

Program Description I

Program Title	STAR TREK-ADVANCED		
Contributor's Name	LARRY SCHNEIDER		
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Program 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

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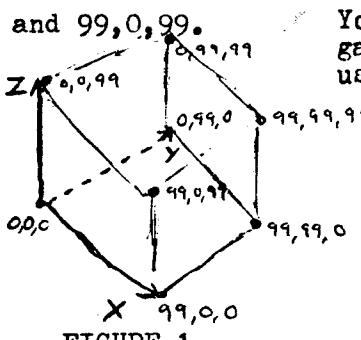


FIGURE 1

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 other hand 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 0'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-definable 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; C--Phasers; D--Photon Trpd's; ~~E~~; 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 f E. 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 ~~.....~~). 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~~ 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. Now blinking in the display is the number 0.00000. This represents the Enterprise

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~~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 if 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 under attack (i.e.; an 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~~ 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..

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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 either ± 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 \leq 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 Ψ 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 ~~they~~ 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!

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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 S S O S S S S S S where D D is the distance to the enemy, S S is the Enterprise status, S S 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 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, ϕ and θ . In this example, there are immediately two things going against you: 1) the fact that the cloak is on heavily

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and 22) 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 ~~is~~ 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; photons: 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 θ 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)

<u>Weapons SB^{STAND-BY}</u>	<u>Angles</u>	<u>New shields setting</u>	<u>Display</u>
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 0 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 0 displayed	34.07000090
fB	-6, 65 D	Enemy destroyed	-5. Actual 0
			64. Actual 0

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

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After the 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

operating limits and warnings 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.

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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.XXXYYZZ...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: ~~XX~~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.

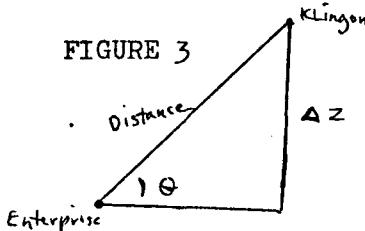
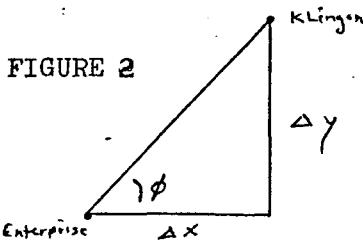


FIGURE 4
absolute value
of $\Delta Y/\Delta X$

		ϕ
0	$1/4 = 14^*$	0
$1/2$	$3/4 = 37^*$	26.5*
1		45
$3/2$	$5/4 = 51^*$	56*
2	$7/4 = 60^*$	63.5*
3		71.5*
4		76*
6		80.5*
10		84*
20		87*

*approximations ^olargest possible angle

	absolute value of $\Delta Z/D$	θ
0	0	0
	$1/8$	7^*
	$1/4$	14.5^*
	$3/8$	22^*
	$1/2$	30
	$5/8$	39^*
	$3/4$	48.5^*
	$7/8$	61^*
	$33/34^o$	76^*

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

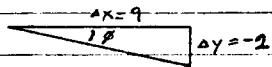


FIGURE 5 $|\Delta Y/X| = .222\ldots$

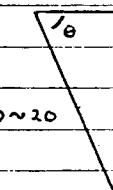


FIGURE 6 $|\Delta Z/D| = .900$

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 system 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 Nubian freighter).

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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:

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

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

*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,or5 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
 $(|\theta_{\text{guess}} - \theta_{\text{correct}}| + |\theta_{\text{guess}} - \theta_{\text{correct}}|)$

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.

Program Description II

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.

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).
9.99999999 99	Enterprise destroyed by enemy vessel.

Reference(s)

User Instructions

CARD # 1

STAR TREK ADVANCED

1 COURSE --

f-steady f weaponsSB f dock [REDACTED] f INIT
-change sensors phasers photon t. T/TB-pr.

2

00369D

User Instructions

CARD # 2

COURSE CONTROL/SENSOR SYSTEM

◀ 1 COURSE--
f-steady
-change

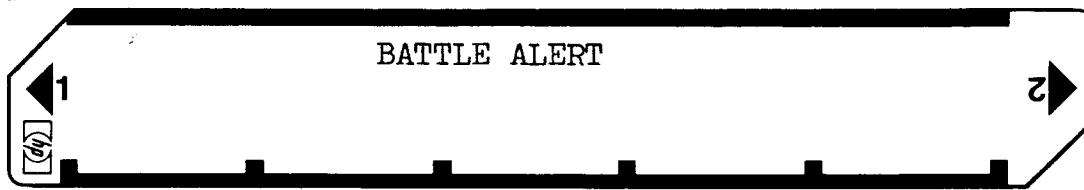
2

User Instructions

CARD # 3

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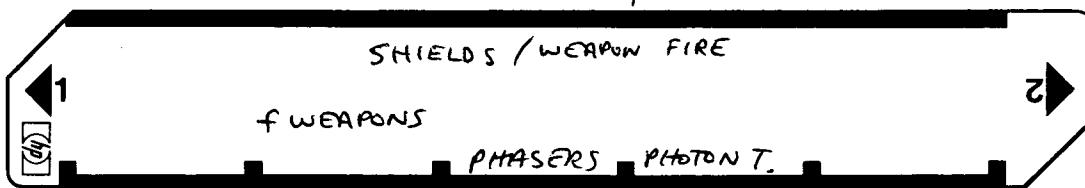
BATTLE ALERT

User Instructions

CARD #4

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updated
10/11/27



CARD # 5

BOST-FIRING OPERATIONS/PRACTICE

1

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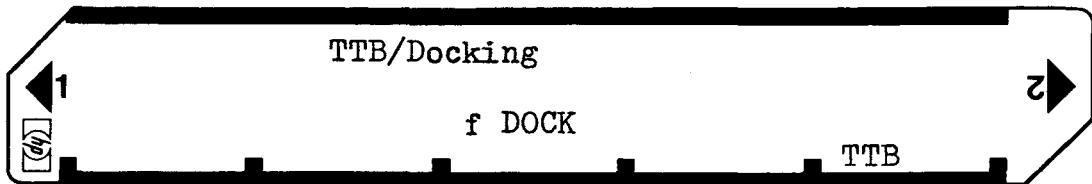
Practice

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Load sides 1 and 2.			
2	To practice go to step 5.			
3	To reset, employ corbomite maneuver, or self-destruct, do nothing		RESET	Enterprise Coordinate
4	To continue, go to card 1 for LRTS or card 2 for course control. If an enemy ship is still in vicinity, go to card 3.			CORBOMITE RESULTS: " "
5	PRACTICE Input a seed between 0 & 1	S		SELF-DESTRUCT -9. 00
5A	Input two angles (guesses)	Ø Ø	E ENTER	Distance Enterprise coordinates Enemy coordinates. Distance.
6	Go to step 5A			correctØ correctØ Accuracy

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User Instructions

CARD # 6



Program Listing I

Program 1

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STEP	KEY ENTRY	KEY CODE	COMMENTS
001	GT0d	22 16 14	
002	*LBL0	21 16 15	
003	CLRG	16-53	
004	ST00	35 00	
005	4	04	Store seed
006	ST0I	35 46	
007	1	01	
008	ST07	35 07	Set damage off
009	*LBL0	21 00	
010	6	06	
011	ST06	35 06	
012	ST0A	35 11	
013	RCLI	36 46	
014	1	01	
015	X=Y?	16-33	
016	SF0	16 21 00	Nubian coordinates?
017	*LBL1	21 01	Setting flag to store in R ₅₉
018	GSB9	23 09	
019	EEX	-23	
020	2	02	
021	X	-35	
022	INT	16 34	
023	ST0B	35 12	
024	F0?	16 23 00	Nubian?
025	GSB5	23 05	Yes - Add to R ₅₉
026	RCLB	36 12	
027	EEX	-23	
028	2	02	
029	+	-55	random coordinate
030	RCL6	36 06	
031	10 ^x	16 33	
032	=	-24	Position coordinate
033	ST+i	35-55 45	
034	3	03	
035	ST-6	35-45 06	
036	RCL6	36 06	
037	0	00	
038	X≤Y?	16-35	
039	GT01	22 01	New coordinate
040	RCLI	36 46	Add ID of ship
041	F0?	16 23 00	
042	ST+9	35-55 09	
043	EEX	-23	
044	7	07	
045	÷	-24	
046	ST+i	35-55 45	
047	DSZI	16 25 46	
048	GT00	22 00	New ship
049	2	02	Set Fuel = -250 so
050	5	05	that first LRP5 run
051	0	00	costs no fuel.
052	CHS	-22	
053	ST06	35 06	
054	P±S	16-51	
055	CLRG	16-53	
056	*LBLd	21 16 14	Long Range Tracking System (LRTS)

STEP	KEY ENTRY	KEY CODE	COMMENTS
057	P±S	16-51	
058	*LBL2	21 02	
059	GSB9	23 09	
060	4	04	Random #
061	X	-35	
062	1	01	
063	+	-55	
064	INT	16 34	
065	ST0I	35 46	
066	RCLI	36 45	
067	EEX	-23	
068	3	03	
069	X=Y?	16-33	Already destroyed?
070	GT02	22 02	New random ship
071	R↓	-31	
072	X<0?	16-45	Towed Nubian?
073	GT02	22 02	New random ship.
074	ST0A	35 11	
075	CLX	-51	
076	ST0B	35 12	
077	3	03	
078	ST0I	35 46	
079	*LBL3	21 03	
080	RCLA	36 11	
081	INT	16 34	
082	EEX	-23	
083	2	02	
084	-	-45	
085	2	02	
086	5	05	
087	÷	-24	
088	1	01	
089	+	-55	
090	INT	16 34	
091	RCLI	36 46	
092	1	01	
093	-	-45	
094	10 ^x	16 33	
095	X	-35	Position in mission sector
096	RCLB	36 12	
097	+	-55	
098	ST0B	35 12	
099	RCLA	36 11	
100	FRC	16 44	
101	EEX	-23	
102	3	03	
103	X	-35	
104	ST0A	35 11	
105	DSZI	16 25 46	
106	GT03	22 03	
107	2	02	
108	5	05	
109	0	00	
110	ST+6	35-55 06	All 250 to Fuel.
111	RCLB	36 12	Mission Sector
112	P±S	16-51	

REGISTERS

0	1	2	3	4	5	6	7	8	9
S0 Seed	S1 Nubian	S2 Klingon	S3 Romulan	S4 Vulcian	S5 Enterprise	S6 Crewmates/ Fuel	S7 Damages OFFLINE	S8 Ships in vicinity	S9 Nubians
A Counter for Register S ₉ positioning	B Coordinates for LRTS	C Used / Mission Sector	D	E	F	G	H	I Counter	

Program Listing II

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
113	PRTX	-14		170			
114	*LBL4	21 04					
115	PSE	16 51					
116	GT04	22 04					
117	*LBL9	321 09	Random # generator				
118	RCL8	36 00					
119	π	16-24					
120	+	-55					
121	5	05					
122	Y ^x	31					
123	FRC	16 44					
124	ST00	35 00	New seed.	180			
125	RTN	24					
126	*LBL5	21 05					
127	RCL8	36 11					
128	10 ^x	16 33					
129	÷	-24					
130	ST+9	35-55 09	Nubin coordinates				
131	RCL8	36 11					
132	2	02					
133	-	-45					
134	ST0A	35 11					
135	R↓	-31					
136	RTN	24					
137	R/S	51					
140							
150							
160							
170							
180							
190							
200							
210							
220							

LABELS					FLAGS	SET STATUS		
A	B	C	D	E	0 Nubian Coordinates	FLAGS	TRIG	DISP
a	b	c	d L.R.T.S.	e Initialize	1	ON OFF	DEG <input checked="" type="checkbox"/>	FIX <input checked="" type="checkbox"/>
0 ✓	1 ✓	2 ✓	3 ✓	4 ✓	2	0 <input type="checkbox"/>	GRAD <input type="checkbox"/>	SCI <input type="checkbox"/>
5 ✓	6	7	8	9 ✓	3	1 <input type="checkbox"/>	RAD <input type="checkbox"/>	ENG <input type="checkbox"/>
						2 <input type="checkbox"/>		n <u>O</u>
						3 <input type="checkbox"/>		

Program Listing I

Program 2

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STEP	KEY ENTRY	KEY CODE	COMMENTS
001	*LBL1	21 01	
002	FIX	-11	
003	P \pm S	16-51	
004	RCL1	36 01	
005	ENT \uparrow	-21	
006	ABS	16 31	
007	=	-24	
008	RCL5	36 05	
009	P \pm S	16-51	
010	X	-35	
011	*LBL8	21 08	
012	PSE	16 51	
013	ST08	22 08	
014	*LBLA	21 11	
015	ST06	35 06	
016	R \downarrow	-31	
017	STOC	-35 13	
018	X \pm Y	-41	
019	ST04	35 04	
020	RCL6	36 06	
021	SIN	-41	
022	RCL4	36 04	
023	X	-35	
024	ST01	35 01	
025	RCL6	36 06	
026	COS	42	
027	RCL4	36 04	
028	X	-35	
029	ST06	35 06	
030	RCLC	36 13	
031	SIN	-41	
032	RCL6	36 06	
033	X	-35	
034	ST02	35 02	
035	RCLC	36 13	
036	COS	42	
037	RCL6	36 06	
038	X	-35	
039	ST03	35 03	
040	*LBLa	21 16 11	
041	GSB7	23 07	
042	3	03	
043	ST01	35 46	
044	P \pm S	16-51	
045	RCL1	36 01	
046	P \pm S	16-51	
047	0	00	
048	ST06	35 06	
049	ST07	35 07	
050	X \times Y?	16-34	
051	1	01	
052	ENT \uparrow	-21	
053	5	05	
054	+	-55	
055	RCL4	36 04	
056	X	-35	

REGISTERS

0 I.D.	1 ΔZ	2 ΔY	3 ΔX	4 R	5	6 (Distance $\theta / R \cos \theta$ Positioning counter)	7 (ECL-CR) New Enterprise Coordinates	8	9
S0 Seed	S1 Nubian	S2 Klingon	S3 Romulan	S4 Vulcian	S5 Enterprise	S6 Fuel	S7 Damages on E.C. ref = 1	S8 Ships in vicinity	S9 Nubian
A	B used for counter	C ϕ	D I.D.	Nubian coordinates	E		I Counter		

Program Listing II

- Program 2

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STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
113	3	03		169	X≤Y?	16-35	close enough for battle
114	ST08	35 08		170	GT06	22 06	No
115	R↑	16-31		171	RCL0	36 00	Ship I.D.
116	4	04		172	ENT↑	-21	
117	X	-35		173	10 ^X	16 33	
118	X	01		174	÷	-24	
119	+	-55		175	P±S	16-51	
120	INT	16 34		176	ST+8	35-55 08	Add to "ships in vicinity" register
121	ST08	35 08		177	P±S	16-51	
122	ST08	35 12		178	*LBL6	21 06	print distance with w/o I.D.
123	*LBL2	21 02		179	GSBe	23 16 15	
124	RCL0	36 00		180	*LBL5	21 05	
125	ST01	35 46		181	ISZi	16 26 45	
126	P±S	16-51		182	5	05	
127	RCLi	36 45	Alien coordinates IXX.IYY.IZZ	183	RCL0	36 00	
128	RCL5	36 05	Enterprise " XX.YYY.ZZZ "	184	X=Y?	16-33	
129	P±S	16-51		185	1	-01	
130	-	-45		186	ST08	35 08	
131	3	03		187	RCLB	36 12	
132	ST01	35 46		188	X#Y?	16-32	
133	CLX	-51		189	GT02	22 02	
134	ST07	35 07		190	RCL8	36 08	
135	R↑	-31		191	CHS	-22	
136	*LBL3	21 02		192	PRTX	-14	
137	ENT↑	-21		193	GSB7	23 07	
138	INT	16 34		194	GT01	22 01	
139	EEX	-23		195	*LBL7	21 07	
140	2	02	C = X, Y, or Z	196	P±S	16-51	
141	-	-45		197	RCL8	36 08	
142	X ²	52		198	P±S	16-51	
143	ST+7	35-55 07		199	X=0?	16-43	
144	R↑	-31		200	RTN	24	
145	FRC	16 44		201	.	-62	
146	EEX	-23		202	1	01	
147	3	03		203	SCI	-12	
148	X	-35		204	X≤Y?	16-35	
149	DSZi	16 25 46		205	CHS	-22	
150	GT03	22 03		206	PRTX	-14	
151	ST00	35 14	I.D.	207	X>0?	16-44	
152	RCL7	36 07	$(x-x_0)^2 + (y-y_0)^2 + (z-z_0)^2$	208	GT01	22 01	
153	JX	54	Distance	209	P±S	16-51	
154	ST06	35 06		210	RCL9	36 09	
155	4	04		211	P±S	16-51	
156	0	00		212	ST00	35 14	
157	X>Y?	16-34		213	CLX	-51	
158	GT04	22 04		214	ST06	35 06	
159	CLX	-51		215	*LBL6	21 16 15	
160	RCL8	36 08		216	P±S	16-51	
161	X>Y?	16-34		217	RCL7	36 07	
162	X#Y	-41		218	P±S	16-51	
163	ST08	35 08		219	X#0?	16-42	
164	GT05	22 05		220	RCLD	36 14	
165	*LBL4	21 04		221	RCL6	36 06	
166	CLX	-51		222	+	-55	
167	3	03		223	PRTX	-14	
168	5	05		224	RTN	24	

LABELS

FLAGS					SET STATUS		
FLAGS		TRIG		DISP			
ON	OFF	DEG	FIX				
0	□	□	□				
1	□	□	□				
2	□	□	□				
3	□	□	□				

A COURSE CHANGE	B Sensor Probe	C	D	E	0	ON	DEG	FIX
a COURSE STEADY	b	c	d	e	1	OFF	GRAD	SCI
0	✓	✓	✓	✓	2	0	RAD	ENG
5	✓	✓	✓	✓	3	1	□	6

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Program Listing I

- Program 3

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STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
001	P ₂ S	16-51		057	ST01	35 45	
002	RCL8	36 08		058	X ²	53	
003	P ₂ S	16-51		059	ST+8	35-55 08	
004	1	01		060	R ⁴	-31	
005	0	00		061	FRC	16 44	
006	X	-35		062	EEX	-23	
007	INT	16 34		063	3	03	
008	X=0?	16-43	Nubian in vicinity?	064	X	-35	Distance to Alien
009	GT00	22 00	No - GTO LBL 00	065	DSZI	16 25 46	
010	CHS	-22	Yes - Display code -1	066	GT02	22 02	Did you select a ship
011	SCI	-12		067	RCL8	36 08	from ships in vicinity?
012	GT06	22 06		068	JX	54	
013	*LBL0	21 00		069	ST08	35 08	Yes - Continue
014	P ₂ S	16-51		070	3	03	No - Display code 4
015	RCL7	36 07		071	5	05	
016	X=0?	16-43		072	X>Y?	16-34	
017	GT09	22 09		073	GT03	22 03	
018	RCL8	36 08		074	4	04	Redisplay ships in vicinity
019	P ₂ S	16-51		075	SCI	-12	
020	*LBL1	21 01		076	PRTX	-14	
021	PSE	16 51		077	FIX	-11	
022	F3?	16 23 03		078	GT00	22 00	
023	GT07	22 07	Ship chosen?	079	*LBL3	21 03	
024	GT01	22 01	Yes... Leave Loop	080	RCL2	36 02	
025	*LBL7	21 07		081	RCL3	36 03	
026	INT	16 34		082	+P	34	
027	ABS	16 31		083	R ⁴	-31	
028	5	05		084	ST06	35 06	
029	X>Y?	16-35		085	RCL1	36 01	
030	GT00	22 00		086	RCL8	36 08	
031	X>Y	-41		087	÷	-24	
032	1	01		088	SIN ⁻¹	16 41	
033	X>Y	-41		089	ST07	35 07	
034	X>Y?	16-35		090	RCL8	36 08	
035	GT00	22 00		091	DSP0	-63 00	
036	ST00	35 00		092	RND	16 24	
037	ST01	35 46		093	DSP4	-63 04	
038	P ₂ S	16-51		094	ST08	35 08	
039	RCL1	36 45		095	RCL5	36 05	
040	RCL5	36 05		096	1	01	
041	P ₂ S	16-51		097	0	00	
042	X>Y	-41		098	0	00	
043	ST05	35 05		099	.	-62	Alien coordinates
044	X>Y	-41		100	1	01	I.O.
045	-	-45		101	0	00	
046	3	03		102	0	00	
047	ST01	35 46	Determine distance	103	1	01	
048	CLX	-51		104	-	-45	
049	ST08	35 08		105	ST05	35 05	Subtract from
050	R ⁴	-31		106	RCL8	36 00	ships in vicinity.
051	*LBL2	21 02		107	ENT↑	-21	I.O.
052	ENT↑	-21		108	10 ^X	16 33	
053	INT	16 34		109	÷	-24	Romulan vessel
054	EEX	-23		110	P ₂ S	16-51	No
055	2	02		111	ST-8	35-45 08	Yes - Employ Romulan ship
056	-	-45		112	P ₂ S	16-51	

REGISTERS

0 I.O.	1 Variable I.O.	2 42	3 4Y	4	5 Alien coordinates	6 Φ	7 ⊖	8 Distance	9
S0 Seed	S1 Nubian	S2 KLingon	S3 Romulan	S4 Vallidian	S5 Enterprise	S6 Fuel	S7 Damages? OFF1; on=0	S8 ships in vicinity	S9 Nubian
A	B	C	D	E	F	G	H	I Counter	

Program Listing II - Program 3

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STEP	KFY ENTRY	KEY CODE	COMMENTS
113	RCL0	36 00	
114	ST01	35 01	
115	3	03	
116	X#Y?	16-32	If sensors damaged, Don't display code 3.
117	GT04	22 04	$\Delta \phi$
118	SCI	-12	
119	F0?	16 23 00	
120	PRTX	-14	$\Delta \theta$
121	FIX	-11	
122	GSB5	23 05	Total angular change due to cloaking device
123	ST+6	35-55 06	
124	ABS	16 31	Determine change in I.D. to lessen brunt of Romulan Attack.
125	GSB5	23 05	
126	ST+7	35-55 07	
127	ABS	16 31	
128	+	-55	
129	.	-62	
130	1	01	
131	5	05	
132	X	-35	
133	.	-62	
134	2	02	
135	1	01	
136	-	-45	
137	INT	16 34	
138	ST+1	35-55 01	
139	*LBL4	21 04	
140	RCL8	36 08	
141	*LBL6	21 06	
142	PSE	16 51	
143	GT06	22 06	
144	*LBL5	21 05	
145	P#S	16-51	
146	RCL0	36 00	
147	Pi	16-24	
148	+	-55	
149	5	05	
150	YX	31	
151	FRC	16 44	
152	ST00	35 00	
153	P#S	16-51	
154	2	02	
155	0	00	
156	X	-35	
157	1	01	
158	0	00	
159	-	-45	
160	INT	16 34	
161	RTN	24	
162	*LBL9	21 09	
163	CF0	16 22 00	Display code 0
164	SCI	-12	Determine first ship in vicinity
165	4	04	
166	ST01	35 46	
167	CLX	-51	
168	PRTX	-14	

LABELS

A B C D E

STEP	KEY ENTRY	KEY CODE	COMMENTS
169	FIX	-11	
170	RCL8	36 08	
171	*P#S	16-51	
172	*LBL8	21 08	
173	FRC	16 44	
174	1	01	
175	0	00	
176	X	-35	
177	ENT↑	-21	
178	INT	16 34	
179	X#B?	16-42	
180	GT07	22 07	
181	R↑	-31	
182	DS2I	16 25 46	
183	GT08	22 08	
184	SCI	-12	
185	4	04	
186	GT06	22 06	
187	R/S	51	
190			
200			
210			
220			

Sensors damaged.

Display code 0
Determine first
ship in vicinity

LABELS					FLAGS	SET STATUS		
A	B	C	D	E	0 Sensors damaged?	FLAGS	TRIG	DISP
a	b	c	d	e	1	ON OFF		
0	1	✓	2	✓	2	1	DEG <input checked="" type="checkbox"/>	FIX <input checked="" type="checkbox"/>
5	✓	1	✓	2	✓	2	GRAD <input type="checkbox"/>	SCI <input type="checkbox"/>
	6	✓	7	✓	3	3	RAD <input type="checkbox"/>	ENG <input type="checkbox"/>
							n-4	

Input Flag

Program Listing I

PROGRAM 4

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
001	EEX	-23		057		-45	
002	2	02		058	X#0?	16-42	
003	STOE	35 15		059	ST02	35 02	
004	CLX	51		060	RCL2	36 02	
005	STOA	35 11		061	ST01	35 46	
006	ST03	35 03		062	*LBL2	21 02	
007	ST04	35 04		063	P#S	16-51	
008	-1	01		064	RCL5	36 05	
009	2	02		065	P#S	16-51	
010	ST02	35 02		066	CHS	-22	
011	*LBL0	21 00		067	GSB3	23 03	Enterprise Coordinates
012	CF1	16 22 01		068	RCL5	36 05	
013	RCL8	36 08		069	GSB3	23 03	
014	RCL3	36 03		070	GT02	22 02	Alien Coordinates
015	EEX	-23		071	*LBL1	21 01	
016	3	03		072	RCLE	36 15	
017	-	-24		073	X#Y?	16-35	
018	+	-55		074	GT00	22 00	
019	P#S	16-51		075	X#Y	-41	
020	RCL7	36 07		076	ST0A	35 11	
021	P#S	16-51		077	F2?	16 23 02	
022	ST09	35 09		078	GT04	22 04	
023	SCI	-12		079	RCL3	36 03	
024	X=0?	16-43		080	RCL3	36 03	
025	PRTX	-14		081	SCI	-12	
026	RCL4	36 04		082	GT05	22 05	
027	X	-35		083	*LBL0	21 14	
028	EEX	-23		084	SF1	16 21 01	PHOTON TORPEDOS
029	6	06		085	*LBLC	21 13	PHASERS
030	-	-24		086	RCL7	36 07	
031	+	-55		087	-	-45	
032	RCLA	36 11		088	ABS	16 31	
033	EEX	-23		089	X#Y	-41	
034	8	08		090	RCL6	36 06	
035	-	-24		091	-	-45	
036	+	-55		092	ABS	16 31	
037	FIX	-11		093	+	-55	
038	DSP8	-63 08		094	ST0B	35 12	
039	*LBL0	21 16 15		095	0	00	
040	4	04		096	F1?	16 23 01	
041	F0?	16 23 00		097	5	05	PHOTON TORP.?
042	10 ^x	16 33		098	ENT↑	-21	Yes - Fuel = 8 x 0
043	STOI	35 46		099	3	03	No - Fuel = 3 x 0
044	R↑	-31		100	+	-55	
045	*LBL9	21 09		101	RCL6	36 08	
046	CF3	16 22 03		102	X	-35	
047	PSE	16 51		103	P#S	16-51	
048	F3?	16 23 03		104	ST+6	35-55 06	
049	GT01	22 01		105	P#S	16-51	
050	DSZI	16 25 46		106	2	02	
051	GT09	22 09		107	RCL8	36 12	
052	*LBL6	21 16 12		108	LN	32	
053	CF0	16 22 00		109	-	-62	
054	DSP6	-63 06		110	0	00	
055	RCL2	36 02		111	3	03	
056	2	02		112	CHS	-22	

REGISTERS

0 I D	1 I D	2 FIRING TIME COUNTEN	3 SE	4 Sv	5 Alien Coordinates	6 Ø	7 Θ	8 Distance	9 Damages?
S0 Sea	S1 Nubian	S2 Klingon	S3 Romulan	S4 Vullian	S5 Enterprise	S6 Fuel	S7 Damages?	S8 SHIPS IN VICINITY	S9 Nubian
A Shields	B 14Ø + 14Ø1	C	D	E	100	I	counter		

Let A = 14Ø1 + 14Ø1

LN(A)

CHANGE TO 4 FOR A GREATER CHALLENGE

PROGRAM 4 - updated 10/11/77					PROGRAM 4				
STEP	KEY ENTRY	KEY CODE	COMMENTS		STEP	KEY ENTRY	KEY CODE	COMMENTS	
113	X	-35	- .03 LN(A)		169	RCL4	36 04	(6-I) (10 ⁴) (S _E - S _V + 100) ²	
114	-	-62	0.1 - 0.03 LN(A)		170	GSB8	23 08	D	
115	1	01	S _V		171	RCLA	36 11	10 K Shields	
116	+	-55	S _E		172	1	01	(10 x S) ²	
117	RCL4	36 04	[.1 - .03 LN(A)] [S _V - S _E + 100] ²		173	0	00	(6-I) (10 ⁴) (S _E - S _V + 100) ²	
118	RCL3	36 03	times 2 if PHOTON TRP's		174	X	-35	(D) (10 x S) ²	
119	GSB8	23 08	D		175	X ²	53	SE	
120	F1?	16 23 01	INT		176	÷	-24	SE ≥ 100?	
121	X	-35	16 34		177	ST+3	35-55 03	Yes - ENT. DESTROYED	
122	X<0?	16-45	180		178	RCL3	36 03	SE > 70	
123	GT04	22 04	RCLE		179	RCLE	36 15	Yes - Sensors	
124	INT	16 34	181		180	X>Y?	16-35	damaged - R _{S7} = 0	
125	ST+4	35-55 04	182		181	N!	16 52	SE > 85	
126	RCL4	36 04	183		182	CLX	-51	Yes - Shields out	
127	RCL6	36 06	184		183	P±S	16-51	↓	
128	PSE	16 51	185		184	ST07	35 07	CODE 5	
129	RCL7	36 07	186		185	P±S	16-51		
130	PSE	16 51	187		186	*LBL5	21 05		
131	RCL8	36 08	188		187	GT05	22 05		
132	STX5	35-35 05	189		188	CLX	-51		
133	DSP0	-63 00	190		189	ST08	22 00		
134	PSE	16 51	191		190	PSE	16 51		
135	RCL9	36 09	192		191	*LBL6	21 05		
136	X	-35	193		192	CLX	-51		
137	SF0	16 21 00	194		193	ST0A	35 11		
138	GT0e	22 16 15	195		194	5	05		
139	*LBL4	21 04	196		195	X>Y?	16-34		
140	SCI	-12	197		196	GT08	22 00		
141	P±S	16-51	198		197	CLX	-51		
142	RCL1	36 01	199		198	ST0A	35 11		
143	0	00	200		199	5	05		
144	X>Y?	16-34	201		200	ENT↑	-21		
145	1	01	202		201	PRTX	-14		
146	ENT↑	-21	203		202	GT08	22 00		
147	2	02	204		203	*LBL3	21 03		
148	+	-55	205		204	PSE	16 51		
149	RCLA	36 11	206		205	PSE	16 51		
150	X	-35	207		206	PSE	16 51		
151	ST+6	35-55 06	208		207	PSE	16 51		
152	P±S	16-51	209		208	DSZI	16 25 46		
153	RCL1	36 01	210		209	GT07	22 07		
154	+	-55	211		210	GT04	22 04		
155	SHIELDS		212		211	*LBL7	21 07		
156	Fuel		213		212	F3?	16 23 03		
157	6	06	214		213	GT03	22 03		
158	RCL1	36 01	215		214	RTN	24		
159	-	-45	216		215	*LBL8	21 08		
160	EEX	-23	217		216	-	-45		
161	4	04	218		217	RCLE	36 15		
162	X	-35	219		218	+	-55		
163	RCL3	36 03	220		219	X ²	53		
164	8	08	221		220	X	-35		
165	5	05	222		221	RCL8	36 08		
166	X≤Y?	16-35	223		222	÷	-24		
167	N!	16 52	224		223	RTN	24		
168	CLX	-51	224		224	R/S	51		

LABELS

LABELS					FLAGS	SET STATUS		
A	B	C PHASERS	D PHOTON TORPEDOS	E	ON OFF	DEG	GRAD	DISP
a	b WEAPON STAND-BY	c	d	e	1 ON IF PHOTON TRPD's	2 ALIEN FIRE FIRST TIME	3 INPUT CHECK	4 FIX SCI ENG n 8
0	1	2	3	4	✓	✓	✓	✓
5	6	7	8	9	✓	✓	✓	✓

Program Listing I - Program 5

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STEP	KEY ENTRY	KEY CODE	COMMENTS
001	SCI	-12	
002	RCL5	36 05	
003	X<0?	16-45	
004	GT00	22 00	
005	3	03	
006	ST01	35 46	
007	0	00	
008	ST05	35 05	
009	RCL3	36 03	
010	8	08	
011	5	05	
012	X≤Y?	16-35	Illegal retreat (SE < 85)?
013	GT01	22 01	No ... continue
014	DSP0	63 00	Yes ... self-destruct
015	CHS	22	
016	ENT↑	-21	Display code 7 - 9
017	PRTX	-14	
018	FIX	-11	
019	*LBL2	21 02	
020	RCLI	36 46	
021	PSE	16 51	Countdown.
022	DSZI	16 25 46	
023	GT02	22 02	
024	EEX	-23	
025	2	02	
026	N!	16 52	Enterprise destroyed.
027	*LBL1	21 01	Legal retreat... New Alien coordinates.
028	PzS	16-51	
029	RCL8	36 00	
030	Pi	16-24	
031	+	-55	
032	5	05	
033	YX	31	
034	FRC	16 44	
035	ST00	35 00	
036	PzS	16-51	
037	EEX	-23	
038	2	02	
039	X	-35	
040	LSTX	16-63	
041	+	-55	coordinate
042	INT	16 34	
043	RCLI	36 46	
044	1	01	
045	-	-45	
046	3	03	
047	X	-35	
048	10X	16 33	
049	÷	-24	
050	ST+5	35-55 05	
051	DSZI	16 25 46	
052	GT01	22 01	
053	RCL8	36 00	
054	ST01	35 46	
055	EEX	-23	
056	7	07	

STEP	KEY ENTRY	KEY CODE	COMMENTS
057	=	-24	
058	ST+5	35-55 05	
059	RCL5	36 05	
060	PzS	16-51	
061	ST01	35 45	
062	PzS	16-51	
063	CF0	16 22 00	
064	7	07	Flag off - Alien NOT destroyed
065	ENT↑	-21	
066	PRTX	-14	Display code 7
067	GT04	22 04	
068	*LBL0	21 00	Check for Sensor Repairs
069	PzS	16-51	
070	RCL7	36 07	
071	PzS	16-51	
072	X≤Y?	16-42	No damages?
073	GT04	22 04	None ... continue
074	RCL3	36 03	SE
075	5	05	
076	1	01	
077	X≤Y?	16-35	SE > 50
078	GT04	22 04	Yes ... No Repairs.
079	PzS	16-51	No ... Repairs
080	1	01	
081	ST07	35 07	
082	PzS	16-51	
083	6	06	
084	ENT↑	-21	Display code 6
085	PRTX	-14	
086	*LBL4	21 04	
087	FIX	-11	I.D.
088	RCL0	36 00	
089	CLRG	16-53	
090	PzS	16-51	
091	ST01	35 46	
092	EEX	-23	
093	3	03	
094	F8?	16 23 00	Alien destroyed?
095	ST01	35 45	Yes - STORE 1000.
096	RCLI	36 01	
097	ENT↑	-21	
098	ABS	16 31	
099	÷	-24	
100	RCL5	36 05	
101	X	-35	
102	PzS	16-51	
103	*LBL5	21 05	
104	PSE	16 51	
105	GT05	22 05	
106	*LBL6	21 15	Practice
107	CF3	16 22 03	
108	CLRG	16-53	
109	ST00	35 00	
110	5	05	
111	0	00	
112	.	-62	

REGISTERS								
0 I.D. / seed	1 $\Delta X (x-50)$	2 X	3 $\Delta Y (y-50)$	4 Y	5 (New) Alien coordinates [42]	6 Z	7 φ	8 θ
S0 Seed	S1 Nubian	S2 Klingon	S3 Romulan	S4 Velticlan	S5 Enterprise	S6 Fuel	S7 Damages CPT = 1 ton/20	S8 Ships in vicinity
A -50.050050	B Distance	C	D	E	F	G	H	I Counter

Program Listing II - Program 5

STEP	KEY ENTRY	KEY CODE	COMMENTS
113	0	00	
114	5	05	
115	0	00	
116	0	00	
117	5	05	
118	CHS	-22	
119	ST0A	35 11	
120	*LBL9	21 89	Enterprise coordinates
121	6	06	
122	ST0I	35 46	
123	*LBL3	21 83	
124	RCL0	36 00	
125	Pi	16-24	
126	+	-55	
127	5	05	
128	YX	-31	
129	FRC	16 44	
130	ST00	35 00	
131	4	04	
132	1	01	
133	X	-35	
134	3	03	
135	0	00	
136	+	-55	
137	INT	16 34	
138	ST0I	35 45	
139	DSZI	16 25 46	
140	5	05	
141	0	00	
142	-	-45	
143	ST0I	35 45	
144	DSZI	16 25 46	
145	GT03	22 83	
146	RCL3	36 03	
147	RCL1	36 01	
148	+P	34	
149	R↓	-31	
150	ST07	35 07	
151	RCL5	36 05	
152	RCL5	36 05	
153	X ²	53	
154	RCL3	36 03	
155	X ²	53	
156	RCL1	36 01	
157	X ²	53	
158	+	-55	
159	+	-55	
160	TX	54	
161	ST08	35 12	
162	PRTX	-14	
163	÷	-24	
164	SIN	16 41	
165	ST08	35 08	00
166	6	06	
167	ST0I	35 46	
168	0	00	

LABELS

FLAGS

SET STATUS

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

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
001	*LBL0	21 00		057	DSZI	16 25 45	
002	FIX	-11		058	1	01	
003	P+S	16-51		059	RCL0	36 00	
004	RCL1	36 01		060	X#Y?	16-32	ALL Aliens out of range
005	ENT↑	-21		061	GT04	22 04	
006	ABS	16 31		062	P+S	16-51	
007	=	-24		063	EEX	-23	
008	RCL5	36 05		064	3	03	
009	P+S	16-51		065	RCL1	36 01	
010	X	-35		066	X#?	16-45	
011	*LBL1	21 01		067	R↓	-31	Nubian towed?
012	PSE	16 51		068	ST01	35 01	Yes - STORE 1000.
013	GT01	22 01		069	2	02	
014	*LBL2	21 15		070	ENT↑	-21	
015	P+S	16-51	TTG (Transport/Tractor beam)	071	PRTX	-14	Display code 2
016	RCL1	36 01		072	0	00	
017	GSB2	23 02		073	ST05	35 05	Enterprise coordinates = 0,0
018	GSB5	23 05		074	4	04	
019	P+S	16-51		075	ST01	35 46	
020	RCL1	36 01		076	RCL7	36 07	
021	CHS	-22		077	X#?	16-42	Damages?
022	ST01	35 01		078	GT07	22 07	No ... continue.
023	.	-62		079	1	01	
024	1	01		080	ST07	35 07	Repair
025	ST-8	35-45 08		081	6	06	
026	P+S	16-51		082	ENT↑	-21	
027	GT08	22 08		083	PRTX	-14	Display code 6
028	*LBL3	21 16 13		084	*LBL7	21 07	
029	P+S	16-51	Docking and Repairs.	085	RCL1	36 45	Check for game over.
030	1	01		086	EEX	-23	
031	0	00		087	3	03	
032	0	00		088	X#Y?	16-32	
033	.	-62		089	GT08	22 08	game over?
034	1	01		090	DSZI	16 25 46	No ... continue.
035	0	00		091	GT07	22 07	
036	0	00		092	DSP0	-63 00	Yes.
037	1	01		093	9	09	
038	GSB2	23 02		094	ENT↑	-21	
039	GSB5	23 05		095	PRTX	-14	Display code 9
040	4	04		096	FIX	-11	
041	ST08	35 08		097	RCL6	36 06	Fuel
042	*LBL4	21 04		098	R/S	51	END
043	RCL0	36 00		099	*LBL8	21 08	
044	ST01	35 46		100	P+S	16-51	
045	P+S	16-51		101	GT08	22 08	
046	RCL1	36 45		102	*LBL2	21 02	Distance
047	GSB2	23 02		103	RCL5	36 05	
048	4	04		104	3	-45	
049	0	00		105	P+S	16-51	
050	X#Y?	16-35		106	3	03	
051	GT06	22 06		107	ST01	35 46	
052	8	08		108	CLX	-51	
053	ENT↑	-21		109	ST07	35 07	
054	PRTX	-14		110	R↓	-31	
055	GT08	22 08		111	*LBL3	21 03	
056	*LBL6	21 06		112	ENT↑	-21	

REGISTERS

0	1	2	3	4	5	6	7	8	9
S0 Seed	S1 Nubian	S2 Klingon	S3 Romulan	S4 Vulcian	S5 Enterprise	S6 Fuel	S7 Damages? 000, OFF=1	S8 ships in vicinity	S9 Nubian
A	B	C	D	E	F	G	H	I Counter	J

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Program Listing II

- Program 6

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STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
113	INT	16 34					
114	EEX	~23		170			
115	2	02					
116	-	~45					
117	X ²	53					
118	ST+7	35-55 07					
119	R↓	~31					
120	FRC	16 44					
121	EEX	~23					
122	3	03		180			
123	X	~35					
124	DSZ1	16 25 46					
125	GT03	22 03					
126	RCL7	36 07					
127	FIX	31 54					
128	RTN	35 24					
129	*LBL5	21 05					
130	SCI	32-12		190			
131	1	01					
132	0	00					
133	X>Y?	16-34	D<10?				
134	RTN	24	Yes-Return				
135	-	07	No...				
136	ENT↑	-21					
137	PRTX	-14					
138	GT00	22 00		200			
139	R/S	51					
140							
150							
160							
220							

LABELS

LABELS					FLAGS		SET STATUS		
A	B	C	D	E	TTB	0	FLAGS	TRIG	DISP
a	b	c	d	e		1	ON OFF		
0 ✓	1 ✓	2 ✓	3 ✓	4 ✓		2	0 □ □	DEG <input checked="" type="checkbox"/>	FIX <input checked="" type="checkbox"/>
5 ✓	6 ✓	7 ✓	8 ✓	9 ✓		3	1 □ □	GRAD <input type="checkbox"/>	SCI <input type="checkbox"/>
							2 □ □	RAD <input type="checkbox"/>	ENG <input type="checkbox"/>
							3 □ □		n 6

00369D

10/11/77

Dear HP user,

Listed below are some minor improvements and corrections to ADVANCED STAR TREK. They have been compiled from the letters and Program Comments I have received from various users.

1) This is neither a correction or an enhancement. It is an oversight made by many users which has prompted many of the invalid coding errors that some users claimed were included in the program. Basically, inconsistencies and errors may crop up if you do not preset the flags before storing your STAR TREK programs. I have reviewed these below...

Program 1--None (set display to FIX 0) (None implies all flags OFF)

Program 2--None (set display to FIX 6)

Program 3--The version most users have includes no flag presetting.

I have added some improvements to this program which necessitates Flag 0 to be preset ON. This is mentioned below. (set display to FIX 4)

Program 4--SET FLAG 2...If this is not done, the sample battle in the instructions will not correspond to the figures that show up on your display (i.e. the first status display comes up as 34.00000080 when it should be 34.00400080. Flag 2 controls initial alien fire upon the ENTERPRISE). (set display to FIX 8)

Program 5--SET FLAG 0...With this flag preset, the program assumes that it is dealing with a destroyed alien before it even begins. If it finds out that the alien is not destroyed, it clears the flag at line 63. (set display to FIX 6)

Program 6--None (set display to FIX 6)

--I assume that everyone knows what I mean by PRESETTING the flags and display before recording the program on a card.--

2) A minor addition. Between steps 31 (h x ↔ y) and 32 (STO 0) of Program 3, one might want to add the steps...

1	01	For further additions to
h x ↔ y	35 52	Program 3, see below.
g ≤ 0	32 71	
GTO 0	22 00	

...to ensure that the player's input is not less than or equal to 1.

3) An oversight on my part...When I write g DSZ 32 33, I really mean g DSZ(i) 32 33...For an example, see program 6, line 57.

4) ENHANCEMENTS TO PROGRAM 3.

These additions are so few, that I did not deem it necessary to rewrite the entire program listing.

Replace step 87 (f INT) with DSP 0 23 00
 f RND 31 24
 DSP 4 23 04

Distance between Enterprise and attacking vessel will now be properly rounded (e.g. 34.4+ will round to 34 and 34.6+ will round to 35).

Between step 112 (g SCI) and 113 (f -x-), add step h F? 0 35 71 00