

Configuring DSN/MRJE for Simplicity and Savings

by Karl C. Collins

Introduction

An in-depth analysis of our MRJE operations reveals opportunities to simplify the operator interface while reducing costs associated with transmission waste, and technical support. This overview covers configurations required by DSN/MRJE (Distributed Network/Multi-leaving Remote Job Entry), its capabilities and consequences of certain configurations as they pertain to managing output, line efficiency, simplifying the console operator interface. Special consideration will be given to handling special non-standard print output. Also, configurations affecting multiple hosts will be discussed.

Historical Background

A little historical background will help illustrate problem areas that precipitated our exploring utilization of the DSN/MRJE capabilities. We HP3000 Series 40 from a card-based batch processing to both MRJE capability and a minimal amount of spooling. As a single user system, all physical devices were spooled on MRJE whenever the host was online. MRJE on an IBM host until specifically released by the operator. Spooling of either jobs for transmission or incoming multiple copies of reports were produced by transmitting the entire report the appropriate number of times. This required additional effort by the operator to manually install a carriage control tape, release the file, and print forms, etc. This culminated in a great deal of operator effort to manage MRJE and the transmission lines were being used inefficiently due to waiting for operator command retransmissions, and transmitting at the speed of the printer rather than the speed the modems could handle. Conversion to the HP3000 complicated the situation in a multiuser environment, spooled printer, and terminal interface program; this made the operator's job difficult as the printer was no longer dedicated. As a result, we moved from an inefficient situation to a more efficient situation.

All of this prompted an effort to find out how to reduce or eliminate the operator intervention from the files back from the host and handle them in a more efficient fashion. Months of trial and effort and searching for knowledgeable users passed before we reached a configuration. We realize that there are still other capabilities of the DSN/MRJE product to be explained.

Overview of MRJE

Before going into detail, a brief overview of MRJE is an advanced form of the RJE (Remote Job Entry) developed by IBM for the submission of batch jobs from a remote terminal. RJE transfers one file at a time to a maximum of one printer, punch and card reader terminal. A bi-synch protocol is used where each block transmitted is checked for integrity and acknowledged before the next block is transmitted. With MRJE, multiple blocks are transferred between multiple host and remote terminal. MRJE can place both acknowledgements and data blocks being transferred and will send different blocks in different blocks of data. Up to seven printers and readers may be configured for a MRJE remote terminal.

The physical components of DSN/MRJE include a Network Processor for a HPIB machine or a Single Line Controller for a Series II/III machine to 52Kb synchronous modem, a dial up or dedicated line and corresponding equipment on the host system.

The software components include the user interface (MRJE.PUB.SYS), the line monitor program (MRJE.LM), the device drivers for the printer/punches, read console. On the host side the software may be JES2 or ASP.

The system we have is a HP3000 Series 40 with a 4800 baud modem, and a dial up line. Our host software. The specific details of this paper are towards this configuration and will be different for other configurations, particularly as regards JES2.

Configuration Overview

There are six different components to be configured for or changing MRJE. Briefly they are as follows:

- o The modem is configured primarily to match dial up vs. dedicated line. This configuration is changed.
- o The INP/SSLC is configured to match the DSN/product. There may be multiple configurations of INP to match the different products and types of modems.
- o The DSN/MRJE device drivers and spooler punches and readers are configured in the Configuration; there may be multiple DSNs configured.
- o The host configuration file (MRJECON) covers about each host system and the type and code of remote terminal to which the host believes it is connected.
- o The host system, such as JES2, has a remote configuration describing the type of terminal (System/360 etc.), the number and type of pseudo terminals and their default setup values.
- o The job stream (MRJESTR) that is used to monitor the program also has some configuration capabilities. It contains file equations that determine the disposition of the various output streams from the message log from the host.

INP Configuration

The INP configuration is downloaded to the INP device and opened for use. As a result there may be different configurations for one physical INP. Configurations for different software products such as DSN/MRJE, which use the same modem and line configurations may be for different modems and line configurations and dedicated, which will require switching the modems. The attributes of an INP configuration are changed except via Sysdump or a Coolstart. As a result it is difficult to occasionally use MRJE on a dial up line normally configured on a dedicated line. The INP configuration can be seen in the System I/O configuration and the SYSINFO utility. Note that in Example 1 are configured (ldevs 15-17) and that they all use physical INP, DRT# 82. Naturally with only a few several DSN products at the same time.

System I/O Configuration

The system I/O configuration determines the devices that are used and therefore the pseudo peripheral

are available for use by MRJE. Of course the host has the same peripheral devices listed in its Remote configuration. It is possible to have separate configurations for different hosts. Several of these pseudo devices required, ldevs 50-53, and 61 in Example 1, two console, printer, and reader. Any additional readers and punches must also be configured here. It is assumed that the MRJE devices are pseudo or imaginary they may be spooled. Their DRT# refers to the physical printer or other device. It will be possible to connect them to a real device through a file statement in the Configuration File. The DRT# also implies a relationship between the INP configurations and devices; and, as a result, providing both a dial-up line capability to a host will require two sets of

When two hosts use the same configuration, they use the same spooled reader for jobs that are submitted though a specific host has to be identified before submitted. When a host comes online the entire spooler will be transmitted to the online host, where the jobs were supposed to be sent. One problem is to configure a separate spooled reader and then have the operator suspend the other reader bringing a host online. A better solution is to completely separate MRJE configurations; this brought online only one reader will be known to be accessed. This solution will be transparent to the users. In Example 1 two hosts have been configured with different number of pseudo printers. Both hosts have identical INP configurations.

Remote Terminal Configuration

The Host system has a Remote Terminal Configuration that keeps track of what type of remote system it is connected with. This configuration must be consistent with the devices in the System I/O configuration and the Host Configuration File. Typically DSN/MRJE System/360 with a console, multileaving interfile transparency option. The details can be found in the DSN/MRJE Reference Manual.

In terms of handling the output the important configuration is the number of additional print devices as well as their default parameters. Examples of devices configured for our remote terminal. Terminal punches should be automatically started, have a "STD.", and be in automatic forms mode. In addition specify the outclasses each device will accept a limit. The automatic start option simply means that the output will always be available for MRJE output, rather than the operator send a command to start the printer. The output for a remote terminal, it looks for an available device of the correct type, outclass, and forms. The type of printer/punch, the outclass is one of 36 outclasses (A-Z,0-9), and the forms being the correct form for each device has default value(s) for each of these attributes are initially assigned when the host system is initially coldloaded. The remote terminal operator may connect to the devices at any time. Optionally, a print command can be set to reserve a printer for reports of a certain range.

When there is output for an automatic forms valid outclass and a new or different forms name will send a SETUP message for that printer with name. The host will also reset the printer to the name. DSN/MRJE will acknowledge the new form printer command to the host (\$SPRn). When DSN/MRJE receives a SETUP message for a non-standard form, it will check the matching environment file and, failing that, send a message to the file. It will continue to do so until a message is received by that printer until the host is signed off. If item 14 of the file is configured incorrectly, DSN/MRJE will send a SETUP message, and not respond to the host system terminal operator will then have to send a start (\$SPRn) to the Host in order to receive the output.

There is a serious conflict within MRJE concerning printers and the SETUP command. The host will send a message and change the forms name parameter changes. The printer is reset to the configured only when the host is IPL'd and not when the host signs off. On the other side, DSN/MRJE keeps the current form on each printer between changes, when the host is brought online all the remote forms = STD. As a result, the host and DSN/MRJE are out of sync in terms of what form they believe is at the printer. There is no mechanism to bring the printer back in sync other than manual inspection and intervention by the operator. Even if DSN/MRJE did keep track between sign-ons, it would not know when the host signs on. As a result, using special forms names is not correct at this time. If this causes serious problems to the systems programmers at your host site to see if there is a patch for JES2, or the appropriate software. I am investigating this problem.

A few words are in order concerning the outclass host site assigns their own values to the outclass partial list of outclass codes used by one of our hosts in Example 2. By assigning different sets of outclass codes to your output devices, and setting up file equations for each device, you can provide for automatic handling of output.

Host Configuration File

DSN/MRJE maintains a file for each host with information about the MRJE pseudo devices, the terminal configuration. This file ties together the configurations. As shown in Example 3, the first letter of the host name. DSN/MRJE uses only the first letter of the host name thereby allowing up to 26 hosts. All MRJE file names end with that letter; for example, MRJE host configuration file for the host DALLAS is MRJEDAL.

Items 2,3 and 19 refer to the MRJE pseudo device I/O configuration and, indirectly to the INP configuration.

DSN/MRJE scans different parts of the output in order to determine the output type, host job type, etc. Items 8-17, and 37 tell

look for this information. Configuring these items can be confusing and, if they are incorrect, the results can be unusual. Appendix A of the MRJE Reference Manual lists values for these items; however, various hosts may have established values that are at variance to those in the manual. These values should be obtained from technical support staff for that host. The HP products installed DSN/MRJE for us were initially unacceptably correct settings. Perseverance and the willingness to try finally led us to correct values. Should you encounter similar difficulties, examine the print banner and message log carefully and keep trying.

Items 20-35 determine the disposition of print output. These items can be given values of a device number, or back reference a file equation by use of a file equation such as !PART3. Output that is routed to a device class or device will have the host job name used. Output that is routed with a file equation will be specified in the file equation.

When output comes back from a host, DSN/MRJE default, solicited, or unsolicited, in addition to punch or forms. In general default (and unidirectional) goes to the devices specified in items 20 and 28. Unsolicited output is routed according to the items 21-27 and 29-35 that corresponds to the device selected to transmit the data from the host. An explanation of these different kinds of output follows shortly.

The remaining items in the host configuration file are clear and will have little effect on your ability to get output from the host.

DSN/MRJE Job Stream

Each host has a job stream that is run in order to monitor MRJE line monitor program. The job stream is for host Dallas and the monitor program is MRJESTR. The job stream must be in PUB.SYS and run as MANA should be carefully secured to keep the password discovered; this also makes sysdump tapes more secure. Example 4 is a listing of MRJESTR.

There are three entries in the example that describe the job stream. First, a file equation must be present for all solicited entries that back reference a file equation. Back references are in the individual Submit command to the users and in the Host Configuration File. Second, a copy of all remote terminal console messages is sent to MRJEMSGD (D for Dallas) that defaults to \$N. This can be used here to redirect that output to the message file, circular file, or for whatever other file you may find useful. A listing of the console messages is helpful in troubleshooting after some output has been sent in a fashion other than you intended. This is especially true since you will not see the console messages unless you are running the MRJE user interface program and terminal console mode at the time the message

or the DSN/MRJE monitor program. And this in Example 4 are executed after the host is sign check to see if any unexpected punch output a site we deal primarily in print output, punch o about four or five times a year, usually without This keeps it from being printed out on the pri lost, or from just sitting in a disk file unnoticed

Host JCL

When print output is produced on the host it is attributes that determine how the output will first attribute is a single character outclass cod site determines what type of output each outcl represents. The second attribute is a forms na characters long and most often has the default. These two parameters or attributes are given in card such as:

```
/*SYSUT1 DD SYSOUT=(F, F123)
```

where the outclass=F
and the Form name = "F123".

There are also two parameters in the host JCL Job statement that are useful to know. The MSGCLASS parameter is used to assign the outclass of the JCL listing that is produced for the job. This listing is similar to the \$STDLIST created for a batch job on the HP3000. Generally this listing is used only when the job has failed for some unknown reason. Further-

```
SUBMIT filename;PRINT= ;PUNCH= ;FORMS=
```

When the Submit command is entered, the input file is translated from ASCII to EBCDIC (unless otherwise instructed) and placed in the spooled reader specified in the Host Configuration File. When the host is next online, the job will be transmitted. Also, at this time an local DSN/MRJE job number is assigned and an entry is made in the host job log (MRJEJOB), along with the parameters. This job log is updated with the host job number and time stamp when the job is actually transmitted. When the output is recieved from the host, this job log entry will be used to determine what parameters were specified for the disposition of the output. The three parameters are optional and will accept two forms of values for a total of three classes or kinds of results. These are referred to a Solicited, Unsolicited, and Default output.

Solicited Output

more it is rather unintelligible to a non-IBM person. Our host maintains an archive of all JCL listings and so we defer these listings in the spooler and then delete them every evening. This procedure change has saved us in excess of three cases of paper a year for one program alone. The MSGLEVEL parameter in the Job statement is used to indicate the detail level of the JCL listing. To minimize line transmission costs, we have this set at the minimum level. These two parameters have a format as follows:

```
MSGCLASS=P,MSGLEVEL=(0,0)(0,0)
```

This will cause the JCL listing to have an outclass of "P" and only the Job card will be printed (first 0) with no messages unless the job terminates abnormally (second 0).

DSN/MRJE Submit Command

When a user wishes to submit a job for batch processing on the host system the DSN/MRJE user interface program is used to select the host and submit the job. There are several parameters on the Submit command that are crucial in determining how the output of that job will be handled when it is recieved from the host. The format of the Submit command is as follows:

When a Submit parameter is given the value of an ldev#, device class, or a back referenced file equation, the output is called solicited. When the output is solicited, all the output of that job and type is routed according to the value specified. In this fashion all the print output for a given job can be routed to a given printer with a device class entry, the forms output can be handled by back referencing a file equation, and the punch output can be routed to a disk file via a file equation. The file equations must be in the MRJE execution job stream (MRJESTRD, Example 4); this will require some advance planning as few users will have access to that job stream. The real problem that arises with solicited output is if your job produces several output files of the same type, ie. print output, you will not be able to handle them differently. This is where unsolicited output has an advantage.

Unsolicited Output

When the parameter given is a zero (PRINT=0), the output is called unsolicited. As such, all the output for that job and type is routed according to the entries in the Host Configuration File associated with the output devices that the Host used to transmit the output to the remote terminal. Specifying unsolicited output may cause different kinds or outclasses of output to be handled differently, even when they come from the same job. Generally, the unsolicited printers are used to handle certain kinds or classes of output, such as deferred output, multi-part paper output, output for specific printers, etc. The limitation of unsolicited output is that you only have 7 printers and 7 punches with which to work. You may also be constrained by the outclass codes that are used by your host site. The additional unsolicited printers that are configured into the system are going to cost some additional overhead whenever the host is online and probably should be used only if there is sufficient traffic, especially if you have a dedicated line and keep the host online all the time.

Default Output

When no parameter is given, or if the output cannot be linked to a given job submission, the output is referred to as default output. Default output is routed to the default devices which are specified in items 20 and 28 of the Host Configuration File. There are two cases where default output is a concern. One is where default output is appearing that should have been handled in another fashion - for some reason DSN/MRJE is unable to identify the output and match it with the job that was submitted. To identify the problem, check the Job Log to see if the entry has been purged or lost for some reason. Next, look at the console message file or listing to see how MRJE interpreted the output when it was received. The other case concerns output from the host that is being generated by some process other than jobs submitted through MRJE. There is no easy solution in this case as DSN/MRJE has no way of knowing how the output should be handled, and therefore the Default option is used. It is possible to write a program to examine these files and redistribute them according to whatever parameters are appropriate. In a paper given at the Montreal conference, Rolf Frydenburg briefly described a batch program running SPOOK as a son process that periodically examines the spooler for files to be redistributed.

Environment Files

There is one last way to provide for special handling of files through DSN/MRJE, and that is with environment files. MPE supports environment files for the HP2680 laser printer and the HP2608S line printer. The environment file contains a forms message, cctl information, and, for the laser printer, the image of the form to be printed. DSN/MRJE supports environment files only for the HP2680 laser printer at this time. If you (1) have an environment file, (2) it is placed in the appropriate group and account (@ENV.HP2680, examples to the contrary in the reference manual are incorrect), (3) it has a four character name that matches the forms name of some host output, (4) the output is returned via an Automatic mode remote printer that generated a SETUP message, and (5) your laser printer has been configured with a device class name of "LPS", then DSN/MRJE will take the output and corresponding environment file and route them to the "LPS". The reference manual says that the SETUP message will be acknowledged by DSN/MRJE only for output that is of outclass = A and sent on remote printer 1. This may or may not be true for environment files, but it is definitely not true for SETUP messages for non-environment forms file output where it works fine for all outclasses and remote printers.

Forms Files

Forms files are sufficiently complex that a summary of their operation may be of help. A forms file is defined to be any host output with a forms name that is not "STD". The key to having DSN/MRJE recognize and handle forms files differently from print and punch output is the receipt of the SETUP message from the host. As indicated earlier this message is not completely reliable without manual intervention of some kind or a custom modification to the JES2 software at the host site. Example 2 shows a technique for minimizing the loss of reliability. An outclass code of "F" is used to designate forms output and a special printer (PR6) is configured with a file equation that labels and defers all output. Then if the print output is designated as unsolicited and a SETUP command is not received for a forms output, the file will be handled according to the forms file equation. All our jobs having forms output are submitted with the unsolicited print option. In this fashion, if the SETUP message is lost, the output will be deferred and labeled to catch the

operator's attention. This technique works well for all forms output created by jobs that are submitted from the HP3000. Forms output from elsewhere still runs the risk of becoming default print output if a SETUP message is not received.

Summary of Output Handling with DSN/MRJE

Without operator intervention, DSN/MRJE provides the capability to bring back output from a host in two general ways. One is the ability to establish up to seven classes or kinds of output (14 with print and punch output), each of which will be handled in a specified way. This is done through the use of the unsolicited designations and outclasses for the different devices and types of files. The other way is a variety of parameters that allow individual jobs or files to be indentified and handled in a specific way. This is done through the use of a solicited designation or a non-standard forms name. The forms name can be used to single out a file with an environment file or the FORMS parameter in the SUBMIT command.

Example 5 lists several of the most complicated batch jobs in terms of output that are submitted by our site. By comparing these against the Remote Terminal and Host configurations, one sees that the output from these jobs can be handled in a desirable fashion and without any intervention on the part of the operator. The JCL listings are deferred for later purging if they are not needed, the forms files are deferred or matched to the appropriate environment files and printers, multipart paper output is

labeled for the operator's attention and deferred, and large reports are given a lower output priority.

While no efforts were made to track the costs before and after our new configuration went into effect, some of the savings have been obvious. Just under 10% of our paper usage is saved by not printing the JCL listings, three cases a year on one production job alone. A corresponding savings has been made in phone line costs by reducing the MSGLEVEL such that each JCL listing is now a maximum of 2 pages, as compared to up to 35 pages previously. Multiple copies of reports are no longer sent, and requests for assistance to recreate and retransmit output that had been lost due to mistakes have been almost completely eliminated. Most importantly the operator no longer has to release, alter, copy, print, and otherwise handle every output file that comes from the host. Furthermore the training and experience required for a new operator is greatly reduced.

Conclusion

DSN/MRJE provides a significant amount of flexibility in terms of being able to manage output from the host system, as well as accommodate various hosts and communications facilities. Each site will have to examine their range of output to determine the unique configuration that will best suit their needs. Hopefully this paper has provided a clearer insight into some of the capabilities that are available. An efficient hands off setup for DSN/MRJE is possible and is well worth the effort.