

# USER'S MANUAL



***TrekDrive***

**by ShadowWorks**

# USER'S MANUAL



**TREKDRIVE v1.0**

**UNITED KERBIN STARFLEET**

**LIBRARY COMPUTER ACCESS AND RETRIEVAL SYSTEM  
VERSION 1.0**

# INTRODUCTION

TREKDRIVE IS A WARP DIRVE MOD INSPIRED BY THE STAR TREK FRANCHISE. THERE ARE MULTIPLE WARP DIRVE MODS FOR KSP, BUT NONE HAVE IMPLEMENTED A NEED, OR REQUIREMENT FOR WARP NACELLES, SOMETHING THAT I HAD SEEN MANY EXPRESS A DESIRE TO HAVE. I SET OUT TO PROVIDE JUST THAT, A WARP DRIVE MOD THAT GIVES NACELLES A PURPOSE .

THE MANUAL THAT FOLLOWS WILL GIVE YOU DETAILED AND ILLUSTRATED INSTRUCTIONS ON USING THE DRIVE AND ALL THAT COMES WITH THE MOD. THIS DOCUMENT ALSO INCLUDES TIPS AND INFORMATION FOR OTHER MODDERS THAT WISH TO ADD THEIR OWN STARSHIPS.

HAPPY LAUNCHINGS, AND BOLDLY GO WHERE NO KERBAL HAS GONE BEFORE....

THESHADOW1138

# GENERAL MOD INFORMATION

THE FOLLOWING COMES WITH THE MOD:

- \* TREKDRIVE.DLL PLUGIN
- \* PARTS
  - \* PHOENIX WARPSHIP (1.875M)
    - \* PHOENIX COCKPIT
    - \* PHOENIX SAS
    - \* PHOENIX FUSELAGE
    - \* PHOENIX WARP NACELLE (WITH DEPLOY ANIMATION)
    - \* PHOENIX WARP CORE
    - \* PHOENIX MAIN THRUSTER
    - \* PHOENIX VERNIER THRUSTER
    - \* AERODYNAMIC FAIRING
    - \* INTERSTAGE DECOUPLER
  - \* PHOENIX LAUNCH VEHICLE (1.875M)
    - \* PHOENIX FIRST STAGE
    - \* PHOENIX LAUNCHER MAIN ENGINE
  - \* NX-CLASS STARSHIP (KERBAL SCALE, ABOUT 151M LONG, 2 COLOR VARIANTS)
    - \* NX BRIDGE MODULE
    - \* NX SAUCER (WARP 5 DRIVE, MULTIPLE NAME VARIANTS)
    - \* NX ENGINEERING SECTION
    - \* NX SECONDARY IMPULSE ENGINE (PORT AND STARBOARD)
    - \* NX MAIN IMPULSE ENGINE (PORT AND STARBOARD)
    - \* NX NAVIGATIONAL DEFLECTOR (2 VARIANTS)
    - \* NX NACELLE PYLONS (3 VARIANTS)
    - \* NX WARP NACELLE (PORT AND STARBOARD)
    - \* NX-REFIT ENGINEERING HULL (WARP 7 DRIVE)
    - \* NX-REFIT WARP NACELLE (PORT AND STARBOARD)
  - \* ENTERPRISE-ERA SHUTTLEPOD
    - \* SHUTTLEPOD FUSELAGE
    - \* SHUTTLEPOD ENGINE

THE NX-CLASS STARSHIP PARTS EACH HAVE TWO (2) COLOR VARIANTS, A BRONZE-GRAY SIMILAR TO THE NX-01 ENTERPRISE, AND A BLUE-GRAY SIMILAR TO THE NX-02 COLUMBIA. THE NAVIGATIONAL DEFLECTOR COMES IN TWO VARIANTS AS WELL, AN OVULAR DISH (NX-01) AND A RECTANGULAR DISH (NX-02). THE NACELLE PYLONS COME IN THREE VARIANTS, THE STANDARD 2 PYLONS UPWARD CONFIGURATION, 2 PYLONS DOWNWARD, AND 4 PYLONS (2 UP, 2 DOWN) ALLOWING FOR VARIATIONS IN YOUR SHIP CONSTRUCTION.

## MOD DEPENDENCIES:

COMMUNITYRESOURCEPACK

B9PARTSWITCH

WATERFALL

# GENERAL MOD INFORMATION: PLUGIN

THE PLUGIN, TREKDRIVE.DLL, INCLUDES FIVE (5) PART MODULES. BELOW EACH MODULE IS LISTED WITH A SHORT DESCRIPTION OF WHAT IT DOES. THERE WILL BE MORE DETAIL ON EACH MODULE GIVEN LATER IN THIS DOCUMENT.

## SW\_MODULEWARPCORE

A SIMPLE GENERATOR MODULE. THE WARP CORE TAKES IN LIQUID DEUTERIUM AND ANTIMATTER AND GENERATES ELECTRIC CHARGE AND WARP PLASMA

## SW\_MODULEWARPGENERATOR

THE ACTUALL WARP DRIVE. THE MAXIMUM WARP AND POWER CONSUMPTION ARE DEFINED IN THE PART CFG. THE DRIVE HAS A CFG DEFINED NUMBER OF REQUIRED NACELLES, AND WILL NOT WORK UNLESS THAT NUMBER IS MET. THE DRIVE ALSO HAS A MINIMUM ELECTRIC CHARGE REQUIREMENT. MAXIMUM WARP CAN BE SELECTED THROUGH A SLIDER IN 0.25 INCREMENTS FROM 0.25 TO THE DEFINED MAXIMUM WARP. WARP SPEED IS CONTROLLED THROUGH NORMAL THROTTLE CONTROL. THE DRIVE HAS TWO ORBIT MODES, "EASY" AND "REALISTIC". "EASY" TRIES TO ESTABLISH A CIRCULAR ORBIT AT THE CURRENT ALTITUDE, WHILE "REALISTIC" SIMPLY USES YOUR VELOCITY TO COMPUTER YOUR ORBIT UPON EXITING WARP.

## SW\_MODULEWARPCOIL

THE MODULE ATTACHED TO THE WARP NACELLES. REQUIRES WARP PLASMA, AND MUST BE CHARGED BEFORE THE WARP DRIVE CAN BE ENGAGED. THE COIL HEATS WHILE AT WARP. HEATING CAN BE ALTERED WITH CFG EDITS AND THROTTLING DOWN, AS MAXIMUM HEATING TAKES PLACE AT THE DRIVE'S MAXIMUM WARP.

## SW\_MODULEIMPULSEENGINE

IN EFFECT, A HIGHLY EFFICIENT FUSION ROCKET. THE THRUST DIRECTION CAN BE TOGGLED BETWEEN FORWARD AND REVERSE, AND BOTH ARE CONTROLLED BY THE THROTTLE. THE THRUST LIMITER DOES WORK. THERE IS A TAKEOFF AND LANDING MODE THAT ALLOWS FOR VTOL BEHAVIOR WITH NO INPUT FROM THE USER. ONCE ORBIT IS ACHIEVED THE TAKEOFF/LANDING THRUST DOES NOT GET APPLIED AND WILL HAVE NO UNEXPECTED AFFECT ON IMPULSE POWERED CRAFT IN ORBIT, OR MORE THAN TWICE THE HEIGHT OF THEIR DEFINED "HOVER" ALTITUDE.

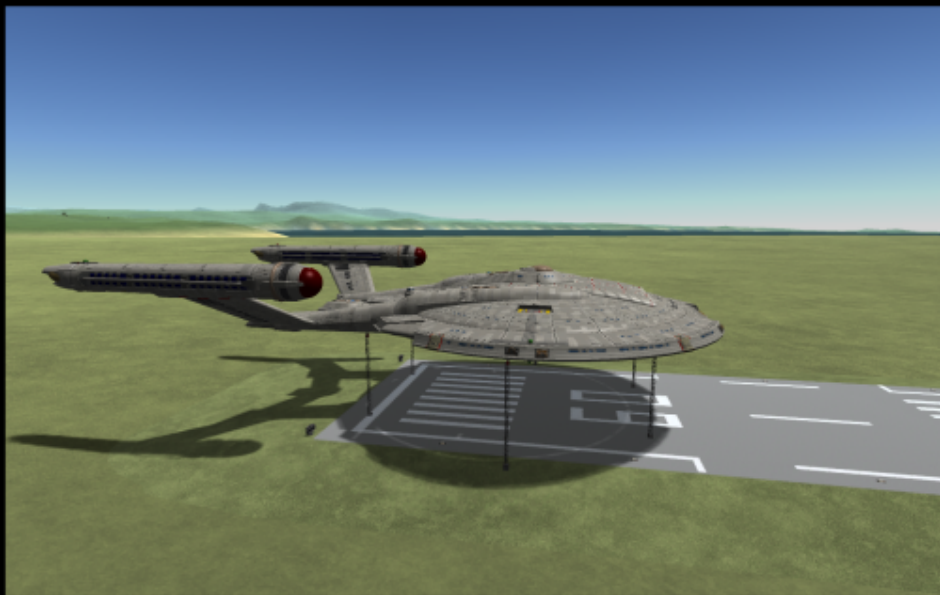
## SW\_MODULEBUSSARDCOLLECTOR

A MODULE TO COLLECT LIQUID DEUTERIUM AND ANTIMATTER WHEN ACTIVATED AND NOT AT WARP VELOCITIES.

# HOW TO USE

WHEN CONSTRUCTING YOUR SHIP, IF NOT BUILDING OUT THE INCLUDED SHIPS, THE SHIP MUST CONTAIN AT LEAST ONE WARP CORE (SW\_MODULEWARPCORE), AT LEAST ONE WARP DRIVE (SW\_MODULEWARPGENERATOR), AND THE REQUIRED NUMBER OF WARP NACELLES (SW\_MODULEWARPCOIL).

AS AN EXAMPLE, LET'S USE THE NX-CLASS STARSHIP. THE WARP DRIVE REQUIRES TWO (2) NACELLES, SO AS LONG AS WE HAVE TWO PARTS THAT HAVE SW\_MODULEWARPCOIL ON THE VESSEL (AS WE DO WITH THE NX), THE WARP DRIVE WILL WORK. YOU CAN HAVE MORE THAN THE REQUIRED NUMBER OF NACELLES, BUT YOU CANNOT HAVE FEWER. SO, OUR EXAMPLE SHIP HAS EVERYTHING WE ABSOLUTELY NEED TO TRAVEL AT WARP SPEEDS (A WARP CORE, A WARP GENERATOR, AND WARP COILS). BELOW IS THE NX ON THE RUNWAY.



## OPERATION OF THE DRIVE:

### STEP 1: ACTIVATE THE WARP CORE

IN THE PART ACTION WINDOW (PAW) OF THE PART CONTAINING THE WARP CORE, THERE WILL BE A SECTION LABELED "WARP CORE OPERATION", AND A BUTTON LABELED "WARP CORE STATUS", AND AN INDICATION THAT IT IS "INACTIVE"

CLICK THE "WARP CORE STATUS" BUTTON TO ACTIVATE THE WARP DRIVE.





# HOW TO USE



ONCE THE WARP CORE IS ACTIVE, IT WILL BE ACTIVELY PRODUCING ELECTRIC CHARGE AND WARP PLASMA. THE WARP PLASMA IS NEEDED BY THE WARP COILS, WHICH LEADS US TO THE NEXT STEP.

## STEP 2: CHARGE THE WARP COILS

IN THE PAW FOR THE WARP NACELLES, OR ANY PART WITH SW\_MODULEWARP\_COIL, YOU WILL FIND A GROUPING LABELED "WARP COIL OPERATION". TO START CHARGING THE WARP COIL SIMPLY CLICK ON THE BUTTON LABELED "CHARGE WARP COILS".



ONCE THE COIL/NACELLE STARTS CHARGING YOU WILL SEE THE "CHARGE PERCENTAGE" BEGIN INCREASING TOWARDS 100. THERE WILL ALSO BE A VISUAL INDICATION OF CHARGE AS THE WARP FIELD EMITTERS (BLUE PART OF THE NACELLE) AND BUSSARD COLLECTORS (RED GLOWING PART OF THE NACELLE) WILL BEGIN TO GLOW. IN THE SCREENSHOT TO THE LEFT YOU CAN SEE THE CHARGING NACELLE AT ALMOST 50% CHARGED AND THE NACELLE PARTIALLY GLOWING.

# HOW TO USE



ONCE THE WARP COILS ARE CHARGED, WHICH MUST BE DONE TO EACH WARP COIL/NACELLE ON THE VESSEL (THIS MAY BE SET AS AN ACTION GROUP), WE ARE READY FOR THE FINAL STEPS OF GOING TO WARP!

## STEP 3: CHECK CHARGE STATUS

IN PAW OF THE PART CONTAINING THE WARP FIELD GENERATOR, THERE IS A SECTION LABELED "WARP FIELD GENERATOR OPERATION" CLICK THE "CHECK CHARGE STATUS" BUTTON.

THIS IS NECESSARY TO ENSURE THAT THE WARP COILS ARE CHARGED. IF THE COILS ARE ALL CHARGED, THE "READY STATUS" WILL CHANGE FROM "NOT READY" TO "READY".





# HOW TO USE

## STEP 4: ENGAGE THE DRIVE

NOW THAT THE "READY STATUS" IS "READY", WE CAN NOW CLICK THE "ENGAGE WARP DRIVE" BUTTON. THIS ACTIVATES THE DRIVE.

ANY THROTTLE INPUT AFTER THE DRIVE IS ENGAGED WILL ACTIVATE WARP SPEED. TO TRAVEL AT IMPULSE POWER/SUB-LIGHT YOU MUST DISENGAGE THE DRIVE FIRST.



## STEP 5: GO TO WARP!

SIMPLY INCREASE THE THROTTLE, AND YOU'LL BE AT WARP. MAKE SURE THAT YOU HAVE DEACTIVATED ANY IMPULSE/SUB-LIGHT ENGINES BEFORE THROTTLING UP THE WARP DRIVE.

THE "WARP FACTOR SELECTION" SLIDER DEFAULTS TO WARP FACTOR 1, BUT CAN BE INCREASED TO AS HIGH AS THE DRIVE'S MAXIMUM WARP FACTOR, TO AS LOW AS WARP 0.25. THIS CAN BE CHANGED BEFORE THROTTLING UP TO WARP, OR WHILE AT WARP.

THERE ARE WARP STAR STREAKS, COURTESY OF WATERFALL EFFECTS, TO VISUALLY INDICATE THAT THE SHIP IS AT WARP.



IN THE PICTURE TO THE RIGHT, WE HAVE INCREASED THE SLIDER, WHICH INCREASES/DECREASES IN 0.25 INCREMENTS, TO WARP 2 WHILE WE WERE TRAVELING AT FULL THROTTLE AT WARP 1.

AS YOU CAN SEE IN THE PAW, WE ARE STILL TRAVELING AT WARP 1, AND THE THROTTLE IS NOW AUTOMATICALLY DECREASED TO 50%. THIS HAPPENS WHEN YOU INCREASE THE SLIDER ONLY TO PREVENT ACCIDENTALLY FLYING PAST SOMETHING IF IT IS ACCIDENTALLY INCREASED. SO, TO GO WARP 2, WE SIMPLY THROTTLE ALL THE WAY BACK UP. IF THE WARP FACTOR SLIDER IS DECREASED, IT WILL MAINTAIN FULL THROTTLE, BUT WILL SLOW DOWN TO THE NEW, LOWER, MAXIMUM WARP.



# HOW TO USE: IMPULSE ENGINES



## PAW OVERVIEW:

THE IMPULSE ENGINES ARE FAIRLY SIMPLE AND FOR THE MOST PART BEHAVE LIKE STOCK ENGINES. THE PAW HAS TOGGLES FOR "HOVER MODE" AND "TRANSLATION MODE". THE DEFAULT MODES ARE "TAKEOFF" AND "FORWARD".

THE "HOVER MODE" TOGGLES BETWEEN TAKEOFF AND LANDING. THOSE APPLIES VERTICAL THRUST ON ALL PARTS OF THE VESSEL TO LIFT IT OFF THE GROUND, OR TO SLOW IT FOR LANDING.

THE "TRANSLATION MODE" TOGGLES BETWEEN FORWARD AND REVERSE. THIS THRUST IS APPLIED TO THE VESSEL CENTER OF MASS (COM) IN ORDER TO PREVENT UNWANTED TORQUES/ROTATIONS OF THE SHIP. IN THE TWO PICTURES BELOW YOU CAN SEE THE TOGGLES ACTIVATED.



## USING THE ENGINES:

THE IMPULSE ENGINES ARE ACTIVATED THROUGH STAGING, JUST LIKE ANY OTHER ENGINE. IF THE SHIP IS LANDED/SPLASHED THE SHIP WILL LIFT GENTLY OFF THE SURFACE. ONCE YOU FEEL IT IS SAFE, YOU CAN THEN THROTTLE UP TO BEGIN FLYING.

WHEN IN LANDING MODE THE SHIP WILL SLOW DOWN TO 5 M/S OF VERTICAL SPEED, BUT YOU NEED TO CANCEL OUT ANY OTHER VELOCITY. IT SHOULD BE NOTED THAT IF YOUR VERTICAL VELOCITY IS TOO LARGE IN A DOWNWARD DIRECTION, THE LANDING FORCE MAY NOT BE ENOUGH TO SLOW YOU DOWN, AND YOU WILL NEED TO SLOW YOURSELF DOWN SOME AS WELL.



# IN-DEPTH: WARP CORE MODULE

## MODULE

```
{  
    name = SW_ModuleWarpCore  
    minAntiMatter = 0.05  
    minMatter = 0.05  
    warpPlasmaProdRate = 10  
    ecProdRate = 100  
    ambientSoundPath = TrekDrive/  
    Sounds/tng_engine_hum  
}
```

## PARAMETER EXPLANATION:

**minAntiMatter:** THE MINIMUM AMOUNT OF ANTIMATTER REQUIRED FOR THE WARP CORE TO OPERATE. IT IS ALSO THE AMOUNT OF ANTIMATTER CONSUMED PER SECOND.

**minMatter:** THE MINIMUM AMOUNT OF LIQUID DEUTERIUM REQUIRED FOR THE WARP CORE TO OPERATE. IT IS ALSO THE AMOUNT OF LIQUID DEUTERIUM CONSUMED PER SECOND.

**warpPlasmaProdRate:** THE AMMOUNT OF WARP PLASMA PRODUCED PER SECOND.

**ecProdRate:** THE AMOUNT OF ELECTRIC CHARGED PRODUCCED PER SECOND.

**ambientSoundPath:** THE GAMEDATA RELATIVE PATH OF THE AMBIENT SOUND OF THE AMBIENT SOUND OF THE WARP DIRVE. THE PATH IN THE EXAMPLE AT LEFT IS THE DEFAULT SOUND PATH. YOU CAN, OF COURSE, USE YOUR OWN SOUND BY SIMPLY CHANGING THE PATH.

## MODULE DESCRIPTION:

THE MODULE IS FAIRLY SIMPLE IN ITS OPERATION; IT SIMPLY TAKES IN ANTIMATTER AND LIQUID DEUTERIUM AND GENERATES ELECTRIC CHARGE AND WARP PLASMA. SIMILAR TO THE STOCK GENERATOR MODULE, IF THE SHIP'S STORES OF ELECTRIC CHARGE AND WARP PLASMA ARE FULL, IT WILL NOT CONSUME ANY RESOURCES. OF COURSE, ONCE EITHER OF THESE TWO RESOURCES ARE BEING CONSUMED IT WILL GENERATE THE OUTPUT RESOURCES.

UNLIKE THE STOCK GENERATOR MODULE, THE INPUT AND OUTPUT RESOURCES ARE HARD CODED AND CANNOT BE CHANGED. A PART WITH THIS MODULE MUST BE PRESENT ON THE VESSEL IN ORDER FOR THE WARP COILS TO CHARGE, WHICH ARE IN TURN REQUIRED FOR THE WARP GENERATOR TO WORK.

# IN-DEPTH: WARP COIL MODULE

## MODULE

```
{  
    name = SW_ModuleWarpCoil  
    warpPlasmaConsumed = 5  
    warpPlasmaNeeded = 250  
    cutoffThreshold = 2  
    coilEfficiency = 0.5  
    maxWarp = 1  
}
```

## PARAMETER EXPLANATION:

**warpPlasmaConsumed:** THE AMOUNT OF WARP PLASMA CONSUMED BY THE WARP NACELLE PER SECOND WHILE AT WARP, AND DURING CHARGING.

**warpPlasmaNeeded:** THE AMOUNT OF WARP PLASMA NEEDED TO FULLY CHARGE THE WARP COIL.

**cutoffThreshold:** THE PERCENTAGE CHARGE BELOW WHICH THE NACELLE WILL BE DISCHARGED AND PREVENT WARP TRAVEL. IF THIS CHARGE THRESHOLD IS REACHED, THE COIL WILL NEED TO BE RECHARGED BEFORE GOING TO WARP. IT MUST BE A VALUE BETWEEN 0 AND 100.

**coilEfficiency:** THE THERMAL EFFICIENCY OF THE COIL, A VALUE BETWEEN 0 AND 1. THIS AFFECTS HEATING OF THE COIL, A HIGHER EFFICIENCY WILL MEAN LONGER TIME AT MAXIMUM WARP.

**maxWarp:** THE MAXIMUM WARP RATING OF THE COIL. THIS DOES NOT AFFECT THE WARP SPEED OF THE VESSEL, BUT THE HEATING OF THE COIL.

## MODULE DESCRIPTION:

THE WARP COIL REQUIRES WARP PLASMA TO CHARGE, AND CONSUMES WARP PLASMA DURING TRAVEL AT WARP SPEEDS. WHILE TRAVELING AT WARP SPEED THE COIL HEATS UP TO EMULATE THE CIRCULATION OF THE HOT WARP PLASMA THROUGH THE COILS. THIS HEATING SCALES EXPONENTIALLY WITH THE CURRENT WARP FACTOR CAUSING MUCH MORE HEATING AT MAXIMUM WARP THAN AT LOWER WARP FACTORS. THIS BEHAVIOR IS TO EMULATE THE BEHAVIOR OF WARP DRIVES IN STAR TREK WHERE THERE ARE LIMITS TO HOW LONG A SHIP MAY SUSTAIN ITS MAXIMUM WARP RATING.

THE COIL EFFICIENCY WILL HELP WITH THIS HEATING IN THAT A MORE EFFICIENT COIL WILL ALLOW LONGER TRAVEL TIMES AT MAXIMUM WARP. THE **maxWarp** PARAMETER IS AN INDICATOR OF THE MAXIMUM WARP AT WHICH IT IS SAFE TO OPERATE THIS PARTICULAR COIL. FOR EXAMPLE, A COIL WITH A **maxWarp** OF 5 ATTACHED TO A DRIVE WITH A MAX OF WARP 7 WILL HEAT MUCH MORE AT FULL WARP, WHILE A COIL WITH A MAX OF 7 ATTACHED TO A DRIVE WITH A MAX OF WARP 5 WILL HEAT FAR LESS AT FULL WARP.

# IN-DEPTH: WARP GENERATOR MODULE

## MODULE

```
{  
    name = SW_ModuleWarpGenerator  
    engineID = uniqueName  
    maxWarp = 1  
    minNacelles = 1  
    electricityReq = 50  
}
```

## PARAMETER EXPLANATION:

**maxWarp:** THE MAXIMUM WARP FACTOR ATTAINABLE BY THE WARP DRIVE.

**engineID:** A UNIQUE NAME IDENTIFYING THE WARP ENGINE. THIS IS NECESSARY FOR WATERFALL FX TO WORK.

**minNacelles:** THE MINIMUM REQUIRED NUMBER OF WARP NACELLS/ WARP COILS FOR THE DRIVE TO WORK.

**electricityReq:** THE AMOUNT OF ELECTRIC CHARGE CONSUMED BY THE DRIVE PER SECOND. IF THIS AMOUNT OF ELECTRICITY IS NOT AVAILABLE, THE DRIVE WILL AUTOMATICALLY DISENGAGE.

## MODULE DESCRIPTION:

THE WARP FIELD GENERATOR HAS TWO REQUIREMENTS, A MINIMUM NUMBER OF WARP NACELLES, OR PARTS IMPLEMENTING SW\_MODULEWARPCOIL, AND A MINIMUM AMOUNT OF ELECTRIC CHARGE. WITHOUT EITHER OF THESE IT WOULD BE IMPOSSIBLE TO GO TO WARP.

SO LONG AS THE MINIMUM REQUIREMENTS DEFINED IN THE MODULE CFG MET THEN IT WILL BE POSSIBLE TO GO TO WARP. THERE ARE A FEW CONDITIONS WHICH CAUSE AN AUTOMATIC SHUTDOWN OF THE DRIVE. IF THE WARP COILS, OR EVEN ONE OF THEM DISCHARGE BELOW THEIR CUTOFF THRESHOLD, THE DRIVE WILL DISENGAGE. THE SAME IS TRUE IF THERE IS NOT ENOUGH ELECTRIC CHARGE. IF ONE OR MORE NACELLES ARE DESTROYED THE DRIVE WOULD ALSO DISENGAGE

A SHIP MAY HAVE MULTIPLE PARTS IMPLEMENTING SW\_MODULEWARPGENERATOR, BUT ONLY ONE CAN BE ACTIVE AT A TIME. THERE IS A CHECK MADE BY THE CODE SO THAT IF ONE WARP GENERATOR IS ACTIVATED ANOTHER WARP GENERATOR ON THE VESSEL CANNOT BE ACTIVATED. FOR EXAMPLE, THE NX-REFIT HAS A WARP 5 DRIVE AND A WARP 7 DRIVE. IF THE WARP 7 DRIVE IS ACTIVATED, THE WARP 5 DRIVE CANNOT BE ACTIVATED. HOWEVER, IF THE WARP 7 DRIVE IS DEACTIVATED, THE WARP 5 DRIVE COULD THEN BE ACTIVATED.

WITH THE DRIVE ACTIVE ONE SIMPLY USES THE THROTTLE TO BEGIN TRAVELING AT WARP SPEEDS. THE VESSEL'S VELOCITY IS NOT ACTUALLY CHANGED, THE VESSEL IS SIMPLY TRANSLATED THROUGH SPACE. THROTTLING DOWN TO 0 OR OTHERWISE DISENGAGING THE DRIVE, IF THE ORBIT MODE IS SET TO "EASY" (THE DEFAULT) THE PLUGIN COMPUTES AS CLOSE TO A CIRCULAR ORBIT AS POSSIBLE, BUT AT THE VERY LEAST PLACES THE VESSEL IN ORBIT OF THE CURRENT REFERENCE BODY. IF THE ORBIT MODE IS "REALISTIC", THE ORBIT WILL BE CALCULATED BY STOCK KSP BASED ON THE VESSEL'S VELOCITY, WHICH IS UNCHANGED BY THE MODULE CODE.



# IN-DEPTH: IMPULSE ENGINE MODULE

## MODULE

```
{
    name = SW_ModuleImpulseEngine
    maxAccel = 2.0
    maxVerticalAccel = 1.0
    hoverAlt = 500
    engineEfficiency = 0.75
    minDeuterium = 0.1
    ecProd = 1000

    PROPELLANT
    {
        name = LqdDeuterium
        ratio = 1.0
        drawGauge = true
    }
}
```

## PARAMETER EXPLANATION:

**maxAccel:** THE MAXIMUM ACCELERATION THAT THE IMPULSE ENGINE WILL APPLY AT FULL THROTTLE AND 100% THRUST. THIS IS IN UNITS OF "g", SO 2 IS 2gs.

**maxVerticalAccel:** THE MAXIMUM ACCELERATION THAT WILL BE APPLIED TO THE VESSEL DURING TAKEOFF. THIS IS IN UNITS OF  $m/s^2$ .

**hoverAlt:** THE ALTITUDE USED IN THE TAKEOFF AND LANDING CODE. IT WON'T STRICTLY "HOVER" AT THIS ALTITUDE, SO IT'S REALLY AN ALTITUDE THAT GIVES US SOME EXTRA HELP TO FLY IN-ATMOSPHERE.

**engineEfficiency:** THE FUEL EFFICIENCY OF THE ENGINE, A VALUE BETWEEN 0 AND 1.

**minDeuterium:** THE MINIMUM AMOUNT OF LIQUID DEUTERIUM NEEDED FOR THE ENGINE TO THRUST WORK.

**ecProd:** THE ELECTRIC CHARGE PRODUCED BY THE ENGINE.

## MODULE DESCRIPTION:

THE IMPULSE ENGINE MODULE BEHAVES VERY MUCH LIKE A NORMAL STOCK ENGINE, EXCEPT IT APPLIES FORCE TO THE CENTER OF MASS OF THE VESSEL, AND THAT THE THRUST IS DEFINED IN THE CFG AS ACCELERATION. USING ACCELERATION INSTEAD OF THRUST ALLOWS FOR EASIER PORTABILITY AS THE MODULE WILL APPLY THE APPROPRIATE THRUST TO GET THE DESIRED ACCELERATION. THIS MEANS WE DON'T HAVE TO WORRY ABOUT THE MASS OF THE VESSEL IN DETERMINING HOW MUCH THRUST IS NEEDED. THRUST DIRECTION CAN BE TOGGLED BETWEEN "FORWARD" AND "REVERSE" ALLOWING THROTTLEABLE CONTROL OF IMPULSE THRUST IN BOTH DIRECTIONS. THE MODULE INHERITS FROM MODULEENGINES AND SO GIVES US ACCESS TO THE THRUST LIMITER, WHICH DOES WORK IN SCALING THE THRUST OF THE IMPULSE ENGINES.

THE "PROPELLANT" DEFINITION IS NECESSARY TO DRAW THE PROPELLANT GAUGE FOR THE IMPULSE ENGINE. THE MODULE CODE IS HARD CODED TO LIQUID DEUTERIUM AS PROPELLANT, SO CHANGING THE "PROPELLANT" DEFINITION WILL NOT CHANGE THE PROPELLANT USED BY THE IMPULSE ENGINES.

THE TAKEOFF/LANDING CODE USES SOMEWHAT SIMPLE LOGIC TO ACCELERATE THE VEHICLE UPWARDS, OR SLOW IT DOWN AS THE CASE MAY BE BY APPLYING AN ACCELERATION TO EACH PART OF THE VESSEL TO COUNTER GRAVITY. THIS FORCE WILL BE APPLIED IN TAKEOFF MODE IN VARYING DEGREES UNTIL THE VESSEL IS ABOVE TWICE THE "hoverAlt". LANDING FORCES WILL BE APPLIED TO SLOW DOWN THE VESSEL TO 5 M/S OF DOWNWARD VERTICAL SPEED, BUT YOU WILL NEED TO CANCEL ANY OTHER VELOCITY ON YOUR OWN TO ENSURE A SAFE LANDING. CARE SHOULD STILL BE TAKEN TO NOT HAVE TOO HIGH OF A DOWNWARD VELOCITY TOO CLOSE TO THE GROUND. NONE OF THESE FORCES WILL BE APPLIED IF THE SHIP IS IN AN ORBIT, OR ESCAPING, SO NO UNWANTED FORCES IN ORBIT.

SINCE IMPULSE ENGINES ARE FUSION ROCKETS, I HAVE THEM GENERATE ELECTRIC CHARGE FROM THAT REACTION.

# IN-DEPTH: BUSSARD COLLECTOR MODULE

## MODULE

```
{  
    name = SW_ModuleBussardCollector  
    collectionRadius = 10  
    collectorEfficiency = 0.75  
}
```

## PARAMETER EXPLANATION:

**collectionRadius:** THE RADIUS IN METERS AROUND THE PART WHICH COLLECTS THE PARTICLES. THIS IS USED INTERNALLY TO COMPUTE A CROSS-SECTIONAL AREA.

**collectorEfficiency:** A VALUE BETWEEN 0 AND 1 MEASURING THE EFFICIENCY OF THE COLLECTION PROCESS.

## MODULE DESCRIPTION:

THE BUSSARD COLLECTOR MODULE DOESN'T REQUIRE ANY RESOURCE PLACEMENT MODS. THE MODULE'S CODE USES RANDOM NUMBER GENERATORS TO RANDOMLY SELECT A PERIOD OF TIME IN SECONDS FROM 0 TO 180, AND A PARTICLE DENSITY IN THE RANGE OF 0 TO 1. SO, IT PREVENTS A CONSTANT COLLECTION AT A CONSTANT RATE AND IN A WAY EMULATES THE SHIP FLYING THROUGH POCKETS OF INTERSTELLAR GASES OF VARYING SIZE AND DENSITY.

COLLECTION IS PREVENTED WHILE AT WARP SPEED. THE REASONING FOR THIS IS THAT WHILE TRAVELLING AT WARP, LOCAL SPACE IN THE WARP FIELD IS AT REST WITH RESPECT TO THE SHIP, SO THE SHIP WOULDN'T ACTUALLY BE MOVING THROUGH ANY INTERSTELLAR GAS CLOUDS TO COLLECT PARTICLES.

WHILE ACTIVE THE COLLECTOR "COLLECTS" LIQUID DEUTERIUM AND ANTIMATTER, THOUGH IT COLLECTS MUCH MORE LIQUID DEUTERIUM THAN ANTIMATTER.

## MODDING TIPS: MODEL SETUP

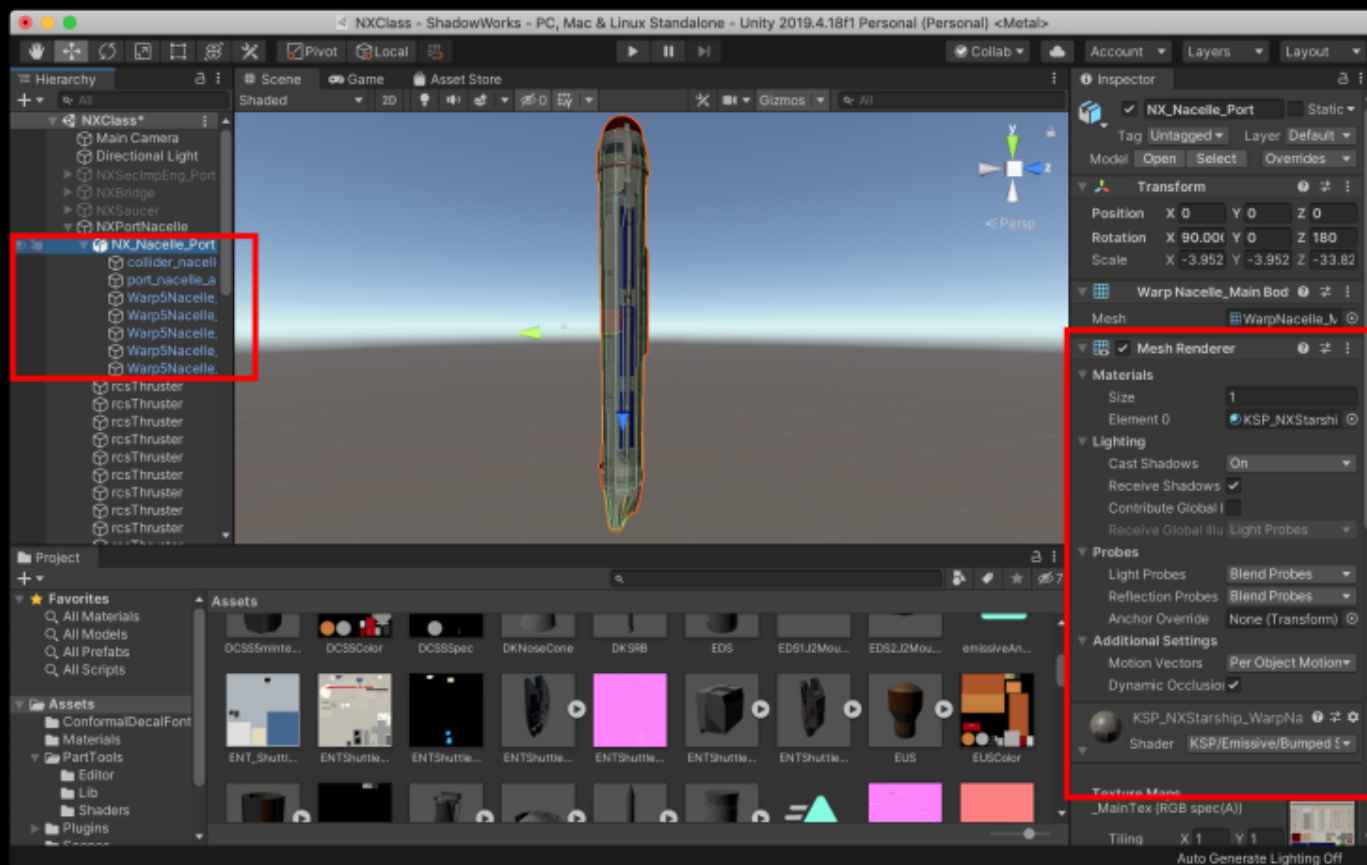
## DO I NEED ANY SPECIAL TRANSFORMS ON MY MODELS?

THIS IS PROBABLY A CONCERN MANY WOULD HAVE. THANKFULLY, FOR MANY I IMAGINE, THE PLUGIN DOES NOT USE ANY SPECIAL TRANSFORMS TO WORK. THIS MEANS THAT THE MODULES INCLUDED IN THE PLUGIN MAY BE ADDED TO ANY PART TO MAKE YOUR OWN SHIP PARTS.

## ARE THERE ANY SPECIAL SETUP NEEDED FOR MY MODELS THEN?

THERE ARE A COUPLE. IF YOU ARE MAKING PARTS FOR USE WITH THIS MOD, OR WANTING TO ADD TREKDRIVE TO EXISTING PARTS, THE PARTS NEED TO BE SETUP LIKE ANY ROCKET PARTS IN KSP. BY THAT, IF THE PART IS SPAWNED IN THE VAB IT SHOULD BE ORIENTED UP. OF COURSE, SPAWNING THE SAME PART IN THE SPACE PLANE HANGER WOULD ORIENT THE SHIP AS YOU'D EXPECT. TO PUT IT ANOTHER WAY, THE FRONT OF YOUR SHIP NEEDS TO BE FACING UP WHEN EXPORTED FROM YOUR MODELING PROGRAM.

THE SECOND THING TO BE AWARE OF IS THE GLOWING OF THE NACELLES. IF YOU ARE MAKING A NACELLE THAT NEEDS TO GLOW AS IT CHARGES, THE PART OF THE NACELLE THAT NEEDS TO GLOW MUST BE THE FIRST MESH OBJECT IN THE UNITY SETUP THAT HAS A "MESH RENDERER" COMPONENT. SIMPLEST WAY TO DO THIS IS TO MERGE OR JOIN THE MESH COMPONENTS THAT NEED TO GLOW AND THEN PARENT ANY OTHER MESHES IN THE NACELLE TO THE COMBINED MESH, OR SIMPLY MERGE OR JOIN THE MESHES THAT MAKE UP YOUR NACELLE. BELOW IS THE SETUP FOR THE NX-CLASS PORT NACELLE.



# MODDING TIPS: SHIP LIGHTS & EFFECTS

## PREVENTING LIGHTS (SPOTLIGHTS/POINT LIGHTS) FROM SHINING ON PLANETS IN ORBIT.

THIS WAS A PROBLEM I ENCOUNTERED WITH THE NX. WITH THE LIGHT SELECTED IN UNITY, CLICK THE DROPDOWN MENU NEXT TO "CULLING MASK" AND UN-CHECK "SCALED SCENERY". "SCALED SCENERY" IS LAYER 10 IN UNITY.

## WHAT IS NEEDED FOR THE WATERFALL BASED WARP STARS EFFECT?

OF COURSE, YOU NEED WATERFALL INSTALLED, WHICH IS PACKAGED WITH THE MOD DOWNLOAD. THEN, FOLLOW THE INSTRUCTIONS PROVIDED BY NERTEA IN HIS DOCUMENTATION FOR WATERFALL ON HOW TO SET UP A WATERFALL EFFECT, MAKING SURE TO USE THE "SIMPLE WARP FX" EFFECT INCLUDED WITH TREKDRIVE. A FURTHER NOTE FOR UNITY SETUP: ANY PART WITH A SPOTLIGHT OR POINT LIGHT, INCLUDING IVAs, MUST HAVE "TRANSPARENT FX" UN-CHECKED IN THE "CULLING MASK" DROPDOWN. "TRANSPARENT FX" IS LAYER 1 IN UNITY.

IF THIS LIGHT SETUP IS NOT, OR CANNOT BE MADE, THE LIGHTS WILL SIMPLY SHINE ON THE WARP STAR EFFECT MESH CAUSING SOME UNEXPECTED BRIGHT SPOTS. SO, THIS REALLY AN AESTHETIC ISSUE THAT YOU CAN IGNORE IF YOU DON'T MIND THE BRIGHT SPOTS.