DR. JOHN MATTIOTES
COMPUTER TECHNOLOGY DEPT.
PURDUE UNIVERSITY
CALUMET CAMPUS
HAMMOND, IN 46323

AS

TABLE OF CONTENTS

TRAVERSE ANALYSIS PROGRAM

I. General Description of the Program

The prime purpose of this program is to solve a large number of the problems which arise in the calculation of traverses. It is a very general program which will be useful in the solution of a wide variety of geometric problems. Provision is made so that traverses may close on any point. Balancing of misclosures (within limits) can be accomplished without re-reading the input data. Interdependent traverses are easily handled by the program since all input and calculated data is stored for future reference. Traverses with (a) one unknown course, (b) two unknown azimuths, (c) two unknown distances, and (d) an unknown azimuth and an unknown distance, not both for the same course, are solvable using this program. Only lengths strictly less than 100,000 feet are allowed.

The program consists of two sections. The first section has the following functions:

1. Read and edit input course records;
2. Calculate azimuths, distances, latitudes, departures, or coordinates when possible for input courses;
3. Store all input data and calculated results of the traverse for further computation;
4. Count the number and type of unknowns for later determinations of problem type;
5. Substitute previously stored course information into the input record when called for (interdependency);

TRAVERSE ANALYSIS PROGRAM FOR A CARD IBM 1620

Authors: Donald T. Mitchell/Cynthia W. Acker
IBM Corporation
618 South Michigan Avenue
Chicago 5, Illinois

Modifications or revisions to this program, as they occur, will be announced in the appropriate Catalog of Programs for IBM Data Processing Systems. When such an announcement occurs, users should order a complete new program from the Program Information Department.

Traverse Analysis Program for IBM Card 1620

Authors: Donald T. Mitchell/Cynthia W. Acker

Direct Inquiries to: Mr. D. T. Mitchell
IBM Corporation
618 South Michigan Avenue
Chicago 5, Illinois

A. Purpose/Description: Program intended to balance traverses and solve for traverse unknowns. Balances misclosures without re-reading input data. Program effects solution in one pass.

B. Method: Standards geometrical techniques and equations utilized.

C. Restrictions and Range: Course length less than 100, 000 feet and no limit on azimuths. Practical limit on 96 courses per traverse.

D. Accuracy: Length, latitude, departure and coordinates carried to 3 decimal places. Azimuths accurate to $\pm$ 0.2 seconds. All arithmetic done in fixed point.

E. Machine Configuration: 20K 1620 with no special features and 1622 Card Reader/Punch.

F. Program Requirements: 19,632 core positions

G. Source Language: 1620/1710 SPS

H. Program Execution Time: Impossible to state running time per course. Thirteen sample programs run and times given on sample output sheets included in writeup.

I. Check-Out Status: Thirteen sample problems testing all problem types solvable with this program.

J. Sample Problem Running Time: Approximately one hour

K. Comments: This program and its documentation were written by an IBM employee. It was developed for a specific purpose and submitted for general distribution to interested parties in the hope that it might prove helpful to other members of the data processing community. The program and its documentation are essentially in the author's original form. IBM serves as the distribution agency in supplying this program. Questions concerning the use of the program should be directed to the author's attention.

The three-digit code of the input record is composed of three one-digit codes as follows:

B/C code =

0 means this course is not to be balanced

1 means this course is to be balanced

2 means the coordinates are given in the input record

3 means course numbers of previously specified course coordinates are given (See examples for punching instructions)

A code =

0 means azimuth of this course is unknown

1 means azimuth of this course follows the code digits of this input record

2 means azimuth of a previously read course is to be used, the number of this course is given in place of this azimuth

$\bar{2}$ means the same as 2 except that the sense of this azimuth is to be reversed

3 means that either the azimuth of a previously read course or of its alternate is to be used. At the time this course is processed, the operator must type in the proper course number to indicate which is to be used.

$\bar{3}$ means the same as 3 except that the sense of the azimuth is to be reversed

D code =

0 means the length of this course is unknown

1 means the length of this course is given in the input record

2 means the length of a previously read course is to be used, the number of this course is given in place of the length

3 means that the length, either of a previously read course or of its alternate, is to be used. At the time this course is processed, the operator must type in the proper course number to indicate which is to be used.

After each input record is read and the computations on the input data are performed, all the known information about the course is placed in course reference storage. One hundred 54-digit reference records are available, one for each possible course number. Any course numbered 25 will always be stored in reference record 25. Therefore, care must be taken in the assignment of course numbers when interdependent traverses are being computed so that information will not be lost by overlaying. This 54-digit course reference record is composed of

3-digit code

6. Type and punch output lines for courses if required by the operator.

Thus, the first section of the program prepares and stores all the information necessary to balance a misclosure or solve for unknowns. In addition, a traverse completely specified by azimuths, lengths, and/or course end coordinates can be completely calculated and printed by this section.

The second section of the program:

1. Determines the type of problem presented by the input data and whether it can be solved.
2. Computes misclosure balancing factors and applies them to the courses to be balanced;
3. Calculates the values of unknown azimuths and distances;
4. Prints all possible solutions of the traverse problem;
5. Stores the results computed in this section, so that it may be used in later calculations of interdependent traverses;
6. Calculates the traverse area if desired.

Traverses with any number of sides can be calculated with this program if no unknowns are to be determined and if no balancing is to be done. Otherwise, the practical limit is 96 courses.

This program was prepared for the IBM 1620 Data Processing System with a 1622 Card Reader - Punch. No special features are needed.

II. Input

A. General Discussion

The input required by the program consists of punched card records, one record for each course of the traverse, read into memory in the order of the traverse. At least two records are required per traverse. Only usable data is punched into the input card. Blank or zero fields are required for unknown azimuths or lengths. All characters in these input records are numeric.

Each input record consists of (a) a two-digit course number, (b) a three-digit code, and (c) other optional data (azimuths, lengths, etc.) in that order. The course number is used only for identification purposes in the program and by the user. The program builds a record of the course numbers in the order they are read in. Therefore, course numbers can be assigned at will by the user. This contributes to the ease of computing nets of interdependent Traverses. Course numbers 00, 97, 98, and 99 have special significance in this program and are explained later.

Input Card Format:

Col. 1 - 2	-	Course number
Col. 3 - 5	-	Codes
Col. 6 - 13	-	Azimuth
Col. 14 - 21	-	Length
Col. 22 - 37	-	Blank
Col. 38 - 46	-	N-S Coordinate
Col. 47 - 55	-	E-W Coordinate

8-digit ($\bar{x}$xx° xx' xx.x") azimuth

8-digit ($\bar{x}$xxxx. xxx) length

8-digit ($\bar{x}$xxxx. xxx) latitude

8-digit ($\bar{x}$xxxx. xxx) departure

9-digit ($\bar{x}$xxxxx.xxx) north-south coordinate

9-digit ($\bar{x}$xxxxx. xxx) east-west coordinate

____record mark

54 characters

with the coordinates specifying the end point of the course.

B. Types of Input Records

Type 1. 2-digit course number

3-digit code (=200)

9-digit north-south coordinate

9-digit east-west coordinate

This type of record is used to specify the end coordinates of a course. If the course number is not 00, the azimuth, length, latitude and departure of the course extending from the end coordinates of the previous course to the coordinates specified in this record are calculated. The azimuth is computed by an arctangent subroutine accurate to $\pm$ .2 seconds. When the course number is 00, this record type specifies the traverse starting coordinates. 200 is the only combination of B/C, A, D codes allowable in this record.

Type 2. 2-digit course number

3-digit code (= 011 or 111)

8-digit azimuth (xxx° yy' zz.z")

8-digit course length (xxxxx. xxx)

This is the standard record specifying azimuth and length of a known course of the traverse. The latitude and departure of such a course are calculated using a sine-cosine subroutine accurate to 8 decimal places. The two valid codes for this record type distinguish between courses to be balanced (111) and not to be balanced (011).

Type 3. 2-digit course number

3-digit code (= 121, 1$\bar{2}$1, 021, 0$\bar{2}$1, 112, or 012)
(= 131, 1$\bar{3}$1, 031, 0$\bar{3}$1, 113, or 013)

2-digit course number designating where to find azimuth in reference storage, or 8-digit azimuth

8-digit length, or 2-digit course number specifying where length to be used can be found in reference storage

This type record is used when <u>either</u> the azimuth <u>or</u> length to be used is already in reference storage from a previous course. The azimuth or length called for by the course number may have been read from a card or computed. The program has the ability to substitute information associated with any previously read-in course into this input record in place of the course number (following the codes). After this substitution is completed, a type 3 record

is treated as a type 2 record.

Type 4. 2-digit course number

3-digit code (=001, 010, 101, or 110)

8-digit azimuth or length

This record is used when either the length or azimuth of the course is unknown (the code tells which). The proper count of unknowns is increased by 1 for the determination of problem type in section two of the program. A B/C code of 1 for this record is ignored.

Type 5. 2-digit course number

3-digit code (=022, $02\bar{2}$, 122, $12\bar{2}$, 300, 033, $03\bar{3}$, 133, $13\bar{3}$, 023, $02\bar{3}$, 123, $12\bar{3}$, 032, $03\bar{2}$, 132, $13\bar{2}$)

2-digit course number

2-digit course number

The course numbers following the codes tell which previous course provided the azimuth and distance (if the code is x22, $x\bar{2}2$, x33, $x\bar{3}3$, x32, $x\bar{3}2$, x23, $x\bar{2}3$) or coordinates (if the code is 300) which are wanted for this course. Whenever a 3 appears in the code, the operator must type in the number of the course to be used (course or alternate). The computer then replaces the 3 or $\bar{3}$ with a 2 or $\bar{2}$ and the code becomes x22 or $x\bar{2}2$. In case the code is x22 or $x\bar{2}2$ the substitution of the proper azimuth and length for the course numbers in the input record results in a type 2 record. A 300 code in

the record means that a type 1 input record is to be formed by fetching the proper coordinates from reference storage. The two course numbers following the codes need not be the same.

Type 6. 2-digit course number

3-digit code (=022, 020, $02\bar{0}$, 102, 120, $12\bar{0}$, 103, 130, $13\bar{0}$, 003, 030, $03\bar{0}$)

2-digit course number

A course with either azimuth in reference storage and length unknown, or azimuth unknown and distance in reference storage, can be presented to the program with this type of record. Replacement of the course number with either the length or azimuth according to the code forms a type 4 record.

Type 7. 2-digit course number

3-digit code (000 or 100)

Both the azimuth and length are unknown for a course presented by this type record. Section one of the program does not effect this record. The counts of unknowns (which determine the type of problem to be solved) are increased when this type of record is encountered. A B/C code of 1 is ignored in this type of input record.

NOTE: To clear Course Reference Storage, read in a card containing 0≠ in columns 1 and 2. (≠ = 0-2-8)

C. Input Examples

1. A traverse for which the latitude and departure of each course and the misclosure are to be computed. There are seven courses in the traverse. Nine records are used -- the seven course records, a record with 00 course number to set the starting coordinates, and a record which will cause the program to calculate the misclosure course for later balancing (if required). The last input record of each traverse must have course number 99. This last record will frequently be a "dummy" used to cause the calculation of the closure course. The card records to be punched for running this example are:

Type	CO. NO. (1-2)	CODES B/C (3)	CODES A (4)	CODES D (5)	AZIMUTH (6-13)	LENGTH (14-21)	COORDINATES NORTH-SOUTH (38-46)	COORDINATES EAST-WEST (47-55)
1	0,0	2	0	0			1,5,0,0,8,7,3,0,6	4,2,1,3,7,6,8,7,6
1	0,1	2	0	0			1,5,0,1,5,2,0,4,3	illegible
2	2,2	0	1	1	1,5,5T4,6,0,6,0	1,3,0,0,0,0,0		
3	0,3	0	1	2	1,2,9,2,4,1,1,9,0	0,2		
3	0,4	0	2	1	0,3	3,9,0,0,0,0		
3	0,5	0	1	1	3,4,4,0,1,1,5,8,0	3,7,0,0,0,0		
1	0,6	2	0	0			1,5,0,4,0,6,6,1	4,2,2,0,8,6,3,5,8
3	0,7	0	1	1	2,6,5T4,1,1,5,7,0	7,1,1,4,6,3		
5	9,9	3	0	0			0,0	0,0

2. A traverse with an unknown length and an unknown azimuth, not both for the same course. In this problem, the last (or 99) course is used in the second section of the program (solution phase) as the third side of the triangle with the unknowns. Note that South and West coordinates are to be punched as negative. The cards to be punched are:

TRAVERSE ANALYSIS PROGRAM--INPUT DATA SHEET

Type	CO. NO.	CODES B/C	CODES A	CODES D	AZIMUTH	LENGTH	COORDINATES NORTH-SOUTH	COORDINATES EAST-WEST
1	00	2	0	0			72591927	-8396292
4	16	0	0	1		817625		
4	13	0	1	0	27253370			
1	99	2	0	0			14697128	2067383$\bar{4}$

III. Calculation Procedures

The second section of the program uses the information stored by the first section to effect a solution to the problem presented.

A. TRAVERSE BALANCING

If the misclosure of the traverse is to be balanced, Console Switch No. 1 must be ON. Console Switch No. 2 is to be

ON for compass rule balancing, and

OFF for transit rule balancing.

These rules are:

Compass Rule

$$LATFAC = \frac{\text{Latitude of Misclosure}}{\text{Sum of lengths of courses to be balanced}}$$

$$DEPFAC = \frac{\text{Departure of Misclosure}}{\text{Sum of lengths of courses to be balanced}}$$

Balanced Latitude = Unbalanced Latitude + (course length) (LATFAC)

Balanced Departure = Unbalanced departure + (course Length) (DEPFAC)

Transit Rule

$$LATFAC = \frac{\text{Latitude of Misclosure}}{\text{Sum of absolute values of latitudes of courses to be balanced}}$$

$$DEPFAC = \frac{\text{Departure of misclosure}}{\text{Sum of absolute values of departures of courses to be balanced}}$$

Balanced Latitude = Unbalanced latitude + |Unbalanced latitude|. (LATFAC)

Balanced Departure = Unbalanced departure + |Unbalanced departure|. (DEPFAC)

Only courses whose input records show a B/C code of 1 will be balanced. Thus, courses of fixed length and direction in a traverse can be held fixed during balancing.

B. TRAVERSE WITH UNKNOWN COURSE

A traverse with an unknown course (i.e., both azimuth and length unknown) is solved very simply by the program. The ending course (required by the program) with course number 99 causes the program to compute the azimuth and length of the course which will close the traverse (either on the starting point or on some other point). A simple substitution of this calculated information into the reference record for the unknown course and a recomputation of the end coordinates of the courses gives the complete traverse solution.

C. TRAVERSE WITH UNKNOWN AZIMUTH AND LENGTH

A traverse with an unknown azimuth and unknown length, not both for the same course, is solved using the following formulas:

DEP (99) = departure of closing course 99

LAT (99) = latitude of closing course 99

A (R) = known azimuth; L(R) = known length

A (U) = unknown ; azim. L(U) = unknown length

$B = DEP(99) \cdot \sin A(R) + LAT(99) \cdot \cos A(R)$

$C = B^2 + L(R)^2 - LAT(99)^2 - DEP(99)^2$

$L(U) = B \pm \sqrt{C}$

$$A(U) = \text{Arctan}\left[\frac{DEP(99) - L(U) \sin A(R)}{LAT(99) - L(U) \cos A(R)}\right]$$

Since two solutions are generated, both must be printed and both must be preserved in memory in so far as possible. The second solution ($L(\omega) = B - \sqrt{C}$) is kept in reference records 97 and 98, with

98 containing the alternate course with unknown distance, and

97 containing the alternate course with unknown azimuth.

D. TRAVERSE WITH TWO UNKNOWN AZIMUTHS

When two unknown azimuths are presented to the program, the following formulas are utilized:

L_1 = length of first course with unknown azimuth

L_2 = length of second course with unknown azimuth

$$S = .5 (L_1 + L_2 + L_{99})$$

$$r = \sqrt{\frac{(S - L_1)(S - L_2)(S - L_{99})}{S}}$$

$$a_2 = 2 \text{ ARCTAN } \left(\frac{r}{S - L_1}\right) ; \quad a_1 = 2 \text{ ARCTAN } \left(\frac{r}{S - L_2}\right)$$

$$A_{\text{unknown 1}} = A_{\text{course 99}} \pm a_1$$

$$A_{\text{unknown 2}} = A_{\text{course 99}} \mp a_2$$

Both solutions here are also preserved in memory and printed. The alternate solution is maintained in course reference records 97 and 98 with

97 containing the course with second unknown azimuth, and

98 containing the course with first unknown azimuth.

E. TRAVERSE WITH TWO UNKNOWN LENGTHS

There is a unique solution to the two unknown distances problem. The distances are computed by

$$L_{\text{unknown 1}} = \left| \frac{\text{LAT (99)} \sin A_2 - \text{DEP (99)} \cos A_2}{\sin (A_1 - A_2)} \right|$$

$$L_{\text{unknown 2}} = \left| \frac{\text{LAT (99)} \sin A_1 - \text{DEP (99)} \cos A_1}{\sin (A_1 - A_2)} \right|$$

where

A_1 = known azimuth of first course with unknown distance

A_2 = known azimuth of second course with unknown distance

After these lengths are found, they are stored in their proper reference records. Then, as with all problems this program solves, the course records are completed (i.e., latitude, departure, and coordinates are computed), printed, and punched.

IV. Output Formats

The typed output from this program consists of one line per course, consisting of

Course number
Azimuth
Length
Latitude (+ for North, - for South)
Departure (+ for East, - for West)
North-South Coordinate
East-West Coordinate

Headings are typed one per program run at the beginning. The results of pre-balancing computations can be typed during the input phase of the program if Console Switch No. 4 is ON. However, if unknowns are present in the traverse, zeroes will be printed for all uncalculated results.

If console Switch No. 3 is ON, the area of each traverse in square feet and acres is computed and typed at the end of the traverse. AREASQFT is given as xxxxxxxxxxx; AREAACRES is typed as xxxxxxxx.xxx (without the decimal point).

The format of the data punched during solution is the following:

Column	1 - 2	Course Number
Column	3 - 5	3-digit code
Column	6 - 13	8-digit (x̄xx°xx'xx. x") azimuth
Column	14-21	8-digit (x̄xxxx.xxx) length
Column	22-29	8-digit (x̄xxxx.xxx) latitude
Column	30-37	8-digit (x̄xxxx.xxx) departure
Column	38-46	9-digit (x̄xxxxx.xxx) north-south coordinate
Column	47-55	9-digit (x̄xxxxx.xxx) east-west coordinate
Column	80	o

V. Operating Instructions

1. Place the program deck in the 1622 card reader.
2. Set the typewriter margins at 10 and 90; no tab stops necessary.

3. Clear memory
   - (a) MBR Check Switch to Program
   - (b) Reset; Insert
   - (c) Type 31 00003 00002
   - (d) Release; Start
   - (e) Instant Stop
4. Load program into Memory
   - (a) All check switches to STOP.
   - (b) Reset
   - (c) Hit LOAD on the card reader
   - (d) Hit START to read last two cards
   - (e) Press ConsoleStart
   - (f) Heading will be typed out
5. Load Input Data Cards; START on Read Unit
6. Load blank cards in Punch Unit. Press START on Punch Unit.
7. Typewriter will type "Set Switches" and computer will halt.

   Set the console switches as follows, and press console start.

#1	ON	Balance if necessary
	OFF	Do no balancing
#2	ON	Use compass rule
	OFF	Use transit rule
#3	ON	Compute area
	OFF	Do not compute area
#4	ON	Type and punch during read-in
	OFF	Type and punch after calculations are complete

8. When the program has completed solving the problem, the typewriter will again type "set switches" and halt. Reset the console switches for the next case and press START on the console.

9. Hit START on reader to read in last two cards.

10. All results will be typed out on the typewriter and punched on the card punch.

VI. SPECIAL PROGRAM NOTES

1. The lower limit used in determining whether to balance a traverse or not is to be stored as $\bar{x}x.xxx$ in two places with field addresses 08671 (START3+143) and 08791 (START3+263). The upper limit for checking for a "bust" is stored as $\bar{x}x.xxx$ with field address 08695. (START3+167). The limits used in the program are 00.501 and 10.001.
2. If the user wishes to type in the input records, change the digit at 05310 to 1.
3. To completely restart, the user may RESET, INSERT 49 05060, RELEASE, START, and load data decks again.
4. The user who wishes to cripple typing of output courses (and retain punching) may replace the instruction at 04408 (TYPCOR) with 49 04768 (B TYCEND).

ERROR INDICATIONS AND MESSAGES

ERR1 --	00 Used as course number for other than first record of Traverse
ERR2 --	Improper codes for 00 starting record
ERR3 --	Unsolvable problem - too many unknowns
ERR4 --	Incorrect code
ERR5 --	Unknown problem type - cannot identify
UNSOL 2 DIST --	Unsolvable problem with two unknown distances - will generate a length greater than 99,999.999
BUST --	Misclosure larger than upper limit

VII. Examples

This section consists of 13 examples which test all problem types solvable with this program. In addition, these examples show some unusual uses of the program and test error conditions. Running times are indicated on the output sheets.

Example 1

CO. NO. (1-2)	CODES B/C (3)	CODES A (4)	CODES D (5)	AZIMUTH (6-13)	LENGTH (14-21)	COORDINATES NORTH-SOUTH (38-46)	COORDINATES EAST-WEST (47-55)
0,6	0	1	1	,6,4,1,3,2,1,1,9,0	,2,7,1,3,7		
2,3	0	1	1	1,1,8,1,4,2,1,0,6,0	,4,7,2,0,6,1		
0,7	0	1	1	2,2,1,1,6,1,1,2,0	,3,7,5,4,3,0		
1,1	0	1	1	2,7,0,1,0,0,1,2,0,0	,6,7,2,0,0		
1,2	0	1	1	3,1,2,1,4,1,1,2,0,0	,5,6,0,3,2,6		
9,9	3	0	0			0,0	0,0
				This shows input data for a traverse for which the misclosure (course 99) is to be computed. Console Switches 1, 2, and 3 were OFF when this example was run. Console Switch 4 was ON so that the results would be typed during input. The program supplies and stores starting coordinates North = 000000000, East = 000000000, when no starting 00 record is given.			

NO.	AZIMUTH	LENGTH	LATITUDE	DEPARTURE	NORTH	EAST
SET SWITCHES						
0000						
06	064 32 19.0	279.324	120.082	252.195	120.082	252.195
23	118 42 06.0	472.061	226.707-	414.060	106.625-	666.255
09	221 51 00.0	375.430	279.656-	250.480-	386.281-	415.775
11	270 00 00.0	67.200	.000-	67.200-	386.281-	348.575
12	318 14 12.0	520.392	388.162	346.610-	1.881	1.965
99	226 15 04.3	2.720	1.881-	1.965-	.000	.000
SET SWITCHES						

Running time 1 min. 21 sec.

Example 2

CO. NO. (1-2)	CODES B/C (3)	CODES A (4)	CODES D (5)	AZIMUTH (6-13)	LENGTH (14-21)	COORDINATES NORTH-SOUTH (38-46)	COORDINATES EAST-WEST (47-55)
0,0	2	0	0			1,0,0,0,0,0,0,0	1,0,0,0,0,0,0,0
0,6	1	1	1	6,4,1,3,2,1,9,0	2,7,9,3,2,4		
2,3	1	1	1	1,1,8,1,4,2,1,0,6,0	4,7,2,0,6,1		
0,9	1	1	1	2,2,1,1,5,1,1,0,0,0	3,7,5,4,3,0		
1,1	0	1	1	2,7,0,1,0,0,1,0,0,0	6,7,2,0,0		
1,2	1	1	1	3,1,8,1,1,4,1,1,2,0	5,2,0,3,9,2		
9,9	2	0	0			1,0,0,0,0,0,0,0	1,0,0,0,0,0,0,0
				This is the input data for a traverse to be balanced. One			
				course (11) is held fixed since its B/C code is 0. Console			
				Switch 1 must be on for any balancing to take place. Two			
				sheets of results follow. The first shows the output with			
				Switches 1, 2, and 4 ON, and 3 OFF. The second shows the			
				results when 1 and 3 are ON, and 2 and 4 OFF. Pre-balancing			
				results are printed when Console Switch 4 is ON.			

NO. AZIMUTH	LENGTH	LATITUDE	DEPARTURE	NORTH	EAST
SET SWITCHES					
00 000 00 00.0	.000	.000	.000	10000.000	10000.000
06 064 32 19.0	279.324	120.082	252.195	10120.082	10252.195
23 118 42 06.0	472.061	226.707-	414.060	9893.375	10666.255
09 221 51 00.0	375.430	279.656-	250.480-	9613.719	10415.775
11 270 00 00.0	67.200	.000-	67.200-	9613.719	10348.575
12 318 14 12.0	520.392	388.162	346.610-	10001.881	10001.965
99 226 15 04.3	2.720	1.881-	1.965-	10000.000	10000.000
00 000 00 00.0	.000	.000	.000	10000.000	10000.000
06 064 34 05.7	278.887	119.764	251.862	10119.764	10251.862
23 118 47 30.9	471.827	227.246-	413.497	9892.518	10665.359
09 221 51 25.7	376.047	280.084-	250.927-	9612.434	10414.432
11 270 00 00.0	67.200	.000-	67.200-	9612.434	10347.232
12 318 08 31.9	520.363	387.568	347.230-	10000.002	10000.002
99 225 00 00.0	.003	.002-	.002-	10000.000	10000.000
SET SWITCHES					

Running time 3 min. 5 sec.

NO. AZIMUTH	LENGTH	LATITUDE	DEPARTURE	NORTH	EAST
SET SWITCHES					
00 000 00 00.0	.000	.000	.000	10000.000	10000.000
06 064 32 42.8	278.875	119.860	251.803	10119.860	10251.803
23 118 47 02.4	471.698	227.127-	413.416	9892.733	10665.219
09 221 50 29.1	376.075	280.174-	250.869-	9612.559	10414.350
11 270 00 00.0	67.200	.000-	67.200-	9612.559	10347.150
12 318 08 22.7	520.216	387.443	347.149-	10000.002	10000.001
99 206 33 54.2	.002	.002-	.001-	10000.000	10000.000
AREASQFT=000000173032					
AREAACRES=00000003972					
SET SWITCHES					

Running time 1 min. 41 sec.

Example 3

CO. NO.	CODES B/C	CODES A	CODES D	AZIMUTH	LENGTH	COORDINATES NORTH-SOUTH	COORDINATES EAST-WEST
0,0	3	0	0			2.3	2.3
2,4	0	1	1	7,31,9,2.7,0	1,0,8,3,2,6		
3,7	0	1	1	1,6,7,2,0,1,5.5,0	4,4,5,0,6,5		
8,7	0	0	0				
0,9	0	5	2	0,9	0,9		
9,9	3	0	0			0,0	0,0
				These input records give the known data for a traverse with			
				one unknown, course (87), and a course (09) in common with the			
				traverse of Example 2. The course reference records for 09			
				and 23 must be in reference storage prior to running this			
				example. Note that the direction of course 09 is to be			
				reversed (A code is 2). All Console Switches were off when			
				this problem was run.			

TRAVERSE ANALYSIS PROGRAM--INPUT DATA SHEET

NO.	AZIMUTH	LENGTH	LATITUDE	DEPARTURE	NORTH	EAST
SET SWITCHES						
00	000 00 00.0	.000	.000	.000	9892.733	10665.219
24	073 19 27.0	108.326	31.085	103.770	9923.818	10768.989
37	167 20 55.0	445.065	434.259-	97.477	9489.559	10866.466
87	285 13 09.2	468.549	123.000	452.116-	9612.559	10414.350
09	041 50 29.1	376.075	280.174	250.869	9892.733	10665.219
99	000 00 00.0	.000	.000	.000	9892.733	10665.219
SET SWITCHES						

Running time 1 min. 18 sec.

Example 4

CO. NO. (1-3)	CODES B/C (5)	CODES A (4)	CODES D (5)	AZIMUTH (6-13)	LENGTH (14-21)	COORDINATES NORTH-SOUTH (38-46)	COORDINATES EAST-WEST (47-55)
0,0	2	0	0			7,3,7,4,0,0,3,7	2,0,3,7,7,4,7,5
1,4	0	1	0	1,9,9,1,4,2,1,4,8,6			
1,5	0	1	0	1,4,4,1,0,6,1,2,4,6			
9,9	2	0	0			7,3,2,8,3,0,6,1	2,0,4,9,9,9,4,6
				This traverse has two courses with unknown lengths, 14 and			
				15. No balancing can be done for a traverse with unknowns			
				(other than course 99) regardless of the setting of Console			
				Switch 1. Console Switch 3 was ON so that the area would			
				be calculated. Console Switches 1, 2, and 4 were OFF.			

TRAVERSE ANALYSIS PROGRAM--INPUT DATA SHEET

4905060

NO.	AZIMUTH	LENGTH	LATITUDE	DEPARTURE	NORTH	EAST
SET SWITCHES						
00	000 00 00.0	.000	.000	.000-	73740.037	20377.475-
14	199 42 48.6	444.908	418.832-	150.075-	73321.205	20527.550-
15	144 06 24.6	47.084	38.143-	27.604	73283.062	20499.946-
99	180 00 00.0	.001	.001-	.000-	73283.061	20499.946-

AREASQFT=000000008642

AREAACRES=00000000198

SET SWITCHES

Running time 1 min. 0 sec.

Example 5

CO. NO.	CODES B/C	A	D	AZIMUTH	LENGTH	COORDINATES NORTH-SOUTH	EAST-WEST
0,0	2	0	0			7,3,7,4,0,3,7	2,0,3,7,7,4,7,5
1,4	0	0	1		4,4,4,9,0,8		
1,5	0	0	1		4,7,0,8,3		
9,9	2	0	0			7,3,2,8,3,0,6,1	2,0,4,9,9,9,4,6
				Two unknown azimuths are present in this example. The			
				problem was run with Console Switches 1, 2, and 4 OFF and			
				3 ON.			

TRAVERSE ANALYSIS PROGRAM--INPUT DATA SHEET

NO.	AZIMUTH	LENGTH	LATITUDE	DEPARTURE	NORTH	EAST
SET SWITCHES						
00	000 00 00.0	.000	.000	.000-	73740.037	20377.475-
14	199 42 48.6	444.908	418.832-	150.075-	73321.205	20527.550-
15	144 06 24.6	47.083	38.142-	27.604	73283.063	20499.946-
99	180 00 00.0	.002	.002-	.000-	73283.061	20499.946-
AREASQFT=000000008642						
AREAACRES=00000000198						
00	000 00 00.0	.000	.000	.000-	73740.037	20377.475-
98	190 17 32.2	444.908	437.749-	79.492-	73302.288	20456.967-
97	245 53 56.2	47.083	19.226-	42.979-	73283.062	20499.946-
99	180 00 00.0	.001	.001-	.000-	73283.061	20499.946-
AREASQFT=000000008642						
AREAACRES=00000000198						
SET SWITCHES						

Running time 2 min. 4 sec.

Example 6

CO. NO.	CODES B/C	A	D	AZIMUTH	LENGTH	COORDINATES NORTH-SOUTH	EAST-WEST
0,0	2	0	0			7,3,7,4,0,0,3,7	2,0,3,7,7,4,7,5-
1,4	1	3	3	1,4	1,4		
1,5	1	3	1	1,5	4,7,0,8,3		
9,9	2	0	0			7,3,2,8,3,0,6,1	2,0,4,9,9,9,4,6-
				This is input data for a traverse to be balanced. One course			
				(14) and the azimuth of another course (15) are in reference			
				storage. Since courses (14) and (15) have alternates (98)			
				and (97) the operator must specify in each case whether the			
				course or its alternate is to be used. Two sheets of results			
				follow. The first uses the courses (14) and (15). The			
				second uses the alternates (98) and (97). Console Switches			
				1 and 2 were ON, and 3 and 4 OFF.			
				Note: Since all traverses with alternate courses use courses 97 and 98 as			
				alternates, any traverse in which a selection of "course or alternate" is			
				to be made must be run after the course which calculates the desired			
				alternates for 97 and 98.			

TRAVERSE ANALYSIS PROGRAM--INPUT DATA SHEET

4905060 34

NO. AZIMUTH	LENGTH	LATITUDE	DEPARTURE	NORTH	EAST
SET SWITCHES					
AZIM 14					
14PS					
DIST 14					
14PS					
AZIM 15					
15PS					
00 000 00 00.0	.000	.000	.000-	73740.037	20377.475-
14 199 42 48.6	444.908	418.832-	150.075-	73321.205	20527.550-
15 144 06 22.0	47.083	38.142-	27.604	73283.063	20499.946-
99 180 00 00.0	.002	.002-	.000-	73283.061	20499.946-
SET SWITCHES					

Running time 1 min. 37 sec.

NO.	AZIMUTH	LENGTH	LATITUDE	DEPARTURE	NORTH	EAST
SET SWITCHES						
AZIM 14						
98S						
DIST 14						
98S						
AZIM 15						
97S						
00	000 00 00.0	.000	.000	.000-	73740.037	20377.475-
98	190 17 32.4	444.908	437.749-	79.492-	73302.288	20456.967-
15	245 53 57.7	47.083	19.226-	42.979-	73283.062	20499.946-
99	180 00 00.0	.001	.001-	.000-	73283.061	20499.946-
SET SWITCHES						

Running time 1 min. 37 sec.

Example 7

CO. NO. (1-2)	CODES B/C (3)	CODES A (4)	CODES D (5)	AZIMUTH (6-13)	LENGTH (14-31)	COORDINATES NORTH-SOUTH (38-46)	COORDINATES EAST-WEST (47-55)
0,0	2	0	0			7,3,7,4,0,0,3,7	2,0,3,7,7,4,7,5
1,9	1	3	3	1 4	1 4		
1,5	1	1	1	1,4,4,0,6,2,4,6	4,7,0,8,3		
9,9	2	0	0			7,3,2,8,3,0,6,1	2,0,4,9,9,9,4,6
				This traverse is to be balanced. It contains one given			
				course(15) and one course(19) which is in reference storage.			
				Course(19) is the same as course (14) but has been given a			
				new number. Two sheets of output follow. The first uses			
				course (14) as the source of the azimuth and length for (19).			
				The second uses the alternate course (98). Console Switch 1 and			
				4 ON; all others were OFF.			

TRAVERSE ANALYSIS PROGRAM--INPUT DATA SHEET

NO. AZIMUTH	LENGTH	LATITUDE	DEPARTURE	NORTH	EAST
SET SWITCHES					
00 000 00 00.0	.000	.000	.000-	73740.037	20377.475-
AZIM 19					
14					
DIST 19					
14					
19 199 42 48.6	444.908	418.832-	150.075-	73321.205	20527.550-
15 144 06 24.6	47.083	38.142-	27.604	73283.063	20499.946-
99 180 00 00.0	.002	.002-	.000-	73283.061	20499.946-
SET SWITCHES					

Running time 1 min. 20 sec.

NO. AZIMUTH	LENGTH	LATITUDE	DEPARTURE	NORTH	EAST
SET SWITCHES					
00 000 00 00.0	.000	.000	.000-	73740.037	20377.475-
AZIM 19					
98					
DIST 19					
98					
19 190 17 32.2	444.908	437.749-	79.492-	73302.288	20456.967-
15 144 06 24.6	47.083	38.142-	27.604	73264.146	20429.363-
99 285 00 06.4	73.074	18.915	70.583-	73283.061	20499.946-
BUST					

Running time: 1 min. 0 sec.

Note: Misclosure was too large to balance. Both Latitude and Departure of misclosure(course 99) are greater than the upper limit tested for in the program.

Example 8

CO. NO. (1-2)	CODES B/C (3)	CODES A (4)	CODES D (5)	AZIMUTH (6-13)	LENGTH (14-31)	COORDINATES NORTH-SOUTH (38-46)	COORDINATES EAST-WEST (47-55)
0,0	2	0	0			8,0,7,1,8,7,0,2	5,8,4,1,8,4,9,2
8,1	0	1	1	8,7,3,3,0,4,0	3,8,1,9,7,1,8,7		
8,3	0	1	1	3,5,7,3,3,0,4,0	,1,8,0,6,0,0		
7,2	0	1	0	2,1,1,0,8,0,4,0			
4,4	0	0	1		3,8,1,9,7,1,8,7		
9,9	3	0	0			,0,0	,0,0
				This input data has one azimuth and one distance, not both			
				for the same course, unknown. All Console Switches were			
				OFF for this example.			

TRAVERSE ANALYSIS PROGRAM--INPUT DATA SHEET

NO. AZIMUTH	LENGTH	LATITUDE	DEPARTURE	NORTH	EAST
SET SWITCHES					
00 000 00 00.0	.000	.000	.000	80718.702	58418.492
81 087 33 04.0	38197.187	1632.096	38162.303	82350.798	96580.795
83 357 33 04.0	180.600	180.435	7.717-	82531.233	96573.078
72 211 08 04.0	42557.631	36427.477-	22004.338-	46103.756	74568.740
44 334 59 15.8	38197.187	34614.948	16150.247-	80718.704	58418.493
99 206 33 54.2	.002	.002-	.001-	80718.702	58418.492
00 000 00 00.0	.000	.000	.000	80718.702	58418.492
81 087 33 04.0	38197.187	1632.096	38162.303	82350.798	96580.795
83 357 33 04.0	180.600	180.435	7.717-	82531.233	96573.078
98 211 08 04.0	.767	.657-	.397-	82530.576	96572.681
97 267 16 52.2	38197.187	1811.874-	38154.190-	80718.702	58418.491
99 090 00 00.0	.001	.000	.001	80718.702	58418.492
SET SWITCHES					

Running time 2 min. 38 sec.

Example 9

CO. NO. (1-2)	CODES E/C (3)	A (4)	D (5)	AZIMUTH (6-13)	LENGTH (14-21)	COORDINATES NORTH-SOUTH (32-46)	EAST-WEST (47-55)
0,0	2	0	0			4,1,4,9,9,9	2,2,0,6,4,9
9,9	2	0	0			2,8,6,4,7,8,9,0	0,0,0
				For this example, the azimuth and length of the course			
				which extends from the first pair of coordinates to the			
				second pair of coordinates is all that is required. This			
				was run with Console Switch 4 ON, and all other Switches OFF.			

TRAVERSE ANALYSIS PROGRAM--INPUT DATA SHEET

NO. AZIMUTH	LENGTH	LATITUDE	DEPARTURE	NORTH	EAST
SET SWITCHES					
00 000 00 00.0	.000	.000	.000	414.999	220.649
99 180 26 06.0	29063.727	29062.889-	220.649-	28647.890-	.000
SET SWITCHES					

Running time 0 min. 23 sec.

Example 10 - Err 2

CO. NO.	CODES B/C	CODES A	CODES D	AZIMUTH	LENGTH	COORDINATES NORTH-SOUTH	COORDINATES EAST-WEST
00	1	0	0			23	23
24	0	1	1	73191270	108326		
37	0	1	1	16720550	445065		
87	0	0	0				
09	0	2̄	2	09	09		
99	3	0	0			00	00

This example contains an improper code (100) for a 00 starting record - Error 2. All Console Switches were OFF.

TRAVERSE ANALYSIS PROGRAM--INPUT DATA SHEET

4905060

RS

NO. AZIMUTH LENGTH LATITUDE DEPARTURE NORTH EAST

SET SWITCHES

ERR2

Running time 0 min. 17 sec.

Example 11 - Err 1

CO. NO.	CODES B/C	CODES A	CODES D	AZIMUTH	LENGTH	COORDINATES NORTH-SOUTH	COORDINATES EAST-WEST
0,0	3	0	0			2,3	2,3
0,0	0	1	1	7,3 1 1,9 8,7 0	1,0 8,3 2,6		
3,7	0	1	1	1,6,7 2,0 5,5 0	4,4,5 0,6,5		
8,7	0	0	0				
0,9	0	-2	2	0,9	0,9		
9,9	3	0	0			0,0	0,0
				This example has 00 used as course number for other than			
				the first record of the traverse - Error 1. All Console			
				Switches were OFF.			

TRAVERSE ANALYSIS PROGRAM--INPUT DATA SHEET

RS

NO. AZIMUTH LENGTH LATITUDE DEPARTURE NORTH EAST

SET SWITCHES

ERR1

Running time 0 min. 17 sec.

Example 12 - Err 4

CO. NO.	CODES B/C	A	D	AZIMUTH	LENGTH	COORDINATES NORTH-SOUTH	EAST-WEST
0,0	3	0	0			2.3	2.3
2,4	0	1	4	73,19,27,0	1,083,26		
3,7	0	1	1	16,72,05,50	4,45,06,5		
8,7	0	0	0				
0,9	0	2	2	0.9	0.9		
9,9	3	0	0			0.0	0.0
				This example has an incorrect code (014) - Error 4. All			
				Console Switches were OFF.			

TRAVERSE ANALYSIS PROGRAM--INPUT DATA SHEET

47

4905060 48

PS

NO. AZIMUTH LENGTH LATITUDE DEPARTURE NORTH EAST

SET SWITCHES

ERR4

Running time 0 min. 17 sec.

Example 13 - Err 3

TRAVERSE ANALYSIS PROGRAM--INPUT DATA SHEET

CO. NO.	CODES B/C	CODES A	CODES D	AZIMUTH	LENGTH	COORDINATES NORTH-SOUTH	COORDINATES EAST-WEST
00	3	0	0			23	02
24	0	1	1	73119270	108326		
37	0	1	0	167201550			
87	0	0	0				
09	0	$\bar{2}$	2	09	09		
99	3	0	0			00	00

This example has too many unknowns and cannot be solved - Error 3. All Console Switches were OFF.

4905060 50

```
NO.  AZIMUTH     LENGTH    LATITUDE    DEPARTURE     NORTH       EAST
SET SWITCHES
ERR3
```

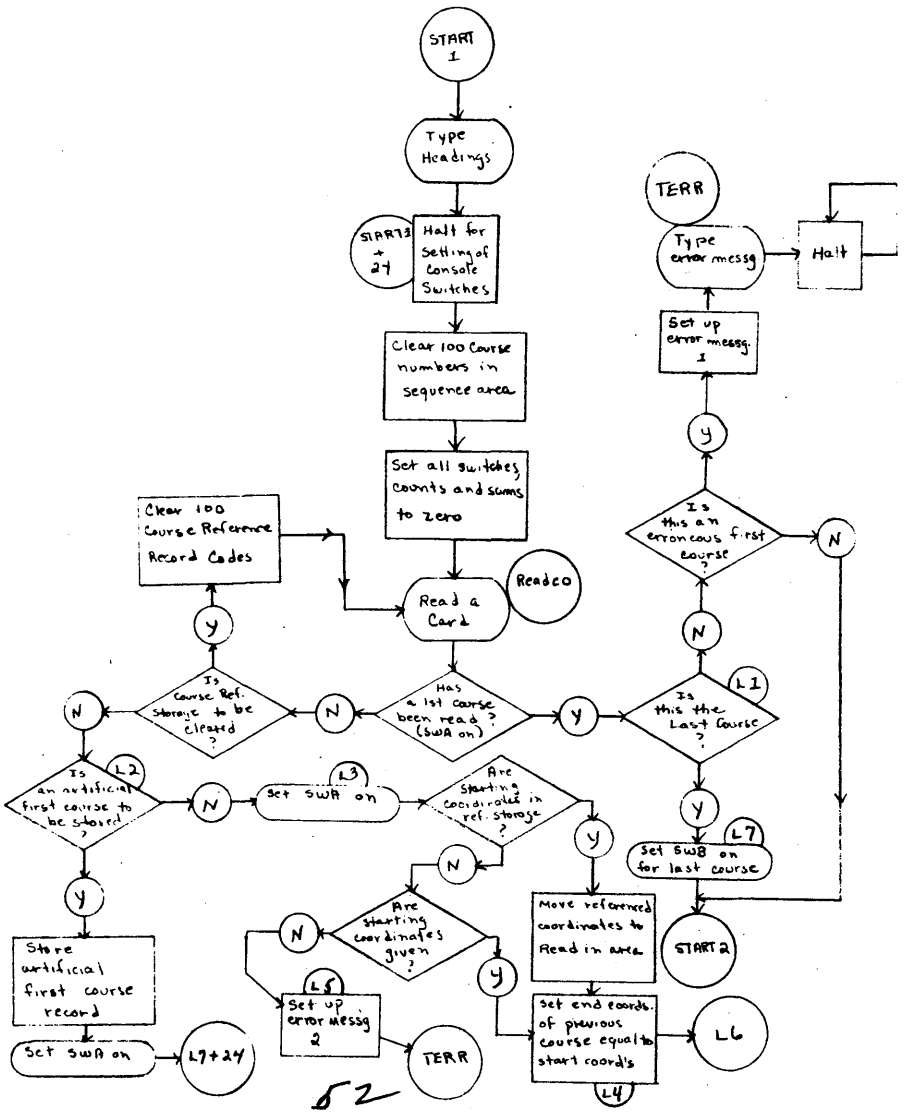
Running time 0 min. 17 sec.

VIII. Storage Map

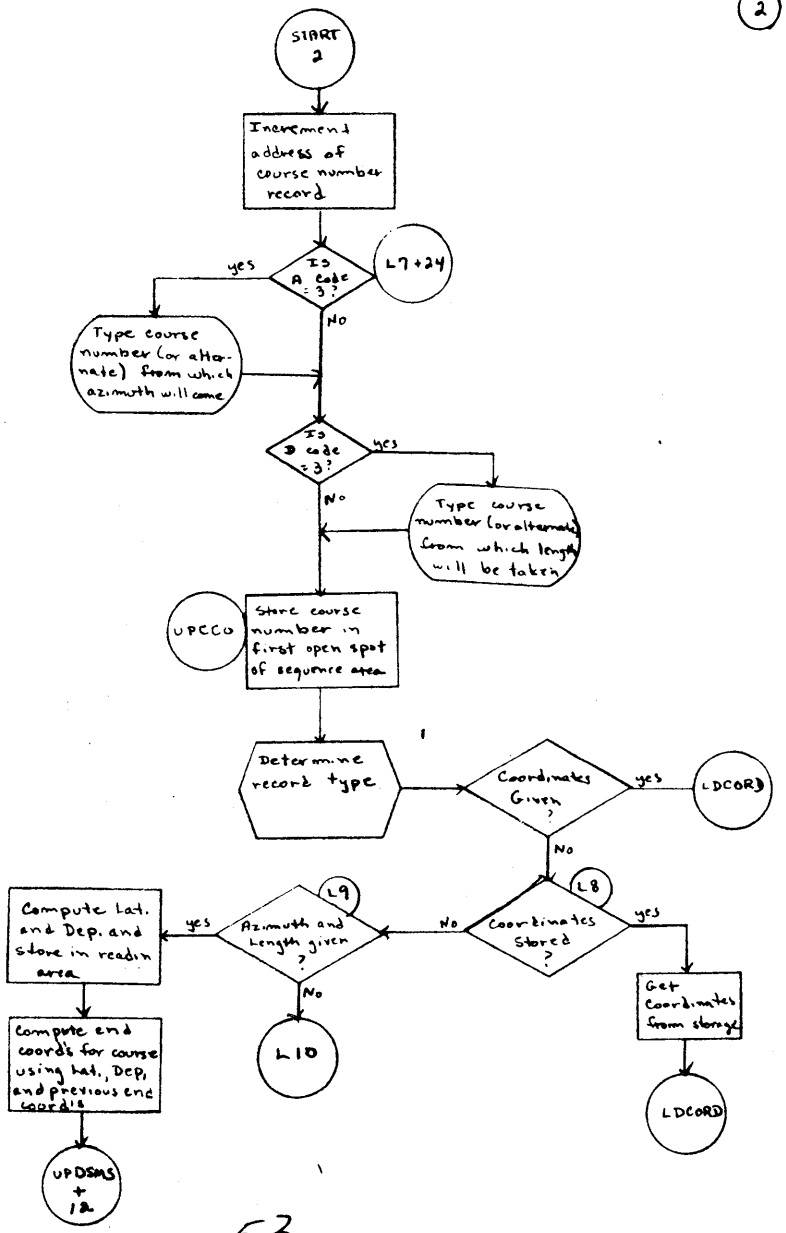
00000 - 00079	Available
00080 - 13785	Program
13786 - 14071	Available
14072 - 14279	Course Number Record
14280 - 14359	Read-in Area #2
14360 - 14439	Output Area
14440 - 14519	Numeric Blanks
14520 - 14599	Read-in Area #1
14600 - 19999	Course Reference Storage

Traverse Analysis
Flow Chart

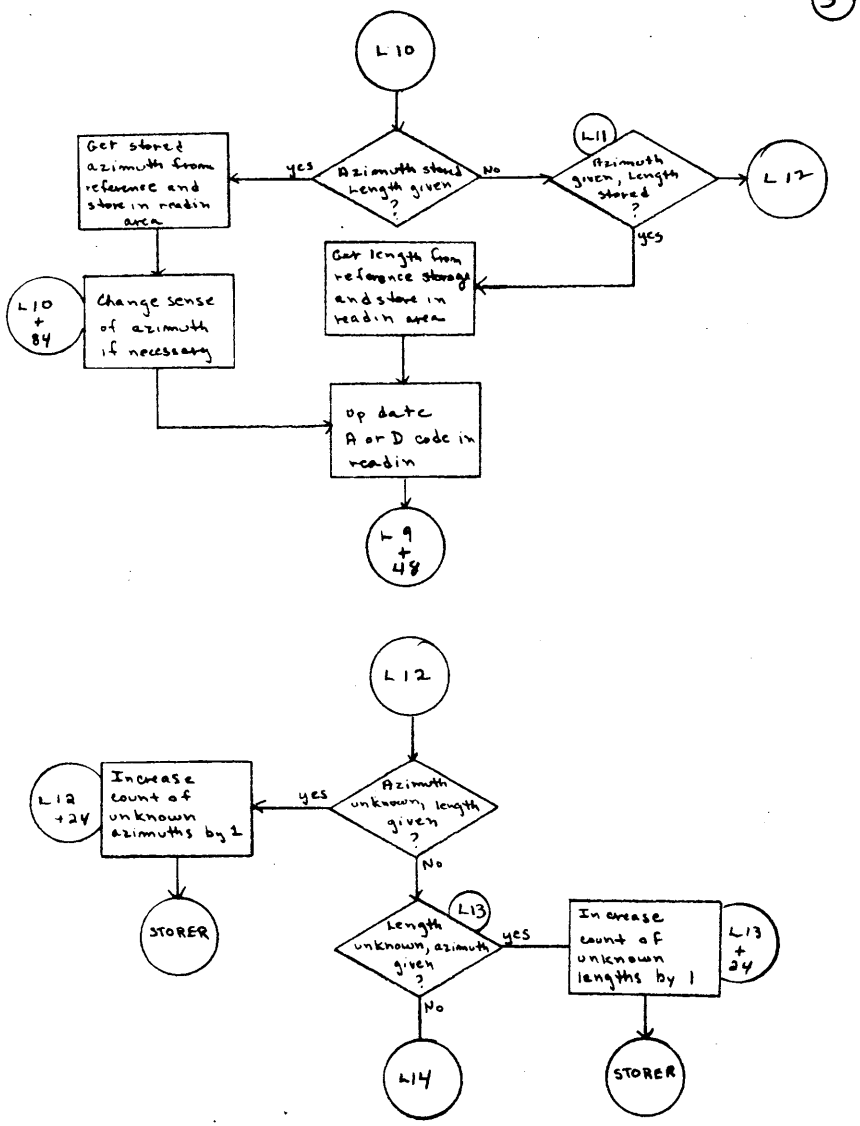
(1)



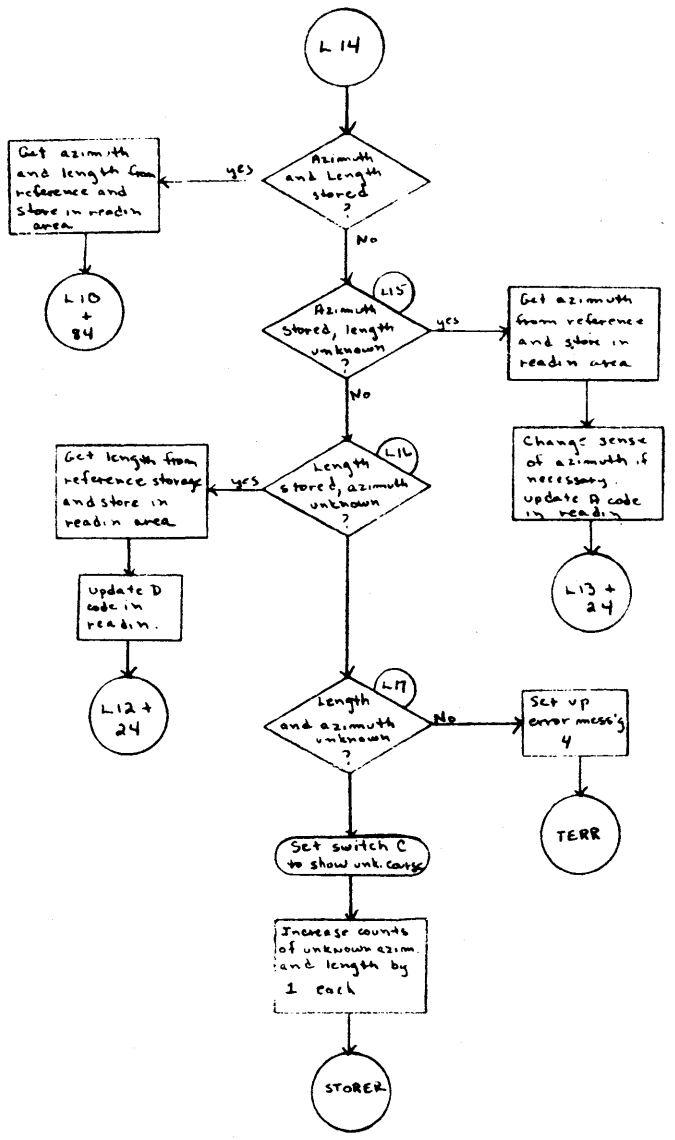
52


START 2
Increment address of course number record
Is A code = 3?
yes
L7+24
No
Type course number (or alternate) from which azimuth will come
Is D code = 3?
yes
No
Type course number (or alternate) from which length will be taken
UPCCO
Store course number in first open spot of sequence area
Determine record type
Coordinates Given?
yes
LDCORD
No
L8
Coordinates Stored?
yes
Get Coordinates from storage
LDCORD
No
L9
Azimuth and Length given?
yes
Compute Lat. and Dep. and store in readin area
No
L10
Compute end coord's for course using Lat., Dep, and previous end coord's
UPDSMS + 12

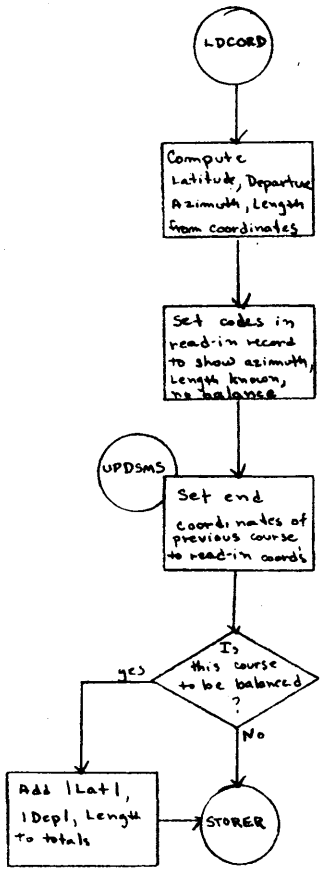
53


L10
Azimuth stored Length given?
yes
Get stored azimuth from reference and store in readin area
L10 + 84
Change sense of azimuth if necessary
No
L11
Azimuth given, Length stored?
yes
L12
Get length from reference storage and store in readin area
Up date A or D code in readin
L9 + 48
L12
Azimuth unknown, length given?
yes
L12 + 24
Increase count of unknown azimuths by 1
STORER
No
L13
Length unknown, azimuth given?
yes
Increase count of unknown lengths by 1
L13 + 24
STORER
No
L14

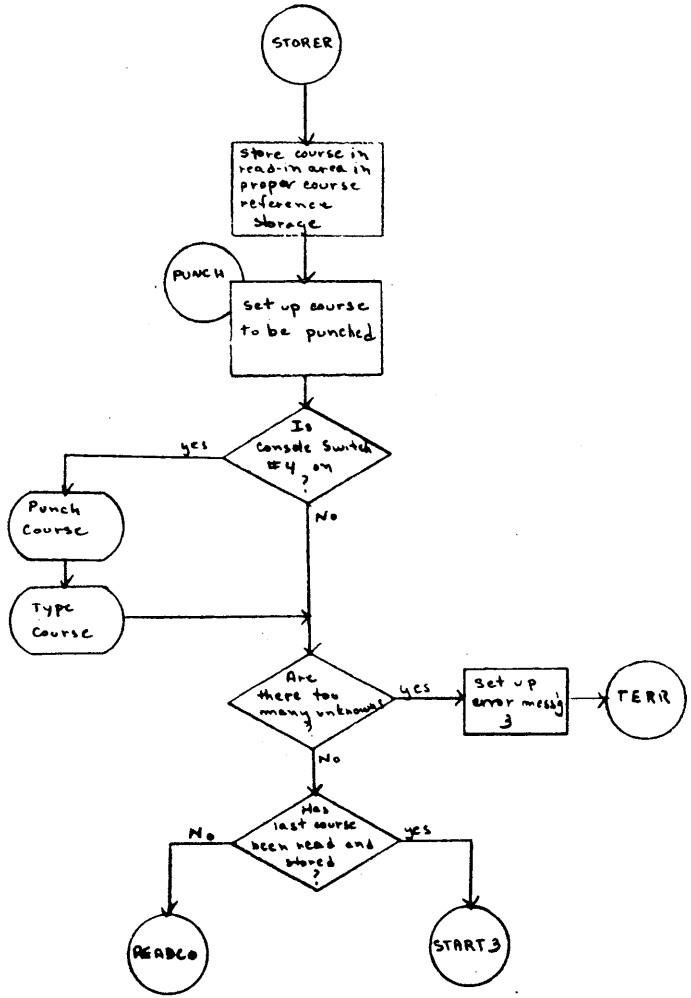
54


L 14
Azimuth and Length stored ?
yes
Get azimuth and length from reference and store in readin area
No
L10 + 84
L15
Azimuth stored, length unknown ?
yes
Get azimuth from reference and store in readin area
No
Change sense of azimuth if necessary, update A code in readin
L13 + 24
L16
Length stored, azimuth unknown ?
yes
Get length from reference storage and store in readin area
Update D code in readin.
L12 + 24
L17
Length and azimuth unknown ?
No
Set up error mess'g 4
TERR
Set switch C to show unk. cases
Increase counts of unknown azim. and length by 1 each
STORER

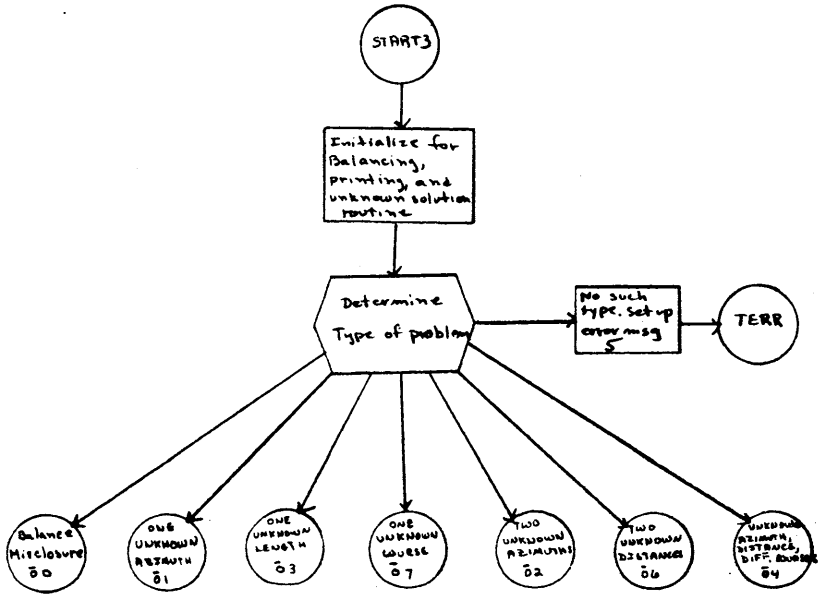
55


LDCORD
Compute Latitude, Departure, Azimuth, Length from coordinates
Set codes in read-in record to show azimuth, Length known, no balance
UPDSMS
Set end coordinates of previous course to read-in coord's
Is this course to be balanced ?
yes
No
Add |Lat|, |Dep|, Length to totals
STORER

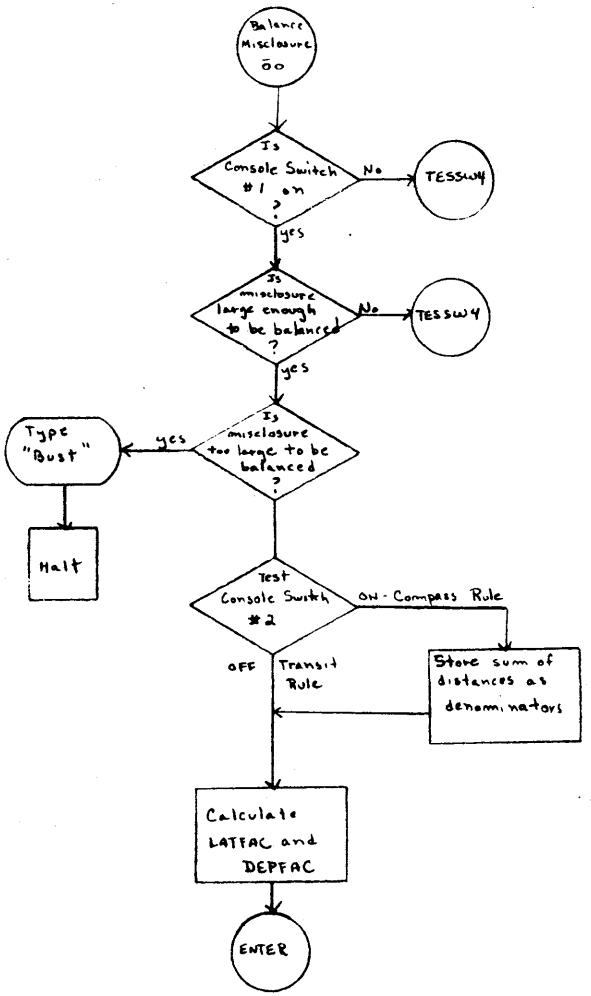
56


STORER
Store course in read-in area in proper course reference storage
PUNCH
Set up course to be punched
Is Console Switch #4 on ?
yes
No
Punch Course
Type Course
Are there too many unknowns?
yes
Set up error messg 3
TERR
No
Has last course been read and stored ?
No
yes
READ0
START3

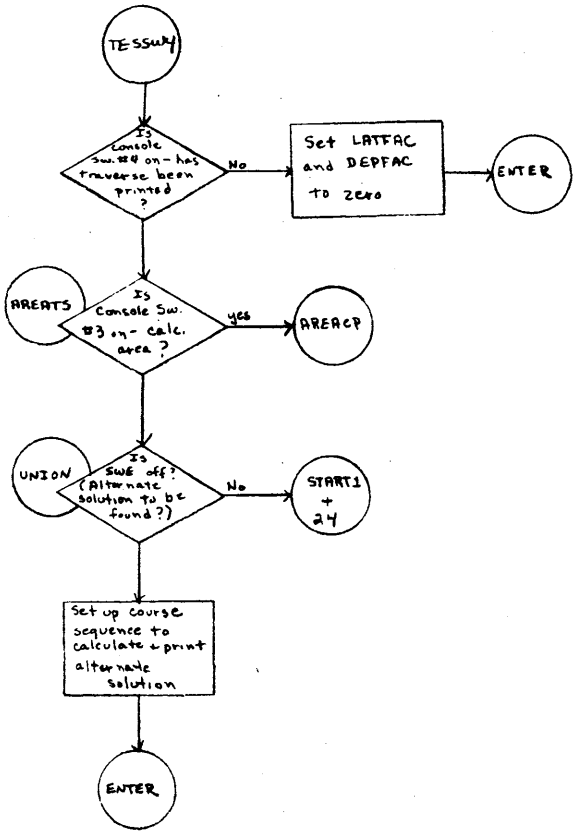
57


START3
Initialize for Balancing, printing, and unknown solution routine
Determine Type of problem
No such type. Set up error msg 5
TERR
Balance Misclosure 0
ONE UNKNOWN AZIMUTH 1
ONE UNKNOWN LENGTH 3
ONE UNKNOWN COURSE 7
TWO UNKNOWN AZIMUTHS 2
TWO UNKNOWN DISTANCE 6
UNKNOWN AZIMUTH, DISTANCE, DIFF. COURSE 4

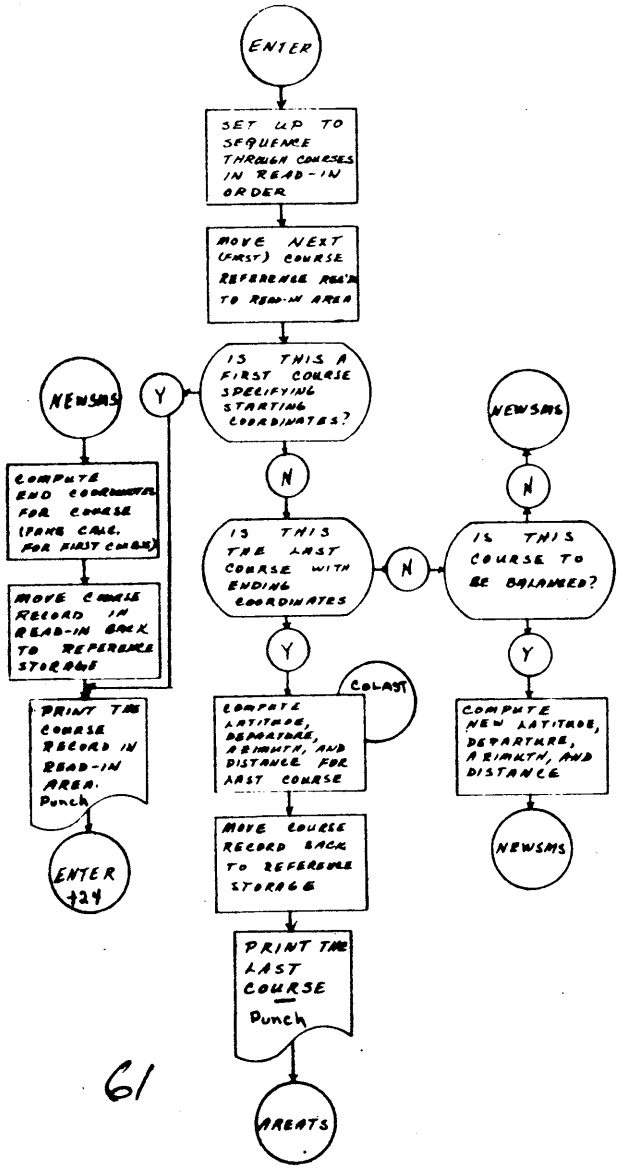
58


Balance Misclosure 00
Is Console Switch #1 on ?
No
TESSW4
yes
Is misclosure large enough to be balanced ?
No
TESSW4
yes
Is misclosure too large to be balanced ?
yes
Type "Bust"
Halt
Test Console Switch #2
ON - Compass Rule
OFF
Transit Rule
Store sum of distances as denominators
Calculate LATFAC and DEPFAC
ENTER

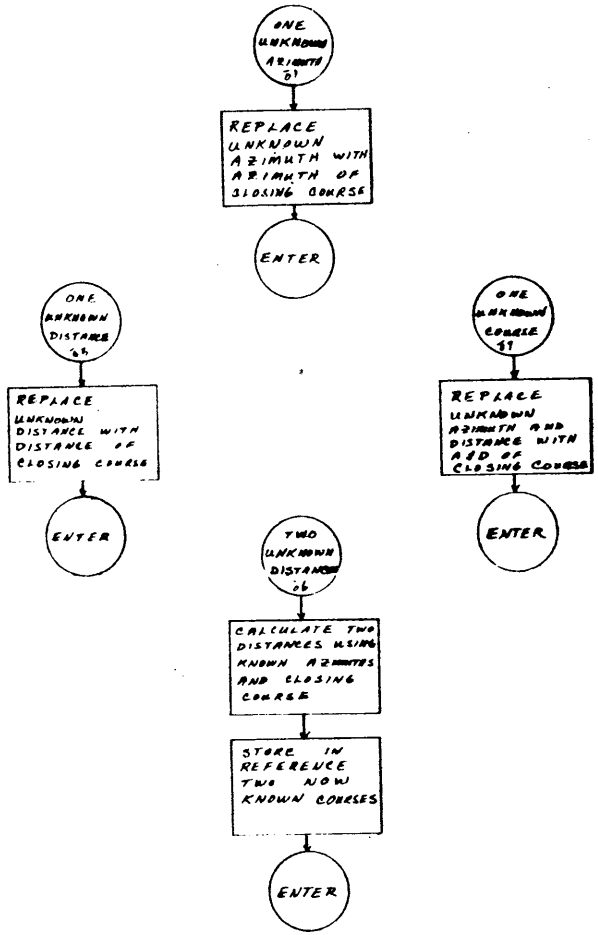
59


TESSW4
Is Console Sw. #4 on - has traverse been printed ?
No
Set LATFAC and DEPFAC to zero
ENTER
AREAT5
Is Console Sw. #3 on - calc. area ?
yes
AREACP
UNION
Is SWE off ? (Alternate solution to be found ?)
No
START1 + 24
Set up course sequence to calculate + print alternate solution
ENTER

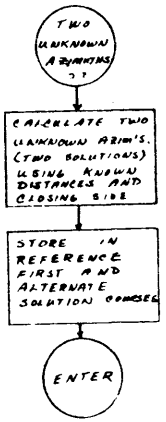
60

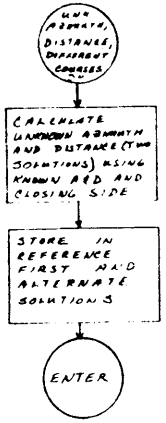

ENTER
SET UP TO SEQUENCE THROUGH COURSES IN READ-IN ORDER
MOVE NEXT (FIRST) COURSE REFERENCE REC'D TO READ-IN AREA
IS THIS A FIRST COURSE SPECIFYING STARTING COORDINATES?
Y
N
NEWSMS
COMPUTE END COORDINATES FOR COURSE (FORE CALC. FOR FIRST COURSE)
MOVE COURSE RECORD IN READ-IN BACK TO REFERENCE STORAGE
PRINT THE COURSE RECORD IN READ-IN AREA. Punch
ENTER 124
IS THIS THE LAST COURSE WITH ENDING COORDINATES
N
Y
COMPUTE LATITUDE, DEPARTURE, AZIMUTH, AND DISTANCE FOR LAST COURSE
COLAST
MOVE COURSE RECORD BACK TO REFERENCE STORAGE
PRINT THE LAST COURSE Punch
AREATS
IS THIS COURSE TO BE BALANCED?
N
Y
NEWSMS
COMPUTE NEW LATITUDE, DEPARTURE, AZIMUTH, AND DISTANCE
NEWSMS

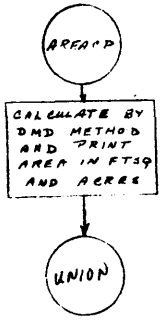
61


ONE UNKNOWN AZIMUTH 61
REPLACE UNKNOWN AZIMUTH WITH AZIMUTH OF CLOSING COURSE
ENTER
ONE UNKNOWN DISTANCE 64
REPLACE UNKNOWN DISTANCE WITH DISTANCE OF CLOSING COURSE
ENTER
ONE UNKNOWN COURSE 67
REPLACE UNKNOWN AZIMUTH AND DISTANCE WITH AZIMUTH AND DISTANCE OF CLOSING COURSE
ENTER
TWO UNKNOWN DISTANCES 66
CALCULATE TWO DISTANCES USING KNOWN AZIMUTHS AND CLOSING COURSE
STORE IN REFERENCE TWO NOW KNOWN COURSES
ENTER

62


TWO UNKNOWN AZIMUTHS
CALCULATE TWO UNKNOWN AZIM'S. (TWO SOLUTIONS) USING KNOWN DISTANCES AND CLOSING SIDE
STORE IN REFERENCE FIRST AND ALTERNATE SOLUTION COURSES
ENTER


ONE AZIMUTH, DISTANCE, DIFFERENT COURSES
CALCULATE UNKNOWN AZIMUTH AND DISTANCE (TWO SOLUTIONS) USING KNOWN AZD AND CLOSING SIDE
STORE IN REFERENCE FIRST AND ALTERNATE SOLUTIONS
ENTER


AREA D
CALCULATE BY DMD METHOD AND PRINT AREA IN FT SQ AND ACRES
UNION

UNCONDENSED OBJECT DECK LISTING

```
01010       DORG402
0101000402
01020NUM    DS  9
0102000410  00009
01030DEN    DS  9
0103000419  00009
01040DIVSUBTDM *68,1,711
0104000420150042800000JZ
01050       TFM QUO-1,0,10
0105000432160082000000Z
01051       TD  QUO,400
0105100444250082100400Z
01060       BNF *636,NUM
0106000456440049200410Z
01070       CF  NUM
0107000468330041000000Z
01080       AM  DIVSUB68,1,10
0108000480110042800001Z
01090       BNF *636,DEN
0109000492440052800419Z
01100       CF  DEN
0110000504330041900000Z
01110       AM  DIVSUB68,1,10
0111000516110042800001Z
01120       TF  99,Z10
0112000528260009900803Z
01130       TF  90,NUM
0113000540260009000410Z
01140       TFM SUBTR66,90
0114000552160059400090Z
01150       TF  FIXERD66,SUBTR66
0115000564260064200594Z
01160       TF  FIXERD618,SUBTR66
0116000576260065400594Z
01170SUBTR  S   90,DEN
0117000588220009000419Z
01180       BN  FIXERD
0118000600470063601300Z
01190       AM  QUO-1,1,10
0119000612110082000001Z
01200       B   SUBTR
0120000624490058800000Z
02010FIXERDA    90,DEN
0201000636210090000419Z
02020       CF  90
0202000648330009000000Z
02030       AM  SUBTR66,1,10
0203000660110059400001Z
02040       CM  SUBTR66,100,9
0204000672140059400J00Z
02050       BE  ENDIV
0205000684460073201200Z
02060       TR  QUO-11,QUO-10
0206000696310081000811Z
02070       TDM QUO-1,0
0207000708150082000000Z
02080       B   SUBTR-24
0208000720490056400000Z
02090ENDIV AM   QUO-1,5,10
```

65

```
J10042000432
J10043200444
J10044400456
J10045600468
J10046800480
J10048000492
J10049200504
J10050400516
J10051600528
J10052800540
J10054000552
J10055200564
J10056400576
J10057600588
J10058800600
J10060000612
J10061200624
J10062400636
J10063600648
J10064800660
J10066000672
J10067200684
J10068400696
J10069600708
J10070800720
J10072000732
```

```
0209000732110082000005Z                                  J10073200744
02100       SF  QUO-10,,,          9 DIGIT ANSWER AT QUO-2
0210000744320081100000Z                                  J10074400756
02110       CM  DIVSUB68,0,10
0211000756140042800000Z                                  J10075600768
02120       BNE *624
0212000768470079201200Z                                  J10076800780
02130       SF  QUO-2
0213000780320081900000Z                                  J10078000792
02140       BB
0214000792420000000000Z                                  J10079200804
02150Z10    DC  10,0000000000,ENDIV671
0215000803  00010
0215000000000002Z                                        060079400804
02160QUO    DS  18
0216000821  00018
03010SQARG DS   18,QUO
0301000821  00018
03020BIGSQTC    SQARG,Z10
0302000822240082100803Z                                  J10082200834
03030       BNE *636
0303000834470087001200Z                                  J10083400846
03040       TF  98,Z10-1
0304000846260009800802Z                                  J10084600858
03050       BB
0305000858420000000000Z                                  J10085800870
03060       TFM SUBT66,SQARG-16,7
0306000870160092400805Z                                  J10087000882
03070       TFM ODD-1,1,10
0307000882160114000001Z                                  J10088200894
03071       TD  ODD,400
0307100894250114100400Z                                  J10089400906
03080       TF  ADDT66,SUBT66
0308000906260103200924Z                                  J10090600918
03090SUBT   S   SQARG-16,ODD-1
0309000918220080501140Z                                  J10091800930
03100       BN  *636
0310000930470096601300Z                                  J10093000942
03110       AM  ODD-1,2,10
0311000942110114000002Z                                  J10094200954
03120       B   SUBT
0312000954490091800000Z                                  J10095400966
03130       CM  SUBT66,SQARG,9
0313000966140092400021Z                                  J10096600978
03140       BL  ADDT
0314000978470102601300Z                                  J10097800990
03150       MM  ODD-1,5,10
0315000990130114000005Z                                  J10099001002
03160       SF  90
0316001002320009000000Z                                  J10100201014
03170       BB
0317001014420000000000Z                                  J10101401026
03180ADDT   A   SQARG-16,ODD-1
0318001026210080501140Z                                  J10102601038
03190       TF  ADDT630,ADDT66
0319001038260105601032Z                                  J10103801050
03200       CF  SQARG-16
0320001050330080500000Z                                  J10105001062
04010       SM  ODD-1,1,10
0401001062120114000001Z                                  J10106201074
04020       CF  ODD-1
0402001074330114000000Z                                  J10107401086
04030       TR  ODD-11,ODD-10
0403001086310113001131Z                                  J10108601098
04040       TDM ODD-1,1
0404001098150114000001Z                                  J10109801110
```

66

```
04050       AM  SUBT&6,2,10
040500111011009240000 2Z                                    J10111001122
04060       B   SUBT-12
040600112249009060000 0Z                                    J10112201134
04070ODD    DS  11,ADDT&115
0407001141  00011
05010CONOS DS  4,ODD
0501001141  00004
05015       DORG01142
0501501142
05020COADDRSF  CONOS-3
050200114232011380000 0Z                                    J10114201154
05030       BNF BBCOAD&12,CONOS-1
050300115444012140114 0Z                                    J10115401166
05040       MM  CONOS,54,9
050400116613011410005 4Z                                    J10116601178
05050       AM  99,14600,7
050500117811009 9J4600Z                                     J10117801190
05060       TF  BBCOAD&11,99,,  ADDRESS OF COURSE WITH E-W COORDINATE
050600119026012130009 9Z                                    J10119001202
05070BBCOADBB  0,0,27
050700120242000000000 0Z                                    J10120201214
05080       SF  CONOS-1
050800121432011400000 0Z                                    J10121401226
05090       MM  CONOS-2,54,9
050900122613011390005 4Z                                    J10122601238
05100       AM  99,14600,7
051000123811009 9J4600Z                                     J10123801250
05110       TF  BBCOAD&6,99,,  ADDRESS OF COURSE WITH N-S COORDINATE
051100125026012080009 9Z                                    J10125001262
05120       B   COADDR&12
051200126249011540000 0Z                                    J10126201274
06010READINDS  1,14520
0601014520  00001
06020       DS  80,READING&79
0602014599  00080
06030COURNODS  2,READING&1
0603014521  00002
06040CODES DS  3,READING&4
0604014524  00003
06050AZIM  DS  8,READING&12
0605014532  00008
06060LENGTHDS  8,READING&20
0606014540  00008
06070LAT    DS  8,READING&28
0607014548  00008
06080DEP    DS  8,READING&36
0608014556  00008
06090NORTH DS  9,READING&45
0609014565  00009
06100EAST   DS  9,READING&54
0610014574  00009
06110       DS  1,READING&55
0611014575  00001
06130LATDEPSF  AZIM-7
061300127432145250000 0Z                                    J10127401286
06140       SF  LENGTH-7
061400128632145330000 0Z                                    J10128601298
06150       TFM SINEND&6,*&24
061500129816021400132 2Z                                    J10129801310
06160       BT  SINCOS,AZIM
061600131027015341453 2Z                                    J10131001322
06170       M   SIN,LENGTH
061700132223023901454 0Z                                    J10132201334
06180       SF  84
061800133432000840000 0Z                                    J10133401346

06190       AM  92,05,10
061900134611000920000 5Z                                    J10134601358
06200       BNF *&24,99
062000135844013820009 9Z                                    J10135801370
07010       SF  91
070100137032000910000 0Z                                    J10137001382
07020       TF  DEP,91
070200138226145560009 1Z                                    J10138201394
07030       M   COS,LENGTH
070300139423023991454 0Z                                    J10139401406
07040       SF  84
070400140632000840000 0Z                                    J10140601418
07050       AM  92,05,10
070500141811000920000 5Z                                    J10141801430
07060       BNF *&24,99
070600143044014540009 9Z                                    J10143001442
07070       SF  91
070700144232000910000 0Z                                    J10144201454
07080       TF  LAT,91
070800145426145480009 1Z                                    J10145401466
07090       A   NCSUM,LAT
070900146621047881454 8Z                                    J10146601478
07100       A   ECSUM,DEP
071000147821047971455 6Z                                    J10147801490
07110       TF  NORTH,NCSUM
071100149026145650478 8Z                                    J10149001502
07120       TF  EAST,ECSUM
071200150226145740479 7Z                                    J10150201514
07130LDEND B   0,0,2
071300151449000000000 0Z                                    J10151401526
08020DEG    DS  3
0802001528  00003
08030MIN    DS  2
0803001530  00002
08040SEC    DS  3
0804001533  00003
08050SINCOSSF  SEC-2
080500153432015310000 0Z                                    J10153401546
08060       SF  MIN-1
080600154632015290000 0Z                                    J10154601558
08070       M   NIN1,DEG
080700155823023240152 8Z                                    J10155801570
08080       TF  SAVSUM,99
080800157026023600009 9Z                                    J10157001582
08090       M   NIN2,MIN
080900158223023310153 0Z                                    J10158201594
08100       A   SAVSUM,99
081000159421023600009 9Z                                    J10159401606
08110       MM  SEC,3087,8
081100160613015330L087 Z                                    J10160601618
08120       A   SAVSUM,99
081200161821023600009 9Z                                    J10161801630
08130       SF  SAVSUM-9
081300163032023510000 0Z                                    J10163001642
08140       CF  SINCOS&11
081400164233015450000 0Z                                    J10164201654
08150       CM  SAVSUM-8,95,10
081500165414023520008 5Z                                    J10165401666
08160       BNH POLYCP
081600166647017380110 0Z                                    J10166601678
08170       SF  SINCOS&11
081700167832015450000 0Z                                    J10167801690
08180       TDM 80,1,11
081800169015000800000 JZ                                    J10169001702
08190       S   89,SAVSUM-1
081900179222090089235 9Z                                    J10170201714
```

67

68

```
08200       SF  81
0820001714320008100000Z
08210       TF  SAVSUM-1,89
0821001726260235900089Z
09010POLYCPM    SAVSUM-1,SAVSUM-1
0901001738230235902359Z
09020       TF  XSQD,90
0902001750260238100090Z
09030       M   XSQD,C9
0903001762230238102273Z
09040       TF  PARTI,C7
0904001774260237202282Z
09050       A   PARTI,90
0905001786210237200090Z
09060       M   PARTI,XSQD
0906001798230237202381Z
09070       TF  PARTI,C5
0907001810260237202292Z
09080       S   PARTI,90
0908001822220237200090Z
09090       M   PARTI,XSQD
0909001834230237202381Z
09100       TF  PARTI,C3
0910001846260237202303Z
09110       A   PARTI,90
0911001858210237200090Z
09120       M   PARTI,XSQD
0912001870230237202381Z
09130       TF  PARTI,C1
0913001882260237202315Z
09140       S   PARTI,90
0914001894220237200090Z
09150       TDM 79,0,11
0915001906150007900000Z
09160       M   PARTI,SAVSUM-1
0916001918230237202359Z
09170       TF  SIN,87
0917001930260239000087Z
09180       M   SIN,SIN
0918001942230239002390Z
09190       SF  99
0919001954320009900000Z
09200       A   99,ONER
0920001966210099023482
10010       BT  BIGSQT,99
1001001978270082200099Z
10020       TF  COS,98
1002001990260239900098Z
10030       CM  SAVSUM-10,1,10
1003002002140235000001Z
10040       BL  QUAD1
1004002014470208601300Z
10050       BE  QUAD2
1005002026460214601200Z
10060       CM  SAVSUM-10,3,10
1006002038140235000003Z
10070       BE  QUAD4
1007002050460220601200Z
10080       SF  SIN
1008002062320239000000Z
10090       SF  COS
1009002074320239900000Z
10100QUAD1 BNF SINEND,SINCOS&11
1010002086440213401545Z
10110       TF  99,SIN
1011002098260099023902
```



```
                10120       TF  SIN,COS
J10171401726    1012002110260239002399Z
                10130       TF  COS,99
J10172601738    1013002122260239900099Z
                10140SINENDB    0,0
J10173801750    1014002134490000000000Z
                10150QUAD2 BNF *&36,SINCOS&11
J10175001762    1015002146440218201545Z
                10160       SF  COS
J10176201774    1016002158320239900000Z
                10170       B   SINEND
J10177401786    1017002170490213400000Z
                10180       SF  SIN
J10178601798    1018002182320239000000Z
                10190       B   QUAD1&12
J10179801810    1019002194490209800000Z
                10200QUAD4 BNF *&36,SINCOS&11
J10181001822    1020002206440224201545Z
                11010       SF  SIN
J10182201834    1101002218320239000000Z
                11020       B   SINEND
J10183401846    1102002230490213400000Z
                11030       SF  COS
J10184601858    1103002242320239900000Z
                11040       B   QUAD1&12
J10185801870    1104002254490209800000Z
                11050C9     DC  8,15148419
J10187001882    1105002273  00008
                11050J5148419Z
J10188201894    11060C7     DC  9,-467376557
                1106002282  00009
J10189401906    11060M6737655PZ
                11070C5     DC  10,7968967928
J10190601918    1107002292  00010
                11070P9689679282
J10191801930    11080C3     DC  11,-64596371106
                1108002303  00011
J10193001942    1108004596371100Z
                11090C1     DC  12,157079631847
J10194201954    1109002315  00012
                11090J570796318472
J10195401966    11100NIN1   DC  9,111111111
                1110002324  00009
J10196601978    11100J111111112
                11110NIN2   DC  7,1851851
J10197801990    1111002331  00007
                11110J8518512
J10199002002    11120ONER   DC  17,100000000000000 0
                1112002348  00017
J10200202014    11120J000000000000  00Z
                11130SAVSUMDS   12
J10201402026    1113002360  00012
                11140PARTI DS   12
J10202602038    1114002372  00012
                11150XSQD   DS  9
J10203802050    1115002381  00009
                11160SIN    DS  9
J10205002062    1116002390  00009
                11170COS    DS  9
J10206202074    1117002399  00009
                12020EASTERDS   9
J10207402086    1202002408  00009
                12030NORTHRDS   9
J10208602098    1203002417  00009
                12040ARCTANTFM *&8,0,10
J10209802110    1204002418160242600000Z
```



```
J10211002122
J10212202134
J10213402146
J10214602158
J10215802170
J10217002182
J10218202194
J10219402206
J10220602218
J10221802230
J10223002242
J10224202254
J10225402266
060226602274
060227402283
060228302293
060229302304
060230402316
060231602325
060232502332
060233202349
J10241802430
```

```
12050       BNF *636.EASTER
1205002430440246602408Z                    J10243002442
12060       CF  EASTER
1206002442330240800000Z                    J10244202454
12070       TDM ARCTAN67.1.11
1207002454150242500000JZ                   J10245402466
12080       BNF *636.NORTHR
1208002466440250202417Z                    J10246602478
12090       CF  NORTHR
1209002478330241700000Z                    J10247802490
12100       TDM ARCTAN68.1
1210002490150242600001Z                    J10249002502
12110       TF  99.NORTHR
1211002502260009902417Z                    J10250202514
12120       A   99.EASTER
1212002514210009902408Z                    J10251402526
12130       BNZ *636
1213002526470256201200Z                    J10252602538
12140       TF  ATNANS.99
1214002538260351300099Z                    J10253802550
12150ATNENDB    *
1215002550490255000000Z                    J10255002562
12160       S   EASTER.NORTHR
1216002562220240802417Z                    J10256202574
12170       TF  NUM.EASTER
1217002574260041002408Z                    J10257402586
12180       BT  DIVSUB.99
1218002586270042000099Z                    J10258602598
12190       CM  QUO-9.10.10
1219002598140081200OJ0Z                    J10259802610
12200       BNE *648
1220002610470265801200Z                    J10261002622
13010       TF  99.QUO-2
1301002622260009900819Z                    J10262202634
13020       TF  90.PIQUAT
1302002634260009003411Z                    J10263402646
13030       B   ADDPIQ
1303002646490297000000Z                    J10264602658
13040       SF  QUO-9
1304002658320081200000Z                    J10265802670
13050       M   QUO-2.QUO-2
1305002670230081900819Z                    J10267002682
13060       TF  XSQD.92
1306002682260238100092Z                    J10268202694
13070       M   XSQD.D15
1307002694230238103418Z                    J10269402706
13080       TF  PARTI.D13
1308002706260237203427Z                    J10270602718
13090       S   PARTI.91
1309002718220237200091Z                    J10271802730
13100       M   PARTI.XSQD
1310002730230237202381Z                    J10273002742
13110       TF  PARTI.D11
1311002742260237203436Z                    J10274202754
13120       A   PARTI.90
1312002754210237200090Z                    J10275402766
13130       M   PARTI.XSQD
1313002766230237202381Z                    J10276602778
13140       TF  PARTI.D9
1314002778260237203445Z                    J10277802790
13150       S   PARTI.90
1315002790220237200090Z                    J10279002802
13160       M   PARTI.XSQD
1316002802230237202381Z                    J10280202814
13170       TF  PARTI.D7
1317002814260237203455Z                    J10281402826
```



```
13180       A   PARTI.90
1318002826210237200090Z                    J10282602838
13190       M   PARTI.XSQD
1319002838230237202381Z                    J10283802850
13200       TF  PARTI.D5
1320002850260237203465Z                    J10285002862
14010       S   PARTI.90
1401002862220237200090Z                    J10286202874
14020       M   PARTI.XSQD
1402002874230237202381Z                    J10287402886
14030       TF  PARTI.D3
1403002886260237203475Z                    J10288602898
14040       A   PARTI.90
1404002898210237200090Z                    J10289802910
14050       M   PARTI.XSQD
1405002910230237202381Z                    J10291002922
14060       TF  PARTI.D1
1406002922260237203485Z                    J10292202934
14070       S   PARTI.90
1407002934220237200090Z                    J10293402946
14080       CF  QUO-9
1408002946330081200000Z                    J10294602958
14090       M   PARTI.QUO-2
1409002958230237200819Z                    J10295802970
14100ADDPIQBNF  *624.99
1410002970440299400099Z                    J10297002982
14110       SF  90
1411002982320009000000Z                    J10298202994
14120       A   90.PIQUAT
1412002994210090003411Z                    J10299403006
14130       TF  PARTI.90
1413003006260237200090Z                    J10300603018
14140       SM  ARCTAN68.1.10
1414003018120242600001Z                    J10301803030
14150       BN  QD2624...       LAT AND DEP POSITIVE
1415003030470312601300Z                    J10303003042
14160       BZ  QD2...          LAT NEGATIVE
1416003042460310201200Z                    J10304203054
14170       BD  QD2612.ARCTAN67..   DEP NEGATIVE
1417003054430311402425Z                    J10305403066
14180       SF  PARTI...        LAT AND DEP NEGATIVE
1418003066320237200000Z                    J10306603078
14190       A   PARTI.PI
1419003078210237203505Z                    J10307803090
14200       B   QD2612
1420003090490311400000Z                    J10309003102
15010QD2    SF  PARTI
1501003102320237200000Z                    J10310203114
15020       A   PARTI.PI
1502003114210237203505Z                    J10311403126
15030       M   DEGRAD.PARTI
1503003126230349502372Z                    J10312603138
15040       TF  ATNANS-5.82
1504003138260350800082Z                    J10313803150
15050       SF  83
1505003150320008300000Z                    J10315003162
15060       TF  PARTI.91
1506003162260237200091Z                    J10316203174
15070       MM  PARTI.60.10
1507003174130237200000Z                    J10317403186
15080       TF  ATNANS-3.90
1508003186260351000090Z                    J10318603198
15090       SF  91
1509003198320009100000Z                    J10319803210
15100       TF  PARTI.96
1510003210260237200096Z                    J10321003222
```

```
15110       MM  PARTI,60,10
151100322213023720000OZ
15120       AM  95,5,10
151200323411000950000 5Z
15130       TF  ATNANS,94
151300324626035130009 4Z
15140       CM  ATNANS,600,9
151400325814035130000OZ
15150       CF  ATNANS-2
151500327033035110000OZ
15160       BL  *&24
151600328247033060130OZ
15170       AM  ATNANS-2,4,10
151700329411035110000 4Z
15180       CM  ATNANS-3,60,10
151800330614035100000OZ
15190       CF  ATNANS-4
151900331833035090000OZ
15200       BL  *&24
152000333047033540130OZ
16010       AM  ATNANS-4,4,10
160100334211035090000 4Z
16020       CM  ATNANS-5,360,9
160200335414035080OL60Z
16030       BL  ATNEND
160300336647025500130OZ
16040       TFM ATNANS-5,0,9
160400337816035080000OZ
16050       B   ATNEND
160500339049025500000 0Z
16060PIQUATDC  10,0785398164
1606003411  00010
1606007853981 64Z
16070D15    DC  7,4054058
1607003418  00007
16070M0540 58Z
16080D13    DC  9,218612288
1608003427  00009
16080K186122 88Z
16090D11    DC  9,-559098861
1609003436  00009
16090N5909886JZ
16100D9     DC  9,964200441
1610003445  00009
16100R64200441Z
16110D7     DC  10,-1390853351
1611003455  00010
16110J39085335JZ
16120D5     DC  10,1994653599
1612003465  00010
16120J9946535 99Z
16130D3     DC  10,-3332986505
1613003475  00010
16130L33298650NZ
16140D1     DC  10,9999993329
1614003485  00010
16140R9999933 29Z
16150DEGRADDC  10,5729577951
1615003495  00010
16150N729577951Z
16160PI     DC  10,3141592653
1616003505  00010
16160L141592653Z
16170ATNANSDS  8
1617003513  00008
17020ADARG2DS  8,ATNANS
```



```
J10322203234
J10323403246
J10324603258
J10325803270
J10327003282
J10328203294
J10329403306
J10330603318
J10331803330
J10333003342
J10334203354
J10335403366
J10336603378
J10337803390
J10339003402
060340203412
060341203419
060341903428
060342803437
060343703446
060344603456
060345603466
060346603476
060347603486
060348603496
060349603506
```

```
1702003513  00008
17030ADARG1DS  8
1703003521  00008
17040ANGADDSF  ADARG2-2,0,8
170400352232035110000OZ
17050       SF  ADARG2-4,0,9
170500353432035090000OZ
17060       SF  ADARG1-2
170600354632035190000OZ
17070       SF  ADARG1-4
170700355832035170000OZ
17080       TF  ANGADD&11,ADARG1
170800357026035330352 1Z
17090       CF  ANGADD&9
170900358233035310000OZ
17100       A   ANGADD&11,ADARG2
171000359421035330351 3Z
17110       BN  *&60
171100360647036660130OZ
17120       SM  ANGADD&11,600,9
171200361812035330000OZ
17130       BN  *&48
171300363047036780130OZ
17140       AM  ADARG1-3,1,10
171400364211035180000 1Z
17150       B   *&36
171500365449036900000OZ
17160       SM  ADARG1-3,1,10
171600366612035180000 1Z
17170       AM  ANGADD&11,600,9
171700367811035330000OZ
17180       SF  ANGADD&9
171800369032035310000OZ
17190       TF  ADARG1,ANGADD&11
171900370226035210353 3Z
17200       TF  ANGADD&23,ADARG1-3
172000371426035450351 8Z
18010       CF  ANGADD&22
180100372633035440000OZ
18020       A   ANGADD&23,ADARG2-3
180200373821035450351 0Z
18030       BN  *&60
180300375047038100130OZ
18040       SM  ANGADD&23,60,10
180400376212035450000OZ
18050       BN  *&48
180500377447038220130OZ
18060       AM  ADARG1-5,1,10
180600378611035160000 1Z
18070       B   *&36
180700379849038340000OZ
18080       SM  ADARG1-5,1,10
180800381012035160000 1Z
18090       AM  ANGADD&23,60,10
180900382211035450000OZ
18100       SF  ANGADD&22
181000383432035440000OZ
18110       TF  ADARG1-3,ANGADD&23
181100384626035180354 5Z
18120       A   ADARG1-5,ADARG2-5
181200385821035160350 8Z
18130       BNN *&96
181300387046039660130OZ
18140       AM  ADARG1-5,360,9
181400388211035160OL60Z
18150       CF  ADARG1--
```



```
J10352203534
J10353403546
J10354603558
J10355803570
J10357003582
J10358203594
J10359403606
J10360603618
J10361803630
J10363003642
J10364203654
J10365403666
J10366603678
J10367803690
J10369003702
J10370203714
J10371403726
J10372603738
J10373803750
J10375003762
J10376203774
J10377403786
J10378603798
J10379803810
J10381003822
J10382203834
J10383403846
J10384603858
J10385803870
J10387003882
J10388203894
```

```
1815003894330352100000Z
18160       CF  ADARG1-2
1816003906330351900000Z
18170       CF  ADARG1-3
1817003918330351800000Z
18180       CF  ADARG1-4
1818003930330351700000Z
18190       CF  ADARG1-5
1819003942330351600000Z
18200       BB
1820003954420000000000Z
18210       SM  ADARG1-5,360,9
1821003966120351600L60Z
18220       BN  *-96
1822003978470388201300Z
18230       B   *-96
1823003990490389400000Z
19010OUT    DS  24
1901004025  00024
19020CONRECDC  24,707070707070037070700000
1902004049  00024
19020P0707070707003707070000Z
19030ZSARG DS  10
1903004059  00010
19040ZSPRNTTR  OUT-23,CONREC-23
1904004060310400204026Z
19050       BNF *624,ZSARG
1905004072440409604059Z
19060       TDM OUT-3,2
1906004084150402200002Z
19070       TD  OUT-4,ZSARG
1907004096250402104059Z
19080       TD  OUT-6,ZSARG-1
1908004108250401904058Z
19090       TD  OUT-8,ZSARG-2
1909004120250401704057Z
19100       BNF *636,ZSARG-7
1910004132440416804052Z
19110       CF  ZSARG-7
1911004144330405200000Z
19120       TDM ZSARG-8,0,11
1912004156150405100000Z
19130       TD  OUT-12,ZSARG-3
1913004168250401304056Z
19140       TD  OUT-14,ZSARG-4
1914004180250401104055Z
19150       TD  OUT-16,ZSARG-5
1915004192250400904054Z
19160       TD  OUT-18,ZSARG-6
1916004204250400704053Z
19170       TD  OUT-20,ZSARG-7
1917004216250400504052Z
19180       TD  OUT-22,ZSARG-8
1918004228250400304051Z
19190       BD  ZSTYPE,ZSARG-8
1919004240430438404051Z
19200       TDM OUT-23,0
1920004252150400200000Z
20010       BD  ZSTYPE,ZSARG-7
2001004264430438404052Z
20020       TDM OUT-21,0
2002004276150400400000Z
20030       BD  ZSTYPE,ZSARG-6
2003004288430438404053Z
20040       TDM OUT-19,0
2004004300150400600000Z
```



```
J10389403906  20050       BD  ZSTYPE,ZSARG-5
              2005004312430438404054Z                    J10431204324
J10390603918  20060       TDM OUT-17,0
              2006004324150400800000Z                    J10432404336
J10391803930  20070       BD  ZSTYPE,ZSARG-4
              2007004336430438404055Z                    J10433604348
J10393003942  20080       TDM OUT-15,0
              2008004348150401000000Z                    J10434804360
J10394203954  20090       BD  ZSTYPE,ZSARG-3
              2009004360430438404056Z                    J10436004372
J10395403966  20100       TDM OUT-13,0
              2010004372150401200000Z                    J10437204384
J10396603978  20110ZSTYPEWATYOUT-22
              2011004384390400300100Z                    J10438404396
J10397803990  20120       BB
              2012004396420000000000Z                    J10439604408
J10399004002  21010TYPCORRCTY00030
              2101004408340003000102Z                    J10440804420
              21020       TF  ZSARG-1,COURNO
              2102004420260405814521Z                    J10442004432
              21030       TD  ZSARG,400
060402604050  2103004432250405900400Z                    J10443204444
              21040       CF  ZSARG-2
              2104004444330405700000Z                    J10444404456
              21050       WNTYZSARG-2
J10406004072  2105004456380405700100Z                    J10445604468
              21060       SPTY
J10407204084  2106004468340000000101Z                    J10446804480
              21070       TF  ZSARG-1,AZIM-5
J10408404096  2107004480260405814527Z                    J10448004492
              21080       CF  ZSARG-3
J10409604108  2108004492330405600000Z                    J10449204504
              21090       WNTYZSARG-3
J10410804120  2109004504380405600100Z                    J10450404516
              21100       SPTY
J10412004132  2110004516340000000101Z                    J10451604528
              21110       TF  ZSARG-1,AZIM-3
J10413204144  2111004528260405814529Z                    J10452804540
              21120       WNTYZSARG-2
J10414404156  2112004540380405700100Z                    J10454004552
              21130       SPTY
J10415604168  2113004552340000000101Z                    J10455204564
              21140       TF  ZSARG-1,AZIM-1
J10416804180  2114004564260405814531Z                    J10456404576
              21150       WNTYZSARG-2
J10418004192  2115004576380405700100Z                    J10457604588
              21151       TD  TYPCOR67,400
J10419204204  2115104588250441500400Z                    J10458804600
              21160       WATYTYPCOR65
J10420404216  2116004600390441300100Z                    J10460004612
              21161       TDM TYPCOR67,0
J10421604228  2116104612150441500000Z                    J10461204624
              21170       TD  ZSARG-1,AZIM
J10422804240  2117004624250405814532Z                    J10462404636
              21180       WNTYZSARG-1
J10424004252  2118004636380405800100Z                    J10463604648
              21190       SPTY
J10425204264  2119004648340000000101Z                    J10464804660
              21200       BT  ZSPRNT,LENGTH
J10426404276  2120004660270406014540Z                    J10466004672
              22010       SPTY
J10427604288  2201004672340000000101Z                    J10467204684
              22020       BT  ZSPRNT,LAT
J10428804300  2202004684270406014548Z                    J10468404696
              22030       SPTY
J10430004312  2203004696340000000101Z                    J10469604708
```

```
22040        BT   ZSPRNT,DEP
2204004708270406014556Z
22050          SPTY
22050047203400000001 01Z
22060        BT   ZSPRNT,NORTH
2206004732270406014565Z
22070          SPTY
2207004744340000000101Z
22080        BT   ZSPRNT,EAST
2208004756270406014574Z
22090TYCENDB
2209004768490000000000Z
23010NCSUM DS   9
2301004788   00009
23020ECSUM DS   9
2302004797   00009
23030ALATSMDS   9
2303004806   00009
23040ADEPSMDS   9
2304004815   00009
23050DISTSMDS   9
2305004824   00009
23060SWC     DS   2
2306004826   00002
23070SWA     DS   1
2307004827   00001
23080SWB     DS   1
2308004828   00001
23090SWE     DS   1
2309004829   00001
23100COORECDSB 2,104,14073
2310014073   00002
23110FAKE00DS   1
2311004830   00001
23120        DC   3,000,FAKE0062
2312004832   00003
23120000Z
             DORG4833
        4833
23130        DC   8,0
2313004840   00008
2313000000000Z
23140        DC   8,0
2314004848   00008
2314000000000Z
23150        DC   8,0
2315004856   00008
2315000000000Z
23160        DC   8,0
2316004864   00008
2316000000000Z
23170        DC   9,0
2317004873   00009
2317000000000Z
23180        DC   10,000000000@
2318004883   00010
2318000000000Z
23190NUMBL DNB 50,14518
2319014518   00050
23190 @@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@Z
23200        DC   1,@,14519
2320014519   00001
23200Z
23210COREF DSB 54,100,14653
2321014653   00054
232200UTPCHDS   80,14439
```

77

```
             2322014439   00080
J10470804720 23230READ2 DSS 80,14280
             2323014280   00080
J10472004732 23240HEAD  DAC 49,NO.  AZIMUTH    LENGTH    LATITUDE    DEPARTURE
             2324004885   00049
J10473204744 23240N556030000416949546463480000000000534555476348000Z          060488404934
             23240000000534163496364444500000000444557415963645945Z          060493404982
J10474404756 23250       DAC 22,      NORTH        EAST@
             2325004983   00022
J10475604768 2325000000000005556596348000000000000000454162630Z          060498205026
             23270ERRWD DAC 5,ERRO@
J10476804780 2327005027   00805
             23270M55959700Z                                              060502605036
             23280BUSTWDDAC 5,BUST@
             2328005037   00805
             23280M26462630Z                                              060503605046
             24010       DORG05060
             2401005060
             24020       RCTY
             2402005060340000000102Z                                      J10506005072
             24030       WATYHEAD
             2403005072390488500100Z                                      J10507205084
             24060       RCTY
             2406005084340000000102Z                                      J10508405096
             24061       WATYR676
             2406105096391375900100Z                                      J10509605108
             24062       RCTY
             2406205108340000000102Z                                      J10510805120
             24063       H
             2406305120480000000000Z                                      J10512005132
             24070       TFM *618,COOREC62
             240700513216051 50J4075Z                                     J10513205144
             24080       TFM ,0,8
             2408005144160000000000Z                                      J10514405156
             24090       AM   *-6,4,10
             2409005156110515000004Z                                      J10515605168
060483004833 24100       CM   *-18,COOREC6206
             2410005168140515 0J4279Z                                     J10516805180
             24110       BNH *-36
             2411005180470514401100Z                                      J10518005192
             24120       TFM SWB,0,8,          SWB, SWA, AND SWC ARE SET TO ZERO
060483304841 2412005192160482800000Z                                      J10519205204
             24130       TFM UPCC066,COOREC
             24130052041606506J4073Z                                      J10520405216
060484104849 24140ACNT   TFM *68,0,10,                  COUNT OF UNK  AZIM
             2414005216160522400000Z                                      J10521605228
             24150DCNT   TFM *68,0,10,                  COUNT OF UNK  DIST
060484904857 2415005228160523600000Z                                      J10522805240
             24160       TF   NCSUM,FAKE00643
             2416005240260478804873Z                                      J10524005252
060485704865 24170       TF   ECSUM,NCSUM
             2417005252260479704788Z                                      J10525205264
             24180       TF   ALATSM,NCSUM
060486504874 2418005264260480604788Z                                      J10526405276
             24190       TF   ADEPSM,NCSUM
             2419005276260481504788Z                                      J10527605288
060487404884 24200       TF   DISTSM,NCSUM
             2420005288260482404788Z                                      J10528805300
             25020READCORNCDREADIN
-7J4469J4519 2502005300361452000500Z                                      J10530005312
             25021       SF   READIN
             2502105312321452000000Z                                      J10531205324
06J4519J4520 25022       SF   CODES-2
             2502205324321452200000Z                                      J10532405336
             25023       SF   AZIM-7
             2502305336321452500000Z                                      J10533605348
```

78

```
25024       SF  LENGTH-7
2502405348321453300000Z                                                    J10534805360
25025       SF  NORTH-8
2502505360321455700000Z                                                    J10536005372
25026       SF  EAST-8
2502605372321456600000Z                                                    J10537205384
25027       SF  LAT-7
2502705384321454100000Z                                                    J10538405396
25028       SF  DEP-7
2502805396321454900000Z                                                    J10539605408
25030       BD  L1,SWA,,    SWA ON IF FIRST COURSE HAS BEEN READ
2503005408430591204827Z                                                    J10540805420
25040       BNR L2,READING1
2504005420450550414521Z                                                    J10542005432
25050       TFM *&18,COREF-51,,COURSE REF CODES ARE TO BE SET TO ZERO
2505005432160545OJ4602Z                                                    J10543205444
25060       TFM ,0
2506005444160000000000Z                                                    J10544405456
25070       AM  *-6,54,10
2507005456110545OOOON4Z                                                    J10545605468
25080       CM  *-18,19948
2508005468140545OJ9948Z                                                    J10546805480
25090       BNH *-36
2509005480470544401100Z                                                    J10548005492
25100       B   READCO
2510005492490530000000Z                                                    J10549205504
25110L2     SF  COURNO-1
2511005504321452000000Z                                                    J10550405516
25120       CM  COURNO,0,10
2512005516141452100000Z                                                    J10551605528
25130       BE  L3
2513005528460562401200Z                                                    J10552805540
25140       TR  COREF-53,FAKE00,,  MUST STORE ARTIFICIAL FIRST COURSE NO.
2514005540311460004830Z                                                    J10554005552
25150       TDM SWA,1,,            TURN ON SWA
2515005552150482700001Z                                                    J10555205564
25160       WNTYFAKE00&49
2516005564380487900100Z                                                    J10556405576
25165       RCTY
2516505576340000000102Z                                                    J10557605588
25170       TF  NCSUM,FAKE00&43
2517005588260478804873Z                                                    J10558805600
25180       TF  ECSUM,FAKE00&43
2518005600260479704873Z                                                    J10560005612
25190       B   L7&24
2519005612490603200000Z                                                    J10561205624
25200L3     TDM SWA,1,,            TURN ON SWA
2520005624150482700001Z                                                    J10562405636
26020       CM  CODES,300,9,  ARE STARTING COORDINATES IN REF. STORAGE
2602005636141452400L00Z                                                    J10563605648
26030       BNE L4
2603005648470582801200Z                                                    J10564805660
26040       SF  READING44,,,  YES
2604005660321456400000Z                                                    J10566005672
26050       TF  97,READING45,,     COURSE  WITH  N-S COORDINATE
2605005672260009714565Z                                                    J10567205684
26060       SF  READING53
2606005684321457300000Z                                                    J10568405696
26070       TF  99,READING54,,     COURSE  WITH  E-W COORDINATE
2607005696260009914574Z                                                    J10569605708
26080       CF  98
2608005708330009800000Z                                                    J10570805720
26090       BT  COADDR,99
2609005720270114200099Z                                                    J10572005732
26100       AM  BBCOAD&6,43,10,    ADDRESS OF N-S COORDINATE
2610005732110120800OM3Z                                                    J10573205744
```



```
26110       AM  BBCOAD&11,52,10,   ADDRESS OF E-W COORDINATE
2611005744110121300ON2Z                                                    J10574405756
26120       TF  *&23,BBCOAD&6
2612005756260577901208Z                                                    J10575605768
26130       TF  NORTH,*
2613005768261456505768Z                                                    J10576805780
26140       TF  *&23,BBCOAD&11
2614005780260580301213Z                                                    J10578005792
26150       TF  EAST,*
2615005792261457405792Z                                                    J10579205804
26155       TDM CODES-2,2,11
2615505804151452200000KZ                                                   J10580405816
26160       B   *&36
2616005816490585200000Z                                                    J10581605828
26170L4     CM  READING&4,200,9
2617005828141452400K00Z                                                    J10582805840
26180       BNE L5
2618005840470588801200Z                                                    J10584005852
27010       TF  NCSUM,NORTH
2701005852260478814565Z                                                    J10585205864
27020       TF  ECSUM,EAST
2702005864260479714574Z                                                    J10586405876
27030       B   L6
2703005876490651200000Z                                                    J10587605888
27040L5     TDM ERRWD&6,2
2704005888150503300002Z                                                    J10588805900
27050       B   TERR
2705005900490597200000Z                                                    J10590005912
27060L1     CM  COURNO,99,10
2706005912141452100OR9Z                                                    J10591205924
27070       BE  L7
2707005924460600801200Z                                                    J10592405936
27080       CM  COURNO,00,10
2708005936141452100000Z                                                    J10593605948
27090       BNE L7&12
2709005948470602001200Z                                                    J10594805960
27100       TDM ERRWD&6,1
2710005960150503300001Z                                                    J10596005972
27110TERR   WATYERRWD
2711005972390502700100Z                                                    J10597205984
27120       H   11111
2712005984481111100000Z                                                    J10598405996
27121       B   *-12
2712105996490598400000Z                                                    J10599606008
27130L7     TDM SWB,1,,    SWB ON IF THIS IS THE LAST COURSE
2713006008150482800001Z                                                    J10600806020
27140       AM  UPCC&6,2,10,  INCREMENT ADDRESS OF COURSE NO. RECORD
2714006020110650600002Z                                                    J10602006032
            TF  99,CODES
0 0 0 6032260009914524Z                                                    J10603206044
            SF  98
0 0 0 6044320009800000Z                                                    J10604406056
27151       CM  99,33,10
2715106056140009900OL3Z                                                    J10605606068
27152       BNE CWA
2715206068470616401200Z                                                    J10606806080
27153       SF  LENGTH-1
2715306080321453900000Z                                                    J10608006092
27154       SF  AZIM-1
2715406092321453100000Z                                                    J10609206104
27156       C   COURNO,LENGTH
2715606104241452114540Z                                                    J10610406116
27157       BNE CWA
2715706116470616401200Z                                                    J10611606128
27158       C   COURNO,AZIM
2715806128241452114532Z                                                    J10612806140
```

```
27159       BNE CWA
2715906140470616401200Z
27160       SF  CWAG4
2716006152320616800000Z
27161CWA    TD  *G32,98
2716106164250619600098Z
27162       CF  *G20
2716206176330619600000Z
27163       CM  *G8,3,710
2716306188140619600003Z
27164       BNE *G132
2716406200470633201200Z
27165       RCTY
2716506212340000000102Z
27166       TD  RG54,COURNO-1
2716606224251373714520Z
27167       TD  RG56,COURNO
2716706236251373914521Z
27168       WATYRG44
2716806248391372700100Z
27169       RCTY
2716906260340000000102Z
27170       RNTYAZIM-1
2717006272361453100100Z
27171       BNF *G36,CODES-1
2717106284440632014523Z
27172       TDM CODES-1,2,11
2717206296151452300OKZ
27173       B   *G24
2717306308490633200000Z
27174       TDM CODES-1,2
2717406320151452300002Z
27175       TD  *G20,99
2717506332250635200099Z
27176       CM  *G8,3,710
2717606344140635200003Z
27177       BNE UPCCO
2717706356470650001200Z
27178       RCTY
2717806368340000000102Z
27179       TD  RG70,COURNO-1
2717906380251375314520Z
27180       TD  RG72,COURNO
2718006392251375514521Z
27181       WATYRG60
2718106404391374300100Z
27182       RCTY
2718206416340000000102Z
27183       RNTYLENGTH-1
2718306428361453900100Z
27184       TDM CODES,2
2718406440151452400002Z
27185       BNF UPCCO,CWAG4
2718506452440650006168Z
27186       CF  CWAG4
2718606464330616800000Z
27187       SF  AZIM-1
2718706476321453100000Z
27188       TF  COURNO,AZIM
2718806488261452114532Z
27150UPCCO TF  ,COURNO
2715006500260000014521Z
27189L6     TF  *G35,CODES
2718906512260654714524Z
27190       TD  *G21,CODES-2
2719006524780654314522Z
```



```
                27200       CF  *G10
J10614006152    2720006536330654600000Z                                  J10653606548
                27210       CM  L6G35,200,9,  BEGIN DETERMINATION OF RECORD TYPE
J10615206164    2721006548140654700K00Z                                  J10654806560
                27220       BNE L8
J10616406176    2722006560470722001200Z                                  J10656006572
                28010LDCORDTF   DEP,EAST,,          COORDINATES GIVEN
J10617606188    2801006572261455614574Z                                  J10657206584
                28020       S   DEP,ECSUM
J10618806200    2802006584221455604797Z                                  J10658406596
                28030       SF  DEP-7
J10620006212    2803006596321454900000Z                                  J10659606608
                28040       TF  LAT,NORTH
J10621206224    2804006608261454814565Z                                  J10660806620
                28050       S   LAT,NCSUM
J10622406236    2805006620221454804788Z                                  J10662006632
                28060       SF  LAT-7
J10623606248    2806006632321454100000Z                                  J10663206644
                28070       M   LAT,LAT
J10624806260    2807006644231454814548Z                                  J10664406656
                28080       TF  LENGTH,99
J10626006272    2808006656261454000099Z                                  J10665606668
                28090       M   DEP,DEP
J10627206284    2809006668231455614556Z                                  J10666806680
                28100       A   99,LENGTH
J10628406296    2810006680210009914540Z                                  J10668006692
                28110       BT  BIGSQT,101
J10629606308    2811006692270082200101Z                                  J10669206704
                28120       AM  98,5,10
J10630806320    2812006704110009800005Z                                  J10670406716
                28130       TF  LENGTH,97
J10632006332    2813006716261454000097Z                                  J10671606728
                28140       TFM CODES,011,9
J10633206344    2814006728161452400011Z                                  J10672806740
                28141       TFM ATNEND66,*636
J10634406356    2814106740160255606776Z                                  J10674006752
                28142       TF  EASTER,DEP
J10635606368    2814206752260240814556Z                                  J10675206764
                28143       BT  ARCTAN,LAT
J10636806380    2814306764270241814548Z                                  J10676406776
                28144       TF  AZIM,ATNANS
J10638006392    2814406776261453203513Z                                  J10677606788
                28150UPDSMSTF   NCSUM,NORTH
J10639206404    2815006788260478814565Z                                  J10678806800
                28160       TF  ECSUM,EAST
J10640406416    2816006800260479714574Z                                  J10680006812
                28170       CF  CODES-2
J10641606428    2817006812331452200000Z                                  J10681206824
                28180       TD  *G20,CODES-2
J10642806440    2818006824250684414522Z                                  J10682406836
                28190       CM  *G8,01,710
J10644006452    2819006836140684400001Z                                  J10683606848
                28200       BNE STORER
J10645206464    2820006848470694401200Z                                  J10684806860
                29010       TF  99,LAT
J10646406476    2901006860260009914548Z                                  J10686006872
                29020       CF  99
J10647606488    2902006872330009900000Z                                  J10687206884
                29030       A   ALATSM,99
J10648806500    2903006884210480600099Z                                  J10688406896
                29040       TF  99,DEP
J10650006512    2904006896260009914556Z                                  J10689606908
                29050       CF  99
J10651206524    2905006908330009900000Z                                  J10690806920
                29060       A   ADEPSM,99
J10652406536    2906006920210481500099Z                                  J10692006932
```

```
29070       A   DISTSM,LENGTH
2907006932210482414540Z                                          J10693206944
29080STORERTD  READING&55,400
2908006944251457500400Z                                          J10694406956
29090       BT  COADDR,COURNO
2909006956270114214521Z                                          J10695606968
29100       TF  *&18,BBCOAD&11
2910006968260698601213Z                                          J10696806980
29110       TR  ,READING2
2911006980310000014522Z                                          J10698006992
29111       BTM PUNCH
2911106992170701600000Z                                          J10699207004
29112       B   BACK
2911207004490707600000Z                                          J10700407016
29120PUNCH TR  OUTPCH-50,NUMBL-49
2912007016311438914469Z                                          J10701607028
29130       TDM OUTPCH,0,, ZERO IN COL 80 INDICATES OUTPUT CARD
2913007028151443900000Z                                          J10702807040
29131       TR  OUTPCH-79,READIN
2913107040311436014520Z                                          J10704007052
29132       TD  OUTPCH-24,NUMBL
2913207052251441514518Z                                          J10705207064
29133       BB
2913307064420000000000Z                                          J10706407076
29140BACK  BNC4*&48,,,              IS COURSE TO BE PRINTED
2914007076470712400400Z                                          J10707607088
29150       TFM TYCEND&6,*&36
2915007088160477407124Z                                          J10708807100
29151       WNCDOUTPCH-79
2915107100381436000400Z                                          J10710007112
29160       B   TYPCOR
2916007112490440800000Z                                          J10711207124
29170       TF  99,ACNT&8
2917007124260009905224Z                                          J10712407136
29180       A   99,DCNT&8
2918007136210009905236Z                                          J10713607148
29190       CM  99,02,10
2919007148140009900002Z                                          J10714807160
29200       BNH *&36
2920007160470719601100Z                                          J10716007172
30010       TDM ERRWD&6,3
3001007172150503300003Z                                          J10717207184
30020       B   TERR
3002007184490597200000Z                                          J10718407196
30030       BD  START3,SWB,,   HAS LAST COURSE BEEN READ
3003007196430852804828Z                                          J10719607208
30040       B   READCO
3004007208490530000000Z                                          J10720807220
30050L8     CM  L6&35,300,9
300500722014065470OL00Z                                          J10722007232
30060       BNE L9
3006007232470740001200Z                                          J10723207244
30070       SF  NORTH-1,,,     COORDINATES IN STORAGE
3007007244321456400000Z                                          J10724407256
30080       SF  EAST-1
3008007256321457300000Z                                          J10725607268
30090       TF  99,EAST
3009007268260009914574Z                                          J10726807280
30100       TF  97,NORTH
3010007280260009714565Z                                          J10728007292
30110       CF  98
3011007292330009800000Z                                          J10729207304
30120       BT  COADDR,99
3012007304270114200099Z                                          J10730407316
30121       AM  BBCOAD&6,43,10
30121073161101208000M3Z                                          J10731607328
```



```
30122       AM  BBCOAD&11,52,10
30122073281101213000N2Z                                          J10732807340
30130       TF  *&23,BBCOAD&6
3013007340260736301208Z                                          J10734007352
30140       TF  NORTH,*
3014007352261456507352Z                                          J10735207364
30150       TF  *&23,BBCOAD&11
3015007364260738701213Z                                          J10736407376
30160       TF  EAST,*
3016007376261457407376Z                                          J10737607388
30170       B   LDCORD
3017007388490657200000Z                                          J10738807400
30180L9     TF  99,CODES
3018007400260009914524Z                                          J10740007412
30190       SF  98
3019007412320009800000Z                                          J10741207424
30200       CM  99,11,10
30200074241400099000J1Z                                          J10742407436
31010       BNE L10
3101007436470747201200Z                                          J10743607448
31020       TFM LDEND&6,UPDSMS&24,,   AZIMUTH AND LENGTH GIVEN
3102007448160152006812Z                                          J10744807460
31030       B   LATDEP
3103007460490127400000Z                                          J10746007472
31040L10    CM  99,21,10
31040074721400099000K1Z                                          J10747207484
31050       BNE L11
3105007484470765201200Z                                          J10748407496
31060       SF  AZIM-1,,,        AZIMUTH STORED, LENGTH GIVEN
3106007496321453100000Z                                          J10749607508
31070       BT  COADDR,AZIM
3107007508270114214532Z                                          J10750807520
31071       AM  BBCOAD&11,10,10
31071075201101213000J0Z                                          J10752007532
31080       TF  *&23,BBCOAD&11
3108007532260755501213Z                                          J10753207544
31090       TF  AZIM,*
3109007544261453207544Z                                          J10754407556
31100       BNF *&72,CODES-1
3110007556440762814523Z                                          J10755607568
31110       SM  AZIM-5,180,9,   REVERSE AZIMUTH
31110075681214527O0J80Z                                          J10756807580
31120       BN  *&36
3112007580470761601300Z                                          J10758007592
31130       CF  AZIM-5
3113007592331452700000Z                                          J10759207604
31140       B   *&24
3114007604490762800000Z                                          J10760407616
31150       AM  AZIM-5,360,9
31150076161114527O0L60Z                                          J10761607628
31160       TDM CODES-1,1,,     INDICATE AZIMUTH KNOWN
3116007628151452300001Z                                          J10762807640
31170       B   L9&48
3117007640490744800000Z                                          J10764007652
31180L11    CM  99,12,10
31180076521400099000J2Z                                          J10765207664
31190       BNE L12
3119007664470776001200Z                                          J10766407676
31200       SF  LENGTH-1,,,    LENGTH STORED, AZIMUTH GIVEN
3120007676321453900000Z                                          J10767607688
32010       BT  COADDR,LENGTH
3201007688270114214540Z                                          J10768807700
32020       AM  BBCOAD&11,18
3202007700110121300018Z                                          J10770007712
32030       TF  *&23,BBCOAD&11
3203007712260773501213Z-                                         J10771207724
```

```
32040       TF  LENGTH,*
3204007724261454007724Z
32050       TDM CODES,1
3205007736151452400001Z
32060       B   L9648
3206007748490744800000Z
32070L12    CM  99,01,10
3207007760140009900001Z
32080       BNE L13
3208007772470784401200Z
32090       AM  ACNT68,1,10,  AZIMUTH UNKNOWN, LENGTH GIVEN
3209007784110522400001Z
32091       SF  COOREC6199
3209107796321427200000Z
32092       TF  COOREC6202,COOREC6200
3209207808261427514273Z
32093       TF  COOREC6200,COURNO
3209307820261427314521Z
32100       B   STORER
3210007832490694400000Z
32110L13    CM  99,10,10,     AZIMUTH GIVEN, LENGTH UNKNOWN
3211007844140009900OJ0Z
32120       BNE L14
3212007856470792801200Z
32130       AM  DCNT68,1,10
3213007868110523600001Z
32131       SF  COOREC6203
3213107880321427600000Z
32132       TF  COOREC6206  ,COOREC6204
3213207892261427914277Z
32133       TF  COOREC6204,COURNO
3213307904261427714521Z
32140       B   STORER
3214007916490694400000Z
32150L14    CM  99,22,10
3215007928140009900K2Z
32160       BNE L15
3216007940470812001200Z
32170       SF  AZIM-1,,,     AZIMUTH AND LENGTH IN STORAGE
3217007952321453100000Z
32180       SF  LENGTH-1
3218007964321453900000Z
32190       TF  99,LENGTH
3219007976260009914540Z
32200       TF  97,AZIM
3220007988260009714532Z
33010       CF  98
3301008000330009800000Z
33020       BT  COADDR,99
3302008012270114200095Z
33030       AM  BBCOAD66,10,10
3303008024110120800OJ0Z
33040       AM  BBCOAD611,18,10
3304008036110121300OJ8Z
33050       TF  *623,BBCOAD66
3305008048260807101208Z
33060       TF  AZIM,*
3306008060261453208060Z
33070       TF  *623,BBCOAD611
3307008072260809501213Z
33080       TF  LENGTH,*
3308008084261454008084Z
33081       TDM CODES,1
3308108096151452400001Z
33090       B   L10684
3309008108490755600000Z
```

J10772407736
J10773607748
J10774807760
J10776007772
J10777207784
J10778407796
J10779607808
J10780807820
J10782007832
J10783207844
J10784407856
J10785607868
J10786807880
J10788007892
J10789207904
J10790407916
J10791607928
J10792807940
J10794007952
J10795207964
J10796407976
J10797607988
J10798808000
J10800008012
J10801208024
J10802408036
J10803608048
J10804808060
J10806008072
J10807208084
J10808408096
J10809608108
J10810808120

85

```
33100L15    CM  99,20,10
3310008120140009900OK0Z
33110       BNE L16
3311008132470830001200Z
33120       SF  AZIM-1,,,     AZIMUTH STORED, LENGTH UNKNOWN
3312008144321453100000Z
33130       BT  COADDR,AZIM
3313008156270114214532Z
33140       AM  BBCOAD611,10,10
3314008168110121300OJ0Z
33150       TF  *623,BBCOAD611
3315008180260820301213Z
33160       TF  AZIM,*
3316008192261453208192Z
33170       BNF *672,CODES-1
3317008204440827614523Z
33180       SM  AZIM-5,180,9,  CHANGE SENSE OF AZIMUTH
3318008216121452700J80Z
33190       BN  *636
3319008228470826401300Z
33200       CF  AZIM-5
3320008240331452700000Z
34010       B   *624
3401008252490827600000Z
34020       AM  AZIM-5,360,9
3402008264111452700L60Z
34030       TDM CODES-1,1
3403008276151452300001Z
34040       B   L13624
3404008288490786800000Z
34050L16    CM  99,02,10
3405008300140009900002Z
34060       BNE L17
3406008312470840801200Z
34070       SF  LENGTH-1,,,     AZIMUTH UNKNOWN, LENGTH STORED
3407008324321453900000Z
34080       BT  COADDR,LENGTH
3408008336270114214540Z
34090       AM  BBCOAD611,18,10
3409008348110121300OJ8Z
34100       TF  *623,BBCOAD611
3410008360260838012132
34110       TF  LENGTH,*
3411008372261454005372Z
34120       TDM CODES,1
3412008384151452400001Z
34130       B   L12624
3413008396490778400000Z
34140L17    CM  99,00,10
3414008408140009900000Z
34150       BE  *636
3415008420460845601200Z
34160       TDM ERRWD66,4
3416008432150503300004Z
34170       B   TERR
3417008444490597200000Z
34180       TFM SWC,01,10,     AZIMUTH AND  LENGTH UNKNOWN
3418008456160482600001Z
34190       AM  ACNT68,01,10
3419008468110522400001Z
34199       SF  COOREC6199
3419908480321427200000Z
34200       TF  COOREC6202  ,COOREC6200
3420008492261427514273Z
34201       TF  COOREC6200  ,COURNO
3420108504261427314521Z
```

J10812008132
J10813208144
J10814408156
J10815608168
J10816808180
J10818008192
J10819208204
J10820408216
J10821608228
J10822808240
J10824008252
J10825208264
J10826408276
J10827608288
J10828808300
J10830008312
J10831208324
J10832408336
J10833608348
J10834808360
J10836008372
J10837208384
J10838408396
J10839608408
J10840808420
J10842008432
J10843208444
J10844408456
J10845608468
J10846808480
J10848008492
J10849208504
J10850408516

86

```
34202       B   L13624
3420208516490786800000Z
35010START3TFM TYPCNT,COOREC-2
3501008528160887 5J4071Z
35020       TF  NCSUM,COREF-10,,  COORDINATES OF FIRST COURSE
3502008540260478814643Z
35030       TF  ECSUM,COREF-1
3503008552260479714652Z
35040       TDM SWE,1
3504008564150482900001Z
35050       A   DCNT68,SWC
3505008576210523604826Z
35060       MM  DCNT68,03,10
3506008588130523600003Z
35070       A   99,ACNT68
3507008600210009905224Z
35080       BNZ ISTYP3-132
3508008612471023201200Z
35090       BNC1TESSW4,,,         IF SW1 ON, BALANCE
3509008624470900800100Z
35100       TF  99,COUR99626,,      LATITUDE OF MISCLOSURE
3510008636260009919972Z
35110D      CF  99
3511008648330009900000Z
35120       CM  99,501,9
3512008660140009900N01Z
35130       BL  *684
3513008672470875601300Z
35140       CM  99,10001,7
3514008684140009900001Z
35150       BL  TESSW2
3515008696470881601300Z
35151       RCTY
3515108708340000000102Z
35160       WATYBUSTWD
3516008720390503700100Z
35170       H   22222
3517008732482222200000Z
35171       B   *-12
3517108744908732000000Z
35180       TF  99,COUR99634,,      DEPARTURE OF MISCLOSURE
3518008756260009919980Z
35190E      CF  99
3519008768330009900000Z
35200       CM  99,501,9
3520008780140009900N01Z
36010       BNL *-108
3601008792460868401300Z
36015       B   TESSW4
3601508804490900800000Z
36020TESSW2BNC2*636 ,,,       USE TRANSIT RULE
3602008816470885200200Z
36030       TF  ALATSM,DISTSM,,   USE COMPASS RULE
3603008828260480604824Z
36040       TF  ADEPSM,DISTSM
3604008840260481504824Z
36050       TF  NUM,COUR99626,,     LAT OF MISCLOSURE
3605008852260041019972Z
36060F      CF  NUM-7
3606008864330040300000Z
36070       TDM NUM-8,0,11
3607008876150040200000Z
36080       BT  DIVSUB,ALATSM
3608008888270042004806Z
36085       SF  QUO-9
3608508900320081200000Z
```

87

```
J10851608528
J10852808540
J10854008552
J10855208564
J10856408576
J10857608588
J10858808600
J10860008612
J10861208624
J10862408636
J10863608648
J10864808660
J10866008672
J10867208684
J10868408696
J10869608708
J10870808720
J10872008732
J10873208744
J10874408756
J10875608768
J10876808780
J10878008792
J10879208804
J10880408816
J10881608828
J10882808840
J10884008852
J10885208864
J10886408876
J10887608888
J10888808900
J10890008912
```

```
36090       TF  LATFAC,QUO-2
3609008912261361100819Z
36100       TF  NUM,COUR99634,,       DEP OF MISCLOSURE
3610008924260041019980Z
36110       CF  NUM-7
3611008936330040300000Z
36120       TDM NUM-8,0,11
3612008948150040200000Z
36130       BT  DIVSUB,ADEPSM
3613008960270042004815Z
36135       SF  QUO-9
3613508972320081200000Z
36140       TF  DEPFAC,QUO-2
3614008984261361900819Z
36150       B   ENTER
36160TESSW4BC4 AREATS
3616009008460905600400Z
36170       TF  LATFAC,Z10-2
3617009020261361100801Z
36180       TF  DEPFAC,Z10-2
3618009032261361900801Z
36190       B   ENTER
3619009044490930800000Z
36200AREATSBC3 AREACP
3620009056461319600300Z
37010UNION BD  05084,SWE,,      NO ALTERNATE SOLUTION IS TO BE PRINTED
3701009068430508404829Z
37020       TFM TYPCNT,COOREC-2
3702009080160887 5J4071Z
37030       TF  NCSUM,COREF-10,,    COORDINATES OF FIRST COURSE
3703009092260478814643Z
37040       TF  ECSUM,COREF-1
3704009104260479714652Z
37050       TDM SWE,1
3705009116150482900001Z
37060       RCTY
3706009128340000000102Z
37080       TFM *&18,COOREC&2
3708009140160915 8J4075Z
37090       C   *,COOREC&200,, FIND COURSES TO BE COMPUTED
3709009152240915214273Z
37100       BE  *&36
3710009164460920001200Z
37110       AM  *-18,2,10
3711009176110915800002Z
37120       B   *-36
3712009188490915200000Z
37130       TF  *&18,*-42
3713009200260921809158Z
37140       TFM *,97,10,      SET COURSE NO OF COURSE TO BE COMPUTED TO 97
3714009212160921200OR7Z
37150       TFM *&18,COOREC&2
3715009224160924 2J4075Z
37160       C   *,COOREC&202
3716009236240923614275Z
37170       BE  *&36
3717009248460928401200Z
37180       AM  *-18,2,10
3718009260110924200002Z
37190       B   *-36
3719009272490923600000Z
37200       TF  *&18,*-42
3720009284260930209242Z
38010       TFM *,98,10
3801009296160929600OR8Z
```

88



```
38015ENTER TF  NCSUM.COREF-10
380150930826047881464 3Z                                        J10930809320
38016      TF  ECSUM.COREF-1
380160932026047971465 2Z                                        J10932009332
38020      AM  TYPCNT,2,10
380200933211088750000 2Z                                        J10933209344
38030      TF  *623,TYPCNT
380300934426093670887 5Z                                        J10934409356
38040      TF  READIN61,*,,      MOVE COURSE NO IN READIN AREA
380400935626145210935 6Z                                        J10935609368
38050      BT  COADDR,READIN61
380500936827011421452 1Z                                        J10936809380
38060      TF  *623,BBCOAD611
380600938026094030121 3Z                                        J10938009392
38070      TR  READIN62,*,,      MOVE COURSE TO READIN AREA
380700939231145220939 2Z                                        J10939209404
38080      CM  READIN61,0,10,    IS THIS THE FIRST COURSE
380800940414145210000 2Z                                        J10940409416
38090      BE  NEWSMS672
380900941646099200120 0Z                                        J10941609428
38100      CM  READIN61,99,10,   IS THIS THE LAST COURSE
381000942814145210009 7Z                                        J10942809440
38110      BE  COLAST
381100944046099680120 0Z                                        J10944009452
38120      TD  *620,READIN62
381200945225094721452 2Z                                        J10945209464
38130      CM  *68,01,710,,      DOES CODE INDICATE COURSE TO BE BALANCED
381300946414094720000 1Z                                        J10946409476
38140      BNE NEWSMS
381400947647098480120 0Z                                        J10947609488
38150      BNC1NEWSMS,,,         IS SWITCH 1 ON TO INDICATE BALANCE
381500948847098480010 0Z                                        J10948809500
38160      M   LENGTH,LATFAC
381600950023145401361 1Z                                        J10950009512
38170      BC2 *648,,,     IF USING COMPASS RULE, BRANCH
381700951246095600020 0Z                                        J10951209524
38180      TF  DISTSM,LAT
381800952426048241454 8Z                                        J10952409536
38190      CF  DISTSM
381900953633048240000 0Z                                        J10953609548
38200      M   DISTSM,LATFAC
382000954823048241361 1Z                                        J10954809560
39010      SF  84
390100956032000840000 0Z                                        J10956009572
39020      BNF *624,99
390200957244095960009 9Z                                        J10957209584
39030      SF  91
390300958432000910000 0Z                                        J10958409596
39040      A   LAT,91,,          BALANCED LATITUDE
390400959621145480009 1Z                                        J10959609608
39050      M   LENGTH,DEPFAC
390500960823145401361 9Z                                        J10960809620
39060      BC2 *648
390600962046096680020 0Z                                        J10962009632
39070      TF  DISTSM,DEP
390700963226048241455 6Z                                        J10963209644
39080      CF  DISTSM
390800964433048240000 0Z                                        J10964409656
39090      M   DISTSM,DEPFAC
390900965623048241361 9Z                                        J10965609668
39100      SF  84
391000966832000840000 0Z                                        J10966809680
39110      BNF *624,99
391100968044097040009 9Z                                        J10968009692
39120      SF  91
391200969232000910000 0Z                                        J10969209704
```



```
39130      A   DEP,91,,          BALANCED DEPARTURE
391300970421145560009 1Z                                        J10970409716
39140      M   LAT,LAT
391400971623145481454 8Z                                        J10971609728
39150      TF  NORTHR ,99
391500972826024170009 9Z                                        J10972809740
39160      M   DEP,DEP
391600974023145561455 6Z                                        J10974009752
39170      A   99,NORTHR
391700975221000990241 7Z                                        J10975209764
39180      BT  BIGSQT,101
391800976427008220010 1Z                                        J10976409776
39190      AM  98,5,10
391900977611000980000 5Z                                        J10977609788
39200      TF  LENGTH,97,,       BALANCED LENGTH
392000978826145400009 7Z                                        J10978809800
40010      TFM ATNEND66,*636
400100980016025560983 6Z                                        J10980009812
40020      TF  EASTER,DEP
400200981226024081455 6Z                                        J10981209824
40030      BT  ARCTAN,LAT
400300982427024181454 8Z                                        J10982409836
40040      TF  AZIM,ATNANS
400400983626145320351 3Z                                        J10983609848
40050NEWSMSA   NCSUM,LAT
400500984821047881454 8Z                                        J10984809860
40060      A   ECSUM,DEP,,       END COORDINATES FOR COURSE COMPUTED
400600986021047971455 6Z                                        J10986009872
40070      TF  NORTH,NCSUM
400700987226145650478 8Z                                        J10987209884
40080      TF  EAST,ECSUM
400800988426145740479 7Z                                        J10988409896
40090      TF  *618,ENTER695
400900989626099140940 3Z                                        J10989609908
40100      TR  *,READIN62,,      PUT BALANCED COURSE BACK IN STORAGE
401000990831099081452 2Z                                        J10990809920
40110      TFM TYCEND66,ENTER624
401100992016047740933 2Z                                        J10992009932
40111      BTM PUNCH
401110993217070160000 0Z                                        J10993209944
40112      WNCDOUTPCH-79
401120994438143600040 0Z                                        J10994409956
40120      B   TYPCOR
401200995649044080000 0Z                                        J10995609968
40130COLASTTF  DEP,EAST,,        CALCULATE LAST COURSE
401300996826145561457 4Z                                        J10996809980
40140      S   DEP,ECSUM
401400998022145560479 7Z                                        J10998009992
40150      SF  DEP-7
401500999232145490000 0Z                                        J109992J0004
40160      TF  LAT,NORTH
401601000426145481456 5Z                                        J1J0004J0016
40170      S   LAT,NCSUM
401701001622145480478 8Z                                        J1J0016J0028
40180      SF  LAT-7
401801002832145410000 2Z                                        J1J0028J0040
40190      M   LAT,LAT
401901004023145481454 8Z                                        J1J0040J0052
40200      TF  NORTHR ,99
402001005226024170009 9Z                                        J1J0052J0064
41010      M   DEP,DEP
410101006423145561455 6Z                                        J1J0064J0076
41020      A   99,NORTHR
410201007621000990241 7Z                                        J1J0076J0088
41030      BT  BIGSQT,101
410301008827008220010 1Z                                        J1J0088J0100
```

```
41040       AM  98.5.10
4104010100110009800005Z                                          J1J0100J0112
41050       TF  LENGTH.97
4105010112261454000097Z                                          J1J0112J0124
41060       TFM ATNEND66.*636
4106010124160255GJ0160Z                                          J1J0124J0136
41070       TF  EASTER.DEP
4107010136260240814556Z                                          J1J0136J0148
41080       BT  ARCTAN.LAT
4108010148270241814548Z                                          J1J0148J0160
41090       TF  AZIM.ATNANS
4109010160261453203513Z                                          J1J0160J0172
41100       TR  COUR99.READING2..  STORE LAST COURSE
4110010172311994614522Z                                          J1J0172J0184
41110       TFM TYCEND66.AREATS
4111010184160477409056Z                                          J1J0184J0196
41120       BTM PUNCH
4112010196170701600000Z                                          J1J0196J0208
41130       WNCDOUTPCH-79
4113010208381436000400Z                                          J1J0208J0220
41140       B   TYPCOR
4114010220490440800000Z                                          J1J0220J0232
41150       CM  99.1.10.        ONE UNKNOWN AZIMUTH
4115010232140009900001Z                                          J1J0232J0244
41160       BNE ISTYP3
4116010244710364012002                                           J1J0244J0256
41170       BT  COADDR.COOREC6200.. GET ADDRESS OF COURSE WITH UNKNOWN AZIM
4117010256270114214273Z                                          J1J0256J0268
41180       TF  *623.BBCOAD611
4118010268261029101213Z                                          J1J0268J0280
41190       TR  READING2.*
4119010280311452210280Z                                          J1J0280J0292
41200       TF  READING12.COUR9961O..  AZIMUTH OF CLOSING COURSE
4120010292261453219956Z                                          J1J0292J0304
42010       TFM LDEND66.*624
4201010304160152OJ0328Z                                          J1J0304J0316
42020       B   LATDEP
4202010316490127400000Z                                          J1J0316J0328
42030       TF  *618.BBCOAD611
4203010328261034601213Z                                          J1J0328J0340
42040       TR  *.READING2..       STORE COMPLETED COURSE
4204010340311034014522Z                                          J1J0340J0352
42050       B   ENTER
4205010352490930800000Z                                          J1J0352J0364
420601STYP3CM  99.3.10.            ONE UNKNOWN DISTANCE
4206010364140009900003Z                                          J1J0364J0376
42070       BNE ISTYP3G132
4207010376471049601200Z                                          J1J0376J0388
42080       BT  COADDR.COOREC6204
4208010388270114214277Z                                          J1J0388J0400
42090       TF  *623.BBCOAD611
4209010400261042301213Z                                          J1J0400J0412
42100       TR  READING2.*
4210010412311452210412Z                                          J1J0412J0424
42110       TF  LENGTH.COUR9961B..  LENGTH OF CLOSING COURSE
4211010424261454019964Z                                          J1J0424J0436
42120       TFM LDEND66.*624
4212010436160152OJ0460Z                                          J1J0436J0448
42130       B   LATDEP
4213010448490127400000Z                                          J1J0448J0460
42140       TF  *618.BBCOAD611
4214010460261047801213Z                                          J1J0460J0472
42150       TR  *.READING2..       STORE COMPLETE COURSE
4215010472311047214522Z                                          J1J0472J0484
42160       B   ENTER
4216010484490930800000Z                                          J1J0484J0496
```

91

```
42170       CM  99.7.10.        ONE UNKNOWN COURSE
4217010496140009900007Z                                          J1J0496J0508
42180       BNE *660
4218010508471056801200Z                                          J1J0508J0520
42190       BT  COADDR.COOREC6200
4219010520270114214273Z                                          J1J0520J0532
42200       TF  *618.BBCOAD611
4220010532261055001213Z                                          J1J0532J0544
43010       TR  *.COUR99
4301010544311054419946Z                                          J1J0544J0556
43020       B   ENTER
4302010556490930800000Z                                          J1J0556J0568
43030       CM  99.6.10..   TWO UNKNOWN DISTANCES
4303010568140009900006Z                                          J1J0568J0580
43040       BNE TYP24
4304010580471125201200Z                                          J1J0580J0592
43050       CF  COOREC6205
4305010592331427800000Z                                          J1J0592J0604
43060       BT  COADDR.COOREC6206
4306010604270114214279Z                                          J1J0604J0616
43070       TF  *623.BBCOAD611
4307010616261063901213Z                                          J1J0616J0628
43080       TR  READING2.*..        FIRST UNKNOWN COURSE
4308010628311452210628Z                                          J1J0628J0640
43090       TF  *623.BBCOAD66
4309010640261066301208Z                                          J1J0640J0652
43100       TR  READ262.*..         SECOND UNKNOWN COURSE
4310010652311428210652Z                                          J1J0652J0664
43110       TFM SINEND66.*624
4311010664160214OJ0688Z                                          J1J0664J0676
43120       BT  SINCOS.AZIM
4312010676270153414532Z                                          J1J0676J0688
43130       TF  ALATSM.SIN
4313010688260480602390Z                                          J1J0688J0700
43140       TF  ADEPSM.COS
4314010700260481502399Z                                          J1J0700J0712
43150       TFM SINEND66.*624
4315010712160214OJ0736Z                                          J1J0712J0724
43160       BT  SINCOS.READ262..    AZIMUTH OF SECOND COURSE
4316010724270153414292Z                                          J1J0724J0736
43170       M   ALATSM.COS
4317010736230480602399Z                                          J1J0736J0748
43180       SF  83
4318010748320008300000Z                                          J1J0748J0760
43190       BNF *624.99..           TEST FOR NEGATIVE
4319010760441078400099Z                                          J1J0760J0772
43200       SF  91
4320010772320009100000Z                                          J1J0772J0784
44010       TF  DISTSM.91..
4401010784260482400091Z                                          J1J0784J0796
44020       M   ADEPSM.SIN
4402010796230481502390Z                                          J1J0796J0808
44030       SF  83
4403010808320008300000Z                                          J1J0808J0820
44040       BNF *624.99
4404010820441084400099Z                                          J1J0820J0832
44050       SF  91
4405010832320009100000Z                                          J1J0832J0844
44060       S   DISTSM.91..      DISTSM#SIN1COS2-COS1SIN2
4406010844220482400091Z                                          J1J0844J0856
44070       SF  *611...         SWITCH
4407010856321086700000Z                                          J1J0856J0868
44080COMMUNM   COUR9962G.SIN
4408010868231997202390Z                                          J1J0868J0880
44090       SF  84
4409010880320008400000Z                                          J1J0880J0892
```

92

```
44100       BNF *624,99
4410010892441091600099Z
44110       SF  92
4411010904320009200000Z
44120       TF  NUM,92
4412010916260041000092Z
44130       M   COUR9934,COS
4413010928231998002399Z
44140       SF  84
4414010940320008400000Z
44150       BNF *624,99
4415010952441097600099Z
44160       SF  92
4416010964320009200000Z
44170       S   NUM,92
4417010976220041000092Z
44180       SF  DISTSM-7
4418010988320481700000Z
44190       BD  *6192,DISTSM-8
4419011000431119204816Z
44200       C   408,DISTSM-1
4420011012240040804823Z
45010       BH  *6192,,      CANNOT BE SOLVED
4501011024461121601100Z
45020       BT  DIVSUB,DISTSM
4502011036270042004824Z
45030       TF  LENGTH,QUO-3
4503011048261454000818Z
45040       TFM LDEND66,*624
4504011060160152OJ1084Z
45050       B   LATDEP
4505011072490127400000Z
45060       TF  *618,BBCOAD611
4506011084261110201213Z
45070       TR  *,READING62,,    STORE COMPLETED COURSE
4507011096311109614522Z
45080       BNF ENTER,COMMUN-1,, BOTH COURSES CALCULATED
4508011108440930810867Z
45090       TF  SIN,ALATSM,,     PREPARE TO CALCULATE SECOND COURSE
4509011120260239004806Z
45100       TF  COS,ADEPSM
4510011322602399048I5Z
45110       TR  READING62,READ2662
4511011144311452214282Z
45120       TF  BBCOAD611,BBCOAD66
4512011156260121301208Z
45130       CF  COMMUN-1
4513011168331086700000Z
45140       B   COMMUN
4514011180491086800000Z
45150       TF  LENGTH,NUM-1
4515011192261454000409Z
45160       B   COMMUN6192
4516011204491106000000Z
45170       WATYUNSLWD
4517011216391362100100Z
45180       H
4518011228480000000000Z
45190       B   *-12
4519011240491122800000Z
46010TYP24  TDM SWE,0,,
4601011252150482900000Z
46020       CM  99,4,10,     UNKNOWN AZIMUTH AND LENGTH, DIFFERENT COURSES
4602011264140009900004Z
46030       BNE TYP2
4603011276471218801200Z
```

93

ALTERNATE SOLUTION TO BE PRINTED

```
J1J0892J0904
J1J0904J0916
J1J0916J0928
J1J0928J0940
J1J0940J0952
J1J0952J0964
J1J0964J0976
J1J0976J0988
J1J0988J1000
J1J1000J1012
J1J1012J1024
J1J1024J1036
J1J1036J1048
J1J1048J1060
J1J1060J1072
J1J1072J1084
J1J1084J1096
J1J1096J1108
J1J1108J1120
J1J1120J1132
J1J1132J1144
J1J1144J1156
J1J1156J1168
J1J1168J1180
J1J1180J1192
J1J1192J1204
J1J1204J1216
J1J1216J1228
J1J1228J1240
J1J1240J1252
J1J1252J1264
J1J1264J1276
J1J1276J1288
```

```
46040       TF  COOREC6202,COOREC6204
4604011288261427514277Z
46050       CF  COOREC6201
4605011300331427400000Z
46060       BT  COADDR,COOREC6202
4606011312270114214275Z
46070       SF  COOREC6201
4607011324321427400000Z
46080       TF  *623,BBCOAD66
4608011336261135901208Z
46090       TR  READ262,*,,      COURSE WITH UNKNOWN AZIMUTH
4609011348311428211348Z
46100       TF  *623,BBCOAD611
4610011360261138301213Z
46110       TR  READING2,*,,     COURSE WITH UNKNOWN LENGTH
4611011372311452211372Z
46120       TFM SINEND66,*624
4612011384160214OJ1408Z
46130       BT  SINCOS,AZIM
4613011396270153414532Z
46140       M   COUR9934,SIN
4614011408231998002390Z
46150       TF  DISTSM,99
4615011420260482400099Z
46160       M   COUR9926,COS
4616011432231997202399Z
46170       A   DISTSM,99
4617011444210482400099Z
46180       BNF *624,DISTSM
4618011456441148004824Z
46190       SF  DISTSM-8
4619011468320481600000Z
46200       M   DISTSM-8,DISTSM-8
4620011480230481604816Z
47010       TF  NORTHR ,99
4701011492260241700099Z
47020       M   READ2620,READ2620
4702011504231430014300Z
47030       A   NORTHR ,99
4703011516210241700099Z
47040       M   COUR9934,COUR9934
4704011528231998019980Z
47050       S   NORTHR ,99
4705011540220241700099Z
47060       M   COUR9926,COUR9926
4706011552231997219972Z
47070       S   NORTHR ,99
4707011564220241700099Z
47080       BT  BIGSQT,NORTHR
4708011576270082202417Z
47090       TF  ZSARG,DISTSM-8,,     STORE A IN ZSARG
4709011588260405904816Z
47100       A   ZSARG,98,,          UNKNOWN LENGTH # A & SQRT%B¤
4710011600210405900098Z
47110       SF  ZSARG-7
4711011612320405200000Z
47120       TF  LENGTH,ZSARG
4712011624261454004059Z
47130       TF  OUT,SIN
4713011636260402502390Z
47140       TF  OUT-9,COS
4714011648260401602399Z
47150       TF  ALATSM,98,,      STORE SQRT%B¤
4715011660260480600098Z
47160       TFM LDEND66,*624
4716011672160152OJ1696Z
```

94

```
J1J1288J1300
J1J1300J1312
J1J1312J1324
J1J1324J1336
J1J1336J1348
J1J1348J1360
J1J1360J1372
J1J1372J1384
J1J1384J1396
J1J1396J1408
J1J1408J1420
J1J1420J1432
J1J1432J1444
J1J1444J1456
J1J1456J1468
J1J1468J1480
J1J1480J1492
J1J1492J1504
J1J1504J1516
J1J1516J1528
J1J1528J1540
J1J1540J1552
J1J1552J1564
J1J1564J1576
J1J1576J1588
J1J1588J1600
J1J1600J1612
J1J1612J1624
J1J1624J1636
J1J1636J1648
J1J1648J1660
J1J1660J1672
J1J1672J1684
```

```
47170       B   LATDEP
471701168449012740000OZ                                          J1J1684J1696
47180       TF  *618.BBCOAD611
471801169626117140121 3Z                                         J1J1696J1708
47190       TR  *.READING62..      STORE COURSE WITH UNKNOWN LENGTH- SOL 1
471901170831117081452 2Z                                         J1J1708J1720
47200       M   LENGTH.OUT..       UNKNOWN LENGTH X SIN%KNOWN AZIMUTH¤
472001172023145400402 5Z                                         J1J1720J1732
48010       BN  *624
480101173247117560130 0Z                                         J1J1732J1744
48020       SF  91
480201174432000910000 0Z                                         J1J1744J1756
48030       A   91.COUR9934.. ADD DEPARTURE OF 99
480301175621000911998 0Z                                         J1J1756J1768
48040       TF  EASTER.91
480401176826024080009 1Z                                         J1J1768J1780
48050       M   LENGTH.OUT-9..
480501178023145400401 6Z                                         J1J1780J1792
48060       BN  *624
480601179247118160130 0Z                                         J1J1792J1804
48070       SF  91
480701180432000910000 0Z                                         J1J1804J1816
48080       A   91.COUR9926
480801181621000911997 2Z                                         J1J1816J1828
48090       TFM ATNEND66.*624
480901182816025561852 Z                                          J1J1828J1840
48100       BT  ARCTAN.91
481001184027024180009 1Z                                         J1J1840J1852
48110       TF  READ2612.ATNANS..  STORE CALCULATED AZIMUTH - 1ST SOLUTION
481101185226142920351 3Z                                         J1J1852J1864
48120       S   DISTSM-8.ALATSM..      A-SORT%B¤
481201186422048160480 6Z                                         J1J1864J1876
48130       SF  DISTSM-15...        8 DIGIT FIELD
481301187632048090000 0Z                                         J1J1876J1888
48140       TF  LENGTH.DISTSM-8..  STORE LENGTH - 2ND SOLUTION
481401188826145400481 6Z                                         J1J1888J1900
48150       TFM LDEND66.*624
481501190016015201924 Z                                          J1J1900J1912
48160       B   LATDEP
481601191249012740000 0Z                                         J1J1912J1924
48170       TR  19892.READING62..  ALT UNKNOWN LENGTH IS COURSE 98
481701192431198921452 2Z                                         J1J1924J1936
48180       M   LENGTH.OUT..      ALT LENGTH X SIN%KNOWN AZIMUTH¤
481801193623145400402 5Z                                         J1J1936J1948
48190       BN  *624
481901194847119720130 0Z                                         J1J1948J1960
48200       SF  91
482001196032000910000 0Z                                         J1J1960J1972
49010       A   91.COUR9934.. ADD DEPARTURE OF 99
490101197221000911998 0Z                                         J1J1972J1984
49020       TF  EASTER.91
490201198426024080009 1Z                                         J1J1984J1996
49030       M   LENGTH.OUT-9.. ALT LENGTH X COS%KNOWN AZIMUTH¤
490301199623145400401 6Z                                         J1J1996J2008
49040       BN  *624
490401200847120322013 0Z                                         J1J2008J2020
49050       SF  91
490501202032000910000 0Z                                         J1J2020J2032
49060       A   91.COUR9926.. ADD LATITUDE OF 99
490601203221000911997 2Z                                         J1J2032J2044
49070       TFM ATNEND66.*624
490701204416025561206 Z                                          J1J2044J2056
49080       BT  ARCTAN.91
490801205627024180009 1Z                                         J1J2056J2068
49090       TR  READING2.READ262
490901206831145221428 2Z                                         J1J2068J2080
49100       TFM LDEND66.*624
491001208016015201J2104Z                                         J1J2080J2092
49110       B   LATDEP
491101209249012740000 0Z                                         J1J2092J2104
49120       TF  *618.BBCOAD66
491201210426121220120 8Z                                         J1J2104J2116
49130       TR  *.READING62..   STORE COURSE WITH UNKNOWN AZIM - SOLUTION1
491301211631121161452 2Z                                         J1J2116J2128
49140       TF  AZIM.ATNANS
491401212826145320351 3Z                                         J1J2128J2140
49150       TFM LDEND66.*624
491501214016015201J2164Z                                         J1J2140J2152
49160       B   LATDEP
491601215249012740000 0Z                                         J1J2152J2164
49170       TR  19838.READING62..  ALT UNKNOWN AZIM IS COURSE 97
491701216431198381452 2Z                                         J1J2164J2176
49180       B   ENTER
491801217649093080000 0Z                                         J1J2176J2188
50010TYP2   CM  99.2.10
500101218814000990000 2Z                                         J1J2188J2200
50020       BE  *636
500201220046122360120 0Z                                         J1J2200J2212
50030       TDM ERRWD66.5..   UNKNOWN PROBLEM TYPE
500301221215050330000 5Z                                         J1J2212J2224
50040       B   TERR
500401222449055972000 0Z                                         J1J2224J2236
50050       CF  COOREC6201
500501223633142740000 0Z                                         J1J2236J2248
50060       BT  COADDR.COOREC6202
500601224827011421427 5Z                                         J1J2248J2260
50070       SF  COOREC6201
500701226032142740000 0Z                                         J1J2260J2272
50080       TF  *623.BBCOAD66
500801227226122950120 8Z                                         J1J2272J2284
50090       TR  READ262.*..          SECOND UNKNOWN AZIMUTH
500901228431142821228 4Z                                         J1J2284J2296
50100       TF  *623.BBCOAD611
501001229626123190121 3Z                                         J1J2296J2308
50110       TR  READING2.*..         FIRST UNKNOWN AZIMUTH
501101230831145221230 8Z                                         J1J2308J2320
50120       TF  NORTHR .COUR9918..  LENGTH 99
501201232026024171996 4Z                                         J1J2320J2332
50130       CF  NORTHR -7
501301233233024100000 0Z                                         J1J2332J2344
50140       TDM NORTHR -8.0.11.      MAKE LENGTH 9 PLACES
501401234415024090000 0Z                                         J1J2344J2356
50150       A   NORTHR .LENGTH
501501235621024171454 0Z                                         J1J2356J2368
50160       A   NORTHR .READ2620
501601236821024171430 0Z                                         J1J2368J2380
50170       MM  NORTHR .5.10.        S IS NOW CALCULATED
501701238013024170000 5Z                                         J1J2380J2392
50180       SF  90
501801239232000990000 0Z                                         J1J2392J2404
50190       TF  NORTHR .98..         STORE S
501901240426024170009 8Z                                         J1J2404J2416
50200       S   98.COUR9918..       S-L99
502001241622000981996 4Z                                         J1J2416J2428
51010       TF  WORK9A.98..            S - L99
510101242826136540009 8Z                                         J1J2428J2440
51020       TF  WORK9B.NORTHR
510201244026136630241 7Z                                         J1J2440J2452
51030       S   WORK9B.LENGTH..        S - L1
510301245222136631454 0Z                                         J1J2452J2464
51040       TF  WORK9C.NORTHR
510401246426136740241 7Z                                         J1J2464J2476
```

95

96

```
51050       S    WORK9C.READ2620..        S - L2
5105012476221367414300Z
51060       M    WORK9B.WORK9C
5106012488231366313674Z
51070       SF   90
5107012500320009000000Z
51080       TF   Z10.99..          STORE LAST TEN POSITIONS
5108012512260080300099Z
51090       CF   90
5109012524330009000000Z
51100       TF   NUM.90
5110012536260041000090Z
51110       BT   DIVSUB.NORTHR
5111012548270042002417Z
51120       TF   Z10-1.FAKE00643
5112012560260080204873Z
51125       TDM  Z10.0
5112512572150080300000Z
51130       M    QUO-2.WORK9A
5113012584230081913654Z
51135       SF   83
5113512596320008300000Z
51140       BT   BIGSQT.100
5114012608270082200100Z
51150       TF   R.98
5115012620261368300098Z
51160       TF   EASTER.R
5116012632260240813683Z
51170       TFM  ATNEND66.*624
5117012644160255J2668Z
51180       BT   ARCTAN.WORK9B
5118012656270241813663Z
51190       BT   ANGADD.ATNANS
5119012668270352203513Z
51200       TF   WORK9B.ADARG1..     A2
5120012680261366303521Z
52010       TF   EASTER.R
5201012692260240813683Z
52020       TFM  ATNEND66.*624
5202012704160255J2728Z
52030       BT   ARCTAN.WORK9C
5203012716270241813674Z
52040       BT   ANGADD.ATNANS
5204012728270352203513Z
52050       TF   WORK9C.ADARG1..        A1
5205012740261367403521Z
52060       TF   ADARG2.WORK9C
5206012752260351313674Z
52070       BT   ANGADD.COUR99610
5207012764270352219956Z
52080       TF   AZIM.ADARG1..          FIRST UNK COURSE
5208012776261453203521Z
52090       TFM  LDEND66.*624
5209012788160152OJ2812Z
52100       B    LATDEP
5210012800490127400000Z
52110       TF   *618.BBCOAD611
5211012812261283001213Z
52120       TR   *.READING2
5212012824311282414522Z
52130       TF   ADARG2.WORK9C
5213012836260351313674Z
52140       SF   ADARG2...      MAKE ANGLE NEGATIVE
5214012848320351300000Z
52150       SF   ADARG2-3
5215012860320351000000Z
```

97

```
J1J2476J2488
J1J2488J2500
J1J2500J2512
J1J2512J2524
J1J2524J2536
J1J2536J2548
J1J2548J2560
J1J2560J2572
J1J2572J2584
J1J2584J2596
J1J2596J2608
J1J2608J2620
J1J2620J2632
J1J2632J2644
J1J2644J2656
J1J2656J2668
J1J2668J2680
J1J2680J2692
J1J2692J2704
J1J2704J2716
J1J2716J2728
J1J2728J2740
J1J2740J2752
J1J2752J2764
J1J2764J2776
J1J2776J2788
J1J2788J2800
J1J2800J2812
J1J2812J2824
J1J2824J2836
J1J2836J2848
J1J2848J2860
J1J2860J2872
```

```
52160       SF   ADARG2-5
5216012872320350800000Z
52170       BT   ANGADD.COUR99610
5217012884270352219956Z
52180       TF   AZIM.ADARG1
5218012896261453203521Z
52190       TFM  LDEND66.*624
5219012908160152OJ2932Z
52200       B    LATDEP
5220012920490127400000Z
53010       TR   19892.READING2..    FIRST UNKNOWN COURSE - ALTERNATE
5301012932311989214522Z
53020       TR   READING2.READ262
5302012944311452214282Z
53030       TF   ADARG2.WORK9B
5303012956260351313663Z
53040       SF   ADARG2
5304012968320351300000Z
53050       SF   ADARG2-3
5305012980320351000000Z
53060       SF   ADARG2-5
5306012992320350800000Z
53070       BT   ANGADD.COUR99610
5307013004270352219956Z
53080       TF   AZIM.ADARG1
5308013016261453203521Z
53090       TFM  LDEND66.*624
5309013028160152OJ3052Z
53100       B    LATDEP
5310013040490127400000Z
53110       TF   *618.BBCOAD66
5311013052261307001208Z
53120       TR   *.READING2..        SECOND UNKNOWN COURSE
5312013064311306414522Z
53130       TF   ADARG2.WORK9B
5313013076260351313663Z
53140       BT   ANGADD.COUR99610
5314013088270352219956Z
53150       TF   AZIM.ADARG1
5315013100261453203521Z
53160       TFM  LDEND66.*624
5316013112160152OJ3136Z
53170       B    LATDEP
5317013124490127400000Z
53180       TR   19838.READING2
5318013136311983814522Z
53190       B    ENTER
5319013148490930800000Z
54005CON1   DC   18.0
5400513177  00018
540050000000 000 0       Z
54006CON2   DSS  18
5400613178  00018
54010AREACPSF  *611
5401013196321320700000Z
54020       TR   WORK9A-8 .14635..   COORDINATES OF FIRST COURSE
5402013208311364614635Z
54030       TFM  COOUT611.COOREC
5403013220161327914073Z
54040       TF   R.CON1
5404013232261368313177Z
54050       TR   CON2.WORK9A-8
5405013244311317813646Z
54060       AM   COOUT611.2.10
5406013256111327900002Z
54070C00UT BT   COADDR.*
```

98

```
5407013268270114213268Z
54080       AM  BBCOADG11,35
5408013280110121300035Z
54090       TF  *623,BBCOADG11
5409013292261331501213Z
54100       TR  WORK9A-8,*
5410013304311364613304Z
54110       M   CON268,WORK9B
5411013316231318613663Z
54120       A   R,99
5412013328211368300099Z
54130       M   CON2617,WORK9A
5413013340231319513654Z
54140       S   R,99
5414013352221368300099Z
54150       BNF *684,AREACPG11
5415013364441344813207Z
54160       CM  BBCOADG11,COUR99635
5416013376140121313J9981Z
54170       BNE COOUT-24
5417013388471324401200Z
54180       CF  AREACPG11
5418013400331320700000Z
54190       TR  CON2,WORK9A-8
5419013412311317813646Z
54200       TR  WORK9A-8,14635
5420013424311364614635Z
55010       B   COOUTG48
5501013436491331600000Z
55020       RCTY
5502013448340000000102Z
55030       WATYR62
5503013460391368500100Z
55040       MM  R,5,10
5504013472131368300005Z
55050       TD  93,400
5505013484250009300400Z
55060       WNTY81
5506013496380008100100Z
55070       RCTY
5507013508340000000102Z
55080       WATYR622
5508013520391370500100Z
55090       TF  R,92
5509013532261368300092Z
55100       MM  R,22957
5510013544131368JK2957Z
55110       TD  94,400
5511013556250009400400Z
55120       WNTY83
5512013568380008300100Z
55125       TDM AREACP,3
5512513580151319600003Z
55130       B   UNION
5513013592490906800000Z
56010LATFACDC  8,0
5601013611  00008
5601000000000Z
56020DEPFACDC  8,0
5602013619  00008
5602000000000Z
56030TYPCNTDS   ,FG11
5603008875  00000
56040COUR99DS  ,19946
5604019946  00000
56050UNSLWDDAC 13,UNSOL 2 DIST@
```

J1J3268J3280

J1J3280J3292

J1J3292J3304

J1J3304J3316

J1J3316J3328

J1J3328J3340

J1J3340J3352

J1J3352J3364

J1J3364J3376

J1J3376J3388

J1J3388J3400

J1J3400J3412

J1J3412J3424

J1J3424J3436

J1J3436J3448

J1J3448J3460

J1J3460J3472

J1J3472J3484

J1J3484J3496

J1J3496J3508

J1J3508J3520

J1J3520J3532

J1J3532J3544

J1J3544J3556

J1J3556J3568

J1J3568J3580

J1J3580J3592

J1J3592J3604

06J3604J3612

06J3612J3620)

```
5605013621  00013
560500455625653007200444962630Z
56060WORK9ADC  9,0
5606013654  00009
560600000000000Z
56070WORK9BDC  9,0
5607013663  00009
560700000000000Z
56075       DC  2,0
5607513665  00002
5607500Z
56080WORK9CDC  9,0
5608013674  00009
560800000000000Z
56090R      DC  9,0
5609013683  00009
560900000000000Z
56100       DAC 10,AREASQFT#@
5610013685  00010
56100M159454162584663330Z
56110       DAC 11,AREAACRES#@
5611013705  00011
56110M159454141435945623306
56111       DAC 8,AZIM 00@
5611113727  00008
56111M169495400707002
56112       DAC 8,DIST 00@
5611213743  00008
56112M449626300707002
56113       DAC 13,SET SWITCHES@
5611313759  00013
561130245630062664963438456202
56120       DEND05060
5612005060
56120  L60000000500490000Z
```

06J3620J3646

06J3646J3655

06J3655J3664

06J3664J3666

06J3666J3675

06J3675J3684

06J3684J3704

06J3704J3726

06J3726J3742

06J3742J3758

06J3758J3784

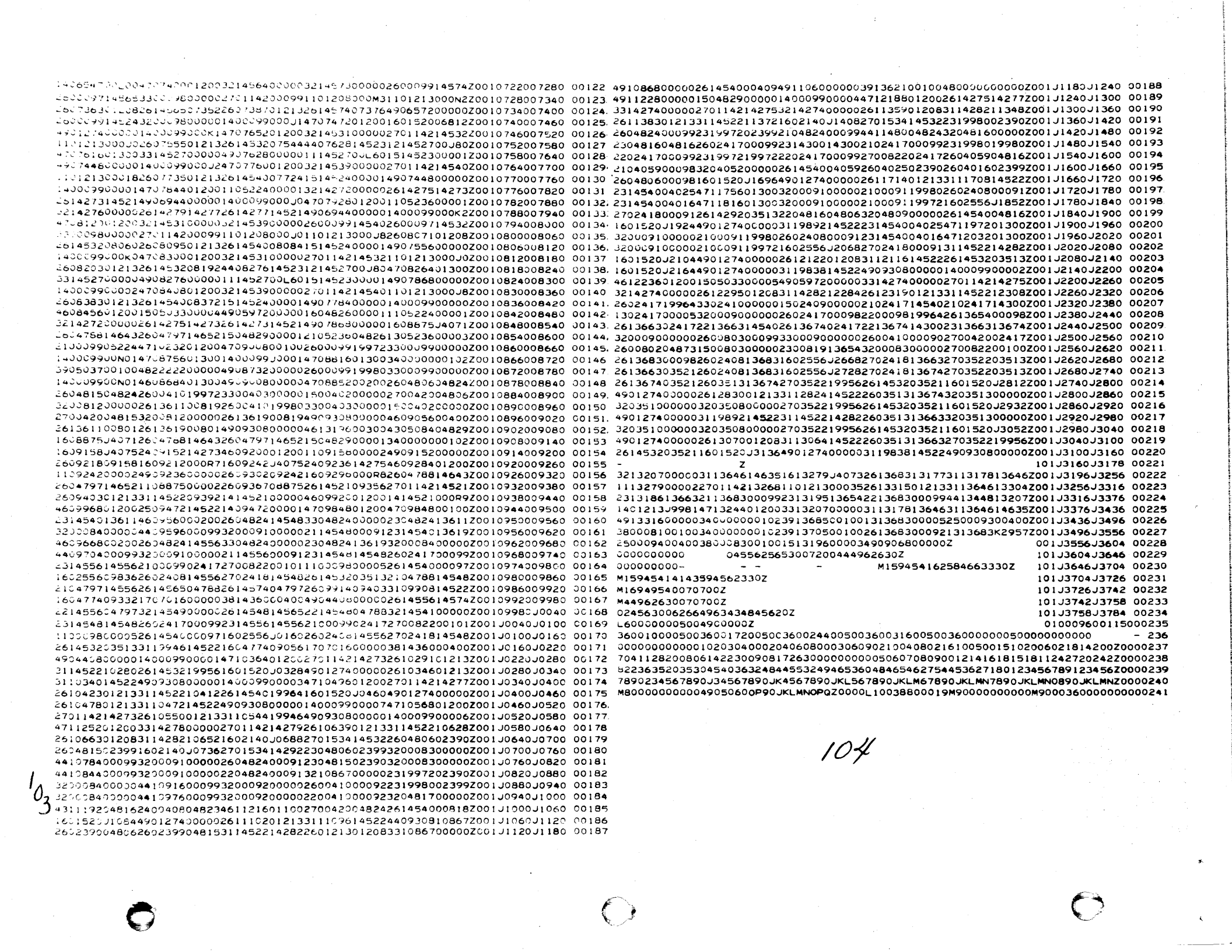
080009600115

99

100

CONDENSED OBJECT DECK LISTING – Deck1

```
3600072005003600201005004400012002762600059002742500011000002600090002690000000
2600095002643100000002002600114002742500000000114900012000000000              -
 10100000004OR7402000000000000
15004280000J16008200000250082100400440049200410330041000000Z001004200048O      1
11004280000144005280041933004190000011004280000126000990803Z0010048000540 00002
26000900041016005940009026006420059426006540059422000900041 9Z001005400060O 00003
47006360130011008200000149005880000021000900041933000900000OZ0010060000660 00005
110059400001140059400J00460073201200310081000811150082000000Z0010066000720 00006
49005640000011008200000532008110000014004280000047007920120OZ0010072000780 00007
3200819000004200000000OZ
-              Z                                                0-1007800080 4 00008
                                                               101007940080 4 00009
240082100803470087001200260009800802420000000000016009240080 5Z0010082200882 00010
160114000001250114100400260103200924220080501140470096601300Z0010088200942 00011
110114000002490C9180000014009240OQ214701C26013001301140000 05Z0010094201002 00012
32000900000042000000000021008050114026010560103233008050000OZ0010100201062 00013
120114000001330114000000310113001131150114C00001110092400002Z0010106201122 00014
4900906000002
                                                               -1011220113 4 00015
320113800000440121401140130114100054110009 9J46002601213000 99Z0010114201202 00016
420000000000320114000000130113900054110009 9J46002601208000 99Z0010120201262 00017
490115400000321452500000321453300000160214001322270153414532Z0010126201322 00018
230239014540320008400000110009200005440138200099320009100000Z0010132201382 00019
261455600091230239914540320008400000110009200005440145400099Z0010138201442 00020
320009100000261454800091210478814548210479714556261456504788Z0010144201502 00021
2614574047974900000000OZ
                                                                001015020152 6 00022
320153100000320152900000230232401528260236000099230233101530Z0010153401594 00023
210236000099130153 30L087210236000099320235100000330154500000Z0010159401654 00024
1402352000R54701738011003201545000001500080000J22000890235 9Z0010165401714 00025
320008100000260235900089230235902359260238100090230238102273Z0010171401774 00026
260237202282210237200090230237202381260237202292220237200090Z0010177401834 00027
230237202381260237202303210237200090230237202381260237202315Z0010183401894 00028
220237200090150007900000230237202359260239000087230239002390Z0010189401954 00029
320009900000210009902348270082200099260239900098140235000001Z0010195402014 00030
470208601300460214601200140235000003460220601200320239000000Z0010201402074 00031
320239900000440213401545260009902390260239002399260239900099Z0010207402134 00032
490000000000440218201545320239900000490213400000320239000000Z0010213402194 00033
490209800000440224201545320239000000490213400000320239900000Z0010219402254 00034
4902098000 00Z
                                                               -102254022 66 00035
J5148419M6737655PP96896792804596371100J57079631847J11111111Z 101022660232 5 00036
J851851J000000000000000   Z
                                                               101023250234 9 00037
16024260000044024660240833024080000015024250000J44025020241 7Z0010241802478 00038
330241700000150242600001260009902417210009902408470256201200Z0010247802538 00039
260351300099490255000000220240802417260041002408270042000099Z0010253802598 00040
1400812000J047026580120026000990081926000900341149029700000 0Z0010259802658 00041
320081200000230081900819260238100092230238103418260237203427Z0010265802718 00042
220237200091230237202381260237203436210237200090230237202381Z0010271802778 00043
260237203445220237200090230237202381260237203455210237200090Z0010277802838 00044
230237202381260237203465220237200090230237202381260237203475Z0010283802898 00045
210237200090230237202381260237203485220237200090330081200000Z0010289802958 00046
230237200819440299400099320009000000210009003411260237200090Z0010295803018 00047
120242600001470312601300460310201200430311402425320237200000Z0010301803078 00048
210237203505490311400000320237200000210237203505230349502372Z0010307803138 00049
260350800082320008300000260237200091130237200000260351000090Z0010313803198 00050
320009100000260237200096130237200000110009500005260351300094Z0010319803258 00051
140351300000330351100000470330601300110351100004140351000000Z0010325803318 00052
330350900000470335401300110350900004140350800L60470255001300Z0010331803378 00053
16035080000049025500000 0Z
                                                               0-1033780340 2 00054
0785398164M054058K18612288N5909886JR6420044 1J39085335JZ       101034020345 6 00055
J994653599L33298650NR999993329N72957795 1L141592653Z           101034560350 6 00056
320351100000320350900000320351900000320351700000260353303521Z0010352203582 00057
330353100000210353303513470366601300120353300000470367801300Z0010358203642 00058
110351800001490369000000120351800001110353300000320353100000Z0010364203702 00059
260352103533260354503518330354400000210354503510470381001300Z0010370203762 00060
120354500000470382201300110351600001490383400000120351600001Z0010376203822 00061
110354500000320354400000260351803545210351603508460396601300Z0010382203882 00062
110351600L60330352100000330351900000330351800000330351700000Z0010388203942 00063
330351600000420000000000120351600L60470388201300490389400000Z0010394204002 00064
P07070707070037070700 00Z
                                                               101040260405 0 00065
310400204026440409604059150402200002250402104059250401904058Z0010406004120 00066
250401704057440416804052330405200000150405100000250401304056Z0010412004180 00067
250401104055250400904054250400704053250400504052250400304051Z0010418004240 00068
430438404051150400200000430438404052150400400000430438404053Z0010424004300 00069
150400600000430438404054150400800000430438404055150401000000Z0010430004360 00070
430438404056150401200000390400300100420000000000340003000102Z0010436004420 00071
260405814521250405900400330405700000380405700100340000000101Z0010442004480 00072
260405814527330405600000380405600100340000000101260405814529Z0010448004540 00073
380405700100340000000101260405814531380405700100250441500400Z0010454004600 00074
390441300100150441500000250405814532380405800100340000000101Z0010460004660 00075
270406014540340000000101270406014548340000000101270406014556Z0010466004720 00076
340000000101270406014565340000000101270406014574490000000000Z0010472004780 00077
-   -      -      -      -      -                         Z    101048300488 4 00078
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@Z 1-1J4469J45190-0079
Z                                                              101J4519J452 0 00080
N556030000416949546463480000000000053455547634800002           101048840493 4 00081
0000005341634963644445000000000444557415963645945Z             101049340498 2 00082
000000000555659634800000000000000045416263 0Z                  101049820502 6 00083
M55959700Z                                                     101050260503 6 00084
M26462630Z                                                     101050360504 6 00085
340000000102390488500100340000000102391375900100340000000102Z0010506005120 00086
4800000000016051 50J4075160000000000110515000004140515 0J4279Z0010512005180 00087
470514401100160482800000160650 6J40731605224000001605236 00000Z0010518005240 00088
260478804873260479704788260480604788260481504788260482404788Z0010524005300 00089
361452000500321452000000321452200000321452500000321453300000Z0010530005360 00090
321455700000321456600000321454100000321454900000430591204827Z0010536005420 00091
450550414521160545 0J460216000000000011054 50000N41405450J9948Z0010542005480 00092
470544401100490530000000321452000000141452100000460562401200Z0010548005540 00093
311460004830150482700001380487900100340000000102260478804873Z0010554005600 00094
260479704873490603200000150482700001141452400L00470582801200Z0010560005660 00095
321456400000260009714565321457300000260009914574330009800000Z0010566005720 00096
270114200099110120800 0M3110121300 0N22605779012082614565 0576 8Z0010572005780 00097
260580301213261457405792151452200 00K49058520000014145240 0K00Z0010578005840 00098
470588801200260478814565260479714574490651200000150503300002Z0010584005900 00099
490597200000141452100 0R946060080120014145210000470602001200Z0010590005960 00100
150503300001390502700100481111100000490598400000150482800001Z0010596006020 00101
110650600002260009914524320009800000140009900 0L347061640120 0Z0010602006080 00102
321453900000321453100000241452114540470616401200241452114532Z0010608006140 00103
470616401200320616800000250619600098330619600000140619600003Z0010614006200 00104
470633201200340000000102251373714520251373914521391372700100Z0010620006260 00105
340000000102361453100100440632014523151452300 00K490633200000Z0010626006320 00106
151452300002250635200099140635200003470650001200340000000102Z0010632006380 00107
251375314520251375514521391374300100340000000102361453900100Z0010638006440 00108
151452400002440650006168330616800000321453100000261452114532Z0010644006500 00109
260000014521260654714524250654514522330654600000140654700K00Z0010650006560 00110
470722001200261455614574221455604797321454900000261454814565Z0010656006620 00111
221454804788321454100000231454814548261454000099231455614556Z0010662006680 00112
210009914540270082200101110009800000526145400009716145240001 1Z0010668006740 00113
160255606776260240814556270241814548261453203513260478814565Z0010674006800 00114
260479714574331452200000250684414522140684400001470694401200Z0010680006860 00115
260009914548330099000002104806000992600099145563300099000 00Z0010686006920 00116
210481500099210482414540251457500400270114214521260698601213Z0010692006980 00117
310000014522170701600000490707600000311438914469151443900000Z0010698007040 00118
311436014520251441514518420000000000470712400400160477407124Z0010704007100 00119
381436000400490440800000260009905224210009905236140009900002Z0010710007160 00120
470719601100150503300003490597200000430852804828490530000000Z0010716007220 00121
```



TEST DATA LISTING - Dec. 6

```
06011 6432190  279324
2301111842060  472061
0901122151000  375430
1101127000000   67200
1201131814120  520392
99300
00200
06111 6432190  279324
2311111842060  472061
0911122151000  375430
1101127000000   67200
1211131814120  520392
99200
00300
24011 7319270  108326
3701116720550  445065
87000
090K2      09       09
99300
00200
1401019942486
1501014406246
99200
00200
14001           444908
15001            47083
99200
00200
14133      14       14
15131      15    47083
99200
00200
19133      14       14
1511114406246    47083
99200
00200
81011 873304038197187
8301135733040  180600
7201021108040
44001         38197187
99300
00200

00100
24011 7319270  108326
3701116720550  445065
87000
090K2      09       09
99300
00300
           --  108326
3701116720550
87000
090K2      09       09
99300
00300
24014 7319270  108326
```

```
                0
10000000 10000000


10000000 10000000
      23       23


                0
73740037 2037747N

73283061 20499940
73740037 2037747N

73283061 20499940
73740037 2037747N

73283061 20499940
73740037 2037747N

73283061 20499940
80718702 58418492


                0
   414999   220649
28647890      000
      23       23


                0
      23       23


                0
      23       23
```

105

```
3701116720550  445065
87000
090K2      09       09
99300
00300
24011 7319270  108326
3701016720550
87000
090K2      09       09
99300
```

```
                0
      23       23


                0
```

106

CARD OUTPUT LISTING

```
0601106432190002793240012008200252195000120082000252195
K3011J184206000472061002267OP00414060000106662N000666255
09011K2151000003754300027965000250480000386283000415775
J1011K700000000067200000000000006720000038628J000348575
J2011L181412000520392003881620034661000000188100000196 5
R9011K261504300002720000018 8J0000196N000000000000  0
000110000000 0        -        -        -10000000010000000
0611106432190002793240012008200252195010120082010252195
K3111J184206000472061002267OP00414060009893375010666255
09111K2151000003754300027965000250480009613719010415775
J1011K700000000067200000000000006720000961371901034 8575
J2111L181412000520392003881620034661001000018810100019 65
R9011K261504300002720000018 8J0000196N010000000010000000
000110000000 0        -        -        -10000000010000000
0611106434057002788870011976400251862010119764010251862
K3111J184730900471827002272400041349700989251801066 5359
09111K2151257003760470028008M0025092P00961243401041 4432
J1011K700000000067200000000000006720000961243401034 7232
J2111L180831900520363003875680034723001000000201000000 2
R9011K250000000000003000000K0000000K010000000010000000
000110000000 0        -        -        -10000000010000000
0611106432428002788750011986000251803010119860010251803
K3111J184702400471698002271 2P00413416009892733010665219
09111K2150291003760750028017M0025086R00961255901041 4350
J1011K700000000067200000000000006720000961255901034 7150
J2111L180822700520216003874430034714R010000002010000001
R9011K063354200000002000000K0000000J010000000010000000
000110000000 0        -        -        - 9892733010665219
K4011073192700010832600031085001037700099238180107 68989
L7011J672055000445065004342 5R00097477009489559010866466
Q7011K851309200468549001230000045211000961255901041 4350
09011041502910037607500280174002508690098927330106 65219
R9011 0000000 0        -        -        - 9892733010665219
000110000000 0        -        -        --7374003702037747N
J4010J994248600444908004188 3K0015007N073321205020527550
J5010J440624600047084000381 4L0002760407328306202049994 0
R9011J800000000000001000000 0J000000000732830610204999 40
000110000000 0        -        -        --7374003702037747N
J4001J994248600444908004188 3K0015007N073321205020527550
J5001J440624600047083000381 4K0002760407328306302049994 0
R9011J800000000000002000000 0K000000000732830610204999 40
000110000000 0        -        -        --7374003702037747N
R8001J901732200444908004377 4R0007949K073302288020456 96P
R7001K455356200047083000192 2000004297R073283062020499 940
R9011J800000000000001000000 0J000000000732830610204999 40
000110000000 0        -        -        --7374003702037747N
J4111J994248600444908004188 3K0015007N073321205020527550
J5111J440622000047083000381 4K0002760407328306302049994 0
R9011J800000000000002000000 0K000000000732830610204999 40
000110000000 0        -        -        --7374003702037747N
R8111J901732400444908004377 4R0007949K073302288020456 96P
J5111K455357700047083000192 2000004297R073283062020499 940
R9011J800000000000001000000 0J000000000732830610204999 40
000110000000 0        -        -        --7374003702037747N
J9111J994248600444908004188 3K0015007N073321205020527550
J5111J440622000047083000381 4K0002760407328306302049994 0
R9011J800000000000002000000 0K000000000732830610204999 40
000110000000 0        -        -        --7374003702037747N
```

107

```
J9111J901732200444908004377 4R0007949K073302288020456 96P
J5111J440624600047083000381 4K0002760407326414602042936L
R9011K850006400073074000189 150007058L073283061020499940
000110000000 0        -        -        -80718702058418492
Q1011087330 40L819718701632096L816230308235079809658079 5
Q3011L573304000180600001804 35000077 1P082531233096573078
P2010K1108040M2557631L642747PK200433Q046103756074568740
M4001L3459158L8197187L4614948J615024P080718704058418493
R9011K063354200000002000000 0K0000000J080718702058418492
000110000000 0        -        -        -80718702058418492
Q1011087330 40L819718701632096L816230308235079809658079 5
Q3011L573304000180600001804 35000077 1P082531233096573078
R8010K1108040000007670000065P0000039P082530576096572681
R7001K6716522L819718701811 87ML815419008071870205841849 1
R9011090000000000001000000000000 00108071870205841849 2
- 110000000 0        -        -        - 414999000220649
R9011J8026060K9063727K906288R0022064R028647890000000000
```

108

COMPUTER TECHNOLOGY