



**Flight Display (PFD)**

Altitude: 1250  
Vertical Speed: -1556  
Heading: 90  
Airspeed: 80  
Fuel: 110  
Temperature: 15

Buttons: PFD, Abort, A01, Nav Source, Bstr

Flight Mode: Flight.PFD | G 034/22:15:23 | Flight.Abort

UAS Status: UAS → Y/T → INN → ATO

Tripped Abort Triggers:

Gige 0/2	Roll	Pitch	Yaw	ReCS
FC 0/3	ReCS A 0/2	0/2	0/2	He P XXXX
RINU	ReCS B 0/2	0/2	0/2	Qty XXX
Tilt 0/3	US RGA 0/3			
USE	FS RGA 0/6			
FTS				
CEASE				
Sep				
ESM Pnl				
SRB Pc				

Control Failures:

	L Roll	R Roll	ReCS
RoCS A 0/3	0/3	0/3	He P XXXX
RoCS B 0/3	0/3	0/3	TK P XXX

Buttons: Abort, HECO Target, Nominal, Abort Oride

**Panel Lights and Panel Converter [F7]**

Lamp Test

Cockpit Lights

Inertial Free

Master Alarm

Survival RCS

Pitch Up

Down

Roll Left Right

Buttons: F3, F4, F5, F6, F7, F8, F9, F10, F11, F12, F13, F14, F15, F16, F17, F18, F19, F20, F21, F22, F23, F24, F25, F26, F27, F28, F29, F30, F31, F32, F33, F34, F35, F36, F37, F38, F39, F40, F41, F42, F43, F44, F45, F46, F47, F48, F49, F50, F51, F52, F53, F54, F55, F56, F57, F58, F59, F60, F61, F62, F63, F64, F65, F66, F67, F68, F69, F70, F71, F72, F73, F74, F75, F76, F77, F78, F79, F80, F81, F82, F83, F84, F85, F86, F87, F88, F89, F90, F91, F92, F93, F94, F95, F96, F97, F98, F99, F100

**Power Distribution Panel**

Batt 1-6: 128.0 V, 90%, 2000 W

Pwr A: 128.0 V, 600 W | Pwr B: 128.0 V, 600 W | Pwr C: 128.0 V, 600 W

D1s 1: 143.0 V, 1035 W | D1s 2: 128.0 V, 600 W | D1s 3: 128.0 V, 600 W

Load A: 600 W | Load B: 600 W | Load C: 600 W

Buttons: Pwr, FCM1, FCM2, FCM3, FCM4, FCM5, FCM6, FCM7, FCM8, FCM9, FCM10, FCM11, FCM12, FCM13, FCM14, FCM15, FCM16, FCM17, FCM18, FCM19, FCM20, FCM21, FCM22, FCM23, FCM24, FCM25, FCM26, FCM27, FCM28, FCM29, FCM30, FCM31, FCM32, FCM33, FCM34, FCM35, FCM36, FCM37, FCM38, FCM39, FCM40, FCM41, FCM42, FCM43, FCM44, FCM45, FCM46, FCM47, FCM48, FCM49, FCM50, FCM51, FCM52, FCM53, FCM54, FCM55, FCM56, FCM57, FCM58, FCM59, FCM60, FCM61, FCM62, FCM63, FCM64, FCM65, FCM66, FCM67, FCM68, FCM69, FCM70, FCM71, FCM72, FCM73, FCM74, FCM75, FCM76, FCM77, FCM78, FCM79, FCM80, FCM81, FCM82, FCM83, FCM84, FCM85, FCM86, FCM87, FCM88, FCM89, FCM90, FCM91, FCM92, FCM93, FCM94, FCM95, FCM96, FCM97, FCM98, FCM99, FCM100

**System Status Panel**

Coolant Loop 1: Pump B On, NH3 Sys 1 On

Coolant Loop 2: Pump B On, NH3 Sys 2 On

2 On, LCG Pump On

5 Fan 2: Speed High

SAT Phone, SAR Radio

Buttons: Trip, Low, Auto

**FCM and VPU Status**

Side 1: FCM 1 On, FCM 3 On, VPU 1 BFS On

Side 2: FCM 2 On, FCM 4 On

Buttons: F2, F3, F4, F5, F6, F7, F8, F9, F10, F11, F12, F13, F14, F15, F16, F17, F18, F19, F20, F21, F22, F23, F24, F25, F26, F27, F28, F29, F30, F31, F32, F33, F34, F35, F36, F37, F38, F39, F40, F41, F42, F43, F44, F45, F46, F47, F48, F49, F50, F51, F52, F53, F54, F55, F56, F57, F58, F59, F60, F61, F62, F63, F64, F65, F66, F67, F68, F69, F70, F71, F72, F73, F74, F75, F76, F77, F78, F79, F80, F81, F82, F83, F84, F85, F86, F87, F88, F89, F90, F91, F92, F93, F94, F95, F96, F97, F98, F99, F100

**Survival Pyros**

Pyro Master Arm, CM Prop Act, CM/SM Sep, Drogue Deploy, Main Deploy, Upright Deploy

Buttons: F4, F5, F6, F7, F8, F9, F10, F11, F12, F13, F14, F15, F16, F17, F18, F19, F20, F21, F22, F23, F24, F25, F26, F27, F28, F29, F30, F31, F32, F33, F34, F35, F36, F37, F38, F39, F40, F41, F42, F43, F44, F45, F46, F47, F48, F49, F50, F51, F52, F53, F54, F55, F56, F57, F58, F59, F60, F61, F62, F63, F64, F65, F66, F67, F68, F69, F70, F71, F72, F73, F74, F75, F76, F77, F78, F79, F80, F81, F82, F83, F84, F85, F86, F87, F88, F89, F90, F91, F92, F93, F94, F95, F96, F97, F98, F99, F100

**PDU Pwr Supply**

C1a Auto, C2a Auto, C1b Auto, C2b Auto

SM Pwr Supply: PCDU 1a Auto, PCDU 2a Auto, PCDU 1b Auto, PCDU 2b Auto

Battery: C1a On, C2a On, C1b On, C2b On

Battery/Aux Bus Voltmeter: 120.3 Volts

Source Select: Aux 1, Off, Aux 2, C1a, C1b, C2a, C2b, Baro Alt

Buttons: F5, F6, F7, F8, F9, F10, F11, F12, F13, F14, F15, F16, F17, F18, F19, F20, F21, F22, F23, F24, F25, F26, F27, F28, F29, F30, F31, F32, F33, F34, F35, F36, F37, F38, F39, F40, F41, F42, F43, F44, F45, F46, F47, F48, F49, F50, F51, F52, F53, F54, F55, F56, F57, F58, F59, F60, F61, F62, F63, F64, F65, F66, F67, F68, F69, F70, F71, F72, F73, F74, F75, F76, F77, F78, F79, F80, F81, F82, F83, F84, F85, F86, F87, F88, F89, F90, F91, F92, F93, F94, F95, F96, F97, F98, F99, F100

1  
00:00:06,070 --> 00:00:04,470  
yes my name is lee morin

2  
00:00:09,190 --> 00:00:06,080  
md phd

3  
00:00:11,669 --> 00:00:09,200  
and i'm a astronaut mission specialist

4  
00:00:14,230 --> 00:00:11,679  
with orion america is building a new

5  
00:00:15,749 --> 00:00:14,240  
spacecraft for exploration could involve

6  
00:00:18,070 --> 00:00:15,759  
missions to the moon missions to an

7  
00:00:19,990 --> 00:00:18,080  
asteroid missions to mars and we want

8  
00:00:23,349 --> 00:00:20,000  
orion to be able to do all those things

9  
00:00:26,710 --> 00:00:23,359  
to take four astronauts into deep space

10  
00:00:29,509 --> 00:00:26,720  
and return them safely to the earth and

11  
00:00:30,390 --> 00:00:29,519  
the goal was to build a cockpit user

12  
00:00:32,870 --> 00:00:30,400  
interface

13  
00:00:35,350 --> 00:00:32,880

a dashboard so to speak that would allow

14

00:00:37,190 --> 00:00:35,360

the crew to control that spacecraft for

15

00:00:39,190 --> 00:00:37,200

that period of time for these deep space

16

00:00:41,750 --> 00:00:39,200

missions and to have the flexibility so

17

00:00:43,350 --> 00:00:41,760

that even if they were away from the

18

00:00:45,110 --> 00:00:43,360

planet for

19

00:00:46,630 --> 00:00:45,120

months or even years

20

00:00:48,950 --> 00:00:46,640

that they would have the information

21

00:00:51,350 --> 00:00:48,960

they needed to fly that vehicle and

22

00:00:53,750 --> 00:00:51,360

return safely to the earth

23

00:00:56,549 --> 00:00:53,760

and the concept was to go with a glass

24

00:00:59,110 --> 00:00:56,559

cockpit and what that means is that the

25

00:01:01,990 --> 00:00:59,120

instruments are all images on a computer

26

00:01:03,990 --> 00:01:02,000

screen they are all on the glass so

27

00:01:06,390 --> 00:01:04,000

rather than flipping a physical switch

28

00:01:08,630 --> 00:01:06,400

the crew brings up a computer screen and

29

00:01:10,710 --> 00:01:08,640

flips a virtual switch a little icon of

30

00:01:14,230 --> 00:01:10,720

a switch or icon of a valve

31

00:01:16,310 --> 00:01:14,240

and with the exception of seven panels

32

00:01:18,390 --> 00:01:16,320

right around the computer screens which

33

00:01:20,630 --> 00:01:18,400

have about 60 switches

34

00:01:22,230 --> 00:01:20,640

that is all of the cockpit of orion

35

00:01:23,990 --> 00:01:22,240

happens on the glass

36

00:01:25,190 --> 00:01:24,000

one big benefit is a weight savings

37

00:01:26,550 --> 00:01:25,200

because you don't have to have a

38

00:01:30,550 --> 00:01:26,560

physical switch

39

00:01:32,310 --> 00:01:30,560

there the weight of the switch but you

40

00:01:33,270 --> 00:01:32,320

also have the weight of the wire to the

41

00:01:35,190 --> 00:01:33,280

switch

42

00:01:37,670 --> 00:01:35,200

and you have to have the weight of

43

00:01:40,950 --> 00:01:37,680

circuitry that takes that wire and feeds

44

00:01:43,670 --> 00:01:40,960

it into the vehicle computers by putting

45

00:01:46,149 --> 00:01:43,680

that on the computer screen you save

46

00:01:47,510 --> 00:01:46,159

that weight and you save the complexity

47

00:01:49,670 --> 00:01:47,520

of those wires

48

00:01:51,910 --> 00:01:49,680

that gives us a lot of flexibility and

49

00:01:53,670 --> 00:01:51,920

as we work with the cockpit if we find

50

00:01:55,590 --> 00:01:53,680

certain ways that we could do it better

51  
00:01:57,429 --> 00:01:55,600  
it's perhaps easier to update the

52  
00:01:59,830 --> 00:01:57,439  
software than it is to rewire the

53  
00:02:01,990 --> 00:01:59,840  
vehicle it's been very exciting to see

54  
00:02:02,870 --> 00:02:02,000  
the orion and the cockpit come together

55  
00:02:04,950 --> 00:02:02,880  
and to

56  
00:02:07,109 --> 00:02:04,960  
see the computer software that i've

57  
00:02:10,630 --> 00:02:07,119  
helped write and my colleagues have been

58  
00:02:13,510 --> 00:02:10,640  
writing come together and i think that

59  
00:02:15,350 --> 00:02:13,520  
these are the screens that

60  
00:02:17,350 --> 00:02:15,360  
some the first crew that goes to an

61  
00:02:19,110 --> 00:02:17,360  
asteroid will be looking at to help them

62  
00:02:21,110 --> 00:02:19,120  
control the vehicle these are the

63  
00:02:23,430 --> 00:02:21,120

screens that the first humans who go to

64

00:02:25,670 --> 00:02:23,440

mars we'll be looking at

65

00:02:27,350 --> 00:02:25,680

as that mission unfolds in the decades

66

00:02:30,150 --> 00:02:27,360

ahead the orion is going to be the

67

00:02:32,550 --> 00:02:30,160

linchpin of humanity's exploration

68

00:02:34,309 --> 00:02:32,560

beyond low earth orbit into deep space

69

00:02:36,070 --> 00:02:34,319

to get a chill thinking about the role