PROGRAM DESCRIPTION I

Program Title HP-41C ADVANCED STAR TREK

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Program Description, Equations, Variables Welcome aboard the United Star Ship ENTERPRISE. As the captain, you are responsible for the safety of this ship and it's crew. Your mission, while playing this game, is to seek out and destroy any enemy star ships that you may encounter and salvage a stranded, friendly freighter. During the course of this mission, you run the risk of being destroyed, either by poor judgement on your part, or by bad luck. Your job, as the captain, is to make decisions which will allow you to complete your mission successfully with the minimum amount of fuel used.

During the course of the game, you will move the ENTERPRISE within the limits of your "Universe" in an attempt to locate all of the aliens. This "Universe" is a 3-D cube, 100 units on each side. At no time, will you be allowed to move outside the limits of this cube. You will pilot the ENTERPRISE on a triaxial co-ordinate system, with each point corresponding to the three co-ordinates "X", "Y", & "Z". This cube is represented in FIGURE 1. The eight corners starting with STARBASE, are as follows: 00,00,00; 99,00,00; 99,99,00; 00,99,00; 00,99,99; 99,99,99; 99,00,99; & 00,00,99.

Your primary objective, while playing the game, is to finish it without getting blown up, something, that you may have trouble doing for the first few times.

Necessary Accessories WITH PRINTER: 3 MEMORY MODULES. NON-PRINT: 4 MEMORY MODULES

Operating Limits and Warnings During weapon fire, should the combatants's position be such that the two firing angles(θ & ϕ) become exact(ie: ENTERPRISE = 15,15,15; ENEMY = 15,45,15 making θ = 90, & ϕ = 0), you should input one of the two angles with an added error(ie: input 0.001 instead of 0.000) since two correct inputs would cause an error display when calculator tries to compute LN(A) of S_α Formula of Status Report.

Reference(s) Mr. Schneider's "ADVANCED STAR TREK" User Library # 00369D

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Aside from the ENTERPRISE, there are four alien vessels that play in this game - all represented by the calculator. Three of these are enemy starships, being the - starting with STRONGEST - KLINGON(2), ROMULAN(3), & VALLICIAN(4). The fourth is a friendly, but stranded freighter - NUBIAN(1) - which you must salvage at one point or another, during the game. The warships, on the other hand, must all be destroyed.

The (X,Y,Z) co-ordinates of the ENTERPRISE are always displayed in the following way: XX.0YY0ZZ - where "XX", "YY", & "ZZ" are the X, Y, & Z co-ordinates(00 to 99) and the "0's", are the placeholders. If you are engaged in battle or have NUBIAN in tow, then display is NEGATIVE. This is also how it is stored in its respective register(s). The co-ordinates of the other ships are stored in their respective registers in a slightly different format: 1XX.1YY1ZZi - where "XX", "YY", & "ZZ" are the X, Y, & Z co-ordinates, "1's" are the placeholders, and "i's" are the ships' identification(I.D.) numbers which are: NUBIAN=1, KLINGON=2, ROMULAN=3, & VALLICIAN=4. However, when their co-ordinates are displayed, the same format as for the ENTERPRISE, is used. Also, the I.D. for the four alien vessels, corresponds to their respective storage registers for their co-ordinates.

To start a game, you must first initialize the calculator with a seed. This is a number between "0" and "1". This then causes the calculator to generate the co-ordinates of the four aliens and store them. It then employs the LONG RANGE TRACKING SYSTEM (LRTS). This is one of two systemsthat help you to find the aliens. The other is the SENSOR PROBE (SNS). The LRTS generates a three digit number called the MISSION SECTOR. Each digit corresponds to the "X", "Y", & "Z" range, in which, at least one or more of the aliens can be found. The display format is "XYZ" and the range of these numbers is: 1 = 00 to 24; 2 = 25 to 49; 3 = 50 to 74; & 4 = 75 to 99

After the Mission Sector has been displayed, the SNS is then deployed, which wi then display the distance to the nearest alien. Should any alien be < 40 units away, then it's I.D. will also be included, unless the SNS was damaged(SNS U/S), in which case, only the distance will be displayed. Also, aliens are displayed(those < 40) in numerical order by I.D.'s. Should a vessel be $\leq$ 35 units away, and if it is one of the three enemies,then the ENTERPRISE is considered under ATTACK, unless the NUBIAN is also one of the vessels $\leq$ 35 units, in which case, you must salvage it first, before you can do battle with the enemy. Should the NUBIAN be this close, you will also be receiving communications as shown by the display "NUBIAN", which will then be followed by it's position formatted as: 1.XXYYZZ. To salvage the NUBIAN, you must be closer than 10 units for the TRANSPORT/TRACTOR BEAM (TTB) to work. Should you try at a greater distance, "TOO FAR AWAY" will be displayed. Once you have the NUBIAN in tow ("NUBIAN""IN TOW"), you can then engage the enemy. This will be done automatically by the calculator, but you have to select the alien you wish to fight, by it's I.D. number, and after doing this, then enter a value for the shields(0 to 99).

When you are fighting an enemy warship, you have to rely on a STATUS REPORT, to determine how well your attack is going, for and against you. It is displayed in the following format:

$DD.0S_{\varepsilon}S_{\varepsilon}0S_{\alpha}S_{\alpha}SS$ - where - "DD" is the distance to enemy rounded-off

"0's" are placeholders

"$S_{\varepsilon}S_{\varepsilon}$" is ENTERPRISE's Status (00 to 99)

"$S_{\alpha}S_{\alpha}$" is ENEMY's Status (00 to 99)

"SS" is value of ENTERPRISE's Shield (00 to 99)

The objective, during a battle, is to force the Enemy's Status to 100 before he can force yours to 100. For this to happen, your weapons must be fired in the right

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direction. After the Status Report display; first the ENTERPRISE's co-ordinates(neg) then the ENEMY's, are displayed. These values are used to determine the correct firing angles(Theta & Phi). See FIGUREs 2 & 3 to see how it is done. To help you find these angles correctly, I have included a WEAPONS ANGLE COMPUTOR(SCWAC), which automatically displays "DISTANCE","THETA",&"PHI" to the Enemy engaged in battle. By using this data, you should have little difficulties in destroying the enemy, unless you got too close, or he happens to be the ROMULAN. If you got too close, particularly to the KLINGON, your Status may reach 100 before you can force his to 100. Also, should your Status exceed 70, then your SNS becomes damaged and will be displayed as "SNS U/S". Should this happen, you will no longer know the Enemy's Status, nor any alien's I.D., or if the ROMULAN has deployed his CLOAK(more on this later). To repair your SNS, you must either destroy an enemy ship(not same one that caused damage during same battle), or dock at STARBASE for repairs. Should your Status then exceed 85, you then will lose your shields, displayed as "NO SHIELDS". Once this occurs, you have only two choices to make. Either try to destroy the enemy with your next shot (highly unlikely), or use the CORBOMITE MANEUVER to trick the enemy into retreating beyond the 35 unit battle zone. Should your Status climb too quickly, you will have no time to carry out any maneuvers, because you will have been BLOWN UP!!

Whenever you engage the ROMULAN in battle, he will deploy a Cloaking Device to distort your weapons firing angles. The amount will vary, but can be as high as ± 9 degrees. Your Status and that of the ROMULAN are your only means to determine how close your guesses are, which is why he is so dangerous to engage in battle if your SNS has been damaged. Using the SCWAC, you can at least establish the range from which you can make your guesses. Based on the changing status between combatants, you should be able to zero in on the correct angles before he is able to destroy you. The distance at which you engage for battle will determine how much time you will have to perform this task. From your initial status, just after setting your shields, will help you to determine the strength of the Cloak as the stronger it is, the weaker is his weapon fire against the ENTERPRISE. You must also take into consideration, the distance between the combatants. The further away you are, the more accurate your guesses must be to have any effect on his Status. The closer in you are, the less accurate your guesses have to be for effect, but unfortunately, his return fire has more effect on your Status; therefore, giving you less time to react to correct your angles after each Status report. Your skill will improve with practice.

Docking at STARBASE, requires that you be closer than 10 units and there must be no enemy warships closer than 40 units to the STARBASE. Should any enemy be this close during a docking attempt, "ALIEN" will be displayed, indicating that until you destroy him, STARBASE will not let its shields down to allow you to dock. A successful docking is shown by the display "DOCKED", and had your SNS been damaged, they will be repaired and "SNS REPAIRED" will be displayed to so indicate. Also, should the NUBIAN been in tow, it will be released at STARBASE.

When you first play the game, should any enemy warships be $\leq$35 units from the STARBASE, you will come under attack before ever leaving the STARBASE. You will have to destroy all enemy vessels within this distance, before you can leave the STARBASE. If necessary, the Corbomite Maneuver can be used, but only if you should lose your shields.

Should you cause the game to stop due to an incorrect procedure, you can restart the play by keying "SNS" which has been assigned to "1/x". Also, should be unfortunate in causing your own self-destruction, you can have a second change by keying "SNS" and you once again find yourself doing battle with the enemy who caused your demize. Who says you shouldn't have a second chance. Least wise, you can't do any worse, and you can keep trying until you either get it right, or wear out the keys on your calculator.

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MAKING ENTRIES:

When you have plotted a course for the ENTERPRISE, you then have to enter and execute it. In order to do this, you must enter three items and in the correct order. You must enter the DISTANCE, then the THETA(θ), & PHI(ϕ) angles with the correct signs. The furthest distance you can go, is 171 units, being diagonally across the cube. Should you try a course that would take you outside the cube, you will be charged for the fuel for the trip, but your position will remain unchanged. See FIGURES 1,2,&3 for complete descriptions on how the angles are derived. If the SECTOR/COURSE/WEAPONS ANGLES COMPUTOR (SCWA) is used, these angles are computed automatically with the correct amounts and signs. Once the three values have been decided, you can execute a course change using these values. You must enter and execute as follows:

"DISTANCE"(ENTER↑)"THETA"(ENTER↑)"PHI"(CHN)

Make sure you have the correct sign when entering the Theta & Phi angles. Also, I have assigned the "CHN" function to the "Σ+" key. Once the above has been entered, the calculator will decide if it is a legal move, and if so, will carry it out. If you wish to continue on the same course, that is, the same distance and direction, you need only press one key, that being the "STD", which has been assigned to "Σ-". In this way, you can use a small distance to make a course consisting of small jumps to aid in finding the aliens. Below, is an example of both.(Seed entered first)

Starting out from STARBASE:

10 ENTER↑ 35 ENTER↑ 25 Σ+ moves the ENTERPRISE to 7.005004(X=7, Y=5, Z=4)

To move 10 more units in the same direction, key "Σ-", which will then move the ENTERPRISE to 14.010008 (X=14, Y=10, Z=8). In order to return to Starbase, use the SCWA computor by keying "0" then "R↓". You will then be given the Distance, Theta, and Phi required to make this course change. Following example illustrates this:

0 R↓ gives "DISTANCE" "18.97" "THETA" "-144.46" "PHI" "-24.94"

Enter it as follows to get back to Starbase:

19 ENTER↑ 144.46 CHS ENTER↑ 24.94 CHS Σ+ moves the ENTERPRISE to 0.000000 (Starbase)

There are three other types of entries, but these have to be made while the program is running, that is, during the pause or blinks. The first is made after you have been notified "UNDER ATTACK" . Once this happens, you will be asked to select the ship you wish to do battle with. Should there only be one, then that is the one you must choose, but should there be more then one, you can choose which you wish to fight first, knowing that once he has been destroyed, you will automatically be UNDER ATTACK by the next one. After the display "UNDER ATTACK", the co-ordinates of the ENTERPRISE is displayed, followed by the I.D.'s of the enemy ships within attacking range(≤ 35 units), displayed in following format:

"0.0234" in which the numbers "2", "3", or "4" will either be included or omitted, depending on whether those ships are within attacking range. As a further note, should your SNS be damaged, in place of this display, you will see "SNS U/S", and therefore, will not know who is or are attacking you. It is during this display, which will be flashing, that you must make an entry of one of the numbers displayed, corresponding to your choice of which enemy you wish to do battle with. Should you be getting "SNS U/S", you will have to rely on your memory as to which ship or ships

is or are attacking and make your choice accordingly. Should you choose an alien not attacking you, when you try to fire your weapons, the display "TOO FAR AWAY" will appear. Your entry need only be keyed, as the calculator will recognize it, and will confirm your choice in the next display which will be: "2.0000", "3.0000", or "4.000", depending on your entry.

Your next action will be to set the value for your SHIELDS. This has to be done during the STATUS REPORT display and must not be greater than "99". The value to use will be determined by the strength of the enemy and its distance. An average starting value is "85", but this can be changed as the fight progresses, to a higher or lower value depending on whether or not you are winning. Again, any changes must be made during the blinking sequence of the Status Report. Refer to earlier explanations as to its format. When it is first displayed, you will get the distance(rounded-off) to the enemy, followed by eight zeros. After you have keyed in your value, the display changes to show your status(ENTERPRISE's) with the shield value as entered. Until you start firing on the enemy, his status will remain at "00".

The last type of entry, is your weapons fire, which occurs during battle. This is a two-stage entry. You must first initialize the WEAPONS FIRE (WPN) by keying "WPN", which has been assigned to "y^x". Once this has been done, wait until your display returns, then key in the THETA and PHI angles and fire by choosing your weapon, either PHASERS(PHS) or PHOTON TORPEDOES(PHT). As the display at this point, is blinking,and switching from the Status Report, to ENTERPRISE's co-ordinates(NEG), then to ENEMY's co-ordinates, then back to Status Report; you should try to make all of the entries together. You will find, that as you key each entry, the program slows down, giving you plenty of time to complete the entries required to execute the firing sequence. There are two differences between the Phasers and Photon Torpedoes.

1. Photon Torpedoes increase the enemy status twice as fast as had you fired your Phasers instead. (PHS: Status Change=5; PHT: Status Change=10).

2. Fuel cost in using PHT over PHS is 8 to 3 respectfully or 2-2/3's greater.

So why not fire Phasers twice instead of Photon Torpedoes once? Because, each time you fire upon the enemy, he fires back, and the difference between the Enemy's and the ENTERPRISE's Status, is an important factor in determining the new ENTERPRISE's Status. Knowing exactly when to use your Photon Torpedoes, is a skill that will come.

During the blinking sequence, you can use the SCWA computor to find out the correct Theta and Phi angles for weapon fire. By using the SCWA, the blinking will stop, but will be restarted when you key in "WPN". The computor automatically uses the co-ordinates of both combatants to determine these angles. Again, as noted before, in the case of the ROMULAN, these angles will have a possible error as high as ± 9 degrees, due to the use of the Cloaking Device, and you, as the Captain, must decide what the correct value is, by trial and error, hoping, that you do not cause your own destruction in the process.

HOW FUEL COSTS ARE CALCULATED

1. Except for its first use when the game is initialized, use of the LONG RANGE TRACKING SYSTEM (LRTS) will cost you 250 fuel units.

2. Making course changes costs 5 times the distance, or 6 times the distance if the NUBIAN is IN TOW(TTB). As mentioned before, should the attempted course change, place you outside the "Universe"(cube), you will be charged for the equivalent fuel costs, without moving anywhere. Such moves could be costly.

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3. Fuel costs are 2 times the value set for the Shields unless you have the NUBIAN IN TOW (TTB), in which case, it is 3 times the value as set by you.

4. Weapons fire will cost you 3 times the distance if Phasers are used, or 8 times the distance, if Photon Torpedoes are used.

Shields and firing fuel drain calculated each time weapons are fired.

FORMULAE USED TO CALCULATE CHANGES IN ENEMY AND ENTERPRISE STATUS:

$$\Delta S_\varepsilon = \text{INT}\left[\frac{(6 - i)(1000)(S_\varepsilon - S_\alpha + 100)^2}{D(10 \times S)^2}\right]$$

$$\Delta S_\alpha = \text{INT}\left[\frac{\{0.1 - 0.03*(\text{LN } A)\}(S_\alpha - S_\varepsilon + 100)^2 W}{D}\right]$$

* To make the game more challenging, change this to -0.04 (Program line # 584)

WHERE:

ΔS_ε = the change in the ENTERPRISE's STATUS

ΔS_α = the change in the ATTACKING VESSEL's STATUS

i = the I.D. of the ATTACKING VESSEL(KLINGON=2, ROMULAN*=3,4,or5, VALLICIAN=4)

S_ε = ENTERPRISE's STATUS

S_α = ATTACKING VESSEL's STATUS

D = DISTANCE

S = SHIELD SETTING

LN = NATURAL LOG

A = the sum of the ABSOLUTE VALUES of the DIFFERENCES of the TWO GUESSED ANGLES and the CORRECT ANGLES.

W = "1" for PHASERS. "2" for PHOTON TORPEDOES

* The more the ROMULAN Cloak is used, the higher is the value of its I.D. and the lower is the change in the ENTERPRISE's Status for any set values.

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HOW TO USE THE "PRACTICE FIRING RANGE"

The two angles used in firing weapons are derived from two right-angle triangles as shown in FIGURE 2. which represents the two angles: THETA (θ), which is found in the "X-Y" Plane; and PHI (ϕ), which is found in the "X-Y to Z" Plane. You will find the formulae used to determine both angles to the left of the tables in FIGURE 3. They are: $THETA = TAN^{-1}(\Delta Y/\Delta X)$ & $PHI = SIN^{-1}(\Delta Z/D)$ where: $\Delta X = X_\alpha - X_\varepsilon$; $\Delta Y = Y_\alpha - Y_\varepsilon$; $\Delta Z = Z_\alpha - Z_\varepsilon$; & $D = \sqrt{\Delta X^2 + \Delta Y^2 + \Delta Z^2}$ which is the distance between the two vessels.

The relation of Theta in the "X-Y" Plane in determining its amount and sign are also included under the formulae. In determining the sign of Phi, if the ratio is negative, so is the angle's sign. Likewise, if the ratio is positive, then so is the angle. Another way of looking at it, positive means you are firing up, and negative means firing down. (Up is when $Z_\alpha \geq Z_\varepsilon$; & Down is when $Z_\alpha < Z_\varepsilon$)

When you use the Practice Firing Range(PFR), the ENTERPRISE's co-ordinates are fixed at 50.050050 (XX=50, YY=50, ZZ=50) and the Enemy's is determined by the seed you enter (0<I) and will change after each practice shot. The program displays "ENTERPRISE" followed by it's co-ordinates, which will blink three times, followed by "ALIEN", then by it's co-ordinates, again blinking three times. The program starts off by giving the distance between both vessels as "DISTANCE" followed by the amount, again blinking three times. This cycle will repeat itself until you enter your firing angle guesses: DISTANCE, ENTERPRISE, ALIEN, DISTANCE, etc.....

Use the following format to fire your weapons at the enemy vessel:

THETA(SIGN if negative)(ENTER↑) PHI(SIGN if negative)(R/S)

After this has been done, the program will come back with the correct THETA angle followed by the amount of your error, followed by the correct PHI, followed by amount of error, followed by the total error in both angles. The program then sets new co-ordinates for the enemy, displaying first the DISTANCE, then the co-ordinates for the ENTERPRISE, then those for the ENEMY, again, in the same format as described in the above. You then make your new guesses and enter them, again, in the same manner as the above. You can keep firing at new positions as long as you wish as program will continue until you stop it(R/S). An example of several practice shots are shown on the next page.

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Follow the instructions in loading this program. Set calculator in the "USER" Mode. Enter a seed and start your firing lessons. Keyed entries are contained in brackets and calculator displays are in quotation marks.

(.1234566789)(XEQ)(ALPHA)(PFR)(ALPHA)

"DISTANCE" "20.223748" "ENTERPRISE" "-50.050050" "ALIEN" "59.048032"

Above will repeat itself until you make angle entries such as the following. From the tables, the approximated ratios $\Delta Y/\Delta X \approx -.222...$ and $\Delta Z/D \approx -.89...$ result in the approximate angles of -10 for THETA and -60 for PHI. Enter them as follows:

(10 CHS)(ENTER↑)(60 CHS)(R/S) *NOTE* Program stops when two(2) entries made.

"THETA" "-12.528808" "ERROR" "2.528808" "PHI" "-62.878615" "ERROR" "2.878615"

"TOTAL ERROR" "5.407423" followed by the new displays:

"DISTANCE" "20.928450" "ENTERPRISE" "-50.050050" "ALIEN" "40.067057"

Again, the above will repeat itself until angles are entered. This time, the approximate ratios and angles are: -1.7 for $\Delta Y/\Delta X$ making THETA ≈ 120 (-60 + 180); and .334... for $\Delta Z/D$ making PHI ≈ 20. Enter them as follows:

(120)(ENTER↑)(20)(R/S)

"THETA" "120.465545" "ERROR" "-.465545" "PHI" "19.540491" "ERROR" ".459509"

"TOTAL ERROR" ".925054" followed by the new displays:

"DISTANCE" "12.806248" "ENTERPRISE" "-50.050050" "ALIEN" "44.058058"

The rest I leave up to you. Good luck in your practice. As a further note, during an actual battle in the "STAR TREK" game, the distance will be rounded-off.

Sample Problem (Sketch if Desired)

FIGURE. 1.

TRIAXIAL CO-ORDINATES

"XX,YY,ZZ"

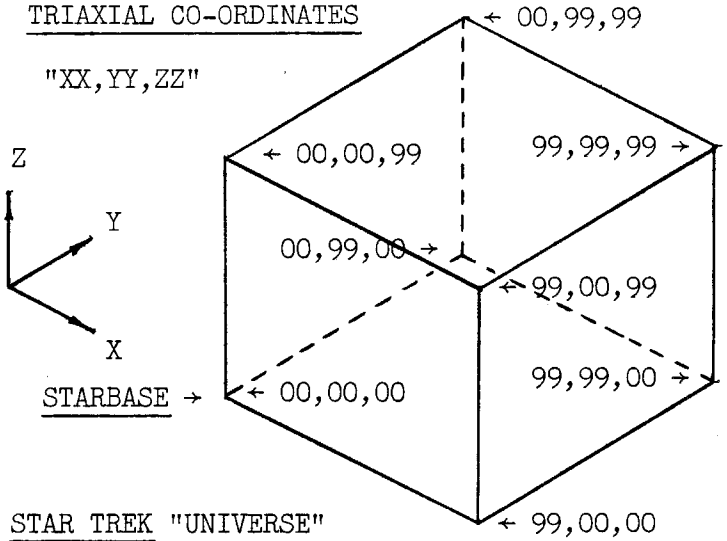
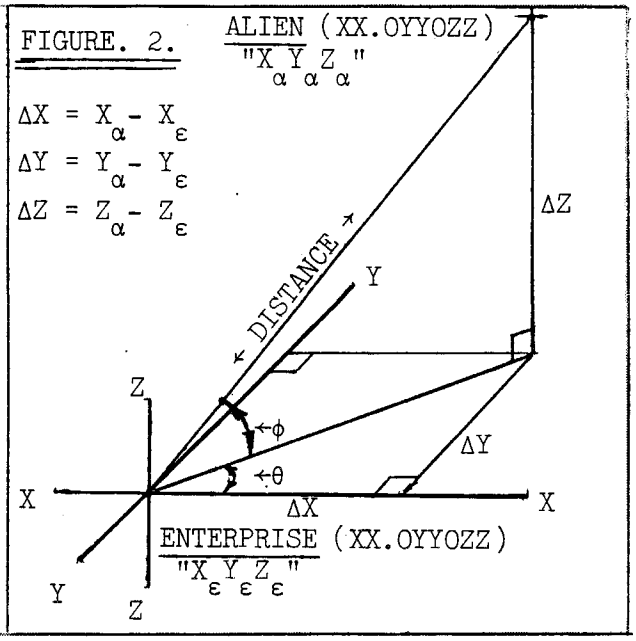


FIGURE. 2.



SOLUTION: ASSIGNED KEYS & FUNCTIONS:

PROGRAM LABELS	ASSIGNED KEYS		FUNCTION	Comments
"CHN"	Σ+	11	COURSE CHANGE	MOVES ENTERPRISE AFTER INPUT OF DISTANCE, THETA(θ), AND PHI(φ)
"STD"	Σ-	-11	COURSE STEADY	MOVES ENTERPRISE SAME DIRECTION AND DISTANCE FROM PREVIOUS "CHN"
"SNS"	1/x	12	SENSORS SYSTEM	USED TO LOCATE ALIEN VESSELS. IF VESSELS ≤35 UNITS AWAY, MAY DISPLAY I.D., IF ENEMY, GOES TO "ALT"
"WPN"	y^x	-12	WEAPONS SYSTEMS INITIALIZATIONS	STARTS WEAPONS FIRE IF ENEMY ≤35 UNITS AWAY. "TOO FAR AWAY" IF NOT.
"PHS"	$\sqrt{x}$	13	PHASERS	FIRES PHASERS AT ENEMY VESSEL
"DOC"	x^2	-13	DOCKING	DOCKS ENTERPRISE AT STARBASE IF <10 UNITS AWAY. "TOO FAR AWAY" IF NOT.
"PHT"	LOG	14	PHOTON TORPEDOES	FIRES PHOTON TORPEDOES AT ENEMY.
"LRTS"	10^x	-14	LONG RANGE TRACKING SYSTEM	USED TO FIND ONE OR MORE ALIENS MISSION SECTOR DISPLAYED "XYZ".
"TTB"	LN	15	TRANSPORTER/TRACTOR BEAM	TAKES NUBIAN IN TOW IF <10 UNITS AWAY, OTHERWISE "TOO FAR AWAY"
"SD"	e^x	-15	SEED	ENTERS SEED (0<1) TO START GAME AND SET ALIENS' CO-ORDINATES.
"CCS"	x<>y	21	SECTOR COURSE COMPUTOR	PLOTS COURSE TO MIDDLE OF MISSION SECTOR "XYZ" (DISTANCE, θ, & φ)
"CCP"	R↓	22	COURSE COMPUTOR	PLOTS COURSE FOR ENTERPRISE TO "0" (STARBASE) OR "XX.OYYOZZ" INPUTS. (DISTANCE, θ, & φ)
"CCW"	SIN	23	WEAPONS ANGLE	DURING BATTLE, PROVIDES "DISTANCE", "THETA"(θ), & "PHI"(φ) TO ENEMY VESSEL FOR WEAPONS FIRE.
"PST"	TAN	25	POST OPERATIONS	IF ENEMY DESTROYED, RESETS REGISTERS, IF USED AFTER SHIELDS LOST, PERFORMS "CORBOMITE MANEUVER". USED ANY OTHER TIME CAUSES ENTERPRISE TO SELF-DESTRUC WITH "3" SECOND COUNT-DOWN.

Sample Problem (Sketch if Desired) FIGURE. 3.

$$\text{DISTANCE (D)} = \sqrt{(X_\varepsilon - X_\alpha)^2+(Y_\varepsilon - Y_\alpha)^2+(Z_\varepsilon - Z_\alpha)^2}$$

$$\text{THETA}(\theta) = \text{TAN}^{-1}(\Delta Y/\Delta X); \quad \text{PHI}(\phi) = \text{SIN}^{-1}(\Delta Z/D)$$

WHERE $\Delta X = X_\alpha - X_\varepsilon$; $\Delta Y = Y_\alpha - Y_\varepsilon$; $\Delta Z = Z_\alpha - Z_\varepsilon$

RULES TO DETERMINE CORRECT VALUE OF THETA

IF $X_\alpha - X_\varepsilon = 0$ then THETA = + 90

IF $X_\alpha > X_\varepsilon$ then sign and value correct

IF $X_\alpha = X_\varepsilon$ and if $Y_\alpha < Y_\varepsilon$ then THETA = - 90

or if $Y_\alpha \geq Y_\varepsilon$ then THETA = + 90

IF $X_\alpha < X_\varepsilon$ and if $Y_\alpha < Y_\varepsilon$ then THETA = θ-180

or if $Y_\alpha \geq Y_\varepsilon$ then THETA = θ+180

APPROXIMATION ANGLE TABLES*

ABS VALUE OF ΔY/ΔX	THETA(θ)
0	0
1/2 ....(1/4=14*)	26.5*
1 .....(3/4=37*)	45
3/2 ....(5/4=51*)	56*
2 .....(7/4=60*)	63.5*
4 .....(3=71.5*)	76*
10 .....(6=80.5*)	84*
∞ .....(20=87*)	90

ABS VALUE OF ΔZ/D	PHI(φ)
0	0
1/8	7*
1/4	14.5*
3/8	22*
5/8 ....(1/2=30).....	39*
7/8 ....(3/4=48.5*)....	61*
1 ...(33/34=76**).....	90

SOLUTION: EXPLANATIONS OF "ALPHA" DISPLAYS INDICATING "STATUS"

NON-PRINT	PRINT VERSION	INDICATES	Comments
"SNS U/S"	"SNS U/S"	SENSORS SYSTEM DAMAGED	OCCURS WHENEVER ENTERPRISE's STATUS BECOMES > 70.
"UNDER ATTACK"	"ATK"	UNDER ATTACK BY ENEMY ALIEN	OCCURS WHENEVER AN ENEMY ALIEN GETS ≤ 35 UNITS FROM ENTERPRISE. DEFLECTORS UP AUTOMATICALLY
"NUBIAN"	"NUB"	COMMUNICATIONS FROM NUBIAN FREIGHTER	OCCURS WHENEVER THE NUBIAN GETS ≤ 35 UNITS FROM ENTERPRISE.
"NUBIAN""IN TOW"	"NUB""I/T"	TRACTOR BEAM ON. NUBIAN IN TOW.	TRANSPORTER/TRACTOR BEAM(TTB) OPERATION SUCCESSFULLY COMPLETED.
"DOCKED"	"DCKD"	DOCKING AT STARBASE COMPLETED	INDICATES THAT ENTERPRISE HAS DOCKED AT STARBASE SUCCESSFULLY.
"TOO FAR AWAY"	"A/T/F"	ENTERPRISE TOO FAR AWAY TO COMPLETE OR EXECUTE PROCEDURES	OCCURS WHEN TRY TO USE "TTB" OR "DOC" AT ≥ 10 UNITS; TRY TO FIRE ON ENEMY AT > 35 UNITS; OR THE CORBOMITE MANEUVER SUCCESSFUL.
"NO SHIELDS"	"N/S"	LOST SHIELDS DURING A BATTLE.	OCCURS WHEN ENTERPRISE's STATUS EXCEEDS 85 DURING A BATTLE.
"SNS REPAIRED"	"SNS OK"	SENSORS SYSTEMS REPAIRS COMPLETED	OCCURS WHEN SENSORS REPAIRED FROM EITHER DOCKING AT STARBASE, OR DESTROYING AN ENEMY VESSEL(NOT ONE WHICH CAUSED DAMAGE IN FIRST PLACE)
"ALIEN"	"ALIEN"	ENEMY ALIEN TOO NEAR STARBASE	STARBASE WILL NOT LOWER SHIELDS TO ALLOW DOCKING BECAUSE ENEMY ALIEN VESSEL < 40 UNITS FROM STARBASE.
"GAME OVER"	"GAME OVER"	MISSION COMPLETED	INDICATES MISSION COMPLETED.
"FUEL USED"	"FUEL = "	TOTAL FUEL COSTS	FOLLOWED BY AMOUNT OF FUEL USED TO COMPLETE MISSION.
"DESTRUCTING"	"DTG"	ENTERPRISE ON SELF-DESTRUCT	CORBOMITE MANEUVER FAILED. USED AT WRONG TIME. THREE SECOND COUNT DOWN FOLLOWED BY:
"YOU BLEW IT"	"YOU BLEW IT"	ENTERPRISE DESTROYED	YOU LOST. THE ENTERPRISE HAS BLOWN UP. BETTER LUCK NEXT TIME.
"CLOAK"	"CK"	ROMULAN IS USING HIS CLOAKING DEVICE	USED BY ROMULAN DURING COMBAT TO DISTORT YOUR FIRING ANGLES(±9)

OPERATIONAL INSTRUCTIONS

Welcome to the "HP-41C Advanced Star Trek" game. For those of you who are familiar with Mr. Schneider's very popular "Star Trek-Advanced"(User Library # 00369D for HP67/97's), this new program is a modification, with some improvements. I have eliminated the need to go from card-to-card, have made most of the programs inter-react automatically, and have replaced his use of scientific notations, with "ALPHA" displays to provide you with your current status as the game progresses. You will note that I have included two(2) versions for you to choose from. One uses four(4) memory modules(Non-print version), and the other uses the printer with three(3) memory modules. The Star Trek programs are identical except in their "ALPHA" displays, with the Print version being abbreviated over the Non-print. Included with the Non-print version, is a Sector/Course/Weapons Angles Computor(SCWAC), which can assist you in making decisions on course maneuvers or weapon firing angles. The Print version, due to its smaller storage capacity, does not have this feature. To replace it, and to help you to practice approximating firing angles, I have included a separate program. This is a Practice Firing Range(PFR) and as the Star Trek program completely fills the HP-41C, you must use it completely separate to the Star Trek one. I have described its operations separately with examples on proceeding page.

As I personally prefer the Non-print version, I have used it in the examples that follow. Besides the use of the SCWAC and slightly longer "ALPHA's", both versions execute the same step and display the same results. When you use the SCWAC, the Sector Computor plots a course to the center of the Mission Sector with just the entry of the 3 digit group derived from the use of the LRTS; the Course Computor gives you all of the necessary information to move the ENTERPRISE to any desired co-ordinate(Starbase=0) by the simple entry of the co-ordinates as displayed by the calculator during a game; the Weapons Angles Computor will automatically calculate the firing angles with whoever you are doing battle with, which will help you to more quickly destroy him. In the case of the ROMULAN, your displayed angles will be within ± 9 degrees, so there is still an element of chance. For those purists, you can play the game without using the SCWAC.

As the mechanics of this program have been explained quite thoroughly earlier on, this is just a brief note on the general operational procedures. The seed must be a value between 0 and 1. The LRTS will generate a 3 digit number which is your Mission Sector, in which, at least one alien vessel will be found. All but its(LRTS) first use, will cost you 250 fuels units. The SNS is usually deployed automatically by other parts of the program, but should the program stop for any reason, or if you blew yourself up and wish to try again, by keying "SNS", you will restart the game. Whenever any aliens get within $\leq$ 35 units of the ENTERPRISE, unless the NUBIAN is one of the vessels so identified, you will automatically go to Battle Alert, followed by those sequences involved in doing battle with the enemy. Should the NUBIAN also be in this group, you will receive communications until you take it into tow. It must be recovered first before you can go into battle. Once engaged in battle, you can not move until all enemy have been destroyed within the 35 unit battle zone. After an enemy has been destroyed, the program goes to the Post(PST) automatically to reset registers and flags, then deploys the SNS to hunt for other aliens, if any left. With the "ALPHA" displays, you should have few difficulties in knowing what is happening.

I trust that the examples that I have provided, will help you to better understand the mechanics of this game, and that you will find enjoyment in its use.

Good luck and good hunting.

PLAYING THE GAME:

Following examples illustrate how the game operates and the mechanics of its various functions and how they work with each other. **NOTE** Following format used: KEYED ENTRIES indicated by brackets - (xxx) - and displays by the calculator are indicated by quotation marks - "xxx".

EXAMPLE GAME - BEGINNING TO END - SHOWING INPUTS, DISPLAYS, & FLAG STATUS

(.3570148692)(e^x) - Seed entered by pressing assigned key "SD". It is assumed "FO on" that the calculator is in the "USER" mode. If not, the assigned keys will not work.

"444" - Mission Sector - 4 = range from 75 to 99 for "X", "Y", & "Z".

"-70.007142" - Distance to nearest alien vessel - is 70.007142 units. NOTE. This range display is always negative until distance becomes < 40 units.

"0.000000" - Co-ordinates of ENTERPRISE(also STARBASE) (X=00, Y=00, Z=00)

(444)(x<>y) - Sector Course Computor used through assigned key "CCS"

"DISTANCE" "150.69" - Distance to middle of sector is 150.69 units.

"THETA" "45.00" - Theta angle to get to the above point is 45.00 degrees.

"PHI" "35.26" - Phi angle to get to the above point is 35.26 degrees.

(151)(ENTER↑)(45)(ENTER↑)(35.26)(Σ+) - Distance, Theta, & Phi entered for course change using assigned key "CHN"

"110.295630" - Distance to NUBIAN - First "1" is I.D., distance is 10.295630 units

"-41.581246" - Distance to nearest alien vessel is 41.581246 units.

"NUBIAN" - Indicates communications coming from NUBIAN freighter.

"1.788384" - Co-ordinates of NUBIAN are X=78, Y=83, Z=84 and "1" is the I.D.

"87.087087" - Co-ordinates of ENTERPRISE are now X=87, Y=87, Z=87

In order to effect Transporter/Tractor Beam, NUBIAN must be closer then 10 units.

(78.083084)(R↓) - Use Course Computor to plot course to mover closer to NUBIAN by using assigned key "CCP"

"DISTANCE" "10.30" - Distance to NUBIAN from ENTERPRISE is 10.30 units.

"THETA" "-156.04" - Required Theta angle for above course is -156.04 degrees.

"PHI" "-16.94" - Required Phi angle for above course is -16.94 degrees.

(10)(ENTER↑)(156.04 CHS)(ENTER↑)(16.94 CHS)(Σ+) - Course change entered by "CHN".

"NUBIAN" - Communications from NUBIAN.

"1.788384" - I.D. and co-ordinates of NUBIAN.

"100.000000" - I.D. and distance to NUBIAN - Distance = 0.0 units.

"335.482390" - I.D. and distance to next alien vessel, which, in this case, is a ROMULAN warship and it is 35.482390 units away.

"-75.716577" - Distance to next nearest alien which is 75.716577 units away.

"NUBIAN" - Communications from NUBIAN again.

"1.788384" - I.D. and co-ordinates of NUBIAN again.

"78.083084" - Co-ordinates of ENTERPRISE.

(LN) - Use Transporter/Tractor Beam on NUBIAN, using assigned key "TTB".

PLAYING THE GAME(CONTINUED)

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"NUBIAN" "IN TOW" - TTB Operation successful. "F0 of

"-78.083084" - Co-ordinates of ENTERPRISE with "Negative" sign, indicating that you have the NUBIAN in tow. Sign will remain until you dock at STARBASE.

"335.482390" - I.D. and distance to ROMULAN warship.

"-75.716577" - Distance to next nearest alien vessel.

"-78.083084" - Co-ordinates of ENTERPRISE.

(5)(ENTER↑)(156 CHS)(ENTER↑)(17 CHS)(Σ+) - Makes course change to engage with the ROMULAN. Used same angles as previous move, as they brought us closer before.

"332.893768" - I.D. and distance to ROMULAN which is now less then 35 units.

"-71.805292" - Distance to next nearest alien vessel. "F3 on

"UNDER ATTACK" - ENTERPRISE is being attacked by ROMULAN. Deflectors on.

"-73.081082" - Co-ordinates of ENTERPRISE. "F3 off,"F0 on

"0.0030" - I.D.(s) of enemy ship(s) attacking the ENTERPRISE.

(3) - I.D. of enemy ship you wish to fight. In this case, only the ROMULAN.

"3.0000" - Confirmation of I.D. of enemy ship you are going to fight.

"CLOAK" - Indicates that the ROMULAN warship has deployed his Cloaking Device, which, while in use, your weapon fire will be distorted by as much as ± 9 degrees in both the Theta and Phi.

"33.0000" - Distance to combatant, rounded-off. In this case, it is the "F0 off,"F2 on ROMULAN, and the rounded distance is 33 units.

"33.00000000" - Status Report, waiting for your input for shield value.

(99) - Value for shield setting. In this case, "99" was chosen, which is the highest value that can be used. You can change this any time during the combat, as long as it is done during the Status Report blinking sequence.

"33.00900099" - Present Status of ENTERPRISE, the enemy's(ROMULAN), and the shield value. ENTERPRISE Status = 09, ROMULAN = 00, SHIELD = 99. During a battle, your objective is to force the enemy's status to 100 before he forces yours. See instructions for more complete details.

"-73.081082" - Co-ordinates of ENTERPRISE. Minus sign indicates NUBIAN still in tow. Had not you had the NUBIAN in tow, this sign would still be minus but would then indicate that you are in battle.

"77.060057" - Co-ordinates of Enemy(ROMULAN) which are X=77, Y=60, Z=57.

(SIN) - Use Weapons Angles Computor to find out firing angles through assigned key "CCW".

"DISTANCE" "32.89" - Distance to Enemy now engaged in combat.

"THETA" "-79.22" - Theta angle for weapon fire.

"PHI" "-49.47" - Phi angle for weapon fire.

The above angles, due use of CLOAK by ROMULAN, are only approximates. You as the captain, must decide which values to use, knowing that your maximum error will only be ± 9 degrees. This means that the range of Theta is -70 to -88, and Phi is -40 to -58 degrees respectfully. Your's and the Enemy's Status, will be the determining factor to how close your guesses are. Your initial Status after setting your shields, plus the distance, is an indication to how strong his Cloak is. The stronger the Cloak, the higher the distortion, and the lower will be your initial status, again, with respects to the distance from which you have engaged the ROMULAN. In this case, it is about average.

To fire at an Enemy, you must first initialize your Weapons Fire "WPN", wait for your display to return(ENTERPRISE Co-ordinates), then enter your two angles, and choose the weapon you want to fire, either PHASERS, or PHOTON TORPEDOES. The assigned keys are: "WPN" for initialization; "PHS" for PHASERS; and "PHT" for PHOTON TORPEDOES. To simplify the battle examples, I have omitted the display between the initialization and weapon firing. In all examples, you will see displayed the ENTERPRISE's co-ordinates, at which time, you will enter the firing angles and weapon choice.

(y^x)(78 CHS)(ENTER↑)(45 CHS)(LOG) - Weapons fire initialized, Theta & Phi guesses entered, and Photon Torps used(Flag "1" indicates Photon Torps used). "F1 on

"33.01701199" - Status - ENTERPRISE = 17 ROMULAN = 11 SHIELD = 99 "F1 off

(y^x)(70 CHS)(ENTER↑)(40 CHS)(LOG) - Same as above, different angles used. "F1 on

"33.02701299" - Status - ENTERPRISE = 27 ROMULAN = 12 SHIELD = 99 "F1 off

(y^x)(88 CHS)(ENTER↑)(58 CHS)(LOG) - Same as above, different angles used. "F1 on

"33.03602599" - Status - ENTERPRISE = 36 ROMULAN = 25 SHIELD = 99 "F1 off

(y^x)(88 CHS)(ENTER↑)(40 CHS)(LOG) - Same as above, different angles used. "F1 on

"33.04403899" - Status - ENTERPRISE = 44 ROMULAN = 38 SHIELD = 99 "F1 off

(y^x)(70 CHS)(ENTER↑)(40 CHS)(LOG) - Same as above, different angles used. "F1 on

"33.05403999" - Status - ENTERPRISE = 54 ROMULAN = 39 SHIELD = 99 "F1 off

(y^x)(88 CHS)(ENTER↑)(50 CHS)(LOG) - Same as above, different angles used. "F1 on

"33.06007199" - Status - ENTERPRISE = 60 ROMULAN = 71 SHIELD = 99 "F1 off

(y^x)(88 CHS)(ENTER↑)(50 CHS)(LOG) - Same as above, same angles used. on

"-86" - Correct Theta angle. "F1 off

"-49" - Correct Phi angle. "F0 on,F4 on

"3" - I.D. of vessel that you destroyed. In this case, the ROMULAN. "F2 off,F4 off

"-73.081082" - Co-ordinates of ENTERPRISE. NUBIAN still in tow.

"-71.805292" - Distance to nearest alien vessel.

"-73.081082" - Co-ordinates of ENTERPRISE again.

As we only know the distance but not the direction, it would just be luck if we were to chose the right direction. For this reason, and to show how the "LRTS" works along with the "SCWAC", I have decided to use the "LRTS" in this game. You should be aware that each time you use the "LRTS", it will cost you 250 fuel units.

(10^x) - Deploys your LRTS by the assigned key "LRTS"

"311" - New Mission Sector in which one or more of the remaining alien vessels will be found.

"-71.805292" - Distance to the nearest alien vessel.

"-73.081082" - Co-ordinates of ENTERPRISE. NUBIAN still in tow.

(311)(x<>y) - Mission Sector "311" entered into Sector Course Computor.

"DISTANCE" "98.90" - Distance to center of Mission Sector "311".

"THETA" "-99.06" - Theta angle required for the above course.

"PHI" "-45.05" - Phi angle required for the above course.

(99)(ENTER↑)(99.06 CHS)(ENTER↑)(45.05 CHS)(Σ+) - Course change entered to take the ENTERPRISE to the center of Mission Sector "311".

"409.273619" - I.D. and distance to alien vessel. In this case, it is the VALLICIAN warship and he is only 9.273619 units away.

"-50.882217" - Distance to next alien vessel which happens to be only one left "F3 on

"UNDER ATTACK" - ENTERPRISE being attacked by VALLICIAN. Deflectors on. "F0 on,F3 off

"-61.011011" - Co-ordinates of ENTERPRISE. NUBIAN still in tow.

"0.0004" - I.D.(s) of Enemy ship(s) attacking the ENTERPRISE.

(4) - I.D. of Enemy ship you wish to fight. In this case, only the VALLICIAN.

"4.0000" - Confirmation of I.D. of Enemy ship you are going to fight.

"9.0000" - Distance to Enemy being engaged, rounded-off. In this case, it is "F0 off the VALLICIAN and the rounded-off distance is 9 units. "F2 on

"9.00000000" - Status report waiting for your shield value input.

(99) - Largest value entered due closeness of the Enemy(VALLICIAN).

"9.02200099" - Status - ENTERPRISE = 22 VALLICIAN = 00 SHIELD = 99

"-61.011011" - Co-ordinates of ENTERPRISE. NUBIAN still in tow.

"66.016017" - Co-ordinates of VALLICIAN are X=66, Y=16, Z=17

(SIN) - Weapons Angles Computor used to determine the firing angles.

"DISTANCE" "9.27" - Distance to Enemy now engaged in battle.

"THETA" "45.00" - Theta angle for weapon fire.

"PHI" "40.32" - Phi angle for weapon fire.

$(y^x)(45)$(ENTER↑)(40)$(\sqrt{x})$ - Weapons fire initialized and Phasers used.

"9.02408899" - Status - ENTERPRISE = 24 VALLICIAN = 88 SHIELD = 99

$(y^x)(45)$(ENTER↑)(40)$(\sqrt{x})$ - Same as above, same angles and Phasers used.

"45" - Correct Theta angle.

"40" - Correct Phi angle. "F0 on,F4 on

"4" - I.D. of vessel you destroyed. In this case, the VALLICIAN. "F2 off,F4 off

"-61.011011" - Co-ordinates of ENTERPRISE. NUBIAN still in tow.

"-50.882217" - Distance to nearest and remaining alien vessel.

"-61.011011" - Co-ordinates of ENTERPRISE again.

(10^x) - LRTS used to find remaining "Mission Sector".

"331" - Mission Sector is "331".

"-50.882217" - Distance to remaining alien vessel.

"-61.011011" - Co-ordinates of ENTERPRISE with NUBIAN still in tow.

(331)(x<>y) - Mission Sector "331" entered into Sector Course Computor.

"DISTANCE" "51.02" - Distance to center of Mission Sector "331".

"THETA" "88.88" - Theta angle required for the above course.

"PHI" "1.12" - Phi angle required for the above course.

(51)(ENTER↑)(88.88)(ENTER↑)(1.12)(Σ) - Course change entered to get to the center of Mission Sector "331".

"209.433981" - I.D. and distance to remaining alien vessel. In this case, it is the KLINGON warship and he is only 9.433981 units away.

"-1000.000000" - This indicates that there are no more aliens left, except the KLINGON and the NUBIAN, which you have in tow.

"UNDER ATTACK" - ENTERPRISE being attacked by the KLINGON. Deflectors on.

"-61.061011" - Co-ordinates of ENTERPRISE. NUBIAN still in tow.

"0.0200" - I.D.(s) of Enemy ship(s) attacking the ENTERPRISE.

(2) - I.D. of Enemy ship you wish to fight. In this case, only the KLINGON.

"2.0000" - Confirmation of I.D. of Enemy ship you are going to fight.

"9.0000" - Distance to Enemy now engaged, rounded-off. In this case, it is the KLINGON and the rounded-off distance is 9 units.

"9.00000000" - Status report waiting for your shield value input.

(99) - Largest value used due closeness and strength of the Enemy(KLINGON).

"9.04300099" - Status - ENTERPRISE = 43 KLINGON = 00 SHIELD = 99

"-61.061011" - Co-ordinates of ENTERPRISE. NUBIAN still in tow.

"53.061011" - Co-ordinates of KLINGON are X=53, Y=61, Z=11

(SIN) - Weapons Angles Computor used to determine the firing angles.

"DISTANCE" "9.43" - Distance to Enemy now engaged in battle.

"THETA" "180.00" - Theta angle for weapon fire.

"PHI" "32.01" - Phi angle for weapon fire.

(y^x)(180)(ENTER↑)(32)($\sqrt{x}$) - Weapons fire initialized and Phasers fired.

"9.05608899" - Status - ENTERPRISE = 56 KLINGON = 88 SHIELD = 99

(y^x)(180)(ENTER↑)(32)($\sqrt{x}$) - Same as above, same angles and Phasers used.

"180" - Correct Theta angle.

"32" - Correct Phi angle.

"2" - I.D. of vessel you destroyed. In this case, the KLINGON.

"-61.061011" - Co-ordinates of ENTERPRISE indicating NUBIAN still in tow.

"-1000.000000" - Indicates no other aliens left.

"-61.061011" - Co-ordinates of ENTERPRISE again.

(0)(R↓) - Course Computor used to plot course back to STARBASE(0,0,0).

"DISTANCE" "86.97" - Distance ENTERPRISE is from STARBASE.

"THETA" "-135.00" - Theta angle for above course.

"PHI" "-7.27" - Phi angle for above course.

NOTE Before entering the above course, you should be aware of the fact that due to small errors within the program using inputted data for course changes, and the fact that you can not travel outside your "Universe", you should use a slightly smaller distance then what the CCP gave you, but large enough to place you within docking distance of STARBASE, that being less than 10 units.

(80)(ENTER↑)(135 CHS)(ENTER↑)(7.27 CHS)(Σ+) - Course change entered to move the ENTERPRISE within docking range of STARBASE.

"-1000.000000" - No aliens left.

"-4.004000" - Co-ordinates of ENTERPRISE. NUBIAN still in tow.

(x^2) - Docking Maneuver made using the assigned key "DOC". This will only work if ENTERPRISE is CLOSER THAN 10 units from STARBASE, and no alien warships closer than 40 units to STARBASE. If you are too far away, "TOO FAR AWAY" will be displayed and the docking will be aborted. Should any alien warships be in too close, "ALIEN" will be displayed, and you will have to destroy all within this distance before STARBASE will allow the ENTERPRISE to dock.

"DOCKED" - Docking completed successfully. Had the NUBIAN been in tow(YES), then it will be released at STARBASE. "FO off

"GAME OVER" - Indicates that you have successfully completed your mission, that being to destroy the three(3) enemy warships and salvage the NUBIAN.

"FUEL USED" - Indicates that the next display will be your fuel costs for this mission.

"7936" - This is a very high value. Use of the LRTS cost us 500 fuel units. Having the NUBIAN in tow while engaging the enemy warships greatly increased all fuel consuming activities. We used the highest possible Shield values and took too many shots to destroy the ROMULAN. All these actions were costly.

The above example was completed successfully, though at a high fuel cost. Let us suppose that you did get into trouble. The example which follows will show other features of this game, and how you must try to cope with them.

When you play this game using the Sector/Course/Weapons Angles Computor(SCWAC), you should have little trouble in dealing with at least two of the enemy warships, those being the KLINGON and the VALLICIAN. That is, unless you bungle your course changes and get too close in, in particular, to the KLINGON, in which case, nothing will save you. The use of the SCWAC allows you to make every shot count, at least when firing on the KLINGON and the VALLICIAN. Not so with the ROMULAN. The ROMULAN uses a Cloaking device during combat, which will distort your firing angles, the amount depending on how strong it is. The maximum that it can distort is ± 9 degrees in both the Theta and Phi angles. See Page 6 on how this works in computing the Status display. While firing angles so computed by the SCWAC would be right on without the CLOAK, you must apply this correction to both of your angles, neither usually being the same amount. As each situation is different, you only have your Status report to guide your guesses.

While in combat, your only indication on how well or bad you are doing against the Enemy warship, is your Status Report. During a battle, your objective is to force his Status to 100 before he can force yours. Should your Status exceed 70, you will then lose your Sensor System(SNS) and the calculator indicates this unfortunate turn of events by displaying "SNS U/S". When this occurs, you will no longer know the I.D. of any of the alien vessels, nor will you know the Enemy's Status during a battle. You are, in effect, flying blind. Also, should matters get worse, that is, if your Status exceeds 85, you will then lose your shields, and again, with no feeling, the calculator indicates this by displaying "NO SHIELDS". Once this happens, you are left with only two choices. Either destroy the Enemy with your next shot(highly unlikely), or bluff the Enemy into retreating beyond the combat zone($\leq$ 35 units) by using the CORBOMITE MANEUVER. You can ONLY use this AFTER your shields have been destroyed. Should you try to use it before losing your shields, then your bluff is called, the calculator displays "DESTRUCTING", gives you a three second count-down, and finishes the job by displaying "YOU BLEW IT", indicating that you and the ENTERPRISE have been reverted back to your basic atoms.

Once you have lost your "SNS", you have two ways in which to repair it. Either by docking back at STARBASE for repairs, or by destroying an enemy while it is U/S (but not during same battle which caused it to go U/S). Unless you have destroyed the ROMULAN in a previous engagement, this second method could be commiting suicide, as with "SNS U/S", you would not get any indication of the Cloaking device being used, even though it would be should you engage the ROMULAN with "SNS U/S".

NOTE If during a battle in which you have engaged more than one of the Enemy, should you lose your Sensors ("SNS U/S") before you have destroyed the other ships within the combat zone, after deploying the Corbomite Maneuver to rid yourself of the first Enemy(or if lucky, destroyed him), when it comes time to engage the next ship, your Ship(s) I.D. display will be replaced by "SNS U/S" and will repeat itself until you key in an I.D. which matches one of those known to be within the combat zone. If you should happen to guess wrong, when you try to initialize weapons fire, a display of "TOO FAR AWAY" will be shown, then the game will recycle until the Ship(s) I.D. is displayed again, at which time you can try a new guess. Should you be using the "PRINTER" Version, because there is no PSE in the program, you will be unable to input an I.D. number. It will keep printing "SNS U/S" until you press "R/S". You then can key in the I.D. then press "R/S" to restart the game. This will only occur when you engage in more than one Enemy ship at a time and you lose you Sensors("SNS U/S") before destroying all of the Enemy within the combat zone and will only be a problem should you be using the "PRINTER" Version.

The next example game is to illustrate other features of this program.

Use the previous game's seed to start a new game. Then eliminate all but the ROMULAN by storing 1000 in the registers 01, 02, & 04. This will make the calculator think that you have destroyed the KLINGON and VALLICIAN, and salvaged the NUBIAN. From the previous game's example, you know the co-ordinates of the ROMULAN, but I have used another method, which along with the SCWAC, will give you a course that will enable you to engage the ROMULAN in battle. Again, Keyed entries are in brackets and Displays in quotation marks.

(.3570148692)(e^x) - Seed entered and LRTS initialized. Again, it is assumed that the calculator is in the "USER" Mode.

"444" - Mission Sector. In this example, we will disregard it.

"-70.007142" - Distance to nearest Alien vessel. Again, it will be disregarded.

"0.000000" - Co-ordinates of ENTERPRISE. We are at STARBASE.

(EEX 3)(STO 01)(STO 02)(STO 04) - This removes the NUBIAN, KLINGON, & VALLICIAN from this game as explained in the above.

(RCL 03)(100.1001)(-)(R↓) - This recalls the ROMULAN storage register, subtracts the placeholders to get the co-ordinates, then uses the SCWAC to plot a course to the ROMULAN's position.

"DISTANCE" "113.04" - Distance to the ROMULAN is 113.04 units.

"THETA" "37.93" - Theta angle required for the above course.

"PHI" "30.28" - Phi angle required for the above course.

As we do not want to get in too close before engaging into combat, let us try to place ourselves about 20 units away from the ROMULAN.

(93)(ENTER↑)(37.93)(ENTER↑)(30.28)(Σ+) - Course change made to try and place the ENTERPRISE about 20 units away from the ROMULAN.

"320.928450" - I.D. and distance to ROMULAN which is about 20.928450 units away.

"-1000.000000" - Indicates no other aliens left, because we removed them.

"UNDER ATTACK" - ENTERPRISE being attacked by the ROMULAN. Deflectors on.

"63.049046" - Co-ordinates of ENTERPRISE.

"0.0030" - I.D.(s) of Enemy ship(s) attacking the ENTERPRISE.

(3) - I.D. of Enemy ship you wish to fight. In this case, only the ROMULAN.

"3.0000" - Confirmation of I.D. of Enemy ship you are going to fight.

"CLOAK" - Indicates that the ROMULAN has deployed his Cloaking device.

"21.0000" - Distance to the ROMULAN, rounded-off. "F0 off,F2 on

"21.00000000" - Status Report waiting for your shield value input.

(85) - Value chosen lower than previous game to illustrate this example.

"21.01900085" - Status - ENTERPRISE = 19 ROMULAN = 00 SHIELD = 85

"-63.049046" - Co-ordinates of ENTERPRISE. Sine indicates that it is under attack.

"77.060057" - Co-ordinates of ROMULAN are X=77, Y=60, Z=57

(SIN) - Weapons Angles Computor used to find firing angles.

"DISTANCE" "20.93" - Distance to ROMULAN is 20.93 units.

"THETA" "38.16" - Theta angle for weapon fire. With Cloak, range is 29 to 47 degrees.

"PHI" "31.71" - Phi angle for weapon fire. With Cloak, range is 23 to 41 degrees.

(y^x)(38)(ENTER↑)(32)(LOG) - Weapons fire initialized, guessed angles entered and Photon Torps used. "F1 on

"21.03602685" - Status - ENTERPRISE = 36 ROMULAN = 26 SHIELD = 85 "F1 off

(y^x)(29)(ENTER↑)(23)(LOG) - Above repeated with new angles. "F1 on

"21.05902885" - Status - ENTERPRISE = 59 ROMULAN = 28 SHIELD = 85 "F1 off

(y^x)(47)(ENTER↑)(41)(LOG) - Above repeated with new angles. "F1 on

"NO SHIELD" - Indicates ENTERPRISE's Status has exceeded 85. You no longer have any protection from Enemy fire. "F1 off

"SNS U/S" - Indicates that your Sensors are damaged and unserviceable. You can no longer see your Enemy's Status or I.D.

"21.08700000" - Status - ENTERPRISE = 87 ROMULAN = ? SHIELD = 00

In the above case, your only recourse is to employ the CORBOMITE MANEUVER.

(TAN) - You have used the Corbomite Maneuver by using the assigned key "PST" which incorporates this maneuver as part of its program. "F0 on "F2 off

"TOO FAR AWAY" - Indicates that the ROMULAN has moved outside the combat zone ($\leq$ 35 units), and you are no longer under attack by him. "F0 off

"63.049046" - Co-ordinates of ENTERPRISE. Note that the negative sign is gone.

"SNS U/S" - Sensors still damaged.

"-57.175169" - Distance to nearest Alien, which, in this case, can only be the ROMULAN, as he only vessel left.

"63.049046" - Co-ordinates of the ENTERPRISE again.

(0)(R↓) - Uses CCP to plot a course back to STARBASE for repairs.

"DISTANCE" "92.12" - Distance to STARBASE fro your present position.

"THETA" "-142.13" - Theta angle required for this course.

"PHI" "-29.96" - Phi angle required for this course.

(90)(ENTER↑)(142.13 CHS)(ENTER↑)(29.96 CHS)(Σ+) - Course change entered to place the ENTERPRISE within docking range of STARBASE.

"SNS U/S" - Sensors still damaged.

"-97.642204" - Distance to nearest Alien, that being the ROMULAN.

"1.001001" - Co-ordinates of ENTERPRISE.

(x^2) - Initialize Docking Maneuver.

"DOCKED" - Docking completed successfully.

"SNS REPAIRED" - Sensors have been repaired.

"0.000000" - Co-ordinates of ENTERPRISE and STARBASE.

"-99.100959" - Distance to nearest and only Alien vessel, that being the ROMULAN.

"0.000000" - Co-ordinates of ENTERPRISE again.

To show what happens when you use the Corbomite Maneuver at the wrong time, While at STARBASE, press the assigned key "PST"(TAN).

(TAN) - Corbomite Maneuver tried at wrong time. "FO on"

"DESTRUCTING" - Your bluff was called and you have placed the ENTERPRISE on Self-Destruct.

"3.000000" - The beginning of a 3 second Count-down.(Faster with printer)

"2.000000" - Two seconds to live.

"1.000000" - One second.

"YOU BLEW IT" - You sure did. Need more be said?

To reset the game, use the Sensor probe by keying the assigned key "SNS"(1/x). *NOTE* If your Sensors had been damaged before, if you want to restart anew, you first must store "1" in register "07", otherwise, they will remain damaged("SNS U/S"). To continue, after it has given you the distance to the ROMULAN and then your position, if you wish to finish the game, use the following steps:

(RCL 03)(100.1001)(-)(R↓) - This recalls the ROMULAN's storage register, subtracts the place-holders, then uses the Course Computor(CCP) to plot a course to the ROMULAN. When you engage him this time, try placing yourself about 30 units away, in order to give yourself a chance in getting the correct angles before you blow it again. Also, if in doubt, use the highest shield value. In time, you should have no trouble in getting these angles quickly and beable to use lower shield values to keep your fuel costs reasonable. I will leave the rest up to you. Good luck.

For those wishing to use the "PRINTER" Version, I have included a print-out that duplicates the above three examples. You will find them on pages 20a - 20c. You can see the differences in the "ALPHA" displays. This was necessary due to the smaller memory when using the Printer. It should be noted that by using the Printer, you will have less time to make keyed entries as a "PRINT" function executes much faster than a "PAUSE" function. Also see NOTE at top of page 18. With more memory such as with the new Quad Memory Module or the HP-41CV, one could change these ALPHA displays making them the same as the "NON-PRINT" Version and as well, include a "PSE" with the "SNS U/S" display to eliminate the problem that could be encountered during a battle. One could also include the SCWAC into the "PRINTER" Version.

When the new memory module becomes available, I will make up a new set of Mag cards for the "NON-PRINT" Version so as to eliminate the need to finish program entries by hand, which at present, is necessary. I will also try to improve the "PRINTER" Version as suggested in the above.

I hope you enjoy playing this game. Good hunting.

PROGRAM LISTING

☐ 67 ☐ 97 ☑ 41C "PRINTER" Version of Game Example on Page 13-17

NOTE Program change required to duplicate below results

KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
.3570148692		Seed entered
	XEQ "SD"	
444	***	Mission Sector
-70.007142	***	Nearest Alien
0.000000	***	STARBASE
151.000000	ENTER↑	Course change
45.000000	ENTER↑	entered
35.260000		
	XEQ "CHN"	
110.295630	***	NUBIAN distance
-41.581246	***	Nearest Alien
NUB		Communications
1.788384	***	NUBIAN Co-ordinates
87.087087	***	ENTERPRISE Co-ord
10.000000	ENTER↑	Course change
-156.040000	ENTER↑	entered
-16.940000		
	XEQ "CHN"	
NUB		Communications
1.788384	***	NUBIAN Co-ordinates
100.000000	***	NUBIAN distance
335.482390	***	ROMULAN distance
-75.716577	***	Nearest Alien
NUB		Communications
1.788384	***	NUBIAN Co-ordinates
78.083084	***	
	XEQ "TTB"	Transport/Tractor
NUB		NUBIAN in tow
I/T		
-78.083084	***	ENTERPRISE Co-ord
335.482390	***	ROMULAN distance
-75.716577	***	Nearest Alien
-78.083084	***	ENTERPRISE Co-ord
5.000000	ENTER↑	Course change
-156.000000	ENTER↑	entered
-17.000000		
	XEQ "CHN"	
332.893768	***	ROMULAN distance
-71.805292	***	Nearest Alien
ATK		Under Attack
-73.081082	***	ENTERPRISE Co-ord
0.0030	***	Ship I.D.(s)
3.0000		I.D. Confirmed
CK		Cloak deployed
33.0000	***	Distance rounded-off
33.00000000	***	Status Report
99.00000000		Shield value entered
33.00900099	***	Status Report

STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
	33.00900099	***	Status Report
	33.00900099	***	repeated
	33.00900099	***	
	-73.081082	***	ENTERPRISE Co-ordinate
	77.060057	***	ROMULAN Co-ordinates
	XEQ "WPN"		Weapons Initialized
	-73.081082	***	ENTERPRISE Co-ordinate
	-78.000000	ENTER↑	Theta angle entered
	-45.000000		Phi angle entered
	XEQ "PHT"		Photon Torps fired
	33.01701199	***	Status Report
	XEQ "WPN"		Weapons Initialized
	-73.081082	***	ENTERPRISE Co-ordinate
	-70.000000	ENTER↑	Theta angle entered
	-40.000000		Phi angle entered
	XEQ "PHT"		Photon Torps fired
	33.02701299	***	Status Report
	XEQ "WPN"		Weapons Initialized
	-73.081082	***	ENTERPRISE Co-ordinate
	-88.000000	ENTER↑	Theta angle entered
	-58.000000		Phi angle entered
	XEQ "PHT"		Photon Torps fired
	33.03602599	***	Status Report
	XEQ "WPN"		Weapons Initialized
	-73.081082	***	ENTERPRISE Co-ordinate
	-88.000000	ENTER↑	Theta angle entered
	-40.000000		Phi angle entered
	XEQ "PHT"		Photon Torps fired
	33.04403899	***	Status Report
	XEQ "WPN"		Weapons Initialized
	-73.081082	***	ENTERPRISE Co-ordinate
	-70.000000	ENTER↑	Theta angle entered
	-40.000000		Phi angle entered
	XEQ "PHT"		Photon Torps fired
	33.05403999	***	Status Report
	XEQ "WPN"		Weapons Initialized
	-73.081082	***	ENTERPRISE Co-ordinate
	-88.000000	ENTER↑	Theta angle entered
	-50.000000		Phi angle entered
	XEQ "PHT"		Photon Torps fired
	33.06007199	***	Status Report
	XEQ "WPN"		Weapons Initialized
	-73.081082	***	ENTERPRISE Co-ordinate
	-88.000000	ENTER↑	Theta angle entered
	-50.000000		Phi angle entered
	XEQ "PHT"		Photon Torps fired
	-86	***	Correct Theta angle
	-49	***	Correct Phi angle
	3	***	ROMULAN destroyed

☐ 67 ☐ 97 ☑ 41C "PRINTER" Version of Game Example on Page 13-17 (Continued)

STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
	-73.081082	***	ENTERPRISE Co-ord
	-71.805292	***	Nearest Alien
	-73.081082	***	ENTERPRISE Co-ord
	XEQ "LRTS"		LRTS deployed
	311	***	Mission Sector
	-71.805292	***	Nearest Alien
	-73.081082	***	ENTERPRISE Co-ord
	99.000000	ENTER↑	Course change
	-99.060000	ENTER↑	entered
	-45.050000		
	XEQ "CHN"		
	409.273619	***	VALLICIAN distance
	-50.882217	***	Nearest Alien
ATK			Under Attack
	-61.011011	***	ENTERPRISE Co-ord
	0.0004	***	Ship I.D.(s)
	4.0000		I.D. Confirmed
	9.0000	***	Distance rounded-off
	9.00000000	***	Status Report
	99.00000000		Shield value entered
	9.02200099	***	Status Report
	9.02200099	***	repeated
	9.02200099	***	
	9.02200099	***	
	-61.011011	***	ENTERPRISE Co-ord
	66.016017	***	VALLICIAN Co-ord
	XEQ "WPN"		Weapons Initialized
	-61.011011	***	ENTERPRISE Co-ord
	45.000000	ENTER↑	Theta angle entered
	40.000000		Phi angle entered
	XEQ "PHS"		Phasers fired
	9.02408899	***	Status Report
	XEQ "WPN"		Weapons Initialized
	-61.011011	***	ENTERPRISE Co-ord
	45.000000	ENTER↑	Theta angle entered
	40.000000		Phi angle entered
	XEQ "PHS"		Phasers fired
	45	***	Correct Theta angle
	40	***	Correct Phi angle
	4	***	VALLICIAN destroyed
	-61.011011	***	ENTERPRISE Co-ord
	-50.882217	***	Nearest Alien
	-61.011011	***	ENTERPRISE Co-ord
	XEQ "LRTS"		LRTS deployed
	331	***	Mission Sector
	-50.882217	***	Nearest Alien
	-61.011011	***	ENTERPRISE Co-ord
	51.000000	ENTER↑	Course changed
	88.880000	ENTER↑	entered
	1.120000		
	XEQ "CHN"		
	209.433981	***	KLINGON distance
	-1000.000000	***	No remaining Aliens
ATK			Under Attack
	-61.061011	***	ENTERPRISE Co-ordinates
	0.0200	***	Ship I.D.(s)
	2.0000		I.D. Confirmed
	9.0000	***	Distance rounded-off
	9.00000000	***	Status Report
	99.00000000		Shield value entered
	9.04300099	***	Status Report
	9.04300099	***	repeated
	9.04300099	***	
	9.04300099	***	
	-61.061011	***	ENTERPRISE Co-ordinates
	53.061016	***	KLINGON Co-ordinates
	XEQ "WPN"		Weapons Initialized
	-61.061011	***	ENTERPRISE Co-ordinates
	180.000000	ENTER↑	Theta angle entered
	32.000000		Phi angle entered
	XEQ "PHS"		Phasers fired
	9.05608899	***	Status Report
	XEQ "WPN"		Weapons Initialized
	-61.061011	***	ENTERPRISE Co-ord tes
	180.000000	ENTER↑	Theta angle entered
	32.000000		Phi angle entered
	XEQ "PHS"		Phasers fired
	180	***	Correct Theta angle
	32	***	Correct Phi angle
	2	***	KLINGON destroyed
	-61.061011	***	ENTERPRISE Co-ordinates
	-1000.000000	***	No Aliens left
	-61.061011	***	ENTERPRISE Co-ordinates
	80.000000	ENTER↑	Course change entered
	-135.000000	ENTER↑	
	-7.270000		
	XEQ "CHN"		
	-1000.000000	***	No Aliens left
	-4.004000	***	ENTERPRISE Co-ordinates
	XEQ "DOC"		Docking maneuver
DCKD			Docked at STARBASE
GAME OVER			Game Over. See
FUEL = 7936			Page 17
	00		

Note: Refer to "HP-41C OWNER'S HANDBOOK AND PR... 67 or 97 "OWNER'S HANDBOOK AND PROGRAM... ...function index is found at the very back of the Handbook. Refer to Appendix E in

PROGRAM LISTING

☐ 67 ☐ 97 ☑ 41C

"PRINTER" Version of Game Example on Page 18-20
NOTE Program change required to duplicate below results

STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
	.3570148692		Seed entered
		XEQ "SD"	
	444	***	Mission Sector
	-70.007142	***	Nearest Alien
	0.000000	***	STARBASE
	1+03	STO 01	1000 Stored in
		STO 02	Registers 1,2,&4
		STO 04	
		RCL 03	ROMULAN Co-ordinates
			with place-holders
	177.160157	***	MANUAL PRINT
	100.100100	-	Subtract place-holders
	77.060057	***	ROMULAN Co-ordinates
			MANUAL PRINT
	93.000000	ENTER↑	Course change entered
	37.930000	ENTER↑	
	30.280000		
		XEQ "CHN"	
	320.928450	***	ROMULAN distance
	-1000.000000	***	No Aliens left
ATK			Under Attack
	63.049046	***	ENTERPRISE Co-ord
	0.0030	***	Ship I.D.(s)
	3.0000		I.D. Confirmed
CK			Cloak deployed
	21.0000	***	Distance rounded-off
	21.00000000	***	Status Report
	85.00000000		Shield value entered
	21.01900085	***	Status Report
	21.01900085	***	repeated
	21.01900085	***	
	21.01900085	***	
	-63.049046	***	ENTERPRISE Co-ordinates
	77.060057	***	ROMULAN Co-ordinates
		XEQ "WPN"	Weapons Initialized
	-63.049046	***	ENTERPRISE Co-ordinates
	38.000000	ENTER↑	Theta angle entered
	32.000000		Phi angle entered
		XEQ "PHT"	Photon Torps fired
	21.03602685	***	Status Report
		XEQ "WPN"	Weapons Initialized
	-63.049046	***	ENTERPRISE Co-ordinates
	29.000000	ENTER↑	Theta angle entered
	23.000000		Phi angle entered
		XEQ "PHT"	Photon Torps fired
	21.05902885	***	Status Report
		XEQ "WPN"	Weapons Initialized
	-63.049046	***	ENTERPRISE Co-ordinates
	47.000000	ENTER↑	Theta angle entered
	41.000000		Phi angle entered
		XEQ "PHT"	Photon Torps fired
N/S			SHIELDS DESTROYED
SNS U/S			SENSORS U/S
	21.08700000	***	Status Report
	21.08700000	***	" "
		XEQ "PST"	
A/T/F			Corbomite Maneuver
	63.049046	***	Alien retreated
SNS U/S			ENTERPRISE Co-ordinates
	-57.175169	***	Sensors U/S
	63.049046	***	Nearest Alien(ROMULAN)
	90.000000	ENTER↑	ENTERPRISE Co-ordinates
	-142.130000	ENTER↑	Course change entered
	-29.960000		
		XEQ "CHN"	
SNS U/S			Sensors U/S
	-97.642204	***	Nearest Alien(ROMULAN)
	1.001001	***	ENTERPRISE Co-ordinate
		XEQ "DOC"	Docking Maneuver
DCKD			Docked at STARBASE
SNS OK			SENSORS REPAIRED
	0.000000	***	STARBASE
	-99.100959	***	Nearest Alien(ROMULAN)
	0.000000	***	STARBASE(ENTERPRISE)

80

90

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Note: Refer to "HP-41C OWNER'S HANDBOOK AND PROGRAMMING GUIDE" for information on ... function index is found at the very back of the Handbook. Refer to Appendix E in ... 67 or 97 "OWNER'S HANDBOOK AND PROGRAMMING GUIDE".

FOR "NON-PRINT" VERSION

SIZE: (HP-41C) 034

STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
01	If you do not have a Card Reader, go to			
	Step # 14 for loading by hand.			
02	Configure calculator with 3 Memory Modules			
	& Card Reader. Turn and leave in "RUN"			
	Mode.			
03	Load "NON-PRINT" program by inserting all			
	9 "WALL" cards(17 sides). Turn off.			
04	Replace Card Reader with 4th Memory			
	Module. Turn back on, leaving in "RUN"			
	Mode for next few steps.			
05	Execute SIZE "000".	"XEQ" ALPHA "SIZE" ALPHA		"000"
06	Execute GTO ".906".	"GTO" ".906"		
07	Switch caculator to "PRGM" Mode.			
08	Execute "END".	"XEQ" ALPHA "END" ALPHA		
09	Execute GTO ".055".	"GTO" ".055"		
10	Turn to P.36-38. Starting with Line 056,			
	finish rest of "SECTOR/COURSE/WEAPONS			
	ANGLES COMPUTOR" program by hand. Be			
	careful that correct "XEQ" &/or "ALPHA's"			
	used, otherwise program will not work.			
11	Switch to "RUN" Mode. Execute "PACK".	"XEQ" ALPHA "PACK" ALPHA		PACKING
12	Execute SIZE "034".	"XEQ" ALPHA "SIZE" ALPHA		"034"
13	Switch to "USER" Mode. See instruction			
	on how to play "STAR TREK".			
14	Hand loading. Configure calculator with			
	4 Memory Modules. Turn on and switch to			
	"RUN" Mode and execute SIZE "000"	"XEQ" ALPHA "SIZE" ALPHA		"000"

USER INSTRUCTIONS

FOR "NON-PRINT" VERSION (CONTINUED)

SIZE: (HP-41C) 034

STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
15	Switch to "PRGM" Mode. From P.25-35			
	CAREFULLY load STAR TREK program. After			
	Line 906, execute "END", then got to P.	"XEQ"	ALPHA "END" ALPHA	
	36-38, CAREFULLY load "SCWAC" program.			
	Be extra careful that you use the correct	"ASN"	ALPHA "CHN" ALPHA	"Σ+"
	"XEQ" &/or "ALPHA's", otherwise program	"ASN"	ALPHA "STD" ALPHA	"Σ-"
	will not work. Calculator will stop from	"ASN"	ALPHA "SNS" ALPHA	"1/x"
	time to time to PACK program, due to its	"ASN"	ALPHA "WPN" ALPHA	"y^x"
	length. Refer to manual if you have any	"ASN"	ALPHA "PHS" ALPHA	"$\sqrt{x}$"
	problems with loading programs correctly.	"ASN"	ALPHA "DOC" ALPHA	"x^2"
16	Switch to "RUN" Mode. Using information	"ASN"	ALPHA "PHT" ALPHA	"LOG"
	Pages 9,51,&52, Assign program labels to	"ASN"	ALPHA "LRTS" ALPHA	"10^x"
	specified keys.	"ASN"	ALPHA "TTB" ALPHA	"LN"
17	After completion of Key Assignments,	"ASN"	ALPHA "SD" ALPHA	"e^x"
	execute "PACK".	"ASN"	ALPHA "CCS" ALPHA	"x<>y"
18	Once PACKING completed, execute SIZE "034".	"ASN"	ALPHA "CCP" ALPHA	"R↓"
19	Switch to "USER" mode. See instruction	"ASN"	ALPHA "CCW" ALPHA	"SIN"
	on how to play "STAR TREK".	"ASN"	ALPHA "PST" ALPHA	"TAN"
		"XEQ"	ALPHA "PACK" ALPHA	PACKING
		"XEQ"	ALPHA "SIZE" ALPHA	"034"

FOR "PRINTER" VERSION Set Printer to "NORM" Mode

SIZE: (HP-41C) 026

STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
01	If you do not have a Card Reader, go to			
	Step # 6, for loading by hand.			
02	Configure calculator with 3 Memory Modules			
	and Card Reader. Turn on and leave it in			
	"RUN" Mode.			
03	Load "WITH PRINTER" program by passing			
	all 9 "WALL" cards(17 sides) through the			
	Card Reader. Turn off calculator.			
04	Replace Card Reader with Printer.			
05	Turn back on, switch to "USER" Mode. See			
	instructions on how to play "STAR TREK".			
06	Hand loading. Configure calculator with			
	3 Memory Modules and Printer. Turn on.			
07	In "RUN" Mode, execute SIZE "000".	"XEQ" ALPHA "SIZE" ALPHA "000"		
08	Switch to "PRGM" Mode. Turn to P.38-48.			
	CAREFULLY load "PRINTER" program by hand.	"ASN" ALPHA "CHN" ALPHA "Σ+"		
	Be careful that you use the correct "XEQ"	"ASN" ALPHA "STD" ALPHA "Σ-"		
	&/or "ALPHA's", otherwise program will	"ASN" ALPHA "SNS" ALPHA "1/x"		
	not work. Calculator may, from time to	"ASN" ALRAH "WPN" ALPHA "y^x"		
	time, stop to PACK program. Refer to	"ASN" ALPHA "PHS" ALPHA "$\sqrt{x}$"		
	manual, if you have any problems.	"ASN" ALPHA "DOC" ALPHA "x^2"		
09	Switch to "RUN" Mode. See Pages, 9,51,&53.	"ASN" ALPHA "PHT" ALPHA "LOG"		
	Assign program labels to specified keys.	"ASN" ALPHA "LRTS" ALPHA "10^x"		
10	After completion of Key Assignments,	"ASN" ALPHA "TTB" ALPHA "LN"		
	execute "PACK".	"ASN" ALPHA "SD" ALPHA "e^x"		
11	Execute SIZE "026".	"ASN" ALPHA "PST" ALPHA "TAN"		
12	Switch to "USER" Mode. Go to Step # 5.	"XEQ" ALPHA "PACK" ALPHA		PACKING
		"XEQ" ALPHA "SIZE" ALPHA "026"		

USER INSTRUCTIONS

FOR "PRINTER" VERSION - MODIFICATIONS Set Printer to "NORM" Mode

SIZE: (HP-41C) 026

STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
01	Use following steps if you wish to have Status Report to Print-Out *NOTE* This change required to duplicate Printed Example which follows Playing Instructions			
02	Follow Steps 01 - 05, Page 23 of 53.			
03	In "RUN" Mode, execute SIZE "025"	"XEQ"	ALPHA "SIZE" ALPHA "025"	
04	In "PRGM" Mode, make following changes to "PRINTER" program.			
05	Go to line 499 and delete "BEEP".	"GTO"	".499" "←" "SST" "SST"	
06	In LBL 24, after CF 22, insert "PRX".	"XEQ"	ALPHA "PRX" ALPHA	
	NOTE This change easier through use of Printer just by pressing "PRINT" key	This step will only work if printer is plug into port.		
07	Switch back to "USER" Mode and execute "PACK"	"XEQ"	ALPHA "PACK" ALPHA	
08	Execute SIZE "026", then go to instructions on how to play "STAR TREK"	"XEQ"	ALPHA "SIZE" ALPHA "026"	
	NOTE One should not use Flag 12 to double size of display as still will use up more then double the amount of paper and it also makes it more difficult to input entries.			XEQ "PST" DTG 3.000000 *** 2.000000 *** 1.000000 *** YOU BLEW IT XEQ "SNS" -99.100959 *** 0.000000 *** RCL 03 148.111186 *** 100.100100 - 48.011086 *** YOU CAN FINISH

USER INSTRUCTIONS

FOR "PRACTICE FIRING RANGE"

SIZE: (HP-41C) 026

STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
01	Configure calculator with Card Reader. No extra Memory Modules required. Using the 2 cards, load program by passing 3 sides through Card Reader. Card Reader can be left attached, but not necessary.			
02	Leave calculator in "RUN" Mode. First execute "PACK", then SIZE "026".	"XEQ" ALPHA "PACK" ALPHA "XEQ" ALPHA "SIZE" ALPHA		"026"
03	Refer to Pages 7 & 8 for instructions on how to use program.			
04	Hand loading. See Pages 48 to 50 for Program Listing. CAREFULLY load this program paying close attention to seeing that correct "XEQ" &/or "ALPHA's" are used. Refer to manual for instructions if not sure about entries. In "PRGM" Mode.			
05	Switch to "RUN" Mode. First execute "PACK" then SIZE "026".	"XEQ" ALPHA "PACK" ALPHA "XEQ" ALPHA "SIZE" ALPHA		"026"
06	Go to Step # 3.			

PROGRAM LISTING

☐ 67 ☐ 97 ☑ 41C "NON-PRINT" VERSION

STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
01	LBL "SD"		"SEED"
02	CLRG		
03	CLA		INITIALIZE
04	CF 00		
05	SF 25		ERROR PROTECTION
06	STO 00		STORE "SEED:
07	4		
08	STO 25		COUNTER CONTROL
09	1		
10	STO 07		SET DAMAGES OFF
11	LBL 00		
12	6		
13	STO 06		
14	STO 20		
15	RCL 25		
16	INT		
17	1		
18	X=Y?		NUBIAN CO-ORDINATES?
19	SF 00		SF TO STORE IN R_{09}
20	LBL 01		
21	XEQ 04		
22	1 E2		
23	*		
24	INT		
25	STO 21		
26	FS? 00		NUBIAN?
27	XEQ 05		YES-ADD TO R_{09}
28	RCL 21		
29	1 E2		
30	+		RANDOM CO-ORDINATES
31	RCL 06		
32	10↑X		
33	/		POSITION
34	ST+ IND 25		CO-ORDINATE
35	3		
36	ST- 06		
37	RCL 06		
38	0		
39	X<=Y?		
40	GTO 01		NEW CO-ORDINATE
41	RCL 25		ADD I.D. OF SHIP
42	INT		
43	FS? 00		NUBIAN?
44	ST+ 09		ADD I.D. OF NUBIAN
45	1 E7		
46	/		
47	ST+ IND 25		
48	DSE 25		
49	GTO 00		NEW SHIP
50	-250		SET FUEL = -250
51	STO 06		SO THAT FIRST USE
52	LBL "LRTS"		OF LRTS COSTS NO FUEL.
53	LBL 02		"LONG RANGE TRACKING SYSTEM"
54	XEQ 04		RANDOM NUMBER
55	4		
56	*		
57	1		
58	+		
59	INT		
60	STO 25		
61	RCL IND 25		RANDOM SHIP
62	1 E3		
63	X=Y?		ALREADY DESTROYED?
64	GTO 02		NEW RANDOM SHIP
65	RDN		
66	X<0?		TOWED NUBIAN?
67	GTO 02		NEW RANDOM SHIP
68	STO 20		
69	CLX		
70	STO 21		
71	3		
72	STO 25		
73	LBL 03		
74	RCL 20		
75	INT		
76	1 E2		
77	-		
78	25		
79	/		
80	1		
81	+		
82	INT		
83	RCL 25		
84	1		
85	-		
86	10↑X		
87	*		POSITION IN MISSION
88	RCL 21		SECTOR

Note: Refer to "HP-41C OWNER'S HANDBOOK AND PROGRAMMING GUIDE" for specific information on keystrokes. The Function Index is found at the very back of the Handbook. Refer to Appendix E in 67 or 97 "OWNER'S HANDBOOK AND PROGRAMMING GUIDE" for exact keystrokes.

PROGRAM LISTING

☐ 67 ☐ 97 ☑ 41C "NON-PRINT" VERSION

STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
89	+		
90	STO 21		
91	RCL 20		
92	FRC		
93	1 E3		
94	*		
95	STO 20		
96	DSE 25		
97	GTO 03		
98	250		
99	ST+ 06		ADD 250 TO FUEL
100	FIX 0		"MISSION SECTOR"
101	BEEP		
102	RCL 21		
103	PSE		
104	GTO "SNS"		
105	*LBL 04		RANDOM NUMBER
106	RCL 00		GENERATOR
107	PI		
108	+		
109	5		
110	Y↑X		
111	FRC		
112	STO 00		NEW SEED
113	RTN		
114	*LBL 05		
115	RCL 20		
116	10↑X		
117	/		
118	ST+ 09		NUBIAN CO-ORDINATES
119	RCL 20		
120	2		
121	−		
122	STO 20		RESET COUNTER
123	RDN		
124	RTN		
125	*LBL "CHN"		"COURSE CHANGE"
126	STO 16		φ
127	RDN		
128	STO 22		θ
129	X<>Y		
130	STO 14		R
131	RCL 16		φ
132	SIN		SIN φ
133	RCL 14		R
134	*		R.SIN φ
135	STO 11		ΔZ
136	RCL 16		φ
137	COS		COS φ
138	RCL 14		R
139	*		R.COS φ
140	STO 16		
141	RCL 22		θ
142	SIN		SIN θ ·
143	RCL 16		R.COS φ
144	*		R.COS φ SIN θ
145	STO 12		ΔY
146	RCL 22		θ
147	COS		COS θ
148	RCL 16		R.COS φ
149	*		R.COS φ COS θ
150	STO 13		ΔX
151	*LBL "STD"		"COURSE - STEADY"
152	FIX 6		
153	XEQ 12		CHECK FOR SHIPS IN
154	13.01		VICINITY
155	STO 25		COUNTER CONTROL
156	RCL 01		NUBIAN
157	0		
158	STO 16		
159	STO 17		
160	X>Y?		NUBIAN TOWED?
161	1		YES-FUEL COST=6xR
162	ENTER↑		NO -FUEL COST=5xR
163	5		
164	+		
165	RCL 14		
166	*		FUEL COST
167	INT		
168	ST+ 06		
169	RCL 05		
170	RDN		
171	*LBL 06		
172	R↑		
173	ENTER↑		
174	FRC		
175	1 E3		
176	*		

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PROGRAM LISTING

☐ 67 ☐ 97 ☑ 41C "NON-PRINT" VERSION

STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
177	X<>Y		
178	INT		
179	RCL IND 25		
180	+		
181	INT		NEW CO-ORDINATE
182	X<0?		
183	GTO 14		
184	1 E2		
185	X<=Y?		
186	GTO 14		
187	X<>Y		
188	RCL 16		
189	10↑X		
190	/		
191	ST+ 17		
192	3		
193	ST+ 16		
194	DSE 25		
195	GTO 06		
196	RCL 17		NEW ENTERPRISE
197	STO 05		CO-ORDINATES
198	◆LBL "SNS"		SENSOR PROBE
199	CLX		
200	STO 08		
201	RCL 00		
202	PI		
203	+		
204	5		
205	Y↑X		
206	FRC		
207	STO 00		
208	RCL 07		DAMAGE REGISTER
209	X=0?		DAMAGES?
210	XEQ 45		"SNS U/S"
211	FIX 6		
212	1 E3		
213	STO 18		
214	R↑		RANDOM NUMBER
215	4		
216	*		
217	1		
218	+		
219	INT		
220	STO 10		
221	STO 21		
222	◆LBL 07		
223	RCL 10		
224	STO 25		
225	RCL IND 25		ALIEN CO-ORDINATES 1XX.1YY1ZZ
226	RCL 05		ENTERPRISE CO-ORDINATES $XX_\varepsilon.OYY_\varepsilon OZZ_\varepsilon$
227	-		
228	3		
229	STO 25		
230	CLX		
231	STO 17		
232	RDN		
233	◆LBL 08		
234	ENTER↑		
235	INT		
236	1 E2		C = X,Y,or Z
237	-		$C - C_\varepsilon$
238	X↑2	→	$(C- C_\varepsilon)^2$
239	ST+ 17		
240	RDN		
241	FRC		
242	1 E3		
243	*		
244	DSE 25		
245	GTO 08		
246	STO 23		I,D.
247	RCL 17		$(X-X_\varepsilon)^2+(Y-Y_\varepsilon)^2+(Z-Z_\varepsilon)^2$
248	SQRT		DISTANCE
249	STO 16		$D=\sqrt{(\Delta X)^2+(\Delta Y)^2+(\Delta Z)^2}$
250	40		
251	X>Y?		ALIEN < 40?
252	GTO 09		YES
253	CLX		
254	RCL 18		
255	X>Y?		
256	X<>Y		
257	STO 18		SMALLEST D ≥ 40
258	GTO 11		
259	◆LBL 09		
260	CLX		
261	35		
262	X<=Y?		CLOSE ENOUGH FOR BATTLE
263	GTO 10		NO
264	RCL 10		SHIP I.D.
265	ENTER↑		
266	10↑X		

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PROGRAM LISTING

☐ 67 ☐ 97 ☑ 41C "NON-PRINT" VERSION

STEP/ LINE	KEY CODE (67/97 only)	COMMENTS
267 /		
268 ST+ 08		ADD TO "SHIP IN VICINITY" REGISTER
269◆LBL 10		DISPLAY DISTANCE
270 XEQ 13		WITH/OR WITHOUT I.D.
271◆LBL 11		
272 ISG 10		INCREMENT R_{10}
273 PSE		
274 5		
275 RCL 10		R_{10} = 5?
276 X=Y?		
277 1		YES - SET IT TO"1"
278 STO 10		
279 RCL 21		VALUE MARKING END OF LOOP
280 X≠Y?		
281 GTO 07		MAXIMUM DISTANCE CAN
282 171		TRAVEL IN CUBE
283 RCL 18		SMALLEST D ≥ 40
284 X>Y?		D > 171?
285 1 E3		YES- NO SHIPS LEFT
286 CHS		DISPLAY WITH MINUS
287 BEEP		SIGN
288 PSE		
289 XEQ 12		CHECK FOR SHIP IN
290 GTO 14		VICINITY
291◆LBL 12		
292 RCL 08		
293 X=0?		SHIPS IN VICINITY ?
294 RTN		NO SHIPS AROUND
295 .1		RETURN
296 X<=Y?		NUBIAN IN VICINITY?
297 XEQ 44		"NUBIAN"
298 .1		NO NUBIAN
299 X=Y?		UNDER ATTACK?
300 XEQ 48		"UNDER ATTACK" YES
301 CLX		SF 03
302 RDN		
303 X>0?		NUBIAN IN VICINITY?
304 GTO 14		NO - GO TO DISPLAY
305 RCL 09		YES - SHOW NUBIAN
306 STO 23		CO-ORDINATES
307 CLX		
308 STO 16		
309◆LBL 13		
310 RCL 07		DISPLAY NUBIAN
311 X≠0?		CO-ORDINATES OR"0"
312 RCL 23		SENSORS ON?
313 RCL 16		I.D./NUBIAN CO-ORDINATI
314 +		DISTANCE/0
315 BEEP		DEPENDS ON "SNS"
316 PSE		
317 PSE		
318 RTN		
319◆LBL 14		
320 CF 04		
321 FIX 6		
322 RCL 01		
323 ENTER↑		
324 ABS		
325 /		
326 RCL 05		NUBIAN TOWED? IF YES
327 *		(R_{01}<0)MAKES ENTERPRISE
328 BEEP		NEGATIVE
329 PSE		
330 FS? 03		INDICATES UNDER
331 GTO "ALT "		ATTACK
332 RTN		
333◆LBL "ALT "		"BATTLE ALERT"
334 CF 03		
335 SF 00		
336 FIX 4		
337 RCL 08		SHIPS IN VICINITY
338 10		
339 *		
340 INT		
341 X=0?		NUBIAN IN VICINITY?
342 GTO 15		NO
343 XEQ 44		YES - "NUBIAN"
344 CHS		
345◆LBL 15		
346 RCL 07		DAMAGES?
347 X=0?		
348 GTO 21		YES
349 RCL 08		SHIPS IN VICINITY
350 BEEP		
351 PSE		
352◆LBL 16		

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PROGRAM LISTING

☐ 67 ☐ 97 ☐ 41C "NON-PRINT" VERSION

STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
353	BEEP		
354	PSE		
355	FS? 22		SHIP CHOSEN?
356	GTO 17		YES - LEAVE LOOP
357	GTO 16		
358	◆LBL 17		
359	INT		
360	ABS		
361	5		CHECK FOR ERROR
362	X<=Y?		INPUT
363	GTO 15		
364	X<>Y		
365	1		ONLY "2,3,or4" CAN
366	X<>Y		BE USED. IF NOT
367	X<=Y?		ONE OF THESE I.D.
368	GTO 15		REPEAT "I.D.'s"
369	STO 10		SHIP I.D.
370	STO 25		
371	RCL IND 25		
372	RCL 05		
373	X<>Y		
374	STO 15		
375	X<>Y		
376	-		
377	13.01		
378	STO 25		COUNTER
379	CLX		
380	STO 18		
381	RDN		
382	◆LBL 18		DETERMINE DISTANCE
383	ENTER↑		
384	INT		
385	1 E2		
386	-		
387	STO IND 25		
388	X↑2		
389	ST+ 18		
390	RDN		
391	FRC		
392	1 E3		
393	*		
394	DSE 25		
395	GTO 18		
396	RCL 18		
397	SQRT		DISTANCE TO ALIEN
398	STO 18		
399	RCL 12		ΔY
400	RCL 13		ΔX
401	R-P		
402	RDN		
403	STO 16		θ
404	RCL 11		ΔZ
405	RCL 18		D
406	/		ΔZ/D
407	ASIN		
408	STO 17		ϕ
409	RCL 15		
410	100.1001		
411	-		
412	STO 15		ALIEN CO-ORDINATES
413	RCL 10		I.D.
414	ENTER↑		
415	10↑X		
416	/		SUBTRACT FROM SHIPS
417	ST- 08		IN VICINITY
418	RCL 10		I.D.
419	STO 11		
420	3		
421	X≠Y?		ROMULAN VESSEL?
422	GTO 19		NO
423	"CLOAK"		"CLOAK" BEING USED
424	FS? 00		SNS DAMAGED?
425	XEQ 49		NO- "CLOAK" DISPLAYED
426	CLA		YES - NO DISPLAY
427	XEQ 20		Δ θ
428	ST+ 16		
429	ABS		
430	XEQ 20		Δ ϕ
431	ST+ 17		
432	ABS		TOTAL ANGULAR CHANGE
433	+		DUE CLOAKING DEVICE
434	.15		DETERMINE CHANGE IN
435	*		I.D. TO LESSEN BRUNT
436	.21		OF ROMULAN ATTACK
437	-		
438	INT		
439	ST+ 11		
440	◆LBL 19		
441	RCL 18		DISTANCE
442	FIX 0		
443	RND		

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PROGRAM LISTING

☐ 67 ☐ 97 ☑ 41C "NON-PRINT" VERSION

STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
444	FIX 4		
445	BEEP		DISPLAY DISTANCE
446	PSE		THEN GO TO
447	PSE		"SHIELDS"
448	GTO "SHD"		
449	◆LBL 20		Δ θ OR Δ ϕ
450	RCL 00		
451	PI		
452	+		
453	5		
454	Y↑X		
455	FRC		
456	STO 00		
457	20		
458	*		
459	10		
460	−		
461	INT		
462	RTN		
463	◆LBL 21		SENSORS DAMAGED
464	CF 00		
465	XEQ 45		"SNS U/S"
466	GTO 17		
467	◆LBL "SHD"		"SHIELDS"
468	CF 00		
469	SF 02		
470	1 E2		
471	STO 24		
472	CLX		
473	STO 20		
474	STO 13		
475	STO 14		
476	12		
477	STO 12		
478	◆LBL 22		
479	CF 01		
480	RCL 18		DISTANCE
481	FIX 0		
482	RND		
483	FIX 8		
484	RCL 13		S_ε
485	1 E3		
486	/		
487	+		DD.OS$_\varepsilon$S$_\varepsilon$
488	RCL 07		
489	STO 19		DAMAGES?
490	X=0?		
491	XEQ 45		SENSORS DAMAGED?
492	RCL 14		YES - "SNS U/S"
493	*		S_α IF SNS DAMAGED
494	1 E6		$S_\alpha = 0$
495	/		
496	+		DD.OS$_\varepsilon$S$_\varepsilon$OS$_\alpha$S$_\alpha$
497	RCL 20		
498	1 E8		SHIELDS
499	/		
500	+		DD.OS$_\varepsilon$S$_\varepsilon$OS$_\alpha$S$_\alpha$SS
501	◆LBL 23		
502	FS? 04		ENEMY DESTROYED?
503	GTO "PST"		YES - GO TO "POST"
504	4		
505	FS? 00		BATTLE NOT BEGUN
506	10↑X		OR OVER?
507	STO 25		YES - BLINKS FOREVER
508	RDN		IN MIDDLE OF BATTLE
509	BEEP		BLINK STATUS 4 TI ;
			ONLY
510	◆LBL 24		
511	CF 22		
512	PSE		
513	FS? 22		SHIELD VALUE INPUT?
514	GTO 27		YES - RESET
515	DSE 25		
516	GTO 24		
517	◆LBL "WPN"		"WEAPONS INITIALIZATION"
518	RCL 18		DISTANCE
519	35		
520	X>Y?		ENEMY < 35 UNITS?
521	GTO 25		YES - CONTINUE FIRING
522	XEQ 47		NO -"TOO FAR AWAY"
523	GTO "SNS"		THEN GO TO "SNS"
524	◆LBL 25		
525	CF 00		
526	FIX 6		
527	RCL 12		DECREMENT FIRING

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PROGRAM LISTING

☐ 67 ☐ 97 ☑ 41C

"NON-PRINT" VERSION

STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
528	2		TIME COUNTER
529	-		
530	X≠0?		
531	STO 12		
532	RCL 12		
533	STO 25		
534	◆LBL 26		
535	RCL 05		ENTERPRISE's
536	CHS		CO-ORDINATES
537	XEQ 28		"DISPLAY"
538	RCL 15		ALIEN CO-ORDINATES
539	XEQ 28		"DISPLAY"
540	GTO 26		
541	◆LBL 27		RESET SHIELDS
542	RCL 24		NEW VALUE MUST BE
543	X<=Y?		LESS THAN 100.
544	GTO 23		
545	X<>Y		
546	STO 20		
547	FS? 02		FIRST TIME AROUND?
548	GTO 29		YES - ALIEN FIRE
549	RCL 13		
550	RCL 13		
551	GTO 30		
552	◆LBL 28		DISPLAY ROUTINE
553	BEEP		
554	PSE		
555	PSE		
556	PSE		
557	DSE 25		
558	GTO 31		
559	GTO 29		
560	◆LBL "PHT"		PHOTON TORPEDOES
561	SF 01		
562	◆LBL "PHS"		PHASERS
563	RCL 17		φ
564	-		Δ φ
565	ABS		
566	X<>Y		
567	RCL 16		θ
568	-		Δ θ
569	ABS		
570	+		|Δ φ| + |Δ θ| = A
571	STO 21		
572	0		
573	FS? 01		PHOTON TORP?
574	5		YES - FUEL= 8xD
575	ENTER↑		
576	3		NO - FUEL= 3xD
577	+		
578	RCL 18		D
579	*		FUEL
580	ST+ 06		
581	2		
582	RCL 21		
583	LN		
584	-.03		-.03 LN(A)
585	*		CHANGE TO -.04 FOR
586	.1		GREATER CHALLENGE
587	+		0.1 -0.03 LN(A)
588	RCL 14		S_α
589	RCL 13		S_ε
590	XEQ 32		
591	FS? 01		TIMES 2 IF PHOTON
592	*		TORPS USED
593	X<0?		
594	GTO 29		
595	INT		$\frac{(.1-.03LN.A(S_\alpha-S_\varepsilon+100)^2}{D}$
596	ST+ 14		
597	RCL 14		
598	RCL 24		
599	X>Y?		
600	GTO 29		
601	-1		ALIEN DESTROYED
602	ST* 15		
603	FIX 0		
604	RCL 16		
605	BEEP		
606	PSE		θ
607	RCL 17		
608	BEEP		
609	PSE		φ
610	RCL 10		I.D.
611	RCL 19		DON'T DISPLAY I.D.
612	*		IF SNS DAMAGED(R_{19}=0)
613	SF 00		
614	SF 04		RESET FLAGS FOR NEXT
615	BEEP		ROUND
616	PSE		I.D. OR "0"

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PROGRAM LISTING

☐ 67 ☐ 97 ☑ 41C "NON-PRINT" VERSION

STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
617	GTO 23		
618	◆LBL 29		
619	RCL 01		NUBIAN TOWED?
620	0		
621	X>Y?		
622	1		YES - FUEL=3xSHIELDS
623	ENTER↑		
624	2		
625	+		NO - FUEL=2xSHIELDS
626	RCL 20		SHIELDS
627	*		FUEL
628	ST+ 06		
629	6		I
630	RCL 11		I.D.(VARIABLE I.D.)
631	−		6 - I
632	1 E4		
633	*		$(6 - I)(10^4)$
634	RCL 13		
635	85		
636	X<=Y?		
637	GTO 50		ENTERPRISE DESTROYED
638	CLX		IF SHIELDS OUT
639	RCL 14		"YOU BLEW IT"
640	XEQ 32		
641	RCL 20		$\frac{(6-I)(10^4)(S_\varepsilon - S_\alpha + 100)^2}{D}$
642	10		
643	*		10 x SHIELDS
644	X↑2		$(10xS)^2$
645	/		$\frac{(6-I)(10^4)(S_\varepsilon - S_\alpha + 100)^2}{(D)(10xS)^2}$
646	INT		
647	ST+ 13		
648	RCL 13		S_ε
649	RCL 24		
650	X<=Y?		$S_\varepsilon \geq 100$?
651	GTO 50		YES- "YOU BLEW IT"
652	RCL 13		
653	70		
654	X>Y?		$S_\varepsilon > 70$?
655	GTO 30		YES - SNS U/S R_{07}=0
656	CLX		
657	STO 07		
658	◆LBL 30		
659	RCL 13		
660	85		
661	X>Y?		$S_\varepsilon > 85$?
662	GTO 22		
663	CLX		
664	STO 20		
665	"NO SHIELD"		YES- "NO SHIELDS"
666	XEQ 49		
667	GTO 22		
668	◆LBL 31		
669	FS? 22		
670	GTO 28		
671	RTN		
672	◆LBL 32		
673	−		
674	RCL 24		
675	+		
676	X↑2		
677	*		
678	RCL 18		
679	/		
680	RTN		
681	◆LBL "PST"		"POST"
682	SF 00		
683	CF 01		
684	CF 02		
685	CF 04		
686	FIX 6		
687	RCL 15		ALIEN CO-ORDINATES
688	X<0?		LESS THAN O(DESTROYED)?
689	GTO 35		YES - CONTINUE
690	3		NO - CHECK FOR RETREAT
691	STO 25		
692	0		
693	STO 15		
694	RCL 13		S_ε
695	85		
696	X<=Y?		ILLEGAL RETREAT($S_\varepsilon \leq 85$)?
697	GTO 34		NO - CONTINUE
698	"DESTRUCTING"		YES "DESTRUCTING"
699	XEQ 49		
700	◆LBL 33		
701	RCL 25		3 SEC COUNT-DOWN
702	BEEP		
703	PSE		

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PROGRAM LISTING

☐ 67 ☐ 97 ☑ 41C

"NON-PRINT" VERSION

STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
704	DSE 25		
705	GTO 33		
706	GTO 50		
707	◆LBL 34		LEGAL RETREAT. NEW
708	RCL 00		ALIEN CO-ORDINATES
709	PI		
710	+		
711	5		
712	Y↑X		
713	FRC		
714	STO 00		
715	1 E2		
716	*		
717	LASTX		
718	+		
719	INT		CO-ORDINATE
720	RCL 25		
721	1		
722	−		
723	3		
724	*		
725	10↑X		
726	/		
727	ST+ 15		
728	DSE 25		
729	GTO 34		
730	RCL 10		
731	STO 25		
732	1 E7		
733	/		
734	ST+ 15		
735	RCL 15		
736	STO IND 25		REPLACES OLD ALIEN CO-ORDINATES WITH NEW
737	CF 00		ALIEN NOT DESTROYED
738	XEQ 47		"TOO FAR AWAY"
739	GTO 36		
740	◆LBL 35		CHECK FOR SENSOR
741	RCL 07		REPAIRS
742	X≠0?		NO DAMAGES?
743	GTO 36		NONE - CONTINUE
744	RCL 13		S_ε
745	51		
746	X<=Y?		S_ε >50?
747	GTO 36		YES-NO REPAIRS
748	XEQ 46		NO -"SNS REPAIRED"
749	◆LBL 36		
750	RCL 10		I.D.
751	STO 25		
752	1 E3		
753	FS? 00		ALIEN DESTROYED?
754	STO IND 25		YES-STORE 1000
755	RCL 01		
756	ENTER↑		
757	ABS		
758	/		
759	RCL 05		
760	*		
761	BEEP		ENTERPRISE's
762	PSE		CO-ORDINATES
763	GTO "SNS "		
764	◆LBL "TTB "		"TRANSPORTER/TRACTOR BEAM (TTB)"
765	RCL 01		
766	XEQ 40		CHECK "D" TO NUBIAN
767	XEQ 42		D<10?
768	FS? 04		NO "TOO FAR AWAY"
769	GTO 14		
770	RCL 01		YES
771	XEQ 44		"NUBIAN"
772	STO 01		
773	.1		
774	ST− 08		CANCEL FROM SHIPS
775	"IN TOW"		IN VICINITY
776	XEQ 49		"IN TOW"
777	GTO 43		
778	◆LBL "DOC "		"DOCKING & REPAIRS"
779	100.1001		
780	XEQ 40		CHECK "D" TO STARBASE
781	XEQ 42		D<10?
782	FS? 04		NO "TOO FAR AWAY"
783	GTO 14		
784	4		YES
785	STO 00		
786	◆LBL 37		CHECK FOR OTHER
787	RCL 00		ALIENS NEAR STARBASE
788	STO 25		
789	RCL IND 25		

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PROGRAM LISTING

☐ 67 ☐ 97 ☑ 41C "NON-PRINT" VERSION

STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
790	XEQ 40		CHECK "D" TO ALIEN
791	40		OUT OF RANGE
792	X<=Y?		
793	GTO 38		YES - CONTINUE
794	"ALIEN"		"ALIEN"
795	XEQ 49		
796	GTO 43		
797	◆LBL 38		
798	DSE IND 25		
799	1		
800	RCL 00		
801	X≠Y?		ALL ALIENS OUT OF
802	GTO 37		RANGE
803	1 E3		
804	RCL 01		
805	X<0?		NUBIAN TOWED?
806	RDN		
807	STO 01		YES- STORE 1000
808	"DOCKED"		
809	XEQ 49		"DOCKED"
810	CF 00		
811	0		
812	STO 05		ENTERPRISE'S
813	4		CO-ORDINATES(0,0,0)
814	STO 25		
815	RCL 07		
816	X≠0?		DAMAGES?
817	GTO 39		NO - CONTINUE
818	XEQ 46		YES-"SNS REPAIRED"
819	◆LBL 39		
820	RCL IND 25		CHECK FOR GAME OVER
821	1 E3		
822	X≠Y?		GAME OVER?
823	GTO 43		NO - CONTINUE
824	DSE 25		
825	GTO 39		YES
826	"GAME OV ER"		
827	XEQ 49		"GAME OVER"
828	"FUEL US ED"		
829	XEQ 49		"FUEL USED"
830	FIX 0		
831	VIEW 06		FUEL USED
832	CF 02		
833	STOP		
			END
834	◆LBL 40		
835	RCL 05		DISTANCE = D
836	-		
837	3		
838	STO 25		
839	CLX		
840	STO 17		
841	RDN		
842	◆LBL 41		
843	ENTER↑		
844	INT		
845	1 E2		
846	-		
847	X↑2		
848	ST+ 17		
849	RDN		
850	FRC		
851	1 E3		
852	*		
853	DSE 25		
854	GTO 41		
855	RCL 17		
856	SQRT		
857	RTN		
858	◆LBL 42		
859	10		
860	X>Y?		D<10?
861	RTN		YES - RETURN
862	XEQ 47		NO-"TOO FAR AWAY"
863	SF 04		
864	RTN		
865	◆LBL 43		DISPLAY
866	CF 00		
867	FIX 6		
868	RCL 01		
869	ENTER↑		
870	ABS		
871	/		
872	RCL 05		
873	*		
874	BEEP		
875	PSE		

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"NON-PRINT" VERSION

STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
876	GTO "SNS "		
877	◆LBL 44		INDICATES EITHER
878	CHS		COMMUNICATIONS OR
879	"NUBIAN"		TTB USED SUCCESSFULLY
880	GTO 49		
881	◆LBL 45		
882	"SNS U/S "		INDICATES SENSORS SYSTEM DAMAGED
883	GTO 49		
884	◆LBL 46		
885	1		
886	STO 07		INDICATES SENSORS
887	"SNS REP AIRED"		SYSTEM REPAIRED
888	GTO 49		
889	◆LBL 47		
890	"TOO FAR AWAY"		INDICATES TOO FAR AWAY TO "DOCK", USE "TTB"; OR ALIEN RETREATED.
891	GTO 49		
892	◆LBL 48		
893	SF 03		INDICATES YOU ARE UNDER ATTACK
894	"UNDER A TTACK"		
895	◆LBL 49		
896	BEEP		DISPLAY ROUTINE
897	AVIEW		
898	PSE		
899	CLD		
900	RTN		
901	◆LBL 50		
902	CF 04		INDICATES YOU BLEW
903	BEEP		UP ENTERPRISE
904	"YOU BLE W IT"		
905	AVIEW		
906	STOP		
907	*END*		ENTER "END" HERE
907	◆LBL "CCS "		SEE COMPLETE SCWAC PROGRAM, P 36
908	1 E2		
909	/		
910	INT		
911	STO 29		
912	XEQ 02		
913	STO 30		
914	XEQ 02		
915	STO 31		
916	XEQ 03		
917	STO 31		
918	RCL 30		
919	XEQ 03		
920	STO 30		
921	RCL 29		
922	XEQ 03		
923	STO 29		
924	XEQ 00		
925	GTO 07		
926	◆LBL "CCP "		
927	INT		
928	STO 29		
929	XEQ 01		
930	STO 30		
931	XEQ 01		
932	STO 31		
933	XEQ 00		
934	GTO 07		
935	◆LBL "CCW "		
936	XEQ 00		
937	RCL 15		
938	INT		
939	STO 29		
940	XEQ 01		
941	STO 30		
942	XEQ 01		
943	STO 31		
944	XEQ 00		
945	GTO 07		
946	◆LBL 00		
947	RCL 05		
948	X<0?		
949	CHS		
950	INT		
951	STO 26		

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PROGRAM LISTING

☐ 67 ☐ 97 ☑ 41C "NON-PRINT" VERSION

STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
952	XEQ 01		
953	STO 27		
954	XEQ 01		
955	STO 28		
956	RTN		
957	◆LBL 01		
958	LASTX		
959	FRC		
960	1 E3		
961	*		
962	END		
01	◆LBL "CCS"		SECTOR/COURSE/WEAPONS ANGLES COMPUTOR(SCWAC)
02	1 E2		" MISSION SECTOR COMP"
03	/		
04	INT		
05	STO 29		"X"
06	XEQ 02		
07	STO 30		"Y"
08	XEQ 02		
09	STO 31		"Z"
10	XEQ 03		
11	STO 31		ZZ
12	RCL 30		
13	XEQ 03		
14	STO 30		YY
15	RCL 29		
16	XEQ 03		
17	STO 29		XX
18	XEQ 00		ENTERPRISE(X,Y,Z)
19	GTO 07		
20	◆LBL "CCP"		"COURSE COMPUTOR"
21	INT		
22	STO 29		NEW - XX
23	XEQ 01		
24	STO 30		NEW - YY
25	XEQ 01		
26	STO 31		NEW - ZZ
27	XEQ 00		ENTERPRISE(X,Y,Z)
28	GTO 07		
29	◆LBL "CCW"		"WEAPONS ANGLES COMP"
30	XEQ 00		
31	RCL 15		
32	INT		
33	STO 29		ENEMY - XX
34	XEQ 01		
35	STO 30		ENEMY - YY
36	XEQ 01		
37	STO 31		ENEMY - ZZ
38	XEQ 00		ENTERPRISE(X,Y,Z)
39	GTO 07		
40	◆LBL 00		"ENTERPRISE(X,Y,Z)"
41	RCL 05		XX.OYYOZZ
42	X<0?		NUBIAN TOWED?
43	CHS		
44	INT		
45	STO 26		ENTERPRISE - XX
46	XEQ 01		
47	STO 27		ENTERPRISE - YY
48	XEQ 01		
49	STO 28		ENTERPRISE - ZZ
50	RTN		
51	◆LBL 01		CO-ORDINATE SEPARATOR
52	LASTX		
53	FRC		
54	1 E3		
55	*		
56	INT		
57	RTN		
58	◆LBL 02		SECTOR SEPARATOR
59	LASTX		
60	FRC		
61	1 E1		
62	*		
63	INT		
64	RTN		
65	◆LBL 03		MISSION SECTOR RANGE
66	1		
67	X=Y?		(X,Y,orZ) = 1?
68	GTO 04		
69	X<>Y		
70	2		
71	X=Y?		(X,Y,orZ) = 2?
72	GTO 05		
73	X<>Y		
74	3		
75	X=Y?		(X,Y,orZ) = 3?

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PROGRAM LISTING

☐ 67 ☐ 97 ☑ 41C "NON-PRINT" VERSION

STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
76	GTO 06		
77	87		(X,Y,orZ) = 4
78	RTN		CENTER SECTOR "4"
79	♦LBL 04		
80	12		(X,Y,orZ) = 1
81	RTN		CENTER SECTOR "1"
82	♦LBL 05		
83	37		(X,Y,orZ) = 2
84	RTN		CENTER SECTOR "2"
85	♦LBL 06		
86	62		(X,Y,orZ) = 3
87	RTN		CENTER SECTOR "3"
88	♦LBL 07		"DISTANCE"
89	FIX 2		
90	RCL 26		ENTERPRISE - XX
91	RCL 29		OTHER - XX
92	−		
93	X↑2		$(\Delta X)^2$
94	RCL 27		ENTERPRISE - YY
95	RCL 30		OTHER - YY
96	−		
97	X↑2		$(\Delta Y)^2$
98	RCL 28		ENTERPRISE - ZZ
99	RCL 31		OTHER - ZZ
100	−		
101	X↑2		$(\Delta Z)^2$
102	+		
103	+		
104	SQRT		$D=\sqrt{(\Delta X)^2+(\Delta Y)^2+(\Delta Z)^2}$
105	"DISTANCE"		
106	XEQ 16		DISPLAY ROUTINE
107	PSE		
108	PSE		DISTANCE FROM
109	STO 32		ENTERPRISE
110	♦LBL 08		"THETA ROUTINE"
111	RCL 29		OTHER - XX
112	RCL 26		ENTERPRISE - XX
113	X=Y?		ARE BOTH EQUAL?
114	GTO 09		YES
115	−		ΔX NO
116	RCL 30		OTHER - YY
117	RCL 27		ENTERPRISE - YY
118	−		ΔY
119	X<>Y		
120	X=0?		ΔX = 0?
121	GTO 11		
122	/		ΔY/ΔX
123	ATAN		$\theta_1 = TAN^{-1}(\Delta Y/\Delta X)$
124	STO 33		
125	RCL 29		OTHER - XX
126	RCL 26		ENTERPRISE - XX
127	X>Y?		IS ENTERPRISE GREATER?
128	GTO 10		YES
129	GTO 15		NO
130	♦LBL 09		
131	RCL 30		OTHER - YY
132	RCL 27		ENTERPRISE - YY
133	X>Y?		IS ENTERPRISE GREATER?
134	GTO 12		YES
135	GTO 11		NO
136	♦LBL 10		
137	RCL 30		OTHER - YY
138	RCL 27		ENTERPRISE - YY
139	X>Y?		IS ENTERPRISE GREATER?
140	GTO 13		YES
141	GTO 14		NO
142	♦LBL 11		
143	90		θ = +90
144	STO 33		
145	GTO 15		
146	♦LBL 12		
147	−90		θ = −90
148	STO 33		
149	GTO 15		
150	♦LBL 13		
151	180		$\theta = (\theta_1 - 180)$
152	ST− 33		
153	GTO 15		
154	♦LBL 14		
155	180		$\theta = (\theta_1 + 180)$
156	ST+ 33		
157	♦LBL 15		
158	"THETA"		

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PROGRAM LISTING

☐ 67 ☐ 97 ☑ 41C

"NON-PRINT" VERSION | "PRINTER" VERSION

STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
159	XEQ 16		"THETA"
160	RCL 33		θ
161	PSE		
162	PSE		
163	RCL 31		OTHER - ZZ
164	RCL 28		ENTERPRISE - ZZ
165	-		ΔZ
166	RCL 32		D
167	/		
168	ASIN		$\phi = SIN^{-1}(\Delta Z/D)$
169	"PHI"		"PHI"
170	XEQ 16		φ
171	STOP		
172	◆LBL 16		DISPLAY ROUTINE
173	BEEP		
174	AVIEW		
175	PSE		
176	CLD		
177	RTN		
178	.END.		

STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
01	◆LBL "SD"		"SEED"
02	CLRG		
03	CLA		INITIALIZE
04	CF 00		ERROR PROTECTION
05	SF 25		STORE "SEED"
06	STO 00		
07	4		COUNTER CONTROL
08	STO 25		
09	1		SET DAMAGES OFF
10	STO 07		
11	◆LBL 00		
12	6		
13	STO 06		
14	STO 20		
15	RCL 25		
16	INT		
17	1		
18	X=Y?		NUBIAN CO-ORDINATES?
19	SF 00		SF TO STORE IN R_{09}
20	◆LBL 01		
21	XEQ 04		
22	1 E2		
23	*		
24	INT		
25	STO 21		
26	FS? 00		NUBIAN?
27	XEQ 05		YES - ADD TO R_{09}
28	RCL 21		
29	1 E2		
30	+		RANDOM CO-ORDINATES
31	RCL 06		
32	10↑X		$
33	/		
34	ST+ IND 25		POSITION CO-ORDINATE
35	3		
36	ST- 06		
37	RCL 06		
38	0		
39	X<=Y?		
40	GTO 01		NEW CO-ORDINATE
41	RCL 25		ADD I.D. OF SHIP
42	INT		
43	FS? 00		NUBIAN?
44	ST+ 09		ADD I.D. OF NUBIAN
45	1 E7		

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☐ 67 ☐ 97 ☑ 41C "PRINTER" VERSION

STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
46	/		
47	ST+ IND 25		
48	DSE 25		
49	GTO 00		NEW SHIP
50	-250		SET FUEL = -250
51	STO 06		SO THAT FIRST USE OF LRTS COSTS NO FUEL
52	LBL "LRTS"		"LONG RANGE TRACKING SYSTEM" (LRTS)
53	LBL 02		
54	XEQ 04		RANDOM NUMBER
55	4		
56	*		
57	1		
58	+		
59	INT		
60	STO 25		
61	RCL IND 25		RANDOM SHIP
62	1 E3		
63	X=Y?		ALREADY DESTROYED?
64	GTO 02		NEW RANDOM SHIP
65	RDN		
66	X<0?		TOWED NUBIAN?
67	GTO 02		NEW RANDOM SHIP
68	STO 20		
69	CLX		
70	STO 21		
71	3		
72	STO 25		
73	LBL 03		
74	RCL 20		
75	INT		
76	1 E2		
77	-		
78	25		
79	/		
80	1		
81	+		
82	INT		
83	RCL 25		
84	1		
85	-		
86	10↑X		
87	*		POSITION IN MISSION SECTOR
88	RCL 21		
89	+		
90	STO 21		
91	RCL 20		
92	FRC		
93	1 E3		
94	*		
95	STO 20		
96	DSE 25		
97	GTO 03		
98	250		
99	ST+ 06		ADD 250 TO FUEL USE
100	RCL 21		"MISSION SECTOR"
101	FIX 0		
102	PRX		
103	GTO "SNS"		
104	LBL 04		RANDOM NUMBER
105	RCL 00		GENERATOR
106	PI		
107	+		
108	5		
109	Y↑X		
110	FRC		
111	STO 00		NEW SEED
112	RTN		
113	LBL 05		
114	RCL 20		
115	10↑X		
116	/		
117	ST+ 09		NUBIAN CO-ORDINATES
118	RCL 20		
119	2		
120	-		
121	STO 20		RESET COUNTER
122	RDN		
123	RTN		
124	LBL "CHN"		"COURSE CHANGE"
125	STO 16		ϕ
126	RDN		
127	STO 22		θ
128	X<>Y		
129	STO 14		R
130	RCL 16		ϕ
131	SIN		SIN ϕ

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"PRINTER" VERSION

STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
132	RCL 14		R
133	*		R.SIN ϕ
134	STO 11		ΔZ
135	RCL 16		ϕ
136	COS		COS ϕ
137	RCL 14		R
138	*		R.COS ϕ
139	STO 16		
140	RCL 22		θ
141	SIN		SIN θ
142	RCL 16		R.COS ϕ
143	*		R.COS ϕ.SIN θ
144	STO 12		ΔY
145	RCL 22		θ
146	COS		COS θ
147	RCL 16		R.COS ϕ
148	*		R.COS ϕ.COS θ
149	STO 13		ΔX
150	◆LBL "STD"		"COURSE-STEADY"
151	XEQ 12		CHECK FOR SHIPS IN VICINITY
152	13.01		
153	STO 25		COUNTER CONTROL
154	RCL 01		NUBIAN
155	0		
156	STO 16		
157	STO 17		
158	X>Y?		NUBIAN TOWED?
159	1		YES-FUEL COST=6xR
160	ENTER↑		NO-FUEL COST=5xR
161	5		
162	+		
163	RCL 14		
164	*		FUEL COST
165	INT		
166	ST+ 06		
167	RCL 05		
168	RDN		
169	◆LBL 06		
170	R↑		
171	ENTER↑		
172	FRC		
173	1 E3		
174	*		
175	X<>Y		
176	INT		
177	RCL IND 25		
178	+		
179	INT		
180	X<0?		NEW CO-ORDINATE
181	GTO 14		
182	1 E2		
183	X<=Y?		
184	GTO 14		
185	X<>Y		
186	RCL 16		
187	10↑X		
188	/		
189	ST+ 17		
190	3		
191	ST+ 16		
192	DSE 25		
193	GTO 06		
194	RCL 17		NEW ENTERPRISE
195	STO 05		CO-ORDINATES
196	◆LBL "SNS"		"SENSOR PROBE"
197	CLX		
198	STO 08		
199	RCL 00		
200	PI		
201	+		
202	5		
203	Y↑X		
204	FRC		
205	STO 00		
206	RCL 07		DAMAGE REGISTER
207	X=0?		DAMAGES?
208	XEQ 45		YES - "SNS U/S"
209	FIX 6		
210	1 E3		
211	STO 18		
212	R↑		RANDOM NUMBER
213	4		
214	*		
215	1		
216	+		
217	INT		
218	STO 10		
219	STO 21		
220	◆LBL 07		

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PROGRAM LISTING

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"PRINTER" VERSION

STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
221	RCL 10		
222	STO 25		
223	RCL IND 25		ALIEN CO-ORDINATES 1XX.1YY1ZZ
224	RCL 05		ENTERPRISE CO-ORDINATE $XX_\varepsilon.OYY_\varepsilon OZZ_\varepsilon$
225	-		
226	3		
227	STO 25		
228	CLX		
229	STO 17		
230	RDN		
231	◆LBL 08		
232	ENTER↑		
233	INT		C = X,Y,orZ
234	1 E2		
235	-		$C - C_\varepsilon$
236	X↑2		$(C - C_\varepsilon)^2$
237	ST+ 17		
238	RDN		
239	FRC		
240	1 E3		
241	*		
242	DSE 25		
243	GTO 08		
244	STO 23		I.D.
245	RCL 17		$(X-X_\varepsilon)^2+(Y-Y_\varepsilon)^2+(Z-Z_\varepsilon)^2$
246	SQRT		DISTANCE
247	STO 16		$D=\sqrt{(\Delta X)^2+(\Delta Y)^2+(\Delta Z)^2}$
248	40		
249	X>Y?		ALIEN < 40?
250	GTO 09		YES
251	CLX		
252	RCL 18		
253	X>Y?		
254	X<>Y		
255	STO 18		SMALLEST D ≥ 40
256	GTO 11		
257	◆LBL 09		
258	CLX		
259	35		
260	X<=Y?		CLOSE ENOUGH FOR BATTLE?
261	GTO 10		NO
262	RCL 10		SHIP I.D.
263	ENTER↑		
264	10↑X		
265	/		
266	ST+ 08		ADD TO "SHIPS IN VICINITY" REGISTER
267	◆LBL 10		
268	XEQ 13		DISPLAY DISTANCE WITH/OR WITHOUT I.D.
269	◆LBL 11		
270	ISG 10		ICREMENT R_{10}
271	PSE		
272	5		
273	RCL 10		R_{10} = 5?
274	X=Y?		
275	1		YES - SET IT TO "1"
276	STO 10		
277	RCL 21		VALUE MARKING END OF
278	X≠Y?		LOOP
279	GTO 07		
280	171		MAXIMUM DISTANCE CAN
281	RCL 18		TRAVEL IN CUBE
282	X>Y?		SMALLEST D ≥ 40
283	1 E3		D > 171?
284	CHS		YES - NO SHIPS LEFT
285	PRX		DISPLAY WITH MINUS
286	XEQ 12		SIGN
287	GTO 14		CHECK FOR SHIPS IN VICINITY
288	◆LBL 12		
289	RCL 08		SHIPS IN VICINITY?
290	X=0?		NO - RETURN
291	RTN		
292	.1		
293	X<=Y?		NUBIAN IN VICINITY?
294	XEQ 44		YES - "NUB"
295	.1		NO NUBIAN
296	X=Y?		UNDER ATTACK?
297	XEQ 48		YES - "ATK"
298	CLX		NO (SF 3)
299	RDN		
300	X>0?		NUBIAN IN VICINITY?
301	GTO 14		NO - GO TO DISPLAY
302	RCL 09		YES - SHOW NUBIAN
303	STO 23		CO-ORDINATES
304	CLX		
305	STO 16		
306	◆LBL 13		DISPLAY NUBIAN
307	RCL 07		CO-ORDINATES OR "0"
308	X≠0?		SENSORS ON?
309	RCL 23		YES - NUBIAN(X,Y,Z)

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STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
310	RCL 16		
311	+		I.D./NUBIAN(X,Y,Z)
312	PRX		DISTANCE/0
313	RTN		DEPENDS ON "SNS"
314	◆LBL 14		
315	CF 04		
316	FIX 6		
317	RCL 01		
318	ENTER↑		
319	ABS		
320	/		NUBIAN TOWED? IF YES
321	RCL 05		(R_{01}<0)MAKES ENTERPRISE
322	*		NEGATIVE
323	PRX		
324	FS? 03		INDICATES UNDER
325	GTO "ALT"		ATTACK
326	RTN		
327	◆LBL "ALT"		"BATTLE ALERT"
328	CF 03		
329	SF 00		
330	FIX 4		
331	RCL 08		SHIPS IS VICINITY
332	10		
333	*		
334	INT		
335	X=0?		NUBIAN IN VICINITY?
336	GTO 15		NO
337	XEQ 44		YES - "NUB"
338	CHS		
339	◆LBL 15		
340	RCL 07		
341	X=0?		DAMAGES?
342	GTO 21		YES
343	RCL 08		NO - SHIPS IN
344	PRX		VICINITY
345	◆LBL 16		
346	PSE		
347	FS? 22		SHIP CHOSEN?
348	GTO 17		YES - LEAVE LOOP
349	GTO 16		NO
350	◆LBL 17		
351	INT		
352	ABS		
353	5		
354	X<=Y?		CHECK FOR ERROR
355	GTO 15		INPUT
356	X<>Y		
357	1		
358	X<>Y		IF "1" or "0"
359	X<=Y?		INPUTTED, NOT VALID
360	GTO 15		IF "2,3,or4" NOT
361	STO 10		USED, REPEAT "I.D.'s"
362	STO 25		SHIP I.D.
363	RCL IND 25		
364	RCL 05		
365	X<>Y		
366	STO 15		
367	X<>Y		
368	-		
369	13.01		
370	STO 25		COUNTER
371	CLX		
372	STO 18		
373	RDN		
374	◆LBL 18		DETERMINE DISTANCE
375	ENTER↑		
376	INT		
377	1 E2		
378	-		
379	STO IND 25		
380	X↑2		
381	ST+ 18		
382	RDN		
383	FRC		
384	1 E3		
385	*		
386	DSE 25		
387	GTO 18		
388	RCL 18		
389	SQRT		DISTANCE TO ALIEN
390	STO 18		
391	RCL 12		Δ Y
392	RCL 13		Δ X
393	R-P		
394	RDN		
395	STO 16		θ

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STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
396	RCL 11		ΔZ
397	RCL 18		D
398	/		ΔZ/D
399	ASIN		$\phi = SIN^{-1}(\Delta Z/D)$
400	STO 17		ϕ
401	RCL 15		
402	100.1001		
403	-		
404	STO 15		ALIEN CO-ORDINATES
405	RCL 10		I.D.
406	ENTER↑		
407	10↑X		
408	/		
409	ST- 08		SUBTRACT FROM SHIPS
410	RCL 10		IN VICINITY
411	STO 11		I.D.
412	3		
413	X≠Y?		ROMULAN VESSEL?
414	GTO 19		NO
415	"CK"		"CLOAK" BEING USED
416	FS? 00		SNS DAMAGED?
417	XEQ 49		NO - "CK" DISPLAYED
418	CLA		YES - NO DISPLAY
419	XEQ 20		Δ θ
420	ST+ 16		
421	ABS		
422	XEQ 20		Δ φ
423	ST+ 17		
424	ABS		TOTAL ANGULAR CHANGE
425	+		DUE CLOAK DEVICE
426	.15		DETERMINE CHANGE IN
427	*		
428	.21		I.D. TO LESSEN BRUNT
429	-		OF ROMULAN ATTACK
430	INT		
431	ST+ 11		
432	◆LBL 19		
433	RCL 18		DISTANCE
434	FIX 0		
435	RND		DISPLAY DISTANCE
436	FIX 4		THEN GO TO"SHIELDS"
437	PRX		
438	GTO "SHD"		
439	◆LBL 20		Δ θ OR Δ φ
440	RCL 00		
441	PI		
442	+		
443	5		
444	Y↑X		
445	FRC		
446	STO 00		
447	20		
448	*		
449	10		
450	-		
451	INT		
452	RTN		
453	◆LBL 21		SENSORS DAMAGED
454	CF 00		
455	XEQ 45		"SNS U/S"
456	GTO 17		
457	◆LBL "SHD"		"SHIELDS"
458	CF 00		
459	SF 02		
460	1 E2		
461	STO 24		
462	CLX		
463	STO 20		
464	STO 13		
465	STO 14		
466	12		
467	STO 12		
468	◆LBL 22		
469	CF 01		
470	RCL 18		DISTANCE
471	FIX 0		
472	RND		
473	FIX 8		
474	RCL 13		S_ε
475	1 E3		
476	/		
477	+		$DD.OS_\varepsilon S_\varepsilon$
478	RCL 07		
479	STO 19		DAMAGES?
480	X=0?		SENSORS DAMAGED?
481	XEQ 45		YES - "SNS U/S"
482	RCL 14		S_α IF SNS DAMAGED
483	*		$S_\alpha = 0$
484	1 E6		

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STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
485	/		
486	+		DD.OS$_\varepsilon$S$_\varepsilon$OS$_\alpha$S$_\alpha$
487	RCL 20		
488	1 E8		SHIELDS
489	/		
490	+		DD.OS$_\varepsilon$S$_\varepsilon$OS$_\alpha$S$_\alpha$SS
491	♦LBL 23		
492	FS? 04		ENEMY DESTROYED?
493	GTO "PST"		YES - GO TO "POST"
494	4		
495	FS? 00		BATTLE NOT BEGUN OR
496	10↑X		OVER?
497	STO 25		YES - BLINKS FOREVER
498	RDN		NO- MIDDLE OF BATTLE
499	BEEP		BLINK STATUS 4 TIMES ONLY
500	♦LBL 24		
501	CF 22		
502	PSE		
503	FS? 22		SHIELD VALUE INPUT?
504	GTO 27		YES - RESET
505	DSE 25		
506	GTO 24		
507	♦LBL "WPN"		"WEAPONS INITIALIZATION"
508	RCL 18		DISTANCE
509	35		
510	X>Y?		ENEMY < 35 UNITS?
511	GTO 25		YES-CONTINUE FIRING
512	XEQ 47		NO- "A/T/F"
513	GTO "SNS"		THEN GO TO "SNS"
514	♦LBL 25		
515	CF 00		
516	FIX 6		
517	RCL 12		DECREMENT FIRING
518	2		TIME COUNTER
519	-		
520	X≠0?		
521	STO 12		
522	RCL 12		
523	STO 25		
524	♦LBL 26		ENTERPRISE's
525	RCL 05		CO-ORDINATES
526	CHS		
527	XEQ 28		"DISPLAY"
528	RCL 15		ALIEN CO-ORDINATES
529	XEQ 28		"DISPLAY"
530	GTO 26		
531	♦LBL 27		RESET SHIELDS
532	RCL 24		
533	X<=Y?		NEW VALUE MUST BE
534	GTO 23		LESS THAN 100.
535	X<>Y		
536	STO 20		
537	FS? 02		FIRST TIME AROUND?
538	GTO 29		YES - ALIEN FIRE
539	RCL 13		
540	RCL 13		
541	GTO 30		
542	♦LBL 28		DISPLAY ROUTINE
543	PRX		
544	PSE		
545	PSE		
546	PSE		
547	DSE 25		
548	GTO 31		
549	GTO 29		
550	♦LBL "PHT"		"PHOTON TORPEDOES"
551	SF 01		
552	♦LBL "PHS"		"PHASERS"
553	RCL 17		ϕ
554	-		$\Delta\phi$
555	ABS		
556	X<>Y		
557	RCL 16		θ
558	-		$\Delta\theta$
559	ABS		
560	+		
561	STO 21		$\lvert\Delta\phi\rvert + \lvert\Delta\theta\rvert = A$
562	0		
563	FS? 01		PHOTON TORP USED?
564	5		YES - FUEL = 8xD
565	ENTER↑		
566	3		NO - FUEL = 3xD
567	+		

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STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
568	RCL 18		D
569	*		FUEL USED
570	ST+ 06		
571	2		
572	RCL 21		
573	LN		-.03 LN(A)
574	-.03		CHANGE TO -.04 FOR
575	*		GREATER CHALLENGE
576	.1		0.1 - 0.03 LN(A)
577	+		
578	RCL 14		S_α
579	RCL 13		S_ε
580	XEQ 32		2X IF PHOTON USED
581	FS? 01		
582	*		$\frac{1-.03LN.A(S_\alpha-S_\varepsilon+100)^2}{D}$
583	X<0?		
584	GTO 29		
585	INT		
586	ST+ 14		
587	RCL 14		
588	RCL 24		
589	X>Y?		
590	GTO 29		
591	-1		
592	ST* 15		ALIEN DESTROYED
593	FIX 0		
594	RCL 16		
595	PRX		
596	RCL 17		θ
597	PRX		
598	RCL 10		ϕ
599	RCL 19		I.D.
600	*		I.D. NOT DISPLAYED
601	SF 00		IF SNS DAMAGED(R_{19}=0)
602	SF 04		
603	PRX		RESETS FLAGS FOR
604	GTO 23		NEXT ROUND
			I.D. OR "0"
605	◆LBL 29		
606	RCL 01		
607	0		
608	X>Y?		
609	1		NUBIAN TOWED?
610	ENTER↑		YES - FUEL=3xSHIELDS
611	2		
612	+		NO - FUEL=2xSHIELDS
613	RCL 20		
614	*		SHIELDS
615	ST+ 06		FUEL COST
616	6		
617	RCL 11		I
618	-		I.D.(VARIABLE I.D.)
619	1 E4		(6 - I)
620	*		
621	RCL 13		(6 - I).10^4
622	85		
623	X<=Y?		ENTERPRISE DESTROYED
624	GTO 50		IF SHIELDS GONE
625	CLX		"YOU BLEW IT"
626	RCL 14		
627	XEQ 32		$\frac{(6-I).10^4(S_\varepsilon-S_\alpha+100)^2}{D}$
628	RCL 20		
629	10		
630	*		10 x SHIELDS
631	X↑2		$(10xS)^2$
632	/		$\frac{(6-I).10^4(S_\varepsilon-S_\alpha+100)^2}{D(10xS)^2}$
633	INT		
634	ST+ 13		
635	RCL 13		S_ε
636	RCL 24		
637	X<=Y?		$S_\varepsilon \geq 100$?
638	GTO 50		YES-"YOU BLEW IT"
639	RCL 13		
640	70		$S_\varepsilon > 70$?
641	X>Y?		YES-"SNS U/S"
642	GTO 30		R_{07}= 0
643	CLX		
644	STO 07		
645	◆LBL 30		
646	RCL 13		
647	85		
648	X>Y?		$S_\varepsilon > 85$?
649	GTO 22		YES-"N/S"
650	CLX		LOST YOUR SHIELDS
651	STO 20		
652	"N/S"		
653	XEQ 49		
654	GTO 22		
655	◆LBL 31		
656	FS? 22		
657	GTO 28		
658	RTN		
659	◆LBL 32		

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STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
660	−		
661	RCL 24		
662	+		
663	X↑2		
664	*		
665	RCL 18		
666	/		
667	RTN		
668*LBL	"PST"		"POST"
669	SF 00		
670	CF 01		
671	CF 02		
672	CF 04		
673	FIX 6		
674	RCL 15		ALIEN CO-ORDINATES
675	X<0?		IF < 0 - DESTROYED
676	GTO 35		YES - CONTINUE
677	3		NO - CHECK FOR RETREAT
678	STO 25		
679	0		
680	STO 15		
681	RCL 13		S_ε
682	85		$(S_\varepsilon \leq 85)$?
683	X<=Y?		ILLEGAL RETREAT
684	GTO 34		NO - CONTINUE
685	"DTG"		YES - "DTG"
686	XEQ 49		
687*LBL	33		
688	RCL 25		3 SEC COUNT-DOWN
689	PRX		
690	DSE 25		
691	GTO 33		
692	GTO 50		
693*LBL	34		LEGAL RETREAT, NEW
694	RCL 00		ALIEN CO-ORDINATES
695	PI		
696	+		
697	5		
698	Y↑X		
699	FRC		
700	STO 00		
701	1 E2		
702	*		
703	LASTX		
704	+		
705	INT		CO-ORDINATE
706	RCL 25		
707	1		
708	−		
709	3		
710	*		
711	10↑X		
712	/		
713	ST+ 15		
714	DSE 25		
715	GTO 34		
716	RCL 10		
717	STO 25		
718	1 E7		
719	/		
720	ST+ 15		
721	RCL 15		
722	STO IND 25		REPLACES OLD ALIEN CO-ORDINATES WITH NEW
723	CF 00		
724	XEQ 47		ALIEN NOT DESTROYED "A/T/F"
725	GTO 36		
726*LBL	35		CHECK FOR SNS REPAIRS
727	RCL 07		
728	X≠0?		DAMAGES?
729	GTO 36		NO - CONTINUE
730	RCL 13		YES S_ε
731	51		$S_\varepsilon > 50$?
732	X<=Y?		YES - NO REPAIRS MADE
733	GTO 36		NO - "SNS OK"
734	XEQ 46		
735*LBL	36		
736	RCL 10		I.D.
737	STO 25		
738	1 E3		
739	FS? 00		ALIEN DESTROYED?
740	STO IND 25		YES - STORE 1000
741	RCL 01		
742	ENTER↑		
743	ABS		
744	/		
745	RCL 05		
746	*		ENTERPRISE's
747	PRX		CO-ORDINATES

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STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
748	GTO "SNS "		
749◆LBL	"TTB "		"TRANSPORTER/TRACTOR BEAM" (TTB)
750	RCL 01		
751	XEQ 40		CHECK "D" TO NUBIAN
752	XEQ 42		D ≤ 10?
753	FS? 04		IF SET, D > 10 AND
754	GTO 14		"A/T/F" THEN RETURN
755	RCL 01		YES
756	XEQ 44		"NUB"
757	STO 01		
758	.1		CANCEL FROM SHIPS
759	ST- 08		IN VICINITY
760	"I/T"		"I/T" NUBIAN IN TOW
761	XEQ 49		
762	GTO 43		
763◆LBL	"DOC "		"DOCKING&REPAIRS"
764	100.1001		
765	XEQ 40		CHECK "D" TO STARBASE
766	XEQ 42		D ≤ 10?
767	FS? 04		IF SET, D > 10 AND
768	GTO 14		"A/T/F" THEN RETURN
769	4		YES
770	STO 00		
771◆LBL	37		CHECK FOR OTHER
772	RCL 00		ALIENS NEAR STARBASE
773	STO 25		
774	RCL IND 25		
775	XEQ 40		CHECK "D" TO ALIEN
776	40		
777	X<=Y?		OUT OF RANGE?
778	GTO 38		YES - CONTINUE
779	"ALIEN"		NO - "ALIEN"
780	XEQ 49		
781	GTO 43		
782◆LBL	38		
783	DSE IND 25		
784	1		
785	RCL 00		
786	X≠Y?		ALL ALIENS OUT OF RANGE
787	GTO 37		
788	1 E3		
789	RCL 01		
790	X<0?		NUBIAN TOWED?
791	RDN		
792	STO 01		YES - STORE 1000
793	"DCKD"		
794	XEQ 49		"DOCKED"
795	CF 00		
796	0		
797	STO 05		ENTERPRISE's
798	4		CO-ORDINATES(0,0,0)
799	STO 25		
800	RCL 07		
801	X≠0?		DAMAGES?
802	GTO 39		NO - CONTINUE
803	XEQ 46		YES "SNS OK"
804◆LBL	39		
805	RCL IND 25		
806	1 E3		
807	X≠Y?		GAME OVER?
808	GTO 43		NO - CONTINUE
809	DSE 25		
810	GTO 39		
811	"GAME OVER"		YES
812	XEQ 49		"GAME OVER"
813	"FUEL ="		
814	ACA		
815	FIX 0		
816	RCL 06		
817	ACX		"FUEL = XXXX"
818	PRBUF		
819	CF 02		
820	STOP		END
821◆LBL	40		
822	RCL 05		
823	-		
824	3		
825	STO 25		
826	CLX		
827	STO 17		
828	RDN		
829◆LBL	41		

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STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
830	ENTER↑		
831	INT		
832	1 E2		
833	−		
834	X↑2		
835	ST+ 17		
836	RDN		
837	FRC		
838	1 E3		
839	*		
840	DSE 25		
841	GTO 41		
842	RCL 17		
843	SQRT		
844	RTN		
845	*LBL 42		
846	10		
847	X>Y?		D < 10?
848	RTN		YES - RETURN
849	XEQ 47		NO - "A/T/F"
850	SF 04		
851	RTN		
852	*LBL 43		DISPLAY
853	CF 00		
854	FIX 6		
855	RCL 01		
856	ENTER↑		
857	ABS		
858	/		
859	RCL 05		
860	*		
861	PRX		
862	GTO "SNS "		
863	*LBL 44		INDICATES EITHER
864	CHS		COMMUNICATIONS OR
865	"NUB"		TTB USED SUCCESSFULLY
866	GTO 49		
867	*LBL 45		INDICATES SENSORS
868	"SNS U/S "		SYSTEM DAMAGED
869	GTO 49		
870	*LBL 46		
871	1		INDICATES SENSOR
872	STO 07		SYSTEM REPAIRED
873	"SNS OK"		
874	GTO 49		
875	*LBL 47		INDICATES TOO FAR
876	"A/T/F"		AWAY TO "DOCK", USE
877	GTO 49		"TTB; OR ALIEN HAS
			RETREATED
878	*LBL 48		
879	SF 03		INDICATES YOU ARE
880	"ATK"		UNDER ATTACK
881	*LBL 49		
882	PRA		DISPLAY ROUTINE
883	CLA		PRINTS "ALPHA"
884	RTN		
885	*LBL 50		
886	CF 04		INDICATES YOU BLEW
887	"YOU BLE W IT"		UP ENTERPRISE
888	PRA		
889	STOP		
890	END		
01	*LBL "PFR "		"PRACTICE FIRING RANGE"
02	FIX 6		
03	CLRG		
04	STO 00		STORE SEED
05	−50.0500 5		ENTERPRISE POSITION
06	STO 20		50.05050(XX.0YYoZZ)
07	*LBL 00		
08	CF 22		RESETS FOR NEXT ROUND
09	6		
10	STO 25		COUNTER
11	*LBL 01		
12	RCL 00		SEED
13	PI		
14	+		
15	5		
16	Y↑X		
17	FRC		
18	STO 00		
19	41		
20	*		

Note: Refer to "HP-41C OWNER'S HANDBOOK AND PROGRAMMING GUIDE" for specific information on keystrokes. The Function Index is found at the very back of the Handbook. Refer to Appendix E in 67 or 97 "OWNER'S HANDBOOK AND PROGRAMMING GUIDE" for exact keystrokes.

PROGRAM LISTING

☐ 67 ☐ 97 ☑ 41C "PRINTER" VERSION"

STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
21	30		
22	+		
23	INT		
24	STO IND 25		
25	DSE 25		
26	50		
27	-		
28	STO IND 25		
29	DSE 25		
30	GTO 01		
31	RCL 03		ΔY
32	RCL 01		ΔX
33	R-P		
34	RDN		
35	STO 07		θ
36	RCL 05		ΔZ
37	RCL 05		
38	X↑2		
39	RCL 03		ΔY
40	X↑2		
41	RCL 01		ΔX
42	X↑2		
43	+		
44	+		
45	SQRT		
46	STO 21		DISTANCE
47	"DISTANCE"		"DISTANCE"
48	XEQ 05		
49	PSE		DISTANCE TO ALIEN
50	/		ΔZ/D=
51	ASIN		$\phi = SIN^{-1}(\Delta Z/D)$
52	STO 08		
53	6		
54	STO 25		
55	0		
56	◆LBL 02		
57	RCL IND 25		
58	RCL 25		
59	1.5		
60	*		
61	3		
62	-		
63	10↑X		
64	/		
65	+		
66	DSE 25		
67	DSE 25		
68	GTO 02		
69	STO 09		ALIEN CO-ORDINATES
70	◆LBL 03		
71	RCL 20		ENTERPRISE(X,Y,Z)
72	"ENTERPRISE"		"ENTERPRISE"
73	XEQ 05		
74	PSE		
75	PSE		-50.05050
76	PSE		
77	FS? 22		ANGLE INPUTS?
78	GTO 04		
79	RCL 09		ALIEN(X,Y,Z)
80	"ALIEN"		"ALIEN"
81	XEQ 05		
82	PSE		
83	PSE		XX.OYYOZZ
84	PSE		
85	FS? 22		ANGLE INPUTS?
86	GTO 04		
87	RCL 21		DISTANCE
88	"DISTANCE"		"DISTANCE"
89	XEQ 05		
90	PSE		D
91	FS? 22		ANGLE INPUTS?
92	GTO 04		
93	GTO 03		
94	◆LBL 04		
95	X<>Y		
96	RCL 07		θ
97	"THETA"		"THETA"
98	XEQ 05		
99	PSE		ACTUAL ANGLE
100	-		
101	"ERROR"		"ERROR"
102	XEQ 05		
103	PSE		AMOUNT OF ERROR
104	ABS		
105	X<>Y		
106	RCL 08		φ
107	"PHI"		"PHI"

Note: Refer to "HP-41C OWNER'S HANDBOOK AND PROGRAMMING GUIDE" for specific information on keystrokes. The Function Index is found at the very back of the Handbook. Refer to Appendix E in 67 or 97 "OWNER'S HANDBOOK AND PROGRAMMING GUIDE" for exact keystrokes.

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PROGRAM LISTING

☐ 67 ☐ 97 ☑ 41C

"PRINTER" VERSION

STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
108	XEQ 05		
109	PSE		ACTUAL ANGLE
110	−		
111	"ERROR"		"ERROR"
112	XEQ 05		
113	PSE		AMOUNT OF ERROR
114	ABS		
115	+		
116	"TOTAL E RROR"		"TOTAL ERROR"
117	XEQ 05		
118	PSE		TOTAL ERROR OF GUESSES. REPEAT FOR NEW ROUND
119	GTO 00		
120	●LBL 05		DISPLAY ROUTINE
121	BEEP		
122	AVIEW		
123	PSE		
124	CLD		
125	RTN		
126	.END.		END
30			
40			
50			
51			
60			
70			
80			
90			
00			

Note: Refer to "HP-41C OWNER'S HANDBOOK AND PROGRAMMING GUIDE" for specific information on keystrokes. The Function Index is found at the very back of the Handbook. Refer to Appendix E in 67 or 97 "OWNER'S HANDBOOK AND PROGRAMMING GUIDE" for exact keystrokes.

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REGISTERS, STATUS, FLAGS, ASSIGNMENTS

(PFR) = PRACTICE FIRING RANGE

NON-PRINT/PRINTER VERSION

DATA REGISTERS

00	I.D.	21	DISTANCE (PFR)
"	SEED (PFR)	22	THETA (θ)
01	NUBIAN (X,Y,Z)	23	I.D.
"	ΔX (X-50) (PFR)	"	NUBIAN (X,Y,Z)
02	KLINGON (X,Y,Z)	24	100
"	X (PFR)	25	COUNTER
03	ROMULAN (X,Y,Z)	26	ENTERPRISE "XX"
"	ΔY (Y-50) (PFR)	27	ENTERPRISE "YY"
04	VALLICIAN (X,Y,Z)	28	ENTERPRISE "ZZ"
"	Y (PFR)	29	MISSION SECTOR "XX", NEW "XX" or ENEMY "XX"
05	ENTERPRISE(X,Y,Z)		
"	NEW ALIEN (X,Y,Z) (PFR)		
"	ΔZ (Z-50) (PFR)	30	MISSION SECTOR "YY", NEW "YY" or ENEMY "YY"
06	FUEL USED		
"	COUNTER	31	MISSION SECTOR "ZZ", NEW "ZZ" or ENEMY "ZZ"
"	Z (PFR)		
07	DAMAGES? OFF=1 ON=0	32	DISTANCE
"	THETA (θ) (PFR)	33	THETA (θ)
08	SHIPS IN VICINITY		
"	PHI (φ) (PFR)		
09	NUBIAN (X,Y,Z)		
"	PRACTIC ALIEN (X,Y,Z) (PFR)		
10	I.D.		
"	SEED		
11	VARIABLE I.D.		
"	ΔZ		
12	ΔY		
"	FIRING TIME COUNT		
13	ΔX		
"	Sε ENTERPRISE STATUS		
14	R		
"	Sα ALIEN STATUS		
15	ALIEN (X,Y,Z)		
16	PHI (φ)		
"	Rcos φ		
"	THETA (θ)		
17	NEW (X,Y,Z) FOR ENTERPRISE		
"	PHI (φ)		
18	DISTANCE		
19	DAMAGES ?		
20	(X,Y,Z) FOR LRTS		
"	SHIELD VALUE		
21	USED		
"	MISSION SECTOR		
"	COUNTER		

STATUS

SIZE 034/026 TOT. REG. 33/25 USER MODE

ENG ____ FIX 0→8 SCI ____ ON ✓ OFF

DEG ✓ RAD ____ GRAD ____

FLAGS

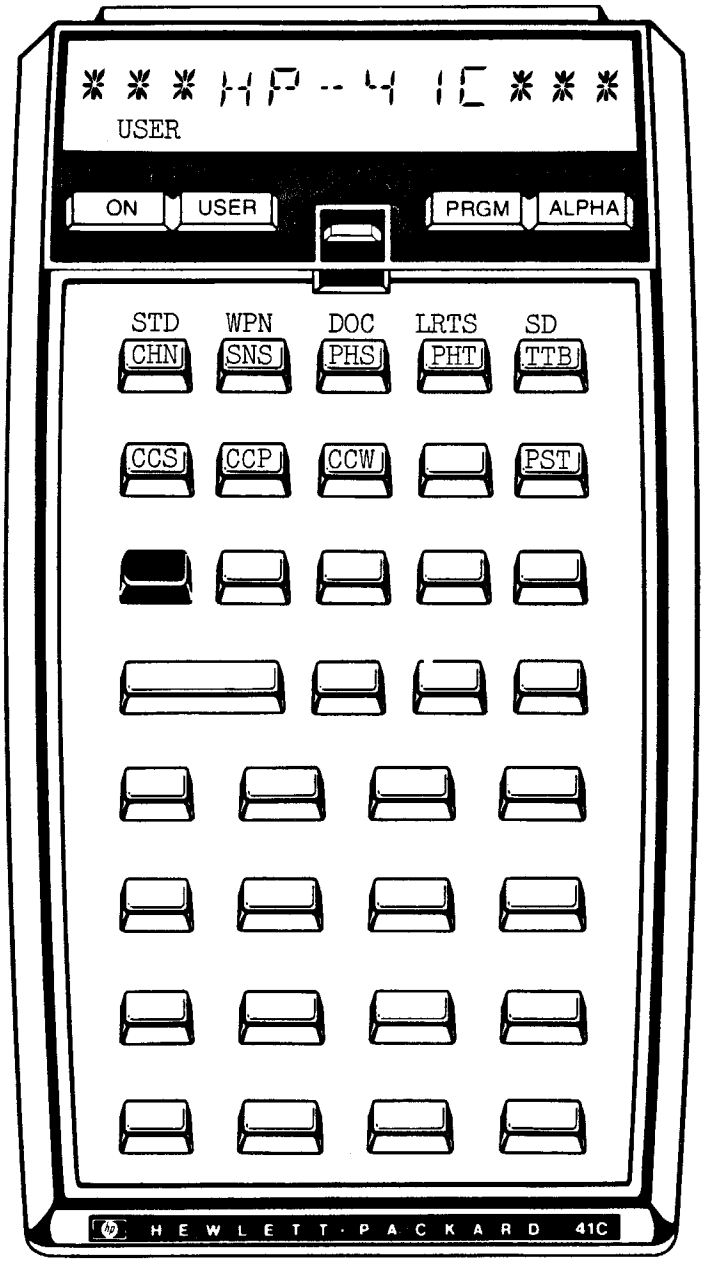
#	INIT S/C	SET INDICATES	CLEAR INDICATES
00	OFF	NUBIAN(XYZ) SET	IN TOW (TTB)
00	OFF	DEFLECTORS ON, UNDER ATTACK	ENEMY I.D. ENTERED AND ACCEPTED
00	OFF	ENEMY DESTROYED	ENEMY I.D. ENTERED DOCKING COMPLETED
01	OFF	PHOTON TORPEDOES FIRED AT ENEMY	FUEL COST FIGURES COMPLETED
02	OFF	INDICATES STATUS REPORT IS NEXT	ENEMY SHIP HAS BEEN DESTROYED
03	OFF	ENTERPRISE UNDER ATTACK BY ALIEN	PROGRAM HAS GONE TO "ALT" (ALERT)
04	OFF	ENEMY DESTROYED	PROGRAM HAS GONE TO "PST"(POST)
22	OFF	NUMERICAL DATA FOR SHIP I.D. & SHIELD VALUES HAVE BEEN ENTERED	DATA ENTRIES ACKNOWLEDGED
25	ON	PROTECTS PROGRAM FROM DATA ERROR DURING PROGRAM RUN AT LEAST ONCE	DATA ERROR MADE DURING PROGRAM RUN

ASSIGNMENTS

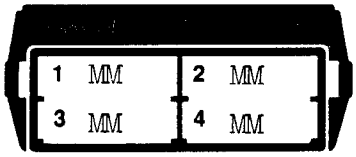
FUNCTION	KEY	FUNCTION	KEY
"CHN" COURSE CHANGE	Σ+	"PHT" PHOTON TORPEDOES	LOG
"STD" COURSE STEADY	Σ-	"LRTS" LONG RANGE TRACKING	10^x
"SNS" SENSORS SYSTEMS	1/x	"TTB" TRANSPORT TRACTOR BEAM	LN
"WPN" WEAPONS INITIALIZATION	y^x	"SD" SEED	e^x
"PHS" PHASERS	$\sqrt{x}$	"CCS" SECTOR	x<>y
"DOC" DOCKING	x^2	"CCP" COURSE	R↓
		"CCW" WEAPONS	SIN
		"PST" POST	TAN

KEYBOARD CARD LABELING

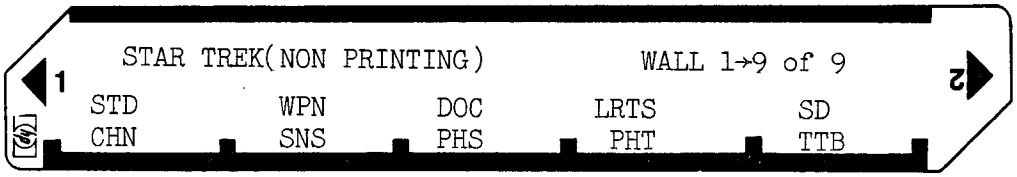
KEYBOARD



SYSTEM CONFIGURATION

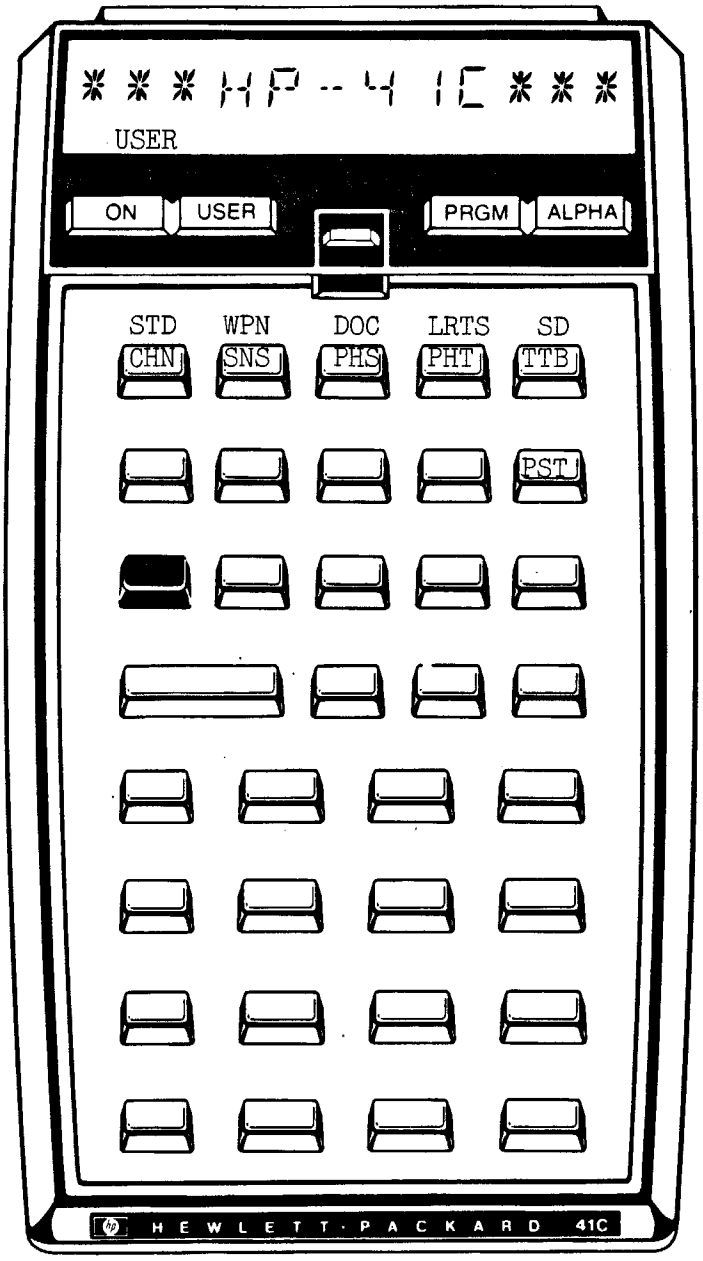


CARD

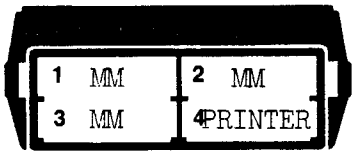


KEYBOARD CARD LABELING

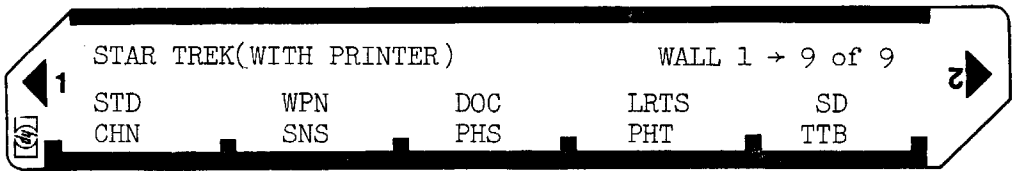
KEYBOARD



SYSTEM CONFIGURATION



CARD



ROW 1 (1 : 6)

ROW 2 (7 : 16)

ROW 3 (17 : 24)

ROW 4 (25 : 30)

ROW 5 (31 : 40)

ROW 6 (41 : 47)

ROW 7 (48 : 52)

ROW 8 (52 : 59)

ROW 9 (60 : 67)

ROW 10 (67 : 75)

ROW 11 (76 : 84)

ROW 12 (85 : 93)

ROW 13 (93 : 99)

ROW 14 (100 : 105)

ROW 15 (106 : 117)

ROW 16 (117 : 124)

ROW 17 (124 : 131)

ROW 18 (132 : 141)

ROW 19 (142 : 150)

ROW 20 (150 : 152)

ROW 21 (153 : 162)

ROW 22 (163 : 173)

ROW 23 (173 : 182)

ROW 24 (182 : 191)

ROW 25 (191 : 196)

ROW 26 (196 : 207)

ROW 27 (208 : 214)

ROW 28 (215 : 224)

ROW 29 (225 : 234)

ROW 30 (234 : 242)

ROW 31 (243 : 250)

ROW 32 (250 : 259)

ROW 33 (259 : 268)

ROW 34 (268 : 278)

ROW 35 (279 : 285)

ROW 36 (285 : 293)

ROW 37 (294 : 301)

ROW 38 (301 : 310)

ROW 39 (310 : 319)

ROW 40 (320 : 326)

ROW 41 (327 : 330)

ROW 42 (331 : 338)

ROW 43 (339 : 346)

ROW 44 (347 : 353)

ROW 45 (354 : 362)

ROW 46 (362 : 369)

ROW 47 (370 : 377)

ROW 48 (378 : 386)

ROW 49 (386 : 394)

ROW 50 (395 : 402)

ROW 51 (402 : 409)

ROW 52 (410 : 417)

ROW 53 (417 : 423)

ROW 54 (423 : 431)

ROW 55 (431 : 438)

ROW 56 (438 : 446)

ROW 57 (447 : 455)

ROW 58 (455 : 458)

ROW 59 (458 : 465)

ROW 60 (466 : 473)

ROW 61 (473 : 481)

ROW 62 (481 : 488)

ROW 63 (489 : 495)

ROW 64 (495 : 503)

ROW 65 (504 : 507)

ROW 66 (507 : 512)

ROW 67 (513 : 518)

ROW 68 (519 : 527)

ROW 69 (528 : 534)

ROW 70 (534 : 541)

ROW 71 (541 : 548)

ROW 72 (548 : 551)

ROW 73 (552 : 557)

ROW 74 (557 : 567)

ROW 75 (568 : 574)

ROW 76 (575 : 583)

ROW 77 (584 : 590)

ROW 78 (591 : 597)

ROW 79 (597 : 604)

ROW 80 (604 : 614)

ROW 81 (615 : 623)

ROW 82 (624 : 630)

ROW 83 (631 : 639)

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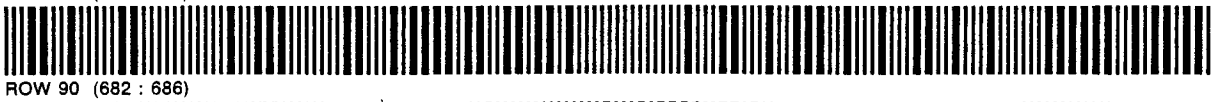
ROW 87 (659 : 668)

ROW 88 (668 : 672)

ROW 89 (673 : 681)



ROW 90 (682 : 686)

ROW 91 (687 : 692)

ROW 92 (692 : 701)

ROW 93 (702 : 713)

ROW 94 (713 : 719)

ROW 95 (720 : 725)

ROW 96 (726 : 733)

ROW 97 (733 : 739)

ROW 98 (739 : 748)

ROW 99 (748 : 751)

ROW 100 (751 : 757)

ROW 101 (758 : 762)

ROW 102 (762 : 764)

ROW 103 (764 : 768)

ROW 104 (769 : 776)

ROW 105 (776 : 780)

ROW 106 (780 : 787)

ROW 107 (787 : 793)

ROW 108 (794 : 802)

ROW 109 (802 : 807)

ROW 110 (808 : 811)

ROW 111 (811 : 813)

ROW 112 (813 : 819)

ROW 113 (820 : 829)

ROW 114 (829 : 838)

ROW 115 (838 : 845)

ROW 116 (845 : 852)

ROW 117 (853 : 862)

ROW 118 (862 : 866)

ROW 119 (866 : 869)

ROW 120 (869 : 874)

ROW 121 (874 : 877)

ROW 122 (878 : 883)

ROW 123 (884 : 887)

ROW 124 (887 : 890)

ADVANCED STAR TREK
NON-PRINTER
PROGRAM REGISTERS NEEDED: 256

USERS' LIBRARY
SPECIAL PROGRAM
NUMBER: 67000-99962

ROW 1 (1 : 6)

ROW 2 (7 : 16)

ROW 3 (17 : 24)

ROW 4 (25 : 30)

ROW 5 (31 : 40)

ROW 6 (41 : 47)

ROW 7 (48 : 52)

ROW 8 (52 : 59)

ROW 9 (60 : 67)

ROW 10 (67 : 75)

ROW 11 (76 : 84)

ROW 12 (85 : 93)

ROW 13 (93 : 99)

ROW 14 (100 : 106)

ROW 15 (107 : 118)

ROW 16 (118 : 125)

ROW 17 (125 : 132)

ROW 18 (133 : 142)

ROW 19 (143 : 151)

ROW 20 (151 : 154)

ROW 21 (154 : 162)

ROW 22 (163 : 174)

ROW 23 (175 : 183)

ROW 24 (184 : 191)

ROW 25 (192 : 198)

ROW 26 (198 : 207)

ROW 27 (208 : 214)

ROW 28 (215 : 225)

ROW 29 (225 : 235)

ROW 30 (236 : 243)

ROW 31 (244 : 250)

ROW 32 (251 : 259)

ROW 33 (260 : 269)

ROW 34 (270 : 279)

ROW 35 (279 : 285)

ROW 36 (286 : 295)

ROW 37 (295 : 302)

ROW 38 (303 : 312)

ROW 39 (312 : 321)

ROW 40 (322 : 331)

ROW 41 (331 : 335)

ROW 42 (335 : 343)

ROW 43 (343 : 351)

ROW 44 (352 : 358)

ROW 45 (358 : 368)

ROW 46 (368 : 377)

ROW 47 (377 : 383)

ROW 48 (384 : 392)

ROW 49 (392 : 398)

ROW 50 (399 : 408)

ROW 51 (409 : 414)

ROW 52 (415 : 423)

ROW 53 (423 : 427)

ROW 54 (428 : 434)

ROW 55 (435 : 442)

ROW 56 (442 : 449)

ROW 57 (449 : 459)

ROW 58 (460 : 466)

ROW 59 (467 : 470)

ROW 60 (470 : 478)

ROW 61 (479 : 485)

ROW 62 (486 : 494)

ROW 63 (494 : 502)

ROW 64 (502 : 508)

ROW 65 (509 : 515)

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ROW 69 (533 : 540)

ROW 70 (540 : 546)

ROW 71 (547 : 553)

ROW 72 (554 : 560)

ROW 73 (560 : 562)

ROW 74 (562 : 571)

ROW 75 (572 : 581)

ROW 76 (582 : 589)

ROW 77 (590 : 596)

ROW 78 (597 : 603)

ROW 79 (604 : 613)

ROW 80 (613 : 621)

ROW 81 (622 : 632)

ROW 82 (632 : 640)

ROW 83 (640 : 648)

ROW 84 (649 : 655)

ROW 85 (656 : 664)

ROW 86 (664 : 666)

ROW 87 (666 : 672)

ROW 88 (672 : 681)

ROW 89 (681 : 685)

ROW 90 (686 : 694)

ROW 91 (695 : 698)

ROW 92 (698 : 702)

ROW 93 (703 : 709)

ROW 94 (710 : 720)

ROW 95 (720 : 729)

ROW 96 (729 : 736)

ROW 97 (737 : 743)

ROW 98 (743 : 749)

ROW 99 (749 : 756)

ROW 100 (757 : 764)

ROW 101 (764 : 768)

ROW 102 (768 : 775)

ROW 103 (775 : 778)

ROW 104 (778 : 779)

ROW 105 (779 : 785)

ROW 106 (786 : 792)

ROW 107 (793 : 796)

ROW 108 (796 : 803)

ROW 109 (803 : 808)

ROW 110 (809 : 817)

ROW 111 (817 : 822)

ROW 112 (823 : 826)

ROW 113 (826 : 828)

ROW 114 (828 : 832)

ROW 115 (832 : 841)

ROW 116 (842 : 850)

ROW 117 (851 : 857)

ROW 118 (858 : 865)

ROW 119 (865 : 875)

ROW 120 (876 : 879)

ROW 121 (879 : 882)

ROW 122 (882 : 887)

ROW 123 (887 : 889)

ROW 124 (889 : 890)

ROW 125 (890 : 894)

ROW 126 (894 : 898)

ROW 127 (899 : 904)

ROW 128 (904 : 907)

ROW 129 (907 : 913)

ROW 130 (913 : 918)

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ROW 132 (924 : 928)

ROW 133 (928 : 933)

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ROW 135 (937 : 943)

ROW 136 (943 : 951)

ROW 137 (952 : 958)

ROW 138 (959 : 962)

ADVANCED STAR TREK
PRACTICE FIRING RANGE
PROGRAM REGISTERS NEEDED: 36

USERS' LIBRARY
SPECIAL PROGRAM
NUMBER: 67000-99962

ROW 1 (1 : 5)

ROW 2 (5 : 9)

ROW 3 (10 : 20)

ROW 4 (21 : 28)

ROW 5 (29 : 39)

ROW 6 (40 : 47)

ROW 7 (47 : 54)

ROW 8 (54 : 62)

ROW 9 (63 : 71)

ROW 10 (72 : 73)

ROW 11 (73 : 80)

ROW 12 (80 : 87)

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ROW 14 (90 : 97)

ROW 15 (97 : 101)

ROW 16 (101 : 108)

ROW 17 (108 : 112)

ROW 18 (113 : 116)

ROW 19 (116 : 124)

ROW 20 (125 : 126)