

REENTRY

AN ORBITAL SIMULATOR
MOCR USER MANUAL

DRAFT

UPDATED: 06/18/2021

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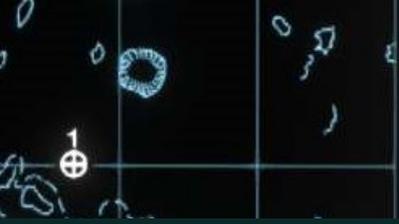
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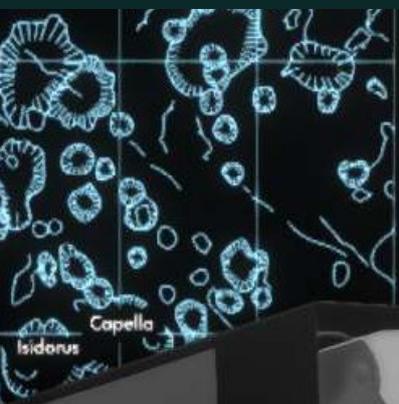
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I. INTRODUCTION



I. INTRODUCTION

1. ABOUT

Thank you for buying REENTRY – An Orbital Simulator!

REENTRY – An Orbital Simulator is an educational game/simulator that allows you to fly and operate spacecrafts in a realistic manner. The available spacecrafts have been programmed using the real manuals provided by NASA, with some modifications and simplifications made to allow this to be an enjoyable experience.

Please note that the game is in its early phase of development and might crash or malfunction at any time. I am working hard to fix bugs, and if you encounter an error, I highly suggest you report the bug on Steam or our Discord.

The Apollo Mission Operations and Control Room Live module is in Early Testing and comes with the base installation packages and might be removed from the game at any time.

LEGAL AND EULA

By downloading and/or using Reentry – An Orbital Simulator, you agree to the EULA located here: https://store.steampowered.com/eula/882140_eula_0

DOWNLOAD

The game can be downloaded from <http://reentrygame.com/> - the game package comes with the Mercury, Gemini and Apollo spacecrafts.

JOIN THE COMMUNITY – CONTRIBUTING

Use the Community Hub to discuss the game, as well as talk with the community, get help and give feedback to the developer.

The community hub for REENTRY can be found here:

<https://steamcommunity.com/app/882140/>

An official Discord server can be found here:

<https://discord.gg/reentrygame>

The reddit subreddit can be found here:

<https://www.reddit.com/r/reentrygame/>

Tools and content files can be found here:

<https://github.com/ReentryGame>

WHAT IS THIS MANUAL?

This manual contains most of the information you need to understand how the Apollo Mission Operations Control Room module for Reentry works. This manual covers the Mission Control multiplayer module for the Apollo Control Center, how you play and general tips on how you can make a session as realistic as possible.

II. INSTALLATION

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4	478	VEH ACC	51	65		
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6	983	GNC PRIMARY	04	02		
7	46	FDO CSM ORB	45	81		
8						
9						
10						
11						
12						
13	253	SPS BURN MON	45	81		
14						
15	1	TU GUIDE	04	01		
16						
17						
18						
19						
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23	1402	SLV BSE NO 1	44	01		
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34	527	CSM EPS HD			04	02
35	1474	CSM LOOK AGL			42	87
36	439	LM ECS			04	02
37	1568	LM LOOK AGL			37	17
38						
39	1278	FDO LM ORB			45	91
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41						
42						
43	678	LM ELEC/INST			11	37
44	398	LM GUID CONT			06	84
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HOURS MINUTES SECONDS

II. INSTALLATION

1. DOWNLOADING

REENTRY is distributed through Steam on the following link:

https://store.steampowered.com/app/882140/Reentry_An_Orbital_Simulator/

You will need to purchase the game to start the download, and to play it.

2. SYSTEM REQUIREMENTS

The system requirements can be seen on the Steam page for Reentry and will have the latest known system requirements. It is not guaranteed that the game will run on your system, even if you meet the requirements. For the latest requirements, always check the Steam page.

MINIMUM

Requires a 64-bit processor and operating system

OS: 64-bit Windows 7, Windows 8.1, Windows 10

Processor: Intel Core i5-4430 / AMD FX-6300

Memory: 8 GB RAM

Graphics: NVIDIA GeForce GTX 960 2GB / AMD Radeon R7 370 2GB

DirectX: Version 11

Storage: 15 GB available space

RECOMMENDED

Requires a 64-bit processor and operating system

OS: 64-bit Windows 7, Windows 8.1, Windows 10

Processor: Intel Core i5-6600K / AMD Ryzen 5 1600

Memory: 32 GB RAM

Graphics: NVIDIA GeForce GTX 1060 3GB / AMD Radeon RX 580 4GB

DirectX: Version 11

Storage: 15 GB available space



III. ASTRONAUT

1.2.1 COMMUNICATION USING TEXT

Not every player wants to use voice or has the equipment to do so.

Text Messages from the Mission Controllers/Capsule Communicator are received in the same manner as the normal offline AI mission control messages you are used to.



A dedicated CapCom interface exists where you can see the chat history and replay to messages from MCC using text. You can access it using the CAPCOM menu option in the COMMUNICATION window. This is only visible when you are connected to a live session.

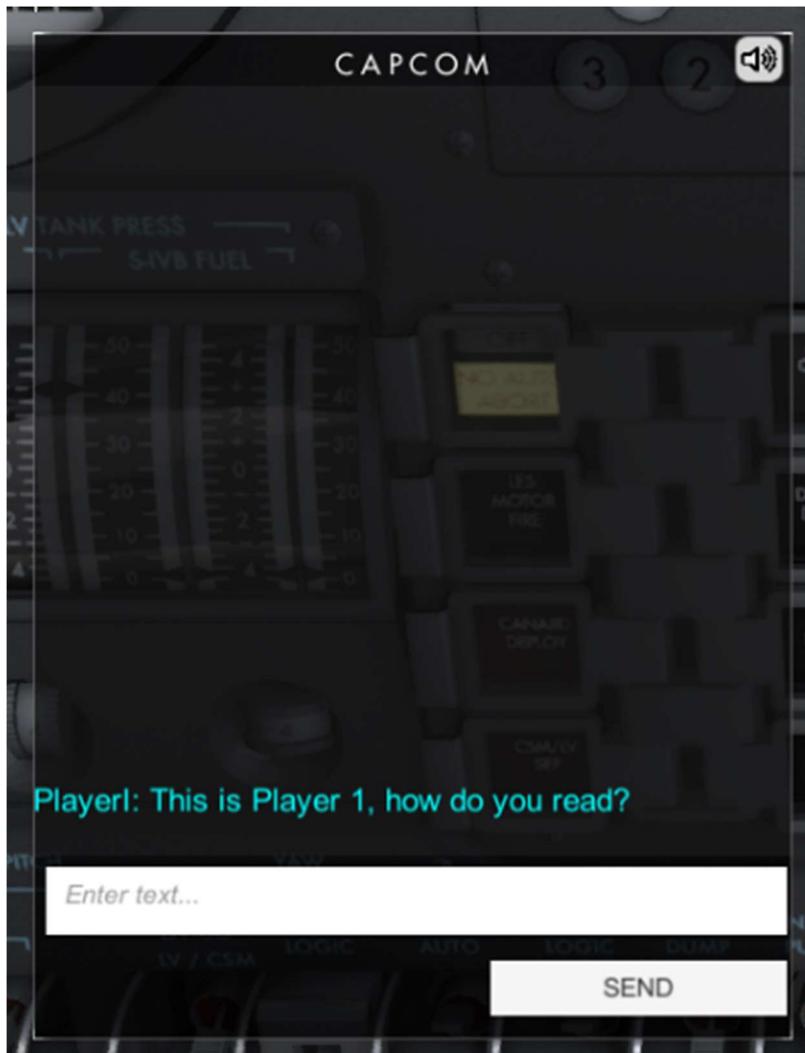


If you click this, the CapCom interface opens in a new window that can be moved around. This view also includes the message log. If you wish to remove the normal mission message command UI (the one with ROGER) and know you won't be needing it, feel free to move it out of the screen.

To send a message to CapCom, enter the message into the textbox and press SEND. You can optionally bind the send button in the INPUT MAPPER.



When the message is sent, it will be directed through the on-board radio system, through the antennas and reach the Apollo Control Centers Capsule Intercom.



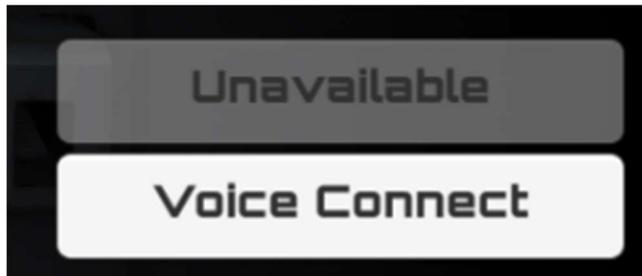
Those mission controllers who are listening to the astronaut/capsule intercom will receive your message. Because of this, you should aim to only talk directly to the CapCom mission controller and let this person deal with the teamwork down on Earth.

1.2.2 COMMUNICATION USING VOICE

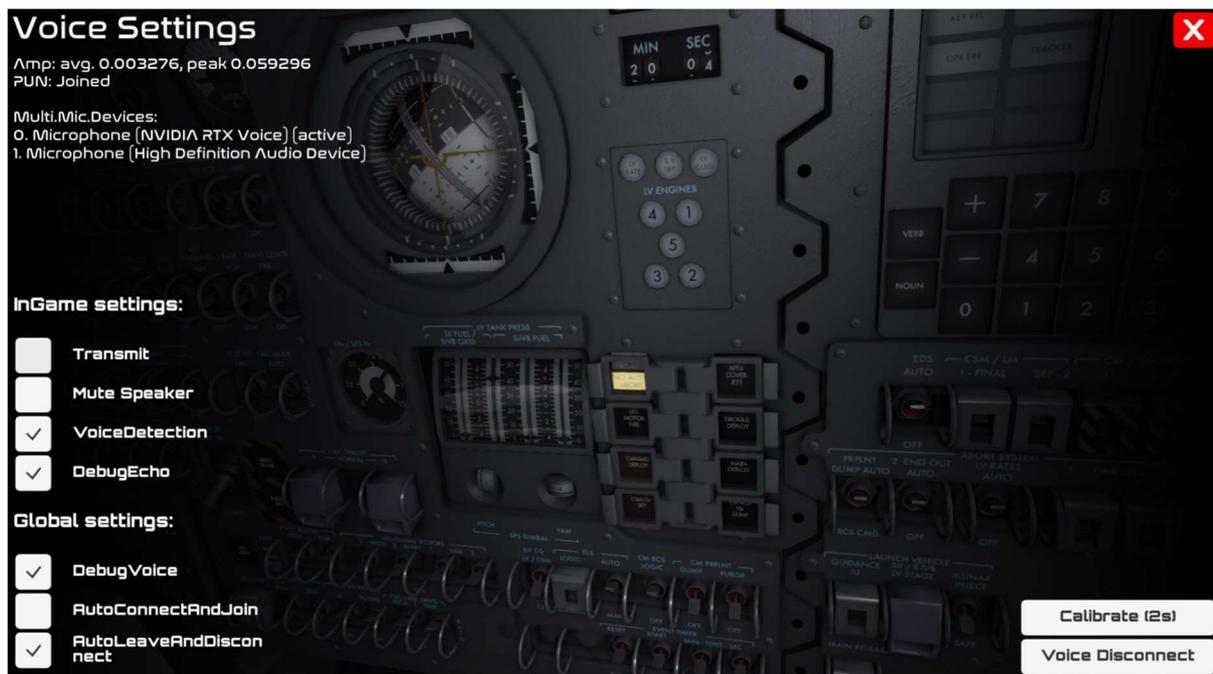
The Voice feature resembles a realistic voice experience between the astronaut and the ground. A dedicated air-to-ground (A/G) intercom exists and can be used to communicate with the mission controllers.

To connect to voice, an extra step is needed. On the CAPCOM text interface, click the VOICE icon  to open the voice settings.

To connect to the voice server, click the Voice Connect button:



The game will then spend a few seconds connecting to voice. Once connected, more buttons will be introduced on the UI.



You won't need to modify the default settings.

To speak, you will need to bind a special Push-To-Talk (PTT) button, usually bound to one of the extra buttons on your mouse.



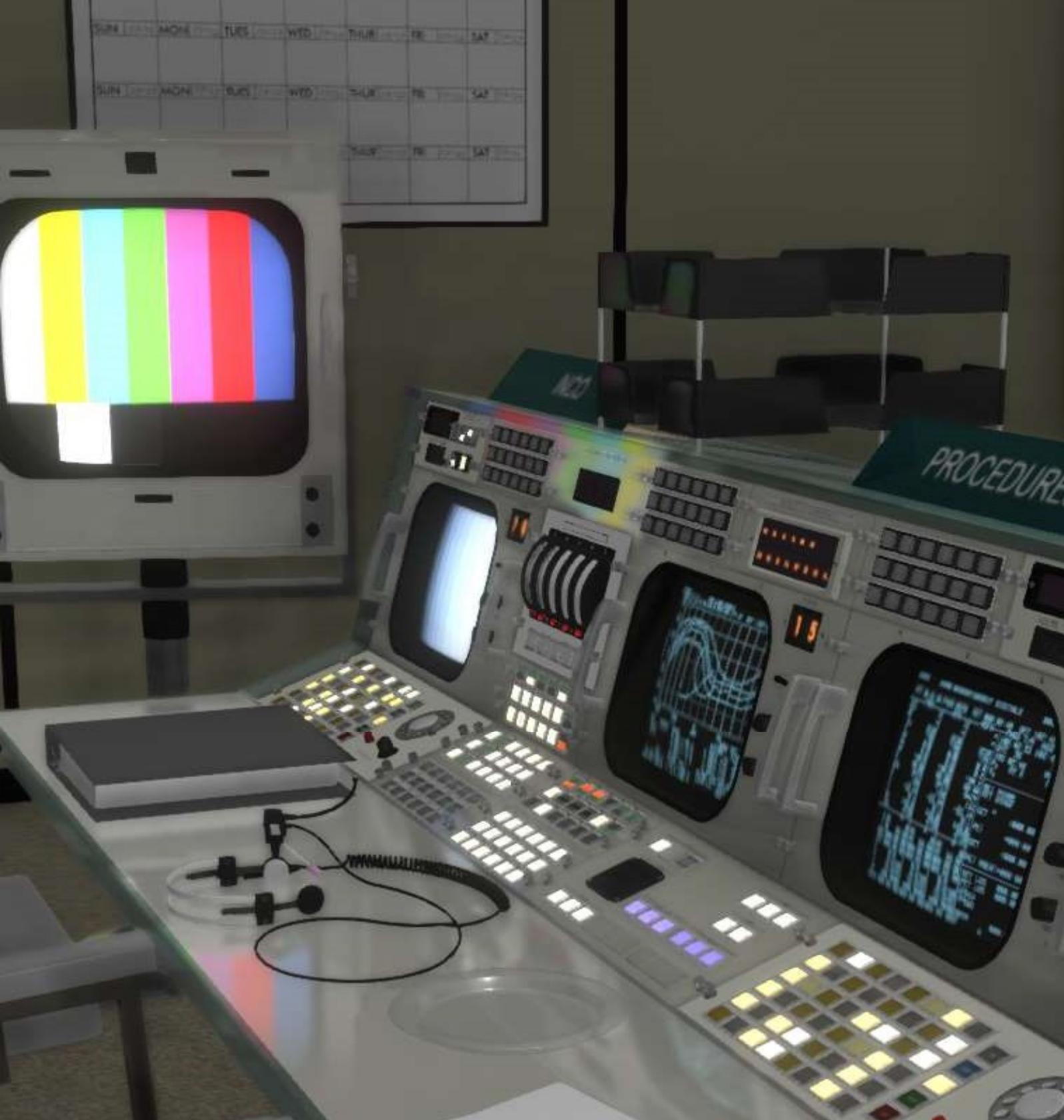
To talk to the A/G intercom, simply hold the PTT button and talk, and release when done.

Voice Detection is enabled by panel configuration. The Commanders Radio Panel in the CSM and the Commanders Radio Panel in the LM configures this. If you set the switch to PTT or PTT/Intercom/ICS, you need to use the PTT to talk. If you set it to VOX, the voice detection logic is enabled.



The Calibrate option on the Voice Settings menu can be used to calibrate VOX. This function will try to detect the noise in your surroundings and use this to calibrate the detection. Do not talk or make any extra noise when calibrating.

When speaking into the A/G intercom, every mission controller who listens to this intercom channel will be able to hear you, and those who has the channel speak-active will be able to talk to you. This is usually CapCom, and the Mission Controller with the CapCom should be the only person to talk with the astronaut, while the other Mission Controllers should be speaking into different channels.



IV. MISSION CONTROLLER

IV. MISSION CONTROLLER

1. INFORMATION FOR THE MISSION CONTROLLER

1.1 FINDING GAMES

Some games might be public, or you might have some friends who are hosting a session. But what if none of the above is available?

The Official Reentry Discord server (<http://discord.gg/reentrygame>) has group channels set up for this, and lfg (looking for group) systems to aid you in setting up a session with members of the community. In addition, we host the Mission Control Academy there, where real players take you through the basics in a relaxed atmosphere.

1.2 CONNECTING

To join a Mission Control session, you need to select MISSION CONTROL from the Main Menu.



Then select the APOLLO MISSION CONTROL option to find Apollo specific games:



Then hit START to load the MOCR.

The first thing you will see is a list of public games, and a way to join private games. To join a public or private game, the astronaut will need to create the server (so the telemetry gets broadcasted). It will then appear in the list of public games if the server is set to public. If the game is private; the astronaut will need to share the invite code with you. The code is then used to join the private game.



1.3 YOUR FIRST STEPS

When you enter, you will be looking into the main room from the entrance door in “walk mode”. This allows you to walk around in the room using WASD and mouse input. Use the View Selector (default bound to V) to select the CAPCOM station.

The camera should place you in front of the CAPSULE COMMUNICATOR desk, and the view should be like this:



You can look and move around using the normal virtual cockpit camera controls.

NOTE:

This is an extraordinarily complex model, and Paoli Mangili did an excellent job with it. I have spent a lot of time with him on making it possible to render it in realtime, and a lot of tricks has been done to render the model with descent fps. However, it will be slow to render if you see the entire room. If you press ESC, you can see the in-game menu. A section called ROOM SETTINGS can be used to tweak some of the rendering settings. You can hide details, switch to a simplified lighting algorithm, or set the room to a dark mode.



The difference between the light and dark mode can be seen in the two following screenshots:





On top of the desk, you can see the role you have to play. Whenever you are in a seat, the sign will tell you which seat you're in and what role you play. Additionally, a UI window in the upper left corner of the screen (the player overview) will also show your role and it will show up in the chat when submitting a message to an intercom. Everyone in Mission Control can see your role in the player overview and in your chat messages.

The first thing you want to do is to set your status report to amber.



This is how you indicate to the flight-controller if you're ready to proceed or not. By default, none of the buttons will be lit. Pressing an unlit button changes the status of the seat. Pressing a lit button turns off the status-report, which can be used to indicate that the seat is vacant. It's recommended that a crewed station is set to amber (yellow, center) outside of GO/NOGO-calls. If you need to leave the seat , set it to none so flight can see this.



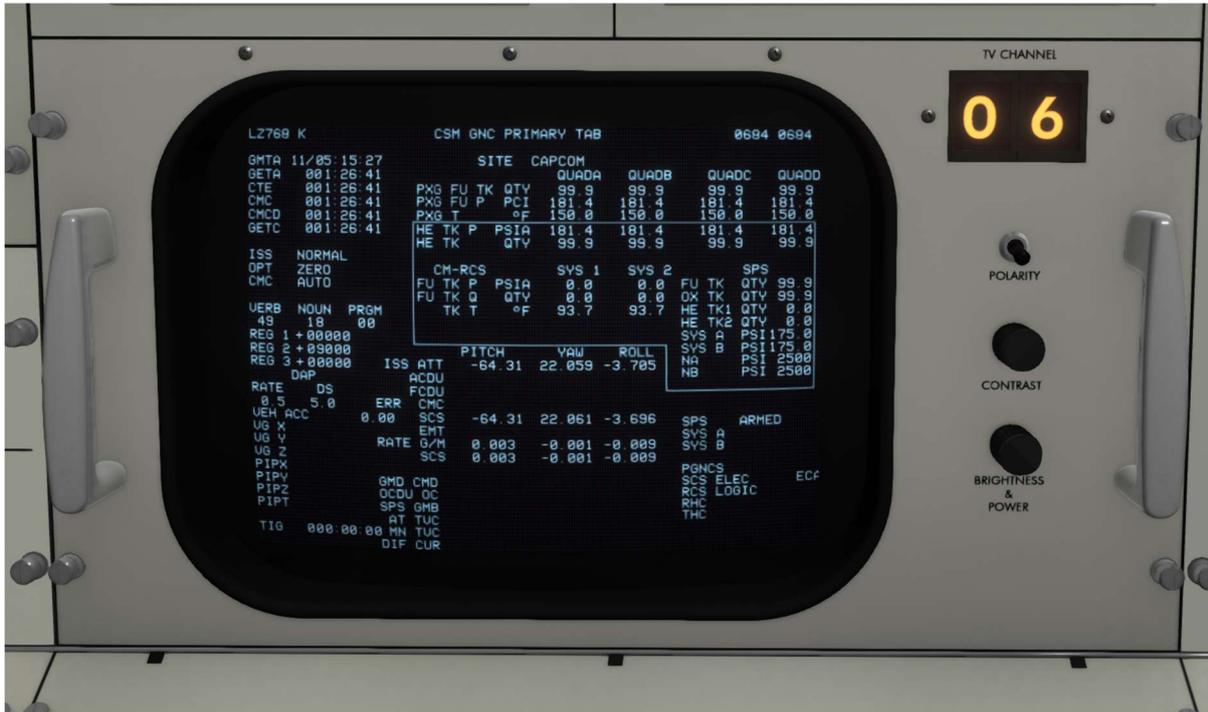
During critical maneuvers or mission phases, this is used during GO/NO-GO calls. If something isn't GO on your station, change it to red and call out reason in the intercom (more on that later). These are the recommended patterns, but the rules FLIGHT set for the mission can change from one to another.

Each station/seat is built up from various modules that specify its function. The main role of CapCom is to communicate with the astronaut (capsule communication). The 2nd thing you want to do is to either type something in the text-intercom, or to join in on the voice-intercom.

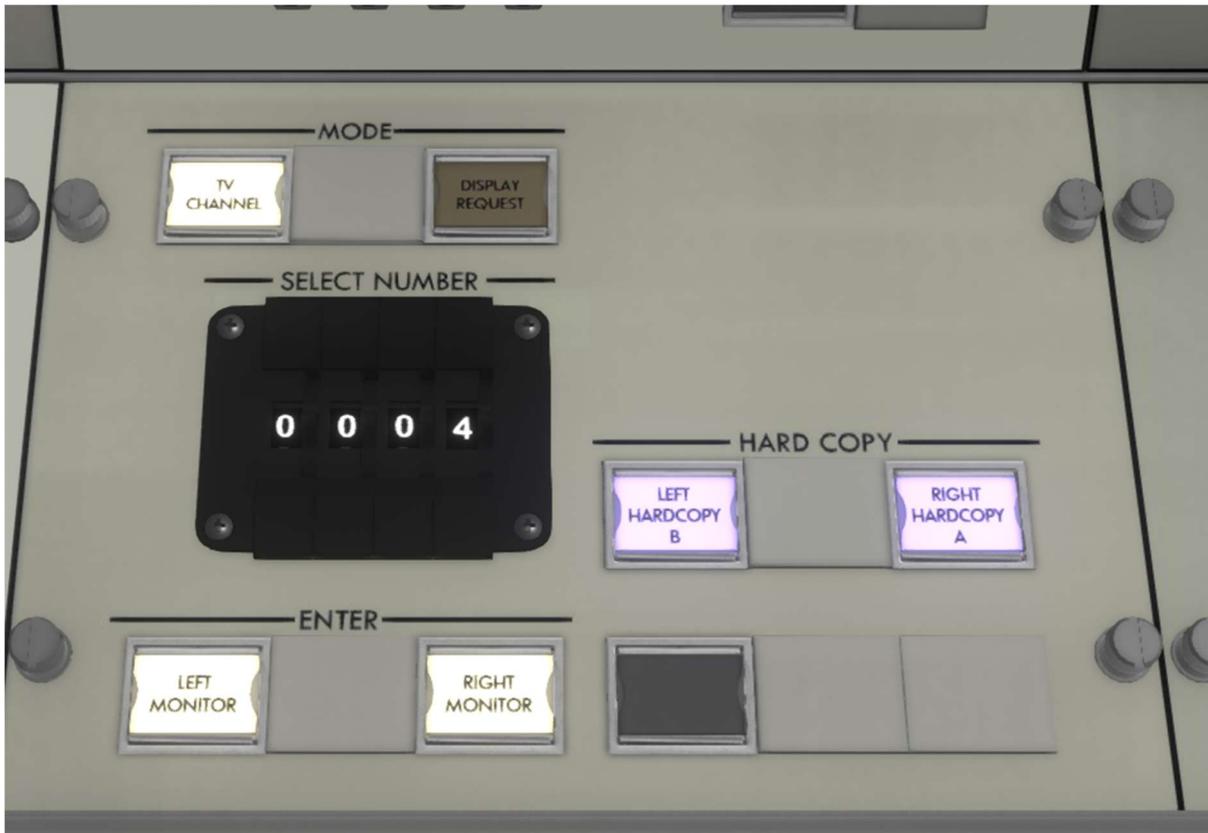
On top of the desk, you can see the Mission Elapsed Time (MET) and Greenwich Mean Time (GMT). MET shows you how long it is since the launch.



The CapCom desk has two monitors. The monitors are used to switch between different TV channels. It can be configured to show any channel you wish, and is usually chosen based on the current mission phase.



Changing TV channels can be done with the TV CHANNEL panel.



This will be covered in the Monitor chapter of this manual.

The last panel module on the CapCom desk is the stop clocks.



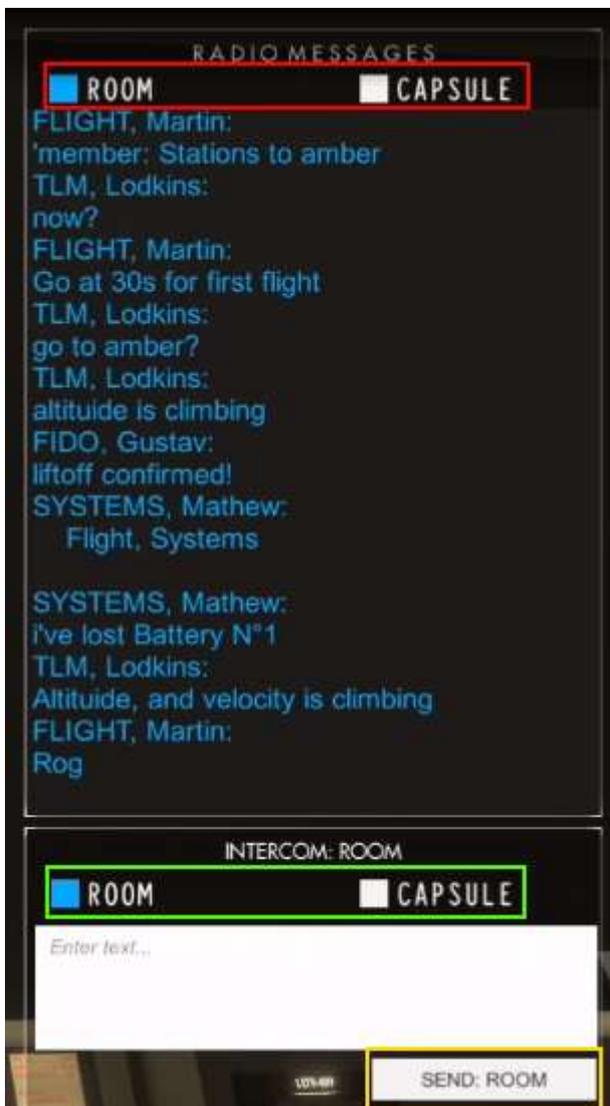
The stop clocks can be used as your own tool and is not synchronized over the network. The only stop clock that is synchronized is the Assistant Flight Directors stop clock. These are usually used as your own tool and must not be confused with the countdowns used towards ignitions and so on. Uses these however you like, or as a backup.

If you look around, you may see the avatars of others. Above the avatars, you'll see their usernames and what Apollo Mission Control level they are (an indicator of how much experience they have as a mission controller for Apollo). You can customize your avatar in the profile-part of the game settings-menu.

The player overview shows everyone in the session, their role and their level. The astronaut is highlighted in red, while your team members on ground are in white.



2. INTERCOM AND RADIO-MESSAGES



If you do not have the text-intercom and radio-messages open, press C. The buttons in the red rectangle allow you to select which intercom you receive messages from,

and you can "listen" to both intercoms at the same time if you want. In this example, the user is receiving messages from the mission control room only.

Radio-messages are color-coded so you know which intercom they're from, with blue for messages in the mission-control intercom. You'll also notice that the messages also indicate the current position of the person. The buttons in the green rectangle allows you to select which intercom you're sending a message to. Historically, you'd listen to multiple intercoms but only speak to capsule if you're CAPCOM, but in MCL that's up to you, or rather the rules FLIGHT set for the mission.



On the other hand, if "radio messages" is setup like this, with both "ROOM" and "CAPSULE" colored, you'll receive messages for both the MCC and capsule.

The Voice-intercom works like it did in real life. You can select what channel you want to talk to, and what channel(s) you want to listen to. The voice-intercom is operated through that large array of white and yellow buttons:



On the top-left you will see a button named PABX ON. It should be dark if not connected to voice, and illuminated if connected. If it is flashing, it is connecting to the voice server. To join, press it once and wait for it to connect (flashing stops).

To select the intercom you wish to speak to, press a white button. Your main intercom will be the A/G (Air/Ground). This is the intercom the astronaut speaks into. Everyone that has the yellow A/G button enabled can listen into this communication.

MOCR CONF is the main room conference intercom, however, each desk also has a dedicated intercom that can be used as you like.

You might have noticed that there are two intercom panels on some of the desks. Feel free to use any. Your intercom settings will not be synchronized, so nobody will be able to mess with your setup. All desks will have your configuration, so you don't need to reconfigure when joining another seat.

3. CONTROLS

(Assuming default controls) Arrow-keys are used to walk around without changing seat (designed to look closer at instruments and around the table, pan around). This only works when you are seated and assigned a role. Holding the middle mouse button lets you pitch and yaw the view, scroll wheel zooms.

The view selector is available if you press V, and a chat-window is viewable if you press C.

To trigger the failure-menu, press CTRL+T.

It's advised that you bind chat send to ENTER or something similar if needed.

4. VIEWS

STATION VIEWS

Each desk is a station with a dedicated role. One player can oversee and operate them all, or multiple players can share the roles among each other. It's usual to have the responsibility of one or two desks in larger games.

ORBIT VIEW

This view is mostly used by mission planners, guidance and retro to plan the orbit and reentry procedures. Markers can be placed and time to these points will be given. It's not yet active in MOCR.

HANG AROUND VIEW

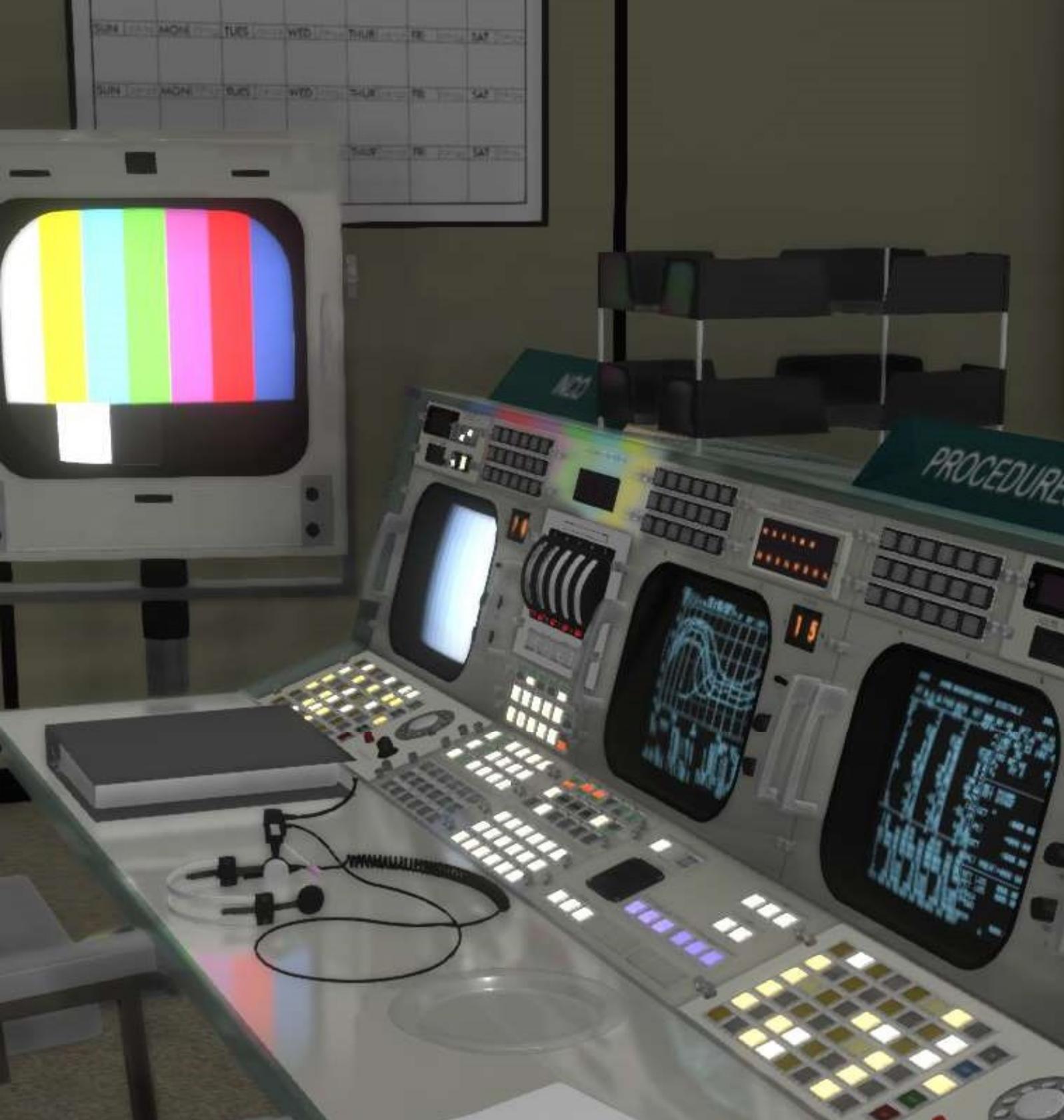
The "FPS" view aka. Hang Around is a way to walk around in the room using a traditional FPS controller. You can use this to oversee the room, join other mission controllers next to their desk, check out the simulator and the map.

THE SIMULATOR

The simulator is just a non-functional mockup of the CSM and LM panels. This is used to have a realistic reference to the capsule panels for verifying switch locations, procedures, and checklists.

5. MISSION PAD

You will have access to the same checklists as the astronauts has onboard. It is a good practice to walk through each checklist with the astronaut and verify the procedures.



V. MONITORS

V. MONITORS

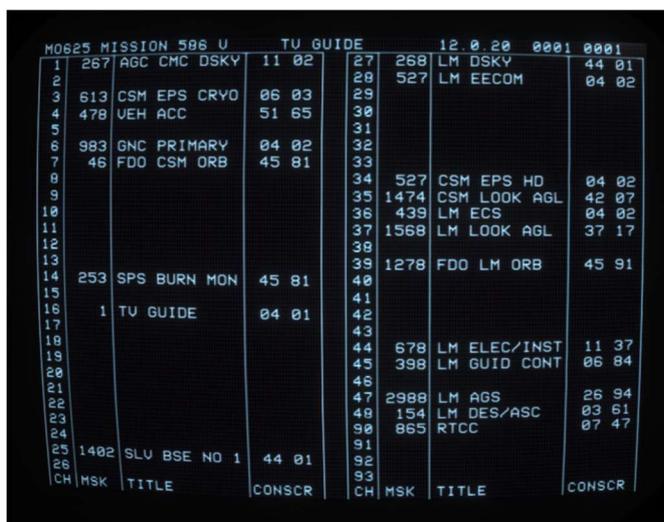
1. GENERAL

Each desk are equipped with monitors used to read data from the spacecrafts. The Saturn V, the CSM and the LM sends telemetry that can be monitored on the screens. A dedicated TV channel system lets you control what monitor should display what channel.



1.1 SWITCHING TV CHANNELS

The TV GUIDE can be used to find the channel you wish to tune into. Some monitors shows the TV channel overview, as well as the projectors in front of the room (unless someone changed them). If you need to bring it up, the TV GUIDE can always be found on channel 16.



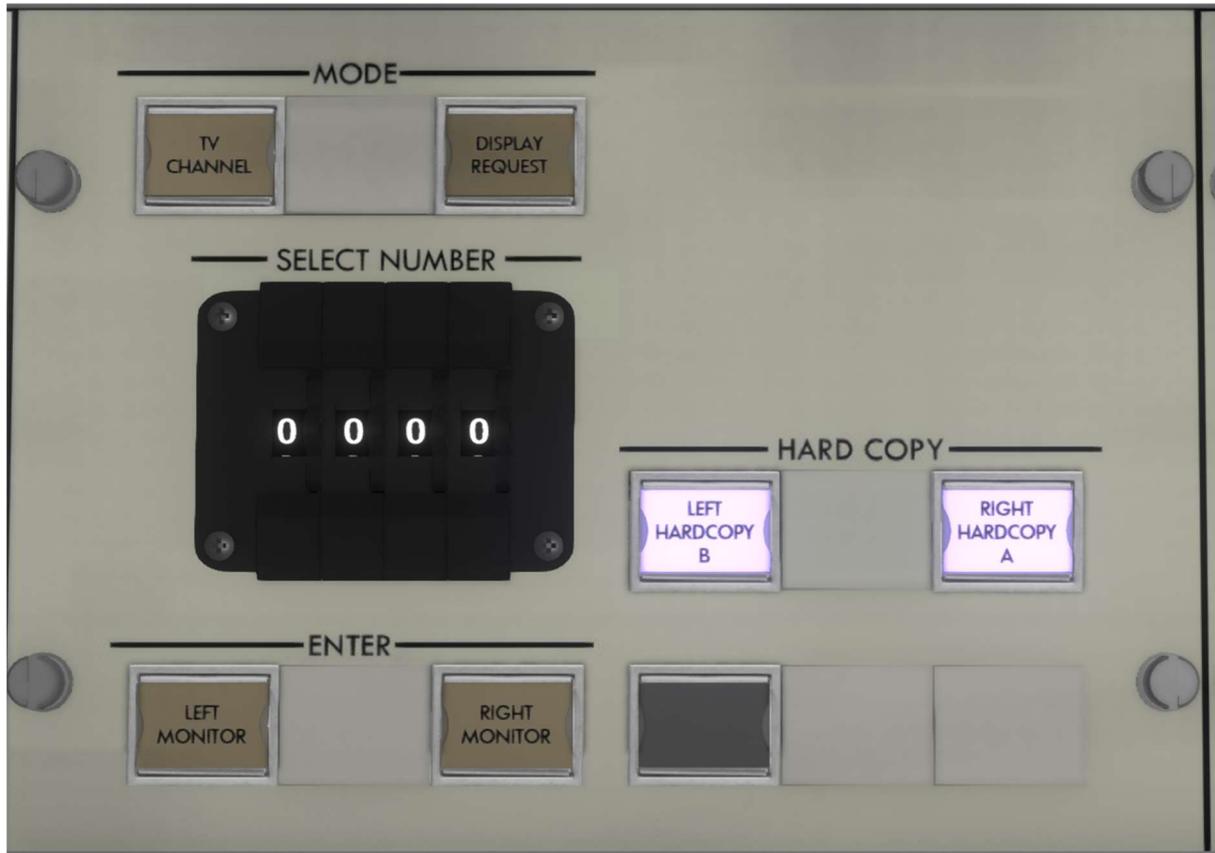
The TV GUIDE is split into two sections (left and right), both equal in how the display the channels. The left column shows the channel (starts from 1 and goes up to 50 and 93). Channel 1 is the AGC CMC DSKY channel for example.

The first thing you should do is to find the channel you are interested in seeing and then finding the channel index of it.

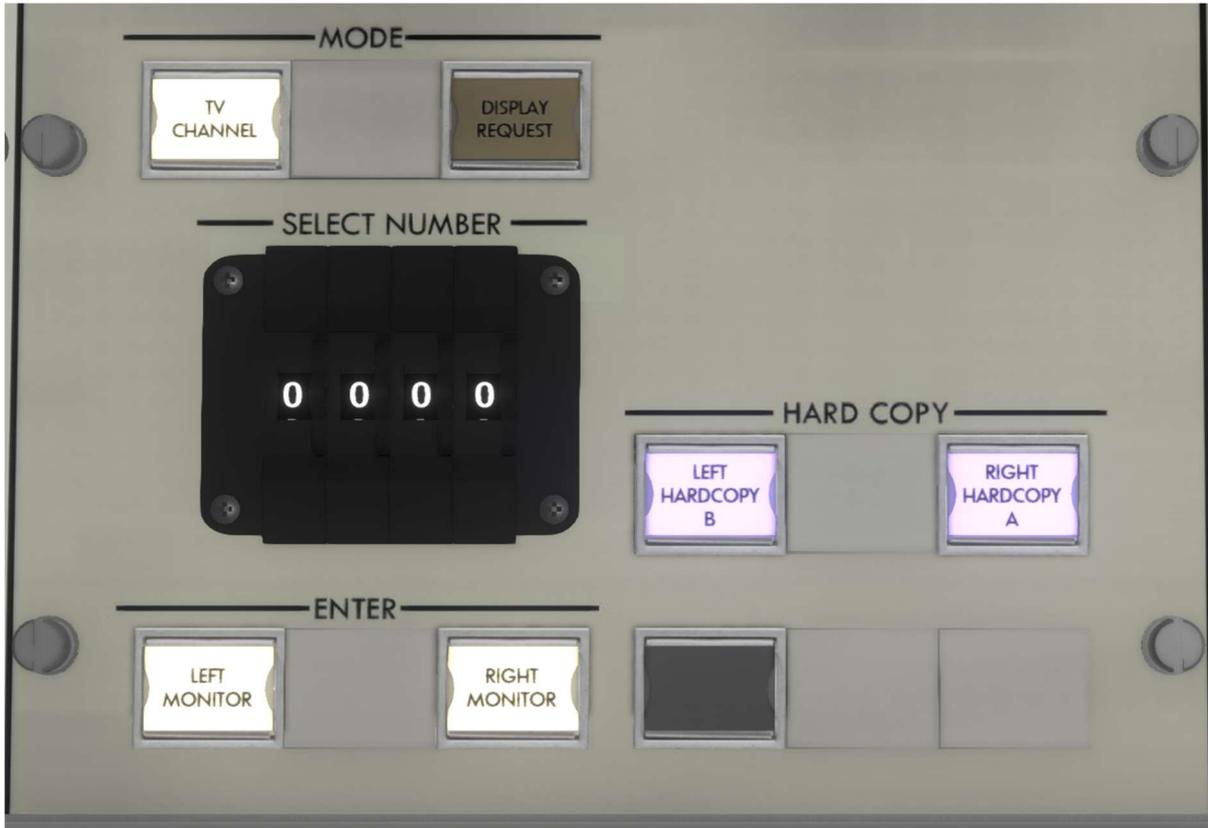
Let's say we wish to see channel 25, the Saturn V Boost Systems Engineer 1 channel: SLV BSE NO 1.

Knowing the index, you can use the TV CHANNEL panel to reconfigure your setup.

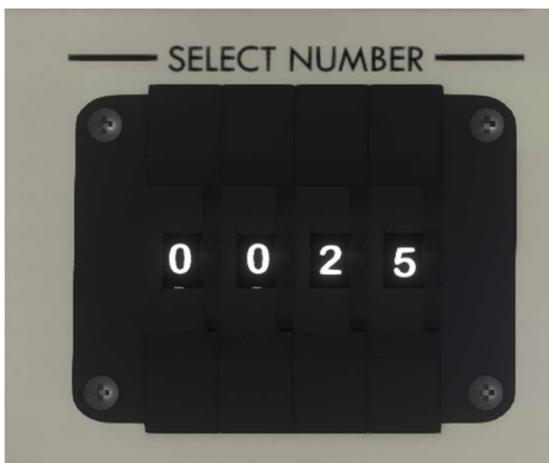
On the CapCom desk, there are two monitors. Some desks has three, and even multiple TV CHANNEL panels. Use the one that changes the monitor you wish to change.



The panel has a MODE section, ENTER section and a HARD COPY section. Mode is used to start a channel change operation where SELECT NUMBER is the channel index you wish to change to. The ENTER section is used to select what monitor that should be changed. For the channel 25 example, first press TV CHANNEL. It should illuminate, along with the ENTER switches.



Then press above the 3rd digit so move it up, or below to move it down. Set it to 2, and set the 4th digit to 5.



With the channel set, press either LEFT MONITOR or RIGHT MONITOR to execute the change. The results can be seen on the monitor you then selected.



As mentioned earlier, the TV guide can also be seen on the projectors, just like any other TV channel.

The image shows a projector screen displaying a TV guide. The screen is divided into two columns of data. The left column lists channels 1 through 26, and the right column lists channels 27 through 93. Each row contains a channel number, a call sign (MSK), a title, and a number (CONSCR). The title '1 TV GUIDE' is highlighted in row 16. The data is as follows:

CH	MSK	TITLE	CONSCR	CH	MSK	TITLE	CONSCR
1	267	AGC CMC DSKY	11 02	27	268	LM DSKY	44 01
2				28	527	LM EECOM	04 02
3	613	CSM EPS CRYO	06 03	29			
4	478	VEH ACC	51 65	30			
5				31			
6	983	GNC PRIMARY	04 02	32			
7	46	FDO CSM ORB	45 81	33			
8				34	527	CSM EPS HD	04 02
9				35	1474	CSM LOOK AGL	42 07
10				36	439	LM ECS	04 02
11				37	1568	LM LOOK AGL	37 17
12				38			
13				39	1278	FDO LM ORB	45 91
14	253	SPS BURN MON	45 81	40			
15				41			
16	1	TV GUIDE	04 01	42			
17				43			
18				44	678	LM ELEC/INST	11 37
19				45	398	LM GUID CONT	06 84
20				46			
21				47	2988	LM AGS	26 94
22				48	154	LM DES/ASC	03 61
23				49	865	RTCC	07 47
24				90			
25	1402	SLV BSE NO 1	44 01	91			
26				92			
CH	MSK	TITLE	CONSCR	CH	MSK	TITLE	CONSCR

1.2 SWITCHING PROJECTORS

The projectors can only be changed from the ASSISTANT FLIGHT DIRECTORs desk (and Procedures once this is implemented). It works exactly the same as changing the TV CHANNEL on a monitor, but instead of selecting a monitor to reconfigure, you select the

projector.



You can see on the right side that each projector can be changed. The TV projectors work the same as a monitor, and can display the same channels that a monitor can display. The AUX and MAIN PROJECTION are special and only some channels can be changed here.

The MAIN PROJECTOR can be reconfigured to show EARTH or the MOON map.



1.3 HARD COPY

Each monitor has a hard copy feature. It will take a screen dump of the current data. If you press the purple button associated to the screen you wish to save, it will copy the screen to a file in the AppData export folder. You can then send this file to others through Discord etc.

The file will look something like this:

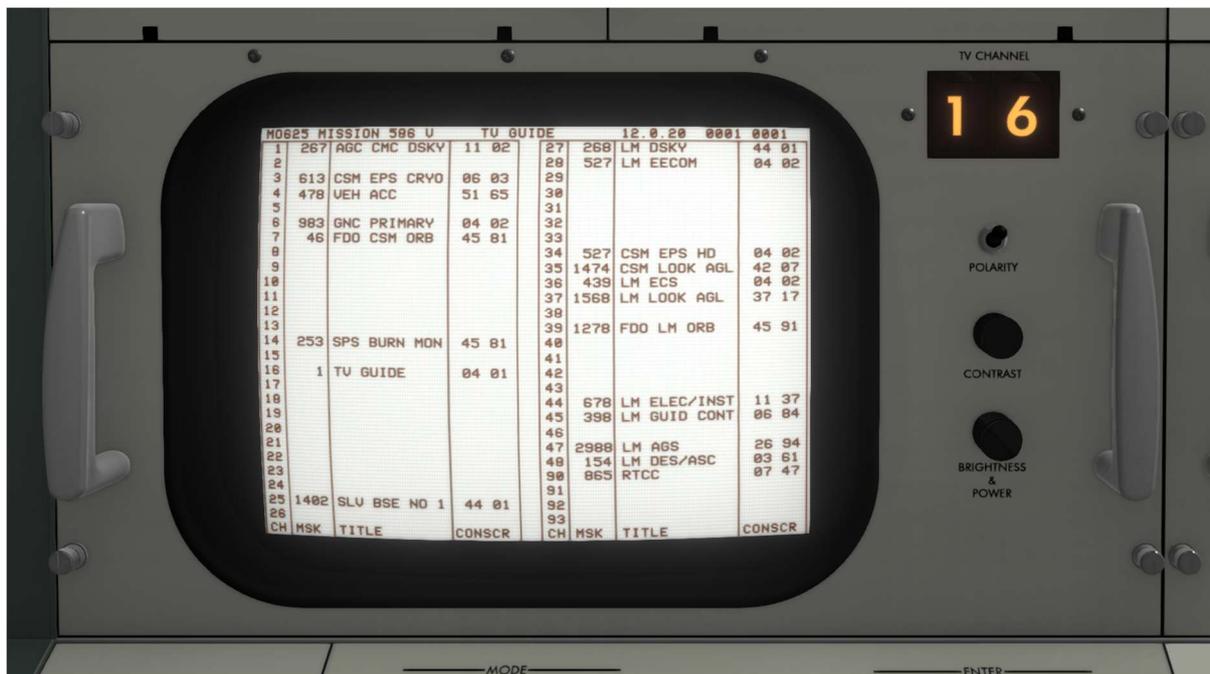
```

LZ768 K                               CSM GNC PRIMARY TAB                               0684 0684
GMTA 11/05:14:47                       SITE ASS'T
GETA 000:46:19                           QUADA  QUADB  QUADC  QUADD
CTE 000:46:19   PXG FU TK QTY  99.9  99.9  99.9  99.9
CMC 000:46:19   PXG FU P  PCI  188.9  188.9  188.9  188.9
CMCD 000:46:19  PXG T    °F  150.0  150.0  150.0  150.0
GETC 000:46:19  HE TK P  PSIA  188.9  188.9  188.9  188.9
                                HE TK    QTY  99.9  99.9  99.9  99.9
ISS  NORMAL
OPT  ZERO
CMC  AUTO
                                CM-RCS  SYS 1  SYS 2  SPS
FU TK P  PSIA  0.0  0.0  FU TK QTY  99.9
FU TK Q  QTY  0.0  0.0  OX TK QTY  99.9
TK T    °F  142.1  142.1  HE TK1 QTY  0.0
                                HE TK2 QTY  0.0
                                SYS A  PSI 175.0
                                SYS B  PSI 175.0
                                NA    PSI 2500
                                NB    PSI 2500
                                PITCH  YAW  ROLL
ISS ATT  66.260  161.47  -79.95
DAP      ACDU
RATE DS  ERR CMC
0.5 5.0  0.00 SCS  66.263  161.44  -79.98  SPS ARMED
VEH ACC 0.00 EMT  SYS A
UG X    RATE G/M  -0.001  0.000  0.000  SYS B
UG Y    SCS      -0.001  0.000  0.000
UG Z
PIPX
PIPY    GMD CMD
PIPZ    OCDU OC
PIPT    SPS GMB
                                PGNCS
                                SCS ELEC
                                RCS LOGIC
                                RHC
                                THC
TIG 000:00:00 MN TUC
                                DIF CUR
    
```

2. HARDWARE



Each monitor is equal and consist of the monitor itself, and some buttons used to interact with it. I plan on implementing all of them, but currently, only the polarity switch is enabled. It can be used to invert the color of the screen.



3. TV CHANNEL DICTIONARY

This section will describe each TV CHANNEL supported by Reentry MOCR Live.

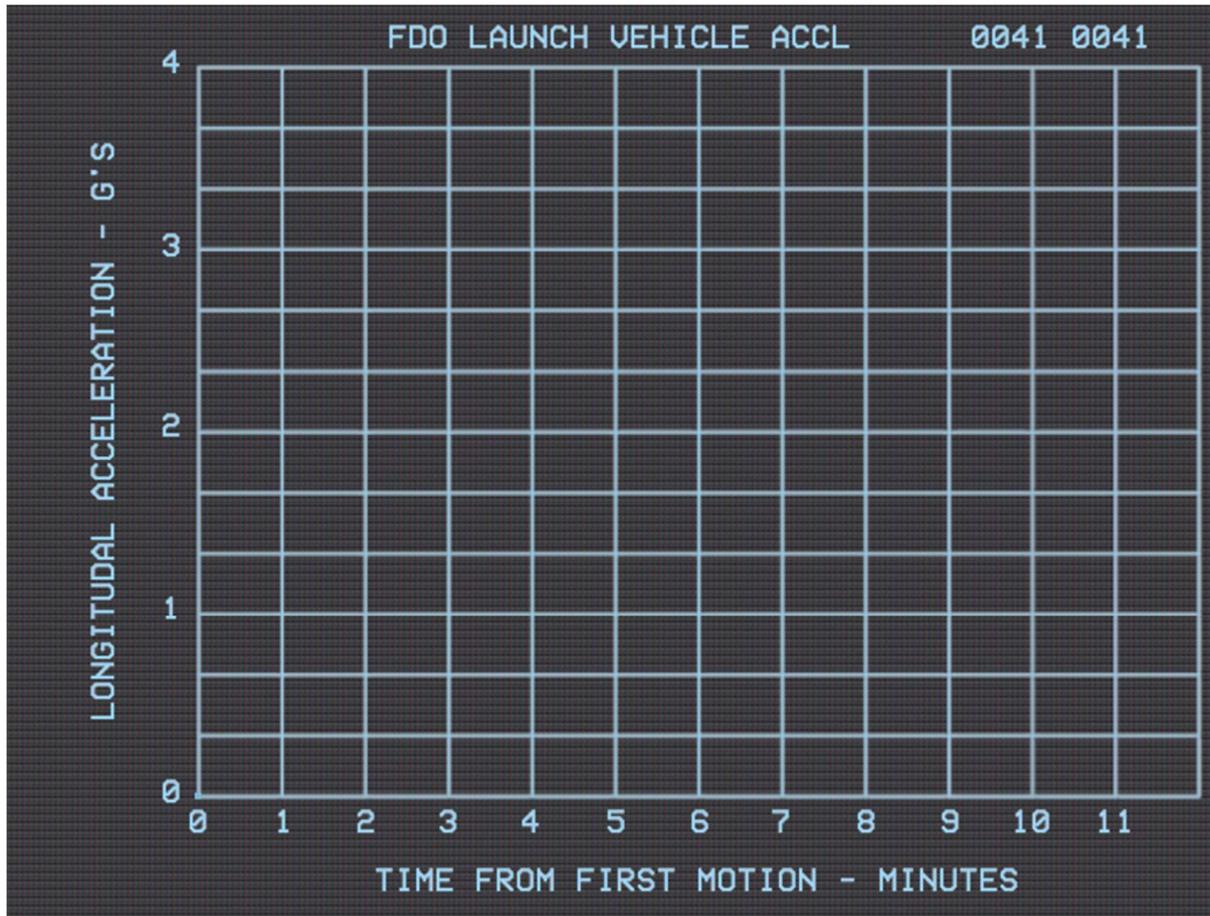
CHANNEL 01: CMC DSKY

```
008120      CMC DSKY AND STATE BUFF MON      0280 0280
      CNU
PG      00      01
UB      00 NO 00      02
R1      00000      03
R2      00000      04
R3      00000      05
      06
      07
      10
      11
      12
      13
      14
      15
      16
      17
      20
CMC GET 083:19:10      21
      22
      23
      24
```

CHANNEL 03: CSM ECS CRYOGENIC TAB

LM1839		CSM ECS CRYO TAB				0613	
GET 083:19:18		GMT 12/24:08:10				SITE BOOSTER	
-----LIFE SUPPORT-----				-----PRIMARY COOLANT-----			
GF3571	LM CABIN P	PSIA			CF8014	ACCUM QTY	PCT
CF0001	CABIN P	PSIA			CF8016	PUMP P	PSID
CF0012	SUIT P	PSIA			SF0260	RAD IN T	°C
CF0053	SUIT P	IN H2O					
CF0015	COMP P	P PSID			CF0070	RAD OUT T	°F
CF0006	SURGE P	P PSIA			CF1981	EVAP IN T	°F
	SURGE QTY	LB			CF0917	STEAM T	°F
02	TK1 CAP	P PSID			CF0071	STEAM P	PSIA
02	TK2 CAP	P PSID			CF0018	EVAP OUT T	°F
CF0036	02 MAN P	PSIA			SF0266	RAD ULU 1/2	
CF0035	02 FLOW	LB/HR			CF0175	GLY FLO	LB/HR
CF0600	SUIT T	°F			-----SECONDARY COOLANT-----		
CF0002	CABIN T	°F			CF0072	ACCUM QTY	PCT
CF0005	CO2 PP	MMHG			CF0079	PUMP P	PSID
	H2O				SF0262	RAD IN T	°F
CF0004	WASTE	PCT			SF0263	RAD OUT T	°F
	WASTE	LB				STEAM P	PSIA
CF0010	POTABLE	PCT			CF0071	EVAP OUT T	°F
	POTABLE	LB			CF0420	H2O RES	PSIA
	URINE NOZ T	°F			TOTAL		AMPS
	H2O NOZ T	°F					
-----CRYO SUPPLY-----			02-1	02-2	H2-1	H2-2	
SC0037-38-39-40	P	PSIA	911.3	911.3	252.9	252.9	
SC0032-33-38-31	QTY	PCT	100.0	100.0	100.0	100.0	
SC0041-42-43-44	T	°F	-360.4	-360.4	-420.5	-420.5	
	QTY	LBS	326.0	326.0	29.0	29.0	

CHANNEL 04: FDO LAUNCH VEHICLE ACCELERATION



CHANNEL 06: CSM GNC PRIMARY TAB

LZ768 K			CSM GNC PRIMARY TAB				0684 0684	
GMTA	11/07:11:43		SITE GNC					
GETA	045:42:38		QUADA		QUADB	QUADC	QUADD	
CTE	045:42:38		PXG FU TK QTY	100.0	99.9	100.0	99.9	
CMC	045:42:38		PXG FU P PCI	-310.6	-313.1	-313.1	-313.1	
CMCD	045:42:38		PXG T °F	164076	164075	164076	164075	
GETC	045:42:38		HE TK P PSIA	-338.7	-338.7	-338.7	-338.7	
			HE TK QTY	100.0	99.9	100.0	99.9	
ISS	NORMAL		CM-RCS		SYS 1	SYS 2	SPS	
OPT	MANUAL		FU TK P PSIA	-341.2	0.0	FU TK QTY	99.9	
CMC	AUTO		FU TK Q QTY	99.9	99.9	OX TK QTY	99.9	
			TK T °F	-100.0	-100.0	HE TK1 QTY	0.0	
VERB	NOUN	PRGM				HE TK2 QTY	0.0	
00	00	00				SYS A PSI	175.0	
REG 1	00000					SYS B PSI	175.0	
REG 2	00000					NA PSI	2500	
REG 3	00000					NB PSI	2500	
	DAP		ISS ATT	PITCH	YAW	ROLL		
				2.347	-39.45	-82.70		
RATE	DS		ACDU					
0.2	5.0		FCDU					
VEH ACC		NaN	ERR CMC	69.392	21.219	33.380	SPS ARMED	
UG X			SCS				SYS A	
UG Y			EMT	0.000	0.000	0.000	SYS B	
UG Z			RATE G/M					
PIPX			SCS	0.000	0.000	0.000		
PIPY							PGNCS	
PIPZ			GMD CMD				SCS ELEC	
PIPT			OCDU OC				RCS LOGIC	
			SPS GMB				RHC PWR DIR	
			AT TUC				THC	
TIG	680:31:33 MN TUC							
			DIF CUR					

CHANNEL 07: FDO CSM ORB DATA

```
                                FDO CSM ORB DATA
12/24:08:10                      SITE BOOSTER
083:19:42

AP          1848.579 KM
PE          1752.418 KM
AP ALT      111.179 KM
PE ALT      15.018 KM

ECC          0.026704
INC          1.369049°
ASC NODE     147.988°
TRUE ANOMOLY 256.747°
ARG PERI     193.272°

PERIOD       6858.327 SEC
TIME TO PE   1910.069 SEC
TIME TO AP   5339.233 SEC
```

CHANNEL 14: SPS BURN MON

```

                                SPS BURN MON
                                BOOSTER
12/24:08:11
083:20:04

TIG          COUNTDOWN
002:30:29   00:00:00

VEH ACC     VEL FT/S    HDOT
0.00        5385.19    -141.34

                                UDOT
                                5383.34

                                VERB  NOUN  PRGM
                                00    00    00
                                REG 1  00000
                                REG 2  00000
                                REG 3  00000

CMC FREE    ATT
  DAP       IMU -5.846  179.95 -0.169
RATE DB     GDC 87.488 -177.5 -177.5
0.5  5.0

                                RATE
                                IMU 0.000  0.000  0.000
                                GDC 0.000  0.000  0.000
    
```

CHANNEL 16: TV GUIDE

M0625 MISSION 586 U				TU GUIDE				12.0.20 0001 0001			
CH	MSK	TITLE	CONSCR	CH	MSK	TITLE	CONSCR	CH	MSK	TITLE	CONSCR
1	267	AGC CMC DSKY	11 02	27	268	LM DSKY	44 01				
2				28	527	LM EECOM	04 02				
3	613	CSM EPS CRYO	06 03	29							
4	478	VEH ACC	51 65	30							
5				31							
6	983	GNC PRIMARY	04 02	32							
7	46	FDO CSM ORB	45 81	33							
8				34	527	CSM EPS HD	04 02				
9				35	1474	CSM LOOK AGL	42 07				
10				36	439	LM ECS	04 02				
11				37	1568	LM LOOK AGL	37 17				
12	55	CSM RCS STUS	21 73	38							
13				39	1278	FDO LM ORB	45 91				
14	253	SPS BURN MON	45 81	40							
15				41							
16	1	TU GUIDE	04 01	42							
17				43							
18				44	678	LM ELEC/INST	11 37				
19				45	398	LM GUID CONT	06 84				
20				46							
21				47	2988	LM AGS	26 94				
22				48	154	LM DES/ASC	03 61				
23				90	865	RTCC	07 47				
24				91							
25	1402	SLV BSE NO 1	44 01	92							
26				93							
CH	MSK	TITLE	CONSCR	CH	MSK	TITLE	CONSCR				

CHANNEL 25: SLV BSE NO 1

L2355F			SLV BSE NO 1				1402 1402		
SITE	BOOSTE	SIC	ACT	POS	Q	BALL	ULL	PRESS	
PC	TNOK	HYD	P	Y	P	P	OXID	FUEL	
E1	L	***	L				24.3	21.0	
E2	L	***	L				L	L	
E3	L	***	L						
E4	L	***	L						
E5	L	***	L						
GET 083:20:20 P			ATT RATE		ATT ERROR		DSKY		
TB1 08:20:20 Y			0.000	P			P 00		
ACC 0.00 R			0.000	Y			U 00 N00		
			0.000	R			R1 00000		
							R2 00000		
							R3 00000		
SII			IU			S/C CONT		GRF	
PC	TNOK	PU	HYD	PR	P	Y	SEC	UT	
E1	L	***	L	L			SEP	FAIL	
E2	L	***	L	L			UOLT	GIM AO	
E3	L	***	L	L			REC	P D	
E4	L	***	L	L			TGN	Y U	
E5	L	***	L	L				R C	
ULL PRESS			PLATFORM		S/C CONT		GRF		
OXID	FUEL	T1I	SUP	PRS	DIR		FAIL		
L	L		BRN	PRS	K19		CNTL		
L	L								
SIUB			SIUB			HYD SYS		COLD HE	
MAINSTAGE	L		ULL	PRESS	PR	L	SUP		
PC			OXID	FUEL	P				
PU			L	L	Y				
TTG			L	L				REG	

CHANNEL 27: LM DSKY

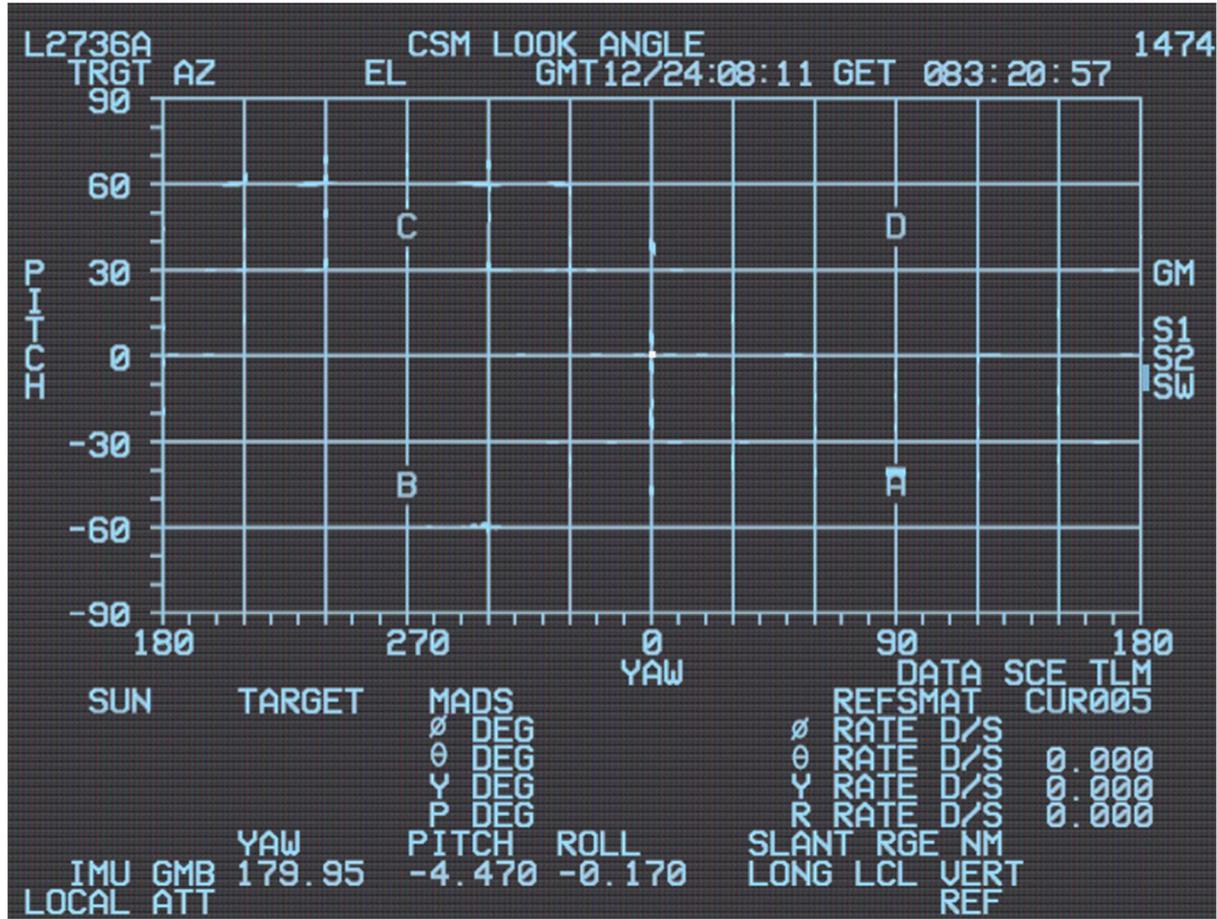
```
008120          LM DSKY AND STATE BUFF MON          0280 0280

                                01
PG      00                    02
UB      00 NO 00              03
R1      00000                 04
R2      00000                 05
R3      00000                 06
                                07
                                10
                                11
                                12
                                13
                                14
                                15
                                16
                                17
                                20
LM GET  083:20:31            21
                                22
                                23
                                24
```


CHANNEL 34: CSM EPS HIGH DENSITY

LM1085		CSM EPS HIGH DENSITY				0518 0518	
GET 083:20:48		GMT 12/24:08:11				SITE BOOSTER	
DC VOLTS		AC VOLTS				FC °F	
CC0206	UMA	28.00	CC0200	AC 1	30.0	SC2084	1 SKN 88.9
CC0207	UMB	28.00	CC0203	AC 2	30.0	SC2085	2 SKN 88.9
CC0210	UBA	37.00	PC PSIA		SC2086	3 SKN 88.9	
CC0211	UBB	37.00	SC2060	1 N2	SC2091	1 CET 240.1	
CC0232	UBR	37.00	SC2061	2 N2	SC2092	2 CET 240.1	
CD0200	UMLA	0.00	SC2062	3 N2	SC2093	3 CET 240.1	
CD0201	UMLB	28.00	SC2066	1 O2	FC RAD °F		
CD0005	UMQA	34.00	SC2067	2 O2	SC2087	1 OUT 88.9	
CD0006	UMQB	34.00	SC2068	3 O2	SC2088	2 OUT 88.9	
DC AMPS		SC2069	1 H2	SC2089	3 OUT 88.9	SC2090	1 IN 88.9
TOT SC	43.00	SC2070	2 H2	SC2091	2 IN 88.9	SC2092	3 IN 88.9
TOT FC	43.00	SC2071	3 H2	PC1 TOTAL PC LOAD			
TOT BAT	0.00	1 O2-H2	ΔP	FC 1			
		2 O2-H2	ΔP	FC 2			
		3 O2-H2	ΔP	FC 3			
SC2113	FC 1	14.33	1 H2-H2	ΔP	INST		
SC2114	FC 2	14.33	2 H2-H2	ΔP	CT0120	PCM	
SC2115	FC 3	14.33	3 H2-H2	ΔP	CT0125	4.25	
CC0222	BAT A	0.00	FC LB/HR		CT0126	0.75	
CC0223	BAT B	0.00	SC2139	1 H2	0.0	CT0140	TAG
CC0224	BAT C	0.00	SC2140	2 H2	0.0	CT0015	-70
CC0216	CHARGR	0.00	SC2141	3 H2	0.0	CT0016	-20
CC2562	LM	0.00	SC2142	1 O2	0.0	CT0017	-6
SC2160	PM 1		SC2143	2 O2	0.0	CT0018	-10
SC2161	PM 2		SC2144	3 O2	0.0	CT0020	55
SC2162	PM 3					CSA220	PROBE
			1—2—3				
CC0175/76/77	INU TMS	93	93	93			

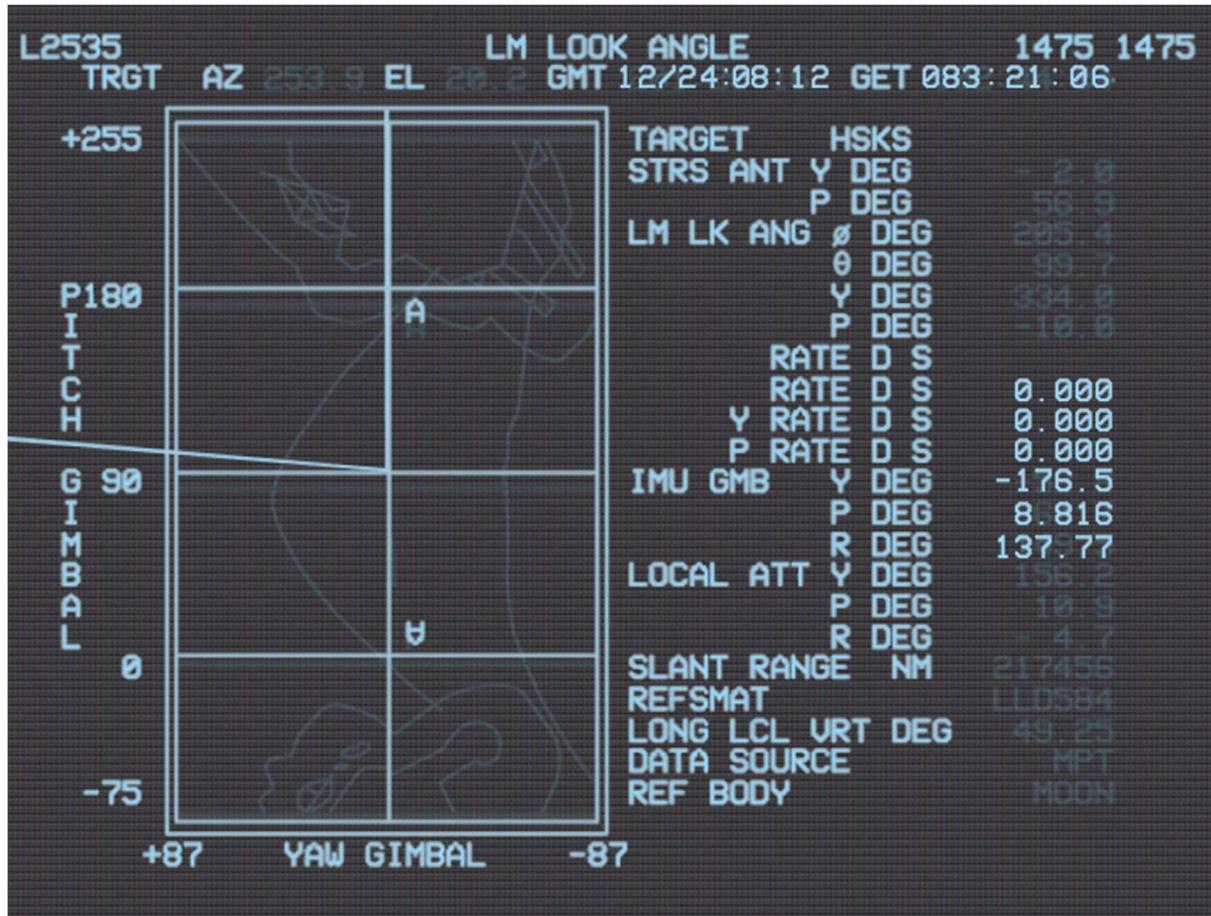
CHANNEL 35: CSM LOOK ANGLE



CHANNEL 36: LM ECS

L2535	LM ECS R/T	DIGITALS	1051	1051
GET	MET	GMT	SITE	
GF3571	CABIN P	GF1301	SUIT PRESS	
GF3572	REPR ELEC	GF1521	CO2 PP	
GF3591	O/H RFL P	GF1021	SUIT TEMP	
GF3592	F/H RFL P			
GF1651	CABIN TEMP	GF9999	H2O SEP R	
		GF1083	SUIT FAN 1	
GF9997	GLY PUMP P	GF1084	SUIT FAN 2	
GF2351	PUMP_P	GF3070/1	DMD REG A	
GF9998	GLY TEMP	GF3073/5	DMD REG B	
GF2041	GLY LEVEL	GF1201	CDR SUIT	
GF2936	PUMP SW/O	GF1202	LMP SUIT	
GF2531	GLY IN T	GF1211/2	SUIT RFL	
GF2501	GLY OUT T	GF1221	SUIT DIU	
		GF1231/2	CABIN RET	
		GF1241	CO2 SEL	
H2O QTY PCT	QTY LBS	QR LBS/HR	H2O ΔP W/B H2O	RGT T
GF4500/2/3	LM4611/9/0	LM4701/2/3	GF4101	GF4511T GL8215
DES				
ASC1				
ASC2				
O2 QTY PCT	QTY LBS	QR LBS/HR	PRESS	O2 M P
LM4603/4/5	LM4602/4/6	LM4704/5/6	GF3584/2/3	GF3580
DES				
ASC1				
ASC2				

CHANNEL 37: LM LOOK ANGLE



CHANNEL 39: FDO LM ORB DATA

```
                                FDO LM ORB DATA
                                SITE BOOSTER
12/24:08:12
083:21:12

AP          1848.517 KM
PE          1750.853 KM
AP ALT     111.117 KM
PE ALT     13.453 KM

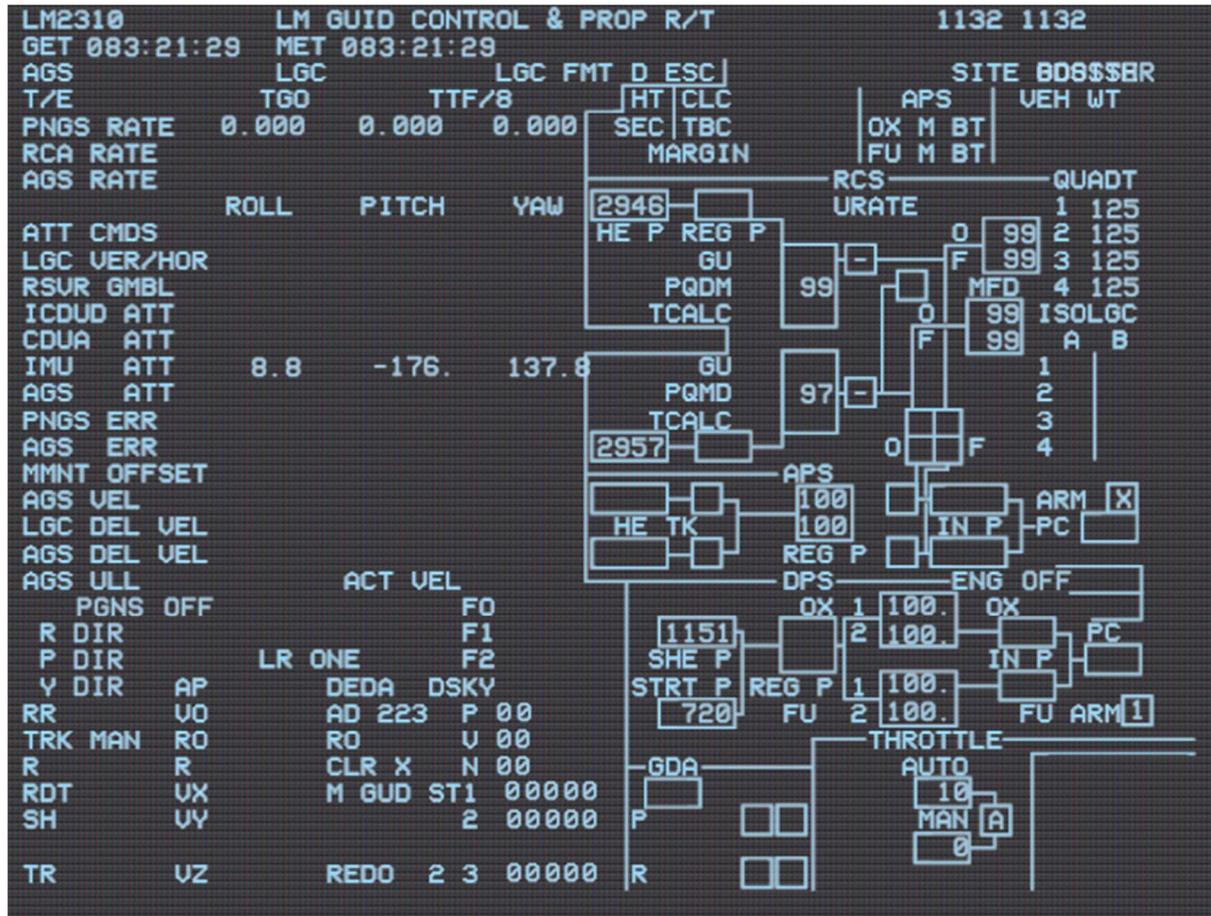
ECC        0.027133
INC        1.368698°
ASC NODE   147.987°
TRUE ANOMOLY 263.477°
ARG PERI   193.642°

PERIOD     6853.680 SEC
TIME TO PE 1778.642 SEC
TIME TO AP 5205.482 SEC
```

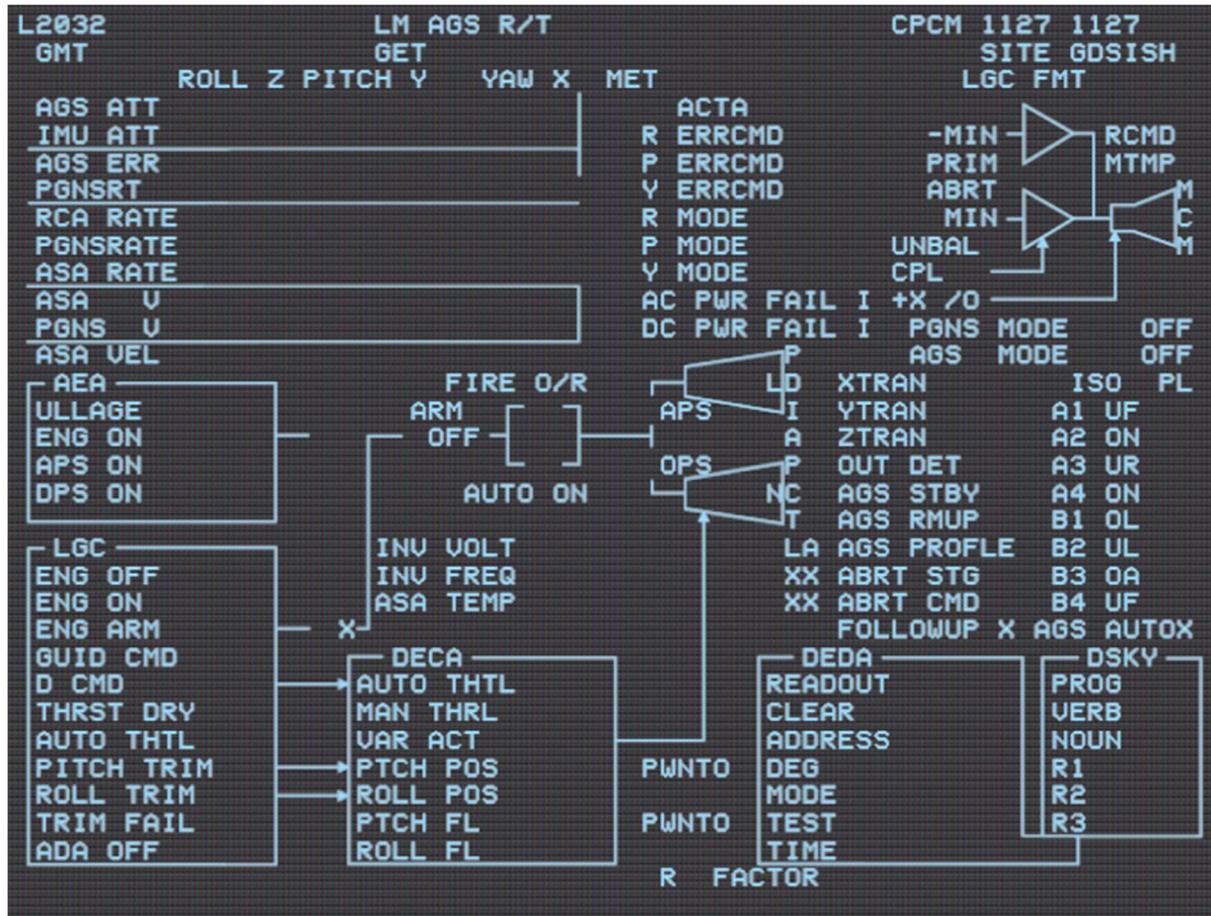
CHANNEL 44: LM ELECT/INST

LZ774 K		LM ELEC/INST R/T					1891	10
GET083:21:22		MET083:21:22		GMT 12/24:08:12		PCM		
BAT STAT	VOLT	CUR	AMP HR	AU	CUR	PCT	LGC	
1 D	28.0	6.1	0.0				AH MED	
2 D	28.0	6.1	0.0				B1	
L D	28.0	0.0	0.0				B2	
3 D	28.0	2.9	0.0				BL	
4 D	28.0	2.9	0.0				B3	
	DES	18.1					B4	
							B5	
LMP	28.0	40.8					B6	
CDR	28.0	25.6					ECA1T	
							ECA2T	
5 E LMPN	28.0	0.0	0.0				Q1T	
6 E CDRN	28.0	0.0	0.0				Q2T	
	ASC	0.0					Q3T	
							Q4T	
PROG	TGO	D	DGET				IMU STBY	
AC1 VOLT	10.0	RCS 2X					IMU OPER	
AC2 VOLT	30.0	RCS+Y+Z					LGC OPER	
INU 1	0.0	ABT CMD					LR STAT	
INU 2	28.0	ABT STG			AAH		RR STAT	
DPS TOP		GEAR D	RET				AGS STAT	
APS TOP		K1-K6					PIT RATE	
DSC 2		K7-K15	FIR				H2O SEP	
DSC 3		OSC 1			DAH		P GLY P	
CAL 85		C&M PWR					S GLY P	

CHANNEL 45: LM GUIDANCE, CONTROL & PROPULSION



CHANNEL 47: LM AGS



CHANNEL 49: LUNAR DESCENT/ASCENT DIGITALS

L2313		LUNAR DESCENT/ASCENT DIGITALS			0084 0084	
PFT	PNGS	MSFN	PET	MSFN	GET	083:21:49
		AGS			PNGS T/M	AGS T/M
REC					GTC	
H _{LGC}	212938				TGO	
H _{LR}	43000				P _M	
h	0			0	Y _M	
HA	111				GET STAGE	
HP	13				PET STAGE	
U _{sLGC}	-146			0	GET	
ΔU _s	-76				PET	
U _{sLR}	0			0	GET	
U	5405				PET	
R ₆₀					GET	
	M	G		G	PET NSERT	
P	9			0	GET LOS	
ø	47				PET LOS	
λ	49				ΔU _{PPF}	
					ΔU _{DRD}	
					GETR	
					P	A M

CHANNEL 90: RTCC

```
RTCC
-----
TRANS-LUNAR INJECTION
-----
LINE 10 FLIGHT TIME (X.XXXXXX)
        0.399000
LINE 11 SOI ANGLE (XXX.XXXX)
        145.9000
LINE 12 DEPARTURE ANGLE (XXX.XXXX)
        013.7000
LINE 14 CALCULATE
CALCULATION RESULTS
TIG
000:00:00
TIME TO IGNITION
000:00:00
TIME TO SOI
000:00:00
ΔU
0.0 FT/S
LUNAR PE
0.0 NMI
FREE RETURN PE
0.0 NMI
DEPARTURE PE
0.0 NMI
-----
LINE 99 UPLINK
-----
INPUT
```



VI. REAL-TIME COMPUTER

VI. REAL-TIME COMPUTER

1. GENERAL

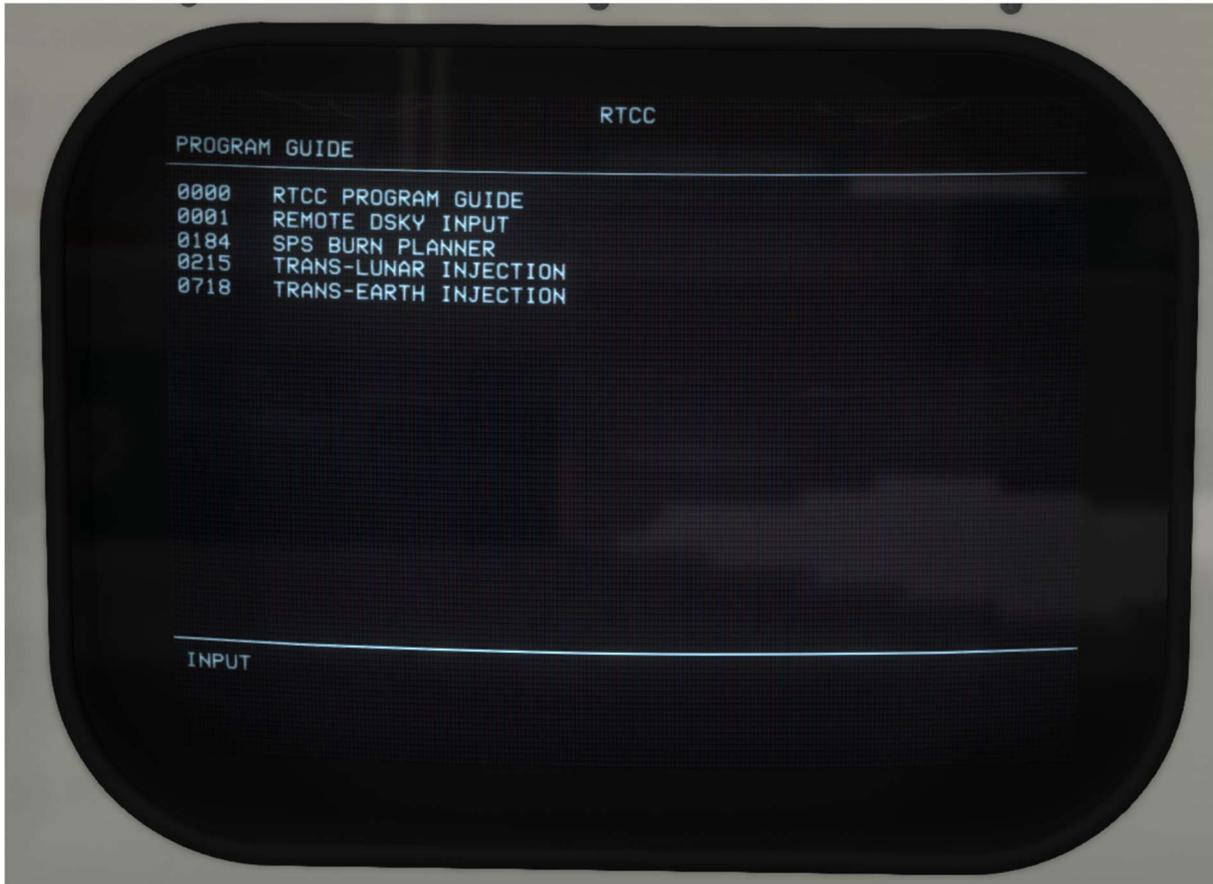
NASA's Real-Time Computing Complex, which resides at the first floor of building 30, the same building that houses MOCR 1 and 2, houses 5 IBM 360/75 computers, of which at any time 2 are used redundantly (1 active, 1 hotswap) to support the flight, while the others are used for sims, experiments, etc, and can be swapped in to replace one of the two flight support computers. Data from the RTCC is primarily fed into the display control system, including the television slide display, which is responsible for controlling the overlays used in the above-mentioned TV-system.

2. OPERATION

The RTCC is operated through the Program Request and keyboard module located on the GUIDANCE and BOOSTER desks.



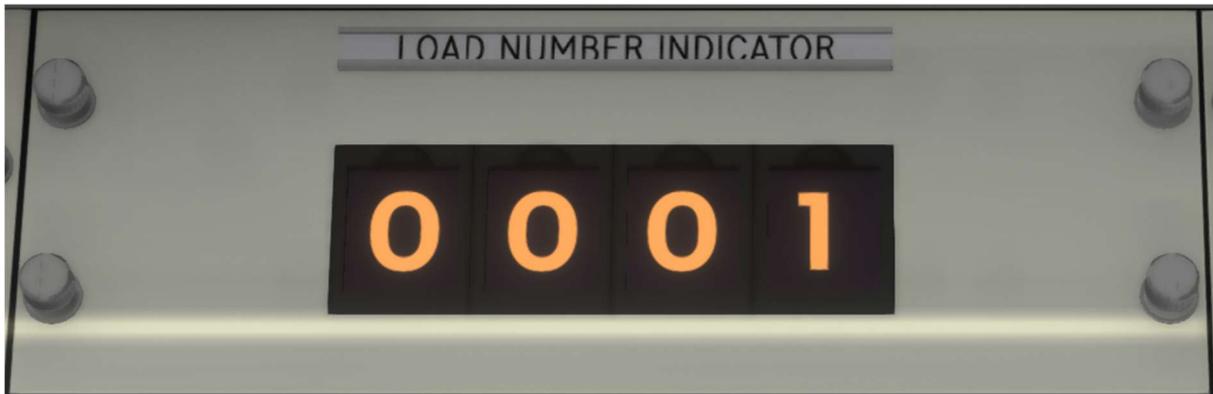
The RTCC has a dedicated TV CHANNEL. Tune in to Channel 90 on a monitor to view it. The default program is 0000 – The Program Guide.



To select a program to run on the RTCC, you will need to perform a Program Request using the LOAD NUMBER INDICATOR. This requires you to enter 4 digits, including leading and trailing zeros. To let the module know you wish to enter data, press the green LOAD button:



The four digits on the LOAD NUMBER INDICATOR blanks. You will then need to enter 4 digits. Press 0 0 0 1 as indicated in the screenshot below.



Then press the white illuminated INITIATE button below LOAD:



This will start program 0001 – DSKY CONSOLE.



This will let you send DSKY commands to the AGC and the LGC. It is currently disabled, and the astronaut will need to set UPL TLM to ACCEPT for it to work.

On the screenshot above, you can see that the program has an INPUT SELECTION.

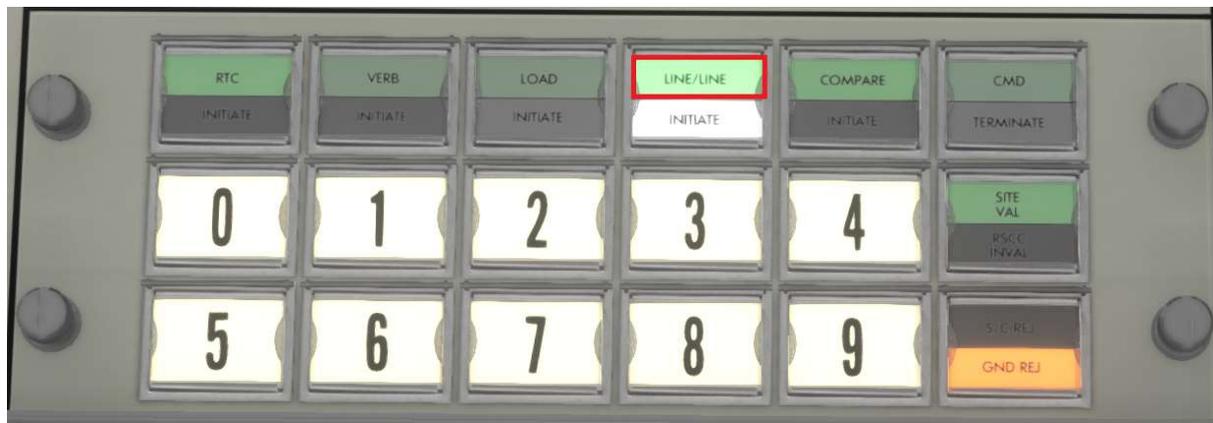


This is a toggle. Notice the LINE indicator, and the ID behind it.

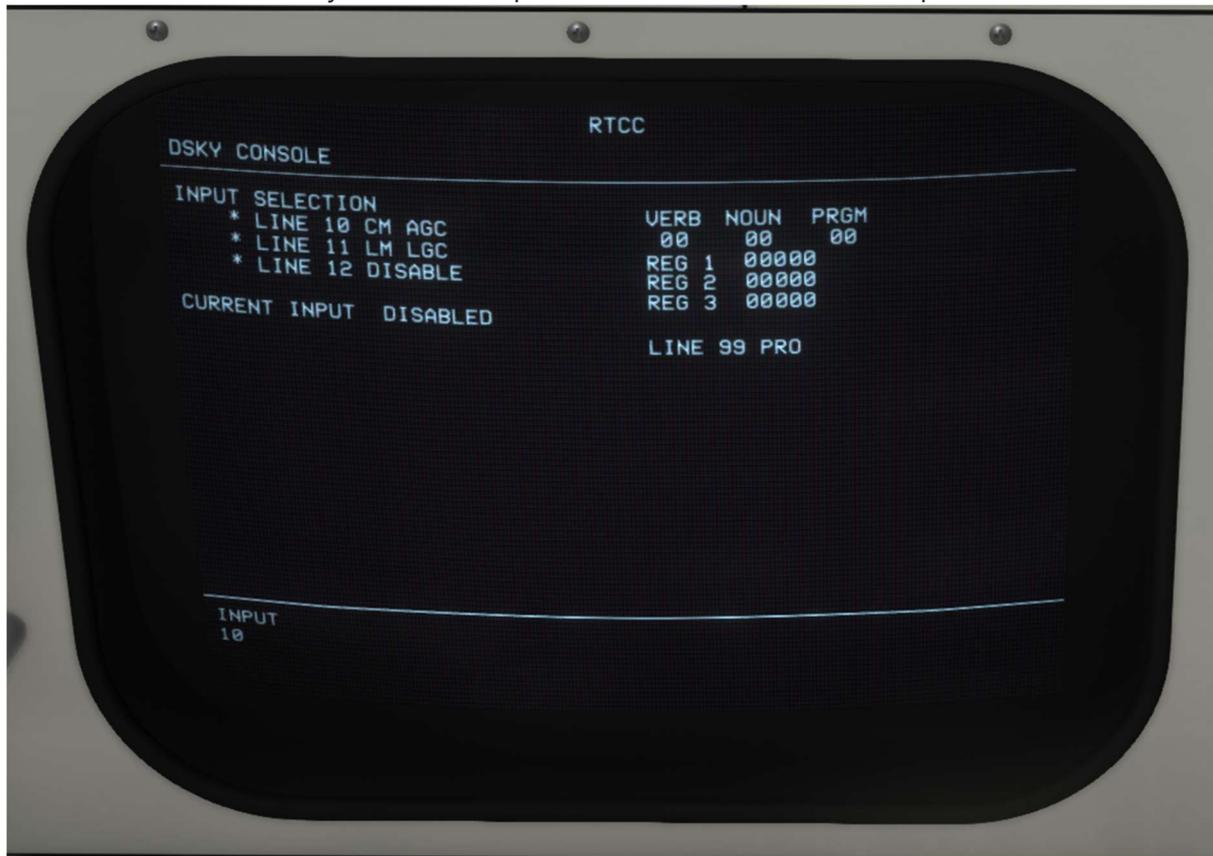
The way you interact with the RTCC is by selecting the LINE you wish to modify by using the ID behind it. Toggles only have an ID, but some can have numbers as well.

Let's try to set LINE 10, CM AGC.

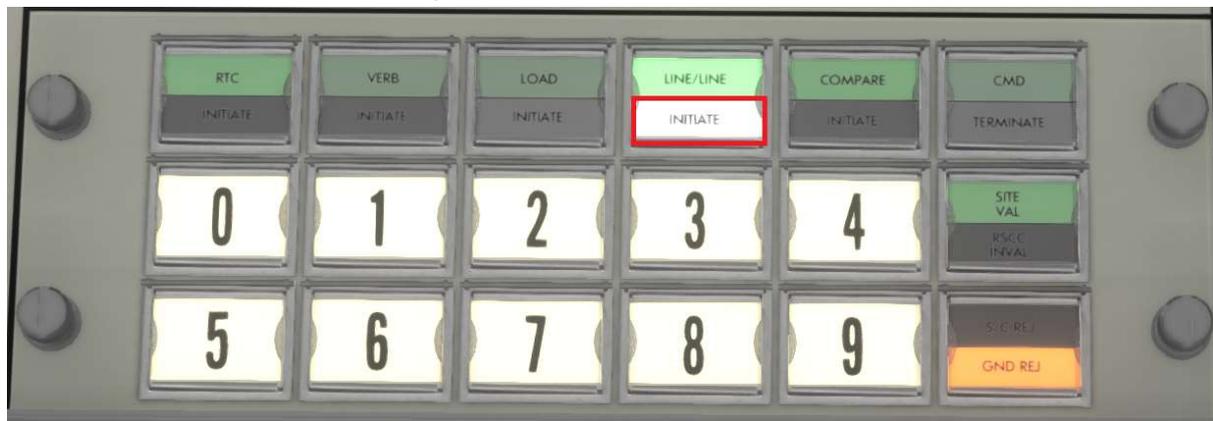
On the RTCC, press the LINE/LINE button:



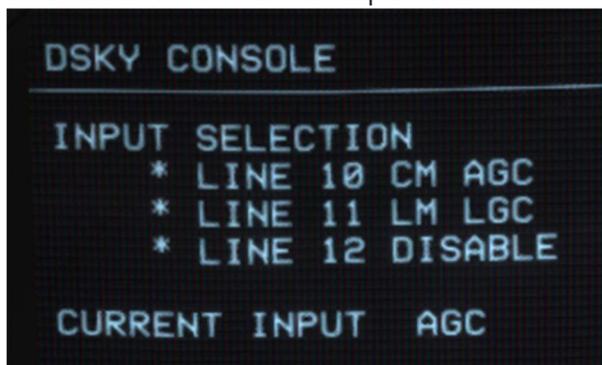
Then enter **1 0** on the keyboard. The input can be seen on the scratch pad on the monitor:



Then hit INITIATE below the LINE/LINE button to send the command to the RTCC.



You can now see that the input device selected is the AGC:



Let's take a look at a more advance program input method.

In the SPS BURN MONITOR, some of the parameters needs a number:



Line 10 in this case expects 4 digits. The (XXX.X) text indicates the expected format. There is no decimal keyboard button, so you will need to provide the input as indicated by the format. In this case, PHASE is in degrees, and can be set to a number between 000.0 and 360.0.

To input a parameter here, first press LINE/LINE and enter 1 0, then press INITIATE. The INITIATE button returns to gray, but the LINE/LINE button remains illuminated.



Insert **1800** and verify the input on the monitor, and cross-check with the format. Format was XXX.X meaning that 1800 equals to 180.0 degrees.



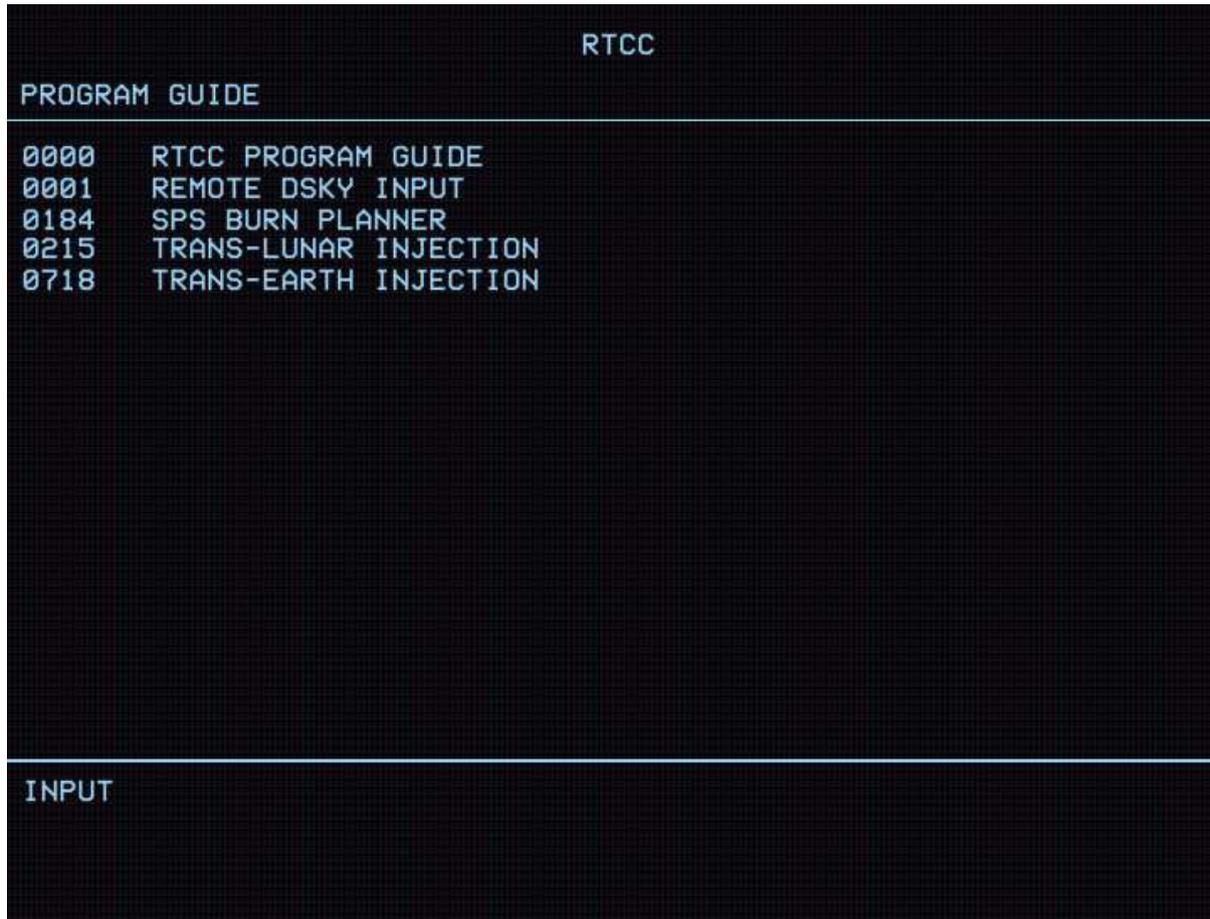
Then press INITIATE again to insert the variable. The green LINE/LINE button will extinguish and the parameter should be inserted.



3. PROGRAMS

This section contains a description of all the supported programs on the RTCC.

3.1 PROGRAM GUIDE



3.2 DSKY PROGRAM

```
RTCC  
-----  
DSKY CONSOLE  
-----  
INPUT SELECTION  
* LINE 10 CM AGC          UERB  NOUN  PRGM  
* LINE 11 LM LGC          00    00    00  
* LINE 12 DISABLE        REG 1  00000  
                           REG 2  00000  
                           REG 3  00000  
CURRENT INPUT  DISABLED  
                           LINE 99 PRO  
-----  
INPUT
```

3.3 SPS BURN PROGRAM

```
RTCC

SPS BURN PROGRAM
-----
LINE 10 PHASE (XXX.X)
      0
LINE 11 dV (XXXX.X)
      0
BURN DIRECTION
  ITEM 12 PROGRADE
  ITEM 13 RETROGRADE
SELECTION    PROGRADE

CALCULATION RESULTS
TIG
000:00:00
TIME TO IGNITION
000:00:00
ESTIMATED BURN LENGTH
AP: 0.0 NMI
PE: 0.0 NMI
TARGET VEL: 0

LINE 14 CALCULATE

LINE 99 UPLINK

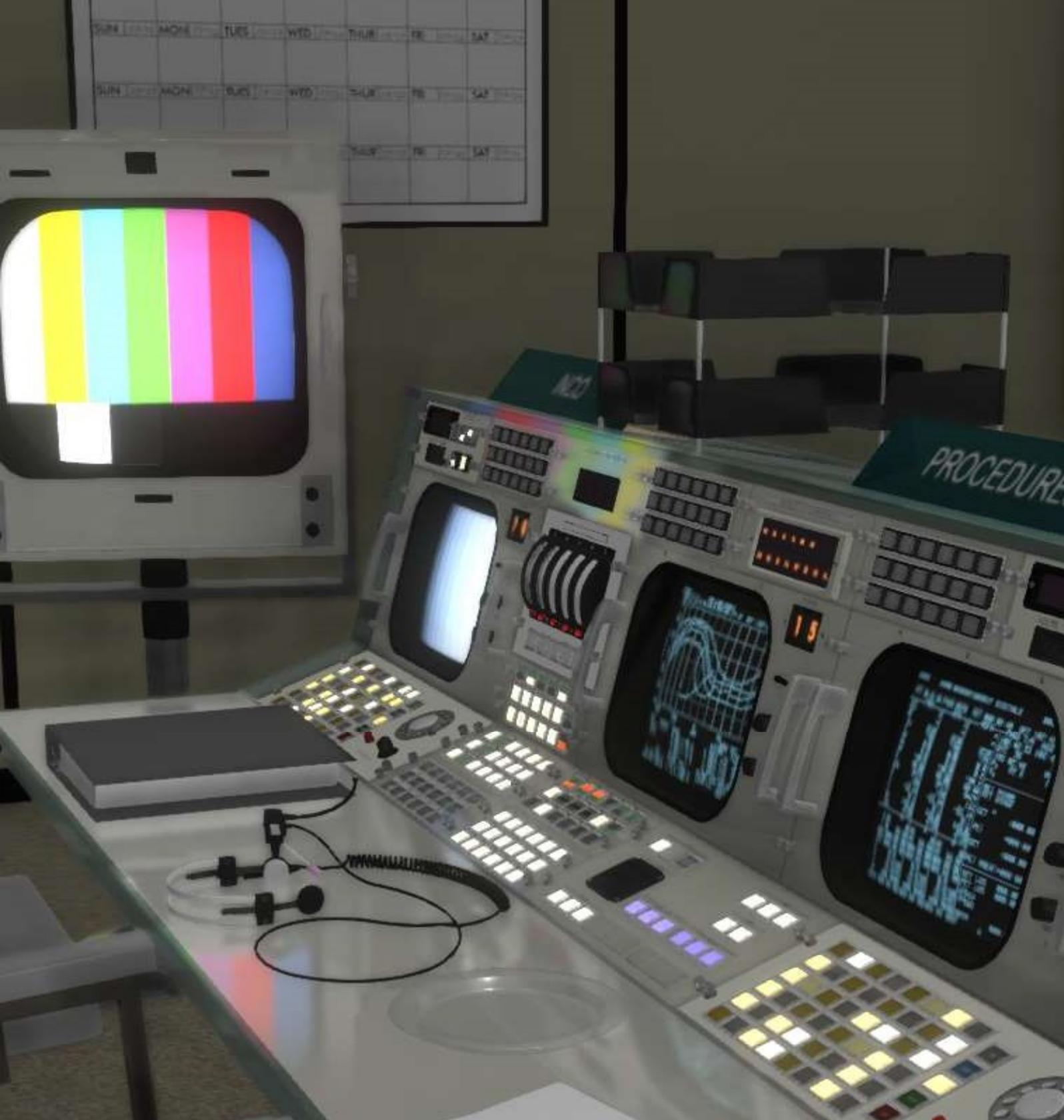
INPUT
```

3.4 TRANS-LUNAR INJECTION PROGRAM

```
RTCC  
TRANS-LUNAR INJECTION  
LINE 10 FLIGHT TIME (X.XXXXXX)  
0.399000  
LINE 11 SOI ANGLE (XXX.XXXX)  
145.9000  
LINE 12 DEPARTURE ANGLE (XXX.XXXX)  
013.7000  
LINE 14 CALCULATE  
CALCULATION RESULTS  
TIG  
000:00:00  
TIME TO IGNITION  
000:00:00  
TIME TO SOI  
000:00:00  
 $\Delta U$   
0.0 FT/S  
LUNAR PE  
0.0 NMI  
FREE RETURN PE  
0.0 NMI  
DEPARTURE PE  
0.0 NMI  
LINE 99 UPLINK  
INPUT
```

3.4 TRANS-EARTH INJECTION PROGRAM

```
RTCC  
TRANS-EARTH INJECTION  
-----  
LINE 10 ESCAPE VEL FRAC (X.XXXXXX)  
      1.100000  
CALCULATION RESULTS  
TIG  
000:00:00  
TIME TO IGNITION  
000:00:00  
TIME TO EI  
000:00:00  
 $\Delta U$   
0.0 FT/S  
EARTH PE  
0.0 NMI  
  
LINE 14 CALCULATE  
  
LINE 99 UPLINK  
-----  
INPUT  
021
```



VII. FLIGHT DIRECTOR

VII. FLIGHT DIRECTOR

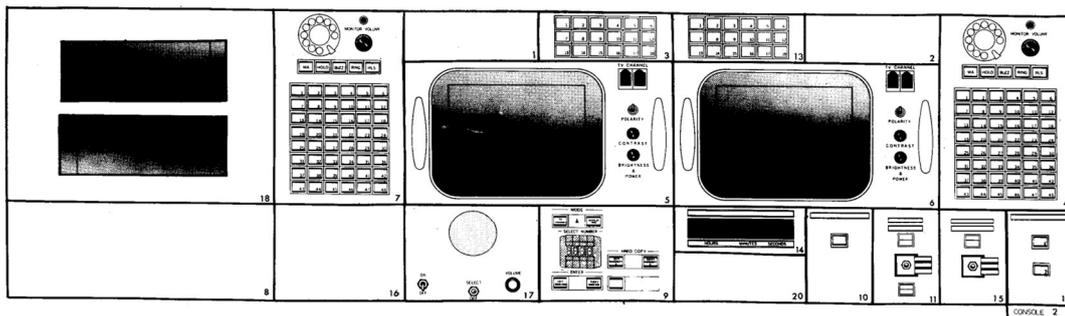
1. GENERAL

The flight director, or commonly known as FLIGHT, is the leader of the mission. FLIGHT has the responsibility of the safety of the crew and the success of the mission. FLIGHT has the ability to trigger the Abort A or B signal, as well as cancelling either the A or B signal. More on abort later.

1.1 THE DESK

03-26-71

LOC	DESCRIPTION	TYPE	NOTE	LOC	DESCRIPTION	TYPE	NOTE
01	BLANK PANEL	D11/6		11	TOGGLE SWITCH/INDICATOR/SW.	D9/98	
02	BLANK PANEL	D11/6		12	TWO PBI SWITCH	D9/4D3	
03	EVENT INDICATOR	D9/5B		13	EVENT INDICATOR	D9/5BU2	
04	VOICE COMM POSITION-3002	V48MFD		14	7 DIGIT CLOCK	D8/3	
05	TV MONITOR 14" PRECISION	C2/1		15	TOGGLE SWITCH/INDICATOR	D9/10C	
06	TV MONITOR 14" PRECISION	C2/1		16	BLANK PANEL	D11/14	
07	VOICE COMM POSITION-3003	V48MFD		17	VOICE COMM SPEAKER	C1/1	
08	BLANK PANEL	D11/16		18	SHELF PANEL (2)	C5/1	
09	MANUAL SELECT KEYBOARD	A6A/1		20	BLANK PANEL	D11/6	
10	SINGLE PBI SWITCH	D9/4A1					



FLIGHT DIRECTOR
CONSOLE NO. 02
ROOM NO. 330

TR155 1-02-02-01

FCBB DATA PACK 111.02.02.01

The layout of the desk can be seen in the drawing above. It has two monitors that can be configured to any channel as needed by the mission phase. In addition, MOCR has installed another panel that can be used to control the countdown (from the Gemini Control Room).



The HOLD and PROCEED indicators control the countdown timer.



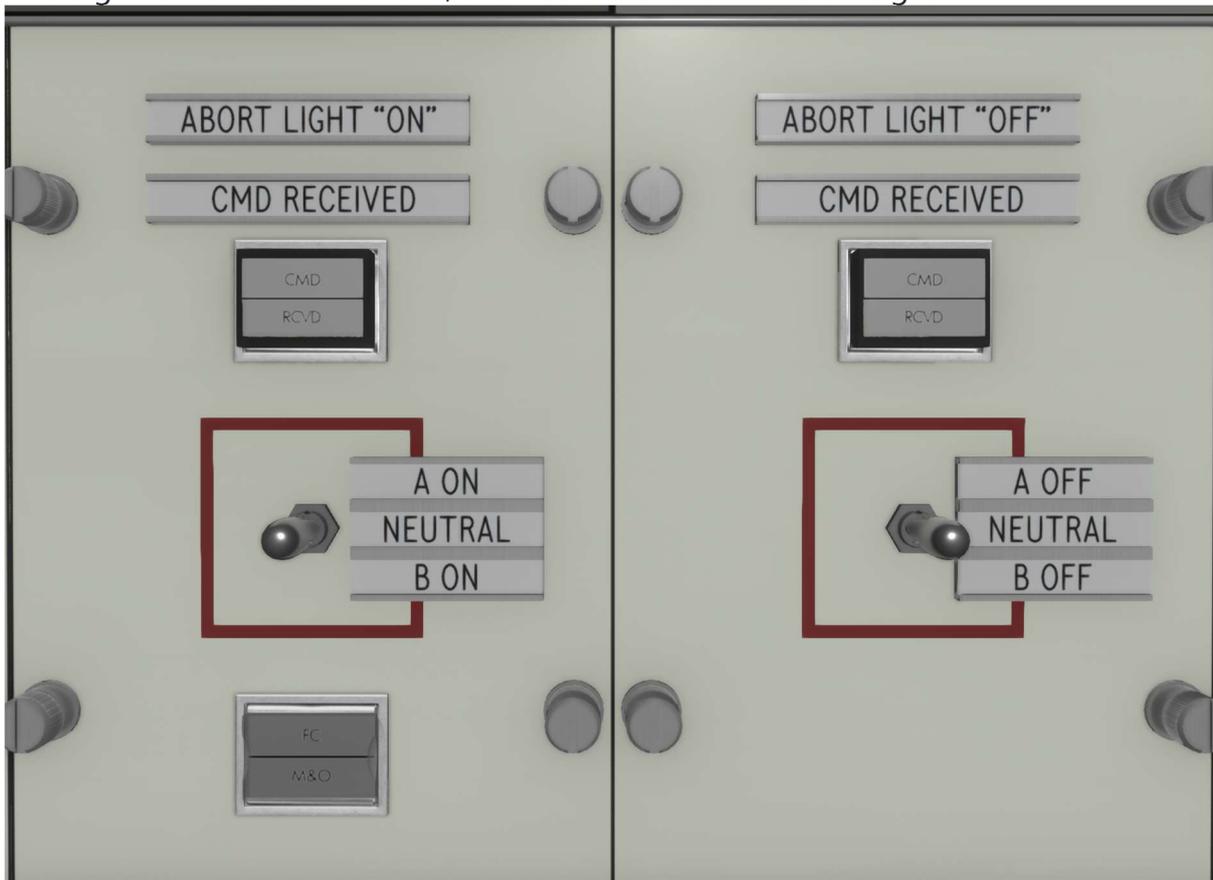
This is only used during countdown. It is useful to stop the countdown when you join a mission that starts from the launch pad, as people join in and get seated.

Another important panel for FLIGHT is that status of each of the seats. In this case, most seats are set to amber, and CAPCOM is set to GREEN. Unoccupied stations are unlit. Each desk has a light in this panel. It can be Amber (seat is occupied), Red

(NOGO), or Green (GO).



In case of an abort, the flight-director presses the abort-buttons, which lights the abort-light in the capsule. This is the cue for the astronaut to pull the abort handle. Two signals are needed for this, the Abort A and the Abort B signal.



FLIGHT can trigger one of the signals, A or B by setting the ABORT LIGHT ON switch to A or B. FLIGHT can also cancel a signal by using the ABORT LIGHT OFF switch.

1.2 OPERATION

The Flight Director oversees the mission. Often referred to as FLIGHT with primary role of leading the mission, the team, and have final call on decisions. The role is mainly focused on the information received over the intercom, and discussions with the other mission controllers. FLIGHTs eyes and ears are mostly focused on the room, and not in the station. Therefore, the seat is placed in the middle of the room with a good view of the map and the other stations.

Flight should have a good understanding of the flight plan (if any), knowledge of the spacecraft as a complete vehicle, and quickly be able to understand if something seems abnormal in any way. FLIGHT has to rely on information between other mission controllers, and should also lead the room when people are joining, such as roles, and how everyone should behave in the room, how the interaction between the room and the Astro should work (CapCom only?), or even set up rules such as setting desk to amber, what intercoms to use for voice (all in one, or each in their own intercom, and then be able to filter the room with the yellow buttons, etc.)

With exception of the intercom, the station has some tools that are frequently used. The map itself is in a good distance to quickly take a glance at the information available, as well as the projectors on the left and right side of it.



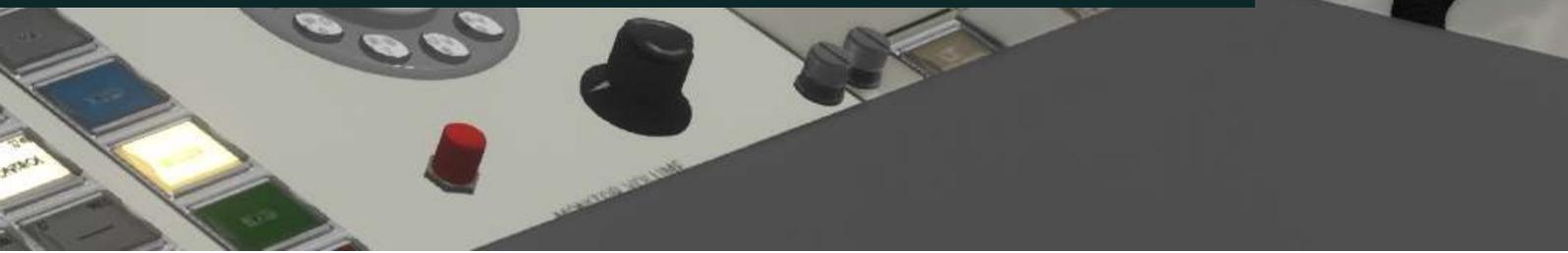
A good FLIGHT leads the room, keeps the order, and makes sure the mission is progressing according to plan. FLIGHT should have a clear vision for the mission, its objectives and how to get there.

NO 1	44 01	91			
CONSCR	CH	MSK	TITLE	CONSCR	
		92			
		93			

CAPCOM



VII. CAPSULE COMMUNICATOR



VIII. CAPSULE COMMUNICATOR

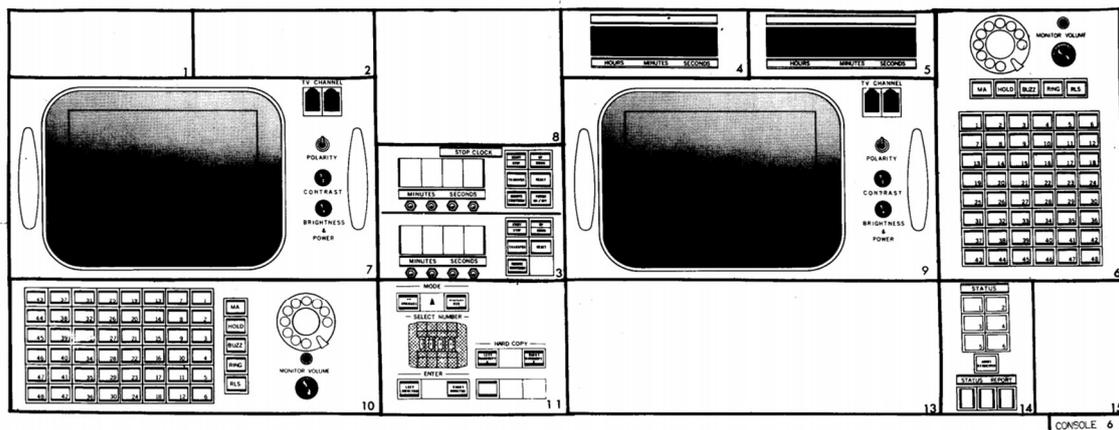
1. GENERAL

The Capsule Communicator aka. CAPCOM, is the only player who should talk directly with the astronauts. A dedicated intercom channel for the Air-to-Ground exists and is the only intercom where communication between the room and the astronaut can happen.

1.1 THE DESK

03-26-71

LOC	DESCRIPTION	TYPE	NOTE	LOC	DESCRIPTION	TYPE	NOTE
01	BLANK PANEL	D11/6		08	BLANK PANEL	D11/14	
02	BLANK PANEL	D11/6		09	TV MONITOR 14" PRECISION	C2/1	
03	STOP CLOCK	B12/2		10	VOICE COMM POSITION-3010	H48MFD	
04	6 DIGIT CLOCK	D8/1		11	MANUAL SELECT KEYBOARD	A6A/1	
05	7 DIGIT CLOCK	D8/3		13	BLANK PANEL	D11/16	
06	VOICE COMM POSITION-3C09	V48MFD		14	STATUS/STATUS REPORT	D9/1A	
07	TV MONITOR 14" PRECISION	C2/1		15	BLANK PANEL	D11/13	



TR155 I-02-06-01

CAP COMM
CONSOLE NO. 06
ROOM NO. 330

FCUB DATA PACK III.02.02.04

The capcom desk has two monitors that can be configured to monitor data based on the mission phase, and the descriptions being made. If the communication topic surrounds the Fuel Cells, the desk can be configured so you see the data that is being discussed. In addition, the GMT and the GET time is seen, as CapCom needs to be on top of things such as burns etc. Two stop clocks can be used for this.



1.2 OPERATION

As with FLIGHT, the CapCom role is also mainly out-of-desk. Your role is to be the main (and most likely only) communication/voice link between the astronaut and the room. You will be the one talking with the astronaut, and the only one who should submit anything on the capsule intercom. You work with the room, listening in on team discussions, talking with FLIGHT on issues, as well as the various desks needed to provide information requested by the astronaut, or report important information from the room.

Your main tool will be the intercom, and if possible, be on voice if the astronaut is on voice. However, the Text-Intercom can also be used! The communication with the crew should be clear, explicit, and singular to keep order.

If multiple players talk with the astronaut, things will likely get out of hand pretty soon and the roles will start to mix up. The CapCom role should be filled by a person who is an astronaut, so they know how the panels work, and visually be very familiar with how the cockpit and layout is set up, in order to describe things and help locating switches if needed. If you are talking with the astronaut, you should speak their language basically.

BOOSTER

001:20:57

25

04

1402 1402
Q BALL ULL PRESS
P DX10 FUEL
23 5 22 1

ATT ERROR	DSKV
P 00	P 00
V 00	U 00
R 00	H00
L 000	R1 00000
	R2 00000
	R3 00000

SEC SEP UT FAIL
VOLT GIM NO
REC P Y D U C
TGN V R GPF

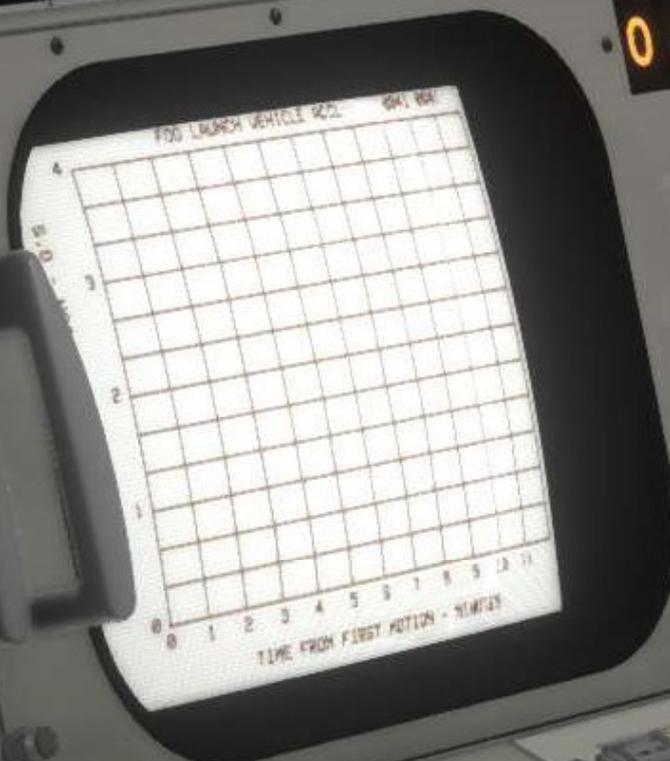
S/C CONT

DIR	FAIL
K19	CNTL

HVD SYS COLD ME
PR L SUP
P V REB

PLATFORM

SUP PRS
BRN PRS
SIUB
PRESS FLUEL
L H



IX. BOOSTER

IX. BOOSTER

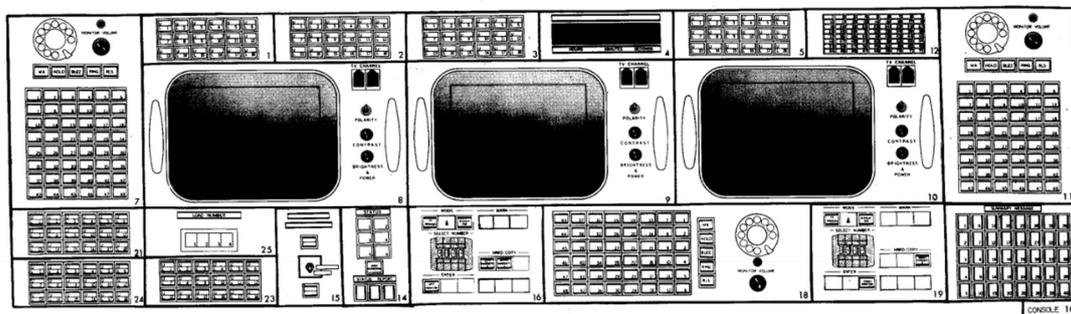
1. GENERAL

The Booster Systems Engineer (BSE) aka. BOOSTER has responsibility for the pre-launch, ignition and ascent systems for the S-IC, S-II and S-IVB stages. It's one of the largest desks and is used until the completion of a Trans-Lunar Injection burn, or when the S-IVB is staged. The BSE should be familiar with the stages of the Saturn V rocket, and monitor their performance and operation during the ascent. The BSE role has the capability of requesting an abort. The desk is not used for the remainder of the mission.

1.1 THE DESK

03-26-71

LOC	DESCRIPTION	TYPE	NOTE	LOC	DESCRIPTION	TYPE	NOTE
01	EVENT INDICATOR	D9/5B		14	STATUS/STATUS REPORT	D9/1A	
02	EVENT INDICATOR	D9/5B		15	TOGGLE SWITCH/INDICATOR	D9/9A	
03	EVENT INDICATOR	D9/5B		16	MANUAL SELECT KEYBOARD	A6B/5	
04	7 DIGIT CLOCK	D8/3		17	SUMMARY MSG ENABLE KEYBOARD	A19/A	
05	EVENT INDICATOR	D9/5B		18	VOICE COMM POSITION-3018	H48MFD	
07	VOICE COMM POSITION-3016	V48MFD		19	MANUAL SELECT KEYBOARD	A6B/6	
08	TV MONITOR 14" PRECISION	C2/1		21	SWITCH MODULE	D9/40F	
09	TV MONITOR 14" PRECISION	C2/1		23	SWITCH MODULE	D9/40E	
10	TV MONITOR 14" PRECISION	C2/1		24	SWITCH MODULE	D9/40F	
11	VOICE COMM POSITION-3017	V48MFD		25	LOAD NUMBER INDICATOR	D9/41B	
12	EVENT INDICATOR (72)	D9/28					



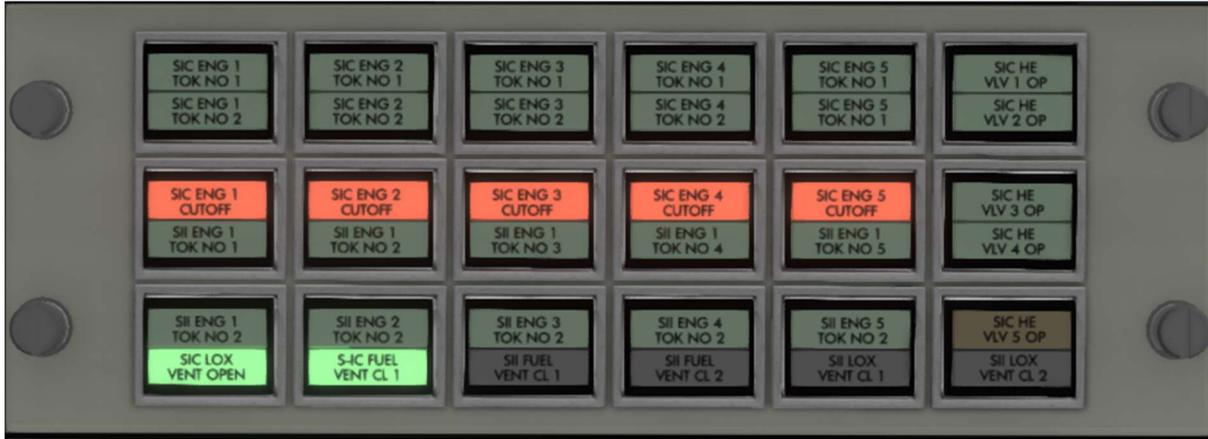
BOOSTER SYSTEMS ENGINEER
CONSOLE NO. 10
ROOM NO. 330

TR155 I-02-10-01

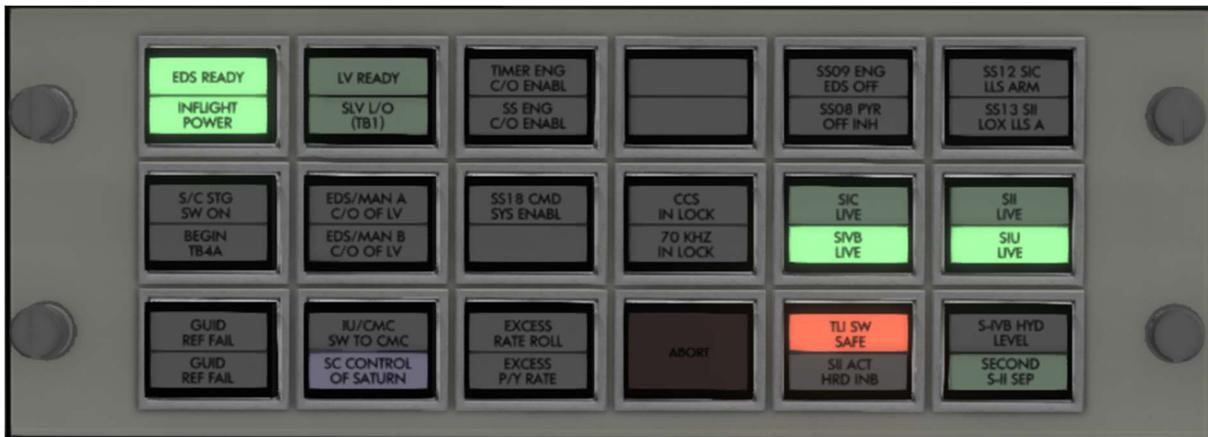
SLV DATA PACK V.02.02.01

The BOOSTER desk has three monitors that should monitor the BSE TV channels and any other based on need during the ascent. The main tools are these monitors, as well as 5 panels with arrays of telilight that shows the status of various systems and equipment.

Panel 1 contains Telights for the thrust signal (Thrsut Not OK) for S-IC and S-II, as well as some He vent valves etc.



Panel 2 contains guidance, IU and abort related telights.



Panel 3 is mainly for the S-IVB.



Panel 4 is the Mission Timer (GET).



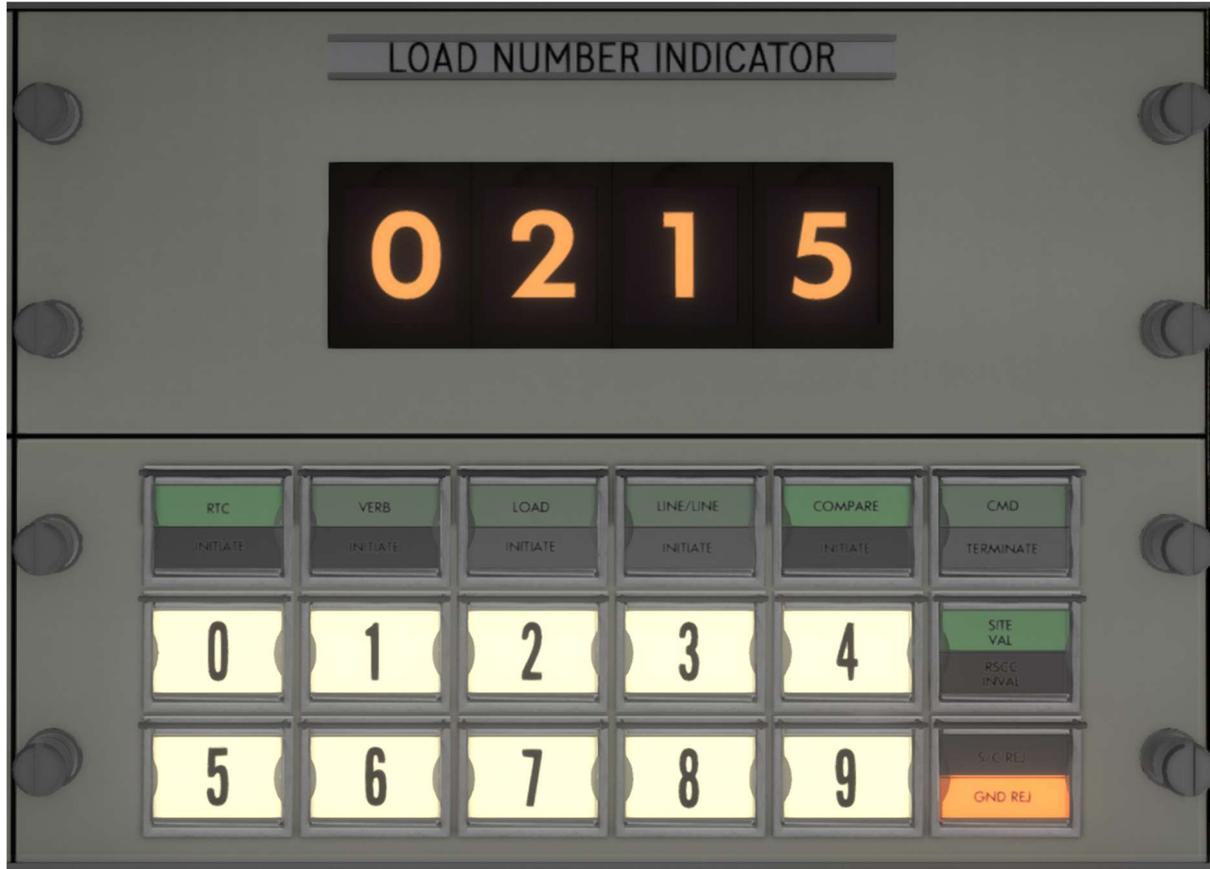
Panel 5.



Panel 6.



The desk also has the RTCC interaction module and the Load Number Indicator. Both are used to control the RTCC as described in the Real-Time Computer Complex chapter.

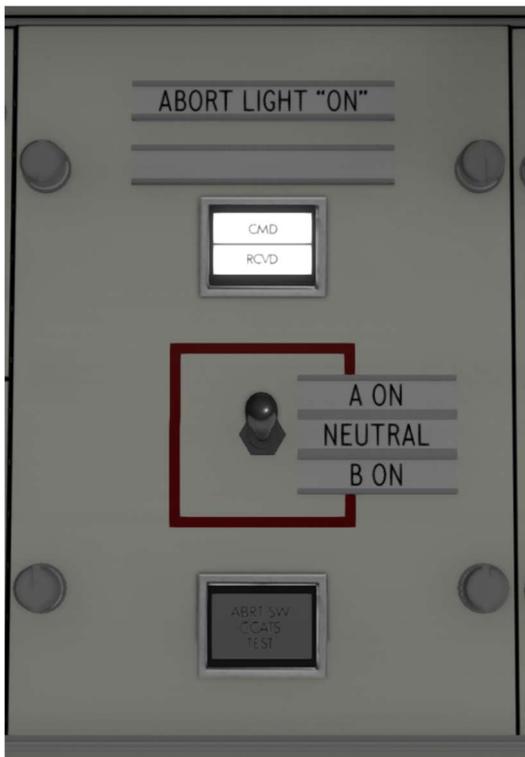


When insertion is reached and the insertion checklists are done, the RTCC will be used to calculate the TLI burn. This is the role of the BSE, while GUIDANCE makes sure that the AGC is set up correctly, can receive the data and that the AGC is set up correctly etc.

Channel 90 shows the RTCC interface for program 0215 (TRANS-LUNAR INJECTION):



BSE can trigger one of the abort mode signals using the ABORT LIGHT "ON" panel. Either signal A or B can be triggered.



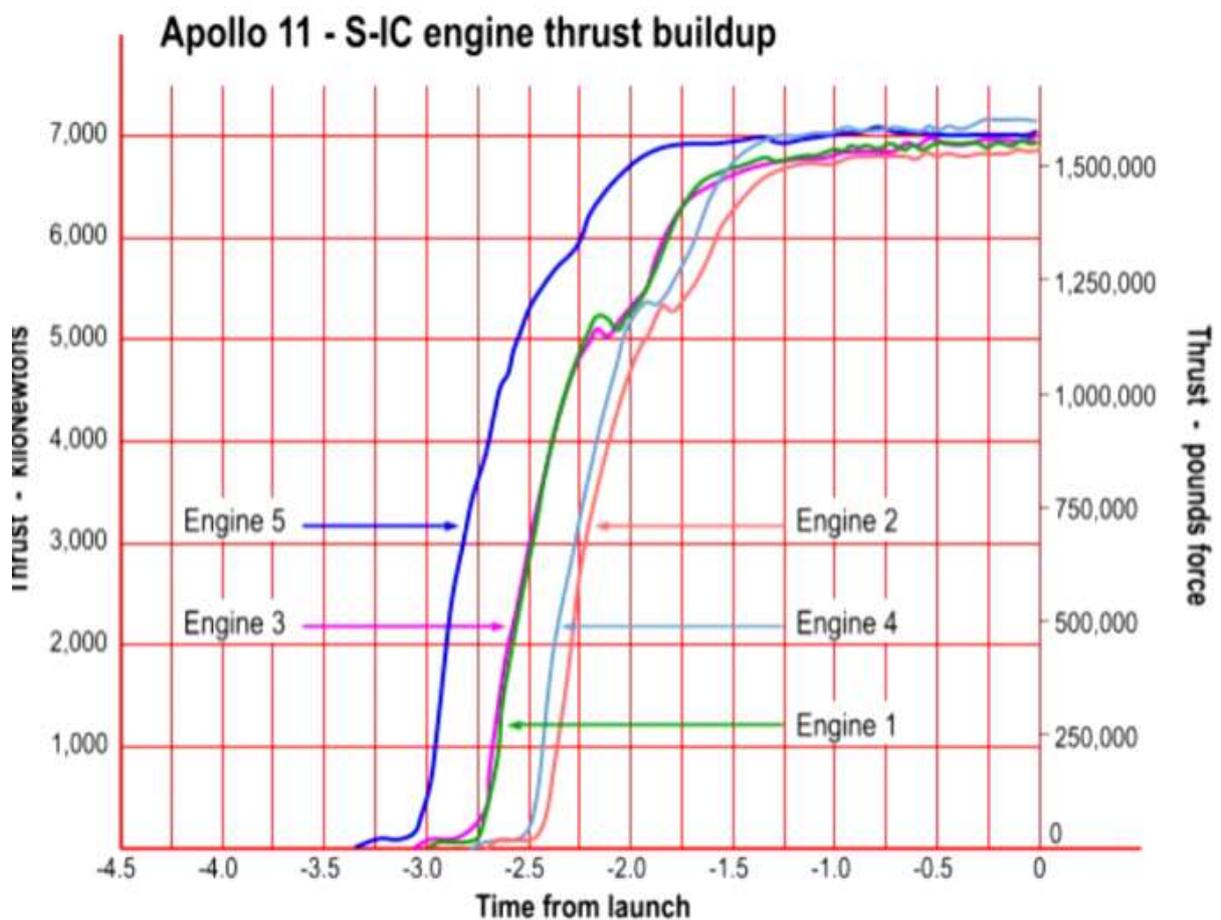
Three intercom panels exist based on where your attention is, two with the portrait layout and one with the landscape layout.

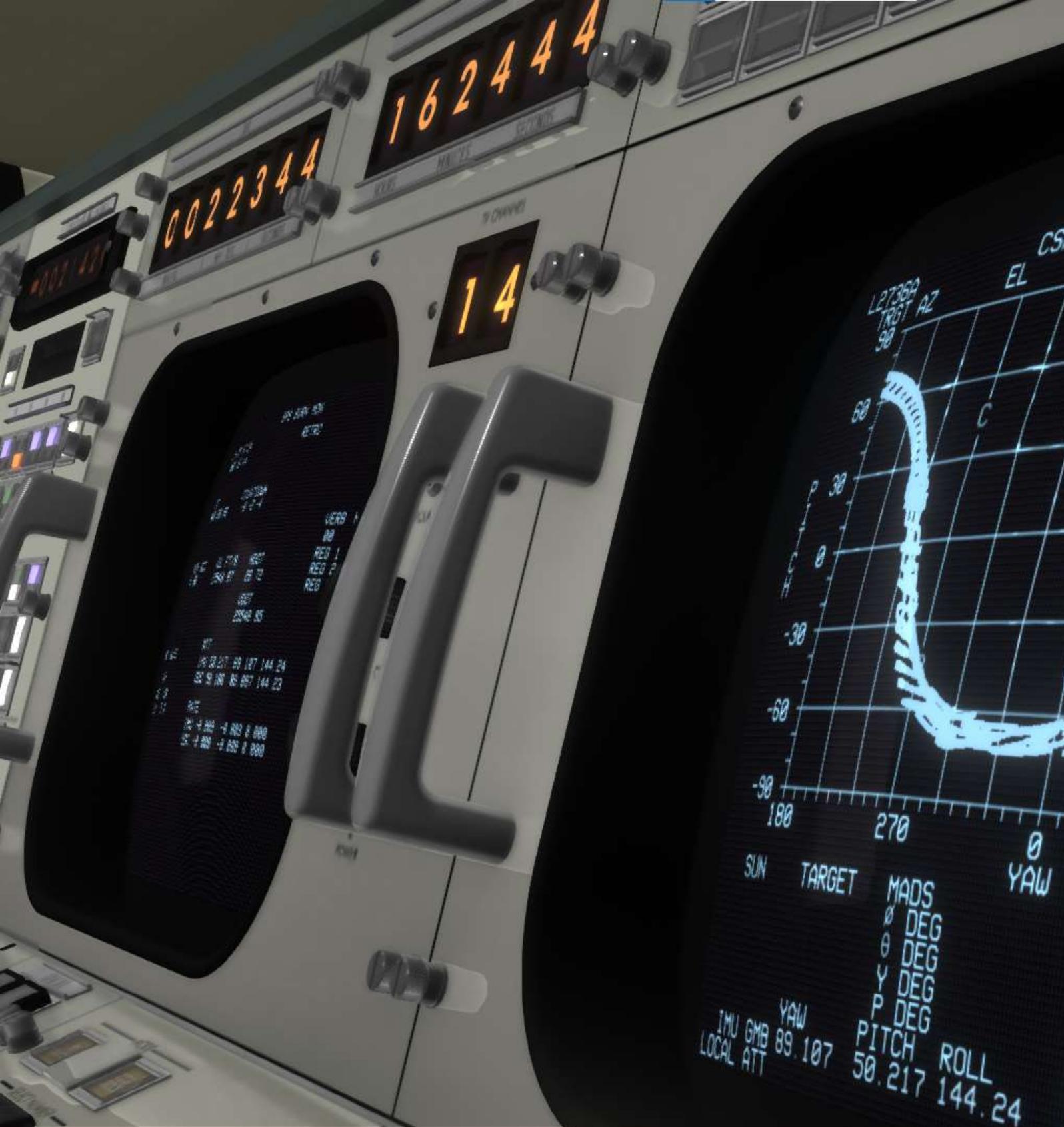
Two panels to control the monitors exist, one to change the left and center monitor, and another to change the right monitor.



1.2 OPERATION

The main responsibility for BOOSTER is the ascent and the performance of the Saturn V rocket. The BSE role basically owns the Saturn V from an engineering perspective. The BSE should call out the staging data, thrust OK data and verify proper ignition and the ignition sequence.





X. RETRO



X. RETRO

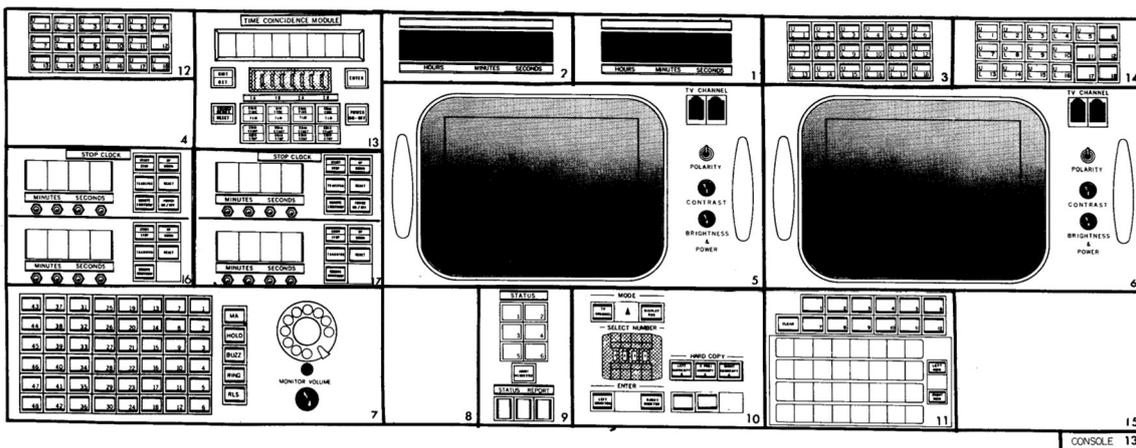
1. GENERAL

The Retrofire Officer (RFO) aka. RETRO has responsibility of getting the crew safely back to Earth with a safe landing. The main player of a return to Earth maneuver, either through a Trans-Earth Injection burn (TEI), or a direct abort, is the Service Propulsion System (SPS). The desk is also a key player in the landing phase after entry.

1.1 THE DESK

03-26-71

LOC	DESCRIPTION	TYPE	NOTE	LOC	DESCRIPTION	TYPE	NOTE
01	6 DIGIT CLOCK	D8/1		10	MANUAL SELECT KEYBOARD	A6A/4	
02	7 DIGIT CLOCK	D8/3		11	DISPLAY REQUEST KEYBOARD	A16/A	
03	SWITCH MODULE	D9/5A1		12	SWITCH MODULE	D9/5H1	
04	BLANK PANEL	D11/6		13	COINCIDENCE TIME	B13/1	
05	TV MONITOR 14" PRECISION	C2/1		14	SWITCH MODULE	D9/5G3	
06	TV MONITOR 14" PRECISION	C2/1		15	BLANK PANEL	D11/14	
07	VOICE COMM POSITION-3022	H48MFD		16	STOP CLOCK	B12/2	
08	BLANK PANEL	D11/13		17	STOP CLOCK	B12/2	
09	STATUS/STATUS REPORT	D9/1A					



TR155 I-02-13-01

RETROFFICE OFFICER
CONSOLE NO. 13
ROOM NO. 330

FDB DATA PACK VI.02.02.03

The RETRO desk has two monitors that should monitor the trajectory and the SPS engine during the deorbit/RTE (Return-To-Earth) burn, or the recovery related channels. The panel has 4 stop clocks used during the various burns, or by planning.



1.2 OPERATION

The main responsibility for RETRO is the retrofire burn and recovery, and the condition of the SPS engine during the TEI burn.



XI. FDO



XI. FDO

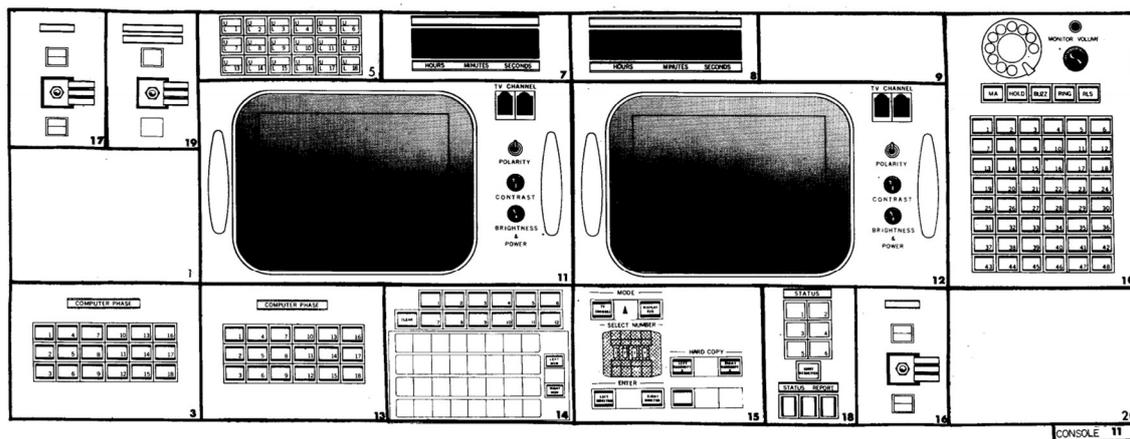
1. GENERAL

The Flight Dynamics Officer aka. FDO or FIDO monitors the trajectory of the vehicles (both CSM and the LM) during the entire mission. This includes watching orbital parameters, and the trajectories during Saturn V ascent, burns, Lunar Descents and Ascents, and entry. The FDO can request an Abort.

1.1 THE DESK

03-26-71

LOC	DESCRIPTION	TYPE	NOTE	LOC	DESCRIPTION	TYPE	NOTE
01	BLANK PANEL	D11/14		13	PHASE CONTROL KEYBOARD	A22/5	
03	PHASE CONTROL KEYBOARD	A22/4		14	DISPLAY REQUEST KEYBOARD	A16/A	
05	EVENT INDICATOR	D9/5B		15	MANUAL SELECT KEYBOARD	A6A/1	
07	6 DIGIT CLOCK	D8/1		16	TOGGLE SWITCH/INDICATOR	D9/9A	
08	7 DIGIT CLOCK	D8/3		17	TOGGLE SWITCH/INDICATOR	D9/10A	
09	BLANK PANEL	D11/6		18	STATUS/STATUS REPORT	D9/1A	
10	VOICE COMM POSITION-3019	V48MFD		19	TOGGLE SWITCH/INDICATOR	D9/9C	
11	TV MONITOR 14" PRECISION	C2/1		20	BLANK PANEL	D11/14	
12	TV MONITOR 14" PRECISION	C2/1					



FLIGHT DYNAMICS OFFICER
CONSOLE NO. 11
ROOM NO. 330

TR155 1-02-11-01

FDB DATA PACK VI.02.02.01



1.2 OPERATION

The main responsibility for FDO is to monitor the orbital parameters, be part of burn planning, or initiate correction burns, and monitor them to verify the trajectories of both the Saturn V, the CSM and the LM.



XII. GUIDANCE



XII. GUIDANCE

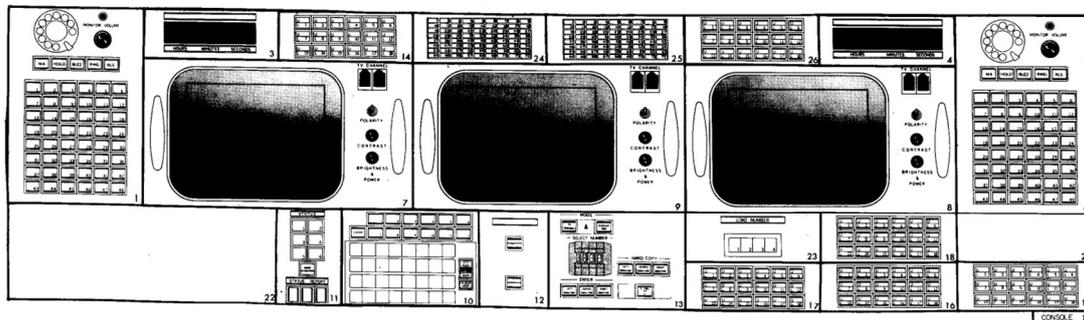
1. GENERAL

The Guidance Officer (GUIDO) aka. GUIDANCE is responsible for the guidance systems for both the CSM and the LM. This mostly involved the Apollo Guidance Computer and the Lunar Guidance Computer. Guido can use the RTCC for aid with burn planning with the person responsible for the burn (BOOSTER for TLI if needed, RETRO for TEI and FDO for the rest). GUIDANCE has the option to send DSKY commands to the CSM and the LM.

1.1 THE DESK

03-26-71

LOC	DESCRIPTION	TYPE	NOTE	LOC	DESCRIPTION	TYPE	NOTE
01	VOICE COMM POSITION-3020	V48MFD		14	EVENT INDICATOR	D9/5B	
03	6 DIGIT CLOCK	D8/1		15	EVENT INDICATOR	D9/5B	
04	7 DIGIT CLOCK	D8/3		16	SWITCH MODULE	D9/40E	
06	VOICE COMM POSITION-3021	V48MFD		17	SWITCH MODULE	D9/40E	
07	TV MONITOR 14" PRECISION	C2/1		18	SWITCH MODULE	D9/40E	
08	TV MONITOR 14" PRECISION	C2/1		21	BLANK PANEL	D11/6	
09	TV MONITOR 14" PRECISION	C2/1		22	BLANK PANEL	D11/16	
10	DISPLAY REQUEST KEYBOARD	A16/B		23	LOAD NUMBER INDICATOR	D9/41B	
11	STATUS/STATUS REPORT	D9/1A		24	EVENT INDICATOR (72)	D9/28	
12	TWO PBI SWITCH	D9/4D5		25	EVENT INDICATOR (72)	D9/28	
13	MANUAL SELECT KEYBOARD	A6A/33		26	SWITCH MODULE	D9/5A2	



TR155 1-02-12-01

GUIDANCE OFFICER
CONSOLE NO. 12
ROOM NO. 330

FDB DATA PACK VI.02.02.02

Bla bla



1.2 OPERATION

The main responsibility of guidance are the computers onboard, and the guidance systems from an execution perspective. While GNC is the engineer of the systems, guidance will focus on the actual attitude, and the usage of the computer during the various phases of the mission. Guidance can interact with the AGC and LGC, as well as the RTCC.

EECOM



XIII. EECOM

ECS CRVO TAB
1/05: 16:38
CF0014 PRIMARY COOLANT PUMP P
CF0016 ACCUM QTY
SF0260 RAD IN T
RAD OUT T
EUAP IN T
TEAM T
M P T

SITE EECOM
PCT
PSID
°C
°F
°F
°F
PSIA
°F

CSM	EPS	HIGH DENSITY
CC0000	AC	1
CC0001	AC	2
SC2000	AC	1
SC2001	AC	2
SC2002	AC	3
SC2003	AC	4
SC2004	AC	5
SC2005	AC	6
SC2006	AC	7
SC2007	AC	8
SC2008	AC	9
SC2009	AC	10
SC2010	AC	11
SC2011	AC	12
SC2012	AC	13
SC2013	AC	14
SC2014	AC	15
SC2015	AC	16
SC2016	AC	17
SC2017	AC	18
SC2018	AC	19
SC2019	AC	20
SC2020	AC	21
SC2021	AC	22
SC2022	AC	23
SC2023	AC	24
SC2024	AC	25
SC2025	AC	26
SC2026	AC	27
SC2027	AC	28
SC2028	AC	29
SC2029	AC	30
SC2030	AC	31
SC2031	AC	32
SC2032	AC	33
SC2033	AC	34
SC2034	AC	35
SC2035	AC	36
SC2036	AC	37
SC2037	AC	38
SC2038	AC	39
SC2039	AC	40
SC2040	AC	41
SC2041	AC	42
SC2042	AC	43
SC2043	AC	44
SC2044	AC	45
SC2045	AC	46
SC2046	AC	47
SC2047	AC	48
SC2048	AC	49
SC2049	AC	50
SC2050	AC	51
SC2051	AC	52
SC2052	AC	53
SC2053	AC	54
SC2054	AC	55
SC2055	AC	56
SC2056	AC	57
SC2057	AC	58
SC2058	AC	59
SC2059	AC	60
SC2060	AC	61
SC2061	AC	62
SC2062	AC	63
SC2063	AC	64
SC2064	AC	65
SC2065	AC	66
SC2066	AC	67
SC2067	AC	68
SC2068	AC	69
SC2069	AC	70
SC2070	AC	71
SC2071	AC	72
SC2072	AC	73
SC2073	AC	74
SC2074	AC	75
SC2075	AC	76
SC2076	AC	77
SC2077	AC	78
SC2078	AC	79
SC2079	AC	80
SC2080	AC	81
SC2081	AC	82
SC2082	AC	83
SC2083	AC	84
SC2084	AC	85
SC2085	AC	86
SC2086	AC	87
SC2087	AC	88
SC2088	AC	89
SC2089	AC	90
SC2090	AC	91
SC2091	AC	92
SC2092	AC	93
SC2093	AC	94
SC2094	AC	95
SC2095	AC	96
SC2096	AC	97
SC2097	AC	98
SC2098	AC	99
SC2099	AC	100

SEC	AL	PUMP	RAD	IN	PSIA	H2
CF0072	AL	PUMP	RAD	IN	PSIA	H2
CF0079	AL	PUMP	RAD	OUT	PSIA	H2
SF0262	AL	PUMP	RAD	OUT	PSIA	H2
SF0263	AL	PUMP	RAD	OUT	PSIA	H2
CF0071	AL	PUMP	RAD	OUT	PSIA	H2
CF0420	AL	PUMP	RAD	OUT	PSIA	H2
TOTAL	AL	PUMP	RAD	OUT	PSIA	H2
02-1	AL	PUMP	RAD	OUT	PSIA	H2
933-1	AL	PUMP	RAD	OUT	PSIA	H2
108-1	AL	PUMP	RAD	OUT	PSIA	H2
-358-1	AL	PUMP	RAD	OUT	PSIA	H2
325-1	AL	PUMP	RAD	OUT	PSIA	H2

CHARGE UNIT

XIII. EECOM

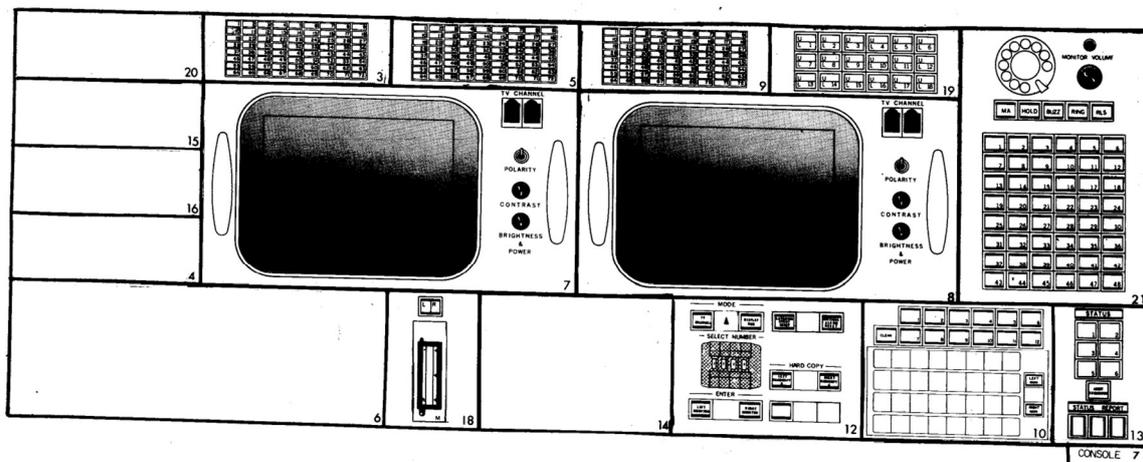
1. GENERAL

The Electrical, Environmental, and Communications controller aka. EECOM has the main responsibility for the electrical and environmental systems onboard the CSM. The main priority is to ensure the CSM is in a good state from a systems perspective to do its intended job. The EECOM should know the procedures for turning on and off the Fuel Cells, how the Main Bus is connected and what fuses and switches are used to tie it when something breaks.

1.1 THE DESK

03-26-71

LOC	DESCRIPTION	TYPE	NOTE	LOC	DESCRIPTION	TYPE	NOTE
03	EVENT INDICATOR (72)	D9/28		12	MANUAL SELECT KEYBOARD	A68/1	
04	BLANK PANEL	D11/6		13	STATUS/STATUS REPORT	D9/1A	
05	EVENT INDICATOR (72)	D9/28		14	BLANK PANEL	D11/14	
06	VOICE COMM POSITION-3011	H48MFD		15	BLANK PANEL	D11/6	
07	TV MONITOR 14" PRECISION	C2/1		16	BLANK PANEL	D11/6	
08	TV MCNITOR 14" PRECISION	C2/1		18	ANALOG METER (1)	D9/29B	
09	EVENT INDICATOR (72)	D9/28		19	BLANK PANEL	D11/6	
10	DISPLAY REQUEST KEYBOARD	A16/A		20	BLANK PANEL	D11/6	
				21	VOICE COMM POSITION-3012	V48-FD	



CSM EECOM ENGINEER
 CONSOLE NO. 07
 ROOM NO. 330

TR155 I-02-07-01

CSB DATA PACK I.02.02.01



1.2 OPERATION

The main responsibility for EECOM is the electrical and environmental systems onboard the CSM.

EECOM

EECOM



1/05 16:38 SITE EECOM

ECS CRYO TAB	PRIMARY COOLANT	ACCUM QTY	PCT
CF0014	PUMP P		PSID
CF0016	RAD IN T		°F
SF0260	RAD OUT T		°F
	EUAP IN T		°F
	EUAP OUT T		°F
	TEAM T		PSIA
	RES		°F

SEC	RAD IN	RAD OUT	PSIA
CF0072	258	258	HE 4
CF0079	99	99	HE 4
SF0262	108	108	HE 4
SF0263	-358	-358	HE 4
CF0071	258	258	HE 4
CF0420	99	99	HE 4
TOTAL	-419	-419	HE 4
02-1	258	258	HE 4
02-2	99	99	HE 4
02-3	108	108	HE 4
02-4	-358	-358	HE 4
02-5	258	258	HE 4

CSM EPS HIGH DENSITY	AC VOLTS	PSIA
CC0000 AC 1	28.00	HE
CC0000 AC 2	28.00	HE
CC0000 AC 3	28.00	HE
SC2060 AC 1	37.00	HE
SC2060 AC 2	37.00	HE
SC2060 AC 3	37.00	HE
SC2060 AC 4	37.00	HE
SC2060 AC 5	37.00	HE
SC2060 AC 6	37.00	HE
SC2060 AC 7	37.00	HE
SC2060 AC 8	37.00	HE
SC2060 AC 9	37.00	HE
SC2060 AC 10	37.00	HE
SC2060 AC 11	37.00	HE
SC2060 AC 12	37.00	HE
SC2060 AC 13	37.00	HE
SC2060 AC 14	37.00	HE
SC2060 AC 15	37.00	HE
SC2060 AC 16	37.00	HE
SC2060 AC 17	37.00	HE
SC2060 AC 18	37.00	HE
SC2060 AC 19	37.00	HE
SC2060 AC 20	37.00	HE
SC2060 AC 21	37.00	HE
SC2060 AC 22	37.00	HE
SC2060 AC 23	37.00	HE
SC2060 AC 24	37.00	HE
SC2060 AC 25	37.00	HE
SC2060 AC 26	37.00	HE
SC2060 AC 27	37.00	HE
SC2060 AC 28	37.00	HE
SC2060 AC 29	37.00	HE
SC2060 AC 30	37.00	HE
SC2060 AC 31	37.00	HE
SC2060 AC 32	37.00	HE
SC2060 AC 33	37.00	HE
SC2060 AC 34	37.00	HE
SC2060 AC 35	37.00	HE
SC2060 AC 36	37.00	HE
SC2060 AC 37	37.00	HE
SC2060 AC 38	37.00	HE
SC2060 AC 39	37.00	HE
SC2060 AC 40	37.00	HE
SC2060 AC 41	37.00	HE
SC2060 AC 42	37.00	HE
SC2060 AC 43	37.00	HE
SC2060 AC 44	37.00	HE
SC2060 AC 45	37.00	HE
SC2060 AC 46	37.00	HE
SC2060 AC 47	37.00	HE
SC2060 AC 48	37.00	HE
SC2060 AC 49	37.00	HE
SC2060 AC 50	37.00	HE

XIV. GNC

XIV. GNC

1. GENERAL

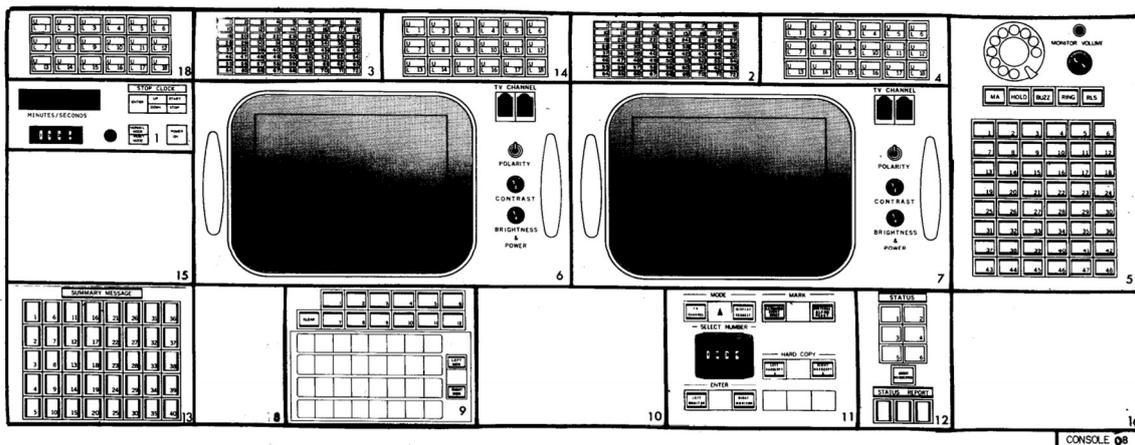
The Guidance, Navigation, and Control aka. GNC is responsible for the systems that enabled the CSM to point in a given direction, translate and function from a hardware perspective.

The primary systems involved is the Reaction and Control system and the Service Propulsion System, and the hardware around the guidance systems.

1.1 THE DESK

03-26-71

LOC	DESCRIPTION	TYPE	NOTE	LOC	DESCRIPTION	TYPE	NOTE
01	STOP CLOCK (4 DIGIT)	B12/3		10	BLANK PANEL	D11/14	
02	EVENT INDICATOR (72)	D9/28		11	MANUAL SELECT KEYBOARD	A6B/1	
03	EVENT INDICATOR (72)	D9/28		12	STATUS/STATUS REPORT	D9/1A	
04	EVENT INDICATOR	D9/5B		13	SUMMARY MSG ENABLE KEYBOARD	A19/A	
05	VOICE COMM POSITION-3013	V48MFD		14	EVENT INDICATOR	D9/5B	
06	TV MONITOR 14" PRECISION	C2/1		15	BLANK PANEL	D11/14	
07	TV MONITOR 14" PRECISION	C2/1		16	BLANK PANEL	D11/14	
08	BLANK PANEL	D11/13		18	EVENT INDICATOR	D9/5B	
09	DISPLAY REQUEST KEYBOARD	A16/A					



CSM GNC ENGINEER
 CONSOLE NO. 08
 ROOM NO. 330

TR155 1-02-08-01

CSB DATA PACK 1.02.02.02



1.2 OPERATION

The main responsibility for GNC is the engineering perspective of the guidance and control systems, the hardware used to maneuver the spacecraft.

TV CHANNEL

28

12001 SITE 6

RET	CDR U	DCA STAT
	LMP U	RCUR SIG
	TOT CUR	ST - ERR
	DES CLR	XNTR PD
	ASC CUR	
	TOT AUG	CAL 85 PCT
	DES AUG	CAL 15 PCT
	ASC AUG	LOCAL ROLL
	RCS_X	LOCAL PTCH
	RCS_Y_Z	LOCAL YAW
	AC VOLT	MA B/M C&M
	AC FREQ	ABRTLA STG
	P GDA	ED K1, K6
	R GDA	ED K7, K15
	DPS ARM	ASC AH CON
	DPS TCP	ASC AH RMG
	APS TCP	DES AH CON
	GR&SB T	DES AH RMG

BAT STAT	VOLT	TM-CLR-AUG
1E MI		
2E MI		
3E MI		
4E MI		
5E LMPN		
6E CDNR		

LMP
CDR
5 E
6 E

PRO
AC1 U
AC2 U
INU 1
INU 2
DPS TOP
APS TOP
DSC 2
DSC 3
CAL 85

BRIGHTNESS & POWER

MODE

LEFT MARK

XV.TELMU

LEFT MONITOR

ENTER

LEFT HARDCORE

HARD CORE

XV. TELMU

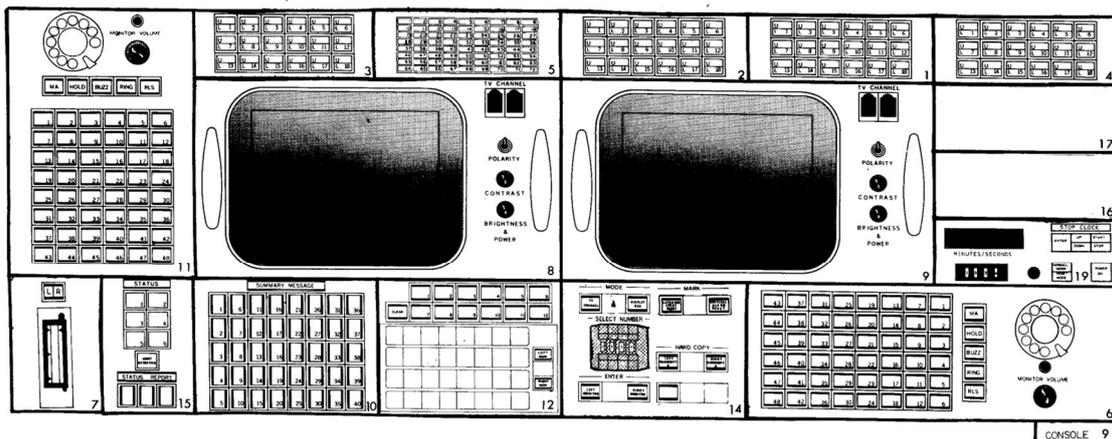
1. GENERAL

The Telemetry, Electrical, and EVA Mobility Unity console aka. TELMU is similar to the EECOM station but for the Lunar Module.

1.1 THE DESK

03-26-71

LOC	DESCRIPTION	TYPE	NOTE	LOC	DESCRIPTION	TYPE	NOTE
01	EVENT INDICATOR	D9/5B		10	SUMMARY MSG ENABLE KEYBOARD	A19/A	
02	EVENT INDICATOR	D9/5B		11	VOICE COMM POSITION-3015	V48MFD	
03	EVENT INDICATOR	D9/5B		12	DISPLAY REQUEST KEYBOARD	A16/A	
04	EVENT INDICATOR	D9/5B		14	MANUAL SELECT KEYBOARD	A6B/1	
05	EVENT INDICATOR (72)	D9/28		15	STATUS/STATUS REPORT	D9/1A	
06	VOICE COMM POSITION-3014	H48MFD		16	BLANK PANEL	D11/6	
07	ANALOG METER (1)	D9/29B		17	BLANK PANEL	D11/6	
08	TV MONITOR 14" PRECISION	C2/1		19	STOP CLOCK (4 DIGIT)	B12/3	
09	TV MONITOR 14" PRECISION	C2/1					



LM TELMU ENGINEER
CONSOLE NO. 09
ROOM NO. 330

TR155 I-02-09-01

LSB DATA PACK IV.02.02.01



1.2 OPERATION

The main responsibility for TELMU is the electrical and environmental systems onboard the Lunar Module.



XVI. CONTROL

XVI. CONTROL

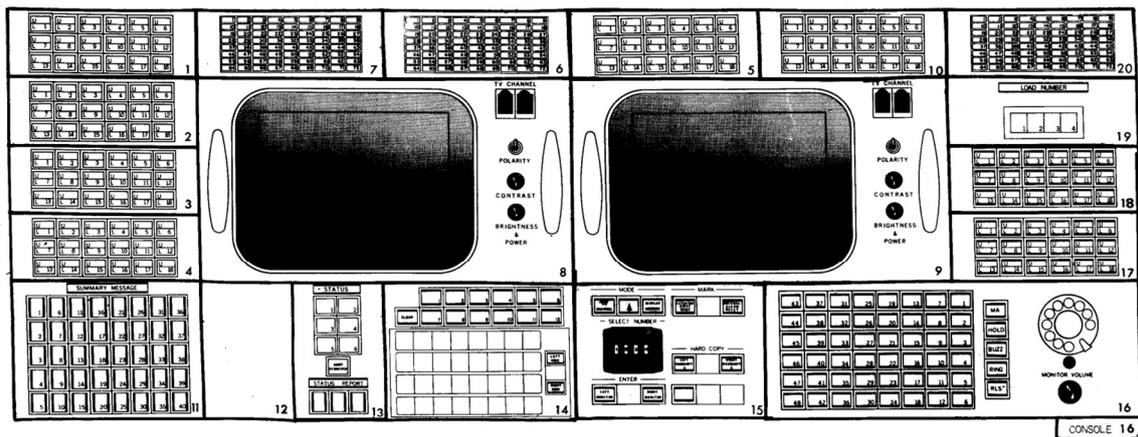
1. GENERAL

The CONTROL console is similar to the GNC console but for the CSM. It's responsible for the hardware used by guidance to point the Lunar Module where it should, and that the guidance systems get the proper data from the radars and so on.

1.1 THE DESK

03-26-71

LOC	DESCRIPTION	TYPE	NOTE	LOC	DESCRIPTION	TYPE	NOTE
01	EVENT INDICATOR	D9/5B		11	SUMMARY MSG ENABLE KEYBOARD	A19/B	
02	EVENT INDICATOR	D9/5B		12	BLANK PANEL	D11/13	
03	EVENT INDICATOR	D9/5B		13	STATUS/STATUS REPORT	D9/1A	
04	EVENT INDICATOR	D9/5B		14	DISPLAY REQUEST KEYBOARD	A16/A	
05	EVENT INDICATOR	D9/5B		15	MANUAL SELECT KEYBOARD	A6A/1	
06	EVENT INDICATOR (72)	D9/28		16	VOICE COMM POSITION-3027	H48MFD	
07	EVENT INDICATOR (72)	D9/28		17	SWITCH MODULE	D9/40E	
08	TV MONITOR 14" PRECISION	C2/1		18	SWITCH MODULE	D9/40E	
09	TV MONITOR 14" PRECISION	C2/1		19	LOAD NUMBER INDICATOR	D9/41B	
10	EVENT INDICATOR	D9/5B		20	EVENT INDICATOR (72)	D9/28	23



LM CONTROL ENGINEER
CONSOLE NO. 16
ROOM NO. 330

TR155 I-02-16-01

LSB DATA PACK IV.02.02.02



1.2 OPERATION

The main responsibility for CONTROL is the engineering perspective of the guidance and control systems, such as the hardware used for attitude control and maneuvering.



TV CHANNEL
16

MINUTES / SECONDS
00:00

POLARITY

CONTRAST

BRIGHTNESS
&
POWER

MISSION	TU GUIDE	CONSCR	CH	MS
25 MISSION 586 U	11 02			
267 AGC CMC DSKV				
613 CSM EPS CRVD	06 03			
478 UEH ACC	51 55			
983 GNC PRIMARY	04 02			
46 FDD CSM DRB	45 81			
253 SPS BURN MON	45 81			
1 TU GUIDE	84 01			
1402 SLV BSE NO 1	44 01			
TITLE	CONSCR	CH	MS	

XVII. ASSISTANT FLIGHT

MAIN PROJ SCREEN
AUX PROJ SCREEN

HARD COPY

XVII. ASSISTANT FLIGHT

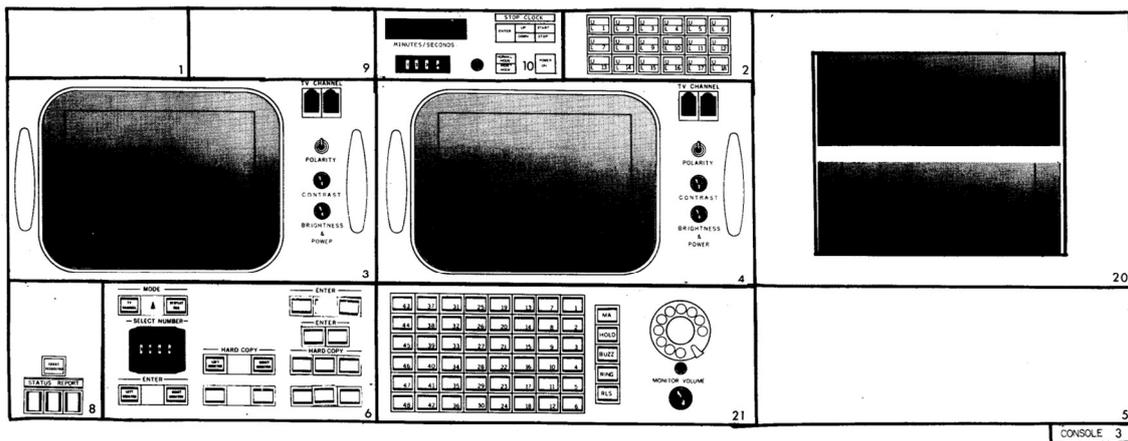
1. GENERAL

The Assistant Flight sits on the console next to FLIGHT and duplicates many of FLIGHT's roles, and monitored the mission status, and configured the projectors based on the mission status.

1.1 THE DESK

03-26-71

LUC	DESCRIPTION	TYPE	NOTE	LUC	DESCRIPTION	TYPE	NOTE
01	BLANK PANEL	D11/6		08	STATUS REPORTING	D9/18	
02	EVENT INDICATOR	D9/5B		09	BLANK PANEL	D11/6	
03	TV MONITOR 14" PRECISION	C2/1		10	STOP CLOCK (4 DIGIT)	B12/3	
04	TV MONITOR 14" PRECISION	C2/1		20	SHELF PANEL (2)	C5/1	
05	BLANK PANEL	D11/16		21	VOICE COMM POSITION-3004	H48MFD	
06	MANUAL SELECT KEYBOARD	A6E/1					



ASST FLIGHT DIRECTOR
 CONSOLE NO. 03
 ROOM NO. 330

TR155 1-02-03-01

FCCIB DATA PACK III.02.02.02



1.2 OPERATION

The main responsibility of the assistant flight director is to work directly with the flight director, and configure the operations room such as projectors.



XVIII. THE TROUBLEMAKER

LOC	DESCRIPTION
	BLANK PANEL
	PHASE CONTR
	EVENT INDIC
	6 DIGIT CLOC
	7 DIGIT CLOC
	BLANK PANEL
	VOICE CONTR
	TV MONITOR 14"
	TV MONITOR 16"

XVIII. THE TROUBLEMAKER

1. GENERAL

1.1 GETTING THE ROLE

The troublemaker role is handed out by the Astronaut and can be given to zero or many mission controllers. If a mission controller receives the role, they will have access to the failure-menu, and can start triggering issues onboard the spacecraft.

To open the troublemaker's tools, use the hot key CTRL+T. A new window will render on top of everything.

The only tool available for now is the FAILURES menu. If you do not have access, it will look like the below.



To request access, let the astronaut know over chat, or a different channel.

1.2 TRIGGERING FAILURES

Use CTRL+T to open the menu, and simply press FAIL on the component you wish to fail.

Nobody will know who issued the failure, when, or even if a failure has been issued. This is something that must be detected, and identified by paying attention to systems, both on ground, and by the astronaut in the spacecraft.