Epoch Conversions

This procedure can be used to convert data from almost any source. I will use NGS data sheet information in this example.

1. obtain data : go to the NGS website to recover control station data.
http://www.ngs.noaa.gov/cgi-bin/datasheet.prl

Retrieval Links	Info Links
DATASHEETS	Tell me more about DATASHEETS
ShapeFiles	Tell me more about ShapeFiles
SDTS	Tell me more about SDTS
TIDAL BENCH MARK	Tell me more about TIDAL BENCH MARKS
ARCHIVED DATASHEETS 2005 NorthCentral posted 11/04/05	Tell me more about ARCHIVED DATASHEETS
ARCHIVED ShapeFiles 2005 NorthCentral posted 11/04/05	Tell me more about ARCHIVED ShapeFiles
CD_ROM	Tell me more about CD_ROM
SUBMIT RECOVERY	Tell me more about Submitting Recovery

Select DATASHEETS

Retrieval Methods

- PIDs - Permanent Identifiers
- CORS SiteID - CORS Site IDs
- Radial Search - provide center coordinates and radius in Miles
- Rectangular Search - provide min/max coordinates
- Station Name
- Project Identifier
- USGS Quad
- COUNTY
- Load Date
- Map Search - Interactive MAP retrieval.

I typically use Radial Search… input Lat and Lon of the site and then search for control is the area you specify. Lat and Lon can be scaled from a Quad, I have been using Google Earth lately.

The Public Resources Code requires us to use Hz Order 1 or better
(see http://www.leginfo.ca.gov/calaw.html select "public resources code" search CCS83 and it will bring you to the current law. See Section 8813.)

The below example is from a project in San Jacinto

Change Input Format	Explain Input Format	Sample	Clear
DEG MIN SEC	Explain DEG MIN SEC	Sample DEG MIN SEC	Clear

Center Latitude = N334735 **Example = N384417**

Center Longitude = W1165815 **Example = W0982215**

Radius = 10 **Max = 30.0 Miles**

Data Type Desired:

- Horizontal Order-B or Better
- Horizontal Order-1 or Better
- Horizontal Order-2 or Better

Stability Desired:

- Any Stability
- Stability A only
- Stability B or better

☐ Output in East Longitude.

☐ Include suspect heights in subsidence areas

☐ Browse Mode

Submit Reset

Press Submit…

Re-Sort-By ◉ Dist ○ Pid ○ H ○ V ○ Vert_Source ○ Lat_approx ○ Lon_approx ○ Stab ○ Designation

4.5	DX5236	1	.	29/SCALED..	N335104	W1165604	....	POTRERO
4.7	DX5267	B	.	88/GPS OBS.	N334412	W1170100	C...	AHMT RYAN
6.1	DX3711	1	.	29/VERT ANG	N334923	W1170414	....	NELSON
6.3	DX3713	1	.	29/SCALED..	N335045	W1170336	....	PICO WEST BASE
6.9	DG9740	A	.	.....	N335333	W1165706	....	POTREROCRKCS2004 CORS ARP
6.9	DG9741	A	.	.....	N335333	W1165706	....	POTREROCRKCS2004 CORS L1 PHASE CENTER
6.9	DG9742	A	.	.....	N335333	W1165706	....	POTREROCRKCS2004 GRP
7.7	DX5190	1	.	29/VERT ANG	N334117	W1165535	....	POLLY
7.8	DX5257	1	.	29/SCALED..	N335244	W1165254	....	OAK
8.1	DX3706	1	.	29/VERT ANG	N335328	W1170250	....	EDEN
8.1	DX5260	1	.	29/VERT ANG	N335429	W1165948	....	DAVID
8.4	AH7473	A	.	88/GPS OBS.	N334022	W1165928	A...	ESRE DIAMOND VAL LAKE E DAM GRM
8.9	DX3714	1	.	29/SCALED..	N334706	W1170730	....	NUEVO
9.1	DX5216	1	.	29/SCALED..	N335040	W1164931	....	RANGER
9.5	AH7474	A	.	88/GPS OBS.	N334054	W1170401	A...	ESRW DIAMOND VAL LAKE W DAM GRM
9.9	DX5203	1	.	29/SCALED..	N335301	W1165011	....	BARTON

Select All

Get Datasheets (for the stations I've selected above)

In this case I downloaded all the Data Sheets and saved them in the project folder.

Here is the problem:
DX5267 EPOCH DATE - 1992.88
AH7473 EPOCH DATE - 2000.35

In this example we will convert DX5267 to Epoch 2000.35

```
DX5267                          *CURRENT SURVEY CONTROL
DX5267  ______________________________________________________________________
DX5267* NAD 83(1992)-  33 44 11.55580(N)     117 01 00.27748(W)      ADJUSTED
DX5267* NAVD 88      -       461.4    (meters)     1514.      (feet)  GPS OBS
DX5267  ______________________________________________________________________
DX5267  EPOCH DATE   -        1992.88
DX5267  X            - -2,412,026.889 (meters)                       COMP
DX5267  Y            - -4,730,451.331 (meters)                       COMP
DX5267  Z            -  3,522,420.750 (meters)                       COMP
DX5267  LAPLACE CORR-           1.69  (seconds)                      DEFLEC99
DX5267  ELLIP HEIGHT-         429.12  (meters)          (08/11/98)   GPS OBS
DX5267  GEOID HEIGHT-         -32.36  (meters)                       GEOID03
```

2. We are in luck, NGS provides a simple tool for just this purpose. I this case I had several monuments on Epoch 2000.35 so I converted the others to that Epoch.

Go to: http://www.ngs.noaa.gov/cgi-bin/HTDP/htdp.prl?f1=4&f2=1

Horizontal Time Dependent Positioning

TRANSFORMING POSITIONS BETWEEN REFERENCE FRAMES

Specify the reference frame for the input values:

- NAD_83(CORS96) North American tectonic plate fixed
- NAD 83(PACP00) Pacific tectonic plate fixed
- NAD 83(MARP00) Mariana tectonic plate fixed
- WGS_72
- WGS_84(original) (NAD_83(CORS96) will be used)

Specify the reference frame for the output values:

- NAD_83(CORS96) North American tectonic plate fixed
- NAD 83(PACP00) Pacific tectonic plate fixed
- NAD 83(MARP00) Mariana tectonic plate fixed
- WGS_72
- WGS_84(original) (NAD_83(CORS96) will be used)

Dates must be expressed as a numerical month (between 1 and 12), a numerical day of the month, and a four character numerical year. The month, day, and year may be separated by spaces or by commas.
Valid examples are:
`5,4,1998` for May 4, 1998
`5 4 1998` for May 4, 1998
The htdp models are not valid for dates before 1907 (the San Francisco earthquake).

Specify the epoch date of the input position:

Specify the epoch date of the output position:

Remember we are converting from one time period in the NAD_83(COORS96) North American Plate to anther time period in the NAD_83(COORS96) North American Plate.

Now, we need to convert the Epoch year from decimal format to the format shown above… so:

for 1992.88 multiply 365 x .88 to get the 321st day of the year
for 2002.35 multiply 365 x .35 to get the 128th day of the year

to make it easy use this chart: http://www.vpcalendar.net/Julian_Date.html

VPC - Day of Year Calendar

Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Day
1	001	032	060	091	121	152	182	213	244	274	305	335	**1**
2	002	033	061	092	122	153	183	214	245	275	306	336	**2**
3	003	034	062	093	123	154	184	215	246	276	307	337	**3**
4	004	035	063	094	124	155	185	216	247	277	308	338	**4**
5	005	036	064	095	125	156	186	217	248	278	309	339	**5**
6	006	037	065	096	126	157	187	218	249	279	310	340	**6**
7	007	038	066	097	127	158	188	219	250	280	311	341	**7**
8	008	039	067	098	128	159	189	220	251	281	312	342	**8**
9	009	040	068	099	129	160	190	221	252	282	313	343	**9**
10	010	041	069	100	130	161	191	222	253	283	314	344	**10**
11	011	042	070	101	131	162	192	223	254	284	315	345	**11**
12	012	043	071	102	132	163	193	224	255	285	316	346	**12**
13	013	044	072	103	133	164	194	225	256	286	317	347	**13**
14	014	045	073	104	134	165	195	226	257	287	318	348	**14**
15	015	046	074	105	135	166	196	227	258	288	319	349	**15**
16	016	047	075	106	136	167	197	228	259	289	320	350	**16**
17	017	048	076	107	137	168	198	229	260	290	321	351	**17**
18	018	049	077	108	138	169	199	230	261	291	322	352	**18**
19	019	050	078	109	139	170	200	231	262	292	323	353	**19**
20	020	051	079	110	140	171	201	232	263	293	324	354	**20**
21	021	052	080	111	141	172	202	233	264	294	325	355	**21**
22	022	053	081	112	142	173	203	234	265	295	326	356	**22**
23	023	054	082	113	143	174	204	235	266	296	327	357	**23**
24	024	055	083	114	144	175	205	236	267	297	328	358	**24**
25	025	056	084	115	145	176	206	237	268	298	329	359	**25**
26	026	057	085	116	146	177	207	238	269	299	330	360	**26**
27	027	058	086	117	147	178	208	239	270	300	331	361	**27**
28	028	059	087	118	148	179	209	240	271	301	332	362	**28**
29	029		088	119	149	180	210	241	272	302	333	363	**29**
30	030		089	120	150	181	211	242	273	303	334	364	**30**
31	031		090		151		212	243		304		365	**31**
Day	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**DAY**

1992.88 = the 321st day of the year = Nov 17, 1992
2002.35 = the 128th day of the year = May 8, 2002

Specify the epoch date of the input position: 11,17,1992

Specify the epoch date of the output position: 5,8,2002

Input the site's position either in terms of latitude, longitude, and ellipsoidal height or in terms of geocentric Cartesian coordinates -X,Y,Z- but not both. For latitude (positive north) and longitude (positive west), use the form degrees, minutes, and seconds and use either commas or spaces to separate the individual values. The field for seconds must include a decimal point. To denote negative values, use negative degrees, minutes, and seconds.
Valid examples for latitude are:
`37,34,35.67`
`37 34 35.67`
`-37 -34 -35.67` denotes a point in the southern hemisphere.
Values for ellipsoidal height or for X, Y, and Z must be specified in meters and must be entered with a decimal point (but without commas).

Select the type of coordinates to be entered:
◉ Latitude, Longitude, Height ○ X, Y, Z

Latitude or X: 33,44,11.55580
Longitude or Y: 117,01,00.27748
Height or Z: 429.12
Station Name (optional): DX5267

Select how the required velocity (relative to the input frame) is to be entered:
◉ Use the velocity predicted by this program (ignore the input boxes below)

The following gets returned:

```
HTDP (version 2.7) OUTPUT

TRANSFORMING POSITIONS FROM NAD_83(CORS96)    (EPOCH = 11-17-1992)
                         TO NAD_83(CORS96)    (EPOCH = 05-08-2000)

             INPUT COORDINATES    OUTPUT COORDINATES     INPUT VELOCITY

 DX5267
  LATITUDE     33 44 11.55580 N     33 44 11.56271 N     24.88 mm/yr  north
  LONGITUDE   117 01  0.27748 W    117 01  0.28319 W    -21.26 mm/yr  east
  ELLIP. HT.            461.400            461.407 m      0.00 mm/yr  up
  X                -2412039.083       -2412039.163 m    -12.66 mm/yr
  Y                -4730475.246       -4730475.079 m     21.97 mm/yr
  Z                 3522438.678        3522438.859 m     20.69 mm/yr
```

3. now we need to convert from Lat Lon to State Plane Coords so go to

http://www.ngs.noaa.gov/cgi-bin/spc_getpc.prl

This utility uses NGS program SPCS83 or program GPPCGP
to convert NAD83 or NAD27 Geodetic Positions
to State Plane Coordinates (SPC)

(•) NAD83 (SPCS83)
( ) NAD27 (GPPCGP)

LATITUDE = N334411.56271 **example = N385930.99999**
LONGITUDE = W1170100.28319 **example = W0985930.99999**

ZONE = 0406 **Leave ZONE blank if you want the program to determine it.**

Submit Reset

(note: if you leave ZONE blank, it may pick the wrong zone if you are in an overlap area. Zone 6 is entered as 0406)

And the following gets returned:

```
=========================================================
           Latitude           Longitude      Datum Zone
 INPUT =   N334411.56271      W1170100.28319 NAD83 0406
 =========================================================

  NORTH(Y)     EAST(X)      AREA  CONVERGENCE    SCALE
  METERS       METERS             DD MM SS.ss
  ------------ ------------ ----  ------------   ----------
  674367.734 1928948.614  CA 6  -0 25 16.82   0.99997875
```

Now, we need to convert meters to Survey Feet… Survey feet are Not international feet.
The correct conversion is 39.37/12 inches = 1 meter
Set up a spread sheet to do the heavy lifting… I use Excel, use the tool of your choice

I prefer to do a cut and paste of the data as I go …

Be neat and clean, copy your data, and you should end up with something like this:

```
EV4009  DESIGNATION -  MEEKS
EV4009  PID         -  EV4009
EV4009  STATE/COUNTY-  CA/SAN BERNARDINO
EV4009  USGS QUAD   -  BIGHORN CANYON (1994)
EV4009
EV4009                          *CURRENT SURVEY CONTROL
EV4009 ______________________________________________________________________
EV4009* NAD 83(1992)-  34 15 28.42425(N)     116 37 02.68652(W)      ADJUSTED
EV4009* NAVD 88      -       1914.0     (meters)     6280.      (feet)  VERTCON
EV4009 ______________________________________________________________________
EV4009 EPOCH DATE -    1991.35


*****************************************
 HTDP (version 2.7) OUTPUT

 TRANSFORMING POSITIONS FROM NAD_83(CORS96)    (EPOCH = 05-08-1991)
                          TO NAD_83(CORS96)    (EPOCH = 01-01-2002)

              INPUT COORDINATES    OUTPUT COORDINATES     INPUT VELOCITY

 EV4009
  LATITUDE      34 15 28.42425 N     34 15 28.45418 N     17.45 mm/yr  north
  LONGITUDE   116 37  2.68652 W    116 37  2.67859 W     -4.05 mm/yr  east
  ELLIP. HT          1914.000           1914.070 m       0.00 mm/yr  UP
  X               -2365060.628       -2365060.239 m      0.78 mm/yr
  Y               -4719334.003       -4719333.681 m     10.60 mm/yr
  Z                3571204.186        3571204.987 m     14.43 mm/yr

=================================================
           Latitude            Longitude       Datum Zone
 INPUT =   N341528.45418       W1163702.67859 NAD83 0406
 =================================================

  NORTH(Y)     EAST(X)      AREA  CONVERGENCE    SCALE
  METERS       METERS             DD MM SS.ss
  ---------- ---------- ----  ----------    ----------
  731997.859 1966156.991  CA 6   -0 12  6.84   1.00008404

2401562.98   6450633.39 sFt


L:\05\5160\PROD\NGS Data\EV4009 DESIGNATION.doc
```