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SC-M-68-602

USER'S MANUAL FOR PLANETARY QUARANTINE LUNAR PROGRAMS
INFORMATION SYSTEM USING THE CDC 217 REMOTE CONSOLE

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October 1968

ABSTRACT

Portions of the research report describing the planetary quarantine computer programs and portions of the computer manufacturer's instructions have been extracted, rearranged, and combined to provide the remote console operator with a workable set of instructions.

Supported by Purchase Order R-09-019-040, Bioscience Division,
Office of Space Science and Applications, NASA Headquarters.

N70-29376

(ACCESSION NUMBER)

(THRU)

(PAGES)

(CODE)

CR-110339

(CATEGORY)

FACILITY FORM 602

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USER'S MANUAL FOR PLANETARY QUARANTINE LUNAR PROGRAMS INFORMATION SYSTEM USING THE CDC 217 REMOTE CONSOLE

Introduction

A computerized information system has been developed to provide information to the NASA Planetary Quarantine Officer regarding the microbiological contamination levels on outbound lunar spacecraft and on the lunar surface.¹ This system uses a CDC 3100 computer at Cape Kennedy coupled to a CDC 217 remote-display console in the Planetary Quarantine office in Washington. The system is programmed to provide a variety of information items by a structured but reasonable question-and-answer dialog between the user and the computer. This manual was prepared to guide the user on how to operate the hardware through the various branches of the "conversation" to the information at the branch ends.

Physical Characteristics

The hardware in the Planetary Quarantine Officer's office in Washington consists of a CDC 217 Remote Inquiry Display Console and a 218 Hard Copy Unit. The 217 consists of a 211 Cathode Ray Tube Display with keyboard input and a Display Controller mounted in the base cabinet of the 211. The Display Controller consists of the delay-line memory, control logic, and the interface for the Bell System's Data-Phone which connects the remote station to the CDC 3100 at Cape Kennedy. In this section we shall be primarily concerned with the operation of the 211 and 218.

Specification for the CDC 211 Entry Display Station

Display Format:	Twenty lines of 50 characters on a 6- x 8-inch display page
Character Size:	Nominally 1/8-inch wide by 1/4-inch high

¹A. L. Roark and A. L. Wyer, "An Interactive Computer Information System for Planetary Quarantine for Lunar Programs," SC-RR-68-545, July 1968.

Character Repertoire:	English alphabet in uppercase, arabic numerals (0-9), punctuation marks, commonly used symbols, and special symbols
Cathode Ray Tube Display:	White, variable-intensity symbols
Keyboard Input:	Standard typewriter keyboard arrangement. Operator composes, verifies, and if necessary corrects without affecting computer operation. An entry mark facilitates fast composition, verification, and correction of typing errors.

Specification for the CDC 218 Hardcopy Printer

Purpose:	Prints paper copies of selected display messages without affecting computer operation
Printer:	IBM Selectric typewriter
Output:	15-1/2 characters per second

Controls

The controls on the display equipment are divided into two groups. Controls on the display controller (the base cabinet) apply power, enable memory and manual release, and indicate alert and communicating conditions. The controls on the 211 itself are to apply power, adjust the cathode ray tube intensity, enter data into the equipment, and control its destination. Not all of these are important in everyday operations. We shall discuss only the more important ones without going into the technical details.

CDC 211 Controls

The controls on the CDC 211 consists of the display station keyboard and an On/Off/Intensity control located on the right hand side of the unit. Most of the keys on the keyboard are the same as those on a standard typewriter.

Depressing an alphanumeric key on the keyboard sends a symbol code to the display controller. Each character is stored in the delay-line memory and displayed on the screen as the message is composed. Located on the screen at all times, when the power is on, is a short line. This appears under the position where the next symbol will be displayed. As each symbol is entered from the typewriter this marker advances automatically and is returned to the left margin at the next lower vertical position automatically upon reaching the right hand margin. This marker is known as the "entry marker." Most of the controls which we will discuss on the keyboard deal with positioning the entry marker.

On/Off/Intensity Control -- The On/Off/Intensity control is a thumbwheel switch and a potentiometer. Turning the switch toward the rear turns on power to the display; turning it farther toward the rear increases its brightness.

SKIP Key -- The SKIP key is located on the keyboard. It is like the space bar on a typewriter in that it moves the entry marker forward one space.

SLEW Key -- The SLEW key is located on the keyboard. It causes a repeated skip of the entry marker while the key is depressed.

CLEAR Key -- The CLEAR key is located on the keyboard. It causes the entry marker to be moved to the upper left corner of the screen and all of the data to be cleared from the delay-line memory and the screen. If it is depressed at the time a message is being sent to the console from the computer the message will be rejected.

RESET Key -- The RESET key moves the entry marker to the upper left-hand corner of the screen, but without clearing the display on the screen. It is located on the keyboard.

LINE SKIP Key -- The LINE SKIP key causes the entry marker to be advanced to the left-hand margin of the next line. It is located on the keyboard.

PRINT Key -- The PRINT key, which is located on the keyboard, causes a hard copy of the display on the screen to be made by the CDC 218.

SEND Key -- The SEND key, located on the keyboard, causes the display then on the screen to be transmitted to the computer. The keyboard is locked until a response is received from the computer. The entry marker is reset to the upper left-hand corner of the screen.

Display Controller Controls

The switch indicator panel on the top of the display controller (the base cabinet of the console) contains a Power On switch, Mem Guard switch, Manual Release switch and Alert and Comm indicators. The only one of these which enters into routine operation is the Power On switch. Alternate depression of this switch causes the equipment to be turned on and off. Illumination of the switch indicates that power is turned on.

The Manual Release switch causes a send request to be cleared, the entry marker reset and the keyboard to be unlocked. Data displayed on the screen is unaffected by this switch. This switch allows the operator to regain control of the display if there is trouble either in the communication line or in the computer.

The Comm indicator when it is illuminated indicates that the computer is communicating with the console. This is a way in which the person using the console can verify that "all is well."

Operation of the Console

The use of the remote console is very straightforward. The person in the Planetary Quarantine Officer's office who wishes to get information from the data files maintained by the CDC 3100

1. Depresses the Power On switch to turn on the display controller
2. Rotates the On/Off/Intensity control backward to turn on the console
3. Depresses the CLEAR key
4. After a 30-second warmup, rotates the On/Off/Intensity control until the entry marker is visible in the upper left corner of the screen
5. Dials the number of the computer at Cape Kennedy. When the operator answers he informs him that he wishes to use the remote. The operator verifies that the computer is in operation and is ready to communicate with the console.

The user and the computer are then ready to communicate with each other using the dialog which will be discussed later in this manual.

When the dialog calls for the console user to send a message to the computer, he

1. Pushes the CLEAR key
2. Types in the message using the keyboard. In case of an error, the user can make corrections by using the LINE SKIP, SKIP, SLEW, BKSP, and RESET keys to move the entry marker to the correct location to retype the necessary information.
3. Pushes the SEND key.

The conversation then continues until the user is through getting data from the computer. To turn off the console, the user

1. Hangs up the telephone
2. Rotates the On/Off/Intensity control forward
3. Depresses the Power On switch.

This section of this manual has been a brief summary of the more important aspects of the general operation of the remote console;²

²If more detailed information is needed, refer to "Control Data Model 217-A (6012-A) Display Equipment Reference/Site Preparation Manual," Control Data Corporation, Pub. No. 82105600, August 1966.

other aspects of the operation will be given in later sections when appropriate.

Dialog Characteristics

As noted, the console language is cast in a conversational format. The computer displays a question to the user. The user's choice among allowable responses to the question determines the question or information displayed next on the console.

The user calls the computer by dialing the computer phone number. The computer operator makes the connection. The computer, when it senses this "interrupt," responds by displaying its first question to the user. The user, in turn, responds by typing in one of the responses appropriate to that question. That response triggers, in the initial steps, another question from the computer to the user. A short series of such questions and responses results in the display of the information desired by the user. Each response to a question narrows the area of interest. For instance, the first response might indicate an interest in "Apollo." The second could specify a particular Apollo flight. The third might specify an interest in the quantitative bioloading on a particular spacecraft module associated with that flight.

The user can, when desired, obtain a hard copy of the visual console display by pressing the PRINT key.

After each display of actual data, the operator clears the screen and types the word "Next." The computer asks if other information from the area being examined is desired. A "yes" response draws another question from the computer regarding what information is desired. For instance, the user might have obtained the quantitative loading on a spacecraft module, but would now like the qualitative listing for the same module. Through this short reprobing dialog, the user can obtain consecutive displays of the various types of information available at the end of that particular information branch.

A "no" response draws a question from the computer regarding interest in a branch at the next higher level of generality. For instance, if the user has obtained all of the information he desires about one module associated with a particular Apollo flight, the computer offers the opportunity to examine another module immediately. A second "no" response brings a question regarding interest at the next higher level, i.e., interest in a different Apollo flight. A third "no" response draws a question regarding further interest in Apollo-connected information. And a fourth "no" brings the opportunity to indicate interest in a different program altogether, i.e., Lunar Inventory. At any point in this dialog returning to higher levels of program generality, the user can respond with a "yes" and proceed, through questions and responses, to the information at the end of another branch. He can move out and back in this manner until he has the information he wants.

The user, for various reasons, may wish to terminate his dialog with the computer while obtaining information. He can terminate by

responding "off" to any question from the computer. This response causes the machine to break the communication connection.

Each time the computer receives a response other than "off," it compares that response with a list of permissible responses to that question. If the response is not permitted, the computer displays the message "Sorry, your response is in error." This can indicate several kinds of error. It can mean that the user has asked the computer to proceed to information not available in the branch being investigated. It can mean that the user, although proceeding properly along a branch, has used a response which is out of sequence. For instance, he might respond "CM QUANT" before the machine has sequenced beyond the branch where "AP XXX" is an appropriate reply. Or, it can simply mean that the operator has made a typographical error in his response.

Hopefully, the language has been designed so the computer will logically cue the next appropriate response set. And it is hoped that the response codes to be typed by the user are phonetic enough to obviate any extensive memorization and short enough to minimize typing errors. Practice with the system should develop operator confidence and comfort quite rapidly. It is suggested that the operator use the operating manual quite deliberately during initial uses.

User Response Codes

The code "XXX" as used in the following definitions indicates any three-figure alphanumeric identification. Some mission items carry three-digit numbers, for example, Command Module 127. Other items such as the lunar modules have two-digit identifiers. The code "XXX" when identifying a lunar module signifies a zero followed by a two-digit number, for example, Lunar Module 032. This practice simply allows the computer to search standardized identifier formats.

Code Abbreviations -- Abbreviations used in the codes have the following meanings:

CM	Command Module
SM	Service Module
CSM	Command and Service Module assembly
LM	Lunar Module
LMA	Lunar Module Ascent stage
LMD	Lunar Module Descent stage
IU	Instrument Unit
SLA	Spacecraft LM Adapter
S4B	Saturn IVB stage

The Codes -- The following codes denote the indicated meanings to the computer:

APOLLO	I want information from the Apollo computer program
LUNAR INVENTORY	I want information from the Lunar Inventory computer program
AP XXX	I want information concerning the specific Apollo flight "XXX"
CM XXX	I want information concerning Command Module "XXX"
SM XXX	... Service Module "XXX"
CSM XXX	... Command and Service Module "XXX"
LM XXX	... Lunar Module "XXX"
LMA XXX	... Lunar Module "XXX" Ascent stage
LMD XXX	... Lunar Module "XXX" Descent stage
IU XXX	... Instrument Unit "XXX"
SLA XXX	... Spacecraft LM Adapter "XXX"
S4B XXX	... Saturn IVB stage "XXX"
ITEM LIST	I want a list of the astronauts, suits, and modules associated with AP XXX
TOTAL QUAN	I want the sum of the quantitative microbial load predictions for the Command Module, Service Module, Lunar Module, Instrument Unit, Spacecraft LM Adapter, and SIVB stage assigned to AP XXX
CM QUAN	1. I want the quantitative microbial load predictions for the Command Module associated with AP XXX (if the user has arrived at this response via the AP XXX dialog branch), or

2. I want the quantitative microbial load predictions for CM XXX (if the user has arrived at this response via the CM XXX dialog branch).

(The meanings are the same as for "CM QUAN" except that the quantitative predictions for a different module or stage are wanted.)

SM QUAN
CSM QUAN
LM QUAN
LMA QUAN
LMD QUAN
IU QUAN
SLA QUAN
S4B QUAN
TOTAL QUAL

I want a merged list of the microorganisms which have been found on all of the modules associated with AP XXX

CM QUAL

1. I want a list of the microorganisms which have been found on the Command Module associated with AP XXX (if the user has arrived at this response via the AP XXX dialog branch), or
2. I want a list of the microorganisms found on CM XXX (if the user has arrived at this response via the CM XXX dialog branch).

(The meanings are the same as for "CM QUAL" except that the microorganisms list is for the specific module or stage indicated in the code.)

SM QUAL
CSM QUAL
LM QUAL
LMA QUAL
LMD QUAL
IU QUAL
SLA QUAL
S4B QUAL

FLIGHT NO	I want the identification of the Apollo flight to which MOD "XXX" is assigned
LOCATION	I want the present physical location of MOD "XXX"
MLAS	I want the Microbial Load at the next Apollo Site
PCLS	I want the Probability of Contamination of next Lunar Samples
LLML	I want the total Live Lunar Microbial Load
MCAP XXX	I want the Microbial Contamination remaining from the AP XXX mission
MCRA XXX	... from the Ranger XXX mission (Ranger 1 through 9)
MCSV XXX	... from the Surveyor XXX mission (Surveyor 1 through 7)
MCAI XXX	... from the AIMP XXX mission (AIMP A through E)
MCLO XXX	... from the Lunar Orbiter XXX mission (Lunar Orbiter 1 through 5)
MCLU XXX	... from the Luna (Russian unmanned) mission (Luna 1 through 13 as of now)
MCRM XXX	... from the Russian Manned XXX mission

The Dialog, Programs, and Information Available

Figures 1 through 13 portray in detail the dialogs leading to various items of information. Figures 1 through 3 cover the AP XXX dialog. This dialog is separated into "Item List," "Quantitative," and "Qualitative" segments, but this is artificial since all of the information is available through the same dialog. The separation is simply to provide uncrowded formats. Figures 4 through 12 portray the CM XXX, SM XXX, etc. dialogs, and Figure 13 portrays the Lunar Inventory dialog. All of these figures include the formats of the information available at the end of each branch and should be useful guides during familiarization with the system.

Figure 14 is a foldout chart which portrays in somewhat less detail the entire console dialog available in the system. This chart should be useful when the operator has gained confidence in using the dialog.

The computer's first question to the user is "What program would you like?" The user has two responses available to this question, "Apollo" or "Lunar Inventory." The "Apollo" response starts the computer along the Apollo branch and leads, ultimately, to information concerning scheduled flights, items associated with those flights, their locations at the Cape, and their microbial contamination. This branch leads only to information concerning Apollo flights which are still at the Cape or enroute to the moon. After an Apollo flight has landed on the moon, no more information about it may be obtained from the Apollo computer program; information about landed flights is different in character and is found in the Lunar Inventory program. (A historic recapitulation of data concerning a landed flight can be obtained from the permanent tape files but only in standard hard copy, not over the console.)

The "Lunar Inventory" response directs the computer along that program branch and leads to information on the dates, landing coordinates, and microbial loadings of past automated and manned shots, their current effects on lunar microbial loads, and their effects at the landing coordinates for the next Apollo flight and on its lunar samples.

The Apollo Dialog

Let us consider the case in which the user elects the "Apollo" response. The computer then asks "What Apollo flight or module?" The user can now elect to examine either (1) a total scheduled Apollo flight and each of its modules and stages, or (2) any specific module or stage in the files regardless of its Apollo flight association.

If he elects to examine a total flight, he responds with "AP XXX." The computer now asks "What AP XXX information do you want?" The user has a variety of options at this point. "Item List" (Figure 1) gets him a display of the identifications of the astronauts and suits, and the CM, SM, CSM, LM, IU, SLA, and SIVB stage associated with Apollo "XXX." "Total Quant" (Figure 2) gets him the predictions of the mean total number of aerobic vegetative, anaerobic vegetative, aerobic spore formers, and anaerobic spore formers on all of the modules and stages associated with Apollo "XXX." This display also shows the 90% confidence level for each type of contamination. And, finally, it provides the above mean total numbers for the date of the last samples, for the scheduled launch date, and for the scheduled lunar landing date.

The "CM (or SM, CSM, etc.) Quant" response portrayed by Figure 2 brings, for that one Apollo XXX-associated module or stage only, the mean numbers and confidence limits for the four types of organisms and the three dates defined under "Total Quant" in the last paragraph.

The "Total Qual" response (Figure 3) brings a merged list of the organisms found on all of the modules and stages associated with Apollo "XXX" as of the last sampling date. The merging of individual lists means that an organism is listed only once regardless of how often and where it is found. This display also indicates the probability that all microorganisms present on the hardware have been detected. The "CM (or SM, etc.) Qual" response in Figure 3 brings the microorganism list and detection probability for that specific Apollo XXX-associated module or stage. The qualitative displays are programmed to accommodate the listing of 100 microorganisms. The console accommodates only 20 lines of information, so the total display has been divided in six sequential, partial listings. The operator triggers the next display in sequence by clearing the screen and typing the word "Next." The return dialog (e.g., "Do you desire other ---XXX information?") provides the opportunity to move from any one information area on the "AP XXX" spectrum to any other.

The preceding are the options open to the user if he uses the "AP XXX" response to the computer's question, "What Apollo flight or module?" The "CM (or other module) XXX" response (Figure 4) brings the question, "What CM XXX information do you want?" Four responses are available, "Flight No," "Location," "CM Quant," and "CM Qual." The "Flight No" response brings a display identifying the Apollo flight to which CM XXX is assigned. "Location" brings a display stating the current Cape location (MSOB, VAB north bay, VAB south bay, Pad 39A or Pad 39B) of CM XXX. "CM Quant" brings the mean number and confidence limit display previously described under the "AP XXX" response except that here it can be requested for a module or stage associated with any unlanded Apollo flight, not just Apollo "XXX." The "CM Qual" response brings the list and detection probability described previously but, again, it can relate to a module or stage from any Apollo flight. As before, the return dialog permits the user to move from display to display for any or all "module XXX" (Figures 5 through 12).

This completes the dialog available under the Apollo program branch.

The Lunar Inventory Dialog

If the initial response to the computer's question, "What program would you like?" is "Lunar Inventory," the machine's second question will be "What Lunar Inventory information do you want?" The user currently has ten responses available (Figure 13).

The response "MLAS" (quantitative Microbial Load at next Apollo Site) calls for a display showing the landing coordinates of the next Apollo flight and the microorganisms per square meter alive at that location as of the last updating of the program. A second response, "PCLS" (Probability of Contamination of next Lunar Samples), brings a display stating the probability of contamination of the next lunar surface samples from previously deposited microbes and from microbes predicted to arrive with the next Apollo flight. The response "LLML" (total Live Lunar Microbial Load) generates a statement of the total number of live microbes remaining on the lunar surface from all previous lunar missions, manned and unmanned.

A series of seven response codes brings a display of the contamination remaining alive from any previous missions. These responses are of the form MCAP XXX (Microbial Contamination from the Apollo XXX mission). The other codes, MCRA XXX, MCSV XXX, MCAI XXX, MCLO XXX, MCLU XXX, and MCRM XXX denote the same information for the Ranger (RA), Surveyor (SV), AIMP (AI), Lunar Orbiter (LO), Russian Luna (LU), and Russian manned (RM) missions. The display for each mission contains the flight identification, launch date, landing date, landing coordinates, quantitative microbial load at launch, quantitative microbial load at impact, and the number of microbes still alive as of the date of last update. The return dialog available after each display provides an opportunity for examining, in consecutive fashion, any or all of the displays available from the Lunar Inventory program.

This completes the dialog currently available from the remote console.

APXXX "ITEM LIST" DIALOG

(Interrupt)

Computer:	"What program would you like?"
Operator:	APOLLO
Computer:	"What Apollo flight or module?"
Operator:	APXXX
Computer:	"What APXXX information do you want?"
Operator:	ITEM LIST
Computer:	<u>Astronaut</u> <u>Suit</u>

(up to 6 ea.)

CMXXX	SMXXX	CSMXXX
LMXXX	IUXXX	SLAXXX
S4BXXX		

The return dialog ("Do you desire other APXXX information?") permits consecutive displays in any order of any APXXX information items without repeating entire routine.

Figure 1

APXXX "QUANTITATIVE" DIALOG

(Interrupt)

Computer: "What program would you like?"

Operator: APOLLO

Computer: "What Apollo flight or module?"

Operator: APXXX

Computer: "What APXXX information do you want?"

Operator: (Can request each of the following)

TOTAL	CM	SM	CSM	LMA	LMD	LM	IU	SLA	S4B
QUAN	QUAN	QUAN	QUAN	QUAN	QUAN	QUAN	QUAN	QUAN	QUAN

Computer:

Mean No.	Sample	Launch	Impact
Date	Date	Date	Date

Aer.Veg.
Anaer.Veg.
Aer.S.F.
Anaer.S.F.

90% Conf.
Limit

Aer.Veg.
Anaer.Veg.
Aer.S.F.
Anaer.S.F.

Quantitative information will appear in the format indicated at left for the total APXXX spacecraft or for the APXXX-associated module selected by the operator.

The return dialog ("Do you desire other APXXX information?") permits consecutive displays in any order of any APXXX information items without repeating entire routine.

Figure 2

APXXX "QUALITATIVE" DIALOG

(Interrupt)

Computer: "What program would you like?"

Operator: APOLLO

Computer: "What Apollo flight or module?"

Operator: APXXX

Computer: "What APXXX information do you want?"

Operator: (Can request each of the following)

TOTAL	CM	SM	CSM	LMA	LMD	LM	IU	SIA	SAB
QUAL	QUAL	QUAL	QUAL	QUAL	QUAL	QUAL	QUAL	QUAL	QUAL

Computer: As of (date):

Sample	Launch	Impact
Date	Date	Date

Qualitative information will appear in the format indicated at left for the total APXXX spacecraft or for the APXXX-associated module selected by the operator.

(lists of organisms;
room for 100)

Probability all have been
identified = .XX

The return dialog ("Do you desire other APXXX information?") permits consecutive displays in any order of any APXXX information items without repeating entire routine.

Figure 3.

CMXXX DIALOG

(Interrupt)

Computer: "What program would you like?"

Operator: APOLLO

Computer: "What Apollo flight or module?"

Operator: CMXXX

Computer: "What CMXXX information do you want?"

Operator: (Can request each of the following)

FLIGHT NO	LOCATION	CM QUAN		CM QUAL	
		Sample Date	Launch Date	Impact Date	As of (date):
Computer: CMXXX is assigned to Apollo _____	CMXXX is located at _____	Mean No.			Sample Date
	(MSOB, VABN, VABS, Pad 39A, or Pad 39B)	Aer.Veg.			Launch Date
		Anaer.Veg.			Impact Date
		Aer.S.F.			
		Anaer.S.F.			(lists of organisms; room for 100)
	90% Conf. Limit				Probability all have been identified = .XX
	Aer.Veg.				
	Anaer.Veg.				
	Aer.S.F.				
	Anaer.S.F.				

The return dialog ("Do you desire other CMXXX information?") permits consecutive displays in any order of the above CMXXX information items.

Figure 4

SMXXX DIALOG

(Interrupt)

Computer: "What program would you like?"

Operator: APOLLO

Computer: "What Apollo flight or module?"

Operator: SMXXX

Computer: "What SMXXX information do you want?"

Operator: (Can request each of the following)

<u>FLIGHT NO</u>	<u>LOCATION</u>	<u>SM QUAN</u>		<u>SM QUAL</u>	
		Sample Date	Launch Date	Impact Date	As of (date):
Computer: SMXXX is assigned to Apollo _____	SMXXX is located at _____ (MSOB, VABN, VABS, Pad 39A, or Pad 39B)	Mean No.			Sample Date
		Aer.Veg.			Launch Date
		Anaer.Veg.			Impact Date
		Aer.S.F.			
		Anaer.S.F.			(lists of organisms; room for 100)
		90% Conf.			Probability all have been identified = .XX
		Limit			
		Aer.Veg.			
		Anaer.Veg.			
		Aer.S.F.			
		Anaer.S.F.			

The return dialog ("Do you desire other SMXXX information?") permits consecutive displays in any order of the above SMXXX information items.

Figure 5

CSMXXX DIALOG

(Interrupt)

Computer: "What program would you like?"

Operator: APOLLO

Computer: "What Apollo flight or module?"

Operator: CSMXXX

Computer: "What CSMXXX information do you want?"

Operator: (Can request each of the following)

<u>FLIGHT NO</u>	<u>LOCATION</u>	<u>CSM QUAN</u>		<u>CSM QUAL</u>	
Computer: CSMXXX is assigned to Apollo _____	CSMXXX is located at _____ (MSOB, VABN, VABS, Pad 39A, or Pad 39B)	Mean No.	Sample Date	Launch Date	Impact Date
		Aer.Veg.	_____	_____	_____
		Anaer.Veg.	_____	_____	_____
		Aer.S.F.	_____	_____	_____
		Anaer.S.F.	_____	_____	_____
		90% Conf. Limit	_____	_____	_____
		Aer.Veg.	_____	_____	_____
		Anaer.Veg.	_____	_____	_____
		Aer.S.F.	_____	_____	_____
		Anaer.S.F.	_____	_____	_____

As of (date):
Sample Date Launch Date Impact Date

(lists of organisms;
room for 100)
Probability all have
been identified = .XX

The return dialog ("Do you desire other CSMXXX information?") permits consecutive displays in any order of the above CSMXXX information items.

Figure 6

LMAXXX DIALOG

(Interrupt)

Computer: "What program would you like?"

Operator: APOLLO

Computer: "What Apollo flight or module?"

Operator: LMAXXX

Computer: "What LMAXXX information do you want?"

Operator: (Can request each of the following)

FLIGHT NO	LOCATION	LMA QUAN		LMA QUAL	
		Sample Date	Launch Date	Impact Date	As of (date):
Computer: LMAXXX is assigned to at Apollo _____	(MSOB, VABN, VABS, Pad 39A, or Pad 39B)	Mean No.			Sample Date
		Aer.Veg.			Launch Date
		Anaer.Veg.			Impact Date
		Aer.S.F.			
		Anaer.S.F.			(lists of organisms; room for 100)
	90% Conf. Limit				Probability all have been identified = .XX
		Aer.Veg.			
		Anaer.Veg.			
		Aer.S.F.			
	Anaer.S.F.				

The return dialog ("Do you desire other LMAXXX information?") permits consecutive displays in any order of the above LMAXXX information items.

Figure 7

LMDXXX DIALOG

(Interrupt)

Computer: "What program would you like?"

Operator: APOLLO

Computer: "What Apollo flight or module?"

Operator: LMDXXX

Computer: "What LMDXXX information do you want?"

Operator: (Can request each of the following)

<u>FLIGHT NO</u>	<u>LOCATION</u>	<u>LMD QUAN</u>		<u>LMD QUAL</u>	
		Sample Date	Launch Date	Impact Date	As of (date):
Computer: LMDXXX is assigned to at Apollo _____	(MSOB, VABN, VABS, Pad 39A, or Pad 39B)	Mean No.			Sample Launch Impact Date Date Date
		Aer.Veg.			
		Anaer.Veg.			
		Aer.S.F.			
		Anaer.S.F.			(Lists of organisms; room for 100)
		90% Conf. Limit			Probability all have been identified = .XX
		Aer.Veg.			
		Anaer.Veg.			
		Aer.S.F.			
		Anaer.S.F.			

The return dialog ("Do you desire other LMDXXX information?") permits consecutive displays in any order of the above LMDXXX information items.

Figure 8

LMXXX DIALOG

(Interrupt)

Computer: "What program would you like?"

Operator: APOLLO

Computer: "What Apollo flight or module?"

Operator: LMXXX

Computer: "What LMXXX information do you want?"

Operator: (Can request each of the following)

FLIGHT NO	LOCATION	LM QUAN		LM QUAL	
		Sample Date	Launch Date	Impact Date	As of (date):
Computer: LMXXX is assigned to at Apollo _____	LMXXX is located at _____	Mean No.			Sample Date
	(MSOB, VABN, VABS, Pad 39A, or Pad 39B)	Aer.Veg.			Launch Date
		Anaer.Veg.			Impact Date
		Aer.S.F.			
		Anaer.S.F.			(lists of organisms; room for 100)
		90% Conf. Limit			Probability all have been identified = .XX
		Aer.Veg.			
		Anaer.Veg.			
		Aer.S.F.			
		Anaer.S.F.			

The return dialog ("Do you desire other LMXXX information?") permits consecutive displays in any order of the above LMXXX information items.

Figure 9

IUXXX DIALOG

(Interrupt)

Computer: "What program would you like?"

Operator: APOLLO

Computer: "What Apollo flight or module?"

Operator: IUXXX

Computer: "What IUXXX information do you want?"

Operator: (Can request each of the following)

<u>FLIGHT NO</u>	<u>LOCATION</u>	<u>IU QUAN</u>	<u>IU QUAL</u>
Computer: IUXXX is assigned to Apollo _____	IUXXX is located at _____ (MSOB, VABN, VABS, Pad 39A, or Pad 39B)	Sample Date _____ Launch Date _____ Impact Date _____	As of (date): Sample Date _____ Launch Date _____ Impact Date _____
	Mean No. _____ Aer.Veg. _____ Anaer.Veg. _____ Aer.S.F. _____ Anaer.S.F. _____		(lists of organisms; room for 100)
	90% Conf. Limit _____		Probability all have been identified = .XX
	Aer.Veg. _____ Anaer.Veg. _____ Aer.S.F. _____ Anaer.S.F. _____		

The return dialog ("Do you desire other IUXXX information?") permits consecutive displays in any order of the above IUXXX information items.

Figure 10

SLAXXX DIALOG

(Interrupt)

Computer: "What program would you like?"

Operator: APOLLO

Computer: "What Apollo flight or module?"

Operator: SLAXXX

Computer: "What SLAXXX information do you want?"

Operator: (Can request each of the following)

<u>FLIGHT NO</u>		<u>LOCATION</u>	<u>SLA QUAN</u>		<u>SLA QUAL</u>				
Computer:	SLAXXX is assigned to Apollo _____	SLAXXX is located at _____ (MSOB, VABN, VABS, Pad 39A, or Pad 39B)	Mean No.	Sample Date	Launch Date	Impact Date	As of (date):		
			Aer.Veg.	_____	_____	_____	Sample Date	Launch Date	Impact Date
			Anaer.Veg.	_____	_____	_____	_____	_____	_____
			Aer.S.F.	_____	_____	_____	_____	_____	(lists of organisms; room for 100)
			Anaer.S.F.	_____	_____	_____	_____	_____	Probability all have been identified = .XX
		90% Conf. Limit	_____	_____	_____	_____			
		Aer.Veg.	_____	_____	_____	_____			
		Anaer.Veg.	_____	_____	_____	_____			
		Aer.S.F.	_____	_____	_____	_____			
		Anaer.S.F.	_____	_____	_____	_____			

The return dialog ('Do you desire other SLAXXX information?') permits consecutive displays in any order of the above SLAXXX information items.

Figure 11

S4BXXX DIALOG

(Interrupt)

Computer: "What program would you like?"

Operator: APOLLO

Computer: "What Apollo flight or module?"

Operator: S4BXXX

Computer: "What S4BXXX information do you want?"

Operator: (Can request each of the following)

FLIGHT NO	LOCATION	S4B QUAN		S4B QUAL	
		Sample Date	Launch Date	Impact Date	As of (date):
Computer: S4BXXX is assigned to at Apollo _____	S4BXXX is located at _____	Mean No.			Sample Date
	(MSOB, VABN, VABS, Pad 39A, or Pad 39B)	Aer.Veg.			Launch Date
		Anaer.Veg.			Impact Date
		Aer.S.F.			
		Anaer.S.F.			(lists of organisms; room for 100)
		90% Conf. Limit			Probability all have been identified = .XX
		Aer.Veg.			
		Anaer.Veg.			
		Aer.S.F.			
		Anaer.S.F.			

The return dialog ("Do you desire other S4BXXX information?") permits consecutive displays in any order of the above S4BXXX information items.

Figure 12

LUNAR INVENTORY DIALOG

(Interrupt)

Computer: "What program would you like?"

Operator: LUNAR INVENTORY

Computer: "What lunar inventory information do you want?"

Operator: (Can request each of the following)

MLAS	PCLS	LLML	MC_XXX
(quant. Microbial Load at next Apollo Site)	(Probability of Contamination of next Lunar Samples)	(total Live Lunar Microbial Load)	(Microbial Contamination alive from previous flights)
Flights can be:			
APXXX			
RA001 thru 009			
SV001 thru 007			
AI00A thru 00E			
L0001 thru 005			
LUXXX (Russian auto.)			
RMXXX (Russ. manned)			

Computer: Load at (coordinates) = $\frac{\text{AEB microbes}}{\text{sq meter}}$ as of (date)

Probability of microbial contamination of next (date) lunar samples = .XX

Total live microbial load as of (date) = AEB

(launch date)
(landing date)
(landing coordinates)
Quant. at launch = AEB
Quant. at impact = AEB
Still alive as of (date) = AEB microbes

Note: $\text{AEB} = A \times 10^B$, where A is a number less than 1 and B is an integer

The return dialog ("Do you desire other lunar inventory information?") permits consecutive displays in any order of the above information items.

Figure 13

Error Response

Computer: "Sorry, your response is in error."

- Means:
1. Operator has asked for information not available in branch being investigated,
 2. Operator has used a response which is out of sequence, or
 3. Operator has made typographical error in his response.

APOLLO

Comp. - "What Apollo flight?"

P. Q. Officer

APXXX

Comp. - "What APXXX information do you want?"

P. Q. Officer

<u>TOTAL</u>	<u>CM</u>	<u>SM</u>	<u>CSM</u>	<u>LMA</u>	<u>LMD</u>	<u>LM</u>	<u>IU</u>	<u>SLA</u>	<u>S4B</u>	<u>TOTAL</u>	<u>CM</u>	<u>SM</u>	<u>CSM</u>	<u>LMA</u>	<u>LMD</u>	<u>LM</u>	<u>IU</u>
<u>QUAN</u>	<u>QUAN</u>	<u>QUAN</u>	<u>QUAN</u>	<u>QUAN</u>	<u>QUAN</u>	<u>QUAN</u>	<u>QUAN</u>	<u>QUAN</u>	<u>QUAN</u>	<u>QUAL</u>	<u>QUAL</u>	<u>QUAL</u>	<u>QUAL</u>	<u>QUAL</u>	<u>QUAL</u>	<u>QUAL</u>	<u>QUAL</u>

Comp. - "Do you desire other APXXX information?"

P. Q. Officer

Yes

Comp. - "What APXXX information do you want?"

No

Comp. - "Do you desire other Apollo information?"

P. Q. Officer

Yes

Comp. - "What Apollo flight or module?"

No

Comp. - "Do you desire information from another Apollo flight?"

P. Q. Officer

Yes

Comp. - "What program would you like?"

No

OFF

FOLDOUT FRAME 1

CONSOLE LANGUAGE

(Interrupt)

Computer - "What program would you like?"

Planetary Quarantine Officer

or module?"

CMXXX SMXXX CSMXXX LMAXXX LMDXXX LMXXX IUXXX SLAXXX S4BXXX

Comp. - "What ---XXX information do you want?"

MLAS PCLS LLML

P. Q. Officer

SLA S4B
QUAL QUAL

FLIGHT NO. LOCATION (MOD.) QUAN (MOD.) QUAL

(These items available for each module)

Comp. - "Do you desire other ---XXX information?"

P. Q. Officer

Yes

Comp. - "What ---XXX information do you want?"

No

Comp. - "Do you desire other Apollo information?"

Comp. - "What luna
do you w

P. Q. Officer

Yes

rogram?"

Comp. - "What Apollo flight or module?"

No

Comp. - "Do you desire information from another program?"

Comp. - "What prog

P. Q. Officer

Yes

Comp. - "What program would you like?"

No

OFF

Figure 14

FOLDOUT FRAME 2

Dialog Termination

Operator can shut down system by replying
"OFF" to any question from the computer.

LUNAR INVENTORY

Comp. - "What lunar inventory information do you want?"

P. Q. Officer

AS PCLS LLML MCAPXXX MCRAXXX MCSVXXX MCAIXXX MCLOXXX MCLUXXX MCRMXXX

MLAS - quant. microbial load at next Apollo site
PCLS - probability of contamination of next lunar samples
LLML - total live lunar microbial load
MC_ _ XXX - microbial contamination remaining from flight _ _ XXX

Flights can be:

AP - Apollo XXX thru ZZZ
RA - Ranger 001 thru 009
SV - Surveyor 001 thru 007
AI - AIMP 00A thru 00E
LO - Lunar Orbiter 001 thru 005
LU - Luna (Russian Automated)
RM - (Russian Manned)

Comp. - "Do you desire other lunar inventory information?"

P. Q. Officer

Yes

No

Comp. - "What lunar inventory information
do you want?"

Comp. - "Do you desire information from
another program?"

P. Q. Officer

Yes

No

OFF

Comp. - "What program would you like?"

FOLDOUT FRAME 3