LCSD-10

SHOWTIME

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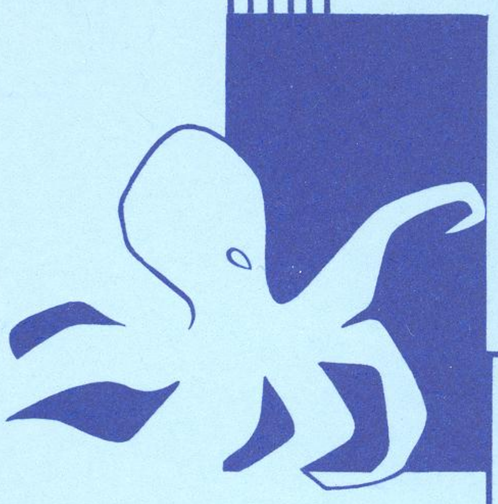

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TRIX AC!PRINT!NIP LCSD10 BOX *boxnumber yourname*

To view the text at a TMDS screen, execute:

TRIX AC!OD!LCSD10!TV*monitornumber*

Type P*pagenumber* to view page

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INTRODUCTION

In many offices at Lawrence Livermore National Laboratory (LLNL) there are television monitors connected to the Octopus computer network. These monitors, the output devices for the Television Monitor Display System (TMDS), are regularly used to display computer output (i.e., a program picture). However, when a TV monitor is not assigned to a program, a rotating series of pictures is displayed that provides information on the status of individual computers and of the entire network. The rotating displays are described in this document, the title of which is taken from the CDC 7600 status display known as Showtime.

EXECUTE LINES

A user at a terminal that is not logged into a worker computer can select the desired status picture by logging into the TMDS concentrator (V machine) as follows:

IDV *monitornumber x*

where the user-typed V is echoed as IDV, *monitornumber* is the number of the TV monitor, and *x* is a single-character mnemonic identifying the desired link picture. If the mnemonic is omitted, the rotating series of status pictures is shown.

For a user at a terminal that is logged into a worker computer, utility-code V (instead of the V computer) is used to select status displays on the TV monitor. The execute line is simply:

V *monitornumber x*

The user must type the V, the following space, *monitornumber*, another space, and *x*, where *monitornumber* is the monitor number and *x* is the desired mnemonic.

Each status picture is identified by a single-character mnemonic identified below. More detailed information is available in the TMDS User's Manual [Ref. 1]; however, since some information in this source is outdated, Bob Judd remains the final authority.

Mnemonic	Picture
M	Message
N	Network
S	CDC 7600 and ENTERPRISE (Showtime)
*	CRAY, and I/O Status (also called the Asterisk or CRAY Showtime display)
V	Shared view display [Ref. 1]
B	Blank display
R	Rotating display showing the message, network, Showtime, and CRAY Showtime displays (10 seconds for each display)
D	Debug display (for system programmers only)

The V machine and utility-code V respond to the execute lines with one of the following messages:

Response	Description
all done	(Utility-code V.) The change in picture has probably been effected and should be reflected on the TV monitor. However, if an undefined mnemonic was typed, utility-code V echoes "all done" and displays the rotating series of status pictures.
Done.	(V machine.) The change was effected, as should be reflected on the TV monitor. If any other reply is given, the requested selection could not be made for the reason indicated by the reply.
Inappropriate level.	(V machine.) The protection level associated with the selected picture is too high; only U (unclassified) level pictures can be selected by a V computer log-in.
Meaning Undefined.	(V machine.) The execute line had the wrong format or included an undefined mnemonic.
Monitor unavailable.	(V machine.) The specified monitor is not free.
tmds error #374 inappropriate level	(Utility-code V.) The protection level associated with the selected picture is too high; only U (unclassified) level pictures can be selected.
tmds error #376 monitor unavailable.	(Utility-code V.) The specified monitor is not free.

In addition, the message @Bye might be received, indicating that the typed message could not reach the V machine because of a failure in the network. In this case simply issue the command again.

The remainder of this document discusses the most common status pictures: Message, Network, Showtime, and Asterisk (also called the CRAY Showtime) and the specific displays appearing on each status picture.

NETWORK PICTURE

The network picture is a dynamic diagram of the Octopus network that shows which links between the computers are currently functioning. This display is accessed by typing

V *monitornumber* N

A typical network picture is shown in Fig. 1.

On the network display, the worker and concentrator computers appear as boxes; the connections between the computers appear as lines joining the boxes. A defective connection appears as a gap at one or both ends of a line; a gap at only one end means that the computer at that end failed in its last attempt to send data over the link. Each computer in Octopus sends the status of all its output interfaces to TMDS. If TMDS judges a computer to be down (because no status information has been received for 10 seconds), then TMDS also assumes that all the output interfaces of that computer are down. A down computer is represented by a box completely surrounded by gaps.

The wide line in the display represents the hyperchannel (commonly referred to as the Octobus). Each system connected to the hyperchannel can send data to any other system connected to the hyperchannel. A gap at the connection to the bus indicates that the last message sent over the hyperchannel failed.

There are normally eight tick marks on the sides of the box marked ATL to represent the eight tape mount arms on the system and the reported status of these units. In the display shown, one arm is down, so only seven tic marks appear.

The lower right-hand corner of the network picture contains a two- or three-digit decimal number followed by INTERFACES DOWN. This number represents a count of the gaps in the schematic diagram. In the lower left-hand corner is the current date and time and, directly below the date, the time that has elapsed since the last deadstart of the TMDS master concentrator.

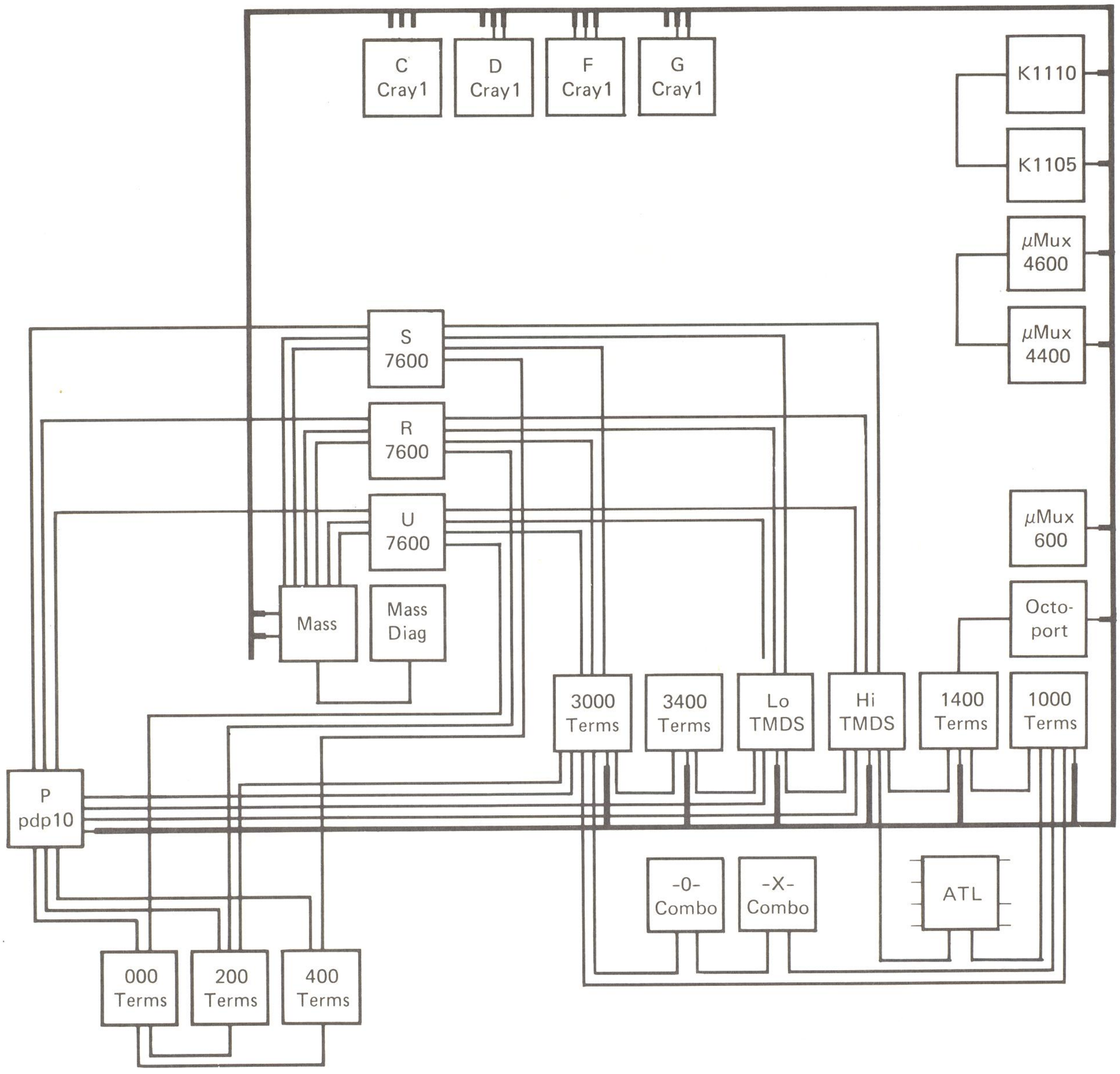

Figure 1. A typical TMDS Network display accessed by typing V *monitornumber* N.

MESSAGE PICTURE

The Message picture displays information to help the user determine the status of the Octopus network, including messages broadcast by computer operators. This display is accessed by typing

V *monitornumber* M

A typical Message picture is shown in Fig. 2.

The top portion of the display shown in Fig. 2 (i.e., above the upper horizontal double line) contains a band for each worker computer and a band for the PDP-10. For each worker computer this band consists of three fields: the left field contains messages, the middle field gives the letter of the computer and indicates with an arrow whether this computer is up or down, and the right field shows the time when the latest status information was received for that computer. For the PDP-10, the information given is the date and time of the last deadstart, the name of the current operating system (e.g., HYDRA9), and the CPU (0 or 1) which is presently online.

The band just below the middle of the picture (between the two double horizontal lines) consists of two fields. The large left-hand field contains the telephone numbers for the Coordination Center, User Services, Math/Stat (Mathematics/Statistics) Consultants, and Software Consultants (i.e., the Consulting Office). The right-hand field, labeled TMDS, gives information about the Television Monitor Display System itself: the queue (i.e., the number of people waiting for a TMDS channel) is shown directly below the TMDS label, and the Lo and Hi represent, respectively, the TMDS concentrator computer that controls channels 1 through 177_8 and the concentrator that controls channels 200_8 through 377_8. The asterisk tells which computer is the master concentrator, i.e., the one which contains the status pictures and controls the crossbar switch connecting the channels to the monitors. The arrow indicates whether the non-master (slave) concentrator is up or down. (An up/down indication is not necessary for the master concentrator, since if it's down there will be no picture.) Following the asterisk or arrow is a number and the letters Ch to indicate how many free channels are available on that concentrator.

In the bottom band (below the lower horizontal double line), the large left-hand field contains messages that relate to the network as a whole. The right-hand field, labeled Terminals, contains information about the concentrators to which the keyboard terminals are connected. The numbers represent the Octopus line number assigned to a series of keyboard terminals. The line number for a specific terminal can be determined by typing the following when logged off

X(return)

Concentrators 000, 200, and 400 are PDP-8 computers accommodating 128_{10} lines each. Concentrators 1000, 1400, 3000, 3400 are PDP-11 computers, accommodating 256_{10} lines each (i.e., if your terminal line is 3563, you'd be interested in the status of the 3400 concentrator). The 4400, 4600, and 600 concentrators are micromux concentrators accommodating 128_{10} lines each. Additional micromux concentrators are under development. As they become available, the PDP-8s will be retired. The arrows indicate whether the concentrator is up or down.

C D/S W/F 03/16 13:12:42 108h CCC Mach Available For Timesharing 08:00 3/17	C ↑	03/17/82 14:21:49
D D/S W/F 03/17 08:17:41 108h DDD Mach Available For Timesharing 08:00 3/17	D ↑	03/17/82 14:21:53
F D/U W/F 03/15 11:22:12 108h F-MACHINE AVAILABLE FOR TIMESHARING 13:18	F ↑	03/17/82 14:22:00
G-MACHINE AVAILABLE FOR TIMESHARING 09:51	G ↑	03/17/82 14:21:53
r d/u w/f 03/17 00:32:27 # 43a RRR Mach Available For Timesharing 08:00 3/17	R ↑	03/17/82 14:24:06
s d/u w/f 03/17 03:46:22 # 43a SSS Mach Available For Timesharing 08:00 3/17	S ↑	03/17/82 14:24:02
UUU Mach Available For Timesharing 08:00 3/17	U ↑	03/17/82 14:23:47
P D/S 03/17 14:06 (HYDRA9) CPU 1	P ↑	03/17/82 14:23:41
Coordination Center . . . . . x24531 User Services . . . . . x23705 Math/Stat Consultants . . . . x32976 Software Consultants x23724	TMDS Queue 00 Lo * 69 Ch Hi ↑ 73 Ch	
3400 Series Concentrator down, 17:30-17:40, 3/17, Due to Maint . . 4400 & 4600 Series Concentrator Down, 0600-0800, 3/18 . . . maint . . . . NOTICE: There Is a Large Back-log of User1. Files to be Processed, Expect A Longer Turn Around Time for Your Output Files 08:00 3/17	Terminals 000↑ ↑1000 200↑ ↑1400 400↑ ↑3000 600↑ ↑3400 4600↑ ↑4400	

Figure 2. A typical TMDS Message display accessed by typing V *monitornumber* M.

ENTERPRISE DISPLAY

ENTERPRISE is the file transport operating system on the PDP-10, and the ENTERPRISE display shows the number of active jobs moving to and from the various worker computers and storage devices. Currently, two storage devices are available for general use: MASS (Multi-Access Storage System) and ATL (Automated Tape Library). XPORT, the file-management utility routine that is the user's interface to ENTERPRISE, provides double recording as the default option for write requests; that is, if no storage is specified, a file is written to both ATL and MASS, and, after the MASS copy has expired, read requests are honored through ATL. The maximum length of a file to be stored on ATL is $4,240,000_8$ ($1,130,496_{10}$) 60-bit words or $4,026,000_8$ ($1,059,840_{10}$) 64-bit words. The maximum file length for MASS storage is $2,021,525_8$ ($533,333_{10}$) 60-bit words or $1,720,440_8$ ($500,000_{10}$) 64-bit words. If an attempt is made to store a file on MASS which exceeds the maximum length, an appropriate message will be returned to the terminal.

The ENTERPRISE display, which appears at the bottom of the CDC 7600 Showtime display, is accessed by typing

V *monitornumber* S

Figure 3 shows a typical ENTERPRISE display.

The ENTERPRISE display is divided into four main horizontal sections. The top section, a single row, gives the status of the ENTERPRISE system, the date, and the time.

ENTERPRISE IS UP. 03/16/82 13:08:11

JOB MIX	CART	TEMP	ATL	DISK	C	D	F	G	R	S	U	P
FROM	13	0	11	0	149	9	1	2	5	1	4	0
TO	22	0	0	0	21	4	28	5	0	103	17	0
TOT TODAY	5227	117	3074	0	2111	1694	1894	1001	2651	4648	2639	34

ACTIVE JOBS: 195 JOBS COMPLETED TODAY: 9064

MASS expiring files recorded JAN 27

Figure 3. A typical TMDS ENTERPRISE display accessed by typing V *monitornumber* S.

The large middle section, consisting of four horizontal rows, shows the mix of jobs to and from the various worker computers and storage devices since the previous midnight. The FROM row shows the number of transport requests from and the TO row shows the number of transport requests to the storage device or worker computer. TOT TODAY is the total number of transport requests completed since the previous midnight. This middle section has several major columns, identified as follows:

Column	Description
CART	MASS Cartridge, commonly called MASS for Multi-Access Storage System. Fast-access storage on wide magnetic tape cartridges. File lifetime is load dependent (currently 35 days, minimum).
TEMP	Jobs whose source has not yet been determined (used by system programmers only).
ATL	Automated Tape Library. Archival storage on 6250 bpi magnetic tapes. Slower access.
DISK	Not currently used.
C, D, F, G, R, S, U, P	The seven right-most columns are headed by single letters to designate the individual online worker computers. C, D, F, and G are CRAYs; R, S, and U are CDC 7600s; and P is the PDP-10.

The third section shows ACTIVE JOBS, which is the total number of requests currently being processed by the ENTERPRISE system, and JOBS COMPLETED TODAY, which is the total number of jobs ENTERPRISE completed since midnight.

The fourth and last section gives the recording date of files currently expiring on MASS.

I/O STATUS REPORT

The I/O Status Report display gives the computer user an estimate of input/output (I/O) turnaround time for the four types of output listed: FR80-105, FR80-FCB, NIP HSP, and NIP CGR (graphics). It is available on the CRAY Showtime display and can be accessed by typing:

V *monitornumber* *

Figure 4 shows a sample I/O Status Report.

For FR80-105 and FR80-FCB output, the dates and times in the "To CHORS at" column are established from the last file plotted before a film cut. The developing and distribution of output normally takes one hour. The time and date this output is available is determined when the microfiche from the last file is placed in the user's output box.

For NIP HSP and NIP CGR output, the time to CHORS is determined from the last file being processed on a disk pack. Unless there is a backlog, the time is only the few minutes it takes the operator to distribute the output to the user's box.

The I/O operators update this display at the time the FR80 film is changed (approximately every two hours) or when all files on a disk pack have been processed.

The space below the dotted line is reserved for special I/O announcements.

11:52:57 03/16/82f *I/O STATUS REPORT*

Output	To CHORS	at	Available at	Output	To CHORS	at	Available at
NIPs HSP	03/15/82	00:48	12:45 03/16/82	FR80-105	03/15/82	11:59	13:15 03/16/82
NIPs CGR	03/15/82	11:53	12:45 03/16/82	FR80-FCB	03/15/82	12:23	13:15 03/16/82

Chors is up . . . p2 is down for e.m.

Figure 4. A typical I/O Status Report accessed by typing V *monitornumber* *

CDC 7600 SHOWTIME DISPLAY

This display, commonly known as the Showtime display and from which this document derives its name, provides information about the user demands on a specific CDC 7600 computer, its system, and its disks. To ensure that the needs of individual programs are satisfied efficiently, the user should tailor use of the various worker computers based on the knowledge of system traffic shown on the Showtime display (i.e., code length and priority). This display can be accessed by typing

V *monitornumber* S

Typical Showtime Display Format

A typical Showtime display is shown in Fig. 5. (The ENTERPRISE status display previously described in this document appears at the bottom of this display.) It comprises four bands: one for each of the three CDC 7600

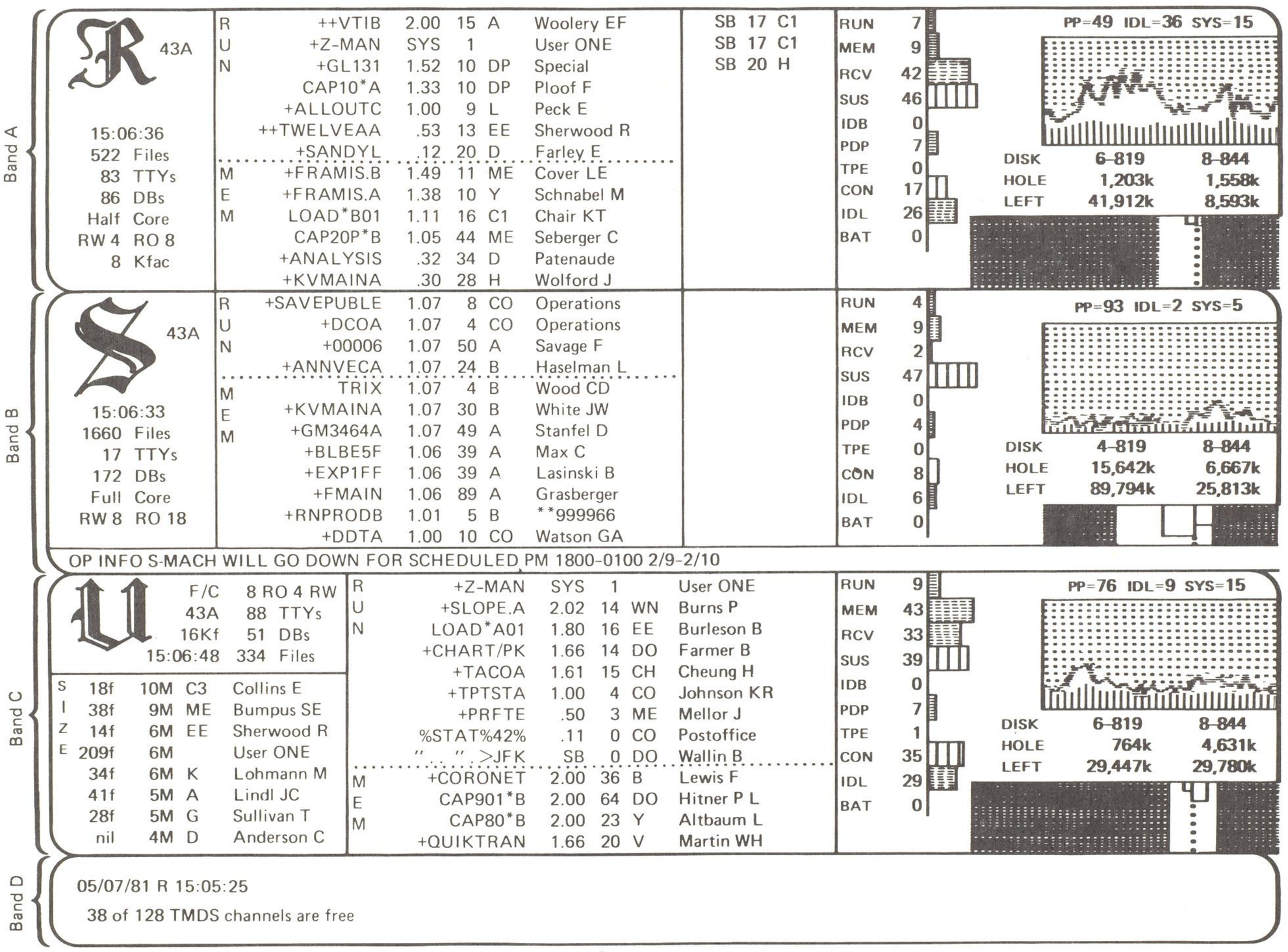

Figure 5. A typical CDC 7600 Showtime display accessed by typing V *monitornumber* S.

worker computers and a fourth labeled Band D immediately below these three giving general information. The operator of each 7600 computer can broadcast current messages of interest to the users. The most recent message from the operator appears at the bottom of the display for that particular computer (as shown at the bottom of the S machine display). Band D comprises two lines; the first line includes the date followed by a letter denoting the 7600 worker computer display that was updated last, and the second line indicates the number of TMDS channels available. Because this display is quite complex, each section will be discussed separately.

For clarity, the display shown in Fig. 6 and discussed in the following paragraphs is broken into fields and the fields into items. These items are then described in detail on the following pages. The basic display shown is for the R machine, but the information given, unless otherwise noted, applies to all the CDC 7600 worker computers.

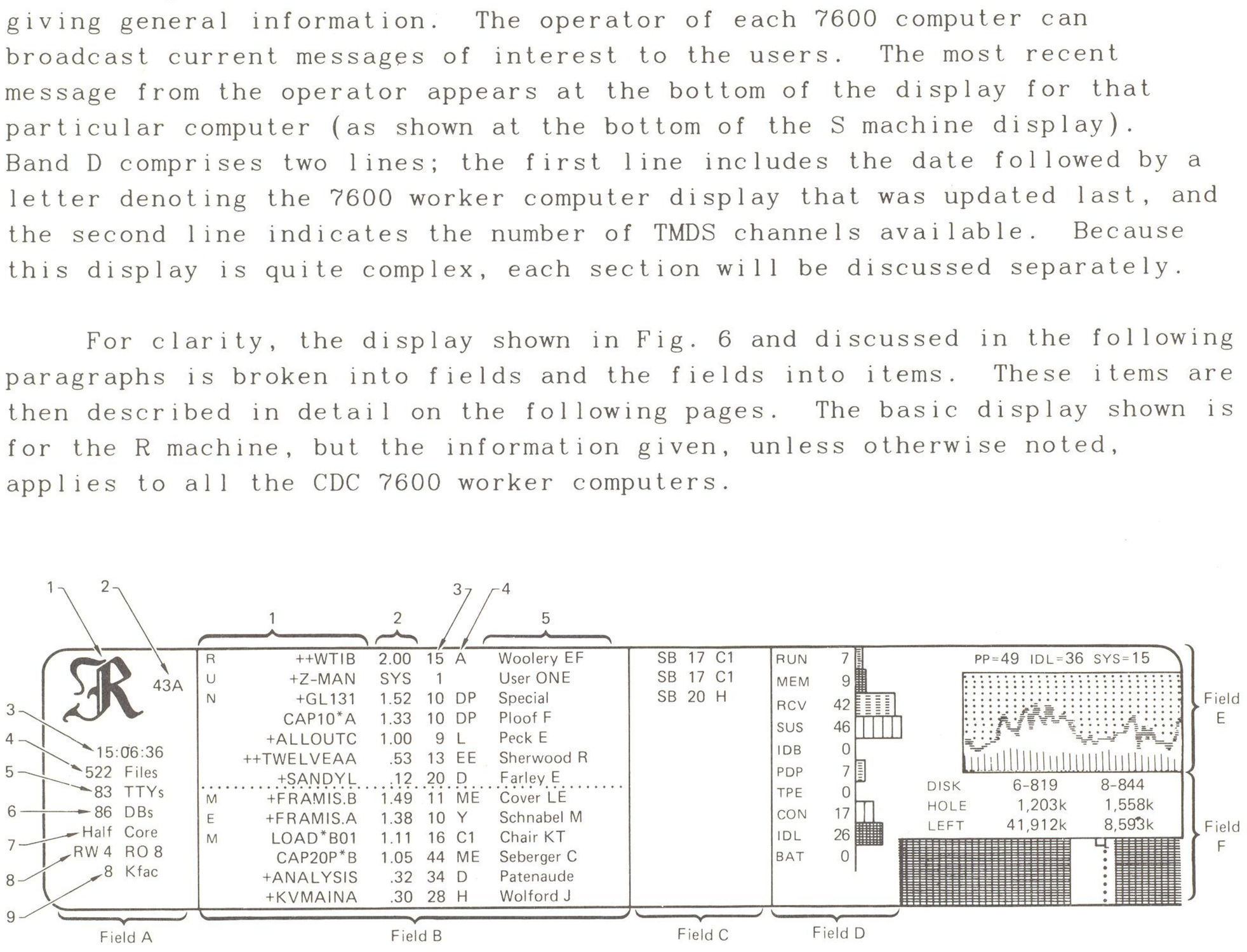

Figure 6. A sample CDC 7600 worker computer display broken into individual fields. This is the display shown under normal load conditions.

Field A

Item	Description
1	Letter of identification for a CDC 7600 computer (e.g., R).
2	Software system version number identifying the current operating system on that particular CDC 7600 (e.g., System 43A).
3	Clock time reported by that 7600 the last time the display was updated (e.g., 15:06:36). When a 7600 goes down, the last display remains as the display for that worker. The time shown will not change until the computer is brought up and the TMDS display is updated.

Field A (cont.)

Item	Description
4	Number of available slots remaining in the active file index (e.g., 522 slots available). This number indicates the number of additional active files that can be accommodated on the system at the current time. Each user logged into a CDC 7600 computer requires a slot in the active file index for every file associated with his user number. If a user is not logged in but has a code running under his user number, the system keeps access to all files associated with that number in the active file index. If a user logs out and has not left a code running, the system moves the user's active file index information to the inactive (passive) file index. The active file index resides in memory, the passive on disk. The maximum number of active file index slots per CDC 7600 computer is 3371. When logging into a CDC 7600 and the number of active file slots is low, the user might receive a two-line message from the system ACTIVE FILE INDEX FULL SOME OF YOUR PRIVATE FILES ARE NOT AVAILABLE indicating that there are not enough slots available in the active file index to accommodate all his files. This message does not mean that files have been lost or destroyed. Rather, the system will not load any of the user's files until there is room for all. Usually logging out and logging back in when the number of available slots increases will provide access to the user's files.
5	The number of terminals logged into that particular 7600 computer (e.g., 83 TTYs).
6	The number of job Descriptor Blocks available on that 7600 computer (e.g., 86 DBs). A descriptor block is required for every running code. The system guarantees one descriptor block for every logged-in terminal whether a job is running or not. When this number is low, the system will return the message, SYSTEM TABLES FULL, TRY AGAIN . The maximum number of active DBs on each 7600 computer is 255. When the number of available active descriptor blocks falls below 10, the 7600 system moves suspended jobs (See Field D, item SUS) to the inactive descriptor block table which resides on disk until the number of available active blocks increases.

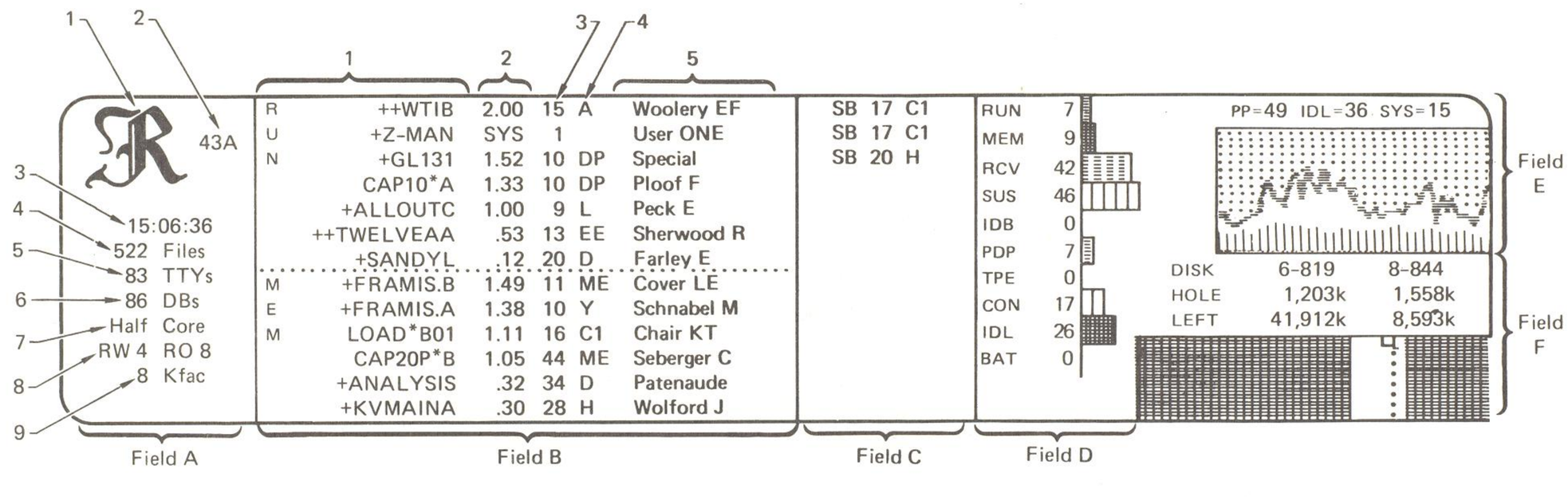

Figure 6. (Repeated) A sample CDC 7600 worker computer display broken into individual fields. This is the display shown under normal load conditions.

Field A (cont.)

Item	Description
7	The maximum core memory size a program will be allowed to use (in this case, half core). Full core is $399,848_{10}$ or $1,414,750_{8}$. The CDC 7600 R-machine is restricted to half-core use during the hours of 0800 to 1700 Monday thru Friday. This enables fast turnaround for small codes in a time-sharing environment.
8	RW (read-write) file purge time (e.g., 4 hours during 0900 to 1700). RO (read-only) file purge time (e.g., 8 hours during 0900 to 1700). The numbers indicate the lifetime in hours that a read-only or a read-write file will remain on disk after it was last referenced. Every time a file is used, the age of that file is set to 0 hours, 0 minutes. When a file reaches the lifetime displayed, the system automatically destroys the file, releasing disk space for other use. If the computer goes down for emergency or preventive maintenance, that time is not added to the age of a file.

Field A (cont.)

Item	Description

8 (cont.) Purge times are automatically set by the operating system according to the table below but may be reset by Computer Operations as needed--mainly to release the disk space.

Table 1. Purge times (in hours) for read-only and read-write files on the CDC 7600 worker computers. The purge time is a variable parameter.

Time	Day of week	File type	Purge times in hours R	S	U
0900 - 1700	Mon. - Thurs.	RO	8	18	8
		RW	4	8	4
1700 - 0900	Mon. - Thurs.	RO	18	18	18
		RW	8	8	8
1700 Fri. - 0900	Mon.	RO	18	18	18
		RW	8	8	8

To determine the age of a file(s) type: FILES AGE. (Return).

9 This number, the K Factor (Kfac), is used by the system to calculate the amount of time a code is guaranteed to run once it enters the Central Processing Unit (CPU). The smaller this number is, the shorter the guaranteed run time; this allows more interactivity for users during timesharing (daytime) hours. Note in the table below that Kfac is also lowered on Saturdays between 0800 and 1600.

Table 2. The K Factor (Kfac) or factor used to calculate the amount of time a code is guaranteed to run. The Kfac is a variable parameter.

Time	Day of week	K Factor R	S	U
0800 - 2000	Mon. - Fri.	8	16	16
2000 - 0800	Mon. - Thurs.	16	16	32
0800 - 1600	Sat.	8	16	16
1600 Sat. - 0800	Mon.	16	16	32

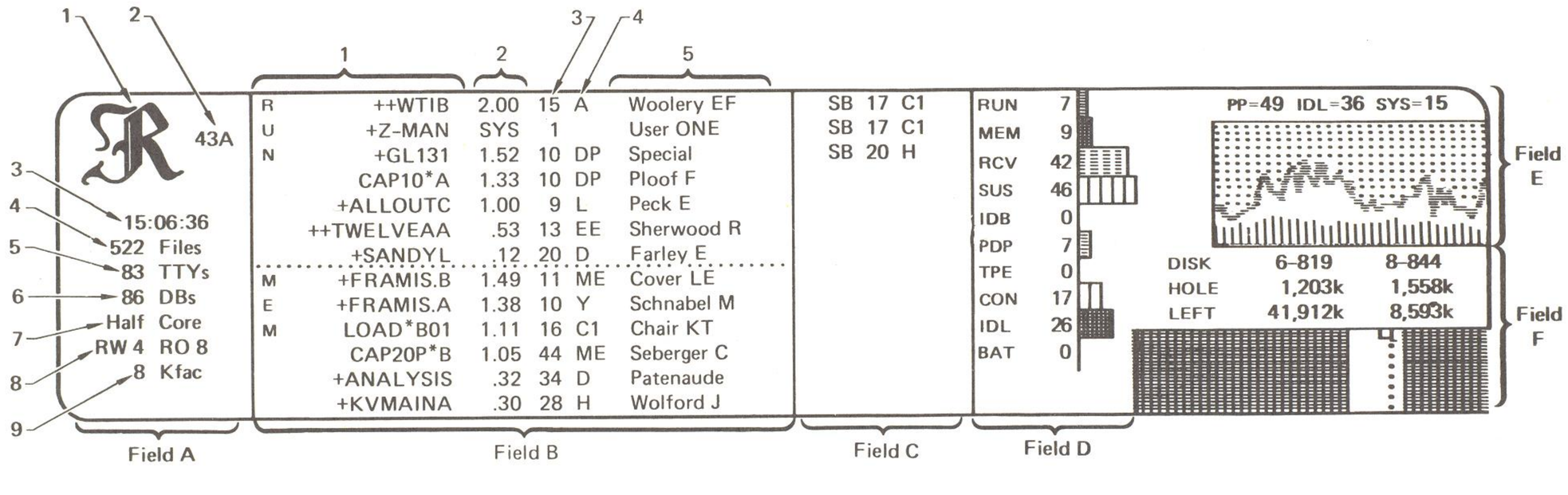

Figure 6. (Repeated) A sample CDC 7600 worker computer display broken into individual fields. This is the display shown under normal load conditions.

Field B

Field B is divided horizontally by a dotted line and vertically displayed in five columns. The information above the dotted line (vertically labeled RUN on the upper left of the field) refers to codes in the CPU memory. CPU memory includes small core memory (SCM) and large core memory (LCM). A code must be loaded into SCM to run, and, actually, only one code can run at a time. The information below the dotted line (vertically labeled MEM on the left-hand side of the field) refers to codes on disk waiting for CPU memory space. If the number of codes waiting for CPU memory exceeds the space available to list them in Field B, the overflow appears in Field C showing only the information in Items 2, 3, and 4 of Field B.

Column	Description
1	Names of the codes running or waiting to run.
2	Priority of the codes running or waiting to run.
3	The percentage of LCM the code requires to run.
4	The LLNL Division associated with the user number (from the file USERS).
5	Name of the user associated with the user number (from the file USERS).

Field C

Field C contains the same information as that shown in Field B, items 2, 3, and 4, and appears here as the overflow from Field B.

Field D

Field D is a bar graph giving a proportional represention of the system states of all codes active on the specific CDC 7600 computer designated. The figures to the immediate left reflect the actual number of codes in the various states. [See Ref. 2 for more detail.]

Item	Description
RUN	The number of codes in LCM and SCM. This number corresponds to the codes listed **above** the dotted line in Field B.
MEM	The number of codes on disk waiting for CPU memory space. This number corresponds to the codes listed **below** the dotted line in Field B plus any overflow appearing in Field C, plus, if Field C is full, any codes not appearing due to lack of space.
RCV	The number of codes waiting for a message from a controller. The controller may be either a terminal or another code.
SUS	The number of codes in the suspend state. These codes have voluntarily relinquished use of the CPU for a period of time. [See Ref. 2, call 25, for more detail.]
IDB	The number of suspended descriptor blocks that have been moved to the Inactive Descriptor Block table on disk. This number may not exceed 128. The system moves a suspended DB to the IDB table when the number of available active descriptor blocks (Field A, Item 6) falls below 10.
PDP	The number of codes waiting for a message from the network (i.e., TMDS or ENTERPRISE).
TPE	The number of codes waiting for a tape to be assigned.
CON	The number of codes waiting for a message from their controllee.
IDL	The number of users logged into the 7600 computer via teletype but not running any jobs; i.e., idle terminals.
BAT	The number of codes running in the batch mode. The system provides a special queue that allows codes to run at a priority of 1.0 on a first-come, first-served basis with a guaranteed maximum run time of four minutes. There is also a maximum allowable size for codes run from this queue (usually half core). At the present time the batch mode is available on the R machine from 0800 to 1300 Monday through Friday. [See Ref. 3 for more detail.]

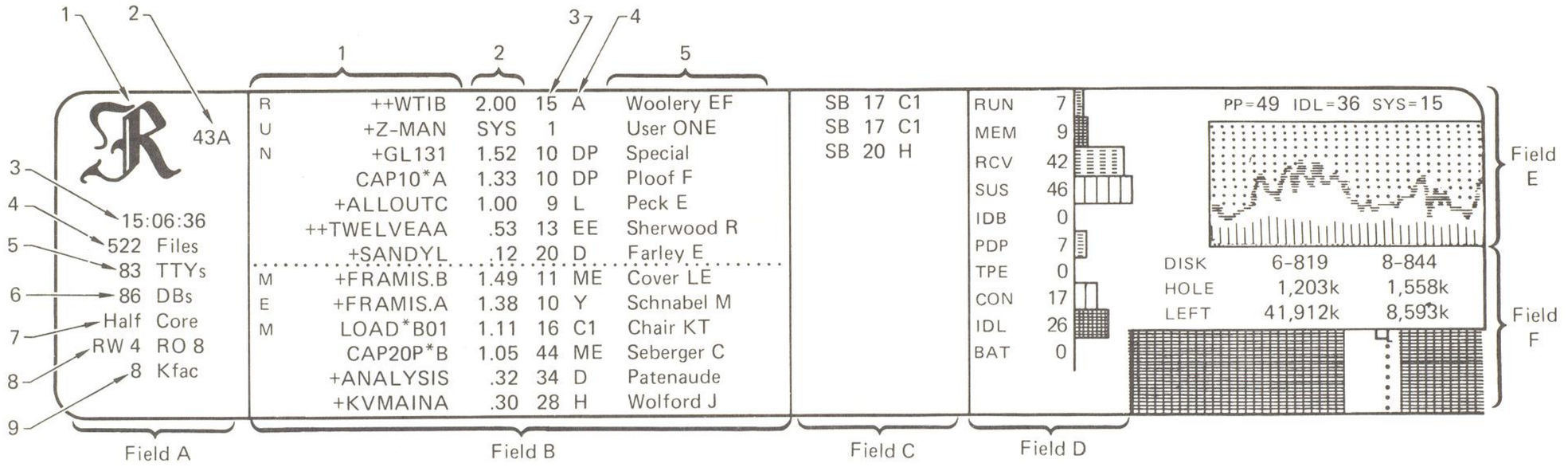

Figure 6. (Repeated) A sample CDC 7600 worker computer display broken into individual fields. This is the display shown under normal load conditions.

Field E

This field is a history chart of the last 10 minutes of CPU activity. The dotted area, read from the top downward, represents the percentage of CPU time consumed by user codes; the striped area, read from the bottom upward, represents the percentage of CPU time consumed by system codes; and the gap between the striped and dotted areas represents the percentage of CPU time devoted to I/O and idle time. The text immediately above the history chart expresses these percentages numerically at the time the display was refreshed.

Item	Description
PP	The percentage of CPU activity used by user codes (e.g., 49).
IDL	The percentage of CPU time used for I/O or idle time, i.e., 36 (the gap between the dotted and striped area).
SYS	The percentage of CPU activity used by system codes (e.g., 15).

Field F

Field F comprises two parts: a cake chart representing the distribution of disk space and a space just above this chart that presents this same information numerically. The cake chart itself has several major parts. The dotted line divides the available disk space proportionally between the 819s and the 844s, with the area to the left of the dotted line representing disk space on the 819s. The two areas are monitored separately. The checked area is the percentage of the disk space in use. The blank area is the percentage of unused disk space. The small square in the upper corner of the blank area represents the largest available space for a single file, referred to as the HOLE size.

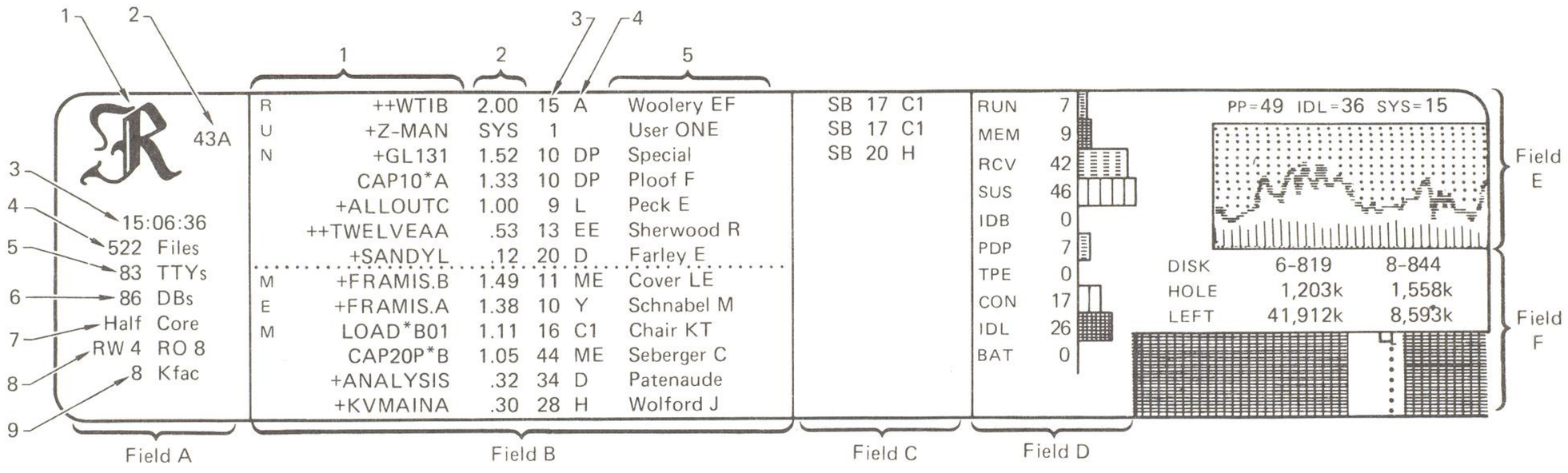

Figure 6. (Repeated) A sample CDC 7600 worker computer display broken into individual fields. This is the display shown under normal load conditions.

Field F (cont.)

The numeric representation of this information is explained as follows.

Item	Description
DISK	The number and type of the disk units attached to the 7600 computer. (e.g., 6 CDC 819s and 8 CDC 844s)
HOLE	The decimal word count of the largest file that can be created on the disks attached to the worker computer.
LEFT	Total unused space remaining on the disks.

Showtime Alternate Formats

The previous discussion describes the display format as shown for the CDC 7600 R machine. When certain usage conditions are met, the display format changes to that described in the following sections and shown in Fig. 7.

The criteria for the new format include the number of slots available in the active file index (see Fig. 6, Field A, item 4) and the HOLE size (see Fig. 6, Field F, item HOLE) available on the 819 and 844 disks.

INDX

When the number of available slots in the active file index falls below 300, Section B appears. Note the mnemonic INDX appearing vertically along the left margin. The seven users listed have been selected based on the number of their active file index entries. Keep in mind that every file in a user's active file index requires one slot and that the maximum per 7600 computer is 3371. It is hoped that when this display appears, users will clean up files not being used by storing them on MASS or tape and by destroying files no longer needed. This will increase the active file index slots available to other users.

SIZE

When the HOLE size on either the 819s or the 844s drops below 1,000K (decimal) words, the display shown in Section C appears. Note the word SIZE appearing vertically along the left margin. The eight users listed have been selected based on the amount of disk space assigned to their private files. This is expressed in millions of words (decimal), e.g., 8M. In this case it is hoped users will destroy or store their large files to release disk space for other users.

SIZE and INDX Combined

When both of the above conditions occur simultaneously, the display shown in section A appears. This display has been divided in half by a dotted line. The top half shows users with the largest amount of disk space. The bottom half shows users with the largest number of files in the active file index. In Section A, above the dotted line in the SIZE portion of the display, the reader will notice "nil" appearing in the column where the number of files would normally appear. This indicates that this user is logged off the computer.

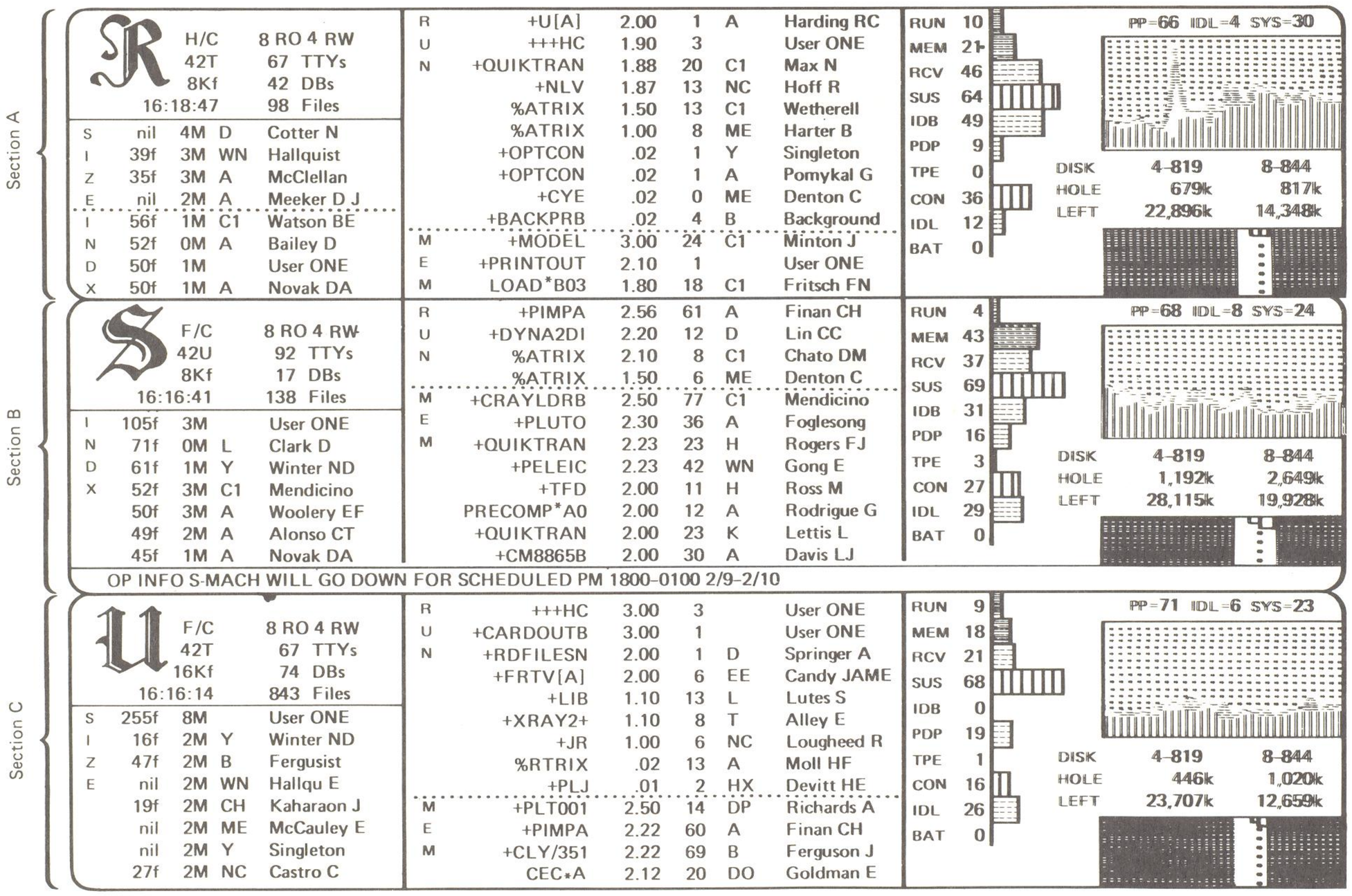

Figure 7. A sample CDC 7600 Showtime display showing the alternate displays that appear under certain system load conditions.

CRAY-1 SHOWTIME DISPLAY

The CRAY-1 Showtime display provides information about the user demands on a specific CRAY worker computer, its system and its disks. To ensure that the needs of individual programs are satisfied efficiently, the user should tailor use of the various worker computers based on knowledge of system traffic gained from this display (i.e., code length and priority). This display can be accessed by typing

V *monitornumber* *

Typical CRAY-1 Showtime Format

A typical CRAY Showtime display is shown in Fig. 8. It comprises four bands, one for each of the CRAY worker computers. (The I/O Status display, previously described in this document, appears at the top of this display.)

C L08h
12:42:30
2430 Files
3 TTYs
159 DBs
RW 18
RE 18
8 Kfac

+DGA	SYS	2		**000003**	61.20Dn	
+IDLERA	SYS	0		**000001**	61.51*	
+RJPP(D)	3.00	1	co	Large Rjet	19.01	
+BAT/OPN	3.00	3	co	**999914**	998.57	
+RS	1.50	54	a	Harte J	9.38	
+BCONE	1.20	2	a1	Giallanza	4.00	
+00ZEE	1.20	3	b	Hainebach	5.00	
+BPORTRA	1.10	3	a	Didit H	8.68	
+WATCHD	1.10	1	co	**999940**	999.81	
+BCONDI	1.10	2	c1	Usd Graphi	99.27	

run 2 · mem 49 · rcv 1 · sus 20 · xmt 0 · pdp 11 · con 9 · idl 1

pp = 96 idl = 00 sys = 04
ioidl = 00
mem load 8.4%
disk 16-819s
hole 6,904k
left 95,359k

D L08h
13:07:04
936 Files
21 TTYs
82 DBs
RW 18
RE 18
8 Kfac

+TRIXGLE	1.60	3	y	Goodwin EJ	.96*n	
GMLBSNC	1.50	9	b	Carlson GW	15.99Dn	
+LT1947	1.30	73	a	Dunlop WH	82.32*n	
+DDTA	1.20	5	h	French SJ	5.00*n	
+TRIXGLA	1.00	3	m	Cole AG	.96*n	
+XDSWC	1.30	66	y	Hazi A, U	98.51	
*AKSN09	1.30	41	a	Burke EW	18.05	
+PXA	1.30	30	m	Masamitsu	.96	
+CIVICA	1.20	18	wn	McMaster W	.90	
+NIKE2DA	1.20	24	wn	Smith CE	4.89	

run 5 · mem 26 · rcv 5 · sus 100 · xmt 0 · pdp 6 · con 22 · idl 5

pp = 67 idl = 00 sys = 15
ioidl = 18
mem load 97.5%
disk 16-819s
hole 11,986k
left 131,836k

F L08h
13:07:16
724 Files
36 TTYs
84 DBs
RW 8
RE 8
8 Kfac

+IMPA	2.00	2	a	Munro D	1.05Ln	
+DDTA	2.00	4	b	Anastasio	.96Dn	
+TRIXGLA	1.50	3	a	Wilson S	1.98*n	
+TRIXGLA	1.20	3	b	Albright	.99*n	
CA101G+	1.20	45	a	Ramos T	2.05D -	
+TRIXGLA	1.20	3	c1	Painter JF	.85*n	
+TRIXGLA	1.10	3	e	Dietrich F	.98*n	
+DMANA	1.00	4	c1	Dusenbury	1.00*n	
+DESTROA	1.00	0	wn	Spelce T	1.00*n	
+TRIXGLA	1.00	3	hy	Warren KH	.91*n	
+FRTVA	.10	6	a	Molenkamo	.86*n	

run 13 · mem 6 · rcv 14 · sus 110 · xmt 1 · pdp 8 · con 9 · idl 6

pp = 85 idl = 00 sys = 15
ioidl = 00
mem load 85.2%
disk 15-819s
hole 16,176k
left 133,294k

G L08h
13:04:40
2020 Files
14 TTYs
127 DBs
RW 18
RE 18
8 Kfac

+WD	1.08	0	ax	(Sp.Acct.	.42*n	
*M0996	1.07	14	a	Zagotta W	86.22*	
*M0995	1.07	14	a	Zagotta W	89.05*	
+MOKU	1.07	42	b	Kiergan Se	238.44*	
+TARTC	1.06	11	a	Pomykal G	52.39*	
+VRR	SYS	0		**000003**	.05*	
+AMBST03	.51	8	b	Tyler JV	9.59*	
+2D	.50	7	a	Meldner H	7.62*	
+GPRODEE	fs	2	t	Weiss M	499.97*	
+GPRODAA	fs	1	t2	Alder B	119.91*	

run 10 · mem 17 · rcv 1 · sus 73 · xmt 0 · pdp 5 · con 16 · idl 3

pp = 96 idl = 00 sys = 04
ioidl = 00
mem load 96.7%
disk 15-DD29s
hole 36,598k
left 735,630k

Figure 8. A sample CRAY-1 Showtime display accessed by typing V *monitornumber* *.

The display shown in Fig. 9 has been chosen as an example for the following discussion. To clarify the examples used, the display is broken into fields and the fields into items. These items are then described in detail on the following pages. The basic display shown is for the D machine, but the information given, unless otherwise noted, applies to all the CRAY worker computers.

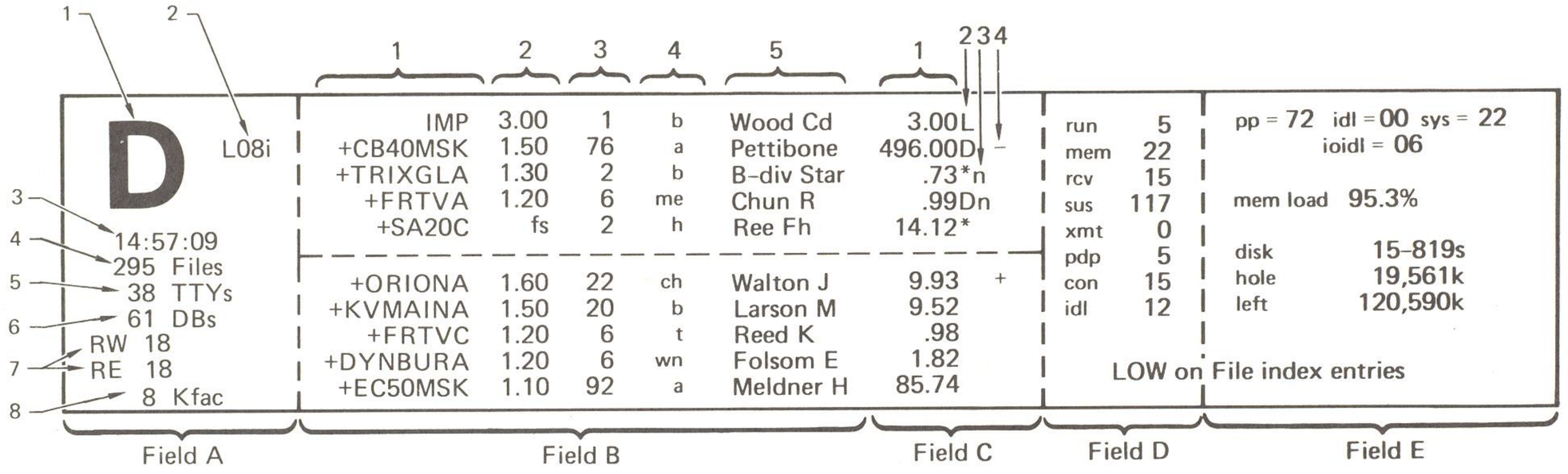

Figure 9. A sample CRAY-1 worker computer display broken into individual fields. This is the display shown under normal load conditions.

Field A

Item	Description
1	Letter of identification for a CRAY-1 computer (e.g., D). operating system on a particular CRAY (e.g., System L08i).
3	Clock time reported by the CRAY the last time the display was updated. When a CRAY goes down the last display remains on the screen. The time shown will not change until the computer is brought up and the TMDS display is updated.
4	Number of available slots remaining in the active file index (e.g., 295 slots available). The number appearing in this position indicates the number of additional active files that can be accommodated on the system at the current time. Each user logged in on a CRAY computer requires a slot in the active file index for every file associated with his user number. If a user is not logged in but has a code running under his user number, the system keeps access to all files associated with that number in the active file index. If a user logs out and has not left a code running, the system moves the user's active file index information to the inactive (passive) file index.

The active file index resides in memory; the passive resides on disk. The maximum number of active file index slots per CRAY computer is 4513. When a user logs into a CRAY and the number of active file slots is low, the user may receive a message from the system (i.e., CANNOT LOAD ALL FILES FROM DISK, INDEX FULL.) indicating that there are not enough slots available in the active file index to accommodate all this user's files. This message does **not** mean that files have been lost or destroyed. Rather, the system will not load any of the user's files until there is room for all. Usually logging out, then logging in when the number of available slots increases will provide access to the user's files.

5 The number of terminals logged into that particular CRAY-1 computer (e.g., 38 TTYs).

6 The number of job Descriptor Blocks (DBs) available on that CRAY-1 computer (e.g., 61 DBs). A descriptor block is required for every running code. The system guarantees one descriptor block to every user logging into the computer and provides one for every logged-in terminal whether or not a job is running. When this number is low, the system will return the message SYSTEM TABLES FULL, TRY AGAIN. The maximum number of active descriptor blocks on each CRAY-1 is 255.

7 RW (read-write) file purge time (e.g., 18 hours).
RE (read-execute) file purge time (e.g., 18 hours).

The numbers indicate the lifetime in hours that a read-execute file and a read-write file will remain on disk. Every time a file is used, the age of that file is set to 0 hours, 0 minutes. When a file reaches the lifetime displayed, the system automatically destroys the file, releasing disk space for other use. To determine the age of a file(s) type: FILES AGE. (Return).

Table 3. Purge times (in hours) for read-write and read-execute files on the CRAY-1 worker computers. This purge time is subject to change.

Time	Day of week	File Type	Purge times in hours C	D	F	G
0900 - 1700	Mon. - Fri.	RW	8	18	8	18
		RE	8	18	8	18
1700 - 0900	Mon. - Thurs. and Weekends	RW	18	18	18	18
		RE	18	18	18	18

8 This number, the K Factor (Kfac), is used by the system to calculate the amount of time a code is guaranteed to run once it enters the CPU (e.g., 8). The smaller this number is, the shorter the guaranteed run time will be; this allows more interactivity for users.

Table 4. The K Factor (Kfac) is the factor used to calculate the amount of time a code is guaranteed to run. This Kfac is subject to change.

Time	Day of week	K Factor C	D	F	G
0800 - 2000	Mon. - Fri.	8	8	8	8
2000 - 0800	Mon. - Fri.	8	16	16	8
0800 - 1600	Saturday	8	8	8	8
1600 Sat. - 0800	Mon.	8	16	16	8

Field B

Field B is divided horizontally by a dotted line. The information above the dotted line refers to codes in the CPU memory. The information below the dotted line refers to codes on disk, waiting for CPU memory space.

Item	Description
1	Names of the codes running or waiting to run.
2	Priority of the codes running or waiting to run. User priority can appear as a decimal number or as sb, fs, or sys, where sb = Standby fs = Free Standby sys = System Jobs
3	The percentage of CPU MEMORY a code requires to run.
4	The LLNL Division associated with the user number (from the file USERS).
5	Name of the user associated with the user number (from the file USERS).

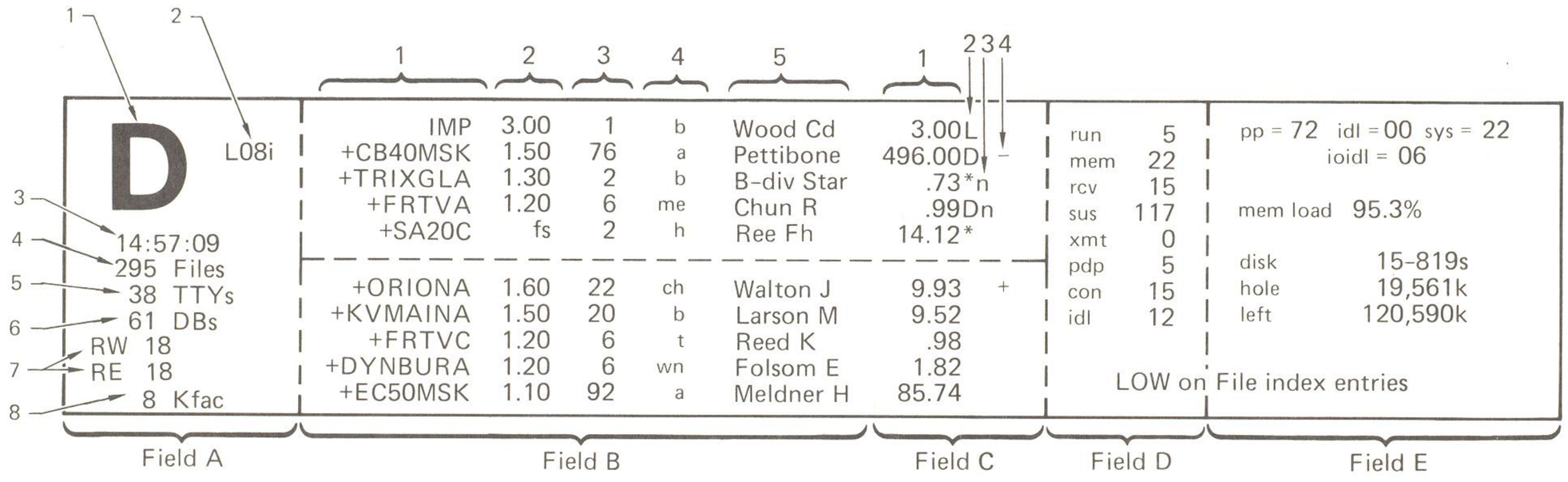

Figure 9. (Repeated) A sample CRAY-1 worker computer display broken into individual fields. This is the display shown under normal load conditions.

Field C

Column	Description
1	The amount of time a job has left to run. The time appearing here is determined by the *t* typed on the execute line (i.e., FILES AGE / *t v*) and does not have any relationship to the time remaining in the user's bank account.
2	This column will either be blank or will have one of the following identifiers: * Problem program is running. I I/O is outstanding. L Problem program is loading. D Problem program is dumping.
3	Column 3 can either be blank or can contain one of the following identifiers: blank The Do Not Disturb bit has not been set. n The Do Not Disturb bit has been set.
4	Column 4 can either be blank or can contain one of the following identifiers: - Priority bump is set and PP is being dumped. + Priority bump is set and PP is being loaded.

Field D

This field shows the system states of all codes running on the specific CRAY-1 computer designated. The figures represent the actual number (octal) of codes in the various states. [See Ref. 4 for specifics.]

Item	Description
run	The number of codes in the CPU memory. This number corresponds to the codes listed above the dotted line in Field B.
mem	The number of codes on disk waiting for CPU memory space. This number corresponds to the codes listed below the dotted line in Field B and codes not appearing due to lack of space.
rcv	The number of codes waiting for a message from a controller. The controller may be a terminal or another code.
sus	The number of codes in the suspend state. These codes have voluntarily given up their use of the CPU for a period of time.
xmt	Problem programs transmitting output messages to user terminals.
pdp	The number of codes waiting for a message from the network. (i.e., TMDS, ENTERPRISE, etc.)
con	The number of codes waiting for a message from their controllee.
idl	Idle. The number of users logged into the CRAY computer via terminal but not running any jobs.

Field E

Item	Description
pp	The percentage of CPU time used by user codes; e.g., 72%.
idl	The percentage of idle CPU time; e.g., 00%.
sys	The percentage of CPU time used by system codes; e.g., 22%.
ioidl	The percentage of I/O-bound time, e.g., 6%.
mem load	The percentage of user memory in use; e.g., 95.3%.
disk	The number and type of disk units attached to the CRAY-1 computer. (e.g., 15 819s)

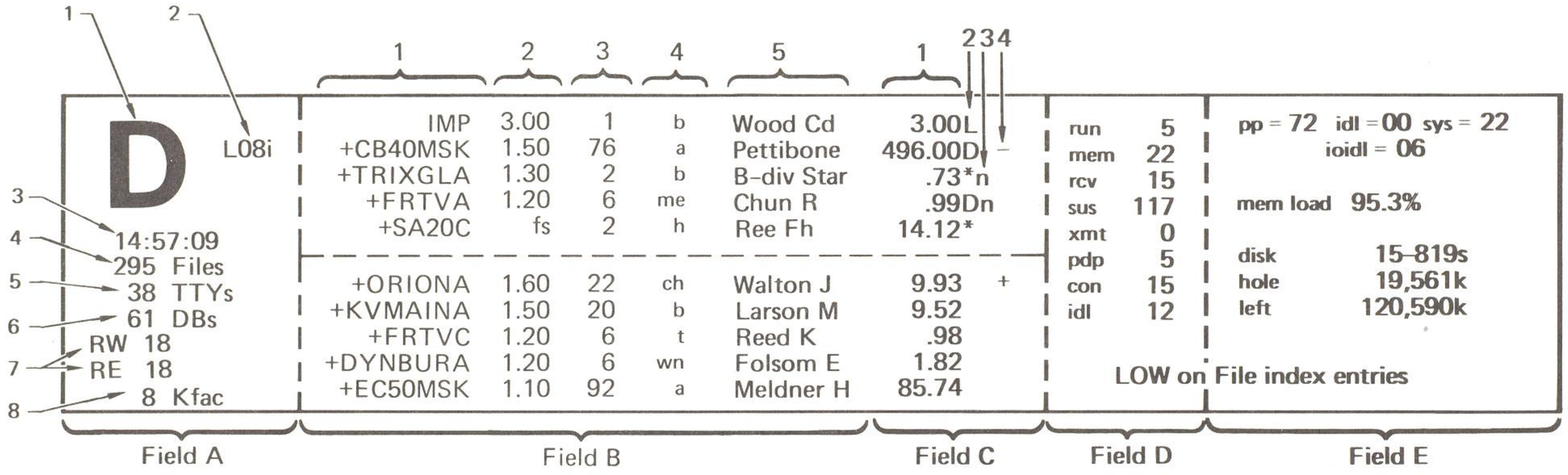

Figure 9. (Repeated) A sample CRAY-1 worker computer display broken into individual fields. This is the display shown under normal load conditions.

Field E (cont.)

Item	Description
hole	This is the word count (decimal) of the largest available space (hole size) for the creation of a file on the disks attached to the worker computer.
left	Total unused space remaining on the disks.

Alternate CRAY-1 Showtime Display Formats

The previous discussion describes the display format most often seen. When certain usage conditions are met, the display format changes to that shown in Fig. 10 and described in the following text.

The criteria for the new format involve the number of slots available in the active file index (Reference Fig. 9, Field A, item 4) and the hole size (Reference Fig. 9, Field E, item hole) available on the 819 disks.

When the number of available slots in the active file index falls below 300, the message "Low on file index entries" appears in the lower right-hand corner of the machine display. (See Fig. 10, CRAY-D.) When this message appears, six users will be listed on the left, the selection based on those users having the greatest number of active file index entries. Every file in a user's active file index requires one slot, and the maximum per CRAY computer is 4513. Hence, when this message appears, users should clean up files not being used by storing them on MASS or ATL and destroying files no longer needed, thus increasing the active file index slots available to other users.

C

59 DB 15:04:34
L08d 423 Files
8 RW 8 RE
8 Kf 48 TTYs

33F	9M	b	Routh JW
53F	9M	wn	Leake GJ
67F	7M	a	Friedman A
57F	7M	a	Dunlop W H
52F	6M	o	Roberts
37F	6M	wn	Harral A

+LDRA	2.00	46	a	Harte J
+DDTBG	1.77	13	a	Hornstein
+IMPA	1.45	2	h	Wong L
+CHCRAYA	1.37	9	wn	Hanner D
+DDTA	1.00	4	c3	Eckert RJ
+LASCON	1.00	1	wn	Maiden D
+TRIXGLA	.51	3	y	Richardson
+CPRODBB	fs	4	t2	Alder B
+HEAT	fs	5	h	Hoover WG
+BUILDA	2.00	5	a	Handeli D

run	9
mem	25
rcv	15
sus	100
xmt	0
pdp	11
tpe	0
con	23
idl	10

pp = 92 idl = 00 sys = 08

mem load 92.5%

disk 15-819s
hole 2,097k
left 90,919k

LOW on Disk space.

D

39 DB 10:59:33
L08d 205 Files
8 RW 8 RE
8 Kf 64 TTYs

134F	6M	b	B-div Star
118F	4M		**999999**
79F	5M	a	Thomson T
78F	1M	a	Tabak M
75F	4M	wn	Hallquist
75F	5M	a	Kravbill D

+KVMAINA	1.25	37	b	Scoggin GG
+LDRA	1.22	28	m	Masomitsu
+SLU	1.13	5	a	Swiger RE
+XHITSB	.12	8	y	Kulander K
+SYSCK	SB	2	co	Microxxxii
+LASCON	SB	1	a	Thiessen R
+CPRODBB	fs	4	t2	Alder B
+LASCON	SB	1	ch	Westmorela
+HEAT	fs	5	h	Hoover WG
+THORA	1.20	25	b	Vantine H

run	9
mem	9
rcv	35
sus	109
xmt	1
pdp	10
tpe	0
con	20
idl	20

pp = 91 idl = 00 sys = 09

mem load 96.2%

disk 15-819s
hole 14,759k
left 143,043k

LOW on File index entries.

F

76 DB 09:51:11
L08g 278 Files
8 RW 8 RE
8 Kf 42 TTYs

386F	14M	a	Nielsen D
147F	8M		**999999**
120F	13M	wn	Hallquist
113F	2M	a	Moore Rp
96F	5M	a	Thomson T
87F	8M	a	Morgan WI

+TRIXGLA	1.20	3	m3	Quigg J D
+XMIS	1.10	40	g	Edwards L
+TRIXGLA	1.10	3	a	Foglesong
*TAM15	1.10	29	a	Stanfel D
+TRIXGLA	1.00	3	t	Dye R
+DDTA	1.00	7	wn	McMaster W
+PUBLISA	1.00	4	co	Operations
+MOKUIA	1.30	19	b	Kransky VJ
+CORONET	1.10	59	a	Pomykal G
+CORONET	1.09	24	a	Dalhed H

run	7
mem	11
rcv	14
sus	109
xmt	1
pdp	7
tpe	0
con	16
idl	11

pp = 87 idl = 00 sys = 13

mem load 95.0%

disk 14-819s
hole 2,107k
left 76,924k

LOW on File index entries.
LOW on Disk space.

Figure 10. A sample CRAY-1 Showtime display showing the alternate displays that appear under certain system load conditions.

When the HOLE size on the 819s drops below 3,000K words, the display shown, in Fig. 10, CRAY-C, appears. Note the message "LOW on Disk space" appearing in the lower right-hand corner. When this message appears, six users will be listed on the left, the selection based on the amount of disk space assigned to their private files. The disk space is expressed in millions of words (decimal). In this case, users should destroy or store their large files to release disk space for other users.

When both of the above conditions occur simultaneously, both messages appear in the lower right-hand corner, as shown in Fig. 10, CRAY-F.

SHARED VIEW DISPLAY

The Shared View display is either blank or is the same as some user's program picture. By means of a message to TMDS from a program, any user can request that this program picture be made the Shared View picture. If the request is granted, then (by selecting the Shared View link) other users interested in the picture can view it from other monitors. The user showing a picture on the Shared View display should be aware that unknown users cannot be prevented from viewing the picture.

The Shared View display can be accessed by typing

V *monitornumber* V

and can be released by accessing any of the other displays. The link to the Shared View display should be released as soon as possible to allow access by other users. [See Ref. 1 for additional detail.]

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3. D. von Buskirk, *Sequential Queues in Flow System 42F*, Lawrence Livermore National Laboratory, Livermore, CA, OC-1198 (1976).

4. National Magnetic Fusion Energy Computer Center, *Craycalls: a Compendium of LTSS System Calls*, Lawrence Livermore National Laboratory, Livermore, CA, MFE-1703 (1980).

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