



BRU Server

Command Line Tools
Version 1.2.0

November 14, 2008

BRU Server Command Line Tools Guide

TOLIS Group, Inc., et al

Copyright © 2005-2008, TOLIS Group, Inc.

Notice of rights

All rights reserved. No part of this book may be reproduced or transmitted in any form by any means without the prior written permission of the publisher and copyright holder. For information on getting permission for reprints and excerpts, contact pr@tolisgroup.com.

Notice of Liability

The information in the book is distributed “as is” and without warranty. While every precaution has been taken in the preparation of the book, TOLIS Group, Inc. nor its resellers and representatives shall have any liability to any person or entity with respect to any loss or damage caused or alleged to be caused directly or indirectly by the information and instructions contained in the book or by the computer software and hardware described within.

Trademarks

Throughout this book trademarks are used. TOLIS Group, Inc. states that we are using any and all trademarked names in an editorial fashion and to the benefit of the trademark owner with no intention of infringement of the trademark.

Update Information

TOLIS Group, Inc. will always work to insure that the data contained in this book is kept up to date. As such, please visit our website at <http://www.bru.com/docs.html> to retrieve the latest version of the book.

Table Of Contents

1 - Command Line Operations.....	5
Agent Command Line Options.....	5
Server Command Line Options.....	6
Command Line Consoles.....	8
BRU Server Command Line Access Commands.....	11
Detailed Command Descriptions.....	12
Machine Parsing of Output.....	21
2 - OS X Support Command Line Utilities.....	23
Controlling Tape Drives - tapectl.....	23
Example tapectl commands and their results.....	24
tapectl command breakdown.....	25
Controlling a Tape Library - libctl.....	27
Example libctl commands and their results.....	28
libctl command breakdown.....	29
3 - Command Syntax for the ‘set’ Command.....	31
Backup:.....	31
UpStage:.....	32
Schedule:.....	33
User:.....	34
Dest:.....	35
4 - Datatable Field Names for setc Command.....	37
General setc Syntax:.....	37
5 - Backing Up The BRU Server Server.....	41
Appendix A - BRU Messages.....	43
Overview.....	43
BRU Message Code Listing.....	44
Appendix E - Support Information.....	65
Appendix F - BRU Server End User License Agreement.....	67

1 - Command Line Operations

In addition to the graphical interfaces, BRU Server provides command line tools to enable non-GUI access and management – `bru-server.cmd` and `bru-server.console` for the management console, and the agent and server daemons themselves.

Agent Command Line Options

If you enter `agent --help` in a terminal, you will see the following:

```
BRU Server Agent version 1.2.0 (C) 2003-2005, TOLIS Group, Inc.
Built 16:17:53 12/05/2005 on pc-00103
Options:
-f, --foreground      Remain in the foreground
-p, --port=           Port to listen on for connections
-v, --version         Print version and exit
-k, --kill            Kill a running agent
--config              Configure authorized servers
-h, --help            Print this list and exit
```

If you run the agent daemon with the `--foreground` option, the daemon will remain attached to the terminal in which it was started and all output that is normally written to the `bru_agent.log` file will also be displayed on the screen. This mode is useful for debugging an agent daemon startup issue. During startup, you will see lines that look like this:

```
20060425 09:04:21 BRU Server Agent starting (version 1.2.0)
20060425 09:04:21 Built 16:17:53 12/05/2005 on pc-00103
20060425 09:04:21 Bound socket
```

To exit this mode, use `CTRL-C`. This will abort the current agent, so you will need to restart it without the `--foreground` option for normal use:

```
^C
20060425 09:04:53 Going down on signal 2
```

The `--port=` option is useful if you are not able to use the agent's default port of 14442. You may set a different port with this command. You should use port numbers above 1024. If you change an agent's port assignment, you must also change the port assignment in that client system's record on the server. This can be achieved in the GUI on the "Data Manager" -> "Clients" panel.

The `--config` option can only be used by the root user and is discussed in detail in Chapter 1.

The remaining options should be self explanatory.

Server Command Line Options

If you enter `server --help` in a terminal, you will see the following:

```
BRU Server 1.2.0 (C) 2002-2005, TOLIS Group Inc.
Built 16:17:53 12/05/2005 on pc-00103
Options:
-P, --password      Set the administrator password and exit
-p, --port=         TCP port BRU Server will accept connections on.
-f, --foreground    Do not fork, send log output to standard out,
                   Used for debugging.
-q, --quick         Do not initialize hardware (faster)
-d, --directory=    Set top level directory for BRU Server.
                   If omitted, current directory is assumed.
-k --kill           Kill a currently running BRU Server
-v, --version       Print version number and exit.
-l, --license       Display the license info.
-h, --help         Print this list.
```

The `--password` option can only be executed if you are running the daemon as root. It will allow you to reset the BRU Server admin password for that system. Non-root attempts to use this option will fail.

If you execute the server daemon with the `--foreground` option, the daemon will remain attached to the terminal in which it was started and all output that is normally written to the `bru_server.log` file will also be displayed on the screen. This mode is useful for debugging a server daemon startup issue. During startup, you will see lines that look like this:

```
20060425 10:14:11 BRU Server starting
20060425 10:14:11 BRU Server 1.2.0 (C) 2002-2005, TOLIS Group Inc.
20060425 10:14:11 Built 16:17:53 12/05/2005 on pc-00103
20060425 10:14:11 Reading license file
20060425 10:14:11 Licensed 100 clients for serial number 8270-5244
20060425 10:14:11 Scanning for tapes and changers
20060425 10:14:11 Found tape at ntape1 EXABYTE/VXA-2a
20060425 10:14:11 Found autoloader at changer0 EXABYTE/VXA 1x10 1U
20060425 10:14:11 Taking inventory of loader changer0
20060425 10:14:11 Configuration signature same as saved configuration
20060425 10:14:11 Listening on port 14441
20060425 10:14:11 Bound socket
```

To exit this mode, use `CTRL-C`. This will abort the current agent, so you will need to restart it without the `--foreground` option for normal use:

```
^C
20060425 10:18:53 Going down on signal 2
```

While the server daemon has an option to assign a non-standard port (`--port=`) and will accept different port assignments than the default of 14441, it will not work as the agent is currently limited to connecting to port 14441 for authentication. This will be changed in a future release of the agent software so that the server daemon may also be started on a non-standard port.

Use the `--quick` option if you want to skip performing an initialization of your tape drives and libraries. If you know that your configuration has not changed, it is safe to use the `--quick` to speed up the startup sequence of the daemon when using a larger library.

If you have installed the BRU Server environment into a different directory or folder that where you're running the actual server daemon, you may specify the alternate directory using the `--directory` option. This is not a recommended mode of operation and you should always run the server daemon from within the install directory.

To read the BRU Server server's license and display it, use the `--license` command. It will display your license information based on your license file.

```
Reading license file
  Licensed 100 clients for serial number 8270-5244
  Adding 25 additional licenses
Current license settings:
Serial number:      8270-5244
clients           : 125
```

If you have changed your license and use of this command reports a different number of clients than the server currently shows as licensed, you need to restart the server to recognize the new license info.

An important note about the server daemon and the `--kill` option - you will **not** be warned or asked to confirm the kill command. The server daemon will be stopped immediately and any running jobs will be aborted.

Command Line Consoles

The `bru-server.cmd` tool allows you to manipulate the server processes directly, via shell script redirection, or even create your own user interface. It requires no special terminal considerations and uses the `stdin`, `stdout`, and `stderr` mechanisms for input and output.

The `bru-server.console` tool is a curses-based tool that uses special terminal control capabilities to provide an interface that includes command history (using the up and down cursor keys) and a split screen to display job info in addition to the normal command sequences. This tool does require a minimally intelligent terminal such as the default OS X Terminal application or (as a minimum) VT-100 compatibility.

To login with `bru-server.cmd`, you must pass the proper arguments on the command line. By simply typing `bru-server.cmd` and hitting enter, you will be reminded of the usage:

```
xserve1 # bru-server.cmd
BRU Server simple command line client 1.1.1
Copyright (C) 2004, TOLIS Group, Inc
Built 23:34:09 11/16/2004 on g4mac.tolisgroup.com
Usage:

bru-server.cmd [ -v ] [ --port=<port number> ] <user> <host>
    -v          Verbose output
    --help     Print this list
```

When you enter the proper command, you will not receive a prompt and you should enter the BRU Server admin user password on the next line after you hit ENTER:

```
bru-server.cmd admin server
<adminpassword>[ENTER]
connected
BRU Server >
```

Once you see the “BRU Server >” prompt, you are logged in and ready to execute commands. One important option is the “-v” option to enable additional verbosity. When you log in using this option, the command prompt will change to “input:” instead of the default. Also, you will now see much more information displayed during job “attach” operations.

```
bru-server.cmd -v admin server
<adminpassword>[ENTER]
connected
input:
```

An example of controlling the `bru-server.cmd` tool via a shell script would use a bit of shell redirection:

```
PASSWORD="mysecret"
SERVER="bruserver.domain.com"
RESULT=`(echo ${PASSWD}
sleep 5
echo show backup
sleep 5
exit) | bru-server.cmd admin $SERVER`
```

The `$RESULT` variable would then contain a list of your current backup job definition names. If you have a normal terminal session available and you are not trying to script the command line, you should use the `bru-server.console` tool. The login with this tool is interactive and will prompt you for the login parameters.

```
tiger1:~ tjones$ bru-server.console
```

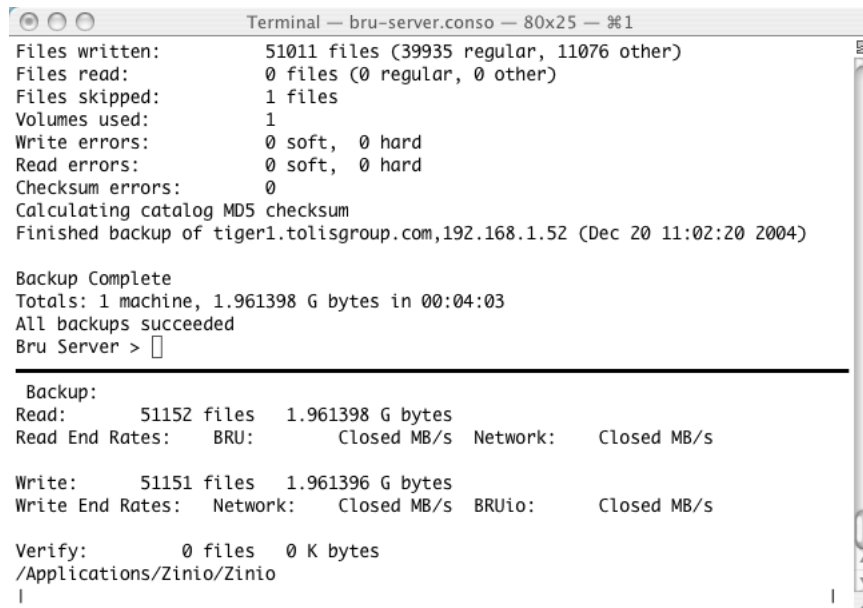


```

Remote hostname >tiger1
Connecting to tiger1:14441... Connected
User name > admin
Password:

```

The main difference is in the way the information is displayed. The `bru-server.console` tool will actually provide a split screen layout when you are monitoring a job. The current data will be displayed in the lower pane while you are able to continue executing commands in the upper panel. If you wish to close a monitor session, press the TAB key. Pressing the TAB key again will reopen the session.



```

Terminal — bru-server.conso — 80x25 — %1
Files written:      51011 files (39935 regular, 11076 other)
Files read:        0 files (0 regular, 0 other)
Files skipped:     1 files
Volumes used:      1
Write errors:      0 soft, 0 hard
Read errors:       0 soft, 0 hard
Checksum errors:   0
Calculating catalog MD5 checksum
Finished backup of tiger1.tolisgroup.com,192.168.1.52 (Dec 20 11:02:20 2004)

Backup Complete
Totals: 1 machine, 1.961398 G bytes in 00:04:03
All backups succeeded
Bru Server > █

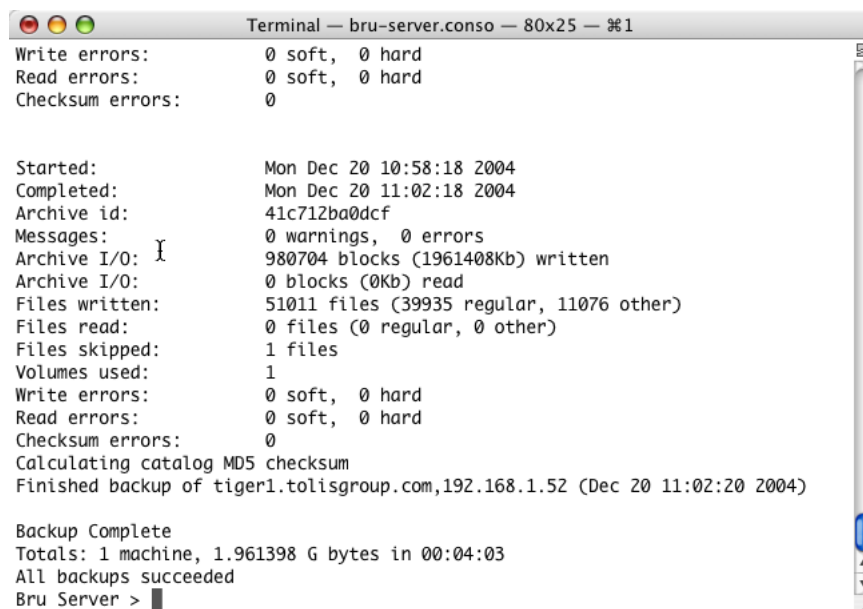
Backup:
Read:      51152 files  1.961398 G bytes
Read End Rates:  BRU:      Closed MB/s  Network:  Closed MB/s

Write:     51151 files  1.961396 G bytes
Write End Rates: Network:  Closed MB/s  BRUio:    Closed MB/s

Verify:    0 files  0 K bytes
/Applications/Zinio/Zinio
|

```

bru-server.console Character Interface – Both Panes



```

Terminal — bru-server.conso — 80x25 — %1
Write errors:      0 soft, 0 hard
Read errors:       0 soft, 0 hard
Checksum errors:   0

Started:           Mon Dec 20 10:58:18 2004
Completed:         Mon Dec 20 11:02:18 2004
Archive id:        41c712ba0dcf
Messages:          0 warnings, 0 errors
Archive I/O:       980704 blocks (1961408Kb) written
Archive I/O:       0 blocks (0Kb) read
Files written:     51011 files (39935 regular, 11076 other)
Files read:        0 files (0 regular, 0 other)
Files skipped:     1 files
Volumes used:      1
Write errors:      0 soft, 0 hard
Read errors:       0 soft, 0 hard
Checksum errors:   0
Calculating catalog MD5 checksum
Finished backup of tiger1.tolisgroup.com,192.168.1.52 (Dec 20 11:02:20 2004)

Backup Complete
Totals: 1 machine, 1.961398 G bytes in 00:04:03
All backups succeeded
Bru Server > █

```

bru-server.console Character Interface – Top Pane Only

The command sequences are the same for both command line tools and are covered below. Entering exit at the prompt will close the console session. However, any job that may have been running will continue to run.

BRU Server Command Line Access Commands

A list of the general commands available and their short descriptions in both the `bru-server.cmd` and `bru-server.console` tools:

<code>archivelist</code>	List files in a catalog
<code>attach</code>	Attach to a running process
<code>backup</code>	Run a backup job
<code>cattest</code>	Test catalog integrity
<code>debug</code>	Dump debug information
<code>delay</code>	Delay command
<code>estimate</code>	Estimate backup size
<code>exec</code>	Run an external command (admin only)
<code>exit</code>	Exits this session
<code>header</code>	Show the tape header
<code>help</code>	Get help
<code>hinv</code>	Scan for tapes and loaders
<code>housekeeping</code>	Perform regularly scheduled maintenance
<code>inspect</code>	Inspect an archive
<code>kill</code>	Terminate a process or session
<code>lastrc</code>	Last return code
<code>license</code>	Reread and show license information
<code>lock</code>	Acquire a lock on a resource
<code>ls</code>	List directory on a client
<code>mounts</code>	List filesystems on a client
<code>mt</code>	Manipulate tape drives
<code>mtx</code>	Manipulate tape loaders
<code>password</code>	Change password
<code>recycle</code>	Recycle tapes in a destination
<code>remote</code>	Remote access to server
<code>restore</code>	Restore an archive
<code>scan</code>	Scan a tape for archives
<code>search</code>	Search archives
<code>set</code>	Set (create, modify, delete) database record variables
<code>setc</code>	Set database component variable
<code>show</code>	Show variables
<code>shutdown</code>	Shut the server down
<code>test</code>	Catalog dump
<code>unlock</code>	Unlock a resource
<code>upstage</code>	Move a staged backup to tape
<code>verify</code>	Verify archive
<code>version</code>	Print the server version
<code>what</code>	Show what is going on
<code>who</code>	Show who is logged in

You can get additional help on any command by typing “help command” at the prompt:

```
BRU Server > help archivelist
archivelist [-m] <archive> <directory>
```

A note about arguments described as lists below - all lists are include in '[' ']' characters with each list element separated by a comma and a space.

```
["/machine/path", "/machine2/path"]
or
[ 1, 3, 4, 17 ]
```

Python users will recognize this format as a standard list assignment.

Detailed Command Descriptions

attach

Attach the current Console session to a BRU Server command that is already running. Requires the session number as an argument. Use the 'what' command to see a list of running processes.

Example:

```
attach 423
```

backup [options] <machine-directory list>

Run a backup job to a <destination>. The machine-directory list is a list consisting of machine and pathnames to back up. A null string means that a full network backup of all machines was selected. If you do not specify a destination (-D), the job is written to the Stage disk.

Options are:

```
-D <destination> Write backup to <destination> instead of disk
-b <bru_arg>      An argument to be passed on to the remote bru
-e <n>           Override encryption default. 0=off 1=on
-z <n>           Override compression default. 0=off 1=on
-j <name>        Name of this job or base job for partial backups
-t <type>        Type of job (Full, Incremental, Differential)
-v              Run archive verification pass
-r              Eject tape after backup (standalone drives only)
-m <email>      Mail results to <email>
-i              Intermittent style backup
-o <mode>        Overwrite mode-- 'overwrite' or 'append'
-Z              Compress files within archives. Slows backups a lot
```

Example:

```
backup -j "Sample Job" -v -m "bruadmin@bru.com" ["/tiger1/Users/",
"/g4mac/Users/"]
```

Notice that multiple systems and paths may be included in the machine-directory list. Each separate entry must be enclosed within double quotes. A single entry consists of at least the machine name as it is declared in the machines database. The example above includes the machines "tiger1" and "g4mac" and backs up the "/Users/" folder/directory on each of the systems. The format is similar to an entry in a netinfo database - the root of the BRU Server environment ("/") followed by the machine ("tiger1") followed by the path on that machine ("/" at least). Because this job includes 2 systems, there will be 2 physical archives created on your archive media (in the example, the Stage directory).

If we were writing to tape instead of the disk Stage, we would pass a destination using the -D option as follows (enter as a single line):

```
backup -j "Sample Job" -D "EXABYTE-default" -v -m "bruadmin@bru.com"
["/tiger1/Users/", "/g4mac/Users/"]
```

This would result in the above job being written to the destination defined as "EXABYTE-default" rather than the disk Stage as in the first example.

In addition to specifying path elements that are to be included in the backup job, you may also pass paths that are to be explicitly excluded from the backup operation in the machine-directory list. To specify directories to be excluded from the backup, add all entries that are to be included

and then specify an empty path (""). Any machine-directory entries that follow this empty path will be processed on the client as elements that are to be explicitly excluded from the backup operation. This is in addition to any client-specific bruxpat entries that may exist on the given client system. An example that would exclude the "/Users/Shared" folder on "tiger1" would be created as follows:

```
["/tiger1/Users/", "/g4mac/Users/", "", "/tiger1/Users/Shared"]
```

Keep in mind that you must specify such exclusions for each machine as a separate entry in the list. While the above example will exclude "/Users/Shared" from the machine "tiger1", it would not exclude it from the machine "g4mac".

During the backup process, if you are using the bru-server.console, you may view the progress display by pressing the TAB key. If you are using the bru-server.cmd and did not start the session with the -v option, you will not see any progress detail and the standard "BRU Server >" prompt will return once the restore process is completed.

```
cattest [ catalog file ]
```

Tests integrity of catalog files named or all catalogs if no catalogs are specified. This is useful to check for corruption in the catalogs on the disk.

```
debug
```

Dumps the server state to aid the BRU Server maintainers

Options are:

```
-q    Do not echo the output; only saves the debug file to /tmp directory
      on the server system named bru_server.debug
-m    Mail the result back to TOLIS Group
```

Note – only use this command if instructed by TOLIS Group support personnel.

```
delay [ secs ]
```

Delay command. Takes a single argument, the number of seconds to delay. The default is one second.

```
estimate [ options ] <machine/directory list>
```

Estimate the size of a backup job.

```
-j <name>    Name of this job, or base job for partial backups
-t <type>    Type of job (Full, Incremental, Differential)
```

Example:

```
estimate -j "Engineering Full" -t "Full" ["/tiger1/Users/"]
```

```
exec <command> [ <arguments> ]
```

Run a command on the server system. This command is only available to the admin user.

```
exit
```

exits this session closing the connection to the server and exiting the local console app.

header <drive name>

Determine which tape is currently loaded in the specified drive.

Example:

```
header ntape0
header /dev/nst0
```

hinv [-d <device> ...]

Scan for tape drives and loaders

```
-d <device>      Disable <device> to prevent it from being used
-q              Do not initialize hardware (faster)
-e              Force drive eject before robot tape pick
```

housekeeping

Perform regularly scheduled maintenance

inspect <device>

Inspect/test an archive. This is the equivalent to BRU's checksum verify pass. To perform a bit-for-bit comparison against the original client system's data, use the "verify" command (see below).

kill <BRU Server process-id>

Stop a process. The process-id is found with the 'what' command.

Example:

```
kill 423
```

lastrc

Print the return code of the last operation. Zero is success, -1 usually means that a command crashed and other nonzero numbers indicate various kinds of failure. This command is primarily used in scripted operations such as interface wrappers.

license [-r]

With no arguments, shows current licensing information.

With -r, re-reads license information from the license file without restarting the server

Example:

```
BRU Server > license
Current license settings:
Serial number : 8290-1580
clients      : 25
```

lock <shared|exclusive> <resource> <timeout>

Acquire an exclusive or shared use of a resource where <timeout> is in seconds. Run with no arguments to see what locks are currently held and pending.

```
ls <machine> <directory>
```

List directories on a client machine

Example:

```
ls tiger1 "/Users"
-rw-r--r--    root    wheel           0 Sep 12 2003 20:20 .localized
drwxrwxrwx    root    wheel          204 Dec 01 2004 15:33 Shared
drwxr-xr-x    501     501           1156 Dec 20 2004 09:36 tjones
drwxr-xr-x    502     502           1156 Dec 20 2004 09:36 andy
```

```
mounts <machine>
```

List mount points on a machine. The agent will only process filesystems that are remarked as "local".

Example:

```
mounts tiger1
local    /                /dev/disk0s3
ignore   /dev              devfs
remote   /dev              fdesc
local    /Volumes/RAID 1 /dev/disk3s3
local    /Volumes/RAID 2 /dev/disk4s3
local    /Volumes/Stage Home /dev/disk1s3
remote   /Network        automount -nsl [332]
remote   /automount/Servers automount -fstab [336]
remote   /automount/static automount -static [336]
remote   /Volumes/Music   //@APPGEN/MUSIC
```

In this example, the agent would not process the filesystems marked as "ignore" or "remote". If you are building a custom wrapper for users, you should not display these filesystem types to prevent confusion caused by a user selecting a filesystem for inclusion in a backup that will not actually be processed.

```
mt <tape device> <mt subcommand> [ arguments ]
```

Manipulation of tape drives. Run "mt" for subcommands

Subcommands are:

```
rewind          Rewind the tape
fsf [n]         fsf the tape n times
bsf [n]         bsf the tape n times
fsfm [n]        fsfm the tape n times
bsfm [n]        bsfm the tape n times
reten          Retension the tape
read n          Read n bytes from the tape
eod            Seek to end of data
setblk n        Set the block size to n
tell           Show current block position
seek n         Seek to block position n
eject          Eject the tape
status         Show tape status
```

Examples:

Get the current drive status

```
mt ntape0 status
Status bits:   BOT ONLINE
Block size:    1024
```

Eject the tape from the drive

```
mt /dev/nst0 eject
```

Get the current block offset on the tape

```
mt /dev/nst0 tell
23837
```

```
mtx <scsi loader device> <mtx command> [ arguments ]
```

Used to manipulate tape loaders.

Commands are:

move <source-address> <dest-address>	Move a cartridge
status	Status of changer
inventory	Force a cartridge inventory
inquiry	Inquire about vendor/model
load	Load a cartridge into a
drive	
unload	Eject a cartridge

Examples:

Get the Library Status

```
mtx changer0 status
Changer changer0
```

```
Drive 1 Empty
```

```
Slot 1 Full "H0000001"   Slot 2 Full "H0000002"   Slot 3 Full "H0000003"
Slot 4 Full "H0000004"   Slot 5 Full "H0000005"   Slot 6 Full "H0000006"
Slot 7 Empty             Slot 8 Empty             Slot 9 Empty
Slot 10 Full "CLNA0002"
```

Move a tape from a slot to the first drive

```
mtx /dev/sg0 move s5 d1
```

Move a tape from a slot to the first Import/Export slot

```
mtx changer0 move s3 i1
```

```
password [ user ] <password>
```

Change the user's password. This is an admin only command.

```
recycle <destination>
```

Examine all tapes within a destination, deleting all associated archive records and marking them as empty. While you can import tapes that have been recycled by mistake, we recommend that you use caution when using this command.


```
remote <host> <port>
```

Connect to a remote host at a particular port and then relay data between it and the server. This command should only be used under the direction of TOLIS Group support and is only available to the admin user.

`host` may be a DNS-resolvable machine name or an IPv4 address
`port` should be an unprivileged TCP port value

```
restore [ -d directory ] [ -m machine ] [ -D device ] <archive> [ file list ]
```

Restore files from <archive>.

```
-m          Specifies a different machine than the one originally backed up
-d          Specifies restoring to a different directory
-D          Specifies a different device than the backup device
-o          Unconditionally overwrite existing files
-e <n>     Override encryption default.  0=off 1=on
-z <n>     Override compression default.  0=off 1=on
[ files ]  Specifies files/directories to restore, the default is all
           files.
```

An example of restoring the /Users/tjones/Documents directory from an archive labeled 412eef560ec1 to the original location, only overwriting older files on the disk:

```
restore 412eef560ec1 ["/Users/tjones/Documents/"]
```

Restoring that same data to the "g4mac" machine's "/private/tmp/" directory adds both the `-m` and `-d` arguments:

```
restore -d "/private/tmp/" -m "g4mac" 412eef560ec1
       ["/Users/tjones/Documents/"]
```

(that should be a single command line).

During the restore process, if you are using the `bru-server.console`, you may view the progress display by pressing the TAB key. If you are using the `bru-server.cmd` and did not start the session with the `-v` option, you will not see any progress detail and the standard "BRU Server >" prompt will return once the restore process is completed.

```
scan [ -s ] <device> [ start end ]
```

Scan tape(s) in a device, adding or updating any BRU archives located to the catalog database. This is referred to as an "Import" operation in the BRU GUI.

```
start end      Start and ending slots, required for loaders.
-s            Slow scan mode
```

```
search [options] <target string> [ archive ... ]
```

Search for elements within the BRU Server catalog database

```
-c          Case insensitive comparison
-r          Regular expression search
-h <n>     Maximum number of hits, default 100
-m          Machine readable output
```

If no archives are listed all known archives will be searched.

```
set [ -m ] <database> <key> [ <value> ... ]
```

Set a key in database <database> to <value>. If <value> is not present, the key is deleted from the database. When using the set command, you must provide values for all values in a given database entry. You use the set command for creating new records, modifying existing records, or deleting records. To delete a record, pass its key value with no further values.

Example to Create a new machine entry:

```
set machines "Lab's G4" 'pc-00101,192.168.1.101', 14442,
  'Oct 21 13:30:38 2005', 0, 0
```

Example to modify the “Labs’s G4” machine’s communication port and encryption settings (you could also set each new value using the setc command):

```
set machines "Lab's G4" 'pc-00101,192.168.1.101', 6435,
  'Oct 21 13:30:38 2005', 0, 1
```

Example to delete a job known as “Monday Incremental”:

```
set backup "Monday Incremental"
```

Note that there are no further values passed beyond the database record’s key value in this deletion example. Specifying a key with no associated value will result in that key being deleted from the datatable.

See Appendix A for a complete list of datatable set command expected formats.

```
setc <database> <key> <field> <value>
```

Sets the value of a component. The key object must already exist. The setc command allows to change a specific value within a database record for a given key.

Example to change the slots assigned to an existing destination called “Weekly Full”:

```
setc -m dest "Weekly Full" slots ["1, 2, 3, 24, 25"]
OK
```

Example to change the port value for a known machine:

```
setc machines "Lab's G4" port 6435
```

(note that the OK response is not returned without the -m option on the command)

See Appendix B for a detailed list of the various setc fields associated with each datatable.

```
show [-m] [ <database> [ <key> ] ]
```

With no arguments, show the database names.

```
BRU Server > show
archives
backup
dest
devices
drives
history
machines
parm
```

```

schedule
tapes
upstage
user

```

With a database, show the keys present in the database

```

BRU Server > show archives
40db3af301bf
40eacdf80e35
411a8c5e0716
4182b2db02f2
41b5f1dc0adf
41c2fdc9033d
41c712ba0dd0

```

With a database and key, show the value of the key

```

BRU Server > show archives 40db3af301bf
Creation date           : Dec 10 13:31:08 2004
Machine                 : tiger1
Job that created this archive : QuickStart Demo
Type of archive         : Full
Tape List               : ['100004']
Archive start blocks    : [0]
Who created this archive : admin

```

If the -m option is passed with the command, the response will look like:

```

BRU Server > show -m archives 40db3af301bf
('Dec 10 13:31:08 2004', 'tiger1', 'QuickStart Demo', 'Full', ['10004'],
 [0], 'admin')

```

shutdown

Stop the server daemon on the currently connected server. Any running jobs will be irretrievably aborted.

test <archive-id>

Validates a specified archive catalog. The archive-id can be determined by examining the archives database.

unlock

Releases a resource. Usage: unlock <resource>. Use the lock command with no arguments to get a list of current locks.

upstage [options] <destination>

Write a staged backup to a destination, deleting the stage file on successful transfer to tape. The destination must be specified.

```

-v           Run archive verification
-r           Eject tape after backup (standalone drives only)
-m <address> Mail transcript of output to <address>
-u <user>    User to upstage files, default is all staged archives
-o <mode>    Overwrite mode-- 'overwrite' or 'append'

```

To UpSptage to the "ADIC-default" destination, verifying the operations, send email to the

bruserver-admin@bru.com user, and overwriting any existing data:

```
upstage -v -m "bruserver-admin@bru.com" -o "overwrite" "ADIC-default"
```

```
verify [ -D device ] [ -m machine ] <archive>
```

Verify the integrity of the archive by reading it. If a machine is specified, the files in the archive are compared against the files on the machine. Changes to the files on disk since the archive was made will be reported.

-D	Specifies a different device than the backup device
-m	Specifies a machine to compare files against
-e <n>	Override encryption default. 0=off 1=on
-z <n>	Override compression default. 0=off 1=on

To perform a comparison verification of the archive against its original client system:

```
verify 40db3af301bf
```

version

Display the version of the server

what

Displays a list of current processes with BRU Server process ID's. You can monitor a process using the attach command or kill a running process with the kill command.

who

Displays a list of who is logged into the BRU Server daemon

Machine Parsing of Output

In all instances, adding a `-m` to the command options will modify the output to be oriented towards machine manipulation rather than being read by humans. For example, the output of the normal `mounts` command would look like:

```
BRU Server > mounts tiger1
local / /dev/disk0s3
ignore /dev devfs
remote /dev fdesc
local /Volumes/Tiger Server /dev/disk1s3
local /Volumes/Data Volume /dev/disk1s5
remote /Network automount -nsl [383]
remote /automount/Servers automount -fstab [404]
remote /automount/static automount -static [404]
local /Volumes/iDisk /dev/disk2s2
remote /Volumes/tolistim idisk.mac.com/tolistim/
remote /Volumes/Music //:@APPGEN/MUSIC
```

While the machine readable (`-m`) version would look like:

```
BRU Server > mounts -m tiger1
[('/dev/disk0s3', '/', 'local'), ('devfs', '/dev', 'ignore'), ('fdesc', '/dev',
'remote'), ('/dev/disk1s3', '/Volumes/Tiger Server', 'local'), ('/dev/disk1s5',
'/Volumes/Data Volume', 'local'), ('automount -nsl [383]', '/Network',
'remote'), ('automount -fstab [404]', '/automount/Servers', 'remote'),
('automount -static [404]', '/automount/static', 'remote'), ('/dev/disk2s2', '/
Volumes/iDisk', 'local'), ('idisk.mac.com/tolistim/', '/Volumes/tolistim',
'remote'), ('//:@APPGEN/MUSIC', '/Volumes/Music', 'remote')]
```

The important elements here are that the entire list is enclosed within square brackets - '[' & ']'. Each subsection is enclosed in parenthesis and the elements within those sections are enclosed in single quotes and separated by commas unless the mount point contains a single quote (apostrophe) in which case the entry is enclosed in double quotes.

Each of the parentheses elements above would relate to the separate line output generated without the `-m` option. For example:

```
('/dev/disk0s3', '/', 'local')
```

equates to:

```
local / /dev/disk0s3
```

in the standard line based output in the original `mounts` example.

2 - OS X Support Command Line Utilities

Controlling Tape Drives - tapectl

If you are running BRU Server under Linux, please review the Linux documentation for the mt-st (mt) and mtx commands. The libctl and tapectl tools are provided for Mac OS X systems where native tape and tape library tools are not available.

Tape drives control their media in one of two manners - rewinding mode and non-rewinding mode. In rewinding mode, the media is opened, if the media is not at its beginning, it is rewound, the user operation is performed, and the media is rewound to its beginning. In non-rewinding mode, the media is opened wherever it is positioned, the operation is performed, and the media position remains where the last command left it. The first mode is useful only for writing or reading a single data set from the beginning of the media. The second mode allows much greater flexibility in how a tape is used.

All of the TOLIS Tape Tools utilities use the non-rewinding mode of access.

The tapectl utility provides the following tape operations:

display	- displays information on all available tape devices
inquiry	- displays SCSI inquiry details for the selected drive
status	- display current drive status
fsf x	- forward space filemark (x = count; 1 is default)
bsf x	- back space filemark (like fsf, but backwards)
seod	- space to end of data for appends
erase	- short erase a tape
lerase	- long (secure) erase - takes hours!
rewind	- rewinds a tape
rewoff	- rewind the tape and unload it
reten	- retention a tape (QIC and TRAVAN tapes)
tell	- report current logical tape block
seek x	- seek to logical tape block 'x'
setblk x	- set drive block size to x (x is required, 0 = variable block)
alert	- display Tape Alert information (if supported and available)
unload	- same as rewoff

Example tapectl commands and their results

```
# tapectl -f ntape0 display
Available Tape Devices:
  ntape0: IBM ULTRIUM-TD1 25D4
  ntape1: IBM ULTRIUM-TD1 25D4

# tapectl -f ntape1 inquiry
Vendor = IBM      , Model = ULTRIUM-TD1
Revision Level = 25D4

# tapectl -f ntape1 status
Medium Type: Unknown
Density Code: 0x40 - DLT1 40 GB, or LTO 1
BlockSize: 0
At block 55259
```

Most other tapectl commands perform their operations silently with the return code of the command indicating success or failure.

```
# tapectl -f ntape1 rewind
# echo $?
0
```

This return code (or exit code) of zero indicates that the rewind was successful. Any non-zero return code indicates an error occurred. In most instances, an error will also return text details if the `-v` (verbosity) option is included in the command:

```
# tapectl -f ntape0 -v erase
Erasing media in drive ... Device Not Ready, No tape inserted
# echo $?
2
```

The return code from this command was 2, and the error message indicates that we attempted to perform a tape operation, but no tape was in the drive.

The following commands can be issued when no tape is in the drive with successful results:

```
display, inquiry, status, setblk, and alert
```

All other tapectl commands will return an error if the tape drive is empty.

tapectl command breakdown

display

tapectl display

The display command searches all busses on your system and reports any type 1 SCSI devices that are located. These devices can be SCSI, Fibre-Channel, Firewire, or USB. We use a naming convention of ntapeX – where X is a number starting at zero. The default tape device for all command is ntape0.

inquiry

tapectl inquiry

The inquiry command issues a SCSI INQUIRY command to the defined device and displays the data returned by the tape drive.

status

tapectl status

The status command gets information from the tape drive and reports the load status, data block size, current block and any SCSI sense messages.

fsf

tapectl fsf 4

The fsf, or Forward Space Filemark command moves the tape forward from its current position to the next filemark. The tape is left positioned on the end of tape (EOT) side of the filemark ready to read or write. You can specify multiple filemarks by providing a number argument after the fsf command.

bsf

tapectl bsf 3

The bsf, or Back Space Filemark command moves the tape backwards from its current position to the previous filemark. The tape is left at the EOT side of the filemark. You can specify multiple filemarks by providing a number argument after the bsf command.

seod

tapectl seod

The seod, or Space to End Of Data command moves the tape forward to the end of currently recorded data. This allows you to position the tape in preparation for writing additional data.

erase

tapectl erase

The erase command uses the SCSI short erase function to clear the contents of the tape. The short erase simply blanks the header on the tape and writes an end of data (EOD) marker at the beginning of the tape. It does not physically erase any data that was previously written on the tape.

lerase

tapectl lerase

The lerase, or Long Erase command actually erases all data on the tape before resetting the EOD marker. While this erase method is more secure than the short erase above, it can take a very long time for a long erase to complete. For example, a 230M SDX3-100 AIT3 tape will take almost 5-1/2 hours to complete the long erase. A DLT VS80 tape will take a little over 2 hours. For most environments, the short erase provides enough security as it takes a specially modified tape drive to read beyond the EOD marker.

rewind

tapectl rewind

The rewind command returns the tape to its beginning.

rewoff

```
tapectl rewoff
```

The rewoff, or Rewind Offline command rewinds the tape and ejects it from the drive.

reten

```
tapectl reten
```

The reten command is only useful for QIC or TRAVAN tape mechanisms. These tapes sometimes require retentioning to reset the tape travel path within the cartridge shell. If you are having problems reading a known good TRAVAN or QIC tape, running two or three retention passes will usually return the tape to readable status. The reten command does nothing if issued to other types of tape drives such as DAT, AIT, DLT, or LTO.

tell

```
tapectl tell
```

The tell command reports the current block location on the tape. Tapes write data in blocks. Using tell can make it easier to locate a specific file or backup set on the tape.

seek

```
tapectl seek 32452
```

The seek command tells the drive to position the tape to the block specified by the numeric argument provided.

setblk

```
tapectl setblk 0
```

The setblk, or set block command sets the physical block size that data is separated into when it is written to the tape surface. For SCSI and Fibre-Channel drives, both variable and fixed block sizes are supported. For ATAPI based drives (usually found in Firewire and USB versions of a drive), only fixed block operation is supported. For most SCSI drives, variable block mode is the most efficient operating mode (setblk 0).

alert

```
tapectl alert
```

The alert command returns the Tape Alert™ status from a compatible tape drive. The Tape Alert status can provide very specific information concerning the health of your tape drive and your media.

unload

```
tapectl unload
```

The unload command is a synonym for rewoff

Controlling a Tape Library - libctl

A tape library allows you to automate the use of multiple tapes and even multiple tape drives without direct user intervention. Tape libraries are often referred to by the names Library, Autoloader, or Changer, but these all refer to the same basic idea – robotic control of loading and unloading of a tape drive within a self contained cabinet. The general distinction is that an Autoloader is usually a smaller unit supporting 10 or fewer tape slots and a single tape drive, while a Library or Changer supports 10s or even 1000s of tape slots and one or more tape drives.

Additionally, it is important to note that many libraries support different access modes. These modes include SCSI – or Random, Console, LCD, and Sequential modes. For proper software operation with libctl, your library should be set to SCSI – or Random mode. For information on the other modes and how you interface with them, please refer to your library's documentation.

The TOLIS Tape Tools libctl utility provides the mechanism to control all of the robotic operations of a library. Commands provided by libctl include:

display	- displays available changer devices
inquiry	- displays the SCSI inquiry info for the selected library
status	- displays info on library queried.
initialize	- (re)initialize elements / read barcodes.
inventory	- Displays load settings for drive(s) and tapes.
load [s] [d]	- Load a tape from slot [s] to drive [d].
unload [d] [s]	- Unload tape from drive [d] to slot [s].
move <fs> <ts>	- Moves tape in slot fs to slot ts. fs and ts are required.
export <fs> [ie]	- Places tape from slot fs into the ie (mailslot) specified.
import [ie] <ts>	- Loads tape in the ie (mailslot) to slot ts. export and import default to the first ie slot.
unlock	- Unlocks the i/e port (mailslot) for addition of tape(s).

Example libctl commands and their results

```
# libctl display
Available Tape Changers:
  changer0: SONY LIB-162 01m6

# libctl status
Vendor = SONY      , Model = LIB-162
Revision Level = 01m6
Unit has barcode reader
Robots: 1 (0), Drives: 1 (82), Tape Slots: 16 (1 - 16),
  No Import/Export slots.
Drive   0: Empty
Slot    1: Full : Ready : A01JEN
Slot    2: Full : Ready : A01JEG
Slot    3: Full : Ready : A01JED
Slot    4: Full : Ready : ABD123
Slot    5: Full : Ready : ABD120
Slot    6: Full : Ready : ABD125
Slot    7: Full : Ready : ABD126
Slot    8: Full : Ready : A01JEE
Slot    9: Full : Ready : A01JG4
Slot   10: Empty
Slot   11: Empty
Slot   12: Empty
Slot   13: Empty
Slot   14: Empty
Slot   15: Empty
Slot   16: Full : Ready : No Bar Code

# libctl -v load 3 0
Vendor = SONY      , Model = LIB-162
Revision Level = 01m6
Unit has barcode reader
Robots: 1 (0), Drives: 1 (82), Tape Slots: 16 (1 - 16),
  No Import/Export slots.
Move Element Called 0, 3, 82
Move Element Complete.
```

As with tapectl, all libctl commands will provide a return code. A zero indicates complete success while non-zero indicates an error has occurred.

libctl command breakdown

display

```
libctl display
```

The display command lists the libraries available according to your OS X. Libraries are type 8 SCSI devices. To provide a standardized naming convention, we refer to the devices as changerX where X is a number starting at zero. The default device for all commands is changer0.

inquiry

```
libctl inquiry
```

The inquiry command issues a SCSI INQUIRY command to the defined device and displays the data returned by the tape library.

status

```
libctl status
```

The status command returns the current status of the selected tape library. This information includes vendor info, number of drives, tape slots, and import/export slots, as well as the status of each of these elements.

initialize

```
libctl initialize
```

The initialize command performs a full INITIALIZE ELEMENT STATUS operation on the entire library. For smaller libraries, this command will finish very quickly, but for a larger library (100+ slots), it can take many minutes to complete.

inventory

```
libctl inventory
```

The inventory command is a subset of the status command in that it returns the status of drives, I/E slots, and tape slots.

load

```
libctl load 3 0
```

The load command instructs the library to load a tape from the slot listed into a drive. The tape slot is required, but the destination drive may be omitted and the default of the first drive (drive 0) will be assumed.

unload

```
libctl unload 0 3
```

The unload command instructs the library to pick the tape from the listed drive and return it to the listed slot. You may omit either the slot and libctl will return the tape to the slot it was originally picked from, or both the drive and the slot and libctl will use drive 0 and the slot the tape was originally picked from.



unload NOTE: *Some libraries require that the tape be physically ejected from the tape drive before being instructed to pick it. Use the 'tapectl unload' command to eject the tape from the drive before issuing the 'libctl unload' command. If you don't do this, the library robot could sit in front of the tape drive for over 10 hours (library dependent) before recognizing that there is no tape to retrieve.*

move

```
libctl move 4 10
```

The move command allows you to relocate a tape from one slot to another within the library. The example command moves the tape in slot 4 to slot 10. Not all libraries support this operation, so check the libctl return code if nothing seems to have occurred. Also, an error will occur if the from slot is empty or the to slot is full.

export

```
libctl export 14 1
```

The export command is only useful if your library has a true Import/Export slot (sometimes called a mailslot or an EE slot). It provides a method of exchanging tapes within the library without requiring that the library be physically opened. This is mainly important in larger libraries where opening the library causes a full reinitialization. This command tells the library to pick the tape from the listed slot and place it into the listed I/E slot. The example picks the tape in slot 14 and places it into the first I/E slot.

import

```
libctl import 1 14
```

The import command is the opposite of the export command. It is only useful if your library has a true Import/Export slot. After you've placed a tape into the I/E slot and locked it, this command will pick the tape and place it into the library's inventory.

unlock

```
libctl unlock
```

The unlock command unlocks the I/E slot. It is not supported by all libraries and can actually cause a system hang between the library and the computer. We recommend that you use your library's control panel for locking and unlocking the I/E slots.

3 - Command Syntax for the 'set' Command

This appendix lists the expected syntax for use with the set command. In each case, the -m option can be supplied immediately after the 'set' command to enable the printing of the OK message. You can also call the 'lastrc' command after issuing a 'set' command to determine the last result code. All lists are separated by a comma and a space.

When the term "null" is used below, this means that you should use an empty set of quote marks like so: "".

When the term "empty set" or "empty list" is used below, this means that you used an empty set of square brackets like so: [].

Backup:

The backup datatable stores the job definitions that are executed either from the GUI or from a scheduled operation. While it is possible to execute an ad hoc backup from the command line, we have limited the 1.2 GUI to only allowing for the execution of stored backup job definitions. Saved definitions don't necessarily need to be scheduled once they are saved.

Syntax:

```
set backup name [machines and pathlists], basejob, owner, destination, [email list],
eject flag, verify flag, overwrite mode or compression setting, job type, base date,
schedule frequency, frequency divisor, [sched list 1], [sched list 2]
```

The name is the name of this backup job definition. It is also the datatable key for this definition. The machines and pathnames are in the format of:

```
["/machine/path/subpath", "/machine/path"]
```

If an excluded path is to be included, all included paths are listed and then a null is entered followed by the excluded paths.

```
["/machine/path1", "/machine/path2", "", "/machine/path1/exclude"]
```

If the job definition is not a Full job, the machines and pathlists should be an empty set.

The basejob is either null or the name of a job to base this job upon. Only applies to Incremental or Differential backups. While it is possible via the command line to create a definition that bases one Incremental or Differential job upon another, it is not recommended and is not allowed in the GUI.

The owner is the owner of the job. This will most likely be "admin" unless you define other users within the BRU Server environment.

The destination is either a defined destination ("i.e." EXABYTE-default", or "Daily 1-4") or should be null to indicate the destination is the Stage Disk.

The email list consists of complete email addresses enclosed in quotes.

```
["user1@machine.domain", "user2@machine.domain"]
```

The eject and verify flags are either 1 or 0 when 1 setting the action to true,

If you are writing to a tape destination, the next field is the overwrite mode. This must be exactly one of "default", "overwrite", or "append". If you are writing the backup to the Stage disk, the argument is either "compressed" or "uncompressed"

The job type is either "Full", "Incremental", or "Differential"

The base date should default to the Unix Epoch ("Jan 01 17:00:00 1970") and should not be manipulated directly.

The frequency defaults to "Never" when saving a backup job. It is adjusted as part of a schedule.

The frequency divisor should always be 1.

The final two lists are part of the schedule process and should both be empty lists when saving a backup definition.

Example:

```
set -m backup "Syntax Test" ["/appgen/usr/local/cvs"], "", "admin", "EXABYTE-
default", ["user@email.dom"], 0, 1, "overwrite", "Full", "Jan 01 17:00:00 1970",
"Never", 1, [], []
```

An Incremental job based upon that Full job, but written to the Stage disk would look like:

```
set -m backup "Syntax Test Incremental" [], "Syntax Test", "admin", "",
["user@email.dom"], 0, 1, "compressed", "Incremental", "Jan 01 17:00:00 1970",
"Never", 1, [], []
```

UpStage:

The upstage datatable stores information about UpStage operations. This is the action of moving staged archives from disk onto tape.

Syntax:

```
set upstage name destination, owner, upstage user, [email list], eject flag, verify
flag, overwrite, frequency, base time, frequency divisor, [sched list 1], [sched
list 2]
```

The name is the name of this UpStage job definition. It is also the datatable key for this job.

The owner is the owner of the job definition. This should normally default to "admin"

The upstage user is the user whose staged archives are to be upstaged. If you wish to upstage ALL staged archives, this should be null.

The email list consists of complete email addresses enclosed in quotes.

```
["user1@machine.domain", "user2@machine.domain"]
```

The eject and verify flags are either 1 or 0 when 1 setting the action to true,

The next field is the overwrite mode. This must be exactly one of "default", "overwrite", or "append".

The frequency should always be set to "Never".

The base date should default to the Unix Epoch ("Jan 01 17:00:00 1970") and should not be manipulated directly.

The frequency divisor should always be 1.

The final two lists are part of the schedule process and should both be empty lists when saving a backup definition.

Example:

```
set -m upstage "Weekly UpStage" "ADIC-default", "admin", "", ["user@email.dom"], 0,
1, "overwrite", "Never", "Jan 01 17:00:00 1970", 1, [], []
```

Schedule:

The schedule datatable stores all scheduled jobs known by a given BRU Server server. Jobs may be scheduled to run once, on a repeating rotation, and can be disabled while retaining the settings. Repeating rotations may be scheduled hourly, daily, weekly and monthly. Additionally, a divisor is provided that allows you to set the frequency to repeat every, every other, every third, etc. For example, a Daily schedule with a divisor value of 3 would run every third day. A Monthly schedule with a divisor of 2 would run every other month on the days specified. By disabling a schedule, you can postpone its running and then by re-enabling it, the job will run again starting on the next scheduled interval with no further changes required.

Syntax:

```
set schedule type-name frequency, frequency divisor, starting date, [sched list 1],
[sched list 2], command, enabled flag, owner
```

The type-name pair is either backup- or upstage- followed by the job name from the backup or upstage datatable:

"backup-Syntax Test" or "upstage-Weekly UpStage"

The frequency is exactly one of "Never", "Once", "Hourly", "Daily", "Weekly", or "Monthly"

The frequency divisor is a number equal to or greater than 1

The starting date is the first time the scheduled job should be run. The date format is US standard in the form "MMM DD HH:MM:SS YYYY" - i.e.: "Nov 01 20:00:00 2005"

The sched list 1 and sched list 2 lists should be empty lists unless the frequency is "Monthly". If Monthly, sched list 1 is a list of days with Sunday being 0 and Saturday being 6 and sched list 2 is the weeks of the month with 0 being the 1st week, 4 being the 5th week, -1 being the last week, and -2 being the next to last week.

The command is the action backup or upstage command that is to be executed when the schedule is run. This would be a command similar to a command that would be executed from the command line.

```
backup -j "Syntax Test" -t "Full" -D "EXABYTE-default" -o overwrite -v ["/appgen/
usr/local/cvs"]
```

Because this command must be passed as a quoted string, any quote marks should be escaped with a backslash - i.e.: \"Syntax Test\"

The enabled flag is either 1 (enabled) or 0 (disabled). A scheduled job that is disabled will not be run on its next scheduled run time.

The owner is the owner of the job schedule, but not necessarily the original job definition. This should normally default to "admin"

Example:

```
set -m schedule "backup-Syntax Test" "Daily", 1, "Nov 28 20:00:00 2005", [], [],
"backup -j \"Syntax Test\" -t \"Full\" -D \"EXABYTE-default\" -o overwrite -v [\"/
appgen/usr/local/cvs\"]", 1, "admin"
```

User:

The `user` datatable stores the settings for BRU Server users. The admin user is always defined and cannot be deleted. Changes to the user datatable can only be performed by the admin user. While it is possible to create multiple users in the 1.x, versions, there are very few differences between the admin user and a non-admin user. Basically, a non-admin user cannot add, delete, or modify users, and they cannot use the 'exec' command.

Adding a new user actually involves 2 steps - creating the user entry and setting that user's password.

Syntax:

```
set user name ( verifier, salt, stage quota, stage age )
```

The name is the name of the user to add. While it is possible to add user names that contain spaces, we recommend that you adhere to a Unix-like single word user name.

The verifier and salt values should initially be set to the string value '0' (including the single quotes).

The stage quota value is the number of megabytes this user may use on the Stage disk. A value of -1 means unlimited.

The stage age value is the longevity of a stage archive that isn't UpStaged to tape. As soon as the housekeeping operation runs, any staged archives that are 1 day older than this value will be deleted from the Stage directory and cleared from the archives datatable.

Syntax:

```
password name password
```

The name is the user name to apply the password account into.

password is the plain text password to assign to this user.

When the password is assigned, the verifier and salt values in the user's record will be updated. It is very important to maintain these values if you reload and modify a user's settings, otherwise the password will be invalidated.

Also, since the password is not double-checked during this operation, please ensure steps to verify that the password being set is the password that was actually chosen.

The admin user may **ALWAYS** override a user's password with the password command.

Example:

```
set user tjones ('0', '0', -1, 45)
```

This will create a new user named tjones with an unlimited stage quota and a 45 day maximum stage archive life expectancy.

```
password tjones my_password
```

This will set the user tjones' password to my_password and update the verifier and salt values in the user record. Once the verifier and salt values are set by the password command, you must read the existing value and reassign them any time you save a users table entry for the user or you will invalidate the user's password.

Example:

```
BRU Server > show users tjones
Verifier                :
0x711CD6F45349C61A8D8E2FACF31AB9D03566492B13A1AF135A75285476090314D57A81CB83CE69180F
9A5EC8D8BB3A5131350DA5819731C5977E35FEEC0840994A8026940F7800544504D5B663B69DBCA4222A3
088165C73D40547B09E2417E16331015734FE0C6CEA946C3603095E9B9D40D3622575DED88FDED1BAE25
FFB785L
Salt                   : 0x3421787BC09FBB2E02776FABB27CDD78L
Stage Quota (Megabytes) : -1
Max stage file age     : 60
```

Therefore, to reset the Stage Quota value, you must specify both the Salt and Verifier values exactly as reported in the results from the show or show -m command. To simplify this, it is recommended that you use the setc command for changing field values.

Dest:

The dest datatable stores the settings for all destinations. As part of the initial hardware scan performed when you first install BRU Server's server daemon, a default destination is created. We strongly recommend that better definitions be defined for daily operations.

Syntax:

```
set dest name
```


4 - Datatable Field Names for setc Command

The following entries list the field names for each datatable, it's Displayed name, and its value type. These are for use with the setc command for updating fields within datatable records.

General setc Syntax:

```
setc datatable key field value
```

Where datatable is the datatable to operate on, key is the unique record identifier, field is the field name from the tables below, and value is the new value to be assigned to the record.

Example:

```
setc schedule "backup-Daily Inc" enabled 0
```

The datatables are listed below. IN the Type column, S = string, I = integer, IL = a list of Integers within square brackets '[' and ']' separated by commas, SL= a list of quoted strings within square brackets '[' and ']' separated by commas.

Table Name	Displayed Name	Field Name	Type	Example
user:	ID		S	tjones
	Verifier	verifier	S	0x711CD6F45349C61A8D8 E2FACF31AB9D03566492B 13A1AF135A752854760903 14D57A81CB83CE69180F9 A5EC8DBB3A5131350DA58 19731C5977E35FEEC08409 94A8026940F7800544504D 5B663B69DBCA4222A3088 165C73D40547B09E2417E1 6331015734FE0C6CEA946 C3603095E9B9D40D362257 5DED88FDED1BAE25FFB7 85L
	Salt	salt	S	0x3421787BC09FBB2E0277 6FABB27CDD78L
	Stage Quota (Megabytes)	stage_quota	I	5000 (-1 = unlimited)
	Max stage file age (days)	stage_age	I	45 (0 = infinite)
destinations:	ID		S	My Destination
	Device name	device	S	ADIC, HP:2, EXABYTE
	Overwrite/append action	action	S	Ask, Overwrite, Append
	Slot list	slots	IL	[2, 3, 4, 5, ...]
	Last overwrite time	otime	S	Sep 18 23:45:13 2005
drives:	ID		S	ntape0, "My Drive", "/dev/nst0"
	Device name	dev_name	S	ntape0, /dev/nst0
	SCSI Device name	scsi_name	S	ntape0, /dev/sg2

	Vendor	vendor	S	CERTANCE
	Product	product	S	ULTRIUM 3
	Revision	rev	S	1724
	Block Size	block_size	I	131072, 262144
	Needs Eject	eject	I	0 or 1
	Megabytes written by drive	megs_written	I	23412
devices:	ID		S	EXABYTE, ADIC, "My Device"
	Drives	drives	SL	['ntape0', 'ntape1']
	Number of slots	slots	I	21
	Changer device	changer	S	changer0, /dev/sg0
	Vendor	vendor	S	EXABYTE
	Product	product	S	221L
	Revision	rev	S	1412
	Write buffer size (Megs)	buffer_size	I	128
	Free slot list	free_slots	IL	[15, 16, 17, 18, 19, 20]
	Device disabled	disabled	I	0 or 1
	Cleaning slot	cleaning_slot	I	21
machines:	ID		S	Jeremy, bruserver.bru.com
	Fully qualified domain name	fqdn	S	pc-00095,192.168.1.95 (This is a combination of the machine name, a comma, and the IPv4 address)
	Port used by BRU Server Agent	port	I	14442
	Time of most recent backup	last_backup	S	Sep 18 23:45:13 2005
	Use compression	compression	I	0 or 1
	Use encryption	encryption	I	0 or 1
backups:	ID		S	"Weekly Full", "My Inc"
	Machines and directories	md_list	SL	["/machine/path"]
	Base job name	base_job	S	empty if Full, or the name of a previously defined Full job is incremental or differential.
	Owner of this job	owner	S	admin
	Destination of backup	dest	S	"HP-default", "My Dest"
	List of email recipients	email	SL	["user@domain", "user2@domain"]
	Eject tape after done	eject	I	0 or 1 (only applies to standalone drives)
	Verify backup	verify	I	0 or 1
	Overwrite mode	omode	S	Empty, Overwrite, or Append
	Type of backup	type	S	Full, Incremental, or Differential
	Base time of backup	base_time	S	Sep 18 23:45:13 2005
	Frequency of backups	frequency	I	Never, Once, Hourly, Daily, Weekly, Monthly
	Divisor of main frequency	n	I	1 = Every 2 = Every Other 3 = Every Third ...

	Frequency dependent list 1	list1	IL	[0, ... , 6]
	Frequency dependent list 2	list2	IL	[0, ..., 5, -1, -2]
upstage:	ID		S	"My Weekly UpStage"
	Owner of this job	owner	S	admin
	Destination of backup	dest	S	"ADIC-default", "US-1"
	User to upstage	user	S	Empty means ALL. Username means only Staged archives owned by the specified user
	List of email recipients	email	SL	["user@domain", "user2@domain"]
	Eject tape after done	eject	I	0 or 1 (only applies to standalone drives)
	Verify backup	verify	I	0 or 1
	Overwrite mode	ov_mode	S	Empty, Overwrite, Append
	Base time of backup	base_time	S	Sep 18 23:45:13 2005
	Frequency of backups	frequency	S	Never
	Divisor of main frequency	n	I	1
	Frequency dependent list 1	list1	IL	Empty Set
	Frequency dependent list 2	list2	IL	Empty Set
history:	ID		S	2005/12/04-18:41:56/ Backup/Appgen
	Date command was run	created_on	S	Sep 18 23:45:13 2005
	Command run by	created_by	S	admin
	Command text	command	S	backup -j "Appgen" -t "Full" -v ["/appgen/usr/appgen", "/ appgen/usr/local/cvs"]
	Command output	history	S	(contains non-progress portion of the command results)
schedule:	ID		S	backup-Appgen
	Frequency	frequency	S	Never, Once, Hourly, Daily, Weekly, Monthly
	Divisor	n	I	1 = Every 2 = Every Other 3 = Every Third ...
	Base Time	base_time	S	Sep 18 23:45:13 2005
	List 1	list1	IL	[0, ... , 6]
	List 2	list2	IL	[0, ... , 5, -1, -2]
	Action	action	S	backup -j "Appgen" -t "Full" -v ["/appgen/usr/appgen", "/ appgen/usr/local/cvs"]
	Enabled	enabled	I	0 or 1
	Owner	owner	S	admin
tapes:	ID		S	100000 series assigned number or barcode if tape has barcode and library supports barcode reader.

Bar Code	bar_code	S	Empty or barcode value reported by library
Bru ID/volume of first archive	first_archive	S	12 character Hex BRU ID: 41e23fa0987e1
Number of rewrites	rewrites	I	5
Last seen in device	lkp_device	S	ADIC, HP:2
Last seen in slot	lkp_slot	I	18
Date of last use	last_used	S	Sep 18 23:45:13 2005
Date of first use	first_used	S	Sep 18 23:45:13 2005
Tape full flag	full	I	0 or 1 (set by software)
Tape inconsistent flag	inconsistent	I	0 or 1 (set by software, resettable after human intervention).
Megabytes written to tape	megs_used	I	123265
Unwritable tape	unwritable	I	0 or 1 (set by software - tape is either bad or write protected)
archives:	ID	S	12 character Hex BRU ID: 41e23fa0987e1
Creation date	created_on	S	Sep 18 23:45:13 2005
Machine	machine	S	"tiger1"
Job that created this archive	job_name	S	Appgen
Type of archive	type	S	Full, Incremental, or Differential
Tape List	tapes	SL	100003, 100004 A0034L2, A0035L2
Archive start blocks	start	IL	0, 231442
Who created this archive	owner	S	admin

5 - Backing Up The BRU Server Server

In addition to backing up client systems and even data from the BRU Server server itself, it is also a good idea to backup the BRU Server server environment as a separate data set for ease in recovering the server should it crash.

The server environment consists of the BRU Server binary components, the database table files, and the catalogs directory. Since the binary components will be recovered by a reinstallation of the BRU Server server, the only elements that should be protected specifically are the database tables and the catalogs directory.

Starting with BRU Server release 1.2.0, all platforms provide access to these elements from within the `/usr/local/bru-server` path. The list of files that should be protected with their own backup are:

<code>archives</code>	<code>backup</code>	<code>dest</code>	<code>devices</code>	<code>drives</code>
<code>history</code>	<code>license</code>	<code>machines</code>	<code>parm</code>	<code>schedule</code>
<code>tapes</code>	<code>upstage</code>	<code>user</code>		

Also be sure to include the `catalogs` directory and its contents in this backup.

Depending on your server system, there are a number of ways that you can protect these files. If you have a DVD burner (because the catalogs directory can get larger than a CD's capacity), it is possible to write them to a DVD (or two for safety). Because of the static state nature of BRU Server's database files, you can even simply drag-and-drop the files and folder listed above to another disk.

Additionally, you can define a single tape destination and backup these files as a special BRU Server backup job, or even manually load a tape and use the BRU standalone engine and back them up manually with a command line script such as:

```
#!/bin/sh

FILES1="archives backup dest devices drives history license"
FILES2="machines parm schedule tapes upstage user"
DIRS="catalogs"
LABEL=" BRU Server environment backup"
DEV=/dev/nst0

cd /usr/local/bru-server
sudo ./bru -cvf ${DEV} -L ${LABEL} ${DIRS} ${FILES1} ${FILES2}
```

This will backup the specified files onto a tape that is loaded in the drive recognized by the system as `/dev/nst0`. For OS X users the device name will be something like `ntape0`. Of course, this simple script won't control your library, so you will need to manually load and unload the media to perform this backup. You could also change the `DEV` variable to point to a file on a locally mounted remote filesystem like this:

```
DEV="/Volumes/Remote RAID 1/Helena_HS_Server.bru"
```

This would create a BRU archive on the mounted filesystem "`Remote RAID 1`" called "`Helena_HS_Server.bru`". This file may then be copied to a rebuilt server and restored after the BRU Server software has been reinstalled. The commands to restore such an archive could look like this:

```
cd /usr/local/bru-server
sudo ./bru -xvf ${DEV} -ua
```

This would restore all of the previous BRU Server data tables and return your BRU Server server environment to the state it was in at the time this backup was created. The '-ua' flag ensures that any existing data table files that were created during the installation will be overwritten by the backup copy.

Appendix A - BRU Messages

Overview

All BRU messages are associated with a number. The message number consists of a single letter followed by three digits. The first letter of the message number indicates the type of message (i.e.: [I181] is an Informational Message). The messages are listed below:

A - alert message

BRU is alerting the user of a problem. This problem or alert, is not as strong as an error or a warning message but none the less BRU will require a response. This message is usually followed by a "Q" message

E - error message

BRU has found that the current operation has errors that it cannot overcome. Depending on the **MAXERRORS** setting in your **BRUTAB**, BRU will terminate with an execution summary exit code of 2.

I - informational message

Information regarding the current process. This type of message is echoed to the `/var/log/brurexeclog` file as an "I" message.

L - log message

Entry message to the `/var/log/brurexeclog` regarding the current process. Entry is a copy of what is sent to the screen with the "I" message. All entries are made with a date and time stamp.

Q - query message

BRU is waiting for a response to complete the current process.

W - warning message

BRU has found problems with the current operation. The errors were not serious but BRU was unable to resolve the issue. Depending on your setting for **MAXWARNINGS** in your **BRUTAB** file BRU will terminate the current process.

NOTE: You should investigate all WARNING and ERROR messages reported by BRU. These messages can result in not being able to restore your data.

Many BRU messages are the result of errors returned by the UNIX system. For these types of errors, the UNIX error message is included as part of the BRU message. This portion of the message is described below:

errno = code, description

code is the UNIX error number.

description is a brief text message associated with the error number. These are system values and are not BRU errors. BRU simply reports them as they are defined by the system.

The BRU messages are listed on the following pages. Following each message is an explanation and possible suggestions for corrective action.

BRU Message Code Listing

[E001] `specify mode (-cdeghitx)`

The user ran BRU without specifying the mode. The user must specify a valid mode. See Appendix D for a list of BRU modes.

[W002] `filename: can't open archive: errno = code, description`

BRU couldn't open the archive file `filename` for some reason. The reason is indicated by the UNIX error message. Make sure that the device actually exists. Also see if another process (or an old BRU process) still has control of the device.

[W003] `filename: warning - close error on archive: errno = code, description`

BRU received an error from the operating system when BRU attempted to close the archive. The reason is indicated by the UNIX error message.

[W004] `warning - archive read error at block blocknum: errno = code, description`

BRU received an unrecoverable error when attempting to read an archive. The reason for the error is indicated by the UNIX error message. Whatever data was available at that location in the archive is unrecoverable.

[W005] `warning - archive write error at block blocknum: errno = code, description`

BRU received an unrecoverable write error while attempting to write an archive. The reason for the error is indicated by the UNIX error message. Whatever data that was to be written at that location in the archive has been discarded. Proper corrective action depends upon the situation and the specific file within which the error occurred. If this error occurred on the first block of an archive, the archive may be write protected, in which case, the `wperm` parameter is probably set incorrectly in the `brutab` file.

Another possibility is that the I/O buffer size is too large for the given device. Experiment with a smaller buffer size. Set the buffer size with the `bufsize` parameter in the `brutab` file or use the `-b` option to set it on the command line.

[E006] `seek error on archive: errno = code, description`

BRU received an unrecoverable seek error from the operating system on an archive file. The reason for the error is indicated by the UNIX error message. Make sure that your archive device actually has the capability to do random seeks to any location. Most tape drives do NOT have this capability.

Check the value of the `seek` parameter in the `brutab` file. If your device does not have the ability to do random seeks, you must set `seek=0`.

[E007] `media size smaller than I/O buffer size!`

This error was caused when BRU detected a media size that was inconsistent with the I/O buffer size. The media size should be at least as large as the I/O buffer size. It is not possible to write to device if the media size smaller is smaller than the buffer size (i.e. BRU cannot write 1 megabyte of buffer data to a floppy with a media size of 720 kilobytes). Check the `brutab` file and make sure that the `bufsize` parameter is less than `size`.

[W008] `warning - buffer size bufsize exceeds maximum maxbufsize allowed for device`

Check the `brutab` file and make sure that `bufsize` is less than `maxbufsize`.

[E009] `can't allocate bufsize archive buffer: errno = code, description`

This message was caused when BRU could not allocate an I/O buffer of the size requested. Try reducing the buffer size to a smaller value. This can be done with the `-b` command line option, or the `bufsize` parameter entry in the `brutab` file.

[W010] filename: warning - block sequence error

BRU detected an inconsistency in the ordering of blocks returned by the archive device on a read.

For example, BRU asked for blocks "11, 12, 13, 14, 15" and got blocks "11, 12, 14, 15, 16." This error may indicate a hardware problem. If this message occurs at the start of the 2nd volume (when reading a multiple volume archive), it probably means that the last few blocks of the previous volume were missing or were unreadable. This can occur if the media size parameter was set too large in the `brutab` file (i.e. `size=150M` for a 60 megabyte tape) during the backup and BRU attempted to write past the end of the previous volume. With some tape drives, it may also occur if the media size was set to zero (unknown). The problem can usually be avoided by setting the media size to a value that is certain to be less than the maximum capacity of the volume (i.e. set `size=149MT` for a 150 megabyte tape).

To detect and avoid this problem, always verify your archive immediately after the backup is performed. `AUTOSCAN` does this automatically for all devices that have an entry in the `brutab` file (unless `noautoscan` is set or you are using a `norewind` device).

[W011] warning - file synchronization error; attempting recovery ...

BRU was expecting to find a file header block while reading an archive, but instead found another type of block. This warning will occur if you started reading an archive at a volume other than the first, or skipped a volume in the middle of reading an archive. This error message can be suppressed with the `-qv` option flag. For more information on the optional flag see Chapter 8. BRU will scan each successive archive block looking for a file header block, and normal processing will resume from the first file header block found.

[W012] filename: no file: errno = code, description

The named file does not exist or part of the path name of the named file is not searchable given the current permission settings.

[E013] filename: can't stat: errno = code, description

The UNIX `stat` system call failed. This means that BRU was unable to obtain status information (ownership, access and modification times, link count, etc.) on the file. The reason for the error is indicated by the UNIX error message. Generally, this error is caused because the file is not accessible with the user's current permission settings. On networked systems, it may occur when trying to access remote (NFS-mounted) files. If this is the case, you should check your network permission settings.

[E014] pathname path too big (1023 max)

This error was caused when BRU detected a pathname longer than 1023 characters. No known UNIX system allows pathnames longer than 1023 characters, so this message may indicate that the filesystem is potentially corrupted or that something else is seriously wrong.

[E015] *** OBSOLETE MESSAGE NUMBER ***

[E016] filename: can't open: errno = code, description

BRU could not open filename. The reason is given as part of the UNIX error message. In many cases, this is caused by insufficient file access permissions.

[W017] filename: warning - file close error: errno = code, description

BRU received an error when attempting to close the file filename. The reason for the error is given by the UNIX error message.

[E018] filename: read error: errno = code, description

BRU received an error while reading a file. The reason is indicated by the UNIX error message. This message means that the file was not backed up properly. It may be an indication of hard disk failure, a corrupted filesystem, a damaged file that is unreadable, or other system problems (like an NFS problem.)

[W019] filename: warning - file was truncated

The file filename was truncated while BRU was in the process of reading or writing it. Usually, another program has modified the file that BRU was reading. This can occur if you are attempting to back up database files and the database program is active. If BRU was creating an archive at the time, the archived file is padded with sufficient null characters to bring it back to the size it was originally (the size of the specified file when BRU began to archive it). This is the same size recorded in the file header block. If this message occurs while backing up, the data archived from filename is probably not correct (because the data was changed while BRU was reading it). Even though BRU may restore this file later without any warnings, the data could contain errors. If this message occurs while restoring an archive, it indicates that a problem occurred and that BRU was unable to restore data from the last part of the file.

[W020] filename: warning - file grew while archiving

The file filename grew in length while BRU was in the process of reading it. If BRU was creating an archive at the time, the archived file was truncated to its original size (the size of the file when BRU started to read it). This is the size recorded in the file header block. This warning is commonly seen for log or database files, to which information is constantly being added. It can generally be avoided by backing up the system in single user mode (or by shutting down the database before doing a backup). If the file causing this message is not critical (i.e. log files like `/var/log/bruxeclog`) you may wish to exclude these files from the backup. This can be done by specifying a pattern in the `bruxpat` file and using the `-QX` option.

[W021] filename: warning - can't set user id: Not owner

BRU attempted to extract filename which was stored with the `suid` bit set and the user running BRU was not the original owner of the file (and did not have superuser privileges).

[W022] filename: warning - can't set group id: Permission denied

BRU attempted to extract filename which was stored with the `sgid` bit set and the user running BRU was not the original owner of the file (and did not have superuser privileges).

[E023] filename: can't exec: errno = code, description

BRU could not execute the file filename for the reason given as part of the UNIX error message. Generally, this error occurs because filename does not exist, or it was not executable by the user running BRU.

[E024] can't fork, try again: errno = code, description

This error was caused when BRU couldn't execute a fork system call. The reason is indicated by the UNIX error message. Generally, this indicates the system is in serious trouble, or the per-user limit on processes has been exceeded.

[E025] unrecognized wait return statcode

The wait system call returned a status code of statcode which BRU was not able to understand. If this error occurs it may indicate that there is a problem with your system or that your version of BRU is incompatible with your current version of UNIX. If you have upgraded your operating system, you may also need to upgrade your copy of BRU.

[E026] child interrupted: errno = code, description

The child process which BRU was waiting for was interrupted. The reason for the error is indicated by the UNIX error message.

[E027] filename: fatal error; stopped by signal sigcode

The child process, filename, which BRU was waiting for was stopped by a UNIX signal. The reason is indicated by sigcode.

[E028] filename: fatal error; terminated by signal sigcode

The child process, filename, which BRU was waiting for was terminated by a UNIX signal. The reason is indicated by `sigcode`.

[W029] `filename core dumped`

BRU was waiting for a child process, filename, which terminated abnormally and dumped to core.

[E030] `inconsistent wait status wait code`

BRU received an unexpected return code of wait code from a UNIX wait system call. Usually, the child process which was being run has gone berserk in some manner. This error may indicate that there is a problem with your system or that your version of BRU is incompatible with your current version of UNIX. If you have upgraded your operating system, you may also need to upgrade your copy of BRU.

[E031] `can't set uid to userid: errno = code, description`

BRU received an error when trying to run the `setuid` system call. The reason is given by the UNIX error message. If this error occurs, it indicates a possible UNIX system bug or an internal bug in BRU.

[E032] `can't set gid to groupid: errno = code, description`

BRU received an error when trying to run the `setgid` system call. The reason is given by the UNIX error message. If this error occurs, it indicates a possible UNIX system bug or an internal bug in BRU.

[W033] `filename: warning - error count block checksum errors`

While reading an archive, BRU detected `errcount` number of checksum errors in the specified file. This message can occur if the archive was originally written with errors-possibly caused by a buffer size setting that is too large. Try setting the buffer size to a smaller value when creating the archive (i.e. set `bufsize=10K` in the `brutab` file or use the `-b 10K` option on the command line). When reading an archive, BRU normally attempts to read the archive with the write buffer size (it obtains the write buffer size from the archive header block stored at the start of the archive). The proper buffer size varies with the system and type of tape drive. In some cases, a tape written on one system (with a large buffer size like 64K) cannot be read properly on another system (which can only handle a small buffer size like 10K). If this is the case, you may be able to force BRU to read the tape by forcing the buffer size to smaller value (i.e. specify `-b 10K` as one of the command line options). Checksum errors may also be caused by hardware or tape problems. Try cleaning the heads on your tape drive. Try to retention the tape. Also, make sure that your tape cartridges are in good shape-tapes do not last forever. They should be rotated frequently and replaced on a regular basis. Make sure that you are using the proper kind of tape with your tape drive. Many tape cartridges look the same (especially 1/4" tapes), but have different densities. For instance, if you have a 150 MB tape drive, you should use 150 MB (DC6150) or 250 MB (DC6250) tape cartridges. You will get errors if you try to write to a 60 MB (DC600A) tape.

[E034] `internal bug in routine routinename`

BRU detected some sort of internal bug in the routine `routinename`. If this error occurs, it may possibly be a bug in BRU, or a hardware or kernel software problem. If it is not repeatable, it is likely to be a hardware or kernel bug. This message should be reported to TOLIS Group Tech Support.

[E035] `can't allocate byte_count more bytes: errno = code, description`

BRU ran out of memory for some reason. This error generally occurs when BRU tries to create a tree from a list of filenames read from the standard input, or when memory is very limited on the system due to hardware or CPU constraints.

[E036] `internal error in tree; pathname overflow`

While building a file tree, BRU created a path which exceeded 1023 characters in length. No known UNIX system allows pathnames longer than 1023 characters, so this message may indicate that the filesystem is corrupted or that something else is seriously wrong.

[E037] `*** OBSOLETE MESSAGE NUMBER ***`

[E038] filename: seek error: errno = code, description

BRU received an error when attempting to seek to a certain location in the file that it was reading or writing. The name of the file is indicated by filename. The reason for the error is given by the UNIX error message. This error is rare and usually indicates a hardware problem with the disk drive.

[W039] warning - info block checksum error

BRU detected a checksum error while reading the first block of an archive. The info block (archive header block) contains information about the archive which is of use to BRU, but not critical to reading or extracting files from the archive. Make sure that the archive you are attempting to read was actually written by BRU. This error often occurs when attempting to read a tape written by another program (like `tar` or `cpio`). It may also occur if you try to read a tape that is blank. If this is the ONLY warning or error message (and BRU appeared to work normally), it can usually be ignored. In this particular case, it means that BRU had trouble reading the first block of the archive, but was able to skip past the first block and read the rest of the archive normally.

[E040] filename: write error: errno = code, description

BRU received an error when attempting to write to the file filename. The reason for the error is shown by the UNIX error message. If this error occurs, it usually indicates a hardware problem with your hard disk. It could also indicate that the filesystem containing filename is out of space, or that the filesystem is write-protected (it may be mounted as "read-only" or you may not have write permission).

[W041] filename: warning - error setting mode: errno = code, description

BRU received an error when attempting to set the mode of filename. The error occurred when BRU was executing the system call `chmod`. The reason is indicated by the UNIX error message.

[W042] filename: warning - error setting owner/group: errno = code, description

BRU received an error from the operating system when attempting to set the owner id or group id of filename. The error occurred when BRU was executing the system call `chown`. The reason is indicated by the UNIX error message. On systems which support symbolic links, this error can occur when BRU attempts to set the owner/group id of a symbolic link which points to a file which does not exist. This can occur if the symbolic link filename is restored, but the file the symbolic link points to is not restored.

[W043] filename: warning - error setting times: errno = code, description

BRU received an error from the operating system when attempting to set the access and modification times of filename. The error occurred when BRU was executing the system call `utime`. The reason is indicated by the UNIX error message.

[E044] filename: error making node: errno = code, description

BRU received an error when attempting to create a special file system node, such as a FIFO, block special file, or character special file. The error occurred when BRU was executing the system call `mknod`. The reason is indicated by the UNIX error message. This message may occur when trying to restore special files and you do not have superuser privileges. On some systems, only the root user has the ability to create special files.

[E045] filename1: can't link to filename2: errno = code, description

BRU received an error when attempting to make a hard link between filename1 and filename2. The reason is indicated by the UNIX error message. This message occurs when filename2 already exists and cannot be overwritten by a link.

[E046] internal error; inconsistent phys blk addr

[W047] warning - missing archive header block; starting at volume volnum

BRU couldn't find an archive header block at volume number volnum. This warning is normal when BRU is asked to start reading an archive at some other volume than the first volume. For example,

you will see this message if you immediately try to restore files from the 3rd tape of an archive (without reading through the 1st and 2nd tapes). If you want to start from a different tape other than the first tape. You must use the `-qv` option, this will suppress the error message.

[W048] `filename: warning - lost linkage: errno = code, description`

BRU could not preserve the linkage of two files. The reason is indicated by the UNIX error message. Generally, this error is seen when BRU ran out of memory when it attempted to allocate memory internally to maintain the linkage information of the specified file. In this case, the file would be archived as two separate, distinct files in the archive. Only the linkage information would be lost.

[W049] `filename: warning - linknum unresolved link(s)`

While archiving the file `filename`, BRU detected `linknum` number of unresolved links to `filename`. This error is generated when there is still another pathname which points to `filename` which does not appear in the archive. Usually, this message occurs when BRU is asked to archive a set of directories that contain files that have hard links to files located in other directories (that are not archived by BRU). This message can be disabled by specifying the `-l` option on the command line.

[W050] `ttyname: warning - can't open for interaction: errno = code, description`

BRU could not open the `tty` stream `ttyname` to interact with the user. The reason for the error is given by UNIX error message. This message may occur when attempting to run BRU in the background and the `-B` option (background mode) has not been specified. When run in the foreground, BRU attempts to use the `/dev/tty` device to communicate with the user. In background mode, `/dev/tty` is not available. In this case, the interaction pathnames can be specified with the `-Iq, queryfile` and `-Ir, replyfile` options on the BRU command line (this is normally used when running BRU with the `brutalk` program).

[E051] `date conversion error: date`

The string specified by `date` is not in the proper format or is not a legal date and time.

[W052] `warning - uname failed: errno = code, description`

BRU received an error when attempting to execute the `uname` system call. The reason is indicated by the UNIX error message.

[W053] `warning - label string too big`

BRU has a string length limit of 63 characters for a user specified label (used with the `-L` option). You must shorten the length of your label string.

[E054] `error - invalid uid/filename as -o argument: pattern`

BRU could not convert a given symbolic user name to the internal numeric form. This error usually occurs when the `-o` option is used and BRU cannot find username in the `/etc/passwd` file.

[E055] `error - illegal wildcard pattern: pattern, errmsg`

The wildcard matching pattern specified by `pattern` is not legal. The reason is indicated by `errmsg`.

[E056] `filename: can't overwrite: errno = code, description`

The file `filename` could not be overwritten during extraction. The reason is indicated by the UNIX error message. In most cases, this message is due to a permissions problem.

[W057] `filename: can't access for write: errno = code, description`

The file `filename` could not be accessed for write. The reason is indicated by the UNIX error message. In most cases, this message is due to a permissions problem.

[W058] `filename: can't access for read: errno = code, description`

The file `filename` could not be accessed for read. The reason is indicated by the UNIX error message. In most cases, this message is due to a permissions problem.

[W059] *filename*: warning - will not be contiguous: *errno* = code, description

BRU was unable to create the file *filename* as a contiguous file. The reason is indicated by the UNIX error message. This message should only occur on systems that support contiguous files (like **Masscomp** or **HP-UX**).

[W060] *filename*: warning - contiguous files not supported, extracted as a regular file

The file *filename* cannot be restored as a contiguous file, so BRU will create a regular UNIX file instead.

[E061] can't read both file list and archive from stdin!

BRU was instructed to read both an archive and a list of files from the standard input stream. This error occurs when an illegal BRU command like the following is entered: **bru -x -f - -**

[W062] warning - premature end of volume *volnum*

When reading/writing an archive device, BRU encountered an end-of-file (or got an I/O error) before reaching the expected end of the archive. This message is often preceded by messages [W004] or [W005]. In this case, it may indicate a problem with the tape drive hardware, old or damaged tapes, or incompatible tape formats (i.e. trying to write to a 60MB tape cartridge on a 150MB tape drive).

[W063] warning - media appears to be unformatted: *errno* = code, description

When BRU first attempted to read/write to a device it received an error. The reason is indicated by the UNIX error message. If BRU receives an error on the first read or write to an archive device, and the error conditions match the values set in the **brutab** entry for unformatted media in this device, BRU will issue this warning message. When writing, if the format and **fmtcmd=** parameters are set for the device, this warning will be suppressed and BRU will attempt to format the media.

[O064] *** OBSOLETE MESSAGE NUMBER ***

[W065] warning - using internal default device table

BRU could not find the **brutab** file specified by the BRUTAB environment variable, or the default **brutab** file located in **/etc/brutab**. In this case, BRU used its internal **brutab**, which may not be correct for the current archive device.

[I066] *filename*: not restored

This is an informational message. BRU did not restore the file *filename* because the current file (on the disk) has a modification time that is newer than the file read from the archive. This is BRU's default method of restoring files. If you wish to overwrite all files, regardless of date, you should add the **-ua** option to the BRU command line.

[W067] warning - media appears to be write protected or wrong density

BRU received an error on its first attempt to write to an archive device. BRU has determined that it might be caused by media that is write-protected. The UNIX system may not return the proper error code, so it is not always possible for BRU to determine if the media is actually write-protected. BRU tries to determine the write-protect status by comparing the **errno** code returned by UNIX with the value of **wperrr** (as specified for the device in the **brutab** file). If **wperrr=0** (or is not set) then BRU must "guess" at whether the device is truly write-protected. In this case, it assumes that an error on the first write attempt is caused by write-protection, and issues the above message.

[W068] *filename*: warning - not found or not selected

The user specified a file on the command line which BRU did not find. The file *filename* may not exist or may be spelled incorrectly. If you are attempting to extract (restore) a file, make sure that *filename* EXACTLY MATCHES with the desired filename on the archive, including any beginning slashes. For example:

```
/myfile DOES NOT MATCH./myfile.
```

[W069] warning - may have to use **-F** option to read archive

BRU encountered an archive which does not appear to have checksum. The archive may have been written with `-F` option (which is not recommended) and must be read with the same option. This message sometimes occurs when BRU attempts to read an archive that was written by another program, like `tar` or `cpio`. It can also occur when BRU has trouble reading a BRU archive due to bad tapes, dirty tape heads, hardware problems, incompatible tape formats, etc.

[E070] *interaction needed, aborted by -B option*

BRU was run with the `-B` option, indicating that it is running in background mode and that no user interaction is possible. It encountered a condition that required user interaction (like loading a new tape) and terminated. The `-B` option is normally set automatically when BRU is started in the background, so this message may occur even if `-B` was not explicitly specified.

[E071] *filename: error making directory: errno = code, description*

BRU received an error when attempting to create a directory. The reason is indicated by the UNIX error message. In most cases, this occurs when the user has insufficient permissions.

[E072] *filename: error reading symbolic link: errno = code, description*

BRU could not read a symbolic link for some reason. The reason is indicated by the UNIX error message.

[E073] *filename: symbolic links not supported*

While running on a system that does not support symbolic links, BRU encountered a symbolic link while comparing an archive in differences mode (`-d` option).

[E074] *filename: could not make symbolic link: errno = code, description*

While extracting the symbolic link `filename`, BRU was unable to create a symbolic link. The reason is indicated by the UNIX error message. This error will occur if your version of UNIX does not support symbolic links.

[E075] *filename: could not make fifo*

BRU tried to extract a FIFO (named pipe file) on a system which does not support FIFOs. Normally, BRU tries to create a regular file with the same name. In this case, the attempt to create a regular file was unsuccessful.

[W076] *warning - link of filename to dirname, dirname is a directory, no link made*

BRU was asked to create a symbolic link from `filename` to the directory `dirname`, on a system which does not support symbolic links. Since hard links to directories are not allowed by UNIX, this warning is issued and no link is made.

[W077] *warning - link of filename1 to filename2, filename2 does not exist*

BRU attempted to create a hard link from `filename1` to `filename2` and `filename2` does not exist. Generally, this message occurs when BRU is asked to do a partial restore and `filename2` is not present.

[W078] *warning - extracted fifo filename as a regular file*

BRU was asked to extract a FIFO named `filename` on a system which does not support FIFOs. It extracted `filename` as a regular file. The correctness or desirability of this behavior is subject to debate, which is why the warning is issued.

[W079] *filename: warning - linkcount additional link(s) added while archiving*

While BRU was archiving a file, there were `linkcount` additional links made to it. These additional links may or may not have been archived.

[W080] ***** OBSOLETE MESSAGE NUMBER *****

[E081] *no default device in brutab file, use -f option*

BRU could not find a default device in the `brutab` file. The default device is always the first device entry in the `brutab` file.

[E082] *** OBSOLETE MESSAGE NUMBER ***

[W083] warning - attempt to change buffer size from `oldbufsize` to `newbufsize` ignored (incompatible `brutab` entries)

BRU detected different default buffer sizes when reading or writing to multiple devices (device cycling). The buffer size is not allowed to change between volumes of an archive. This error usually occurs at the start of the second device, when BRU reads the `bufsize` parameter for that device (from the `brutab` file) and discovers that the buffer size differs from the size used by the first device. To avoid this warning message, use the `-b` option to force a specific buffer size for all devices.

[E084] double buffering I/O error, `bytecount` bytes read/written: `errno = code`, `description`

[E085] problem setting up double buffering, using normal buffering

Both of these errors indicate that BRU encountered a problem setting up the double buffering. Sometimes, reducing the I/O buffer size will remedy the problem.

[E086] `filename`: media ejection failed: `errno = code`, `description`

On systems which support ejection of archive media under software control, BRU may be configured to eject each media when it is done with the media. BRU encountered some sort of error while attempting to eject the media.

[I087] `filename`: compressed version was larger, stored uncompressed

When file compression is utilized via the `-Z` option, BRU will check to ensure that the compressed version of the file uses fewer archive blocks than the uncompressed version. If the compressed version will not result in any savings in archive space (it is larger than the normal file), then the uncompressed version will be archived instead.

[E088] `filename`: decompression failed (`errmsg`)

BRU received an error from when attempting to decompress a file. The reason is indicated by `errmsg`. The file `filename` has not been extracted properly and may contain errors.

[W089] warning - estimate mode ignores compression

BRU was told to use both the `-e` and `-z` options simultaneously. Because of the large overhead in compressing files, and because there is no way to determine the compression ratio without actually doing the compression, BRU cannot estimate how much archive space is required for an archive when compression is enabled. Therefore, the `-e` option ignores possible savings due to compression.

[W090] `filename`: warning - not deleted: `errno = code`, `description`

BRU received some sort of error while attempting to delete (unlink) `filename`.

[W091] `filename`: warning - compression failed, stored uncompressed

BRU received an error from UNIX when BRU attempted to compress `filename` for storage (such as a filesystem temporary space overflow). BRU could not generate the compressed version of the file. Thus, the file was stored uncompressed.

[E092] *** OBSOLETE MESSAGE NUMBER ***

[W093] warning - buffer size `bufsize` exceeds system imposed limit `buflimit` with double buffering

While attempting to set up double buffering using System V Style shared memory support, BRU was asked to use an I/O buffer size which resulted in the double buffering buffers exceeding the system imposed shared memory limits. Try setting `shmmax` to a smaller value.

[W094] warning - buffer size automatically adjusted to `bufsize`

While attempting to set up double buffering using System V Style shared memory support, BRU was asked to use an I/O buffer size which resulted in the double buffering buffers exceeding the system imposed shared memory limits. The I/O buffer size was automatically adjusted downwards to the maximum size which the system could support.

[E095] could not get shared memory segment: kilobytes: errno = code, description

BRU was attempted a system call to `shmget` and was unable to get the requested amount of shared memory. The reason is indicated by the UNIX error message.

[E096] could not attach shared memory segment: errno = code, description

BRU made a system call to `shmget` which failed after BRU had already made a successful `shmget` call. The reason for the error is indicated by UNIX error message.

[E097] could not allocate message queue: errno = code, description

BRU could not allocate the memory needed to perform double buffering (`-D` option). The reason is indicated by the UNIX error message. Your system may not support shared memory, or the shared memory parameters (`shmmax`, `shmseg`, `shmall`) may not be set correctly in the `brutab` file.

[E098] warning - don't understand -I option badargs

The string `badargs` was not recognized as a valid argument for the interaction option `-I`.

[W099] warning - need more than segments shared memory segments

BRU was not able to allocate enough shared memory segments. Try setting the `shmseg` parameter for the device in use to a lower value.

[W100] warning - failed to move break value by {number of bytes} bytes: errno = code, description

BRU made a system call to `sbrk` which failed. BRU was unable to adjust the break value. This message is only caused when BRU was previously able to adjust the break value to the desired place; or should be able to adjust the break value, such as when reducing the amount of memory used.

[W101] warning - compression initialization failed, -Z suppressed

BRU could not acquire sufficient memory to perform the requested file compression. Compression was not performed. Try reducing the number of bits in compression by using the `-N` option with a lower value.

[W102] warning - unknown child died, pid pidnumX(expected pidnum), status statcode

While waiting for a specific child process to exit, the wait system call returned to BRU the pid of another process, `pidnumX`, which exited with the status of `statcode`. This error should never occur. If this error occurs, it is usually indicative of a serious problem with the system.

[E103] double buffer child died, status statcode

The child process used by BRU for double buffering died unexpectedly. The reason is indicated by the UNIX status code `statcode`.

[E104] warning - double buffer child error errcode

The child process used by BRU for double buffering received some sort of fatal error, which the child process was able to recognize as unrecoverable. The reason for the error is indicated by `errcode`.

[W105] warning - no double buffer child to reap: errno = code, description

BRU was waiting for a double buffer child to exit and the wait system call failed for some reason which was unexpected in the parent process.

[W106] warning - archive device may need "shmcopy" flag set in brutab entry

On some systems, the device driver for a given archive device may not be able to do I/O directly to or from shared memory. BRU detects this condition when the first write to, or the first read from, a given device fails with UNIX error code `errno` set to `EFAULT`. BRU issues this warning message and automatically attempts to switch to a mode where the data is copied to or from a local buffer. This automatic switching generally succeeds on writes and fails on reads, which is why the suggested fix is printed as a warning message.

[E107] `filename: error - unrecoverable archive write error, some data lost: errno = code, description`

BRU received an unrecoverable write error while creating an archive, and all or part of the data was lost for `filename`. This message may be an indication of tape hardware problems, dirty tape heads, an improper BRU buffer size, tapes that need retensioning, or tapes that are simply worn out. On high-density tape drives, this message can occur when an attempt is made to write to a low-density tape. Usually this happens with 1/4" tape cartridges, which all look similar. For example, this error will occur when using a 150MB tape drive to write to a DC600A (60MB) or DC300 (30MB) tape cartridge. High-density tape drives can normally read low-density cartridges, but they cannot write to them.

[W108] `warning - media appears to be unformatted or write protected: errno = code, description`

This is a general warning which may appear on the first attempt to read or write an archive volume which is unformatted, or when an attempt is made by BRU to write to an archive which is write-protected. The reason for the warning is indicated by the UNIX error message. This warning may also occur if the backup device does not respond properly when BRU attempts to open the device for writing. BRU is "faked out" and thinks that the device is write-protected. This often occurs with on the first attempt to write to a SCSI device. Try repeating the command. If BRU works successfully, this message can be safely ignored.

[W109] `warning - assuming end of volume volnum (unknown size)`

BRU encountered an unrecoverable read or write error before reaching the end of an archive while reading or writing a volume of unknown size. BRU may have actually reached the end of the volume, or BRU may have simply reached a bad spot on the media, which BRU cannot proceed past. Because BRU does not know the media size, BRU has no way of knowing the difference, hence, the warning message. If no other warnings, or errors, occur, this warning is benign.

[W110] `warning - found volume volnumX, expecting volnum`

BRU was expecting to find volume `volnum` and it encountered a different volume. Remove the volume and replace it with the correct volume.

[O111] `*** OBSOLETE MESSAGE NUMBER ***`

[W112] `warning - volume not part of archive created archivedate`

BRU received the correct volume number, but the date of the volume differs from the current archive. Generally, this warning occurs when the wrong tape is inserted while attempting to extract an archive.

[A113] `alert - all data currently on devicename will be destroyed`

When the `brutab` entry for a device includes the `qfwrite` boolean value, this message will be issued on the first write to the first volume placed in that device, and BRU will wait for confirmation to continue. In devices which might share both mounted and unmounted media, this prevents inadvertently overwriting media which may have been left in the device by mistake.

[I114] `*** OBSOLETE MESSAGE NUMBER ***`

[A115] `*** OBSOLETE MESSAGE NUMBER ***`

[I116] `*** OBSOLETE MESSAGE NUMBER ***`

[I117] `don't know how to rewind archive device`

BRU doesn't know how to rewind the present archive device.

[A118] `rerun with "-b bufsizek" argument`

Re-run your BRU command with the specified buffer size

```
[Q119] action filename: please confirm [y/n/g]
```

BRU is waiting for confirmation of the given action. The `-w` flag was specified on the command line.

```
[Q120] query options [default: Option] >>
```

General message used to prompt user with various messages.

```
[A121] load volume volnum - press ENTER to continue on device device name
```

```
[W122] filename: warning - too large under current ulimit, not extracted
```

The size of filename exceeds the current ulimit. Set ulimit to a larger value and try again.

```
[E123] ulimit call failed to set maximum file size limit to blkcount blocks
```

BRU was unable to set the ulimit to a larger value.

```
[W124] warning - no double buffering support included in this version
```

Your version of BRU does not support double buffering. BRU reverts to normally buffered I/O.

```
[W125] warning - shared memory does not appear to be working in your kernel
```

Verify the settings in you kernel. Contact your UNIX provider for help.

```
[E126] problem sending message to other process
```

While in double-buffer mode, BRU could not communicate with the child process.

```
[E127] problem receiving message from other process: errno = code, description
```

While in double-buffer mode, BRU could not communicate with the child process.

```
[W128] filename: warning - file contents changed while archiving
```

BRU found that the file it was backing up had been changed. This can happen during live system backups. BRU does not lock files when reading. If a file is modified while BRU is reading it, this message will occur.

```
[W129] *** OBSOLETE MESSAGE NUMBER ***
```

```
[W130] warning - I/O error on first block
```

BRU cannot read or write the first block of the archive. Verify that the given device has a tape in the drive and that the tape has not been ejected.

```
[W131] warning - archive device may need "ignoreclose" flag set in brutab entry
```

We have found that some tape drives require this setting in the `brutab` file. For additional information on this settings please refer to chapter 4 of this User's Guide

```
[W132] warning - media size automatically adjusted to size
```

This message is issued when BRU starts writing to a new volume and has changed the media size to a value which is different than the size originally specified. This can occur if BRU encountered the end-of-tape sooner than expected. For example, the media size was specified as 150M, but BRU hit the end-of-tape (on the first tape) at 120 Mb. BRU will then ask for the next volume and adjust the media size (for the second tape) to a value slightly less than 120 Mb.

```
[W133] warning - no entry for device devicename in brutabfile
```

BRU could not locate an entry in your `brutab` file for the given device.

```
[E134] internal error errcode - failed self consistency and portability checks
```

This indicates that the BRU executable file has been damaged or the BRU version is not the correct one for your system. This usually occurs when BRU cannot successfully determine your timezone offset from GMT or receives a bad value for the current date and time from a `tzset` function call.

```
[E135] path beginning with filename too large (maxlen characters max)
```

The specified filename exceeds the system limit.

[W136] filename1: warning - link to filename2 broken, saved as duplicate

The character length of the link name `filename2`, was too large to store in the file header block.

[W137] warning - wait failed: errno = code, description

During double-buffering, an error occurred while waiting for a child process.

[E138] error - unable to format device devicename

BRU could not format the device. It may be write protected, or command specified by `fmtcmd=` failed when attempting to format the device.

[E139] error - timed out during execution of pid pidnum

BRU attempted to execute an external program and the process timed out.

[E140] error - unable to read include/exclude pattern file: filename

The specified include/exclude pattern contains an error. BRU could not read the file.

[W141] warning - bruxpat pattern: pattern, errmsg

The specified include/exclude pattern contains an error. The reason for the error is indicated by `errmsg`. Edit the `bruxpat` file to correct the problem.

[W142] -E option ignored with -c, -e, -i or -t options

This is an illegal command option for the given modes (`-c -e -i or -t`)

[I143] rewinding volume [volnum] to begin autoscan

BRU prints this informational message to let you know it is rewinding volume number `volnum` to begin the **AUTOSCAN**. Rewinding may sometimes take a substantial (several minutes) length of time, it depends on the speed of your tape drive.

[I144] begin autoscan of volume [volnum]

BRU prints this informational message to let you know it has begun the auto-scanning of volume number `volnum`. Auto-scanning may sometimes take a substantial (several minutes to over an hour) amount of time, depending on the speed of your archive device.

[E145] autoscan checksum error at block blocknum (kbsize)

BRU detected a problem while performing a checksum validation during the **AUTOSCAN** phase. It could be an indication of tape hardware problems, dirty tape heads, an improper BRU buffer size, tapes with the wrong density, tapes that need to be retensioned, or tapes that are simply worn out. If this message occurs at the beginning of a tape (`blknum` is less than 10), it may indicate that your tape drive (or device driver) contains a bug and returned control to BRU before it finished rewinding. BRU tried to start the **AUTOSCAN**, but was unable to read the tape (because it was still rewinding). Often this problem can be fixed by setting the `maxrewindtime` parameter for your device in the `/etc/brutab` file. A setting of `maxrewindtime=300` seems to work for most tape drives. Sometimes this message occurs with tape drives that are confused by BRU's overwrite-protect feature. If overwrite-protect is enabled, BRU attempts to read the tape before it tries to write. Some tape drives cannot handle this. If this is the case, edit the `/etc/brutab` file and disable the global `brutab` parameter `"#+ OVERWRITE PROTECT"` by removing the `"+"` sign or by deleting the line.

[E146] unable to get memory (bytecount bytes) needed for autoscan buffer

BRU is unable to allocate enough memory to create an **AUTOSCAN** buffer. This message usually indicates that the buffer size (the `bufsize` or `asbufsize` parameters in `/etc/brutab`) is too large. It may also be caused by a shortage of memory or by system problems.

[W147] cannot do autoscan - device 'devicename' has "flagname" flag set in brutab

This usually indicates that the `norewind` or `noautoscan` flags are set in the device entry in your `/etc/brutab` file.

[E148] `autoscan read error at block blknum (kbsize): errno = code, description`

BRU received an error when attempting to read an archive during the `AUTOSCAN` phase. The reason for the error is indicated by the UNIX error message. This message may be an indication of tape hardware problems, dirty tape heads, an improper BRU buffer size, tapes with the wrong density, tapes that need retensioning, or tapes that are simply worn out. Often, this message occurs along with [E145]. Refer to its description for more information.

[W149] `autoscan detected errors - media or hardware may be bad`

This message indicates that errors or warnings were detected during the `AUTOSCAN` phase.

[I150] `autoscan of blkcount blocks on volume [volnum], time, speed Kb/sec`

[L151] `autoscan of blkcount blocks on volume [volnum], time, speed Kb/sec`

These messages are completion messages for the `AUTOSCAN` pass.

[E152] `error - timed out trying to open filename`

BRU timed out while trying open a device or file.

[E153] `error - timed out trying to read`

BRU timed out while trying read form a device or file.

[E154] `error - timed out trying to write`

BRU timed out while trying to write to a device.

[E155] `error - memory fault (SIGSEGV)`

BRU received a `SIGSEGV` signal from your OS. This is generally indicative of a memory issue in your system.

[E156] `error - memory fault (SIGSEGV) in child process`

BRU received a `SIGSEGV` signal from UNIX on one of its child processes. This is generally indicative of a memory issue in your system.

[E157] `error - received terminate signal (SIGTERM)`

BRU received a `SIGTERM` signal from your OS.

[E158] `error - received quit signal (SIGQUIT)`

BRU received a `SIGQUIT` from your OS.

[E159] `error - received interrupt signal (SIGINT)`

BRU received a `SIGINT` signal from your OS.

[E160] `error - received hangup signal (SIGHUP)`

BRU received a `SIGHUP` signal from your OS.

[E161] `error - received strange signal (signame)`

BRU received an unexpected signal.

For more information on the various signals please refer to your operating systems documentation or contact the OS manufacturer.

[W162] `warning - unable to open execution log file 'logfile': errno = code, description`

BRU was not able to open the `brurexeclog` file. This could be due to a permissions problem or the location of the file is not what BRU expected. With every BRU command or operation BRU will attempt to make an entry to the `BRUEXECLOG` file.

[L163] START (info), CMD = 'cmdline'

The entry in your `BRUEXECLOG` and to your screen shows that actual command that was started during your BRU process. It also shows you the release and version of BRU you are running.

[L164] START - child process for double-buffering

[L165] FINISH - warncount warnings, errorcount errors, exit code = exitcode

[L166] starting volume volnum on device "devicename"

[L167] device = devicename, buffer = bufsizeK bytes, media size = size

[E168] *** OBSOLETE MESSAGE NUMBER ***

[E169] error - bad argument for -T option

The user entered BRU options in an illegal combination.

[E170] error - illegal combination of mode options (-cdeghitx)

The user entered BRU options in an illegal combination.

[W171] warning - needs to be owned by root and have suid bit set

[W172] warning - cannot open device 'devicename' to do autoscan

BRU could not open `devicename` to perform `AUTOSCAN` verification.

[E173] error - exceeded warning count limit of maxwarn

BRU exceeded the maximum number of allowed warnings and terminated. The maximum number of warnings can be changed with the `BRUMAXWARNINGS` environment variable.

[E174] error - exceeded error count limit of maxerror

BRU exceeded the maximum number of allowed errors and terminated. The maximum number of errors can be changed with the `BRUMAXERRORS` environment variable or the `BRUMAXERRORS GLOBAL BRUTAB` setting - see Chapter 4.

[E175] error - bad pattern match on: {/etc/bruxpat}, entry

This would and should be superseded by [W141].

[E176] error - bad raw block size = blksize, cannot extract raw file 'filename'

BRU cannot restore or extract the given raw file from the archive. The information specified in the `BRURAW` file has an incorrect block size defined.

[W177] warning - specified size is too large, try setting size to newsize Kbytes

BRU has determined that the size given for the device you are using as an archive device is too high. BRU has suggested that you use a smaller size as the one specified in this warning message.

[L178] rewinding volume [volnum] to begin autoscan

BRU writes this message to the `brurexeclog` to time stamp when it began to rewind volume `volnum` prior to starting an `AUTOSCAN`. Rewinding may take a substantial (several minutes) amount of time.

[L179] issued reset cmd 'cmdstring'

BRU has reset the device as specified by the reset command you defined in the `BRUTAB` file

[W180] warning - reset cmd error: errno = code, description

BRU received a UNIX error message when attempting to reset the device with the given reset command as specified in the `BRUTAB` file

[I181] read/wrote blkcount blocks on volume [volnum], time, speed Kb/sec

This reports the number of blocks written/read during the current BRU process. This will also indicate the speed at which the process ran by showing you the time and speed in Kb/sec.

[L182] `read/wrote blkcount blocks on volume [volnum], time, speed Kb/sec`

This reports the number of blocks written/read during the current BRU process. This will also indicate the speed at which the process ran by showing you the time and speed in Kb/sec

[W183] `skipped autoscan of volume [volnum]: reason`

BRU prints this message to let you know it has skipped the **AUTOSCAN** of volume `volnum`. The reason is indicated as part of the message.

[I184] `waiting time seconds to finish rewind`

Reports that BRU is waiting a certain amount of seconds before attempting to complete the process

[L185] `waiting time seconds to do rewind`

Reports that BRU is waiting a certain amount of seconds before attempting to complete the process

[L186] `using 'rshname' as remote shell`

BRU will use the given file name as it's remote shell

[E187] `unable to execute remote shell 'rshname'`

BRU is unable to use the given filename as the remote shell. Verify that it exists and that you have the proper permission set.

[E188] `cannot find remote shell to execute`

BRU can not execute the remote shell. Verify it is in the correct location and that you have proper permissions set.

[A189] `filename is not a device`

You have attempted to write to a file name. BRU is reporting that this is not a device but a file.

[A190] `file filename already exists`

BRU is reporting that you are attempting to write to a file that already exists on the system.

[E191] `error - compression buffer too large, cannot allocate kbcounatk bytes`

The given **ZBUFSIZE** in your **BRUTAB** file is too large for your system to support. You should change the **ZBUFSIZE** setting in your **BRUTAB** file to a smaller number then re-attempt your process.

[E192] `filename: compression error (errmsg), data is corrupted`

An error occurred while BRU was compressing filename, the reason for the error is indicated by **errmsg**. The file was not backed up properly and the archived file contains errors. Normally, this error is caused when BRU attempts to back up a file that was changing (like a database file). For information, refer to "Live System Backups" in Chapter 9. In a few rare occurrences, this error has been caused by disk controller hardware failures or by corrupted filesystems.

[E193] `filename: decompression error (errmsg)`

An error occurred during the restore and decompression of a compressed file. The **errmsg** will indicate what the problem is with the file.

[E194] `filename: warning - file was not backed up: errno = code, {description}`

This message is issued when BRU encounters a problem on its first attempt to read filename. Often, this is caused by improper permissions. If filename is part of an NFS-mounted filesystem or the **/etc/export** file (and BRU is running as root), this message can occur if BRU is unable to access the file due to insufficient root permissions. You may need to modify your network security parameters by editing your **/etc/hosts.equiv** or **.rhosts** file. Configuring network security can get complicated (and all networks are different), so refer to your UNIX network documentation for details.

[Q195] enter new device name [default: devicename] >>

BRU is requesting that you enter a new device name or to continue the operation on the default device.

[E196] error - attempt limit exceeded ... BRU terminated

BRU has reached it's maximum numbers of errors given in the **BRUTAB** file.

[E197] error - illegal device name ... BRU terminated

BRU has attempted to write to a device that is not stated in the **BRUTAB** file. The setting in **BRUTAB** of **BRUTABONLY=YES** has forced this error. By changing the default value to **NO** for this setting you will be able to write to this device.

[W198] try using a smaller buffer size (like bufsizeK)

BRU is attempting to write to a device that is responding with errors. BRU has determined this write error as having to large of a buffer size setting set for the given device. By using the **-b** option in your command line and change the buffer size to a smaller size BRU might be able to complete the operation.

[A199] OVERWRITE PROTECT: volume is from archive written on date

BRU has found that the date of this archive is within it's overwrite protect setting.

[A200] insert another volume and press ENTER to continue

Query message asking for a different tape.

[E201] user entered Q => QUIT in routine routinename

A user entered Q to quit the operation on one of BRU query to the terminal.

[I202] switching to next device

This is an information message stating that BRU is switching to a different tape drive. This message is sent during a device cycling operation

[I203] device cycling discontinued

BRU has stopped device cycling.

[W204] filename filename1 too long, changed to filename2

This message occurs when BRU restores a file with a name that is longer than 14 characters (the maximum on older UNIX systems). BRU automatically renames the file and shortens it to 14 characters. If your system supports filenames longer than this, this behavior can be suppressed. Simply add the global **brutab** parameter "**#+ MAXFILENAMELEN=255**" to the beginning of the **/etc/brutab** file.

[I205] filename is an existing directory

The given file name in **filename** is a directory

[W206] regular expression error, string

[E207] error - failed MOUNTCMD/UNMOUNTCMD of volume volnum on device device name (exit code = #)

BRU attempted to run the specified **MOUNT** and **UNMOUNT** commands as was not able to complete the operation. The device and volume number is listed in the error message.

[W208] warning - autoscan buffer size adjusted to newbufsizeKb

BRU found that the given buffer size for the **AUTOSCAN** process had to be changed to complete the process. If you see this warning message you should adjust your **BRUTAB** buffer size setting to match the given size for the warning message.

[W209] warning - skipped archive file filename

BRU has skipped the file listed on the warning message.

[W210] warning - could not rewind device

BRU could not rewind the given device.

[E211] unable to write nullcount end nulls

When closing the archive for a specific write, BRU was unable to write the entire closing block of data. This can be caused by low memory, no disk space (of writing to a disk archive), or a write failure on a tape drive.

[E212] BRU terminated, media may be write protected or wrong density

BRU could not continue to write to the device. The reason for this error could be that the configuration of the tape drive size was wrong or that you are using a different size tape on this device.

[W213] could not read password file

BRU could read your password file. This can be caused by a permissions problem. Try running the process again as root and see if that resolves the warning.

[W214] could not read group file

BRU could not read your group file. This can be caused by a permissions problem. Try running the process again as root and see if that resolves the warning.

[I215] translating filename to filename

This is a status message informing you that the filename is being translated to the new filename

[L216] translating filename to filename

This is a log entry you will not see this message echoed to the screen

[W217] warning - filename translates to "null"

BRU is reporting the given filename in your translate file is translating to null

[E218] error - unable to read translate table file: filename

BRU is reporting that it can read your translation file. Make sure that the file is in an ASCII format and is in the given directory stated in your **BRUTAB** file

[E219] translation table error 'ERROR TEXT'

If you have specified a translation table via the **-T** command line option, BRU is unable to read the contents of the specified file. The **'ERROR TEXT'** will describe the exact error encountered.

[O220] *** OBSOLETE MESSAGE NUMBER ***

[E221] filename : cannot overwrite directory with file

BRU can not overwrite the directory with a file.

[E222] filename : cannot overwrite file with directory

BRU can not overwrite the file with a directory.

[E223] unable to inspect "norewind" device

The given device has the "norewind" option set in **BRUTAB**. With this option set BRU can not rewind the device and perform the **AUTOSCAN** option.

[E224] error - invalid -u argument "%s"

Invalid argument with the **-u** option. Valid options are (a b c d i p r f)

[E225] error - unable to execute MOUNTCMD="filename"

BRU can not run the given **MOUNTCMD** or it is attempting to run a command that is illegal.

[W226] "device" : device open when UNMOUNTCMD was called (loc=%d)

The device was open with a different request when BRU called the `UNMOUNTCMD`

[W227] "filename": warning - error setting owner/group on symbolic link: errno = number, {description}

BRU could not set the owner/group information for the specified file. The UNIX error number and description, described the problem.

[E228] error - unable to read raw-partition file: "filename"

BRU could not read the given `BRURAW` file. Make sure that the file has the correct permissions and is in the given directory.

[E229] error - no raw-device description in bruraw table: "filename"

There was no information provided in the `BRURAW` file.

[W230] warning - invalid raw-device specified (& ignored): "filename"

A invalid device was specified in the `BRURAW` file BRU has now ignored that device and is not backing up the given device.

[W231] warning - problem reading label file: "filename"

BRU could not read the given file to create a label from. Make sure that the file exist and that

[W232] filename: warning - file may be locked

BRU is reporting that the given file name might be a locked file. BRU can not read the file and this might cause BRU to terminate if you have set a low setting for the maximum number of warnings.

[W233] warning - unable to read smart-restore pattern file: filename

BRU is not able to read your given Smart-Restore file. Verify that the file is in the correct ASCII format and has the correct permissions set.

[W234] warning - smart-restore parse error '%s' on line '%s'

An error occurred while parsing your `/etc/smartrestore` file.

[W235] warning - problem creating archive catalog: filename

BRU could create its archive catalog file in the given directory specified in the `GLOBAL BRUTAB BRUTEMP=directory`

[W236] *** OBSOLETE MESSAGE NUMBER ***

[W237] *** OBSOLETE MESSAGE NUMBER ***

[E238] error - invalid -Q argument: "%s"

The argument that you passed with the `-Q` option is not valid. Arguments for `-Q` must immediately follow the `-Q` (i.e.: `-QL`) and be separated from the other options on the command line by at least one white space character.

[E239] error - invalid -U argument: "%s"

The only arguments for `-U` are numeric (0, 1, 2, etc).

[E240] error - unable to read, tape may be incompatible

[W241] warning - cannot translate "%s" to "%s"

Attempts to translate filenames during a restore were not allowed. This is probably a permissions problem.

[A242] enter label for volume %d:

[E243] error - previous UNMOUNTCMD on device "%s" failed

[W244] warning - left %d temporary files, check removevolog file "%s"

During a restore, BRU ran into a number of open/in use files. These files were copied to a temporary directory and the tape version was restored. You may remove the temporary files by running the shell script displayed.

```
[I245] "%s": skipped file, %s
```

The file listed was skipped in this operation because of the reason given.

Appendix B - Support Information

TOLIS Group offers 30 days of free technical support on all BRU Products from the date of your original product purchase. After the initial 30 days, annual support plans are available that will extend your support coverage for an additional twelve months beyond the initial 30 days (for a total of thirteen months of coverage).

During the support period, all updates to the version of BRU or BRU Server that you have currently licensed are included for no additional cost. Additionally, as long as your annual support contract is maintained, updates to your currently licensed product will continue to be made available for no additional cost and cross-grades for the same product (i.e.: OS X to Solaris) or upgrades to a different product (BRU LE to BRU Server) are provided at a discount.

When contacting support, please provide the following info in your email or have it available at the time of your call:

What:	Example:
Product Name and Version	BRU Server 1.2.0
Product Serial Number	8275-9827
OS and Version / kernel	OS X 10.3.9 or Linux 2.6.11
Server System Info	2GHz G5 Dual Xserve or AMD Athlon 64 3500+

Your Phone Number
Times to call if we are not immediately able to answer your call

Additionally, be sure that you have admin access to the server system, including the tape drive(s) and library.

Our availability and contact information is:

Monday - Friday, 8AM to 5PM MST (Arizona)
480-505-1814 - Voice
480-505-0492 - Fax
support@tolisgroup.com

Additionally, you may also make use of our online product forums. While a TOLIS Group employee may not answer your posts, there are many knowledgeable BRU product users that frequent the forums and provide help even after hours and on weekends and holidays.

<http://www.bru.com/forums/>

Appendix C - BRU Server End User License Agreement

TOLIS Group, Inc.

LICENSE AGREEMENT

This License Agreement ("Agreement"), provided by TOLIS Group, Inc. ("TOLIS"), governs the use of the object code version of the BRU brand computer software, documentation and materials accompanying this Agreement or otherwise provided in connection herewith (collectively, "Software"), owned by TOLIS, by the person or entity ("Client") that has clicked on the "Agree" button within the installer. For purposes of this Agreement, Software may be the BRU Server server, agent, or console component.

IF YOU DO NOT AGREE WITH THE TERMS THAT FOLLOW, YOU MUST SELECT THE "DISAGREE" OPTION IN THE INSTALLER AND YOU MUST NOT USE THE SOFTWARE.

1. LICENSE AND USE RESTRICTIONS.

Subject to all other terms of this Agreement including the payment of any applicable fees, TOLIS hereby grants to Client a non-exclusive, non-transferable license, without the right to grant sub-licenses, to use one (1) copy of the Software solely for Client's own, internal purposes. The foregoing license includes the right of Client to make a reasonable number of copies of the computer programs contained in the Software solely for backup and archival purposes; provided, however, that all such copies shall be deemed Software for purposes of this Agreement. The foregoing license shall terminate immediately and without notice for any breach of this Agreement by Client, including any failure to pay fees when due. Upon any such termination, Client shall immediately destroy or delete any and all Software and promptly confirm in writing that Client has done so.

Transferability to a new computer system is permitted when the original system upon which a given license is currently installed is to be retired, decommissioned, or otherwise taken out of daily utilization by the originally licensed client. It is permissible to retain use of the licensed software on the original system for a period of overlap required to allow the transfer of data from the original system to the replacement system. Once the license has been transferred to the replacement system and the replacement system is placed in normal use, the license must be removed from the original system. At no other time is it allowable to utilize the same software license on two or more different computers at the same time.

The Software is and shall remain the sole and exclusive confidential and proprietary property of TOLIS, subject to protection under the intellectual property laws of the United States and those throughout the world. Client agrees not to use or disclose the Software, during and after the term of this Agreement, except as expressly permitted by this Agreement. Client further agrees not to modify the Software, remove any notices or markings on the Software, or reverse compile, reverse assemble, reverse engineer or otherwise attempt to learn or disclose the trade secrets contained in the Software, transfer the Software in whole or in part over a network, or permit any third party to do any of the foregoing. Nothing in this Agreement shall be construed as conferring any license under any of TOLIS' intellectual property rights, whether by estoppel, implication, or otherwise, except for those licenses expressly granted herein.

2. WARRANTY AND DISCLAIMER.

TOLIS warrants that for a period of sixty (60) days from the date of receipt by Client of the Software, the media on which the Software was delivered shall be without defects in materials or workmanship. TOLIS agrees to replace any defective media which is returned to TOLIS within the foregoing sixty (60) day period. TOLIS may make available to Client additional services, including updates, enhancements or improvements of or to the Software, under separate written agreement, and for additional payment.

THE FOREGOING WARRANTY IS THE ONLY WARRANTY GIVEN HEREUNDER. EXCEPT AS OTHERWISE PROVIDED ABOVE, THE SOFTWARE IS PROVIDED ON AN "AS IS" BASIS, WITHOUT ANY WARRANTY WHATSOEVER. ALL EXPRESS, IMPLIED OR STATUTORY CONDITIONS, REPRESENTATIONS AND WARRANTIES, INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT, ARE DISCLAIMED. Some states do not allow the disclaimer of implied warranties, so the foregoing limitations may not apply to you.

3. LIMITATION OF LIABILITY.

TOLIS SHALL NOT BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, CONSEQUENTIAL OR EXEMPLARY DAMAGES ARISING UNDER THIS AGREEMENT OR IN CONNECTION WITH THE SOFTWARE, REGARDLESS OF WHETHER ADVISED BEFOREHAND OF THE POSSIBILITY OF SUCH DAMAGES. IN NO EVENT SHALL THE LIABILITY OF TOLIS HEREUNDER EXCEED THE SUM OF ONE HUNDRED DOLLARS (\$100), REGARDLESS OF THE CAUSE OF ACTION, IN TORT, CONTRACT OR OTHERWISE.

4. GENERAL.

Any action related to this Agreement shall be governed by the substantive laws of the State of Arizona, without regard to conflicts of law principles. The State and Federal courts located in Maricopa County, Arizona, shall have sole jurisdiction over any dispute arising hereunder, and the parties hereby consent to the personal jurisdiction of such courts. Neither this Agreement, nor any rights hereunder, may be assigned by operation of law or otherwise, in whole in part, by Client without the prior, written permission of TOLIS. Any sale of more than fifty percent (50%) of the common voting stock of, or other right to control, Client shall be deemed an assignment. Any purported assignment without such permission shall be void. Any waiver of any rights of TOLIS under this Agreement must be in writing, signed by TOLIS, and any such waiver shall not operate as a waiver of any future breach of this Agreement. In the event any portion of this Agreement is found to be illegal or unenforceable, such portion shall be severed from this Agreement, and the remaining terms shall be separately enforced. The parties agree that any breach or threatened breach of this Agreement by Client is likely to cause TOLIS damage that is not fully reparable by payment of damages, and further agree that in such case TOLIS shall be entitled to seek and obtain injunctive or other equitable relief to protect its rights hereunder. Client's performance hereunder and use of the Software shall at all times comply with all applicable laws, rules and regulations, including those governing export of technical information, and Client shall fully indemnify, defend and hold harmless TOLIS against any violation thereof. This Agreement is the entire agreement between the parties with respect to this subject matter, and supersedes any and all prior or contemporaneous, conflicting or additional communications, negotiations or agreements.

Thank you for doing business with TOLIS Group, Inc.!

TOLIS Group, Inc.
9495 East San Salvador Dr.
Suite 250
Scottsdale, AZ 85258
bruinfo@tolisgroup.com