

THE NETFEED[®] PRODUCT SERIES

MarketLink[®]

SECOND EDITION, AMENDED

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INTRODUCTION

Overview

MarketLink™ v. 3.02 or greater, is DataCode's 32-bit Dynamic Data Exchange(DDE) application. Some features described in this edition are available in v. 6.01 and greater. MarketLink™ interfaces directly to the DataCode Netfeed™ Server to source live data for display at the desktop and to contribute data from the desktop back to the Netfeed™ CLIENT database.

One important use for MarketLink™ is to support live, real-time links, in Microsoft Excel spreadsheets. A second important function is to send data back to the Netfeed™ Server's CLIENT database. Data contributions from MarketLink™ can be viewed on CLIENT pages or logical records displayed in WorldWatch™ Insight and/or can be contributed to outside vendors.

In summary, MarketLink™ can:

- Request and receive data from any service supported by the Netfeed™ Server.
- Field real time updates for any item for requesting applications.
- Request and receive data from multiple sources simultaneously.
- Transmit data and updates, to the Netfeed™ CLIENT database.

Software Compatibility

MarketLink™ v. 6.0 is compatible with DDE compliant applications on MS Windows '95, '98, 2000 and NT platforms.

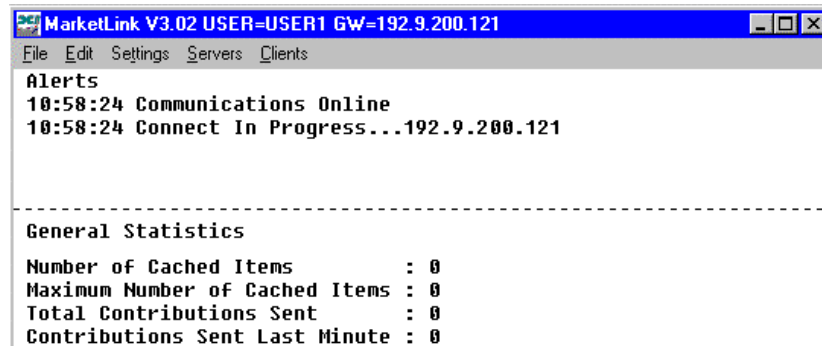
Installation

Installation of MarketLink™ occurs with the general installation of Netfeed™ System. Its icon can be found in the Netfeed™ Applications group.

GETTING STARTED WITH MARKETLINK™

Automatic Start Up

Logon to the Netfeed™ Server will usually occur automatically, as the initial installation and setup instructions provide the required configuration to do so. When MarketLink™ successfully connects, you will see the following message:

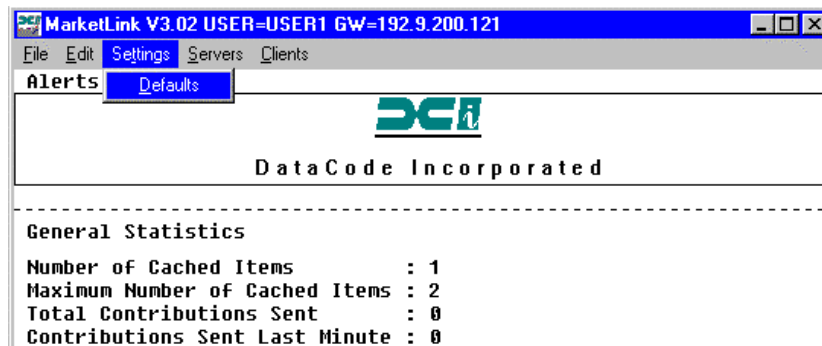


The MarketLink Online Message

Setting the Default Request Type

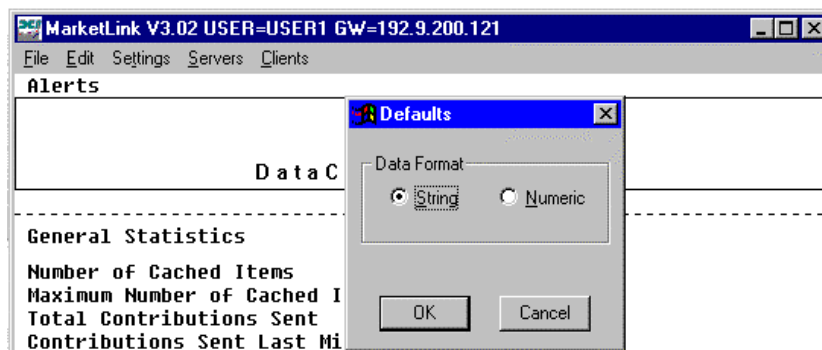
To make using MarketLink™ very easy, one step you should take is to ensure that all requests are made in the most general form. After this step you can minimize MarketLink™ and allow it to run in the background.

- 1) Select Settings/Defaults from the menu.



The MarketLink Settings Menu

- 2) The Defaults dialog box will open. Make sure String is selected.



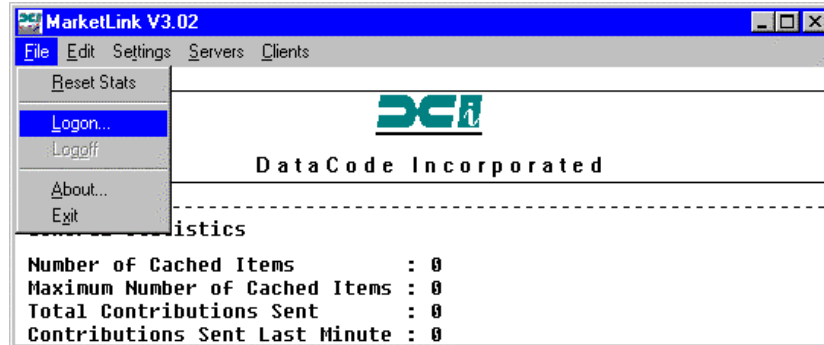
The Defaults dialog box

- 3) Click OK.

After successfully connecting, start your client application and request the data you want using the steps described in the following chapters.

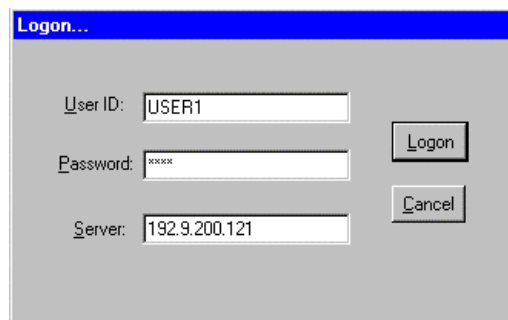
Starting Up MarketLink™ Manually

1) Choose File/Logon from the MarketLink menu.



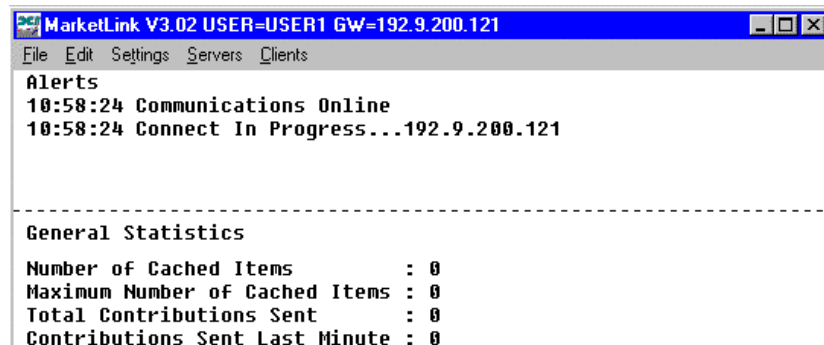
The MarketLink File Menu

2) Type your User ID, Password and, if necessary, the Server nodename or TCP/IP address into the dialog box. Then, click the Logon button.



The Logon Dialog Box

3) A successful logon will display the "Communications Online" message in the logon area for 10 seconds. Other messages to the user will displayed in the same area if the logon is not complete. Possible error messages are listed in Appendix C.



The "Online" Message

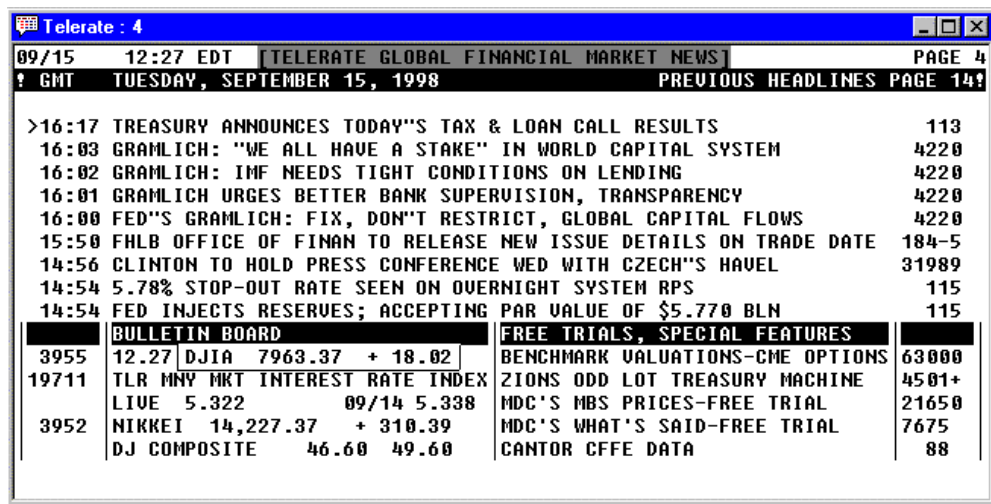
RETRIEVING REAL TIME DATA WITH UPDATES

While connected to the Netfeed™ Server, MarketLink™ waits for requests for data from your DDE compatible application. Live links, requests for data and updates, may be created automatically by “dragging” selected data from WorldWatch™ Insight and “dropping” it into the requesting application, like Excel. Or, the formula for a live link may be typed directly into the requesting application. A live link request must always include a number of parameters in a specific format, described below.

The “Drag and Drop” Method for Creating Links

The drag and drop method of creating live links requires a session of WorldWatch™ Insight (WWI) to be opened simultaneously with MarketLink™. See the WorldWatch™ Insight manual if you have a question about the operation of WWI. With WWI open, follow these steps to create a link. Microsoft’s Excel spreadsheet is used in this example.

1) Select the desired data in WWI.

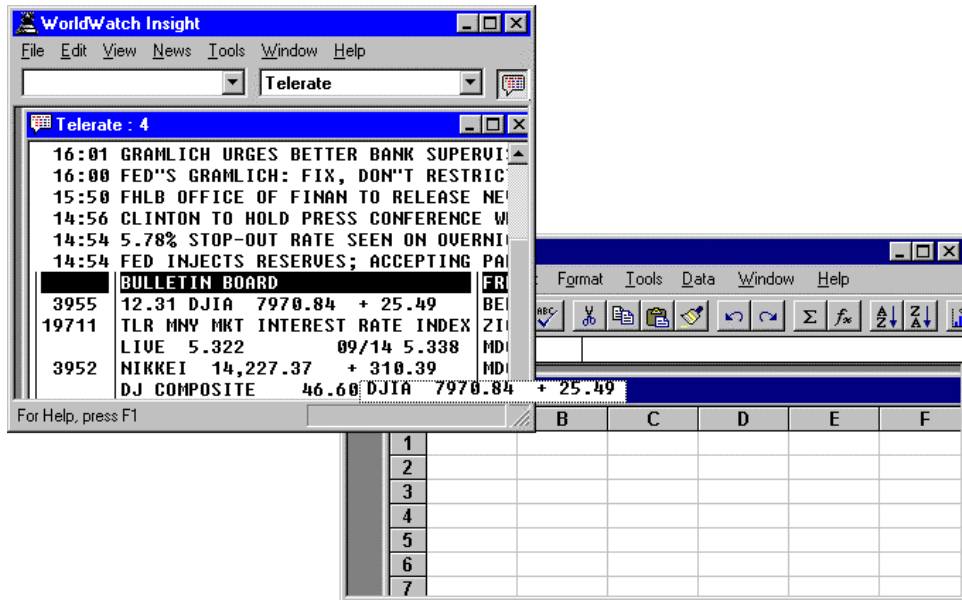


The screenshot shows a terminal window titled "Telerate : 4". The window displays financial market news and data. The top part shows a list of news items with timestamps and page numbers. Below this, there are three columns of data: "BULLETIN BOARD", "FREE TRIALS, SPECIAL FEATURES", and "BENCHMARK VALUATIONS-CME OPTIONS".

| BULLETIN BOARD | | FREE TRIALS, SPECIAL FEATURES |
|----------------|--|--|
| 3955 | 12.27 DJIA 7963.37 + 18.02 | BENCHMARK VALUATIONS-CME OPTIONS 63000 |
| 19711 | TLR MNY MKT INTEREST RATE INDEX LIVE 5.322 09/14 5.338 | ZIONS ODD LOT TREASURY MACHINE 4501+ |
| 3952 | NIKKEI 14,227.37 + 310.39 | MDC'S MBS PRICES-FREE TRIAL 21650 |
| | DJ COMPOSITE 46.60 49.60 | MDC'S WHAT'S SAID-FREE TRIAL 7675 |
| | | CANTOR CFFE DATA 88 |

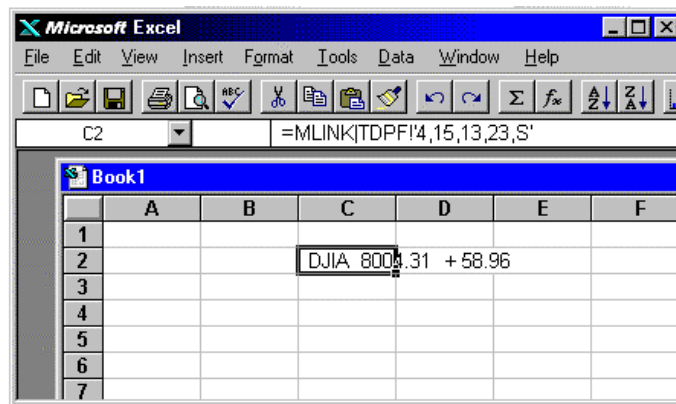
A Block of Data is Selected from a Telerate Page

2) Drag the block of data to the Excel spreadsheet and drop it in.



"Dragging" the Selected Data to Excel

3) The formula for the live link may be seen in Excel's formula bar.



The Formula that Creates the Link

Understanding The Excel Formula for Live Links

The formula in this section may be typed directly into a cell in Microsoft's Excel for Windows and may be used for other Microsoft DDE compatible applications.

To create a live link, certain information must always be specified. The general form of a request is as follows:

=server|topic!'requested data, data format'

Each part of the request formula is further described, below.

server The server is the application providing data to the requesting application. In this case, it is always MLINK.

| a vertical line. This character is located above the \ key on most keyboards.

topic the topic is the source data feed. The list of acronyms for the various feeds supported by MarketLink™ can be found in Appendix A. These must always be expressed in upper case letters.

! exclamation mark. This character is usually located above the 1 on the top row of most keyboards.

' ' pair of single quote marks or apostrophes. These marks enclose the requested data.

requested data the data request can be in a variety of formats, but must always be in upper case letters. A valid request may fully identify the desired data. There are also cases where consistent assumptions are supported. These assumptions will be illustrated later in the text.

The requested data portion requires you to understand the data available to you by each vendor and the record format in which the data is available. Record formats are of two basic kinds:

- Page Records - In this record format data characters, either numbers or letters, are fit into a display in rows and columns. Data in this format cannot be identified by the type of information it represents. For example, the number "100" in a page cannot be identified as a last price, or bid, or ask. It can only be identified by the row and column it occupies, as well as the number of characters of which it is comprised. A request for this type of data must include its row, column and number of characters.
- Logical Records - In contrast to page records, data in this format can be identified by the type of information it represents. Each logical record has fields which hold the data content. In a request to MarketLink for a data field, the field may sometimes be requested by a literal name, and always by a field identifying(FID) number. Frequently used, valid literal names accepted by MarketLink™ are listed in Appendix B. Examples are LAST, BID, ASK.

data format two data formats are possible: "string" or "numeric". Any data that must include character(s) other than numbers must be requested as a string, represented by an "S". Data which contains only numbers, or from which you wish to eliminate non-numeric characters if they follow, may be requested as numeric, represented by an "N".

About Live Links from a Page

Information desired from a page must be identified completely by its page name, row, column, length, and the indication that it is a "string", rather than numeric, if it contains characters which are not numbers.

Example:

=MLINK|TDPF!'4,R14,13,23,S'

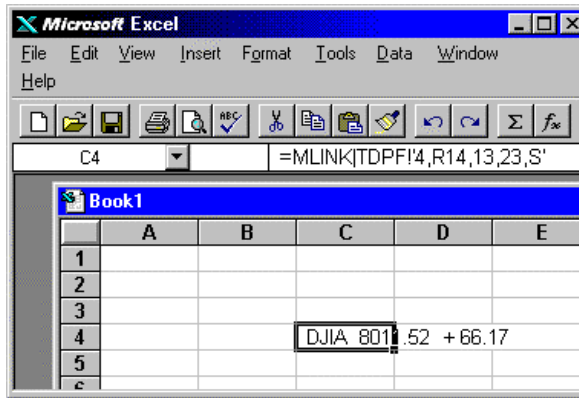
Here the request through MarketLink (MLINK) is made for Telerate data (TDPF).

The Requested Data part of this formula represents the following:

- 4** is the page number
- R14** indicates row 14 as the row location of the data.
- 13** is the number of columns (characters) from the left where the desired data begins.
- 23** is the number of characters(or columns) to display in the cell.

This is a string request because the desired data includes characters that are not numbers.

This formula provides a link to the following data:



A Live Link to a Page

About Live Links from a Logical Record or “Quote”

For ease of understanding, we can call a logical record a quote. A live link from a quote identifies, instead of the page name, or number, the quote symbol. To create a link for a specific field of data, the data field's “literal” name or FID number can be used. Literal field names are supported for most of the frequently used data items, but not all of the data items. All data fields can be requested using their FID numbers. A list of supported literal field names is found in Appendix B of this manual.

Example:

=MLINK|DTN!'CN9,LAST'

In this example the datafeed used is DTN.

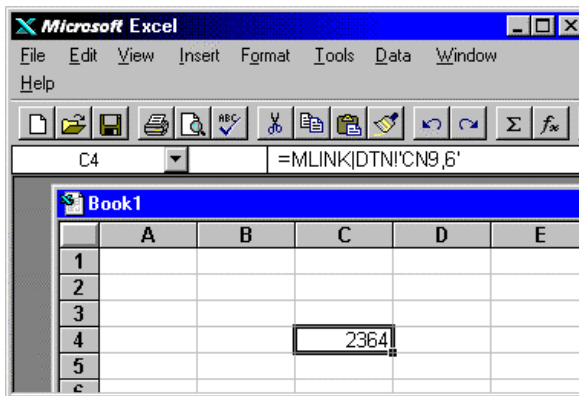
The Requested Data part of this formula represents the following:

- CN9** is the quote symbol.
- LAST** is the field name.

This request could also be formed like this:

=MLINK|DTN!'CN9,6'

Either of these formulas would support the following live data:

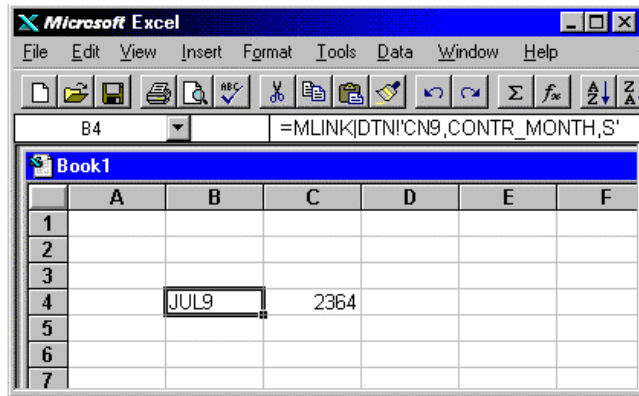


A Live Link to a Quote

For some quote fields, there may be a requirement to be more specific in the request. A request for the contract month description is one example. Because this field contains letters and numbers, it is necessary to request it as a string, as follows:

=MLINK|DTN!'CN8,CONTR_MONTH,S'

This would provide the following live link:



A Live Link to a Quote Requesting a "String"

TECHNICAL ASPECTS OF MARKETLINK™ - USING THE STATISTICS, CACHE, AND ALERTS VIEWS

The action behind the scenes in MarketLink™ can be viewed on the application's interface and in dialog boxes accessed through its menu. Through a discussion of these displays, MarketLink's operation can be explained. The sections below provide these discussions.

The General Statistics Display

The lower half of the MarketLink interface is dedicated to the application's statistical display. In this section, the four items in this display are first defined, and then explained.

Number of cached items

def. - This indicates the number of records MarketLink currently has cached, regardless of the number of fields requested from each record.

If you were to see a list of these items, it would be the same list of symbols, or page names or numbers, as are being used by your requesting application. Each item is counted only once in this statistic, regardless of the number of times it is used by your application. The "cache" that is mentioned is simply MarketLink's local database, on your PC, that contains these items.

Maximum number of cached items

def. - This indicates the highest level of items that were requested and received by MarketLink during the current session.

This number will be the same as "Number of cached items" unless, for example, you closed one spreadsheet and opened another with different items in it. This number may be an important indicator to you, also, that the records you've been watching are still live and receiving updates. If a record is dropped, this number would be higher than "Number of cached items". This statistic may be reset to zero during the session by choosing *File/Reset Stats*.

Both "Number of cached items" and "Maximum number of cached items" refer to data *coming into* MarketLink. The next two statistics refer to data *being sent* by MarketLink.

Total contributions sent

def. - This is the cumulative number of updates that have been sent to the Netfeed Server Client database during the current MarketLink session.

Contributions sent last minute

def. - This is the number of updates sent through MarketLink to the Netfeed Server Client database during the previous minute.

Applications which are contributing data through MarketLink to the Netfeed Client database may be expected to send a number of updates in a determined period. The cumulative number of updates as well as the number of updates per minute can help you to determine the throughput you are creating on the Client feed. Additionally, these statistics may become important if you are contributing to a vendor having restrictions on the number of updates accepted from contributors.

Resetting Statistics

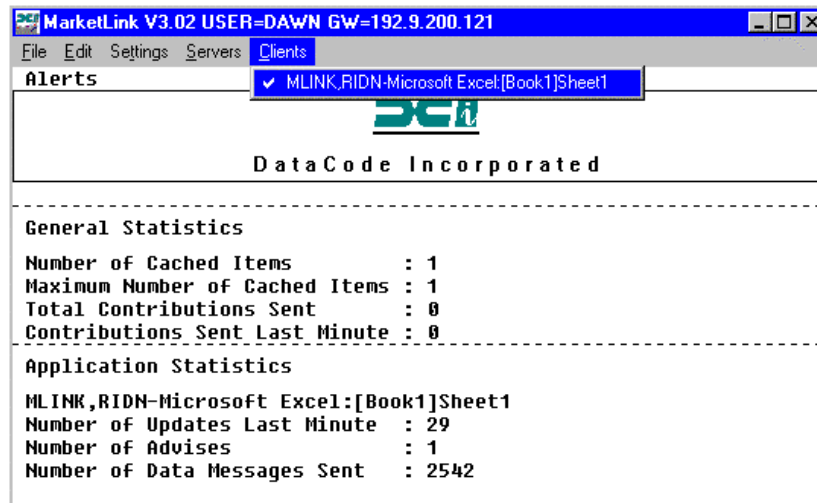
During a MarketLink session, it may be necessary to reset the cumulative statistics displays to zero. This may be done by selecting the File menu's Reset Stats command.

The Application Statistics Display

As previously mentioned, MarketLink performs both “server” and “client” functions for other DDE-compatible applications. It is the “go-between” for the Netfeed Server; sourcing requested information for the client application and forwarding contributed data from the server application to the Netfeed Server CLIENT database. A single application, like Microsoft Excel, may be both client and server application. When viewing application statistics, however, these functions generate separate statistics.

To display server or client application statistics:

- 1) Click on the menu item Servers or Clients.
- 2) Click on the application listed there for which you want to display statistics.
- 3) Expand the MarketLink interface to show the Applications Statistics display.



The Application Statistics Display

Statistics regarding updates may be useful should a question arise regarding the platform’s ability to handle a level of throughput. Or, if the level of updates generated by a server application exceeds that expected or specified by a vendor to whom they are forwarded, the effectiveness of an adjustment may be noted here.

Advises are either the requests the client application has made to MarketLink or that MarketLink has made to an application acting as a server. The number of advises made may indicate whether DDE communications are normal or not.

The MarketLink Cache

Cache Description

The MarketLink cache is a dynamic database of the quotes or pages for which have real time links in your DDE-compatible application. You will not see items for which a snap shot request has been made.

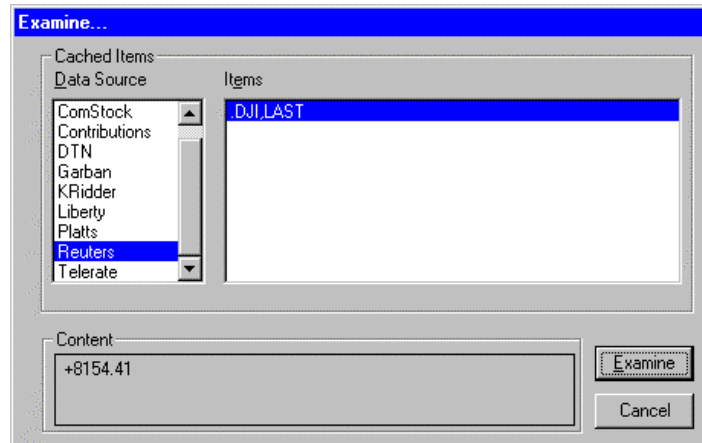
For each item in the cache, MarketLink maintains the full record, up to date, with all its fields. Only the fields that are requested by your application can be viewed in MarketLink’s interface, however.

Viewing the Cache and Updates

The Edit menu provides you with the functionality to view MarketLink’s cache. Optionally, you can set up the user messaging feature that will alert you to updates on selected fields. These

functions can be used to ensure that the value in MarketLink's cache matches that in your requesting application and that updates are passing through.

Select Edit/Examine to see a snapshot display of MarketLink's cache content for any chosen data item.



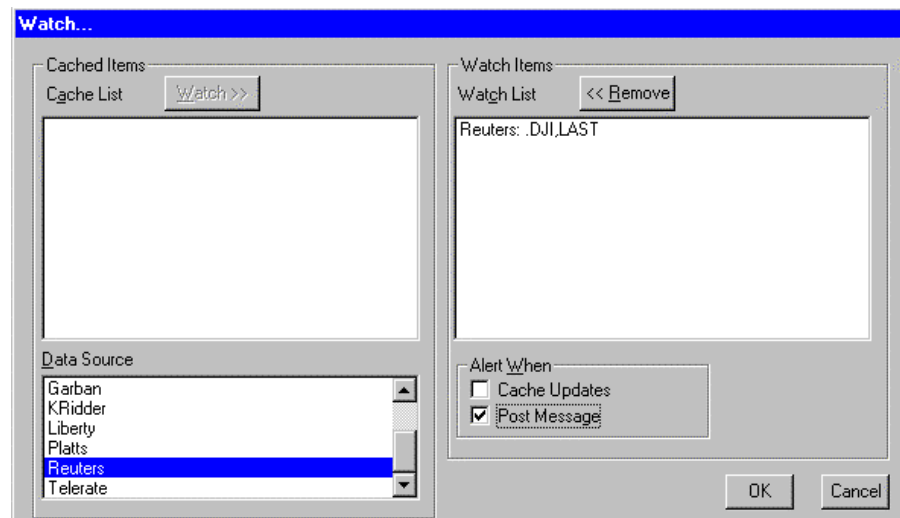
The Edit/Examine Dialog Box

To see the cached item's data:

- 1) Select Edit/Examine.
- 2) In the dialog box that appears, select the Data Source.
- 3) Select the Item from the lists. An *Item* is a one field from a record.
- 4) Click the Examine button.
- 5) The value for the item selected will appear in the Content box.

In order to ensure that update traffic is occurring for one or more items, you may wish to be alerted when an update is received by MarketLink and cached and/or when an update is posted, that is, sent, to your requesting application. This function is enabled by the menu item Edit/Watch.

Select Edit/Watch to be informed when an update message occurs. When an item is selected in this function, messages are posted in the Alerts area of the MarketLink interface.



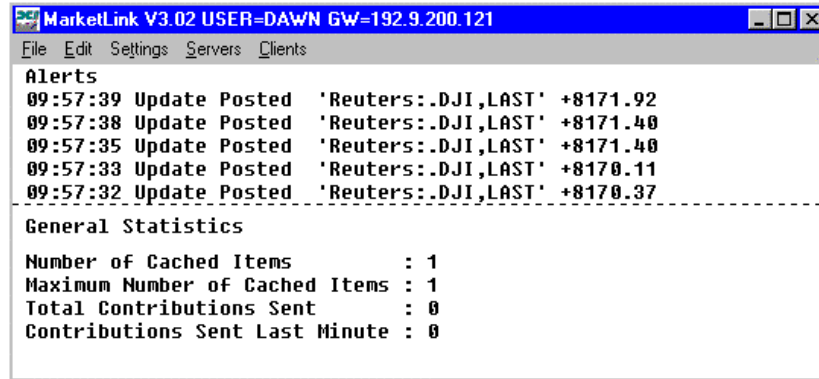
The Edit /Watch Dialog Box

To view update messages:

- 1) Select Edit/Watch
- 2) Select the Data Source. Cached items for the source will then be listed.

- 3) Select the item you want from the Cache List.
- 4) Click the Watch button. That will move the item into the Watch List.
- 5) While the item is highlighted, select the event for which you wish to be alerted: when the cache updates and/or when the update is posted, that is, sent to your requesting application.
- 6) Click OK.

“Cache Updated” and/or “Update Posted” messages will be displayed for each update message handled. Each message is time stamped with the hour, minute, and second.

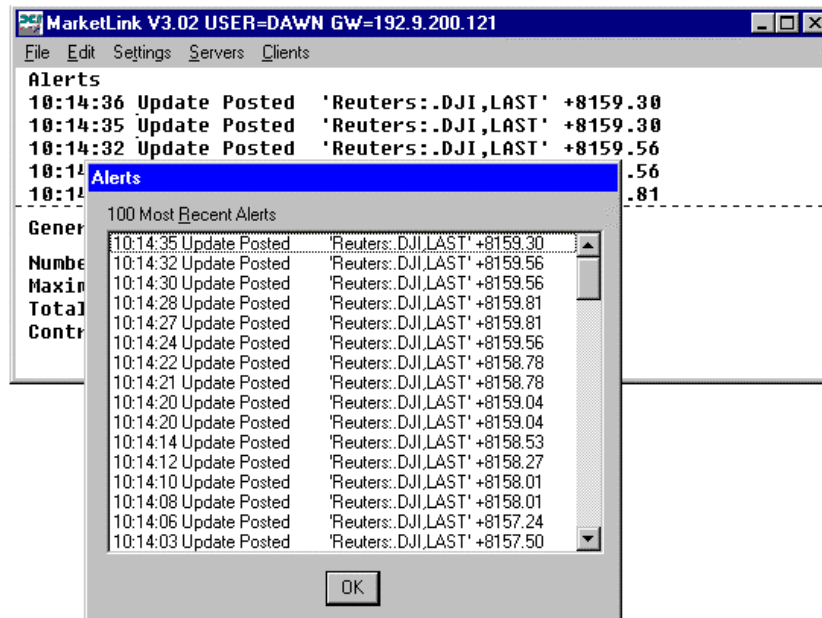


Alerts Regarding Updates Sent to the Requesting Application

The five most current messages will be displayed in top area of MarketLink.

Viewing Previous Alerts

Previous messages may be viewed by selecting Edit/Alerts... from the menu.



Previous Alerts May be Viewed

Up to 100 messages can be viewed in the Alerts scrolling window. Please note: this display is static. It will not update while open. Above, the Alerts window is filled with previous Update Posted messages. The Alerts window will also display previous error, or other connectivity, operational and cache, related messages.

CONTRIBUTING DATA WITH UPDATES TO THE NETFEED SERVER

Overview

The Netfeed System provides you with the ability to create and distribute data with real time updates through the CLIENT database. Data may be created in a proprietary application, Excel spreadsheet, or may reside in a proprietary database. An easy way to create a link with your live data and the CLIENT database is through MarketLink. MarketLink has the capability to forward CLIENT record initialization messages and updates to the Netfeed Server very efficiently using Excel spreadsheets and macros.

This section describes the Excel macro commands used to create records and contribute data to the CLIENT database through MarketLink.

A Word About the CLIENT Database

The CLIENT database resides in the Netfeed Server. It can consist of quote, or “logical”, records and page records. Quote records may consist of any number of defined fields. Page records may be 15 rows x 64 columns or 24 rows x 80 columns.

Quote records and the fields they contain, as well as page size and name are defined at the time the record is created. Additional fields may be added to a quote record at any time. The mechanism for record creation is newly available in MarketLink 3.02 and is the first command described below, following the general instructions for creating contribution macros. Thirdly, the macro formats that can be used to create Excel-to-CLIENT links for data updates are described.

Excel Contribution Macros: General Procedures and Commands

All Excel macros for Netfeed contributions follow the same basic format. What can differ are the MarketLink-specific commands used in the macro. These commands are used for particular purposes, such as record-creation in CLIENT, formatting data contributions and “packaging” of contribution messages.

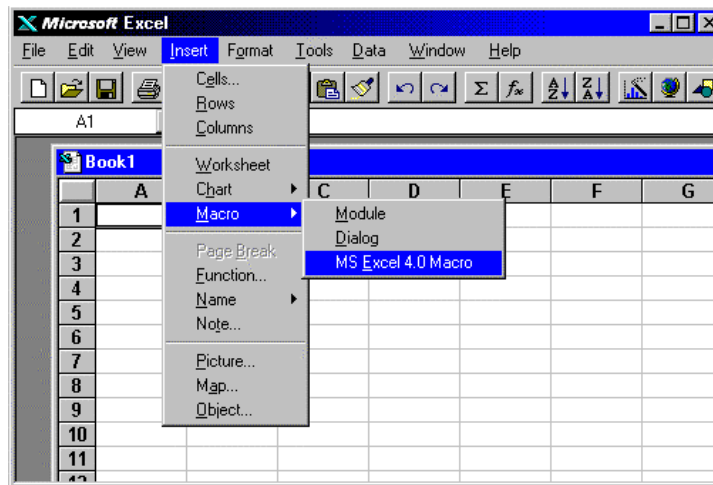
The first and last of the following three sections outline procedures for getting started and completing the contribution macro by defining it through Excel. The middle section shows and describes general Excel macro commands that are used with the specialized MarketLink contribution macro commands for Excel.

Getting Started With the Macro Sheet

The following procedure uses Excel 7.0a.

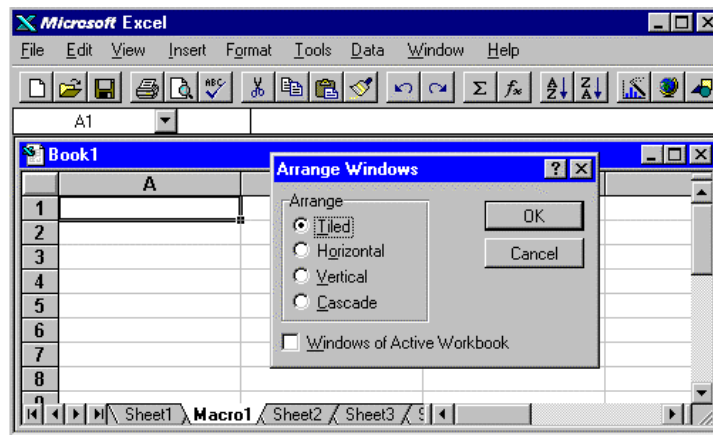
After opening Excel:

- 1) Select Insert/Macro/MS Excel Macro 4.0 from the Excel menu.



Insert an Excel 4.0 Macro Sheet into the Workbook

- 2) Select Window/Arrange... and select Tiled so that you can see the worksheet tabs at the bottom of the Excel's window. Ensure that Macro sheet follows any active spreadsheets.



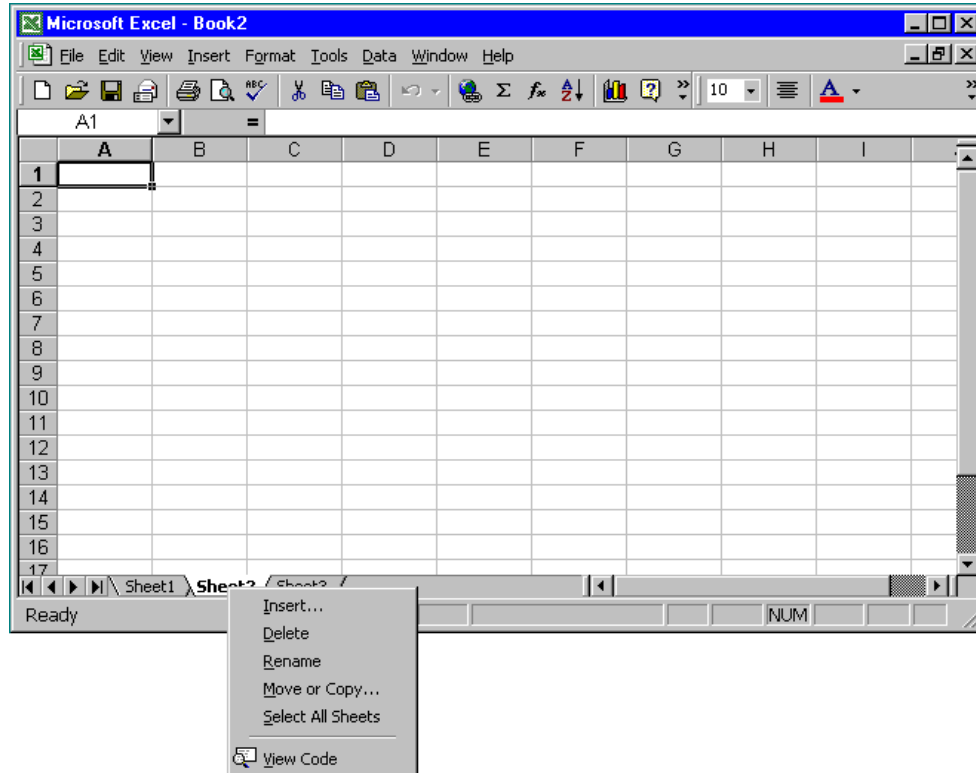
A Tiled Window Allows You to See and Use Worksheet Tabs

The following procedure uses Excel 2000.

After opening Excel:

- 1) Right click on the Sheet2 tab at the bottom of the spreadsheet.

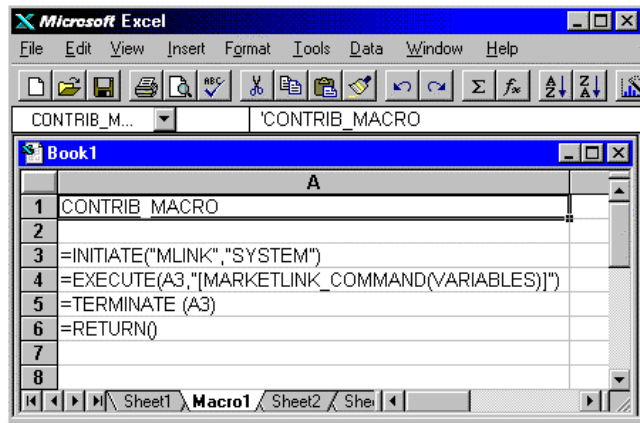
2) Select the Insert command from the floating menu.



3) Select MS Excel 4.0 Macro from the choices that appear in the dialog box.

General Excel Macro Commands

The Excel commands for starting and completing a macro are the same for each form of the contribution macro. The commands are written as follows:



General Excel Commands with MarketLink Commands

An explanation of the form is as follows:

- 1) The content of cell A1 is the macro name.
- 2) The content of cell A3 opens the channel to MarketLink for DDE communications.
- 3) The EXECUTE statement in cell A4 is followed, in parenthesis, by the special MarketLink commands. The EXECUTE statement may be repeated one or more times in a macro.

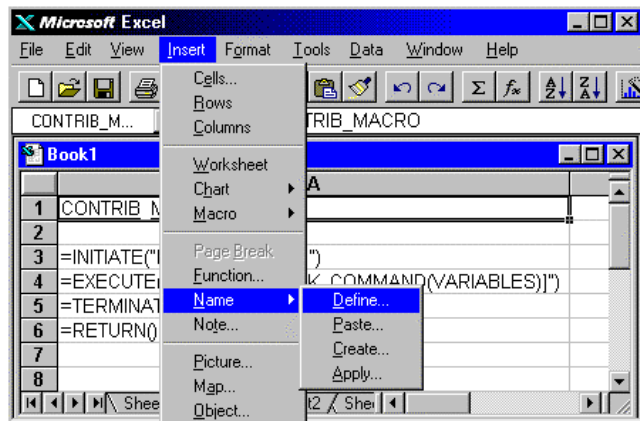
The parameters in the square brackets refer to the channel established in cell A3. A specific MarketLink command is used, shown here as MARKETLINK_COMMAND, along with the variable(s) associated with it, shown here as VARIABLES.

- 4) The statement in cell A5, TERMINATE, signals the completion of requests to be made to establish communication links. It does not necessarily close communication with MarketLink.
- 5) The RETURN() statement is always the final statement at the end of a contribution macro.

Defining and Saving the Contribution Macro

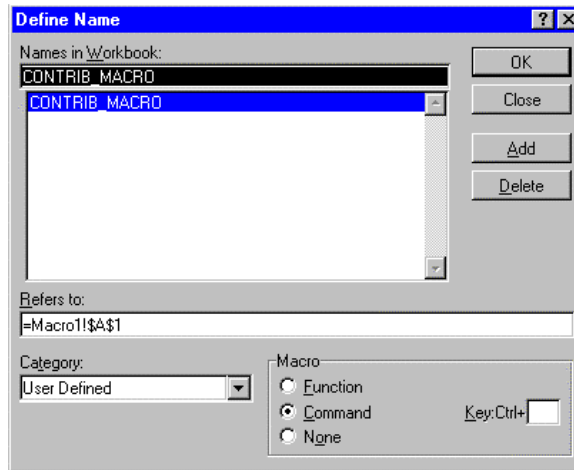
A macro must be known, or 'defined' to Excel In order for it to be called into operation. Use the following steps to define a macro in Excel:

- 1) Place the cursor in cell containing the macro name, usually cell A1.
- 2) Select Insert/Name/Define...



Select Insert/Name/Define...

3) In the dialog box that appears, select the macro name and click the Command button to define this macro as a Command macro. Complete the process by clicking Add, then Close.

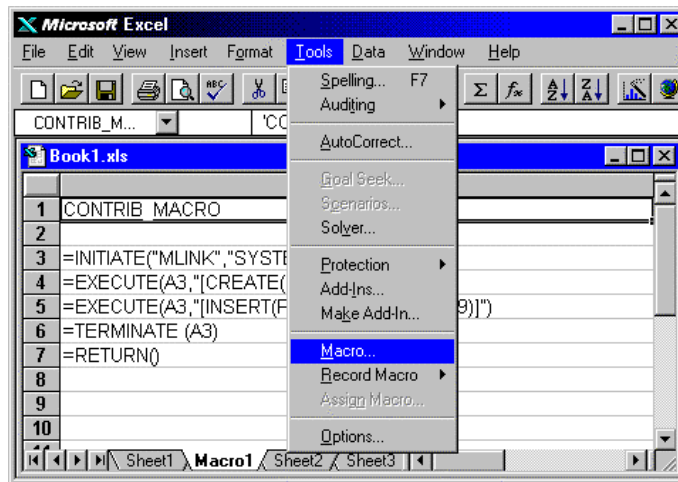


Define the Macro as a Command Macro

4) The macro is now defined and can be called into use.
Note: Be sure to save your workbook often as you add to it.

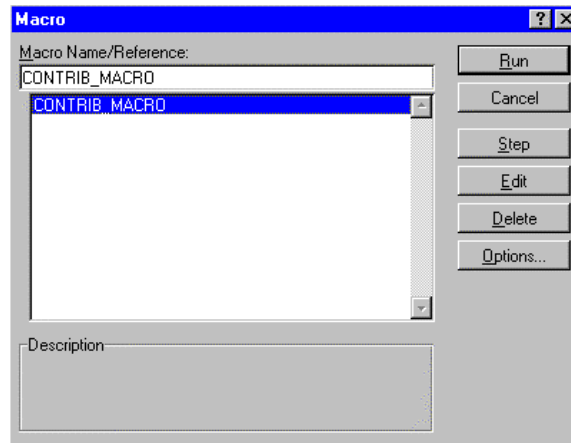
Using the Excel Macro

When the macro name is defined, the Excel macro can be called into use. This is done through the Tools/Macro... menu selection in Excel.



The Tools Menu with Macro... Selected

Then, select the macro name in the dialog box and click Run.



Select the Macro and Click Run

Excel Contribution Macros: MarketLink Commands

The following commands are used along with Excel macro commands for the general purpose of creating contributing links through MarketLink to the Netfeed Server. Each of the commands are designed for a specific use, in order to meet the various system and data requirements of the customer.

Each command is

presented below in context, preceded by the =EXECUTE command. In the explanatory section that follows each MarketLink command, it will be assumed that =EXECUTE is understood.

In addition, the first parameter in parenthesis following =EXECUTE will refer to the cell containing channel establishing =INITIATE("MLINK", "SYSTEM") command is found. It will be assumed as cell A3 and will not be further explained below.

The CREATE Command

The CREATE command creates a record in the Netfeed CLIENT database.

Caution: While CREATE may be used “in-line” with other macro commands, it is strongly suggested that it be used in a separate macro. Because this command initializes and defines CLIENT records, each time a macro containing the CREATE command is run, the record is reinitialized and all data previously contributed to it will be deleted. Therefore, care should be taken when using this command.

When used within a data contribution macro, CREATE is best used immediately following the INITIATE command, as only updates following it are applied to the record. Any data contributed to the record before CREATE will be lost.

The CREATE command may be used following the BEGINUPDATE command. If it is so used, the *target* parameter of the BEGINUPDATE command would define the record name and the *rename* parameter of the CREATE command may be omitted. If the name is present in a CREATE command following BEGINUPDATE, it will be ignored. The CREATE command must still be used to initialize the record and define the *format* of the record. The APPENDFDATA command should be used after the CREATE command as any data sent to the record before it is initialized will be lost, as stated above.

CREATE should be used only once in the macro.

This command has the following form:

```
=EXECUTE(A3,"[CREATE(rename,format)]")
```

Where:

CREATE is the MarketLink command to create a CLIENT record

rename is a parameter which defines the name of the CLIENT record. The maximum allowable characters for the record name is twenty (20). This is the “symbol” used in WorldWatch to retrieve the record.

format this parameter defines the Client record as a page or quote through use of one of the three valid values:

15X64
24X80
LOGICAL

Values 15X64 and 24X80 creates a page and its dimensions.
Value LOGICAL creates a quote record.

Example: =EXECUTE(A3,"[CREATE(TESTPAGE,15X64)]")

The DELETE Command

The DELETE command is used to delete a record from the Netfeed CLIENT database.

This command is used in the macro in the following form:

```
=EXECUTE(A3,"[DELETE(rename)]")
```

Where:

DELETE is the MarketLink command to delete a CLIENT record.

recname is a parameter which defines the name of the record the user wishes to delete.

Example: =EXECUTE(A3,"[DELETE(TESTPAGE)]")

The INSERT Command

This command encapsulates the update data with the macro, and so does not refer to a spreadsheet for the data. This command is the simplest and easiest to use of contribution macro forms but should be used when the update data changes little, to avoid many changes in the macro.

This command has the following form:

=EXECUTE(A3,"[INSERT(*target,field,offset,length,format,data*)]")

where:

INSERT is the MarketLink command to send data to a CLIENT record

target is the name of the CLIENT record to be updated.

field is the part of the record to be updated. For a quote record, this is expressed as either the literal name or FID number. For a page record, the row number may be used.

offset used primarily for page record rows, this value represents the number of characters from the start of the row to where the update starts. To begin at the first position in the row the offset value is 0 (zero).

length this value represents the length of the update that should be contributed. If the actual contributed data is less than the stated length, the format parameter should be used.

format a group of characters representing data justification formatting rule for the update if the supplied data is fewer characters than the stated length.

This variable takes the format of : %PadJustification

where:

% represents the format command.

Pad is the character, or empty space, used to fill the length of the field which does not contain contributed data.

Justification valid values "R" , "L" and "C" represent a right, left or center justification rule for the data.

Example: % R represents right justification with a space to fill in any unoccupied area of the contributed length.

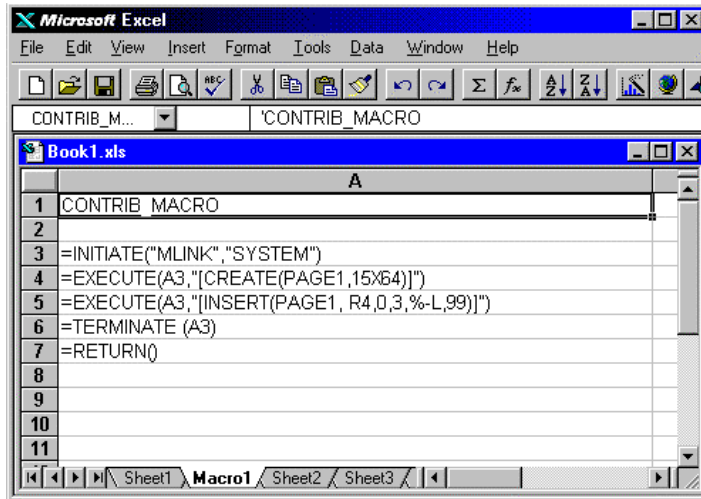
Format is most important when, for example, a value has changed from a length of three to a length of two and the current contents of the third position on the target page must be cleared. Example: a value of 100 changes to 99.

data this is the data to be contributed.

CAUTION - The INSERT command cannot be used in the macro between the BEGIN/ENDUPDATE commands.

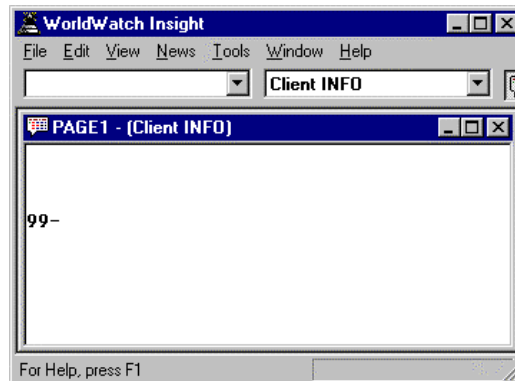
Example: =EXECUTE(A3,"[INSERT(PAGE1,R4,0,3,%-R,99)]")

The following shows an example of this command in the context of a contribution macro, also using the CREATE command.



The CREATE and INSERT Command in Context

Execution of this macro creates the following display in WorldWatch:



Example PAGE1 is Created and Update is Posted

The BEGIN / ENDUPDATE command

The BEGIN/ENDUPDATE insert command should be used when multiple updates will be sent to a single target CLIENT record. Its purpose is to reduce network traffic by accumulating updates to build a single message to be sent to the Netfeed Server.

The mechanism utilizes three commands: BEGINUPDATE, APPENDFDATA, and ENDUPDATE.

These commands have the form of:

=EXECUTE(A3,"[BEGINUPDATE(*target*)]")

=EXECUTE(A3,"[APPENDFDATA(*field,offset,length,format,data*)]")

=EXECUTE(A3,"[ENDUPDATE]")

Where:

BEGINUPDATE starts the process of building a single message for the target page.

target is the client page or record to receive the updates.

APPENDFDATA supplies updates to the target page or record. Several APPENDFDATA statements may follow a single BEGINUPDATE statement.

field is the part of the record to be updated. For a quote record, this is expressed as either the literal field name or FID number. For a page record, the row number may be used.

offset used primarily for page record rows, this value represents the number of characters from the start of the row to where the update starts. To begin at the first position in the row the offset value is 0 (zero).

length this value represents the length of the update that should be contributed. If the actual contributed data is less than the stated length, the format parameter should be used.

format a group of characters representing data justification formatting rule for the update if the supplied data is fewer characters than the stated length.

This variable takes the format of : %PadJustification

where:

% represents the format command.

Pad is the character, or empty space, used to fill the length of the field which does not contain contributed data.

Justification valid values "R" , "L" and "C" represent a right, left or center justification rule for the data.

Example: % R represents right justification with a space to fill in any unoccupied area of the contributed length.

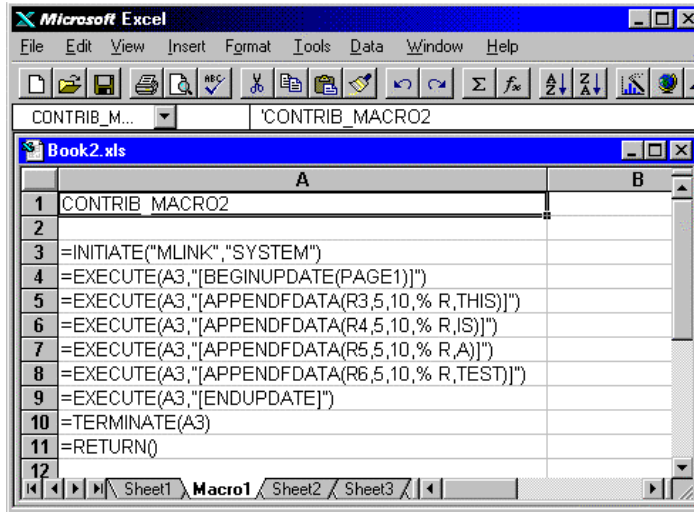
Format is most important when, for example, a value has changed from a length of three to a length of two and the current contents of the third position on the target page must be cleared. Example: a value of 100 changes to 99.

data this is the data to be contributed

ENDUPDATE completes building of message and sends it to the CLIENT database.

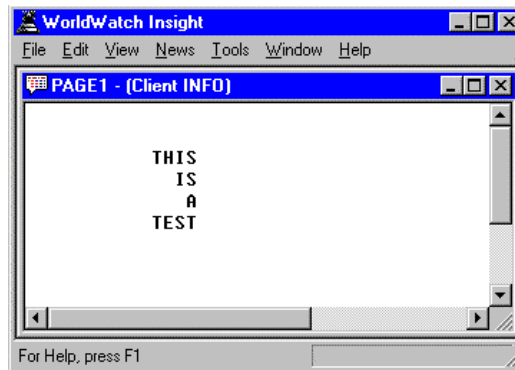
CAUTION: The INSERT command cannot be used in the macro between the BEGIN/ENDUPDATE commands.

The following is an example of this type of macro:



An Example Macro using BEGIN/ENDUPDATE

The example macro creates the following display in WorldWatch:



The Result of the CONTRIB_MACRO2

The LINKUPDATE command

This command creates a “hot link” between the contributing application as the server, and the CLIENT database. By creating the “hot link”, this command eliminates the requirement for the macro to be run repeatedly to contribute updates. LINKUPDATE causes MarketLink to database contributed data before forwarding it to CLIENT and so provides the optional feature of forwarding only changed data. Because this command causes additional processing of the data, it should be used with care, mostly where it is necessary to restrict updates to changed data.

An additional, feature has been added to MarketLink version 6.01 and greater. It is an optional feature of the LINKUPDATE command. An additional parameter provides the ability to send a time stamp, which may include time and/or date, with the data to a logical record. The time stamp data is originated from the PC MarketLink is running on.

This command has the form of:

=EXECUTE(A3, "[LINKUPDATE(*target,field,offset,length,format,condition,timeand/ordate,application,topic,item*)]")

where:

LINKUPDATE identifies to MarketLink that a link is to be made from between the following *target* and *application*.

target defines the CLIENT record with which the link is to be made.

field defines the target quote field or page row.

offset defines the offset from the start of the page row.

length defines the length of the update to a page.

format a group of characters representing data justification formatting rule for the update if the supplied data is fewer characters than the stated length.

This variable takes the format of : %PadJustification

where:

% represents the format command.

Pad is the character, or empty space, used to fill the length of the field which does not contain contributed data.

Justification valid values "R" , "L" and "C" represent a right, left or center justification rule for the data.

Example: % R represents right justification with a space to fill in any unoccupied area of the contributed length.

condition a parameter representing the condition under which contributions should be made to CLIENT.

Options are:

A all data.

C changed data only.

timeand/ordate this is an optional parameter.

This parameter causes MarketLink to source the time and date from the PC on which it is running and forward that data along with the data content from *item* to the Client Logical record. Depending upon the parameter used, this data may be sent to the Trade Time and Trade Date or Active time and Active date fields.

Valid parameters are:

| | |
|---|------------------------|
| T | to send to Trade Time |
| D | to send to Trade Date |
| t | to send to Active Time |
| d | to send to Active Date |

If both time and date are desired, the parameters are inserted together IE . TD or td .

Note: Use of Trade Time and Trade Date are suggested for use with FID 6, Last. Active Time and Active Date are suggested for use with any other field.

application the application from which the hot link is to be made.

topic the DDE parameter further defining the source of the contributed data.

item an additional parameter further defining the source from which to establish the link. If the item is a cell reference, the cell reference

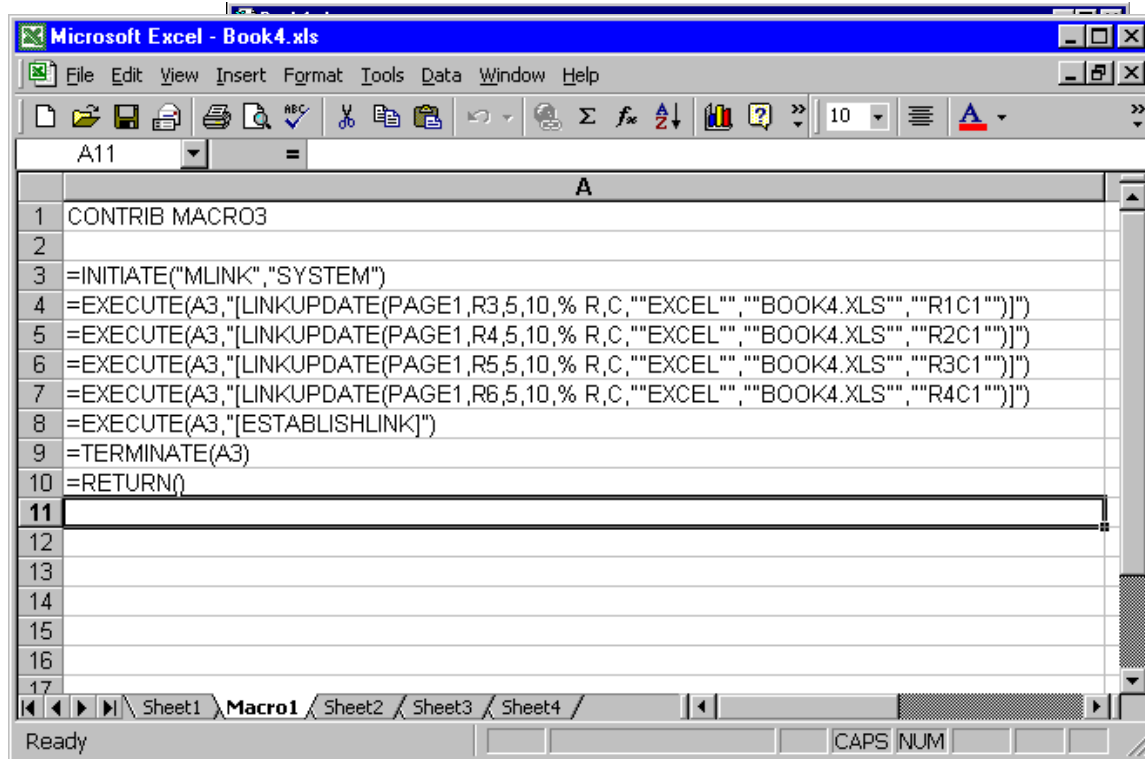
must be defined in R1C1 style, and must not be defined as a cell name IE. A1.

=EXECUTE(A3,"[ESTABLISHLINK]") follows and completes the LINKUPDATE command.

There may be a number of lines containing the LINKUPDATE command, each establishing the link between a spreadsheet cell and a field or page coordinate in a CLIENT record. ESTABLISHLINK is used only once, following what may be a series of LINKUPDATE commands.

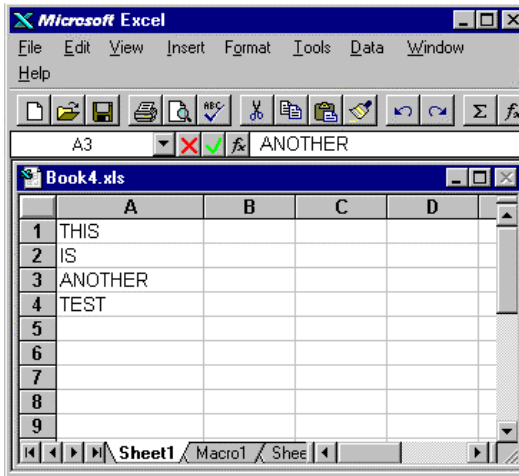
Using this macro form, as long as MarketLink's connection with the Netfeed Server remains unbroken, and the macro sheet is open, any data typed into the linked cells may be forwarded to CLIENT, without rerunning the macro.

The following is an example macro using the LINKUPDATE command.



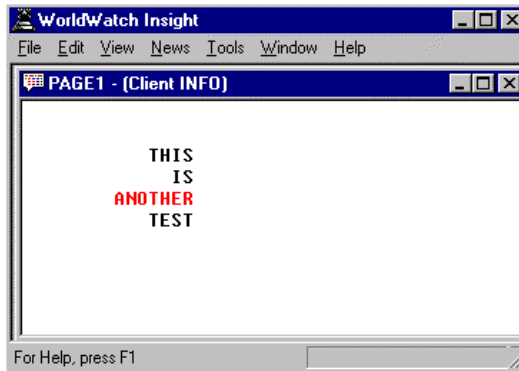
An Example Macro Using LINKUPDATE/ESTABLISHLINK

You will notice that the example macro, above, references a spreadsheet cell, which is on Sheet1 of BOOK4.XLS.



Sheet1 of BOOK4.XLS Contains the Linked Cells

In contrast to other contribution macro forms, when using LINKUPDATE and ESTABLISHLINK, MarketLink can optionally forward only changes to the data as updates. Using the other macro forms, MarketLink forwards all updates whether or not the data has changed. Because this option is selected in the example macro here, only changed data will be forwarded. PAGE1, below, is updated only with the changed data.



PAGE1 is Updated Only with Changed Data

APPENDIX A - SUPPORTED DATA SERVICES

Acronyms for data services supported by MarketLink.

| | |
|--------|---------------------------------|
| CLIENT | Netfeed CLIENT database |
| BRIDGE | Bridge data feed |
| DTN | Data Transmission Network |
| EBMI | Eurobroker broker feed |
| GARB | Garban broker feed |
| GFI | GFI broker feed |
| HFC | Hilliard Farber broker feed |
| MFDC | Marketfeed.com |
| KRDDF | Knight Ridder Digital Data Feed |
| LBI | Liberty Brokerage |
| PLA | Platt's Global Alert |
| PMI | PMI Scandinavian Forex |
| PREBON | Prebon Yamane broker feed |
| RIDN | Reuters |
| RMJ | RMJ brokerage |
| SPC | S & P Comstock |
| TDPF | Telerate Digital Page Feed |
| TRAD | Tradition broker feed |
| TTF | Tullett & Tokyo brokerage |

APPENDIX B - SUPPORTED FIELDS

MarketLink recognizes the following list of literal field names. These fields may or may not be available from a particular data service or record on a data service.

| | |
|-------------|--|
| ACTIVE_DATE | The date of the last activity related to the instrument. |
| ACVOL | Today's total trading volume. |
| AM_CLOSE | The closing price of the morning's trading on GAFTA. |
| ASK | Latest or best ask price. |
| ASK YIELD | The ask yield on a debt instrument. |
| ASKEXID | Best ask exchange identifier. US Composite stock only. |
| ASKSIZE | The quantity offered at the latest ask price or the number of selling contracts. |
| ASSETS | Assets for US over the counter money market funds. |
| AV_MATRTY | Average maturity of US over the counter money market funds. |
| BASISVALUE | For debt instruments, the dollar value of a single basis point. |
| BCKGRNDPAG | The name of a page containing background information about the item. |
| BID | Latest or best bid price or the offer price. |
| BID YIELD | The bid yield on a debt instrument. |
| BIDEXID | Best bid exchange identifier. US Composite stock only. |
| BID_NET_CH | The difference between the latest bid and the previous closing bid. |
| BIDSIZE | The quantity bid at the latest bid price or the number of buying contracts. |
| BID_TICK | The direction of bidding from the previous bid. |
| BLKCOUNT | Number of block trades today. |
| BLKVOLUM | Today's total block trading volume. Updated whenever a trade of over 10,000 shares occurs. |
| BOND_TYPE | The type of bond. |
| CALL_DATE | When a bond is redeemed prior to its expiry date, the call date is the date of redemption. |
| CAP_GAIN1 | Capital gains. |
| CASH_AVGE | Average price, input once a month. |
| CEDEL_NO | CEDEL number. |
| CLOSE | For commodities, today's first or only closing price. |
| CLOSE2 | For commodities, today's first or only closing price. |

| | |
|-------------|--|
| CLOSE_ASK | Last ask price of the day. For US Composites, the last best ask price. |
| CLOSE_BID | Last bid price of the day. For US Composites, the last best bid price. |
| CLSRNGTP | Today's closing price(s) type. |
| CONTE_CLS | Contante close. Cash price on Italian bond market. |
| CONTR_MONTH | The month in which a contract becomes deliverable if not liquidated or traded out before the date specified. |
| COUPN_DATE | The date on which the next bond interest payment is made. |
| COUPN_RATE | The interest rate assigned to a bond when it is issued. |
| CTS_QUAL | CTS stock price qualifier. |
| CUM_EX_MKR | Cum/ex security marker. |
| CURRENCY | The currency in which the instrument is trading. |
| DIVIDEND | The latest reported dividend to be paid per share to shareholders. |
| DIVIDENDTP | Latest reported dividend type. |
| DIVPAYDATE | Date on which dividend will be paid. |
| DSPLAY_NAME | Expanded displayable name. |
| DURATION | The duration of a debt instrument. |
| EARNINGS | Latest reported earnings per share. |
| EFF7DYLD | Effective 7 day yield of money market funds. |
| EPYHSTCLOS | The historic close for the issue at the final trading day in the previous calendar year. |
| EUROCLR_NO | Euroclear number. |
| EXDIVDATE | The date on which the issue will trade ex-dividend. |
| EXPIR_DATE | The date on which the future or option expires. |
| FPRC_1_MTH | 1 month forward price of Swiss equities. |
| FPRC_2_MTH | 2 month forward price of Swiss equities. |
| FPRC_3_MTH | 3 month forward price of Swiss equities. |
| FPRC_6_MTH | 6 month forward price of Swiss equities. |
| FPRC_9_MTH | 9 month forward price of Swiss equities. |
| HIGH | Today's highest transaction value. |
| HIGH_BID | Today's highest bid price. |
| HST_CLOSE | Most recent non-zero closing or settlement price. |

| | |
|------------|---|
| HSTCLBDDAT | The historic closing bid date. |
| HST_CLSBID | The historic closing bid, i.e. the last non-zero closing bid. |
| HSTCLSDATE | Date of the most recent non-zero closing price. |
| ISSUE_PRC | The price at which the issue was initially allocated. |
| ISSUES_ADV | Number of issues which have advanced today. |
| ISSUES_DEC | Number of issues which have declined today. |
| ISSUES_UNC | Number of issues unchanged today. |
| KASS_PRC | The Kassakurse price; the cash price established daily. |
| KERB_PRC1 | Kerb price for Italian equities and the London Commodities Exchange. The unofficial trading price when the market has closed. |
| LAST | Price of last trade; current value. |
| LAST1 | First previous trade. A snapshot value; no updates are sent to this field. |
| LAST2 | Second previous trade. A snapshot value; no updates are sent to this field. |
| LAST3 | Third previous trade. A snapshot value; no updates are sent to this field. |
| LAST4 | Fourth previous trade. A snapshot value; no updates are sent to this field. |
| LF_HGH_DAT | Date on which the life high was established. |
| LF_LOW_DAT | Date on which the life low was established. |
| LIFE_HIGH | The highest value ever achieved by this issue. |
| LIFE_LOW | The lowest value ever achieved by this issue. |
| LIMIT_IND | Indicates if a commodity or commodity option has reached its upper or lower trading limit. |
| LOCHIGH | Highest transaction during the life of the contract. |
| LOCLOW | Lowest transaction during the life of the contract. |
| LOLIMIT | Lower limit for today's trading. |
| LOT_SIZE | The smallest quantity of a future which may be traded. For options, the contract size. |
| LOW | Today's lowest transaction value. |
| LOW_BID | Today's lowest bid price. |
| MATUR_DATE | The date on which a bond matures. |
| MKT_ST_IND | Indicates the current futures market status, including whether a fast market condition exists. |

| | |
|------------|--|
| MOVES_ADV | Accumulated moves of issues that have advanced today. |
| MOVES_DEC | Accumulated moves of issues that have declined today. |
| MOVES_UNC | Accumulated moves of issues that are unchanged today. |
| NASDSTATUS | For NASD issues, this indicates the market status. |
| NAV_DATE | Date of net asset value. |
| NAVALUE | Net asset value for US over the counter mutual funds. |
| NAV_NETCHN | Difference between last and previous closing net asset value. |
| NAVALUE_1 | Previous day net asset value of a mutual fund. |
| NAVDATE_1 | Date of previous day's net asset value. |
| NAVOLCODE | NASD volume code. For NASD bid/ask issues, this indicates which day's official volume is contained in today's accumulated volume field. |
| NETCHNG | Difference between latest trading price and previous close or settlement price. |
| NEW_LOWS | Number of issues making a new yearly low today. |
| NEW_HIGHS | Number of issues which have made a new yearly high today. |
| NO_BUYERS | Number of buyers. |
| NO_SELLERS | Number of sellers. |
| NUM_BIDS | The number of bids made for a NASDAQ bid ask quoted equity. |
| NUM_MOVES | Number of trades today. |
| OFFCL_CODE | Unique numeric code assigned to the instrument. |
| OFF_BND_NO | Official bond number for Italian bonds. |
| OFFER | Mutual fund offer price. |
| OPEN | For commodities, the first or only opening price in an open range. |
| OPEN2 | For commodities, the second opening price in an open range. |
| OPEN_ASK | First ask price of the day; for US Composites, the first best ask price. |
| OPEN_BID | First bid price of the day; for US Composites, the first best bid price. |
| OPEN_PRICE | Today's opening price. |
| OPINT | Open interest. The total number of option or futures contracts that have not been closed, or in the case of commodities, liquidated or offset by delivery. |
| OPINTNC | Open interest net change. The difference between the current and previous open interest. |

| | |
|-------------|--|
| OPNRNGTP | Today's open price(s) type. |
| PCTCHNG | Percentage change in the latest trade price from the previous close. |
| PERATIO | Ratio of stock price to earnings per share. |
| PM_CLOSE | The closing price of the afternoon's trading on GAFTA. |
| PRC_QL_CD | Price qualifier code for equities, bonds and options. |
| PRIMACT_1 | The most recent, primary activity on an instrument. |
| PRTY_PRICE | Parity price. Value in Swiss francs of US and Canadian stocks quoted on Swiss Bourses on their own local exchanges. |
| PRV_YRHIGH | The highest value during the previous calendar year. |
| PRV_YRLOW | The lowest value during the previous calendar year. |
| PUTCALLIND | Indicates whether option is a put or a call. |
| RATING | The rating for a bond. For example, for US bonds, this could be the Standard and Poors rating. |
| RATING_ID | The identity of the security rating agency. |
| RDNDISPLAY | Display type indicator. |
| RDN_EXCHID | The exchange on which the instrument trades. |
| RISKFACTOR | The risk factors are calculated daily by LIFFE and indicate the risk of an option relative to that of the related futures contract. They are used as the basis of the option margining system. |
| SESSIONHI | First session high price of Japanese security |
| SESSIONLO | First session low price of a Japanese security |
| SESSION2HI | Second session high price of a Japanese security. |
| SESSION2LO | Second session low price of a Japanese security. |
| SETTLE | Settlement price. The official closing price of a commodity set by the clearing house at the end of the trading day. |
| SETTLE_DATE | The date of the settlement price held in the SETTLE field. |
| SHORTADDON | Additional element of margin required by LIFFE on short options positions, reflecting higher risk than in long positions. |
| STRIKE_PRC | Strike price; the price at which an option is exercisable. |
| TDY_OF_CLS | Today's official close for Italian equities and bonds. |
| TERM_CLS | Termine close. Cash price on Italian bond market. |
| TIMACT | Time of this instrument's last activity. |
| TOT_ISSUES | The number of issues which have traded today. |

| | |
|-------------|---|
| TOT_MOVES | The total number of moves today |
| TOT_VOLUME | Today's total market volume. |
| TRADE_DATE | The date of the last trade of the instrument. |
| TRADE_TIME | Time of the last trade of the instrument. |
| TRADE_VOL | Transactional volume of the trade price reported in LAST. |
| TRD_UNITS | The smallest price units in which the issue trades. |
| TRDXID | Exchange identifier of the latest trade. US Composites only. |
| UPLIMIT | Upper trading limit for today's trading. |
| VALOREN_NO | Valoren number. |
| VOLUME_ADV | Accumulated volume of issues that have advanced today. |
| VOLUME_DEC | Accumulated volume of issues that have declined today. |
| VOLUME_UNC | Accumulated volume of issues that are unchanged today. |
| YCHIGH_IND | Year or contract high indicator. This indicates whether a year or contract high has been established today. |
| YCLOW_IND | Year or contract low indicator. This indicates whether a year or contract low has been established today. |
| YIELD | Dividend per share expressed as a percentage of the price. |
| YIELD_32ND | For debt instruments, the yield value of 1/32 nd . |
| YLD_7DAY | 7 day yield of money market funds. |
| YLD_NETCHNG | Net change of the yield from the previous close. |
| YLDTOMAT | For debt instruments, the yield to maturity which is the yield taking into account the price discount or premium over face value. |
| YR_HI_DATE | Date on which the year or contract high, as in YRHIGH or LOCHIGH fields, was made. |
| YR_LOW_DATE | Date on which the year or contract low, as in YRLOW or LOCLOW fields, was made. |
| YRBIDHIGH | The highest bid this calendar year. |
| YRBIDLOW | The lowest bid this calendar year. |
| YRBDHI_IND | Indicator showing whether the highest bid this calendar year was made today. |
| YRBDLO_IND | Indicator showing whether the lowest bid this calendar year was made today. |
| YRHIGH | The highest value this calendar year. |
| YRLOW | The lowest value this calendar year. |

| | |
|----------|--|
| YTM_ASK | For debt instruments, the yield to maturity of the ask price. |
| YTM_BID | For debt instruments, the yield to maturity of the bid price. |
| YTM_HIGH | For debt instruments, the daily high of the yield to maturity. |
| YTM_LOW | For debt instruments, the daily low of the yield to maturity. |
| YTM_OPEN | For debt instruments, the day's opening yield to maturity. |

APPENDIX C - USER ALERT MESSAGES

Listed below are MarketLink Alert messages and a brief explanation, where available or necessary.

Logon attempt failed! - Logon failure for undetermined reason

Check Password and User ID, and try again. - Logon failure due to incorrect ID and/or password

ACK/NACK Post Failure. - Run time error:Unable to post request or response on message cue.

NACK Post Failure. - Run time error:Request to server not acknowledged.

Response Post Failure. - Run time error: Unable to post response on message que.

Busy Post Failure. - Run time error:Unable to post response on message queue.

Resources overloaded, recovery in progress. - Run time error:Windows resources overloaded and data may be delayed, recovery in progress.

Communications Online. - User has successfully logged on.

LAN Communications Fault. - Logon failure or run time error due to undetermined network communication error. User should check that appropriate driver is loaded.

Request for *symbol* unsatisfied (*error number*). - Gateway unable to send symbol for undetermined reason

Logon Failure. - Unsuccessful log on for undetermined reason.

Secondary Communications Fault. - Datafeed no longer available.

Communications Offline. - Server not available or log on unsuccessful.

LAN Access Denied.

Communications Recovery Complete. - Communications for datafeed hvae recovered, data should be available.

Data unavailable for *symbol*, no such name.

Data unavailable for *symbol*, technical reasons (*error number*).

Data unavailable for *symbol* (*error number*).

Data unavailable for *symbol*, not permissioned.

Overload Recovery Complete.

Command parse failure. Check syntax.- Error in request syntax.

Datafeed at subscriber capacity. - For request/response feeds, no new records will be supplied until one or more records in use are cancelled.

Lan driver buffer overflow. - Interl message buffer overflow.

Overload recovery in progress.

APPENDIX D - DATA RESPONSE MESSAGES

The following responses may be displayed by the Windows DDE compatible application when a live link is attempted.

| | |
|----------|---|
| #N/A CMS | Communications error |
| #N/A I/R | Insufficient Resources; datafeed at capacity |
| #N/A N/A | Data unAvailable |
| #N/A N/P | Not Permissioned error |
| #N/A N/T | Datafeed Throttle limit reached |
| #N/A T/E | Data unavailable; Technical Error |
| #N/A T/O | Request has Timed Out; must be re-requested |
| #N/A B/M | Bad Message; returned when literal field reference is erroneous |
| #WAIT | Data has been requested from the Netfeed Server, but not received yet |