sia Program Library
IBM Japan, Ltd.
Systems Engineering Dept.
14, 1 Chome Nagata-cho
Chiyoda-ku
Tokyo, Japan

Canadian Program Library
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1150 Eglinton Ave. E.
Don Mills 402, Ont.
Canada

European Program Library
IBM France
23, Allée-Maillasson
F.92-Boulogne-Billancourt
France

Société Anonyme Au Capital de
347. 424. 000 F-R.C.
(Seine 55B-11 846)

Program Information Dept.
IBM Corporation
40 Saw Mill River Road
Hawthorne, New York 10532
United States

South American
Program Library
IBM do Brasil, Ltda.
Avenida Presidente
Vargas 642, 4 Andar
Caixa Postal 1830-ZC-00
Rio de Janeiro, Brazil

South Pacific
Program Library
IBM Australia, Ltd.
Box 3318 G.P.O.
Sydney, N.S.W.
Australia

JUNE 1968

Memorandum to: Recipients of IBM 1130 COMMERCIAL SUBROUTINE PACKAGE, 1130-SE-25X

Subject: Version 3, Modification Level 1

The subject program is being forwarded to you with this memorandum.

Basic program material consists of:

Application Directory (attached)
Program Reference Manual (H20-0241-3), TNL N20-1888
Card deck consisting of object programs and sample problems.
Refer to Card Deck Key in Application Directory for further description.

Optional program material:

Source statements and sample problems on one 9 track Distribution Tape Reel (DTR) (800 or 1600 bpi, as requested).
Refer to the Tape Key in the Application Directory for further description.

Any discrepancy between the material received and material ordered, or any errors in reproduction, should be reported to the Manager of the Program Library providing your programming systems.

Enclosures

Revised NOVEMBER 1968
Version 3 Modification Level 1

1130 COMMERCIAL SUBROUTINE PACKAGE

(1130-SE-25X) Version 3

APPLICATION DIRECTORY

This directory contains information concerning all available material associated with the subject application. Its objective is to enable the recipient to understand what he has received, where to locate specific items, and what to do with them.

CONTENTS

DOCUMENTATION DIRECTORY

Application Description (H20-0520). This manual contains sufficient information to enable the reader to determine whether the application would be useful to him. Contents include subroutine specifications and machine configurations.

Program Reference Manual (H20-0241-3), TNL N20-1888. This manual enables the reader to understand and implement the component parts of the application. A detailed description of the logical operation of the computer programs associated with the subject is also presented. The manual is a combined user's, operator's and systems manual. Contents include:

Detailed Description of Each Subroutine
Sample Problems
Flowcharts
Listings

REFERENCE MATERIAL

IBM 1130 Computing System Functional Characteristics (A26-5881). This manual describes the IBM 1130 Computing System in detail, at the machine language level.

IBM 1130 Assembler Language (C26-5927). This publication is intended for programmers who have a basic knowledge of the IBM 1130 Computing System. It describes the IBM 1130 Assembler language in detail, and includes a full description of each type of Assembler statement.

IBM 1130 Subroutine Library (C26-5929). This bulletin contains a description of each of the IBM-supplied subroutines for conversion, input/output and internal manipulation.

IBM 1130/1800 Basic FORTRAN IV Language (C26-3715). This manual contains the information describing FORTRAN as implemented on the IBM 1130. It is necessary to understand the information in this manual in order to use the 1130 Commercial Subroutine Package.

DECK KEY -- BASIC MACHINE-READABLE (OBJECT DECKS)

(NOTES: The underlined name is the name under which the routine has been stored. Columns 73-75 contain CSP.)

	Description	Number of Cards	Columns 76-80
1.	//JOB card	1	00000
2.	// DUP card	1	00010
3.	*DELETE cards for previous version CSP	24	00020-00250
4.	*STORE card for ADD/SUB	1	00260
5.	ADD/SUB object deck	9	00270-00350
6.	*STORE card for A1A3/A3A1	1	00360
7.	A1A3/A3A1 object deck	6	00370-00420
8.	*STORE card for A1DEC	1	00430
9.	A1DEC object deck	4	00440-00470
10.	*STORE card for CARRY	1	00480
11.	CARRY object deck	4	00490-00520
12.	*STORE card for DECA1	1	00530
13.	DECA1 object deck	4	00540-00570
14.	*STORE card for DIV	1	00580
15.	DIV object deck	8	00590-00660
16.	*STORE card for DPACK/DUNPK	1	00670
17.	DPACK/DUNPK object deck	5	00680-00720
18.	*STORE card for EDIT	1	00730
19.	EDIT object deck	7	00740-00800
20.	*STORE card for FILL	1	00810
21.	FILL object deck	3	00820-00840
22.	*STORE card for GET	1	00850
23.	GET object deck	6	00860-00910
24.	*STORE card for ICOMP	1	00920
25.	ICOMP object deck	5	00930-00970
26.	*STORE card for IOND	1	00980
27.	IOND object deck	3	00990-01010
28.	*STORE card for MOVE	1	01020
29.	MOVE object deck	3	01030-01050
30.	*STORE card for MPY	1	01060
31.	MPY object deck	6	01070-01120
32.	*STORE card for NCOMP	1	01130
33.	NCOMP object deck	3	01140-01160
34.	*STORE card for NSIGN	1	01170
35.	NSIGN object deck	3	01180-01200
36.	*STORE card for NZONE	1	01210
37.	NZONE object deck	4	01220-01250
38.	*STORE card for PACK/UNPAC	1	01260
39.	PACK/UNPAC object deck	4	01270-01300
40.	*STORE card for PRINT/SKIP	1	01310

41.	PRINT/SKIP object deck	5	01320-01360
42.	*STORE card for PUT	1	01370
43.	PUT object deck	5	01380-01420
44.	*STORE card for P1403/S1403	1	01430
45.	P1403/S1403 object deck	5	01440-01480
46.	*STORE card for P1442	1	01490
47.	P1442 object deck	5	01500-01540
48.	*STORE card for READ/PUNCH	1	01550
49.	READ/PUNCH object deck	5	01560-01600
50.	*STORE card for R2501	1	01610
51.	R2501 object deck	5	01620-01660
52.	*STORE card for STACK	1	01670
53.	STACK object deck	3	01680-01700
54.	*STORE card for TYPER/KEYBD	1	01710
55.	TYPER/KEYBD object deck	5	01720-01760
56.	*STORE card for WHOLE	1	01770
57.	WHOLE object deck	3	01780-01800
58.	*STORE card for ARGS	1	01810
59.	ARGS object deck	5	01820-01860
60.	Sample Problem 1 FOR card	1	25940
61.	Sample Problem 1 FORTRAN source deck	106	25950-27000
62.	Sample Problem 1 EXECUTE card	1	27010
63.	Sample Problem 1 data	198	27020-28990
64.	Sample Problem 2 FOR card	1	29000
65.	Sample Problem 2 FORTRAN source deck	156	29010-30560
66.	Sample Problem 2 EXECUTE card	1	30570
67.	Sample Problem 2 data	93	30580-31500
68.	Sample Problem 3 JOB and FOR cards	2	31510-31520
69.	Sample Problem 3 FORTRAN source deck	55	31530-32070
70.	Sample Problem 3 EXECUTE card	1	32080
71.	Sample Problem 3 data	20	32090-32280
	TOTAL	822 cards	

DECK KEY -- OPTIONAL MACHINE-READABLE MATERIAL (SOURCE DECKS)

(NOTES: The underlined name is the name under which the routine is stored. Columns 73 - 75 contain CSP. The material is supplied in the form of card images on one reel of tape.)

	Description	Number of Cards	Columns 76 - 80
1.	//JOB Card	1	00010
2.	ADD/SUB routine ALP source deck	180	00020-01810
3.	Disk utility for storing ADD/SUB	2	00182-00183
4.	A1A3/A3A1 routine ALP source deck	140	01840-03230
5.	Disk utility for storing A1A3/A3A1	2	03240-03250
6.	A1DEC routine ALP source deck	83	03260-04080
7.	Disk utility for storing A1DEC	2	04090-04100
8.	CARRY routine ALP source deck	76	04110-04860
9.	Disk utility for storing CARRY	2	04870-04880
10.	DECA1 routine ALP source deck	85	04890-05730
11.	Disk utility for storing DECA1	2	05740-05750
12.	DIV routine ALP source deck	243	05760-08180
13.	Disk utility for storing DIV	2	08190-08200
14.	DPACK/DUNPK ALP source deck	99	08210-09190
15.	Disk utility for storing DPACK/DUNPK	2	09200-09210
16.	EDIT routine ALP source deck	217	09220-11380
17.	Disk utility for storing EDIT	2	11390-11400
18.	FILL routine ALP source deck	37	11410-11770
19.	Disk utility for storing FILL	2	11780-11790
20.	GET routine ALP source deck	105	11800-12840
21.	Disk utility for storing GET	2	12850-12860
22.	ICOMP routine ALP source deck	129	12870-14150
23.	Disk utility for storing ICOMP	2	14160-14170
24.	IOND routine ALP source deck	13	14180-14300
25.	Disk utility for storing IOND	2	14310-14320
26.	MOVE routine ALP source deck	45	14330-14770
27.	Disk utility for storing MOVE	2	14780-14790
28.	MPY routine ALP source deck	167	14800-16460
29.	Disk utility for storing MPY	2	16470-16480
30.	NCOMP routine ALP source deck	49	16490-16970
31.	Disk utility for storing NCOMP	2	16980-16990
32.	NSIGN routine ALP source deck	49	17000-17480
33.	Disk utility for storing NSIGN	2	17490-17500
34.	NZONE routine ALP source deck	83	17510-18330
35.	Disk utility for storing NZONE	2	18340-18350
36.	PRINT/SKIP routine ALP source deck	66	18360-19010

37.	Disk utility for storing PRINT/SKIP	2	19020-19030
38.	PUT routine ALP source deck	109	19040-20120
39.	Disk utility for storing PUT	2	20130-20140
40.	P1403/S1403 routine ALP source deck	74	20150-20880
41.	Disk utility for storing P1403/S1403	2	20890-20900
42.	P1442 routine ALP source deck	53	20910-21430
43.	Disk utility for storing P1442	2	21440-21450
44.	READ/PUNCH routine ALP source deck	83	21460-22280
45.	Disk utility for storing READ/PUNCH	2	22290-22300
46.	R2501 routine ALP source deck	61	22310-22910
47.	Disk utility for storing R2501	2	22920-22930
48.	STACK routine ALP source deck	16	22940-23090
49.	Disk utility for storing STACK	2	23100-23110
50.	TYPER/KEYBD routine ALP source deck	81	23120-23920
51.	Disk utility for storing TYPER/KEYBD	2	23930-23940
52.	PACK/UNPAC routine ALP source deck	66	23950-24600
53.	Disk utility for storing PACK/UNPAC	2	24610-24620
54.	WHOLE routine ALP source deck	38	24630-25000
55.	Disk utility for storing WHOLE	2	25010-25020
56.	ARGS routine ALP source deck	89	25030-25910
57.	Disk utility for storing ARGS	2	25920-25930
58.	Sample Problem 1 FOR card	1	25940
59.	Sample Problem 1 FORTRAN source deck	106	25950-27000
60.	Sample Problem 1 EXECUTE card	1	27010
61.	Sample Problem 1 data	198	27020-28990
62.	Sample Problem 2 FOR card	1	29000
63.	Sample Problem 2 FORTRAN source card	156	29010-30560
64.	Sample Problem 2 EXECUTE card	1	30570
65.	Sample Problem 2 data	93	30580-31500
66.	Sample Problem 3 JOB and FOR cards	2	31510-31520
67.	Sample Problem 3 FORTRAN source deck	55	31530-32070
68.	Sample Problem 3 EXECUTE card	1	32080
69.	Sample Problem 3 data	20	32090-32280
	TOTAL	3228 cards	

Note: This source tape is available on one Distribution Tape Reel (DTR), 9-track @ 800 or 1600 bpi. See page 7 for tape key.

PREPARATORY SYSTEMS PROCEDURES

This section includes information on how to use this package. The package is available in two forms:

- Basic machine-readable form. This consists of object decks that can be stored on the disk using the Monitor Disk Utility Program.

- Optional program material. This consists of the source statements, placed on a reel of magnetic tape in card image format. This material is for those users with card systems (no disk) and for those users who want the source cards so that they may modify the CSP routines.

Note that the Program Reference Manual (H20-0241) contains listings of the source statements. Users who need only a few of the routines in source format may prefer to prepare the cards themselves rather than choose the magnetic tape option.

BASIC MACHINE-READABLE OBJECT DECKS

This deck of 822 cards is ready to be run as one JOB. It will delete 24 subroutines of Version 2 (if they are on the disk), store the 28 new subroutines in the User Area, and then execute three sample problems.

Operating instructions are as follows:

1. Mount and make ready the disk cartridge on which the routines are to be stored.

2. Place a cold start card in front of the 822-card library deck. (Use the proper cold start card, as applicable-- that for Version 1 or for Version 2 of the Monitor.)

3. Ready the card reader and any other I/O devices to be used.

4. Set the console switches to reflect which I/O devices you want the sample problem to use (Figure 1).

5. Press IMMEDIATE STOP, RESET, and LOAD on the console. This will start the loading and execution process.

6. Each of the three sample problems ends on a numbered STOP statement (see Figure 2). These STOPs indicate successful completion; press START to continue.

NOTE: Sample problem 2 will not execute if Version 1 of the Monitor is in use.

OPTIONAL PROGRAM MATERIAL

The optional program material package consists of 3228 source card images on one Distribution Tape Reel (DTR), 9-track @ 800 or 1600 bpi.

Tape Key

1. Tapemark
2. CSP source decks and sample problems, blocked 20 records per block, 80 characters per record.
3. Tapemark

To punch the source cards, use program 360P-UT-053. The Utility Modifier Statement card should read as follows:

```
//UTC, TR, FF, A=(80,1600), B=(80,80), IU, O1
```

To list, use program 360P-UT-052. The Utility Modifier Statement card should read as follows:

```
//UTP, TL, FF, A=(80,1600), B=(132), IR, O1
```

For additional parameters for an individual user, see IBM manuals IBM System/360 Basic Programming Support Specifications, Card and Tape Utility Programs (C24-5026) and IBM System/360 BPS Operating Guide (C24-5027-1).

With The 1130 Disk Monitor System

The deck of 3328 cards is ready to be run as one JOB. It will assemble the 28 subroutines of Version 3, store them on the disk in the User Area, and then execute three sample problems. If a previous version of the Commercial Subroutines is present on the disk cartridge, the old routines must be deleted before attempting to store the new ones.

Operating instructions are as follows:

1. Mount and make ready the disk cartridge on which the routines are to be stored.

2. Place a cold start card in front of the 3228-card source deck. (Use the proper cold start card, as applicable — that for Version 1 or for Version 2 of the Monitor.)

3. Ready the card reader and any other I/O devices to be used.

4. Set the console switches to reflect which I/O devices you want the sample problems to use (Figure 1).

5. Press IMMEDIATE STOP, RESET, and LOAD on the console. This will start the loading and execution process.

6. Each of the three sample problems ends on a numbered STOP statement (see Figure 2). These STOPs indicate successful completion; press START to continue.

Note: Sample problem 2 will not execute if Version 1 of the Monitor is in use.

Without The 1130 Disk Monitor System

With an 1130 card system (no disk) the subroutines may be assembled with the card Assembler:

1. Separate the 3228-card deck into 28 assembler source (subroutine) decks and 3 FORTRAN source (test problem) decks. Label each deck.

2. Remove all cards with // in columns 1 and 2.

3. Remove all *STORE cards.

4. The subroutines may now be assembled. Place a subroutine source deck in the card reader behind the Core Image Loader and the Assembler decks.

5. Press IMMEDIATE STOP and RESET on the console.

6. Ready all I/O devices.

7. Press PROGRAM LOAD on the console.

8. Press reader START to process the last two cards.

9. Remove the source deck from stacker 2 and place it in the read hopper again.

10. Press START in the reader. Pass 2 now begins.

11. Press START on the reader to process the last two cards. The "list deck" so obtained may now be processed by the compressor program for later use.

12. After each subroutine is compressed, it may be placed in the Card Subroutine library.

The three sample problems may be compiled and executed in accordance with the standard FORTRAN procedures.

Input Device	Output Device	Switches		
		0	1	2
1442	console printer	down	down	down
1442	1132	up	down	down
1442	1403	up	up	down
2501	console printer	down	down	up
2501	1132	up	down	up
2501	1403	up	up	up

Figure 1. Console switch settings for sample problems

Sample Problem	STOP codes
1	1111
2	0111
3	3333

Figure 2. Stop codes displayed in accumulator by sample problems

REQUIRED PROGRAMMING SYSTEMS

IBM 1130 FORTRAN — 1130-FO-001
IBM 1130 Assembler — 1130-SP-001
IBM 1130 Subroutine Library — 1130-LM-001
IBM 1130 Utility Routines — 1130-UT-001
or
IBM 1130 Monitor System — 1130-OS-005
or
IBM 1130 Monitor System, Version 2 — 1130-OS-005

MINIMUM MACHINE CONFIGURATION

For execution: Any 8K 1130 System, with card reader
For assembly: Any 4K 1130 System, with card reader

MAINTENANCE PROCEDURES

This program will be maintained through the use of serially numbered modification levels Any unmodified system is considered to be modification level 0. Each subsequent modification raises the modification level by 1. The initial availability of this program is version 1 modification level 0. Should the nature or number of changes become large, a new version will be distributed. Each major revision raises the version number by 1; modification levels to a new version begin at 1.

Modification letters will be mailed to all previous recipients of the program. All modification letters will be supplied with the program. The change or alter cards will be included in the deck to reflect the latest changes.

An Authorized Programming Analysis Report (APAR) should be submitted through your local IBM system engineer to report any difficulties encountered in the use of this system. The APAR should be addressed to APAR Processing, IBM Application Programming Standards, 112 East Post Road, White Plains, New York.

IBM

Application Program

H20-0241-3

1130 Commercial Subroutine Package

(1130-SE-25X), Version 3, Modification 1

Program Reference Manual

The IBM 1130 Commercial Subroutine Package is for IBM 1130 users with a knowledge of FORTRAN. The package is not intended to make FORTRAN a complete commercial language, but to supply commercial capability to users of IBM 1130 FORTRAN.

This manual is a combined user's, operator's, and system manual.

Form H20-0241-3
Front Cover revised 10/11/68
By TNL N20-1888

Fourth Edition

This edition, H20-0241-3, is a major revision obsoleting H20-0241-2.

A form is provided at the back of this publication for reader's comments.
If the form has been removed, comments may be addressed to IBM Corporation,
Technical Publications Department, 112 East Post Road, White Plains, N.Y. 10601.

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CONTENTS

INTRODUCTION

The 1130 Commercial Subroutine Package has been written to facilitate the use of FORTRAN in basic commercial programming. Included in the package are the following items:

- The GET routine, which allows the programmer to decode input records after they have been read. This eliminates the common FORTRAN-associated problem that occurs when input cards enter the system in an unknown sequence. Input records that vary in this way may be read with the A1 format and converted to real numbers (using GET) after the program has determined which type record was just read.

- An editing routine, EDIT, for the preparation of output in special formats. With EDIT it is possible to insert commas, supply leading blanks, float dollar signs, display a CR symbol after negative numbers, etc. EDIT is especially useful in the preparation of invoices, checks, and other commercial documents.

- Code conversion routines for data manipulation and more efficient data packing:

GET	-	A1 format to Real
PUT	-	Real to A1 format
PACK	-	A1 to A2 format
UNPAC	-	A2 to A1 format
A1A3	-	A1 to A3 format
A3A1	-	A3 to A1 format
DPACK	-	D1 to D4 format
DUNPK	-	D4 to D1 format
A1DEC	-	A1 to decimal format
DECA1	-	Decimal to A1 format

- A variable-length decimal arithmetic package. In this system, all arithmetic is done with integer or decimal numbers, with field lengths chosen by the user. This subset of the Commercial Subroutine Package includes routines for variable-length decimal add (ADD), subtract (SUB), multiply (MPY), divide (DIV), compare (ICOMP), and sign test (NSIGN).

  Use of this system eliminates two of the arithmetic problems associated with FORTRAN: the accuracy problem (the inexact representation of fractions) and the magnitude problem (extended precision values limited to nine digits, etc.).

- Subroutines for improved speed and control of I/O devices. By taking advantage of the 1130's cycle-stealing capability, the overlapped I/O routines can substantially speed the throughput rates of many jobs. Subroutines are supplied for the

  IBM 1442 Card Read Punch
  IBM 1442-5 Card Punch
  IBM 2501 Card Reader
  IBM 1132 Printer
  IBM 1403 Printer
  Console Keyboard
  Console Typewriter

In addition to input/output, subroutines are supplied for control of the 1132 and 1403 carriage and the 1442 stacker select mechanism.

- Several utility routines for common tasks:

NCOMP	for comparing two variable-length alphameric (A1) fields
MOVE	for moving data from one area to another
FILL	to fill an area with a specified value
WHOLE	to truncate the fractional portion of a real number
NZONE	for testing and modifying zone punches

USE OF THE COMMERCIAL SUBROUTINE PACKAGE

CSP is modular in design -- the user may use whichever routines he needs and ignore the others.

The routines may be assembled on any 4K card 1130 system, but an 8K system will probably be required for any extensive usage. The desired subroutines may be inserted in the FORTRAN execute deck (card systems) or stored in the Subroutine Library on the disk cartridge. In addition, some of the CSP routines use certain parts of the IBM 1130 Subroutine Library. (See "Core Allocation" in the Appendix.)

All of the routines are written in the 1130 Assembler Language.

The control statement

```
*ONE WORD INTEGERS
```

must be used in programs that call any of the Commercial subroutines.

The control statement

```
*EXTENDED PRECISION
```

must be used in any program that calls the GET or PUT subprograms. The other CSP routines are independent of the real number precision.

In general, CSP will operate under either Version 1 or Version 2 of the 1130 Disk Monitor System. The exceptions are P1403, S1403, P1442, and R2501, which use subroutines supplied only with Version 2 (see the detailed descriptions for more particulars).

The use of the overlapped I/O portion of CSP is an "either/or" proposition. For nondisk I/O, the programmer must choose either the CSP overlapped routines or the standard FORTRAN routines. The two systems cannot be intermixed within the same program. Note the emphasis on nondisk. This exclusion does not apply to disk I/O, which may be used regardless which of the two systems is selected.

Use of the overlapped I/O routines also excludes the employment of the TRACE feature of FORTRAN, since it used portions of the FORTRAN package for output.

MACHINE REQUIREMENTS

For execution, an 8K 1130 system, with any card reader, is necessary. In addition, the following I/O devices are supported:

1442 Card Read Punch, Model 6 or 7
1442 Card Punch, Model 5
2501 Card Reader, Model A1 or A2
1403 Printer, Model 6 or 7
1132 Printer
Console Keyboard
Console Typewriter

Other I/O devices may be utilized through standard FORTRAN.

For assembly, any 1130 card system is sufficient. The subroutines may be card- or disk-resident.

SPECIAL CONSIDERATIONS — ARITHMETIC

Real arithmetic. When using CSP, remember that the standard FORTRAN limitations apply to all real numbers.

Extended precision numbers should not exceed ±1,000,000,000. (or 9 digits).

Fractions must be avoided if exact results are desired. All critical arithmetic should be done with whole numbers. For example, the extension

40.75 hours x $2.225 per hour

should be carried out as

4075. hundredths of hours x 2225. mills per hour

If this is not done, precision errors may appear in the results.

Decimal arithmetic. If the nine-digit or fractional limitations of FORTRAN prove burdensome, the Decimal Arithmetic package may be used. In this system, all arithmetic is done with whole numbers (no fractions), and the number of digits in each variable is chosen by the user.

A number in decimal format may be as long as desired; there is no practical limit to field length.

FORTRAN FORMAT I/O

In general, CSP works with arrays in A1 format -- one alphameric character per word. For those routines that operate on other formats, conversion routines are supplied to ease the translation between A1 and the other format.

In this area, however, one complication may occur: the use of zone punches. In many commercial applications, it is customary to X-punch the units position of a credit or negative field. Because the 11-0 Hollerith combination is not recognized by the conversion routines used with FORTRAN READs, it is necessary, when keypunching, to omit the 0-punch when an 11-punch is present in the same column. This is not a problem with 1130-produced cards that later serve as input to subsequent runs. No control X-punches, in any positions, will be recognized when the underpunched digit is a zero. "Not recognized" means that the character position is replaced with a blank. This is the case for both input and output when standard FORTRAN READs and WRITEs are used.

A 12-punch is not recognized by the conversion routines with FORTRAN when the underpunched digit is a zero. Therefore, a plus zero (12-0 Hollerith) will be expressed as only a 0-punch. For this reason, plus fields should be left unzoned rather than 12-punched in the units position.

When the input routines supplied with this package are used, this problem does not exist. All zone punches are recognized and are treated properly.

CSP OVERLAPPED I/O

The CSP overlapped I/O routines have been provided to take advantage of the cycle-stealing capability of the 1130. Because many allow processing to be resumed before the I/O is finished, their use will increase the throughput rates of many programs.

The table below summarizes the overlap capabilities of the routines:

This device	is overlapped with this function
Card reader (1442 or 2501)	Conversion from card code to A1 format
Card punch	nothing (not overlapped)
Console keyboard	nothing (not overlapped)
Console printer	anything but the console keyboard
Printer (1132 or 1403)	anything

The CSP I/O routines also permit the reading and punching of the 11-0 and 12-0 punches, both of which must be avoided with standard FORTRAN I/O.

The use of the overlapped I/O portion of CSP is an "either/or" proposition. For nondisk I/O, the programmer must choose either the CSP overlapped routines or the standard FORTRAN routines. The two systems cannot be intermixed within the same program. Note the emphasis on nondisk. This exclusion does not apply to disk I/O, which may be used regardless which of the two systems is selected.

Use of the overlapped I/O routines also excludes the employment of the TRACE feature of FORTRAN, since it uses portions of the FORTRAN package for output.

The following routines are included in the CSP I/O group:

CREAD		
~~READ~~	PRINT	TYPER
PUNCH	SKIP	KEYBD
~~R2501~~	~~P1403~~	STACK
P1442	~~S1403~~	

If any of these routines are used, standard FORTRAN READ and WRITE commands may not appear in the same program.

When using Version 1 of the 1130 Disk Monitor System, the programmer must place the statement

```
CALL IOND
```

before any STOP or PAUSE statement. This will ensure that all pending I/O interrupts have been serviced before the CPU stops or pauses. IOND should not be called if Version 2 of the Monitor is in use.

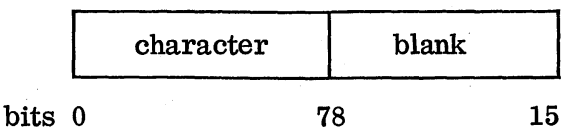
P1403, S1403, P1442, and R2501 use parts of the subroutine library supplied with Version 2 of the 1130 Disk Monitor System. If they are to be used with a Version 1 Monitor, the Version 2 subroutines must be loaded onto the Version 1 disk. See the detailed descriptions of P1403, S1403, P1442, and R2501 for more particulars.

DATA FORMATS USED

Although most of the CSP routines are oriented toward use of the A1 format, several new formats have been introduced. In addition, several of the standard formats must be considered in a different light.

A1 FORMAT

A1 format consists of one character per 16-bit word, left-justified:

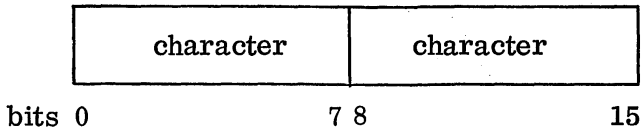


The right-hand eight bits should always contain the blank character, which is 055 000 in binary. This blank will always be inserted by the CSP routines and the standard FORTRAN A1 format.

The sign of an A1 field is assumed to be carried as an 11- or 12-punch over the rightmost character. An 11-punch is taken to signify a negative field; a 12-punch (or no-zone punch) signifies a positive field.

A2 FORMAT

A2 format consists of two characters per word:



A3 FORMAT

Although A3 format exists in standard FORTRAN terminology, its use in this manual has a different connotation. Here, A3 format means that one word contains three characters.

This can be done only by using a unique coding scheme. The user supplies a table of 40 characters. Then, the A1A3 and A3A1 subroutines may be used to translate from A1 to A3 format and vice versa.

The A3 format cannot be pictured graphically, since the three characters are combined as a single integer or binary number.

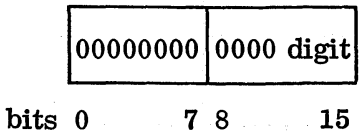
The A3 format permits highly efficient packing of alphabetic data and may be used to save considerable space on the disk.

Note, however, that only 40 characters may be used. This may not be enough for some applications. For example, if the characters chosen were A through Z, 0 through 9, the blank, comma, period, and dash, 40 would probably be ample for a name and address file. It would not be sufficient for a product description file that also required slashes, dollar signs, etc.

D1 FORMAT

D1 format consists of one digit per word, right-justified. Because the decimal arithmetic routines operate on data in this format, D1 format is also called decimal format.

D1 format is as follows:



A decimal field is stored in an array in D1 format. The sign of the field will be carried with the rightmost digit. For example, the six-digit field 001968 could be placed in the 12th through 17th position in the NUMBR array:

NUMBR(12) = 0
NUMBR(13) = 0
NUMBR(14) = 1
NUMBR(15) = 9
NUMBR(16) = 6
NUMBR(17) = 8

The same field, if it were negative, would be written as $001968\overline{8}$, and the sign would be reflected in the rightmost digit:

NUMBR(12) = 0
NUMBR(13) = 0
NUMBR(14) = 1
NUMBR(15) = 9
NUMBR(16) = 6
NUMBR(17)= -9

Note that NUMBR (17) is -9 rather than -8; this must be done because the 1130 cannot represent a negative zero. The following scheme is used with negative numbers:

If the sign of the field is negative and the rightmost digit is a	The rightmost D1 digit will be carried as a
0	-1
1	-2
2	-3
3	-4
4	-5
5	-6
6	-7
7	-8
8	-9
9	-10

Usually, this need not concern the programmer, since the A1DEC and DECA1 routines will automatically implement the special coding of negative fields. Setting up negative constants, though, must be handled properly by the programmer.

D4 FORMAT

D4 format consists in general of four decimal digits per word, with each digit occupying four bits of the word. However, since the sign digit (the rightmost one) carries the sign, it is handled separately, and is placed by itself in the last word of the D4 field. This is best illustrated by showing several examples:

The five-digit number +12345

first word				second word			
1	2	3	4				+5
0001	0010	0011	0100	0000	0000	0000	0101

The six-digit number +123456

first word				second word				third word			
1	2	3	4	5	F	F	F				+6
0001	0010	0011	0100	0101	1111	1111	1111	0000	0000	0000	0110

The seven-digit number +1234567

first word				second word				third word			
1	2	3	4	5	6	F	F				+7
0001	0010	0011	0100	0101	0110	1111	1111	0000	0000	0000	0111

The filler consists of four 1 bits, the hexadecimal F. A more detailed description of D4 format may be found with the description of the DPACK routine.

FORMAT REQUIREMENTS

The requirements for each subroutine are as follows:

Subroutine	Format of Data before Processing	Format of Data after Processing
ADD	D1 format	D1 format
A1A3	A1 format	A3 format
A1DEC	A1 format	D1 format
A3A1	A3 format	A1 format
CARRY	D1 format	D1 format
DECA1	D1 format	A1 format
DIV	D1 format	D1 format
DPACK	D1 format	D4 format
DUNPK	D4 format	D1 format
EDIT	A1 format	A1 format
FILL	Any integer (A1, A2, D1, etc.)	Same as FILL character
GET	A1 format	Real variable (extended precision)
ICOMP	D1 format	Greater than, equal to, or less than zero
IOND	None	None
KEYBD	A1 format	A1 format
MOVE	Any integer (A1, A2, D1, etc.)	Same as before MOVE
MPY	D1 format	D1 format
NCOMP	A1 format	Greater than, equal to, or less than zero

Subroutine	Format of Data before Processing	Format of Data after Processing
NSIGN	D1 format	Integer variable
NZONE	A1 format	Integer variable
PACK	A1 format	A2 format
PRINT	A1 format	A1 format
PUNCH	A1 format	A1 format
PUT	Real variable (extended precision)	A1 format
P1403	A1 format	A1 format
P1442	A1 format	A1 format
READ	A1 format	A1 format
R2501	A1 format	A1 format
SKIP	Decimal constant	None
STACK	None	None
SUB	D1 format	D1 format
S1403	Decimal constant	None
TYPER	A1 format	A1 format
UNPAC	A2 format	A1 format
WHOLE	Real variable (any precision)	Real variable (any precision)

ADD
A1A3
A1DEC
A3A1
CARRY
DECA1
DIV
DPACK
DUNPK
EDIT
FILL
GET
ICOMP
IOND
KEYBD
MOVE
MPY
NCOMP
NSIGN
NZONE
PACK
PRINT
PUNCH
PUT
P1403
P1442
READ
R2501
SKIP
STACK
SUB
S1403
TYPER
UNPAC
WHOLE

DETAILED DESCRIPTIONS

This section gives the general format and a description of each routine. Each description contains format, function, parameter description, detailed description, example, errors, and remarks. The function describes the capabilities of the routine. The parameter description explains in detail how the parameters, variables, and constants should be set up. The detailed description tells exactly what the subroutine does and how it should be used. Examples are given as an aid to the programmer. Certain specification and input errors may occur when using the package, and these are explained. The remarks section describes some peculiarities of the routine. Further information may be obtained from the flowcharts and listings.

→ ADD
A1A3
A1DEC
A3A1
CARRY
DECA1
DIV
DPACK
DUNPK
EDIT
FILL
GET
ICOMP
IOND
KEYBD
MOVE
MPY
NCOMP
NSIGN
NZONE
PACK
PRINT
PUNCH
PUT
P1403
P1442
READ
R2501
SKIP
STACK
SUB
S1403
TYPER
UNPAC
WHOLE

Format: CALL ADD(JCARD,J,JLAST,KCARD,K,KLAST,NER)

Function: Sums two arbitrary-length decimal data fields, placing the result in the second data field.

Parameter description:

JCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. This is the array which is added, the addend. The data must be stored in JCARD in decimal format, one digit per word.

J - An integer constant, an integer expression, or an integer variable. This is the position of the first digit to be added (the left-hand end of a field).

JLAST - An integer constant, an integer expression, or an integer variable, greater than or equal to J. This is the position of the last digit to be added (the right-hand end of a field).

KCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. This is the augend, the array which is added to. It will contain the result in decimal format, one digit per word.

K - An integer constant, an integer expression, or an integer variable. This is the position of the first digit of KCARD (the left-hand end of a field).

KLAST - An integer constant, an integer expression, or an integer variable, greater than or equal to K. This is the position of the last character of KCARD (the right-hand end of a field).

NER - An integer variable. Upon completion of the subroutine, this variable indicates whether arithmetic overflow occurred.

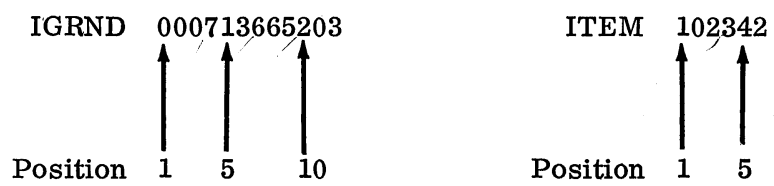
Detailed description: The corresponding digits, by place value, of JCARD and KCARD, are summed and placed back in KCARD. This operation is from left to right, with both fields being right-adjusted. Next, all carries are set in order. If overflow occurred, it is indicated by NER being equal to KLAST. NER must be initialized and reset by the user. More detailed information may be found in the ADD flowchart and listing.

Example: DIMENSION IGRND(12),ITEM(6)

N=0

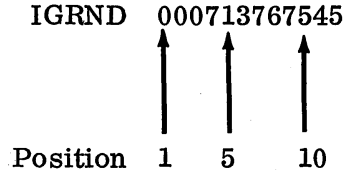
CALL ADD(ITEM,1,6,IGRND,1,12,N)

Before:



N=0

After:



ITEM is unchanged.

N=0

The numeric data field ITEM, in decimal format, is ADDed to the numeric data field IGRND, also in decimal format. Note that the fields are both right-justified. The error indicator, N, is the same, since there is no overflow out of the high-order digit (left-hand end) of the IGRND field.

Errors: If the KCARD field is not large enough to contain the sum, that is, if there is a carry out of the high-order digit, the error indicator, NER, will be set equal to KLAST, and the KCARD field will be filled with 9s.

If the JCARD field is longer than the KCARD field, nothing will be done and the error indicator will be equal to KLAST.

Remarks: Conversion from EBCDIC to decimal is necessary before using this subroutine. This may be accomplished with the A1DEC subroutine.

The length of the JCARD and KCARD fields is arbitrary, up to the maximum space available.

Note that the error indicator is not reset by this subroutine. It is the responsibility of the user to initialize, test, and reset the error indicator.

A1A3

Format: CALL A1A3(JCARD,J,JLAST,KCARD,K,ICHAR)

Function: To convert from A1 format (one character per word) to A3 format (three characters per word).

Parameter description:

JCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. This array contains the field to be converted. Originally, this field must be in A1 format, one character per word.

J - An integer constant, an integer expression, or an integer variable. This is the position of the first character of JCARD to be converted (the left-hand end of a field).

JLAST - An integer constant, an integer expression, or an integer variable. This is the position of the last character of JCARD to be converted (the right-hand end of a field).

KCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. This is the array into which the data is converted, in A3 format, three characters per word.

K - An integer constant, an integer expression, or an integer variable. This is the position of the first element of KCARD to receive the converted characters (the left-hand end of a field).

ICHAR - The name of a one-dimensional integer array defined in a DIMENSION statement. This array contains a table used in the conversion.

Detailed description: Three characters in A1 format are taken, one at a time, from the JCARD array. The relative position of each character is found in the table ICHAR. Then these three relative positions are used to form an A3 integer as follows:

A3 INTEGER=(N1-20)*1600+(N2*40)+N3

where N1 is the relative position of the first character in the ICHAR array, etc. The A3 integer is then placed in the KCARD array, and the next group of three A1 characters is packed, and so on. Note that the relative position runs from 0 to 39, not 1 to 40.

Example: Set up ICHAR as follows:

```
      DIMENSION    ICHAR(40)
      READ(2,1)ICHAR
    1 FORMAT(40A1)
```

or

```
      DIMENSION ICHAR(40)
      CALL READ(ICHAR,1,40,N)
```

The card to be read is:

Content	E	T	A	O	I	N	b	S	H
Card column	1	5	10	15	20	25	30	35	40
Relative position	0	4	9	14	19	24	29	34	39

Content	R	D	L	U	C	M	F	W	Y
Card column	41	45	50	55	60	65	70	75	80
Relative position	40	44	49	54	59	64	69	74	79

It is the user's responsibility to create the ICHAR array. It must always contain 40 characters, one of them a blank.

A1A3 may be used as follows:

```
      DIMENSION JCARD(21),  KCARD(10),ICHAR(40)
      CALL A1A3(JCARD,1,21,KCARD,1,ICHAR)
```

Before:

JCARD CUSTOMER NAME IS HERE

Position	1	5	10	15	20

KCARD 0123456789

Position	1	5	10

ICHAR is as above.

After:

JCARD is the same.
ICHAR is the same.

KCARD	-10713	-30266	-31634	-23906	-31756	-20552	-31640	7	8	9
Position	1	2	3	4	5	6	7	8	9	10
Represents	CUS	TOM	ERb	NAM	EbI	SbH	ERE			

The large negative numbers at each of the first seven positions reflect A3 integers (three A1 characters).

Errors: If a character does not appear in ICHAR, and does appear in JCARD, it will be coded as a blank.

Remarks: It is the user's responsibility to create the ICHAR array. It must always contain 40 characters. The arrangement shown in the example is, in general, the best, since the characters appear in the order of their most frequent occurrence, and this arrangement includes those characters (A-Z, 0-9, blank, comma, period, and ampersand) commonly found in alphabetic files (names and addresses, etc.). The user may, however, place any 40 characters in the ICHAR array, in any order.

If the field to be compressed consists primarily of numbers, for example, they should be placed first in the ICHAR array.

Note that the A3 format discussed here is a special one and is not the same as the FORTRAN A3 format.

ADD
A1A3
A1DEC
A3A1
CARRY
DECA1
DIV
DPACK
DUNPK
EDIT
FILL
GET
ICOMP
IOND
KEYBD
MOVE
MPY
NCOMP
NSIGN
NZONE
PACK
PRINT
PUNCH
PUT
P1403
P1442
READ
R2501
SKIP
STACK
SUB
S1403
TYPER
UNPAC
WHOLE

A1DEC

Format: CALL A1DEC(JCARD,J,JLAST,NER)

Function: Converts a field from A1 format, one digit per word, to decimal format, right-justified, one digit per word.

Parameter description:

JCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. This is the name of the field that will be converted. Originally, this field must be in A1 format, one character per word.

J - An integer constant, an integer expression, or an integer variable. This is the position of the first character of JCARD to be converted (the left-hand end of a field).

JLAST - An integer constant, an integer expression, or an integer variable, greater than or equal to J. This is the position of the last character of JCARD to be converted (the right-hand end of a field).

NER - An integer variable. This variable will be equal to the position of the last invalid (nonnumeric or nonblank) character encountered, except for the JLAST position, which may contain a sign.

Detailed description: The subroutine operates from left to right. Each character is checked for validity (digit or blank). Blanks are changed to zeros. If a character is invalid, the error indicator, NER, is set equal to the position of the character. If the character is valid, it is converted to decimal format and right-justified using the formula

$$\text{Decimal digit} = (\text{character}+4032)/256$$

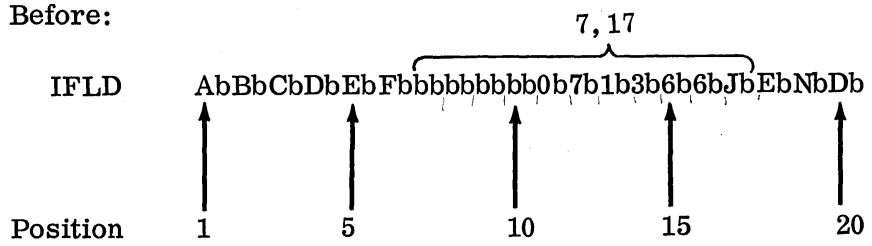
When all characters have been converted, the decimal field is signed. More detailed information may be found in the A1DEC flowchart and listing.

Example: DIMENSION IFLD(20)

N=0

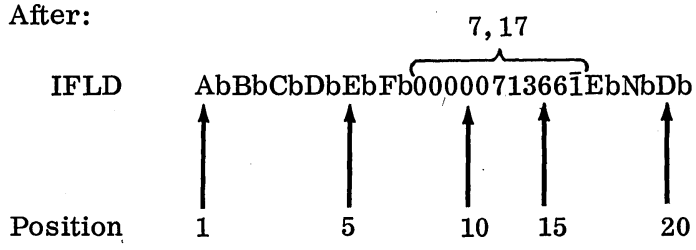
CALL A1DEC(IFLD,7,17,N)

Before:



N=0

After:



N=0

Before execution, the field is shown in A1 format, the character followed by a blank. Therefore, the field to be converted is

bbbb071366J

After execution, the field has been converted, as is evident. There were no invalid characters in the field, since N is the same.

Errors: If an invalid character (nonnumeric or nonblank) is encountered, the error indicator is set equal to the position of that character, and processing of the field continues.

Remarks: When the error indicator has been set, the character indicated is the last invalid character. There may be other invalid characters in the field, occurring to the left of the character noted.

Zone punches are used, at times, to indicate conditions (switches). These zones can be removed with the NZONE subroutine. Following is an error routine to correct errors of this type:

```
                Main Line
                    .
                    .
                    .
1       CALL A1DEC(IFLD,J,JLAST,N)
        IF(N) 2,2,3
2       Continue Main Line
                    .
                    .
                    .
3          Error Routine
        CALL NZONE(IFLD,N,4,N1)
        N1=0
        CALL A1DEC(IFLD,N,N,N1)
        IF(N1) 5,5,4
4       STOP 999
5       CALL DECA1(IFLD,J,JLAST,N)
        N=0
        GO TO 1
```

When an error of this type occurs, N will be greater than zero. Control would go to statement 3. Using the NZONE routine, the zone is removed (if not a special character). The invalid character is now converted with the A1DEC routine. If the character is still invalid, control goes to statement 4 and the program will STOP. If the character is now valid, it has been converted and control goes to statement 5. However, there may have been other invalid characters. Therefore, at statement 5 the field is converted back to A1 format and control returns to statement 1, where the field is again converted from A1 format to decimal format. This process continues until a truly invalid character (special character) is encountered, or until the field is converted with no errors.

Note that the error indicator is not reset by this subroutine. It is the responsibility of the user to initialize and reset the error indicator.

Format: CALL A3A1(JCARD,J,JLAST,KCARD,K,ICHAR)

Function: To convert from A3 format (three characters per word) as created by the A1A3 subroutine to A1 format (one character per word).

Parameter description:

JCARD – The name of a one-dimensional integer array defined in a DIMENSION statement. This array contains the field to be converted. Originally, this field must be in A3 format, three characters per word.

J – An integer constant, an integer expression, or an integer variable. This is the position of the first element of JCARD to be converted (the left-hand end of a field).

JLAST – An integer constant, an integer expression, or an integer variable. This is the position of the last element of JCARD to be converted (the right-hand end of a field).

KCARD – The name of a one-dimensional integer array defined in a DIMENSION statement. This is the array into which the data is converted, in A1 format, one character per word.

K – An integer constant, an integer expression, or an integer variable. This is the position of the first element of KCARD to receive the converted characters (the left-hand end of a field).

ICHAR – The name of a one-dimensional integer array defined in a DIMENSION statement. This array contains a table used in the conversion.

Detailed description: A3 integers are taken, one at a time, from the JCARD array. Each is decoded into the three numbers of which it is composed, as follows:

$$N1=\left\{\begin{array}{l}\text{(A3 INTEGER/1600) + 20 if the A3 integer is positive}\\ \text{((A3 INTEGER + 32000)/1600) if the A3 integer is negative}\end{array}\right\}$$

N2=(A3 INTEGER-(N1-20)*1600)/40

N3=A3 INTEGER-(N1-20)*1600-(N2*40)

The resulting integers, N1, N2, N3, are then used to locate their corresponding A1 characters in the ICHAR array. Each A1 character is then placed in the KCARD array.

Note that each element of JCARD requires three elements in KCARD.

Example: Set up ICHAR as follows:

```
      DIMENSION     ICHAR(40)
      READ(2,1)   ICHAR
1     FORMAT (40A1)
```

or

```
      DIMENSION  ICHAR(40)
      CALL  READ(ICHAR,1,40,N)
```

The card to be read is:

```
Content          ETAOINbSHRDLUCMFWYP0123456789VBGKQJXZ,.&
                 ↑    ↑    ↑    ↑    ↑    ↑    ↑    ↑    ↑
Card
 column          1    5    10   15   20   25   30   35   40

Relative
 position        0    4    9    14   19   24   29   34   39
```

It is the user's responsibility to create the ICHAR array. It must always contain 40 characters.

A3A1 may be used as follows:

```
      DIMENSION JCARD(21),  KCARD(30),  ICHAR(40)

      CALL  A3A1(JCARD,1,8,  KCARD,1,  ICHAR)
```

Before:

```
JCARD  -30076 -20556 -20547 -26800 -15765 -23397 -17038 -30237
       ↑                              ↑
Position 1                            5

KCARD  012345678901234567890123456789
       ↑  ↑  ↑  ↑  ↑  ↑  ↑
Position 1  5  10 15 20 25 30
```

ICHAR is as above.

After:

JCARD is the same.

ICHAR is the same.

```
KCARD  THIS IS CODED INFORMATIO456789
       ↑  ↑  ↑  ↑  ↑  ↑  ↑
Position 1  5  10 15 20 25 30
```

Errors: If JLAST is less than J, one element will be decoded into three characters.

Remarks: It is the user's responsibility to create the ICHAR array. It must always contain 40 characters. The arrangement shown in the example is, in general, the best, since it is in the order of the most frequent occurrence of the letters of the alphabet.

Note that the A3 format discussed here is a special one, and is not the same as the FORTRAN A3 format.

ADD
A1A3
A1DEC
A3A1
CARRY
DECA1
DIV
DPACK
DUNPK
EDIT
FILL
GET
ICOMP
IOND
KEYBD
MOVE
MPY
NCOMP
NSIGN
NZONE
PACK
PRINT
PUNCH
PUT
P1403
P1442
READ
R2501
SKIP
STACK
SUB
S1403
TYPER
UNPAC
WHOLE

CARRY

Format: CALL CARRY(JCARD,J,JLAST,KARRY)

Function: Resolve all carries within the specified field and indicate any high-order carry out of the field. This routine will not normally be called by the user.

Parameter description:

JCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. This is the field that will be interrogated for carries. The data must be in decimal format.

J - An integer constant, an integer expression, or an integer variable. This is the position of the first digit of JCARD (the left-hand end of a field).

JLAST - An integer constant, an integer expression, or an integer variable, greater than or equal to J. This is the position of the last character of JCARD (the right-hand end of a field).

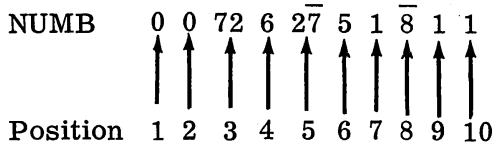
KARRY - An integer variable. This variable will contain any carry out of the high-order position of the JCARD field. If there is no carry, KARRY will be set to zero.

Detailed description: The routine operates from right to left, examining the low-order digit first. The digit being examined is divided by ten. Since only integers are used, the quotient of this division is the carry in that digit. Ten times the carry is subtracted from the digit. If the digit is now negative, ten is added to the digit and one is subtracted from the carry. At this point, or if the resultant digit was positive, the next digit to the left is examined. First, the carry from the previous digit is added to this digit. Then the process for the first digit, starting with division by ten, is carried out. When all digits have been examined, from JCARD(JLAST) to JCARD(J) inclusive, the final carry is set and the routine terminates. More detailed information may be found in the CARRY flowchart and listing.

Example: DIMENSION NUMB(10)

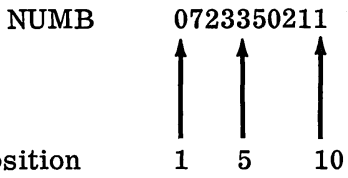
CALL CARRY(NUMB,1,10,N)

Before:



N=22

After:



N=0

After an arithmetic operation the condition of the NUMB field is as shown at "Before". The third, fifth and eighth positions appear as shown, because multiple arithmetic operations have generated them. The object of the CARRY routine is to resolve this type of problem.

Notice that a 1 has been borrowed from the seventh position to resolve the -8 condition. Similarly, a 3 has been borrowed from the fourth position, and the 7 from 72 has gone into the second position.

Errors: None

Remarks: This routine is used by the other routines in this package as a service routine. In general, the user need not call this routine, since all carries are resolved by the arithmetic routines themselves (ADD, SUB, MPY, DIV).

DECA1

Format: CALL DECA1(JCARD,J,JLAST,NER)

Function: Converts a field from decimal format, right-justified, one digit per word, to A1 format, one character per word.

Parameter description:

JCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. This is the name of the field that will be converted. Originally, this field must be in decimal format, one digit per word.

J - An integer constant, an integer expression, or an integer variable. This is the position of the first digit of JCARD to be converted (the left-hand end of a field).

JLAST - An integer constant, an integer expression, or an integer variable, greater than or equal to J. This is the position of the last character of JCARD to be converted (the right-hand end of a field).

NER - An integer variable. This variable will be equal to the position of the last digit of JCARD which was negative or greater than 9, except for the JLAST position, which can be negative (sign).

Detailed description: The subroutine operates from left to right. First the sign is determined. Then each digit, starting with JCARD(J), is converted to A1 format using the formula

$$\text{Character} = 256 * (\text{decimal digit}) - 4032$$

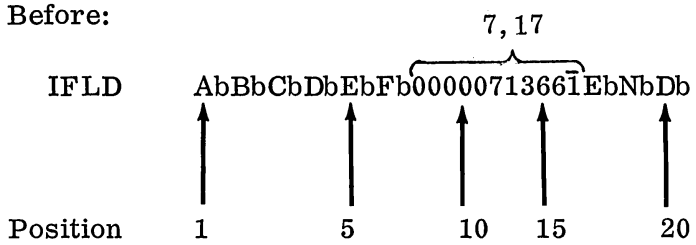
When all digits have been converted, the field is signed. More detailed information may be found in the DECA1 flowchart and listing.

Example: DIMENSION IFLD(20)

N=0

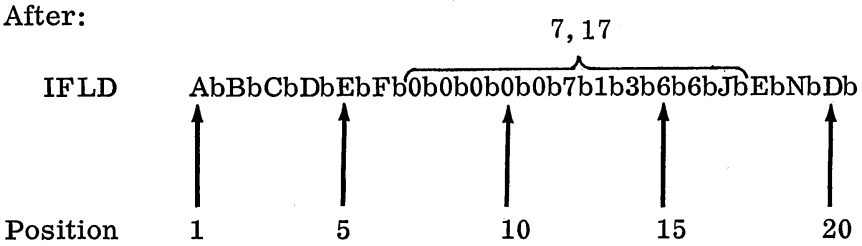
CALL DECA1(IFLD,7,17,N)

Before:



N=0

After:



N=0

Before execution the field is shown in decimal format. The field to be converted is

00000713661

After execution, the field has been converted to A1 format, as is evident, the character followed by a blank. There were no invalid digits in the field, since N is the same.

Errors: If an invalid digit (not 0 to 9, inclusive) is encountered, the error indicator is set equal to the position of that character, and processing of the field continues.

Remarks: When the error indicator indicates an error, the digit indicated is the last invalid digit. There may be other invalid digits in the field, occurring to the left of the digit noted.

These errors should not occur, since the arithmetic routines (ADD, SUB, MPY, and DIV) will resolve carries. However, if this does happen, the user's program should indicate (possibly by STOPing) that this has occurred.

Note that the error indicator is not reset by this subroutine. It is the responsibility of the user to initialize and reset the error indicator.

DIV

Format: CALL DIV(JCARD,J,JLAST,KCARD,K,KLAST,NER)

Function: Divides one arbitrary-length decimal data field by another, placing the quotient and remainder in the dividend.

←Parameter description:

JCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. This array is the divisor. The data must be stored in JCARD in decimal format, one digit per word.

J - An integer constant, an integer expression, or an integer variable. This is the position of the first digit of the divisor (the left-hand end of a field).

JLAST - An integer constant, an integer expression, or an integer variable, greater than or equal to J. This is the position of the last digit of the divisor (the right-hand end of a field).

KCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. This array, the dividend, will contain the quotient and the remainder, extended to the left, in decimal format, one digit per word.

K - An integer constant, an integer expression, or an integer variable. This is the position of the first digit of the dividend (the left-hand end of a field).

KLAST - An integer constant, an integer expression, or an integer variable, greater than or equal to K. This is the position of the last digit of the dividend (the right-hand end of a field). This is also the position of the last digit of the remainder.

NER - An integer variable. Upon completion of the subroutine, this variable indicates whether division by zero was attempted, or whether the KCARD field is not long enough.

Detailed description: First the signs are cleared from both fields and saved. Then the KCARD field is extended to the left the length of the JCARD field (JLAST-J+1), and filled with zeros. If the KCARD field will be extended below KCARD(1), NER will be set equal to KLAST and the routine will be terminated. Next, the JCARD field is scanned to find the high-order significant digit. If no digit is found, the error indicator NER is set to KLAST, and the result is the same as the input. When a digit is found, the division begins. It is done by the method of trial divisors:

1. The high-order digit of the divisor is used as the trial divisor.

2. The trial divisor is divided into the next high-order digit of the dividend to generate a digit of the quotient.

3. The digit of the quotient is multiplied by the trial divisor.

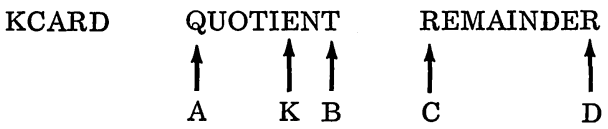
4. This product is subtracted from the corresponding number of digits in the high-order portion of the dividend.

5. As long as the result is positive, the quotient digit is the next digit in the quotient. A return is made to step 2.

6. When the result is negative, the product from step 3 is added back to the dividend, 1 is subtracted from the quotient digit, and the new quotient digit is placed in the quotient as the next digit. Finally, the signs are generated for the quotient and remainder and the sign is replaced on the divisor.

The quotient will be located in the KCARD field. The subscript of the first digit of the quotient will be K-(JLAST-J+1), and the subscript of the last digit of the quotient will be KLAST-(JLAST-J+1).

The remainder will also be located in the KCARD field. The subscript of the first digit of the remainder will be KLAST-JLAST+J, and the subscript of the last digit of the remainder will be KLAST.



A is the position whose subscript is K-(JLAST-J+1).
K is the first position of the dividend, defined earlier.
B is the position whose subscript is KLAST-(JLAST-J+1).
C is the position whose subscript is KLAST-(JLAST-J).
D is the position whose subscript is KLAST.

More detailed information may be found in the DIV flowchart and listing.

Example:

```
DIMENSION IDVSR(5),IDVND(15)
N=0
CALL DIV(IDVSR,1,5,IDVND,6,15,N)
```

Before:

IDVSR 00982 — Position 1 5

IDVND ABCDE0007136673 — Position 1 5 10 15

N=0

After:

IDVSR is unchanged.

N=0

IDVND 000000726700479 — Position 1 5 10 15

The numeric data field IDVND has been divided by the numeric data field IDVSR, the quotient and remainder being placed in IDVND. Note that the IDVND field has been extended to the left the length of the IDVSR field, five positions.

Errors: If division by zero is attempted, the only action is that KCARD is extended and filled with zeros. The error indicator indicates that division by zero was attempted (NER=KLAST).

If there is not enough room to extend the KCARD field to the left, NER will again be set equal to KLAST, and the routine will terminate. None of the fields involved will be modified.

Remarks: Conversion from EBCDIC to decimal is necessary before using this subroutine. This may be accomplished with the A1DEC subroutine.

The length of the JCARD and KCARD fields is arbitrary, up to the maximum space available.

The arithmetic performed is decimal arithmetic, using whole numbers only. No decimal point alignment is allowed. For this reason numbers should have an assumed decimal point at the right-hand end.

Space must always be provided in the KCARD field for expansion. The first position of the dividend, K, must be at least JLAST-J+1 positions from the beginning of KCARD. For example, if JCARD is seven positions, 1 through 7, the dividend in KCARD must start at least seven positions (7-1+1=7) from the beginning of KCARD. This would have K equal to 8.

Format: CALL DPACK(JCARD, J, JLAST, KCARD, K)

Function: Information in D1 format, one digit per word, is packed into D4 format, four digits per word.

Parameter description:

JCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. This array contains the data to be packed, in D1 format, one digit per word.

J - An integer constant, an integer expression, or an integer variable. This is the position of the first character of JCARD to be packed (the left-hand end of a field).

JLAST - An integer constant, an integer expression, or an integer variable greater than J. This is the position of the last character of JCARD to be packed (the right-hand end of a field).

KCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. This is the array into which the data is packed, in D4 format, four digits per word.

K - An integer constant, an integer expression, or an integer variable. This is the position of the first element of KCARD to receive the packed characters (the left-hand end of a field).

Detailed description: Initially, the field to be packed (the JCARD array) is in D1 format. This consists of one digit per word, right-justified (occupying the rightmost four bits of the word). The sign of the field is carried with the rightmost or low-order digit.

The operation of the DPACK subroutine is as follows: Starting at JCARD(J), and working from left to right, each four-bit digit of the JCARD array is placed into four bits of the KCARD array, four to the word, starting at KCARD(K). When JCARD(JLAST) is encountered, it is assumed to be the last D1 digit, and to carry the sign of the field. The DPACK routine then places JCARD(JLAST), unpacked, in its entirety, into KCARD((JLAST-J+7)/4), the last position in the KCARD array.

Any unused space in the preceding KCARD word is then filled with 1 bits. This bit arrangement or format will be called D4 format.

For example, suppose a seven-position JCARD array is to be packed, and it contains 1, 2, 3, 4, 5, 6, 7:

JCARD(1) = 1
JCARD(2) = 2
JCARD(3) = 3
JCARD(4) = 4

JCARD(5) = 5
JCARD(6) = 6
JCARD(7) = 7

JCARD(1) through JCARD(4) will be placed in KCARD(1) as 0001 0010 0011 0100.

JCARD(5) and JCARD(6) will be placed in KCARD(2) as 0101 0110 0000 0000.

JCARD(7) will be placed, without conversion, in KCARD(3) as 0000 0000 0000 0111.

Then the two unused four-bit areas in KCARD(2) will be filled with 1's as 0101 0110 1111 1111.

More detailed information may be found in the DPACK/DUNPK flowchart and listing.

The table below may be used to determine the number of words required for a field after it is packed. For example, a twelve-digit decimal field will be packed into a four-word field:

- First word: 1st, 2nd, 3rd, and 4th digits
- Second word: 5th, 6th, 7th and 8th digits
- Third word: 9th, 10th, and 11th digits, plus four 1 bits (filler)
- Fourth word: 12th digit carrying the sign of the field.

Field Length		Field Length		Field Length	
Before Packing	After Packing	Before Packing	After Packing	Before Packing	After Packing
2	2	18	6	34	10
3	2	19	6	35	10
4	2	20	6	36	10
5	2	21	6	37	10
6	3	22	7	38	11
7	3	23	7	39	11
8	3	24	7	40	11
9	3	25	7	41	11
10	4	26	8	42	12
11	4	27	8	43	12
12	4	28	8	44	12
13	4	29	8	45	12
14	5	30	9	46	13
15	5	31	9	47	13
16	5	32	9	48	13
17	5	33	9	49	13

Example: DIMENSION IUNPK(26), IPAKD(26)

CALL DPACK(IUNPK, 1, 10, IPAKD, 1)

Before:

IUNPK 123456789123

Position 1 5 10

IPAKD ABCDEFGHIJ

Position 1 5 10

After:

IUNPK is the same.

IPAKD 1234 5678 9FFF 0001 EFGHIJ

Position 1 2 3 4 5 6 10

Errors: None

Remarks: If JLAST is less than or equal to J, only one character of JCARD will be packed, and it will be treated as the sign. A multiple of four characters in JCARD will always be packed into KCARD. An equation for how much space is required, in elements, in KCARD is:

$$\text{Space in KCARD} = \frac{\text{JLAST-J+7}}{4}$$

This result is rounded down at all times.

DUNPK

Format: CALL DUNPK(JCARD, J, JLAST, KCARD, K)

Function: Information in D4 format, four digits per word, is unpacked into D1 format, one digit per word.

Parameter description:

JCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. This array contains the data to be unpacked, in D4 format, four digits per word.

J - An integer constant, an integer expression, or an integer variable. This is the position of the first element of JCARD to be unpacked (the left-hand end of a field).

JLAST - An integer constant, an integer expression, or an integer variable greater than J. This is the position of the last element of JCARD to be unpacked, (the right-hand end of a field).

KCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. This is the array into which the data is unpacked, in D1 format, one digit per word.

K - An integer constant, an integer expression, or an integer variable. This is the position of the first element of KCARD to receive the unpacked characters (the left-hand end of a field).

Detailed description: See the detailed description of DPACK for an explanation of the D1 and D4 formats.

The JCARD field, in packed (D4) format, will be unpacked (converted to D1 format) and placed in the KCARD field. Starting at JCARD(J), moving from left to right, each four-bit digit is placed in the rightmost four bits of a word in the KCARD array, starting at KCARD(K).

Filler bits (four 1's) are recognized as such and are ignored.

JCARD(JLAST), the last word to be converted, is not altered, but is moved to KCARD(KLAST). KLAST cannot be calculated exactly at this point, but KLAST-K+1 will be the same as JLAST-J+1 when the field was originally packed. In other words, field lengths will not be changed by a DPACK and subsequent DUNPK.

The maximum value of KLAST can be calculated as

4*(JLAST-J)+1

However, it may be one, two, or three fewer positions in length.

More detailed information may be found in the DPACK/DUNPK flowchart and listing.

Example:

```
DIMENSION IUNPK(26),IPAKD(26)

CALL DUNPK(IPAKD,1,3,IUNPK,1)
```

Before:

```
IPAKD     1234 5678 0003          IUNPK     FbIbLbLbbbIbNbbbTbHbIbSb
                 ↑    ↑    ↑                      ↑        ↑        ↑
                 1    2    3                      1        5        10
Position                                  Position
```

After:

IPAKD is the same.

```
IUNPK     123456783HbIbSb
               ↑    ↑    ↑
               1    5    10
Position
```

Errors: None

Remarks: If JLAST is less than or equal to J, only the first element of JCARD, JCARD(J) will be unpacked and it will be treated as the sign.

EDIT

Format: CALL EDIT(JCARD, J, JLAST, KCARD, K, KLAST)

Function: Edits data from one array into another array, which contains the edit mask.

Parameter description:

JCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. This array contains the data to be edited, called the source field, one character per word, in A1 format.

J - An integer constant, an integer expression, or an integer variable. This is the position of the first character of JCARD to be edited (the left-hand end of a field).

JLAST - An integer constant, an integer expression, or an integer variable, greater than or equal to J. This is the position of the last character of JCARD to be edited (the right-hand end of a field).

KCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. This is the array into which data is edited; it contains the edit mask before editing begins, stored one character per word, in A1 format, and is called the mask field.

K - An integer constant, an integer expression, or an integer variable. This is the position of the first character of the edit mask (the left-hand end of a field).

KLAST - An integer constant, an integer expression, or an integer variable, greater than K. This is the position of the last character of the edit mask (the right-hand end of a field).

Detailed description: The following table gives the control characters for editing, the characters used to make up the mask, and their respective functions:

Control Character	Function
b (blank)	This character is replaced by a character from the source field.
0 (zero)	This character indicates zero suppression and is replaced by a character from the source field. The position of this character indicates the rightmost limit of zero suppression (see description of operation below). Blanks are inserted in the high-order nonsignificant positions of the field.

Control Character	Function
. (decimal point)	This character remains in the mask field where placed. However, if zero suppression is requested, it will be removed if it is to the left of the last character to be zero-suppressed.
, (comma)	This character remains in the mask field where placed. However, if zero suppression is requested, it will be removed if it is to the left of the last character to be zero-suppressed.
CR (credit)	These two characters can be placed in the two rightmost positions of the mask field. They are undisturbed if the source field is negative. (If the source field is positive, the characters C and R are blanked out.) In editing operations, a negative source field is indicated by an 11-zone over the rightmost character. Whether CR is blanked out or not, no data will be edited into these positions when CR is present, but rather into the edit characters to the left. The letters C and R may be used in the remainder of the edit mask, where they will be treated as normal alphabetic characters, without being subject to sign control. Only the R character is checked, so the C character may be any legal character, and it will be treated as described.
- (minus)	This character is handled similarly to CR in the rightmost position of the mask field.
* (asterisk)	This character operates the same as the 0 (zero) for zero suppression, except that asterisks rather than blanks are inserted in the high-order nonsignificant positions of the field, providing asterisk check protection.
$ (floating dollar sign)	This character has the same effect as the 0 (zero) for zero suppression, except that a $ is inserted to the left of the first significant character found, or to the left of the position that stopped the zero suppression.

The operation of the edit routine may be described in five steps:

1. Characters are placed in the mask field from the source field, moving from right to left. The characters 0 (zero), b (blank), * (asterisk) and $ (dollar sign) are replaced with characters from the source field. No other characters in the mask field are disturbed.

2. If all characters in the source field have not been placed in the mask field before the end of the mask field is encountered, the whole mask is set to asterisks and editing is terminated.

3. CR (credit) and - (minus) in the rightmost positions of the mask field are blanked if the source field is positive (does not have an 11-zone over the rightmost character).

4. The zero suppression scan starts at the left end of the mask field and proceeds left to right, replacing zeros (0), blanks (b's), decimal points (.), and commas (,). The last position replaced will occur where the zero suppression character was located, or one position to the left of where a significant character, not zero (0), blank (b), decimal point (.), or comma (,), occurs. If the zero suppression character was an asterisk (*), the replacement character is an asterisk. Otherwise, the replacement character is a b (blank).

5. If the zero suppression character was a dollar sign ($), a dollar sign is placed in the last replaced position in the zero suppression scan.

In order for the edit routine to work correctly and as described, five rules must be followed in creating the mask field:

1. There must be at least as many b's (blanks) in the mask field as characters in the source field.

2. If the mask field contains zero (0), asterisk (*), or dollar sign ($), zero suppression will be used and the first character in the mask field must be a b (blank).

3. The mask field must not contain more than one of the following, which may appear only once:

   0 (zero)

   * (asterisk)

   $ (dollar sign)

4. If the rightmost character in the mask field is an R, the next character to the left should be a C, in order to edit with CR (credit). Both characters will be blanked if the source field is positive. If the rightmost character in the mask field is - (minus), it will be blanked if the source field is positive.

5. All numeric, alphabetic, and special characters may be used in the mask field. All characters that do not have special meaning will be left in their original position in the mask field during the edit.

   More detailed information may be found in the EDIT flowchart and listing.

Example: There are three common methods for creating a mask field such as b,bb$.bbCR:

Method 1

```
      DIMENSION MASK(10)
1     FORMAT(10A1)
      IN=2
      READ(IN,1)MASK
```

Method 2

```
DIMENSION MASK(10)
MASK(1)=16448
MASK(2)=27456
MASK(3)=16448
MASK(4)=16448
MASK(5)=23360
MASK(6)=19264
MASK(7)=16448
MASK(8)=16448
MASK(9)=-15552
MASK(10)=-9920
```

Method 3

```
DIMENSION MASK(10)
DATA MASK/'b','','b','b','$','.','b','b','C','R'/
```

Method 1 creates the mask by reading it from a card. Method 2 creates the mask with FORTRAN arithmetic statements, setting each position of the mask to the desired character. It uses the decimal equivalents of the various EBCDIC codes, as listed in the APPENDIX. Method 3, using the DATA statement, is by far the shortest and simplest. Note that each character requires a word of core storage, regardless of the method employed.

The table of examples below illustrates how the EDIT routine works:

Source Field	Mask Field	Result
00123D	bb,bb$.bbCR	bbb$12.34bb
00123M	bb,bb$.bbCR	bbb$12.34CR
00123M	bb,bb$.bb-	bbb$12.34-
00123D	bb,bb$.bb-	bbb$12.34b
46426723	b,bbb,bb$.bbCR	b$464,267.23bb
00200P	b,bb*.bbCR	***20.07CR
082267139	bbb-bb-bbbb	082-26-7139
01234567	bbbb$.bbCR	**********
0AB1234	bbbbb$.bbCR	b$AB12.34bb
-12345	bb,bb$.bb-	$-,123.45b

Because the mask field is destroyed after each use, it is advisable to move the mask field to the output area and perform the edit function in the output area.

Errors: If the number of characters in the source field is greater than the number of blanks in the mask field, the mask field is filled with asterisks(*).

Format: CALL FILL(JCARD,J,JLAST,NCH)

Function: Fills an area with a specified character.

Parameter description:

JCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. This array contains the area to be filled.

J - An integer constant, an integer expression, or an integer variable. This is the position of the first character of JCARD to be filled (the left-hand end of a field).

JLAST - An integer constant, an integer expression, or an integer variable, greater than or equal to J. This is the position of the last character of JCARD to be filled (the right-hand end of a field).

NCH - An integer constant, an integer expression, or an integer variable. This is the code for the fill character. The Appendix contains a list of those codes corresponding to the EBCDIC character set; however, NCH may be any integer.

Detailed description: The area of JCARD, starting with J and ending with JLAST, is filled with the character equivalent to the NCH code, one character per word. More detailed information may be found in the FILL flowchart and listing.

Example: CALL FILL (IPRNT,3,10,16448)

Fill the area IPRNT from positions 3 through 10 with blanks. In other words, clear the area.

IPRNT:

Before: A B C D E F G H I J K L M N O P Q R S b . . .

After: A B b b b b b b b b K L M N O P Q R S b . . .

Position 1 5 10 15 20

Errors: None.

GET

Format: GET (JCARD, J, JLAST, SHIFT)

Function: Extracts a data field from an array, and converts it to a real number. This is a function subprogram.

Parameter description:

JCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. This array contains the data to be retrieved, stored one digit per word, in A1 format.

J - An integer constant, an integer expression, or an integer variable. This is the position of the first character of JCARD to be retrieved (the left-hand end of a field).

JLAST - An integer constant, an integer expression, or an integer variable, greater than or equal to J. This is the position of the last character of JCARD to be retrieved (the right-hand end of a field).

SHIFT - A real constant, a real expression, or a real variable. If decimal places are required, SHIFT is equal to 10^{-d}, d being the number of decimal places. When SHIFT is used as a scale factor, SHIFT is 10^{d}, d being the number of zeros. If a card contains 12345 and the value of SHIFT is 0.0001, the result will be 1.2345. The result will be 123450. if a value 10.0 is assigned to SHIFT.

Detailed description: Using the formula

BINARY DIGIT = (EBCDIC CODE + 4032) / 256

the real digits are retrieved. Each binary digit is shifted left and summed, resulting in a whole number decimal. The sum is multiplied by SHIFT to locate the decimal point. The result is then placed in the real variable GET. If there are blanks in the data field, they are treated as zeros. If a nonnumeric character, other than blank, appears in any position other than the low-order position, the variable containing the result is zero. If a special character, other than the - (minus), appears in the low-order position, the resulting variable is set to zero.

For input and for output the sign must be placed over the low-order position as an 11-punch for minus and a 12 or no overpunch for plus. If the low-order position is zero and the number is negative, the column must contain only an 11-punch. (The zero must not be punched when FORTRAN I/O is used.) If the low-order position is zero and the number is positive, the column must contain only the zero punch. (The 12 row must not be punched when FORTRAN I/O is used.)

More detailed information may be found in the GET flowchart and listing.

Example 1: DIMENSION INCRD(80)

B=GET(INCRD,1,5,0.001)

Before: INCRD 0123456b...

Position 1 5

After: INCRD is the same.

B = 1.234 (Approximately, since a fraction is present)

Example 2:

```
A = GET (INCRD,1,6,1.0) + GET (INCRD,7,12,1.0)
  + GET (INCRD,13,18,1.0) + GET (INCRD,19,24,1.0)
  + GET (INCRD,25,30,1.0) + GET (INCRD,31,36,1.0)
  + GET (INCRD,37,42,1.0) + GET (INCRD,43,48,1.0)
```

Before:

INCRD 001221 000070 145035 700357 161111 724368 120001 270124

Position 1 6 12 18 24 30 36 42 48

After: INCRD is the same

A = 2122287. (Exactly, since no fractions were generated)

The above example sums the six-digit fields found in the first 48 columns of a card. Any arithmetic operation can be performed with GET () as an operand.

Errors: If a nonnumeric character, other than blank, appears in a position other than the low-order position, the result is set to zero.

If a special character other than - (minus) appears in the low-order position, the result is set to zero.

Remarks: The GET routine is a function subprogram. As such, it is used in an arithmetic expression as shown in the example.

When using standard FORTRAN I/O, and the digit in the units position is a zero, a minus sign is shown as an 11-punch only; a plus is shown as a zero-punch only.

In most cases the value of SHIFT should be 1.0, placing the decimal point at the right-hand end of the number. (For dollars and cents calculations, the result of the GET would be in cents.) This will eliminate precision errors from the calculations. The decimal point may be replaced (moved to the left) with the EDIT routine for output.

If GET (or PUT) is used, the calling program must use extended precision.

Format: ICOMP (JCARD,J,JLAST,KCARD,K,KLAST)

Function: Two variable-length decimal format data fields are compared. The result is set to a negative number, zero, or a positive number. This is a function subprogram.

Parameter description:

JCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. This array contains the first data field to be compared, one digit per word, in decimal format.

J - An integer constant, an integer expression, or an integer variable. This is the position of the first character of JCARD to be compared (the left-hand end of a field).

JLAST - An integer constant, an integer expression, or an integer variable, greater than or equal to J. This is the position of the last character of JCARD to be compared (the right-hand end of a field).

KCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. This array contains the second data field to be compared, one digit per word, in decimal format. If the fields are unequal in length, the KCARD field must be the longer field.

K - An integer constant, an integer expression, or an integer variable. This is the position of the first character of KCARD to be compared (the left-hand end of a field).

KLAST - An integer constant, an integer expression, or an integer variable, greater than or equal to K. This is the position of the last character of KCARD to be compared (the right-hand end of a field).

Detailed description: Since the fields are assumed to be right-justified, the first operation is to examine the length of each field. If KCARD is longer than JCARD, the leading digits of KCARD are examined. If any one of them is greater than zero the result (ICOMP) is the opposite sign of KCARD. If they are all zero, or if the lengths are equal, corresponding digits are compared. The routine operates from left to right. The routine terminates when KCARD is longer than JCARD and a nonzero digit appears in the high-order of KCARD, when JCARD and KCARD do not match, or when all digits in JCARD and KCARD are equal. The following table shows the value of ICOMP, depending on the relation of the JCARD field to the KCARD field:

ICOMP	Relation
- (minus)	JCARD is less than KCARD
0 (zero)	JCARD is equal to KCARD
+ (plus)	JCARD is greater than KCARD

More detailed information may be found in the ICOMP flowchart and listing.

Example:

```
DIMENSION ITOT(10),ICTL(10)

IF (ICOMP(ICTL,1,10,ITOT,1,10)) 1,2,1
```

The control total is compared to the total calculated. Control goes to statement 1 if the totals do not match (the calculated total is greater than or less than the control total). Control goes to statement 2 if the calculated total is equal to the control total. The fields compared are not changed.

ITOT	0007136673
ICTL	0007136688
ICOMP	after is positive.

Errors: No errors are detected. However, the JCARD field must not be longer than the KCARD field.

Remarks: ICOMP is a function subprogram and as such should be used in an arithmetic expression.

If JLAST is less than J, or KLAST is less than K, the result is unpredictable.

IOND

Format: CALL IOND

Function: Checks for I/O interrupts and loops until no I/O interrupts are pending.

This subroutine need not be used in conjunction with Version 2 of the 1130 Disk Monitor System. It (IOND) is required only for programs operating under control of Version 1 of the Monitor.

Detailed description: The routine checks the Interrupt Service Subroutine Counter to see whether any I/O interrupts are pending. If the counter is not zero, the routine continues to check it until it becomes zero. Then the routine returns control to the user. More detailed information may be found in the IOND flowchart and listing.

```
Example:    CALL IOND

            PAUSE 777
```

The two statements shown will wait until all I/O interrupts have been serviced. Then the program will PAUSE. If an I/O interrupt is pending, and IOND is not used before a PAUSE, the program will not PAUSE.

Errors: None

Remarks: This statement must always be used before a STOP or PAUSE statement.

It may also be helpful in debugging programs. Sometimes, with more than one event going on at the same time (PRINTing and processing) during debugging, difficulties can be encountered. The user may not be able to easily find the cause of trouble. The use of IOND after each I/O statement will ensure that only one I/O operation is going on at any given time.

KEYBD

Format: CALL KEYBD(JCARD,J,JLAST)

Function: Reads characters from the keyboard.

Parameter description:

JCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. This array will contain the keyed information when reading is finished. The information will be in A1 format, one character per word.

J - An integer constant, an integer expression, or an integer variable. This is the position of the first word of JCARD into which a character will be keyed (the left-hand end of a field).

JLAST - An integer constant, an integer expression, or an integer variable, greater than or equal to J. This is the position of the last word of JCARD into which a character will be keyed (the right-hand end of a field).

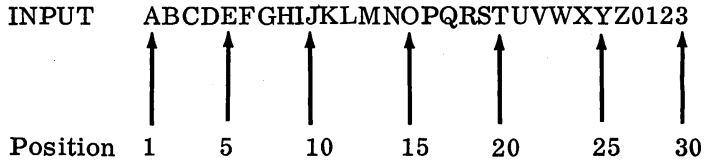
Detailed description: The keyboard is read and the information being read is printed on the console printer. When the specified number of characters have been read, or when EOF is encountered, the reading terminates. The characters read are converted from keyboard codes to EBCDIC and placed in A1 format, one character per word. Control is now returned to the user. More detailed information may be found in the TYPER/KEYBD flowchart and listing.

Example:

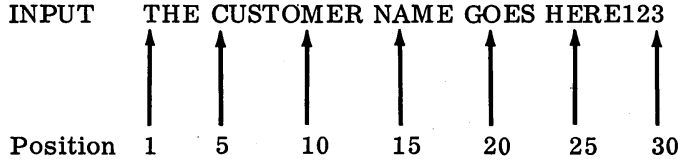
```
DIMENSION INPUT(30)

CALL KEYBD(INPUT,1,27)
```

Before:



After:



The array INPUT, from INPUT(1) to INPUT(27), has been filled with information read from the keyboard.

Errors: The following WAITs may occur:

WAIT (loc)	Accumulator (hex)	Action
41	2xx0	Ready the keyboard.
41	2xx1	Internal subroutine error. Rerun job. If error persists, verify that the subroutine deck is accurate using the listing in this manual. If the deck is the same, contact your local IBM representative. Save all output.

Only 60 characters at a time may be read from the keyboard.

If more than 60 characters are specified (JLAST-J+1 is greater than 60), only 60 characters will be read.

Remarks: The characters asterisked in Appendix D of IBM 1130 Subroutine Library (C26-5929) will be entered into core storage and printed. All other characters will be entered into core storage but will not be printed.

If this subroutine is used, all other I/O must use commercial routines.

MOVE

Format: CALL MOVE(JCARD,J,JLAST,KCARD,K)

Function: Moves data from one array to another array.

Parameter description:

JCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. This is the array from which data is moved. The data may be stored in JCARD in any format, one character per word.

J - An integer constant, an integer expression, or an integer variable. This is the position of the first character of JCARD to be moved (the left-hand end of a field).

JLAST - An integer constant, an integer expression, or an integer variable, greater than or equal to J. This is the position of the last character of JCARD to be moved (the right-hand end of a field).

KCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. This is the array to which data is moved, one character per word.

K - An integer constant, an integer expression, or an integer variable. This is the position of the first character of KCARD to which data will be moved (the left-hand end of a field).

Detailed description: Characters are moved, left to right, from the sending field, JCARD, starting with JCARD(J) and ending with JCARD(JLAST), to the receiving field KCARD, starting with KCARD(K). More detailed information may be found in the MOVE flowchart and listing.

Example: DIMENSION INPUT(80),IOUT(120)

L=20

K=14

CALL MOVE(INPUT,6,L,IOUT,K)

Before:

INPUT

bbbb12ABC45ZYXPQR999Ab...

Position 1 5 10 15 20

IOUT

bbbbbb1bb77b6ABCDEFGHIJKLMNOPb...

Position 1 5 10 15 20 25 30

After:

INPUT is the same.

IOUT

bbbbbb1bb77b62ABC45ZYXPQR999Pb...

Position 1 5 10 15 20 25 30

The field in the array INPUT, starting at INPUT(6) and ending at INPUT(20), is moved to the field in the array IOUT, starting at IOUT(14). A total of 15 characters are moved.

Errors: None

MPY

Format: CALL MPY(JCARD,J,JLAST,KCARD,K,KLAST,NER)

Function: Multiplies two arbitrary-length decimal data fields, placing the product in the second data field.

Parameter description:

JCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. This array is the multiplier. The data must be stored in JCARD in decimal format, one digit per word.

J - An integer constant, an integer expression, or an integer variable. This is the position of the first digit that will multiply (the left-hand end of a field).

JLAST - An integer constant, an integer expression, or an integer variable, greater than or equal to J. This is the position of the last digit to multiply (the right-hand end of a field).

KCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. This array, the multiplicand, will contain the product, extended to the left, in decimal format, one digit per word.

K - An integer constant, an integer expression, or an integer variable. This is the position of the first digit of the multiplicand (the left-hand end of a field).

KLAST - An integer constant, an integer expression, or an integer variable, greater than or equal to K. This is the position of the last character of the product and the multiplicand (the right-hand end of a field).

NER - An integer variable. This variable will indicate whether the KCARD field is not long enough.

Detailed description: First the signs are cleared from both fields and saved. Then the KCARD field is extended to the left the length of the JCARD field (JLAST-J+1) and filled with zeros. If the KCARD field will be extended below KCARD (1), NER will be set equal to KLAST and the routine will be terminated. Next, the JCARD field is scanned to find the high-order significant digit. If no digit is found, the result is set to zero. When a digit is found, the actual multiplication begins. The significant digits in the JCARD field are multiplied by the digits in the KCARD field, one at a time, starting with KCARD(K) and ending with KCARD(KLAST). The preliminary results are summed, shifting after each preliminary multiplication to give the correct place value to the preliminary results. Finally, the correct sign is generated for the result, in KCARD, and the sign of JCARD is restored. More detailed information may be found in the MPY flowchart and listing.

Example: DIMENSION MPLR(5),MCAND(15)

N=0

CALL MPY(MPLR,1,5,MCAND,6,15,N)

Before:

MPLR 00982

Position 1 5

MCAND ABCDE0007136673

Position 1 5 10 15

N=0

After:

MPLR is unchanged.

N=0

MCAND 000007008212886

Position 1 5 10 15

The numeric data fields MPLR and MCAND are multiplied, the result being placed in MCAND. Note that the MCAND field has been extended to the left the length of the MPLR field, five positions, and that N has not been changed.

Errors: If there is not enough room to extend the KCARD field to the left, NER will be set equal to KLAST, and the routine will terminate.

Remarks: Conversion from EBCDIC to decimal is necessary before using this subroutine. This may be accomplished with the A1DEC subroutine. The length of the JCARD and KCARD fields is arbitrary, up to the maximum space available.

The arithmetic performed is decimal arithmetic, using whole numbers only.

Space must always be provided in the KCARD field for expansion. The first position of the multiplicand, K, must be at least JLAST-J+1 positions from the beginning of KCARD. For example, if JCARD is 7 positions, 1 through 7, then the multiplicand, in KCARD, must start at least seven positions (7-1+1=7) from the beginning of KCARD. This would have K equal to 8.

The product, located in the KCARD field, will begin at position K-(JLAST-J+1) of KCARD, and end at position KLAST of KCARD.

NCOMP

Format: NCOMP(JCARD,J,JLAST,KCARD,K)

Function: Two variable-length data fields are compared, and the result is set to a negative number, zero, or a positive number. This is a function subprogram.

Parameter description:

JCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. This array contains the first data field to be compared, one character per word, in A1 format.

J - An integer constant, an integer expression, or an integer variable. This is the position of the first character of JCARD to be compared (the left-hand end of a field).

JLAST - An integer constant, an integer expression, or an integer variable, greater than or equal to J. This is the position of the last character of JCARD to be compared (the right-hand end of a field).

KCARD - The name of a one-dimensional, integer array defined in a DIMENSION statement. This array contains the second data field to be compared, one character per word, in A1 format.

K - An integer constant, an integer expression, or an integer variable. This is the position of the first character of KCARD to be compared (the left-hand end of a field).

Detailed description: Corresponding characters of JCARD and KCARD are compared logically, starting with JCARD(J) and KCARD(K). The routine operates from left to right. The routine terminates when JCARD and KCARD do not match, or when the character at JCARD(JLAST) has been compared. The following table shows the value of NCOMP, depending on the relation of the JCARD field to the KCARD field:

NCOMP	Relation
- (minus)	JCARD is less than KCARD
0 (zero)	JCARD is equal to KCARD
+ (plus)	JCARD is greater than KCARD

More detailed information may be found in the NCOMP flowchart and listing.

Example: DIMENSION IN(80),MASTR(80)

IF (NCOMP(IN,1,20,MASTR,1))1,2,3

The field on the input card starting in column 1 and ending in column 20 is compared with the master field. Control goes to statement 1 if the input card is less than the master card. Control goes to statement 2 if the input card equals the master card. Control goes to statement 3 if the input card is greater than the master card. The fields compared are not changed.

IN	1234567bbbbbbbABCDEF
MASTR	1234567bbbbbbbABCDEF
NCOMP after is zero	

Errors: None

Remarks: The collating sequence in ascending order is as follows:

A,B,C,D,E,F,G,H,I,J,K,L,M,N,O,P,Q,R,S,T,U,V,W,X,Y,Z,0,1,2,3,4,5,6,7,8,9,

blank,.,<,(,+,&,$,*,),-,/,,,%,#,@,',=

The compare operation is terminated by the last character of the first data field, the data field at JCARD, or by an unequal comparison. NCOMP is a function subprogram and as such should be used in an arithmetic statement.

NSIGN

Format: CALL NSIGN(JCARD,J,NEWS,NOLDS)

Function: Interrogate the sign and return with a code as to what the sign is. Also, modify the sign as specified.

Parameter description:

JCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. This array contains the digit to be interrogated or modified, in decimal (D1) format.

J - An integer constant, an integer expression, or an integer variable. This is the position of the digit to be interrogated or modified.

NEWS - An integer constant, an integer expression, or an integer variable. This is the code specifying the desired modification of the sign.

NOLDS - An integer variable. Upon completion of the routine, this variable contains the code specifying what the sign was.

Detailed description: The sign is retrieved and NOLDS is set as in the table below:

NOLDS is	When the sign was
+1	positive
-1	negative

Then a new sign is inserted, specified by NEWS, as shown in the table below:

NEWS	Sign
+1	positive
0	opposite of old sign
-1	negative
NOLDS	no change

More detailed information may be found in the NSIGN flowchart and listing.

Example:	DIMENSION INUMB(9) CALL NSIGN(INUMB,9,0,N)
Before:	N=0, INUMB(9)=7
After:	N=1, INUMB(9)= -7

Errors: None

Remarks: The digit processed must be in decimal (D1) format. If it is not, the results are meaningless.

NZONE

Format: CALL NZONE(JCARD,J,NEWZ,NOLDZ)

Function: Interrogate the zone and return with a code as to what the zone is. Also, modify the zone as specified.

Parameter description:

JCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. This array contains the character to be interrogated or modified, in A1 format.

J - An integer constant, an integer expression, or an integer variable. This is the position of the character in JCARD to be interrogated or modified.

NEWZ - An integer constant, an integer expression, or an integer variable. This is the code specifying the modification of the zone.

NOLDZ - An integer variable. This variable contains the code specifying what the zone was.

Detailed description: The zone is retrieved and NOLDZ is set as in the table below:

NOLDZ is	When the character was
1	A-I
2	J-R
3	S-Z
4	0-9
more than 4	special

Then a new zone is inserted, specified by NEWZ, as shown in the table below:

NEWZ	Character
1	12 zone
2	11 zone
3	0 zone
4	no zone
more than 4	no change

When a special character is the original character, the zone will not be changed. More detailed information may be found in the NZONE flowchart and listing.

Example:	DIMENSION IN(80) CALL NZONE(IN,1,2,J)
Before:	J = 0 IN(1) = a B (a 12, 2 punch)
After:	J = 1 IN(1) = a K (an 11, 2 punch)

Errors: None

Remarks: The minus sign or dash (-, an 11-punch) is treated as if it were a negative zero, not as a special character. This is the only exception.

The only modification performed on an input minus sign is that it may be transformed to a digit zero with no zone (a positive zero).

~~PACK~~ PAC

Format: CALL ~~PACK~~ PAC(JCARD,J,JLAST,KCARD,K)

Function: Information in A1 format, one character per word, is PACKed into A2 format, two characters per word.

Parameter description:

JCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. This is the input array, containing the data in A1 format, one character per word.

J - An integer constant, an integer expression, or an integer variable. This is the position of the first character of JCARD to be PACKed (the left-hand end of a field).

JLAST - An integer constant, an integer expression, or an integer variable, greater than J. This is the position of the last character of JCARD to be PACKed (the right-hand end of a field).

KCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. This is the array into which the data is PACKed, in A2 format, two characters per word.

K - An integer constant, an integer expression, or an integer variable. This is the position of the first element of KCARD to receive the PACKed characters (the left-hand end of a field).

Detailed description: The characters in the JCARD array are taken in pairs, starting with JCARD(J), and PACKed together into one element of KCARD, starting with KCARD(K). Since the characters are taken in pairs, an even number of characters will always be PACKed. If necessary, the character at JCARD(JLAST+1) will be used in order to make the last data PACKed a pair. More detailed information may be found in the PACK/UNPAC flowchart and listing.

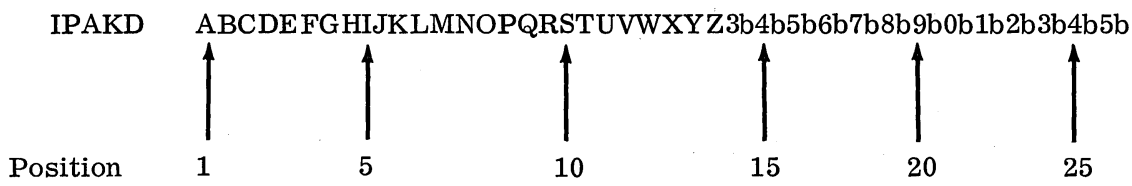
Example: DIMENSION IUNPK(26),IPAKD(26)

CALL PACK(IUNPK,1,25,IPAKD,1)

Before:

After:

IUNPK is the same.



Note that each two characters shown above represent one element of the array. Also, after IUNPK has been PACKed, the twenty-sixth character, Z, has been PACKed since 25 characters were specified (between J and JLAST).

Errors: None

Remarks: If JLAST is less than or equal to J, the first two characters of JCARD will be PACKed. An even number of characters in JCARD will always be PACKed into KCARD. An equation for how much space is required, in elements, in KCARD is

$$\text{Space in KCARD} = \left[\frac{\text{JLAST}-\text{J}+2}{2}\right]$$

This result is rounded down at all times.

PRINT

Format: CALL PRINT(JCARD,J,JLAST,NER)

Function: The printing of one line on the IBM 1132 Printer is initiated, and control is returned to the user.

Parameter description:

JCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. This array contains the information to be printed, on the IBM 1132 Printer, in A1 format, one character per word.

J - An integer constant, an integer expression, or an integer variable. This is the position of the first character of JCARD to be printed (the left-hand end of a field).

JLAST - An integer constant, an integer expression, or an integer variable, greater than or equal to J. This is the position of the last character of JCARD to be printed (the right-hand end of a field).

NER - An integer variable. This variable indicates carriage tape channel conditions that have occurred in printing.

Detailed description: When the previous print operation is finished, if a print operation was going on, the routine begins. The characters to be printed are packed and reversed. Since the characters are taken in pairs, an even number of characters is required. If necessary, the character at JCARD(JLAST+1) will be used to get an even number. Then printing is initiated and control is returned to the user. When printing is finished, the printer spaces one line and the indicator, NER, is set as follows:

NER is	when
3	Channel 9 has been encountered
4	Channel 12 has been encountered

If channel 9 or channel 12 is not encountered, the indicator is not set.

If a WAIT occurs at location 41, one of the following conditions exists:

Condition	Accumulator (hex)
Printer not ready or end of forms.	6xx0
Internal subroutine error. Rerun job. If error persists, verify that the subroutine deck is accurate, using the listing in this manual. If the deck is the same, contact your local IBM representative. Save all output.	6xx1

All of the above WAITs require operator intervention.

Only one line can be printed at a time (JLAST-J+1 must be less than or equal to 120).

More detailed information may be found in the PRINT/SKIP flowchart and listing.

Example:

```
      DIMENSION IOUT(120)
      N=0
      CALL PRINT(IOUT,1,120,N)
      IF(N-3)  1,2,3
    2 Channel 9 routine
    3 Channel 12 routine
    1 Normal processing
```

The line in IOUT, from IOUT(1) through IOUT(120), is printed. The indicator is tested to see whether (1) the line was printed at channel 9 or (2) the line was printed at channel 12. Appropriate action will be taken.

Notice that the test of the indicator is made after printing. The test should always be performed in this way to see where the line has just been printed. If the indicator was set, the line was printed at channel 9 or channel 12.

Errors: If JLAST is less than J, only one character will be printed. If more than 120 characters are specified (JLAST-J+1 is greater than 120), only 120 characters will be printed.

Remarks: After each line is printed, the condition indicator should be checked for the channel 9 or channel 12 indication. In doing this the same variable should always be used for the indicator.

The indicator is not reset by the subroutine. It is the responsibility of the user to initialize and reset this indicator.

If this subroutine is used, any other I/O must use commercial subroutines, with the exception of disk, which must always use FORTRAN I/O.

PUNCH

Format: CALL PUNCH(JCARD,J,JLAST,NER)

Function: Punches a card on the IBM 1442, Model 6 or 7. See Subroutine P1442 for punching on the 1442 Model 5.

Parameter description:

JCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. This array contains the characters to be punched into a card, in A1 format, one character per word.

J - An integer constant, an integer expression, or an integer variable. This is the position of the first character of JCARD to be punched (the left-hand end of a field).

JLAST - An integer constant, an integer expression, or an integer variable, greater than or equal to J. This is the position of the last character of JCARD to be punched (the right-hand end of a field).

NER - An integer variable. This variable indicates any conditions that have occurred in punching a card, and the nature of these conditions.

Detailed description: The characters to be punched are converted from EBCDIC to card codes, one at a time. When all characters have been converted, the punching operation is initiated. If an error occurs during the operation, the condition indicator is set, and the operation is continued. The possible values of the condition indicator and their meaning are listed below:

NER is	when
0	Last card condition.
1	Feed or punch check. Operator intervention required.

If a WAIT occurs at location 41, one of the following conditions exists:

Conditions	Accumulator (hex)
Punch not ready.	1xx0
Internal subroutine error. Rerun job. If error persists, verify that the subroutine deck is accurate, using the listing in this manual. If the deck is the same, contact your IBM representative. Save all output.	1xx1

All of the above WAITs require operator intervention.

Only one card can be punched at a time (JLAST-J+1 must be less than or equal to 80).

More detailed information may be found in the READ/PUNCH flowchart and listing.

Example:

```
DIMENSION IOTPT(80)

N=-1

CALL PUNCH(IOTPT,1,80,N)
```

Before:

```
IOTPT    NAME...ADDRESS...AMOUNT
           ↑        ↑        ↑
Position   1        20       60

     N=-1
```

After:

IOTPT is the same.

N=0

The information in IOTPT, from IOTPT(1) to IOTPT(80), has been punched into a card. Since N=0, the information was punched correctly, and the card punched into was the last card.

Errors: If a punch or feed check occurs, the condition indicator will be set equal to 1. If an internal error occurs, the system will WAIT as specified above.

If more than 80 characters are specified (JLAST-J+1 is greater than 80), only 80 characters, one card, will be punched.

Remarks: After each card is punched, the condition indicator should be checked for the last card indication. This will occur only after the last card has physically been punched.

The condition indicator is not reset by the subroutine. It is the responsibility of the user to initialize and reset this indicator.

If this subroutine is used, any other I/O must use commercial subroutines, with the exception of disk, which must always use FORTRAN I/O.

ADD
A1A3
A1DEC
A3A1
CARRY
DECA1
DIV
DPACK
DUNPK
EDIT
FILL
GET
ICOMP
IOND
KEYBD
MOVE
MPY
NCOMP
NSIGN
NZONE
PACK
PRINT
PUNCH
PUT ←
P1403
P1442
READ
R2501
SKIP
STACK
SUB
S1403
TYPER
UNPAC
WHOLE

PUT

Format: CALL PUT(JCARD,J,JLAST,VAR,ADJST,N)

Function: Converts the whole portion of a real variable, VAR, to an EBCDIC integer number, half-adjusting as specified, and places the result, after decimal point alignment, in an array. An 11-zone is placed over the low-order, rightmost position in the array if VAR is negative.

Parameter description:

JCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. This array will contain the result of the PUT routine, EBCDIC coded information, in A1 format, one digit per word.

J - An integer constant, an integer expression, or an integer variable. This is the first position of JCARD to be filled with the result (the left-hand end of a field).

JLAST - An integer constant, an integer expression, or an integer variable, greater than or equal to J. This is the last position to be filled with the result (the right-hand end of a field).

VAR - A real constant, a real expression, or a real variable. This is the number whose whole portion will be PUT.

ADJST - A real constant, a real expression, or a real variable. This is added to the variable, VAR, as a half-adjustment factor.

N - An integer constant, an integer expression, or an integer variable. This specifies the number of digits to truncate from the right-hand end of the number, VAR.

Detailed description: First, the half-adjustment factor is added to the real variable, VAR. Then, each digit is retrieved using the formula

EBCDIC DIGIT = 256 (BINARY DIGIT) - 4032

and placed in the output area. Each binary digit is retrieved by subtracting the digits already retrieved from VAR and multiplying by 10. The next digit is then retrieved and placed in the output area. More detailed information may be found in the PUT flowchart and listing.

Example: DIMENSION IPRNT(120)

CALL PUT(IPRNT,1,12,A,5.0,1)

Before:

A = 1234567.

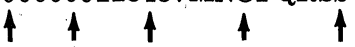
IPRNT ABCDEFGHIJKLMNOPQRSb

Position 1 5 10 15 20

After:

A = 1234567.

IPRNT 000000123457MNOPQRSb



Position 1 5 10 15 20

Errors: None

Remarks: If the receiving field, JCARD, is not large enough to hold all of the output, only the low-order digits are placed.

If JLAST is less than or equal to J, only one digit will be PUT.

It is necessary for the programmer to use the ADJST parameter in every PUT. For example, assume that the number to be PUT is 123.00. Because the IBM 1130 is a binary machine, the number may be represented in core storage as 122.999....If this number is PUT with ADJST equal to zero, the result will be 122. However, with ADJST equal to 0.5, the preliminary result is 123.499; when PUT, the result is 123. The value of ADJST should be a 5 in the decimal position one to the right of the low-order digit to be PUT.

The last two factors, ADJST and N, form a logical pair, and should usually appear as either:

	ADJST		N
	.5	and	0
or	5.	and	1
or	50.	and	2
or	500.	and	3
	etc.		etc.

ADJST should never be less than .5, since this will introduce fraction inaccuracies. From this it follows that N should never be negative.

If PUT (or GET) is used, the calling program must use extended precision.

P1403

Format: CALL P1403(JCARD,J,JLAST,NER)

Function: The printing of one line on the IBM 1403 Printer, Model 6 or 7, is initiated, and control is returned to the user.

Parameter description:

JCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. This array contains the information to be printed, on the IBM 1403 Printer, in A1 format, one character per word.

J - An integer constant, an integer expression, or an integer variable. This is the position of the first character of JCARD to be printed (the left-hand end of a field).

JLAST - An integer constant, an integer expression, or an integer variable, greater than or equal to J. This is the position of the last character of JCARD to be printed (the right-hand end of a field).

NER - An integer variable. This variable indicates carriage control tape conditions that have occurred in printing.

Detailed description: When the previous print operation is finished, if a print operation was going on, the routine begins. The characters to be printed are converted to 1403 Printer codes and reversed so as to match the 1403 buffer mechanism. Since the characters are taken in pairs, an even number of characters is required. If necessary, the character at JCARD(JLAST+1) will be used to get an even number. Printing is then initiated and control is returned to the user. When printing is finished, the printer spaces one line and the indicator, NER, is set as follows:

NER is	when
3	Channel 9 has been encountered
4	Channel 12 has been encountered

If neither channel 9 nor channel 12 is encountered, the indicator is not set. If a WAIT occurs at location 41, one of the following conditions exists:

Conditions	Accumulator (hex)
Printer not ready or end of forms.	9000
Internal subroutine error. Rerun job. If error persists, verify that the subroutine deck is accurate, using the listing in this manual. If the deck is the same, contact your local IBM representative. Save all output.	9001

All of the above WAITs require operator intervention.

Only one line can be printed at a time (JLAST-J+1 must be less than or equal to 120).

More detailed information may be found in the P1403 flowchart and listing.

Example:

```
      DIMENSION IOUT(120)
      N=0
      CALL P1403(IOUT,1,120,N)
      IF(N-3)1,2,3
2     Channel 9 routine
3     Channel 12 routine
1     Normal processing
```

The line in IOUT, from IOUT(1) through IOUT(120), is printed. The indicator is tested to see whether (1) the line was printed at channel 9 or (2) the line was printed at channel 12. Appropriate action will be taken.

Notice that the test of the indicator is made after printing. The test should always be performed in this way to see where the line has just been printed. If the indicator was set, the line was printed at channel 9 or channel 12.

Errors: If JLAST is less than J, two characters will be printed. If more than 120 characters are specified (JLAST-J+1 is greater than 120), only 120 characters will be printed.

Remarks: After each line is printed, the condition indicator should be checked for the channel 9 or channel 12 indication. In doing this, the same variable should always be used for the indicator.

The indicator is not reset by the subroutine. It is the responsibility of the user to initialize and reset this indicator.

If this subroutine is used, any other I/O must use commercial subroutines, with the exception of disk, which must always use FORTRAN I/O.

This CSP subroutine uses three subprograms that are part of the Disk Monitor Version 2 subroutine library. If P1403 is to be used with Version 1 of the Monitor, ZIPCO, EBPT3, and PRNT3 must be loaded onto the Version 1 disk cartridge.

P1442

Format: CALL P1442(JCARD,J,JLAST,NER)

Function: Punches a card on the IBM 1442, Model 5, 6, or 7.

Parameter description:

JCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. This array contains the characters to be punched into a card, in A1 format, one character per word.

J - An integer constant, an integer expression, or an integer variable. This is the position of the first character of JCARD to be punched (the left-hand end of a field).

JLAST - An integer constant, an integer expression, or an integer variable, greater than or equal to J. This is the position of the last character of JCARD to be punched (the right-hand end of a field).

NER - An integer variable. This variable indicates any conditions that have occurred in punching a card, and the nature of these conditions.

Detailed description: The characters to be punched are converted from EBCDIC to card codes, one at a time. When all characters have been converted, the punching operation is initiated. If an error occurs during the operation, the condition indicator is set, and the operation is continued. The possible values of the condition indicator and their meaning are listed below:

NER is	when
0	Last card condition.
1	Feed or punch check. Operator intervention required.

If a WAIT occurs at location 41, one of the following conditions exists:

Conditions	Accumulator (hex)
Punch not ready.	1xx0
Internal subroutine error. Rerun job. If error persists, verify that the subroutine deck is accurate, using the listing in this manual. If the deck is the same, contact your IBM representative. Save all output.	1xx1

All of the above WAITs require operator intervention.

Only one card can be punched at a time (JLAST-J+1 must be less than or equal to 80).

More detailed information may be found in the P1442 flowchart and listing.

Example: DIMENSION IOTPT(80)

N = -1

CALL P1442(IOTPT,1,80,N)

Before:

IOTPT NAME...ADDRESS...AMOUNT

Position 1 20 60

N = -1

After:

IOTPT is the same.

N = 0

The information in IOTPT, from IOTPT(1) to IOTPT(80), has been punched into a card. Since N = 0, the information was punched correctly, and the card punched into was the last card.

Errors: If a punch or feed check occurs, the condition indicator will be set equal to 1. If an internal error occurs, the system will WAIT as specified above.

If JLAST is less than J, only one character will be punched.

If more than 80 characters are specified (JLAST-J+1 is greater than 80), only 80 characters, one card, will be punched.

Remarks: After each card is punched, the condition indicator may be checked for the last-card indication. This will occur only after the last card has physically been punched.

The condition indicator is not reset by the subroutine. It is the responsibility of the user to initialize and reset this indicator.

If this subroutine is used, any other I/O must use commercial subroutines, with the exception of disk, which must always use FORTRAN I/O.

If a program contains no calls to the READ subroutine, this routine (P1442) may be used to punch cards on the 1442, Model 6 or 7, at a considerable savings in core storage. This is due to the fact that READ and PUNCH are two different entry points to the same subroutine. A call to one or both will cause the READ/PUNCH routine to be added to the core load. P1442 is smaller in size, since it is basically the PUNCH portion of the READ/PUNCH routine. A program may not CALL both READ/PUNCH and P1442; the Monitor will refuse to load two I/O routines that service the same device. To feed the first card, a P1442 CALL may be issued, punching 80 blanks.

This CSP subroutine uses part of the Disk Monitor Version 2 subroutine library. If P1442 is to be used with Version 1 of the Monitor, PNCH1 must be loaded onto the Version 1 disk cartridge.

Format: CALL ~~READ~~ CREAD(JCARD,J,JLAST,NER)

Function: Reads a card from the IBM 1442, Model 6 or 7, only, overlapping the conversion from card codes to EBCDIC.

Parameter description:

JCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. A card will be read into this array, in A1 format, one character per word.

J - An integer constant, an integer expression, or an integer variable. This is the position of the first word of JCARD into which a character will be read (the left-hand end of a field).

JLAST - An integer constant, an integer expression, or an integer variable, greater than or equal to J. This is the position of the last word of JCARD into which a character will be read (the right-hand end of a field).

NER - An integer variable. This variable indicates any conditions that have occurred in reading a card, and the nature of these conditions.

Detailed description: A card read operation is started. While the card is being read, the characters, one at a time, are converted from card codes to EBCDIC. If an error occurs during the operation, the condition indicator is set, and the operation continues. The possible values of the condition indicator and their meaning are listed below:

NER is	when
0	Last card condition.
1	Feed or read check. Operator intervention required.

If a WAIT occurs at location 41, one of the following conditions exists:

Conditions	Accumulator (hex)
Reader not ready.	1xx0
Internal subroutine error. Rerun job. If error persists, verify that the subroutine deck is accurate, using the listing in this manual. If the deck is the same, contact your IBM representative. Save all output.	1xx1

All of the above WAITs require operator intervention.

Only one card can be read at a time (JLAST-J+1 must be less than or equal to 80). More detailed information may be found in the READ/PUNCH flowchart and listing.

Example:

```
DIMENSION INPUT(160)

N1=-1

CALL CREAD(INPUT,1,80,N1)

N2=-1

CALL CREAD(INPUT,81,160,N2)
```

Before:

```
INPUT    000000...0000000000
         ↑  ↑     ↑   ↑
Position 1  5     155 160

N1=-1

N2=-1
```

After:

```
INPUT    THIS IS THE NAME...SECOND CARD...
         ↑  ↑  ↑   ↑  ↑↑  ↑  ↑          ↑
Position 1  5  10  15 80 81 85 90        160

N1=-1

N2=-1
```

From the user's viewpoint the next card is read into the INPUT array (1-80). N1 is not one of the indicated values, so the first read was successful. The next card is read into the INPUT array (81-160). N2 is not one of the indicated values, so the second read was also successful.

Errors: If a read or feed check occurs, the condition indicator will be set equal to 1. If an internal error occurs, the system will WAIT as specified above.

If more than 80 characters are specified (JLAST-J+1 is greater than 80), only 80 characters, one card, will be read.

Remarks: After each card read, the condition indicator may be checked for the last card indication. This will occur only after the last card has physically been read into core storage.

The condition indicator is not reset by the subroutine. It is the responsibility of the user to initialize and reset this indicator.

If this subroutine is used, any other I/O must use commercial subroutines, with the exception of disk, which must always use FORTRAN I/O.

Note that the READ subroutine will not detect Monitor // control cards, as opposed to the standard FORTRAN READ, which exits when such a card is encountered.

R2501

Format: CALL R2501(JCARD, J, JLAST, NER)

Function: Reads a card from the IBM 2501, Model A1 or A2 only, overlapping the conversion from card codes to EBCDIC.

Parameter description:

JCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. A card will be read into this array, in A1 format, one character per word. This array should always be 80 words in length.

J - An integer constant, an integer expression, or an integer variable. This is the position of the first word of JCARD into which a character will be read (the left-hand end of a field).

JLAST - An integer constant, an integer expression, or an integer variable, greater than or equal to J. This is the position of the last word of JCARD into which a character will be read (the right-hand end of a field).

NER - An integer variable. This variable indicates any conditions that have occurred in reading a card, and the nature of these conditions.

Detailed description: A card read operation is started. While the card is being read, the characters, one at a time, are converted from card codes to EBCDIC. If an error occurs during the operation, the condition indicator is set, and the operation continues. The possible values of the condition indicator and their meaning are listed below:

NER is	when
0	Last card condition.
1	Feed or read check. Operator intervention required.

If a WAIT occurs at location 41, one of the following conditions exists:

Conditions	Accumulator (hex)
Reader not ready.	1xx0
Internal subroutine error. Rerun job. If error persists, verify that the subroutine deck is accurate, using the listing in this manual. If the deck is the same, contact your IBM representative. Save all output.	1xx1

All of the above WAITs require operator intervention.

Only one card can be read at a time (JLAST-J+1 must be less than or equal to 80). More detailed information may be found in the R2501 flowchart and listing.

```
Example:    DIMENSION INPUT(160)

            N1=-1

            CALL R2501(INPUT,1,80,N1)

            N2=-1

            CALL R2501(INPUT,81,160,N2)
```

Before:

```
  INPUT     000000...0000000000
            ↑  ↑     ↑    ↑
Position    1  5     155  160

  N1=-1

  N2=-1
```

After:

```
  INPUT     THISbISbTHEbNAME...SECONDbCARD.........
            ↑  ↑  ↑   ↑  ↑ ↑  ↑    ↑          ↑
Position    1  5  10  15 80 81 85   90         160

  N1=-1

  N2=-1
```

The first card is read into the INPUT array (1-80). N1 is not one of the indicated values, so the first read was successful. The next card is read into the INPUT array (81-160). N2 is not one of the indicated values, so the second read was also successful.

Errors: If a read or feed check occurs, the condition indicator will be set equal to 1. If an internal error occurs, the system will WAIT as specified above.

If more than 80 characters are specified (JLAST-J+1 is greater than 80), only 80 characters, one card, will be read.

Remarks: After each card read, the condition indicator may be checked for the last-card indication. This will occur only after the last card has physically been read into core storage.

The condition indicator is not reset by the subroutine. It is the responsibility of the user to initialize and reset this indicator.

If this subroutine is used, any other I/O must use commercial subroutines, with the exception of disk, which must always use FORTRAN I/O.

Note that the R2501 routine does not detect Monitor // control cards, as opposed to the standard FORTRAN READ, which exits when such a card is encountered.

This CSP subroutine uses part of the Disk Monitor Version 2 subroutine library. If R2501 is to be used with Version 1 of the Monitor, READ1 must be loaded onto the Version 1 disk cartridge.

Format: CALL SKIP(N)

Function: Execute the requested control function on the IBM 1132 Printer

Parameter description:

N - An integer constant, an integer expression, or an integer variable. The value of this variable corresponds to an available control function.

Detailed description: If the printer is busy, the subroutine WAITs. Otherwise, or when the printer finishes, the routine executes the requested function and returns control to the calling program. The control functions and their values are as follows:

Function	Value
Immediate skip to channel 1	12544
Immediate skip to channel 2	12800
Immediate skip to channel 3	13056
Immediate skip to channel 4	13312
Immediate skip to channel 5	13568
Immediate skip to channel 6	13824
Immediate skip to channel 9	14592
Immediate skip to channel 12	15360
Immediate space of 1 space	15616
Immediate space of 2 spaces	15872
Immediate space of 3 spaces	16128
Suppress space after printing	0

Normal spacing is one space after printing.

Example: NUMBR=12544

CALL SKIP(NUMBR)

The carriage skips until a punch in channel 1 of the carriage control tape is encountered (normally this is at the top of a page).

Errors: Only the codes mentioned above can be used. The use of anything else will result in either no movement of the carriage or a WAIT at location 41 with 6xx1 in the accumulator (hex).

Remarks: When space suppression after printing is executed, it is reset to single-space after printing. If the user wishes to continue suppression, he must reissue the suppression command.

If this subroutine is used, any other I/O must use commercial subroutines, with the exception of disk, which must always use FORTRAN I/O.

Format: CALL STACK

Function: Selects the alternate stacker on the IBM 1442, Model 6 or 7, only for the next card to go through the punch station. More detailed information may be found in the STACK flowchart and listing.

Example: A card has been read. The sum of the four-digit numbers in columns 10-13 and 20-23 is punched in columns 1-5. If the sum is negative, the card should be selected into the alternate stacker. A program to solve the problem follows:

	FORTRAN Statement	Meaning
1	FORMAT(9X,I4,6X,I4)	Description of the input data.
2	FORMAT(I5)	Description of the output data.
	IO=2	Input unit number.
3	READ(IO,1)I1,I2	Input statement.
	I3=I1+I2	Sum.
	IF(I3)4,5,5	Is the sum negative?
4	CALL STACK	Yes — select the card.
5	WRITE(IO,2)I3	No — punch.
	GO TO 3	Process the next card.
	END	

Errors: None

Remarks: If the card reader is in a not-ready state (last card) and the card just read is to be stacker-selected, the card reader will not accept the stacker select command. The user should place a blank card after the card designating last card to his program. This will prevent the card reader from becoming not ready and will allow the card to be stacker-selected.

ADD
A1A3
A1DEC
A3A1
CARRY
DECA1
DIV
DPACK
DUNPK
EDIT
FILL
GET
ICOMP
IOND
KEYBD
MOVE
MPY
NCOMP
NSIGN
NZONE
PACK
PRINT
PUNCH
PUT
P1403
P1442
READ
R2501
SKIP
STACK
SUB ←
S1403
TYPER
UNPAC
WHOLE

SUB

Format: CALL SUB(JCARD,J,JLAST,KCARD,K,KLAST,NER)

Function: Subtracts one arbitrary-length decimal data field from another arbitrary-length decimal data field, placing the result in the second data field.

Parameter description:

JCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. This is the array that is subtracted, the subtrahend. The data must be stored in JCARD in decimal format, one digit per word.

J - An integer constant, an integer expression, or an integer variable. This is the position of the first digit to be subtracted (the left-hand end of a field).

JLAST - An integer constant, an integer expression, or an integer variable, greater than or equal to J. This is the position of the last digit to be subtracted (the right-hand end of a field).

KCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. This array, the minuend, is subtracted from, and will contain the result in decimal format, one digit per word.

K - An integer constant, an integer expression, or an integer variable. This is the position of the first digit of KCARD (the left-hand end of the field).

KLAST - An integer constant, an integer expression, or an integer variable, greater than or equal to K. This is the position of the last character of KCARD (the right-hand end of a field).

NER - An integer variable. Upon completion of the subroutine, this variable will indicate whether arithmetic overflow occurred.

Detailed description: The sign of the JCARD field is reversed and then the JCARD and KCARD fields are ADDed using the ADD subroutine. More detailed information may be found in the SUB flowchart and listing.

Example: DIMENSION IGRND(12), ITEM(6)

N=0

CALL SUB(ITEM,1,6,IGRND,1,12,N)

Before:

IGRND 000713665203 ITEM 102342̄

Position 1 5 10 Position 1 5

N=0

After:

IGRND 000713767545 ITEM is unchanged.

Position 1 5 10

N=0

The numeric data field ITEM, in decimal format, is SUBtracted from the numeric data field IGRND, also in decimal format. Note that the fields are both right-justified. In this case, since the ITEM field is negative, and the operation to be performed is subtraction, the ITEM field is added to the IGRND field. The error indicator, N, is the same, since there is no overflow out of the high-order digit, left-hand end, of the IGRND field.

Errors: If the KCARD field is not large enough to contain the sum (that is, if there is a carry out of the high-order digit), the error indicator, NER, will be set equal to KLAST.

If the JCARD field is longer than the KCARD field, nothing will be done and the error indicator will be equal to KLAST.

Remarks: See the remarks for the ADD subroutine.

S1403

Format: CALL S1403(N)

Function: Execute the requested control function on the IBM 1403 Printer, Model 6 or 7, only.

Parameter description:

N - An integer constant, an integer expression, or an integer variable. The value of this variable corresponds to an available control function.

Detailed description: If the printer is busy, the subroutine WAITs. Otherwise, or when the printer finishes, the routine executes the requested function and returns control to the calling program. The control functions and their values are as follows:

Function	Value
Immediate skip to channel 1	12544
Immediate skip to channel 2	12800
Immediate skip to channel 3	13056
Immediate skip to channel 4	13312
Immediate skip to channel 5	13568
Immediate skip to channel 6	13824
Immediate skip to channel 7	14080
Immediate skip to channel 8	14336
Immediate skip to channel 9	14592
Immediate skip to channel 10	14848
Immediate skip to channel 11	15104
Immediate skip to channel 12	15360
Immediate space of 1 space	15616
Immediate space of 2 spaces	15872
Immediate space of 3 spaces	16128
Suppress space after printing	0

Normal spacing is one space after printing.

Example: NUMBR=12544

CALL S1403(NUMBR)

The carriage skips until a punch in channel 1 of the carriage control tape is encountered. (Normally this is at the top of a page.)

Errors: Only the codes mentioned above can be used. The use of anything else will result in either no movement of the carriage or a WAIT at location 41 with 6xx1 in the accumulator (hex).

Remarks: When space suppression after printing is executed, it is reset to single-space after printing. If the user wishes to continue suppression, he must give the suppression command again.

If this subroutine is used, any other I/O must use commercial subroutines, with the exception of disk, which must always use FORTRAN I/O.

This CSP subroutine uses three subprograms that are part of the Disk Monitor Version 2 subroutine library. If S1403 is to be used with Version 1 of the Monitor, ZIPCO, EBPT3, and PRNT3 must be loaded onto the Version 1 disk cartridge.

TYPER

Format: CALL TYPER(JCARD,J,JLAST)

Function: The typing on the console printer is initiated, and control is returned to the user.

Parameter description:

JCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. This array contains the characters to be printed on the console printer, in A1 format, one character per word.

J - An integer constant, an integer expression, or an integer variable. This is the position of the first character of JCARD to be printed (the left-hand end of a field).

JLAST - An integer constant, an integer variable, or an integer expression, greater than or equal to J. This is the position of the last character of JCARD to be printed (the right-hand end of a field).

Detailed description: The characters to be printed are converted from EBCDIC to console printer codes and are packed. Since the characters are taken in pairs, an even number of characters is required. If necessary, the character at JCARD(JLAST+1) will be used to get an even number. Then the print operation is started. While printing is in progress, control is returned to the user's program.

More detailed information may be found in the TYPER/KEYBD flowchart and listing.

Example:

```
DIMENSION IOTPT(120)

CALL TYPER(IOTPT,1,120)
```

Before:

```
IOTPT    QUANTITY...ITEM...PRICE...AMOUNT
           ↑     ↑     ↑     ↑          ↑
Position   1     5     20    80         120
```

After:

IOTPT is the same. The line is being printed.

The printing of the line, specified in IOTPT, is initiated on the console printer, and control returns to the user's program.

Errors: If a WAIT occurs at location 41, one of the following conditions exists:

Condition	Accumulator (hex)
Console printer is not ready. Make it ready and continue.	2xx0
Internal subroutine error. Rerun job. If error persists, verify that the subroutine deck is accurate, using the listing in this manual. If the deck is the same, contact your local IBM representative. Save all output.	2xx1

If JLAST is less than J, two characters will be printed. If more than 120 characters are specified (JLAST-J+1 is greater than 120), only 120 characters will be printed.

Remarks: The asterisked characters in Appendix D of IBM 1130 Subroutine Library (C26-5925) are legal. No other characters will be printed.

If this subroutine is used, any other I/O must use commercial subroutines, with the exception of disk, which must always use FORTRAN I/O.

Control functions can be used on the console printer. The following table indicates the available control functions and the decimal constant required for each function:

Function	Decimal constant
Tabulate	1344
Shift to black	5184
Carrier return	5440
Backspace	5696
Line feed	9536
Shift to red	13632

The decimal constant corresponding to a particular function must be placed in the output area (JCARD). The function will take place when its position in the output area is printed.

Example:

```
JCARD(1)=5440

JCARD(21)=1344

JCARD(30)=5440

JCARD(51)=5440

JCARD(82)=5440

CALL TYPER(JCARD,1,101)
```

The above coding will carrier-return to a new line, then print characters 2-20 of JCARD, tab to the next tab stop; print characters 22-29, carrier return, print characters 31-50, carrier return, print characters 52-81, carrier return, and finally print characters 83-101.

UNPAC

Format: CALL UNPAC(JCARD,J,JLAST,KCARD,K)

Function: Information in A2 format, two characters per word, is UNPACked into A1 format, one character per word.

Parameter description:

JCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. This is the input array, containing the data in A2 format, two characters per word.

J - An integer constant, an integer expression, or an integer variable. This is the position of the first element of JCARD to be UNPACked (the left-hand end of a field).

JLAST - An integer constant, an integer expression, or an integer variable greater than or equal to J. This is the position of the last element of JCARD to be UNPACked (the right-hand end of a field).

KCARD - The name of a one-dimensional integer array defined in a DIMENSION statement. This is the array into which the data is UNPACked, in A1 format, one character per word.

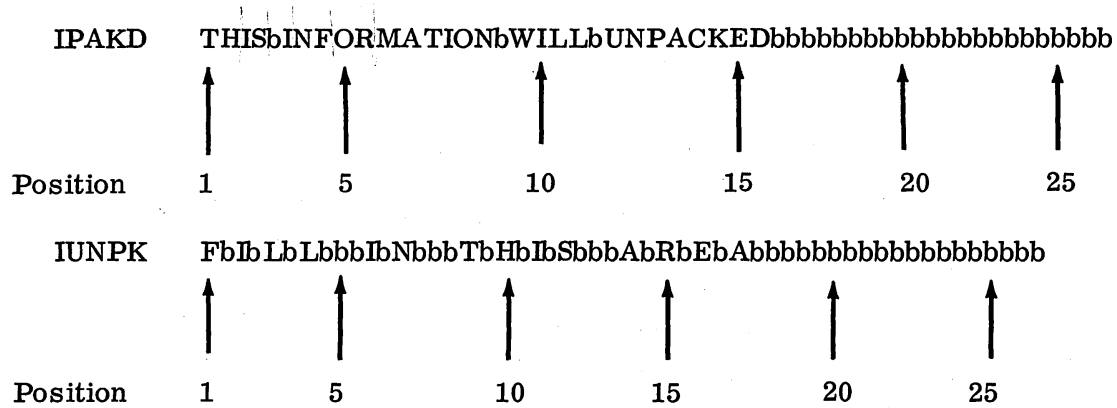
K - An integer constant, an integer expression, or an integer variable. This is the position of the first element of KCARD to receive the UNPACked characters (the left-hand end of a field).

Detailed description: The characters in the JCARD array (A2) are UNPACked left to right, starting with JCARD(J), and placed in the KCARD array (A1), starting with KCARD(K). Each element of JCARD, when UNPACked, will require two elements of KCARD. More detailed information may be found in the PACK/UNPAC flowchart and listing.

Example: DIMENSION IUNPK(26),IPAKD(26)

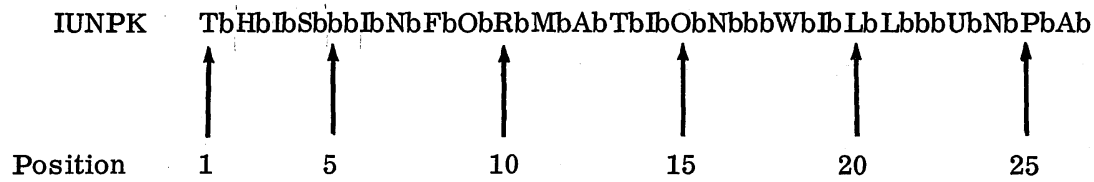
CALL UNPAC(IPAKD,1,13,IUNPK,1)

Before:



After:

IPAKD is the same.



Note that each two characters shown above represent one element of the array.

Errors: None

Remarks: If JLAST is less than or equal to J, only the first element of JCARD,JCARD(J) will be UNPACked into the first two elements of KCARD. An even number of characters will always be UNPACked into KCARD. An equation for how much space is required, in elements, in KCARD is

$$\text{Space in KCARD} = 2\ (\text{JLAST}-J+1)$$

Format: WHOLE (EXPRS)

Function: Truncates the fractional portion of a real expression.

Parameter description:

EXPRS - A real expression. This is the expression that is truncated (the fractional part is made zero).

Detailed description: The result of the expression is shifted right until the fractional portion has been shifted off. Then the result is shifted left to give the original result with a zero fraction.

Example:	A=WHOLE(.1*B+.5)
Before:	A=0.0 B=71234.99
After:	A=7123.000 B=71234.99
The expression, (.1*B+.5), has been evaluated, and the fractional portion has been dropped.	

Errors: None

Remarks: The argument, EXPRS, must always be a real expression. If the purpose is to simply truncate the fraction from a number A, the expression must be (1.0*A).

If a single variable is used as an argument, the results of WHOLE are unpredictable. In other words, this will not work:

A=WHOLE(B)

Note that the WHOLE function truncates the value of the argument or expression within the parentheses; it does not round off before truncation. For this reason, the user must be careful when working with fractional numbers. For example, if

```
X = 1570000.
```

and

```
Y = WHOLE (X* .001)
```

Y will equal 1569.000 rather than 1570.000. This occurs because the multiplication by .001 yielded 1569.999 rather than 1570.000.

To avoid such a possibility, the argument for WHOLE should be half-adjusted by the user:

```
Y = WHOLE (X*.001+0.5)
```

before it is sent to WHOLE to be truncated.

SAMPLE PROBLEMS

PROBLEM 1

This program has been written to exercise many of the routines. A card is read and a code on that card initiates the operation of the specified routine. The card image is printed before execution of the routine, the resulting variable is printed and the card image is printed after execution of the routine.

Switch settings are as follows:

Input Device	Output Device	Switches		
		0	1	2
1442	console printer	down	down	down
1442	1132	up	down	down
1442	1403	up	up	down
2501	console printer	down	down	up
2501	1132	up	down	up
2501	1403	up	up	up

Make sure that the switches are set properly before the program begins.

After processing is completed, sample problem 1 will STOP with 1111 displayed in the accumulator. Press START to continue.

A general purpose *IOCS card

```
*IOCS(CARD,1132 PRINTER,TYPEWRITER)
```

has been supplied with the sample problem. If this does not match the 1130 configuration to be used, a new *IOCS card will be required.

Sample Problem 1: Source Program

```
// FOR                                                                  CSP25940
** SAMPLE PROBLEM 1                                                     CSP25950
* NAME SMPL1                                                           CSP25960
*IOCS(CARD,1132 PRINTER,TYPEWRITER)                                    CSP25970
* ONE WORD INTEGERS                                                    CSP25980
* EXTENDED PRECISION                                                   CSP25990
* LIST ALL                                                             CSP26000
C-----GENERAL PURPOSE 1130 COMMERCIAL SUBROUTINE PACKAGE TEST PROGRAM.  CSP26010
      DIMENSION NCARD(80), NAMES(5,13)                                  CSP26020
1     FORMAT (80A1)                                                     CSP26030
2     FORMAT (I10, 4F10.0, F10.3)                                       CSP26040
3     FORMAT (30HONOW TESTING 1130 CSP ROUTINE ,5A1,16H WITH PARAMETERS,CSP26050
     X4F10.5, F10.3)                                                    CSP26060
4     FORMAT (13H CARD BEFORE=,80A1)                                    CSP26070
5     FORMAT (13H CARD AFTER =,80A1)                                    CSP26080
6     FORMAT(1H ,5I3,2X,12HCARD AFTER =,1X,80A1)                        CSP26090
7     FORMAT(1H0,4X,10HINDICATORS,3X,12HCARD BEFORE=,1X,80A1)           CSP26100
8     FORMAT (10H ANSWER IS, F20.3)                                     CSP26110
C-----DEFINE UNIT NUMBERS OF I/O DEVICES.                               CSP26120
      CALL DATSW(0,N)                                                   CSP26130
      CALL DATSW(1,M)                                                   CSP26140
      CALL DATSW(2,L)                                                   CSP26150
      NREAD=6*(1/L)+2                                                   CSP26160
      NWRIT=2*(1/N)+2*(1/M)+1                                           CSP26170
      READ (NREAD,1) NAMES                                              CSP26180
10    READ (NREAD,2) N, V1, V2, V3, V4, VAR                             CSP26190
      IF (N) 98,98,99                                                   CSP26200
98    STOP 1111                                                         CSP26210
99    WRITE (NWRIT,3) (NAMES(I,N), I=1,5), V1, V2, V3, V4, VAR          CSP26220
      N1=V1                                                             CSP26230
      N2=V2                                                             CSP26240
      N3=V3                                                             CSP26250
      N4=V4                                                             CSP26260
      NVAR=VAR                                                          CSP26270
      NER1=0                                                            CSP26280
      NER2=0                                                            CSP26290
      NER3=0                                                            CSP26300
      NER4=0                                                            CSP26310
      NER5=0                                                            CSP26320
      READ (NREAD,1) NCARD                                              CSP26330
      IF(N-7)  21,21,22                                                 CSP26340
21    WRITE(NWRIT,4) NCARD                                              CSP26350
C-----GO TO 1130 CSP ROUTINE                                            CSP26360
      GO TO (11,12,13,14,15,16,17), N                                   CSP26370
C-----COMP ROUTINE                                                      CSP26380
11    ANS=NCOMP(NCARD,N1,N2,NCARD,N3)                                   CSP26390
      GO TO 19                                                          CSP26400
C-----MOVE ROUTINE                                                      CSP26410
12    CALL MOVE(NCARD,N1,N2,NCARD,N3)                                   CSP26420
      GO TO 20                                                          CSP26430
C-----NZONE ROUTINE                                                     CSP26440
13    CALL NZONE(NCARD,N1,N2,N3)                                        CSP26450
      ANS=N3                                                            CSP26460
      GO TO 19                                                          CSP26470
C-----EDIT ROUTINE                                                      CSP26480
14    CALL EDIT(NCARD,N1,N2,NCARD,N3,N4)                                CSP26490
```

```
      GO TO 20                                                          CSP26500
C-----GET ROUTINE                                                       CSP26510
15    ANS=GET(NCARD,N1,N2,V3)                                           CSP26520
      GO TO 19                                                          CSP26530
C-----PUT ROUTINE                                                       CSP26540
16    CALL PUT(NCARD,N1,N2,VAR,V3,N4)                                   CSP26550
      GO TO 20                                                          CSP26560
C-----FILL ROUTINE                                                      CSP26570
17    CALL FILL(NCARD,N1,N2,NVAR)                                       CSP26580
      GO TO 20                                                          CSP26590
19    WRITE (NWRIT,8) ANS                                               CSP26600
20    WRITE (NWRIT,5) NCARD                                             CSP26610
      GO TO 10                                                          CSP26620
22    WRITE(NWRIT,7) NCARD                                              CSP26630
C-----A1DEC ROUTINE                                                     CSP26640
      CALL A1DEC(NCARD,N1,N2,NER1)                                      CSP26650
      CALL A1DEC(NCARD,N3,N4,NER2)                                      CSP26660
      N=N-7                                                             CSP26670
      GO TO (23,24,25,26,27,28),N                                       CSP26680
C-----ADD ROUTINE                                                       CSP26690
23    CALL ADD(NCARD,N1,N2,NCARD,N3,N4,NER3)                            CSP26700
      GO TO 29                                                          CSP26710
C-----SUB ROUTINE                                                       CSP26720
24    CALL SUB(NCARD,N1,N2,NCARD,N3,N4,NER3)                            CSP26730
      GO TO 29                                                          CSP26740
C-----MPY ROUTINE                                                       CSP26750
25    CALL MPY(NCARD,N1,N2,NCARD,N3,N4,NER3)                            CSP26760
      GO TO 29                                                          CSP26770
C-----DIV ROUTINE                                                       CSP26780
26    CALL DIV(NCARD,N1,N2,NCARD,N3,N4,NER3)                            CSP26790
      GO TO 29                                                          CSP26800
C-----ICOMP ROUTINE                                                     CSP26810
27    NER3=ICOMP(NCARD,N1,N2,NCARD,N3,N4)                               CSP26820
      GO TO 29                                                          CSP26830
C-----NSIGN ROUTINE                                                     CSP26840
28    CALL NSIGN(NCARD,N1,NVAR,NER3)                                    CSP26850
C-----DECA1 ROUTINE                                                     CSP26860
29    CALL DECA1(NCARD,N1,N2,NER4)                                      CSP26870
      IF(N-3)  33,32,30                                                 CSP26880
30    IF(N-4)  33,31,33                                                 CSP26890
31    JSPAN=N2-N1                                                       CSP26900
      KSPAN=N4-N3                                                       CSP26910
      KSTRT=N3-JSPAN-1                                                  CSP26920
      N3=N4-JSPAN                                                       CSP26930
      CALL DECA1(NCARD,KSTRT,N3-1,NER5)                                 CSP26940
      GO TO 33                                                          CSP26950
32    N3=N3-N2+N1-1                                                     CSP26960
33    CALL DECA1(NCARD,N3,N4,NER5)                                      CSP26970
      WRITE(NWRIT,6) NER1,NER2,NER3,NER4,NER5,NCARD                     CSP26980
      GO TO 10                                                          CSP26990
      END                                                               CSP27000
```

```
VARIABLE ALLOCATIONS
 V1   =0000  V2   =0003  V3   =0006  V4   =0009  VAR  =000C  ANS  =000F  NCARD=0064  NAMES=00A5  N    =00A6  M    =00A7
 L    =00A8  NREAD=00A9  NWRIT=00AA  I    =00AB  N1   =00AC  N2   =00AD  N3   =00AE  N4   =00AF  NVAR =00B0  NER1 =00B1
 NER2 =00B2  NER3 =00B3  NER4 =00B4  NER5 =00B5  JSPAN=00B6  KSPAN=00B7  KSTRT=00B8

STATEMENT ALLOCATIONS
 1    =00C4  2    =00C7  3    =00CC  4    =00EB  5    =00F6  6    =0101  7    =0111  8    =0126  10   =0177  98   =018A
 99   =018C  21   =01E8  11   =01FA  12   =0206  13   =020F  14   =021C  15   =0226  16   =0230  17   =023A  19   =0242
 20   =0248  22   =0251  23   =0274  24   =027F  25   =028A  26   =0295  27   =02A0  28   =02AC  29   =02B2  30   =02C0
 31   =02C6  32   =02EE  33   =02F8

FEATURES SUPPORTED
 ONE WORD INTEGERS
 EXTENDED PRECISION
 IOCS

CALLED SUBPROGRAMS
 DATSW   NCOMP   MOVE    NZONE   EDIT    GET     PUT     FILL    A1DEC   ADD     SUB     MPY     DIV     ICOMP   NSIGN
 DECA1   ELD     ESTO    IFIX    FLOAT   WRTYZ   SRED    SWRT    SCOMP   SFIO    SIOA1   SIOIX   SIOF    SIOI    SUBSC
 STOP    CARDZ   PRNTZ

INTEGER CONSTANTS
     0=00BA       1=00BB       2=00BC       6=00BD    1111=00BE       5=00BF       7=00C0       3=00C1       4=00C2    4369=00C3

CORE REQUIREMENTS FOR SMPL1
 COMMON       0  VARIABLES    186  PROGRAM    600

END OF COMPILATION
```

Sample Problem 1: Output

```
// XEQ                                                    CSP27010

NOW TESTING 1130 CSP ROUTINE NCOMP WITH PARAMETERS   1.00000  10.00000  11.00000   0.00000     0.000
CARD BEFORE=ABCDEFGHIJKLMNOPQRST                                                    2CSP27040
ANSWER IS          -272.000
CARD AFTER =ABCDEFGHIJKLMNOPQRST                                                    2CSP27040

NOW TESTING 1130 CSP ROUTINE NCOMP WITH PARAMETERS   1.00000  10.00000  11.00000   0.00000     0.000
CARD BEFORE=BCBD F    BCBD F                                                        4CSP27060
ANSWER IS             0.000
CARD AFTER =BCBD F    BCBD F                                                        4CSP27060

NOW TESTING 1130 CSP ROUTINE NCOMP WITH PARAMETERS  20.00000  25.00000  30.00000   0.00000     0.000
CARD BEFORE=                JKLMN     CBAFG                                       6CSP27080
ANSWER IS          224.000
CARD AFTER =                JKLMN     CBAFG                                       6CSP27080

NOW TESTING 1130 CSP ROUTINE MOVE  WITH PARAMETERS   1.00000   5.00000  20.00000   0.00000     0.000
CARD BEFORE=ABCDE                                                                   8CSP27100
CARD AFTER =ABCDE           ABCDE                                                   8CSP27100

NOW TESTING 1130 CSP ROUTINE MOVE  WITH PARAMETERS  40.00000  49.00000   1.00000   0.00000     0.000
CARD BEFORE=                                9876543210                              10CSP27120
CARD AFTER =9876543210                      9876543210                              10CSP27120

NOW TESTING 1130 CSP ROUTINE NZONE WITH PARAMETERS  10.00000   5.00000   0.00000   0.00000     0.000
CARD BEFORE=          A                                                             12CSP27140
ANSWER IS             1.000
CARD AFTER =          A                                                             12CSP27140

NOW TESTING 1130 CSP ROUTINE NZONE WITH PARAMETERS  10.00000   5.00000   0.00000   0.00000     0.000
CARD BEFORE=          I                                                             14CSP27160
ANSWER IS             1.000
CARD AFTER =          I                                                             14CSP27160

NOW TESTING 1130 CSP ROUTINE NZONE WITH PARAMETERS  20.00000   5.00000   0.00000   0.00000     0.000
CARD BEFORE=                0                                                       16CSP27180
ANSWER IS             4.000
CARD AFTER =                0                                                       16CSP27180

NOW TESTING 1130 CSP ROUTINE NZONE WITH PARAMETERS  20.00000   5.00000   0.00000   0.00000     0.000
CARD BEFORE=                9                                                       18CSP27200
ANSWER IS             4.000
CARD AFTER =                9                                                       18CSP27200

NOW TESTING 1130 CSP ROUTINE NZONE WITH PARAMETERS  30.00000   5.00000   0.00000   0.00000     0.000
CARD BEFORE=                            J                                           20CSP27220
ANSWER IS             2.000
CARD AFTER =                            J                                           20CSP27220

NOW TESTING 1130 CSP ROUTINE NZONE WITH PARAMETERS  30.00000   5.00000   0.00000   0.00000     0.000
CARD BEFORE=                            R                                           22CSP27240
ANSWER IS             2.000
CARD AFTER =                            R                                           22CSP27240

NOW TESTING 1130 CSP ROUTINE NZONE WITH PARAMETERS  10.00000   1.00000   0.00000   0.00000     0.000
```

```
CARD BEFORE=          A                                                                  24CSP27260
ANSWER IS                1.000
CARD AFTER =          A                                                                  24CSP27260

NOW TESTING 1130 CSP ROUTINE NZONE WITH PARAMETERS  10.00000   1.00000   0.00000   0.00000      0.000
CARD BEFORE=          1                                                                  26CSP27280
ANSWER IS                4.000
CARD AFTER =          A                                                                  26CSP27280

NOW TESTING 1130 CSP ROUTINE NZONE WITH PARAMETERS  10.00000   1.00000   0.00000   0.00000      0.000
CARD BEFORE=          J                                                                  28CSP27300
ANSWER IS                2.000
CARD AFTER =          A                                                                  28CSP27300

NOW TESTING 1130 CSP ROUTINE NZONE WITH PARAMETERS  20.00000   4.00000   0.00000   0.00000      0.000
CARD BEFORE=                I                                                           30CSP27320
ANSWER IS                1.000
CARD AFTER =                9                                                           30CSP27320

NOW TESTING 1130 CSP ROUTINE NZONE WITH PARAMETERS  20.00000   2.00000   0.00000   0.00000      0.000
CARD BEFORE=                9                                                           32CSP27340
ANSWER IS                4.000
CARD AFTER =                R                                                           32CSP27340

NOW TESTING 1130 CSP ROUTINE NZONE WITH PARAMETERS  20.00000   3.00000   0.00000   0.00000      0.000
CARD BEFORE=                R                                                           34CSP27360
ANSWER IS                2.000
CARD AFTER =                Z                                                           34CSP27360

NOW TESTING 1130 CSP ROUTINE NZONE WITH PARAMETERS  30.00000   3.00000   0.00000   0.00000      0.000
CARD BEFORE=                            D                                               36CSP27380
ANSWER IS                1.000
CARD AFTER =                            U                                               36CSP27380

NOW TESTING 1130 CSP ROUTINE NZONE WITH PARAMETERS  30.00000   2.00000   0.00000   0.00000      0.000
CARD BEFORE=                            4                                               38CSP27400
ANSWER IS                4.000
CARD AFTER =                            M                                               38CSP27400

NOW TESTING 1130 CSP ROUTINE NZONE WITH PARAMETERS  30.00000   4.00000   0.00000   0.00000      0.000
CARD BEFORE=                            M                                               40CSP27420
ANSWER IS                2.000
CARD AFTER =                            4                                               40CSP27420

NOW TESTING 1130 CSP ROUTINE EDIT  WITH PARAMETERS   1.00000   6.00000  20.00000  30.00000      0.000
CARD BEFORE=123456                  ,  $.  CR                                           42CSP27440
CARD AFTER =123456               $1,234.56                                              42CSP27440

NOW TESTING 1130 CSP ROUTINE EDIT  WITH PARAMETERS   1.00000   6.00000  20.00000  30.00000      0.000
CARD BEFORE=02343K                  ,  $.  CR                                           44CSP27460
CARD AFTER =02343K                 $234.32CR                                            44CSP27460

NOW TESTING 1130 CSP ROUTINE EDIT  WITH PARAMETERS   1.00000   6.00000  20.00000  29.00000      0.000
```

```
CARD BEFORE=00343-                  ,  $.  -                                            46CSP27480
CARD AFTER =00343-                   $34.30-                                            46CSP27480

NOW TESTING 1130 CSP ROUTINE EDIT  WITH PARAMETERS   1.00000   7.00000  21.00000  28.00000      0.000
CARD BEFORE=1234567                 ,  $.                                               48CSP27500
CARD AFTER =1234567                ********                                             48CSP27500

NOW TESTING 1130 CSP ROUTINE EDIT  WITH PARAMETERS   1.00000   6.00000  10.00000  30.00000      0.000
CARD BEFORE=00005M                 ,*  .  CR                                           50CSP27520
CARD AFTER =00005M   *************00.54CR                                             50CSP27520

NOW TESTING 1130 CSP ROUTINE EDIT  WITH PARAMETERS   1.00000   6.00000  20.00000  29.00000      0.000
CARD BEFORE=    5M                ,0  .  -                                           52CSP27540
CARD AFTER =    5M                ***   .54-                                          52CSP27540

NOW TESTING 1130 CSP ROUTINE GET   WITH PARAMETERS   1.00000   5.00000   0.01000   0.00000      0.000
CARD BEFORE=12345                                                                     54CSP27560
ANSWER IS              123.449
CARD AFTER =12345                                                                     54CSP27560

NOW TESTING 1130 CSP ROUTINE GET   WITH PARAMETERS   1.00000   5.00000   0.01000   0.00000      0.000
CARD BEFORE=1234N                                                                     56CSP27580
ANSWER IS             -123.449
CARD AFTER =1234N                                                                     56CSP27580

NOW TESTING 1130 CSP ROUTINE GET   WITH PARAMETERS   1.00000   7.00000   0.00100   0.00000      0.000
CARD BEFORE=1 3 5 7                                                                   58CSP27600
ANSWER IS             1030.506
CARD AFTER =1 3 5 7                                                                   58CSP27600

NOW TESTING 1130 CSP ROUTINE GET   WITH PARAMETERS   1.00000   5.00000   1.00000   0.00000      0.000
CARD BEFORE=12AB4                                                                     60CSP27620
ANSWER IS                0.000
CARD AFTER =12AB4                                                                     60CSP27620

NOW TESTING 1130 CSP ROUTINE GET   WITH PARAMETERS   1.00000   5.00000   1.00000   0.00000      0.000
CARD BEFORE=1230-                                                                     62CSP27640
ANSWER IS          -12300.000
CARD AFTER =1230-                                                                     62CSP27640

NOW TESTING 1130 CSP ROUTINE GET   WITH PARAMETERS   1.00000   3.00000   0.00001   0.00000      0.000
CARD BEFORE=123                                                                       64CSP27660
ANSWER IS                0.001
CARD AFTER =123                                                                       64CSP27660

NOW TESTING 1130 CSP ROUTINE PUT   WITH PARAMETERS   1.00000   5.00000   0.50000   0.00000  12345.000
CARD BEFORE=                                                                          66CSP27680
CARD AFTER =12345                                                                     66CSP27680

NOW TESTING 1130 CSP ROUTINE PUT   WITH PARAMETERS   1.00000   2.00000   5.00000   1.00000  12890.000
CARD BEFORE=                                                                          68CSP27700
CARD AFTER =89                                                                        68CSP27700

NOW TESTING 1130 CSP ROUTINE PUT   WITH PARAMETERS  11.00000  15.00000   5.00000   1.00000  12345.000
```

```
CARD BEFORE=                                                                    70CSP27720
CARD AFTER =          01235                                                     70CSP27720

NOW TESTING 1130 CSP ROUTINE PUT   WITH PARAMETERS  10.00000  16.00000  50.00000   2.00000-34567.000
CARD BEFORE=                                                                    72CSP27740
CARD AFTER =          0000340                                                   72CSP27740

NOW TESTING 1130 CSP ROUTINE PUT   WITH PARAMETERS  10.00000  17.00000   5.00000   1.00000   -16.000
CARD BEFORE=                                                                    74CSP27760
CARD AFTER =          0000000K                                                  74CSP27760

NOW TESTING 1130 CSP ROUTINE FILL  WITH PARAMETERS   1.00000  10.00000   0.00000   0.00000 16448.000
CARD BEFORE=ABCDEFGHIJK                                                         76CSP27780
CARD AFTER =           K                                                        76CSP27780

NOW TESTING 1130 CSP ROUTINE FILL  WITH PARAMETERS  20.00000  25.00000   0.00000   0.00000 23360.000
CARD BEFORE=                ABCDEFGH                                            78CSP27800
CARD AFTER =                A$$$$$$H                                            78CSP27800

NOW TESTING 1130 CSP ROUTINE ADD   WITH PARAMETERS  31.00000  35.00000  66.00000  70.00000     0.000

    INDICATORS   CARD BEFORE=                              24                          2048  CSP27820
  0  0  0  0  0  CARD AFTER =                          00024                          02072  CSP27820

NOW TESTING 1130 CSP ROUTINE SUB   WITH PARAMETERS  31.00000  35.00000  66.00000  70.00000     0.000

    INDICATORS   CARD BEFORE=                              24                          2048  CSP27840
  0  0  0  0  0  CARD AFTER =                          00024                          02024  CSP27840

NOW TESTING 1130 CSP ROUTINE MPY   WITH PARAMETERS  31.00000  35.00000  66.00000  70.00000     0.000

    INDICATORS   CARD BEFORE=                              24                          2048  CSP27860
  0  0  0  0  0  CARD AFTER =                          00024                    0000049152  CSP27860

NOW TESTING 1130 CSP ROUTINE DIV   WITH PARAMETERS  31.00000  35.00000  66.00000  70.00000     0.000

    INDICATORS   CARD BEFORE=                              24                          2048  CSP27880
  0  0  0  0  0  CARD AFTER =                          00024                    0008500008  CSP27880

NOW TESTING 1130 CSP ROUTINE ICOMP WITH PARAMETERS  31.00000  35.00000  66.00000  70.00000     0.000

    INDICATORS   CARD BEFORE=                              24                          2048  CSP27900
  0  0 -6  0  0  CARD AFTER =                          00024                          02048  CSP27900

NOW TESTING 1130 CSP ROUTINE NSIGN WITH PARAMETERS   1.00000   1.00000   2.00000   2.00000     1.000

    INDICATORS   CARD BEFORE= 65                                                            CSP27920
  0  0  1  0  0  CARD AFTER = 65                                                            CSP27920

NOW TESTING 1130 CSP ROUTINE ADD   WITH PARAMETERS  31.00000  35.00000  66.00000  70.00000     0.000

    INDICATORS   CARD BEFORE=                              99                          2048  CSP27940
  0  0  0  0  0  CARD AFTER =                          00099                          02147  CSP27940

NOW TESTING 1130 CSP ROUTINE SUB   WITH PARAMETERS  31.00000  35.00000  66.00000  70.00000     0.000

    INDICATORS   CARD BEFORE=                              99                          2048  CSP27960
  0  0  0  0  0  CARD AFTER =                          00099                          01949  CSP27960

NOW TESTING 1130 CSP ROUTINE MPY   WITH PARAMETERS  31.00000  35.00000  66.00000  70.00000     0.000

    INDICATORS   CARD BEFORE=                              99                          2048  CSP27980
  0  0  0  0  0  CARD AFTER =                          00099                    0000202752  CSP27980

NOW TESTING 1130 CSP ROUTINE DIV   WITH PARAMETERS  31.00000  35.00000  66.00000  70.00000     0.000

    INDICATORS   CARD BEFORE=                              99                          2048  CSP28000
  0  0  0  0  0  CARD AFTER =                          00099                    0002000068  CSP28000

NOW TESTING 1130 CSP ROUTINE ICOMP WITH PARAMETERS  31.00000  35.00000  66.00000  70.00000     0.000

    INDICATORS   CARD BEFORE=                              99                          2048  CSP28020
  0  0 -9  0  0  CARD AFTER =                          00099                          02048  CSP28020

NOW TESTING 1130 CSP ROUTINE NSIGN WITH PARAMETERS   1.00000   1.00000   2.00000   2.00000    -1.000

    INDICATORS   CARD BEFORE= 54                                                            CSP28040
  0  0  1  0  0  CARD AFTER = N4                                                            CSP28040

NOW TESTING 1130 CSP ROUTINE ADD   WITH PARAMETERS   1.00000  20.00000  41.00000  70.00000     0.000

    INDICATORS   CARD BEFORE= 12345678901234567890                  12345678901234567890123456789O  CSP28060
  0  0  0  0  0  CARD AFTER = 12345678901234567890                  12345678902469135780246913578O  CSP28060

NOW TESTING 1130 CSP ROUTINE SUB   WITH PARAMETERS   1.00000  20.00000  41.00000  70.00000     0.000

    INDICATORS   CARD BEFORE= 12345678901234567890                  12345678901234567890123456789O  CSP28080
  0  0  0  0  0  CARD AFTER = 12345678901234567890                  12345678900000000000000000000  CSP28080

NOW TESTING 1130 CSP ROUTINE MPY   WITH PARAMETERS   1.00000  20.00000  41.00000  70.00000     0.000

    INDICATORS   CARD BEFORE= 12345678901234567890                  12345678901234567890123456789O  CSP28100
  0  0  0  0  0  CARD AFTER = 12345678901234567890015241578753238836750342935775019051998750190521OO  CSP28100

NOW TESTING 1130 CSP ROUTINE DIV   WITH PARAMETERS   1.00000  20.00000  41.00000  70.00000     0.000

    INDICATORS   CARD BEFORE= 12345678901234567890                  12345678901234567890123456789O  CSP28120
  0  0  0  0  0  CARD AFTER = 12345678901234567890000000000000000001000000000000000000001234567890  CSP28120

NOW TESTING 1130 CSP ROUTINE ICOMP WITH PARAMETERS   1.00000  20.00000  41.00000  70.00000     0.000

    INDICATORS   CARD BEFORE= 12345678901234567890                  12345678901234567890123456789O  CSP28140
  0  0 -1  0  0  CARD AFTER = 12345678901234567890                  12345678901234567890123456789O  CSP28140

NOW TESTING 1130 CSP ROUTINE NSIGN WITH PARAMETERS   1.00000   1.00000   2.00000   2.00000     0.000

    INDICATORS   CARD BEFORE= 32                                                            CSP28160
```

```
 0  0  1  0  0  CARD AFTER = L2                                                                         CSP28160

NOW TESTING 1130 CSP ROUTINE ADD   WITH PARAMETERS   1.00000  20.00000  41.00000  70.00000       0.000

    INDICATORS   CARD BEFORE= 123456789012345678 9-                    123456789012345678901234567890  CSP28180
 0  0  0  0  0   CARD AFTER = 123456789012345678 9-                    123456789000000000000000000000  CSP28180

NOW TESTING 1130 CSP ROUTINE SUB   WITH PARAMETERS   1.00000  20.00000  41.00000  70.00000       0.000

    INDICATORS   CARD BEFORE= 1234567890123456789-                     123456789012345678901234567890  CSP28200
 0  0  0  0  0   CARD AFTER = 1234567890123456789-                     123456789024691357802469135780  CSP28200

NOW TESTING 1130 CSP ROUTINE MPY   WITH PARAMETERS   1.00000  20.00000  41.00000  70.00000       0.000

    INDICATORS   CARD BEFORE= 1234567890123456789-                     123456789012345678901234567890  CSP28220
 0  0  0  0  0   CARD AFTER = 1234567890123456789-0152415787532388367503429357750190519987501905210-  CSP28220

NOW TESTING 1130 CSP ROUTINE DIV   WITH PARAMETERS   1.00000  20.00000  41.00000  70.00000       0.000

    INDICATORS   CARD BEFORE= 1234567890123456789-                     123456789012345678901234567890  CSP28240
 0  0  0  0  0   CARD AFTER = 1234567890123456789-000000000000000000001000000000-0000000001234567890  CSP28240

NOW TESTING 1130 CSP ROUTINE ICOMP WITH PARAMETERS   1.00000  20.00000  41.00000  70.00000       0.000

    INDICATORS   CARD BEFORE= 1234567890123456789-                     123456789012345678901234567890  CSP28260
 0  0 -1  0  0   CARD AFTER = 1234567890123456789-                     123456789012345678901234567890  CSP28260

NOW TESTING 1130 CSP ROUTINE NSIGN WITH PARAMETERS   1.00000   1.00000   2.00000   2.00000       1.000

    INDICATORS   CARD BEFORE= ON                                                                         CSP28280
 0  0 -1  0  0   CARD AFTER = 6N                                                                         CSP28280

NOW TESTING 1130 CSP ROUTINE ADD   WITH PARAMETERS   1.00000  20.00000  41.00000  70.00000       0.000

    INDICATORS   CARD BEFORE= 12345678901234567890                     12345678901234567890123456789-  CSP28300
 0  0  0  0  0   CARD AFTER = 12345678901234567890                     12345678900000000000000000000-  CSP28300

NOW TESTING 1130 CSP ROUTINE SUB   WITH PARAMETERS   1.00000  20.00000  41.00000  70.00000       0.000

    INDICATORS   CARD BEFORE= 12345678901234567890                     12345678901234567890123456789-  CSP28320
 0  0  0  0  0   CARD AFTER = 12345678901234567890                     12345678902469135780246913578-  CSP28320

NOW TESTING 1130 CSP ROUTINE MPY   WITH PARAMETERS   1.00000  20.00000  41.00000  70.00000       0.000

    INDICATORS   CARD BEFORE= 12345678901234567890                     12345678901234567890123456789-  CSP28340
 0  0  0  0  0   CARD AFTER = 123456789012345678900152415787532388367503429357750190519987501905210-  CSP28340

NOW TESTING 1130 CSP ROUTINE DIV   WITH PARAMETERS   1.00000  20.00000  41.00000  70.00000       0.000

    INDICATORS   CARD BEFORE= 12345678901234567890                     12345678901234567890123456789-  CSP28360
 0  0  0  0  0   CARD AFTER = 12345678901234567890000000000000000000001000000000-000000000123456789-  CSP28360

NOW TESTING 1130 CSP ROUTINE ICOMP WITH PARAMETERS   1.00000  20.00000  41.00000  70.00000       0.000


    INDICATORS   CARD BEFORE= 12345678901234567890                     12345678901234567890123456789-  CSP28380
 0  0  0  0  0   CARD AFTER = 12345678901234567890                     12345678901234567890123456789-  CSP28380

NOW TESTING 1130 CSP ROUTINE NSIGN WITH PARAMETERS   1.00000   1.00000   2.00000   2.00000      -1.000

    INDICATORS   CARD BEFORE= NM                                                                         CSP28400
 0  0 -1  0  0   CARD AFTER = NM                                                                         CSP28400

NOW TESTING 1130 CSP ROUTINE ADD   WITH PARAMETERS   1.00000  20.00000  41.00000  70.00000       0.000

    INDICATORS   CARD BEFORE= 1234567890123456789-                     12345678901234567890123456789-  CSP28420
 0  0  0  0  0   CARD AFTER = 1234567890123456789-                     12345678902469135780246913578-  CSP28420

NOW TESTING 1130 CSP ROUTINE SUB   WITH PARAMETERS   1.00000  20.00000  41.00000  70.00000       0.000

    INDICATORS   CARD BEFORE= 1234567890123456789-                     12345678901234567890123456789-  CSP28440
 0  0  0  0  0   CARD AFTER = 1234567890123456789-                     12345678900000000000000000000-  CSP28440

NOW TESTING 1130 CSP ROUTINE MPY   WITH PARAMETERS   1.00000  20.00000  41.00000  70.00000       0.000

    INDICATORS   CARD BEFORE= 1234567890123456789-                     12345678901234567890123456789-  CSP28460
 0  0  0  0  0   CARD AFTER = 1234567890123456789-01524157875323883675034293577501905199875019052100  CSP28460

NOW TESTING 1130 CSP ROUTINE DIV   WITH PARAMETERS   1.00000  20.00000  41.00000  70.00000       0.000

    INDICATORS   CARD BEFORE= 1234567890123456789-                     12345678901234567890123456789-  CSP28480
 0  0  0  0  0   CARD AFTER = 1234567890123456789-0000000000000000000010000000000000000000123456789-  CSP28480

NOW TESTING 1130 CSP ROUTINE ICOMP WITH PARAMETERS   1.00000  20.00000  41.00000  70.00000       0.000

    INDICATORS   CARD BEFORE= 1234567890123456789-                     12345678901234567890123456789-  CSP28500
 0  0  0  0  0   CARD AFTER = 1234567890123456789-                     12345678901234567890123456789-  CSP28500

NOW TESTING 1130 CSP ROUTINE NSIGN WITH PARAMETERS   1.00000   1.00000   2.00000   2.00000       0.000

    INDICATORS   CARD BEFORE= ML                                                                         CSP28520
 0  0 -1  0  0   CARD AFTER = 4L                                                                         CSP28520

NOW TESTING 1130 CSP ROUTINE ADD   WITH PARAMETERS   1.00000  20.00000  51.00000  70.00000       0.000

    INDICATORS   CARD BEFORE= 12345678901234567890                               12345678901234567890  CSP28540
 0  0  0  0  0   CARD AFTER = 12345678901234567890                               24691357802469135780  CSP28540

NOW TESTING 1130 CSP ROUTINE SUB   WITH PARAMETERS   1.00000  20.00000  51.00000  70.00000       0.000

    INDICATORS   CARD BEFORE= 12345678901234567890                               12345678901234567890  CSP28560
 0  0  0  0  0   CARD AFTER = 12345678901234567890                               00000000000000000000  CSP28560

NOW TESTING 1130 CSP ROUTINE MPY   WITH PARAMETERS   1.00000  20.00000  51.00000  70.00000       0.000

    INDICATORS   CARD BEFORE= 12345678901234567890                               12345678901234567890  CSP28580
 0  0  0  0  0   CARD AFTER = 12345678901234567890           0152415787532388367501905199875019052100  CSP28580

NOW TESTING 1130 CSP ROUTINE DIV   WITH PARAMETERS   1.00000  20.00000  51.00000  70.00000       0.000
```

```
    INDICATORS   CARD BEFORE= 12345678901234567890                                  12345678901234567890  CSP28600
  0  0  0  0  0  CARD AFTER = 12345678901234567890        0000000000000000000010000000000000000000  CSP28600

NOW TESTING 1130 CSP ROUTINE ICOMP WITH PARAMETERS   1.00000   20.00000   51.00000   70.00000      0.000

    INDICATORS   CARD BEFORE= 12345678901234567890                                  12345678901234567890  CSP28620
  0  0  0  0  0  CARD AFTER = 12345678901234567890                                  12345678901234567890  CSP28620

NOW TESTING 1130 CSP ROUTINE NSIGN WITH PARAMETERS   1.00000   1.00000   2.00000   2.00000      1.000

    INDICATORS   CARD BEFORE= -0                                                                        CSP28640
  0  0 -1  0  0  CARD AFTER = 00                                                                        CSP28640

NOW TESTING 1130 CSP ROUTINE ADD   WITH PARAMETERS   1.00000   20.00000   51.00000   70.00000      0.000

    INDICATORS   CARD BEFORE= 123456789012345678 9-                                 12345678901234567890  CSP28660
  0  0  0  0  0  CARD AFTER = 123456789012345678 9-                                 00000000000000000000  CSP28660

NOW TESTING 1130 CSP ROUTINE SUB   WITH PARAMETERS   1.00000   20.00000   51.00000   70.00000      0.000

    INDICATORS   CARD BEFORE= 123456789012345678 9-                                 12345678901234567890  CSP28680
  0  0  0  0  0  CARD AFTER = 123456789012345678 9-                                 24691357802469135780  CSP28680

NOW TESTING 1130 CSP ROUTINE MPY   WITH PARAMETERS   1.00000   20.00000   51.00000   70.00000      0.000

    INDICATORS   CARD BEFORE= 123456789012345678 9-                                 12345678901234567890  CSP28700
  0  0  0  0  0  CARD AFTER = 123456789012345678 9-        0152415787532388367501905199875019052100-  CSP28700

NOW TESTING 1130 CSP ROUTINE DIV   WITH PARAMETERS   1.00000   20.00000   51.00000   70.00000      0.000

    INDICATORS   CARD BEFORE= 123456789012345678 9-                                 12345678901234567890  CSP28720
  0  0  0  0  0  CARD AFTER = 123456789012345678 9-        0000000000000000000010000000000000000000  CSP28720

NOW TESTING 1130 CSP ROUTINE ICOMP WITH PARAMETERS   1.00000   20.00000   51.00000   70.00000      0.000

    INDICATORS   CARD BEFORE= 123456789012345678 9-                                 12345678901234567890  CSP28740
  0  0***  0  0  CARD AFTER = 123456789012345678 9-                                 12345678901234567890  CSP28740

NOW TESTING 1130 CSP ROUTINE NSIGN WITH PARAMETERS   1.00000   1.00000   2.00000   2.00000     -1.000

    INDICATORS   CARD BEFORE= -0                                                                        CSP28760
  0  0 -1  0  0  CARD AFTER = -0                                                                        CSP28760

NOW TESTING 1130 CSP ROUTINE ADD   WITH PARAMETERS   1.00000   20.00000   51.00000   70.00000      0.000

    INDICATORS   CARD BEFORE= 12345678901234567890                                  123456789012345678 9-  CSP28780
  0  0  0  0  0  CARD AFTER = 12345678901234567890                                  00000000000000000000-  CSP28780

NOW TESTING 1130 CSP ROUTINE SUB   WITH PARAMETERS   1.00000   20.00000   51.00000   70.00000      0.000

    INDICATORS   CARD BEFORE= 12345678901234567890                                  123456789012345678 9-  CSP28800
  0  0  0  0  0  CARD AFTER = 12345678901234567890                                  24691357802469135780-  CSP28800

NOW TESTING 1130 CSP ROUTINE MPY   WITH PARAMETERS   1.00000   20.00000   51.00000   70.00000      0.000
```

```
    INDICATORS   CARD BEFORE= 12345678901234567890                                  123456789012345678 9-  CSP28820
  0  0  0  0  0  CARD AFTER = 12345678901234567890        0152415787532388367501905199875019052100-  CSP28820

NOW TESTING 1130 CSP ROUTINE DIV   WITH PARAMETERS   1.00000   20.00000   51.00000   70.00000      0.000

    INDICATORS   CARD BEFORE= 12345678901234567890                                  123456789012345678 9-  CSP28840
  0  0  0  0  0  CARD AFTER = 12345678901234567890        0000000000000000000010000000000000000000-  CSP28840

NOW TESTING 1130 CSP ROUTINE ICOMP WITH PARAMETERS   1.00000   20.00000   51.00000   70.00000      0.000

    INDICATORS   CARD BEFORE= 12345678901234567890                                  123456789012345678 9-  CSP28860
  0  0***  0  0  CARD AFTER = 12345678901234567890                                  123456789012345678 9-  CSP28860

NOW TESTING 1130 CSP ROUTINE NSIGN WITH PARAMETERS   1.00000   1.00000   2.00000   2.00000      0.000

    INDICATORS   CARD BEFORE= -0                                                                        CSP28880
  0  0 -1  0  0  CARD AFTER = 00                                                                        CSP28880

NOW TESTING 1130 CSP ROUTINE ADD   WITH PARAMETERS   1.00000   20.00000   51.00000   70.00000      0.000

    INDICATORS   CARD BEFORE= 123456789012345678 9-                                 123456789012345678 9-  CSP28900
  0  0  0  0  0  CARD AFTER = 123456789012345678 9-                                 24691357802469135780-  CSP28900

NOW TESTING 1130 CSP ROUTINE SUB   WITH PARAMETERS   1.00000   20.00000   51.00000   70.00000      0.000

    INDICATORS   CARD BEFORE= 123456789012345678 9-                                 123456789012345678 9-  CSP28920
  0  0  0  0  0  CARD AFTER = 123456789012345678 9-                                 00000000000000000000-  CSP28920

NOW TESTING 1130 CSP ROUTINE MPY   WITH PARAMETERS   1.00000   20.00000   51.00000   70.00000      0.000

    INDICATORS   CARD BEFORE= 123456789012345678 9-                                 123456789012345678 9-  CSP28940
  0  0  0  0  0  CARD AFTER = 123456789012345678 9-        0152415787532388367501905199875019052100-  CSP28940

NOW TESTING 1130 CSP ROUTINE DIV   WITH PARAMETERS   1.00000   20.00000   51.00000   70.00000      0.000

    INDICATORS   CARD BEFORE= 123456789012345678 9-                                 123456789012345678 9-  CSP28960
  0  0  0  0  0  CARD AFTER = 123456789012345678 9-        0000000000000000000010000000000000000000-  CSP28960

NOW TESTING 1130 CSP ROUTINE ICOMP WITH PARAMETERS   1.00000   20.00000   51.00000   70.00000      0.000

    INDICATORS   CARD BEFORE= 123456789012345678 9-                                 123456789012345678 9-  CSP28980
  0  0  0  0  0  CARD AFTER = 123456789012345678 9-                                 123456789012345678 9-  CSP28980
```

Sample Problem 1: Data Input Listing

```
// XEQ                                                                  CSP27010
NCOMPMOVE NZONEEDIT GET  PUT  FILL ADD  SUB  MPY  DIV  ICOMPNSIGN       CSP27020
        1         1        10        11                               1CSP27030
ABCDEFGHIJKLMNOPQRST                                                   2CSP27040
        1         1        10        11                               3CSP27050
BC8D F    BC8D F                                                       4CSP27060
        1        20        25        30                               5CSP27070
                  JKLMN     CBAFG                                      6CSP27080
        2         1         5        20                               7CSP27090
ABCDE                                                                  8CSP27100
        2        40        49         1                               9CSP27110
                                      9876543210                       10CSP27120
        3        10         5                                         11CSP27130
        A                                                              12CSP27140
        3        10         5                                         13CSP27150
        I                                                              14CSP27160
        3        20         5                                         15CSP27170
                  0                                                    16CSP27180
        3        20         5                                         17CSP27190
                  9                                                    18CSP27200
        3        30         5                                         19CSP27210
                            J                                          20CSP27220
        3        30         5                                         21CSP27230
                            R                                          22CSP27240
        3        10         1                                         23CSP27250
        A                                                              24CSP27260
        3        10         1                                         25CSP27270
        1                                                              26CSP27280
        3        10         1                                         27CSP27290
        J                                                              28CSP27300
        3        20         4                                         29CSP27310
                  I                                                    30CSP27320
        3        20         2                                         31CSP27330
                  9                                                    32CSP27340
        3        20         3                                         33CSP27350
                  R                                                    34CSP27360
        3        30         3                                         35CSP27370
                            D                                          36CSP27380
        3        30         2                                         37CSP27390
                            4                                          38CSP27400
        3        30         4                                         39CSP27410
                            M                                          40CSP27420
        4         1         6        20        30                     41CSP27430
123456                 ,  $.  CR                                       42CSP27440
        4         1         6        20        30                     43CSP27450
02343K                 ,  $.  CR                                       44CSP27460
        4         1         6        20        29                     45CSP27470
00343-                 ,  $.  -                                        46CSP27480
        4         1         7        21        28                     47CSP27490
1234567                ,  $.                                           48CSP27500
        4         1         6        10        30                     49CSP27510
00005M                 ,*  .  CR                                      50CSP27520
        4         1         6        20        29                     51CSP27530
    5M                 ,0  .  -                                       52CSP27540
        5         1         5       .01                               53CSP27550
12345                                                                  54CSP27560
        5         1         5       .01                               55CSP27570
1234N                                                                  56CSP27580
        5         1         7      .001                               57CSP27590
1 3 5 7                                                                58CSP27600
```

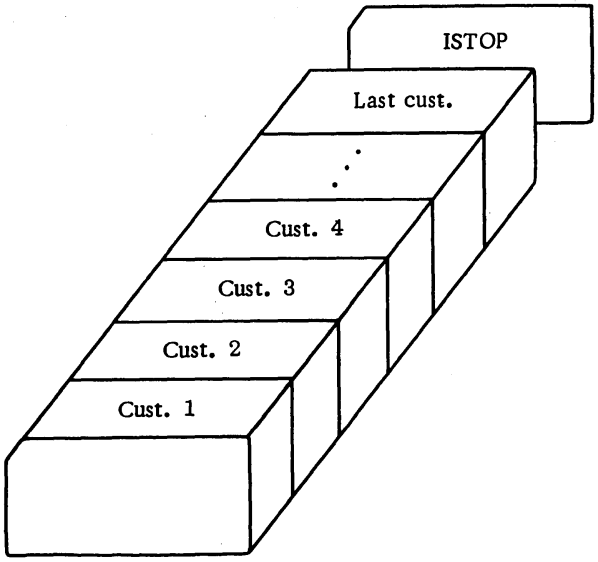
```
          5          1          5          1.                                        59CSP27610
12AB4                                                                               60CSP27620
          5          1          5          1.                                        61CSP27630
1230-                                                                               62CSP27640
          5          1          3     .00001                                         63CSP27650
123                                                                                 64CSP27660
          6          1          5        0.5          0    12345.                  65CSP27670
                                                                                    66CSP27680
          6          1          2        5.0          1    12890.                  67CSP27690
                                                                                    68CSP27700
          6         11         15        5.0          1    12345.                  69CSP27710
                                                                                    70CSP27720
          6         10         16       50.0          2   -34567.                  71CSP27730
                                                                                    72CSP27740
          6         10         17        5.0          1      -16.                  73CSP27750
                                                                                    74CSP27760
          7          1         10                               16448.              75CSP27770
ABCDEFGHIJK                                                                         76CSP27780
          7         20         25                               23360.              77CSP27790
                    ABCDEFGH                                                        78CSP27800
         08         31         35          66         70                            CSP27810
                                    24                                     2048    CSP27820
         09         31         35          66         70                            CSP27830
                                    24                                     2048    CSP27840
         10         31         35          66         70                            CSP27850
                                    24                                     2048    CSP27860
         11         31         35          66         70                            CSP27870
                                    24                                     2048    CSP27880
         12         31         35          66         70                            CSP27890
                                    24                                     2048    CSP27900
         13          1          1           2          2         1.                 CSP27910
65                                                                                  CSP27920
         08         31         35          66         70                            CSP27930
                                    99                                     2048    CSP27940
         09         31         35          66         70                            CSP27950
                                    99                                     2048    CSP27960
         10         31         35          66         70                            CSP27970
                                    99                                     2048    CSP27980
         11         31         35          66         70                            CSP27990
                                    99                                     2048    CSP28000
         12         31         35          66         70                            CSP28010
                                    99                                     2048    CSP28020
         13          1          1           2          2        -1.                 CSP28030
54                                                                                  CSP28040
         08         01         20          41         70                            CSP28050
12345678901234567890                  12345678901234567890                        CSP28060
         09         01         20          41         70                            CSP28070
12345678901234567890                  12345678901234567890                        CSP28080
         10         01         20          41         70                            CSP28090
12345678901234567890                  12345678901234567890                        CSP28100
         11         01         20          41         70                            CSP28110
12345678901234567890                  12345678901234567890                        CSP28120
         12         01         20          41         70                            CSP28130
12345678901234567890                  12345678901234567890                        CSP28140
         13          1          1           2          2                           CSP28150
32                                                                                  CSP28160
         08         01         20          41         70                            CSP28170
```

```
1234567890123456789-                     123456789012345678901234567890  CSP28180
        09        01        20        41         70                      CSP28190
1234567890123456789-                     123456789012345678901234567890  CSP28200
        10        01        20        41         70                      CSP28210
1234567890123456789-                     123456789012345678901234567890  CSP28220
        11        01        20        41         70                      CSP28230
1234567890123456789-                     123456789012345678901234567890  CSP28240
        12        01        20        41         70                      CSP28250
1234567890123456789-                     123456789012345678901234567890  CSP28260
        13         1         1         2          2        1.            CSP28270
ON                                                                       CSP28280
        08        01        20        41         70                      CSP28290
12345678901234567890                     12345678901234567890123456789-  CSP28300
        09        01        20        41         70                      CSP28310
12345678901234567890                     12345678901234567890123456789-  CSP28320
        10        01        20        41         70                      CSP28330
12345678901234567890                     12345678901234567890123456789-  CSP28340
        11        01        20        41         70                      CSP28350
12345678901234567890                     12345678901234567890123456789-  CSP28360
        12        01        20        41         70                      CSP28370
12345678901234567890                     12345678901234567890123456789-  CSP28380
        13         1         1         2          2       -1.            CSP28390
NM                                                                       CSP28400
        08        01        20        41         70                      CSP28410
1234567890123456789-                     12345678901234567890123456789-  CSP28420
        09        01        20        41         70                      CSP28430
1234567890123456789-                     12345678901234567890123456789-  CSP28440
        10        01        20        41         70                      CSP28450
1234567890123456789-                     12345678901234567890123456789-  CSP28460
        11        01        20        41         70                      CSP28470
1234567890123456789-                     12345678901234567890123456789-  CSP28480
        12        01        20        41         70                      CSP28490
1234567890123456789-                     12345678901234567890123456789-  CSP28500
        13         1         1         2          2                      CSP28510
ML                                                                       CSP28520
        08        01        20        51         70                      CSP28530
12345678901234567890                               12345678901234567890  CSP28540
        09        01        20        51         70                      CSP28550
12345678901234567890                               12345678901234567890  CSP28560
        10        01        20        51         70                      CSP28570
12345678901234567890                               12345678901234567890  CSP28580
        11        01        20        51         70                      CSP28590
12345678901234567890                               12345678901234567890  CSP28600
        12        01        20        51         70                      CSP28610
12345678901234567890                               12345678901234567890  CSP28620
        13         1         1         2          2        1.            CSP28630
-0                                                                       CSP28640
        08        01        20        51         70                      CSP28650
1234567890123456789-                               12345678901234567890  CSP28660
        09        01        20        51         70                      CSP28670
1234567890123456789-                               12345678901234567890  CSP28680
        10        01        20        51         70                      CSP28690
1234567890123456789-                               12345678901234567890  CSP28700
        11        01        20        51         70                      CSP28710
1234567890123456789-                               12345678901234567890  CSP28720
        12        01        20        51         70                      CSP28730
1234567890123456789-                               12345678901234567890  CSP28740
        13         1         1         2          2       -1.            CSP28750
-0                                                                       CSP28760
        08        01        20        51         70                      CSP28770
12345678901234567890                               1234567890123456789-  CSP28780
```

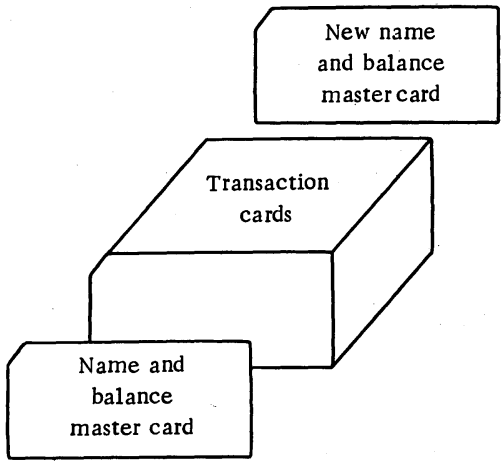
```
        09        01        20        51         70                      CSP28790
12345678901234567890                               1234567890123456789-  CSP28800
        10        01        20        51         70                      CSP28810
12345678901234567890                               1234567890123456789-  CSP28820
        11        01        20        51         70                      CSP28830
12345678901234567890                               1234567890123456789-  CSP28840
        12        01        20        51         70                      CSP28850
12345678901234567890                               1234567890123456789-  CSP28860
        13         1         1         2          2                      CSP28870
-0                                                                       CSP28880
        08        01        20        51         70                      CSP28890
1234567890123456789-                               1234567890123456789-  CSP28900
        09        01        20        51         70                      CSP28910
1234567890123456789-                               1234567890123456789-  CSP28920
        10        01        20        51         70                      CSP28930
1234567890123456789-                               1234567890123456789-  CSP28940
        11        01        20        51         70                      CSP28950
1234567890123456789-                               1234567890123456789-  CSP28960
        12        01        20        51         70                      CSP28970
1234567890123456789-                               1234567890123456789-  CSP28980
                                                                         CSP28990
```

PROBLEM 2

The purpose of this program is to create invoices. The input deck is as follows:



Input deck



Detailed description of individual customer deck

Each customer has the old master name and balance card, followed by the transaction cards, followed by a blank master name and balance card. The invoice is printed as in the example, and a new master name and balance card image is printed on the console printer. Then the next customer is processed until the stop code card is reached (ISTOP in cc 1-5). In an actual situation the new card image would be punched and stacker-selected. Then, as input to the next run of the program, a new input deck would have to be prepared.

Switch settings are the same as for sample problem 1, except that output cannot be directed toward the console printer.

Input Device	Output Device	Switches		
		0	1	2
1442	1132	up	down	down
1442	1403	up	up	down
2501	1132	up	down	up
2501	1403	up	up	up

Make sure that the switches are set properly before the program begins.

After processing is completed, sample problem 2 will STOP with 0111 displayed in the accumulator. Press START to continue.

Note: Sample Problem 2 cannot be executed if Version 1 of the Monitor is being used.

Sample Problem 2: Detailed Description

1. Read all constant information and determine output unit (1132 or 1403).

2. Initialize error indicators.

   a. J=2

   b. I=0, L=0, M=0

3. Read the first card. It should be a master card.

4. Is the card read in 3 the last card?

   No — 5 Yes — 64

5. Is the card read in 3 above a master card?

   No — 72 Yes — 6

6. Go to the top of a new page.

7. Clear the print area.

8. Print the customer name.

9. Move the edit mark to the work area.

10. Edit the previous balance.

11. Print the customer street address.

12. Move the words PREVIOUS BALANCE to the print area.

13. Move the work area to the print area.

14. Print the customer city, state, and zip code.

15. Skip 3 lines.

16. Print the column headings.

17. Print the print area.

18. Clear the print area.

19. Convert the previous balance from A1 format to decimal format.

20. Is the conversion in 19 correct?

    No — 66 Yes — 21

21. Set the total (ISUM) equal to the previous balance.

22. Set up the output area for the new master card.

23. Read a card.

24. Is the card read at 23 the last card?

    No — 25 Yes — 64

25. Is the card read at 23 a master card?

    No — 26 Yes — 52

26. Is the card read at 23 a transaction card?

    No — 49 Yes — 27

27. Is the card read at 23 for the same customer being processed?

    No — 49 Yes — 28

28. Move the item name to the print area.

29. Move the edit mask to the print area for dollar amount.

30. Move the edit mask to the print area for quantity.

31. Edit the quantity.

32. Edit the dollar amount.

33. Print the detail line assembled in 28 through 32.

34. Has channel 12 on the carriage tape been encountered?

    No — 35 Yes — 46

35. Convert the dollar amount from A1 format to decimal format.

36. Is the conversion in 35 correct?

    No — 40 Yes — 37

37. Add the dollar amount to ISUM.

38. Did overflow occur in the addition in 37?

    No — 23 Yes — 39

39. STOP and display 777.

40. Make the character in error a digit.

41. Try to convert only the character in error.

42. Is the conversion in 41 correct?

    No — 43 Yes — 44

43. STOP and display 666.

44. Convert the entire field back to A1 format.

45. Go to 35.

46. Go to the top of a new page.

47. Print the headings.

48. Go to 35.

49. Type ERROR on the console printer.

50. Type the card read on the console printer.

51. Go to 23.

52. Convert the total (ISUM) from decimal format to A1 format.

53. Is the conversion in 52 correct?

    No — 54 Yes — 55

54. STOP and display 555.

55. Clear the print area.

56. Move the edit mask to the print area.

57. Edit the total (ISUM).

58. Place the unedited total (ISUM) in the new master card.

59. Type the new master card image on the console printer.

60. Move the word TOTAL to the print area.

61. Skip 2 lines.

62. Print the print area, the total line.

63. Go to 2b.

64. Type END OF JOB.

65. STOP and display 111.

66. Make the character in error a digit.

67. Try to convert only the character in error.

68. Is the conversion in 67 correct?

    No — 69 Yes — 70

69. STOP and display 444.

70. Convert the entire field back to A1 format.

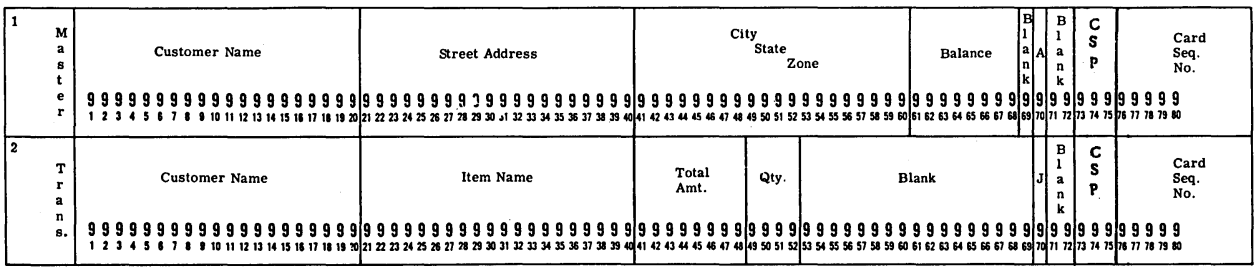
71. Go to 19.

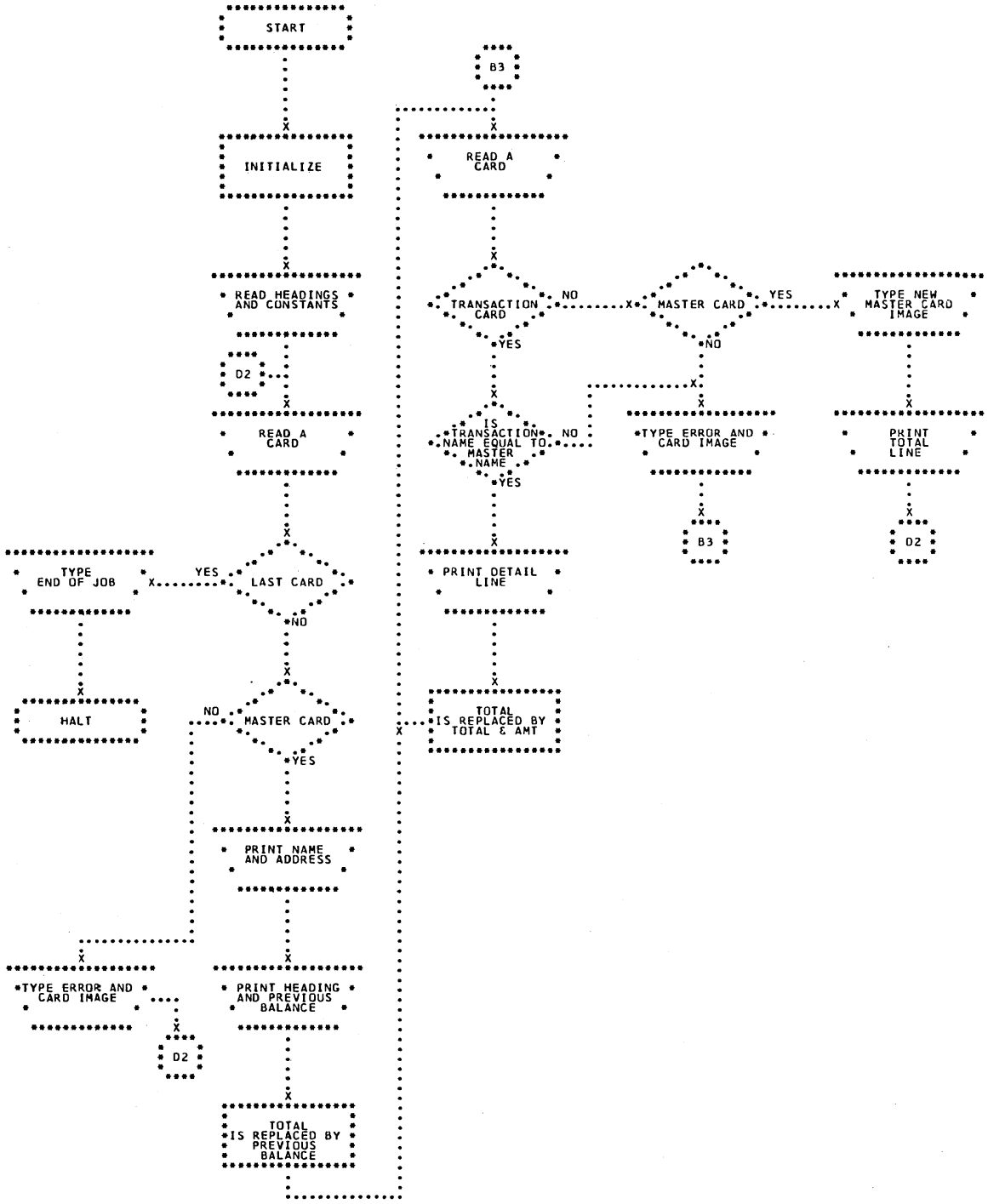
72. Type ERROR on the console printer.

73. Type the card read on the console printer.

74. Go to 2b.

Card Formats




START
INITIALIZE
READ HEADINGS AND CONSTANTS
D2
READ A CARD
LAST CARD
YES
NO
TYPE END OF JOB
HALT
MASTER CARD
NO
YES
PRINT NAME AND ADDRESS
TYPE ERROR AND CARD IMAGE
D2
PRINT HEADING AND PREVIOUS BALANCE
TOTAL IS REPLACED BY PREVIOUS BALANCE
B3
READ A CARD
TRANSACTION CARD
NO
YES
IS TRANSACTION NAME EQUAL TO MASTER NAME
NO
YES
PRINT DETAIL LINE
TOTAL IS REPLACED BY TOTAL & AMT
MASTER CARD
YES
NO
TYPE ERROR AND CARD IMAGE
B3
TYPE NEW MASTER CARD IMAGE
PRINT TOTAL LINE
D2

Sample Problem 2: Source Program

```
// FOR                                                                    CSP29000
** SAMPLE PROBLEM 2                                                       CSP29010
* NAME SMPL2                                                             CSP29020
* LIST ALL                                                               CSP29030
* ONE WORD INTEGERS                                                      CSP29040
* EXTENDED PRECISION                                                     CSP29050
C-----THE INPUT IS MADE UP OF A MASTER CARD FOLLOWED BY THE TRANSACTION  CSP29060
C-----CARDS FOR EACH CUSTOMER. WE WANT TO PRINT AN INVOICE AND PRINT A   CSP29070
C-----NEW MASTER CARD FOR EACH CUSTOMER.                                 CSP29080
      DIMENSION INCRD(82),IMASK(13),IPRNT(79),IOTCD(80),ISTOP(5),        CSP29090
     1IHEAD(80), IPRVB(16),ITOT(5),IWK(13),ISUM(8),IEROR(6),IEOJ(10)     CSP29100
      CALL DATSW (2,N2)                                                  CSP29110
      CALL DATSW(1,N3)                                                   CSP29120
      GO TO (28,27),N2                                                   CSP29130
27    CALL READ(IEOJ,1,10,J)                                             CSP29140
      CALL READ(IEROR,1,6,J)                                             CSP29150
      CALL READ(IMASK,1,13,J)                                            CSP29160
      CALL READ(IPRVB,1,16,J)                                            CSP29170
      CALL READ(IHEAD,1,72,J)                                            CSP29180
      CALL READ(IHEAD,73,80,J)                                           CSP29190
      CALL READ(ISTOP,1,5,J)                                             CSP29200
      CALL READ(ITOT,1,5,J)                                              CSP29210
      GO TO 58                                                           CSP29220
28    CALL R2501(IEOJ,1,10,J)                                            CSP29230
      CALL R2501(IEROR,1,6,J)                                            CSP29240
      CALL R2501(IMASK,1,13,J)                                           CSP29250
      CALL R2501(IPRVB,1,16,J)                                           CSP29260
      CALL R2501(IHEAD,1,72,J)                                           CSP29270
      CALL R2501(IHEAD,73,80,J)                                          CSP29280
      CALL R2501(ISTOP,1,5,J)                                            CSP29290
      CALL R2501(ITOT,1,5,J)                                             CSP29300
58    J=2                                                                CSP29310
      INCRD(81)=16448                                                    CSP29320
      INCRD(82)=5440                                                     CSP29330
1     I=0                                                                CSP29340
      L=0                                                                CSP29350
      M=0                                                                CSP29360
      GO TO (30,29),N2                                                   CSP29370
29    CALL READ(INCRD,1,80,J)                                            CSP29380
      GO TO 59                                                           CSP29390
30    CALL R2501(INCRD,1,80,J)                                           CSP29400
59    IF(J-1)  22,2,2                                                    CSP29410
2     IF(NCOMP(INCRD,1,5,ISTOP,1))   3,22,3                              CSP29420
3     CALL NZONE(INCRD,70,5,K)                                           CSP29430
      IF(K-1)   26,4,26                                                  CSP29440
4     GO TO (34,33) ,N3                                                  CSP29450
33    CALL SKIP(12544)                                                   CSP29460
      GO TO 60                                                           CSP29470
34    CALL S1403(12544)                                                  CSP29480
60    CALL FILL(IPRNT,1,79,16448)                                        CSP29490
      GO TO (36,35),N3                                                   CSP29500
35    CALL PRINT(INCRD,1,20,I)                                           CSP29510
      GO TO 61                                                           CSP29520
36    CALL P1403(INCRD,1,20,I)                                           CSP29530
61    CALL MOVE(IMASK,1,13,IWK,1)                                        CSP29540
      CALL EDIT(INCRD,61,68,IWK,1,13)                                    CSP29550
```

```
      GO TO (38,37),N3                                                  CSP29560
37    CALL PRINT(INCRD,21,40,I)                                         CSP29570
      GO TO 62                                                          CSP29580
38    CALL P1403(INCRD,21,40,1)                                         CSP29590
62    CALL MOVE(IPRVB,1,16,IPRNT,23)                                    CSP29600
      CALL MOVE(IWK,1,13,IPRNT,67)                                      CSP29610
      GO TO (41,39),N3                                                  CSP29620
39    CALL PRINT(INCRD,41,60,I)                                         CSP29630
      CALL SKIP(16128)                                                  CSP29640
      CALL PRINT(IHEAD,1,80,I)                                          CSP29650
      CALL PRINT(IPRNT,1,79,I)                                          CSP29660
      GO TO 63                                                          CSP29670
41    CALL P1403(INCRD,41,60,I)                                         CSP29680
      CALL S1403(16128)                                                 CSP29690
      CALL P1403(IHEAD,1,80,I)                                          CSP29700
      CALL P1403(IPRNT,1,79,I)                                          CSP29710
63    CALL FILL(IPRNT,1,79,16448)                                       CSP29720
40    CALL A1DEC(INCRD,61,68,L)                                         CSP29730
      IF(L)   5,5,23                                                    CSP29740
5     CALL MOVE(INCRD,61,68,ISUM,1)                                     CSP29750
      CALL MOVE(INCRD,1,80,IOTCD,1)                                     CSP29760
6     GO TO (32,31),N2                                                  CSP29770
31    CALL READ(INCRD,1,80,J)                                           CSP29780
      GO TO 64                                                          CSP29790
32    CALL R2501(INCRD,1,80,J)                                          CSP29800
64    IF(J-1)   22,7,7                                                  CSP29810
7     CALL NZONE(INCRD,70,5,K)                                          CSP29820
      IF(K-1)   18,19,8                                                 CSP29830
8     IF(K-2)   18,9,18                                                 CSP29840
9     IF(NCOMP(INCRD,1,20,IOTCD,1))   18,10,18                          CSP29850
10    CALL MOVE(INCRD,21,40,IPRNT,23)                                   CSP29860
      CALL MOVE(IMASK,1,13,IPRNT,67)                                    CSP29870
      CALL MOVE(IMASK,3,8,IPRNT,7)                                      CSP29880
      IPRNT(12)=-4032                                                   CSP29890
      CALL EDIT(INCRD,49,52,IPRNT,7,12)                                 CSP29900
      CALL EDIT(INCRD,41,48,IPRNT,67,79)                                CSP29910
      GO TO(49,48),N3                                                   CSP29920
48    CALL PRINT(IPRNT,1,79,I)                                          CSP29930
      GO TO 65                                                          CSP29940
49    CALL P1403(IPRNT,1,79,I)                                          CSP29950
65    IF(I-3)   11,11,17                                                CSP29960
11    CALL A1DEC(INCRD,41,48,L)                                         CSP29970
      IF(L)   12,12,14                                                  CSP29980
12    CALL ADD(INCRD,41,48,ISUM,1,8,M)                                  CSP29990
      IF(M)   13,6,13                                                   CSP30000
13    CALL IOND                                                         CSP30010
      STOP 777                                                          CSP30020
14    CALL NZONE(INCRD,L,4,N1)                                          CSP30030
      N1=0                                                              CSP30040
      CALL A1DEC(INCRD,L,L,N1)                                          CSP30050
      IF(N1)   16,16,15                                                 CSP30060
15    CALL IOND                                                         CSP30070
      STOP 666                                                          CSP30080
16    CALL DECA1(INCRD,41,48,L)                                         CSP30090
```



```
      L=0                                                               CSP30100
      GO TO 11                                                          CSP30110
17    GO TO (51,50),N3                                                  CSP30120
50    CALL SKIP(12544)                                                  CSP30130
      CALL PRINT(IHEAD,1,80,I)                                          CSP30140
      GO TO 66                                                          CSP30150
51    CALL S1403(12544)                                                 CSP30160
      CALL P1403(IHEAD,1,80,I)                                          CSP30170
66    I=0                                                               CSP30180
      GO TO 11                                                          CSP30190
18    CALL TYPER(IEROR,1,5)                                             CSP30200
      CALL TYPER(INCRD,1,82)                                            CSP30210
      GO TO 6                                                           CSP30220
19    CALL DECA1(ISUM,1,8,L)                                            CSP30230
      IF(L)   20,21,20                                                  CSP30240
20    CALL IOND                                                         CSP30250
      STOP 555                                                          CSP30260
21    CALL FILL(IPRNT,1,79,16448)                                       CSP30270
      CALL MOVE(IMASK,1,13,IPRNT,67)                                    CSP30280
      CALL EDIT(ISUM,1,8,IPRNT,67,79)                                   CSP30290
      CALL MOVE(ISUM,1,8,IOTCD,61)                                      CSP30300
      CALL TYPER(IOTCD,1,80)                                            CSP30310
      CALL MOVE(ITOT,1,5,IPRNT,23)                                      CSP30320
      GO TO (55,54),N3                                                  CSP30330
54    CALL SKIP(15872)                                                  CSP30340
      CALL PRINT(IPRNT,1,79,I)                                          CSP30350
      GO TO 67                                                          CSP30360
55    CALL S1403(15872)                                                 CSP30370
      CALL P1403(IPRNT,1,79,I)                                          CSP30380
67    CALL TYPER(INCRD,81,82)                                           CSP30390
      GO TO 1                                                           CSP30400
22    CALL TYPER(IEOJ,1,10)                                             CSP30410
      CALL IOND                                                         CSP30420
      STOP 111                                                          CSP30430
23    CALL NZONE(INCRD,L,4,N1)                                          CSP30440
      N1=0                                                              CSP30450
      CALL A1DEC(INCRD,L,L,N1)                                          CSP30460
      IF(N1)   25,25,24                                                 CSP30470
24    CALL IOND                                                         CSP30480
      STOP 444                                                          CSP30490
25    CALL DECA1(INCRD,61,68,L)                                         CSP30500
      L=0                                                               CSP30510
      GO TO 40                                                          CSP30520
26    CALL TYPER(IEROR,1,5)                                             CSP30530
      CALL TYPER(INCRD,1,82)                                            CSP30540
      GO TO 1                                                           CSP30550
      END                                                               CSP30560
```

VARIABLE ALLOCATIONS

```
 INCRD=0051  IMASK=005E  IPRNT=00AD  IOTCD=00FD  ISTOP=0102  IHEAD=0152  IPRVB=0162  ITOT =0167  IWK  =0174  ISUM =017C
 IEROR=0182  IEOJ =018C  N2   =018D  N3   =018E  J    =018F  I    =0190  L    =0191  M    =0192  K    =0193  N1   =0194
```

STATEMENT ALLOCATIONS

```
 27   =01D6  28   =0208  58   =0238  1    =0248  29   =025A  30   =0262  59   =0268  2    =026E  3    =0277  4    =0283
```

```
SAMPLE PROBLEM 2                                                    PAGE 04
33   =0289  34   =028E  60   =0291  35   =029D  36   =02A5  61   =02AB  37   =02C0  38   =02C8  62   =02CE  39   =02E2
41   =02F9  63   =030E  40   =0314  5    =031E  6    =032C  31   =0332  32   =033A  64   =0340  7    =0346  8    =0354
9    =035A  10   =0363  48   =0395  49   =039D  65   =03A3  11   =03A9  12   =03B3  13   =03C0  14   =03C4  15   =03D8
16   =03DC  17   =03E8  50   =03EE  51   =03F9  66   =0402  18   =0408  19   =0414  20   =041E  21   =0422  54   =045U
55   =045B  67   =0464  22   =046B  23   =0474  24   =0488  25   =048C  26   =0498

FEATURES SUPPORTED
 ONE WORD INTEGERS
 EXTENDED PRECISION

CALLED SUBPROGRAMS
 DATSW    READ     R2501    NCOMP    NZONE    SKIP     S1403    FILL     PRINT    P1403    MOVE     EDIT     A1DEC    ADD      IOND
 DECA1    TYPER    STOP

INTEGER CONSTANTS
     2=0198       1=0199      10=019A       6=019B      13=019C      16=019D      72=019E      73=019F      80=01A0       5=01A1
 16448=01A2   5440=01A3       0=01A4      70=01A5   12544=01A6      79=01A7      20=01A8      61=01A9      68=01AA      21=01AB
    40=01AC      23=01AD      67=01AE      41=01AF      60=01B0   16128=01B1       3=01B2       8=01B3       7=01B4    4032=01B5
    49=01B6      52=01B7      12=01B8      48=01B9     777=01BA       4=01BB     666=01BC      82=01BD     555=01BE   15872=01BF
    81=01C0     111=01C1     444=01C2    1911=01C3    1638=01C4    1365=01C5     273=01C6    1092=01C7

CORE REQUIREMENTS FOR SMPL2
 COMMON       0  VARIABLES     408  PROGRAM     780

END OF COMPILATION


// XEQ                                                              CSP30570
```

Sample Problem 2: Invoice Output

DAVES MARKET
1997 WASHINGTON ST.
NEWTOWN, MASS. 02158

QTY	NAME	AMT
	PREVIOUS BALANCE	$111.29
8	SUGAR - BAGS	$21.02
11	CHICKEN SOUP - CASES	$38.76
10	TOMATO SOUP - CASES	$30.11
8	SUGAR RETURNED	$21.02CR
6	COOKIES - CASES	$45.21
17	GINGER ALE - CASES	$52.37
17	ROOT BEER - CASES	$52.37
17	ORANGE ADE - CASES	$52.37
17	CREME SODA - CASES	$52.37
17	CHERRY SODA - CASES	$52.37
17	SODA WATER - CASES	$52.37
25	DOG FOOD - CASES	$101.26
25	CAT FOOD - CASES	$101.26
10	SOAP POWDER - CASES	$72.89
10	DETERGENT - CASES	$72.89
12	HAM - TINS	$36.75
12	HAM - LOAF	$33.75
12	SALAMI	$33.75
12	BOLOGNA	$33.75
12	CORNED BEEF	$33.75
12	ROAST BEEF	$33.75
1,000	BREAD - LOAF	$150.00
4,000	ROLLS	$150.00
200	MILK - QUARTS	$57.42
100	MILK - HALF GALS	$57.42
50	MILK - GALS	$57.42
100	POTATOES - BAGS	$11.23
100	TOMATOES - LOOSE	$11.23
100	CARROTS - BUNCHES	$11.23
10	DETERGENT - CASES	$72.89
12	HAM - TINS	$36.75
12	HAM - LOAF	$33.75
12	SALAMI	$33.75
12	BOLOGNA	$33.75
12	CORNED BEEF	$33.75
12	ROAST BEEF	$33.75
1,000	BREAD - LOAF	$150.00
4,000	ROLLS	$150.00
200	MILK - QUARTS	$57.42
50	MILK - GALS	$57.42
100	MILK - HALF GALS	$57.42
100	POTATOES - BAGS	$11.23
100	TOMATOES - LOOSE	$11.23
100	CARROTS - BUNCHES	$11.23
10	DETERGENT - CASES	$72.89
12	HAM - TINS	$36.75
1,000	BREAD - LOAF	$150.00

QTY	NAME	AMT
4,000	ROLLS	$150.00
200	MILK - QUARTS	$57.42
100	MILK - HALF GALS	$57.42
50	MILK - GALS	$57.42
100	POTATOES - BAGS	$11.23
100	TOMATOES - LOOSE	$11.23
100	CARROTS - BUNCHES	$11.23
10	DETERGENT - CASES	$72.89
12	HAM - TINS	$36.75
12	HAM - LOAF	$33.75
12	SALAMI	$33.75
12	BOLOGNA	$33.75
12	CORNED BEEF	$33.75
12	ROAST BEEF	$33.75
1,000	BREAD - LOAF	$150.00
4,000	ROLLS	$150.00
200	MILK - QUARTS	$57.42
100	MILK - HALF GALS	$57.42
100	MILK - HALF GALS	$57.42
100	POTATOES - BAGS	$11.23
100	TOMATOES - LOOSE	$11.23
100	CARROTS - BUNCHES	$11.23
10	DETERGENT - CASES	$72.89
12	HAM - TINS	$36.75
	TOTAL	$3,893.25

STANDISH MOTORS
10 WATER STREET
PLYMOUTH, MASS.02296

QTY	NAME	AMT
	PREVIOUS BALANCE	$2,356.36
20	AIR CLEANERS - CASES	$200.03
6	GREASE - BARRELS	$165.24
20	TIRES - 650 X 13	$260.38
50	TIRES - 750 X 14	$900.53
50	TIRES - 800 X 14	$1,012.00
100	GASOLINE CAPS	$99.68
	TOTAL	$4,994.22

Sample Problem 2: Console Printer Log and New Master Card Listing

```
ERROR THIS IS A DELIBERATE ERROR                                        J  CSP30660
ERROR DAVE MARKET                THIS CARD IS A DELIBERATE MISTAKE      J  CSP30680
DAVES MARKET        1997 WASHINGTON ST. NEWTOWN, MASS. 0215800389325 A  CSP30670
ERROR STANDISH MOTOR      THIS CARD IS NOT CORRECT   ABCDEFGHIJKLMNOPQRSTUVJ  CSP31470
STANDISH MOTORS     10 WATER STREET     PLYMOUTH, MASS.0229600499422 A  CSP31410

END OF JOB
```

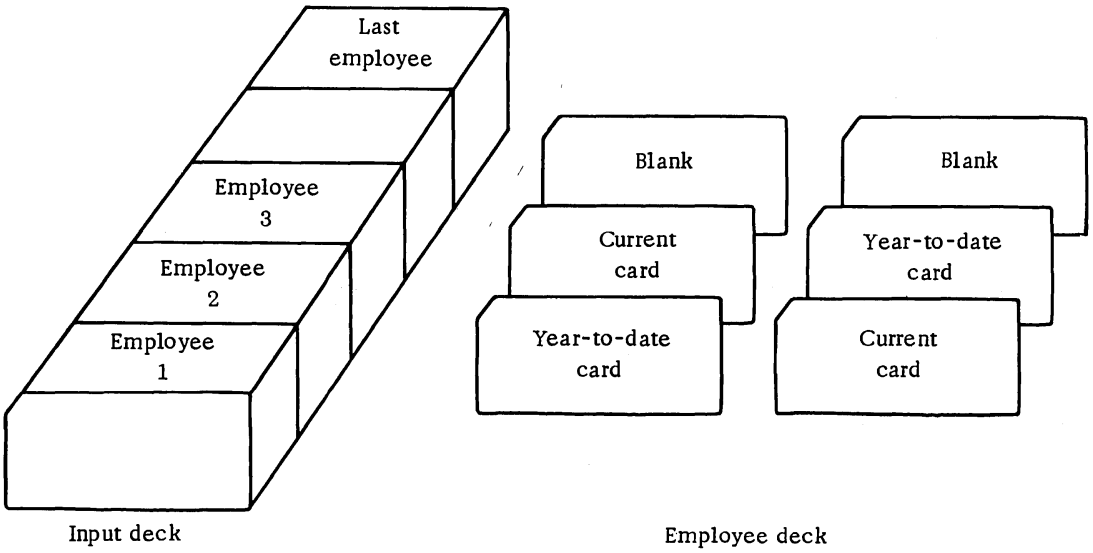
Sample Problem 2: Data Input Listing

```
// XEQ                                                                    CSP30570
END OF JOB                                                                CSP30580
ERROR                                                                     CSP30590
    , $. CR                                                               CSP30600
PREVIOUS BALANCE                                                          CSP30610
        QTY          NAME                                                 CSP30620
AMT                                                                       CSP30630
ISTOP                                                                     CSP30640
TOTAL                                                                     CSP30650
THIS IS A DELIBERATE ERROR                                             J  CSP30660
DAVES MARKET        1997 WASHINGTON ST. NEWTOWN, MASS. 02158000111129  A  CSP30670
DAVE MARKET                THIS CARD IS A DELIBERATE MISTAKE           J  CSP30680
DAVES MARKET        SUGAR - BAGS         000021020008                  J  CSP30690
DAVES MARKET        CHICKEN SOUP - CASES000038760011                   J  CSP30700
DAVES MARKET        TOMATO SOUP - CASES 000030110010                   J  CSP30710
DAVES MARKET        SUGAR RETURNED       0000210K0008                  J  CSP30720
DAVES MARKET        COOKIES - CASES      000045210006                  J  CSP30730
DAVES MARKET        GINGER ALE - CASES   000052370017                  J  CSP30740
DAVES MARKET        ROOT BEER - CASES    000052370017                  J  CSP30750
DAVES MARKET        ORANGE ADE - CASES   000052370017                  J  CSP30760
DAVES MARKET        CREME SODA - CASES   000052370017                  J  CSP30770
DAVES MARKET        CHERRY SODA - CASES  000052370017                  J  CSP30780
DAVES MARKET        SODA WATER - CASES   000052370017                  J  CSP30790
DAVES MARKET        DOG FOOD - CASES     000101260025                  J  CSP30800
DAVES MARKET        CAT FOOD - CASES     000101260025                  J  CSP30810
DAVES MARKET        SOAP POWDER - CASES  000072890010                  J  CSP30820
DAVES MARKET        DETERGENT - CASES    000072890010                  J  CSP30830
DAVES MARKET        HAM - TINS           000036750012                  J  CSP30840
DAVES MARKET        HAM - LOAF           000033750012                  J  CSP30850
DAVES MARKET        SALAMI               000033750012                  J  CSP30860
DAVES MARKET        BOLOGNA              000033750012                  J  CSP30870
DAVES MARKET        CORNED BEEF          000033750012                  J  CSP30880
DAVES MARKET        ROAST BEEF           000033750012                  J  CSP30890
DAVES MARKET        BREAD - LOAF         000150001000                  J  CSP30900
DAVES MARKET        ROLLS                000150004000                  J  CSP30910
DAVES MARKET        MILK - QUARTS        000057420200                  J  CSP30920
DAVES MARKET        MILK - HALF GALS     000057420100                  J  CSP30930
DAVES MARKET        MILK - GALS          000057420050                  J  CSP30940
DAVES MARKET        POTATOES - BAGS      000011230100                  J  CSP30950
DAVES MARKET        TOMATOES - LOOSE     000011230100                  J  CSP30960
DAVES MARKET        CARROTS - BUNCHES    000011230100                  J  CSP30970
DAVES MARKET        DETERGENT - CASES    000072890010                  J  CSP30980
DAVES MARKET        HAM - TINS           000036750012                  J  CSP30990
DAVES MARKET        HAM - LOAF           000033750012                  J  CSP31000
DAVES MARKET        SALAMI               000033750012                  J  CSP31010
DAVES MARKET        BOLOGNA              000033750012                  J  CSP31020
DAVES MARKET        CORNED BEEF          000033750012                  J  CSP31030
DAVES MARKET        ROAST BEEF           000033750012                  J  CSP31040
DAVES MARKET        BREAD - LOAF         000150001000                  J  CSP31050
DAVES MARKET        ROLLS                000150004000                  J  CSP31060
DAVES MARKET        MILK - QUARTS        000057420200                  J  CSP31070
DAVES MARKET        MILK - GALS          000057420050                  J  CSP31080
DAVES MARKET        MILK - HALF GALS     000057420100                  J  CSP31090
DAVES MARKET        POTATOES - BAGS      000011230100                  J  CSP31100
DAVES MARKET        TOMATOES - LOOSE     000011230100                  J  CSP31110
DAVES MARKET        CARROTS - BUNCHES    000011230100                  J  CSP31120
DAVES MARKET        DETERGENT - CASES    000072890010                  J  CSP31130
DAVES MARKET        HAM - TINS           000036750012                  J  CSP31140
DAVES MARKET        BREAD - LOAF         000150001000                  J  CSP31150
DAVES MARKET        ROLLS                000150004000                  J  CSP31160
```

```
DAVES MARKET        MILK - QUARTS        000057420200                  J  CSP31170
DAVES MARKET        MILK - HALF GALS     000057420100                  J  CSP31180
DAVES MARKET        MILK - GALS          000057420050                  J  CSP31190
DAVES MARKET        POTATOES - BAGS      000011230100                  J  CSP31200
DAVES MARKET        TOMATOES - LOOSE     000011230100                  J  CSP31210
DAVES MARKET        CARROTS - BUNCHES    000011230100                  J  CSP31220
DAVES MARKET        DETERGENT - CASES    000072890010                  J  CSP31230
DAVES MARKET        HAM - TINS           000036750012                  J  CSP31240
DAVES MARKET        HAM - LOAF           000033750012                  J  CSP31250
DAVES MARKET        SALAMI               000033750012                  J  CSP31260
DAVES MARKET        BOLOGNA              000033750012                  J  CSP31270
DAVES MARKET        CORNED BEEF          000033750012                  J  CSP31280
DAVES MARKET        ROAST BEEF           000033750012                  J  CSP31290
DAVES MARKET        BREAD - LOAF         000150001000                  J  CSP31300
DAVES MARKET        ROLLS                000150004000                  J  CSP31310
DAVES MARKET        MILK - QUARTS        000057420200                  J  CSP31320
DAVES MARKET        MILK - HALF GALS     000057420100                  J  CSP31330
DAVES MARKET        MILK - HALF GALS     000057420100                  J  CSP31340
DAVES MARKET        POTATOES - BAGS      000011230100                  J  CSP31350
DAVES MARKET        TOMATOES - LOOSE     000011230100                  J  CSP31360
DAVES MARKET        CARROTS - BUNCHES    000011230100                  J  CSP31370
DAVES MARKET        DETERGENT - CASES    000072890010                  J  CSP31380
DAVES MARKET        HAM - TINS           000036750012                  J  CSP31390
                                                                       A  CSP31400
STANDISH MOTORS     10 WATER STREET      PLYMOUTH, MASS.0229600235636  A  CSP31410
STANDISH MOTORS     AIR CLEANERS - CASES000200030020                   J  CSP31420
STANDISH MOTORS     GREASE - BARRELS     000165240006                  J  CSP31430
STANDISH MOTORS     TIRES - 650 X 13     000260380020                  J  CSP31440
STANDISH MOTORS     TIRES - 750 X 14     000900530050                  J  CSP31450
STANDISH MOTORS     TIRES - 800 X 14     001012000050                  J  CSP31460
STANDISH MOTOR      THIS CARD IS NOT CORRECT   ABCDEFGHIJKLMNOPQRSTUVJ  CSP31470
STANDISH MOTORS     GASOLINE CAPS        000099680100                  J  CSP31480
                                                                       A  CSP31490
ISTOP                                                                     CSP31500
```

PROBLEM 3

The purpose of this program is to print a payroll register and punch a new year-to-date card for each employee. The input deck is as follows:



The year-to-date and current cards are read and processed. The payroll register is printed as in the example, and a new year-to-date card image is printed on the console printer. Then the next employee is processed.

As is shown, the order of the year-to-date card and current card is not known before the cards are read.

Switch settings are as follows:

Input Device	Output Device	Switches		
		0	1	2
1442	console printer	down	down	down
1442	1132	up	down	down
1442	1403	up	up	down
2501	console printer	down	down	up
2501	1132	up	down	up
2501	1403	up	up	up

Make sure that the switches are set properly before the program begins.

After processing is completed, sample problem 3 will STOP with 3333 displayed in the accumulator. Press START to continue.

A general purpose *IOCS card has been supplied with the sample problem. If this does not match the 1130 configuration to be used, a new *IOCS card will be required.

*IOCS (CARD, 1132 PRINTER, TYPEWRITER)

Sample Problem 3: Detailed Description

1. Determine the output unit from the data switches.

   Console printer, 1132 Printer, or 1403 Printer

2. Read the edit mask.

3. Read a card.

4. Is the card read in (3) blank?

   Yes — 18 No — 5

5. Is the card read in (3) a year-to-date card?

   Yes — 11 No — 6

6. Is the card read in (3) a current card?

   Yes — 8 No — 7

7. Stop.

8. Move the employee number to storage (JEMP).

9. Extract the number of hours worked (HRS).

10. Go to (3).

11. Move the department number to storage (IDEP).

12. Move the employee number to storage (IEMP).

13. Move the employee name to storage (INM).

14. Move the Social Security number to storage (ISS).

15. Move the pay rate to storage (IRT).

16. Move the year-to-date gross to storage (IYTD).

17. Go to (3).

18. Are IEMP and JEMP the same?

    Yes — 19 No — 24

19. Current amount (CURR) is set equal to HRS times pay rate.

20. New year-to-date is set equal to CURR +IYTD.

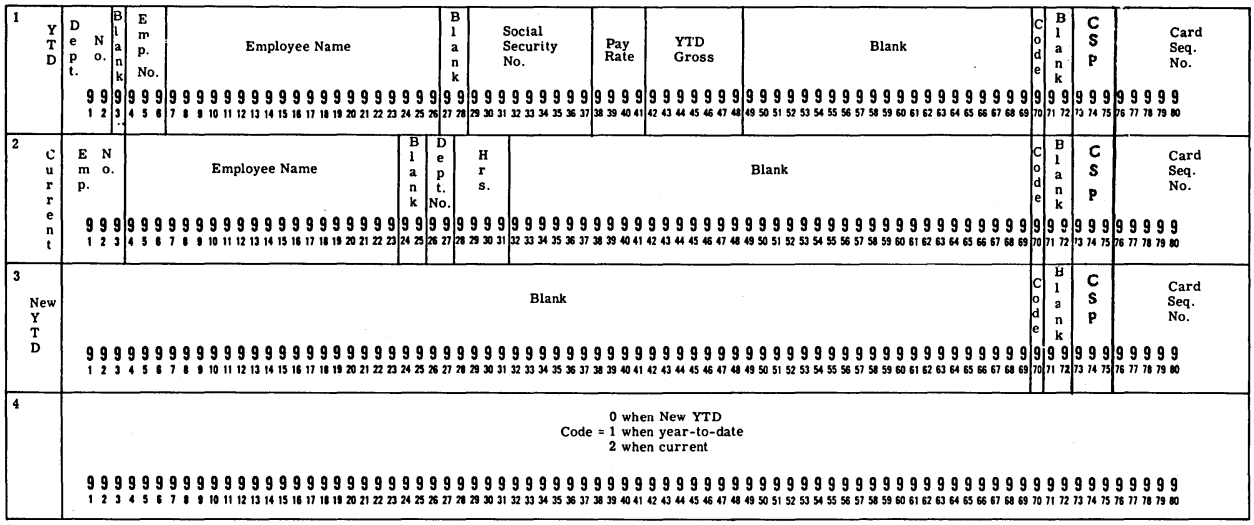
21. Print a new year-to-date card image on the console printer.

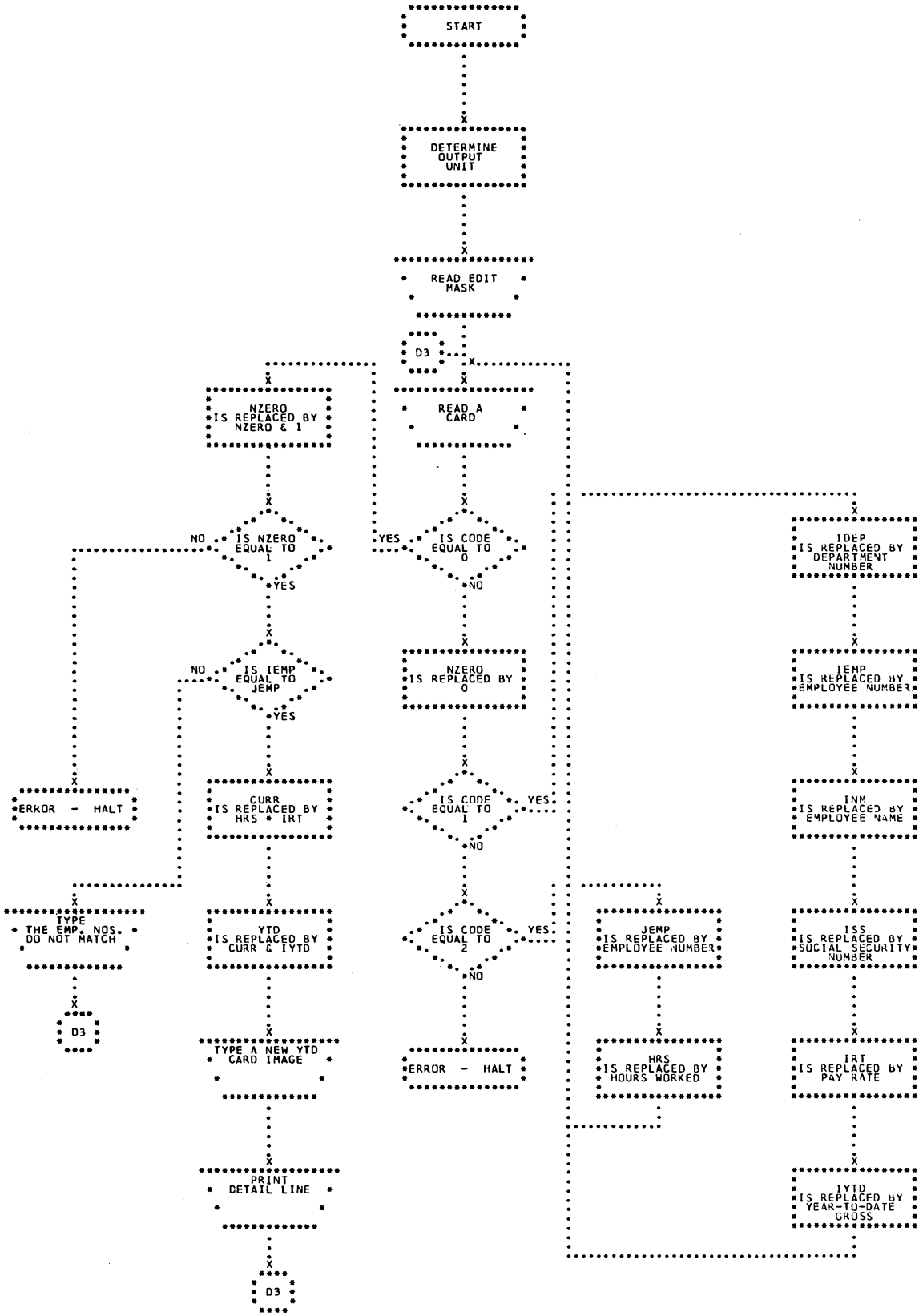
22. Print the payroll register line as in the example.

23. Go to (3).

24. Halt. If start is pushed, go to (3).

Card Formats




START
DETERMINE OUTPUT UNIT
READ EDIT MASK
D3
READ A CARD
IS CODE EQUAL TO 0
YES
NO
NZERO IS REPLACED BY 0
IS CODE EQUAL TO 1
YES
NO
IS CODE EQUAL TO 2
YES
NO
ERROR - HALT
NZERO IS REPLACED BY NZERO & 1
IS NZERO EQUAL TO 1
NO
YES
IS IEMP EQUAL TO JEMP
NO
YES
ERROR - HALT
TYPE THE EMP. NOS. DO NOT MATCH
D3
CURR IS REPLACED BY HRS * IRT
YTD IS REPLACED BY CURR & IYTD
TYPE A NEW YTD CARD IMAGE
PRINT DETAIL LINE
D3
JEMP IS REPLACED BY EMPLOYEE NUMBER
HRS IS REPLACED BY HOURS WORKED
IDEP IS REPLACED BY DEPARTMENT NUMBER
IEMP IS REPLACED BY EMPLOYEE NUMBER
INM IS REPLACED BY EMPLOYEE NAME
ISS IS REPLACED BY SOCIAL SECURITY NUMBER
IRT IS REPLACED BY PAY RATE
IYTD IS REPLACED BY YEAR-TO-DATE GROSS

Sample Problem 3: Source Program

```
// JOB                                                                  CSP31510
// FOR                                                                  CSP31520
* NAME SP3                                                             CSP31530
*IOCS(CARD,1132 PRINTER,TYPEWRITER)                                    CSP31540
* ONE WORD INTEGERS                                                    CSP31550
* EXTENDED PRECISION                                                   CSP31560
* LIST ALL                                                            CSP31570
      DIMENSION MASK(12),IN(69),IDEP(2),IEMP(3),INM(20),ISS(9),IRT(4),  CSP31580
     1 IYTD(7),JEMP(3),NYTD(7),ICUR(6),KCURR(12),KOYTD(12),KNYTD(12)    CSP31590
    1 FORMAT (69A1,I1)                                                  CSP31600
    2 FORMAT (12A1)                                                     CSP31610
20    FORMAT (1H ,2A1,1X,23A1,2X,20A1,21X,1H1,3X,7HCSP     )            CSP31620
30    FORMAT (1H ,2A1,2X,3A1,2X,20A1,5X,3(12A1,2X))                     CSP31630
      CALL DATSW(0,I)                                                   CSP31640
      CALL DATSW(1,M)                                                   CSP31650
      CALL DATSW(2,L)                                                   CSP31660
      NREAD=6*(1/L)+2                                                   CSP31670
      NWRIT=2*(1/I)+2*(1/M)+1                                           CSP31680
      READ (NREAD,2) MASK                                               CSP31690
   15 READ (NREAD,1) IN,ICD                                             CSP31700
      IF (ICD) 6,10,6                                                   CSP31710
6     NZERO=0                                                           CSP31720
      GO TO (7,8), ICD                                                  CSP31730
C     THIS IS THE YEAR TO DATE PROCESSING                               CSP31740
    7 CALL MOVE (IN,1,2,IDEP,1)                                         CSP31750
      CALL MOVE (IN,4,6,IEMP,1)                                         CSP31760
      CALL MOVE (IN,7,26,INM,1)                                         CSP31770
      CALL MOVE (IN,29,37,ISS,1)                                        CSP31780
      CALL MOVE (IN,38,41,IRT,1)                                        CSP31790
      CALL MOVE (IN,42,48,IYTD,1)                                       CSP31800
      GO TO 15                                                          CSP31810
C     THIS IS CURRENT PERIOD PROCESSING                                 CSP31820
    8 CALL MOVE (IN,1,3,JEMP,1)                                         CSP31830
      HRS=GET (IN,28,30,100.0)                                          CSP31840
      GO TO 15                                                          CSP31850
10    NZERO = NZERO + 1                                                 CSP31860
      IF (NZERO - 1) 100,100,101                                        CSP31870
101   STOP 3333                                                         CSP31880
100   IF (NCOMP(IEMP,1,3,JEMP,1)) 99,11,99                             CSP31890
   11 CURR=(HRS*GET(IRT,1,4,10.0)+500.0)/1000.0                         CSP31900
      YTD=CURR+GET (IYTD,1,7,10.0)                                      CSP31910
      CALL PUT (NYTD,1,7,YTD,5.0,1)                                     CSP31920
      WRITE (1,20) IDEP,IEMP,INM,ISS,IRT,NYTD                           CSP31930
      CALL PUT (ICUR,1,6,CURR,5.0,1)                                    CSP31940
      CALL MOVE (MASK,1,12,KCURR,1)                                     CSP31950
      CALL MOVE (MASK,1,12,KOYTD,1)                                     CSP31960
      CALL MOVE (MASK,1,12,KNYTD,1)                                     CSP31970
      CALL EDIT (ICUR,1,6,KCURR,1,12)                                   CSP31980
      CALL EDIT (IYTD,1,7,KOYTD,1,12)                                   CSP31990
      CALL EDIT (NYTD,1,7,KNYTD,1,12)                                   CSP32000
      WRITE (NWRIT,30) IDEP,IEMP,INM,KOYTD,KCURR,KNYTD                  CSP32010
      GO TO 15                                                          CSP32020
C     THIS IS AN ERROR.  THE EMP NOS DO NOT MATCH.                      CSP32030
99    WRITE (1,40)                                                      CSP32040
40    FORMAT (' THE EMP NOS DO NOT MATCH.')                             CSP32050
      GO TO 15                                                          CSP32060
```

```
 SAMPLE PROBLEM 3                                                 PAGE 02
      END                                                         CSP32070

VARIABLE ALLOCATIONS
 HRS  =0000  CURR =0003  YTD  =0006  MASK =0017  IN   =005C  IDEP =005E  IEMP =0061  INM  =0075  ISS  =007E  IRT  =0082
 IYTD =0089  JEMP =008C  NYTD =0093  ICUR =0099  KCURR=00A5  KOYTD=00B1  KNYTD=00BD  I    =00BE  M    =00BF  L    =00C0
 NREAD=00C1  NWRIT=00C2  ICD  =00C3  NZERO=00C4

STATEMENT ALLOCATIONS
 1    =00E8  2    =00EC  20   =00EF  30   =0103  40   =0114  15   =016C  6    =0178  7    =0182  8    =01AE  10   =01BF
 101  =01CB  100  =01CD  11   =01D6  99   =0259

FEATURES SUPPORTED
 ONE WORD INTEGERS
 EXTENDED PRECISION
 IOCS

CALLED SUBPROGRAMS
 DATSW   MOVE    GET     NCOMP   PUT     EDIT    EADD    EMPY    EDIV    ELD     ESTO    WRTYZ   SRED    SWRT    SCOMP
 SFIO    SIOAI   SIOI    STOP    CARDZ   PRNTZ

REAL CONSTANTS
   .100000000E 03=00C6     .100000000E 02=00C9     .500000000E 03=00CC     .100000000E 04=00CF     .500000000E 01=00D2

INTEGER CONSTANTS
     0=00D5      1=00D6      2=00D7      6=00D8      4=00D9      7=00DA     26=00DB     29=00DC     37=00DD     38=00DE
    41=00DF     42=00E0     48=00E1      3=00E2     28=00E3     30=00E4   3333=00E5     12=00E6  13107=00E7

CORE REQUIREMENTS FOR SP3
 COMMON       0  VARIABLES    198  PROGRAM    410

END OF COMPILATION
```

Sample Problem 3: Payroll Register Output

```
// XEQ                                                          CSP32080

01  101  NALNIUQ , J          $7,453.06      $198.91      $7,651.97
52  201  OMINOREG,     M      $3,524.37      $143.82      $3,668.19
76  676  NEDAB,    R          $10,060.60     $297.27      $10,357.87
76  689  NEDUOL,   R          $10,060.60     $297.27      $10,357.87
01  253  NROH , J             $9,555.62      $279.65      $9,835.27
```

Sample Problem 3: Console Printer Error Log and New Year-to-Date Card Image

```
01 101NALNIUQ,  J          7985664320542076519 7    1   CSP

52 2010MINOREG,    M       0133256780423036681 9    1   CSP

76 676NEDAB,    R          0142330600810103578 7    1   CSP

76 689NEDUOL,   R          7986037940810103578 7    1   CSP

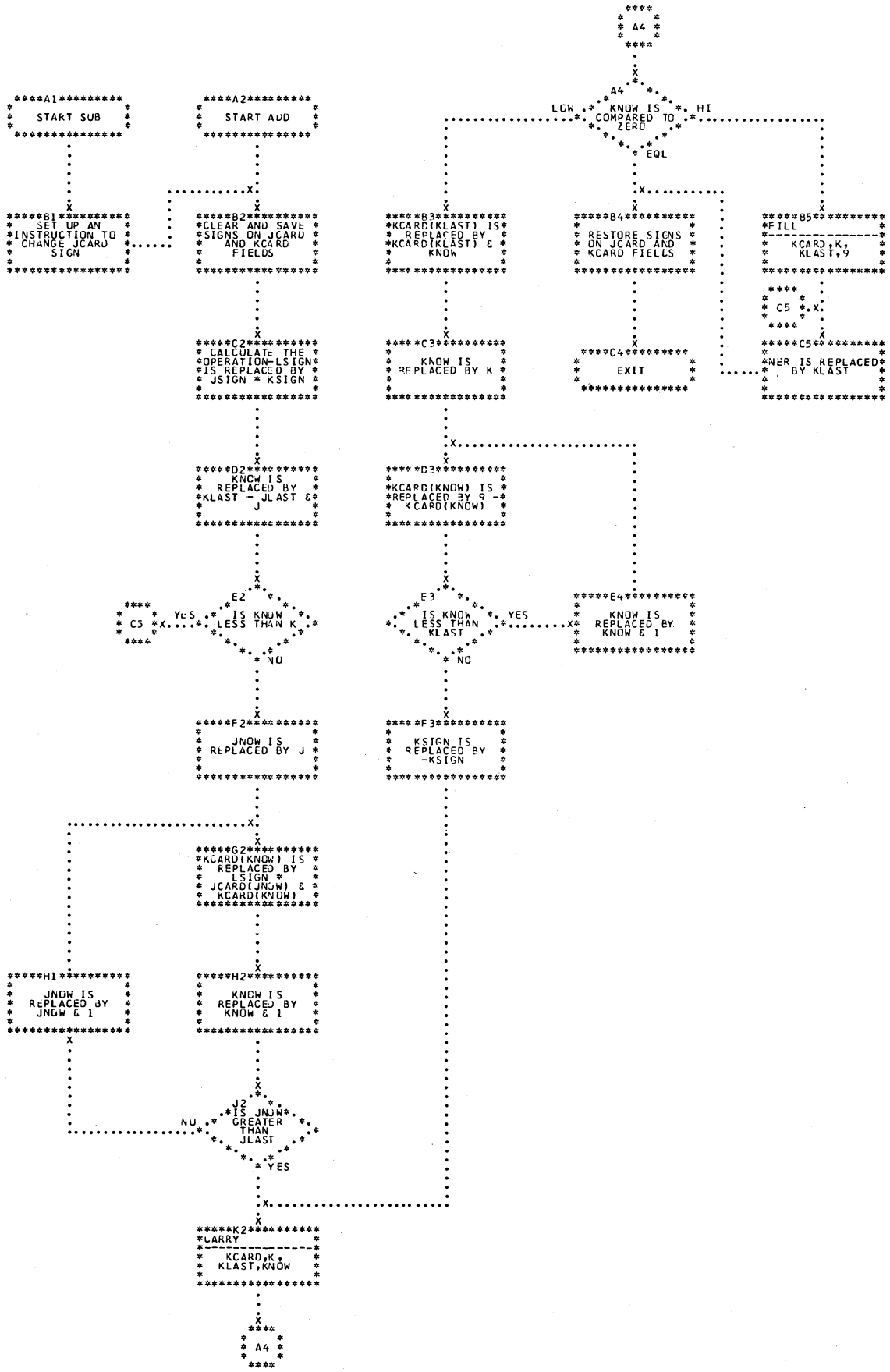
THE EMP NOS DO NOT MATCH.

01 253NROH,   J            9546230570762098352 7    1   CSP
```

Sample Problem 3: Data Input Listing

```
// XEQ                                                                  CSP32080
   ,  $,  CR                                                            CSP32090
01 101NALNIUQ , J          79856643205420745306                      1  CSP32100
101NALNIUQ , J           01367                                       2  CSP32110
                                                                     0  CSP32120
2010MINOREG,    M        52340                                       2  CSP32130
52 2010MINOREG,    M        01332567804230352437                     1  CSP32140
                                                                     0  CSP32150
76 676NEDAB,   R            01423306008101006060                     1  CSP32160
676NEDAB,   R            76367                                       2  CSP32170
                                                                     0  CSP32180
689NEDUOL,   R           76367                                       2  CSP32190
76 689NEDUOL,   R           79860379408101006060                     1  CSP32200
                                                                     0  CSP32210
99 999ONATNOM J             99999999901160511122                     1  CSP32220
099ONATNOM , J           994009                                      2  CSP32230
                                                                     0  CSP32240
01 253NROH , J              95462305707620955562                     1  CSP32250
253NROH , J              01367                                       2  CSP32260
                                                                     0  CSP32270
                                                                        CSP32280
```

CHART AD 1130 COMMERCIAL ADD/SUB SUBROUTINE



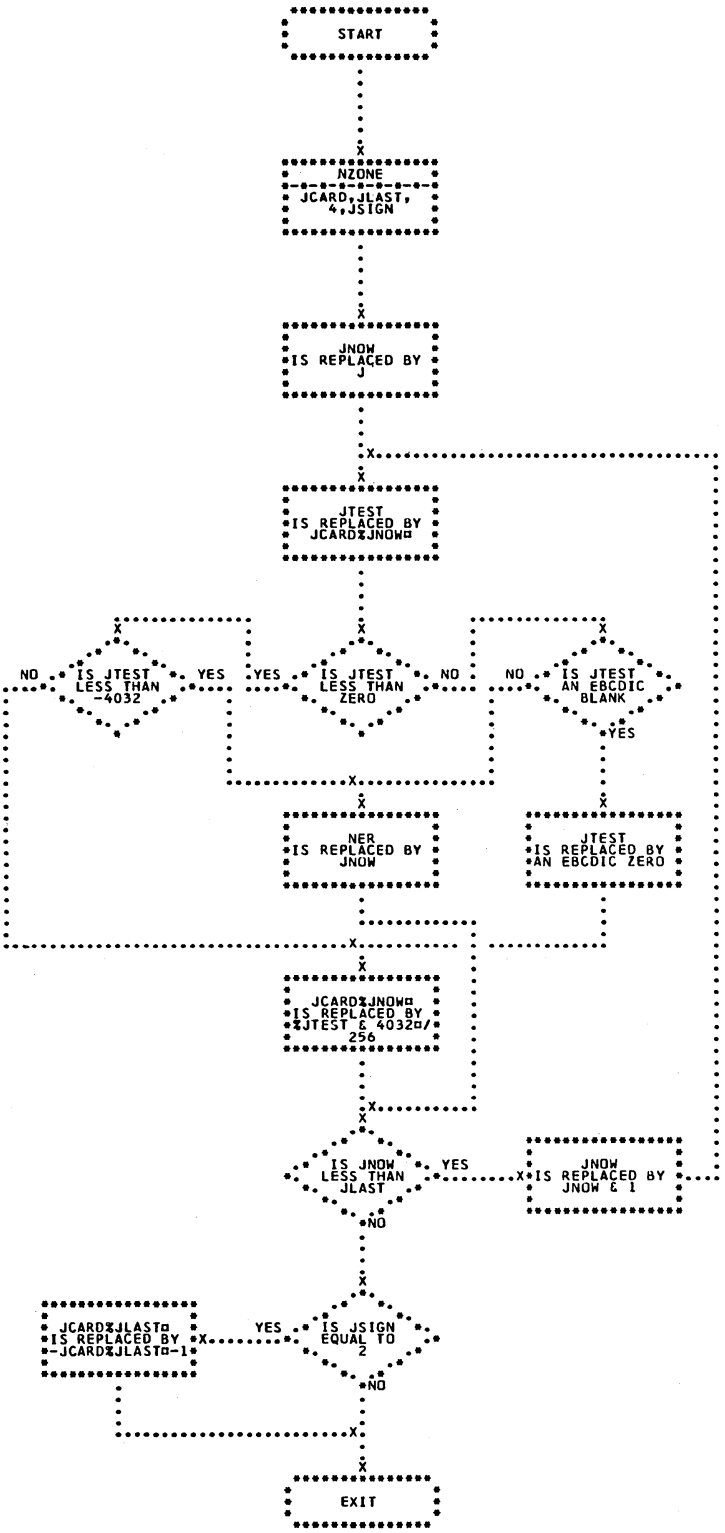
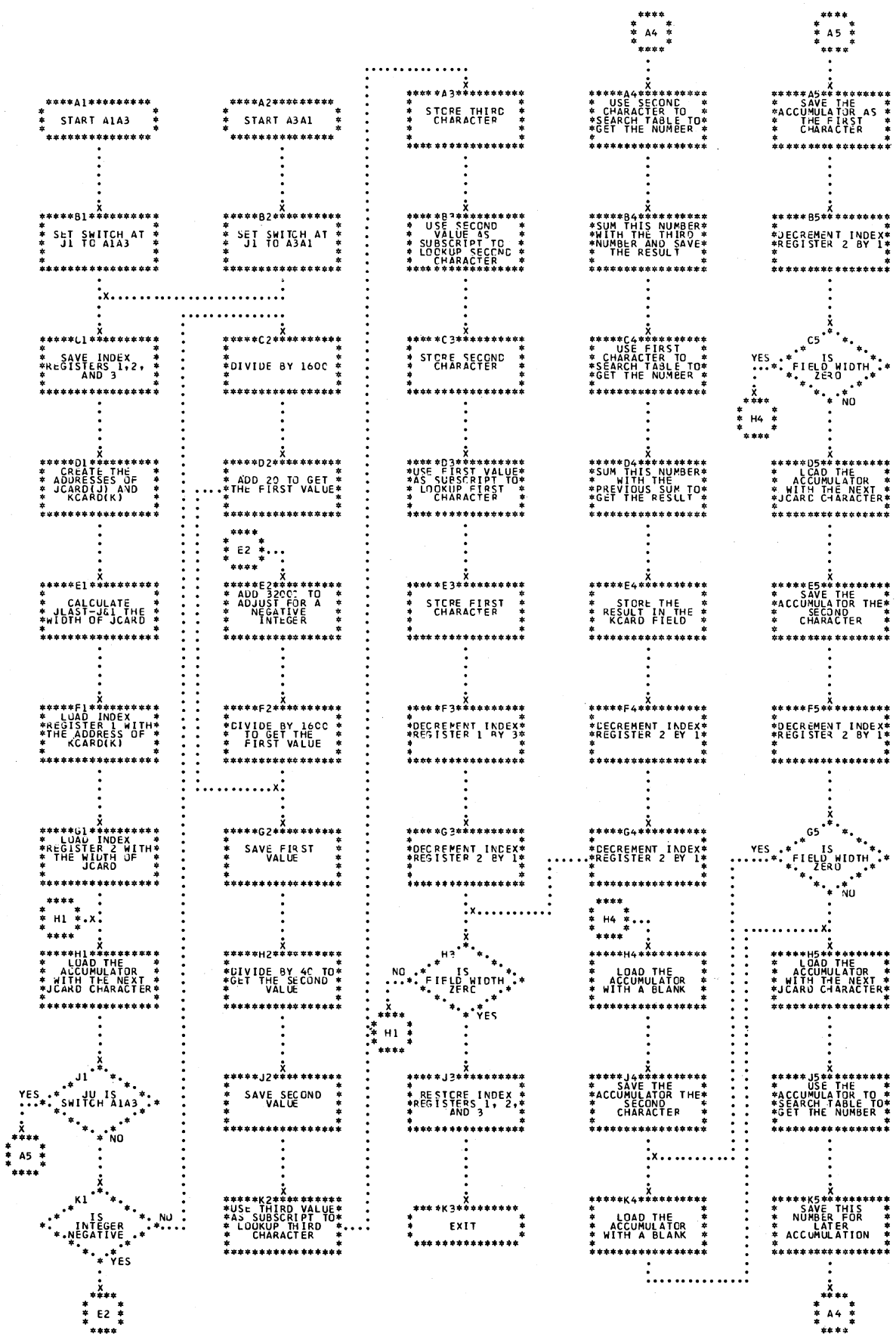

START
NZONE
JCARD,JLAST,
4,JSIGN
JNOW
IS REPLACED BY
J
JTEST
IS REPLACED BY
JCARD%JNOW¤
NO
IS JTEST
LESS THAN
-4032
YES
YES
IS JTEST
LESS THAN
ZERO
NO
NO
IS JTEST
AN EBCDIC
BLANK
YES
NER
IS REPLACED BY
JNOW
JTEST
IS REPLACED BY
AN EBCDIC ZERO
JCARD%JNOW¤
IS REPLACED BY
%JTEST & 4032¤/
256
IS JNOW
LESS THAN
JLAST
YES
JNOW
IS REPLACED BY
JNOW & 1
NO
JCARD%JLAST¤
IS REPLACED BY
-JCARD%JLAST¤-1
YES
IS JSIGN
EQUAL TO
2
NO
EXIT

CHART A3 1130 COMMERCIAL A1A3 SUBROUTINE



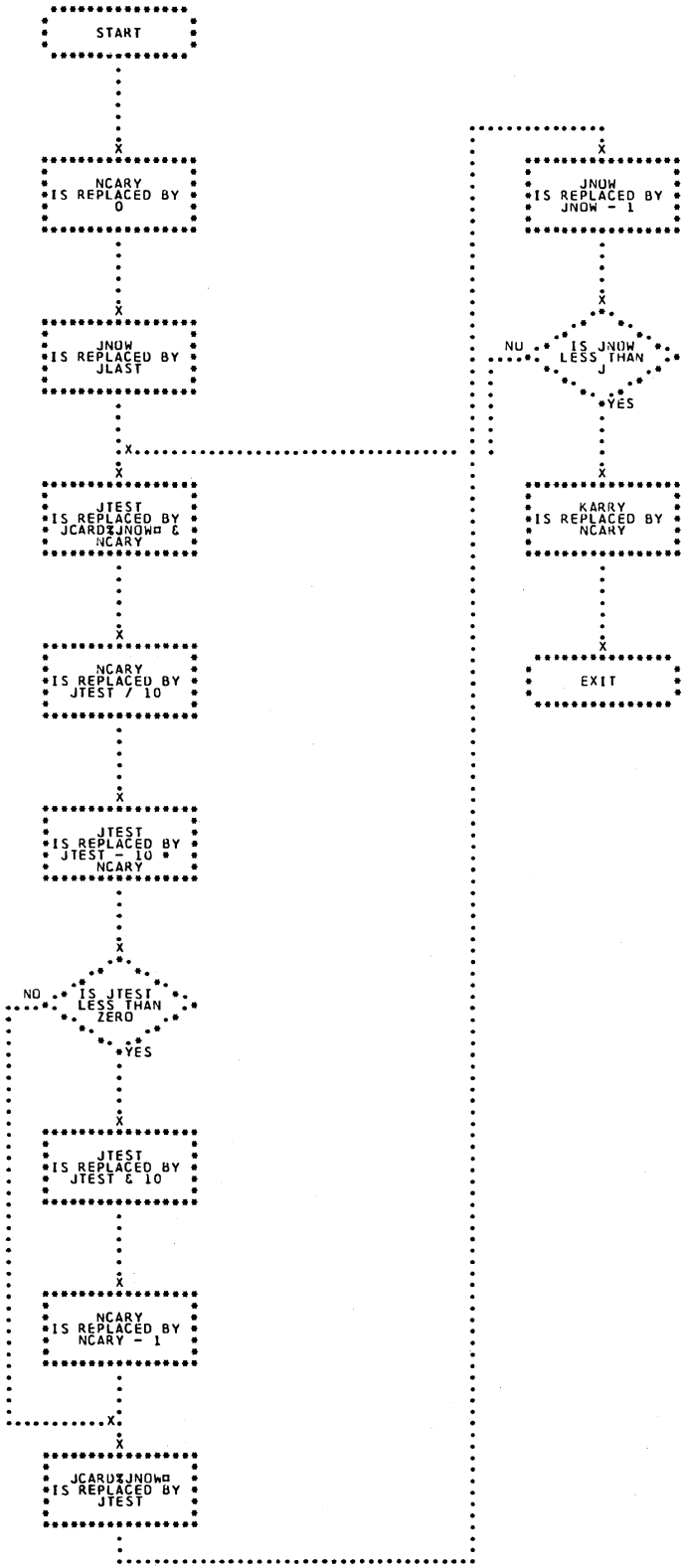
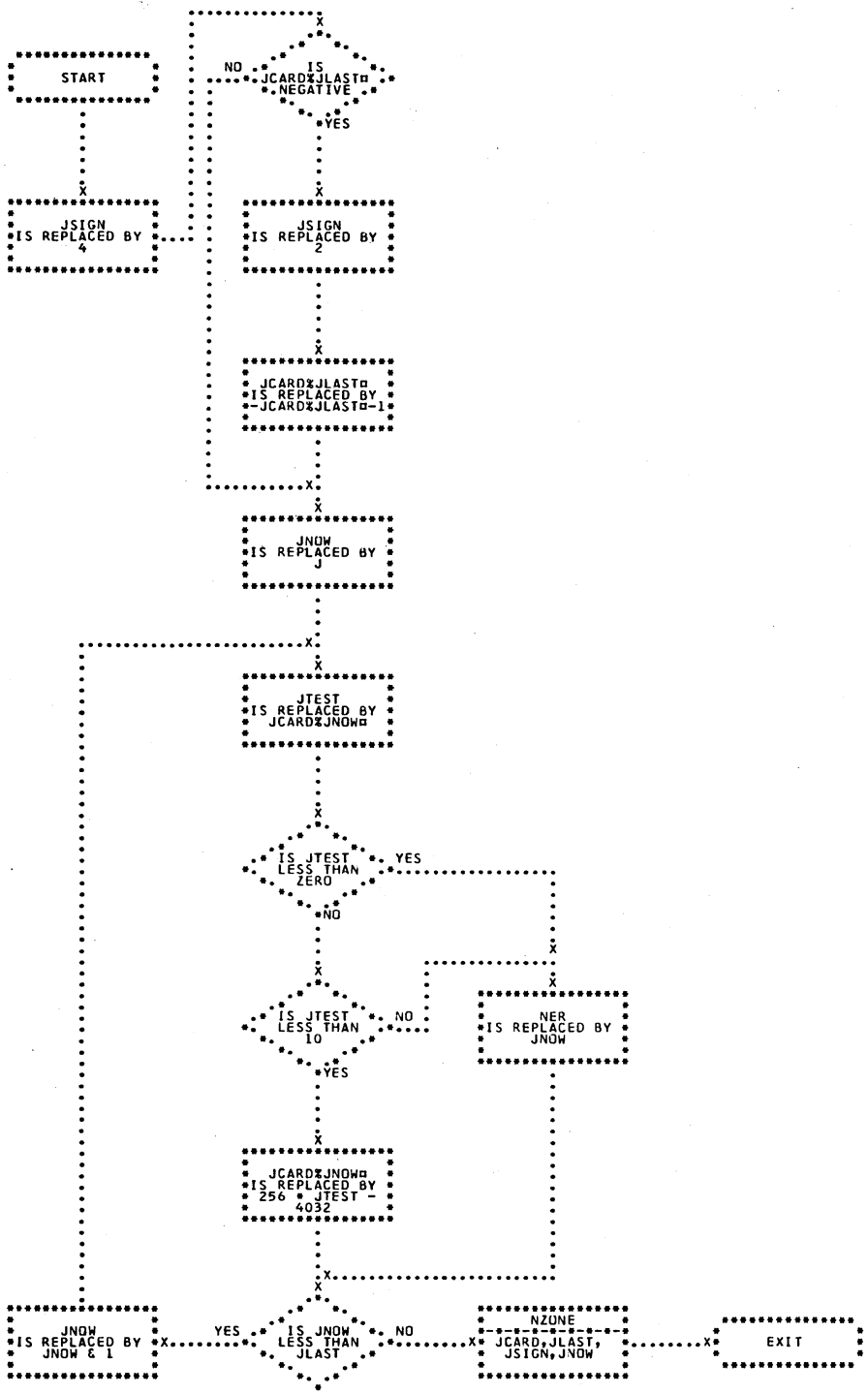
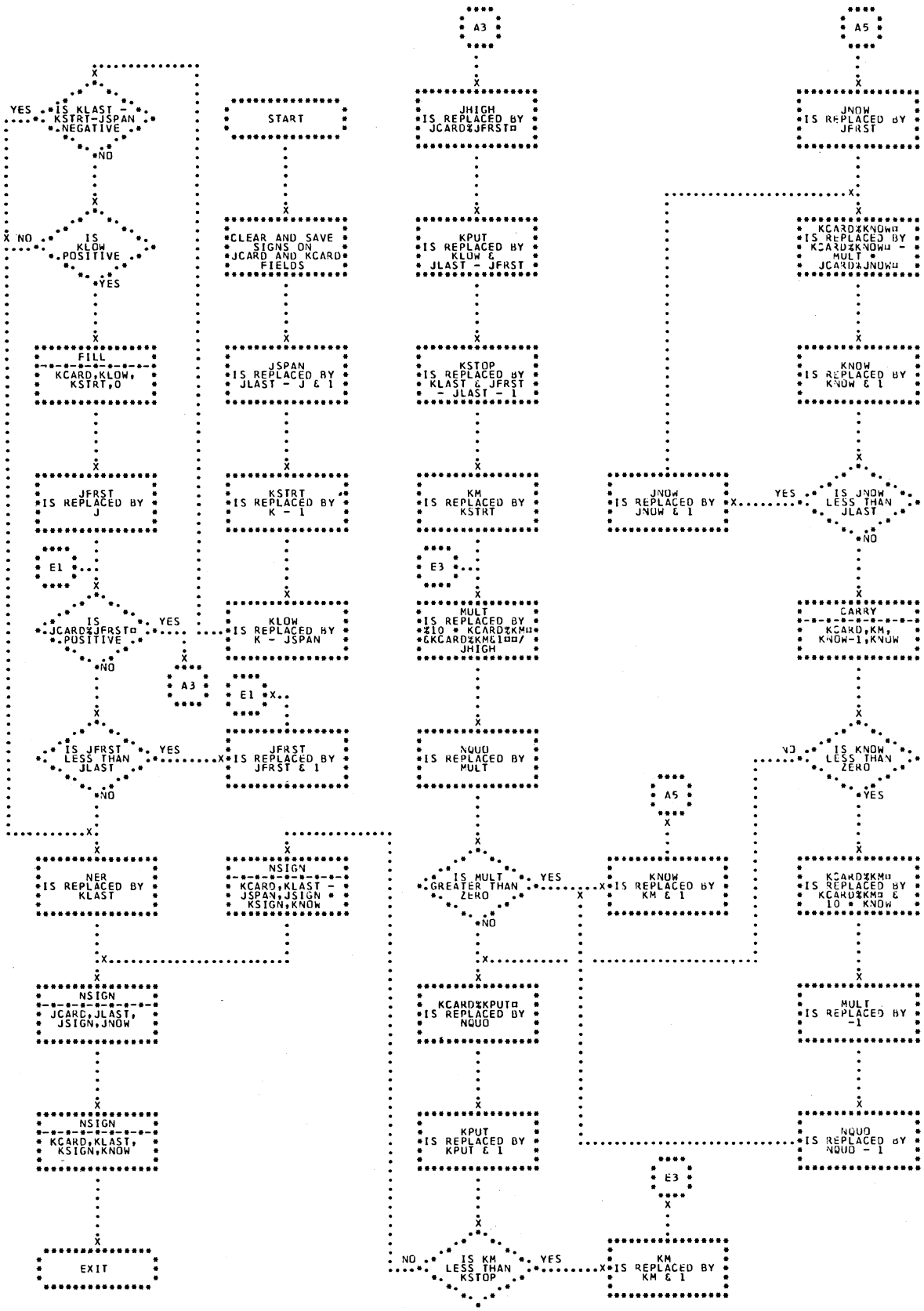
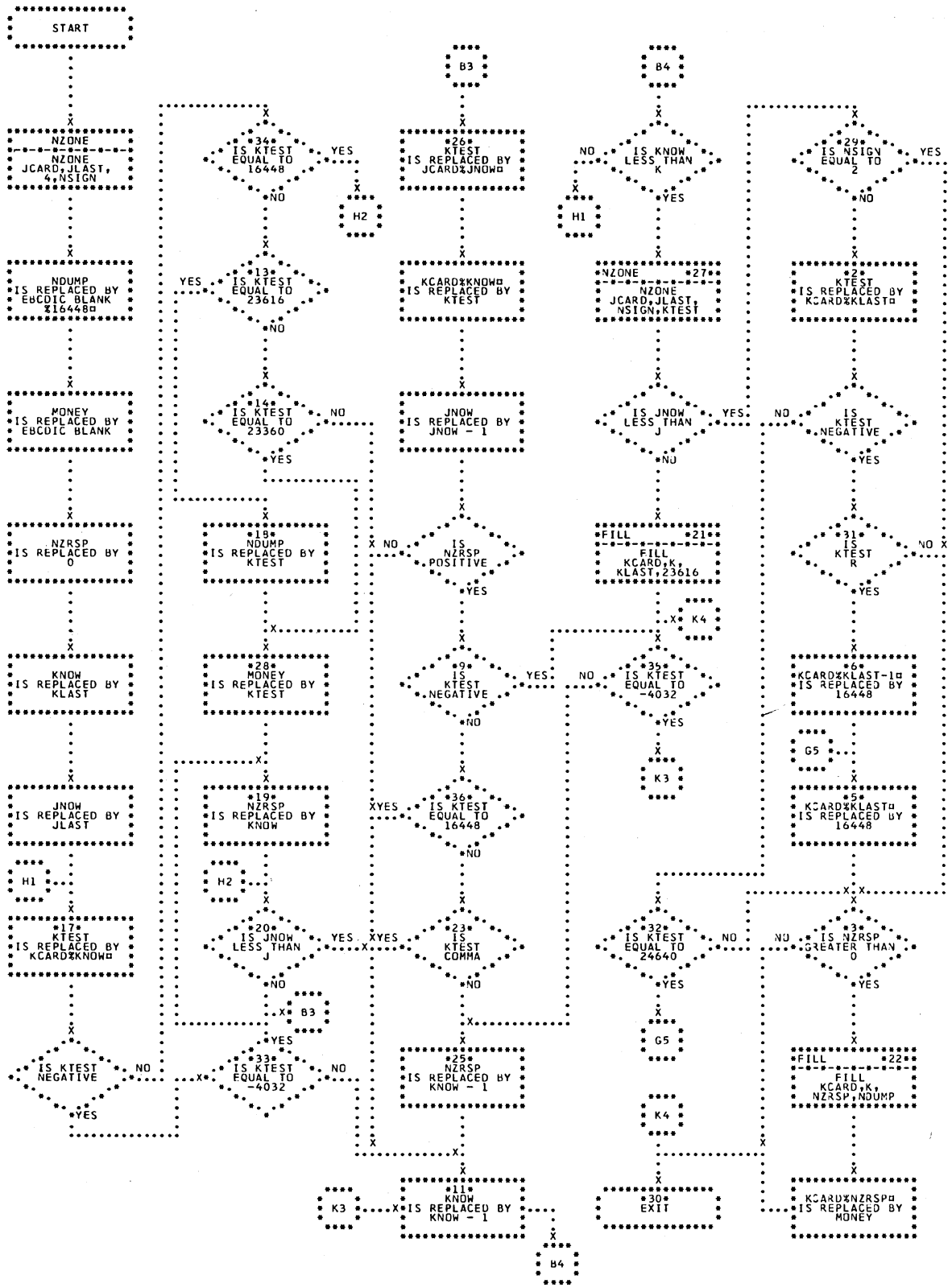
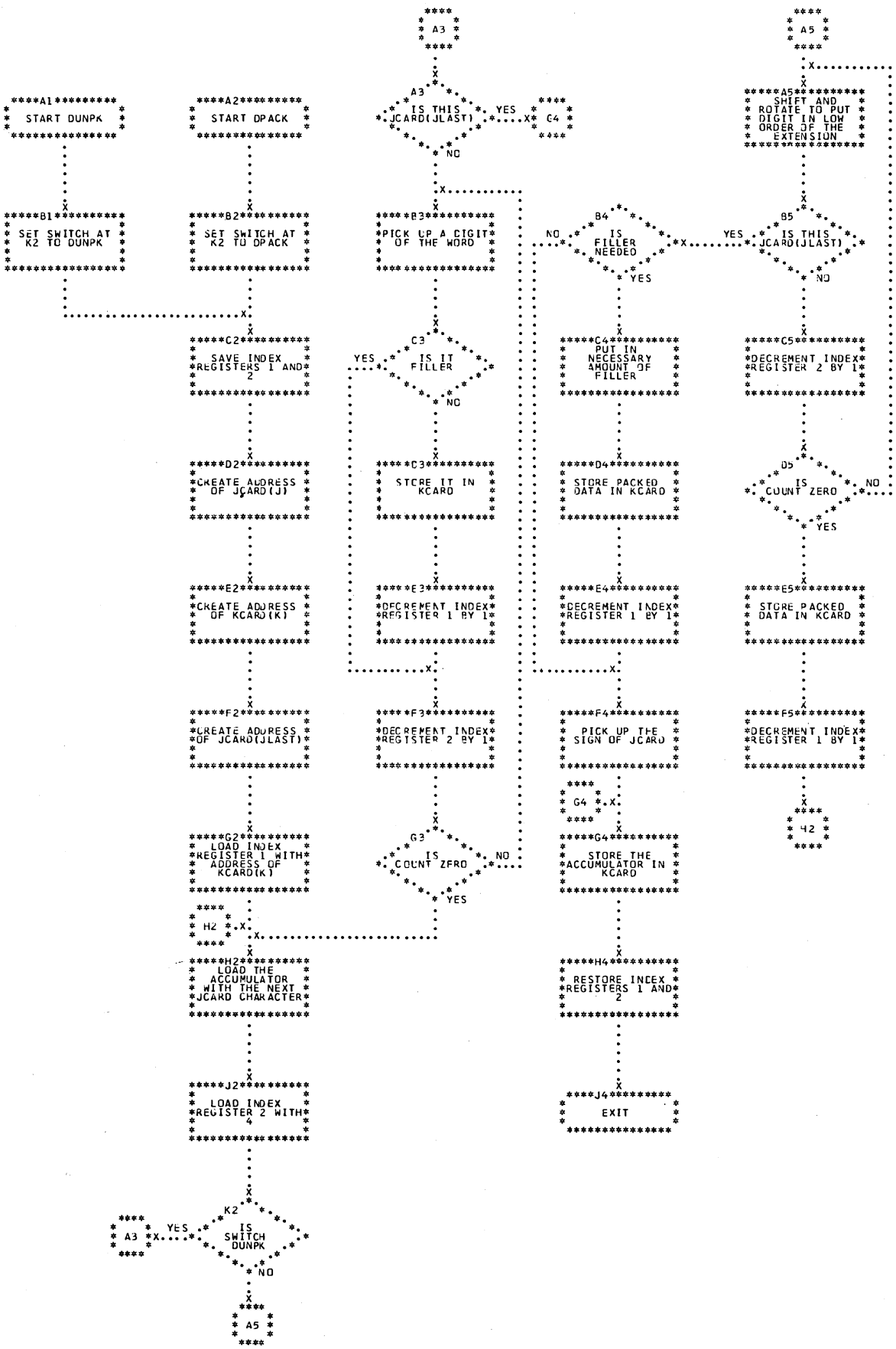

START
NCARY IS REPLACED BY 0
JNOW IS REPLACED BY JLAST
JTEST IS REPLACED BY JCARD&JNOW¤ & NCARY
NCARY IS REPLACED BY JTEST / 10
JTEST IS REPLACED BY JTEST - 10 * NCARY
IS JTEST LESS THAN ZERO
NO
YES
JTEST IS REPLACED BY JTEST & 10
NCARY IS REPLACED BY NCARY - 1
JCARD&JNOW¤ IS REPLACED BY JTEST
JNOW IS REPLACED BY JNOW - 1
IS JNOW LESS THAN J
NO
YES
KARRY IS REPLACED BY NCARY
EXIT

CHART DE 1130 COMMERCIAL DECA1 SUBROUTINE



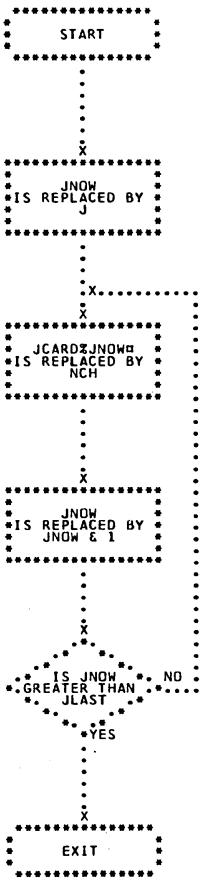

IS KLAST - KSTRT-JSPAN NEGATIVE
YES
NO
IS KLOW POSITIVE
NO
YES
FILL KCARD,KLOW, KSTRT,0
JFRST IS REPLACED BY J
E1
IS JCARD&JFRST¤ POSITIVE
YES
NO
A3
IS JFRST LESS THAN JLAST
YES
NO
NER IS REPLACED BY KLAST
NSIGN JCARD,JLAST, JSIGN,JNOW
NSIGN KCARD,KLAST, KSIGN,KNOW
EXIT
START
CLEAR AND SAVE SIGNS ON JCARD AND KCARD FIELDS
JSPAN IS REPLACED BY JLAST - J & 1
KSTRT IS REPLACED BY K - 1
KLOW IS REPLACED BY K - JSPAN
E1
JFRST IS REPLACED BY JFRST & 1
NSIGN KCARD,KLAST - JSPAN,JSIGN * KSIGN,KNOW
A3
JHIGH IS REPLACED BY JCARD&JFRST¤
KPUT IS REPLACED BY KLOW & JLAST - JFRST
KSTOP IS REPLACED BY KLAST & JFRST - JLAST - 1
KM IS REPLACED BY KSTRT
E3
MULT IS REPLACED BY ¤10 * KCARD&KM¤ &KCARD&KM&1¤¤/ JHIGH
NQUO IS REPLACED BY MULT
IS MULT GREATER THAN ZERO
YES
NO
KCARD&KPUT¤ IS REPLACED BY NQUO
KPUT IS REPLACED BY KPUT & 1
IS KM LESS THAN KSTOP
NO
YES
A5
JNOW IS REPLACED BY JFRST
KCARD&KNOW¤ IS REPLACED BY KCARD&KNOW¤ - MULT * JCARD&JNOW¤
KNOW IS REPLACED BY KNOW & 1
IS JNOW LESS THAN JLAST
YES
NO
CARRY KCARD,KM, KNOW-1,KNOW
IS KNOW LESS THAN ZERO
NO
YES
KCARD&KM¤ IS REPLACED BY KCARD&KM¤ & 10 * KNOW
MULT IS REPLACED BY -1
NQUO IS REPLACED BY NQUO - 1
A5
JNOW IS REPLACED BY JNOW & 1
KNOW IS REPLACED BY KM & 1
E3
KM IS REPLACED BY KM & 1


START
NZONE JCARD,JLAST, 4,NSIGN
NDUMP IS REPLACED BY EBCDIC BLANK %16448¤
MONEY IS REPLACED BY EBCDIC BLANK
NZRSP IS REPLACED BY 0
KNOW IS REPLACED BY KLAST
JNOW IS REPLACED BY JLAST
H1
17 KTEST IS REPLACED BY KCARD%KNOW¤
IS KTEST NEGATIVE
NO
YES
34 IS KTEST EQUAL TO 16448
H2
13 IS KTEST EQUAL TO 23616
14 IS KTEST EQUAL TO 23360
18 NDUMP IS REPLACED BY KTEST
28 MONEY IS REPLACED BY KTEST
19 NZRSP IS REPLACED BY KNOW
20 IS JNOW LESS THAN J
B3
33 IS KTEST EQUAL TO -4032
B3
26 KTEST IS REPLACED BY JCARD%JNOW¤
KCARD%KNOW¤ IS REPLACED BY KTEST
JNOW IS REPLACED BY JNOW - 1
IS NZRSP POSITIVE
9 IS KTEST NEGATIVE
36 IS KTEST EQUAL TO 16448
23 IS KTEST COMMA
25 NZRSP IS REPLACED BY KNOW - 1
11 KNOW IS REPLACED BY KNOW - 1
K3
B4
B4
IS KNOW LESS THAN K
H1
*NZONE *27* NZONE JCARD,JLAST, NSIGN,KTEST
IS JNOW LESS THAN J
*FILL *21* FILL KCARD,K, KLAST,23616
K4
35 IS KTEST EQUAL TO -4032
K3
32 IS KTEST EQUAL TO 24640
G5
K4
30 EXIT
29 IS NSIGN EQUAL TO 2
2 KTEST IS REPLACED BY KCARD%KLAST¤
IS KTEST NEGATIVE
31 IS KTEST R
6 KCARD%KLAST-1¤ IS REPLACED BY 16448
G5
5 KCARD%KLAST¤ IS REPLACED BY 16448
3 IS NZRSP GREATER THAN 0
*FILL *22* FILL KCARD,K, NZRSP,NDUMP
KCARD%NZRSP¤ IS REPLACED BY MONEY



ADD
A1A3
A1DEC
A3A1
CARRY
DECA1
DIV
DPACK
DUNPK
EDIT
FILL
GET
ICOMP
IOND
KEYBD
MOVE
MPY
NCOMP
NSIGN
NZONE
PACK
PRINT
PUNCH
PUT
P1403
P1442
READ
R2501
SKIP
STACK
SUB
S1403
TYPER
UNPAC
WHOLE

CHART FL 1130 COMMERCIAL FILL SUBROUTINE



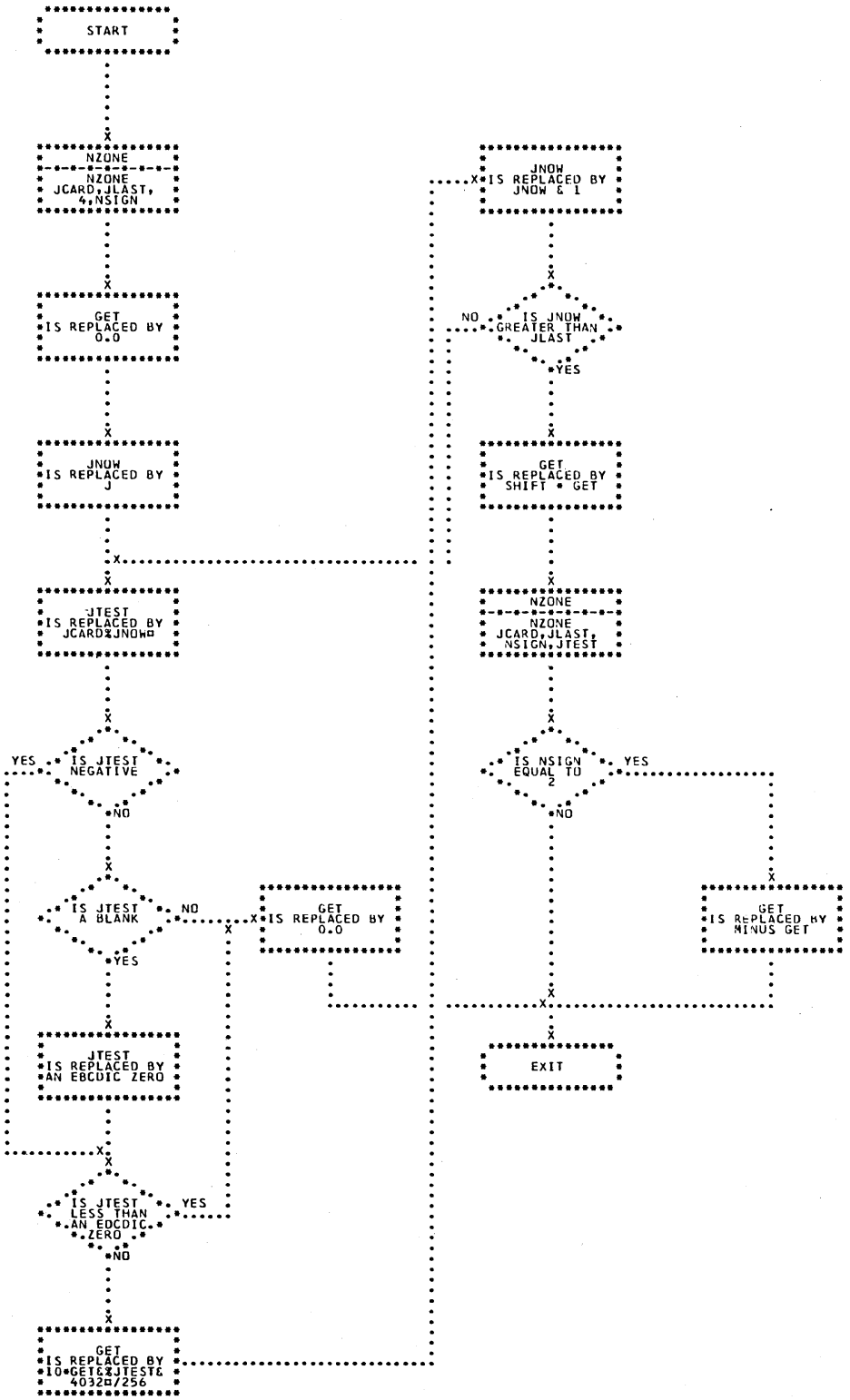
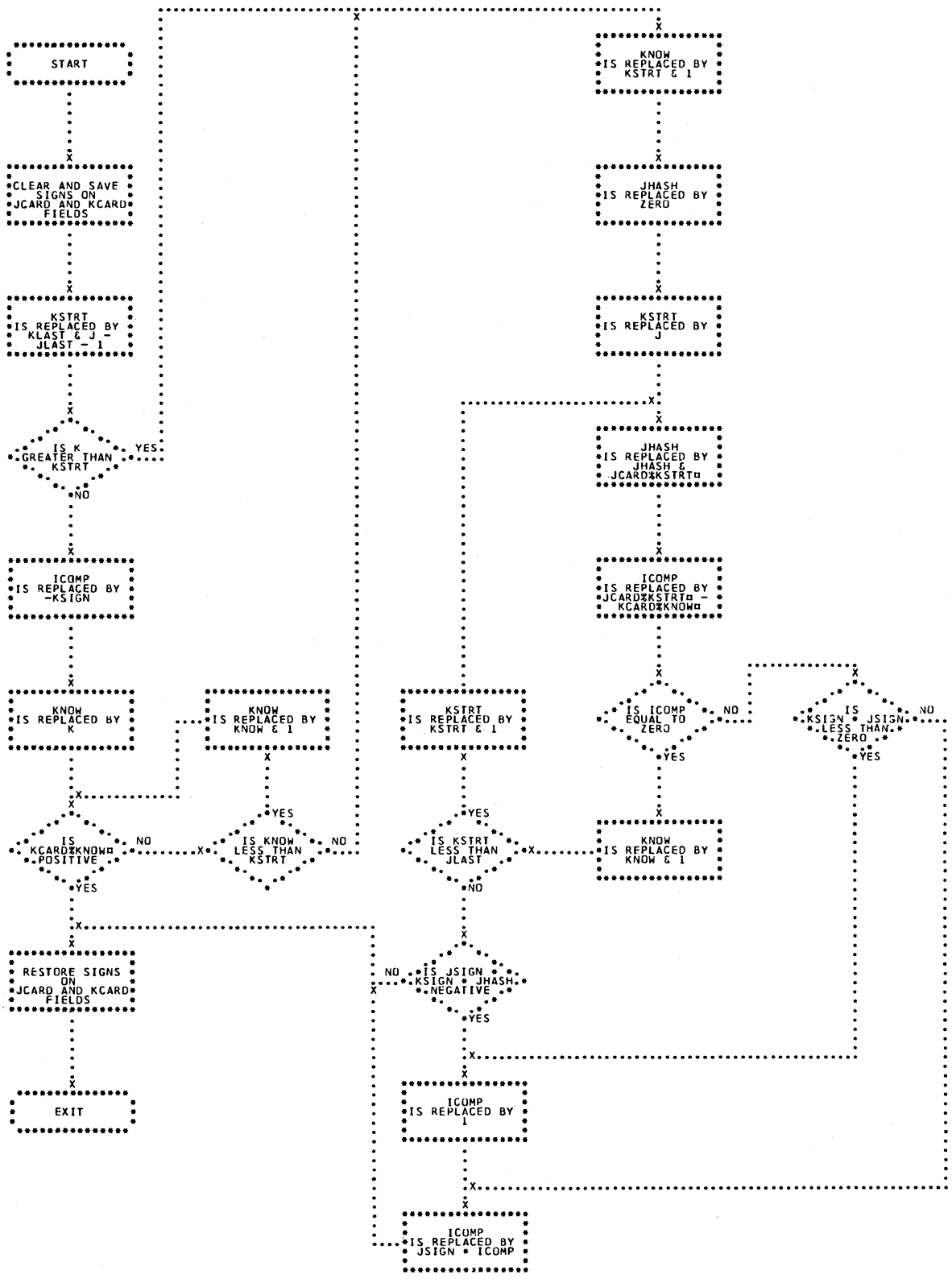


CHART IC 1130 COMMERCIAL ICOMP FUNCTION



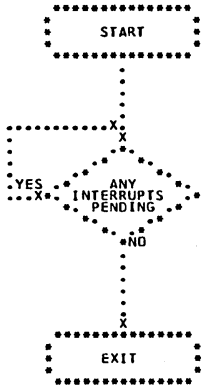
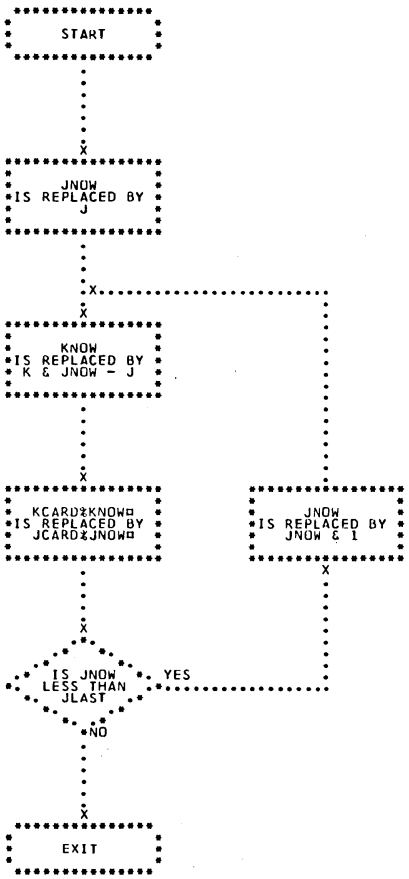
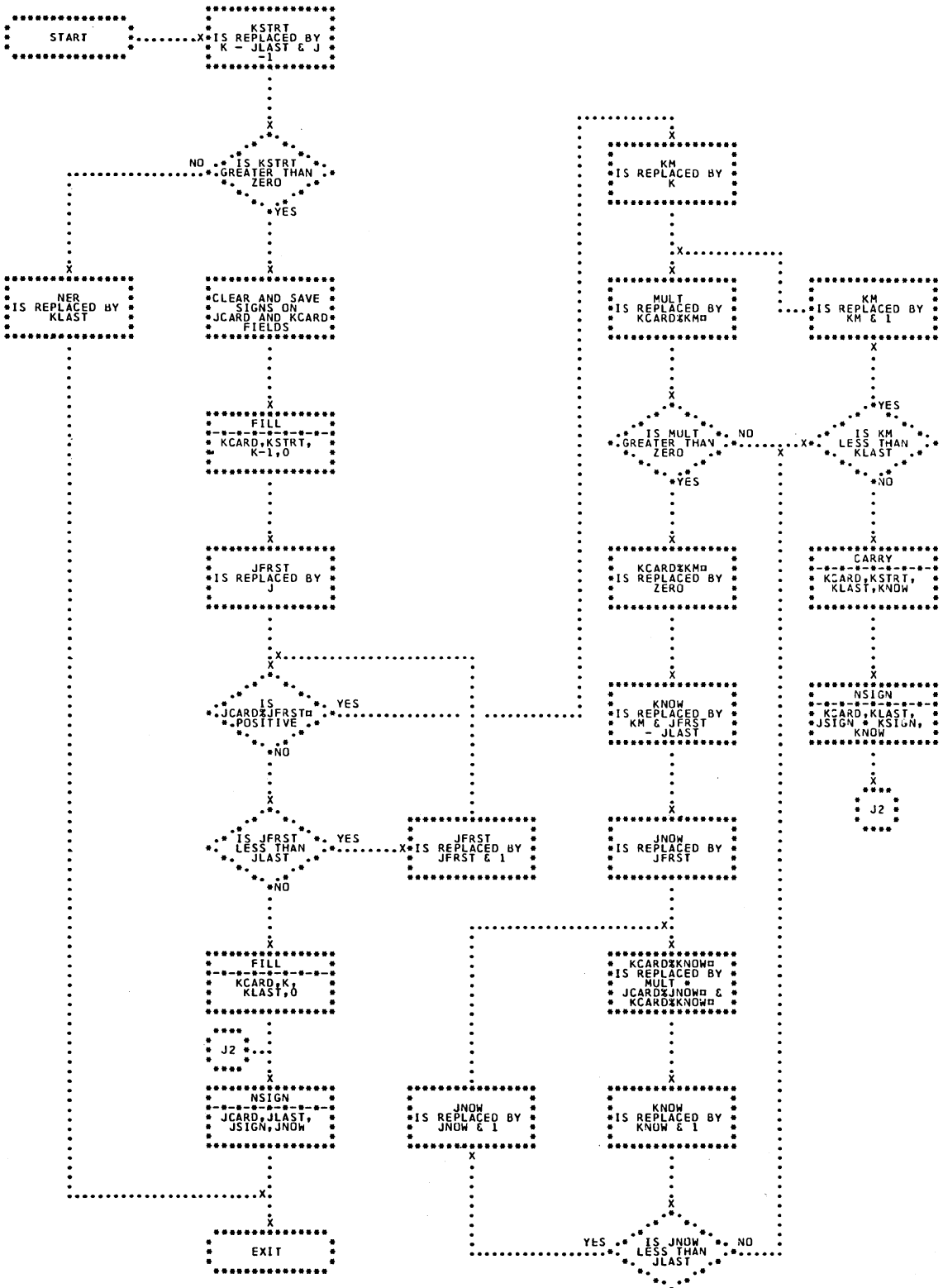
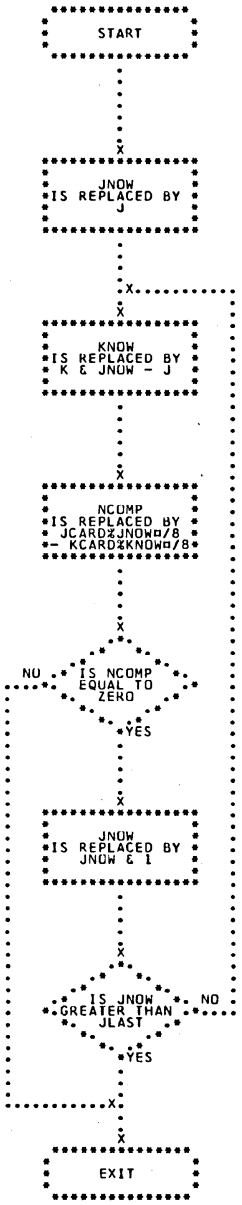


CHART MV 1130 COMMERCIAL MOVE SUBROUTINE




START
KSTRT IS REPLACED BY K - JLAST & J -1
IS KSTRT GREATER THAN ZERO
NO
YES
NER IS REPLACED BY KLAST
CLEAR AND SAVE SIGNS ON JCARD AND KCARD FIELDS
FILL KCARD,KSTRT, K-1,0
JFRST IS REPLACED BY J
IS JCARD*JFRST POSITIVE
YES
NO
IS JFRST LESS THAN JLAST
YES
NO
JFRST IS REPLACED BY JFRST & 1
FILL KCARD,K, KLAST,0
J2
NSIGN JCARD,JLAST, JSIGN,JNOW
JNOW IS REPLACED BY JNOW & 1
EXIT
KM IS REPLACED BY K
MULT IS REPLACED BY KCARD*KM
IS MULT GREATER THAN ZERO
NO
YES
KCARD*KM IS REPLACED BY ZERO
KNOW IS REPLACED BY KM & JFRST - JLAST
JNOW IS REPLACED BY JFRST
KCARD*KNOW IS REPLACED BY MULT JCARD*JNOW & KCARD*KNOW
KNOW IS REPLACED BY KNOW & 1
IS JNOW LESS THAN JLAST
YES
NO
KM IS REPLACED BY KM & 1
IS KM LESS THAN KLAST
YES
NO
CARRY KCARD,KSTRT, KLAST,KNOW
NSIGN KCARD,KLAST, JSIGN,KSIGN, KNOW
J2



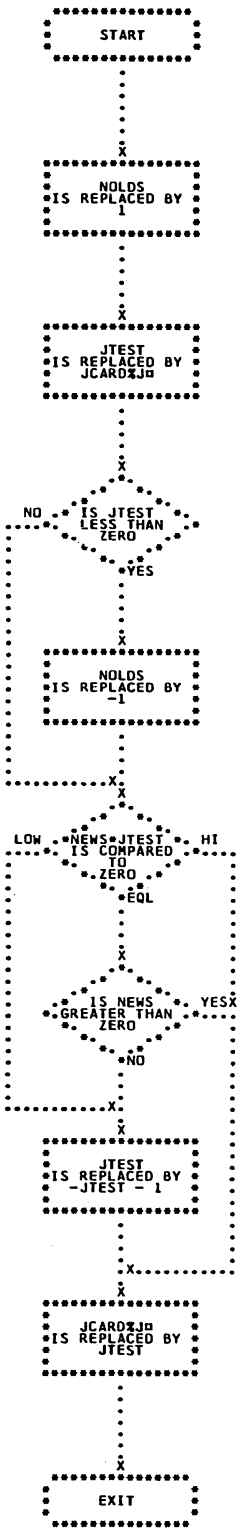
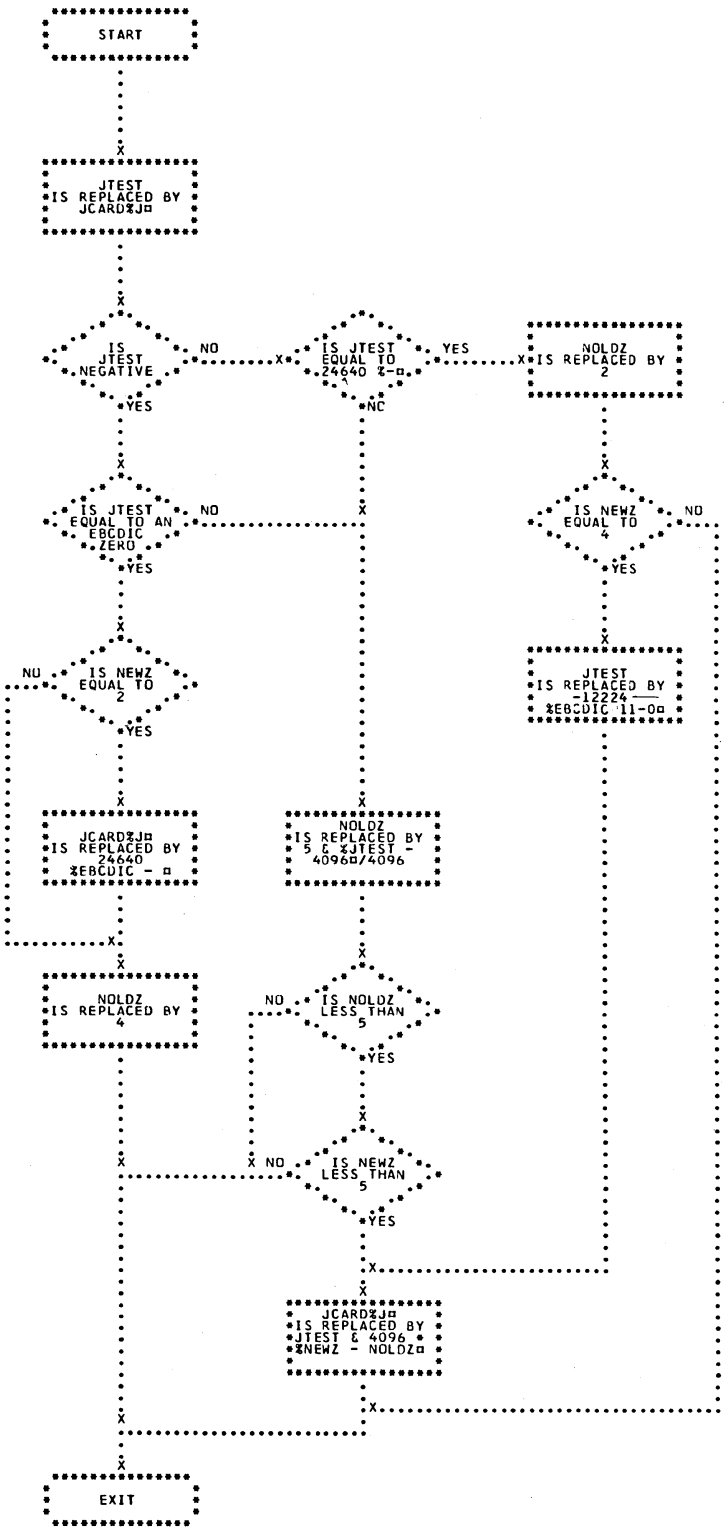


CHART NZ 1130 COMMERCIAL NZONE SUBROUTINE



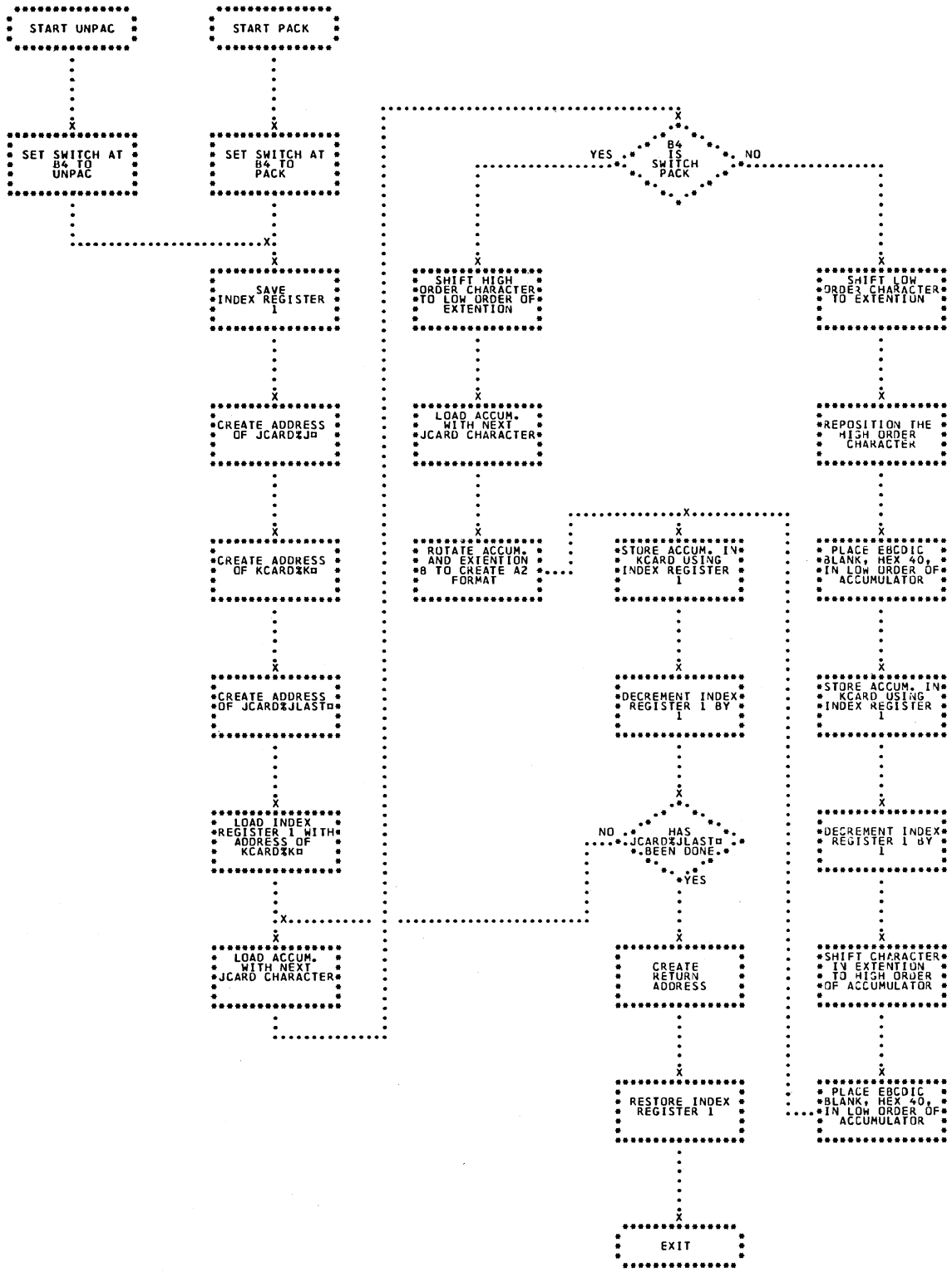
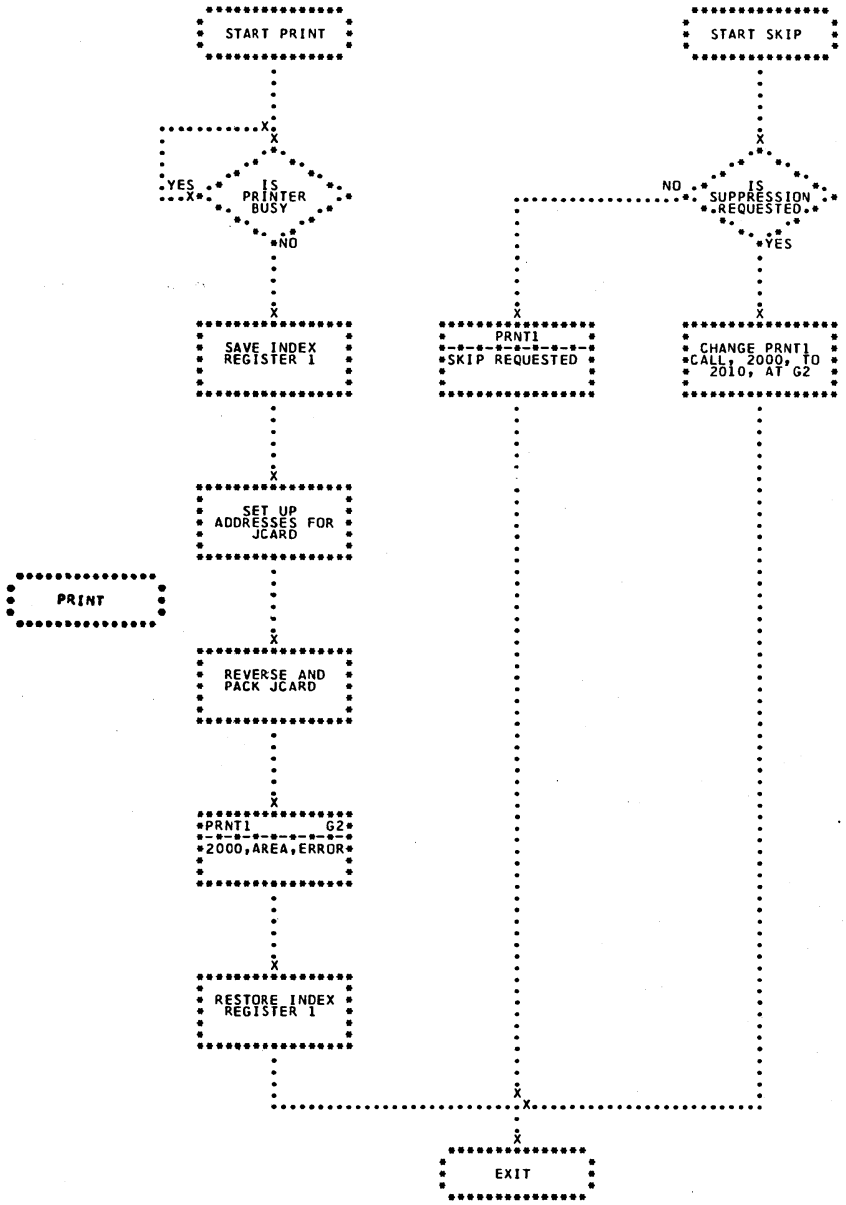
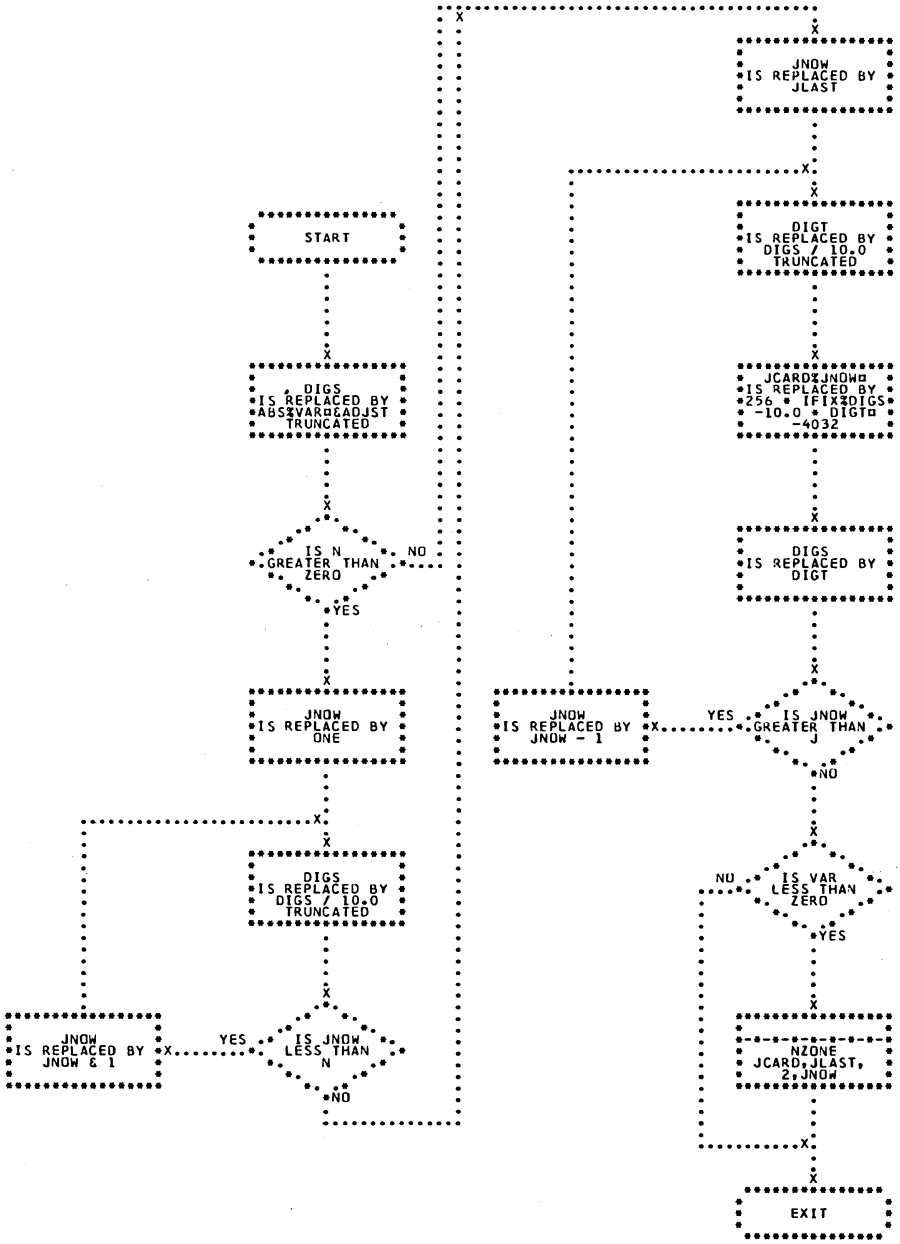
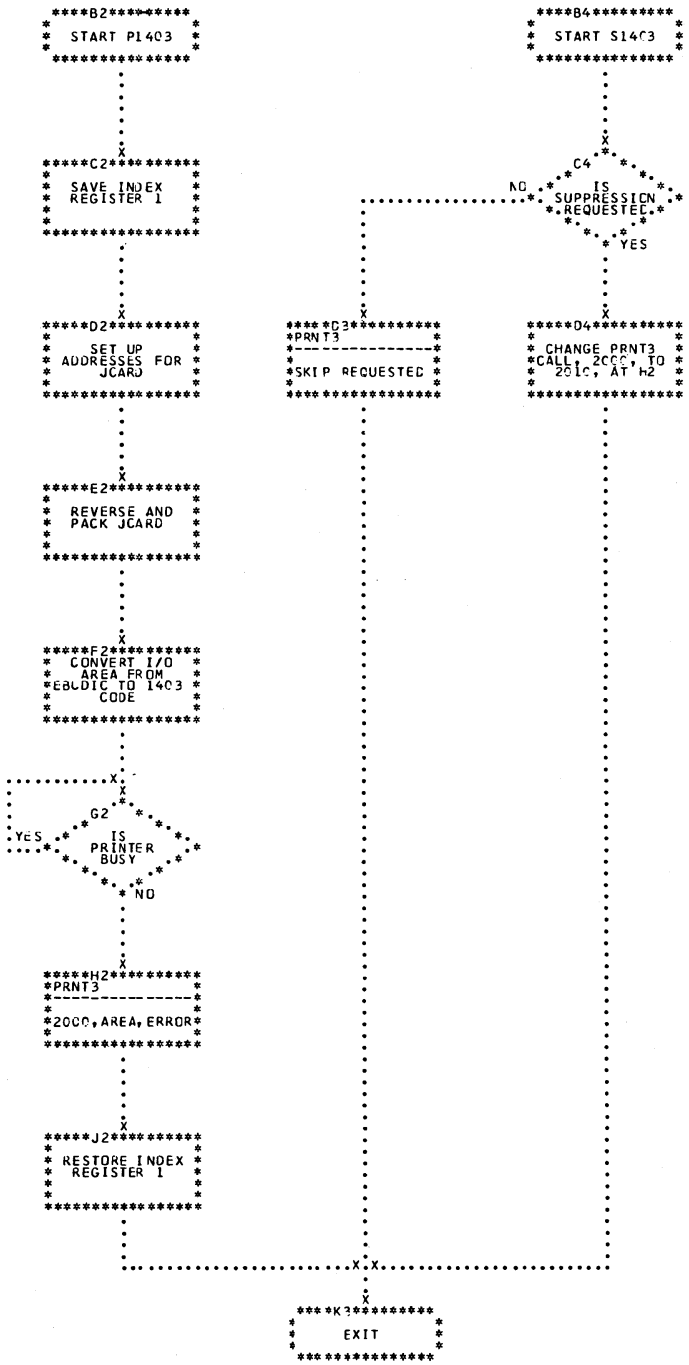
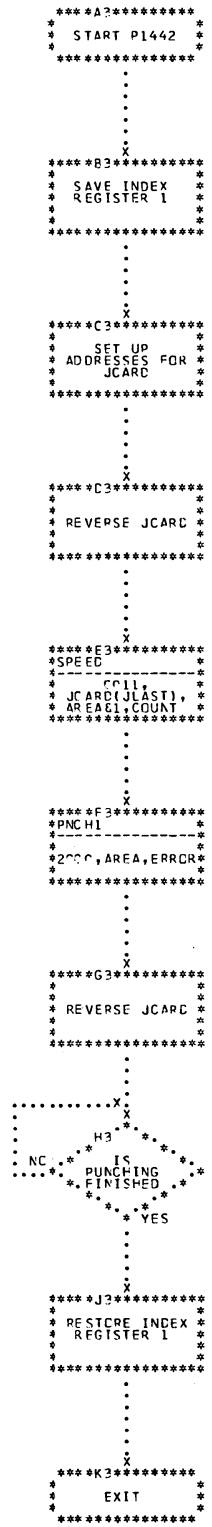

START UNPAC
START PACK
SET SWITCH AT B4 TO UNPAC
SET SWITCH AT B4 TO PACK
B4 IS SWITCH PACK
YES
NO
SAVE INDEX REGISTER 1
SHIFT HIGH ORDER CHARACTER TO LOW ORDER OF EXTENTION
SHIFT LOW ORDER CHARACTER TO EXTENTION
CREATE ADDRESS OF JCARD%J□
LOAD ACCUM. WITH NEXT JCARD CHARACTER
REPOSITION THE HIGH ORDER CHARACTER
CREATE ADDRESS OF KCARD%K□
ROTATE ACCUM. AND EXTENTION 8 TO CREATE A2 FORMAT
STORE ACCUM. IN KCARD USING INDEX REGISTER 1
PLACE EBCDIC BLANK, HEX 40, IN LOW ORDER OF ACCUMULATOR
CREATE ADDRESS OF JCARD%JLAST□
DECREMENT INDEX REGISTER 1 BY 1
STORE ACCUM. IN KCARD USING INDEX REGISTER 1
LOAD INDEX REGISTER 1 WITH ADDRESS OF KCARD%K□
HAS JCARD%JLAST□ BEEN DONE
NO
YES
DECREMENT INDEX REGISTER 1 BY 1
LOAD ACCUM. WITH NEXT JCARD CHARACTER
CREATE RETURN ADDRESS
SHIFT CHARACTER IN EXTENTION TO HIGH ORDER OF ACCUMULATOR
RESTORE INDEX REGISTER 1
PLACE EBCDIC BLANK, HEX 40, IN LOW ORDER OF ACCUMULATOR
EXIT

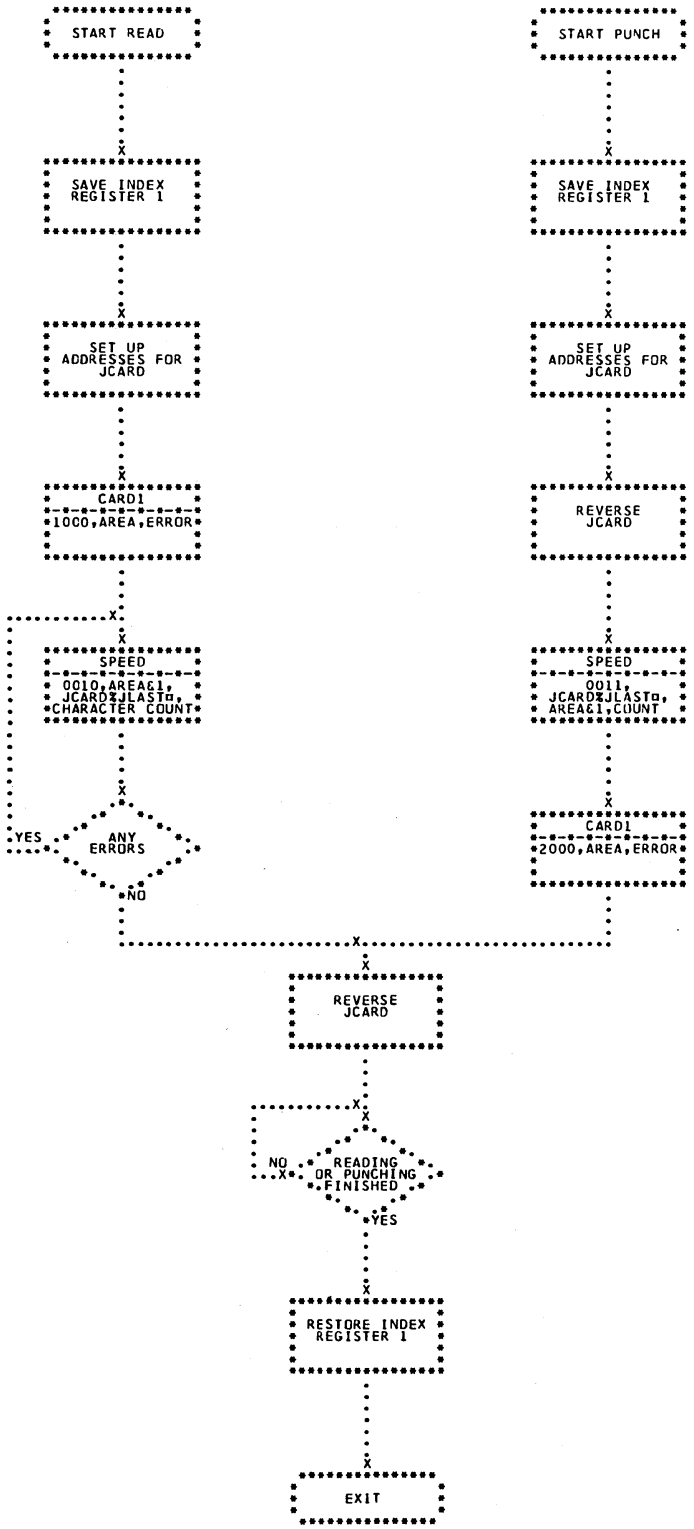
CHART PS 1130 COMMERCIAL PRINT/SKIP SUBROUTINE

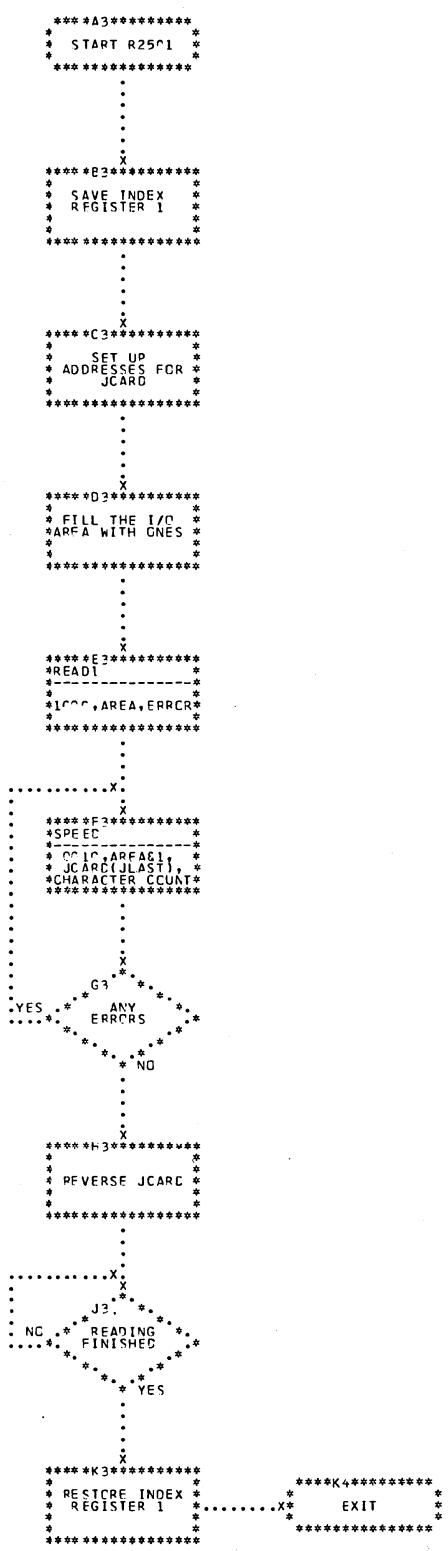




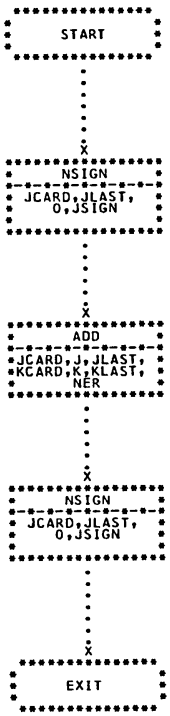


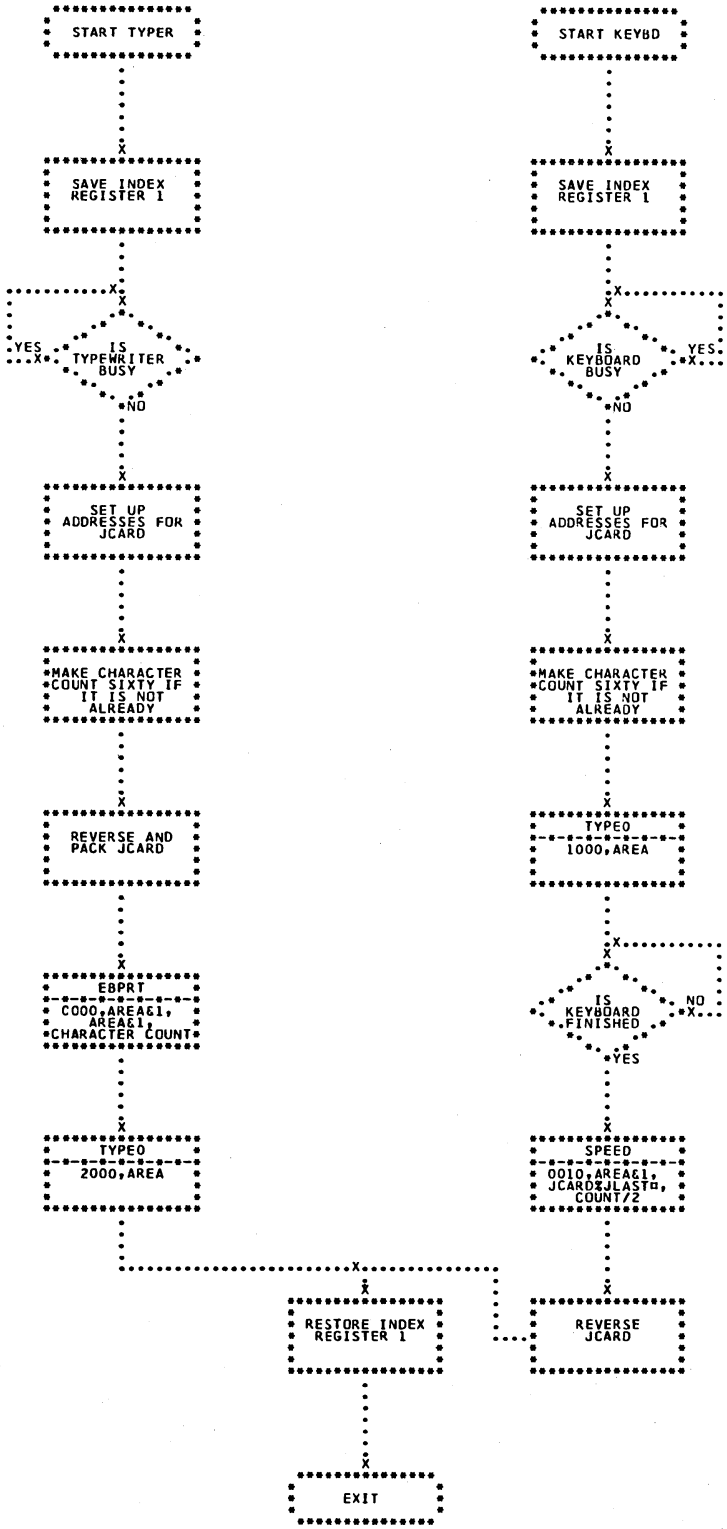

A3
START P1442
B3
SAVE INDEX REGISTER 1
C3
SET UP ADDRESSES FOR JCARD
D3
REVERSE JCARD
E3
SPEED
CALL, JCARD(JLAST), AREA(1,COUNT
F3
PNCH1
2000,AREA,ERROR
G3
REVERSE JCARD
H3
NO
IS PUNCHING FINISHED
YES
J3
RESTORE INDEX REGISTER 1
K3
EXIT

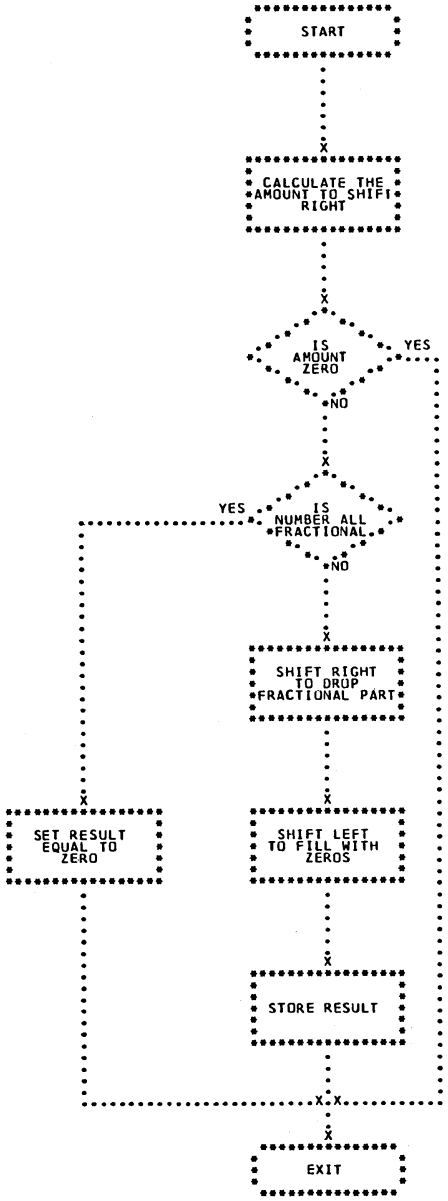

START READ
SAVE INDEX REGISTER 1
SET UP ADDRESSES FOR JCARD
CARD1
1000,AREA,ERROR
SPEED
0010,AREA&1,
JCARD%LAST¤,
CHARACTER COUNT
ANY ERRORS
YES
NO
START PUNCH
SAVE INDEX REGISTER 1
SET UP ADDRESSES FOR JCARD
REVERSE JCARD
SPEED
0011,
JCARD%LAST¤,
AREA&1,COUNT
CARD1
2000,AREA,ERROR
REVERSE JCARD
READING OR PUNCHING FINISHED
NO
YES
RESTORE INDEX REGISTER 1
EXIT



ADD
A1A3
A1DEC
A3A1
CARRY
DECA1
DIV
DPACK
DUNPK
EDIT
FILL
GET
ICOMP
IOND
KEYBD
MOVE
MPY
NCOMP
NSIGN
NZONE
PACK
PRINT
PUNCH
PUT
P1403
P1442
READ
R2501
SKIP
STACK
SUB
S1403
TYPER
UNPAC
WHOLE







```
// JOB                                                                  CSP00010
// ASM                                                                  CSP00020
* NAME ADD                                                      (ID)    CSP00030
** ADD/SUB SUBROUTINES FOR 1130 COMMERCIAL SUBROUTINE PACKAGE   (ID)    CSP00040
* LIST                                                                 CSP00050
0008    01104000          ENT     ADD  ADD SUBROUTINE ENTRY POINT      CSP00060
                  *          CALL ADD(JCARD,J,JLAST,KCARD,K,KLAST,NER)  CSP00070
                  *               THE FIELD JCARD(J) THROUGH           CSP00080
                  *               JCARD(JLAST) IS ADDED TO THE         CSP00090
                  *               FIELD KCARD(K) THROUGH               CSP00100
                  *               KCARD(KLAST).                        CSP00110
0000    22902000          ENT     SUB  SUBTRACT SUBROUTINE ENTRY POINT CSP00120
                  *          CALL SUB(JCARD,J,JLAST,KCARD,K,KLAST,NER)  CSP00130
                  *               THE FIELD JCARD(J) THROUGH           CSP00140
                  *               JCARD(JLAST) IS SUBTRACTED FROM      CSP00150
                  *               THE FIELD KCARD(K) THROUGH           CSP00160
                  *               KCARD(KLAST).                        CSP00170
0000 0  0000      SUB   DC        *-*  ARGUMENT ADDRESS COMES IN HERE.  CSP00180
0001 0  C0FE            LD      SUB  PICK UP ARGUMENT ADDRESS.          CSP00190
0002 0  D005            STO     ADD  STORE IT AT ADD.                   CSP00200
0003 0  C002            LD      IHFS LOAD THE INSTRUCTION TO CHANGE     CSP00210
0004 0  D028            STO     SWIT SIGN OF JCARD FOR SUBTRACT.        CSP00220
0005 0  7005            MDX     ADD+3 START COMPUTING.                  CSP00230
0006 0  F06E      IHFS  EOR   X   HFFFF-SWIT-1 CHANGE SIGN OF SUBTRHND  CSP00240
0007 0  7002      MDX   MDX       *+2  SKIP OVER NEXT INSTRUCTION.       CSP00250
0008 0  0000      ADD   DC        *-*  ARGUMENT ADDRESS COMES IN HERE.  CSP00260
0009 0  C0FD            LD      MDX  LOAD SKIP OVER INSTRUCTION.        CSP00270
000A 0  D022            STO     SWIT STORE IT AT SWIT.                  CSP00280
000B 0  6970            STX   1 SAVE1+1 SAVE IR1.                       CSP00290
000C 01 65800008        LDX   I1 ADD  PUT ARGUMENT ADDRESS IN IR1       CSP00300
000E 0  C100            LD    1 0    GET JCARD ADDRESS                  CSP00310
000F 00 95800002        S     I1 2    SUBTRACT JLAST VALUE              CSP00320
0011 0  D049            STO     DO+1 PLACE ADDRESS FOR ADD OR SUBTR     CSP00330
0012 0  8004            A       ONE+1 ADD CONSTANT OF ONE               CSP00340
0013 0  D017            STO     JPLUS+1 CREATE JCARD(JLAST) ADDRESS     CSP00350
0014 00 C5800002        LD    I1 2    GET JLAST VALUE                   CSP00360
0016 00 95800001  ONE   S     I1 1    SUBTRACT J VALUE                  CSP00370
0018 0  80FE            A       ONE+1 ADD CONSTANT OF ONE               CSP00380
0019 0  4808            BSC     +    SKIP IF POSITIVE                   CSP00390
001A 0  C0FC            LD      ONE+1 NEGATIVE OR ZERO-MAKE COUNT 1     CSP00400
001B 0  D03B            STO     COUNT+1 STORE JCARD LENGTH              CSP00410
001C 0  C103            LD    1 3    GET KCARD ADDRESS                  CSP00420
001D 0  D044            STO     KCRD1 PLACE IN CALLING SEQUENCE OF      CSP00430
001E 0  D062            STO     KCRD2 CARRY AND FILL SUBROUTINES        CSP00440
001F 00 95800005        S     I1 5    SUBTRACT KLAST VALUE              CSP00450
0021 0  D037            STO     KCRD3+1 PLACE LOAD ADDR FOR ADD/SUB     CSP00460
0022 0  D03A            STO     KCRD4+1 PLACE STORE ADDR FOR RESULT     CSP00470
0023 0  D04F            STO     KCRD5+1 PLACE SUBTRACT ADDRESS AND      CSP00480
0024 0  D050            STO     KCRD6+1 STORE ADDR FOR NEG CARRY        CSP00490
0025 0  80F1            A       ONE+1 ADD CONSTANT OF ONE               CSP00500
0026 0  D044            STO     KCRD7+1 PLACE ADDR FOR SIGN CHANGE      CSP00510
0027 0  D010            STO     KPLUS+1 PLACE ADDR OF SIGN OF KCARD     CSP00520
0028 0  C106            LD    1 6    GET NER ADDRESS                   CSP00530
0029 0  D05E            STO     ERA+1 SAVE NER ADDRESS                  CSP00540
                  *               CLEAR AND SAVE SIGNS ON JCARD         CSP00550
                  *               AND KCARD FIELDS.                     CSP00560
002A 00 C4000000  JPLUS LD    L   *-*  GET SIGN OF JCARD                CSP00570
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002C 0  D070            STO     JSIGN SAVE SIGN OF JCARD                CSP00580
002D 0  7002    SWIT    MDX     *+2  SKIP ON ADD=CHANGE SIGN ON SUBT    CSP00590
002E 01 D480002B        STO  I  JPLUS+1 STORE CHANGED SIGN OF JCARD     CSP00600
0030 01 4C100037        BSC  L  KPLUS,- DETERMINE SIGN OF JCARD         CSP00610
0032 0  F069            EOR     HFFFF NEGATIVE - MAKE POSITIVE          CSP00620
0033 01 D480002B        STO  I  JPLUS+1 STORE IT POSITIVE               CSP00630
0035 01 74010041        MDX  L  OP,1 CHANGE OPERATION - SEE OP & OPR    CSP00640
0037 00 C4000000 KPLUS  LD   L  *-*  GET SIGN OF KCARD                  CSP00650
0039 0  D064            STO     KSIGN SAVE SIGN OF KCARD                CSP00660
003A 01 4C100041        BSC  L  OP,- DETERMINE SIGN OF KCARD            CSP00670
003C 0  F05F            EOR     HFFFF NEGATIVE - MAKE POSITIVE          CSP00680
003D 01 D4800038        STO  I  KPLUS+1 STORE IT POSITIVE               CSP00690
003F 01 74010041        MDX  L  OP,1 CHANGE OPERATION - SEE OP & OPR    CSP00700
                *                       CALCULATE THE OPERATION.        CSP00710
                *                       INITIALLY THIS IS FOR ADD.  IT  CSP00720
                *                       CAN BE CHANGED UP TO TWO TIMES, CSP00730
                *                       FIRST TO SUBTRACT AND THEN BACK CSP00740
                *                       AGAIN TO ADD.  SEE OPR.         CSP00750
0041 0  C062    OP      LD      OPR  PICK UP OPERATION                  CSP00760
0042 0  D017            STO     DO   STORE IT AT DO                     CSP00770
0043 0  C063            LD      OPO  RESET THE PICK UP INSTRCTN TO +    CSP00780
0044 0  D0FC            STO     OP   WITH INSTRUCTION AT OPO            CSP00790
0045 0  C104            LD   1  4    GET ADDRESS OF K                   CSP00800
0046 0  D01C            STO     K1   STORE IT AT K1 FOR CARRY SUBRTN    CSP00810
0047 0  D03A            STO     K2   AND AT K2 FOR FILL SUBROUTINE      CSP00820
                *                       DETERMINE IF JCARD IS LONGER    CSP00830
                *                       THAN KCARD.  KLAST-JLAST+J=KNOW CSP00840
                *                       IS COMPARED TO K.  IF KNOW IS   CSP00850
                *                       GREATER THAN OR EQUAL TO K GO   CSP00860
                *                       TO KLAS3 FOR ERROR.             CSP00870
0048 00 C5800005        LD   I1 5    GET KLAST VALUE                    CSP00880
004A 0  D03B            STO     KLAS3+1 SAVE IT TO INDICATE ERROR       CSP00890
004B 00 95800004        S    I1 4    SUBTRACT K VALUE                   CSP00900
004D 0  D021            STO     COMP+1 SAVE FOR CMPLMNT ON NEG CARRY    CSP00910
004E 00 95800002        S    I1 2    SUBTRACT JLAST VALUE               CSP00920
0050 00 85800001        A    I1 1    ADD J VALUE                        CSP00930
0052 01 4C2800A0        BSC  L  RETAD,+Z IS JCARD LONGER THAN KCARD     CSP00940
0054 0  7107            MDX  1  7    NO-OK-MOVE OVER SEVEN ARGUMENTS    CSP00950
0055 0  6928            STX  1  DONE1+1 CREATE RETURN ADDRESS           CSP00960
                *                       SETUP JNOW                      CSP00970
0056 00 65000000 COUNT  LDX  L1 *-*  LOAD JCARD LENGTH TO IR1           CSP00980
                *                       KCARD(KNOW)=KCARD(KNOW) + OR -  CSP00990
                *                                  JCARD(JNOW)          CSP01000
0058 00 C5000000 KCRD3  LD   L1 *-*  LOAD KCARD(KNOW)                   CSP01010
005A 00 85000000 DO     A    L1 *-*  ADD OR SUBTRACT JCARD(JNOW)        CSP01020
005C 00 D5000000 KCRD4  STO  L1 *-*  STORE RESULT IN KCARD(KNOW)        CSP01030
                *                       KNOW=KNOW+1 AND SEE IF JNOW IS  CSP01040
                *                       GREATER THAN JLAST.  IF NOT,    CSP01050
                *                       JNOW=JNOW+1 AND GO BACK FOR     CSP01060
                *                       MORE.                           CSP01070
005E 0  71FF            MDX  1  -1   DECREMENT IR1                      CSP01080
005F 0  70F8            MDX     KCRD3 GO BACK FOR MORE                  CSP01090
                *                       RESOLVE CARRIES GENERATED       CSP01100
                *                       DURING OPERATION.               CSP01110
0060 30 03059668 AGAIN  CALL    CARRY GO TO CARRY SUBROUTINE            CSP01120
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0062 0  0000        KCRD1 DC      *-*  KCARD ADDRESS                          CSP01130
0063 0  0000        K1    DC      *-*  K ADDRESS                              CSP01140
0064 1  0087        KLAS1 DC      KLAS3+1 KLAST ADDRESS                       CSP01150
0065 1  0008              DC      ADD  ADDRESS TO HOLD ANY CARRY              CSP01160
                    *                  LET KNOW BE ANY RESULTING CARRY       CSP01170
                    *                  IF NEGATIVE, COMPLIMENT AND           CSP01180
                    *                  CHANGE THE SIGN OF KCARD.  IF         CSP01190
                    *                  ZERO, ALL DONE.  IF POSITIVE,         CSP01200
                    *                  OVERFLOW ERROR.                       CSP01210
0066 01 4C18008A           BSC  L  FIN,+- CHECK FOR ZERO-YES GO TO FIN         CSP01220
0068 01 4C100080          BSC  L  ERR9,- NO-CHECK FOR OVERFLOW-YES ERR9       CSP01230
006A 00 84000000    KCRD7 A    L  *-*  COMPLIMENT-ADD CARRY TO LOW            CSP01240
006C 01 D480006B          STO  I  KCRD7+1 ORDER AND STORE IT BACK             CSP01250
                    *                  COMPLIMENT - SUBTRACT EACH            CSP01260
                    *                  DIGIT FROM 9 AND CHANGE THE           CSP01270
                    *                  SIGN OF KCARD.                        CSP01280
006E 00 65000000    COMP  LDX  L1 *-*  LOAD IR1 WITH LENGTH OF KCARD         CSP01290
0070 0  7101              MDX   1 1    ADD 1 TO GET THE TRUE LENGTH           CSP01300
0071 0  C02E              LD     NINE LOAD A NINE.                           CSP01310
0072 00 95000000    KCRD5 S    L1 *-*  SUBTRACT KCARD(KNOW)                   CSP01320
0074 00 D5000000    KCRD6 STO  L1 *-*  PUT BACK IN KCARD(KNOW)               CSP01330
                    *                  SEE IF KNOW IS GREATER THAN           CSP01340
                    *                  KLAST.  IF NOT, KNOW=KNOW+1           CSP01350
0076 0  71FF              MDX   1 -1   DECREMENT IR1                         CSP01360
0077 0  7CF9              MDX    COMP+3 GO BACK FOR MORE                     CSP01370
0078 0  C026              LD     KSIGN                                       CSP01380
0079 0  F0FA              EOR    KCRD6                                       CSP01390
007A 0  D024              STO    KSIGN SET SIGN OF KCARD                     CSP01400
007B 0  70E4              MDX    AGAIN CHECK AGAIN FOR CARRIES               CSP01410
007C 00 65000000    SAVE1 LDX  L1 *-*  RESTORE IR1                           CSP01420
007E 00 4C000000    DONE1 BSC  L  *-*  RETURN TO CALLING PROGRAM             CSP01430
                    *                  ERROR - ERROR - OVERFLOW- - - -       CSP01440
0080 30 062534C0    ERR9  CALL     FILL FILL KCARD WITH NINES.                CSP01450
0082 0  0000        KCRD2 DC       *-*  ADDRESS OF KCARD                      CSP01460
0083 0  0000        K2    DC       *-*  ADDRESS OF K                          CSP01470
0084 1  0087        KLAS2 DC       KLAS3+1 ADDRESS KLAST                      CSP01480
0085 1  00A0              DC       NINE FILL CHARACTER                        CSP01490
0086 00 65000000    KLAS3 LDX  L1 *-*  PICK UP KLAST VALUE                   CSP01500
0088 00 6D000000    ERA   STX  L1 *-*  STORE VALUE AT NER                     CSP01510
                    *                  RESTORE SIGNS ON JCARD AND            CSP01520
                    *                  KCARD FIELDS                          CSP01530
008A 0  C013        FIN   LD       JSIGN PICK UP SIGN OF JCARD                CSP01540
008B 01 D480002B          STO  I   JPLUS+1 AND RESTORE IT                     CSP01550
008D 0  C011              LD       KSIGN PICK UP SIGN OF KCARD               CSP01560
008E 01 4C280095          BSC  L   NEG,+Z CHECK FOR PLUS OR MINUS            CSP01570
0090 01 C4800038          LD   I   KPLUS+1 PLUS-GET NEW SIGN AND             CSP01580
0092 01 4C280099          BSC  L   REV,+Z REVERSE IT IF NEGATIVE             CSP01590
0094 0  70E7              MDX      SAVE1 POSITIVE-ALL DONE-GO TO EXIT..      CSP01600
0095 01 C4800038    NEG   LD   I   KPLUS+1 MINUS-GET NEW SIGN AND            CSP01610
0097 01 4C28007C          BSC  L   SAVE1,+Z GO TO EXIT IF NOT NEGATIVE       CSP01620
0099 0  F003        REV   EOR      HFFFF REVERSE THE SIGN                     CSP01630
009A 01 D4800038          STO  I   KPLUS+1 STORE IT BACK                     CSP01640
009C 0  70DF              MDX      SAVE1 ALL DONE-GO TO EXIT.............    CSP01650
009D 0  FFFF        HFFFF DC       /FFFF CONSTANT OF ALL BINARY ONES          CSP01660
009E 0  0000        JSIGN DC       *-*  SIGN OF JCARD                        CSP01670
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009F 0  0000        KSIGN DC       *-*  SIGN OF KCARD                         CSP01680
00A0 0  0009        NINE  DC       9    CONSTANT OF NINE                      CSP01690
00A1 0  7107        RETAD MDX   1  7          MOVE OVER SEVEN ARGUMENTS      CSP01700
00A2 0  69DC              STX   1  DONE1+1 CREATE RETURN ADDRESS              CSP01710
00A3 01 4C000086          BSC  L   KLAS3   GO TO KLAS3                       CSP01720
00A5 00 85000000    OPR   A    L1 *-*  ADD FOR ADD OR SUBTRACT OPERATN        CSP01730
00A7                      ORG      OPR+1 RESET THE ADDRESS COUNTER           CSP01740
00A6 00 95000000          S    L1 *-*  SUBTR FOR ADD OR SUBTR OPRATN         CSP01750
00A8                      ORG      OPR+2 RESET THE ADDRESS COUNTER           CSP01760
00A7 00 85000000          A    L1 *-*  ADD FOR ADD OR SUBTRACT OPERATN       CSP01770
00A9                      ORG      OPR+3 RESET THE ADDRESS COUNTER           CSP01780
00A8 0  C063        OPO   LD   X   OPR-OP-1 FOR RESETING THE INSTRCTN        CSP01790
                    *                  AT OP TO ITS INITIAL STATE..          CSP01800
00AA                      END                                                CSP01810
```

NO ERRORS IN ABOVE ASSEMBLY.

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// DUP                                                                      CSP01820
*STORE      WS  UA  ADD                                                     CSP01830
3418 000C
```

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// ASM                                                                  CSP01840
** A1A3/A3A1 SUBROUTINES FOR 1130 COMMERCIAL SUBROUTINE PACKAGE    (ID) CSP01850
* NAME A1A3                                                          (ID) CSP01860
* LIST                                                                    CSP01870
0000     01C41CC0          ENT     A1A3 A1A3 SUBROUTINE ENTRY POINT       CSP01880
                     *     CALL A1A3(JCARD,J,JLAST,KCARD,K,ICHAR)         CSP01890
                     *          THE WORDS JCARD(J) THROUGH                CSP01900
                     *          JCARD(JLAST) IN A1 FORMAT ARE             CSP01910
                     *          CRAMMED INTO KCARD IN A3 FORMAT.          CSP01920
0006     01CC1C40          ENT     A3A1 A3A1 SUBROUTINE ENTRY POINT       CSP01930
                     *     CALL A3A1(JCARD,J,JLAST,KCARD,K,ICHAR)         CSP01940
                     *          THE WORDS JCARD(J) THROUGH                CSP01950
                     *          JCARD(JLAST) IN A3 FORMAT ARE             CSP01960
                     *          UNCRAMMED INTO KCARD IN A1 FORMAT.        CSP01970
0000 0   0000      A1A3  DC      *-* ARGUMENT ADDRESS COMES IN HERE       CSP01980
0001 0   C002            LD      SW1 LOAD BRANCH TO ELSE                  CSP01990
0002 0   D02A            STO     SWTCH STORE BRANCH AT SWITCH             CSP02000
0003 0   7007            MDX     START  START COMPUTING                   CSP02010
0004 0   7021      SW1   MDX  X  ELSE-SWTCH-1  BRANCH TO ELSE            CSP02020
0005 0   7000      SW2   MDX  X  0  NOP INSTRUCTION                       CSP02030
0006 0   0000      A3A1  DC      *-* ARGUMENT ADDRESS COMES IN HERE       CSP02040
0007 0   C0FE            LD      A3A1 PICK UP ARGUMENT ADDRESS AND        CSP02050
0008 0   D0F7            STO     A1A3 STORE IT IN A1A3                    CSP02060
0009 0   C0FB            LD      SW2  LOAD NOP INSTRUCTION                CSP02070
000A 0   D022            STO     SWTCH  STORE NOP AT SWITCH               CSP02080
000B 0   6965      START STX    1 SAVE1+1  SAVE IR1                       CSP02090
000C 0   6A66            STX    2 SAVE2+1  SAVE IR2                       CSP02100
000D 0   6B67            STX    3 SAVE3+1  SAVE IR3                       CSP02110
000E 01  65800000        LDX   I1 A1A3 PUT ARGUMENT ADDRESS IN IR1        CSP02120
0010 0   C100            LD     1 0  GET JCARD ADDRESS                    CSP02130
0011 00  95800002        S     I1 2  SUBTRACT JLAST VALUE                 CSP02140
0013 0   D018            STO     JCARD+1  CREATE JCARD(J) ADDRESS         CSP02150
0014 0   D03F            STO     OVR1+1   STORE JCARD(J) ADDRESS          CSP02160
0015 0   D044            STO     OVR2+1   STORE JCARD(J) ADDRESS          CSP02170
0016 0   C103            LD     1 3  GET KCARD ADDRESS                    CSP02180
0017 0   8006            A       ONE+1  ADD CONSTANT OF 1                 CSP02190
0018 00  95800004        S     I1 4  SUBTRACT K VALUE                     CSP02200
001A 0   D00D            STO     KCARD+1  CREATE KCARD(K) ADDRESS         CSP02210
001B 00  C5800002        LD    I1 2  GET JLAST VALUE                      CSP02220
001D 00  95800001  ONE   S     I1 1  SUBTRACT J VALUE                     CSP02230
001F 0   80FE            A       ONE+1  ADD CONSTANT OF 1                 CSP02240
0020 0   D009            STO     CNT+1  CREATE FIELD WIDTH                CSP02250
0021 0   C105            LD     1 5  GET ICHAR ADDRESS                    CSP02260
0022 0   9028            S       D40    SUBTRACT CONSTANT OF 40           CSP02270
0023 0   D060            STO     TABLE+1  CREATE TABLE END ADDRESS        CSP02280
0024 0   D066            STO     TCODE+1  STORE TABLE END ADDRESS         CSP02290
0025 0   7106            MDX    1 6  ADJUST OVER 6 ARGUMENTS              CSP02300
0026 0   6950            STX    1 DONE1+1  CREATE RETURN ADDRESS          CSP02310
0027 00  65000000  KCARD LDX   L1 *-*  PUT KCARD ADDRESS IN IR1           CSP02320
0029 00  66000000  CNT   LDX   L2 *-*  PUT FIELD WIDTH IN IR2             CSP02330
002B 00  C6000000  JCARD LD    L2 *-*  PICK UP JCARD(J)                   CSP02340
002D 0   7000      SWTCH MDX   X  0  SWITCH BETWEEN CRAM AND UNCM        CSP02350
002E 01  4C280047        BSC   L  MINUS,+Z  TEST SIGN OF INTEGER          CSP02360
0030 0   1890            SRT     16   SHIFT INTEGER TO EXTENSION          CSP02370
0031 0   A81B            D       D1600 DIVIDE BY 1600                     CSP02380
0032 0   801B            A       D20  ADJUST FIRST VALUE                 CSP02390
0033 0   D0D2      HOLD  STO     A3A1 SAVE FIRST CHARACTER VALUE          CSP02400
```

ADD
A1A3
A1DEC
A3A1
CARRY
DECA1
DIV
DPACK
DUNPK
EDIT
FILL
GET
ICOMP
IOND
KEYBD
MOVE
MPY
NCOMP
NSIGN
NZONE
PACK
PRINT
PUNCH
PUT
P1403
P1442
READ
R2501
SKIP
STACK
SUB
S1403
TYPER
UNPAC
WHOLE


```
0034 0  1810              SRA     16   ZERO ACCUMULATOR                    CSP02410
0035 0  A815              D       D40  DIVIDE BY 40                        CSP02420
0036 0  D0C9              STO     A1A3 SAVE SECOND CHARACTER VALUE         CSP02430
0037 0  1090              SLT     16 SHIFT THIRD CHAR VALUE TO ACCUM       CSP02440
0038 01 4400007E          BSI  L  DECOD DECODE THIRD CHARACTER             CSP02450
003A 0  D1FE              STO   1 -2   STORE THIRD CHARACTER               CSP02460
003B 0  C0C4              LD      A1A3 GET SECOND CHARACTER                CSP02470
003C 01 4400007E          BSI  L  DECOD DECODE SECOND CHARACTER            CSP02480
003E 0  D1FF              STO   1 -1   STORE SECOND CHARACTER              CSP02490
003F 0  C0C6              LD      A3A1 GET FIRST CHARACTER                 CSP02500
0040 01 4400007E          BSI  L  DECOD DECODE FIRST CHARACTER             CSP02510
0042 0  D100              STO   1 0    STORE FIRST CHARACTER               CSP02520
0043 0  71FD              MDX   1 -3   DECREMENT A1 OUT ARRAY              CSP02530
0044 0  72FF              MDX   2 -1   DECREMENT FIELD WIDTH               CSP02540
0045 0  70E5              MDX     JCARD FIELD WIDTH IS NOT ZERO            CSP02550
0046 0  7029              MDX     SAVE1 GO TO RESTORE AND RETURN           CSP02560
0047 0  8004        MINUS A       D32K ADJUST FOR NEGATIVE INTEGER         CSP02570
0048 0  1890              SRT     16   SHIFT INTEGER TO EXTENSION          CSP02580
0049 0  A803              D       D1600 DIVIDE BY 1600                     CSP02590
004A 0  70E8              MDX     HOLD GO TO GET THE REMAINING INTEGERS    CSP02600
004B 0  0028        D40   DC      40   CONSTANT OF 40                      CSP02610
004C 0  7D00        D32K  DC      32000 CONSTANT OF 32000                  CSP02620
004D 0  0640        D1600 DC      1600 CONSTANT OF 1600                    CSP02630
004E 0  0014        D20   DC      20   CONSTANT OF 20                      CSP02640
004F 0  D0B6        ELSE  STO     A3A1 STORE FIRST A1 CHARACTER            CSP02650
0050 0  72FF              MDX   2 -1   DECREMENT FIELD WIDTH               CSP02660
0051 0  7001              MDX     OVR1 GO TO GET NEXT CHARACTER            CSP02670
0052 0  7025              MDX     FILL1 LAST CHARACTER-FILL WITH BLANK     CSP02680
0053 00 C6000000    OVR1  LD    L2 *-*  GET SECOND CHARACTER                CSP02690
0055 0  D0AA              STO     A1A3 STORE SECOND CHARACTER              CSP02700
0056 0  72FF              MDX   2 -1   DECREMENT FIELD WIDTH               CSP02710
0057 0  7001              MDX     OVR2 GO TO GET NEXT CHARACTER            CSP02720
0058 0  7021              MDX     FILL2 LAST CHARACTER-FILL BLANK          CSP02730
0059 00 C6000000    OVR2  LD    L2 *-*  GET THIRD CHARACTER                 CSP02740
005B 01 44000087    RET   BSI  L  CODE CODE CHARACTER TO NUMBER             CSP02750
005D 0  D0CA              STO     KCARD&1 SAVE NUMBR OF THIRD CHARACTER    CSP02760
005E 0  C0A1              LD      A1A3 GET SECOND CHARACTER                CSP02770
005F 01 44000087          BSI  L  CODE CODE SECOND CHARACTER               CSP02780
0061 0  A0E9              M       D40  MULTIPLY BY 40 AND                  CSP02790
0062 0  1090              SLT     16   SHIFT TO ACCUMULATOR                CSP02800
0063 0  80C4              A       KCARD+1 ADD NUMBER(THIRD) AND            CSP02810
0064 0  D0C3              STO     KCARD+1 SAVE RESULTING INTEGER           CSP02820
0065 0  C0A0              LD      A3A1 GET FIRST CHARACTER                 CSP02830
0066 01 44000087          BSI  L  CODE CODE FIRST CHARACTER                CSP02840
0068 0  90E5              S       D20  SUBTRACT 20                         CSP02850
0069 0  A0E3              M       D1600 MULTIPLY BY 1600                   CSP02860
006A 0  1090              SLT     16   SHIFT TO ACCUMULATOR                CSP02870
006B 0  80BC              A       KCARD+1 ADD IN PREVIOUS RESULT           CSP02880
006C 0  D100              STO   1 0    STORE IN A3 ARRAY                   CSP02890
006D 0  71FF              MDX   1 -1   NEXT WORD IN A3 ARRAY               CSP02900
006E 0  72FF              MDX   2 -1   DECREMENT FIELD WIDTH               CSP02910
006F 0  70BB              MDX     JCARD GET MORE A1 CHARACTERS             CSP02920
0070 00 65000000    SAVE1 LDX   L1 *-*  RESTORE IR1                       CSP02930
0072 00 66000000    SAVE2 LDX   L2 *-*  RESTORE IR2                       CSP02940
0074 00 67000000    SAVE3 LDX   L3 *-*  RESTORE IR3                       CSP02950
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0076 00 4C000000    DONE1 BSC  L  *-*  RETURN TO CALLING PROGRAM          CSP02960
0078 0  C004        FILL1 LD      H4040 FILL WITH TWO BLANKS               CSP02970
0079 0  D086              STO     A1A3 STORE SECOND CHARACTER BLANK        CSP02980
007A 0  C002        FILL2 LD      H4040 FILL WITH ONE BLANK                CSP02990
007B 0  7201              MDX   2 1    SET IR1 TO 1                       CSP03000
007C 0  70DE              MDX     RET  GO TO CODE ROUTINE                  CSP03010
007D 0  4040        H4040 DC      /4040 CONSTANT OF A1 BLANK               CSP03020
007E 0  0000        DECOD DC      *-*  DECODE RETURN ADDRESS GOES HERE     CSP03030
007F 0  809E              A       ONE+1 ADD ONE TO NUMBER GIVING           CSP03040
0080 0  D001              STO     PLACE+1 SUBSCRIPT OF TABLE AND SAVE      CSP03050
0081 00 67000000    PLACE LDX   L3 *-*  LOAD IR3 WITH SUBSCRIPT OF TABLE   CSP03060
0083 00 C7000000    TABLE LD    L3 *-*  GET A1 CHARACTER                    CSP03070
0085 01 4C80007E          BSC  I  DECOD RETURN                             CSP03080
0087 0  0000        CODE  DC      *-*  CODE RETURN ADDRESS GOES HERE       CSP03090
0088 0  D0F5              STO     DECOD SAVE THE CHARACTER TO BE CODED     CSP03100
0089 0  6328              LDX   3 40 LOAD IR3 WITH THE TABLE LENGTH-40     CSP03110
008A 00 C7000000    TCODE LD    L3 *-*  LOAD CHARACTER FROM ICHAR ARRAY     CSP03120
008C 0  F0F1              EOR     DECOD ZERO ACCUMULATOR IF MATCH          CSP03130
008D 01 4C200094          BSC  L  OUT,Z GO TO PUT IF NOT ZERO              CSP03140
008F 0  6BEE        AWAY  STX   3 DECOD SAVE SUBSCRIPT OF MATCH            CSP03150
0090 0  C0ED              LD      DECOD LOAD SUBSCRIPT                     CSP03160
0091 0  908C              S       ONE+1 SUBTRACT ONE GIVING NUMBER         CSP03170
0092 01 4C800087          BSC  I  CODE RETURN                              CSP03180
0094 0  73FF        OUT   MDX   3 -1 DECREMENT THROUGH THE TABLE-ICHAR     CSP03190
0095 0  70F4              MDX     TCODE GO TRY AGAIN                       CSP03200
0096 0  C0E6              LD      H4040 NOT IN THE TABLE - LOAD A BLANK    CSP03210
0097 0  70F0              MDX     CODE+1 GO BACK TO CODE THE BLANK....     CSP03220
0098                      END                                              CSP03230
```

NO ERRORS IN ABOVE ASSEMBLY.

```
// DUP
*STORE      WS  UA  A1A3                                                   CSP03240
3332 000A                                                                  CSP03250
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```
// ASM                                                                  CSP03260
** A1DEC SUBROUTINE FOR 1130 COMMERCIAL SUBROUTINE PACKAGE          (ID) CSP03270
* NAME A1DEC                                                        (ID) CSP03280
* LIST                                                                 CSP03290
0001    01C44143          ENT     A1DEC A1DEC SUBROUTINE ENTRY POINT   CSP03300
                  *                     CALL A1DEC(JCARD,J,JLAST,NER)  CSP03310
                  *                     THE WORDS JCARD(J) THROUGH     CSP03320
                  *                     JCARD(JLAST) ARE CONVERTED FROM CSP03330
                  *                     A1 FORMAT TO D1 FORMAT AND THE CSP03340
                  *                     ORIGINAL DATA IS REPLACED BY THE CSP03350
                  *                     CONVERTED DATA.                CSP03360
0000 0  0004      FOUR    DC      4     CONSTANT OF FOUR               CSP03370
0001 0  0000      A1DEC   DC      *-*   ARGUMENT ADDRESS COMES IN HERE CSP03380
0002 0  6941              STX   1 SAVE1+1 SAVE IR1                     CSP03390
0003 01 65800001          LDX   I1 A1DEC PUT ARGUMENT ADDRESS IN IR1   CSP03400
0005 0  C100              LD    1 0     GET JCARD ADDRESS              CSP03410
0006 0  D017              STO     JCRD1 SETUP JCARD ADDRESS FOR NZONE  CSP03420
0007 00 95800002  TWO     S     I1 2    SUBTRACT JLAST VALUE           CSP03430
0009 0  D01B              STO     PICK+1 PLACE LOAD ADDRESS FOR CONVRS CSP03440
000A 0  D02C              STO     PUT+1 PLACE STORE ADDRESS FOR CONVRS CSP03450
000B 0  8007              A       ONE+1 ADD CONSTANT OF ONE            CSP03460
000C 0  D033              STO     LAST+1 PLACE ADDRESS OF SIGN POSITON CSP03470
000D 0  C102              LD    1 2     GET JLAST ADDRESS              CSP03480
000E 0  D010              STO     JLAS1 SETUP JLAST ADDRESS FOR NZONE  CSP03490
000F 01 C480001F          LD    I JLAS1 GET JLAST VALUE AND            CSP03500
0011 0  D0EF              STO     A1DEC SAVE IT AT A1DEC               CSP03510
0012 00 95800001  ONE     S     I1 1    SUBTRACT J VALUE               CSP03520
0014 0  80FE              A       ONE+1 ADD CONSTANT OF ONE            CSP03530
0015 0  4808              BSC     +     CHECK FIELD WIDTH              CSP03540
0016 0  C0FC              LD      ONE+1 ZERO OR NEGATIVE-MAKE IT ONE   CSP03550
0017 0  D00B              STO     COUNT+1 OK-SAVE WIDTH IN COUNT       CSP03560
0018 0  C103              LD    1 3     GET NER ADDRESS                CSP03570
0019 0  D016              STO     ERA+1 SAVE IT                        CSP03580
001A 0  7104              MDX   1 4     MOVE OVER FOUR ARGUMENTS       CSP03590
001B 0  692A              STX   1 DONE1+1 CREATE RETURN ADDRESS        CSP03600
                  *                     REMOVE AND SAVE THE SIGN       CSP03610
001C 30 15A56545          CALL    NZONE REMOVE THE ZONE OVER LOW ORDER CSP03620
001E 0  0000      JCRD1   DC      *-*   ADDRESS OF JCARD               CSP03630
001F 0  0000      JLAS1   DC      *-*   ADDRESS OF JLAST               CSP03640
0020 1  0000              DC      FOUR ADDRESS OF CONSTANT OF FOUR     CSP03650
0021 1  001E              DC      JCRD1 ADDRESS OF OLD ZONE            CSP03660
                  *                     JNOW=J                         CSP03670
0022 00 65000000  COUNT   LDX   L1 *-*  LOAD IR1 WITH FIELD WIDTH      CSP03680
                  *                     JTEST=JCARD(JNOW)              CSP03690
0024 00 C5000000  PICK    LD    L1 *-*  PICK UP JCARD(JNOW) AND        CSP03700
0026 01 4C100032          BSC   L  POS,- CHECK IT AGAINST ZERO          CSP03710
0028 0  901E              S       ZERO NEGATIVE-IS IT LESS THAN        CSP03720
0029 01 4C100035          BSC   L  OK,- AN EBCDIC ZERO                 CSP03730
                  *                     NER=JNOW                       CSP03740
002B 0  69F7      ERR     STX     1 COUNT+1 YES - ERROR                CSP03750
002C 0  C0D4              LD      A1DEC COMPUTE THE SUBSCRIPT          CSP03760
002D 0  90F5              S       COUNT+1 OF THIS CHARACTER IN         CSP03770
002E 0  80E4              A       ONE+1 THE ARRAY AND                  CSP03780
002F 00 D4000000  ERA     STO   L  *-*  STORE THE SUBSCRIPT AT NER     CSP03790
0031 0  7006              MDX     MORE GO GET THE NEXT CHARACTER       CSP03800
0032 0  9015      POS     S       BLANK NOT NEGATIVE - IS IT AN        CSP03810
0033 01 4C20002B          BSC   L  ERR,Z EBCDIC BLANK                  CSP03820
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                                                                PAGE   2
                  *                     JTEST + 4032 IS NOW IN ACCUM   CSP03830
                  *                     SHIFT 8 IS SAME AS DIVIDE BY 256 CSP03840
0035 0  1808      OK      SRA     8     EITHER BLANK OR DIGIT - PUT    CSP03850
0036 00 D5000000  PUT     STO   L1 *-*  THE FOUR BITS OF DECIMAL BACK  CSP03860
                  *                     SEE IF JNOW IS LESS THAN JLAST. CSP03870
                  *                     IF YES, JNOW=JNOW+1 AND GO BACK CSP03880
                  *                     FOR MORE.  IF NO, SET UP THE   CSP03890
                  *                     SIGN.                          CSP03900
0038 0  71FF      MORE    MDX     1 -1  DECREMENT THE FIELD WIDTH      CSP03910
0039 0  70EA              MDX     PICK GO BACK FOR MORE                CSP03920
                  *                     WAS THE ORIGINAL SIGN INDICATION CSP03930
                  *                     TWO.  IF NOT, ALL DONE.  IF YES CSP03940
                  *                     MAKE THE SIGN NEGATIVE.        CSP03950
                  *                     JCARD(JLAST)=-JCARD(JLAST) - 1 CSP03960
003A 0  C0E3              LD      JCRD1 PICK UP THE OLD ZONE AND       CSP03970
003B 0  90CC              S       TWO+1 CHECK IT AGAINST TWO           CSP03980
003C 01 4C200043          BSC   L  SAVE1,Z IF NO MATCH GO TO EXIT      CSP03990
003E 0  90D4              S       ONE+1 IF MATCH, MAKE THE             CSP04000
003F 00 F4000000  LAST    EOR   L  *-*  SIGN NEGATIVE(LOW ORDER) AND  CSP04010
0041 01 D4800040          STO   I  LAST+1 STORE IT BACK                CSP04020
                  *                     EXIT.......................... CSP04030
0043 00 65000000  SAVE1   LDX   L1 *-*  RESTORE IR1                   CSP04040
0045 00 4C000000  DONE1   BSC   L  *-*  RETURN TO CALLING PROGRAM      CSP04050
0047 0  F040      ZERO    DC      /F040 CONSTANT OF EBCDIC ZERO        CSP04060
0048 0  4040      BLANK   DC      /4040 CONSTANT OF EBCDIC BLANK       CSP04070
004A                      END                                          CSP04080

   NO ERRORS IN ABOVE ASSEMBLY.
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// DUP                                                                  CSP04090
*STORE      WS  UA  A1DEC                                              CSP04100
333C 0005
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// ASM                                                                  CSP04110
** CARRY SUBROUTINE FOR 1130 COMMERCIAL SUBROUTINE PACKAGE        (ID) CSP04120
* NAME CARRY                                                      (ID) CSP04130
* LIST                                                                 CSP04140
0000     03059668          ENT     CARRY CARRY SUBROUTINE ENTRY POINT  CSP04150
                     *                    CALL CARRY(JCARD,J,JLAST,KARRY) CSP04160
                     *                    THE WORDS JCARD(J) THROUGH      CSP04170
                     *                    JCARD(JLAST) ARE CHECKED TO SEE CSP04180
                     *                    THAT THEY ARE BETWEEN ZERO AND  CSP04190
                     *                    NINE.  IF THEY ARE NOT, THE     CSP04200
                     *                    UNITS DIGIT REMAINS AND THE TENS CSP04210
                     *                    DIGIT IS TREATED AS A CARRY TO  CSP04220
                     *                    THE NEXT WORD.                  CSP04230
0000 0   0000      CARRY DC      *-* ARGUMENT ADDRESS COMES IN HERE      CSP04240
0001 0   6930            STX   1 SAVE1+1 SAVE IR1                        CSP04250
0002 01  65800000        LDX   I1 CARRY PUT ARGUMENT ADDRESS IN IR1      CSP04260
0004 0   C100            LD    1 0     GET JCARD ADDRESS                 CSP04270
0005 00  95800002        S     I1 2     SUBTRACT JLAST VALUE              CSP04280
0007 0   8004            A       ONE+1 ADD CONSTANT OF ONE               CSP04290
0008 0   D011            STO     SRCE+1 CREATE JCARD(JLAST) ADDRESS      CSP04300
0009 00  C5800002        LD    I1 2     GET JLAST VALUE                  CSP04310
000B 00  95800001  ONE   S     I1 1     SUBTRACT J VALUE                 CSP04320
000D 0   80FE            A       ONE+1 ADD CONSTANT OF ONE               CSP04330
000E 0   4808            BSC     +     CHECK FIELD WIDTH                 CSP04340
000F 0   C0FC            LD      ONE+1 ZERO OR NEGATIVE-MAKE IT ONE      CSP04350
0010 0   D007            STO     COUNT+1 OK-SAVE WIDTH IN COUNT          CSP04360
0011 0   C103            LD    1 3     GET KARRY ADDRESS                 CSP04370
0012 0   D01D            STO     OVF+1 AND SAVE IT                       CSP04380
0013 0   7104            MDX   1 4     MOVE OVER FOUR ARGUMENTS          CSP04390
0014 0   691F            STX   1 DONE1+1 CREATE RETURN ADDRESS           CSP04400
0015 0   10A0            SLT     32    CLEAR THE ACCUMULATOR AND EXTEN   CSP04410
                     *                    LET CARRY BE THE SAME AS NCARY  CSP04420
0016 0   D0E9            STO     CARRY SET NCARY TO ZERO                 CSP04430
0017 00  65000000  COUNT LDX   L1 *-*   LOAD IR1 WITH THE FIELD WIDTH     CSP04440
                     *                    THE NEXT INSTRUCTION STARTS OUT CSP04450
                     *                    BY PICKING UP JCARD(JLAST).     CSP04460
                     *                    THE SUBSCRIPT IS DECREMENTED BY CSP04470
                     *                    THE INSTRUCTION AFTER POSZ.     CSP04480
                     *                    THE CALCULATIONS ARE..          CSP04490
                     *                    JTEST=JCARD(JNOW)+NCARY         CSP04500
                     *                    NCARY=JTEST/10                  CSP04510
                     *                    JTEST=JTEST-10*NCARY            CSP04520
0019 00  C4000000  SRCE  LD    L *-*   PICK UP JCARD(JNOW)                CSP04530
001B 0   80E4            A       CARRY ADD THE PREVIOUS CARRY TO IT      CSP04540
001C 0   1890            SRT     16    SHIFT THE ACCUM TO THE EXTENTON   CSP04550
001D 0   A817            D       TEN   DIVIDE BY TEN AND                 CSP04560
001E 0   D0E1            STO     CARRY STORE THE QUOTIENT AT NCARY       CSP04570
                     *                    THE QUOTIENT IS THE GENERATED   CSP04580
                     *                    CARRY.                          CSP04590
001F 0   1090            SLT     16    PUT REMAINDER IN ACCUMULATOR AN   CSP04600
0020 01  4C100028        BSC   L POSZ,- CHECK TO SEE IF NEGATIVE-NO-     CSP04610
                     *                    GO TO POSZ.....                 CSP04620
0022 0   8012            A       TEN   YES - COMPLIMENT BY ADDING TEN    CSP04630
0023 0   1890            SRT     16    STORE TEMPORARILY IN EXTENTION    CSP04640
0024 0   C0DB            LD      CARRY LOAD NCARY                        CSP04650
0025 0   90E6            S       ONE+1 AND SUBTRACT                      CSP04660
0026 0   D0D9            STO     CARRY ONE FROM IT                       CSP04670
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                     *                    JCARD(JNOW)=JTEST               CSP04680
0027 0   1090            SLT     16    SHIFT COMPLIMENTED REMAINDER      CSP04690
                     *                    BACK TO ACCUMULATOR             CSP04700
0028 01  D480001A  POSZ  STO   I  SRCE+1 AND STORE IN RESULT              CSP04710
                     *                    JNOW=JNOW-1                     CSP04720
002A 01  7401001A        MDX   L  SRCE+1,1 GO TO NEXT DIGIT OF JCARD      CSP04730
                     *                    IF JNOW IS LESS THAN J, ALL     CSP04740
                     *                    DONE.  OTHERWISE, GET THE NEXT  CSP04750
                     *                    DIGIT.                          CSP04760
002C 0   71FF            MDX     1 -1  DECREMENT THE FIELD WIDTH         CSP04770
002D 0   70EB            MDX     SRCE GO BACK FOR NEXT DIGIT             CSP04780
                     *                    KARRY=NCARY                     CSP04790
002E 0   C0D1            LD      CARRY ALL DONE - PICK UP ANY            CSP04800
002F 00  D4000000  OVF   STO   L *-*   GENERATED CARRY AND STORE IT      CSP04810
                     *                    AR KARRY.  EXIT.....            CSP04820
0031 00  65000000  SAVE1 LDX   L1 *-*   RESTORE IR1                      CSP04830
0033 00  4C000000  DONE1 BSC   L  *-*   RETURN TO CALLING PROGRAM        CSP04840
0035 0   000A      TEN   DC      10    CONSTANT OF TEN                   CSP04850
0036              END                                                    CSP04860

    NO ERRORS IN ABOVE ASSEMBLY.


// DUP                                                                  CSP04870
*STORE      WS  UA  CARRY                                              CSP04880
3341 0004
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// ASM                                                                  CSP04890
** DECA1 SUBROUTINE FOR 1130 COMMERCIAL SUBROUTINE PACKAGE          (ID) CSP04900
* NAME DECA1                                                         (ID) CSP04910
* LIST                                                                 CSP04920
0000     04143071          ENT     DECA1 DECA1 SUBROUTINE ENTRY POINT   CSP04930
                     *                CALL DECA1(JCARD,J,JLAST,NER)       CSP04940
                     *                THE WORDS JCARD(J) THROUGH          CSP04950
                     *                JCARD(JLAST) ARE CONVERTED FROM     CSP04960
                     *                D1 FORMAT TO A1 FORMAT AND THE      CSP04970
                     *                ORIGINAL DATA IS REPLACED BY THE    CSP04980
                     *                CONVERTED DATA.                     CSP04990
0000 0   0000        DECA1 DC        *-*  ARGUMENT ADDRESS COMES IN HERE   CSP05000
0001 0   6942              STX   1 SAVE1+1 SAVE IR1                       CSP05010
0002 01  65800000          LDX   I1 DECA1 PUT ARGUMENT ADDRESS IN IR1     CSP05020
0004 0   C100              LD    1 0    GET JCARD ADDRESS                 CSP05030
0005 0   D039              STO     JCRD1 SETUP JCARD ADDRESS FOR NZONE    CSP05040
0006 00  95800002    TWO   S     I1 2    SUBTRACT JLAST VALUE              CSP05050
0008 0   D020              STO     PICK+1 PLACE LOAD ADDRESS FOR CONVRSN  CSP05060
0009 0   D030              STO     PUT+1 PLACE STORE ADDRESS FOR CONVRSN  CSP05070
000A 0   8007              A       ONE+1 ADD CONSTANT OF ONE              CSP05080
000B 0   D010              STO     TEST+1 CREATE JCARD(JLAST) ADDRESS     CSP05090
000C 0   C102              LD    1 2    GET JLAST ADDRESS                 CSP05100
000D 0   D032              STO     JLAS1 SETUP JLAST ADDRESS FOR NZONE    CSP05110
000E 01  C4800040          LD    I JLAS1 GET JLAST VALUE AND              CSP05120
0010 0   D0EF              STO     DECA1 SAVE IT AT DECA1                 CSP05130
0011 00  95800001    ONE   S     I1 1    SUBTRACT J VALUE                  CSP05140
0013 0   80FE              A       ONE+1 ADD CONSTANT OF ONE              CSP05150
0014 0   4808              BSC     +    CHECK FIELD WIDTH                 CSP05160
0015 0   C0FC              LD      ONE+1 NEGATIVE OR ZERO-MAKE IT ONE     CSP05170
0016 0   D010              STO     COUNT+1 OK-SAVE WIDTH IN COUNT         CSP05180
0017 0   C103              LD    1 3    GET NER ADDRESS                   CSP05190
0018 0   D018              STO     ERA+1 SAVE IT                          CSP05200
0019 0   7104              MDX   1 4    MOVE OVER FOUR ARGUMENTS          CSP05210
001A 0   692B              STX   1 DONE1+1 CREATE RETURN ADDRESS          CSP05220
                     *                CHECK THE SIGN OF JCARD.  IF        CSP05230
                     *                NEGATIVE, SET JSIGN=2, AND MAKE     CSP05240
                     *                IT POSITIVE.  OTHERWISE, SET        CSP05250
                     *                JSIGN=4                             CSP05260
001B 00  C4000000    TEST  LD    L   *-*  GET JCARD(JLAST)                 CSP05270
001D 01  4C280021          BSC   L NEG,+Z CHECK FOR NEGATIVE              CSP05280
001F 0   C027              LD      FOUR NO - LOAD FOUR                    CSP05290
0020 0   7004              MDX     GO   SKIP OVER NEGATIVE PROCESSING     CSP05300
0021 0   F026        NEG   EOR     HFFFF YES - CHANGE SIGN TO POSITIVE    CSP05310
0022 01  D480001C          STO   I TEST+1 RESTORE SIGN AS POSITIVE        CSP05320
0024 0   C0E2              LD      TWO+1 LOAD TWO                         CSP05330
0025 0   D0F6        GO    STO     TEST+1 STORE ACCUMULATOR TO SAVE SIGN  CSP05340
                     *                JNOW=J                              CSP05350
0026 00  65000000    COUNT LDX   L1 *-*  LOAD IR1 WITH FIELD WIDTH        CSP05360
                     *                JTEST=JCARD(JNOW)                   CSP05370
0028 00  C5000000    PICK  LD    L1 *-*  PICK UP JCARD(JNOW)              CSP05380
002A 01  4C100033          BSC   L OK,- AND CHECK IT AGAINST ZERO         CSP05390
                     *                NER=JNOW                            CSP05400
002C 0   69FA        ERR   STX   1 COUNT+1 LESS THAN - ERROR             CSP05410
002D 0   C0D2              LD      DECA1 CALCULATE THE SUBSCRIPT          CSP05420
002E 0   90F8              S       COUNT+1 OF THIS DIGIT                  CSP05430
002F 0   80E2              A       ONE+1 AND STORE                        CSP05440
0030 00  D4000000    ERA   STO   L *-*  IT AT NER                         CSP05450
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0032 0   7008              MDX     MORE GET NEXT DIGIT                    CSP05460
0033 0   9015        OK    S       TEN  NOT LESS - COMPARE IT TO          CSP05470
0034 01  4C10002C          BSC   L ERR,- CONSTANT OF TEN-NOT LESS GO TO   CSP05480
                     *                ERR                                 CSP05490
0036 0   8012              A       TEN  LESS - ADD TEN BACK               CSP05500
0037 0   1008              SLA     8    SHIFT THE FOUR BITS OF DECIMAL    CSP05510
0038 0   E811              OR      ZERO IN PLACE AND CREATE A1            CSP05520
0039 00  D5000000    PUT   STO   L1 *-*  CHARACTER-STORE IN JCARD(JNOW)   CSP05530
                     *                SEE IF JNOW IS LESS THAN JLAST.     CSP05540
                     *                IF YES, JNOW=JNOW+1 AND GO BACK     CSP05550
                     *                FOR MORE.  IF NO, SETUP THE SIGN    CSP05560
003B 0   71FF        MORE  MDX   1 -1   DECREMENT THE FIELD WIDTH          CSP05570
003C 0   70E8              MDX     PICK GO BACK FOR MORE                  CSP05580
003D 30  15A56545          CALL    NZONE NZONE ROUTINE TO PLACE SIGN      CSP05590
003F 0   0000        JCRD1 DC      *-*  ADDRESS OF JCARD                  CSP05600
0040 0   0000        JLAS1 DC      *-*  ADDRESS OF JLAST                   CSP05610
0041 1   001C              DC      TEST+1 ADDRESS OF SIGN INDICATOR TO    CSP05620
                     *                USE                                 CSP05630
0042 1   003F              DC      JCRD1 ADDRESS OF SIGN INDICATOR FOR    CSP05640
                     *                OLD SIGN                            CSP05650
                     *                EXIT                                CSP05660
0043 00  65000000    SAVE1 LDX   L1 *-*  RESTORE IR1                      CSP05670
0045 00  4C000000    DONE1 BSC   L  *-*  RETURN TO CALLING PROGRAM         CSP05680
0047 0   0004        FOUR  DC      4    CONSTANT OF FOUR                  CSP05690
0048 0   FFFF        HFFFF DC      /FFFF CONSTANT OF ALL BINARY ONES      CSP05700
0049 0   000A        TEN   DC      10   CONSTANT OF TEN                   CSP05710
004A 0   F040        ZERO  DC      /F040 CONSTANT OF EBCDIC ZERO          CSP05720
004C                   END                                               CSP05730

   NO ERRORS IN ABOVE ASSEMBLY.

// DUP                                                                  CSP05740
*STORE      WS  UA  DECA1                                               CSP05750
3345 0006
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// ASM                                                                  CSP05760
** DIV SUBROUTINE FOR 1130 COMMERCIAL SUBROUTINE PACKAGE                (ID) CSP05770
* NAME DIV                                                              (ID) CSP05780
* LIST                                                                      CSP05790
0000    04265000          ENT     DIV  DIVIDE SUBROUTINE ENTRY POINT      CSP05800
                *             CALL DIV(JCARD,J,JLAST,KCARD,K,KLAST,NER)  CSP05810
                *                  THE WORDS JCARD(J) THROUGH            CSP05820
                *                  JCARD(JLAST) ARE DIVIDED INTO         CSP05830
                *                  THE WORDS KCARD(K) THROUGH            CSP05840
                *                  KCARD(KLAST).  THE KCARD FIELD        CSP05850
                *                  IS EXTENDED TO THE LEFT AND           CSP05860
                *                  CONTAINS THE QUOTIENT AND             CSP05870
                *                  REMAINDER.                            CSP05880
0000 0  0000    DIV   DC      *-*  ARGUMENT ADDRESS COMES IN HERE          CSP05890
0001 0  6970          STX   1 SAVE1+1 SAVE IR1                            CSP05900
0002 0  6A71          STX   2 SAVE2+1 SAVE IR2                            CSP05910
0003 0  6B72          STX   3 SAVE3+1 SAVE IR3                            CSP05920
0004 01 65800000      LDX   I1 DIV  PUT ARGUMENT ADDRESS IN IR1           CSP05930
0006 0  C100          LD    1 0    GET JCARD ADDRESS                      CSP05940
0007 00 95800002      S     I1 2    SUBTRACT JLAST VALUE                  CSP05950
0009 0  D04C          STO     SRCH+1 STORE END OF JCARD ADDRESS           CSP05960
000A 01 D40000AD      STO   L MULT1+1 FOR SEARCH AND MULTIPLICATION       CSP05970
000C 0  8004          A       ONE+1 ADD CONSTANT OF ONE                   CSP05980
000D 0  D011          STO     SGNJ+1 CREATE JCARD(JLAST) ADDRESS          CSP05990
                *             JSPAN=JLAST-J+1                           CSP06000
000E 00 C5800002  TWO LD    I1 2    GET JLAST VALUE                       CSP06010
0010 00 95800001  ONE S     I1 1    SUBTRACT J VALUE                      CSP06020
0012 0  80FE          A       ONE+1 ADD CONSTANT OF ONE                   CSP06030
0013 0  4808          BSC     +    CHECK FIELD WIDTH                      CSP06040
0014 0  C0FC          LD      ONE+1 NEGATIVE OR ZERO-MAKE IT ONE          CSP06050
0015 0  D03E          STO     SRCHT+1 STORE COUNT FOR SEARCH              CSP06060
0016 0  C103          LD    1 3    GET KCARD ADDRESS                      CSP06070
0017 0  D037          STO     KCRD1 SAVE FOR FILL                         CSP06080
0018 00 95800005      S     I1 5    SUBTRACT KLAST VALUE                  CSP06090
001A 0  80F6          A       ONE&1 ADD CONSTANT OF ONE                   CSP06100
001B 0  D00D          STO     SGNK+1 CREATE KCARD(KLAST) ADDRESS          CSP06110
001C 0  7107          MDX   1 7    MOVE OVER SEVEN ARGUMENTS              CSP06120
001D 0  695A          STX   1 DONE1+1 CREATE RETURN ADDRESS               CSP06130
                *             CLEAR AND SAVE THE SIGNS ON THE           CSP06140
                *             JCARD AND THE KCARD FIELDS                CSP06150
001E 00 C4000000  SGNJ  LD    L *-*  PICKUP THE SIGN OF JCARD             CSP06160
0020 0  D0DF          STO     DIV  SAVE IT IN DIV                         CSP06170
0021 01 4C100027      BSC   L JPLUS,- IF NOT NEGATIVE-GO TO JPLUS         CSP06180
0023 0  F039          EOR     HFFFF+1 NEGATIVE-MAKE IT POSITIVE           CSP06190
0024 01 D480001F      STO   I SGNJ+1 PUT BACK IN JCARD(JLAST)             CSP06200
0026 0  C036          LD      HFFFF+1 LOAD A MINUS ONE                    CSP06210
0027 0  1890      JPLUS SRT     16   SAVE IN EXTENSION                    CSP06220
0028 00 C4000000  SGNK  LD    L *-*  PICKUP THE SIGN OF KCARD             CSP06230
002A 0  D04F          STO     KSIGN SAVE IT IN KSIGN                      CSP06240
002B 01 4C100033      BSC   L KPLUS,- IF NOT NEGATIVE-GO TO KPLUS         CSP06250
002D 0  F02F          EOR     HFFFF+1 NEGATIVE-MAKE IT POSITIVE           CSP06260
002E 01 D4800029      STO   I SGNK+1 PUT BACK IN KCARD(KLAST)             CSP06270
0030 0  1090          SLT     16   GET SIGN OF JCARD                      CSP06280
0031 0  F02B          EOR     HFFFF+1 CHANGE IT                           CSP06290
0032 0  7001          MDX     OVRK SKIP NEXT INSTRUCTION                  CSP06300
0033 0  1090      KPLUS SLT     16   GET SIGN OF JCARD                     CSP06310
0034 0  D046      OVRK  STO     QSIGN STORE FOR SIGN OF QUOTIENT          CSP06320
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                    *                       KSTRT=K-1                                   CSP06330
0035 00 C580FFFD            LD    I1 -3     GET VALUE OF K                              CSP06340
0037 0  8025                A       HFFFF61 SUBTRACT CONSTANT OF ONE                    CSP06350
0038 0  D040                STO     KSTRT SAVE IN KSTRT                                 CSP06360
                    *                       KLOW=K-JSPAN                                CSP06370
0039 0  80D7                A       ONE+1 GET VALUE OF K                                CSP06380
003A 0  9019                S       SRCHT+1 SUBTRACT JSPAN                              CSP06390
003B 0  D041                STO     KLOW SAVE IN KLOW                                   CSP06400
003C 00 C580FFFE    MTWO    LD    I1 -2     GET KLAST VALUE                             CSP06410
003E 0  D040                STO     TMP  SAVE IT                                        CSP06420
                    *                       CALCULATE THE ADDRESS OF THE                CSP06430
                    *                       SIGN OF THE QUOTIENT                        CSP06440
003F 0  C00F                LD      KCRD1 GET KCARD ADDRESS                             CSP06450
0040 0  903E                S       TMP  SUBTRACT KLAST VALUE                           CSP06460
0041 0  8012                A       SRCHT+1 ADD JSPAN                                   CSP06470
0042 0  80CE                A       ONE+1 ADD CONSTANT OF ONE                           CSP06480
0043 01 D40000DF            STO   L QUOT+1 STORE ADDR OF SIGN OF QUOTIENT               CSP06490
                    *                       IS KLAST-KSTRT-JSPAN NEGATIVE               CSP06500
0045 0  C039                LD      TMP  LOAD KLAST VALUE                               CSP06510
0046 0  9032                S       KSTRT SUBTRACT KSTRT                                CSP06520
0047 0  900C                S       SRCHT+1 SUBTRACT JSPAN                              CSP06530
0048 01 4C28005B            BSC   L ERR,+Z IF NEGATIVE-GO TO ERROR                      CSP06540
                    *                       IS KLOW POSITIVE                            CSP06550
004A 0  C032                LD      KLOW OK-GET KLOW VALUE                              CSP06560
004B 01 4C08005B            BSC   L ERR,+ IF NOT POSITIVE-GO TO ERROR                   CSP06570
                    *                       FILL THE EXTENSION OF KCARD WITH            CSP06580
                    *                       ZEROES                                      CSP06590
004D 30 062534C0            CALL    FILL OK-FILL EXTENSION WITH ZEROES                  CSP06600
004F 0  0000        KCRD1   DC      *-*  ADDRESS OF KCARD                               CSP06610
0050 1  007D                DC      KLOW ADDRESS OF LEFT END OF EXTENSION               CSP06620
0051 1  0079                DC      KSTRT ADDRESS OF RGHT END OF EXTENSON               CSP06630
0052 1  007C                DC      ZIP  ADDRESS OF CONSTANT OF ZERO                    CSP06640
                    *                       JFRST=J                                     CSP06650
0053 00 66000000    SRCHT   LDX   L2 *-*  LOAD IR2 WITH JCARD COUNT                    CSP06660
0055 00 C6000000    SRCH    LD    L2 *-*  PICKUP JCARD(JFRST)                           CSP06670
                    *                       IS JCARD(JFRST) POSITIVE                    CSP06680
0057 01 4C300080            BSC   L HIT,-Z IF POSITIVE-GO TO HIT                        CSP06690
                    *                       SEE IF JFRST IS LESS THAN JLAST.            CSP06700
                    *                       IF YES, JFRST=JFRST+1 AND GO                CSP06710
                    *                       BACK FOR MORE.  IF NO, ERROR.               CSP06720
0059 0  72FF                MDX     2 -1    DECREMENT IR2                               CSP06730
005A 0  70FA                MDX     SRCH GO BACK FOR MORE                               CSP06740
                    *                       ERROR - NER=KLAST                           CSP06750
005B 0  C023        ERR     LD      TMP  PICKUP KLAST VALUE                             CSP06760
005C 00 D580FFFF    HFFFF   STO   I1 -1     AND STORE IN NER                            CSP06770
                    *                       REPLACE JCARD SIGN                          CSP06780
005E 0  C0A1        FINER   LD      DIV  PICKUP JCARD SIGN AND                          CSP06790
005F 01 D480001F            STO   I SGNJ+1 PUT IT BACK                                  CSP06800
                    *                       REPLACE KCARD SIGN                          CSP06810
0061 0  C018                LD      KSIGN PICKUP KCARD SIGN                             CSP06820
0062 01 4C28006C            BSC   L KNEG,+Z IF NEGATIVE-GO TO KNEG                      CSP06830
0064 01 C4800029            LD    I SGNK+1 NOT NEGATIVE-PICKUP NEW SIGN                 CSP06840
0066 01 4C100071            BSC   L SAVE1,- IF NOT NEGATIVE-GO TO EXIT                  CSP06850
0068 0  F0F4        BCK1    EOR     HFFFF+1 NEGATIVE-CHANGE SIGN AND                    CSP06860
0069 01 D4800029            STO   I SGNK+1 PUT INTO KCARD(KLAST)                        CSP06870
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006B 0  7005              MDX     SAVE1 GO TO EXIT                          CSP06880
006C 01 C4800029  KNEG    LD   I  SGNK+1 NEGATIVE-PICKUP NEW SIGN           CSP06890
006E 01 4C280071          BSC  L  SAVE1,+2 IF NEGATIVE-GO TO EXIT           CSP06900
0070 0  70F7              MDX     BCK1 NOT NEGATIVE-GO TO BCK1              CSP06910
                *                     EXIT.............................     CSP06920
0071 00 65000000  SAVE1   LDX  L1 *-*  RESTORE IR1                          CSP06930
0073 00 66000000  SAVE2   LDX  L2 *-*  RESTORE IR2                          CSP06940
0075 00 67000000  SAVE3   LDX  L3 *-*  RESTORE IR3                          CSP06950
0077 00 4C000000  DONE1   BSC  L  *-*  RETURN TO CALLING PROGRAM            CSP06960
0079 0  0000      KSTRT   DC     *-*  ONE LESS THAN K                       CSP06970
007A 0  0000      KSIGN   DC     *-*  SIGN OF KCARD                         CSP06980
007B 0  0000      QSIGN   DC     *-*  SIGN OF QUOTIENT                      CSP06990
007C 0  0000      ZIP     DC     0    CONSTANT OF ZERO                      CSP07000
007D 0  0000      KLOW    DC     *-*  SUBSCRIPT OF LEFTMOST POSITION        CSP07010
                *                     OF EXTENSION OF KCARD                 CSP07020
007E 0  000A      TEN     DC     10   CONSTANT OF TEN                       CSP07030
007F 0  0000      TMP     DC     *-*  TEMPORARY STORAGE                     CSP07040
                *                     JHIGH=JCARD(JFRST)                    CSP07050
0080 0  D0D3      HIT     STO       SRCHT+1 SAVE FIRST SIGNIFICANT DIGIT    CSP07060
                *                     KPUT=KLOW+JLAST-JFRST                 CSP07070
0081 0  6A28              STX   2 JLOOP+1 GET THE VALUE OF JLAST-JFRST      CSP07080
0082 0  C0CC              LD      KCRD1 GET KCARD ADDRESS                   CSP07090
0083 0  D03E              STO     KCRD2 SAVE FOR CARRY                      CSP07100
0084 0  90F8              S       KLOW SUBTRACT KLOW VALUE                  CSP07110
0085 0  9024              S       JLOOP+1 SUBTRACT JLAST-JFRST VALUE        CSP07120
0086 0  90B6              S       MTWO+1 ADD CONSTANT OF TWO                CSP07130
0087 0  D04E              STO     PUT2+1 SAVE ADDRESS FOR STORING           CSP07140
                *                     KSTOP=KLAST+JFRST-JLAST-1             CSP07150
0088 0  C0F6              LD      TMP  GET KLAST VALUE                      CSP07160
0089 0  9020              S       JLOOP+1 SUBTRACT JLAST-JFRST VALUE        CSP07170
008A 0  90D2              S       HFFFF+1 ADD CONSTANT OF ONE               CSP07180
008B 0  D0CA              STO     SRCH61 SAVE VALUE FOR COMPLIMENTING       CSP07190
008C 0  90EC              S       KSTRT SUBTRACT KSTRT VALUE                CSP07200
008D 0  D00B              STO     LOOPM+1 SAVE COUNT AT LOOPM+1             CSP07210
008E 0  C033              LD      KCRD2 GET KCARD ADDRESS                   CSP07220
008F 0  90EF              S       TMP  SUBTRACT KLAST VALUE                 CSP07230
0090 0  8019              A       JLOOP61 ADD JLAST-JFRST VALUE             CSP07240
0091 0  D009              STO     DIV161 SAVE FOR MULT. BY TEN              CSP07250
0092 0  D038              STO     DIV561 SAVE FOR ADD OF 10*KNOW            CSP07260
0093 0  D039              STO     DIV661 SAVE FOR STORE OF 10*KNOW          CSP07270
0094 0  80C8              A       HFFFF+1 SUBTRACT CONSTANT OF ONE          CSP07280
0095 0  D009              STO     DIV261 SAVE FOR ADD INTO MULT             CSP07290
0096 0  D01A              STO     DIV361 SAVE FOR SUBTRACTION FROM          CSP07300
0097 0  D01B              STO     DIV461 SAVE FOR STORE SUBTRACTED FROM     CSP07310
                *                     KM=KSTRT                              CSP07320
0098 00 65000000  LOOPM   LDX  L1 *-*  LOAD IR1 WITH COUNT                  CSP07330
                *                     MULT=(10*KCARD(KM)+KCARD(KM+1))       CSP07340
                *                           DIVIDED BY JHIGH                CSP07350
009A 00 C5000000  DIV1    LD   L1 *-*  PICKUP KCARD(KM)                    CSP07360
009C 0  A0E1              M       TEN  MULTIPLY BY TEN                      CSP07370
009D 0  1090              SLT     16   REPOSITION PRODUCT                   CSP07380
009E 00 85000000  DIV2    A    L1 *-*  ADD IN KCARD(KM+1)                   CSP07390
00A0 0  1890              SRT     16   REPOSITION FOR DIVISION              CSP07400
00A1 0  A8B2              D       SRCHT+1 DIVIDE BY JHIGH                   CSP07410
00A2 0  D0DA              STO     KLOW SAVE IN KLOW(MULT)                   CSP07420
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                        *                       NQUO=MULT                       CSP07430
00A3 0  D0D5                    STO     KSTRT SAVE IN KSTRT(NQUO)               CSP07440
                        *                       IS MULT GREATER THAN ZERO       CSP07450
00A4 01 4C0800D4                BSC  L  PUT,+ IF MULT NOT POSITIVE-GO TO PUT    CSP07460
                        *                       KNOW=KM+1                       CSP07470
00A6 0  6901            ADBCK   STX     1 KNOW+1 POSITIVE-GET KM+1 AND          CSP07480
00A7 00 67000000        KNOW    LDX  L3 *-*  PUT IT IN IR3                      CSP07490
                        *                       JNOW=JFRST                      CSP07500
00A9 00 66000000        JLOOP   LDX  L2 *-*  RELOAD IR2 WITH REMAINING JCARD    CSP07510
00AB 0  1810                    SRA     16   CLEAR ACCUMULATOR                  CSP07520
                        *                       KCARD(KNOW)=KCARD(KNOW)    -    CSP07530
                        *                                  MULT*JCARD(JNOW)     CSP07540
00AC 00 96000000        MULT1   S    L2 *-*  LOAD NEGATIVE JCARD(JNOW)          CSP07550
00AE 0  A0CE                    M       KLOW MULTIPLY BY MULT                   CSP07560
00AF 0  1090                    SLT     16   REPOSITION PRODUCT                 CSP07570
00B0 00 87000000        DIV3    A    L3 *-*  ADD IN KCARD(KNOW)                  CSP07580
00B2 00 D7000000        DIV4    STO  L3 *-*  STORE AT KCARD(KNOW)               CSP07590
                        *                       KNOW=KNOW+1                     CSP07600
00B4 0  73FF                    MDX     3 -1    DECREMENT IR3                   CSP07610
00B5 0  7000                    MDX     *    NOP                                CSP07620
                        *                       IS JNOW LESS THAN JLAST.  IF YES CSP07630
                        *                       JNOW=JNOW+1 AND GO BACK FOR MORE CSP07640
                        *                       IF NO, RESOLVE CARRIES.         CSP07650
00B6 0  72FF                    MDX     2 -1    DECREMENT IR2                   CSP07660
00B7 0  70F3                    MDX       JLOOP+2 NOT DONE-GO BACK FOR MORE     CSP07670
00B8 0  69EF                    STX     1 KNOW+1 DONE=CALCULATE                 CSP07680
00B9 0  C09C                    LD        SRCH&1 THE VALUE OF                   CSP07690
00BA 0  90ED                    S         KNOW+1 KNOW-1                         CSP07700
00BB 0  D0EC                    STO       KNOW+1 BY COMPLIMENTING COUNT         CSP07710
00BC 0  6BDC                    STX     3 LOOPM+1 CALCULATE THE                 CSP07720
00BD 0  C098                    LD        SRCH&1 VALUE OF KM                    CSP07730
00BE 0  90DA                    S         LOOPM+1 BY COMPLIMENTING THE          CSP07740
00BF 0  D0D9                    STO       LOOPM+1 OTHER COUNT                   CSP07750
                        *                       RESOLVE CARRIES IN THIS RESULT  CSP07760
00C0 30 03059668                CALL    CARRY RESOLVE CARRIES                   CSP07770
00C2 0  0000            KCRD2   DC      *-*  ADDRESS OF KCARD                   CSP07780
00C3 1  00A8                    DC        KNOW+1 ADDRESS OF KM                  CSP07790
00C4 1  0099                    DC        LOOPM+1 ADDRESS OF KNOW-1             CSP07800
00C5 1  00A8                    DC        KNOW+1 ADDRESS OF GENERATED CARRY     CSP07810
                        *                       IS KNOW LESS THAN ZERO          CSP07820
00C6 01 4C1000D4                BSC  L  PUT,- IF NOT NEGATIVE-GO TO PUT         CSP07830
                        *                       KCARD(KM)=KCARD(KM)+10*KNOW     CSP07840
00C8 0  A0B5                    M         TEN  NEGATIVE-MULTIPLY CARRY BY TEN   CSP07850
00C9 0  1090                    SLT       16   REPOSITION PRODUCT               CSP07860
00CA 00 85000000        DIV5    A    L1 *-*  ADD IN KCARD(KNOW)                  CSP07870
00CC 00 D5000000        DIV6    STO  L1 *-*  STORE AT KCARD(KNOW)               CSP07880
                        *                       MULT=-1                         CSP07890
00CE 0  C08E                    LD        HFFFF+1 LOAD A MINUS ONE              CSP07900
00CF 0  D0AD                    STO       KLOW STORE IN MULT                    CSP07910
                        *                       NQUO=NQUO-1                     CSP07920
00D0 0  C0A8                    LD        KSTRT LOAD THE VALUE OF NQUO          CSP07930
00D1 0  808B                    A         HFFFF+1 SUBTRACT CONSTANT OF ONE      CSP07940
00D2 0  D0A6                    STO       KSTRT STORE IN NQUO                   CSP07950
00D3 0  70D2                    MDX       ADBCK GO TO ADD OVERDRAW BACK         CSP07960
                        *                       KCARD(KPUT)=NQUO                CSP07970
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00D4 0  C0A4            PUT     LD      KSTRT LOAD NQUO                         CSP07980
00D5 00 D4000000        PUT2    STO  L  *-*  STORE AT KCARD(KPUT)               CSP07990
                        *                       KPUT=KPUT+1                     CSP08000
00D7 01 74FF00D6                MDX  L  PUT2+1,-1 MODIFY KCARD(KPUT) ADDRESS    CSP08010
                        *                       SEE IF KM IS LESS THAN KSTOP.   CSP08020
                        *                       IF YES, KM=KM+1 AND GO BACK FOR CSP08030
                        *                       MORE.  IF NO, PLACE ALL SIGNS.  CSP08040
00D9 0  71FF                    MDX     1 -1    DECREMENT IR1                   CSP08050
00DA 0  70BF                    MDX       DIV1 NOT DONE-GO BACK FOR MORE        CSP08060
                        *                       PUT SIGN ON QUOTIENT            CSP08070
00DB 0  C09F                    LD        QSIGN DONE-PICKUP SIGN OF QUOTIENT    CSP08080
00DC 01 4C2800E8                BSC  L  NEG,+Z IF NEGATIVE-GO TO NEG            CSP08090
00DE 00 C4000000        QUOT    LD   L  *-*  NOT NEGATIVE-PICKUP ACTUAL SIGN    CSP08100
00E0 01 4C10005E                BSC  L  FINER,- IF NOT NEGATIVE-GO TO OTHERS    CSP08110
00E2 01 F400005D        BCK2    EOR  L  HFFFF+1 NEGATIVE-CHANGE SIGN            CSP08120
00E4 01 D48000DF                STO  I  QUOT+1 PUT SIGN ON QUOTIENT             CSP08130
00E6 01 4C00005E                BSC  L  FINER, GO TO REPLACE OTHER SIGNS        CSP08140
00E8 01 C48000DF        NEG     LD   I  QUOT+1 NEGATIVE-PICKUP ACTUAL SIGN      CSP08150
00EA 01 4C28005E                BSC  L  FINER,+Z IF NEGATIVE-GO TO OTHER SIGN   CSP08160
00EC 0  70F5                    MDX       BCK2 GO TO CHANGE SIGN                CSP08170
00EE                            END                                             CSP08180
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NO ERRORS IN ABOVE ASSEMBLY.

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// DUP                                                                  CSP08190
*STORE      WS  UA  DIV                                                 CSP08200
334B 000F
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// ASM                                                                  CSP08210
** DPACK/DUNPK SUBROUTINES FOR 1130 COMMERCIAL SUBROUTINE PACKAGE  (ID) CSP08220
* NAME DUNPK                                                      (ID) CSP08230
* LIST                                                                 CSP08240
0000    049155D2          ENT     DUNPK DUNPK SUBROUTINE ENTRY POINT   CSP08250
                  *               CALL DUNPK(JCARD,J,JLAST,KCARD,K)    CSP08260
                  *               THE WORDS JCARD(J) THROUGH           CSP08270
                  *               JCARD(JLAST) IN D4 FORMAT ARE        CSP08280
                  *               UNPACKED INTO KCARD IN D1 FORMAT.    CSP08290
0006    045C10D2          ENT     DPACK DPACK SUBROUTINE ENTRY POINT   CSP08300
                  *               CALL DPACK(JCARD,J,JLAST,KCARD,K)    CSP08310
                  *               THE WORDS JCARD(J) THROUGH           CSP08320
                  *               JCARD(JLAST) IN D1 FORMAT ARE PACKED CSP08330
                  *               INTO KCARD IN D4 FORMAT.             CSP08340
0000 0  0000      DUNPK DC        *-* ARGUMENT ADDRESS COMES IN HERE   CSP08350
0001 0  C003            LD        SW2 LOAD NOP INSTRUCTION             CSP08360
0002 0  D020            STO       SWTCH STORE NOP AT SWITCH            CSP08370
0003 0  7007            MDX       START COMPUTING                      CSP08380
0004 0  7027      SW1   MDX   X   ELSE-SWTCH-1 BRANCH TO ELSE          CSP08390
0005 0  7000      SW2   MDX   X   0  NOP INSTRUCTION                   CSP08400
0006 0  0000      DPACK DC        *-* ARGUMENT ADDRESS COMES IN HERE   CSP08410
0007 0  C0FE            LD        DPACK PICK UP ARGUMENT ADDRESS       CSP08420
0008 0  D0F7            STO       DUNPK AND STORE IT IN DUNPK          CSP08430
0009 0  C0FA            LD        SW1 LOAD BRANCH TO ELSE              CSP08440
000A 0  D018            STO       SWTCH STORE BRANCH AT SWITCH         CSP08450
000B 0  6952      START STX     1 SAVE1+1 SAVE IR1                     CSP08460
000C 0  6A53            STX     2 SAVE2+1 SAVE IR2                     CSP08470
000D 01 65800000        LDX   I1 DUNPK PUT ARGUMENT ADDRESS IN IR1     CSP08480
000F 0  C100            LD      1 0 GET JCARD ADDRESS                  CSP08490
0010 0  8001            A         ONE+1 ADD CONSTANT OF 1              CSP08500
0011 00 95800001  ONE   S     I1 1 SUBTRACT J VALUE                    CSP08510
0013 0  D00D            STO       JCARD+1 CREATE JCARD(J) ADDRESS      CSP08520
0014 0  C103            LD      1 3 GET KCARD ADDRESS                  CSP08530
0015 0  80FC            A         ONE+1 ADD CONSTANT OF 1              CSP08540
0016 00 95800004  FOUR  S     I1 4 SUBTRACT K VALUE                    CSP08550
0018 0  D006            STO       KCARD+1 CREATE KCARD(K) ADDRESS      CSP08560
0019 0  C100            LD      1 0 GET JCARD ADDRESS                  CSP08570
001A 0  80F7            A         ONE+1 ADD CONSTANT OF 1              CSP08580
001B 00 95800002        S     I1 2 SUBTRACT JLAST VALUE                CSP08590
001D 0  D0E8            STO       DPACK CREATE JCARD(JLAST) ADDRESS    CSP08600
001E 00 65000000  KCARD LDX   L1 *-* PUT KCARD ADDRESS IN IR1          CSP08610
0020 00 C4000000  JCARD LD    L   *-* PICK UP JCARD(J)                 CSP08620
0022 0  6204            LDX     2 4    LOAD IR2 WITH 4, DIGITS/WORD  CSP08630
0023 0  7000      SWTCH MDX   X   0 SWITCH BETWEEN DPACK AND DUNPK     CSP08640
0024 0  1890            SRT       16   TEMPORARILY SAVE ACCUM IN EXTNTN CSP08650
                  *               CHECK FOR JCARD(JLAST)               CSP08660
0025 0  C0FB            LD        JCARD+1 PICK UP CURRENT JCARD ADDR   CSP08670
0026 0  90DF            S         DPACK SUBTRACT JCARD(JLAST)          CSP08680
0027 01 4C080059        BSC   L   ALLDO,+ IF ZERO, ALL DONE - ALLDO    CSP08690
0029 0  1810      AGAIN SRA       16   NOT DONE - CLEAR ACCUMULATOR    CSP08700
002A 0  1084            SLT       4    GET FIRST DIGIT OF WORD         CSP08710
002B 0  F00A            EOR       H000F IS IT FILLER                   CSP08720
002C 01 4C180031        BSC   L   NEXT,+- YES - GO TO NEXT             CSP08730
002E 0  F007            EOR       H000F NO - RESTORE TO ORIGINAL       CSP08740
002F 0  D100            STO     1 0    STORE IN KCARD                  CSP08750
0030 0  71FF            MDX     1 -1   GO TO NEXT WORD OF KCARD        CSP08760
0031 0  72FF      NEXT  MDX     2 -1   DECREMENT DIGITS/WORD           CSP08770
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0032 0  70F6              MDX       AGAIN MORE IN THIS WORD - GO BACK  CSP08780
0033 01 74FF0021          MDX   L   JCARD+1,-1 THIS WORD DONE          CSP08790
                  *                     GET NEXT WORD IN JCARD       CSP08800
0035 0  70EA              MDX       JCARD GO BACK                      CSP08810
0036 0  000F      H000F   DC        /000F CONSTANT OF 15 TO DETECT FILLER CSP08820
0037 01 74010021  EN      MDX   L   JCARD+1,1 BACK UP JCARD FOR SIGN   CSP08830
0039 0  6AE5              STX     2 KCARD+1 IF DIGITS/WORD IS FOUR,    CSP08840
003A 0  C0E4              LD        KCARD+1 ALL DONE EXCEPT FOR SIGN   CSP08850
003B 0  90DB              S         FOUR+1 SUBTRACT FOUR FROM DIGITS/WORD CSP08860
003C 01 4C180046          BSC   L   LAST,+- IF ZERO - ALL DONE - GO LAST CSP08870
003E 0  1884              SRT       4    NOT DONE - TAKE OUT SIGN      CSP08880
003F 0  C023      BACK    LD        HF000 PUT IN FILLER                CSP08890
0040 0  18DC              RTE       28   SET FILLER IN LOW ORDER OF EXTN CSP08900
0041 0  72FF              MDX     2 -1   DECREMENT DIGITS/WORD         CSP08910
0042 0  70FC              MDX       BACK MORE - GO BACK                CSP08920
0043 0  1090              SLT       16   DONE - PUT EXTENSION IN ACCUM CSP08930
0044 0  D100              STO     1 0    STORE IN KCARD                CSP08940
0045 0  71FF              MDX     1 -1   GET NEXT WORD OF KCARD FOR SIGN CSP08950
0046 01 C4800021  LAST    LD    I   JCARD+1 PICK UP SIGN OF JCARD       CSP08960
0048 0  7011              MDX       ALLDO+1 GO TO INSTRUCTION AFTER ALLDO CSP08970
0049 01 C4800021  OVR     LD    I   JCARD+1 PICK UP NEXT JCARD DIGIT    CSP08980
004B 0  100C      ELSE    SLA       12   PUT DIGIT IN HIGH ORDER OF ACC CSP08990
004C 0  18DC              RTE       28   SET DIGIT IN LOW ORDER OF EXTN CSP09000
004D 01 74FF0021          MDX   L   JCARD+1,-1 GET NEXT JCARD WORD     CSP09010
                  *                     CHECK FOR JCARD(JLAST)       CSP09020
004F 0  C0D1              LD        JCARD+1 PICK UP CURRENT JCARD ADDR CSP09030
0050 0  9085              S         DPACK SUBTRACT JCARD(JLAST)        CSP09040
0051 01 4C280037          BSC   L   EN,+Z IF ZERO,ALL DONE - GO TO EN  CSP09050
0053 0  72FF              MDX     2 -1   NOT DONE-DECREMENT DIGITS/WORD CSP09060
0054 0  70F4              MDX       OVR  GO BACK FOR NEXT DIGIT        CSP09070
0055 0  1090              SLT       16   WORD FULL-PUT EXTN IN ACCUM   CSP09080
0056 0  D100              STO     1 0    STORE IN KCARD                CSP09090
0057 0  71FF              MDX     1 -1   GET NEXT KCARD WORD           CSP09100
0058 0  70C7              MDX       JCARD GO BACK                      CSP09110
0059 0  1090      ALLDO   SLT       16   DONE-PUT EXTENSION IN ACCUMULTR CSP09120
005A 0  D100              STO     1 0    STORE SIGN IN KCARD           CSP09130
005B 01 74050000          MDX   L   DUNPK,5 CREATE RETURN ADDRESS      CSP09140
005D 00 65000000  SAVE1   LDX   L1  *-* RESTORE IR1                    CSP09150
005F 00 66000000  SAVE2   LDX   L2  *-* RESTORE IR2                    CSP09160
0061 01 4C800000          BSC   I   DUNPK RETURN TO CALLING PROGRAM    CSP09170
0063 0  F000      HF000   DC        /F000 CONSTANT OF 15 FOR FILLER    CSP09180
0064                      END                                          CSP09190

    NO ERRORS IN ABOVE ASSEMBLY.
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// DUP                                                                  CSP09200
*STORE      WS  UA  DUNPK                                               CSP09210
339A 0007
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// ASM                                                                  CSP09220
** EDIT SUBROUTINE FOR 1130 COMMERCIAL SUBROUTINE PACKAGE          (ID) CSP09230
* NAME EDIT                                                        (ID) CSP09240
* LIST                                                                 CSP09250

0000     051098C0           ENT     EDIT EDIT SUBROUTINE ENTRY POINT     CSP09260
                     *               CALL EDIT(JCARD,J,JLAST,KCARD,K,KLAST) CSP09270
                     *                    THE WORDS JCARD(J) THROUGH      CSP09280
                     *                    JCARD(JLAST) ARE EDITED UNDER   CSP09290
                     *                    CONTROL OF THE MASK AT WORDS    CSP09300
                     *                    KCARD(K) THROUGH KCARD(KLAST)   CSP09310
                     *                    AND THE RESULT IS AT KCARD(K)   CSP09320
                     *                    THROUGH KCARD(KLAST).           CSP09330
0000 0   0000       EDIT    DC      *-*  ARGUMENT ADDRESS COMES IN HERE     CSP09340
0001 0   696D               STX   1 SAVE1+1 SAVE IR1                      CSP09350
0002 0   6A6E               STX   2 SAVE2+1 SAVE IR2                      CSP09360
0003 01  65800000           LDX  I1 EDIT PUT ARGUMENT ADDRESS IN IR1      CSP09370
0005 0   C100               LD    1 0    GET JCARD ADDRESS                CSP09380
0006 0   D02B               STO     JCRD1 SAVE JCARD ADDRESS FOR NZONE    CSP09390
0007 0   D07D               STO     JCRD2 SAVE JCARD ADDRESS FOR NZONE    CSP09400
0008 00  95800002           S    I1 2    SUBTRACT JLAST VALUE             CSP09410
000A 0   8007               A       ONE+1 ADD CONSTANT OF ONE             CSP09420
000B 0   D050               STO     JCARD+1 CREATE JCARD(JLAST) ADDRESS   CSP09430
000C 0   C102       TWO     LD    1 2    GET JLAST ADDRESS                CSP09440
000D 0   D025               STO     JLAS1 SAVE JLAST ADDRESS FOR NZONE    CSP09450
000E 0   D077               STO     JLAS2 SAVE JLAST ADDRESS FOR NZONE    CSP09460
000F 00  C5800002           LD   I1 2    GET JLAST VALUE                  CSP09470
0011 00  95800001   ONE     S    I1 1    SUBTRACT J VALUE                 CSP09480
0013 0   80FE               A       ONE+1 ADD CONSTANT OF ONE             CSP09490
0014 0   4808               BSC     +    CHECK FIELD WIDTH                CSP09500
0015 0   C0FC               LD      ONE+1 NEGATIVE OR ZERO-MAKE IT ONE    CSP09510
0016 0   D026               STO     LDXJ+1 SAVE FIELD WIDTH               CSP09520
0017 0   C104               LD    1 4    GET K ADDRESS                    CSP09530
0018 0   D077               STO     K1   SAVE K ADDRESS FOR FILL          CSP09540
0019 01  D40000C1           STO  L  K2   SAVE K ADDRESS FOR FILL          CSP09550
001B 0   C105               LD    1 5    GET KLAST ADDRESS                CSP09560
001C 0   D074               STO     KLAS1 SAVE KLAST ADDRESS FOR FILL     CSP09570
001D 0   C103               LD    1 3    GET KCARD ADDRESS                CSP09580
001E 0   D070               STO     KCRD1 SAVE KCARD ADDRESS FOR FILL     CSP09590
001F 01  D40000C0           STO  L  KCRD2 SAVE KCARD ADDRESS FOR FILL     CSP09600
0021 00  95800005           S    I1 5    SUBTRACT KLAST VALUE             CSP09610
0023 0   80EE               A       ONE+1 ADD CONSTANT OF ONE             CSP09620
0024 0   D01A               STO     KCARD+1 CREATE KCARD(KLAST) ADDRESS   CSP09630
0025 0   D07F               STO     KCRD3+1 CREATE KCARD(KLAST) ADDRESS   CSP09640
0026 00  C5800005           LD   I1 5    GET JLAST VALUE                  CSP09650
0028 00  95800004   FOUR    S    I1 4    SUBTRACT J VALUE                 CSP09660
002A 0   80E7               A       ONE+1 ADD CONSTANT OF ONE             CSP09670
002B 0   4808               BSC     +    CHECK FIELD WIDTH                CSP09680
002C 0   C0E5               LD      ONE+1 NEGATIVE OR ZERO-MAKE IT ONE    CSP09690
002D 0   D00D               STO     LDXK+1 SAVE FIELD WIDTH               CSP09700
002E 0   7106               MDX   1 6    MOVE OVER SIX ARGUMENTS          CSP09710
002F 0   6943               STX   1 DONE1+1 CREATE RETURN ADDRESS         CSP09720
                     *               REMOVE AND SAVE THE JCARD ZONE        CSP09730
0030 30  15A56545           CALL    NZONE NZONE TO REMOVE SIGN            CSP09740
0032 0   0000       JCRD1   DC      *-*  ADDRESS OF JCARD                  CSP09750
0033 0   0000       JLAS1   DC      *-*  ADDRESS OF JLAST                  CSP09760
0034 1   0029               DC      FOUR+1 ADDRESS OF A FOUR              CSP09770
0035 1   00CA               DC      NSIGN ADDRESS OF OLD SIGN INDICATOR   CSP09780
                     *                    NDUMP=16448                     CSP09790
                     *                    MONEY=16448                     CSP09800
0036 0   C85E               LDD     BLANK LOAD TWO BLANKS                 CSP09810
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0037 0  D85E            STD     MONEY STORE IN MONEY AND NDUMP          CSP09820
                *                       NZRSP=0                         CSP09830
0038 0  1810            SRA     16      CLEAR THE ACCUMULATOR           CSP09840
0039 0  D05E            STO     NZRSP SET NZRSP EQUAL TO ZERO           CSP09850
                *                       KNOW=KLAST                      CSP09860
003A 00 65000000 LDXK   LDX  L1 *-*     LOAD IR1 WITH KCARD COUNT       CSP09870
                *                       JNOW=JLAST                      CSP09880
003C 00 66000000 LDXJ   LDX  L2 *-*     LOAD IR2 WITH JCARD COUNT       CSP09890
                *                       KTEST=KCARD(KNOW)               CSP09900
003E 00 C40C0000 KCARD  LD   L  *-*     PICKUP KCARD(KNOW)              CSP09910
0040 0  D0FA            STO     LDXK+1 AND SAVE IT TEMPORARILY          CSP09920
                *                       IS KTEST NEGATIVE               CSP09930
0041 01 4C100047        BSC  L  POSZ,-  IS IT NEGATIVE-NO-GO TO POSZ    CSP09940
                *                       IS KTEST EQUAL TO AN EBCDIC ZERO CSP09950
0043 0  9050            S       ZERO YES-CHECK AGAINST EBCDIC ZERO      CSP09960
0044 01 4C20007F        BSC  L  NEXT,Z  IF NOT EQUAL-GO TO NEXT         CSP09970
0046 0  700F            MDX     ZRSP IF EQUAL-GO TO ZRSP                CSP09980
                *                       IS KTEST EQUAL TO 16448         CSP09990
0047 0  904D            POSZ    S       BLANK NOT NEGATIVE-CHECK AGAINST EBCD CSP10000
0048 01 4C180057        BSC  L  SRCE,+- BLANK-EQUAL-GO TO SRCE          CSP10010
004A 0  C0F0            LD      LDXK+1 NOT EQUAL-PICKUP KTEST           CSP10020
                *                       IS KTEST EQUAL TO 23616         CSP10030
004B 0  904E            S       DLRSG IS IT A DOLLAR SIGN               CSP10040
004C 01 4C180054        BSC  L  MNY,+- YES-GO TO MNY                    CSP10050
004E 0  C0EC            LD      LDXK+1 NO-PICKUP KTEST                  CSP10060
                *                       IS KTEST EQUAL TO 23360         CSP10070
004F 0  9049            S       AST   IS IT AN ASTERISK                 CSP10080
0050 0  4820            BSC     Z     YES-SKIP NEXT INSTRUCTION         CSP10090
0051 0  702D            MDX     NEXT NO-GO TO NEXT                      CSP10100
                *                       NDUMP=KTEST                     CSP10110
0052 0  C0E8            LD      LDXK+1 PICKUP KTEST AND                 CSP10120
0053 0  D043            STO     NDUMP STORE IT IN NDUMP                 CSP10130
                *                       MONEY=KTEST                     CSP10140
0054 0  C0E6            MNY     LD      LDXK+1 PICKUP KTEST AND         CSP10150
0055 0  D040            STO     MONEY STORE IT IN MONEY                 CSP10160
                *                       NZRSP=KNOW                      CSP10170
0056 0  6941            ZRSP    STX   1 NZRSP SAVE KNOW IN NZRSP        CSP10180
                *                       SEE IF JNOW IS LESS THAN J.  IF CSP10190
                *                       YES, GO TO NEXT. IF NO, GO TO   CSP10200
                *                       JCARD.                          CSP10210
0057 0  6AA8            SRCE    STX   2 EDIT GET IR1 AND                CSP10220
0058 0  C0A7            LD      EDIT LOAD ITS VALUE                     CSP10230
0059 01 4C08007F        BSC  L  NEXT,+ IF NOT POSITIVE-GO TO NEXT       CSP10240
                *                       KTEST=JCARD(JNOW)               CSP10250
                *                       KCARD(KNOW)=KTEST               CSP10260
005B 00 C4000000 JCARD  LD   L  *-*     POSITIVE-PICKUP JCARD(JNOW) AND CSP10270
005D 01 D480003F        STO  I  KCARD+1 STORE IT IN KCARD(KNOW)         CSP10280
005F 0  D0DD            STO     LDXJ+1 STORE IN KTEST                   CSP10290
                *                       JNOW=JNOW-1                     CSP10300
0060 0  72FF            MDX   2 -1     DECREMENT IR2                    CSP10310
0061 0  7000            MDX     *      NOP                              CSP10320
0062 01 7401005C        MDX  L  JCARD+1,1 MODIFY JCARD ADDRESS TO       CSP10330
                *                       JNOW-1                          CSP10340
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                        *                       IS NZRSP POSITIVE                       CSP10350
0064 0  C033                    LD      NZRSP PICKUP NZRSP AND                          CSP10360
0065 01 4C08007F                BSC  L  NEXT,+ IF NOT POSITIVE-GO TO NEXT               CSP10370
                        *                       IS KTEST NEGATIVE                       CSP10380
0067 0  C0D5                    LD      LDXJ+1 POSITIVE-PICKUP KTEST                    CSP10390
0068 01 4C100074                BSC  L  OVER,- IF NOT NEGATIVE-GO TO OVER               CSP10400
006A 0  9029                    S       ZERO NEGATIVE-CHECK AGAINST ZERO                CSP10410
006B 01 4C18007F                BSC  L  NEXT,+- EQUAL-GO TO NEXT                        CSP10420
006D 0  700D                    MDX     SETAG NOT EQUAL-GO TO SETAG                     CSP10430
                        *                       EXIT.............................       CSP10440
006E 00 65000000        SAVE1   LDX  L1 *-*  RESTORE IR1                                CSP10450
0070 00 66000000        SAVE2   LDX  L2 *-*  RESTORE IR2                                CSP10460
0072 00 4C000000        DONE1   BSC  L  *-*  RETURN TO CALLING PROGRAM                  CSP10470
                        *                       IS KTEST EQUAL TO BLANK                 CSP10480
0074 0  9020            OVER    S       BLANK CHECK KTEST AGAINST BLANK                 CSP10490
0075 01 4C18007F                BSC  L  NEXT,+- IF EQUAL-GO TO NEXT                     CSP10500
                        *                       IS KTEST EQUAL TO COMMA                 CSP10510
0077 0  C0C5                    LD      LDXJ+1 NOT EQUAL-CHECK KTEST                    CSP10520
0078 0  9022                    S       COMMA AGAINST A COMMA                           CSP10530
0079 01 4C18007F                BSC  L  NEXT,+- EQUAL-GO TO NEXT                        CSP10540
                        *                       NZRSP=KNOW-1                            CSP10550
007B 0  691C            SETAG   STX   1 NZRSP NOT EQUAL-SET NZRSP EQUAL TO              CSP10560
007C 01 74FF0098                MDX  L  NZRSP,-1 KCARD COUNT MINUS ONE                  CSP10570
007E 0  7000                    MDX     *    NO-OP                                      CSP10580
                        *                       SEE IF KNOW IS LESS THAN K.  IF         CSP10590
                        *                       YES, PUT JCARD ZONE BACK.  IF NO        CSP10600
                        *                       GO BACK FOR MORE.                       CSP10610
007F 01 7401003F        NEXT    MDX  L  KCARD+1,1 MODIFY KCARD ADDRESS TO               CSP10620
                        *                       KNOW-1                                  CSP10630
0081 0  71FF                    MDX   1 -1   DECREMENT IR1                              CSP10640
0082 0  70BB                    MDX     KCARD GO BACK FOR MORE                          CSP10650
                        *                       PUT JCARD ZONE BACK                     CSP10660
0083 30 15A56545                CALL    NZONE RESTORE JCARD ZONE                        CSP10670
0085 0  0000            JCRD2   DC      *-*  ADDRESS OF JCARD                           CSP10680
0086 0  0000            JLAS2   DC      *-*  ADDRESS OF JLAST                           CSP10690
0087 1  00CA                    DC      NSIGN ADDRESS OF NEW SIGN INDICATOR             CSP10700
0088 1  0000                    DC      EDIT DUMMY                                      CSP10710
                        *                       SEE IF JNOW IS LESS THAN J.  IF         CSP10720
                        *                       YES, GO TO OK.  IF NO, FILL WITH        CSP10730
                        *                       ASTERISKS AND EXIT                      CSP10740
0089 0  6AA8                    STX   2 JCRD1 GET THE CONTENTS OF                       CSP10750
008A 0  C0A7                    LD      JCRD1 IR2 AND CHECK                             CSP10760
008B 01 4C0800A0                BSC  L  OK,+ IF NOT POSITIVE-GO TO OK                   CSP10770
008D 30 062534C0                CALL    FILL POSITIVE-ERROR-JCARD TOO LONG              CSP10780
                        *                       FILL KCARD WITH ASTERISKS               CSP10790
008F 0  0000            KCRD1   DC      *-*  ADDRESS OF KCARD                           CSP10800
0090 0  0000            K1      DC      *-*  ADDRESS OF K                               CSP10810
0091 0  0000            KLAS1   DC      *-*  ADDRESS OF KLAST                           CSP10820
0092 1  0099                    DC      AST  ADDRESS OF FILL CHARACTER                  CSP10830
0093 0  70DA                    MDX     SAVE1 GO TO EXIT                                CSP10840
0094 0  F040            ZERO    DC   E  /F040 CONSTANT OF EBCDIC ZERO                   CSP10850
0095 0  4040            BLANK   DC      /4040 CONSTANT OF EBCDIC BLANK                  CSP10860
0096 0  0000            MONEY   DC      *-*  FILL FOR FLOATING $                        CSP10870
0097 0  0000            NDUMP   DC      *-*  FILL FOR ANY SUPPRESSION                   CSP10880
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0098 0  0000            NZRSP   DC      *-*  HOW FAR TO ZERO SUPPRESS                   CSP10890
0099 0  5C40            AST     DC      /5C40 CONSTANT OF ASTERISK                      CSP10900
009A 0  5B40            DLRSG   DC      /5B40 CONSTANT OF DOLLAR SIGN                   CSP10910
009B 0  6B40            COMMA   DC      /6B40 CONSTANT OF COMMA                         CSP10920
009C 0  6040            MINUS   DC      /6040 CONSTANT OF MINUS SIGN                    CSP10930
009D 0  D940            R       DC      /D940 CONSTANT OF LETTER R                      CSP10940
009E 0  0001            ONE2    DC      1     CONSTANT OF ONE                           CSP10950
009F 0  0002            TWO2    DC      2     CONSTANT OF TWO                           CSP10960
                        *                       IS NSIGN EQUAL TO TWO                   CSP10970
00A0 0  C029            OK      LD      NSIGN PICKUP THE ORIGINAL ZONE                  CSP10980
00A1 0  90FD                    S       TWO2 INDICATOR AND CHECK AGAINST TWO            CSP10990
00A2 01 4C1800B7                BSC  L  NEG,+- EQUAL-GO TO NEG                          CSP11000
                        *                       KTEST=KCARD(KLAST)                      CSP11010
00A4 00 C4000000        KCRD3   LD   L  *-*  NOT EQUAL-PICKUP KCARD(KLAST)              CSP11020
00A6 0  90F5                    S       MINUS AND CHECK AGAINST MINUS SIGN              CSP11030
00A7 01 4C1800B4                BSC  L  LD2,+- IF EQUAL-GO TO LD2                       CSP11040
00A9 0  80F2                    A       MINUS NOT EQUAL-GET KTEST AND CHECK             CSP11050
00AA 0  90F2                    S       R     AGAINST LETTER R                          CSP11060
00AB 01 4C2000B7                BSC  L  NEG,Z IF NOT EQUAL-GO TO NEG                    CSP11070
00AD 01 740100A5                MDX  L  KCRD3+1,1 EQUAL-GET ADDRESS OF                  CSP11080
                        *                       KCARD(KLAST-1)                          CSP11090
                        *                   KCARD(KLAST-1)=16448                        CSP11100
00AF 0  C0E5                    LD      BLANK PICKUP A BLANK                            CSP11110
00B0 01 D48000A5                STO  I  KCRD3+1 STORE AT KCARD(KLAST-1)                 CSP11120
00B2 01 74FF00A5                MDX  L  KCRD3+1,-1 GET ADDR OF KCARD(KLAST)             CSP11130
                        *                   KCARD(KLAST)=16448                          CSP11140
00B4 0  C0E0            LD2     LD      BLANK PICKUP A BLANK                            CSP11150
00B5 01 D48000A5                STO  I  KCRD3+1 STORE AT KCARD(KLAST)                   CSP11160
                        *                       IS NZRSP GREATER THAN ZERO              CSP11170
00B7 0  C0E0            NEG     LD      NZRSP GET NZRSP AND                             CSP11180
00B8 01 4C08006E                BSC  L  SAVE1,+ IF NOT POSITIVE-EXIT                    CSP11190
00BA 01 84800090                A    I  K1   POSITIVE-CALCULATE SUBSCRIPT OF            CSP11200
00BC 0  90E1                    S       ONE2 LAST POSITION TO BE ZERO                   CSP11210
00BD 0  D0E7                    STO     KCRD3+1 SUPPRESSED-END OF FILL AREA             CSP11220
                        *                       ZERO SUPPRESS                           CSP11230
00BE 30 062534C0                CALL    FILL FILL ROUTINE TO ZERO SUPPRESS              CSP11240
00C0 0  0000            KCRD2   DC      *-*  ADDRESS OF KCARD                           CSP11250
00C1 0  0000            K2      DC      *-*  ADDRESS OF K                               CSP11260
00C2 1  00A5                    DC      KCRD3+1 ADDRESS OF END OF FILL AREA             CSP11270
00C3 1  0097                    DC      NDUMP ADDRESS OF FILL CHARACTER                 CSP11280
                        *                   KCARD(NZRSP)=MONEY                          CSP11290
00C4 0  C0FB                    LD      KCRD2 GET KCARD ADDRESS                         CSP11300
00C5 0  90DF                    S       KCRD3+1 SUBTRACT LAST FILL VALUE                CSP11310
00C6 0  80D7                    A       ONE2 ADD CONSTANT OF ONE                        CSP11320
00C7 0  D002                    STO     STOK+1 CREATE KCARD(NZRSP) ADDRESS              CSP11330
00C8 0  C0CD                    LD      MONEY PICKUP MONEY VALUE                        CSP11340
00C9 00 D4000000        STOK    STO  L  *-*  STORE FOR SUPPRESSION                      CSP11350
00CA                    NSIGN   EQU     STOK+1 TO SAVE CORE STORAGE                     CSP11360
00CB 0  70A2                    MDX     SAVE1 GO TO EXIT                                CSP11370
00CC                            END                                                     CSP11380

   NO ERRORS IN ABOVE ASSEMBLY.
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ADD
A1A3
A1DEC
A3A1
CARRY
DECA1
DIV
DPACK
DUNPK
EDIT
FILL
GET
ICOMP
IOND
KEYBD
MOVE
MPY
NCOMP
NSIGN
NZONE
PACK
PRINT
PUNCH
PUT
P1403
P1442
READ
R2501
SKIP
STACK
SUB
S1403
TYPER
UNPAC
WHOLE

```
// DUP                                                                  CSP11390
*STORE      WS  UA  EDIT                                                 CSP11400
3361 000D
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```
// ASM                                                                  CSP11410
** FILL SUBROUTINE FOR 1130 COMMERCIAL SUBROUTINE PACKAGE          (ID) CSP11420
* NAME FILL                                                        (ID) CSP11430
* LIST                                                                 CSP11440
0000     062534C0          ENT     FILL FILL SUBROUTINE ENTRY POINT    CSP11450
                     *                   CALL FILL(JCARD,J,JLAST,NCH)  CSP11460
                     *                   THE WORDS JCARD(J) THROUGH    CSP11470
                     *                   JCARD(JLAST) ARE FILLED WITH THE CSP11480
                     *                   CHARACTER AT LOCATION NCH.    CSP11490
0000 0   00C0        FILL    DC      *-* ARGUMENT ADDRESS COMES IN HERE  CSP11500
0001 0   6919                STX   1 SAVE1+1 SAVE IR1                    CSP11510
0002 01  65800000            LDX   I1 FILL PUT ARGUMENT ADDRESS IN IR1   CSP11520
0004 0   C100                LD    1 0    GET JCARD ADDRESS              CSP11530
0005 00  95800002            S     I1 2    SUBTRACT VALUE OF JLAST       CSP11540
0007 0   D00F                STO     STO+1 CREATE ADDRESS OF JCARD(JLAST) CSP11550
0008 00  C5800002            LD    I1 2    GET VALUE OF JLAST            CSP11560
000A 00  95800001    ONE     S     I1 1    SUBTRACT VALUE OF J           CSP11570
000C 0   80FE                A       ONE+1 ADD CONSTANT OF ONE           CSP11580
000D 0   4808                BSC     +     CHECK FIELD WIDTH             CSP11590
000E 0   C0FC                LD      ONE+1 NEGATIVE OR ZERO - MAKE IT ONE CSP11600
000F 0   D005                STO     LDX+1 OK - STORE FIELD WIDTH IN LDX  CSP11610
0010 00  C5800003            LD    I1 3    GET FILL CHARACTER - NCH      CSP11620
0012 0   7104                MDX   1 4    MOVE OVER FOUR ARGUMENTS       CSP11630
0013 0   6909                STX   1 DONE1+1 CREATE RETURN ADDRESS       CSP11640
                     *                   JNOW=J                        CSP11650
0014 00  65000000    LDX     LDX   L1 *-* LOAD IR1 WITH FIELD WIDTH      CSP11660
                     *                   JCARD(JNOW)=NCH               CSP11670
0016 00  D5000000    STO     STO   L1 *-* STORE FILL CHAR AT JCARD(JNOW) CSP11680
                     *                   SEE IF JNOW IS LESS THAN JLAST. CSP11690
                     *                   IF YES, JNOW=JNOW+1 AND GO BACK CSP11700
                     *                   FOR MORE.  IF NO, EXIT.       CSP11710
0018 0   71FF                MDX     -1    DECREMENT FIELD WIDTH         CSP11720
0019 0   70FC                MDX       STO NOT DONE - GO BACK FOR MORE   CSP11730
                     *                   EXIT........                  CSP11740
001A 00  65000000    SAVE1   LDX   L1 *-* DONE - RESTORE IR1             CSP11750
001C 00  4C000000    DONE1   BSC   L  *-* RETURN TO CALLING PROGRAM      CSP11760
001E                         END                                         CSP11770
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    NO ERRORS IN ABOVE ASSEMBLY.
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// DUP                                                                  CSP11780
*STORE      WS  UA  FILL                                                 CSP11790
336E 0003
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// ASM                                                                  CSP11800
** GET SUBROUTINE FOR 1130 COMMERCIAL SUBROUTINE PACKAGE                (ID) CSP11810
* NAME GET                                                             (ID) CSP11820
* LIST                                                                      CSP11830
0000    0716300C          ENT     GET  GET SUBROUTINE ENTRY POINT         CSP11840
                  *                    GET(JCARD,J,JLAST,SHIFT)            CSP11850
                  *                    THE WORDS JCARD(J) THROUGH          CSP11860
                  *                    JCARD(JLAST) ARE CONVERTED TO A     CSP11870
                  *                    REAL NUMBER AND MULTIPLIED BY       CSP11880
                  *                    SHIFT TO PLACE THE DECIMAL POINT    CSP11890
0000 0  0000      GET   DC      *-*  ARGUMENT ADDRESS COMES IN HERE         CSP11900
0001 0  694R            STX   1 FIN+1 SAVE IR1                            CSP11910
0002 01 65800000        LDX   I1 GET  PUT ARGUMENT ADDRESS IN IR1          CSP11920
0004 0  C100            LD    1 0     GET JCARD ADDRESS                   CSP11930
0005 0  D013            STO     JCRD1 STORE FOR NZONE AT JCRD1            CSP11940
0006 0  D03C            STO     JCRD3 STORE FOR NZONE AT JCRD3            CSP11950
0007 00 95800002  TWO   S     I1 2    SUBTRACT JLAST VALUE                CSP11960
0009 0  D018            STO     JCRD2+1 CREATE JCARD(JLAST) ADDRESS       CSP11970
000A 0  C103            LD    1 3     GET SHIFT ADDRESS AND               CSP11980
000B 0  D033            STO     SHIFT STORE FOR MULTIPLY TO PLACE .       CSP11990
000C 00 C5800002        LD    I1 2    GET JLAST VALUE AND                 CSP12000
000E 0  D0F1            STO     GET  SAVE FOR NZONE                       CSP12010
000F 00 95800001  ONE   S     I1 1    SUBTRACT J VALUE                    CSP12020
0011 0  80FE            A       ONE+1 ADD CONSTANT OF ONE                 CSP12030
0012 0  4808            BSC     +    CHECK FIELD WIDTH                    CSP12040
0013 0  C0FC            LD      ONE+1 NEGATIVE OR ZERO-MAKE IT ONE        CSP12050
0014 0  D00E            STO     CNT+1 OK-SAVE FIELD WIDTH AT COUNT        CSP12060
0015 0  7104            MDX   1 4    MOVE OVER FOUR ARGUMENTS             CSP12070
0016 0  6938            STX   1 DONE1+1 CREATE RETURN ADDRESS             CSP12080
                  *                    MAKE THE FIELD POSITIVE AND         CSP12090
                  *                    SAVE THE ORIGINAL SIGN              CSP12100
0017 30 15A56545        CALL    NZONE NZONE TO CLEAR ORIGINAL SIGN        CSP12110
0019 0  0000      JCRD1 DC      *-*  ADDRESS OF JCARD                     CSP12120
001A 1  0000            DC      GET  ADDRESS OF JLAST                     CSP12130
001B 1  0050            DC      FOUR ADDRESS OF CONSTANT OF FOUR          CSP12140
001C 1  0019            DC      JCRD1 ADDRESS OF OLD SIGN INDICATOR       CSP12150
001D 0  10A0            SLT     32   CLEAR ACCUMULATOR AND EXTENSION      CSP12160
001E 0  DB7E            STD   3 126  CLEAR MANTISSA OF FAC                CSP12170
001F 0  D37D            STO   3 125  CLEAR CHARACTERISTIC OF FAC          CSP12180
                  *                    LET GET AND ANS BE EQUIVALENT       CSP12190
0020 20 058A3580        LIBF    ESTO STORE THE CONTENTS OF FAC            CSP12200
0021 1  005A            DC      ANS  AT GET                               CSP12210
                  *                    JNOW=J                              CSP12220
0022 00 65000000  CNT   LDX   L1 *-*  LOAD IR1 WITH THE FIELD WIDTH        CSP12230
                  *                    JTEST=JCARD(JNOW)                   CSP12240
0024 00 C5000000  JCRD2 LD    L1 *-*  PICKUP JCARD(JNOW)                  CSP12250
0026 01 4C28002C        BSC   L  MAYBE,+Z IS JTEST NEGATIVE-YES-MAYBE     CSP12260
0028 0  9028            S       BLANK NO - IS JTEST EQUAL TO AN           CSP12270
0029 01 4C200053        BSC   L  ERR,Z EBCDIC BLANK - NO - GO TO ERR      CSP12280
002B 0  C026            LD      ZERO YES - REPLACE BLANK WITH ZERO        CSP12290
002C 0  9025      MAYBE S       ZERO IS JTEST LESS THAN AN EBCDIC         CSP12300
002D 01 4C280053        BSC   L  ERR,+Z ZERO - YES - GO TO ERR            CSP12310
                  *                    JTEST+4032 IN ACCUMULATOR           CSP12320
                  *                    GET=10*GET+(JTEST+4032)/256         CSP12330
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                  *                    SHIFT 8 IS SAME AS DIVIDE BY 256    CSP12340
002F 0  1808              SRA     8    NO - SHIFT 4 BIT DIGIT TO LOW       CSP12350
0030 20 064D6063          LIBF    FLOAT ORDER OF ACC AND MAKE REAL         CSP12360
0031 20 058A3580          LIBF    ESTO STORE REAL DIGIT                    CSP12370
0032 1  0057              DC      TEMP IN TEMPORARY STORAGE                CSP12380
0033 20 054C4000          LIBF    ELD  LOAD FAC WITH                       CSP12390
0034 1  005A              DC      ANS  GET                                 CSP12400
0035 20 05517A00          LIBF    EMPY MULTIPLY GET                        CSP12410
0036 1  005D              DC      ETEN BY TEN                              CSP12420
0037 20 15599500          LIBF    NORM NORMALIZE THE PRODUCT               CSP12430
0038 20 05044100          LIBF    EADD ADD TEMPORARY STORAGE               CSP12440
0039 1  0057              DC      TEMP TO FAC                              CSP12450
003A 20 058A3580          LIBF    ESTO STORE RESULT                        CSP12460
003B 1  005A              DC      ANS  IN GET                              CSP12470
                  *                    SEE IF JNOW IS LESS THAN JLAST.     CSP12480
                  *                    IF YES, JNOW=JNOW+1 AND GO BACK     CSP12490
                  *                    FOR MORE.  IF NO, PLACE DECIMAL     CSP12500
                  *                    POINT.                              CSP12510
003C 0  71FF              MDX   1 -1   DECREMENT FIELD WIDTH               CSP12520
003D 0  70E6              MDX     JCRD2 NOT DONE-GET NEXT DIGIT            CSP12530
                  *                    GET=SHIFT*GET                       CSP12540
003E 20 05517A00          LIBF    EMPY DONE-MULTIPLY BY SHIFT TO PLACE     CSP12550
003F 0  0000      SHIFT   DC      *-*  ADDRESS OF SHIFT---DECIMAL POINT   CSP12560
0040 20 15599500          LIBF    NORM NORMALIZE THE RESULT                CSP12570
                  *                    REPLACE SIGN OF JCARD               CSP12580
0041 30 15A56545          CALL    NZONE RESTORE ORIGINAL JCARD SIGN        CSP12590
0043 0  0000      JCRD3   DC      *-*  ADDRESS OF JCARD                    CSP12600
0044 1  0000              DC      GET  ADDRESS OF JLAST                    CSP12610
0045 1  0019              DC      JCRD1 ADDRESS OF ORIG. SIGN INDICATOR    CSP12620
0046 1  0043              DC      JCRD3 DUMMY                              CSP12630
                  *                    IF INDICATOR EQUALS 2,              CSP12640
                  *                    GET=-GET.  OTHERWISE, EXIT.....     CSP12650
0047 0  C0D1              LD      JCRD1 LOAD OLD SIGN AND SEE IF IT        CSP12660
0048 0  90BF              S       TWO+1 WAS NEGATIVE                       CSP12670
0049 01 4C20004C          BSC   L  FIN,Z IF YES,REVERSE SIGN-NO-EXIT       CSP12680
                  *                    GET=-GET                            CSP12690
004B 20 22559000          LIBF    SNR  REVERSE THE SIGN OF THE RESULT      CSP12700
                  *                    EXIT.........................       CSP12710
004C 00 65000000  FIN     LDX   L1 *-*  RESTORE IR1                       CSP12720
004E 00 4C000000  DONE1   BSC   L  *-*  RETURN TO CALLING PROGRAM          CSP12730
0050 0  0004      FOUR    DC      4    CONSTANT OF FOUR                    CSP12740
0051 0  4040      BLANK   DC      /4040 CONSTANT OF EBCDIC BLANK           CSP12750
0052 0  F040      ZERO    DC      /F040 CONSTANT OF EBCDIC ZERO            CSP12760
0053 0  10A0      ERR     SLT     32   CLEAR ACCUMULATOR AND EXTENSION     CSP12770
0054 0  DB7E              STD   3 126  CLEAR MANTISSA OF FAC                CSP12780
0055 0  D37D              STO   3 125  CLEAR CHARACTERISTIC OF FAC          CSP12790
0056 0  70F5              MDX     FIN -GO TO EXIT                          CSP12800
0057    0003      TEMP    BSS     3    TEMPORARY STORAGE                   CSP12810
005A    0003      ANS     BSS     3    TEMPORARY STORAGE                   CSP12820
005D 84 50000000  ETEN    XFLC    10.0 CONSTANT OF 10.0 (TEN)              CSP12830
0060                      END                                              CSP12840

    NO ERRORS IN ABOVE ASSEMBLY.
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```
// DUP                                                                  CSP12850
*STORE      WS  UA  GET                                                  CSP12860
3371 0007
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```
// ASM                                                                  CSP12870
** ICOMP SUBROUTINE FOR 1130 COMMERCIAL SUBROUTINE PACKAGE          (ID) CSP12880
* NAME ICOMP                                                         (ID) CSP12890
* LIST                                                                 CSP12900
0000     090D6517           ENT     ICOMP ICOMP SUBROUTINE ENTRY POINT   CSP12910
                       *               ICOMP(JCARD,J,JLAST,KCARD,K,KLAST)  CSP12920
                       *                  THE WORDS JCARD(J) THROUGH       CSP12930
                       *                  JCARD(JLAST) ARE COMPARED TO THE CSP12940
                       *                  WORDS KCARD(K) THROUGH           CSP12950
                       *                  KCARD(KLAST).                    CSP12960
0000 0  0000       ICOMP DC      *-* ARGUMENT ADDRESS COMES IN HERE       CSP12970
0001 0  6973             STX   1 SAVE1+1 SAVE IR1                         CSP12980
0002 01 65800000         LDX   I1 ICOMP PUT ARGUMENT ADDRESS IN IR1       CSP12990
0004 0  C100             LD    1 0    GET JCARD ADDRESS                   CSP13000
0005 00 95800002         S     I1 2    SUBTRACT JLAST VALUE               CSP13010
0007 0  D048             STO     JPIC1+1 STORE JCARD(JLAST) FOR JHASH     CSP13020
0008 0  D04A             STO     JPIC2+1 STORE JCARD(JLAST) FOR ICOMP     CSP13030
0009 0  800A             A       ONE+1 ADD CONSTANT OF ONE                CSP13040
000A 0  D00F             STO     SGNJ+1 CREATE ADDRESS OF JCARD(JLAST)    CSP13050
000B 0  C103             LD    1 3    GET KCARD ADDRESS                   CSP13060
000C 00 95800005         S     I1 5    SUBTRACT KLAST VALUE               CSP13070
000E 0  D046             STO     KPIC2+1 STORE KCARD(KLAST) FOR ICOMP     CSP13080
000F 0  8004             A       ONE+1 ADD CONSTANT OF ONE                CSP13090
0010 0  D011             STO     SGNK+1 CREATE ADDRESS OF KCARD(KLAST)    CSP13100
0011 00 C5800002   TWO   LD    I1 2    GET VALUE OF JLAST                 CSP13110
0013 00 95800001   ONE   S     I1 1    SUBTRACT VALUE OF J                CSP13120
0015 0  80FE             A       ONE+1 ADD CONSTANT OF ONE                CSP13130
0016 0  4808             BSC     +     CHECK FIELD WIDTH                  CSP13140
0017 0  C0FC             LD      ONE+1 NEGATIVE OR ZERO-MAKE IT ONE       CSP13150
0018 0  D035             STO     CNTCO+1 SAVE FIELD WIDTH IN COMP CNT     CSP13160
                       *               CLEAR AND SAVE THE SIGNS ON THE    CSP13170
                       *               JCARD AND THE KCARD FIELDS         CSP13180
0019 00 C4000000   SGNJ  LD    L *-*  PICKUP THE SIGN OF JCARD            CSP13190
001B 0  D05C             STO     JSIGN SAVE IT                            CSP13200
001C 01 4C100021         BSC   L SGNK,- IS IT NEG-NO-LOOK AT KCARD        CSP13210
001E 0  F00F             EOR     HFFFF+1 YES-MAKE IT POSITIVE AND         CSP13220
001F 01 D480001A         STO   I SGNJ+1 CHANGE JCARD FIELD SIGN           CSP13230
0021 00 C4000000   SGNK  LD    L *-*  PICKUP THE SIGN OF KCARD            CSP13240
0023 0  D055             STO     KSIGN SAVE IT                            CSP13250
0024 01 4C100029         BSC   L CHCK,- IS IT NEG-NO-GO TO CHCK           CSP13260
0026 0  F007             EOR     HFFFF+1 YES-MAKE IT POSITIVE AND         CSP13270
0027 01 D4800022         STO   I SGNK+1 CHANGE THE KCARD FIELD SIGN       CSP13280
0029 0  7106       CHCK  MDX     1 6    MOVE OVER SIX ARGUMENTS           CSP13290
002A 0  694C             STX     1 DONE1+1 CREATE RETURN ADDRESS          CSP13300
                       *               K IS COMPARED TO                   CSP13310
                       *               KSTRT=KLAST+J-JLAST-1              CSP13320
002B 00 C580FFFE         LD    I1 -2   PICKUP THE VALUE OF K              CSP13330
002D 00 9580FFFF   HFFFF S     I1 -1   SUBTRACT THE VALUE OF KLAST         CSP13340
002F 00 9580FFFB         S     I1 -5   SUBTRACT THE VALUE OF J            CSP13350
0031 00 8580FFFC         A     I1 -4   ADD THE VALUE OF JLAST            CSP13360
0033 0  80E0             A       ONE+1 ADD CONSTANT OF ONE                CSP13370
0034 01 4C30004B         BSC   L JHASH,-Z IF POSITIVE GO TO JHASH         CSP13380
0036 0  F0F7             EOR     HFFFF+1 OTHERWISE COMPLIMENT AND ADD     CSP13390
0037 0  80DA             A       TWO+1 ONE GIVING LEADING PART KCARD      CSP13400
0038 0  D009             STO     ZIPCT+1 STORE THIS COUNT AT ZIPCT        CSP13410
0039 00 8580FFFE         A     I1 -2   ADD VALUE OF K                     CSP13420
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003B 0  90D8            S       ONE+1 SUBTRACT CONSTANT OF ONE          CSP13430
003C 0  D0C3            STO     ICOMP STORE TEMPORARILY                 CSP13440
003D 0  C1FD            LD    1 -3    GET KCARD ADDRESS                 CSP13450
003E 0  90C1            S       ICOMP SUBTRACT TEMPORARY VALUE GIVING   CSP13460
003F 0  D006            STO     KPIC1+1 ADDR FOR SEARCHING BEGINNING    CSP13470
                *                       OF KCARD                        CSP13480
                *                       ICOMP=-KSIGN                    CSP13490
0040 0  C038            LD      KSIGN LOAD SIGN OF KCARD                CSP13500
0041 0  F0EC            EOR     HFFFF+1 NEGATE IT                       CSP13510
0042 0  D0BD            STO     ICOMP STORE IT IN ICOMP                 CSP13520
                *                       KNOW=K                          CSP13530
0043 00 65000000    ZIPCT LDX   L1 *-*  LOAD IR1 WITH BEGINNING KCARD CT CSP13540
0045 00 C5000000    KPIC1 LD    L1 *-*  PICKUP KCARD(KNOW)               CSP13550
                *                       IS KCARD(KNOW) POSITIVE         CSP13560
0047 01 4C30006D        BSC   L FIN,-Z IF POSITIVE, GO TO FIN           CSP13570
                *                       SEE IF KNOW IS LESS THAN KSTRT. CSP13580
                *                       IF YES, KNOW=KNOW+1 AND LOOK AT CSP13590
                *                       NEXT KCARD WORD.  IF NO, GO TO  CSP13600
                *                       JHASH.                          CSP13610
0049 0  71FF            MDX   1 -1    OTHERWISE, DECREMENT FIELD WIDTH  CSP13620
004A 0  70FA            MDX     KPIC1 NOT DONE-GO BACK FOR NEXT DIGIT   CSP13630
                *                       JHASH=0                         CSP13640
004B 0  1810        JHASH SRA     16    DONE-CLEAR ACCUMULATOR          CSP13650
004C 0  D0B3            STO     ICOMP CLEAR ICOMP                       CSP13660
                *                       KNOW=KSTRT+1                    CSP13670
                *                       KSTRT=J                         CSP13680
004D 00 65000000    CNTCO LDX   L1 *-*  LOAD IR1 WITH FIELD WIDTH       CSP13690
                *                       JHASH=JHASH+JCARD(KSTRT)        CSP13700
004F 00 85000000    JPIC1 A     L1 *-*  ADD JCARD(KSTRT) TO JHASH       CSP13710
0051 0  1890            SRT     16    STORE JHASH IN EXTENSION          CSP13720
                *                       ICOMP=JCARD(KSTRT)-KCARD(KNOW)  CSP13730
0052 00 C5000000    JPIC2 LD    L1 *-*  LOAD JCARD(KSTRT)                CSP13740
0054 00 95000000    KPIC2 S     L1 *-*  SUBTRACT KCARD(KNOW)             CSP13750
0056 0  D0A9            STO     ICOMP STORE RESULT                      CSP13760
                *                       IS ICOMP ZERO - NO - GO TO NEQ  CSP13770
0057 01 4C200063        BSC   L NEQ,Z IF NOT ZERO, GO TO NEQ.           CSP13780
0059 0  1090            SLT     16    OTHERWISE, PUT JHASH IN ACCUM     CSP13790
                *                       KNOW=KNOW+1                     CSP13800
                *                       SEE IF KSTRT IS LESS THAN JLAST.CSP13810
                *                       IF YES, KSTRT=KSTRT+1 AND TRY   CSP13820
                *                       NEXT PAIR OF DIGITS.  IF NO,    CSP13830
005A 0  71FF            MDX   1 -1    DECREMENT FIELD WIDTH             CSP13840
005B 0  70F3            MDX     JPIC1 NOT DONE - GO BACK                CSP13850
                *                     IF NO IS JSIGN*KSIGN*JHASH NEGATIVE.CSP13860
005C 01 4C18006D        BSC   L FIN,+- DONE-IF JHASH IS ZERO GO FIN     CSP13870
005E 0  C019            LD      JSIGN OTHERWISE - COMPUTE JSIGN         CSP13880
005F 0  F019            EOR     KSIGN TIMES KSIGN                       CSP13890
0060 01 4C10006D        BSC   L FIN,- IF NOT NEGATIVE, GO TO FIN        CSP13900
0062 0  7004            MDX     OVR1 OTHERWISE GO TO OVR1               CSP13910
                *                       IS KSIGN*JSIGN NEGATIVE         CSP13920
0063 0  C014        NEQ LD      JSIGN COMPUTE JSIGN                     CSP13930
0064 0  F014            EOR     KSIGN TIMES KSIGN                       CSP13940
0065 01 4C100069        BSC   L OVR2,- IF NOT NEGATIVE, GO TO OVR2      CSP13950
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                *                       ICOMP=1                         CSP13960
0067 0  C0E5        OVR1 LD       CNTCO OTHERWISE, SET ICOMP            CSP13970
0068 0  D097             STO      ICOMP TO A POSITIVE NUMBER            CSP13980
                *                       ICOMP=JSIGN*ICOMP               CSP13990
0069 0  C00E        OVR2 LD       JSIGN                                 CSP14000
006A 0  1005             SLA      5                                     CSP14010
006B 0  F094             EOR      ICOMP                                 CSP14020
006C 0  D093             STO      ICOMP                                 CSP14030
                *                RESTORE SIGNS ON JCARD,KCARD FIELDS    CSP14040
006D 0  C00A        FIN  LD       JSIGN RESTORE THE ORIGINAL            CSP14050
006E 01 D480001A         STO   I  SGNJ+1 SIGN OF JCARD                  CSP14060
0070 0  C008             LD       KSIGN RESTORE THE ORIGINAL            CSP14070
0071 01 D4800022         STO   I  SGNK+1 SIGN OF KCARD                  CSP14080
0073 0  C08C             LD       ICOMP PUT ICOMP IN THE ACCUMULATOR    CSP14090
                *                       EXIT                            CSP14100
0074 00 65000000    SAVE1 LDX   L1 *-*  RESTORE IR1                     CSP14110
0076 00 4C000000    DONE1 BSC   L *-*  RETURN TO CALLING PROGRAM         CSP14120
0078 0  0000        JSIGN DC      *-*  SIGN OF JCARD                    CSP14130
0079 0  0000        KSIGN DC      *-*  SIGN OF KCARD                    CSP14140
007A                      END                                           CSP14150
```

NO ERRORS IN ABOVE ASSEMBLY.

```
// DUP                                                          CSP14160
*STORE      WS  UA  ICOMP                                       CSP14170
3378 0008
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```
// ASM                                                                  CSP14180
** IOND SUBROUTINE FOR 1130 COMMERCIAL SUBROUTINE PACKAGE          (ID) CSP14190
* NAME IOND                                                        (ID) CSP14200
* LIST                                                                 CSP14210
0000    09595100          ENT     IOND       SUBROUTINE NAME           CSP14220
                  *CALL IOND    NO PARAMETERS                          CSP14230
                  *CALL IOND    ALLOWS I/O OPERATIONS TO END BEFORE A  CSP14240
                  *             PAUSE OR STOP IS ENTERED               CSP14250
0000    0001      IOND  BSS     1          ARGUMENT ADDRESS            CSP14260
0001 00 74000032  IOPND MDX  L  50,0       ANY INTERRUPTS PENDING      CSP14270
0003 0  70FD            MDX     IOPND      YES - KEEP CHECKING         CSP14280
0004 01 4C800000  BACK  BSC  I  IOND       NO - RETURN TO CALLING PRG  CSP14290
0006                    END                                            CSP14300

    NO ERRORS IN ABOVE ASSEMBLY.
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```
// DUP                                                                  CSP14310

*STORE      WS  UA  IOND                                               CSP14320

3380 0002
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```
// ASM                                                                  CSP14330
** MOVE SUBROUTINE FOR 1130 COMMERCIAL SUBROUTINE PACKAGE          (ID) CSP14340
* NAME MOVE                                                        (ID) CSP14350
* LIST                                                                 CSP14360
0000    145A5140          ENT     MOVE MOVE SUBROUTINE ENTRY POINT     CSP14370
                  *                      CALL MOVE(JCARD,J,JLAST,KCARD,K) CSP14380
                  *                      THE WORDS JCARD(J) THROUGH    CSP14390
                  *                      JCARD(JLAST) ARE MOVED TO KCARD CSP14400
                  *                      STARTING AT KCARD(K).         CSP14410
0000 0  0000      MOVE  DC      *-*    ARGUMENT ADDRESS COMES IN HERE  CSP14420
0001 0  691F            STX   1 SAVE1+1 SAVE IR1                       CSP14430
0002 01 65800000        LDX   I1 MOVE  PUT ARGUMENT ADDRESS IN IR1     CSP14440
0004 0  C100            LD    1 0      GET JCARD ADDRESS               CSP14450
0005 00 95800002        S     I1 2     SUBTRACT JLAST VALUE            CSP14460
0007 0  D013            STO     LD1+1  PLACE ADDR OF JCARD(JLAST) IN   CSP14470
                  *                    PICKUP OF MOVE                  CSP14480
0008 00 C5800002        LD    I1 2     GET JLAST VALUE                 CSP14490
000A 00 95800001  ONE   S     I1 1     SUBTRACT J VALUE                CSP14500
000C 0  4828            BSC     +Z     CHECK FIELD WIDTH               CSP14510
000D 0  1810            SRA     16     NEGATIVE - MAKE IT ZERO         CSP14520
000E 0  D00A            STO     LDX+1  STORE FIELD WIDTH IN LDX        CSP14530
000F 0  C103            LD    1 3      GET KCARD ADDRESS               CSP14540
0010 00 95800004        S     I1 4     SUBTRACT K VALUE                CSP14550
0012 0  9006            S       LDX+1  SUBTRACT FIELD WIDTH            CSP14560
0013 0  D009            STO     STO+1  PLACE ADDR OF KCARD(KLAST) IN   CSP14570
                  *                    STORE OF MOVE                   CSP14580
0014 01 74010019        MDX   L LDX+1,1      ADD ONE TO FIELD WIDTH    CSP14590
                  *                    MAKING IT TRUE                  CSP14600
0016 0  7105            MDX   1 5      MOVE OVER FIVE ARGUMENTS        CSP14610
0017 0  690B            STX   1 DONE1+1 CREATE RETURN ADDRESS          CSP14620
                  *                    JNOW=J                          CSP14630
                  *                    KNOW=K+JNOW-J                   CSP14640
0018 00 65000000  LDX   LDX   L1 *-*   LOAD IR1 WITH FIELD WIDTH       CSP14650
                  *                    KCARD(KNOW)=JCARD(JNOW)         CSP14660
001A 00 C5000000  LD1   LD    L1 *-*   PICKUP JCARD(JNOW)              CSP14670
001C 00 D5000000  STO   STO   L1 *-*   STORE IT IN KCARD(KNOW)         CSP14680
                  *                    SEE IF JNOW IS LESS THAN JLAST. CSP14690
                  *                    IF YES, JNOW=JNOW+1 AND MOVE    CSP14700
                  *                    NEXT CHARACTER.  IF NO, EXIT.... CSP14710
001E 0  71FF            MDX   1 -1     DECREMENT THE FIELD WIDTH       CSP14720
001F 0  70FA            MDX     LD1    NOT DONE - GET NEXT WORD        CSP14730
                  *                    EXIT............................ CSP14740
0020 00 65000000  SAVE1 LDX   L1 *-*   DONE - RESTORE IR1              CSP14750
0022 00 4C000000  DONE1 BSC   L  *-*   RETURN TO CALLING PROGRAM        CSP14760
0024                    END                                            CSP14770

    NO ERRORS IN ABOVE ASSEMBLY.
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```
// DUP                                                                  CSP14780

*STORE      WS  UA  MOVE                                               CSP14790

3382 0003
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```
// ASM                                                                  CSP14800
** MPY SUBROUTINE FOR 1130 COMMERCIAL SUBROUTINE PACKAGE                (ID) CSP14810
* NAME MPY                                                             (ID) CSP14820
* LIST                                                                      CSP14830
0000    145E8000          ENT     MPY  MPY SUBROUTINE ENTRY POINT          CSP14840
                  *           CALL MPY(JCARD,J,JLAST,KCARD,K,KLAST,NER)   CSP14850
                  *                THE WORDS JCARD(J) THROUGH             CSP14860
                  *                JCARD(JLAST) MULTIPLY THE WORDS        CSP14870
                  *                KCARD(K) THROUGH KCARD(KLAST).         CSP14880
                  *                THE RESULT IS IN THE KCARD FIELD       CSP14890
                  *                EXTENDED TO THE LEFT.                  CSP14900
0000 0  0000      MPY     DC       *-*  ARGUMENT ADDRESS COMES IN HERE     CSP14910
0001 0  6A6A              STX   2 SAVE2+1 SAVE IR2                         CSP14920
0002 0  696B              STX   1 SAVE1+1 SAVE IR1                         CSP14930
0003 01 6580000C          LDX   I1 MPY  PUT ARGUMENT ADDRESS IN IR1        CSP14940
0005 0  C104              LD    1 4     GET K ADDRESS                      CSP14950
0006 0  D05E              STO      K1   STORE FOR FILL OF ZEROES           CSP14960
                  *                   CALCULATE  K-1                      CSP14970
0007 01 C4800065          LD    I  K1   GET VALUE OF K                     CSP14980
0009 0  900B              S        ONE+1 SUBTRACT CONSTANT OF ONE           CSP14990
000A 0  D0F5              STO      MPY  STORE IN MPY                        CSP15000
000B 0  C100              LD    1 0     GET JCARD ADDRESS                  CSP15010
000C 00 95800002          S     I1 2     SUBTRACT JLAST VALUE               CSP15020
000E 0  D04E              STO      SRCH+1 SAVE FOR JFRST SEARCH             CSP15030
000F 0  D075              STO      MULT1+1 SAVE FOR MULTIPLICATION          CSP15040
0010 0  8004              A        ONE+1 ADD CONSTANT OF ONE                CSP15050
0011 0  D02F              STO      OK+2 CREATE ADDRESS OF JCARD(JLAST)      CSP15060
0012 00 C5800002  TWO     LD    I1 2     GET JLAST VALUE                    CSP15070
0014 00 95800001  ONE     S     I1 1     SUBTRACT J VALUE                   CSP15080
0016 0  80FE              A        ONE+1 ADD CONSTANT OF ONE                CSP15090
0017 0  4808              BSC      +    CHECK FIELD WIDTH                   CSP15100
0018 0  C0FC              LD       ONE+1 NEGATIVE OR ZERO-MAKE IT ONE       CSP15110
0019 0  D024              STO      SCHCT+1 SAVE FIELD WIDTH FOR SEARCH      CSP15120
001A 0  C103              LD    1 3     GET KCARD ADDRESS                  CSP15130
001B 0  D03C              STO      KCRD1 SAVE FOR FILL                      CSP15140
001C 0  D047              STO      KCRD2 SAVE FOR FILL                      CSP15150
001D 0  D076              STO      KCRD3 SAVE FOR CARRY                     CSP15160
001E 00 95800005          S     I1 5     SUBTRACT JLAST VALUE               CSP15170
0020 0  D054              STO      PICK+1 SAVE FOR MULTIPLICATION           CSP15180
0021 0  D059              STO      PUT1+1 SAVE FOR MULTIPLICATION           CSP15190
0022 0  80F2              A        ONE+1 ADD CONSTANT OF ONE                CSP15200
0023 0  D027              STO      SGNK+1 CREATE ADDRESS OF KCARD(KLAST)    CSP15210
0024 0  C105              LD    1 5     GET KLAST ADDRESS                  CSP15220
0025 0  D070              STO      KLAS2 SAVE FOR CARRY                     CSP15230
0026 0  D03F              STO      KLAS1 SAVE FOR FILL                      CSP15240
0027 00 C5800005          LD    I1 5     GET KLAST VALUE                    CSP15250
0029 00 95800004          S     I1 4     SUBTRACT K VALUE                   CSP15260
002B 0  80E9              A        ONE+1 ADD CONSTANT OF ONE                CSP15270
002C 0  4808              BSC      +    CHECK FIELD WIDTH                   CSP15280
002D 0  C0E7              LD       ONE+1 NEGATIVE OR ZERO-MAKE IT ONE       CSP15290
002E 0  D043              STO      MULTC+1 SAVE FOR MULTIPLICATION          CSP15300
002F 0  7107              MDX   1 7     MOVE OVER SEVEN ARGUMENTS          CSP15310
0030 0  693F              STX   1 DONE1+1 CREATE RETURN ADDRESS            CSP15320
                  *                   KSTRT=K-JLAST+J-1                   CSP15330
0031 0  C0CE              LD       MPY  LOAD K-1                            CSP15340
0032 00 8580FFFA          A     I1 -6    ADD VALUE OF J                     CSP15350
```

ADD
A1A3
A1DEC
A3A1
CARRY
DECA1
DIV
DPACK
DUNPK
EDIT
FILL
GET
ICOMP
IOND
KEYBD
MOVE
MPY
NCOMP
NSIGN
NZONE
PACK
PRINT
PUNCH
PUT
P1403
P1442
READ
R2501
SKIP
STACK
SUB
S1403
TYPER
UNPAC
WHOLE

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0034 00 9580FFFB          S    I1 -5   SUBTRACT VALUE OF JLAST          CSP15360
0036 01 4C30003D          BSC  L  SCHCT,-Z IF KSTRT POSITIV-GO TO SCHCT CSP15370
                       *                NER=KLAST                       CSP15380
0038 00 C580FFFE          LD   I1 -2   NOT POSITIVE-LOAD KLAST VALUE    CSP15390
003A C0 D580FFFF    MONE  STO  I1 -1   AND STORE AT NER                 CSP15400
003C 0  7030              MDX     SAVE1 GO TO EXIT                      CSP15410
                       *                JFRST=J                         CSP15420
003D 00 65000000    SCHCT LDX  L1 *-*  LOAD IR1 WITH JCARD FIELD WIDTH CSP15430
003F 0  D0FE        OK    STO     SCHCT+1 SAVE KSTRT IN SCHCT+1         CSP15440
                       *                CLEAR AND SAVE THE SIGNS ON THE CSP15450
                       *                JCARD AND THE KCARD FIELDS      CSP15460
0040 00 C4000000          LD   L  *-*  GET JCARD(JLAST) VALUE            CSP15470
0042 0  D05E              STO     JSIGN SAVE SIGN IN JSIGN              CSP15480
0043 01 4C100049          BSC  L  OVRJ,- IF NOT NEGATIVE-GO TO OVRJ     CSP15490
0045 0  F0F5              EOR     MONE+1 NEGATIVE-MAKE SIGN POSITIVE    CSP15500
0046 01 D4800041          STO  I  OK+2 AND PUT BACK IN JCARD(JLAST)     CSP15510
0048 0  C0F2              LD      MONE+1 PICKUP A MINUS ONE             CSP15520
0049 0  1890        OVRJ  SRT     16   PUT JSIGN INDICATION IN EXTENTON CSP15530
004A 00 C4000000    SGNK  LD   L  *-*  PICKUP KCARD(KLAST)              CSP15540
004C 01 4C100054          BSC  L  KPLUS,- IF NOT NEGATIVE-GO TO KPLUS   CSP15550
004E 0  F0EC              EOR     MONE+1 NEGATIVE-MAKE POSITIVE AND     CSP15560
004F 01 D480004B          STO  I  SGNK+1 PUT BACK IN KCARD(KLAST)       CSP15570
0051 0  1090              SLT     16   GET JSIGN INDICATION             CSP15580
0052 0  F0E8              EOR     MONE+1 CHANGE IT                      CSP15590
0053 0  7001              MDX     OVRK SKIP THE NEXT INSTRUCTION        CSP15600
0054 0  1090        KPLUS SLT     16   GET JSIGN INDICATION             CSP15610
0055 0  D04C        OVRK  STO     KSIGN SAVE SIGN FOR RESULT            CSP15620
                       *                FILL LEFT EXTENSION OF KCARD    CSP15630
                       *                WITH ZEROES                     CSP15640
0056 30 062534C0          CALL    FILL FILL KCARD EXTENSION WITH ZEROES CSP15650
0058 0  0000        KCRD1 DC      *-*  ADDRESS OF KCARD                 CSP15660
0059 1  003E              DC      SCHCT+1 ADDRESS OF KSTRT              CSP15670
005A 1  0000              DC      MPY  ADDRESS OF K-1                   CSP15680
005B 1  00A3              DC      ZIP  ADDRESS OF ZERO                  CSP15690
                       *                IS JCARD(JLAST) POSITIVE        CSP15700
005C 00 C5000000    SRCH  LD   L1 *-*  PICKUP JCARD(JFRST)              CSP15710
005E 01 4C300071          BSC  L  MULTC,-Z IF POSITIVE-GO TO MULTC      CSP15720
                       *                SEE IF JFRST IS LESS THAN JLAST. CSP15730
                       *                IF YES, JFRST=JFRST+1 AND GO    CSP15740
                       *                BACK FOR MORE.  IF NO,          CSP15750
                       *                MULTIPLICATION IS BY ZERO.      CSP15760
0060 0  71FF              MDX  1 -1   NOT POSITIVE-DECREMENT IR1        CSP15770
0061 0  70FA              MDX     SRCH NOT DONE - GO BACK FOR MORE      CSP15780
                       *                FILL WITH ZERO SINCE MULTIPLIER CSP15790
                       *                IS ZERO                         CSP15800
0062 30 062534C0          CALL    FILL DONE-MAKE ENTIRE RESULT ZERO     CSP15810
0064 0  0000        KCRD2 DC      *-*  ADDRESS OF KCARD                 CSP15820
0065 0  0000        K1    DC      *-*  ADDRESS OF K                     CSP15830
0066 0  0000        KLAS1 DC      *-*  ADDRESS OF KLAST                 CSP15840
0067 1  00A3              DC      ZIP  ADDRESS OF ZERO                  CSP15850
                       *                RESTORE THE SIGN OF JCARD       CSP15860
                       *                EXIT.............................CSP15870
0068 0  C038        FIN   LD      JSIGN PICKUP JCARD SIGN               CSP15880
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0069 01 D4800041          STO  I  OK+2 AND RESTORE IT                    CSP15890
006B 00 66000000    SAVE2 LDX  L2 *-*  RESTORE IR2                      CSP15900
006D 00 65000000    SAVE1 LDX  L1 *-*  RESTORE IR1                      CSP15910
006F 00 4C000000    DONE1 BSC  L  *-*  RETURN TO CALLING PROGRAM         CSP15920
                    *                  KM=K                            CSP15930
0071 00 66000000    MULTC LDX  L2 *-*  POSITIVE-LOAD IR2 WITH KCARD CNT CSP15940
0073 0  69F1          STX   1 K1   SAVE JFRST AT K1                     CSP15950
                    *                  MULT=KCARD(KM)                  CSP15960
0074 00 C6000000    PICK  LD   L2 *-*  PICKUP KCARD(KM)                  CSP15970
0076 01 4C080090          BSC  L  MO,+ IS IT POSITIVE-NO-GO TO MO        CSP15980
0078 C  D0ED              STO     KLAS1 YES-SAVE KCARD(KM)               CSP15990
0079 C  1810              SRA     16    CLEAR ACCUMULATOR                CSP16000
                    *                   KCARD(KM)=0                     CSP16010
007A 00 D6000000    PUT1  STO  L2 *-*  SET KCARD(KM)=0                   CSP16020
                    *                  KNOW=KM+JFRST-JLAST             CSP16030
007C 0  6AF5              STX   2 MULTC+1 GET THE VALUE                  CSP16040
007D 0  C0F4              LD      MULTC+1 OF KM                          CSP16050
007E 0  80E6              A       K1    AND ADD JFRST                    CSP16060
007F 0  808B              A       MONE+1 TO IT AND CALCULATE             CSP16070
0080 C  80FA              A       PUT1+1 THE ADDRESS OF                  CSP16080
0081 0  D009              STO     PUT2+1 KCARD(KNOW)                     CSP16090
                    *                  JNOW=JFRST                      CSP16100
0082 01 65800065          LDX  I1 K1   LOAD IR1 WITH JFRST               CSP16110
                    *                  KCARD(KNOW)=MULT*JCARD(JNOW)    CSP16120
                    *                             +KCARD(KNOW)         CSP16130
0084 00 C5000000    MULT1 LD   L1 *-*  PICKUP JCARD(JNOW)                CSP16140
0086 0  A0DF              M       KLAS1 MULTIPLY BY MULT                 CSP16150
0087 0  1090              SLT     16    RE-ALIGN THE PRODUCT             CSP16160
0088 01 8480008B          A    I  PUT2+1                                 CSP16170
008A 00 D4000000    PUT2  STO  L  *-*                                    CSP16180
008C 01 74FF008B          MDX  L  PUT2+1,-1 MODIFY ADDR OF KCARD(KNOW)  CSP16190
                    *                  SEE IF JNOW IS LESS THAN JLAST. CSP16200
                    *                  IF YES, JNOW=JNOW+1 AND GO BACK CSP16210
                    *                  FOR MORE.  IF NO, CHECK KM.     CSP16220
008E 0  71FF              MDX     1 -1   DECREMENT IR1                   CSP16230
008F 0  70F4              MDX     MULT1 NOT DONE-GO BACK FOR MORE        CSP16240
                    *                  SEE IF KM IS LESS THAN KLAST.   CSP16250
                    *                  IF YES, KM=KM+1 AND GO BACK FOR CSP16260
                    *                  MORE.  IF NO, RESOLVE CARRIES.  CSP16270
0090 0  72FF        MO    MDX   2 -1   DONE-DECREMENT IR2                CSP16280
0091 0  70E2              MDX     PICK NOT DONE-GO BACK FOR MORE         CSP16290
                    *                  RESOLVE CARRIES IN THE PRODUCT  CSP16300
0092 30 03059668          CALL    CARRY DONE-RESOLVE CARRIES IN THE RES CSP16310
0094 0  0000        KCRD3 DC      *-*  ADDRESS OF KCARD                  CSP16320
0095 1  003E              DC      SCHCT+1 ADDRESS OF KSTRT               CSP16330
0096 0  0000        KLAS2 DC      *-*  ADDRESS OF KLAST                  CSP16340
0097 1  0094              DC      KCRD3 DUMMY                            CSP16350
                    *                  GENERATE THE SIGN OF THE PRODUCT CSP16360
0098 0  C009              LD      KSIGN PICKUP THE SIGN INDICATOR        CSP16370
0099 01 4C100068          BSC  L  FIN,- IF NOT NEGATIVE-ALL DONE-EXIT    CSP16380
009B 01 C480004B          LD   I  SGNK+1 NEGATIVE-PICKUP KCARD(KLAST)    CSP16390
009D 0  F09D              EOR     MONE+1 CHANGE THE SIGN                 CSP16400
009E 01 D480004B          STO  I  SGNK+1 RESTORE KCARD(KLAST)            CSP16410
```



```
00A0 0  70C7              MDX     FIN   GO TO EXIT                      CSP16420
00A1 0  0000        JSIGN DC      *-*   SIGN OF JCARD                   CSP16430
00A2 0  0000        KSIGN DC      *-*   SIGN OF PRODUCT                 CSP16440
00A3 0  0000        ZIP   DC      0     CONSTANT OF ZERO                CSP16450
00A4                      END                                           CSP16460
```

NO ERRORS IN ABOVE ASSEMBLY.

```
// DUP                                                                  CSP16470
*STORE      WS  UA  MPY                                                 CSP16480
3385 000A
```

```
// ASM                                                                  CSP16490
** NCOMP SUBROUTINE FOR 1130 COMMERCIAL SUBROUTINE PACKAGE          (ID) CSP16500
* NAME NCOMP                                                         (ID) CSP16510
* LIST                                                                 CSP16520
0000     150D6517          ENT     NCOMP NCOMP SUBROUTINE ENTRY POINT  CSP16530
                     *                    NCOMP(JCARD,J,JLAST,KCARD,K)  CSP16540
                     *                    THE WORDS JCARD(J) THROUGH    CSP16550
                     *                    JCARD(JLAST) STARTING WITH    CSP16560
                     *                    JCARD(J) ARE COMPARED LOGICALLY CSP16570
                     *                    TO THE FIELD STARTING AT      CSP16580
                     *                    KCARD(K).  ALL DATA MUST BE IN CSP16590
                     *                    A1 FORMAT.                    CSP16600
0000 0  0000         NCOMP DC      *-*   ARGUMENT ADDRESS COMES IN HERE  CSP16610
0001 0  6925               STX     1 SAVE1+1 SAVE IR1                    CSP16620
0002 01 65800000           LDX   I1 NCOMP PUT ARGUMENT ADDRESS IN IR1    CSP16630
0004 0  C100               LD      1 0     GET JCARD ADDRESS             CSP16640
0005 00 95800002           S     I1 2      SUBTRACT JLAST VALUE          CSP16650
0007 0  D017               STO     LD1+1 CREATE END OF JCARD ADDRESS     CSP16660
0008 00 C5800002           LD    I1 2      GET JLAST VALUE               CSP16670
000A 00 95800001     ONE   S     I1 1      SUBTRACT J VALUE              CSP16680
000C 0  4828               BSC     +Z      CHECK FIELD WIDTH             CSP16690
000D 0  1810               SRA     16      NEGATIVE - MAKE IT ZERO       CSP16700
000E 0  D00A               STO     LDX+1 SAVE FIELD WIDTH                CSP16710
000F 0  C103               LD      1 3     GET KCARD ADDRESS             CSP16720
0010 00 95800004           S     I1 4      SUBTRACT K VALUE              CSP16730
0012 0  9006               S       LDX+1 SUBTRACT FIELD WIDTH            CSP16740
0013 0  D007               STO     LD2+1 CREATE END OF KCARD ADDRESS     CSP16750
0014 01 74010019           MDX   L LDX+1,1 MAKE FIELD WIDTH TRUE         CSP16760
0016 0  7105               MDX     1 5     MOVE OVER FIVE ARGUMENTS      CSP16770
0017 0  6911               STX     1 DONE1+1 CREATE RETURN ADDRESS       CSP16780
                     *                    JNOW=J                        CSP16790
                     *                    KNOW=K+JNOW-J                 CSP16800
0018 00 65000000     LDX   LDX   L1 *-*   PUT FIELD WIDTH IN IR1         CSP16810
001A 00 C5000000     LD2   LD    L1 *-*   PICKUP JCARD(JNOW)            CSP16820
001C 0  1884               SRT     4       DIVIDE BY SIXTEEN             CSP16830
001D 0  D0FB               STO     LDX+1 SAVE TEMPORARILY                CSP16840
001E 00 C5000000     LD1   LD    L1 *-*   PICKUP KCARD(KNOW)            CSP16850
0020 0  1884               SRT     4       DIVIDE BY SIXTEEN             CSP16860
0021 0  90F7               S       LDX+1 CALCUL JCARD(JNOW)-KCARD(KNOW)  CSP16870
0022 01 4C200026           BSC   L SAVE1,Z IS NCOMP ZERO-NO-ALL DONE     CSP16880
                     *                    SEE IF JNOW IS LESS THAN JLAST. CSP16890
                     *                    IF YES, JNOW=JNOW+1 AND GO BACK CSP16900
                     *                    FOR MORE.  IF NO, EXIT.       CSP16910
0024 0  71FF               MDX     1 -1    YES-DECREMENT FIELD WIDTH     CSP16920
0025 0  70F4               MDX     LD2     GO BACK FOR MORE              CSP16930
                     *                    ALL DONE - - EXIT.............. CSP16940
0026 00 65000000     SAVE1 LDX   L1 *-*   RESTORE IR1                   CSP16950
0028 00 4C000000     DONE1 BSC   L *-*    RETURN TO CALLING PROGRAM     CSP16960
002A                       END                                         CSP16970

    NO ERRORS IN ABOVE ASSEMBLY.

// DUP                                                                  CSP16980
*STORE      WS  UA  NCOMP                                               CSP16990
338F 0004
```

```
// ASM                                                                  CSP17000
** NSIGN SUBROUTINE FOR 1130 COMMERCIAL SUBROUTINE PACKAGE        (ID) CSP17010
* NAME NSIGN                                                      (ID) CSP17020
* LIST                                                                CSP17030
0000     158891D5          ENT     NSIGN NSIGN SUBROUTINE ENTRY POINT  CSP17040
                     *                    CALL NSIGN(JCARD,J,NEWS,NOLDS)  CSP17050
                     *                    THE SIGN OF THE DIGIT AT        CSP17060
                     *                    JCARD(J) IS TESTED AND NOLDS IS CSP17070
                     *                    SET.  THE SIGN IS MODIFIED AS   CSP17080
                     *                    INDICATED BY NEWS.              CSP17090
0000 0   0000      NSIGN DC      *-*  ARGUMENT ADDRESS COMES IN HERE      CSP17100
0001 0   691A              STX   1 SAVE1+1 SAVE IR1                       CSP17110
0002 01  65800000          LDX   I1 NSIGN PUT ARGUMENT ADDRESS IN IR1     CSP17120
0004 0   C100              LD    1 0    GET JCARD ADDRESS                 CSP17130
0005 00  95800001    ONE   S     I1 1    SUBTRACT J VALUE                  CSP17140
0007 0   80FE              A         ONE+1 ADD CONSTANT OF ONE              CSP17150
0008 0   D001              STO       CHAR+1 CREATE JCARD(J) ADDRESS         CSP17160
                     *                    JTEST=JCARD(J)                  CSP17170
0009 00  C4000000    CHAR  LD    L *-*  PICKUP DIGIT                       CSP17180
000B 01  4C10001F          BSC   L PLUS,- IS JTEST NEGATIV-NO-GO TO PLUS  CSP17190
000D 0   1890              SRT       16   YES-SAVE TEMPORARILY            CSP17200
                     *                    NOLDS=-1                        CSP17210
000E 0.  C019              LD        HFFFF PICKUP MINUS ONE                CSP17220
000F 00  D5800003          STO   I1 3    STORE IN NOLDS                   CSP17230
                     *                    NEWS*JTEST IS COMPARED TO ZERO  CSP17240
                     *                    NEWS IS COMPARED TO ZERO        CSP17250
0011 00  C5800002          LD    I1 2    PICKUP NEWS                      CSP17260
0013 01  4C280019          BSC   L FIN,+Z IF NEGATIVE ALL DONE            CSP17270
                     *                    JTEST=-JTEST-1                  CSP17280
0015 0   1090        REV   SLT       16   RESTORE JTEST                   CSP17290
0016 0   F011              EOR       HFFFF CHANGE THE SIGN                 CSP17300
                     *                    JCARD(J)=JTEST                  CSP17310
0017 01  D480000A          STO   I  CHAR+1 PUT NEW SIGN IN JCARD(J)       CSP17320
0019 0   7104        FIN   MDX   1 4    MOVE OVER FOUR ARGUMENTS         CSP17330
001A 0   6903              STX   1 DONE1+1 CREATE RETURN ADDRESS          CSP17340
                     *                    EXIT.........................   CSP17350
001B 00  65000000    SAVE1 LDX   L1 *-*  RESTORE IR1                      CSP17360
001D 00  4C000000    DONE1 BSC   L  *-*  RETURN TO CALLING PROGRAM         CSP17370
001F 0   1890        PLUS  SRT       16   SAVE TEMPORARILY                CSP17380
                     *                    NOLDS=1                         CSP17390
0020 0   C0E5              LD        ONE+1 PICKUP CONSTANT OF ONE          CSP17400
0021 00  D5800003          STO   I1 3    STORE IT IN NOLDS                CSP17410
                     *                    NEWS*JTEST IS COMPARED TO ZERO  CSP17420
                     *                    NEWS IS COMPARED TO ZERO        CSP17430
0023 00  C5800002          LD    I1 2    PICKUP NEWS                      CSP17440
0025 01  4C300019          BSC   L FIN,-Z IF POSITIVE - ALL DONE          CSP17450
0027 0   70ED              MDX       REV  REVERSE SIGN - GO TO REV        CSP17460
0028 0   FFFF        HFFFF DC        /FFFF CONSTANT OF MINUS ONE          CSP17470
002A                       END                                           CSP17480

    NO ERRORS IN ABOVE ASSEMBLY.
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```
// DUP                                                                  CSP17490

*STORE      WS  UA  NSIGN                                               CSP17500

3393 0004
```

ADD
A1A3
A1DEC
A3A1
CARRY
DECA1
DIV
DPACK
DUNPK
EDIT
FILL
GET
ICOMP
IOND
KEYBD
MOVE
MPY
NCOMP
NSIGN
NZONE
PACK
PRINT
PUNCH
PUT
P1403
P1442
READ
R2501
SKIP
STACK
SUB
S1403
TYPER
UNPAC
WHOLE

```
// ASM                                                                  CSP17510
** NZONE SUBROUTINE FOR 1130 COMMERCIAL SUBROUTINE PACKAGE          (ID) CSP17520
* NAME NZONE                                                         (ID) CSP17530
* LIST                                                                 CSP17540
0000    15A56545          ENT     NZONE NZONE SUBROUTINE ENTRY POINT   CSP17550
                      *               CALL NZONE(JCARD,J,NEWZ,NOLDZ)   CSP17560
                      *               THE ZONE OF THE CHARACTER AT     CSP17570
                      *               JCARD(J) IS TESTED AND NOLDZ IS  CSP17580
                      *               SET.  THE ZONE IS MODIFIED AS    CSP17590
                      *               INDICATED BY NEWZ.               CSP17600
0000 0  0000      NZONE DC      *-*  ARGUMENT ADDRESS COMES IN HERE     CSP17610
0001 0  6925            STX     1 SAVE1+1 SAVE IR1                     CSP17620
0002 01 65800000        LDX     I1 NZONE PUT ARGUMENT ADDRESS IN IR1   CSP17630
0004 0  C100            LD      1 0    GET JCARD ADDRESS               CSP17640
0005 00 95800001  ONE   S       I1 1    SUBTRACT J VALUE               CSP17650
0007 0  80FE            A          ONE+1 ADD CONSTANT OF ONE           CSP17660
0008 0  D01A            STO        STO+1 CREATE JCARD(J) ADDRESS       CSP17670
0009 0  D001            STO        LD1+1 CREATE JCARD(J) ADDRESS       CSP17680
                      *               JTEST=JCARD(J)                   CSP17690
000A 00 C4000000  LD1   LD      L  *-*  PICKUP THE CHARACTER           CSP17700
000C 0  D0FE            STO        LD1+1 SAVE IT TEMPORARILY           CSP17710
                      *               IS JTEST NEGATIVE                CSP17720
000D 01 4C10003A        BSC     L  PLUS,-  IF NOT NEGATIVE-GO TO PLUS  CSP17730
000F 0  9018            S          ZERO NEGATIVE-CHECK TO SEE IF IT IS CSP17740
0010 01 4C18002E        BSC     L  TWO,+- AN EBCDIC ZERO-YES-GO TO TWO CSP17750
                      *               NOLDZ=5+(JTEST-4096)/4096        CSP17760
                      *               SHIFT 12 IS EQUIVALENT TO DIVIDE CSP17770
                      *               BY 4096                          CSP17780
                      *               AND 3000 IS EQUIVALENT TO        CSP17790
                      *               SUBTRACT 4096 AND SHIFT          CSP17800
0012 0  C0F8            LD         LD1+1 NO-RELOAD JTEST               CSP17810
0013 0  E019            AND        H3000 REMOVE ALL BUT BITS 2 AND 3   CSP17820
0014 0  180C            SRA        12   PUT IN LOW ORDER OF ACCUMULATOR CSP17830
0015 0  80F0            A          ONE+1 ADD CONSTANT OF ONE           CSP17840
0016 00 D5800003        STO     I1 3    STORE IN NOLDZ                 CSP17850
                      *               IS NEWZ LESS THAN FIVE           CSP17860
0018 00 C5800002        LD      I1 2    PICKUP VALUE OF NEWZ           CSP17870
001A 0  9011            S          FOUR AND CHECK FOR LESS THAN FIVE   CSP17880
001B 01 4C300024        BSC     L  FINIS,-Z NO-GO TO EXIT              CSP17890
001D 0  800E            A          FOUR YES - RESTORE NEWZ             CSP17900
                      *               JCARD(J)=JTEST+4096*(NEWZ-NOLDZ) CSP17910
001E 00 95800003        S       I1 3    SUBTRACT NOLDZ                 CSP17920
0020 0  100C            SLA        12   PUT RESULT IN BITS 2 AND 3     CSP17930
0021 0  80E9            A          LD1+1 ADD ORIGINAL CHARACTER        CSP17940
0022 00 D4000000  STO   STO     L  *-*  STORE BACK IN JCARD(J)         CSP17950
                      *               EXIT.............................CSP17960
0024 0  7104      FINIS MDX     1 4    MOVE OVER FOUR ARGUMENTS        CSP17970
0025 0  6903            STX     1 DONE1+1 CREATE RETURN ADDRESS        CSP17980
0026 00 65000000  SAVE1 LDX     L1 *-*  RESTORE IR1                    CSP17990
0028 00 4C000000  DONE1 BSC     L  *-*  RETURN TO CALLING PROGRAM      CSP18000
002A 0  6040      MINUS DC         /6040 CONSTANT OF EBCDIC MINUS SIGN CSP18010
002B 0  F040      ZERO  DC         /F040 CONSTANT OF EBCDIC ZERO       CSP18020
002C 0  0004      FOUR  DC         4    CONSTANT OF FOUR               CSP18030
002D 0  3000      H3000 DC         /3000 CONSTANT FOR STRIPING BITS    CSP18040
                      *               IS NEWZ TWO                      CSP18050
002E 00 C5800002  TWO   LD      I1 2    PICKUP VALUE OF NEWZ           CSP18060
0030 0  90FE            S          TWO+1 IS IT TWO                     CSP18070
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0031 01 4C200036        BSC     L  NOT,Z NO - GO TO NOT                CSP18080
                      *               JCARD(J)=24640                   CSP18090
0033 0  C0F6            LD         MINUS YES - SET JCARD(J)            CSP18100
0034 01 D4800023        STO     I  STO+1 EQUAL TO AN EBCDIC MINUS SIGN CSP18110
                      *               NOLDZ=4                          CSP18120
0036 0  C0F5      NOT   LD         FOUR SET NOLDZ                      CSP18130
0037 00 D5800003        STO     I1 3    EQUAL TO FOUR                  CSP18140
0039 0  70EA            MDX        FINIS GO TO EXIT                    CSP18150
                      *               IS JTEST AN EBCDIC MINUS SIGN    CSP18160
003A 0  90EF      PLUS  S          MINUS NOT NEGATIVE - CHECK FOR EBCDIC CSP18170
003B 01 4C200049        BSC     L  SPEC,Z MINUS SIGN-NO-GO TO SPEC     CSP18180
                      *               NOLDZ=2                          CSP18190
003D 0  C0F1            LD         TWO+1 YES-LOAD TWO AND STORE        CSP18200
003E 00 D5800003        STO     I1 3    IT IN NOLDZ                    CSP18210
                      *               IS NEWZ FOUR                     CSP18220
0040 00 C5800002        LD      I1 2    PICKUP VALUE OF NEWZ AND       CSP18230
0042 0  90E9            S          FOUR CHECK FOR VALUE OF FOUR        CSP18240
0043 01 4C200024        BSC     L  FINIS,Z NO-GO TO FINIS              CSP18250
                      *               JCARD(J)=-4032                   CSP18260
0045 0  C0E5            LD         ZERO YES-LOAD EBCDIC ZERO AND       CSP18270
0046 01 D4800023        STO     I  STO+1 STORE IT AT JCARD(J)          CSP18280
0048 0  70DB      BIG   MDX        FINIS GO TO EXIT                    CSP18290
0049 0  C0FE      SPEC  LD         BIG  SPECIAL CHARACTER-LOAD LARGE   CSP18300
004A 00 D5800003        STO     I1 3    NUMBER AND STORE AT NOLDZ      CSP18310
004C 0  70D7            MDX        FINIS ALL DONE - GO TO EXIT         CSP18320
004E                    END                                            CSP18330

    NO ERRORS IN ABOVE ASSEMBLY.


// DUP                                                                  CSP18340
*STORE      WS  UA  NZONE                                              CSP18350
3397 0006
```

```
// ASM                                                                  CSP18360
** PRINT AND SKIP SUBROUTINES FOR 1130 CSP                        (ID) CSP18370
* NAME PRINT                                                      (ID) CSP18380
* LIST                                                                 CSP18390
0041    17649563          ENT     PRINT      SUBROUTINE ENTRY POINT    CSP18400
                  * CALL PRINT (JCARD, J, JLAST, NERR3)                CSP18410
                  * PRINT JCARD(J) THROUGH JCARD(JLAST) ON THE         CSP18420
                  * 1132 PRINTER. PUT ERROR PARAMETER IN NERR3.        CSP18430
0069    224895C0          ENT     SKIP       SUBROUTINE ENTRY POINT    CSP18440
                  * CALL SKIP(N)                                       CSP18450
                  * EXECUTE CONTROL FUNCTION SPECIFIED BY INTEGER N    CSP18460
0000 0  0001      ONE     DC      1          CONSTANT OF 1             CSP18470
0001 0  2000      SPACE   DC      /2000      PRINT FUNCTION WITH SPACE CSP18480
0002 0  0000      JCARD   DC      *-*        JCARD J  ADDRESS          CSP18490
0003 0  0000      JLAST   DC      *-*        JCARD JLAST  ADDRESS      CSP18500
0004    003D      AREA    BSS     61         WORD COUNT & PRINT AREA   CSP18510
0041 0  0000      PRINT   DC      *-*        ADDRESS OF 1ST ARGUMENT   CSP18520
0042 20 176558F1  TEST    LIBF    PRNT1      CALL BUSY TEST ROUTINE    CSP18530
0043 0  0000              DC      /0000      BUSY TEST PARAMETER       CSP18540
0044 0  70FD              MDX     TEST       REPEAT TEST IF BUSY       CSP18550
0045 0  691A              STX   1 SAVE1&1    STORE IR1                 CSP18560
0046 01 65800041          LDX   I1 PRINT     LOAD 1ST ARGUMENT ADDRESS CSP18570
0048 20 01647880          LIBF    ARGS       CALL ARGS ROUTINE         CSP18580
0049 1  0002              DC      JCARD      JCARD J  PICKED UP        CSP18590
004A 1  0003              DC      JLAST      JCARD JLAST  PICKED UP    CSP18600
004B 1  0004              DC      AREA       CHARACTER COUNT PICKED UP CSP18610
004C 0  0078              DC      120        MAX CHARACTER COUNT       CSP18620
004D 0  C0B6              LD      AREA       GET CHARACTER COUNT       CSP18630
004E 0  80B1              A       ONE        HALF ADJUST               CSP18640
004F 0  1801              SRA     1          DIVIDE BY TWO             CSP18650
0050 0  D0B3              STO     AREA       STORE WORD COUNT          CSP18660
0051 0  C103              LD    1 3          GET ERROR WORD ADDRESS    CSP18670
0052 0  D012              STO     ERR&1      STORE IT IN ERROR ROUTINE CSP18680
0053 20 195C10D2          LIBF    RPACK      CALL REVERSE PACK ROUTINE CSP18690
0054 1  0002              DC      JCARD      JCARD J  ADDRESS          CSP18700
0055 1  0003              DC      JLAST      JCARD JLAST  ADDRESS      CSP18710
0056 1  0005              DC      AREA&1     PACK INTO I/O AREA        CSP18720
0057 20 176558F1          LIBF    PRNT1      CALL PRINT ROUTINE        CSP18730
0058 0  2000      WRITE   DC      /2000      PRINT PARAMETER           CSP18740
0059 1  0004              DC      AREA       I/O AREA BUFFER           CSP18750
005A 1  0063              DC      ERROR      ERROR PARAMETER           CSP18760
005B 0  C0A5              LD      SPACE      LOAD PRINT WITH SPACE     CSP18770
005C 0  D0FB              STO     WRITE      STORE IN PRINT PARAMETER  CSP18780
005D 0  7104              MDX   1 4          INCREMENT OVER 4 ARGUMENTS CSP18790
005E 0  6903              STX   1 DONE1&1    STORE IR1                 CSP18800
005F 00 65000000  SAVE1   LDX   L1 *-*       RELOAD OR RESTORE IR1     CSP18810
0061 00 4C000000  DONE1   BSC   L  *-*       RETURN TO CALLING PROGRAM CSP18820
0063 0  0000      ERROR   DC      *-*        RETURN ADDRESS GOES HERE  CSP18830
0064 00 D4000000  ERR     STO   L *-*        STORE ACC IN ERROR PARAM  CSP18840
0066 0  1810              SRA     16         CLEAR ACC                 CSP18850
0067 01 4C800063          BSC   I ERROR      RETURN TO PRNT1 PROGRAM   CSP18860
0069 0  0000      SKIP    DC      *-*        ADDRESS OF ARGUMENT ADDR  CSP18870
006A 01 C4800069          LD    I SKIP       GET ARGUMENT ADDRESS      CSP18880
006C 0  D001              STO     ARG&1      DROP IT AND               CSP18890
006D 00 C4000000  ARG     LD    L *-*        GET ARGUMENT              CSP18900
006F 01 4C300074          BSC   L NOSUP,*-2  GO TO NOSUPPRESSION IF &  CSP18910
0071 0  C009              LD      NOSPC      SET UP SPACE SUPPRESSION  CSP18920
```



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0072 0  D0E5              STO     WRITE      CHANGE PRINT FUNCTION     CSP18930
0073 0  7003              MDX     DONE       GO TO RETURN              CSP18940
0074 0  D001      NOSUP   STO     CNTRL      SET UP COMMAND            CSP18950
0075 20 176558F1          LIBF    PRNT1      CALL THE PRNT ROUTINE     CSP18960
0076 0  3000      CNTRL   DC      /3000      CARRIAGE COMMAND WORD     CSP18970
0077 01 74010069  DONE    MDX   L SKIP,1     ADJUST RETURN ADDRESS     CSP18980
0079 01 4C800069          BSC   I SKIP       RETURN TO CALLING PROGRAM CSP18990
0078 0  2010      NOSPC   DC      /2010      SUPPRESS SPACE COMMAND    CSP19000
007C                      END                END OF PRINT SUBPROGRAM   CSP19010
```

NO ERRORS IN ABOVE ASSEMBLY.

```
// DUP                                                                  CSP19020
*STORE      WS  UA  PRINT                                              CSP19030
339D 0005
```

```
// ASM                                                                  CSP19040
** PUT SUBROUTINE FOR 1130 COMMERCIAL SUBROUTINE PACKAGE          (ID) CSP19050
* NAME PUT                                                          (ID) CSP19060
* LIST                                                                 CSP19070
0000     17923000          ENT     PUT  PUT SUBROUTINE ENTRY POINT     CSP19080
                     *               CALL PUT(JCARD,J,JLAST,VAR,ADJST,N) CSP19090
                     *                  THE REAL NUMBER VAR IS HALF-     CSP19100
                     *                  ADJUSTED WITH ADJST AND          CSP19110
                     *                  TRUNCATED.  THEN DIGITS ARE      CSP19120
                     *                  CONVERTED FROM REAL TO EBCDIC    CSP19130
                     *                  AND PLACED IN THE JCARD FIELD    CSP19140
                     *                  FROM JCARD(JLAST) TO JCARD(J).   CSP19150
0000 0  0000      PUT   DC      *-*  ARGUMENT ADDRESS COMES IN HERE      CSP19160
0001 0  6957            STX   1 FIN+1 SAVE IR1                           CSP19170
0002 01 65800000        LDX   I1 PUT   PUT ARGUMENT ADDRESS IN IR1       CSP19180
0004 0  C100            LD    1 0    GET JCARD ADDRESS                   CSP19190
0005 0  D04E            STO     JCRD1 SAVE FOR NZONE SUBROUTINE          CSP19200
0006 00 95800002        S     I1 2    SUBTRACT JLAST VALUE               CSP19210
0008 0  800E            A       ONE+1 ADD CONSTANT OF ONE                CSP19220
0009 0  D03D            STO     PUT1+1 CREATE JCARD(JLAST) ADDRESS       CSP19230
000A 0  C103            LD    1 3    GET VAR ADDRESS                     CSP19240
000B 0  D014            STO     VAR  SAVE FOR PICKUP                     CSP19250
000C 0  800A            A       ONE+1 ADD CONSTANT OF ONE                CSP19260
000D 0  D041            STO     SIGN+1 SAVE SIGN POSITION ADDRESS        CSP19270
000E 0  C104            LD    1 4     GET ADJST ADDRESS                  CSP19280
000F 0  D012            STO     ADJST AND SAVE                           CSP19290
0010 00 C5800005        LD    I1 5    GET N VALUE AND                    CSP19300
0012 0  D017            STO     ADRN2+1 SAVE FOR TRUNCATION              CSP19310
0013 00 C5800002  TWO   LD    I1 2    GET JLAST VALUE AND                CSP19320
0015 0  D024            STO     JLAST SAVE IT AT JLAST                   CSP19330
0016 00 95800001  ONE   S     I1 1    SUBTRACT J VALUE                   CSP19340
0018 0  80FE            A       ONE+1 ADD CONSTANT OF ONE                CSP19350
0019 0  4808            BSC     +    CHECK FIELD WIDTH                   CSP19360
001A 0  C0FC            LD      ONE+1 NEGATIVE OR ZERO-MAKE IT ONE       CSP19370
001B 0  D017            STO     PUTCT+1 OK-SAVE FIELD WIDTH              CSP19380
001C 0  7106            MDX   1 6    MOVE OVER SIX ARGUMENTS             CSP19390
001D 0  693D            STX   1 DONE1+1 CREATE RETURN ADDRESS            CSP19400
                     *                  DIGS=WHOLE(ABS(VAR)+ADJST)       CSP19410
001E 30 05042880        CALL    EABS TAKE THE ABSOLUTE VALUE             CSP19420
0020 0  0000      VAR   DC      *-*  OF VAR                              CSP19430
0021 20 05044100        LIBF    EADD ADD TO IT THE                       CSP19440
0022 0  0000      ADJST DC      *-*  HALF-ADJUSTMENT VALUE               CSP19450
0023 30 262164C5        CALL    WHOLE TRUNCATE ANY FRACTION              CSP19460
0025 0  F040      ZERO  DC      /F040 CONSTANT OF EBCDIC ZERO            CSP19470
                     *                  IS N GREATER THAN ZERO           CSP19480
0026 0  C003            LD      ADRN2+1 CHECK TO SEE IF N IS GREATER     CSP19490
0027 01 4C080032        BSC   L PUTCT,+ THAN ZERO-NO-GO TO PUTCT         CSP19500
                     *                  JNOW=1                           CSP19510
0029 00 65000000  ADRN2 LDX   L1 *-*  YES-PUT VALUE OF N IN IR1          CSP19520
002B 20 05517A00  AGAIN LIBF    EMPY MULTIPLY BY                         CSP19530
002C 1  005C            DC      PNT1 ONE TENTH                           CSP19540
002D 30 262164C5        CALL    WHOLE TRUNCATE THE FRACTION              CSP19550
002F 0  0000            DC      0    DUMMY                               CSP19560
                     *                  SEE IF JNOW IS LESS THAN N.      CSP19570
                     *                  IF YES, JNOW=JNOW+1 AND GO BACK  CSP19580
                     *                  FOR MORE.  IF NO, START          CSP19590
                     *                  CONVERTING.                      CSP19600
```

```
0030 0  71FF              MDX   1 -1    DECREMENT N BY ONE                CSP19610
0031 0  70F9              MDX     AGAIN NOT DONE-GO BACK FOR MORE         CSP19620
                     *                  JNOW=JLAST                        CSP19630
0032 00 65000000     PUTCT LDX   L1 *-*  DONE-PUT FIELD WIDTH IN IR1       CSP19640
0034 20 058A3580     BACK  LIBF     ESTO STORE FAC                        CSP19650
0035 1  0062              DC        DIGS IN DIGS                          CSP19660
                     *                  DIGT=WHOLE(DIGS/10.0)             CSP19670
0036 20 05517A00          LIBF      EMPY MULTIPLY BY                      CSP19680
0037 1  005C              DC        PNT1 ONE TENTH AND                    CSP19690
0038 30 262164C5          CALL      WHOLE TRUNCATE ANY FRACTION           CSP19700
003A 0  0000         JLAST DC       *-*  JLAST VALUE                      CSP19710
003B 20 058A3580          LIBF      ESTO STORE RESULT IN                  CSP19720
003C 1  0065              DC        DIGS1 DIGS1-SAME AS DIGT              CSP19730
                     *                  JCARD(JNOW)=256*IFIX(DIGS         CSP19740
                     *                                - 10.0*DIGT)-4032   CSP19750
                     *                  MULTIPLY BY 256 IS SAME AS SHIFT  CSP19760
                     *                  EIGHT                             CSP19770
                     *                  SUBTRACT 4032 IS SAME AS OR F040  CSP19780
003D 20 05517A00          LIBF      EMPY MULTIPLY DIGT BY                 CSP19790
003E 1  005F              DC        ETEN TEN AND                          CSP19800
003F 20 15599500          LIBF      NORM NORMALIZE THE RESULT             CSP19810
0040 20 22559000          LIBF      SNR  REVERSE THE SIGN                 CSP19820
0041 20 05044100          LIBF      EADD AND ADD IN THE                   CSP19830
0042 1  0062              DC        DIGS VALUE OF DIGS                    CSP19840
0043 20 091899C0          LIBF      IFIX FIX THE RESULT                   CSP19850
0044 0  1008              SLA       8     AND PLACE IN BITS 4-7           CSP19860
0045 0  E8DF              OR        ZERO  MAKE AN A1 CHARACTER            CSP19870
0046 00 D4000000     PUT1  STO   L  *-*  AND STORE IN JCARD(JNOW)         CSP19880
0048 20 054C4000          LIBF      ELD  SET FAC EQUAL                    CSP19890
0049 1  0065              DC        DIGS1 TO DIGS1                        CSP19900
                     *                  SEE IF JNOW IS GREATER THAN J.    CSP19910
                     *                  IF YES, JNOW=JNOW-1 AND GO BACK   CSP19920
                     *                  FOR MORE.  IF NO, SET ZONE.       CSP19930
004A 01 74010047          MDX   L  PUT1+1,1 CHANGE JCARD ADDRESS          CSP19940
004C 0  71FF              MDX    1 -1   DECREMENT COUNT                   CSP19950
004D 0  70E6              MDX     BACK NOT DONE-GO BACK FOR MORE          CSP19960
                     *                  IS VAR LESS THAN ZERO             CSP19970
004E 00 C4000000     SIGN  LD    L  *-*  DONE-PICKUP ORIGINAL SIGN         CSP19980
0050 01 4C100058          BSC   L  FIN,- IF NOT NEG-ALL DONE-GO TO EXIT   CSP19990
0052 30 15A56545          CALL      NZONE CALL NZONE FOR ZONE SETTING     CSP20000
0054 0  0000         JCRD1 DC       *-*  ADDRESS OF JCARD                 CSP20010
0055 1  003A              DC        JLAST ADDRESS OF JLAST                CSP20020
0056 1  0014              DC        TWO+1 ADDRESS OF NEW ZONE INDICATOR   CSP20030
0057 1  0054              DC        JCRD1 DUMMY                           CSP20040
                     *                  EXIT.............................. CSP20050
0058 00 65000000     FIN   LDX   L1 *-*  RESTORE IR1                       CSP20060
005A 00 4C000000     DONE1 BSC   L  *-*  RETURN TO CALLING PROGRAM          CSP20070
005C 7D 66666666     PNT1  XFLC     0.1  CONSTANT OF ONE TENTH             CSP20080
005F 84 50000000     ETEN  XFLC     10.0 CONSTANT OF TEN POINT ZERO        CSP20090
0062    0003         DIGS  BSS      3    TEMPORARY AREA FOR GETTING A DGT CSP20100
0065    0003         DIGS1 BSS      3    TEMPORARY AREA FOR GETTING A DGT CSP20110
0068                      END                                            CSP20120

    NO ERRORS IN ABOVE ASSEMBLY.
```

```
// DUP                                                                   CSP20130
*STORE      WS  UA  PUT                                                  CSP20140
33A2 0007
```

ADD
A1A3
A1DEC
A3A1
CARRY
DECA1
DIV
DPACK
DUNPK
EDIT
FILL
GET
ICOMP
IOND
KEYBD
MOVE
MPY
NCOMP
NSIGN
NZONE
PACK
PRINT
PUNCH
PUT
P1403
P1442
READ
R2501
SKIP
STACK
SUB
S1403
TYPER
UNPAC
WHOLE

```
// ASM                                                                  CSP20150
** PRINT AND SKIP SUBROUTINES FOR 1130 CSP, 1403                  (ID) CSP20160
* NAME P1403                                                      (ID) CSP20170
* LIST                                                                 CSP20180
0041    17C74C33          ENT     P1403      SUBROUTINE ENTRY POINT    CSP20190
                        * CALL P1403 (JCARD, J, JLAST, NERR3)          CSP20200
                        * PRINT JCARD(J) THROUGH JCARD(JLAST) ON THE   CSP20210
                        * 1403 PRINTER. PUT ERROR PARAMETER IN NERR3.  CSP20220
0072    22C74C33          ENT     S1403      SUBROUTINE ENTRY POINT    CSP20230
                        * CALL S1403(N)                                CSP20240
                        * EXECUTE CONTROL FUNCTION SPECIFIED BY INTEGER N CSP20250
0000 0  0001      ONE   DC      1          CONSTANT OF 1               CSP20260
0001 0  2000      SPACE DC      /2000      PRINT FUNCTION WITH SPACE   CSP20270
0002 0  0000      JCARD DC      *-*        JCARD J  ADDRESS            CSP20280
0003 0  0000      JLAST DC      *-*        JCARD JLAST  ADDRESS        CSP20290
0004    003D      AREA  BSS     61         WORD COUNT & PRINT AREA     CSP20300
0041 0  0000      P1403 DC      *-*        ADDRESS OF 1ST ARGUMENT     CSP20310
0042 0  6926            STX   1 SAVE1&1    STORE IR1                   CSP20320
0043 01 65800041        LDX   11 P1403     LOAD 1ST ARGUMENT ADDRESS   CSP20330
0045 20 01647880        LIBF    ARGS       CALL ARGS ROUTINE           CSP20340
0046 1  0002            DC      JCARD      JCARD J  PICKED UP          CSP20350
0047 1  0003            DC      JLAST      JCARD JLAST  PICKED UP      CSP20360
0048 1  0004            DC      AREA       CHARACTER COUNT PICKED UP   CSP20370
0049 0  0078            DC      120        MAX CHARACTER COUNT         CSP20380
004A 0  C0B9            LD      AREA       GET CHARACTER COUNT         CSP20390
004B 0  80B4            A       ONE        HALF ADJUST                 CSP20400
004C 0  1801            SRA     1          DIVIDE BY TWO               CSP20410
004D 0  D0B6            STO     AREA       STORE WORD COUNT            CSP20420
004E 0  1001            SLA     1          DOUBLE IT = CHARACTER       CSP20430
004F 0  D00A            STO     CNT        COUNT AND STORE COUNT       CSP20440
0050 0  C103            LD    1 3          GET ERROR WORD ADDRESS      CSP20450
0051 0  D01C            STO     ERR&1      STORE IT IN ERROR ROUTINE   CSP20460
0052 20 195C10D2        LIBF    RPACK      CALL REVERSE PACK ROUTINE   CSP20470
0053 1  0002            DC      JCARD      JCARD J  ADDRESS            CSP20480
0054 1  0003            DC      JLAST      JCARD JLAST  ADDRESS        CSP20490
0055 1  0005            DC      AREA&1     PACK INTO I/O AREA          CSP20500
0056 20 292570D6        LIBF    ZIPCO      CALL CONVERSION ROUTINE     CSP20510
0057 0  0000            DC      /0000      FROM EBCDIC TO 1403 CODES   CSP20520
0058 1  0005            DC      AREA+1     FROM I/O AREA               CSP20530
0059 1  0005            DC      AREA+1     TO I/O AREA                 CSP20540
005A 0  0000      CNT   DC      *-*        CHARACTER COUNT             CSP20550
005B 30 050978F3        CALL    EBPT3      CONVERSION TABLE FOR ZIPCO  CSP20560
005D 20 176558F3  TEST  LIBF    PRNT3      CALL BUSY TEST ROUTINE      CSP20570
005E 0  0000            DC      /0000      BUSY TEST PARAMETER         CSP20580
005F 0  70FD            MDX     TEST       REPEAT TEST IF BUSY         CSP20590
0060 20 176558F3        LIBF    PRNT3      CALL PRINT ROUTINE          CSP20600
0061 0  2000      WRITE DC      /2000      PRINT PARAMETER             CSP20610
0062 1  0004            DC      AREA       I/O AREA BUFFER             CSP20620
0063 1  006C            DC      ERROR      ERROR PARAMETER             CSP20630
0064 0  C09C            LD      SPACE      LOAD PRINT WITH SPACE       CSP20640
0065 0  D0FB            STO     WRITE      STORE IN PRINT PARAMETER    CSP20650
0066 0  7104            MDX   1 4          INCREMENT OVER 4 ARGUMENTS  CSP20660
0067 0  6903            STX   1 DONE1&1    STORE IR1                   CSP20670
0068 00 65000000  SAVE1 LDX   L1 *-*        RELOAD OR RESTORE IR1       CSP20680
006A 00 4C000000  DONE1 BSC   L  *-*       RETURN TO CALLING PROGRAM   CSP20690
006C 0  0000      ERROR DC      *-*        RETURN ADDRESS GOES HERE    CSP20700
006D 00 D4000000  ERR   STO   L *-*        STORE ACC IN ERROR PARAM    CSP20710
```



```
006F 0  1810            SRA     16         CLEAR ACC                   CSP20720
0070 01 4C80006C        BSC   I ERROR      RETURN TO PRNT3 PROGRAM     CSP20730
0072 0  0000      S1403 DC      *-*        ADDRESS OF ARGUMENT ADDR    CSP20740
0073 01 C4800072        LD    I S1403      GET ARGUMENT ADDRESS        CSP20750
0075 0  D001            STO     ARG&1      DROP IT AND                 CSP20760
0076 00 C4000000  ARG   LD    L *-*        GET ARGUMENT                CSP20770
0078 01 4C30007D        BSC   L NOSUP,-Z   GO TO NOSUPPRESSION IF &     CSP20780
007A 0  C009            LD      NOSPC      SET UP SPACE SUPPRESSION    CSP20790
007B 0  D0E5            STO     WRITE      CHANGE PRINT FUNCTION       CSP20800
007C 0  7003            MDX     DONE       GO TO RETURN                CSP20810
007D 0  D001      NOSUP STO     CNTRL      SET UP COMMAND              CSP20820
007E 20 176558F3        LIBF    PRNT3      CALL THE PRNT3 ROUTINE      CSP20830
007F 0  3000      CNTRL DC      /3000      CARRIAGE COMMAND WORD       CSP20840
0080 01 74010072  DONE  MDX   L S1403,1    ADJUST RETURN ADDRESS       CSP20850
0082 01 4C800072        BSC   I S1403      RETURN TO CALLING PROGRAM   CSP20860
0084 0  2010      NOSPC DC      /2010      SUPPRESS SPACE COMMAND      CSP20870
0086                    END                END OF P1403 SUBPROGRAM     CSP20880
```

NO ERRORS IN ABOVE ASSEMBLY.

```
// DUP                                                                  CSP20890
*STORE      WS  UA  P1403                                              CSP20900
33A9 0006
```

```
// ASM                                                                  CSP20910
** PUNCH SUBROUTINE FOR 1130 CSP, 1442-5                          (ID) CSP20920
* NAME P1442                                                      (ID) CSP20930
* LIST                                                                CSP20940
0053    17C74D32          ENT     P1442     SUBROUTINE ENTRY POINT    CSP20950
                  * CALL P1442 (JCARD, J, JLAST, NERR2)               CSP20960
                  * PUNCH JCARD(J) THROUGH JCARD(JLAST) INTO THE      CSP20970
                  * BEGINNING OF A CARD. PUT ERROR PARAMETER INTO     CSP20980
                  * NERR2.                                           CSP20990
0000 0  0000      JCARD DC      *-*       JCARD J  ADDRESS          CSP21000
0001    0051      AREA  BSS     81        I/O AREA BUFFER           CSP21010
0052 0  0000      FLAG  DC      *-*       ERROR INDICATOR           CSP21020
0053 0  0000      P1442 DC      *-*       FIRST ARGUMENT ADDRESS    CSP21030
0054 0  6922            STX   1 SAVE1&1   SAVE IR1                  CSP21040
0055 01 65800053        LDX   I1 P1442    LOAD 1ST ARGUMENT ADDRESS CSP21050
0057 20 01647880        LIBF    ARGS      CALL ARGS SUBPROGRAM      CSP21060
0058 1  0000            DC      JCARD     GET JCARD(J) ADDRESS      CSP21070
0059 1  0067            DC      JLAS2     GET JCARD(JLAST) ADDRESS  CSP21080
005A 1  0001            DC      AREA      GET CHARACTER COUNT       CSP21090
005B 0  0050            DC      80        MAX CHARACTER COUNT       CSP21100
005C 0  C0A4            LD      AREA      DISTRIBUTE COUNT          CSP21110
005D 0  D00B            STO     CNT2      INTO CNT2                 CSP21120
005E 0  C103            LD    1 3         GET ERROR WORD ADDRESS    CSP21130
005F 0  D01C            STO     ERR+1     STORE INSIDE ERROR ROUTINE CSP21140
0060 0  1810            SRA     16        CLEAR ACC                 CSP21150
0061 0  D0F0            STO     FLAG      CLEAR ERROR INDICATOR     CSP21160
0062 20 22989547        LIBF    SWING     CALL REVERSE ARRAY        CSP21170
0063 1  0000            DC      JCARD     FROM JCARD J              CSP21180
0064 1  0067            DC      JLAS2     TO JCARD JLAST            CSP21190
0065 20 225C5144        LIBF    SPEED     CALL CONVERSION ROUTINE   CSP21200
0066 0  0011            DC      /0011     FROM EBCDIC TO CARD CODE  CSP21210
0067 0  0000      JLAS2 DC      *-*       FROM JCARD JLAST          CSP21220
0068 1  0002            DC      AREA&1    TO THE I/O AREA BUFFER    CSP21230
0069 0  0000      CNT2  DC      *-*       CHARACTER COUNT           CSP21240
006A 20 17543231        LIBF    PNCH1     CALL PUNCH ROUTINE        CSP21250
006B 0  2000            DC      /2000     PUNCH                     CSP21260
006C 1  0001            DC      AREA      I/O AREA BUFFER           CSP21270
006D 1  007A            DC      ERROR     ERROR PARAMETER           CSP21280
006E 20 22989547        LIBF    SWING     REVERSE THE ARRAY         CSP21290
006F 1  0000            DC      JCARD     FROM JCARD(J)             CSP21300
0070 1  0067            DC      JLAS2     TOJCARD(JLAST)            CSP21310
0071 20 17543231  TEST  LIBF    PNCH1     CALL BUSY TEST ROUTINE    CSP21320
0072 0  0000            DC      /0000     BUSY TEST PARAMETER       CSP21330
0073 0  70FD            MDX     TEST      REPEAT IF BUSY            CSP21340
0074 0  7104            MDX   1 4         INCREMENT 4 ARGUMENTS     CSP21350
0075 0  6903            STX   1 DONE+1    STORE IR1                 CSP21360
0076 00 65000000  SAVE1 LDX   L1 *-*       RESTORE IR1               CSP21370
0078 00 4C000000  DONE  BSC   L  *-*       RETURN TO CALLING PROGRAM CSP21380
007A 0  0000      ERROR DC      *-*       START OF ERROR ROUTINE    CSP21390
007B 00 D4000000  ERR   STO   L *-*       STORE ACC IN ERROR WORD   CSP21400
007D 01 74010052        MDX   L FLAG,1    SET THE FLAG INDICATOR    CSP21410
007F 01 4C80007A        BSC   I ERROR     RETURN TO INTERRUPT PROGRM CSP21420
0082                    END               END OF P1442 SUBPROGRAM   CSP21430

   NO ERRORS IN ABOVE ASSEMBLY.
```

```
// DUP                                                                  CSP21440
*STORE      WS  UA  P1442                                               CSP21450
33AF 0004
```

ADD
A1A3
A1DEC
A3A1
CARRY
DECA1
DIV
DPACK
DUNPK
EDIT
FILL
GET
ICOMP
IOND
KEYBD
MOVE
MPY
NCOMP
NSIGN
NZONE
PACK
PRINT
PUNCH
PUT
P1403
P1442
READ
R2501
SKIP
STACK
SUB
S1403
TYPER
UNPAC
WHOLE

```
// ASM                                                                  CSP21460
** READ AND PUNCH SUBROUTINES FOR 1130 CSP                        (ID) CSP21470
* NAME READ                                                       (ID) CSP21480
* LIST                                                                 CSP21490
0053     19141100          ENT    CREAD       SUBROUTINE ENTRY POINT     CSP21500
                         * CALL READ (JCARD, J, JLAST, NERR1)            CSP21510
                         * READ COLUMNS FROM BEGINNING OF CARD INTO JCARD(J) CSP21520
                         * THROUGH JCARD(JLAST). PUT ERROR PARAMETER IN  CSP21530
                         * NERR1.                                        CSP21540
008C     179150C8          ENT    PUNCH       SUBROUTINE ENTRY POINT     CSP21550
                         * CALL PUNCH (JCARD, J, JLAST, NERR2)           CSP21560
                         * PUNCH JCARD(J) THROUGH JCARD(JLAST) INTO THE  CSP21570
                         * BEGINNING OF A CARD. PUT ERROR PARAMETER INTO CSP21580
                         * NERR2.                                        CSP21590
0000 0   0000        JCARD DC     *-*         JCARD J  ADDRESS           CSP21600
0001     0051        AREA  BSS    81          I/O AREA BUFFER            CSP21610
0052 0   0000        FLAG  DC     *-*         ERROR INDICATOR            CSP21620
0053 0   0000        CREAD DC     *-*         FIRST ARGUMENT ADDRESS     CSP21630
0054 0   691B              STX    1 SAVE1&1   SAVE IR1                   CSP21640
0055 01  65800053          LDX    I1 CREAD    GET 1ST ARGUMENT ADDRESS   CSP21650
0057 0   4022              BSI    SETUP       GO TO SETUP                CSP21660
0058 20  03059131          LIBF   CARD1       CALL CARD READ ROUTINE     CSP21670
0059 0   1000              DC     /1000       READ                       CSP21680
005A 1   0001              DC     AREA        AREA PARAMETER             CSP21690
005B 1   0073              DC     ERROR       ERROR PARAMETER            CSP21700
005C 20  225C5144    CONVT LIBF   SPEED       CALL CONVERSION ROUTINE    CSP21710
005D 0   0010              DC     /0010       CARD CODE TO EBCDIC        CSP21720
005E 1   0002              DC     AREA&1      FROM AREA                  CSP21730
005F 0   0000        JLAS1 DC     *-*         TO JCARD JLAST             CSP21740
0060 0   0000        CNT1  DC     *-*         CHARACTER COUNT            CSP21750
0061 0   C0F0              LD     FLAG        ERROR INDICATOR            CSP21760
0062 01  4C180067          BSC  L FINAL,&-    ALL DONE IF ZERO           CSP21770
0064 0   1810              SRA    16          CLEAR ACC                  CSP21780
0065 0   D0EC              STO    FLAG        CLEAR THE INDICATOR        CSP21790
0066 0   70F5              MDX    CONVT       CONVERT AGAIN              CSP21800
0067 20  22989547    FINAL LIBF   SWING       REVERSE THE ARRAY          CSP21810
0068 1   0000              DC     JCARD       FROM JCARD J               CSP21820
0069 1   005F              DC     JLAS1       TO JCARD JLAST             CSP21830
006A 20  03059131    TEST  LIBF   CARD1       CALL BUSY TEST ROUTINE     CSP21840
006B 0   0000              DC     /0000       BUSY TEST PARAMETER        CSP21850
006C 0   70FD              MDX    TEST        REPEAT IF BUSY             CSP21860
006D 0   7104              MDX    1 4         INCREMENT 4 ARGUMENTS      CSP21870
006E 0   6903              STX    1 DONE&1    STORE IR1                  CSP21880
006F 00  65000000    SAVE1 LDX    L1 *-*      RESTORE IR1                CSP21890
0071 00  4C000000    DONE  BSC    L *-*       RETURN TO CALLING PROGRAM  CSP21900
0073 0   0000        ERROR DC     *-*         START OF ERROR ROUTINE     CSP21910
0074 00  D4000000    ERR   STO    L *-*       STORE ACC IN ERROR WORD    CSP21920
0076 01  74010052          MDX    L FLAG,1    SET THE FLAG INDICATOR     CSP21930
0078 01  4C800073          BSC    I ERROR     RETURN TO INTERRUPT PROGRM CSP21940
007A 0   0000        SETUP DC     *-*         START OF SETUP ROUTINE     CSP21950
007B 20  01647880          LIBF   ARGS        CALL ARGS SUBPROGRAM       CSP21960
007C 1   0000              DC     JCARD       GET JCARD J  ADDRESS       CSP21970
007D 1   005F              DC     JLAS1       GET JCARD JLAST  ADDRESS   CSP21980
007E 1   0001              DC     AREA        GET CHARACTER COUNT        CSP21990
007F 0   0050              DC     80          MAX CHARACTER COUNT        CSP22000
0080 0   C0DE              LD     JLAS1       DISTRIBUTE JCARD JLAST     CSP22010
0081 0   D014              STO    JLAS2       INTO JLAS2                 CSP22020
```



```
0082 01  C4000001          LD   L AREA        DISTRIBUTE COUNT           CSP22030
0084 0   D0DB              STO    CNT1        INTO CNT1                  CSP22040
0085 0   D012              STO    CNT2        AND CNT2                   CSP22050
0086 0   C103              LD   1 3           GET ERROR WORD ADDRESS     CSP22060
0087 0   D0ED              STO    ERR&1       STORE INSIDE ERROR ROUTINE CSP22070
0088 0   1810              SRA    16          CLEAR ACC                  CSP22080
0089 0   D0C8              STO    FLAG        CLEAR ERROR INDICATOR      CSP22090
008A 01  4C80007A          BSC  I SETUP       RETURN TO CALLING PROG     CSP22100
008C 0   0000        PUNCH DC     *-*         PUNCH ROUTINE STARTS HERE  CSP22110
008D 0   69E2              STX    1 SAVE1&1   SAVE IR1                   CSP22120
008E 01  6580008C          LDX    I1 PUNCH    LOAD 1ST ARGUMENT ADDRESS  CSP22130
0090 0   40E9              BSI    SETUP       GO TO SETUP ROUTINE        CSP22140
0091 20  22989547          LIBF   SWING       CALL REVERSE ARRAY         CSP22150
0092 1   0000              DC     JCARD       FROM JCARD J               CSP22160
0093 1   005F              DC     JLAS1       TO JCARD JLAST             CSP22170
0094 20  225C5144          LIBF   SPEED       CALL CONVERSION ROUTINE    CSP22180
0095 0   0011              DC     /0011       FROM EBCDIC TO CARD CODE   CSP22190
0096 0   0000        JLAS2 DC     *-*         FROM JCARD JLAST           CSP22200
0097 1   0002              DC     AREA&1      TO THE I/O AREA BUFFER     CSP22210
0098 0   0000        CNT2  DC     *-*         CHARACTER COUNT            CSP22220
0099 20  03059131          LIBF   CARD1       CALL PUNCH ROUTINE         CSP22230
009A 0   2000              DC     /2000       PUNCH                      CSP22240
009B 1   0001              DC     AREA        I/O AREA BUFFER            CSP22250
009C 1   0073              DC     ERROR       ERROR PARAMETER            CSP22260
009D 0   70C9              MDX    FINAL       ALL THROUGH, GO TO FINAL   CSP22270
009E                       END                END OFCREAD SUBPROGRAM     CSP22280

    NO ERRORS IN ABOVE ASSEMBLY.


// DUP                                                                  CSP22290
*STORE      WS  UA CREAD                                                CSP22300
3383 0006
```

```
// ASM                                                                  CSP22310
** READ SUBROUTINE FOR 1130 CSP, 2501                                  (ID) CSP22320
* NAME R2501                                                           (ID) CSP22330
* LIST                                                                 CSP22340
0053    19CB5C31          ENT     R2501      SUBROUTINE ENTRY POINT     CSP22350
                  * CALL R2501(JCARD, J, JLAST, NERR1)                 CSP22360
                  * READ COLUMNS FROM BEGINNING OF CARD INTO JCARD(J)  CSP22370
                  * THROUGH JCARD(JLAST). PUT ERROR PARAMETER IN       CSP22380
                  * NERR1.                                            CSP22390
0000 0  0000      JCARD DC      *-*        JCARD J  ADDRESS           CSP22400
0001    0051      AREA  BSS     81         I/O AREA BUFFER            CSP22410
0052 0  0000      FLAG  DC      *-*        ERROR INDICATOR            CSP22420
0053 0  0000      R2501 DC      *-*        FIRST ARGUMENT ADDRESS     CSP22430
0054 0  692C            STX   1 SAVE1&1    SAVE IR1                   CSP22440
0055 01 65800053        LDX   I1 R2501     GET 1ST ARGUMENT ADDRESS   CSP22450
0057 20 01647880        LIBF    ARGS       CALL ARGS SUBPROGRAM       CSP22460
0058 1  0000            DC      JCARD      GET JCARD J  ADDRESS       CSP22470
0059 1  0072            DC      JLAS1      GET JCARD JLAST  ADDRESS   CSP22480
005A 1  0001            DC      AREA       GET CHARACTER COUNT        CSP22490
005B 0  0050            DC      80         MAX CHARACTER COUNT        CSP22500
005C 0  C0A4            LD      AREA       DISTRIBUTE COUNT           CSP22510
005D 0  D015            STO     CNT1       INTO CNT1                  CSP22520
005E 0  C103            LD    1 3          GET ERROR WORD ADDRESS     CSP22530
005F 0  D026            STO     ERR&1      STORE INSIDE ERROR ROUTINE CSP22540
0060 0  1810            SRA     16         CLEAR ACC                  CSP22550
0061 0  D0F0            STO     FLAG       CLEAR ERROR INDICATOR      CSP22560
0062 0  7104            MDX   1 4          INCREMENT 4 ARGUMENTS      CSP22570
0063 0  691F            STX   1 DONE&1     STORE IR1                  CSP22580
0064 0  C026            LD      ONE  SET AREA TO ALL ONES              CSP22590
0065 00 65000050        LDX   L1 80   LOAD IR1 WITH AREA SIZE          CSP22600
0067 01 D5000001  MO    STO   L1 AREA STORE A ONE IN AREA              CSP22610
0069 0  71FF            MDX   1 -1   GO TO NEXT WORD OF AREA          CSP22620
006A 0  70FC            MDX     MO   GO BACK UNTIL FINISHED            CSP22630
006B 20 19141131        LIBF    READ1      CALL CARD READ ROUTINE     CSP22640
006C 0  1000            DC      /1000      READ                       CSP22650
006D 1  0001            DC      AREA       AREA PARAMETER             CSP22660
006E 1  0084            DC      ERROR      ERROR PARAMETER            CSP22670
006F 20 225C5144  CONVT LIBF    SPEED      CALL CONVERSION ROUTINE    CSP22680
0070 0  0010            DC      /0010      CARD CODE TO EBCDIC        CSP22690
0071 1  0002            DC      AREA&1     FROM AREA                  CSP22700
0072 0  0000      JLAS1 DC      *-*        TO JCARD JLAST             CSP22710
0073 0  0000      CNT1  DC      *-*        CHARACTER COUNT            CSP22720
0074 0  C0DD            LD      FLAG       ERROR INDICATOR            CSP22730
0075 01 4C18007A        BSC   L FINAL,6-   ALL DONE IF ZERO           CSP22740
0077 0  1810            SRA     16         CLEAR ACC                  CSP22750
0078 0  D0D9            STO     FLAG       CLEAR THE INDICATOR        CSP22760
0079 0  70F5            MDX     CONVT      CONVERT AGAIN              CSP22770
007A 20 22989547  FINAL LIBF    SWING      REVERSE THE ARRAY          CSP22780
007B 1  0000            DC      JCARD      FROM JCARD J               CSP22790
007C 1  0072            DC      JLAS1      TO JCARD JLAST             CSP22800
007D 20 19141131  TEST  LIBF    READ1      CALL BUSY TEST ROUTINE     CSP22810
007E 0  0000            DC      /0000      BUSY TEST PARAMETER        CSP22820
007F 0  70FD            MDX     TEST       REPEAT IF BUSY             CSP22830
0080 00 65000000  SAVE1 LDX   L1 *-*        RESTORE IR1                CSP22840
0082 00 4C000000  DONE  BSC   L  *-*       RETURN TO CALLING PROGRAM  CSP22850
0084 0  0000      ERROR DC      *-*        START OF ERROR ROUTINE     CSP22860
0085 00 D4000000  ERR   STO   L *-*        STORE ACC IN ERROR WORD    CSP22870
```

```
                                                                       PAGE   2
0087 01 74010052          MDX   L  FLAG,1     SET THE FLAG INDICATOR   CSP22880
0089 01 4C800084          BSC   I  ERROR      RETURN TO INTERRUPT PROGRM CSP22890
008B 0  0001        ONE   DC       1    CONSTANT OF ONE               CSP22900
008C                      END              END OF R2501 SUBPROGRAM    CSP22910

    NO ERRORS IN ABOVE ASSEMBLY.
```

```
// DUP                                                                 CSP22920

*STORE      WS  UA  R2501                                              CSP22930

3389 0005
```

```
// ASM                                                                 CSP22940
** STACKER SELECT SUBROUTINE FOR 1130 COMMERCIAL SUBROUTINE PACKAGE(ID) CSP22950
* NAME STACK                                                          (ID) CSP22960
* LIST                                                                CSP22970
0002    228C10D2          ENT     STACK STACK SUBROUTINE POINT       CSP22980
                  *                       CALL STACK                 CSP22990
                  *                       SELECTS THE NEXT CARD THROUGH CSP23000
                  *                       THE PUNCH STATION TO THE   CSP23010
                  *                       ALTERNATE STACKER ON THE 1442-5, CSP23020
                  *                       6,OR 7.                    CSP23030
0000 0  0000      IOCC  DC      0    I/O COMMAND - FIRST WORD          CSP23040
0001 0  1480            DC      /1480 I/O COMMAND - SECOND WORD        CSP23050
0002 0  0000      STACK DC      *-*  RETURN ADDRESS COMES IN HERE      CSP23060
0003 0  08FC            XIO     IOCC          SELECT STACKER           CSP23070
0004 01 4C800002        BSC   I STACK         RETURN TO CALLING PROG   CSP23080
0006                    END                                            CSP23090

    NO ERRORS IN ABOVE ASSEMBLY.
```

ADD
A1A3
A1DEC
A3A1
CARRY
DECA1
DIV
DPACK
DUNPK
EDIT
FILL
GET
ICOMP
IOND
KEYBD
MOVE
MPY
NCOMP
NSIGN
NZONE
PACK
PRINT
PUNCH
PUT
P1403
P1442
READ
R2501
SKIP
STACK
SUB
S1403
TYPER
UNPAC
WHOLE

```
// DUP                                                                  CSP23100
*STORE      WS  UA  STACK                                                CSP23110
33BE 0002
```

```
// ASM                                                                  CSP23120
** TYPE AND KEYBD SUBROUTINES FOR 1130 CSP                        (ID) CSP23130
* NAME TYPER                                                      (ID) CSP23140
* LIST                                                                 CSP23150
003F    23A17159          ENT     TYPER      SUBROUTINE ENTRY POINT    CSP23160
                  * CALL TYPE (JCARD, J, JLAST)                        CSP23170
                  * TYPE JCARD(J) THROUGH JCARD(JLAST)                 CSP23180
0069    12168084          ENT     KEYBD      SUBROUTINE ENTRY POINT    CSP23190
                  * CALL KEYBD (JCARD, J, JLAST)                       CSP23200
                  * ENTER AT KEYBOARD JCARD(J) THROUGH JCARD(JLAST)    CSP23210
0000 0  0001      ONE   DC      1          CONSTANT OF 1               CSP23220
0001 0  0000      JCARD DC      *-*        JCARD J  ADDRESS            CSP23230
0002    003D      AREA  BSS     61         I/O AREA BUFFER             CSP23240
003F 0  0000      TYPER DC      *-*        FIRST ARGUMENT ADDR HERE    CSP23250
0040 0  691A            STX   1 SAVE1&1    SAVE IR1                    CSP23260
0041 0  6178            LDX   1 120 -      PUT 120 IN IR1              CSP23270
0042 0  6923            STX   1 MAXCH      STORE IT AS MAX CHARS       CSP23280
0043 01 6580003F        LDX   I1 TYPER     PUT FIRST ADDR IN IR1       CSP23290
0045 0  4018            BSI     SETUP      GO TO SETUP                 CSP23300
0046 0  C0BB            LD      AREA       GET CHARACTER COUNT         CSP23310
0047 0  80B8            A       ONE        HALF ADJUST IT AND          CSP23320
0048 0  1801            SRA     1          DIVIDE IT BY TWO            CSP23330
0049 0  D0B8            STO     AREA       AND REPLACE IT              CSP23340
004A 0  1001            SLA     1          DOUBLE IT                   CSP23350
004B 0  D008            STO     CNT1       AND PUT IT IN CNT1          CSP23360
004C 20 195C10D2        LIBF    RPACK      CALL REVERSE PACK ROUTINE   CSP23370
004D 1  0001            DC      JCARD      FROM JCARD J                CSP23380
004E 1  0083            DC      JLAST      TO JCARD JLAST              CSP23390
004F 1  0003            DC      AREA&1     PACK INTO I/O AREA          CSP23400
0050 20 05097663        LIBF    EBPRT      CALL CONVERSION ROUTINE     CSP23410
0051 0  0000            DC      /0000      FROM EBCDIC                 CSP23420
0052 1  0003            DC      AREA&1     TO PRINTER CODE,            CSP23430
0053 1  0003            DC      AREA&1     ALL IN THE I/O AREA         CSP23440
0054 0  0000      CNT1  DC      *-*        HALF ADJSTD CHARACTER CNT   CSP23450
0055 20 23A17170        LIBF    TYPE0      CALL TYPE ROUTINE           CSP23460
0056 0  2000            DC      /2000      TYPE PARAMETER              CSP23470
0057 1  0002            DC      AREA       I/O AREA BUFFER             CSP23480
0058 0  7103      FINAL MDX   1 3          INCREMENT OVER 3 ARGUMENTS  CSP23490
0059 0  6903            STX   1 DONE&1     STORE IR1                   CSP23500
005A 00 65000000  SAVE1 LDX   L1 *-*       RESTORE IR1                 CSP23510
005C 00 4C000000  DONE  BSC   L *-*        RETURN TO CALLING PROGRAM   CSP23520
005E 0  0000      SETUP DC      *-*        START OF SETUP ROUTINE      CSP23530
005F 20 23A17170  TEST  LIBF    TYPE0      CALL BUSY TEST ROUTINE      CSP23540
0060 0  0000            DC      /0000      BUSY TEST PARAMETER         CSP23550
0061 0  70FD            MDX     TEST       REPEAT TEST IF BUSY         CSP23560
0062 20 01647880        LIBF    ARGS       CALL ARGS ROUTINE           CSP23570
0063 1  0001            DC      JCARD      1ST ARGUMENT TO JCARD J     CSP23580
0064 1  0083            DC      JLAST      TO JCARD JLAST              CSP23590
0065 1  0002            DC      AREA       TO CHARACTER COUNT          CSP23600
0066 0  0000      MAXCH DC      *-*        MAXIMUM NUMBER OF CHARS     CSP23610
0067 01 4C80005E        BSC   I SETUP      END OF SETUP, RETURN        CSP23620
0069 0  0000      KEYBD DC      *-*        START OF KEYBOARD ROUTINE   CSP23630
006A 0  69F0            STX   1 SAVE1&1    SAVE IR1                    CSP23640
006B 0  613C            LDX   1 60         PUT BUFFER LENGTH IN IR1    CSP23650
006C 0  69F9            STX   1 MAXCH      60 IS MAX NO OF CHARS       CSP23660
006D 01 65800069        LDX   I1 KEYBD     1ST ARGUMENT ADDR IN IR1    CSP23670
006F 0  40EE            BSI     SETUP      GO TO SETUP                 CSP23680
```



```
0070 0  613C            LDX   1 60         PUT BUFFER LENGTH IN IR1    CSP23690
0071 0  1810            SRA     16         CLEAR THE ACC               CSP23700
0072 01 D5000002  CLEAR STO   L1 AREA      CLEAR THE I/O BUFFER        CSP23710
0074 0  71FF            MDX   1 -1         DECREMENT IR1               CSP23720
0075 0  70FC            MDX     CLEAR      AND CONTINUE CLEARING       CSP23730
0076 01 65800069        LDX   I1 KEYBD     1ST ARGUMENT ADDR IN IR1    CSP23740
0078 0  C089            LD      AREA       PUT CHARACTER COUNT         CSP23750
0079 0  D00A            STO     CNT2       IN CNT2                     CSP23760
007A 20 23A17170        LIBF    TYPE0      CALL KEYBOARD ROUTINE       CSP23770
007B 0  1000            DC      /1000      KEYBOARD PARAMETER          CSP23780
007C 1  0002            DC      AREA       I/O AREA BUFFER             CSP23790
007D 20 23A17170  TEST1 LIBF    TYPE0      CALL BUSY TEST ROUTINE      CSP23800
007E 0  0000            DC      /0000      BUSY TEST PARAMETER         CSP23810
007F 0  70FD            MDX     TEST1      REPEAT TEST IF BUSY         CSP23820
0080 20 225C5144        LIBF    SPEED      CALL CONVERSION ROUTINE     CSP23830
0081 0  0010            DC      /0010      CARD CODE TO EBCDIC         CSP23840
0082 1  0003            DC      AREA&1     FROM THE I/O AREA BUFFER    CSP23850
0083 0  0000      JLAST DC      *-*        TO JCARD JLAST              CSP23860
0084 0  0000      CNT2  DC      *-*        CHARACTER COUNT             CSP23870
0085 20 22989547        LIBF    SWING      CALL REVERSE ARRAY          CSP23880
0086 1  0001            DC      JCARD      REVERSE FROM JCARD J        CSP23890
0087 1  0083            DC      JLAST      TO JCARD JLAST              CSP23900
0088 0  70CF            MDX     FINAL      ALL THROUGH, GO TO FINAL    CSP23910
008A                    END                END OF TYPE SUBPROGRAM      CSP23920

    NO ERRORS IN ABOVE ASSEMBLY.
```

```
// DUP                                                              CSP23930
*STORE      WS  UA  TYPER                                           CSP23940
33C0 0006
```

```
// ASM                                                              CSP23950
** PACK/UNPAC SUBROUTINES FOR 1130 COMMERCIAL SUBROUTINE PACKAGE   (ID) CSP23960
* LIST                                                             CSP23970
* NAME UNPAC                                                       (ID) CSP23980
0000    24557043          ENT     UNPAC UNPACK SUBROUTINE ENTRY POINT  CSP23990
                  *               CALL UNPAC(JCARD,J,JLAST,KCARD,K)    CSP24000
                  *               THE WORDS JCARD J  THROUGH           CSP24010
                  *               JCARD JLAST  IN A2 FORMAT ARE        CSP24020
                  *               UNPACKED INTO KCARD K  IN A1 FORMAT. CSP24030
0006    17043480          ENT     PACK PACK SUBROUTINE ENTRY POINT     CSP24040
                  *               CALL PACK(JCARD,J,JLAST,KCARD,K)     CSP24050
                  *               THE WORDS JCARD J  THROUGH           CSP24060
                  *               JCARD JLAST  IN A1 FORMAT ARE PACKED CSP24070
                  *               INTO KCARD K  IN A2 FORMAT.          CSP24080
0000 0  0000      UNPAC DC        *-*  ARGUMENT ADDRESS COMES IN HERE  CSP24090
0001 0  C003            LD        SW2 LOAD NOP INSTRUCTION             CSP24100
0002 0  D01E            STO       SWTCH STORE NOP AT SWITCH            CSP24110
0003 0  7007            MDX       START COMPUTING                      CSP24120
0004 0  7009      SW1   MDX   X   ELSE-SWTCH-1 BRANCH TO ELSE          CSP24130
0005 0  7000      SW2   MDX   X   0 NOP INSTRUCTION                    CSP24140
0006 0  0000      PACK  DC        *-*  ARGUMENT ADDRESS COMES IN HERE  CSP24150
0007 0  C0FE            LD        PACK PICK UP ARGUMENT ADDRESS        CSP24160
0008 0  D0F7            STO       UNPAC AND STORE IT IN UNPAC          CSP24170
0009 0  C0FA            LD        SW1 LOAD BRANCH TO ELSE              CSP24180
000A 0  D016            STO       SWTCH STORE BRANCH AT SWITCH         CSP24190
000B 0  6930      START STX     1 SAVE1&1 SAVE IR1                     CSP24200
000C 01 65800000        LDX   I1  UNPAC PUT ARGUMENT ADDRESS IN IR1    CSP24210
000E 0  C100            LD      1 0 GET JCARD ADDRESS                  CSP24220
000F 0  8001            A         ONE+1 ADD CONSTANT OF 1              CSP24230
0010 00 95800001  ONE   S     I1  1 SUBTRACT J VALUE                   CSP24240
0012 0  D00D            STO       JCARD+1 CREATE JCARD(J) ADDRESS      CSP24250
0013 0  C103            LD      1 3 GET KCARD ADDRESS                  CSP24260
0014 0  80FC            A         ONE+1 ADD CONSTANT OF 1              CSP24270
0015 00 95800004        S     I1  4 SUBTRACT K VALUE                   CSP24280
0017 0  D006            STO       KCARD+1 CREATE KCARD(K) ADDRESS      CSP24290
0018 0  C100            LD      1 0 GET JCARD ADDRESS                  CSP24300
0019 0  80F7            A         ONE+1 ADD CONSTANT OF 1              CSP24310
001A 00 95800002        S     I1  2 SUBTRACT JLAST VALUE               CSP24320
001C 0  D0E9            STO       PACK CREATE JCARD JLAST  ADDRESS     CSP24330
001D 00 65000000  KCARD LDX   L1  *-* PUT KCARD ADDRESS IN IR1         CSP24340
001F 00 C4000000  JCARD LD    L   *-* PICK UP JCARD(J)                 CSP24350
0021 0  7000      SWTCH MDX   X   0 SWITCH BETWEEN PACK AND UNPACK      CSP24360
0022 0  1888            SRT       8 SHIFT LOW ORDER BITS TO EXT        CSP24370
0023 0  1008            SLA       8 REPOSITION HIGH ORDER BITS         CSP24380
0024 0  E81A            OR        BMASK PUT BLANK IN LOW ORDER BITS    CSP24390
0025 0  D100            STO     1 0 PUT IN KCARD K                     CSP24400
0026 0  71FF            MDX     1 -1 DECREMENT KCARD ADDRESS           CSP24410
0027 0  1088            SLT       8    MOVE THE EXTEN INTO THE ACCUM   CSP24420
0028 0  1008            SLA       8    IN TWO STEPS                    CSP24430
0029 0  E815            OR        BMASK PUT BLANK IN LOW ORDER BITS    CSP24440
002A 0  7006            MDX       FINIS BRANCH AROUND PACK ROUTINE     CSP24450
002B 0  1898      ELSE  SRT       24 SHIFT HIGH ORDER BITS INTO EXT    CSP24460
002C 01 74FF0020        MDX   L   JCARD+1,-1 DECREMENT JCARD ADDRESS   CSP24470
002E 01 C4800020        LD    I   JCARD+1 PICK UP JCARD(J+1)           CSP24480
0030 0  18C8            RTE       8 SHIFT IN BITS FROM EXT             CSP24490
0031 0  D100      FINIS STO     1 0 PUT IN KCARD K                     CSP24500
0032 01 74FF0020        MDX   L   JCARD+1,-1 DECREMENT JCARD ADDRESS   CSP24510
```



```
0034 0  71FF            MDX     1 -1 DECREMENT KCARD ADDRESS           CSP24520
0035 0  C0EA            LD        JCARD+1 GET JCARD(J) ADDRESS         CSP24530
0036 0  90CF            S         PACK SUBTRACT JCARD JLAST  ADDRESS   CSP24540
0037 01 4C10001F        BSC   L   JCARD,- CONTINUE IF DIFFERENCE & OR   CSP24550
0039 01 74050000        MDX   L   UNPAC,5 CREATE RETURN ADDRESS        CSP24560
003B 00 65000000  SAVE1 LDX   L1  *-* RESTORE IR1                      CSP24570
003D 01 4C800000        BSC   I   UNPAC RETURN TO CALLING PROGRAM      CSP24580
003F 0  0040      BMASK DC        /40 MASK 0000000001000000            CSP24590
0040                    END                                            CSP24600
```

NO ERRORS IN ABOVE ASSEMBLY.

```
// DUP                                                              CSP24610
*STORE      WS  UA  UNPAC                                           CSP24620
33C6 0005
```

ADD
A1A3
A1DEC
A3A1
CARRY
DECA1
DIV
DPACK
DUNPK
EDIT
FILL
GET
ICOMP
IOND
KEYBD
MOVE
MPY
NCOMP
NSIGN
NZONE
PACK
PRINT
PUNCH
PUT
P1403
P1442
READ
R2501
SKIP
STACK
SUB
S1403
TYPER
UNPAC
WHOLE

```
// ASM                                                                  CSP24630
** WHOLE NUMBER SUBROUTINE FOR 1130 COMMERCIAL SUBROUTINE PACKAGE  (ID) CSP24640
* NAME WHOLE                                                          (ID) CSP24650
* LIST                                                                 CSP24660
0006     262164C5          ENT     WHOLE      SUBROUTINE ENTRY POINT   CSP24670
                    * X=WHOLE(Y), WITH Y IN FAC TO START               CSP24680
                    * X IN FAC BECOMES THE INTEGRAL PART OF Y.         CSP24690
0000 0  0000        DBL1  DC      0          DBL CONSTANT OF 1        CSP24700
0001 0  0001              DC      1          REST OF DBL1 CONSTANT    CSP24710
001F                MANT  EQU     31         MANTISSA LENGTH          CSP24720
0002 0  009F        C159  DC      128+MANT   EXPONENT OF FULL INTEGER CSP24730
0003 0  001F        C31   DC      MANT       MANTISSA LENGTH          CSP24740
0004 0  189F        SRT   SRT     MANT       SRT MANTISSA LENGTH      CSP24750
0005 0  0800        H0800 DC      /0800      DIFF BETWEEN SRT AND SLT CSP24760
0006 0  0000        WHOLE DC      *-*        ARGUMENT ADDRESS HERE    CSP24770
0007 0  C0FA              LD      C159       EXP OF FULL INTEGER      CSP24780
0008 0  937D              S     3 125        SUBTRACT EXP OF Y        CSP24790
0009 01 4C28001A          BSC   L DONE,+Z    BRANCH IF ALL INTEGER    CSP24800
000B 0  90F7              S       C31        SUBTRACT MANTISSA LENGTH CSP24810
000C 01 4C10001E          BSC   L FRACT,-    BRANCH IF ALL FRACTIONAL CSP24820
000E 0  80F5              A       SRT        CREATE RIGHT SHIFT       CSP24830
000F 0  D005              STO     RIGHT      STORE  RIGHT SHIFT       CSP24840
0010 0  90F4              S       H0800      CREATE  LEFT SHIFT       CSP24850
0011 0  D006              STO     LEFT       STORE   LEFT SHIFT       CSP24860
0012 0  CB7E              LDD   3 126        PICK UP MANTISSA         CSP24870
0013 0  4828              BSC     +Z         CHECK FOR NEGATIVE MANTISA CSP24880
0014 0  98EB              SD      DBL1       SUBTRACT 1 IF NEGATIVE   CSP24890
0015 0  1880        RIGHT SRT     *-*        RIGHT SHIFT              CSP24900
0016 0  4828              BSC     +Z         CHECK FOR NEGATIVE MANTISA CSP24910
0017 0  88E8              AD      DBL1       ADD 1 IF NEGATIVE        CSP24920
0018 0  1080        LEFT  SLT     *-*        LEFT SHIFT               CSP24930
0019 0  DB7E        STORE STD   3 126        STORE MANTISSA           CSP24940
001A 01 74010006    DONE  MDX   L WHOLE,1    CREATE RETURN ADDRESS    CSP24950
001C 01 4C800006          BSC   I WHOLE      RETURN TO CALLING PROGRAM CSP24960
001E 0  10E0        FRACT SLC     32         ZERO ACC AND EXT         CSP24970
001F 0  D37D              STO   3 125        ZERO THE EXPONENT        CSP24980
0020 0  70F8              MDX     STORE      ZERO THE MANTISSA        CSP24990
0022                      END                END OF WHOLE SUBROUTINE  CSP25000

    NO ERRORS IN ABOVE ASSEMBLY.


// DUP                                                                  CSP25010
*STORE      WS  UA  WHOLE                                              CSP25020
33CB 0003
```

```
// ASM                                                                  CSP25030
** ARGS, RPACK AND SWING SUBROUTINES FOR 1130 CSP                  (ID) CSP25040
* LIST                                                                 CSP25050
* NAME ARGS                                                       (ID) CSP25060
                    -LIBR-              LIBF-TYPE-ROUTINES-FOLLOW     CSP25070
                  * THESE SUBROUTINES CANNOT BE CALLED FROM FORTRAN    CSP25080
0002    01647880        ENT     ARGS        SUBROUTINE ENTRY POINT     CSP25090
                  * ARGS GETS THE ARGUMENT FOR THE I/O ROUTINES        CSP25100
0030    195C10D2        ENT     RPACK       SUBROUTINE ENTRY POINT     CSP25110
                  * RPACK REVERSES AND PACKS EBCDIC STRINGS            CSP25120
004F    22989547        ENT     SWING       SUBROUTINE ENTRY POINT     CSP25130
                  * SWING REVERSES AN EBCDIC STRING                    CSP25140
0000 0  0001    ONE     DC      1           CONSTANT OF ONE            CSP25150
0001 0  0000    JLAST   DC      *-*         JCARD(JLAST) ADDRESS       CSP25160
0002 0  6A2A    ARGS    STX   2 SAVE2&1     ARGS ROUTINE STARTS HERE   CSP25170
0003 00 66800000        LDX   I2 0          GET 1ST ARGUMENT ADDR      CSP25180
0005 0  C100            LD    1 0           GET JCARD ADDR             CSP25190
0006 00 95800002        S     I1 2          SUBTRACT JLAST VALUE       CSP25200
0008 0  80F7            A       ONE         ADD ONE                    CSP25210
0009 00 D6800001        STO   I2 1          STORE IN 2ND ARG           CSP25220
000B 0  C100            LD    1 0           GET JCARD ADDR             CSP25230
000C 00 95800001        S     I1 1          SUBTRACT J VALUE           CSP25240
000E 0  80F1            A       ONE         ADD ONE                    CSP25250
000F 00 D6800000        STO   I2 0          STORE IN 1ST ARG           CSP25260
0011 00 96800001        S     I2 1          SUBTRACT JLAST ADDR        CSP25270
0013 0  80EC            A       ONE         ADD ONE                    CSP25280
0014 01 4C08001B        BSC   L  EROR1,+    CHECK FOR NEG OR 0 CHARS   CSP25290
0016 0  9203            S     2 3           OK. SUBTRACT MAX CHARS     CSP25300
0017 01 4C300021        BSC   L  ERROR,-Z   CHECK MORE THAN MAX CHARS   CSP25310
0019 0  8203            A     2 3           ADD MAX CHARS BACK         CSP25320
001A 0  700D            MDX     OK          ADDRESSES OK               CSP25330
001B 00 C6800000 EROR1  LD    I2 0          PICK UP JCARD(J)           CSP25340
001D 00 D6800001        STO   I2 1          AND STORE IN JCARD(JLAST)  CSP25350
001F 0  C0E0            LD      ONE         SET UP CHAR COUNT OF 1     CSP25360
0020 0  7007            MDX     OK          GO TO STORE CHAR COUNT     CSP25370
0021 00 C6800000 ERROR  LD    I2 0          PICK UP JCARD(J)           CSP25380
0023 0  9203            S     2 3           AND CALCULATE JCARD(JLAST) CSP25390
0024 0  80DB            A       ONE         TO BE JCARD(J+MAX-1)       CSP25400
0025 00 D6800001        STO   I2 1          STORE ADDR IN JCARD(JLAST) CSP25410
0027 0  C203            LD    2 3           LOAD CHARACTER COUNT       CSP25420
0028 00 D6800002 OK     STO   I2 2          STORE CHARACTER COUNT      CSP25430
002A 0  7204            MDX   2 4           CREATE RETURN ADDR         CSP25440
002B 0  6A03    LAST    STX   2 DONE&1      STORE RETURN ADDRESS       CSP25450
002C 00 66000000 SAVE2  LDX   L2 *-*        RESTORE IR2                CSP25460
002E 00 4C000000 DONE   BSC   L  *-*        RETURN TO CALLING PROGRAM  CSP25470
0030 0  6AFC    RPACK   STX   2 SAVE2&1     RPACK ROUTINE STARTS HERE  CSP25480
0031 00 66800000        LDX   I2 0          GET 1ST ARGUMENT ADDRESS   CSP25490
0033 00 C6800000        LD    I2 0          GET JCARD ADDR             CSP25500
0035 0  D006            STO     JCARD&1     INITIALIZE JCARD ADDRESS   CSP25510
0036 00 C6800001        LD    I2 1          GET SECOND ARGUMENT ADDR   CSP25520
0038 0  D0C8            STO     JLAST       INITIALIZE JCARD JLAST     CSP25530
0039 0  C202            LD    2 2           GET AREA ADDRESS           CSP25540
003A 0  D009            STO     KCARD&1     INITIALIZE PACK TO ADDRESS CSP25550
003B 00 C4000000 JCARD  LD    L  *-*        LOAD FIRST CHARACTER       CSP25560
003D 0  1898            SRT     24          SHIFT INTO EXT             CSP25570
003E 01 74FF003C        MDX   L  JCARD&1,-1 DECREMENT ADDRESS          CSP25580
0040 01 C480003C        LD    I  JCARD&1    GET SECOND CHARACTER       CSP25590
```



```
0042 0  18C8            RTE     8           SHIFT RIGHT, RETRIEVE EXT  CSP25600
0043 00 D4000000 KCARD  STO   L  *-*        STORE IN AREA              CSP25610
0045 01 74FF003C        MDX   L  JCARD&1,-1 DECREMENT ADDRESS          CSP25620
0047 01 74010044        MDX   L  KCARD&1,&1 INCREMENT AREA ADDRESS     CSP25630
0049 0  C0F2            LD      JCARD&1     GET ENDING ADDRESS         CSP25640
004A 0  90B6            S       JLAST       SUBTRACT JCARD JLAST  ADDR CSP25650
004B 01 4C10003B        BSC   L  JCARD,-     REPEAT IF NOT MINUS        CSP25660
004D 0  7203            MDX   2 3           INCREMENT OVER 3 ARGS      CSP25670
004E 0  70DC            MDX     LAST        ALL THROUGH, GO TO LAST    CSP25680
004F 0  6ADD    SWING   STX   2 SAVE2&1     SWING ARRAY END FOR END    CSP25690
0050 00 66800000        LDX   I2 0          GET 1ST ARGUMENT ADDRESS   CSP25700
0052 00 C6800000        LD    I2 0          GET FIRST ARGUMENT         CSP25710
0054 0  D007            STO     BACK&1      STORE AT BACK ADDRESS      CSP25720
0055 00 C6800001        LD    I2 1          GET 2ND ARGUMENT           CSP25730
0057 0  D001            STO     FRONT&1     STORE AT FRONT ADDRESS     CSP25740
0058 00 C4000000 FRONT  LD    L  *-*        GET WORD FROM FRONT        CSP25750
005A 0  1890            SRT     16          PUT IT IN THE EXT          CSP25760
005B 00 C4000000 BACK   LD    L  *-*        GET A WORD FROM THE BACK   CSP25770
005D 0  E810            OR      HEX40       OR IN AN EBCDIC BLANK      CSP25780
005E 01 D4800059        STO   I  FRONT&1    PUT IT IN THE FRONT        CSP25790
0060 0  1090            SLT     16          RETRIEVE THE EXT           CSP25800
0061 0  E80C            OR      HEX40       OR IN AN EBCDIC BLANK      CSP25810
0062 01 D480005C        STO   I  BACK&1     PUT IT IN THE BACK         CSP25820
0064 01 74010059        MDX   L  FRONT&1,&1 INCREMENT THE FRONT ADDR    CSP25830
0066 01 74FF005C        MDX   L  BACK&1,-1  DECREMENT THE BACK ADDR     CSP25840
0068 0  C0F0            LD      FRONT&1     GET THE FRONT ADDRESS      CSP25850
0069 0  90F2            S       BACK+1      SUBTRACT THE BACK ADDRESS  CSP25860
006A 01 4C080058        BSC   L  FRONT,&    REPEAT IF MINUS            CSP25870
006C 0  7202            MDX   2 2           INCREMENT OVER 2 ARGS      CSP25880
006D 0  70BD            MDX     LAST        ALL THROUGH, GO TO LAST    CSP25890
006E 0  0040    HEX40   DC      /0040       EBCDIC BLANK CODE          CSP25900
0070                    END                 END OF ARGS SUBPROGRAM     CSP25910

   NO ERRORS IN ABOVE ASSEMBLY.
```

```
// DUP                                                                  CSP25920
*STORE      WS  UA  ARGS                                                CSP25930
33CE 0008
```

APPENDIX

CORE ALLOCATION

To calculate the core requirements, sum the number of words for all routines used. If NZONE, CARRY, NSIGN, SERVICE, WHOLE, ADD, and/or FILL are not included in the first sum, and they are CALLed by a routine in the first sum, add their number of words to the first sum. Then calculate the Reference core requirements. Keep in mind that no matter how many times a Reference is used, it should be considered only once. Sum the core requirements of all References used. Add this sum to the first sum. The resulting total is the core requirement for the 1130 Commercial Subroutine Package. Notice that the FORTRAN subroutines a, b, and c will be used by most FORTRAN programs and so will be present whether the package is used or not.

CSP Routine Name	Number of Words	Calls These CSP Routines	Calls These Subroutine Library Routines
A1DEC	74	NZONE	-
A1A3/A3A1	152	-	-
ADD/SUB	170	CARRY, FILL	-
ARGS	112	-	-
CARRY	54	-	-
DECA1	76	NZONE	-
DIV	238	CARRY, FILL	-
DPACK/DUNPK	100	-	-
EDIT	204	NZONE, FILL	-
FILL	30	-	-
GET	96	NZONE	ref. a
ICOMP	122	-	-
IOND	6	-	-
MOVE	36	-	-
MPY	164	CARRY, FILL	-
NCOMP	42	-	-
NSIGN	42	-	-
NZONE	78	-	-
PACK/UNPAC	66	-	-
PRINT/SKIP	124	ARGS	ref. d
PUT	104	NZONE, WHOLE	ref. a and b
P1403/S1403	134	ARGS	ref. i
P1442	130	ARGS	ref. h
READ/PUNCH	158	ARGS	ref. e and g
R2501	140	ARGS	ref. c and g
STACK	6	-	-
TYPER/KEYBD	138	ARGS	ref. f and g
WHOLE	34	-	-

References

a. (EADD, EMPY, ESTO, FLOAT, NORM, SNR, FARC, XMD) 450 words
b. (EABS, IFIX) 74 words
c. (READ1) 110 words
d. (PRNT1) 404 words
e. (CARD1) 264 words
f. (TYPE0, EBPRT) 638 words
g. (SPEED, ILS04) 360 words
h. (PNCH1) 218 words
i. (PRNT3, ZIPCO, EBPT3) 544 words

EBCDIC CHARACTERS AND DECIMAL EQUIVALENTS

A	-16064	S	-7616	blank	16448
B	-15808	T	-7360	. (period)	19264
C	-15552	U	-7104	< (less than)	19520
D	-15296	V	-6848	(	19776
E	-15040	W	-6592	+	20032
F	-14784	X	-6336	&	20544
G	-14528	Y	-6080	$	23360
H	-14272	Z	-5824	*	23616
I	-14016	0	-4032	)	23872
J	-11968	1	-3776	- (minus)	24640
K	-11712	2	-3520	/	24896
L	-11456	3	-3264	,	27456
M	-11200	4	-3008	%	27712
N	-10944	5	-2752	#	31552
O	-10688	6	-2496	@	31808
P	-10432	7	-2240	' (apostrophe)	32064
Q	-10176	8	-1984	=	32320
R	-9920	9	-1728		

Subprogram Name	Approximate* Execution Time in Microseconds**
GET	2250 + 2190 C
PUT	3450 + 3090 C
EDIT	630 + 90 S + 180 M
MOVE	300 + 45 C
FILL	300 + 30 C
WHOLE	1400
NCOMP	250 + 75 C
NZONE	350
ICOMP	500 + 95 C
NSIGN	240
ADD	2160 + 216 L
SUB	2160 + 216 L
MPY	2400 + 120 P
DIV	4000 + Q (445 + 667 DIV)
A1DEC	700 + 54 A
DECA1	180 + 117 A
A1A3	470 + 1084 A
A3A1	545 + 156 A
PACK	360 + 63 A
UNPAC	420 + 66 A
DPACK	392D
DUNPK	360D

C = Length of the field, in characters
S = Length of the source field
M = Length of the edit mask
P = Length of the multiplier field x length of the multiplicand field (significant digits only--don't count leading zeros)
A = Length of the A1 field
D = Length of the packed decimal (D4) field
L = Length of the longer of the two fields (significant digits only--don't count leading zeros)
Q = Number of significant digits in the quotient (result) field
DIV = Number of significant digits in the divisor (denominator) field

* All timings are approximate, and are based on test runs of "typical" cases, using fields of "average" size, magnitude, etc. Unusual cases may (or may not) differ significantly from the timings obtained from the given equations. This is particularly true of the decimal arithmetic routines (ADD, SUB, MPY, DIV).

** Based on 3.6-microsecond CPU cycle speed. Multiply by 0.6 to obtain timings on 2.2-microsecond CPU.

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Format of Commercial Subroutine Calls (and Parameters*)	Page**	Format of Data: Before		After	Comments on Parameters
*ONE WORD INTEGERS		—	---	—	Must use for every CSP program
*EXTENDED PRECISION		—	---	—	Must use if GET or PUT is present
*IOCS (DISK)		—	---	—	Only DISK can be specified for CSP I/O
CALL ADD(JCARD,J,JLAST,KCARD,K,KLAST,NER)	13	D1	---	D1	Initialize NER to 0; error if NER=KLAST
CALL A1A3(JCARD,J,JLAST,KCARD,K,ICHAR)	15	A1	---	A3	You must define ICHAR array, and it must contain 40 characters
CALL A1DEC(JCARD,J,JLAST,NER)	18	A1	---	D1	Initialize NER to 0; error if NER≠0
CALL A3A1(JCARD,J,JLAST,KCARD,K,ICHAR)	21	A3	---	A1	You must define ICHAR array, and it must contain 40 characters
CALL DECA1(JCARD,J,JLAST,NER)	26	D1	---	A1	Initialize NER to 0; error if NER≠0
CALL DIV(JCARD,J,JLAST,KCARD,K,KLAST,NER)	28	D1	---	D1	Initialize NER to 0; error if NER=KLAST
CALL DPACK(JCARD,J,JLAST,KCARD,K)	31	D1	---	D4	
CALL DUNPK(JCARD,J,JLAST,KCARD,K)	34	D4	---	D1	
CALL EDIT(JCARD,J,JLAST,KCARD,K,KLAST)	36	A1	---	A1	Control characters in mask are: b0.,CR-*S
CALL FILL(JCARD,J,JLAST,NCH)	41	Dec.	---	A1	See reverse side for decimal values for NCH
GET(JCARD,J,JLAST,SHIFT)	42	A1	---	Real***	SHIFT must be real, extended precision. (1.0=no shift)
ICOMP(JCARD,J,JLAST,KCARD,K,KLAST)	45	A1	---	-0+	Minus:JCARD<KCARD;Zero:JCARD=KCARD;Plus:JCARD>KCARD.
CALL IOND	47	None	---	None	Use before PAUSE or STOP (Monitor Version 1 Only)
CALL KEYBD(JCARD,J,JLAST)	48	A1	---	A1	Maximum of 60 Characters allowed
CALL MOVE(JCARD,J,JLAST,KCARD,K)	50	Any	---	Same	
CALL MPY(JCARD,J,JLAST,KCARD,K,KLAST,NER)	52	D1	---	D1	Initialize NER to 0; error if NER=KLAST
NCOMP(JCARD,J,JLAST,KCARD,K)	54	A1	---	-0+	Minus:JCARD<KCARD;Zero:JCARD=KCARD;Plus:JCARD> KCARD.
CALL NSIGN(JCARD,J,NEWS,NOLDS)	56	D1	---	Integer	See reverse side for values for NEWS and NOLDS
CALL NZONE(JCARD,J,NEWZ,NOLDZ)	58	A1	---	Integer	See reverse side for values for NEWZ and NOLDZ
CALL PACK(JCARD,J,JLAST,KCARD,K)	60	A1	---	A2	
CALL PRINT(JCARD,J,JLAST,NER)	62	A1	---	A1	Initialize NER to 0; if NER=3, reached chan.9; if NER=4, reached chan. 12
CALL PUNCH(JCARD,J,JLAST,NER)	64	A1	---	A1	Initialize NER to -1; if NER=0, last card, if NER=1, feed or punch check
CALL PUT(JCARD,J,JLAST,VAR,ADJST,N)	66	Real***	---	A1	VAR and ADJST must be real, extended precision
CALL P1403(JCARD,J,JLAST,NER)	68	A1	---	A1	Initialize NER to 0; if NER=3, reached chan. 9; if NER=4, reached chan. 12
CALL P1442(JCARD,J,JLAST,NER)	70	A1	---	A1	Initialize NER to -1; if NER=0, last card; if NER=1, feed or punch check
CALL READ(JCARD,J,JLAST,NER)	73	A1	---	A1	Initialize NER to -1; if NER=0, last card; if NER=1, feed or read check
CALL R2501(JCARD,J,JLAST,NER)	76	A1	---	A1	Initialize NER to -1; if NER=0, last card; if NER=1, feed or read check
CALL SKIP(N)	79	Dec.	---	None	See reverse side for functional values for N
CALL S1403(N)	84	Dec.	---	None	See reverse side for functional values for N
CALL STACK	81	None	---	None	
CALL SUB(JCARD,J,JLAST,KCARD,K,KLAST,NER)	82	D1	---	D1	Initialize NER to 0; error if NER=KLAST
CALL TYPER(JCARD,J,JLAST)	86	A1	---	A1	See reverse side for values for functional characters
CALL UNPAC(JCARD,J,JLAST,KCARD,K)	89	A2	---	A1	
WHOLE(EXPRESSION)	91	Real	---	Real	The expression must be "real" not "integer".

* All parameters required by each subroutine must be supplied.

** Page Number in 1130 Commercial Subroutine Package (1130-SE-25X), Version 3 Program Reference Manual (H20-0241-3)

*** Must use extended precision in calling program.

Form H20-0241-3
Revised 10/11/68
By TNL N20-1888

FILL and NCOMP

	EBCDIC Char.	Dec. Equiv.
Low	(12-0)	-16320 (1)(2)
	A	-16064
	B	-15808
	C	-15552
	D	-15296
	E	-15040
	F	-14784
	G	-14528
	H	-14272
	I	-14016
	(11-0)	-12224 (1)(2)
	J	-11968
	K	-11712
	L	-11456
	M	-11200
	N	-10944
	O	-10688
	P	-10432
	Q	-10176
	R	-9920
	S	-7616
	T	-7360
	U	-7104
	V	-6848
	W	-6592
	X	-6336
	Y	-6080
	Z	-5824
	0	-4032
	1	-3776
	2	-3520
	3	-3264
	4	-3008
	5	-2752
	6	-2496
	7	-2240
	8	-1984
	9	-1728
	blank	16448
	. (period)	19264
	< (less than)	19520 (1)
	(	19776
	+	20032
	&	20544
	$	23360
	*	23616
	)	23872
	- (minus)	24640
	/	24896
	,	27456
	%	27712 (1)
High	#	31552 (1)
	@	31808 (1)
	' (apostrophe)	32064
	=	32320

Listed in Collating Sequence

(1) Not on 1132 or 1403 Printers
(2) Not on console typewriter

28224

NSIGN — used with D1 fields

If NOLDS IS:	Then sign was:
+1	positive
-1	negative

When NEWS is:	Sign is set to:
+1	positive
0	opposite of old sign
-1	negative
NOLDS	no change

NZONE — used with A1 fields

If NOLDZ is:	Then character was:
1	A-I
2	J-R
3	S-Z
4	0-9
more than 4	special

When NEWZ is:	Character is set to:
1	12 zone
2	11 zone
3	0 zone
4	no zone
more than 4	no change

SKIP and S1403 function	Value for N
Immediate skip to channel 1	12544
Immediate skip to channel 2	12800
Immediate skip to channel 3	13056
Immediate skip to channel 4	13312
Immediate skip to channel 5	13568
Immediate skip to channel 6	13824
Immediate skip to channel 9	14592
Immediate skip to channel 12	15360
Immediate space of 1 space	15616
Immediate space of 2 spaces	15872
Immediate space of 3 spaces	16128
Suppress space after printing	0

Normal spacing is one space after printing.

TYPER function	Decimal constant in (JCARD) output area
Tabulate	1344
Shift to black	5184
Carrier return	5440
Backspace	5696
Line Feed	9536
Shift to red	13632

The procedures set forth in IBM 1130 Card/Paper Tape Programming System Operator's Guide (C26-3629) and in IBM 1130 DISK Monitor System Reference Manual (C26-3750 or C26-3717) should be followed to execute the sample problems and all user-written programs.

Switch settings for the sample problems are as follows:

Input Device	Output Device	Switches		
		0	1	2
1442	console printer	down	down	down
1442	1132	up	down	down
1442	1403	up	up	down
2501	console printer	down	down	up
2501	1132	up	down	up
2501	1403	up	up	up

Make sure that the switches are set properly before the program begins.

Note: Sample Problem 2 cannot be executed if Version 1 of the Monitor is being used.

Conditions A and B (see list below) have the following meaning:

A Device not ready.

B Internal subroutine error. Rerun job. If error persists, verify that the subroutine deck is accurate, using the listings in this manual. If the deck is the same, contact your local IBM representative. Save all output.

IAR	Accumulator (hex)	Device	Condition
41	1xx0	1442 Card Read Punch	A
41	1xx1	1442 Card Read Punch	B
41	2xx0	Console printer or keyboard	A
41	2xx1	Console printer or keyboard	B
41	4xx0	2501 Card Reader	A
41	4xx1	2501 Card Reader	B
41	6xx0	1132 Printer	A
41	6xx1	1132 Printer	B
41	9xx0	1403 Printer	A
41	9xx1	1403 Printer	B

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Core Requirements for 1130 FORTRAN (C20-1641)

1130 FORTRAN Programming Techniques (C20-1642)

IBM 1130 Card/Paper Tape Programming System Operator's Guide (C26-3629)

IBM 1130 DISK Monitor System Reference Manual (C26-3750)

IBM 1130 Assembler Language (C26-5927)

IBM 1130 Subroutine Library (C26-5929)

IBM 1130/1800 Basic FORTRAN IV Language (C26-3715)

IBM 1130 DISK Monitor System, Version 2 (C26-3717)

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1130 COMMERCIAL SUBROUTINE PACKAGE (1130-SE-25X)
VERSION 3, MODIFICATION 1
PROGRAM REFERENCE MANUAL

Please remove the following pages from H20-0241-3 and replace them with the corresponding pages attached:

Front cover
15-16
43-44
47-48
95-100
165-176
191-192
195-196
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Changes are indicated by a vertical line in the left margin.

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Program Reference Manual

H20-0241-3

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