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Project: Space Station

by

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INTRODUCTION

Project: Space Station is a mission simulator. With the help of NASA and other space officials, *Project: Space Station* is closely authentic to NASA's Space Station program. The shuttle is the backbone of the Space Station program, having the capacity to lift housing modules and other construction items into space. To fulfill the goals of the Space Station program, NASA must do the following:

+ Appropriate funds to the different budgets.
+ Purchase equipment which has been contracted out to build.
+ Schedule shuttle launches over the next 15 years to the necessary items into space to build the station.
+ Construct the space station.
+ Deploy satellites for contract income.
+ Conduct R and D projects in hopes of making discoveries that will saves lives, money and time.

All of the above functions are simulated in *Project: Space Station*. In addition, crew members can have personality clashes while working together. Assigning the right crew members is a factor in deciding if the project is a success.

GOAL

As the Mission Coordinator, you must build a space station and keep it running. There is more than one way to achieve that goal. You can continue a mission as long as your revenue continues to come in. If revenue drops, you will have to survive with your remaining resources.

Although *Project: Space Station* is not set to real-time, you may find that your missions can take as long as days or weeks on end, especially if the mission is going well. Just like a complex jigsaw puzzle, it is rarely completed in one day.

MANUAL ORGANIZATION

The manual is divided into three sections:

GETTING STARTED: Explains how to load Project: Space Station and some of the conventions used in this manual.

TUTORIAL SECTION: Walks you through a section of the program.

REFERENCE SECTION: Describes the eight mains program functions in detail. Use this part of the manual to learn how to perform a specific task.

Getting Started

This section helps you load the game and explains some of the basic principles of the game.

SYSTEM REQUIREMENTS

IBM: *Project: Space Station* requires an IBM PC/XT/AT, TANDY 1000/2000/3000 or IBM 100% compatible machine with 256K, DOS 2.0 or greater, a Hercules mono. or CGA card, and disk drive. A second disk drive and joystick are optional.

C64: A C64 or C128 (in C64 mode) and a disk drive are required. A joystick is optional.

Apple: An Apple IIe, IIc, or II+ with 64 K and one disk drive are required. A joystick is optional.

LOADING THE PROGRAM

IBM: Boot the computer with DOS 2.0 or later. At the A> prompt, insert the *Project: Space Station Start/Install Disk* (Disk 1 of 2) in Drive A, type **install a:**, press Enter, and follow the prompts (Disk a: is *Project: Space Station Disk 1*; Disk b: is your DOS disk). **Note: If using a hard drive, type install c:.** When the Installation Screen

appears, insert the *Start/Install* disk (Disk 1), type **Station**, and press Enter (If on a monochrome system, type **mono** and press Enter). The program will load and you will be prompted if you need to insert your other Space Station Disk.

C64: You may use a Fast Load cartridge with *Project: Space Station*. Remove all other cartridges and plug your joystick into Port 2. Turn on the computer and disk drive. Put the *Project: Space Station* disk in the disk drive, type **Load "*",8,1**, and press RETURN. It will take a few minutes for the program to load.

Apple: Insert the *Project: Space Station* disk into your disk drive with the label facing up, and turn on your computer. Be sure the CAPS LOCK key is down. You are asked if you are using a joystick. Type **Y** for yes or **N** for no. In a few seconds, you are asked to turn your disk over. Remove the disk from the drive and reinsert it with the disk label facing down, then press RETURN.

After the program has loaded, the Mission Select and Disk Manager screen appears. This is where missions begin and end. Before attempting to build your own station, it is recommended that you step through the tutorials.

KEYBOARD COMMANDS

Although the use of a joystick is optional, this manual is written with the joystick in mind. The keyboard equivalents are listed below:

IBM: Use the cursor arrow keys to move the highlight up and down or left and right. The ENTER key functions as a joystick button press and the ESC key allows you to exit a section of the program. The joystick can be toggled on and off by pressing CNTRL-J while under the "Change Keyboard Layout" selection in the Disk Manager.

C64: Use the cursor control keys to move up and down or left and right. The SPACE BAR functions as a joystick button press. If you wish to change the keyboard commands, select "Change Keyboard Layout" while in the Disk Manager.

Apple: **A** moves the highlight up. **Z** moves it down. The left arrow key moves the highlight to the left, while the right arrow key moves it to the right. The SPACE BAR functions as a joystick button press. If you wish to change the keyboard commands, select "Change Keyboard Layout" while in the Disk Manager.

THE MAIN MENU

The Main Menu is always at the top of the screen. It is composed of 8 icons which correspond to the 8 main sections of the program. From this menu it is possible to get to any other part of the program. The highlight feature shows which section of the

program you are currently in. To select a Main Menu option, use the joystick (or keyboard commands) to move the highlight left or right to the desired option, then press the fire button (or appropriate keyboard command).

THE STATUS BOARD

The Status Board is always at the bottom of the screen. It contains a message indicator, a message board, and the current date of the mission.

The message indicator lamp flashes in the center of the screen whenever a message is waiting to be read. Messages can be read immediately or ignored indefinitely. To read a message, press **M**. Because old messages are replaced with new ones, only the four most recent messages are stored.

The date-line contains the mission's currdent date in a month-day-year format. When the program is first loaded or a new mission is started, the date-line is set to 9/1/87. Time does not begin until START MISSIONS AND BEGIN LAUNCHES is selected. Until then, time is frozen to let you plan and set up your mission. Once the mission begins, the date is

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updated at different rates according to the section of the program you are in as outlined below:

Rate	Section Affected
Frozen	Time is frozen in the "Disk Manager "and "Help" screens. It is also frozen in the "Launch Scheduling Phase" under Plan.
Slow	Activities such as launches, landings, and EVA functions are done in "real-time". In the Launch or Land sections, everything happens in the span of one day. In the EVA section, one EVA day is equal to approximately 1 minute of actual real-time.
Fast	In all other sections, one day is equal to approximately 8 real-time seconds.

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TUTORIALS

The process of building a space station is broken down into 5 tutorials. Each tutorial has a goal that should be achieved by the end of the tutorial. It is recommended that you go over each tutorial before attempting to finish a sample mission or before starting your own mission from scratch. The 5 tutorials and their goals are shown below:

Tutorial	Goal
Plan	Complete a plan and have it approved.
Launch	Successfully launch a shuttle into orbit.
EVA	Dock modules together and other EVA functions.
Land	Successfully land a shuttle.
R and D	Conduct a research and development experiment.

To start a tutorial, select the Disk Icon. From the menu that appears, select "Choose Mission Tutorial". Now move the highlight to the desired tutorial and select it.

PLAN TUTOR

Anytime a large scale project is undertaken, careful planning must be done to ensure the success of that project. The goal of the Plan Tutorial is to get a plan approved for a mission and SAVE it. To gain approval, the five budget items involved need to be approved, the right personnel need to be hired, and the correct modules need to be purchased. Plan is an important part of the project. It will be essential to return to the Plan section many times during the course of a mission. The Plan options are:

+Budget   +Crew Selection
+Space Equipment   +Module Selection
+Station Design   +Launch Scheduling
        +Summary and Approval

Move the highlight and press the button to enter any of these areas.

BUDGET
You must allocate funds to five different budget items before your plan can be approved. These items are plan, equipment, modules, operations, and research and development. Each item has 3 entries: dollars spent, dollars remaining in the reserve fund, and the total of both dollars spent and what remains in the reserve fund. Each budget item has a reserve fund color bar. The dollars in the reserve fund are

increased or decreased by moving the joystick to the right (increase) or to the left (decrease).

Now, let's actually set the reserve funds. To set the reserve fund for Planning, move the highlight to "Planning" and push the joystick to the right until the dollar value in the reserve fund reaches $1,000 Million. For "Equipment", set the dollar value at $1,600 Million. Move to "Modules" and set the reserve dollars at $2,000 Million. Set "Operations" at $1,200 Million. Finally, set "R & D" to $400 Million. Note that the project budget is now $3,800 Million. These are the remaining funds available after allocating money to the five budget items. If your dollar value in the total project budget is not the same, review this section again.

Money is spent from these categories at different rates and for different expenses. "Planning" spends money at a rate of $5 Million a day. Money is spent from the "Equipment" and "Module" budgets every time an item of space equipment or a module is purchased. "Operations" bears the cost of shuttle launches and landings, in addition to basic station maintainance and crew member's salaries. Money is spent from the "R & D" budget during the course of a R & D project.

After setting your budget items, select "Exit". The Plan icon at the top of the screen will begin

flashing. Press the button again to enter the Plan section. Now, move the highlight down to "Crew Selection" and press the button.

CREW SELECTION
The crew selection screen has four pages of crew members. Each page holds eight crew members, for a total of 32 different crew members. Each crew member has a main occupation or a specialty, but a crew member may have other "hidden specialities" which might not be so apparent. By reading the personnel profiles or "Vitas", you may learn about a crew members hidden talents.

You must assign at least six crew members to space duty to start a mission and pass the approval process. One of the members must be a shuttle pilot. A crew member's salary is deducted from the "Operations" budget. Because of the high cost of other operations, the crew deductions are not noticeable on a month to month basis. Deductions become apparent on a yearly basis.

To hire the crew for the tutorial, move the highlight down to "For More Crew" and press the fire button three times. The cursor is now on page 4. Move up to "A. Simpson: and select him by moving the joystick to the right. Simpson is assigned to the ground duty roster and his status changes from ----

to GRND. Continue to hire crew members. Hire "M. Stevens", "S. Travers", "C. Waite", "J. Whiting", and "H. Walsh".

To read a crew member's personnel profile, move the highlight to the person's name and press the fire button. The first page of the profile will appear. Press the button for the second page and again for the final page. You return to the crew selection list when done. The speed of the display for profile information may be toggled from normal to fast by pressing any key. Normal speed is one character at a time. Fast displays one page at a time. On the Commodore 64, pressing the RESTORE key will abort the display output and return you to the crew lists. On the IBM and Apple, press Esc..

After reading the profiles of your crew members, exit "Crew Selection" and reenter "Plan". Now move the highlight down to "Space Equipment" and select it.

SPACE EQUIPMENT

The space equipment screen contains all the equipment needed to perform space operations and other experiments. Items purchased from "Space equipment" are deducted from the Equipment reserve budget.

For the purpose of the tutorial, move the highlight to "space suit", and move the joystick to the right until you have purchased three space suits. Next, purchase one "manned maneuvering unit" (MMU). You will also need to purchase an "Orbital Construction POD" for EVA space activities.

For more information on a piece of equipment, move the highlight to that item and press the fire button. When you are ready to move on, exit "Space Equipment" and reenter "Plan". Now, select "Module Selection".

MODULE SELECTION

Modules are the building blocks of the space station. They are interlocking compartments, each having a specific function. Because modules are expensive, it is a good idea to purchase only the modules you will need initially. There is no need to buy an initial docking module as there is already one in space. For a better understanding of a module's function, highlight the module and press the fire button.

For now, purchase a "Crew Module", a "Hanger Module", and a "Power Module". The reserve budget should read $575 Million. When it does, exit "Module Selection", reenter "Plan", and then select "Station Design".

STATION DESIGN

It seems unwise to build a space station without having an idea of what the station should look like, "Station Design" allows you to build the station on screen before launching the first module. You will not be required to follow this original design. You may think of a better one once you get into space.

You will see a workspace with a docking module in the center and several modules around the perimeter. Move the arrow to the perimeter of a module. The display box tells you what type of module it is and how many you have. Also visible are a trash can and right and left scrolling arrows. For details on these, see Planning Reference.

Select the crew module (lower left). Now move it to the left of the docking module. Press the fire button to drop the crew module into place next to the docking module. If the module does not drop into place and leaves a gap between it and the docking module, pick up the crew module again. Move the module a little closer and release it. If it does not release, it is too close to the docking module. Once it is in place, pick up the power module (upper left). Press the fire button a second time to change the module's orientation from horizontal to vertical. Now, line it up above the docking module and drop it into place. There you have it, a simple yet effective space station design.

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Now, exit "Station Design", reenter "Plan" and then select "Launch Scheduling".

LAUNCH SCHEDULING

The two space shuttles, Atlantis and Discovery, can hold crew members, space station modules, and the equipment necessary for survival. The auto-packing computer makes it easy to load the shuttle. When it is on, items are moved into the payload of the next available shuttle automatically, according to the time they were purchased. Similarly, crew members are scheduled to be aboard the next available shuttle according to when they were hired. However, if a critically need item or crew member is need on the next scheduled launch, you can alter the payloads. By arranging the payload yourself, it is possible to maximize the efficiency of sending materials and people into space.

For the tutorial, move the red cursor until it is behind the leftmost shuttle. Because the auto-packer is on, there are already crew members and items in the shuttle. Move the highlight to "More Hold" and press the fire button (You can also scroll through the contents by pressing S). Now, move the highlight to "Suits" and press the button three times. The three have moved from the "Hold Area" to the "Shuttle Contents".

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At the moment, there is no shuttle pilot on the shuttle. Move the highlight until it is behind the second shuttle. Now, move down to "Walsh Sht" and press the fire button. He is moved to the waiting area. Move the highlight back to the first shuttle, press S, and move the highlight to "Walsh Sht" under "Crew Hold". Press the button to assign Walsh to the shuttle.

Now, all phases of the Plan Section have been completed. It is time to have your plan approved. Exit "Launch Scheduling", reenter "Plan" and then select "Summary and Approval".

SUMMARY AND APPROVAL
To continue with a new mission, you must have your plan approved. The approval status box states that the present plan has not been approved, and it is not immediately apparent why. By stepping through the budget items a separate status is seen for each item. The item status box states that the first budget item, "Plan" has been approved. By continuing through the the items, you see that R & D has not been approved. There needs to be at least $800 Million in allocated funds in order to get approval. Presently, only $400 Million is allocated.

To adjust the plan for approval, select "continue Planning". The planning submenus appear. Select "Budget". Move to R & D and push the joystick to the right until the funds reach $800 Million. Exit "Budget" and return to "Summary and Approval".

Upon returning to "Summary and Approval", the plan has been approved, and you may either "Continue Planning", as before, or you may "Begin the Mission". Before beginning the mission, save this plan to disk, so you may use it again later.

To save the plan, select "Begin Mission". Now select the Disk icon from the top menu bar. This takes you to the Disk Manager screen. You need a separate disk to save your plan on. DO NOT SAVE YOUR PLAN ON THE PROJECT: SPACE STATION DISK. To format your disk, select "Format a Data Disk". Once your disk is formatted, select "Save Current Project". You are asked for a project name. Type in "Apprvd Plan" and press Return (Enter). Now, insert your formatted disk and press Return (Enter) again. Your plan is now saved. Reinsert the Project: Space Station disk.

LAUNCH TUTOR

All equipment, modules, and crew members are sent into space by the shuttles which are launched into orbit under the "Launch" section. The shuttle must have items in its' payload before it is launched. The

goal of the "Launch" tutorial is to successfully launch a shuttle into orbit.

Select the Launch Tutorial from the Disk Manager. When you enter the tutorial, the message lamp indicator will be flashing. Mission Control has sent a message. Press M to read it. It states that a launch is scheduled for today. This message appears each time a launch day occurs.

Sometimes a launch must be put on hold. There are two kinds of hold: mandatory and voluntary. In mandatory holds, Mission Control holds the countdown to correct a problem discovered in the final seconds of the countdown. Mission Control resumes the countdown when the problem is fixed. Voluntary holds are instated by you, usually to wait for better weather conditions. To watch the weather conditions change, move the highlight to "Hold Countdown".

If the shuttle is held too long, the launch window is missed and the mission is aborted. The launch can also be aborted if severe weather conditions are present at lift-off. If a mission is aborted, all scheduled launches are set back two weeks.

To proceed with the tutorial, move the highlight to "Proceed Launch". Watch the countdown. Ignition starts at T minus 3 seconds. At T minus 0, you have

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lift-off! The screen switches to an inside-the-cockpit view. The cockpit contains a shuttle viewing monitor, a flight path monitor, and an on-board message monitor. The flight path monitor (upper right) has a number of moving boxes, which are guides for maneuvering the shuttle into orbit. Using the joystick, try to keep the shuttle in the center of the target squares.

Even if you stray off course quite a bit, you will still reach the same orbit as the space station, but you may be on the other side of the earth, directly opposite the space station. This will make EVA activities cumbersome and impractical due to the time and fuel required for a POD to move the modules. Payloads are automatically deployed at the end of a launch. To move them about in space, see the EVA tutorial.

EVA TUTOR

During the building of a space station, many activities take place. These Extra Vehicular Activities (EVA) are performed under careful supervision. The goal of the EVA tutorial is to successfully dock two modules and learn to maneuver the POD in space. The POD is the most used piece of equipment in EVA. It is used to move and dock space station modules. Satellites are deployed into their orbits using the POD. PODs are even

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dexterous enough to remove small amounts of space debris which get into the orbit of the space station.

To enter the EVA Tutorial, select it from under the Disk Manger menu. Upon starting the tutorial, you see a POD, some modules, a shuttle and part of a satellite.

The POD has retro-active jet paks attached to each side. By firing a jet-pak on one side, the POD moves in the opposite direction. This is known as a retro-active force. For example, is you move the joystick (or arrow key) to the right, the POD moves to the left. If held in one direction, the POD speed increases. There are two ways to stop the POD> If the jet paks are idle, the POD slowly stops moving and eventually returns to the pull of orbit. You can also stop a POD by firing the retro-jet packs that are on the same side as the direction of the POD's movement. It is a good idea to practice moving the POD around before you try any serious activities.

The POD has three elements which must be watched over: structural damage, oxygen, and fuel. Although the POD is made of a strong alloy that is triple-wall constructed, damage can be sustained if it is repeatedly bounced off of modules or other items in space. The POD contains enough oxygen to last about 16 days. Fuel is used almost constantly and must be

replenished frequently. The faster the POD moves, the faster the fuel is used.

Press S on the keyboard. The Operations Menu and the POD Status Screen appear. At the bottom of the screen is each element of the POD status represented by a color bar. All bars are measured left to right. Damage ranges from light to heavy. Fuel and oxygen range from empty to full. To exit the Status Board, select "Return to POD Operations". Continue to maneuver the POD until you receive the message "POD Fuel Exhausted". At this point, your POD is immobile and you will need another POD to rescue it.

To get a new POD, press S. Select "Bring out a new POD for EVA". A new screen appears. This allows you to select a crew member to operate the POD. Select Baxter from the Discovery shuttle by pressing the joystick button. His status will change to EVA. Now, select "Bring Out POD". The new POD appears near the shuttle that you selected the crew member from. This POD will rescue the defunct POD. The crew member in the stranded POD needs to be rescued before the oxygen supply runs out.

Note: To bring out a new POD, you must have at least one POD in storage and one crew member in space. The crew member may be in one of the shuttles or in the space station.

Move the operational POD over to one side of the defunct POD and press the fire button to grasp it. Move both POD's over on top of one of the shuttles and press the button again. The message "POD Moved Into Storage" appears and the defunct POD will be repaired and refueled.

Each time the POD latches onto a hangar module or a reserve fuel tank, the POD's fuel is replenished. The hangar module is a garage for vehicles and other equipment. The POD can replenish it's fuel and oxygen at the hangar module. Minor damage to the POD can also be repaired. Reserve fuel tanks do not hold as much fuel as the hangar module and contain no oxygen. To conserve the reserve fuel tanks, press the fire button during a refuel. This releases the POD from the tank.

Move the POD to the side of the Crew module and latch on to it by pressing the fire button. You will see the message "Grasped Crew Module" (Once the POD has a module attached to it, pressing C tells you what module the POD is carrying.).

To rotate the Crew module, press **R**. The module's orientation will switch from horizontal to vertical. Press **R** again to change it back. The Power and Radiator modules are best suited for rotation. They can be docked to the top or bottom of a Docking module.

To release the crew module, press the fire button. The module will float away and return to orbit. Modules can not be released when other modules or space equipment is obstructing the return path back to orbit. If this happens, a message will warn you of the problem. Move to POD and module and try again.

To dock the Crew module to the Docking module, use the POD to hold the Crew Module horizontally, and move the POD until the right end of the Crew module hits th left end of the Docking module. When the two ends impact correctly, there is a click and you receive the message, "Docking Achieved". There is no need to hit the fire button when docking modules together. Dockings take place automatically when modules are properly aligned.

LAND TUTOR

Shuttles return from space not only to bring items back, but to pick up additional items and take them into space. The goal of the Land Tutorial is to safely land the shuttle on the runway.

The first thing to do is check the weather. This will let you know if it it is an ideal time for a shuttle landing. Move the highlight to ""View the Landsite"

and press the the fire button.   After checking the weather, press the button again to exit.

Now, select "Land Discovery".   The shuttle begins its exit from orbit by going into it's "turn and burn" mode.   Watch the flight path monitor (Upper   right). Use the joystick or arrow keys to keep the shuttle in the center of the target squares during the re-entry period.   Even if you stray off course, the shuttle will reach the land site.   The problem with   straying off course, is that depending on how far you stray, you will be too close or too far from the runway to make an easy landing and your shuttle will   therefore, sustain more damage.

Once the shuttle reaches the runway entry point, the screen changes to the land site at Edwards Air Force Base.   At this point, press S to stop time.   The shuttle will suspend in mid-air (The   shuttle   can only be suspended in the tutorial.   This will not work during a normal mission.).   Look at the three elements (altitude, airspeed, runway) displayed in the   top right corner of the screen.   They are defined as follows:

Altitude: The distance in feet, from the
shuttle to the ground.

Airspeed: The speed in miles per hour, at
whichthe shuttle travels through the
air.

Runway: The distance in feet, between the
shuttle and the start of the runway.

While suspended in mid-air, the shuttle can move between five positions it has for landing.   Pull down on the joystick to move the nose in an   upward direction.   Pull up to move the shuttle downward. The higher the nose is pulled, the faster t h e reduction in airspeed and the slower the descent of the   shuttle.

When you are ready to continue, press S   and continue with the landing.   You can   press S to start and stop the landing as many times as you desire.

The shuttle can only glide while landing.   Landing on   the   runway requires   a   certain   finesse   o f changing angles that can only be   mastered through practice.   Ideally,   touch-down   should   occur   w h e n the altitude and runway distances are 0 feet and the airspeed is 300 mph.   If the runway is near and the altitude is too high, push the nose of the   shuttle down.   The altitude will drop quickly, however, the airspeed will increase.   If the runway is too far and the altitude is to low, pull th nose up.   Altitude will suspend and airspeed will decrease.   The   minimum

airspeed the shuttle can slow to is 300 mph. An on-board computer regulates the airspeed so that it does not not fall below this.

Once the shuttle has landing, move the joystick to the right (or press the right arrow key) for short intervals to slow it down. The braking system can be destroyed if the shuttle lands too fast or the brakes are applied too heavily, so be careful.

When the shuttle comes to a complete stop, a damage report appears. It contains the status of the landing gear, the braking system, and the insulation tiles. The time needed to repair the shuttle is also shown. A shuttle can not be launched while in repairs and the fastest a shuttle can be repaired and turned around is 7 days. The better you get at landing, the faster you can use the shuttle for another launch.

RESEARCH AND DEVELOPMENT TUTOR

Research and Development (R&D) is the only way to sustain the Space Station Program Successful projects earn money for the program, while projects that fail lose money. In R&D, projects are assigned numbers, crew members are assigned to projects, and research paks are allocated. Reports are issued on active projects each week. The goal of the R&D tutorial is to successfully conduct an R&D project.

Enter the R&D Tutorial by selecting it from the Disk Manger menu. Next, select "Start-Cancel-View". The first eight R&D projects are displayed. Select the first project, "Crop Inventory". Information appears on the project, including a suggested crew and the types of research paks that should be used. The suggested crew members for "Crop Inventory" are an agronomist and an environmentalist. General research paks are also suggested. After reading the description of "Crop Inventory", press the fire button to return to the Project Selection screen. Now, with the highlight on "Crop Inventory", push the joystick to the right to assign it an R&D number.

Return to the Assignment Board, by selecting "Return to Project". The Project Board now shows "Crop Inventory" in the Review. Now, move the highlight to "1 Crop Inventory" . The status window states that the project is awaiting crew members and research paks before it can begin.

Press the fire button to assign crew members and research paks. The left part of the screen displays the first eight crew members in alphabetical order. Each members occupation and status is shown in an abbreviated form. A member's status can be one of

seven different modes before being assigned to project:

----- Member has not been hired.
GRND Member is on the ground.
STAT Member is in the Space Station.
ATLS Member is on the Atlantis.
DISC Member is on the Discovery.
EVA Member is performing an EVA function.
DEAD Member is dead.

Move the highlight to "For More Crew" and select it three times. Move up to the crew member "Waite", whose status is "Stat". Move the joystick (or arrow key) to the right to assign Waite to the project. Only crew members that are in the station can be assigned to an R&D project. Thus, any crew member working on a project is assumed to be in the station.

Now, select "For More Crew" two more times and then select crew member "Mendoza". He is on the Atlantis (ATLS) and must be transferred to the station before he can be assigned to the "Crop Inventory "project. To transfer Mendoza, exit the R&D screen by moving the highlight to "Return to Review" and selecting it twice. The highlight at the top of the menu will flash. Move it to "Station" and select it. Press S to change the designated shuttle from the Discovery to the Atlantis. Move the

highlight to "For More Crew" and select it. Move to "Mendoza" and push the joystick to the left to move Mendoza from the Atlantis to the Space Station.

While you are here note that the Space Station screen also gives a synopsis of the type and how many of each module comprise the station. For the purpose of "Crop Inventory", the station should have at least a crew module, a lab module, a power module and a communications module.

Exit the Station screen, then move the highlight to the R&D icon and select it. Next, move down and select "1 Crop Inventory" from the Project Review Board. Move to "For More Crew" and select it. Move up to Mendoza and push the joystick to the right to assign him to the project.

Move up to "Gen Res Pacs" and push the joystick to the right five times to transfer five General Research Pacs from the Project Assignment Board to the Equipment and Crew Board. Exit the Assignment Board by selecting "Return to Review". Move the cursor down to "1 Crop Inventory" and watch the Progress Report status window change. Progress reports are updated weekly. It shows how many man-days were used, how many research pacs have been used, and the costs of research and development so far. This window also shows how much revenue the project has produced. This

revenue is added to the Total Project Budget. Costs are deducted from the R&D reserve funds.

During the tutorial only, it is possible to speed up your R&D time. Move the highlight to "1 Crop Inventory" on the Project Review board. Press **R** once and the date will advance one week, and the project will have cost $1M, but generated $3M in revenue. Continue to press **R** until you are awarded a contract of $60 Million by the U.S. Department of Agriculture to track wheat production in the central plains. This completes the R&D tutorial.

TUTOR INFORMATION

The order you take in building a station is entirely up to you. However, there are a few key actions which outline the flow of a mission:

1. Plan: A mission cannot start without an approved plan. All sample missions included on your *Project: Space Station* disk include pre-approved plans.

2. Launch: After the plan is approved, the first shuttles are sent into orbit and their cargo is deployed in space.

3. EVA: Now, modules which are floating in space need to be docked to the space station. The POD does this and also deploys satellites.

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4. Land: The shuttle returns to Earth, sometimes to bring crew or items back; other times just to bring more items into space.

5. Cycle: Steps 1 - 4 continue until the station is able to perform R&D projects.

6. R&D: R&D can begin as soon as the station is configured properly for the chosen R&D project.

SAMPLE MISSIONS

There are three sample missions that are at various stages of development. They make it possible to step in as the project coordinator without having to start from scratch. The three missions are outlined below:

1. Research: A complete Space Station. Ready to start R&D experiments or take on special EVA tasks.

2. EVA: A partially-built Space Station. Requires additional module docking. Modules are floating in orbit.

3. Approved: A complete and approved Plan. Modules still need to be launched into space by the shuttles.

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To select a sample mission, select the Disk Manager, then select "Resume Prior Mission From Disk". The names of the three sample missions appear. Select a sample mission to play.

Note: On the Apple, the sample missions are saved in keyboard mode. If you are using a joystick, you will want to go to the "Change Keyboard Layout" section of the Disk Manager (See page 48.).

REFERENCE

This section covers each phase in more depth than the tutorial. For a basic understanding of a certain section, consult the appropriate tutorial.

PLAN REFERENCE

The Budget is where the monies are allocated from the total project budget funds to five specific reserve funds: Planning, Equipment, Modules, Operations, and R&D.

WHAT THINGS COST

Planning: Every day spent in a planning screen costs $5 Million.
Equipment and Modules: The cost ranges from $5M to $900M per piece.
Operations: Shuttle launches cost $75M. Landings cost $50M. EVA Maintenance is $2M per day. Salaries are $1M per month for every 8 astronauts.
R & D: Cost varies from $1M to $5M per week depending on the project.

CREW SELECTION

The crew selection menu is where crew members are assigned to the space duty roster. There are 32 crew members, each having a designated yearly salary and a job speciality. Crew members also have the ability to learn other jobs, but not at the same efficiency. Their personality traits can also help or hinder the success of an R&D project. There are 15 different job specialties:

Aerospace Engineer (2)   Agronomist (1)
Astronomer (2)   Biologist (2)
Chemist (2)   Communication Eng. (2)
Computer Specialist (2)   Environmentalist (1)
Flight Engineer (4)   Geologist (2)
Materials Engineer (3)   Meteorologist (2)
Physicians (2)   Physicists (2)
Shuttle Pilot (3)

The number in the ( ) indicates the number of crew members with that job. There must be 6 crew members, one of which must be a shuttle pilot, assigned to the duty roster before a project can begin. Only crew members that are presently on the ground can be removed from the duty roster. Crew members that have died will remain inoperative for the remainder of the mission.

SPACE EQUIPMENT

Purchased items are automatically stored into the shuttle payload and holding areas. There is a minimum requirement purchase of at least one Orbital Construction POD before a project can begin.

MODULE SELECTION

Purchased modules are automatically stored in the shuttle payload and holding areas. There is a minimum requirement purchase of at least three modules (a crew module, a hangar module, and a power module) before a project can begin.

STATION DESIGN

This is where the "paper design" of the station takes place. It is not required that a space station design be created, however it is extremely helpful to get an idea of what the station should look like before all the modules are in space.

The workspace scrolls left and right to give the equivalent of three screen widths of workspace. To scroll the screen, use the joystick (or appropriate keys) to move the flashing arrow pointer to the left or right arrow and press the fire button/spacebar. Holding down the button gives continuous scrolling.

You can determine the type of a module and how many have been purchased by placing the arrow pointer on top a modules and then looking at the box at the bottom.

See page 14 for information on connecting the modules together.

You may return a module if it is no longer needed by selecting the module and moving it to the trash can icon. Making sure that the module is over the trash can, press the fire button/spacebar to drop the module.

LAUNCH SCHEDULING
This area has two functions: scheduling shuttle flights and rearranging payloads.

Setting Launch Dates
Up to eight launches can be scheduled at a time. To schedule a launch or move a launch date, move the red cursor to the desired shuttle and select it. Move the shuttle left to advance the launch time, or to the right to push the date back. Press the fire button to release the shuttle. Launches can be scheduled up to 24 months in advance. Any launch that fails to be executed within its allotted launch window will push back the entire launch schedule.

The Auto-Packing Computer
This computer can be turned on and off in Launch Scheduling. When it is on, items purchased and crew hired are placed into the shuttles automatically. Crew members are assigned to shuttles in groups of three. Space equipment and

modules are packed in the payload according to weight and volume. If an item is too large or heavy for a shuttle, it is assigned to the next scheduled flight. When the computer is off, payloads are not filled. Items and crew go into their respective holding area as they are bought or hired. To toggle the computer on and off, press **R**.

Rearranging Payloads Manually
By rearranging payloads, you can organize them to their maximum efficiently. To do this, move the red cursor to the desired shuttle, the move the highlight left or right to either the shuttle payload or one of the payload holding areas. Move the highlight to the desired object and press the button. to move the desired object from one payload area to another. To transfer between shuttles, the item must first be moved form the first shuttle to the holding area and then to the new shuttle. Items like space equipment and modules cannot be transferred if the shuttle's weight or volume would be exceeded during a transfer attempt. In the case of space suits, it is possible to take as many as needed. Space suits are combined in a storage compartment that is loaded onto the shuttle as one unit.

SUMMARY AND APPROVAL
This is the last option in the Planning section. From this screen, a brief summary is displayed and a quick check is made to make sure that all the

minimum requirements have been met. The minimum requirement are:

Plan: Must allocate at least $1M.
Crew: Must hire at least 6 people, one of which must be a shuttle pilot.
Equipment: Must allocate at least $1.5M.
Modules: Must purchase at least one crew modules and one power module.
Operations: Must allocate at least $1.2M.
R&D: Must allocate at least $800M.

The approval status box displays whether the budget is approved or not. If the budget is not approved a new mission cannot begin.

To begin a new mission, select "Start Mission and Begin Launches".

LAUNCH REFERENCE

While on the launch pad, it may be advantageous to hold the countdown in anticipation of better weather conditions. To hold the countdown, move the highlight to "Hold Countdown". Stay on "Hold Countdown" until the weather changes. When the countdown is on hold, 1 real-time minute equals one full day of the mission. When the countdown is not on hold, 1 real-time second equals 1 real-time mission second.

If a launch is delayed too long it will miss its launch window. A launch can also abort if severe weather conditions (winds of 40-75 mph or thunderstorms) exist at lift-off time. Both these delays will set all scheduled launches back two weeks.

The launch can be aborted until the countdown reaches T minus 3 seconds. To abort the launch, press Restore on the Commodore or Esc on the Apple or IBM. Once the shuttle lifts off, stay on course by watching the flight path monitor and keeping the shuttle image in the center of the target squares. How well the shuttle stays on course will determine how far the payload is deployed from the station. To exit the launch area after the payload has been deployed, simply press the fire button or spacebar.

LAND REFERENCE

Upon entering Land, the status of the two shuttles is presented. If the shuttle is in orbit, a report is given stating how many days the shuttle has been in orbit. If the shuttle has landed and is still in repairs, a report is given stating how many days remain until the shuttle is completely repaired. Note: The life support systems on the shuttle can only sustain life for 30 days while in orbit.

A weather report is obtained by viewing the land site. The ideal weather conditions include clear and sunny skies, and winds of 20 mph or less.

To begin the process of landing the shuttle, move the highlight to the shuttle you wish to land and select it. Note: A shuttle can only land if it is in orbit and has 2 crew members in it. The shuttle will begin its exit out of orbit. Once the shuttle leaves orbit, it needs guidance to align properly with the landing strip. To stay on course, keep the shuttle in the center of the target squares at all times. Initial distance from the runway is based on how well the shuttle stayed on course during this sequence.

Once the shuttle reaches the runway entry point, the screen changes to a view of the land site at Edwards Air Force Base. The shuttle can be damaged by landing at too harsh an angle, or if it is travelling too fast. As the shuttle glides back to Earth it has limited controls. Ths shuttle can be in one of 5 positions. Changing the position of the shuttle will change the airspeed and rate of descent. To move the shuttle between positions, push up or down on the joystick to move the nose up or down, respectively.

Once the shuttle lands, apply the brakes by moving the joystick to the right for short intervals. The

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braking system can be destroyed if the shuttle lands too fast and requires too much braking to stop.

After landing, a report is presented. It includes the status of the landing gear, the brake system and the insulation tiles along with a report on the number of days needed to repair the shuttle. Repair time is based on the extent of damage. The best turn-around time is 7 days. To exit the Land screen, press the fire button/spacebar.

STATION REFERENCE

This section gives a quick summary of how many modules comprise the space station, and allows you to move crew members between the two shuttles and space station. When the mission begins, an initial docking module is automatically launched into an orbit. The docking module is the cornerstone of the space station and cannot be moved.

Crew members may switch between the station and the pre-selected shuttle at the bottom right of the screen (To change the designated shuttle, press S.). When moving a crew member from one shuttle to another, that crew member must go to the station before moving to the other shuttle. To move the crew members between the shuttles and the station, move the highlight to the desired crew member and select him. Move the joystick to the right to move the crew member form the station to the shuttle.

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Move it the left to move the crew member form the shuttle to the station. A crew member can only be moved to the station or shuttle is there is room. The shuttles have a maximum capacity of 6, whereas the station's capacity is based on the number of crew modules. Each crew module can hold 4 people. Crew members that die can not be moved. Crew members can die through exposure to radiation. Protect them by providing the station with enough of the correct modules for these rare emergencies. To exit the station screen move to word "exit" and select it.

EVA REFERENCE

In the EVA section, you may dock modules, deploy and repair satellites, and remove space debris. Upon entering the EVA screen after a successful launch, there are equipment or modules floating in space. The POD's task is to maneuver the items into place. To move the POD, push the joystick left to move the POD right and vice-versa. Moving up, down, and diagonally requires this "opposite" movement also.

See pages 22 and 23 for information on selecting, rotating, docking and releasing modules. To undock a module, move the POD to an unattached side of the module. Press the fire button/spacebar to grab the module, move the module away from the station and press again to release it.

See pages 21 and 22 for instructions on bringing out a new POD and refueling a POD.

During EVA, space debris is pulled into the same orbit as the station's. The debris is usually remote and is not a problem until later in the mission. To remove the debris, move the POD next to a piece of debris and press the fire button to grasp it. Move the POD to low orbit (bottom of the screen) and press again to release it. It will leave orbit and burn up before reaching Earth.

To return modules to the shuttle payload, use the POD to grasp the module, then move the module down to the shuttle. With the module on top of the shuttle, press the fire button to release the module into the shuttle. This procedure also works with space equipment. The shuttle payload can only hold 2 items of space equipment, two modules, OR one of each. Each item is represented by a blue square in the shuttle's hull. Items are sold back at 60% of original cost when the shuttle returns the items to Earth. The monies are added to the equipment budget or module budget depending on which type was returned.

Equipment in storage can be viewed by pressing S. It lists the number of POD's, MMU's, and Suits in

storage. This new screen also reports on the POD status. Fuel and oxygen are explained on page 20. Damage is sustained when the POD hits a modules or other space item. Repairing PODs is difficult to do in space, so they are often brought back to the Hangar or a shuttle. Return a POD in the same manner as you would return a module (see above).

To attach a PAM to a satellite, move the POD over to one side of the PAM. Move the PAM over to the satellite so that the top of the PAM is under the bottom of the satellite and press the fire button. PAMs (Payload Assistance Modules) are satellite boosters used to help a satellite achieve its final orbit. Satellites deployed into geosynchronous orbit requires a PAM. Deploying a satellite provides you with revenue ($275M for geosynchronous orbit; $200M for low orbit.). You have 10 days to respond to the request for satellite deployment before the job is turned over to a European space agency. To fire a satellite or PAM, select "Fire a Satellite" or "Fire a PAM on a Sattelite". The POD must be close to the satellite or PAM in order for the operator to launch it. Unless a PAM is connected to a satelite it is not possible to fire the PAM.

RESEARCH & DEVELOPMENT REFERENCE

To start or cancel a project, select "Start-Cancel - View", the move to the desired project. Push the joystick to the right to start a project and assign it a number. Push it to the left to cancel a project. Only four projects can be in progress at once. To get a description of a project, highlight it and press the fire button. This description will suggest crew members and research paks. To exit this portion, select "Return to R &D".

To assign or remove crew members or research paks, move the highlight to the project on the review board and press the button. Now, move the highlight to the member or pak. Move the joystick to the right to assign that member or pak. Move it to the left to remove them from the project. Only crew members that in the station (STAT) can be assigned to a project.

When you are in the Project Review Board, a project's crew and paks can be viewed in the upper right window. It shows how many research pacs remain and who is currently working on the project. In the lower window, you can monitor the project's progress. The cost of a project reduces the R&D fund. Revenue is added to the Total Project Funds Available. A progress report is given weekly for each R&D project.

There are three major milestones for each project. When you reach one, a message is displayed describing any contracts awarded, etc., Of course, disasters can occur. Machines break down, lab animals get out, fires break out.... These things can put the project on hold for awhile.

DISK REFERENCE

The disk screen is a disk management utility. All disk functions are accessed from this screen. Time is frozen while in the Disk Manager. The Restore key (C64), or Esc (IBM, Apple) aborts the current operation and returns you to the top Main Menu.

START NEW MISSION

Use this option to start a mission from scratch. Enter a mission name up to 11 characters (8 on the IBM) and press RETURN (ENTER). Your mission has started! Note: Upon beginning a new mission, the current mission is lost.

CATALOG MISSIONS

Insert your disk and press the fire button/spacebar. You are told the name of the disk, the amount of space used and remaining on the disk, and a list of available missions. Press the button again to return to the Disk Manager.

SAVING A MISSION

This selection lets you save your mission at is current status, If you do not want to save the mission press the button (or Restore or Esc). Otherwise, press RETURN (ENTER). If a mission already exists by the same name, you are reminded. Press **Y** to replace the existing file. It is possible to give the mission a new name. Press the delete key until the existing name is gone and then type the new name. **Note: Do not save games on to the** *Project: Space Station* **disks.**

RESUME PRIOR MISSION

This selection lets you continue at the point you left off in a previous mission. Insert your mission disk and press the button. You are shown a list of all missions on the disk. Move the highlight and press the button to select the mission to resume. After the mission loads, select "Exit" and you're ready to go.

CHOOSE MISSION TUTORIAL

Move the highlight to the desired tutorial and select it. Turn to the directed section of the manual and follow the instructions. Note: Upon beginning a mission tutorial, the current mission will be lost.

FORMAT NEW MISSION DATA DISK

This command is used to prepare a blank disk for storing missions. Once a mission disk is formatted, it will hold a large number of missions. Note:

Formatting a disk erases any data that is on the disk. Insert a blank disk and press **Y** when ready to format, or press the fire button to abort and return to the disk menu. When finished, the Disk Manager returns. Note: On the IBM, this format command will format the disk in drive A. It can not be used to format your hard drive.

CHANGE KEYBOARD LAYOUT

A chart is displayed on the left of the screen showing the current key that each direction and unction is set to. To change a direction or function key, press one of the legal keys nopt currently being used. The highlight moves to the next choice. When it is correctly set, press Restore (C64) or Esc (IBM, Apple). The following key are not legal:

C64: Run/Stop, Restore, Ctrl, Shift, Shiftlock, Commodore, Function keys, and S, R, M, and C.

Apple: Escape, Ctrl, Shift, Shiftlock, Delete, Apple keys, and S, R, M, and C.

IBM: S, R, M, C, and Esc.

HELP REFERENCE

Use the help screen to answer questions you have about a particular part of the program. Time is frozen in the help screen. Upon entry, the help selection for the part of the program you just came

from appears on screen. After the initial selection, the Help Menu Selection appears. To select an option, move the highlight to the option and press the button to read the first page. Press again for each additional page or press Restore (C64) or Esc (IBM, Apple) to return the Help Menu. Note: Any key can be pressed to toggle the display output between single character and full page display speed.