

EntireX Broker Tutorial

EntireX Broker is delivered with a Natural tutorial. This tutorial is written in the programming language Natural but is useful even if you are using another programming language. Natural is required for installation of the tutorial.

This chapter covers the following topics:

- Introduction to Tutorial
 - Calling the Tutorial Menu
 - Global Defaults for the Tutorial
 - Tutorial Commands
 - Using the Tutorial Help
 - Using the Example Programs
 - The Tutorial Trace Facility
 - ACI Test Tool: Single Broker Request
-

Introduction to Tutorial

The Natural tutorial shows you how to actively use EntireX Broker by

- allowing you to specify values for the fields in the ACI, which allows you to issue all types of requests and test use of EntireX Broker. See *ACI Test Tool: Single Broker Request*.
- allowing you to measure throughput and response time of EntireX Broker. See *Stress Mode*.
- offering several example client and appropriate server programs for programming language Natural; see *Examples for EntireX Broker Tutorial*. All programs can be displayed, edited and executed. Help texts are available for each program to explain the purpose of the program, indicate typical usage, and illustrate the logical program flow.

Under UNIX and Windows, use the Natural SYSOBJH utility to install the EntireX Broker Tutorial (the Natural-based tutorial application SYSETB that is provided with EntireX). See *Object Handler* in the Natural Tools and Utilities documentation for more information.

Calling the Tutorial Menu

To activate the online tutorial, log on to library SYSETB in your Natural environment and issue the MENU command. This displays the online tutorial menu, which consists of a list of the client and server example programs:

```

18:54:34          *** ENTIREX BROKER TUTORIAL ***          07-11-15
VERSION 8.0

      Client  Server
-----  -----
___ EXCL01CP  EXCL01SP  NON CONVERSATIONAL EXAMPLES -----
___ EXCL03CP  EXCL03SP  Single Requests without Reply
___ EXCL03CP  EXCL03SP  Single Requests with Reply
-----  -----
___ EXCN01CP  EXCN01SP  Conversational Examples -----
___ EXCN01CP  EXCN01SP  Long running Service - Non-blocked Client
___ EXCN02CP  EXCN02SP  Transfer messages from Server to Client
___ EXCN04CP  EXCN04SP  Transfer messages from Client to Server
___ EXCN05CP  EXCN05SP  Server with multiple parallel Conversations
-----  -----
___ EXDM01CP  EXDM01SP  Special Features -----
___ EXDM01CP  EXDM01SP  Send messages with HOLD - delayed delivery
___ EXDM02CP  EXDM02SP  Remove Service while Conversations exist
___ EXDM03CP  EXDM03SP  Server for multiple Services
-----  -----
___ EXRQ01-P  EXRQ01-P  Customized Client/Server computing -----
___ EXRQ01-P  EXRQ01-P  Single Broker Requests
___ NATEX1CP  NATEX1SP  Model to write Client/Server programs API Version 1
___ NATEX2CP  NATEX2SP  Model to write Client/Server programs API Version>1

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      HELP  GLOB  EXIT          UP    DOWN

```

The example programs are grouped according to the following types:

- *Non-conversational Examples*
- *Conversational Examples*
- *Special Features*
- *Getting Started*

Meaning of the information in the columns:

Column	Source
Client	Name of the client program
Server	Name of the server program followed by a description of the example.

Function keys available from the main menu:

PF Key	Function	Description
PF9	HELP	A general help is displayed.
PF2	GLOB	Prompts for global defaults to be used for the current session.
PF3	EXIT	Leave the online tutorial.
PF7	UP	Scroll up.
PF8	DOWN	Scroll down.

Global Defaults for the Tutorial

The following pop-up window is displayed when you press PF2 from the tutorial main menu:

```

18:54:34                *** ENTIREX BROKER TUTORIAL ***                07-11-15
VERSION 8.0

  Clie  +-----+
  ----  ! Please modify defaults or press ENTER to continue ... ! ---
__ EXCL0 !
__ EXCL0 ! Broker ID ..... ETBxxx !
  ----  ! Server Class .. ETB ! ---
__ EXCN0 ! Server Name ... Tutorial !
__ EXCN0 ! Broker Stub ... BROKER !
__ EXCN0 ! User ID ..... ILGWBU !
__ EXCN0 ! Token ..... !
  ----  ! Node ..... Node: MVS/ESA Name put into send data ! ---
__ EXDM0 ! Msg Length .... 64 Length of send/receive data !
__ EXDM0 ! Wait Time ..... 45S Time blocked SEND/RECEIVE ! ---
__ EXDM0 ! SDPA Version .. 5 1, 2, 3, 4, 5, 6. !
  ----  ! Locale String.. !
__ EXRQ0 ! Arch Byte ..... (rarely used) !
__ NATEX ! Force Logon ... ' ' or 'N' or 'Y' !
__ NATEX ! Encrypt Level.. ' ' or '1' or '2' !
  +-----+

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      HELP  GLOB  EXIT                UP      DOWN
    
```

The following global default settings can be modified and will be valid for the current session:

Default	Meaning
Broker ID	ID of the Broker in use.
Server Class	Server class in use for every example.
Server Name	Server name in use for every example.
User ID	User ID in use when running an example.
Token	Token in use when running an example.
Node	Node name put into send data.
Msg Length	Message length used for the SEND-LENGTH and RECEIVE-LENGTH.
Wait Time	Timeout value used for blocked SEND and RECEIVE calls.
SDPA version	Version of Broker control block (formerly SDPA) to select usage of old or new EntireX Broker Interface layout.

Tutorial Commands

From the tutorial menu you can execute, list and edit example programs. You can also display several help texts on each program.

You can perform a function by entering the appropriate line command in the input field preceding the client program name. To display a list of available line commands, enter an asterisk in the input field preceding the client program name.

The table below lists the available line commands:

Command	Meaning
XC	Execute client program.
XS	Execute server program.
SH	Shut down server.
H	Help for the example as a whole.
HC	Help for client program.
HS	Help for server program.
LC	List (display) client program.
LS	List (display) server program.
EC	Edit client program.
ES	Edit server program.

The examples are also documented in *Examples for EntireX Broker Tutorial*.

Using the Tutorial Help

The tutorial help facility provides help texts for each client and server example program. To display the online help text, issue the appropriate line command, H, HC or HS, for the selected example on the online tutorial menu.

The following screen shows the online help for the server of the example "Single Requests without Reply" (line command HS):

```

19:08:25                *** ENTIREX BROKER Tutorial ***                03-05-15
                          Server: Single Requests without Reply

Descr. : This server establishes a service which is able to collect
         simple messages from clients that require no reply.
         A REGISTER is necessary to inform the Broker of the availability
         of the service. The Deregister, issued as the last action, informs
         the Broker of the unavailability of the service served by this
         server.
         The server wants to wait for a client message and therefore uses
         a blocked RECEIVE, that is, a RECEIVE with W=nS is issued to the
         Broker.

Coding : LOGON      -----> logon to Broker
         REGISTER   -----> offer service
         repeat
           RECEIVE,W=nS,CID=NEW -----> wait for message
         until ...
         Deregister -----> deregister service

```

LOGOFF -----> logoff from Broker

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
 HELP EXIT Expml Cln Srv

The following functions are available from the help screen. You can execute a function by pressing the appropriate PF key:

PF Key	Function	Description
PF1	HELP	Display general help.
PF3	EXIT	Leave the help screen.
PF9	EXMPL	Display general help screen specific to example.
PF10	CLN	Display client help screen specific to example.
PF11	SRV	Display server help screen specific to example.

Note:

You can use PF10 and PF11 to toggle between the client and server help screens.

Using the Example Programs

Use of the example "client/server programs" is the same for each example. You need to start two sessions in order to "play" with EntireX Broker, one by executing the server program and the other by executing the client program.

As the first session, start the server by entering XS in the input field preceding the program name, for example in the line for Single Requests without Reply. This displays the following startup parameter pop-up window:

```

9:11:38          *** ENTIREX BROKER TUTORIAL ***          07-11-15
                   VERSION 8.0

      Client   Server
-----
xs EXCL01CP +-----+
__ EXCL03CP ! Please enter values or press ENTER to continue ... !
----- ! -----
__ EXCN01CP ! Mode ..... 1 1=Step 2=Stress 3=Silent !
__ EXCN02CP ! !
__ EXCN04CP ! Server Class . ETB !
__ EXCN05CP ! Server Name .. Tutorial !
----- ! Service ..... NcNoReply ! -----
__ EXDM01CP ! !
__ EXDM02CP ! User ID ..... ILGWBU !
__ EXDM03CP ! Token ..... !
----- ! -----
__ EXRQ01-P ! Msg Length ... 64 !
__ NATEX1CP ! ! n 1
__ NATEX2CP +-----+ n>1

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      HELP GLOB EXIT UP DOWN
    
```

The fields in this window are listed in logical groups. The first group controls the execution of the example and contains the mode parameter; for clients, end criteria to stop the execution is also displayed. Valid mode parameters are *Step Mode*, *Stress Mode*, *Silent Mode*. The other fields show some global defaults which you can overwrite for this particular client/server run. Note, however, that the Broker ID and Wait Time values can only be modified in the Global Defaults window (see above).

When using an example for the first time, you are recommended to select Step mode.

Step Mode

In this mode, the example is executed step by step. This means that every broker call is displayed on your screen and must be explicitly issued by pressing PF5. Upon return, the response from the broker is displayed in the Errtxt field together with the next meaningful broker call, ready for execution. You can always view previous Broker calls using the trace facility (PF4), which provides "before and after" images of every call issued to the broker.

If you select Step Mode and press ENTER, a screen similar to the following is displayed for every example:

```

Press PF5 to issue Request ...
19:13:53                *** ENTIREX BROKER TUTORIAL ***                03-05-15
                          Server: Single Requests without Reply

Errtxt .....
Send Data .. _____
Rcve Data ..

Type/Vers .. 1 / 5
Broker ID .. ETBxxx                Send Len ..... 64
Function ..* LOGON_____        Rcve Len ..... 64
Option ....* _____          Errtx Len .... 40
Wait .....* _____          Rtrn Len ..... 0

Class ..... ETB_____          User ID ..... ILGWBU_____
Name ..... Tutorial_____      Token ..... _____
Service .... NcNoReply_____    Password ..... _____
Conv ID ...* _____          New Password . _____
User Data .. _____          Sec Token .... _____
Conv Stat .. Environment ..     Client UID ...

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help Strss  Exit  Trace Exec                SBuff RBuff

```

The following functions are available from this screen. You can execute a function by pressing the appropriate PF key:

PF Key	Function	Description
PF1	HELP	Display the help screen on the example program. See <i>Using the Tutorial Help</i> .
PF2	STRSS	Change execution mode to <i>Stress</i> .
PF3	EXIT	Leave sample program.
PF4	TRACE	Invoke the <i>The Tutorial Trace Facility</i> .
PF5	EXEC	Issue broker call.
PF10	SBUFF	See <i>Display/Modify Send Buffer</i> .
PF11	RBUFF	See <i>Display/Reset Receive Buffer</i> .

Stress Mode

In this mode, the example is executed without further user interaction. Every Broker call issued is also displayed on the screen to allow you to see the activity of the client or server. Execution terminates in different ways:

- For clients:**
 Further end criteria (such as number of messages and number of conversations) are supplied in the startup parameter window of the client example. When the specified values are reached, processing stops.
- For servers:**
 Servers run until they are shut down by a special shut down message sent to the server (SH command from the tutorial main menu).

When execution in Stress mode is stopped, the following summary of client/server activity is displayed:

```

Waiting for Request ...
20:54:37          *** ENTIREX BROKER TUTORIAL ***          03-05-15
                   Server: Single Requests without Reply
+-----+
!
! 00200216 API: Invalid BROKER-ID
! OP System .. MVS                               Load Count Max
! TP System .. CICS                               -----
! Speed/Mode . 191.850 / 2                       Messages ...
! Msg Length . 64                                Conv .....
! ETB Calls .. 1                                 Parallel CID
!
! Time/Call   Count   Ave     Min     Max   Time elapsed Absolute Relative
! -----
! Send non-blk                Total ..... 0.0      100 %
! Send blocked                Executing .. 0.0      83.5 %
! Rcv non-blk                 Waiting
! Rcv blocked                 Transport . 0.0      16.4 %
! EOC .....                   Partner ... 0.0      %
! Undo .....
! Register ...
! Deregister .
+-----+
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help  Strss Exit Trace Exec                               Buff RBuff
    
```

Meaning of the fields:

Field	Meaning
OP	System Underlying operating system.
TP	System Underlying transaction monitor.
Speed	Indication of the performance of the environment, relative to the corresponding value of other environments.
Mode	Execution mode of the example.
Msg	Length of messages sent/received.
ETB	Number of calls issued to the broker.
Load	
Messages/Count	Number of messages sent/received.
Messages/Max	Number of messages used as criteria to stop execution.
Conv/Count	Number of conversations conducted.
Conv/Max	Number of conversations used as criteria to stop execution.
Parallel CID/Count	Highest number of parallel conversations reached.
Parallel CID/Max	Maximum number of parallel conversations allowed.
Time/Call	
Send non-blk/Count	Number of non-blocked SEND calls issued.
Send non-blk/Ave	Average elapsed time for a non-blocked SEND call.
Send non-blk/Min	Shortest elapsed time for a non-blocked SEND call.
Send non-blk/Max	Longest elapsed time for a non-blocked SEND call.
Send blocked	Same as above for blocked SEND calls.
Rcve non-blk	Same as above for non-blocked RECEIVE calls.
Rcve blocked	Same as above for blocked RECEIVE calls.
EOC	Same as above for EOC calls.
Undo	Same as above for UNDO calls.
Register	Same as above for REGISTER calls.
Deregister	Same as above for DEREGISTER calls.
Time elapsed	
Total/Absolute	Elapsed time in seconds between start and end for the run.
Total/Relative	Percentage of time between start and end for the run.
Executing/Absolute	Elapsed time in seconds when example is executing.

Field	Meaning
Executing/Relative	Percentage of time when example is executing.
Waiting	Time needed for transport plus execution time required by the partner.
Transport/Absolute	Elapsed time in seconds used for transport services. Transport means EntireX Broker and all other media involved such as SVCs, link routines, Entire Net-work, TCP/IC.
Transport/Relative	Percentage of time used for transport services.
Partner/Absolute	Elapsed time in seconds needed by the partner to execute the call. This is relevant only to blocked SEND calls, as this is the only call involving a partner.
Partner/Relative	Percentage of time needed by the partner to execute the call. This is relevant only to blocked SEND calls, as this is the only call involving a partner.

Note:

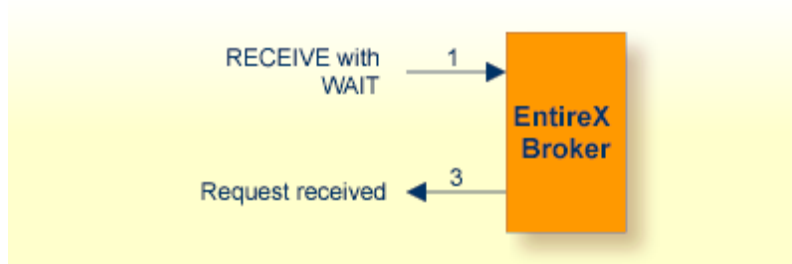
Total/Relative=(Executing/Relative)+(Transport/Relative)+Partner/Relative=100%

The waiting period of the different call types consists of the following times:

Blocked RECEIVE

For blocked RECEIVES, the elapsed time is calculated from the following:

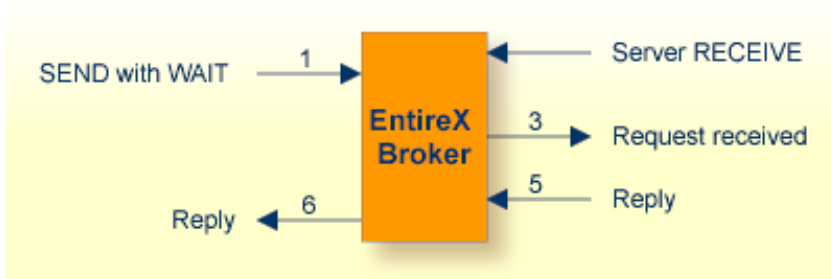
1. The time when the RECEIVE call was routed from the server to the broker.
2. A time of no activity during which there was no client request to be processed. This value may be high.
3. The time when an incoming client request was routed from the broker to the server.

**Blocked SEND**

For blocked SENDS, the elapsed time is calculated from the following:

1. The time when the SEND call was routed from the client to the broker.
2. A time of no activity during which there was no server ready to process the request. This value may be high.

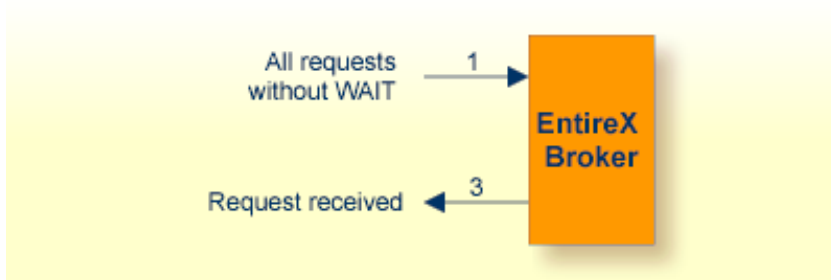
3. The time when the client request was routed from the broker to the server.
4. The time when the request was processed by the server.
5. The time when the response was routed from the server to the broker.
6. The time when the answer was routed from the broker back to the client.



All Other EntireX Broker Calls

For all other calls to the broker, the elapsed time is calculated from the following:

1. The time when the call was routed from the participant to the broker.
2. The time when the call was processed by the broker.
3. The time when the call was routed from the broker back to the participant.



Silent Mode

In this mode, the same applies as for Stress mode, except that no map I/Os are performed between broker calls. It is therefore not possible to view activities while the client and server example is running.

The Tutorial Trace Facility

The trace facility is activated by pressing the appropriate PF key after starting an example program. With the trace option on, "before and after" images of the last ten requests issued to the broker are made visible. When the trace option is selected, the most recent request is always displayed:

Use PF7 / PF8 to scroll to older / more recent requests. Scroll right with PF11 to display a second screen page for every request.

```

21:00:07          *** ENTIREX BROKER TUTORIAL ***          03-05-15
----- Image after call ----- Image before call -    0 First
Type/Vers .. 1 / 5          1 / 5
Errtext .... 00000000 Successful response
-----
Broker ID .. ETB233 ETB233
Class ..... ETB ETB
Name ..... Tutorial Tutorial
Service .... NcNoReply NcNoReply
Fct ..... LOGON LOGON
Option .....
Wait .....
Conv ID ....
Conv Status.
User Data ..
Client UID .
-----
Send Data .. 0000000000326891781
Rcve Data ..
-----

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help      Exit          Up    Down      Left  Right

```

The following functions are available from this screen You can execute a function by pressing the appropriate PF key:

PF Key	Function	Description
PF1	HELP	Display a help screen on the example program.
PF3	EXIT	Leave trace.
PF7	UP	Scroll to older requests.
PF8	DOWN	Scroll to more recent requests.
PF10	LEFT	Scroll to first screen page.
PF11	RIGHT	Scroll to second screen page.

Display/Modify Send Buffer

Selecting this option by pressing PF10 after starting the example from the tutorial menu displays the send buffer contents in hexadecimal and character format:

```

21:01:28          *** ENTIREX BROKER TUTORIAL ***          03-05-15
                  Display/Modify Send Buffer

00016 0000000000081804 F0F0F0F0F0F0F0F0F0F0F0F0F8F1F8F0F4      Send Len .. 64
00032 070_____ F0F7F0404040404040404040404040404040
00048 _____ 404040404040404040404040404040404040
00064 _____ 404040404040404040404040404040404040
00080 _____ 404040404040404040404040404040404040
00096 _____ 404040404040404040404040404040404040
00112 _____ 404040404040404040404040404040404040
00128 _____ 404040404040404040404040404040404040
00144 _____ 404040404040404040404040404040404040
00160 _____ 404040404040404040404040404040404040
00176 _____ 404040404040404040404040404040404040
00192 _____ 404040404040404040404040404040404040
00208 _____ 404040404040404040404040404040404040
00224 _____ 404040404040404040404040404040404040
00240 _____ 404040404040404040404040404040404040
00256 _____ 404040404040404040404040404040404040
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help      Exit      Top Up      Down Bot      Posit      Reset

```

Use PF6 to PF9 to scroll up or down as needed. Positioning to a specific offset is possible by pressing PF10. You can overwrite the send buffer contents in the character-oriented column. The send buffer is cleared with PF12.

Meaning of the information in the columns from left to right:

Column	Meaning
1	Send buffer offset decimal.
2	Send buffer contents displayed in character format.
3	Send buffer contents displayed in hexadecimal format.

The following functions are available from this screen. You can execute a function by pressing the appropriate PF key:

PF Key	Function	Description
PF1	HELP	Display a help screen on the example program.
PF3	EXIT	Leave send buffer display.
PF6	TOP	Position to first page.
PF7	UP	Scroll one up page.
PF8	DOWN	Scroll down one page.
PF9	BOT	Position to last page.
PF10	POSIT	Position to a specified offset in the send buffer.
PF12	RESET	Set the send buffer to low values.

Display/Reset Receive Buffer

Selecting this option by pressing PF11 after starting the example from the tutorial menu displays the receive buffer contents in hexadecimal and character format in the same way as for the send buffer. See *Display/Modify Send Buffer*.

ACI Test Tool: Single Broker Request

This screen is an ACI test tool. An interface is provided which allows you to fill the broker ACI yourself and therefore issue all types of ACI requests in any sequence. You can use it

- for test purposes of EntireX Broker;
- for studying EntireX Broker functions and functionality;
- as counterpart of any client or server written in any programming language.

If you execute this program, (line command XC or XS), the user interface presents the broker ACI directly, which you can fill:

```

Press PF5 to issue Request ...
19:46:24          *** ENTIREX BROKER TUTORIAL ***          03-05-15
                   : Single Broker Requests

Errtxt .....
Send Data .. _____
Rcve Data ..

Type/Vers .. 1 / 5
Broker ID .. ETBxxx          Send Len ..... 0
Function ..* _____      Rcve Len ..... 0
Option ....* _____      Errtx Len .... 40
Wait .....* _____      Rtrn Len ..... 0

Class ..... ETB_____      User ID ..... ILGWBU_____
Name ..... Tutorial_____  Token ..... _____
Service .... Request_____  Password ..... _____
Conv ID ...* _____      New Password . _____
User Data .. _____      Sec Token .... _____
Conv Stat .. _____      Environment .. _____
    
```

Client UID ...

```
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Help      Exit Trace Exec Reg Dreg Send Rcve SBuff RBuff Reset
```

Press PF6 to PF9 to assign default values to the broker ACI for the selected function. A field help is available for fields marked with an asterisk (mark the field with the cursor and press PF1).

To issue a request to the broker, press PF5.

The following functions are available from this screen. You can execute a function by pressing the appropriate PF key:

PF Key	Function	Description
PF1	HELP	Display a help screen on this example program. If you press PF1 with the cursor on a field marked with an asterisk (*), a help window for the field is displayed.
PF3	EXIT	Leave the program.
PF4	TRACE	Invoke tracing of requests. See <i>The Tutorial Trace Facility</i> .
PF5	EXEC	Route a request to the broker.
PF6	REG	Assign defaults for REGISTER function to the ACI.
PF7	DREG	Assign defaults for DEREGISTER function to the ACI.
PF8	SEND	Assign defaults for SEND function to the ACI.
PF9	RCVE	Assign defaults for RECEIVE function to the ACI.
PF10	SBUFF	See <i>Display/Modify Send Buffer</i>
PF11	RBUFF	See <i>Display/Reset Receive Buffer:</i>
PF12	RESET	Set the ACI to low values.