Rogue System

GSI S31c FireArc Prototype

Operations Manual

This page should have the version crap on it.

The version of the doc is Alpha 5.0

The version of the game this doc goes with is 0.1.10.26.15

Version history
Alpha 1
        Rough test
Alpha 2
        Proper layout with page numbers and everything
Alpha 2.1
        Did you know the MFD was called the HMD?
        Added some of the HMD panels
Alpha 3
        Added Tuturial 3 checklist (Style 1)
Alpha 3.1
        Added Tutorial 5 checklist (Style 2)
        Added Version history like a dork
Alpha 3.2
        Changed Tutorial 3 to single column
        Split Forward panel into F1-F3
Alpha 3.3
        Added Tutorial 4 checklists
        Added panel and button information to tutorial 5
Alpha 4.0
        Cleaned up Tutorial 3
Alpha 4.1
        Fixed some derps in Tutorial 3
        New control panel images
        Added new HMD panels
        Added frequency data to COMMS page
        Added Startup checklist

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1 HOW TO USE THIS DOCUMENT

1-2 How To Use This Document

In order to make everyone's lives easier this document is designed to provide a standard control panel scheme.

The panels are labeled forward to aft, top to bottom.
F= Forward
L=Left
R=Right
A=Aft

The buttons are labeled top to bottom, left to right.
The labels I am using for the buttons are from the tool tip hoover text.

An example of how I would use this is the first few steps of the docking tutorial

(The tutorial chunk that was here previously has been deleted because I wrote the whole thing in a later section)

You can be all NASA with their cool checklists and tack on some useful information at the same time.

Sherpa

2 CONTROL PANEL OVERVIEW

2.1   F1 Caution And Warning (CAW)

SYS BUS 1 UNDERVOLT	SYS BUS 2 UNDERVOLT	MAIN BUS UNDERVOLT
SYS BUS 1 OVERLOAD	SYS BUS 2 OVERLOAD	MAIN BUS OVERLOAD
SYS BUS 1 FAILURE	SYS BUS 2 FAILURE	MAIN BUS FAILURE
WPN BUS UNDERVOLT	ECS OVERTEMP	ECS FAULT
WPN BUS FAILURE	BMS LOW VOLT	BMS RECHARGE
BMS FAULT	BMS ACID LEAK	BMS CAPACITY
FCS CORE LOW TEMP	BMS OVERTEMP	FCS OVERTEMP
FCS CORE MCL	FCS FAULT	FCS REACT FLOW RATE
FCS SOV FAIL	TMS COOL PRESSURE	TMS COOL LEVEL LOW
TMS LASER COOL FAIL	TMS PUMP OVERSPEED	TMS PUMP FAIL
TMS LOOP OVERTEMP	TMS RAD MOTOR	TMS RAD FAIL
TMS FAULT	TMS SYS OVERTEMP	VMS FAULT

FAULT ACK

01

SYS BUS 1 UNDERVOLT	SYS BUS 2 UNDERVOLT	MAIN BUS UNDERVOLT
SYS BUS 1 OVERLOAD	SYS BUS 2 OVERLOAD	MAIN BUS OVERLOAD
SYS BUS 1 FAILURE	SYS BUS 2 FAILURE	MAIN BUS FAILURE
WPN BUS UNDERVOLT	ECS OVERTEMP	ECS FAULT
WPN BUS FAILURE	BMS LOW VOLT	BMS RECHARGE
BMS FAULT	BMS ACID LEAK	BMS CAPACITY
	BMS OVERTEMP	
FCS CORE LOW TEMP		FCS OVERTEMP
FCS CORE MCL	FCS FAULT	FCS REACT FLOW RATE
FCS SOV FAIL		
	TMS COOL PRESSURE	TMS COOL LEVEL LOW
TMS LASER COOL FAIL	TMS PUMP OVERSPEED	TMS PUMP FAIL
TMS LOOP OVERTEMP	TMS RAD MOTOR	TMS RAD FAIL
TMS FAULT	TMS SYS OVERTEMP	VMS FAULT

02 03 05 07 09

04 06 08 10

01) SYS BUS 1 Caution And Warning Block
02) SYS BUS 2 Caution And Warning Block
03) MAIN BUS Caution And Warning Block
04) WEAPON BUS Caution And Warning Block
05) ESC Caution And Warning Block
06) BMS Caution And Warning Block
07) FCS (FCM) Caution And Warning Block
08) TMS Caution And Warning Block
09) VMS Caution And Warning Block
10) Fault Acknowledge

2.2   F2 Hard-Mounted Display (HMD)
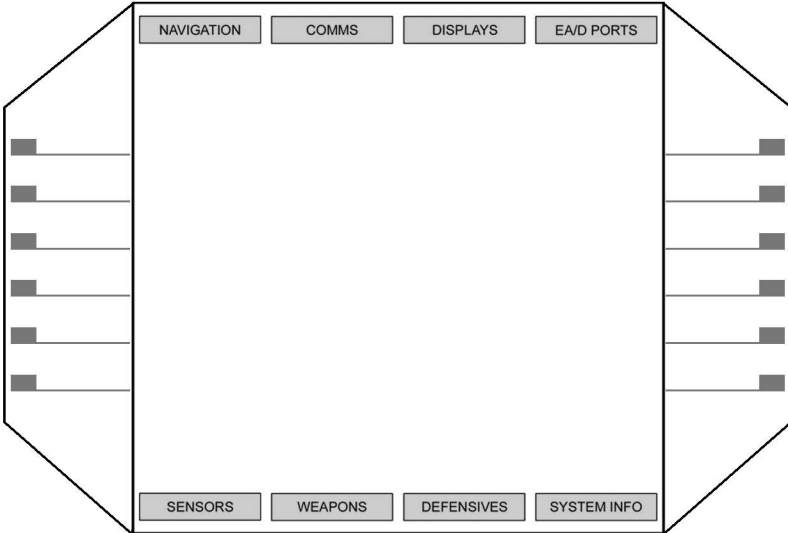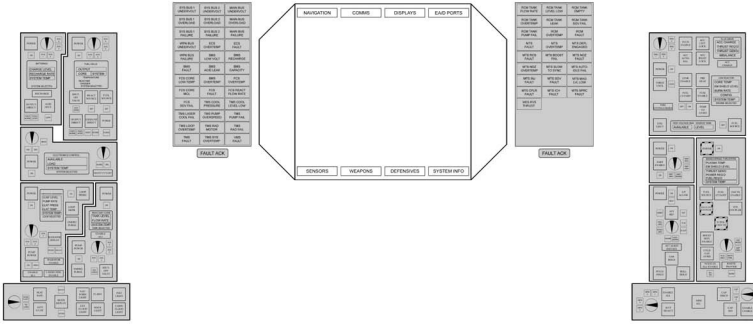
The HMD has an entire section devoted to the individual screens. Check the table of contents.

2.3 F3 Caution And Warning (CAW)

RCM TANK FLOW RATE	RCM TANK LEVEL LOW	RCM TANK EMPTY
RCM TANK OVERTEMP	RCM TANK LEAK	RCM TANK SOV FAIL
RCM TANK PUMP FAIL	RCM OVERTEMP	RCM FAULT
MTS FAULT	MTS OVERTEMP	MTS DEFL ENGAGED
MTS RCS FAULT	MTS BOOST FAIL	MTS NOZ FAULT
MTS NOZ OVERTEMP	MTS SLOW TO SYNC	MTS AUTO-IDLE FAIL
MTS INJ FAULT	MTS SOV FAULT	MTS MAG LVL LOW
MTS CPLR FAULT	MTS ICH FAULT	MTS SPRC FAULT
MES RVS THRUST		

01 02 03 04

RCM TANK FLOW RATE	RCM TANK LEVEL LOW	RCM TANK EMPTY
RCM TANK OVERTEMP	RCM TANK LEAK	RCM TANK SOV FAIL
RCM TANK PUMP FAIL	RCM OVERTEMP	RCM FAULT
MTS FAULT	MTS OVERTEMP	MTS DEFL ENGAGED
MTS RCS FAULT	MTS BOOST FAIL	MTS NOZ FAULT
MTS NOZ OVERTEMP	MTS SLOW TO SYNC	MTS AUTO-IDLE FAIL
MTS INJ FAULT	MTS SOV FAULT	MTS MAG LVL LOW
MTS CPLR FAULT	MTS ICH FAULT	MTS SPRC FAULT
MES RVS THRUST		

FAULT ACK

01) RCM Caution And Warning Block
02) MTS Caution And Warning Block
03) MTS Caution And Warning Block
04) Fault Acknowledge

2.4   L1 Battery Management System (BMS)

BATTERIES

- CHARGE LEVEL
- RECHARGE RATE
- SYSTEM TEMP

SYSTEM SELECTED

POWER

ON

SYS 1   SYS 2   SYS 3   SYS 4

01   02   D1   03   04   05

RECHARGE

OUTPUT DIRECT   ACID NEUT

FEED NORM   FEED XFER   LEAK
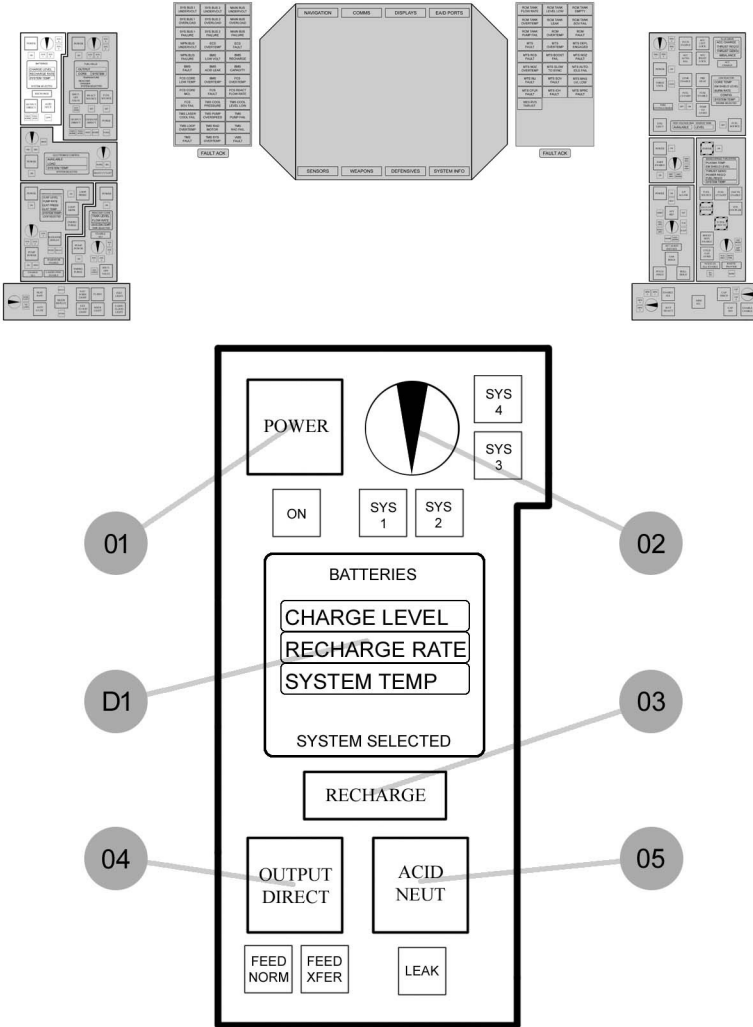
01) BMS Battery Enable
02) BMS Battery Select
03) BMS Battery Recharge
04) BMS Battery Output Select
05) BMS Acid Neutralizer

D1) BMS Display
        The display will be covered in section XX

2.5   L2 Fuel Cell Manager (FCM)
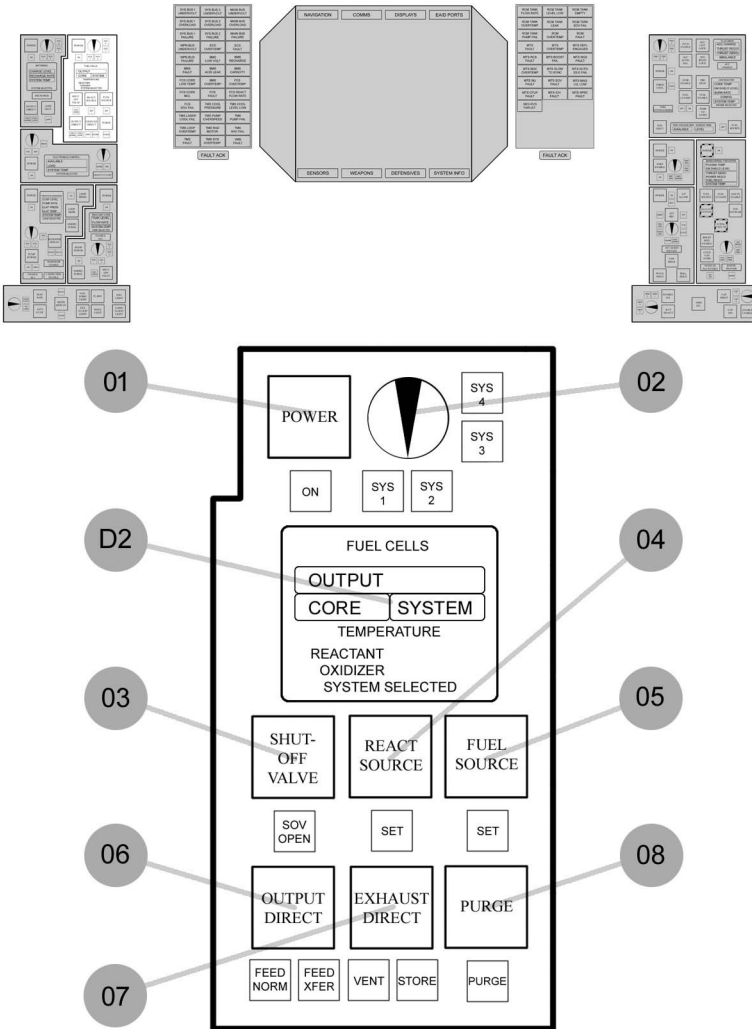
01) FCS Cell Enable *
02) FCS Cell Select *
03) FCS Shut-Off Valve *
04) FCS Reactant Source Select *
05) FCS Fuel Select *
06) FCS Power Output Select *
07) FCS Bi-Product Disposal *
08) FCS Contamination Purge *

D2) FCM Display
          The display will be covered in section XX

NOTE:

* The tool tips use FCS however on the F1 HMD Systems Info page
the sub system is called FCM so….yeah. That's a thing that should
probably be changed one way or the other.

2.6 L3 Electronic Control System (ECS)
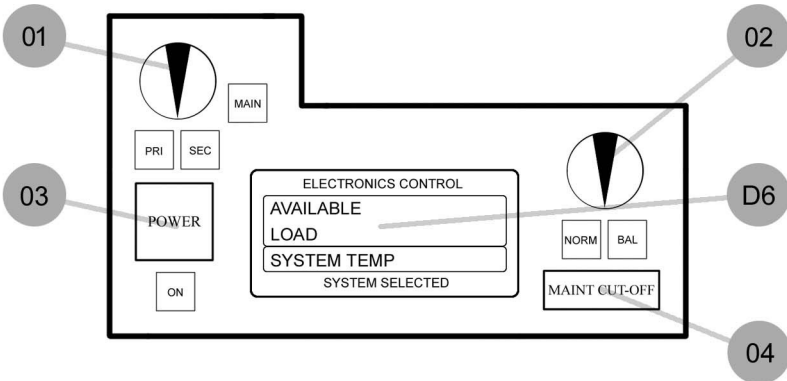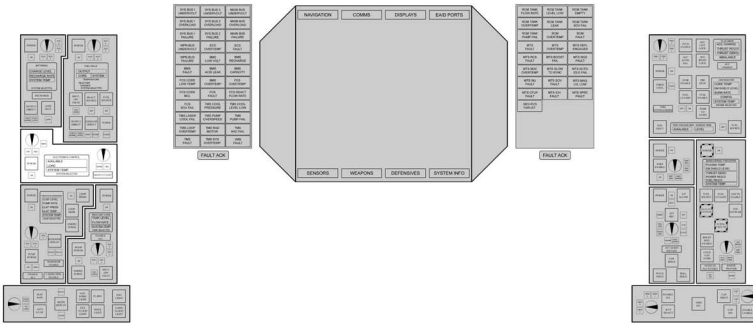
01) ECS Bus Select
02) ECS Bus Distribution Mode
03) ECS Bus Enable
04) ECS Maintenance Cut-Off

D6) ECS Display
        The display will be covered in section XX

2.7 L4 Temperature Management System (TMS)
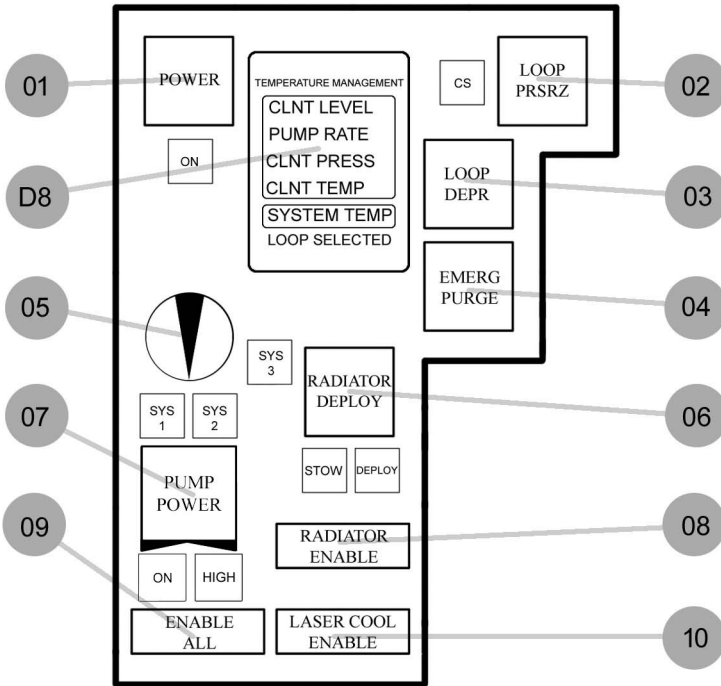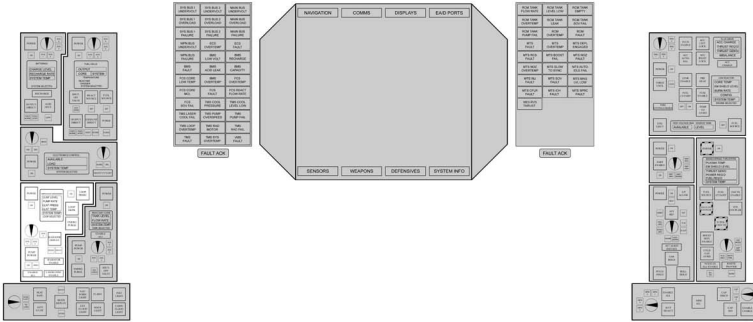
01) TMS Loop Enable
02) TMS Loop Pressurize
03) TMS Loop Depressurize
04) TMS Flash Cool (Vent) Loop
05) TMS Loop Select
06) TMS Loop Radiator Deploy
07) TMS Loop Power *
08) TMS TMS Loop Radiator Enable
09) TMS Enable All Pumps
10) TMS Loop Laser Cooling Enable

D8) TMS Display
        The display will be covered in section XX

NOTE:

* The TMS Loop Power button is a three position toggle.
If anyone has a good suggestion on how I can draw that, I'm
listening.

2.8 L5 Reactant Core Manager (RCM)
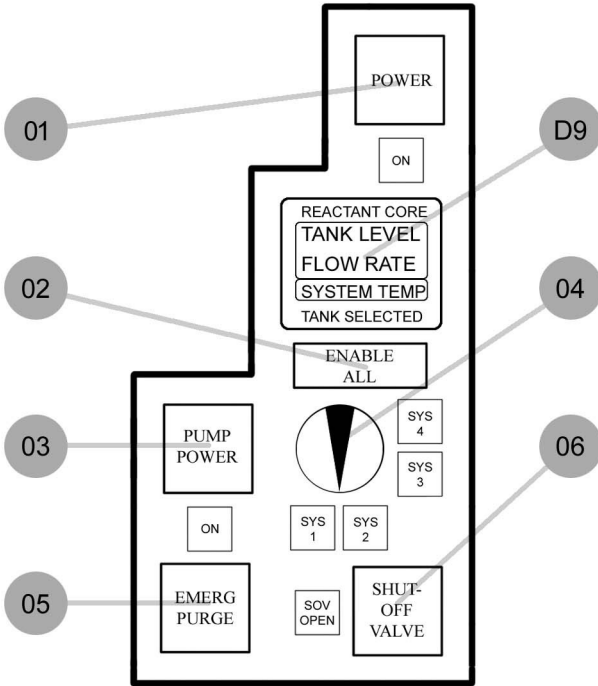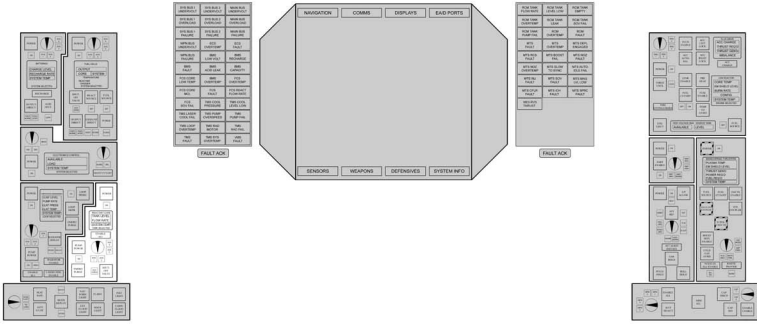
01) RCM System Enable
02) RCM Enable All Pumps
03) RCM Tank Pump Power
04) RCM Tank Select
05) RCM Tank Emergency Overboard Dump
06) RCM Tank Shut-Off Valve

D9) RCM Display
        The display will be covered in section XX

Tanks:

SYS 1 Argon (Ar)
SYS 2 Hydrogen (H2)
SYS 3 Oxygen (O2)
SYS 4 Lithium (Li)

2.9 L6 Core Ship Systems Manager
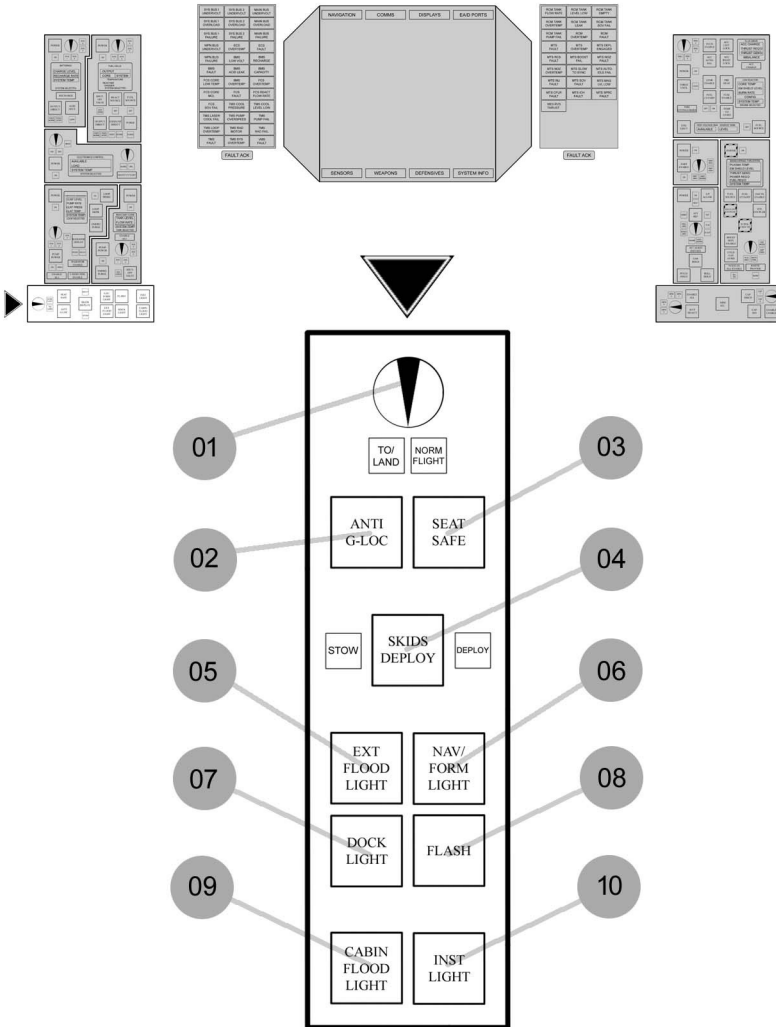
01) Seat Flight Mode Select
02) Seat Anti-G Enable
03) Seat Safe For Flight
04) CSSM Skids Deploy *
05) CSSM Exterior Flood Lighting
06) CSSM Navigation/Formation Lighting
07) CSSM Docking Port Lighting
08) CSSM Strobe Beacon Lighting
09) CSSM Cabin Flood Lighting
10) CSSM Instrument Lighting

NOTE:

* The tool tip for Skids Deploy incorrectly shows as
CSSM Navigation/Formation Lighting. Be careful which one you
click on when internally docked.

This panel has been rotated clockwise from its actual orientation
It seemed like a good idea at the time?

2.10 R1 Main Engine System (MES)

01		ENG 4	FLUX ENABLE	ACC LEFT LOCK
02		ENG 3		

FLUX DRIVE

ACC CHARGE
THRUST REQ'D
THRUST GEN'D

IMBALANCE

ACC CHARGE

POWER   ON

LENR ENABLE   PRE HEAT

LEN REACTOR

CORE TEMP
EM SHIELD LEVEL
BURN RATE
CONFIG
SYSTEM TEMP

ENGINE SELECTED

THROT LOCK   LOCK

FUEL CUT-OFF   FUSE ENABLE

FIRE EXTINGUISHER

OFF   ON

TEMP CO OVRD

ENG EJECT

HIGH VOLTAGE BUS   SOURCE TANK

AVAILABLE   LEVEL

SET   FUEL SOURCE

ENG 1   ENG 2

ACC AUTO-BAL   ACC RIGHT LOCK

01 02 03 D3 04 05 06 07 08 09 10 D4 11 12 13 14 15 16 D5

01) MES Engine Select
02) MES Flux Drive Enable
03) MES Accumulator (Left) Lock
04) MES Accumulator Auto Balance
05) MES Accumulator (Right) Lock
06) MES Accumulator Charge
07) MES System Enable
08) MES LENR Enable
09) MES Chamber Pre-Heater
10) MES Throttle Lock
11) MES Fuel Cut-Off
12) MES LENR Fuse Enable
13) MES Extinguisher
14) MES Temperature Cut-Off Override
15) MES Engine Jettison
16) MES LENR Fuel Source Select

D3 MES Flux Drive Display
       The display will be covered in section XX
D4 MES LEN Reactor Display
       The display will be covered in section XX
D5 MES Display
       The display will be covered in section XX

2.11   R2 Maneuvering Thruster System (MTS)
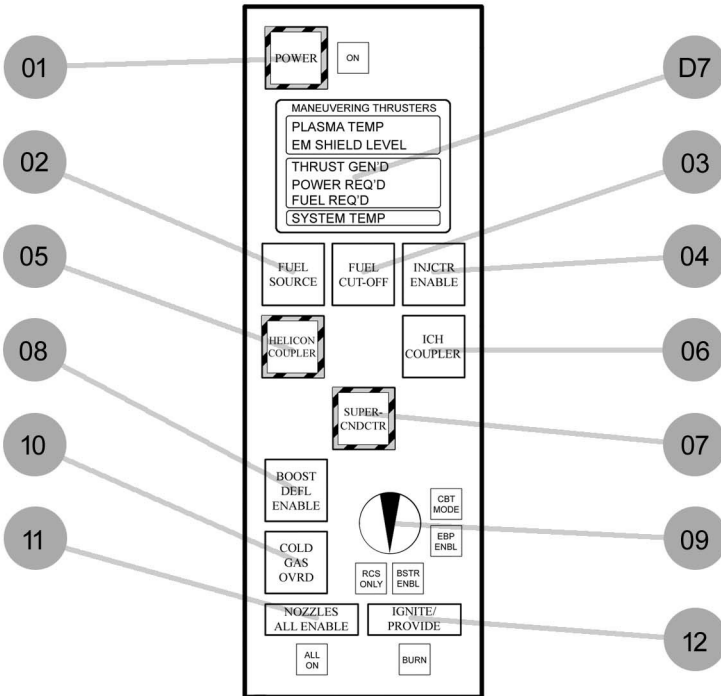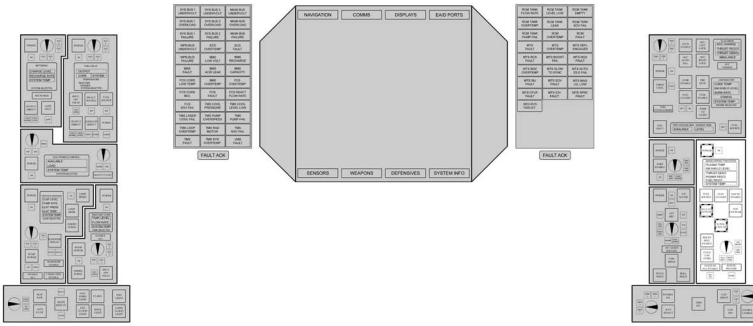
01) MTS System Enable *
02) MTS Fuel Source Select
03) MTS Fuel Cut-Off Valve
04) MTS Fuel Injector Enable **
05) MTS Helicon Ionize-Enable *
06) MTS ICH Cyclotron Enable
07) MTS Superconductor Enable *
08) MTS Boost Deflector
09) MTS Thrust Mode Select
10) MTS Cold Gas Override
11) MTS Nozzle All Enable
12) MTS Core Ignitor/Thrust Provide ***

D7) Maneuvering Thrusters Display
        The display will be covered in section XX

NOTE:

* These switches have safety covers on them. It is probably for a good reason

** Insert VTEC Kicked in Yo joke here

*** This is a press and hold button.
If anyone has a good suggestion on how I can draw that, I'm listening.

2.12   R3 Communication System (COMMS)
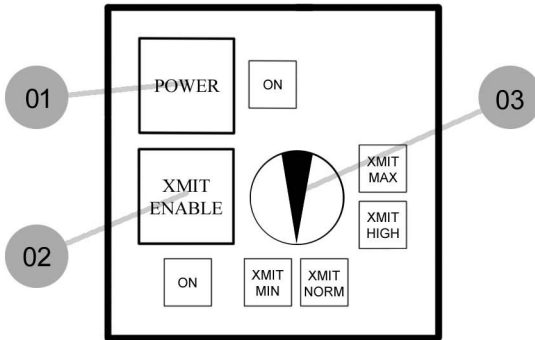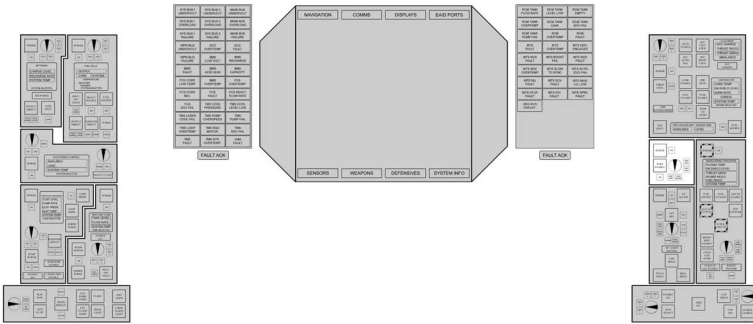
01) COMMS System Enable
02) COMMS Transmitter Enable
03) COMMS Transmission Power Select

Tutorial 2
        ST Approach 45.2.2
        Localizer 45.2.200

Tutorial 3
        ST Departure 45.2.3
        Localizer 45.2.202

Tutorial 4
        ST Approach 45.2.2
        Localizer 45.2.200

2.13 R4 Navigation/Auto-Pilot System (NAS)
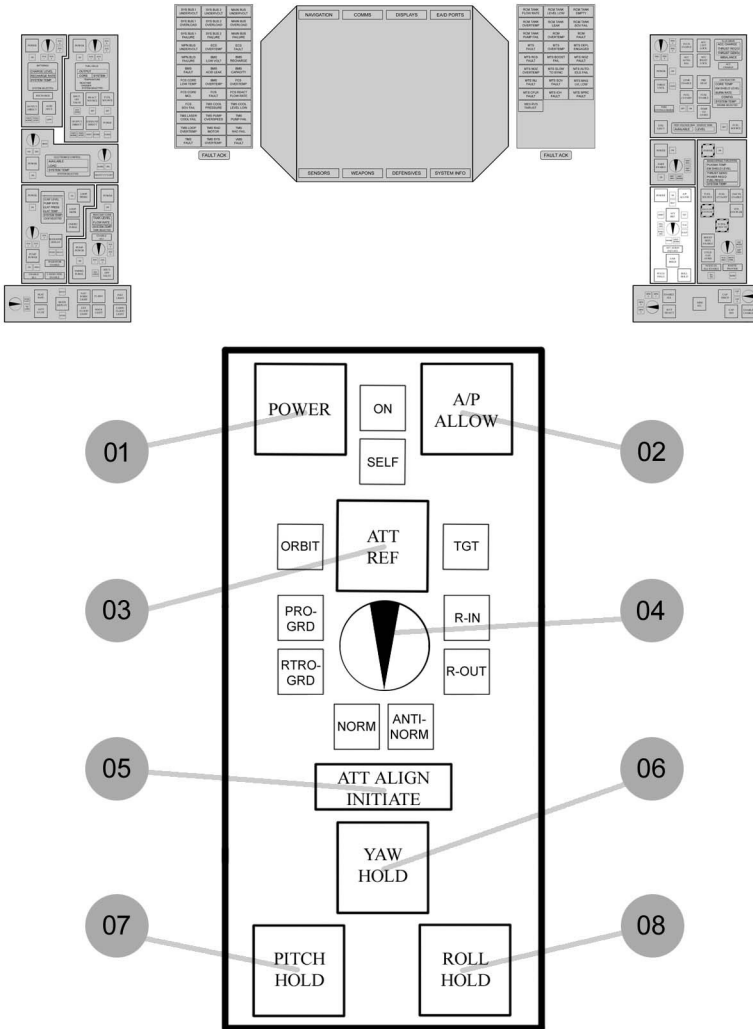
01) NAS System Enable
02) NAS Auto Pilot Allow
03) NAS Attitude Reference Select
04) NAS Attitude Mode Select
05) NAS Align Initiate
06) NAS Yaw Hold
07) NAS Pitch Hold
08) NAS Roll Hold

2.14   R5 Weapon Management System (WMS)
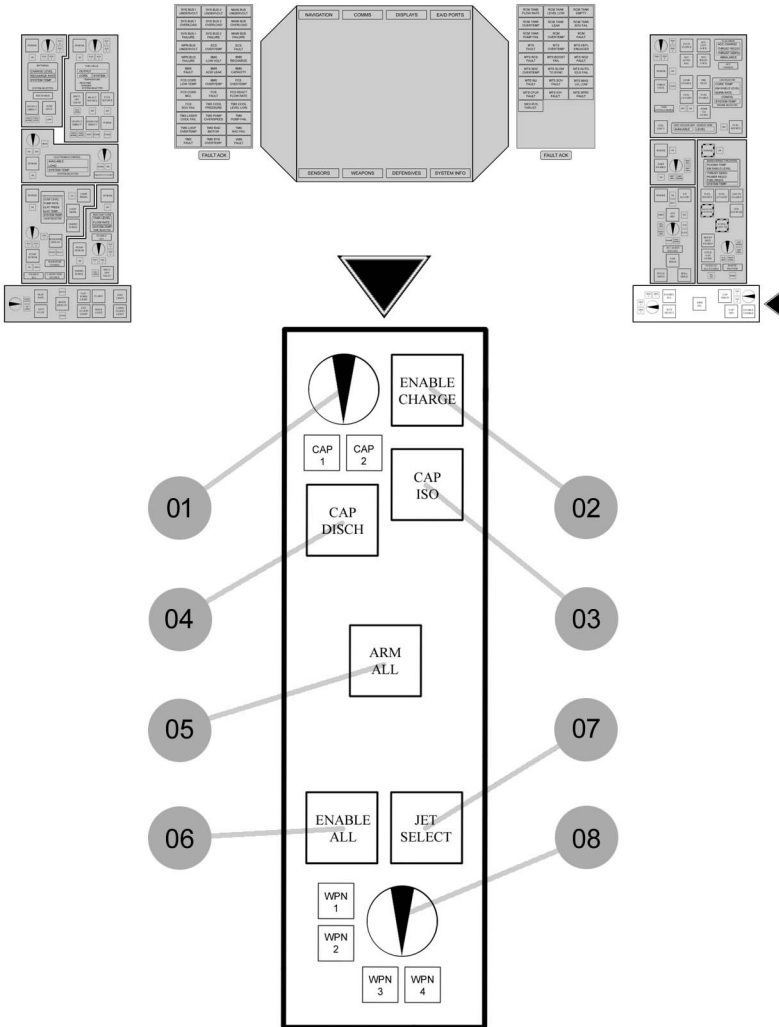
01) WMS Weapon Select
02) WMS Weapon Capacitor Enable/Charge
03) WMS Weapon Capacitor Isolate
04) WMS Weapon Capacitor Discharge
05) Weapon Arm All *
06) Weapon Enable All *
07) Weapon Jettison Selected
08) Weapon Selected

NOTE:

* None of these switches have a cover so watch your step when entering or exiting the seat when the ship is operational

This panel has been rotated counterclockwise from its actual orientation
It seemed like a good idea at the time?

2.15   A1 Access Panel

01 EMERGENCY LIGHTING

02 SECURE SEAT
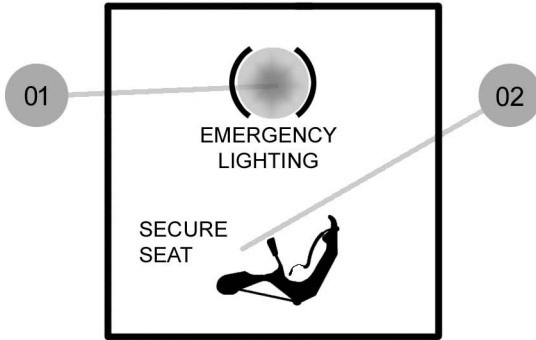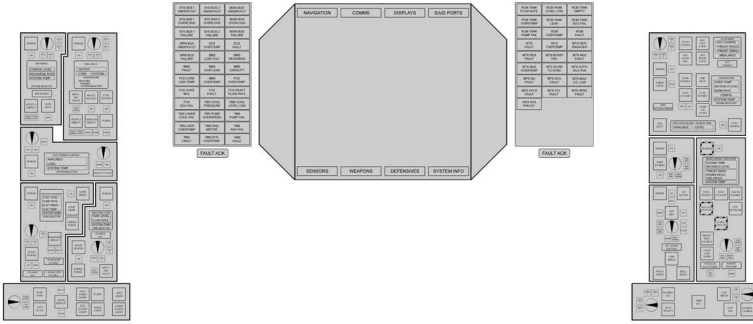
01) CSM Cabin Flood Lights*

02) SEAT Safe/Unsafe

Note:

* I think we're missing an S from CSSM here.

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3 HMD PANELS

3.1   HMD Cold Startup
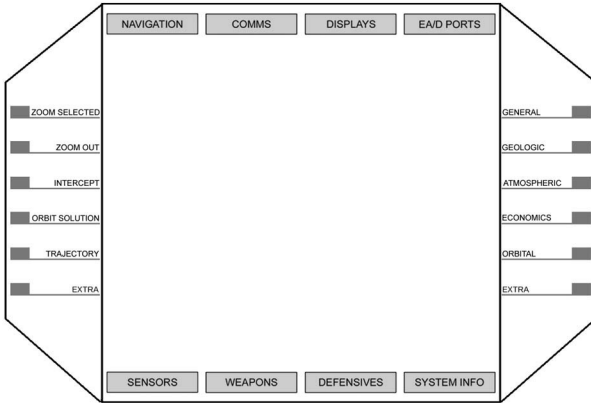
3.2   HMD Navigation
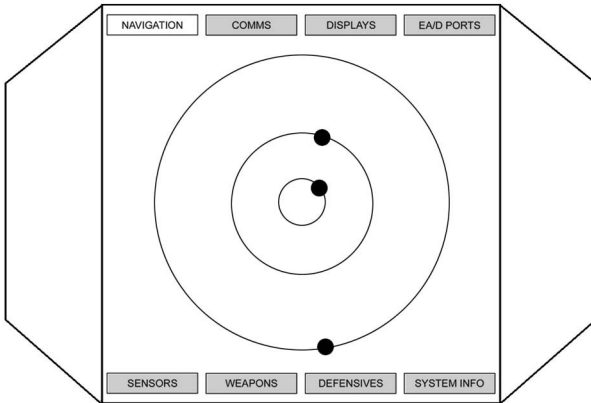
3.3   HMD Navigation (Object Selected)
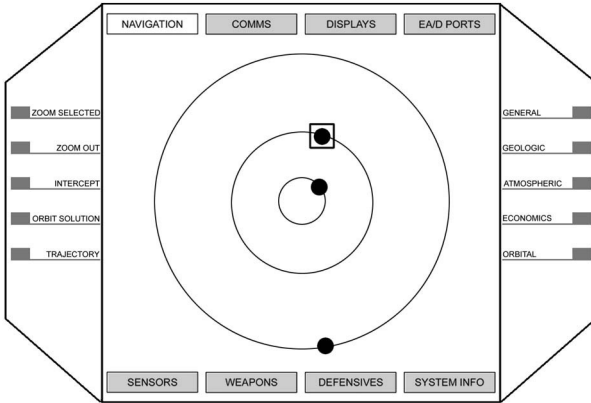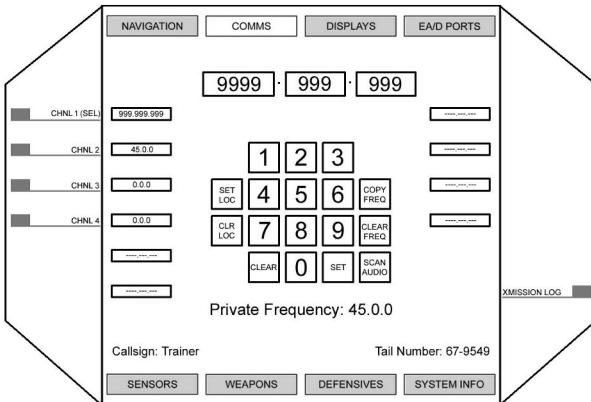
3.4   HMD COMMS

3.5 HMD Displays
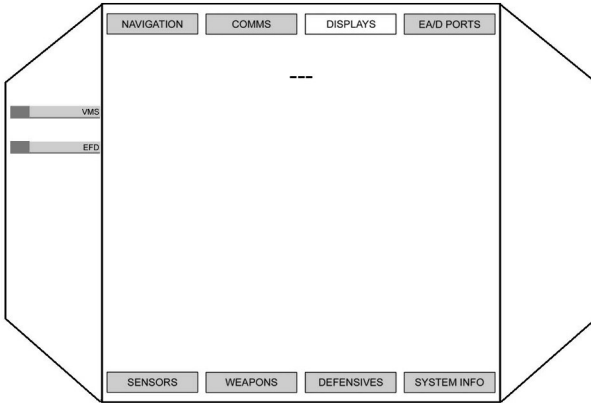
3.6 HMD Displays – VMS

3.7   HMD Displays – EFD

| NAVIGATION | COMMS | DISPLAYS | EA/D PORTS |

-- Eye's-Front Display (EFD)

VMS

EFD

| SENSORS | WEAPONS | DEFENSIVES | SYSTEM INFO |

3.8   HMD EA/D Ports

| NAVIGATION | COMMS | DISPLAYS | EA/D PORTS |

PORT 1

PORT 2

PORT 3

Port Connector Size:

Localizer Connector Size:

STATUS:
* NO PORT SELECTED *
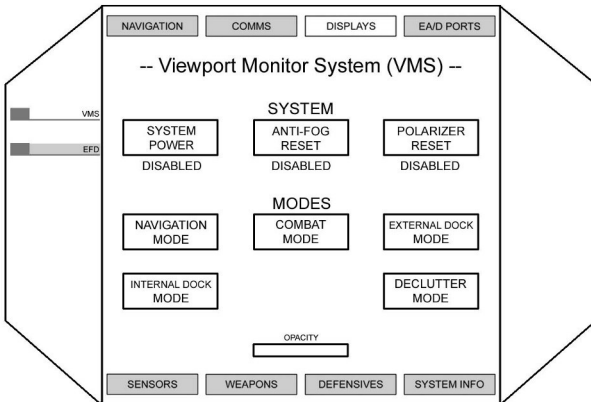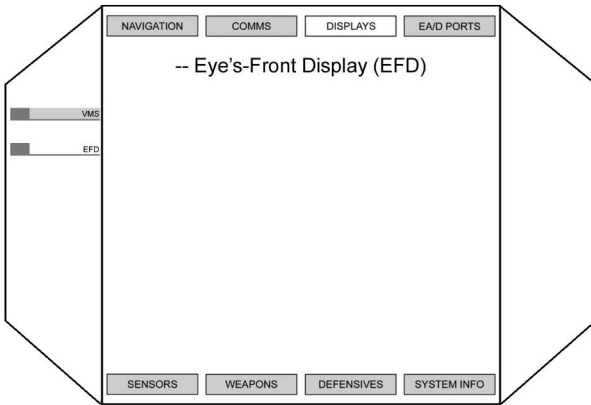
| SENSORS | WEAPONS | DEFENSIVES | SYSTEM INFO |
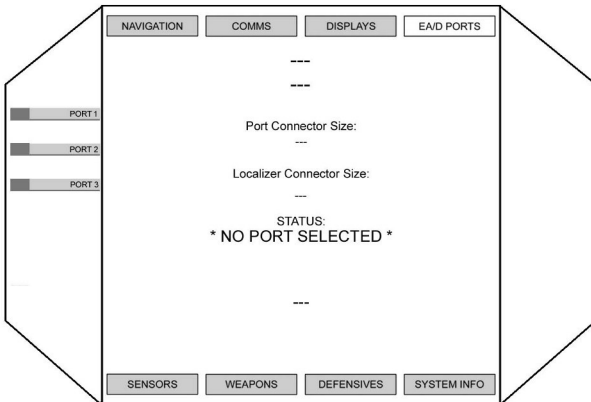
3.9   HMD EA/D Ports – Port 1
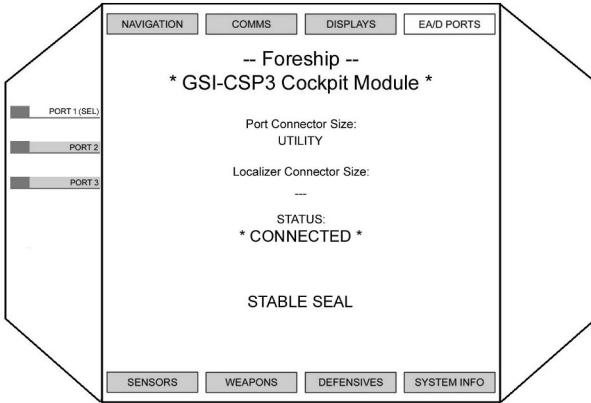
3.10   HMD EA/D Ports – Port 2
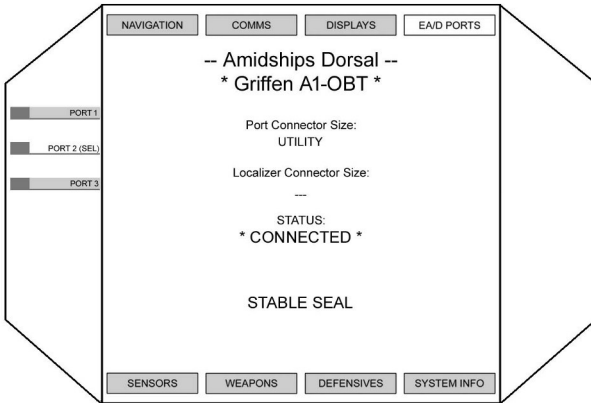
3.11   HMD EA/D Ports – Port 3
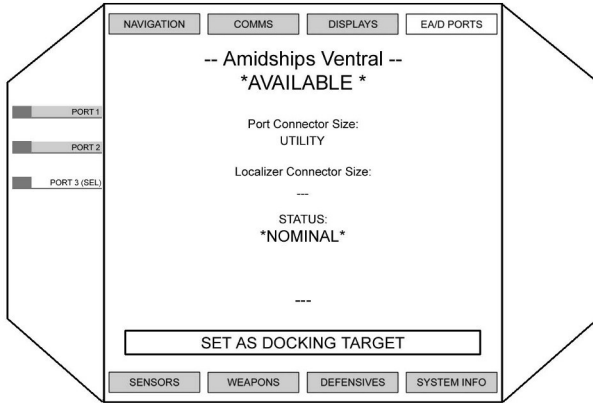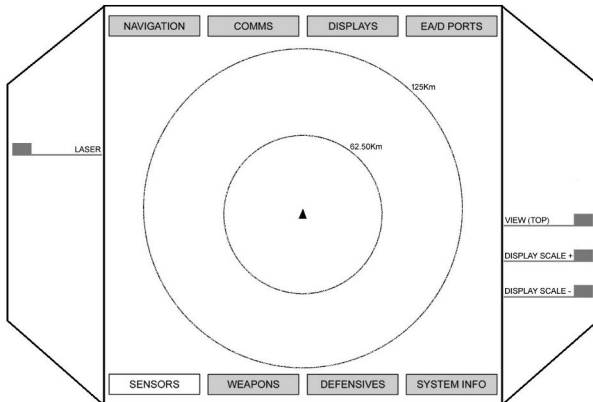
3.12   HMD Sensors

3.13 HMD Weapons
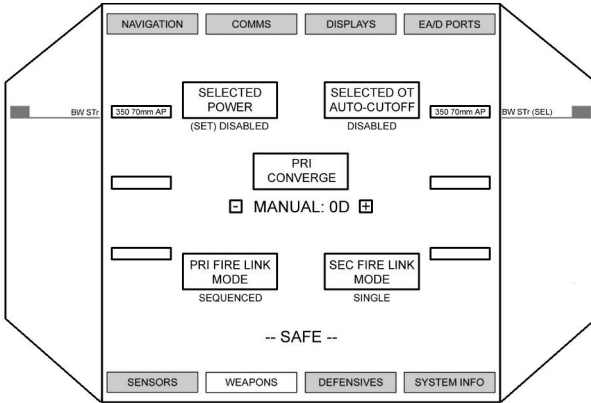
3.14 HMD Defensives
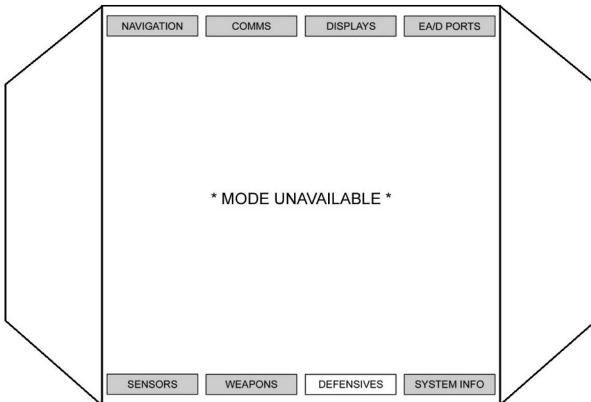
3.15 HMD Systems Info
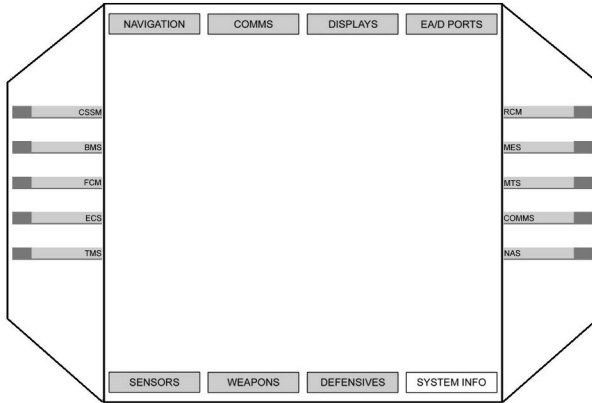
3.16 HMD Systems Info – CSSM

CORE SHIP SYSTEMS MANAGER (CSSM)

The Core Ship Systems Manager handles the basic functions of the ship such as lighting, hatches and gangways, and landing skid deployment. Many systems route directly into CSSM for centralized data collection. These Include:
-- Ship's Onboard Intelligence (SOI): allows for direct communication with the pilot, co-pilot functionality and the collection and display of Caution and Warning information.
-- Life Support Systems (LSS): provides proper cabin atmosphere temperature, mixture and pressurization. Various methods of reducing acceleration force affects on crew members are also handled by LSS.
-- Viewport Monitor System (VMS): uses external cameras and internal monitors to provide exterior views for the crew

CSSM is SOI-monitored for fault detection

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4 TUTORIALS

4.1   Tutorial 3 System Startup

Entering Cockpit

There is a panel right outside the cockpit hatch but I haven't drawn it yet
MDR-01 Mid Deck Right Panel One
  01 COCKPIT HATCH – OPEN

A1 Aft Panel
  02 SECURE SEAT – UNSECURE

Enter Pilot's Seat

L6 CSSM Panel
  03 SEAT SAFE – ENABLE
  10 INST LIGHT – ENABLE
  09 CABIN FLOOD LIGHT – DISABLE

Switch Check

✓ All Panels Powered Down

L5 RCM Panel
  04 TANK SELECT – SYS 1

L4 TMS Panel
  05 LOOP SELECT – SYS 1

L3 ECS Panel
  01 BUS SELECT – PRI
  02 BUS DISTRIBUTION MODE SELECT – NORM

L2 FCM Panel
  02 CELL SELECT – SYS 1

L1 BMS Panel
  02 BATTERY SELECT – SYS 1

R1 MES Panel
  01 ENGINE SELECT – SYS 1

R2 MTS Panel
  09 THRUST MODE SELECT – RCS ONLY

R3 COMMS Panel
  03 TRANSMISSION POWER SELECT – XMIT NORM

Primary Bus Enable

L1 BMS Panel
  01 POWER – ON

L3 ECS Panel
  03 POWER – ON

F1 CAW Panel
  01 fault acknowledge

L3 ECS Panel
  04 MAINT CUT-OFF – DISABLE (green)
D6 ECS Display
  ✔ AVAILABLE is GREEN

  ✔ F1 CAW SYS BUS 1 lights out

L1 BMS Panel
  03 RECHARGE – ENABLE
D1 BMS Display
  ✔ RECHARGE RATE is RISING

Secondary Bus Enable

L1 BMS Panel
  02 BATTERY SELECT – SYS 2
  01 POWER – ON
  03 RECHARGE – ENABLE
D1 BMS Display
  ✔ RECHARGE RATE is RISING

> If SYS 1 battery is enabled and has charge
> SYS 2 battery will not show RECHARGE RATE
> This is expected

L3 ECS Panel
  01 BUS SELECT – SEC
  03 POWER – ON
  02 BUS DISTRIBUTION MODE SELECT – BAL

  ✔ F1 CAW SYS BUS 2 lights out

> There will be a delay on SYS BUS 2 OVERLOAD
> This is expected

Fuel Cell Preheat

L2 FCM Panel
  01 POWER – ON
  02 CELL SELECT – SYS 2
  01 POWER – ON

Standard TMS Enable

L4 TMS Panel
  01 POWER – ON
  02 LOOP PRSRZ – CS
  07 PUMP POWER – ON

> **CAUTION** PUMP POWER is a three position switch
> avoid running pumps in HIGH mode

D8 TMS Display
  ✔ CLNT LEVEL is RISING
  ✔ CLNT PRESS is RISING
L4 TMS Panel
  02 ✔ LOOP PRSRZ is DISABLED
  05 LOOP SELECT – SYS 2
  02 LOOP PRSRZ – CS
  07 PUMP POWER – ON

> **CAUTION** PUMP POWER is a three position switch
> avoid running pumps in HIGH mode

D8 TMS Display
  ✔ CLNT LEVEL is RISING
  ✔ CLNT PRESS is RISING
L4 TMS Panel
  02 ✔ LOOP PRSRZ is DISABLED
  09 ✔ ENABLE ALL is ENABLED

✔ F1 CAW TMS lights out

Alternate TMS Enable
WARNING! This procedure will automatically enable TMS SYS 1 and SYS 2 Use the **standard procedure** if you are unaware of the spacecrafts condition or are unable to communicate with STC Emergency Crews

L4 TMS Panel
  01 POWER – ON
  02 LOOP PRSRZ – CS
  05 LOOP SELECT – SYS 2
  02 LOOP PRSRZ – CS
  09 ENABLE ALL – ENABLE
D8 TMS Display
  ✔ CLNT LEVEL is RISING
  ✔ CLNT PRESS is RISING
L4 TMS Panel
  02 ✔ LOOP PRSRZ is DISABLED
  05 LOOP SELECT – SYS 2
D8 TMS Display
  ✔ CLNT LEVEL is RISING
  ✔ CLNT PRESS is RISING
L4 TMS Panel
  02 ✔ LOOP PRSRZ is DISABLED

✔ F1 CAW TMS lights out

COMMS Enable

R3 COMMS Panel
  01 POWER – ON
  02 XMIT ENABLE – ON

> SYS BUS 2 OVERLOAD will illuminate.
> This is expected

Check in with STC

TAB
5) Space Traffic Control
1) Check In

Control this is 10-3889 (YOU) checking in.

10-3889 (YOU), this is Control. We have you checked in. Over.

TAB
5) Space Traffic Control
2) Request Departure Clearance

Control, this is 10-3889 (YOU). Requesting departure clearance.

10-3889 (YOU), this is Control. Departure approved. Notify Control before LENR initiation. Over.

Standard RCM Enable

L5 RCM Panel
  01 POWER – ON
  04 TANK SELECT cycle SYS 1 to SYS 4
    03 PUMP POWER – ON
    06 SHUT-OFF VALVE – SOV OPEN
  ✔ **02** ENABLE ALL is ENABLED

✔ F3 CAW RCM lights out

Alternate RCM Enable

WARNING!
This procedure will automatically enable RCM SYS 1 to SYS 4
Use the **standard procedure** if you are unaware
of the spacecrafts condition or are unable to communicate
with STC Emergency Crews

L5 RCM Panel
  01 POWER – ON
  02 ENABLE ALL – ENABLE
  04 TANK SELECT cycle SYS 1 to SYS 4
    D9 RCM display
      ✔ TANK LEVEL
    L5 RCM Panel
      03 ✔ PUMP POWER is ON
      06 ✔ SHUT-OFF VALVE is SOV OPEN

✔ F3 CAW RCM lights out

MES Preliminary Enable

R1 MES Panel
  07 POWER – ON
  08 LENR ENABLE – ENABLE
D4 LEN REACTOR Display
  ✔ EM SHIELD LEVEL is GREEN
R1 MES Panel
  09 PRE HEAT – ENABLE
D4 LEN REACTOR Display
  ✔ CORE TEMP is ORANGE
R1 MES Panel
  16 FUEL SOURCE – SET

VMS Enable

F2 HMD
  HMD DISPLAYS
      VMS
         SYSTEM POWER
          wait for screen to power on
         EXTERNAL DOCK MODE (OPTIONAL)

LENR Pre Enable Check

R1 MTS Panel
  09 ✔ PRE HEAT is GREEN

Request LENR activation from STC

TAB
5) Space Traffic Control
1) Ready for LENR Initiation

Control, this is XX-XXXX (YOU). Requesting LENR reaction.

XX-XXXX (YOU) Control. Copy. You are cleared to initiate LENR.
Notify Control when ready for departure. Over.

LENR and Main System Bus Enable

R1 MES Panel
  11 FUEL CUT-OFF – ENABLE
  12 FUSE ENABLE – ENABLE
D4 LEN REACTOR Display
  ✔ CORE TEMP is GREEN

L3 ECS Panel
  01 BUS SELECT – MAIN
  03 POWER – ON
D6 ECS Display
  ✔ AVAILABLE is RISING
L3 ECS Panel
  01 BUS SELECT cycle PRI, SEC, MAIN
    D6 ECS Display
      ✔ AVAILABLE
      ✔ LOAD

  ✔ F1 CAW Main Bus lights out
  ✔ F1 CAW SYS 2 OVERLOAD light out

NAS Enable

R4 NAS Panel
  01 POWER – ON

MTS Enable

R2 MTS
  01 POWER toggle SAFETY
  01 POWER – ON
  02 FUEL SOURCE – ENABLE
  03 FUEL CUT-OFF – ENABLE
  04 INJECTR ENABLE – ENABLE
  11 NOZZLES ALL ENABLE – ALL ON

FCM Enable

CAUTION you can damage the fuel cells
by allowing flow when the core temp is low.

L2 FCM Panel
  02 CELL SELECT cycle SYS 1 – SYS 2
    D2 FCM display
      ✔ CORE is GREEN
    L2 FCM Panel
      03 ✔ SHUT-OFF VALVE is YELLOW
      05 FUEL SOURCE – SET
      04 REACT SOURCE – SET

  ✔ F1 CAW FCM (FSC) lights out

Undock Check List

L6 CSSM Panel
  01 FLIGHT MODE SELECT – NORM FLIGHT

F2 HMD
  HMD COMMS

L3 ECS Panel
  04 MAINT CUT-OFF – ENABLE (yellow)

Request to Undock from STC

TAB
5) Space Traffic Control
2) Ready for departure

Control, this is XX-XXXX (YOU). Ready to depart.

XX-XXXX (YOU) this is Control. Clearance granted. Over.

XX-XXXX (YOU), Control. Maintenance power disabled. Stand by for departure frequencies.

XX-XXXX (YOU), Control. Tune ST Departure on 45.2.3

XX-XXXX YOU), Control. Tune localizer for exterior collar 3 using 45.2.202

XX-XXXX (YOU), Control. Umbilicals disconnected. Stand by for release.

All previous transmissions can be viewed using 'XMISSION LOG' from the COMMS sub-menu.

Configure COMMS Channels before release

F2 HMD
  HMD COMMS
        CHNL 3
          select Left Channel Box
            45
          select Center Channel Box
            2
          select Right Channel Box
            3
          SET
        CHNL 4
          select Left Channel Box
            45 (if unset)
          select Center Channel Box
            2 (if unset)
          select Right Channel Box
            202
          SET
          SET LOC

After Station Release

F2 HMD
  HMD NAVIGATION

Maneuver away from station.
The tutorial suggests Aft Translation (Down Arrow)

When Clear of the Station Deploy Radiators

✔ *F2 exterior free camera or cycle F4 exterior fixed cameras to verify the spacecraft is clear of the station*

L4 TMS Panel
  05 LOOP SELECT cycle SYS 1 – SYS 2
        06 RADIATOR DEPLOY – DEPLOY
        06 ✔ DEPLOY INDICATOR is GREEN
      D8 TMS Display
        ✔ *CLNT TEMP is FALLING*

When beyond STC Limiter range – 200 meters

R2 MTS Panel
  07 SUPER-CNDCTR toggle SAFETY
  05 HELICON COUPLER toggle SAFETY
  07 SUPER-CNDCTR – ENABLE
D7 MTS Display
  ✔ EM SHIELD LEVEL is GREEN
R2 MTS Panel
  05 ✔ HELICON COUPLER is WHITE
  05 HELICON COUPLER – ENABLE
  12 IGNITE/PROVIDE hold until BURN INDICATOR is GREEN

CAUTION!
If the BURN INDICATOR does illuminate after five (5) seconds
something has gone very wrong
with your procedure or the spacecraft.

  06 ICH COUPLER – ENABLE

✔ F3 CAW MTS lights

FLUX Drive Enable

✔ Idle Throttle
D7 MTS Display
  ✔ THRUST GEN'D is ZERO
  ✔ POWER REQ'd is ZERO

R1 MES
  02 FLUX ENABLE – ENABLE
  10 THROT LOCK – LOCK
  ✔ **10** LOCK INDICATOR is GREEN
  ✔ **03** ACC LEFT LOCK is ENABLED
  ✔ **05** ACC RIGHT LOCK is ENABLED
  04 ACC AUTO-BAL – ENABLE
  ✔ **04** ACC AUTO-BAL is YELLOW
  06 ACC CHARGE – ENABLE
  ✔ **06** ACC CHARGE is YELLOW
D3 MES FLUX DRIVE Display
  ✔ ACC CHARGE is ORANGE
R1 MES
  ✔ **10** THROT LOCK is YELLOW
  ✔ **03** ACC LEFT LOCK is YELLOW
  ✔ **05** ACC RICHT LOCK is YELLOW
  ✔ **06** ACC CHARGE is GREEN
D3 MES FLUX DRIVE Display
  ✔ ACC CHARGE is GREEN
R1 MES
  ✔ **06** ACC CHARGE is LIGHTS OUT
  06 ACC CHARGE – DISABLE
  03 ACC LEFT LOCK – DISABLE
  ✔ **03** ACC LEFT LOCK is GREEN
  ✔ **04** ACC AUTO-BAL is GREEN
  05 ACC RICHT LOCK – DISABLE
  ✔ **05** ACC RICHT LOCK is GREEN
  ✔ **04** ACC AUTO-BAL is YELLOW
  10 THROT LOCK – DISABLE
  ✔ **10** LOCK INDICATOR is GREEN

4.2   Tutorial 4 External Docking

yV: X.XXms
yO: XX.XXm

RNG: XX.XXm

ROLL: X.XX

zV: X.XXms
zO: XX.XXm

xV: X.XXms
xO: XX.XXm

YAW: X.XX

DEVIATIONS:

PITCH: X.XX
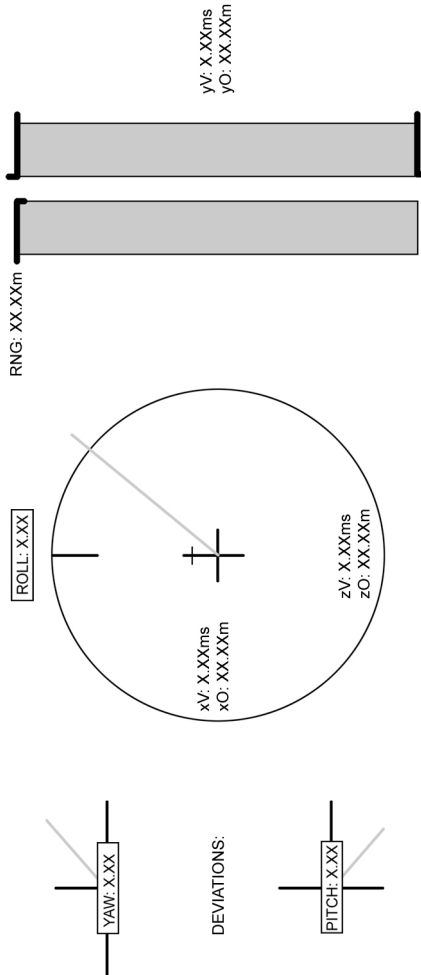
Docking HUD

Note: About Tutorial 3

Because this tutorial involves flying to the test platform and docking, most of this section will be generalities and my own bad habits. I will include as many facts as possible but ultimately your personal flying style will determine how useful this section of the manual becomes. At the end of the day, all that matters is a safe and successful dock.

<div align="right">Sherpa</div>

Entering Cockpit

MDR1
  CSM: cockpit hatch Open **MDR1-01**

The first thing I do after entering the cockpit is listen for clicks from the proximity sensor. I have had the tutorial start me between 200m and 5km. The proximity sensor has a range of 500m so if you hear clicking it is important to get the spacecraft under control ASAP.

A1 Panel
  SECURE SEAT – UNSECURE **A1-02**

Enter Pilot's Seat

L6 CSSM
  SEAT SAFE – ENABLE **L6-03**
  INST LIGHT – ENABLE **L6-10**
  CABIN FLOOD LIGHT – DISABLE **L6-09**

VMS Enable

F2 HMD
  HMD   DISPLAYS
        VMS
            SYSTEM POWER
            EXTERNAL DOCK MODE

While waiting for the VMS to power on, use the external cameras (F2) and try and locate the station. This is especially important if you are within 500m. You will not have accurate positional data until you have comms set up with the station but you can use the translational controls (The arrow keys and [ ]) to slow your approach or departure. F1 will return you to the cockpit view.

Contact the Local STC

TAB
1) Open Chanel
3) Local STC
1) Announce

Control, this is XX-XXXX (YOU). Come in. Over.
XX-XXXX (YOU) this is control. We copy you, Over.

TAB
1)Open Chanel
3)Local STC
2) On Approach

Control, this is XX-XXXX (YOU). On approach. Over.
XX-XXXX (YOU), Control. Copy. Continue inbound and contact ST
Approach on 45.2.2

NOTE:
You can review all communications by checking the COMMS
recorder
F2 HMD
 HMD COMMS
        XMISSION LOG

Configure ST Approach Channel

F2 HMD
 HMD COMMS
        CHNL 3
          select Left channel box
            45
          select Center channel box
            2
          select Right channel box
            2
        SET

Check In With ST Approach and Request Docking

TAB
2) Private Channel
2) 45.2.2
1) STC
1) Check In: ST Approach

ST Approach, this is XX-XXXX (YOU). Checking in.
XX-XXXX (YOU), this is ST Approach. We have you checked in.
Over.

Note:
Docking requests should be made within 100km of the station

TAB
2) Private Channel
2) 45.2.2
1) STC
1) Request Docking

ST Approach, this is XX-XXXX (YOU). Request docking with you.
Over
XX-XXXX (YOU), this is Control, Clearance granted. Over.
XX-XXXX (YOU), Control. Tune localizer for exterior collar 1 using
45.2.200

Configure STC Docking Channel

F2 HMD
  HMD COMMS (if unset)
        CHNL 4
          select Left channel box
           45 (if unset)
          select Center channel box
           2 (if unset)
          select Right channel box
           200
        SET
        SET LOC

Configure HUD for Docking

F2 HMD
  HMD EA/D PORTS
       PORT 2 (Amidships Dorsal)
           SET AS DOCKING TARGET

✔ HUD *VALID*

NAS Enable

R4 NAS
  ✔ POWER – ON **R4-01**
  A/P ALLOW – ENABLE **R4-02**
  YAW HOLD – ENABLE **R4-06**
  PITCH HOLD – ENABLE **R4-07**
  ROLL HOLD – ENABLE **R4-08**

Maneuvering in Space

There are four systems on the spacecraft for maneuvering.
  FLUX Drive
  MTS Booster
  Hot Plasma Maneuvering Jets
  Cold Plasma Maneuvering Jets

Note:
This tutorial will not be covering FLUX Drive operation

The MTS Booster system will provide ~.8m/s per throttle "click" Forward (normal operation) or Aft (Thrust Deflection Enabled **R2-08**) of acceleration.

The Hot Plasma Maneuvering Jets can provide ~ 1.3m/s of translational or rotational velocity.

The Cold Plasma Maneuvering Jets can provide ~ .1m/s of translational or rotational velocity.

Which of these systems you use will depend on the distances involved and your ability to ensure the safety of your spacecraft and any other vessels in the area.

Rule of thumb: No faster than .04m/s per 100m from the target

Translational Velocity moves the spacecraft in any of the six cardinal directions (Up, Down, Left, Right, Forward, Aft) regardless of the current orientation. You can think of this in terms of the WASD keys used in most first or third person video games.

Rotational Velocity changes the orientation of the spacecraft with out affecting its current Translational Velocity (Roll, Pitch, Yaw). You can think of this in terms of mouse-look as used in most first or third person video games.

Note:
Auto Pilot (NAS) will only help you control your rotational velocity at this time. You will have to manually correct your flight to control your translational velocities.

STC Requirements by Distance

Greater than 1500m (1.5km)
  Distance Meter will read FAR APPROACH and be GREEN
  No special considerations

1500m (1.5km)
  Distance Meter will read FAR APPROACH and be GREEN
  STC will ask you to reduce velocity to under 40m/s

1000m (1km)
  Distance Meter will read FAR APPROACH and be GREEN
  At 100m the Distance Meter will begin to decrease

800m
  Distnace Meter will read FAR APPROACH and be GREEN
  STC will ask you to reduce velocity to under 20m/s

500m
  Distance Meter will read NEAR APPROACH and be GREEN
  At 500m the proximity sensor will begin to click. The faster the clicking to closer you are to the target

300m

XX-XXXX (YOU), this is Control. You're under 300 meters. Cease closure and shut-down your MTS CORE. Over.

R2 MTS
  ICH COUPLER – DISABLE **R2-06**
  ✔ D7 PLASMA TEMP – COLD PLASMA LEVEL
  TOGGLE HELICON COUPLER SAFETY **R2-05 SAFETY**
  HELICON COUPLER – DISABLE **R2-05**

200m
  Distance Meter will read COURSE ALIGN and be ORANGE

100m
  STC will ask you to stow any radiators that may be damaged while docking

XX-XXX (YOU), this is Control. You're within 100 meters. Stow all obstructions immediately. Over.

50m
  Distance Meter will read FINE ALIGN and be ORANGE

5m
  Distance Meter will read PRECISE ALIGN and be RED
  Height Meter will Reset

2.5m
  Distance Meter will read FOR CAPTURE and be RED
  Height Meter will Reset

0.0m
CONNECTED

In order to successfully dock your spacecraft must:
  Be within +/- 4 degrees in Roll, Pitch and Yaw
  Be within +/- .05m in the Z and X axis and .03 in the Y axis
  Be moving no faster than .08m/s

XX-XXXX (YOU), Control. Reading solid contact. Stand by one... Over.
XX-XXXX (YOU) Control. Connection locked and stable. Engaging umbilical. Over
There is more but I can't scroll down :(

That's Great But How Do I Do That?

Some of this will depend on your distance from the target. Once you have channel 4 localized to the docking port (which you can do at any time during the tutorial however you need to talk to STC before you can dock) you can see how far from the station you are and what directions you are moving in. Typically when I start I'm within 500m of the station so I don't have to worry about firing up the engines but your kilometerage(?) may vary.

What to do if you are far from the target

The first thing I do is zero out my velocities in the Z, Y and Z axis

The orientation of your spacecraft probably doesn't line up with the test platform so I wouldn't worry about the O half of the three O V combinations (xO, yO and zO).

xV (Left / Right)
  if X is positive translate Right (Right Arrow) to bring it to 0.0
  if X is negative translate Left (Left Arrow) to bring it to 0.0
zV (Forward / Aft)
  if Z is positive translate Aft (Down Arrow) to bring it to 0.0
  if Z is negative translate Forward (Up Arrow) to bring it to 0.0
yV (Up / Down)
  if Y is positive translate Down ([) to bring it to 0.0
  if Y is negative translate Up (]) to bring it to 0.0

If you are having a difficult time zeroing out your velocities enabling Cold Gas Override (**R2-10**) should help.

Note:
If you need to use the main engines to close distance remember to disable Cold Gas Override (**R2-10**) and switch Thrust Mode Select (**R2-09**) to BSTR ENBL

Point the spacecraft towards to test platform using the rotational controls

Yaw Left (Insert) Yaw Right (PgUp)
Pitch Up (End) Pitch Down (Home)

Note:
The x, y and z V indicators will bounce around as you add rotational forces to the spacecraft. This is expected behavior.

The Pitch, Roll and Yaw indicators will be corrected when closer to the station.

Accelerate towards the test platform with a few clicks of the throttle (=) until vZ is ~ 40m/s then throttle back down to zero (-).

Note:
If you cross the 1Km boundary throttle back to zero regardless of speed.

R2 MTS
  BOOST DEFL ENABLE – ENABLE (yuck **R2-08**)
and slow the spacecraft down as STC calls out your speed at distance.
1500m 40m/s or less
800m 20m/s or less
300m STC will call for you to stop
300-200m disable ICH and Helicon Couplers
R2 MTS
  ICH COUPLER – DISABLE **R2-06**
  ✔ D7 PLASMA TEMP – COLD PLASMA LEVEL
  TOGGLE HELICON COUPLER SAFETY **R2-05 SAFETY**
  HELICON COUPLER – DISABLE **R2-05**

Note:
This will put the spacecraft into Cold Gas Override mode. You should be moving slower than 3 m/s in all three axis before you disable hot plasma production.

What to do if you are near the target

Now that the spacecraft is in a stable position it is time to align the Pitch, Yaw and Roll indicators for docking

The spacecraft needs to be within +/- 4 degrees to successfully dock. The indicators will shift from Red to Orange to Green as your alignment improves.

Pitch
  If Pitch is positive pitch down (Home)
  if Pitch is negative pitch up (End)
Yaw
  if Yaw is positive yaw left (Insert)
  if Yaw is negative yaw right (PgUp)
Roll
  if Roll is < 180 roll left (Delete)
  if Roll is <180 roll right (PgDn)

Alignment Tones:
As you change your alignment you will hear two tones. Tone one is position relative to the two intended docking ports. Tone two is relative to rotational orientation. As you improve alignment both tones will rise. When you are aligned they will harmonize

Now that you are aligned with the docking port check the Height indicator (Z Axis) to insure you are arriving below the target. The indicator should be Green and read a positive number of meters. +10m will insure you do not collide with the training platform regardless of radiator deployment.

yO (Up / Down)
  if Y is positive translate Up (])
  if Y is negative translate Down ([)
xO (Left / Right)
  If X is positive translate Left (Left Arrow)
  if X is negative translate Right (Right Arrow)
zO (Forward / Aft)
  if Z is positive translate Forward (Up Arrow)
  if Z is negative translate Aft (Down Arrow)

Note:
I prefer to set my Y (Up/ Down) height, correct my X (Left/Right) axis, correct my Z (Forward/Aft) axis and finally reduce Y height until docked

Once you are below the station correct the X and Z axis with the translation controls to within +/- .05m. Check for traffic and docking orientation using the external cameras (F2) to insure you close safely with the station.

Note:
The distance indicators are relative to the docking port and not the edges of the spacecraft!

The FireArc is 30m long and 16m wide with the dorsal docking port centered left to right (8m from each side) and 16m from the front of the spacecraft(14m aft).

You should now be sitting 10m below the docking port with xV, yV and zV reading 0.00m/s and yO and xO reading 0.00m
If you have not already stowed the radiator on cooling loop one do so now.

L4 TMS
  ✔ LOOP SELECT – SYS 1 **L4-05**
  RADIATOR DEPLOY – STOW **L4-06**

Translate upward to complete the docking maneuver (]) while checking that the spacecraft does not drift in the X and Z axis.

Note:
Docking ports are rated to handle closing speeds up to .08m/s however the nominal closing speed is.03m/s

At .03m in the Y axis, assuming nominal deviation in translation and rotation the spacecraft should dock with the station.

Yay?

5.3m

16m

30m

8m

16m

8m

14m
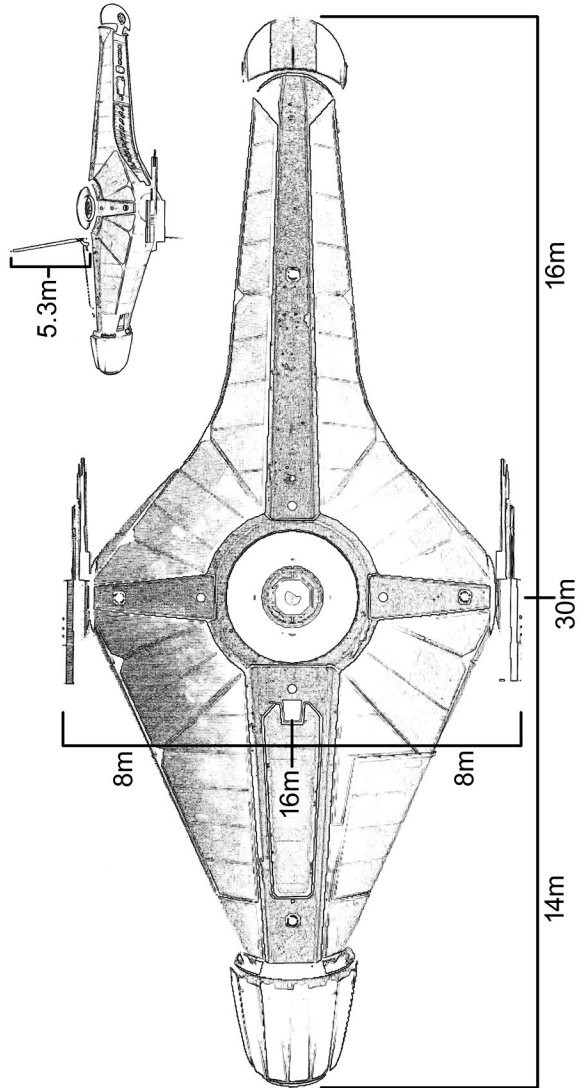
4.3   Tutorial 5 System Shutdown

Entering Cockpit

There is a panel right outside the cockpit hatch but I haven't drawn it yet
MDR-01 Mid Deck Right Panel One
  01 COCKPIT HATCH – OPEN

A1 Aft Panel
  02 SECURE SEAT – UNSECURE

Enter Pilot's Seat

L6 CSSM Panel
  03 SEAT SAFE – ENABLE
  10 INST LIGHT – ENABLE
  09 CABIN FLOOD LIGHT – DISABLE

Connect to Station Power

L3 ESC Panel
  04 MAINT CUT-OFF – DISABLE (GREEN)

MTS Shutdown

R2 MTS Panel
  06 ICH COUPLER – DISABLE
D7 MTS Display
  ✔ PLASMA TEMP is at COLD PLASMA LEVEL
R2 MTS Panel
  05 HELICON COUPLER toggle SAFETY
  05 HELICON COUPLER – DISABLE
D7 MTS Display
  ✔ PLASMA TEMP is ZERO
R2 MTS Panel
  07 SUPER-CNDCTR toggle SAFETY
  07 SUPER-CNDCTR – DISABLE

F3 CAW Panel
  01 fault acknowledge

MTS Shutdown (Cont)

R2 MTS Panel
  04 INJCTR ENABLE – DISABLE
  03 FUEL CUT-OFF – DISABLE
  01 POWER toggle SAFETY
  01 POWER – OFF

NAS Shutdown

R4 NAS Panel
  01 POWER – OFF

MES Preliminary Shutdown

R1 MES Panel
  12 FUSE ENABLE – DISABLE
  11 FUEL CUT-OFF – DISABLE
  09 PRE-HEAT – DISABLE

Main Bus Shutdown

L3 ESC Panel
  01 BUS SELECT – MAIN
  03 POWER – OFF

VMS Shutdown

F2 HMD
  HMD DISPLAY
        VMS
            SYSTEM POWER – DISABLED

MES Shutdown

D4 LENR Display
  ✔ CORE TEMP is ZERO
R1 MES Panel
  08 LENR ENABLE – DISABLE
D4 LENR Display
  ✔ EM SHIELD is FALLING
R1 MES Panel
  07 POWER – OFF

Secondary Bus Shutdown

L3 ESC Panel
  01 BUS SELECT – SEC
  03 POWER – OFF

L1 BMS Panel
  02 BATTERY SELECT – SYS 2
  03 RECHARGE – DISABLE
  01 POWER – OFF

FCM Shutdown

L2 FCM Panel
  02 FCM SELECT cycle SYS 1 – SYS 2
      03 ✔ SHUT-OFF VALVE is DISABLED
      03 SHUT-OFF VALVE – DISABLE
      01 POWER – OFF

RCM Shutdown

L5 RCM Panel
  04 TANK SELECT cycle SYS 1 – SYS 4
      06 SHUT-OFF VALVE – DISABLE
      03 PUMP POWER – OFF

F1 CAR Panel
  01 fault acknowledge

L5 RCM Panel
  01 POWER - OFF

TMS Shutdown

L4 TMS Panel
  05 LOOP SELECT cycle SYS 1 – SYS 2
      03 LOOP DEPR – ENABLE
    D8 TMS Display
      ✔ *CLNT PRESS is FALLING*
    L4 TMS Panel
      07 ✔ PUMP POWER is OFF
  01 POWER – OFF

COMMS Shutdown

R3 COMMS Panel
  02 XMIT ENABLE – OFF
  01 POWER – OFF

Primary Bus Shutdown

L3 ESC Panel
  01 BUS SELECT – PRI
  03 POWER – OFF

L1 BMS Panel
  02 BATTERY SELECT – SYS 1
  03 RECHARGE – DISABLE
  01 POWER – OFF

Exit Cockpit

L6 CSSM Panel
  09 CABIN FLOOD LIGHT – ENABLE
  10 INST LIGHT – DISABLE
  03 SEAT SAFE – DISABLE
  01 FLIGHT MODE SELECT – TO/LAND

A1 Aft Panel
  02 SECURE SEAT – SECURE

MDR-01 Mid Deck Right Panel One
  01 COCKPIT HATCH – SEAL

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5 CHECKLISTS

5.1   System Startup Checklist

	Enter Cockpit
	MDR-01 COCKPIT HATCH – OPEN **01**
	A1 SECURE SEAT – UNSECURE **02**
	L6 SEAT SAFE – ENABLE **03** INST LIGHT – ENABLE **10** CABIN FLOOD LIGHT – DISABLE **09**
	Pre Flight Switch Check
	Check All Panels Are Powered Down
	L5 TANK SELECT SYS 1 **04**
	L4 LOOP SELECT SYS 1 **05**
	L3 BUS SELECT PRI **01** BUS DISTRIBUTION MODE SELECT NORM **02**
	L2 CELL SELECT SYS 1 **02**
	L1 BATTERY SELECT SYS 1 **02**
	R1 ENGINE SELECT SYS 1 **01**
	R2 THRUST MODE SELECT RCS ONLY **09**
	R3 TRANSMISSION POWER SELECT XMIT NORM **03**
	Enable Primary Electrical Bus
	L1 POWER – ON **01**
	L3 POWER – ON **03**
	F1 fault acknowledge **01**
	L3 MAINT CUT-OFF – DISABLE (green) **04** **D6** Check AVAILABLE is GREEN
	Check F1 CAW SYS BUS 1 lights out
	L1 RECHARGE – ENABLE **03** **D1** Check RECHARGE RATE is RISING

Enable Secondary Electrical Bus	
L1 BATTERY SELECT SYS 2 **02** POWER – ON **01** RECHARGE – ENABLE **03** **D1** Check RECHARGE RATE is RISING	
If SYS 1 battery is enabled and has charge SYS 2 battery will not show RECHARGE RATE	
L3 BUS SELECT SEC **01** POWER – ON **03** BUS DISTRIBUTION MODE BAL **02**	
Check F1 CAW SYS BUS 2 lights out	
There will be a delay on SYS BUS 2 OVERLOAD	
Fuel Cell Pre Heat	
L2 POWER – ON **01** CELL SELECT SYS 2 **02** POWER – ON **01**	
Enable Cooling Loops	
L4 POWER – ON **01** LOOP PRSRZ – CS **02** PUMP POWER – ON **07**	
Warning PUMP POWER is a three position switch	
D8 Check CLNT LEVEL is RISING Check CLNT PRESS is RISING **L4** Check LOOP PRSRZ is DISABLED **02** LOOP SELECT SYS 2 **05** LOOP PRSRZ – CS **02** PUMP POWER – ON **07**	
Warning PUMP POWER is a three position switch	
D8 Check CLNT LEVEL is RISING Check CLNT PRESS is RISING **L4** Check LOOP PRSRZ is DISABLED **02** Check ENABLE ALL is ENABLED **09**	
Check F1 CAW TMS lights out	

5-4 Checklists

■	**Enable Communication Systems**
	R3 POWER – ON **01** XMIT ENABLE – ON **02**
■	SYS BUS 2 OVERLOAD will illuminate.
	CHECK IN WITH STC
■	**Enable Reactant Core Manager**

	L5 POWER – ON **01**
	     TANK SELECT cycle SYS 1 to SYS 4 **04**
	       PUMP POWER – ON **03**
	       SHUT-OFF VALVE – SOV OPEN **06**
	     Check ENABLE ALL is ENABLED

■	Check F3 CAW RCM lights out
	Main Engine Preliminary Startup
■	**R1** POWER – ON **07** LENR ENABLE – ENABLE **08** **D4** Check EM SHIELD LEVEL is GREEN **R1** PRE HEAT – ENABLE **09** **D4** Check CORE TEMP is ORANGE **R1** FUEL SOURCE SET **16**
	Enable HUD

■	**F2** HMD
	     HMD DISPLAYS
	          VMS
	               SYSTEM POWER

	LENR Pre Activation Check
■	**R1** Check PRE HEAT is GREEN **09**
	REQUEST LENR ACTIVATION

Enable LENR and Main System Bus	■
R1 FUEL CUT-OFF – ENABLE **11** 　　 FUSE ENABLE – ENABLE **12** **D4** Check CORE TEMP is GREEN	
L3 BUS SELECT MAIN **01** 　　 POWER – ON **03** **D6** Check AVAILABLE is RISING **L3** BUS SELECT cycle PRI, SEC, MAIN **01** **D6** 　Check AVAILABLE 　　 Check LOAD	■
Check F1 CAW Main Bus lights out Check F1 CAW SYS 2 OVERLOAD light out	
Enable Navigation Auto Pilot	■
R4 POWER – ON **01**	
Enable Main Engine	■
R2 POWER toggle SAFETY **01** 　　 POWER – ON **01** 　　 FUEL SOURCE – ENABLE **02** 　　 FUEL CUT-OFF – ENABLE **03** 　　 INJECTR ENABLE – ENABLE **04** 　　 NOZZLES ALL ENABLE – ALL ON **11**	
Enable Fuel Cells	■
Warning Fuel Cell damage may result if temp is low	
L2 CELL SELECT cycle SYS 1 – SYS 2 **02** **D2** 　Check CORE is GREEN **L2** 　Check SHUT-OFF VALVE is YELLOW **03** 　　 FUEL SOURCE – SET **05** 　　 REACT SOURCE – SET **04**	■
Check F1 CAW FCM (FSC) lights out	

5-6 Checklists

	Undock Checklist
	L6 FLIGHT MODE SELECT NORM FLIGHT **01**
	F2 HMD HMD COMMS
	L3 MAINT CUT-OFF – ENABLE (yellow) **04**
	REQUEST STATION UNDOCKING
	Configure COMMS Chanels
	F2 HMD HMD NAVIGATION
	When Clear Of The Station

	L4 LOOP SELECT cycle SYS 1 – SYS 2 **05**
	        RADIATOR DEPLOY – DEPLOY **06**
	        Check DEPLOY INDICATOR is GREEN **06**
	D8 Check CLNT TEMP is FALLING

	When Beyond STC Limit

	R2 SUPER-CNDCTR toggle SAFETY **07**
	       HELICON COUPLER toggle SAFETY **05**
	       SUPER-CNDCTR – ENABLE **07**
	D7 Check EM SHIELD LEVEL is GREEN
	R2 Check HELICON COUPLER is WHITE **05**
	       HELICON COUPLER – ENABLE **05**
	       IGNITE/PROVIDE hold
	       Check BURN INDICATOR is GREEN **12**
	       ICH COUPLER – ENABLE **06**

	Check F3 CAW MTS lights out

Enable FLUX Drive

D7 Check THRUST GEN'D is ZERO
Check POWER REQ'd is ZERO

R1 FLUX ENABLE – ENABLE **02**
THROT LOCK – LOCK **10**
Check LOCK INDICATOR is GREEN **10**
Check ACC LEFT LOCK is ENABLED **03**
Check ACC RIGHT LOCK is ENABLED **05**
ACC AUTO-BAL – ENABLE **04**
Check ACC AUTO-BAL is YELLOW **04**
ACC CHARGE – ENABLE **06**
Check ACC CHARGE is YELLOW **06**
D3 Check ACC CHARGE is ORANGE
R1 Check THROT LOCK is YELLOW **10**
Check ACC LEFT LOCK is YELLOW **03**
Check ACC RICHT LOCK is YELLOW **05**
Check ACC CHARGE is GREEN **06**
D3 Check ACC CHARGE is GREEN
R1 Check ACC CHARGE is LIGHTS OUT **06**
ACC CHARGE – DISABLE **06**
ACC LEFT LOCK – DISABLE **03**
Check ACC LEFT LOCK is GREEN **03**
Check ACC AUTO-BAL is GREEN **04**
ACC RICHT LOCK – DISABLE **05**
Check ACC RICHT LOCK is GREEN **05**
Check ACC AUTO-BAL is YELLOW **04**
THROT LOCK – DISABLE **10**
Check LOCK INDICATOR is GREEN **10**

5.2   System Shutdown Checklist

■	**Enter Cockpit**
	MDR-01 COCKPIT HATCH – OPEN **01**
■	**A1** SECURE SEAT – UNSECURE **02**
	L6 SEAT SAFE – ENABLE **03** FLIGHT MODE SELECT NORM FLIGHT **01** CABIN FLOOD LIGHT – DISABLE **09** INST LIGHT – ENABLE **10**
■	**Connect To Station Power**
	L3 MAINT CUT-OFF – DISABLE (GREEN) **04**
■	**Shutdown Maneuvering Thruster System**
	R2 ICH COUPLER – DISABLE **06** **D7** Check PLASMA TEMP is COLD PLASMA LEVEL **R2** HELICON COUPLER toggle SAFETY **05** HELICON COUPLER – DISABLE **05** **D7** Check PLASMA TEMP is ZERO **R2** SUPER-CNDCTR toggle SAFETY **07** SUPER-CNDCTR – DISABLE **07**
■	**F3** fault acknowledge **01**
	R2 INJCTR ENABLE – DISABLE **04** FUEL CUT-OFF – DISABLE **03** POWER toggle SAFETY **01** POWER – OFF **R2-01**
■	**Shutdown Navigation/Auto-Pilot**
	R4 POWER – OFF **01**
■	**Main Engine Preliminary Shutdown Procedure**
	R1 FUSE ENABLE – DISABLE **12** FUEL CUT-OFF – DISABLE **11** PRE-HEAT – DISABLE **09**
■	**Shutdown Main System Bus**
	L3 BUS SELECT MAIN **01** POWER – OFF **03**

Shutdown VMS	

F2 HMD
    HMD DISPLAYS
         VMS
            SYSTEM POWER – DISABLED

Shutdown Main Engine	

D4 Check CORE TEMP is ZERO
R1 LENR ENABLE – DISABLE **08**
D4 Check EM SHIELD is FALLING
R1 POWER – OFF **07**

Shutdown Secondary Electrical Bus	

L3 BUS SELECT SEC **01**
    POWER – OFF **03**

L1 BATTERY SELECT SYS 2 **02**
    RECHARGE – DISABLE **03**
    POWER – OFF **01**

Shutdown Fuel Cells	

L2 CELL SELECT cycle SYS 1 – SYS 2 **02**
    Check SHUT-OFF VALVE is DISABLED **03**
    SHUT-OFF VALVE – DISABLE **03**
    POWER – OFF **01**

Shutdown Reactant Core Manager	

L5 TANK SELECT cycle SYS 1 to SYS 4 **04**
    SHUT-OFF VALVE – DISABLE **06**
    PUMP POWER – OFF **03**

F1 fault acknowledge **01**

L5 POWER – OFF **01**

Shutdown Temperature Management System	

L4 LOOP SELECT cycle SYS 1 – SYS 2 **05**
    LOOP DEPR – ENABLE **03**
D8   Check CLNT PRESS is FALLING
L4   Check PUMP POWER is OFF **07**
    POWER – OFF **01**

5-10 Checklists

	Shutdown Communication System
■	**R2** XMIT ENABLE – OFF **02** POWER – OFF **01**
	Shutdown Primary Electrical Bus
■	**L3** BUS SELECT PRI **01** POWER – OFF **03** MAINT CUT-OFF – ENABLE (YELLOW) **04**
	L1 CELL SELECT SYS 1 **02** RECHARGE – DISABLE **03** POWER – OFF **01**
■	**Exit Cockpit**
	L6 CABIN FLOOD LIGHT – ENABLE **09** INST LIGHT – DISABLE **10** SEAT SAFE – DISABLE **03** FLIGHT MODE SELECT TO/LAND **01**
■	**A1** SECURE SEAT – SECURE **02**
	MDR-01 COCKPIT HATCH – SEAL **01**

6 RANDOM STUFF

6-2 Random Stuff

This will eventually be an Appendix but right now it's random stuff that will find a new home eventually. Probably.

6.1   VMS Orbital Information

Relative-TRGT Velocity
Prograde / Retrograde

Relative-SELF Velocity
Prograde / Retrograde

Acceleration Vector
Prograde / Retrograde

Orbital Vector
Prograde / Retrograde

Orbital Vector
Radial-In / Radial-Out

Orbital Vector
Normal / Anti-Normal

Celestial Destination

Steer-To Target
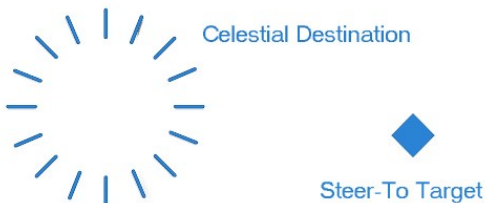
In space. No one can tell you which way is up.
Which is a big problem because it makes it hard to navigate.

While there are several terms in current use that mean the same thing
(thanks science!) I'll stuck to the terminology used in the game.

In simple terms you can think of it like this:
Prograde / Retrograde = Forward/Backward
Radial-In / Radial-Out = Left/Right
Normal / Anti-Normal = Up/Down

Except there is no up. And forward is independent of which direction
the spacecraft is pointing. And it depends if you are in a clockwise or
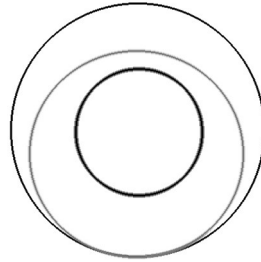counterclockwise orbit.
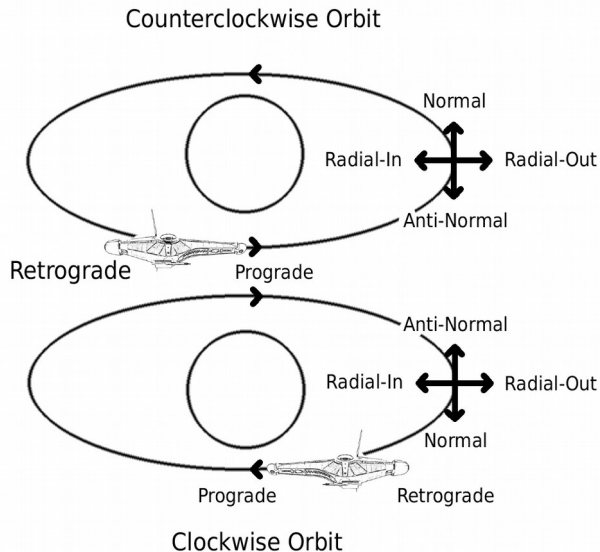
6-4 Random Stuff

What I'm going to say here is technically wrong but for the sake
of my sanity (and those reading) it's close enough. If someone
want's to write a paper on N body physics and relativity, knock
yourself out.

Prograde/Retrograde: The vector the spacecraft is traveling.
Prograde adds velocity and retrograde removes it.
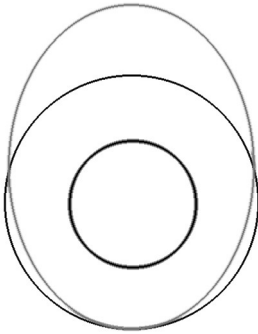

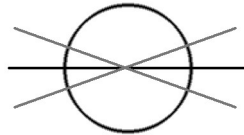Prograde Burn   Retrograde Burn

Burning towards prograde will raise your orbit on the opposite
side and burning retrograde will lower it. If you add enough
velocity you can escape the gravitational pull of the body you are
orbiting. If you remove enough velocity you will crash into it.
Either of these things could be bad.

Radial-In/Radial-Out: A vector 90^0 from your velocity that is coplanar with your velocity.
And now things get tricky. Radial-in points towards the source of gravity you are orbiting and radial-out away. If you are flying counterclockwise radial-in would be on your left and radial-out on your right. The opposite is true if you are orbiting clockwise. Burning radially will "swing" your orbit around. It's easier to see a picture.
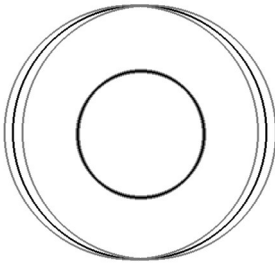
Radial-In / Radial-Out Burn   Normal / Anti-Normal Burn

Normal/Anti-Normal: A vector 90^0 from your velocity that is perpendicular with your velocity. If you are orbiting counterclockwise normal is "up" or "North" if you are in an equatorial orbit and anti-normal is "down" or South". The opposite is true if you are orbiting clockwise. Things get funky if you are in a polar orbit and I don't remember which way is which. Burning normal or anti-normal will change the plane of your orbit. This is useful when traveling to bodies that aren't in the solar plane or when rendezvousing with an object in orbit on a body that has an axial tilt.
While you can burn normal/anti-normal to change your orbit from counterclockwise to clockwise it's a massive waste of fuel and other pilots will point and laugh at you. Burn retrograde until it becomes prograde instead.

6.2 TODO What Things Are On Which Bus

6.3 TODO What Things Are On Which Cooling Loop