
AUTODRM-NT V2.0
INSTALLATION AND USER'S GUIDE



GEOTECH INSTRUMENTS, LLC

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Overview of AutoDRM-NT v2.0 features

- Includes all basic functionality needed for seismic and infrasound stations and arrays.
- Follows all basic message conventions on size, line length, date-time formats, station and channel naming, and units given in the IDC documentation.
- Supports: begin line, msg_type data and request, msg_type command_request and command_response, msg_id, ref_id lines.
- Supports both Email and FTP as data return mechanisms.
- Environment lines: time, sta_list, chan_list, time_stamp.
- Able to provide: WAVEFORM, CHANNEL, STATION, RESPONSE and OUTAGE data. Accepts requests and supports data messages for all these types.
- Supports station core command functions for operation change (station calibration) and key management (generate keypair, start new keypair) as described in the IDC documentation (The Structure of Commands to IMS Stations, Informal Paper, Nov. 2001).
- Main formats supported for requests: IMS2.0, IMS1.0 or GSE2.0 (default is GSE2.0).
- Sub-formats supported for waveforms: compressed 6-bit CM6 and AU6 (default is CM6, AU6 not tested).
- User access to the AutoDRM-NT commands is provided with three authorization levels.
- Supports the HELP command.
- Optionally, AutoDRM-NT uses S/MIME protocol for digitally signed messages, both incoming and outgoing.
- Follows the recommendations on AutoDRM-NT implementation safeguards given by the IDC documentation (against repeated requests, excessive requests, returned mail).
- The AutoDRM-NT ignores repeated requests by the same user within ten minutes.
- Maximum email message size is 1 MB, maximum size of an FTP message is 10 MB.
- Returned mail (due to errors in the address) is forwarded to the operator.
- The original request is echoed back in the response message as data_type log.
- In case of syntax errors or not implemented commands, AutoDRM-NT returns a data_type error_log message.
- In case of errors in operation, the error message is saved locally (for the use of the station operator who should take appropriate action), and a data_type error_log message is returned to the sender. All request messages, even in case of errors, are answered. Exceptions are not validated digitally signed incoming messages.
- Keeps a log file of the incoming and outgoing messages (parameters of msg_id lines, volume of transferred data, time of message processing). Also, keeps a log of all remote command attempts, their initiations and outcomes (successful or not) together with their corresponding execution messages.
- Geotech's AutoDRM-NT for the Windows NT operating systems is based on the algorithm developed by Dr. Urs Kradolfer (Kradolfer, 1993, 1996; see also http://seismo.ethz.ch/autodrm_software.html).

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1 AUTODRM-NT INSTALLATION AND CONFIGURATION

1.1 AutoDRM-NT Programs

If pre-installed at the factory, all passwords are set to `geotech`, and one can skip the Installation section.

1.2 Installation

Choose a name for the home directory of the AutoDRM-NT. Recommended is `C:\autodrm`. Create this directory if it does not already exist. Copy to it from the AutoDRM-NT CD the self-extracting archive file `AutoDRM-NT.exe`. Then, go to the AutoDRM-NT home directory `C:\autodrm` and expand the archive file using the command: `AutoDRM-NT`

This procedure will create all directories and files necessary for running the `autodrm`. In the following, it will be assumed that the home directory for the AutoDRM-NT is `\autodrm`.

1.2.1 Configuration

- i) A GUI called `ADRMCFG` is provided for easy configuration of `Autodrm.rc`, `Autodrm.setup`, `Autodrm.super`, `Autodrm.allow` and `Autodrm_cmd.allow` files. If done manually (not recommended), modify the following files in directory `\autodrm\adm`.

Table 1-1 - AutoDRM-NT Program Files

Program/File Name	Check for
Autodrm.rc (initialization file for the AutoDRM-NT)	All entries
Autodrm.setup (setup file for the AutoDRM-NT)	All entries
Autodrm.super (file to set AutoDRM-NT superusers)	All entries
Autodrm.allow (file to set AutoDRM-NT allowed users)	All entries
Autodrm_cmd.allow (file to set AutoDRM-NT commands access levels)	All entries
Cronos.tab (control file for Cronos)	Path for AutoDRM-NT programs

NOTE

The path of AutoDRM-NT programs needs to be changed only if the chosen home directory is other than `C:\autodrm`.

- ii) Copy the files `STARTautodrm.bat` and `STOPautodrm.bat` to one of the directories included in the system path (for example, `C:\Winnt`)
- iii) Set the AutoDRM-NT system to be started automatically at each system startup. Click on Start, Settings, Taskbar & Start Menu, Start Menu Programs, Add and add the following: `C:\autodrm\adm\STARTautodrm.bat` to the Startup folder.

- iv) Set the environment variable HOME to the path of the AutoDRM-NT home directory. Click on My Computer - Properties, go to Environment and add a System Variable with the name HOME and its Value set to the AutoDRM-NT home path (e.g. C:\autodrm). You need to restart the computer before this change comes into effect.

1.3 Data Handling Programs for the Geotech's ICP

The home directory of the data handling programs will be \auto, located on the same drive as the AutoDRM-NT home directory. Create this directory if it does not already exist. Copy to it from the Geotech's AutoDRM-NT CD the self-extracting archive file auto.exe. Then, go to the C:\auto directory and expand the archive file using the command: auto. This command will create all directories and executables necessary to the AutoDRM-NT to access data acquired by the Geotech's ICP.

Next step is to run the command: statab

Will create the necessary initial data files (station table, calibration information file). Statab should be run any time a change is made in the ICP configuration as regarding number and name of channels. The file created by statab (\auto\cal\yyyymmdd_hhmm.cal) *has to be edited manually to make the necessary additions, such as entering geographical coordinate system* (e.g. WGS-84). However, the exact number of lines, each including the name of the station and channel, is already prepared by statab starting from the ICP configuration file (\icp\station.nam).

1.4 Programs and Services Required by the AutoDRM-NT System

1.4.1 Cronos Task Scheduler

The Cronos Hourglass service is used to schedule the operation of the AutoDRM-NT system. The scheduler is licensed from Redsword Corporation.

The steps for installing and configuring cronos are the following:

- i) At the command prompt go to directory C:\autodrm\adm, where the cronos files are stored, and enter: cronos install

This installs the program as a Windows-NT system service.

- ii) Go to Control Panel, Services, and set the Startup parameters for the Cronos Hourglass as follows: "Startup Type: Automatic", and "Log On As: System Account".

For more informations on how to install and configure cronos, refer to the \autodrm\adm\cronos_readme.txt file.

1.4.2 WorldMail Server

1.4.2.1 Installation

Run the setup program from the Qualcomm Eudora WorldMail CD. Choose to install WorldMail server and all its components. During setup, choose the default options, including installation of 'DAO' files. Make sure your Windows NT computer name is the same as the first element of your DNS domain name (see Control Panel, Network, Microsoft TCP/IP Properties). For example, if your domain name is: icpa.geoinstr.com your computer name must be icpa.

!!! WARNING !!!

The computer name **should NOT** contain the underscore ('_') or dot ('.') signs !

1.4.2.2 Configuration

After rebooting, open the Mail Server Manager. Connect to your server by entering the password used given during the installation process, open Internet Mail, Local Domains, and add your domain (in the example above `icpa.geoinstr.com`) as a New Local Mail Domain. Activate the postmaster. Configure `postmaster` account by checking Message store user. Then, choose to Add to this domain one new Message Store User: `autodrm`. If the station/AutoDRM operator does not already have an email account elsewhere, add also a new Message Store User `operator`. For each of these users choose the default Configuration. In the Configuration General menu enter a password in the Authentication field. Close WorldMail server.

1.4.2.3 Changing the Domain Name

Go to Control Panel, Network, Protocols, TCP/IP, DNS, and change the Domain to the new Hostname.Domainname. Then, open WorldMail, Internet Mail, Local Domains and delete the Domain containing 'geoinstr'. Then, add the new domain Hostname.Domainname and create 3 "Message Store Users" as described in the AutoDRM-NT manual (`autodrm`, `operator` and `postmaster`). Then, go to Program Files\WorldMail\Smtp\MailBoxes\ and delete the all subdirectories with the old domain names.

1.4.3 Cmailto Mail Client

The `mailto` software licensed from Sureshot is used as mail client by the AutoDRM-NT system.

The `mailto` program is stored in the directory `C:\autodrm\bin` and does not need any special installation procedure. The e-mail client uses the local computer as SMTP server and calls a utility program named `removelines.exe` (also present in the directory `C:\autodrm\bin`) for handling S/MIME signed messages.

1.4.4 Outlook Express Mail Client

In case of errors, the AutoDRM-NT sends automatically messages to the 'operator' or to the 'postmaster'. Their email accounts are already created and registered with the WorldMail server. Outlook Express is not actually part of the AutoDRM-NT system, but may be used by the station operator for periodically checking the 'postmaster' and 'operator' accounts for AutoDRM-NT originated messages.

In order to access those two accounts, one should configure the Outlook Express mail client, which is part of, and is installed automatically with, the Windows NT operating system. One email address should be `postmaster.icpa.geoinstr.com`, and the other `operator.icpa.geoinstr.com`. The setup wizard guides through the configuration process. Choose the options local area network, follow the configuration steps, and you may allow Outlook Express as the default mail client.

1.4.5 FTP Server

1.4.5.1 Installation

Run the FTP server setup program from the NetManage ViewNow CD. During setup, choose the default options. The following items must be selected, when prompted: Custom installation and Private installation; select "TCP/IP File and Print" (Shared files are automatically selected) and select "Install files for all users".

1.4.5.2 Configuration

After rebooting, in the General Configuration Menu, the following items must be selected, in addition to the default options:

- in When Windows starts, "Start the FTP Server"
- in Connections, "Allow anonymous connections"
- in "Configuration Menu for anonymous users", "Set user's access rights",
add the `c:\autodrm\pub` directory to the list of "Accessible Folders" and set it as "Home folder", with "List and Read access only". Remove the `c:\` folder from the list, if present. Click Yes to set the same New users access rights. Click the upper left arrow to Start the FTP server.

Reboot the computer and the AutoDRM-NT system is now ready to run.

2 AUTODRM-NT OPERATION

If pre-installed at the factory, one has still to include `STARTautodrm.bat` in the Startup folder as described in section 1.2.1, step iii), page 3, and to set up in Services the Cronos Hourglass scheduler to Startup Type Automatic, as described in section 1.4.1, step ii), on page 4.

2.1 How to Start and Stop AutoDRM-NT

Open a Command prompt window. To start the AutoDRM-NT system, type:

```
STARTautodrm
```

This command starts the `cronos` service, which schedules the automatic run of AutoDRM-NT. At each system boot this command to start the AutoDRM-NT is launched automatically.

To stop AutoDRM-NT, type: `STOPautodrm` at the command prompt.

This command will stop `cronos` so that no any new AutoDRM-NT processes will be started. However, the ongoing processes, in case that some AutoDRM-NT operations are in progress, will be continued until completion, unless forced by the operator (not recommended). Alternatively, one can use the icons on the desktop, if present.

To see if AutoDRM-NT is up and running, go to My Computer, Control Panel, Services, and check if Cronos Hourglass is Started. While running, different applications will be launched and can be seen in the Taskbar.

The operator should check from time to time the `postmaster` and `operator` email accounts using e.g. the Outlook Express mail client.

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3 IMPORTANT REMARKS

1. AutoDRM-NT v2.0 runs only on a PC with its system clock set on absolute GMT time.
2. For running AutoDRM-NT v2.0, enter the names of stations and channels in the Geotech's ICP configuration using capital letters only. Change to `\auto` subdirectory and run `statab` after each station/channel name change.
3. In case of requests using the FTP command, AutoDRM-NT stores response files locally, in directory `\autodrm\pub`, to be later retrieved by the requesters. Only in this case, once per year, the station operator should delete old files from this directory (for example, older than one month).
4. Optionally, AutoDRM-NT can automatically send mail messages larger than a pre-defined limit size (600 000 bytes, see `autodrm.rc`) as attachments (option 'A'), while messages of smaller size are sent as mail text (option 'T'). If this limit is set to 0, all e-mail messages are sent as mail text (recommended).
5. AutoDRM-NT keeps two log files of its operation in the `\autodrm\log` directory: `autodrm.log`, where run-time reports and error messages of AutoDRM-NT are written, and `autodrm_users.log`, where information about requests to AutoDRM-NT and their outcomes is written. The station operator may remove these files periodically (for example, once per year). The removal has to be performed with the AutoDRM-NT stopped. When re-started, the AutoDRM-NT will create new log files.
6. The AutoDRM-NT HELP command can be used to distribute information about the local data center/station and AutoDRM-NT. It is recommended that the AutoDRM-NT operator will edit the file `autodrm.help` from the `\autodrm\adm` directory and update it with informations on the local station or data center, such as name and location, email address, etc.
7. The outages and waveform segments may be slightly different if the CSS vs. CD1 ring buffers are searched for. The reason is the different time resolution of the Geotech's implementation of the ICP environment (1 second in the CSS case vs. 30 seconds in the CD1 case), as well as the different data streams handled by different programs that cannot be started/stopped simultaneously. As of November 15th, 2001, the AU6 data sub-format could not be tested, the redefinition of this sub-format being underway, so only CSS formatted ring buffer can be used.
8. If pre-installed at the factory, all passwords are set to `'geotech'`. Also, if pre-installed at the factory, shortcuts to `STARTautodrm.bat`, `STOPautodrm.bat`, `grapher`, Email server and FTP server are present on the Desktop, and the Outlook Express mail client is configured.
9. The interfaces to two programs SIGN and VALIDATE have been implemented to handle digitally signed emails. SIGN, if present, signs outgoing emails with the digital signature obtained externally to AutoDRM-NT. VALIDATE, if present, checks incoming emails for valid digital signature, logging in the `\autodrm\log\autodrm.log` file the failed validations.
10. A separate program package CALPlus v1.1 is available for automatic or manual sensor calibration and calibration database management. See CALPlus manual for more details. Without CALPlus, AutoDRM-NT will not offer calibration information when requested.

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4 INTERFACES BETWEEN GEOTECH'S ICP AND AUTODRM-NT V2.0

Table 4-1 - Interface of Geotech's ICP and AutoDRM-NT

Input files	Program (interface)	Output files
\icp\station.nam \auto\cal*.dat \auto\gsecal.rsp	STATAB (generates or updates channel information)	\auto\cal*.cal \auto\cal*.dat \auto\cal\stationcal.ndx
\auto\cal*.cal \auto\cal*.dat \auto\cal\stationcal.ndx	IMSCAL (prepares final response file in IMS1.0/ IMS2.0 format)	\auto\waves\responses.lst
\auto\tmp*.cal \auto\tmp*.dat	IMSCAL2 (prepares system response file in IMS1.0/ IMS2.0 format)	\autodrm\msg\responses.lst
\auto\cal*.cal \icpdata\cssfiles \auto\cal\stationcal.ndx	CSS2IMS1 (converts CSS3.0 ring buffer files into CM6 data format)	\auto\waves\waveforms.ims
\auto\cal*.cal \icpdata\aut\authfiles \auto\cal\stationcal.ndx	CD12IMS1 (converts authenticated CD1 ring buffer files into AU6 data format)	\auto\waves\waveforms.ims
\auto\cal*.cal \auto\cal\stationcal.ndx \icpdata\cssfiles	OUTCSS (identifies data gaps in the CSS3.0 ring buffer)	\auto\waves\outages.lst
\auto\cal*.cal \auto\cal\stationcal.ndx \icpdata\aut\authfiles	OUTCD1 (identifies data gaps in the CD1 ring buffer)	\auto\waves\outages.lst
\auto\cal*.cal \auto\cal\stationcal.ndx	CHANNELS (generates channel information)	\auto\waves\channels.lst
\auto\cal*.cal \auto\cal\stationcal.ndx	STATIONS (generates station information)	\auto\waves\stations.lst
\auto\tmp*.cal \auto\tmp*.dat	UPDATE (updates station calibration information)	\auto\cal*.cal \auto\cal*.dat \auto\cal\stationcal.ndx

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5 AUTODRM-NT COMMANDS AND EXAMPLE MESSAGES

STATION and CHANNEL Commands

Request:

```
begin ims1.0
msg_type request
msg_id req_001 TEST
email john.poetschke@geoinstr.com
time 2000/01/17 to 2000/01/18
sta_list *
chan_list *
station ims1.0
channel
stop
```

AutoDRM reply:

This output was generated fully automatically by the Geotech Automatic Data Request Manager AutoDRM-NT v2.0, based on the Swiss AutoDRM v2.95, running at the Geotech Instruments, Dallas, Texas, USA

Your request arrived at : Jan 27 13:06:45 2000 local time
The AutoDRM started at : Jan 27 19:05:11 2000 local time

```
BEGIN      IMS1.0
MSG_TYPE   data
MSG_ID     Jan_27_19:05:11_2000 GEO_NDC
REF_ID     REQ_001 TEST
DATA_TYPE  log
  Got command: BEGIN IMS1.0
  Got command: MSG_ID REQ_001 TEST
  Request comes from: "mike" <mike@lani-nt.geoinstr.com>
  Got command: MSG TYPE REQUEST
  Got command: EMAIL JOHN.POETSCHKE@GEOINSTR.COM
  Got command: TIME 2000/01/17 TO 2000/01/18
  StartTime: 200001170000 0.00
  EndTime   : 200001180000 0.00
  Got command: STA_LIST *
  Got command: CHAN_LIST *
  Got command: STATION IMS1.0
  Command <station> processed
  Got command: CHANNEL
  Command <channel> processed
  Got command: STOP
DATA_TYPE  station IMS1.0
Net Sta   Type  Latitude  Longitude  Coord Sys  Elev  On Date  Off Date
      SA105 3C    .00000   .00000    .000      2000/01/26
DATA_TYPE  channel GSE2.0
Net Sta   Chan Aux  Latitude  Longitude  Coord Sys  Elev  Depth  Hang  Vang  Sample Rate
Inst      On Date  Off Date
      SA105 BBZ    .00000   .00000    .000   .000   .0   .0   .000000
      2000/01/26
      SA105 BBN    .00000   .00000    .000   .000   .0   .0   .000000
      2000/01/26
      SA105 BBE    .00000   .00000    .000   .000   .0   .0   .000000
      2000/01/26
STOP
```

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RESPONSE Command

Request:

```
begin ims1.0
msg_type request
msg_id req_002 TEST
email john.poetschke@geoinstr.com
time 2000/01/17 to 2000/01/18
sta_list sa105
chan_list *z
response
stop
```

AutoDRM reply:

This output was generated fully automatically by the Geotech Automatic Data Request Manager AutoDRM-NT v2.0, based on the Swiss AutoDRM v2.95, running at the Geotech Instruments, Dallas, Texas, USA

Your request arrived at : Jan 27 13:07:27 2000 local time
The AutoDRM started at : Jan 27 19:06:12 2000 local time

```
BEGIN      IMS1.0
MSG_TYPE   data
MSG_ID     Jan 27 19:06:12_2000 GEO_NDC
REF_ID     REQ_002 TEST
DATA_TYPE  log
Got command: BEGIN IMS1.0
Got command: MSG_ID REQ_002 TEST
Request comes from: "mike" <mike@lani-nt.geoinstr.com>
Got command: MSG_TYPE REQUEST
Got command: EMAIL JOHN.POETSCHKE@GEOINSTR.COM
Got command: TIME 2000/01/17 TO 2000/01/18
StartTime: 200001170000 0.00
EndTime   : 200001180000 0.00
Got command: STA_LIST SA105
sta_list after check is: SA105
Got command: CHAN_LIST *Z
Got command: RESPONSE
Command <response> processed
Got command: STOP
DATA_TYPE  response GSE2.0
CAL2 SA105 BBZ          .00000000E+00   .000   .00000 2000/01/16 00:27
2000/01/26 00:27
FAP2  1 C              .000   1 Seismometer response
      1.00000   .10000000E+01   1
PAZ2  2 V              .10000000E+01   .000   1   1 LP @ 53 Hz + HP @ 0.02 Hz
      -.12440700E+00   .00000000E+00
      .00000000E+00   .00000000E+00
PAZ2  3 V              .10000000E+01   .000   1   0 AA LP @ 1979.5 Hz in dig.
      -.12437810E+05   .00000000E+00
DIG2  4                .26471900E+06   40.00000 Geotech D-series
FIR1  5                .10E+01   8   .000 B   17 Geotech D-series stage 1
      .00000000E+00   .00000000E+00   .10000000E+01   .40000000E+01   .10000000E+02
      .20000000E+02   .35000000E+02   .56000000E+02   .84000000E+02   .12000000E+03
      .16100000E+03   .20400000E+03   .24600000E+03   .28400000E+03   .31500000E+03
      .33600000E+03   .34400000E+03
FIR2  6                .10E+01   128   .000 B   7 Geotech D-series stage 2
      .81920000E+04   .98304000E+05   .54067200E+06   .18022400E+07   .40550400E+07
      .64880640E+07   .75694080E+07
```

AutoDRM-NT Commands and Example Messages

```
FIR3 7 .10E+01 2 .000 B 51 Geotech D-series stage 3
-.26000000E+02 -.24700000E+03 -.82200000E+03 -.13620000E+04 -.83900000E+03
.10120000E+04 .21970000E+04 .21200000E+03 -.34430000E+04 -.30770000E+04
.31560000E+04 .71680000E+04 .25600000E+03 -.10709000E+05 -.76440000E+04
.10713000E+05 .18055000E+05 -.38730000E+04 -.28007000E+05 -.11826000E+05
.31641000E+05 .35194000E+05 -.22177000E+05 -.60427000E+05 -.54040000E+04
.77065000E+05 .51056000E+05 -.71982000E+05 -.10690500E+06 .33416000E+05
.15629600E+06 .43678000E+05 -.17571800E+06 -.15240900E+06 .13985600E+06
.27057300E+06 -.29083000E+05 -.36042700E+06 -.16217300E+06 .37180700E+06
.41780700E+06 -.24684000E+06 -.69318100E+06 -.78388000E+05 .90249700E+06
.68523100E+06 -.86521700E+06 -.17135580E+07 -.26200000E+03 .32762080E+07
.49504710E+07
(Theoretical response provided by Crystal Semiconductor Corporation)
STOP
```

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WAVEFORM Command

Request:

```
begin ims1.0
msg_type request
msg_id req_003 TEST
email john.poetschke@geoinstr.com
time 2000/01/17 00:01 to 2000/01/17 00:02
sta_list *
chan_list *z
waveform ims1.0:cm6
stop
```

AutoDRM reply:

This output was generated fully automatically by the Geotech Automatic Data Request Manager AutoDRM-NT v2.0, based on the Swiss AutoDRM v2.95, running at the Geotech Instruments, Dallas, Texas, USA

Your request arrived at : Jan 27 13:05:11 2000 local time
The AutoDRM started at : Jan 27 19:04:11 2000 local time

```
BEGIN      IMS1.0
MSG_TYPE   data
MSG_ID     Jan 27 19:04:11_2000 GEO_NDC
REF_ID     REQ_003 TEST
DATA_TYPE  log
Got command: BEGIN IMS1.0
Got command: MSG_ID REQ_003 TEST
Request comes from: "mike" <mike@lani-nt.geoinstr.com>
Got command: MSG_TYPE REQUEST
Got command: EMAIL JOHN.POETSCHKE@GEOINSTR.COM
Got command: TIME 2000/01/17 00:01 TO 2000/01/17 00:02
StartTime: 200001170001 0.00
EndTime   : 200001170002 0.00
Got command: STA_LIST *
Got command: CHAN_LIST *Z
Got command: WAVEFORM IMS1.0:CM6
Command <waveform> processed
Got command: STOP
DATA_TYPE  waveform IMS1.0:CM6
WID2_2000/01/17 00:01:00.000 SA105 BBZ      CM6      2400      40.000000      .00E+00
1.000          .0      .0
STA2          .00000      .00000          .000      .000
DAT2
qGaIFFF1I0+F2J-0J2FF0+1J0++3L0-H4K+2J11H+0H0F-FG1FF2FGG0+I32M0FH3-GF2+H3GI1G+0F+
F0H+1F1H-OK+20IG5HH-F+2H-2IF2HF++F-2H+-H00J00F-H-2FFH+--0H10L21I+00GG0G-++1GG0FG
.....
-HH4-G0+-K+4H+FF+00I10I0FF00GHF4HI4-I-F+H2-G-0F-GH4GI-00+H-+F0G-+-0J+2HG5FK0-F+H
21I0-FG00FJ00H+00+H0G0FH4I+1L5+I4M+3-GF1+FGF00FI-0+F--G1+I-0-+HF3IF4HI1-FG3FH2II
2H
CHK2      505132
STOP
```

OUTAGE Command

Request:

```
begin ims1.0
msg_type request
msg_id req_004 TEST
email john.poetschke@geoinstr.com
time 2000/01/17 to 2000/01/18
sta_list *
chan_list *
outage ims1.0
stop
```

AutoDRM reply:

This output was generated fully automatically by the Geotech Automatic Data Request Manager AutoDRM-NT v2.0, based on the Swiss AutoDRM v2.95, running at the Geotech Instruments, Dallas, Texas, USA

Your request arrived at : Jan 27 13:07:56 2000 local time
The AutoDRM started at : Jan 27 19:07:12 2000 local time

```
BEGIN      IMS1.0
MSG_TYPE   data
MSG_ID     Jan_27_19:07:12_2000 GEO_NDC
REF_ID     REQ_004 TEST
DATA_TYPE  log
Got command: BEGIN IMS1.0
Got command: MSG_ID REQ_004 TEST
Request comes from: "mike" <mike@lani-nt.geoinstr.com>
Got command: MSG_TYPE REQUEST
Got command: EMAIL JOHN.POETSCHKE@GEOINSTR.COM
Got command: TIME 2000/01/17 TO 2000/01/18
StartTime: 200001170000 0.00
EndTime   : 200001180000 0.00
Got command: STA_LIST *
Got command: CHAN_LIST *
Got command: OUTAGE IMS1.0
Command <outage> processed
Got command: STOP
DATA_TYPE  outage IMS1.0
Report period from 2000/01/17 00:00:00.000 To 2000/01/18 00:00:00.000
Net      Sta  Chan Aux      Start Date Time      End Date Time
Duration Comment
3600.025 SA105 BBZ      2000/01/17 22:59:59.975 2000/01/18 00:00:00.000
3600.025 SA105 BBN      2000/01/17 22:59:59.975 2000/01/18 00:00:00.000
3600.025 SA105 BBE      2000/01/17 22:59:59.975 2000/01/18 00:00:00.000
3600.025
STOP
```

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HELP Command

Request:

```
begin ims1.0
email john.poetschke@geoinstr.com
help
stop
```

AutoDRM reply:

```
From: autodrm <autodrm@icpa.geoinstr.com>
To: JOHN.POETSCHKE@GEOINSTR.COM <JOHN.POETSCHKE@GEOINSTR.COM>
Subject: Geotech AutoDRM-NT Response
Date: Friday, January 28, 2000 2:47 PM
```

This output was generated fully automatically by the Geotech Automatic Data Request Manager AutoDRM-NT v2.0, based on the Swiss AutoDRM v2.95, running at the Geotech Instruments, Dallas, Texas, USA

Your request arrived at : Jan 28 15:07:47 2000 local time
The AutoDRM started at : Jan 28 21:06:44 2000 local time

```
BEGIN      IMS1.0
MSG_TYPE   data
MSG_ID     Jan_28_21:06:44_2000 GEO_NDC
REF_ID     (No_MSG_ID_received)
DATA_TYPE  log
Got command: BEGIN IMS1.0
no MSG_ID received - o.k.
Request comes from: "mike" <mike@lani-nt.geoinstr.com>
Got command: EMAIL JOHN.POETSCHKE@GEOINSTR.COM
Got command: HELP
Got command: STOP
DATA_TYPE  comment
```

```
#####
                                                    November 2001
```

USERS GUIDE OF THE A U T O D R M - N T

This users guide consists of three parts:

- Part 1 is about electronic mail to and from the AutoDRM
- Part 2 explains the complete command set understood by AutoDRM
- Part 3 gives illustrative examples of request mails in both the 'old' and new GSE2.0 format (this part is especially for those who do not want to read the whole text!).
- Part 4 gives the features of this version of AutoDRM-NT v2.0

THE FOLLOWING EXAMPLES ARE BASED ON THE SWISS AutoDRM

1) Sending and receiving electronic mail from AutoDRM

=====
In order to obtain data from the Swiss Seismological Service, you simply send an electronic request mail to the Automatic Data Request Manager (AutoDRM):

E-mail address of the AUTODRM:

AutoDRM-NT Commands and Example Messages

* on Internet : AUTODRM@SEISMO.IFG.ETHZ.CH

The request e-mail must contain commands (starting at column 1), depending on what you would like to receive.

Minimum requirements are:

- * The first line must start with : BEGIN
- * Any line in between starts with: EMAIL emailaddress
- * The last line starts with : STOP

where `emailaddress` is your e-mail address.

The return address (`emailaddress`) you submit depends, whether the AUTODRM should send the response to you via Internet or another net:

- * via Internet enter: EMAIL user@host.domain
- * via Bitnet enter: EMAIL user@host.BITNET

NOTE: If you are not sure how your return address should look like for our machine, simply send a mail to the AutoDRM with the text 'HELP'; this text may be either in the subject or in the body of the request-mail.
The AutoDRM will then send the correct return address back to you!

- * The response of the AutoDRM is sent to you via electronic mail. For requests which result in large responses (> ~ 1 Megabyte), you must specify an option (FTP): If this option is set, AutoDRM sends the data automatically via FTP to you, OR, if you prefer, the response is stored at our computer and you only get a short e-mail, providing you with the filename of the response and a detailed description on how you may transfer the response file by yourself to your computer using FTP (File Transfer Protocol). A more detailed description about this option can be found in part 2 of this users guide.
- * Precautions
In order to avoid endless loops and other inconvenient things, no response mails are sent to requestors with the name POSTMASTER, MAILER-DAEMON or AUTODRM.
Furthermore, an identical request from the same user is not processed if the second request arrives within the same 10 minutes.

2) Description of the commands that are understood by AutoDRM

=====

BEGIN	First line in every request to AutoDRM. This command will cause the AutoDRM to respond in the 'old' AutoDRM-language. However, AutoDRM understands both request commands in the old and the new (GSE2.0) format.
BEGIN 2.0	First line in a GSE2.0-request. This command causes this AutoDRM to respond in the 'GSE2.0-AutoDRM-language'. However, AutoDRM understands both request commands in the old and the new (GSE2.0) format.
MSG_TYPE request	Should be the second line of a request, if user wants to follow GSE2.0 formats. This line is optional on *this* AutoDRM but not at others (as e.g. the

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	GSETT-3 IDC).
MSG_ID your_msg_id source_id	Third line of a request message, if user wants to follow GSE2.0 formats. The message_ID of the sender; may be up to 20 characters long. This message_id and the source_id will appear as the reference_id (REF_ID) in the response! The source_id's are specified in the GSE2.0 documentation (max. 7chars) This line is optional on *this* AutoDRM but not at others (as e.g. the GSETT-3 IDC).
E-MAIL email@address.of.the.user	E-Mail address where response should be sent to.
E_MAIL email@address.of.the.user	same as E-MAIL command
EMAIL email@address.of.the.user	same as E-MAIL command
GUIDE	Send the information (User's Guide) printed here.
INFOR	Same as command GUIDE.
HELP	Same as command GUIDE.
FTP email@address.of.the.user	Instead of the 'E-MAIL' command: Send only short note via e-mail to the requestor and store the response locally on ftp-directory. (--> This is the new GSE2.0 format)
FTP filename	Note that command 'FTP' has two meanings, depending whether the request is in the 'old' format or in GSE2.0 format (GSE2.0 format: see above). This command sets the ftp option. If you also give your internet-address (see command INTER, below), the response will be automatically transferred to you via FTP. It is assumed you have an anonymous ftp-account (user=ftp, password=ftp). Your 'filename' also may contain a path and should point to a directory/file with appropriate write-access (Example: FTP pub/response.fil). You will get a short note with the output of the FTP-command via e-mail. If you do NOT give your internet-address, the response will be archived on a special file; however, because there may already exist a file with your suggested name 'filename', AutoDRM will recognize this and give a unique name to the file. Only a short mail is sent to the user. This mail contains the filename of the archived response file and a description on how to transfer the file to the user's computer using FTP (File Transfer Protocol) via TCP/IP. (--> This is the old AutoDRM format)
FTP	Basically the same as FTP, but AutoDRM will choose a filename for you (because the filename is missing). (--> This is the old AutoDRM format)
INTER IP_number	If the option FTP is set, this command tells AutoDRM

AutoDRM-NT Commands and Example Messages

to automatically transfer the response to the FTP-account at the internet-address given here as 'IP_number'. This address should be given in the numerical form as in the /etc/hosts file on UNIX-machines (Example: INTER 129.132.53.1)
(--> This is the old AutoDRM format)

TIME [StartDateTime] TO [EndDateTime] Definition of Start- and End-DateTime
Format: 1994/02/24 16:23:50.20
If EndDateTime is omitted, the current DateTime is assumed.
Instead of the TIME command you may also use the DATE1 and DATE2 commands!

DATE1 yyyyymmddhhmm Define start of the time interval
('yyyy': year, 'mm': month, 'dd': day, 'hh': hour, 'mm': minute;
Example: 24 Feb 1992 15:46
is: DATE1 199202241546).

DATE2 yyyyymmddhhmm Define end of the time interval
('yyyy': year, 'mm': month, 'dd': day, 'hh': hour, 'mm': minute;
Example: 24 Feb 1992 15:46
is: DATE2 199202241546).

STA_LIST ABC [,DEFG] [,HIJK] Definition of stations desired
(multiple station codes must be separated by commas).
No default.

CHAN_LIST SHZ [,SHN] [,SLZ] Definition of channels desired
(multiple channel IDs must be separated by commas).
Default: *Z

AUX_LIST [aux1] [,aux2] Definition of 'auxiliary' ID's
(multiple auxiliary IDs must be separated by commas).

WAVEFORM GSE2.0 Get waveforms for specified Time/Channels
Waveforms are supplied from our continuous recordings - if no continuous data is available, the event-file archive is searched for data.

WAVEF stn Similar to command WAVEFORM GSE2.0, but no STA_LIST is required (station stn' is defined on the command line). Valid station names may be obtained using the command SLIST (see there). Multiple lines with this command (for additional stations) are allowed. This command must be preceded by either the command TIME or the commands DATE1 and DATE2.

STATION GSE2.0 Get station-info for specified stations (specifiy by using STA_LIST and CHAN_LIST environment commands).

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CHANNEL GSE2.0	Get channel-info for specified channels (specifiy by using STA_LIST and CHAN_LIST environment commands).
RESPONSE GSE2.0	Get response-data (calibration) of the specified stations/channels (specifiy by using STA_LIST and CHAN_LIST environment commands).
BULLETIN GSE2.0	Get bulletin-data for the specified TIME environment.
ORIGIN GSE2.0	Get origin-data for the specified TIME environment.
ARRIVAL GSE2.0	Get arrival-data for the specified TIME environment.
CALIB stn	Similar to command RESPONSE GSE2.0, but but no STA_LIST is required (station stn' is defined on the command line). The calibration is sent as poles and zeros (PAZ) plus a scale factor and allows you, to deconvolute the received waveform into displacement. If a DATE1 command is received, then the transfer function for this date is sent; otherwise the transfer function for the current date is used (Note: At the Swiss Seismological Service we keep track of any changes in the transfer functions with respect of time). Multiple lines with this command (for additional stations) are allowed.
OUTAGE GSE2.0	Get outage-info on specified channels (TIME and STA_LIST environment required).
TITLE your subject	The response mail returned to you will have the subject you specify here; if not specified, a default subject is used (Swiss AUTO_DRM Response).
SUBJE your subject	Same as command TITLE .
DETEC	Send a list of all detections (and locations, if the event was located) made within the specified time interval. (For each detection we store 180 seconds of data of all channels.) This command must be preceded by either the command TIME or the commands DATE1 and DATE2.
AMI A	Send a list of the most recent locations of the 'Alert Message Informations' received. Locations possibly belonging to same event are grouped together. Optionally a time interval (TIME or DATE1 and DATE2) may be specified to filter the output. If no time interval is specified, the first 100 lines are sent.

AutoDRM-NT Commands and Example Messages

SOURC CODECO	Send the FORTRAN source code of program CODECO, which allows the conversion between various GSE-formats. The program contains the compression and decompression routines used by the GSE (Group of Scientific Experts) at the CD (Conference on Disarmament, Geneva). Using this program makes it easy to read and decompress the data files received from the AUTODRM. Attention: GSE2.0 format is supported but has not yet been fully tested (please note, that the information contained in the waveform-headers of the old GSE- and the new GSE2.0 format is not the same and therefore some information might be either lost or be unknown when converting between the 2 GSE-formats). Compression and decompression routines are working in both formats and have been tested.
PPICK stn	Send the P-picks of station 'stn' for all the detected events within a time interval. The P-picks (arrival times) are marked as 'manual' or 'automatic' picks. This command must be preceded by either the command TIME or the commands DATE1 and DATE2.
AVAIL	Send a list of detections (without locations) of which (within the specified time interval) waveform data is available. This command must be preceded by either the command TIME or the commands DATE1 and DATE2.
SLIST	Send a list of stations for which waveforms and/or calibration data is available. The station list also contains the coordinates of the stations.
STOP	This must be the last line of any request

3) Examples of AUTODRM request mails

Example 1:

Many users send this kind of mail regularly (usually on a daily basis) to us (of course without the 'GUIDE' command).

Command line:	Meaning:
BEGIN	Start of a request
GUIDE	Send the information printed here
AMI A	Send a list of the associated 'Alert Messages'
EMAIL was@gsehub.css.gov	E-mail address where output should be sent to
STOP	End of a request

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Example 2:

The FTP and INTER commands in this example are not required; without them you will receive the full response via e-mail.

Command line:	Meaning:
BEGIN	Start of a new request
DATE1 199307180055	Start of time interval: 1993Jul18 00:55 GMT
DATE2 199307180056	End of time interval : 1993Jul18 00:56 GMT
DETEC	Send the detections made within time interval
PPICK OSS	\ Send all available P-picks of the stations
PPICK SLE	/ OSS and SLE for the specified time interval
FTP pub/incoming/out.fil	File-descr. to where response should be FTP'ed
INTER 192.12.25.18	Internet-address of the user's computer
EMAIL was@gsehub.css.gov	E-mail address where output should be sent to
STOP	End of the request

Example 3:

This sample mail shows how to retrieve waveform and calibration data.

Command line:	Meaning:
BEGIN	Start of a new request
DATE1 199307190800	Start of time interval: 1993Jul19 08:00 GMT
DATE2 199307192030	End of time interval : 1993Jul19 20:30 GMT
WAVEF OSS	\ Send all waveforms of the stations OSS and
WAVEF SLE	/ SLE recorded within the time interval
CALIB OSS	Send calibration data of station OSS
EMAIL was@gsehub.css.gov	E-mail address where output should be sent to
STOP	End of the request

Example 4:

This sample mail shows how to request data in GSE2.0 format.

Command-line sent to AutoDRM:	Meaning:
BEGIN GSE2.0	Begin of message
MSG_TYPE request	This is a request
MSG_ID your_specific_ID DEU_NDC	Your ID
TIME 1994/12/18 22:54:4.0 TO 1994/12/18 22:56:12.0	Define Start/End Time
STA_LIST APL	Define station(s)
CHAN_LIST SHZ, SLZ	Define channel(s)
WAVEFORM GSE2.0	You want waveforms
STATION GSE2.0	Station-info needed
CHANNEL GSE2.0	Channel-info needed
RESPONSE GSE2.0	Send calibration-info
OUTAGE GSE2.0	Send outage info
E-MAIL fish@sdac.bgr.hannover.de	Your e-mail address
STOP	End of request

Instead of 'E-MAIL your@mail.address' you may also specify FTP your@mail.address; then you receive only a short message and the actual response is stored locally (to be retrieved later via FTP).

Note: If 'BEGIN GSE2.0' is specified, the format-options of the commands WAVEFORM, STATION, CHANNEL, RESPONSE, and OUTAGE default to GSE2.0 and therefore the format-specification 'GSE2.0' is optional!

AutoDRM-NT Commands and Example Messages

- NOTE:
- All command lines must start on column 1
 - The BEGIN command is absolutely necessary (unless you send the HELP command)!
 - The commands WAVEF, DETEC, AVAIL, and PPICK must be preceded by either the TIME or the DATE1 and DATE2 commands.
 - AUTODRM response mails are limited to a size of approximately 1 Megabyte UNLESS the FTP-option is used. If your request would produce a larger response mail, the number of waveforms sent will automatically be reduced and an error message will appear. Therefore: use the FTP-option or SPLIT your requests (see below)!
 - A request mail may contain several requests; each request must start with the command BEGIN, must end with the command STOP and should have the command EMAIL with the e-mail address. The response of each request is sent by a separate e-mail in order to keep the message size small.
 - Only one time interval (DATE1 & DATE2) per request is allowed, if you use the old 'WAVEF stn'; if you use the STA_LIST and TIME environment, followed by the WAVEFORM command, you may use multiple TIME intervals!
 - The presence of a SUBJECT in the incoming request mail is not necessary. However, if there is a subject, it is ignored.

4) AutoDRM-NT v2.0 FEATURES:

=====

- Has the basic capabilities needed for seismic and infrasound stations and arrays, as described in IDC documentation
- Follows all basic message conventions on size, line length, date-time formats, station and channel naming, units given in the IDC documentation
- Supports: begin line, msg_type data and request, msg_type command_request and command_response, msg_id, ref_id lines
- Supports both Email and FTP as data return mechanism
- Supported environment lines: time, sta_list, chan_list, time_stamp
- Is able to provide: WAVEFORM, CHANNEL, STATION, RESPONSE and OUTAGE data. Accepts requests and supports data messages for all these types.
- Supports station core command functions for operation change (station calibration) and key management (generate keypair, start new keypair) as described in the IDC documentation (The Structure of Commands to IMS Stations, Informal Paper, Nov. 2001)
- Main formats supported for requests: IMS2.0, IMS1.0 or GSE2.0 (default is GSE2.0)
- Subformats supported for waveforms: CM6 and AU6 (default is CM6)
- Users access to the AutoDRM commands is managed on three authorization levels
- Supports the HELP command
- Follows the recommendations on AutoDRM implementation safeguards given by the IDC documentation (against repeated requests, excessive requests, returned mail)
- Ignores repeated requests by the same user within ten minutes
- Maximum email message size is 1 megabyte, maximum size of a FTP message

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is 10 MB

- Returned mail (due to errors in the address) is forwarded to the operator. Requests coming from a postmaster, a mailer-daemon or another autodrm are also rejected and sent to the operator.
- The original request is echoed back in the response message as data_type log
- In case of syntax errors or not implemented commands, returns a data_type error_log message
- In case of errors in operation, the error message is saved locally (for the use of the station operator who should take appropriate action), and a data_type error_log message is returned to the sender. All request messages, even in case of errors, are answered.
- Keeps a log of the incoming and outgoing messages (parameters of msg_id lines, volume of transferred data, time of message processing). Also, keeps a log of all remote command attempts, their initiations and outcomes (successful or not) together with their corresponding execution messages.

The command set may be extended in the near future. It is recommended to use the command GUIDE from time to time in order to be up to date with the newest implementations of the AutoDRM-NT .

NOTE: This version 2.0 of AutoDRM-NT by Geotech Instruments is based on version 2.95 (from August 2000) of the Swiss AutoDRM originally published by Dr. Urs Kradofer (1993, 1996).

STOP

6 INSIDE AUTODRM-NT

Table 6-1 - AutoDRM-NT Periodic Task

Run Time	Task Scheduler	Program to Run (Path)	Task
Every minute	CRONOS Service	RUNAUTODRM (\autodrm\adm\)	Looks for incoming mail Looks for and processes calibration messages
Every 20 minutes	CRONOS Service	AUTODRM_WATCHER (\autodrm\prog\)	AutoDRM watchdog
Every day	CRONOS Service	CD1RING (\autodrm\adm\)	Deletes old CD1 files in \icpdata\aut\ (synchronized to ICP)

Table 6-2 - AutoDRM-NT Commands

AutoDRM-NT Command	AutoDRM-NT Local Routine	Interface to the Geotech's ICP (path)
WAVEFORM	WRITEWAVEFORM_LOCAL	CD12IMS1 (CD1 format) CSS2IMS1 (CSS format) (\auto)
CHANNEL	WRITECHANNEL_LOCAL	CHANNELS (\auto)
STATION	WRITESTATION_LOCAL	STATIONS (\auto)
RESPONSE	WRITERESPONSE_LOCAL	IMSCAL (\auto)
OUTAGE	WRITEOUTAGE_LOCAL	OUTCD1 (CD1 format) OUTCSS (CSS format) (\auto)
HELP or GUIDE	-	-
CALIBRATE_START	WRITECALSTART_LOCAL	CAL (\auto)
GENERATE_KEYPAIR	WRITEKEYGEN_LOCAL	-
START_KEYPAIR	WRITEKEYSTART_LOCAL	-

Table 6-3 - AutoDRM-NT v2.0 Programs and Tools

Input Files	Program (Path)	Programs Called (Path)	Output Files	Task
\autodrm\adm\autodrm.setup	RUNAUTODRM (\autodrm\adm\)	AUTODRM.BAT (\autodrm\prog\)	-	Launches AutoDRM
\yourinmaildir*.new \autodrm\msg\calib.wai	AUTODRM.BAT (\autodrm\prog\)	TESTEXFIL TOUCH MERGEMAIL SPLITMAILFILE AUTOCAL (\autodrm\bin\ AUTO.BAT (\autodrm\prog\)	\autodrm\work\mail.file* \autodrm\work\autodrm.lock (deleted at exit)	Checks for new mail. Launches processing of each incoming message. 'Locks' the AutoDRM-NT while working. Handle processing and messaging of calibration data
\autodrm\work\autodrm.lock	TESTEXFIL (\autodrm\bin\)	-	\autodrm\fnot.\$\$\$ (only if input file not exists)	Checks if AutoDRM is busy
\autodrm\work\autodrm.lock (or none)	TOUCH (\autodrm\bin\)	-	\autodrm\work\autodrm.lock (create or update it)	Signals that AutoDRM is busy
\yourinmaildir*.new (deleted at exit)	MERGEMAIL (\autodrm\bin\)	VALIDATE (\autodrm\bin\)	\autodrm\work\autodrm.mail	Uploads new mail files from server, validates, formats and merges them to one file
\yourinmaildir*.new (one file)	VALIDATE (\autodrm\bin\)	SMIME (\station\)	\yourinmaildir*.new kept if request is valid or deleted if request is not valid	Validates incoming mail
\autodrm\work\mail.file* (one file)	AUTO (\autodrm\prog\)	TOUCH AUTODRM.EXE (\autodrm\bin\)	\autodrm\work\current.mail	launches processing for the current request

Input Files	Program (Path)	Programs Called (Path)	Output Files	Task
\autodrm\adm\autodrm.rc \autodrm\work\current.mail	AUTODRM.EXE (including AUTODRM LOCAL ROUTINES) (\autodrm\bin\)	TOUCH FILECUT SENDMAIL (\autodrm\bin\)	\autodrm\log\autodrm.log \autodrm\log\autodrm_users.log \autodrm\log\last.request \autodrm\msg\calib.wai temporary files in \autodrm\work\ and \autodrm\msg (deleted at exit)	processes current request. sends automatic response message by e-mail
\autodrm\work\header.file	FILECUT (\autodrm\bin\)	-	\autodrm\work\header.file	re-formats ascii file (erases last line)
\autodrm\adm\autodrm.setup \autodrm\work\header.file	SENDMAIL (\autodrm\bin\)	SIGN CLEMAIL (\autodrm\bin\)	\autodrm\work\header.file (to be sent by clemail)	formats outgoing e- mail message as text or attachment, signs it, and e-mails it
autodrm\work\header.file	SIGN (\autodrm\bin\)	SMIME (\station\)	\autodrm\work\signed.file	signs outgoing mail
\autodrm\msg\calib.wai (deleted at exit)	AUTOCAL (\autodrm\bin\)	SENDMAIL (\autodrm\bin\ CAL IMSCAL2 UPDATE (\auto\)	\autodrm\msg\calib.mai (deleted at exit) \auto\messages\rbc.cal.message \auto\messages\sin.cal.message (overwritten at each ran)	reformats and sends calibration results produced by remote (automated) calibrations

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7 AUTODRM-NT COMMANDS TO INFRASOUND / SEISMIC STATIONS

AutoDRM-NT v2.0 supports station core command functions for operation change (station calibration) and key management (generate keypair, start new keypair). The format and syntax of these commands follows the guidelines given in the IDC documentation: The Structure of Commands to IMS Stations, Informal Paper, Nov. 2001.

7.1 Station Calibration

The command request CALIBRATE_START is used to calibrate seismic or infrasound stations. The command response consists first of calibration confirmation, CALIBRATE_CONFIRM and then later sending calibration results, CALIBRATE_RESULT.

CALIBRATE_START Command

Syntax:

```
BEGIN IMS2.0
MSG_TYPE COMMAND_REQUEST
MSG_ID id_string [source]
EMAIL address
TIME_STAMP yyyy/mm/dd hh:mm:ss
CALIBRATE_START station site channel
START_TIME yyyy/mm/dd hh:mm:ss
SENSOR yes | no
TYPE sine | random | do
CALIB_PARAM duration amplitude frequency | duration amplitude bit width |
duration
STOP
```

Station is the station code (5 characters for seismic, 4 for infrasound stations).

Site is the five-character array element site name, and *channel* is the three-character channel designator (data stream name). All these three arguments are required.

The *START_TIME* line specifies the requested start time for the calibration (UTC). In some cases, AutoDRM-NT will modify this parameter and set it to current time if the requested start time is past, or to current time plus 7 days if the requested start time is later than that.

The request specifies whether the sensor should be included in the calibration or not (*SENSOR* yes or no) as well as the type of the calibration, which can be either *sine*, *random* or *DO*.

Sine wave calibration

For this calibration type, the command parameters are given in one *CALIB_PARAM* line as calibrating signal duration (in seconds), amplitude (in Volts) and frequency (in Hertz). All the three parameters are required. If more than one *CALIB_PARAM* line is present in the command request, only the first *CALIB_PARAM* line will be processed and the AutoDRM-NT will output a *data_type* log message warning that the remaining parameter lines are ignored.

Random binary calibration

For this calibration type, the command parameters are given in one *CALIB_PARAM* line as calibrating signal duration (in seconds), amplitude (in Volts) and bit width (in seconds). Recommended value for bit width is 1. All the three parameters are required.

Digital Output (DO) calibration

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For this calibration type, there is only one command parameter, calibrating signal duration (in seconds), to be specified in the CALIB_PARAM line.

When receiving a CALIBRATE_START command, AutoDRM-NT performs a check on the incoming request, whether the TIME_STAMP is recent (not older than 5 days) and the station, site and channel codes are valid. Station code is verified against the name registered in the computer's system registry, the site code against the valid array element list and the channel code against the valid channel list. If this check fails, AutoDRM-NT returns a `data_type error_log` message:

CALIBRATE_START command rejected

Also, if another calibration is already scheduled and not yet finished, AutoDRM-NT will return a `data_type error_log` message:

CALIBRATE_START command not executed: calibration already scheduled

AutoDRM-NT relays the CALIBRATE_START command to the station and waits 60 seconds for the confirmation of the calibration successful scheduling. Temporary files (as given in Table 7.1) insure the communication between the AutoDRM-NT and the station.

Whenever the command is not successfully carried out, AutoDRM-NT response includes the `data_type error_log` message:

CALIBRATE_START command not executed,

followed by a brief message describing the encountered error.

AutoDRM-NT generates the response CALIBRATE_CONFIRM to acknowledge the successful execution of the command request.

CALIBRATE_CONFIRM Command

Syntax:

```
BEGIN IMS2.0
MSG_TYPE COMMAND_RESPONSE
MSG_ID id_string [source]
REF_ID ref_string [ref_source]
CALIBRATE_CONFIRM station site channel
START_TIME yyyy/mm/dd hh:mm:ss | NOT_CONFIRMED
STOP
```

The REF_ID line parameters are copied from the MSG_ID line of the CALIBRATE_START command message.

The START_TIME line provides the time (in UTC) that the calibration will start, which may be the requested time or a different time when the station can perform the calibration. If the calibration cannot be performed at the requested time and a new start time cannot be provided, this will be indicated as START_TIME NOT_CONFIRMED.

For every confirmed calibration of sine or random type involving seismic sensors, AutoDRM-NT is producing and sending a response message with the calibration results. First, as soon as the start time arrives, the automated calibration procedure CAL (from CALPLUS software package) is started, and then AutoDRM-NT checks every minute if calibration results as output by CAL are available. As soon as the calibration processing results are found, they are reformatted and sent to the requester as a CALIBRATE_RESULT response message, and they are also automatically included in the station calibration database by running the UPDATE procedure (from CALPLUS software package). Otherwise, if the results are not available for six hours after calibration start time, AutoDRM-NT will cancel its quest and no new response message will be generated.

CALIBRATE_RESULT Command

Syntax:

```
BEGIN IMS2.0
MSG_TYPE COMMAND_RESPONSE
MSG_ID id_string [source]
REF_ID ref_string [ref_source]
CALIBRATE_RESULT station site channel
IN_SPEC YES
[CALIB value]
[CALPER value]
[system response in IMS2.0 format]
STOP
```

The REF_ID line parameters are copied from the MSG_ID line of the CALIBRATE_START command message. The *id_string* copies the similar parameter from the CALIBRATE_CONFIRM MSG_ID line followed by the string 'RES'.

In case of sine calibration, the response consists of a pair of values for the calibration constant (CALIB) and period at which the calibration constant was calculated (CALPER). For a random calibration, the full system response in IMS2.0 format is provided.

NOTE: Starting AutoDRM-NT with command STARTautodrm deletes all existing calibration message files \auto\messages\calibration.*, in order to prevent any interference between automatic station calibrations and possibly older manual ones.

7.2 Generate New Keypair

The command request GENERATE_KEYPAIR is used to generate new keypairs at the station authenticators. The response KEYPAIR_GENERATED acknowledges the successful execution of the command request and provides the information on the new keys.

GENERATE_KEYPAIR Command

Syntax:

```
BEGIN IMS2.0
MSG_TYPE COMMAND_REQUEST
MSG_ID id_string [source]
EMAIL address
TIME_STAMP yyyy/mm/dd hh:mm:ss
GENERATE_KEYPAIR station [site]
[DSA_P value]
[DSA_Q value]
[DSA_G value]
STOP
```

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Station is the station code (5 characters for seismic, 4 for infrasound stations). Site is the five-character array element site name. If both arguments are provided, the command will refer to the designated array element authenticator, otherwise, if only the first argument is provided, the command will refer to the station computer authenticator.

Optionally, the request may specify the DSA parameters (P, Q and G) to be used for the new keys (as of November 15th, 2001, PEM format for DSA parameters not supported).

AutoDRM-NT performs a check on the incoming request, whether the TIME_STAMP is recent (not older than 5 days) and the station and site codes are valid. Station code is verified against the name registered in the computer's system registry, and the site code against the valid array element list. If such check fails, AutoDRM-NT returns a `data_type error_log` message:

GENERATE_KEYPAIR command rejected

AutoDRM-NT relays the GENERATE_KEYPAIR command to the station and waits 60 seconds for the confirmation of its successful execution. Temporary files (as given in Table 7.1) insure the communication between the AutoDRM-NT and the station.

Whenever the command is not successfully carried out, AutoDRM-NT response includes the `data_type error_log` message:

GENERATE_KEYPAIR command not executed,

followed by a brief description of the encountered error.

AutoDRM-NT generates the response KEYPAIR_GENERATED to acknowledge the successful execution of the command request and provide the information on the new keys.

KEYPAIR_GENERATED Command

Syntax:

```
BEGIN IMS2.0
MSG_TYPE COMMAND_RESPONSE
MSG_ID id_string [source]
REF_ID ref_string [ref_source]
KEYPAIR_GENERATED station [site]
[SIGNATURE signature]
{certificate request}
STOP
```

The REF_ID line parameters are copied from the MSG_ID line of the GENERATE_KEYPAIR command message.

The SIGNATURE line is omitted if the old key is used to sign the email message. It includes the signature corresponding to the new key signed with the old key, in hex representation.

The certificate request is given as hexadecimal ASCII values, in lines starting with `dname=`, `y=`, `p=`, `q=` and `g=` followed by the appropriate values (as of November 15th, 2001, PEM format for certificate request not supported).

7.3 Start New Keypair

The command request START_KEYPAIR is used to start using a new keypair at the station authenticators. The response KEYPAIR_STARTED acknowledges the successful execution of the command request.

START_KEYPAIR Command

Syntax:

```
BEGIN IMS2.0
MSG_TYPE COMMAND_REQUEST
MSG_ID id_string [source]
EMAIL address
TIME_STAMP yyyy/mm/dd hh:mm:ss
START_KEYPAIR station [site] [time]
{X509_certificate}
STOP
```

Station and site represent the station and array element site code, respectively. If both names are provided the command will refer to the designated array element authenticator, otherwise, if only the first argument is given, the command will refer to the station computer authenticator.

Optionally, the request may specify the time to start using the new keypair. If this parameter is not given, the new keypair will be started immediately upon command receipt.

The PEM certificate is included in the message for use at the station.

AutoDRM-NT performs a check on the incoming request, whether the TIME_STAMP is recent (not older than 5 days) and the station and site codes are valid. Station code is verified against the name registered in the computer's system registry, and the site code against the valid array element list. If such check fails, AutoDRM-NT returns a `data_type error_log` message:

START_KEYPAIR command rejected

AutoDRM-NT relays the START_KEYPAIR command to the station and waits 60 seconds for the confirmation of its successful execution. Temporary files (as given in Table 7.1) insure the communication between the AutoDRM-NT and the station.

Whenever the command is not successfully carried out, AutoDRM-NT response includes the `data_type error_log` message:

START_KEYPAIR command not executed,

followed by a brief description of the encountered error.

AutoDRM-NT generates the response `KEYPAIR_STARTED` to acknowledge the successful execution of the command request. The response is immediate, even if START_KEYPAIR command is required and will be executed with delay (as specified by the *time* parameter).

KEYPAIR_STARTED Command

Syntax:

```
BEGIN IMS2.0
MSG_TYPE COMMAND_RESPONSE
MSG_ID id_string [source]
REF_ID ref_string [ref_source]
KEYPAIR_STARTED station [site]
STOP
```

The REF_ID line parameters are copied from the MSG_ID line of the START_KEYPAIR command message.

7.4 Update the Certificate Revocation List

The command request UPDATE_CRL is used to send a new Certificate Revocation List (CRL) to the station and to request to update the station copy. The response CRL_UPDATED acknowledges the successful execution of the command request.

UPDATE_CRL Command

Syntax:

```
BEGIN IMS2.0
MSG_TYPE COMMAND_REQUEST
MSG_ID id_string [source]
EMAIL address
TIME_STAMP yyyy/mm/dd hh:mm:ss
UPDATE_CRL station [site]
{X509 crl}
STOP
```

Station and site represent the station and array element site code, respectively. If both names are provided the command will refer to the designated array element authenticator, otherwise, if only the first argument is given, the command will refer to the station computer authenticator.

The CRL in X.509 (PEM) format is included.

AutoDRM-NT performs a check on the incoming request, whether the TIME_STAMP is recent (not older than 5 days) and the station and site codes are valid. Station code is verified against the name registered in the computer's system registry, and the site code against the valid array element list. If such check fails, AutoDRM-NT returns a `data_type error_log` message:

UPDATE_CRL command rejected

AutoDRM-NT relays the UPDATE_CRL command to the station and waits 60 seconds for the confirmation of its successful execution. Temporary files (as given in Table 7.1) insure the communication between the AutoDRM-NT and the station.

Whenever the command is not successfully carried out, AutoDRM-NT response includes the `data_type error_log` message:

`UPDATE_CRL` command not executed,

followed by a brief description of the encountered error.

AutoDRM-NT generates the response `CRL_UPDATED` to acknowledge the successful execution of the command request.

`CRL_UPDATED` Command

Syntax:

```
BEGIN IMS2.0
MSG_TYPE COMMAND_RESPONSE
MSG_ID id_string [source]
REF_ID ref_string [ref_source]
CRL_UPDATED station [site]
STOP
```

The `REF_ID` line parameters are copied from the `MSG_ID` line of the `UPDATE_CRL` command message.

AutoDRM-NT keeps a log of all attempts for remote commands to stations, including their initiations and outcomes (successful or not) and the corresponding success or error messages. This log is kept locally on the machine running the AutoDRM-NT software, in the file `\autodrm\log\autodrm_users.log`.

Table 7-1 - AutoDRM-NT Command Requests and Responses

AutoDRM-NT Command Request	Output file	Input file	AutoDRM-NT Command Response
CALIBRATE_START	\\autodrm\\msg\\calib.req	\\autodrm\\msg\\calib.ack	CALIBRATE_CONFIRM CALIBRATE_RESULT
GENERATE_KEYPAIR	\\autodrm\\msg\\genkey.req	\\autodrm\\msg\\genkey.res	KEYPAIR_GENERATED
START_KEYPAIR	\\autodrm\\msg\\startkey.req	\\autodrm\\msg\\startkey.res	KEYPAIR_STARTED
UPDATE_CRL	\\autodrm\\msg\\upcrl.req	\\autodrm\\msg\\upcrl.res	CRL_UPDATED

8 AUTODRM-NT USER AUTHORIZATION MANAGEMENT

The user access to the AutoDRM-NT commands is provided with three authorization levels. The AutoDRM-NT control file `\autodrm\adm\autodrm.allow` contains the list of email addresses of users who are allowed to request data or to issue station commands, and their respective levels of authorization (allowed values: 1, 2 or 3 given in column one). Users with email addresses not registered in the list will be denied any access to AutoDRM-NT commands. If this control file is missing then global access to the AutoDRM-NT is permitted, so after initial setup or any change, the file attributes should always be changed to "read-only".

The AutoDRM-NT superuser (with the email address as given in the control file `\autodrm\adm\autodrm.super`) has always the highest level of authorization, namely 1. However, his email address has still to be registered in the `autodrm.allow` file with authorization level 1.

Another AutoDRM-NT control file is `\autodrm\adm\autodrm_cmd.allow`, containing the list of AutoDRM-NT commands and their respective levels of authorization (given in column one). Any command missing in the list will have by default authorization level 3, and all authorized users will have access to it.

In order to have access to an AutoDRM-NT command, the user authorization level has to be smaller to or equal than the command level.

Whenever the user is denied access to a specific command, AutoDRM-NT will include the following message in its response `data_type log` file:
Command not available: authorization failed.

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