PLESSEY

CIB Utility

User's Guide

PURPOSE OF THIS DOCUMENT

The CIB User's Guide reviews the basic concepts of disc
volume save/restore when using the Plessey Cartridge
Backup Utility (CIB).

INTENDED AUDIENCE

This manual is a description of the CIB utility. It is
meant to function as a reference guide for operators.

DOCUMENT CONVENTIONS

Throughout this manual the following conventions apply:

Any character enclosed in angle brackets, < >, refers to
a key to be pressed on the terminal keyboard. Thus <LF>
refers to the line-feed key, <CR> to the carriage return
key, <RO> to rubout, etc.

Any terminal keystroke to be performed with the
"control" key depressed is indicated by a prefacing
"CTRL-". For example "CTRL-C" refers to holding down
the "CTRL" key and striking the "C" key.

The sequence of characters, "ddn:", that appear in
example command lines, represent any legal device name,
"DM0:" or "DL1:", for example.

All numbers are in decimal unless indicated otherwise.

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THE WINCHESTER-TAPE CARTRIDGE SYSTEM - AN OVERVIEW

The Plessey Winchester-technology disc drives provide
high storage capacity and reliability with the
additional advantage of a small enclosed system. The
Plessey CSV11A "streaming" tape cartridge and the CIB
utility, provide for rapid backup and restore of data to
and from the "fixed" Winchester media. Although
specifically designed for use with the Winchester disc,
the tape cartridge can also be used with conventional
"removable" discs if this operation suits your needs.

Winchester discs differ from conventional disc drives in
that the magnetic recording medium (or "disc pack") is
fixed within the drive unit and may not be removed by
the user. The tape cartridge and the Plessey CIB
utility are used to transport data to and from discs for
off-site storage, data redundancy and exchange with
other computer systems. Therefore, while the Winchester
disc pack remains fixed on the computer system, the
recorded data may be "streamed" quickly and efficiently
to tape cartridge.

The term "streaming" refers to the way in which the tape
drive reads and writes data on the cartridge. When you
watch the tape cartridge reading and writing, it will
move at a high constant speed (approximately 90 inches
per second). This characteristic (of reading or writing
data at constant speed) is known as "streaming". The
streaming tape cartridges are well suited for backing-up
and restoring Winchester discs because of their large
capacity (over 18 million characters on a 450 foot
cartridge) and the high rate at which data can be
transferred to them (approximately 90,000 bytes per
second).

There are four separate "tracks" of data written on the
tape cartridge. When the end of track 0 is reached,
track 1 is recorded in the reverse direction. Similarly
when the end of track 1 is reached, track 2 begins in
the same direction as track 0. Once track 3 has been
recorded, the tape is full with 4 tracks of data. This
is why you may observe the tape reversing direction
several times while operating.

One cartridge is provided with your system - it contains
a bootable copy of the Plessey CIB program, and
(optionally) operating system software to be loaded to
the Winchester disc. This cartridge should be marked as
your "master copy" and should always be inserted in the
cartridge deck with the "write-protect" tumbler in the
"SAFE" position. Store it where it will not be lost or
damaged.

GETTING STARTED

The tape cartridge shipped with your system must first be "booted" to load the CIB utility. Go to the front panel of the system and make sure the power switch is in the "on" position. Place the distribution tape in the tape cartridge slot (making sure the cartridge is write-protected) and then press the "boot" switch and type "BT" to boot the cartridge as follows:

    *BT<CR>

In the event the system does not contain a Plessey PM-MFV11, or MFV11A CARD, an autoboot capability is provided within the tape cartridge controller which permits booting the CIB program by entering the following ODT* command:

    @777100G

Note that jumper W3, the autoboot enable jumper must be "IN" on the tape cartridge controller card, the PM-CCV11A/B for this option to be enabled. Enabling this option does not interfer with normal boot option.

Once the tape has booted, the CIB program is used to transfer your software distribution to the Winchester disc, usually with a command similar to:

    CIB>ddn:=BT:

Note that the CIB utility will use all of available memory for buffering to ensure streaming during transfer. If available memory is less than the maximum 128k words then the CIB utility will print the message:

    % Memory size is not optimum

It is recommended that the maximum memory is provided so that the tape cartridge will stream on the slower RL01, RL02-emulation discs.

Any unit may be hardware-booted from the console terminal by typing the disc and unit number, for example:

    *ddn:<CR>

to boot device 'dd' and unit 'n', or software-booted from CIB by typing the disc and unit number and the switch '/BO', for example:

    CIB>ddn:/BO

Please refer to the CIB User's Manual section for more
information.

NOTE: For this option to work the controller must be
         revision level D or greater. This can be
         verified by checking the solder side of the
         board. The revision level is etched in a 1/2"
         box. Also the 100234 PROM set must be REV C or
         greater and the 100236 PROM must be REV B or
         greater.

*On-line debugging technique.

CIB - CARTRIDGE IMAGE BACKUP UTILITY

INTRODUCTION

The CIB program is used to backup and restore disc images. An "image" of a disc is all data recorded on it regardless of its format. Therefore, the CIB utility is used to backup RT-11, RSX-11M, TSX, RSTE/E, XXDP or any other disc format.

Since all sectors (except bad blocks) on the disc are backed-up and restored by CIB, an identical amount of time to backup a disk will be required regardless of the number of sectors in use. Thus, the backup time will remain the same whether the disk has 30000 used blocks or 50000 used blocks. CIB may be used to transfer images between any of its supported devices, as detailed below:

Currently the following devices are supported by CIB:

Mneumonic	Model	DEC Equivalent
BT	CSV11A	(none)
DM	FCV06	RK06/07
DK	DCV11	RK05
DL	DCV21L	RL01/02

When a disc is copied to tape (i.e. BT: or MT:), a bootable copy of CIB is placed on the tape header. This makes each backup tape bootable.

Image copies between two units of the same (non-tape) device are also supported by CIB. In this mode, however, the CIB utility is not copied to the output device.

Note that the CIB performs an exact image copy which does not attempt to relocate good data around badblocks on the disk. As a consequence, the backup tape must be restored to the same disc from which the backup was taken or to error free media.

CARTRIDGE HANDLING SUGGESTIONS:

Please read the cartridge manufacturer's handling instructions. "Before using a new cartridge, it should be 'retentioned', that is, run forward to the end of tape, then rewound so that the tension on the tape is even throughout the spool." Type the following command line to retention tapes:

<div align="center">CIB>BT:/RT</div>

If the cartridge has experienced temperature variations during storage or if it repositions frequently (instead of moving continuously in one direction) restart the utility by typing CTRL-C (hold down the CTRL key and then type a C). This aborts the operation and returns to the prompt. Retention the cartridge and try again. If, when backing up, it continues to reposition, use another tape. If, when restoring, it continues to reposition, let it run. It will restore the image.

<div align="center">CAUTION:</div>

When writing a backup image to a cartridge the utility does not give an opportunity to decide against using it; it does not display the old label or make any checks before using it. The user should have a system of cartridge management to avoid writing over valuable information.

COMMAND LANGUAGE

Commands to CIB are made at the "CIB>" prompt. The syntax of the command line is as follows:

(output-device):[/switches]=(input-device):[/switches]

For example: CIB>DMO:=DM1:

The direction of the data transfer is always right-to-left, thus the "input-device" is always on the right side of the equal sign, and conversely the "output-device" is always on the left side. For the example above, a exact copy of DM1: will be transfered to DMO:

Ordinarily you will not need to furnish any of the optional command switches, but at times switches may be useful.

For example: CIB>DMO:/FO=BT:

Here the "/FO" (format a device) switch is used to format device DMO: prior to restoring a backup set from cartridge tapes.   NOTE: To support this function the device to be formatted must have hardware format capability, and requires that the on board format switch be enabled.

At any time you may type "/HE" to the CIB> prompt to get a brief summary of the command line and available switches.

Examples:

In order to load a software distribution from BT: to DMO:, type:

CIB>DMO:=BT:

To backup your disc at the end of the day, type:

CIB>BT:=DMO:

The output device is always specified on the left side of the equal sign, whereas the input device is always specified on the right side of the equal sign.

While you are entering a command line, but before typing <CR>, you may correct typing errors by using the "rubout" or "back space" keys. If you wish to erase the entire line and start over, type CTRL-U. This will place the cursor below the CIB> prompt on the following

line.   Should you type a mispelled command to CIB, and
it is rejected, you may find it useful to type CTRL-R to
"retype" your last command. This will leave the cursor
positioned directly following the last character you
typed, whereupon you may backup with the rubout key and
correct your mistake. (Any time you wish to retype the
last command entered, type CTRL-R.)

CTRL-C typed at any time will cause CIB to halt its
current operation and reinitialize returning control to
the user.

EXAMPLES OF BACKUP AND RESTORE SEQUENCES

Example of a restore or initial load of a distribution:

Shutdown the operating system normally (not applicable to initial load of the distribution cartridge).

Insert a cartridge and boot the system from BT. (Any cartridge that has received a backup before will do. Initially, only the distribution cartridge will serve the purpose.)

Do this step for each cartridge in the restore set which has experienced temperature variation. Type the following command line after the 'CIB>' prompt:

                    CIB>BT:/RT

This retentions the cartridge.

Type in a command line after the 'CIB>' prompt appears. For example, type:

                    CIB>DL0:=BT:<CR>

The utility will now ask for insertion of the cartridge to restore. If already inserted just pull it out and reinsert it. Pulling it out about an inch and reinserting works.

The restore now take place. The tape will make up to four end to end passes. RL01's, RL02,s and RK05's take less than a pass. RK06's take almost four passes. RK07's extend onto a second cartridge.

If the restore requires a second cartridge the utility requests another cartridge. Insert another cartridge. The utility checks this new cartridge and informs the operator if it does not have a volume number one higher than the cartridge just restored. The operator then receives a message which offers three options: 1) continue, 2) try another, or 3) quit.

Example of a backup operation:

Shutdown the operating system normally.

Insert a cartridge and boot the system from BT. (Any cartridge that has received a backup before will do. Initially, only the distribution cartridge will serve the purpose.)

Do this step for each new cartridge the backup might use. Type the following command line after the 'CIB>' prompt:

                    CIB>BT:/RT

This retentions the cartridge. New cartridges do not require formatting.

Type in a command line after 'CIB>' prompt appears. For example, type:

                    CIB>BT:=ddn:<CR>

The utility will now ask for insertion of the cartridge to receive the backup. If already inserted just pull it out and reinsert it. Pulling it out about an inch and reinserting works.

The backup now takes place. The tape will make up to four end to end passes. RK06's take almost four passes. RL01's, RL02's and RK05's take less than a pass. RK07's extend onto a second cartridge.

If the backup requires a second cartridge the utility requests another cartridge. Insert another cartridge. When writing a backup image to a cartridge the utility does not give an opportunity to decide against using it; it does not display the old label or make any checks before using it.

SWITCHES

Note that not all CIB commands cause data transfers. They are available for utility operations for such purposes as formatting, booting and sizing discs, and erasing/retentioning tape cartridges. They are presented here for reference:

/BL=n   Set transfer size to 'n' blocks (where 'n' is a decimal number)

             Example: CIB>BT:/BL=10=DM0:
                or: CIB>BT:=DM0:/BL=10

             This switch sets the number of 256 word blocks to transfer per disk access. It can occur on either the input or output device specification, in conjunction with the device specification, or in conjunction with the RN switch. BL default is set up according to the cylinder size of a disk media (DL=10, DK=12, DM=11). For usage consideration see Note 1 after discussion at /RN Switch.

             Due to hardware limitation, for DL (RL1/02) the block number shouldn't be set greater than 20 decimals.

             The '% Ring size = nnnnnn cells, mmmmmm blocks per cell' message informs the operator of the current settings of switches RN and BL respectively. The message displays the values in octal.

/BO   Boot a device

             Example: CIB>DM:/BO   (boots DM0:)

             The boot switch is used to bootstrap the specified device the same as if you had typed the device mneumonic to the console emulator.

/FO   Format device

             Example: CIB>DM1:/FO   (Format RK06/07
                                             unit 1)

             The format command is used to format discs and erase tape cartridges. Sometimes marginal cartridges may be salvaged by performing an "erase" or format pass. As well, the format

switch is used to format disc devices. To use this function the device to be formatted must be capable of on board format, and the format switch must be enabled.

/HE   Help

             Example: CIB>/HE

             The help command is used to print a short description of the CIB command line and its associated switches on the console keyboard.

/ID   Identify the current program and version

             In addition to the above, it also displays a copy count on the second line. Each time CIB writes a new output cartridge it increments a counter. The second line message 'DC #nnnnnn' contains the number of times CIB has duplicated itself. (The CIB utility label on the cartridge contains a volume sequence number.)

/RN=n   Set ring buffer size to 'n' cells (where 'n' is a decimal number)

             Example: CIB>BT:/RN=2=DM0:
                 or: CIB>BT:=DM0:/RN=2

             This switch determines the number of ring buffer cells to use. It can occur on either the input or output device specification. It can occur in conjunction with the BL switch. RN defaults to 2. For usage considerations see note 1.

             The '% Ring size = nnnnnn cells, mmmmmm blocks per cell' message informs the operator of the current setting of switches RN and BL respectively. The message displays the values in octal.

NOTE 1:   Not all combinations of disk drives and
           cartridge tape will stream with the default
           values of BL and RN. New installations may
           find that the cartridge device does not
           stream. Set BL to the number of blocks
           (sectors) per track. Set RN to an integer
           such that BL x 512 x RN does not exceed
           22,528. If RN does not equal 2 or greater,
           cut BL in half and recalculate RN.

           BL x 512 x RN = number of bytes required for
           transfer buffer space.

/RT   Retension tape

           Example: CIB>BT:/RT   (Retensions BT0:
                                         cartridge)

           From time to time tape cartridges may become
           unreadable due to loss of tape-head contact,
           requiring tape retensioning. Tapes may become
           loose for a variety of reasons — such as
           cartridge removal while in motion or
           excessive start/stop operation. Should you
           have a tape which looks loose or has boot or
           transfer errors try a retentioning pass with
           the above example command.

/RW   Rewind

           Example: CIB>BT:/RW

           The rewind command allows you to manually
           rewind a tape device. Normally tapes are
           rewound automatically and you probably will
           never need to use this switch.

/SZ   Set disc size

           Example: CIB>DM:/SZ=300   (Sets size of
                                             DM0: to 300
                                             blocks.)

           The set size command is used to change the
           size of a disc from bootup default values.
           The switch may be specified alone on a command
           line or together with a transfer command. The
           setting will be maintained until a subsequent
           /SZ switch to the same device-unit is

specified or the CIB program is rebooted. Note that uo error checking is performed on the parameter argument supplied. Transfers between unlike-sized devices may cause transfer error messages to be issued.

/VE   Verify data after backup/restore

               Example: CIB>BT:/VE=DM0:   (Backup RK 06/07
                                              to BT: and verify
                                              data)

               The verify data command is used to verify data which was transfered by the backup command. This switch must be issued with the backup or restore command and be placed right after the output device.

/VO   Verify data only (no backup/restore)

               Example: CIB>BT:/VO=DM: (Verify data
                                              between RK06/07
                                              and BT)

               Same as: CIB>DM:/VO=BT

               To prevent an accident caused by the typing of the command string, 'write protect' both input and output devices.

               The verify data only command is used to verify data without making a backup/restore pass.

               When /VO is issued, the output device and input device can be exchanged.

/WB   Write bootstrap

               Example: CIB>BT:/WB   (Writes CIB
                                              bootblock on
                                              BT0:)

               Normally, the "write-boot" operation is performed automatically during a backup to a CIB-bootable device such as BT:. If it is desired to make a copy of CIB without a data backup, it must be performed with the /WB switch. Note that the message "? Can't write boot" will occur upon any device error (including write protect violations), or for any device not supported as CIB bootable.

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ERROR MESSAGES

Error messages will inform you of command and execution
errors.   When CIB finds an objectionable keyword in your
command, it will underline the keyword and print a pertinent
message, allowing you to correct it and resume.

When execution errors occur, the remedy will depend on the
severity of the error message. In general, comments and
warnings are printed prefaced by the "%" character, e.g.:

> % Please mount new output tape no. 001

Fatal errors are prefaced with the "?" character, e.g.:

> ? Illegal keyword

All error messages and their suggested operator action are
alphabetized and summarized below:

Error: ? Boot attempt aborted
During: Command execution
Remedy: An error condition has caused a device
                bootstrap to fail.   The cause of this
                message will have been detailed on the
                line preceeding this message. Reenter
                command when device error has been
                rectified.

Error: ? Can't write boot
During: Command execution
Remedy: An error has occured during the writing
                of a CIB bootstrap. The cause of this
                error will have been detailed on the line
                preceeding this message.

Error: ? Checksum failure on load
During: Boot/startup
Remedy: A self-check feature of CIB has
                determined contamination has occured.
                This is probably due to memory failure
                but may also be caused by read failures
                on the boot device. Try rebooting. The
                processor will halt following this
                message. Do not use CIB if this message
                is displayed.

Message: % Memory size is not optimum
During: Boot/startup
Action: CIB has determined that available memory
                is less than 124kw but greater than or
                equal to 28kw; CIB will work correctly
                but not at the optimum speed.

Error: ? Data verification error
During: Command execution
Remedy: This message sent by the device driver
                indicates that a data comparison error
                (write check error) had been detected.
                The execution is aborted with the message
                "Verification failed,...........". Wait
                until the tape is fully rewound and retry
                the same command. If error persists
                reformat media or try another tape.

Error: ? Device type unsupported
During: Command interpretation
Remedy: The device specified is unknown to the
                CIB utility. Retype command line.

377   An operation was attempted on a
             block that is marked as bad in the
             bad block file

Error: ? Error during retention
During: Command execution
Remedy: An error has occured on the CSV11A during
                a retention pass. The cause of the error
                will have been detailed on the line
                preceeding this message.

Error: ? Error in parameter
During: Command interpretation
Remedy: A   switch   requiring   a   number   as   a
                parameter cannot be deciphered. Check
                any switch you have specified of the
                form: "/SW=xxx" for proper syntax.

Error: ? DDn: fatal hardware error
During: Command execution
Remedy: An   unrecoverable   hardware   condition
                caused an I/O operation to abort. Retry
                when   hardware   condition   has   been
                rectified.

Error: ? Format aborted
During: Command execution
Remedy: A format operation in progress has been
                cancelled   due   to   device   error.   The
                device error will have been detailed on
                the line preceeding this message. If you
                cannot rectify the error condition, refer
                to field service.

Error: ? Format legal only on output device
During: Command execution
Remedy: The format switch has been specified for
                a device other than the device on the
                left side of the equal sign. Reenter the
                format command separately, e.g. DM:/FO,
                or place the /FO switch on the output
                device, e.g. DM:/FO=BT:.

```
Error:      ? DDn: illegal function requested NNN
During:         Command execution
Remedy:         An illegal function was issued to a
                device driver. This message should never
                occur; please submit an SPR. Below is a
                key of function codes that may be
                printed:

            NNN                 Description

            001         Read logical block
            002         Write logical block
            003         Block skip tape
            004         Rewind tape
            005         Rewind tape and place offline
            006         Ensure tape at BOT and ready
            007         Format
            010         Write file mark
            011         Read file mark/space file
            012         Intialize/format
            013         Retention device


Error:      ? Illegal keyword
During:         Command interpretation
Remedy:         Reenter command line with corrected
                device or switch name.


Error:      ? Illegal switch
During:         Command interpretation
Remedy:         Underlined switch is unknown, type /HE
                for a list of accepted switches.


Error:      ? Invalid device usage implied
During:         Command interpretation
Remedy:         More than one input or output device
                specified or input and output devices are
                the same. Reenter command line with
                corrected device designators.


Error:      ? Legal only on output device
During:         Command interpretation
Remedy:         A write bootstrap command (/WB) was
                specified on the input device. Reenter
                command indicating /WB on output device.

Error:      ? No device specified
During:         Command interpretation
Remedy:         The underlined switch refers to a device,
                but no device has been specified.
                Reenter the command line including a
```

device designator immediately preceeding the switch.

Error: % Not next tape, expected NNN, received JJJ
           % Try another(T), Continue regardless(C)
           or Quit(Q)?
During: Tape load requests
Remedy: The tape cartridge or reel is out of
               expected sequence. Type "T" and you will
               be asked to mount the correct backup
               volume. If you type "C", results are
               unpredictable. Typing "Q" will return
               you to the "CIB>" prompt. Please note
               that the numbers NNN and JJJ above are
               displayed in octal.

Error: ? DDn: not ready
During: Command execution
Remedy: The specified device was not ready and
               loaded.   Retry operation after assuring
               that device is ready.

Error: ? DDn: offline
During: Command execution
Remedy: The specified device was unexpectedly
               offline or unavailable. Rectify hardware
               condition and retry command.

Message: % Please mount new [input/output] tape [no.
           xxx]
During: Command execution
Action: Place the requested tape reel or
               cartridge in the tape drive. If a
               cartridge is already inserted and
               it is the cartridge you wish to use,
               remove and reinsert it.

```
Error:      ? DDn: requested LBN exceeds device size, LBN
            xxxxxx,yyyyyy
During:         Command execution
Remedy:         An  operation was attempted that exceeded
                the size of the specified device.  Submit
                an SPR if you encounter this message.

Error:      ? Retentioning only allowed on BT:
During:         Command execution
Remedy:         A  /RT  switch  has  been specified for a
                device  other  than  the  CSV11A.  Since
                retentioning applies only to this device,
                reenter  the  command  line  with  BT:
                specified.

Message:    % Ring size = nnnnnn, mmmmmm blocks per cell
During:         Command execution
Action:         For information only (no action required)
                For  explanation, see 'SWITCHES' section,
                BL switch.

Error:      ? Sorry - not yet implemented
During:         Command interpretation
Remedy:         A  switch  you have specified is known to
                CIB  but  is  not  implemented.  Please
                report  this  message  via SPR for any
                supported switch.

Error:      ? Specify single device
During:         Command execution
Remedy:         During  a  boot command (/BO), either the
                device  name  was  ommitted, or more than
                one  device  was  supplied.  Reenter the
                boot command with a single device.

Error:      ? Syntax error in device name
During:         Command interpretation
Cause:          Underlined  string is not a proper device
                name.  Try  reentering  command line in
                proper form, such as:  "DK3:".

Error:      ? Too many equal signs supplied
During:         Command interpretation
Remedy:         Reenter command line.
```

Error: Trap through vector NNN, PC=XXXXXX, PS=YYYYYY
During: All operational modes
Remedy: An unexpected system trap or interrupt
          has occured. The remedy will depend on
          the vector through which the trap
          occurred. Refer to the PDP-11 processor
          handbook for information on trap vectors.
          A trap through vector 014 indicates that
          an internal CIB error has been detected.
          In this case please submit an SPR.

Error: ? Unformattable device
During: Command execution
Remedy: This message will appear if CIB does not
          support formatting of the specified
          device. Check to be sure formatting is
          required on the device (for example,
          RL01's cannot be formatted), and if
          required, refer to your operating system
          manuals for the proper procedure.

Error: ? Unit not configured
During: Command interpretation
Remedy: CIB was built without the specified
          device unit. Please submit a software
          performance report.

Error: ? Unit number must be 0-7
During: Command interpretation
Cause: Device unit number out of range. Try
          reentering command line.

Error: ? DDn: unrecoverable data error
During: Command execution
Remedy: An unrecoverable ECC or parity error has
          occured on the specified device. Retry
          the operation on another tape or disc.
          If the indicated device is the FCV06
          Winchester disc, try formatting the disc
          before proceeding.

Error: ? Verification failed: Rewinding the tape.
During: Command execution
Remedy: A data comparison error has occured after
          the data transfer is done. The
          verification routine is then aborted.
          Wait until the tape is fully rewinded,
          then format the output device and retry
          the same command. If error persists
          reformat media or try another tape.

Error: % Warning - output device not completely full
After: Transfer phase is complete.
Remedy: This warning message is printed if the
                input device did not provide sufficient
                data to fill the output device. This
                condition may occur, for example if an
                RK06 backup set is restored to an RK07
                (The RK07 contains 53790 blocks while an
                RK06 contains only 27126 blocks).

Error: ? DDn: write locked
During: Command execution
Remedy: The specified device was write locked
                when a write request was made by the
                operator, to proceed write-allow the
                device.

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