IBM

IBM System/38

IBM System/38
Installation Manual—
Conversion Planning

Preface

This publication is a planning guide for installing the System/38. It is intended for the DP manager and programmers involved in the installation of the System/38.

The major topics covered are:

- Introduction to System/38 Planning

- System/38 Installation Considerations

- The Installation Plan

Notes:
1. This manual follows the convention that *he* means *he* or *she.*
2. Some of the publications listed below can be ordered now; others will be available later. Where the name of a publication is followed by an order number, that publication can be ordered now.

Prerequisite Publications

- *IBM System/38 Introduction*, GC21-7728

- *IBM System/38 Control Program Facility Concepts Manual*, GC21-7729

Related Publications

- *IBM System/38 Control Program Facility Reference Manual—Control Language*

- *IBM System/38 Control Program Facility Reference Manual—Data Description Specifications*

- *IBM System/38 Control Program Facility Programmer's Guide*

- *IBM System/38 RPG II Reference Manual and Programmer's Guide*

- *IBM System/38 Source Entry Utility Reference Manual and User's Guide*

- IBM System/38 Data File Utility Reference Manual and User's Guide

- *IBM System/38 Query Utility Reference Manual and User's Guide*

Contents

This planning guide is intended for the wide range of users who will be transferring their existing applications from current environments to System/38. It is intended to help you develop and keep up-to-date a customized plan suited to your particular installation objectives. The amount of planning and effort necessary to make the transition will vary depending upon your current operating environment and your application goals on System/38. A sample plan is provided in the back of this manual that addresses most installation activities. You may use this plan as a starting point and customize it to your goals. Following the sample plan are blank planning forms that can be copied and filled out.

Your planning may already be underway in areas such as application development, introductory education, or physical site preparation. In this case, the installation plan can be used to document the effort to date and plan the remainder of the installation.

Before developing a general installation plan, you should be familiar with the contents of the *System/38 Introduction* and the *CPF Concepts Manual*. The detailed installation plan may require additional reading or formal education, depending on the complexity of your installation goals.

This manual is organized as follows:

Chapter 1. Introduction to System/38 Planning: The importance of planning is discussed along with some of the overall factors that should be considered in an installation plan.

Chapter 2. System/38 Considerations: The key system enhancements and differences that should be considered are discussed.

Chapter 3. The Installation Plan: The points of a comprehensive plan are described to assist you in constructing your installation plan.

Chapter 4. The System/3 Conversion Utility Program Product: This chapter introduces the Conversion Utility and how it fits into the conversion of System/3 to System/38.

Appendixes: The appendixes contain information about converting existing code to System/38 and the working documents needed to construct an installation plan.

Forms: Following the appendixes are the working documents needed to construct an installation plan.

Chapter 1. Introduction to System/38 Planning

The function and price performance of System/38 provides opportunities to process many new and advanced applications that may not have been feasible on previous systems. To take advantage of these opportunities, goals should be established, including reevaluation of any current application plans, and reflected in your installation plan. These goals should consider both long and short term objectives and address new applications, enhancing existing applications or running current applications on the new system.

Defining these goals should be the starting point of your installation plan. Here are some questions that may help you define your goals or update those you now have to reflect the capabilities of System/38.

1. Which new functions will mean the most to your processing requirements?

2. How can you take advantage of these functions?
   a. Short term
      - New applications?
      - Redesign of current applications?
      - Other?
   b. Long term
      - Additional new applications?
      - Redesign or replace old applications?

3. What impact will business cycles have on the time of installation?

4. What resources will be available?
   a. For conversion?
   b. For other activities like new appplications and maintenance?

5. What current jobs must be converted to run on System/38?

Your goals for data processing should also reflect the objectives of your organization. Therefore, it is important to have executive involvement, understanding, and agreement with your processing goals. Having defined or redefined your goals, they should become the basis for your installation plan and updated as your plans are implemented or your needs change.

WHY A GOOD PLAN IS IMPORTANT

A good installation plan should be customized to meet your needs and should contain a level of detail that supports your goals and objectives. If developed and maintained a good plan:

- Provides you with a good understanding of the installation process

- Allows you to measure the progress of the installation process

- Allows you to communicate the scope and progress of the installation process to others

- Helps maintain project direction

PLANNING CONSIDERATIONS

After defining your goals and realizing the importance of a good plan for installing your system, the next step is to consider the areas that your plan should address. These areas include:

- Resources—personnel assignments and system facilities

- Education—formal and in-house

- Physical planning—system and site preparation

- Applications-conversion—development and maintenance

- Documentation

- Data file transfer

- System installation/cutover period

Following is a brief discussion on each of these areas as it applies to your installation plan.

Resources

In the development of an installation plan, the resources of time, manpower, and support facilities are important factors. A realistic installation plan is one that addresses these resources and takes into consideration such things as vacations, education, applications development, business cycles, peak system loads, and machine time for development, conversion, and testing. The plan should also be flexible enough to handle unanticipated changes.

Personnel assignments relative to installation activities should be made as early as possible, especially the coordinator for installation/conversion. The coordinator should be the focal point for installation activities, monitoring progress, defining and scheduling support facilities like test time and media, and interface with IBM and user department representatives.

System/38 test facilities will be provided at most IBM locations. Your IBM representative can explain the provisions for using these facilities or for testing on your own or another system. IBM provides an installation test allowance period on System/38 so you can use your own system for testing and conversion activities before transferring regular processing to the new system.

Additional disk packs, tapes, or diskettes may be needed during the installation process. This can be determined early in the planning phase and arrangements made to have them available when needed.

Education

Knowledge of the system and how it can be used are key elements in taking advantage of the System/38 capabilities. IBM has a comprehensive set of courses to address a wide range of user installation requirements and, later growth requirements. A summary of these courses is provided in Appendix E.

Note: Check with your IBM representative for a current list of all courses.

Some questions you should address in developing your education plan are:

1.   What education do you need?

2.   When is this education needed?

3.   Who should be educated?

4.   When can they go?

With this information defined, your IBM representative can then help match your needs with the availability of courses and schedule them for you.

In addition to formal education courses, user department education, management briefings, and operator education may be planned and scheduled.

Physical Planning

The physical planning for System/38 includes electrical requirements, environment control, space requirements, and work station considerations. Detailed information on physical planning is contained in the *System/38 Installation Manual—Physical Planning*, GA21-9293. Physical planning should be discussed in the Phase I review meeting with your IBM Marketing Representative.

Applications

Current application conversion and new application development typically account for the largest number of installation activities and the most time and resources. Addresssing these applications also represents many opportunities to take advantage of new System/38 functions. Because of the impact on the installation plan and the significance of the new function, it is most important to clearly understand installation goals and carefully consider the options available when addressing applications for System/38.

While new application development provides an automatic opportunity to use new capabilities, there are several options that should be considered for current applications. The options for addressing one or more of your current applications are:

- Replace with new applications

- Redesign existing applications

- Recode to enhance current applications

- Use existing code and design with required changes

- Discontinue applications no longer needed

Certain applications lend themselves very nicely to being redesigned using System/38 functions. For instance, online inquiries, online data entry, and online file maintenance functions can be accomplished on System/38 using the Interactive Data Base Utility or simple RPG programs. Through application redesign you may realize significant advantages in application functions, performance, and maintainability. This approach is recommended whenever the advantages justify the additional resources required and those resources are available.

You may also choose to enhance existing applications, which could provide many new function benefits but require less resources than redesign. For instance, adding online inquiries or file maintenance functions to existing batch applications is a relatively small effort which could provide more responsive, accurate data to user departments. This approach is especially applicable to jobs written in a compatible programming language where extensive recoding or redesign is not required. Since all current programs need to be at least recompiled on System/38, installation may be an opportune time to make these enhancements.

For other applications, a direct conversion to System/38 may be the best approach. Most System/3 RPG coded programs can be recompiled and run on System/38 with only minor changes to the Header and File Description statements. System/3 Auto-Report is compatible with System/38 Auto-Report, and no changes are required. System/3 OCL and procedures can also be readily converted to System/38 CL, and disk sort functions (except Summary Sort) can be replaced with logical files or Conversion Reformat Utility. This approach to current applications running on System/38 involves a minimum of change to design and operation and allows applications to be run in native mode. However, taking full advantage of System/38 functions may still require some recoding or redesign at a future time. The most significant advantage of this approach is that it requires the least amount of time.

System/3 users considering direct conversion for any of their applications should consider using the System/3 Conversion Utility Program Product (described in Chapter 4). This utility automates many of the tasks described above and runs on most models of System/3. With this utility most conversion activities can be performed on your own System/3 before installing System/38.

A new system installation can be an ideal time to add new applications if enough time and resources are available to design, code and test new programs. New application development activities should give priority to reducing the conversion effort by replacing current applications. It may, however, be desirable to defer new application development until after the System/38 is installed. In either case, careful planning is essential to a smooth conversion and installation.

Documentation of Current Applications

The documentation you have on your current applications is an important factor when moving any of them to System/38. This documentation can be in the form of system flow diagrams, program flow diagrams, source program listings, data file record layouts, or operating procedures. Gathering and organizing existing documentation is an important activity that can be done early in the preinstallation period.

Data file information describing files, records, and fields helps to define your System/38 data base files. Also, key fields and sort fields must be looked at to determine how the files are accessed in your current applications. This information is needed to determine the access paths needed to run your present applications on System/38 and make your System/38 data base meaningful and easy to use.

Documentation and cross reference aids may be used to analyze your current system. Programs such as System/3 Data Base Techniques Field Developed Program allow you to resolve duplicate file names and develop more meaningful and standardized field names which will help improve the final conversion product. For Auto Report users, data file definitions are more meaningful and easier to develop when program copy modules can be referenced.

System/3 users can also use the System/3 Conversion Utility as an excellent guide to gathering and documenting the elements for conversion. It provides a methodology to help identify duplicate names, missing files, OCL or programs, and organize these elements for easy modifications or updating.

It is important that any manual operations in your present applications be documented so their purpose in the work flow can be fully understood. Manual operations are excellent candidates for new or expanded applications.

Appendix F contains a list of suggestions for standardizing and documenting your present applications.

Data File Transfer

Since System/38 uses the concept of fixed disk storage, a plan must be established to:

- Select a medium common to both systems, such as tape or diskette

- Determine the volume and time requirements for data transfer

- Establish file activity cutoff

- Transfer current files to the interchange medium

- Load current files to the System/38 data base

These activities must be carefully planned to avoid last minute problems at cutover time.

System Overlap Period

While most users will want to complete conversion as soon as possible, many will find that overlapping the availability of the old and new systems for a time can provide a smoother and quicker conversion. The concept of overlapping systems as used here means installing and using your System/38 to complete program compiling and testing, operator orientation, and other installation activities while daily processing continues on your previous system. This concept does not mean parallel processing of work on both systems although the option is available.

Overlapping systems will allow you to complete testing on your configuration, reduce trips to a test location, provide a more flexible cutover period, and probably help you install and convert sooner. Overlapping systems can also minimize the impact on user departments and provide an in-house training facility that may be especially important to online user departments.

Overlapping systems will alter the physical site requirements such as space, power, cabling, and air conditioning. There may also be other resources required for this period which may cause temporary changes in daily schedules.

Contact your IBM Marketing Representative for facilities to assist you at cutover time.

Chapter 2. System/38 Installation Considerations

The System/38 hardware and software provides many new functions and expanded capabilities. In providing these functions, new and different techniques are employed which must be considered in developing your installation plan. The topics discussed in this chapter highlight the System/38 features that may impact your plan.

This chapter assumes that you have a general understanding of System/38 facilities presented in the *System/38 Introduction* and the *CPF Concepts Manual*. References to additional information on the topics presented in this chapter will be made where appropriate.

STORAGE MANAGEMENT

The key to System/38 storage management is the concept of objects. All information stored on the system is stored in object form and is processed by functions that operate on objects. An object is a named collection of data that exists on the system. Some examples of objects are:

- Programs

- Files

- Queues

These objects can be accessed by name without regard to where they are actually stored on the system.

Objects on System/38 are grouped into libraries. Libraries allow more specific identification of objects and allow better system organization. Two libraries are provided with each system, the system library, used for CPF objects, and a general purpose library, which is a default library when no other library is referenced. You may create as many additional libraries as you need to meet your requirements. When planning your library structure you shouuld decide:

- How many libraries will you need?

- What programs and files will be in each library?

- Who will have access to each library?

Some points to consider when planning your library structure are:

- Application grouping – For ease of documentation and ease of use, it may help to group your objects by application. This is similar to the current practice of grouping related programs and files onto the same disk pack or module.

- Backup and recovery – To facilitate backing up key files you may want to group them into one library. In this way, a single command (Save Library) can be used to save or restore the entire library.

- Offline storage – Although it is desirable to have your entire data base online, you may want to store a portion of it offline and restore it when needed for processing.

The information on libraries in the CPF Programmer's Guide will help you plan your library structure to suit your needs.

WORK MANAGEMENT

System/38 utilizes a new concept that uses job descriptions to manage system resources and manage the work flow on the system. This concept offers a significant improvement over traditional work management facilities. Although the system manages the work flow, you must tell the system how it should be managed. Through job statements and other CL commands, you can establish priorities and the sequence of jobs used by the system. You can also arrange your jobs so certain applications are always available or assign specific work stations to be used in an application. Once you have established job descriptions the system uses them to manage the work flow. The following topics highlight some of the concepts used in System/38 work management. More information on work management is contained in the CPF Concepts Manual and the CPF Programmer's Guide.

Subsystems

To manage the work being done on the system, System/38 must control many factors, such as device availability, processing time, and the use of storage. In addition, the execution of interactive jobs and batch jobs must be managed. To perform these functions efficiently, subsystems are used. A subsystem is essentially a system operating within a larger system, with a subset of the system resources assigned to it by the user. On System/38, a subsystem is an operating environment that is available to the jobs operating within it. IBM provides three subsystems designed to meet the requirements of most System/38 users. They are:

- An interactive subsystem, for interactive jobs submitted from work stations.

- A batch subsystem, for batch jobs executed from the batch queue.

- A spooling subsystem, which controls spooling functions.

You can also define any number of your own subsystems, called user defined subsystems. In this way, you can design a work environment that meets specific application requirements.

As part of your installation plan, you should allow time to do the appropriate subsystem planning. You should determine in which subsystem various jobs will be run and determine if any user-defined subsystems are to be used. This process is similar to planning partitions on System/3. However, you have much more flexibility since there are no storage restrictions or limit to the number of subsystems you may have. If user subsystems are defined, the appropriate resource allocation of storage, time, and job limits must also be determined.

Multiprogramming

System/38 is a multiprogramming system. It accepts and processes requests from a work station user independently of what other work stations are doing. The system can also process batch jobs while it is processing interactive jobs from work stations. To provide this multiprogramming support, the system must manage both system resources and the work flow on the system.

When moving current applications to System/38, you must plan your jobs to execute in the right sequence. Present systems using the partition concept can execute one job at a time within a partition. The System/38 uses a subsystem concept that allows multiple jobs to execute concurrently within the same subsystem. This concept requires that the sequence in which jobs are executed be controlled differently. Some of the methods used to control job execution sequence on the System/38 are:

- Group sequence dependent programs into a job – The programs within a job are executed sequentially.

- Limit the activity level of the subsystem – This controls the number of jobs that can execute concurrently within a subsystem.

- Use user-defined subsystems – This allows the initiation of jobs to be controlled by the system operator.

You can move your present job streams to System/38 so it will run similar to your present environment, one job per subsystem, or you may modify your present job streams to make better use of System/38 multiprogramming capabilities.

Jobs

A job is a single identifiable sequence of processing actions submitted to the system as a group. Work on the system is identified, scheduled, and controlled through the job to which it belongs. A job log is maintained by the system for each job as it executes and entries in the job log are made for processing actions, completion messages, and error messages that occur during the job. There are two types of jobs on System/38: interactive and batch.

Interactive Jobs

An interactive job is all the work performed as a result of input received from a work station user from sign-on until sign-off.

Batch Jobs

A batch job is a job in which the processing actions are submitted as a predefined series of actions without dialog between the user and the system.

DATA MANAGEMENT

System/38 data management maintains the file/record/field concepts of previous systems but has additional functions that greatly increase the file sharing, data independence, and data retrieval capabilities that are required in interactive work station environments. This provides program compatibility but also provides an opportunity for growth. When evaluating your data conversion needs, you should examine the data base functions available on System/38 and determine where they might be beneficial.

All data files are defined by data description specifications (DDS) to the system at least to a record level and if needed, to a field or subfield level. The lower level description can be used as externally described fields for RPG programs. Being system defined, they can also be used by other functions such as inquiry and query. Therefore, when developing your file definitions the following points should be considered.

1.   To what degree will I use system defined data in my programs?

2.   What user departments will use the description for inquiry or maintenance functions?

There are two types of files on System/38: physical and logical. A physical file actually contains data records. Conceptually, it is the same as data files on present systems. Records can be retrieved in arrival sequence.

A logical file is a data base file through which data from one or more physical files can be accessed in a format and organization that can differ from the physical representation. It contains no actual data, but rather a definition for how to retrieve and format the records from physical files.

When moving files from another system, the simplest and most direct conversion method would be to make all existing files physical files on System/38.

However, logical files can be of significant benefit. Logical files allow you to:

- Access a single data file in multiple sequence, simultaneously.

- Reduce redundant transaction files (often the product of sorts or copies).

- Eliminate sorts from your job stream.

Therefore, when planning your data conversion, evaluate the potential of using logical files. More information on data management can be found in the *CPF Concepts Manual*.

APPLICATION DEVELOPMENT

System/38 provides many functions that make application programming easier and more efficient than on previous systems. Through the use of CPF functions and other System/38 programs, most application development activities can be performed interactively from a work station.

When developing your installation plan, one of the key areas of that plan, and potentially one of the most exciting will be new application development. This section discusses some of those enhancements that may prove beneficial to you when developing applications. Additional information can be found in the *CPF Concepts Manual*.

Message Handling

Communication between users and programs on the System/38 is supported by the message handling facilities. The CPF supports message types that allow information, inquiries, requests, and replies to be sent between users and programs. Also supported are completion and diagnostic messages to provide information about the status of work on the system. More information on message handling is contained in the *CPF Concepts Manual*.

High-Level Language

Application programs for the System/38 are written in an expanded version of RPG II. Functions have been added to make RPG more work station and data base oriented. For example, no special coding is required to write an interactive on-line program. The work station formats are described outside of the program and read or written by the EXFMT operation. The addition of several file control operation codes (OPEN, CLOSE, READE, READP, WRITE, UPDAT) allow the programmer to control all the input and output operations for a file if he desires.

Also with the comprehensive control language and enhanced Interactive Data Base Utility (IDU) many functions which previously required a high-level-language program can now be more productively accomplished using the utility or control language.

Utilities

Interactive Data Base Utility (IDU)

This utility consists of a set of three separate utilities that are executed from a work station. Each utility is discussed in the following paragraphs. The System/38 user should consider the functions provided by the IDU and how they can be used to enhance existing and new applications.

Source entry utility (SEU) — The source entry utility provides an interactive method of entering source (CL, programs, DDS) into the System/38. This utility, in combination with other programmer services, provides a powerful tool for the programmer to code and test new applications and maintain existing applications. More information on the source entry utility is in the *Source Entry Utility Reference Manual and User's Guide.*

Data file utility (DFU) — The data file utility provides the System/38 user the capability of interactively defining a data entry or simple file inquiry program for a work station. The program can then be executed and the data entered or inquiry made. The System/38 user should consider replacing existing data entry and inquiry programs with this utility. More information on the data file utility is contained in the *Data File Utility Reference Manual and User's Guide.*

Query — The System/38 Query facility gives the user the ability to interactively define and execute complex queries against data base files. This facility should be considered for impromptu management reports and complex inquiries. More information on the Query utility is contained in the *Query Utility Reference Manual and User's Guide.*

Conversion Reformat Utility

This utility is similar to the System/3 sort and provides ease of conversion for System/3 users. It provides the System/3 sort function with the exception of summary sort. System/3 summary sorts must be reprogrammed using either System/38 RPG or the Query function of the IDU. More information on this utility is contained in the *System/38 Conversion Reformat Utility Reference Manual*, SC21-7780.

CL Language

The language supported by the CPF is the System/38 control language (CL). All system functions are controlled by this single consistent interface. The CL on the System/38 can be used in three ways; entered individually from a work station, entered as statements in a batch job stream, or used as source statements and compiled into a CL program. For information on using CL, refer to the *CPF Concepts Manual* and the *System/38 Introduction*.

OTHER SYSTEM FACILITIES

On any data processing system, there are activities and procedures that are necessary for managing the control and use of the system. These activities are part of designing and developing a system to meet the needs of the organization that uses the system. The system facilities provided by the System/38 allow for you to design your own unique system. The following paragraphs discuss some of these facilities.

Security

On an interactive system such as System/38, the implementation of controls that ensure data integrity and security becomes especially important. Without these controls, the potential for data being misused or destroyed increases.

Ultimate control over the entire system is given by installation management to an individual identified in System/38 as the security officer. It is he who defines to the system who can use the system and under what restrictions each user is to operate. The collection point for storing users' rights of use and execution environment, is the user profile. Through the issuance of security related commands, the security officer can modify the contents of existing user profiles and can both create new and delete existing profiles. This capability permits you to tailor your System/38 to meet your needs. Commands, I/O devices, work stations, and files can be controlled using these security facilities.

When your System/38 is installed, it includes a set of predefined user profiles that allow the use of all system functions. It is your responsibility to define and implement the appropriate profiles to ensure your specific security requirements are met. As your application base increases, you may find it necessary to reevaluate your security definitions and enhance them to maintain a secure operating environment.

Backup/Recovery

In developing new applications or converting old ones, consideration should be given to backup/recovery. While not essential to the running of an application, backup/recovery procedures are necessary to ensure a timely and complete recovery after certain types of program and system failures.

The System/38 provides for large amounts of on-line information on fixed storage devices. New procedures may have to be designed so that the key active files are recoverable.

System/38 provides comprehensive save/restore facilities which can be used to develop good backup/recovery procedures. More information on backup/recovery is contained in Chapter 2 of the *System/38 Introduction* and Chapter 6 of the *CPF Concepts Manual*.

Input/Output Devices

The System/38 supports the 5250 Information Display System, Diskette Magazine Drive, 5424 MFCU, and the system printers as input/output devices. The key element in that device support is the device file. It contains a description of the particular device and is referenced by the system when data is transferred to or from that device. Since the devices are described externally to programs, there is a certain amount of device independence. That is, the programmer can alter the device being referenced in a program simply by modifying the device file without having to change or recompile the program.

General device descriptions for nondisplay devices are provided with your system. You may want to enhance them by adding additional file information such as record descriptions and device control information. Additional descriptions may have to be built to provide unique device information required for certain application programs.

Display device support is even more advanced in that the device files also include all the necessary screen layouts as described by data description specifications. When developing new or converting on-line applications, one of the elements that should be evaluated is planning how existing work station descriptions need to be modified or enhanced or if new descriptions should be developed. More information on device support is contained in the *CPF Concepts Manual*.

If you currently have non-5250 work stations installed, another consideration when developing your installation plan should be your cutover procedure. For those applications that will be switching to 5250s, it is important that any required operator training and testing be sufficiently completed to make the transition as smooth as possible. This is one activity that could be completed during an overlap period.

Although 5250s are normally connected to System/38 using twinaxial cable, to facilitate work station cutovers IBM offers a special adapter that can be purchased which allows 5250 work stations to be connected to coaxial cable. Using this facility, one additional work station may be added to a coaxial cable using the work station Cable Through feature. If however, you are planning to increase the amount of work stations installed on your system, in the near term it may be beneficial to change to twinaxial cable. In either case, the proper planning must take place.

This chapter highlights the main points of an installation plan. The items discussed are listed in the installation plan in the back of this manual. Space is provided in this chapter and in the planning sheets to add, modify, or delete items in order to tailor the activities to your particular needs. Your installation plan should be kept up-to-date and used throughout the installation process.

The guidelines presented in this chapter and the planning sheets in the back of this manual are structured in five phases. Activities defined in any phase may overlap activities in any other phase, as you will see later in this chapter.

The five suggested phases are:

- Phase I. Initial planning and education activities

- Phase II. The detailed plan and installation requirements

- Phase III. Initial application conversion/design and test

- Phase IV. Preinstall phase

- Phase V. System/38 installation and cutover

PHASE I. INITIAL PLAN AND EDUCATION ACTIVITIES

The objectives of Phase I are:

- Gain a basic understanding of System/38 installation

- Verify the order and installation objectives

- Prepare to define a detailed installation plan

A. Initial Planning

Initial planning should involve the DP manager, IBM SE, and marketing representative. The following should be considered:

1. Review and commit the installation objectives.

2. Appoint a coordinator who will control and track the installation effort.

3. Appraise conversion alternatives, evaluate personnel requirements, and layout a general installation plan.

4. Evaluate conversion and documentation aids such as:
   a. System/3 Data Base Techniques
   b. Cross Reference Aid
   c. System/3 Conversion Utility Program Product

5. Set up review procedures with management.

6. Evaluate educational needs and schedule formal and informal education. An education summary is contained in Appendix E.

7. Evaluate the conversion impact on business over the installation period. (Consider the business cycle effect on testing and cutover.)

8. Review the system configuration and specifications.

9. Order publications and program products, and update the system library subscription service (SLSS).

10. Order forms needed for conversion or new applications.
    a. DDS forms
    b. RPG forms

11. Order any additional storage media needed for conversion/installation.
    a. Tapes
    b. Diskettes
    c. Disk

B. Education

As part of each phase, certain courses are recommended. Appendix E contains information that will help to plan education.

C. Determine and Collect Information Needed For:

1. Performance evaluation — If you are doing performance evaluation, the data requirements should be discussed with your SE.

2. Conversion of existing applications.
   a. Operational information
      - Run books
      - Operator instructions
   b. Work station documentation
      - Operation instructions
      - Display differences
   c. Source
      - High level language source listings and machine readable source
      - Screen definitions listings and machine readable source
      - Assignment set or equivalent
   d. Application documentation
      - System flow diagrams
   e. Utilities
      - Sort and copy specifications
   f. File documentation
      - File and record layouts
      - VTOCs
   g. OCL and procedures

3. New Applications
   a. Program requirements
   b. Program specifications

D. Plan Physical Installation Requirements

1. Resolve
   a. Installation/removal dates (special consideration if overlap period is involved)
   b. Facility requirements (electrical, environmental)
   c. Cutover procedures
   d. Work station installation plan

E. Phase I Review Meeting

The review meeting should include your management, the SE, and the marketing representative. The items discussed should include:

1. Conversion objectives

2. General plan

3. Education

4. Physical plan

5. Cutover plan

6. Tracking procedures

7. Contingency plan

PHASE II. DETAIL PLAN AND INSTALLATION REQUIREMENTS

The objectives of Phase II are:

- Identify detailed installation requirements and schedule activities.

- Gain System/38 installation skills.

- Install conversion utilities if used.

- Confirm system configuration.

A. Define and Schedule Detailed Installation Plan

This is the time to schedule the following:

1. Education

2. Equipment schedules

3. Manpower constraints

4. Software arrival dates

5. Test machine availability

6. User machine availability

7. Publication availability

8. Cutoffs for current program development and maintenance

B. Education

The following education activities are suggested during Phase II.

1. Formal Education
   a. See Appendix E.

2. Informal Education
   a. In-house seminars

3. Management Education
   a. Update seminar

C. Conversion Preparation

1. Install conversion utilities (if used).
   a. Establish disk work areas.
   b. Validate installation.

2. Identify any missing procedures or source programs.
   a. Gather missing information

3. Determine duplicate files and resolve them.

4. Select the application conversion sequence.

D. Application Development Preparation

1. Review specifications and requirements.

2. Design the application.

3. Design the program.

4. Consider an application package.

E. Complete Physical Planning With IBM Customer Engineering

1. Floor plan

2. Electrical requirements

3. Air conditioning modifications

4. Work station locations
   - Temporary and permanent
   - Cable planning (coaxial/twinaxial)
   - Modems
   - Remote/local

F. System Facilities Planning

    1.   CPF options

    2.   Offline storage requirements

    3.   Subsystem definition resources allocation

    4.   Spool options

    5.   Security

    6.   Recovery

G. Phase II Review Meeting

The Phase II review meeting should include the DP manager, SE, and marketing representative. The topics discussed should be:

    1.   Confirm the system configuration
        a. Confirm the work station requirements

    2.   Evaluate the progress of the installation plan
        a. First application conversion or rewrite
        b. New application design
        c. Education requirements met
        d. Overlap and cutover
        e. TP network changes

    3.   Physical planning

    4.   Documentation changes
        a. Operational
        b. Application

PHASE III. INITIAL APPLICATION AND TEST REVIEW

The objectives of Phase III are:

- Complete the first test on System/38 of the converted or new application.

- Validate the installation plan.

A. First System/38 Test

Preparation at customer location

1. Create and save test data.

2. Convert the first application or code a new application.

3. Dump the converted application to the interchange medium.

4. Write any remaining programs needed to test the application.

First test at GSC:

5. Load converted programs, new programs, and files.

6. Compile all programs.

7. Test programs.

8. Make changes and retest if necessary.

9. Save all output.

B. Post Test Evaluation

1. Evaluate test results.

2. Make appropriate adjustments to the installation plan for:
   a. Education
   b. Documentation
   c. GSC time scheduled
   d. Test procedures for performance, work station operation, and interrelationships between files and programs

PHASE IV. PREINSTALL PHASE

The objectives of Phase IV are:

- Complete final preparation for System/38 installation

A. Complete Application Conversion

1. Convert remaining applications.

2. Correct any problems.

3. Save output on the interchange medium.

B. Complete Design and Coding New or Expanded Applications

C. Prepare for GSC Test Sessions

    1.   Consider overlapping the testing and compiling.

    2.   Collect and load needed programs, CL, and test data to interchange medium.

D. GSC Test Sessions

    1.   Load the files, CL, and data definitions.

    2.   Compile the programs.

    3.   Test the applications.

    4.   Save the results.

E. Evaluate Results

    1.   Ensure preinstallation testing procedures are completed.

    2.   Identify additional educational requirements.

    3.   Assess the current schedule.

F. Review File Definition

    1.   Ensure that DDS is structured to meet the requirements of all applications.

G. Create or Modify Documentation

    1.   System operator

    2.   Work station operator

    3.   Remote users

    4.   Backup procedures

H. Complete Preinstall Informal Education

    1.   Departments

    2.   Remote locations

    3.   Executive

    4.   DP personnel

I. Complete the Physical Site Modifications (Work Station-Remote and Local)

J. Phase IV Review

The Phase IV review should include the DP manager, SE, and marketing representative. Topics discussed should be:

    1.   Ship schedules.

    2.   Current schedule.

    3.   Review cutover plans.

    4.   Ensure proper installation resources.

    5.   Ensure that the physical site preparation is complete.

PHASE V. INSTALL SYSTEM/38 AND CUT OVER

The objectives of Phase V are:

- Install System/38.

- Complete testing requirements.

- Cut over to new system.

A. System/38 Installation

    1.   Ensure all programs are converted and compiled.

    2.   Data transfer plans in place.

    3.   Load CPF and other program products, and perform system specialization.

    4.   Restore converted/compiled programs.

B. Install Work Stations

    1.   Temporary/permanent locations

    2.   Phased or complete installation

    3.   Local and remote

C. Systems Overlap Activities

    1.   Perform data transfer for test files.

    2.   System tests for key applications.
           a. Application tests for new programs.
           b. Volume tests if needed (performance evaluation).
           c. Remote tests.
           d. Verify backup and recovery procedures.

    3.   Complete operator education.
           a. Work station user department
           b. System
           c. Remote work stations

    4.   Perform system tuning adjustments as necessary.

D. Final Cutover

    1.   Transfer the converted data to the interchange medium.

    2.   Load on System/38 at GSC if necessary.

    3.   Restore on your system.

    4.   Perform final application tests.

E. Remove Old System

Chapter 4. System/3 Batch Conversion Utility Program Product

The System/3 Batch Conversion Utility is a one-time-charge program product that automates the details of conversion while allowing you to be in complete control of the overall conversion process.

The System/3 Batch Conversion Utility converts the programming elements of a System/3 installation to their System/38 equivalent. This includes:

- Converting RPG II source programs to System/38 RPG source programs

- Converting RPG II Auto Report source programs to System/38 RPG Auto Report source programs

- Converting System/3 Procedures to System/38 CL Programs

- Converting System/3 OCL to System/38 CL

- Converting selected System/3 Utility statements to their System/38 equivalents

- Generating data descriptions for System/3 disk files that are to be moved to the System/38 data base

CONVERSION UTILITY OVERVIEW

The conversion is under your control. You may elect to let the utility automatically convert everything that needs converting. On the other hand, you may intervene and choose what is to be converted.

Because corrections may be necessary during conversion and because you may want to alter the conversion output, a comprehensive maintenance service package is included. Through the use of maintenance service, you can resolve and correct statements that need special attention or modify the conversion process so the output meets your particular needs.

Throughout the conversion process, extensive communication is maintained through printouts and messages so you will be able to understand what is happening. In addition, an extensive set of output procedures is provided so you may print or punch any of the elements that are participating in the conversion.

Besides performing the actual conversion, the Conversion Utility generates the interchange medium that will be used to move the converted material from the System/3 to System/38. You choose the interchange medium that fits your system and whether you want to convert your system in steps or do the whole conversion at once.

Figure 1 shows an overview of the Conversion Utility.

The input to the conversion is the user's source libraries, OCL job streams, data files, and procedures.

System/3 Disk

Data Files

Libraries

Card

Tape

Diskette

System/3

Conversion Processing

System/3 Disk

Conversion Utility Programs and Procedures

Conversion processing is the interaction of user's source, conversion working tables and files, conversion programs, and user intervention through utility control statements.

Source Conversion

Conversion Utility Working Tables and Files

Data Description Creation

User Interface

OCL to CALL Conversion Procedures

Utility Control Statements

Generate System/38 CL to Load Converted System

Printed Reports of Conversion Progress

Generate Interchange Media

Converted System That Can be Loaded to System/38

Figure 1. Conversion Utility Overview

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CONVERSION STEPS

The Conversion Utility is an important part of the total conversion effort needed to convert your present System/3 to System/38. Generally the total conversion effort consists of four steps.

1. Plan and Convert

2. Generate Interchange Media

3. Testing

4. Install the Converted System

Figure 2 shows an overview of the total conversion effort and where the Conversion Utility is used.

```
                          ┌─────────────────────┐
                          │   User's System/3   │
                          ├─────────────────────┤
                          │  Plan and Convert   │
                          ├─────────────────────┤                Step 1
                          │  Conversion Plan    │
                          │                     │
                          │  Present System/3   │
                          │  Source Material    │
                          │                     │
                          │  System/3 Conversion│
                          │  Utility            │
                          └─────────────────────┘

  Converted
  Source

                          ┌─────────────────────┐
                          │    GSC System/3     │
                          ├─────────────────────┤
                          │ Generate Interchange│
                          │ Media               │              Step 2
                          └─────────────────────┘
  Converted
  Source on
  Interchange
  Media that
  Can be Read
  by a GSC System/38

                          ┌─────────────────────┐
                          │   GSC System/38     │
                          ├─────────────────────┤
                          │      Testing        │
                          ├─────────────────────┤
                          │ Compile Programs    │              Step 3
                          │                     │
                          │ Create Data         │
                          │ Base Files          │
                          │                     │
                          │ Test Programs       │
                          └─────────────────────┘
  Converted
  System on
  Interchange
  Media that can be
  Read by your System/38

                          ┌─────────────────────┐
                          │   Your System/38    │
                          ├─────────────────────┤
                          │   Install the       │              Step 4
                          │   Converted         │
                          │   System            │
                          └─────────────────────┘
```

Figure 2. Conversion Steps

1. Plan and Convert

The first step of your conversion can be done completely at your location. This includes writing your conversion plan, gathering System/3 source material, and gathering the documentation of your present applications.

Run the Conversion Utility during step 1 to do the actual conversion of RPG II source, utility functions, OCL, and Procedures, and to create the data description specifications (DDS) for your data files. The Conversion Utility is designed to be used in stages. Each stage completes a major task in the conversion process. At the end of each stage, the progress of the conversion can be analyzed from the printed output produced in that stage. The staged approach also allows more realistic scheduling of system time because the conversion can be done in pieces.

The conversion stages and a brief description of each stage are show below:

Install Stage – Copy the Conversion Utility programs and procedures from the PID pack to your pack.

Stage 1.   Create and initialize the working tables and files used by the Conversion Utility programs and load the System/3 source and procedures to an indexed source file.

Stage 2.   Identify all programs and procedures, resolve file naming conflicts, and load the OCL job streams to an indexed source file.

Stage 3.   Convert RPG II and RPG II Auto Report source to System/38 RPG and RPG Auto Report source.

Stage 4.   Generate System/38 data description specifications from RPG II programs, RPG II Auto Report programs, and OCL.

Stage 5.   Convert OCL and procedures to their System/38 equivalents.

Stage 6.   Put the converted system on the interchange medium and generate the System/38 CL to load the converted system to System/38.

2. Generate Interchange Media

Step 2 of the conversion creates an interchange medium that can be read by System/38. This step can be done at your location if you have tape or diskette on your present system. If you use the IBM General System Center (GSC) to create the interchange medium, the output will be a tape that can be read by a GSC System/38.

A detailed description of choosing the interchange medium that fits your needs is in Appendix D of this manual.

3. Testing

Take your interchange medium from step 2 to a GSC System/38. The GSC System/38 will compile your RPG source, create the System/38 data base files, and load your data files to the System/38 data base.

Your converted job streams are now ready to be tested under the System/38 environment.

Finally, step 3 dumps your system to diskette magazines in System/38 save/restore format. The converted system on diskette magazines can be used for future test sessions or installed on your System/38 via the System/38 restore function.

4. Install the Converted System

When your System/38 is installed, the diskette magazines from step 3 can be loaded to your System/38 via the System/38 restore function.

One approach to converting your present applications to System/38 is the job stream approach. A job stream accomplishes a logical unit of work through the exectuion of one or more consecutive programs. The programs can be user written or utility programs, such as sort or copy. Generally, the execution of programs within a batch job stream is sequence dependent (program A must be run before program B).

The following example shows a payroll jobstream and how it is converted to System/38. Although this example is a System/3 job stream, it is representative of the conversion of any batch job stream.

PAYROLL JOB STREAM CONVERSION EXAMPLE

Description of Payroll Job Stream

Assume the time and attendance are verified and entered into the system daily and that maintenance on the employee master file is done weekly or in daily batches.

The weekly payroll job stream consists of:

- PAY01 – A program that reads the employee master file (EMPMAS) and the daily hours file (HOURS); and writes a current earnings file (CUREARN) consisting of total hours and gross pay for each employee as well as current deduction and tax status information, name, and social security number.

- PAY02 – A program that reads the current earnings file (CUREARN); computes all taxes, deductions, and net pay; and updates CUREARN with this information.

- PAY03 – A program that prints a deduction register in clock number sequence by reading CUREARN.

- PAY04 – A program that prints the check register in clock number sequence and updates the employee year-to-date file (YTDPAY). Year-to-date information is written to the current earnings record for printing on the check stub.

- PAY05 – A sort that resequences the current earnings file by department number in preparation for printing checks.

- PAY06 – The check writing program. Input is the sorted file (CHKFIL) from PAY05.

Figure 3 shows the job stream flowchart for the weekly payroll job stream.
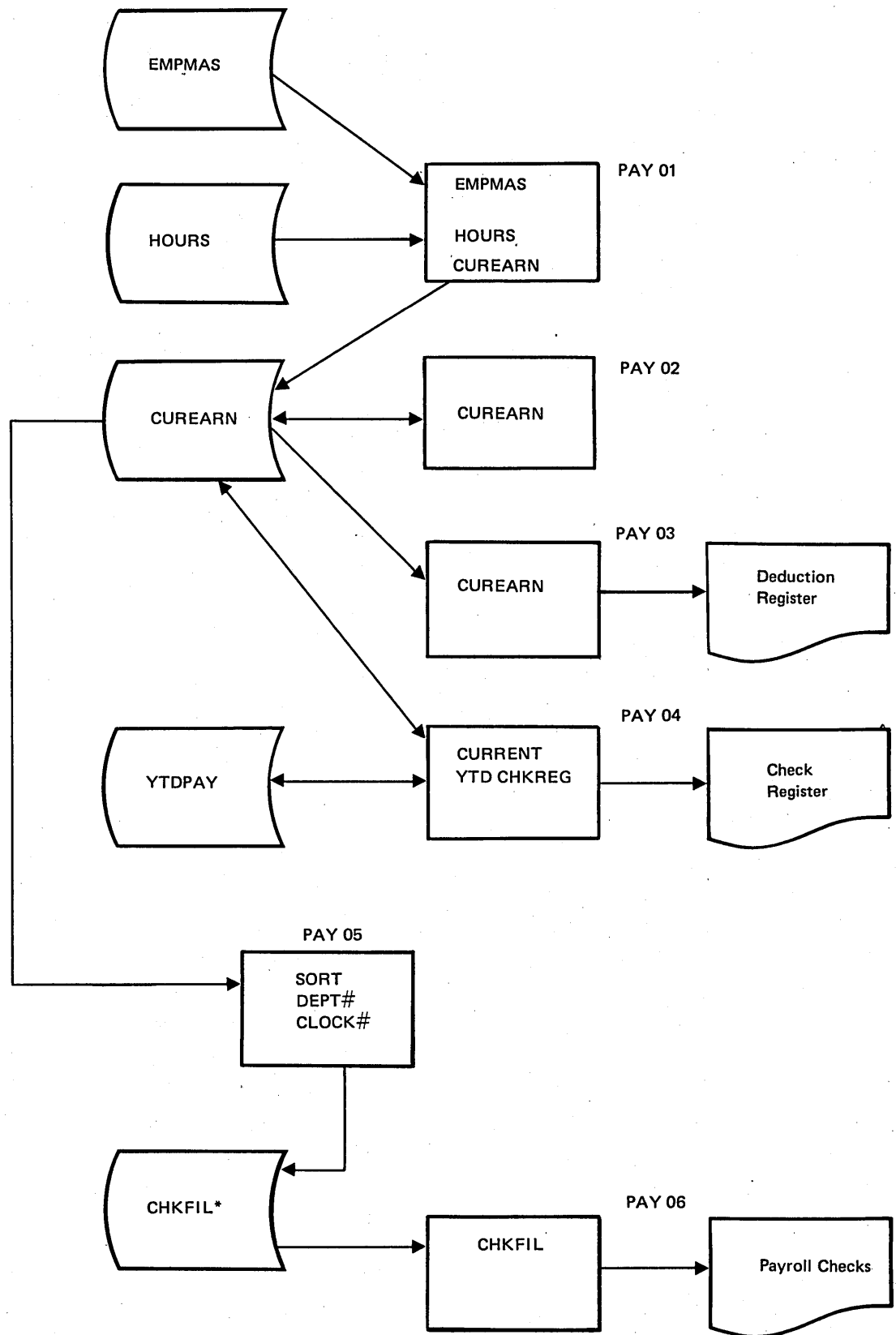
Figure 3. Weekly Payroll Flowchart

The following six procedures represent the OCL necessary to run each program.

```
PAY01
// LOAD PAY01,R1
// FILE NAME-EMPMAS,UNIT-D1,PACK-D1D1D1
// FILE NAME-HOURS,UNIT-D2,PACK-D2D2D2
// FILE NAME-CUREARN,UNIT-D2,PACK-D2D2D2,RECORDS-500
// RUN
PAY02
// LOAD PAY02,R1
// FILE NAME-CUREARN,UNIT-D2,PACK-D2D2D2
// RUN
PAY03
// LOAD PAY03,R1
// FILE NAME-CUREARN,UNIT-D2,PACK-D2D2D2
// RUN
PAY04
// LOAD PAY04,R1
// FILE NAME-CURRENT,UNIT-D2,PACK-D2D2D2,LABEL-CUREARN
// FILE NAME-YTD,UNIT-D1,PACK-D1D1D1,LABEL-YTDPAY
// RUN
PAY05
// LOAD $DSORT,F1
// FILE NAME-INPUT,UNIT-D2,PACK-D2D2D2,LABEL-CUREARN
// FILE NAME-OUTPUT,UNIT-D2,PACK-D2D2D2,LABEL-CHKFIL,RECORDS-500
// RUN
```

H SORTR		7A	X 128	
FNC	5	7		DEPT NO.
FNC	1	4		CLOCK NO.
FND	1	128		RECORD

```
// END

PAY06
// LOAD PAY06,R1
// FILE NAME-CHKFIL,UNIT-D2,PACK-D2D2D2
// RUN
```

To run this job stream, the operator calls a procedure named PAYROL that consists of:

```
PAYROL
// CALL PAY01,R1
// CALL PAY02,R1
// CALL PAY03,R1
// CALL PAY04,R1
// CALL PAY05,R1
// CALL PAY06,R1
```

Analyzing the Job Stream For Conversion

The job stream approach will provide a shopping list of elements to be converted. Starting with the invocation OCL, (// CALL PAYROL,R1 and // RUN), all of the procedure names can be determined and listings of the OCL can be obtained. Using the OCL listings, it is possible to prepare a list of files, programs, and utility control statements that must be converted. This is shown below:

Procedures (CALL)	Programs (LOAD)	Files (LABEL)
PAY01	PAY01 (RPG)	EMPMAS (IS)
PAY02	PAY02 (RPG)	HOURS (SEQ)
PAY03	PAY03 (RPG)	CUREARN (SEQ)
PAY04	PAY04 (RPG)	YTDPAY (IS)
PAY05	$SORT	CHKFIL (SEQ)
PAY06	PAY06 (RPG)	

The following documentation should be gathered:

• Procedure listings

• RPG source listings

• Disk record layouts

• VTOC listing (helpful in determining retain status, file organization, and size)

Steps to Convert the Payroll Job Stream to System/38

1. Prepare the System/38 data description specifications (DDS) for each disk file.

2. Make necessary changes to RPG programs (see Appendix B). *Note:* When modifying the F-specs in program PAY04, the file names could be changed to agree with the file labels. This would necessitate changing the I specs and O specs as well. These changes would however, eliminate the need for the file override CL command (OVRDBF) in the System/38 job stream.

3. Code the System/38 CL to replace the present OCL.

1. Prepare the System/38 DDS.

Figure 4 shows the System/3 disk record layouts that are used to create the DDS. The figures that follow Figure 4 show the DDS specification forms filled out to describe the files to the System/38 data base.

Figure 4. System/3 Disk Record Layout

| 1–10 | 11–20 | 21–30 | 31–40 | 41–50 | 51–60 | 61–70 |

CODE CLOCK DEPT. NAME STREET CITY

Employee Master (EMPMAS)

CLOCK DEPT. DATE IN1 OUT1 IN2 OUT2 IN3 OUT3 CODE

Daily Hours (HOURS)

CLOCK DEPT. REGHRS OTHRS REGPAY OTPAY DED1 DED2 DED3 DED4 DED5 FIT FICA LOCTX ADJ SSN NAME

Current Earnings (CUREARN)

CLOCK SSN YTDGRS YTDFIT YTDFIC YTDLOC YTDED1 YTDED2 YTDED3 YTDED4 YTDED5 QTDGRS QTDFIT QTDFIC QTDLOC QTDED1

Year-To-Date Earnings (YTDPAY)

CLOCK DEPT REGHRS OTHRS REGPAY OTPAY DED1 DED2 DED3 DED4 DED5 FIT FICA LOCTK ADJ SSN NAME

SORTED CURRENT EARNINGS (CHKFIL)

| 1-10 | 11-20 | 21-30 | 31-40 | 41-50 | 51-60 | 61-70 |

Note: These (∗→ ←∗) hours and $AMT fields are packed
format with two decimal places.

IBM International Business Machines Corporation

DATA DESCRIPTION SPECIFICATIONS

File	EMPLOYEE MASTER	Keying Instruction	Graphic							Description		Page	of
Programmer		Date		Key									

Sequence Number	Form Type	And/Or/Comment (A/O/*)	Not	Indicator	Not	Indicator	Not	Indicator	Type (R/K/S/O)	Reserved	Name	Reference (R)	Length	Data Type (A/B/I/N/P/S/W/X/Y)	Decimal Positions	Usage (I/O/B/H/M)	Line	Pos	Functions
	A	*									EMPLOYEE MASTER RECORD FORMAT								
	A	*																	
	A								R		EMPMAS								TEXT('EMPLOYEE MASTER RECORD')
	A										CODE		1						COLHDG('EMPLOYEE' 'RECORD' 'CODE')
	A										CLOCK		4						COLHDG('CLOCK' 'NUMBER')
	A										DEPT		3						COLHDG('DEPT.' 'NUMBER')
	A										NAME		25						COLHDG('EMPLOYEE' 'NAME')
	A																		
	A																		
	A																		
	A																		
	A								K		CLOCK								
	A																		
	A																		
	A																		
	A																		
	A																		
	A																		
	A																		

*Number of sheets per pad may vary slightly.

Figure 5. DDS for Employee Master File

File	DAILY TIME RECORD		Keying	Graphic							Description		Page	of
Programmer		Date	Instruction	Key										

A

Sequence Number	Form Type	And/Or/Comment (A/O/*)	Not	Indicator	Not	Indicator	Not	Indicator	Type (R/K/S/O)	Reserved	Name	Reference (R)	Length	Data Type (A/B/I/N/P/S/W/X/Y)	Decimal Positions	Usage (I/O/B/H/M)	Line	Pos	Functions
	A	*									DAILY HOURS RECORD FORMAT								
	A	*																	
	A																		REF(EMPMAS)
	A								R		HOURS								TEXT('DAILY TIME RECORD')
	A										CLOCK	R							
	A										DEPT	R							
	A										DAY		2						COLHDG('DAY')
	A										MONTH		2						COLHDG('MONTH')
	A										YEAR		2						COLHDG('YEAR')
	A										IN1		4	S	2				COLHDG('CLOCK' 'IN-1')
	A										OUT1		4	S	2				COLHDG('CLOCK' 'OUT-1')
	A										IN2		4	S	2				COLHDG('CLOCK' 'IN-2')
	A										OUT2		4	S	2				COLHDG('CLOCK' 'OUT-2')
	A										IN3		4	S	2				COLHDG('CLOCK' 'IN-3')
	A										OUT3		4	S	2				COLHDG('CLOCK' 'OUT-3')
	A										CODE		1						COLHDG('HOURS' 'RECORD' 'CODE')
	A																		
	A																		
	A																		
	A																		

*Number of sheets per pad may vary slightly.

Figure 6. DDS for Daily Time Record File

DATA DESCRIPTION SPECIFICATIONS

File	CURRENT EARNINGS	Keying Instruction	Graphic						Description		Page	of
Programmer	Date		Key									

A

Sequence Number	Form Type	And/Or/Comment (A/O/*)	Not	Indicator	Not	Indicator	Not	Indicator	Type (R/K/S/O)	Reserved	Name	Reference (R)	Length	Data Type (A/B/I/N/P/S/W/X/Y)	Decimal Positions	Usage (I/O/B/H/M)	Location Line	Pos	Functions
	A	*									CURRENT EARNINGS RECORD FORMAT								
	A	*																	
	A																		REF(EMPMAS)
	A								R		CUREARN								TEXT('CURRENT EARNINGS RECORD')
	A										CLOCK	R							
	A										DEPT	R							
	A										REGHRS		5		2				COLHDG('REGULAR' 'HOURS')
	A										OTHRS		5		2				COLHDG('OVERTIME' 'HOURS')
	A										REGPAY		7		2				COLHDG('REGULAR' 'PAY')

*Number of sheets per pad may vary slightly.

Figure 7. DDS for Current Earnings File

IBM International Business Machines Corporation

GX21-7754-0 UM/050*
Printed in U.S.A.

File	YTD EARNINGS		Keying Instruction	Graphic							Description		Page	of
Programmer		Date		Key										

A

Sequence Number	Form Type	And/Or/Comment (A/O/*)	Not	Indicator	Not	Indicator	Not	Indicator	Type (R/K/S/O)	Reserved	Name	Reference (R)	Length	Data Type (A/B/I/N/P/S/W/X/Y)	Decimal Positions	Usage (I/O/B/H/M)	Line	Pos	Functions
	A	*									YEAR-TO-DATE EARNINGS RECORD FORMAT								
	A	*																	
	A								R		YTDPAY								TEXT('YTD EARNINGS RECORD')
	A										CLOCK	R							REFFLD(CLOCK EMPMAS)
	A										SSN	R							REFFLD(SSN EMPMAS)
	A										YTDGRS		7		2				COLHDG('YTD' 'GROSS' 'EARNINGS')
	A																		
	A																		
	A																		
	A																		
	A								K		CLOCK								
	A																		
	A																		
	A																		
	A																		
	A																		
	A																		
	A																		
	A																		

*Number of sheets per pad may vary slightly.

Figure 8. DDS for YTD Earnings File

DATA DESCRIPTION SPECIFICATIONS

| File | CHECK FILE | Keying Instruction | Graphic | | | | | | | Description | | Page | of |
| Programmer | Date | | Key | | | | | | | | | | |

A

			Conditioning							Name		Length			Location			Functions

Sequence Number	Form Type	And/Or/Comment (A/O/*)	Not	Indicator	Not	Indicator	Not	Indicator	Type (R/K/S/O)	Reserved	Name	Reference (R)	Length	Data Type (A/B/I/N/P/S/W/X/Y)	Decimal Positions	Usage (I/O/B/H/M)	Line	Pos	Functions
	A	*									LOGICAL FILE TO ACCESS CUREARN BY DEPT. AND CLOCK NUMBER								
	A	*									FOR CHECK WRITING								
	A								R		CHKFIL								PFILE(CUREARN)
	A								K		DEPT.								
	A								K		CLOCK								
	A																		
	A																		
	A																		
	A																		
	A																		
	A																		
	A																		
	A																		
	A																		
	A																		
	A																		
	A																		
	A																		

*Number of sheets per pad may vary slightly.

Figure 9. DDS for Check File

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2. Make Changes To RPG Programs

The following figures show the changes made to the RPG specifications to convert the RPG II programs to System/38 RPG.

File Description Specifications

Line	Form Type	Filename	File Type / File Designation / End of File / Sequence / File Format	Block Length	Record Length	Mode of Processing	Device	Symbolic Device	Name of Label Exit / Extent Exit for DAM	Continuation Lines	File Addition/Unordered
0 2	F	* S/3 PROGRAM PAY01 FILE DESC SPECS									
0 3	F	HOURS	IP F	38	38		DISK45		[Before]		
0 4	F	EMPMAS	IC E	256	256 R 4AI	2	DISK45				
0 5	F	CUREARN	O F	128	128		DISK45				
0 6	F										
0 7	F	* S/38 PROGRAM PAY01 FILE DESC. SPECS.									
0 8	F	HOURS	IP E				DISK ◄—Externally Described				
0 9	F	EMPMAS	IF E			K	DISK ◄—Externally Described		[After]		
1 0	F	CUREARN	O F		128		DISK ◄—Program Described				
	F										
	F										

Figure 10. File Description Specifications for PAY01

RPG INPUT SPECIFICATIONS

Program
Programmer
Date
Punching Instruction
Graphic
Punch
Card Electro Number
Page [ ] of __
Program Identification: D A Y 0 1

Line	Form Type	Filename	Sequence	Number (1/N)	Option (O), U	Record Identifying Indicator	Record Identification Codes — Position 1	Not (N)	C/Z/D	Character	Position 2	Not (N)	C/Z/D	Character	Position 3	Not (N)	C/Z/D	Character	Stacker Select	P/B/L/R	From	To	Decimal Positions	Field Name	Control Level (L1-L9)	Matching Fields or Chaining Fields	Field Record Relation	Plus	Minus	Zero or Blank
0 1	I	HOURS	NS		01																										
0 2	I																				38	38		HRCODE						
0 3	I																				1	4		CLOCK	L2					
0 4	I																				5	7		DEPT						
0 5	I																				8	9		DAY	L1					
0 6	I																				10	11		MONTH						
0 7	I																				14	17	2	INL						
0 8	I																				18	21	2	OUTL						
0 9	I																				22	25	2	IN2						
1 0	I																				26	29	2	OUT2						
1 1	I																				30	33	2	IN3						
1 2	I																				34	37	2	OUT3						
1 3	I	EMPMAS	NS		02																									
1 4	I																				1	1		EMPCOD						
1 5	I																				2	5		CLOCK						
1 6	I																				6	8		DEPT						
1 7	I																				9	33		NAME						
1 8	I																													
1 9	I																													
2 0	I																													
	IX	* S/3 PAY01 INPUT SPECS																												

Before

Figure 11. Input Specifications for PAY01 on System/3

GX21-9094- U/M050*
Printed in U.S.A.

IBM International Business Machines Corporation

Program		Punching Instruction	Graphic						Card Electro Number			Page		of	Program Identification	75 76 77 78 79 80
Programmer	Date		Punch													

I — Input Specifications

Record Identification Codes / Field Location / Field Indicators

Line	Form Type	Filename	O R / A N D	Sequence	Number (1/N)	Option (O) U	Record Identifying Indicator, *, or DS	Position (1)	Not (N)	C/Z/D	Character	Position (2)	Not (N)	C/Z/D	Character	Position (3)	Not (N)	C/Z/D	Character	Stacker Select	P/B/L/R	From	To	Decimal Positions	Field Name	Control Level (L1-L9)	Matching Fields or Chaining Fields	Field Record Relation	Plus	Minus	Zero or Blank
0 1	I	HOURS					01																								
0 2	I							CODE																	HRCODE						
0 3	I																								CLOCK	L2					
0 4	I																								DAY	L1					
0 5	I	EMPMAS					02																								
0 6	I							CODE																	EMPCOD						
0 7	I																														
0 8	I																														
0 9	I	* S/38 PAY01 INPUT SPECS																													
1 0	I																														
1 1	I												[After]																		
1 2	I																														
1 3	I																														

Note: Input override specifications are required for externally described data files for the following reasons:

1. To associate record ID indicator used in the program with an externally described record (columns 19 and 20 on lines 01 and 05).
2. To rename an externally described field for use in a program (columns 21 to 41 and columns 53 to 58 on lines 02 and 06).
3. To indicate control fields (columns 59, 60 on lines 03 and 04).

This example illustrates the case where two fields in the data base with two different meanings have the same name, 'code'. While this is valid, it is recommended that such fields be given unique names within the data base.

Figure 12. Input Specifications for PAY01 on System/38

File Description Specifications

F — File Description Specifications form

```
02  F* S/3 PROGRAM PAY 02 FILE DESC. SPECS
03  F*                                                    [Before]
04  FCUREARN  UP    F  128  128              DISK45
05  F
06  F* S/38 PROGRAM PAY02 FILE DESC SPECS.
07  F*
08  FCUREARN  UP    F       128              DISK       [After]
09  F
10  F
```

Figure 13. RPG Specifications for PAY02

File Description Specifications

F — File Description Specifications form

```
02  F* S/3 PROGRAM PAY03 FILE DESC. SPECS.
03  FCUREARN  IP    F  256  128         DISK45    [Before]
04  FLIST     O     F       132    OF   LPRINTER
05  F
06  F* S/38 PROGRAM PAY 03 FILE DESC. SPECS.
07  FCUREARN  IP    E                   DISK  ◄——— Externally Described File
08  FLIST     O     F       132    OF   LPRINTER
09  F                                             [After]
10  F
                                        (Input Specs Not Shown.)
```

Figure 14. RPG Specifications for PAY03

File Description Specifications

F

```
     |  | File Type                    | Mode of Processing
Line | Filename | File Designation     | Length of Key Field or of Record Address Field
     |          |  End of File         |  Record Address Type
     |          |   Sequence           |   Type of File Organization or Additional Area
     |          |    File Format       |    Overflow Indicator   Device   Symbolic Device   Name of Label Exit   Extent Exit for DAM   File Addition/Unordered
```

Line		Filename				Block Length	Record Length					Device	Symbolic Device			
0 2	F	* S/3 PROGRAM PAY04 FILE DESC. SPECS.														
0 3	F	CURRENT	UP		F	128	128						DISK45		Before	
0 4	F	YTD	UC		F	256	256R	4AI	1			DISK45			
0 5	F	CHKREG	O		F		132				OF		LPRINTER			
0 6	F															
0 7	F	* S/38 PROGRAM PAY04 FILE DESC. SPECS.														
0 8	F	CURRENT	UP		F		128						DISK ⟶ Program Described Files			
0 9	F	YTD	UF		F		256	4AI	1				DISK			
1 0	F	CHKREG	O		F		132				OF		LPRINTER			
	F														After	
	F															

Figure 15. RPG Specifications for PAY04

File Description Specifications

F

Line		Filename				Block Length	Record Length					Device	Symbolic Device			
0 2	F	* S/3 PROGRAM PAY06 FILE DESC SPECS														
0 3	F	*														
0 4	F	CHKFIL	IP		F	128	128						DISK45		Before	
0 5	F	CHECKS	O		F		132				OF		LPRINTER			
0 6	F															
0 7	F	* S/38 PROGRAM PAY06 FILE DESC. SPECS														
0 8	F	*														
0 9	F	CHKFIL	IP		E			K					DISK ⟵ Externally Described File			
1 0	F	CHECKS	O		F		132				OF		LPRINTER			
	F														After — (Input Specs Not Shown.)	
	F															

Figure 16. RPG Specifications for PAY06

3. Code the System/38 CL to Replace the System/3 OCL

The chart at the end of this appendix shows OCL statements and how they relate to System/38 CL. By using the chart and other System/38 documentation, the following CL was created to replace the OCL:

```
// JOB JOBD(QBATCH) JOB(PAYROLL)
CALL PAY01
CALL PAY02
OVRPRTF FILE(LIST) TOFILE(QPRINT)
CALL PAY03
OVRDBF FILE(CURRENT) TOFILE(CUREARN)
OVRDBF FILE(YTD) TOFILE(YTDPAY)
OVRPRTF FILE(CHKREG) TOFILE(QPRINT)
CALL PAY04
OVRPRTF FILE(CHECKS) TOFILE(QPRINTS) ALIGN(*YES)
 FORMTYPE(PAYROLL-CHECKS)
CALL PAY06
// ENDJOB
```

To execute this job, the operator would use the Start Data Base Reader command:

```
STRDBRDR FILE(QCLSRC) MBR(PAYROLL)
```

Note: QCLSRC is the CL source file and PAYROLL is the member into which the job stream was copied.

Summary

For this sample conversion, extensive use is made of system-supplied objects and control language default values as follows:

- The default user library (QGPL) is used exclusively.

- RPG source members are written into the IBM-supplied source file (QRPGSRC) using the CPYF (Copy File) command.

- DDS source members are written into the IBM-supplied source file (QDDSSRC) using the CPYF (Copy File) command.

- The CL job stream is written into the IBM-supplied source file (QCLSRC) using the CPYF (Copy File) command.

Note: The use of the CPYF (Copy File) command with the RPG, DDS, and CL assumes that these source members are brought to the System/38 on an appropriate interchange medium. These source members could be entered into their respective files via the interactive source entry utility as well.

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The IBM-supplied source files are in the default user library (QGPL).

- Other system-supplied objects are:

  QBATCH – job description
  QBATCH – job queue
  QPRINT – printer device file
  QPRINTS – printer device file

- The IBM-supplied batch subsystem (QBATCH) is used.

- If desired, you could create your own objects using the following
  commands:
  - CRTJOBD (Create Job Description)
  - CRTJOBQ (Create Job Queue)
  - CRTPRTF (Create Printer File)
  - CRTLIB (Create Library)
  - CRTOUTQ (Create Output Queue)

This sample application is easily enhanced using new System/38 function in
the following areas:

DDS – Although not required for conversion, the payroll files are described to
     the field level with text and column headings. This allows the files to be
     accessed as externally described files in current applications and future
     applications, and by the Interactive Data Base Utility.

RPG – The input only files in PAY01, PAY03, and PAY06 are recoded as
     externally described files. Assuming the field names on the input
     specifications are the same as defined on the DDS, the field definitions in
     the programs are removed and an E entered in column 19 of the F
     specification. (See the PAY01 specifications.)

While it may be desirable to convert all current programs to use
externally described data, you may want to do this conversion in two
stages: one stage prior to installation of your System/38 and the other
stage after your System/38 is installed.

Stage 1: Replace current files with externally described data in those
programs which lend themselves to this conversion, such as input only files
where the majority of the I spec field descriptions are the same as the DDS
field names.

Stage 2: Review those programs that still contain program described files, such as update and output files where different field names and field indicators are used in the output specifications, and determine what changes must be made to complete the conversion to externally described data files.

This approach may be desirable due to conversion time constraints and the learning curve associated with the installation of a new system. Any new programs should be written using externally described data.

In this example, only stage 1 of this method is employed.

The H specifications in each program are optionally omitted.

CL – The sort (PAY05) was eliminated by using the logical file (CHKFIL) in PAY06. This logical file allows PAY06 to access the data records in the current earnings file (CUREARN) by 'DEPT,CLOCK' sequence. In the case of a more complex multirecord type sort, the Conversion Reformat Utility might be the preferred alternative.

The following chart shows the OCL statements, equivalent commands, and an explanation column. A complete description of the System/38 commands is contained in the *CPF Reference Manuals*.

OCL Statement	System/38 CL Command	Explanation
ASSIGN	Not needed	Simulation Areas not used on System/38
ATTR	Not needed	Priority is a parameter on the System/38 JOB statement
BSCA	Not needed	Communication lines are described with the System/38 CRTLIND (Create Line Description) command.
CALL	CALL (Call Program) On System/38 you call a CL program in place of a procedure.	
COMPILE	CRTRPGPRG (Create RPG Program)	
DATE	CHGSYSVAL (Change System Value)	

OCL Statement	System/38 CL Command	Explanation
FILE	See Explanation	Three conditions determine the action you must take for a FILE statement: 1. If the file has been described to System/38 from a previous job stream, no statement is needed. 2. If the file is being created in this job stream, you must describe the file with DDS and create the file with a CRTLF or CRTPF command. 3. If the filename is different than the label, you must use the OVRDBF (Override Data Base File) command to equate the filename to the label name.
FORMS	Not needed	Form size on System/38 is designated in the print file.
HALT	Not needed	To implement the halt function on System/38 you must analyze the use of halt in your jobstream. Some halts are not needed, such as changing disk packs. Forms alignment halts are handled with a parameter on the Create Print File command. End of Job halts can be handled with the Hold/Release parameters for that job.
IMAGE	Not needed	The print image is specified in the print file.
INCLUDE	Not needed	On System/38 you CALL a CL program to insert it in your jobstream.
JOB	JOB	The System/38 JOB command designates the start of a job. The parameters on the JOB statement describe the job. The end of a job is determined by the ENDJOB command.
LIBRARY	Not needed	On System/38 the library search list controls the order of library search.
LOAD*	Not needed	Object code is not directly loadable on System/38.

OCL Statement	System/38 CL Command	Explanation
LOAD	Not needed	Save the program name to generate a CALL to replace the RUN statement for this program.
LOCAL	CHGVAR (Change Variable)	The local data area for a work station on System/38 is the program variable for the program activation being executed.
LOCKOUT	Not needed	Program levels are not used on System/38.
LOG	DSPLOG (Display Log)	This command can be used anytime to examine the history file.
NOHALT	Not needed	See HALT.
PARTITION	Not needed	There are no partitions on System/38.
PAUSE	Not needed	See HALT. The display message function of PAUSE can be done with the System/38 DSPMSG (Display Message) command.
PRINTER	Not needed	On System/38 these options are specified in the print file.
PUNCH	Not needed	On System/38 these options are specified in the device file.
READER	Not needed	The operator can use the STRRDR (Start Reader) command to perform this function.
REGION	Not needed	On System/38, the storage management function provides the storage needed for a job.
RUN	CALL (Call Program)	Take the program name from the previous LOAD statement. If the previous LOAD statement referenced #RPG or $RPG, use the CRTRPGPRG (Create RPG Program) command.
SWITCH	CHGSYSVAL (Change System Value) or CHGVAR (Change Variable)	CHGSYSVAL changes a system value CHGVAR changes a variable declared in a CL program.
SYSLIST	Not needed	On System/38, when a utility needs an output device, it is designated as a parameter on the utility request.

OCL Statement	System/38 CL Command	Explanation
WORKSTN	Not needed	The devices used by a program are designated in the application program by referring to device files for the devices you want to use in the program.
/&	Not needed	There are no job steps on System/38
/.	JOB and ENDJOB	
*	/*...*/	
Inline data followed by /*	DATA and //ƀ, //DATA, //JOB, or user defined character string.	If inline data is used in your jobstream, the //DATA command precedes the data and the end of the data is identified by //ƀ, the next //DATA, the next //JOB, or a user defined character string.
//*	DSPMSG (Display Message)	
//**	DSPMSG (Display Message)	

Appendix B. RPG II to System/38 RPG Conversion

Programs written in RPG II can be converted to System/38 by modifying some of the RPG II source specifications. The modified source must be compiled on System/38 to produce usable System/38 code. The following charts show the RPG II specifications that are different on System/38 and briefly explain the differences. The specifications that do not appear on the charts are used the same in RPG II and System/38 and do not require modification. A complete explanation of the System/38 RPG specifications is contained in the *System/38 RPG III Reference Manual*.

Control Card Specifications (H Specs)

Column	RPG II Spec.	Conversion Action	Explanation
7-9	Any Entry	Change to blank	Storage size to compile not needed on System/38.
10	Any Entry	Change to blank	Object output specified through CL if needed.
11	Any Entry	Change to blank	Listing option specified through CL if needed.
12-14	Any Entry	Change to blank	Storage size needed to execute not needed on System/38.
16	Any Entry	Change to blank	Blanks expected.
17-20	Any Entry	Change to blank	Some System/3 Models use Col 17-20 for a sterling indication. System/38 does not use 17-20 for a sterling indication but does use 19-20 for an additional date editing option.
22-25	Any Entry	Change to blank	Blanks expected.
27-36	Any Entry	Change to blank	Blanks expected.
37	Any Entry	Change to blank	Inquiry attributes not required on System/38.
38-40	Any Entry	Change to blank	Blanks expected.

Column	RPG II Spec.	Conversion Action	Explanation
41	Any Entry	Change to blank.	Forms alignment is provided through CL and data management.
42	Any Entry	Change to blank Blanks expected.	
45	Any Entry	Change to blank	Use CL to cause halt.
45	Any Entry	Change to blank	Nonprint character action specified through CL if needed. Default is no halt.
46-47	Any Entry	Change to blank	Blanks expected.
48	Any Entry	Change to blank	Shared I/O area not needed on System/38.
49-74	Any Entry	Change to blank	Blanks expected.

File Description Specifications (F Specs)

Watch for double usage of files in an RPG program. In RPG, it is possible to open the same index sequential file twice: once for keyed processing, and once for relative record processing. This is done by providing two F specifications with different program file names and then using FILE statements to refer both program file names to the same physical file. There is no equivalent to this on System/38. If this is encountered, a logical file should be created over the physical file.

Column	RPG II Spec.	Conversion Action	Explanation
15	D	Change to blank	Display operations do not require a file specification.
15-16	OC	UF and generate dummy input spec	No direct file support on System/38 but user can totally allocate file and initialize with dummy records.
16	D,C	Use F	Chained or demand files are now defined as full procedural function files (I/O controlled by calc operations).
19	F, D, V, S, M	Use F or E	F means to use the file description from the input specs. E means to use the file description defined in the System/38 data base.
20-23	Not blank	Change to blank	Block length not used on System/38.
31-32	IT	No Change	
31, 32	I, not T	No Change	
31, 32	Not I, 1-9	Change 32 to blank	Multiple I/O areas are not supported.
40-46	MFCU1 MFCU2 MFCM1 MFCM2 READ42 READ01	Change to CARD.	If multiple card files are supported in the program, they must be differentiated through CL. OVERRIDE cards can be generated later to reflect hopper selection since devices were made less specific (MFCU to CARD). On the OVERRIDE, if spool is employed (on System/38 inline data must be spooled) the spool device keyword is SYSIN.
40-46	TAPE DISKET CONSOLE CRT77 BSCA	Change to SEQ.	Tape, diskette, console, CRT, and BSCA files are treated as sequential files with the device supplied through CL.
40-46	PRINTR2 PRINT84	Change to PRINTER	If multiple printer files are supported in the program, they must be differentiated through CL.

Column	RPG II Spec.	Conversion Action	Explanation
40-46	DISK40 DISK45	Change to DISK	
40-46	SPECIAL		SPECIAL files may force program recoding.
40-46	Blank	Change to SEQ	Device independent file is treated as a sequential file, with the device specified via CL.
47-52	Not blank	Change to blank	Blanks expected.
53, 54-59	Blank, SUBRxx		User must provide proper subroutine name on System/38.
53, 60-65	Blank, value	Change 60-65 to blank	Storage index not needed on System/38.
53, 54-59	K, ASCII or BUFOFF	Drop continuation spec	Tape options not applicable on System/38.
53, 54-59	K, INDEX	Drop continuation spec	Index buffer size not applicable on System/38.
53, 54-59	K, table or array name	Move 54-59 to elsewhere (C spec) and put in PLIST followed by blank and uniquely generated PLIST name (PLNAME).	Table/array name function specified differently.

Generate two C specs

```
                      (53)      (54-59)    (60-65)
F                     K         PLISTƀ     PLNMnn
C      PLNAME         PLIST
C                     PARM      ARRAY
```

Where PLNAME is uniquely generated and ARRAY is table or array name.

Column	RPG II Spec.	Conversion Action	Explanation
66	U	Change to blank	All loading of indexed files on System/38 is unordered.
67	Not blank	Change to blank	Blanks expected.
68-69	Not blank	Change to blank	Number of extents supported through CL.
70	Not blank	Change to blank	Tape options not applicable on System/38.
73-74	Not blank	Change to blank	Blanks expected.

Extension Specifications (E Specs)

Column	RPG II	Conversion Action	Explanation
7-10	Not blank	Change to blank	Blanks expected
11-18	Name of ADDROUT file	No Change	
11-18	Duplicate table or array filename	Use new filename	Unique file names required for preexecution time tables and arrays.
11-18, 33-35	Blank, not blank and the number of entries per record times the sum of the entry lengths is greater than 80	Table or array may have to be restructured	Data in record for compile time table or array cannot exceed position 80.

Line Counter Specifications (L Specs)

Column	RPG II	Conversion Action	Explanation
25–74	Not blank	Change to blank	Blanks expected.

Telecommunications Specifications (T Specs)

Column	RPG II	Conversion Action	Explanation
6	T	Specification dropped	Telecommunications supported as sequential devices, with the device supplied through CL.

Input Specifications (I Specs)

Column	RPG II	Conversion Action	Explanation
71–74	Not blank	Change to blank	Blanks expected.

Calculation Specifications (C Specs)

Column	RPG II	Conversion Action	Explanation
28–32 33–42	DSPLY, not blank	Change 33–42 to blanks	Filename not needed on System/38. Defaults to device requesting program execution or to operator's console if batch request
28–32 43–48	RLABL, INnn	Change 43–48 to *INnn	Indicator specified by *IN prefix on System/38
28–32 53	SQRT, not H	Put H in 53	Half adjust not automatically provided on System/38
28–32, 33–42	DEBUG filename whose record length is less than 80	Make DEBUG files at least 80 characters	Record length of DEBUG files must be at least 80
28–32	EXIT	Check if SUBRXX is supported on System/38	Assembly language subroutine will need recoding; RPG program may also.

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Output Specifications (O Specs)

Column	RPG II	Conversion Action	Explanation
23-31	LO	Change to blank	LO is not permitted in output specifications.
71-74	Not blank	Change to blank	Blanks expected.

Auto Report Option Specifications (U Spec)

A U in position 6 of the statement identifies it as an Auto Report option specification.

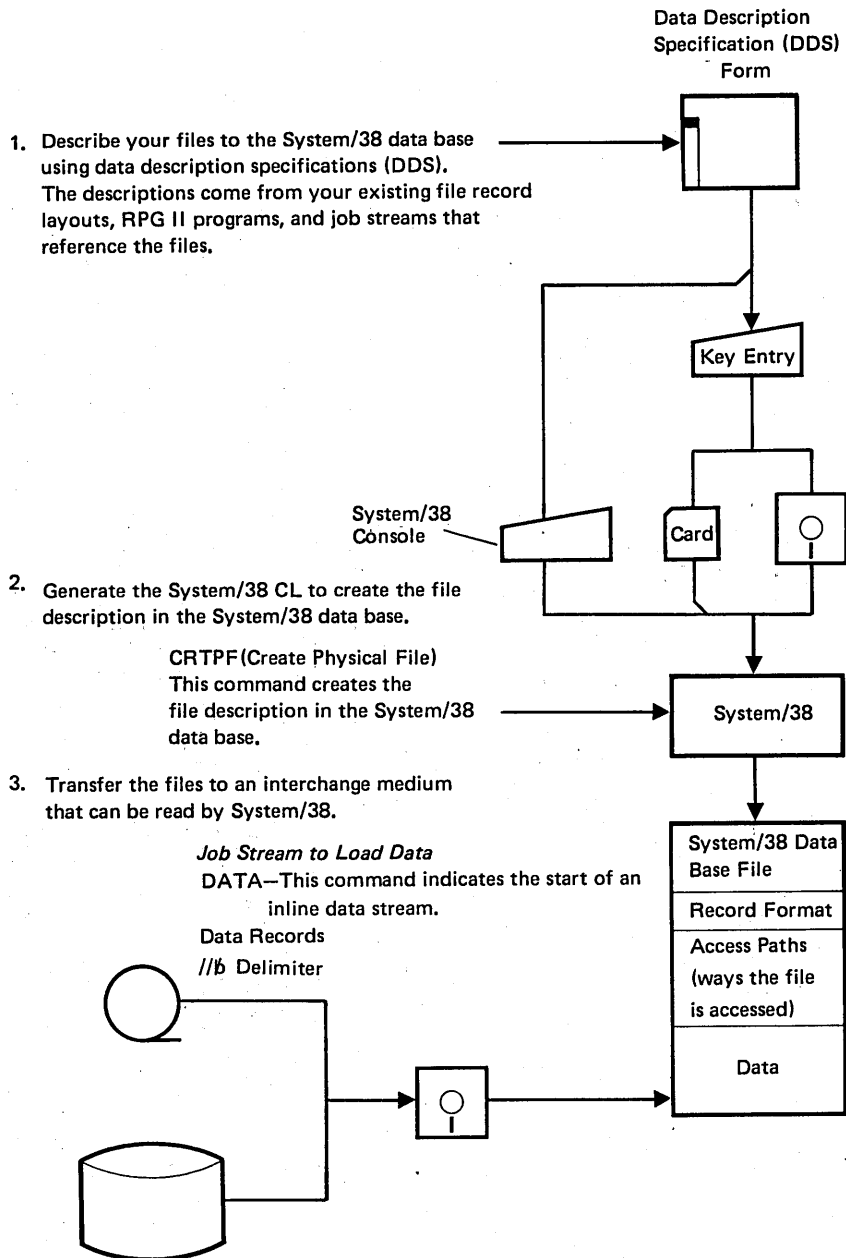| Column	RPG II	Conversion Action	Explanation
8-16	xx,yyyyyy where xx is unit, and yyyyyy is member name	QRPGSRC.LIBRARY, MEMBERNAME where QRPGSRC is standard RPG source file; member name is same as yyyyyy.	System/38 library name replaces unit (xx). The user must put the Auto Report Source into the proper System/38 library.

Auto Report Copy Specifications

/COPY in columns 7-11 of the statement (column 6 may contain any entry except H or U, or may be blank) identifies it as an Auto Report copy specification.

Column	RPG II	Conversion Action
13-21	xx,yyyyyy where xx is unit and yyyyyy is member name.	QRPGSRC.LIBRARY, MEMBERNAME where QRPGSRC is standard RPG Source File; membername is same as yyyyyy. System/38 library name replaces unit (xx).

Appendix C. System/38 Data File Definition

To move your present data files to the System/38 data base, there are three steps.

Data Description
Specification (DDS)
Form

1. Describe your files to the System/38 data base using data description specifications (DDS). The descriptions come from your existing file record layouts, RPG II programs, and job streams that reference the files.

Key Entry

System/38
Console

Card

2. Generate the System/38 CL to create the file description in the System/38 data base.

CRTPF(Create Physical File)
This command creates the file description in the System/38 data base.

System/38

3. Transfer the files to an interchange medium that can be read by System/38.

Job Stream to Load Data
DATA—This command indicates the start of an inline data stream.
Data Records
//b Delimiter

System/38 Data Base File

Record Format

Access Paths (ways the file is accessed)

Data

You do not have to change your present RPG II program logic or input specifications to use your existing files on System/38. This is made possible by an option on the System/38 RPG file description specifications.

System/38 RPG File Description Specification Position 19	Explanation
F (program described data)	The file description is taken from the RPG input specifications when the program is compiled on System/38.
E (externally described data)	The file description is taken from the System/38 data base when the program is compiled on System/38.

The reason you must at least partially describe your files is to allow the System/38 data base functions to be used to replace your present access methods and sorts. For example, if an RPG program processes a file sequentially by key, you must describe the key field and the order you want to access the records with DDS.

System/3 sorts affect the way you describe your files to System/38. System/3 sort specifications may be translated to System/38 logical files. This means a sort field becomes a key field in the logical file. If a System/3 sort uses parital fields for sort fields, the field may have to be split, because access paths must work with whole fields. There are also restrictions on select/omit when using logical files to replace sorts. System/3 multirecord type files may require the creation of more than one file to perform sorts that use select omit logic. If field splitting, select/omit, and multirecord type files result in a record format that is no longer meaningful, the Conversion Reformat Utility can be used to perform the System/3 sorts. This utility uses your System/3 sort specifications to access the records without extensive permanent changes to your record formats in the System/38 data base.

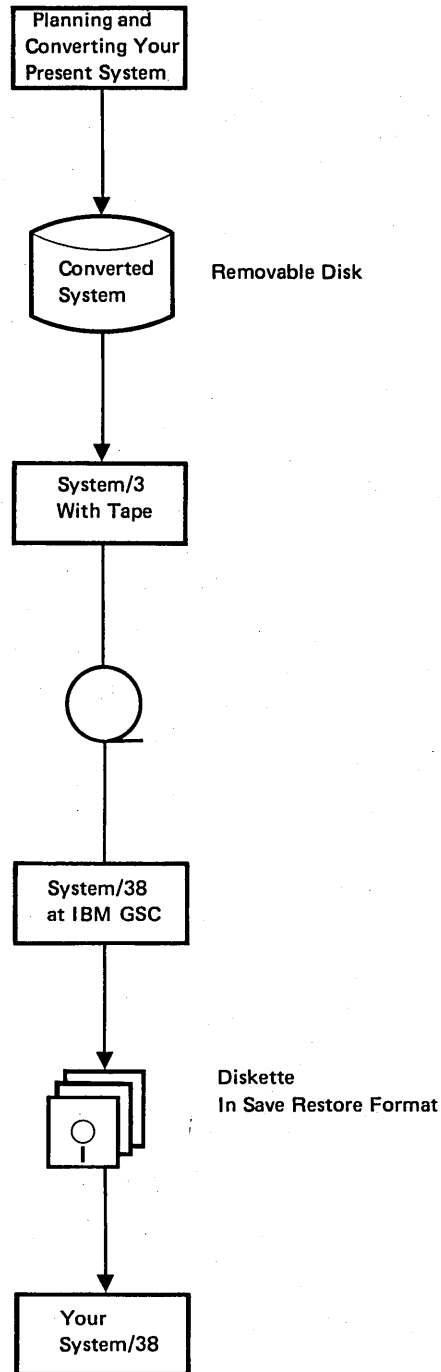Examples in Appendix A show the DDS to describe files to the System/38 data base.

Appendix D. Interchange Media

An important part of any conversion is transferring the actual data from your present system to the new system. The method used to transfer your data to System/38 depends on the hardware configuration of your present system. The IBM General System Center for your area is equipped to help you generate the interchange medium to load your system to System/38.

The following figures illustrate some of the ways the interchange medium can be generated and points out some of the factors that may help you decide which method best suits your particular needs.
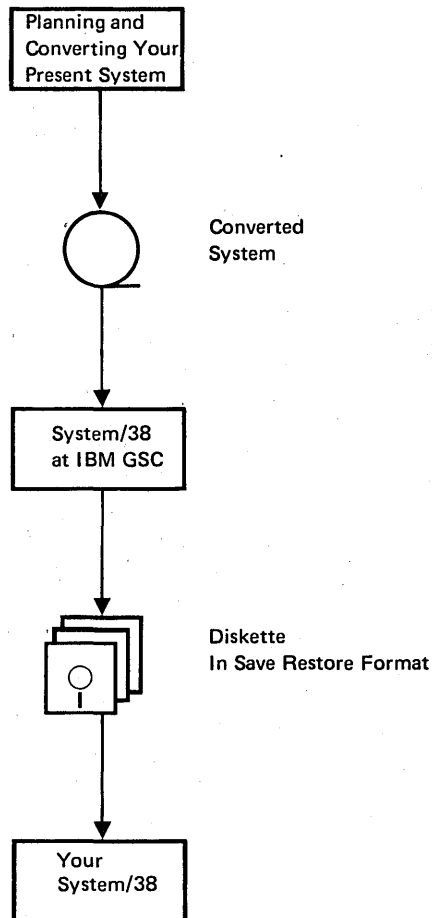
Removable Disk

If you have removable disk on your present system and no magnetic tape or diskette, you must use removable disk for the first step in transferring your data to System/38. After you have your system on removable disk, the options available are shown below.
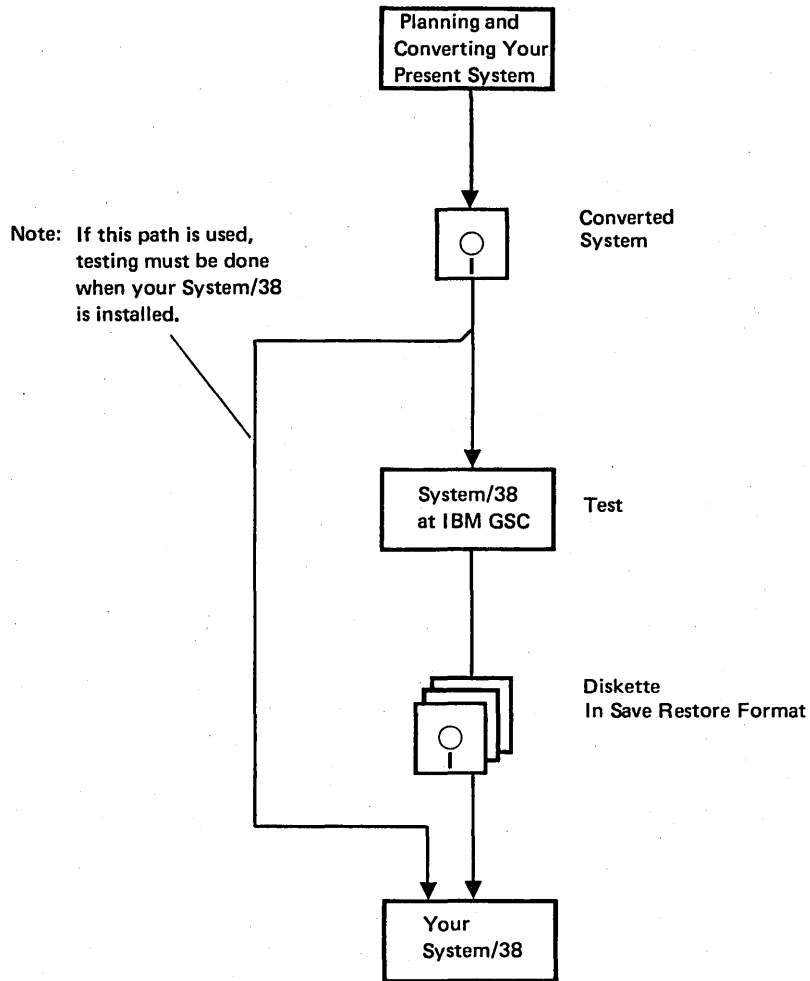
```
          ┌─────────────────┐
          │ Planning and    │
          │ Converting Your │
          │ Present System  │
          └────────┬────────┘
                   │
                   ▼
            ╭───────────╮
            │ Converted │      Removable Disk
            │ System    │
            ╰───────────╯
                   │
                   ▼
          ┌─────────────────┐
          │ System/3        │
          │ With Tape       │
          └────────┬────────┘
                   │
                  ◯
                   │
          ┌─────────────────┐
          │ System/38       │
          │ at IBM GSC      │
          └────────┬────────┘
                   │
                   ▼
              ▱▱▱          Diskette
                           In Save Restore Format
                   │
                   ▼
          ┌─────────────────┐
          │ Your            │
          │ System/38       │
          └─────────────────┘
```

Magnetic Tape

If you have magnetic tape on your present system, you can put your converted system on tape and go directly to the GSC System/38. This allows you to do some testing and create the diskettes at the same time. This interchange method is shown below.

```
┌─────────────────┐
│ Planning and    │
│ Converting Your │
│ Present System  │
└─────────────────┘
        │
        ▼
       ╭───╮              Converted
       │   │              System
       ╰───╯
        │
        ▼
┌─────────────────┐
│ System/38       │
│ at IBM GSC      │
└─────────────────┘
        │
        ▼
      ▱▱▱               Diskette
     ▱   ▱             In Save Restore Format
     ▱ O ▱
      ▱▱▱
        │
        ▼
┌─────────────────┐
│ Your            │
│ System/38       │
└─────────────────┘
```

Diskette

If you have a system with diskette output, you can put your converted system on diskette and go directly to your System/38. There is an important consideration to this method. All source and all disk files must be copied to diskette and segmented into 128-byte records for later concatenation on System/38. Thus, the number of diskettes may be cumbersome. However, this method could be useful for testing parts of your system.

```
                                    ┌──────────────┐
                                    │Planning and  │
                                    │Converting Your│
                                    │Present System │
                                    └──────────────┘
                                            │
                                            ▼
Note:  If this path is used,          ┌──────┐      Converted
       testing must be done           │  ○   │      System
       when your System/38            │  I   │
       is installed.                  └──────┘
                                            │
                                            ▼
                                    ┌──────────────┐
                                    │ System/38    │   Test
                                    │ at IBM GSC   │
                                    └──────────────┘
                                            │
                                            ▼
                                     ┌─────┐        Diskette
                                     │  ○  │        In Save Restore Format
                                     │  I  │
                                     └─────┘
                                            │
                                            ▼
                                    ┌──────────────┐
                                    │ Your         │
                                    │ System/38    │
                                    └──────────────┘
```

The education chart in this appendix will help you plan the education requirements for System/38. Details on the courses shown here can be supplied by your IBM marketing representative.

Classes	Customer Exec	Department Mgr	DP Manager (new)	DP Manager (experienced)	Programmer (new)	Programmer (experienced)	System Operator	Workstation User
Programming Fundamentals					X			
RPG Fundamentals					X			
RPG Workshop					X			
System/38 Environment			X	X	X	X	O	
Facilities and Installation Plan			X	X	X	X		
Application Analysis			X		X	O		
System/38 Programming Facilities			O	O	X	X		
System/38 Implementation			O	O	X	X		
Conversion Workshop			O	O	X	X		
Customer Executive	X							
User Management Seminar		X	X	O				
DP Concepts	O	O			X		O	
Operator Training (PI)							X	
Workstation Operator Training (PI)								X
DP Manager Conference			O					

O — Optional

Appendix F. Suggestions for Improved Standards and Documentation

Preparing an installation/conversion plan and gathering your System/3 source material are activities that can be done prior to the actual conversion. The following list contains suggestions that may be helpful in preparing and documenting your System/3 source. Some of the items on the list could be implemented on your System/3 prior to conversion if desired. Others may be planned and the actual changes made at conversion time.

General

1. Consider putting out a Report Survey to user departments to see what reports are actually being used and if any fields in the reports can be deleted.

2. Clean up written documentation such as source listings, file layouts, and other documentation.

3. Locate and document unusual techniques such as modifying OCL in flight, modifying libraries as if they were data, and processing index files without specifying key lengths and location. These techniques may not produce the same result on System/38.

4. Consider backing up individual files rather than entire packs.

5. Be able to store your source and procedures using $MAINT.

Programs

1. Identify programs the could be replaced by the System/38 Interactive Data Base Utility (IDU) function of query, source entry, or data file utility. Also consider using the System/38 command CPYF (Copy File) to replace existing programs.

2. Investigate any subroutines or assembler language code to see if RPG can be used as a replacement.

3. Survey all existing programs and delete obsolete and unused programs.

4. If you have used RENAME under $MAINT and the object code does not match the source code, make them match and change the OCL as required.

5. Divide by zero and similar intentional errors should be reviewed, because the result may be different on System/38.

Files

1. Field names for a particular record should be standard and consistent.

    Exceptions:
    a. The field is redefined.
    b. The field is both numeric and alphabetic in the same program or multiple programs.

2. Look at your VTOC and get rid of unused files.

3. Be sure indexed files don't have duplicate keys or bad records that were never removed.

4. Resolve duplicate file names on the same pack (different dates) and on multiple packs due to operational techniques or multivolume files.

Job Streams

1. Procedures should be used. (That is, try to use // CALL instead of // LOAD.) This will reduce the volume of OCL to be converted.

2. // JOBNAME JOB and // STEPNAME LOAD and/. should be incorporated if they are supported on your System/3.

3. Analyze the use of System/3 sorts and see if summary sorts are necessary.

4. Look at your OCL and see if procedure overrides can be replaced with complete new OCL.

5. Consider using utilities to get external data to disk and always process from disk instead of card, diskette, or tape.

6. Identify // PAUSE cards that are used to stop the machine. Some of the manual operations performed when the machine is stopped will not be needed on System/38. Others can be done using CPF functions.

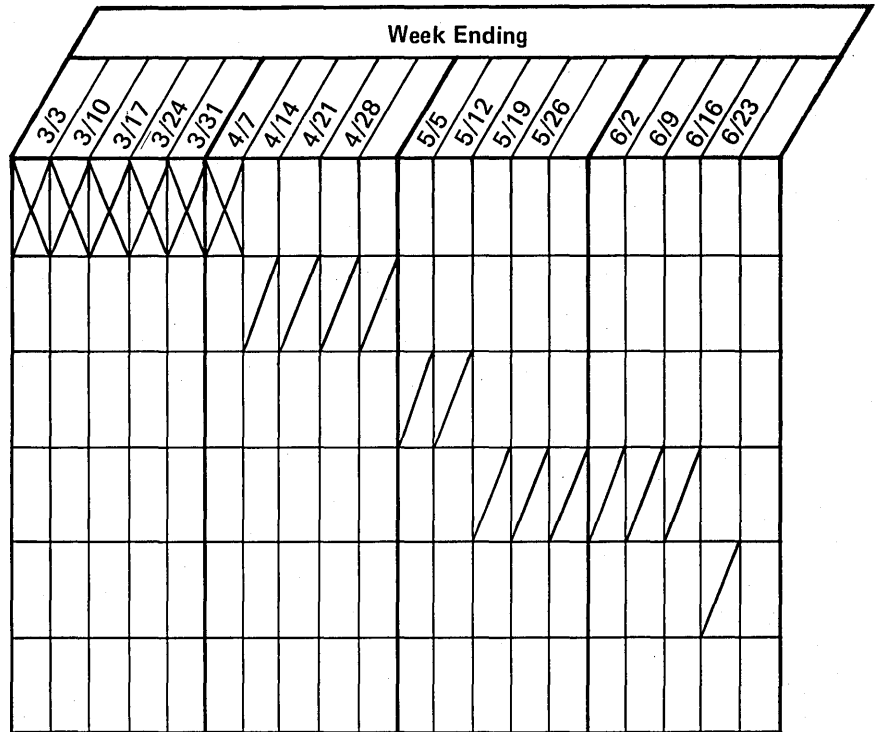**SAMPLE INSTALLATION PLAN**

The Installation Plan
For
XYZ Corp.

1. Remove the following pages from this manual and make several copies for working copies.

2. As each step is planned, apply the activity to the schedule.

3. If additional weeks are needed, an extension sheet for the schedule is provided at the end of the plan.

4. As each step is completed, indicate the completion of the activity in the box associated with each step.

5. The items on the schedule correspond to the topics discussed in Chapter 3.

The schedules provided in the plan show the five phases in detail and one overview schedule. The sample schedule shown below illustrates one way they can be used. The schedule shown here shows Phase I complete and then added to the overview schedule on the following page.

PHASE I. INITIAL PLAN AND EDUCATION

Week Ending

Week ending columns: 3/3, 3/10, 3/17, 3/24, 3/31, 4/7, 4/14, 4/21, 4/28, 5/5, 5/12, 5/19, 5/26, 6/2, 6/9, 6/16, 6/23

A. Initial plan

B. Education

- Programming Fundamentals
- RPG Fundamentals
- System/38 Environment
- Facilities and Installation Planning

C. Collect source needed for conversion

D. Physical planning

F. Phase I review meeting
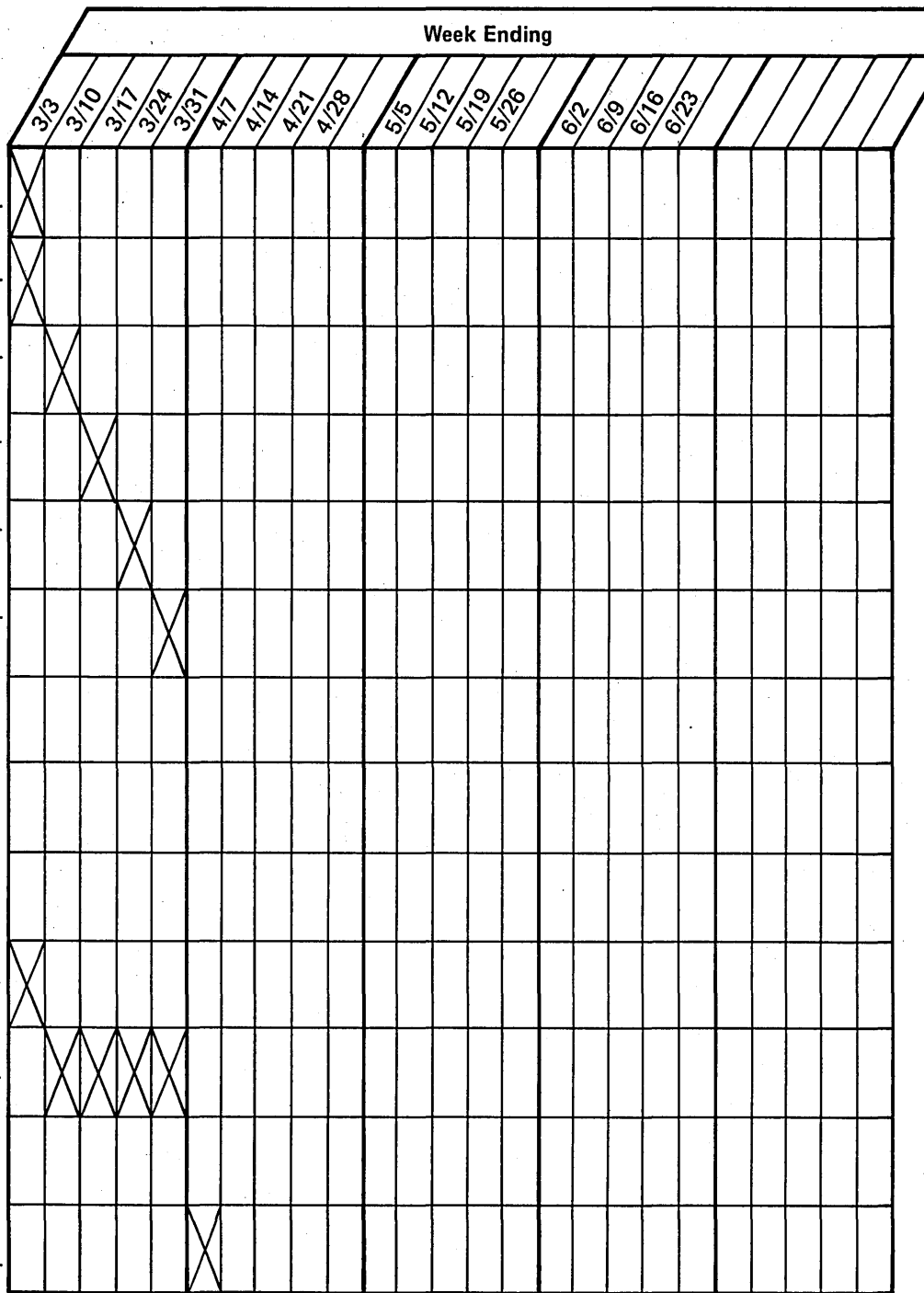
A sample of the overview schedule is shown below. Phase I
is complete and the rest of the phases are planned.

Legend

Planned   Complete

OVERVIEW OF CONVERSION
SCHEDULE

☑ ✓   Phase I

☐   Phase II

☐   Phase III

☐   Phase IV

☐   Phase V

Week Ending

3/3 3/10 3/17 3/24 3/31 4/7 4/14 4/21 4/28 5/5 5/12 5/19 5/26 6/2 6/9 6/16 6/23

INSTALLATION PLAN FORMS

The Installation Plan
For

1. Remove the following pages from this manual and make several copies for
    working copies.

2. As each step is planned, apply the activity to the schedule.

3. If additional weeks are needed, an extension sheet for the schedule is provided
    at the end of the plan.

4. As each step is completed, indicate the completion of the activity in the box
    associated with each step.

5. The items on the schedule correspond to the topics discussed in Chapter 3.

PHASE I. INITIAL PLAN AND
       EDUCATION

☐   A. Initial
       Plan

☐   B. Education

☐

☐

☐

☐

☐

☐

☐

☐   C. Collect Source
       needed for
       conversion

☐   D. Physical Planning

☐

☐   E. Phase I review
       meeting

PHASE II. DETAIL PLAN AND
INSTALLATION REQUIREMENTS

☐ A. Define and
schedule detail
installation plan

☐ B. Education

☐ 1. Formal education

☐

☐

☐ 2. Informal
education

☐ 3. Management
education

☐ C. Conversion
Preparation.

☐ 1. Install
conversion
utilities (if used)

☐ 2. Identify missing
procedures of
source programs

☐ 3. Determene
duplicate file
names

☐ 4. Select application
conversion
sequence

D. Application
development

    1. Review
       specifications

    2. Develop
       design

    3. Design
       programs

E. Complete physical
planning

F. System facilities
planning

G. Phase II review
meeting

PHASE III. INITIAL APPLICATION
AND TEST REVIEW

☐ A. First System/38 test

Preparation at customer
location

☐ 1. Create and save
test data

☐ 2. Convert first
application

☐ 3. Put on
interchange

☐ 4. Complete
remaining
programs to test

First Test At GSC

☐ 5. Load programs
and files

☐ 6. Compile
programs

☐ 7. Test
programs

☐ 8. Make changes
and retest

☐ 9. Save all
output

☐ B. Post test evaluation

PHASE IV. PRE–INSTALL PHASE

☐ A. Application
conversion

☐ B. New applications
complete

☐ C. Prepare for GSC
test session

☐ D. GSC test session

☐ E. Evaluate results

☐ F. Make appropriate
changes to DDS

☐ G. Modify documentation

☐ H. Complete preinstall
information education

☐ I. Complete physical
site modifications

☐ J. Phase IV review

PHASE V INSTALL SYSTEM/38 AND
     CUT OVER

☐   A. System/38 installation

☐   B. Install work
            stations

☐   C. Systems overlap
            activities

☐   D. Final cutover

☐   E. Remove old
            system

OVERVIEW OF CONVERSION
SCHEDULE

☐ PHASE I

☐ PHASE II

☐ PHASE III

☐ PHASE IV

☐ PHASE V
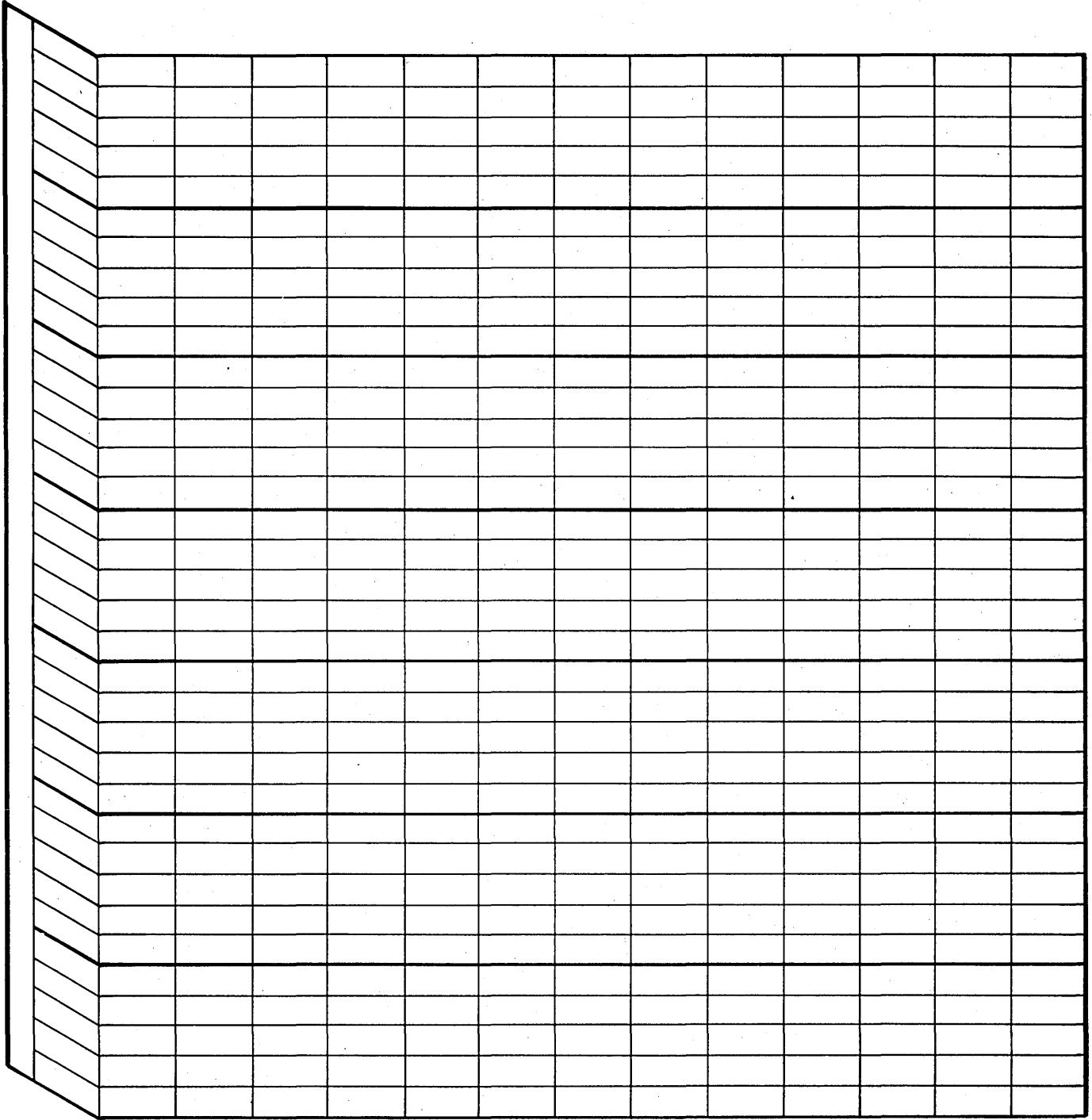
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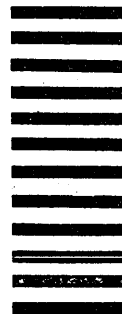
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