OTTER 3.0*

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OTTER is a clause-based theorem prover for first-order logic with equality. It offers the inference rules binary resolution, hyperresolution, unit-resulting resolution, and paramodulation; it also offers forward and backward subsumption, forward and backward demodulation (rewriting), term ordering, Knuth-Bendix completion, answer literals, and conversion of first-order formulas to clauses. OTTER 3.0 can be used in two modes. In the ordinary mode, the user specifies inferences rules and a search strategy, and in the autonomous mode (new in OTTER 3.0, see below) the user simply supplies a set of clauses. The goal in building OTTER was to have a fast, production-quality theorem prover for experimenting with new methods and for assisting mathematicians and logicians with their research.

At the core of OTTER is a straightforward mechanism, the *given-clause algorithm*, for drawing inferences and searching for a refutation with the set of support strategy. The given-clause algorithm operates mainly on two lists of clauses, *sos* and *usable*. At the start of the search, *sos* is the supported clauses, and *usable* is the nonsupported clauses. The main loop of the given-clause algorithm is the following.

```
While (sos is not empty and no refutation has been found)
    1. Let given_clause be the 'best' clause in sos;
    2. Move given_clause from sos to usable;
    3. Infer and process new clauses using the inference rules in
           effect; each new clause must have the given_clause as
           one of its parents and members of usable as its other
           parents;  new clauses that pass the retention tests
           are appended to sos;
End of while loop.
```

Surrounding the core of OTTER are many additional features, including weighting functions to guide and restrict the search, a simple interactive routine for modifying the search, a flexible syntax, and evaluable functions and enhanced term rewriting for "programming" searches.

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New Features. Features new in OTTER 3.0 include Prolog-style operator declaration, the hot-list strategy for emphasizing key clauses, interactive selection of given clauses, ordered hyperresolution, optimization for propositional problems, and an autonomous mode.

For the autonomous mode, the user supplies a set of clauses and/or nonclausal formulas, then OTTER does a simple syntactic analysis, automatically setting parameters and assigning clauses to lists. The properties that are considered are whether the clauses are Horn, are propositional, involve equality, contain equality axioms, and are all units.

Experiments on TPTP. Table 1 lists the results of OTTER in its autonomous mode for the problems of TPTP v1.0.0 [2]. TPTP problems involving equality contain equality axioms, and for those problems, we deleted the equality axioms and used paramodulation and demodulation instead.

The TPTP experiments were run on an i486 DX2-66 processor running the Linux operating system. (For OTTER jobs, the Linux i486 is about 1.3 times faster than a SPARCstation 2.) For problems that are listed, the number of seconds taken to find a proof is shown. If a problem is not listed, then a proof was not found within ten minutes.

Availability. The OTTER 3.0 distribution, including source code, many test problems, and the manual [1], is freely available by anonymous FTP from `info@mcs.anl.gov`; see the file `pub/Otter/README`. OTTER 3.0 might be available for DOS and/or Macintosh operating systems in the near future. One can request information by e-mail from `otter@mcs.anl.gov`.

Table 1: TPTP Problem—Seconds to Proof

ALG001-3	418	ALG002-1	2						
BOO001-1	<1	BOO002-1	34	BOO003-1	14	BOO003-2	<1	BOO004-1	2
BOO004-2	1	BOO005-1	8	BOO006-1	20	BOO006-2	<1	BOO007-2	100
BOO008-1	221	BOO008-2	173	BOO009-1	19	BOO009-2	1	BOO010-1	9
BOO010-2	1	BOO011-1	<1	BOO012-1	60	BOO012-2	<1	BOO012-3	407
BOO013-1	22	BOO013-2	<1	BOO013-3	23	BOO014-2	40	BOO016-1	11
BOO016-2	2	BOO017-1	31	BOO017-2	3				
CAT001-1	14	CAT001-3	3	CAT002-1	31	CAT002-3	572	CAT002-4	53
CAT003-1	12	CAT003-4	577	CAT004-1	30	CAT005-1	2	CAT005-3	<1
CAT005-4	<1	CAT006-1	2	CAT006-3	<1	CAT006-4	<1	CAT007-1	<1
CAT007-3	13	CAT008-1	3	CAT009-1	4	CAT010-1	4	CAT011-1	<1
CAT011-2	<1	CAT011-3	548	CAT011-4	21	CAT012-1	2	CAT012-3	228
CAT012-4	14	CAT013-1	<1	CAT013-3	546	CAT013-4	18	CAT014-1	2
CAT014-2	<1	CAT014-3	551	CAT014-4	18	CAT016-3	<1	CAT016-4	<1
CAT017-3	<1	CAT017-4	<1	CAT018-1	3	CAT019-1	<1	CAT019-2	<1
CAT019-3	23								
COL001-1	2	COL001-2	<1	COL002-1	1	COL002-2	14	COL004-3	<1
COL007-1	<1	COL008-1	<1	COL009-1	3	COL010-1	<1	COL011-1	13
COL012-1	<1	COL013-1	<1	COL014-1	<1	COL015-1	<1	COL016-1	<1
COL017-1	<1	COL018-1	<1	COL019-1	<1	COL020-1	<1	COL021-1	<1
COL022-1	<1	COL023-1	<1	COL024-1	<1	COL025-1	<1	COL026-1	1
COL027-1	2	COL028-1	<1	COL029-1	<1	COL030-1	<1	COL031-1	<1
COL032-1	<1	COL033-1	<1	COL034-1	2	COL035-1	19	COL039-1	13
COL040-1	17	COL041-1	1	COL044-1	17	COL045-1	<1	COL048-1	<1
COL049-1	5	COL050-1	<1	COL051-1	<1	COL052-1	<1	COL052-2	<1
COL053-1	<1	COL054-1	<1	COL055-1	<1	COL056-1	<1	COL057-1	8
COL058-1	<1	COL058-2	1	COL058-3	<1	COL059-1	<1	COL060-2	<1

Table 1: TPTP Problem—Seconds to Proof (continued)

COL060-3	<1	COL061-2	<1	COL061-3	<1	COL062-2	<1	COL062-3	<1
COL063-2	<1	COL063-3	<1	COL063-4	<1	COL063-5	<1	COL063-6	<1
COL064-10	<1	COL064-11	<1	COL064-2	<1	COL064-3	<1	COL064-4	<1
COL064-5	<1	COL064-6	<1	COL064-7	<1	COL064-8	<1	COL064-9	<1
COL066-2	<1	COL066-3	<1						
COM001-1	<1	COM002-1	<1	COM002-2	<1				
GEO002-3	<1	GEO003-1	2	GEO003-2	3	GEO003-3	1	GEO006-3	15
GEO007-3	255	GEO011-2	<1	GEO011-3	3	GEO011-4	<1	GEO011-5	<1
GEO013-3	101	GEO014-2	<1	GEO015-2	2	GEO015-3	<1	GEO016-2	<1
GEO016-3	<1	GEO017-2	5	GEO017-3	4	GEO018-2	4	GEO018-3	6
GEO019-2	<1	GEO019-3	<1	GEO020-2	5	GEO020-3	4	GEO021-2	3
GEO021-3	6	GEO022-2	17	GEO022-3	16	GEO024-2	4	GEO024-3	3
GEO026-2	14	GEO026-3	27	GEO027-3	4	GEO030-2	110	GEO030-3	93
GEO034-3	95	GEO035-2	1	GEO035-3	1	GEO036-2	469	GEO036-3	85
GEO038-2	3	GEO038-3	2	GEO039-2	27	GEO039-3	<1	GEO041-3	3
GEO045-3	10	GEO046-3	9	GEO047-3	6	GEO051-3	93	GEO052-3	92
GEO053-3	15	GEO054-2	<1	GEO054-3	<1	GEO055-2	<1	GEO055-3	<1
GEO056-2	6	GEO056-3	<1	GEO057-2	2	GEO057-3	<1	GEO058-2	38
GEO058-3	8	GEO064-3	5	GEO065-3	5	GEO066-3	5	GEO067-2	4
GEO067-3	3	GEO069-3	107						
GRA001-1	<1								
GRP001-1	<1	GRP001-2	<1	GRP001-4	<1	GRP001-5	<1	GRP002-3	2
GRP002-4	4	GRP003-1	<1	GRP003-2	<1	GRP004-1	<1	GRP004-2	<1
GRP005-1	<1	GRP006-1	<1	GRP007-1	<1	GRP008-1	11	GRP009-1	<1
GRP010-1	<1	GRP010-4	<1	GRP011-4	<1	GRP012-1	<1	GRP012-2	<1
GRP012-3	4	GRP012-4	<1	GRP013-1	<1	GRP017-1	<1	GRP018-1	<1
GRP019-1	<1	GRP020-1	<1	GRP021-1	<1	GRP022-1	<1	GRP022-2	<1
GRP023-1	<1	GRP023-2	<1	GRP025-1	4	GRP025-2	2	GRP025-3	4
GRP025-4	4	GRP026-1	11	GRP026-2	4	GRP026-3	11	GRP026-4	7
GRP027-1	<1	GRP027-2	<1	GRP028-1	<1	GRP029-1	<1	GRP029-2	<1
GRP030-1	<1	GRP031-1	<1	GRP031-2	<1	GRP032-3	<1	GRP033-3	<1
GRP033-4	<1	GRP034-3	<1	GRP034-4	<1	GRP035-3	<1	GRP036-3	<1
GRP037-3	2	GRP038-3	<1	GRP041-2	<1	GRP042-2	<1	GRP043-2	<1
GRP044-2	<1	GRP045-2	<1	GRP046-2	<1	GRP047-2	<1	GRP048-2	<1
GRP050-1	37	GRP058-1	10	GRP059-1	11	GRP070-1	225	GRP075-1	140
GRP076-1	313	GRP078-1	254	GRP079-1	100	GRP085-1	2	GRP086-1	2
GRP087-1	24	GRP096-1	211	GRP098-1	258	GRP100-1	224	GRP103-1	326
HEN001-1	<1	HEN001-3	<1	HEN001-5	<1	HEN002-1	<1	HEN002-2	<1
HEN002-3	<1	HEN002-4	<1	HEN002-5	<1	HEN003-1	<1	HEN003-2	<1
HEN003-3	<1	HEN003-4	<1	HEN003-5	2	HEN004-1	3	HEN004-2	2
HEN004-3	1	HEN004-4	4	HEN004-5	5	HEN004-6	2	HEN005-1	<1
HEN005-2	2	HEN005-3	<1	HEN005-4	4	HEN005-5	5	HEN005-6	<1
HEN006-1	4	HEN006-2	7	HEN006-3	52	HEN006-4	4	HEN006-5	8
HEN006-6	65	HEN006-7	4	HEN007-1	24	HEN007-2	2	HEN007-3	199
HEN007-4	<1	HEN007-5	61	HEN007-6	2	HEN008-1	<1	HEN008-2	3
HEN008-3	<1	HEN008-4	2	HEN008-5	<1	HEN008-6	<1	HEN009-1	18
HEN009-2	2	HEN009-3	518	HEN009-4	1	HEN009-5	3	HEN009-6	17
HEN010-1	14	HEN010-2	3	HEN010-4	7	HEN010-5	6	HEN010-6	8
HEN010-7	2	HEN011-1	209	HEN011-2	162	HEN011-4	255	HEN011-5	483
HEN012-1	1	HEN012-3	<1						
LAT005-1	16	LAT005-2	5						
LCL004-1	24	LCL006-1	419	LCL007-1	<1	LCL008-1	<1	LCL009-1	<1
LCL010-1	3	LCL011-1	75	LCL012-1	555	LCL013-1	<1	LCL014-1	164
LCL015-1	481	LCL016-1	272	LCL017-1	549	LCL018-1	379	LCL022-1	<1

Table 1: TPTP Problem—Seconds to Proof (continued)

LCL023-1	3	LCL024-1	516	LCL025-1	37	LCL026-1	53	LCL027-1	<1
LCL029-1	3	LCL030-1	420	LCL033-1	<1	LCL034-1	8	LCL035-1	<1
LCL036-1	2	LCL039-1	127	LCL040-1	113	LCL041-1	3	LCL043-1	4
LCL044-1	5	LCL046-1	<1	LCL047-1	4	LCL048-1	4	LCL049-1	42
LCL050-1	44	LCL051-1	223	LCL052-1	43	LCL053-1	46	LCL055-1	23
LCL056-1	20	LCL057-1	22	LCL059-1	20	LCL064-1	486	LCL064-2	8
LCL065-1	2	LCL066-1	<1	LCL067-1	249	LCL070-1	248	LCL071-1	253
LCL072-1	115	LCL075-1	9	LCL076-1	<1	LCL076-2	<1	LCL076-3	<1
LCL077-1	<1	LCL077-2	<1	LCL079-1	<1	LCL080-1	66	LCL080-2	52
LCL081-1	<1	LCL082-1	<1	LCL083-1	16	LCL083-2	<1	LCL084-2	<1
LCL084-3	<1	LCL086-1	<1	LCL087-1	<1	LCL088-1	2	LCL089-1	3
LCL090-1	2	LCL091-1	3	LCL092-1	4	LCL093-1	112	LCL094-1	5
LCL095-1	13	LCL096-1	105	LCL097-1	4	LCL098-1	6	LCL101-1	<1
LCL102-1	33	LCL103-1	221	LCL104-1	<1	LCL106-1	<1	LCL107-1	<1
LCL108-1	1	LCL109-5	<1	LCL109-6	102	LCL110-1	1	LCL110-2	<1
LCL111-1	2	LCL111-2	9	LCL112-1	<1	LCL112-2	<1	LCL113-2	<1
LCL114-2	1	LCL115-1	8	LCL115-2	2	LCL116-2	2	LCL117-1	<1
LCL118-1	8	LCL120-1	50	LCL121-1	120	LCL126-1	<1	LCL128-1	125
LCL130-1	<1	LCL131-1	122	LCL132-1	<1	LCL133-1	<1	LCL134-1	<1
LCL135-1	<1	LCL138-1	105	LCL139-1	<1	LCL140-1	<1	LCL141-1	<1
LCL143-1	<1	LCL146-1	107	LCL153-1	<1	LCL154-1	<1	LCL155-1	<1
LCL156-1	<1	LCL157-1	<1	LCL158-1	<1	LCL159-1	1	LCL161-1	<1
LCL162-1	40	LCL163-1	162	LCL164-1	1				
LDA001-1	<1	LDA002-1	2	LDA003-1	<1	LDA007-1	40	LDA007-2	25
LDA007-3	<1	LDA010-2	195	LDA011-2	189	LDA012-2	11	LDA013-1	<1
MSC001-1	7	MSC002-1	<1	MSC002-2	<1	MSC003-1	<1	MSC004-1	<1
MSC005-1	29	MSC006-1	5	MSC007-1.002	<1	MSC007-1.003	<1	MSC007-1.004	<1
MSC007-1.005	<1	MSC007-1.006	9	MSC007-1.007	193	MSC007-2.002	<1	MSC007-2.003	3
MSC008-1.002	67								
NUM001-1	<1	NUM002-1	<1	NUM003-1	<1	NUM004-1	<1	NUM009-1	40
NUM014-1	<1	NUM015-1	<1	NUM016-1	<1	NUM016-2	<1	NUM017-1	168
NUM017-2	168	NUM019-1	<1	NUM020-1	<1	NUM021-1	<1	NUM022-1	<1
NUM023-1	<1	NUM025-1	<1	NUM025-2	<1	NUM180-1	7	NUM183-1	45
NUM190-1	11	NUM228-1	10	NUM283-1.002	<1	NUM283-1.003	<1	NUM283-1.004	<1
NUM283-1.005	9	NUM284-1.002	<1	NUM284-1.003	<1	NUM284-1.004	<1	NUM284-1.005	<1
NUM284-1.006	<1	NUM284-1.007	<1	NUM284-1.008	<1	NUM284-1.009	<1	NUM284-1.010	<1
PLA002-1	<1	PLA003-1	<1						
PRV001-1	<1	PRV002-1	2	PRV003-1	<1	PRV005-1	2	PRV006-1	<1
PRV008-1	2	PRV009-1	<1						
PUZ001-1	<1	PUZ001-2	<1	PUZ002-1	<1	PUZ003-1	<1	PUZ004-1	<1
PUZ005-1	1	PUZ006-1	<1	PUZ007-1	<1	PUZ008-1	<1	PUZ008-2	<1
PUZ009-1	<1	PUZ011-1	<1	PUZ012-1	<1	PUZ013-1	<1	PUZ014-1	<1
PUZ016-1	4	PUZ018-1	<1						
RNG001-1	31	RNG001-2	7	RNG001-3	77	RNG001-4	19	RNG001-5	32
RNG002-1	<1	RNG003-1	<1	RNG004-1	20	RNG004-2	31	RNG004-3	5
RNG005-1	4	RNG005-2	<1	RNG006-1	50	RNG006-2	8	RNG006-3	12
RNG007-1	11	RNG007-4	<1	RNG008-1	130	RNG008-2	183	RNG008-3	1
RNG008-4	1	RNG008-5	98	RNG008-6	164	RNG008-7	2	RNG010-1	<1
RNG010-2	<1	RNG011-5	<1	RNG012-6	<1	RNG013-6	<1	RNG014-6	<1
RNG015-6	<1	RNG016-6	1	RNG017-6	<1	RNG018-6	<1	RNG019-6	2
RNG019-7	1	RNG020-6	1	RNG020-7	1	RNG021-6	1	RNG021-7	1
RNG023-6	1	RNG023-7	1	RNG024-6	1	RNG024-7	1	RNG025-4	77
RNG025-5	115	RNG025-6	76	RNG025-7	116	RNG027-2	<1	RNG028-2	<1
RNG029-2	<1	RNG037-1	4	RNG037-2	<1	RNG038-1	<1	RNG038-2	<1

Table 1: TPTP Problem—Seconds to Proof (continued)

RNG039-1	10	RNG039-2	11	RNG040-1	<1	RNG040-2	1	RNG041-1	3
ROB002-1	<1	ROB003-1	<1	ROB004-1	1	ROB005-1	46	ROB008-1	<1
ROB009-1	<1	ROB010-1	<1	ROB011-1	<1	ROB013-1	<1	ROB014-2	216
ROB016-1	<1	ROB021-1	2	ROB022-1	2	ROB023-1	2	ROB025-1	313
SYN001-1.001	<1	SYN001-1.002	<1	SYN001-1.003	<1	SYN001-1.004	<1	SYN001-1.005	<1
SYN001-1.006	<1	SYN001-1.007	3	SYN001-1.008	11	SYN001-1.009	63	SYN001-1.010	449
SYN002-1.000	<1	SYN002-1.002	<1	SYN002-1.004	<1	SYN002-1.006	<1	SYN002-1.008	<1
SYN002-1.010	<1	SYN002-1.012	<1	SYN002-1.016	<1	SYN002-1.020	1	SYN002-1.030	3
SYN002-1.040	9	SYN002-1.050	25	SYN003-1.002	<1	SYN003-1.003	<1	SYN003-1.004	<1
SYN003-1.005	<1	SYN003-1.006	<1	SYN003-1.007	<1	SYN003-1.008	<1	SYN003-1.009	<1
SYN003-1.010	<1	SYN004-1.002	<1	SYN004-1.003	<1	SYN004-1.004	<1	SYN004-1.005	<1
SYN004-1.006	<1	SYN004-1.007	<1	SYN004-1.008	<1	SYN004-1.009	<1	SYN004-1.010	<1
SYN005-1.002	<1	SYN005-1.003	<1	SYN005-1.004	<1	SYN005-1.005	<1	SYN005-1.006	<1
SYN005-1.007	<1	SYN005-1.008	<1	SYN005-1.009	<1	SYN005-1.010	<1	SYN006-1	<1
SYN007-1.001	<1	SYN007-1.002	<1	SYN007-1.003	<1	SYN007-1.004	<1	SYN007-1.005	3
SYN007-1.006	13	SYN007-1.007	62	SYN008-1	<1	SYN009-1	<1	SYN010-1.002	<1
SYN010-1.005	<1	SYN010-1.010	<1	SYN010-2.002	<1	SYN010-2.005	<1	SYN010-2.010	<1
SYN010-3.002	<1	SYN010-3.005	<1	SYN010-3.010	2	SYN014-2	<1	SYN015-2	219
SYN028-1	<1	SYN029-1	<1	SYN030-1	<1	SYN031-1	<1	SYN032-1	<1
SYN033-1	<1	SYN034-1	<1	SYN035-1	<1	SYN036-3	2	SYN036-4	26
SYN037-1	74	SYN037-2	<1	SYN038-1	2	SYN039-1	2	SYN040-1	<1
SYN041-1	<1	SYN042-1	<1	SYN043-1	<1	SYN044-1	<1	SYN045-1	<1
SYN046-1	<1	SYN047-1	<1	SYN048-1	<1	SYN049-1	<1	SYN050-1	<1
SYN051-1	<1	SYN052-1	<1	SYN053-1	<1	SYN054-1	<1	SYN055-1	<1
SYN057-1	<1	SYN058-1	<1	SYN060-1	<1	SYN061-1	<1	SYN062-1	<1
SYN063-1	<1	SYN064-1	<1	SYN065-1	<1	SYN066-1	<1	SYN068-1	<1
SYN069-1	<1	SYN070-1	<1	SYN071-1	<1	SYN072-1	<1	SYN073-1	<1
SYN074-1	12	SYN075-1	2	SYN079-1	<1	SYN080-1	<1	SYN081-1	<1
SYN082-1	<1	SYN083-1	<1	SYN085-1.005	<1	SYN085-1.010	<1	SYN085-1.020	<1
SYN088-1.005	<1	SYN088-1.010	<1	SYN089-1.005	<1	SYN089-1.010	2	SYN089-1.020	22
SYN090-1.005	<1	SYN090-1.010	<1	SYN090-1.020	2	SYN093-1.005	1	SYN093-1.010	9
SYN093-1.020	130	SYN094-1.005	<1	SYN094-1.010	2	SYN094-1.020	6	SYN095-1.005	<1
SYN095-1.010	2	SYN095-1.020	17	SYN096-1.005	<1	SYN096-1.010	<1	SYN096-1.020	2
SYN097-1.005	3	SYN097-1.010	33	SYN097-1.020	538	SYN098-1.005	2	SYN098-1.010	6
SYN098-1.020	20	SYN099-1.005	<1	SYN099-1.010	6	SYN099-1.020	52	SYN100-1.005	<1
SYN100-1.010	2	SYN100-1.020	4	SYN101-1.005	5	SYN101-1.010	23	SYN101-1.020	140
SYN102-1.005	4	SYN102-1.010	7	SYN102-1.020	16				
TOP002-2	<1	TOP004-1	<1	TOP004-2	<1	TOP005-2	<1		
SET001-1	<1	SET002-1	31	SET003-1	<1	SET004-1	<1	SET006-1	<1
SET008-1	5	SET009-1	3	SET012-4	263	SET017-6	96	SET017-7	221
SET019-3	30	SET019-4	24	SET024-3	5	SET024-4	3	SET024-6	<1
SET024-7	2	SET025-3	4	SET025-4	2	SET025-6	2	SET025-7	3
SET027-3	583	SET027-4	559	SET027-6	4	SET027-7	4	SET043-5	<1
SET044-5	<1	SET045-5	<1	SET046-5	<1	SET050-6	7	SET051-6	6
SET052-6	8	SET053-6	8	SET054-6	<1	SET054-7	<1	SET055-6	81
SET055-7	<1	SET056-6	123	SET056-7	127	SET057-6	1	SET057-7	1
SET058-6	1	SET058-7	1	SET059-6	1	SET059-7	1	SET060-6	3
SET060-7	5	SET061-6	86	SET061-7	10	SET062-6	33	SET062-7	1
SET063-6	32	SET063-7	1	SET064-6	133	SET064-7	13	SET065-6	<1
SET065-7	1	SET072-6	197	SET072-7	403	SET073-6	83	SET073-7	2
SET074-6	83	SET074-7	2	SET075-6	67	SET075-7	2	SET077-6	<1
SET077-7	<1	SET078-6	1	SET078-7	1	SET079-6	100	SET079-7	2
SET080-6	<1	SET080-7	1	SET081-6	1	SET081-7	2	SET082-6	138
SET082-7	99	SET083-6	133	SET083-7	279	SET084-6	8	SET084-7	46

Table 1: TPTP Problem—Seconds to Proof (continued)

SET085-6	158	SET093-6	7	SET093-7	87	SET094-6	107	SET094-7	64
SET095-7	2	SET096-6	495	SET096-7	33	SET101-6	2	SET101-7	3
SET102-6	2	SET102-7	3	SET108-6	6	SET108-7	41	SET117-6	8
SET117-7	62	SET118-6	1	SET118-7	3	SET146-6	159	SET152-6	7
SET158-6	1	SET166-6	102	SET184-6	5	SET196-6	135	SET197-6	135
SET203-6	1	SET204-6	8	SET235-6	33	SET236-6	34	SET242-6	2
SET296-6	<1	SET411-6	52	SET479-6	185	SET506-6	43	SET507-6	87
SET510-6	156	SET516-6	443	SET517-6	491	SET553-6	476	SET558-6	1
SET559-6	293	SET561-6	310	SET562-6	427	SET563-6	120	SET564-6	102
SET565-6	291	SET566-6	118						

References

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[2] C.B. Suttner, G. Sutcliffe, and T. Yemenis. The TPTP Problem Library (TPTP v1.0.0 - TR 13.11.93). Technical Report FKI-184-93, Institut für Informatik, Technische Universität München, Munich, Germany; Technical Report 93/11, Department of Computer Science, James Cook University, Townsville, Australia, 1993.