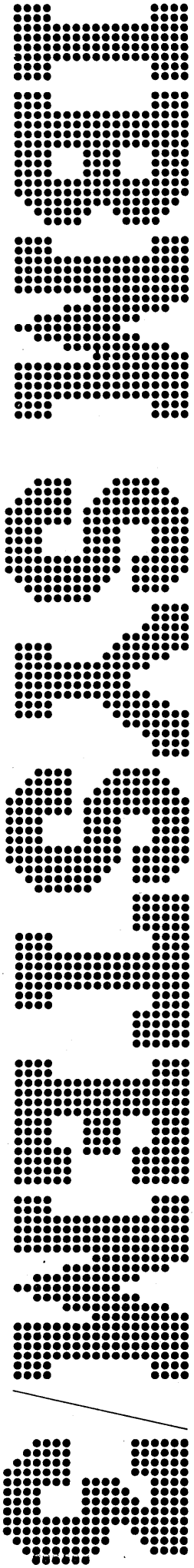

IBM System/3
RPG II Auto Report Feature
Reference Manual

Model 6–5703–RG1 (Feature 6008/6009)
Model 10 Disk–5702–RG1
(Feature 6028/6029)
Model 12–5705–RG1
Model 15–5704–RG1

Program Product

SC21-5057-2
File No. S3-28

Third Edition (December 1975)

This is a major revision of, and obsoletes, SC21-5057-1 and Technical Newsletters SN21-7691 and SN21-5256. Information for the Model 12 RPG II Compiler has been added. Changes are indicated by a vertical line to the left of the change. New or extensively revised illustrations are indicated by the symbol (●) to the left of the figure title.

This revision, a part of version 04, modification 00 of IBM System/3 Model 15 RPG II (Program Product Number 5704-RG1), also applies to IBM System/3 Model 6 RPG II (Program Product Number 5703-RG1), IBM System/3 Model 10 Disk RPG II (Program Product Number 5702-RG1), and IBM System/3 Model 12 RPG II (Program Product Number 5705-RG1). This revision remains in effect for all subsequent versions and modifications unless specifically altered by a new edition or a technical newsletter. 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/3 Bibliography,* Order Number GC20-8080, for the editions that are applicable and current.

Requests for copies of IBM publications should be made to your IBM representative or to the IBM branch office serving your locality.

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 Corporation, Publications, Department 245, Rochester, Minnesota 55901.

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Preface

This publication describes the Auto Report Feature of the following RPG II compiler programs:

- IBM System/3 Model 10 Disk System RPG II Program (Program Product 5702-RG1)
- IBM System/3 Model 6 RPG II Program (Program Product 5703-RG1)
- IBM System/3 Model 12 RPG II Program (Program Product 5705-RG1)
- IBM System/3 Model 15 RPG II Program (Program Product 5704-RG1).

The coding for and operation of the RPG II Auto Report Feature are described for programmers with basic experience in RPG II. Also, in Appendix B, the internal operation of the Auto Report Feature is diagrammed for the use of IBM service personnel and customer personnel with maintenance responsibility.

The System/3 Model 8 is supported by System/3 Model 10 Disk System control programming and program products. The facilities described in this publication for the Model 10 are also applicable to the Model 8, although the Model 8 is not referenced. It should be noted that not all devices and features which are available on the Model 10 are available on the Model 8. Therefore, Model 8 users should be familiar with the contents of *IBM System/3 Model 8 Introduction,* GC21-5114.

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:

- *IBM System/3 RPG II Reference Manual,* SC21-7504
- *IBM System/3 Model 6 RPG II Reference Manual,* SC21-7517
- *IBM System/3 Models 6, 8, 10, and 12 System Generation Reference Manual,* GC21-5126
- *IBM System/3 Model 15 System Generation Reference Manual,* GC21-7616

System Control Program (SCP) Reference Manuals

- *IBM System/3 Model 6 Operation Control Language and Disk Utility Programs Reference Manual,* GC21-7516
- *IBM System/3 Model 10 Disk System Control Programming Reference Manual,* GC21-7512
- *IBM System/3 Model 12 System Control Programming Reference Manual,* GC21-5130
- *IBM System/3 Model 15 System Control Programming Reference Manual,* GC21-5077

Note: The availability date for the Model 12 manuals is not the same as for this manual. Orders sent shortly after the edition date of this manual may be considered invalid.

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HOW TO USE THIS MANUAL

This manual is divided into three parts. Part I describes a series of examples to illustrate the basic Auto Report coding. By studying the reports shown in the examples along with the Auto Report coding that produced them, you can 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 the Auto Report Feature 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.

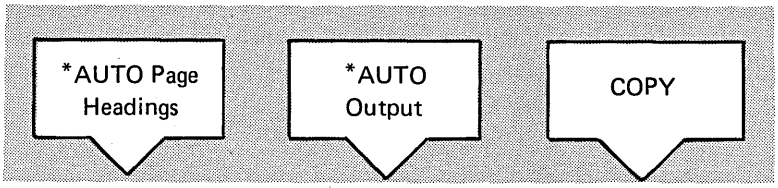
Part III contains the complete reference information for using the Auto Report Feature.

Three appendixes contain further information: Appendix A contains programming tips and aids for RPG II programmers using the Auto Report Feature; Appendix B describes the organization and internal operation of the Auto Report Feature for maintenance personnel; Appendix C lists and explains the Auto Report error messages.

Introduction

WHAT IS THE AUTO REPORT FEATURE?

The RPG II Auto Report Feature is a program that 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. The special Auto Report statements control the three separate functions of Auto Report:



Provides a simplified method of coding page headings.	Provides a simplified method of coding output specifications.	Provides a method of copying cataloged specifications from a source library to include them in an RPG II source program.

WHAT IS THE PURPOSE OF THE AUTO REPORT FEATURE?

The RPG II Auto Report Feature 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.

The Auto Report Feature 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.

The RPG II Auto Report Feature includes three 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 and 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.

HOW DOES AUTO REPORT WORK?

The Auto Report Feature generates a complete RPG II source program that is ready to be compiled from the following kinds of 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. Standard RPG II specifications and *AUTO specifications copied from a source library by the Auto Report Copy function.

Option Specifications

Line	Form Type	Source (P/C/B)	Source Statement Library Name	Reserved	Work Files (1-9)	Data Suppress (N)	*Suppress (N)	Labels (U)	Reserved
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 1	U								

Figure 1. Auto Report Option Specifications

If you use the Auto Report Copy function, Auto Report copies the designated specifications from the source library. Then, if you provide 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. When a complete RPG II source program has been generated, Auto Report calls the RPG II compiler.

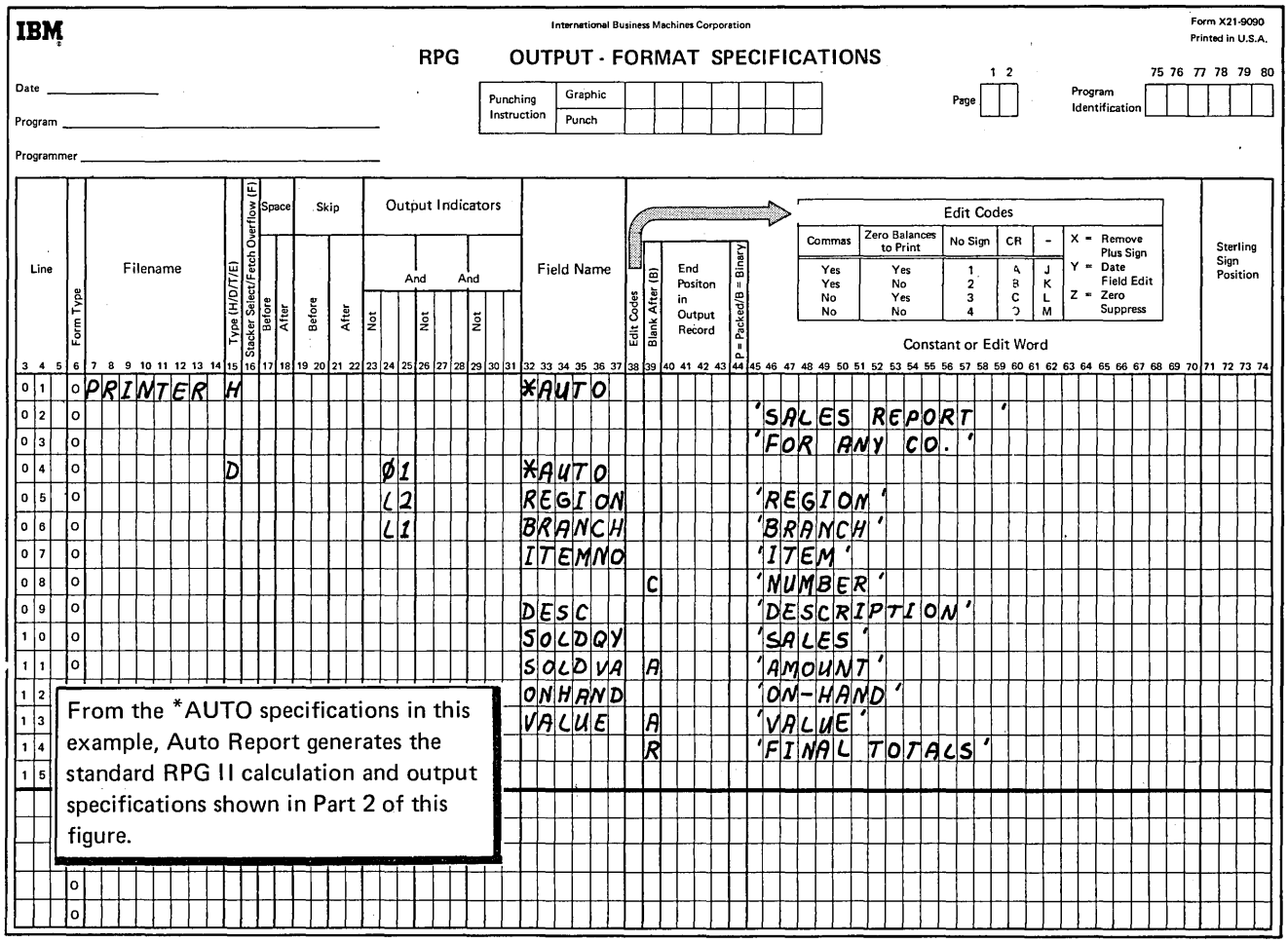


Figure 2 (Part 1 of 2). Using *AUTO Specifications, Auto Report Generates Standard RPG II Specifications

Generated Specifications

```
0012  0140EC   01                EXSR A$$SUM
0013  0150ECL1          SOLDV2    ADD  SOLDV1    SOLDV2  92
0014  0160ECL1          VALUE2    ADD  VALUE1    VALUE2  92
0015  0170ECL2          SOLDVR    ADD  SOLDV2    SOLDVR  92
0016  0180ECL2          VALUER    ADD  VALUE2    VALUER  92
0017  0190ECSR          A$$SUM    BEGSR
0018  0200ECSR          SOLDV1    ADD  SOLDVA    SOLDV1  92
0019  0210ECSR          VALUE1    ADD  VALUE     VALUE1  92
0020  0220ECSR                    ENDSR
```

Calculations to roll totals for SOLDVA and VALUE fields

```
0021  0230EOPRINTER H  206   1P
0022  0240EO        OR       OA
0023  0250EO                                  45 'SALES REPORT '
0024  0260EO                                  56 'FOR ANY CO.'
0025  0270EO                    UDATE Y        8
0026  0280EO                    PAGE  Z       89
0027  0290EO                                  85 'PAGE '
0028  0300EOPRINTER H  1     1P
0029  0310EO        OR       OA
0030  0320EO                                   6 'REGION'
0031  0330EO                                  14 'BRANCH'
0032  0340EO                                  21 'ITEM'
0033  0350EO                                  36 'DESCRIPTION'
0034  0360EO                                  47 'SALES'
0035  0370EO                                  62 'AMOUNT'
0036  0380EO                                  71 'ON-HAND'
0037  0390EO                                  86 'VALUE'
0038  0400EOPRINTER H  2     1P
0039  0410EO        OR       OA
0040  0420EO                                  22 'NUMBER'
0041  0430EOPRINTER D  1     01
0042  0440EO                   L2    REGION    3
0043  0450EO                   L1    BRANCH   12
0044  0460EO                         ITEMNO   23
0045  0470EO                         DESC     40
0046  0480EO                         SOLDQYK  46
0047  0490EO                         SOLDVAKB 62
0048  0500EO                         ONHANDK  69
0049  0510EO                         VALUE KB 86
0050  0520EOPRINTER T 12     L1
0051  0530EO                         SOLDV1KB 62
0052  0540EO                         VALUE1KB 86
0053  0550EO                                  87 '*'
0054  0560EOPRINTER T  2     L2
0055  0570EO                         SOLDV2KB 62
0056  0580EO                         VALUE2KB 86
0057  0590EO                                  88 '**'
0058  0600EOPRINTER T 12     LR
0059  0610EO                         SOLDVRKB 62
0060  0620EO                         VALUERKB 86
0061  0630EO                                  47 'FINAL TOTALS'
0062  0640EO                                  89 '***'
```

Page heading (includes date and page number)

Column headings

Detail output specifications

Total output specifications

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

Figure 3 shows the general method of operation of the Auto Report Feature. Additional information about the method of operation and internal organization of the RPG II Auto Report Feature is provided in Appendix B.

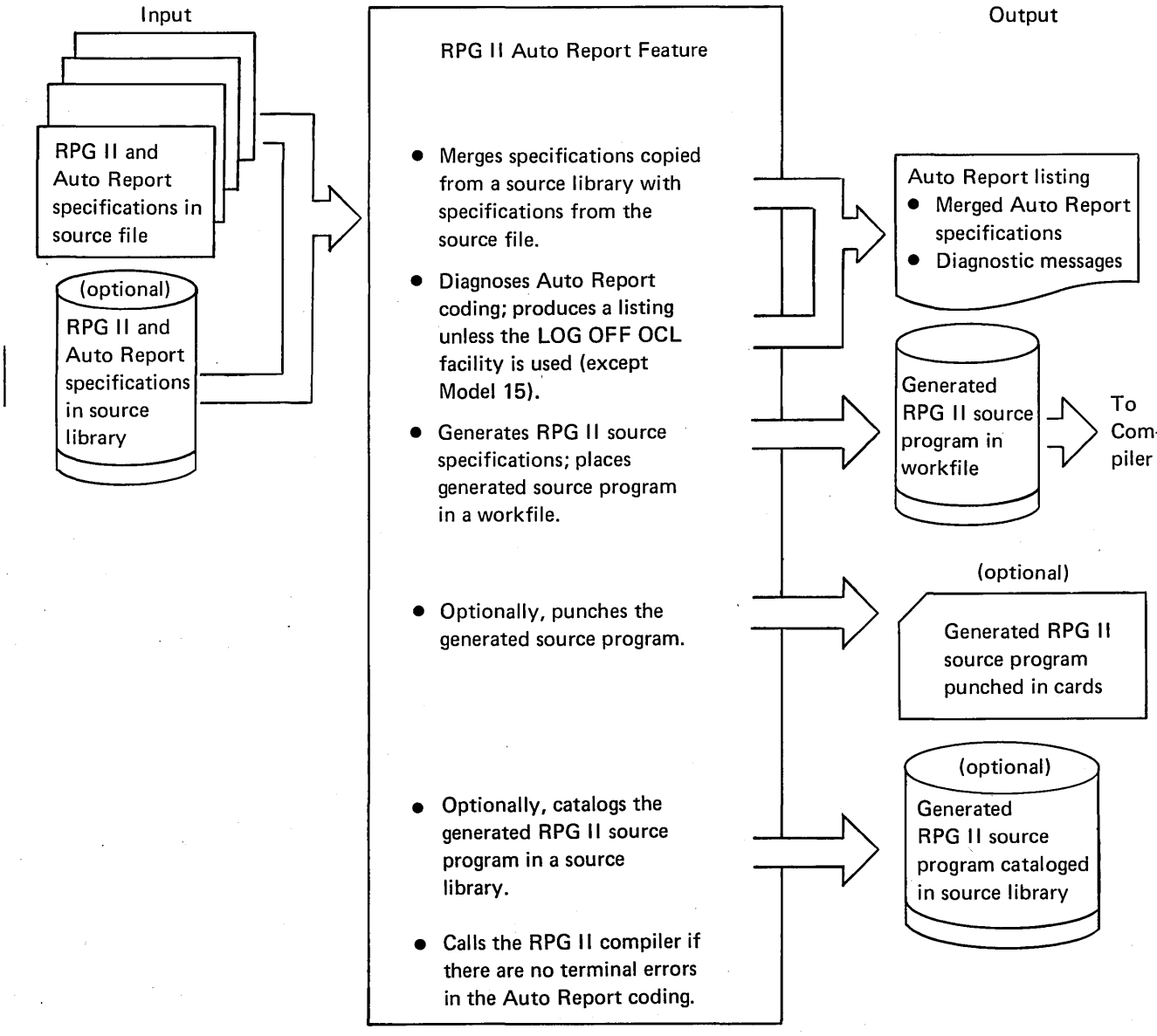


Figure 3. Operations of the Auto Report Feature

PART I.

HOW 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 opposite page.

10/26/71 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	AP6549P	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

Line	Form Type	Filename	File Type	File Designation	End of File	Sequence	File Format	Block Length	Record Length	L/R	Mode of Processing	Length of Key Field or of Record Address Field	Record Address Type	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	Core Index	Continuation Lines K	Continuation Lines Option	Continuation Lines Entry	File Addition/Unordered	Number of Tracks for Cylinder Overflow	Number of Extents	Tape Rewind	File Condition U1-U8
02	F	SALES	I	P			F	473	43									DISK													
03	F	PRINTER	O				F	120	120									PRINTER													

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Form X21-9094
Printed in U.S.A.

RPG INPUT SPECIFICATIONS

Date _____

Program _____

Programmer _____

Punching Instruction	Graphic							
	Punch							

Page 1 2

Program Identification 75 76 77 78 79 80

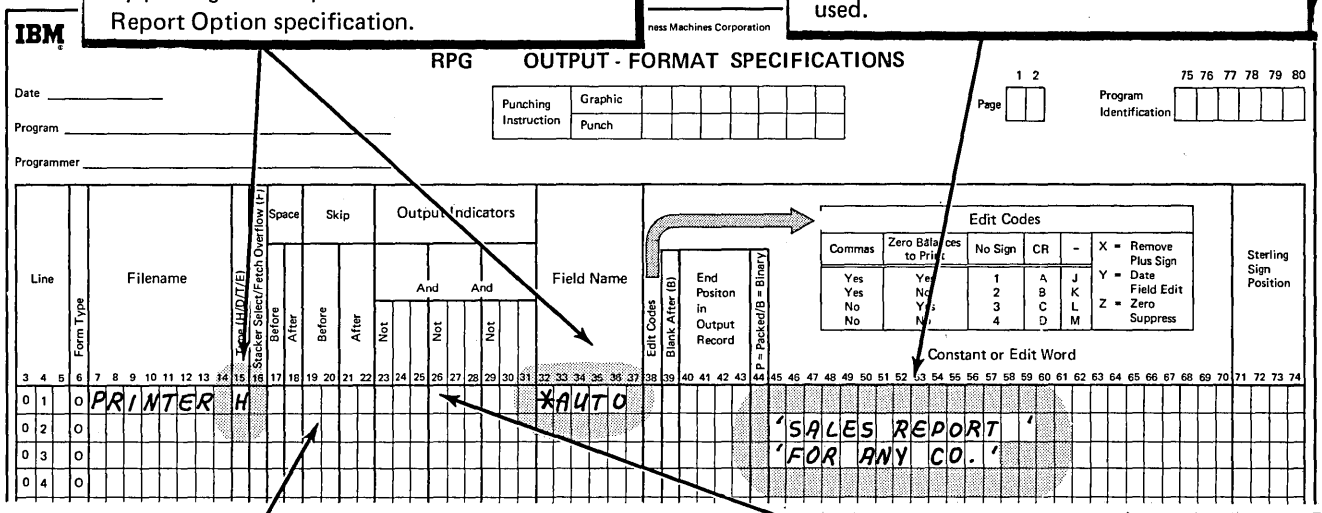
Line	Form Type	Filename	Sequence	Number (1-N)	Option (O)	Record Identifying Indicator or *	Record Identification Codes 1 Position	1 Not (N)	1 C/Z/D	1 Character	2 Position	2 Not (N)	2 C/Z/D	2 Character	3 Position	3 Not (N)	3 C/Z/D	3 Character	Stacker Select	P = Packed/B = Binary	Field Location From	Field 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	Sterling Sign Position
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	SOLDVA							
08	I																				35	36	0	ONHAND							
09	I																				37	43	2	VALUE							
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.

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 line 06 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 Line 06

Blank line

A **B** **A**

10/26/71 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	AP6549P	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

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RPG OUTPUT - FORMAT SPECIFICATIONS

Date _____ Program _____ Programmer _____

Punching Instruction: Graphic / Punch — Page 1 2 — Program Identification 75 76 77 78 79 80

Line	Form Type	Filename	Type (H/D/T/E)	Stacker Select/Fetch Overflow (F)	Space Before	Space After	Skip Before	Skip After	Output Indicators (And / And)	Field Name	Edit Codes	Blank After (B)	End Positon in Output Record	P = Packed/B = Binary	Constant or Edit Word	Sterling Sign Position
01	O	PRINTER	H							*AUTO						
02	O														'SALES REPORT'	
03	O														'FOR ANY CO.'	
04	O		D						Ø1	*AUTO						
05	O									REGION					'REGION'	
06	O									BRANCH					'BRANCH'	
07	O									ITEMNO					'ITEM'	
08	O									DESC					'DESCRIPTION'	
09	O									SOLDQY					'SALES'	
10	O									SOLDVA		A			'AMOUNT'	
11	O									ONHAND					'ON-HAND'	
12										VALUE		A			'VALUE'	

Edit Codes

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

A

B

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

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.

10/26/71 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	AP6549P	1/4 TON TRUCK	20	30,000.00	6	9,000.00
					141,000.00		48,000.00 *

A B C

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.

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Form X21-9094
Printed in U.S.A.

RPG INPUT SPECIFICATIONS

Date _____
Program _____
Programmer _____

Punching Instruction: Graphic / Punch

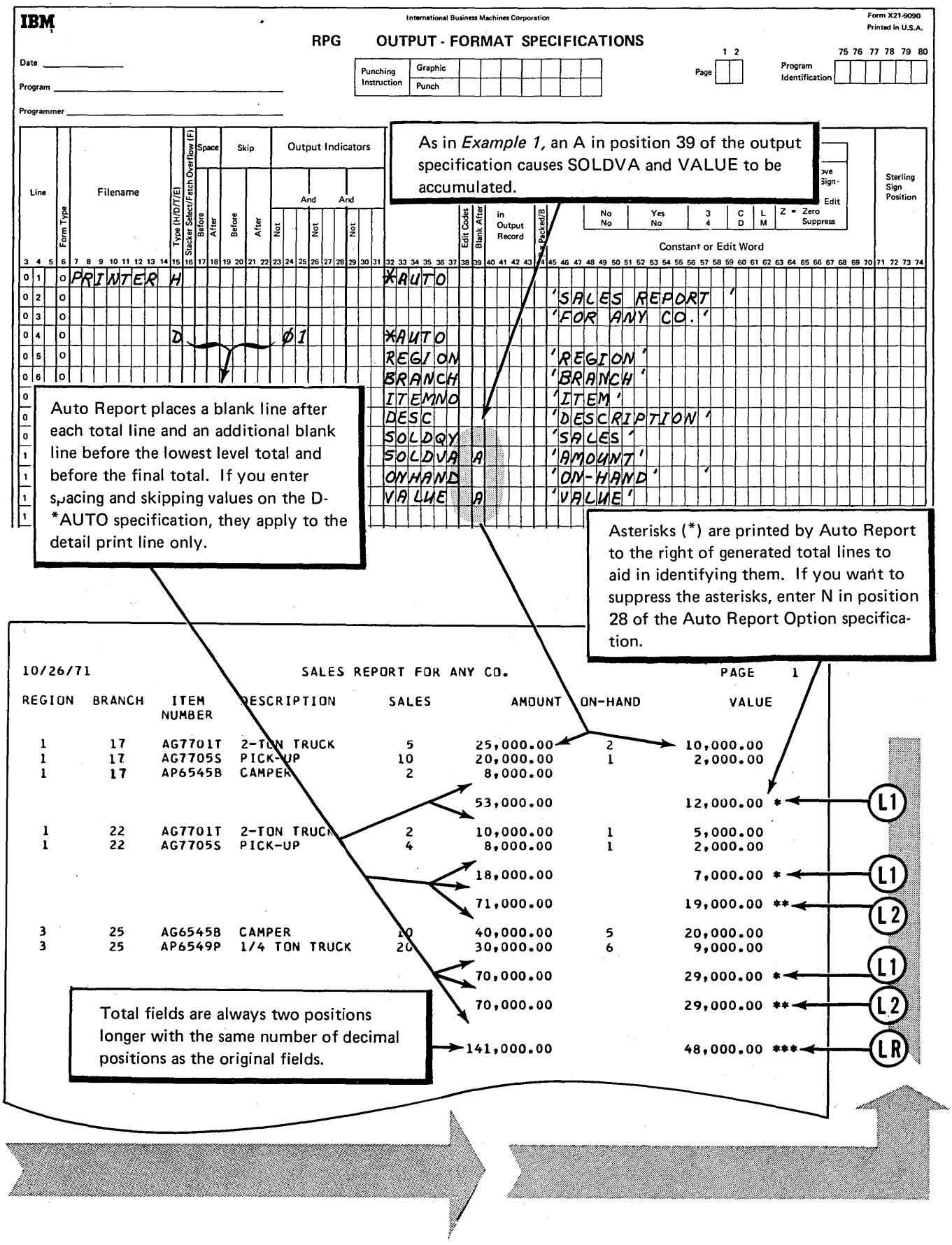
Page 1 2

Program Identification 75 76 77 78 79 80

Line	Form Type	Filename	Sequence	Number (1-N)	Option (O)	Record Identifying Indicator or **	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 = Packed/B = Binary	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	Sterling Sign Position
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 1	I	SALES	AA			Ø1																									
0 2	I																				1	7		ITEMNO							
0 3	I																				8	9		BRANCHL1							
0 4	I																				1Ø	1Ø		REGIONL2							
0 5	I																				11	25		DESC							
0 6	I																				26	27	Ø	SOLDQY							
0 7	I																				28	34	2	SOLDVA							
0 8	I																				35	36	Ø	ONHAND							
0 9	I																				37	43	2	VALUE							
1 0	I																														

2

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


IBM
International Business Machines Corporation
Form X21-9090
Printed in U.S.A.
RPG OUTPUT - FORMAT SPECIFICATIONS
Date
Program
Programmer
Punching Instruction
Graphic
Punch
Page
Program Identification
Line
Form Type
Filename
Type (H/D/T/E)
Stacker Select/Fetch Overflow (F)
Space
Skip
Output Indicators
And
Not
Before
After
Edit Codes
Blank After
Output Record
Packed/B
Edit
Sterling Sign Position
Constant or Edit Word
Z = Zero Suppress
PRINTER H
*AUTO
'SALES REPORT '
'FOR ANY CO.'
D
01
*AUTO
REGION
BRANCH
ITEMNO
DESC
SOLDQY
SOLDVA A
ONHAND
VALUE A
'REGION '
'BRANCH '
'ITEM '
'DESCRIPTION '
'SALES '
'AMOUNT '
'ON-HAND '
'VALUE '
As in *Example 1,* an A in position 39 of the output specification causes SOLDVA and VALUE to be accumulated.
Auto Report places a blank line after each total line and an additional blank line before the lowest level total and before the final total. If you enter spacing and skipping values on the D-*AUTO specification, they apply to the detail print line only.
Asterisks (*) are printed by Auto Report to the right of generated total lines to aid in identifying them. If you want to suppress the asterisks, enter N in position 28 of the Auto Report Option specification.
10/26/71 SALES REPORT FOR ANY CO. PAGE 1
REGION BRANCH ITEM NUMBER 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 * L1
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 * L1
71,000.00 19,000.00 ** L2
3 25 AG6545B CAMPER 10 40,000.00 5 20,000.00
3 25 AP6549P 1/4 TON TRUCK 20 30,000.00 6 9,000.00
70,000.00 29,000.00 * L1
70,000.00 29,000.00 ** L2
141,000.00 48,000.00 *** LR
Total fields are always two positions longer with the same number of decimal positions as the original fields.

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

1

Line	Form Type	Filename	I/O/U/C/D	P/S/C/R/T/D	E	A/D	F/V/S/M/D	Block Length	Record Length	L/R	A/P/I/K	I/D/T or 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	Core Index	Continuation Lines: K	Continuation Lines: Option	Continuation Lines: Entry	A/U	File Addition/Unordered	Number of Tracks for Cylinder Overflow	Number of Extents	Tape Rewind	R/U/N	File Condition U1-U8
02	F	SALES	I	P			F	473	43								DISK															
03	F	PRINTER	O				F	120	120								PRINTER															
04	F																														

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RPG INPUT SPECIFICATIONS

Date _____

Program _____

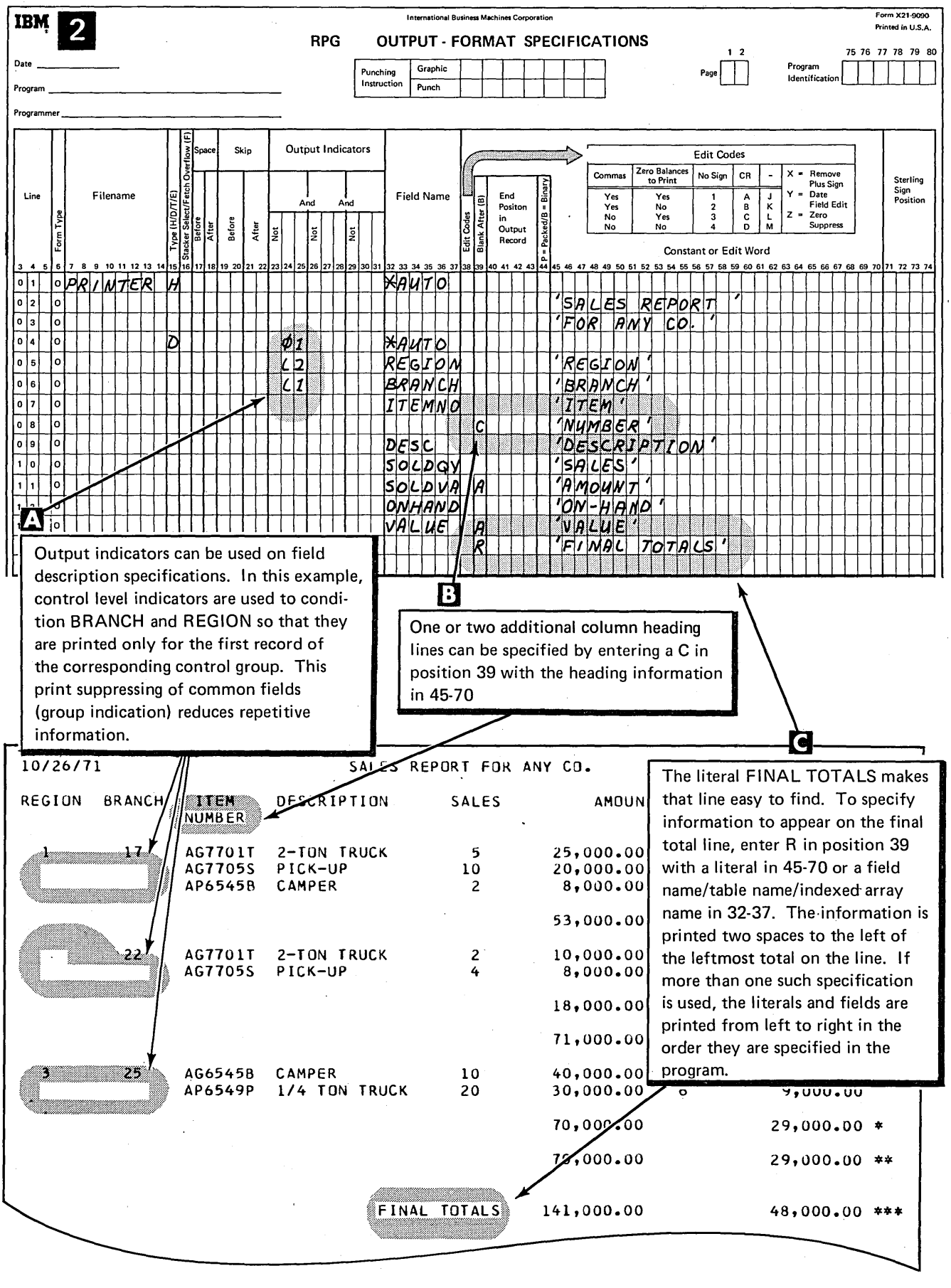
Programmer _____

Punching Instruction	Graphic							
	Punch							

Page 1 2

Program Identification 75 76 77 78 79 80

Line	Form Type	Filename	Sequence	Number (1-N)	Option (O)	Record Identifying Indicator or **	Record Identification Codes 1: Position	1: Not (N)	1: C/Z/D	1: Character	Record Identification Codes 2: Position	2: Not (N)	2: C/Z/D	2: Character	Record Identification Codes 3: Position	3: Not (N)	3: C/Z/D	3: Character	Stacker Select	P = Packed/B = Binary	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	Sterling Sign Position
01	I	SALES	AA			01																									
02	I																				1	7		ITEMNO							
03	I																				8	9		BRANCHL1							
04	I																				10	10		REGIONL2							
05	I																				11	25		DESC							
06	I																				26	27	0	SOLDQY							
07	I																				28	34	2	SOLDVA							
08	I																				35	36	0	ONHAND							
09	I																				37	43	2	VALUE							
10	I																														


IBM 2
International Business Machines Corporation
Form X21-9090
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RPG OUTPUT - FORMAT SPECIFICATIONS
Date
Program
Programmer
Punching Instruction
Graphic
Punch
Page
Program Identification
Line
Form Type
Filename
Type (H/D/T/E)
Stacker Select/Fetch Overflow (F)
Space
Skip
Output Indicators
And
Field Name
Edit Codes
Blank After (B)
End Positon in Output Record
P = Packed/B = Binary
Edit Codes
Commas
Zero Balances to Print
No Sign
CR
-
X = Remove Plus Sign
Y = Date Field Edit
Z = Zero Suppress
Constant or Edit Word
Sterling Sign Position
PRINTER H
XAUTO
'SALES REPORT '
'FOR ANY CO. '
D
01
L2
L1
*AUTO
REGION
BRANCH
ITEMNO
'REGION '
'BRANCH '
'ITEM '
C
'NUMBER '
DESC
'DESCRIPTION '
SOLDQY
'SALES '
SOLDVA A
'AMOUNT '
ONHAND
'ON-HAND '
VALUE A
'VALUE '
R
'FINAL TOTALS '
A
B
C
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.
One or two additional column heading lines can be specified by entering a C in position 39 with the heading information in 45-70
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.
10/26/71 SALES REPORT FOR ANY CO.
REGION BRANCH ITEM NUMBER DESCRIPTION SALES AMOUN
1 17 AG7701T 2-TON TRUCK 5 25,000.00
AG7705S PICK-UP 10 20,000.00
AP6545B CAMPER 2 8,000.00
53,000.00
22 AG7701T 2-TON TRUCK 2 10,000.00
AG7705S PICK-UP 4 8,000.00
18,000.00
71,000.00
3 25 AG6545B CAMPER 10 40,000.00
AP6549P 1/4 TON TRUCK 20 30,000.00
70,000.00 29,000.00 *
29,000.00 **
FINAL TOTALS 141,000.00 48,000.00 ***

EXAMPLE 4

*AUTO Page Headings | *AUTO Output

Problem

Expand the sales report from *Examples 1-3* to include a cross-totals column and:

- **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

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.

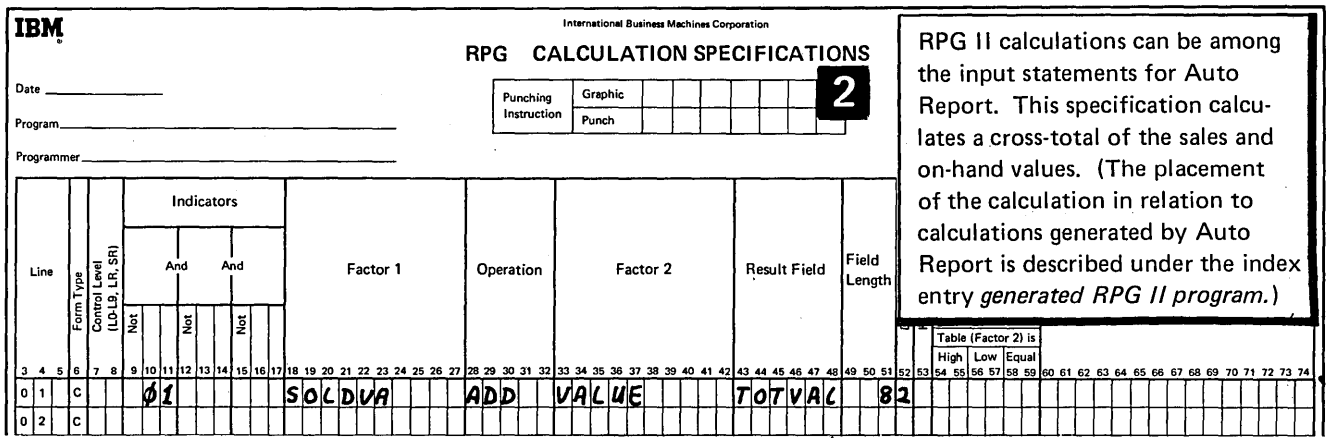
3 Code *AUTO specifications:

- **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)

```
11/18/71                          SALES REPORT FOR ANY CO.                                  PAGE    1
                                  B → REGION 1 ← C                                  2
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               2           8,000.00                                8,000.00

                  D  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
11/18/71                          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
         AP6549P  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 opposite pages to see the Auto Report coding to obtain this report.



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RPG CALCULATION SPECIFICATIONS

Punching Instruction: Graphic / Punch — 2

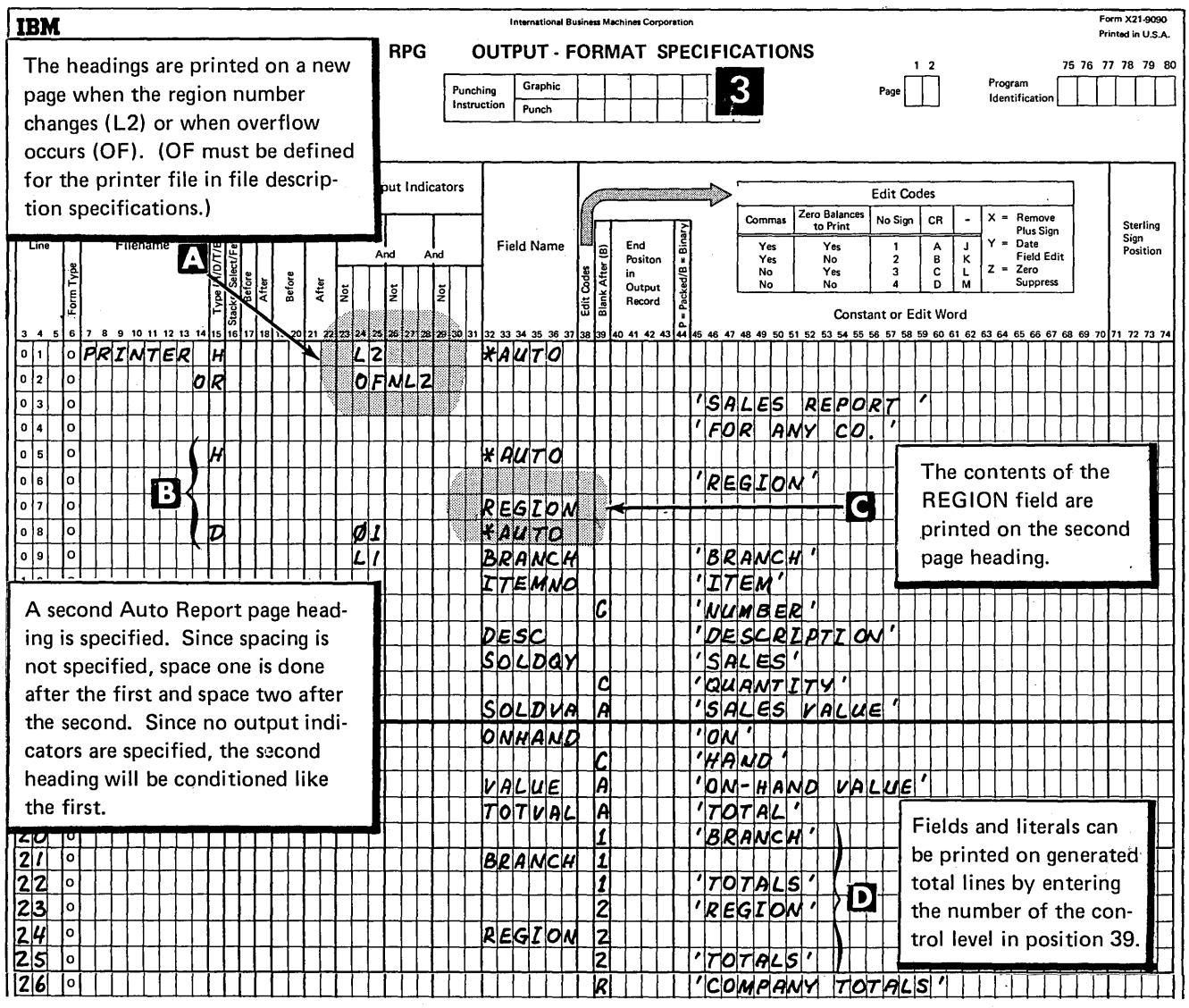
Date _____

Program _____

Programmer _____

Line	Form Type	Control Level (L0-L9, LR, SR)	Indicators: And / And — Not	Factor 1	Operation	Factor 2	Result Field	Field Length	Table (Factor 2) is: High / Low / Equal
01	C		Ø1	SOLDVA	ADD	VALUE	TOTVAL	82	
02	C								

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.*)



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RPG OUTPUT - FORMAT SPECIFICATIONS

Punching Instruction: Graphic / Punch — 3

Page: 1 2

Program Identification: 75 76 77 78 79 80

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.)

Line	Form Type	Filename (A)	Type (H/D/T/E)	Stacker Select/Fe	Output Indicators: Before / After / And / And — Not	Field Name	Edit Codes	Blank After (B)	End Position in Output Record	P = Packed/B = Binary	Edit Codes: Commas / Zero Balances to Print / No Sign / CR / -	Constant or Edit Word	Sterling Sign Position
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						(C)	
08	O		D		Ø1	*AUTO							
09	O				L1	BRANCH						'BRANCH'	
						ITEMNO						'ITEM'	
							C					'NUMBER'	
						DESC						'DESCRIPTION'	
						SOLDQY						'SALES'	
							C					'QUANTITY'	
						SOLDVA	A					'SALES VALUE'	
						ONHAND						'ON'	
							C					'HAND'	
						VALUE	A					'ON-HAND VALUE'	
						TOTVAL	A					'TOTAL'	
20	O						1					'BRANCH'	
21	O					BRANCH	1						
22	O						1					'TOTALS'	
23	O						2					'REGION'	
24	O					REGION	2						
25	O						2					'TOTALS'	
26	O						R					'COMPANY TOTALS'	

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

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.

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 job.

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.

```
10/26/71                        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     AP6549P   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 using the Library Maintenance disk utility program (*see the appropriate system control programming reference manual*).

File Description Specifications

Line	Filename	Form Type	File Type	File Designation	End of File	Sequence	File Format	Block Length	Record Length	Mode of Processing	Length of Key Field or of Record Address Field	Record Address Type	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	Core Index	Continuation Lines K	Continuation Lines Option	Continuation Lines Entry	File Addition/Unordered	Number of Tracks for Cylinder Overflow	Number of Extents	Tape Rewind	File Condition U1-U8
			I/O/U/C/D	P/S/C/R/T/D	E	A/D	F/V/S/M/D			L/R	A/P/I/K	I/D/T or 2														A/U		R/U/N		
02	SALES	F	IP				F	473	43								DISK													
03	PRINTER	F	O				F	120	120								PRINTER													

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RPG INPUT SPECIFICATIONS

Date _____ Program _____ Programmer _____

Punching Instruction: Graphic / Punch

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.

Line	Filename	Form Type	Sequence	Option (O)	Number (1-N)	Record Identifying Indicator or **	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 = Packed/B = Binary	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	Sterling Sign Position
01	SALES	I	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	SOLDVA							
08		I																			35	36	0	ONHAND							
09		I																			37	43	2	VALUE							

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RPG OUTPUT - FORMAT SPECIFICATIONS

Date _____ Program _____ Programmer _____

Punching Instruction: Graphic / Punch

Page 1 2 — Program Identification 75 76 77 78 79 80

Line	Filename	Form Type	Type (H/D/T/E)	Stacker Select/Fetch Overflow (F)	Space Before	Space After	Skip Before	Skip After	Output Indicators And Not	Output Indicators And Not	Output Indicators Not	Field Name	Edit Codes	Blank After (B)	End Position in Output Record	P = Packed/B = Binary	Constant or Edit Word	Sterling Sign Position
01	PRINTER	O	H									*AUTO						
02		O															'SALES REPORT '	
03		O															'FOR ANY CO.'	
04		O	D						01			*AUTO						
05		O										REGION					'REGION'	
06		O										BRANCH					'BRANCH'	
07		O										ITEMNO					'ITEM'	
08		O										DESC					'DESCRIPTION'	
09		O										SOLDQY					'SALES'	
10		O										SOLDVA	A				'AMOUNT'	
11		O										ONHAND					'ON-HAND'	
12		O										VALUE	A				'VALUE'	

Edit Codes

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

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

Line	Form Type	Filename	I/O/U/C/D	P/S/C/R/T/D	E	A/D	F/V/S/M/D	Block Length	Record Length	L/R	A/P/I/K	I/D/T or 2	Key Field Starting Location	Extension Code E/L	Device	Symbolic Device	Labels S/N/E/M	Name of Label Exit	Extent Exit for DAM	Core 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	PRINTER	O				F	120	120						PRINTER														

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RPG INPUT SPECIFICATIONS

Date _____ Program _____ Programmer _____

Punching Instruction: Graphic / Punch

Page 1 2 — Program Identification 75 76 77 78 79 80

Line	Form Type	Filename	Sequence	Number (1-N)	Option (O)	Record Identifying Indicator or **	Position	Not (N)	Field Name	Control Level (L1-L9)	Matching Fields or Chaining Fields	Field Record Relation	Field Indicators: Plus	Minus	Zero or Blank	Sterling Sign Position
01	I	/COPY R1,SALETR														

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

The source library is located on disk unit R1.

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

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.

IBM **RPG OUTPUT - FORMAT S**

Punching Instruction: Graphic / Punch

Commas	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

Y = Date Field Edit; Z = Zero Suppress

Constant or Edit Word

Line	Form Type	Filename	Type (H/D/T/E)	Space: Stacker Select/Fetch Overflow (F)	Space: Before	Space: After	Skip: Before	Skip: After	Output Indicators: And Not	And Not	And Not	Field Name	Edit Codes	Blank After (B)	End Position in Output Record	P = Packed/B = Binary	Constant or Edit Word	Sterling Sign Position
01	O	PRINTER	H									*AUTO						
02	O																'SALES REPORT '	
03	O																'FOR ANY CO. '	
04	O		D						01			*AUTO						
05	O											REGION					'REGION '	
06	O											BRANCH					'BRANCH '	
07	O											ITEMNO					'ITEM '	
08	O											DESC					'DESCRIPTION '	
09	O											SOLDQY					'SALES '	
10	O											SOLDVA		A			'AMOUNT '	
11	O											ONHAND					'ON-HAND '	
12	O											VALUE		A			'VALUE '	

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.

```
10/26/71                          SALES REPORT FOR ANY CO.                          PAGE    1

REGION  BRANCH   ITEM     DESCRIPTION       SALES        AMOUNT   ON-HAND          VALUE
                 NUMBER

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

                                                      53,000.00                12,000.00 *

          22     AG7701T  2-TON TRUCK         2       10,000.00      1         5,000.00
                 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
                 AP6549P  1/4 TON TRUCK      20       30,000.00      6         9,000.00
```

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International Business Machines Corporation

Form X21-9094
Printed in U.S.A.

RPG INPUT SPECIFICATIONS

Cataloged input specifications for the SALES file.

Punching Instruction: Graphic / Punch

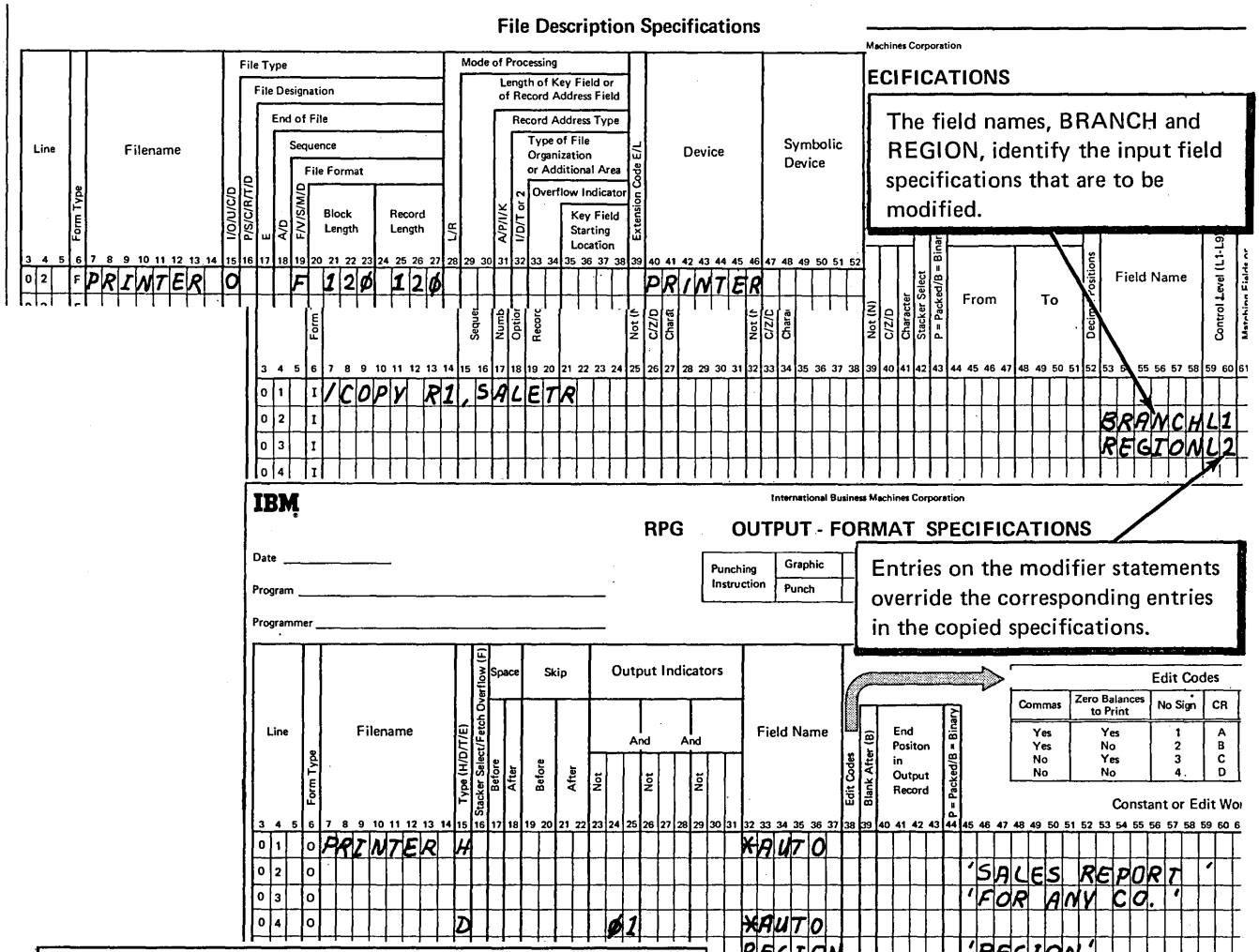
Page 1 2

Program Identification 75 76 77 78 79 80

Line (3 4 5)	Form Type (6)	Filename (7–14)	Sequence (15–16)	Number (1-N) (17)	Option (O) (18)	Record Identifying Indicator or ** (19–20)	Record Identification Codes 1: Position (21–24)	1: Not (N) (25)	1: C/Z/D (26)	1: Character (27)	2: Position (28–31)	2: Not (N) (32)	2: C/Z/D (33)	2: Character (34)	3: Position (35–38)	3: Not (N) (39)	3: C/Z/D (40)	3: Character (41)	Stacker Select (42)	P = Packed/B = Binary (43)	Field Location From (44–47)	Field Location To (48–51)	Decimal Positions (52)	Field Name (53–58)	Control Level (L1-L9) (59–60)	Matching Fields or Chaining Fields (61–62)	Field Record Relation (63–64)	Field Indicators Plus (65–66)	Field Indicators Minus (67–68)	Field Indicators Zero or Blank (69–70)	Sterling Sign Position (71–74)
01	I	SALES	AA			Ø1																									
02	I																				1	7		ITEMNO							
03	I																				8	9		BRANCH							
04	I																				1Ø	1Ø		REGION							
05	I																				11	25		DESC							
06	I																				26	27Ø		SOLDQY							
07	I																				28	342		SOLDVA							
08	I																				35	36Ø		ONHAND							
09	I																				37	432		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).



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.

PART II.

SAMPLE PROGRAM

Sample Program

This sample program is present on the distribution disk cartridge containing the Auto Report Feature. You should execute the sample program after system generation is complete to verify installation of the Auto Report Feature. (see index entry *Running the Sample Program*.)

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

JOB DESCRIPTION

This job prepares a Cash Receipts Register using RPG II with the Auto Report Feature. The *AUTO Page Headings feature and the *AUTO Output feature 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. RPG II calculations specifications that cannot be generated by Auto Report are included in the Auto Report program to verify the discount taken by each 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, CSHREC (Figure 4), are cataloged as separate members in the source library on disk unit R1. The cataloged specifications are included in the program by the Auto Report Copy feature.

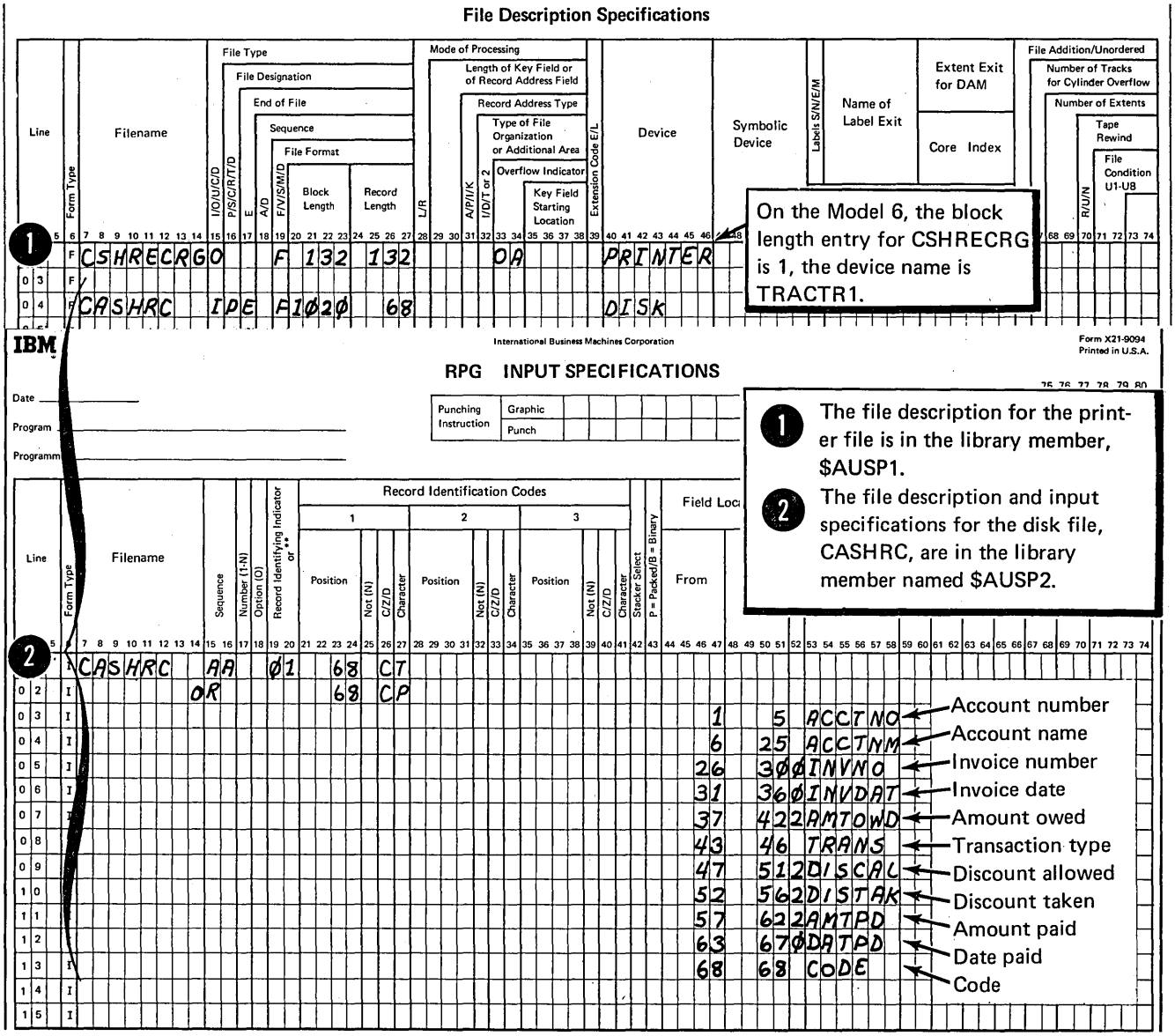


Figure 4. File Description and Input Specifications that are Cataloged in the Source Library Members $AUSP1 and $AUSP2.

AUTO REPORT CODING

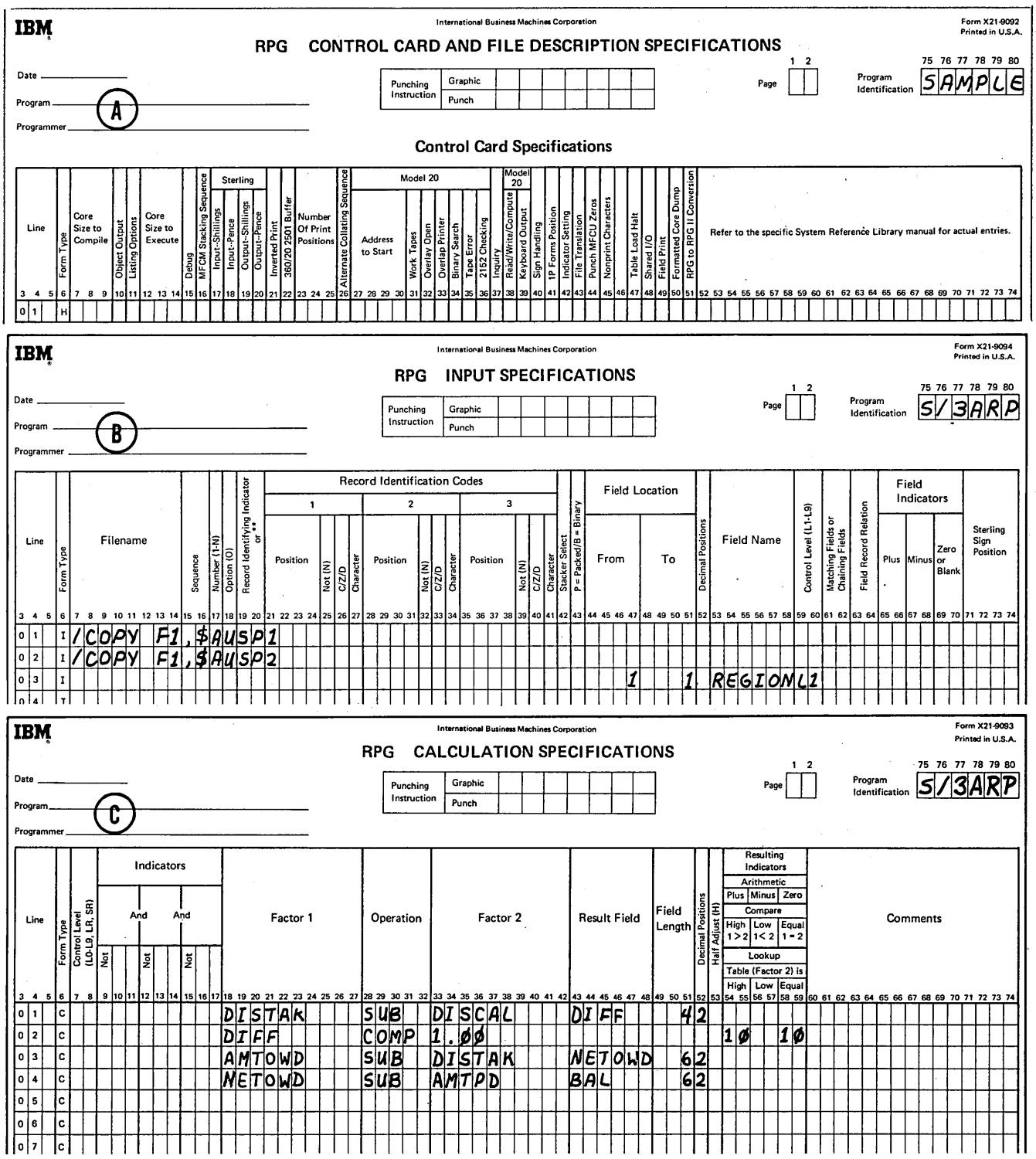
Figure 5 shows the RPG II and Auto Report specifications that must be included in the Auto Report Program to produce the Cash Receipts Register.

RPG Control Card Specifications

The control card 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 control card options are required in this program, so the specification need contain only an H in position 6 and the Program Identification entry, SAMPLE, 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 RPG II source program. (The use of the Program Identification characters by the RPG II compiler is described in the RPG II reference manual for your system.)

/COPY Statements

The /COPY statements shown in Figure 5, insert B, are used to copy the file description and input specifications for the job from the source library on disk unit F1. The



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RPG CONTROL CARD AND FILE DESCRIPTION SPECIFICATIONS

Date _____ Program _____ (A) Programmer _____

Punching Instruction: Graphic / Punch

Page 1 2 — Program Identification 75 76 77 78 79 80: SAMPLE

Control Card Specifications

Line	Form Type	Core Size to Compile	Object Output	Listing Options	Core Size to Execute	Debug	MFCM Stacking Sequence	Sterling: Input-Shillings	Sterling: Input-Pence	Sterling: Output-Shillings	Sterling: Output-Pence	Inverted Print	360/20 2501 Buffer	Number Of Print Positions	Alternate Collating Sequence	Model 20: Address to Start	Model 20: Work Tapes	Model 20: Overlay Open	Model 20: Overlap Printer	Model 20: Binary Search	Model 20: Tape Error	Model 20: 2152 Checking	Model 20: Inquiry	Model 20: Read/Write/Compute	Model 20: Keyboard Output	Sign Handling	1P Forms Position	Indicator Setting	File Translation	Punch MFCU Zeros	Nonprint Characters	Table Load Halt	Shared I/O	Field Print	Formatted Core Dump	RPG to RPG II Conversion	Refer to the specific System Reference Library manual for actual entries.
01	H																																			

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RPG INPUT SPECIFICATIONS

Date _____ Program _____ (B) Programmer _____

Punching Instruction: Graphic / Punch

Page 1 2 — Program Identification 75 76 77 78 79 80: S/3ARP

Line	Form Type	Filename	Sequence	Number (1-N)	Option (O)	Record Identifying Indicator or **	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 = Packed/B = Binary	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	Sterling Sign Position
01	I	/COPY F1,$AUSP1																													
02	I	/COPY F1,$AUSP2																													
03	I																				1	1		REGION	L1						
04	I																														

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RPG CALCULATION SPECIFICATIONS

Date _____ Program _____ (C) Programmer _____

Punching Instruction: Graphic / Punch

Page 1 2 — Program Identification 75 76 77 78 79 80: S/3ARP

Line	Form Type	Control Level (L0-L9, LR, SR)	Indicators: And Not	Indicators: And Not	Indicators: And Not	Factor 1	Operation	Factor 2	Result Field	Field Length	Decimal Positions	Half Adjust (H)	Resulting Indicators: Arithmetic Plus	Arithmetic Minus	Arithmetic Zero	Compare High 1>2	Compare Low 1<2	Compare Equal 1=2	Lookup Table (Factor 2) is High	Lookup Low	Lookup 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											
05	C																					
06	C																					
07	C																					

Figure 5 (Part 1 of 2). RPG II and Auto Report Specifications to Produce the Cash Receipts Register

first statement copies the file description specification for the printer file from the library member named $AUSP1. The second statement copies the file description and input specifications for the disk file, CASHRC, from the library member named $AUSP2. A modifier statement adds an input field definition for the REGION field. 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.

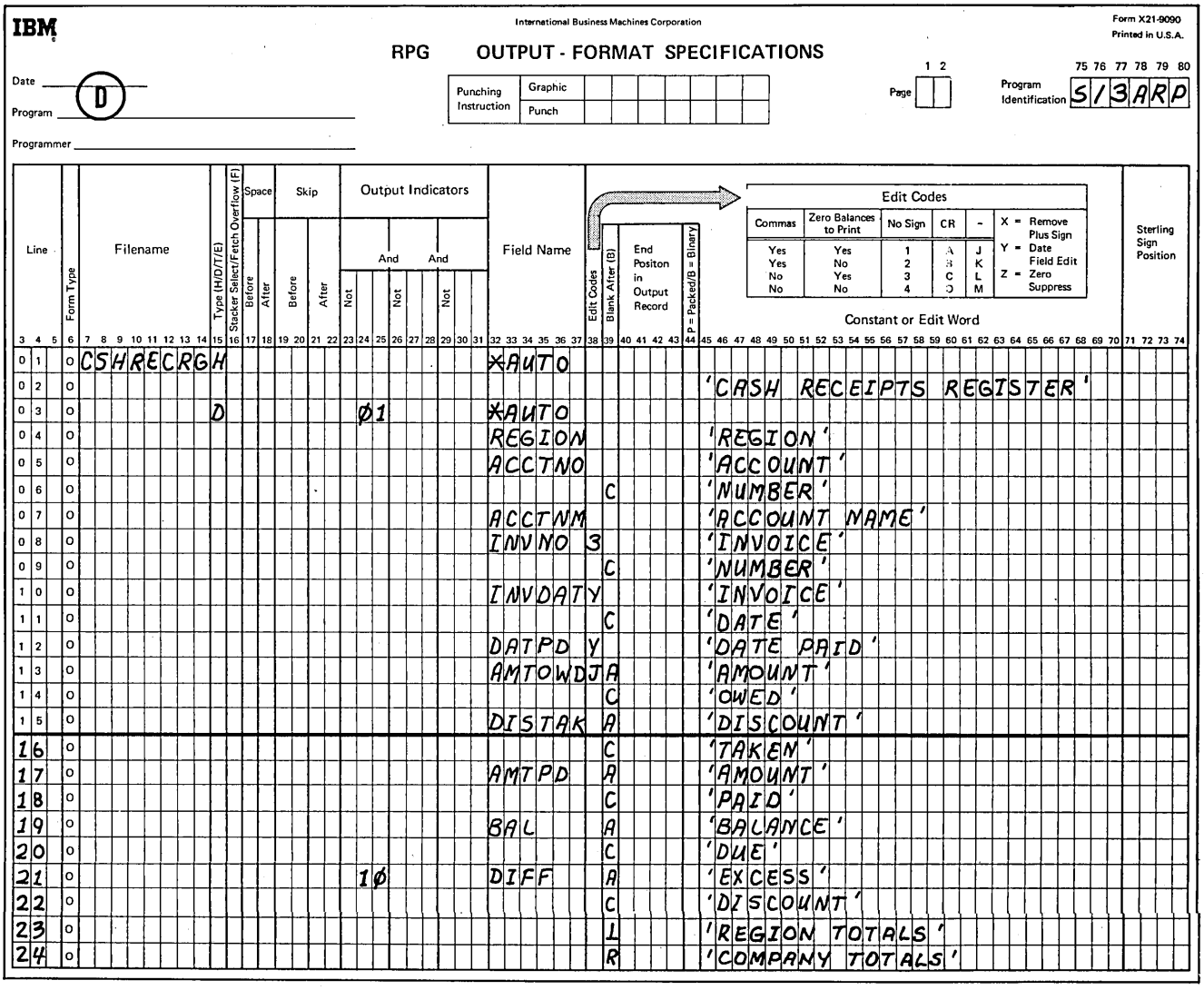

Figure 5 (Part 2 of 2). RPG II and Auto Report Specifications to Produce the Cash Receipts Register

Calculation Specifications

The calculation specifications shown in Figure 5, insert C, 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).

*AUTO Specifications

The coding for the *AUTO Page Headings and the *AUTO Output features is shown in Figure 5, insert D. Notice that the Y edit code is used for the date 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.

The J edit code is used for the AMTOWD field to allow zero balance to print for that field.

Totals are accumulated and printed by Auto Report for five fields, as indicated by A entries in position 39. Since an L1 control level 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 D).

Before the sample program can be run, an RPG II program, $AUSPA, which also resides on the distribution disk pack, is compiled by RPG II and executed to build data for the Auto Report sample program (Figure 6). After this data has been built, the sample program, $AUSPB, is processed by the Auto Report Feature, compiled by RPG II, and executed to give the report. The listing and output of the sample program should look like Figure 7.

Successful execution of the sample program indicates that Auto Report has been installed correctly.

RUNNING THE SAMPLE PROGRAM

The sample Auto Report program and the procedure to compile and execute it are on the distribution disk cartridge. The sample program must be run after system generation is complete and after the generated system on F1 has been copied to a backup or tailored system pack (see *IBM System/3 Models 6, 8, 10, and 12 System Generation Reference Manual,* GC21-5126, or *IBM System/3 Model 15 System Generation Reference Manual,* GC21-7616, for procedures for performing system generation). RPG II, Auto Report, and the source library procedure to load Auto Report must reside on the tailored pack prior to running the sample program.

```
                                DATA FOR SAMPLE PROGRAM

11243JONES HARDWARE          27541071171  2375CASH   47   47  232807211T
11352NU-STYLE CLOTHIERS      27987071471  8707CASH  174       400007261P
11886MIDI FASHIONS INC       15771070471 10722CASH  214  214 1050807141T
12874OLOOK INTERIORS         25622070971  6795CASH  136       679507231T
18274STREAMLINE PAPER INC29703072171 27403       548  238 1705507301P
23347RITE-BEST PENS CO       20642071871  1560       31       100007201P
25521IMPORTS OF NM           29273072071 79740     1593 1193 5854707271P
26723ALRIGHT CLEANERS        19473070771 46200CASH  924      4620007231T
28622NORTH CENTRAL SUPPLY17816070571  7597CASH  152       759707221T
29871FERGUSON DEALERS        27229071071  6191CASH  124       619107221T
30755FASTWAY AIRLINES        26158070671 74272CASH 1495 1685 7258707191T
31275ENVIRONMENT CONCERNS20451070671  2943       59       150007301P
32457B SOLE SILOS            27425071071 11005CASH  220      1100507201T
37945HOFFTA BREAKS INC       18276070671  4723CASH   94       472307231T
42622EASTLAKE GRAVEL CO      16429070571  2937CASH   58       293707231T
```

Figure 6. Sample Data for Sample Program

The source sequence number generated by Auto Report appears in print positions 2-5 of the listing. (Print position 1 is blank.)

Print position 6 of the Auto Report listing indicates the origin of the specification:

Blank — Specification comes from the source file.

C — Specification was copied from a source library by /COPY.

X — A /COPY modifier statement from the source file which adds, changes, or deletes entries on a cataloged input field specification (none present in this example).

Auto Report Source Listing

```
0001      H                                                                  SAMPLE
0002  0101 I/COPY F1,$AUSP1                                                  S/3ARP
0003C   03 FCSHRECRGO   F 132 132     OA     PRINTER                        CATALS
0004  0102 I/COPY F1,$AUSP2                                                  S/3ARP
0005C   02 FCASHRC  IPE F1020  68            DISK                           CATALS
0006C   01 ICASHRC  AA  01   68 CT                                          CATALS
0007C   02 I        OR        68 CP                                         CATALS
0008C   03 I                                      1   5 ACCTNO             CATALS
0009C   04 I                                      6  25 ACCTNM             CATALS
0010C   05 I                                     26  30 0INVNO             CATALS
0011C   06 I                                     31  36 0INVDAT            CATALS
0012C   07 I                                     37  42 2AMTOWD            CATALS
0013C   08 I                                     43  46 TRANS              CATALS
0014C   09 I                                     47  51 2DISCAL            CATALS
0015C   10 I                                     52  56 2DISTAK            CATALS
0016C   11 I                                     57  62 2AMTPD             CATALS
0017C   12 I                                     63  67 0DATPD             CATALS
0018C   13 I                                     68  68 CODE               CATALS
0019    01 I                                      1   1 REGIONL1           S/3ARP
0020    01 C          DISTAK    SUB  DISCAL    DIFF    42                  S/3ARP
0021    02 C          DIFF      COMP 1.00                 10  10            S/3ARP
0022    03 C          AMTOWD    SUB  DISTAK    NETOWD  62                  S/3ARP
0023  0204 C          NETOWD    SUB  AMTPD     BAL     62                  S/3ARP
0024  0301 OCSHRECRGH                *AUTO                                  S/3ARP
0025  0302 O                                     'CASH RECEIPTS REGISTER'   S/3ARP
0026  0303 O        D         01     *AUTO                                  S/3ARP
0027    0350                       REGION        'REGION'                   S/3ARP
0028  0304 O                       ACCTNO        'ACCOUNT'                  S/3ARP
0029  0305 O                                  C  'NUMBER'                   S/3ARP
0030  0306 O                       ACCTNM        'ACCOUNT NAME'             S/3ARP
0031  0310 O                       INVNO 3       'INVOICE'                  S/3ARP
0032  0311 O                                  C  'NUMBER'                   S/3ARP
0033  0312 O                       INVDATY       'INVOICE'                  S/3ARP
0034  0313 O                                  C  'DATE'                     S/3ARP
0035  0314 O                       DATPD Y       'DATE PAID'                S/3ARP
0036    14 O                       AMTOWDJA      'AMOUNT'                   S/3ARP
0037  0402 O                                  C  'OWED'                     S/3ARP
0038       O                       DISTAK A      'DISCOUNT'                 S/3ARP
0039  0404 O                                  C  'TAKEN'                    S/3ARP
0040  0405 O                       AMTPD  A      'AMOUNT'                   S/3AR
0041  0406 O                                  C  'PAID'                     S/3ARP
0042       O                       BAL    A      'BALANCE'                  S/3ARP
0043  0408 O                                  C  'DUE'                      S/3ARP
0044  0409 O                 10    DIFF   A      'EXCESS'                   S/3ARP
0045  0410 O                                  C  'DISCOUNT'                 S/3ARP
0046  0411 O                                  1  'REGION TOTALS'            S/3ARP
0047  0412 O                                  R  'COMPANY TOTALS'           S/3ARP

 E N D   O F   S O U R C E

NO  ERRORS IN PROGRAM

 END OF AUTO REPORT PROGRAM
```

Figure 7 (Part 1 of 4). Listing and Output of Sample Program

RPG II Compiler Listing

```
      0010 H                                                                    SAMPLE
RG 004


0001  0020OFCSHRECRGO   F 132 132     OA     PRINTER                           SAMPLE
0002  0030OFCASHRC  IPE F1020  68           DISK                              SAMPLE


      0040 I*/COPY F1,$AUSP1                                                    SAMPLE
      0050 I*/COPY F1,$AUSP2                                                    SAMPLE
0003  0060OICASHRC  AA  01  68 CT                                              SAMPLE
0004  0070OI        OR       68 CP                                            SAMPLE
0005  0080OI                                    1   5 ACCTNO                  SAMPLE
0006  0090OI                                    6  25 ACCTNM                  SAMPLE
0007  0100OI                                   26  30 0INVNO                  SAMPLE
0008  0110OI                                   31  36 0INVDAT                 SAMPLE
0009  0120OI                                   37  42 2AMTOWD                 SAMPLE
0010  0130OI                                   43  46 TRANS                   SAMPLE
0011  0140OI                                   47  51 2DISCAL                 SAMPLE
0012  0150OI                                   52  56 2DISTAK                 SAMPLE
0013  0160OI                                   57  62 2AMTPD                  SAMPLE
0014  0170OI                                   63  67 0DATPD                  SAMPLE
0015  0180OI                                   68  68 CODE                    SAMPLE
0016  0190 I                                    1   1 REGIONL1                SAMPLE


0017  0200 C           DISTAK    SUB  DISCAL    DIFF    42                     SAMPLE
0018  0210 C           DIFF      COMP 1.00                 10  10               SAMPLE
0019  0220 C           AMTOWD    SUB  DISTAK    NETOWD  62                     SAMPLE
0020  0230 C           NETOWD    SUB  AMTPD     BAL     62                     SAMPLE
0021  0240EC   01               EXSR A$$SUM                                    SAMPLE
0022  0250ECL1         AMTOWR    ADD  AMTOW1    AMTOWR  82                     SAMPLE
0023  0260ECL1         DISTAR    ADD  DISTA1    DISTAR  72                     SAMPLE
0024  0270ECL1         AMTPDR    ADD  AMTPD1    AMTPDR  82                     SAMPLE
0025  0280ECL1         BALR      ADD  BAL1      BALR    82                     SAMPLE
0026  0290ECL1         DIFFR     ADD  DIFF1     DIFFR   62                     SAMPLE
0027  0300ECSR         A$$SUM    BEGSR                                          SAMPLE
0028  0310ECSR         AMTOW1    ADD  AMTOWD    AMTOW1  82                     SAMPLE
0029  0320ECSR         DISTA1    ADD  DISTAK    DISTA1  72                     SAMPLE
0030  0330ECSR         AMTPD1    ADD  AMTPD     AMTPD1  82                     SAMPLE
0031  0340ECSR         BAL1      ADD  BAL       BAL1    82                     SAMPLE
0032  0350ECSR 10      DIFF1     ADD  DIFF      DIFF1   62                     SAMPLE
0033  0360ECSR                   ENDSR                                        SAMPLE


0034  0370EOCSHRECRGH  206   1P                                                SAMPLE
0035  0380EO        OR       OA                                               SAMPLE
0036  0390EO                                    76 'CASH RECEIPTS REGISTER'    SAMPLE
0037  0400EO                          UDATE Y    8                           SAMPLE
0038  0410EO                          PAGE  Z  131                           SAMPLE
0039  0420EO                                   127 'PAGE '                    SAMPLE
0040  0430EOCSHRECRGH  1     1P                                                SAMPLE
0041  0440EO        OR       OA                                               SAMPLE
```

Figure 7 (Part 2 of 4). Listing and Output of Sample Program

RPG II Compiler Listing (continued)

```
0450EO                                    6 'REGION'                    SAMPLE
0460EO                                   15 'ACCOUNT'                   SAMPLE
0470EO                                   29 'ACCOUNT NAME'              SAMPLE
0480EO                                   46 'INVOICE'                   SAMPLE
0490EO                                   56 'INVOICE'                   SAMPLE
0500EO                                   67 'DATE PAID'                 SAMPLE
0510EO                                   80 'AMOUNT'                    SAMPLE
0520EO                                   92 'DISCOUNT'                  SAMPLE
0530EO                                  105 'AMOUNT'                    SAMPLE
0540EO                                  118 'BALANCE'                   SAMPLE
0550EO                                  128 'EXCESS'                    SAMPLE
0560EOCSHRECRGH  2      1P                                              SAMPLE
0570EO        OR        OA                                              SAMPLE
0580EO                                   14 'NUMBER'                    SAMPLE
0590EO                                   45 'NUMBER'                    SAMPLE
0600EO                                   54 'DATE'                      SAMPLE
0610EO                                   79 'OWED'                      SAMPLE
0620EO                                   90 'TAKEN'                     SAMPLE
0630EO                                  104 'PAID'                      SAMPLE
0640EO                                  116 'DUE'                       SAMPLE
0650EO                                  129 'DISCOUNT'                  SAMPLE
0660EOCSHRECRGD  1      01                                              SAMPLE
0670EO                          REGION    3                             SAMPLE
0680EO                          ACCTNO   14                             SAMPLE
0690EO                          ACCTNM   37                             SAMPLE
0700EO                          INVNO 3  45                             SAMPLE
0710EO                          INVDATY  56                             SAMPLE
0720EO                          DATPD Y  66                             SAMPLE
0730EO                          AMTOWDJB 80                             SAMPLE
0740EO                          DISTAKKB 92                             SAMPLE
0750EO                          AMTPD KB 105                            SAMPLE
0760EO                          BAL   KB 118                            SAMPLE
0770EO                  10      DIFF  KB 129                            SAMPLE
0780EOCSHRECRGT 12      L1                                              SAMPLE
0790EO                          AMTOW1JB 80                             SAMPLE
0800EO                          DISTA1KB 92                             SAMPLE
0810EO                          AMTPD1KB 105                            SAMPLE
0820EO                          BAL1  KB 118                            SAMPLE
0830EO                          DIFF1 KB 129                            SAMPLE
0840EO                                   67 'REGION TOTALS'             SAMPLE
0850EO                                  130 '*'                         SAMPLE
0860EOCSHRECRGT 12      LR                                              SAMPLE
0870EO                          AMTOWRJB 80                             SAMPLE
0880EO                          DISTARKB 92                             SAMPLE
0890EO                          AMTPDRKB 105                            SAMPLE
0900EO                          BALR  KB 118                            SAMPLE
0910EO                          DIFFR KB 129                            SAMPLE
0920EO                                   67 'COMPANY TOTALS'            SAMPLE
0930EO                                  131 '**'                        SAMPLE
```

Figure 7 (Part 3 of 4). Listing and Output of Sample Program

3/10/72 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	
1	11243	JONES HARDWARE	27541	7/11/71	7/21/1	23.75	.47	23.28			
1	11352	NU-STYLE CLOTHIERS	27987	7/14/71	7/26/1	87.07		40.00	47.07		
1	11886	MIDI FASHIONS INC	15771	7/04/71	7/14/1	107.22	2.14	105.08			
1	12874	OLOOK INTERIORS	25622	7/09/71	7/23/1	67.95		67.95			
1	18274	STREAMLINE PAPER INC	29703	7/21/71	7/30/1	274.03	2.38	170.55	101.10		
					REGION TOTALS	560.02	4.99	406.86	148.17		*
2	23347	RITE-BEST PENS CO	20842	7/18/71	7/20/1	15.80		10.00	5.80		
2	25521	IMPORTS OF NM	29273	7/20/71	7/27/1	797.40	11.93	585.47	200.00		
2	26723	ALRIGHT CLEANERS	19473	7/07/71	7/23/1	462.00		462.00			
2	28622	NORTH CENTRAL SUPPLY	17816	7/05/71	7/22/1	75.97		75.97			
2	29871	FERGUSON DEALERS	27229	7/10/71	7/22/1	61.91		61.91			
					REGION TOTALS	1,413.08	11.93	1,195.35	205.80		*
3	30755	FASTWAY AIRLINES	26158	7/06/71	7/19/1	742.72	16.85	725.97		1.90	
3	31275	ENVIRONMENT CONCERNS	20451	7/06/71	7/30/1	29.43		15.00	14.43		
3	32457	B SOLE SILOS	27425	7/10/71	7/20/1	110.05		110.05			
3	37945	HOFFTA BREAKS INC	18276	7/06/71	7/23/1	47.23		47.23			
					REGION TOTALS	929.43	16.85	898.15	14.43	1.90	*
4	42622	EASTLAKE GRAVEL CO	16429	7/05/71	7/23/1	29.37		29.37			
					REGION TOTALS	29.37		29.37			*
					COMPANY TOTALS	2,931.90	33.77	2,529.73	368.40	1.90	**

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

Obtaining the Sample Program — Model 10, 12, or 15

Note: The OCL statements shown in the following procedures should be entered using the device you selected as your system input device during system generation, unless you have altered the device assignment during IPL by entering a READER OCL statement or a READER Operation Control Command (OCC). For a description of Operator Control Commands, see the *IBM System/3 Model 15 System Control Programming Reference Manual,* GC21-5077.

The system input device may be one of the following:

Model 10 or 12	*Model 15*
5424 MFCU	5424 MFCU
1442 Card Read Punch	1442 Card Read Punch
5471 Printer/Keyboard	2560 MFCM
3741 Data Station or Programmable Work Station, directly attached	2501 Card Reader
	3277 Display Station
	3741 Data Station or Programmable Work Station, directly attached

1. Mount the distribution pack on R1 and ready the disk.
2. Set the program load selector at REMOVABLE DISK.
3. Remove any cards from the reader hoppers.
4. Press reader NPRO. Any cards in the wait station are fed into a stacker.
5. Ready the printer.
6. Enter the following OCL statements from the assigned System input device.

For Model 10, 12, or 15 without Spooling

```
// DATE 00/00/00
// CALL $AUPL, R1
// RUN
```

For Model 15 with Spooling

```
//AUTORPT1 JOB
// CALL $AUPL, R1
// RUN
/.
```

7. If the system input device is the card reader, place the punched OCL statements in the reader hopper.

8. Press reader START

9. Press PROGRAM LOAD. Initial program loading is performed, and when complete, the system begins reading cards (Models 10 and 12), or stops with a message displayed on the CRT (Model 15). If your system has DPF (Models 10 and 12), EJ is displayed in the message display unit when initial program loading is complete. Press PROG 1 HALT/RESET to continue.

For Model 15 without spooling, press the PF12 key, position the cursor on the CRT to the partition 1 end of job message, and press the ENTER key to continue.

When $AUPL has copied the needed source programs and procedures from the distribution pack to F1, EJ is displayed in the message display unit (Models 10 and 12), or a message is displayed on the CRT (Model 15).

10. Press reader NPRO. One card is fed into a stacker. Remove the OCL cards from the stacker. Continue with, *Compiling and Executing the Sample Program Model 10, 12, or 15.*

Note: If your printer has 132 print positions, follow the procedure under *Compiling and Executing the Sample Program Model 10, 12, or 15.* If your printer has fewer than 132 print positions, use the procedure *Changing Print Position Size Models 10 and 12* to alter printer size.

Changing Print Position Size — Models 10 and 12

1. Enter the following OCL statements from the assigned system input device, inserting the file description specification after the // COPY statement as shown.

```
// LOAD $MAINT, F1
// RUN
// COPY FROM-READER,TO-F1,LIBRARY-S,
                          RETAIN-R,NAME-$AUSP1
Place the file description specification here.
// CEND
// END
```

File Description Specifications

Line	Form Type	Filename	I/O/U/C/D	P/S/C/R/T/D	E	A/D	F/V/S/M/D	Block Length	Record Length	L/R	A/P/I/K	I/D/T or 2	Type of File Organization or Additional Area	Overflow Indicator	Key Field Starting Location	Extension Code E/L	Device
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
File Type										Mode of Processing							
File Designation										Length of Key Field or of Record Address Field							
End of File										Record Address Type							
Sequence																	
File Format																	
0 2	F	CSHRECR60					F	Ø96	Ø96					OA			PRINTER
0 3	F																

2. Place the cards in the reader hopper.

3. Press reader START. When the cards have been read, EJ is displayed in the message display unit.

4. Press reader NPRO. One card is fed into a stacker.

Continue with the procedure in the next paragraph, *Compiling and Executing the Sample Program – Model 10, 12, or 15.* See index entry *overflow of the D/T-* AUTO print lines* for a report showing the result of the reduced printer record length.

Compiling and Executing the Sample Program – Model 10, 12, or 15

1. Remove the distribution pack.

2. Mount the tailored system disk cartridge (disk ID is SYSTEM) on R1 and ready disk.

3. Enter the following OCL statements from the assigned system input device:

```
// DATE 00/00/00 (omit on spooled Model 15)
// AUTORPT2 JOB (spooled Models 12 and 15 only)
// NOHALT

// LOG PRINTER
// CALL RPG,R1
// FILE NAME-$SOURCE, UNIT-R1, RETAIN-T,
   TRACKS-10,PACK-SYSTEM
// COMPILE SOURCE-$AUSPA,UNIT-F1
// RUN

// CALL AUTO2,F1
// RUN

// CALL AUTO,R1
// COMPILE SOURCE-$AUSPB,UNIT-F1
// RUN

// HALT
// CALL AUTO3,F1
//RUN
/. (spooled Model 15 only)
```

4. Ready printer.

5. Set program load selector at REMOVABLE DISK.

6. Press PROGRAM LOAD.

7. Initial program loading is performed and when complete the system begins reading cards (Models 10 and 12), or stops with a message displayed on the CRT (Model 15).

   If your system has DPF (Models 10 and 12), EJ is displayed in the message display unit when initial program loading is complete. Press PROG 1 HALT/ RESET to continue.

   For Model 15 without spooling, press the PF12 key, position the cursor on the CRT to the partition 1 end of job message, and press the ENTER key to continue.

If you run the sample program a second time, a 6E halt occurs twice during the run. This halt indicates that an entry with the same name already exists in the library. When this halt occurs, select option 0 to continue. This deletes the old library entry and replaces it with the new entry.

Obtaining the Sample Program – Model 6

1. Mount the distribution disk cartridge on R1 (Disk ID is SYSTEM).

2. Ready disk R1 (set DRIVE 1 switch to ON).

3. Set DISK SELECT switch to REMOVABLE.

4. When disk becomes ready, move PROGRAM LOAD switch to ON.

5. When the system prints DATE, follow the system prompts and operator responses shown below. The source library procedure $AUPL copies the sample program and procedures from the distribution disk cartridge on R1 to F1.

System Prompts	*Operator Responds*
DATE	mmddyy or ddmmyy
READER	Press PROG START key or type KEY
READY	CALL
CALL NAME	$AUPL
UNIT	R1
MODIFY	RUN
MODIFY	RUN

6. When halt ABCD12345 occurs, press system STOP and set DRIVE 1 switch to OFF. Remove the distribution disk cartridge from R1.

Compiling and Executing the Sample Program — Model 6

1. Mount the tailored system disk cartridge on R1 (disk ID is SYSTEM). This pack contains the RPG II compiler, the Auto Report Feature, and the source library procedure to load Auto Report (AUTO).

2. Ready disk R1 (set DRIVE 1 switch to ON).

3. When the disk becomes ready, move the SYSTEM START/STOP switch to START.

4. Follow the system prompts and operator responses shown below to compile the preliminary RPG II program, $AUSPA.

System Prompts	*Operator Responds*
READY	CALL
CALL NAME	AUTO1
UNIT	F1
(RPG procedure)	
SOURCE	$AUSPA
MODIFY	RUN

5. If the sample program has been run previously, a D2345 halt occurs during compilation of the $AUSPA program. When this halt occurs, enter 0 and press the PROG START key. The object program is stored in the object library under the name CREATE. If the program has been run previously, the new object library member replaces the old member.

6. When compilation is complete, halt ABCD12345 occurs. Move the SYSTEM START/STOP switch to START.

7. Follow the system prompts and operator responses shown below to execute the CREATE program.

System Prompts	*Operator Responds*
READY	CALL
CALL NAME	AUTO2
UNIT	F1
(AUTO2 procedure)	
MODIFY	RUN

8. After the data for the Auto Report sample program has been printed (Figure 6) and the CASHRC file has been created, halt ABCD12345 occurs. Move the SYSTEM START/STOP switch to START.

9. Follow the system prompts and operator responses shown below to compile the sample program, $AUSPB

System Prompts	*Operator Responses*
READY	CALL
CALL NAME	AUTO
UNIT	R1
(AUTO procedure)	
SOURCE	$AUSPB
MODIFY	RUN

10. If the sample program has been run previously, a D2345 halt occurs during compilation of the Auto Report sample, $AUSPB. When this halt occurs, enter 0 and press the PROG START key. The object program is cataloged in the object library under the name SAMPLE. If the program has been run previously, the new object library member replaces the old member.

11. When compilation is complete, halt ABCD12345 occurs. Move the SYSTEM START/STOP switch to START.

12. Follow the system prompts and operator responses shown below to execute the SAMPLE program.

System Prompts	*Operator Responses*
READY	CALL
CALL NAME	AUTO3
UNIT	F1
MODIFY	RUN

When halt ABCD12345 occurs, the sample program is complete. The listing and report for the sample program should match Figure 7.

PART III.

REFERENCE INFORMATION

Auto Report Option Specification

The Auto Report Option specification (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 entires for the meanings of the blank entries). The Option specification cannot be within a source library member that is copied by a /COPY statement, but it may be cataloged with statements that are compiled using the COMPILE OCL statement. Do not confuse the Option specification (U in position 6) with the RPG II control card (H in position 6). If the RPG II control card 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 control card specification with blank entries.

SPECIFICATIONS

The following entries on the Option specification are used in the same way as corresponding entries on standard RPG specifications. See the appropriate RPG II reference manual for descriptions of these common entries:

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

Form Type (6)

Enter a U in position 6 of the statement to identify it as an Auto Report Option specification.

Source (7)

Entry	*Explanation*
P (Model 10, 12, or 15)	The generated RPG II source program is to be punched into cards or written to diskette.
C (Models 6, 10, and 15)	The generated source program is to be cataloged in a source library on disk. (Enter the location and name of the cataloged member in positions 8-16.)
B (Models 10, 12, and 15)	The generated source program is to be both punched into cards or written to diskette and cataloged in a source library. (Enter the location and name of the cataloged member in positions 8-16.)
Blank	The generated source program is to be neither punched nor cataloged.

Use position 7 to request additional output from Auto Report. You can specify that the source program be punched into cards or written to diskette, cataloged in a source library, both punched and cataloged, or neither punched nor cataloged. In all cases, the generated source program is also written on a disk work file from which it is immediately compiled.

If a punched deck is desired (P or B option on the Model 10 Disk System, Model 12 or 15), blank cards must be placed in the hopper of the card unit which was assigned as system output device during system generation or which was subsequently assigned as system output device by means of a // PUNCH OCL statement. If you are using the 1442 Card Read Punch, place blank cards behind the source deck in the hopper. The punched cards are stacked as follows:

Option Specifications

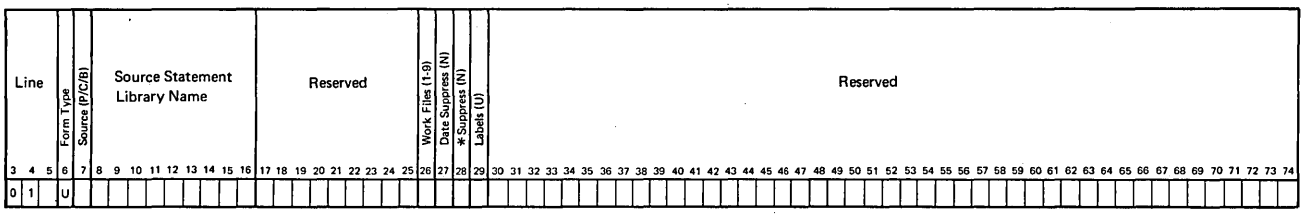

Figure 8. Auto Report Option Specifications

System Output Device	*Stacker*
Model 10, 12, or 15	
MFCU2	4 (cards are interpreted)
MFCU1	1 (cards are interpreted)
1442	2 (cards are not interpreted)
Model 15 Only	
MFCM1 (Model A1)	1 (cards interpreted if print feature installed)
MFCM2 (Model A1)	5 (cards interpreted if print feature installed)
MFCM1 (Model A2)	1 (cards interpreted if print feature installed)
MFCM2 (Model A2)	4 (cards interpreted if print feature installed)

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 re-running the Auto Report Feature. If the source output is to go to diskette, then the correct diskette should be mounted and readied before the output operation begins.

Generated source programs that are cataloged become permanent source library members (RETAIN-P). That is, they are not deleted unless you use the DELETE function of the Library Maintenance Program to delete individual members, or the ALLOCATE function to delete the entire library. A library member cataloged by Auto Report, however, is replaced by another member cataloged under the same name.

As source library members, source programs can be compiled using the COMPILE OCL statement or they can be written or punched out using the COPY function of the Library Maintenance Program. The generated source program is not cataloged when terminal errors exist in the Auto Report statements.

A typical use for punching and cataloging the source program in the same step (B entry for Model 10, 12, or 15) is to save time in modifying the source program if the output report is unsatisfactory. This saves re-running the Auto Report Feature with revised specifications or punching the generated source program using the Library Maintenance Program so that it can be modified.

Source Statement Library Name (8-16)

Entry	*Explanation*
{R1 / R2 / F1 / F2},name	The name of the disk on which the source library resides followed by the library name of the cataloged source program.

Make an entry in positions 8-16 if the generated source program is to be cataloged in a source library (C or B entry in position 7). Positions 8-9 contain the name of the disk on which the source library resides (R1, R2, F1, F2).

Position 10 contains a comma. Positions 11-16 contain the name under which the generated source program is to be cataloged. The name can consist of one to six characters; the first character must be in position 11 and must be alphabetic (any of the letters A-Z or one of the three special characters #, $, or @.) The remaining characters can be alphabetic or numeric.

If the name used to catalog the generated source program is the same as the name of an existing permanent member in the library, the old member is replaced by the new member.

Positions 17-26

Positions 17-26 are not used. Leave them blank.

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. See index entry *asterisk indication* for rules used in generating asterisk indication.

Positions 29-74

Positions 29-74 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 the Auto Report Feature are requested by entering the characters *AUTO in positions 32-37 of a record description specification on the standard RPG Output-Format Sheet. *AUTO can be entered on a heading, detail, or total specification (H, D, or T in position 15), but not on an exception output specification (E in position 15). *AUTO can be used with only one file in a program. That file must be printer file. (Either carriage of a dual feed printer may be specified in positions 40-46 of the file description specification. The CONSOLE device may not be specified.)

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 Report 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.

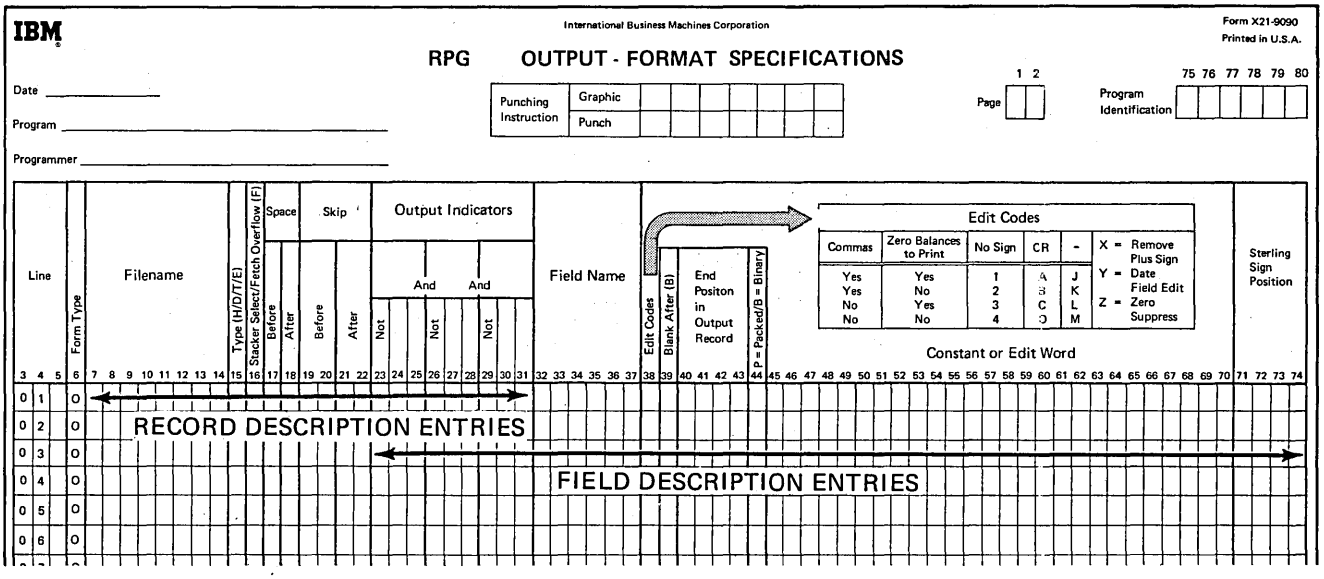

Figure 9. Two Categories of Output Specifications

*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 order specified on the RPG Output-Format 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 index entry *Field Description Specifications, positions 45-70,* for entering 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 control card 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 Specification.

Note: The Auto Report Feature uses one of the unused RPG II PAGE fields (PAGE, PAGE1, PAGE2) 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 on which the heading is to be printed. The filename must correspond to the rules for filenames given in the RPG II reference manual.

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, the Auto Report Feature skips to line 06 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 RPG II reference manual. 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 to 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.

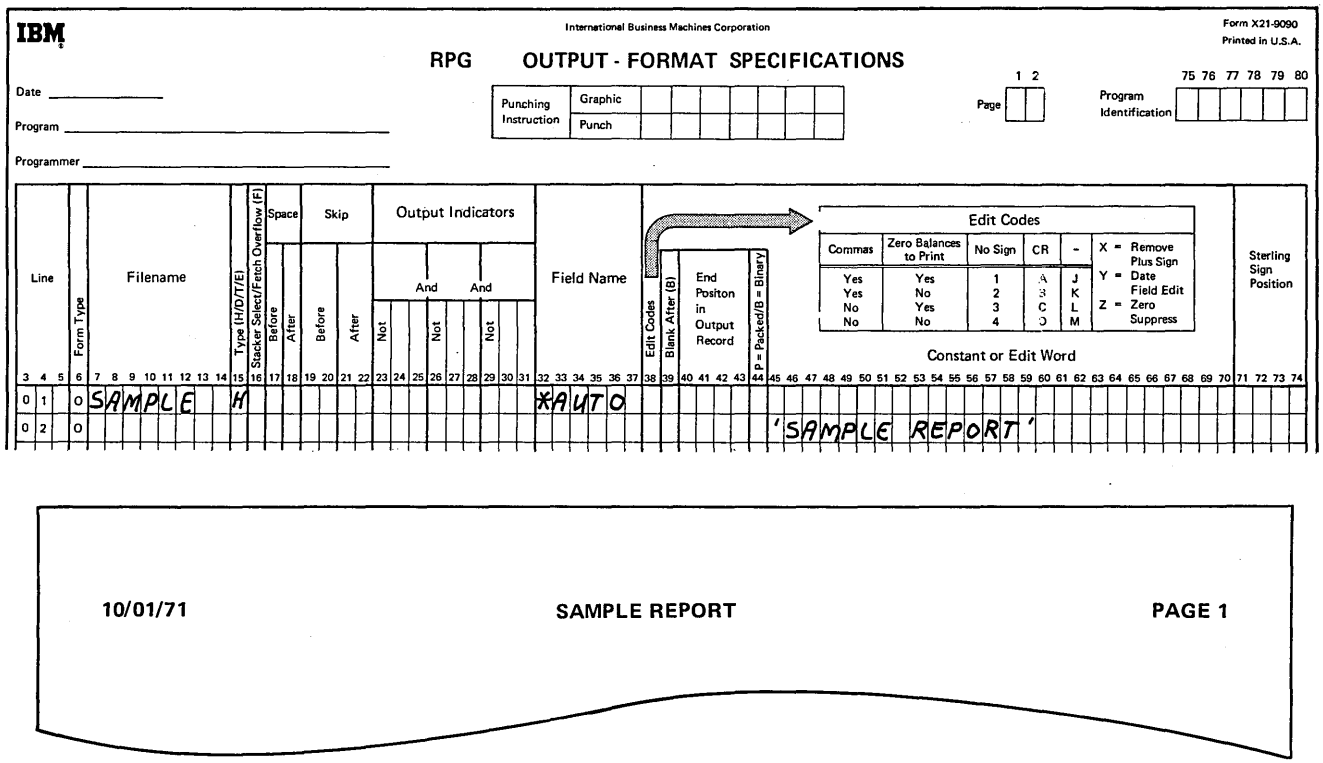

Figure 10. Specifications and Results – *AUTO Heading Line

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, PAGE2, 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 columns 32-37. If you use a 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 the Auto Report Feature 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 RPG II reference manual 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 Output Specifications

Detail reports (where a line is printed for each individual record 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 specifications 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 specifications 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-L9, 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 Job,* and under index entry *group printing.*

RECORD DESCRIPTION SPECIFICATIONS

An Auto 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 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 RPG II reference manual.

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 to appear on the detail line
- Column headings
- Total rolling
- 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 your RPG II reference manual.

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.

Restriction: If you specify N1P on a D-*AUTO record description specification which is followed by field descriptions for totaling fields (A in position 39), the calculations generated for the totaling fields are also conditioned by N1P. This causes a terminal diagnostic in the RPG II compiler.

*AUTO (32-37)

To indicate that you are using the Auto Report Feature, 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 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 on each detail line conditioned by the indicator. When group printing is specified (T-*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).

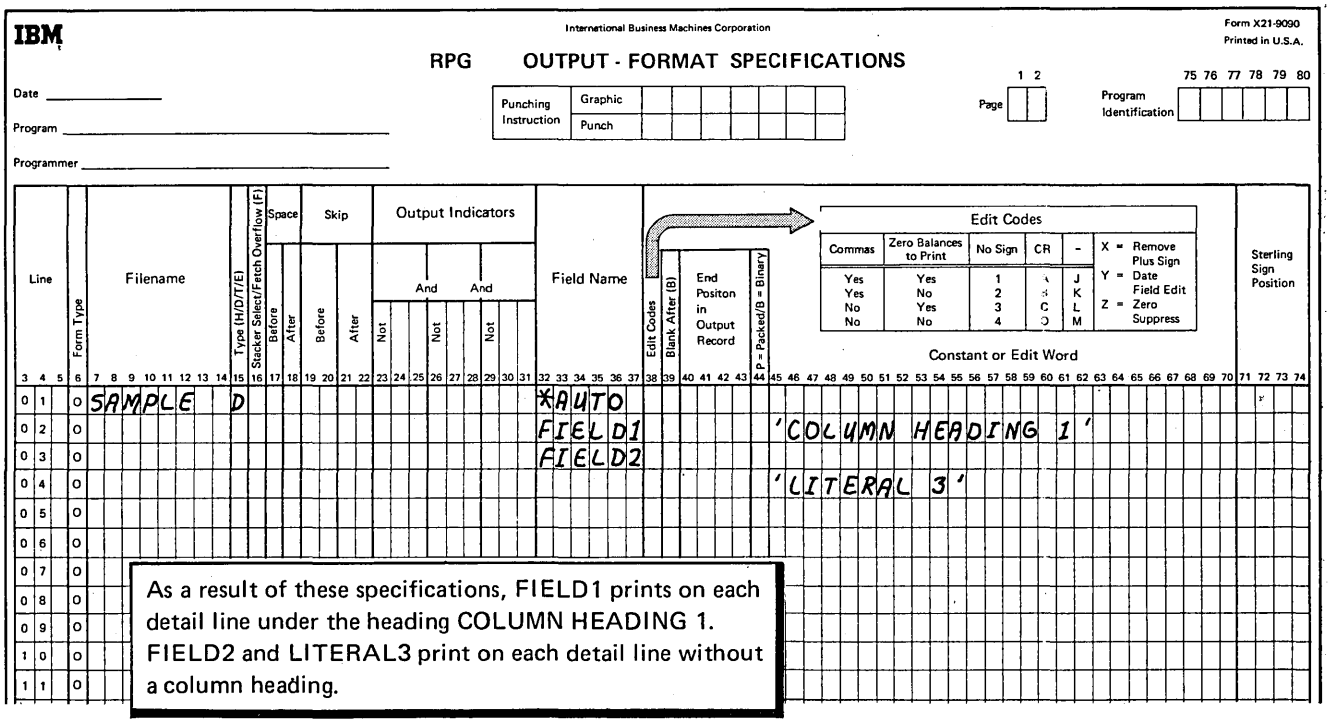

Figure 11. Auto Report Field Description Specifications (Blank in Position 39).

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 rightmost 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 cannot be specified. Leave this position blank.

Constant (45-70)

You may enter a literal (constant) or blanks in positions 45-70 when position 39 contains blank. 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 record 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.

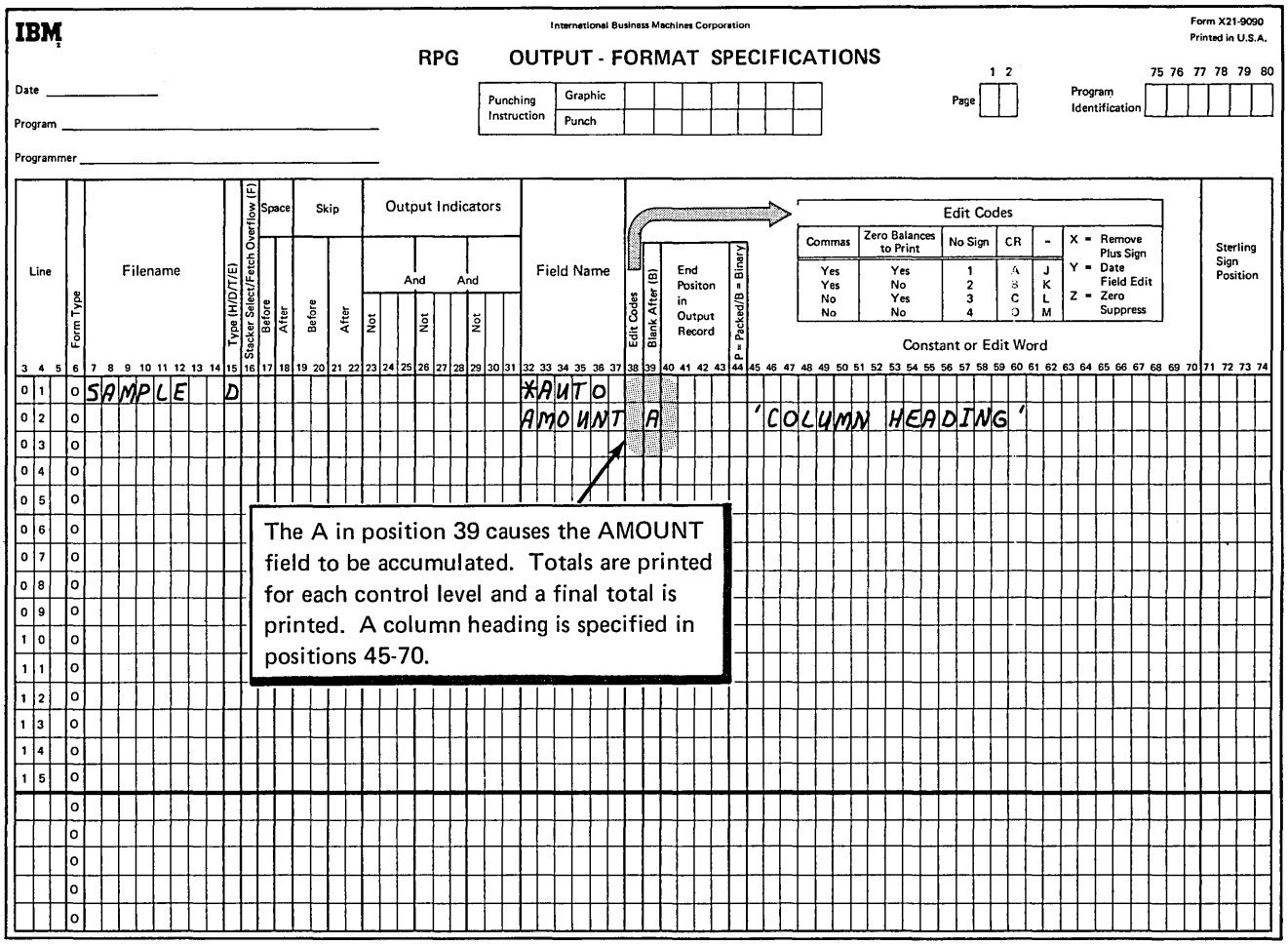

Figure 12. Describing a Field That is to be Accummulated.

Generated Total Fields

When an A is specified in positions 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

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 index entry *group printing, example 1.*) 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 AMOUN1, 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 indentical 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 index entry *group printing, example 1.*) 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 columns 32-37.

Position 39

Enter an A to indicate that totals are to be accumulated for the field named in columns 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 are printed on the line, to the right of the highest end position generated from the D/T-*AUTO specification. One asterisk is printed to the right on the lowest level total line generated. One additional asterisk is printed 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 is printed to the right of the L1 line, two asterisks are printed on the L3 line, and three are printed on the LR line. As many as ten asterisks are printed 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 Specification.

End Position in Output Record (40-43)

Positions 40-43 may be left blank or may contain the print position of the rightmost 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 cannot be used. 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. The Auto Report Feature 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, B, 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).

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.

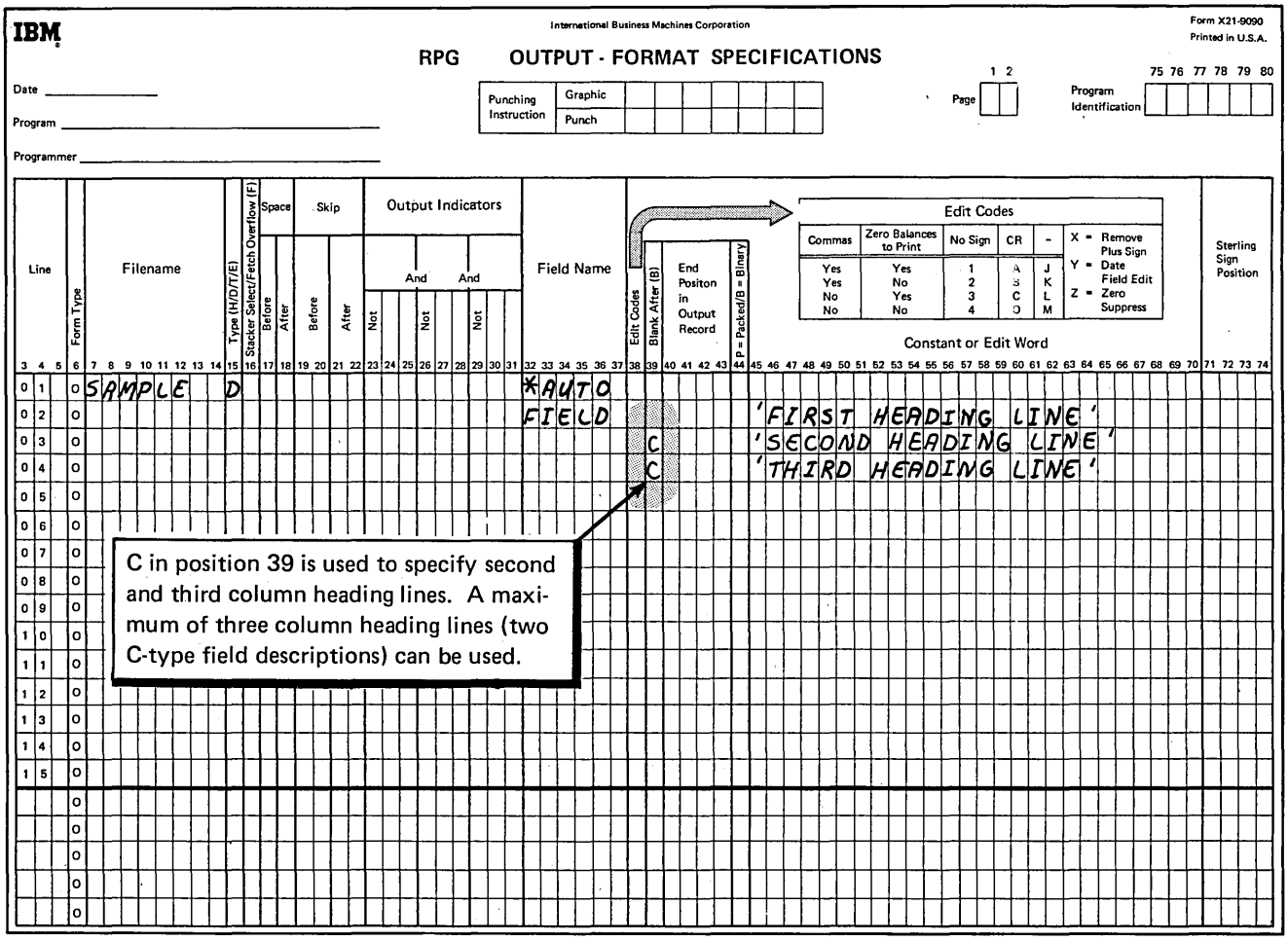

Figure 13. Specifying Second and Third Column Heading Lines

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.

If none of the *AUTO output fields are defined with an A in position 39, then 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.

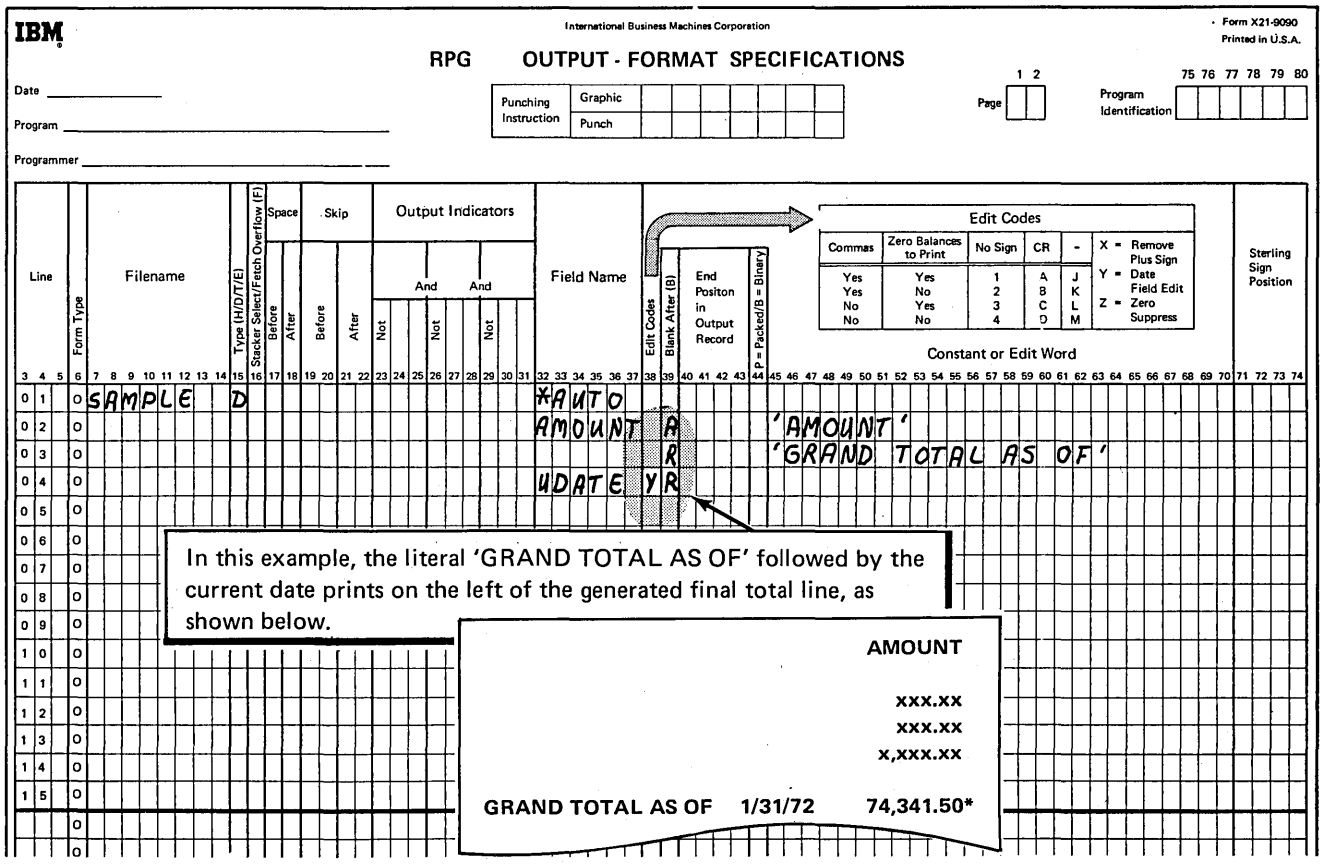

Figure 14. Specifying a Literal and a Field to Print on a Generated Total Line

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 the Auto Report Feature.

Position 39

Enter one of numbers 1, 2, 3, 4, 5, 6, 7, 8, 9, or the letter R. These entries correspond to the indicators L1, L2,... L9, and LR. 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, then 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-*AUTO specification, totals are printed for all defined control levels and LR.

File Description Specifications

Line	Filename	Form Type	I/O/U/C/D	P/S/C/R/T/D	E	A/D	F/V/S/M/D	Block Length	Record Length	L/R	A/P/I/K	I/D/T or 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	Core Index	K	Option	Entry	A/U	Number of Tracks for Cylinder Overflow	Number of Extents	Tape Rewind	R/U/N	File Condition U1-U8
02	SALES	F	IP				F	473	43								DISK													
03	PRINTER	F	O				F	120	120								PRINTER													
04	DISKSUM	F	O				F	250	25								DISK													

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RPG INPUT SPECIFICATIONS

Date _____ Program _____ Programmer _____ Punching Instruction: Graphic / Punch — Page — Program Identification

Line	Filename	Form Type	Sequence	Number (1-N)	Option (O)	Record Identifying Indicator or **	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 = Packed/B = Binary	Field Location: From	Field Location: To	Decimal Positions	Field Name	Control Level (L1-L9)	Field
01	SALES	I	AA			01																				
02		I																			1	7		ITEMNO		
03		I																			8	9		BRANCHL1		
04		I																			10	10		REGIONL2		
05		I																			11	25		DESC		
06		I																			26	27	0	SOLDQY		
07		I																			28	34	2	SOLDVA		
08		I																			35	36	0	ONHAND		
09		I																			37	43	2	VALUE		

L1 and L2 are the defined control levels.

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

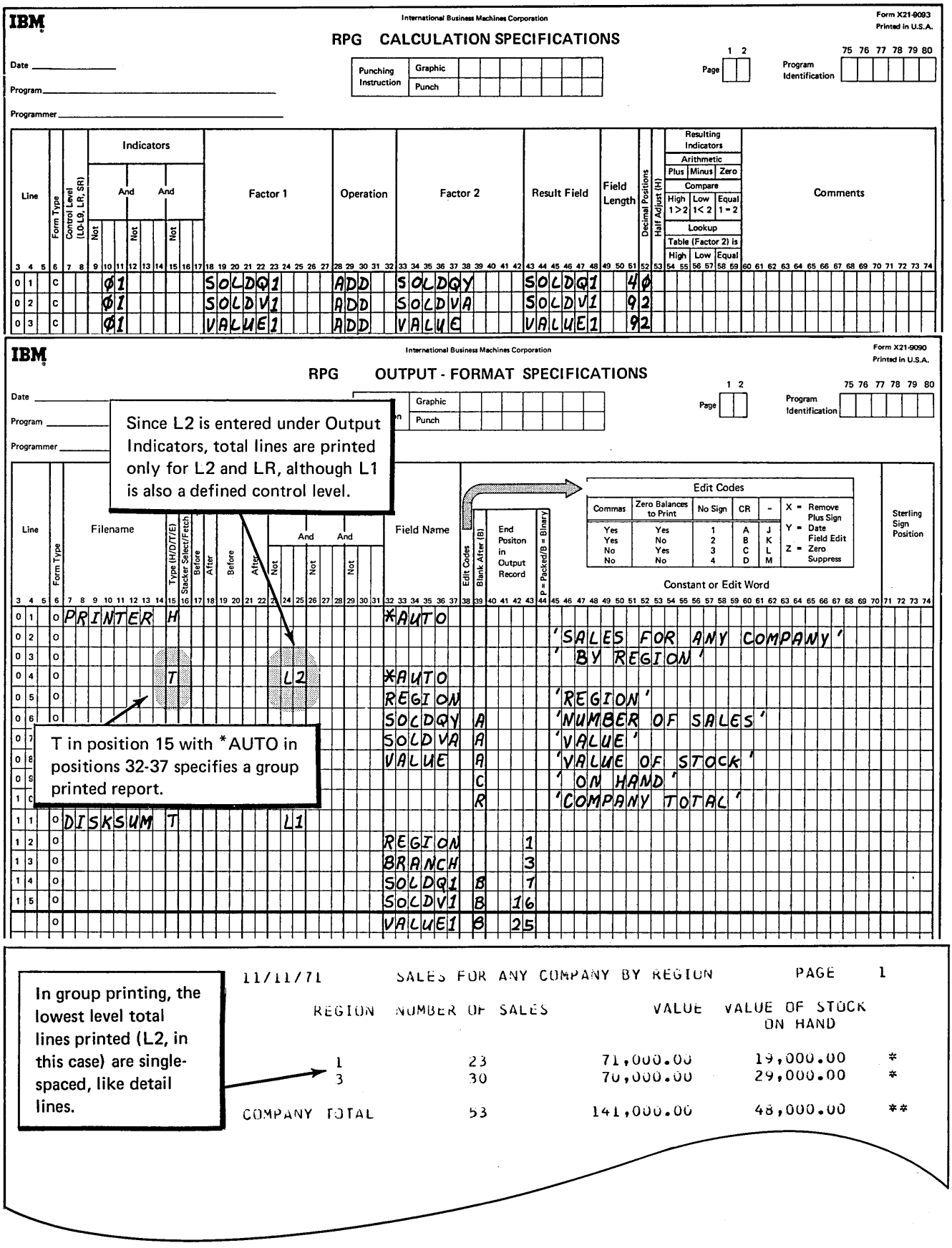


Figure 16. Using *AUTO to Produce a Group Printed Report Showing Region and Final Totals

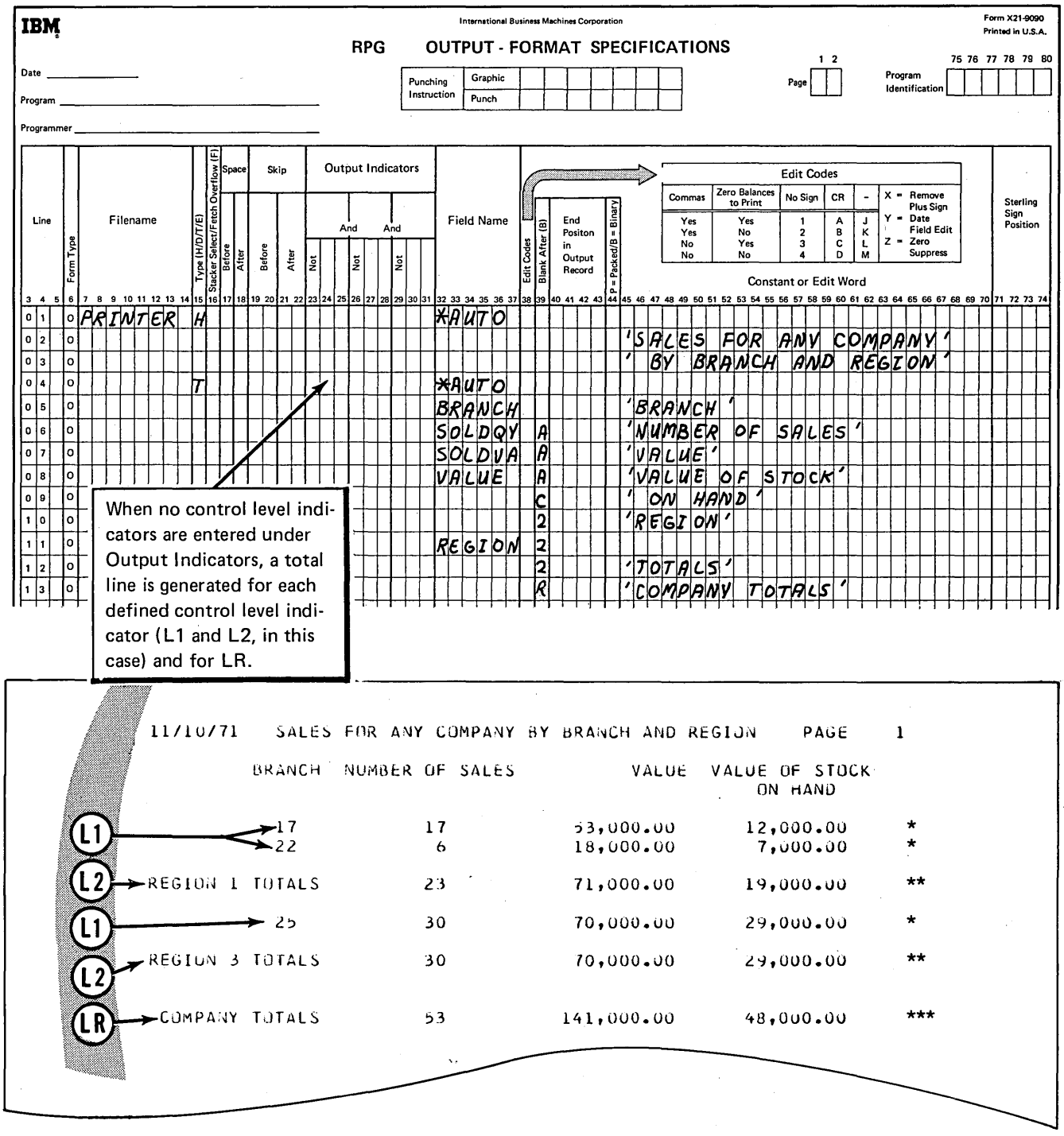


Figure 17. Using *AUTO to Produce a Group Printed Report Showing Branch, Region, and Final Totals

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 Library Maintenance disk utility program (see the appropriate SCP reference manual listed in the preface).

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 entry 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 1: 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 entry 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
13-21	xx,yyyyyy identifies the disk unit on which the source library containing the entry to be included resides and the source member. xx can be: R1, R2, F1, or F2. yyyyyy is the name, up to six characters long, of the entry to be included.
22-49	Blank
50-80	Enter any information or comments. The contents of these positions are not read by the Auto Report Feature.

Figure 18 shows an example of the /COPY statement.

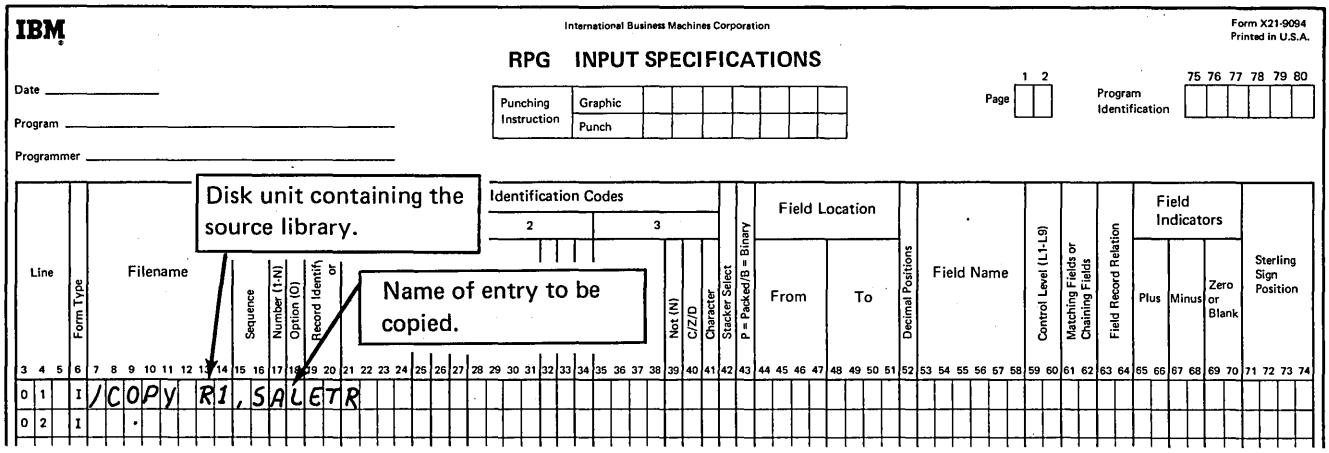
MODIFYING COPIED SPECIFICATIONS

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.

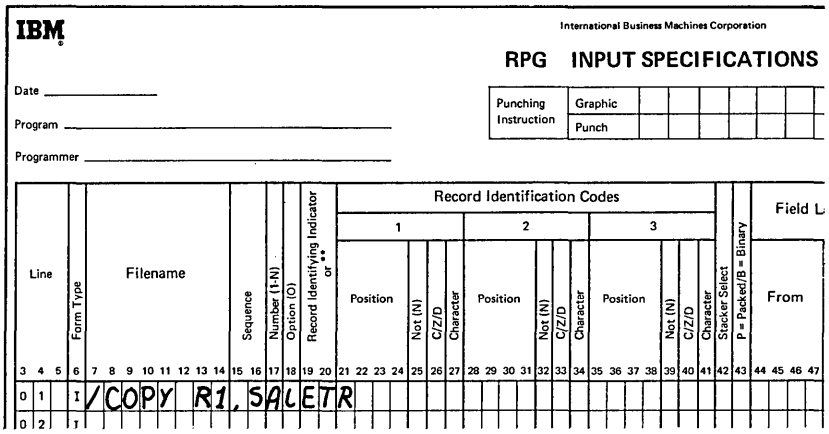


Note: It is convenient to code the /COPY statement on the Input sheet if input specifications are to be modified as they are copied. (See index entry *modifying input specifications.*)

Figure 18. Example of the /COPY Auto Report Statement

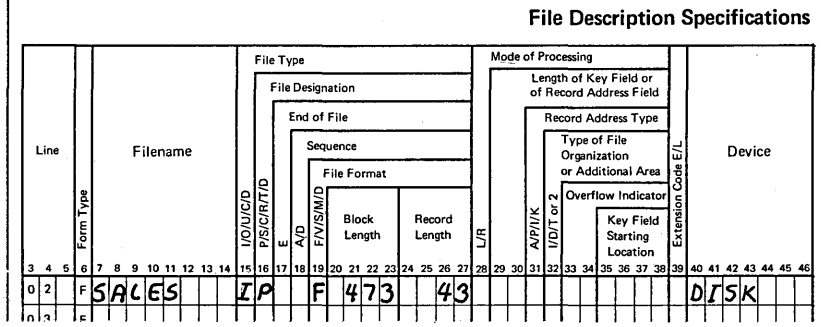
For example, suppose the file description specification for a frequently used file named SALES is to be copied from the source library. The original specification contains an I in File Type (position 15), defining SALES as an input file (Figure 19, insert A). In a particular job, you want to update the 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 entry named SALETR.



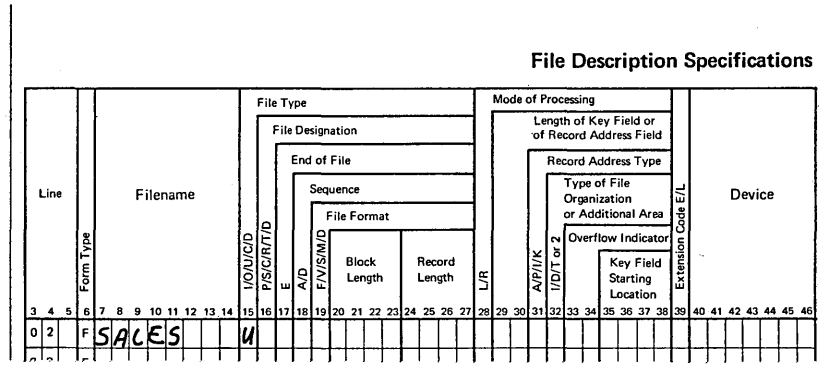
(A)

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



(B)

Copy function modifier statement.



(C)

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

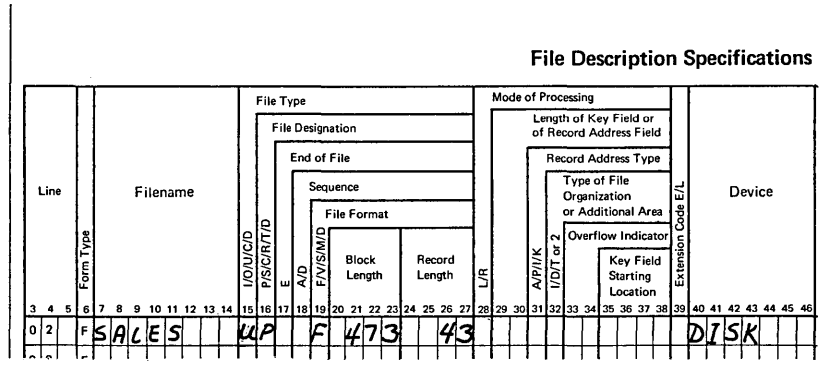


Figure 19. Modifying a Copied File Description Specification

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, add an ampersand to the modifier statement 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 modified.

Only one file description specification with a particular filename is allowed to come from the library entries 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.

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 fieldnames 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 inlcude at least 20 input field modifier statements per /COPY statement. If more than the minimum amount of main storage is available, more than 20 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 main 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.

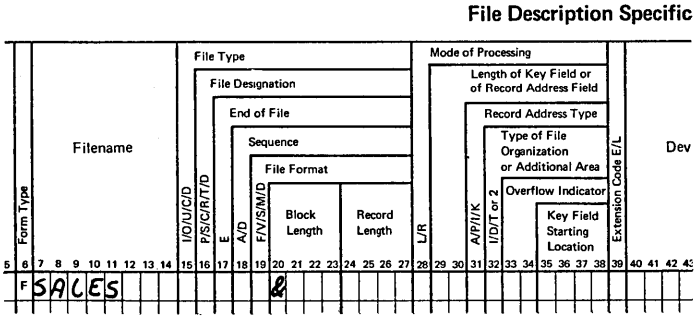
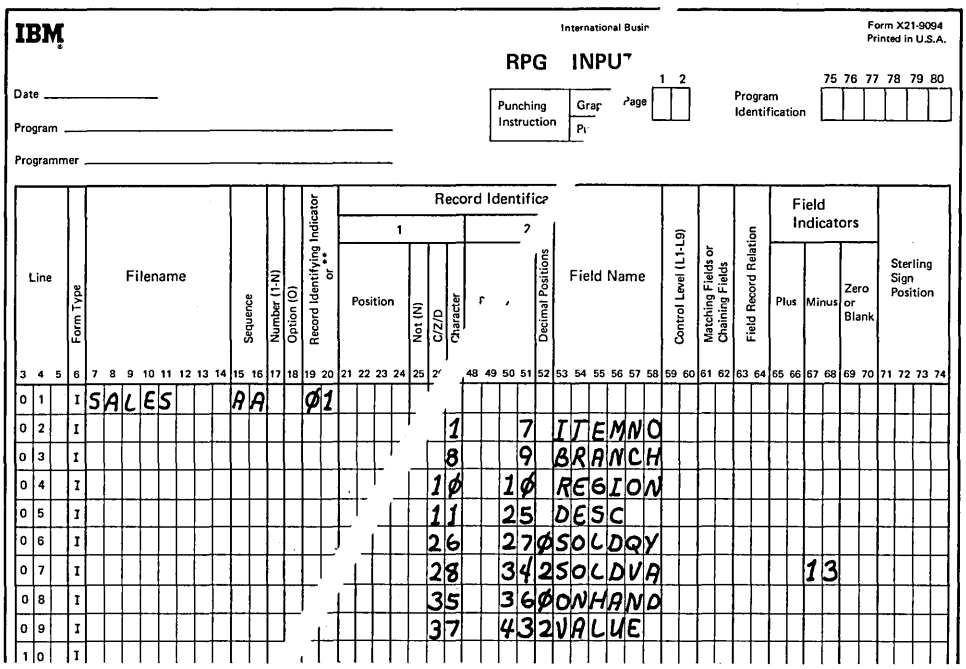


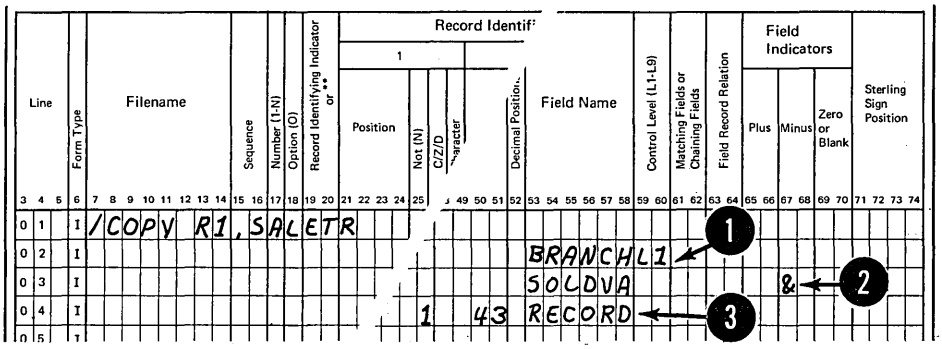
Figure 20. Setting a Copied File Description Entry to Blank

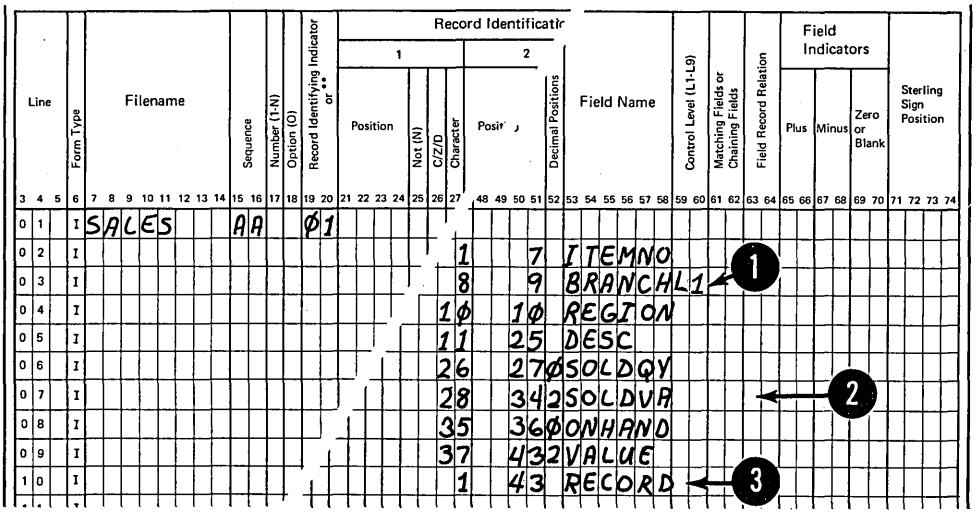
Input specifications as cataloged in the source library.



/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.





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

The Generated RPG II Program

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 22 and 23 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 22 are similar to those under *How to Use RPG II Auto Report, Example 6.* The file description and input specifications for the SALES file are cataloged in a source library, as in that example.

The Copy function is used to include the specifications for the SALES file (Figure 22, insert 2). Since BRANCH and REGION are to be control fields for the sales report, modifier statements follow the /COPY statement to add control level indicators to the input specifications.

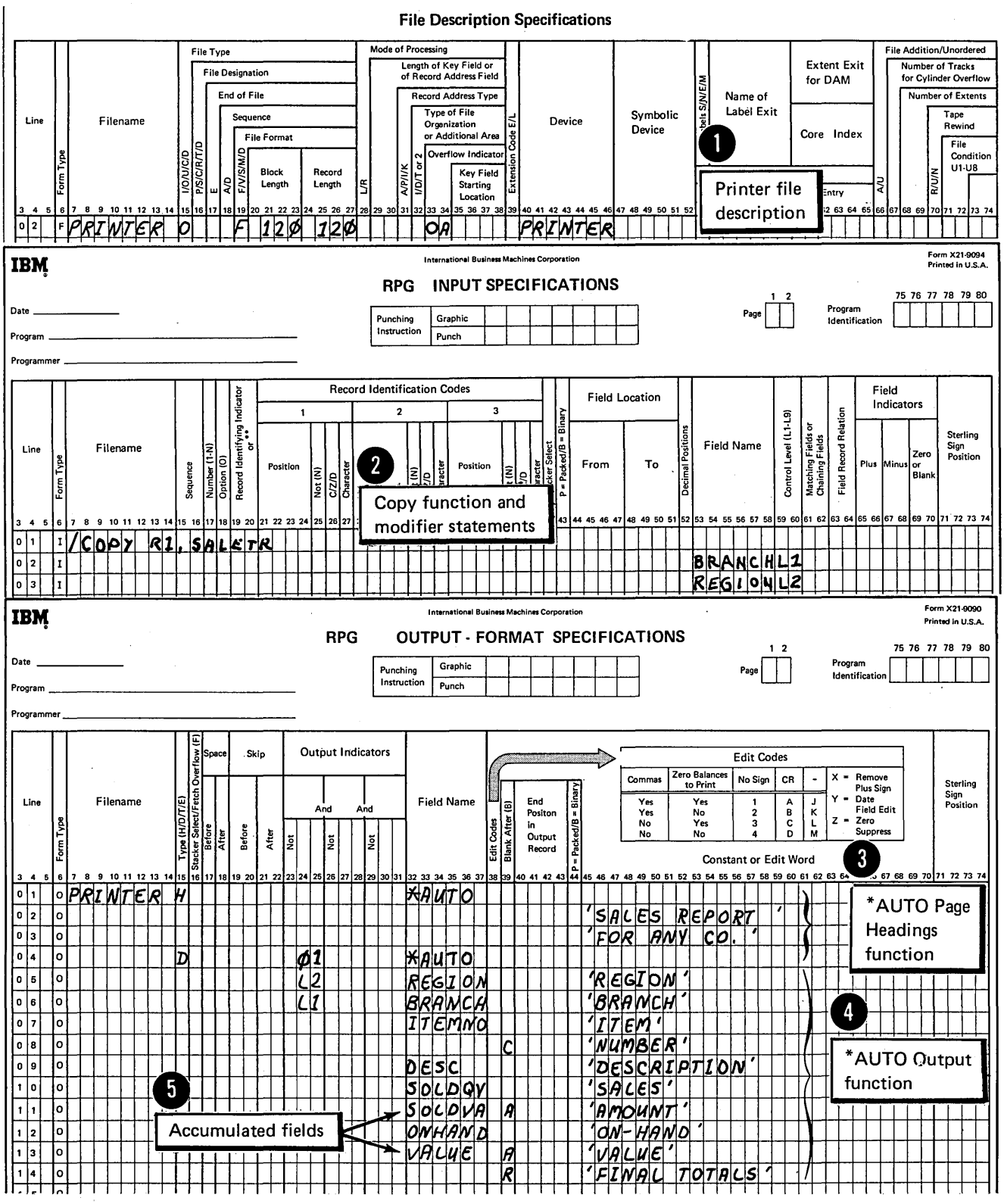
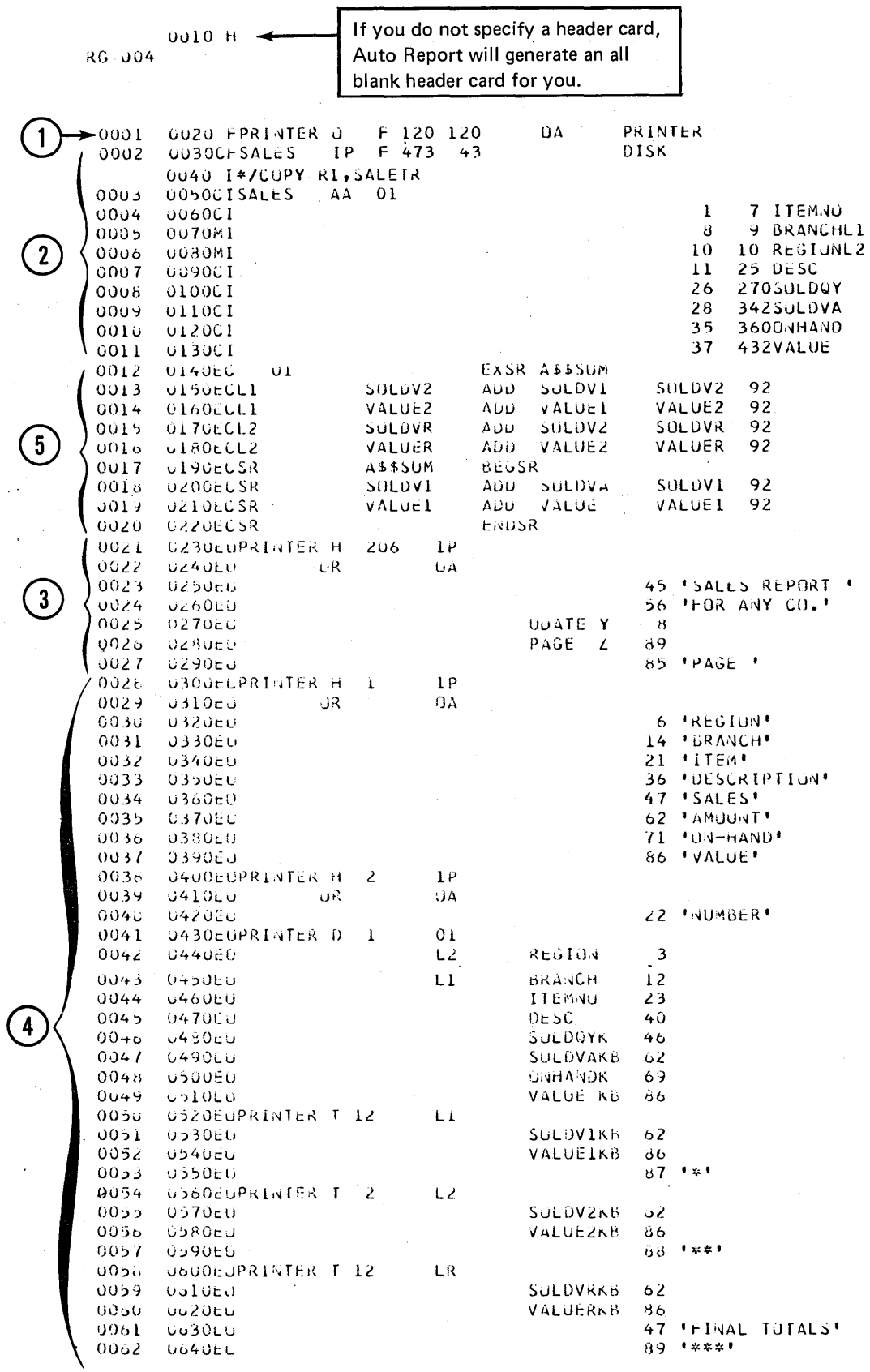


Figure 22. Auto Report Specifications for a Sales Transaction Report




```
          0010 H
RG 004
0001  0020 FPRINTER O   F 120 120      OA      PRINTER
0002  0030IFSALES   IP  F 473  43              DISK
      0040 I*/COPY R1,SALETR
0003  0050IISALES   AA  01
0004  0060II                                          1   7 ITEMNO
0005  0070MI                                          8   9 BRANCHL1
0006  0080MI                                         10  10 REGIONL2
0007  0090II                                         11  25 DESC
0008  0100II                                         26  270SOLDQY
0009  0110II                                         28  342SOLDVA
0010  0120II                                         35  360ONHAND
0011  0130II                                         37  432VALUE
0012  0140EC   01                  EXSR A$$SUM
0013  0150ECL1          SOLDV2     ADD  SOLDV1    SOLDV2  92
0014  0160ECL1          VALUE2     ADD  VALUE1    VALUE2  92
0015  0170ECL2          SOLDVR     ADD  SOLDV2    SOLDVR  92
0016  0180ECL2          VALUER     ADD  VALUE2    VALUER  92
0017  0190ECSR          A$$SUM     BEGSR
0018  0200ECSR          SOLDV1     ADD  SOLDVA    SOLDV1  92
0019  0210ECSR          VALUE1     ADD  VALUE     VALUE1  92
0020  0220ECSR                     ENDSR
0021  0230EOPRINTER H  206   1P
0022  0240EO        OR      OA
0023  0250EO                                       45 'SALES REPORT '
0024  0260EO                                       56 'FOR ANY CO.'
0025  0270EO                          UDATE Y       8
0026  0280EO                          PAGE  Z      89
0027  0290EO                                       85 'PAGE '
0028  0300EOPRINTER H  1    1P
0029  0310EO        OR      OA
0030  0320EO                                        6 'REGION'
0031  0330EO                                       14 'BRANCH'
0032  0340EO                                       21 'ITEM'
0033  0350EO                                       36 'DESCRIPTION'
0034  0360EO                                       47 'SALES'
0035  0370EO                                       62 'AMOUNT'
0036  0380EO                                       71 'ON-HAND'
0037  0390EO                                       86 'VALUE'
0038  0400EOPRINTER H  2    1P
0039  0410EO        OR      OA
0040  0420EO                                       22 'NUMBER'
0041  0430EOPRINTER D  1    01
0042  0440EO                    L2    REGION      3
0043  0450EO                    L1    BRANCH     12
0044  0460EO                          ITEMNO     23
0045  0470EO                          DESC       40
0046  0480EO                          SOLDQYK    46
0047  0490EO                          SOLDVAKB   62
0048  0500EO                          ONHANDK    69
0049  0510EO                          VALUE KB   86
0050  0520EOPRINTER T 12    L1
0051  0530EO                          SOLDV1KB   62
0052  0540EO                          VALUE1KB   86
0053  0550EO                                     87 '*'
0054  0560EOPRINTER T  2    L2
0055  0570EO                          SOLDV2KB   62
0056  0580EO                          VALUE2KB   86
0057  0590EO                                     88 '**'
0058  0600EOPRINTER T 12    LR
0059  0610EO                          SOLDVRKB   62
0060  0620EO                          VALUERKB   86
0061  0630EO                                     47 'FINAL TOTALS'
0062  0640EC                                     89 '***'
```

Figure 23. RPG II Source Program Generated from Auto Report Specifications

Generated Calculations

Calculations are generated to accumulate totals for fields named on *AUTO field description specifications which have an A in position 39 (Figure 24).

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 24, the EXSR statement is conditioned by the same indicator(s) that condition 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 24, total calculations to accumulate L2 and LR 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 24 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.

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

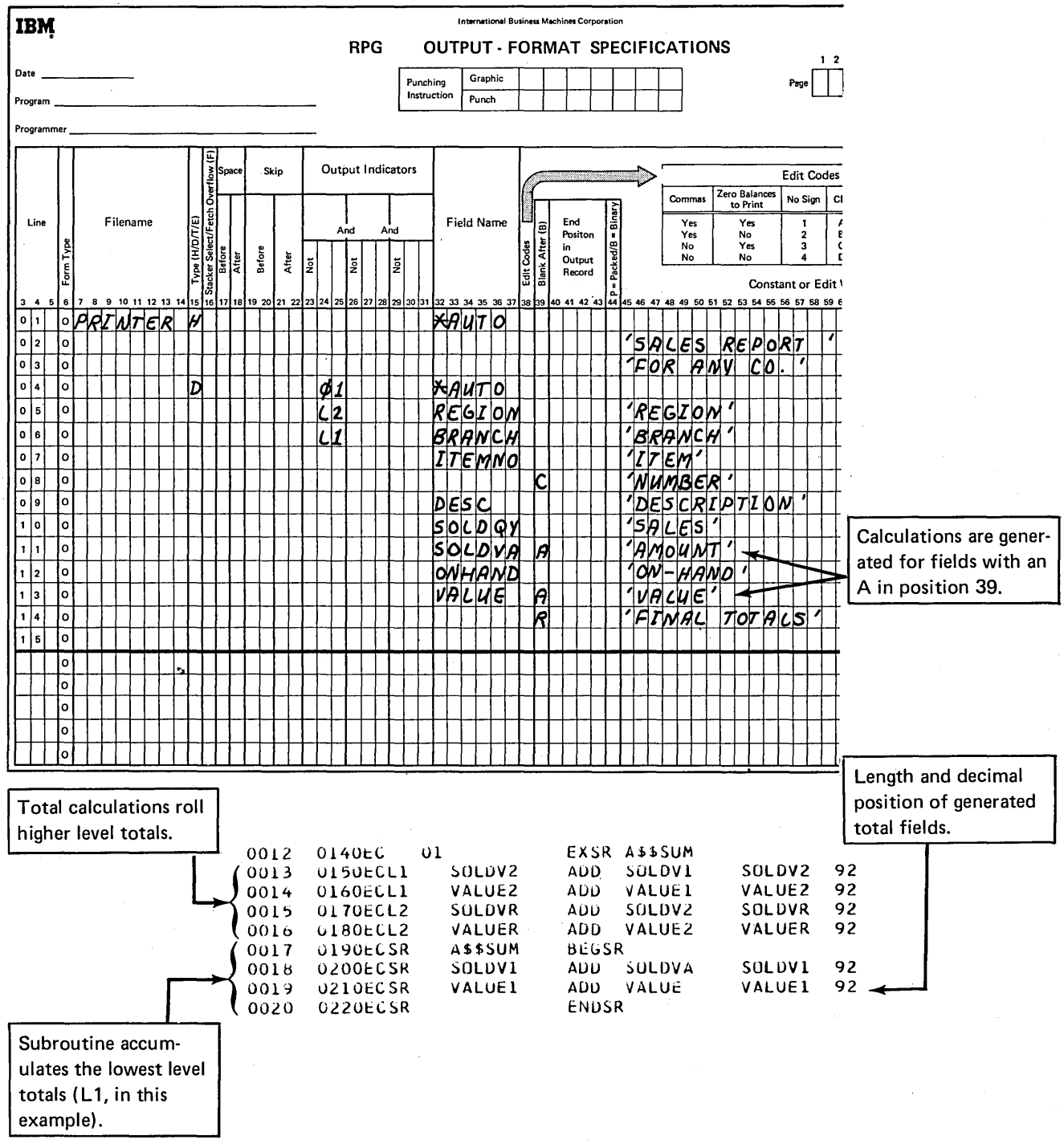
Figure 25 shows the output specifications generated by Auto Report. Specifications supplied by Auto Report (column heading specifications, total specifications, conditioning indicators, spacing and skipping values, end position values, blank after) can be identified by comparing the listing with the 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. RPG Control Card Specification
2. File Description Specifications
3. Extension Specifications
4. Line Counter Specifications
5. Teleprocessing Specifications
6. Input Specifications
7. Calculation Specifications (in the order: detail, L0, L1-L9, LR, and subroutines)
8. Output Specifications
9. Tables and arrays loaded at compilation time (must be placed last among the input statements to Auto Report)



Note: Placement of the generated calculations in the RPG II source program is shown in Figure 23.

Figure 24. Calculations Generated from Auto Report Coding for Sales Transaction Report

RPG OUTPUT - FORMAT SPECIFICATIONS

Date _____

Program _____

Programmer _____

Punching Instruction	Graphic							
	Punch							

Page 1 2

Line	Form Type	Filename	Type (H/D/T/E)	Stacker Select/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	Blank After (B)	End Position in Output Record	P = Packed/B = Binary
0 1	O	PRINTER	H									&AUTO				
0 2	O															
0 3	O															
0 4	O		D						01			&AUTO				
0 5	O								L2			REGION				
0 6	O								L1			BRANCH				
0 7	O											ITEMNO				
0 8	O													C		
0 9	O											DESC				
1 0	O											SOLDQY				
1 1	O											SOLDVA		A		
1 2	O											ONHAND				
1 3	O											VALUE		A		
1 4	O													R		

Commas	Zero Balances to Print	No Sign	CR
Yes	Yes	1	A
Yes	No	2	B
No	Yes	3	C
No	No	4	D

Edit Codes

Constant or Edit W

| | | | | | | | | | | | | | | |

Calculations 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 23 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 specification, place them after that specification and put the same entry in position 6.

Restriction

The order of tables and arrays is not altered when the source specifications are sorted. Therefore, 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, then any compilation 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. Compilation 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 compilation time tables and arrays are copied. This procedure insures that your File Translation and Alternate Collating Sequence tables are the first compilation time tables in the generated RPG II source program.

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 26 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 line 06 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 26 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 the Auto Report Feature. If you want to find 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*). The procedure for reformatting an *AUTO page heading line varies depending on your system.

Model 10 Disk System, Model 12, or 15: Punch the generated source program and modify the end positions on the appropriate heading field descriptions. You can obtain a punched deck or have the generated source program written to diskette by specifying the P or B option in position 7 of the Auto Report Option specifications (see index entry *source, position 7* for detailed instructions).

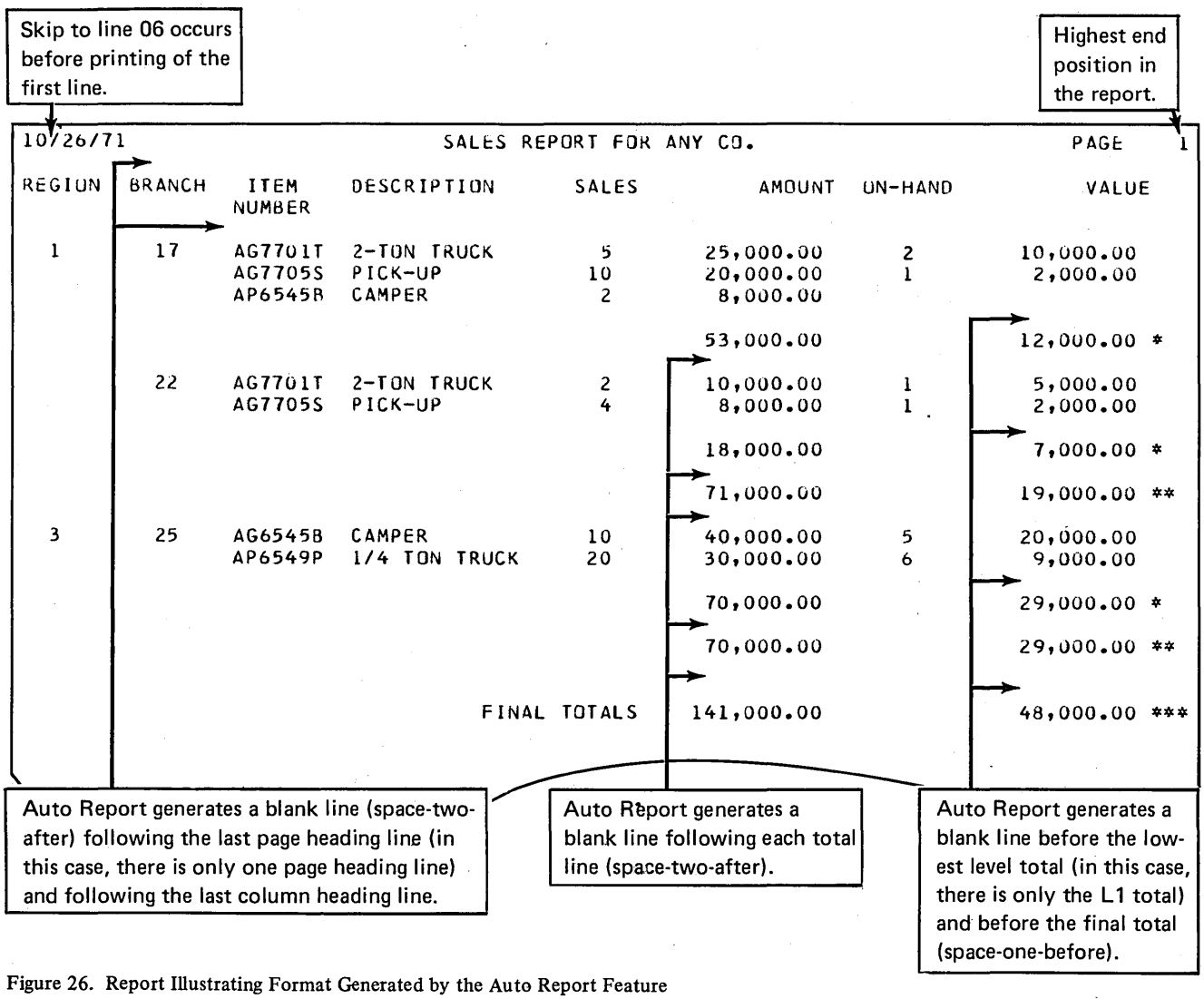


Figure 26. Report Illustrating Format Generated by the Auto Report Feature

Model 6: Catalog the generated RPG II source program in a source library by specifying the C option in position 7 of the Auto Report Option Specifications (see index entry *source, position 7*). Change the end positions on the generated source statements using the Keyboard Source Entry conversational utility program (see *IBM System/3 Model 6 Conversational Utility Programs Reference Manual,* SC21-7528).

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 27 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 printer record length has been reduced from 132 to 96. In the output specifications for Figure 27, 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 27.

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.

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

3/10/72 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	7/11/71	7/21/1 23.28	23.75	.47	
1	11352	NU-STYLE CLOTHIERS	27987	7/14/71	7/26/1 40.00	87.07 47.07		
1	11886	MIDI FASHIONS INC	15771	7/04/71	7/14/1 105.08	107.22	2.14	
1	12874	OLOOK INTERIORS	25622	7/09/71	7/23/1 67.95	67.95		
1	18274	STREAMLINE PAPER INC	29703	7/21/71	7/30/1 170.55	274.03 101.10	2.38	
					REGION TOTALS 406.86	560.02 148.17	4.99	*
2	23347	RITE-BEST PENS CO	20842	7/18/71	7/20/1 10.00	15.80 5.80		
2	25521	IMPORTS OF NM	29273	7/20/71	7/27/1 585.47	797.40 200.00	11.93	
2	26723	ALRIGHT CLEANERS	19473	7/07/71	7/23/1 462.00	462.00		
2	28622	NORTH CENTRAL SUPPLY	17816	7/05/71	7/22/1 75.97	75.97		
2	29871	FERGUSON DEALERS	27229	7/10/71	7/22/1 61.91	61.91		
					REGION TOTALS 1,195.35	1,413.08 205.80	11.93	*
3	30755	FASTWAY AIRLINES	26158	7/06/71	7/19/1 725.87	742.72	16.85 1.90	
3	31275	ENVIRONMENT CONCERNS	20451	7/06/71	7/30/1 15.00	29.43 14.43		
3	32457	B SOLE SILOS	27425	7/10/71	7/20/1 110.05	110.05		
3	37945	HOFFTA BREAKS INC	18276	7/06/71	7/23/1 47.23	47.23		
					REGION TOTALS 898.15	929.43 14.43	16.85 1.90	*
4	42622	EASTLAKE GRAVEL CO	16429	7/05/71	7/23/1 29.37	29.37		
					REGION TOTALS 29.37	29.37		*
					COMPANY TOTALS 2,529.73	2,931.90 368.40	33.77 1.90	**

Figure 27. Report Illustrating Overflow of D-*AUTO Print Lines

System Considerations

This section includes information about installation, operating instructions, and operation control language for the Auto Report Feature.

INSTALLATION AND MAINTENANCE

Beginning with version 06, modification level 00 of the IBM System/3 Model 10 and Model 6 Disk Systems, the RPG II Auto Report Feature is distributed as part of the system release. In order to install Auto Report, follow the procedures for system generation described in *IBM System/3 Models 6, 8, 10, and 12 System Generation Reference Manual,* GC21-5126, or *IBM System/3 Model 15 System Generation Reference Manual,* GC21-7616.

The RPG II Auto Report Feature distributed with the system release includes the following:

- An IBM-supplied source library procedure (named AUTO) for loading the Auto Report Feature program (see index entry *operation control language considerations*).
- The Auto Report Feature program, consisting of 17 object modules (O.modules), requiring approximately 192 sectors of object library space on disk. See Appendix B for the names of the modules.
- A sample program and the source library procedures to compile and execute it (see *Part II. Sample Program* for a description of the program and the procedure to run it).

PARTITION SIZE

The Auto Report Feature program requires at least 5K (5120) bytes of main storage space. On systems with Dual Programming Feature, Auto Report can run in either program level 1 or program level 2, but must be the only program operating.

On the Model 15, Auto Report can run in either partition 1 or 2. The Auto Report Feature can run concurrently with a program in another partition if the I/O devices required by Auto Report are not allocated to the other partition.

OPERATING CONSIDERATIONS

To compile an RPG II program that includes Auto Report specifications, follow the instructions for compiling an RPG II program given in *IBM System/3 RPG II Reference Manual,* SC21-7504. Remember the following differences when compiling an Auto Report source program:

1. The name used in the OCL CALL statement is AUTO; the name on the LOAD statement is $AUTO.
2. The Auto Report Option specification (U in position 6) must be the first specification in the Auto Report source program.
3. On the Model 10 Disk System, Model 12, or 15, if you want the source program generated by Auto Report to be punched into cards, place blank cards in the hopper of the card unit which was assigned as system output device during system generation or which was subsequently assigned as system output device by means of a // PUNCH OCL statement. If you are using the 1442 Card Read Punch, place blank cards behind the source deck in the hopper. The punched cards are stacked as follows:

System Output Device	*Stacker*
Model 10, 12, or 15	
MFCU2	4 (cards are interpreted)
MFCU1	1 (cards are interpreted)
1442	2 (cards are not interpreted)
Model 15 Only	
MFCM1 (Model A1)	1 (cards interpreted if print feature installed)
MFCM2 (Model A1)	5 (cards interpreted if print feature installed)
MFCM1 (Model A2)	1 (cards are not interpreted)
MFCM2 (Model A2)	4 (cards are not interpreted)

OPERATION CONTROL LANGUAGE CONSIDERATIONS

In order to compile an RPG II program that includes Auto Report specifications, the Auto Report Feature program must be loaded into main storage. After the Auto Report Feature program has generated an RPG II source program, it calls the RPG II compiler to compile the source program. An IBM-supplied procedure can be called to load the Auto Report Feature program. The OCL statements to include the procedure from the source library are:

Model 10 Disk System, Models 12 and 15:

```
// CALL AUTO, R1
// RUN
```

Model 6:

System Prompts	*Response*
READY	CALL
CALL NAME-	AUTO
UNIT-	R1
MODIFY	RUN

The OCL statements included in the source library procedure named AUTO are:

Model 10 Disk System, Models 12 and 15:

```
// LOAD $AUTO,R1
// FILE NAME-$SOURCE,UNIT-R1,RETAIN-S,
// TRACKS-10,PACK-SYSTEM
// FILE NAME-$WORK,UNIT-R1,RETAIN-S,
// TRACKS-10,PACK-SYSTEM
// RUN
```

Model 6:

LOAD	NAME-$AUTO
	UNIT-R1
FILE	NAME-$WORK
	UNIT-R1
	PACK-SYSTEM
	RETAIN-S
	TRACKS-10
FILE	NAME-$SOURCE
	UNIT-R1
	PACK-SYSTEM
	RETAIN-S
	TRACKS-10
COMPILE	OBJECT-R1
	SOURCE-name
	UNIT-F1

Note: name = name of user source program

Library procedures can be modified. OCL statements necessary to modify a library procedure are described in the appropriate SCP reference manual (see list in Preface).

If you wish to change the number of tracks in $SOURCE and $WORK, modify the library procedure, calculating tracks as follows:

$$\text{Tracks} = \frac{\text{Number of specifications}}{48}$$

For *number of specifications,* use the greater of the number of specifications read by the Auto Report Feature or the estimated number of specifications in the generated source program. The calculated number of tracks should be used for both $SOURCE and $WORK.

HALTS

The Auto Report Feature does not diagnose all error conditions in the source program. Diagnostics that are performed by the RPG II compiler are not duplicated by Auto Report. If a program cannot be successfully generated because of errors in the Auto Report specifications, Auto Report halts, displaying the following halt code:

Models 10, 12, and 15:	'8
Model 6:	ABD45

Only recovery option 3 (immediate cancel) is available following this halt, unless NOHALT (// NOHALT OCL statement) is in effect. If NOHALT is in effect, the halt will not occur (Models 6, 10, and 12). On Model 15 a halt will not occur if a severity of 2 or greater is specified on a NOHALT statement. Instead, the RPG II compilation is bypassed and the next job is allowed to execute.

If an RPG II source program is successfully generated, Auto Report calls the RPG II compiler without halting. Normal RPG II compilation halts can occur after compilation has begun. Compilation halts and object program execution halts are explained in:

- *IBM System/3 System Messages,* GC21-5076.
- *IBM System/3 Model 10 Disk System Halt Guide,* GC21-7540.
- *IBM System/3 Model 12 Halt Guide.*
- *IBM System/3 Model 6 Halt Guide,* GC21-7541.

COMPILE Statement

The COMPILE statement may be used to specify the name of an Auto Report source program in the source library that is to be compiled by the RPG II compiler using the Auto Report Feature and/or to specify where the object program is to be placed. Unlike the specifications included by a /COPY Auto Report statement, source library specifications included by a COMPILE may contain a /COPY Auto Report statement and an Auto Report Option specification. See the OCL reference manual for your system for a description of the COMPILE statement.

LOG Statement

Output of the Auto Report Feature program listing is governed by the LOG statement. See the appropriate OCL reference manual for your system for a description of the LOG statement. The LOG OFF OCL facility can be used to suppress the Auto Report listing on the Model 10 Disk System, Model 6, or 12 when in card mode (when the 5496 Data Recorder, 129 Card Data Recorder, or directly attached 3741 is used to process OCL). The LOG OFF facility does not suppress the Auto Report listing on the Model 6 in conversational mode or on the Model 15.

APPENDIXES

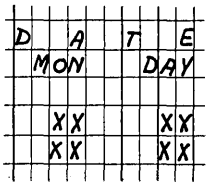
Appendix A: Programming Aids and Tips

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

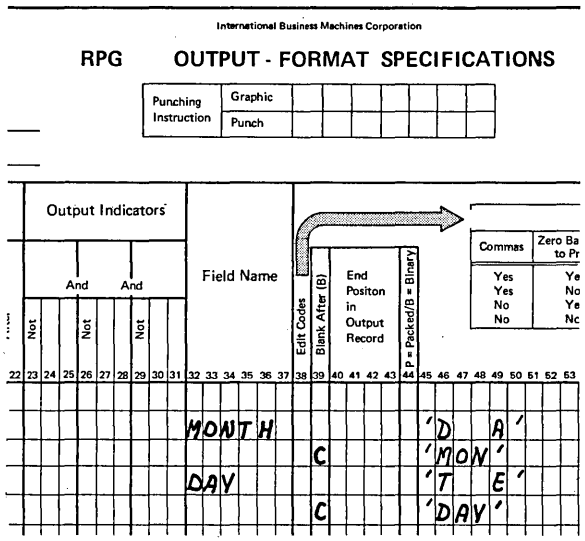
39	7-22	23-31	32-37	38	40-43	44	45-70
Blank	Blank	Blank or Indicators	Field Name	Blank or Edit Code	Blank or End Position	Blank	Blank or Column Heading
	Blank	Blank or Indicators	Blank	Blank	Blank or End Position	Blank	Literal
B	Blank	Blank or Indicators	Field Name	Blank or Edit Code	Blank or End Position	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. 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:



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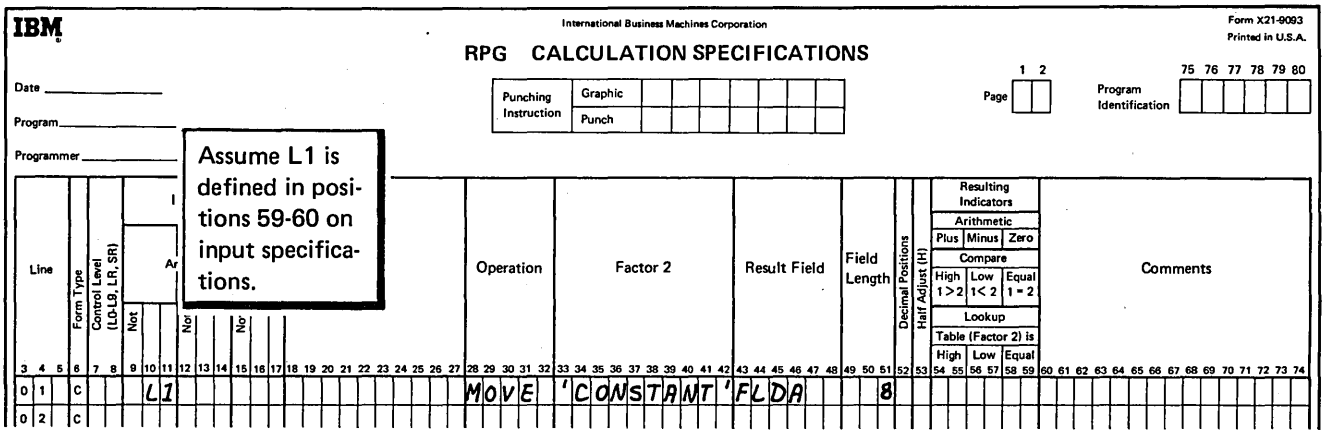
RPG OUTPUT - FORMAT SPECIFICATIONS

Punching Instruction	Graphic								
	Punch								

Line	Form Type	Output Indicators: And	And	Field Name	Edit Codes	Blank After (B)	End Position in Output Record	P = Packed/B = Binary	Commas	Zero Ba to Pr
		Not	Not	Not					Yes	Ye
									Yes	No
									No	Ye
									No	Nc
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	
				MONTH		C			'DAY'	
				DAY		C			'DAY'	

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



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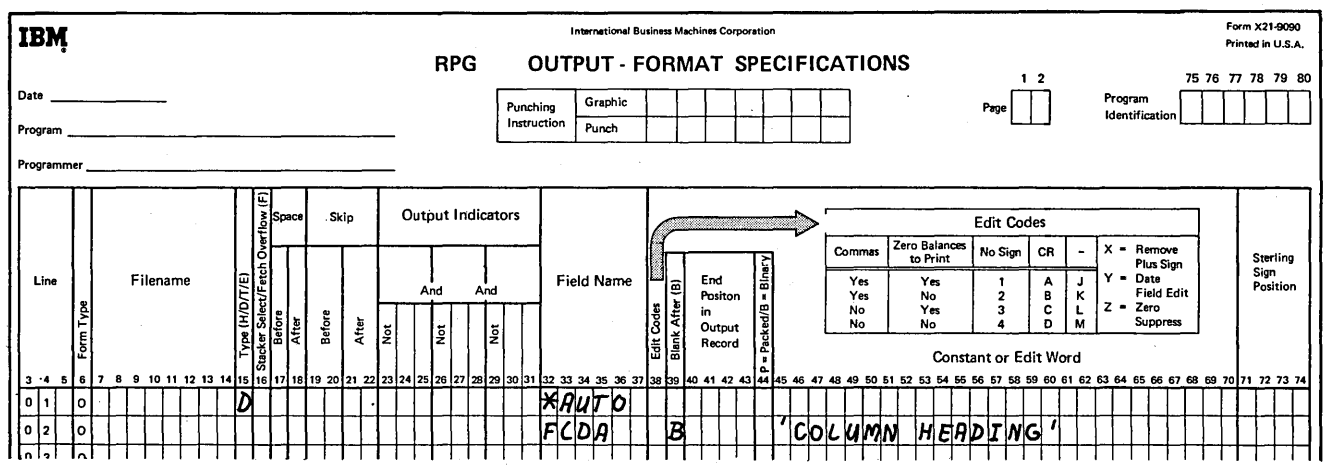
Date _____ Program _____ Programmer _____

Punching Instruction	Graphic								
	Punch								

Page 1 2 Program Identification 75 76 77 78 79 80

Assume L1 is defined in positions 59-60 on input specifications.

Line	Form Type	Control Level (L0-L9, LR, SR)	I Ar Not	Not	Not	Operation	Factor 2	Result Field	Field Length	Decimal Positions	Half Adjust (H)	Resulting Indicators: Arithmetic Plus	Minus	Zero	Compare High 1>2	Low 1<2	Equal 1=2	Lookup	Table (Factor 2) is High	Low	Equal	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 1	C		L1			MOVE	'CONSTANT'	FLDA	8													
0 2	C																					



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RPG OUTPUT - FORMAT SPECIFICATIONS

Date _____ Program _____ Programmer _____

Punching Instruction	Graphic								
	Punch								

Page 1 2 Program Identification 75 76 77 78 79 80

Edit Codes

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

Constant or Edit Word

Line	Form Type	Filename	Type (H/D/T/E)	Stacker Select/Fetch Overflow (F)	Space Before	Space After	Skip Before	Skip After	Output Indicators: And	And	Field Name	Edit Codes	Blank After (B)	End Position in Output Record	P = Packed/B = Binary	Sterling Sign Position
									Not	Not Not						
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 1	O		D								*AUTO					
0 2	O										FCDA		B	'COLUMN HEADING'		

3. 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 calculations 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 5 for an example.

4. 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:

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Date _____ Program _____ Programmer _____

Punching Instruction: Graphic / Punch

Page 1 2 — Program Identification 75 76 77 78 79 80

Line	Form Type	Filename	Sequence	Number (1-N)	Option (O)	Record Identifying Indicator or **	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 = Packed/B = Binary	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	Sterling Sign Position
01	I	INPUT	AA			10	1		C	A																					
02	I																				2	27		NAME	L1						
03	I																														
04	I																														
05	I		BB			11	1		C	1																					
06	I		OR			12	1		C	W																					
07	I																				2	18		DESC							
08	I																				19	21	0	QTY							
09	I																				22	26	2	SALES							

The following coding gives incorrect results:

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RPG OUTPUT - FORMAT SPECIFICATIONS

Date _____ Program _____ Programmer _____

Punching Instruction: Graphic / Punch

Page 1 2 — Program Identification 75 76 77 78 79 80

Edit Codes

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

Constant or Edit Word

Line	Form Type	Filename	Type (H/D/T/E)	Stacker Select/Fetch Overflow (F)	Space: Before	Space: After	Skip: Before	Skip: After	Output Indicators: And Not	And	And Not	Field Name	Edit Codes	Blank After (B)	End Position in Output Record	P = Packed/B = Binary	Constant or Edit Word	Sterling Sign Position
01	O	PRINT	T						L1			*AUTO						
02	O											DESC					'DESCRIPTION'	
03	O											QTY		A			'QUANTITY'	
04	O											SALES		A			'AMOUNT'	
05	O																	

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 above, 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:

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RPG CALCULATION SPECIFICATIONS

Date _____ Program _____ Programmer _____

Punching Instruction: Graphic / Punch — Page — Program Identification

Line	Form Type	Control Level (L0-L9, LR, SR)	Indicators: And / And (Not)	Factor 1	Operation	Factor 2	Result Field	Field Length	Decimal Positions	Half Adjust (H)	Resulting Indicators: Arithmetic (Plus / Minus / Zero); Compare (High 1>2 / Low 1<2 / Equal 1=2); Lookup; Table (Factor 2) is (High / Low / Equal)	Comments
01	C		11		Z-ADD	QTY	QTYA	30				
02	C		11		Z-ADD	SALES	SALESA	52				

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RPG OUTPUT - FORMAT SPECIFICATIONS

Date _____ Program _____ Programmer _____

Punching Instruction: Graphic / Punch — Page — Program Identification

Line	Form Type	Filename	Type (H/D/T/E)	Stacker Select/Fetch Overflow (F)	Space: Before / After	Skip: Before / After	Output Indicators: And / And (Not)	Field Name	Edit Codes	Blank After (B)	End Position in Output Record	P = Packed/B = Binary	Constant or Edit Word
01	O	PRINT	T				L1	*AUTO					
02	O							DESC					'DESCRIPTION'
03	O							QTYA		A			'QUANTITY'
04	O							SALESA		A			'AMOUNT'

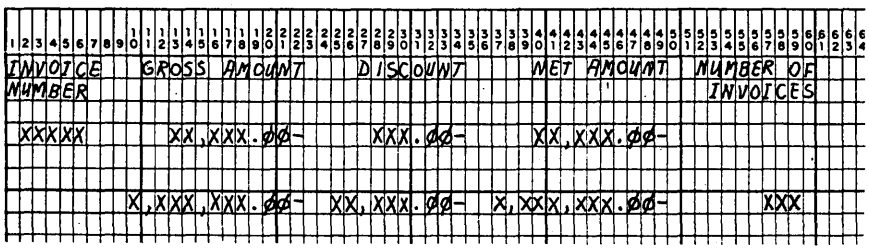
Edit Codes

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

Sterling Sign Position

5. 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:

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RPG CALCULATION SPECIFICATIONS

Date _____

Program _____

Programmer _____

Punching Instruction: Graphic / Punch

Page 1 2

Program Identification 75 76 77 78 79 80

Line	Form Type	Control Level (L0-L9, LR, SR)	Indicators: And / And — Not	Factor 1	Operation	Factor 2	Result Field	Field Length	Decimal Positions	Half Adjust (H)	Resulting Indicators: Arithmetic — Plus / Minus / Zero; Compare — High 1>2 / Low 1<2 / Equal 1=2; Lookup — Table (Factor 2) is High / Low / Equal	Comments
01	C		01	TOTORD	ADD	1	TOTORD	30				
02	C				MOVE	' '	BLANKS	1				

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RPG OUTPUT - FORMAT SPECIFICATIONS

Date _____

Program _____

Programmer _____

Punching Instruction: Graphic / Punch

Page 1 2

Program Identification 75 76 77 78 79 80

Edit Codes

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

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

6. Another method of counting records is shown below. This method is especially applicable when:

   a. You are doing a detail list
   b. You do not want 1's listed down the page
   c. You want to take totals by control level.

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RPG CALCULATION SPECIFICATIONS

Date _____ Program _____ Programmer _____ Punching Instruction: Graphic / Punch — Page 1 2 — Program Identification 75 76 77 78 79 80

Line	Form Type	Control Level (L0-L9, LR, SR)	Indicators: And / Not	Factor 1	Operation	Factor 2	Result Field	Field Length	Decimal Positions	Half Adjust (H)	Resulting Indicators: Arithmetic (Plus / Minus / Zero); Compare (High 1>2 / Low 1<2 / Equal 1=2); Lookup (Table (Factor 2) is: High / Low / Equal)	Comments
01	C				Z-ADD	Ø	COUNT	3	Ø			
02	C			1	ADD	COUNT1	COUNT1					
03	C											

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RPG OUTPUT - FORMAT SPECIFICATIONS

Date _____ Program _____ Programmer _____ Punching Instruction: Graphic / Punch — Page 1 2 — Program Identification 75 76 77 78 79 80

Line	Form Type	Filename	Type (H/D/T/E)	Stacker Select/Fetch Overflow (F)	Space: Before / After	Skip: Before / After	Output Indicators: And / Not	Field Name	Edit Codes	Blank After (B)	End Position in Output Record	P = Packed/B = Binary	Constant or Edit Word	Sterling Sign Position
01	O		D					*AUTO						
02	O													
03	O						LR	COUNT		A			'RECORD'	
04	O									C			'COUNT'	
05	O													

Edit Codes

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

Calculation Specifications

Line 01 This instruction is needed only to define the field COUNT for accumulation.

Line 02 This instruction accumulates the total for the first control level.

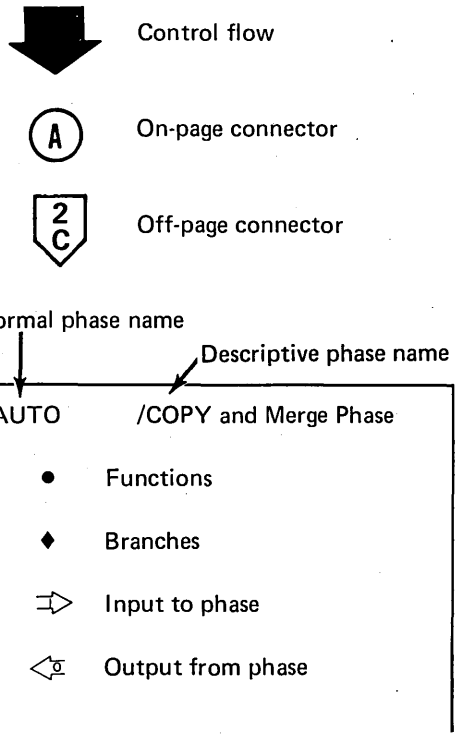
Output Specifications

Line 03 This instruction causes the generation of calculation and output specifications for the detail and total lines. The LR conditioning indicator prevents the generated detail calculation from occurring. It also prevents printing at detail time.

Note: If no control levels are specified in the program, a 1 would be added to COUNTR rather than COUNT1 on the calculation specifications.

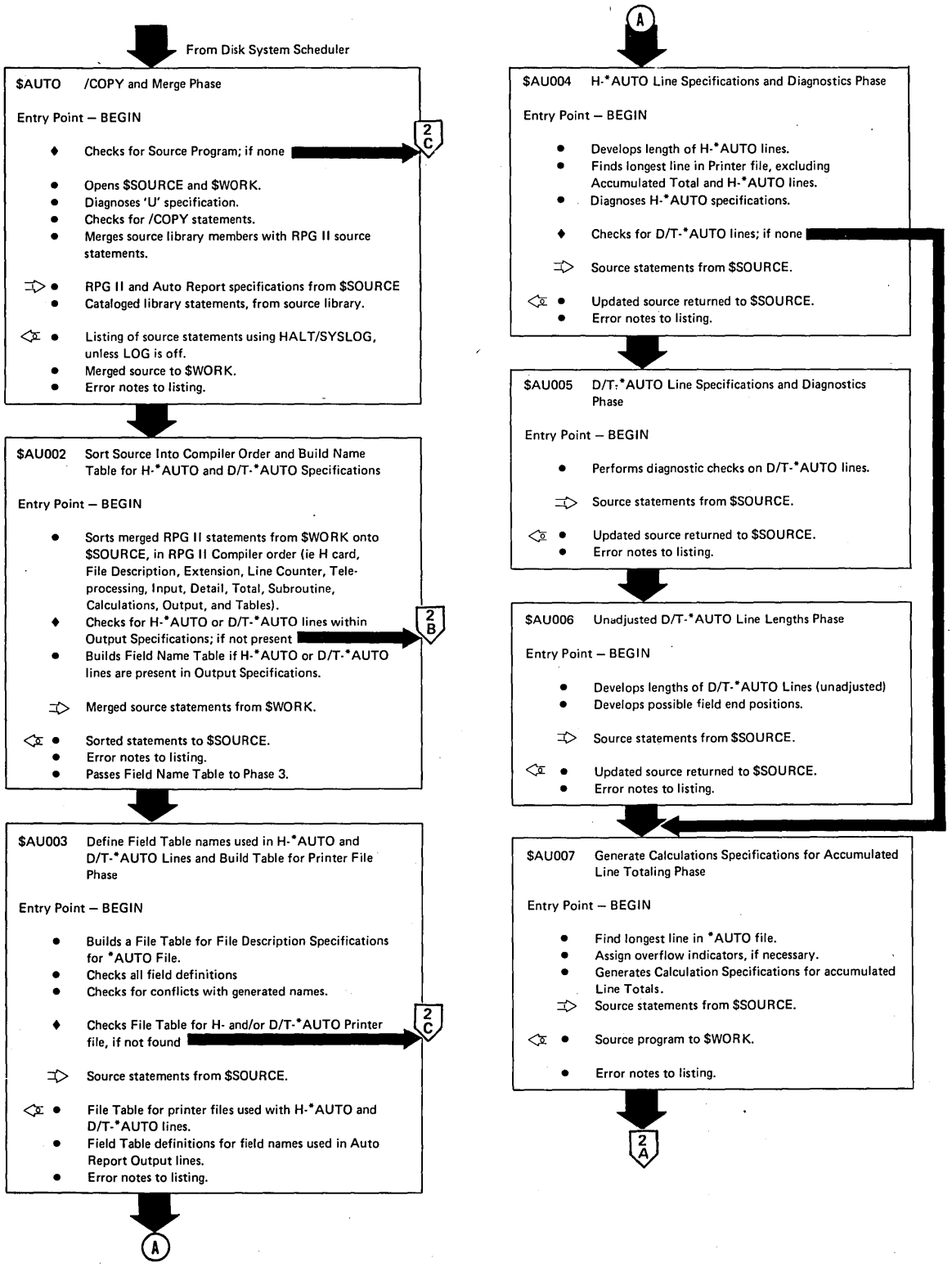
Appendix B: Internal Operation of the Auto Report Feature

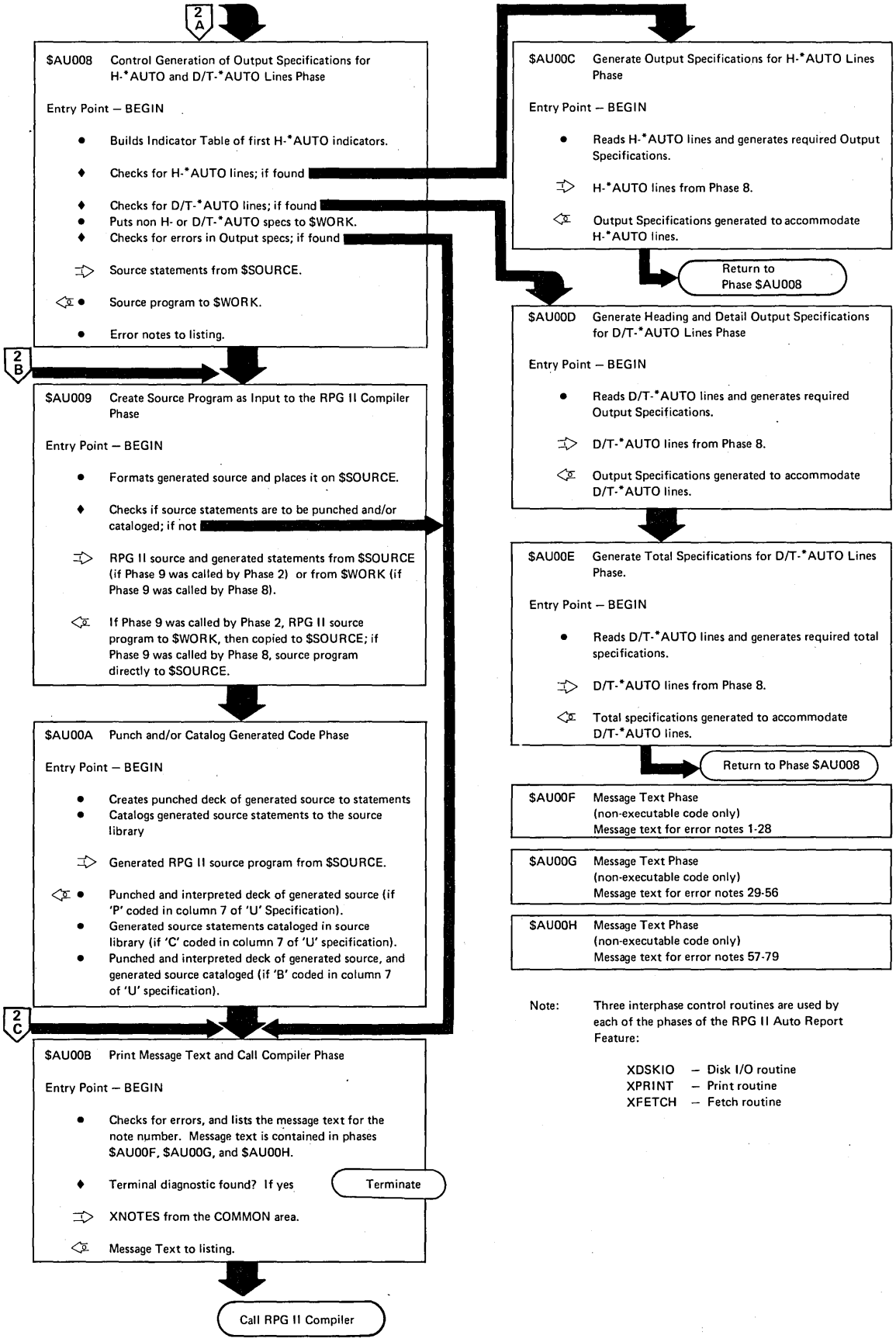
The diagrams in this appendix show the phase structure of the Auto Report Feature and give the general functions of each Auto Report phase. The symbols used on these diagrams and their meanings are:



If you are reviewing these operational diagrams as the result of receiving an Auto Report diagnostic message, you can find the number of the phase that generated the message in Appendix C.

Auto Report source statements are read and placed in the $SOURCE work file by the Scheduler prior to calling the first phase of Auto Report.


From Disk System Scheduler
$AUTO /COPY and Merge Phase
Entry Point – BEGIN
♦ Checks for Source Program; if none
2 C
• Opens $SOURCE and $WORK.
• Diagnoses 'U' specification.
• Checks for /COPY statements.
• Merges source library members with RPG II source statements.
• RPG II and Auto Report specifications from $SOURCE
• Cataloged library statements, from source library.
• Listing of source statements using HALT/SYSLOG, unless LOG is off.
• Merged source to $WORK.
• Error notes to listing.
$AU002 Sort Source Into Compiler Order and Build Name Table for H-*AUTO and D/T-*AUTO Specifications
Entry Point – BEGIN
• Sorts merged RPG II statements from $WORK onto $SOURCE, in RPG II Compiler order (ie H card, File Description, Extension, Line Counter, Teleprocessing, Input, Detail, Total, Subroutine, Calculations, Output, and Tables).
♦ Checks for H-*AUTO or D/T-*AUTO lines within Output Specifications; if not present
2 B
• Builds Field Name Table if H-*AUTO or D/T-*AUTO lines are present in Output Specifications.
Merged source statements from $WORK.
• Sorted statements to $SOURCE.
• Error notes to listing.
• Passes Field Name Table to Phase 3.
$AU003 Define Field Table names used in H-*AUTO and D/T-*AUTO Lines and Build Table for Printer File Phase
Entry Point – BEGIN
• Builds a File Table for File Description Specifications for *AUTO File.
• Checks all field definitions
• Checks for conflicts with generated names.
♦ Checks File Table for H- and/or D/T-*AUTO Printer file, if not found
2 C
Source statements from $SOURCE.
• File Table for printer files used with H-*AUTO and D/T-*AUTO lines.
• Field Table definitions for field names used in Auto Report Output lines.
• Error notes to listing.
A
A
$AU004 H-*AUTO Line Specifications and Diagnostics Phase
Entry Point – BEGIN
• Develops length of H-*AUTO lines.
• Finds longest line in Printer file, excluding Accumulated Total and H-*AUTO lines.
• Diagnoses H-*AUTO specifications.
♦ Checks for D/T-*AUTO lines; if none
Source statements from $SOURCE.
• Updated source returned to $SOURCE.
• Error notes to listing.
$AU005 D/T-*AUTO Line Specifications and Diagnostics Phase
Entry Point – BEGIN
• Performs diagnostic checks on D/T-*AUTO lines.
Source statements from $SOURCE.
• Updated source returned to $SOURCE.
• Error notes to listing.
$AU006 Unadjusted D/T-*AUTO Line Lengths Phase
Entry Point – BEGIN
• Develops lengths of D/T-*AUTO Lines (unadjusted)
• Develops possible field end positions.
Source statements from $SOURCE.
• Updated source returned to $SOURCE.
• Error notes to listing.
$AU007 Generate Calculations Specifications for Accumulated Line Totaling Phase
Entry Point – BEGIN
• Find longest line in *AUTO file.
• Assign overflow indicators, if necessary.
• Generates Calculation Specifications for accumulated Line Totals.
Source statements from $SOURCE.
• Source program to $WORK.
• Error notes to listing.
2 A



Note: Three interphase control routines are used by each of the phases of the RPG II Auto Report Feature:

XDSKIO – Disk I/O routine
XPRINT – Print routine
XFETCH – Fetch routine

Appendix C: Diagnostic Messages

In addition to the note number and the message text, this appendix contains the following information for each diagnostic message:

1. A number, identifying the phase (or phases) of the Auto Report Feature that generates the message.

2. An explanation, where possible, of the specific condition or error that caused the message to be generated.

To locate a functional description of the phase that generated the message, find the phase name in Appendix B that corresponds to the number given with the message text. (The identifying number 1 corresponds to Phase $AUTO, 2 corresponds to $AU002, 3 corresponds to $AU003, etc.)

The following statements, used in the diagnostic messages, require additional explanation:

PROGRAM IS TERMINATED – This statement appears in the message when the error is severe and Auto Report will not complete the generation of an RPG II source program. When this statement does not appear in the message text, the message is a warning. Auto Report assumes an entry, if necessary, for warning errors.

SPEC IS DROPPED – This statement means that the specification containing the error will not be used in generating an RPG II source program.

Note:	*Phase*	*Message and Explanation*
001	1	SOURCE PROGRAM IS MISSING. PROGRAM IS TERMINATED. /* or ** was encountered as the first record in the source program.
002	2	RPG II CONTROL CARD, H SPEC, IS MISSING. A CONTROL CARD WITH BLANK ENTRIES IS CREATED. H specification was not present in the source file or in the source library member.
003	2	SOURCE PROGRAM CONTAINS MORE THAN ONE RPG II CONTROL CARD, H SPEC. ALL BUT THE FIRST ARE DROPPED. Multiple RPG II control cards in the source program. Copied member may contain a control card.
004	1	DUPLICATE FILENAMES ARE PRESENT ON THE FILE DESCRIPTION SPECS READ FROM THE SOURCE FILE. DUPLICATE IS DROPPED. The source file can contain only one file description specification for a filename.

Note	*Phase*	*Message and Explanation*
005	1	REQUESTED LIBRARY MEMBER CANNOT BE FOUND. SPEC IS DROPPED. Requested library member not found because: 1. Wrong name used for member 2. Wrong pack specified 3. Wrong pack mounted 4. No records in the member Drop the /COPY.
006	1	DUPLICATE FILENAMES ARE PRESENT ON THE FILE DESCRIPTION SPECS READ FROM THE SOURCE LIBRARY MEMBER. DUPLICATE IS DROPPED. The source library member can contain only one file description specification for a filename. The error occurred because: 1. One source library member contains two file description specifications for the same filename, or 2. More than one source library member has file description specifications for the same filename.
007	1	TABLE AREA PROVIDED FOR INPUT FIELD OVERRIDES EXCEEDED. OVERRIDE FUNCTION IS DISCONTINUED FOR THIS /COPY. The number of input field modifier statements following a /COPY exceeds available space in the table. Increasing the amount of main storage available to the Auto Report Feature program will allow use of more fields. Those fields which could be overridden will be added to the file. Therefore, it is possible to have invalid specifications in the generated program. Auto Report always handles at least 20 overrides. Place override statements first followed by input fields to be added to the copied specifications to allow all table space to be used for override statements.
008	1	INVALID RPG II SPEC TYPE. SPEC IS DROPPED. The error occurred for one of the following reasons: 1. Position 6 does not contain an H, F, E, L T, I, C, or O. 2. Position 7 does not contain an asterisk. 3. Comment appears on an H spec. 4. /COPY appears on an H spec (the /COPY is handled correctly).
009	3	INVALID OR UNDEFINED FILE FOR *AUTO LINES. PROGRAM IS TERMINATED. Error occurred because of one of the following: 1. *AUTO file is not a printer or line counter file. 2. File description specification for *AUTO file is missing. 3. Names on file description specification and *AUTO file do not match.
010	2	TABLE AREA FOR FIELD NAMES HAS BEEN EXCEEDED. SPEC IS DROPPED. Each field used is placed into a table. The table has been filled. Increase the amount of main storage available to Auto Report Feature to increase the table space.
011	3	TABLE AREA PROVIDED FOR FIELD NAMES EXCEEDED. NON-UNIQUE FIELD NAMES MAY BE GENERATED. Generated field names which end in 1-9 or R are added to the field name table. To avoid duplicate names do not use field names which end in 1-9 or R.

Note	*Phase*	*Message and Explanation*
012	7	GENERATED TOTAL FIELD PREVIOUSLY DEFINED WITH DIFFERENT ATTRIBUTES. PREVIOUS DEFINITION IS USED. The generated total field was previously defined with either a different field length or a different number of decimal positions. First definition is used. Both the total field and the generated field name are printed with the error note number.
013	2	*AUTO PREVIOUSLY USED FOR A DIFFERENT FILE. DROP ALL SPECS TO NEXT RECORD TYPE. *AUTO can be specified for only one file.
014	4, 5	POSITIONS 7-22 ARE NOT BLANK ON OUTPUT FIELD SPEC. BLANKS ARE ASSUMED. Positions 7-22 of output field specifications must be blank.
015	4, 5	INVALID INDICATOR. BLANKS ARE ASSUMED. Positions 24-25, 27-28 or 30-31 are not 01-99, L0-L9, MR, 1P, H1-H9, 0A-0G, 0V or blank. Positions 23, 26 or 29 are not N or blank. The invalid indicator is printed with the note number.
016	2, 4, 5	INVALID FIELD NAME. SPEC IS DROPPED. The field name is invalid for one of these reasons: 1. Field name not found. 2. Field name not defined. 3. Array index with blank after the comma, or a comma as the first character. Column headings for the field are also dropped.
017	4, 5	INVALID ENTRY IN POSITION 38 AND/OR 44. BLANKS ARE ASSUMED. Position 38 and position 44 must be blank for alphameric fields.
018	4	INVALID ENTRY IN POSITION 39. BLANK IS ASSUMED. Position 39 was not a B or blank for any field on a H-*AUTO line.
019	4	INVALID ENTRY IN POSITIONS 40-43. BLANKS ARE ASSUMED. End position cannot be specified on field specifications in an H-*AUTO line.
020	4	INVALID ENTRY IN POSITIONS 45-70. BLANKS ARE ASSUMED. A literal or edit word cannot be specified with an alphameric field.
021	4	FIELD NAME WILL BE CONDITIONED BY THE INDICATOR N1P. Field name is used and the H-*AUTO line is unconditioned.
022	4, 5	INVALID EDIT CODE, POSITION 38. BLANK IS ASSUMED. Position 38 is not one of the following valid edit codes: A, B, C, D, J, K, L, M, 1, 2, 3, 4, X, Y, or Z.
023	4, 5	INVALID ENTRY IN POSITION 44. BLANK IS ASSUMED. Position 44 is not blank for a numeric field.
024	5	CONDITIONING INDICATORS IN POSITIONS 23-31 ARE NOT BLANK FOR A TOTALING FIELD, A IN POSITION 39, ON A T *AUTO LINE. BLANKS ARE ASSUMED. The indicators specified on a totaling field in a T *AUTO specification are not used when generating specifications.

Note	*Phase*	*Message and Explanation*
025	4, 5	LITERAL IN POSITIONS 45-70 HAS APOSTROPHE MISSING AT BEGINNING OR END. BLANKS ARE ASSUMED IN POSITIONS 45-70. The error occurred for one of these reasons: 1. Position 45 is not an apostrophe, but 45-70 are not blank. 2. Position 45 is an apostrophe, but there are no apostrophes in 46-70. 3. There is an embedded single apostrophe (not paired) in positions 46-69. 4. Positions through position 70 are not blank after last apostrophe. This specification is dropped if no field name is present. Otherwise, positions 45-70 are assumed blank.
026	4, 5	UNABLE TO DETERMINE IF FIELD OR RECORD SPEC. SPEC IS DROPPED. Position 15 is blank indicating it is a field specification but positions 32-37 and 45-70 are also blank. This specification and its possible column headings are dropped.
027	4	POSITIONS 38-44 ARE NOT BLANK WHEN A LITERAL IS SPECIFIED. BLANKS ARE ASSUMED. Positions 38-44 must be blank when a literal is specified on a H-*AUTO line.
028	4, 5	POSITIONS 7-13 ARE NOT BLANK ON AND/OR SPEC. BLANKS ARE ASSUMED. Positions 7-13 are not blank when 14-16 contain AND or 14-15 contain OR.
029	4, 5	SPACE AND/OR SKIP ENTRIES IN POSITIONS 17-22 ARE INVALID. BLANKS ARE ASSUMED ONLY FOR INVALID ENTRY. Positions 17 and/or 18 do not contain 0-3 or blank, or positions 19-20, 21-22 do not contain 01-99, A0-A9, B0-B9, or ƀ1-ƀ9.
030	4, 5	POSITIONS 37-70 NOT BLANK ON RECORD SPEC. BLANKS ARE ASSUMED. Positions 37-70 must be blank for record types.
031	5	INVALID ENTRY IN POSITION 38. BLANK IS ASSUMED. Edit code cannot be specified for a literal on D/T-*AUTO lines.
032	5	END POSITION IN POSITIONS 40-43 IS INVALID. BLANKS ARE ASSUMED. Error occurred because either positions 40-43 contain invalid numbers or the end position exceeds the record length.
033	6	GENERATED FIELD LENGTH EXCEEDS 15. 15 IS ASSUMED. Two positions have been added to a field specified with an A in position 39 in order to generate a total field. The length of the generated total field exceeds 15.

Note	*Phase*	*Message and Explanation*
034	3	DEFINITION OF FIELD IS INVALID. DEFINITION IS NOT USED. This error occurred for one of these reasons: 1. Length equals 0. 2. Length greater than 15 for a numeric field. 3. Length entry is non-numeric. 4. Length less than decimal position. 5. Decimal position entry is non-numeric. 6. Position 43 is not P, B, or blank.
035	4, 5	ARRAY NAME SPECIFIED ON *AUTO LINE. SPEC IS DROPPED. This error occured for one of these reasons: 1. The field name in this H-*AUTO or D/T-*AUTO spec is an array name. 2. A generated name for this D/T-*AUTO spec total field is an array name. In this case, the specification is dropped along with all its column headings. Both the total field name and the generated field array name are printed with the note number.
036	3	RECORD LENGTH FOR FILE WITH *AUTO LINES IS INVALID. ASSUME RECORD LENGTH OF 96. This error occurred for one of these reasons: 1. Record length is 0. 2. Record length is non-numeric. 3. Record length is blank.
037	2, 5	TOTALING, A IN POSITION 39, SPECIFIED FOR AN INVALID FIELD NAME. SPEC IS DROPPED. Position 39 of a D/T-*AUTO spec field has an A, yet the field name is: 1. Blank. 2. A table name. 3. An indexed array name. 4. A Page field. Drop the specification and all its column headings.
038	5	TOTALING, A IN POSITION 39, SPECIFIED FOR AN ALPHAMERIC FIELD. ASSUME POSITION 39 IS BLANK. D/T-*AUTO line, field name is alphameric and position 39 is an A.
039	5	POSITIONS 7-38 NOT BLANK FOR A COLUMN HEADING. BLANKS ARE ASSUMED. Position 39 is a C, positions 7-38 must be blank.
040	5	INVALID ENTRY IN POSITION 39. BLANK IS ASSUMED. Error occurred for one of these reasons: 1. Position 39 is B but Field Name is blank. 2. Field specification of a D/T-*AUTO line and position 39 is not A, B, C, 1-9, R or blank.
041	5	COLUMN HEADING, C IN POSITION 39, SPECIFIED BUT LITERAL NOT PRESENT. SPEC IS DROPPED. Position 39 is a C and positions 45-70 are blank.

Note	*Phase*	*Message and Explanation*
042	4, 5	EDIT CODE AND EDIT WORD ARE BOTH SPECIFIED. EDIT WORD IS DROPPED. Edit Code in position 38 and edit word in positions 45-70 are both specified. Positions 45-70 are assumed blank.
043	5	EDITING SPECIFIED FOR AN ALPHAMERIC FIELD. ASSUME BLANKS IN POSITIONS 38 AND 45-70. Positions 38 and 45-70 must be blank for alphameric fields.
044	4, 5	INVALID ENTRY IN POSITION 16. BLANK IS ASSUMED. Position 16 is not F or blank.
045	4, 5	AND/OR SPEC OUT OF SEQUENCE. SPEC IS DROPPED. The AND/OR (positions 14-16) does not follow a record specification.
046	2	MULTIPLE D/T *AUTO LINES SPECIFIED IN THE PROGRAM. DROP ALL SPECS TO NEXT RECORD TYPE. Only one D/T-*AUTO line is allowed in the program.
047	5	COLUMN HEADING SPEC OUT OF ORDER. SPEC IS DROPPED. Field spec with a C in position 39 does not follow a specification with a C, B, A, or blank (with a field name in 32-37) in position 39.
048	6	END POSITION INVALID FOR THIS SPEC TYPE. ASSUME BLANKS IN POSITIONS 40-43. End position cannot be specified for these specifications if: 1. C in position 39, or 2. 1-9 or R in position 39.
049	6	SPECIFIED END POSITION IS LESS THAN FIELD OR LITERAL LENGTH. ASSUME BLANKS IN POSITIONS 40-43. End positions (40-43) must be at least as large as the field or literal.
050	5	MORE THAN THREE COLUMN HEADING LINES SPECIFIED. SPEC IS DROPPED. Only two consecutive specs may have a C in position 39.
051	6	NO VALID TOTALING FIELDS SPECIFIED. ONLY ONE D/T OUTPUT LINE IS GENERATED. TOTAL LINE CONSTANTS, 1-9, R IN POSITION 39, ARE DROPPED. Position 39 of D/T-*AUTO line does not contain an A. Therefore no automatic totaling is done and no total lines are generated.
052	5	1-9, R IS INVALID IN POSITION 39. SPEC IS DROPPED. Position 39 contains 1-9, but the associated level indicator (L1-L9) was not defined on input specifications (59-60), or this is a T-*AUTO line and the lowest level indicator used on the T-*AUTO is of greater or equal level. For example, if 2 was specified in position 39, then L2 must be defined as a level indicator on the input specifications, and if this is a T-*AUTO line, the lowest control level indicator present on the T-*AUTO line must be L1.
053	4, 5	INDICATORS NOT ALLOWED ON THIS SPEC TYPE. BLANKS ARE ASSUMED IN POSITIONS 23-31. Indicators are not allowed on: 1. Field descriptions following an H-*AUTO specification. 2. Field description with position 39 containing a 1-9 or R following a D/T-*AUTO line.

Note	*Phase*	*Message and Explanation*
054	6	SPECIFIED END POSITION CAUSES OVERLAYS OF FIELDS OR LITERALS. BLANKS ARE ASSUMED IN POSITIONS 40-43. The length of the line up to this specification plus the length of the field/literal of this specification is greater than the specified end position.
055	All Phases	I/O ERROR OCCURRED. PROGRAM IS TERMINATED. The additional information printed with the error describes the problem. 41 – Permanent disk error. 44W – The number of tracks allocated for $WORK is too small. 44S – The number of tracks allocated for $SOURCE is too small. For 44 errors, increase size of the work file and rerun.
056	1	SOURCE LIBRARY MEMBER NAME IS INVALID. ENTRY IS DROPPED. This message applies to both the U spec and /COPY. The error occurred for one of these reasons: 1. Pack name not R1, R2, F1, or F2. 2. Comma is missing or not left justified against pack name. 3. The member name exceeds six characters. 4. The member name is missing, it does not exist in the library, or it is incorrectly specified. 5. Embedded blank in the member name.
057	2	TOTALING SPECIFIED MORE THAN ONCE FOR THIS FIELD NAME. SPEC IS DROPPED. Field name specified with an A in position 39 more than once. Specification is dropped.
058	4	MAXIMUM NUMBER OF H *AUTO LINES EXCEEDED. DROP ALL SPECS TO NEXT RECORD TYPE. More than five H-*AUTO lines specified. Drop all excess H-*AUTO lines.
059	1	INVALID ENTRY IN POSITION 7 OF U SPEC. BLANK IS ASSUMED. Valid entries are P, C, B or blank. The generated source deck is not punched.
060	1	LIBRARY NAME IN POSITIONS 8-16 IS NOT BLANK. BLANKS ARE ASSUMED. These must be blank if position 7 is P or blank.
061	1	INVALID ENTRY IN DATE SUPPRESS, POSITION 27. BLANK IS ASSUMED. Valid entries are N and Blank. Page/date is not suppressed.
062	1	INVALID ENTRY IN ASTERISK SUPPRESS, POSITION 28. BLANK IS ASSUMED. Valid entries are N and blank. Asterisks will appear.
063	4, 5	AND/OR SPEC IS INVALID. SPEC IS DROPPED. This error occurred for one of these reasons: 1. Main record specification doesn't have conditioning indicators. 2. AND/OR spec has no indicators.

Note	*Phase*	*Message and Explanation*
064	8	D/T *AUTO LINE OVERFLOW WILL OCCUR WITH GENERATION OF ASTERISK INDICATION. ALL ASTERISKS ARE SUPPRESSED. One or more of the asterisks would cause overflow of the defined printer record length.
065	1	POSITIONS FOLLOWING LIBRARY MEMBER NAME ARE NOT BLANK. BLANKS ARE ASSUMED. Positions 22-49 of /COPY statement or positions 17-26 or 29-74 of the U spec are not blank. This may be caused by an imbedded blank in the name. In this case characters up to the blank are considered the name. The rest of the characters are dropped.
066	6	MORE THAN 19 AND/OR LINES CONDITION AN *AUTO LINE. THIS AND ALL FOLLOWING AND/OR SPECS ARE DROPPED. The RPG II language does not permit over 19 AND/OR lines on output specifications.
068	1	NUMBER OF FILE DESCRIPTION SPECS EXCEEDS THE MAXIMUM ALLOWED. SPEC IS DROPPED. The maximum number of file description specifications allowed is 20.
069	6	AUTOMATIC TOTALING OF THIS FIELD RESULTS IN GENERATED FIELD NAME CONFLICTS. ASSUME POSITION 39 BLANK. This error occurred for one of these reasons: 1. A field name that was generated for totaling was previously defined as alphameric. 2. Another field name, which is a duplicate through five characters to this field name, appears in the program and is used as a totaling field. Both names are printed. This may cause incorrect format of the output line.
070	C, D	GENERATED LINE IS TOO LONG. EXCESS IS DROPPED. Either the length of H-*AUTO line exceeds the record length or the length of D/T-*AUTO line exceeds twice the record length, depending on which is specified.
071	2	INVALID OUTPUT RECORD TYPE IN POSITION 15. SPEC IS DROPPED. Entry must be either H, D, T, or E.
072	8	PAGE FIELD NOT AVAILABLE FOR USE IN PAGE HEADING. NO PAGE NUMBERING WILL OCCUR. All the page fields have been used in the program. Format of output line maybe incorrect.
073	A	ERROR OCCURRED WHEN ATTEMPTING TO CATALOG PROGRAM IN SOURCE LIBRARY. PROGRAM IS NOT CATALOGED. This error occurred for one of these reasons: 1. Library is full. 2. Invalid operation (library may not be allocated).

Note	*Phase*	*Message and Explanation*
074	A	DUPLICATE NAME IN SOURCE LIBRARY. THIS PROGRAM REPLACES PREVIOUS MEMBER.
075	A	PERMANENT I/O ERROR WHILE PUNCHING GENERATED SOURCE PROGRAM ON MFCU. PUNCHING IS DISCONTINUED.
076	7	GENERATED END POSITION FOR TOTAL LINE CONSTANT, 1-9 OR R IN POSITION 39, EXCEEDS RECORD LENGTH. DROP ALL TOTAL LINE CONSTANTS. This error occurred for one of these reasons: 1. The length of the constants for a particular level exceeds the record length. 2. The first A-type field encountered has a beginning position greater than the record length.
077	5	LEVEL INDICATOR USED ON T *AUTO LINE IS UNDEFINED. INDICATOR IS DROPPED. A control level indicator used on a T-*AUTO line must be defined in positions 59-60 of the input field specifications. The invalid indicator will be printed with the error note and no total lines will be generated.
078	1	INVALID ENTRY IN POSITION 7 OF U SPECIFICATION. ASSUME NO PUNCHING. Model 10 or 12: If both punching and cataloging are requested (B entry) at least an 8K partition must be available. Model 6: Punching of a generated source deck is not supported.
079	7	D *AUTO IS CONDITIONED BY MORE THAN 7 AND/OR LINES. ONLY THE FIRST 7 AND/OR LINES WILL CONDITION THE GENERATED CALCULATION. The indicators which condition a D-*AUTO line are used to condition the generated EXSR calculation specification needed for total rolling. RPG II will only allow seven lines of AND/OR conditioning indicators in calculations.

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