

Implement External Load Modules

L61571

LCN

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Revision 05 Date 9/99**

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This module supports **TotalPlant** Solution (TPS) system network.

TPS is the evolution of TDC 3000^X.

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Acronyms

CDS.....	Custom Data Segment
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Parameters

CBREV(x)	Custom Backplane Software Revision
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References

Publication Title	Publication Number	Binder Title	Binder Number
<i>Engineer's Reference Manual</i>	SW09-605	Implementation/Startup	TPS 3030-2

Introduction

Module Overview

About this module This module describes the types of custom software (External Load Modules) available for certain LCN nodes. It also provides an overview of the configuration required to implement the custom software.

Objectives Given a description of all the available External Load Modules and an LCN with nodes containing External Load Module software

- Determine what nodes have External Load Module software loaded.
- Determine the purpose of each External Load Module that is loaded.
- Determine the memory required to support a node's External Load Modules.

Implement External Load Modules

External Load Modules

Definition

External load modules are software options (.LO files) that load on top of the standard LCN node personalities (.PI files), allowing the node to have additional functionality above and beyond its base application software.

To implement External Load Modules, you must specify the .LO files on the node's NCF display. When you load the node, the software option becomes part of the node personality.

The nodes that can have External Load Modules are

- AMs,
- USs, and
- CGs.

Example

An example of an External Load Module is Remote User LCN Access (RULA). RULA includes hardware and External Load Module software for the US that allows the user to perform operations on a remote LCN across Ethernet media.

Also known as...

External Load Modules are also known as

- Runtime Extensions,
- Backplane Software,
- Custom Software,
- Load Options, and
- Overlay Modules.

A certain type of External Load Module is often called a "set," meaning that it is a set of CL callable subroutines.

Standard option vs separately purchased option

Some External Load Modules are part of the standard software that comes with your system; others are options that must be purchased separately.

Honeywell supplies loading instructions with External Load Module software that is purchased separately.

The standard LCN documentation provides instructions for the modules referred to as standard configurable options.

Terminology

The following terms pertain to External Load Modules:

Loader Directive Record	A record in the NCF file that contains the External Load Module names to be loaded into the node. It is user-defined for the node during NCF configuration, and is read by the node during startup.
External Load Module	A loadable object file (.LO file) consisting of executable program code. Resides in directory &CUS.
Set	A collection of related subroutines. A set is created and delivered as a loadable object file that has a .LO suffix. The sets are referred to as External Load Modules during NCF configuration and are referred to as a “runtime extensions” when used in the AM.
Set Definition File	<p>Set Definition Files (.SF files) are written by Honeywell to define the calling sequences of the CL callable Pascal programs in a Set. It is read by the CL compiler to do the following:</p> <ul style="list-style-type: none">• type checking on the arguments,• generating the proper code call for a subroutine in a set. <p>Resides in directory &CLX.</p>

Configuring External Load Modules

Description To configure a node's External Load Module capability, you use the LCN Node display in the NCF:

- US and CG—page 2 of the node's NCF display
- AM—page 3 of the node's NCF display

Examples Figures 1 and 2 show examples of NCF configuration pages for External Load modules.

Configuration entries Table 1 defines the NCF entries for External Load Modules.

Table 1 – NCF Entries for External Load Modules

Entry	Definition
Name	Name of the external load module .LO file(s).
Use Default Personality	<p>YES—assigns the node's on-process personality as the personality with which these external load modules are to be loaded.</p> <p>All the entries under the personality columns are automatically filled in with the default personalities.</p> <p>The default personalities are AM: AMO, US: OPR or UP, CG: CIO</p>
Additional Module Memory (Words)	This allows the user to reserve more memory above and beyond what is required to simply support the external load module requirements for this node. If left at zero, the <i>Total (Modules plus additional memory)</i> number indicates the amount of memory required to support only the external load modules configured in this software release. Typically, one would configure 10 to 15% additional memory in the <i>Additional Memory</i> port above and beyond this number to allow for increases in external load module file sizes when migrating to new software releases.
Total (Modules plus additional memory)	This number is the summation of the amount of memory required to support the external load modules in this software release and any additional memory configured under the <i>Additional Module Memory</i> entry.
Maximum External Module Memory (Words)	This selection is available on the US and CG configuration pages. It allows the user to reserve even more memory above and beyond what is indicated in the <i>Total (Modules plus Additional Memory)</i> port. The user can choose to enter additional memory either here or under <i>Additional Module Memory</i> .
Further External Directives	<p>Loader commands that execute as the External Load Module is loaded.</p> <p>Sometimes used for "patching" External Load Module software during the load phase.</p> <p>Select NO unless otherwise instructed by the External Load Module documentation.</p> <p>YES—an external load directive file (located in a special directory) must be accessed when the node is loaded with its personality.</p>

06 Jan 83 16:04:09 1

APPLICATION MODULE NODE

PAGE 3 OF 3 ON-LINE

NODE 19

ENTER EXTERNAL LOAD MODULE NAMES & ASSOCIATED PERSONALITY-TYPES:

NAME	PERS.	NAME	PERS.	NAME	PERS.	NAME	PERS.
FILE	AMO	AMCL05	AMO				
CONV	AMO						
AMCL01	AMO						
AMCL02	AMO						
AMCL03	AMO						
AMCL04	AMO						

AMO

ADDITIONAL MODULE MEMORY (WORDS)

87245

TOTAL (MODULES PLUS ADDITIONAL MEMORY)

417792

FURTHER EXTERNAL DIRECTIVES?

YES NO

F1=CHECK F3=SET OFFLINE F5=ABORT F7=NEXT ITEM F9=PACK NCF F11=TAB
F2=INSTALL F4=PRINT

34495

Figure 1 - NCF Configuration Example for External Load Modules—AM

06 Jan 83 16:05:00 1

UNIVERSAL STATION NODE

PAGE 2 OF 2 ON-LINE

NODE 1

ENTER EXTERNAL LOAD MODULE NAMES & ASSOCIATED PERSONALITY-TYPES:

NAME	PERS.	NAME	PERS.	NAME	PERS.	NAME	PERS.
DPBASE	OPR						
DPEQLT	OPR						
MSF	UP						
UPBASE	UP						
UPEQLT	UP						

OPR UP

ADDITIONAL MODULE MEMORY (WORDS)

7780 15771

TOTAL (MODULES PLUS ADDITIONAL MEMORY)

8276 16416

MAXIMUM EXTERNAL MODULE MEMORY (WORDS)

YES NO YES NO

FURTHER EXTERNAL DIRECTIVES?

ALL 7000

EXTERNAL CUSTOM SCHEMATIC MEMORY (KILOWORDS)

F1=CHECK F3=SET OFFLINE F5=ABORT F7=NEXT ITEM F9=PACK NCF F11=TAB
F2=INSTALL F4=PRINT

34496

Figure 2 - NCF Configuration Example for External Load Modules—US

Displays that Indicate if Custom Software is Loaded

Displays

The list of External Load Modules that are loaded into a particular node can be viewed on the following displays:

- the DATACHNG display on PERFMENU (see Figure 3), or
- the CBREV display on PERFMENU (see Figure 4)—R410 and later

The mechanism for displaying a node’s External Load Modules is a PSDP parameter:

CBREV (x)

where x = 1 to 32

Display data

The data for External Load Modules displayed on the CBREV and DATACHNG displays has the following syntax:

MODNAM VV, RR

where:

- MODNAM = Name of the custom software
- VV = LCN software version on which that custom software runs
- RR = Revision of custom software

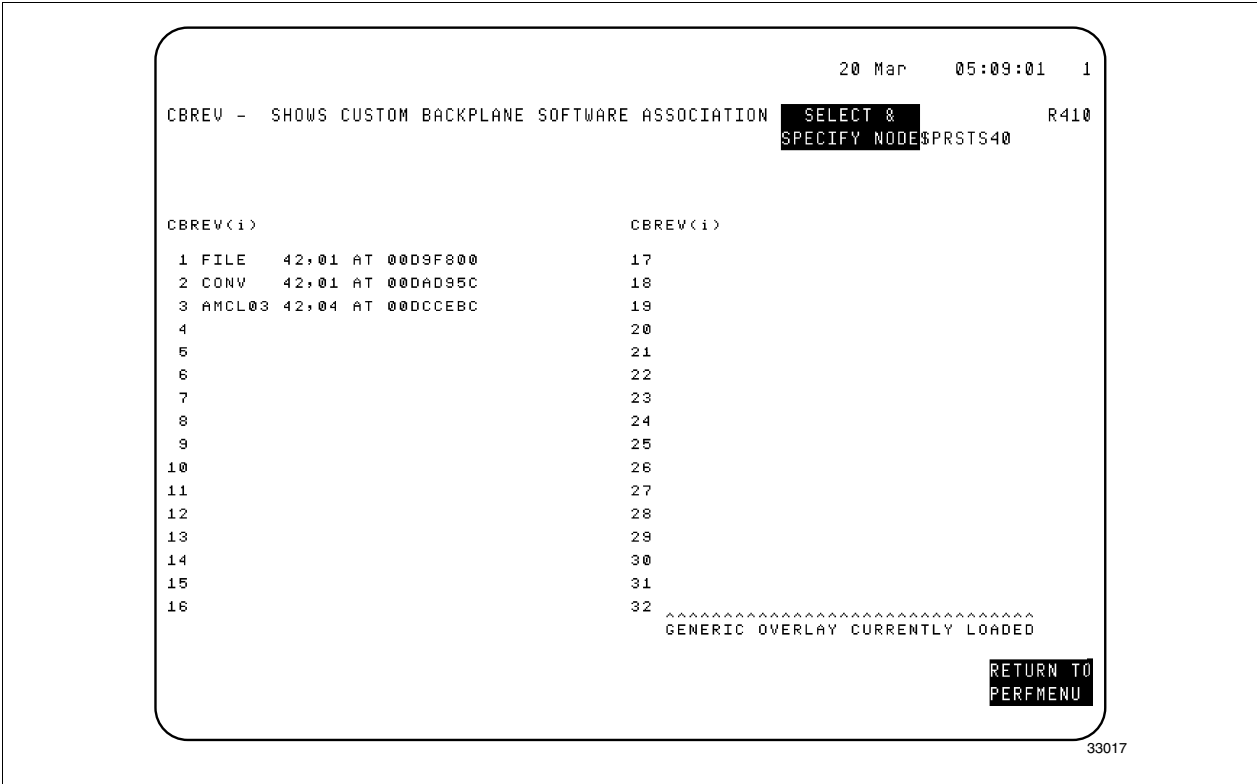


Figure 3 - CBREV Display

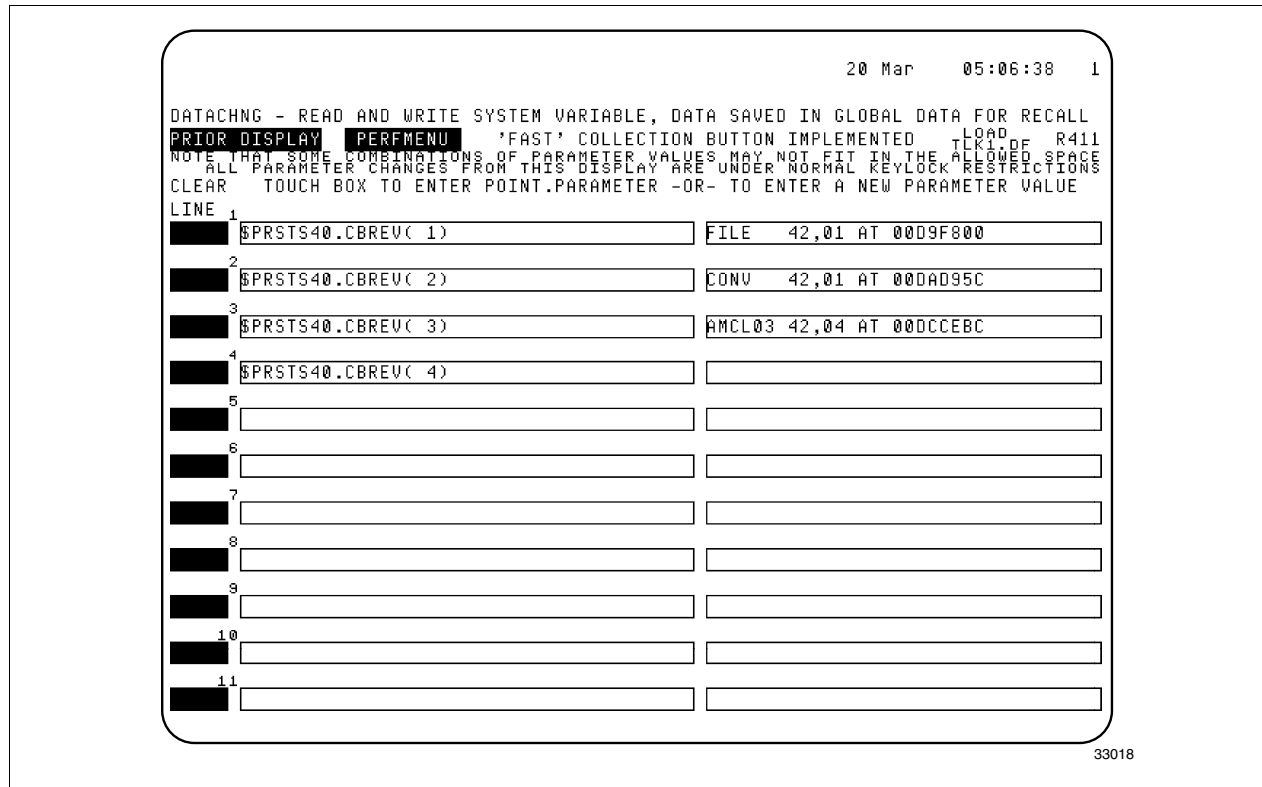


Figure 4 - DATAHNG Display

External Load Module Loading Errors

Preventing errors

The following requirements must be met to prevent External Load Module loading errors:

- The revision of the External Load module software must match the LCN software revision.
- The node must have sufficient memory to support the External Load Module software; otherwise, the node loads with a WARNING or the node crashes.

Error indication

The following displays indicate a node's External Load Module errors:

- The node's Status display (see Figure 5—US example).
- The node's Status Detail display (see Figure 6—US example).
- The node's Detailed Module Error display (see Figure 7—US example).

Figure 5 shows an example of a US with a WARNING message. Figure 6 the US's Status Detail display that explains the WARNING (The External Load Module file could not be located when the US was loaded.).

SELECT FUNCTION

08 Aug 96 13:17:46 1

CONSOLE STATUS AND ASSIGNMENT

LOCAL STA ADB: 14Jun96 09:53:46:327

CONSOLE	1 - MANUFACTURING	STATUS	AREA	PERIPHS	PRTRS	DRIVES	PENS	ACCESS	MAINT
* 1	1 UNVL	WARNING	:NORTH	OK	1	1, 2		ENGR	
2	2 US	OFF		????				----	
3	3 US	OFF		????				----	
4	4 UxS	OK	:NORTH	SERVICE	4	7		ENGR	
5	5 US	OFF		????				----	
6	6 OPR	OK	:NORTH	SERVICE	6	11,12		ENGR	
7	7 US	OFF		????				----	
8	8 US	OFF		????				----	
9	9 US	OFF		????				----	
10	10 US	OFF		????				----	

ENB AUTO
LOAD/DMP

LOAD/
DUMP

ACCESS
CHG

AREA
CHG

UNIT
DISPLAY

STATUS
DETAIL

SHUT
DOWN

MAINT
INFO

PRTR
ASSIGN

PERIPH
STATUS

ENTER

34497

Figure 5 - WARNING Status Example—US

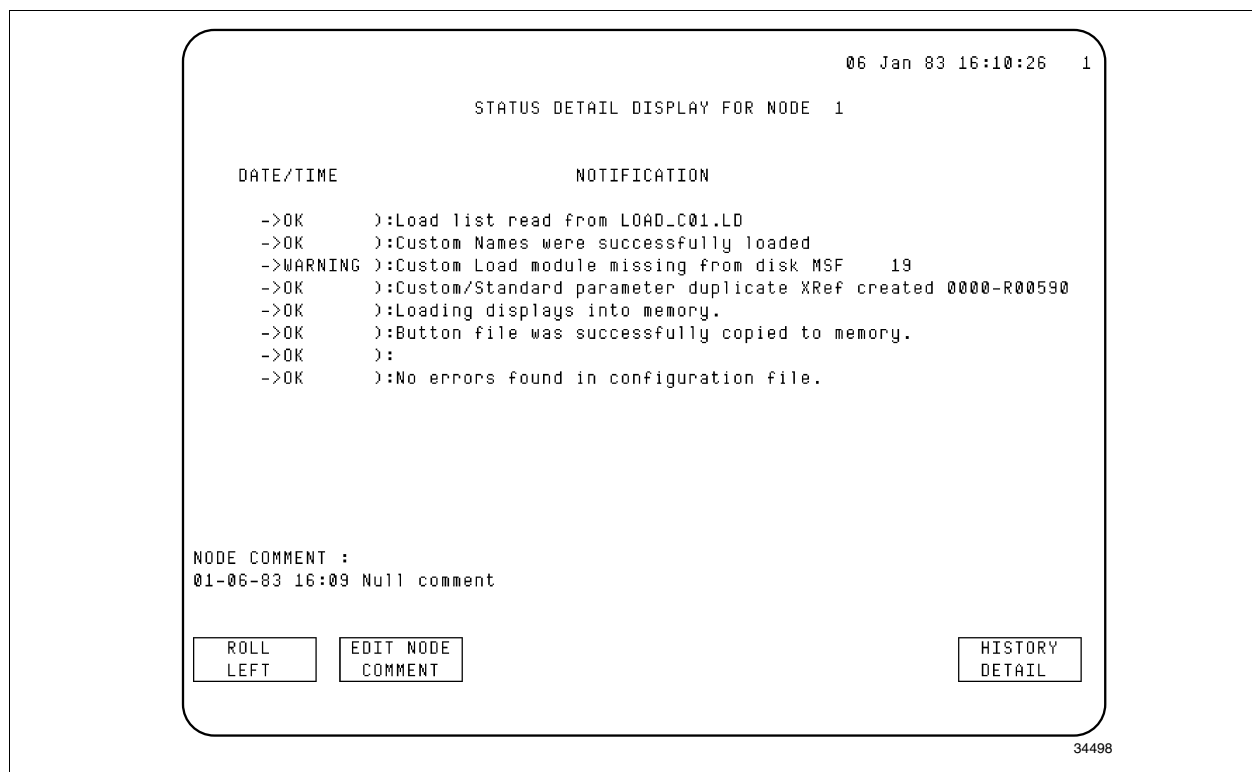


Figure 6 - Load Module Error Example—US Status Detail Display

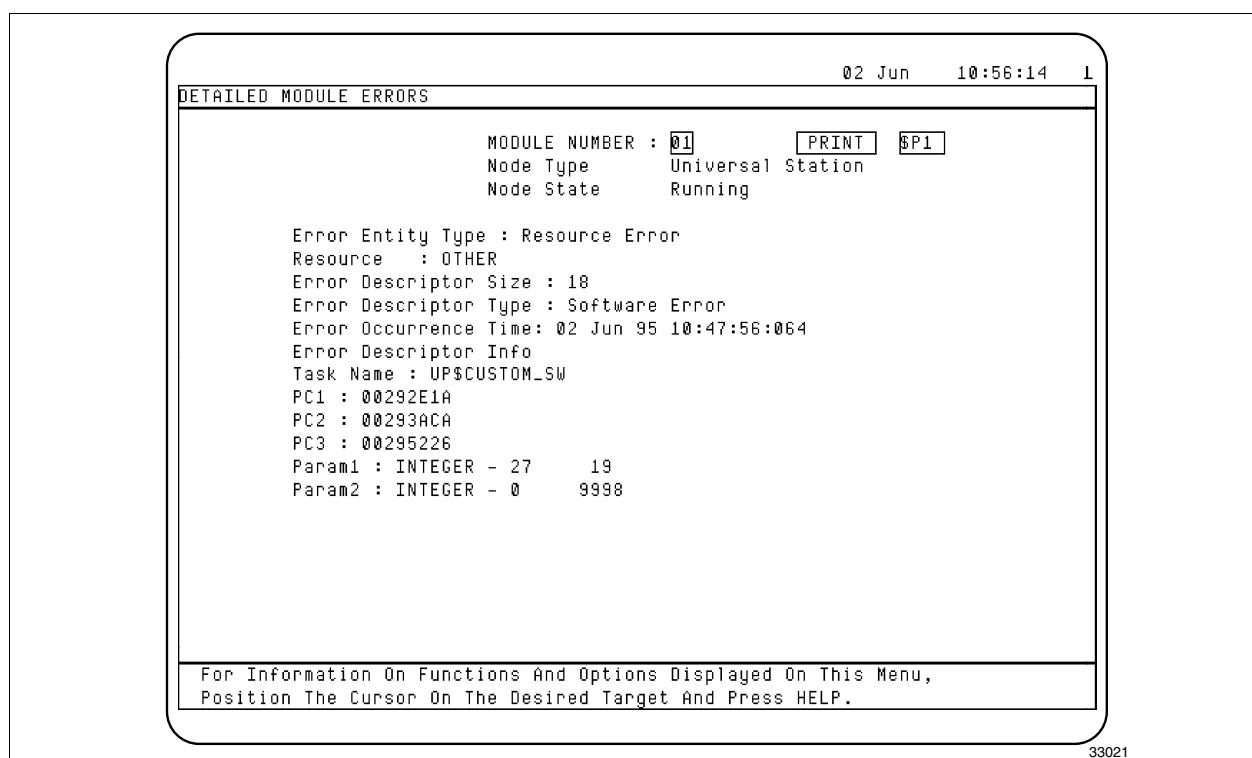


Figure 7 - Load Module Error Example—SMCC Detailed Module Error Display

Detailed Module Error display

On a node's Detailed Module Error display (see Figure 7), the Param1 integer indicates the error code. Table 2 describes the error codes.

Errors

On R3xx, if a node crashes upon startup, the following node status appears in the status field on the Node Status display, instead of FAIL:

CS-ERRnn

where nn = two digit error code (see Table 2)

On R400 and later, WARNING appears in the node status field. The error description can be viewed on the node's Status Detail display.

Table 2 – External Load Module Errors

Error	Description
01	Memory Mapping—Multiple Err
02	Module Mapped outside usr area
03	Could not find External Directive File
04	Error Opening Load Module File
05	Error Reading Load Module Recl
06	Max. Num Load Modules Exceeded
07	All Requested Memory Used Up
08	Error Reading Load Module
09	Error Closing Load Module File
10	File Name String Too Long
11	Invalid Load Module File Name
12	Invalid Base Adr Directive
13	Base Module Name Not Found
14	Memory Verify Error
15	Illegal (odd?) Verify Address
16	Invalid Verify Directive
17	Illegal (odd?) Change Address
18	Invalid Change Directive
19	Unrecognized Directive in NCF or External Directive File

Errors, continued

Table 2 – External Load Module Errors, continued

Error	Description
20	Error Closing Directive File
21	Get Memory Err in set mod name
22	Create IDB Err in set mod name
23	Add IDB Error in set mod name
24	Store IDB Err in set mod name
25	Delete IDB Err in set mod name
26	Load Module - Linking Errors
27	Custom Software not on disk
28	Volume Mount Error—Cust load
29	Unrecognized NCF Load Directv
30	Invalid Mem_alloc Directive
31	Module Type incompatible with Personality Type
32	Module/Pers Version mismatch
33	Error Opening load Dir File
34	Invalid Include Directive
35	Invalid P2 Header Pointer

Types of External Load Modules

Application Module Table 3 lists some of the External Load Modules available for the AM:

Table 3 – AM External Load Modules

External Load Module	Description	Rel.
File I/O Extension: FILE CONV (Standard Option)	A set of subroutines that enable a CL/AM program to both write data to and read data from ASCII text files on the History Module. Packaged as two sets.	R300
Continuous History Access: CONV AMCL03 (Standard Option)	A set of subroutines that enable CL/AM programs to read historized data from the History Module. Packaged as two sets.	R400
Math Library: AMCL02 (Standard Option)	A set of subroutines to perform standard deviation and array math calculations. Packaged as one set.	R400
AM File Print (Purchased Option)	A set of subroutines that output a printable file to a printer on the LCN. May specify a backup printer. A completion check subroutine is available. Page control, page length, starting and ending record number, and starting and ending characters are configurable.	R400
Steam Tables (Purchased Option)	A set of subroutines allowing either single- or double-precision calculation of thermodynamic properties.	R400
CDS Move and Multiple Move Parameter: AMCL01 (Standard Option)	Packaged as one set. Enables the user to <ul style="list-style-type: none"> Copy the contents of a CDS on a source AM point to another CDS with the same structure on a destination AM point. Define lists of parameters and move them with a single call. 	R410
Fast External CDS Fetch: AMCL04 (Standard Option)	When loaded in an AM with CDSs, allows other nodes on the LCN (CGs, USs, and other AMs) to have faster access to this custom data. Packaged as one set.	R410
Off-Node Access AMCL05 (Standard Option)	Packaged as one set. Enables the user to <ul style="list-style-type: none"> Fetch string array elements in foreground CL from any on-physical-node point. If not configured, fetches are restricted to on-logical-node points (points in the same unit). Indirect to points that are off-logical-node at any level of multilevel indirection. (All points must be on-physical-node). If this extension is not configured, off-logical-node references can only occur in the last level of multilevel indirection. 	R410
A ^X M Coprocessor Access AMCL06 (Required) XCCES (Standard Option)	XCCES provides a configurable security option. AMCL06 is required for A ^X M node startup.	R430

Table 4 – US External Load Modules

External Load Module	Description	LCN Rel.
XY Plot (Purchased Option)	Allows up to 20 plots of 4 traces each to be added to a schematic.	R300
Demand Update (Purchased Option)	Allows the user to specify when, and only when, a schematic will update. It is particularly useful with large graphics that tax the processing capabilities of the data owners.	R300
Equipment List nnBASE nnEQLT MSF (UP&EP only) (Standard Option)	If the user has a number of similar sets of process equipment performing similar functions, this option allows the development of generic PM/CL or MC/CL programs and one or more common schematics. The actual set of files depends on the personality. nn is OP, EP, or UP	R400
Alarm/Message Window MSGWIN (Purchased Option)	Consists of PE tools (subpictures, actors, and collectors), which can be used to create Alarm Summary and Message Summary display functionality on custom schematic displays.	R401
Alarm Point Schematic Initiation ADPMOD ADPUNP (Purchased Option)	Provides the ability to invoke associated custom schematic displays from the Alarm Summary, Unit Alarm Summary, Alarm Annunciator, and several Organizational Summary displays. Standard on R510 and later.	R401
Remote User LCN Access (Purchased Option)	Allows user to remotely access a different LCN across a wide range of communication media, including Ethernet cable, phone lines, T1 lines, or satellite links.	R430
H.A.L. 2000	Searches text files, Picture Editor Source file, and button files to identify time references that may cause year 2000 problems.	R401

Computer Gateway Table 5 lists some of the External Load Modules available for the CG:

Table 5 – CG External Load Modules

External Load Module	Description	LCN Rel.
VAX/LCN Time Synch (Purchased Option)	Provides the following time synchronization configurable options: <ul style="list-style-type: none">• Synch VAX time to LCN time,• Synch LCN time to VAX time,• Synch VAX time to an external clock and LCN time to VAX time.	R230

Complete list For a complete list of Honeywell Custom Software supported on R6xx, refer to Appendix A of this course module.

Lab Exercise

Implement External Load Modules

Instructions

1. Call up an on-line NCF LCN node configuration for a US, AM, or CG.
2. Familiarize yourself with the External Load Module configuration page (page 2 for a US or CG, page 3 for an AM).
3. Abort (F5) the NCF configurator.

Appendix A

Honeywell Custom Software Compatibility Matrix for R600

Custom Software Compatibility Matrix for R600

Background

The software backplane packages that Honeywell offers may be dependent on a software release or equipment configuration. Compatibility also has restrictions to full use of all software release or partial use of all release features. The following chart will help you determine compatibility of packages available at this time with R600.

Custom Software Compatibility Matrix for R6xx

APPLICATION	RUNS ON	VERSION
Backplane Steam Tables	AM	50.01
CLM AccuRay	AM	1.0
CLM Measurex	AM	1.0
Horizon Production Manager	AM	1.0
Horizon Profile Manager	AM	
Lippke 3000	AM	
Scanner Application Module (SAM)	AM	
CLM Platform Software	AM	R340.4
System Gateway 100: Interface to Foxboro Spectrum	AM	1.6
Bristol Babcock Interface Software for CLM	AM	R1.0
Modbus Interface Software for CLM	AM	1.12
Modbus Slave Interface Software for CLM	AM	1.1
Modbus Repeater Software for CLM	AM	1.1
Modbus Repeater Software for CLM	AM	1
Allen Bradley PLC Interface Software for CLM	AM	1.5
Westinghouse Redac 80 RTU Interface Software for CL	AM	1
Basic Measuring Instruments RTU Interface Software	AM	
Intermetrics RTU Interface Software for CLM/Modbus	AM	1
Enraf CIU I/F for CLM Platform	AM	1.10a
DeltaNet I/F for CLM Platform	AM	R1.0
Tiway I/F for CLM Platform	AM	R40.1
Applied Automation Optichrom 2100 I/F Software for CLM	AM	
Questor Analyzer I/F Software for CLM	AM	1.3
Varec 6840 I/F Software for CLM/Modbus	AM	1
Applied Automation HCI-A I/F Software for CLM	AM	1.8
Applied Automation HCI-C01 I/F Software for CLM	AM	1.7
ABB Process Analytics I/F Software for CLM	AM	1.3
L&J Application for CLM/Modbus	AM	1.2
L&J MCG 2000 I/F Software for CLM	AM	1
ANSI X3.28 Subset Protocol I/F Software for CLM	AM	1.1
CL Source View	AM	2.1
Horizon Predictive Control (MISO)	AM	1.3
Blend Ratio Control (BRC)	AM	44.2
Common Module Components (CMC)	AM	41.1
Storage Data Manager (SCM)	AM	44.2
Task Control Module (TCM)	AM	41
Task Monitoring Module (TMM)	AM	41.2
Recovery Island (Causticizing)	AM	1.0
Recovery Island (Evaporators)	AM	1.0
Recovery Island (Lime Kiln)	AM	1.0

Custom Software Compatibility Matrix for R6xx, continued

APPLICATION	RUNS ON	VERSION
Recovery Island (Recovery Boiler)	AM	1.0
Thermo-Mechanical Pulping (TMP)	AM	1.0
AM File Print	AM	50.1
Sequence Download – AM	AM	50.04
Batch Digester	AM	
RealTime SPQC II (SPQC-II)	AM	1.05 + I27
Batch Supervisor Module 45 (Flexible Formulation)	AM	2.3
Robust Multivariable Predictive Control	AM/AxM	145.01
Profit Suite of Product (RMPCT)	AM/AxM/NT	
Application Module X (AxM)	AxM	200.1
PHD	AxM+HPM+VAX	R150
CM50S for AxP	AxP	4.1, 4.2
Dynamic Matrix Control I/F (DMCI)	AxP	2.1
Application Builder and Exec (ABE)	AxP	5.0
LCN Time Sync	LCN	50.02
Micro-TDC3000 Phase 3	Micro	
TPS Builder	PC/NT	
LCN Workbook	PC	7.1
Sandiford Tools(Windows)	PC	
SACDA Trainer	SIM	98.2
Alarm/Message Window	US	60.1
H.A.L. 2000	US	60.1
Tuning Trend Display	US	4.0
RULA	US/UxS	
XY Plot	US/UxS/GUS	60.01
Vara Trend	US/UxS/GUS	1.02
Looptune II	US/UxS/GUS	1.2
Alarm Point Schematic Initiation	UxS	50.01
Multiple Schematics	UxS	200.4
Universal X Station	UxS	200.4
UxS Operator Window Manager	UxS	100
Key Card Access System	UxS	60.1
Demand Update/US Sch – UPUPD	UxS	50.01
Large Character Phantom	UxS	50.01
PC Data Exchange	UxS+AxM+PC	100
CM50S for VAX	VAX	6.0
Dynamic Matrix Control I/F (DMCI)	VAX	2.1
Application Builder and Exec (ABE)	VAX	5.0
Blend Property Control (BPC)	VAX	43.5
VAX/LCN Time Synch	VAX	50.1
Open VMS LCN Time Sync	VAX/AxP	5.1

LAST PAGE

