SC33-6034-1
File No. S370-28

Licensed Program

DOS/VS RPG II Auto Report

Program Number 5746-RG1

IBM

Summary of Amendments

Release 1

SC33-6034-0 documents Auto Report as an integral part of the DOS/VS RPG II Licensed Program. The information on the internal operation of Auto Report previously given in Appendix B of *IBM DOS RPG II Auto Report Feature,* SC21-5056 can now be found in *DOS/VS RPG II Logic,* LY33-9062.

Release 2

SC33-6034-1 documents changes to the Sample Program and incorporates minor editorial changes.

Second Edition (June 1978)

This edition is a major revision of, and obsoletes, SC33-6034-0. Changes to text and illustrations are indicated by a vertical line to the left of the change.

This edition applies to Release 2 of IBM DOS/VS RPG II Licensed Program 5746-RG1 and to all subsequent releases and modifications until otherwise indicated in new editions or Technical Newsletters. Changes are continually made to the specifications herein; before using this publication in connection with the operation of IBM Systems, consult the latest *IBM System/370 Bibliography,* GC20-0001, for the editions that are applicable and current.

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A form for reader's comments is provided at the back of this publication. If the form has been removed, comments may be addressed to IBM Laboratory, Programming Publications Department, Schoenaicher Strasse 220, D-7030 Boeblingen, Germany. Comments become the property of IBM.

CONTENTS

ILLUSTRATIONS

This publication describes Auto Report, which is part of the IBM DOS/VS RPG II Licensed Program (5746-RG1).

The coding for and operation of RPG II Auto Report are described for programmers with basic experience in RPG II.

PREREQUISITES

This manual assumes that you are able to code RPG II programs that include such basic operations as: using disk files, listing records on a printer, simple calculations, and group totals. If you do not have this experience, you can receive basic instruction in RPG II through IBM education courses or programmed instruction courses, or by reading Introduction to RPG II, GC21-7514.

Related Publications

The following manuals are available for further reference concerning subjects discussed in this book:

- DOS/VS RPG II Language, SC33-6031
- DOS/VS RPG II Installation Reference, SC33-6032
- DOS/VS Sort/Merge Programmer's Guide, SC33-4028 (Program Number 5746-SM1)
- DOS/VS Sort/Merge Version 2 Programmer's Guide, SC33-4044 (Program Number 5746-SM2)

If a sort program other than one of the above IBM sort programs is used with the Select/Sort function of Auto Report, see the reference manual for that program.

The diagnostic messages produced by Auto Report are described in DOS/VS RPG II Messages, SC33-6033.

For information on DOS/VS, refer to the following publications:

- DOS/VS System Generation, GC33-5377
- DOS/VS System Management Guide, GC33-5371
- DOS/VS Data Management Guide, GC33-5372
- DOS/VS System Utilities, GC33-5381
- DOS/VS Supervisor and I/O Macros, GC33-5373
- DOS/VS Operating Procedures, GC33-5378
- Guide to DOS/VS Assembler, GC33-4024

Part I describes a series of examples to illustrate the basic Auto Report coding. By studying the reports shown in the examples alcng with the Auto Report coding that produced them, you learn the results of each Auto Report coding entry. In this way, you can code your own Auto Report programs in the shortest possible time.

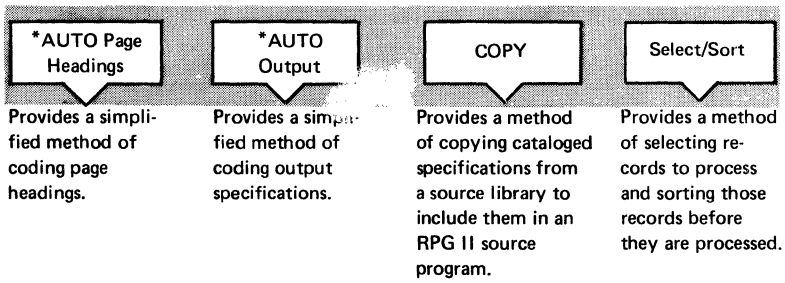
Part II contains a complete sample program. When you have completed Part I, study this program to see how Auto Report is used to code a complete program. The procedures for running the program, the complete printed listing, and the report produced as output by the program are shown so that you will know what to expect when you code your own Auto Report program.

Part III contains the complete reference information for using Auto Report.

Appendix A contains programming tips and aids for RPG II programmers using Auto Report.

WHAT IS AUTO REPORT?

RPG II Auto Report operates prior to the RPG II compiler. Auto Report accepts special, simplified specifications and standard RPG II source specifications and uses them to generate a complete RPG II source program. If the Select/Sort function is used, Auto Report also generates an object module to control the selection and sorting of input records. The special Auto Report statements control the four separate functions of Auto Report.



WHAT IS THE PURPOSE OF AUTO REPORT?

RPG II Auto Report has two primary purposes:

1. To enable the beginning RPG II users to easily code a program to produce a simple report.

2. To help experienced RPG II programmers code programs faster and to provide them with additional features not available in RPG II.

Auto Report can reduce the time required to plan and code RPG II programs by freeing the programmer from many tasks, such as repetitive coding of specifications in different programs, planning the format of reports, and coding specifications to accumulate and print totals for numeric fields. By simplifying programming tasks so that the programmer makes fewer errors and by providing a set of diagnostics in addition to the RPG II diagnostics, Auto Report can reduce debugging time.

RPG II Auto Report includes four separate functions that can be used in any combination:

*AUTO Page Headings

Auto Report simplifies the specification of page headings. The programmer does not have to specify conditioning indicators, spacing, and end positions. Auto Report automatically centers the title and prints it at the top of each page with a date and page number.

*AUTO Output

Auto Report simplifies the specifications for a report that may include columns of data with column headings and totals. On one output specification line, the programmer can name a field, specify a column heading to appear above the field, and specify that several levels of totals be accumulated for the field. The programmer does not have to code separate RPG II output specifications to print the column headings, detail lines, or total lines, or calculation specifications to accumulate the totals. Auto Report assumes edit codes if the programmer does not provide them and determines spacing and end positions to produce a report with a neatly prepared format.

Copy

Normal RPG II specifications for the *AUTO Page Headings and *AUTO Output functions that have been cataloged in a source library can be copied by Auto Report to be included in the RPG II program generated by Auto Report. You can use the Copy function to include frequently-used specifications that are common to different programs. You can modify copied file description and input specifications to suit each particular program.

Select/Sort

The Select/Sort function allows the programmer to:

1. Select only those records from a file which he desires to process, bypassing all other records.

2. Sort an entire file into the sequence he desires before processing the entire file.

3. Select records, sort the selected records, and process the selected and sorted records.

Select/Sort specifications are entered on the lower half of the RPG Auto Report Specifications form (Figure 1).

HOW DOES AUTO REPORT WORK?

Auto Report generates a complete RPG II source program and, if the Select/Sort function is employed, a Select/Sort object module from the following input:

1. An Auto Report Option specification (Figure 1).

2. *AUTO Page Headings and *AUTO Output specifications you provide in the source file.

3. Standard RPG II specifications you provide in the source file.

4. Auto Report Copy statements in the source file, with or without modifier statements.

5. Select/Sort specifications (Figure 1).

6. Standard RPG II specifications and *AUTO specifications copied from a source library by the Auto Report Copy function.

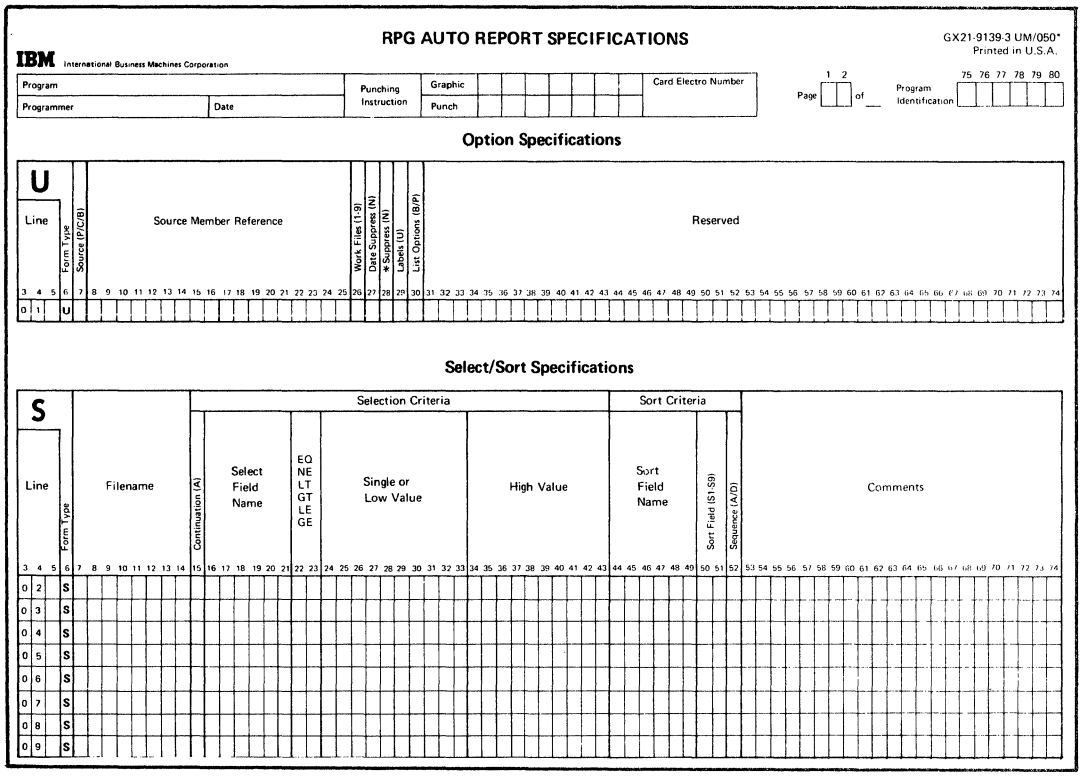


Figure 1. Auto Report Specifications Form

When you use the simplified specifications for the *AUTO Page Headings and *AUTO Output functions, Auto Report generates normal RPG II specifications (Figure 2) for the final RPG II source program. If you use the Auto Report Copy function, Auto Report copies the designated specificatons from the source library. If you include Select/Scrt specifications in the Auto Report program, Auto Report generates a Select/Sort object module. When a complete RPG II source program has been generated, Auto Report calls the RPG II compiler. The resulting RPG II object program and the Select/Sort object module are then link-edited to form the final load module.

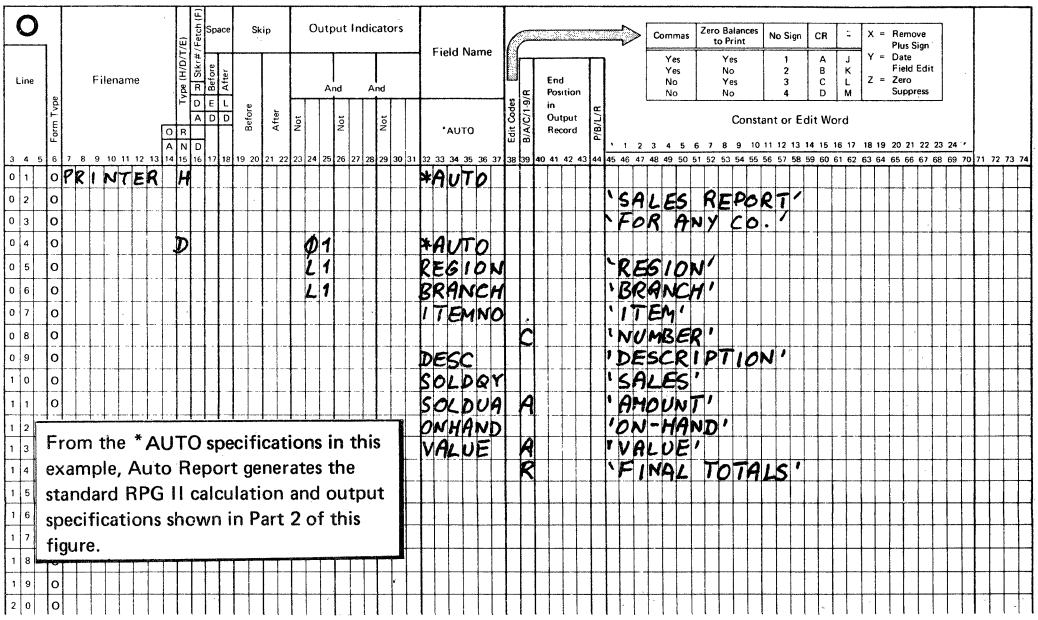


Figure 2 (1 of 2). Using *AUTO Specifications, Auto Report Generates Standard RPG II Specifications

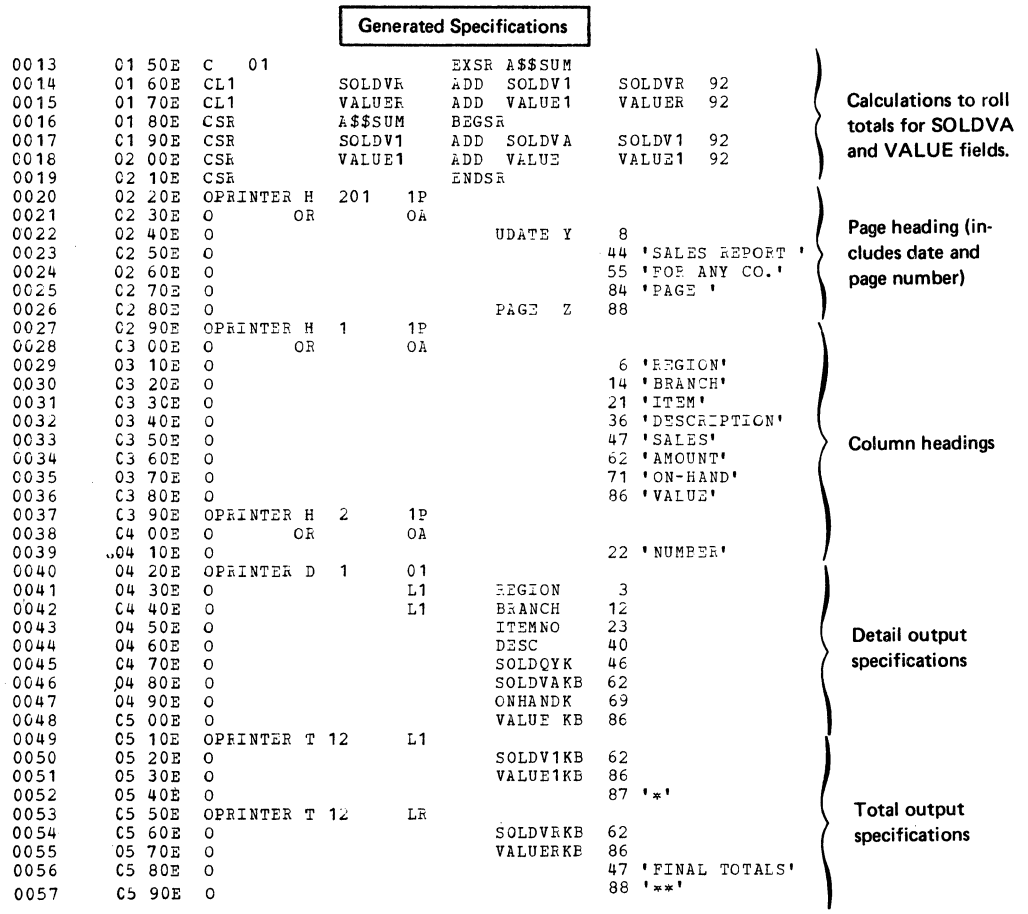


Figure 2 (2 of 2). Using *AUTO Specifications, Auto Report Generates Standard RPG II Specifications

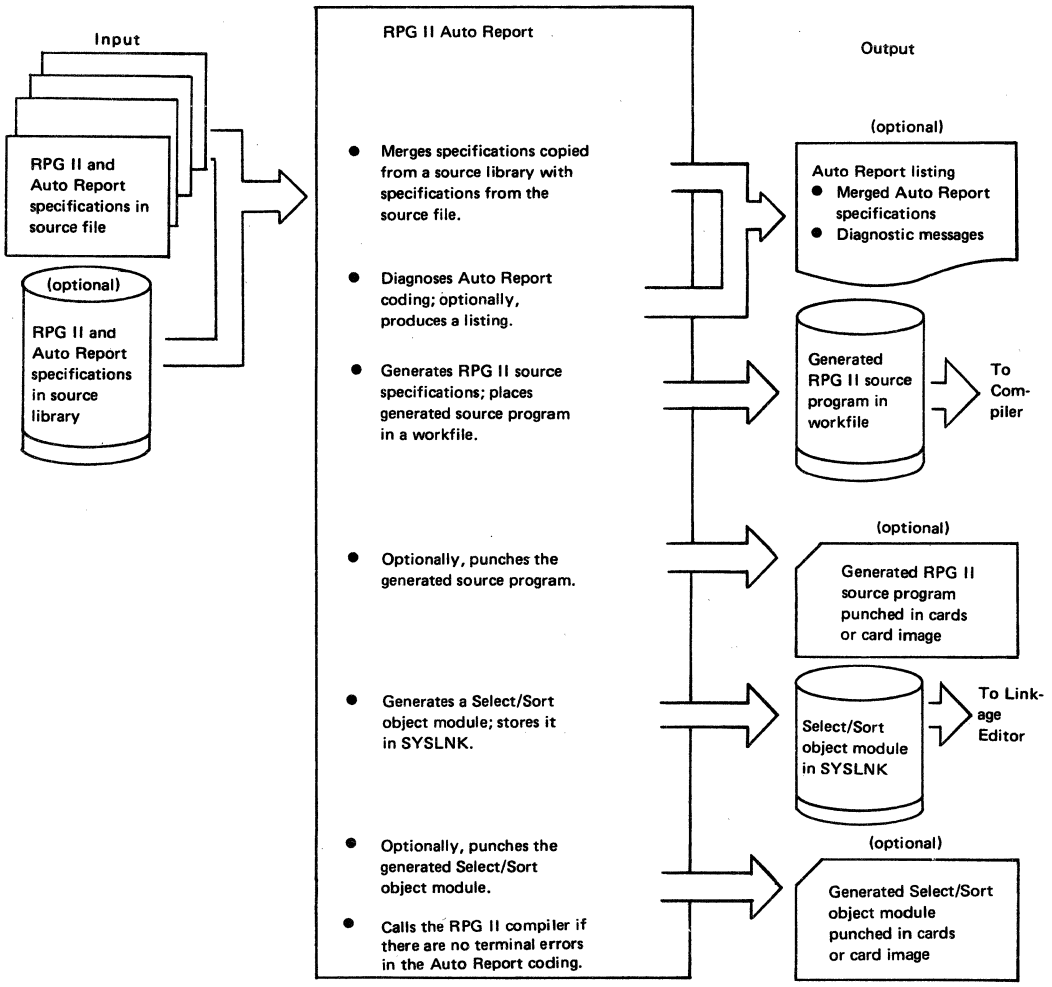


Figure 3. Operations of Auto Report

PART I.

HCW TO USE RPG II AUTO REPORT

*AUTO PAGE HEADINGS AND *AUTO OUTPUT

Examples 1 through 4 explain how Auto Report is used in generating report page headings and such output specifications as: column headings, detail lines, and total lines.

EXAMPLE 1

*AUTO Page Headings | *AUTO Output

Problem

Produce the sales report shown below using the *AUTO Page Headings and *AUTO Output functions of Auto Report.

Procedure

1. Code normal RPG II file description and input specifications for the job.
2. Code *AUTO Page Headings to produce a one-line page heading that includes date and page number.
3. Code *AUTO Output to produce one-line column headings, detail report lines, and final totals.

Letters refer to fields on the following page.

01/05/78 SALES REPORT FOR ANY CO. PAGE 1

C REGION	B BRANCH	A ITEM	D DESCRIPTION	E SALES	F AMOUNT	G ON-HAND	H VALUE
1	17	AG7701T	2-TON TRUCK	5	25,000.00	2	10,000.00
1	17	AG7705S	PICK-UP	10	20,000.00	1	2,000.00
1	17	AP6545B	CAMPER	2	8,000.00		
1	22	AG7701T	2-TON TRUCK	2	10,000.00	1	5,000.00
1	22	AG7705S	PICK-UP	4	8,000.00	1	2,000.00
3	25	AG6545B	CAMPER	10	40,000.00	5	20,000.00
3	25	AP6549B	1/4 TON TRUCK	20	30,000.00	6	9,000.00
					141,000.00		48,000.00 *

1 Code RPG II file description and input specifications

FILE DESCRIPTION SPECIFICATIONS

F

Line	Form Type	Filename	File Type: I/O/U/C/D	File Designation: P/S/C/R/T/D/F	End of File: E	Sequence: A/D	File Format: F/V/S/M/D	Block Length	Record Length	Mode of Processing: L/R	Length of Key Field or of Record Address Field	A/P/I/K	Record Address Type	Type of File Organization or Additional Area: I/X/D/T/R or 2	Overflow Indicator	Key Field Starting Location	Extension Code E/L	Device	Symbolic Device	Labels S/N/E/M	Name of Label Exit	Extent Exit for DAM	Storage Index	Continuation Lines: K	Option	Entry	File Addition/Unordered: A/U	Number of Tracks for Cylinder Overflow	Number of Extents	R/U/N	Tape Rewind	File Condition U1-U8
02	F	SALES	I	P			F	430	43									DISK40	SYS006S													
03	F	PRINTER	O				F	120	120									PRINTER	SYSLST													
04	F																															

INPUT SPECIFICATIONS

I

Line	Form Type	Filename	Sequence: O	A	N	D	Number (1/N)	Option (O), U, S	Record Identifying Indicator or DS	Record Identification Codes 1: Position	1: Not (N)	1: C/Z/D	1: Character	2: Position	2: Not (N)	2: C/Z/D	2: Character	3: Position	3: Not (N)	3: C/Z/D	3: Character	Stacker Select	P/B/L/R	Field Location: From	To	Decimal Positions	Field Name	Control Level (L1-L9)	Matching Fields or Chaining Fields	Field Record Relation	Field Indicators: Plus	Minus	Zero or Blank
01	I	SALES	A	A					01															1	7		ITEMNO						
02	I																							8	9		BRANCH						
03	I																							10	10		REGION						
04	I																							11	25		DESC						
05	I																							26	27	0	SOLDQY						
06	I																							28	34	2	SOLDVA						
07	I																							35	36	0	ONHAND						
08	I																							37	43	2	VALUE						
09	I																															
10	I																															
11	I																															

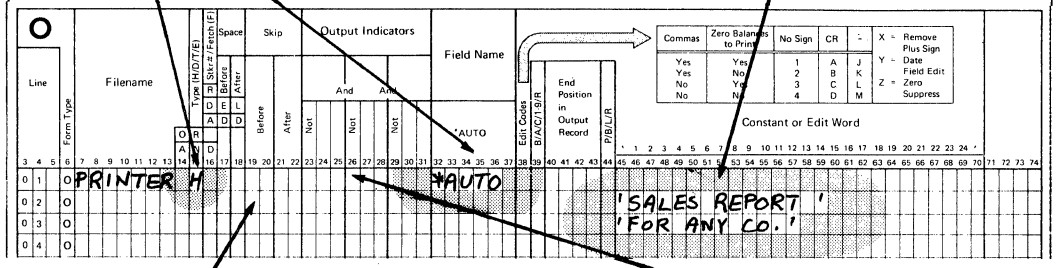
	Field Name	Contents
A	ITEMNO	Item number
B	BRANCH	Number of the branch office where the item was sold
C	REGION	Sales region in which the branch office is located
D	DESC	Description of the sales item
E	SOLDQY	Quantity of the item sold
F	SOLDVA	Total value of the items sold
G	ONHAND	Quantity of the item remaining on hand
H	VALUE	Total value of the items remaining on hand

2 Code *AUTO Page Headings specifications

OUTPUT SPECIFICATIONS

A Enter an H in position 15 and *AUTO in 32-36 to request an Auto Report page heading. Up to five page heading lines can be described. The system date is printed on the left and the page number on the right of the first heading line on each page. The date and page can be suppressed by placing an N in position 27 of the Auto Report Option specification.

B The title information is centered by Auto Report; do not enter end positions in 40-43. Fields and table/array elements can also be used.



C When Space and Skip entries (positions 17-22) are left blank, skip to channel 1 is assumed for the first heading line; single spacing is done between heading lines; double spacing after the last heading line. (See *Example 4* for an example of multiple page heading lines.)

D When Output Indicators (positions 23-31) are left blank, Auto Report page headings are printed on each page (conditioned by 1P or overflow). If no overflow indicator is defined for the printer file, Auto Report assigns an unused overflow indicator to the printer file.

C Channel 1

Blank line

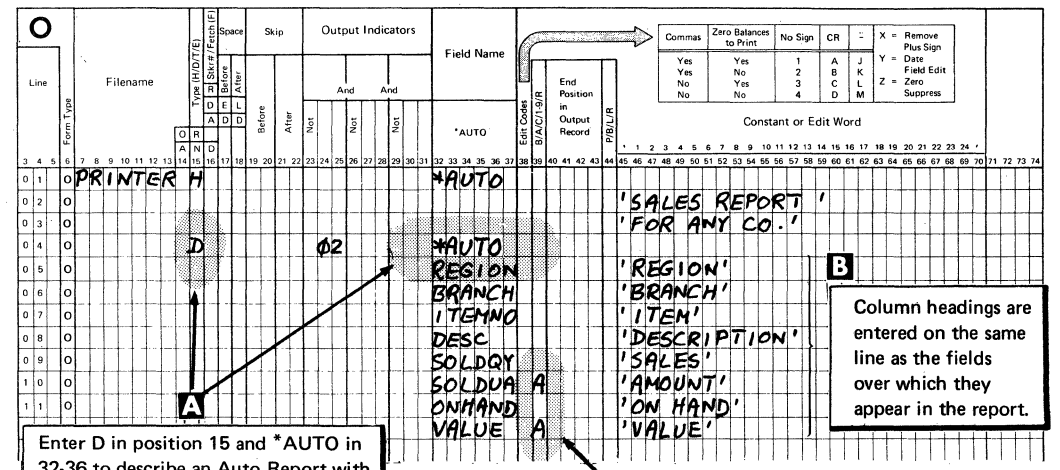
A 01/03/78 **B** SALES REPORT FOR ANY CO. **A** PAGE 1

REGION	BRANCH	ITEM	DESCRIPTION	SALES	AMOUNT	ON-HAND	VALUE
1	17	AG7701T	2-TON TRUCK	5	25,000.00	2	10,000.00
1	17	AG7705S	PICK-UP	10	20,000.00	1	2,000.00
1	17	AP6545B	CAMPER	2	8,000.00		
1	22	AG7701T	2-TON TRUCK	2	10,000.00	1	5,000.00
1	22	AG7705S	PICK-UP	4	8,000.00	1	2,000.00
3	25	AG6545B	CAMPER	10	40,000.00	5	20,000.00
3	25	AP6549B	1/4 TON TRUCK	20	30,000.00	6	9,000.00
					141,000.00		48,000.00 *

3 Code *AUTO Output specifications to produce:

- **A** Detail report lines
- **B** Column headings
- **C** Final totals

OUTPUT SPECIFICATIONS



Enter D in position 15 and *AUTO in 32-36 to describe an Auto Report with detail lines. The record identification indicator 01 will condition printing of the detail lines.

Enter an A in position 39 to cause fields to be accumulated. Auto Report generates (1) total fields and calculations to accumulate the totals and (2) total output specifications to print the totals.

Column headings are entered on the same line as the fields over which they appear in the report.

```
01/03/78                    SALES REPORT FOR ANY CO.                    PAGE     1

REGION   BRANCH   ITEM      DESCRIPTION      SALES        AMOUNT     ON-HAND    VALUE
  1        17     AG7701T   2-TON TRUCK          5     25,000.00           2   10,000.00
  1        17     AG7705S   PICK-UP             10     20,000.00           1    2,000.00
  1        17     AP6545B   CAMPER               2      8,000.00
  1        22     AG7701T   2-TON TRUCK          2     10,000.00           1    5,000.00
  1        22     AG7705S   PICK-UP              4      8,000.00           1    2,000.00
  3        25     AG6545B   CAMPER              10     40,000.00           5   20,000.00
  3        25     AP6549B   1/4 TON TRUCK       20     30,000.00           6    9,000.00

                                              141,000.00                     48,000.00 *
```

A — Detail report lines

B — Column headings

C — Final totals

Auto Report formats the report so that column headings and data are neatly spaced and centered on each other.

All numeric fields for which a blank, B, or A is specified in position 39 are edited by the K edit code unless a different edit code is specified.

EXAMPLE 2

***AUTO Output**

Problem

Expand sales report from *Example 1* to include three levels of totals:

1. Total for each branch
2. Total for each region
3. Final total

Procedure

1. Code file description and *AUTO specifications as in *Example 1.*
2. Add control level indicators to the input fields BRANCH and REGION.

Note: The *AUTO Output function can also be used to produce a group printed report. See index entry *group printing,* for a discussion and examples of group printing.

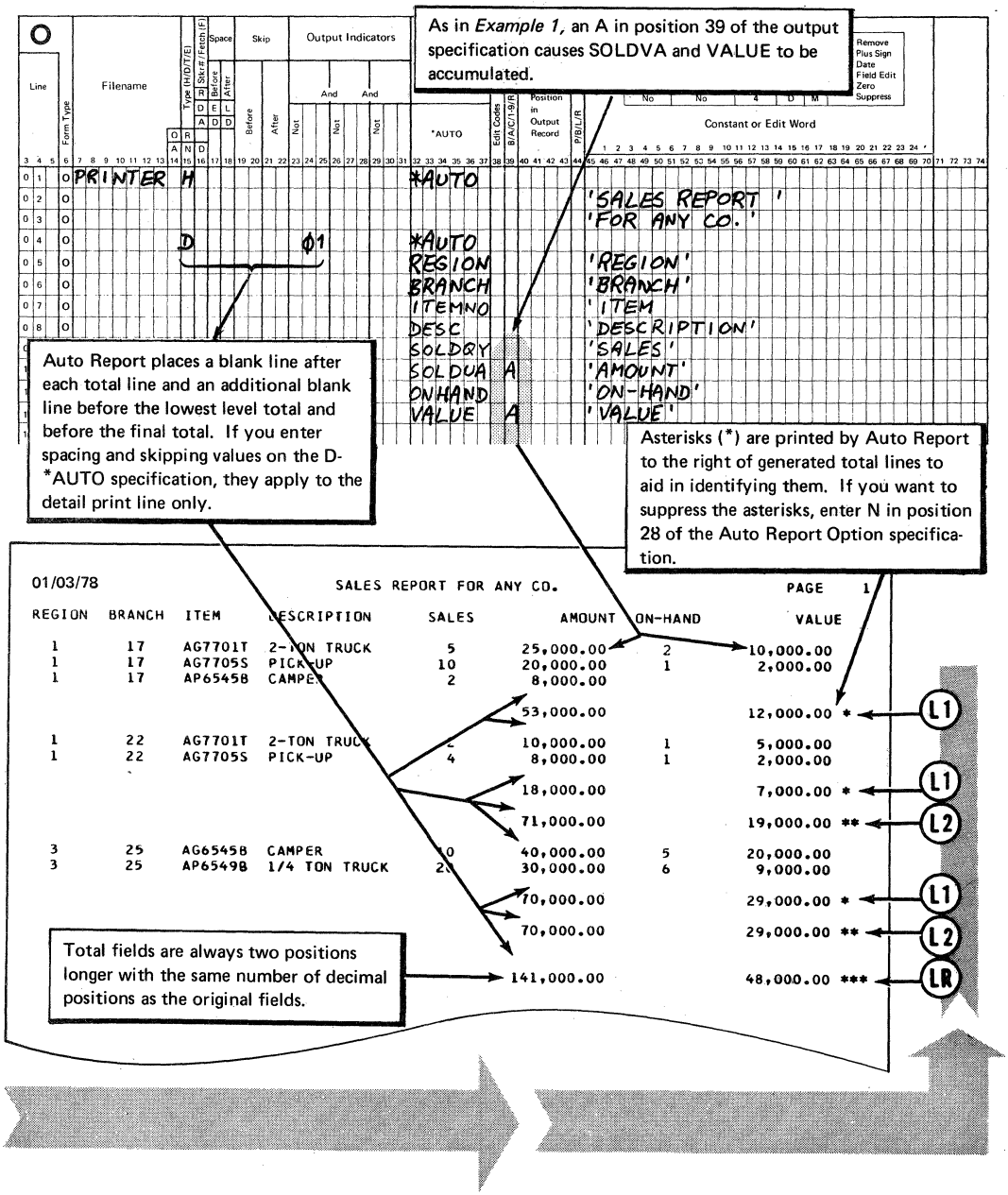
INPUT SPECIFICATIONS

I

Line	Form Type	Filename	Sequence	Number (1-N)	Option (O, U, S)	Record Identifying Indicator	Record Identification Codes 1: Position	1: Not (N)	1: C/Z/D	1: Character	2: Position	2: Not (N)	2: C/Z/D	2: Character	3: Position	3: Not (N)	3: C/Z/D	3: Character	Stacker Select	P/B/L/R	Field Location: From	Field Location: To	Decimal Positions	Field Name	Control Level (L1-L9)	Matching Fields or Chaining Fields	Field Record Relation	Field Indicators: Plus	Field Indicators: Minus	Field Indicators: Zero or Blank
01	I	SALES	AA			Ø1																								
02	I																				1	7		ITEMNO						
03	I																				8	9		BRANCHL1						
04	I																				1Ø	1Ø		REGIONL2						
05	I																				11	25		DESC						
06	I																				26	27	Ø	SOLDQY						
07	I																				28	34	2	SOLDVA						
08	I																				35	36	Ø	ONHAND						
09	I																				37	43	2	VALUE						
10	I																													

Since two control levels are defined, SOLDVA and VALUE fields (see following page) are accumulated to two levels of totals (branch and region) and a final total (LR).

OUTPUT SPECIFICATIONS



EXAMPLE 3

***AUTO Output**

Problem

Expand the sales report from *Examples 1* and *2* to contain:

- **A** Group indication for REGION and BRANCH fields
- **B** Second column heading line
- **C** Literal (constant) on the final total line

Procedure

1. Code file description and input specifications as for *Example 2.*
2. Code *AUTO Output with:
   - **A** Output indicator on field description specifications
   - **B** C in position 39 and a literal in 45-70
   - **C** R in position 39 and a literal in 45-70

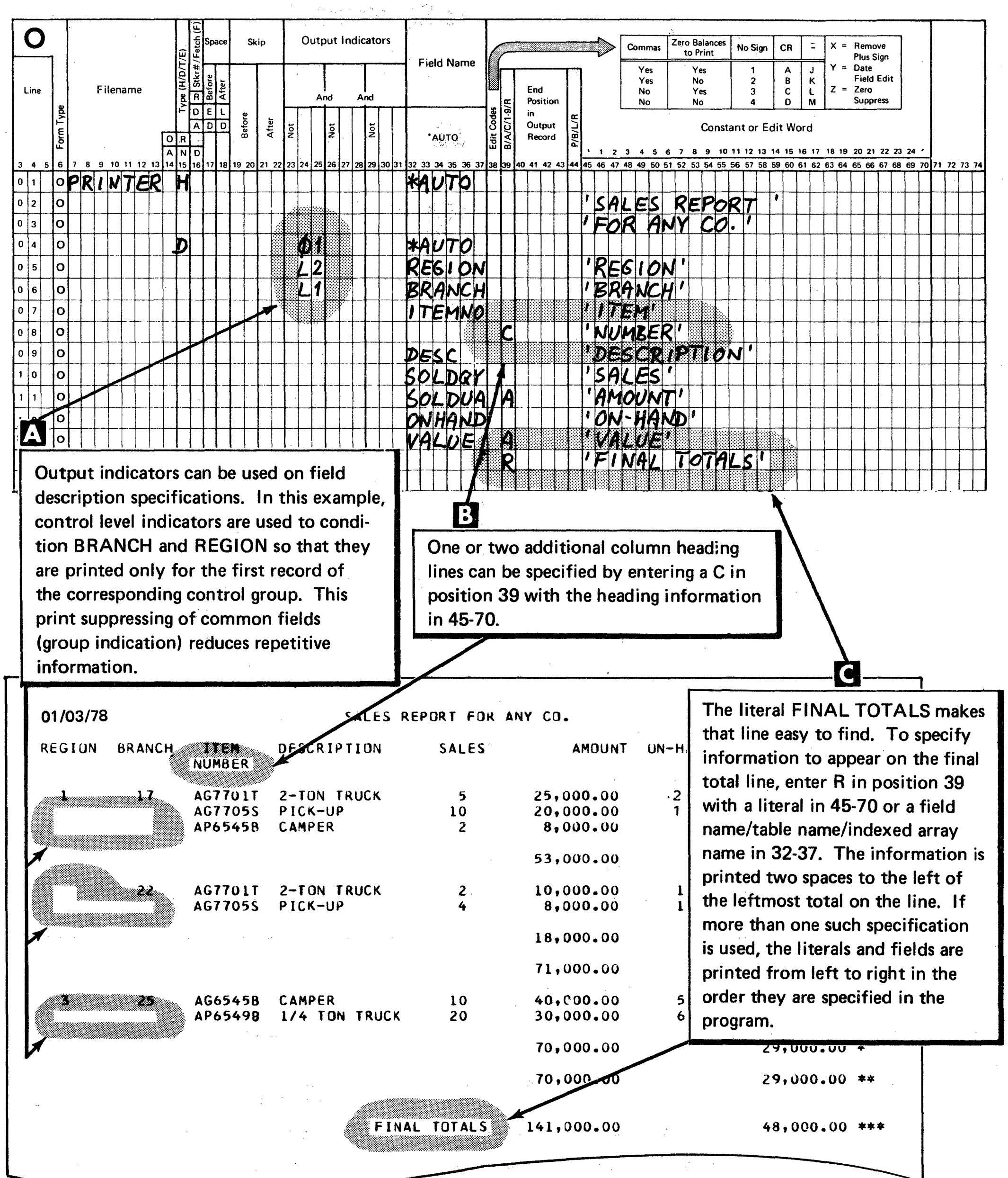
FILE DESCRIPTION SPECIFICATIONS

Line	Form Type	Filename	I/O/U/C/D	P/S/C/R/T/D/F	E	A/D	F/V/S/M/O	Block Length	Record Length	L/R	A/P/I/K	I/X/D/T/R or 2	Overflow Indicator	Key Field Starting Location	Extension Code E/L	Device	Symbolic Device	Labels S/N/E/M	Name of Label Exit	Extent Exit for DAM	Storage Index	K	Option	Entry	A/U	Number of Tracks for Cylinder Overflow	Number of Extents	Tape Rewind	File Condition U1-U8	R/U/N
02	F	SALES	I	P			F	430	43							DISK40	SYSØØ6S												
03	F	PRINTER	O				F	120	120							PRINTER	SYSLST												
04	F																												

INPUT SPECIFICATIONS

Line	Form Type	Filename	Sequence	Number (1/N)	Option (O), U, S	Record Identifying Indicator	Record Identification Codes 1: Position	1: Not (N)	1: C/Z/D	1: Character	2: Position	2: Not (N)	2: C/Z/D	2: Character	3: Position	3: Not (N)	3: C/Z/D	3: Character	Stacker Select	P/B/L/R	Field Location From	Field Location To	Decimal Positions	Field Name	Control Level (L1-L9)	Matching Fields or Chaining Fields	Field Record Relation	Field Indicators: Plus	Minus	Zero or Blank
			O A	R N	D																									
01	I	SALES	AA			Ø1																								
02	I																				1	7		ITEMNO						
03	I																				8	9		BRANCHL1						
04	I																				1Ø	1Ø		REGIONL2						
05	I																				11	25		DESC						
06	I																				26	27	Ø	SOLDQY						
07	I																				28	34	2	SOLDUA						
08	I																				35	36	Ø	ONHAND						
09	I																				37	43	2	VALUE						
10	I																													

OUTPUT SPECIFICATIONS



A Output indicators can be used on field description specifications. In this example, control level indicators are used to condition BRANCH and REGION so that they are printed only for the first record of the corresponding control group. This print suppressing of common fields (group indication) reduces repetitive information.

B One or two additional column heading lines can be specified by entering a C in position 39 with the heading information in 45-70.

C The literal FINAL TOTALS makes that line easy to find. To specify information to appear on the final total line, enter R in position 39 with a literal in 45-70 or a field name/table name/indexed array name in 32-37. The information is printed two spaces to the left of the leftmost total on the line. If more than one such specification is used, the literals and fields are printed from left to right in the order they are specified in the program.

EXAMPLE 4

*AUTO Page Headings

*AUTO Output

Problem

Expand the sales report from *Examples 1-3* to include:

- **A** A new report page for each region
- **B** Two heading lines on each page
- **C** A field in a page heading line
- **D** Identification of branch and region totals; a cross-totals column

Procedure

1 Code file description and input specifications as in *Example 3;* add an overflow indicator to the printer file.

2 Code RPG II calculation specification for cross-total.

3 Code *AUTO specifications:

- **A** Output indicators on page heading specifications
- **B** Two heading lines per page
- **C** Use of a field in an *AUTO page heading specification
- **D** Fields and literals on L1-L9 total lines (1-9 in position 39)

```
01/03/78                              SALES REPORT FOR ANY CO.                                   [2] PAGE   1
                                  [B]        REGION 1 <--[C]
BRANCH   ITEM     DESCRIPTION          SALES      SALES VALUE   ON   ON-HAND VALUE               TOTAL
         NUMBER                      QUANTITY                  HAND

  17     AG7701T  2-TON TRUCK             5        25,000.00     2      10,000.00             35,000.00
         AG7705S  PICK-UP                10        20,000.00     1       2,000.00             22,000.00
         AP6545B  CAMPER     [D]          2         8,000.00                                   8,000.00

                         BRANCH 17 TOTALS          53,000.00            12,000.00             65,000.00 *

  22     AG7701T  2-TON TRUCK             2        10,000.00     1       5,000.00             15,000.00
         AG7705S  PICK-UP                 4         8,000.00     1       2,000.00             10,000.00

                         BRANCH 22 TOTALS          18,000.00             7,000.00             25,000.00 *

                     [D] REGION 1 TOTALS           71,000.00            19,000.00             90,000.00 **
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
[A]
01/03/78                              SALES REPORT FOR ANY CO.                                       PAGE   2
                                             REGION 3

BRANCH   ITEM     DESCRIPTION          SALES      SALES VALUE   ON   ON-HAND VALUE               TOTAL
         NUMBER                      QUANTITY                  HAND

  25     AG6545B  CAMPER                 10        40,000.00     5      20,000.00             60,000.00
         AP6549B  1/4 TON TRUCK          20        30,000.00     6       9,000.00             39,000.00

                         BRANCH 25 TOTALS          70,000.00            29,000.00             99,000.00 *

                          REGION 3 TOTALS          70,000.00            29,000.00             99,000.00 **

                           COMPANY TOTALS         141,000.00            48,000.00            189,000.00 ***
```

Note: Compare matching letters (**B**) on this and the following pages to see the Auto Report coding to obtain this report.

CALCULATION SPECIFICATIONS

2

RPG II calculations can be among the input statements for Auto Report. This specification calculates a cross-total of the sales and on-hand values. (The placement of the calculation in relation to calculations generated by Auto Report is described under the index entry *generated RPG II program.*)

Line	Form Type	Indicators	Factor 1	Operation	Factor 2	Result Field Name	Length	Decimal Positions
01	C	01	SOLDVA	ADD	VALUE	TOTVAL	8	2
02	C							

OUTPUT SPECIFICATIONS

The headings are printed on a new page when the region number changes (L2) or when overflow occurs (OF). (OF must be defined for the printer file in file description specifications.)

A

Line	Form Type	Filename	Type (H/D/T/E)	Output Indicators	Field Name / *AUTO	B/A/C/1-9/R	Constant or Edit Word
01	O	PRINTER	H	L2	*AUTO		
02	O		OR	OFNL2			
03	O						'SALES REPORT'
04	O						'FOR ANY CO.'
05	O		H		*AUTO		
06	O						'REGION'
07	O				REGION		
08	O		D	01	*AUTO		
09	O			L1	BRANCH		'BRANCH'
10	O				ITEMNO		'ITEM'
11	O					C	'NUMBER'
					DESC		'DESCRIPTION'
					SOLDQY		'SALES'
						C	'QUANTITY'
					SOLDVA	A	'SALES VALUE'
					ONHAND		'ON'
						C	'HAND'
					VALUE	A	'ON-HAND VALUE'
					TOTVAL	A	'TOTAL'
						1	'BRANCH'
					BRANCH	1	
22	O					1	'TOTALS'
23	O					2	'REGION'
24	O				REGION	2	
25	O					2	'TOTALS'
26	O					R	'COMPANY TOTALS'

A second Auto Report page heading is specified. Since spacing is not specified, space one is done after the first and space two after the second. Since no output indicators are specified, the second heading will be conditioned like the first.

C The contents of the REGION field are printed on the second page heading.

D Fields and literals can be printed on generated total lines by entering the number of the control level in position 39.

COPY

Examples 5 and 6 illustrate use of the Auto Report Copy function to copy specifications from the source library and to override copied specifications for a particular program.

EXAMPLE 5

COPY

Problem

Use the Copy function to obtain specifications for the sales report below (same as in *Example 1*).

Procedure

1. Catalog the file description and input specifications for the SALES file in the source library.
2. Code the /COPY statement in the specifications for Auto Report.

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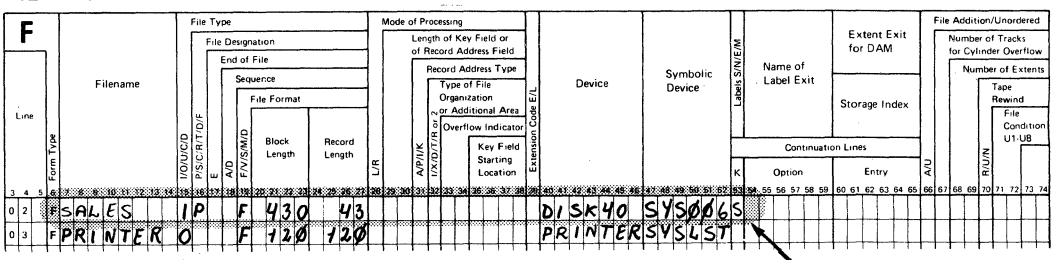
REGION	BRANCH	ITEM	DESCRIPTION	SALES	AMOUNT	ON-HAND	VALUE
1	17	AG7701T	2-TON TRUCK	5	25,000.00	2	10,000.00
1	17	AG7705S	PICK-UP	10	20,000.00	1	2,000.00
1	17	AP6545B	CAMPER	2	8,000.00		
1	22	AG7701T	2-TON TRUCK	2	10,000.00	1	5,000.00
1	22	AG7705S	PICK-UP	4	8,000.00	1	2,000.00
3	25	AG6545B	CAMPER	10	40,000.00	5	20,000.00
3	25	AP6549B	1/4 TON TRUCK	20	30,000.00	6	9,000.00
					141,000.00		48,000.00 *

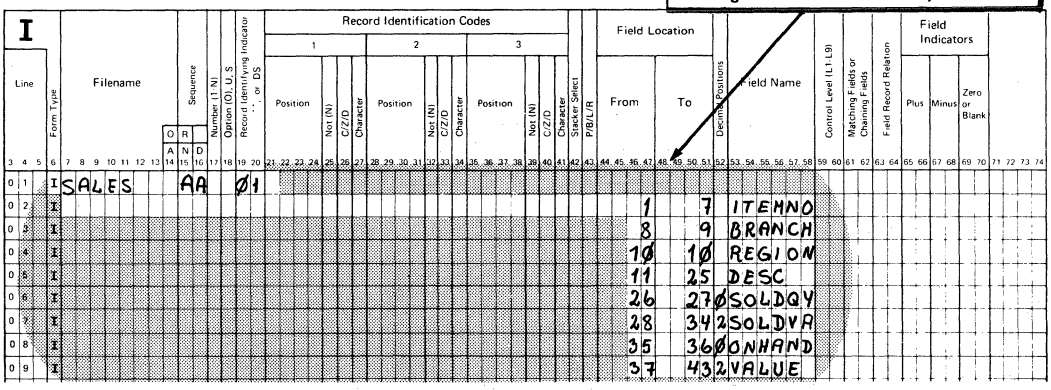
1 Catalog specifications for the SALES file in the source library:

FILE DESCRIPTION SPECIFICATIONS

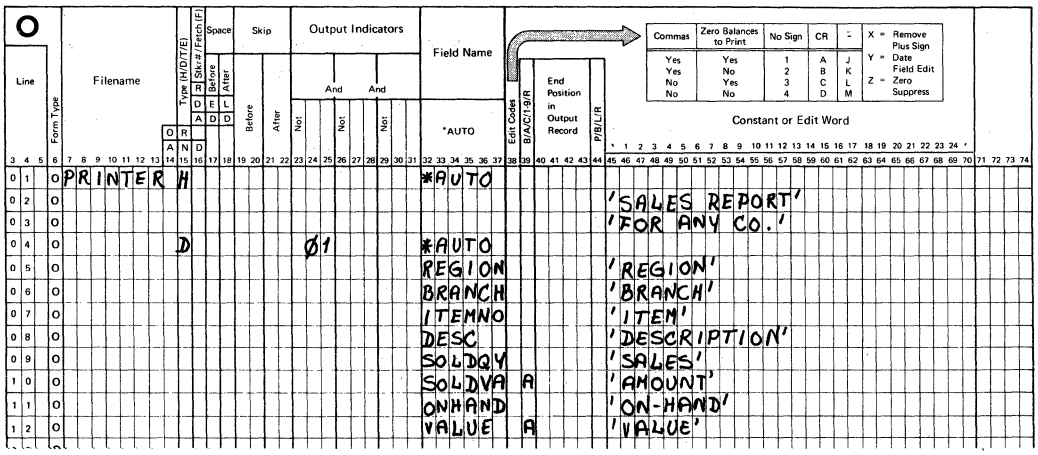


These specifications could be replaced by a single statement as shown on the opposite page if they had previously been cataloged in the source library

INPUT SPECIFICATIONS

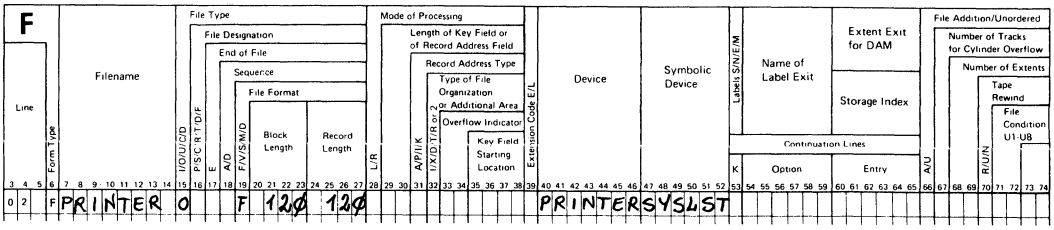


OUTPUT SPECIFICATIONS

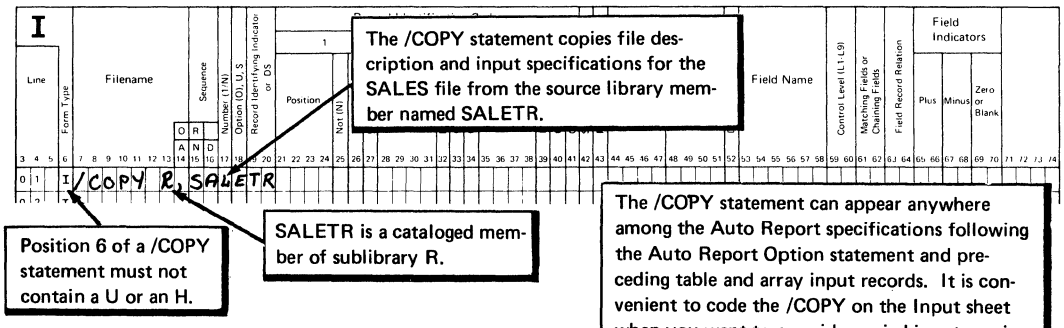


2 Code the /COPY statement to include the file description and input specifications. (For a detailed description of the Copy function see index entry Auto Report Copy Specifications.)

FILE DESCRIPTION SPECIFICATIONS



INPUT SPECIFICATIONS



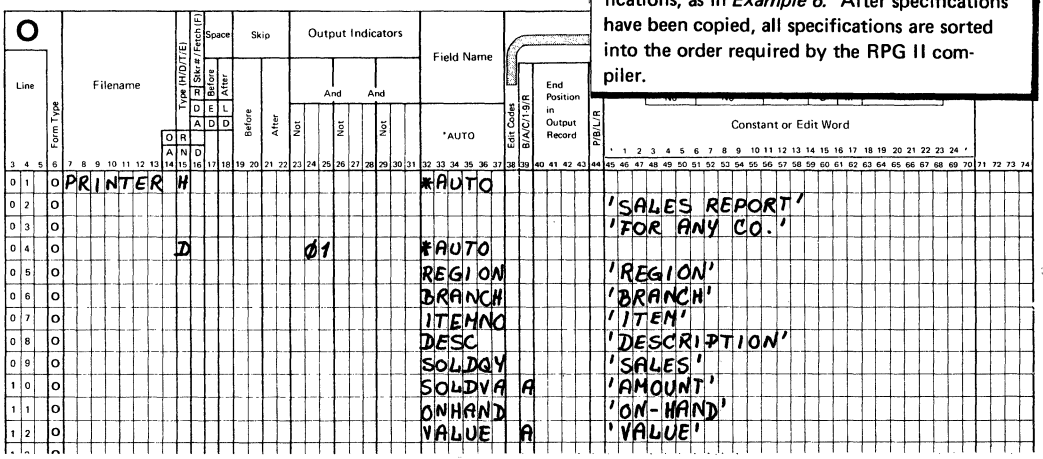
The /COPY statement copies file description and input specifications for the SALES file from the source library member named SALETR.

Position 6 of a /COPY statement must not contain a U or an H.

SALETR is a cataloged member of sublibrary R.

The /COPY statement can appear anywhere among the Auto Report specifications following the Auto Report Option statement and preceding table and array input records. It is convenient to code the /COPY on the Input sheet when you want to override copied input specifications, as in *Example 6*. After specifications have been copied, all specifications are sorted into the order required by the RPG II compiler.

OUTPUT SPECIFICATIONS



EXAMPLE 6

COPY

Problem

Override copied input specifications to produce a report (below) that includes subtotals for branch and region.

Procedure

1. Catalog specifications for the SALES file, as in *Example 5*.
2. Code the /COPY statement.
3. Code /COPY modifier statements to add control level indicators to BRANCH and REGION fields on copied specifications.

```
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REGION  BRANCH  ITEM      DESCRIPTION      SALES      AMOUNT    ON-HAND     VALUE

  1       17    AG7701T   2-TON TRUCK        5     25,000.00       2     10,000.00
  1       17    AG7705S   PICK-UP           10     20,000.00       1      2,000.00
  1       17    AP6545B   CAMPER             2      8,000.00

                                             53,000.00                  12,000.00 *

  1       22    AG7701T   2-TON TRUCK        2     10,000.00       1      5,000.00
  1       22    AG7705S   PICK-UP            4      8,000.00       1      2,000.00

                                             18,000.00                   7,000.00 *

                                             71,000.00                  19,000.00 **

  3       25    AG6545B   CAMPER            10     40,000.00       5     20,000.00
  3       25    AP6545B   1/4 TON TRUCK     20     30,000.00       6      9,000.00
```

INPUT SPECIFICATIONS

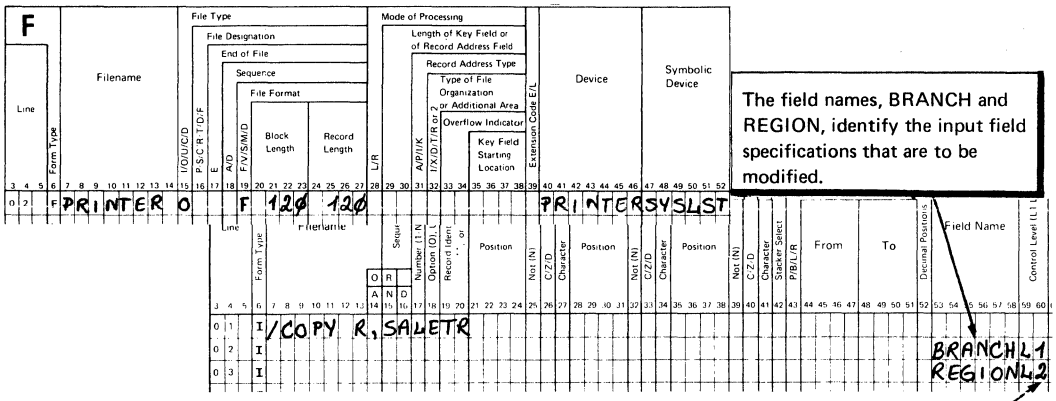
Cataloged input specifications for the SALES file.

Line	Form Type	Filename	O/A	R/N	D	Sequence	Number (1/N)	Option (O), U, S	Record Identifying Indicator	Record Identification Codes 1: Position	1: Not (N)	1: C/Z/D	1: Character	2: Position	2: Not (N)	2: C/Z/D	2: Character	3: Position	3: Not (N)	3: C/Z/D	3: Character	Stacker Select	P/B/L/R	Field Location: From	Field Location: To	Decimal Positions	Field Name	Control Level (L1-L9)	Matching Fields or Chaining Fields	Field Record Relation	Field Indicators: Plus	Minus	Zero or Blank
01	I	SALES		AA		01																										
02	I																							1	7		ITEMNO						
03	I																							8	9		BRANCH						
04	I																							10	10		REGION						
05	I																							11	25		DESC						
06	I																							26	27	0	SOLDQY						
07	I																							28	34	2	SOLDUA						
08	I																							35	36	0	ONHAND						
09	I																							37	43	2	VALUE						
10	I																																

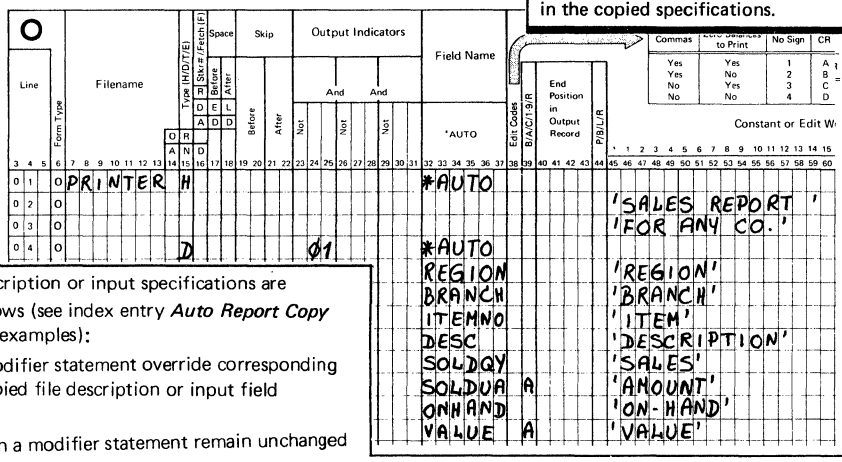
In order to produce a report that has subtotals for branch and region, L1 must be assigned to BRANCH and L2 to REGION as the specifications are copied from the source library.

2 and **3** Code /COPY and modifier statements. As a result of the modifier statements three levels of totals are accumulated for the SOLDVA and VALUE fields (L1, L2, and LR).

FILE DESCRIPTION SPECIFICATIONS



OUTPUT SPECIFICATIONS



Cataloged file description or input specifications are overridden as follows (see index entry ***Auto Report Copy Specifications*** for examples):

- Entries in a modifier statement override corresponding entries in a copied file description or input field specification.
- Blank entries in a modifier statement remain unchanged in a copied specification.
- Ampersand (&) in the leftmost position of an entry in the modifier statement sets the entry to blanks in the copied specification.
- New fields can be added to input specifications by adding new input field specifications as modifier statements.
- Modifier statements do not change the cataloged specifications. The modification is only for the program into which the specifications have been copied.

SELECT/SORT

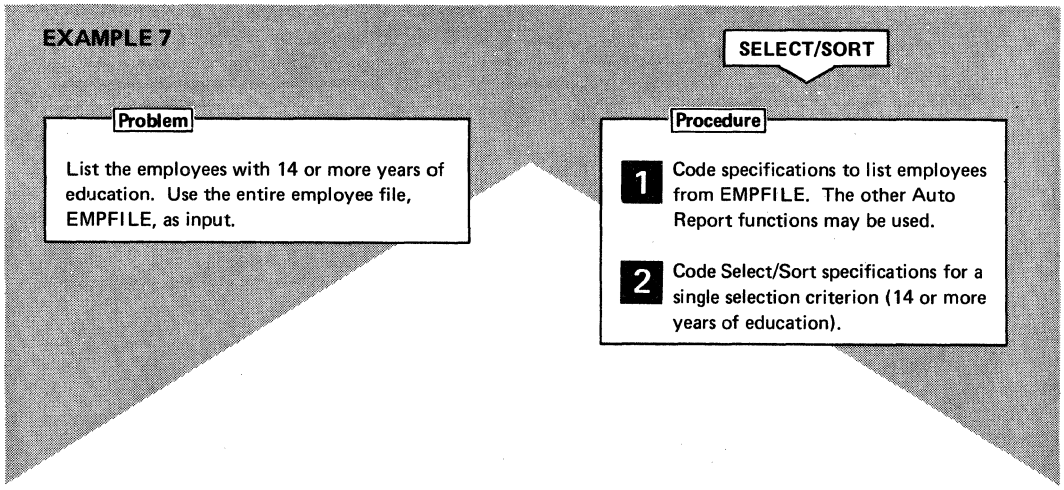
Examples 7 through 9 show how the Select/Sort function of Auto Report is used to select and sort records for processing. The three examples show the three possible ways you can use the Select/Sort function:

Example 7 - Select only those records from a file that you want to process for a particular report.

Example 8 - Sort records into the sequence you want before processing them.

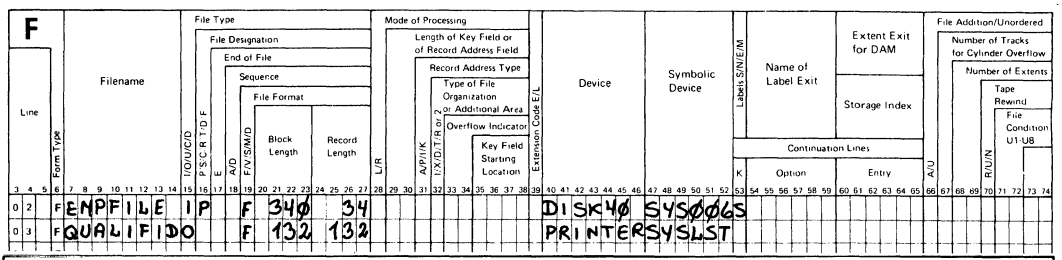
Example 9 - Select the records you want to process, sort them into the sequence you want, and process them.

For a more detailed description of the Select/Sort function, see index entry Auto Report Select/Sort Specifications.



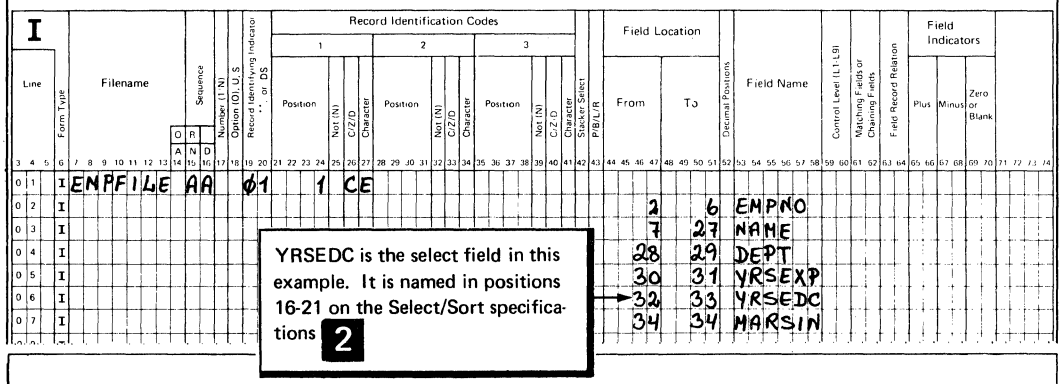
1 Code specifications to list employees from EMPFILE:

FILE DESCRIPTION SPECIFICATIONS



Line	Form Type	Filename	IO/U/C/D	P/S/C/R/T/D/F	E	A/D	F/V/S/M/D	Block Length	Record Length	L/R	A/P/I/K	T/X/D/T/R for 2	Type of File Organization or Additional Area	Overflow Indicator	Key Field Starting Location	Extension Code E/L	Device	Symbolic Device	Labels S/N/E/M	Name of Label Exit	Extent Exit for DAM	Storage Index	Continuation Lines K	Option	Entry	File Addition/Unordered A/U	Number of Tracks for Cylinder Overflow	Number of Extents	Tape Rewind R/U/N	File Condition U1-U8
02	F	ENPFILE	I	P			F	340	34								DISK40	SYS006S												
03	F	QUALIFIDO					F	132	132								PRINTER	SYSLST												

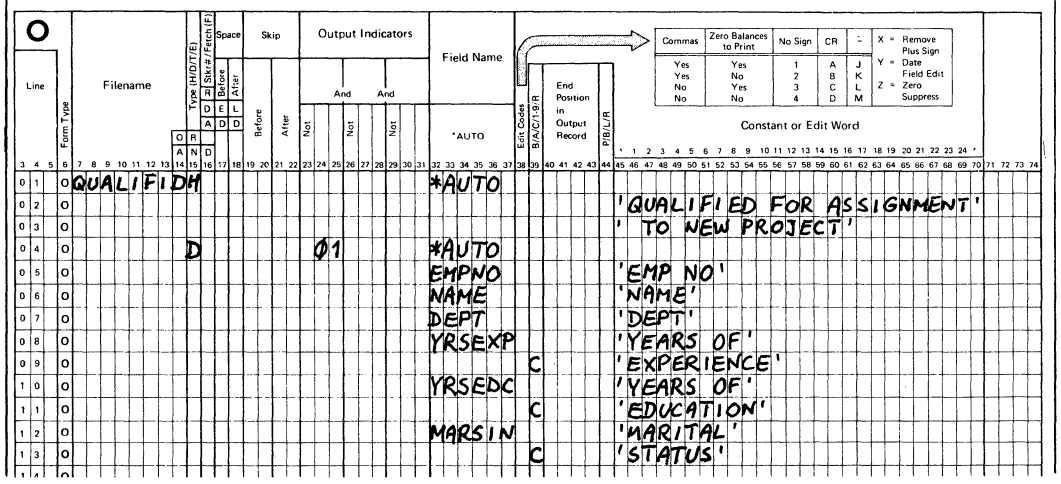
INPUT SPECIFICATIONS



Line	Form Type	Filename	Sequence	Number (1-N)	Option (O,U,S)	Record Identifying Indicator or DS	Record Identification Codes 1 Position	1 Not (N)	1 C/Z/D	1 Character	2 Position	2 Not (N)	2 C/Z/D	2 Character	3 Position	3 Not (N)	3 C/Z/D	3 Character	Stacker Select	P/B/L/R	Field Location From	Field Location To	Decimal Positions	Field Name	Control Level (L1-L9)	Matching Fields or Chaining Fields	Field Record Relation	Field Indicators Plus	Minus	Zero or Blank
01	I	ENPFILE	AA		01		1		C	E																				
02	I																				2	6		EMPNO						
03	I																				7	27		NAME						
04	I																				28	29		DEPT						
05	I																				30	31		YRSEXP						
06	I																				32	33		YRSEDC						
07	I																				34	34		MARSIN						

YRSEDC is the select field in this example. It is named in positions 16-21 on the Select/Sort specifications **2**

OUTPUT SPECIFICATIONS



Line	Form Type	Filename	Type (H/D/T/E)	Space	Skip	Output Indicators	Field Name	Edit Codes	End Position in Output Record	P/B/L/R	Constant or Edit Word
01	O	QUALIFIDH					*AUTO				'QUALIFIED FOR ASSIGNMENT'
02	O										' TO NEW PROJECT'
03	O		D			01	*AUTO				
04	O						EMPNO				'EMP NO'
05	O						NAME				'NAME'
06	O						DEPT				'DEPT'
07	O						YRSEXP				'YEARS OF'
08	O							C			'EXPERIENCE'
09	O						YRSEDC				'YEARS OF'
10	O							C			'EDUCATION'
11	O						MARSIN				'MARITAL'
12	O							C			'STATUS'

Commas: Yes, Yes, No, No — Zero Balances to Print: Yes, No, Yes, No — No Sign: 1, 2, 3, 4 — CR: A, B, C, D — -: J, K, L, M

X = Remove Plus Sign; Y = Date Field Edit; Z = Zero Suppress

2 Code a selection criterion to test the YRSEDC field on each reccrd in EMPFILE:

SELECT/SORT SPECIFICATIONS

The codes in 22-23 specify the relationship between the select field value and the single value in 24-33 (this entry must be blank when high value is used).

EQ — equal to
NE — not equal to
LT — less than
GT — greater than
LE — less than or equal to
GE — greater than or equal to

Entries under single or low value and entries under high value can be numeric or alphameric literals and field names. The rules for forming literals are the same as the rules for literals on RPG II calculations. In this example the field, YRSEDC, is alphameric, so the literal, '14', is also alphameric (must be enclosed in apostrophes). High value must be blank in a single value test.

S				Selection Criteria				Sort Criteria			
Line	Form Type	Filename	Continuation (A)	Select Field Name	EQ NE LT GT LE GE	Single or Low Value	High Value	Sort Field Name	Sort Field (51-58)	Sequence (A/D)	Comments
02	S	EMPFILE		YRSEDC	GE	'14'					
03	S										
04	S										
09	S										

An S in position 6 identifies a Select/Sort specification

This specification says: select those records from EMPFILE in which the value of the field YRSEDC is greater than or equal to 14. (The Select/Sort specification can be placed anywhere among the Auto Report specifications, following the Auto Report Option specification and preceding compilation time tables and arrays.)

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EMP NO	NAME	DEPT	YEARS OF EXPERIENCE	YEARS OF EDUCATION	MARITAL STATUS
01472	NOVAK, JAMES	22	6	15	M
02754	ARLINGTON, STEVE	47	5	16	S
17629	REEVES, DONALD	41	10	14	S
27452	DONALDSON, ANDREW	31	3	14	M
76958	JAMESON, RALPH	15	10	14	S
79878	SMYTHE, CURTIS	22	6	14	S
79972	WILSON, HORACE	19	12	16	S
80001	KNOLTE, DAVID	16	6	15	M
82795	MORGAN, JERRY	27	7	14	S
92744	JONAS, GEORGE	41	2	14	S
95966	SWENSON, HELMER	15	7	16	S
97772	VANDERVEER, GALE	23	7	16	M

The employee file, EMPFILE, is in ascending sequence by employee number, so the report remains in that sequence.

EXAMPLE 8

SELECT/SORT

Problem

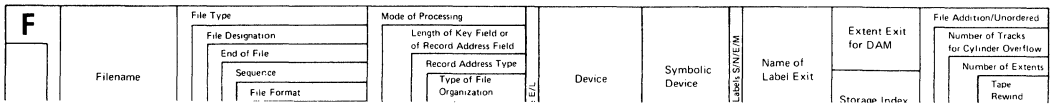
List all employees in EMPFILE in descending sequence according to their years of experience.

Procedure

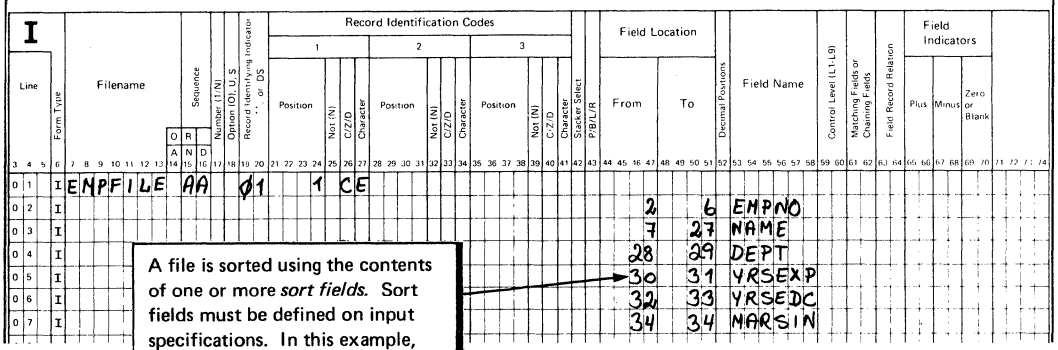
1. Code the same file description, input, and output specifications as in *Example 7* to list records from EMPFILE.
2. Code Select/Sort specifications for a single sort criterion (descending sequence by years of experience).

1

FILE DESCRIPTION SPECIFICATIONS

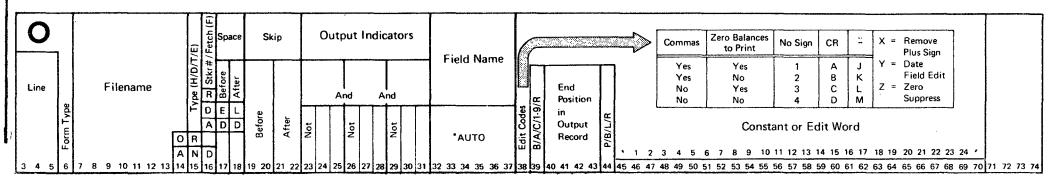


INPUT SPECIFICATIONS



A file is sorted using the contents of one or more *sort fields*. Sort fields must be defined on input specifications. In this example, YRSEXP is the sort field.

OUTPUT SPECIFICATIONS



2

Name the sort field in positions 44-49.

Any of the nine codes, S1-S9, can be entered if a single sort field is used.

Enter the sequence of the sort in position 52.

SELECT/SORT SPECIFICATIONS

S

Line	Form Type	Filename	Selection Criteria: Continuation (A)	Select Field Name	EQ NE LT GT LE GE	Single or Low Value	High Value	Sort Criteria: Sort Field Name	Sort Field (S1-S9)	Sequence (A/D)	Comments
3 4 5	6	7 8 9 10 11 12 13 14	15	16 17 18 19 20 21	22 23	24 25 26 27 28 29 30 31 32 33	34 35 36 37 38 39 40 41 42 43	44 45 46 47 48 49	50 51	52	53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74
0 2	S	EMPFILE						YRSEXP	S1	D	
0 3	S										
0 4	S										
0 5	S										
0 6	S										
0 7	S										
0 8	S										
0 9	S										

This specification says: sort EMPFILE into descending sequence according to the contents of the YRSEXP field.

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EMP NO	NAME	DEPT	YEARS OF EXPERIENCE	YEARS OF EDUCATION	MARITAL STATUS
12430	TUPPER, LOUIS	34	31	12	S
01426	SCHMIDT, ADOLF	27	31	12	M
92764	ASTOR, GEORGE	16	29	8	M
72441	DREW, FRANKLIN	37	25	8	M
62202	WASHINGTON, JOHN	15	18	12	S
81060	JOHNSON, JAY	34	18	13	M
90413	STONE, MARTIN	19	18	12	S
47246	BAKER, STUART	23	15	8	M
32404	TORRENCE, HORATIO	31	14	10	M
32166	GRAYSON, TRUMAN	22	14	12	M
29721	STRIKE, STEVEN	41	13	12	M
79972	WILSON, HORACE	19	12	16	S
76958	JAMESOM, RALPH	15	10	14	S
17629	REEVES, DONALD	41	10	14	S
27224	HOLLY, JAY	27	10	12	S
95966	SWENSON, HELMER	15	7	16	S
82795	MORGAN, JERRY	27	7	14	S
97772	VANDERVEER, GALE	23	7	16	M
80001	KNOLTE, DAVID	16	6	15	M
01472	NOVAK, JAMES	22	6	15	M
79878	SMYTHE, CURTIS	22	6	14	S
02754	ARLINGTON, STEVE	47	5	16	S
27452	DONALDSON, ANDREW	31	3	14	M
92744	JONAS, GEORGE	41	2	14	S

EXAMPLE 9

SELECT/SORT

Problem

List the single employees from EMPFILE who have 6 to 10 years of experience or more than 13 years of education. List the employees in descending sequence according to their years of experience; then sort employees with equal years of experience into ascending sequence according to their years of formal education.

Procedure

1. Code the same file description, input, and output specifications as in *Example 6* to list records from EMPFILE.
2. Code more than one selection criteria in the same program.
3. Code more than one sort criteria in the same program.

1 All select fields and all sort fields must be defined on input specifications (see *Example 7*). Marital status (MARSIN), years of experience (YRSEXP), and years of education (YRSEDC) are select fields in this example; they are named in positions 16-21 of the Select/Sort specifications. Years of experience (YRSEXP) and years of education (YRSEDC) are also sort fields in this example; therefore they are named in positions 44-49.

2 This selection process cannot be described in a single Select/Sort specification, since several distinct tests are involved. There are actually two *sets* of criteria to describe, as follows:

- Years of experience (YRSEXP) must be between 6 and 10 *and* Marital status (MARSIN) must be single (S)

  or

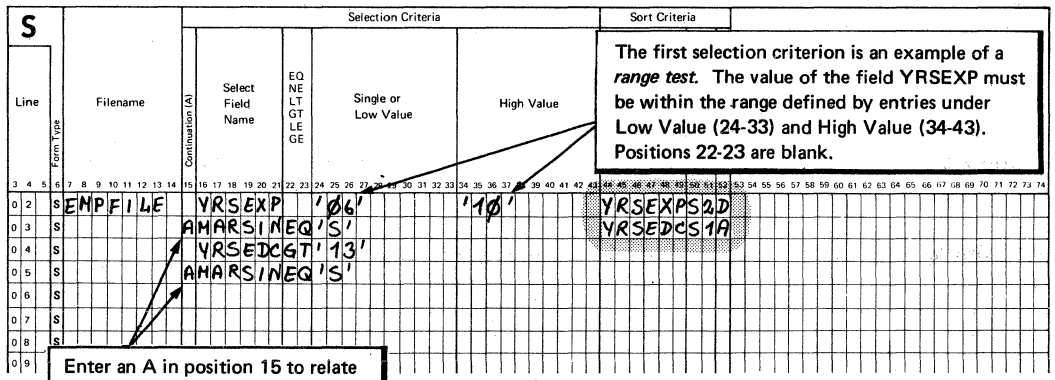
- Years of education (YRSEDC) must be greater than 13 *and* Marital status (MARSIN) must be single (S)

Either the first set or the second set of criteria must be met by a record to be selected for processing.

3 Only those records which meet the selection criteria are sorted.

2 Code selection criteria:

SELECT/SORT SPECIFICATIONS



The first selection criterion is an example of a *range test.* The value of the field YRSEXP must be within the range defined by entries under Low Value (24-33) and High Value (34-43). Positions 22-23 are blank.

Enter an A in position 15 to relate a selection criterion to the previous criteria in an AND relationship. Leave blank for OR relationship.

Either the selection criteria in lines 02 *and* 03 *or* the criteria in lines 04 *and* 05 must be met.

Wilson, Arlington, and Jonas do not have between six and ten years of experience, but they are selected because they are single and have more than 13 years of education.

Holly has fewer than 13 years of education, but he is selected because he has between six and ten years of experience and he is single.

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EMP NO	NAME	DEPT	YEARS OF EXPERIENCE	YEARS OF EDUCATION	MARITAL STATUS
79972	WILSON, HORACE	19	12	16	S
27224	HOLLY, JAY	27	10	12	S
76958	JAMESON, RALPH	15	10	14	S
17629	REEVES, DONALD	41	10	14	S
82795	MORGAN, JERRY	27	7	14	S
95966	SWENSON, HELMER	15	7	16	S
79878	SMYTHE, CURTIS	22	6	14	S
02754	ARLINGTON, STEVE	47	5	16	S
92744	JONAS, GEORGE	41	2	14	S

Final Report

3 Code sort criteria:

SELECT/SORT SPECIFICATIONS

S

Line	Form Type	Filename	Continuation (Al)	Selection Criteria: Select Field Name	Selection Criteria: EQ NE LT GT LE GE	Selection Criteria: Single or Low Value	Selection Criteria: High Value	Sort Criteria: Sort Field Name	Sort Criteria: Sort Field (S1-S9)	Sort Criteria: Sequence (A/D)	Comments
02	S	ENPFILE		YRSEXP		'06'	'10'	YRSEXPS2D			
03	S			AMARSINEQ	'S'			YRSEDCS1A			
04	S			YRSEDCGT	'13'						
05	S			AMARSINEQ	'S'						
06	S										
07	S										
08	S										
09	S										

The sort by years of experience is done first, since YRSEXP has the higher sort field code.

Experience in descending sequence. Education in ascending sequence.

First, selected records are sorted into descending sequence by years of experience.

Secondly, records with equal years of experience are sorted into ascending sequence.

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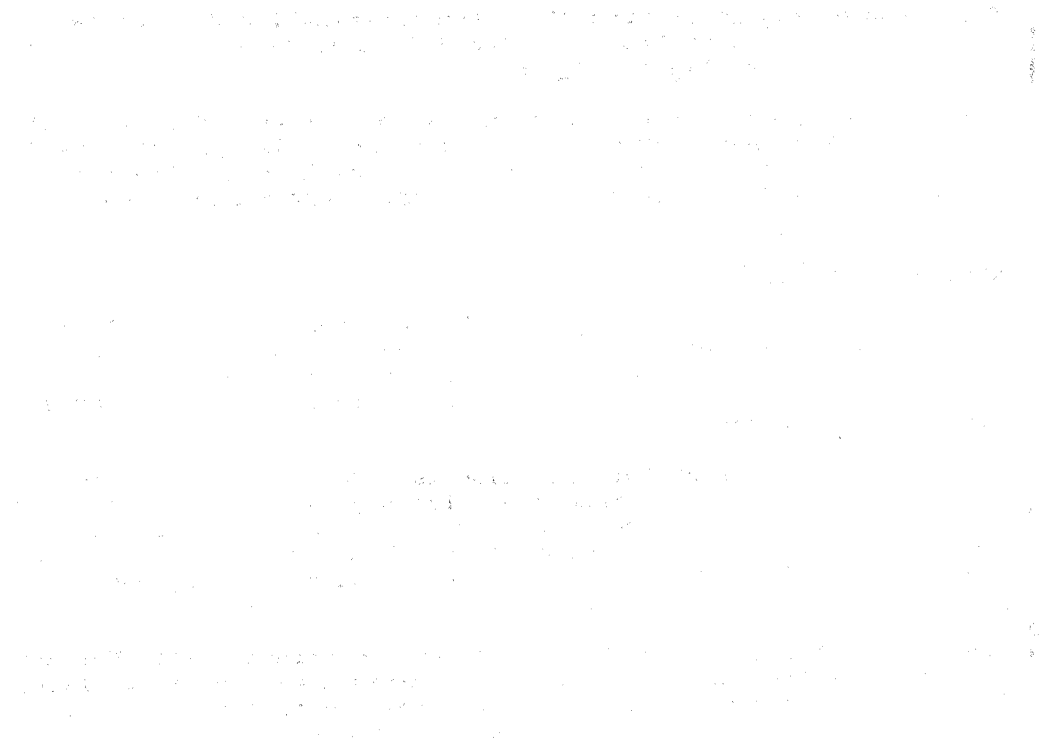
EMP NO	NAME	DEPT	YEARS OF EXPERIENCE	YEARS OF EDUCATION	MARITAL STATUS
79972	WILSON, HORACE	19	12	16	S
27224	HOLLY, JAY	27	10	12	S
76958	JAMESON, RALPH	15	10	14	S
17629	REEVES, DONALD	41	10	14	S
82795	MORGAN, JERRY	27	7	14	S
95966	SWENSON, HELMER	15	7	16	S
79878	SMYTHE, CURTIS	22	6	14	S
02754	ARLINGTON, STEVE	47	5	16	S
92744	JONAS, GEORGE	41	2	14	S

Final Report

PART II.

SAMPLE PROGRAM



This sample program is present on the distribution disk or tape containing the DOS/VS RPG II Licensed Program (see the publication DOS/VS RPG II Installation Reference).

This sample program illustrates the use of all Auto Report functions: *AUTO Page Headings, *AUTO Output, Copy, and Select/Sort. The Auto Report specifications for the program are explained. The Auto Report listing, the RPG II listing, and the final report are shown.

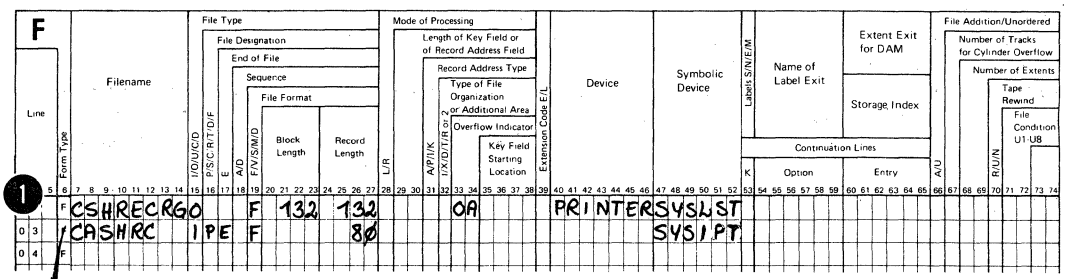
PROGRAM DESCRIPTION

This program prepares a Cash Receipts Register using RPG II with Auto Report. The *AUTO Page Headings function and the *AUTO Output function are used to generate the RPG II output specifications for the report and the calculation specifications to accumulate final totals for several fields on the report.

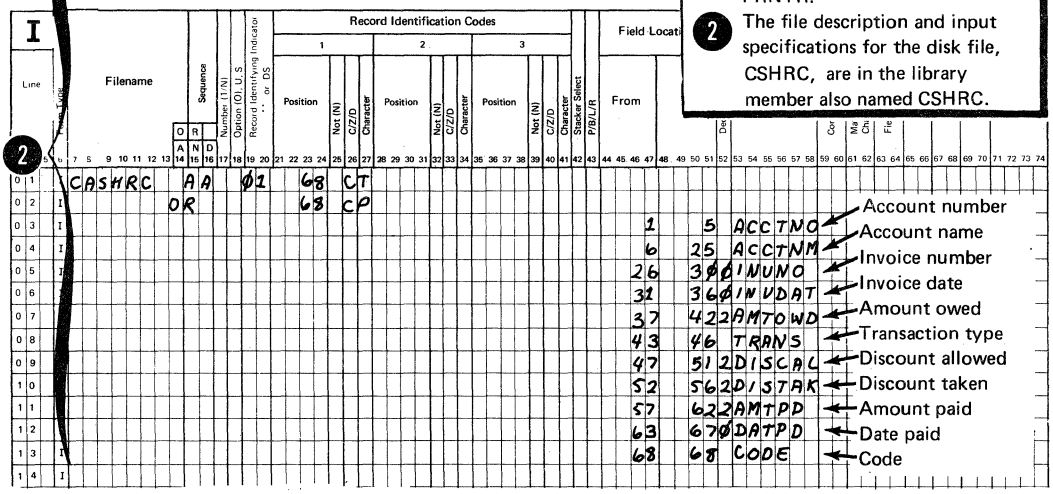
The Auto Report Select/Sort function is used to select records for only those customers who have made a partial payment and to list the selected records in ascending sequence by invoice date. RPG II calculation specifications that cannot be generated by Auto Report are included in the Auto Report program to verify the discount taken by each selected customer and to calculate the balance due.

The file description specifications for the printer file, CSHRECRG, and the file description and input specifications for the input file, CASHRC (Figure 4), are cataloged as separate members in a source library. The cataloged specifications are included in the program by the Auto Report Copy function.

FILE DESCRIPTION SPECIFICATIONS



INPUT SPECIFICATIONS



1. The file description for the printer file is in the library member, PRNTR.
2. The file description and input specifications for the disk file, CSHRC, are in the library member also named CSHRC.

Figure 4. File Description and Input Specifications that are Cataloged in the Source Library (Sublibrary R) Members PRNTR and CASHRC

AUTO REPORT CODING

Figure 5 shows the RPG II and Auto Report specifications that must be included in the Auto Report program to produce the Cash Receipts Register.

RPG Header Specifications

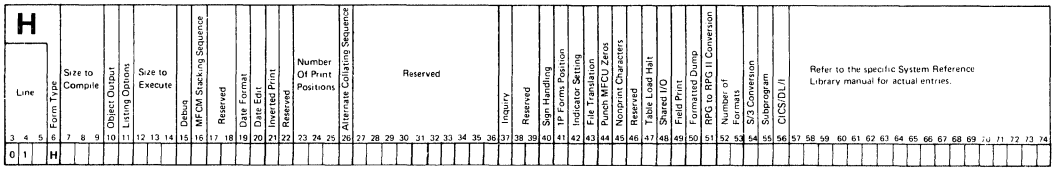
The header specification shown in Figure 5, insert A, should be included in the Auto Report program, since it is not present among the cataloged specifications (Figure 4). None of the header options are required in this program, so the specification need contain only an H in position 6 and the Program Identification entry, AR0004 in positions 75-80. The Program Identification characters from positions 75-80 of the H specification are placed in positions 75-80 of all specifications in the generated source program (Figure 7). (The use of the Program Identification characters by the RPG II compiler is described in the publication DOS/VS RPG II Language.)

/COPY Statements

The /CCPY statements shown in Figure 5, insert B, are used to ccpy the file description and input specifications for the program from the sublibrary named R in the source library. The first statement copies the file description specification for the printer file from the library member named PRNTR. The second statement copies the file description and input specifications for the card file, CASHRC, from the library member also named CASHRC. As a result of these /COPY statements, the file description and input specifications shown in Figure 4 are included in the RPG II source program generated by Auto Report.

(A)

HEADER SPECIFICATIONS



(B)

INPUT SPECIFICATIONS

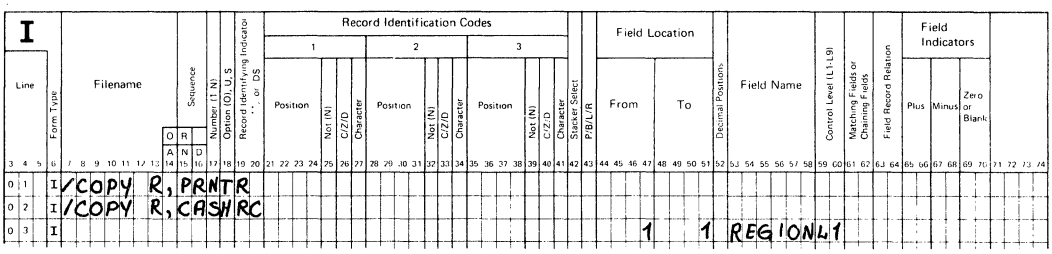


Figure 5 (1 of 3). RPG II and Auto Report Specifications to Produce the Cash Receipts Register

Select/Sort Specifications

Figure 5, insert C, shows the Select/Sort coding to select custcmers who have made a partial payment and to sort those records into ascending sequence by invoice date. The single selection criterion specifies that the field named CODE must contain the character P (indicating partial payment) on each record selected. The single sort criterion specifies that those records selected are to be sorted into ascending sequence (A in position 52) according to the contents of the INVDAT field.

Since no Auto Report Option specification is included, Auto Report assumes all of the options corresponding to blank entries. Therefore, one disk work file is used for the sort.

Calculation Specifications

The calculation specifications shown in Figure 5, insert D, are included in the Auto Report program to perform special operations that cannot be generated by Auto Report. First, the discount allowed for each customer is subtracted from the discount taken by each customer. Indicator 10 is turned on if the difference is greater than or equal to $1.00. The remaining calculations subtract the discount taken and the amount paid from the amount owed.

The order in which these calculations are placed in relation to the calculations generated by Auto Report is shown in the Auto Report listing of the generated RPG II source program (Figure 7).

Ⓒ

SELECT/SORT SPECIFICATIONS

S

Line	Form Type	Filename	Selection Criteria: Continuation (A)	Select Field Name	EQ NE LT GT LE GE	Single or Low Value	High Value	Sort Criteria: Sort Field Name	Sort Field (S1-S9)	Sequence (A/D)	Comments
3 4 5	6	7 8 9 10 11 12 13 14	15	16 17 18 19 20 21	22 23	24 25 26 27 28 29 30 31 32 33	34 35 36 37 38 39 40 41 42 43	44 45 46 47 48 49	50 51	52	53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74
02	S	CASHRC		CODE	EQ	'P'		INVDATS	1	A	
03	S										
04	S										
05	S										
06	S										
07	S										
08	S										
09	S										

Figure 5 (2 of 3). RPG II and Auto Report Specifications to Produce the Cash Receipts Register

*AUTO Specifications

The coding for the *AUTO Page Headings and the *AUTO Output features is shown in Figure 5, insert E. Notice that the Y edit code is used for the data fields (lines 10 and 12). Auto Report generates a K edit code for numeric fields when an edit code is not specified. No edit code is generated for numeric fields when they are described with a 1-9 or R in position 39. A 3 edit code is specified for the INVNO field to suppress the printing of the comma edit character.

DIFF is printed on the detail line only if it is $1.00 or more. Remember, output indicator 10 is used only to condition the printing of the field on the detail line; it does not affect the printing of the generated field on the total line.

Totals are accumulated and printed by Auto Report for five fields, as indicated by A entries in position 39. Since an L1 control is defined in the input field specification for REGION, which is added to the input specifications for the CASHRC file (see Figure 5, insert B), regional and final totals are accumulated for each field which has an A in position 39. The total lines are identified by the literals shown in lines 23 and 24 of the *AUTO specifications (Figure 5, insert E).

(D)

CALCULATION SPECIFICATIONS

Line	Form Type	Control Level (L0-L9, LR, SR, AN/OR)	Indicators: And / And	Factor 1	Operation	Factor 2	Result Field: Name	Result Field: Length	Result Field: Decimal Positions	Result Field: Half Adjust (H)	Resulting Indicators: Arithmetic: Plus	Minus	Zero	Resulting Indicators: Compare: 1>2	1<2	1=2	Resulting Indicators: Lookup(Factor 2) Is: High	Low	Equal	Comments
01	C			DISTAK	SUB	DISCAL	DIFF	42												
02	C			DIFF	COMP	1.00											10		10	
03	C			AMTOWD	SUB	DISTAK	NETOWD	62												
04	C			NETOWD	SUB	AMTPD	BAL	62												

(E)

OUTPUT SPECIFICATIONS

Line	Form Type	Filename	Type (H/D/T/E)	Space: Before	Space: After	Skip: Before	Skip: After	Output Indicators: And / And: Not	Field Name	Edit Codes	End Position in Output Record	P/B/L/R	Constant or Edit Word
01	O	CSHRECRGH							*AUTO				
02	O												'CASH RECEIPTS REGISTER'
03	O		D					01	*AUTO				
04	O								REGION				'REGION'
05	O								ACCTNO				'ACCOUNT'
06	O									C			'NUMBER'
07	O								ACCTNM				'ACCOUNT NAME'
08	O								INVNO	3			'INVOICE'
09	O									C			'NUMBER'
10	O								INVDATY				'INVOICE'
11	O									C			'DATE'
12	O								DATPD	Y			'DATE PAID'
13	O								AMTOWD	A			'AMOUNT'
14	O									C			'OWED'
15	O								DISTAK	A			'DISCOUNT'
16	O									C			'TAKEN'
17	O								AMTPD	A			'AMOUNT'
18	O									C			'PAID'
19	O								BAL	A			'BALANCE'
20	O									C			'DUE'
21	O							10	DIFF	A			'EXCESS'
22	O									C			'DISCOUNT'
23	O									1			'REGION TOTALS'
24	O									R			'COMPANY TOTALS'

Commas: Yes/Yes, Yes/No, No/Yes, No/No
Zero Balances to Print: Yes, No, Yes, No
No Sign: 1, 2, 3, 4
CR: A, B, C, D
-: J, K, L, M
X = Remove Plus Sign
Y = Date Field Edit
Z = Zero Suppress

Figure 5 (3 of 3). RPG II and Auto Report Specifications to Produce the Cash Receipts Register

RUNNING THE SAMPLE PROGRAM

See the publication DOS/VS RPG II Installation Reference for how to run the sample program. The data used for the program is shown in Figure 6. The listing and output for the sample program should look like Figure 7.

```
11243JONES HARDWARE       27541071177  2375CASH    47    47   232807217T
11352NU-STYLE CLOTHIERS   27987071477  8707CASH   174         400007267P
11886MIDI FASHIONS INC    15771070477 10722CASH   214   214 1050807147T
12874ULOOK INTERIORS      25622070977  6795CASH   136         679507237T
18274STREAMLINE PAPER INC29703072177 27403       548   238 1705507307P
23347RITE-BEST PENS CO    20842071877  1580        31         100007207P
25521IMPORTS OF NM        29273072077 79740      1593  1193 5854707277P
26723ALRIGHT CLEANERS     19473070777 46200CASH   924         4620007237T
28622NORTH CENTRAL SUPPLY 17816070577  7597CASH   152          759707227T
29871FERGUSON DEALERS     27229071077  6191CASH   124          619107227T
30755FASTWAY AIRLINES     26158070677 74272CASH 1495  1685 7258707197T
31275ENVIRONMENT CONCERNS 20451070677  2943        59         150007307P
32457B SOLE SILCS         27425071077 11005CASH   220         1100507207T
37945HOFFTA BREAKS INC    18276070677  4723CASH    94          472307237T
42622EASTLAKE GRAVEL CO   16429070577  2937CASH    58          293707237T
```

Figure 6. Sample Data for Sample Program

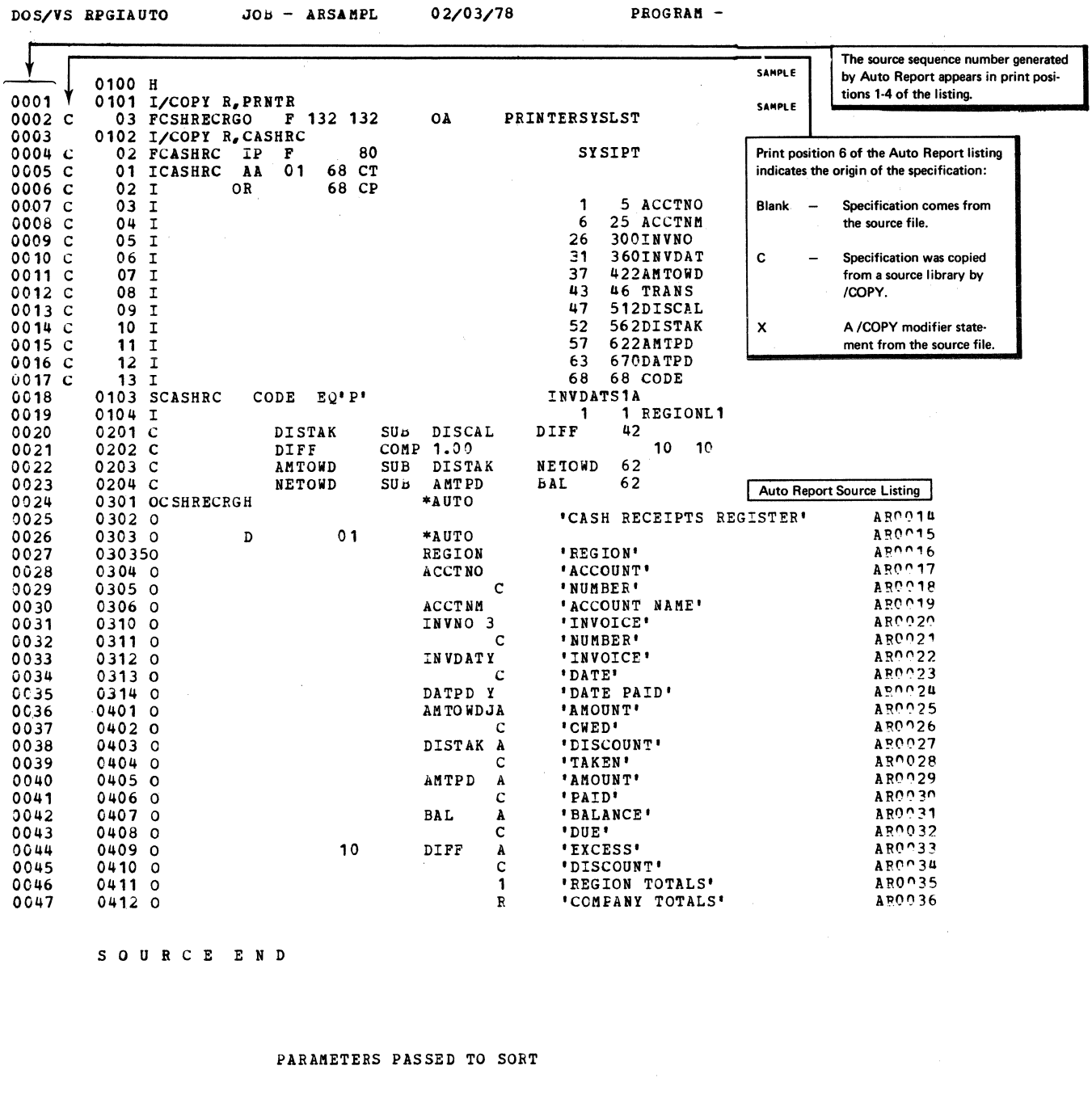


Figure 7 (1 of 5). Listing and Output of Sample Program

```
     RECORD TYPE=F,LENGTH=80
     INPFIL EXIT
     OUTFIL EXIT
     OPTION PRINT=CRITICAL,LABEL=(,,S)
     MODS PH1=(,,E15),PH3=(,,E35)
     SORT FIELDS=(31,6,ZD,A),WORK=1

NO ERRORS DETECTED BY AUTO REPORT

END OF AUTO REPORT PROGRAM
```

See Appendix B for a description of the parameters passed to the Sort program by Auto Report when the Select/Sort function is used in a program.

Figure 7 (2 of 5). Listing and Output of Sample Program

```
0001     00 20C  FCSHRECRGO   F 132 132     OA     PRINTERSYSLST                    AR0004
0002     00 30C  FCASHRC  IP  F      80           SYSIPT                           AR0004
0003     00 40   F                                      KRDEXITRGSORT              AR0004
         00 50   I*/COPY R,PRNTR                                                   AR0004
         00 60   I*/COPY R,CASHRC                                                  AR0004
0004     00 70C  ICASHRC  AA  01  68 CT                                            AR0004
0005     00 80C  I        OR      68 CP                                            AR0004
0006     00 90C  I                                        1   5 ACCTNO             AR0004
0007     01 00C  I                                        6  25 ACCTNM             AR0004
0008     01 10C  I                                       26 300INVNO              AR0004
0009     01 20C  I                                       31 360INVDAT             AR0004
0010     01 30C  I                                       37 422AMTOWD             AR0004
0011     01 40C  I                                       43  46 TRANS             AR0004
0012     01 50C  I                                       47 512DISCAL             AR0004
0013     01 60C  I                                       52 562DISTAK             AR0004
0014     01 70C  I                                       57 622AMTPD              AR0004
0015     01 80C  I                                       63 670DATPD              AR0004
0016     01 90C  I                                       68  68 CODE              AR0004
0017     02 00   I                                        1   1 REGIONL1          AR0004
0018     02 10   C           DISTAK    SUB  DISCAL    DIFF    42                  AR0004
0019     02 20   C           DIFF      COMP 1.00                 10  10           AR0004
0020     02 30   C           AMTOWD    SUB  DISTAK    NETOWD  62                  AR0004
0021     02 40   C           NETOWD    SUB  AMTPD     BAL     62                  AR0004
0022     02 50E  C   01              EXSR A$$SUM                                   AR0004
0023     02 60E  CL1         AMTOWR    ADD  AMTOW1    AMTOWR  82                  AR0004
0024     02 70E  CL1         DISTAR    ADD  DISTA1    DISTAR  72                  AR0004
0025     02 80E  CL1         AMTPDR    ADD  AMTPD1    AMTPDR  82                  AR0004
0026     02 90E  CL1         BALR      ADD  BAL1      BALR    82                  AR0004
0027     03 00E  CL1         DIFFR     ADD  DIFF1     DIFFR   62                  AR0004
0028     03 10E  CSR         A$$SUM    BEGSR                                       AR0004
0029     03 20E  CSR         AMTOW1    ADD  AMTOWD    AMTOW1  82                  AR0004
0030     03 30E  CSR         DISTA1    ADD  DISTAK    DISTA1  72                  AR0004
0031     03 40E  CSR         AMTPD1    ADD  AMTPD     AMTPD1  82                  AR0004
0032     03 50E  CSR         BAL1      ADD  BAL       BAL1    82                  AR0004
0033     03 60E  CSR 10      DIFF1     ADD  DIFF      DIFF1   62                  AR0004
0034     03 70E  CSR                   ENDSR                                       AR0004
0035     03 80E  OCSHRECRGH  201   1P                                              AR0004
0036     03 90E  O        OR       OA                                              AR0004
0037     04 00E  O                          UDATE Y    8                          AR0004
0038     04 10E  O                                    76 'CASH RECEIPTS REGISTER'  AR0004
0039     04 20E  O                                   127 'PAGE '                   AR0004
0040     04 30E  O                          PAGE  Z 131                           AR0004
0041     04 40E  OCSHRECRGH  1     1P                                              AR0004
0042     04 50E  O        OR       OA                                              AR0004
0043     04 60E  O                                    6 'REGION'                   AR0004
0044     04 70E  O                                   15 'ACCOUNT'                  AR0004
0045     04 80E  O                                   29 'ACCOUNT NAME'             AR0004
0046     04 90E  O                                   46 'INVOICE'                  AR0004
0047     05 00E  O                                   56 'INVOICE'                  AR0004
0048     05 10E  O                                   67 'DATE PAID'                AR0004
0049     05 20E  O                                   80 'AMOUNT'                   AR0004
0050     05 30E  O                                   92 'DISCOUNT'                 AR0004
0051     05 40E  O                                  105 'AMOUNT'                   AR0004
0052     05 50E  O                                  118 'BALANCE'                  AR0004
0053     05 60E  O                                  128 'EXCESS'                   AR0004
0054     05 70E  OCSHRECRGH  2     1P                                              AR0004
0055     05 80E  O        OR       OA                                              AR0004
```

RPG II Compiler Listing

Figure 7 (3 of 5). Listing and Output of Sample Program

```
0056     05 90E  O                                    14 'NUMBER'                AR0004
0057     06 00E  O                                    45 'NUMBER'                AR0004
0058     06 10E  O                                    54 'DATE'                  AR0004
0059     06 20E  O                                    79 'OWED'                  AR0004
0060     06 30E  O                                    90 'TAKEN'                 AR0004
0061     06 40E  O                                   104 'PAID'                  AR0004
0062     06 50E  O                                   116 'DUE'                   AR0004
0063     06 60E  O                                   129 'DISCOUNT'              AR0004
0064     06 70E  OCSHRECRGD  1     01                                            AR0004
0065     06 80E  O                      REGION     3                            AR0004
0066     06 90E  O                      ACCTNC    14                            AR0004
0067     07 00E  O                      ACCTNM    37                            AR0004
0068     07 10E  O                      INVNO 3   45                            AR0004
0069     07 20E  O                      INVDATY   56                            AR0004
0070     07 30E  O                      DATPD Y   66                            AR0004
0071     07 40E  O                      AMTOWDJB  80                            AR0004
0072     07 50E  O                      DISTAKKB  92                            AR0004
0073     07 60E  O                      AMTPD KB 105                            AR0004
0074     07 70E  O                      BAL   KB 118                            AR0004
0075     07 80E  O                10    DIFF  KB 129                            AR0004
0076     07 90E  OCSHRECRGT 12     L1                                            AR0004
0077     08 00E  O                      AMTOW1JB  80                            AR0004
0078     08 10E  O                      DISTA1KB  92                            AR0004
0079     08 20E  O                      AMTPD1KB 105                            AR0004
0080     08 30E  O                      BAL1  KB 118                            AR0004
0081     08 40E  O                      DIFF1 KB 129                            AR0004
0082     08 50E  O                               67 'REGION TOTALS'             AR0004
0083     08 60E  O                              130 '*'                         AR0004
0084     08 70E  OCSHRECRGT 12     LR                                            AR0004
0085     08 80E  O                      AMTOWRJB  80                            AR0004
0086     08 90E  O                      DISTARKB  92                            AR0004
0087     09 00E  O                      AMTPDRKB 105                            AR0004
0088     09 10E  O                      BALR  KB 118                            AR0004
0089     09 20E  O                      DIFFR KB 129                            AR0004
0090     09 30E  O                               67 'COMPANY TOTALS'            AR0004
0091     09 40E  O                              131 '**'                        AR0004

     E N D   O F   S O U R C E
```

RPG II Compiler Listing (continued)

Figure 7 (4 of 5). Listing and Output of Sample Program

2/03/78 CASH RECEIPTS REGISTER PAGE 1

REGION	ACCOUNT NUMBER	ACCOUNT NAME	INVOICE NUMBER	INVOICE DATE	DATE PAID	AMOUNT OWED	DISCOUNT TAKEN	AMOUNT PAID	BALANCE DUE	EXCESS DISCOUNT
3	31275	ENVIRONMENT CONCERNS	20451	7/06/77	7/30/7	29.43		15.00	14.43	
					REGION TOTALS	29.43		15.00	14.43	*
1	11352	NU-STYLE CLOTHIERS	27987	7/14/77	7/26/7	87.07		40.00	47.07	
					REGION TOTALS	87.07		40.00	47.07	*
2	23347	RITE-BEST PENS CO	20842	7/18/77	7/20/7	15.80		10.00	5.80	
2	25521	IMPORTS OF NM	29273	7/20/77	7/27/7	797.40	11.93	585.47	200.00	
					REGION TOTALS	813.20	11.93	595.47	205.80	*
1	18274	STREAMLINE PAPER INC	29703	7/21/77	7/30/7	274.03	2.38	170.55	101.10	
					REGION TOTALS	274.03	2.38	170.55	101.10	*
					COMPANY TOTALS	1,203.73	14.31	821.02	368.40	**

Report produced by Sample Program

Figure 7 (5 of 5). Listing and Output of Sample Program

PART III.

REFERENCE INFORMATION

The Auto Report Option Specifications form (Figure 8) can be used by the programmer to select certain options regarding the output from Auto Report. The Option specification is not required in the Auto Report program. If present, it must appear as the first specification in the program. If the Option specification is not present, Auto Report assumes all of the options that correspond to blank entries on the specification (see individual entries for the meanings of the blank entries.) The Option specification cannot be within a source library member that is copied by a /COPY statement. Do not confuse the Option specification (U in position 6) with the RPG II header specification (H in position 6). If the RPG II header specification is not present, either in the Auto Report source program or within a copied source library member (see index entry Auto Report Copy Specifications), Auto Report generates a header specification with blank entries.

OPTION SPECIFICATIONS

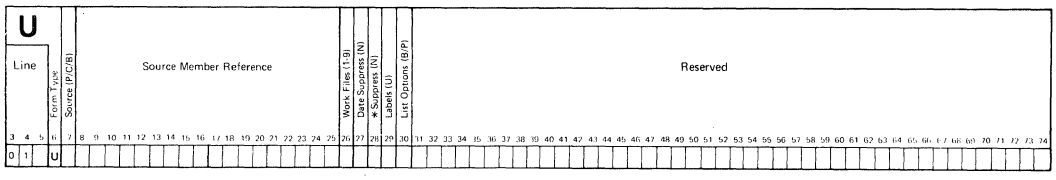


Figure 8. Auto Report Cption Specifications

SPECIFICATICNS

The following entries on the Cption specifications are used in the same way as corresponding entries on standard RPG specifications. See the publication DOS/VS RPG II Language for descriptions of these common entries:

- Page (positions 1-2)
- Line (positions 3-5)
- Program Identification (positions 75-80)

Form Type (6)

A U is preprinted in this position of the specifications form (Figure 8). The U in position 6 of an Auto Report statement identifies it as an Auto Report Option specification.

Source (7)

Entry	Explanation
P	The generated RPG II source program is to be punched into cards in addition to being written on a disk work file.
Blank	The generated source program is to be written on a disk work file; it is not to be punched into cards.

Position 7 is used to request that additional output be produced by Auto Report. By entering a P in position 7, you can specify that the source program be punched into cards. Whether it is punched or nct, the generated source program is written on a disk work file from which it is immediately compiled.

In certain instances, you may wish to punch the generated source program so that you can manually modify it to suit your specific needs. For example, you can reformat the output report by changing the end positions on the generated output specifications without rerunning Auto Report.

If a punched deck is requested, the deck is punched on the device assigned to SYSPCH with stacker selection into stacker 2. If Select/Sort is specified in the Auto Report specifications, the object module produced by Auto Report for Select/Sort is punched ahead of the generated source program.

Note: You can easily separate the punched object cards from the source cards as follows: Insert a sorting needle or a wire (such as a straightened paper clip) in any of the punch holes of the first card column of the object deck, which is punched ahead of the source deck. The wire is stopped by the first source card and you can separate the deck. This technique works because the first card column of each card in the object deck contains a 12-2-9 multipunch, while the first card column of the first card in the generated source deck always contains a 0 punch.

The object module produced for Select/Sort can also be put out under contrcl of the DOS/VS OPTION statement. See index entry Processing an Auto Report Program for additional information about the DCS/VS OPTION statement.

Positions 8-25

Positions 8-25 are not used. Leave them blank.

Work Files (26)

Entry	Explanation
1-8	The number of disk work files used by the Sort program when Select/Sort is used.
3-9	The number of tape work files used by the Sort program when Select/Sort is used.
Blank	One work file is assumed (disk only).

Enter the number of work files to be used by the Sort program when the Select/Sort function is used. For a complete description of sort work files, see one of the publications

- DOS/VS Sort/Merge Programmer's Guide
- DOS/VS Sort/Merge Version 2 Programmer's Guide.

If one of the above IBM sort programs is not used for the Select/Sort function, see the reference manual for the sort program being used.

Date Suppress (27)

Entry	Explanation
N	Suppresses the date and the page number on the first *AUTO page heading line.
Blank	Page number and date are included on the first *AUTO page heading line.

If you do not wish the first *AUTO heading line to have the generated date on the left and page number on the right, enter an N in position 27. When these fields are suppressed, the page title and any other fields you specify can occupy the entire line. See index entry *AUTO Page Headings Specifications for further information on the generated date and page numbers.

*Suppress (28)

Entry	Explanation
N	Suppresses the asterisk indication from generated total output lines.
Blank	Asterisks are generated for total output lines.

If you do not want asterisks to print beside generated totals, enter an N in position 28.

Labels (29)

Entry	Explanation
U	Unlabeled tape work files are used for the Sort program.
Blank	Tape work files for the Sort program have standard labels.

When you use the Select/Sort function and unlabeled tape work files are to be used by the Sort program, enter a U in position 29. If you enter a U in position 29, you must enter one of the numbers 3-9 in position 26 to indicate the number of tape work files used. For a description of work file labeling, see one of the publications

- DOS/VS Sort/Merge Programmer's Guide
- DOS/VS Sort/Merge Version 2 Programmer's Guide.

If a sort program other than one of the above IBM sort programs is used with the Select/Sort function, see the reference manual for that program.

Positions 30-74

Positions 30-74 are not used. Leave them blank.

The *AUTO Page Headings function and the *AUTO Output function provide simplified methods of describing printed output. These functions of Auto Report are requested by entering the characters *AUTO in positions 32-37 of a record description specification on the standard RPG Output Specificatons form. *AUTO can be entered on a heading, detail, or total specification (H, D, or T in position 15). *AUTO can be used with only one file in a program. That file must be a printer file. (In this publication, printer file is defined as any output file using the device PRINTER in positions 40-46 of the file description specification, or as a line counter file, identified by an L in position 39 of the file description specification.) Device independent files are accepted only if they are line counter files.

In RPG II, output specifications are divided into two general types (Figure 9):

1. Record description specifications (positions 7-31) describe when and where the output line is to be printed. One record description specification is required for each different type of line to be printed. Only the first record description for a file need contain a filename in positions 7-14.

2. Field description specifications (positions 23-74) following a record description specification tell when, where, and how each item of data (field or literal) is to be printed on the output record. There may be several field description specifications following a record description specification.

Auto Report Page Headings and Auto Output specifications are also divided into the two general categories: record description specifications and field description specifications. However, the entries on these specifications are used differently than in standard RPG II.

The following RPG II output entries are not changed when they are used with *AUTO. See the RPG II reference manual for descriptions of these entries:

- Page (positions 1-2)
- Line (positions 3-5)
- Form Type (position 6)
- Program Identification (positions 75-80)

Positions 71-74 must always be blank on Auto Report output specifications.

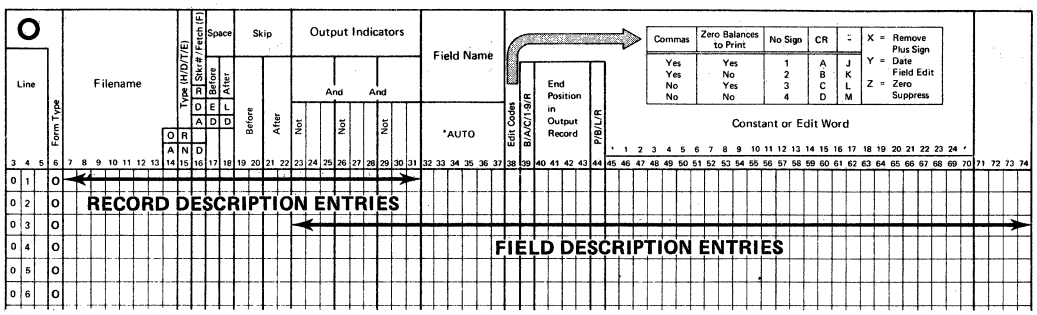


Figure 9. Two Categories of Output Specifications

*AUTO PAGE HEADINGS SPECIFICATIONS

The *AUTO Page Headings function provides an easy way to produce a page heading at the top of every page of a printed report (Figure 10). Up to five H-*AUTO specifications can be used if a multiple-line page heading is desired. If both normal RPG II heading lines and H-*AUTO lines are specified in combination for a file, they are printed in the crder specified on the RPG Output Specifications sheet. The *AUTO Page Headings function can be used with only one file per program.

The heading line generated by the first H-*AUTO specification contains a date and page number. (The first heading line can also contain a title. See the index entry Field Description Specifications, positions 45-70, for how to enter a title.) The generated date is left-justified and prints with slashes as follows: mm/dd/yy (unless the format is altered by the RPG II Inverted Print option, position 21 of the header specification). The generated page number is right-justified and is preceded by the word PAGE. The page number field is four digits in length and it is zero-suppressed.

If you do not want the date and page number to print on the first heading line, you can suppress them by entering an N in position 27 of the Auto Report Option Specifications.

Note: Auto Report uses one of the unused RPG II PAGE fields (PAGE, PAGE1-PAGE7) for page numbering. If all PAGE fields are used in the program, Auto Report does not number pages.

RECORD DESCRIPTION SPECIFICATIONS

Each *AUTO heading (*H-AUTO) record description defines a separate heading line. The record description entries allow the programmer to enter spacing and skipping information and to specify under what conditions the line is printed.

Filename (7-14)

Enter the name of the printer file (or line counter file) on which the heading is to be printed. The filename must correspond to the rules for filenames given in the publication DOS/VS RPG II Language.

Type (15)

Enter an H in position 15 on each record description specification which defines a page heading line. This entry, with the entry *AUTO in positions 32-37, defines this as an H-*AUTO heading specification (Figure 10). Up to five H-*AUTO specifications are allowed.

Position 16

Position 16 is not used in H-*AUTO specifications. Leave it blank.

Space/Skip (17-22)

You may enter your own spacing and skipping values in these positions, according to the rules given in the RPG II reference manual. If you do not enter spacing and skipping values in these positions, Auto Report skips to channel 1 before the first line is printed and spaces 2 after the last H-*AUTO line is printed. If multiple H-*AUTO lines are used, Auto Report spaces 1 after each line except the last. For additional information on generated spacing and skipping values, see index entry report format.

Output Indicators (23-31)

On the first H-*AUTO specification, you may either leave positions 23-31 blank or enter your own output indicators according to the rules given in the publication DOS/VS RPG II Language. If you leave these positions blank, Auto Report causes the corresponding output line to be printed at first page (1P) time in the program cycle and when overflow occurs. Thus, the heading is printed at the top of each page of the printed report. You may assign indicators to subsequent H-*AUTO specifications. If positions 23-31 are blank on any H-*AUTO specification after the first, that specification is assigned the same indicators as the first.

If an overflow indicator is defined on the file description specification for the printer file, that indicator is used to condition the generated heading specifications. Otherwise, an unused overflow indicator is defined for the file on the file description specification by Auto Report and is used to condition the line.

You may use AND and OR specifications with H*-AUTO output indicators if you enter an output indicator on the first specification. Normal RPG II rules for AND and OR lines apply.

*AUTO (32-37)

Enter *AUTO in positions 32-37. This entry and H in position 15 of the output specification (Figure 10) indicate that you are requesting an Auto Report heading line.

Positions 38-70

Positions 38-70 are not used on the record description line. Leave them blank.

FIELD DESCRIPTION SPECIFICATIONS

Each H-*AUTO record description specification can be followed by one or more field descriptions. The field description specifications are used to specify the title to be printed on the heading line and to describe any other fields and literals to be printed on the line.

Positions 7-31

Positions 7-31 are not used on field descriptions. Leave them blank. (Note that Output Indicators, positions 23-31, cannot be used tc condition a field on an H-*AUTO specification.)

Field Name (32-37)

Entry	Explanation
Blank	A literal (enclosed in apostrophes) may be entered in positions 45-70. The literal is printed on the heading line.
Field name	Field defined in the program is printed on the heading line.
Table name	A table element is printed on the heading line.
Indexed Array name	An array element is printed on the heading line.

Use positions 32-37 to enter a field name, table name, or indexed array name defined elsewhere in the program that you want to print on the heading line. If a name is entered, an edit word may be entered in positions 45-70, but not a literal. A literal must be entered in positions 45-70 if positions 32-37 are blank.

OUTPUT SPECIFICATIONS

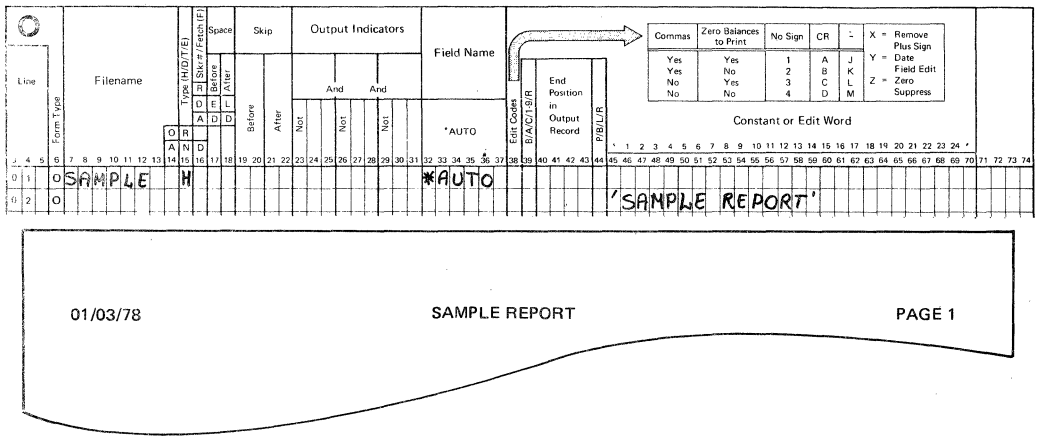


Figure 10. Specificatcns and Results - *AUTO Heading Line

If Output Indicators (positions 23-31) are left blank on the record description specification, Auto Report conditions all fields and table/array elements included on the heading line with N1P in positions 23-25. Therefore, the field or table/array element does not print on the first page. (If printed on the first page, the field might not contain meaningful data, since the first record has not been read.) N1P is not generated for the following RPG II reserved words: PAGE, PAGE1-PAGE7,UDATE,UDAY,UMONTH,UYEAR.

For information on formatting and centering *AUTO heading lines, see index entry report format.

Edit Codes (38)

You may enter an edit code in position 38 if a numeric field, array element, or table element is named in positions 32-37. If you use an edit code, positions 45-70 must be blank unless asterisk protection or a floating dollar sign is specified. If position 38 is blank, no editing is done by Auto Report unless an edit word is used.

Blank After (39)

Enter a B in position 39 if you want a numeric field reset to zeros after it is printed, or if you want an alphameric field reset to blanks after it is printed on the heading line.

Positions 40-44

Positions 40-44 are not used with *AUTO heading specifications. Leave them blank. For information on the positioning of fields and literals in the title line and centering of heading lines in relation to the body of the report, see index entry report format.

Constant or Edit Word (45-70)

Entry	Explanation
Literal (constant)	Title or other literal (enclosed in apostrophes) that is to appear on the printed line.
Edit word	The edit pattern used to edit the numeric field named in positions 32-37 of the same field description line.
Blank	Positions 32-37 contain the name of a field which either is not edited or is edited by an edit code.

Use positions 45-70 to specify the title and other information that is to appear on the output line and to edit numeric fields that are to appear on the line. Rules for specifying literals and edit words are identical to those given in the publication DOS/VS RPG II Language except that no end positions can be specified.

For information on the positioning of fields and literals in the title line and centering of heading lines in relation to the body of the report, see index entry report format.

*AUTO CUTPUT SPECIFICATIONS

Detail reports (where a line is printed for each individual reccrd that is read) and group printed reports (where only totals are printed) can be specified using the *AUTO Output function alone or in combination with standard RPG II specifications. The *AUTO Output function generates totals and formats columns and column headings.

A single detail or total *AUTO record description (D/T-*AUTO) specification and its associated field description specificaticns can be used to specify:

1. Up to three lines of column headings to appear above a field.

2. Accumulation of several levels of totals, including a final total (known as total rolling).

3. Generation by Auto Report of end positions for column headings and fields.

4. Generation by Auto Report of the K edit code for numeric fields.

5. Fields or literals to be printed next to generated totals.

This section describes the *AUTO Output record description specification and the four types of field description specifications that can be associated with it. The four types are distinguished by entries in position 39. The remaining entries on a field description specification have different meanings depending on the entry in position 39.

The valid entries in position 39 of the field description specifications and their meanings are:

- Blank or B: Indicates the associated field or literal is to appear on the detail line.

- A: Indicates the associated numeric field is to be printed on the detail line and accumulated. A total is printed for each control level defined in positions 59-60 of the input specificaticns for the program. A final total is also printed (LR).

- C: Indicates the associated literal is to be printed on the second or third line of column headings.

- 1, 2, 3, 4, 5, 6, 7, 8, 9, R: Indicates the associated field or literal is to appear on the total line generated for the respective control level indicator (L1-I9, LR).

See index entry group printing for the effect of these entries in a group printed report.

Note: Examples of the four types of Auto Report field description specifications are found in Part I: How to Use RPG II Auto Report, Part II: Sample Program, and under index entry group printing.

RECORD DESCRIPTION SPECIFICATIONS

An Autc Report record description specification must contain the entry *AUTO in positions 32-37. *AUTO can appear only on a record description specification. This entry indicates that the record description and the following field descriptions are redefined according to their use by Auto Report.

Filename (7-14)

Enter the name of the printer file (or line counter file) on which the report is to be printed. This must be the same file named on H-*AUTO specifications, if any. The filename must correspond to the rules for filenames given in the publication DOS/VS RPG II Language.

Type (15)

Entry	Explanation
D	The Auto Report specifications describe a report containing detail lines.
T	The Auto Report specifications describe a report containing total lines, but no detail lines (group printed report).

Enter a D in position 15 and *AUTO in positions 32-37 if you want Auto Report to generate a report that contains detail lines. The field description specifications associated with the D-*AUTO record description are used to specify fields, column headings, total rolling, and literals to appear on total lines. Examples of D-*AUTO specifications and reports are found in Part I: How to Use RPG II Auto Report.

Enter a T in position 15 and *AUTO in positions 32-37 if you want Auto Report to generate a group printed report (see index entry group printing).

Only one detail or total *AUTO (D/T-*AUTO) record description specification can be used in a program.

Fetch Overflow (16)

Enter an F in position 16 if you want to specify fetch overflow. The normal rules for fetch overflow apply. See the publication DOS/VS RPG II Language.

When used with the *AUTO Output function, fetch overflow applies only to the detail line. If group printing is specified (T in position 15), fetch overflow applies to the lowest level total line to be printed.

Space/Skip (17-22)

Enter spacing and skipping values in positions 17-22 according to the normal RPG II rules. Entries specified apply only to the detail line generated by a D-*AUTO specification or the first total line generated by a T-*AUTO specification.

Leave positions 17-22 blank if you want single spacing to be done after each detail line printed or, if group printing is specified, after the first total line printed. For information on spacing and skipping for generated column heading and total lines, see index entry report format.

Output Indicators (23-31)

Enter any valid output indicators in positions 23-31 to condition the detail or group print line generated by this *AUTO specification. If these positions are left blank on a D-*AUTO specification, the generated detail line is conditioned by N1P. Therefore, it is not printed at

first page (1P) time in the RPG II program cycle. If these positions are left blank for a T-*Auto specification, the first generated total line is conditioned by the lowest control level indicator defined in the program. (See index entry group printing for additional information about the use of this entry with a T*-AUTO specification.)

You may use AND and OR specifications with *AUTO output indicators if you enter an output indicator on the first record description specification. Normal RPG II rules for AND and OR lines apply.

Indicators you enter in positions 23-31 of the record description specification (and its associated AND/OR lines) apply only to the detail line generated by a D-*AUTO specification or the group print line (lowest level total specification) generated by a T-*AUTO specification.

If column headings are specified in the field descriptions that follow this *AUTO record description, they are conditioned by either:

1. The same indicators that were specified for the first H-*AUTO specification.

2. The first page (1P) indicator in an OR relationship with the overflow indicator specified for the file on the file description specification. If no overflow indicator is specified, Auto Report defines an unused overflow indicator and uses it to condition the lines.

*AUTO (32-37)

To indicate that you are using Auto Report, enter *AUTO in positions 32-37 on the record description line. Position 15 must contain a D or a T in this case, to indicate a detail or total *AUTO specification. Only one D/T-*AUTO specification may be used in a program.

Positions 38-70

Positions 38-70 are not used on a D/T-*AUTO record description specification. Leave them blank.

FIELD DESCRIPTION (BLANK OR B IN POSITION 39)

D-*AUTO and T-*AUTO field description specifications containing a blank or B in position 39 describe:

- An alphameric field such as an item description
- A numeric field that is not totaled
- A literal
- A field with a literal to be used as a column heading (Figure 11)

A field named on the line (or a literal, when no field is named) following a D-*AUTO record description specification is printed only on the detail report line. If the field (or literal, when no field is named) on the line follows a T-*AUTO record description, it appears only on the first total line generated.

Positions 7-22

Positions 7-22 are not used on the field description lines. Leave them blank.

OUTPUT SPECIFICATIONS

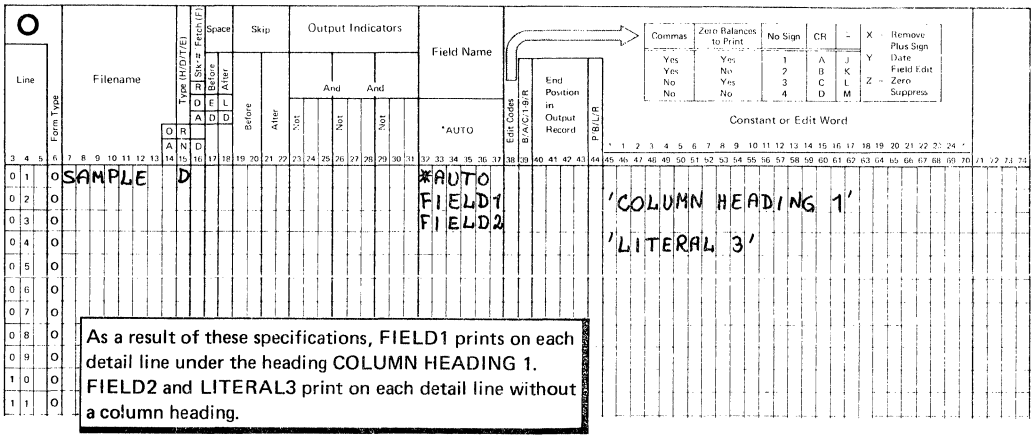


Figure 11. Auto Report Field Description Specifications (Blank in Position 39)

Output Indicators (23-31)

Enter any valid RPG II output indicators in positions 23-31 or leave them blank. If these positions are left blank, the field (or literal, when no field is named on the line) is printed each time the detail line is printed. When group printing is specified (I-*AUTO specification), the field (or literal, when no field is named on the line) is printed each time the lowest level total line is printed.

If a column heading is specified in positions 45-70 to appear over a field named in positions 32-37, the column heading is not affected by output indicators entered in positions 23-31.

Field Name (32-37)

You may enter a field name, indexed array name, table name, or blanks in positions 32-37. If you leave positions 32-37 blank, you must enter a literal in positions 45-70 of the same field description specification.

If a field name, indexed array name, or table name is entered, the value of the field or element is printed on the detail line (on the first total line, if group printing is specified).

Edit Codes (38)

You may enter a valid RPG II edit code in position 38 if positions 32-37 contain the name of a numeric field, a numeric array element, or a numeric table. This position must be blank for alphameric fields and table/array elements, and for literals. If position 38 is left blank on a field description line for a numeric field or table/array element, a K edit code is provided by the Auto Report program. The K edit code causes a numeric field or element to be printed with commas and a decimal point, such as 3,489.13. It also causes zero suppression; zero balances are not printed and negative balances are printed with a minus sign on the right.

Blank After (39)

Entry	Explanation
Blank	Field is not to be reset to zeros or blanks after printing.
B	Numeric field is reset to zeros after it is printed; alphameric field is reset to blanks.

Enter a B in position 39 when alphameric or numeric fields, array elements, or table elements are to be reset to zeros or blanks after they are printed. Blank-after cannot be used for literals. This entry applies only to the detail line (or the first total line, if group printing is specified).

End Position in Output Record (40-43)

Either leave positions 40-43 blank or enter the print position of the right-most character of the field (literal, if no field is named in positions 32-37) to be printed. If this entry is blank, Auto Report generates end positions for fields, literals, and column headings. See index entry report format for additional information and considerations.

Position 44

Position 44 is not used, since packed and binary data and right/left signed numeric data cannot be specified. Leave this position blank.

Constant (45-70)

You may enter a literal (constant) or blanks in positions 45-70. Literals are enclosed in apostrophes according to the normal RPG II rules for coding literals.

If these positions are left blank, a field name, indexed array name, or table name must be entered under Field Name (positions 32-37). Column heading continuation lines (see index entry field description, C in position 39) may follow this field description line, but the first line of the printed column heading will be blank.

If a literal is entered in these positions along with a field name in positions 32-37, the literal is printed on the first column heading line over the field value. When a column heading is used, the length used to space the column on the report is the greater of the longest column heading length or the field length, adjusted for editing. (See index entry report format for additional information on how columns and fields are centered and spaced by Auto Report.)

If a literal is entered in positions 45-70 and Field Name (positions 32-37) is blank, the literal is printed each time the detail report line is printed. In group printing, the literal is printed each time the first generated total line is printed.

FIELD DESCRIPTION (A IN POSITION 39)

Enter an A in position 39 of a field description specification following a D/T-*AUTO specification if you want Auto Report to accumulate and print totals for the field named in positions 32-37 (Figure 12). As many levels of totals are printed as you have defined in the Control

Level entry (positions 59-60) on input specifications. A final total (LR) is also printed. (This process is called total rolling.)

If group printing is specified and a control level indicator higher than the lowest defined control level is specified in positions 23-31 on the record description specification, totals are generated for the indicator entered, all higher defined indicators, and LR.

The total output records generated by Auto Report as a result of entering an A in position 39 of a field description specification are conditioned by the associated control level indicator defined in the input specifications. One total output record is generated for each control level indicator defined in the program.

Generated Total Fields

When an A is specified in position 39 of a detail or total *AUTO field description specification, Auto Report generates and names total fields to be used in accumulating the required levels of totals. Field names for the total fields are generated by Auto Report based on the name in positions 32-37 of the A-type field description. Names are generated in the following way:

1. If the specified field name has fewer than six characters, one character is added to the name to create a name for the total field. The added character is 1-9 or R, corresponding to the total indicators L1 through L9 and LR, respectively. For example, if ITEM is the specified field name and all nine control levels are defined, the generated field names are:

   ITEM1, ITEM2, ...ITEM9, and ITEMR

2. If the specified field name has six characters, the last character is replaced by one of the characters 1 through 9, or R. For example, if AMOUNT is the specified field name and all nine control levels are defined, the generated field names are:

   AMOUN1, AMOUN2, ...AMOUN9,AMOUNR

OUTPUT SPECIFICATIONS

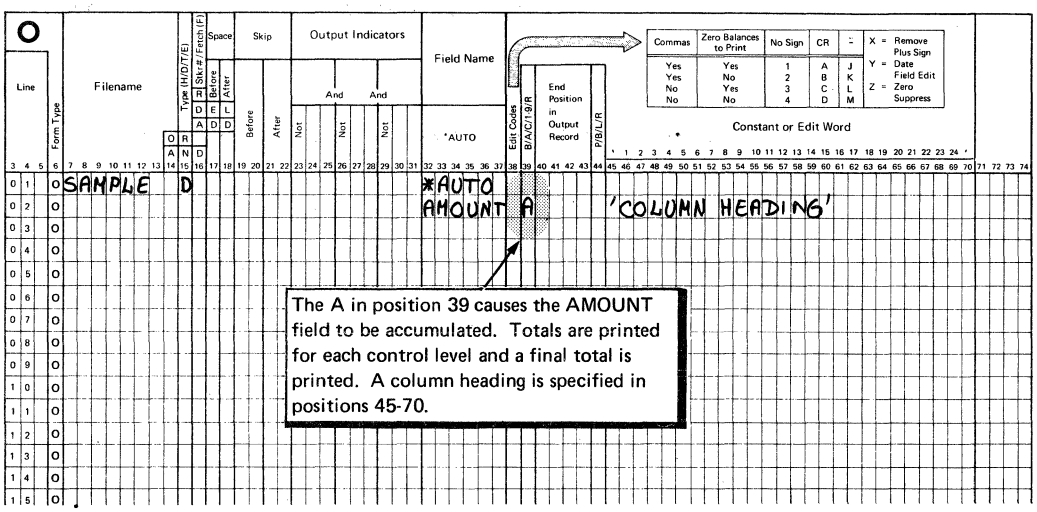


Figure 12. Describing a Field that is to be Accumulated

Total fields are generated and named for all control level indicators defined in the program and for LR. (For an exception to this rule, see group printing, example 1 later in this section.) For example, if L1 and L3 are assigned to control fields on the input specifications and the field QTY is specified, three total fields, QTY1, QTY3, and QTYR are generated and named by Auto Report. All total fields generated for the same level, such as QTY1 and AMOUNT1, are printed on the same total line, and that line is conditioned by the corresponding control level indicator.

Generated total fields are two digits longer than the original field. For example, if the field QTY is defined with a length of 3, QTY1, QTY3, and QTYR all have lengths of 5. The number of decimal positions remains the same in the generated fields. You can define a field name previously in a program which is the same as a generated field name, giving that field whatever length and number of decimal positions you wish. If you do this, the generated field is assigned the previously defined length and number of decimal positions (if the previous field is numeric).

Considerations

Generated field names may be referenced in RPG II specifications that are included in the program. The programmer must be aware, however, that the use of generated fields in this way may interfere with the automatic accumulation of totals performed by Auto Report.

Field names ending in 1-9 or R should not be used in an Auto Report program that accumulates totals, since Auto Report generates total fields ending in those characters. This is especially important for 6-character field names, since total fields are formed by replacing the last character with 1-9 or R.

No field name may be used more than once with an A in position 39. Also, if a 5- or 6-character field name is specified with an A in position 39, a second 5- or 6-character field name in which the first

five characters are identical may not be specified with an A in position 39. For example, if the following four field names are specified with an A in position 39 in an Auto Report specification, all but the first are invalid:

FIELD

FIELDX - invalid because the first five characters duplicate the first five characters of the first field

FIELDY - invalid for the same reason as FIELDX

FIELD - invalid since it is a duplicate of the first field

Positions 7-22

Positions 7-22 must remain blank on the field description lines.

Output Indicators (23-31)

Enter any valid RPG II output indicators in positions 23-31 or leave them blank. If you leave these positions blank, the field described is printed on each detail line. If you enter indicators in positions 23-31, the field is printed only when the conditions represented by those indicators are met. Leave these positions blank for group printing.

If a column heading is specified in positions 45-70 to appear over a field named in positions 32-37, the column heading is not affected by output indicators entered in these positions. Also, output indicators specified when position 39 contains an A do not affect field description specifications generated for totals.

Output indicators specified on an A-type field description specification following a D-*AUTO specification condition the calculations generated for the field. If the A-type field description follows a T-*AUTO specification, however, a specified indicator does not condition calculations generated for the field.

Field Name (32-37)

When you enter an A in position 39, you must enter the name of a numeric field that is to be accumulated in positions 32-37. These positions may not identify an array, array element, or table. The field named is printed on each detail line of the report. If group printing is specified, the total field for the lowest control level indicator defined (L1, L2,... L9, LR, in that order) is printed on the generated total line. (For an exception to this rule see group printing, example 1, later in this section.) Totaling for any particular field by entering an A in position 39 may be specified only once in each program.

In order to generate calculation and output specifications to accumulate and print the various levels of totals required, Auto Report creates and names additional totaling fields. Names for the fields are constructed based on the field name specified in these positions according to a set of rules (see index entry generated total fields).

Edit Codes (38)

You may enter an edit code in position 38 or leave it blank. If you leave this position blank, a K edit code is generated for the field

named in positions 32-37. This causes the field to be edited with commas and a decimal point, such as 1,234,567.89. The field is also zero-suppressed. Zero balances are not printed; negative balances are printed with a minus sign on the right. The edit code you enter, or the generated K edit code, applies to all generated total fields as well as to the field named in positions 32-37.

Position 39

Enter an A to indicate that totals are to be accumulated for the field named in positions 32-37 of this field description. A total is printed for every control level indicator defined in the input specifications and for LR. When position 39 contains an A, positions 32-37 must contain the name of a numeric field. Positions 45-70 may contain a literal to be used as the first line of a column heading. (See index entry generated specifications for additional information.)

Note: When the lowest defined control level indicator used to condition a T-*AUTO specification is higher than the lowest control level indicator defined in the input specifications, only the total lines corresponding to the lowest defined control level indicator used to condition the T-*AUTO specification, the higher defined control levels, and LR are generated. See index entry group printing.

Resetting Total Fields to Zero: When position 39 contains an A, the Auto Report program generates a B (blank after) in position 39 of all the detail and total field description specifications generated from the field name specified. Thus, the field value for the specified field name and any generated field name are reset to zero after the field value is printed.

If group printing is specified, Auto Report generates a calculation to reset the specified field to zero on each cycle. This prevents the same value from being accumulated more than once. An unconditioned total calculation operation (Z-ADD) is used to set the field value to zero. This calculation is the first total calculation in the generated RPG II source program.

Asterisk Indication: To indicate that a printed line is a generated total line, asterisks print on the line, to the right of the highest end position generated from the D/T-*AUTO specification. One asterisk prints to the right on the lowest level total line generated. One additional asterisk prints on each higher level line including the final total.

For example, suppose L1 and L3 are defined control level indicators in a program. One asterisk prints to the right of the L1 line, two asterisks print on the L3 line, and three print on the LR line. As many as ten asterisks print on the LR line if all nine control level indicators are defined in the program.

If you do not want asterisk indication on your report, you can suppress the generation of asterisks on total lines by entering an N in position 28 of the Auto Report Option Specifications.

End Position in Output Record (40-43)

Positions 40-43 may be left blank or may contain the print position of the right-most character of the field to be printed. If this entry is blank, Auto Report generates end positions for fields and column headings. See index entry report format for additional information and considerations.

Position 44

Position 44 is not used with Auto Report, since packed and binary data and right/left signed numeric fields cannot be specified. Leave these positions blank.

Constant (45-70)

Either leave positions 45-70 blank or enter a literal. Do not enter an edit word; editing is accomplished by an edit code. If a literal is entered when position 39 contains an A, the literal becomes the first line of the column heading over the accumulated field.

If these positions are left blank, the first line of the column heading is blank, but column heading continuation lines can still be used to specify the second and third line of the column heading (see index entry field description, C in position 39).

See index entry report format for information on how column headings and fields are centered and spaced by Auto Report.

FIELD DESCRIPTION (C IN POSITION 39)

*AUTO field descriptions can be used to specify a second and third column heading line by entering a C in position 39.

At times you may want more information in a column heading than can be contained on one line. Auto Report enables you to specify the second and third lines of column headings by simply specifying the literals to appear on those lines. No additional heading output lines need be coded; no end positions need be calculated. The special field description specification that allows you to do this is identified by a C in position 39 (Figure 13).

Positions 7-38

Positions 7-38 must be blank on a field description that has a C in position 39.

Position 39

Enter a C. One or two C-type specifications may follow a field description specification that has an A, E, or blank in position 39 and an entry in positions 32-37. The first C-type specification causes a second column heading line to be generated. The second C-type specification causes a third column heading line to be generated (Figure 13).

OUTPUT SPECIFICATIONS

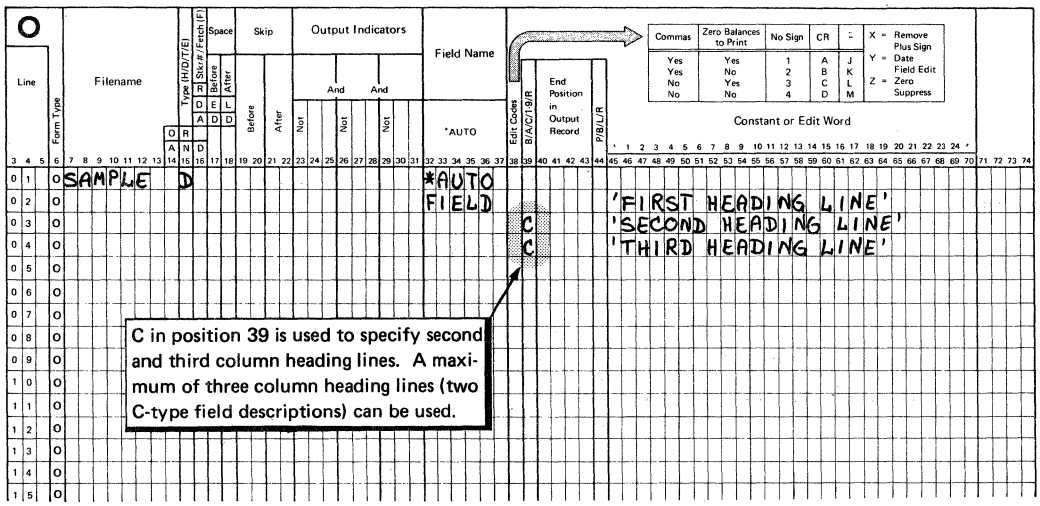


Figure 13. Specifying Second and Third Column Heading Lines

Positions 40-44

Positions 40-44 must be blank on a C-type field description specification.

Constant (45-70)

Enter a literal (constant), up to 24 positions including blanks, enclosed in apostrophes. The literal becomes the second or third line of column headings, depending on whether it is on the first or second C-type specification. If two or three column heading lines are specified, the shorter literals are centered on the longest.

FIELD DESCRIPTION (1-9 OR R IN POSITION 39)

Enter 1, 2, 3, 4, 5, 6, 7, 8, 9, or R in position 39 of a field description to specify a field or literal to be printed on a specific total line.

Auto Report allows you to print other information on generated total lines in addition to the generated totals resulting from A-type field descriptions. The value entered in position 39 corresponds to the level of the total line on which the information is to be printed (the corresponding control level must be defined in positions 59-60 in the input specifications). For example, a 3 in position 39 indicates the information is printed on the L3 total line; an R indicates the information appears on the final total, or LR, line (Figure 14). Fields and literals specified in this way are printed to the left of the leftmost generated total on the line. See index entry report format for exact placement.

This type of field description can be used to print identifying information such as DISTRICT TOTAL, GRAND TOTAL, or other literal information. It can also be used to print a field and to specify an edit word, floating dollar sign, or asterisk protection for the field.

OUTPUT SPECIFICATIONS

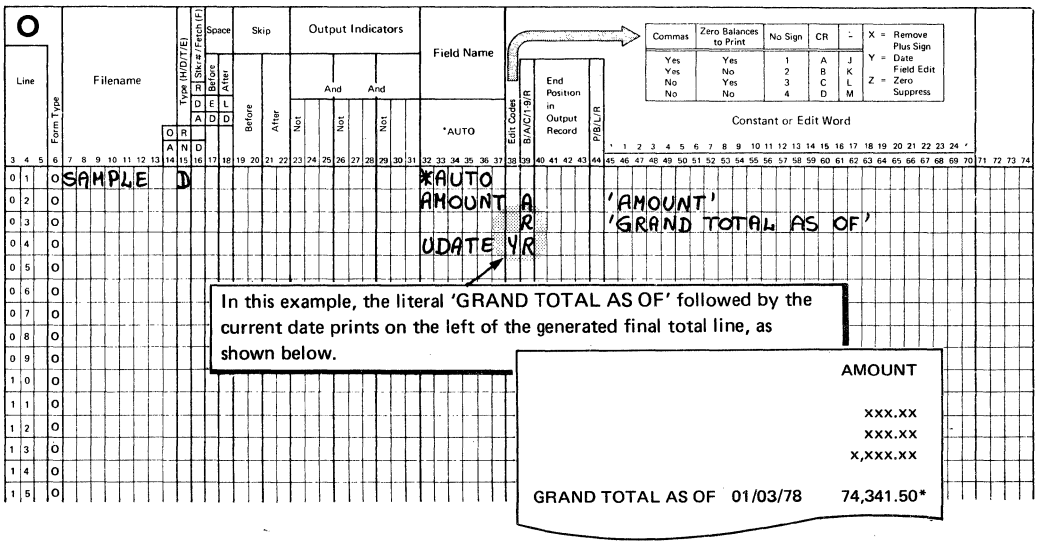


Figure 14. Specifying a Literal and a Field to Print on a Generated Total Line

If none of the *AUTO output fields is defined with an A in position 39, 1-9 or R cannot be used in position 39.

In group printing, only specify numbers that are higher than the lowest control level indicator used to condition the T-*AUTO specification. If the T-*AUTO specification is not conditioned by a control level indicator, use only numbers that are higher than the lowest control level defined in positions 59-60 on the input specifications.

Positions 7-31

Positions 7-31 must be blank on a field description line with 1-9 or R in position 39.

Field Name (32-37)

Enter the name of a field, an indexed array name, or a table name. The corresponding field or element value prints on the total line indicated by the entry in position 39. If you leave positions 32-37 blank, you must enter a literal in positions 45-70.

Edit Code (38)

You may enter an edit code in position 38 to edit a numeric field named in Field Name (positions 32-37). If position 38 is left blank, an edit word may be entered in positions 45-70. If position 38 is blank, no edit code is assumed by Auto Report.

Position 39

Enter one of the numbers 1, 2, 3, 4, 5, 6, 7, 8, 9, or the letter R. These entries correspond to the indicators I1, I2,... I9, and IR. The entry identifies a specific total line on which the field or literal described is to be printed.

The entry in position 39 must correspond to a control level that is defined in the input specifications in the program. In group printing, the entry in this position must be higher than the control level of the first total line generated.

End Position in Output Record (40-43)

Do not make an entry in positions 40-43 on field description specifications with 1-9 or R in position 39. See index entry report format for additional information and considerations.

Position 44

Leave position 44 blank.

Constant or Edit Word (45-70)

You may leave positions 45-70 blank, or you may enter a literal or edit word.

If Field Name (positions 32-37) on this specification line contains an entry, positions 45-70 may contain any of the following:

- Blanks, if no editing is needed for the field or if the field is already edited by an edit code in position 38.
- Edit word, if special editing is desired.
- Floating dollar sign or asterisk protection entry used with an edit code.

Positions 45-70 may not contain a literal when Field Name contains an entry. However, when Field Name is blank, positions 45-70 must contain a literal.

GROUP PRINTING

In group printing, data is summarized for a group of input records and only totals are printed on the report. Totals may consist of subtotals with a final total, or only a final total.

Specifications

In order to specify group printing using Auto Report, enter a T under Type (position 15) with *AUTO in positions 32-36. You may enter a control level indicator under Output Indicators (positions 23-31).

When a T-*AUTO specification is used, a line is not printed for each individual record that is read, but only after a complete control group has been read. This is shown in the two group printing examples which follow.

In Example 1 a total line is generated for the lowest control level indicator specified in positions 23-31 and for all higher control level indicators defined and LR.

In Example 2, however, no control level indicators are specified in positions 23-31. In this case a total line is generated for the lowest control level indicator defined on input specifications (positions 59-60) in the program and for all higher control level indicators defined and LR.

Fields and literals defined on field description specifications which have a blank or B in position 39 and follow a T-*AUTO record description are printed on the lowest level total line. Fields defined with an A in position 39 are not printed on the total lines, but the total fields created by Auto Report (see index entry generated total fields) are printed on their associated total lines. Continued column headings (C in position 39) and total-indicated fields (1-9 or R in position 39) can also be specified on field descriptions following a T-*AUTO record description.

Output indicators may be entered in positions 23-31 of a field description specification following a T-*AUTO record description if position 39 of the field description contains a blank or a B. If output indicators are used on a field description which has an A in position 39 following a T-*AUTO specification, those indicators are ignored by Auto Report. Output indicators may not be used on a field description that contains C, 1-9, or R in position 39.

Example 1

In this example, a group printed report is prepared to show sales totals for Any Company. The report is similar to those prepared in Part I: How to Use RPG II Auto Report. However, in this example, only the totals for each region and the entire company are shown; individual items (detail lines) are not listed.

A disk summary file, DISKSUM, is also produced by this program. The summary file contains a summary record of the sales data for each branch.

Figure 15 shows the file description and input specifications for the program. BRANCH and REGION are defined as control fields.

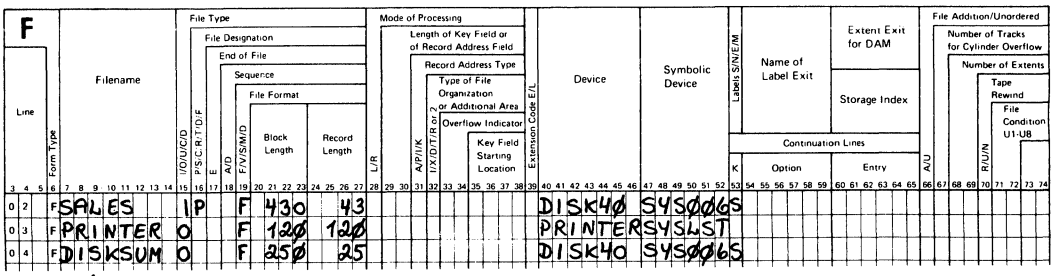
Figure 16 shows the output specifications and the group printed report. Since the T-*AUTO specification is conditioned by L2, only the totals for REGION (L2) and for the entire company (LR) are printed on the report. The totals for BRANCH (L1) are not printed.

The output specifications for DISKSUM (Figure 16) illustrate use of standard RPG II output specifications in the same program with *AUTO specifications. The output record described is written on the disk file, DISKSUM, when there is an L1 control break (BRANCH field changes). Since the T-*AUTO specification is conditioned by L2, Auto Report does not generate fields for the L1 control level, although L1 is defined in the input specifications. Therefore, standard RPG II calculation specifications must be used to calculate the L1 totals. The L1 total fields that are written on the DISKSUM file (SOLDQ1, SOLDV1, and VALUE1) must be defined in these calculations.

Example 2

In this example, a group printed report similar to Example 1 is printed using the same file description and input specifications (Figure 15). Figure 17 shows that by not conditioning the T-*AUTC specification, totals are printed for all defined control levels and LR.

FILE DESCRIPTION SPECIFICATIONS



INPUT SPECIFICATIONS

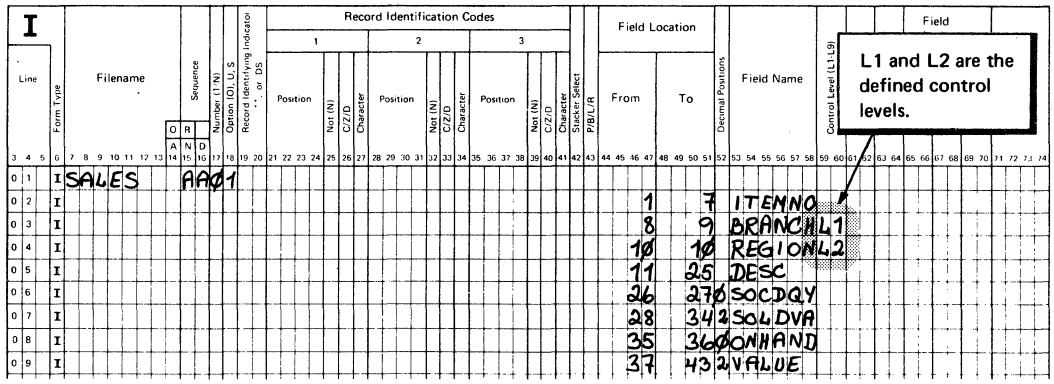
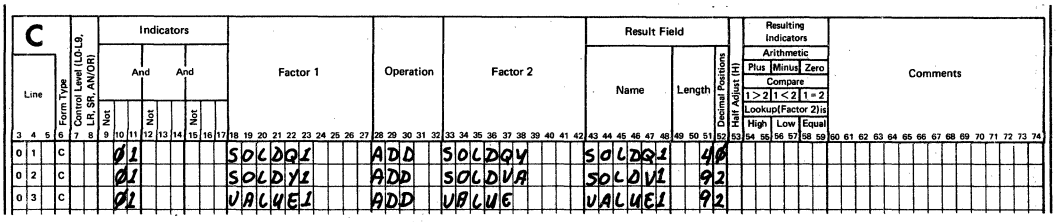


Figure 15. File Description and Input Specifications for the Group Printed Reports in Example 1 and Example 2

CALCULATION SPECIFICATIONS



C	Line	Form Type	Control Level (L0-L9, LR, SR, AN/OR)	Indicators: And	Indicators: And	Factor 1	Operation	Factor 2	Result Field: Name	Result Field: Length	Result Field: Decimal Positions	Half Adjust (H)	Resulting Indicators: Arithmetic: Plus	Minus	Zero	Resulting Indicators: Compare: 1>2	1<2	1=2	Resulting Indicators: Lookup(Factor 2)is: High	Low	Equal	Comments
	01	C		01		SOLDQ1	ADD	SOLDQY	SOLDQ1	40												
	02	C		01		SOLDY1	ADD	SOLDVA	SOLDV1	92												
	03	C		01		VALUE1	ADD	VALUE	VALUE1	92												

OUTPUT SPECIFICATIONS

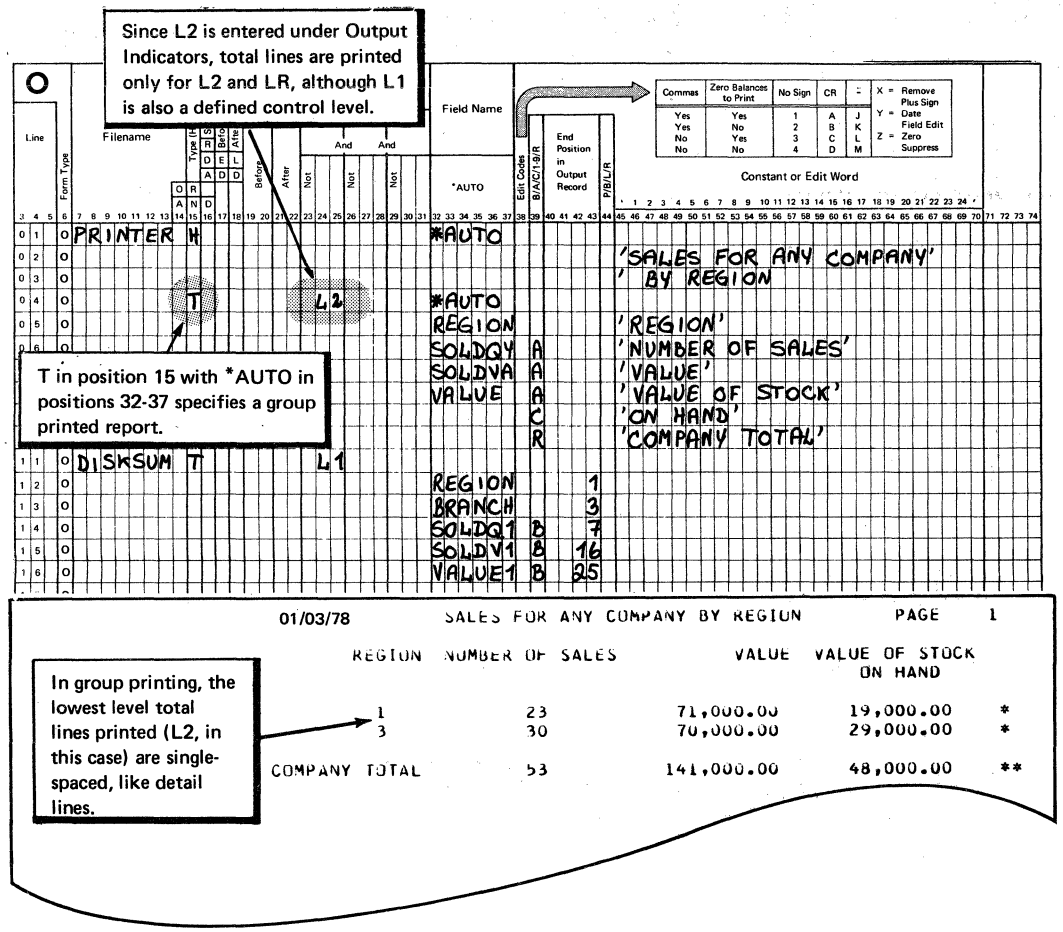


Figure 16. Using *AUTO to Produce a Group Printed Report Showing Region and Final Totals

OUTPUT SPECIFICATIONS

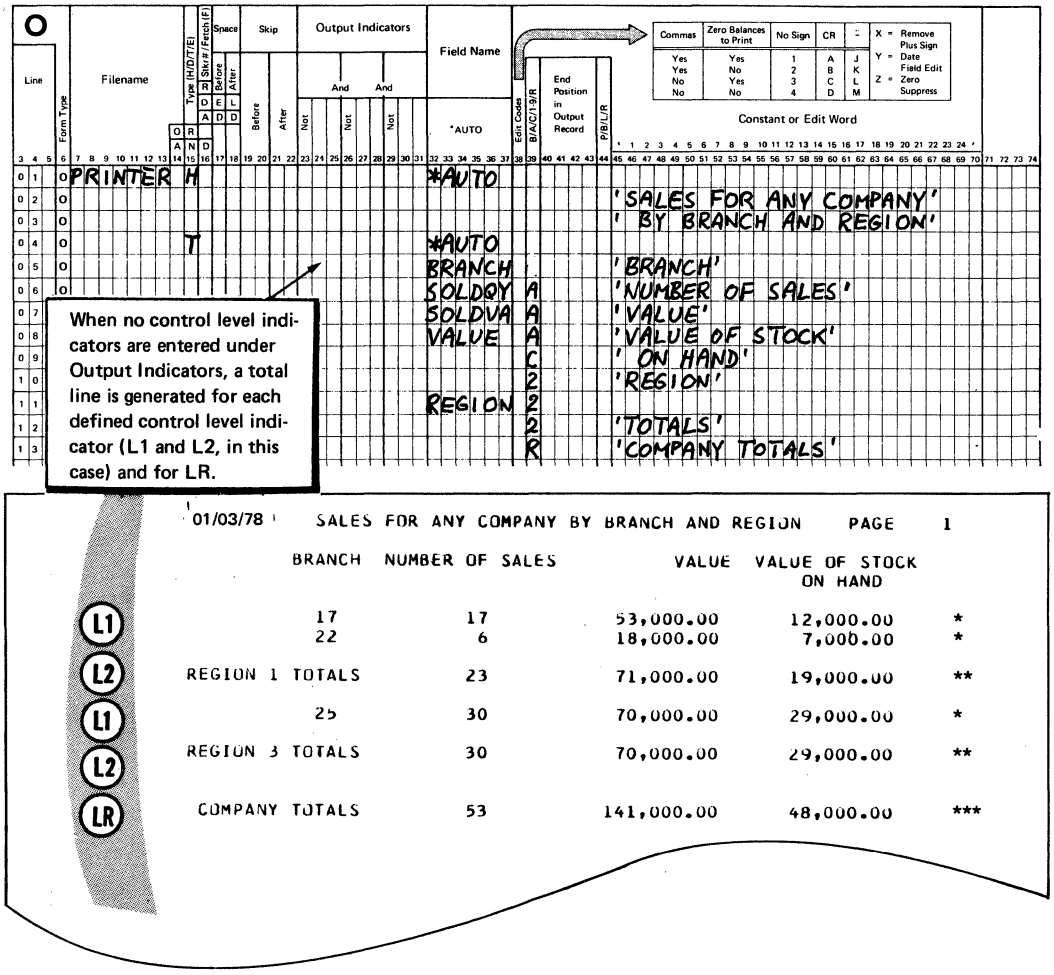


Figure 17. Using *AUTO to Produce a Group Printed Report Showing Branch, Region, and Final Totals

AUTO REPORT COPY SPECIFICATIONS

The Auto Report Copy function provides a way to include cataloged RPG II source specifications into an RPG II program. The source specifications that are included must reside as a source library member on disk. The source library member is created using the DOS/VS librarian functions described in the publication DOS/VS System Management Guide.

Using the Copy function, you can include source specifications that are identical or nearly identical in several different programs and thus reduce the need to repeatedly code specifications that are used in several programs. For example, if file description and input specifications for a particular file are very similar in different programs, these specifications can be placed in a source library member using the Library Maintenance program and included in any program in which the file is used by means of the Copy function.

Auto Report specifications and any valid RPG II specifications, including tables and arrays, can be copied in this manner. The Auto Report Option specification and other Copy statements cannot be copied. See Part I: How to Use RPG II Auto Report for an example of using the Copy function.

The specifications included in an Auto Report program by means of the Copy function are initially placed in the program immediately following the /COPY statement. When all specifications have been copied from the source library, the entire Auto Report program is sorted into the order required by the RPG II compiler (see index entry order of generated specifications).

/COPY STATEMENT SPECIFICATIONS

You request the Copy function by means of a special statement, the /COPY statement, that is included in the Auto Report program. This statement identifies the source library member that contains the RPG II specifications to be included in the RPG II source program generated by Auto Report. /COPY statements must follow the Auto Report Option specification and they must precede source tables and arrays (File Translation tables, Alternate Collating Sequence tables, and compile time tables and arrays). The format of the /COPY statement is:

Position(s)	Entry
1-5	Page and line number indicating the placement of the statement in the sequence of Auto Report source specifications.
6	This position may contain any entry except H or U, or may be blank.
7-11	Enter the characters /COPY.
12	Blank
13-22	x,yyyyyyyy x is the name of the sublibrary containing the source library member to be included. yyyyyyyy is the name, up to eight characters long, of the member to be included.
23-49	Blank

50-80 Enter any information or comments. The contents of these positions are not read by Auto Report.

Figure 18 shows an example of the /COPY statement.

INPUT SPECIFICATIONS

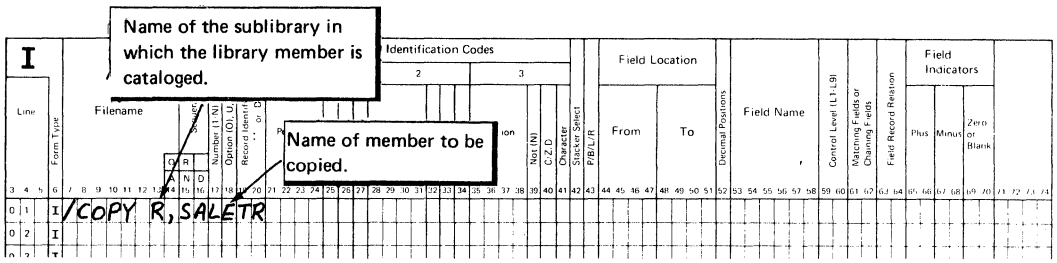


Figure 18. Example of the /CCPY Auto Report Statement

MODIFYING CCPIED SPECIFICATIONS

You can include statements among your Auto Report specifications to modify file description and input field specifications as they are copied from the source library. No other types of specifications can be modified. /COPY modifier statements from the source file which add, change, or delete entries on cataloged input field specifications are identified by an X in position 6 of the Auto Report listing.

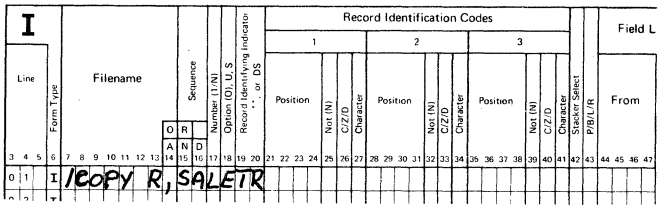
Modifying File Description Specifications

To modify a file description specification that is copied from a source library, enter the filename in positions 7-14 of a file description specification (F in position 6). Then make only those entries on the line which are to replace existing entries in the copied specification or which are to be included as new entries. Blank entries in the modifier statement do not affect the copied statement.

For example, suppose the file description specification for a frequently used file named SALES is to be copied from the source library. The original specification contains an I in File Type (Position 15), defining SALES as an input file (Figure 19, insert A). In a particular program, you want to update the sales file, so you must change position 15 to a U. Therefore, you must include a modifier file description specification (Figure 19, insert B) in the Auto Report source program. The modifier statement must contain the filename, SALES, and the new File Type Entry, U. As a result of the modifier statement, the File Type on the copied file description specification is changed from I to U (Figure 19, insert C).

/COPY statement to copy specifications for SALES file from the source library member named SALETR in sublibrary R.

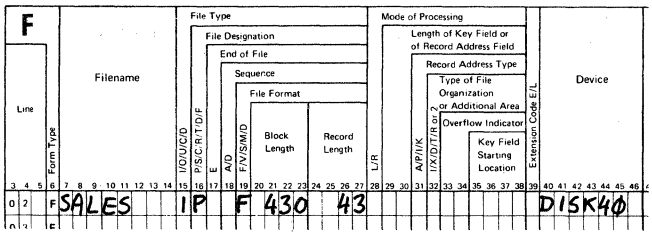
INPUT SPECIFICATIONS



(A)

File description specification as it is cataloged in the source library.

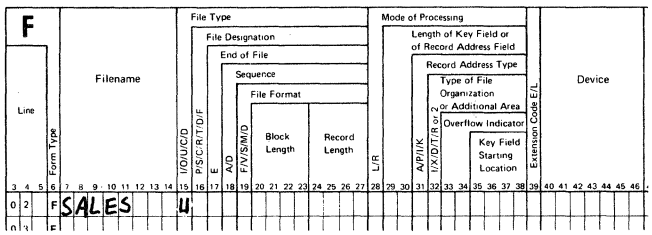
FILE DESCRIPTION SPECIFICATIONS



(B)

Copy function modifier statement.

FILE DESCRIPTION SPECIFICATIONS



(C)

Resulting file description specification that is included in the RPG II source program.

FILE DESCRIPTION SPECIFICATIONS

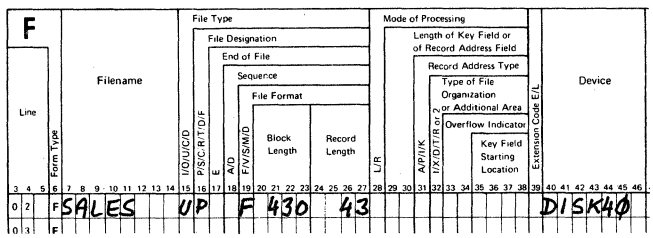


Figure 19. Modifying a Copied File Description Specification

In order to set an entry to blanks, enter an ampersand (&) in the first position of that entry on the modifier statement, and leave the remaining positions blank. For example, in order to remove the Block Length entry (positions 20-23) from the cataloged specification shown in Figure 19, insert A, specify an ampersand in position 20, as shown in Figure 20, and leave positions 21-23 blank.

Modifier statements for file description specifications do not have to be in any particular order in the Auto Report source program, except that they may not immediately follow the /COPY statement if input field specifications are also being modifed.

Only one file description specification with a particular filename is allowed to come from the library members and a particular filename can be used only once on a modifier statement.

No modifications are allowed to the file description continuation specifications that may accompany a copied file description. New continuation specifications can be added by placing them after a file description modifier statement for the file. A maximum of five continuation specifications is allowed to follow a file description specification (combined total of original and added continuation specifications).

Modifying Input Field Specifications

Only input field specifications (specifications describing individual fields on the input record) can be modified. To modify an input field specification copied from the source library, enter the field name in positions 53-58 of an input field modifier statement (I in position 6). Modifier statements for input field specifications must immediately follow the /COPY statement in the Auto Report program that copies those specifications. The first specification following the /COPY statement which is not an input field specification is considered the end of the input field modifier statements for that /COPY statement. (A comment statement with an I in position 6 is not considered the end of the input field modifier statements.)

The method of replacing, adding, or blanking entries is similar to the method used to modify file description specifications. To replace or add entries, code the new entry in the proper location in the modifier statement; to set an entry to blank, place an ampersand (&) in the first position of that entry in the modifier statement. Figure 21 shows examples of modifying input specifications.

The modifier statement modifies all copied input field specifications which have the same field name. If there is no input field by the same name, the modifier statement is added to the program as a new input field specification. Modifier statements with duplicate field names are allowed (length and number of decimal positions must also be the same), but only the first is used to modify a copied specification. Others are added as new input field specifications.

You can include up to 270 input field modifier statements per /COPY statement. If more than the minimum amount of virtual storage is available, more than 270 statements can be accepted.

Note: For best results, place those statements first which modify existing input field specifications; then place those which are to be added as new input field specifications. This procedure is suggested because input field modifier statements which do not fit into the special storage table for modifier statements are added to the RPG II source program as new input field specifications. This order of specifying modifier statements increases the likelihood that excess statements, if any, will be valid field descriptions.

FILE DESCRIPTION SPECIFICATIONS

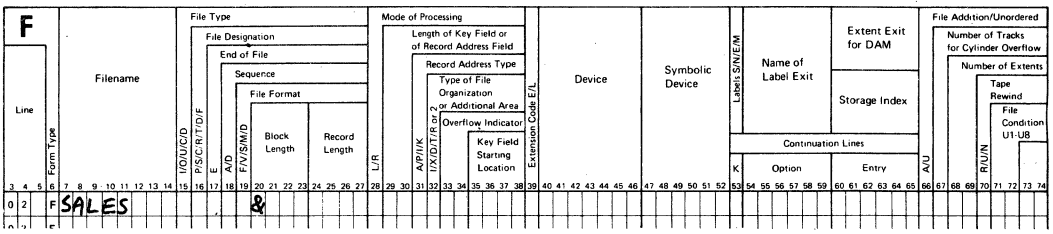
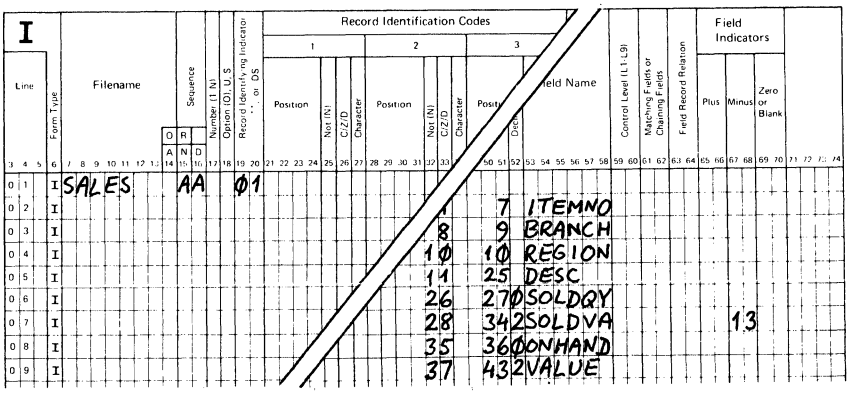


Figure 20. Setting a Copied File Description Entry to Blank

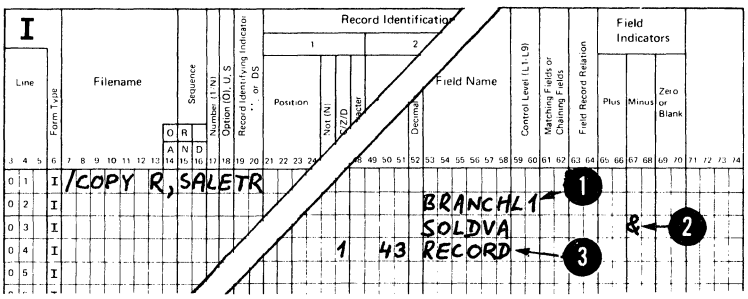
INPUT SPECIFICATIONS



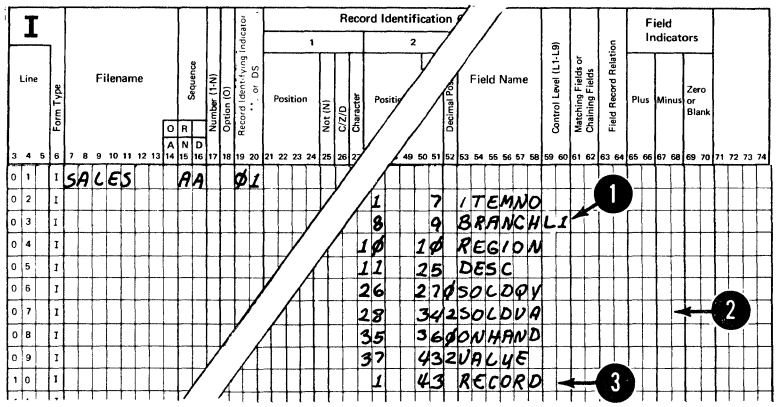
INPUT SPECIFICATIONS

/COPY statement and modifier statements:

1. Add an entry to BRANCH field description.
2. Blank out minus field indicator on SOLDVA description.
3. Add a new field description.



INPUT SPECIFICATIONS



Resulting input specifications for SALES file showing:

1. Added L1 indicator.
2. Blanks in place of minus field indicator.
3. Added field description.

Figure 21. Modifying Copied Input Field Specifications

AUTO REPORT SELECT/SORT SPECIFICATIONS

The Select/Sort function enables you to:

1. Select only those records from a file which you desire to process.

2. Sort a file into a specific sequence before processing it.

3. Select records you desire to process, sort those records, and then process them.

The Select/Sort specifications (Figure 22) are used to specify how you want to process the file. Positions 15-43 describe which records to select for processing from the file and positons 44-52 describe how to sort the records before processing. Individual specifications may contain both select and sort entries. See Part I: How to Use RPG II Auto Report for examples of Select/Sort.

Select/Sort specifications can be placed anywhere within the source program following the Auto Report Option specification and preceding any compile time tables and arrays. Select/Sort specifications may also be copied from a source library member by means of a /COPY statement.

Based on the Select/Sort specifications, Auto Report produces an object module that is link-edited with the RPG II object program. A file description continuation specification is also produced for the generated RPG II source program defining a Read Exit for the file using Select/Sort. The entry point of the Select/Sort object module, RGSORT, appears on the generated Read Exit. (See index entry generated specifications for an example of a generated Read Exit.)

SELECT/SORT SPECIFICATIONS

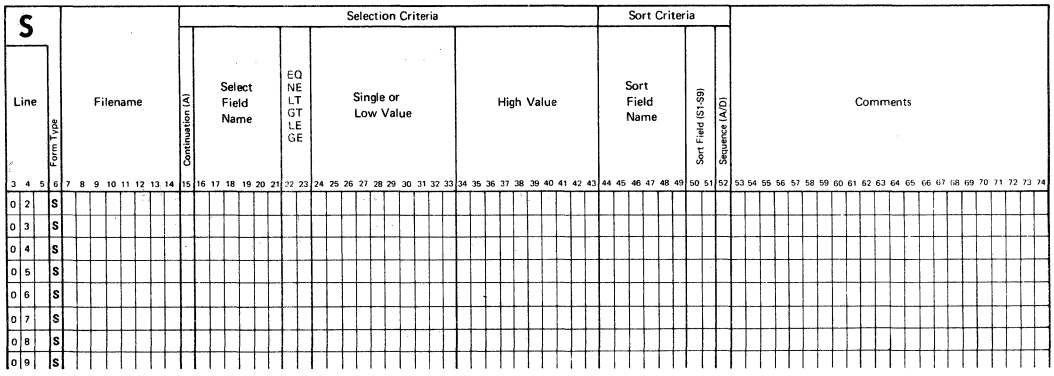


Figure 22. Select/Sort Specifications

POSITICNS 1-14, 53-80

Page and Line Number (1-5)

These entries are coded the same way as in RPG II specifications.

Form Type (6)

Enter an S in position 6 to specify the Select/Sort functicn.

Filename (7-14)

Enter a filename in positions 7-14 to identify the file which is being processed. A spread card file cannot be named in positions 7-14. Rules to follow when specifying a filename are:

1. The filename must be the same as the filename on a file description specification for a primary or secondary file.

2. The filename must be entered on the first Select/Sort specification.

3. Only one file in a program can be used with the Select/Sort function. Therefore, the second and all succeeding Select/Sort specifications must contain either blanks in positions 7-14 or the same filename as in the first specification.

4. The Mode of Processing (position 28) entry on the file description specification must be blank, that is, the file must be sequentially processed, without limits.

Comments (53-74)

You may enter comments in these positions.

Program Identification (75-80)

Code this entry as you would on an RPG specifications form.

SELECTICN CRITERIA (15-43)

Positions 15-43 are used to select specific records from a file for processing. Records can be selected from input, update, or combined files which are defined as primary or secondary files in file description specifications.

Continuation (15)

Entry	Explanation
Blank	1. This specification contains a selection criterion which, if met by an input record, qualifies that record for processing.

2. This specification begins a set of selection criteria that must all be met by a record to be selected for processing.

A This specification continues a set of selection criteria that begins in the last specification which has a blank in position 15.

If you enter more than one selection criterion or set of criteria, they are in an OR relationship. To be selected for processing, a record must meet one of the single selection criteria or sets of criteria. If a record does not meet any of the single selection criteria or sets of criteria, it is bypassed and the next record is read.

Consider, for example, the selection criteria shown in Figure 23 (see index entry example 9 for the complete example from which this illustration is taken). Lines 02 and 03, together, form a set of selection criteria. That is, a record is selected from the employee file (EMPFILE) if years of experience (YRSEXP) and marital status (MARSIN) are as specified in positions 16-43. Lines 04 and 05, together, are a second set of selection criteria. That is, a record can also be selected if years of education (YRSEDC) and marital status are as described in positions 16-43. Only one of the sets of criteria (lines 02 and 03 or lines 04 and 05) need be met to select a record for processing.

SELECT/SORT SPECIFICATIONS

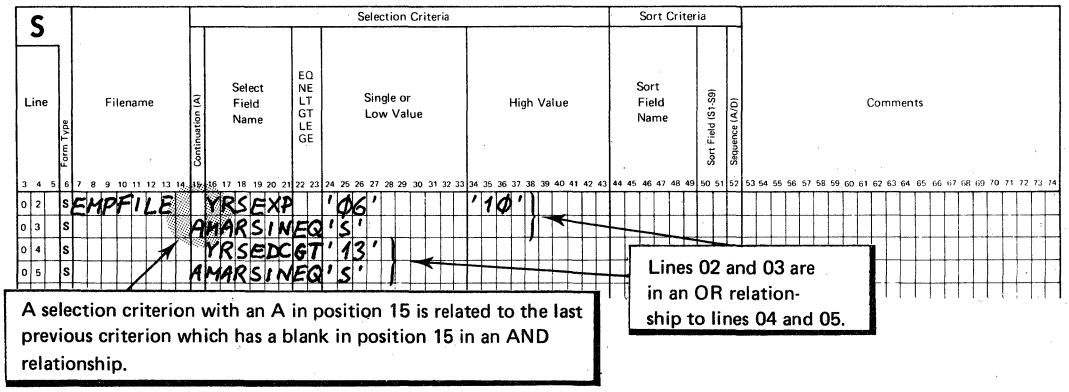


Figure 23. Using Multiple Selection Criteria

Select Field Name (16-21)

The selection process is done by comparing the contents of a field with the criteria specified on the Select/Sort specifications. Enter the name of the field to be tested in positions 16-21.

When specifying a field name, keep two rules in mind:

1. A select field cannot be defined as part of a key on the input specifications (K preceding the Field Location entries).

2. The select field name must be the same as a field name in the input specifications for this file. The first positions defined on input specifications for the field are the positions checked for the selection of records.

Type of Test (22-23)

Entry	Explanation
Blank	The value of the field specified in positions 16-21 must be greater than or equal to the literal specified (or contents of the field named) in positions 24-33; but the field value must be less than or equal to the literal specified (or the contents of the field named) in positions 34-43.
EQ	The value of the select field must be equal to the literal (or contents of the field named) in positions 24-33 for the record to be selected.
NE	The value of the select field must not be equal to the literal (or contents of the field named) in positions 24-33 for the record to be selected.
LT	The value of the select field must be less than the literal (or contents of the field named) in positions 24-33 for the record to be selected.
GT	The value of the select field must be greater than the literal (or contents of the field named) in positions 24-33 for the record to be selected.
LE	The value of the select field must be less than or equal to the literal (or contents of the field named) in positions 24-33 for the record to be selected.
GE	The value of the select field must be greater than or equal to the literal (or contents of the field named) in positions 24-33 for the record to be selected.

Positions 22-23 define the relationship the select field is to have to the numeric or alphameric literal specified or to the field named in positions 24-33 (Single Value). If these positions are blank, the select field must contain a value (or characters) within the range defined by positions 24-33 (Low Value) and positions 34-43 (High Value).

Remember the following points when specifying fields and literals as selection criteria:

- If numeric fields are compared, fields of unequal length are aligned at the implied decimal point. The shorter field is extended with zeros to the left and/or right of the decimal point such that the lengths of the fields are equal for comparison.
- If alphameric fields are compared, fields of unequal length are aligned at their leftmost characters. The shorter field is extended with blank characters to equal the length of the longer field.
- All numeric comparisons are algebraic. A plus value is always greater than a minus value.
- Leading blanks in unpacked numeric fields are assumed to be zeros.
- An alphameric field cannot be compared to a numeric field.
- A table/array name or an array element may not be specified in the selection criteria.
- Figure 23 shows both types of selection tests.

Line 02 shows a range test in which YRSEXP must be greater than or equal to 6, but less than or equal to 10. Lines 03, 04, and 05 are single value tests. The field MARSIN must be equal to the character S and the field YRSEDC must be greater than 13.

Single or Low Value (24-33)

Enter a numeric literal, an alphameric literal, or a field name. If a field name is entered, that field name must be defined in input specifications for the file from which records are being selected. Literals follow the same rules of formation as literals used in RPG II calculation specifications. Entries are left-justified; alphameric literals must be enclosed in apostrophes.

Positons 24-33 must always contain an entry when records are being selected from a file. If this entry is the single value (positions 34-43 are blank), an entry must be made in positions 22-23 to define the relationship between this entry and the Select Field (positions 16-21). If this entry is a low value, positions 22-23 must be blank and positions 34-43 must contain the high value of a range of values the select field may have.

In Figure 23, for example, positions 24-33 contain a single value in lines 03, 04, and 05. In each case, the relationship to the select field is given in positions 22-23 (EQ, GT, EQ, respectively) and positions 34-43 are blank. In line 02, however, positions 24-33 contain the low value (6) and positions 34-43 contain the high value (10) that the select field, YRSEXP, may have.

High Value (34-43)

Enter an alphameric or numeric literal or a field name in positions 34-43 when a range test is being done to determine record selection. The field or literal entered must be the high value of a range of values the Select Field (positions 16-21) may have. Positions 22-23 must be blank when a high value is specified. Positons 24-33 must contain the low value of the range. The same rules for comparing selection criteria with the select field apply to this entry as are given under index entry type of test, positions 22-23.

SORT CRITERIA (44-52)

Positions 44-52 are used to describe how to sort records within a file before processing them. The file to be sorted must be an input file which is defined as a primary or secondary file.

If selection criteria are specified for a file which also has sort criteria, the records to be processed are selected from the file first and then only the selected records are sorted. If no selection criteria are specified, the entire file named in Filename (positions 7-14) is sorted in the order determined by the sort criteria in positions 44-52.

Sort Field Name (44-49)

Enter the name of a field on the input record by which the input file is to be sorted. If the file is to be sorted on the contents of more than one sort field, two or more field names can be entered in these positions on separate specification lines. See index entry sort field, positions 50-51 for an explanation of sorting when two or more sort fields are named.

Remember the following when specifying a sort field name:

1. A sort field cannot be defined as part of a key in input specifications (K in position 44).

2. The sort field must be defined in input specifications. If the field is defined more than once on the input specifications, the first definition of the field defines the location length. Decimal positions are not considered in sorting.

Sort Field (50-51)

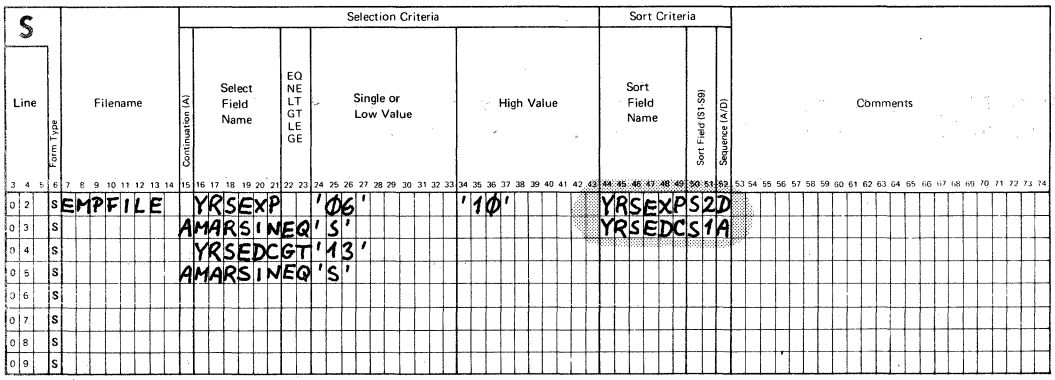
Enter one of the codes S1 through S9 in positions 50-51 for each sort field that is named in positions 44-49. This code indicates the order of significance of the sort field.

If only one sort field is specified, any of the nine sort codes may be entered. If two or more sort fields are specified, a different code must be entered for each. The order of significance of the codes is in descending order, with S9 the most significant, followed by S8, and so forth. A high-numbered code may be used without specifying all lower codes.

The sort field with the highest code is used first to sort the entire file into either ascending or descending sequence. Each group of records for which the contents of that sort field were equal is then sorted according to the contents of the sort field with the second highest code, into either ascending or descending sequence. Groups of records in which the contents of the second sort field are equal are then sorted by the contents of the sort field with the third highest code and so forth, for as many sort fields as are specified.

The specifications for a two field sort are shown in Figure 24. (For a complete example, see index entry example 9.) Fields containing years of experience (YRSEXP) and years of education (YRSEDC) are assigned as S2 and S1 sort fields, respectively. Figure 25 shows the result of these sort specifications. First, the S2 sort field is used to sort the entire file, EMPFILE, into descending sequence. Next, the S1 sort field is used to sort records with equal YRSEXP values into ascending sequence. (See the next paragraph Sequence (52) for a description of ascending and descending sequence specification.)

SELECT/SORT SPECIFICATIONS



S	Line	Form Type	Filename	Selection Criteria: Continuation (A)	Select Field Name	EQ NE LT GT LE GE	Single or Low Value	High Value	Sort Criteria: Sort Field Name	Sort Field (S1 S9)	Sequence (A/D)	Comments
0 2		S	EMPFILE		YRSEXP		'06'	'10'	YRSEXP	S2	D	
0 3		S			AMARSINEQ		'S'		YRSEDC	S1	A	
0 4		S			YRSEDC	GT	'13'					
0 5		S			AMARSINEQ		'S'					
0 6		S										
0 7		S										
0 8		S										
0 9		S										

Figure 24. Specifying Sort Criteria

Sequence (52)

Entry	Explanation
A	The sort field is to be sorted into ascending sequence.
D	The sort field is to be sorted into descending sequence.

If this entry is left blank, ascending sequence is assumed.

	YEARS OF EXPERIENCE	YEARS OF EDUCATION	
The selected records are sorted into descending sequence by years of experience, YRSEXP since that sort field has the highest sort code (S2).	12	16	Within equal years of experience, records are sorted into ascending order by years of education, YRSEDC, the S1 sort field.
	10	14	
	10	14	
	10	17	
	7	14	
	7	16	
	6	14	
	6	14	

Figure 25. Results of Sorting by Two Sort Fields

The RPG II program produced by Auto Report includes RPG II specifications from the following three sources:

1. Those included by the programmer in the Auto Report program (any valid RPG II specifications are allowed).

2. Those copied from a source library using the /COPY statement.

3. Those generated by Auto Report.

The specifications are in the order required by the RPG II compiler. Among the generated specifications are calculations to accumulate totals for the specified fields on the D/T-*AUTO specification. The output specifications generated by Auto Report are also included. These specifications contain the necessary spacing, skipping, and end position entries to produce a formatted report.

FORMAT OF THE GENERATED SPECIFICATIONS

The generated RPG II specifications are in the following format:

Position	Contents
1-4	Sequence number of the specification. This number starts as 0010 on the RPG II control statement and is incremented by 0010 on each specification that follows. If more than 999 specifications are present in the program, the sequence is restarted at 0000.
5	Code that identifies the specification, as follows:
	Blank — A standard RPG II specification present in the Auto Report program.
	C — Specification copied from a source library.
	M — Specification copied from a source library and modified.
	E — Specification generated by Auto Report.
6-74	Standard RPG II specification.
75-80	The same characters as are present in positions 75-80 of the RPG control statement. (If these positions are blank on the RPG control statement, they are also blank on all specifications in the generated RPG II program.)

Compile time tables and arrays are not changed by Auto Report; they remain in standard table/array record format.

GENERATED SPECIFICATIONS

Standard RPG II specifications are generated by Auto Report and are combined with RPG II specifications included in the input to Auto Report and specifications copied from the source library to produce the final

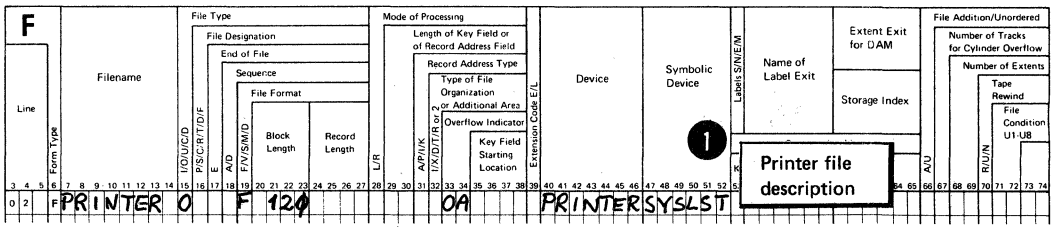
RPG II source program. This section describes the generated RPG II specifications and the order of those specifications in the RPG II source program.

Figures 26 and 27 show Auto Report specifications for a sales report and the resulting RPG II source specifications that are generated for the report. Numbers are inserted in the figures to identify the Auto Report functions and to show the specifications that are generated by each function. The Auto Report specifications in Figure 26 are similar to those under index entry example 6. The file description and input specifications for the SALES file are cataloged in a source library, as in that example. In this example, however, the Select/Sort function is added to produce a sales report that is different from the earlier example (Figure 28).

The Copy function is used to include the specifications for the SALES file (Figure 26, insert 2). Since BRANCH is to be the control field for the sales report, a modifier statement follows the /COPY statement to add a control level indicator to the input specification for the BRANCH field. Figure 27, insert 2, shows the RPG II specifications included in the generated source program as a result of the /COPY statement.

The Select/Sort function is used to select the Region 1 records for the report and to sort the records. The records are sorted into ascending sequence by branch. Within each branch, records are sorted into descending sequence by quantity sold. As a result of the Select/Sort specifications (Figure 26, insert 6), a file description continuation specification containing a Read Exit to the Select/Sort object module is generated by Auto Report for the SALES file description (Figure 27, insert 6).

FILE DESCRIPTION SPECIFICATIONS



INPUT SPECIFICATIONS

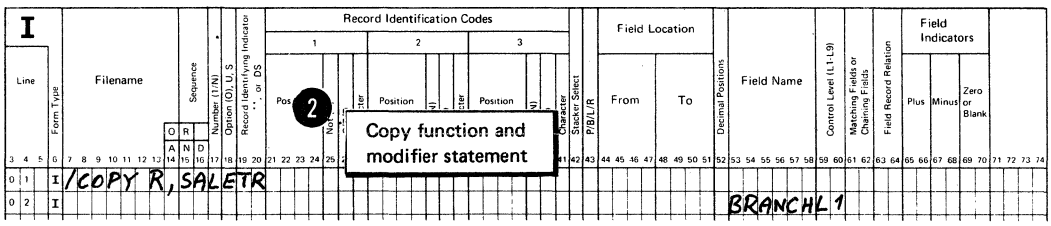
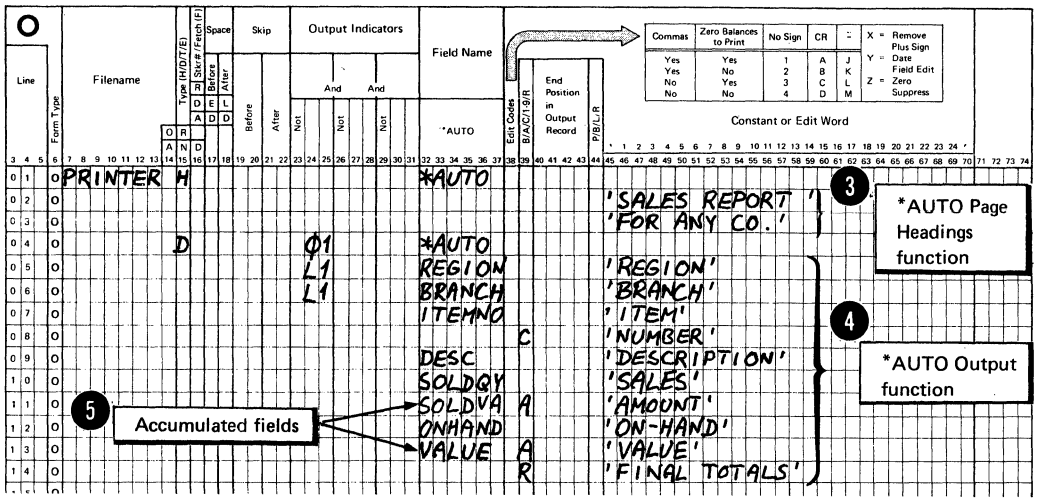


Figure 26 (1 of 2). Auto Report Specifications for a Sales Transaction Report

OUTPUT SPECIFICATIONS



SELECT/SORT SPECIFICATIONS

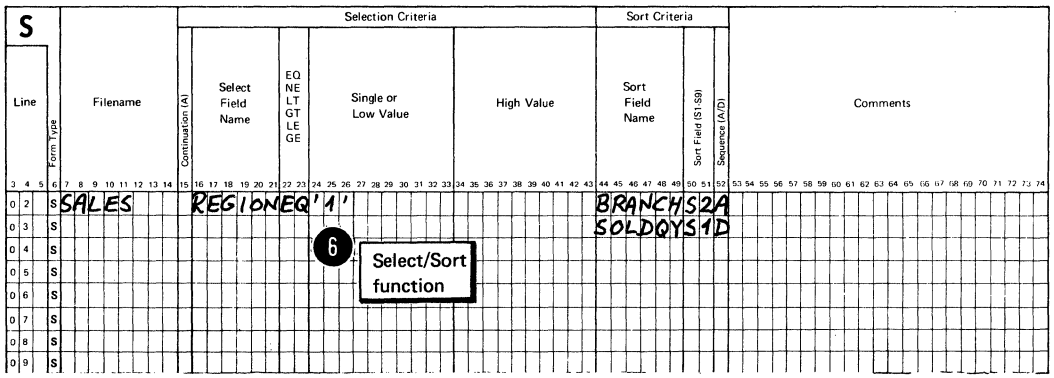
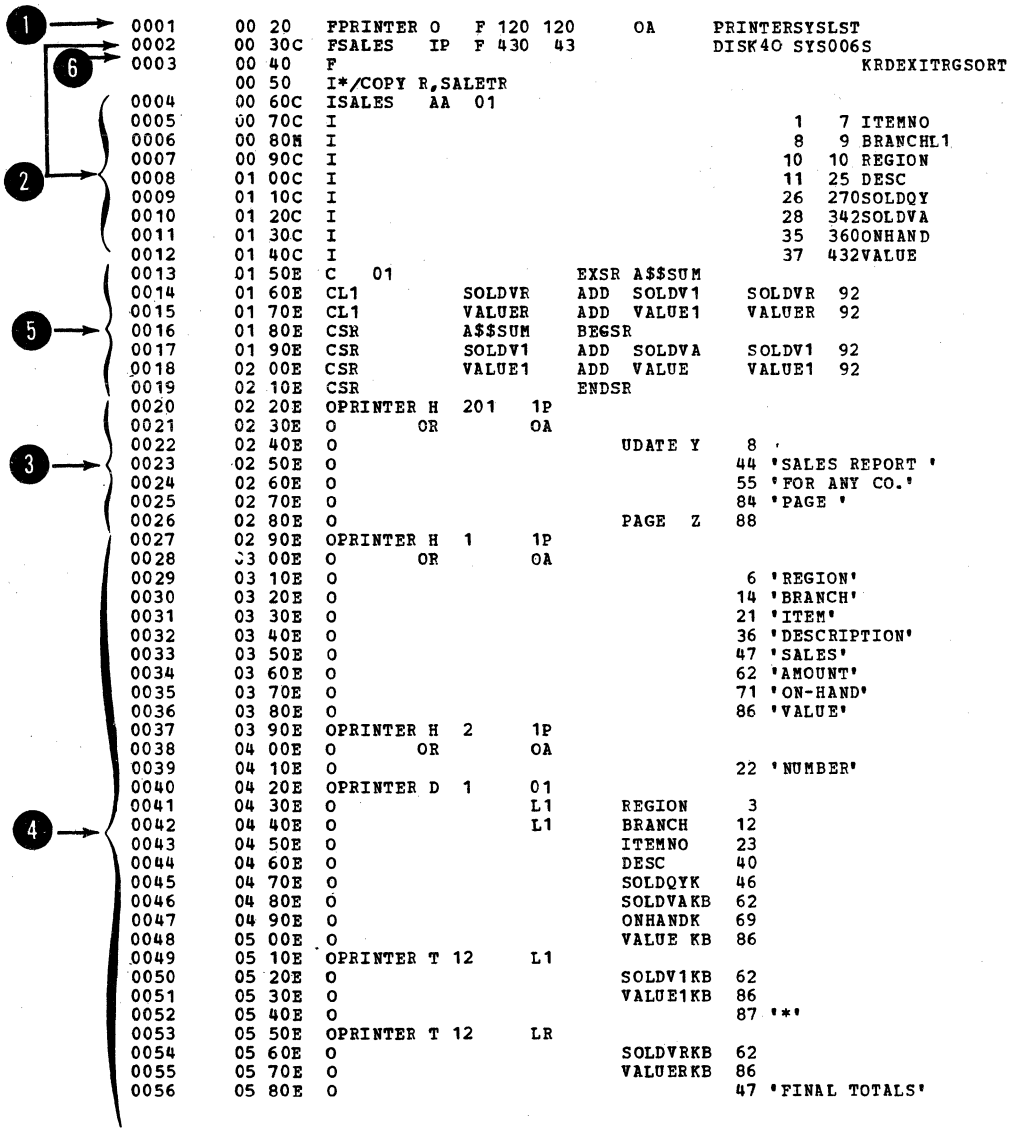


Figure 26 (2 of 2). Auto Report Specifications for a Sales Transaction Report



```
0001     00 20   FPRINTER O   F 120 120      OA     PRINTERSYSLST
0002     00 30C  FSALES   IP  F 430  43             DISK4O SYS006S
0003     00 40   F                                              KRDEXITRGSORT
         00 50   I*/COPY R,SALETR
0004     00 60C  ISALES   AA  01
0005     00 70C  I                                                1   7 ITEMNO
0006     00 80M  I                                                8   9 BRANCHL1
0007     00 90C  I                                               10  10 REGION
0008     01 00C  I                                               11  25 DESC
0009     01 10C  I                                               26 270SOLDQY
0010     01 20C  I                                               28 342SOLDVA
0011     01 30C  I                                               35 360ONHAND
0012     01 40C  I                                               37 432VALUE
0013     01 50E  C   01                EXSR A$$SUM
0014     01 60E  CL1          SOLDVR   ADD  SOLDV1    SOLDVR  92
0015     01 70E  CL1          VALUER   ADD  VALUE1    VALUER  92
0016     01 80E  CSR          A$$SUM   BEGSR
0017     01 90E  CSR          SOLDV1   ADD  SOLDVA    SOLDV1  92
0018     02 00E  CSR          VALUE1   ADD  VALUE     VALUE1  92
0019     02 10E  CSR                   ENDSR
0020     02 20E  OPRINTER H   201   1P
0021     02 30E  O        OR         OA
0022     02 40E  O                            UDATE Y    8 '
0023     02 50E  O                                      44 'SALES REPORT '
0024     02 60E  O                                      55 'FOR ANY CO.'
0025     02 70E  O                                      84 'PAGE '
0026     02 80E  O                            PAGE  Z   88
0027     02 90E  OPRINTER H   1     1P
0028     03 00E  O        OR         OA
0029     03 10E  O                                       6 'REGION'
0030     03 20E  O                                      14 'BRANCH'
0031     03 30E  O                                      21 'ITEM'
0032     03 40E  O                                      36 'DESCRIPTION'
0033     03 50E  O                                      47 'SALES'
0034     03 60E  O                                      62 'AMOUNT'
0035     03 70E  O                                      71 'ON-HAND'
0036     03 80E  O                                      86 'VALUE'
0037     03 90E  OPRINTER H   2     1P
0038     04 00E  O        OR         OA
0039     04 10E  O                                      22 'NUMBER'
0040     04 20E  OPRINTER D   1     01
0041     04 30E  O                   L1       REGION     3
0042     04 40E  O                   L1       BRANCH    12
0043     04 50E  O                            ITEMNO    23
0044     04 60E  O                            DESC      40
0045     04 70E  O                            SOLDQYK   46
0046     04 80E  O                            SOLDVAKB  62
0047     04 90E  O                            ONHANDK   69
0048     05 00E  O                            VALUE KB  86
0049     05 10E  OPRINTER T 12      L1
0050     05 20E  O                            SOLDV1KB  62
0051     05 30E  O                            VALUE1KB  86
0052     05 40E  O                                      87 '*'
0053     05 50E  OPRINTER T 12      LR
0054     05 60E  O                            SOLDVRKB  62
0055     05 70E  O                            VALUERKB  86
0056     05 80E  O                                      47 'FINAL TOTALS'
```

Note: If you do not specify a header statement, Auto Report generates a blank header statement for you. The header statement appears on the page preceding the listing of generated specifications.

Figure 27. RPG II Source Program Generated from Auto Report Specifications

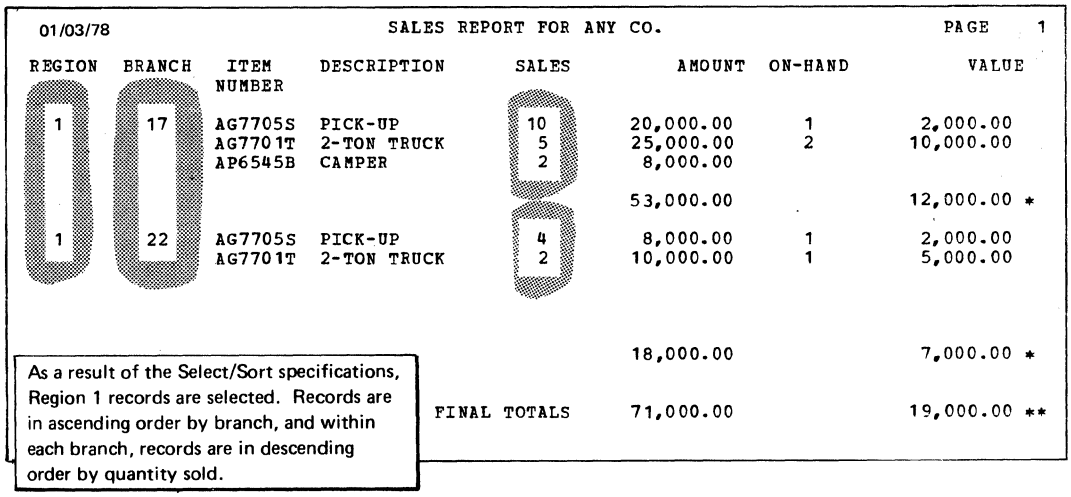


Figure 28. Report Produced Using Auto Report Functions

Generated Calculations

Calculations are generated to accumulate totals for fields named on *AUTO field description specifications which have an A in position 39 (Figure 29).

An RPG II subroutine is generated to accumulate the values from these fields into the lowest level generated total fields. The name of the subroutine is always A$$SUM. The subroutine specifications are conditioned differently, depending on whether detail or group printing is specified:

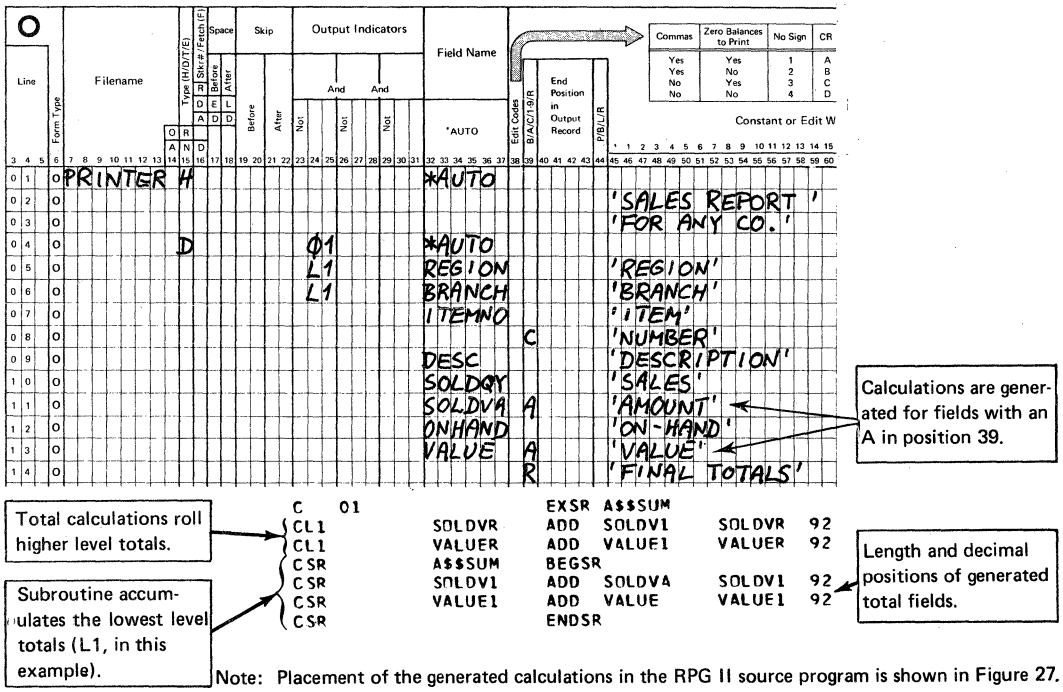
1. If detail printing is specified, as in Figure 29, the EXSR statement is conditioned by the same indicator(s) that condition(s) the D-*AUTO specification (01, in this example). Each ADD statement in the subroutine is conditioned by the field indicator(s) specified with the field in its field description specification (none, in this example).

2. If group printing had been specified, the EXSR statement and all ADD statements in the subroutine would have been unconditioned.

Total calculations are generated to roll the total from the lowest level defined total field through the higher level defined total fields and the final total. The total calculation to add the total from one level to that of the next higher level is conditioned by the control level indicator corresponding to the field name of the lower level. As shown in Figure 29, total calculations to accumulate IR totals are followed by the subroutine to accumulate the lowest level total, L1.

Generated total fields are defined (given length and number of decimal positions) when the total field is used as the result field in a generated calculation. In the input specifications, SOLDVA and VALUE are numeric fields defined with a length of 7 and two decimal positions. Figure 29 shows that the total fields generated from SOLDVA and VALUE are defined as two positions longer than the original fields, with the same number of decimal positions.

OUTPUT SPECIFICATIONS



Note: Placement of the generated calculations in the RPG II source program is shown in Figure 27.

Figure 29. Calculations Generated from Auto Report Coding for Sales Transaction Report

When group printing is specified (T-*AUTO specification), Auto Report generates total calculations to reset each of the accumulated fields (A in position 39) on the lowest level total line to zero on each cycle. A (Z-ADD) calculation, conditioned by L0, is generated for each accumulated field. These calculations are the first total calculations in the generated RPG II source program.

Generated Output Specifications

Figure 30 shows the output specifications generated by Auto Report. Specifications supplied by Auto Report (column heading specifications, total specifications, conditioning indicators, spacing and skipping values, end position values, blank after) can be identified by comparing the listing with the Auto Report specifications.

Auto Report generates specifications to reset accumulated fields to zero after they are printed. See index entry field description (A in position 39) for a discussion of resetting fields to zero. In this example, blank after is generated for accumulated fields.

Order of Generated Specifications

The specifications in the RPG II source program generated by Auto Report are in the order required by the RPG II compiler. When specifications are included by means of a /COPY statement, those specifications are initially placed immediately after the /COPY statement. After all

specifications have been copied and before Auto Report generates RPG II specifications from the H-*AUTO and D/T-*AUTO specifications, the entire Auto Report source program is sorted into the following order:

1. Header Specifications
2. File Description Specifications
3. Extension Specifications
4. Line Counter Specifications
5. Input Specifications
6. Calculation Specifications
7. Output Specifications
8. Tables and arrays loaded at compile time (must be placed last among the input statements to Auto Report).

Calculation Specifications: Generated RPG II calculation specifications are placed in the following order by Auto Report:

1. Detail calculations specified by the programmer.
2. EXSR statement for the generated subroutine.
3. Total calculations generated by Auto Report, grouped in order by level (all L0 calculations, then all L1 calculations, and so forth).
4. Total calculations specified by the programmer.
5. Subroutines specified by the programmer.
6. Generated RPG II subroutine which accumulates the lowest level total.

Output Specifications: Output heading specifications generated for H-*AUTO specifications appear in the same order they are coded on the Output sheet in relation to other RPG II and *AUTO output specifications for the file.

Normally, RPG II output specifications generated from a D/T-*AUTO specification are in the following order:

1. Heading specifications generated for column headings.
2. Detail specifications.
3. Total specifications, with the lowest level first and LR last.

This group of specifications is placed in the same relative position in the program as the original D/T-*AUTO specification. All other RPG II output specifications remain in their original order.

If, however, the programmer specifies a normal RPG II total output specification conditioned by a positive (no N in position 23) control level indicator in positions 24-25 for the file which has a D/T-*AUTO specification, all output specifications in the program are sorted into the following format:

1. All heading, detail, and exception output specifications. They remain in the same order as they are in the generated RPG II source program. Total specifications which are not conditioned by a positive control level indicator in positions 24-25 remain as they were in the program.

2. Total specifications which are conditioned by a positive control level indicator in positions 24-25. These specifications are sorted into ascending order by the control level indicator in positions 24-25, with LR last.

See Figure 27 and Part II: Sample Program for examples of the ordering of generated specifications.

Comment Statements: Comment statements (identified by an asterisk in position 7) are allowed among the statements read by Auto Report. However, since the sort of RPG II specifications is based on the contents of position 6, comments may not occur in the expected order. To ensure that comments remain with the correct specifications, place them immediately after that specification and on the same specifications form.

Restriction: The order of tables and arrays is not altered when the source specifications are sorted. However, when you include tables and arrays from a source library, they may not occur in the correct order after the sort. For example, if a File Translation or Alternate Collating Sequence table is present in the Auto Report source file, any compile time tables or arrays included from a source library member are out of order. That is, the included tables or arrays are placed ahead of the File Translation table. Recall that compile time tables and arrays must be loaded in the following order:

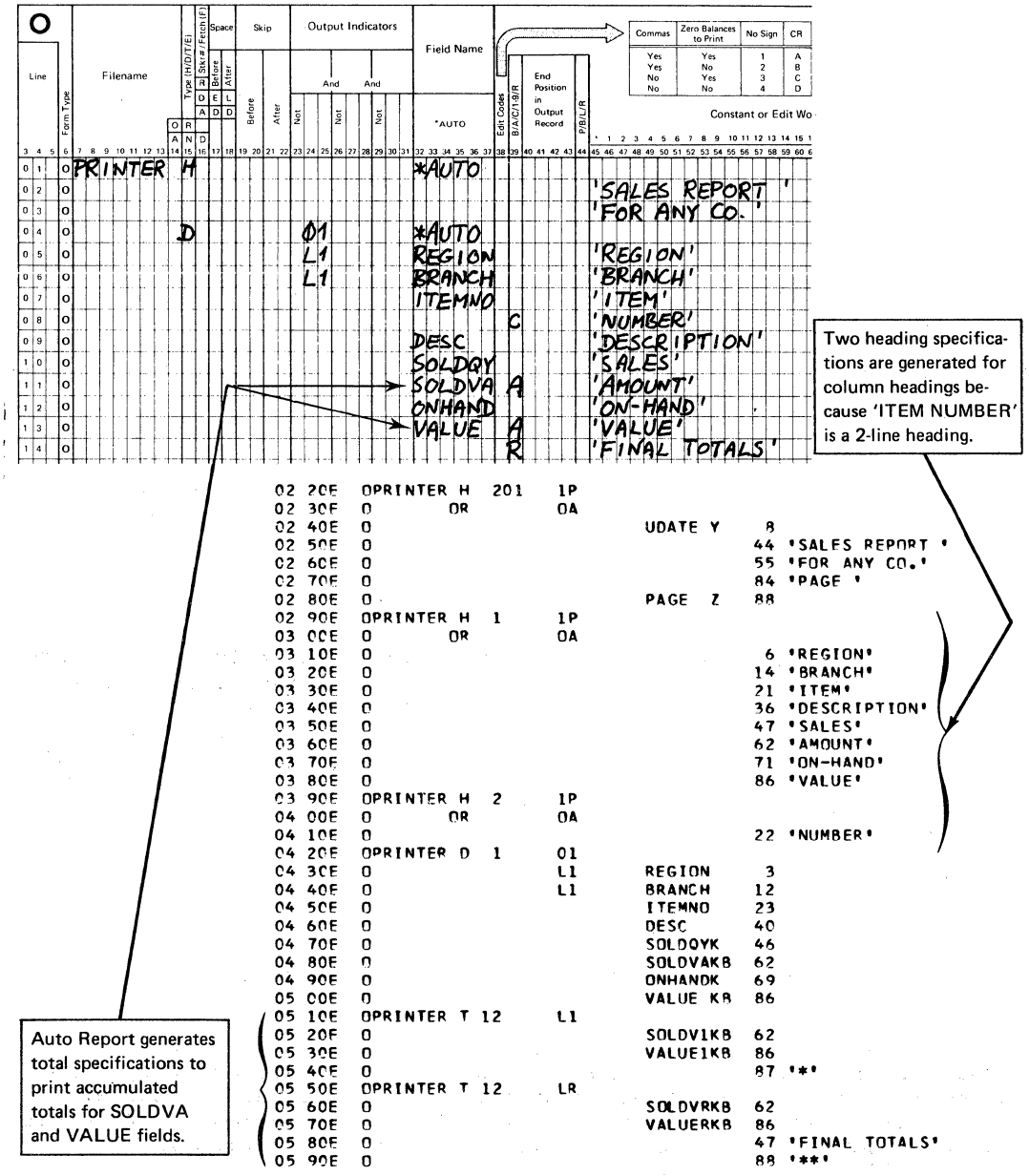
1. File Translation Specifications

2. Alternate Collating Sequence Specifications

3. Compile time tables and arrays in the order described on the Extension sheet.

A solution to this restriction is to place your File Translation and Alternate Collating Sequence tables in a source library and copy them from the library before any other compile time tables and arrays are copied. This procedure ensures that your File Translation and Alternate Collating Sequence tables are the first compile time tables in the generated RPG II source program.

OUTPUT SPECIFICATIONS




```
02 20E  OPRINTER H  201    1P
02 30E  O        OR        OA
02 40E  O                          UDATE Y     8
02 50E  O                                     44 'SALES REPORT '
02 60E  O                                     55 'FOR ANY CO.'
02 70E  O                                     84 'PAGE '
02 80E  O                          PAGE  Z     88
02 90E  OPRINTER H  1      1P
03 00E  O        OR        OA
03 10E  O                                      6 'REGION'
03 20E  O                                     14 'BRANCH'
03 30E  O                                     21 'ITEM'
03 40E  O                                     36 'DESCRIPTION'
03 50E  O                                     47 'SALES'
03 60E  O                                     62 'AMOUNT'
03 70E  O                                     71 'ON-HAND'
03 80E  O                                     86 'VALUE'
03 90E  OPRINTER H  2      1P
04 00E  O        OR        OA
04 10E  O                                     22 'NUMBER'
04 20E  OPRINTER D  1      01
04 30E  O                  L1      REGION      3
04 40E  O                  L1      BRANCH     12
04 50E  O                          ITEMNO     23
04 60E  O                          DESC       40
04 70E  O                          SOLDQYK    46
04 80E  O                          SOLDVAKB   62
04 90E  O                          ONHANDK    69
05 00E  O                          VALUE KB   86
05 10E  OPRINTER T 12      L1
05 20E  O                          SOLDV1KB   62
05 30E  O                          VALUE1KB   86
05 40E  O                                     87 '*'
05 50E  OPRINTER T 12      LR
05 60E  O                          SOLDVRKB   62
05 70E  O                          VALUERKB   86
05 80E  O                                     47 'FINAL TOTALS'
05 90E  O                                     88 '**'
```

Figure 30. Output Specifications Generated from Auto Report Coding for Sales Transaction Report

REPORT FORMAT

One of the advantages of Auto Report is that it frees the programmer from the task of specifying the format of his report on the Output sheet. Auto Report can completely format the report by spacing, skipping, centering lines, and calculating end positions for fields and literals.

SPACING AND SKIPPING

Spacing and skipping can be either left to Auto Report or specified by the programmer. Figure 31 shows spacing and skipping generated by Auto Report. For the specifications used to produce the report, see index entry generated RPG II program.

If Space/Skip (positions 17-22) are left blank on an H-*AUTO specification, a skip to channel 1 is done before the first heading line is printed and space-two-after is done for the last heading line. If more than one heading line is specified, space-one-after is done for the first and all succeeding lines except the last. If the programmer specifies spacing and skipping entries, he must follow normal RPG II rules for spacing and skipping.

Column heading lines are spaced like page headings. Space-one-after is done for all except the last. Space-two-after is done for a single heading line, or for the last heading line if more than one is specified. The programmer cannot specify his own spacing and skipping entries for column headings.

If spacing and skipping entries are made on a D-*AUTO record description specification, the entries apply to the detail line generated. The entries do not apply to column headings or total lines generated by Auto Report from the D-*AUTO specification. Normal RPG II rules for spacing and skipping must be followed. Space-one-after is assumed for the generated detail line if spacing and skipping entries are not made.

Space-two-after is generated for all total lines produced by Auto Report from a D-*AUTO specification. In addition, the lowest level total line and the final total line are also generated with a space-one-before.

If spacing and skipping entries are made on a T-*AUTO specification, the entries apply to the lowest level total line generated, but not to column headings or higher level total lines. If spacing and skipping are not made, the lowest level total lines are generated with space-one-after; all higher levels are generated with space-two-after. Space-one-before is always generated for the second-to-the-lowest level total and the final total. (See Figure 17 for an example.)

PLACEMENT OF HEADINGS AND FIELDS

Auto Report generates end positions for fields and literals and centers column headings, columns, and report lines (see Figure 31 for an example). However, if the programmer specifies an end position for a field or literal on a D/T-*AUTO field description line, that end position is used on all column heading, detail, and total specifications generated from the field description. (The specified end position may be altered slightly by Auto Report when the line is centered or when the column heading and field are positioned in relation to each other.) If

the specified end position causes an overlap with a previous field or literal, Auto Report generates a new end position.

Specify end positions only when you want to eliminate the automatic spacing between fields or when you want to spread out or expand a report on the page.

Page Headings

If the date and page number are printed on the first *AUTO page heading line (that is, if they are not suppressed by an N in position 27 of the Option specification) the date is always printed in positions 1-8. The page number is printed with an end position equal to the highest end position of the longest line in the report. When the first *AUTO page heading (including date, title, and page number) is the longest line in the report, one blank space separates the title from the date and the word PAGE from the title. If the resulting line exceeds the record length of the printer file, the excess information on the right of the line is not printed.

If a line generated from a D/T-*AUTO specification is the longest report line, that line is printed starting in print position 1, and the title portion of the first page heading line is centered in relation to that line. Additional *AUTO page headings are then centered on the first *AUTO page heading line.

If an *AUTO page heading is the longest line in the report and a D/T-*AUTO specification is present, any other *AUTO page heading lines and the line generated from the D/T-*AUTO specification are centered on the longest page heading.

Fields and constants appear in the order specified in the *AUTO output specifications, from left to right. Auto Report provides one blank space before and after fields on the heading line. No spacing is provided between literals.

Reformatting *AUTO Page Headings: You can reformat an *AUTO page heading line if you do not want to use the end positions for fields and constants that are generated by Auto Report. Obtain a punched deck of the generated source program and modify the end positions on the appropriate heading field descriptions. You can obtain a punched deck by specifying a P in position 7 (Source) of the Auto Report Option specification or by means of the DOS/VS OPTION statement, OPTION DECK. (See index entry, source (7), for detailed instructions for obtaining a punched deck. See index entry control statement considerations for a discussion of the OPTION statement.)

If you want to know what end positions are generated for page, date, and title information, see the listing of the generated source program that is produced by the RPG II compiler (see index entry generated specifications).

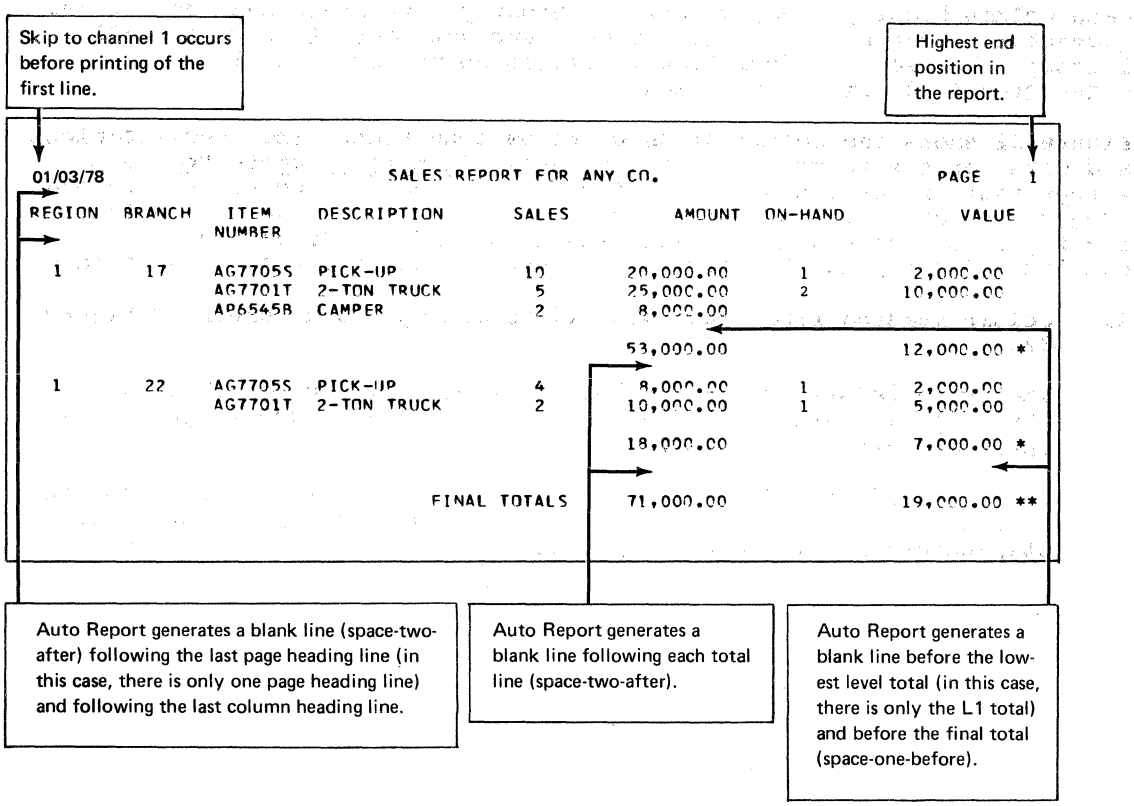


Figure 31. Report Illustrating Format Generated by Auto Report

Body of the Report

Placement of column headings above columns depends on which is longer, the heading or the associated field (including edit characters). If any of the column headings is longer than the associated field, the field is centered under the longest column heading literal. If, however, the field is longer than the longest column heading literal, the column heading is left-justified over an alphameric field and right-justified over a numeric field. When more than one column heading line is specified, shorter column headings are always centered on the longest.

Fields and literals appear from left to right on a line in the order they are specified on the output specifications. At least two blank spaces appear before each field on the line. However, no spaces are provided before a literal; the programmer must incorporate blanks within literals to provide for additional spacing.

Total indication information (fields and literals specified with 1-9 or R in position 39) is placed to the left of the first total field (A in position 39) on the corresponding total line, followed by two spaces. If two or more such fields or literals are specified for a total line, they appear from left to right in the order specified on the left of the first total on the line. Each field is preceded and followed by one space. No spacing is provided for literals.

Overflow of the D/T-*AUTO Print Lines: If the lines generated from a D/T-*AUTO specification are longer than the record length specified for the printer file, a second print line (overflow line) is generated for

each column heading line, detail (or group print) line, and total line. (Remember, a second print line is not generated for *AUTO page heading lines.) The excess information is placed on the overflow line in the order specified, right-justified.

Figure 32 shows the result of an overflow condition. The specifications and data for the report are the same as in Part II: Sample Program, except that the Select/Sort function is not used and the printer record length has been reduced from 132 to 96. In the output specifications for Figure 32, no spacing or skipping is specified. If you specify spacing and skipping, however, Auto Report spaces the report as follows:

1. Column heading lines and total lines are spaced as shown in Figure 32.

2. The space-before and skip-before entries you specify are used for the original detail (or group print) line. Auto Report generates space-one-after for this line.

3. The space-after and skip-after entries you specify are used for the overflow line. Auto Report generates blanks for space-before and skip-before for the overflow line.

Figure 32. Report Illustrating Overflow of D-*AUTO Print Lines

01/03/78 CASH RECEIPTS REGISTER PAGE 1

REGION	ACCOUNT NUMBER	ACCOUNT NAME	INVOICE NUMBER	INVOICE DATE	DATE PAID / AMOUNT PAID	AMOUNT OWED / BALANCE DUE	DISCOUNT TAKEN / EXCESS DISCOUNT	
1	11243	JONES HARDWARE	27541	7/11/76	7/21/6	23.75	.47	
					23.28			
1	11352	NU-STYLE CLOTHIERS	27987	7/14/76	7/26/6	87.07		
					40.00	47.07		
1	11886	MIDI FASHIONS INC	15771	7/04/76	7/14/6	107.22	2.14	
					105.08			
1	12874	OLOOK INTERIORS	25622	7/09/76	7/23/6	67.95		
					67.95			
1	18274	STREAMLINE PAPER INC	29703	7/21/76	7/30/6	274.03	2.38	
					170.55	101.10		
						560.02	4.99	
					406.86	148.17		*
2	23347	RITE-BEST PENS CO	20842	7/18/76	7/20/6	15.80		
					10.00	5.80		
2	25521	IMPORTS OF NM	29273	7/20/76	7/27/6	797.40	11.93	
					585.47	200.00		
2	26723	ALRIGHT CLEANERS	19473	7/07/76	7/23/6	462.00		
					462.00			
2	28622	NORTH CENTRAL SUPPLY	17816	7/05/76	7/22/6	75.97		
					75.97			
2	29871	FERGUSON DEALERS	27229	7/10/76	7/22/6	61.91		
					61.91			
						1,413.08	11.93	
					1,195.35	205.80		*
3	30755	FASTWAY AIRLINES	26158	7/06/76	7/19/6	742.72	16.85	
					725.87		1.90	
3	31275	ENVIRONMENT CONCERNS	20451	7/06/76	7/30/6	29.43		
					15.00	14.43		
3	32457	B SOLE SILOS	27425	7/10/76	7/20/6	110.05		
					110.05			
3	37945	HOFFTA BREAKS INC	18276	7/06/76	7/23/6	47.23		
					47.23			
						929.43	16.85	
					898.15	14.43	1.90	*
4	42622	EASTLAKE GRAVEL CO	16429	7/05/76	7/23/6	29.37		
					29.37			
						29.37		
					29.37			*
						2,931.90	33.77	
					2,529.73	368.40	1.90	**

Auto Report prints those columns that cannot be completely contained on the original line on overflow lines.

PROCESSING AN AUTO REPORT PROGRAM

Explanation of the compilation, link-editing, and execution steps in the processing of a program can be found in the publication DOS/VS System Management Guide.

Auto Report requires the same three processing steps and an additional processing step: execution of Auto Report prior to compilation. However, since Auto Report calls the RPG II compiler when it has completed generation of the RPG II source program, no job control statements are required in the job stream for the compiler. That is, the Auto Report processing step and the process of compilation are combined into a single job step (step A, as illustrated in Figure 33).

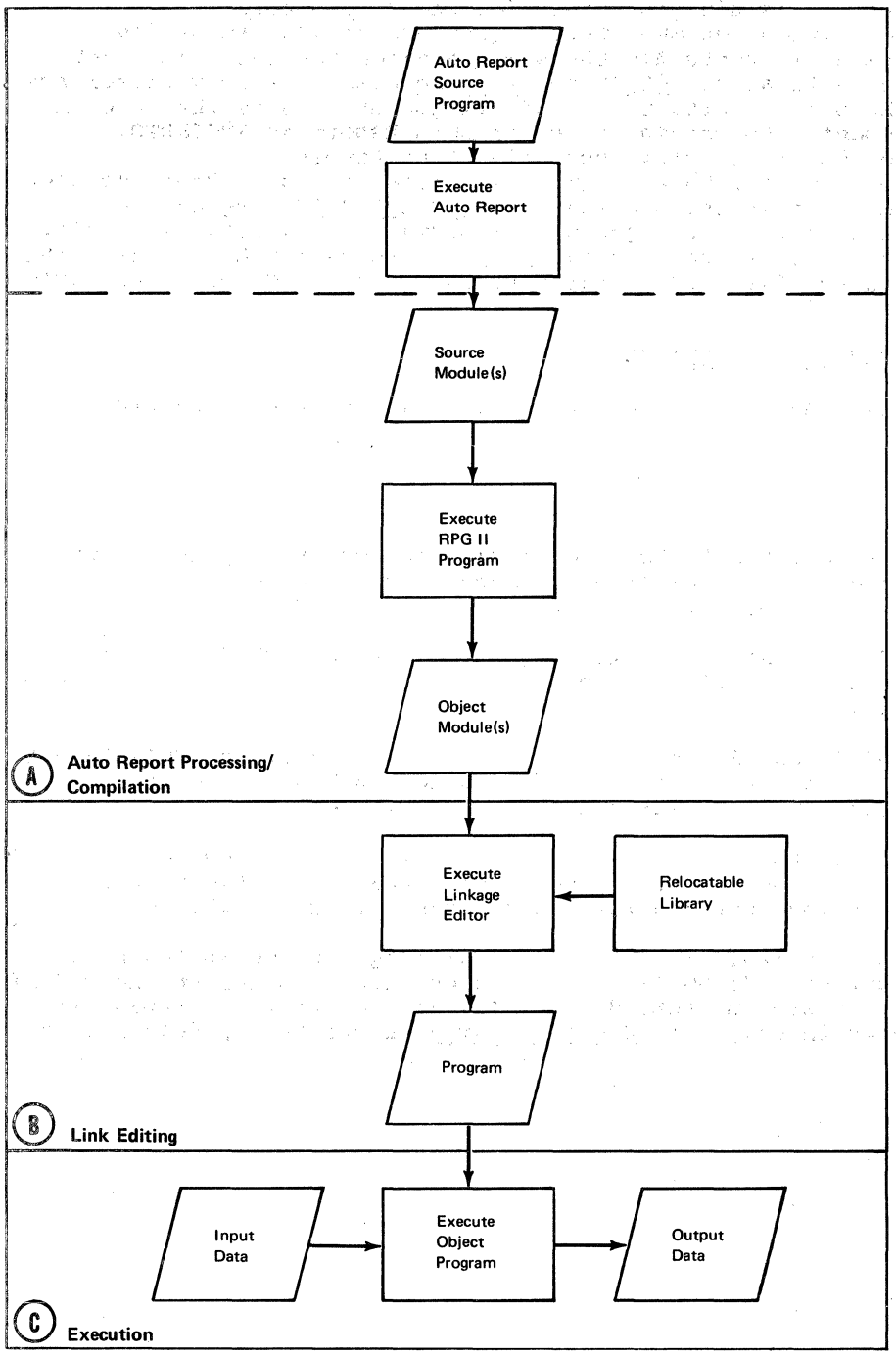


Figure 33. Processing of Auto Report Programs

Figure 34 shows the sample job stream for the Auto Report processing/compilation job step only. (The assumptions regarding symbolic device assignments are the same as given for the sample job streams in the publication DOS/VS RPG II Language.) The only difference between Auto Report job streams and RPG II job streams is the name on the EXEC statement; the program name for Auto Report is RPGIAUTO. Figure 34 shows how to specify successive Auto Report processing/compilations, thereby producing more than one object module. The job stream shown in the publication DOS/VS RPG II Language for compile and link-edit and the job stream shown for compile, link-edit, and execute can also be used for Auto Report processing by changing the program name on the first EXEC statement in the job streams to RPGIAUTO.

CONTROL STATEMENT CONSIDERATIONS

All control statements used with RPG II can also be used with RPG II Auto Report.

OPTION Statement

The OPTION statement can be used to specify job control options. When OPTION DECK is used, the Select/Sort object module is punched. After the compilation, the RPG II object program is also punched.

If OPTION LINK or CATAL is specified, the Select/Sort object module (RGSORT) is written on SYSLNK prior to compilation of the generated RPG II source program.

OPTION LINK, DECK can also be specified. In this case, the Select/Sort object module is placed on SYSLNK and is also punched. After the compilation, the RPG II object module is not punched.

The RPG II source program produced by Auto Report is punched only if a P is entered in position 7 of the Auto Report Option Specifications. The OPTION statement does not control the punching of this deck.

The Auto Report listing, like the RPG II listing, is controlled by the LIST/NOLIST options. If NOLIST is specified, the Auto Report and RPG II compiler listings are suppressed. If LIST is specified, a listing in the format shown in Part II: Sample Program is printed by Auto Report.

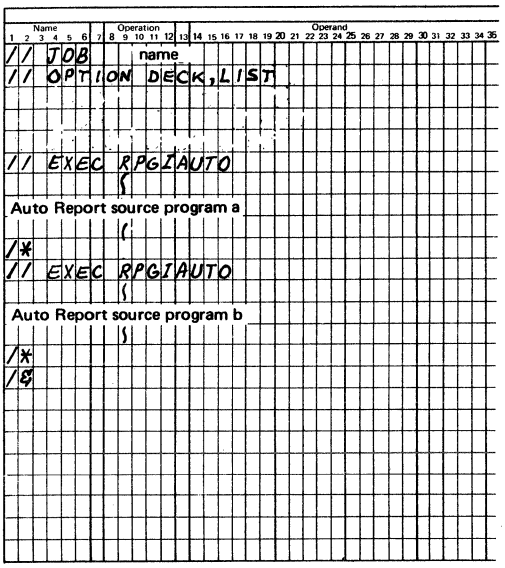


Figure 34. Compiling Two Programs that Use Auto Report

APPENDIX

The following chart should be helpful in determining valid *AUTO Output entries depending on the contents of position 39:

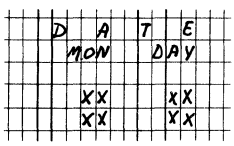
39	7-22	23-31	32-37	38	40-43	44	45-70
Blank	Blank	Blank or Indicators	Field Name	Blank or Edit Code	Blank or End Position	Blank	Blank or Column Heading
	Blank	Blank or Indicators	Blank	Blank	Blank or End Position	Blank	Literal
B	Blank	Blank or Indicators	Field Name	Blank or Edit Code	Blank or End Position	Blank	Blank or Column Heading
A	Blank	Blank or Indicators	Field Name	Blank or Edit Code	Blank or End Position	Blank	Blank or Column Heading
C	Blank	Blank	Blank	Blank	Blank	Blank	Column Heading
1-9, R	Blank	Blank	Field Name	Blank or Edit Code	Blank	Blank	Blank or Edit Word
	Blank	Blank	Blank	Blank	Blank	Blank	Literal

The following miscellaneous programming suggestions may be helpful in specific programming situations:

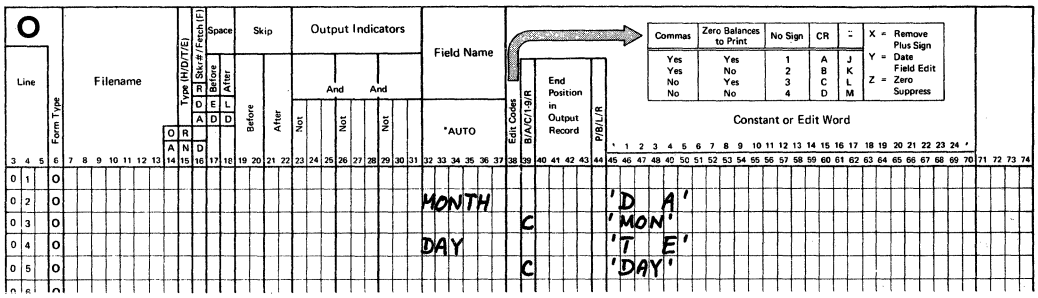
1. When the sort function of Select/Sort is used, only those portions of a record which are defined by input specifications or are used in record identification codes are passed to the sort program. Therefore, you can improve the performance of the sort by defining only those fields in the input record which are used in the program. (This applies to fixed length records only. When variable length records are sorted, the entire record is passed to sort.)

2. In order to increase the amount of virtual storage table space available for input field modifier statements following a /COPY statement, increase the amount of storage available to Auto Report. Increasing the available storage also increases the table size available for fields used with H-*AUTO and D/T-*AUTO specifications. In order to increase the amount of storage available to Auto Report, specify a larger partition size using the DOS/VS ALLOC and ALLOCR commands, described in the publication DOS/VS System Control Statements.

3. One column heading can be printed over two or more fields if automatic column spacing is taken into consideration. For example, if the heading DATE is to print over a month field and a day field as follows:

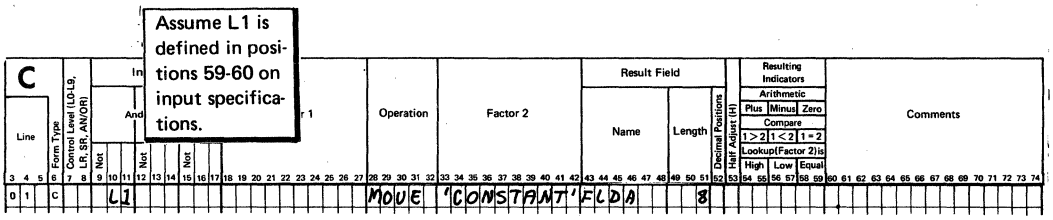


Code the output specifications as follows:

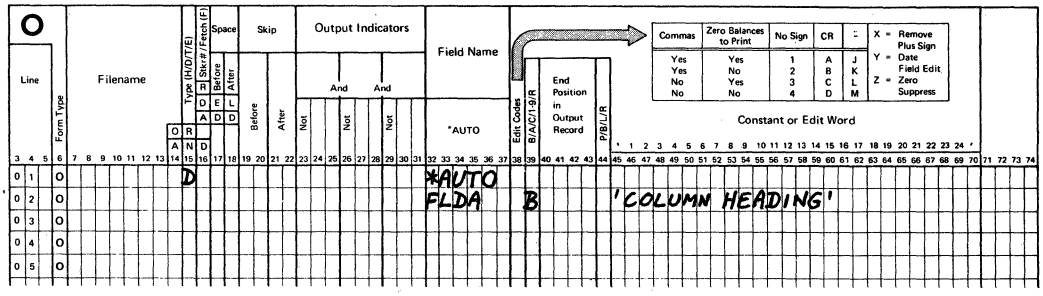


4. To print a constant on only the first detail line under a column heading, move the constant to a field in calculation specifications and print that field.

CALCULATION SPECIFICATIONS



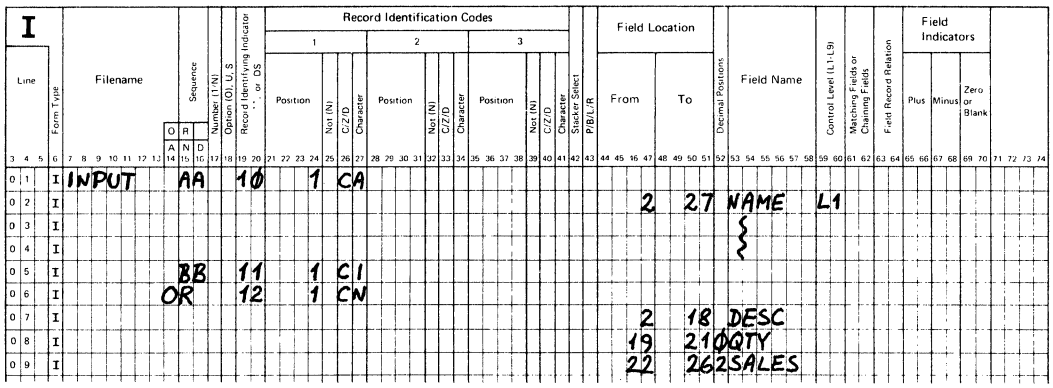
OUTPUT SPECIFICATIONS



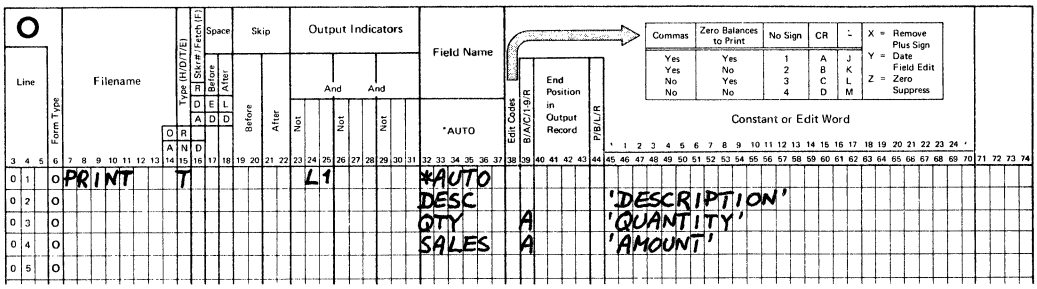
5. In order to print a column heading using the *AUTO function, a field name must be coded with that column heading. If a need arises to print a column heading for a field that is to be printed only at total time in the RPG II program cycle, create a field of blanks by means of calculation specifications and print that blank field with the desired column heading. Then use a normal RPG II total specification and code the desired field to print using end positions. See programming tip 7 for an example.

6. If group printing is being done and more than one record type is present in the input file, certain precautions must be taken by the programmer. If a field to be accumulated is present in all record types, but only one record type is to be processed, proper total is not generated unless additional coding is used. Given the following input specification:

INPUT SPECIFICATIONS



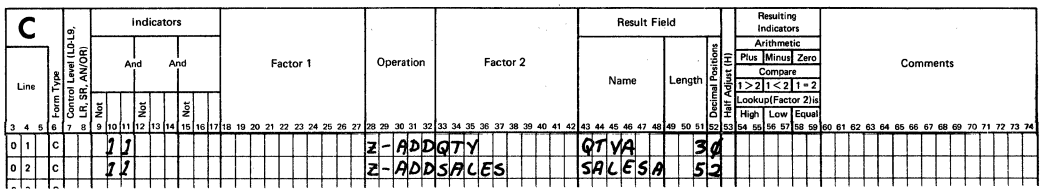
The following coding gives incorrect results:



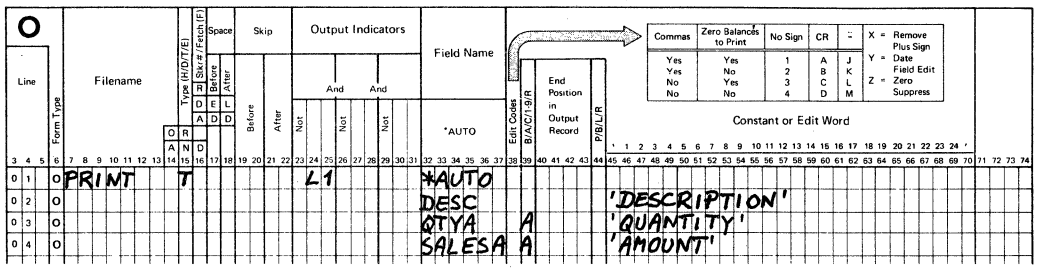
The results are incorrect because the T-*AUTO specification causes an unconditioned ADD subroutine to be generated if a field is to be added. In the Auto Report coding abcve, QTY is added when the 10 indicator is on and when indicators 11 or 12 are on.

The following coding is a method of obtaining the correct results:

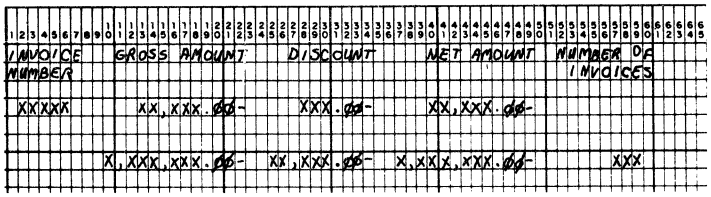
CALCULATION SPECIFICATIONS



OUTPUT SPECIFICATIONS

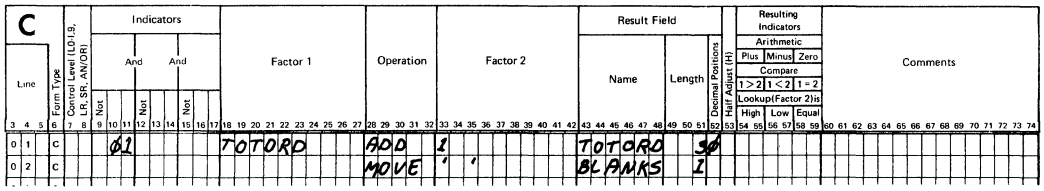


7. When printing an invoice register, the total number of invoices is often printed, as shown on the following print chart:



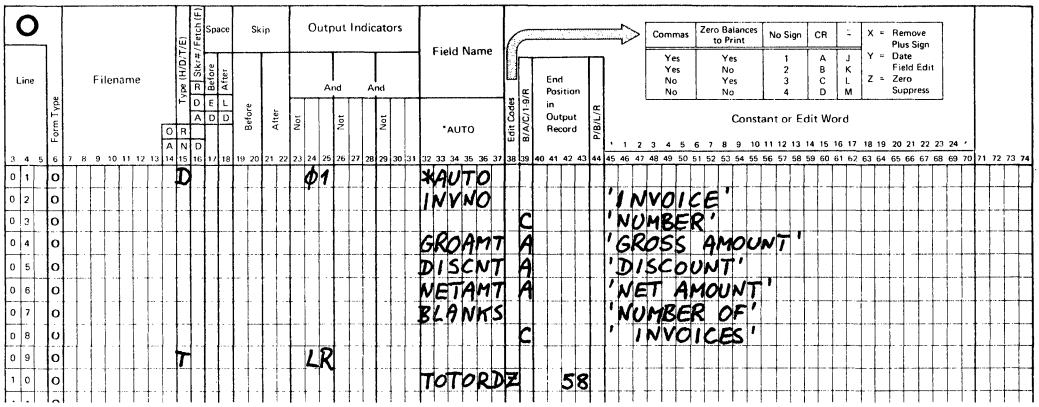
A method of accomplishing this is shown by the following calculation and Auto Report output specifications:

CALCULATION SPECIFICATIONS



Line	Form Type	Control Level (L0-L9, LR, SR, AN/OR)	Indicators: And	Indicators: And	Factor 1	Operation	Factor 2	Result Field: Name	Result Field: Length	Result Field: Decimal Positions	Result Field: Half Adjust (H)	Resulting Indicators: Arithmetic: Plus	Resulting Indicators: Arithmetic: Minus	Resulting Indicators: Arithmetic: Zero	Resulting Indicators: Compare: 1>2	Resulting Indicators: Compare: 1<2	Resulting Indicators: Compare: 1=2	Resulting Indicators: Lookup(Factor 2)is: High	Resulting Indicators: Lookup(Factor 2)is: Low	Resulting Indicators: Lookup(Factor 2)is: Equal	Comments
01	C		01		TOTORD	ADD	1	TOTORD	30												
02	C					MOVE	' '	BLANKS	1												

OUTPUT SPECIFICATIONS



Line	Form Type	Filename	Type (H/D/T/E)	Fetch Overflow (F)	Space: Before	Space: After	Skip: Before	Skip: After	Output Indicators: And: Not	Output Indicators: And: Not	Output Indicators: And: Not	Field Name	Edit Codes	End Position in Output Record	P/B/L/R	Constant or Edit Word
01	O		D						01			*AUTO				
02	O											INVNO				'INVOICE NUMBER'
03	O												C			
04	O											GROAMT	A			'GROSS AMOUNT'
05	O											DISCNT	A			'DISCOUNT'
06	O											NETAMT	A			'NET AMOUNT'
07	O											BLANKS	A			'NUMBER OF'
08	O												C			' INVOICES'
09	O		T						LR							
10	O											TOTORDZ		58		

Edit Codes: B/A/C/1-9/R

Commas	Zero Balances to Print	No Sign	CR	-
Yes	Yes	1	A	J
Yes	No	2	B	K
No	Yes	3	C	L
No	No	4	D	M

X = Remove Plus Sign
Y = Date Field Edit
Z = Zero Suppress

Note: Numbers in parentheses are references to positions on specification forms.

W

Z

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