you have created or recieved contains important information, you may wish to retain those icons on your tactical map after you have finished reading or creating the report. To do this you must use the **Post to Map** function. You access this function in the same way for reports which you have received or created.

	What You Do	What Happens
1.	From the last page of the report format you are creating or receiving, press **Send**.	The Report Action Menu will appear.
2.	Press the **Post to Map** button.	The highlighted icons on your tactical map will be posted. Since these icons are "posted" over the top of the icons in your report, a filled white box will surround the report icons.
3.	Select a combat radio network(s) to send the report over, and press **Send**.	The report will be sent, a copy of the message will go to the OLD File, and the icons will remain on the tactical display.

ENH CVC2

Automatically Posted Icons

Two combat reports **may** post their icons to the tactical map under certain specific circumstances. These reports are the INTEL and SPOT. If these messages have been in the message queue for longer than five minutes, **AND** have not been read, the report icons will be posted to the map, and the combat reports will be filed in the appropriate OLD File.

IVC2 ENH CVC2

Deleting Posted Icons

If many report icons are posted on your tactical map, it may become cluttered with too many objects. You can remove posted icons, and declutter your tactical map by the following steps:

	What You Do	What Happens
1.	Press the **Map** dedicated key.	The Map menu will appear.
2.	Press the **Posted Icons** button.	The Delete Posted Icons menu will appear.

Once this menu appears you have several options available for deleting posted icons. You can select icons individually or by the age of the posted icons (i.e., how long the icons have been posted). To delete an icon by touching, do the following:

	What You Do	What Happens
1.	Select the icon to be deleted.	
2.	Touch the icon with the cursor or your finger.	If the icon is a posted icon, it will be highlighted for deletion. If the icon is a message icon, you will see "report icon was touched" in the message area.
3.	Repeat step 2 until you have selected all the posted icons you wish to delete.	Additional posted icons will be highlighted.
4.	Once you are satisified with the icons selected, press the **Delete** button.	The highlighted posted icons will be deleted from the tactical map.

If you make an incorrect selection, you may unselect the delete before you have pressed the **Delete** button, by selecting the **Reset** toggle at the bottom of the page.

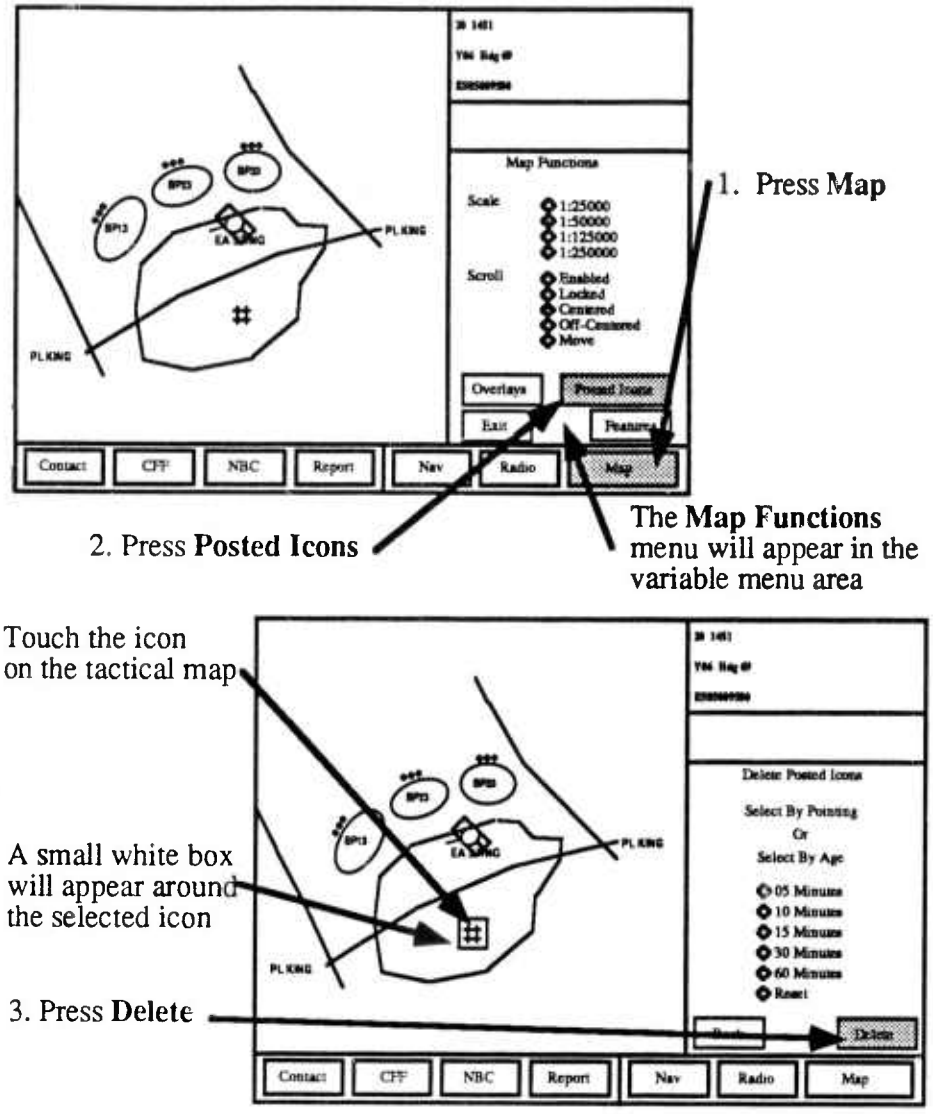


Figure 30a Deleting Posted Icons

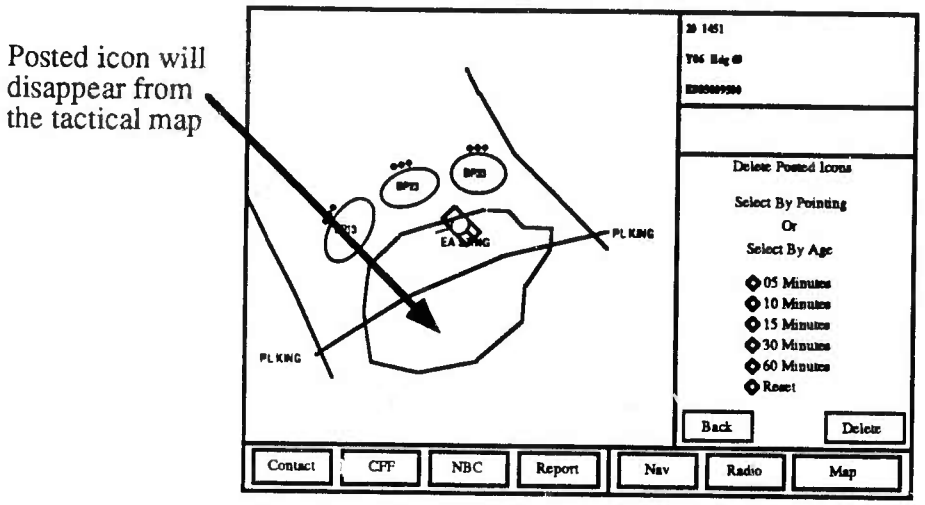


Figure 30b Deleting Posted Icons

To delete posted icons by age, do the following:

	What You Do	What Happens
1.	Select an age, and press the toggle next to the age. For example, if you wish to delete reports older than 5 minutes, press the toggle next to **05 Minutes**.	The toggle next to the selected age will be filled, and all report that age or older will be highlighted.
2.	Press **Delete**.	The highlighted icons will be deleted.

If you make an incorrect selection, you may unselect the delete before you have pressed the **Delete** button, by selecting the **Reset** toggle at the bottom of the page.

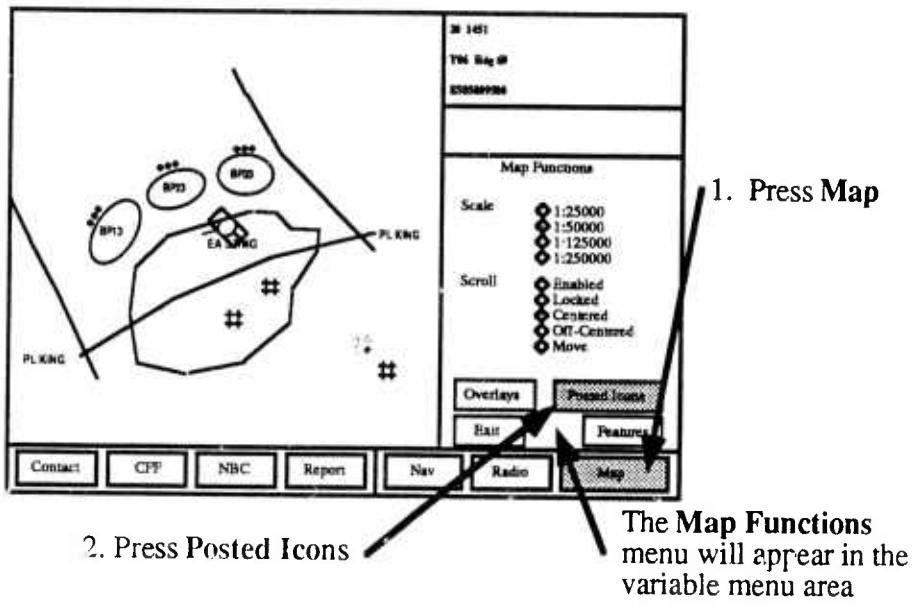


Figure 31a Deleting Posted Icons by Age

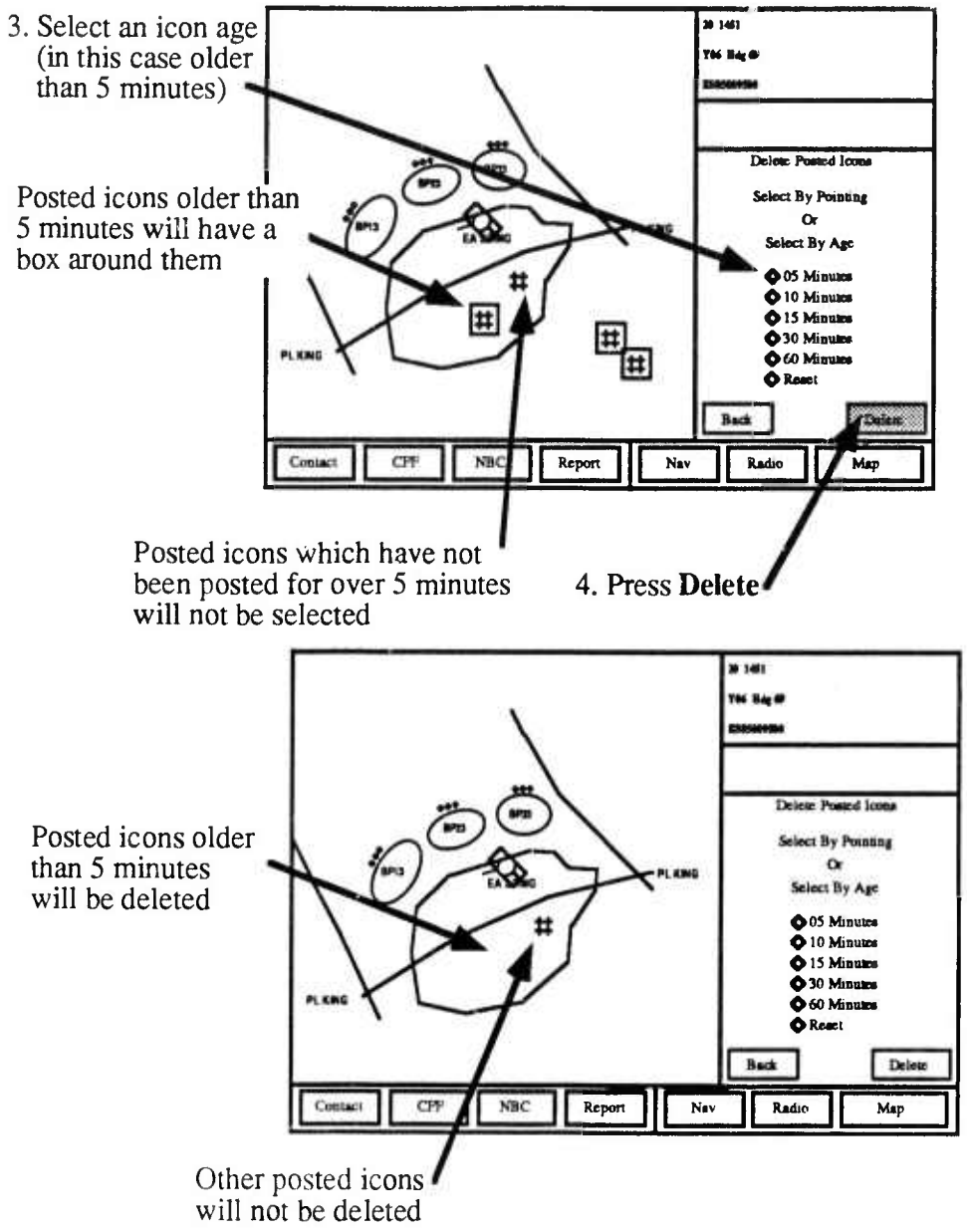


Figure 31b Deleting Posted Icons by Age

Chapter 7: Navigation

The CCD also contains an embedded position navigation (POSNAV) system. This system is responsible for locating your tank icon on the tactical map and orienting the icon correctly. It also updates your grid and orientation in the CCD own location area.

Using the CCD with its embedded POSNAV system can help you navigate your tank more efficiently and effectively. You can enter a series of waypoints to designate a route you wish to follow, and designate one of those waypoints to be active. When you make a waypoint active, the navigation system will display the waypoint number, distance to the waypoint (km), and the direction to the waypoint for your driver With this information, the driver can easily navigate around obstacles and take you to the waypoint with little additional assistance from you. The NAV function also allows you to create and send routes. Copies of the routes you send and receive are saved in the **ROUTE FILE**. You can select and use any of these as your current (active) route.

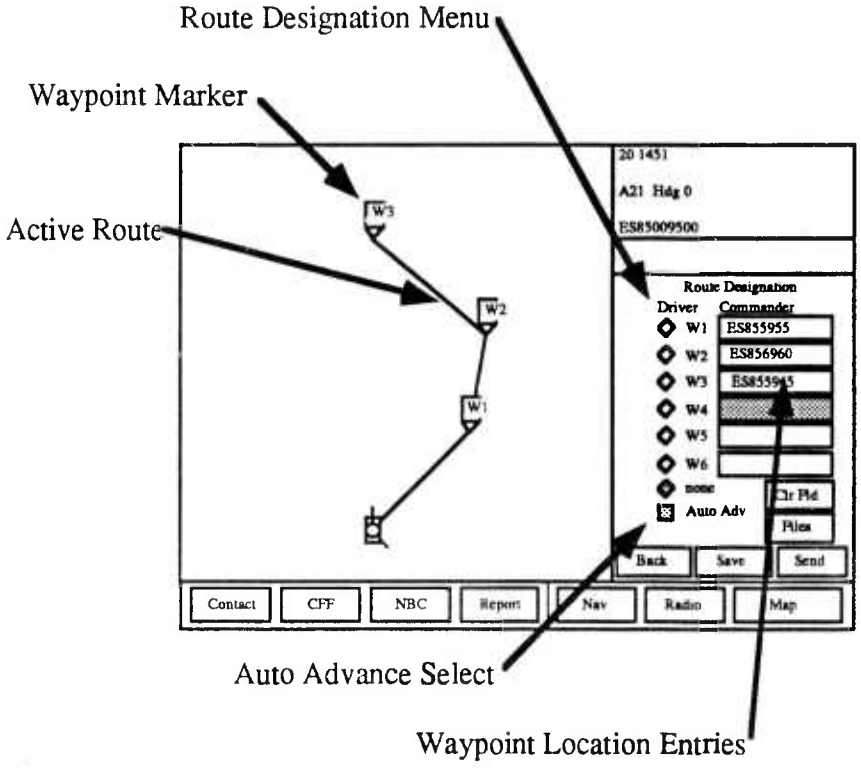


Figure 32 NAV Menu with a Route Displayed

IVC2 ENH CVC2

CREATING A ROUTE

When you press the **NAV** button, you will see a menu with entries for up to 6 waypoints. Waypoints are simply locations on the ground which you select and use to pass important navigation information to your driver. They are not necessarily checkpoints. The following steps show you how to enter waypoints:

	What You Do	What Happens
1.	Press the **NAV** dedicated menu key.	The **Route Designation** variable menu will appear.
2.	Touch the first location field, located in the column titled **Commander** with your finger or cursor control.	The box selected will be backlit, and is ready for you to enter the waypoint.
3.	Select a location on the tactical map for the waypoint, and touch the location with your finger or cursor control.	When you lift your finger or "click" the cursor control, the 6-digit UTM grid coordinate will appear in the location field. Also a waypoint marker will appear on the tactical map.
4.	Repeat step 3 to adjust the waypoint location.	New UTM grid coordinates and waypoint markers will appear on the display.
5.	Repeat step (2-4) with different location fields, until all locations have been entered correctly.	New UTM grid coordinates will appear. You will also see additional waypoint markers and line segements connecting successive waypoints.

You have now created a **Route**, which can be used immediately, saved, or sent to other commanders.

IVC2 ENH CVC2

MAKING A WAYPOINT ACTIVE

Once waypoints have been selected, you must make a waypoint active to pass navigation information to the driver. To make the waypoint active:

What You Do	What Happens
Press the small box under column labeled **Driver**.	The small box will be lit, and a line will appear on your tactical map between your tank icon and the selected waypoint.

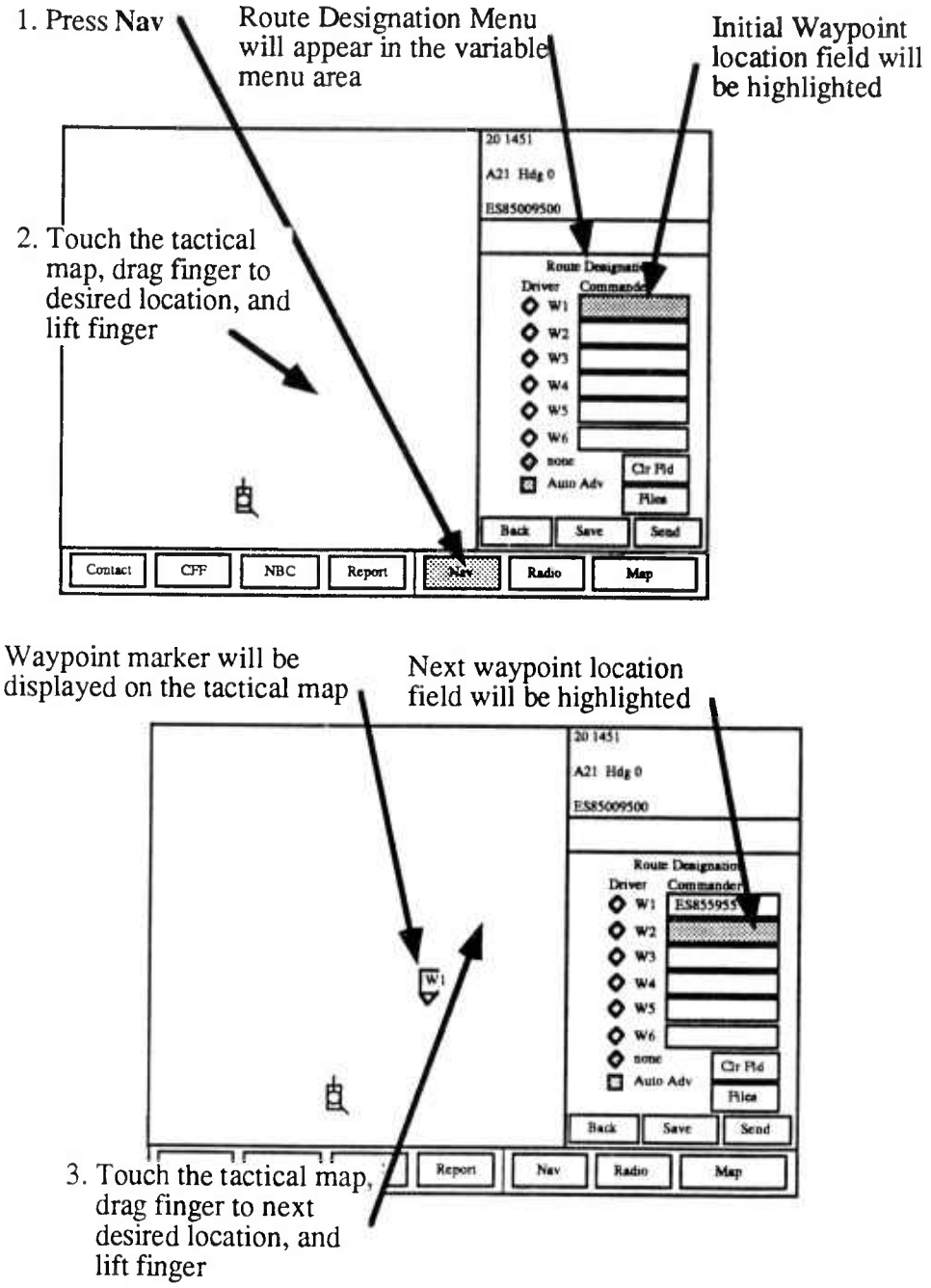


Figure 33a Creating a Route and Making a Waypoint Active

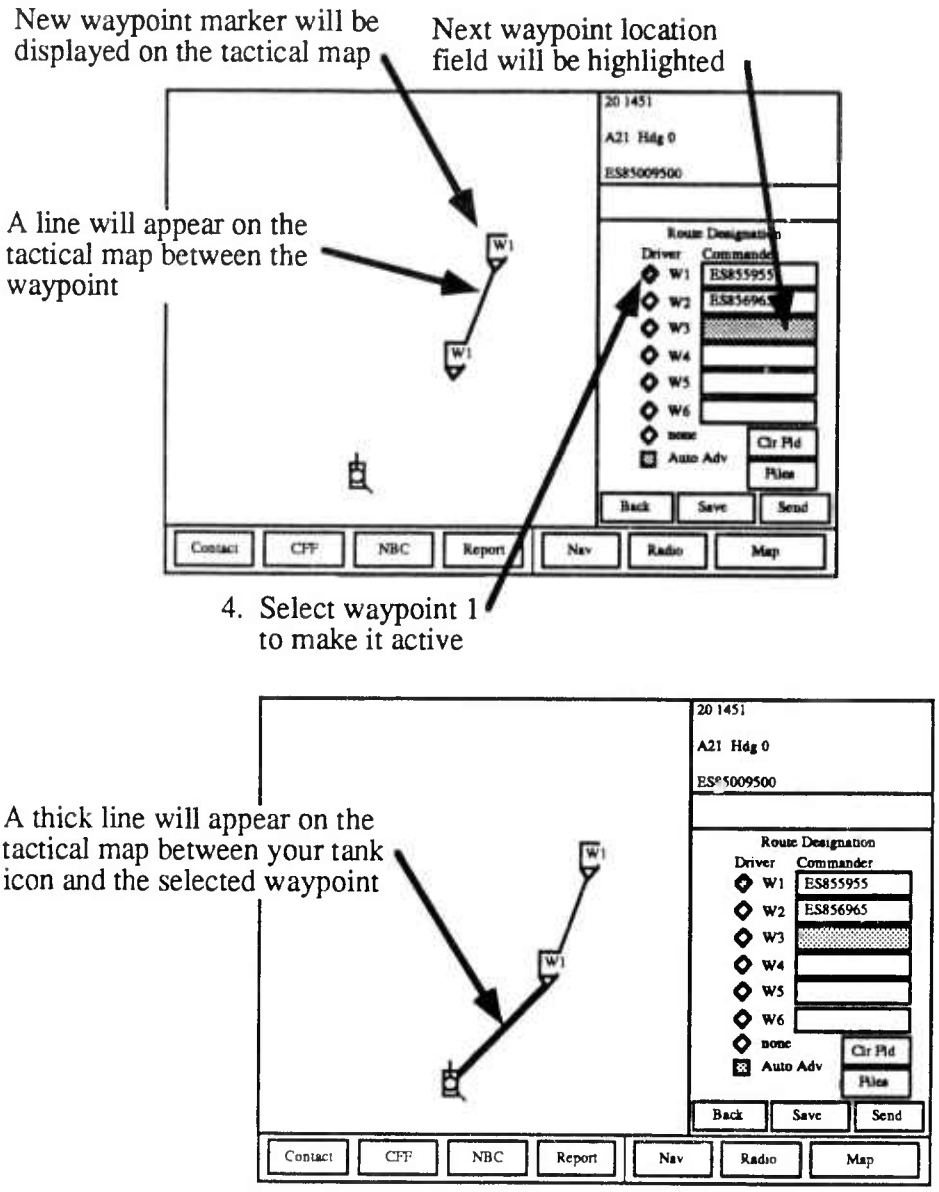


Figure 33b Creating a Route and Making a Waypoint Active

Once the waypoint is active, your driver receives the following information:

- The active Waypoint Number (**WP #**)
- The distance to the selected waypoint (**WP DIST**) in kilometers
- The orientation of the tank hull (**VEH HDG**) in degrees
- The deviation between the tank hull and the direction to the waypoint in degrees (**DEVN**)
- A **Steer-To Indicator** which the driver uses to guide the tank to the next waypoint (the indicator points straight up when the tank is oriented toward the waypoint)

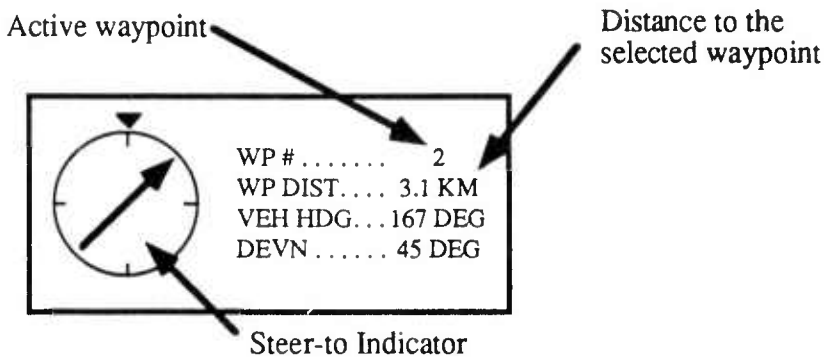


Figure 34 CVC2 Driver's Display

IVC2 ENH CVC2

WAYPOINT UPDATING

Navigation waypoints can be updated automatically or manually. The automatic adavance (**Auto Adv**) feature is initially selected when you enter your tank.

ENH CVC2

AUTO ADVance

If **Auto Adv** is selected, the next listed waypoint will become the new current waypoint when your tank is within 100 meters of the current waypoint. A beep will be heard in the tank commander's and driver's headsets, and a "**Updating Waypoint**" message will appear in the Message Area. Your driver's display will visually prompt him of the update and the indicator will move to reflect the new information.

Note: You can still manually advance to any waypoint at any time, even if the Auto Adv feature is active.

IVC2 ENH CVC2

Manual Update

If **Auto Adv** is **NOT** selected, you must manually select a new waypoint when you arrive at the next waypoint or at the time you wish to change to the new waypoint.

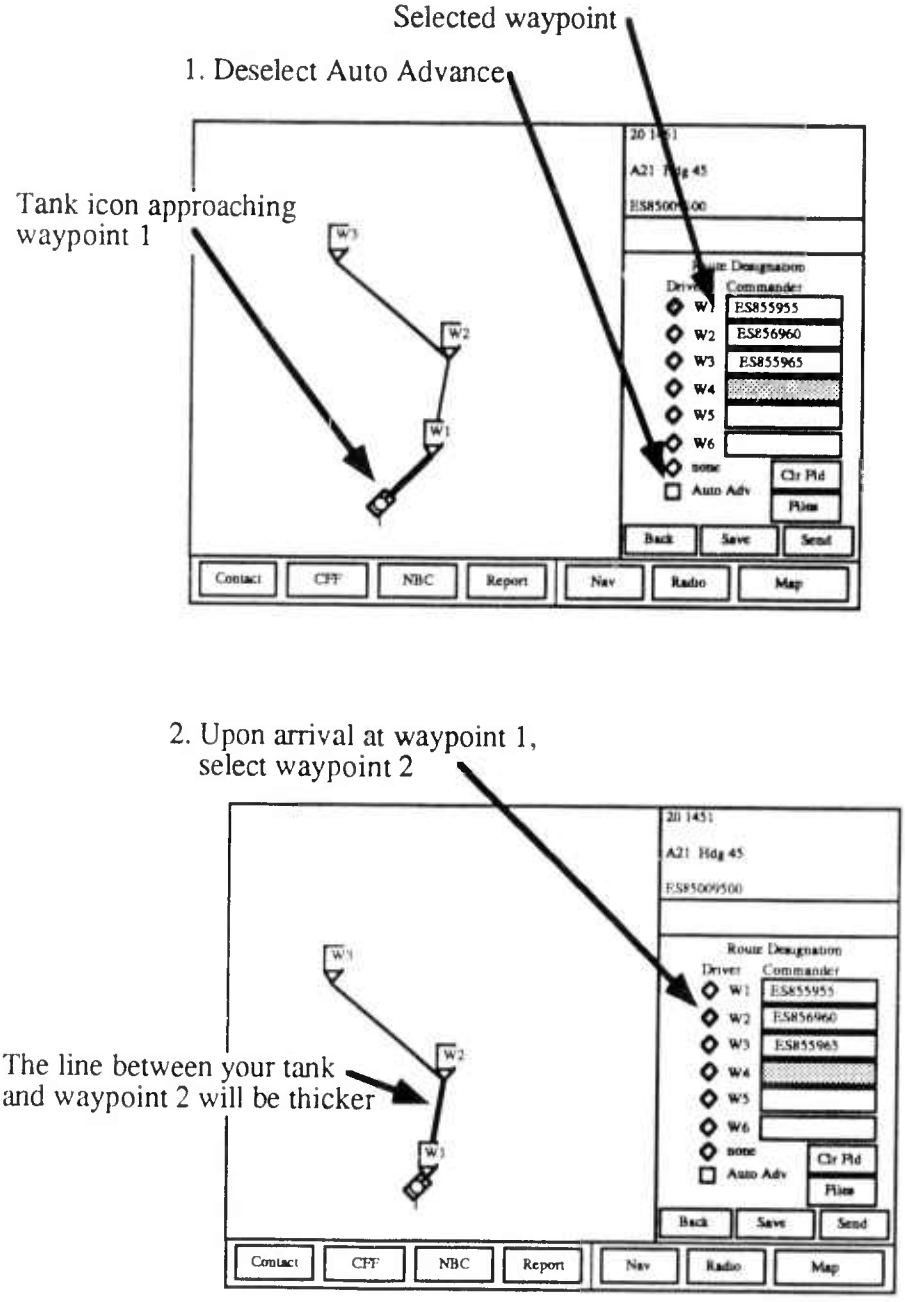


Figure 35 Manual Waypoint Updating

IVC2 ENH CVC2

SAVING A ROUTE

Routes can be saved in a Route File (**Files**) at any time simply by pressing the **Save** button at the bottom center of the variable menu area. When this button is pressed a file is saved with your call sign, the current date, and the current time.

ENH CVC2

SENDING A ROUTE

It is also possible to send a route to other commanders by selecting the **Send** option, located in the lower right-hand corner of the variable menu area. To send a file to another commander complete the following steps:

	What You Do	What Happens
1.	Create a route.	The route will appear on the tactical map.
2.	Press the Send button.	The Report Action menu will appear in the variable menu area.
3.	Select the radio network(s) you wish to send the reports over.	The network(s) will be highlighted.
4.	Press Send.	The route file will be sent over the selected networks and a **Message Sent** prompt will appear in the message center.

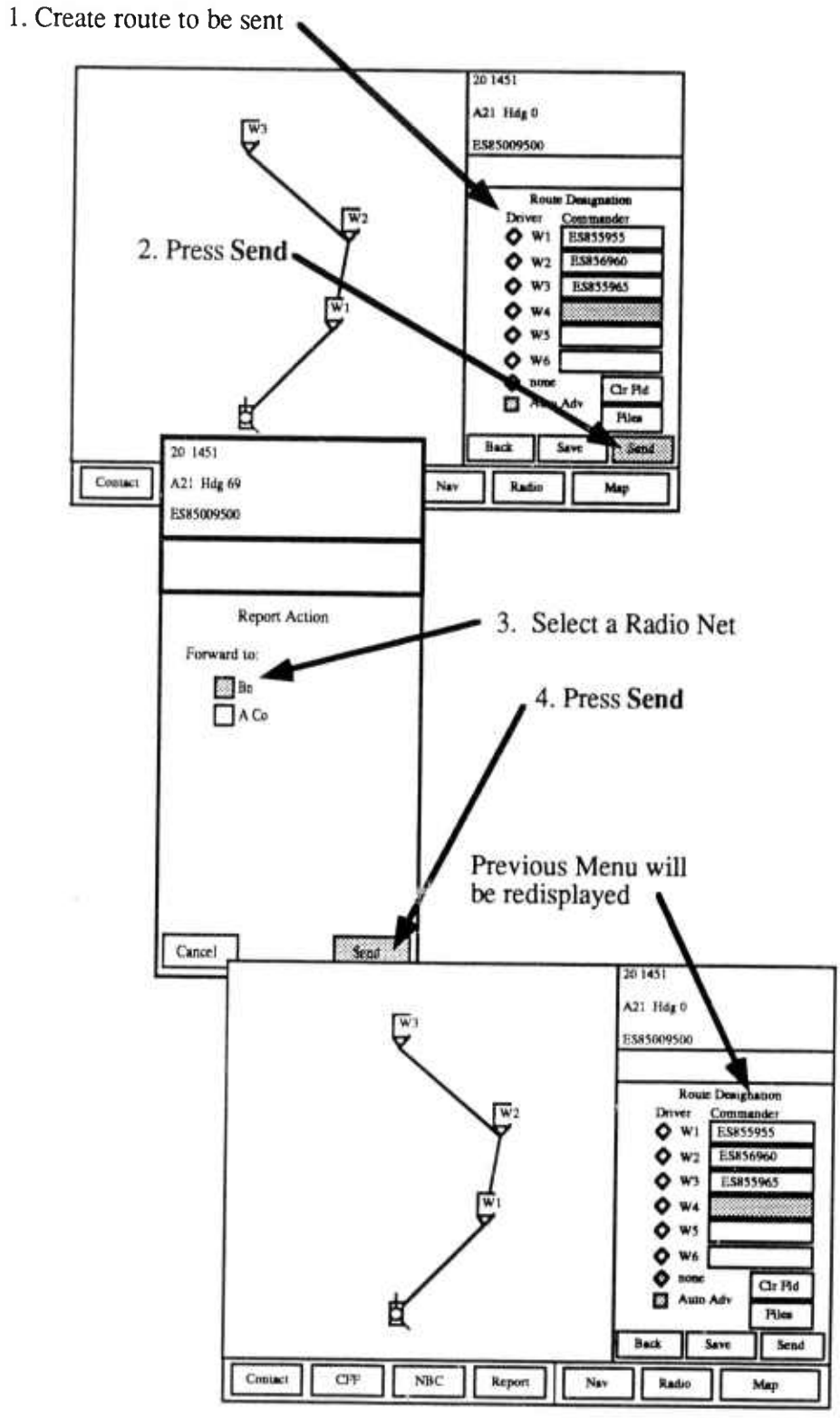


Figure 36 Sending a Route

ENH CVC2

RECEIVING A ROUTE

Route files from other commander's are received the same way combat reports are received. When you receive a route, you will hear a beep in your headset, and see the Receive key highlighted. When you press RECEIVE, the RECEIVED QUEUE will appear in the variable menu area. This queue contains all messages, including routes, which are waiting. For routes in the queue, you will see the date time group when the message was received, the identity of the commander who first created the report, and the report type (**Rte**).

To select and view the contents of the route:

	What You Do	**What Happens**
1.	Place your finger or move the cursor over the desired route header.	This highlights the route header.
2.	Press SHOW.	The route contents now appear in the variable menu area, and the route appears on the tactical map with dotted lines and waypoint symbols if another route is active.
3.	To make the route active (the route you wish to use), press **Make Active**.	The new route will become active and replace any previously existing route.

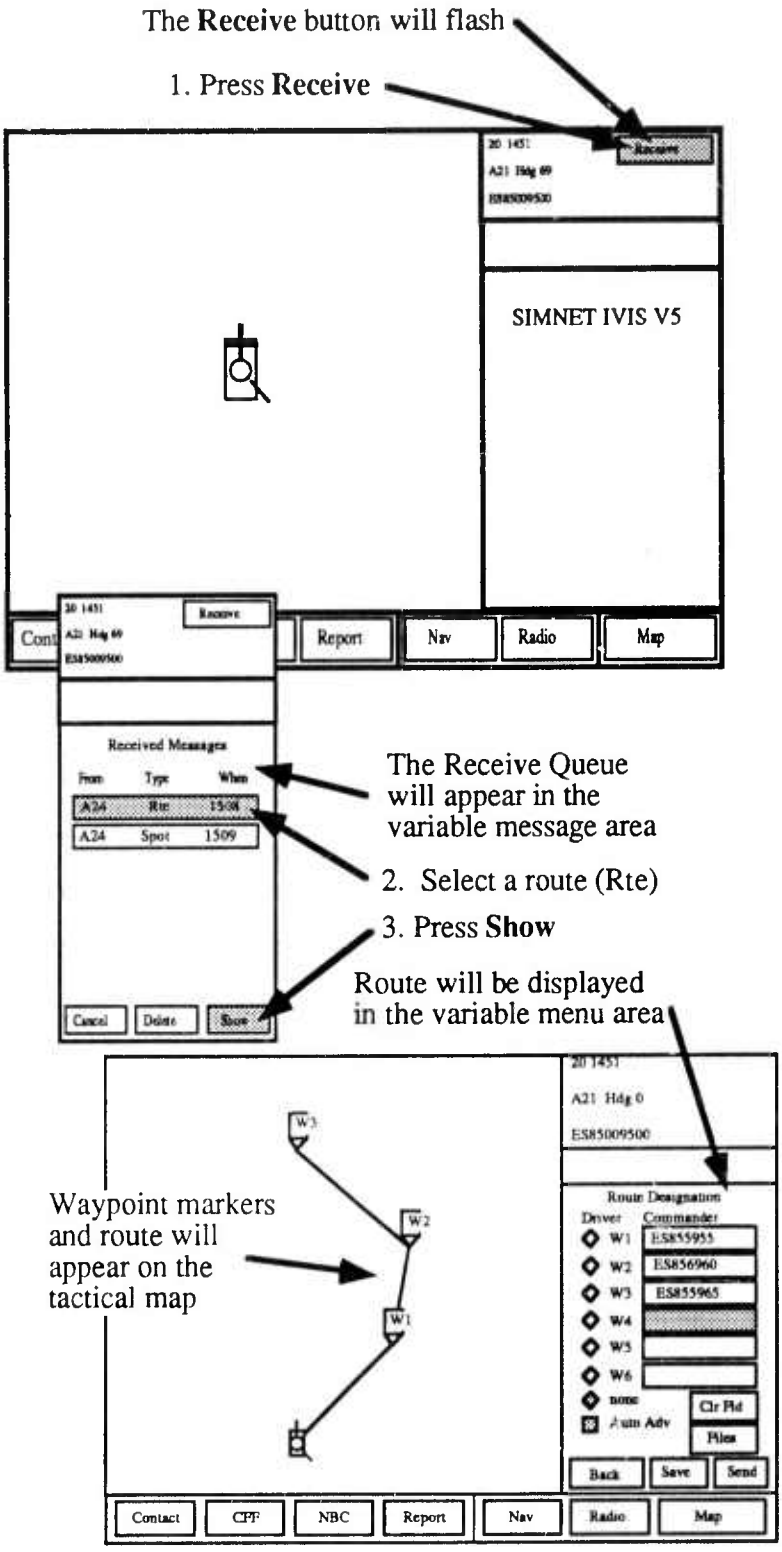


Figure 37 Receiving a Route

IVC2 ENH CVC2

USING ROUTE FILES

The CVC2 System treats routes just like combat messages. To see saved copies of routes you created or received from other commanders, use the **Files** button on the Route Designation Menu. The following steps show you how to retrieve old route files:

	What You Do	What Happens
1.	Press the **Nav** dedicated key on the CCD.	The **Route Designation** menu will appear.
2.	Press **Files**.	The old route files will appear in the variable menu area.
3.	Select the old file you wish to view.	The new route you have selected will appear on your tactical map with dotted lines and waypoint symbols.
4.	To use the new route, press **Make Active**.	The new route will replace the current route.

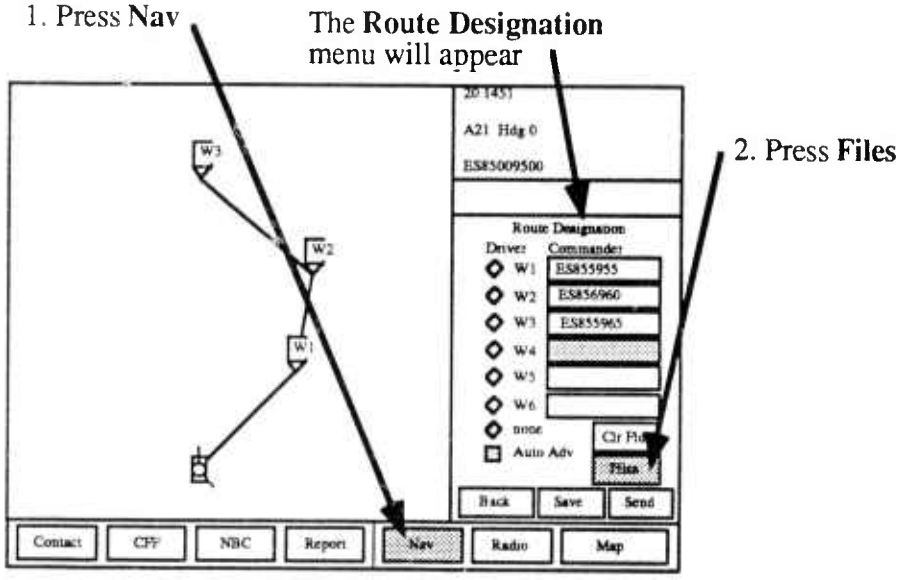


Figure 38a Selecting an Old Route and Making It Active

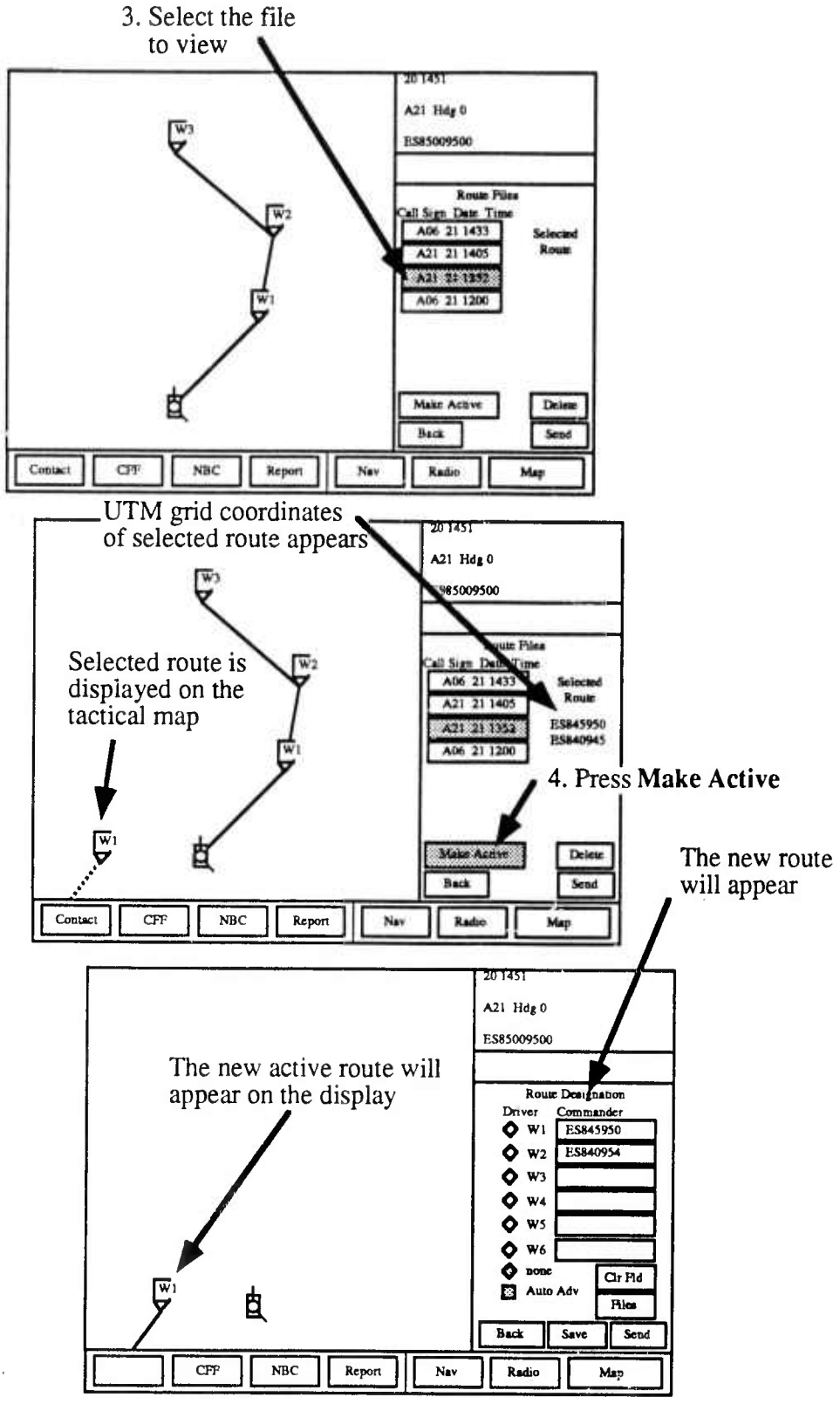


Figure 38b Selecting an Old Route and Making It Active

Section III

Commander's Independent Thermal Viewer (CITV)

Chapter 8: CITV Modes and Functions

OPERATING THE CITV

The CITV contains a single thermal display which can be used to scan the battlefield independently of the tank gunner, and several controls and switches which operate the device.

When the CITV is ON the CITV tank icon will be visible in the bottom center of the thermal display. The hull of this icon will be oriented in the same direction as the tank's hull, and the CCD tank icon. Two other orientation indicators (lines) will be visible on this icon and represent the direction of the main gun and CITV sight with respect to the tank hull. CITV sector set limits will also appear on the display.

Most of the CITV controls are located around the thermal display. In addition, some CITV controls are located on the commander's control handle.

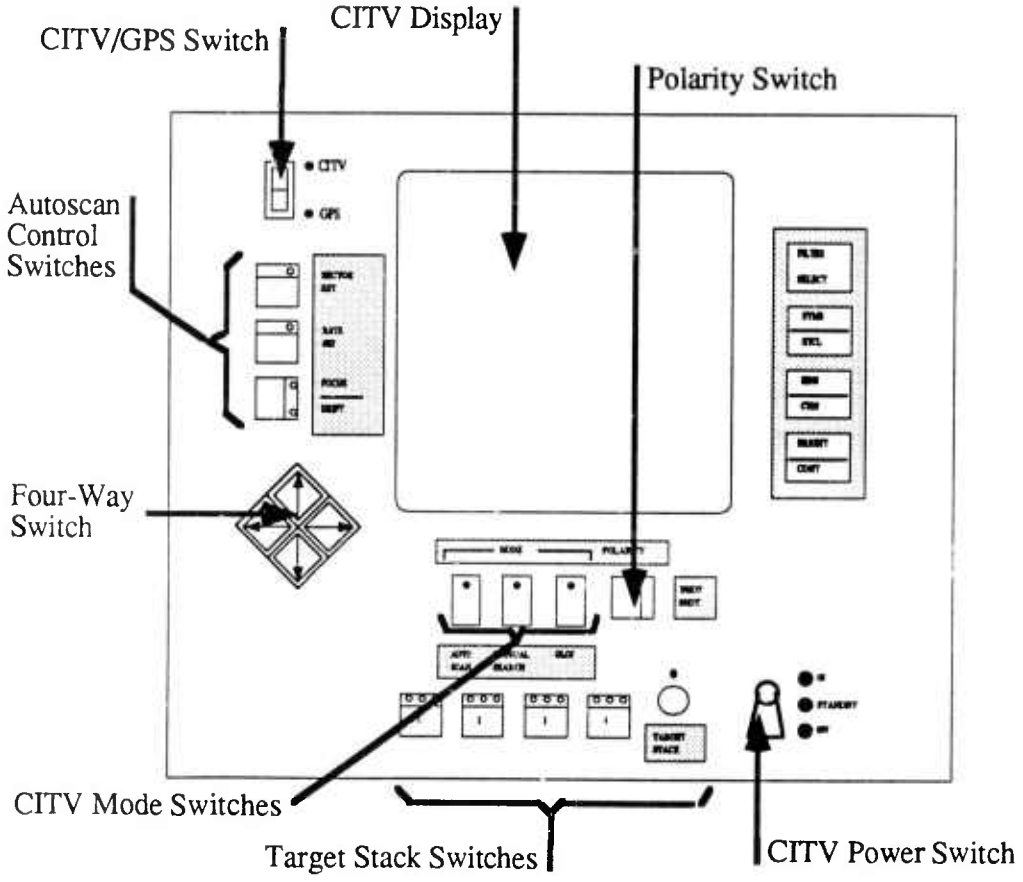
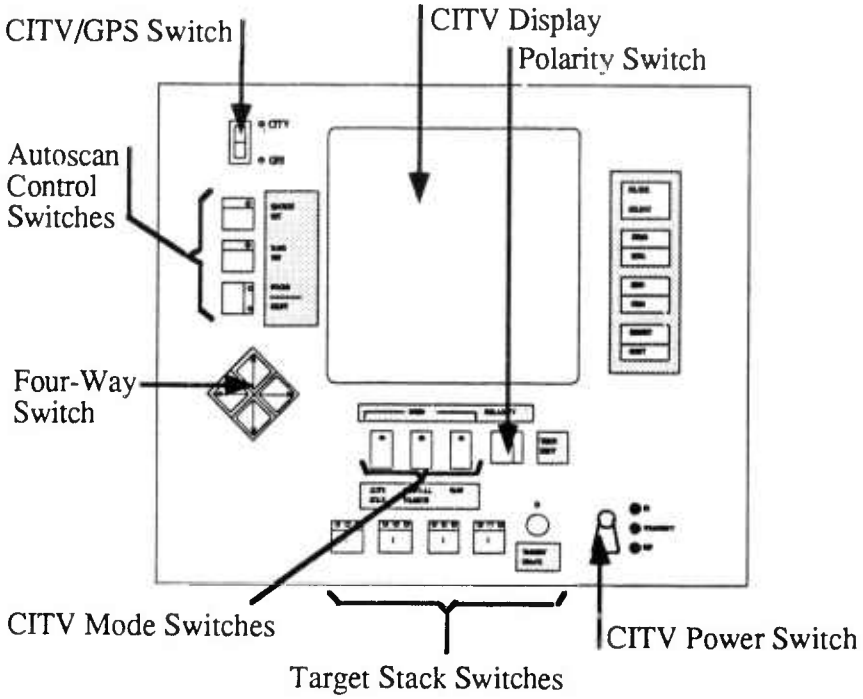


Figure 39 The SIMNET CVC2 CITV



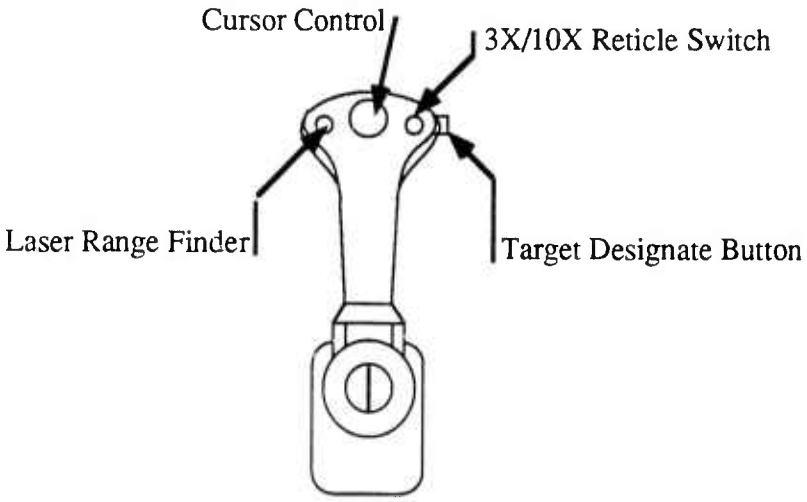


Figure 40 The SIMNET CVC2 CITV and Control Handle

CITV/GPS

The **CITV/GPS** switch is used to toggle the view in the CITV display between the CITV sight (CITV) and the Gunner's line of sight (GLOS). When the CITV is ON and the CITV/GPS switch is set to CITV, the view in the CITV display is coming from the independent thermal viewer. Also, use of the control handle has no effect on the main gun. However, if the CITV/GPS switch is set to GPS, the view in the CITV display is a thermal view of the Gunner's Primary Sight. The control handle is now used to override the gunner's control of the turret and operate the main gun, and **not** the CITV.

CITV **Polarity**

The **Polarity** switch is used to assist you in interpreting thermal images. "Hot" areas can appear as either white hot (WHOT) or black hot (BHOT).

CITV **3X/10X**

The CITV **3X/10X** switch.is located on the Commander's Control Handle, and is used to toggle between **3X** or **10X** magnification in the CITV display.

CITV **Laser Range Finder**

The CITV **Laser Range Finder** (CITV LRF) is used to lase to targets in the CITV and is similar to the Main Gun LRF. If the CITV/GPS switch is set to GPS, you are actually using the Main Gun LRF.

CITV **Target Designate**

The **target designate** button.can be used by the commander to designate a target for the M1 gunner. When you press this button the M1 main gun and turret will traverse until the CITV reticle is aligned with the main gun reticle, as long as the palm switch is also depressed. Lifting up on the palm switch before the turret ceases traversing will cause the turret to stop, and return control to the gunner (the CITV and main gun reticles will not be aligned).

CVC2 IDENTIFICATION FRIEND OR FOE (IFF) SYSTEM

An IFF system has been built into the prototype CITV of your M1 simulator. Whenever you use your CITV LRF and lase to a possible target an IFF symbol will appear in the upper left hand corner of your CITV display. The possible IFF symbols are:

IFF Symbol	Indicates
	Target is **FRIENDLY**
XX	Target is **ENEMY**
?	Target is **UNKNOWN**

Warning: The IFF system is not one hundred percent accurate; consequently users are urged to supplement the system with visual recognition prior to taking a target under fire.

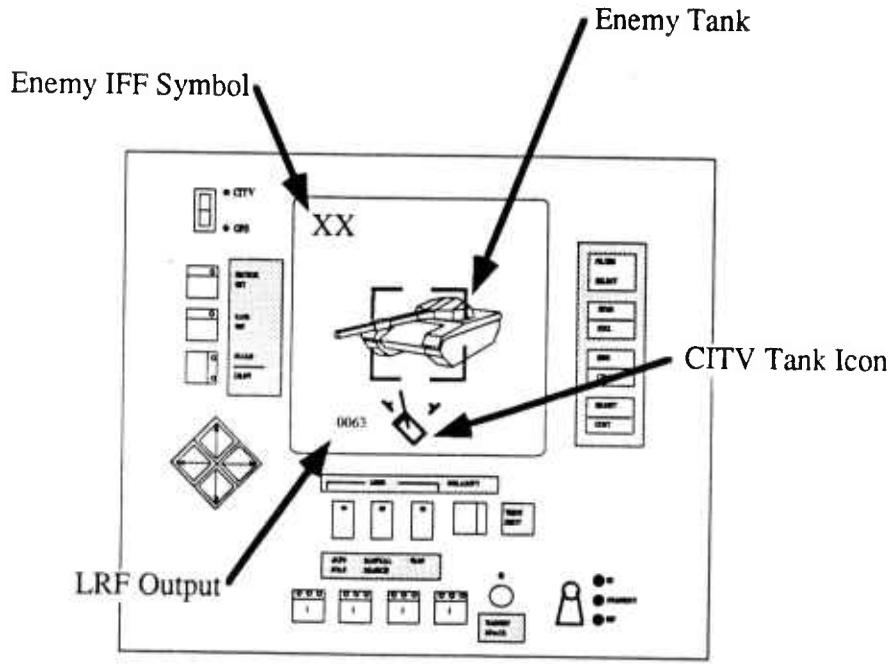


Figure 41 CITV View with IFF Symbol Present

Prior to receiving the IFF system's evaluation of a target, you must receive a valid return from the CITV LRF. In general, the longer the range to the target, the **less accurate** the system will be.

CVC2

CITV TARGET STACK

The prototype CITV in your M1 simulator also has a target stacking capability. Using the **CITV Target Stack** you can place up to 4 targets in a stack and assign them a priority. The system will then track the target. The tank gunner can then select and engage each target.

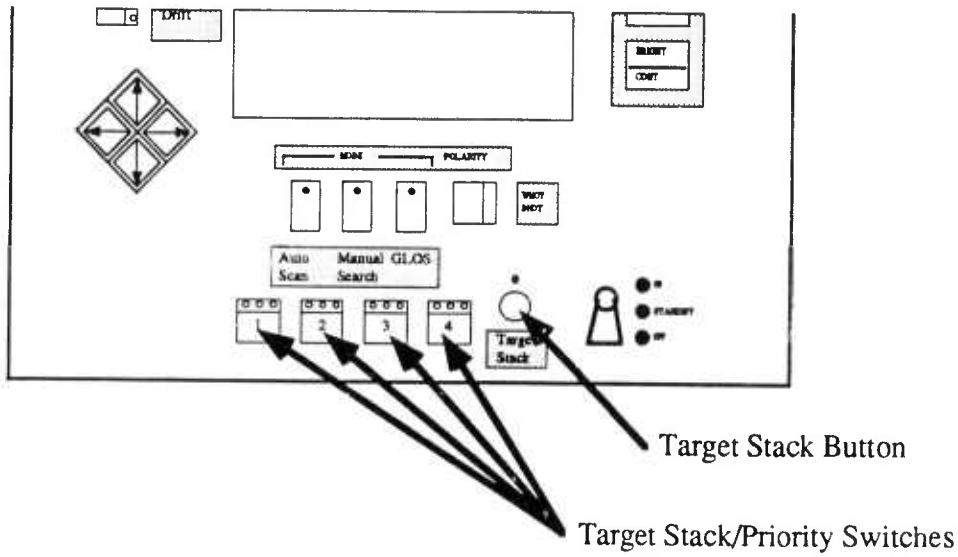


Figure 42 CITV Target Stack Controls

Placing Targets in the CITV Target Stack

	What You Do	What Happens
1.	Identify a target you wish to place in the target stack.	
2.	Press the Target Stack button on the CITV.	The small lamp over the Target Stack button will be lit.
3.	Use the CITV LRF to lase to the target.	LRF range to the target and the IFF indicator symbol will appear in the CITV display.
4.	Press the Target Stack switch corresponding to the desired priority.	The red lamp over the target stack switch will be lit. One of the two directional lamps will be lit.
5.	Continue to search for targets and repeat steps (1) through (4) as necessary.	

Placing a Higher Priority Target in the Stack

If you enter a new target into a stack position which is already occupied, the new target will be placed into the selected priority position, and all previously entered targets will be "bumped" to the next lower priority position.

Removing Targets from the Stack

You can remove targets from the queue by pressing the priority position button of the target you wish to remove (without pressing the target stack button). The target is dropped from the stack and any lower priority targets move up in the queue.

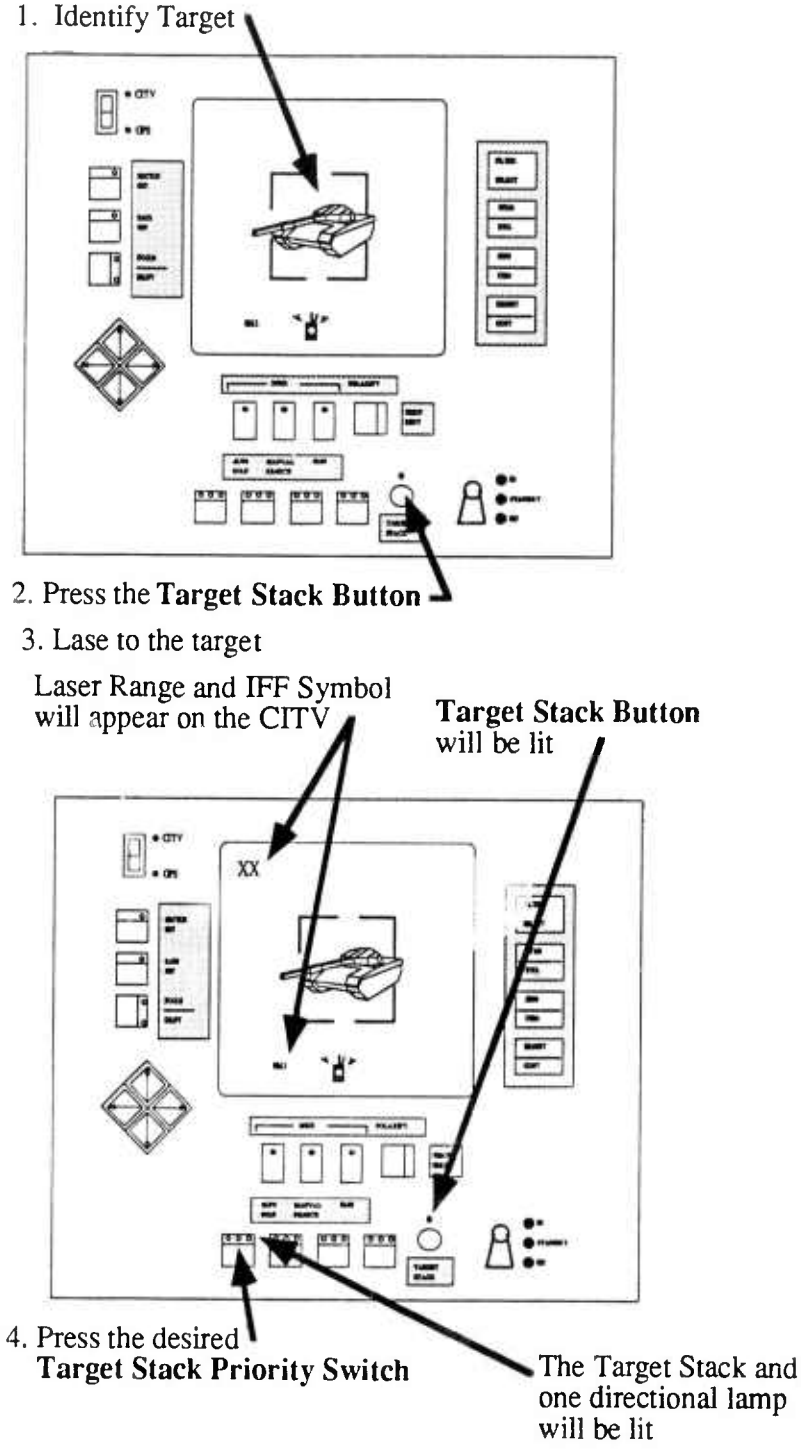


Figure 43 Using the CITV Target Stack Controls

ENGAGING TARGETS FROM THE GUNNER'S POSITION

The gunner can select and engage targets from the target stack using the following steps:

	What You Do	What Happens
1.	Press the target stack switch.	The small lamp over the target stack button will be lit.
2.	Press the priority position button for the desired target.	The main gun will immediately traverse until the selected target is under the main gun reticle.
3.	Engage target as usual.	
4.	Repeat steps (1) through (3) as needed.	

ENGAGING TARGETS FROM THE TANK COMMANDER'S POSITION

The tank commander can also engage targets in the using the target stack by the following steps:

	What You Do	What Happens
1.	Press the target stack switch.	The small lamp over the target stack switch will be lit.
2.	Select a target from the stack.	
3.	Press the priority position button for the desired target.	The main gun will immediately traverse until the selected target is under the main gun reticle.
4.	Engage target as usual.	
5.	Repeat steps (1) through (3) as needed.	

CVC2

CITV OPERATIONAL MODES

The CITV can be operated in one of three modes:

AUTO SCAN

In this mode the CITV will scan back and forth between two preset sector limits (left limit and right limit) at a preset scan rate. When this mode is first selected default sector limits and a default scan rate will be in effect.

Using the **Four-Way Switch** these default values can be changed. To change the sector limits (including elevation) in AUTO SCAN mode:

1. Press the **SECTOR SET** switch.
2. Grasp the control handle (depressing the palm switch).
3. Slew the CITV so that the desired left limit is targeted by the CITV reticle.
4. Press the left arrow key on the **Four-Way switch**. You have now set the left sector limit (azimuth).
5. Repeat steps (1) through (4) to reset the right sector limit.

To change the sector scan rate:

1. Press the **RATE SET** switch.
2. Press the up arrow (repeatedly if necessary) to increase the scan rate.
3. Press the down arrow (repeatedly if necessary) to decrease the scan rate.
4. Turn the **RATE SET** switch off.

AUTO SCAN (Continued)

If at any time you grasp the control handle and depress the palm switch, the CITV will stop scanning. Any of the basic controls discussed above (e.g., **polarity, 3X/10X, target designate, LRF, target stack**, may also be used if the palm switch is depressed. Once you release the palm switch, automatic scanning will immediately resume.

MANUAL SEARCH

In this mode the CITV is stabilized, and moves only in response to the commander's control handle. All of the basic controls discussed above (e.g., **polarity, 3X/10X, target designate, LRF, target stack**, may also be used in this mode.

GLOS — In this mode the CITV is stabilized, and is aligned with and automatically maintains the gunner's line of sight. If the commander depresses the palm switch, the CITV will temporarily stop tracking the main gun; it will immediately return once the palm switch is released.

To select a mode or change a mode:

	What you do	What you see
1.	Press the CITV mode switch for the desired mode.	The small lamp on that switch will be lit.
2.	Operate the CITV	The CITV will operate as described for that mode.
3.	To change the mode again, press the new desired mode.	The small lamp on the new switch will be lit.