

OUTPUT4

Output matrices onto a FORTRAN readable file

Write matrices in ASCII or binary format onto a FORTRAN readable file.

Format:

OUTPUT4 M1, M2, M3, M4, M5//ITAPE/IUNIT/UNUSED3/BIGMAT/DIGITS \$

Input Data Blocks:

Mi Matrices. Mi cannot be a factor matrix (forms 4, 5, 10, 11, 13, and 15).

Parameters:

ITAPE Input-integer-default = -1. ITAPE controls the status of the unit before OUTPUT4 starts to write any matrices as follows:

ITAPE	ACTION
0	None
-1	Rewind IUNIT before Write.
-2	End File and Rewind IUNIT after Write.
-3	Both

IUNIT Input-integer-no default. The absolute value of IUNIT is the FORTRAN unit number on which the matrices are written. If IUNIT is negative, the sparse output option is used, which means that only nonzero items in the matrix are written to the unit. Siemens PLM Software does not recommend IUNIT = 0. See Remark 1.

UNUSED3 Input-integer-default=1. Unused.

BIGMAT Input-logical-default=FALSE. BIGMAT is applicable only when IUNIT < 0. BIGMAT=FALSE selects the format that uses a string header as described under Remark 1. However, if the matrix has more than 65535 rows, BIGMAT is automatically set to TRUE regardless of the value specified.

DIGITS Input-integer-default = 9. DIGITS is the requested number of digits for the fractional part of the real values written for the ASCII format option (FORMATTED on the ASSIGN FMS statement). The FORTRAN Format Specification used internally by OUTPUT4 to write real values is formed as follows:

FORTRAN Format Specification: P, rEw.d
 d = DIGITS
 w = d + 7
 r = 80/w (integer portion)

For example, if

DIGITS = 9, the format is 1P,5E16.9

or if DIGITS = 16, the format is 1P,3E23.16

Remarks:

1. Each matrix is written on IUNIT as follows:

- Record 1:

Word number	Type	Meaning
1	Integer	Number of columns (NCOL)
2	Integer	Number of rows (NR, if BIGMAT=TRUE, NR < 0)
3	Integer	Form of matrix (NF). See Remark 11 and Section 1.4.
4	Integer	Type of matrix (NTYPE). See Remark 11 and Section 1.4.
5 and 6	Character	Name of matrix (2A4 format)
7	Character	If ASCII format, this is the FORTRAN format specification based on DIGITS parameter value. If binary format, this is blank.

- Records 2, 3, 4, and so on for nonsparse and binary format, (IUNIT > 0 and binary format) and repeated for each nonzero column, i=ICOL through NCOL.

Word number	Type	Meaning
1	Integer	Column number (ICOL)
2	Integer	Row position of first nonzero term (IROW)

Word number	Type	Meaning
3	Integer	Number of words in the column (NW). See Remark 3.
4 through (NW+3)	Real or Complex	Column element values, single or double precision

- Records 2, 3, 4, and so on for nonsparse and ASCII format, (IUNIT > 0), are repeated for each nonzero column, ICOL through NCOL. Records 3, 4, and so on, are also repeated for each group of r values (see DIGITS parameter).

Record number	Word number	Type	Meaning
2	1	Integer	Column number (ICOL)
	2	Integer	Row position of first nonzero term (IROW)
	3	Integer	Number of words in the column (NW). See Remark 3.
3, 4, and so on	1 through NW	Real or Complex	Column element values, single or double precision

- Records 2, 3, 4, and so on for sparse, binary, and string header format (IUNIT < 0, and BIGMAT = FALSE).

Word number	Type	Meaning
1	Integer	Column number (ICOL)
2	Integer	Zero
3	Integer	Number of words in the column (NW). See Remark 3.
4 through (NW+3)	Integer	String header (IS)*
	Real or Complex	A string of nonzero values, single or double precision

*IS = IROW + 65536(L + 1) where IROW is the row position of the first term in the string and L is the length of the string, see Remark 3. For example, a string of six words beginning in row 4 has IS=458756. L and IROW can be derived from IS by:

$$L = \text{INT}(\text{IS}/65536) - 1$$

$$\text{IROW} = \text{IS} - 65536(L + 1)$$

- Records 2, 3, 4, and so on for sparse, binary, and regular string format (IUNIT < 0, and BIGMAT = TRUE).

Word number	Type	Meaning
1	Integer	Column number (ICOL)
2	Integer	Zero
3	Integer	Number of words in the column (NW). See Remark 3.
4 through (NW+3)	Integer	Length of string, L, plus 1. See Remark 3.
	Integer	Row position of first term in string (IROW)
	Real or complex	A string of nonzero values, single or double precision

- Records 2, 3, 4, and so on for sparse, ASCII, and string header format (IUNIT < 0, and BIGMAT = FALSE) are repeated for each nonzero column. Records 3 and 4 are repeated for each string. Record 4 is also repeated for each group of r values (see DIGITS parameter).

Record number	Word number	Type	Meaning
2	1	Integer	Column number (ICOL)
	2	Integer	Zero
	3	Integer	Number of words in the column (NW). See Remark 3.
3	1	Integer	String header (IS)*
4	1 through NW	Real or Complex	A string of nonzero values, single or double precision

- Records 2, 3, 4, and so on for sparse, ASCII, and regular string format (IUNIT < 0, and BIGMAT = TRUE) are repeated for each nonzero column. Records 3 and 4 are repeated for each string. Record 4 is also repeated for each group of r values (see DIGITS parameter).

Record number	Word number	Type	Meaning
2	1	Integer	Column number (ICOL)
	2	Integer	Zero
	3	Integer	Number of words in the column (NW). See Remark 3.
3	1	Integer	Length of string, L, plus 1. See Remark 3.
	2	Integer	Row position of first term in string (IROW)
4	1 through NW	Real or Complex	A string of nonzero values, single or double precision

2. A record with the last column number plus +1 and at least one value in the next record is written on IUNIT.
3. The number of words in the column, NW (or string, L), is the number of elements in the column (or string) times the number of words per type. Number of words per type is given in the table below. For example, a column with seven real double precision elements is 14 words long.

Type	Number of words
1 – Real single precision	1
2 – Real double precision	2
3 – Complex single precision	2
4 – Complex double precision	4

4. Siemens PLM Software recommends the ASSIGN FMS statement for assigning the FORTRAN unit (see "Making File Assignments" in the *NX Nastran Installation and Operations Guide*). Selection of a proper value for IUNIT is machine dependent.
5. If the nonsparse format (IUNIT > 0) is selected, zero terms are explicitly present after the first nonzero term in any column until the last nonzero term.
6. Null columns are not output.
7. An entire column must fit in memory.
8. The FORTRAN binary file option (FORM = UNFORMATTED on the ASSIGN FMS statement) is the preferred method when the file is to be used on the same computer. The ASCII format FORM = FORMATTED on the ASSIGN FMS statement allows use of the file on another computer type.
9. The output format of these files can be read by the INPUTT4 module.
10. OUTPUT4 files can be read using a utility FORTRAN subroutine called GETIDS, which is provided in the utility directory. (See "Building and Using MATTST " in the *NX Nastran Installation and Operations Guide*.) GETIDS is in the file called mattst.f or mattst.for.
The program must be modified if the ASCII format is desired.
The program is designed to read matrices less than 65536 rows (BIGMAT = FALSE).
11. Sparse factor matrices (forms 4, 5, 10, 11, 13, and 15) cannot be processed by OUTPUT4.
12. If you select any of the options for endianness using the ASSIGN FMS statement, the resulting files are fortran readable only on systems having the same endianness. The only way to read these files on the same machines is to use the INPUTT4 command.