

RTS3 features:

- 1) Generator capacities can be entered as decimal values. Integer generator convolution is an exact process whereas decimal values use interpolation.
- 2) Only one hourly historical data file is needed. There are no VERs.
- 3) The program source code is given in Matlab and Fortran.
- 4) RTS3 is used to reproduce “exact” indices appearing in the 1986 RTS paper.

Here is the format of the hourly file H1979RTS.TXT

```
23 1979 IEEE RTS ONE AREA SYSTEM HOURLY DEMANDS US
YYYYMMDDHH,D, DEMAND ,
1986010101,1,0.53711228, 1530.770, RTS1979.TXT c
1986010102,1,0.50504561, 1439.380, Read data thr
1986010103,1,0.48099614, 1370.839, We can also a
1986010104,1,0.47297930, 1347.991, RTS3 does not
1986010105,1,0.47297930, 1347.991,
1986010106,1,0.48099614, 1370.839, Note that an
1986010107,1,0.59322842, 1690.701, These are the
1986010108,1,0.68942772, 1964.869, load profiles
1986010109,1,0.76157684, 2170.494, larger than a
1986010110,1,0.76959368, 2193.342, test is perfo
1986010111,1,0.76959368, 2193.342, integer value
1986010112,1,0.76157684, 2170.494, integer value
1986010113,1,0.76157684, 2170.494, a computer in
1986010114,1,0.76157684, 2170.494, RTS3 program
1986010115,1,0.74554386, 2124.800,
1986010116,1,0.75356035, 2147.647, Having an abi
1986010117,1,0.79364351, 2261.884, with upgrades
1986010118,1,0.80166000, 2284.731, data with the
1986010119,1,0.80166000, 2284.731, the mathemati
1986010120,1,0.76959368, 2193.342, new code and
1986010121,1,0.72951053, 2079.105,
1986010122,1,0.66537789, 1896.327, : : : :
end,,,,,
```

The first line is a title following the number 23 which means read only the first 23 characters on each line. The second line is simply a header and is skipped.

Comments can be placed beyond column 23 and will be ignored by RTS3. D is the day of the week with 1 being a Monday in the original RTS data. This file includes 8736 hours in the arbitrary test year. The last line of the hourly data must have an end statement as shown above. The hourly MW demands have been per unitized.

Here is the format of the generator data file G1979.txt

The G1979 files are designed to reproduce the 1979 RTS “exact” indices published in 1986. Here is the top of the G1979.txt file:

```
26 1979 ONE AREA IEEE RELIABILITY TEST SYSTEM TO ...
H1979RTS.TXT          hdata file hourly prof...
2850.,0.,8.E-3,      peak demand MW (use ta...
0,                  number of VER (variabl...
0,                  Reserve Margin Capacit...
0,                  installed Pmax MW for ...
  PMAX, RM%, FOR, DER, DMW, BU#, GENERATORNAM, ID,
    20.,100.,.100,.000, 0., 101,ABEL___OIL___,06,
    20.,100.,.100,.000, 0., 101,ABEL___OIL___,07,
    76.,100.,.020,.000, 0., 101,ABEL___COAL_,L1,
    76.,100.,.020,.000, 0., 101,ABEL___COAL_,L2,
    20.,100.,.100,.000, 0., 102,ADAMS___OIL___,08,
    20.,100.,.100,.000, 0., 102,ADAMS___OIL___,09,
```

The first line is a title following the number 26 which tells RTS3 how many columns to read of data on each line following the title. Comments and notes entered after column 26 will be ignored by the program.

The second line is the hourly data file name followed by blanks. The generator file points to the hourly demand and variable energy file.

The third line is the peak demand forecast, the LFU (load forecast uncertainty) in percent, and a cutoff LOLP value. If a day has an LOLP as high as 8.E-3, the entire day is listed in file OPH.csv.

The fourth line shows there are 0 VERs in file H1979RTS.TXT.

The fifth line would be percentage capacity credits to be given to the VERs.

The sixth line is the MW of nameplate capacity of any VERs if they were present.

The seventh line is a header that is used as a header in the .csv output file reports.

The eighth line and all the rest of the lines are generator data. Each generator has a Pmax nameplate capacity, the percentage of the capacity to be used in the reserve margin (100% in this case), a FOR (forced outage rate), a derated MW state and the derated state probability of being in that state, i.e. the DER.

The order in which generators are entered does not change the reliability indices values. If generators are entered as integer values without a fractional MW, the convolution process is an exact one. If a generator has a fractional MW, the generator is treated as being fractionally in both the nearest integer states as an approximation. All the dispatchable generators in the original RTS are integers.

Setting up RTS3 in a directory to do a study.

Copy the ten files in RTS1986.zip to your working directory.

H1979RTS.txt is the historical hourly profiles.

G1979.txt is the generator data base case of the 1979 system.

G1979(a-j) are variations of parameters appearing in the 1986 RTS paper.

OP79(a-j) files are the output reports.

RTS3.for is the fortran code which can be compiled from any F77 compiler.

RTS3.m is the Matlab code which gives the same results but runs slower than F77.

Open a DOS window, go to the directory you put the files in, and type RTS3.exe or RTS3.m to run the program. Type in the file G1979.txt. Then press return for the target LOLE question to skip it. Hit return again to end the program. Review the output reports OP.txt, OP.csv, and OPH.csv.

Ask g.preston@ieee.org for an RTS3.exe executable if you wish to run RTS3.for. Watcom F77 is open source and is an excellent way to run RTS3.for.

You may use the RTS3 program as you wish but the results you obtain do not have any guarantees from me that your results are accurate. It's an experimental tool and there are likely to be errors in the code. Use it at your own risk.

Gene Preston, PhD

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g.preston@ieee.org (preferred)

512-892-3621 (leave message)