

Shohei Tanaka's Japanese "Just Intonation" Reed Organs:

Realization of "Broad Just Intonation"

SHINOHARA Moriyoshi

In 1932, Japanese physicist, Shohei Tanaka (1862-1945) invented a Japanese just intonation reed organ (hereafter J-JIRO) which improved upon his German JIRO (i.e. Enharmonium) designs. In his main work, *The Foundations of Japanese Harmony* (1940), Tanaka classified JI into "JI", "authentic-JI", and "broad-JI". It is unclear, however, which of these he had in mind for his J-JIRO design.

From this work, I have inferred that the Enharmonium does not produce enough harmonic sevenths because of its "authentic-JI" design. And thus, Tanaka designed a J-JIRO which does produce enough harmonic sevenths. Primarily by examining this inference, I will clarify which JI type he had in mind for his J-JIRO design.

First, I outlined how 53-JI and its close approximation, 53 equal temperament, form the basis for Tanaka's tuning theory. Then I showed that the J-JIRO is not tuned to JI, but to 1/8 schisma temperament, which goes against conventional thinking. Next, I analyzed 31 tones, from 21 Japanese "JI" reed organ keys. This analysis confirmed that the J-"JI"RO produces 5 more "harmonic sevenths" than the Enharmonium. These 5 are an approximation of the harmonic seventh's (7:4) substitute interval (225:128). Lastly, my research strongly suggests that he had "authentic-JI" (5-limit JI) in mind for the Enharmonium—to which, I theorized in an earlier paper, 53-ET was applied—and "broad-JI" (7-limit JI) for the J-"JI"RO.

Tanaka had a type of JI in mind for the J-"JI"RO, which was different from the Enharmonium JI. A significant reason for this difference could be that he, through his study of traditional Japanese music, along with musicologist Hisao Tanabe and others, cultivated an ear for intervals which do not fit into the framework of Western harmonic theory. The concrete verification of this is a subject for future research.