

ROPES

Remote Online Print Executive System Version 17.0

General Information

PREFACE

This publication contains information necessary for the installation, maintenance and operation of the Remote Online Print Executive System (ROPES), a proprietary program product used to manage a network of printers in the CICS interactive environment. It provides data processing managers, system programmers, application programmers and operating personnel with the information required to effectively use this product.

Information in this publication is subject to significant change.

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| Eleventh Edition (June 2011)

| This edition applies to Version 17.0 of the program product Remote Online Print Executive System (ROPES) and to all subsequent versions and modifications until otherwise indicated in new editions or newsletters.

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Introduction

What This Manual Contains

This manual contains an introduction to ROPES with an overview of the functionality ROPES provides.

Each chapter in the manual addresses one or more of these subjects.

Other ROPES related activities are documented in the other ROPES manuals. The Related Publications lists those manuals and summarizes their contents.

Just a brief note on a notation used in this manual. Wherever you see <hlq> in a data set name we are referring to the **high level qualifier** you choose to use when installing the ROPES data sets. You should always substitute that value when you actually refer to the data sets in JCL, and you will need to make this information available to any programmers or users that might need this information in the course of their work.

Related Publications

In addition to this manual, there are five other ROPES publications. Your installation was supplied with at least one copy of each of these manuals in Adobe Acrobat (PDF) format. You may print any copies you require for your company's use, but remember that this material is licensed to your company and may not be distributed outside of your organization.

User's Guide

This manual is intended for end-users of ROPES. It explains the various ROPES status displays, the ROPES commands and transactions used to control ROPES, the JES transfer facility used to retrieve output from JES for printing by ROPES, and it documents the report browsing transaction.

Administrator's Guide

This manual is intended to guide the ROPES

installer and administrator through the steps required to install ROPES, customize ROPES for your installation, establish and maintain the ROPES control files, archive report data, audit ROPES activities, account for ROPES usage, secure ROPES, and tailor and use the ROPES exits.

Programmer's Guide

This manual is intended for programmers that will be interfacing application programs to ROPES through the ROPES Application Programming Interface. The ROPES sample programs are also documented here.

Utilities Guide

This manual is intended for programmers that will be using the ROPES utility programs. The ROPES sample programs are also documented here.

Messages and Codes

This manual is intended for administrators, programmers and end users that will be using the various functions of ROPES. It contains a complete list of the ROPES messages and codes with descriptions and suggested user actions when appropriate.

Functions and Features

The Remote Online Print Executive System (ROPES) provides complete facilities for generating, retrieving and printing reports under CICS and in batch. A versatile set of capabilities is provided which enables users to place report data on the ROPES queue concurrent with online printing operations. A comprehensive command structure allows effective control of ROPES by any authorized terminal operator; dedicated control terminals are not required. Easy-to-use application interfaces are provided which minimize the programming effort required to get a printing application “on the air.”

The report distribution flexibility provided by ROPES allows ROPES users to distribute time-dependent information with high reliability.

ROPES is currently used to distribute:

- financial statements
- payroll information
- fuel distribution and usage reports
- work orders
- benefits checks
- customer inquiry and status responses
- memos
- performance and productivity reports
- daily transaction activity logs
- labels
- packing lists
- student grade reports
- work tracking reports
- program compilation listings
- court calendars
- invoices
- purchase orders
- payroll checks
- shipping orders
- fax messages
- banking reports
- new customer information
- insurance policy forms
- repair tickets
- bills of lading
- gas leak reports
- sales tickets
- video terminal screen images
- ...and many, many more.

ROPES is an easy-to-use, application-oriented support package for CICS. ROPES provides online and batch application programmers with access to the full range of ROPES services:

- report generation using ANSI printer carriage controls
- user-written error processing routines
- enables the application program to discard unwanted output
- directs the system to checkpoint the ROPES control information at user-defined sync points
- provides command and macro level support for COBOL, PL/1 and assembler
- supports blocked report generation and retrieval
- provides a program interface to the ROPES command processor, so that your applications can issue ROPES commands in conjunction with their other processing and to enable the implementation of “super” commands to meet your installation’s needs.

After CICS start-up has been completed, ROPES printing may be started with ROPES commands. Alternatively, printing may be started automatically after CICS initialization. In the event of a system interruption, ROPES will resume printing operations at the beginning of the pages being printed when the interruption occurred.

When ROPES printing is started, all printers that were previously active are started. Also, those printers that were not active but have a “cold start” class definition are started as well. Optionally, a printer may be “held” on start up to allow forms alignment or report assignment changes.

While ROPES is active, the operation of printers is dynamically controlled with commands entered from the Operator Menu. Printers may be started, stopped, forward or back spaced, interrupted, tested and sent

forms alignment messages. Reports may be held, released, restarted, canceled or transferred between printers. A report may be sent to multiple printers simultaneously.

Control of a printer may be assigned to a particular terminal, to a group of terminals, or determined dynamically. If a printer is not assigned a control terminal, the first terminal from which an operator command is issued for the printer becomes the control terminal. Once a control terminal is linked to a printer, operator commands for that printer may be entered from that terminal only. Supervisory commands, also defined on the Operator Menu, may be entered from any terminal, provided that an authorized operator is signed on. All diagnostic messages for a printer are directed to its control terminal and to the ROPES master terminal if one is defined. The control terminal is not dedicated to ROPES and may be used for any other purpose.

During CICS operations, ROPES manages the storage of report data on the ROPES queue concurrent with data retrieval and transmission to printers. ROPES also manages the transfer of data from the operating system Spool (JES or POWER) to the ROPES queue, manages the transfer of data produced by batch applications into the online queue, and provides for full online, menu-controlled maintenance of the ROPES control information.

Batch and online applications pass the text of a report, together with the report name, to a ROPES service module. ROPES handles the buffering, blocking, unblocking and device dependencies automatically. ROPES stores the data and returns control to the application task. When a printer is started, ROPES prints the reports assigned to the printer based on the class and priority of the reports.

The text of a report may be deleted automatically after printing or may be retained on queue for reprinting. A comprehensive online queue reorganization and archiving facility is included and may be set up to run automatically.

ROPES supports a wide variety of printers and related devices. Virtually all devices supported by CICS are supported by ROPES, including Personal Computers with a variety of 3270 emulation options. ROPES batch printing uses the operating system Spool subsystem, so all devices supported by JES, POWER

and VM are supported by ROPES. ROPES reports may also be transmitted by e-mail (SMTP is required) and by IP (CICS TCP/IP Sockets is required). SMTP messages may include the ROPES Report as embedded text, attached text or as an attached Adobe® Acrobat® compatible PDF file.

All ROPES CICS modules and most ROPES batch modules are reentrant and AMODE 31 compatible. Furthermore, we have insured that the enhancements to the transaction interface module, ROPEOSRV and all of the Axios Products supplied exits, are Threadsafe. ***It is your responsibility to insure that the user exits coded by your site are also Threadsafe.***

You should be aware of the fact that the ROPES interface program uses CICS commands that have not yet been made Threadsafe by IBM. These include, primarily, File Control commands. As a consequence, we strongly recommend that client sites wishing to run DB2 transactions that also use ROPES review their application structure with the goal of eliminating, as much as possible, the interspersing of ROPES calls and SQL, to minimize the number of Change Mode events that occur during transaction processing.

It is our intention to continue to review the ROPES modules and we intend that all ROPES CICS modules be eligible for execution in the OTE when this is available to non-DB2 transactions, and that any ROPES module invoked by a client application is Threadsafe. To this end, you are invited to scan the ROPES Online Modules using the IBM supplied Load Module Scanner and the filter tables provided in each release of CICS to review the suitability of this use in your environment. Over time, we expect more of the CICS Basic API to be made Threadsafe by IBM, and we will not introduce any new commands or features to ROPES that are not Threadsafe without clearly documenting this for you.

You will notice that the object module linkage editing for the ROPES software has been broken up to allow most of the ROPES modules to be linked with the RENT option. Most ROPES batch modules and all ROPES CICS modules are fully reentrant. Most are RMODE(ANY) compatible as well. The CSDPPT member provided has been supplemented with a CSDPPTTS member in which programs that are Threadsafe are marked with the appropriate

concurrency option. It will now be possible for you to prevent storage overlays in ROPES modules if you run with RENTPGM=YES. If you are not already doing so with your own applications, use caution when switching to this environment.

Beginning with Version 10.0 we started a process intended to separate the business logic of the ROPES modules from the Presentation Logic. To that end, we restructured the ROPO and ROPS transaction processor programs ROPERPO and ROPEROPS to contain only the Presentation Logic and both modules will now obtain the data to display from a new module, ROPEBLPS (Business Logic - Printer Status). The ROPEBLPS module is a Command Level, COMMAREA driven program with a fully documented user interface that is now being made available to all users who wish to provide fully integrated access to the ROPES information within their applications, or, through the various facilities of DPL, ECI, EXCI, the CICS Clients and/or the CICS Transaction Gateway, make this information available to users on non-z/OS platforms as required. You can now begin to tightly integrate ROPES into your environment without having to give up control to ROPES modules that may allow unplanned user interactions. In Version 12.0, we have extended this process to the ROPN, RORL, ROAL and RORS transactions. ROPEROPN, ROPERORL, ROPEROAL and ROPERORS have been updated to contain only the presentation logic. New Business Logic modules have been supplied for these services: ROPEBLNS (Business Logic - Network Status), ROPEBLRL (Business Logic - Report List, used for both RORL and ROAL) and ROPEBLRS (Business Logic - Report Status).

It is our intention to extend this support to as many modules as is practical, and new ROPEBLxx modules will be introduced, from time to time, in maintenance releases, enhancement releases and in future versions.

In Version 11.0 we have provided a set of modules that will allow your applications to request I/O to the ROPES VSAM data sets in a way that is compatible with the various facilities of DPL, ECI, EXCI, the CICS Clients and/or the CICS Transaction Gateway, to make this information available to users on non-z/OS platforms as required.

Beginning with Version 12.0, we are making additional changes to ROPES to assist our customers who are developing new or revamping old applications in order to implement their own SOA strategies. To that end, we have recognized that additional ways to access the ROPES data are needed, and these methods must not be restricted to the "traditional" CICS environment. In Version 12.0 we have introduced the use of CICS Business Transaction Services containers as an additional method for passing ROPES information between the ROPES product and the user's applications, regardless of platform. We will be expanding this support in future releases to insure that our customers can make effective use of all associated platforms and maximize the benefits of ROPES in their evolving application environment.

Overview of ROPES features.

The following brief overview of ROPES features is keyed to the various sections of this manual, where a more comprehensive description and explanation of the use of the feature may be found.

TCP/IP Printing Support

The ROPES TCPIP/LPR Remote Print Feature provides an interface to remote Line Printer Daemons (LPDs) via the internet or intranet to print ROPES reports. Limitations on the location of the LPD servers is determined by network configuration and security. LPD support will permit printing to OS/390, z/OS, Windows or Unix print servers as well as LPD equipped printers

The ROPES TCPIP Direct Socket Print Feature provides an interface to remote IP attached printers via the internet or intranet to print ROPES reports. Limitations on the location of the printers is determined by network configuration and security. Direct printing to a socket support will permit printing to OS/390, z/OS, Windows or Unix print servers as well as IP attached printers that support such connections.

The ROPES LPR Remote Print Feature and the ROPES TCPIP Direct Socket Print Feature require TCPIP for MVS, CICS Sockets, and CICS version 3.3 or higher.

In ROPES V17, IPv6 support has been added to the LPR and Direct Socket printing support.

Extended Device Controls

The Extended Device Controls Feature permits large streams of Printer Control Language device codes to be sent to a ROPES printer. Using the ROPES Extended Device Controls Feature, PCL code sequences can be unlimited in size. Any number of PCL code sequences may be established during device initialization and device reset or termination. Large sequences can be broken down into smaller

sequences and labeled and used accordingly. Other compatible devices can reuse PCL sequences.

The Extended Device Controls Feature is available for TCPIP/LPR Remote printers.

The Extended Device Controls Feature requires the following software: CICS 3.3 or higher, OS/390, ROPES Version 7.0 and all ROPES LPR feature maintenance, TCPIP for MVS, and CICS Sockets.

Extended Device Controls includes the EDC Override Feature (Extended Device Controls Override Feature). This feature permits one part of a PCL Overlay table/module to be dynamically overridden with a parameter/option value from another part of the ROPES system. Five different types of override are possible with the EDC Override feature. One of the override types permits the ROPES printer or report definition copies value to be used as an overriding value for a PCL code sequence that sets the number of printer copies. Other override types enable the Characters Per Inch, Lines Per Inch, and Orientation settings found in the ROPES FCB to override appropriate PCL code sequences.

E-Mail Interface

The ROPES e-mail interface provides a mechanism for routing ROPES report output to internet or intranet e-mail destinations. E-mail destinations are only limited by the TCP/IP and SMTP mail server configurations you have installed. The SMTP server you use can be a z/OS, OS/390, Windows or UNIX based server.

The ROPES E-mail Interface also supports attaching the selected report to the e-mail as a separate file. Three file attach formats are provided, plain text, PDF, or HTML document formats. Reports delivered in PDF format are automatically converted to PDF format prior to delivery. Reports delivered in HTML format are automatically converted to HTML format prior to delivery. Reports delivered in plain text format are delivered without conversion. File

attachments are setup through parameters in the ROPES Device Characteristics Blocks. Attachments are delivered using the MIME 1.01 standard.

The ROPES e-mail interface requires TCPIP for MVS, SMTP Mail Server for MVS, CICS Sockets, and CICS version 3.3 or higher. A minimum NJE configuration with at least the host node explicitly defined is also required. *The name of the host node must match the name of the host as it appears in the TCPIP configuration.*

TCP/IP Translation Facility

New with Version 14, we have added support for user control of the TCP/IP data translation performed for LPR or Direct Socket printing. The new facility adds additional fields to the ROLI panel to allow the user to specify the translation routine and table to be used. This support includes the ability to use the IBM CICS Sockets routine EZACICTR and its entry points, EZACIE2A and EZACIA2E to provide translation table rules down to the individual ROPES printer and report, if needed.

Controlling ROPES Printers

ROPES operator commands may be entered from the Operator Command Menu. This menu contains prompting information for every command, showing the type of data required, the maximum size of the data fields, and the purpose of the command. The operator only needs to “X” the command to be performed, fill in the variable data, and press ENTER. The function is validated and performed, and diagnostic or confirmation messages are displayed. If more messages are generated than can fit on the display, the command processor waits for the operator to press ENTER before message output continues, so no messages will be missed.

Commands may also be entered directly from a clear screen using an abbreviated command format. No prompting is provided, but diagnostic messages are handled in the same way.

Operator commands may also be executed by application programs. The response messages are sent to the terminal or returned to the application

program for processing.

Displaying Status and Information

Operator displays are provided to monitor the activity and status of all aspects of ROPES online operation. The displays show:

- the overall status of ROPES, the Alternate Facility, the SPOOL Transfer Utility and the screen print exit. The product status is also shown, including the licensed CPUs. (ROSS)
- the current status of each ROPES report (RORL)
- the current status of each ROPES Alternate Facility report (ROAL)
- the attributes and assignment of a report (RORS)
- the status and configuration of any or all printers controlled by the terminal at which the request is made (ROPO)
- the status and configuration of any or all printers in the network (ROPS)
- the current status and activity of every printer in the network (ROPN)

JES and POWER Retrieval

ROPES, through its integrated Spool Transfer Utility (RSTU), provides a comprehensive, menu-driven facility for the retrieval of data spooled to the operating system spool queue. Data may be selected using a number of criteria, including the job name, job number, output class and remote or user destination.

Pre-definition of transfer requests, automatic start up and shutdown, continuous or demand monitoring, three activity logging options, easy tailoring, dynamic report name generation and attention to performance considerations make RSTU the most flexible and

efficient Spool retrieval and printing facility available.

Browsing Reports

The ROPES report browse facility gives your users the ability to examine any report at their terminal. Function keys make scrolling up, down, left and right fast and easy. Report lines can be labeled for instant repositioning. A Find command and a Repeat Find key allow you to search for a character string and find its first, last, next or previous occurrence. All or part of the report can be copied into another report for immediate printing or to produce a condensed or summary report.

Utility Programs

Several utility programs are provided to aid you in performing common functions. Included are utilities to copy reports from the ROPES queue to a SYSOUT or other data set, to transfer data from batch jobs to ROPES and to generate screen images for printing and distribution over the printer network and to create Adobe® Acrobat® PDF documents from ROPES reports.

A Report Distribution utility allows you to take a large report and distribute its component parts to one or more ROPES printers. The source report may be stored in the ROPES queue or in an extra-partition transient data set which can be dynamically allocated.

The more recent versions of ROPES have introduced EXCI capable utility functions to allow concurrent access to ROPES from batch and online utilities. The current direction in ROPES is to implement more of these EXCI capable utilities to improve ROPES availability.

Archiving Report Data

The online queue reorganization function will write a

copy of all print data deleted from the queue to a transient data destination specified by your installation. This data set may be saved as an archive of all ROPES report data. This facility is controlled from the system information maintenance menu and may be changed at any time.

The data in the archive may be reloaded to the ROPES queue at any time. The data may also be printed on a batch printer directly from the archive data set. The data retrieved or printed from the archive may be selected by name and creation date and time.

Auditing and Accounting

ROPEs provides a complete audit trail of all commands issued, all response messages from the command processor, all online maintenance activities and all control operator and master terminal operator messages generated, even if they are not displayed. This log is defined on the system information maintenance menu and is a transient data destination which you may assign as an intra- or extra-partition data set.

Accounting data is sent to a user-defined transient data destination. The data captured includes the name of the report, the printer at which it was printed, the start and end time and date of the printing operation, the number of lines printed, the page count, and a count of the write requests issued. The data is provided in EBCDIC for either machine or manual processing. User data can be included in the accounting record. An exit is provided to allow you to supply this data.

Security

Security of data is important to ROPES users. In addition to the normal security provided by CICS and external security packages at a transaction, program or file level, ROPES provides two levels of security for operator commands (printer operators and supervisory operators) and user exits in the application program service module, the command menu processor module, the report browse processor, the Spool transfer control processor, and the Spool transfer data retrieval processor.

Many exit programs and transaction front-end capabilities are also provided to allow you to dynamically control a variety of ROPES activities. Interfacing ROPES transactions and programs to your own application programs and menus is easy.

Finally, some facilities, such as the Job Submission Facility, have a user exit to interface directly with your external security package, such as RACF and any other package with a RACF compatible API.

Command Level Programming

ROPES supports the command level programmer with a wide range of easy-to-use commands. The commands are incorporated into your application program by copying or generating the required command sequence from the language support libraries provided. No special preprocessing is required. COBOL, PL/1 and assembler language command level programming is supported, using the standard command level data areas and techniques.

ROPES application program functions include:

BACKSPACE

read backward, skipping lines

CHECKPOINT

record a report's current status

DELETEREPORT

delete data stored by an application

ENDLINES

end report generation

ENDREAD

end report retrieval

FINDREPORT

check a report's existence and current line count

FORWARDSPACE

read forward, skipping lines

PREPARE

prepare the ROPES data areas

READLINEBACKWARD

read the previous line from a report

READLINEGROUP

read a group of lines from a report

READLINE

read a line from a report

READONLYPREPARE

prepare the ROPES data areas for read-only processing

RESETREPORT

delete all data stored in a report

SENDLINE

send a line to a report

SENDLINEGROUP

send a group of lines to a report

TERMINATE

end processing for an application

ROPES provides an interface between your application programs and the ROPES command processor.

Concurrent Batch and Online Operations

The Alternate Facility allows your batch applications to write data to ROPES reports while ROPES is running online. This function is transparent to your application and does not require the use of the operating system Spool or SVCs. The Alternate Facility data is stored on a special ROPES queue, and the online Alternate Facility processor automatically transfers the data you store to the normal ROPES queue. Alternate Facility maintenance is performed online, the Alternate Queue is automatically reorganized by ROPES, and operations can be started and stopped through the CICS start-up and shut-down PLTs for maximum availability and ease of operation.

| Certain functions can also be performed using the
| ROPES EXCI Interface and the ROPES utilities that
| have been designed to use that interface.

The ROPES EXCI Interface

The ROPES External Interface feature is available in ROPES Version 10.0 and above. It provides a mechanism whereby a batch process (client) may communicate with a CICS process (server) to update ROPES resources under CICS control. This feature of ROPES has been added to extend CICS operation time and reduce the "batch window" requirements for ROPES. Several utility functions are offered with the new ROPES External Interface at this time. Many new utility functions will be created to exploit this new feature of ROPES with future updates and releases.

The ROPES External Interface feature uses the CICS External Interface (EXCI) to communicate between the batch and online environments. The External CICS Interface uses CICS/MRO facilities to provide communication between the CICS and batch environments. This means that CICS/MRO facilities must be available in order to use the ROPES External Interface Feature.

Standby Access To ROPES for Applications

Comparable to the Alternate Facility is the Standby Facility. The Standby Facility provides a method for online applications to create ROPES reports even if the primary ROPES facility is down for maintenance and the primary facility files are close or the primary facility file owning region is down. The application data will be written to a separate set of ROPES data sets and this is done transparently, so the application code does not need to be changed in any way. Once the primary ROPES facility is started, a task can be initiated automatically to transfer data from one or more application region Standby Facility data sets to the primary ROPES files.

ROPES Web Interface

The ROPES Web Interface is a basic working example of how ROPES might be presented to the end-user through a Web Browser interface. It can be used as is or tailored to accommodate your installation's needs or preferences. A sample security

exit is also provided. It is expected that your installation will modify this exit to meet your own security requirements.

The current implementation does not permit an end user to edit or alter any ROPES information. This is planned for a future release. However, you should note that unless otherwise restricted, the end user can view any report contents in the system.

The ROPES Web Interface uses the ROPES Business Logic and Business Transaction Services Container Services modules previously released, and one new module of each type that is being released concurrent with the introduction of the interface (see above). We have released this version of the web interface in source code as well as object code format so that you may use the programs as examples of how this can be done, and it does not require you to directly interface with the internal ROPES controls or require you to process the ROPES data sets directly.

Business Logic Modules

ROPES includes several "business logic" modules that you can use within your own applications to obtain ROPES data through a COMMAREA that will allow your programs to access the data without being dependent upon a knowledge of the ROPES files and internal rules. These modules can be used to assist you in incorporating SOA solutions that include ROPES information.

Business Transaction Services (BTS) Support For Your Applications

ROPES includes several modules that you can use within your own applications to obtain ROPES data through a CICS BTS Container that will allow your programs to access the data without being dependent upon a knowledge of the ROPES files and internal rules. These modules can be used to assist you in incorporating SOA solutions that include ROPES information.

Maintenance

ROPES control information is maintained online through a structure of menus. The menus allow the selection of the maintenance function to be performed, the definition, alteration and deletion of reports, the definition, alteration and deletion of printers, the assignment of reports to printers, the specification of certain transaction codes, the specification of system parameters and the initiation of a queue reorganization.

| Batch utilities are provided to perform various
| functions, including maintenance of ROPES data.
| While most of these utilities require that the ROPES
| data sets be closed in CICS, several utilities use the
| ROPES EXCI interface to allow concurrent batch and
| online access to the ROPES data set.
|

customers. These custom changes are made available to all customers through periodic mailings, new releases and by customer request. If you find that you need a modification to ROPES, please call or write requesting the change. Please be as specific as possible.

Installation

ROPES installation is simple. After restoring the program and source libraries from the distribution tape, the user needs only to define the ROPES data sets, load them from the starter data sets provided, copy the CICS table entries provided into the PPT, PCT and FCT, compile the CICS tables (migrate them to the CSD, if desired) and bring up CICS. All other installation activities are performed online.

| Beginning in ROPES V16, a Migration Utility has
| been provided for each new release to insure that
| ROPES file changes necessitated by new ROPES
| features can be applied as needed during release
| upgrades.
|

Tailoring ROPES

Most ROPES installations do not require custom tailoring. However, if your installation requires tailoring of certain device attributes, forms control blocks and default spool transfer parameters, this tailoring is accomplished by assembling simple tables which are generated with macro instructions. This tailoring is usually done just once, when the system is installed. Thereafter, all maintenance is usually done online. Complete instructions for this one time tailoring are provided.

In addition to the above facilities, Axios develops custom changes to ROPES at the request of our

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