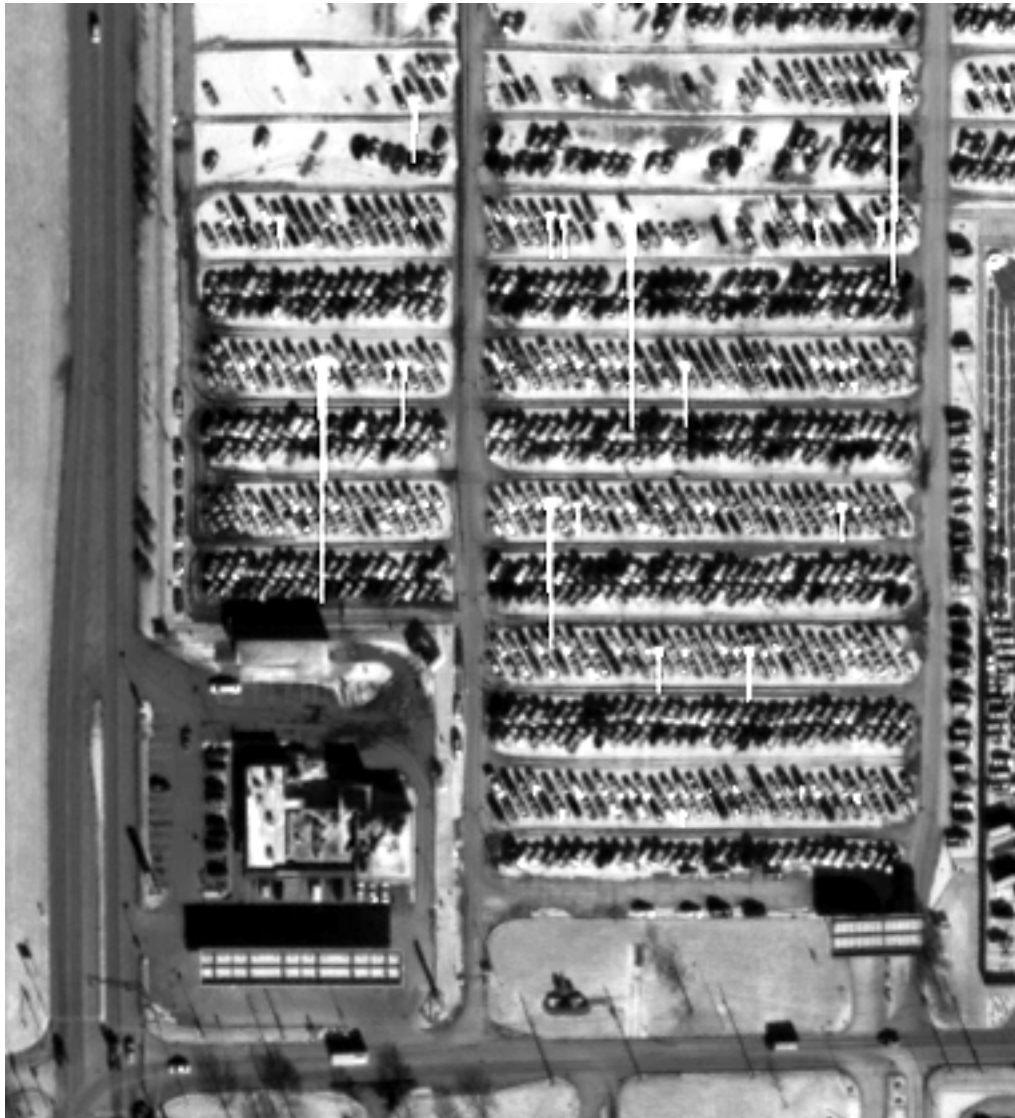




QuickBird  
(Digital Globe)  
scene over  
Purdue campus,  
0.6m GSD

EROS-A (ImageSat Int'l) scene over Purdue campus, GSD 2m





Example of radiometry outside design limits – specular reflections from car windshields cause saturation and corruption of surrounding pixel data. Quickbird scene over Indianapolis

qb\_eph\_short.txt

```
satId = "QB02";
revNumber = 6984;
stripId = "018F24";
type = "R";
version = "A";
generationTime = 2003-01-16T19:58:19.000000Z;
startTime = 2003-01-15T16:30:25.613302Z;
numPoints = 1536;
timeInterval = 0.020;
ephemList = (
( 1, 408384.8844293977000000, -5163749.7635908620000000, 4436609.3965829052000000, -1239.4888535016760000, -5028.7879607649920000,
-5720.9589832489428000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138,
0.0034951595622186, 0.0033038605521562),
( 2, 408360.0945991199100000, -5163850.3368877340000000, 4436494.9775853315000000, -1239.5137702293241000, -5028.6552395191966000,
-5721.0706890709816000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138,
0.0034951595622186, 0.0033038605521562),
( 3, 408335.3042634393800000, -5163950.9075712236000000, 4436380.5563067487000000, -1239.5386860655569000, -5028.5225194834038000,
-5721.1823886786469000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138,
0.0034951595622186, 0.0033038605521562),
( 4, 408310.5134390606000000, -5164051.4755447917000000, 4436266.1328579923000000, -1239.5636011559900000, -5028.3897989066654000,
-5721.2940835802046000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138,
0.0034951595622186, 0.0033038605521562),
( 5, 408285.7221157521100000, -5164152.0408676518000000, 4436151.7071710778000000, -1239.5885149174810000, -5028.2570757500234000,
-5721.4057756451830000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138,
0.0034951595622186, 0.0033038605521562),
( 6, 408260.9302897587800000, -5164252.6035616370000000, 4436037.2792209256000000, -1239.6134270991549000, -5028.1243479082186000,
-5721.5174667506008000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138,
0.0034951595622186, 0.0033038605521562),
( 7, 408236.1379686567800000, -5164353.1635829173000000, 4435922.8490578737000000, -1239.6383393299229000, -5027.9916195945643000,
-5721.6291529698956000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138,
0.0034951595622186, 0.0033038605521562),
( 8, 408211.3451372779100000, -5164453.7210192960000000, 4435808.4165810896000000, -1239.6632499398020000, -5027.8588827577578000,
-5721.7408415882464000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138,
0.0034951595622186, 0.0033038605521562),
( 9, 408186.5518146483800000, -5164554.2757608248000000, 4435693.9819168188000000, -1239.6881601295511000, -5027.7261471188431000,
-5721.8525239326164000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138,
0.0034951595622186, 0.0033038605521562),
( 10, 408161.7579970051900000, -5164654.8278293489000000, 4435579.5450399844000000, -1239.7130688432751000, -5027.5934110526096000,
-5721.9642015822692000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138,
0.0034951595622186, 0.0033038605521562),
( 11, 408136.9636805903900000, -5164755.3772467095000000, 4435465.1059254995000000, -1239.7379759150231000, -5027.4606722755771000,
-5722.0758765569126000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138,
0.0034951595622186, 0.0033038605521562),
( 12, 408112.1688577248700000, -5164855.9240572024000000, 4435350.6645224867000000, -1239.7628833574331000, -5027.3279269600826000,
-5722.1875518958896000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138,
0.0034951595622186, 0.0033038605521562),
( 13, 408087.3735399062900000, -5164956.4681945406000000, 4435236.2209070846000000, -1239.7877891206740000, -5027.1951812936704000,
-5722.2992225041826000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138,
0.0034951595622186, 0.0033038605521562),
( 14, 408062.5777119310200000, -5165057.0097466474000000, 4435121.7749782791000000, -1239.8126938009420000, -5027.0624267368466000,
-5722.4108957495546000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138,
0.0034951595622186, 0.0033038605521562),
( 15, 408037.7814080712000000, -5165157.5485154754000000, 4435007.3269635737000000, -1239.8375975685840000, -5026.9296817048989000,
-5722.5225555244660000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138,
0.0034951595622186, 0.0033038605521562),
( 16, 408012.9845902742200000, -5165258.0847211499000000, 4434892.8766101077000000, -1239.8625005253600000, -5026.7969260128311000,
```

qb\_eph\_short.txt

-5722.6342194407034000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138,  
0.0034951595622186, 0.0033038605521562),  
( 17, 407988.1872776256100000, -5165358.6182533158000000, 4434778.4240446528000000, -1239.8874017114140000, -5026.6641699379952000,  
-5722.7458786682364000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138,  
0.0034951595622186, 0.0033038605521562),  
( 18, 407963.3894739071300000, -5165459.1490901774000000, 4434663.9692922337000000, -1239.9123026456771000, -5026.5314149170572000,  
-5722.8575317238192000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138,  
0.0034951595622186, 0.0033038605521562),  
( 19, 407938.5911677281800000, -5165559.6772976266000000, 4434549.5122771570000000, -1239.9372021627250000, -5026.3986555227930000,  
-5722.9691835221311000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138,  
0.0034951595622186, 0.0033038605521562),  
( 20, 407913.7923515114800000, -5165660.2029195325000000, 4434435.0529490188000000, -1239.9621006900529000, -5026.2658875865909000,  
-5723.0808376378691000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138,  
0.0034951595622186, 0.0033038605521562),  
( 21, 407888.9930442849300000, -5165760.7258459805000000, 4434320.5914340978000000, -1239.9869988811961000, -5026.1331209529944000,  
-5723.1924853773753000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138,  
0.0034951595622186, 0.0033038605521562),  
( 22, 407864.1932385091200000, -5165861.2461206922000000, 4434206.1276821578000000, -1240.0118950301969000, -5026.0003518316717000,  
-5723.3041303072878000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138,  
0.0034951595622186, 0.0033038605521562),  
( 23, 407839.3929341306200000, -5165961.7637438988000000, 4434091.6616929295000000, -1240.0367913172199000, -5025.8675800187784000,  
-5723.4157722767050000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138,  
0.0034951595622186, 0.0033038605521562),  
( 24, 407814.5921273921800000, -5166062.2787374342000000, 4433977.1934413221000000, -1240.0616860891651000, -5025.7348036245221000,  
-5723.5274131845435000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138,  
0.0034951595622186, 0.0033038605521562),  
( 25, 407789.7908374298700000, -5166162.7909909720000000, 4433862.7230541231000000, -1240.0865787401151000, -5025.6020327774231000,  
-5723.6390442813126000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138,  
0.0034951595622186, 0.0033038605521562),  
( 26, 407764.9890260284900000, -5166263.3007250028000000, 4433748.2502779299000000, -1240.1114724043421000, -5025.4692472704091000,  
-5723.7506827320894000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138,  
0.0034951595622186, 0.0033038605521562),  
( 27, 407740.1867352232200000, -5166363.8076970577000000, 4433633.7753914054000000, -1240.1363637601801000, -5025.3364691133829000,  
-5723.8623098269563000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138,  
0.0034951595622186, 0.0033038605521562),  
( 28, 407715.3839307231800000, -5166464.3121051555000000, 4433519.2981669558000000, -1240.1612542116579000, -5025.2036805088655000,  
-5723.9739408876603000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138,  
0.0034951595622186, 0.0033038605521562),  
( 29, 407690.5806353776700000, -5166564.8138173902000000, 4433404.8187561864000000, -1240.1861443373839000, -5025.0708930320652000,  
-5724.0855657244474000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138,  
0.0034951595622186, 0.0033038605521562),  
( 30, 407665.7768454225200000, -5166665.3128555929000000, 4433290.3371340139000000, -1240.2110328364070000, -5024.9381052751223000,  
-5724.1971857625613000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138,  
0.0034951595622186, 0.0033038605521562),  
( 31, 407640.9725532829800000, -5166765.8092636177000000, 4433175.8532500258000000, -1240.2359198483621000, -5024.8053128661959000,  
-5724.3088047961246000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138,  
0.0034951595622186, 0.0033038605521562),  
( 32, 407616.1677627221800000, -5166866.3030196670000000, 4433061.3671292672000000, -1240.2608071189391000, -5024.6725178331099000,  
-5724.4204207921521000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138,  
0.0034951595622186, 0.0033038605521562),  
( 33, 407591.3624700154200000, -5166966.7941454304000000, 4432946.8787468020000000, -1240.2856923313550000, -5024.5397180942127000,  
-5724.5320359164170000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138,  
0.0034951595622186, 0.0033038605521562),  
( 34, 407566.5566827502900000, -5167067.2825970957000000, 4432832.3881530017000000, -1240.3105772986769000, -5024.4069180002934000,  
-5724.6436460991517000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138,  
0.0034951595622186, 0.0033038605521562),

qb\_eph\_short.txt

( 35, 407541.7503971572200000, -5167167.7683964921000000, 4432717.8953227606000000, -1240.3354610585141000, -5024.2741150437441000, -5724.7552536735602000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138, 0.0034951595622186, 0.0033038605521562),  
( 36, 407516.9436132981800000, -5167268.2515434166000000, 4432603.4002563078000000, -1240.3603429983170000, -5024.1413096995166000, -5724.8668583176623000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138, 0.0034951595622186, 0.0033038605521562),  
( 37, 407492.1363311174800000, -5167368.7320381207000000, 4432488.9029533751000000, -1240.3852252342660000, -5024.0085017655347000, -5724.9784598885581000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138, 0.0034951595622186, 0.0033038605521562),  
( 38, 407467.3285506754800000, -5167469.2098803949000000, 4432374.4034141740000000, -1240.4101056727411000, -5023.8756911267810000, -5725.0900588023787000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138, 0.0034951595622186, 0.0033038605521562),  
( 39, 407442.5202720261900000, -5167569.6850700481000000, 4432259.9016389335000000, -1240.4349847458770000, -5023.7428780171167000, -5725.2016547899402000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138, 0.0034951595622186, 0.0033038605521562),  
( 40, 407417.7114989337900000, -5167670.1575853014000000, 4432145.3976526987000000, -1240.4598636650051000, -5023.6100642341444000, -5725.3132461005862000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138, 0.0034951595622186, 0.0033038605521562),  
( 41, 407392.9022276399200000, -5167770.6274479683000000, 4432030.8914303733000000, -1240.4847410383500000, -5023.4772477394026000, -5725.4248347224348000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138, 0.0034951595622186, 0.0033038605521562),  
( 42, 407368.0924505628100000, -5167871.0947018927000000, 4431916.3829215420000000, -1240.5096172496330000, -5023.3444250318671000, -5725.5364236510904000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138, 0.0034951595622186, 0.0033038605521562),  
( 43, 407343.2821791045100000, -5167971.5592812626000000, 4431801.8722018888000000, -1240.5344932691130000, -5023.2116015117208000, -5725.6480080300998000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138, 0.0034951595622186, 0.0033038605521562),  
( 44, 407318.4713980521800000, -5168072.0212739361000000, 4431687.3591703540000000, -1240.5593682349049000, -5023.0787694500941000, -5725.7595947299533000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138, 0.0034951595622186, 0.0033038605521562),  
( 45, 407293.6601380013700000, -5168172.4805036038000000, 4431572.8440297274000000, -1240.5842408506710000, -5022.9459447445797000, -5725.8711700819940000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138, 0.0034951595622186, 0.0033038605521562),  
( 46, 407268.8483721758800000, -5168272.9371246044000000, 4431458.3266024897000000, -1240.6091139731341000, -5022.8131134612750000, -5725.9827458069994000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138, 0.0034951595622186, 0.0033038605521562),  
( 47, 407244.0361083045700000, -5168373.3910925649000000, 4431343.8069396745000000, -1240.6339848731420000, -5022.6802796620950000, -5726.0943187742896000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138, 0.0034951595622186, 0.0033038605521562),  
( 48, 407219.2233463344700000, -5168473.8424077258000000, 4431229.2850410044000000, -1240.6588559946119000, -5022.5474432057326000, -5726.2058887384437000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138, 0.0034951595622186, 0.0033038605521562),  
( 49, 407194.4100901426900000, -5168574.2910478786000000, 4431114.7609320227000000, -1240.6837251629499000, -5022.4146059885716000, -5726.3174543740370000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138, 0.0034951595622186, 0.0033038605521562),  
( 50, 407169.5963321442800000, -5168674.7370568514000000, 4431000.2345623123000000, -1240.7085932153070000, -5022.2817646366912000, -5726.4290184965657000, 0.0047847180901878, 0.0001857647065552, -0.0004488663884886, 0.0104184982125138, 0.0034951595622186, 0.0033038605521562),

att\_sm.txt

```
satId = "QB02";
revNumber = 6984;
stripId = "018F24";
type = "R";
version = "C";
generationTime = 2003-03-06T00:42:17.000000Z;
startTime = 2003-01-15T16:30:25.613302Z;
numPoints = 1536;
timeInterval = 0.020;
attList = (
( 1, -0.7040772364131122, 0.6084671987802185, 0.3085474873056571, 0.1970821180391420,
0.000000000748000, 0.000000000626000, 0.000000000320000, 0.000000000211000,
0.000000000926000, -0.000000000278000, -0.000000000184000, 0.000000000132000,
-0.000000000093900, 0.0000000001410000),
( 2, -0.7040486260814283, 0.6084635533741053, 0.3085771241190689, 0.1971491689016602,
0.000000000748000, 0.000000000626000, 0.000000000320000, 0.000000000211000,
0.000000000926000, -0.000000000278000, -0.000000000184000, 0.000000000132000,
-0.000000000093900, 0.0000000001410000),
( 3, -0.7040200084635732, 0.6084599076338240, 0.3086067592944894, 0.1972162179004099,
0.000000000748000, 0.000000000626000, 0.000000000320000, 0.000000000211000,
0.000000000926000, -0.000000000278000, -0.000000000184000, 0.000000000132000,
-0.000000000093900, 0.0000000001410000),
( 4, -0.7039913835622260, 0.6084562615622418, 0.3086363928259171, 0.1972832650258250,
0.000000000748000, 0.000000000626000, 0.000000000320000, 0.000000000211000,
0.000000000926000, -0.000000000278000, -0.000000000184000, 0.000000000132000,
-0.000000000093900, 0.0000000001410000),
( 5, -0.7039627514063729, 0.6084526151267377, 0.3086660246987977, 0.1973503102973103,
0.000000000748000, 0.000000000626000, 0.000000000320000, 0.000000000211000,
0.000000000926000, -0.000000000278000, -0.000000000184000, 0.000000000132000,
-0.000000000093900, 0.0000000001410000),
( 6, -0.7039341120126442, 0.6084489683092629, 0.3086956549042639, 0.1974173537245181,
0.000000000748000, 0.000000000626000, 0.000000000320000, 0.000000000211000,
0.000000000926000, -0.000000000278000, -0.000000000184000, 0.000000000132000,
-0.000000000093900, 0.0000000001410000),
( 7, -0.7039054653024428, 0.6084453211921315, 0.3087252834871497, 0.1974843952633586,
0.000000000748000, 0.000000000626000, 0.000000000320000, 0.000000000211000,
0.000000000926000, -0.000000000278000, -0.000000000184000, 0.000000000132000,
-0.000000000093900, 0.0000000001410000),
( 8, -0.7038768113677589, 0.6084416736772192, 0.3087549103966772, 0.1975514349671005,
0.000000000748000, 0.000000000626000, 0.000000000320000, 0.000000000211000,
0.000000000926000, -0.000000000278000, -0.000000000184000, 0.000000000132000,
-0.000000000093900, 0.0000000001410000),
( 9, -0.7038481501313845, 0.6084380258490790, 0.3087845356738563, 0.1976184727857813,
0.000000000748000, 0.000000000626000, 0.000000000320000, 0.000000000211000,
0.000000000926000, -0.000000000278000, -0.000000000184000, 0.000000000132000,
-0.000000000093900, 0.0000000001410000),
( 10, -0.7038194816412571, 0.6084343776579422, 0.3088141592911623, 0.1976855087443634,
0.000000000748000, 0.000000000626000, 0.000000000320000, 0.000000000211000,
0.000000000926000, -0.000000000278000, -0.000000000184000, 0.000000000132000,
-0.000000000093900, 0.0000000001410000),
```

```

scene_id          MBT1-e1186781
satellite         A01
camera            NA30
optical_sensor    CCD
image_type        basic_scene
related_img       NA
integ_time        3.937
sun_elev          50.67
sun_azim          32.42
gsd               2.5
mean_pt_angle     28.0
mean_img_azim     33.0
sweep_start_utc   2004-04-11,16:03:19.28246
sweep_end_utc     2004-04-11,16:03:41.01297
t_offset          0
image_length      13.800000
image_width       18.725000
QF_time           +1562.1679707406836
QF_vector         4566007.3217000002,-190211.8703000000,5140446.9817000004,5521.6614000000,-1717.8371000000,-4953.1812000000
0,
num_vectors       6
state_vector      20040411160319.28200,+1562.1689731765298,5022605.8261000002,-337894.9995000000,4688512.9589000000,5013.82
94000000,-1689.8635000000,-5475.1625000000
state_vector      20040411160323.21900,+1562.1690187482891,5042299.5115999999,-344545.4252000000,4666910.8421000000,4989.61
20000000,-1688.2216000000,-5497.7354000000
state_vector      20040411160327.15700,+1562.1690643200484,5061897.8313999996,-351189.3351000000,4645219.9671000000,4965.30
04000000,-1686.5476000000,-5520.2036000000
state_vector      20040411160331.09400,+1562.1691098918075,5081400.4151999997,-357826.6031000000,4623440.7474999996,4940.89
51000000,-1684.8417000000,-5542.5665000000
state_vector      20040411160335.03200,+1562.1691554635668,5100806.8953000000,-364457.1035000000,4601573.5983999996,4916.39
65000000,-1683.1038000000,-5564.8237000000
state_vector      20040411160338.96900,+1562.1692010353261,5120116.9051000001,-371080.7105000000,4579618.9369000001,4891.80
51000000,-1681.3341000000,-5586.9748000000
num_sets          3
coefficient_set   20040411160317.22100,+1562.1689493286467,-0.2123207317,0.0005884296,-0.0000023084,0.0000000116,0.46622817
35,-0.0093477727,-0.0000592931,-0.0000000222,-0.0422525068,-0.0032499859,-0.0000101413,0.0000001254
coefficient_set   20040411160332.27100,+1562.1691235184617,-0.2039481241,0.0005268614,-0.0000017876,0.0000000124,0.31204121
49,-0.0111423645,-0.0000596349,0.0000002141,-0.0930327465,-0.0034672604,-0.0000040222,0.0000002402
coefficient_set   20040411160341.02100,+1562.1692247916096,-0.1994665461,0.0005061292,0.0004566450,0.0000000000,0.210123777
7,-0.0121351994,-0.0000631608,0.0000000000,-0.1235178572,-0.0034676943,0.0008258206,0.0000000000
phi_s             -12.73
tht_s             30.96
psi_s             -1.47
gma_s             33.23
phi_e             -11.81
tht_e             18.78
psi_e             -5.64
gma_e             22.07
os_factor         1.00
os_angle          0.00
latc              40.4277
lonc              -86.9176
lat1              40.4899
lon1              -87.0277
lat2              40.4928
lon2              -86.8104
lat3              40.4204
lon3              -87.0185
lat4              40.4231
lon4              -86.8163
lat5              40.3686
lon5              -87.0121
lat6              40.3712
lon6              -86.8203
width             7490
height            5520
bands             1
precision         11
cc_assess         0

```



81sup.txt

```
overall_cc          0
detail_cc          0
cc_ul              0
cc_ur              0
cc_lr              0
cc_ll              0
noise_level        None
missing_lines      0
averaged_lines     0
missing_cols       0
pel_fov            3.75
center_pixel       3550
active_pixels      7490
camera_matrix      camera_matrix
0.999992730903,0.003715805948,-0.000854942379,-0.003715944421,0.999993082984,-0.000160437635,0.0008543403
10,0.000163613387,0.999999621667
la_comments        None
ca_comments        None
□
```

## norad\_tle.txt

LANDSAT 5  
 1 14780U 84021A 10034.19922353 .00000070 00000-0 25610-4 0 4818  
 2 14780 98.2151 104.0564 0003837 108.8219 251.3410 14.57108041379026  
 SPOT 2  
 1 20436U 90005A 10033.13954381 .00000073 00000-0 23192-4 0 374  
 2 20436 98.6413 116.4797 0154595 313.6100 45.2368 14.61934985 39141  
 ERS-2  
 1 23560U 95021A 10034.22334133 .00000200 00000-0 90387-4 0 8770  
 2 23560 98.5352 111.0638 0000885 115.6226 244.5064 14.32256010773280  
 RADARSAT-1  
 1 23710U 95059A 10034.20838014 .00000142 00000-0 72042-4 0 48  
 2 23710 98.5801 42.7171 0001028 87.4368 43.4550 14.29980308743824  
 TOMS EP  
 1 23940U 96037A 10033.22361048 .00000065 00000-0 26421-4 0 2685  
 2 23940 98.0001 260.1587 0029613 5.7144 354.4390 14.52285073722814  
 MIDORI (ADEOS)  
 1 24277U 96046A 10033.44928414 -.00000004 00000-0 15152-4 0 2716  
 2 24277 98.3980 354.0349 0000860 8.1233 351.9969 14.28607463701809  
 ORBVI EW 2 (SEASTAR)  
 1 24883U 97037A 10033.82569771 .00000057 00000-0 21845-4 0 462  
 2 24883 98.3669 164.5540 0001530 171.9130 188.2112 14.60021607666091  
 IRS-1D  
 1 24971U 97057A 10034.20159465 .00000186 00000-0 81927-4 0 819  
 2 24971 98.2129 63.7823 0053362 326.4634 33.3181 14.32963829645913  
 TRMM  
 1 25063U 97074A 10033.96167123 .00058956 00000-0 82316-3 0 2725  
 2 25063 34.9644 252.0889 0000819 265.7850 94.2816 15.55726049696064  
 SPOT 4  
 1 25260U 98017A 10034.10550447 .00000052 00000-0 45000-4 0 8971  
 2 25260 98.6705 107.6908 0000377 108.2766 251.8841 14.20043052615103  
 FASAT B  
 1 25395U 98043B 10033.18215419 -.00000013 00000-0 12032-4 0 6574  
 2 25395 98.3142 57.2710 0001904 248.3078 111.7905 14.24374318601188  
 TECHSAT 1B (GO-32)  
 1 25397U 98043D 10034.16875918 -.00000216 00000-0 -77592-4 0 1035  
 2 25397 98.3160 48.9819 0000565 348.4363 11.6793 14.23169672600982  
 LANDSAT 7  
 1 25682U 99020A 10034.09683002 .00000035 00000-0 17761-4 0 5797  
 2 25682 98.2272 104.1304 0000466 54.6651 305.4590 14.57098981574702  
 KITSAT 3  
 1 25756U 99029A 10034.06578879 -.00000041 00000-0 19356-5 0 1179  
 2 25756 98.6517 239.2399 0013943 187.7206 172.3776 14.52560667566676  
 DLR-TUBSAT  
 1 25757U 99029B 10034.17709580 -.00000026 00000-0 57055-5 0 5611  
 2 25757 98.6800 230.0101 0013984 216.6021 143.4206 14.50852845566200  
 IRS-P4 (OCEANSAT 1)  
 1 25758U 99029C 10033.33910403 .00000195 00000-0 60548-4 0 3598  
 2 25758 98.2722 129.5889 0000479 61.5874 298.5373 14.50864470566230  
 QUIKSCAT  
 1 25789U 99034A 10033.60362040 .00000014 00000-0 23939-4 0 6345  
 2 25789 98.6301 224.6822 0000711 40.5571 319.5658 14.26798234553317  
 IKONOS 2  
 1 25919U 99051A 10034.21528309 -.00000011 00000-0 67810-5 0 8290  
 2 25919 98.1099 111.0802 0001742 92.2484 267.8929 14.64448717553877  
 CBERS 1 (ZY 1A)  
 1 25940U 99057A 10033.74490015 -.00000059 00000-0 -67064-5 0 4985  
 2 25940 98.1652 31.3854 0006138 109.3981 250.7871 14.34472996539866  
 TERRA  
 1 25994U 99068A 10034.18334141 .00000135 00000-0 39932-4 0 4741  
 2 25994 98.2042 110.7499 0001521 72.7337 287.4047 14.57106153538792  
 ARI RANG 1 (KOMPSAT-1)  
 1 26032U 99070A 10034.18739298 .00000131 00000-0 32544-4 0 6043  
 2 26032 97.8909 271.1610 0004236 211.7968 148.2979 14.65663103541324  
 EO-1  
 1 26619U 00075A 10034.14422611 .00000993 00000-0 20693-3 0 8426  
 2 26619 98.1384 103.2056 0008955 308.2828 51.7636 14.62074034490017  
 SAC C  
 1 26620U 00075B 10033.45454320 .00000074 00000-0 26062-4 0 9195  
 2 26620 97.8888 59.2440 0001307 71.9052 288.2316 14.56593766489198  
 EROS A1  
 1 26631U 00079A 10034.14041763 .00001076 00000-0 55407-4 0 6062  
 2 26631 97.4611 101.7403 0007662 261.1099 181.7111 15.18525731509566  
 QUIKBI RD 2  
 1 26953U 01047A 10034.14698539 .00002242 00000-0 58372-4 0 9113  
 2 26953 97.1235 110.0798 0002164 98.6475 346.2238 15.39904861466158  
 TES  
 1 26957U 01049A 10034.16457723 .00000623 00000-0 53111-4 0 8957  
 2 26957 97.6288 112.1519 0025690 115.3013 245.0883 15.01061175453859  
 JASON 1

1 26997U 01055A 10032.99319697 -.00000038 00000-0 10000-3 0 1384  
 2 26997 66.0456 313.1688 0007217 275.0420 84.9772 12.80929929381470  
 METEOR-3M  
 1 27001U 01056A 10033.58554423 -.00000034 00000-0 96922-5 0 5802  
 2 27001 99.2325 244.5190 0013652 155.5497 204.6301 13.68714161407038  
 BADR-B  
 1 27003U 01056C 10034.22929182 -.00000020 00000-0 25191-4 0 4403  
 2 27003 99.2228 251.6849 0020455 156.0683 204.1419 13.70102250407593  
 MAROC-TUBSAT  
 1 27004U 01056D 10033.19844636 .00000023 00000-0 74373-4 0 4418  
 2 27004 99.2186 249.9622 0019324 159.1813 201.0124 13.70030978407426  
 ENVI SAT  
 1 27386U 02009A 10034.21436253 .00000145 00000-0 69953-4 0 7445  
 2 27386 98.5434 103.2514 0000955 92.6661 332.8845 14.32251093414569  
 SPOT 5  
 1 27421U 02021A 10034.22109757 .00000169 00000-0 10000-3 0 8171  
 2 27421 98.7479 109.9139 0001270 92.9627 343.1826 14.20020147401956  
 AQUA  
 1 27424U 02022A 10033.79250049 .00000035 00000-0 17741-4 0 5514  
 2 27424 98.2054 337.2885 0001475 101.9057 258.2313 14.57112306412343  
 HAI YANG-1A  
 1 27430U 02024A 10032.82382649 .00000068 00000-0 42863-4 0 2648  
 2 27430 98.4482 97.5870 0009730 119.9503 240.2623 14.29736754402885  
 ALSAT 1  
 1 27559U 02054A 10034.18653214 .00000045 00000-0 15810-4 0 1481  
 2 27559 97.9089 267.2041 0023086 343.2822 16.7607 14.69362274383642  
 MIDORI II (ADEOS-II)  
 1 27597U 02056A 10033.18380141 .00000019 00000-0 25430-4 0 614  
 2 27597 98.4453 94.9237 0001066 25.5289 334.5945 14.26191615371575  
 ICESAT  
 1 27642U 03002A 10033.54022623 .00000271 00000-0 28860-4 0 4697  
 2 27642 93.9944 49.7227 0003319 97.5657 262.5946 14.90882113383989  
 ORBVI EW 3  
 1 27838U 03030A 10034.20950962 .00002278 00000-0 56118-4 0 3577  
 2 27838 97.0273 89.7699 0001216 70.7325 289.4116 15.41567590370981  
 IRS-P6 (RESOURCESAT-1)  
 1 28051U 03046A 10034.18994134 .00000236 00000-0 12762-3 0 3936  
 2 28051 98.6897 111.8827 0002094 171.4569 269.2016 14.21640825326933  
 CBERS 2 (ZY 1B)  
 1 28057U 03049A 10033.81590006 -.00000000 00000-0 14511-4 0 419  
 2 28057 98.2517 81.2217 0002304 48.0033 312.1340 14.34923958329471  
 TANSUO 1  
 1 28220U 04012A 10034.13544335 .00000393 00000-0 47408-4 0 4376  
 2 28220 97.4703 63.9159 0012335 141.2521 218.9563 14.88761639314778  
 FORMOSAT-2 (ROCSAT 2)  
 1 28254U 04018A 10034.20135006 .00000012 00000-0 37830-4 0 4565  
 2 28254 99.1026 97.2649 0001493 74.7757 359.8197 14.00730250291861  
 AURA  
 1 28376U 04026A 10032.97366646 .00000011 00000-0 12569-4 0 7145  
 2 28376 98.2032 338.5600 0001247 99.5237 260.6111 14.57107792295271  
 PARASOL  
 1 28498U 04049G 10033.39948277 .00000005 00000-0 11241-4 0 6214  
 2 28498 98.2999 340.2166 0001084 79.9957 280.1339 14.58328100272616  
 IRS-P5 (CARTOSAT-1)  
 1 28649U 05017A 10034.15410658 .00000107 00000-0 19864-4 0 3624  
 2 28649 97.9322 108.4374 0001856 70.2670 289.8760 14.82622173257080  
 TOPSAT  
 1 28891U 05043B 10034.16403811 .00000066 00000-0 23276-4 0 7794  
 2 28891 98.0245 281.8981 0016948 349.4295 10.6550 14.59792333227564  
 SI NAH 1  
 1 28893U 05043D 10033.74807305 .00000005 00000-0 10375-4 0 6793  
 2 28893 98.0270 282.6274 0015527 349.5847 10.5022 14.60096999227553  
 ALOS (DAI CHI)  
 1 28931U 06002A 10034.17329179 .00000129 00000-0 36727-4 0 5164  
 2 28931 98.1669 111.0915 0001179 99.3193 260.8183 14.59565577214597  
 EROS B  
 1 29079U 06014A 10034.11259493 .00001426 00000-0 72706-4 0 2600  
 2 29079 97.4157 155.4039 0009593 335.4445 149.1305 15.18318735209559  
 RSS-1 (YAOGAN 1)  
 1 29092U 06015A 10034.19221297 -.00000326 00000-0 -36033-4 0 2237  
 2 29092 97.8565 28.2526 0001907 94.7592 265.3838 14.80351656203944  
 RESURS-DK 1  
 1 29228U 06021A 10034.14051760 .00002164 00000-0 49109-4 0 951  
 2 29228 69.9337 115.8665 0158445 162.1715 245.3366 15.32938987203711  
 ARI RANG 2 (KOMPSAT-2)  
 1 29268U 06031A 10034.20645038 .00000098 00000-0 28833-4 0 9257  
 2 29268 98.0159 285.1369 0018587 138.1187 222.1444 14.61734787187837  
 LAPAN-TUBSAT  
 1 29709U 07001A 10034.17908626 .00000037 00000-0 11553-4 0 4031

norad\_tle.txt

2 29709 97.7804 88.2388 0012051 251.8248 108.1676 14.80280420165651  
 CARTOSAT-2 (IRS-P7)  
 1 29710U 07001B 10034.21036814 .00000330 00000-0 52173-4 0 3981  
 2 29710 97.9811 95.7084 0000793 127.4460 232.6842 14.78615304165527  
 HAI YANG-1B  
 1 31113U 07010A 10034.21149375 .00000173 00000-0 84650-4 0 1379  
 2 31113 98.5196 108.1260 0014796 106.0348 254.2469 14.29453068146944  
 COSMO-SKYMED 1  
 1 31598U 07023A 10034.14794996 -.00000039 00000-0 16212-5 0 9704  
 2 31598 97.8616 223.9466 0001255 85.0058 275.1305 14.82166637143832  
 TERRASAR-X  
 1 31698U 07026A 10034.12605355 -.00000450 00000-0 -18248-4 0 9412  
 2 31698 97.4444 43.2260 0001721 81.4392 318.6705 15.19149866146333  
 WORLDVIEW-1 (WV-1)  
 1 32060U 07041A 10034.13589047 .00000726 00000-0 32459-4 0 6559  
 2 32060 97.4094 114.4094 0002302 82.7524 6.6346 15.24472409132272  
 CBERS 2B  
 1 32062U 07042A 10034.22098439 .00000111 00000-0 50347-4 0 6466  
 2 32062 98.4606 112.3299 0027412 21.4618 338.7722 14.38456032124626  
 COSMO-SKYMED 2  
 1 32376U 07059A 10034.18170437 .00000035 00000-0 10919-4 0 3830  
 2 32376 97.8615 223.9808 0001176 87.3979 272.7345 14.82167788116582  
 RADARSAT-2  
 1 32382U 07061A 10034.23187659 .00000214 00000-0 10000-3 0 3592  
 2 32382 98.5793 43.5915 0001020 91.1256 328.5211 14.29984802111715  
 CARTOSAT-2A  
 1 32783U 08021A 10034.16981852 .00001747 00000-0 24478-3 0 9652  
 2 32783 97.9181 98.4132 0016194 30.0308 330.1878 14.78688706 95461  
 IMS-1  
 1 32786U 08021D 10033.37037759 .00000133 00000-0 24388-4 0 6077  
 2 32786 97.9171 98.8339 0012640 8.3500 351.7906 14.80070627 95438  
 JASON 2 (OSTM)  
 1 33105U 08032A 10033.41983596 -.00000050 00000-0 46041-4 0 5471  
 2 33105 66.0444 312.6851 0007615 271.7822 88.2328 12.80929743 75831  
 RAPI DEYE 2  
 1 33312U 08040A 10034.21945247 .00000054 00000-0 14172-4 0 6171  
 2 33312 97.9602 122.6584 0013518 84.3985 275.8787 14.79920414 77379  
 RAPI DEYE 5  
 1 33313U 08040B 10034.17771990 .00000014 00000-0 88617-5 0 6092  
 2 33313 97.9603 121.9676 0017567 317.3033 42.6819 14.79918319 77317  
 RAPI DEYE 1  
 1 33314U 08040C 10034.16518683 .00000049 00000-0 13491-4 0 6556  
 2 33314 97.9595 122.6997 0026163 95.0491 265.3711 14.79920108 77350  
 RAPI DEYE 3  
 1 33315U 08040D 10034.13703500 .00000032 00000-0 11232-4 0 5886  
 2 33315 97.9583 122.0531 0013184 34.9019 325.3066 14.79919003 77311  
 RAPI DEYE 4  
 1 33316U 08040E 10034.19074334 .00000007 00000-0 79266-5 0 5816  
 2 33316 97.9580 121.9766 0012093 339.2819 20.7911 14.79919172 77316  
 HJ-1A  
 1 33320U 08041A 10034.22299682 .00000065 00000-0 17120-4 0 5590  
 2 33320 97.9589 111.4136 0025924 60.6389 299.7419 14.75216767 75954  
 HJ-1B  
 1 33321U 08041B 10034.11983485 .00000035 00000-0 12683-4 0 5978  
 2 33321 97.9610 111.3437 0044334 71.8272 288.7766 14.75225900 75923  
 GEOEYE 1  
 1 33331U 08042A 10034.17966456 .00000073 00000-0 22742-4 0 5716  
 2 33331 98.0817 110.0871 0011781 73.7096 286.5426 14.64462437 75282  
 THEOS  
 1 33396U 08049A 10034.19865007 .00000169 00000-0 10000-3 0 3555  
 2 33396 98.7154 103.4444 0000947 98.2980 338.1445 14.20025529 69560  
 COSMO-SKYMED 3  
 1 33412U 08054A 10034.16904027 .00000376 00000-0 53781-4 0 4086  
 2 33412 97.8615 223.9676 0001218 82.6517 277.4822 14.82169561 69041  
 YAOGAN 4  
 1 33446U 08061A 10034.19016903 -.00000403 00000-0 -51766-4 0 3141  
 2 33446 97.8837 114.7386 0014142 9.7135 350.4366 14.75530548 63267  
 YAOGAN 5  
 1 33456U 08064A 10034.11161139 .00000971 00000-0 41717-4 0 3018  
 2 33456 97.3513 110.4260 0003396 283.9886 168.2525 15.25029659 63248  
 YAOGAN 6  
 1 34839U 09021A 10034.18711632 .00000821 00000-0 43593-4 0 9063  
 2 34839 97.6072 109.7568 0002449 39.0472 39.9752 15.18149344 43552  
 RAZAKSAT  
 1 35578U 09037A 10034.12097957 .00000601 00000-0 97379-5 0 6225  
 2 35578 8.9863 86.2611 0017603 332.7039 27.2210 14.64949060 29954  
 DEIMOS-1  
 1 35681U 09041A 10034.12310412 -.00016513 00000-0 -28073-2 0 5816  
 2 35681 98.1134 292.9897 0016937 106.3507 253.9429 14.69042614 27690

norad\_tle.txt

OCEANSAT 2  
1 35931U 09051A 10033.86262833 .00006029 00000-0 15388-2 0 2516  
2 35931 98.3310 132.3327 0001540 158.7693 201.3050 14.50868865 19223  
WORLDVIEW-2  
1 35946U 09055A 10034.19911018 .00000043 00000-0 29386-4 0 3605  
2 35946 98.5604 111.5571 0001584 153.7065 206.4213 14.37276116 16875  
SMOS  
1 36036U 09059A 10034.05106220 -.00000043 00000-0 00000+0 0 791  
2 36036 98.4388 223.1213 0000730 105.7714 254.3580 14.39763731 13385  
YAOGAN 7  
1 36110U 09069A 10034.12294977 -.00000050 00000-0 00000+0 0 1698  
2 36110 97.8412 177.4230 0027836 122.2707 238.1207 14.76239019 8222

Standard Two-Line Elements (TLE) Format

```
25107 Iridium 48
1 25107U 97082D 98151.26839894 -.00007632 00000-0 -27359-2 0 1321
2 25107 86.3970 282.3520 0003565 65.4476 294.7132 14.34205441 23251
```

Breakdown of a Two Line Element Set

Line 0= "25107 Iridium 48", provides the NORAD catalog number and/or possibly other information such as the common name assigned to the satellite.

```
!>Line Number 1
! !>Catalog Number (NORAD)
! ! !>Security Classification for this Element Set
! ! ! !>International Identification for this Object (COSPAR)
! ! ! ! !>Two Digit Year
! ! ! ! !>Day of Year
! ! ! ! !>Fraction of 24 Hour Day
! ! ! ! !>Sign of 1st Time Derivative
! ! ! ! !>1st Time Derivative
! ! ! ! !>Sign of 2nd Time Derivative
! ! ! ! !>2nd Time Derivative
! ! ! ! !>Sign of exponent
! ! ! ! !>Exponent 2ndTimeDerivative
! ! ! ! !>Sign of BSTAR drag term
! ! ! ! !>BSTAR/Drag Term
! ! ! ! !>Sign of Exponent
! ! ! ! !>Exponent BstarDrg
! ! ! ! !>Ephemeris Type
! ! ! ! !>Element No.
-----! ! ! ! !>Checksum
1 25107U 97082D 98151.26839894 -.00007632 00000-0 -27359-2 0 1321 = Line 1
2 25107 086.3970 282.3520 0003565 065.4476 294.7132 14.34205441 23251 = Line 2
123456789012345678901234567890123456789012345678901234567890123456789 = col umns
-----! ! ! ! !>Checksum
! ! ! ! !>Rev # @ Epoch
! ! ! ! !>MeanMotion(Revolutions/Day)
! ! ! ! !>Mean Anomaly
! ! ! ! !>Argument of Perigee
! ! ! ! !>Eccentricity, with assumed decimal point leading
! ! ! ! !>Right Ascension of Ascending Node
! ! ! ! !>Inclination
! ! ! ! !>Catalog Number (NORAD)
!>Line Number 2
```

Line 0 provides the catalog number and/or possibly other information such as the common name assigned to the satellite.

Line 1

Column Numbers First Last	Number of Characters	Description
1 1	1	Line No. Identification
3 7	5	Catalog No.
8 8	1	Security Classification
10 17	8	International Identification
19 32	14	YRDOY.FODdddd
34 34	1	Sign of first time derivative
35 43	9	1st Time Derivative
45 45	1	Sign of 2nd Time Derivative
46 50	5	2nd Time Derivative
51 51	1	Sign of 2nd Time Derivative Exponent
52 52	1	Exponent of 2nd Time Derivative
54 54	1	Sign of Bstar/Drag Term
55 59	5	Bstar/Drag Term
60 60	1	Sign of Exponent of Bstar/Drag Term
61 61	1	Exponent of Bstar/Drag Term
63 63	1	Ephemeris Type
65 68	4	Element Number
69 69	1	Check Sum, Modulo 10

Line 2

Column Numbers First Last	Number of Characters	Description
------------------------------	-------------------------	-------------

			tle_format.txt
1	1	1	Line No. Identification
3	7	5	Catalog No.
9	16	8	Inclination
18	25	8	Right Ascension of Ascending Node
27	33	7	Eccentricity with assumed leading decimal
35	42	8	Argument of the Perigee
44	51	8	Mean Anomaly
53	63	11	Revolutions per Day (Mean Motion)
64	68	5	Revolution Number at Epoch
69	69	1	Check Sum Modulo 10