

Some Suggested Operator Interface Screens
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First a remark on notation. In the following, the word "screen" will be used to indicate a particular display, with its associated commands and parameters. It will not mean a piece of hardware, for which I will use the word "terminal". To a first approximation, any terminal can run any screen, and the same screen may simultaneously appear on more than one terminal.

After a number of discussions based on extending the VLA control screen philosophy, I have concluded that any possible feature will be requested, nay demanded. Despite complaints about my earlier memo's (VLBA Memo 396) suggested limitation to the capabilities of a VT-100 or equivalent, it still impresses me as the thing to do. That is, the control philosophy will be based on that as a lowest common denominator, as more modern or more sophisticated devices will probably be able to emulate the VT-100. The primary consequence of this will be that it will be inconvenient to implement good graphics on this lowest common denominator. The implication is that it is probably inconvenient to combine graphics and control in the same program. One must exit the control program to run a graphics program.

On the other hand, this is a fairly large lowest common denominator, in the sense that it is likely that displays will tend to grow to 24 lines by 80 columns. If we end up wanting smaller displays for portable or hand-held use at various places about the stations, we will either have to have special screens, or some sort of scrolling, both fairly unhappy solutions.

Since hardware details are still very unsettled, it is not currently very profitable to speculate on the details of the screens to control or diagnose particular devices. It is, however, possible to say what one wants in some of the global displays. I suggest a few here to provide an illustration of the principles and, rather coincidentally as something to shoot at and comment on for these particular displays.

A screen may be in command mode or parameter mode. In command mode one of the commands (near the bottom of the screen - see attached illustrations) will be selected, and this will be shown to the operator by displaying it in reverse video, flashing, or some other obvious indication depending on the particular terminal for which it is implemented. A short help for that command will appear following the "COMMAND:" preceding the command list. One may move from one command to the next by pressing one of the arrow keys on the terminal, or by pressing a letter. The right and left arrows will move the selected command one space horizontally. The first command on the second line follows the last command on the first; and the first command on the first line follows the last command on the last line. The vertical arrows change lines for the selected commands. The first line follows the last line. Typing a letter causes the selected command to be the first

command (in the sense of right arrows repeated as needed) that begins with that letter. If no command begins with the typed character, the program would echo a BEL. The command selection will be implemented as a table driven subroutine, so that other selection devices (mice, tablets, trackballs, etc.) can be implemented by writing one routine, should it appear profitable to do so.

In command mode, the values in the displays will be continually updated.

Pressing RETURN while in command mode will cause the selected command to be executed. Some commands require no further information for their execution. Others require a parameter to be entered. These also appear in the list of parameters at the bottom of the screen. When one of these commands is executed, the screen enters parameter mode, with a cursor in the appropriate position in the parameter section of the screen. The parameter is entered, and RETURN is pressed again, returning the screen to command mode. When the parameter is alphameric only sufficient characters necessary to select the value unambiguously need be entered. If return is pressed without entering a parameter, the previous value is unchanged (but other actions, normally executed on changing a parameter will take place). While in parameter mode, DEL, BACKSPACE, and ↑U (or equivalent) operate as one might expect. Pressing RETURN to enter the parameter may also cause additional events, for instance sending a command to a device based on the value of the parameter.

During parameter mode, the values on the screen will not be updating unless it is convenient to implement this for the particular screen (as it is not on a VT-100).

Standard Commands

Every screen will have four standard commands, which are described below. In addition, a screen will generally have special commands of its own to control its particular hardware. To help follow the discussion below, I suggest referring to the sample screens attached to the end of this Memo. The first three are suggested screens for global VLBA control functions. The last is a VLA front end screen, converted to the suggested philosophy, and is obviously wrong for the VLBA, but is included as an example of what a hardware specific screen might look like.

The PAGE command is used to change from one screen type to another. When the PAGE command is executed, the screen goes into parameter mode. One may then type the name of the screen type one wishes brought up on ones terminal, followed by RETURN, or one of several special characters. ESC would return one to the host operating system. Left arrow and right arrow would be used in screens controlling one/station type devices to

cycle around the stations, right arrow moving you to the next station to the east, left arrow to the next station to the west (it is not clear to me what these arrows should do in the global displays discussed here). Up and down arrows would be used to change the type of display, perhaps in the sense that up arrow goes to a more general display, down arrow to a more detailed one.

The SELECT command is used to select one of the values being displayed in the upper part of the screen for more obvious display as a bar graph at the very bottom of the screen. Each monitored value would have a range associated with it for this display.

The LOCK command would be used to change the lock state, which I suggest have names derived from the equivalent VLA commands. In the GIVE state, commands issued from the screen would not be sent to the associated hardware. In the USE state, the associated device would receive commands both from the screen and from the program which normally controls it. In the TAKE state, the associated device would receive commands only from the screen, and would not receive commands sent to it by the normal observing programs (which would, however, continue to generate those commands). In all of these cases, the state would revert to GIVE when the screen was PAGED away from. The state KEEP would have the effect of TAKE, except the device would not be made available to normal observing on exit. (A timeout for KEEP seems called for to handle the case of loss of communications after KEEPing a device for preventive diagnostic purposes).

The NORMALIZE command would have the effect of sending to the device the commands necessary to put it in the state called for by the current observing or processing schedule.

Screen description - Schedule management

The schedule management screen displays what each station is proposing to do for the next 24 hours, using a separate symbol for each schedule file it knows about, and displaying explicitly the name of the file currently in use. Subarraying is controlled by using this screen to send different schedule files to different stations, or sending the same file with different start and stop times to the different stations.

The NORMALIZE command would be used to cause an immediate switch to the new schedule if the schedule just sent includes the current moment.

The SEND command sends the file named in the file parameter to the station named in the station parameter, with instructions to the station to begin it at the named starttime. The sending routine would scan the schedule before sending it, and only send as far as the last observation actually above the horizon for the station to which it is being sent.

The READ command, if the named station admitted to having a copy of the named file, would cause it to be transferred back to the array control computer, for comparison, etc., to find out what version it is.

The STARTTIME parameter could be a given UTC time, the symbol *, indicating to start this schedule immediately after the latest one the station has (even if we have to miss the first part of this schedule), or the symbol ↑, indicating to start this schedule at its contained starttime, even if we have to abort the previous schedule early. The STATION command would cause the schedule file to be sent to any one station, or to all stations.

The FILE parameter gives the name of the file containing the schedule to be sent.

Screen description - Station status

This screen displays a few facts about each station. Suggested are the station name, the observing file it is currently using, the source currently being observed, the azimuth (with a symbol indicating which side of the cable wrap is being used), the elevation, the current pointing errors, and a code indicating the status of various components in the antenna (yet to be defined in detail).

The NORMALIZE command would cause the given station (or all stations, as selected by the STATION parameter) to be unstowed, the antenna pointed to the source as given by the appropriate schedule.

The STOW command would cause the antenna to go to survival position and any other appropriate precautionary measures to be taken. This command could only be issued if the LOCK status is "keep".

Screen description - Correlator Control

This screen lists for each transport what tape reel is currently mounted, in terms of station, date and time at current tape position. It would have a status indication, which, for reels actually in use, could conveniently be some measure of error rate or other data quality indicator.

The screen would list the next few tapes to be mounted (and, if the correlator structure we settle on requires it) where to mount them. This screen would be practically unique in issuing orders to the operator, instead of the other way around.

The OFFLINE command would toggle the up/down status of the drive named in the KPORT parameter.

The UNLOAD command would cause the named transport to unload the tape it currently contains (loading is probably most conveniently done by manual action at the drive after hanging the tape).

The STOP command would halt all processing and do appropriate resets to all the hardware.

The PAUSE command would cause all processing to stop, but status to be preserved such that it may be resumed again.

The NORMALIZE command would have different effects depending on whether the last command given was STOP or PAUSE. If the latter, tapes would be backspaced as appropriate, and processing resumed at approximately the point when the PAUSE was issued. If the former, processing would be started at the beginning of the correlation control file, after appropriate verification that the proper tapes were mounted, etc. The correlator control computer could also put the machinery into a PAUSE state on its own, for instance if the operator has not mounted the proper tape by the time it is needed. The remedial action would then be to mount the proper tape and issue the NORMALIZE command.

The FILE parameter would give the name of a correlation control file for the correlator run. It is not clear to me how one proceeds if one is processing two experiments simultaneously, whether one makes up a single correlation control file describing the whole correlator setup, or whether the description can be split into two more or less independent files. In the latter case, one would have two copies of this screen, one for each experiment.

SCHEDULE MANAGEMENT

TIME 20:17

85jun13 18 20 22 00 02 04 06 08 10 12 14 16 18 FILE

PUERTORICO	-----	VB143
MASS	-----	VB143
IOWA	-----	VB143
TEXAS	-----	VB143
LOSALAMOS	XXXXXXXXXXXXXXXXXXXX -----	TESTS
PIETOWN	-----	VB143
ARIZONA	-----	VB143
CALIFORNIA	OOXXXXXX-----	EURONET
WASHINGTON	-----	VB143
HAWAII	-----	VB143

COMMANDS:

PAGE	SELECT	LOCK	NORMALIZE	SEND
READ	STARTTIME	STATION	FILE	

PARAMETERS:

SELECT nothing	LOCK use	STARTTIME *	STATION all	FILE vh103
**				**

STATION STATUS 85jun13

TIME 20:17

STATION	FILE	SOURCE	AZ	EL	AZ	-	ERR	-	EL	STAT
PUERTORICO	VB143	3C120	184>	48	00	00	04	00	00	01 000
MASS	VB143	3C120	93<	42	00	00	01	-00	00	02 100
IOWA	VB143	3C120	345<	44	-	00	00	02	00	00 01 000
TEXAS	VB143	3C120	357<	44	-	74	55	32	46	02 13 030
LOSALAMOS	TESTS	3C84	254>	22	00	00	02	-00	00	00 001
PIETOWN	VB143	3C120	7<	43	00	00	01	00	00	02 000
ARIZONA	VB143	3C120	9<	43	**	**	**	**	**	** LINE OUT
CALIFORNIA	EURONET	3C273	90>	22	00	00	01	00	00	01 000
WASHINGTON	VB143	3C120	22>	19	00	00	02	00	00	00 000
HAWAII	VB143	3C120	70>	12	00	00	03	00	00	02 100

COMMANDS:

PAGE SELECT LOCK NORMALIZE STOW

STATION

PARAMETERS:

SELECT az err LOCK give STATION hawaii

-40

40

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CORRELATOR CONTROL

TIME NOW 18:46

XPORT	STATION	DATE	TIME	STAT	XPORT	STATION	DATE	TIME	STAT
1	PIETN	85JUN20	20:32	0	12	WASH	85JUN20	22:16	WAIT
2	LOSALA	85JUN20	20:32	1	13	PR	85JUN20	20:32	0
3	empty			OFF	14	HAWAII	85JUN20	20:32	2
4	TEXAS	85JUN20	20:32	0	15	ARIZ	85JUN20	20:32	0
5	IOWA	85JUN20	20:32	0	16	empty			OFF
6	down			OFF	17	MASS	85JUN20	20:32	1
7	down			OFF	18	empty			OFF
8	PIETN	85JUN20	21:17	WAIT	19	IOWA	85JUN20	20:32	3
9	empty			OFF	20	CALIF	85JUN20	20:32	0
10	load			9	21	WASH	85JUN20	20:32	0
11	empty			OFF	22	empty			OFF

LOAD NEXT REELS:A785 LOSALA A324 WASH A516 ARIZ A112 IOWA

COMMANDS:

PAGE SELECT LOCK NORMALIZE XPORT

OFFLINE UNLOAD STOP PAUSE FILE

PARAMETERS:

SELECT nothing LOCK use XPORT 10 FILE pjun20

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	FE FOR ANTENNA 7					
	A	B	C	D		
CAL	1.485	1.180	2.440	2.435		
GTP	2.970	2.975	2.970	2.975		
ALC	2.020	1.375	3.195	2.980		
PK.DET	0.565	0.300	0.275	0.325		
SYS/CAL	30.0	29.9	18.2	18.1		
	I	AB	V	I	CD	V
K MXR	-0.200	-1.025	0.005	-0.970		
KU MXR	0.000	-0.865	0.005	-0.845		
PA 1	0.005	0.710	-0.310	0.860		
PA 2	0.025	1.325	0.010	0.920		
PUMP TEMP	49.55		49.65			
HTR CUR	8.185		5.560			
2nd LO	3567	3511				

MODE	XFER SW	CAL	
COMP	OFF	ON	AUTO
		AB	CD
PROG BAND		L	L
BAND		L	L
FIRST LO		3200	LOCK
PARAMP		ON	ON
DEWAR			17 K
He SUPPLY			274 PSI
He RETURN			76 PSI
VACUUM			0 u
F5 TEMP			21.9 C
GROUND			-0.005 V
+10 SUPPLY			10.005 V

COMMANDS:

PAGE	SELECT	LOCK	NORMALIZE	BAND
XFER	CAL			

PARAMETERS:

SELECT acal	LOCK use	BAND 11	XFER off	CAL on_auto
0				5

