SECURITIES INDUSTRY AUTOMATION CORPORATION

ATP III
Release document
Emergency Release 1.0.f2

Version 4

February 6, 2001

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Section I: INTRODUCTION and DESIGN CHANGES

This Emergency Release 1.0.f2 consists of script changes and changes to the Transaction Engine. It differs from previous releases in that the fallforward spans **Days 0-3;** previous release documents covered **Days 0-2. Day 3** has the procedures for the fallforward at the second site (Metro). Once Day 1 has been completed at Water Street, the system will have moved into Day 2, and Day 2 procedures must be followed until Metro falls forward before Day 3.

Existing scripts are being replaced with new versions for three reasons:

1. To eliminate the possibility of Versant errors due to databases having the same database ID (DBID);
2. To fix the DBID problem, which will make it possible to run a normal Option Start of Day and End of Day;
3. To automate the process of checking product instances in the segment databases.

The Transaction Engine is being modified to handle the recently introduced NASDAQ specification (please see **Appendix B**).

A. MANAGE UNIQUE DB IDS TO PREVENT LOID CONFLICTS

Versant requires an unique id (LOID) for each instance of an object created in the database within a given database system, i.e., osc-dbid file. Uniqueness of the LOID depends on uniqueness of the dbid (database ID). Carrying LOIDS (instances) from different databases with the same dbid into one database causes an error, SM_E_KEYALREADYEXISTS. Versant software will distribute unique database IDs across one site, but not across the two sites. As a result, a segment database on Water Street might have the same dbid as one on Metro. Because of this problem, Options in the segment databases were not migrated to the Common Database at EOD in previous releases. Because there were no Option products in the CDB, Options could not be initialized with other products during SOD procedures.

These new scripts assign every database an unique ID made up of the following numbers:

```
<generation number><metro/water indicator><segment number>
```

`<metro/water indicator>` is the next to last digit in the hostname. `<segment number>` is the value of the numeric part of the segment name. Each Common Database is assigned a `<segment number>` value of 99.

The generation number `g` starts at 1 and is increased, mod 30, during every EOD, according to the formula `g' = (g % 30) + 1` (so each ID repeats about once a month). The value is kept in `$CONFIG_DIR/DBgeneration`, which is created and initialized the first time these scripts are used.

listAllDBids may be run from the command line to show the DB ids of all databases in the system.

B. SCRIPT CHANGES PERMIT RUNNING NORMAL OPTIONS SOD/EOD

At the moment it is not possible to run a normal Options Start of Day because Option products are not migrated to the Common Database at End of Day because of LOID conflicts. These new scripts will make it possible to handle Options in the same way as all other products; that is, once the new scripts are installed, Option products will migrate to the Common Database during EOD and will be initialized in the same way as all other products during SOD.

C. SCRIPT TO CHECK PRODUCT TOTALS IN SEGMENT DATABASES

Previously to find out if the number of products in the segment databases matched those in the CDB, the operator had to add up the products in each segment. A new script, `getSegmentTotals` will return the total product count by product type for an entire site or for all the segments on a specified node. The command line syntax is

```
getSegmentTotals <metro | water | host [host...]>
```

`getSegmentTotals metro`	*Product totals listed by products for all segment DBs on the Metro side*
`getSegmentTotals water`	*Product totals listed by products for all segment DBs on the Water Street side*
`getSegmentTotals matd3240`	*Product totals for all segments on matd3240*
`getSegmentTotals matd3240 matd3260 matd3280`	*Product totals for all segments on the three machines*

The "side" options may not work on machines with nonstandard names, e.g. ITE.

D. CORRECT HANDLING OF NASDAQ NTDS MESSAGES T-C, T-c AND LEVEL 1 Q-X

For NTDS messages category T type C and category T type c (OTC issues), and QX for NASDAQ Level 1 quotes (short form inside quote message), NASDAQ has begun transmitting the letter I to indicate that the price field contains whole numbers only for products that trade in decimals and those that trade in fractions. ATP III was interpreting the letter I by the old specifications and treating all prices in these messages as decimals. In this release, when a message of the category and type listed above is received with the letter I in the denominator field, ATP III will apply the message to the database and publish it as either fractional (denominator 256) or decimal (denominator 10,000) based on the product's classification in the Master files.

Section II - FILE CHANGES/UPDATES

A. SUMMARY

Release is available at:

```
madb3020:/home/vgujje/qa_pickup/release1.0.f.2_opt.tar.Z.
```

The release is optimized with QA_TRACE set to OFF and Query DB set to OFF. All files are included in the release.

B. DETAILS: MODIFIED FILES

Modified Files (scripts)

```
../src/scripts/BuildAdminDB.ksh
../src/scripts/BuildCommonDB.ksh
../src/scripts/CreateCommonDB.ksh
../src/scripts/opBuildCommonDB.ksh
../src/scripts/opCreateCommonDB.ksh
../src/scripts/opCreateSelectedSegDB.ksh
../src/scripts/StartDBSegment.ksh
../src/scripts/utils.ksh
```

Files Added (scripts)

```
../src/scripts/getSegmentTotals
../src/scripts/listAllDBids
../src/scripts/listDuplicateDBids
../src/scripts/setDBgeneration
```

Modified Files (Transaction Engine)

```
../src/business/LevelOne/RegularLevelOneQuote.cxx
../src/business/NasdaqTrade/NasdaqDecimalTradeHandler.cxx
../src/business/NasdaqTrade/NasdaqLongTradeHandler.cxx
../src/business/NasdaqTrade/NasdaqTrade.cxx
```

Section III – PROCEDURES

A. INTRODUCTION

These procedures include the installation from tape and implementation of the new scripts at both Water Street and Metro sites, falling forward on Water Street first, then Metro.

B. CHANGES IN SOD/EOD DURING INSTALLATION

Implementation of these scripts will cause changes in the way Start of Day and End of Day are run during the changeover. Once the new release is in place at both sites, SOD and EOD procedures will be uniform and simpler. Changes in SOD/EOD have been documented below in detail. Intraday processing will continue as usual.

C. DAY BY DAY PROCEDURES

This procedure begins on Day 0 after a normal EOD has been run. Please note that the procedure spans Days 0-3. Previous installations of a new release have covered only Days 0-2. Once Day 1 has been completed at Water Street, the system will have moved into Day 2, and Day 2 procedures must be followed until Metro falls forward before Day 3. We should not fall forward at Metro until at least one full day (SOD-EOD) has been run flawlessly at Water Street.

DAY 0

Fall Forward at Water Street

1. After running a normal EOD, on all Water Street boxes change the current_rel links to release 1.0.f2. Use the procedure in **Appendix A, paragraph A, Script for Installation and Fallforward at a site.**

2. Make sure the Metrotech ATPLinks are set up as Primary. Then:

3. Check that the installation works by performing a manual initialization of segment databases at Water Street:

   A. Remove all log files.
   B. Create all Water Street segment databases.
   C. From a command prompt on watd3250, run `listDuplicateDBids`. It should not show any duplicates. Also, run `listAllDBids` and check that the DB ids conform to the rules given above. To find the current generation number, enter

   D. `>cat $CONFIG_DIR/DBgeneration`

   E. Start all Water Street segments.

F. Start the Line Handlers. Ignore their complaints about being unable to connect to the Metrotech segments.
G. Run 'Manual Initialization of Segment Symbols' for Equity and NASDAQ. Write down the numbers of products initialized.
H. After the segment databases have fully initialized, check that the totals of the product counts for Equities, NASDAQ Equities and Indices in the segment databases are the same as those product counts in the Water Street Common Database. You can use the new script, `getSegmentTotals`, documented in **Section I, paragraph C.**
I. Check the log files for SM_E_KEY and NET_EREAD errors:

```
>ksh

>for h in watd3250... watd33?0; do remsh $h 'find $ATP_LOG_DIR –
type f –exec grep –e SM_E_KEY –e NET_EREAD {} /dev/null \;'; done

>exit
```

J. Stop all segments.
K. Stop the line handlers.
L. Remove all segment databases.
M. Remove the log files.

4. If the product counts agree (Day 0, paragraph 3H above) and if there are no SM_E_KEY or NET_EREAD errors in the log files (Day 0 paragraph 3I above), then go on to Day 1 with Release 1.0.f2 ER in place at Water Street.

   If the product counts do ***not*** agree, or if there are SM_E_KEY or NET_EREAD errors in the log file, fall back on 1.0.f1 at Water Street. Use the procedure in the **Appendix, paragraph B, Fallback Procedures.**

   After the fallback, proceed normally with 1.0.f1 at both sites. No processing will be done with 1.0.f2 until further notice.

DAY 1

1. Run a normal SOD at both sites.

   A normal SOD includes using the `makeOptions` script to initialize and Auto-Add Options, item 38-43 in the Third Shift checklist (dated February 5, 2001).

2. Process normally during the day.

Day 1 End of Day:

1. Make sure that the options master files `symbol.dat` and `series.dat` have been fetched.
2. ***At both sites:*** run a normal End of Day at both sites, but ***do not*** send Option EOD messages.

   That is, follow the Second Shift checklist through item 25. In this procedure we will run an Options EOD at Water Street, despite the notice at the beginning of the checklist.

3. Check that all Equity, NASDAQ and Index EOD messages have been sent by making sure that the product counts in the Common Database on each site have stabilized (i.e., two runs of CheckInst.ksh $COMMON_DB on the same machine, one minute apart, show the same number of each type of product).
4. ***At Metrotech only***: stop all the Metrotech segments.

   On ATPIII Menu button <9>, "Segment Maintenance," click on button <6>, "Kill Segments on Selected Nodes." Select the menu item for "Kill Segments on all METROTECH Nodes."

5. Send the Option EOD messages. Click first on the "Send Option EOD Msg" button, then on the Options "Send Market EOD Msg" button. Check that all Water Street Common Database Option counts have stabilized. Use the procedure in paragraph 3. above.

   There should be about 100,000 options in that database.

6. Restart the Metrotech segments.

   On ATPIII Menu button <9>, "Segment Maintenance," click on button <3>, "Start Segments on Selected Nodes." Select the menu item for "Start Segments on all METROTECH Nodes."

7. Continue and conclude End of Day. That is, resume the Second Shift checklist at item 26.

   The product counts should **not** be the same in the Water Street and Metro CDBs, because Water Street should have 100,000+ Option products.

   The system is now in Day 2. Please go on to Day 2 procedures.

Fallback During or After Day 1

Use the procedure in the **Appendix, paragraph B, Fallback Procedures.**

DAY 2

Note: in previous releases, Day 2 has involved falling forward at the backup site. In this release there is no release change on Day 2 at either site. But after EOD on Day 1, the system will be in Day 2, and will stay in Day 2 until Metrotech falls forward before Day 3. Day 2 requires different procedures for SOD and EOD at the two different sites, and these procedures must be followed until Metrotech falls forward. We should not fall forward at Metro until at least one full day (SOD-EOD) has been run flawlessly at Water Street.

Day 2 Start of Day

1. At both sites run the Third Shift February 5 SOD checklist up to but not including ***step 38,*** the special Options initialization.

   In step 34: because there are option products in the Water Street Common Database, the message for the Option segments, 2-31, 36-41 and 43-47, should be "Fully initialized."

2. ***At Water Street only***: stop all the Water Street segments.

   On ATPIII Menu button <9>, "Segment Maintenance," click on button <6>, "Kill Segments on Selected Nodes." Select the menu item for "Kill Segments on all WATERSTREET Nodes." Ignore the error messages from the Water Street LH that it cannot connect.

3. ***Run steps 38-46*** on the checklist, to initialize OPRA products by the script at Metrotech only.

   Option products will not be manually initialized at Water Street because the segments aren't running. You won't be able to get an Option count from Water Street because the segments aren't running, but the Metro count should match the count from step #39.

4. Restart the ***Water Street*** segments.

   On ATPIII Menu button <9>, "Segment Maintenance," click on button <3>, "Start Segments on Selected Nodes." Select the menu item for "Start Segments on all WATERSTREET Nodes."

5. Resume the checklist at ***step 47*** and continue through to the end. In ***step 48*** the number of Options at Metrotech may not be the same as the number of Options at Water Street, but the number at Metrotech should match the counts from checklist steps #39, 43 and 44.

6. Finish the checklist and finish normal SOD procedures.

Day 2 Intraday:

Process normally. If you must fall back at Water Street, use the fallback procedure in **Day 0** above.

Day 2 End of Day:

1. Make sure that the options master files `symbol.dat` and `series.dat` have been fetched.
2. ***At both sites:*** run a normal End of Day at both sites, but ***do not*** send Option EOD messages.

   That is, follow the Second Shift checklist through item 25. In this procedure we will run an Options EOD at Water Street, despite the notice at the beginning of the checklist.
3. Check that all Equity, NASDAQ and Index EOD messages have been sent by making sure that the product counts in the Common Database on each site have stabilized (i.e., two runs of CheckInst.ksh $COMMON_DB on the same machine, one minute apart, show the same number of each type of product).
4. ***At Metrotech only***: stop all the Metrotech segments.

   On ATPIII Menu button <9>, "Segment Maintenance," click on button <6>, "Kill Segments on Selected Nodes." Select the menu item for "Kill Segments on all METROTECH Nodes."
5. Send the Option EOD messages. Click first on the "Send Option EOD Msg" button, then on the Options "Send Market EOD Msg" button. Check that all Water Street Common Database Option counts have stabilized. Use the procedure in paragraph 3. above.

   There should be about 100,000 options in that database.
6. Restart the Metrotech segments.

   On ATPIII Menu button <9>, "Segment Maintenance," click on button <3>, "Start Segments on Selected Nodes." Select the menu item for "Start Segments on all METROTECH Nodes."
7. Continue and conclude End of Day. That is, resume the Second Shift checklist at item 26.

The product counts should **not** be the same in the Water Street and Metro CDBs, because Water Street should have 100,000+ Option products.

Fallback at Water Street after EOD

Stop all segments, if they aren't already stopped.

Stop the Water Street Line Handler.

Stop the Water Street Common Database.

Remove all segment databases. Remove the log files if they have been backed up.

On each machine that is falling back use the procedure in the **Appendix, paragraph B, Fallback Procedures. Resume the SOD/EOD procedures used in the checklists for Release 1.0.f1.**

BEFORE DAY 3

Fall Forward at Metrotech

This procedure assumes that you have completed EOD at both sites, stopped all databases, made all necessary backups, removed all segments, log files, etc. Make sure you back up the Common Database at each site.

1. After running a normal EOD, on all Metrotech boxes change the current_rel links to release 1.0.f2. Use the procedure in **Appendix A, paragraph A, Script for Installation and Fallforward at a site.**

2. Check that the installation works by performing a manual initialization of segment databases at Metrotech:

   A. Remove all log files if you haven't already.
   B. Restore the most recent **Water Street** Common Database to the **Metrotech** site, replacing the Metrotech CDB (the Water Street CDB will have Options and Metro doesn't).
   C. Create all Metrotech segment databases.
   D. From a command prompt on matd3240, run `listDuplicateDBids`. It should not show any duplicates. Also, run `listAllDBids` and check that the DB ids conform to the rules given above. To find the current generation number, enter

   ```
   >cat $CONFIG_DIR/DBgeneration
   ```

   E. Start all Metrotech segments.
   F. Start the Line Handlers. Ignore their complaints about being unable to connect to the Water Street segments.
   G. Run 'Manual Initialization of Segment Symbols' for Equity, NASDAQ ***and Options.*** Write down the numbers of products initialized.
   H. After the segment databases have fully initialized, check that the totals of the product counts for Equities, NASDAQ Equities Indices ***and Options*** in the segment databases are the same as those product counts in the Metrotech Common Database. You can use the new script, `getSegmentTotals`, documented in **Section I, paragraph C (**`getSegmentTotals metro`**.**
   I. Check the log files for SM_E_KEY and NET_EREAD errors:

   ```
   >ksh

   >for h in matd3240... matd32?0; do remsh $h 'find $ATP_LOG_DIR -
   type f -exec grep -e SM_E_KEY -e NET_EREAD {} /dev/null \;'; done

   >exit
   ```

   J. Stop all segments.
   K. Stop the line handlers.
   L. Remove all segment databases.
   M. Remove the log files.

5. If the product counts agree (**Before Day 3, paragraph 2G** above) and if there are no SM_E_KEY or NET_EREAD errors in the log files, then go on to Day 3 below.

    1. If the product counts do ***not*** agree, or if there are SM_E_KEY or NET_EREAD errors in the log file, fall back on 1.0.f1 at Metrotech. Use the procedure in the **Appendix, paragraph B, Fallback Procedures.**

    2. Restore the most recent Metrotech Common Database to Metrotech. (This isn't a typo; we replaced the Metrotech CDB with one from Water Street in the procedure above, Before Day 3, paragraph 2B.)

    After the fallback, proceed normally with 1.0.f1 at Metrotech and 1.0.f2 at Water Street. You have returned to Day 2 and must follow Day 2 procedures.

DAY 3

Day 3 Start of Day

Start of Day will follow usual procedures at both sites and will follow the February 5 Third Shift checklist, except that we will leave out the special script Option initialization. That is, ***leave out steps 38-46. Complete step 37 and then jump to step 47.***

> In step **34**, all segments should be fully initialized. In step **48** the counts from Metro and Water should match, but there will be no numbers from steps #39, 43 and 44 to compare them to (because we have eliminated those steps).

Day 3 Intraday

Process normally at both sites. Operations will decide which site is primary.

Day 3 End of Day

End of Day is the same at both sites. It follows the Second Shift checklist, except that an **Options** End of Day procedure **will** be run after the Equity End of Day. Click first on the "Send Option EOD Msg" button, then on the Options "Send Market EOD Msg" button.

AFTER DAY 3

When both sites have fallen forward, Options will be regularly included with other products in SOD and EOD procedures.

In the Second Shift Checklist, the Option EOD should be run after Equities (step 23). (In fact it doesn't matter whether Options are run before or after Equities, but the button for "Send Option EOD Msg" must be clicked on before the Option button below it, "Send Market EOD Msg").

Start of Day will follow usual procedures at both sites and will follow the February 5 Third Shift checklist, except that we will leave out the special script Option initialization. That is, ***leave out steps 38-46. Complete step 37 and then jump to step 47.***

> In step **34**, all segments should be fully initialized. In step **48** the counts from Metro and Water should match, but there will be no numbers from steps #39, 43 and 44 to compare them to (because we have eliminated those steps).

Fallback at Both Sites

Use the procedure in the **Appendix, paragraph B, Fallback Procedures. If you fall back to 1.0.f1, you will also have to go back to the SOD and EOD checklists for that release.** That is, at SOD you will have to run the special script procedure (`makeOptions`) in the checklist at steps 38-47, and in EOD procedures you will not run an Options EOD.

Appendix A: Installation and Implementation of ATPIII 1.0.f2

A. SCRIPT FOR INSTALLATION AND FALLFORWARD AT A SITE

1. Use ftp or tar tape to load installation file on home directory of the atp3 user, that is, ftp or rcp `release1.0.f.2_opt.tar.Z` to `/atp3/qa_pickup` on one of the servers at the site.

2. Log on to that server as atp.

3. For each machine that you want to install on, including the one that you are currently logged on to, run

installRelease.csh -prod <target-machine> <release-name> atp3 <atp3-password>

where <release-name> is as in the name of the compressed tar file. This can be done from a loop with all the installs running in parallel in the background. Bear in mind that you will be falling forward in two phases, so that for **Phase 1** (Water Street) you would use, for example (ksh syntax):

for h in watd... watd... watd...; do installRelease.csh -prod $h `release1.0.f.2_opt.tar.Z` atp3 pwd &; done

and for **Phase 2** (Metrotech):

for h in matd... matd... matd...; do installRelease.csh -prod $h `release1.0.f.2_opt.tar.Z` atp3 pwd &; done

You do NOT have to untar, uncompress or rename directories; the script does it for you. The configuration will be the same as for the previous release.

B. FALLBACK PROCEDURES

On each ATP III server that is falling back:

```
rm ~/current_rel
ln -s ~/release1.0.f1 ~/current_rel
```

C. MANUAL PROCEDURES

Manual installation and fallforward should not be necessary but are included just in case.

1. MANUAL INSTALLATION OF ATPIII 1.0.f2.

On all ATP III servers:

1.) Use ftp or tar tape to load installation file to the home directory of the atp3 user.

2.) Uncompress the installation file.

3.) Untar the uncompressed file. Rename the directory to release1.0.f2:

```
mv release1.0.f1.install release1.0.f2
```

2. MANUAL FALLFORWARD PROCEDURES

On each ATP III server that is falling forward:

Link to current configuration files and fall forward:

```
cd ~/release1.0.f2/bin
rm -f config.fts LH_IP
ln -s ~/current_config/config.fts config.fts
ln -s ~/current_config/LH_IP LH_IP

rm ~/current_rel
ln -s ~/release1.0.f2 ~/current_rel
```

Appendix B: NASDAQ VENDOR ALERT DETAILS

A. AFFECTED MESSAGE FORMATS

5.1 Short-Form Trade Report - Nasdaq and OTC Equity Issues

Category T - Type C (for Nasdaq)
Category T - Type c (for OTC equity issues)

Message Criteria:

For Trade reports which meet the following criteria, a short-form record will be created for Nasdaq and OTC issues:

- a symbol of 5 characters or less
- a currency of US dollars only
- trade price within the limits for a 6 byte field as described in Appendix B
- sale condition not equal to seller
- report volume of 99,999 shares or less

If the trade report does not meet any one of these criteria, a Long-Form Trade Report record will be created.

Message Format:

Issue Symbol	Sale Condition	Trade Price Denominator	Trade Price	Report Volume	Change Indicator
5	1	1	6	5	1

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5.1A Short-Form Inside Quotation

Category Q - Type X

Message Criteria:

For Inside quotations which meet the following criteria, a short-form record will be created for Nasdaq issues:

- a symbol of 5 characters or less
- a currency of US dollars only
- both bid and ask prices within the limits for a 6 byte field as described in Appendix B
- both bid and ask sizes of 99 round lots or less
- no special conditions

If the Inside quotation does not meet any one of these criteria, a Long-Form Inside Quotation record will be created.

Message Format:

Issue Symbol	Inside Bid Denominator	Inside Bid Price	Inside Bid Size	Inside Bid MC	Inside Ask Denominator	Inside Ask Price	Inside Ask Size
5	1	6	2	1	1	6	2

Inside Ask MC	Condition	UPC Indicator	Short Sale Bid Tick
1	1	1	1

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B. NASDAQ DENOMINATOR CODE TABLE

PRICE FORMATS

The following tables identifies the denominator of the fraction or decimal point placement for price contained within quotation prices.

Fractional Pricing

Price Denominator Code	Price Denominator Value	Short Form Messages		Long Form Messages	
		Whole	Numerator	Whole	Numerator
3	8	5	1	11	1
4	16	4	2	10	2
5	32	4	2	10	2
6	64	4	2	10	2
7	128	3	3	9	3
8	256	3	3	9	3
I	1	6	0	12	0
Space	1	6 (Zero filled)	0	12 (Zero filled)	0

Decimal Prices

Price Denominator Code	Price Denominator Value	Short Form Messages		Long Form Messages	
		Whole	Numerator	Whole	Numerator
A	10	5	1	11	1
B	100	4	2	10	2
C	1,000	3	3	9	3
D	10,000	2	4	8	4
E	100,000	1	5	7	5
F	1,000,000	0	6	6	6
G	Reserved				
H	Reserved				
I	1	6	0	12	0
Space	1	6 (Zero filled)	0	12 (Zero filled)	0