CANADA
Department of Northern Affairs and National Resources
FORESTRY BRANCH

A LIGHT PORTABLE TOWER
to Facilitate Measurement of Vertical Gradients in Tree Studies

by
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Forest Research Division
Technical Note No. 62
1957

Published under the authority of
The Minister of Northern Affairs and National Resources
Ottawa, 1957

A Light Portable Tower To Facilitate Measurement Of Vertical Gradients In Tree Studies

Project P-385

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Research on the terminal parts of forest trees and on their response to microenvironmental factors is limited by their physical inaccessibility. Wooden towers are often used to support instruments for measuring the microclimate at different levels within a forest stand (Geiger, 1950). Disadvantages of this type of tower include the weight of constructional materials and lack of mobility after erection.

In spruce, female flowers usually occur in the upper part of the tree. Thus, in a study of the physiological factors influencing flowering in spruce at the Petawawa Forest Experiment Station, it is necessary to follow periodic internal and external changes in the leader and adjacent branches of mature trees, as well as to record the seasonal march of environmental factors at the height where flowering occurs. To aid in this investigation, a portable sectional tower was designed by the author and constructed by a local metal-working firm.

Each section of the tower consists of two five-foot-square frames of two-inch magnesium alloy tubing, one with built-in ladder (Fig. 1) weighing 20 lbs., and the other without ladder weighing 17½ lbs. Two seven-foot cross braces weighing 13½ lbs. each (Fig. 2) join the two frames to complete one section of the tower which thus weighs 64½ lbs. altogether, with no individual piece weighing more than 20 lbs. Projecting corners of each frame fit into adjacent sections. Wing nuts facilitate erection. The tower may be extended to a height of 60 feet and is braced by four guy wires at the 20-foot level. It is designed to carry three men with additional weight of winter ice and snow. The basal section has adjustable foot-pads (Fig. 3) for levelling purposes. A full area platform which consists of three units, 18 inches wide with hooked ends (Fig. 4), can be established on the top of each five-foot section. The tower can be dismantled and erected at another location in a few hours.

The tower is shown in use (Fig. 5) on a 35-foot black spruce (*Picea mariana* (Mill.) BSP). A shaded hygrothermograph may be seen near the top of the tower at leader height. Near the base of the tower a three-pen thermograph records temperature in the tree trunk at the four-foot level and in the soil at the 2- and 12-inch depths. The data thus obtained are being used for the investigation of physiological factors influencing flowering in spruce (Fraser, 1957). The ecological aspect of this study is comparable to that of Platt (1956) who is using two 50-foot towers located at ecological extremes of a dense woodland and of an open field.

The light weight of the component parts, ease of construction, and portability has made this magnesium-alloy tower useful for various purposes. In addition to the research on spruce, the tower has facilitated high-angle shots for forestry films made on this station. It would also be useful for studies of nesting behaviour of birds, assessment of value of locations for permanent fire towers, and for other forestry studies requiring observations at elevated positions in tree crowns.

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Geiger, Rudolph. 1950. The climate near the ground. Harvard Univ. Press. Cambridge, Mass., 482 pp.

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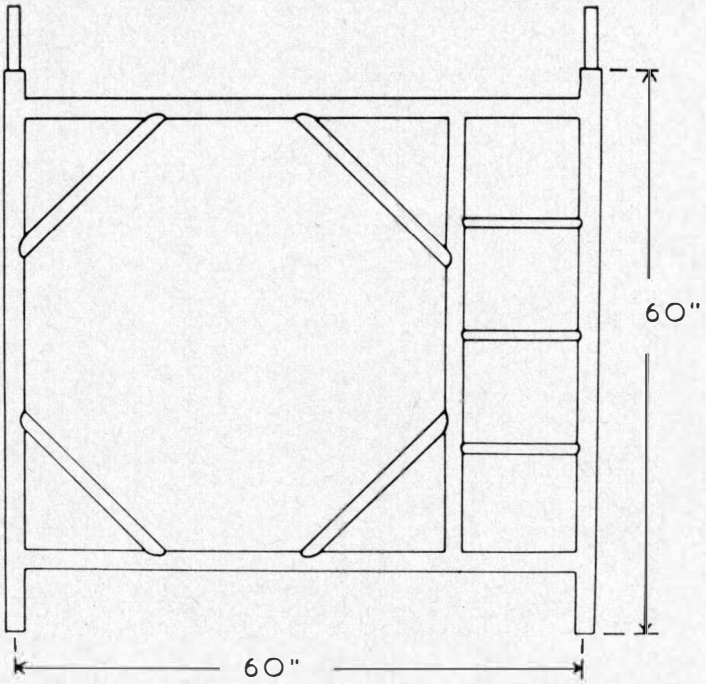

Figure 1. Typical end panel of one tower section with built-in ladder. Weight 20 lbs. Opposite end without ladder.

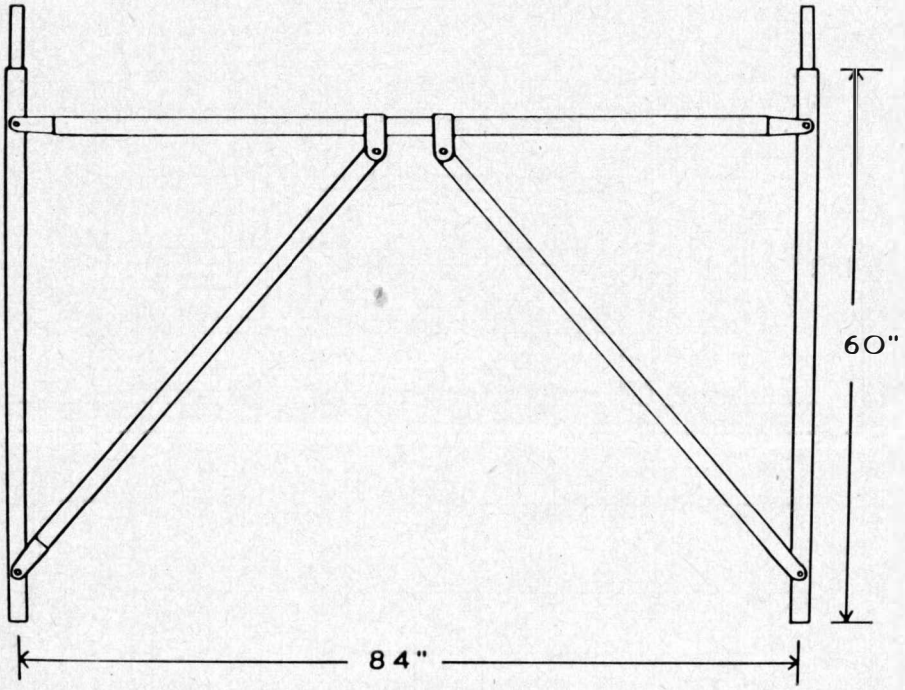

Figure 2. Typical side frame which joins end panels to form one section of the tower. Weight 13½ lbs.

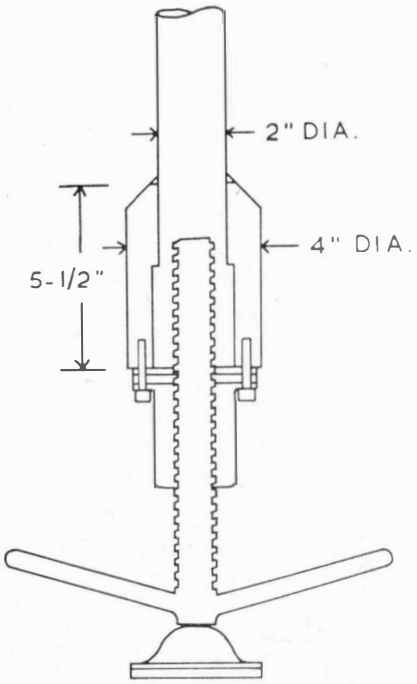

Figure 3. Adjustable leg which forms part of the bottom set of end panels in the tower.

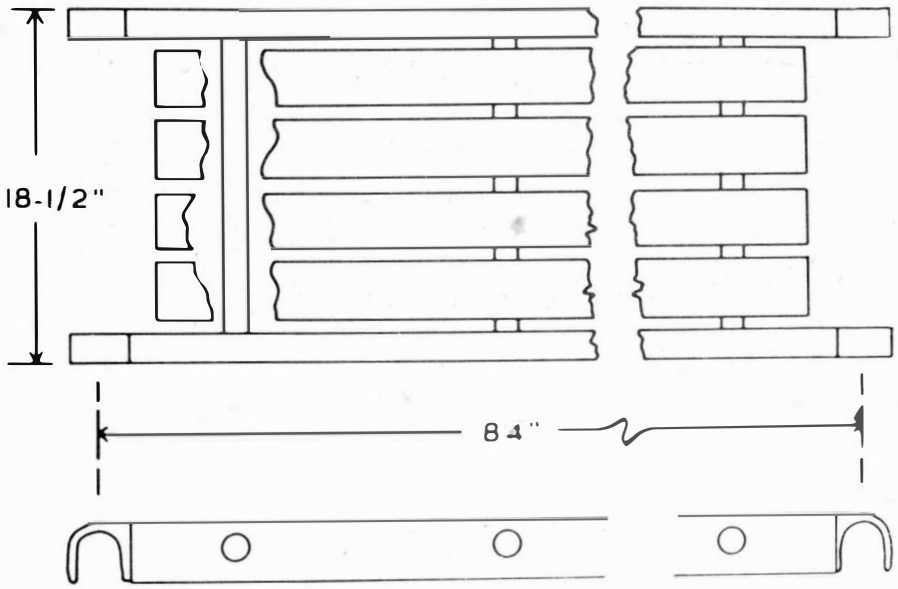

Figure 4. Removable staging unit which may be used to form part of a platform at each five-foot level on the tower.

Figure 5. Portable sectional tower with built-in ladder erected around a 35-foot black spruce. A shaded hygrothermograph is attached to it at leader height, and a three-pen thermograph is enclosed in the box near the base.

EDMOND CLOUTIER, C.M.G., O.A., D.S.P.
QUEEN'S PRINTER AND CONTROLLER OF STATIONERY
OTTAWA, 1957.