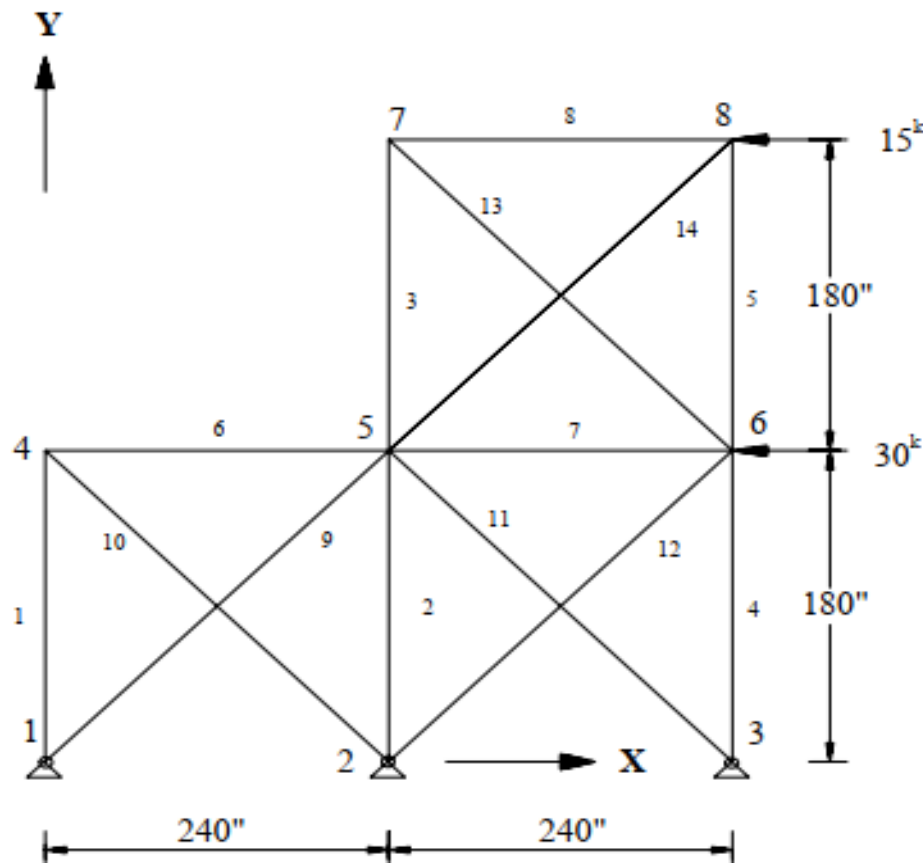




Example Problem No. 4

This example is a typical case of a load-dependent structure where the structural condition changes for different load cases. In this example, different bracing members are made inactive for different load cases. This is done to prevent these members from carrying any compressive forces.





Actual input is shown in bold lettering followed by explanation.

STAAD PLANE

*** A PLANE FRAME STRUCTURE WITH TENSION BRACING**

Every input has to start with the word **STAAD**. The word **PLANE** signifies that the structure is a plane frame structure and the geometry is defined through X and Y axes.

UNIT INCH KIP

Specifies the unit to be used.

SET NL 3

This structure has to be analysed for 3 primary load cases. Consequently, the modeling of our problem requires us to define 3 sets of data, with each set containing a load case and an associated analysis command. Also, the members which get switched off in the analysis for any load case have to be restored for the analysis for the subsequent load case. To accommodate these requirements, it is necessary to have 2 commands, one called "SET NL" and the other called "CHANGE". The SET NL command is used above to indicate the total number of primary load cases that the file contains. The CHANGE command will come in later (after the PERFORM ANALYSIS command).

JOINT COORDINATES

```
1 0 0 0 3 480. 0 0  
4 0 180. 0 6 480. 180. 0  
7 240. 360. 0 ; 8 480. 360. 0
```

Joint number followed by X, Y and Z coordinates are provided above. Since this is a plane structure, the Z coordinates are given as all zeros. Semicolon signs (;) are used as line separators, to facilitate specification of multiple sets of data on one line.

MEMBER INCIDENCE

```
1 1 4 2 ; 3 5 7 ; 4 3 6 ; 5 6 8 ; 6 4 5 7  
8 7 8 ; 9 1 5 ; 10 2 4 ; 11 3 5 ; 12 2 6  
13 6 7 ; 14 5 8
```



Defines the members by the joints they are connected to.

**MEMBER TRUSS
9 TO 14**

The above command defines that members 9 through 14 are of type truss. This means these members can only carry axial tension/compression and no moments.

**MEMBER PROP AMERICAN
1 TO 5 TABLE ST W12X26
6 7 8 TA ST W18X35
9 TO 14 TA LD L50505**

Properties for all members are assigned from the American (AISC) steel table. The word ST stands for standard single section. The word LD stands for long leg back-to-back double angle. Since the spacing between the two angles of the double angle is not provided, it is assumed to be 0.0.

**CONSTANTS
E 29000. ALL
POISSON STEEL ALL**

The CONSTANT command initiates input for material constants like E (modulus of elasticity), Poisson's ratio, etc. Built-in default value of steel is used for the latter.

**SUPPORT
1 2 3 PINNED**

PINNED supports are specified at Joints 1, 2 and 3. The word PINNED signifies that no moments will be carried by these supports.

INACTIVE MEMBERS 9 TO 14

The above command makes the listed members inactive. The stiffness contribution of these members will not be considered in the analysis till they are made active again.