How to Draw Starship Deck Plans
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When most players look at a set of deck plans for a starship, they think “How cool is that!” Some might think it’s easy to draft the plans up and be tempted to try their hand at it. They probably can, given time and effort, plus a little bit of artistic talent. In this article, we shall endeavor to provide advice to those who are willing to attempt such a project.

The point is that we want to publish a lot of starship deck plans in RPG books and as separate products. To publish a lot of deck plans, you need people doing deck plans, and given the time element for the first of the Traveller books, we’re going to have to use everyone who ever drew a set of deck plans and recruit a few more people. We need everyone working from a common set of protocols and concepts, producing plans that even if they don’t look like the work of a single artist, they are all equally usable.

ADB, Inc., as of 2012, pays $150 for a set of “Level 2” plans of a cruiser, those being plans that have every wall, every door, and every “fixture” (e.g., control panels, major equipment, and so forth). We’ll pay a bit more for “Level 1” plans (with furniture). If we’re up against a deadline, we can publish products with Level 3 plans that have only pressure bulkheads, major (SSD) equipment, turbolifts, and so forth (leaving out many interior partitions). A set of Level 3 plans might say in effect “this area has crew quarters” without breaking down the details. It would be preferable for key areas (bridge, engine room, etc.) to be at Level 2 or Level 1 standards.

The single most important thing you can do is, before you start, contact ADB, Inc., tell them you want to be part of this project, read everything that the company makes available, and perhaps demonstrate your abilities by doing a sample page of plans. You’ll be assigned a ship and given not just a deadline, but a series of interim deadlines. It takes a month or more to do a set of plans and ADB, Inc., cannot afford to wait a month to find out that you aren’t going to produce (or produce anything useful). We’ll want to see preliminary plans within a week and a deck every few days thereafter.

Drafting a good set of deck plans is part science and part art. A quick on-line search will reveal a plethora of deck plans available for space ships not only for Star Trek but most other sci-fi genera. A large portion of these are very basic and/or have serious flaws which suggest the artist put little thought or effort into them. These are “okay” for a one-off adventure setting, but if you want a ship that your players can use as their home base for a campaign, you will want something that looks realistic. Take time to study as many deck plans as you can.

BEFORE YOU BEGIN
One cannot simply sit down and start drawing a starship and expect to create anything useful. There’s a lot of planning and forethought involved before drafting the first line. You may want to find a box and put your sanity in it for safe keeping, because you might lose it otherwise as you get deeper into the project. Just kidding: it’s not all that bad. It can be a daunting task, however; the Federation police cutter, the smallest ship in the fleet, is the equivalent of a six-story building the size of an NFL football field.

The first consideration is which computer program to use. Obviously, one can draft plans the old-fashioned way with pencil and paper, but at best you could produce plans someone with a computer could copy. If you decide to do the computer work yourself, you’ll need a decent drafting application. You will need what’s known as a vector graphics program, as opposed to a raster (or bit-map) editor. Raster editor applications such as Microsoft Paint and Corel’s Paint Shop Pro will not work well because once you draw a line, the program “forgets” that it’s a line and turns it into a bunch of pixels. There is no easy way to select that line to move or adjust it later on. The two best options are computer-aided design (CAD) programs such as TurboCAD™ or ViaCAD™ and high-end graphic editors such as Macromedia Freehand™, Adobe Illustrator™, Corel Draw™, or Smart Draw™. There are 2D versions of many CAD programs available for under $50, but these are still full-featured programs with fairly steep learning curves. The graphic editors tend to be a bit more intuitive to use but cost several hundred dollars. The home designer programs such as Instant Architect™ are intended to draft houses and other square buildings, thus lack features and abilities required for drafting space ships.

If you intend to submit your finished deck plans to ADB for publication, you’ll need a program that can export in a file format that ADB’s computers can import and edit. The point here is that if we notice a problem we need to be able to fix it, not depend on you to send in a revised file. (With our luck, you’ll be on vacation when we need fixes done.) At this time, the programs known to work are: NOT SURE YET. SVC is buying a PC for this and other reasons.

Whichever program you decide to use, we recommend playing with it before starting on the starship project. Start by mapping out your house, or one floor of the office you work in, or maybe design your dream house. Be sure to use as many features the program offers as possible, such as snap-grids. Be sure to create a symbols/objects library. (If you create a nice control panel, copy it to a library document so you can easily find it when you need one instead of scanning through deck after deck looking for a particular conference table that looked really nice. Use the standard symbols and concepts seen on our other plans and our reference and resource documents.

Next, create a small starship from scratch, perhaps a civilian science vessel, about 50 meters long by 25 meters wide by 12 meters high, with 3 or 4 decks. By now, you should be comfortable with the program’s menus and have a feel for how to fit rooms and such into the ship, so you’re ready to begin the project.

WHAT IS A STARSHIP?
None of us have ever designed a starship and precious few have ever designed so much as a real-world house or aircraft. You need to understand “naval...
architecture’ at least to a basic level, and we don’t have time for you to spend five years in engineer school. You can read a few books on how to build World War II battleships, but they’re not going to be of a lot of serious immediate use in building a starship.

Probably the most familiar analogy for any of us is an office building. A starship is really just a big building designed to do business (albeit one designed to fight off an enemy attack and, by the way, to move at highway speeds). People have to have a way to get in it, move around inside it, do their business, interact with the outside world, keep things running, breath and eat and sleep, watch TV, have a small social gathering, and keep up with all of the paperwork. In our case, it’s a self-contained building without utility connections, although you could think of those engines out there on the struts as the power company (and those engines don’t need deck plans, just “engine access” routes from your plans to them). You’re going to have to store and recycle the water and do something about the trash. You cannot count on a delivery truck from the food warehouse or office supply store or hardware store more than once every few weeks or even months.

Oh, and the taxpayers paid for it and don’t want you to include anything that isn’t going to be used all the time. That means a lot of spaces have to work for their primary task and their occasional emergency duties.

The house you live in and the building you work in probably have two kinds of walls. Exterior walls are weather-tight and insulated. Interior walls aren’t much more than soundproof privacy screens (and if you don’t like your little sister’s music, you know that soundproof is not as strictly defined as we’d all like). Firewalls between adjacent apartments are not much different from exterior weather-tight walls. There may be “wet walls” that have plumbing in them, but their actual construction has few differences from the wall between the den and the bedroom.

Starships have four types of walls. The exterior hull is thick (no one knows, but go with a foot or so); proof against radiation, heat, cold, vacuum, and enemy weapons; and not something you want to make any more holes in than you have to. The “interior partitions” between two staterooms (say, two or three inches thick) are not going to stand up to blast and explosive decompression. (It would be too expensive to make every interior wall that way.) The intermediate type of wall is a pressure bulkhead, which is thicker (call it six inches), is stronger, and won’t collapse if one side is suddenly in hard vacuum. (The ability to withstand blast damage varies, but generally speaking, a hand grenade or slug-rifle won’t penetrate a pressure bulkhead.) The fourth type is an armored bulkhead, a thicker form of pressure bulkhead (call it nine inches), which surrounds the bridge, the arms room, the weapons compartments, and munitions storage. These are not much different from an exterior wall although they lack the insulation and heat/cold redistribution systems. For your purpose, these are just thicker or thinner (solid) lines.

Many game systems use a grid of some sort. Ignore that for now; it’s easy enough to add another drawing layer later. (For RPG books, the smaller size of the printed plans means these will be omitted or the plan will be unreadable.) This does, however, mean that your rooms need to have no “white fill color” inside them.

GETTING DOWN TO SERIOUS WORK

Select the ship you want to design. Consult with ADB, Inc., to make sure nobody else is already doing it, and for any specific guidance. If you’ve shown any promise that you can deliver good plans, ADB, Inc., will shower you with no end of JPG files of existing art, even creating some new art for you in some cases. (We have at least a top view of every major ship.) Review all available material for it, including SSDs for all known variants and upgrades. Obtain and look at the miniature. Write a checklist of everything that you need to include in the deck plans.

Write a crew list (based on published crew lists and SFB data about crew size) to determine how many personnel are needed for each duty location, e.g., two per weapon (plus two or three supervisors per battery of weapons), about ten per two-box main bridge, auxiliary control room, emergency bridge, etc. You don’t need to name every crewman; you just need an idea of how many duty stations each compartment needs. Creating a crew list really isn’t that hard. Get the SFB data for the number of crew units (each with 10 people) and Marine boarding parties (each five people). Remember that Marines (and deck crews) are in that total crewmen figure.) Figure out the weapons crews and the bridge crews. Then get one of the published crew lists and just scale everything up or down.

Start by drafting a top-plane view of the ship to scale. Presumably, the ship is already in the Star Fleet Universe and therefore there will be clip art available from ADB. If there is a miniature available (and there probably is), even better. According to the Franz Joseph Technical Manual (the basis for SPU), the ST:TOS Enterprise is 288.6 meters long, and its saucer is 127.1 meters in diameter, so adjust your ship to be of reasonable size compared to this. The new Starline 2500 miniatures are supposed to be on a 1:3125 scale, but there is some room (no more than +/- 125 points) for error if you need your design to be slightly larger/smaller to fit. The most critical thing you must do, and must do first, is to establish how big the ship is in meters (and how high it is in decks). This is information you want to calculate closely and have approved by ADB, Inc. (Since ADB, Inc., is going to ask experts such as Nick Blank and Will McCammon to help us decide if you got the size and the number of decks right, you might just want to ask them.) Remember that there is a BBS topic for deck plans. Ask ADB to set up a folder for your specific project and use it to get information and input. Get as much input as you can from the acknowledged experts before drawing the first stroke.

One point here. It’s necessary to have other people review your work, but you don’t want to randomly email copies to people you do not know who just offer to review it for you. Maybe they don’t really know what they’re talking about (the acknowledged experts do) and maybe they someday (soon) start posting your deck plans all over the place. Talk with ADB, Inc., about who can be trusted with actual copies of your work. You can, of course, just generally ask in the topic for general advice (“Should I put the mess hall in the front or
and anything else that is pre-defined by established clip
impulse engines, shuttlebay (more below on that one),
weapon mounts, tractor beams, probe launchers,
made for you. Sketch in features such as main bridge,
and/or a miniature, some decisions have already been
ship's interior features. If you're basing it off of clip art
bottom. This for the rest of the decks, left to right and top to
draw your footprint outline for the next deck (or decks)
the width of usable headroom. (The headroom outline
below) or has odd-shaped hull (e.g., the Federation
If the decks are staggered (per wedge ship mentioned
headroom (3.5 meters should be fine). Nothing says the
deck must be on a continuous plane from bow to stern;
a wedge-shaped ship would probably have the decks in
staggered tiers as you move back in the thicker part of
the ship. Likewise, the shuttlebay and engineering
section will probably be over-height decks.

**ANOTHER POINT OF VIEW**

Draw the deck plates in the side-plane view to
create a cut-away view of the interior of the ship. Unless
the ship is a Federation saucer ship or Gorn bubble
ship, draw a front-on (bow-plane) view of the ship and
draw in the deck plates to match the side cut-away view.
If the decks are staggered (per wedge ship mentioned
above) or has odd-shaped hull (e.g., the Federation
police cutter or old light cruiser), you will need to make
several cross-sections at various points down the length
of the hull. This will allow you to see where there is
insufficient headroom along the edges of the hull, etc.
Use those wedged-shaped edge areas for water and
gas storage tanks, or other cargo storage.

Next, make several copies of the top-plane view,
one for each deck of the ship. Place these side by side,
with the bow to the top of the screen, with the noses all
along the same line. Draw a centerline from bow-to-
t stern on each of these. The next step can be a little
tricky. Starting with the left-most top-view, draw the
outline of the deck space for Deck #1, taking into
account the side cut-away and front cross-section views
above. Make note of both the total width of the deck and
the width of usable headroom. (The headroom outline
for one deck will be the footprint outline for the next
deck up. The footprint outline for one deck is the same
as the headroom outline for the next deck down.) Do
this for the rest of the decks, left to right and top to
bottom.

At this point, you are ready to begin laying out the
ship’s interior features. If you’re basing it off of clip art
and/or a miniature, some decisions have already been
made for you. Sketch in features such as main bridge,
weapon mounts, tractor beams, probe launchers,
impulse engines, shuttlebay (more below on that one),
and anything else that is pre-defined by established clip
art or miniatures. There’s no need to draw much detail
at this time; you just need the general size and location
mapped out. Use existing deck plans as a guide to
properly size each item. For example, the Federation
heavy cruiser’s main bridge bubble is 16.2 meters in
diameter, and the bridge itself is 10.5 meters interior
diameter. The Federation frigate’s main bridge is seven
meters interior diameter.

The SSD defines lots of things in a general way.
Labs, bridges, security stations, and transporters are
“sort of in the general area” but not really specific. [The
Marine boarding party diagrams in Module M have more
information, but are still not precise.] If it’s on the left
side of the main hull, you cannot move it to the rear hull
or the right side, but you could put it on any deck (and if
you pencil in transporters now, don’t be afraid to move
them up or down a deck later). Indeed, you might (if
your drawing programs allows it) even color-code stuff
that you just “stuck somewhere” as opposed to things
that “absolutely positively have to be right here and
nowhere else.” At the end, do a “select-all” and turn
everything to the basic black color.

You’ll learn over time the “tactics” of graphic design.
Assuming your program does it, you can “group” all of
the features of one compartment (say, a transporter
room) into a unit. This allows it to be moved, or copied,
or colored, as a block.

Remember when we told you to study existing
plans? Those plans may tell you that the bridge on the
SSD comes with a nearby navigation compartment that
is not on the SSD. The navigation (stellar cartography if
you want) compartment can be anywhere in the general
area of the bridge, so color-code it as movable for now.
There is also going to be a fairly big computer room.
(look at the ones on the existing plans and scale up or
down by the overall size of the ship.) Without a real-time
Internet to refer to, a starship has to virtually carry the
sum total of the empire’s knowledge with it.

**THE BIG PIECES**

Next comes the shuttlebay (or bays), its location
defined by the SSD and miniature. Obviously, this is
next to the external hatches. Remember that the
shuttlebay must be large enough to house shuttlecraft
ready for flight and those in storage (with access to
bring them out), plus room to land an extra shuttlecraft
for visitors.

The engine room is traditionally located adjacent to
the impulse engines. It must be large enough to accommodate the engineers and all the secondary
hardware that makes it all work. There is always a
power-control switching room and a computer
compartment somewhere near the engine room, but
those can be “somewhere around here” and moved
later.

Few warships have a proper cargo bay, but almost
all ships will have some cargo storage areas. Except for
bulk freighters and tug pods, which have much larger
cargo bays, one SSD box is typically about 100 square
meters floor space or 500 cubic meters volume.
(remember that Orion ships only steal the good stuff
and their cargo spaces are half-size per SSD box. Only
police ships have real cargo bays and those may also
be undersized as they are carrying emergency supplies,
not pallets of random commercial cargo.) Pick an empty spot near the front edge, one without adequate headroom, and mark it for storage of the solar sail.

The next thing you want to figure out is where you will put sickbay. (This is always somewhere deep inside, far from any outside wall. The mess hall or cafeteria is very likely to be very close to the shuttlebay, sickbay, transporters, and the main external docking ports. (That may end up defining where sickbay and the main external docking points are.) This is because that big empty area is often used to triage mass casualties and to marshal large numbers of people who are arriving or leaving.

The gym (with its large public rest room) is often somewhere near transporters and might even be near the sickbay so its space can be used to handle mass casualties or to house temporary visitors such as evacuees.

Now, step back and try to visualize how the rest of the ship will be laid out. Go over the protocol list and make note of big things like recycling, machine shops, recreation areas, and how much housing (crew quarters) you will need.

GETTING AROUND IN YOUR SHIP

Try to visualize foot-traffic, the corridors, and turbolift routes. Once you have that in your head, lay out the turbolift system. Start with the smallest deck (i.e., main bridge deck on a Federation ship) and locate the vertical turbolift shaft. The Federation standard size for a turbolift car appears to be 3.0 meters, but some deck plans use 2.0 or 2.5 meter diameter cars. Draw a horizontal guideline through the center of the vertical shaft and extend it to the left/right to the other decks. Measure the distant off-set from the ship's center line. Go to the next deck down/up and draft in the turbolift vertical shaft using the reference line and off-set to properly locate it directly above/below the first one. Remember that a single turbolift vertical shaft need not extend all the way from the top to the bottom of the ship (it’s a little better if it does), but the turbolift systems should extend to every deck and allow for rapid transport to important sections of the ship. Sketch in the horizontal turbolift tubes connecting the vertical shafts, leaving space to either side for rooms and corridors.

The ship will also need space for the vertical runs of HVAC (heating, ventilating, air condition, a.k.a., life support, including plumbing and the main electrical cables) so lay those out. They have to extend onto every deck, but on larger ships you really need multiple vertical access shafts. It is sometimes convenient to place these next to the turbolift shafts, since you’re “blowing a hole” through every deck in the stack anyway. (On larger ships, you’ll need two or three vertical turbolift shafts. Imagine asking yourself if you’d put up with the delays of going from the front of one deck, to the center or rear of the deck, and then back to the front of the next deck down. If you have horizontal shafts on adjacent decks, draw a hole to connect them near the extreme ends. Traffic control will love you for that.)

Likewise, map out spiral stairwells and other access ladders, taking care to properly align everything with the deck above/below as needed. Remember that once the vertical shafts are locked in, it will be very hard to move them later on. If you find that you must move a stairwell to make something else fit, you will need to move it on other decks as well, which could force you to re-draw major sections of those decks if they were near completion. Plan ahead; plan carefully.

Sketch in the corridors, allowing space for rooms. Previous deck plans typically use two-meter wide corridors, but some use 1.5-meter or even 1.25-meter corridors. Make sure it’s possible to walk to any part of the ship that the crew would need access to. Be sure to allow enough space to create adequate-sized rooms.

Double-check that all systems have been accounted for. Don’t forget to allow for variants and upgrades. Take a moment and look through every variant of the base hull. If the commando variant of this ship replaces the photon battery with barracks, you need to have adequate access to move a lot of Marines out of that barracks in a hurry.

At this point, you probably have everything required for a Level 3 deck plan.

DETAILS, DETAILS

One of the last things you want to sketch in is crew quarters. These come in small pieces and you can fit some here and some there if you have to.

The minimum space required for a one-man room with a bed, night stand, dresser, wall locker, and small table with chair is about 2.5 by 3.5 meters. [This assumes humans. Gorns and Kzintis will need 15% more space.] A space of 5 by 6 meters can easily accommodate four bunk beds and eight wall lockers for a small barracks area, or it can be a single stateroom with separate bedroom, living room, and private lavatory. Make sure that there is a bed for every member of the crew; unless it’s a troop ship, there’s no need for “hot bunks.” You may have been planning to provide staterooms for the entire crew but now discover that you don’t have space and so must use two-man dorm-room style quarters for most of the crew. If there’s still not enough room, you’ll have to cut back the size of other systems. We’ve all had to scrap an entire project (three-quarters completed) and start all over from scratch due to lack of space for everything the ship required.

If on the other hand you find that you have “too much” space, go back through the checklist to make sure you have everything the ship and crew needs. Add space to other things (engineering, power switching, fuel, etc.). Turn a small unused area into a conference room, or a lunch room for the chief petty officers. Feel free to create extra recreation rooms and such, or use it for more storage space. If you can’t find a use for all the extra space, you may need to scrap the design and start over with a smaller hull outline or lose a deck.

It should go without saying that you need to check with ADB, Inc., or a mentor (if you can get someone like Nick Blank to take you under his wing) at every step. That way, if you did something that is not going to be approved, you don’t have to start over but can just correct your path from where you are. By all means, if you get to the point of “I cannot make this work” then make sure that ADB Inc. and your mentor see your work and offer their advice.
FINISHING THE PROJECT

Once you’re satisfied with the results, set the project aside for a day or two and then review it again with fresh eyes.

Then, send it to ADB, Inc., and let us look at it. This is the hardest part of the whole job. You have to freeze the design (except for any notes you think of, which you put on a separate document) while waiting for a review. It’s going to be really bad if you move a conference room while ADB, Inc., is reviewing the now-obsolete plans. You should, at this point, have a full set of Level 2 plans and don’t really have to go any further.

If you’re still happy with it, methodically go back through the ship and harden in all the features by adding in furniture and work stations and such. Double-check that walls are where you want them so that, for example, a row of crew quarters are all (more or less) the same size rooms. Clean up any stray lines that you used for reference, and add labels to define features.

AN ART, NOT A SCIENCE

That is the science of drafting deck plans; the art part is the ability to make things fit together in a realistic and logical package. Remember that form follows function, and this is very true in designing a starship. You would not want to place the main bridge, auxcon, and emergency bridge all side-by-side (or stacked on top of each other), for example, nor would you want the sickbay to be near the outside edge of the ship or too close to the engine room. You need a reason and a function for everything you draw. For example, on the Federation police cutter, Garth placed the gymnasium near the shuttlebay and transporter room to allow the gym to double as a staging area for boarding-party actions and also as a medical triage area for mass casualty events. Part of the fun (and a major source of headaches) is coming up with creative ways to resolve unusual design requirements.

Remember that taxpayers spent a lot of money for this ship. They did not design in a Christmas Tree Room because it would be used only two weeks a year. Spaces must be multi-functional, and that includes emergency use of spaces. (If the mess hall is full of refugees, your crew is going to have to get by with the equivalent of brown bag lunches for a few days, but the taxpayers would not pay for a “refugee accommodation compartment” that will rarely be used.)

Much like writing a fiction story, success derives from a good start with a vision and plan of what you want the end result to look like. As in writing a story, you may find yourself with “writer’s block” from time to time. The advantage here is you can move to a different part of the ship and come back to the section that’s giving you difficulty later. When you come back to that part, don’t be surprised if things suddenly “click” into place and it almost draws itself. We’ve told you plan ahead and plan from start to finish, but don’t be afraid to change the plan if you must. Don’t get obsessive and “lock in” the placement of something that you might need to move to another location. Moving the lab to another deck, for example, might free up space you need for something else. Lastly, try to draw in at least one item every day. If you put the project on the back-burner, it will end up in the freezer. Keep at it At the end, you’ll have a design that you can feel proud of, especially if it makes players think, “How cool is that!”