SPACE ACE 21

Instruction Manual

Space Ace 21 is a computer game for the TRS-80* Model I or III microcomputer. 16k RAM and Level II basic or Model III basic are required.

I.   INTRODUCTION

Space Ace 21 is a SciFi game of tactical space combat.   The players design their own space craft from 12 different module types.   The program gives a graphic display of each craft and a complete status report.   After the craft designs are checked for errors, the craft then engage in a battle.

Special Features

1) Human or computer opponent.
2) Fight in two or three dimensions.
3) Action sounds and graphics
4) Three scenarios to choose from: Smuggler, Refuel Option, and Phoenix Decathlon.

II.   ABBREVIATIONS

The following abbreviations are used in the text of this manual:

BC - Battle Capability   Max - Maximum
CO - Computer Opponent   Min - Minimum
KG - Kilograms   No. - Number
KM - Kilometers   2D - Two Dimensional
Sec- Seconds (time)   3D - Three Dimensional

III.   LOADING THE PROGRAM

When you turn on your computer, set MEMORY SIZE? to 32370.   If you don't, the program will bomb.   CLOAD the program and check for a good load.   There are two or more offloads of this program on the same side of the tape.   If the first does not load then try another.   RUN the program.   On the first RUN it will BREAK after a few seconds.   RUN it again.   It will not break out on its own on subsequent RUN's.

* TRS-80 is a trademark   (1)
of Tandy Corp.

IV.   SCENARIOS

1. Smuggler - The right side's craft must get past the left side's craft. CO's No. 1 through 5 are designed for this scenario. Since the CO always takes the right side you cannot be the smuggler against the CO. However, you can be a smuggler against another human opponent. The smuggler is started at a random location between 2828 and 8660 KM from its home base. The smugglers goal is to dock with home base with as much cargo or passengers as possible.

2. Refuel Option - The players may return to base and dock after combat. The craft will be serviced with more fuel, torpedoes, and missiles. Damage to all the modules will remain. COs No. 6 through 10 are designed for this scenario. The space ships are started at their bases.

3. Phoenix Decathlon - This scenario can be played against the CO only. You can start against any CO you wish and then you will run through all ten COs. Each time you defeat one, another CO will rise up out of the ashes of the destroyed craft. The space craft start this scenario at their home bases. The left side's craft must refuel as in scenario No. 2. If two human players attempt to play the Phoenix Decathlon, the game will revert to scenario No. 2. If you can defeat all ten COs you will be declared a "Space Ace".

V.   SHIP DESIGN

There are only three rules that apply to space ship design:
a. You must have at least one each of the five essential modules: bridge, engine, fuel, generator, and life support.
b. Legal engine mounts require that the module directly under the engine module be a zero space. Therefore it is convenient for you to place your engines on module positions 19, 20, & 21.
c. If you don't like your design or have made an error, you must RUN the program again.

VI.   MODULE MASS and POSITION NUMBERS

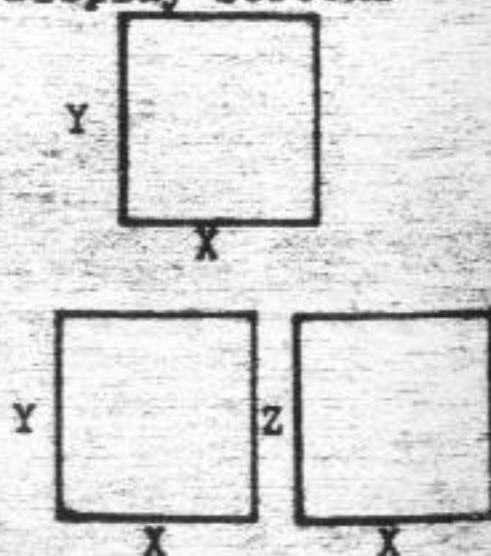| code	name	mass (KG)	Module position numbers		
A	Armor	25,000	1	2	3
B	Bridge	10,000			
C	Cargo	100,000	4	5	6
D	Disruptor	10,000			
E	Engine	40,000	7	8	9
F	Fuel	110,000			
G	Generator	30,000	10	11	12
L	Life Support	10,000			
M	Missiles(1 ea.)	15,000	13	14	15
P	Phaser	10,000			
S	Sensor	5,000	16	17	18
T	Torpedo (4 ea.)	14,000			
Z	Zero	0	19	20	21

Each space craft can hold up to 21 modules. For a complete description of what each module does, see the section on Module Funtions.   * Essential Modules
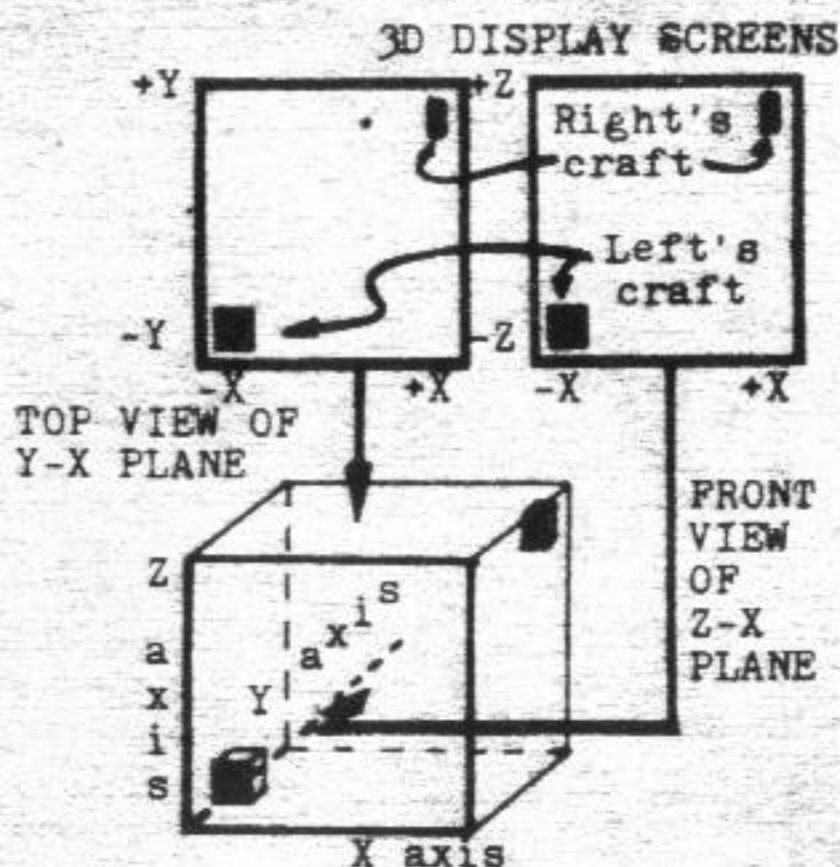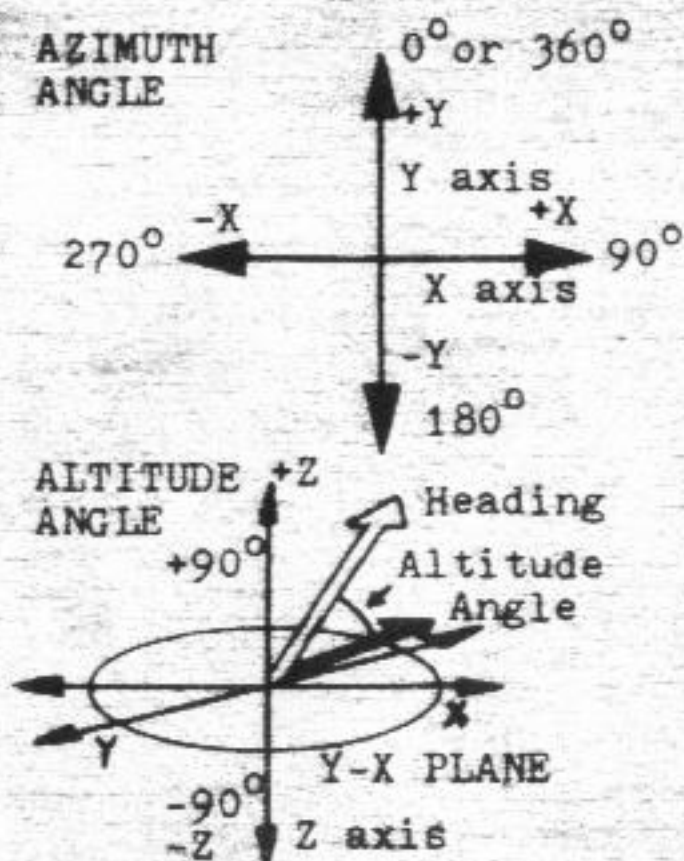
VII.   DISPLAY

Display Screens

A. The 2D display has one rectangle. The Y axis is vertical and the X axis is horizontal.

B. The 3D display has two rectangles. The Y axis is vertical on the left retangle. The Z axis is vertical on the right rectangle. The X axis is horizontal on both rectangles.

CAUTION NOTE: If you BREAK the program or scroll the video screen upward during battle, then you must start a new game.

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AZIMUTH
ANGLE   0°or 360°   3D DISPLAY SCREENS

                      +Y   Right's
                      Y axis   craft
      -X   +X   Left's
270°   90°   craft
      X axis
                      -Y
                      180°   TOP VIEW OF
ALTITUDE +Z   Y-X PLANE   FRONT
ANGLE   Heading   VIEW
      +90°   Altitude   OF
                     Angle   Z-X
                                                                      PLANE
                     Y-X PLANE
      -90°
      -Z   Z axis   X axis

The space craft is considered the origin for angle calculations.

C. Heading Angles - The azimuth angle is the angle of rotation
around the Z axis in the Y-X plane (see the diagram above).
The altitude angle is the angle between the heading vector
and the Y-X plane (see the diagram above). In the 2D game
the altitude angle is always zero.

D. Scale Factor - The display screens change scale factor to
show the positions of each craft relative to each other.
The large graphic block represents the left sides craft and
the smaller graphic block represents the right sides craft.
The center of the display screens represents roughly half the
distance between the two craft. The scale factor represents
the distance along one side of the display screen plus about
10% more.

E. Game Boundaries - You should not go beyond +100,000 or
-9,999 KM in any direction. If you do the status display
becomes hard to interpret.

F. Status - The print to the
right shows a typical game in
progress. The unlabeled
number in center top is the
relative angular velocity
factor.   Occasionally it
will occlude one of the
craft graphic blocks.
SF = Scale Factor
DISTANCE = Distance between
the ships in KM.
SP = Speed in KM/Sec
AZ = Azimuth Angle
AL = Altitude Angle
TR = Torpedoes Remaining
MR = Missiles Remaining
BC = % Battle Capability
F = Fuel Remaining in
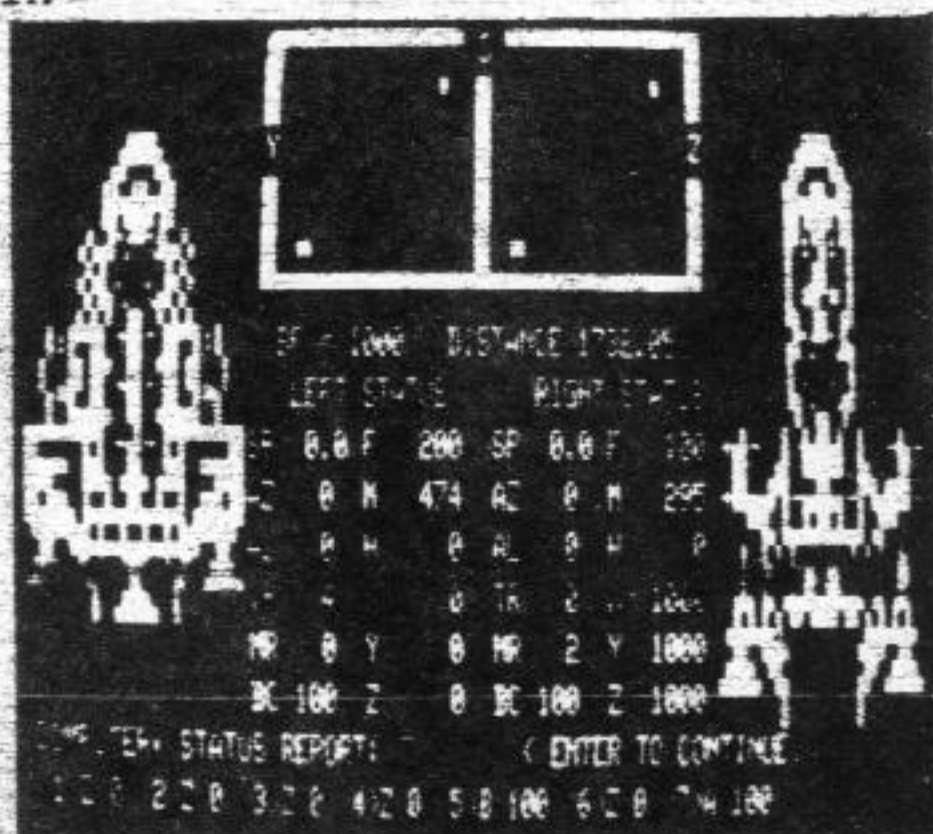   thousands of KG.
M = Mass of the ship in
      thousands of KG.
H = Distance to home base in KM.
X = X position in KM.
Y = Y position in KM.
Z = Z position in KM.

Note: In the 2D game the Altitude Angle and the Z coordinate
       remain zero.

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VIII. HOME BASE

Each craft has a home base represented by an X,Y,Z coordinate.
The display screens do not show the home bases.

Base	coordinate	left side	right side
Location	X	0	1000
in KM from	Y	0	1000
origin.	Z	0	1000 (0 for 2D game)

IX. COMMAND ENTRIES

There are four command entries each 10 second turn: Status
Report, Heading Maneuver, Speed Change, and Weapons.
Since the game is stop action the right side player should
secretly write down command entries intended before the left
side player starts entering commands. This will prevent
cheating.

A. Status Report - In addition to your constant status display
you can get a detailed report on the % capability of each
module on your craft. Each module starts with 100 %
capability.
Example of report: 8) G 100
                                    └────── % capability remaining
                            └──────── letter code
                        └────────── module position No.

B. Heading Maneuver - See the section on Heading and Speed
changes for a detailed explanation.
  1. Homing: The ship's computer will determine headings for
      1) Enemy Ship 2) Enemy Base 3) Home Base.
  2. Angles: You enter the angle you desire.
  3. N.C. + No change.
  4. Dock : Your craft must be within 100 KM of home base
              and you must be playing scenario 2 or 3.

C. Speed Changes -
  1. Max   : The ship's computer will determine and go to
              the maximum speed possible for that turn.
  2. Min   : The ship's computer will determine and go to
              the minimum speed possible for that turn.
  3. Specify: You input the desired speed.
  4. N.C.   : No change.

D. Weapons - See the section on Module Functions for a detailed
explanation on the use of each weapon system.

X. HEADING and SPEED CHANGES

The ship's computer has a hierarchy of maneuvering priorities.
It will attempt to make the turn requested first and if there
is thrust left over it will attempt to make the speed change.

A. Heading Changes - When commanded to turn the ship's
computer will determine:
1) The amount of thrust available.
2) The desired heading vectors.
3) The amount of thrust required to change heading and maintain
   the same speed.
4) An intermediate heading, which will be approximated if the
   thrust is not available.
5) The amount of fuel used.

B. Speed Changes - When commanded to change speed the ship's
computer will determine:
1) The amount of thrust left after a heading change.
2) The speed change or an intermediate speed change.
3) The amount of fuel used.

Note: The higher your speed the harder it is to change
direction. You must plan ahead.

XI. DOCKING

To dock your craft you must be within 100 KM of your home base,
and playing scenario 2 or 3. When docking, missiles and
torpedoes will be replaced and the fuel modules will be topped
off. You can still fire phasers and disruptors during docking.

XII. DEFEAT

To defeat your opponent's space craft you must remove the combined % capability of any of the essential module types or have your opponent run out of fuel.

XIII. MODULE FUNCTIONS

A module is made up of 10 graphic character blocks. Each module starts with 100 % capability at the beginning of the game. How well any particular module functions may or may not depend on its % capability.

<u>Armor</u> - Armor modules with greater than 30% capability will protect other modules to the left and right. The amount of damage is cut in half for hits by phasers, torpedoes, and missiles. Disruptors are unaffected. The most effective place for armor is on the centerline position.

<u>Bridge</u> - The bridge is considered the control center. Because of supposed redundancy it will function down to 5 % capability.

<u>Cargo</u> - Cargo is useful in scenario No. 1. See how much you can smuggle through.

<u>Disruptors</u> - This is a devastating close range weapon. You must have at least 40% generator and 40% disruptor capability. and 10,000 KG of fuel to fire disruptors. Each disruptor unit that hits the enemy will do 10% damage to one module. Disruptors always hit and have a Max range of 1199.9 KM. The number of hits depends on the range (see table below). For example: 2 units will hit if the enemy's range is between 480.1 and 720.0 KM. Disruptors use 10,000 KG of fuel each time they are fired.   DISRUPTOR HIT TABLE

Units	Range	Units	Range	Units	Range	Units	Range	Units	Range
40	36.0	32	45.0	24	60.0	16	90.0	8	180.0
39	36.6	31	46.4	23	62.6	15	96.0	7	205.7
38	37.8	30	48.0	22	65.4	14	102.8	6	240.0
37	38.9	29	49.6	21	68.5	13	110.7	5	288.0
36	40.0	28	51.4	20	72.0	12	120.0	4	360.0
35	41.1	27	53.3	19	75.7	11	130.9	3	480.0
34	42.3	26	55.3	18	80.0	10	144.0	2	720.0
33	43.6	25	57.6	17	84.7	9	160.0	1	1199.9

Range is in KM

<u>Engine</u> - The pulse engines can fire 0.1 seconds Max out of every 10 seconds. However, each engine will give 100,000,000 Newtons of thrust at 100% capability. Each engine will use 3000 KG of fuel per Max burn. The engines will lose thrust directly proportional to the damage they receive.

<u>Fuel</u> - Each fuel module holds 1000 KG of fuel per 1% capability or 100,000 KG when full. An empty fuel module has a 10,000 KG mass. You can not have more fuel on board than the combined % capability of the fuel modules times 1000. Fuel is used by the engines and by the generator to provide disruptor or phaser power.

<u>Generator</u> - The generator module provides energy for the ships phasers, disruptors, and life support system.

<u>Life Support</u> - This module provides the crew and passengers with a habitable environment. In scenario No. 1 , each life support module can support 50 passengers (one for each 2%).

<u>Missile</u> - Missiles are deadly intermediate range weapons. The missiles hit 10 seconds (game time) after they are fired, ie: at the end of the turn after the craft have moved. The missiles have a 500 KM range and take on the ship's vector when launched. For example: Suppose the launching craft has a velocity of 20 KM/Sec. The center of the kill radius will be figured from a point 200 KM (20 KM/Sec times 10 Sec) from the launching position. The center of the kill radius is computed as if the launching craft maintained speed and heading for 10 seconds. Each missile has a mass of 10,000 KG. A Max of 9 can be launched per turn. If the graphic display of the missile shows damage then that missile is rendered useless.

The graphic display of the missile is made up of 4 graphic blocks (see right). Missiles do 90% damage.

Note: You cannot launch missiles or torpedoes within 100 KM of your base. The CO is not restricted by this rule.

Phasers - Phasers are excellent long range weapons, but they are not accurate. The probability for a phaser hit depends on three factors: distance between craft, relative angular velocity factor, and sensor capability. The distance between the craft is twice as important as the relative angular velocity factor. The Max range for phasers is 1199.9 KM. The Max number of phaser units that can be fired per turn is 9. You can fire 5 units Max per phaser module and must have at least 20% generator capability; 20% phaser capability and 1000 KG of fuel per unit fired. Each unit fired uses 1000 KG of fuel. Each phaser unit does 10% damage to the module it hits unless the module is protected by armor.
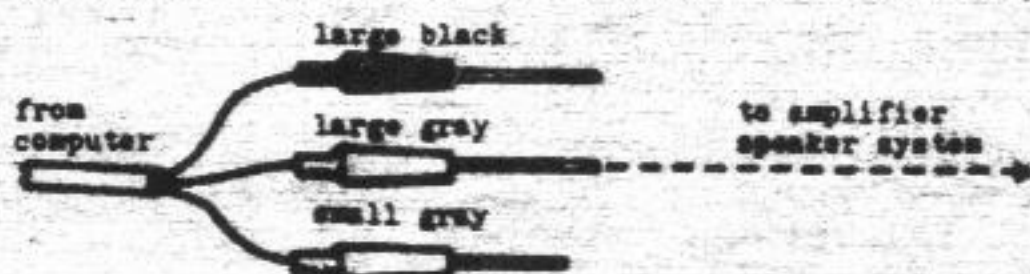
Sensors - Sensors can increase accuracy of the phasers by up to 10%. Sensor effectiveness decreases with damage.

Torpedoes - Torpedoes act just like miniature missiles with a 200 KM kill radius. They cause 50% damage to the module they hit. You can fire a Max of 9 per turn. Each torpedo has a mass of 2500 KG. They can be rendered useless by damage.

Zero - A zero space is provided so that you can design interesting looking space craft. Also a zero space is needed behind engine modules mounted high on the craft. Phaser and disruptor units will hit zero spaces, missiles and torpedoes will not.

XIV. ACTION SOUNDS

To get action sounds connect a "cheapie" speaker-amp to the middle pin of the cassette connector. Radio Shack sells a low price speaker-amp which will work just great (around $12.).

XV. AUTHOR'S COMMENTS

We realize that the concepts of movement and weaponry may be difficult to understand on first try. Play a few practice games before you really try to be a serious contender.

The computer opponent has no special advantage (except launching missiles and torpedoes within 100 KM of home base). Once you get a little experience you will find that the CO is a real turkey. This game is most challenging when played by two human opponents.

WEAPON SUMMARY TABLE	Max Range (KM)	Max Units per turn	Damage per Module per Unit hit	Affected by Armor **	Fuel Used KG	Generators required	Optimum Ranges	Min % Capability to fire
Phasers	1199.9	9	10%	yes	1000/unit	20/unit	long	20/unit
Disruptors	1199.9	40*	10%	no	10,000	40	close	40
Missiles	500	9	90%	yes	none	none	medium	undamaged graphic block
Torpedoes	200	9	50%	yes	none	none	close	graphic block

* See disruptor hit table   **Armor can reduce damage by 50%