## SPEC CPU®2017 Integer Rate Result

### Hardware

<table>
<thead>
<tr>
<th>Test Date:</th>
<th>Dec-2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor:</td>
<td>Supermicro</td>
</tr>
<tr>
<td>Tested by:</td>
<td>Supermicro</td>
</tr>
<tr>
<td>CPU Name:</td>
<td>Intel Xeon Gold 6248R</td>
</tr>
<tr>
<td>Max MHz:</td>
<td>4000</td>
</tr>
<tr>
<td>Nominal:</td>
<td>3000</td>
</tr>
<tr>
<td>Enabled:</td>
<td>48 cores, 2 chips, 2 threads/core</td>
</tr>
<tr>
<td>Orderable:</td>
<td>1.2 chips</td>
</tr>
<tr>
<td>Cache L1:</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>Cache L2:</td>
<td>1 MB I + D on chip per core</td>
</tr>
<tr>
<td>Cache L3:</td>
<td>35.75 MB I + D on chip per chip</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
<tr>
<td>Memory:</td>
<td>384 GB (12 x 32 GB 2Rx4 PC4-3200AA-R, running at 2933)</td>
</tr>
<tr>
<td>Storage:</td>
<td>1 x 200 GB SATA III SSD</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
</tbody>
</table>

### Software

| OS: | Red Hat Enterprise Linux release 8.2 |
| Compiler: | C/C++: Version 19.1.2.275 of Intel C/C++ Compiler for Linux; Fortran: Version 19.1.2.275 of Intel Fortran Compiler for Linux |
| Parallel: | No |
| Firmware: | Version 3.3 released Feb-2020 |
| File System: | xfs |
| System State: | Run level 3 (multi-user) |
| Base Pointers: | 64-bit |
| Peak Pointers: | Not Applicable |
| Other: | None |

### Power Management

BIOS set to prefer performance at the cost of additional power usage.

---

### SPECrate®2017_int_base = 351

<table>
<thead>
<tr>
<th>SPECrate®2017_int_peak = Not Run</th>
</tr>
</thead>
</table>

### COPY

<table>
<thead>
<tr>
<th>Program</th>
<th>Copies</th>
</tr>
</thead>
<tbody>
<tr>
<td>500.perlbench_r</td>
<td>96</td>
</tr>
<tr>
<td>502.gcc_r</td>
<td>96</td>
</tr>
<tr>
<td>505.mcf_r</td>
<td>96</td>
</tr>
<tr>
<td>520.omnetpp_r</td>
<td>96</td>
</tr>
<tr>
<td>523.xalancbmk_r</td>
<td>96</td>
</tr>
<tr>
<td>525.x264_r</td>
<td>96</td>
</tr>
<tr>
<td>531.deepsjeng_r</td>
<td>96</td>
</tr>
<tr>
<td>541.leela_r</td>
<td>96</td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td>96</td>
</tr>
<tr>
<td>557.xz_r</td>
<td>96</td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>Program</th>
<th>SPECrate®2017_int_base (351)</th>
</tr>
</thead>
<tbody>
<tr>
<td>500.perlbench_r</td>
<td>253</td>
</tr>
<tr>
<td>502.gcc_r</td>
<td>241</td>
</tr>
<tr>
<td>505.mcf_r</td>
<td>195</td>
</tr>
<tr>
<td>520.omnetpp_r</td>
<td>582</td>
</tr>
<tr>
<td>523.xalancbmk_r</td>
<td>481</td>
</tr>
<tr>
<td>525.x264_r</td>
<td>295</td>
</tr>
<tr>
<td>531.deepsjeng_r</td>
<td>732</td>
</tr>
<tr>
<td>541.leela_r</td>
<td>707</td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td>205</td>
</tr>
<tr>
<td>557.xz_r</td>
<td>740</td>
</tr>
</tbody>
</table>
## SPEC CPU®2017 Integer Rate Result

**Supermicro**

SuperServer 2029U-TRT  
(X11DPU, Intel Xeon Gold 6248R)

**CPU2017 License:** 001176  
**Test Sponsor:** Supermicro  
**Tested by:** Supermicro  
**Test Date:** Dec-2020  
**Hardware Availability:** Feb-2020  
**Software Availability:** Aug-2020

**SPECrate®2017_int_base =** 351  
**SPECrate®2017_int_peak =** Not Run

### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>500.perlbench_r</td>
<td>96</td>
<td>605</td>
<td>253</td>
<td>604</td>
<td>253</td>
<td>605</td>
<td>253</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>502.gcc_r</td>
<td>96</td>
<td>558</td>
<td>244</td>
<td>563</td>
<td>241</td>
<td>568</td>
<td>240</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>505.mcf_r</td>
<td>96</td>
<td>266</td>
<td>583</td>
<td>266</td>
<td>582</td>
<td>267</td>
<td>581</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>520.omnetpp_r</td>
<td>96</td>
<td>647</td>
<td>195</td>
<td>646</td>
<td>195</td>
<td>648</td>
<td>195</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>523.xalancbmk_r</td>
<td>96</td>
<td>210</td>
<td>482</td>
<td>211</td>
<td>480</td>
<td>211</td>
<td>481</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>525.x264_r</td>
<td>96</td>
<td>229</td>
<td>734</td>
<td>230</td>
<td>731</td>
<td><strong>230</strong></td>
<td><strong>732</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>531.deepsjeng_r</td>
<td>96</td>
<td>373</td>
<td>295</td>
<td>373</td>
<td>295</td>
<td>373</td>
<td>295</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>541.leela_r</td>
<td>96</td>
<td>563</td>
<td>283</td>
<td>576</td>
<td>276</td>
<td>576</td>
<td>276</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td>96</td>
<td>356</td>
<td>707</td>
<td>356</td>
<td>707</td>
<td><strong>356</strong></td>
<td><strong>707</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>557.xz_r</td>
<td>96</td>
<td>507</td>
<td>205</td>
<td>507</td>
<td>205</td>
<td>507</td>
<td>205</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SPECrate®2017_int_base =** 351  
**SPECrate®2017_int_peak =** Not Run

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

### Submit Notes

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

### Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"

### Environment Variables Notes

Environment variables set by runcpu before the start of the run:

```
LD_LIBRARY_PATH = 
"/home/cpu2017/lib/intel64:/home/cpu2017/lib/ia32:/home/cpu2017/je5.0.1-32"

MALLOC_CONF = "retain:true"
```

### General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM  
memory using Redhat Enterprise Linux 8.0  
Transparent Huge Pages enabled by default  
Prior to runcpu invocation  
Filesystem page cache synced and cleared with:

```
sync; echo 3>/proc/sys/vm/drop_caches
```

(Continued on next page)
Supermicro
SuperServer 2029U-TRT
(X11DPU , Intel Xeon Gold 6248R)

<table>
<thead>
<tr>
<th>SPECrate®2017_int_base</th>
<th>351</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate®2017_int_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CPU2017 License</th>
<th>001176</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor</td>
<td>Supermicro</td>
</tr>
<tr>
<td>Tested by</td>
<td>Supermicro</td>
</tr>
<tr>
<td>Test Date</td>
<td>Dec-2020</td>
</tr>
<tr>
<td>Hardware Availability</td>
<td>Feb-2020</td>
</tr>
<tr>
<td>Software Availability</td>
<td>Aug-2020</td>
</tr>
</tbody>
</table>

**General Notes (Continued)**

```
runcpu command invoked through numactl i.e.:
umactl --interleave=all runcpu <etc>
```

NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5753 (Spectre variant 1) is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2) is mitigated in the system as tested and documented.

**Platform Notes**

BIOS Settings:
Power Technology = Custom
Power Performance Tuning = BIOS Controls EPB
ENERGY_PERF_BIAS_CFG mode = Extreme Performance
SNC = Enable
Stale AtoS = Disable
IMC Interleaving = 1-way Interleave
Patrol Scrub = Disable

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7ed0be6e6a485a0011
running on X11DPU-01 Fri Dec 4 20:02:24 2020

SUT (System Under Test) info as seen by some common utilities.
For more information on this section, see
https://www.spec.org/cpu2017/Docs/config.html#sysinfo

From /proc/cpuinfo

```
model name : Intel(R) Xeon(R) Gold 6248R CPU @ 3.00GHz
  2 "physical id"s (chips)
  96 "processors"
cores, siblings (Caution: counting these is hw and system dependent. The following excerpts from /proc/cpuinfo might not be reliable. Use with caution.)
cpu cores : 24
siblings : 48
physical 0: cores 0 1 2 3 4 5 6 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 25 26 27 28 29
```

From lscpu:

```
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 96
On-line CPU(s) list: 0-95
```
Supermicro
SuperServer 2029U-TRT (X11DPU, Intel Xeon Gold 6248R)

SPEC CPU®2017 Integer Rate Result

Copyright 2017-2020 Standard Performance Evaluation Corporation

SPECrate®2017_int_base = 351
SPECrate®2017_int_peak = Not Run

CPU2017 License: 001176
Test Sponsor: Supermicro
Test Date: Dec-2020
Hardware Availability: Feb-2020
Tested by: Supermicro
Software Availability: Aug-2020

Platform Notes (Continued)

Thread(s) per core: 2
Core(s) per socket: 24
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 6248R CPU @ 3.00GHz
Stepping: 7
CPU MHz: 3600.010
CPU max MHz: 4000.0000
CPU min MHz: 1200.0000
BogoMIPS: 6000.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 36608K
NUMA node0 CPU(s): 0-3,7,8,12-14,18-20,48-51,55,56,60-62,66-68
NUMA node1 CPU(s): 4-6,9-11,15-17,21-23,52-54,57-59,63-65,69-71
NUMA node2 CPU(s): 24-27,31-33,37-39,43,44,72-75,79-81,85-87,91,92
NUMA node3 CPU(s): 28-30,34-36,40-42,45-47,76-78,82-84,88-90,93-95
Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov
pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp
lm constant_tsc art arch_perfmon pebs bts rep_good ntop stop_tsc pdcm
aerfmpertf pni pclmulqdq dtes64 ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm
pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c
rdread lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single
intel_pmx ssbd mba ibrs stibp ibrs_enhanced tpr_shadow vni flexpriority ept
vpid fsxgsbase tsc_adjust bmid hle avx2 smep bmi2 avx512cd avx512bw avx512vl
xsaveopt xsavec xsaves cqm_llc cqm_occupy_llc cqm_mbm_total cqm_mbm_local
dtherm ida arat pln pts pkup ospe avx512_vnni md_clear flush_l1d arch_capabilities

/proc/cpuinfo cache data
cache size : 36608 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
physical chip.
available: 4 nodes (0-3)
node 0 cpus: 0 1 2 3 7 8 12 13 14 18 19 20 48 49 50 51 55 56 60 61 62 66 67 68
node 0 size: 95343 MB
node 0 free: 95091 MB
node 1 cpus: 4 5 6 9 10 11 15 16 17 21 22 23 52 53 54 57 58 59 63 64 65 69 70 71
node 1 size: 96762 MB
node 1 free: 96477 MB
node 2 cpus: 24 25 26 27 31 32 33 37 38 39 43 44 72 73 74 75 79 80 81 85 86 87 91 92

(Continued on next page)
SPEC CPU®2017 Integer Rate Result

Supermicro
SuperServer 2029U-TRT
(X11DPU , Intel Xeon Gold 6248R)

SPEC®2017_int_base =  351
SPEC®2017_int_peak = Not Run

CPU2017 License: 001176
Test Sponsor: Supermicro
Test Date: Dec-2020
Tested by: Supermicro
Hardware Availability: Feb-2020
Software Availability: Aug-2020

Platform Notes (Continued)

node 2 size: 96735 MB
node 2 free: 95493 MB
node 3 cpus: 28 29 30 34 35 36 40 41 42 45 46 47 76 77 78 82 83 84 88 89 90 93 94 95
node 3 size: 96762 MB
node 3 free: 96593 MB
node distances:
  node 0 1 2 3
  0: 10 11 21 21
  1: 11 10 21 21
  2: 21 21 10 11
  3: 21 21 11 10

From /proc/meminfo
MemTotal: 394858132 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
os-release:
  NAME="Red Hat Enterprise Linux"
  VERSION="8.2 (Ootpa)"
  ID="rhel"
  ID_LIKE="fedora"
  VERSION_ID="8.2"
  PLATFORM_ID="platform:el8"
  PRETTY_NAME="Red Hat Enterprise Linux 8.2 (Ootpa)"
  ANSI_COLOR="0;31"
redhat-release: Red Hat Enterprise Linux release 8.2 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.2 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.2:ga

uname -a:
  Linux X11DPU-01 4.18.0-193.el8.x86_64 #1 SMP Fri Mar 27 14:35:58 UTC 2020 x86_64
  x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

itlb_multihit: KVM: Mitigation: Split huge pages
CVE-2018-3620 (L1 Terminal Fault): Not affected
Microarchitectural Data Sampling: Not affected
CVE-2017-5754 (Meltdown): Not affected
CVE-2018-3639 (Speculative Store Bypass): Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2017-5753 (Spectre variant 1): Mitigation: usercopy/swapsgs barriers and __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling

(Continued on next page)
SPEC CPU®2017 Integer Rate Result

Supermicro
SuperServer 2029U-TRT
(X11DPU , Intel Xeon Gold 6248R)

SPECrates®2017_int_base = 351
SPECrates®2017_int_peak = Not Run

CPU2017 License: 001176
Test Sponsor: Supermicro
Tested by: Supermicro

Test Date: Dec-2020
Hardware Availability: Feb-2020
Software Availability: Aug-2020

Platform Notes (Continued)

tsx_async_abort: Mitigation: Clear CPU buffers; SMT vulnerable
run-level 3 Dec 4 19:55
SPEC is set to: /home/cpu2017
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda4 xfs 184G 8.5G 176G 5% /

From /sys/devices/virtual/dmi/id
BIOS: American Megatrends Inc. 3.3 02/21/2020
Vendor: Supermicro
Product: Super Server
Serial: 0123456789

Additional information from dmidecode follows. WARNING: Use caution when you interpret
this section. The 'dmidecode' program reads system data which is "intended to allow
hardware to be accurately determined", but the intent may not be met, as there are
frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.
Memory:
  12x NO DIMM NO DIMM
  12x SK Hynix HMA84GR7CJR4N-XN 32 GB 2 rank 3200

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
<table>
<thead>
<tr>
<th>C</th>
<th>500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base) 525.x264_r(base) 557.xz_r(base)</th>
</tr>
</thead>
</table>
==============================================================================

Intel(R) C Compiler for applications running on Intel(R) 64, Version
19.1.2.275 Build 20200604
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
==============================================================================

==============================================================================
<table>
<thead>
<tr>
<th>C++</th>
<th>520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base) 541.leela_r(base)</th>
</tr>
</thead>
</table>
==============================================================================

Intel(R) C++ Compiler for applications running on Intel(R) 64, Version
19.1.2.275 Build 20200604
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
==============================================================================

==============================================================================
<table>
<thead>
<tr>
<th>Fortran</th>
<th>548.exchange2_r(base)</th>
</tr>
</thead>
</table>
==============================================================================

(Continued on next page)
SPEC CPU®2017 Integer Rate Result

Supermicro
SuperServer 2029U-TRT
(X11DPU, Intel Xeon Gold 6248R)

SPECraten 2017_int_base = 351
SPECraten 2017_int_peak = Not Run

CPU2017 License: 001176
Test Sponsor: Supermicro
Tested by: Supermicro

Test Date: Dec-2020
Hardware Availability: Feb-2020
Software Availability: Aug-2020

Compiler Version Notes (Continued)

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.1.2.275 Build 20200623
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

Base Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc

Fortran benchmarks:
ifort

Base Portability Flags

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
502.gcc_r: -DSPEC_LP64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-m64 -qnextgen -std=c11
-Wl, -plugin-opt= -x86-branches-within-32B-boundaries -Wl, -z, muldefs
-xCORE-AVX512 -O3 -ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.3.275/linux/compiler/lib/intel64_lin
-lqkmalloc

(Continued on next page)
# SPEC CPU®2017 Integer Rate Result

## Supermicro

SuperServer 2029U-TRT  
(X11DPUS , Intel Xeon Gold 6248R)

<table>
<thead>
<tr>
<th>SPECrate®2017_int_base</th>
<th>351</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate®2017_int_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CPU2017 License</th>
<th>001176</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor</td>
<td>Supermicro</td>
</tr>
<tr>
<td>Tested by</td>
<td>Supermicro</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test Date</th>
<th>Dec-2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware Availability</td>
<td>Feb-2020</td>
</tr>
<tr>
<td>Software Availability</td>
<td>Aug-2020</td>
</tr>
</tbody>
</table>

## Base Optimization Flags (Continued)

**C++ benchmarks:**
- `m64 -qnextgen -Wl,-plugin-opt=-x86-branches-within-32B-boundaries`
- `Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto -mfpmath=sse`
- `funroll-loops -qopt-mem-layout-trans=4`
- `L/usr/local/IntelCompiler19/compilers_and_libraries_2020.3.275/linux/compiler/lib/intel64_lin`
- `lqkmalloc`

**Fortran benchmarks:**
- `m64 -Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs`
- `xCORE-AVX512 -O3 -ipo -no-prec-div -qopt-mem-layout-trans=4`
- `nostandard-realloc-lhs -align array32byte -auto`
- `mbranches-within-32B-boundaries`
- `L/usr/local/IntelCompiler19/compilers_and_libraries_2020.3.275/linux/compiler/lib/intel64_lin`
- `lqkmalloc`

The flags files that were used to format this result can be browsed at:

You can also download the XML flags sources by saving the following links:

SPEC CPU and SPECrate are registered trademarks of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU®2017 v1.1.0 on 2020-12-04 07:02:23-0500.
Report generated on 2020-12-28 09:45:12 by CPU2017 PDF formatter v6255.
Originally published on 2020-12-22.