NATIONAL INSTITUTE OF OCEANOGRAPHY

WORMLEY, GODALMING, SURREY

General Purpose
Utility Programs

N.I.O. INTERNAL REPORT No. N. 28

1973

NATIONAL INSTITUTE OF OCEANOGRAPHY

WORMLEY, GODALMING, SURREY.

GENERAL PURPOSE

UTILITY PROGRAMS

N.I.O. Internal Report No. N28

1973.

M.I.O. PROGRAMS M.28

(Subroutines have negative numbers)

Disk Utilities

		DIKTW
-83	Dump disk to magnetic tape file	
		TDIKW
-84	Dump magnetic tape file to disk	
		IREAD
-90	Read a sector from disk	
		HAUSE
132	Seek home disk arms	
		DIMAG
204	Book keeping for DIKTR	
		MAGDI
205	Book keeping for TDIKW	
		SAVES
285	Dump or restore a disk sector	

Card and paper tape utilities

-208	To read non parity ASCII code from paper tape	HPAPT
271	19∅∅ code to 18∅∅ code conversion	C19∅∅
284	To convert non parity ASCII tape to cards	HPTAP

General Utilities

-87	Shift a word right	ISRA
-88	Shift a word left	ISLA

Queries regarding the use or availability of any
of the programs in this volume may be made to:-

> The Program Librarian,
> Data Processing Group,
> National Institute of Oceanography,
> Wormley, Godalming, Surrey.

from whom a comprehensive list of all current N.I.O.
Programs is available.

All the programs in this volume have been compiled and executed on an I.B.M. 1800 Computer having the following configuration:-

1802 Processor-controller with 32,768 words of core storage
3 1810 Disk Drives Model A
2 2401 Magnetic Tape Drives (30 Kc/s) (7 track)
1443 Printer, 240 lines/minute
1442 Model 6 Card Read-Punch
1816 Keyboard-Printer
Facit Paper Tape Reader, 1000 Characters/second
Facit Paper Tape Punch, 150 Characters/second

The Operating Systems were T.S.X. Version 3 or M.P.X. Version 3.

PROGRAM – 83

Program Title:
(For Lib. list)   Disk to magnetic tape dumping
                                subroutine

Classification Letter: U

Program Name: DIKTR

Version Number: 21

Type of Program: Subroutine

Operating System: MPX

Language: Assembler

Programmer/date: C. Clayson/M. Olliff

Program Passed By: E. Page

Description: To dump the contents of an entire disk
                                to a file on magnetic tape.

System Prerequisites:

Inskel Common Variables:

Subroutine Called: BULKN, MAGT

Programs Called:

Files Called:

Operation and Method:

       To Use:-   CALL DIKTR (IDISK, IDRIV, IDECK)

          or in assembler,

                   CALL DIKTR
                   DC   IDISK
                   DC IDRIV
                   DC IDECK

Where IDISK is the number of the disk from which the dump is
          to take place

IDRIV is the drive number of that disk
IDECK is the magnetic tape deck to be used.
(∅ or 1)

The Label on the disk is compared with the one passed to the subroutine to ensure that the correct disk has been loaded, then consecutive sectors from disk are read and written up to magnetic tape, until the entire disk has been stored on the tape.

Each sector is checked to see whether it is file protected, and if so, bit ∅ of the sector address word is set to 1 before being recorded on tape, so that a program dumping the data back to disk will be able to set the correct file protect status for each sector.

Error messages are printed on the console typewriter if the job fails.

This subroutine is mainly used in conjunction with the program DIMAG (N.I.O. 204), which keeps a record of the disks dumped.

PROGRAM -84

Program Title: (For Lib. List)	Magnetic tape to disk dumping Subroutine.
Classification Letter:	U
Program Name:	TDIKW
Version Number:	21
Type of Program:	Subroutine
Operating System:	M.P.X.
Language:	Assembler
Programmer/Date:	C. Clayson/M. Olliff
Program Passed By:	E. Page
Description:	To dump a magnetic tape file to disk
System Prerequisites:	
Inskel Common Variables:	
Subroutines Called:	BULKN, MAGT, TYPEN
Programs Called:	
Files Called:	

Operation and Method: To use:- CALL TDIKW (IDISK,IDRIV,IDECK)

        or in Assembler   CALL TDIKW

                        DC   IDISK

                        DC   IDRIV

                        DC   IDECK

where IDISK is the number of the disk to which the dump is to take place.

    IDRIV is the drive number of that disk.

    IDECK is the magnetic tape deck to be used (∅ or 1).

Sector ∅ of the object disk is read and the defective cylinder table of this disk is saved, when the new data for sector ∅ is read from magnetic tape, the defective cylinder table of the object disk is included with the new data. Records of one sector length (plus sector address word) are read from magnetic tape and stored on the disk, until the whole file has been dumped to disk. If bit ∅ of the sector address word is set to 1, the sector is file protected after it has been written. The drive of the object disk before executing the job (IDRIV) does not have to be the same as the drive of the disk stored on tape, but after running the job, it will have the drive number of the disk stored on tape.

For example, a drive ∅ (system) disk stored on tape can be copied to a drive 1 disk, but when the job is finished, the drive 1 disk will now be a drive ∅ disk.

Error messages are printed on the 1816 typewriter if the job fails.

Title   Read a sector from disk

Name   IREAD

Language   1800 Assembler

Machine   IBM 1800

Purpose   To read one sector from disk into an integer array

Use   Called by CALL IREAD(IDISK,ISECT, IFILE)

                 where:-

                 IDISK is the logical disk drive
                 ISECT is the sector number (0 to 1599)
                 IFILE is the array for data to be read into. IFILE must
                 be dimensioned IFILE(322); IFILE(320) will contain the
                 first word of the sector; IFILE (1) will contain the last
                 word.

                 An *IOCS(DISK) card is not required

Restrictions   A complete sector (320 words) of data must be read. Loss
                 of data will result if this is not adhered to.

Programmer   D. Brown

Title   Seek home disk arms, and update the in-core device tables.

Name   HAUSE

Machine   IBM 1800

Language   1800 Assembler

Purpose   To ensure that all the disk arms have been brought home
                and that the device tables are up to date.

Job Description

                              cc 19
        //bJOB   X

        //bXEQbHAUSEbbbFX

        N.B. This program must be executed after initialising a
             new disk cartridge, and therefore the above two cards may
             precede the cards for the next job.

Execution Time   Approx. ten seconds.

Programmers   C. Clayson and D. Brown.

PROGRAM 204

Program Title: (For Lib. list)	Book-keeping for DIKTR
Classification Letter:	U
Program Name:	DIMAG
Version Number:	21
Type of Program:	Non-process
Operating System:	MPX
Language:	Fortran IV
Programmer/date:	Eileen Page
Program Passed By:	E. Page
Description:	To dump disks to mag tape and record details.

System Prerequisites:

Inskel Common Variables:

Subroutines Called:　　NCOMP, FILE2, DIKTR, MAGOP, IGET

Programs Called:

Files Called:　　DIREK

Operation and Method:

　　To execute the program

```
// b JOB
// b * PROJECT/NAME/TITLE
// b XEQ to DIMAG
* FILES (1∅, DIREK, ∅)
* CCEND
```

Followed by 2 data cards

1.　Cols. 1 to 80　A comments card describing the contents of the disk to be dumped.

2.　Cols. 1 to 12　NAMT1. This is the name of the mag tape

to be used, left justified in the first 6 columns, e.g.
MXXX, and the no. of the file to be written to, right justified
in the last 6 columns.

Cols. 21-25   IDISK, the number of the disk to be dumped

Col. 31   IDRIV, the number of the drive on which the
above disk is loaded.

Col. 41   IDECK, the unit (1 or 2) on which the mag tape
is loaded.

The directory file (DIREK) is searched for a previous dump to
the requested magnetic tape and file, in which case an error
message is printed and the job aborted. Otherwise the magnetic
tape is positioned at the correct file, using FILE2, and the
subroutine DIKTR is called to copy the disk, sector by sector,
to the magnetic tape. On completion, the number of entries
in the DIREK file is increased by 1 and details of the dump are
entered at the end of the file. An end-of-file marker is written
to the magnetic tape, and it is rewound while a completion
message is being written to the 1443 printer and the typewriter.

NOTES: Approximately 9 disks may be dumped to a 2400' magnetic
tape. The DIREK file should be enlarged if more than 31 entries
are required.

D.P.G. internal use only.

PROGRAM __205__

Program Title:
(For Lib. List)   Book-keeping for TDIKW

Classification Letter;   U

Program Name: MAGDI

Version Number: 21

Type of Program: Non-process

Operating System: MPX

Language: Fortran IV

Programmer/Date: Eileen Page / M. Olliff

Program Passed By: E. Page

Description: To dump a file on mag tape to disk and
                                update the directory file.

System Prerequisites:

Inskel Common Variables:

Subroutines Called: NCOMP, IGET, FILE2, TDIKW

Programs Called:

Files Called:

Operation and Method:

```
// b JOB
// b *PROJECT/NAME/TITLE
// b XDQbMAGDI
* FILES (1Ø,DIREK,Ø)
*CCEND
```

followed by 2 data cards.

1. Cols. 1-80   A comments card describing the contents of
                  the disk to be retrieved.

2. Cols. 1-12   NAMT1 This is the name, left justified,
                  of the mag tape used in the first 6 columns,
                  and the no. of the file, right justified, in
                  the last 6 columns.

Cols.   13-16   JDRIV is the no. of the drive on which the
                 contents of the tape file are to be stored,
                 this must not be drive $\emptyset$.

Cols.   17-21   JDISK is the no. of the disk used.

The required magnetic tape must be loaded to drive 1 (lun 5).

The program searches the DIREK file for an entry to the
requested magnetic tape and file. If there is no entry an
error message is printed and the program exits, otherwise the
magnetic tape is positioned at the correct file and TDIKW is
called to copy the tape to disk. A completion message is then
printed on the 1443 printer and the typewriter, and the new dump
date is written to the DIREK file entry. A mag tape file may
be dumped to disk as often as is necessary. The disk should
be cleared using a *DLABL statement before running the program.

Note: It may be necessary to relabel the disk after its
contents have been restored. This should be done using the
*DLABL function, taking care not to erase the disk!, or by
using N.I.O. Program 231 (LABEL).
D.P.G. Internal use only.

PROGRAM 285

Program Title: (For Lib. List)	Dumping or restoring a disk sector.
Classification Letter:	U
Program Name:	SAVRS
Version Number:	2∅
Type of Program:	Non-Process
Operating System:	M.P.X.
Language:	Assembler
Programmer/Date:	I. Dolling (I.B.M.)/M. Olliff June 1973
Program Passed By:	R. Wells
Description:	To dump or restore a sector of disk to or from core and to the 1443 printer.

System Prerequisites:

Inskel Common Variables:

Subroutines Called: DMPHX

Programs Called:

Files Called:

Operation and Method: This program is useful for dumping a sector from a disk while running under a system disk with no dumping facilities.   To execute the program:-

<div align="center">

//∅JOB

//∅XEQ∅SAVRS

*CCEND

</div>

The following message will then be printed on the 1816, IF YOU WANT TO EXIT, TURN DATA SWITCH ∅ ON.   After turning data switch ∅ off and pressing start, the following message will then be printed.
USING THE DATA SWITCHES SELECT THE FOLLOWING OPTIONS

<div align="center">

DATA SWITCH ZERO   UP = DUMP

DATA SWITCH ZERO DOWN= RESTORE

</div>

DATA SWITCHES 1 to 15 INDICATE DRIVE AND SECTOR ADDR. DSSS.
DATA SWITCHES 1, 2, 3

<div align="center">

∅ ∅ ∅   =   DRIVE ∅

∅ ∅ 1   =   DRIVE 1

∅ 1 ∅   =   DRIVE 2

</div>

Then by setting the data switches to the required function and address, and pressing start, the requested sector will be dumped to core and to the 1443 printer; or the contents of the disk buffer in the program will be restored to the disk at the address given, and also dumped to the 1443 printer.

For example, a sector of drive zero could be dumped to core and
then restored to a disk on drive one (provided that the program
has not been re-executed between functions).

After a function has been completed, a message:-

                    IF YOU WANT TO EXIT, TURN DATA SWITCH Ø ON

is printed to enable an exit or another function to be processed.

The format of the dump on the 1443 printer is as follows:-:

          The first line of data may be ignored.

          The second line contains,

          XXXX   Ø14Ø   YYYY   DDDD   ....   DDDD

and subsequent lines contain,

          XXXX   DDDD

Where XXXX is the absolute address in core of the data,

      YYYY is the drive and sector address of the data

      DDDD is the data.

The 6th hex word on the bottom line gives the file protect status
of the sector, /6ØØØ for file protect on, or /3ØØØ for file protect
off.

PROGRAM -208

Program Title: (For Lib. List)	To read from paper tape in non-parity ASCII code.
Classification Letter:	U
Program Name:	HPAPT
Version Number:	2$\emptyset$
Type of Program:	Subroutine
Operating System:	M.P.X.
Language:	Assembler
Programmer/Date:	M. Olliff 11/6/73
Program Passed By:	R. Wells
Description:	To read a record from paper tape.

System Prerequisites:

Inskel Common Variables:

Subroutines Called:

Programs Called:

Files Called:

Operation and Method: This is the subroutine PAPTN with a non-parity ASCII new line instead of the even-parity new line used in the laboratory. This new line (with 8th channel punched) is hex $\emptyset\emptyset8A$. When it is encountered by the subroutine it is assumed to denote the end of a record. For details of use, see PAPTN in the M.P.X. Subroutine Library Manual.

N.I.O. PROGRAM 271

Program Title: (For Lib. List)	1900 Card to 1800 Card Conversion
Classification Letter:	U
Program Name:	C19ØØ
Version Number:	2Ø
Type of Program:	
Operating System:	M.P.X.
Language:	Fortran IV
Programmer/date:	M. Olliff 8.1.73
Program Passed By:	R. Wells
Description:	To convert a deck of ICL cards to IBM code
System Prerequisites:	
Inskel Common Variables:	
Subroutines Called	
Programs Called:	
Files Called:	

Operation and Method:

The program reads in a deck of cards until it reads a terminator card (all holes punched in Col 1.) It writes all the cards to a temporary file on disk. It then reads the data from disk, converts to IBM 1800 card code, and punches a new deck of cards.

Maximum no. of cards is 400.

Input

```
// JOB                    X 19
// XEQ C1900      FX
Card deck to be converted
Terminator card.
```

Note The only codes which are not the same in IBM as ICL code are as follows:-

PLUS	+
COLON	: (converted to # as no colon on 1443)
APOSTROPHE	'
EQUAL	=
LEFT BRACKET	(
RIGHT BRACKET	)

PROGRAM 284

Program Title: (For Lib. List)	To convert non-parity ASCII tape to cards.
Classification Letter:	U
Program Name:	HPTAP
Version Number:	2∅
Type of Program:	Non-Process
Operating System:	M.P.X.
Language:	Fortran IV
Programmer/Date:	M. Olliff 11/6/73
Program Passed By:	R. Wells
Description:	Conversion of paper tape in non-parity ASCII code.

System Prerequisites:

Inskel Common Variables:

Subroutines Called: HPAPT, ZZIPP, ISOA1

Programs Called:

Files Called:

Operation and Method: The program reads a record from tape, converts it to EBCDIC, then punches it on a card, using a WRITE statement. This is continued until the tape reader runs out of tape, as there is no special terminator. It is assumed that there is a maximum of 80 characters per record. The code input on the paper tape always has the 8th channel punched, this bit is removed from each character before entering the subroutine ZZIPP (N.I.O. -123), as the table ISOA1 (N.I.O. -133) is used and this table requires the parity bit (bit 8) to be zero (blank).

It is also assumed that there is a carriage return before the new line character, both these characters are omitted from each record before punching to card.

To execute the program:-

```
//ᵇJOB
//ᵇ*PROJECT NUMBER/NAME/TITLE
//ᵇXEQᵇHPTAP
*CCEND
```

Title	Shift a word right
Name	ISRA
Language	1800 Assembler
Operating System	T.S.X.
Machine	I.B.M. 1800
Purpose	To shift the bits of a word right
Use	K = ISRA(IWD, NUMB)

Where IWD is the word to be shifted NUMB is the number of places to be shifted and K is the result

Programmer	W. Strudwick

Title   Shift a word left

Name   ISLA

Language   1800 Assembler

Machine   IBM 1800

Purpose   To shift the bits of an integer word left

Use   K = ISLA(IWD,NUMB)

               where IWD is the word to be shifted; NUMB is the
               number of places to be shifted and K is the result.

Programmer   W. Strudwick