

MEMORY OF THE WORLD REGISTER

Introduction of the decimal metric system, 1790-1837

Ref No. 2004-36

PART A – ESSENTIAL INFORMATION

1. SUMMARY

Items relating to the introduction of the decimal metric system, 1790-1837.

The decimal metric system, on which today's international measurement system is based, originated in Revolutionary France before spreading across national borders and achieving universal acceptance virtually everywhere and in practically every field.

2. DETAILS OF THE NOMINATOR

2.1 Name (person or organization):

Centre historique des Archives nationales (National Historical Archives Centre – CHAN)

2.2 Relationship to the documentary heritage nominated:

Owner and custodian

2.3 Contact person(s) and contact details (address, phone, fax, email):

Mr Gérard Ermisse,
General Conservator of the Heritage, Director of the CHAN
Tel.: 01 40 27 62 30
gerard.ermisse@culture.gouv.fr

Ms Ariane James-Sarazin,
Conservator for the Department of Cultural and Educational Activities/*Musée de l'histoire de France* (Museum of French History)
60 rue des Francs-Bourgeois
75003 Paris
Tel.: 01 40 27 62 83
Fax: 01 40 27 66 45
ariane.james-sarazin@culture.gouv.fr

3. IDENTITY AND DESCRIPTION OF THE DOCUMENTARY HERITAGE

3.1 Name and identification details of the items being nominated:

Introduction of the decimal metric system:

- (a) *Proposal concerning weights and measures, submitted to the National Assembly by the Bishop of Autun, Paris, 1790, printed, 20 pages, serial no. AD VIII 36D*

- (b) Law concerning the method of establishing standard weights and measures, decree of 26 March 1791, approved by the King on 30 March, printed, 2 pages, serial no. AD VIII 36D
- (c) National Convention decree establishing a standard system of weights and measures, 1 August 1793, printed, 16 pages, serial no. AD VIII 36D
- (d) *General system of Republican measurements derived from the length of the earth's meridian according to the reports and decrees of the Constituent Assembly, Legislative Assembly and National Convention*, 4 Brumaire, year III (25 October 1794), handwritten watercolour plate, comprising five tables, serial no. NN 12/16, 17
- (e) National Convention decree establishing the nomenclature of the new system of weights and measures, 18 Germinal, year III (7 April 1795), handwritten, 8 pages, embossed stamp of the Republic, serial no. A 166/173
- (f) Prototype standard metre with case, made by Lenoir, platinum, 1799, serial no. AE Vin 1
- (g) Prototype standard kilogram with case, made by Fortin, platinum, 1799, serial no. AE VIn 25
- (h) Certificate of registration of the standard metre and kilogram with the National Archives, 4 Messidor, year VII (22 June 1799), handwritten, serial no. AE I 23 p. 1
- (i) Law on weights and measures, 4 July 1837, vellum, handwritten, signed by Louis Philippe, large yellow wax seal, serial no. A 1146

3.2 Description:

Reasons for change:

At the end of the *Ancien Régime*, the vast range of different measurements in France and Europe was chaotic; it was just about tolerable for the peasants who were working the land, but inconvenient for merchants and unacceptable for a man of the Enlightenment such as Talleyrand, Bishop of Autun, who in 1790 denounced “this appalling variety”. In France, there were hundreds of different terms for each type of unit: length, surface, volume, mass. Some were connected to the human body (thumb, finger, handful, armful, foot, pace), work (*hommée, fauchée, journal*) or transport (donkey-load, load, bag, barrel). The situation was made more complex by the fact that the same word always referred to a range of different values. A foot, for example, corresponded to 20 or so different lengths within the kingdom. It is therefore easy to understand why, in 1789, the “cahiers de doléances” (grievance lists) complained of the diversity of measurements and the metrological abuses practised by the lords; there were calls for “one King, one law; one weight and one measure”.

What the Revolution achieved:

The night of 4 August 1789 put an end to certain privileges, including the standard measurement system, and opened the way for a reform of weights and measures. The following year, on 9 March 1790, Talleyrand's proposal (a) to the Constituent Assembly set out some of the reforms that were to come: existing measures were to be abandoned and attempts made to find within the natural world (unrelated to the human body) and in accordance with suggestions from scientists a measurement that was universal, invariable, reproducible and verifiable everywhere and

at all times. The notion of universality was therefore present right from the outset. The Assembly then drafted a decree (b) approved by the King, under which the British Parliament and the Royal Society in London were to be asked to help define the standard metre.

This hope, which was based on a desire to do away with “anything that could arouse suspicion of the influence of a particular interest in France” (Condorcet) and which therefore involved rejecting the idea of a “national foot” or “national pound”, was dashed. The French resigned themselves to ploughing a lone furrow.

In March 1791, it was decided, on the recommendation of Condorcet and the Academy of Sciences, that a quarter of the earth’s meridian should be used as a natural, universal unit. The term “metre” was first used in 1790, but was not officially adopted until the Law of 1 August 1793 (c). Through this text, the National Convention developed the work begun by the Constituent Assembly by introducing the first version of the metric system. Since the economic and military context meant that it was necessary to facilitate the distribution of provisions, the Convention decided not to wait until the conclusion of the triangulation work begun by Delambre and Méchain in 1792. It thought that the “provisional” metre could be determined from the measurement of the same meridian carried out by Lacaille in 1739 and 1740: the metre, one ten-millionth of the distance from the North Pole to the equator, was therefore equal to 3 feet 11 lines and 44 hundredths of a line of the Academy’s gauge.

Since a number of omissions and errors were noted as a result of the speed with which the reforms took place, a more thorough law was published on 18 Germinal, year III (7 April 1795): this was the law (“decree”) (e) on the decimal metric system, which affirmed the need to make a provisional platinum standard metre.

The Republic wished to continue the work begun under the constitutional monarchy, taking the revolutionary step of placing the reform of weights and measures in a context of universal reason, in stark contrast to the previous philosophy. Ideological considerations took precedence over practical and scientific necessity. It was necessary to create a new cultural framework in rationalized time (the calendar was being reformed) and space, where the citizen could live free from the “mistakes of a superstitious, credulous past”. The reform of weights and measures was therefore meant to be both a principle of national unification and one of bringing different nations together in accordance with the messianic ideal of France as the mother of nations and governess of the human race. The metric system formed part of the new values of liberty, equality, unity and justice: “by establishing a standard system of weights and measures, the National Assembly hopes that, in future, citizens will be able to perform for themselves all calculations relevant to their interests. Without this independence, they can enjoy neither truly equal rights, since such equality is dependent on the possibility of exercising those rights, nor genuine freedom, since nobody is free if they are forced to act in accordance with what other people say” (Condorcet). Paradoxically, the introduction of the decimal metric system in 1795 meant that – for a while – it was less likely to become a universal system. It was rejected by the monarchies, particularly the United Kingdom, as well as by the United States.

Producing the standard measures:

It was then necessary to produce the two prototype standards (metre and kilogram) on to which the relevant measurements would be copied for distribution to the *départements*, where they would be used for the manufacture and standardization of common measures. Platinum was preferred to copper or brass because it was stable and less sensitive to cold and heat. Janéty, the only silversmith in Paris and France capable of making large platinum objects, was commissioned to provide a platinum sponge, compressed and planished while hot, from which Fortin created the

standard kilogram (g) and Lenoir the standard metre (f). On 4 Messidor, year VII (22 June 1799), these two prototypes were presented to the Council of the Five Hundred and the Council of Ancients, before being deposited in the Archives of the Republic, in the iron safe where they are still kept today (h).

Towards final adoption:

The new system was gradually adopted throughout the country with the different types of measures adopted one by one across various geographical zones: first in the capital, then the Paris Basin, starting with the towns, and finally in the other provinces. The first copper standard kilograms did not arrive in the *départements* until June 1800. Only through the adoption of the law of 4 July 1837 (i), tabled by the Minister of Commerce, Martin, and supported by Thiers and Guizot, did the decimal metric system become compulsory throughout France from 1 January 1840.

Today, more than a century and a half after it was finally established in France, the metric system has prevailed and spread across the whole world. In the mid-nineteenth century, it slowly began to shed its French character, which was due to its origins. Standard measures were exchanged. The system was authorized in Great Britain in 1864 and in the United States in 1866; it was already compulsory in Belgium, the Netherlands, Italy, northern Germany, Spain, Portugal, Mexico, Colombia, Venezuela, etc. The metre and kilogram kept in the Archives were internationally recognized as the definitive original units, even though they did not correspond exactly to the natural measurements on which they were based. Hence it was said at the World Fair of 1867 that standard measures for other countries should be copied from those kept in the French Archives. The International Metre Commission took responsibility for this process, which culminated in 1875 in the Convention of the Metre and the creation of the International Bureau of Weights and Measures, whose laboratory was based at the Pavillon de Breteuil in the Parc de Saint-Cloud. The first platinum-iridium casting, in 1874, was considered to be insufficiently pure and was taken to England in 1885 to form the International Prototype Metre of 1889, with an X-shaped cross-section.

In 1960, a new definition of the metre, based on the orange-red radiation of Krypton 86, was introduced when the whole metric system, now known as the International System of Units, was extended. In 1983, the latest definition created a link between the metre, as a unit of length, and the second, a unit of time.

4. JUSTIFICATION FOR INCLUSION/ASSESSMENT AGAINST CRITERIA

4.1 Authenticity

The authenticity of all the items is fully established.

4.2 World significance, uniqueness and irreplaceability

The metric system established by the French Revolution has gradually been adopted by the whole international community. From the outset, it was meant to be a means of standardization, codification and hence integration of different nations. Today, this form of codification is used in virtually every field of human activity, following the principle of international ISO standards.

All of these items are unique and irreplaceable. Some of them, such as the platinum standard metre and kilogram, are also priceless in monetary terms.

4.3 Criteria of (a) time, (b) place, (c) people, (d) subject and theme, (e) form and style

(a) Time

The metric system was the result of the scientific and philosophical spirit of the Enlightenment. It is one of the most valuable legacies of the French Revolution and sums up its principles and ideals.

(b) Place

The metric system was not devised from a narrow, national perspective, since it was based on the observation of nature rather than on specific cultural considerations. Its creators believed it would benefit “all peoples for all time” (Condorcet).

(c) People

The metric system is the fruit of the work of scientists of different nationalities, dating back to the mid-seventeenth century, as well as members of the various revolutionary assemblies which laid the foundations of modern France.

(d) Theme

Standardizing measurements as part of a single, universally adopted system helps to improve interpersonal relations and harmony.

(e) Value to society

The metric system has direct social implications in everyday life and for each one of us.

4.4 Issues of rarity, integrity, threat and management

(a) Rarity: unique

(b) Integrity: total

(c) Threat: none of the items is under threat

5. ***LEGAL INFORMATION***

5.1. Owner of the documentary heritage (name and contact details):

Ministry of Culture and Communication
French National Archives
National Historical Archives Centre
60 rue des Francs-Bourgeois
75003 Paris

5.2 Custodian of the documentary heritage (name and contact details, if different to owner):

Ministry of Culture and Communication
French National Archives
National Historical Archives Centre
Museum of French History
60 rue des Francs-Bourgeois
75003 Paris

5.3 Legal status:

- (a) Category of ownership: public/legal entity
- (b) Accessibility: free
- (c) Copyright status: none
- (d) Responsible administration: National Historical Archives Centre: this national centre, which is answerable to the French National Archives of the Ministry of Culture and Communication, was set up to preserve, communicate and promote the French national archives dating from the seventh century AD to the establishment of the Fifth Republic in 1958.
- (e) Other factors: relevant legal provisions: Archives Act no. 79-18 of 3 January 1979 and Circular no. 2004/006 of 2 March 2004 concerning the heritage code

6. *MANAGEMENT PLAN*

6.1 The National Historical Archives Centre has a general preservation plan for all its collections, which include all the documents relating to the reform of the metric system. It has a preservation department, run by a conservator of the heritage, which deals with all issues concerning document preservation and operates a fixed policy in this area, with its own budget and resources (restoration workshop).

7. *CONSULTATION*

7.1 The owner and custodian of the heritage submitted the nomination to the French Memory of the World committee for its assessment.

PART B – SUBSIDIARY INFORMATION

8. *ASSESSMENT OF RISK*

8.1 There are no risks. The National Historical Archives Centre has its own preservation department, restoration workshop and photographic laboratory. Security on the premises is provided 24 hours a day and the burglar and fire alarms conform to the necessary standards.

9. ASSESSMENT OF PRESERVATION

9.1 Physical state: very good

- preservation history: as soon as they entered into force, the items were deposited in the National Archives, set up under the French Revolution to preserve the archives of the assemblies and governments of the day.
- current preservation policy:

Items (f), (g) and (h) have been photographed and digitized; researchers only have access to these reproductions. The National Historical Archives Centre allows the originals to be viewed only under exceptional circumstances. Furthermore, during the nineteenth century, all of these documents were removed from their original series so that they could be stored separately in the strongroom at the National Historical Archives Centre, i.e. in the Museum of French History.

Documents (a), (b), (c), (d), (e) and (i) may be viewed by researchers in the reading room at the National Historical Archives Centre.

- persons responsible for preservation: items (a), (b), (c), (e) and (i): Ms Yvette Lebrigand, Conservator of the Heritage, responsible for the nineteenth century section; item (d): Ms Cécile Souchon, Conservator of the Heritage, responsible for the maps and charts section; items (f), (g) and (h): Ms Ariane James-Sarazin, Conservator of the Heritage, responsible for the Department of Cultural and Educational Activities/Museum of French History.

PART C – LODGEMENT

This nomination is lodged by:

JAMES-SARAZIN, ARIANE
Paris, 9 June 2004