HAKOKAIDAN or KAIDAN-DANSU: THE TRADITIONAL JAPANESE STEP-CHEST

Name:

Japanese:	階段箪笥・箱階段・箱梯子
	Kaidan-dansu; hakokaidan; (hakohashigo; hakodan)
German:	Treppenschrank; Schranktreppen; Stiegenkasten;
English:	step-chest; staircase-chest; stair cabinet; box-staircase;
French:	meuble escalier; armoire escalier; escalier emboîté;
Dutch:	trapkast; trapmeubel;
Italian:	scala ad armadio; comoda scala;

Japanese historic periodisation		
Ancient - Kodai	Kofun	300-552
	Asuka	552-710
	Nara	710-794
Medieval - Chusei	Heian	794-1185
	Kamakura	1185-1333
	Muromachi	1338-1568
Feudal - Edo	Azuchi-Momoyama	1568-1600
	Tokugawa/Edo	1600-1868
Modern - Gendai	Meiji	1868-1912
	Taisho	1912-1926
	Showa	1926-1989
	Heisei	1989-

Unit	Kanji	Relative value	Metric value
mō	毛, 毫	1/1000 sun	0.0303 mm
rin	厘	1/100 sun	0.3030 mm
bu	分	1/10 sun	3.030 mm
sun	寸	10 bu, 1/10 shaku	3.030 cm
shaku	尺	10 sun	30.30 cm
ken	間	6 shaku	1.818 m
jō	丈	10 shaku	3.030 m
chō	町	60 ken	109 m
ri	里	36 chō	3.927 km

Location:	Kyoto, Japan (but not exclusively)
	Traditional town-houses or 'machiya'
Client:	Merchants and craftsmen/artisans ('chonin' classes)
Time-period:	From early Edo to late Taisho period
Design:	Evolved from common stair-ladder to storage furniture or 'tansu'
Construction:	Local artisans: joiners / carpenters / cabinet makers
Materials:	Cypress, cedar or cryptomeria, zelkova, pine, chestnut, Japanese oak
Measurements:	Following traditional 'ken'-system of practical construction module.

1. Machiya

The Japanese step-chest (kaidan-dansu or hakokaidan) is inextricably linked with the traditional 'machiya' in Kyoto. In contrast to the 'minka', which are farmhouses, fishermen's houses and mountain dwellings, the 'machiya' is a merchants' and craftsmen's town-house, specifically in Kyoto, also often called 'kyo-machiya'. Kyoto 'machiya' are traditional townhouses with distinctive Kyoto-style latticework doors and slatted upstairs windows (fig. 1+2). Machiya are already depicted on 17th century screens and they were still built during the Taisho period and beyond until about 1936.

These wooden houses, where merchants and artisans both lived and worked, provided a space in front for a store, in the middle for family quarters with small garden, and in the rear for workshops and warehouses. Many of them can still be seen in the Gion district and they came to be regarded as one of the typical traditional structures which characterise the ancient city of Kyoto.

Kyoto, Japan's capital of traditional culture, is one of the few Japanese cities that was spared from the bombings of World War II, yet every year scores of 'machiya' are destroyed, victims of neglect and urban redevelopment, thus rapidly erasing the traditional urban fabric. Luckily civic groups in Kyoto are working hard to save the buildings that remain and to preserve this superb example of Kyoto vernacular architecture.

Typically the 'machiya' has a narrow front of about 5.5 to 6.4 m (3 to 3.5 'ken') and a depth of around 20 m (11 'ken'). As homes were taxed according to the size of the street frontage, this design originated from economic necessity (fig. 16). However, as merchants became richer, they built larger 'machiya' and it is not unusual to find a frontage of 6 and 7 'ken' (12.7 m).

The meaning of the modern concept of the 'module' has an exceptional antecedent in Japan, where for hundreds of years the ordinary houses have been built on the basis of a modular order which is unique.

Indeed, the Japanese 'ken' module is an extraordinary phenomenon in architecture. As a vernacular system, this indigenous method contains a highly refined and advanced system of order for the construction trade. The 'ken' (181.8 cm or 1.82 m) represents the standardised distance between two columns (inter-post span) of the wooden structure of the house and is equal to 6 'shaku' (6 x 30.3 cm).

The area around Kyoto is considered the centre of the planning method based on the tatami size (0.5 'ken' x 1 'ken'). Not only the tatami mat, but also the dimensions of the sliding doors, the partitions and the staircase may be based on the standard size of the 'ken' or 1.82 m (see fig. 16). The primary reasons for this development were the 'ken' measure's intimacy with daily life, its close relationship to human measurements and its practicality in use (ref. Engel 1985). Interesting to note here is that Le Corbusier's Modulor, which was also intended to be a practical aid for architects based on 'a harmonious measure to the human scale', had a standard measurement of 1.83 m.

Fig. 1+2 *Machiya in the Gion district of Kyoto (photos http://www.japansociety.org and http://www.kyotomachiya.com)*

2. Tansu

Tansu is the collective term for the antique cabinetry of Japan. This cabinetry first appeared in the early Edo period (1615-1780), and continued through the late Edo (1780-1867) and Meiji era (1868-1912). The Edo period was the merchant's era and 'tansu' chests evolved from the portable coffers, trunks, and shelves of the merchant and warrior. The evolution of designs with multiple doors and drawers arose in response to changing needs during a period of economic expansion and rising standards of living.

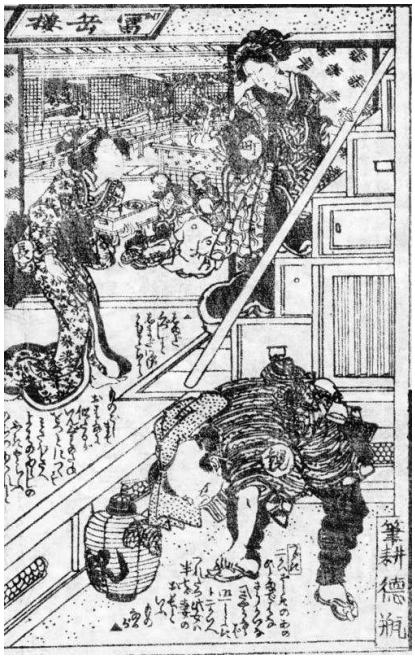

Fig. 3 + 4 + 5 *Step-tansu depicted in wood cuts of the 18th-19th century (photos http://shibui-kotto.blogspot.com)*

The 'tansu' cabinetry exists generally within three categories: (i) storage, (ii) administration, and (iii) personal use. Their convenience stimulated the creation of numerous types of chests for use in the front shop area, with multiple drawers for specific functions. Many different designs for different purposes were created and one of the more imaginative is certainly the 'kaidan-dansu', the staircase-chest.

3. Kaidan dansu or hakokaidan,

Initially, the impact of the merchants on the evolution of 'tansu' was an urban phenomenon limited primarily to Edo, Kyoto, and Osaka. During the Edo period these cities were the first major places where commerce flourished and two-story housing occurred. Old prints show evidence of step-chests in the Kyoto-Osaka vicinity even before 1700 (see articles by David Jackson).

The definition which is mostly accepted refers to the staircase-chest as a 'tansu' constructed as a freestanding staircase with storage drawers and compartments built into the steps. The staircase was conceived as a series of steps, whereby the space beneath the treads was utilised to provide storage in the form of cupboards or drawers and mostly a combination of both. They are sometimes also referred to as 'hakodan' or 'hakodan-dansu' or 'hakohashigo', although the exact meaning of each of these expressions can differ slightly. This combined staircase and storage chest, common in 'machiya' from the early Edo period onward, are occasionally found in 'minka' and sometimes in temples.

Whereas most of the early 'tansu' were made of paulownia wood for lightness, since they were carried on the backs of salesmen if necessary, 'kaidan-dansu' were intended to be (mostly) stationary, their foremost purpose being an efficient utilisation of available physical space. A majority of Edo 'kaidan-dansu' for shops indicate a preference by the cabinetmaker for framework and steps of pine, drawer and door face members of zelkova, and vertical panelling and drawer interiors of cryptomeria or cypress. The most commonly used woods were cryptomeria (cedar), cypress and pine. Exceptional and quite valuable are staircase chests made entirely of a hardwood such as zelkova, oak or chestnut (see articles by Ms Clarke). As of the Meji period the 'kaidan dansu' design became more elaborate and under Western influence developed into one of the features to show off ones wealth and status (ref. articles by Prof. Kudo).

Fig. 6 + 7 *Striking examples of kaidan-dansu in Sugi wood or Cryptomeria Japonica (photos from Shibui website: http://www.shibuihome.com)*

The construction method can be either with a wooden frame assembled with mortise and tenon joints and painted with 'urushi' lacquer, or the staircase can be built-up of thick wooden boards of cedar wood or even Japanese oak. Today, kaidan-dansu are still made but often their original double purpose (staircase + storage) has been lost and they end up as large artefacts exhibited for their beauty or uniqueness (fig. 37).

The metalwork is mostly simple with hand-wrought iron or copper fixtures for the drawers and small indented finger grips for the sliding doors (fig. 27; 28; 29; 38; 39). The degree of artistry on the metalwork is mostly modest, although in later chests, intricately carved designs can sometimes be seen. As a combination of architecture and furniture, 'kaidan-dansu' aren't usually made of the most valuable materials but today they often command high prices, both because of their distinctiveness and relative rarity.

Originally a steep stair-ladder was used in most buildings in Japan as can still be seen in traditional rural houses (fig. 8+9) and even in the most prestigious buildings e.g. the Himeji castle (see Mr. Jackson's articles). The second floor in the 'machiya', which was originally used to lodge the servants or employees, was reached with a narrow staircase/ladder or a removable ladder that could be hidden in a closet.

Fig. 8 Stair-ladder (photo Karel Bos 01/11)

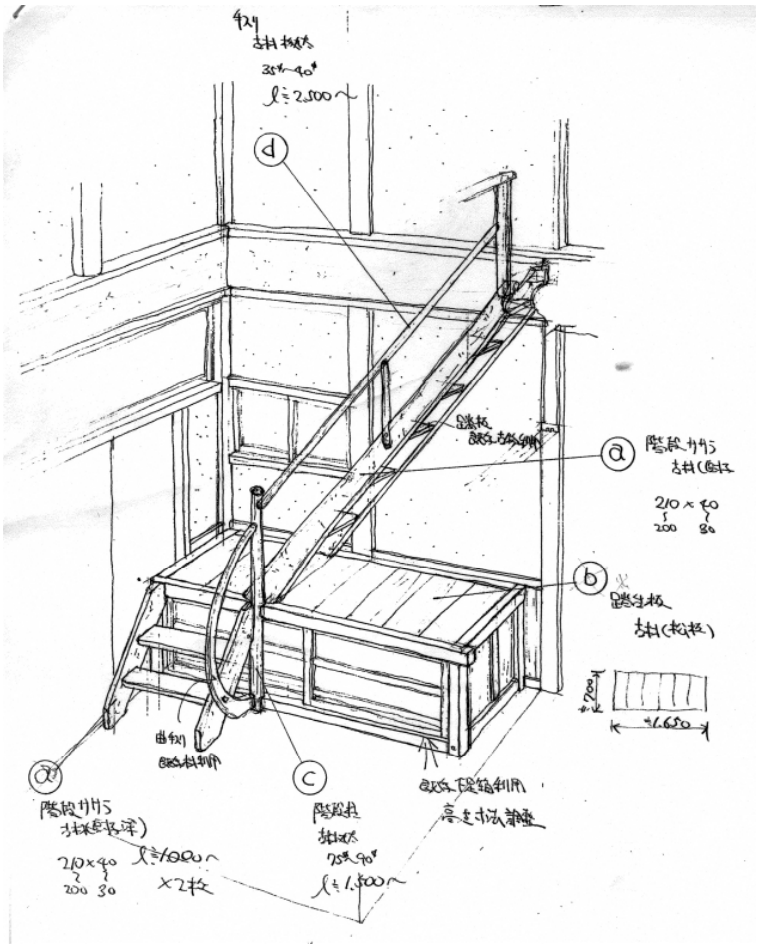

Fig. 9 Survey by architect Ryoichi Kinochita of Kyoto

Later, staircases evolved into 'hakokaidan' or 'kaidan-dansu', i.e. boxes with storage space placed on top of one another to form the staircase. Even if this very decorative staircase was used, it was always placed in a secondary room and mostly behind sliding doors (fig. 31) and separated from the main living space. In most cases the staircase was in the kitchen area towards the middle of the building so that it could easily be accessed from the shop and also from the private rooms.

Staircases were considered unimportant, even irrelevant and had no architectural or cultural significance (as noted by Mr. Jackson). Because the original kaidan-dansu were rather functional than decorative, the staircase was rarely displayed as an architectural feature until well in the Meji period. During that period, some 'machiya' had 2 staircases whereby one was used as the service-stair and in that case, the other staircase received more prominence and would be visible from the main living area or shop (fig. 40).

Another typical feature of a free-standing kaidan-dansu is that the storage drawers and cupboards would rarely be doubled-up and be accessible from both sides of the staircase. Even when the steps are more than 60 cm wide and there is a room and/or corridor on both sides, the storage spaces will only be available on one side. However, as it was the case in many other types of 'tansu', the extra depth was often used to incorporate a secret compartment behind the obvious storage spaces. This compartment, used for important papers, money or jewellery, would then be accessed by opening a number of other drawers and sliding doors in a certain sequence known to the owner.

The stairs adjacent to the shop-front would only consist of drawers (fig. 7), while the stairs in the private quarters would have bigger cupboards with sliding doors as well (fig. 6). At a later stage, doors with hinges would also be used for the cupboards. Later stairs (19th and 20th century) could even have steps with a protruding 'nose' (fig. 10) and an intricate handrail (examples in award-winning articles by Professor Kudo).

Fig. 10 Steps with nose (photo: http://www.kurofuneantiques.com)

Fig. 11 Square steps (photo http://www.shibuihome.com)

Due to space restrictions, in a number of 'machiya' the staircase cannot be approached from the front of the steps but only from the side. In that case the bottom step will be deeper in order to facilitate access (fig. 15). Alternatively an extra step will be added on the side of the staircase (fig. 13). In exceptional cases, during the Meiji and Taisho period, the steps would turn towards the side of the staircase (as mentioned by Professor Kudo).

Fig. 12 + 13 Arrangement of the steps when approach from the front of the chest is required (photos http://www.kyotomachiya.com)

Fig. 14 Turning staircase (photos David Jackson) (http://www.tansuconservation.com)

Fig 15. Larger bottom step (photo: www.fuchu.or.jp/~kagu/tansu/kaidan.htm)

Measurements:

As the staircase had to fit in the 'machiya', which was conceived on the basis of the 'ken' modular system, it is normal that the joiner, carpenter or cabinet maker would also use the same integrated system as much as possible. Adaptations to the unique setting of each house were of course necessary and therefore a strict modular system could not always be followed when fitting the staircase into the available space, hence the use of the traditional measuring system (ken / shaku) is sometimes not really apparent in the kaidan-dansu. The plan dimension of the staircase however will almost never exceed the size of 1 tatami mat i.e. 0.5 x 1 'ken' (91 x 182 cm), but in some cases can be as small as 1/2 the size of a tatami mat! (fig. 35). This measurement is approximate as standard tatami sizes can vary slightly according to region.

The Japanese step-chest can be built-in or free-standing, but at any rate it can hardly be called a comfortable or safe staircase as the rise is always steeper than 45^{o}. As it is customary in Japan, the staircase is steep with high risers (from 20 to 30 cm) and has narrow goings (from 10 to 20 cm). The steps are typically between 2 and 3 'shaku' (60 and 90 cm) wide and often they have no handrail. In some cases the handrail is an added element e.g. in the Kojima house in Kyoto (fig. 18) or a rope with large wooden beads serves as safety device e.g. in Kawai Kanjiro's house/museum in Kyoto (fig. 21).

The 'kaidan-dansu' were made in 1, 2 or 3 units (fig. 17). The number of steps varies, but usually, the single-unit chest has 6 or 7 steps. The two-piece chest, usually, has a combined total of 8 or 9 steps. The three-piece chest is rarely found these days, but if encountered, it will be tall (about 220 cm) and narrow, with a combined total of 10 or 11 steps (as mentioned by Ms Clarke). The single-unit chest comes in various heights, ranging from about 122 cm (4 shaku) to 168 cm (5.5 shaku). Two-piece chests are often around 1 'ken' high (1.82 m), while three-piece chests can be 7 'shaku' (2.12 m) or 8 'shaku' (2.42 m). It is customary that the kaidan-dansu does not reach all the way to the first floor. In that case a number (1 to 4) of steps are added above the step-chest and fixed to the wooden structure (e.g. the Kojima house). They do not form part of the kaidan-dansu.

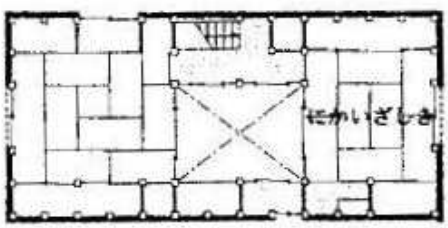

Fig. 16 Plan of machiya 1st floor based on 3 'ken' module (Prof. Kudo)

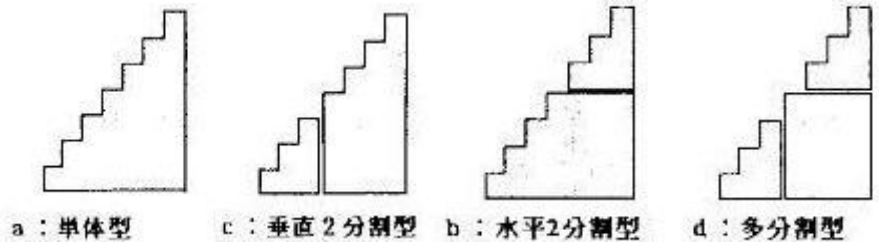

Fig. 17 Kaidan-dansu made in 1, 2 or 3 units (drawing from Professor Kudo)

Fig. 18 *Handrail probably added at a later stage Kojima house, Kyoto (photo Karel Bos)*

Fig. 19 Original handrail (http://www.yumehori.com/)

Fig. 20 *Single step-chest with handrail (photo http://www.zentnercollection.com)*

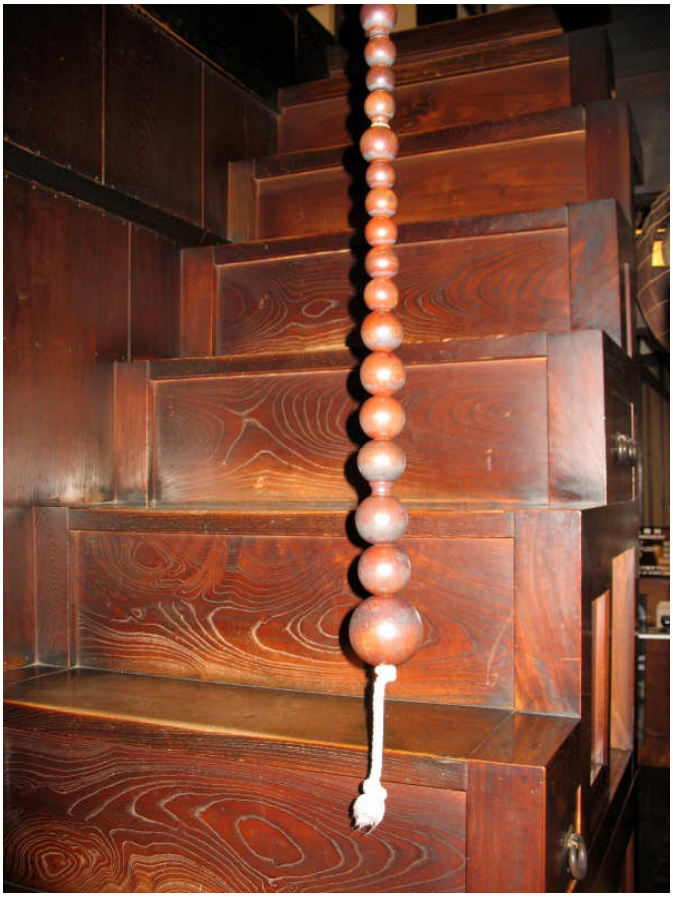

Fig. 21 Kawai Kanjiro's house 'handrail' (photo Kawai Kanjiro's House Folk Art Museum)

Although, in Japan, the staircase in the traditional house was in general an item not really considered worth noticing, it is thanks to its original design and exquisite craftsmanship that kaidan-dansu is one of the exceptional examples of the bond between the crafts of architecture, cabinetry, joinery and carpentry.

Even if today kaidan-dansu are either removed from their original context and considered a collector's item sold for high prices in western antique shops, or produced as characterless imitations in different countries, it is interesting to note that this unique example of Japanese craftsmanship and resourcefulness is still being considered worth owning and appreciating. It is also therefore that some more inspired modern interpretations of the kaidan-dansu must be seen as a tribute to this exceptional example of Japanese creativity and practical solution-finding, originally designed as the perfect integration into the daily life and living space of the merchants and artisans, and this for a period of over 3 centuries!

Fig 22 + 23 + 24 *A few modern interpretations of the kaidan-dansu (photos http://hausideen.haus.de)*

Bibliography:

Clarke, Rosy (1983) Japanese Antique Furniture. Weatherhill, New York. 150 pp.

Clarke, Rosy (1984) A step in time: staircase chests of old Japan. In: Arts of Asia (March-April) pp. 96-103.

Engel, Heino (1985) Measure and construction of the Japanese house. Tuttle Publishing, Tokyo. 149 pp.

Freese, Thomas (1991) Die Kunstwerke des japanischen Schreiners. Traditionelle Holztechniken und ihre Erzeugnisse. Deutsche Verlags-Anstalt, Stuttgart. 112 pp.

Jackson, David (2007) The kaidan dansu, a stairway in historical shadow. Final report, Japan Foundation. 29 pp. (www.tansuconservation.com%2Fkaidan%2Fdjackson_kaidan.pdf)

Jackson, David (2009) The unknown background to Japan's staircase chests. In: Daruma (winter) pp. 12-29.

Koizumi, Kazuko (1986) Traditional Japanese furniture. Kodansha International, Tokyo. 223 pp.

Kudo, Takashi (1991) Characteristics of "Hakokaidan" The staircase chest in a traditional town house. A study on the design of "Hakokaidan" (1). In: Bulletin of Japan Society of Social Design (88) pp. 177-184.

Kudo, Takashi (1992) Form and composition of "Hakokaidan" The staircase chest. A study on the design of "Hakokaidan" (2). In: Bulletin of Japan Society of Social Design (88) pp. 185-192.

Kudo, Takashi (1992) Construction of "Hakokaidan" The staircase chest. A study on the design of "Hakokaidan" (3). In: Bulletin of Japan Society of Social Design (90) pp. 41-48.

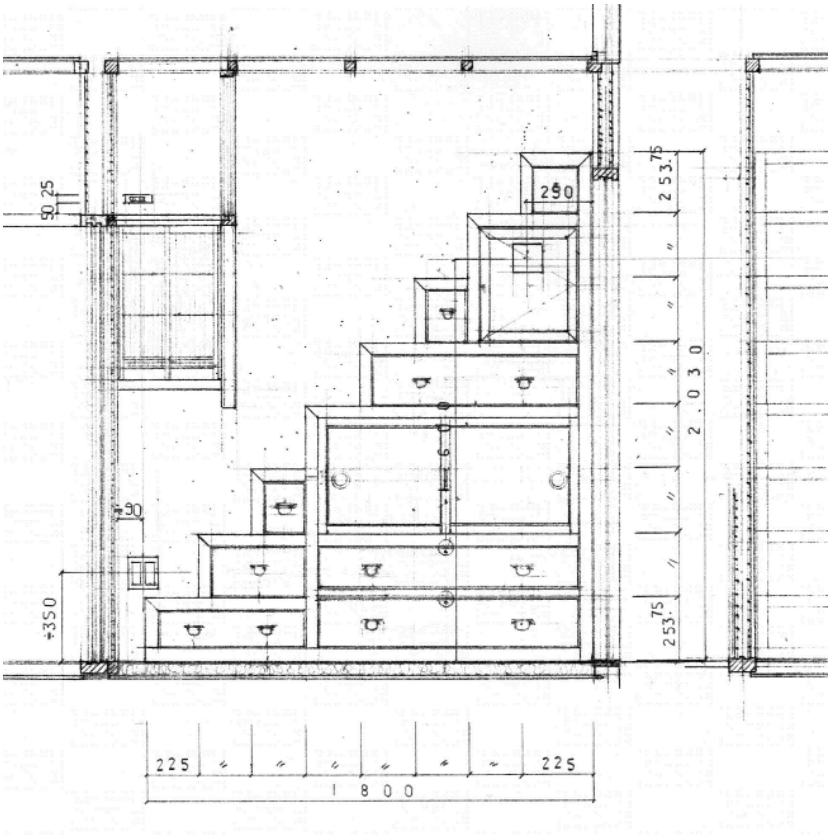

Fig. 25 *Survey of kaidan-dansu for restoration purposes (drawing by architect Ryoichi Kinoshita, Kyoto)*

Fig. 26 *Detail of steps (photo Shibui: http://www.shibuihome.com)*

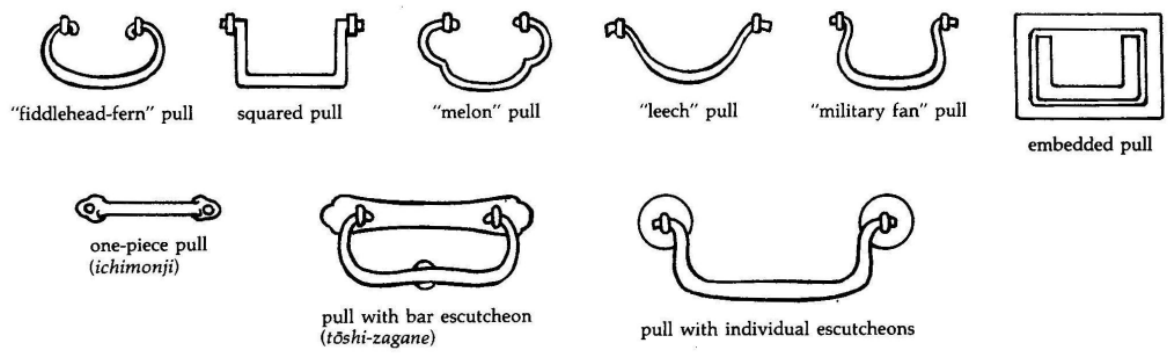

Fig. 27 + 28 + 29 *Typical metalwork of tansu (drawing from Koizumi and photos from Zentner and Shibui) (http://www.zentnercollection.com and http://www.shibuihome.com)*

Fig. 30 Access from the side via a widened step

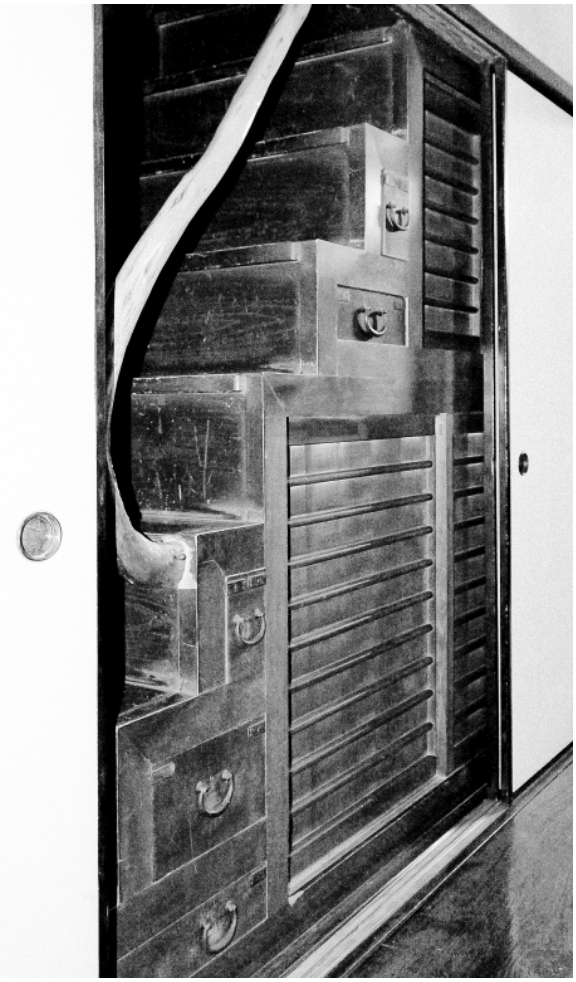

Fig. 31 Kaidan dansu hidden behind screens (photos Karel Bos 01/11)

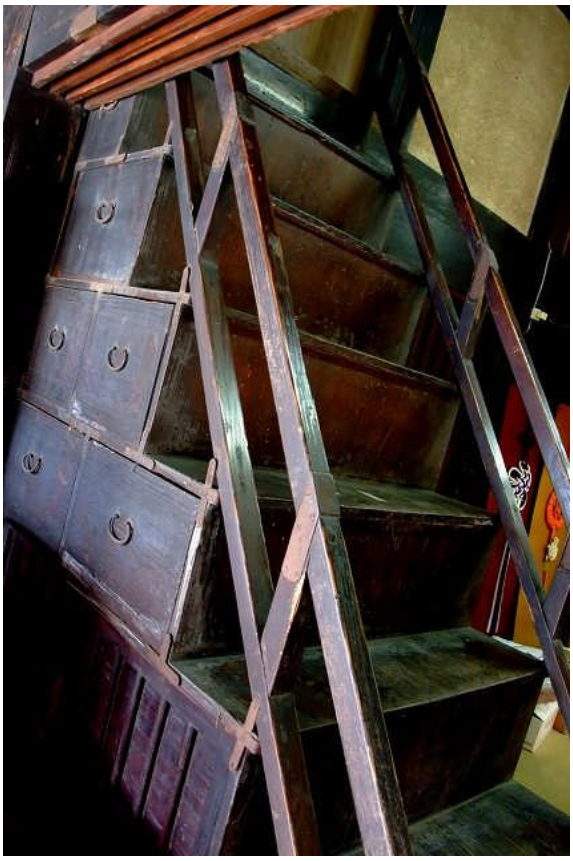

Fig 32 + 33 Elaborate handrails on later kaidan dansu following Western influence under Meiji period (photos http://blogimg.goo.ne.jp and http://blog.so-net.ne.jp).

Fig. 34: Probably assembled from 2 different kaidan dansu: Note the different metalwork and door-grip in lower part. (photo http://www.schelma.com)

Fig. 35: Very steep kaidan dansu: Footprint of 1/2 tatami mat! (photo http://www.kofukuan.net)

Fig. 36 Side access to the stairs; elaborate handrail; of later Meji period (photo Kofukuan).

Fig. 37 Kaidan dansu after restoration; ready for sale. (photo Kofukuan)

Fig. 38 *Detail drawers Kojima house (photo K. Bos)*

Fig. 39 Detail metalwork (photo Shibui: http://www.shibuihome.com)

Fig. 40 *Kaidan-dansu in ceramics shop in Kyoto (photo Karel Bos)*

Fig. 41 Another very steep kaidan-dansu (photo by Jay Weiland - Woodwork)