SpaceX Starship add-on
v.220923

RECOMMENDED ADD-ONS

D3D9 Graphics Client

The hi-res surface tiles for Gulf Coast area:
https://mirror.orbiter-radio.co.uk/orbiter/assets/packages/Earth/EarthHi_10_07.zip

Boca Chica base and surface tiles:
https://www.orbithangar.com/showAddon.php?id=5c32a896-277f-4343-9c91-35e33747e5b7

Orbiter Forum Thread:
https://www.orbiter-forum.com/threads/spacex-superheavy.39783/

STARSHIP (UPPER STAGE) CONTROLS
C = Toggle HUD Info display (LAUNCH/ORBITAL/REENTRY/LANDING)
E = Set cockpit camera view
K = Open/Close Launch Control Panel
V = Start Launch Autopilot
N = Manual Jettison Booster

P = Open/Close payload bay   (Starship only)
W = Tilt Payload Attachment Fitting ring (for payload jettison)   (Starship only)
J = Jettison Payload   (Starship only)
M = Foward Light On/Off   (Starship only)

Ctrl+A = Aerofoil Mode Flight/Reentry
Alt+NumPad/ = Aerfoil Steering Enable/Disable
D = Aft Yaw RCS Enable/Disable
B = Upper Stage Main Fuel Dump
Ctrl+K = Enter Upper Stage Landing Target

Alt+PageUp/PageDn = +/- AoA Wing Trim [Ctrl+PageUp/PageDn for fine adjust]
Alt+Delete = Set AoA Wing Trim 0%

U = Reentry Attitude Autopilot On/Off
Controls AoA and Bank from orbit to Mach1.8 (~20km alt.) then switches to "Skydive" mode.
(Use IMFD "Base Approach" or BaseApproachMFD to target reentry interface at 120km alt.
See notes below.)

F = Fly-by-Wire Reentry On/Off [Shift + Cursor Pad Arrows = Bank/AoA]
Set Bank and AoA during reentry, vessel rotates around airspeed vector.

Ctrl+J = Use Landing Reserve Fuel On/Off
Ctrl+N = Upper Stage engine selection (All/Vac/SL)
Ctrl+1/2/3 = Upper Stage Raptor SL selection (1,2 or 3 engines)

Ctrl+B = Skydive-and-Land Autopilot On/Off (from ~20km)
Ctrl+V = Retropulsion Landing Autopilot On/Off (from ~10km)

G = Deploy/Stow Landing Gear

TANKER (UPPER STAGE) CONTROLS
M = Select Source Tank: Payload or Main Tank
W = Select Target Propellant Tank for fuel transfer (enter tank index 0,1,2,etc.)
J = Start/Stop fuel transfer (200kg/s)
(on docking, tanker will automatically select docked vessel "default" propellant tank)

BOOSTER (LOWER STAGE) CONTROLS (after jettison)
K = Enter Boostback/Landing Target name
M = Set Boostback mode (Boostback+Landing / Landing Only)
B = Start/Stop Boostback autopilot
P = Select Engines (33 / 13 / 3)
J = Deploy/Stow Grid Fins
E = Set cockpit camera view

LZ1 LANDING PAD CONTROLS
N = Toggle pad mesh invisible/visible

BC_PAD TEST STAND CONTROLS
K = Lights on/off
V = LOX vent on/off
P = Attach Vessel to Pad (Enter name)

BC_TOWER LAUNCH TOWER CONTROLS
J = Engage/Disengage QDA Claw
G = Engage/Disengage QDA
B = Enable/Disable Catch Sequence (deletes any currently "caught" vessel)
P = Enter Catch Target Name (useful for multiple launches, otherwise can leave on AUTO)
K = Lights on/off
V = LOX vent on/off
N = Attach Vessel to Pad (Enter name)
1 / 2 = Lower / Raise / Pause Catch Arms
3 / 4 = Open / Close / Pause Catch Arms
5 / 6 / 7 = Slew Right / Left / Centre Catch Arms
8 / 9 = +/- Transport Attached Vessel Along Arms
NOTE: You can place the caught booster stage on to the pad by moving it into position (within 2m), and releasing it (open arms [3]).

LAUNCH CONTROL PANEL
Press [K] to toggle the Launch Control Panel On/Off.

Attach any existing vessel as payload, by entering name and click on "Attach".

Enter target orbit parameter and click on "Enter". Inclination must be greater than launch latitude.
Enter positive inclination for launch to ascending-node azimuth, negative inclination for descending node.
1st Stage Apogee at MECO is automatically calculated from target orbit perigee, but can be overiden.

Enter name of 1st Stage boostback-and-landing target (can be base or landed vessel).
Enable/disable 1st Stageboostback-and-landing autopilot.
Toggle 1st Stage autopilot mode: "boostback-and-landing" or "landing only".
Enter fuel reserved for 1st Stage boostback and landing.
Enter name of Starship reentry and landing target.
Enter max. acceleration limiter for ascent autopilot.
Activate T-10 Launch Autopilot for launch to target orbit or set Liftoff time UTC.

DE-ORBIT FOR RE-ENTRY NOTES

Use IMFD"Base Approach" or BaseApproachMFD to perform de-orbit burn for reentry.
Re-entry interface parameters:

Altitude (Alt.)	120km
Re-entry Angle (ReA)	1.5°
Anterior Angle (Ant)	45°

DOCKING

Starship and Tanker have a Docking Port defined, centrally located on top (heads-up) of the vessel. This enables Starship and tanker to dock "back-to-back" - see "Tanker Docking and Transfer test" scenario. Use DockingMFD to perform docking.

MULTIPLE STARSHIPS/TANKERS IN THE SAME SCENARIO

Due to my limited coding ability, each Starship vessel (not the Booster) requires its own .cfg and associated .dll .

Copy and rename .cfg and .dll (edit new .cfg to point to new .dll)

See "Double launch" scenarios for example.

VEHICLE DATA

Booster stage

Dry Mass	180000kg
Propellant Mass	3400000kg
Thrust	2200000N per engine (x33)
ISP	3490(Vac) 3200(SL) Ns/kg
RCS Thrust	3600N per engine
RCS ISP	3000 Ns/kg

Upper Stage

Dry Mass	120000kg
Main Propellant Mass	1175000kg
Landing Reserve Propellant Mass	25000kg
Thrust	2200000N per engine (x3 Vac + x3 SL)
ISP (VAC Raptor)	3680 (Vac) 3100 (SL) Ns/kg
ISP (SL Raptor)	3490 (Vac) 3200 (SL) Ns/kg
RCS Thrust	3600N per engine
RCS ISP	3000 Ns/kg
Tanker max.fuel payload	170000kg

Starship Propellant Tank Index

Upper Stage Main	0
Upper Stage Reserve	1
Booster Stage Main	2

Tanker Propellant Tank Index

Upper Stage Main	0
Upper Stage Reserve	1
Payload Propellant	2
Booster Stage Main	3

Booster Propellant Tank Index

Main	0