

80	0	0	773.15664	0 1976	- 773.15664	- - 31s
81	0	0	773.35227	0 1981	- 773.35227	- - 32s
82	0	0	773.43040	0 2314	- 773.43040	- - 32s
83	0	0	773.52847	0 2337	- 773.52847	- - 32s
84	0	0	773.78055	0 2323	- 773.78055	- - 32s
85	0	0	773.88774	0 2409	- 773.88774	- - 32s
86	0	0	773.98060	0 2393	- 773.98060	- - 33s
87	0	0	774.12658	0 2350	- 774.12658	- - 33s
88	0	0	774.15853	0 2362	- 774.15853	- - 33s
89	0	0	774.20629	0 2379	- 774.20629	- - 33s
90	0	0	774.23392	0 2390	- 774.23392	- - 33s
91	0	0	774.27088	0 2397	- 774.27088	- - 33s
92	0	0	774.30766	0 2399	- 774.30766	- - 34s
93	0	0	774.33608	0 2399	- 774.33608	- - 34s
94	0	0	774.36589	0 2401	- 774.36589	- - 34s
95	0	0	774.63972	0 2386	- 774.63972	- - 34s
96	0	0	774.65621	0 2358	- 774.65621	- - 34s
97	0	0	774.69732	0 2360	- 774.69732	- - 34s
98	0	0	774.74015	0 2359	- 774.74015	- - 34s
99	0	0	774.77519	0 2359	- 774.77519	- - 35s
100	0	0	774.81199	0 2358	- 774.81199	- - 35s
101	0	0	774.85300	0 2355	- 774.85300	- - 35s
102	0	0	774.88695	0 2353	- 774.88695	- - 35s
103	0	0	774.92234	0 2328	- 774.92234	- - 35s
104	0	0	774.96259	0 2320	- 774.96259	- - 35s
105	0	0	774.99485	0 2299	- 774.99485	- - 35s
106	0	0	775.02925	0 2248	- 775.02925	- - 36s
107	0	0	775.05004	0 2243	- 775.05004	- - 36s
108	0	0	775.08364	0 2228	- 775.08364	- - 36s
109	0	0	775.11756	0 2228	- 775.11756	- - 36s
110	0	0	775.15778	0 2242	- 775.15778	- - 36s
111	0	0	775.18665	0 2234	- 775.18665	- - 36s
112	0	0	775.24593	0 2226	- 775.24593	- - 37s
113	0	0	775.26467	0 2042	- 775.26467	- - 37s
114	0	0	775.28954	0 2225	- 775.28954	- - 38s
115	0	0	775.30768	0 2218	- 775.30768	- - 38s
116	0	0	775.31338	0 1779	- 775.31338	- - 38s
117	0	0	775.34384	0 2190	- 775.34384	- - 38s
118	0	0	775.36295	0 2192	- 775.36295	- - 39s
119	0	0	775.38836	0 2197	- 775.38836	- - 39s
120	0	0	775.41259	0 2193	- 775.41259	- - 39s
121	0	0	775.59325	0 2201	- 775.59325	- - 39s
122	0	0	775.61192	0 2199	- 775.61192	- - 39s
123	0	0	775.63102	0 2180	- 775.63102	- - 39s
124	0	0	775.72590	0 2175	- 775.72590	- - 39s
125	0	0	775.75242	0 2177	- 775.75242	- - 40s
126	0	0	775.77055	0 2176	- 775.77055	- - 40s
127	0	0	775.79435	0 2177	- 775.79435	- - 40s
128	0	0	775.85597	0 2174	- 775.85597	- - 40s
129	0	0	775.87189	0 2155	- 775.87189	- - 40s
130	0	0	775.92279	0 2128	- 775.92279	- - 40s
131	0	0	775.96372	0 2232	- 775.96372	- - 40s
132	0	0	776.05948	0 2208	- 776.05948	- - 41s
133	0	0	776.14054	0 2204	- 776.14054	- - 41s
134	0	0	776.16664	0 2150	- 776.16664	- - 41s
135	0	0	776.23122	0 1820	- 776.23122	- - 41s
136	0	0	776.30638	0 1822	- 776.30638	- - 41s
137	0	0	776.34524	0 1830	- 776.34524	- - 42s
138	0	0	776.37531	0 2242	- 776.37531	- - 42s
139	0	0	776.38790	0 2217	- 776.38790	- - 42s
140	0	0	776.39461	0 1812	- 776.39461	- - 42s
141	0	0	776.39461	0 1815	- 776.39461	- - 42s
142	0	0	777.40069	0 2065	- 777.40069	- - 46s
143	0	0	777.40069	0 2063	- 777.40069	- - 46s
144	0	0	780.33595	0 1485	- 780.33595	- - 47s
145	0	0	780.33595	0 1478	- 780.33595	- - 47s
146	0	0	783.05256	0 1767	- 783.05256	- - 48s
147	0	0	783.52611	0 1552	- 783.52611	- - 48s
148	0	0	785.25401	0 1631	- 785.25401	- - 49s
149	0	0	785.70891	0 1567	- 785.70891	- - 50s
150	0	0	786.53522	0 1169	- 786.53522	- - 50s
151	0	0	786.85469	0 933	- 786.85469	- - 50s
152	0	0	787.14832	0 936	- 787.14832	- - 50s
153	0	0	787.34479	0 931	- 787.34479	- - 50s
154	0	0	787.49435	0 934	- 787.49435	- - 51s
155	0	0	787.60182	0 1113	- 787.60182	- - 51s
156	0	0	788.48092	0 1849	- 788.48092	- - 52s
157	0	0	788.68656	0 1139	- 788.68656	- - 52s
158	0	0	789.15672	0 1156	- 789.15672	- - 52s
159	0	0	789.21005	0 1101	- 789.21005	- - 52s
160	0	0	789.24484	0 1105	- 789.24484	- - 52s
161	0	0	789.31295	0 1134	- 789.31295	- - 52s
162	0	0	789.48717	0 1240	- 789.48717	- - 53s
163	0	0	789.52155	0 1254	- 789.52155	- - 53s

unknown

164	0	0	789.55156	0 1183	- 789.55156	- - 53s
165	0	0	789.66228	0 1217	- 789.66228	- - 53s
166	0	0	789.75755	0 1826	- 789.75755	- - 53s
167	0	0	789.77822	0 1849	- 789.77822	- - 53s
168	0	0	789.79065	0 1848	- 789.79065	- - 53s
169	0	0	789.88515	0 1820	- 789.88515	- - 54s
170	0	0	789.91548	0 1840	- 789.91548	- - 54s
171	0	0	789.94684	0 1823	- 789.94684	- - 54s
172	0	0	789.95574	0 1833	- 789.95574	- - 54s
173	0	0	789.98756	0 1580	- 789.98756	- - 54s
174	0	0	789.99615	0 1565	- 789.99615	- - 54s
175	0	0	790.00560	0 1584	- 790.00560	- - 54s
176	0	0	790.00924	0 1585	- 790.00924	- - 55s
177	0	0	790.00924	0 1599	- 790.00924	- - 55s
178	0	0	809.83802	0 1600	- 809.83802	- - 58s
179	0	0	816.15573	0 1671	- 816.15573	- - 59s
180	0	0	816.15573	0 1649	- 816.15573	- - 59s
181	0	0	816.73124	0 1748	- 816.73124	- - 59s
182	0	0	816.86239	0 1771	- 816.86239	- - 60s
183	0	0	816.99921	0 1282	- 816.99921	- - 60s
184	0	0	816.99921	0 1406	- 816.99921	- - 60s
185	0	0	834.58565	0 1953	- 834.58565	- - 65s
186	0	0	834.58565	0 1849	- 834.58565	- - 66s
187	0	0	836.08593	0 1477	- 836.08593	- - 66s
188	0	0	836.42157	0 1394	- 836.42157	- - 66s
189	0	0	837.48812	0 1393	- 837.48812	- - 67s
190	0	0	837.53320	0 1331	- 837.53320	- - 67s
191	0	0	837.62329	0 1317	- 837.62329	- - 67s
192	0	0	837.63840	0 1308	- 837.63840	- - 67s
193	0	0	837.64578	0 1209	- 837.64578	- - 67s
194	0	0	838.48654	0 1158	- 838.48654	- - 69s
195	0	0	838.48654	0 1153	- 838.48654	- - 69s
196	0	0	838.58702	0 1231	- 838.58702	- - 70s
197	0	0	838.58751	0 1190	- 838.58751	- - 70s
198	0	0	839.04186	0 1153	- 839.04186	- - 72s
199	0	0	839.04186	0 1245	- 839.04186	- - 73s
200	0	0	839.04186	0 1244	- 839.04186	- - 73s
201	0	0	839.31291	0 1319	- 839.31291	- - 73s
202	0	0	839.33058	0 1238	- 839.33058	- - 74s
203	0	0	839.33533	0 1196	- 839.33533	- - 74s
204	0	0	839.52985	0 1183	- 839.52985	- - 76s
205	0	0	839.52985	0 1111	- 839.52985	- - 76s
206	0	0	839.82347	0 1151	- 839.82347	- - 77s
207	0	0	839.82347	0 1105	- 839.82347	- - 77s
208	0	0	840.06574	0 1185	- 840.06574	- - 79s
209	0	0	840.06574	0 1200	- 840.06574	- - 79s
210	0	0	840.07971	0 1218	- 840.07971	- - 79s
211	0	0	840.22940	0 1230	- 840.22940	- - 81s
212	0	0	840.22940	0 1147	- 840.22940	- - 81s
213	0	0	840.24768	0 1054	- 840.24768	- - 81s
214	0	0	840.24896	0 1088	- 840.24896	- - 82s
215	0	0	840.24896	0 1090	- 840.24896	- - 82s
216	0	0	840.47195	0 1184	- 840.47195	- - 83s
217	0	0	840.47195	0 1181	- 840.47195	- - 83s
218	0	0	840.49092	0 1242	- 840.49092	- - 84s
219	0	0	840.56391	0 1155	- 840.56391	- - 84s
220	0	0	840.56938	0 1151	- 840.56938	- - 84s
221	0	0	840.68237	0 1143	- 840.68237	- - 86s
222	0	0	840.68237	0 1098	- 840.68237	- - 86s
223	0	0	840.68237	0 1087	- 840.68237	- - 86s
224	0	0	840.68237	0 1119	- 840.68237	- - 86s
225	0	0	840.82678	0 1095	- 840.82678	- - 88s
226	0	0	840.82678	0 1067	- 840.82678	- - 88s
227	0	0	840.89252	0 1022	- 840.89252	- - 88s
228	0	0	840.89252	0 1015	- 840.89252	- - 88s
229	0	0	840.89320	0 1063	- 840.89320	- - 89s
230	0	0	840.89320	0 1062	- 840.89320	- - 89s
231	0	0	841.13091	0 1121	- 841.13091	- - 90s
232	0	0	841.13091	0 1109	- 841.13091	- - 91s
233	0	0	841.14367	0 1116	- 841.14367	- - 91s
234	0	0	841.25270	0 1165	- 841.25270	- - 93s
235	0	0	841.25270	0 1160	- 841.25270	- - 93s
236	0	0	841.27528	0 1101	- 841.27528	- - 93s
237	0	0	841.27597	0 1117	- 841.27597	- - 93s
238	0	0	841.48182	0 1039	- 841.48182	- - 95s
239	0	0	841.48506	0 980	- 841.48506	- - 95s
240	0	0	841.49551	0 1133	- 841.49551	- - 97s
241	0	0	841.49551	0 1106	- 841.49551	- - 97s
242	0	0	841.49642	0 1027	- 841.49642	- - 98s
243	0	0	841.51981	0 1069	- 841.51981	- - 99s
244	0	0	841.51981	0 1069	- 841.51981	- - 100s
245	0	2	841.51981	0 1069	- 841.51981	- - 109s
246	1	4	841.51981	1 1096	- 841.51981	- 2980 110s
247	19	24	845.98063	4 1026	- 845.98063	- 1019 116s

```
248 66 78 850.00000 14 410 - 847.96508 - 492 120s
249 222 236 850.00000 40 281 - 847.96508 - 214 125s
250 382 382 848.73755 8 633 - 848.20271 - 174 130s
251 558 526 851.77778 29 226 - 848.20271 - 162 135s
252 648 626 853.33333 44 215 - 848.20271 - 190 140s
253 796 756 infeasible 72 - 848.20271 - 202 145s
254 946 904 897.00000 81 417 - 848.20271 - 193 150s
255 * 978 817 237 1267.0000000 848.20271 33.1% 190 150s
256 H 1014 726 1067.0000000 848.20271 20.5% 194 151s
257 1045 748 873.97638 70 1069 1067.00000 848.20271 20.5% 199 195s
258 1047 749 856.66667 24 621 1067.00000 848.20271 20.5% 199 207s
259 1048 750 1050.00000 40 670 1067.00000 848.20271 20.5% 198 218s
260 1049 751 868.19725 81 1036 1067.00000 848.20271 20.5% 198 226s
261 1052 753 1056.66667 21 757 1067.00000 848.20271 20.5% 198 235s
262 1053 753 967.00000 83 458 1067.00000 848.20271 20.5% 197 250s
263 1059 757 897.00000 86 581 1067.00000 848.20271 20.5% 196 258s
264 H 1059 718 1060.0000000 848.20271 20.0% 196 265s
265 H 1059 682 1040.0000000 848.20271 18.4% 196 271s
266 1065 686 850.00000 28 634 1040.00000 848.20271 18.4% 195 278s
267 1066 687 916.50922 42 190 1040.00000 850.00000 18.3% 195 287s
268 1067 688 1040.00000 12 341 1040.00000 850.00000 18.3% 195 292s
269 1068 688 968.33333 37 229 1040.00000 850.00000 18.3% 195 299s
270 1069 689 974.00000 32 324 1040.00000 850.00000 18.3% 195 302s
271 1070 690 878.61569 13 264 1040.00000 850.00000 18.3% 194 309s
272 1071 690 897.00000 86 467 1040.00000 850.00000 18.3% 194 313s
273 H 1071 655 860.0000000 850.00000 1.16% 194 318s
274 1073 657 850.00000 56 308 860.00000 850.00000 1.16% 194 320s
275 1076 660 860.00000 35 1069 860.00000 850.00000 1.16% 256 347s
276 1078 661 860.00000 41 142 860.00000 850.00000 1.16% 256 354s
277 1079 662 860.00000 5 175 860.00000 851.67786 0.97% 256 363s
278 1080 663 860.00000 90 131 860.00000 853.22071 0.79% 255 366s
279
280 Cutting planes:
281 Gomory: 28
282 Cover: 335
283 Implied bound: 16
284 Projected implied bound: 11
285 Clique: 60
286 MIR: 6
287 StrongCG: 2
288 Flow cover: 28
289 GUB cover: 22
290 Zero half: 9
291 RLT: 10
292 Relax-and-lift: 10
293 BQP: 2
294
295 Explored 1080 nodes (382257 simplex iterations) in 366.81 seconds (653.06 work units)
296 Thread count was 8 (of 8 available processors)
297
298 Solution count 5: 860 1040 1060 ... 1267
299
300 Optimal solution found (tolerance 1.00e-04)
301 Best objective 8.6000000000000e+02, best bound 8.6000000000000e+02, gap 0.0000%
302 Optimal Obj: 860.0
303 Obj = 860.0
304 Solutions
305 Vessel i: 0: li: 7, pi: 14-21, ai-di: 6-22, taoi-deltai: 6-21, periodi: 15, taoPi_SP-deltaPi_SP: 6-11, periodPi: 5, betaNi: 8, bi: 15, Txijt: 105, oli: 105, o2i: 100, o3i: -270, o4i: 160, Ti: 95
306 Vessel i: 1: li: 7, pi: 27-34, ai-di: 48-75, taoi-deltai: 48-74, periodi: 26, taoPi_SP-deltaPi_SP: 48-55, periodPi: 7, betaNi: 15, bi: 26, Txijt: 182, oli: 182, o2i: 140, o3i: -513, o4i: 300, Ti: 109
307 Vessel i: 2: li: 7, pi: 14-21, ai-di: 25-52, taoi-deltai: 25-51, periodi: 26, taoPi_SP-deltaPi_SP: 25-32, periodPi: 7, betaNi: 15, bi: 26, Txijt: 182, oli: 182, o2i: 140, o3i: -513, o4i: 300, Ti: 109
308 Vessel i: 3: li: 5, pi: 22-27, ai-di: 14-21, taoi-deltai: 14-20, periodi: 6, taoPi_SP-deltaPi_SP: 14-16, periodPi: 2, betaNi: 4, bi: 6, Txijt: 30, oli: 30, o2i: 40, o3i: -100, o4i: 80, Ti: 50
309 Vessel i: 4: li: 7, pi: 7-14, ai-di: 6-30, taoi-deltai: 7-30, periodi: 23, taoPi_SP-deltaPi_SP: 7-13, periodPi: 6, betaNi: 16, bi: 23, Txijt: 161, oli: 181, o2i: 120, o3i: -459, o4i: 320, Ti: 162
310 Vessel i: 5: li: 7, pi: 7-14, ai-di: 37-62, taoi-deltai: 37-50, periodi: 13, taoPi_SP-deltaPi_SP: 37-41, periodPi: 4, betaNi: 7, bi: 13, Txijt: 91, oli: 91, o2i: 80, o3i: -243, o4i: 140, Ti: 68
311 Vessel i: 6: li: 5, pi: 21-26, ai-di: 2-21, taoi-deltai: 2-8, periodi: 6, taoPi_SP-deltaPi_SP: 2-5, periodPi: 3, betaNi: 3, bi: 6, Txijt: 30, oli: 30, o2i: 60, o3i: -75, o4i: 60, Ti: 75
312 Vessel i: 7: li: 6, pi: 0-6, ai-di: 7-27, taoi-deltai: 7-12, periodi: 5, taoPi_SP-deltaPi_SP: 7-10, periodPi: 3, betaNi: 5, bi: 5, Txijt: 30, oli: 30, o2i: 60, o3i: -52, o4i: 100, Ti: 138
313 Vessel i: 8: li: 7, pi: 6-13, ai-di: 51-71, taoi-deltai: 51-56, periodi: 5, taoPi_SP-deltaPi_SP: 51-53, periodPi: 2, betaNi: 3, bi: 5, Txijt: 35, oli: 35, o2i: 40, o3i: -81, o4i: 60, Ti: 54
314 TimeSolveModel: 390.000000
315
316
317
318 TimeAll: 394.000000
319
320
321
322
```