

Program Submittal

☒ New Program

☐ Revision to
Program No. _____

HP-67 Serial No. 1 6 0 9 A 0 0 5 5 6

HP-97 Serial No. _____

Program Title

Underline 1 or 2
Keywords

6 7 - S T A R T R E K - A D V A N C E D

Keyword(s)

Underlined
in Title

1 S T A R

2 T R E K

No. of Steps

1 1 3

Category No.

9 9 9 8

Category Name

G A M E S

Abstract- 75 Word Maximum

Here are 1113 steps of decision making that put the pressure on you, the captain. You fly the U. S. S. Enterprise on a triaxial coordinate system tracking down Klingon, Romulan, and Vallician war vessels in addition to a stranded Nubian freighter. Functions include advanced sensor system, course controls, shields, phasers, photon torpedoes, transporter, tractor beam, Romulan cloaking device, self-destruct, and even a practice "firing range."

Name

LARRY

G

SCHNEIDER

First

Initial

Last

Address

~~XXXXXXXXXXXXXXXXXXXX~~

1001 Provincial Tower/34 S. Main St.

City

Wilkes-Barre

State

Pa.

Zip Code

18701

Acceptance Choice: ☐ Four Programs or ☒ Two Programs and 10 blank cards. Please credit the free programs to me. Can I possibly receive more than 10 cards due to the length of the program? Thank you...

Submittal Checklist: Please use the checklist below to insure submittal of all the proper program documentation.

☒ Program Submittal

☒ User Instructions

☒ Program Description I

☒ Program Form(s)

☒ Program Description II

☒ Magnetic Card (s)

ACKNOWLEDGMENT AND AGREEMENT

To the best of my knowledge, I have the right to contribute this program material without breaching any obligation concerning nondisclosure of proprietary or confidential information of other persons or organizations. I am contributing this program material on a nonconfidential nonobligatory basis to Hewlett-Packard Company ("HP") for inclusion in its program library, and I agree that HP may use, duplicate, modify, publish, and sell the program material, and authorize others to do so without obligation or liability of any kind. HP may publish my name and address, as the contributor, to facilitate user inquiries pertaining to this program material.

Signature

Larry G. Schneider

Date

9/27/76

Program Description I

Program Title STAR TREK-ADVANCEDContributor's Name LARRY SCHNEIDERAddress 1001 PROVINCIAL TOWER34 SOUTH MAIN STREETCity WILKES-BARREState PA.Zip Code 18701Program Description, Equations, Variables COMPLETE INSTRUCTIONS

THE PROGRAMS: Program #1: Initialization and Long Range Tracking System;

This program starts the game off by generating random coordinates for the four alien vessels, and presetting the Enterprise coordinates, the fuel, the damage control, the sensor memory. In addition, this program controls the long range tracking system, a type of sensor probe used for vessels in deep space. Program #2: Course control and Sensor Probe; This program allows the captain to set the course of the ENTERPRISE and to operate the sensor system. Program #3: Battle Alert. This program does the necessary presetting prior to a battle with an alien vessel. Program #4: Shields and weapon fire; This program allows the user to set the ENTERPRISE shields, to fire its phaser banks, and to fire its photon torpedoes. In addition, it controls weapon fire upon the ENTERPRISE by an alien ship. Program #5: Post-firing operations; This program does the necessary presetting after a battle with an alien vessel. It includes ENTERPRISE self-destruct, a corbomite maneuver, and sensor repair operations. Program #6: Transport/Tractor beam/Docking; This program controls salvaging operations of the Nubian freighter and ENTERPRISE docking at Starbase.

HOW TO PLAY.....

~~Operating Instructions and Warnings~~ Welcome aboard the United Starship Enterprise. You are now the captain of this vessel and must make the decisions regarding the safety of the ship and of the crew. You fly the Enterprise on a triaxial coordinate system, each point corresponding to three coordinates, x, y, and z. This "galaxy" is represented in Fig. 1. You must never take the ship outside this area. Each axis is 100 units long in the positive direction so that you are playing in a cube with the following points as

its corners: 0,0,0; 0,99,0; 99,99,0; 99,0,0; 0,0,99; 0,99,99; 99,99,99

This program has been verified only with respect to the numerical example given in *Program Description II*. User accepts and uses this program material AT HIS OWN RISK, in reliance solely upon his own inspection of the program material and without reliance upon any representation or description concerning the program material.

NEITHER HP NOR THE CONTRIBUTOR MAKES ANY EXPRESS OR IMPLIED WARRANTY OF ANY KIND WITH REGARD TO THIS PROGRAM MATERIAL, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. NEITHER HP NOR THE CONTRIBUTOR SHALL BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES IN CONNECTION WITH OR ARISING OUT OF THE FURNISHING, USE OR PERFORMANCE OF THIS PROGRAM MATERIAL.

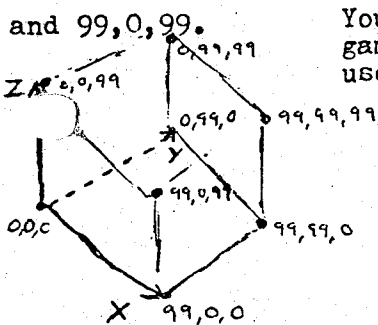


FIGURE 1

Your primary objective when playing Star Trek is to finish the game; that is, don't get blown up! No matter how much fuel you use, the ship, the crew, and you are no good to starfleet command blown "sky" high! Of secondary importance is your fuel. For the purposes of this game, fuel starts at 0 and increases. Hence, at the game's end, you will know how much fuel you have used up. Your goal each time you play Star Trek is to use the least amount of fuel possible. In this way, you can compare your play from one game to the next.

Aside from the Enterprise, there are four other vessels that play in this game (all represented by the calculator). Three of these are enemy vessels and they are (BEGINNING WITH THE STRONGEST): Klingon warship, Romulan warship,

Vallician warship. The fourth vessel is a friendly, stranded, Nubian freighter which you must salvage at one point or another during the game. The warships on the otherhand must be destroyed! The (x,y,z) coordinates of the Enterprise are always displayed in the following way: XX.OYYOZZ where XX, YY, and ZZ are the x,y, and z coordinates (from 00 to 99) and the O's are placeholders. The coordinates of the other ships are stored in their respective registers in a slightly different format: 1XX.1YY1ZZI where XX, YY, and ZZ are the x,y, and z coordinates, the 1's are placeholders, and I is the identification number of the vessel (Klingon=2, Romulan=3, Vallician=4, and Nubian=1). However, anytime these coordinates are displayed, they are done so in the same format shown for the Enterprise. In addition, the ID numbers for each alien vessel correspond to the secondary storage registers where their coordinates are stored.

PLAYING THE GAME..... The 6 program cards for Star Trek are for the most part ordered in the sequence in which you will use them. After running card 1 through the reader (both sides), it should be placed in the slot above the user-defineable keys and left there for the game's entirety. The labels for this card are as follows: A--(Course) change; a--(Course) steady; B--Sensor probe; b--Weapons SB; C--Phasers; c--Dock; D--Photon Trpd's; ~~E--TTB/Prac.~~; E--TTB/Prac.; e--Init. To begin the game, one must first input a random "seed" between 0 and 1 such as .1234567898 or .493768209. Try a practice game now. Input the seed .5514650293 (after reading card 1 of course). Now hit ~~134~~. The program is now presetting the secondary storage registers. In addition, it is also running through the Long Range Tracking System. LRTS is used as an aid in tracking down any one of the four ships randomly situated on the axes. Operating the LRTS uses up 250 units of fuel EXCEPT for the first time it is run which is now directly following initialization. You may use this system anytime during the game (it is operated directly by reading card 1 ~~again~~). Note that the result 134 is blinking. ALL KEYSTROKES DURING STAR TREK ARE DONE DURING THE BLINKING PROCESS. In other words, a program should never stop running until the game is completely over. Even the magnetic cards are read during the blinks. Should you accidentally hit a key outside of the blink "window", the program will stop. Usually you can set things straight again by simply hitting R/S. This goes also if an entry you make should cause the display to say ERROR. Let's return now to our program which is now blinking 134 (Complete initialization takes from 45 to 60 seconds). 134 is called the mission sector and supplies us with information regarding the position of one alien vessel. Each digit of the mission sector corresponds to the range of the coordinate values, x,y, or z. For example, if the first digit of the mission sector was 1 (which it is), we would know that the x value of one of the alien ships is between 0 and 24 inclusive. 2 would correspond to a value between 25 and 49, 3, between 50 and 74, and 4, between 75 and 99. Thus in this example, one of the alien vessels has an x value from 0 to 24, a y value from 50 to 74 and a z value from 75 to 99. As a result of this information, we can now set a course for the Enterprise which is not totally derived from conjecture. We can set a course which would send us in the general direction of the mission sector. With luck, we'll come within range of another ship on the way, fight IT, and then still know in which direction to head for another alien contact. One word of advice regarding LRTS. Try not to overdo running this program unless you have absolutely no idea where to start looking for the enemy. 250 units of fuel can certainly go toward a better cause!

ENTERPRISE COURSE CONTROL.....

Now during one of the blinks of 134, read in both sides of card 2. Note that the program never stops running but goes directly onto the program on the new card. blinking in the display is the number 0.000000. This represents the Enterprise

Program Description I

Program Title STAR TREK-ADVANCED

Contributor's Name LARRY SCHNEIDER

Address

City

State

Zip Code

~~Program Description~~ Equations, Variables coordinates which are now 0,0,0 (Starbase 0). Moving the Enterprise requires three inputs, the distance and two angles represented by ϕ and θ . Once input here, a value will be retained in the display. For example, hit the following keys all during one blink: 3 ENTER 2 ENTER 1 ; 1.000000 is now in the x register (and display), 2 is in the y register, and 3 in the z register. The same can be accomplished is you hit 3, let it blink, hit 2, let it blink, and then hit 1. Note however if you hit 3, let it blink, 2 ENTER, let it blink, and 1 the registers (from T to X) will be 3,2,2, and 1. The point of all of this is to show you that inputting values for course change need not be hurried but they must be input correctly or else your values will not be positioned correctly in the stack (R(distance) in the z register, ϕ in the y register, and θ in the x register and display.). A course change may be implemented at any time EXCEPT when you are u

ENEMY vessel is fewer than 35 units away from the Enterprise). Fuel drain for movement is calculated from 5 times the value of R (the distance moved) or 6 times R when the tractor beam is on (more about that later). The first input necessary as mentioned is the variable R. There is no limit to this input. An advantage of taking shorter jumps from one point

Operating Limits and Warnings
 xxxxxxxxxxxxxxxx to another is that in conjunction with the sensor system, one might be able to more accurately determine the angular inputs that are best in directing the ship toward an enemy vessel. The second input is the azimuthal or horizontal angle, ϕ . This angle represents your direction on the horizontal plane; thus, it would correspond to the angle you would use on a two dimensional X,Y coordinate system (0 degrees to the right, 90 degrees forward, 180 degrees to the left, etc..)

This program has been verified only with respect to the numerical example given in *Program Description II*. User accepts and uses this program material AT HIS OWN RISK, in reliance solely upon his own inspection of the program material and without reliance upon any representation or description concerning the program material.

NEITHER HP NOR THE CONTRIBUTOR MAKES ANY EXPRESS OR IMPLIED WARRANTY OF ANY KIND WITH REGARD TO THIS PROGRAM MATERIAL, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. NEITHER HP NOR THE CONTRIBUTOR SHALL BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES IN CONNECTION WITH OR ARISING OUT OF THE FURNISHING, USE OR PERFORMANCE OF THIS PROGRAM MATERIAL.

This angle must be within the range 0 to +180 and -1 to -179. The third input is the angle of elevation, θ , or the vertical angle and must be in the range -90 to +90. (-90 corresponds to going directly downward while +90 is upward). Note that if this is neither +90, it makes no difference what the horizontal angle is. Should θ ever equal +90 degrees, use the convention of setting ϕ equal to 0 (this is important when firing weapons). Let's try a few operations for practice. To move five units to the right, we would hit 5 ENTER 0 ENTER 0 A (course change). The Enterprise coordinates are now 5,0,0. To move another 5 units to the right, one need only press f A (course steady). Do that now and see the new coordinates 10,0,0. Move 5 units straight up: 5 ENTER 0 ENTER 90 A...coordinates are now 10,0,5. Now 5 units forward: 5 ENTER 90 ENTER 0 A...The coordinates are now 10,5,5. By hitting 12 ENTER 153 CHS ENTER 24 CHS A, the Enterprise will return to Starbase 0 (0,0,0). The Enterprise coordinates will not change under the following conditions: 1) The Enterprise is under attack (an enemy vessel is less than 35 units away); if this is the case, Code 1 will be displayed. or 2) The new Enterprise coordinates would not lie in the range specified on the first page of instructions; if this is the case, the user WILL be charged for the fuel that would normally have been needed! The Sensor Probe program on card 2 is used to determine distances to alien vessels. Once the distance separating the Enterprise and an alien vessel is less than 40, the identification of the vessel will be revealed (unless sensors have been damaged---more about that later). At a distance of under 35 units, the Enterprise is considered to be under attack and cannot move. Starfleet orders clearly state that the Enterprise must stay and fight the enemy ship until the last possible moment. With the display blinking 0.000000, hit B to operate Sensor Probe. The number that comes up is -81.351091. This represents the distance in units to the ship closest to the Enterprise but more than 40 units away. It is the last output from sensor probe and is recognized by the negative sign. The display then returns to the Enterprise coordinates 0,0,0. Given the mission sector 134, hit the following keys to set the course for the Enterprise: 23 ENTER 60 ENTER 70 A. The new coordinates are 3,6,21. Move another 23 units in the same direction by hitting f A...the new Enterprise coordinates are 6,12,42. Now hit B again for another Sensor Probe. The first number displayed is 338.340579. An alien vessel is fewer than 40 units away (this is a positive number). To be precise, its distance is 38.340579 units. The first digit is the vessel's I.D. number. In this case, 3 represents the Romulan warship. Note the Enterprise is not yet under attack by the Romulans. The next output (and the last since it is negative) is -71.561163 is again the distance of the closest vessel more than 40 units away. Finally we see the Enterprise coordinates again, 6,12,42/ When the Enterprise is fighting an enemy vessel, a number of variables are used to determine the status of both ships. One very important value is the distance separating the two ships. It is probably best to be as far away from the enemy as possible when fighting it (i.e.; closer to 35) since the closer you are, the harder is the Enterprise hit by enemy fire. Then again, also keep in mind the enemy since Klingon fire is more dangerous than Vallician fire. Let us move in 5 more units by hitting 5 ENTER 60 ENTER 70 A...coordinates: 6,13,46. Now hit B, Sensor Probe. The first ϕ value is 334.539832 (Romulan warship firing upon the Enterprise and at a distance of 34+ units), the second and last (negative sign!) is -67+ (no need to explain), and then code 1 is shown (Note: Codes are recognized easily because they are always displayed in scientific notation...the only number important is the one to the left...the exponent is not relevant). Code 1 tells us that the Enterprise deflectors have automatically turned on due to the attack of the enemy Romulan. Note that a course change can no longer be made (try inputting values and hitting A!). As captain you must immediately signal BATTLE ALERT. Do this by reading card 3. The new number displayed is 0.0030. This lets us know what ships are attacking us. In this example, the Romulan is the only one. Input now the vessel you wish to fight (first). If you input a number of a vessel not in range, code 4 will be displayed (see CODES and EXPLANATIONS). Our only choice now is the Romulan, #3 so input 3 now. The program will continue by itself. The first thing displayed is CODE 3 (this will only be displayed if we are fighting a Romulan). The Romulan cloak is being used. What does this mean? When you fire your weapons at the enemy later on, you will need to input ϕ and θ as your guesses of the angles to the enemy. Your deviation from the actual angles is a factor in how well you've hurt the enemy ship. The Romulan cloak varies these actual angles by up to 9 degrees in either direction. The cloak drains energy from the Romulan ship so that the more ~~the more~~ the angles are varied, the easier the Romulan fire is on the Enterprise. So keep in mind the angles you'll be estimating aren't necessarily the correct ones in this case!

Program Description I

Program Title	STAR TREK-ADVANCED		
Contributor's Name	LARRY SCHNEIDER		
Address			
City	State	Zip Code	

~~PROGRAM DESCRIPTION, EQUIPMENT, VARIABLES~~ The last output from Battle Alert is the distance (rounded to a whole number)...We see here that the distance is 34.0000. Now read in card 4, shields and weapon fire. The distance is still displayed. The very first input now should be the initial setting for the shields. The shields value must not exceed 99. When selecting a shields value, consider the enemy ship, the distance, and the difference of the Enterprise and Enemy ship status (to be explained soon). It's probably best to start off with a relatively high value and gradually drop it every so often if you find yourself doing better. The number you will be seeing when running this program tells you much information. It is formatted like so: D D . O S_e S_e O S_v S_v S S where D D is the distance to the enemy, S_eS_e is the Enterprise status, S_vS_v is the attacking vessel status, and S S is the value of the shields. Status of either ship is a value ranging from 0 (no damages) to 100 (vessel blown up). Your objective is to get the enemy status to 100 before the Enterprise status gets there in as few rounds of firing as possible. After the first setting of the shields, the Enterprise will be hit by enemy fire. After that, no change in status will occur following a resetting of the shields value. To set or change the shields value, simply input ~~operating instructions~~ the setting. After reading in card 4, hit 80...the program will continue by itself. Note the shields setting is confirmed as 80 (last two digits) and the new Enterprise status is 4. Actually this is a small change in status compared to the average enemy fire. The reason the change is so low is because the cloak is being heavily used, and the distance is the largest possible, 34. When firing weapons, two angles must be input, 0 and 9. In this example, there are immediately two things going against you: 1) the fact that the cloak is on heavily

This program has been verified only with respect to the numerical example given in *Program Description II*. User accepts and uses this program material AT HIS OWN RISK, in reliance solely upon his own inspection of the program material and without reliance upon any representation or description concerning the program material.

NEITHER HP NOR THE CONTRIBUTOR MAKES ANY EXPRESS OR IMPLIED WARRANTY OF ANY KIND WITH REGARD TO THIS PROGRAM MATERIAL, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. NEITHER HP NOR THE CONTRIBUTOR SHALL BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES IN CONNECTION WITH OR ARISING OUT OF THE FURNISHING, USE OR PERFORMANCE OF THIS PROGRAM MATERIAL.

and 2) θ is calculated from the exact distance and now you are only given the distance rounded off (which could vary the angle several degrees)...this is the error in the Enterprise sensor system...it generally doesn't cause any problem. Guessing angles is a tricky business and the hardest duty you have as Captain. Included in this game is a program on "target practice" (on card 5). Later, hints will be given on how to best estimate these two firing angles. There are two differences between phasers and photon torpedoes: 1) Photon torpedoes increase the enemy ~~ix~~ status twice as much as would have been if phasers were fired (note: phasers: change in status=5; photon's: change in status=10.....phasers: change in status=0; photon's: change in status=0) and 2) Fuel cost is 2 and 2/3 greater. Why then not fire phasers twice instead of photon torpedoes once? Because each time you fire upon the enemy they fire back and the difference in enemy and Enterprise status is an important factor in determining the new Enterprise status. Knowing exactly when to use your photon torpedoes is a skill that must be developed. It wouldn't be too difficult for the average player to quickly destroy the Romulan under these conditions. Shown below are a poor player's inputs in order to demonstrate the workings of this program. Before firing weapons, ~~fB~~ must be hit. The Enterprise coordinates will then be displayed (three pauses) and will be recognized as a negative number. These will alternate with the Alien coordinates (positive). To fire, simply hit \emptyset ENTER \emptyset and then C for phasers or D for photon torpedoes. Once an angle is input, it will be held for an extra cycle of pauses so that you need not be hurried in inputting the second angle or the firing label (C or D). For your first shot, you are given approximately 45 seconds of coordinate pausing to input your angles and fire before the enemy fires back. Each successive shot reduces the timer by 10 seconds (until 5 seconds are reached at which point you are given 5 seconds for every shot thereafter). Here now are the inputs of that poor player: (the status display is presently 34.00400080)

Weapons SB ^{STAND-BY}	Angles	New shields setting	Display
fB	-15,80 C		34.00800080
fB	-17,80 C		34.01300080
fB	-15,82 C		34.01800080
		90	34.01800090
fB	-13,78 C		34.02200190
fB	-11,78 C		34.02700290
fB	-10,75 C		34.03200490
fB	-10,73 C		34.03700790
fB	-10,73 D		34.04201390
fB	-8, 73 C		34.04701690
fB	-8, 71 C		34.05202090
fB	-8, 69 C		34.05702590
fB	-8, 67 C		34.06203190
fB	-6, 67 C		34.06703990
fB	-6, 65 C	CODE \emptyset displayed	34.07000090 (34.07100090)
The sensors have been damaged...you must now continue without knowledge of the enemy's status.			
fB	-6,65 C	CODE \emptyset displayed	34.07500090
fB	-6, 65 D	Enemy destroyed	-5.
			64. Actual \emptyset
			0. Actual \emptyset

This ends with the blinking zero. Normally the last blinking digit would be the I.D.# of the alien vessel destroyed. The 0 is blinking because the sensors have been damaged. Eventually one might receive a code 5. This means the shields have been knocked out. You can either try ONE more shot to destroy the enemy (if you don't you're a dead duck!) or go immediately to card 5 for the corbomite maneuver (tricking the enemy into retreating...however, you will meet him again before the game's end). If you go to card 5 before receiving code 5, the Enterprise will self-destruct. To summarize, go on to card 5 immediately following the destruction of the enemy (blinking I.D.), after receiving code 5 and wishing to play it safe, or before receiving code 5 and wishing to blow up the Enterprise yourself. No doubt the first couple of times you fight an enemy vessel, you'll probably be blown up. It takes experience...and lots of practice to be a captain of a starship.

Back to the game. Since we have destroyed the enemy (if you haven't already done the

Program Description I

Program Title	STAR TREK-ADVANCED		
Contributor's Name	LARRY SCHNEIDER		
Address			
City	State	Zip Code	

~~Program Description I~~ series of keystrokes above, do so now), we can now read in card 5. The program will continue automatically and determine what to do 1) generate new coordinates for the enemy (it has retreated) 2) self-destruct or 3) none of the above--the enemy has been destroyed. In cases 1 and 3, the last output will be the Enterprise coordinates signalling you to continue on to your next mission. In this example, presetting is done quickly and the Enterprise coordinates appear in the display: 6,13,46. There are two more things to discuss. Return now to card #2 and read it in. Now hit 75, ENTER 52 ENTER 17 A for a course change...new Enterprise coordinates: 50,69,67. Now hit B, Sensor Probe. The first output is 18.055470. It is positive...but why isn't the vessel I.D. present? Because our sensors were damaged in the last battle. How does one repair the sensors? There are two ways 1) By docking at starbase (to be explained later) or 2) By destroying an enemy vessel in battle and keeping the Enterprise status under 51. In this case, repairs will be done in the program on card 5. Repairs are signalled by code 6. Back to the output 18+. Since this value is under 35, we are probably under attack (if this was the case, which it isn't, we wouldn't receive a choice of combat when we ran Battle Alert). The second output is -41+ (no need to explain). The third output is CODE -1. So we are not under attack. We are receiving communications from a stranded Nubian freighter (which is 18+ units away) (if sensors were operating, the first output would have been 118+). The fourth output is CODE 0 (reminding us that sensors are damaged). Finally the coordinates again. If a Nubian is fewer than 35 units away, the Enterprise is still capable of being moved. If both a Nubian and an enemy vessel are within range, the Nubian gets priority and must be

These figures were calculated to get the Enterprise to a specific location. For reasons of Nubian salvaging explanation.

This program has been verified only with respect to the numerical example given in Program Description II. User accepts and uses this program material AT HIS OWN RISK, in reliance solely upon his own inspection of the program material and without reliance upon any representation or description concerning the program material.

NEITHER HP NOR THE CONTRIBUTOR MAKES ANY EXPRESS OR IMPLIED WARRANTY OF ANY KIND WITH REGARD TO THIS PROGRAM MATERIAL, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. NEITHER HP NOR THE CONTRIBUTOR SHALL BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES IN CONNECTION WITH OR ARISING OUT OF THE FURNISHING, USE OR PERFORMANCE OF THIS PROGRAM MATERIAL.

salvaged before going into battle with the enemy vessel. When the Nubian appears in the sensor probe, it does not have to be salvaged immediately; If you wish, you can pick it up later. Remember that towing it costs extra fuel in both movement and also when operating the shields in battle. However, it might not be convenient to go out of the way to pick it up later. The choice is yours. UNDER NORMAL CONDITIONS (SENSORS NOT DAMAGED) THE COORDINATES OF THE NUBIAN FREIGHTER WOULD BE DISPLAYED WHEN RUNNING SENSOR PROBE IF THE NUBIAN WERE FEWER THAN 35 UNITS AWAY...THE NUBIAN COORDINATE FORMAT WOULD BE 1.XXYZZ...IT WOULD BE DISPLAYED WITH SCIENTIFIC NOTATION. With sensors damaged, you must salvage without knowing the coordinates. Salvaging the Nubian involves beaming (transporting) the occupants aboard the Enterprise and towing the vessel with the Enterprise tractor beam. All of this can only be done when the Nubian is fewer than 10 units away. Once this is accomplished salvaging can be accomplished. Input now: ~~XY~~5X 10 ENTER 52 ENTER 17 A. The new Enterprise coordinates are 55, 76, 69. Check the distance to the Nubian. Hit B. The distance is now 9.48+. Close enough for salvaging operations. Once coordinates of the Enterprise are returned to the display, read in card 6. Press E. Negative Enterprise coordinates signify completion of salvaging operations and tractor beam on. Docking at Starbase is similar. The Enterprise must be fewer than 10 units away from coordinates 0,0,0. In addition, no alien vessels must be in the vicinity. If there are, code 8 will appear and you should go immediately to card 2 and run the Sensor Probe program. Such an alien vessel must be destroyed before the starbase shields are lowered. Once you are within range, go to card 6 and hit f C. The Enterprise coordinates will become 0,0,0. The Nubian will be released and out of tow. Repairs will be completed on sensors. (Note that the latter two events will occur only under the right conditions...Nubian being towed for the former, sensors damaged for the latter.). The Enterprise coordinates 0,0,0 will be displayed if you must go out again. If the three enemy vessels have all been destroyed and the Nubian freighter salvaged, code 9 will appear and the fuel will be displayed. The game is over!

TARGET PRACTICE PROGRAM---CARD 5

The two angles used in firing weapons are derived from two right angle triangles. Figure 2 shows the representation of ϕ . The side opposite to the angle is the difference in y values (enemy y value minus Enterprise y value) while the adjacent side is the difference in x values. Figure 3 shows how θ is formed in a triangle whose side opposite to the angle is the difference in z values and whose hypotenuse is the distance. The Star Trek beginner can use triangles such as these to help him estimate the firing angles. He may also choose to memorize some key ratios and corresponding angles as shown in Figure 4.

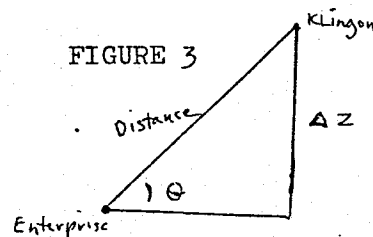
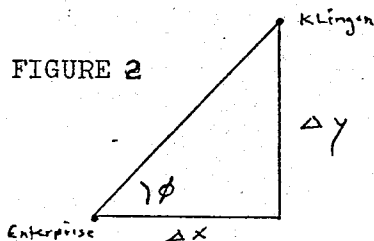


FIGURE 4

absolute value of $\Delta Y/\Delta X$		ϕ	absolute value of $\Delta Z/D$		θ
0		0	0		0
1/2	1/4=14*	26.5*	1/8		7*
1	3/4=37*	45	1/4		14.5*
3/2	5/4=51*	56*	3/8		22*
2	7/4=60*	63.5*	1/2		30
3		71.5*	5/8		39*
4		76*	3/4		48.5*
6		80.5*	7/8		61*
10		84*	33/34 ^o		76*
20		87*			

*approximation ^olargest possible angle

Program Description I

Program Title

STAR TREK-ADVANCED

Contributor's Name

LARRY SCHNEIDER

Address

City

State

Zip Code

~~Program Description, Equations, Variables~~ Read card 5 in now. * Input a seed between 0 and 1 (say, .1234566789). Hit E. The first number output will be the distance between the Enterprise and the alien; in our example, it is 20.22+. The next output will be the Enterprise coordinates (negative sign). For purposes of target practice, the Enterprise coordinates will always be 50.050050 or 50,50,50. These will blink three times. The next output are the coordinates of the alien vessel; in our example, 59.048032 or 59,48,32. These, too, will blink three times. Finally, the distance is displayed again. These last three inputs will keep repeating until two angular inputs are made separated by an ENTER. Figures 5 and 6 show the triangles that would be used for these angles.

* FIRST, TURN HP-67/97 OFF, THEN ON.

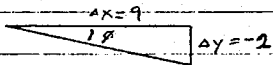


FIGURE 5 $|Y/X| = .222...$

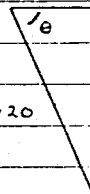


FIGURE 6

$|Z/D| = .900$

The angles made be input during any blink.

Keep in mind that when playing Star Trek,

you see the exact distance in Sensor Probe and the "rounded-off" distance during weapon fire. Let's input as our guesses the numbers -10

~~Operating Limits and Warnings~~ and -60 (10 CHS ENTER 60 CHS). The next output from the program will be the correct horizontal angle (-12.5+). Following this will be the correct vertical angle (-62.8+) and finally --how far off we were-- (5.4+). A new problem is then generated and you can try again!

--SHIELDS AND WEAPON FIRE FUEL COST AND STATUS CHANGE--

The fuel needed for the shields is equal to twice the value set for the shields (three times the value if you are towing the Rubian freighter).

This program has been verified only with respect to the numerical example given in Program Description II. User accepts and uses this program material AT HIS OWN RISK, in reliance solely upon his own inspection of the program material and without reliance upon any representation or description concerning the program material.

NEITHER HP NOR THE CONTRIBUTOR MAKES ANY EXPRESS OR IMPLIED WARRANTY OF ANY KIND WITH REGARD TO THIS PROGRAM MATERIAL, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. NEITHER HP NOR THE CONTRIBUTOR SHALL BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES IN CONNECTION WITH OR ARISING OUT OF THE FURNISHING, USE OR PERFORMANCE OF THIS PROGRAM MATERIAL.

Hence, if the shields setting is 75, the fuel cost is 150 (225 if the Nubian is being towed...The Enterprise must provide extra shields protection for this ship). Phasers require 3 times the distance in fuel units while Photon Torpedoes require 8 times the distance (rounded off). Shields and firing fuel drain is calculated each time the weapons are fired.

Here are the formulae used for calculating change in enemy and Enterprise status:

$$\Delta S_e = \text{INT} \left\{ \frac{(6-I)(10000)(S_e - S_v + 100)^2}{(D)(10 \times S)^2} \right\}$$

$$\Delta S_v = \text{INT} \left\{ \frac{((0.1 - 0.03 \cdot \text{LN}(A)))(S_v - S_e + 100)^2 (W)}{D} \right\}$$

*To make the game more challenging, this number can be changed to $-0.04(\text{LN}(A))$. See program step # 111 on card # 4.

WHERE:

- ΔS_e = the CHANGE in Enterprise Status
- ΔS_v = the CHANGE in Attacking Vessel Status
- I = the I.D.# of the attacking Vessel (2 for the Klingon, 3, 4, or 5 for the Romulan*, and 4 for the Vallician)
- S_e = ENTERPRISE STATUS
- S_v = ATTACKING VESSEL STATUS
- D = Distance (rounded to a whole number)
- S = The shields setting
- LN = Natural log
- A = the SUM of the ABSOLUTE VALUES of the DIFFERENCES of the two guessed angles and the two correct angles
 $(|\phi_{\text{guess}} - \phi_{\text{correct}}| + |\theta_{\text{guess}} - \theta_{\text{correct}}|)$
- W = 1 for Phasers and 2 for Photon Torpedoes

*The more the Romulan cloak is used, the higher is the value of the I.D.# and the lower is the change of Enterprise Status for any set of values.

A rare occurrence: Should the positions of the enemy and the Enterprise happen to be such that the two firing angles can be deduced exactly (for example Enterprise=15,15,15; Enemy= 15,45,15; $\phi = 90$, $\theta = 0$), you should input one angle with an added error (for example, input 0.001 instead of 0.000) since two correct inputs would cause an error display when the calculator tries to compute LN(A) (see S_v formula above).

Should you know the vertical angle to be 90 degrees, inputting 0 and 90 as the angles would cause an error display. Rather input 0.001 and 90 or 0.000 and 90.001.*

*Recall that if $\theta = 90$ degrees, the calculator sets ϕ equal to 0.

Sketch(es)

CODES AND EXPLANATIONS

All codes are displayed in scientific notation.
The number to the left is relevant...the exponent to the
right is not.

~~XXXXXX~~ Sample Problem(s)CODE #EXPLANATION

0	Sensor system damaged from enemy phaser attack.
1	Deflectors on--Enterprise under attack.
-1	Enterprise receiving communication from Nubian freighter. It is stranded and requires assistance.
2	Docking at Starbase 0 completed.
3	Romulan warship employing the cloaking device.
4	Alien vessel out of range.
5	Enterprise shields knocked out.
6	Sensor system repairs completed
7	Enterprise out of range (for TTB, docking, etc...)
8	Alien vessel in the area. Starbase 0 will not lower their shields to allow the Enterprise to dock.
9	GAME OVER

~~Solution(s)~~

-9	Enterprise on SELF-DESTRUCT (3 second countdown).
9.999999999 99	Enterprise destroyed by enemy vessel.

Reference(s)

2

[illegible]

User Instructions

CARD # 2

00369D

COURSE CONTROL/SENSOR SYSTEM

1 COURSE--

f-steady

-change sensors

2

[illegible]

User Instructions

CARD # 3

BATTLE ALERT

1

6

[illegible]

User Instructions

CARD # 4

Page 15 of 29

SHIELDS/WEAPON FIRE

fWEAPONS

PHASERS PHOTON T.

[illegible]

User Instructions

CARD # 6

TTB/Docking

f DOCK

TTB

TTB/Docking

1

f DOCK

2

TTB

[illegible]

Program Listing I

Program 1

Page 18 of 29

00369D

KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
001	STOD	If prgm. is running, Go to A.R.T.S.	057	P2S		
002	*LBL0	Initialize	058	*LBL2		
003	CLRG		059	GSB9		Random #
004	STOD	Store Seed	060	4		
005	4		061	X		
006	STOI		062	1		
007	1		063	+		
008	STOF	Set damages off	064	INT		
009	*LBL0		065	STOI		
010	6		066	RCL1		Random ship
011	STOF		067	EEX		
012	STOA		068	3		
013	RCL1		069	X=Y?		Already destroyed?
014	1		070	GT02		New random ship
015	X=Y?	Nubian coordinates?	071	R4		
016	SF0	Set flag to store in R59	072	X<0?		Toned Nubian?
017	*LBL1		073	GT02		New random ship
018	GSB9		074	STOA		
019	EEX		075	CLX		
020	2		076	STOB		
021	X		077	3		
022	INT		078	STOI		
023	STOB		079	*LBL3		
024	F0?	Nubian?	080	RCLA		
025	GSB5	Yes - Add to R59	081	INT		
026	RCLB		082	EEX		
027	EEX		083	2		
028	2		084	-		
029	+	random coordinate	085	2		
030	RCL6		086	5		
031	10*		087	÷		
032	÷	Position coordinate	088	1		
033	ST+1		089	+		
034	3		090	INT		
035	ST-6		091	RCL1		
036	RCL6		092	1		
037	0		093	-		
038	X=Y?		094	10*		
039	GT01	New coordinate	095	X		Position in Mission Sector
040	RCL1	Add FD of ship	096	RCLB		
041	F0?		097	+		
042	ST+9		098	STOB		
043	EEX		099	RCLA		
044	7		100	FRC		
045	÷		101	EEX		
046	ST+1		102	3		
047	DSZ1		103	X		
048	GT00	New ship	104	STOA		
049	2	set Fuel = -250 so	105	DSZ1		
050	5	that fuel lets run	106	GT03		
051	0	costs no fuel.	107	2		
052	CHS		108	5		
053	STOF		109	0		
054	P2S		110	ST+6		Add 250 to Fuel.
055	CLRG		111	RCLB		Mission Sector
056	*LBL0	Long Range Tracking System (LRTS)	112	P2S		

REGISTERS

REGISTERS										
	1	2	3	4	5	6	7	8	9	
0	S1 Seed	S2 Nubian	S3 Klingen	S4 Romulan	S5 Vulcanian	S6 Enterprise	S6 Counters/ Fuel	S7 Damages OFFER FUEL	S8 ships in vicinity	S9 Nubian
Counter for Registers S1 Positions		B used / mission sector		C		D		E		I counter

Program Listing II

Program 1

Page 19 of 29

00369D

TEP KEY ENTRY KEY CODE

COMMENTS

STEP

KEY ENTRY

KEY CODE

COMMENTS

113 PRTX
114 *LBL4
115 PSE
116 GT04
117 *LBL9
118 RCL0
119 Pi
120 +
121 5
122 Y*
123 FRC
124 ST00
125 RTN
126 *LBL5
127 RCL4
128 10*
129 ÷
130 ST+9
131 RCL4
132 2
133 -
134 ST0A
135 R↓
136 RTN
137 R/S

Random # generator

New seed

Nubian coordinates

Reset Counter

170

180

190

200

210

220

LABELS

FLAGS

SET STATUS

B

C

D

E

0

Nubian Coordinates

FLAGS

TRIG

DISP

b

c

d

L.R.T.S.

e

Initialize

1

ON OFF

0 ☐ ☒

DEG ☒

FIX ☒

1 ☐ ☐

GRAD ☐

SCI ☐

2 ☐ ☐

RAD ☐

ENG ☐

3 ☐ ☐

✓

✓

✓

✓

✓

✓

✓

Program Listing 1 - Program 2

Page 20 of 29

00369D

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
001	*LBL1			057	INT		
002	FIX			058	PZS		
003	PZS			059	ST+6		
004	RCL1			060	RCL5		
005	ENT1			061	PZS		
006	ABS			062	R1		
007	=			063	*LBL0		
008	RCL5		Nubian towed? If yes	064	R1		
009	PZS		(n.<0) Make Enterprise negative.	065	ENT1		
010	X			066	FRC		
011	*LBL8			067	EEX		
012	PSE			068	3		
013	GT00			069	X		
014	*LBLA			070	XZY		
015	ST06			071	INT		
016	R1			072	RCL1		
017	ST0C			073	+		
018	XZY			074	INT		New Coordinate
019	ST04			075	XK0?		
020	RCL6			076	GT01		
021	SIN			077	EEX		
022	RCL4			078	2		
023	X			079	XZY?		
024	ST01			080	GT01		
025	RCL6			081	XZY		
026	COS			082	RCL6		
027	RCL4			083	10*		
028	X			084	=		
029	ST06			085	ST+7		
030	RCLC			086	3		
031	SIN			087	ST+6		
032	RCL6			088	DSZI		
033	X			089	GT00		
034	ST02			090	RCL7		New Enterprise coordinates
035	RCLC			091	PZS		
036	COS			092	ST05		
037	RCL6			093	PZS		
038	X			094	GT01		
039	ST03			095	*LBLB		Sensor Probe
040	*LBLa			096	CLX		
041	GSB7		Check for ship in vicinity	097	PZS		
042	3			098	ST08		
043	ST01			099	RCL6		
044	PZS			100	P1		
045	RCL1		Nubian	101	+		
046	PZS			102	5		
047	0			103	Y*		
048	ST06			104	FRC		
049	ST07			105	ST00		
050	XZY?		Nubian Towed?	106	RCL7		Damage Register
051	1		Yes - Fuel cost = 6 x R	107	PZS		
052	ENT1		No - Fuel cost = 5 x R	108	SCI		
053	5			109	X=0?		Damage?
054	+			110	PSE		Display code 0
055	RCL4			111	FIX		
056	X		Fuel cost	112	EEX		

REGISTER

I.D.	1	2	3	4	5	6	7	8	9
	ΔZ	ΔY	ΔX	R		$\theta / R \cos \theta$	New Enterprise Coordinates		
Seed	S1 Nubian	S2 Klingon	S3 Romulan	S4 Vulcan	S5 Enterprise	S6 Fuel	S7 Damage in vicinity	S8 ships in vicinity	S9 Nubian
	B Used for counter	C ϕ	D I.D. Nubian Coordinates	E	I Counter				

EP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
	113	3		169	X≠Y?		Close enough for Battle
	114	ST08		170	GT06		No
	115	R1	Random #	171	RCL0		Ship I.D.
	116	4		172	ENT1		
	117	X		173	10*		
	118	1		174	=		
	119	+		175	P≠S		Add to "ships in vicinity"
	120	INT		176	ST+8		register
	121	ST00		177	P≠S		
	122	ST08		178	*LBL6		
	123	*LBL2		179	GSBe		Print distance within w/o I.D.
	124	RCL0		180	*LBL5		
	125	ST01		181	ISZ1		Increment Register 0
	126	P≠S		182	5		
	127	RCL1	Alien coordinates (XX.YYZZ	183	RCL0		
	128	RCL5	Enterprise " XX.OYX.PZZ	184	X=Y?		R ₀ =5?
	129	P≠S		185	1		Yes - Set it to 1.
	130	-		186	ST00		
	131	3		187	RCL6		Value marking end of loop.
	132	ST01		188	X≠Y?		
	133	CLX		189	GT02		
	134	ST07		190	RCL8		Smallest D ≥ 40
	135	R↓		191	CHS		
	136	*LBL3		192	PRTX		
	137	ENT1		193	GSB7		Check for ships in vicinity
	138	INT		194	GT01		
	139	EEX	C = X, Y, or Z	195	*LBL7		
	140	2		196	P≠S		
	141	-	C - C ₀	197	RCL8		ships in vicinity
	142	X ²	(C - C ₀) ²	198	P≠S		
	143	ST+7		199	X=0?		No ships around
	144	R↓		200	RTN		Return
	145	FRC		201	.		
	146	EEX		202	1		
	147	3		203	SCI		
	148	X		204	X≠Y?		Nubian in vicinity?
	149	DSZ1		205	CHS		Yes - DSP code -1
	150	GT03		206	PRTX		No - DSP code 1
	151	ST00	I.D.	207	X>0?		Nubian in vicinity?
	152	RCL7	$(x-x_0)^2 + (y-y_0)^2 + (z-z_0)^2$	208	GT01		No - Return
	153	FX	Distance	209	P≠S		Yes - Show Nubian
	154	ST06		210	RCL9		coordinates
	155	4		211	P≠S		Nubian coordinates
	156	0		212	ST00		
	157	X>Y?		213	CLX		
	158	GT04		214	ST06		
	159	CLX		215	*LBL4		Print Nubian coordinates or
	160	RCL8		216	P≠S		code C.
	161	X>Y?		217	RCL7		
	162	X≠Y		218	P≠S		
	163	ST08	Smallest D ≥ 40	219	X≠0?		Sensors on?
	164	GT05		220	RCLD		I.D./Nubian Coordinates
	165	*LBL4		221	RCL6		Distance / 0
	166	CLX		222	+		
	167	3		223	PRTX		
	168	5		224	RTN		

LABELS					FLAGS	SET STATUS			
COURSE CHANGE	B	C	D	E	0	FLAGS		TRIG	DISP
	Sensor Probe					ON OFF			
COURSE STEADY	b	c	d	e	1	0	<input type="checkbox"/> <input type="checkbox"/>	DEG <input checked="" type="checkbox"/>	FIX <input checked="" type="checkbox"/>
						1	<input type="checkbox"/> <input type="checkbox"/>	GRAD <input type="checkbox"/>	SCI <input type="checkbox"/>
✓	1 ✓	2 ✓	3 ✓	4 ✓	2	2	<input type="checkbox"/> <input type="checkbox"/>	RAD <input type="checkbox"/>	ENG <input type="checkbox"/>
✓	6 ✓	7 ✓	8 ✓	9	3	3	<input type="checkbox"/> <input type="checkbox"/>		n <u>6</u>

KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
001	P2S			057	FRC	
002	RCL8	ships in vicinity		058	EEX	
003	P2S			059	3	
004	1			060	X	
005	0			061	DSZ1	
006	X			062	GT02	
007	INT			063	RCL8	Distance to Alien
008	X=0?	Nubian in vicinity?		064	IX	
009	GT00	No - GT0 LBL 00		065	ST08	
010	CHS	Yes - Display code -1		066	3	Did you select a ship from "ships in vicinity."
011	SCI			067	5	
012	GT06			068	X>Y?	
013	*LBL0			069	GT03	Yes - Continue
014	P2S			070	4	No - Display code 4
015	RCL7			071	SCI	
016	X=0?	Damages?		072	PRTX	
017	GT09	Yes		073	FIX	
018	RCL8	ships in vicinity		074	GT00	Redisplay ships in vicinity
019	P2S			075	*LBL3	
020	*LBL1			076	RCL2	AY
021	PSE			077	RCL3	AX
022	F3?	ship chosen?		078	+P	
023	GT07	Yes... Leave loop		079	R4	
024	GT01			080	ST06	φ
025	*LBL7			081	RCL1	Δ2
026	INT			082	RCL8	D
027	ABS			083	=	Δ2/D
028	5	check for error input		084	SIN ⁻¹	
029	XΔY?			085	ST07	0
030	GT00			086	RCL8	
031	XΔY			087	INT	
032	ST00	ship I.D.		088	ST08	
033	ST01			089	RCL5	
034	P2S			090	1	
035	RCL1			091	0	
036	RCL5			092	0	
037	P2S			093	.	
038	XΔY			094	1	
039	ST05			095	0	
040	XΔY			096	0	
041	-			097	1	
042	3			098	-	
043	ST01			099	ST05	Alien coordinates
044	CLX			100	RCL0	I.D.
045	ST08			101	ENT1	
046	R4			102	10 ^x	
047	*LBL2	Determine distance		103	=	
048	ENT1			104	P2S	
049	INT			105	ST-8	submitted from ships in vicinity.
050	EEX			106	P2S	
051	2			107	RCL0	I.D.
052	-			108	ST01	
053	ST01			109	3	Romulan vessel
054	X ²			110	XΔY?	No
055	ST+8			111	GT04	Yes - Display Romulan CLX
056	R4			112	SCI	

REGISTERS

I.D.	1 Variable I.D.	2	3	4	5 Alien coordinates	6	7	8 Distance	9
	Δ2	ΔY	ΔX			φ	0		
used	S1 Nubian	S2 Klingon	S3 Romulan	S4 Vulcanian	S5 Enterprise	S6 Fuel	S7 Damages?	S8 ships in vicinity	S9 Nubian
							CPAL, CMC		
	B		C		D	E		I	Counter

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
113	PRTX		Print code 3	169	ENT1		
114	FIX			170	INT		
115	GSB5		$\Delta \phi$	171	X#0?		A ship in vicinity?
116	ST+6			172	GT07		Yes... continue
117	ABS			173	R4		No... continue
118	GSB5		$\Delta \theta$	174	DSZI		
119	ST+7			175	GT08		
120	ABS			176	SCI		
121	+		Total angular change.	177	4		
122	.		Determine change in I.O.	178	GT06		No ships - display code 4
123	1		to lessen amount of	179	R/S		
124	5		Romulan Attack (determined				
125	X		by how much "energy" is used				
126	.		for the clock - magnitude				
127	2		of $ \Delta \phi + \Delta \theta $				
128	1						
129	-						
130	INT						
131	ST+1						
132	*LBL4		Distance				
133	RCL8						
134	*LBL6						
135	PSE						
136	GT06						
137	*LBL5		$\Delta \phi$ or $\Delta \theta$				
138	P#S						
139	RCL8						
140	PI						
141	+						
142	5						
143	YX						
144	FRC						
145	ST00						
146	P#S						
147	2						
148	0						
149	X						
150	1						
151	0						
152	-						
153	INT						
154	RTN						
155	*LBL9		Sensors damaged.				
156	SCI		Determine <u>first</u> ship in				
157	4		vicinity.				
158	ST01						
159	CLX						
160	PRTX		Display code 0.				
161	FIX						
162	RCL8						
163	P#S						
164	*LBL8						
165	FRC						
166	1						
167	0						
168	X						

LABELS					FLAGS	SET STATUS		
	B	C	D	E	0	FLAGS	TRIG	DISP
	b	c	d	e	1	ON OFF		
✓	1	2	3	4	2	0 <input type="checkbox"/> <input type="checkbox"/>	DEG <input checked="" type="checkbox"/>	FIX <input checked="" type="checkbox"/>
						1 <input type="checkbox"/> <input type="checkbox"/>	GRAD <input type="checkbox"/>	SCI <input type="checkbox"/>
						2 <input type="checkbox"/> <input type="checkbox"/>	RAD <input type="checkbox"/>	ENG <input type="checkbox"/>
✓	6	7	8	9	3	3 <input type="checkbox"/> <input checked="" type="checkbox"/>		n <u>4</u>

input flag

Program Listing I - Program 1

Page 2 of 1

00369D

KEY ENTRY	KEY CODE
001	EEX
002	2
003	STOE
004	CLX
005	STOA
006	STO3
007	STO4
008	1
009	2
010	STO2
011	*LBL0
012	CF0
013	CF1
014	RCL8
015	RCL3
016	EEX
017	3
018	=
019	+
020	P#S
021	RCL7
022	P#S
023	STO3
024	SCI
025	X#0?
026	FRTX
027	RCL4
028	X
029	EEX
030	6
031	=
032	+
033	RCLA
034	EEX
035	8
036	=
037	+
038	FIX
039	DSP8
040	*LBL9
041	CF3
042	PSE
043	F3?
044	GT01
045	GT09
046	*LBL1
047	RCL6
048	X#Y?
049	GT00
050	X#Y
051	STOA
052	F2?
053	GT04
054	RCL3
055	RCL3
056	SCI
057	GT05

COMMENTS	STEP	KEY ENTRY	KEY CODE
	058	*LBL6	
	059	F0?	
	060	RTH	
	061	DSP6	
	062	SF0	
	063	RCL2	
	064	2	
	065	-	
	066	X#0?	
	067	STO2	
	068	RCL2	
	069	STO1	
	070	*LBL2	
	071	P#S	
	072	RCL5	
	073	P#S	
	074	CHS	
	075	GSB3	
	076	RCL5	
	077	GSB3	
	078	GT02	
	079	*LBLD	
	080	SF1	
	081	*LBLC	
	082	F0?	
	083	GT06	
	084	GT00	
	085	*LBL6	
	086	RCL7	
	087	-	
	088	ABS	
	089	X#Y	
	090	RCL6	
	091	-	
	092	ABS	
	093	+	
	094	STO6	
	095	6	
	096	F1?	
	097	5	
	098	ENT1	
	099	3	
	100	+	
	101	RCL8	
	102	X	
	103	P#S	
	104	ST+6	
	105	P#S	
	106	2	
	107	RCLB	
	108	LN	
	109	.	
	110	0	
	111	3	
	112	CHS	

weapon's stand-by
Has stand-by already been hit?
Yes - Return.

Firing Time counter
Decrement by 2 until
it equals 2.

Enterprise coordinates

Pause to display
Alien coordinates
Pause to display

Photon Torpedoes
Phasers
Standby hit first
~~Yes~~ Yes...
No... Return.

⊖
Δ ⊖

∅
Δ ∅

|Δ ⊖| + |Δ ∅|

Photon Torpedoes?
Yes - Fuel cost = 8 x D
No - Fuel cost = 3 x D

Distance
Fuel cost

Let A =
|Δ ⊖| + |Δ ∅|
LN(A)

change to 4 for more
of a challenge.

REGISTERS									
0 I.D.	1 I.D.	2 Firing Time Counter	3 Enterprise Status S _E	4 Attacking vessel status S _V	5 Alien coordinates	6 ∅	7 ⊖	8 Distance	9 Damages?
S0 Seed	S1 Nubian	S2 Klingon	S3 Remulan	S4 Vullician	S5 Enterprise	S6 Fuel	S7 Damages! ON=0; OFF=1	S8 ships in vicinity	S9 Nubian
A Shields		B Δ ⊖ + Δ ∅		C		D		E 100	
								I Counter	

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
113	X		-.03 LN(A)	169	GSB8		$(G-I)(10^4)(S_F - S_0 + 100)^2$
114	.			170	RCL4		Shields(S) ^D
115	1			171	1		
116	+		J- .03 LN(A)	172	0		
117	RCL4		S _v	173	X		10 x S
118	RCL3		S _E	174	X ²		(10 x S) ²
119	GSB8		$(0.1 - .03 LN(A)) [S_v - S_0 + 100]^2$	175	÷		$(G-I)(10^4)(S_F - S_0 + 100)^2$
120	F1?		Photon Torpedoes? D	176	INT		ΔS_E
121	X		Yes - Multiply by 2.	177	ST+3		
122	X<0?		$\Delta S_v < 0$	178	RCL3		S _E
123	GT04		Yes ... Don't change S _v	179	RCL4		
124	INT			180	X<Y?		S _E ≥ 100?
125	ST+4			181	N!		Yes - Enterprise destroyed.
126	RCL4			182	CLX		
127	RCL4			183	7		
128	X>Y?		S _v ≥ 100?	184	0		
129	GT04		No - Continue	185	X>Y?		S _E < 70?
130	1		Yes - signal destruction of alien	186	GT05		Yes - continue
131	CHS		Make Alien coordinates negative	187	CLX		No - Sensors damaged
132	STX5			188	P+S		
133	DSP0		φ	189	ST07		
134	RCL6		θ	190	P+S		
135	PSE			191	*LBL5		
136	RCL7			192	CLX		
137	PSE			193	8		
138	RCL0		I.D.	194	5		
139	RCL9		IF Damages, equal to 0 - otherwise = 1	195	X>Y?		S _E < 85?
140	X			196	GT00		Yes - continue
141	GT09		Display I.D. on 0.	197	CLX		No - shields out
142	*LBL4		Alien fire	198	ST0A		
143	SCI			199	5		
144	P+S			200	ENT↑		
145	RCL1		Nubian	201	PRTX		Display code 5
146	0			202	GT00		
147	X>Y?		Nubian towed?	203	*LBL3		
148	1		Yes - Fuel cost = 3 x Shields	204	PSE		
149	ENT↑			205	PSE		
150	2		No - Fuel cost = 2 x Shields	206	PSE		
151	+			207	DSZ1		Time out?
152	RCL4		Shields	208	GT07		No - continue
153	X		Fuel cost	209	GT04		Yes ... Alien Fire
154	ST+6			210	*LBL7		Angle input?
155	P+S			211	F3?		Yes - Leave angle in Display
156	6			212	GT03		No - Display other coordinates
157	RCL1		I.D. (I)	213	RTH		
158	-		G-I	214	*LBL8		
159	EEX			215	-		
160	4			216	RCL4		
161	X		$(G-I)(10^4)$	217	+		
162	RCL3			218	X ²		
163	8			219	X		
164	5			220	RCL8		
165	X<Y?		Shields out?	221	÷		
166	N!		Yes - Enterprise destroyed	222	RTH		
167	CLX			223	R/S		
168	RCL4						

LABELS

FLAGS

SET STATUS

	B	C	D	E		FLAGS	TRIG	DISP
	0	Phasers	1	Photon Torpedoes	0	Routine Permit check		
✓	1	Enterprise Stand-by	2		1	Phasers/Photon Torpedoes	ON OFF	FIX <input checked="" type="checkbox"/>
	6		7		2	Set time - Alien Around Fire	DEG <input checked="" type="checkbox"/>	SCI <input type="checkbox"/>
					3	Input check	GRAD <input type="checkbox"/>	ENG <input type="checkbox"/>
							RAD <input type="checkbox"/>	n <u>5</u>

Page 26 of 29

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
001	SCI			056	ST+5		
002	RCL5		Alien coordinates	059	RCL5		
003	X#0?		Less than 0 (destroyed)?	060	P#S		
004	GT00		Yes... continue	061	ST01		Replace old Alien coordinates with new.
005	3		No... check for Retreat	062	P#S		
006	ST01			063	CF0		
007	0			064	7		Flag off - Alien NOT destroyed
008	ST05			065	ENT1		
009	RCL3		SE	066	PRTX		
010	8			067	GT04		Display code 7
011	5			068	*LBL0		
012	X#Y?		Illegal retreat (SE < 85)?	069	P#S		Check for Sensor Repairs
013	GT01		No... continue	070	RCL7		
014	DSP0		Yes... self-destruct	071	P#S		
015	CHS			072	X#0?		
016	ENT1		Display code 9 - 9	073	GT04		No damages?
017	PRTX			074	RCL3		None... continue
018	FIX			075	5		SE
019	*LBL2			076	1		
020	RCL1			077	X#Y?		
021	PSE		Countdown.	078	GT04		SE > 50
022	DSZI			079	P#S		Yes... No Repairs.
023	GT02			080	1		No... Repairs
024	EEX			081	ST07		
025	2			082	P#S		
026	N!		Enterprise destroyed.	083	6		
027	*LBL1		Legal retreat... new Alien coordinates.	084	ENT1		
028	P#S			085	PRTX		
029	RCL0			086	*LBL4		Display code 6
030	Pi			087	FIX		
031	+			088	RCL0		
032	5			089	CLRG		I.D.
033	Y*			090	P#S		
034	FRC			091	ST01		
035	ST00			092	EEX		
036	P#S			093	3		
037	EEX			094	F0?		
038	2			095	ST01		Alien destroyed?
039	X			096	RCL1		Yes - STORE 1000
040	LSTX			097	ENT1		
041	+			098	ABS		
042	INT		coordinate	099	÷		
043	RCL1			100	RCL5		
044	1			101	X		
045	-			102	P#S		
046	3			103	*LBL5		
047	X			104	PSE		
048	10*			105	GT05		
049	÷			106	*LBL6		Practice
050	ST+5			107	CF3		
051	DSZI			108	CLRG		
052	GT01			109	ST00		
053	RCL0			110	5		
054	ST01			111	0		
055	EEX			112	.		
056	7						

REGISTERS									
0 $I = D / \text{seed}$	1 $\Delta X (x - s2)$	2 $\div x$	3 $\Delta Y (y - s2)$	4 Y	5 A_{Alien} ΔZ <small>Coordinate (ZAU)</small>	6 Z	7 ϕ	8 \odot	9 $\text{Practice Alien Coordinate}$
0 Seed	S1 Nabian	S2 Klingon	S3 Romulan	S4 Vallician	S5 Enterprise	S6 Fuel	S7 Damages <small>CFE = 1 / CFE0</small>	S8 ships in vicinity	S9 Nabian
-SC.050C5C		B Distance	C		D	E		I Counter	

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
113		0		169	*LBL6		
114		5		170	RCL1		
115		0		171	RCL1		
116		0		172	1		
117		5		173	.		
118	CHS			174	5		
119	STOA		Enterprise coordinates	175	x		
120	*LBL9			176	3		
121	6			177	-		
122	STOI			178	10x		
123	*LBL3			179	=		
124	RCL0			180	+		
125	PI			181	DSZI		
126	+			182	DSZI		
127	5			183	GT06		
128	20 Yx			184	ST09		Alien coordinates
129	FRC			185	*LBL7		
130	ST00			186	RCLA		Enterprise
131	-4			187	PSE		
132	1			188	PSE		
133	x			189	PSE		
134	3			190	F3?		Angle input?
135	0			191	GT08		Yes
136	+			192	RCL9		Alien
137	INT			193	PSE		
138	STOI			194	PSE		
139	DSZI			195	PSE		
140	5			196	F3?		Angle input?
141	0			197	GT08		
142	-			198	RCL6		Distance
143	STOI			199	PSE		
144	DSZI			200	F3?		
145	GT03			201	GT08		
146	RCL3		ay	202	GT07		
147	RCL1		ax	203	*LBL8		
148	+P			204			
149	R4			205	RCL7		φ actual
150	ST07		φ	206	PRTX		
151	RCL5		az	207	-		
152	RCL5			208	ABS		
153	X²			209	X²Y		θ guess
154	RCL3		ay	210	RCL8		θ actual
155	X²			211	PRTX		
156	RCL1		ax	212	-		
157	X²			213	ABS		
158	+			214	+		
159	+			215	PRTX		
160	JX		Distance	216	GT09		
161	ST08			217	R/S		
162	PRTX						
163	=						
164	SIN⁻¹						
165	ST08						
166	6						
167	STOI						
168	0						

LABELS

FLAGS

SET STATUS

B	C	D	E	Practice	0 Alien Destruction	FLAGS	TRIG	DISP
b	c	d	e		1	ON OFF		
✓ 1	✓ 2	✓ 3	✓ 4	✓ 5	2	0 <input checked="" type="checkbox"/> <input type="checkbox"/>	DEG <input checked="" type="checkbox"/>	FIX <input checked="" type="checkbox"/>
✓ 6	✓ 7	✓ 8	✓ 9	✓ 10	3	1 <input type="checkbox"/> <input type="checkbox"/>	GRAD <input type="checkbox"/>	SCI <input type="checkbox"/>
						2 <input type="checkbox"/> <input type="checkbox"/>	RAD <input type="checkbox"/>	ENG <input type="checkbox"/>
						3 <input type="checkbox"/> <input type="checkbox"/>		n <u>6</u>

INPUT CHECK

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
001	*LBL0			057	DSZ1		
002	FIN			058	1		
003	P#S			059	ROL6		
004	ROL1			060	X#Y?		
005	ENT1			061	GT04		
006	ABS			062	P#S		ALL Aliens out of range.
007	=			063	EEK		
008	ROL5			064	3		
009	P#S			065	ROL1		
010	X			066	X#0?		Nubian towed?
011	*LBL1			067	R+		Yes - STORE 1000.
012	PSE			068	ST01		
013	GT01			069	2		
014	*LBL6		T.T.O (Transport/Tractor base)	070	ENT1		
015	P#S			071	PRTX		Display code 2
016	ROL1			072	0		
017	G8B2		Check distance to Nubian	073	ST05		Enterprise Coordinates = 000
018	G8B5		D < 10?	074	4		
019	P#S		Yes	075	ST01		
020	ROL1			076	ROL7		
021	CHS			077	X#0?		Damages?
022	ST01			078	GT07		No... continue.
023	.			079	1		
024	1			080	ST07		Repair
025	ST-8		Cancel from ship in vicinity	081	6		
026	P#S			082	ENT1		
027	GT00			083	PRTX		Display code 6
028	*LBL6		Docking and Repairs.	084	*LBL7		
029	P#S			085	ROL1		check for game over
030	1			086	EEK		
031	0			087	3		
032	0			088	X#Y?		game over?
033	.			089	GT08		No... continue.
034	1			090	DSZ1		
035	0			091	GT07		
036	0			092	DSP0		Yes.
037	1			093	9		
038	G8B2		check distance to Starbase.	094	ENT1		Display code 9
039	G8B5		D < 10?	095	PRTX		
040	4		Yes	096	FIX		FUEL
041	ST00			097	ROL6		END
042	*LBL4		check for other aliens	098	R/S		
043	ROL0		around starbase.	099	*LBL6		
044	ST01			100	P#S		
045	P#S			101	GT00		Distance
046	ROL1			102	*LBL2		
047	G8B2		check distance to Alien	103	ROL5		
048	4			104	-		
049	0			105	P#S		
050	X#Y?		out of range?	106	3		
051	GT06		Yes... continue.	107	ST01		
052	8			108	CLA		
053	ENT1			109	ST07		
054	PRTX			110	R+		
055	GT00			111	*LBL3		
056	*LBL6			112	ENT1		

REGISTERS

1	2	3	4	5	6	7 Distance	8	9
S1 Nubian	S2 Klingon	S3 Romulan	S4 Vulcanian	S5 Enterprise	S6 Fuel	S7 Damages!	S8 ships in vicinity	S9 Nubian
B	C	D	E	I	counter			

[illegible]