SPERRY UNIVAC Operating System/4 (OS/4)

General Disc Prep Routine

Programmer Reference

has, A, B

SPERRY UNIVAC COMPUTER SYSTEMS

UP-8014

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UNIVAC OS/4
GENERAL DISC PREP
ROUTINE
PROGRAMMER REFERENCE
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Operating System/4 (OS/4)
General Disc
Prep Routine

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I. INTRODUCTION

1.1. GENERAL

This manual describes the disc pack preparation routine used with the UNIVAC OS/4 Operating System (OS/4). This facility is provided through use of the disc prep routine PREPDK, which is a general disc prep routine capable of initializing any UNIVAC disc subsystem. For additional information concerning OS/4, see *UNIVAC OS/4 Operating System Guide Programmer Reference, UP–7934* (current version).

Use of this manual assumes knowledge of *UNIVAC OS/4 Job Control Programmer Reference, UP–7793* (current version); *UNIVAC 9400 System Supervisor Programmer Reference, UP–7689* (current version); and *UNIVAC 9400 System Assembler/Central Processor Unit Programmer Reference, UP–7600* (current version).

1.2. STATEMENT CONVENTIONS

The conventions used to illustrate the statements in this manual are:

- Capital letters and punctuation marks are information which must be coded exactly as shown.
- Lowercase letters and terms represent information which must be supplied by the programmer.
- An ellipsis indicates the presence of a variable number of entries.
- The symbol Δ represents a blank space.

2. PROGRAM FUNCTION AND STRUCTURE

2.1. PROGRAM FUNCTION

The function of a UNIVAC OS/4 Disc Prep routine is to prepare disc packs for operation in the UNIVAC OS/4 Operating System (OS/4). This involves testing newly manufactured disc packs for surface defects and generating the initial track records recognized by the operating system.

2.1.1. Disc Surface Analysis

Some small areas on a disc pack may become scratched or contaminated in manufacture or use, inhibiting the writing and reading of data correctly on the tracks in the damaged areas. For this reason, a number of alternate tracks have been set aside to be used when other tracks, called primary tracks, are found to be defective.

One function of the disc prep routine is to analyze the surface of the disc pack for defective tracks, keep a history of these defective tracks, and assign alternates. The result of this analysis is the track condition table which is printed out and used to determine the condition of the disc pack. The track condition table is a list of defective tracks and assigned alternates for a disc pack (see Appendixes C and D). The track condition table may be preserved on punched cards or on the disc for subsequent modification.

Disc surface analysis writes a short record on the defective primary track which points to the alternate track to be used in its place. This record, called the track descriptor record (R0), must be program readable or the disc pack is unusable.

The configuration of primary and alternate disc tracks used for the OS/4 is given in Table 2–1.

Table 2–1. Primary and Alternate Disc Track Configuration

Disc Subsystem	Track Type	Disc Pack Area				Total Number of Tracks
		From Cylinder Head		To Cylinder Head		
UNIVAC 8411	primary	0000	00	00C7	09	2000
	alternate	00C8	00	00CA	09	30
UNIVAC 8414	primary	0000	00	00C7	13	4000
	alternate	00C8	00	00CA	13	60
UNIVAC 8424	primary	0000	00	018F	13	8000
	alternate	0190	00	0195	13	120

2.1.2. Record Initialization

The second function of the disc prep routine is to construct the initial records which must be written on the tracks of the disc pack before it can receive the data or programs provided by the operating system. These records include:

- initial program load (IPL) records
- disc volume label records
  - standard volume label (VOL1) records
  - user volume label (VOL2 through VOL8) records
- volume table of contents (VTOC) records

For disc storage file conventions, see *UNIVAC 9400 Data Management System Programmer Reference, UP–7629* (current version).

2.2. PROGRAM STRUCTURE

The OS/4 disc prep routine is basically divided into eight sections, one root segment and seven other sections called phases. Each phase has a specific function and is independent of any other, with the exception that information may be passed from one phase to another through the root segment, and may be executed in any order, with the exception of phase 0 which must be executed first. If any problems are encountered during the operation of the disc prep routine, an error message is printed at the console with the possibility of a program abort. Error messages are listed in the *UNIVAC 9400 System Operations Handbook Operator Reference, UP–7871* (current version).

2.2.1. Root Segment

The root segment controls the phases and the order in which they run as specified by phase 0. It contains common constants and subroutines used by more than one phase, and storage space for information being passed from one phase to another.

When the disc prep routine is executed, control is passed to the root segment. The root segment passes control first to phase 0 and then to the various other phases of the disc prep routine. However, when a phase is completed, control is always returned to the root segment.

2.2.2. Phase 0

This phase analyzes all input parameters to verify validity and sets up appropriate information in the root segment based upon these parameters.

2.2.3. Phase 1

This phase writes the home addresses and track descriptor records on all selected tracks, then reads them back and compares the data to check for validity. Unequal compares cause a message to be printed at the system console giving the expected data followed by the data that was read (See the *UNIVAC 9400 System Operations Handbook Operator Reference, UP–7871* (current version).)

2.2.4. Phase 2

This phase performs a surface analysis of all selected tracks, and writes the history of defective tracks (Table C–1) in the track condition table which resides in the root segment. The surface analysis is performed by forcing the data area in the track descriptor record to fill an entire track with a user-specified data pattern. This data is read back into main storage and a comparison is made to check for validity. Unequal compares cause the track in question to be declared defective, and an alternate track is assigned.

2.2.5. Phase 3

This phase formats the disc pack in accordance with the track condition table. This is accomplished by rewriting the home addresses and track descriptor records of each primary and alternate track (Appendix E). After the rewrite, the home address indicates whether a primary track is defective; the track descriptor record contains the address of the assigned alternate track which replaces the defective primary track.

2.2.6. Phase 4

This phase prints the output information (track condition table) that was gathered in previous phases. The track condition table is always printed on the line printer when phase 4 is executed. As an option, the track condition table may be generated on punched cards and/or on an unused operable alternate track as illustrated in Figure 2–1.

2.2.7. Phase 5

This phase writes dummy IPL records, a standard volume 1 label record, user volume label records, and the VTOC records.

2.2.8. Phase 6

This phase examines the VTOC to see that all tracks to be written on are empty-space tracks (tracks that contain no unexpired records). If any tracks contain unexpired records, the disc prep routine is aborted instead of proceeding to other phases.

If phase 6 is to be executed, it must immediately follow phase 0.

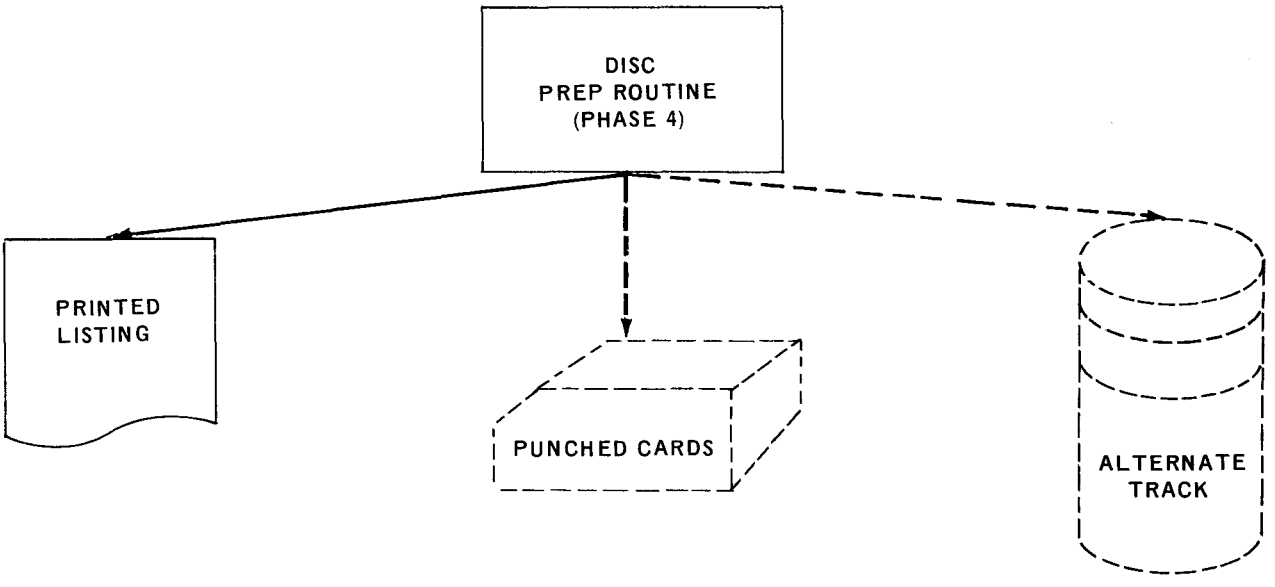


Figure 2–1. Prep Routine Output

3. PROGRAM DESCRIPTION AND CONTROL STREAM

3.1. GENERAL

The disc prep routine for the UNIVAC OS/4 Operating System (OS/4) is a multiphase routine which has the capacity for numerous disc prep applications. The user regulates disc prepping methods by supplying the pertinent input data to the disc prep routine. Before choosing a disc prepping method, the user should consider the current makeup and condition of the disc pack to be prepped. The following list gives some possible applications of the disc prep routine:

- A complete initialization and checkout of a blank disc pack.
- Prepping only a selected portion of a disc pack (partial prep).
- Prepping a disc pack which currently contains data but has a suspected defective track (card insert method).
- A prep run which produces only a listing of the track condition table.

For system timing considerations, see Appendix F.

3.2. INPUT/OUTPUT DATA

Data input to the disc prep routine is transferred from punched cards and/or disc. There are two types of input data:

- Track condition table

  This data is located in the root segment of the disc prep routine, and is generated by one of the following sources (Appendix C):

  – current execution of the disc prep routine; or

  – previous execution of the disc prep routine, brought in by the current execution from punched cards or an alternate track on the disc pack.

- Phase parameters

  This data is entered through the control stream in phase PARAM statements.

There are two types of output data from the disc prep routine:

- Track condition table (Appendix D)
  - always printed on the line printer
  - punched on cards (optional)
  - written on an unused and operable disc track (optional)
- System console messages

  Messages from the disc prep routine are typed on the system console. Some messages are informative while others are error messages, see the *UNIVAC 9400 System Operations Handbook Operator Reference, UP–7871* (current version).

3.3. CONTROL STREAM REQUIREMENTS

The disc prep routine is executed within the OS/4 as either a job or job step. It is defined and directed by means of job control statements in a control stream. These control statements are recognized and processed by job control. Each of the control statements requires user-supplied parameters which are dependent upon the user's disc prepping intentions. Some of the parameters are used for job control functions while others are required for the intended execution of the disc prep routine. The parameters used by the disc prep routine are in fixed format and cannot be used with other software requiring a free-format scan.

The job control statements required for the proper execution of the disc prep routine are explained in the following paragraphs. A detailed description of each control statement is given in *UNIVAC OS/4 Job Control Programmer Reference, UP–7793* (current version).

3.3.1. JOB Statement

The JOB statement is normally the first job control statement in the control stream. The name specified on the JOB statement is used to identify the control stream in the job file.

3.3.2. DVC Statement

The logical unit number of the device for each file required during the execution of the disc prep routine must be specified in the DVC statement.

3.3.3. LFD Statement

Certain logical files must be defined on the LFD statements in the control stream for a disc prep run if the associated peripherals are to be used. The logical file definitions are:

Logical Name	File
DISKIN	File name for the disc pack to be prepped
PRNTR	File name for phase 4 print operation
PUNCH	File name for phase 4 punch operation

3.3.4. EXEC Statement

The program name for the EXEC control statement is the name of the routine to be executed:

PREPDK – indicating the disc prep routine for the UNIVAC 8411/8414/8424 Disc Subsystems.

3.3.5. PARAM Statement

The PARAM statement and related field parameters for each phase are described in detail in Section 4.

3.3.6. Data Delimiters

Phase 0 and phase 5 have disc prep services, which are optional. If these services are requested, additional statements are required: INSERT statements, which follow the phase 0 PARAM statement, and VOL statements, which follow the phase 5 PARAM statement. These statements must be preceded by a start-of-data (/$) statement and followed by an end-of-data (/*) statement.

3.3.7. End-of-Job Statement

The end-of-job (/&) statement indicates the end of a control stream for a disc prep run.

4. PARAM STATEMENT DESCRIPTIONS

4.1. GENERAL

Each of the seven phases in the disc prep routine for the UNIVAC OS/4 Operating System (OS/4) is identified by a PARAM statement. If a phase is to be executed, the associated PARAM statement and any optional statements for the phase must be present in the control stream.

The phase 0 PARAM statement must always be the first statement in the set of parameter statements because the root segment automatically passes control to phase 0. The order of the PARAM statements is the order in which the individual phases are executed.

The entire set of parameter statements is verified before major operations begin on the disc pack. Each PARAM statement must have the following format:

//ΔPARAMΔPHASEΔphase-numberΔfield-parameters

where:

phase-number
Is a 1-digit number, 0 through 6, representing the phase.

field-parameters
Start in column 18. Spaces and commas are not permitted within field parameters; however, in some cases, fields may be blank or the trailing positions in a field may be blank. The parameters for each statement are given with the description of each phase.

4.2. PHASE 0 PARAM STATEMENT

The phase 0 PARAM statement is always the first statement in the set of parameter statements. It is followed immediately by the cards containing the track condition table, if the optional punched card method is used. An INSERT statement follows if the track insert option is used (field parameter 8). The remaining statements may be specified in any order.

The format of the phase 0 PARAM statement is:

1 4	10
// PARAM	PHASEΔ0Δnppppppaaaaaabbbbbbccccccdefg

Field Parameter 1 (column 18):

n

Is a decimal number from 1 to 6 specifying the number of phases to be run after phase 0 is completed. This field must not be blank.

Field Parameter 2 (columns 19–24):

pppppp

Is a string of decimal numbers having from one to six digits, left-justified. Each digit corresponds to a phase number which the root segment uses to control the order in which the phases are to be run. For example, the order might be 6123ΔΔ. This illustrates a disc prep run where phase 6 is run first, followed by phases 1, 2, and 3. Phases 4 and 5 are not run.

Field Parameter 3 (columns 25–30):

aaaaaa

Specifies the six hexadecimal numbers representing the primary track address at which the disc prepping is to start. The first four numbers represent the cylinder address (cccc); the second two numbers represent the head address (hh) of the starting primary track.

For a UNIVAC 8411 disc pack, the highest cylinder address (of 200 cylinders) is 00C7; the highest head address (of 10 heads) is 09.

For a UNIVAC 8414 disc pack, the highest cylinder address (of 200 cylinders) is 00C7; the highest head address (of 20 heads) is 13.

For a UNIVAC 8424 disc pack, the highest cylinder address (of 400 cylinders) is 018F; the highest head address (of 20 heads) is 13.

If omitted

The value 000000 is assumed.

Examples:

1. UNIVAC 8411 disc

COLUMNS

25	26	27	28	29	30
0	0	0	0	0	9

Disc prepping starts at track address 000009.

2. UNIVAC 8414 disc

COLUMNS

25	26	27	28	29	30
0	0	C	7	1	3

Disc prepping starts at track address 00C713.

3. UNIVAC 8424 disc

COLUMNS

25	26	27	28	29	30
0	1	8	2	0	0

Disc prepping starts at track address 018200.

Field Parameter 4 (columns 31–36):

bbbbbb

Specifies the six hexadecimal numbers representing the primary track address at which the disc prepping is to end.

For a UNIVAC 8411 disc pack, the highest cylinder address (of 200 cylinders) is 00C7; the highest head address (of 10 heads) is 09.

For a UNIVAC 8414 disc pack, the highest cylinder address (of 200 cylinders) is 00C7; the highest head address (of 20 heads) is 13.

For a UNIVAC 8424 disc pack, the highest cylinder address (of 400 cylinders) is 018F; the highest head address (of 20 heads) is 13.

NOTE:

The ending track address must be equal to or greater than the starting track address specified in field parameter 3. If the addresses in field parameters 3 and 4 are equal, only one track in the disc pack is prepped. The ending primary track address must not be greater than the last primary track address of the particular disc pack.

If omitted

The value 00C709 (for UNIVAC 8411 disc) or 00C713 (for UNIVAC 8414 disc) or 018F13 (for UNIVAC 8424 disc) is assumed.

Examples:

1. UNIVAC 8411 disc

COLUMNS

31	32	33	34	35	36
0	0	C	7	0	9

Disc prepping ends at address 00C709.

2. UNIVAC 8414 disc

COLUMNS

31	32	33	34	35	36
0	0	0	0	0	9

Disc prepping ends at address 000009.

3. UNIVAC 8424 disc

COLUMNS

31	32	33	34	35	36
0	1	5	0	1	3

Disc prepping ends at address 015013.

Field Parameter 5 (columns 37–42):

cccccc

Specifies the six alphanumeric characters representing the disc pack serial number. If it is a new disc pack with no existing number, the number specified in this field is assigned. If the disc pack is not new, the specified number may be the existing number or a new number, depending on which phases are being run.

Examples:

1. UNIVAC 8411/8414/8424 disc

COLUMNS

37	38	39	40	41	42
D	S	P	0	0	1

2. UNIVAC 8411/8414/8424 disc

COLUMNS

37	38	39	40	41	42
1	0	2	3	4	3

Field Parameter 6 (column 43):

d

Specifies the method of generating and transferring the track condition table to the root segment of the disc prep routine. One of the following alphabetic characters is used to specify the method:

S

Surface analysis method

D

Disc method

C

Punched card method

Δ

S is assumed

- Surface Analysis Method

  This method is used when the disc pack to be prepped is blank and has no previous track condition table. The track condition table is then generated by the surface analysis method during phase 2.

  This method should be used only when prepping a disc pack for the first time, or when a complete prep (phases 0–5) is executed on the full disc pack.

- Disc Method

  This method is used when the disc pack has been in use and the current information is to be retained. The existing track condition table must then be used to create the track condition table. Thus, if an additional defective track is found, it is assigned to an available alternate track and the track condition table is updated. When the disc method is used, the disc prep routine searches the alternate track area and reads the track condition table into the root segment. A previously executed phase 4 places the track condition table on a track in the alternate track area and prints out the table on the line printer. (See Appendix D.)

- Punched Card Method

  This method is used if the track condition table on the disc pack has been destroyed. A previously executed phase 4 produces a punched card deck of the track condition table for the particular disc pack. (See Appendix D.) The punched card deck is placed in the control stream immediately following the phase 0 PARAM statement.

NOTES:

1. *The start-of-data (/$) and end-of-data (/*) cards produced by phase 4 must be included here, since the cards are numbered and the numbers are checked by phase 0.*

2. *Each entry in the track condition table is 14 bytes long. Previous prep programs (PREP1100, PREP1400) had a 12-byte entry. If the D or C option is specified, the track condition table must have a length of 14 bytes. If an error occurs because of incompatibility, reprep the disc volume with the S option specified.*

Field Parameter 7 (column 44):

e

Specifies whether the alternate track area of the disc pack is to be tested. The values specified may be:

Y

Indicates that the alternate track area is to be tested.

N

Indicates that the alternate track area is not to be tested.

Δ

Y is assumed.

In addition to the primary track area, the alternate track area is normally tested also. (Some runs do not require that the alternate track area be tested.) Before testing an alternate track, the disc prep routine checks the track condition table to verify that the track has not been designated as defective or been assigned to a defective primary track.

Field Parameter 8 (column 45):

f

Specifies whether some tracks are to be automatically recorded as defective. The values specified may be:

Y

Indicates that defective tracks are designated by INSERT statements in the control stream.

N

Indicates that defective tracks are not designated.

Δ

N is assumed.

This parameter may be used when an intermittent defect on a track is noticed during the execution of operating system programs, but the defect was not detected during a normal disc prep run. The user then may wish to force the use of an alternate track by specifying the track as defective to avoid interference with future operations. If this parameter is specified, the address of each track suspected of being defective is indicated on a separate INSERT statement. Subsequent execution of phase 3 assigns alternate tracks to the inserted defective primary tracks. (See 4.3.)

NOTE:

When executing phase 3 with INSERT cards, the method of generating the track condition table indicated in column 43 of the PARAM phase 0 card should be a D or a C.

Field Parameter 9 (column 46):

g

Specifies if a normal surface analysis is to be performed or if only the tracks listed on the INSERT statements are to be designated as defective. The values specified may be:

I

Indicates that only the INSERT statements are to be used to designate defective tracks.

Δ

Indicates that a normal surface analysis is planned.

4.2.1. Summary of Phase 0 PARAM Statement

A summary of all the field parameters used on the phase 0 PARAM statement is given in Table 4–1. All of these parameters are verified by the disc prep routine before other statements are read and verified. The PARAM statements, which follow the phase 0 PARAM statement, must be in the order specified in phase 0 field parameter 2. Any statements that have invalid field parameters cause error messages to be typed out on the system console. See the *UNIVAC 9400 System Operations Handbook Operator Reference, UP–7871* (current version).

Table 4–1. Summary of Phase 0 PARAM Statement Field Parameters

Column Number	Field Parameter Number	Preset Value if Column is Left Blank	Parameter Limitations	Definition
18	1	Not preset	Decimal number from 1 to 6	Number of phases to be run after phase 0
19–24	2	Not preset	Decimal number from 1 to 6 (unused columns blank)	Phase numbers in the order in which they are run
25–30	3	000000	Hexadecimal digits: ⩽ 00C709 for UNIVAC 8411 disc ⩽ 00C713 for UNIVAC 8414 disc ⩽ 018F13 for UNIVAC 8424 disc	Starting primary track address
31–36	4	00C709 for UNIVAC 8411 disc 00C713 for UNIVAC 8414 disc 018F13 for UNIVAC 8424 disc	⩾ Starting primary track address: ⩽ 00C709 for UNIVAC 8411 disc ⩽ 00C713 for UNIVAC 8414 disc ⩽ 018F13 for UNIVAC 8424 disc	Ending primary track address
37–42	5	Not preset	Must be entered as alphanumeric	Serial number of disc pack
43	6	S	S, C, or D	Method of deriving track condition table: S = Surface analysis C = Cards D = Disc
44	7	Y	Y or N	Y = Test alternate tracks N = No testing of alternate tracks
45	8	N	Y or N	Y = Some defective tracks are designated by INSERT statements N = No defective tracks designated by INSERT statements
46	9	Δ	Δ or I	I = Defective tracks are designated only by INSERT statements Δ = Normal testing
47–80			Blank	

4.2.2. Phase 0 PARAM Statement Examples

The following examples of the phase 0 PARAM statement could possibly be used for a typical disc prep:

```
 LABEL     △OPERATION△                    OPERAND                        △
1          10      16
// PARAM    PHASE   0 512345 00000000C709DSP012SYN
```

This statement indicates there are five phases to be executed: phases 1, 2, 3, 4, and 5, respectively. The disc pack is to be prepped from track 000000 to track 00C709 and is given DSP012 as a volume serial number. The disc pack is to be prepped using the surface analysis method with testing of alternate tracks, and no INSERT statements are in the control stream.

```
// PARAM    PHASE   0 41235 00000000C709FILE01SYN
```

This statement indicates four phases are to be executed: phases 1, 2, 3 and 5 respectively. The disc pack is to be prepped from track 000000 to track 00C709 and is given FILE01 as a volume serial number. No previous track history is needed as input, alternate tracks are to be tested, and no INSERT statements are in the control stream.

4.3. INSERT STATEMENT

An INSERT statement is used when field parameter 8 of the phase 0 PARAM statement is a Y. The INSERT statement contains the address of a track suspected of being intermittently defective for which an alternate is to be assigned. Only one track address may be specified on an INSERT statement. Multiple INSERT statements are permitted. The INSERT statements are placed in the control stream between the job control data delimiter statements, start-of-data (/$), and end-of-data (/*). The set of statements must follow the phase 0 PARAM statement.

If the track address on the INSERT statement is for an alternate track, it is immediately noted in the track condition table in main storage. If the address is for a primary track, it is stored in main storage. Then when phase 3 is executed, the inserted defective primary tracks are assigned to alternate tracks. The primary and alternate track configuration for direct access subsystems is given in Table 2–1.

The format of the INSERT statement, which must start in column 1, is:

1	10
INSERT	**dddddd**

Field Parameter 1 (columns 10–13):

dddddd

Is the address (ccchh) of a possibly defective track.

Examples:

1. UNIVAC 8411 Disc

```
LABEL      ΔOPERATIONΔ      OPERAND                    Δ
1          10               16
/$
INSERT     00010002
INSERT     000AC000
INSERT     000C9001
/*
```

2. UNIVAC 8414 Disc

```
/$
INSERT     000C0113
INSERT     000C7113
INSERT     000C8000
/*
```

3. UNIVAC 8424 Disc

```
/$
INSERT     000A0111
INSERT     01810113
INSERT     01900000
/*
```

4.4. PHASE 1 PARAM STATEMENT

Phase 1 writes the home address and track descriptor (R0) records on all tracks in the selected areas (primary and alternate tracks), and then reads them back for verification. The format for these records is given in Appendix E.

If any errors are encountered in comparing the data written and read, an error message is typed out and the testing continues. However, errors here indicate that the pack is unusable, since the track descriptor record must be valid to control defective space on the disc pack.

NOTE:

Phase 1 writes the home address and track descriptor (R0) records disregarding any alternate tracks that may have been assigned by a previous disc run. Phase 1 should be executed only in conjunction with phase 2 and phase 3. If phase 1 is specified with both the writing and reading of the home address and track descriptor records, but the surface analysis phase (phase 2) is not specified, the disc prep error message UX20 INCORRECT USE OF PHASE 1 appears.

The phase 1 PARAM statement must be as follows:

1 4	10
// PARAM	PHASE△1△k

Field Parameter 1 (Column 18):

k

Specifies whether the home address and track descriptor records are to be both written and read or read only. In either case the data read is compared to the data expected.

B

Both read and write

R

Read only

△

B is assumed

Example:

LABEL	△OPERATION△	OPERAND	△
1	10	16	
//, PARAM	PHASE	1, B	

4.5. PHASE 2 PARAM STATEMENT

Phase 2 is concerned with testing the tracks in the selected areas for good data retention over the entire track surface. This is accomplished by writing a very long track descriptor (R0) record, and then reading it back and comparing the data read to the data expected. The length of the R0 record is such that a track overrun condition is expected. This prevents the speed of the disc drive from affecting the amount of track which is tested.

The alternate tracks are tested first and if any are found to be defective, they are marked as such in the track condition table. The primary tracks are then tested. If any are found to be defective, the track condition table is searched and the first operative unassigned alternate track is assigned as the alternate for the defective primary track.

NOTE:

If Phase 2 is to be executed on only a portion of the disc pack, the method of generating the track condition table specified in column 43 of the PARAM phase 0 card should be either a C or a D.

The format of the phase 2 PARAM statement is as follows:

1 4	10
// PARAM	PHASE△2△hhj

Field Parameter 1 (columns 18–19):

hh

Specifies two hexadecimal digits representing the 1-byte test pattern used to fill the track surface. Hexadecimal E5 is the worst-case pattern.

If omitted

E5 is assumed.

Field Parameter 2 (column 20):

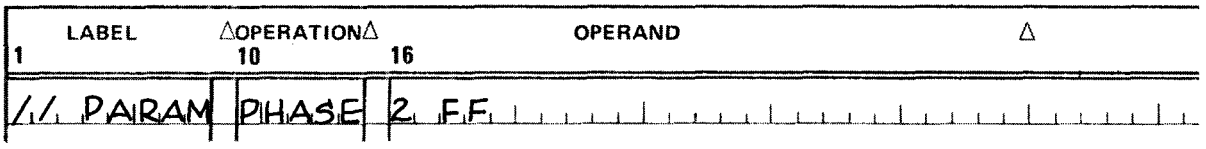
j

Specifies the number of times (1–7) the 1-byte test pattern is circularly shifted one bit and the tract retested. A track may be retested a maximum of seven times before testing proceeds to the next track.

If omitted

Value of 0 is assumed. See Appendix F for the timing considerations for this option.

Example:



4.6. PHASE 3 PARAM STATEMENT

Phase 3 rewrites the home address and track descriptor (R0) records in accordance with the track condition table in main storage. Defective and alternate tracks are noted as such in respective flag bytes, and the addresses in the R0 count and data fields are exchanged. (See Appendix E.) Good tracks are written in the same manner as phase 1. All data written is read back and compared, and an unequal compare causes a program abort.

The operations are performed in the following sequence:

1. All primary tracks tested as good are rewritten.
2. The defective primary tracks are rewritten with appropriate references to their alternate tracks.
3. Defective alternate tracks are rewritten.
4. Alternate tracks which have been assigned are rewritten with appropriate references to their primary tracks.
5. Good, unassigned alternate tracks are rewritten.

The format of the phase 3 PARAM statement is:

1 4	10
// PARAM	PHASEΔ3

No additional parameters are required for this statement.

4.7. PHASE 4 PARAM STATEMENT

Phase 4 generates output information concerning the results of the disc pack test. The track condition table in main storage is analyzed, edited, and printed out on the line printer. The track condition table is also normally written on an unassigned alternate track although there is an option to prevent this. Another option allows the same information to be punched out on cards. A description of all three types of output is given in Appendix D.

The format of the phase 4 PARAM statement is:

1 4	10
// PARAM	PHASE Δ4 Δrs

Field Parameter 1 (column 18):

r

Specifies whether the track condition table is to be punched on cards.

Y

Output on card punch

N

Prevent punching

Δ

Y is assumed

See D.2 for format of the punched card output.

Field Parameter 2 (column 19):

s

Specifies whether the track condition table is to be written on an alternate track. Normally, this field should be blank for contingency purposes.

L

Prevent writing output on alternate track

Δ

Write output on alternate track

See D.3 for the format of the alternate track.

Example:

LABEL	ΔOPERATIONΔ	OPERAND	Δ
1	10	16	
//, PARAM	PHASE	4 Y,	

This example indicates that, in addition to printing the track condition table, phase 4 generates it on an alternate disc track and punches the output on cards.

4.8.PHASE 5 PARAM STATEMENT

Phase 5 writes appropriate records on the disc pack to prepare it for use by other programs in the OS/4. The records include dummy initial program load (IPL) records, standard volume label record, user volume label records, and volume table of contents (VTOC). The volume label records and VTOC records are described in *UNIVAC 9400 System Data Management System Programmer Reference, UP–7629* (current version).

These records are written on track 0 of cylinder 0 in the following order:

1. dummy IPL records
2. volume label records
3. optional VTOC (begins on track 2 in an IPL volume)

A set of parameter statements for phase gives the necessary information for each volume label (on separate VOLn statements), indicates the capacity and allocation for the VTOC, and indicates whether or not the disc pack is an IPL volume. An IPL volume is one which can be used to initially load the OS/4. If an IPL volume is indicated, phase 5 leaves space on the disc pack for the appropriate records to be written by other operating system programs to allow initial loading to occur.

The required additional statements (/$, VOLn, and /* cards) immediately follow the phase 5 PARAM statement.

The format of the phase 5 PARAM statement is:

1 4	10
// PARAM	PHASE△5△cdeeeeee

Field Parameter 1 (column 18):

c

Is a decimal number (1 through 8) or blank representing the number of volume label cards found in the phase 5 set of parameter statements. This number includes the standard volume label. If blank, 1 is assumed.

Field Parameter 2 (column 19):

d

Is an alphabetic character (Y or N) or a blank denoting whether the disc pack is used for an IPL volume.

Y

Disc pack is an IPL volume. This causes the disc prep routine to generate 1536 null bytes in the data area in record 1 on track 0 of cylinder 0, and two null bytes in the data area in record 2.

N

Disc pack is not an IPL volume. This generates two null bytes in the data area in records 1 and 2 on track 0 of cylinder 0.

△

Y is assumed.

→ Field Parameter 3 (columns 20–25):

eeeeee
Is the ending track address (ccchh) for the VTOC. This address must be greater than or equal to the starting VTOC address, but the VTOC should not be on more than two consecutive cylinders.

If omitted
000009 is assumed for UNIVAC 8411 disc; 000013 is assumed for UNIVAC 8414 and 8424 discs.

4.9. PHASE 5 VOLUME LABEL STATEMENTS

The phase 5 volume label statements contain the data necessary for creating the standard volume label (VOL1) and any user volume labels (VOLn). These labels are described in the *UNIVAC 9400 System Data Management System Programmer Reference, UP–7629* (current version).

Preceding the first volume label statement (VOL1) must be a start-of-data card (/$), and following the last user volume label statement must be an end-of-data card (/*).

4.9.1. Standard Volume Label Statement (VOL1)

The format of the standard volume label statement is:

1	5
VOL1	ssssssrttttttΔ..Δaaaaaaaaaa Δ...

Field Parameter 1 (columns 5–10):

ssssss
Not used; reserved for volume serial number.

Field Parameter 2 (column 11):

r
Is a 0 or 1 for volume security byte.

Field Parameter 3 (columns 12–17):

tttttt
Is the VTOC starting track address (ccchh).

If this field is blank, the VTOC starts at one of two places:

1. If it is not an IPL volume, the VTOC begins following the last volume label record on track 0. The disc prep routine generates format 4, format 5, and format 0 records on track 0 until there are 16 total records on track 0 for the UNIVAC 8411 disc, and 25 total records for the UNIVAC 8414 and 8424 discs.

2. If it is an IPL volume, the VTOC begins on track 2, record 1, allowing all of track 1 for the IPL program.

In either case, the disc prep routine generates 16 format 0 label records for the UNIVAC 8411 disc, and 25 format 0 label records for the UNIVAC 8414 and 8424 discs on all tracks in the VTOC area except the first track.

Field Parameter 4 (columns 18–41):

This field is not used; it is left blank.

Field Parameter 5 (columns 42–51):

aaaaaaaaaa
Is the alphanumeric name and address of the owner.

4.9.2. User Volume Label Statement (VOLn)

There may be a maximum of seven user volume label statements, in order by label number, and following the standard volume label statements.

The user volume label records are located on track 0 of cylinder 0, after the VOL1 label.

The format of the user volume label statement is:

1	5
VOLn	uuu...u

where:

n
Is a label number from 2 to 8.

Field Parameter 1 (columns 5–80):

u
Is any user-supplied information.

4.9.3. Example of Phase 5 Statement

The following example shows the order and format of the statements required to execute phase 5:

1 LABEL	△OPERATION△ 10	16 OPERAND △
/, PARAM	PHASE	5, 3Y
/$		
VOL1	10	
VOL2	ROSEMARY, H	DISPENSARY
VOL3	HARRIS	L, PROGRAMMING
/*		

4.10. PHASE 6 PARAM STATEMENT

Phase 6 is a check phase which assures that the disc pack test area, specified on the phase 0 PARAM statement, does not contain records already in use. Phase 6 normally is used only on a pack which has previously been prepped and used by the OS/4. If phase 6 is to be executed it must immediately follow phase 0.

This phase first reads the standard volume label record on track 0 and compares the volume serial number in the record with the one on the phase 0 PARAM statement. An unequal compare causes an error message to be typed out on the system console, and the routine terminates.

Phase 6 then uses the VTOC starting address in the standard volume label record to locate the first format 5 label record in the VTOC, and reads this record. The test area addresses on the phase 0 PARAM statement are compared against the empty-space addresses in the format 5 label record. If the test area is not all empty spaces, a message is typed out on the system console, and the routine aborts. If the test area is empty space, a message is typed out on the system console, and the routine proceeds.

The only parameter card required by phase 6 is the PARAM statement.

The format of the phase 6 PARAM statement is:

1 4	10
// PARAM	PHASE△6

No additional parameters are required for this card.

APPENDIX A. EXAMPLE CONTROL STREAMS

A.1. GENERAL

This appendix gives several examples of control streams that may be used when prepping disc packs for use in the UNIVAC OS/4 Operating System (OS/4) subsystems. The blanks indicated in the parameter statements in the following examples must be placed as indicated and may not be omitted.

A.2. COMPLETE DISC PREP

A typical disc prep run performs a complete test of a blank disc pack, produces a printout of the track condition table, and creates the IPL, volume label, and VTOC records.

Control streams in the following example write home addresses and track descriptor records on all tracks, perform a surface analysis of the entire disc pack surface, rewrite these records according to the results of the surface analysis, output the information on the line printer, punch, and test disc, and write dummy IPL and VOL1 records on track 0000 and a VTOC from 000002 to track 000009 (UNIVAC 8411 disc) or track 000013 (UNIVAC 8414 and 8424 discs).

The most complete test would use the same set of parameter statements with field 2 of the phase 2 PARAM statement changed to 7. This would, of course, increase the program running time. See Appendix F for program timing considerations.

- UNIVAC 8411 Disc Control Stream Example:

```
LABEL    ΔOPERATIONΔ          OPERAND                              Δ
1         10     16
// JOB FULPREP1
// DVC 9   // LFD DISKIN
// DVC 3   // LFD PRNTR
// DVC 8   // LFD PUNCH
// EXEC PREPDK00
// PARAM PHASE 0 512345 00000000C709DSP0125YN
// PARAM PHASE 1 B
// PARAM PHASE 2 E50
// PARAM PHASE 3
// PARAM PHASE 4 Y
```

(continued)

```
LABEL      OPERATION    OPERAND
1          10           16                                                72
// PARAM   PHASE  5,1Y000009
/$
VOL1       000002
/*
/&
```

- UNIVAC 8414 Disc Control Stream Example:

```
// JOB FULPREP2
// DVC 9  // LFD DISKIN
// DVC 3  // LFD PRNTR
// DVC 8  // LFD PUNCH
// EXEC PREPDK00
// PARAM  PHASE  0,512345,00000000C713DSP012SYN
// PARAM  PHASE  1,B
// PARAM  PHASE  2,E50
// PARAM  PHASE  3
// PARAM  PHASE  4,Y
// PARAM  PHASE  5,1Y000013
/$
VOL1       000002
/*
/&
```

- UNIVAC 8424 Disc Control Stream Example:

```
// JOB FULPREP3
// DVC 9  // LFD DISKIN
// DVC 3  // LFD PRNTR
// DVC 8  // LFD PUNCH
// EXEC PREPDK00
// PARAM  PHASE  0,512345,00000001BF13DSP012SYN
// PARAM  PHASE  1,B
// PARAM  PHASE  2,E50
// PARAM  PHASE  3
// PARAM  PHASE  4,Y
// PARAM  PHASE  5,1Y000013
/$
VOL1       000002
/*
/&
```

- Preset Parameter Method:

Because of the preset parameter values, the same complete disc prep is performed if the following parameter statements are substituted.

```
LABEL      ΔOPERATIONΔ      OPERAND                    Δ
1          10               16
// PARAM   PHASE   0 512345                  DSP012
// PARAM   PHASE   1
// PARAM   PHASE   2
// PARAM   PHASE   3
// PARAM   PHASE   4
// PARAM   PHASE   5
/$
VOL1
/*
/&
```

A.3. ANALYZE DISC PACK

The control streams in the following example analyze the surface of the entire disc pack, assign alternate tracks to those found defective, and only print the results on the line printer.

- UNIVAC 8411 Disc Control Stream Example:

```
// JOB CHKPREP1
// DVC 9    // LFD DISKIN
// DVC 3    // LFD PRNTR
// EXEC PREPDK00
// PARAM   PHASE   0 3234    00000000C709DISKO1SYN
// PARAM   PHASE   2 E50
// PARAM   PHASE   3
// PARAM   PHASE   4 NL
/&
```

- UNIVAC 8414 Disc Control Stream Example:

```
LABEL      OPERATION     OPERAND
1          10        16
// JOB CHKPREP2
// DVC 9     // LFD DISKIN
// DVC 3     // LFD PRNTR
// EXEC PREPDK00
// PARAM PHASE 0 3234 ,00000000C713DISK01SYN
// PARAM PHASE 2 E50
// PARAM PHASE 3
// PARAM PHASE 4 NL
/&
```

- UNIVAC 8424 Disc Control Stream Example:

```
LABEL      OPERATION     OPERAND
1          10        16
// JOB CHKPREP3
// DVC 9     // LFD DISKIN
// DVC 3     // LFD PRNTR
// EXEC PREPDK00
// PARAM PHASE 0 3234 ,00000001 8F13DISK01SYN
// PARAM PHASE 2 E50
// PARAM PHASE 3
// PARAM PHASE 4 NL
/&
```

A.4. TRACK INSERT PREP

Another type of testing involves prepping disc packs which already have data on some tracks. Such a case is a track found to be defective during a previous run. In this case, the defective track should be assigned to an alternate track. This can be done through the use of the INSERT statement without disturbing the data on the disc pack.

This type of run should be restricted to defective primary tracks, as a defective alternate track cannot be assigned to another alternate track.

A.4.1. Track Condition Table on Alternate Track

The control streams in the following example use the INSERT statement, and the track condition table is generated from an alternate track:

- UNIVAC 8411 Disc Control Stream Example:

```
1          LABEL      ΔOPERATIONΔ      OPERAND                    Δ
                      10          16
// JOB BADTRAC1
// DVC 9     // LFD DISKIN
// DVC 3     // LFD PRNTR
// EXEC PREPDK00
// PARAM     PHASE  0 3634   004C07004C07INS102DNYI
/$
INSERT       004C07
/*
// PARAM     PHASE  6
// PARAM     PHASE  3
// PARAM     PHASE  4 N
/&
```

- UNIVAC 8414 Disc Control Stream Example:

```
// JOB BADTRAC2
// DVC 9     // LFD DISKIN
// DVC 3     // LFD PRNTR
// EXEC PREPDK00
// PARAM     PHASE  0 3634   008A13008A13INS102DNYI
/$
INSERT       008A13
/*
// PARAM     PHASE  6
// PARAM     PHASE  3
// PARAM     PHASE  4 N
/&
```

- UNIVAC 8424 Disc Control Stream Example:

```
LABEL      △OPERATION△          OPERAND                            △
1           10     16
// JOB BADTRAC3
// DVC 9    // LFD DISKIN
// DVC 3    // LFD PRNTR
// EXEC PREPDK00
// PARAM PHASE0 3634  015A0B015A0BINS102DNYI
/$
INSERT     015A0B
/*
// PARAM PHASE6
// PARAM PHASE3
// PARAM PHASE4 N
/&
```

A.4.2. Track Condition Table on Punched Cards

The control streams in the following example use the INSERT statement, and the track condition table is generated from a punched card deck:

- UNIVAC 8411 Disc Control Stream Example:

```
// JOB BADTRAC4
// DVC 9    // LFD DISKIN
// DVC 3    // LFD PRNTR
// EXEC PREPDK00
// PARAM PHASE0 3634  004C07004C07INS102CNYI
```

Punched card deck containing track condition table (See Appendix D.)

```
/$
INSERT     004C07
/*
// PARAM PHASE6
// PARAM PHASE3
// PARAM PHASE4 N
/&
```

- **UNIVAC 8414 Disc Control Stream Example:**

```
LABEL      OPERATION      OPERAND                                  COMMENT
1          10             16
/./ JOB BADTRAC5
/./ DVC 9  /./ LFD DISKIN
/./ DVC 3  /./ LFD PRNTR
/./ EXEC PREPDK00
/./ PARAM PHASE 0 3634  004C07004C07INS102CNVI
:  } Punched card deck containing track condition table (See Appendix D.)
/$
INSERT     004C07
/*
/./ PARAM PHASE 6
/./ PARAM PHASE 3
/./ PARAM PHASE 4 N
/&
```

- **UNIVAC 8424 Disc Control Stream Example:**

```
LABEL      OPERATION      OPERAND                                  COMMENT
1          10             16
/./ JOB BADTRAC6
/./ DVC 9  /./ LFD DISKIN
/./ DVC 3  /./ LFD PRNTR
/./ EXEC PREPDK00
/./ PARAM PHASE 0 3634  015A0B015A0BINS102CNVI
:  } Punched card deck containing track condition table (See Appendix D)
/$
INSERT     015A0B
/*
/./ PARAM PHASE 6
/./ PARAM PHASE 3
/./ PARAM PHASE 4 N
/&
```

A.5. PREP OF PARTIAL DISC PACK

A partial disc pack may be prepped if, for example, an area on the disc pack has not been used for some time. The existing track condition table is read from the disc and the new updated track condition table is punched on cards and also written on an available alternate track.

- UNIVAC 8411 Disc Control Stream Example:

LABEL	OPERATION	OPERAND
/\/ JOB PAPREP		1
/\/ DVC 9	/\/ LFD	DISKIN
/\/ DVC 3	/\/ LFD	PRNTR
/\/ DVC 8	/\/ LFD	PUNCH
/\/ EXEC	PREPDK	00
/\/ PARAM	PHASE	0,561234,0065000C709VOLUMIDYN
/\/ PARAM	PHASE	6
/\/ PARAM	PHASE	1
/\/ PARAM	PHASE	2,CBI
/\/ PARAM	PHASE	3
/\/ PARAM	PHASE	4
/&		

- UNIVAC 8414 Disc Control Stream Example:

/\/ JOB PAPREP		2
/\/ DVC 9	/\/ LFD	DISKIN
/\/ DVC 3	/\/ LFD	PRNTR
/\/ DVC 8	/\/ LFD	PUNCH
/\/ EXEC	PREPDK	00
/\/ PARAM	PHASE	0,561234,0065000C713VOLUMIDYN
/\/ PARAM	PHASE	6
/\/ PARAM	PHASE	1
/\/ PARAM	PHASE	2,CBI
/\/ PARAM	PHASE	3
/\/ PARAM	PHASE	4
/&		

- UNIVAC 8424 Disc Control Stream Example:

LABEL	OPERATION	OPERAND
1	10	16
/\/ JOB	PARPRED	3
/\/ DVC 9	/\/ LFD	DISKIN
/\/ DVC 3	/\/ LFD	PRNTR
/\/ DVC 8	/\/ LFD	PUNCH
/\/ EXEC	PREPDK	00
/\/ PARAM	PHASE	0, 561234 ODA60001 8F1 3VOLUMI DYN
/\/ PARAM	PHASE	6
/\/ PARAM	PHASE	1
/\/ PARAM	PHASE	2, CB11
/\/ PARAM	PHASE	3
/\/ PARAM	PHASE	4
/&		

APPENDIX B. ERROR MESSAGES

Unexpected errors encountered during the execution of a UNIVAC OS/4 Operating System (OS/4) disc prep routine are generally not recoverable. It is imperative that this routine run to completion without errors, since the resultant disc pack is used by many other programs. If a hardware error occurs, the problem should be resolved without any recovery attempts being made, and the routine rerun.

All error messages are typed out on the system console.

Refer to the *UNIVAC 9400 System Operations Handbook Operator Reference, UP–7871* (current version) for explanations of all disc prep error messages.

APPENDIX C. ORGANIZATION OF TRACK CONDITION TABLE

A UNIVAC OS/4 Operating System (OS/4) disc prep routine maintains a record of the general condition of the entire disc pack in a track condition table which is kept in phase 0. The track condition table is organized in track histories of 14 bytes each. There is one track history for each alternate track in the disc pack. Each history lists the condition of an alternate track and the defective primary track it is to replace, if any, as shown in the following table.

Table C–1. Track History Format

Byte Number	Mnemonic Abbreviation	Significance
0 and 1	$c_a c_a c_a c_a$	Alternate track cylinder address
2	$h_a h_a$	Alternate track head address
3	b b	Code byte — This byte signifies the following conditions only if there is a 1 in the indicated bit position: 0 — Alternate track in bytes 0 and 1 is defective 1 — Primary track in bytes 4 and 5 is defective and track in bytes 0 and 1 is its alternate 2 — Alternate track in 0 and 1 not yet assigned 3 — Alternate track in bytes 0 and 1 is assigned by this run 4 — Defective track found by surface analysis 5 — Defective track designated by card insert 6 — Alternate track in bytes 0 and 1 contains track condition table 7 — Alternate track assigned by previous run
4	r r	Reserved
5 and 6	$c_p c_p c_p c_p$	Defective primary track cylinder address
7	$h_p h_p$	Defective primary track head address
8 and 9	w w w w	Number of record 0 data bytes written on track
10 and 11	f f f f	Number of first bad byte encountered on track
12	d d	Bad byte read
13	x x	Byte expected to be read

APPENDIX D. FORMAT OF TRACK CONDITION TABLE OUTPUT

D.1. PRINTOUT FORMAT

If phase 4 of the UNIVAC OS/4 Operating System (OS/4) disc prep routine is run, a printout of the track condition table occurs on the line printer. If all the alternate tracks are assigned or defective and additional defective primary tracks are found, up to four of the additional defective tracks, each preceded by the word EXCESS, are listed at the end of the table.

For an explanation of the format of the track condition tables in the following examples, see Table C–1.

D.1.1. UNIVAC 8411 Disc Printout Example

THE FOLLOWING TRACK CONDITION TABLE WAS GENERATED ON 01/01/70 AT 00:01 ON DISC PACK SERIAL NUMBER 123456. ALL NUMBERS ARE IN HEXADECIMAL NOTATION.

ALTERNATE CYLINDER	TRACK HEAD	CODE BYTE 01234567	PRIMARY CYLINDER	TRACK HEAD	BYTES WRITTEN ON BAD TRACK	FIRST BAD BYTE FOUND	BYTE READ	BYTE EXPECTED
00C8	00	01011000	0004	01	0EDF	0156	EB	E5
00C8	01	01011000	0018	01	0EE0	0156	F5	E5
00C8	02	01011000	0020	01	0EE0	0155	FD	E5
00C8	03	01011000	0020	02	0EE0	0155	EF	E5
00C8	04	01011000	0020	05	0EE0	0154	E7	E5
00C8	05	01011000	0024	01	0EDF	0154	E7	E5
00C8	06	01011000	0025	01	0EE0	0156	E6	E5
00C8	07	01011000	003B	01	0EE1	0153	EF	E5
00C8	08	01011000	004E	01	0EE0	0220	FD	E5
00C8	09	01011000	008B	00	0EE1	02E8	E7	E5
00C9	00	01011000	009A	03	0EE0	023E	E7	E5
00C9	01	01011000	00B3	09	0EE1	02C8	F5	E5
00C9	02	10010100						
00C9	03	01011000	00B4	00	0EE1	02C7	EB	E5
00C9	04	01011000	00B9	01	0EE1	0221	F5	E5
00C9	05	01011000	00BB	01	0EE1	0220	E7	E5
00C9	06	01011000	00C3	01	0EE0	01EE	E7	E5
00C9	07	01011000	00C4	01	0EE1	01EE	E7	E5
00C9	08	01010100	0001	03				
00C9	09	01010100	0006	09				

ALTERNATE CYLINDER	TRACK HEAD	CODE BYTE 01234567	PRIMARY CYLINDER	TRACK HEAD	BYTES WRITTEN ON BAD TRACK	FIRST BAD BYTE FOUND	BYTE READ	BYTE EXPECTED
00CA	00	10010100						
00CA	01	01010100	00C7	09				
00CA	02	00010010						
00CA	03	00100000						
00CA	04	00100000						
00CA	05	00100000						
00CA	06	00100000						
00CA	07	00100000						
00CA	08	00100000						
00CA	09	00100000						

A ONE IN A CODE BYTE BIT MAY BE INTERPRETED AS FOLLOWS:

BIT 0 – THE ALTERNATE TRACK LISTED IN THE SAME LINE IS DEFECTIVE.
BIT 1 – THE PRIMARY TRACK LISTED IN THE SAME LINE IS DEFECTIVE AND THE ALTERNATE TRACK LISTED IS ASSIGNED AS ITS ALTERNATE.
BIT 2 – THE ALTERNATE TRACK LISTED IN THE SAME LINE IS GOOD BUT HAS NOT BEEN ASSIGNED.
BIT 3 – THE ALTERNATE TRACK LISTED IN THE SAME LINE HAS BEEN ASSIGNED BY THIS RUN.
BIT 4 – THE DEFECTIVE TRACK WAS FOUND BY SURFACE ANALYSIS.
BIT 5 – THE DEFECTIVE TRACK WAS DESIGNATED BY CARD INSERT.
BIT 6 – THE ALTERNATE TRACK LISTED IN THE SAME LINE IS GOOD AND CONTAINS THE TRACK CONDITION TABLE.
BIT 7 – THE ALTERNATE TRACK LISTED IN THE SAME LINE WAS ASSIGNED BY A PREVIOUS RUN.

'EXCESS' UNDER 'ALTERNATE TRACK' INDICATES THAT THERE ARE NO MORE GOOD UNASSIGNED ALTERNATE TRACKS AVAILABLE.

D.1.2. UNIVAC 8414 Disc Printout Example

THE FOLLOWING TRACK CONDITION TABLE WAS GENERATED ON 01/01/70 AT 00:01 ON DISC PACK SERIAL NUMBER 123456. ALL NUMBERS ARE IN HEXADECIMAL NOTATION.

ALTERNATE CYLINDER	TRACK HEAD	CODE BYTE 01234567	PRIMARY CYLINDER	TRACK HEAD	BYTES WRITTEN ON BAD TRACK	FIRST BAD BYTE FOUND	BYTE READ	BYTE EXPECTED
00C8	00	01011000	0004	01	1DDF	0156	EB	E5
00C8	01	01011000	0018	01	1DE0	0156	F5	E5
00C8	02	01011000	0020	01	1DE0	0155	FD	E5
00C8	03	01011000	0020	02	1DE0	0155	EF	E5
00C8	04	01011000	0020	05	1DE0	0154	E7	E5
00C8	05	01011000	0024	0A	1DDf	0154	E7	E5
00C8	06	01011000	0025	01	1DE0	0156	E6	E5
00C8	07	01011000	003B	01	1DE1	0153	EF	E5
00C8	08	01011000	004E	13	1DE0	0220	FD	E5

ALTERNATE CYLINDER	TRACK HEAD	CODE BYTE 01234567	PRIMARY CYLINDER	TRACK HEAD	BYTES WRITTEN ON BAD TRACK	FIRST BAD BYTE FOUND	BYTE READ	BYTE EXPECTED
00C8	09	01011000	008B	00	1DE1	02E8	E7	E5
00C8	0A	01011000	009A	03	1DE0	023E	E7	E5
00C8	0B	01011000	00B3	09	1DE1	02C8	F5	E5
00C8	0C	10010100						
00C8	0D	01011000	00B4	00	1DE1	02C7	EB	E5
00C8	0E	01011000	00B9	01	1DE1	0221	F5	E5
00C8	0F	01011000	00BB	01	1DE1	0220	E7	E5
00C8	10	01011000	00C3	10	1DE0	01EE	E7	E5
00C8	11	01011000	00C4	01	1DE1	01EE	E7	E5
00C8	12	01010100	0001	03				
00C8	13	01010100	0006	09				
00C9	00	10010100						
00C9	01	01010100	00C7	09				
00C9	02	00010010						
00C9	03	00100000						
00C9	04	00100000						
00C9	05	00100000						
00C9	06	00100000						
00C9	07	00100000						
00C9	08	00100000						
00C9	09	00100000						
00C9	0A	00100000						
00C9	0B	00100000						
00C9	0C	00100000						
00C9	0D	00100000						
00C9	0E	00100000						
00C9	0F	00100000						
00C9	10	00100000						
00C9	11	00100000						
00C9	12	00100000						
00C9	13	00100000						
00CA	00	00100000						
00CA	01	00100000						
00CA	02	00100000						
00CA	03	00100000						
00CA	04	00100000						
00CA	05	00100000						
00CA	06	00100000						
00CA	07	00100000						
00CA	08	00100000						
00CA	09	00100000						
00CA	0A	00100000						
00CA	0B	00100000						
00CA	0C	00100000						
00CA	0D	00100000						
00CA	0E	00100000						
00CA	0F	00100000						
00CA	10	00100000						
00CA	11	00100000						
00CA	12	00100000						
00CA	13	00100000						

A ONE IN A CODE BYTE BIT MAY BE INTERPRETED AS FOLLOWS:

BIT 0 – THE ALTERNATE TRACK LISTED IN THE SAME LINE IS DEFECTIVE.
BIT 1 – THE PRIMARY TRACK LISTED IN THE SAME LINE IS DEFECTIVE AND THE ALTERNATE TRACK LISTED IS ASSIGNED AS ITS ALTERNATE.
BIT 2 – THE ALTERNATE TRACK LISTED IN THE SAME LINE IS GOOD BUT HAS NOT BEEN ASSIGNED.

BIT 3 – THE ALTERNATE TRACK LISTED IN THE SAME LINE HAS BEEN ASSIGNED BY THIS RUN.
BIT 4 – THE DEFECTIVE TRACK WAS FOUND BY SURFACE ANALYSIS.
BIT 5 – THE DEFECTIVE TRACK WAS DESIGNATED BY CARD INSERT.
BIT 6 – THE ALTERNATE TRACK LISTED IN THE SAME LINE IS GOOD AND CONTAINS THE TRACK CONDITION TABLE.
BIT 7 – THE ALTERNATE TRACK LISTED IN THE SAME LINE WAS ASSIGNED BY A PREVIOUS RUN.

'EXCESS' UNDER 'ALTERNATE TRACK' INDICATES THAT THERE ARE NO MORE GOOD UNASSIGNED ALTERNATE TRACKS AVAILABLE.

D.1.3. UNIVAC 8424 Disc Printout Example

THE FOLLOWING TRACK CONDITION TABLE WAS GENERATED ON 01/01/70 AT 00:01 ON DISC PACK SERIAL NUMBER 123456. ALL NUMBERS ARE IN HEXADECIMAL NOTATION.

ALTERNATE CYLINDER	TRACK HEAD	CODE BYTE	PRIMARY CYLINDER	TRACK HEAD	BYTES WRITTEN ON BAD TRACK	FIRST BAD BYTE FOUND	BYTE READ	BYTE EXPECTED
0190	00	01011000	0004	01	1DDF	0156	EB	E5
0190	01	01011000	0018	01	1DE0	0156	F5	E5
0190	02	01011000	0020	01	1DE0	0155	FD	E5
0190	03	01011000	0020	02	1DE0	0155	EF	E5
0190	04	01011000	0020	05	1DE0	0154	E7	E5
0190	05	01011000	0024	0A	1DDF	0154	E7	E5
0190	06	01011000	0025	01	1DE0	0156	E6	E5
0190	07	01011000	003B	01	1DE1	0153	EF	E5
0190	08	01011000	004E	13	1DE0	0220	FD	E5
0190	09	01011000	008B	00	1DE1	02E8	E7	E5
0190	0A	01011000	009A	03	1DE0	023E	E7	E5
0190	0B	01011000	00B3	09	1DE1	02C8	F5	E5
0190	0C	10010100						
0190	0D	01011000	00B4	00	1DE1	02C7	EB	E5
0190	0E	01011000	00B9	01	1DE1	0221	F5	E5
0190	0F	01011000	00BB	01	1DE1	0220	E7	E5
0190	10	01011000	00C3	10	1DE0	01EE	E7	E5
0190	11	01011000	00C4	01	1DE1	01EE	E7	E5
0190	12	01010100	0001	03				
0190	13	01010100	0006	09				
0191	00	10010100						
0191	01	01010100	00C7	09				
0191	02	01011000	0109	0A	1DDF	02C3	E9	E5
0191	03	01011000	0176	13	1DE1	0166	F0	E5
0191	04	01011000	0179	12	1DE0	02F1	EB	E5
0191	05	10011000			1DDF	0098	E7	E5

ALTERNATE CYLINDER	TRACK HEAD	CODE BYTE 01234567	PRIMARY CYLINDER	TRACK HEAD	BYTES WRITTEN ON BAD TRACK	FIRST BAD BYTE FOUND	BYTE READ	BYTE EXPECTED
0191	06	01010100	0182	00				
0191	07	00010010						
0191	08	00100000						
0191	09	00100000						
0191	0A	00100000						
0191	0B	00100000						
0191	0C	00100000						
0191	0D	00100000						
0191	0E	00100000						
0191	0F	00100000						
0191	10	00100000						
0191	11	00100000						
0191	12	00100000						
0191	13	00100000						
0192	00	00100000						
0192	01	00100000						
0192	02	00100000						
0192	03	00100000						
0192	04	00100000						
0192	05	00100000						
0192	06	00100000						
0192	07	00100000						
0192	08	00100000						
0192	09	00100000						
0192	0A	00100000						
0192	0B	00100000						
0192	0C	00100000						
0192	0D	00100000						
0192	0E	00100000						
0192	0F	00100000						
0192	10	00100000						
0192	11	00100000						
0192	12	00100000						
0192	13	00100000						
0193	00	00100000						
0193	01	00100000						
0193	02	00100000						
0193	03	00100000						
0193	04	00100000						
0193	05	00100000						
0193	06	00100000						
0193	07	00100000						
0193	08	00100000						
0193	09	00100000						
0193	0A	00100000						
0193	0B	00100000						
0193	0C	00100000						
0193	0D	00100000						
0193	0E	00100000						

ALTERNATE CYLINDER	TRACK HEAD	CODE BYTE 01234567	PRIMARY CYLINDER	TRACK HEAD	BYTES WRITTEN ON BAD TRACK	FIRST BAD BYTE FOUND	BYTE READ	BYTE EXPECTED
0193	0F	00100000						
0193	10	00100000						
0193	11	00100000						
0193	12	00100000						
0193	13	00100000						
0194	00	00100000						
0194	01	00100000						
0194	02	00100000						
0194	03	00100000						
0194	04	00100000						
0194	05	00100000						
0194	06	00100000						
0194	07	00100000						
0194	08	00100000						
0194	09	00100000						
0194	0A	00100000						
0194	0B	00100000						
0194	0C	00100000						
0194	0D	00100000						
0194	0E	00100000						
0194	0F	00100000						
0194	10	00100000						
0194	11	00100000						
0194	12	00100000						
0194	13	00100000						
0195	00	00100000						
0195	01	00100000						
0195	02	00100000						
0195	03	00100000						
0195	04	00100000						
0195	05	00100000						
0195	06	00100000						
0195	07	00100000						
0195	08	00100000						
0195	09	00100000						
0195	0A	00100000						
0195	0B	00100000						
0195	0C	00100000						
0195	0D	00100000						
0195	0E	00100000						
0195	0F	00100000						
0195	10	00100000						
0195	11	00100000						
0195	12	00100000						
0195	13	00100000						

D.2. PUNCHED CARD OUTPUT FORMAT

If a disc prep routine is run with the phase 4 punch option, the track condition table is punched on a card deck (Figure D–1). The deck contains a separate card for each track history (Table D–1), plus an excess of four track history cards. Under normal conditions, the excess cards have no pertinent data. However, if all the alternate tracks are assigned or defective, the excess cards contain a history of the additional defective primary tracks that cannot be reassigned.

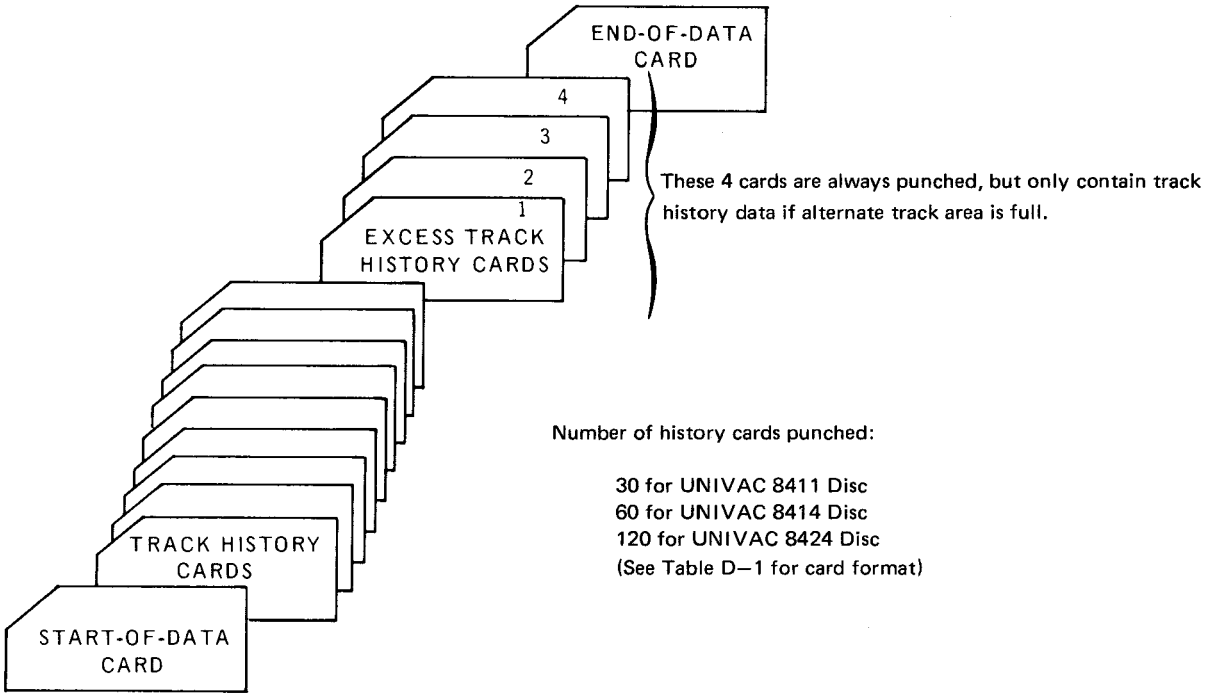


Figure D–1. Punched Card Deck of Track Condition Table

Table D–1. Track Condition Table Deck Punched Card Format

Card Column	Start-of-Data Card	Track History Card	Excess Track History Card	End-of-Data Card
1–3	/$Δ	Blank	Blank	/*Δ
4–27	Track History for xxxxxx ①			
28–29	Blank			
30–37	mm/dd/yy ②			
38–39	Blank			
40–45	Blank	Track history. See Table C–1 for format.	FFFF	Blank
46–67	Blank		See Table C–1 for format. Used only if alternate track area is full; otherwise blank.	Blank
68–70	Blank			
71–80	CARDΔ#Δnnn ③			

NOTES:

① xxxxxx represents the disc pack serial number.

② mm/dd/yy represents the month, day and year on which the table was generated.

③ nnn represents the card sequence numbers in the track condition table deck.

D.3. ALTERNATE TRACK FORMAT

If a disc prep routine is run with the phase 4 alternate track option, the track condition table is written on a data record of an alternate track of the disc pack. The following gives the format of the appropriate data record.

D.3.1. UNIVAC 8411 Disc

- Count Area (hexadecimal)

  0ccc00hh010C01E8

  where:

  0ccc00hh
  Is the track address

- Key Area

  TRACKΔΔTABLE

- Data Area

  488 bytes containing the track condition table, plus extra space for any excess track histories in case alternate track area is full, and an 8-byte date field.

D.3.2. UNIVAC 8414 Disc

- Count Area (hexadecimal)

  0ccc00hh010C038C ←

  where:

  0ccc00hh
  Is the track address

- Key Area

  TRACK△△TABLE

- Data Area

  908 bytes containing the track condition table, plus extra space for any excess track histories in case alternate track area is full, and an 8-byte date field.

D.3.3. UNIVAC 8424 Disc

- Count Area (hexadecimal)

  0ccc00hh010C06D4 ←

  where:

  0ccc00hh
  Is the track address

- Key Area

  TRACK△△TABLE

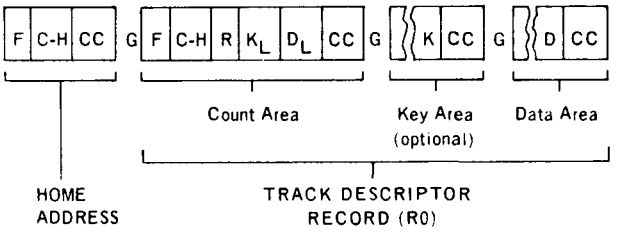
- Data Area

  1748 bytes containing the track condition table, plus extra space for any excess track histories in case alternate track area is full, and an 8-byte date field.

APPENDIX E. HOME ADDRESS AND TRACK DESCRIPTOR RECORD

E.1. GENERAL

The capacity and general format of the home address and track descriptor record of the UNIVAC OS/4 Operating System (OS/4) disc prep routine are shown in Figure E–1. All the information for this track area is generated by the disc prep routine except the cyclic check bytes and gap area generated by the hardware and the key area, which is not used. (See Tables E–1 and E–2.)



NOTE:

All bytes are read left to right.

LEGEND:

F = Flag (one byte)
C–H = Cylinder and head address (four bytes)
CC = Cyclic check (two bytes) – hardware supplied
G = Gap (proportionate in length to preceding field)
R = Record number (one byte)
K_L = Key length (one byte)
D_L = Data length (two bytes)
K = Key
D = Data

Figure E–1. Home Address and Track Descriptor Record Format

Table E–1. Home Address Data

Area	Bytes	Bits	Data
Flag	0	0 to 5	Zeros
		6	0 denotes operative track. 1 denotes defective track.
		7	0 denotes primary track. 1 denotes alternate track.
Track address	1 and 2	Cylinder address	
	3	Zeros	
	4	Head address	
Cyclic check	5 and 6	Generated by hardware	

Table E–2. Track Descriptor Record Data

Area		Bytes	Data
Count	Flag	0	Same as home address (See Table E–1.)
	Track address	1 to 4	Primary track address if flag byte indicates an operative primary track Alternate track address if flag byte indicates a defective primary track
	Record number	5	Zeros
	Key length	6	00
	Data length	7 and 8	0008
	Cyclic check	9 and 10	Generated by hardware
Key	K		Not used
Data	Track address	0 to 3	Same as track address in count area
	Bytes per track	4 to 7	UNIVAC 8411 Disc – 000E2900 UNIVAC 8414 Disc – 001C7E00 UNIVAC 8424 Disc – 001C7E00

E.2. EXAMPLES

All of the following home addresses and R0 records are presented in hexadecimal notation.

E.2.1. Operative Primary Track

- UNIVAC 8411 Disc

HOME ADDRESS		R0	
FLAG	ADDRESS	COUNT AREA	DATA AREA
00	00C70009	0000C7000900000008	00C70009000E2900

The home address indicates an operative primary track which is the last track of the disc pack (00C7009). Since the track is operative, the same information is in the count area. This area also indicates a data field length of eight bytes. The data area contains the primary track address and the maximum number of bytes used per track (3,625).

- UNIVAC 8414 disc

HOME ADDRESS		R0	
FLAG	ADDRESS	COUNT AREA	DATA AREA
00	00C70013	0000C7001300000008	00C70013001C7E00

This example is essentially the same as for UNIVAC 8411 disc. The only differences are the address (00C70013) and the maximum number of bytes used per track (7,294).

- UNIVAC 8424 disc

HOME ADDRESS		R0	
FLAG	ADDRESS	COUNT AREA	DATA AREA
00	018F0013	00018F001300000008	018F0013001C7E00

This example is essentially the same as for UNIVAC 8414 disc.

E.2.2. Defective Primary Track

- UNIVAC 8411 disc

HOME ADDRESS		R0	
FLAG	ADDRESS	COUNT AREA	DATA AREA
02	00C70009	0100C8000000000008	00C80000000E2900

The home address of this example indicates that the same primary track, given in example E.2.1, is defective. In this case, phase 3 of the disc prep routine checks the track condition table, selects an operative unassigned alternate track. The R0 record of the alternate track is then written into the R0 area of the defective primary track.

- UNIVAC 8414 disc

HOME ADDRESS		R0	
FLAG	ADDRESS	COUNT AREA	DATA AREA
02	00C70013	0100C8000000000008	00C80000001C7E00

This example is essentially the same as for UNIVAC 8411 disc.

- UNIVAC 8424 disc

HOME ADDRESS		R0	
FLAG	ADDRESS	COUNT AREA	DATA AREA
02	018F0013	010190000000000008	01900000001C7E00

This example is essentially the same as for UNIVAC 8411 disc.

E.2.3. Assigned Alternate Track

- UNIVAC 8411 disc

HOME ADDRESS		R0	
FLAG	ADDRESS	COUNT AREA	DATA AREA
01	00C80000	0200C7000900000008	00C70009000E2900

The home address of this example indicates an operative alternate track. This track is assigned to the defective primary track indicated in example E.2.2. Phase 3 of the disc prep routine writes the previous R0 record of the defective primary track into the R0 area of the assigned alternate track.

- UNIVAC 8414 disc

HOME ADDRESS		R0	
FLAG	ADDRESS	COUNT AREA	DATA AREA
01	00C80000	0200C7001300000008	00C70013001C7E00

This example is essentially the same as for UNIVAC 8411 disc.

- UNIVAC 8424 disc

HOME ADDRESS

FLAG	ADDRESS
01	01900000

R0

COUNT AREA	DATA AREA
02018F001300000008	018F0013001C7E00

This example is essentially the same as for UNIVAC 8411 disc.

APPENDIX F. TIMING CONSIDERATIONS

The following UNIVAC OS/4 Operating System (OS/4) times assume that a complete prep is performed, all tracks are tested, and no other programs are running simultaneously.

- UNIVAC 8411 disc

  Phase 0 – negligible

  Phase 1 – 3 minutes

  Phase 2 – 5 minutes, plus an additional 4 minutes for each data pattern shift and retest

  Phase 3 – 3 minutes

  Phase 4 – negligible

  Phase 5 – negligible

  Phase 6 – negligible

- UNIVAC 8414 disc

  Phase 0 – negligible

  Phase 1 – 5 minutes

  Phase 2 – 10 minutes, plus an additional 8 minutes for each data pattern shift and retest

  Phase 3 – 5 minutes

  Phase 4 – negligible

  Phase 5 – negligible

  Phase 6 – negligible

- UNIVAC 8424 disc

  Phase 0 – negligible

  Phase 1 – 10 minutes

→ Phase 2 – 20 minutes with an additional 15 minutes for each data pattern shift and retest

  Phase 3 – 10 minutes

  Phase 4 – negligible

  Phase 5 – negligible

  Phase 6 – negligible

INDEX

Comments concerning this manual may be made in the space provided below. Please fill in the requested information.

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