Program ENDF2C
Convert ENDF Data to Standard FORTRAN, C and C++ Format.

2014-2 Oct. 2014 * Changed from D to E exponential form to improve compatibility between computer languages.
* Changed ENDF data filenames from ENDF2CENDFB to ENDFB, to agree with PREPRO default definitions.
* Added code name (to be compatible with PREPRO output), but NOT TIME (to keep this code as computer independent as possible).
2017-1 May 2017 * Updated based on user feedback.
2018-1 Jan. 2018 * Added on-line output for ALL ENDFERROR
2019-1 June 2019 * Added /UNITS/ to allow correct output at end = output either o.k. or error.
2021-1 Jan. 2021 * Updated for FORTRAN 2018
2023-1 Feb. 2023 * Identify ENDF in and out filenames

Purpose
This code is designed for,
1) ENDF Data in any ENDF format = ENDF-1 through ENDF-6.
2) On any type of computer = 32 or 64 bit system/compiler

This code tries to keep things as simple as possible
1) There are NO INPUT PARAMETERS.
2) It reads an ENDF formatted file named ENDFB.IN
3) It writes an ENDF formatted file named ENDFB.OUT
4) It writes a report file named ENDF2C.LST

Author's Message
----------------
I consider insuring that ENDF data is in a standard, officially approved format for FORTRAN, C and C++ is SO IMPORTANT this code does only one thing - and only one thing - and it does it in the simplest possible manner - efficiency is NOT a consideration - ONLY accuracy and general utility of the ENDF data is considered.

Method
------

Other codes that attempt to do the same thing - including codes written be me decades ago - are very complicated, and therefore ERROR PRONE because they try to deal with each and every variant in which data can be coded in the ENDF format. Needless to say this means that every time the ENDF formats and procedures change these codes MUSE also be changed.

In contrast, ENDF2C uses my almost 50 years of experience dealing with the ENDF format to realize that except for the comments at the beginning for each evaluation (MF/MT=1/451), every line of ENDF data is IDENTICAL - in every version of the ENDF format, from the original ENDF to today's ENDF-6. So to translate ENDF data into an official format I do not have to consider differences in each section (MF/MT) of data.

Every line of ENDF is divided into 6 fields, each 11 columns wide. Each of the 6 fields is either, blank, integer or floating point. Floating point fields ALL include a decimal point (.). So that ALL ENDF2C this code does is convert every floating point field to standard ENDF2C format.

In order to insure that this PRESERVES the accuracy of the data
this is done by reading and writing each ENDF line as characters. ENDF2C
Blank and integer fields are copied exactly as read. ALL floating ENDF2C
point number that are read are converted internally from character ENDF2C
to floating point - they are then converted back into characters ENDF2C
in a standard, officially approved format, for output.

As a last step to insure the accuracy of results the characters ENDF2C
to be output are again converted from characters to floating ENDF2C
point, and the numerical value that is output is compared to the ENDF2C
numerical value originally read, and if there is ANY DIFFERENCE ENDF2C
the characters strings read and written are listed in the output: ENDF2C
the characters strings read and written as well as the difference ENDF2C
is listed in the output report (ENDF2C.LST) and on the screen.

Running Time
------------
It takes only seconds to translate an ENDF formatted evaluation, ENDF2C
so running time need not be a consideration. Concentrate on ENDF2C
keeping it simple and reliable - that should be your focus.

Documentation
-------------
ALL of my codes that process ENDF data and change it in ANY WAY ENDF2C
do document what they have done by adding comment lines at the end ENDF2C
of the comment section (MF/MT=1/451) of each evaluation. This ENDF2C
allows data users to determine the pedigree of the data they are ENDF2C
using, by reading these comments. This code documents what is has ENDF2C
done by adding the following 2 comment lines.

****************** Program ENDF2C (Version 2023-1) **************
Convert ENDF Data to Standard FORTRAN, C and C++ Format

WARNING - This documentation is IMPORTANT to data users and it ENDF2C
should not be deleted.

Written by
-----------
Dermott E. Cullen
University of California (retired)

-----Present Home Address---------------------------------------------
Dermott E. Cullen
1466 Hudson Way
Livermore, CA 94550
U.S.A.
Telephone  925-443-1911
E. Mail RedCullen1@Comcast.net
Website RedCullen1.net/HOMEPAGE.NEW

====================================================================