DEPARTMENT OF
MINERALS AND ENERGY

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

Record 1974/154

PROCESSING PROGRAMS FOR THE GREAT ARTESIAN BASIN
ADP - SYSTEM

by

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*Bureau de Recherches Geologiques et Minieres

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CONTENTS

SUMMARY

The original data collected for the computer-based, digital model study of the Great Artesian Basin have to be subjected to several transformations to create the input data required for the GABSIM program. Eight computer programs designed to assist in those transformations are presented. Application notes and running instructions are presented for each program. Variable lists, program flow charts, and printouts are supplied in the Appendix.

1. INTRODUCTION

This is the fourth in a series of reports which deal with the Great Artesian Basin (GAB) automatic data processing system. Earlier reports dealt with the organization of data on punch cards (Ungemach & Habermehl, 1973), programs designed to check for errors in data transcription (Krebs, 1973), and the permanent storage, updating, and retrieval of data (Seidel, 1973).

The object of the GAB study is to produce a computer-based simulation model of the flow and for this the program GABSIM has been developed. The model requires input data which have been defined in consistent terms, averaged, and summarized for discrete nodes on a regular grid system. The organization of the data in the GAB ADP storage system, however, is based on the form in which data are found in the original records. This report describes eight programs designed to assist in the transformation of these data into the prescribed input form.

2. NOTES ON THE PRESENTATION

Two versions of each program exist, one for reading data from a physical card deck, the other one for reading data from disc files. The first version is used either when only a moderate amount of data is involved or when new data have not been entered into the magnetic tape data storage and retrieval system. Section 3 (Application and Processing Instructions) describes each program under the following headings:

Application - the type of data read, the operations performed, and the printout (or plots) produced by the program.
Retrieval of Data from Tape - the card types to be retrieved from tape and the disc files on which the retrieval data are to be kept for processing (for details on the retrieval procedure refer to Seidel, 1973). This applies only when the disc version of the program is to be used.
Parameter Card(s) - information and codes to be punched on one or several cards accompanying the program.
Card Deck Organization - job control cards and deck structure for the card version, and modifications to obtain the disc version.

Lists of variable names, program flow charts, and printouts are presented in the Appendix.

3. APPLICATION AND PROCESSING INSTRUCTIONS

3.1 Program PRCAFØ

Application

In order to determine the aquifer(s) tapped by a well, the elevation and thickness of tapped intervals are required. Program PRCAFØ reads Master Cards (type 4A) and Well Casing and Screen Cards (4B) and prints tables containing well number, well location, ground elevation, interval elevation and thickness, and a code indicating type of casing or screen, for each map sheet.

Retrieval of Data from Tape

Retrieve card type 4A on disc file FDO1, and 4B on FDO2. Specify insertion of EØF marks between map sheets.

Parameter Card

One parameter card is required, which specifies in Format I2 the number of map sheets to be processed.

Card Deck Organization

a) all data read from cards

*CY,CCDMR*WC,PRCAFØ

PRCAFØ(T100,P1000)

ACCØUNT(CCDMR*WC)

FTN.

LGØ.

End of Section card

PRØGRAM(...

as listed in Appendix 1

End of Partition card

Parameter Card

Data deck as shown on Fig. 1

End of Information card.

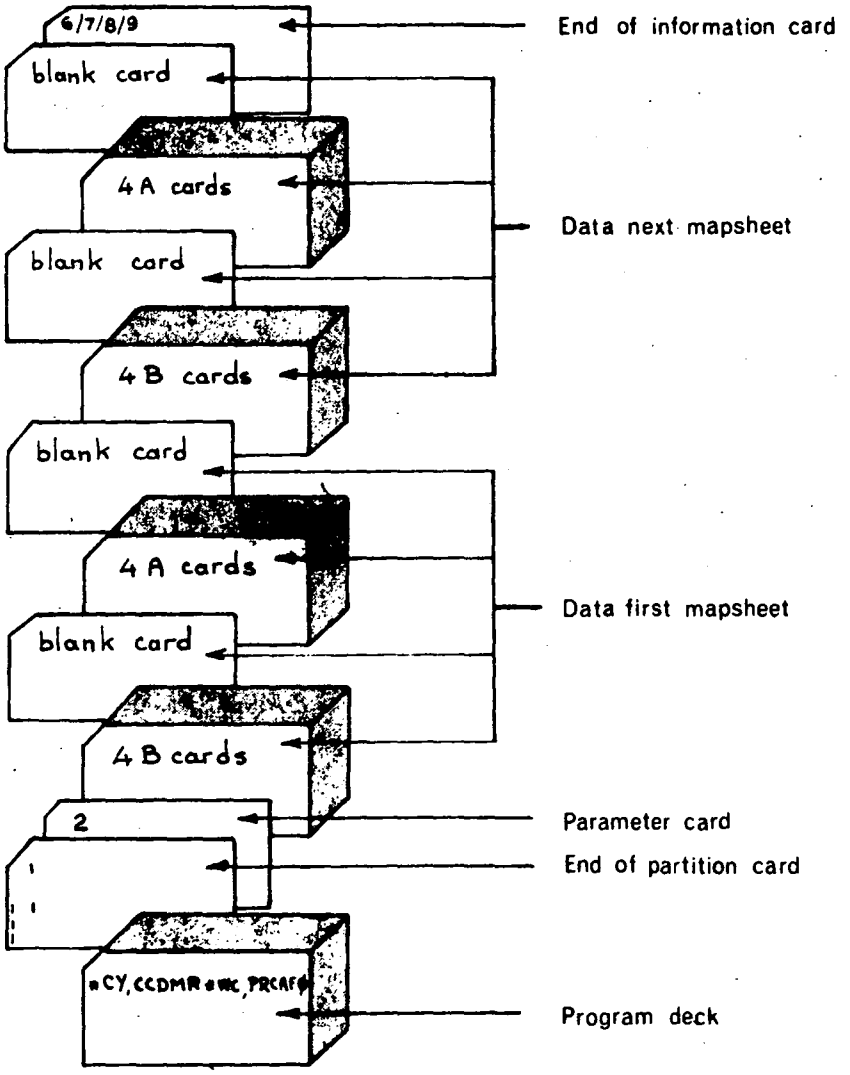


Figure 1 **Card Deck Organisation** **Program PRCAFØ**

Record 1974/154 M(G)535

WELL NUMBER	AQUIFER NUMBER	LOCATION LONGITUDE	LOCATION LATITUDE	GROUND ELEVATION (FEET)	BOTTOM ELVTN (FEET)	TAPPED INTERVALS(F) FROM(F)	TO(F)	THICKNESS	NATURE	CARD 48
1928		140 54 54	19 41 30	263;0	-1665.					YES
1929		140 51 12	19 42 30	276;0	-1228.					YES
1930		140 40 48	19 40 18	287;0	-1658.	-1653.	-1658.	-5,0	1	YES
1931		140 43 6	19 27 36	240;0	-1558.					YES
1932		140 35 18	19 31 12	283;0	-1572.					YES
1933		140 34 30	19 34 30	283;0	-1547.					YES
1934		140 58 27	19 46 39	280;0	-876.					YES
1936		140 56 36	19 35 0	240;0	-987.					YES
1938		140 50 54	19 29 36	260;0	-1330.	-1040.	-1043.	-3,0	3	YES
1939		140 45 48	19 30 18	255;0	-1666.	-1223.	-1226.	-3,0	3	YES
1939		140 45 48	19 30 18	255;0	-1666.	-1295.	-1298.	-3,0	3	YES
1939		140 45 48	19 30 18	255;0	-1666.	-1355.	-1358.	-3,0	3	YES
1939		140 45 48	19 30 18	255;0	-1666.	-1425.	-1428.	-3,0	3	YES
1939		140 45 48	19 30 18	255;0	-1666.	-1601.	-1604.	-3,0	3	YES
1939		140 45 48	19 30 18	255;0	-1666.	-1660.	-1663.	-3,0	3	YES
1940		140 48 54	19 34 42	235;0	-1179.	-1025.	-1028.	-3,0	3	YES
1940		140 48 54	19 34 42	235;0	-1179.	-1105.	-1108.	-3,0	3	YES
1940		140 48 54	19 34 42	235;0	-1179.	-1125.	-1128.	-3,0	3	YES
1940		140 48 54	19 34 42	235;0	-1179.	-1145.	-1148.	-3,0	3	YES
1940		140 48 54	19 34 42	235;0	-1179.	-1165.	-1168.	-3,0	3	YES
1941		140 41 12	19 33 54	250;0	-1788.					YES
1943		140 17 24	19 17 24	272;0	-195.					YES
1946		140 58 12	19 15 54	210;0	-1340.					YES
1947		140 22 36	19 14 0	260;0	-1739.	-1612.	-1739.	-127,0	3	YES
1948		140 33 42	19 16 30	240;0	-1780.					YES
1949		140 59 36	19 42 18	250;0	-875.					YES
1950		140 57 18	19 39 42	245,0	-760.					YES

Figure 2. Sample Printout PRCAFØ

b) data read from disc files

following ACCØUNT(...) card insert:

- ATTACH (DØ4A, FDO1, I=CCDMR*WC)
- ATTACH (DØ4B, FDO2, ID=CCDMR*WC)

within main program replace statements 1, 17, 19, 49, 51 by

- PRØGRAM PRCAFØ (INPUT, ØUTPUT, DØ4A, DØ4B, FI4B, TAPE60=INPUT, TAPE61=ØUTPUT, TAPE11=DØ4A, TAPE12=DØ4B, TAPE20=FI4B)
- READ (12,104) KS, ...
- IF(EØF(12)) 12, 11
- 20 READ (11, 102) FEUI, ...
- IF(EØF(11)) 22, 21

Figure 2 shows a sample printout produced by the program.

3.2 Program COJAC

Application

Program COJAC reads flow test and recovery data from the pumping and Flowing Test cards (type 4I) and plots discharge values versus the logorithm of time since start of test (t) and/or recovery pressures versus the logorithmns of t/t_1 (t_1 time since recovery started). The straight line slopes of these plots are used to calculate transmissivities by the Modified Jacob Method.

Retrieval of Data from Tape

Retrieve card type 4I on disc file FDO9. No EØF marks between map sheets.

Parameter Card

One parameter card is required, on which the length of a log cycle in inches is specified for scaling of the plots. Reading Format is F5.0.

Card Deck Organization

a) Data read from cards

* CY,CCDMR*WC,CØJAC

CØJAC(T100, P1000)

ACCØUNT (CCDMR*WC)

DISPØSE (TAPE1,*PL=CIR)

FTN.

LGØ.

End of Section card

PRØGRAM (.....

as listed in Appendix 2, including subroutines

End of Partition Card

Parameter Card

Data Cards

one blank card

End of Information Card

b) Data read from disc File

insert following ACCØUNT (...) statement:

- ATTACH (DØ4I, FD09, ID=CCDMR*WC)

replace within main program statements 1, 12, 15 by

- PROGRAM COJAC (INPUT, OUTPUT, DO4I, TAPE1, TAPE60=INPUT, TAPE 61 = ØUTPUT, TAPE 19 = DØ4I)
- READ (19, 100) MAP, KS, NUFØR, ...
- IF (EØF (19)) 2, 1

Figure 3 shows a sample plot produced by the program

3.3 Program PIEZØM

Application

Program PIEZOM reads the Master Cards (4A), Head Temperature Cards (4G), and Total Dissolved Solids Cards (4K) and corrects the recorded pressures to their equivalent of pure water at 15°C. Output consists of a printed table for each well listing the pressure as head above sea level in metres vs the

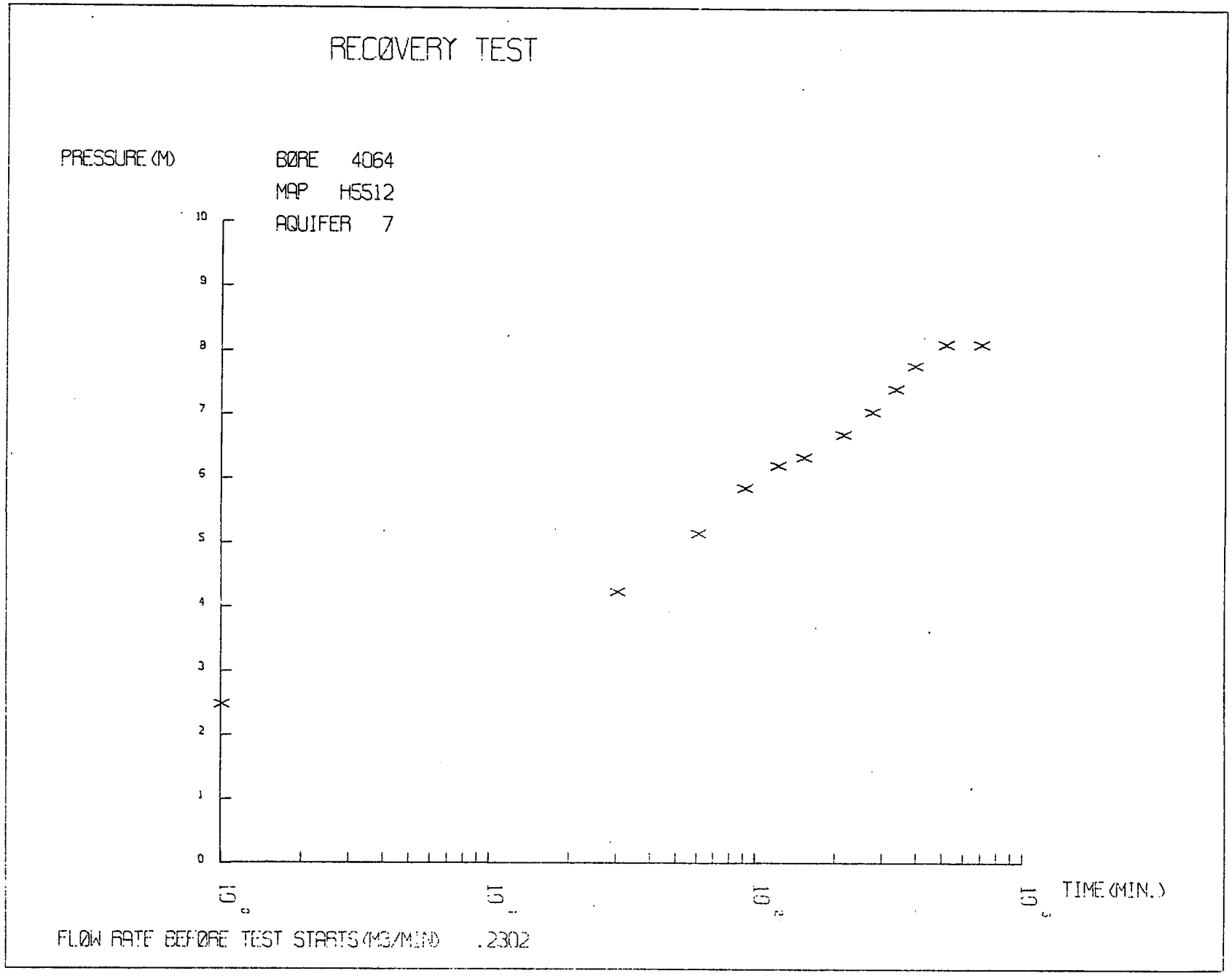


Figure 3. Sample Plotting CØJAC

time of measurement, and a plot of the same values on natural scales for purpose of interpolation.

Retrieval of Data from Tape

Retrieve cardtype 4A on disc file FD01, 4G on FD07, 4K on FD11.
Specify code for insertion of EØF mark after each map sheet.

Parameter Card

One parameter card is required which specifies the number of mapsheets submitted for processing. Reading format is I2.

Card Deck Organization

a) Data read from cards (Fig. 4)

*CY, CCDMR*WC, PIEZØM

PIEZØM (T100, P1000)

ACCOUNT (CCDMR*WC)

DISPØSE (TAPE 1, *PL = CIR)

FTN.

LGØ.

End of Section Card.

PRØGRAM (....

as listed in Appendix 3, including subroutines

End of Partition Card

Parameter Card

Data deck as shown on Fig. 4.

End of Information Card

b) Data read from disc file

following ACCØUNT (....) card insert :

- ATTACH (DØ4A, FD01, ID = CCDMR*WC)
- ATTACH (DØ4G, FD07, ID = CCDMR*WC)
- ATTACH (DØ4K, FD11, ID = CCDMR*WC)

replace within main program statements 1, 19, 21, 31, 61, 64 by

- PRØGRAM PIEZØM (INPUT, ØUTPUT, FCAM, FCAMD, DØ4A, DØ4G, DØ4K, TAPE 1, TAPE 60 = INPUT, TAPE 61 = ØUTPUT, TAPE 20 = FCAM, TAPE 30 = FCAMD, TAPE 11 = DØ4A, TAPE 17 = DØ4G, TAPE 21 = DØ4K)
- 10 READ (11, 102) MANUB, ...
- IF (EØF(11)) 411, 11
- READ (21, 103) KS, NUWEL, ...
- IF (EØF(21)) 4, 3
- READ (17, 104) KS, NUFØR, ...
- IF (EØF (17)) 1000, 42

Figures 5 and 6 show a sample printed table and plotting.

3.4 Program PINLI

Application

Program PINLI reads the Master Cards (4A) and the Aquifer Description Cards (4D) and searches for wells in which a water level below the ground surface has been recorded within the first aquifer sequence. This water level is assumed to be the water table. For each map sheet a table is printed showing well number, water table elevation, water table depth below ground, ground elevation, and bore location co-ordinates. Depths and elevations are given in feet and metres.

Retrieval of Data from Tape

Retrieve card type 4A on disc file D01, 4D on FD04.
Specify code for insertion of EØF marks after each map sheet.

Parameter Card

One parameter card is required which specifies the number of map sheets to be processed. Reading format is I2.

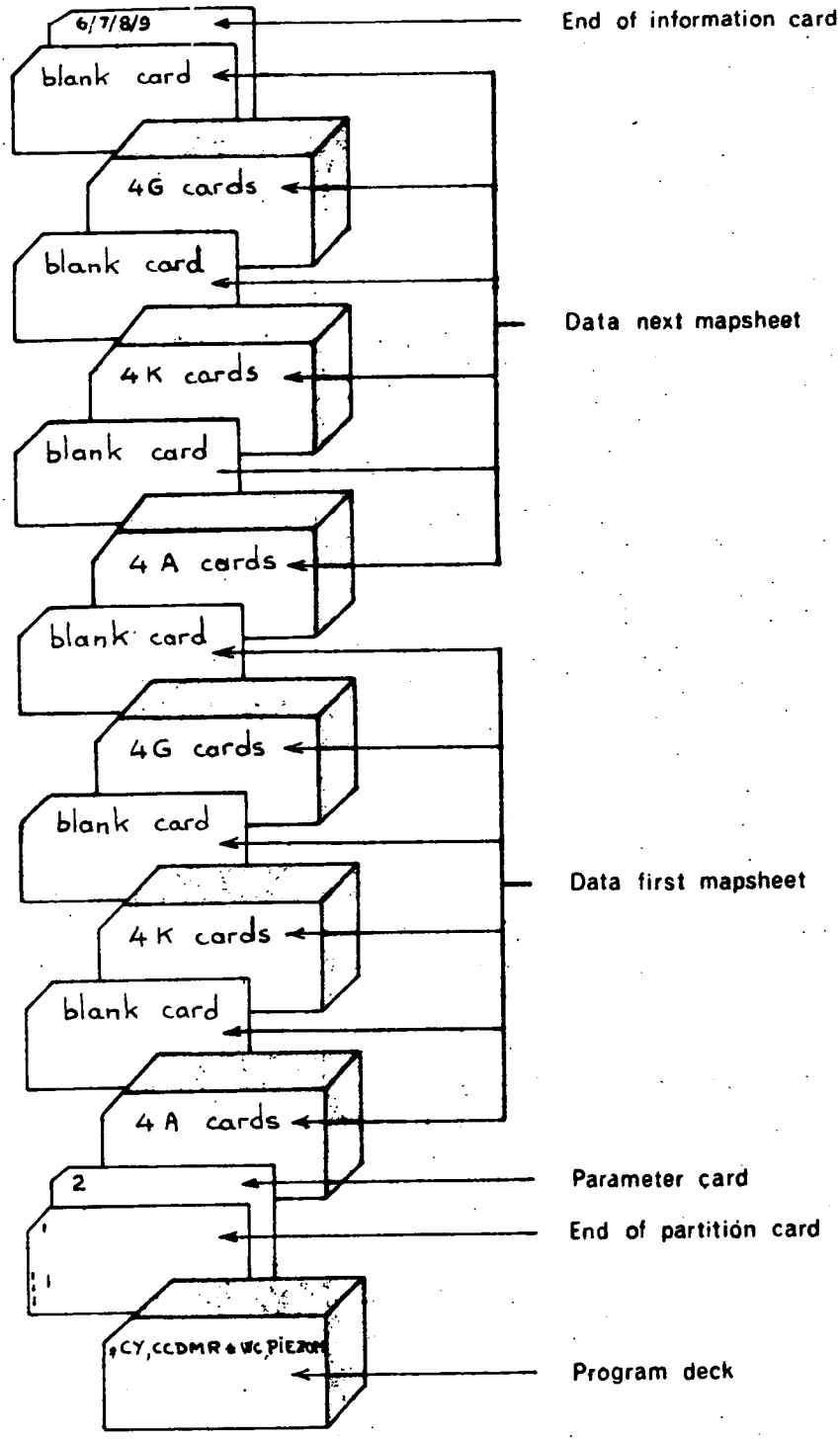


Figure 4 **Card Deck Organisation Program PIEZOM**

Record 1974/154

M(G)536

```
*****************************
* WELL                 4340 *
* MAP                H56  1 *
* AQUIFER NUMBER          P *
* LONGITUDE    150  1 12    *
* LATITUDE      28 56 42    *
* GROUND ELVTN(M) 218.60    *
* ACCURACY            MSRD  *
*****************************
```

DATE	MEASURE(M)	B.U.	DATE	MEASURE(M)	B.U.	DATE	MEASURE(M)	B.U.
34 3	227.51	1	34 10	227.51	1	35 8	226.10	1
36 8	225.04	1	37 7	224.34	1	38 8	223.99	1
39 9	222.93	1	41 8	221.52	1	42 7	220.82	1
43 8	220.12	1	44 8	219.06	1	45 7	218.00	1
46 8	218.71	1	47 9	218.00	1	48 9	217.65	1
51 1	217.30	1	51 8	216.59	1	52 9	215.89	1
53 9	215.19	1	54 9	215.89	1	55 9	214.83	1
56 8	218.00	2	57 9	216.59	2	59 10	216.95	2
60 9	215.89	2	61 9	215.89	2	62 9	216.24	2
63 9	215.89	2	64 10	215.19	2	65 10	214.83	2
66 11	214.83	1	67 9	214.83	1	69 9	213.78	1
70 9	214.13	2	71 9	213.43	2	72 9	213.43	2
73 9	213.07	2						

Figure 5. Sample Tabulation PIEZØM

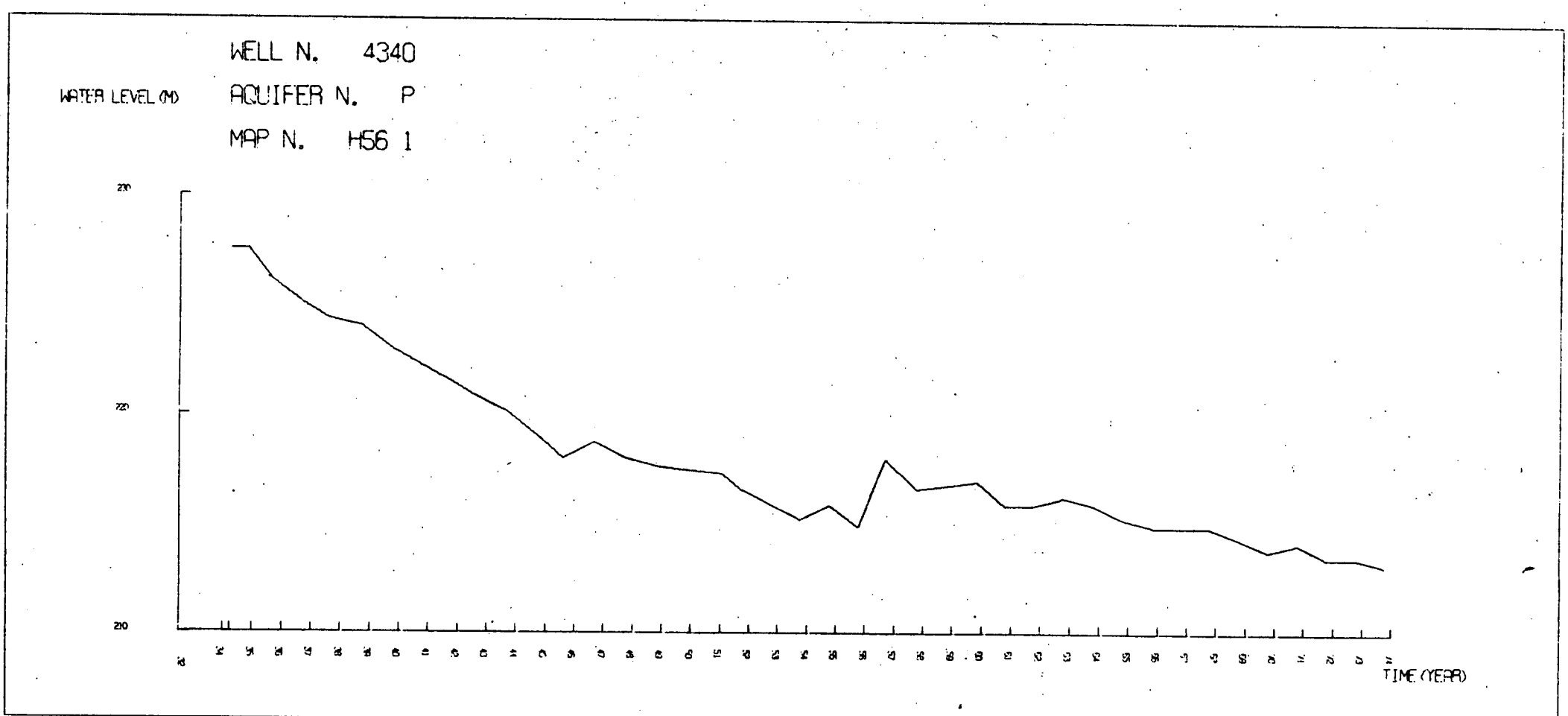


Fig. 6. Sample Plotting PIEZØM

Card Deck Organization

a) Data read from cards

*CY, CCDMR*WC, PINLI

PINLI (T100, P1000)

ACCØUNT (CCDMR*WC)

FTN.

LGØ.

End of Section Card

PRØGRAM ....

as listed in Appendix 4

End of Partition Card

Data deck as shown on Fig. 7.

End of Information Card

b) Data read from disc files

following ACCOUNT (....) card insert :

- ATTACH (DØ4A, FD01, ID = CCDMR*WC)
- ATTACH (DØ4D, FD04, ID = CCDMR*WC)

replace within main program the statements 1, 14, 16, 39, 41 by

- PRØGRAM PINLI (INPUT, ØUTPUT, DØ4A, DØ4D, TAPE 60 = INPUT, TAPE 61 = ØUTPUT TAPE 10 = DØ4A, TAPE 11 = DØ4D)
- READ (10, 101) MANUB, ...
- IF (EØF(10)) 199, 11
- READ (11, 104) KS, ...
- IF (EØF(11)) 250, 1

Figure 8 shows a sample table printed by PINLI

3.5 Program CALKA

Application

Program CALKA reads Master Cards (4A) and Well Hydrodynamics Card (4H), and converts recorded transmissivities into permeabilities using the thickness

of the tested interval as aquifer thickness. A table listing bore location, ground elevation (feet and metres), tested interval top, bottom, and thickness (feet), transmissivity (m^2/day), permeability (m/day) is printed for each map sheet.

Retrieval of Data from Tape

Retrieve card type 4A on disc file FD01, 4H on FD08, specify insertion of EØF marks after each map sheet.

Parameter Card

One parameter card is required, which specifies in Format I2 the number of map sheets to be processed.

Card Deck Organization

a) Data read from Cards

*CY, CCDMR*WC, CALKA

CALKA (T100, P1000)

ACCØUNT (CCDMR*WC)

FTN.

LGØ.

End of Section Card

PROGRAM .....

as listed in Appendix 5

End of Partition Card

Data Deck as shown on Fig. 9

End of Information Card

b) Data read from disc files

following ACCØUNT (....) card insert :

- ATTACH (DØ4A, FD01, ID = CCDMR*WC)

- ATTACH (DØ4H, FD08, ID = CCDMR*WC)

within the main program replace statements 1, 10, 12, 36, 38 by

- PRØGRAM CALKA (INPUT, ØUTPUT, DØ4A, DØ4H, TAPE 60 = INPUT,

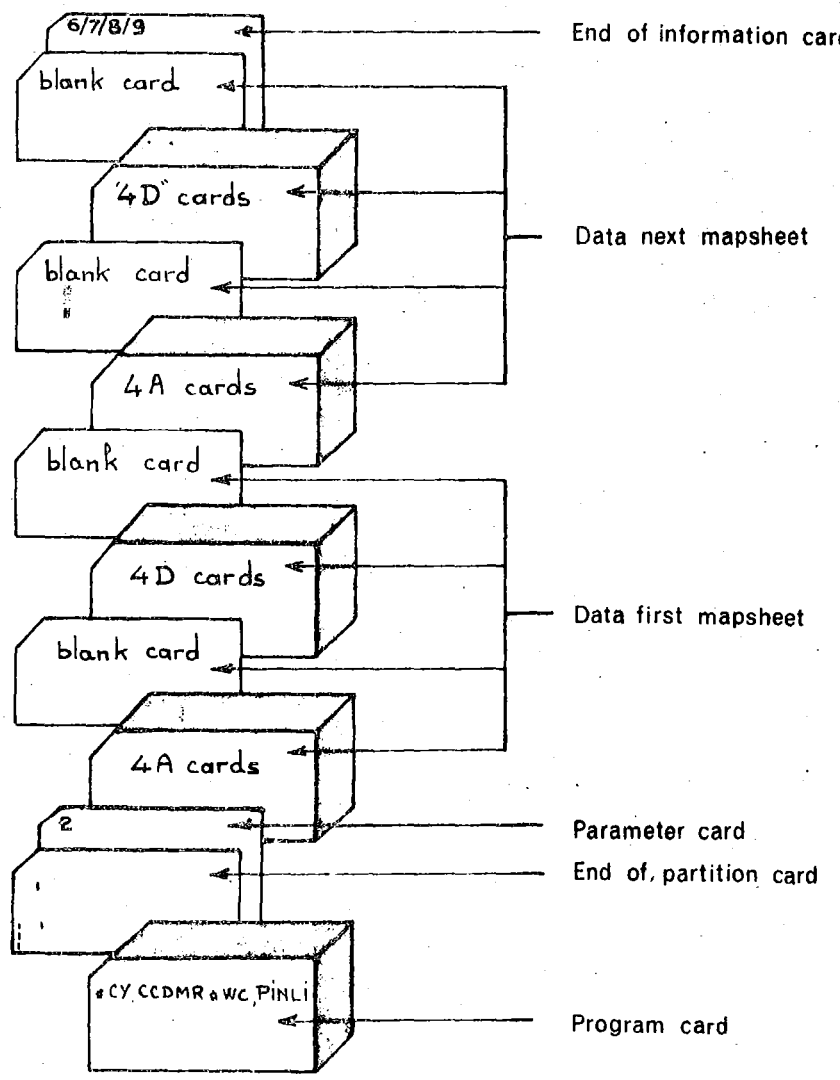


Figure 7 **Card Deck Organisation** **Program PINLI**

Record 1974/154

M(G)537

G, A, B, GROUND WATER PROJECT

LISTING OF WATER TABLE LEVELS

MAP NUMBER H55 9

WELL NUMBER	WATER TABLE ELEV, METERS	WATER TABLE ELEV, FEET	WATER TABLE DEPTH, METERS	WATER TABLE DEPTH, FEET	GROUND ELEVATION, METERS	GROUND ELEVATION, FEET	LOCATION LONGITUDE	LOCATION LATITUDE
4079	84,79	278.0	4,57	15,0	89,36	293.0	*144 3 18	*30 28 18*
4079	80,82	265.0	8,54	28,0	89,36	293.0	*144 3 18	*30 28 18*
4081	78,05	255.9	12,20	40,0	90,25	295.9	*144 25 36	*30 36 27*
4081	62,80	205.9	27,45	90,0	90,25	295.9	*144 25 36	*30 36 27*
4699	90,89	298.0	5,19	17,0	96,07	315.0	*144 33 27	*30 29 21*
4720	76,85	252,0	8,54	28,0	85,40	280.0	*144 18 36	*30 46 6*
4728	89,67	294,0	6,41	21,0	96,07	315.0	*144 14 9	*30 17 57*
4729	89,95	295,0	4,57	15,0	94,55	310.0	*144 7 6	*30 16 0*
4731	83,55	275.0	12,20	40,0	96,07	315.0	*144 17 10	*30 31 16*
4732	82,35	270,0	9,15	30,0	91,50	300.0	*144 1 54	*30 25 18*
4759	76,85	252.0	7,01	23,0	83,88	275.0	*144 4 24	*30 35 48*
5510	84,79	278.0	9,76	32,0	94,55	310.0	*144 17 54	*30 21 58*
6929	93,02	305.0	10,67	35,0	103,70	340.0	*144 37 55	*30 1 42*
12120	92,41	303,0	9,76	32,0	102,18	335,0	*145 0 28	*30 3 0*
19111	76,25	250,0	18,30	60,0	94,55	310.0	*144 40 33	*30 16 0*
604699	90,89	298.0	5,19	17,0	96,07	315.0	*144 33 27	*30 29 21*

Figure 8. Sample Tabulation PINLI

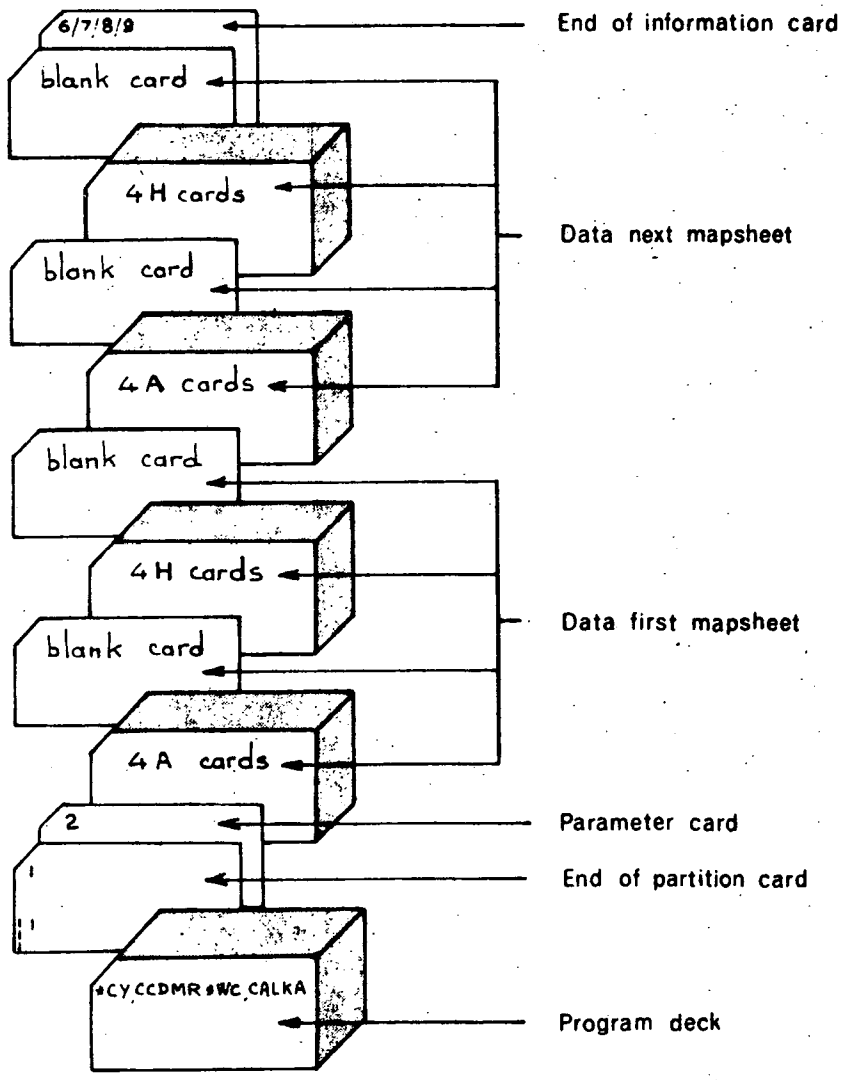


Figure 9 Card Deck Organisation Program CALKA

Record 1974/154

M(G)538

G.A.B. GROUND WATER PROJECT

PERMEABILITY VALUES

MAP NUMBER G55 1

WELL NUMBER	LOCATION LONGITUDE	LOCATION LATITUDE	GROUND ELEVATION FEET	GROUND ELEVATION METERS	AQUIFER CODE	AQUIFER TAPPED(ELEV,FEET) FROM	AQUIFER TAPPED(ELEV,FEET) TO	THICK,	TRANS, M2/D	PERM, M,/D
11445	145 27 46	24 39 50	1015,0	310,	B	-1117,	=1165,	48,0	95,7	6,5
17223	145 25 35	24 50 3	934,0	284,9	H				134,0	
17263	145 8 21	24 54 42	1100.0	336,	F	-3550,	=4193,	643,0	36,2	,2
601494	145 29 10	24 24 10	933.0	285,	3	-1300,	=1574,	274,0	65,3	,8

Figure 10. Sample Tabulation CALKA

TAPE 61 = ØUTPUT, TAPE 10 = DØ4A, TAPE 11 = DØ4H)

- 4 READ (10, 101) MANUB, ...
- IF (EØF(10)) 99, 1
- READ (11, 104) KS, ...
- IF (EØF (11)) 9, 8

Fig. 10 shows a sample results printout of program CALKA.

3.6 Program TRAMD

Application

Program TRAMD reads Well Discharge Data Cards (4E) and plots on a natural scale discharge (m^3/hr) versus time (years). Simultaneously a table is produced listing the individual measurements recorded.

Retrieval of Data from Tape

Retrieve cardtype 4E on disc file FD05. No EØF marks between map sheets.

Parameter Card

No parameter card required

Card Deck Organization

a) Data read from cards

*CY, CCDMR*WC, TRAMD
TRAMD (T100, P1000)
ACCØUNT (CCDMR*WC)
DISPØSE (TAPE 1, *PL = CIR)
FTN.
LGO.
End of Section Card
PRØGRAM

as listed in Appendix 6

End of Partition Card

Data Cards (4E)

one blank card

End of Information Card

b) Data read from disc file

following ACCØUNT statement insert:

- ATTACH (DØ4E, FD05, ID = CCDMR*WC)

within main program replace statements 1, 10, 13 by

- PRØGRAM TRAMD (INPUT, ØUTPUT, DØ4E, TAPE 1, TAPE 60 = INPUT, TAPE 61 = ØUTPUT, TAPE 15 = DØ4E)
- READ (15, 100) MAP, ...
- IF (EØF (15)) 2, 1

Figures 11 and 12 show a sample tabulation and plotting.

3.7 Program LIST4D

Application

Program LIST4D reads Master Cards (4A) and Aquifer Description Cards (4D). It tabulates depths and elevations in metres of top and bottom of a tested aquifer section and the recorded water levels.

Retrieval of Data from Tape

Retrieve card type 4A on disc file FD01, 4D on FD04.
Specify code for insertion of EØF marks between map sheets.

Parameter Card

One parameter card is required, which specifies in Format I2 the number of map sheets to be processed.

Card Deck Organization

a) Data read from cards

*CY, CCDMR*WC, LIST4D

LIST4D (T100, P1000)

```
**************************
* WELL NUMBER      4401 *
* MAP NUMBER      H5510 *
* AQUIFER NUMBER     1 *
**************************
```

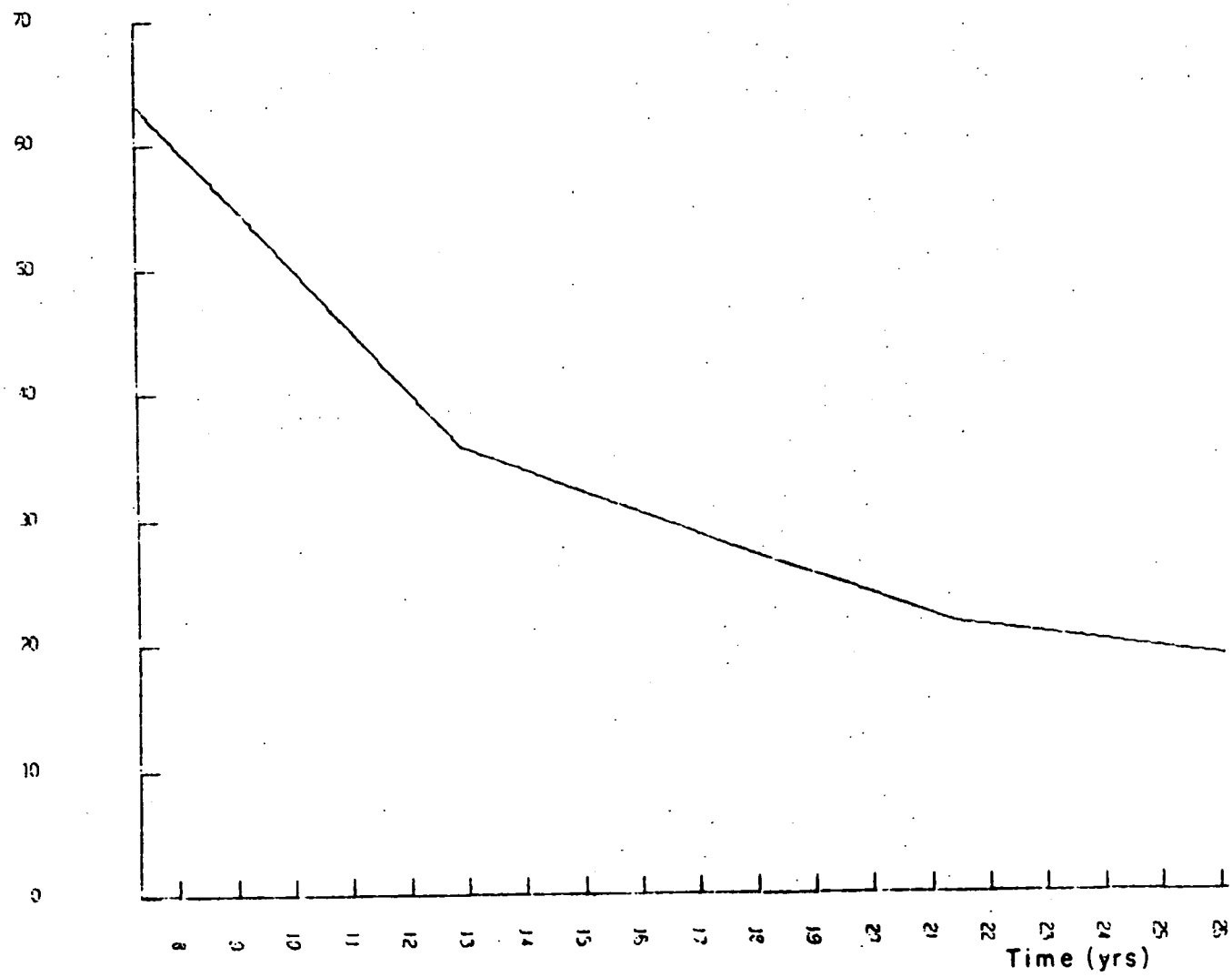
DATE	DISC.(M3/H)	DATE	DISC.(M3/H)	DATE	DISC.(M3/H)
7 4	63.18	12 11	35.56	17 7	27.62
21 5	21.38	29 7	16.46	34 4	14.57
39 2	13.81	45 11	9.46	50 12	8.89
56 6	7.19	62 4	6.24	68 11	5.11
70 3	3.97	72 3	1.14		

Figure II. Sample Tabulation TRAMD

WELL N. 4401

AQUIFER N. 1

MAP NØ H5510



Record 1974/154

Fig. 12. Sample Plotting TRAMD

M(G)548

WELL NUMBER	1112
MAP NUMBER	E5419
LOCATION 139 34 48	18 4 24
GROUND ELEVATION(M)	19.8
DATE OF COMPLETION	1929

****

	TOP(M)		BOTTOM(M)		THICKNESS	DEPTH TESTED(M)		WATER LEVEL(M)	
	DEPTH	ELEVATN	DEPTH	ELEVATN	(M)	DEPTH	ELEVATN	DEPTH	ELEVATN
TEST 1	-0.0	0.0	-0.0	0.0	0.0	76.3	-56.4	- 76.3	-56.4
TEST 2	-0.0	0.0	-0.0	0.0	0.0	517.9	-498.1	- 488.0	-468.2
TEST 3	564.3	-544.4	565.2	-545.3	.9	564.3	-544.4	+ -0.0	0.0
TEST 4	655.8	-635.9	664.9	-645.1	9.2	661.9	-642.0	+ -0.0	0.0

AQUICLUDES THICKNESS(M)

****

2-1	441.6
3-2	46.4
4-3	90.6

Figure 13. Sample Tabulation LIST4D

ACCØUNT (CCDMR**WC)

FTN.

LGØ.

End of Section Card

PROGRAM (....

as listed in Appendix 7

End of Partition Card

Data cards as shown on fig. 7 (Program PINLI)

End of Information Card

b) Data read from disc files

following ACCOUNT (....) statement insert:

- ATTACH (FI4A, FD01, ID = CCDMR*WC)
- ATTACH (FI4D, FD04, ID = CCDMR*WC)

within main program replace statements 1, 14, 16, 28, 31 by

- PRØGRAM LIST4D (INPUT, ØUTPUT, FI4A, FI4D, TAPE 60 = INPUT, TAPE 61 = ØUTPUT, TAPE 10 = FI4A, TAPE 20 = FI4D)
- 4 READ (10, 101) NUWEL, ...
- IF (EØF (10)) 2, 1
- READ (20, 102) MAP, ...
- IF (EØF(20)) 10, 11

Figure 13 shows a sample table produced by program LIST4D

4. REFERENCES

KREBS, G., 1973 - Data check programs for the Great Artesian Basin ADP system. Bur. Miner. Resour. Aust. Rec. 1973/203 (unpubl.).

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Contents of Appendix

Program PRCAFØ List of Variables

NBMAP	number of map sheets to be processed
LTCP (*)	codes defining aquifers
NBE4B	number of wells for which aquifer intersection is recorded on 4B cards
KS	card continuation code
NFØR	well number
NAEØ (*)	well equipment codes
TØP (*)	top of tapped interval
BØT (*)	bottom of tapped interval
NBEN	number of 4B cards for current well
IND	number of 4B cards with tapped interval data
LTNAEQ (*)	codes defining tapped intervals
TTØP (*)	top of tapped interval
TBØT (*)	bottom of tapped interval
IKN	print index
INDIC	page skipping index
FEUI	mapsheet recorded on master card
NUWEL	well number recorded on master card
LWLØ (*)	well location
GREL	ground elevation
TØDE	total depth
NC4B	number of 4B cards
FRØM	top elevation
TØ	bottom elevation
EPAIS	thickness of interval

List of variables Program CØJAC & Subroutines

1. program COJAC

CYL length of Logarithmic cycle expressed in inches

CC card code

MAP map number

KS card continuation code

NUFOR well number

AQ aquifer tapped

LTT type of test

FLBTS flow rate before test starts

PRBTS pressure before test starts

LCUS unit in which the pressure is expressed

IAN, MOIS, JOUR, HEU, MIN: date as year, month, day, hour, minute at which the test has started

LTH( ), LTM ( ): time of the measurements in hours and minutes

TFLO ( ) flow measurement

TPR ( ) pressure measurement

LTU ( ) unit in which the pressure measurements are expressed

LTTS type of following test

TTM ( ) time of measurements expressed in minutes

IANR-MOISR-JOURR-IHEUR-MINR: date in years, months, days, hours and minutes of which the second test has started

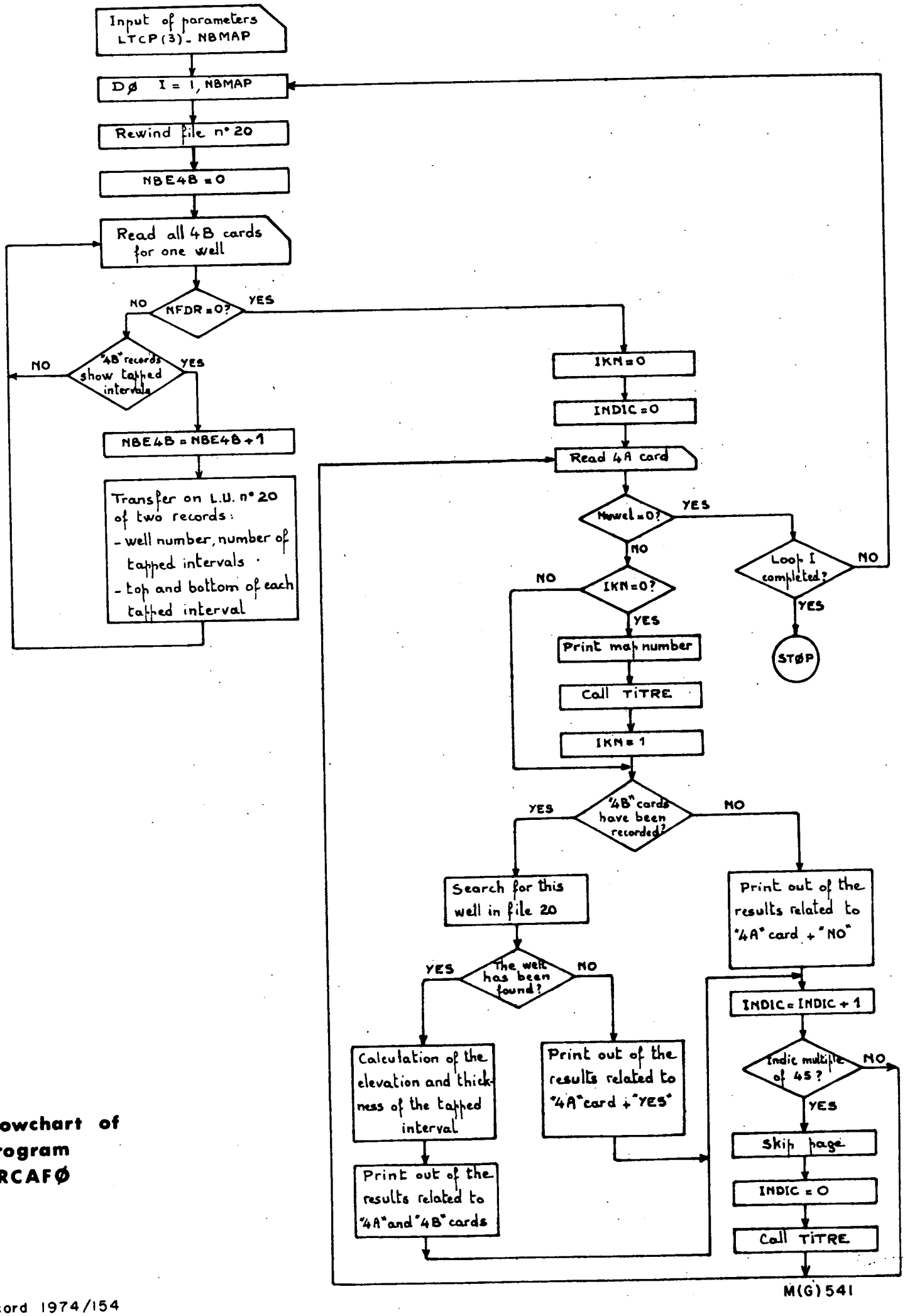
NBEN number of measurements for one test

2. Subroutine TECMI

IAN1, MOIS1, JOUR1, IHEU1, MIN1: first date in year, months, days, hours minutes

IAN2, MOIS2, JOUR2, IHEU2, MIN2: last date in year, months, days, hours, minutes

DELT: time in minute between the last and the first date



Flowchart of Program PRCAFØ

```
      PROGRAM PRCAFO(INPUT,OUTPUT,FI4B,TAPE60=INPUT,TAPE61=OUTPUT,
     1TAPE20=FI4B)
      DIMENSION LTCP(3),NAEQ(100),TOP(100),BOT(100),LTNAEQ(100),TTOP(100
     1),TBOT(100),LWLO(6)
      INTEGER OUT
      COMMON IN,OUT
      DATA LTCP/1,3,4/
      IN=60
      OUT=61
      READ(IN,1000)NBMAP
 1000 FORMAT(I2)
      DO 2222 IJK=1,NBMAP
      REWIND 20
      NBE4B=0
   13 K=1
   33 KK=K+1
      READ(IN,104)KS,NFOR,(NAEQ(N),TOP(N),BOT(N),N=K,KK)
  104 FORMAT(8X,I1,I6,2(4X,I1,1X,2F4.0,16X))
      IF(NFOR)11,12,11
   11 IF(KS)1,2,1
    1 K=KK+1
      GO TO 33
    2 DO 40 L=K,KK
      IF(TOP(L))40,41,40
   40 CONTINUE
      NBEN=KK
      GO TO 42
   41 NBEN=L-1
   42 KKK=0
      IND=0
      DO 50 J=1,NBEN
      DO 60 L=1,3
      IF(NAEQ(J)-LTCP(L))60,61,60
   60 CONTINUE
      GO TO 50
   61 KKK=1
      IND=IND+1
      LTNAEQ(IND)=NAEQ(J)
      TTOP(IND)=TOP(J)
      TBOT(IND)=BOT(J)
   50 CONTINUE
      IF(KKK)14,13,14
   14 NBE4B=NBE4B+1
      WRITE(20)NFOR,IND
      WRITE(20)(LTNAEQ(I),TTOP(I),TBOT(I),I=1,IND)
      GO TO 13
   12 IKN=0
      INDIC=0
   20 READ(IN,102)FEU1,NUWEL,(LWLO(K),K=1,6),GREL,TODE,NC4B
  102 FORMAT(3X,A5,1X,I6,10X,I3,5I2,1X,F5.0,1X,F5.0,8X,I2)
      IF(NUWEL)21,22,21
   21 IF(IKN)23,24,23
   24 IKN=1
      WRITE(OUT,103)FEU1
  103 FORMAT(1H1,9(/),23X,33(1H*)/23X,1H*,*  G.A.B. GROUND WATER PROJECT
     1  *,1H*/23X,1H*,7X,17(1H*),7X,1H*/23X,1H*,*      TAPPED PARTS ELEVA
     2TION    *,1H*/23X,1H*,7X,17(1H*),7X,1H*/23X,1H*,8X,
```

```
      3*MAP NUMBER *,A5,7X,1H*/23X,33(1H*))
       CALL TITRE
   60  23 GREL=GREL/10.
       TODE=GREL-TODE
       IF(NC4B)64,65,64
   65  65 INDIC=INDIC+1
       IF(INDIC-(INDIC/45*45))66,63,66
   65  63 WRITE(OUT,109)
      109 FORMAT(1X,99(1H*))
       CALL TITRE
       INDIC=0
   66  66 WRITE(OUT,108)NUWEL,(LWLO(K),K=1,6),GREL,TODE
   70 108 FORMAT(1X,1H*,2X,I6,3X,1H*,7X,1H*,1X,I3,1X,I2,1X,I2,1H*,3(1X,I2),
      11H*,F7.1,2X,1H*,F6.0,1X,1H*,36X,3HNO*)
       GO TO 2000
   64  64 REWIND 20
       DO 70 L=1,NBE4B
   75  READ(20)NFOR,IND
       READ(20)(LTNAEQ(I),TTOP(I),TBOT(I),I=1,IND)
       IF(NUWEL-NFOR)70,71,70
   70  70 CONTINUE
       INDIC=INDIC+1
   80  IF(INDIC-(INDIC/45*45))72,73,72
   73  73 WRITE(OUT,109)
       CALL TITRE
       INDIC=0
   72  72 WRITE(OUT,199)NUWEL,(LWLO(K),K=1,6),GREL,TODE
   85 199 FORMAT(1X,1H*,2X,I6,3X,1H*,7X,1H*,1X,I3,1X,I2,1X,I2,1H*,3(1X,I2),
      11H*,F7.1,2X,1H*,F6.0,1X,1H*,35X,4HYES*)
       GO TO 2000
   71  71 DO 80 L=1,IND
       INDIC=INDIC+1
   90  IF(INDIC-(INDIC/45*45))81,82,81
   82  82 WRITE(OUT,109)
       CALL TITRE
       INDIC=0
   81  81 FROM=GREL-TTOP(L)
   95  TO=GREL-TBOT(L)
       EPAIS=TO-FROM
       WRITE(OUT,106)NUWEL,(LWLO(N),N=1,6),GREL,TODE,FROM,TO,EPAIS,
      1LTNAEQ(L)
  106 FORMAT(1X,1H*,2X,I6,3X,1H*,7X,1H*,1X,I3,1X,I2,1X,I2,1H*,3(1X,I2),
  100 11H*,F7.1,2X,1H*,F6.0,1X,1H*,F7.0,1H*,1X,F7.0,1H*,1X,F7.1,1X,1H*,
      22X,I1,3X,6H* YES*)
   80  80 CONTINUE
 2000 INDIC=INDIC+1
       IF(INDIC-(INDIC/45*45))210,211,210
  105  210 WRITE(OUT,107)
       107 FORMAT(1X,1H*,97X,1H*)
       GO TO 20
       211 WRITE(OUT,109)
       CALL TITRE
  110  INDIC=0
       GO TO 20
   22  22 WRITE(OUT,109)
 2222  CONTINUE
       STOP
```

```
      SUBROUTINE TITRE
      INTEGER OUT
      COMMON IN,OUT
      WRITE(OUT,102)
  102 FORMAT(1H1)
      WRITE(OUT,100)
  100 FORMAT(///,1X,99(1H*)/1X,1H*,11X,1H*,*AQUIFER*,1H*,5X,*LOCATION*,
     17X,1H*,*  GROUND *,1H*,* BOTTOM*,1H*,8X,*TAPPED INTERVALS(F)*,6X,
     21H*,*CARD*,1H*,
     3/1X,1H*,*WELL NUMBER*,1H*,7X,22(1H*),*ELEVATION*,1H*,* ELVTN *,
     435(1H*),4X,1H*)
      WRITE(OUT,101)
  101 FORMAT(1X,1H*,11X,1H*,*NUMBER *,1H*,*LONGITUDE *,1H*,*LATITUDE *,
     11H*,* (FEET)  *,1H*,* (FEET)*,1H*,*FROM(F)*,1H*,*  TO(F) *,1H*,
     2*THICKNESS*,1H*,*NATURE*,1H*,* 48 *,1H*/1X,99(1H*))
      RETURN
      END
```

Variables

MOIS(12)	number of days in each month
NHDI	time in hours of the first date
PRDA	time in minutes of the first date
NHD2	time in hours of the last date
DEDA	time in minutes of the last date

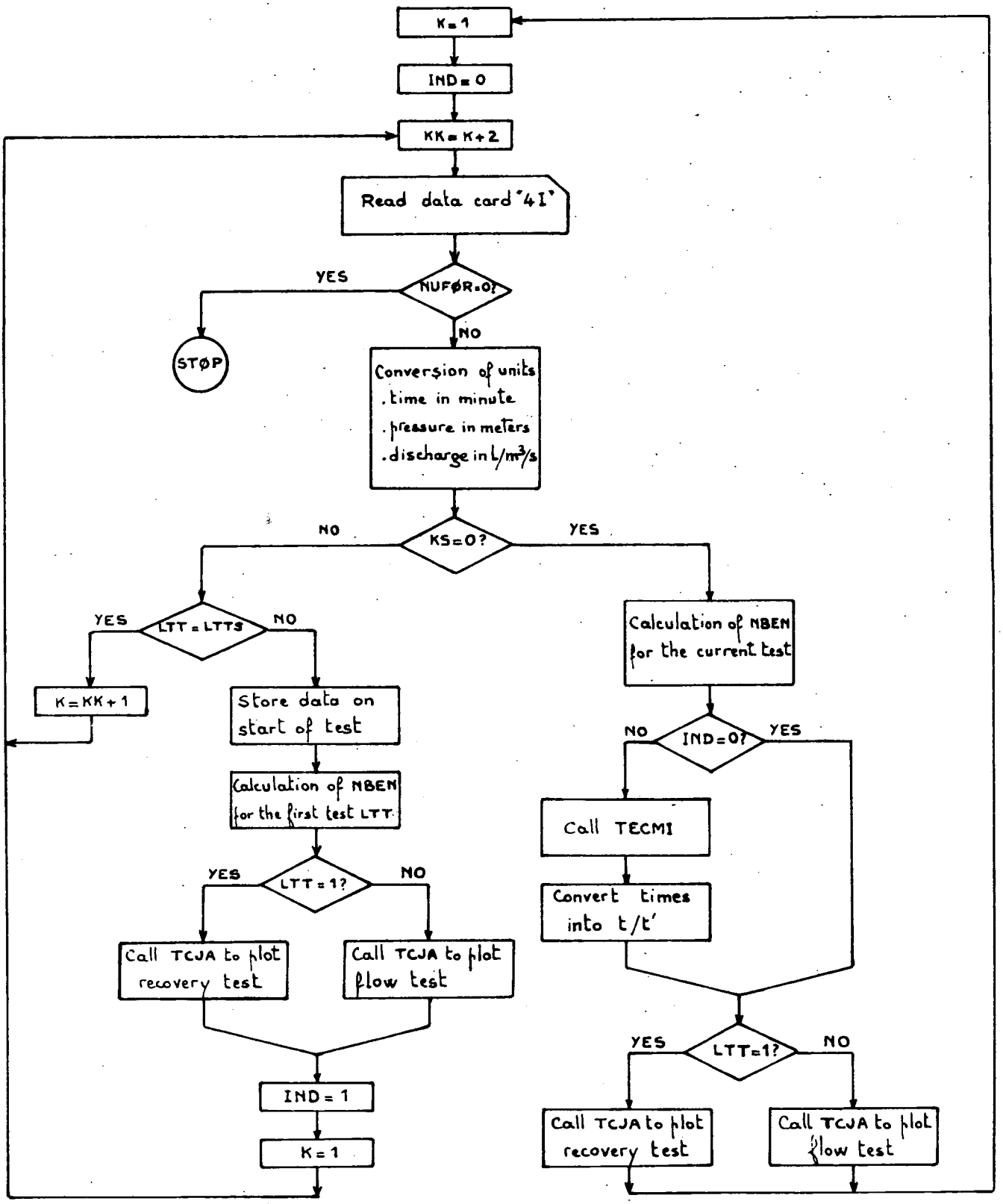
3. Subroutine TCJA

LTT:	type of test which has to be plotted
	LTT=1 recovery test
	LTt=2 flowing test
TIME (*):	time of measurements expressed in minutes
VAR (*):	variable which has to be plotted
NBEN :	number of measurements
CYL :	length of logarithmic cycle
NUWEL:	well number
MAP :	map number
AQ :	aquifer topped
VALD :	pressure or flow rate (according to the value of LTT) before the test starts
LKK :	index equal to:
	- 0 when the time axis is produced with the total time values
	- 1 when the time axis is producted with T/T
AMI :	minimum value of the measurements
AMA :	maximum value of the measurements
MIN :	minimum value expressed in multiples of 10
MAX :	maximum value expressed multiples of 10
AMX :	range of measurements
UNX, UNY:	scale factors for X and Y
NUPC :	characteristic of the first time expressed in minutes - (Logarithmic number)
NUDC :	characteristic of the test time value expressed in minutes
NBC :	number of logarithmic cycles which have to be plotted

List of variables. program PIEZOM

1. program PIEZOM

NBGR:	number of plots	
TDSFT(20):	density versus temperature	
TCP(3):	accuracy code for the well ground elevation	
POCP(3):	text for these codes	
NBFT:	number of map sheets to be processed	
NBEN:	number of master cards for which pressure measurements are recorded	
MANUB:	map number	)
NUFO:	well number	)
LSIT(6):	well location	)
GREL:	ground elevation	)
CPR:	accuracy of the ground elevation	) read on master cards
DEPTH:	depth	)
DARE:	date of bore completion	)
NC4G:	number of 4G cards recorded	)
KS:	card continuation code	)
NUWEL:	well number	)
LUN (20):	unit in which the TDS measurement is expressed	) read on '4' cards
TDS (20):	TDS measurement	)
NBMUK:	number of TDS measurements	
SOM:	Sum of TDS measurements	
VAMOY:	average TDS value	
DENS:	density of the water according to the TDS value	
NUFOR:	well number	)
NUAQ:	aquifer code	) read on '4G' cards
IAN, MOIS:	year and month of measurement	)



Flowchart of Program CØJAC

Record 1974

M(G)542

```
      PROGRAM COJAC(INPUT,OUTPUT,TAPE1,TAPE60=INPUT,TAPE61=OUTPUT)
      DIMENSION LTH(99),LTM(99),TFLO(99),TPR(99),LTU(99),TTM(99)
      INTEGER OUT
      IN=60
 5    OUT=61
      READ(IN,1000)CYL
 1000 FORMAT(F5.0)
   53 K=1
      CALL SETPLOT(0.,8HCCDMR*WC,8HTRACOJAC)
10    IND=0
   18 KK=K+2
      READ(IN,100)MAP,KS,NUFOR,AQ,LTT,FLBTS,PRBTS,LCUS,IAN,MOIS,JOUR,
     1IHEU,MIN,(LTH(I),LTM(I),TFLO(I),TPR(I),LTU(I),I=K,KK),LTTS
  100 FORMAT(3X,A5,I1,I6,A1,I1,F5.0,F4.0,I1,5I2,3(2I2,2F4.0,I1),1X,I1)
15    IF(NUFOR)1,2,1
    1 FLBTS=FLBTS*4.54/1440.
      IF(LCUS)201,5,201
  201 GO TO(3,4),LCUS
    3 PRBTS=PRBTS*0.3048/10.
20    GO TO 5
    4 PRBTS=PRBTS/10.*2.31*0.3048
    5 DO 10 I=K,KK
      LL=LTU(I)
      IF(LL)202,13,202
25  202 GO TO(11,12),LL
   11 TPR(I)=TPR(I)/10.*0.3048
      GO TO 13
   12 TPR(I)=(TPR(I)/10.)*0.3048*2.31
   13 IF(TFLO(I))213,214,213
30 213 TFLO(I)=1./(TFLO(I)*4.54/86400.)
  214 TTM(I)=LTH(I)*60+LTM(I)
   10 CONTINUE
      IF(KS)14,15,14
   14 IF(LTTS-LTT)16,17,16
35 17 K=KK+1
      GO TO 18
   16 IANR=IAN
      MOISR=MOIS
      JOURR=JOUR
40    IHEUR=IHEU
      MINR=MIN
      DO 20 I=K,KK
      IF(TTM(I))20,21,20
   20 CONTINUE
45    NBEN=KK
      GO TO 22
   21 NBEN=I-1
   22 IF(LTT-1)31,32,31
   31 WRITE(OUT,123)MAP,NUFOR
50 123 FORMAT(///,15X,*MAP *,A5,3X,*WELL *,I6/15X,23(1H*)/)
      WRITE(OUT,101)(TTM(I),TFLO(I),I=1,NBEN)
  101 FORMAT(1X,*TIME(MIN)*,F10.2,3X,*DISCHARGE(M3/SEC)*,F10.4)
      CALL TCJA(LTT,TTM,TFLO,NBEN,CYL,NUFOR,MAP,AQ,PRBTS)
      GO TO 33
55    32 WRITE(OUT,123)MAP,NUFOR
      WRITE(OUT,102)(TTM(I),TPR(I),I=1,NBEN)
  102 FORMAT(1X,*TIME(MIN)*,F10.2,4X,*PRESSURE(METERS)*,F10.2)
```

```
                CALL TCJA(LTT,TTM,TPR,NBEN,CYL,NUFOR,MAP,AQ,FLBTS)
             33 IND=1
60              K=1
                GO TO 18
             15 DO 40 L=K,KK
                IF(TTM(L))40,41,40
             40 CONTINUE
65              NBEN=KK
                GO TO 42
             41 NBEN=L-1
             42 IF(IND)43,44,43
             43 CALL TECH(IANR,MOISR,JOURR,IHEUR,MINR,IAN,MOIS,JOUR,IHEU,MIN,DEL)
70              DO 50 I=1,NBEN
                TTM(I)=TTM(I)/(TTM(I)-DEL)
             50 CONTINUE
             44 IF(LTT-1)51,52,51
             51 WRITE(OUT,123)MAP,NUFOR
75              WRITE(OUT,101)(TTM(I),TFLO(I),I=1,NBEN)
                CALL TCJA(LTT,TTM,TFLO,NBEN,CYL,NUFOR,MAP,AQ,PRRTS)
                CALL PLOCHOP
                GO TO 53
             52 WRITE(OUT,123)MAP,NUFOR
80              WRITE(OUT,102)(TTM(I),TPR(I),I=1,NBEN)
                CALL TCJA(LTT,TTM,TPR,NBEN,CYL,NUFOR,MAP,AQ,FLBTS)
                CALL PLOCHOP
                GO TO 53
              2 CALL ENDPLOT
85              STOP
                END
```

```
      SUBROUTINE TCJA(LTT,TIME,VAR,NBEN,CYL,NUWEL,MAP,AQ,VALD)
      DIMENSION TIME(1),VAR(1),TI1(3),TI2(3),TI(3),TI4(11),TI5(10)
      LKK=0
      AMI=VAR(1)
 5    DO 10 I=2,NBEN
      IF(AMI-VAR(I))10,10,11
   11 AMI=VAR(I)
   10 CONTINUE
      AMA=VAR(1)
10    DO 20 J=2,NBEN
      IF(AMA-VAR(J))21,20,20
   21 AMA=VAR(J)
   20 CONTINUE
      DO 30 I=1,10000
15    L=I*10
      IF(L-AMI)30,31,31
   30 CONTINUE
   31 MIN=L-10
      DO 40 J=1,10000
20    M=J*10
      IF(M-AMA)40,41,41
   40 CONTINUE
   41 MAX=M
      AMX=MAX-MIN
25    UNX=AMX/6.
      UNY=1./CYL
      CALL PLOT(UNX,UNY,2)
      CALL PLOT(-9*UNX,-3*UNY,1)
      CALL PLOT(0.,0.,3)
30    NUPC=ALOG10(TIME(1))
      NUDC=ALOG10(TIME(NBEN))+1
      IF(NUPC-NUDC)42,43,43
   43 TEMP=NUPC
      LKK=1
35    NUPC=NUDC-1
      NUDC=TEMP+1
   42 NBC=NUDC-NUPC+1
      DO 50 I=1,NBC
      LP=NUPC+I-1
40    ORD=(I-1)*CYL*UNY
      CALL PLOT(0.,ORD,4)
      CALL PLOT(0.2*UNX,ORD,3)
      CALL TEXT(2H10,2,2)
      CALL PLOT(0.4*UNX,ORD+0.2*UNY,3)
45    ENCODE(2,100,NCYL)LP
  100 FORMAT(I2)
      CALL TEXT(NCYL,2,1)
      CALL PLOT(0.,ORD,3)
      CALL PLOT(-0.1*UNX,ORD,4)
50    CALL PLOT(0.,ORD,3)
   50 CONTINUE
      CALL PLOT(0.,0.,3)
      NBC=NBC-1
      DO 60 J=1,NBC
55    DIST=(J-1)*UNY*CYL
      DO 70 K=1,9
      AK=K*UNY*CYL
```

```
      ORD=DIST*ALOG10(AK)
      CALL PLOT(0.,ORD,3)
60    CALL PLOT(-0.1*UNX,ORD,4)
   70 CONTINUE
   60 CONTINUE
      CALL PLOT(0.3*UNX,ORD+0.5*UNY,3)
      CALL PLOTSET(2)
65    IF(LKK)71,72,71
   72 CALL TEXT(10HTIME(MIN.),10,2)
      GO TO 73
   71 CALL TEXT(14HTIME-T/T'(MIN),14,2)
   73 CALL PLOTSET(1)
70    IN=AMX/10
      CALL PLOT(0.,0.,3)
      DO 90 J=MIN,MAX,IN
      X=J-MIN
      CALL PLOT(-X,0.,4)
75    CALL PLOT(-X,0.1*UNY,4)
      CALL PLOT(-X,-0.5*UNY,3)
      CALL PLOTSET(2)
      ENCODE(7,102,LQP)J
  102 FORMAT(I7)
80    CALL TEXT(LQP,7,1)
      CALL PLOTSET(1)
   90 CALL PLOT(-X,0.,3)
      ABTX=AMX+0.5*UNX
      IF(LTT-1)91,92,91
85    91 CALL PLOT(-ABTX,-1.5*UNY,3)
      CALL PLOTSET(2)
      CALL TEXT(12H1/Q(M3/SEC.),12,2)
      CALL PLOTSET(1)
      GO TO 93
90    92 CALL PLOT(-ABTX,-1.5*UNY,3)
      CALL PLOTSET(2)
      CALL TEXT(11HPRESSURE(M),11,2)
      CALL PLOTSET(1)
   93 DO 110 I=1,NBEN
95    XX=VAR(I)-MIN
      YY=(ALOG10(TIME(I))-NUPC)
      CALL PLOT(-XX,YY,3)
      CALL TEXT(1HX,0,2)
  110 CONTINUE
100   CALL PLOT(-6.5*UNX,0.5*UNY,3)
      CALL PLOTSET(2)
      ENCODE(11,103,TI1)NUMEL
  103 FORMAT(5HBORE ,I6)
      CALL TEXT(TI1,11,2)
105   CALL PLOTSET(1)
      CALL PLOT(-6.2*UNX,0.5*UNY,3)
      CALL PLOTSET(2)
      ENCODE(11,104,TI2)MAP
  104 FORMAT(6HMAP   ,A5)
110   CALL TEXT(TI2,11,2)
      CALL PLOTSET(1)
      CALL PLOT(-5.9*UNX,0.5*UNY,3)
      CALL PLOTSET(2)
      ENCODE(11,105,TI3)AQ
```

```
      105 FORMAT(10HAQUIFER   ,A1)
          CALL TEXT(TI3,11,2)
          CALL PLOTSET(1)
          IF(LTT=1)111,112,111
      112 CALL PLOT(0,8*UNX,-1,5*UNY,3)
          CALL PLOTSET(2)
          ENCODE(44,106,TI4)VALD
      106 FORMAT(36HFLOW RATE BEFORE TEST STARTS(M3/MIN),F8,4)
          CALL TEXT(TI4,44,2)
          CALL PLOTSET(1)
          CALL PLOT(-7.5*UNX,1,*UNY,3)
          CALL PLOTSET(2)
          CALL TEXT(13HRECOVERY TEST,13,3)
          CALL PLOTSET(1)
          GO TO 113
      111 CALL PLOT(0,8*UNX,-1,5*UNY,3)
          CALL PLOTSET(2)
          ENCODE(38,107,TI5)VALD
      107 FORMAT(30HPRESSURE BEFORE TEST STARTS(M),F8,4)
          CALL TEXT(TI5,38,2)
          CALL PLOTSET(1)
          CALL PLOT(-7.5*UNX,1,*UNY,3)
          CALL PLOTSET(2)
          CALL TEXT(12HFLOWING TEST,12,3)
          CALL PLOTSET(1)
      113 CALL PLOT(-8,*UNX,-2,*UNY,3)
          CALL PLOT(-8,*UNX,ORD+2,*UNY,4)
          CALL PLOT(1,*UNX,ORD+2,*UNY,4)
          CALL PLOT(1,*UNX,-2,*UNY,4)
          CALL PLOT(-8,*UNX,-2,*UNY,4)
          CALL PLOT(-9,*UNX,ORD+3,*UNY,3)
          RETURN
          END
```

LBU:	build up of pressure	)
PRES:	pressure measurement	)
LCU:	unit of pressure measurement	) read on '4G' cards
TEMP:	temperature measurements	)
LTYD:	unit of temperature measurement	)

NE4G: number of pressure measurements

MN: index of the positions of the temperature measurements read on 4G cards (multiple of 5)

DTD15: ratio between the density of the water at the recorded temperature and the density at 15°

PIEZO: potential of the aquifer

2. Subroutine HYDRØ

IAN (300) years of measurements

MDIS (300) months of measurements

PIEZØ (300) potential values

NOWEL: well number

AQUI: aquifer number

MANUB: map number

NBEN: number of measurements

DARE: date of completion of the bore

AMI: minimum measurement

AMA: maximum measurement

MIN: minimum measurement expressed in multiples of 10

MAX: maximum measurement expressed in multiples of 10

AMX: range of measurements

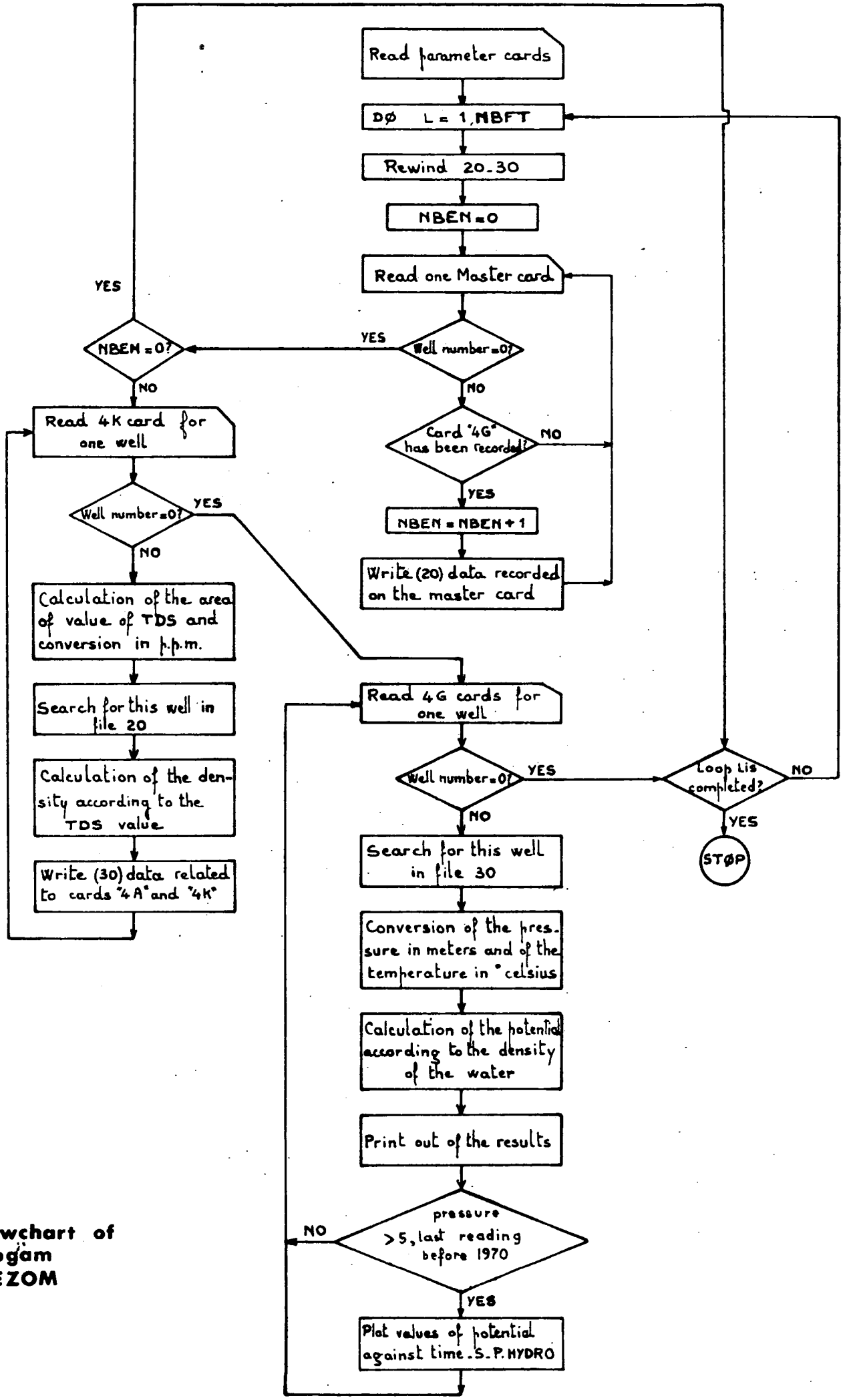
LDEB: first date of measurement expressed in months

LFIN: last date of measurement expressed in months

AMY: range of the date of measurements

UNY: scale factor for the Y axis

UNX:	scale factor for the X axis
DEBAN:	time, expressed in months between the date of completion of the bore and the first measurements
LAR:	date of completion of the bore expressed in integers
NBA:	number of years during which measurements have been performed.
PAY:	time grid distance in years



Flowchart of Progam PIEZOM

```
      PROGRAM PIEZOM(INPUT,OUTPUT,FCAM,FCAMD,TAPE1,TAPE60=INPUT,
     1TAPE61=OUTPUT,TAPE20=FCAM,TAPE30=FCAMD)
      DIMENSION TDSFT(20),LSIT(6),LJN(20),TDS(20),IAN(300),MOIS(300),
     1LBU(300),PRES(300),LCU(300),R_(300),TEMP(300),LTYD(300),PIEZO(300)
     2,TCP(3),POCP(3),GE(300),TEPR(300)
      INTEGER OUT,CPR,TCP
      DATA TDSFT/1.0000,0.9997,0.9991,0.9982,0.9970,0.9956,0.9940,0.9923
     1,0.9902,0.9880,0.9857,0.9832,0.9805,0.9778,0.9748,0.9718,0.9686,
     20.9653,0.9619,0.9583/,TCP/0,1,2/,POCP/4HUNWN,4HMSRD,4HESTD/
      IN=60
      OUT=61
      NBGR=0
      READ(IN,155)NBFT
  155 FORMAT(I2)
      DO 1000 IJK=1,NBFT
      REWIND 20
      REWIND 30
      NBEN=0
   10 READ(IN,102)MANUB,NUFO,(LSIT(J),J=1,6),GREL,CPR,DEPTH,DARE,NC4G
  102 FORMAT(3X,A5,1X,I6,10X,I3,5I2,1X,F5.0,I1,F5.0,F3.0,14X,I2)
      IF(NUFO)11,411,11
   11 IF(NC4G)2,10,2
    2 NBEN=NBEN+1
      WRITE(20)NUFO,MANUB,(LSIT(K),K=1,6),GREL,CPR,DEPTH,DARE
      GO TO 10
  411 IF(NBEN)41,1000,41
   41 K=1
    7 KK=K+6
      READ(IN,103)KS,NUWEL,(LUN(I),TDS(I),I=K,KK)
  103 FORMAT(8X,I1,I6,1X,7(3X,I1,F5.0))
      IF(NUWEL)3,4,3
    3 IF(KS)5,6,5
    5 K=KK+1
      GO TO 7
    6 DO 20 I=K,KK
      IF(TDS(I))20,21,20
   20 CONTINUE
      NBM4K=KK
      GO TO 22
   21 NBM4K=I-1
   22 SOM=0.
      DO 30 I=1,NBM4K
      KL=LUN(I)
      GO TO(31,32,33),KL
   32 TDS(I)=TDS(I)*1.43
      GO TO 31
   33 TDS(I)=TDS(I)*28349,5/4.54
   31 SOM=SOM+TDS(I)
   30 CONTINUE
      VAMOY=SOM/NBM4K
      REWIND 20
      DO 40 I=1,NBEN
      READ(20)NUFO,MANUB,(LSIT(J),J=1,6),GREL,CPR,DEPTH,DARE
      IF(NUFO-NUWEL)40,47,40
   40 CONTINUE
   47 DENS=((VAMOY/1000.)*(50./0.035))/(50./0.035)
      WRITE(30)NUFO,MANUB,(LSIT(J),J=1,6),GREL,CPR,DEPTH,DARE,DENS
```

```
      GO TO 41
    4 L=1
60  46 LL=L+2
      READ(IN,104)KS,NUFOR,NUAQ,(IAN(I),MOIS(I),LRU(I),PRES(I),LCU(I),
     1RL(I),TEMP(I),LTYD(I),I=L,LL)
  104 FORMAT(8X,I1,I6,A1,1X,3(2I2,I1,F6.0,I1,2F3.0,I1,1X))
      IF(NUFOR)42,1000,42
65    42 IF(KS)44,45,44
      44 L=LL+1
      GO TO 46
      45 DO 50 I=L,LL
      IF(MOIS(I))50,51,50
70    50 CONTINUE
      NE4G=LL
      GO TO 52
      51 NE4G=I-1
      52 REWIND 30
75    DO 60 I=1,NREN
      READ(30)NUFO,MANUB,(LSIT(J),J=1,6),GREL,CBR,DEPTH,DARE,DENS
      IF(NUFO-NUFOR)60,61,60
      60 CONTINUE
      61 NT=0
80    SOTC=0
      DO 70 I=1,NE4G
      GE(I)=(GREL/10.*RL(I)/10.)*0.3048
      IJ=LCU(I)
      IF(IJ)77,78,77
85    78 IJ=1
      77 GO TO(71,72,73),IJ
      72 PRES(I)=PRES(I)/10.*2.31*0.3048
      GO TO 74
      73 PRES(I)=(PRES(I)/10.)*0.102
90    GO TO 74
      71 PRES(I)=PRES(I)*0.3048/10.
      74 IF(LTYD(I))75,70,75
      75 NT=NT+1
      IF(LTYD(I)-1)82,83,82
95    83 TEPR(NT)=5./9.*(TEMP(I)-32.)
      GO TO 84
      82 TEPR(NT)=TEMP(I)
      84 SOTC=SOTC+TEPR(NT)
      70 CONTINUE
100   IF(SOTC)85,86,85
      86 MN=7
      GO TO 87
      85 TMOY=SOTC/NT
      DO 80 K=2,20
105   L=K*5
      IF(L-TMOY)80,80,81
      80 CONTINUE
      81 MN=K-1
      87 DTD15=TDSFT(MN)/TDSFT(3)
110   DO 120 I=1,NE4G
      PIEZO(I)=((DTD15*(DEPTH*0.3048*DENS))+PRES(I))+GE(I)-(DEPTH*0.3048
     1)
  120 CONTINUE
      GREL=GREL/10*0.3048
```

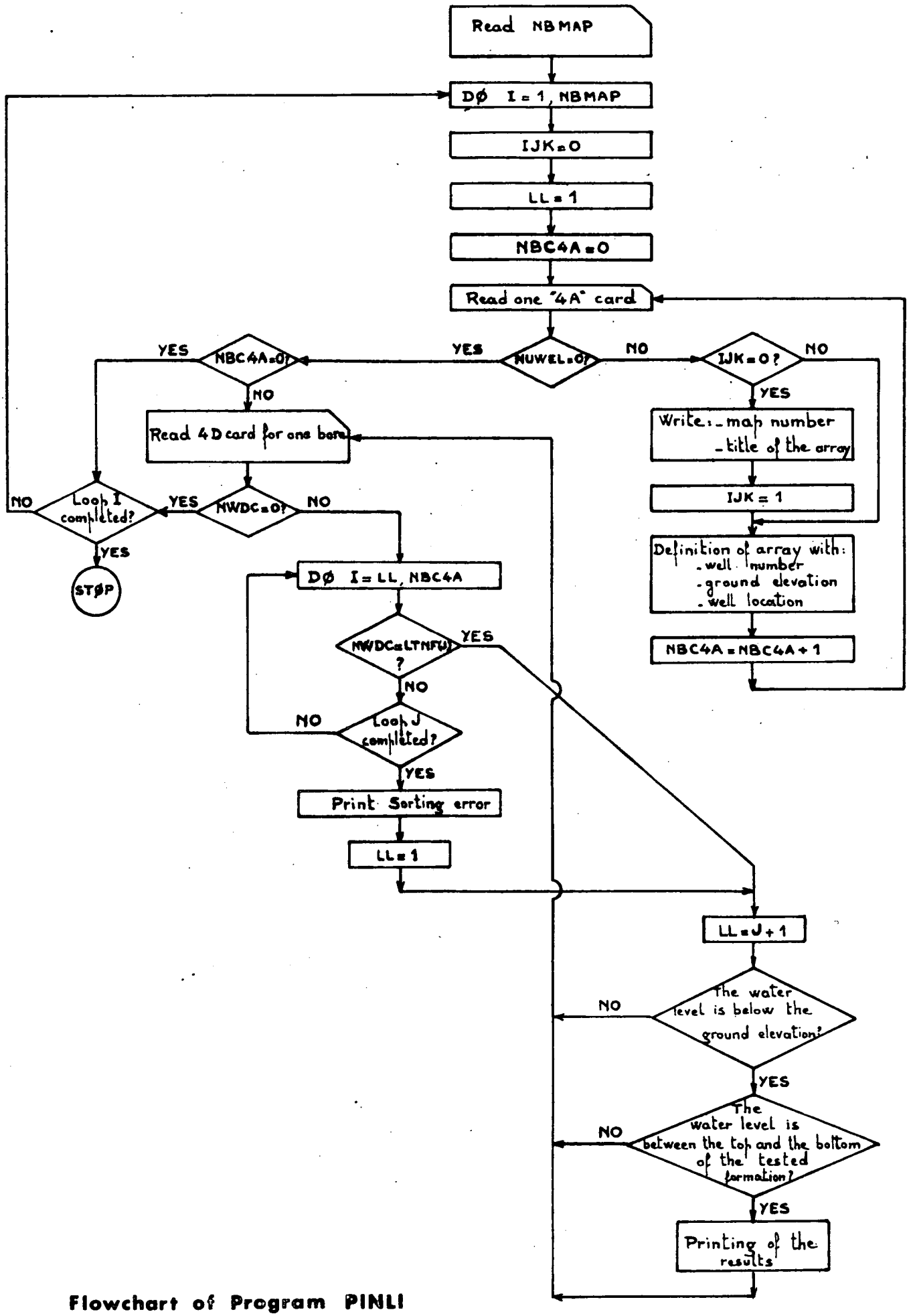
```
      WRITE(OUT,105)NUFOR,MANUB,NUAQ,(LSIT(I),I=1,6),GREL
  105 FORMAT(1H1,///,27X,26(1H*)/27X,6H* WELL,12X,I6,2H */27X,5H* MAP,
     14X,A5,2H */27X,16H* AQUIFER NUMBER,7X,A1,2H */27X,11H* LONGITUDE,
     24X,3(1X,I2),2H */27X,10H* LATITUDE, 5X,3(1X,I2),2H */27X,
     317H* GROUND ELVTN(M),F7.2,2H *)
      DO 90 J=1,3
      IF(CPR-TCP(J))90,91,90
   90 CONTINUE
   91 WRITE(OUT,106)POCP(J)
  106 FORMAT(27X,10H* ACCURACY,10X,A4,2H */27X,26(1H*))
      WRITE(OUT,107)
  107 FORMAT(///,1X,79H DATE  MEASURE(M)  B.U.      DATE  MEASURE(M)  B.
     1U.      DATE  MEASURE(M)  B.U.//)
      WRITE(OUT,108)(IAN(I),MOIS(I),PIEZO(I),LBU(I),I=1,NE4G)
  108 FORMAT(3(1X,I2,1X,I2,4X,F7.2,4X,I1,6X))
      IF(NE4G.GE.4)GO TO 95
      GO TO 4
   95 CALL SETPLOT(0,8HCCDMR*MC,8HTRAPIEZO)
      CALL HYDRO(IAN,MOIS,PIEZO,NUFOR,NUAQ,MANUB,NE4G,DARE)
      NBGR=NBGR+1
      IF(NBGR-(NBGR/4*4))4,1001,4
 1001 CALL PLOCHOP
      GO TO 4
 1000 CONTINUE
      CALL ENDPLOT
      STOP
      END
```

```
      SUBROUTINE HYDRO(IAN,MOIS,PIEZO,NUMEL,AQUI,MANUE,NBEN,DARE)
      DIMENSION IAN(1),MOIS(1),PIEZO(1),CHA(2),AQ(2),EMA(2)
      AMI=PIEZO(1)
      DO 10 I=2,NBEN
      IF(AMI-PIEZO(I))11,10,10
   11 AMI=PIEZO(I)
   10 CONTINUE
      AMA=PIEZO(1)
      DO 20 J=2,NBEN
      IF(AMA-PIEZO(J))21,20,20
   21 AMA=PIEZO(J)
   20 CONTINUE
      DO 30 I=1,1000
      L=I*10
      IF(L-AMI)30,31,31
   30 CONTINUE
   31 MIN=L-10
      DO 40 J=1,1000
      M=J*10
      IF(M-AMA)40,41,41
   40 CONTINUE
   41 MAX=M
      AMX=MAX-MIN
      IF(IAN(1)-80)42,42,43
   42 LDEB=(IAN(1)+900)*12+MOIS(1)
      GO TO 44
   43 LDEB=(IAN(1)+800)*12+MOIS(1)
   44 IF(IAN(NBEN)-80)45,45,46
   45 LFIN=(IAN(NBEN)+900)*12+MOIS(NBEN)
      GO TO 47
   46 LFIN=(IAN(NBEN)+800)*12+MOIS(NBEN)
   47 AMY=LFIN-((DARE*12)*6)
      UNY=36.
      UNX=AMX/5.
      CALL PLOT(UNX,UNY,2)
      CALL PLOT(-9.*UNX,-UNY+4.,1)
      CALL PLOT(0.,0.,3)
      DEBAN=(LDEB-((DARE*12)+6))
      CALL PLOT(0.,DEBAN,4)
      CALL PLOT(-UNX/10.,DEBAN,4)
      CALL PLOT(UNX/3.,0.,3)
      LAR=DARE
      LAR=LAR-(LAR/100*100)
      ENCODE(2,2222,LAR)LAR
      CALL TEXT(LAR,2,1)
      CALL PLOT(0.,DEBAN,3)
      NBA=(AMY-DEBAN)/12.+2
      DO 50 J=1,NBA
      PAY=DEBAN+(J-1)*12-MOIS(1)
      CALL PLOT(0.,PAY,4)
      CALL PLOT(-UNX/10.,PAY,4)
      CALL PLOT(UNX/5.,PAY-2.,3)
      KAR=IAN(1)+J-1
      IF(KAR-100)51,52,52
   52 KAR=KAR-100
   51 ENCODE(2,2222,KAR)KAR
 2222 FORMAT(I2)
```

```
      CALL TEXT(KAR,2,1)
   50 CALL PLOT(0.,PAY,3)
      CALL PLOT(UNX/2.,AMY,3)
      CALL PLOTSET(2)
      CALL TEXT(10HTIME(YEAR),10,2)
      CALL PLOTSET(1)
      CALL PLOT(0.,0.,3)
      DO 60 J=MIN,MAX,10
      X=J-MIN
      CALL PLOT(-X,0.,4)
      CALL PLOT(-X,4.,4)
      CALL PLOT(-X,-30.,3)
      CALL PLOTSET(2)
      ENCODE(5,3333,LQP)J
 3333 FORMAT(I5)
      CALL TEXT(LQP,5,1)
      CALL PLOTSET(1)
   60 CALL PLOT(-X,0.,3)
      CALL PLOT(-6*UNX,-50.,3)
      CALL PLOTSET(2)
      CALL TEXT(14HWATER LEVEL(M),14,2)
      CALL PLOTSET(1)
      XX=PIEZO(1)-MIN
      CALL PLOT(-XX,DEBAN,3)
      DO 70 J=2,NBEN
      IF(IAN(J)-800)71,71,72
   72 DAT=(IAN(J)-800)*12+MOIS(J)
      GO TO 73
   71 DAT=(IAN(J)+900)*12+MOIS(J)
   73 DAT=DAT-LDEB+DEBAN
      XX=PIEZO(J)-MIN
   70 CALL PLOT(-XX,DAT,4)
      CALL PLOT(-6.5*UNX,20.,3)
      CALL PLOTSET(2)
      ENCODE(14,123,CHA)NUWEL
  123 FORMAT(8HWELL N. ,I6)
      CALL TEXT(CHA,14,3)
      CALL PLOTSET(1)
      CALL PLOT(-6.*UNX,20.,3)
      CALL PLOTSET(2)
      ENCODE(14,124,AQ)AQUI
  124 FORMAT(13HAQUIFER N°  ,A1)
      CALL TEXT(AQ,14,3)
      CALL PLOTSET(1)
      CALL PLOT(-5.5*UNX,20.,3)
      CALL PLOTSET(2)
      ENCODE(14,125,EMA)MANUB
  125 FORMAT(9HMAP N°  ,A5)
      CALL TEXT(EMA,14,3)
      CALL PLOTSET(1)
      CALL PLOT(-7*UNX,-2*UNY,3)
      CALL PLOT(-7*UNX,AMY+72.,4)
      CALL PLOT(UNX,AMY+72.,4)
      CALL PLOT(UNX,-72.,4)
      CALL PLOT(-7*UNX,-72.,4)
      CALL PLOT(-9*UNX,AMY+108.,3)
      RETURN
```

List of variables - Program PINLI

NBMAP:	number of map sheets to be processed
IJK :	index used to print the title
NBCUA:	number of master cards read for each map
MANUB:	map number read on the master card
NUWEL:	well number
LØCA(6):	well location
GREL :	ground elevations
N4D :	code defining whether 4D card is available
LTNF (1000):	array of well numbers
TGREL(1000):	array of ground elevations
LTLD (1000,b):	array of well locations
KS :	card continuation code
NWDC :	well number read on 4D card
TOP: :	top of the formation
BOT :	bottom of the formation
DETE :	depth tested
SIG :	sign
DEPTH:	water level
NBEN :	number of records for one well
WALEF:	water level elevation expressed in feet
WALEM:	water level elevation expressed in metres
GRELF:	ground elevation expressed in feet
GRELM:	ground elevation expressed in meters
DEPF :	water level depth expressed in feet
DEPM :	water level depth expressed in metres



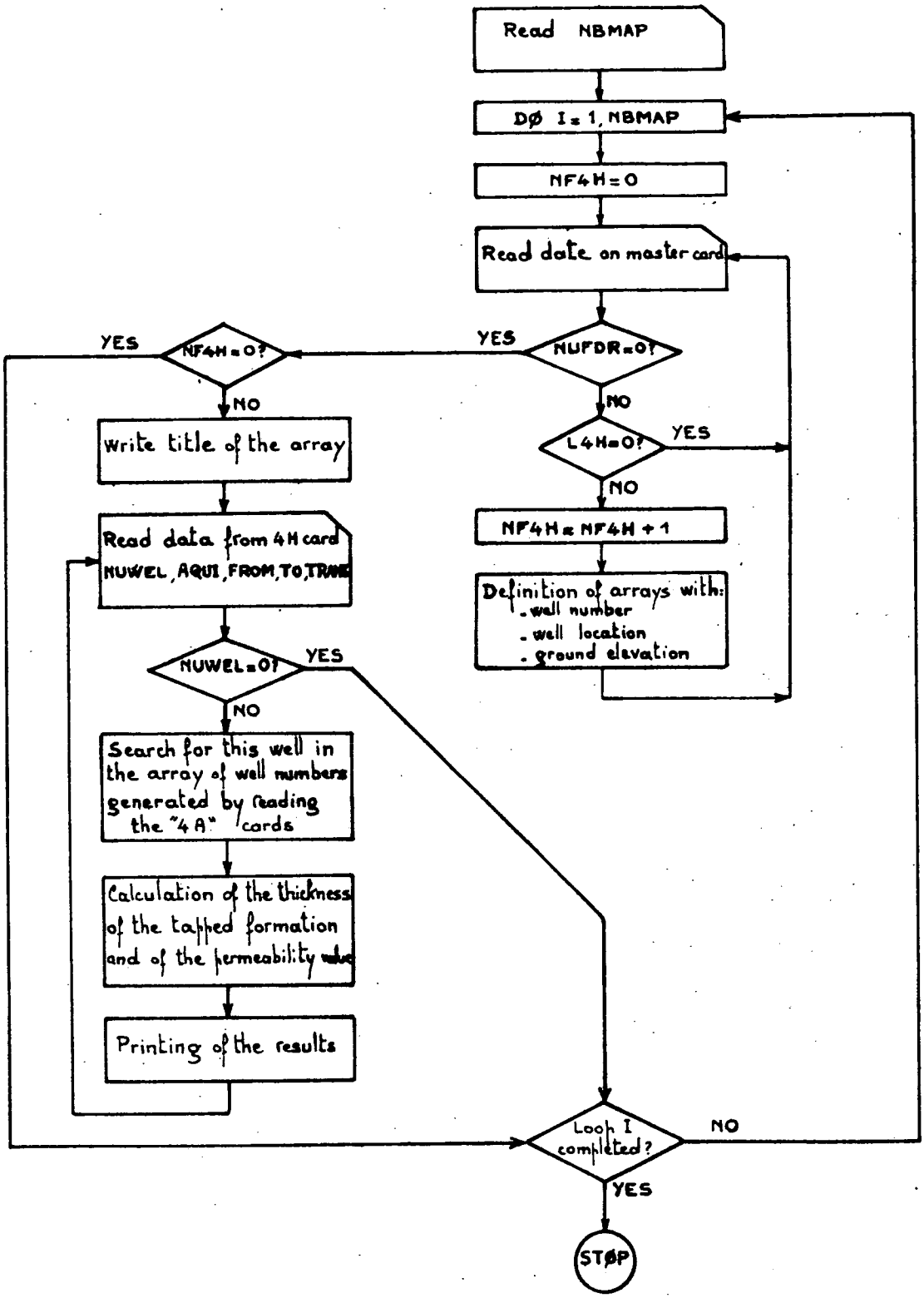
Flowchart of Program PINLI

M(G)544

```
      PROGRAM PINLI(INPUT,OUTPUT,TAPE60=INPUT,TAPE61=OUTPUT)
      DIMENSION LTNF(1000),TGREL(1000),TOP(20),BOT(20),SIG(20),DETE(20),
     1DEPTH(20),LOCA(6),LTLO(1000,6)
      INTEGER OUT
      DATA(SIGM=1H=)
      IN=60
      OUT=61
      READ(IN,99)NBMAP
   99 FORMAT(I2)
      DO 200 MM=1,NBMAP
      IJK=0
      NBC4A=0
      LL=1
   10 READ(IN,101)MANUB,NUWEL,(LOCA(J),J=1,6),GREL,N4D
  101 FORMAT(3X,A5,1X,I6,10X,I3,5I2,1X,F5.0,18X,I1)
      IF(NUWEL)11,199,11
   11 IF(N4D)91,10,91
   91 IF(IJK)14,13,14
   13 WRITE(OUT,102)MANUB
  102 FORMAT(1H1,5(/),31X,33(1H*)/31X,1H*,*  G.A.B. GROUND WATER PROJECT
     1  *,1H*/31X,1H*,7X,17(1H*),7X,1H*/31X,1H*,* LISTING OF WATER TABLE
     2 LEVELS *,1H*/31X,1H*,7X,17(1H*),7X,1H*/31X,1H*,8X,
     3*MAP NUMBER *,A5,7X,1H*/31X,33(1H*))
      WRITE(OUT,103)
  103 FORMAT(///,5X,86(1H*)/5X,1H*,11X,74H*WATER TABLE ELEV.*WATER TABLE
     1 DEPTH* GROUND ELEVATION*     LOCATION      */5X,
     212H*WELL NUMBER,74(1H*)/5X,1H*,11X,74H* METERS *  FEET  * METERS *
     3  FEET  * METERS *  FEET  *LONGITUDE*LATITUDE*/5X,86(1H*))
      IJK=1
   14 NBC4A=NBC4A+1
      LTNF(NBC4A)=NUWEL
      TGREL(NBC4A)=GREL/10.
      DO 50 K=1,6
   50 LTLO(NBC4A,K)=LOCA(K)
      GO TO 10
  199 IF(NBC4A)6,200,6
    6 K=1
    5 KK=K+1
      READ(IN,104)KS,NWDC,(TOP(I),BOT(I),DETE(I),SIG(I),DEPTH(I),I=K,KK)
  104 FORMAT(8X,I1,I6,2(3X,2F4.0,7X,F4.0,A1,F4.0,5X))
      IF(NWDC)1,250,1
    1 IF(KS)3,4,3
    3 K=KK+1
      GO TO 5
    4 DO 20 J=K,KK
      IF(DETE(J))20,21,20
   20 CONTINUE
      NBEN=KK
      GO TO 22
   21 NBEN=J=1
   22 DO 40 J=LL,NBC4A
      IF(NWDC-LTNF(J))40,41,40
   40 CONTINUE
      WRITE(OUT,107)NWDC
  107 FORMAT(2X,*WELL *,I6,* BAD SORTED*)
      LL=1
      GO TO 6
```

```
      41 LL=J+1
         DO 30 I=1,NBEN
60       IF(SIG(IT-SIGM)30,31,30
      31 IF(DEPTH(I))35,30,35
      35 IF(DEPTH(I)-TOP(I))30,32,32
      32 IF(DEPTH(I)-BOT(I))33,33,30
      33 WALEF=TGREL(J)-DEPTH(I)
65       WALEM=WALEF*0,305
         GRELF=TGREL(J)
         GRELM=GRELF*0,305
         DEPF=DEPTH(I)
         DEPM=DEPF*0,305
70       WRITE(OUT,105)NWDC,WALEM,WALEF,DEPM,DEPF,GRELM,GRELF,(LTLO(J,MN),
        1MN=1,6)
     105 FORMAT(5X,1H*,I8,3X,1H*,F7,2,2H *,F7,1,2H *,F7,2,2H *,F7,1,2H *,
        1F7,2,2H *,F7,1,2H *,I3,1X,I2,1X,I2,1H*,I2,1X,I2,1X,I2,1H*)
      30 CONTINUE
75       GO TO 6
     250 WRITE(OUT,106)
     106 FORMAT(5X,86(1H*))
     200 CONTINUE
         STOP
80       END
```

```
      SUBROUTINE TECMI(IAN1,MOIS1,JOUR1,IHEU1,MIN1,IAN2,MOIS2,JOUR2,IHEU
     12,MIN2,DELT)
      DIMENSION MOIS(12)
      INTEGER PRDA,DEDA
      MOIS(1)=31
      MOIS(2)=28
      MOIS(3)=31
      MOIS(4)=30
      MOIS(5)=31
      MOIS(6)=30
      MOIS(7)=31
      MOIS(8)=31
      MOIS(9)=30
      MOIS(10)=31
      MOIS(11)=30
      MOIS(12)=31
      IF(IAN1-(IAN1/4*4))1,2,1
    2 MOIS(2)=29
    1 NHD1=0
      MONTH=MOIS1
      IF(MONTH-1)3,4,3
    3 MONTH=MONTH-1
      DO 10 I=1,MONTH
   10 NHD1=NHD1+MOIS(I)
    4 NHD1=NHD1+JOUR1
      LYEAR=IAN1-1
      NHD1=LYEAR*365+LYEAR/4+NHD1
      NHD1=NHD1*24+IHEU1
      PRDA=NHD1*60+MIN1
      IF(IAN2-(IAN2/4*4))21,22,21
   22 MOIS(2)=29
      GO TO 25
   21 MOIS(2)=28
   25 NHD2=0
      MONTH=MOIS2
      IF(MONTH-1)23,24,23
   23 MONTH=MONTH-1
      DO 20 J=1,MONTH
   20 NHD2=NHD2+MOIS(J)
   24 NHD2=NHD2+JOUR2
      LYEAR=IAN2-1
      NHD2=LYEAR*365+LYEAR/4+NHD2
      NHD2=NHD2*24+IHEU2
      DEDA=NHD2*60+MIN2
      DELT=DEDA-PRDA
      RETURN
      END
```



Flowchart of Program CALKA

Record 1974 / 154

M(G) 545

```
      PROGRAM CALKA(INPUT,OUTPUT,TAPE60=INPUT,TAPE61=OUTPUT)
      DIMENSION LOC(6),LTNFO(500),TGREL(500),LTLOC(500,6),TRANS(50)
      INTEGER OUT
      IN=60
 5    OUT=61
      READ(IN,100)NBMAP
  100 FORMAT(I2)
      DO 10 IJK=1,NBMAP
      NF4H=0
 10     4 READ(IN,101)MANUB,NUFOR,(LOC(I),I=1,6),GREL,L4H
  101 FORMAT(3X,A5,1X,I6,10X,I3,5I2,1X,F5.0,25X,I1)
      IF(NUFOR)1,99,1
    1 IF(L4H)3,4,3
    3 NF4H=NF4H+1
 15 MANUP=MANUB
      LTNFO(NF4H)=NUFOR
      TGREL(NF4H)=GREL
      DO 20 J=1,6
      LTLOC(NF4H,J)=LOC(J)
 20  20 CONTINUE
      GO TO 4
     99 IF(NF4H)2,10,2
      2 WRITE(OUT,102)MANUP
  102 FORMAT(1H1, 2(/),33X,33(1H*)/33X,1H*,*  G,A,B, GROUND WATER PROJEC
 25    1T  *,1H*/33X,1H*,7X,17(1H*),7X,1H*/33X,1H*,*      PERMEABILITY VALI
     2UES      *,1H*/33X,1H*,7X,17(1H*),7X,1H*/33X,1H*,8X,
     3*MAP NUMBER *,A5,7X,1H*/33X,33(1H*))
      WRITE(OUT,103)
  103 FORMAT(//,1X,99(1H*)/1X,99H*  WELL  *      LOCATION       * GROUND
 30    1 ELEVATION*    AQUIFER TAPPED(ELEV.FEET) * TRANS, *  PERM, *,7X,
     21H*,8X,72(1H*),8X,1H*,8X,1H*/1X,99H* NUMBER * LONGITUDE * LATITUDE
     3*  FEET  * METERS *CODE*  FROM  *   TO   * THICK,*  M/D  *  M/D
     4 */1X,99(1H*))
     52 K=1
 35   7 KK=K+2
      READ(IN,104)KS,NUWEL,AQUI,FROM,TO,(TRANS(J),J=K,KK)
  104 FORMAT(8X,I1,I6,A1,8X,2F4.0,3(1X,F6.0,5X))
      IF(NUWEL)8,9,8
    8 IF(KS)5,6,5
 40   5 K=KK+1
      GO TO 7
     6 DO 30 L=K,KK
      IF(TRANS(L))30,31,30
   30 CONTINUE
 45 NBEN=KK
      GO TO 32
   31 NBEN=L-1
   32 TRTOT=0
      DO 40 J=1,NBEN
 50 TRTOT=TRTOT+TRANS(J)
   40 CONTINUE
      TRMOY=TRTOT/NBEN
      TRMOY=TRMOY*0.0149
      EPAIS=TO-FROM
 55 IF(EPAIS)41,42,41
   41 PER=TRMOY/(EPAIS*0.305)
      GO TO 43
```

```
      42 PER=0,
      43 DO 50 N=1,NF4H
60       IF(NUWEL.EQ.LTNFO(N))50,51,50
      50 CONTINUE
         WRITE(OUT,105)NUWEL
     105 FORMAT(2X,*WELL NUMBER *,I6,* IS NOT IN THE MASTER CARD SET*)
         GO TO 52
65    51 GRELF=TGREL(N)/10.
         GRELM=GRELF*0.305
         TO=GRELF-TO
         FROM=GRELF-FROM
         IF(EPAIST)53,54,53
70    53 WRITE(OUT,106)NUWEL,(LTLOC(N,K),K=1,6),GRELF,GRELM,AQUI,FROM,TO,
        1EPAIS,TRMOY,PER
     106 FORMAT(1X,1H*,I7,3H * ,I3,1X,I2,1X,I2,3H * ,I2,1X,I2,1X,I2,
        12H* ,F6.1,3H * ,F6.0,3H * ,A1,4H  * ,F6.0,3H * ,F6.0,3H * ,F5.1,
        22H *,F7.1,2H *,F7.1,2H *)
75       GO TO 52
      54 WRITE(OUT,108)NUWEL,(LTLOC(N,K),K=1,6),GRELF,GRELM,AQUI,TRMOY
     108 FORMAT(1X,1H*,I7,3H * ,I3,1X,I2,1X,I2,3H * ,I2,1X,I2,1X,I2,
        12H* ,F6.1,3H * ,F6.1,3H * ,A1,4H  * ,7X,1H*,8X,1H*,7X,1H*,F7.1,
        22H *,8X,1H*)
80       GO TO 52
       9 WRITE(OUT,107)
     107 FORMAT(1X,99(1H*))
      10 CONTINUE
         STOP
85       END
```

List of variables Program TRAMD & Subroutine

1. Program TRAMD

MAP	:	map sheet number
ISUIT	:	card continuation code
NUWEL	:	well number
AQUI	:	aquifer number
IAN (200)	:	year
MDIS (200)	:	month
DISC (200)	:	discharge measurements
TYFL (200)	:	type of flow
NBEN	:	number of free flow discharge measurements

2. Subroutine EVDEB

IAN	:	year of discharge measurements
MØIS	:	month of discharge measurements
DISC	:	discharge measurements
NUWEL	:	well number
MAP	:	map number
AQUI	:	aquifer number
NBEN	:	number of values which have to be plotted
AMI	:	smallest discharge measurement
AMA	:	highest discharge measurement
MIN	:	smallest discharge measurement expressed in multiples of 10
MAX	:	highest discharge measurement expressed in multiples of 10
AMX	:	range of discharge measurements
LDEB	:	first date of discharge measurements expressed in months
LFIN	:	last date of discharge measurements
AMY	:	range in the time of discharge measurements

UNY : scale factor for Y axis

UNX : scale factor for X axis

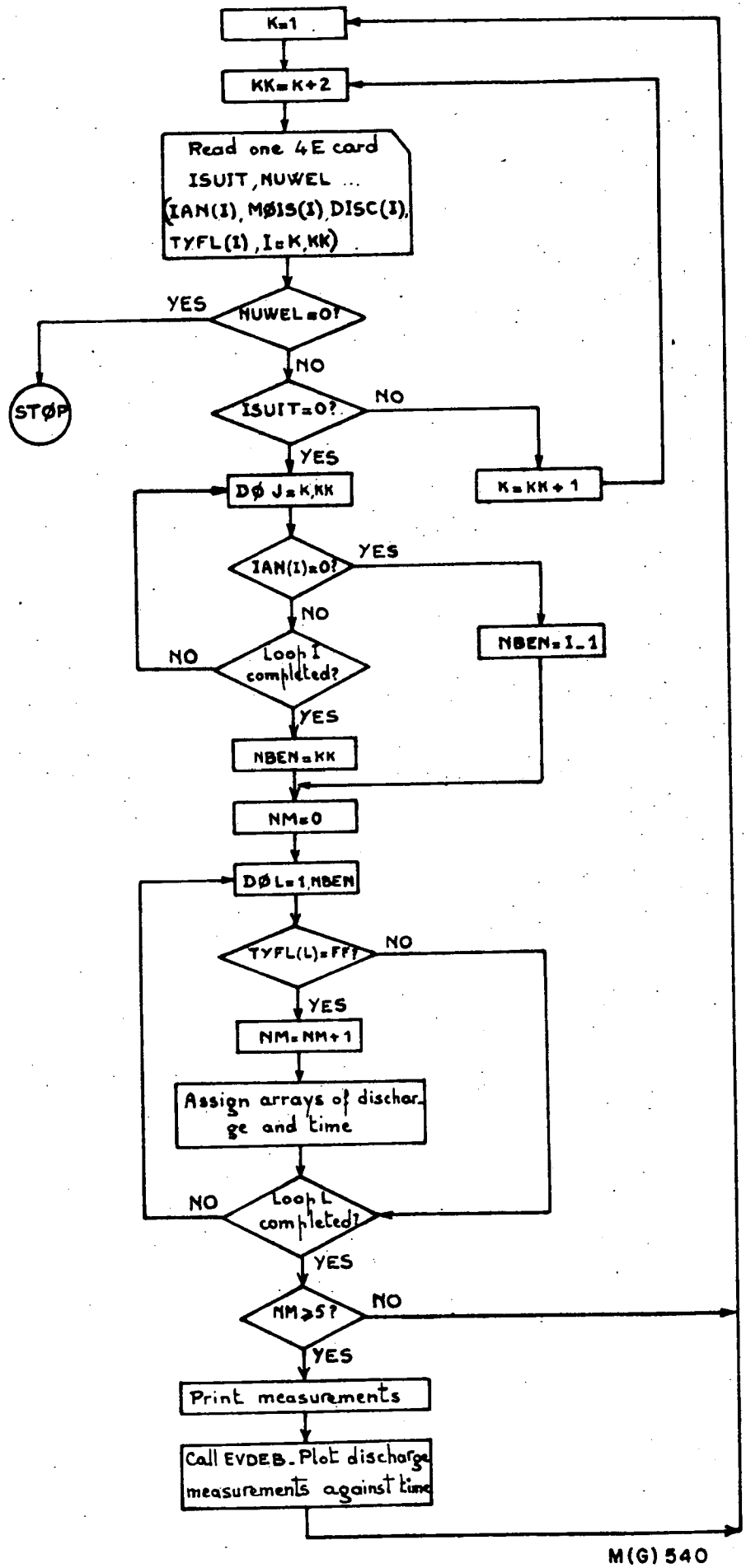
DEBAN : elapsed time (in months) between the first measurement and the end of the current year

NBA : number of years for which the discharge has been recorded

PAY : time grid (y-axis)

J : values of discharge expressed in multiply of Lo

XX) : coordinates of points
DAT)



Flowchart of Program TRAMD

Record 1974/154

M(G) 540

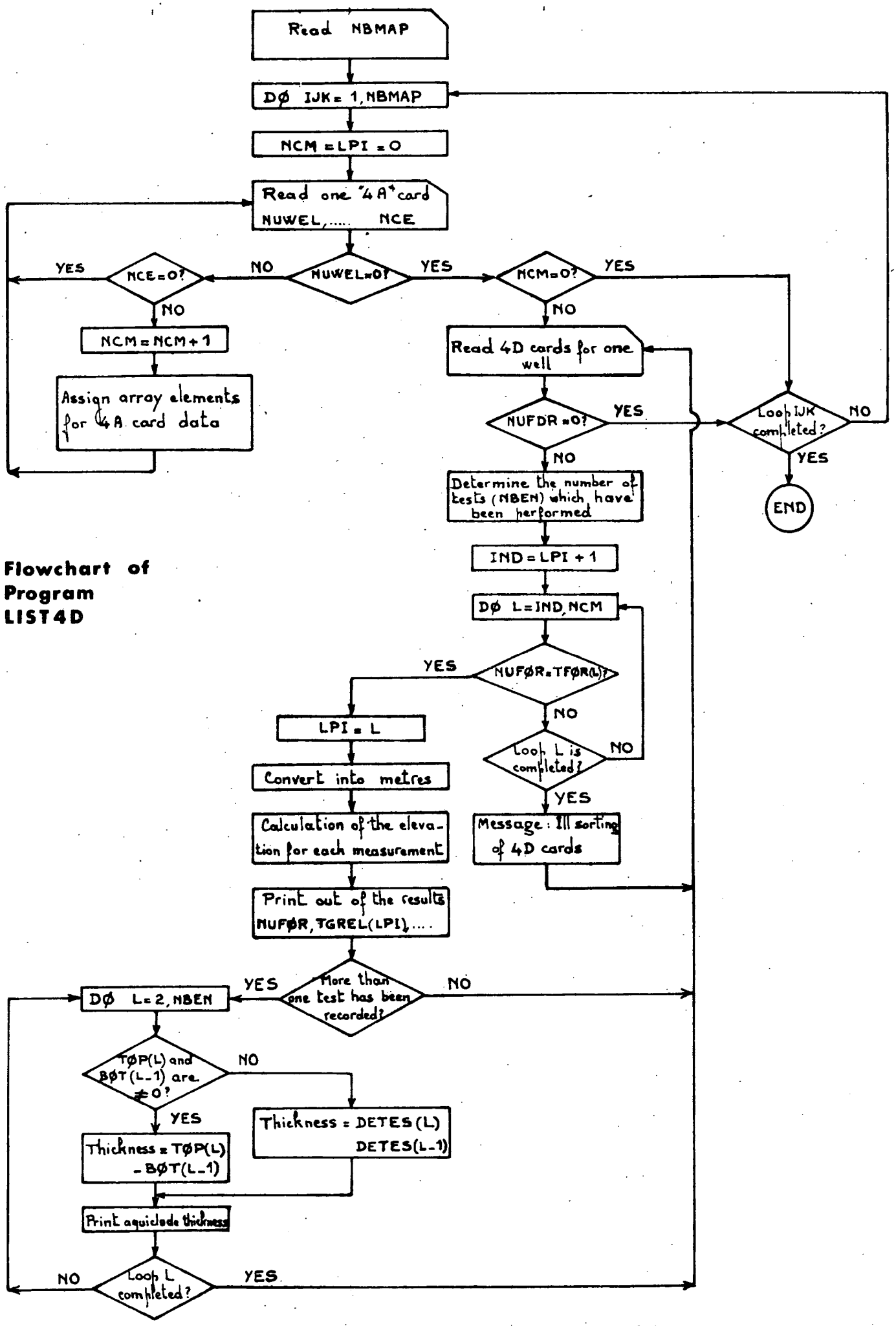
```
      PROGRAM TRAMD(INPUT,OUTPUT,TAPE1,TAPE60=INPUT,TAPE61=OUTPUT)
      DIMENSION IAN(200),MOIS(200),DISC(200),TYFL(200)
      INTEGER OUT
      DATA(FLO=2HFF)
      IN=60
      OUT=61
    8 K=1
      CALL SETPLOT(0,8HCCDMR*WC,8HDIS/TIME)
    5 KK=K+2
      READ(IN,100)MAP,ISUIT,NUWEL,AQUI,(IAN(I),MOIS(I),DISC(I),TYFL(I),
     1I=K,KK)
  100 FORMAT(3X,A5,I1,I6,A1,2X,3(2I2,F4.0,7X,A2,3X))
      IF(NUWEL)1,2,1
    1 IF(ISUIT)3,4,3
    3 K=KK+1
      GO TO 5
    4 DO 10 J=K,KK
      IF(IAN(J))10,6,10
   10 CONTINUE
      NBEN=KK
      GO TO 7
    6 NBEN=J-1
    7 NM=0
      DO 20 L=1,NBEN
      IF(TYFL(L)-FLO)20,21,20
   21 NM=NM+1
      IAN(NM)=IAN(L)
      MOIS(NM)=MOIS(L)
      DISC(NM)=DISC(L)*4,54/24.
   20 CONTINUE
      IF(NM-5)8,22,22
   22 WRITE(OUT,101)NUWEL,MAP,AQUI
  101 FORMAT(1H1,///28X,24(1H*)/28X,1H*,* WELL NUMBER    *,I6,2H */
     128X,2H* ,*MAP NUMBER      *,A5,2H */28X,2H* ,*AQUIFER NUMBER      *,
     2A1,2H */28X,24(1H*)//3(5X,*DATE     DISC.(M3/H)*)/)
      WRITE(OUT,102)(IAN(I),MOIS(I),DISC(I),I=1,NM)
  102 FORMAT(3(4X,I2,1X,I2,5X,F8.2,3X))
      CALL EVDEB(IAN,MOIS,DISC,NUWEL,MAP,AQUI,NM)
      CALL PLOCHOP
      GO TO 8
    2 CALL ENDPLOT
      END
```

```
      SUBROUTINE EVDEB(IAN,MOIS,DISC,NUMEL,MAP,AQUI,NBEN)
      DIMENSION IAN(1),MOIS(1),DISC(1),CHA(2),AQ(2),MNB(2)
      AMI=DISC(1)
      DO 10 I=2,NBEN
      IF(AMI-DISC(I))10,10,11
   11 AMI=DISC(I)
   10 CONTINUE
      AMA=DISC(1)
      DO 20 J=2, NBEN
      IF(AMA-DISC(J))21,20,20
   21 AMA=DISC(J)
   20 CONTINUE
      DO 30 I=1,100
      L=I*10
      IF(L-AMI)30,31,31
   30 CONTINUE
   31 MIN=L-10
      DO 40 J=1,100
      M=J*10
      IF(M-AMA)40,41,41
   40 CONTINUE
   41 MAX=M
      AMX=MAX-MIN
      IF(IAN(1)-85)42,42,43
   42 LDEB=(IAN(1)-900)*12+MOIS(1)
      GO TO 44
   43 LDEB=(IAN(1)-800)*12+MOIS(1)
   44 IF(IAN(NBEN)-72)45,45,46
   45 LFIN=(IAN(NBEN)-900)*12+MOIS(NBEN)
      GO TO 47
   46 LFIN=(IAN(NBEN)-800)*12+MOIS(NBEN)
   47 AMY=LFIN-LDEB
      UNY=36.
      UNX=AMX/5.
      CALL PLOT(UNX,UNY,2)
      CALL PLOT(-9.*UNX,-UNY*4.,1)
      CALL PLOT(0.,0.,3)
      DEBAN=12-MOIS(1)
      CALL PLOT(0.,DEBAN,4)
      CALL PLOT(-UNX/10.,DEBAN,4)
      CALL PLOT(0.,DEBAN,3)
      NBA=(AMY-DEBAN)/12.+2
      DO 50 J=1, NBA
      PAY=DEBAN+(J-1)*12
      CALL PLOT(0.,PAY,4)
      CALL PLOT(-UNX/10.,PAY,4)
      CALL PLOT(UNX/5.,PAY-2.,3)
      KAR=IAN(1)+J
      IF(KAR-100)51,52,52
   52 KAR=KAR-100
   51 ENCODE(2,2222,KAR)KAR
 2222 FORMAT(I2)
      CALL TEXT(KAR,2,1)
   50 CALL PLOT(0.,PAY,3)
      CALL PLOT(UNX/2.,AMY,3)
      CALL PLOTSET(2)
      CALL TEXT(10HTIME(YEAR),10,2)
```

```
      CALL PLOTSET(1)
      CALL PLOT(0.,0.,3)
   60 DO 60 J=MIN,MAX,10
      X=J-MIN
      CALL PLOT(-X,0.,4)
      CALL PLOT(-X,4.,4)
      CALL PLOT(-X,-30.,3)
      CALL PLOTSET(2)
      ENCODE(5,3333,LQP)J
 3333 FORMAT(I5)
      CALL TEXT(LQP,5,1)
      CALL PLOTSET(1)
   60 CALL PLOT(-X,0.,3)
      CALL PLOT(-6*UNX,-30.,3)
      CALL PLOTSET(2)
      CALL TEXT(15HDISCHARGE(M3/H),15,2)
      CALL PLOTSET(1)
      XX=DISC(1)-MIN
      CALL PLOT(-XX,0.,3)
      DO 70 J=2,NBEN
      IF(IAN(J)-72)71,71,72
   72 DAT=(IAN(J)-800)*12+MOIS(J)
      GO TO 73
   71 DAT=(IAN(J)-900)*12+MOIS(J)
   73 DAT=DAT-LDEB
      XX=DISC(J)-MIN
   70 CALL PLOT(-XX,DAT,4)
      CALL PLOT(-6.5*UNX,20.,3)
      CALL PLOTSET(2)
      ENCODE(12,123,CHA)NUWEL
  123 FORMAT(8HWELL N. ,I4)
      CALL TEXT(CHA,12,3)
      CALL PLOTSET(1)
      CALL PLOT(-6.*UNX,20.,3)
      CALL PLOTSET(2)
      ENCODE(12,124,AQ)AQUI
  124 FORMAT(11HAQUIFER N. ,A1)
      CALL TEXT(AQ,12,3)
      CALL PLOTSET(1)
      CALL PLOT(-5.5*UNX,20.,3)
      CALL PLOTSET(2)
      ENCODE(12,125,MNB)MAP
  125 FORMAT(7HMAP NO ,A5)
      CALL TEXT(MNB,12,3)
      CALL PLOTSET(1)
      CALL PLOT(-7*UNX,-72.,3)
      CALL PLOT(-7*UNX,AMY+72.,4)
      CALL PLOT(UNX,AMY+72.,4)
      CALL PLOT(UNX,-72.,4)
      CALL PLOT(-7*UNX,-72.,4)
      CALL PLOT(-9*UNX,AMY+108.,3)
      RETURN
      END
```

List of variables - Program LIST4D

NBMAP :	number of maps to be processed		
NCM :	number of master cards per map sheet		
NUWEL :	well number	)	
LDCA(6) :	well location	)	
GREL :	ground elevation	)	read on the master card
DATE :	date of completion of the bore	)	
NCE :	code defining whether 4D cards have been recorded		
TFØR (500):	array of well numbers		
TDATE (500):	array of the date of completions		
TALØC (500,6):	array of well locations		
MAP :	map number		
KS :	card continuation code		
NUFØR :	well number		
TØP (100):	top of the tested formation		
BØT (100):	bottom of the tested formation		
DETES (100):	depth tested		
SIGN (100):	sign of elevation or depth		
WATL (100):	depth of water level		
NBEN :	number of test recorded		
TØPE (100):	top elevation of the tested formation		
BØTE (100):	bottom elevation of the tested formation		
THIC (100):	thickness of the tested formations		
DETESE (100):	depth tested		
AQTH (100):	thickness		



Flowchart of Program LIST4D

```
      PROGRAM LIST4D(INPUT,OUTPUT,TAPE60=INPUT,TAPE61=OUTPUT)
      DIMENSION TFOR(500),TALOC(500,6),TGREL(500),TOP(100),BOT(100),DETE
     1S(100),SIGN(100),WATL(100),TOPE(100),DOTE(100),THIC(100),DETESE(10
     20),LOCA(100),WATLE(100),AQTH(100),TDATE(500)
      INTEGER OUT,TFOR,TALOC,DATE,TDATE
      OUT=61 $  IN=60
      READ(IN,100)NBMAP
  100 FORMAT(I2)
      DO 10 IJKL=1,NBMAP
      WRITE(OUT,1000)
 1000 FORMAT(1H1)
      NCM=0
      LPI=0
    4 READ(IN,101)NUWEL,(LOCA(I),I=1,6),GREL,DATE,NCE
  101 FORMAT(9X,I6,10X,I3,5I2,1X,F5.0,6X,I3,9X,I1)
      IF(NUWEL)1,2,1
    1 IF(NCE)3,4,3
    3 NCM=NCM+1
      TDATE(NCM)=DATE+1000
      TFOR(NCM)=NUWEL
      DO 20 I=1,6
   20 TALOC(NCM,I)=LOCA(I)
      TGREL(NCM)=GREL/10.+0.305
      GO TO 4
    2 IF(NCM)5,10,5
    5 L=1
   14 LL=L+1
      READ(IN,102)MAP,KS,NUFOR,(TOP(J),BOT(J),DETES(J),SIGN(J),WATL(J),
     1J=L,LL)
  102 FORMAT(3X,A5,I1,I6,2(3X,2F4.0,7X,F4.0,A1,F4.0,5X))
      IF(NUFOR)11,10,11
   11 IF(KS)12,13,12
   12 L=LL+1
      GO TO 14
   13 DO 30 K=L,LL
      IF(DETES(K))30,31,30
   30 CONTINUE
      NBEN=LL
      GO TO 32
   31 NBEN=K-1
   32 IND=LPI+1
      DO 40 L=IND,NCM
      IF(NUFOR-TFOR(L))40,41,40
   40 CONTINUE
      WRITE(OUT,103)NUFOR,MAP
  103 FORMAT(2X,*WELL *,I6,* MAP *,A5,* DOES NOT EXIST OR IS BAD SORTED*
     1)
      GO TO 5
   41 LPI=L
      DO 50 J=1,NBEN
      TOP(J)=TOP(J)*0.305
      IF(TOP(J))53,54,53
   54 TOPE(J)=0
      GO TO 55
   53 TOPE(J)=TGREL(LPI)-TOP(J)
   55 BOT(J)=BOT(J)*0.305
      IF(BOT(J))5[illegible]56
```