

COMBAT LEADER



Manufactured and distributed in the U.K. under licence from Strategic Simulations Incorporated by U.S. Gold Limited, Unit 10, The Parkway Industrial Centre, Heneage Street, Birmingham B7 4LY.

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NOTE: The (SELECT or F5) key will display the list of missions from which you may choose. You may press the (SELECT or F5) key once the initial display is shown and thus skip over the theme music if you so wish.

1. Description of Game

COMBAT LEADER is a tactical game that simulates combat between elements of tank and mechanised infantry companies on the modern battlefield. It is a flexible game that can be played on different levels and can include many different elements, such as tanks, infantry fighting vehicles, infantry, machine guns, rifles, antitank weapons, and mortars. With this game it is possible to simulate tactical combat in a wide variety of scenarios from the period of World War II up through the 1980's. The game is complex, especially for those who do not have any military experience. For this reason, we suggest you try the novice game first.

II. Loading Instructions (Atari Versions):

This game requires 48K of memory. If there are any cartridges in the front slots of your computer, remove them before loading.

To load the cassette version:

1. Rewind the tape.
2. Press the (PLAY) button on the tape recorder.
3. Turn on the computer while holding down the (START) key (START and OPTION on XL models). The computer will beep once.
4. Hit (RETURN) on the computer keyboard.
5. Allow 10 minutes for it to load. You don't have to hang around while it is loading. The computer will beep three times when it is finished loading the program.
6. If the computer display gives the "MEMO PAD" message, then something went awry. Repeat the loading procedure.

To load the disk version:

1. Insert the diskette and turn on the disk drive.
2. Turn on the computer. (On XL models hold down OPTION whilst turning on).
3. The program will load automatically.

(Commodore 64 Versions)

To load the cassette version:

1. Rewind the tape.
2. Press the (PLAY) button on the tape recorder.
3. Type LOAD and hit (RETURN).
4. Then type RUN and hit (RETURN).

To load the disk version:

1. Turn on the disk drive.
2. Type LOAD "8", 8, 1 and hit (RETURN).
3. Then type RUN and hit (RETURN).

Notes: Keep cassette recorder at least two feet away from the monitor to prevent electrical interference. When playing with several units, you should set a pace of no greater than six.

Control Keys:

The / key acts as the (START) key. Hit it to start a

new game.

The / key acts as the (SELECT) key. Hit it to select a game from the list of missions.

Note: Plug your joystick into control port #2.

III. Novice Game

After the preliminary music and display, the computer will present the following menu:

Select game:






- (1) Novice
- (2) Intermediate
- (3) Build your own game
- (4) Attack Enemy
- (5) Seize and hold position
- (6) Mobile Defence
- (7) Reconnaissance

Hit the (1) key to start the novice game. A portion of the battlefield is now displayed. Hit the Space Bar now to pause the game. Notice that the border around the battleground turns black when the action is stopped.

On the screen you will see a group of tanks. This group of 5 tanks forms Platoon A, a tank platoon that you command. In this game you are to meet and destroy a tank platoon commanded by your computer. The computer's platoon is located to the north, out of the area displayed by the computer.

The size of the battlefield is 77 character lines high and 40 characters wide with each character representing 30-40 meters in distance (although due to some abstract quantities of the game, this is not an absolute scale). About 30 percent of the battlefield (23 character lines by 40 characters wide) can be viewed at any time. To see the northern (upper) part of the battlefield, use your joystick to move the cursor (a small orange circle) to the top of the screen. Notice that the screen scrolls when you try to move the cursor beyond the upper edge of the screen. See the numbers on the sides of the screen? There is a number for every ten character lines. For example, the 6 corresponds to the 60th character line from the top.

You will notice five types of terrain on the battlefield

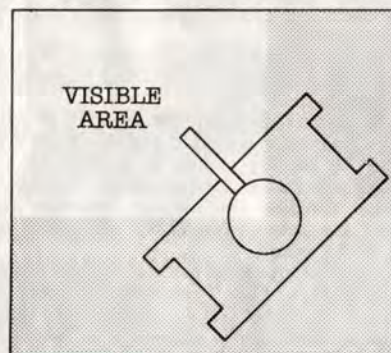
- | | |
|---|--|
|  | — Open fields (blank areas), |
|  | — Trees, |
|  | — Rocky areas (irregular patterns of tiny spots), |
|  | — Depressions (dark, circular areas), and |
|  | — Hills (lines mark the outer edge of each level). |

Each type of terrain has certain effects on the visibility of units, their speed, and cover (the chance of being hit by enemy fire):

- Clear terrain offers good visibility and movement but little cover.
- Trees restrict visibility, slow movement of armour, and provide good cover.
- Rocky areas allow good visibility, restrict movement significantly, and offer a little cover.
- Depressions allow good vision for units in them, slow movement of units climbing out of them, and provide good cover.
- Hills allow very good visibility for units on top of them, slow movement of units climbing up their slopes, and provide some cover. Of course, you cannot see through hills.

At the bottom of the screen, you will see a message from your Battalion Headquarters on the maximum score you can achieve in this game — 20 points. You receive points for destroying an enemy tank and lose points when one of your tanks is destroyed. To obtain the maximum number of points possible, you must destroy all enemy forces while losing none of your own. The points for the novice game can range from 0 to 20. At the end of the game, your Battalion Headquarters will give you the final score. To obtain the current score while the game is being played, hit the (S) key.

In COMBAT LEADER, the information on enemy forces is obtained from those forces you command that see enemy units. You see the enemy through the eyes of your troops. An enemy tank will appear on the screen only if at least one of your troops is looking at it at that moment. A unit can view a 90 degree area at a time, as shown:



The turret of a tank can be moved to position the tank cannon in any of eight directions. A unit can see the same direction its gun is pointed. A unit can see up to 24 characters of distance up, down, or across on the screen (16 characters diagonally). A unit will be visible if it is within that range, is within an enemy's field of vision, and is not

hidden from view by hills, trees, rocks, etc. The computer has no advantage in seeing opposing forces.

In this game you are acting as Platoon Leader, a position held by a commissioned officer, specifically, a Lieutenant. As an officer, you control your men by giving orders. Basically, the three types of orders you can give your men are:

- where to go,
- where to look, and
- whether to fire or cease firing.

Your tank platoon acts on your orders. For example, to move your platoon:

1. Move the joystick to position the cursor at the battlefield location to which the platoon is to move.
2. Hit the (A) key. This will designate that Platoon A (your platoon) is to receive an order.
3. Hit the (G) key. This will issue the order to the platoon to go to the position marked by the cursor.

To order your units to fire, hit the (A) key, then the (F) key for "fire at will." After this order is given, your units will fire at any enemy forces that they see. This order will remain in effect until a "cease firing" order is given.

To issue any order in this game, you hit two keys. First, hit the key to designate which unit is to receive the order. Then, hit the key corresponding to the order desired. There are four basic orders a tank Platoon Leader can issue:

G = Go to position marked by cursor.

T = Target position is marked by cursor (i.e. have the unit look towards the cursor position).

F = Fire at will

C = Cease firing.

You may issue an order to an individual tank by hitting the number key (1) to (5) to designate the tank, instead of hitting (A). That will allow you to control your tanks individually or in sections.

An order remains in effect until another order superseding it is given. For example, if the order to fire is given, this command remains in effect until an order to cease firing is given.

If a tank is destroyed and you designate it to receive an order, you will get the message "NO RESPONSE" for that tank.

During the game, you will receive a message when your tanks first see the enemy and when you come under fire. The border around the battlefield turns red to tell you a message was received. To display the message, hit the red "FIRE" button of your joystick.

During the game, a tank may be either disabled or destroyed by enemy fire. If disabled, a tank can fire but cannot move. If a tank is merely disabled, it will eventually be repaired by its crew. A tank may not be repaired while it is under fire.

To start a new game, hit the (START) key. You can start a new game at any time.

Now you know everything you need to play the Novice Game. If you don't remember all you have read — don't worry. The game is not that complic-

ated. Besides, as Platoon Leader, you are in the role of a Lieutenant. If you were too knowledgeable you would not be convincing as a Lieutenant.

To resume play, hit the Space Bar again. Try out the Novice Game to get a feel for COMBAT LEADER. After you are comfortable with it, move on to the additional information to play the Intermediate Game. Don't be intimidated by the length of the material. Most of it is intended to enhance your understanding and enjoyment of the game. It does not have to be memorized!

IV. Military Concepts:

I'm providing some background for those who have had little exposure to the nature of modern mechanized warfare.

Until World War II, horse cavalry was the mobile force in an army. Cavalry was used to outmanoeuvre and outflank an enemy force, to scout the enemy, and to rapidly move to a critical area of the battlefield to concentrate combat force.

Cavalry was replaced between World War I and World War II by motorized forces, including tanks, half-tracks, and trucks that were used to equip the armoured division (or panzer division, as the Germans call it). The armoured division is a combined arms force consisting of tank and motorized infantry units. In this force the tanks are used to shock and overwhelm the enemy force while the infantry, transported by some type of infantry carrier, follow up to mop up resistance or to fight in areas unsuitable for armour.

The modern combat leader has a variety of weapons at his disposal. The weapons provide two types of fire, direct and indirect. Direct fire is provided by weapons that are fired directly at enemy forces that are in view. Direct fire is provided by rifles, machine guns, tank cannons, and antitank guns. Indirect fire is provided by mortars. Direct fire can be very deadly but is limited to forces in line of sight of your forces.

Fire suppression is an important factor in modern combat. What it refers to is the tendency for direct fire to suppress or inhibit the fire of enemy units. The principle is simple: when you are being shot at you spend more time under cover and less time shooting. In this game, the rate of fire of a unit drops if it comes under fire.

There are three modes of movement for combat forces: travelling, travelling overwatch, and bounding overwatch. The mode of combat leader selects depends on the likelihood of contact with the enemy.

Travelling refers to moving quickly, in formation, without looking for enemy units. It is used if contact with the enemy is considered extremely unlikely.

Overwatch refers to the use of part of a force to watch over the movement of a leading force. If the leading force comes under fire, the overwatch force returns fire until the leading force takes cover.

If a platoon or company is moving using the travelling overwatch mode, it is divided into two parts, with one part leading and the other in an overwatch capacity. Travelling overwatch is used if contact with enemy is possible.

Bounding overwatch refers to moving each half of a platoon or company past each other by bounds, a sort of leap frogging. The two forces take turns in the roles of overwatch and leader. Only one force moves at a time. Bounding overwatch is used if contact with the enemy is likely.

The structure of an army is based on levels of command. The levels range from the commander of an army group (a General) to a Squad Leader (a Sergeant). There are usually about 12 men per squad, a couple of squads per section, two sections per platoon, three or four platoons per company, two to four companies per battalion, and so on up the line. The commander at each level has absolute authority over subordinate units, unless his orders conflict with those of a higher level commander. His decisions can result in the life or death of those who are under his command.

COMBAT LEADER is based on US Army Field Manual 71-1, Tank and Mechanized Infantry Company Team. It simplifies many of the elements of modern combat but does correspond fairly well to the composition, capabilities, and doctrine of some of the forces in the US Army. The weapons characteristics of combat forces are fairly well represented in the game.

V. Forces:

This game involves the operations of a combined arms company team. On the modern battlefield, companies may be pure (consisting of only tank, rifle, or mechanized infantry platoons) or may contain a mix of these under a company headquarters.

Each tank platoon is given the strength of 5 tanks at the start of the game. Up to 3 tank platoons can be given to each side.

Each infantry platoon consists of 16 two-man teams. Each team is treated as a single unit in the game. An infantry platoon is divided into four squads with four teams per squad. The infantry platoon contains one security (machine gun) squad, one antitank squad, one rifle squad, and one mortar squad.

Infantry carriers can be used to transport infantry. A carrier platoon has 4 carriers at the start of the game. Each carrier can carry an infantry squad. When infantry rides in carriers, it is "mounted". When on foot, it is referred to as "dismounted".

A scout platoon may be included in the game. The scout platoon has 4 scout vehicles. Each vehicle has the same characteristics as an infantry carrier in terms of size, speed, armour, and weapons, but cannot carry infantry.

VI. Weapons:

Six kinds of weapons are used in this game. They are the tank cannon, the antitank gun, the bazooka (or equivalent light antitank weapon), the machine gun, the rifle, and the mortar.

The cannon of a tank is very deadly. It has a long range (20 characters) and is lethal to both armour and infantry. It fires about 14 rounds per minute.

An anti-tank gun is mounted on each carrier or scout vehicle and is carried by each team in an antitank infantry squad. Its armour-piercing shell or missile can knock out both tanks and carriers but is ineffective against infantry. Its range is 16 characters. Its rate of fire is about 10 rounds per minute.

A light antitank weapon (such as a bazooka) is carried by each of the four teams in a rifle squad. Its armour-piercing shell is similar to that of an antitank gun but has a short range. Its range is only 8 characters. Its rate of fire is about 10 rounds per minute.

A machine gun is mounted on each tank and carrier and is carried by each of the four teams in a security squad. It is deadly against infantry but has no effect on armour. The range of a machine gun is 20 characters. It fires 240 rounds per minute.

A rifle is carried by each of the four teams in a rifle or antitank squad. It has the same range as the machine gun and each shot is more accurate, but it fires only 60 rounds per minute.

A mortar is a short cannon that fires a shell in an arc high up in the air. The shells make a whistling sound as they fall to the ground. Mortars are not very accurate. The radius of the impact area tends to get smaller the closer they are to their target. Mortars can fire either smoke or high explosive rounds. The high explosive shells can knock out armour if they hit it directly, but are most effective against infantry. The smoke shells create smoke for about one minute but do not harm armour or infantry (smoke is used to obscure the vision of the enemy; it is not a weapon). The range of mortars is 8 to 40 characters. If the target you designate for mortars is outside that range, the mortar squad will send you the message "TARGET OUT OF RANGE." Mortars fire about 10 rounds per minute.

Each rate of fire shown above is the maximum rate of fire for the weapon. Actual rates of fire are usually less. Rate of fire is affected by vision and fire suppression. If the enemy forces are behind cover, your rate of fire will be lower. Similarly, the rate of fire of a unit declines when it is under enemy fire since its aim is disrupted.

VII. Movement

You can order your forces to either move at normal speed or hurry. At normal speed a unit tends to use cover. Infantry units walk at normal

speed. If units moving at this speed see enemy forces they will stop, take aim, and fire (if they have previously been given an F order). This slows movement considerably. A unit that is ordered to hurry tends to avoid trees that slow down movement. Infantry units run when ordered to hurry. Units hurrying tend to keep moving when enemy forces are seen, occasionally stopping to take aim and fire (if they have previously been given an F order). Naturally, units ordered to hurry will have a slower rate of fire than units moving at normal speed.

Mortar squads, when moving at normal speed or hurrying, will stop altogether and will not budge when ordered to fire or to provide a smoke screen. They will only move after being ordered to cease firing.

VIII. Messages:

You communicate with your units through the cursor which is moved by your joystick and by sending and receiving messages.

When someone sends you a message, the border around the battlefield turns red. To display the message, hit the fire button on the joystick. If more than one message is received, they will be displayed in the order received. After the last message is displayed, the border will change back to green.

To send a message, hit the key for the unit you are sending the message to. Then, hit the letter key corresponding to the message. While you are in the process of sending a message, the border will turn blue. After you finish sending it, the border will change back to green.

If you are the Company Commander, you will control all forces in your company. You will be able to send a message to any active platoon, squad, or patrol (if it is not active, you will get the message, "NO RESPONSE.") As company commander you will not be able to control individual tanks or carriers, but you will be able to form patrols.

You designate the unit by hitting the letter key corresponding to it:

Letter	Unit Abbreviation	Unit Description
A	PLT A	Tank Platoon A
B	PLT B	Tank Platoon B
C	PLT C	Tank Platoon C
D	PLT D	Carrier Platoon D
E	PLT E	Carrier Platoon E
F	SCOUT	Scout Platoon
G	G PAT	G Patrol
H	H PAT	H Patrol
I	SQ IS	Security Squad I
J	SQ JA	Antitank Squad J
K	SQ KR	Rifle Squad K
L	SQ LM	Mortar Squad L
M	SQ MS	Security Squad M
N	SQ NA	Antitank Squad N

○ SQ OR Rifle Squad ○
P SQ PM Mortar Squad P

Q COMPANY COMMANDER

(Not for sending orders. Used ONLY for setting yourself as company commander)

The single letters corresponding to the units are hard to remember at first. However, using single keys to give orders is fast. This speed is appreciated when action on the battlefield is hot and heavy.

These are the orders the Company Commander can give:

- G- Go to position marked by cursor
- T- Target is at position marked by cursor (have unit look towards cursor position)
- F- Fire at will.
- C- Cease firing. Do not fire at all until given another "F" order.
- H- Hurry! Move to designated position as fast as possible. Reduce rate of fire.
- N- Normal speed. Use cover while moving. Fire if told to and if targets are available.
- S- Provide smoke screen. (This order is given only to mortar units.)
- D- Dismount infantry from carrier.
- M- Mount infantry into carrier.
- P- Provide a patrol out of your platoon.
- E- End your patrol. Rejoin your platoon.

If you hit the wrong key in designating the it to receive the order, hit the (DELETE) key.

To issue the order to fire all units under your command, hold down the (SHIFT) key and hit the (F) key.

There are four special function keys:

- R- Report on enemy units seen. This causes your units to provide a report on units seen by them.
- S- Score. This provides you with the current score.
- X- Terminate mission. This ends the mission and tallies the final score.
- SPACE BAR- Halt play until space bar is pressed again.

IX. Use of Patrols:

The Company Commander (not a platoon or squad leader) may establish and end patrols. A patrol is a single tank or carrier that looks around for enemy units. It can be used to gather information about enemy locations, in advance of the main body of your forces. To establish a patrol, hit the key of the platoon to provide the patrol and then the (P) key. If any units in the platoon are available, they will become the patrol. Up to 2 patrols (G and H) can be established on each side.

Patrols constantly look around to identify enemy units. Don't bother establishing target positions for patrols. They establish their own

target positions.

After enemy units are identified, it may be best to end the patrols so that the tanks or carriers can fight with their platoons. To end a patrol, hit the letter (G) or (H) corresponding to the patrol. Then, hit the (E) key.

X. Intelligence:

All information on the disposition of enemy forces is provided by your units that view the enemy. This information is passed on to you in the form of visible objects on your screen and in intelligence reports. Intelligence reports are sent by units that have spotted and identified enemy platoons or squads. A report is sent when a unit first spots an enemy unit or when you request a report. To request a report, hit the (R) key. You will then receive a report on the location and direction of each enemy unit that has been seen recently. If more than one unit has been seen, the border around the battleground will turn red. The remaining reports will be kept in memory. Hit the red "Fire" button to display the additional reports.

If no enemy units have been identified, your Company Headquarters will send the message, "NEGATIVE REPORT." Otherwise, for each unit seen, you will get a message, such as:

FM G PAT: PLT D AT 20 HOR 19 VER, DIR SE

This translates to: "From G Patrol: Platoon D from enemy company was seen at position 20 horizontal, 19 vertical, moving in the direction of Southeast."

The vertical position of a unit on the screen can be identified by referring to the numbers on the sides of the screen. For example, the vertical position of 60 on the screen can be located by the number "6" on the side of the screen. A unit located across from the "6" is at the vertical position of 60.

There are ten character lines between each number on the side of the screen. To locate the exact vertical position, count up or down from the nearest number. For example, a unit located at vertical position 55 is half way between the 5 and 6.

The horizontal position of a unit can range from 0 on the far left of the screen to 39 on the far right. A 19 is in the centre of the screen.

North on the screen is at the top. South is at the bottom. If a unit is moving Southeast, it is moving to the bottom right hand corner of the screen.

XI. Infantry:

Infantry consists of foot soldiers that make up the bulk of every army. Each infantry platoon consists of four squads. Each squad consists of four teams.

Each infantry team (consisting of two men) is represented by a small "+" on the screen. It is treated as a single unit in this game.

The four squads that make up a platoon include

a security (machine gun) squad, an anti-tank squad a rifle squad, and a mortar squad. Each squad has the ability to fire on enemy infantry. The security squad fires machine guns, the mortar squad uses mortars, and the other squads fire rifles against enemy infantry.

Infantry travels on foot at a slow pace unless it runs or unless it is mounted in a carrier. If you order an infantry squad to hurry, it will run to the position you designate for it. It runs at nearly three times the speed of walking. After running for a couple of minutes, the infantry will tire and slow down. To rest a tired infantry squad, order it to return to normal speed.

If the infantry is mounted in a carrier, the carrier will take it wherever you tell the infantry squad to go. However, the carrier will disregard the order if you later give an order to the carrier platoon to go to a different location.

While it is mounted infantry is protected from enemy fire by the armour of its personnel carrier. It cannot fire at the enemy while mounted inside a carrier.

Each infantry squad will be mounted at the start of the game if carriers are available. To dismount a squad, hit the letter key corresponding to the squad. Then, hit (D) for "dismount." If a carrier is destroyed while conveying an infantry squad, the squad immediately dismounts.

To mount a squad, hit the key corresponding to the squad. Then, hit the (M) key, the carrier assigned to the squad will then move to the same position you ordered the squad to move to. When the squad and carrier have reached the same position, the squad will mount the carrier. If the carrier has been destroyed the mount command will be disregarded.

XII. Changing Your Command

During a game, you may change the unit you command. You may take over the command of the entire company or of any platoon or squad. If you change your command, the computer will take control of the unit you previously commanded (and fight with you against the enemy forces). To take over control of another unit, hold down the (CONTROL) key and hit the letter key of the platoon or squad you want to command. If you want to take command of the company as a whole, hold down the (CONTROL) key and hit the (Q) key.

You may change commands any time you want and as many times as you want. This may come in handy when the unit you are commanding is destroyed. If you are in command of a squad, don't be surprised if the computer forces your squad to mount its carrier. Also, remember that as long as you are a platoon or squad commander you will be able to give orders to individual tanks, carriers, or infantry teams under your control by using the (1) to (5) keys. Company Commanders

may not order individual units, only platoons, squads and patrols.

NOTE: The concept of fighting an enemy force controlled by the computer with friendly forces of which some are also controlled by the computer is quite unusual. It is important that players of Combat Leaders realize that the computer can control units of both sides.

XIII. Control Keys

The (START) key starts the mission. You can start a new mission at almost any time by hitting the (START) key.

The (SELECT) key will display the list of missions from which you may choose. You may press the (SELECT) key once the initial display is shown and thus skip over the theme music if you so wish.

XIV. Scoring:

The score for a game is based primarily on the numbers and types of units destroyed by each side during a game. The value per unit is 5 points per tank, 3 per carrier, and 1 per infantry. The points are adjusted based on the relative number of forces on each side, the strength of armour, fire accuracy, and armour speed. The score shown as possible score at the start of the game is the maximum score that can be made based on the strength of each side. For games in which you are attempting to complete a mission, you can earn a bonus of up to 100 points for completing the mission. A partial bonus is given for partial completion of the mission. In any case, the score will always range from 0 to 255 points.

Each player is responsible for ending the game when he feels satisfied that he has completed his mission (ending the game is done by typing X). The computer will automatically end the game once it determines that one side is hopelessly outnumbered.

To determine victory you must relate your final score as a percentage of the maximum possible score by using the following formula:

$(100 \times \text{FINAL SCORE}) / \text{MAXIMUM POSSIBLE SCORE}$

Compare this percentage to the following table:

VICTORY LEVEL	PERCENTAGE
DECISIVE VICTORY	> 74
SUBSTANTIVE VICTORY	50-74
MARGINAL VICTORY	25-49
DEFEAT	< 25

EXAMPLE: Assume your maximum score is 230 and your final score is 95. Using the formula given your percentage would be 41.3 ($100 \times 95 / 230 = 41.3$). Since this falls between 25 and 49 you would have achieved a marginal victory.

XV. Intermediate Game:

The Intermediate Game pits a mechanized infantry platoon that you command against a similar platoon commanded by the computer. You will command a carrier platoon and 4 infantry squads:

Key	Abbreviation	Unit Title
D	PLT D	Carrier Platoon D
I	SQ IS	Security Squad I
J	SQ JA	Antitank Squad J
K	SQ KR	Rifle Squad K
L	SQ LM	Mortar Squad L

The four infantry squads will be mounted in their carriers at the start of the game.

Your objective in this game is to destroy the enemy forces that are located in the north part of the battlefield.

To select the intermediate game, hit the (SELECT) key. Then, hit the (2) key.

XVI. Other Games Available:

Besides the novice and intermediate games, you can choose from four "mission" games or you can build your own game. The four mission games include:

1. Attack and destroy enemy forces. In this game your objective is to destroy all forces commanded by the enemy. You will command a tank company with mechanized infantry platoons attached to it. Your score depends on your ability to wipe out all enemy forces while preserving your own forces.
2. Seize and hold an objective position. In this game the computer will assign you a key terrain position at the start of the game. The position will be marked with an "X" on the battlefield. You must occupy the position and fight off enemy attacks. You will command a mixed tank and mechanized infantry company. Your score will depend on:
 - a. Your ability to destroy enemy forces while preserving your own.
 - b. Your ability to occupy the key terrain area and hold it until the computer gives up its attacks. Note: You do not have to occupy the position all the time as long as you have forces on it at the end of the game (your forces must be within approximately 5 squares of the "X" to hold it).
3. Mobile defence. In this game you will try to keep the enemy forces as far north as possible for as long as possible. You will command a small mixed tank and mechanized infantry company. Your score will depend on your ability to maintain a defensive line as far forward (North) as possible for as long as

possible, while keeping your forces intact.

4. Reconnaissance. In this game you must identify enemy forces. You will command a light armoured force. Your score will be based on your ability to identify the enemy forces without having your force destroyed. Your score will fluctuate up and down based on the number of enemy units currently identified (you will only receive points for units which have been spotted within the previous two minutes).

XVII. Building your own Game:

One of the strong points of this game is the ability to easily change the playing conditions to create a wide variety of games. This is intended to overcome a problem of many war games — they become stale after being played a few times since the player gets used to the terrain and learns the optimum strategy for success. To prevent this, you can create your own game with many different types of terrain and different mixes of forces. Millions of game variations are available. You can build a game to suit your specific interests.

XVIII. Types of Options:

1. Hills, trees, rocky areas, and depressions (1 to 8). A "1" for any of these results in none or practically none of them appearing on the battlefield. A higher number generally causes more of the terrain features to appear on the battlefield.
2. Tank and carrier speed (1 to 6). A "1" for any of these results in very slow speed — about the same as infantry. A "6" results in fast movement. A "3" was intended to correspond to around 30 kilometers per hour while a "6" corresponds to about 60 kilometers per hour.
3. Tank and carrier armour (1 to 6). These numbers refer to the armour thickness of each vehicle type relative to the armour penetration ability of tank and antitank guns. Thinner armour results in a higher probability of damage or destruction if the vehicle is hit by enemy fire. Note: Armour is thick or thin only in relation to the penetration ability of a gun that is used against it. Tank armour has tended to get progressively thicker since tanks were invented in World War I. Similarly, the penetration ability of antiarmour weapons has progressively increased. A heavy tank that was nearly impervious to fire from a 20MM antitank gun early in World War II would be considered thinly armoured relative to today's antitank missiles. Carrier armour is thinner than tank armour, thus a value of 2 for tank armour

would be equivalent to a value of 3 or 4 for carrier armour.

4. Antitank gun fire (0 to 3). A higher number generally refers to greater accuracy or a higher probability of hitting targets. A "0" prohibits carriers from firing antitank guns. A "1" results in the same fire accuracy as a light antitank gun or bazooka with a range limited to 8 characters, instead of 16 for a regular antitank gun. A "2" rating corresponds to a recoilless rifle such as the Soviet RPG-7 or a medium antitank guided missile such as the U.S. Dragon missile system. A "3" corresponds to a heavy antitank gun such as the Soviet Sagger or the U.S. TOW antitank guided missile system. An "O" rating is appropriate for World War II carriers and for modern carriers that do not normally mount an antitank gun. If a "0" rating is chosen, infantry antitank squads for that side will get a rating of "2"; otherwise the infantry antitank squad will assume the rating given for antitank gun fire. Infantry rifle squads will always be given a rating of "1". Mortar and machine gun squads will always be given a rating of "0".
5. Tank fire (1 to 3). A higher number means a better chance of hitting a target. Since range is an important factor when determining hit probabilities, the higher the rating, the greater the "effective" range of the tank.
6. Number of tank (0 to 3) and carrier (0 to 2) platoons. The number shown is the number a side will have at the start of the game. Each side can have up to 3 tank platoons and 2 carrier platoons.
7. Panic under fire (Y or N). A "Y" (yes) will subject the units on both sides with the possibility of panicking when they come under heavy enemy fire. When a unit panics, it turns and runs ignoring orders from its commander until it is out of danger. An "N" (no) causes all units to remain cool under fire.
8. Pace of game (1 to 8). A higher number causes everything to speed up in the game, making the game more exciting and more difficult. The most realistic pace in this game is about 3 or 4. The rates of fire of the various weapons systems, given earlier in this manual, corresponds to a pace of 4.
9. Scenario # (1 to 8). A different number here changes the mix of terrain elements to add variety to the game.
10. Command (A to Q). If you choose "Q" you will be the Company Commander. Otherwise, the letter corresponds to the platoon or squad for which you will be the leader. If you choose to be a squad or platoon leader, the computer will be the Company Commander.
11. Scout platoon (Y or N). A "Y" (yes) results in a scout platoon being included in the game. A

scout platoon is a platoon of carriers that do not carry infantry.

12. Number of infantry platoons (0 to 2). The number shown is the number each side will have at the start of the game. Up to 2 infantry platoons may be included on each side.

XIX. Ideas For Creating Your Own Games:

COMBAT LEADER gives you the opportunity to create games to simulate combat between various types of armoured forces at various time periods from World War II on. To help you do this, Appendix B provides some information on the armour, speed, and fire rating of various armoured fighting vehicles.

Armour thickness in the tables refers to the maximum thickness of armour, measured in millimeters. There are 25 millimeters per inch. This means that the maximum thickness of the German Panzerkampfwagen III from World War II was about two inches. The maximum armour thickness of the modern Soviet tank, T-10, is about 10 inches. The thickness of armour on different parts of a tank tends to vary. As a general rule, the sides and back of a tank have roughly half the thickness of the front armour.

The tank speed shown in the table is the top road speed, measured in kilometers per hour (KPH). You may convert this to miles per hour by dividing by 1.6 (there are 1.6 kilometers per mile). For example, the Matilda tank had a speed of 24 KPH or 15 miles per hour.

The factors in the table correspond to numbers in the option list. For example, suppose you want to simulate battles between elements of the German Afrika Corps and the British Eighth Army in North Africa during the spring of 1942. On the German side you might choose the Panzerkampfwagen III tank while on the British side you might choose the Matilda tank. (Panzerkampfwagen is abbreviated as PKW in Appendix B. It means "armoured fighting vehicle".) If you chose to play the German side you would give your tanks an armour strength of 4 and a speed of 5. You would give the enemy tanks an armour strength of 6 and a speed of 3. Naturally, these factors can be adjusted to agree with your knowledge of the tanks or your particular tastes. The terrain would be that of desert with factors of 2 or 3 for hills and trees and about a 4 for rocky areas and depressions. Fire accuracy would be a 1 for each side, to reflect the state of fire control at that time.

A sample "build your own game" is given in appendix A. In this game the player should attempt to hold either hill 25 HOR 28 VER or hill 20 HOR 48 VER. The player should award himself 20 points if he holds a hill at the end of the game (also add 20 points to the possible maximum score). This game recreates an American defence of a key area in France during September

1944. The defending forces consisting of one Sherman platoon and one tank destroyer platoon fought off an attack by two enemy Panther platoons and a platoon of infantry carried by STG III assault guns.

XX. Designer's Notes:

I am providing some comments on the way Combat Leader was designed for those who are interested in the techniques of software development for a large program.

Combat Leader is a modular program. A module, by the way, is a subroutine that performs a specific function. Everything that is large and complicated can be broken down into component parts that are small and simple. With modular programming, you identify the functions that will be performed by the program, and write the routines that will be used to perform the functions. Routines will normally use from 50 to 200 bytes. This program consists of hundreds of subroutines. The main program itself consists of only 100 bytes. The use of modular programming simplifies a program. That is important for a large program like Combat Leader, that has about 18,000 instructions. It also aids in debugging. When an error occurs it can easily be traced to a specific routine and isolated. It is important to document a modular program. You should always document what each routine does, show what goes into it, and what comes out of it. That way, when you make changes, you won't have to trace through and decipher big chunks of code.

Time management played an important part in the design of this program. Quite a bit goes on all at once, especially when 120 separate tanks, carriers, and infantry teams are involved in a battle. Machine language is fast, but even it can get bogged down if a program is poorly designed. To keep things moving smoothly while the program is running, a few important techniques are used. The program functions are grouped into cycles, with 12 cycles per second. The computer is always busy; when it completes a cycle early, it runs "vision" routines (routines in which units look for and identify enemy unit). Tables are used

extensively. Use of tables can cut execution time considerably, since it takes much less time to look up a value on a table than to run a routine to compute it or to execute a series of "if-then" type statements. Use of tables has some added benefits — they are easy to change and cut down on the length of routines.

Combat Leader makes use of "artificial intelligence" on various levels. Although the term "artificial intelligence" sounds esoteric, the actual development of routines for tactical decisions made by the computer is rather simple. The process involves three actions: identify the factors that affect the decisions (for example, type of terrain, position of the enemy, level of enemy fire, relative strength, and so on); quantify the factors into numbers and place the numbers in tables; and write a routine that will select the computer's decision based on the decision tables and random values (to add unpredictability). Using this method it is possible to develop decision routines that do a pretty good job of simulating human decision processes.

The key word in developing a larger program is simplicity. By using modular programming, making heavy use of tables for all types of processes, and by fully documenting each function, it is possible to create very large, sophisticated programs.

COMBAT LEADER represents an advance in the current state of the art for computer war games. Computers hold great promise in the future for creating war games that are increasingly more enjoyable and more realistic. Computers offer some significant advantages for war games: (i) they quickly and painlessly perform the "bookkeeping" that otherwise must be performed manually; (ii) they readily provide a second or third player for a game; and (iii) they offer dimensions not often found in board games, including more varied terrain, the use of "robot" subordinate commanders, greater ranges of movement and combat factors, realistic intelligence, and the possible; use of arcade speed and graphics. All of these factors can result in war games that are more exciting, challenging and realistic.

— David Hille

APPENDIX A

RATINGS FOR COMPUTER-GENERATED SCENARIOS

	Novice Game	Inter- mediate Game	Attack Enemy	Hold Objective Position	Mobile Defence	Recon- naissance	Sample Build your Own Game
Hills	4	5	V	V	V	V	4
Trees	4	5	V	V	V	V	7
Rocky Areas	3	4	V	V	V	V	1
Depressions	3	5	V	V	V	V	2
Carrier Speed for You	6	6	5*	5*	6	6	6
Tank Speed for You	6	6	5*	5*	5	6	4
Carrier Speed for Enemy	6	5	5*	5*	5*	5	4
Tank Speed for Enemy	6	5	5*	5*	5*	5	6
Carrier Armour for You	6	6	3*	2*	2*	2	6
Tank Armour for You	6	6	5*	4*	4*	4	5
Carrier Armour for Enemy	5	5	2*	2*	2*	2*	6
Tank Armour for Enemy	5	5	5*	4*	4*	4*	6
Antitank Gun Fire for You	2	2	2*	2	2	2	3
Tank Fire for You	2	2	2*	2	2	2	1
Antitank Gun Fire for Enemy	1	1	2*	2	1*	1*	3
Tank Fire for Enemy	1	1	2*	2	1*	1*	2
# of Tank Platoons for You	1	0	3	2	1	0	1
# of Carrier Platoons for You	0	1	2	1	1	1	1
# of Tank Plts for Enemy	1	0	1*	2*	2*	2*	2
# of Carrier Plts for Enemy	0	1	1*	1*	2	1*	1
Panic Under Fire	N	N	N	N	N	N	Y
Pace of Game	2	3	S	S	S	S	3
Scenario	3	6	1*	3*	5*	7*	7
Command	A	Q	Q	Q	Q	Q	Q
Scout Platoon for You	N	N	Y	N	Y	Y	N
Scout Platoon for Enemy	N	N	N*	N*	Y	N*	N
# of Infantry Plts for You	0	1	2	1	1	0	0
# of Infantry Plts for Enemy	0	1	1	1	1*	1*	1

* = Number shown varies by + 1, 50% of the time.

V = Varies from 1 to 8, randomly selected.

S = Set by player at start of game.

N = None or zero.

APPENDIX B

HISTORICAL RATINGS FOR TANKS AND CARRIERS

Vehicle Type	Thickness in MM's	Armour Factor	Kilometers Per Hour	Speed Factor	Fire Accuracy
1939 to 1942:					
ENGLAND:					
Matilda	Tank	78	6	24	3 1
Valentine	Tank	65	5	24	3 1
Crusader II	Tank	40	3	42	5 1
FRANCE:					
Char B-1	Tank	60	5	28	3 1
Hotchkiss	Tank	45	3	36	4 1
S-35 Medium	Tank	55	5	40	5 1
GERMANY:					
Panzerkampfwagon II	Tank	35	2(3)	40	5 1(2)
PKW III	Tank	50	4	40	5 1
SPW	Carrier	10	1	45	5 0
ITALY:					
M11	Tank	30	2	42	5 1
M13	Tank	40	3	34	4 1
JAPAN:					
Type 89	Tank	17	1	25	3 1
Type 95	Tank	12	1	45	5 1
Type 97	Tank	25	2	38	4 1
POLAND:					
7-TP	Tank	15	1	40	5 1
SOVIET UNION:					
T-26	Tank	25	2	27	3 1
BT-7	Tank	22	2	53	6 1
T-34/76	Tank	47	4	52	6 1
USA:					
Grant	Tank	55	5	38	4 1
Stuart	Tank	38	3(5)	58	6 1(2)
1943 to 1945:					
ENGLAND:					
Matilda	Tank	78	5	24	2 1
Valentine	Tank	65	4	24	2 1
Crusader III	Tank	40	2	42	4 1
Comet	Tank	80	5	51	5 1
Bren	Carrier	11	1	52	5 0

Vehicle Type	Thickness in MM's	Armour Factor	Kilometers Per Hour	Speed Factor	Fire Accuracy
GERMANY:					
Panzerkampfwagon III	Tank	50	3	40	4 1
PKW IV	Tank	80	5	42	4 1
PKW V Panther	Tank	100	6	55	6 2
PKW VI Tiger	Tank	110	6	37	3 2
STG III	Tank	90	5(6)	40	4 1(3)
SPW	Carrier	10	1	55	6 0
JAPAN:					
Type 95	Tank	12	1	45	5 1
Type 97	Tank	25	1	38	4 1
SOVIET UNION:					
T-34/85	Tank	75	5	52	5 2
KV-85	Tank	100	6	42	5 2
JS-11	Tank	120	6	37	3 2
SU-76	Tank	45	3(5)	45	5 1(2)
USA:					
Stuart	Tank	38	2(4)	58	6 1(2)
Sherman	Tank	76	5	40	4 1
M10	Tank	76	5(6)	55	6 1(3)
M24 Chaffee	Tank	25	1	55	6 1
M26 Pershing	Tank	80	5	55	6 2
Half Track	Carrier	13	1	64	6 0
Current:					
CHINA:					
Type 59	Tank	25	1	35	3 1
Type 62	Tank	14	1	40	3 1
K63	Carrier	10	1	50	5 1
ENGLAND:					
Centurian	Tank	140	5	35	3 2
Chieftain	Tank	140	5	48	4 3
FV432	Carrier	13	1	52	5 0
FRANCE:					
AMX-30	Tank	50	2	65	5 2
AMX-10P	Carrier	12	1	65	5 2
Panhard VCR	Carrier	10	1	110	6 3
GERMANY:					
Leopard I	Tank	70	3	70	6 2
Leopard II	Tank	100	4	70	6 3
Marder	Carrier	30	2	75	6 2
ISRAEL:					
Type 67	Tank	80	3	50	4 2
Merkava	Tank	100	4	45	4 3
JAPAN:					
Type 61	Tank	70	3	53	5 2
Type 74	Tank	64	3	45	4 2
Type 73	Carrier	10	1	60	5 0

CREDITS

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Vehicle Type	Thickness in MM's	Armour Factor	Kilometers Per Hour	Speed Factor	Fire Accuracy
T-55	170	5	48	4	2
T-62	90	4	42	4	2
T-70	100	4	55	5	2
PT-76	14	1(1)	44	4	1(2)
T-10	250	6	42	4	2
BTR-60	10	1	80	6	0
BMP-1	14	1	80	6	3
USA:					
M48	120	5	48	4	2
M60	120	5	48	4	2
M551 Sheridan	30	1	70	6	3
M1 Abrams	130	5	72	6	3
M113	30	2	70	6	0
XM2 Bradley	42	3	66	5	2

Note: The number in parentheses should be used if the tank is being used as a carrier.