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DIBBUK USERS GUIDE

Introduction

DIBBUK is a computer aided system for DATACON instrumented beams based on user keyboard commands. It replaces a variety of obsolete manual controls of secondary beam line power supplies that have been used at the AGS. At present, DIBBUK performs such functions as running magnet power supplies, moving collimators and targets, monitoring them and alarming on faults, saving and restoring different running configurations and providing a TUNE BOX for a computer aided manual control. This users guide will be updated as other types of devices are added to the system. The report consists of five sections. Section I describes the available tasks and how they may be used while Sections II and III describe the instruction formats and nomenclatures used. Section IV applies only to the console terminal (EAG) and Section V describes the DATACON-CAMAC operations.

I. Task Description

A. ABORT

The ABORT task terminates the execution of all active tasks at the user terminal except for SET. Should the SET task be active, ABORT will not be scheduled.

B. CALBRT

The CALBRT task calibrates the digitizing circuitry. Should the calibration exceed predetermined limits, the element is placed on deferred status. This task may be scheduled by the user, although it is automatically scheduled by MONITR, UP, and IDLE. Unlike the other tasks, CALBRT will not automatically remove an element from deferred status when it is initially scheduled (see Section II.), nor will it acknowledge completion of execution.

C. CLOSE

To bring a collimator or target to the closed position, i.e., minimum setpoint magnitude.

D. DUMP AND RESTOR

These two tasks permit the user to store (DUMP) and retrieve (RESTOR) up to 20 element parameter files. Every user has a preassigned core area and disk space where the element parameters are stored. With the SET and TUNE tasks (as described elsewhere) the user may specify the setpoint, tolerance, and polarity of any element. These new parameters may be stored for a future running configuration by scheduling DUMP. The task requests the user to specify the file where the information is to be stored (I2 format). If the file number is not within range, the task exits. If the task experiences a disk hardware error, the user is informed and asked to tell the EAG Watch. RESTOR types back the time and date when the requested file was created.

E. IDLE

To bring an element to its minimum regulating current, one uses the IDLE task. The element must have its rectifiers on to be affected. Caution: if MONITR task is active, MONITR will attempt to bring the specified elements to setpoint upon the termination of the IDLE task.

F. LIST

The LIST task outputs the present status of the specified elements. The first output line consists of the file number that is being used, the terminal number, date, time of day and the beam momentum. If the present power supply does not correspond to that stored in the working file, a series of brackets < > is printed about the element magnitude

value. If there is a discrepancy between the polarity read back and that which is stored in the working file, a series of brackets < > is printed about the designated polarity. If a particular element has been designated as "high risk" an @ is printed. If a particular element is being monitored an * is printed. LIST is automatically scheduled to run at one minute intervals when MONITR is running. Both the automatic scheduling by MONITR and the user scheduling of UNDEFR alters any previous operation subset for LIST, i.e., obviates the use of the LI,R <CR> command. (See Section II.)

G. MONITR

MONITR examines the status of the specified elements every five seconds. Should an element be out of tolerance, off, etc., the element will be placed on deferred status. This results in a written message, an audible alarm on the TUNE BOX (there is a reset button), a contact closure available at the BNC connectors on the front of the TUNE BOX and a LAM in the DATACON-CAMAC module. If an element is deferred, it ceases being monitored. To continue the monitoring process for this element, one must schedule the UNDEFR task. In addition, there is a time interval select switch and an audible alarm or light switch on the TUNE BOX that controls the maximum allowable time interval for no transmissions from the computer. If for example, one sets the dial for a 10 second sampling period and there have been no transmissions during this time, an alarm is sounded. This is of particular use when the user is running MONITR, but is not near his terminal and he doesn't notice that DIBBUK has gone down. He will then receive either a visual or audible alarm and an electrical contact closure. To terminate the MONITR task, one schedules ENDMON by typing EM.

The status of all active elements, whether or not a particular one is being monitored, is sent to the DATACON-CAMAC module every five seconds (see Section V). This module is accessed only when MONITR is active.

H. OFF

To bring an element to rectifiers and blowers off, one uses the OFF task. One must first bring it to standby (see STNDBY). The element

must be in the standby state to be affected. Should the element have its rectifiers on, it will be deferred. This task is normally used to shut down supplies for extended periods of time.

I. ON

To bring an element to rectifiers and blowers on, one uses the ON task. The element is not necessarily in regulation. The initial state of the element is of no consequence.

J. OPEN

To bring a collimator or target to its setpoint value.

K. SET

SET allows one to change the stored setpoint, tolerance, polarity software bit, the hardware polarity of an element and enter the beam momentum. The task queries for input with the character #.

1. To alter the stored setpoint, one types

   /D03S <CR>

   (e.g. change the setpoint of D03). Task then requests input. If one types a line feed the value is not altered.

2. To alter the stored tolerance one types,

   /D03T <CR>.

3. To set the polarity software bit to 'A' polarity, one types,

   /D03A <CR>.

4. To set the polarity software bit to 'B' polarity, one types,

   /D03B <CR>.

5. To reverse the element polarity (hardware), one types,

   /D03P <CR>.

   When a hardware polarity change is requested, the element is first read. If the element has its rectifier on, the request is not honored. If during the process of a polarity change there is a fault indication, several attempts are made to reset, and if that fails, the element is placed on deferred status.

6. To scale all setpoints by a factor between 0 and 10.0, one types,

   A <CR>.

The task then requests the scale factor and then alters the stored setpoints for all active elements. The elements are not affected. One must schedule the UP task to change the elements themselves. If the new stored set point exceeds the maximum allowable value, the task stores the extrema as the new setpoint.

7. To enter the beam momentum, one types,

M <CR>.

The task requests that the beam momentum be entered in GeV/c. Should the AGS limit be exceeded, the SET task requests the entry of a new command.

8. To exit from the SET task, one types,

ES <CR>.

The ABORT task will not be scheduled when SET is active.

L. STNDBY

To bring an element to rectifiers off and blowers on (standby), one uses the STNDBY task. The standby state is mandatory when the AGS is in a "Save-A-Watt" mode. The inital state of the element is of no consequence.

M. TUNE

The TUNE task permits the user to alter the element magnitude by manually changing the value of an up-down counter (TUNE BOX). The element specified by the dialed in octal address must be on, otherwise a new device will be requested. At the termination of tuning an element, the setpoint is set to the final tuned magnitude. TUNE ouputs the following series of messages to the user (see below). Line #1 is the task identification. Lines #2 and #3 are messages for setting the element adddress on the TUNE BOX. When the address is set, the request of Line #4 should be executed. If the address is valid, Line #5 is printed. When the switch is enabled, then Line #6, i.e., element identification, is printed and tuning begins. (Note: As one becomes adept with this procedure you will note that one does not have to wait for the messages before going on to the next step.) By putting the switch in the off position, tuning ceases and Line #3 is printed. The task can be terminated at any time by scheduling EXTUNE (ET).

1. (TUNE)
2. Set tune switch to off.
3. Set address and then set tune switch to on.
4. Set tune switch to off.
5. Set tune switch to on.
6. PS #0479 element D03 is being tuned.

The green "locked in" light on the TUNE BOX indicates that the computer is actively scanning the box. After following the previous instructions, the red "tuning" light will also come on. This indicates that a particular element is actually being modified, i.e., being tuned. An element may be tuned even though MONITR is running and even if it is on deferred status. Should an element cease to be tuned, the audible alarm will momentarily be activated.

N. UNDEFR

The UNDEFR task allows the user to remove the specified elements from deferred status; i.e., temporary software inactive status. The elements are specified in the task scheduling command. UNDEFR can be run while MONITR is running. The tasks, CLOSE, IDLE, OFF, ON, OPEN, STNDBY, UP and MONITR initially remove all deferred members of the operation subset from deferred status. (See Section II.)

O. UP

To bring an element to a specified setpoint, one uses the UP task. The initial state of the element is of no consequence.

II. Scheduling Tasks

All tasks are scheduled (enabled or disabled) by typing at the experimenters console in one of the following formats:

1. Task <CR> ..... <CR> = Return
2. Task, All, D03, Q45 <CR>
3. Task, D03, Q45 ..... <CR>
4. Task, X, D03, Q45 ... <CR>
5. Task, R <CR>

Task refers to the name of the function desired. Only the first two letters of the task name are acceptable, otherwise the task is not scheduled. All elements are designated by a single character digit and a two character number. D03 or D3 is a valid entry. D037 is interpreted as D03.

The type (1) format requests that the task named acts upon all the active elements that belong to that terminal. 'Active' means that the element is powered and available; i.e., not 'inactive'.

The type (2) format specifies that all active elements and the "high risk" elements, e.g., D03 and Q45, should be acted upon.

The type (3) format specifies which elements should be affected by the task named. If any of the elements cannot be acted on because of the reasons described previously, the element is ignored.

The type (4) format specifies that all elements except those named should be affected by the task named.

The type (5) format specifies, for MONITR, LIST and UNDEFR only, that the previously defined operation subset for that task be repeated again. This for example, obviates the necessity of retyping the string of elements to be listed every time one wants that list updated, i.e., it is a repeat command.

The software is structured to prevent the simultaneous running of logically conflicting tasks. If one requests a task that cannot run with one that is already running, a message to that effect is made. For example, one can run UP, MONITR, TUNE and LIST simultaneously, however, OFF and UP, cannot be. A bit pattern is typed out which specifies as to what is running (see below). One must either terminate (ABORT) or wait for the natural termination of the conflicting task before one can schedule the new task.

The following tasks require only the task name. All other input is ignored:

1.	ENDMON	(EM)	4.	SET	(SE)	7.	ABORT (AB)
2.	DUMP	(DU)	5.	TUNE	(TU)		
3.	RESTOR	(RE)	6.	EXTUNE	(ET)		

The SET and TUNE request their own element information. See separate task write-ups.

Upon the initial scheduling of MONITR, CLOSE, IDLE, OFF, ON, OPEN, STNDBY and UP, those elements that are to be acted upon and are on a deferred status, are removed from the deferred state. This is NOT the case for CALBRT.

The bit pattern of active tasks is:

BIT #	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	Terminal Active = Ø Inactive = 1	UNUSED	UNUSED	CLOSE/IDLE/OFF/ON/OPEN/ STNDBY/UP/	MONITR/ENDMON	UNDEFR	UNUSED	DUMP/RESTOR	SET	LIST	TUNE/EXTUNE	UNUSED	CALBRT	ABORT	UNUSED	UNUSED

III. Nomenclature

1. Calibration: The A/D circuitry is calibrated by calculating its gain and offset via the digitization of two reference voltages. The D/A cicuitry is corrected for by direct digital software control.
2. Deferred Status: Status which prevents, other than by a manual intervention by the user, the software from acting upon the specified element. Elements that experience faults, drift out of tolerance, etc., are placed on this status.
3. High Risk: Element must be specified by name to turn on, off etc. The "TASK, ALL" command is not sufficient.

4. Idle Status: An element that is at its minimum current setting is defined to be at idle.
5. In Regulation: The element is tracking the computer magnitude commands.
6. Inactive Status: The specified element is unavailable for any computer operations.
7. Invalid ADC Conversion: Harware error. The hardware has sensed a faulty voltage digitization by the A/D circuitry.
8. Minimum Value: The minimum regulated shunt voltage obtainable by the specified element.
9. Off Status: The specified element is completely shutdown; i.e., blowers and rectifiers are off.
10. On Status: The specified element has its rectifers on.
11. Read Error: Hardware error. The computer was unable to successfully read the magnitude and status bits of a particular element.
12. Reversing Switch Fault: Hardware error. The polarity reversing switch is sensed to be in an indeterminate state.
13. Schedule: To schedule a task, is to request its execution.
14. Setpoint Value: The stored magnitude at which the element is to be during its normal operation (target point). A magnitude of 1 count is equivalent to a 25 μV reading with a DVM.
15. Shared Status: Elements that are controlled and/or monitored by more than one user are said to be shared. The shared designation for a given user implies that he can only read the magnitude and status for that element, and that in no way can he interfere with the operation of that element.
16. Software Polarity Bit: That polarity which the software expects the element to be at. 'A' = polarity of the AGS main ring magnets.
17. Standby Status: The specified element has its blowers on, and its rectifiers off.

18. Sub: The digitizing circuitry (A/D) is not set to scan the controlling reference voltage. It is set to scan either the calibration references, hall current, etc.
19. Subaddress: The hardware multiplexer address which defines the voltage input presented to the digitizing circuitry (A/D).
20. Task: A task is any set of programmed logic that is separate from other sets of programmed logic, and whose execution can be directed by the operating system and whose initiation is caused by the user.
21. Tuning Status: An element which is tracking the magnitude settings of the TUNE BOX is said to be in TUNE status.

IV. Console Terminal Tasks (EAG only)

The console terminal allows one to get into the operating system monitor, therefore caution must be used in issuing commands. The console terminal has the ability to run three tasks. These are not available to other uses. They are BEAMS, FAILSF and STATUS. Terminals are numbered 0-7.

A. BEAMS

BEAMS lists on the console terminal or the line printer the present status of the specified beam line elements. Note that in lieu of the element tolerance value, the maximum setpoint value is displayed. The following are examples of how to run BEAMS.

1. List terminal #2 just once.

   ↑C

   .SC, BEAMS,2 <CR>.

2. List terminal #2 and repeat it every 120 seconds.

   ↑C

   .SC,BEAMS,2, 120 <CR>

3. Stop listing.

   ↑C

   .DE,BEAMS <CR>

   When the typing stops then type:

   ↑C

   .SC,BEAMS,8 <CR>

4. To list each terminal sequentially.

   ↑C

   .SC,BEAMS,9 <CR>

5. To output to the line printer.

   ↑C

   .AS LP:,CTY <CR>

6. To return output to the console terminal.

   ↑C

   .AS,,CTY <CR>

B. FAILSF

FAILSF saves the user running files on a preassigned disk area, scans the user on/off status switches and transmits the user status to the AGS PDP-10. This is done every 20 seconds. FAILSF need only be scheduled at the initial loading of the system from the disk. The disk must be write enabled, otherwise FAILSF will print back an error message that there is a disk error. If this occurs, one must reschedule FAILSF. The following is an example of how to run FAILSF.

1. To enter the Julian date.

   ↑C

   .SC,FAILSF,2 <CR>

   Enter Julian data (DDD)

   #072 <CR> (Type 3 character date; e.g. 72 is no acceptable)

2. To start failsafe updating procedure.

   ↑C

   .SC,FAILSF,1 <CR>

   *Note: The command SC,FAILSF <CR> is not to be used. This command starts the failsafe procedure by taking what is in memory and storing it onto the disk. The correct procedure is to take what is stored on the disk and load it into memory.

3. To enter the time of day.

   ↑C

   .TI HH:MM:SS <CR>

4. To assign the printer for error message output.

↑C

.AS LP:,ERR <CR>

C. STATUS

This task enables the console user to alter the status of any element recognized by DIBBUK. This task is scheduled by typing:

↑C

.SC,STATUS <CR>

It types back the character #.

The input format is TERMINAL #, ELEMENT, COMMAND, MAGNITUDE (N,XYY,C,MMMM).

Should it not respond or type a ?, then type X <CR> amd start the sequence over again.

1. To make an element active.

   2,Q13,A <CR> (Terminal #2, element Q13)

   To make all elements active

   2,,A <CR>

2. To make an element inactive.

   2,Q13, I <CR>

   To make all elements inactive.

   2,,I <CR>

3. To change the software polarity bit of an element.

   2,Q13,P <CR>

4. To make an element shared.

   2,Q13,S <CR>

   In case the terminal number of the control element had not been previously specified, one types 2,Q13,S,N <CR> where N = terminal number where control element data block is to be found.

5. To remove an element from shared status.

   2,Q13,N <CR>

6. To alter the maximum setpoint permitted for an element.

   2,Q13,M,3824 <CR> (Maximum is set to 3824)

7. To change the element power supply number
   2.Q13,#,479 <CR> (e.g., P.S. #479)
   To clear the new power supply brackets < > one must repeat the above command. This should be done after the experimenter has acknowledged the power supply change.
8. To change the shunt type (see Table 1.)
   2.Q13,T,5 <CR> (e.g. Type 5)
9. To make an element High Risk.
   2,Q13,H <CR>
10. To make an element Low Risk
    2,Q13,L <CR>
11. To make an element shunt controlled.
    2,Q13,C <CR>
12. To make an element hall controlled.
    2,Q13,V <CR>
13. To disable a user terminal.
    2,,D <CR>
14. To enable a user terminal.
    2,,E <CR>
15. To bring all active elements to a "rectifier off" status. This command disables all user terminals and is intended for use after a power outage.
    EMER <CR>
16. To exit from the task.
    X <CR>

V. DATACON-CAMAC

The DATACON-CAMAC unit provides secondary beam line information through the CAMAC Dataway to the experimenters computer. Each element, e.g. magnet power supply,[1] consists of two successive 16 bit words. There are a total of 64 words per module with the first element being words #0 and #1 and the rest in sequential order. The elements are loaded in the same order as is presented by the LIST task.[2] The module is loaded with updated values only when the MONITR task is active, i.e.

once every five seconds when MONITR is running. All elements are updated even though they may not be a member of the current operation subset or be deferred. Should an element become deferred, a LAM is generated. The DATACON[3] and CAMAC operations are asynchronous with respect to each other. The magnet power supply format is the following:

WORD 1:	Bits 0-7	=	Element DATACON Address		
	Bit 8	=	Deferred by MONITR task		
	Bits 9-12	=	0	=	Shunt or Hall Voltage
			1	=	25 mV Calibration Reference
			2	=	75 mV Calibration Reference
			3	=	Hall Voltage or Shunt
			4	=	Hall Current
			$5\text{-}17_8$	=	Unused
	Bit 13	=	1	=	"A" Polarity
			0	=	"B" Polarity
	Bit 14	=	1	=	Rectifier On
			0	=	Rectifier Off
	Bit 15	=	1	=	Standby On
			0	=	Standby Off
WORD 2:	Bits 0-11	=	Element Last Read Magnitude		
	Bits 12-15	=	Unused		

CAMAC Specifications

The CAMAC command functions are the following:

	COMMAND		ACTION
F(0) -	A(i)	(i = 0-15)	Gates External "Group One" Data Onto Dataway (Words 0-15)
F(1) -	A(i)	(i = 0-15)	Gates External "Group Two" Data Onto Dataway (Words 16-31)
F(2) -	A(i)	(i = 0-15)	Gates External "Group Three" Data Onto Dataway (Words 32-47)
F(3) -	A(i)	(i = 0-15)	Gates External "Group Four" Data Onto Dataway (Words 48-63)

F(8)	-	A(0)		Returns Q if LAM is set.
F(10)	-	A(0)	- S1	Clears LAM
F(24)	-	A(0)	- S1	Disable LAM
F(26)	-	A(0)	- S1	Enable LAM
C	-	S2		Clears LAM
Z	-	S2		Clears LM - Disable LAM

Status Indications

The front panel status indications are the following:

N light flashes whenever module is addressed by CAMAC.

LE light on whenever LAM is enabled.

L light on whenever a LAM is pending.

DR light flashes whenever accepting DATACON data.

DATACON Specifications

All transmissions must have the SET/READ bit enabled. A LAM is generated with bit C6.[1] The CAMAC module address may be adjusted via slide switches to any address between $0\text{-}377_8$.

C5 - C0	Memory Address ($0 - 77_8$)
C6	LAM Set Flag
M15 - M0	Magnitude

References

1. V.J. Kovarik, BNL, EP&S Tech. Note #58 (1973).
   B.B. Culwick, BNL, CAOS Hardware Note APSC-B (1975).

2. See Section I.
   D.I. Lowenstein, F.W. Stubblefield, Nucl. Instr. & Methds., 129, 575 (1975).

3. R. Frankel, BNL, AGS Tech. Note #88 (1971).
   V.J. Kovarik, BNL, EP&S Tech. Note #49 (1972).
   B.B. Culwick, BNL, EP&S Tech. Note #50 (1972).
   V.J. Kovarik, BNL, EP&S Tech. Note #58 (1973).

TABLE 1.

Shunt Type	Amperes/Computer Count
0	1.0
1	1.250
2	.0015
3	.525
4	.03125
5	.0625
6	.075
7	.10
8	.125
9	.20
10	.250
11	.30
12	.375
13	.50
14	.625
15	.750